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Managing Water in the West

Sacramento and San Joaquin Basins Study Public Meeting #2

March 11, 2014

U.S. Department of the Interior
Bureau of Reclamation

Meeting Agenda

- Introduction
- Sacramento and San Joaquin Basins Study Overview
- System Risk and Reliability Assessment
  - Phase 1 Results
  - Next Steps
- Study Schedule and Key Milestones

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Meeting Logistics

- Participants will be on “silent” mode
- Participants can ask questions using webinar tool
- Question-and-answer session following presentation
- Reclamation will respond to questions and post responses on Basins Study website

Sacramento and San Joaquin Basins Study Overview

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Basin Studies

- **Purpose**
  - Work with state and local partners in 17 Western States to evaluate future water supply and demand imbalances in a changing climate
- **Basin Studies Include:**
  - Assessments of the risks and impacts of climate change on water resources, and
  - Development of potential mitigation and adaptation strategies to meet future demands
  - Potential subsequent Feasibility-Level Investigations

SSJBS Study Objectives

- **Perform a scenario-based assessment of potential impacts of future climate changes and socioeconomic uncertainties on the Central Valley water resource management including:**
  - **Water Supply & Demands; Water Quality; Hydropower & GHG; Urban & Agricultural Economics; Recreation; Flood Control; Ecological Resources**
- **Collaboratively develop and evaluate portfolios of potential water management actions addressing Central Valley vulnerabilities**
- **Identify trade-offs between potential adaptation strategies and make recommendations for feasibility studies**

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BASINS STUDY AREA

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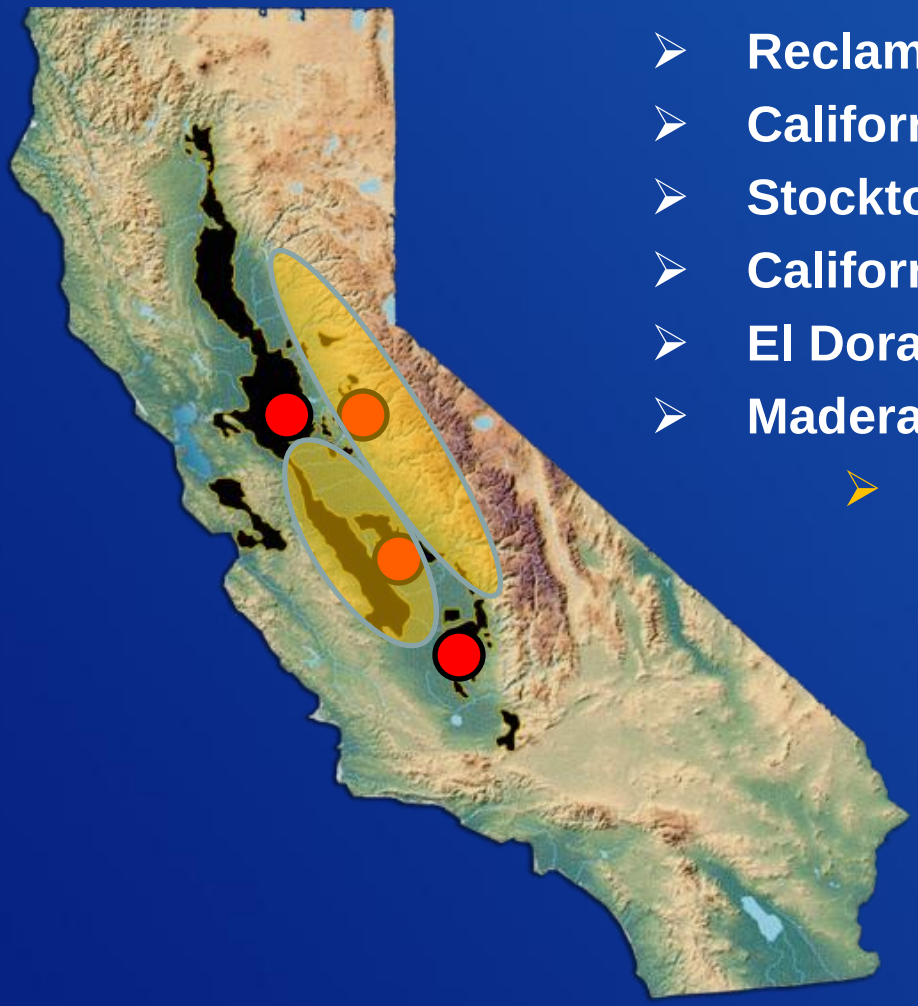
Geographic Coverage of Basin Study Partners



- Cost-Share Partners include:
  - Reclamation
  - California DWR
  - Stockton East Water District
  - California Partnership for San Joaquin Valley
  - El Dorado County Water Agency
  - Madera County Resource Management Agency
    - Proposed Additional Partners
      - Friant Water Authority
      - Mountain Counties Water Resources Association
      - Northern California Water Association
      - State Water Contractors
      - San Luis & Delta-Mendota Water Authority

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Climate Impact Assessment Technical Approach and Results

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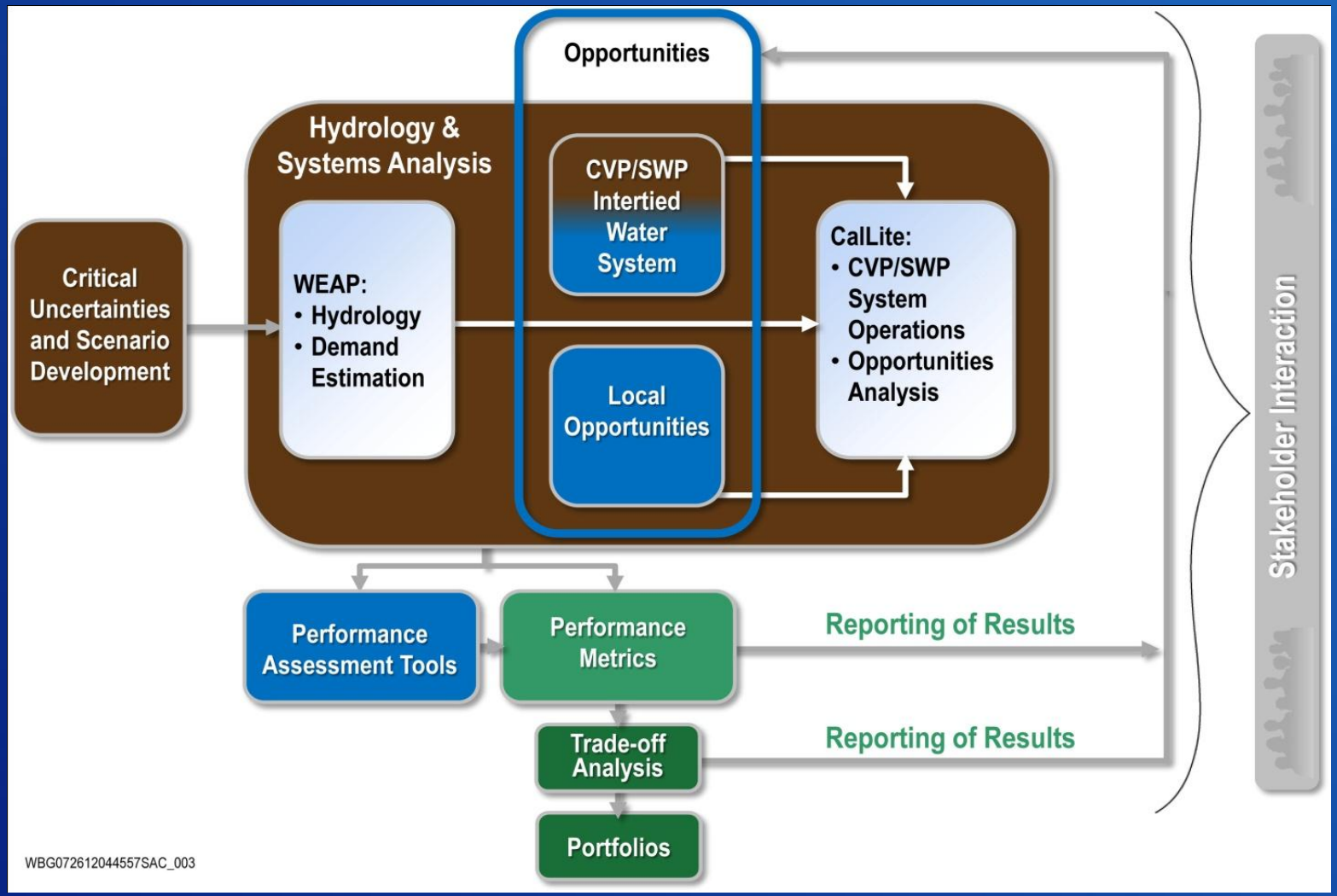
Basins Study Technical Approach



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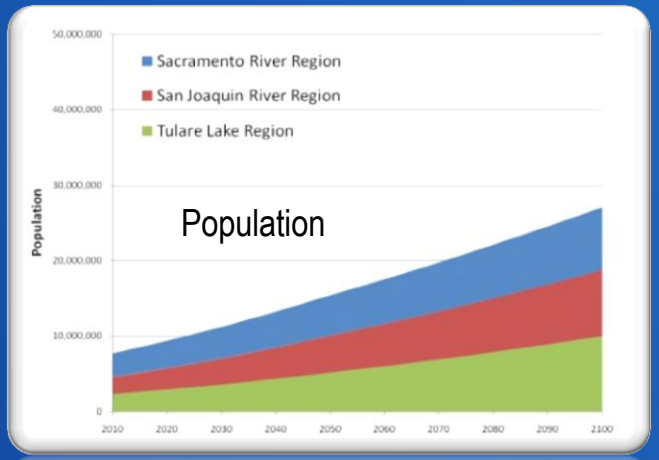
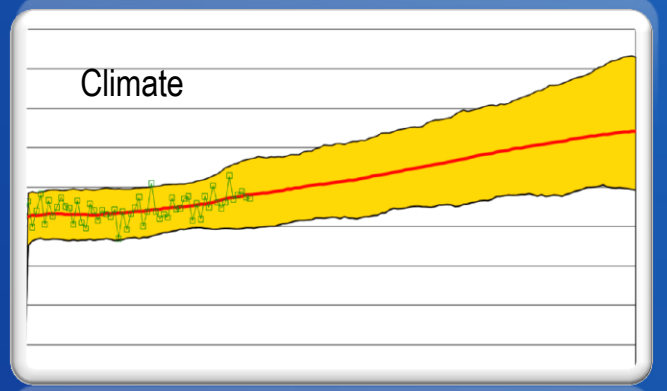
Representation of Climate and Socioeconomic Uncertainty

- **18 scenarios bracket the range of uncertainty:**
  - **One future socioeconomic conditions**
    - **Current Trends**
  - **18 future climate conditions**
    - **1 reflecting historical conditions without climate change**
    - **5 Ensemble-Informed future climate scenarios**
    - **12 Downscaled CAT12 climate projections**





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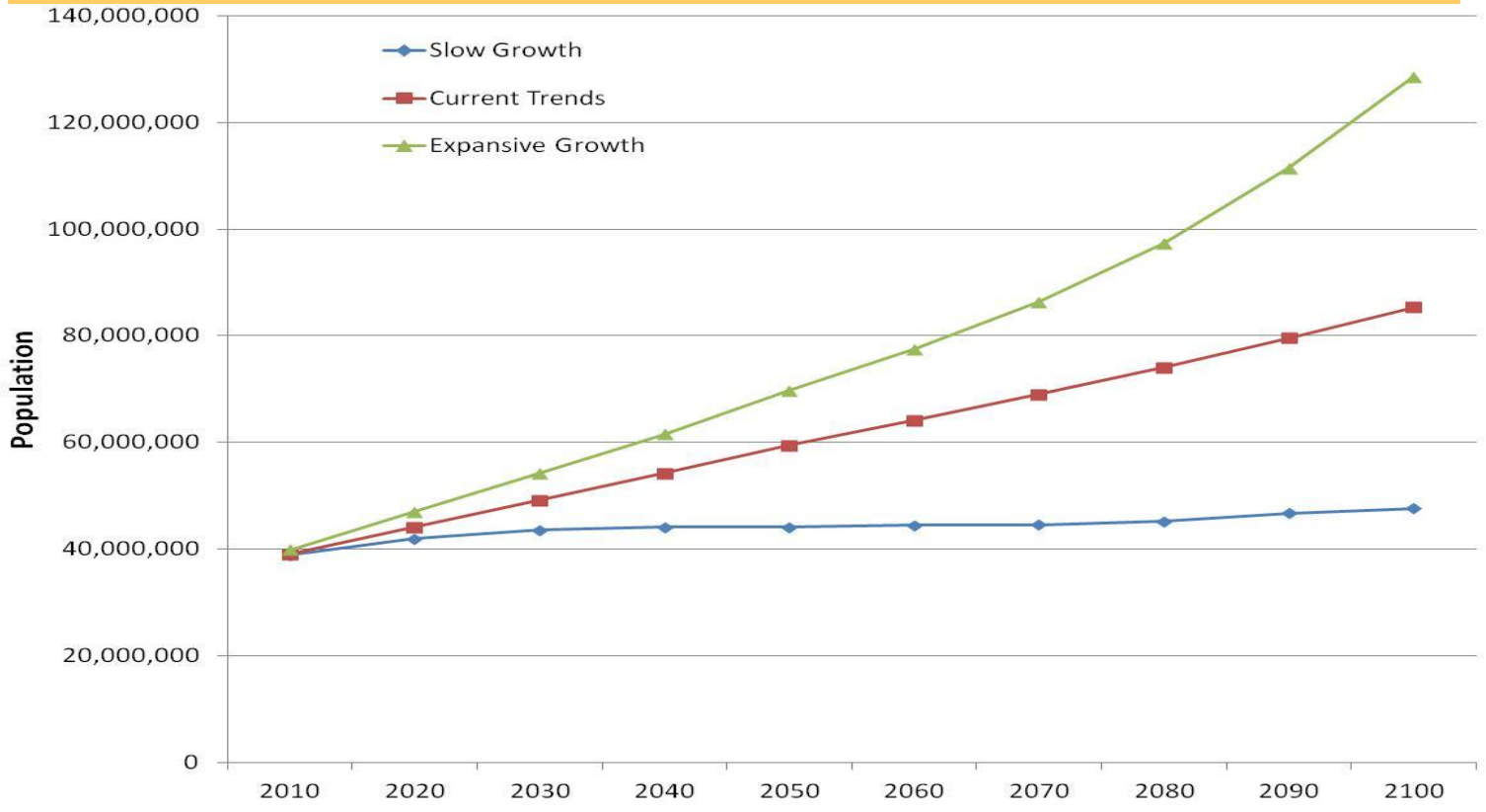
Socioeconomic Scenarios

State of California Population Projections

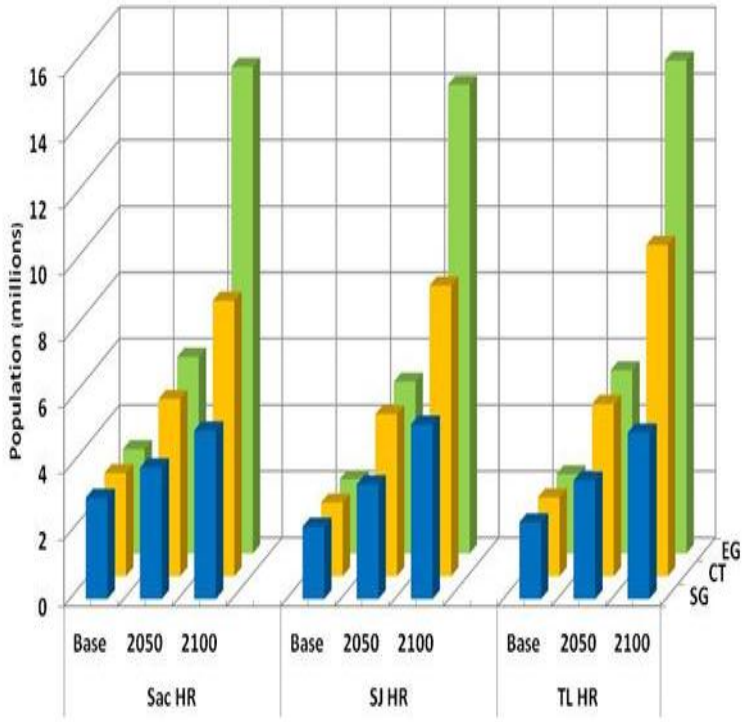
California population projected to increase by 10-90 Million by 2100



Socioeconomic Scenarios

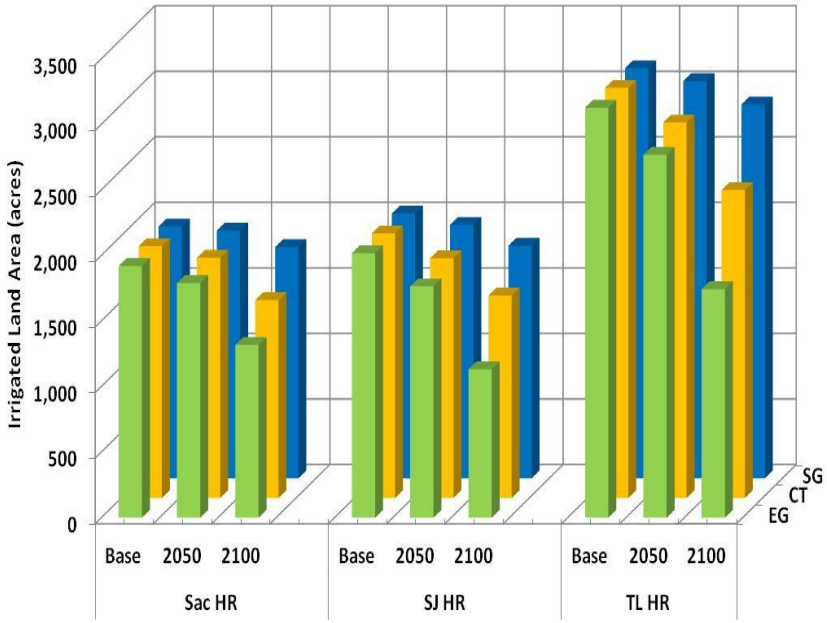
Population

Central Valley population projected to increase by 8 M by 2050 and 19 M by 2100 in Current Trends



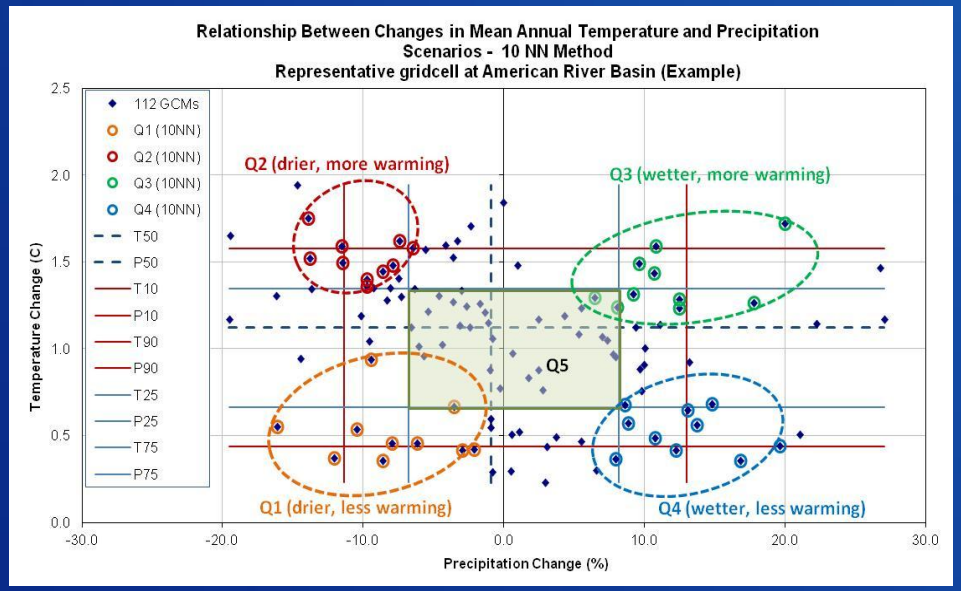
Irrigated Land Area

Irrigated acreage projected to decline by 500,000 acres by 2050 and 1.7 million acres by 2100 due to urban growth in Current Trends

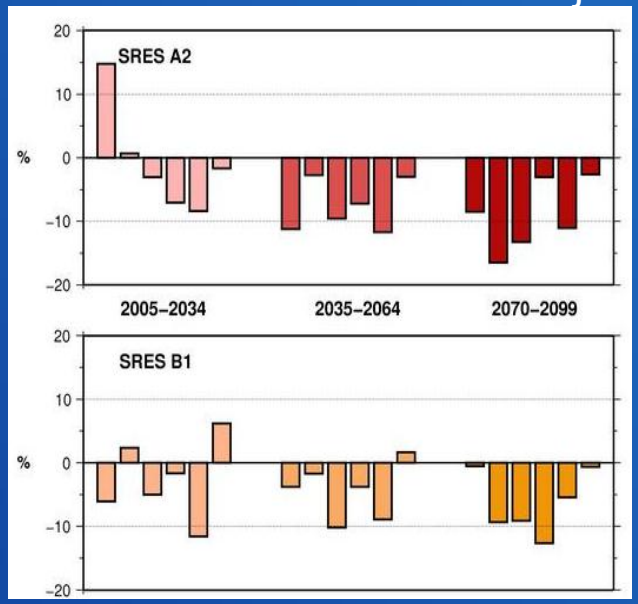


Climate Scenarios – Two Approaches

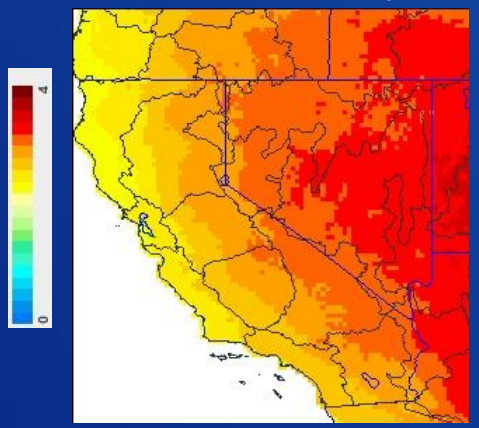
Ensemble-Informed Scenarios



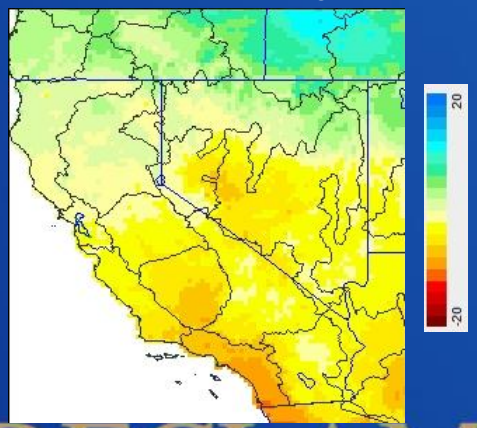
Individual Downscaled Climate Projections



Temperature Change



Precipitation Change



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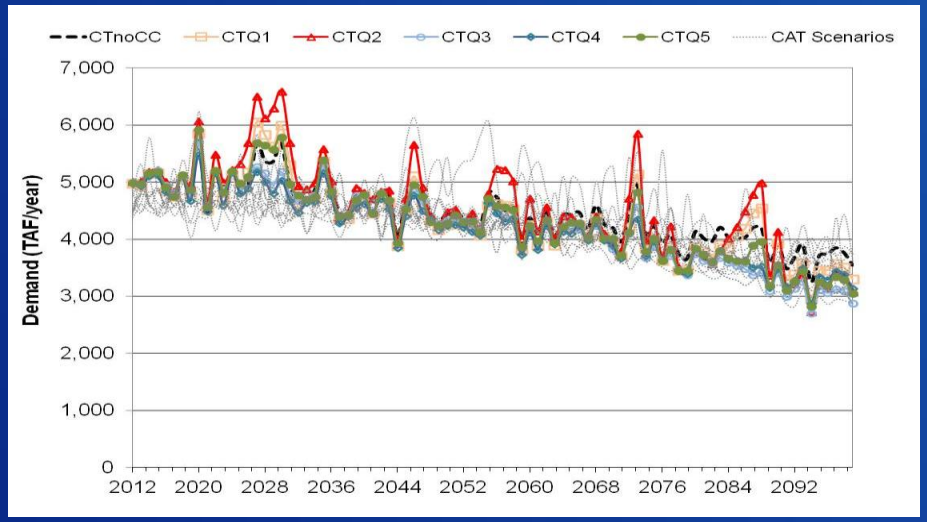
Future Water Supply and Demand Assessments

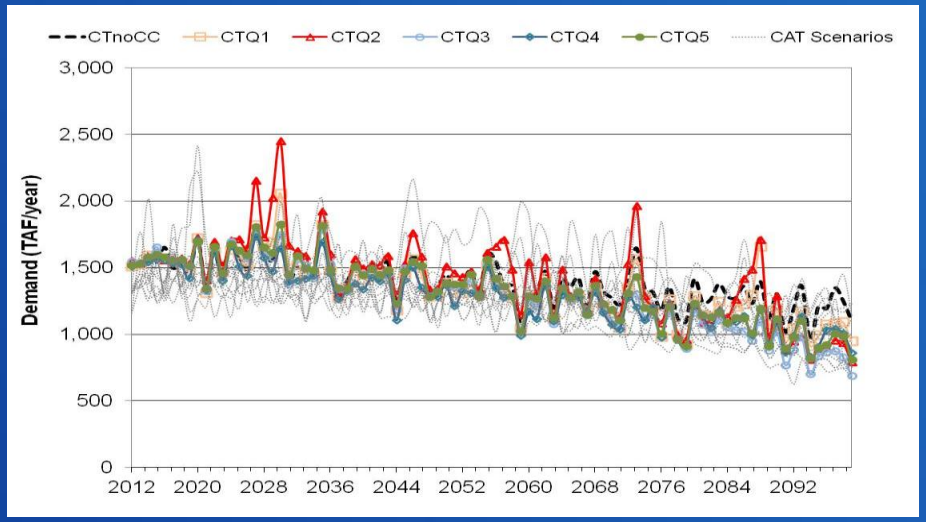
Projected Water Demand: Simulated Agricultural Demand

Decreases due to reduction in irrigated acreage and climate effects

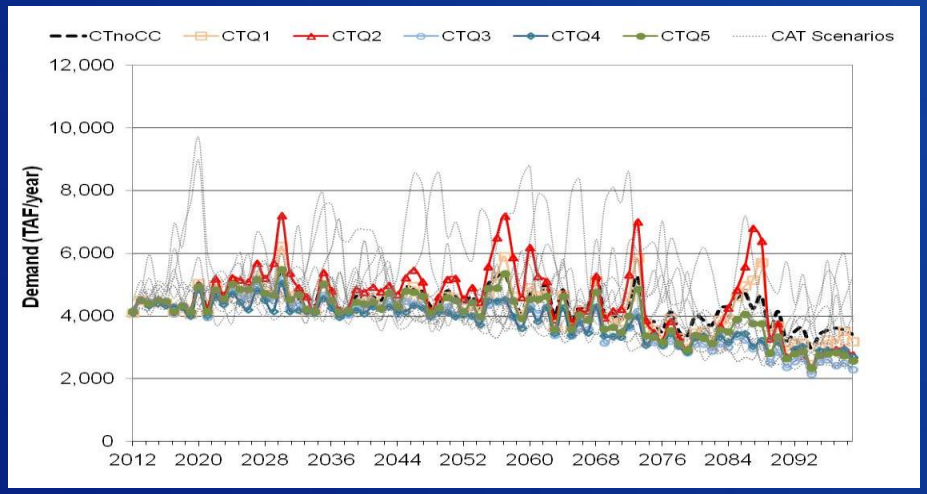
Sacramento-River System



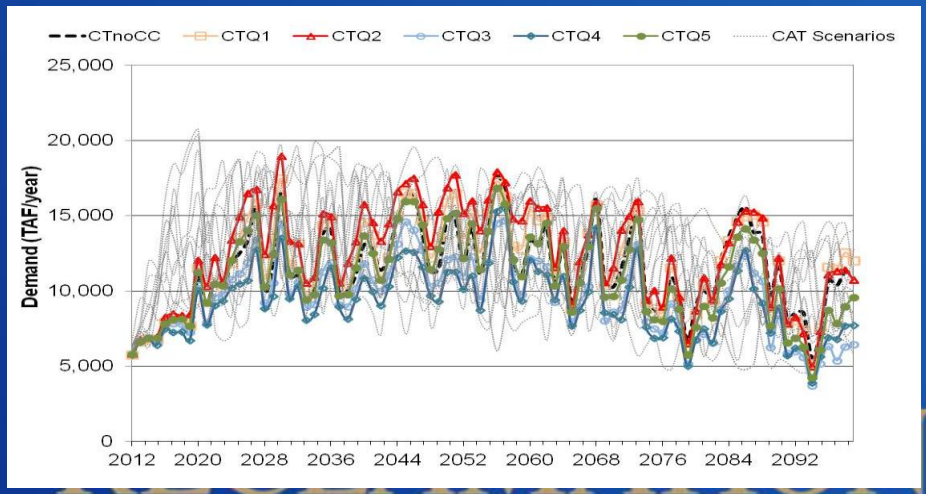
Eastside Streams and Delta



San Joaquin River System



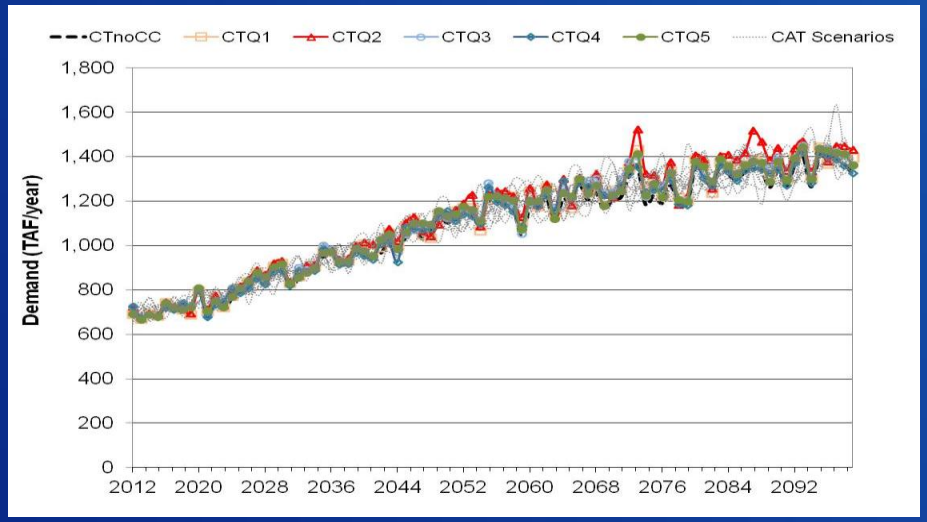
Tulare Lake Region



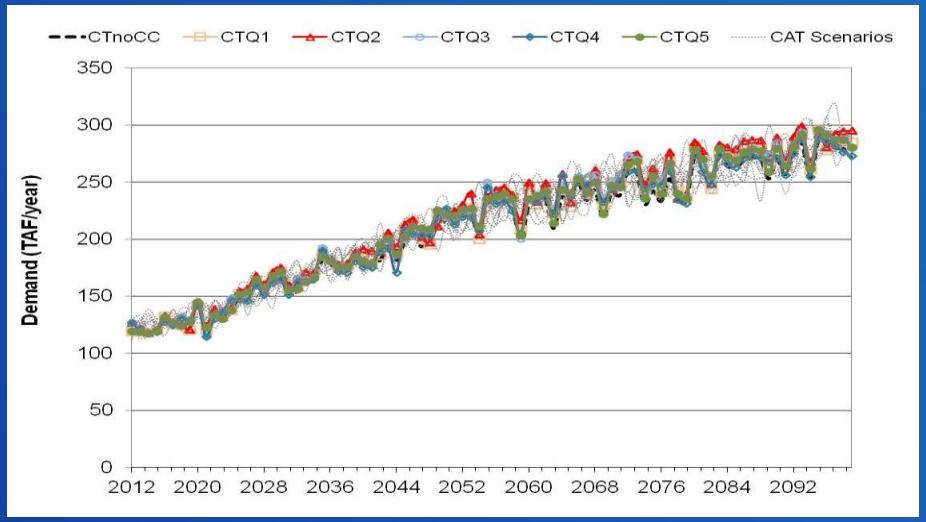
Projected Water Demand: Simulated Urban Demand

Increases due to population growth, even as water use efficiency improves

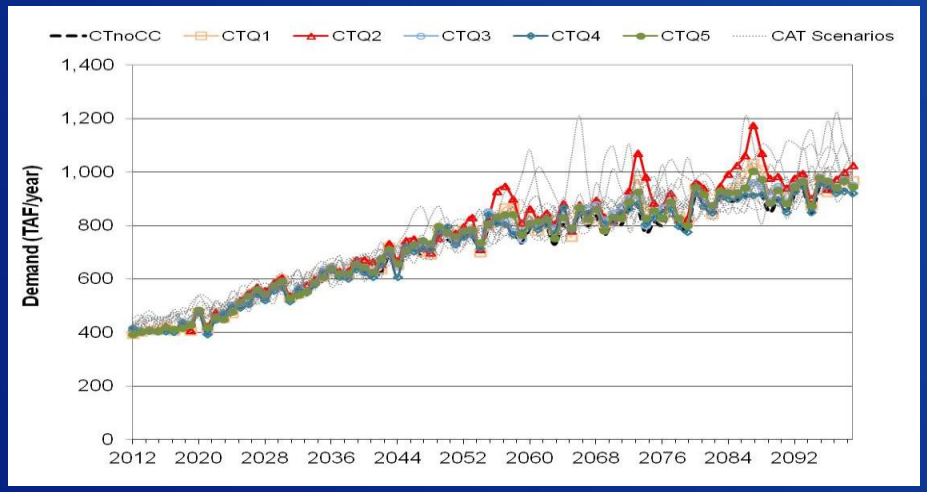
Sacramento-River System



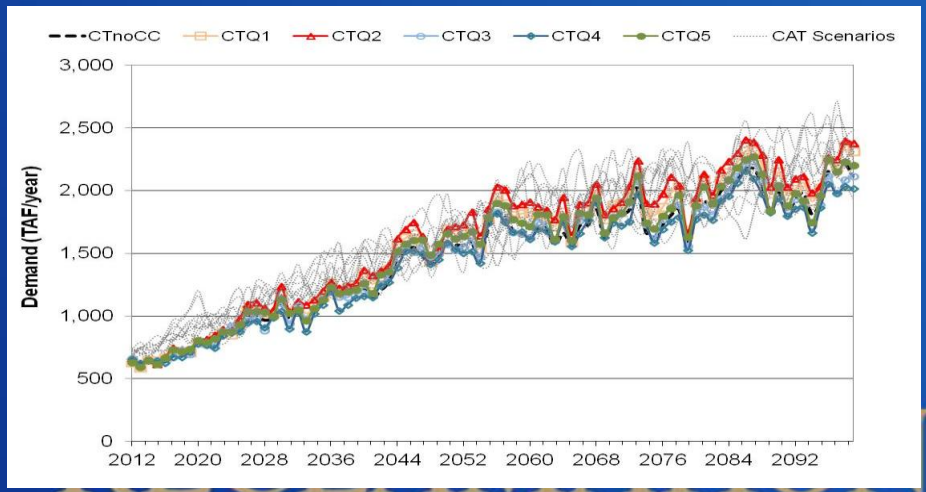
Eastside Streams and Delta



San Joaquin River System



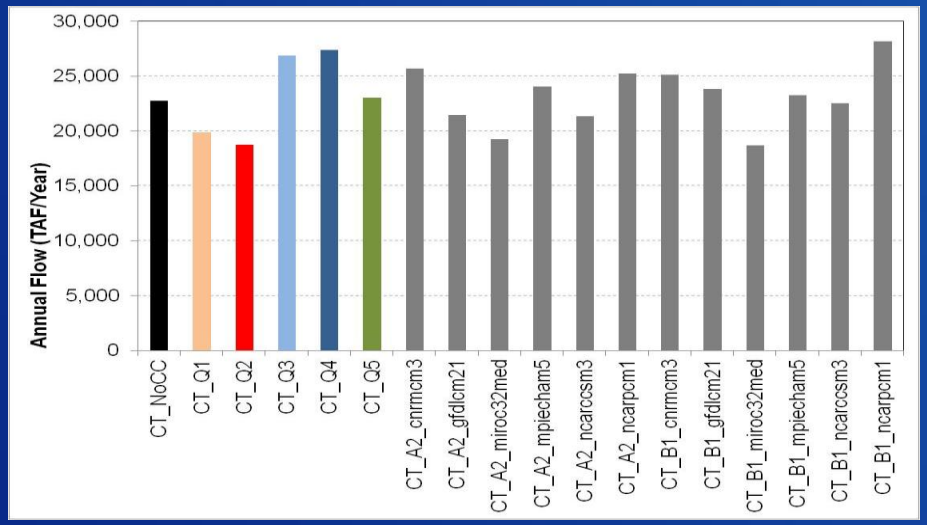
Tulare Lake Region



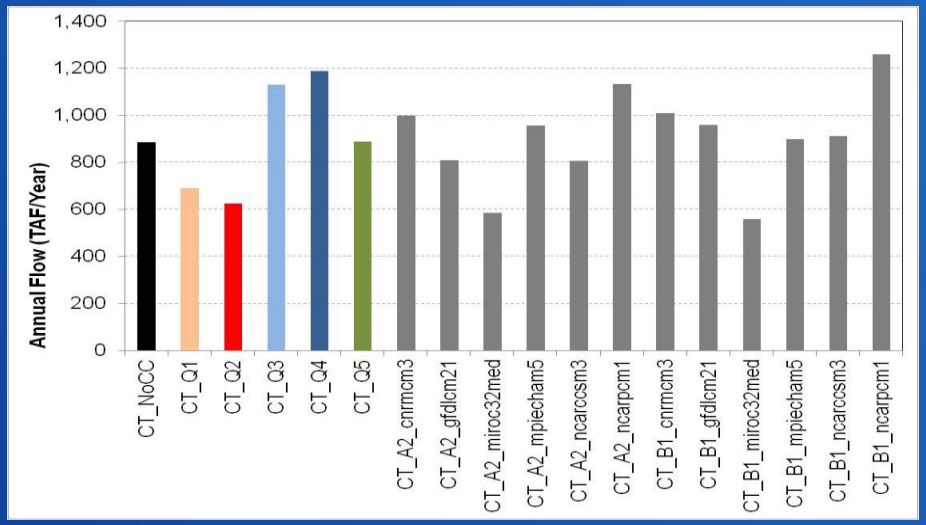
Projected Water Supplies: Average Annual Runoff

Average annual water supplies vay across climate scenarios and regions

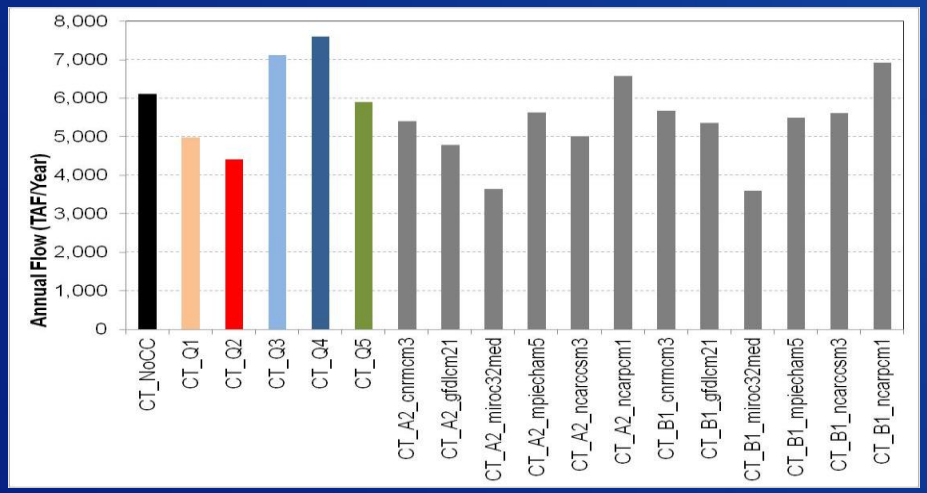
Sacramento-River System



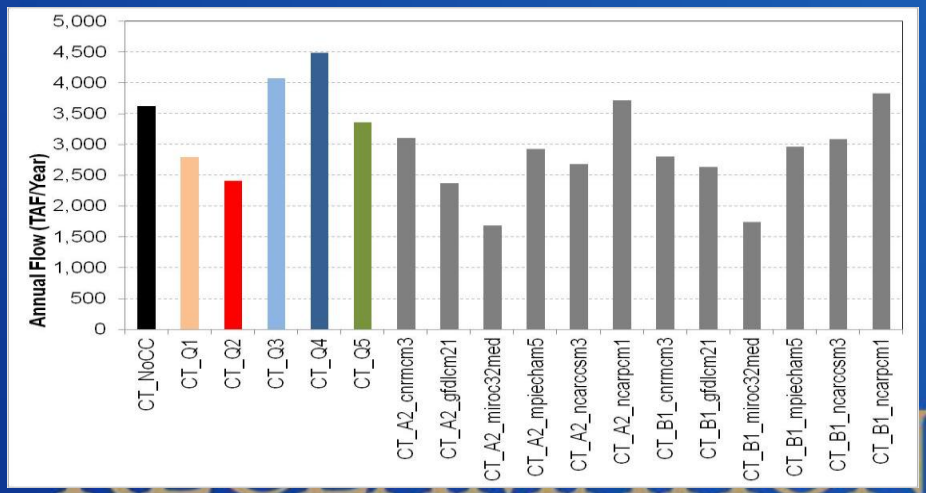
Eastside Streams and Delta



San Joaquin River System



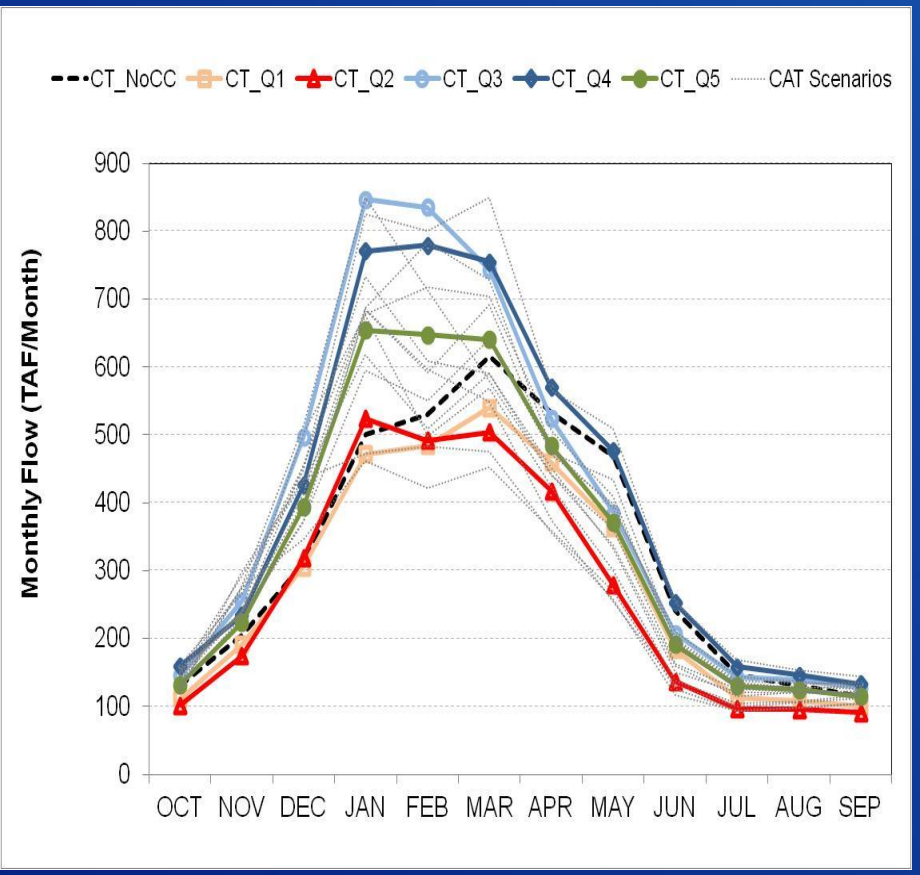
Tulare Lake Region



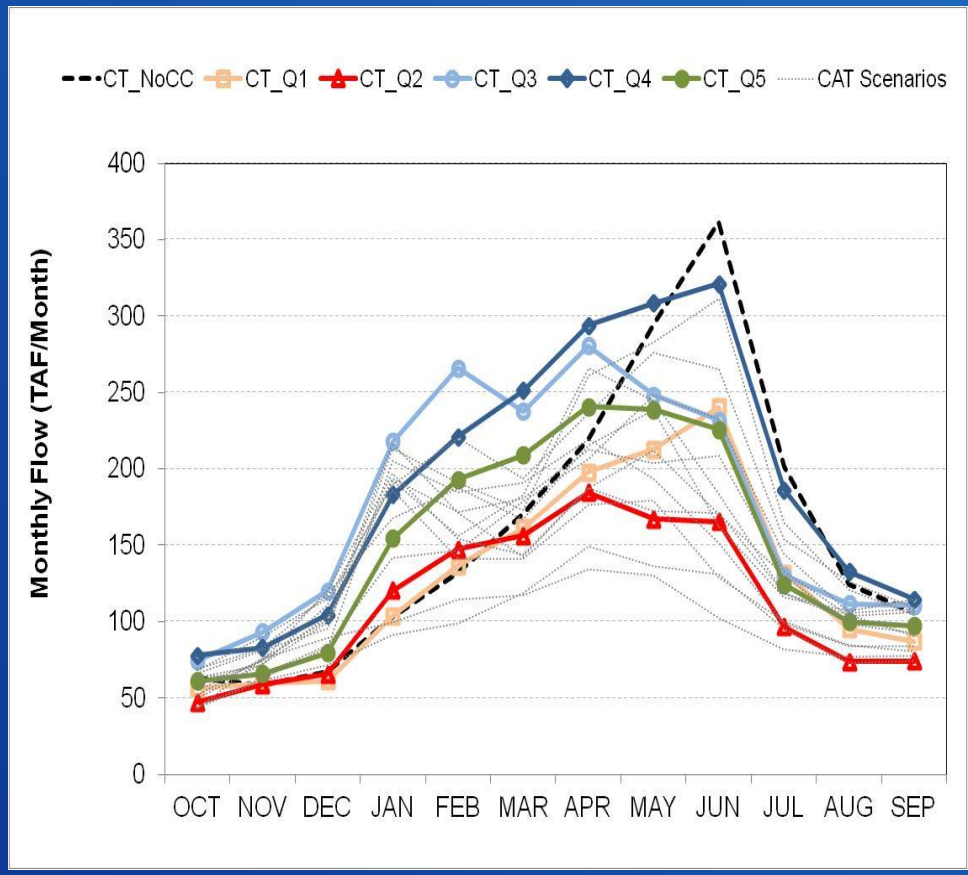
Projected Water Supplies: Monthly Flow Changes

Climate change causes a shift in monthly runoff to earlier in the year

Feather River into Lake Oroville



San Joaquin River into Millerton Lake



Water Supply and Water Demand Assessments – Next Steps

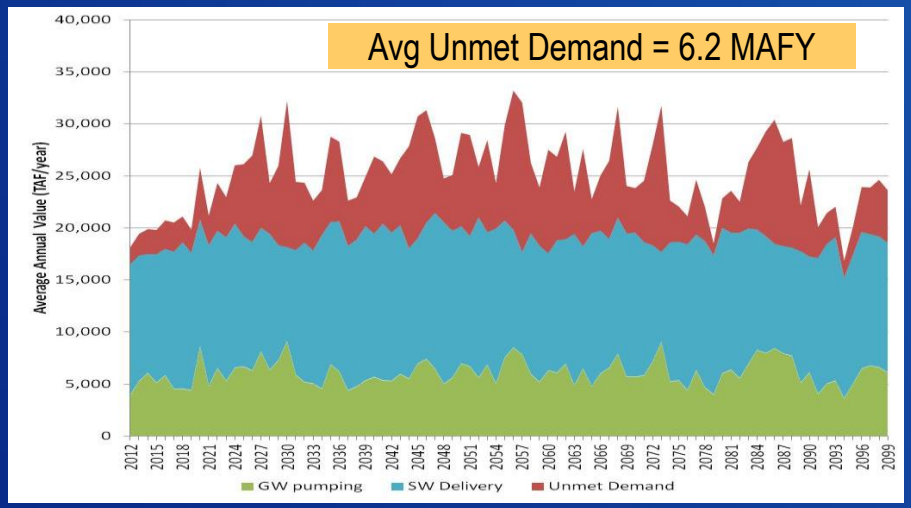
- Updated socioeconomic scenarios based on California Water Plan 2013
- Updated climate scenarios based on CMIP5 data
- Additional scenarios capturing greater range of future uncertainty

System Reliability Assessment

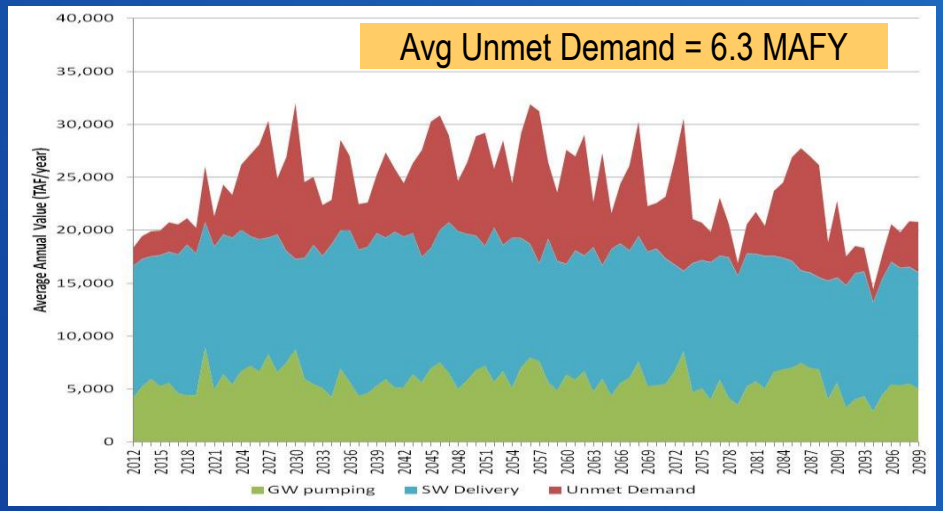
- Basins Study requires assessment of climate impacts to various water-dependent resources
- Resource Categories
  - Delivery Reliability
  - Water Quality
  - Hydropower
  - Flood Control
  - Recreation
  - Ecological
- Basin study utilizes Indicator Metrics
  - High-level metrics that are indicative of resource area changes
- Preliminary Results
  - Metrics and methods will be refined during 2014

Delivery Reliability: Unmet Demands in the Central Valley

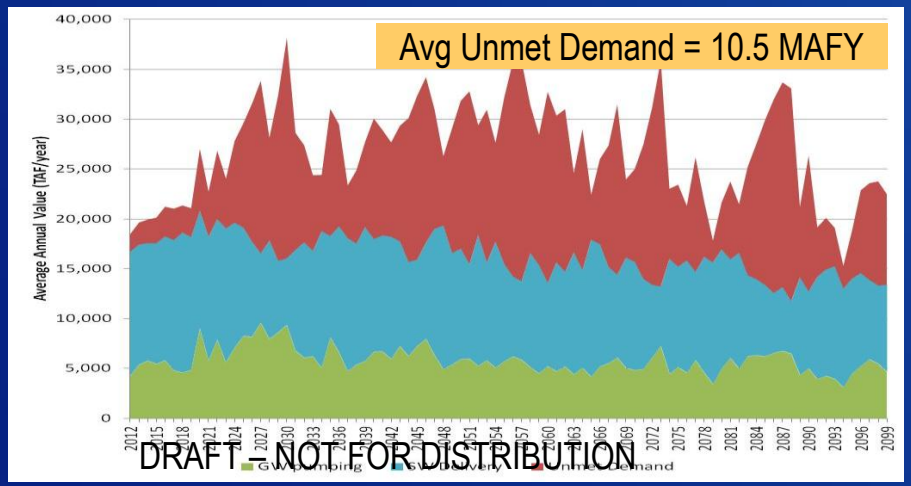
Current Trends – No Climate Change



Current Trends – Q5 Climate Scenario



Current Trends– Q2 Climate Scenario



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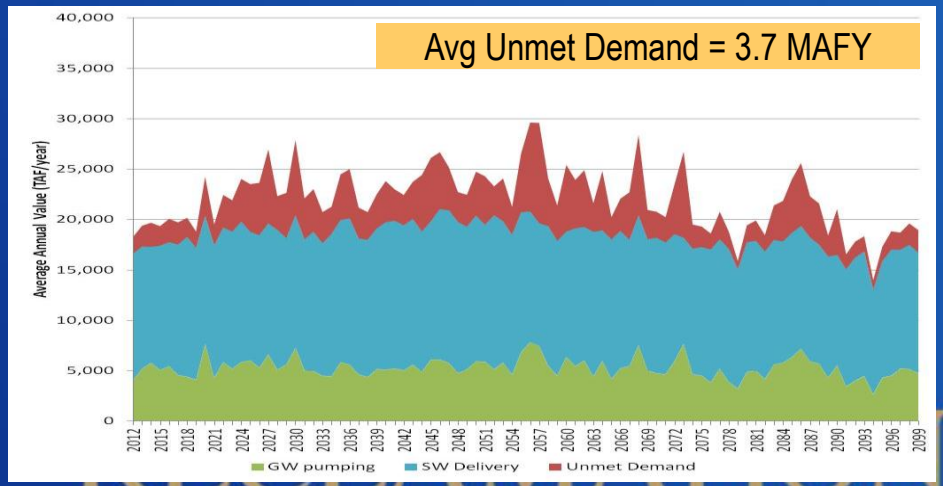
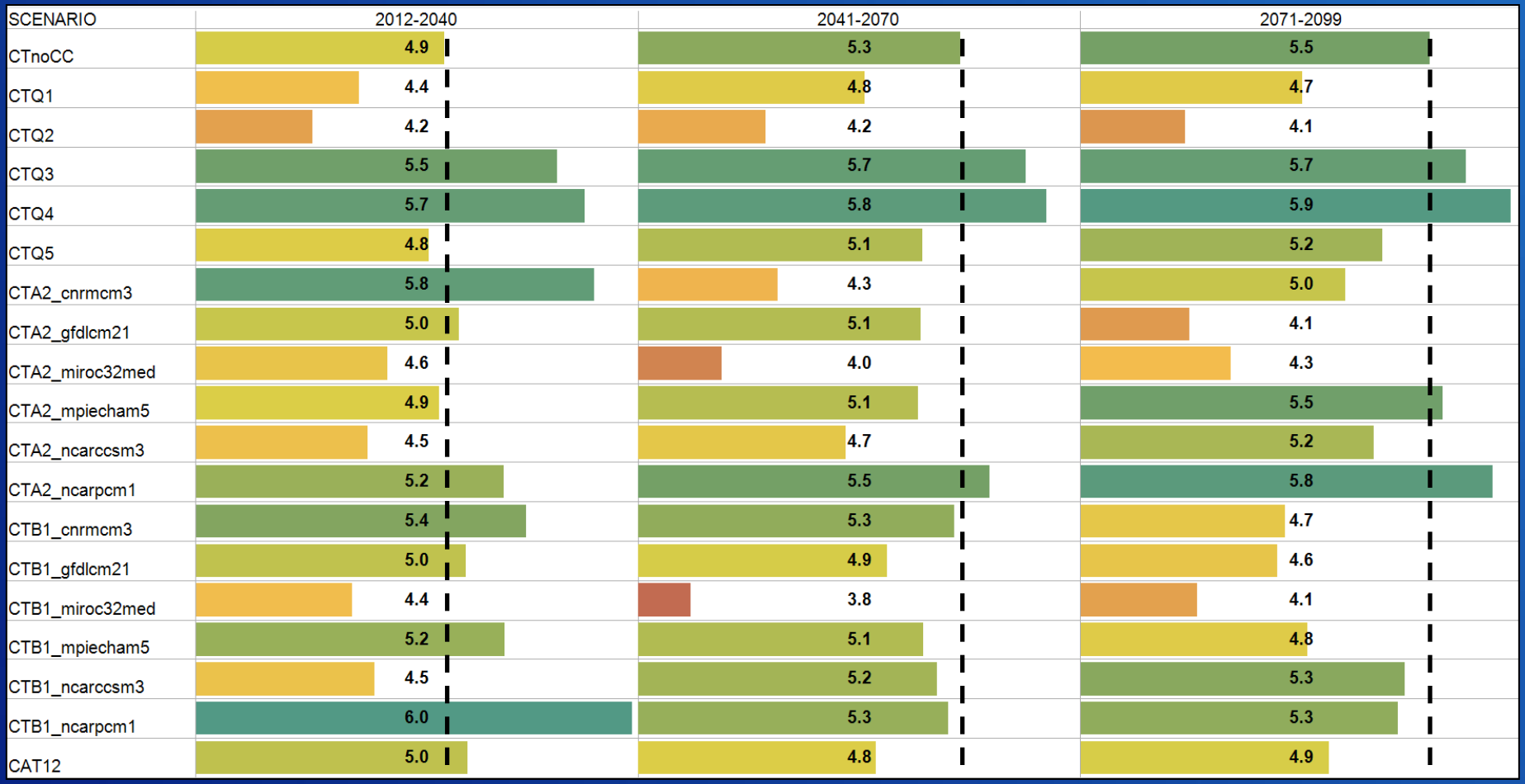
Current Trends– Q4 Climate Scenario



Delivery Reliability:
SWP and CVP Annual Delta Exports



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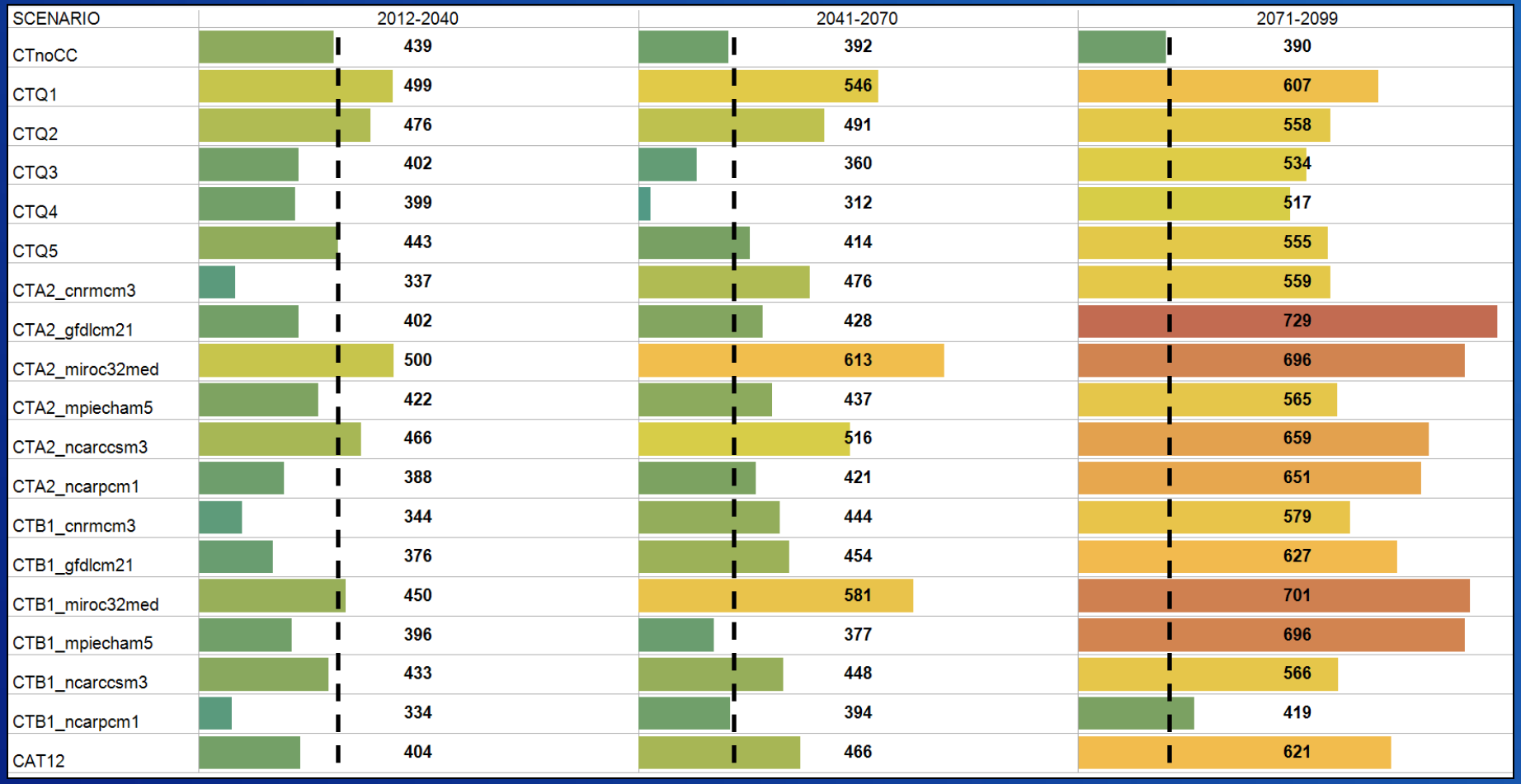
Water Quality:
Projected Annual Avg EC at Rock Slough



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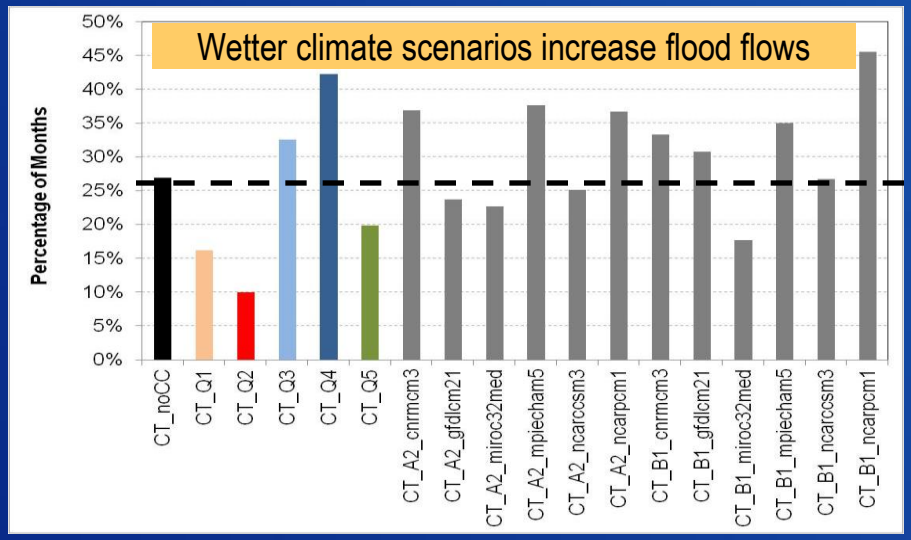
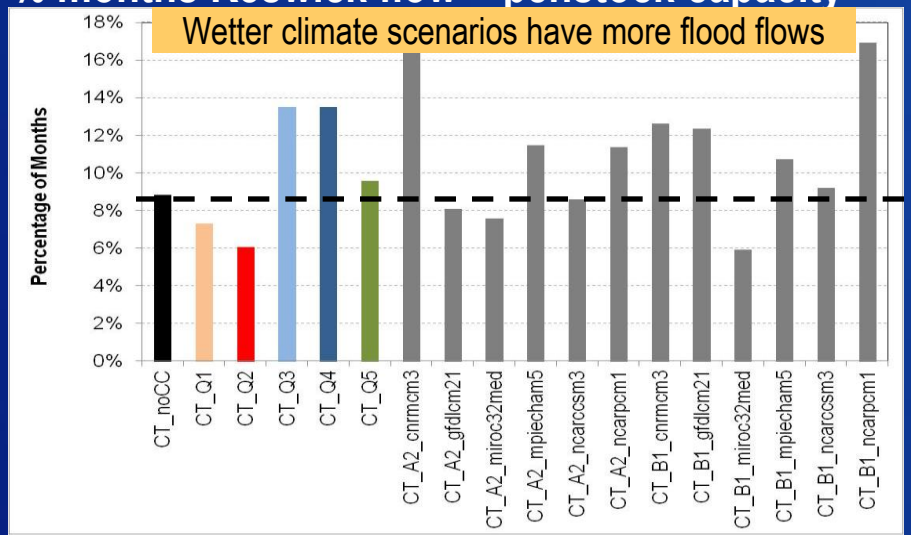
Flood Control and Recreation Metrics

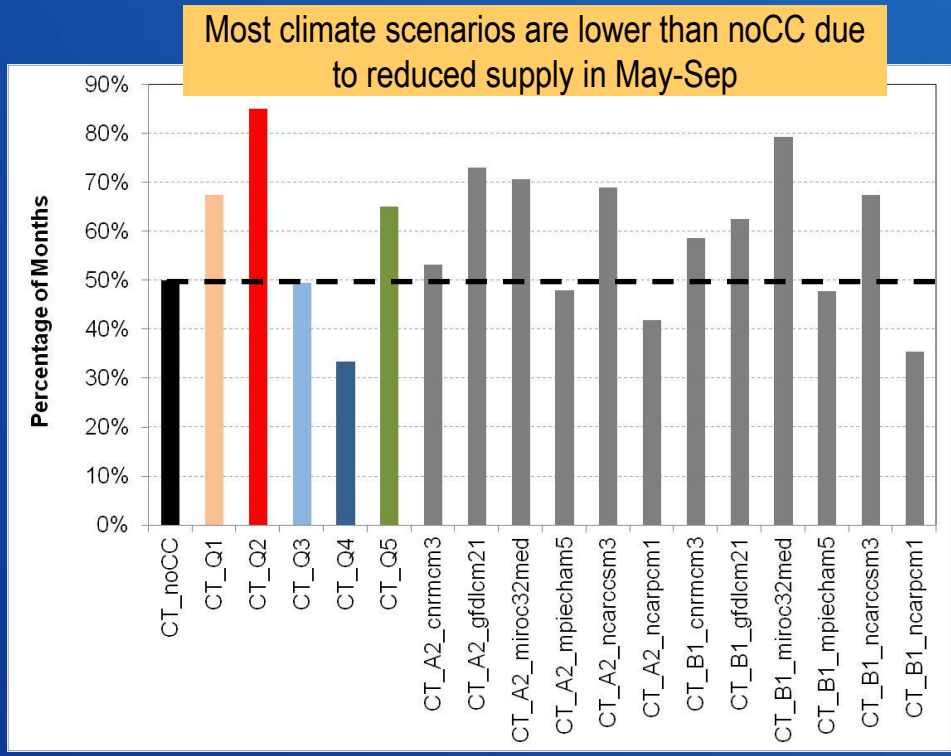
Flood Control:
% of months that Shasta storage is at flood conservation pool



% months Keswick flow > penstock capacity



Recreation:
% of months that Shasta water surface elevation or surface area is less than noCC median values



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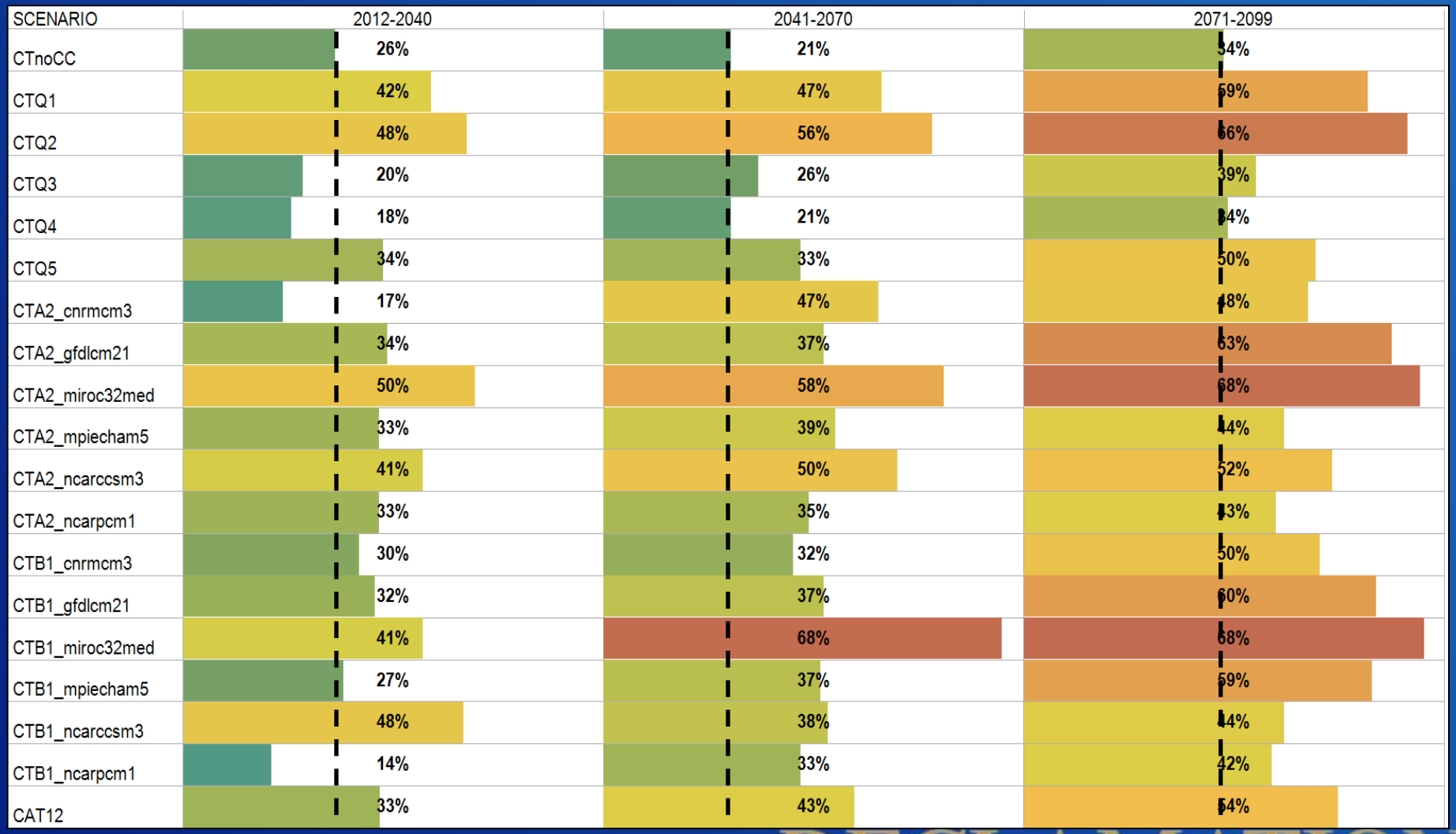
Ecological Resources:
Projected Spring X2 Greater than 74 km



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Reliability Analysis – Next Steps

- Additional refinements to metrics
  - Change in groundwater storage
  - River water temperature
  - Refined flood control metrics
  - Agricultural and urban economics
  - Refined ecological metrics
- Refined analysis and tools to be applied
  - Improved temperature modeling (SRWQM and HEC5Q models)
  - Improved ecological approaches (daily variability, regulatory standards, refuge deliveries)
  - Improved economic analysis (LCPSIM, SWAP, OMWEM, SBWQM, LCRBWQM)

Approach for Developing Adaptation Options

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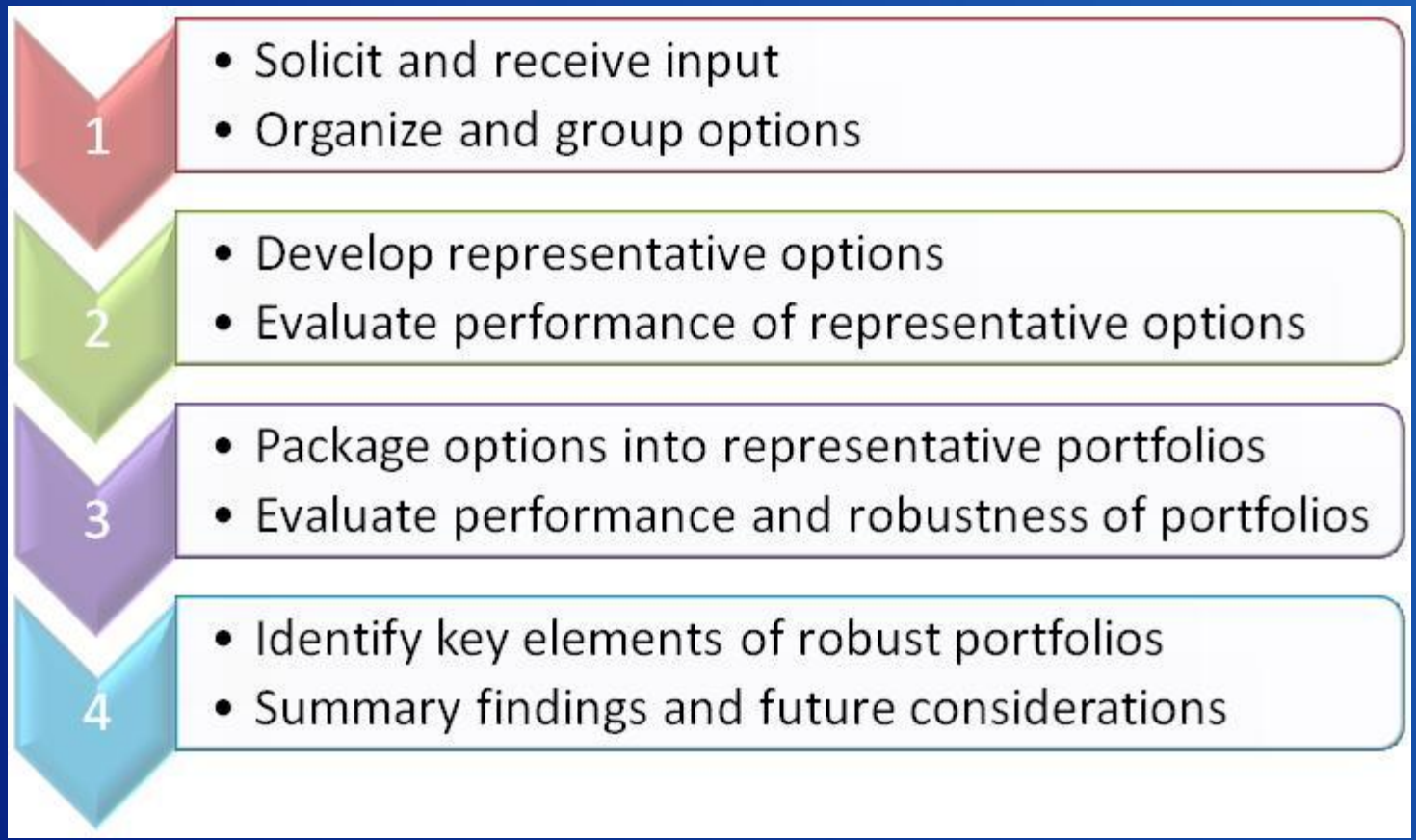
Objective of the Options and Strategies Phase

- The objective of the Options and Strategies phase is to identify, describe, and evaluate options and strategies that can be implemented to improve system performance in the face of climate and socioeconomic uncertainties
- The Study is intended to explore a broad range of adaptation options and identify promising solutions, but will not result in the selection of a particular proposed option or set of options

Approach for Developing & Evaluating Options & Strategies



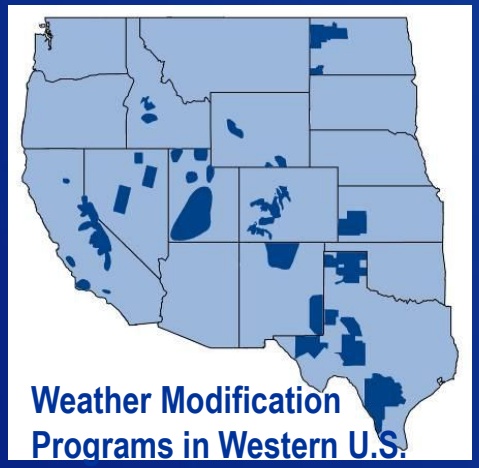
Options and Strategies - Examples

Wastewater Reuse

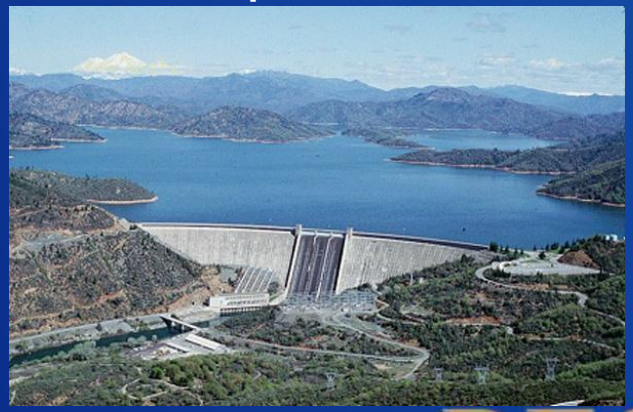
Desalination

Water Conservation

Weather Modification



Storage, Conveyance, & System Operations



Watershed Management

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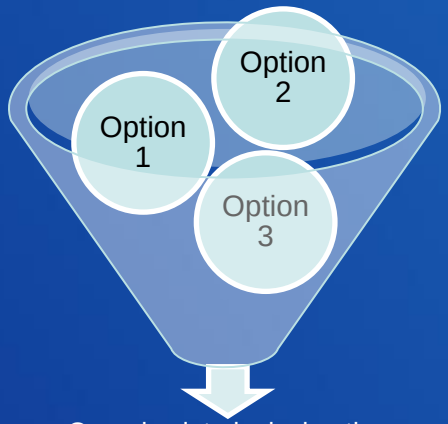
Adaptation Options Analyzed by Previous Central Valley Programs

- Central Valley Project Integrated Resource Plan
  - Urban and agricultural water use efficiency
  - Recycled municipal water
  - Desalination
  - North-of-Delta surface storage (NODOS, SLWRI)
  - Delta Conveyance
  - South-of-Delta surface or groundwater storage
  - Enhanced environmental flow targets
- California Water Plan 2013
  - Urban and agricultural water use efficiency
  - Recycled municipal water
  - North-of-Delta and South-of-Delta surface storage
  - Environmental flow targets
  - Groundwater recovery targets

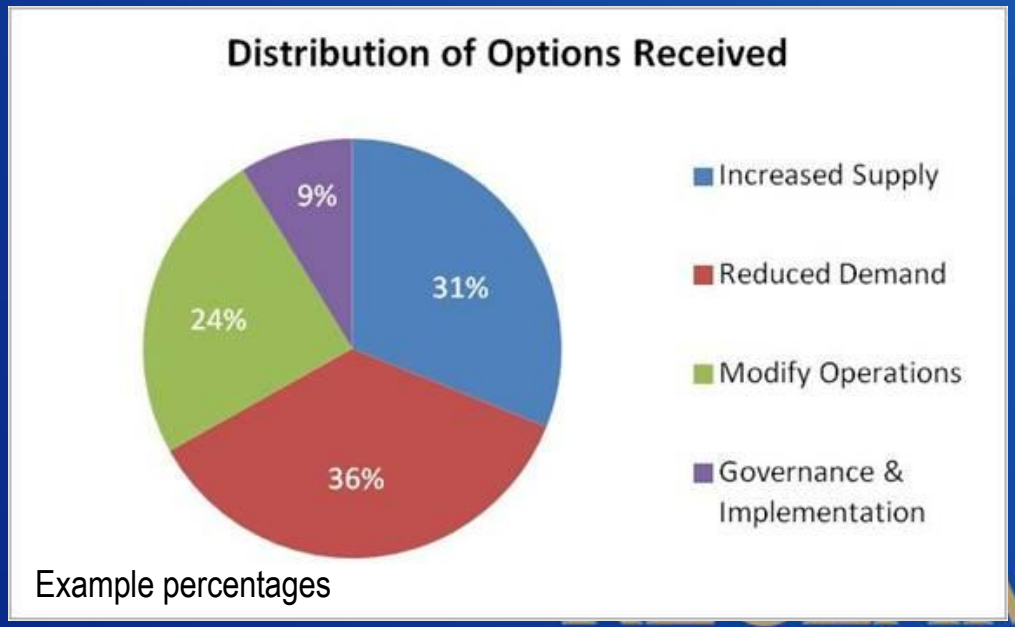
Organizing and Categorizing Options

- All options submitted to the Study will be reviewed organized into categories



- Options grouped into like categories

Increase Supply | Decrease Demand | Modify Operations | Governance & Implementation



Option Characterization Approach

- Characterization will be done at an “appraisal” level
- Options characterized quantitatively or qualitatively
- Quantitative characterization entails
  - Evaluation of characterization criteria:
  - Assignment of A through E based on criteria assessment
- Qualitative characterization includes discussion of potential opportunities and constraints, including legal and regulatory constraints
  - Many governance and implementation options will be characterized qualitatively

Option Characterization Criteria and Assumptions

Potential Characterization Criteria Include:

- Potential yield
- Timing of implementation
- Technical feasibility and reliability
- Cost
- Energy source and needs
- Permitting requirements
- Legal
- Policy considerations
- Implementation risk/uncertainty
- Long-term viability
- Operational flexibility

Adaptation and Strategies Development – Next Steps

- Solicit and develop range of options for consideration
  - *Solicitation forthcoming in April/May on Basin Study website and notification via email distribution list*
- Characterize and evaluate options
- Develop portfolios (combination of options) to explore range of options and effectiveness for improving reliability
- Develop insights for common options in most robust portfolios

Outreach Plan and Coordination

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Outreach and Coordination

- Outreach to focus on the following:
  - Basin Study Partners
  - Tribes
  - Environmental organizations
  - Other interested stakeholder groups
  - General public
- Basin Study Partner coordination through Executive Committee and Project Team meetings
- Outreach to stakeholder groups through individual meetings
- Public outreach through web-based meetings

Basins Study Schedule and Status

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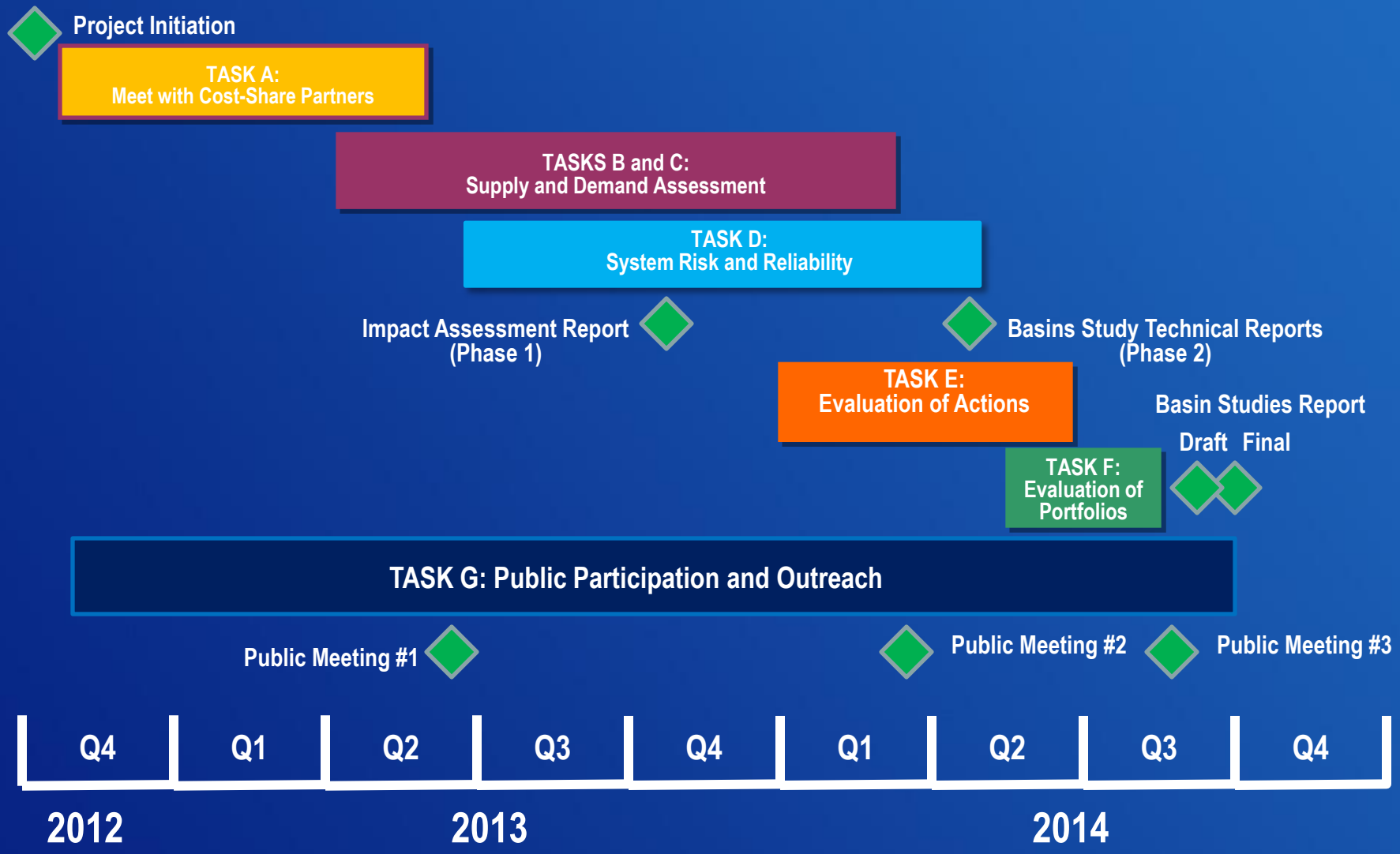
Basins Study Schedule



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Study Information

- Reclamation's Basin Study Program Website
  - http://www.usbr.gov/WaterSMART/bsp/studies.html
- Sacramento and San Joaquin Basins Study Website
  - http://www.usbr.gov/mp/SSJBasinStudy.html
  - 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;
    Mary Johannis phone: 916-978-5082; or
    Shelley Mcginnis: 916-978-4349
  - email: sha-mpr-ssjbasinstudy@usbr.gov

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