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Managing Water in the West

Colorado River Basin Water Supply and Demand Study

First Public Meeting
March 23, 2010
Las Vegas, NV and Webinar

U.S. Department of the Interior
Bureau of Reclamation

Agenda

- Welcome & Introductions
- Logistics
- Study Overview
- Study Update
- Question & Answer Session
- Next Steps

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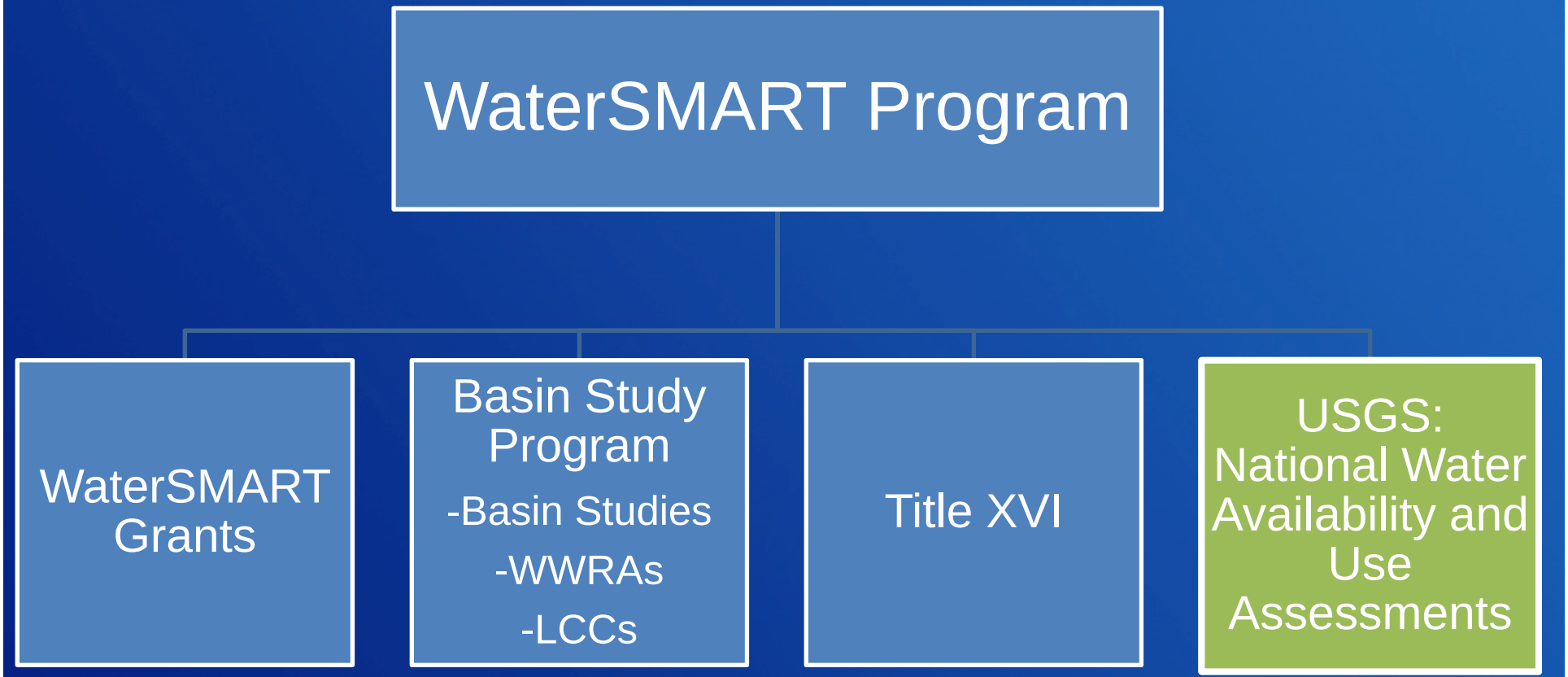
Study Overview



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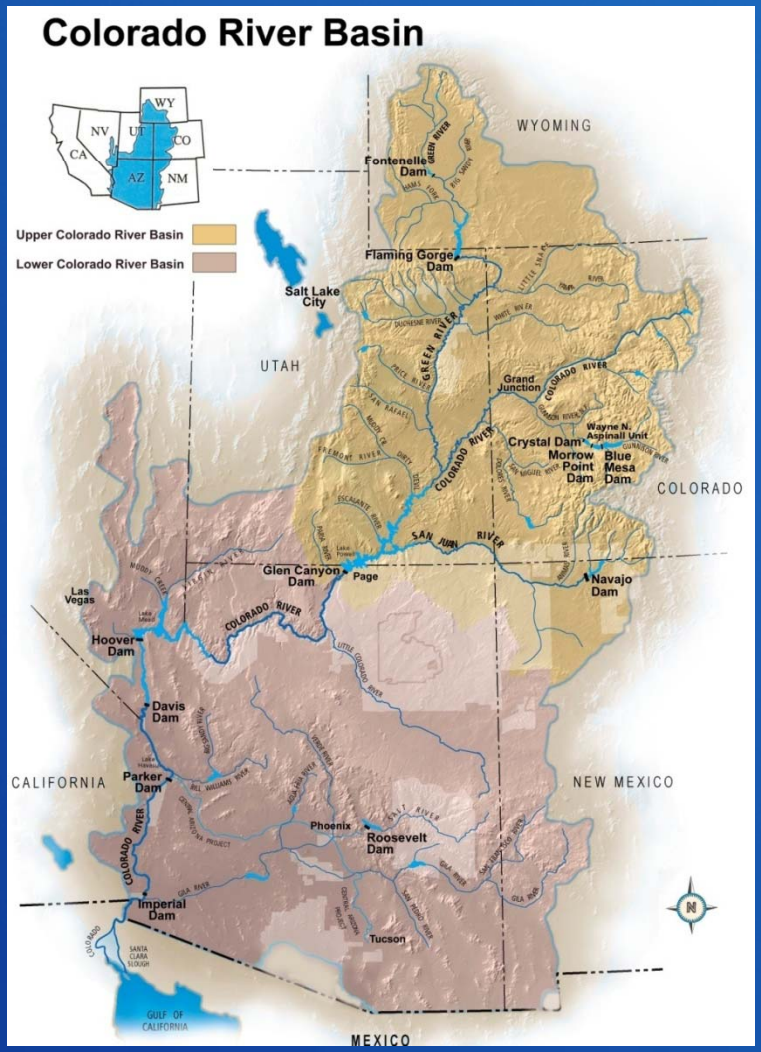
Objectives of the Study

- Define current and future imbalances in water supply and demand
- Assess the system reliability and risks to all Basin resources
- Develop and evaluate adaptation and mitigation strategies



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Colorado River Basin Resources

- The Colorado River supports many important resources including:
  - water allocations and deliveries consistent with the apportionments under the Law of the River
  - hydroelectric power generation
  - recreation
  - fish, wildlife, and their habitats (including candidate, threatened, and endangered species)
  - water quality including salinity
  - flow and water dependent ecological systems
  - flood control
- The Study will look at system reliability with respect to all resources

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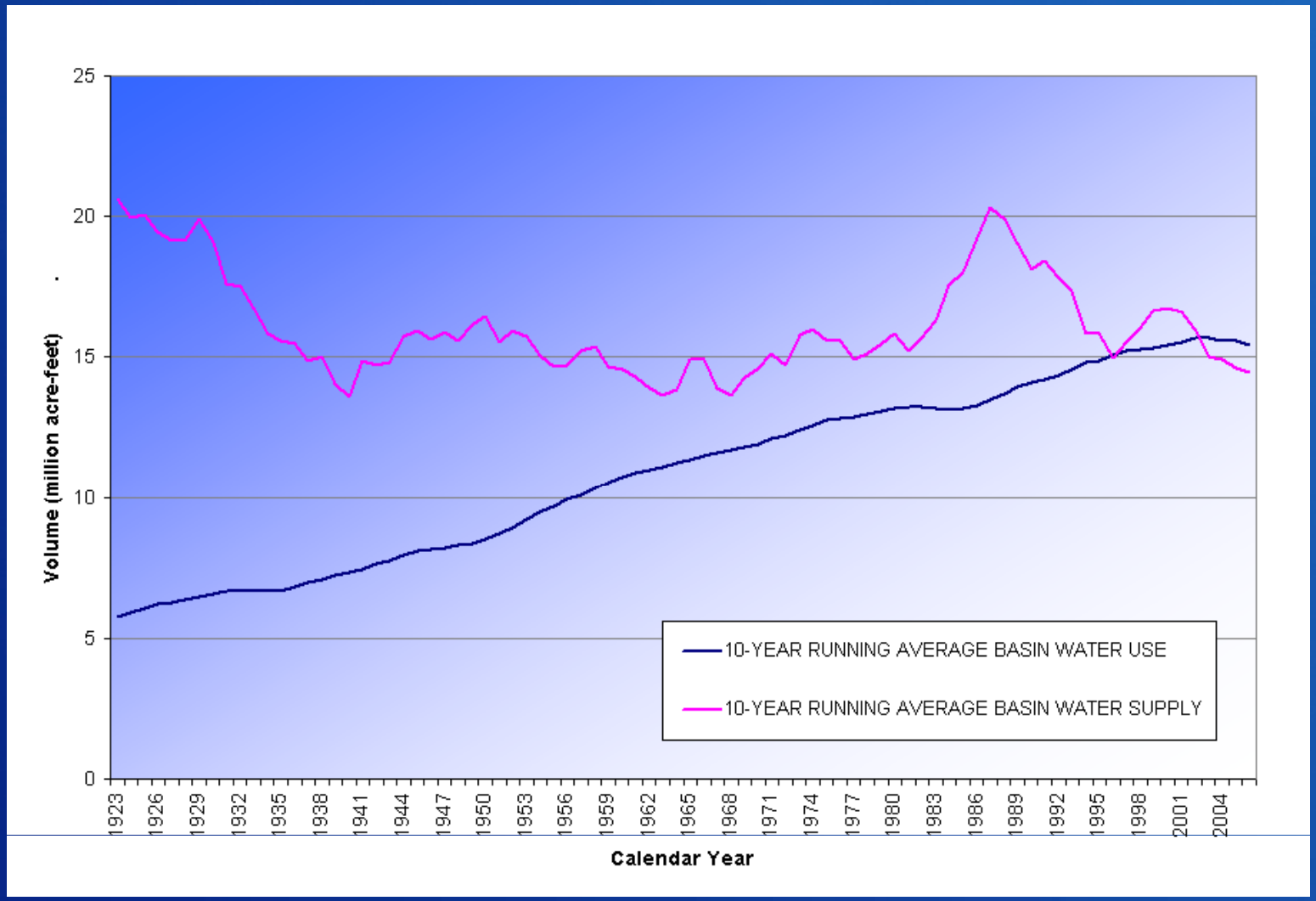
Colorado River Water Supply and Demand



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Study Considerations

- Study area: Colorado River Basin and those adjacent areas of the Basin States that receive Colorado River water
- Estimated cost of $2 million for two years
- 50/50 cost share by Reclamation and the Non-Federal Cost-Share Partners

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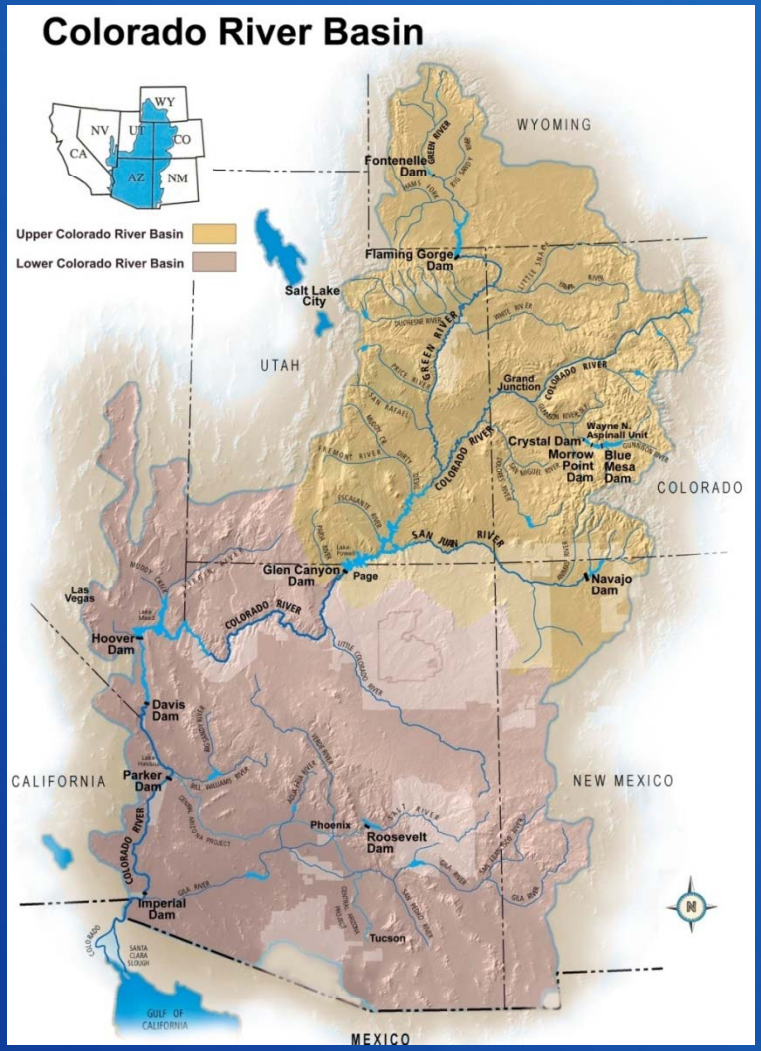
Cost-Share Partners

- Arizona Department of Water Resources
- (California) Six Agency Committee
- Colorado Water Conservation Board
- New Mexico Interstate Stream Commission
- Southern Nevada Water Authority
- Utah Division of Water Resources
- Wyoming State Engineer's Office
- Reclamation's Upper and Lower Colorado Regions



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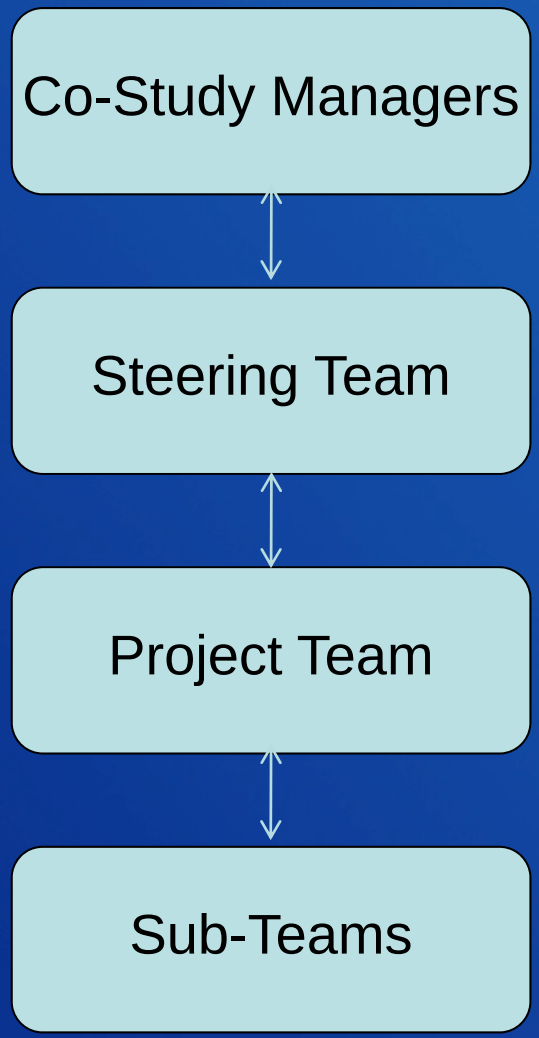
Study Management Structure



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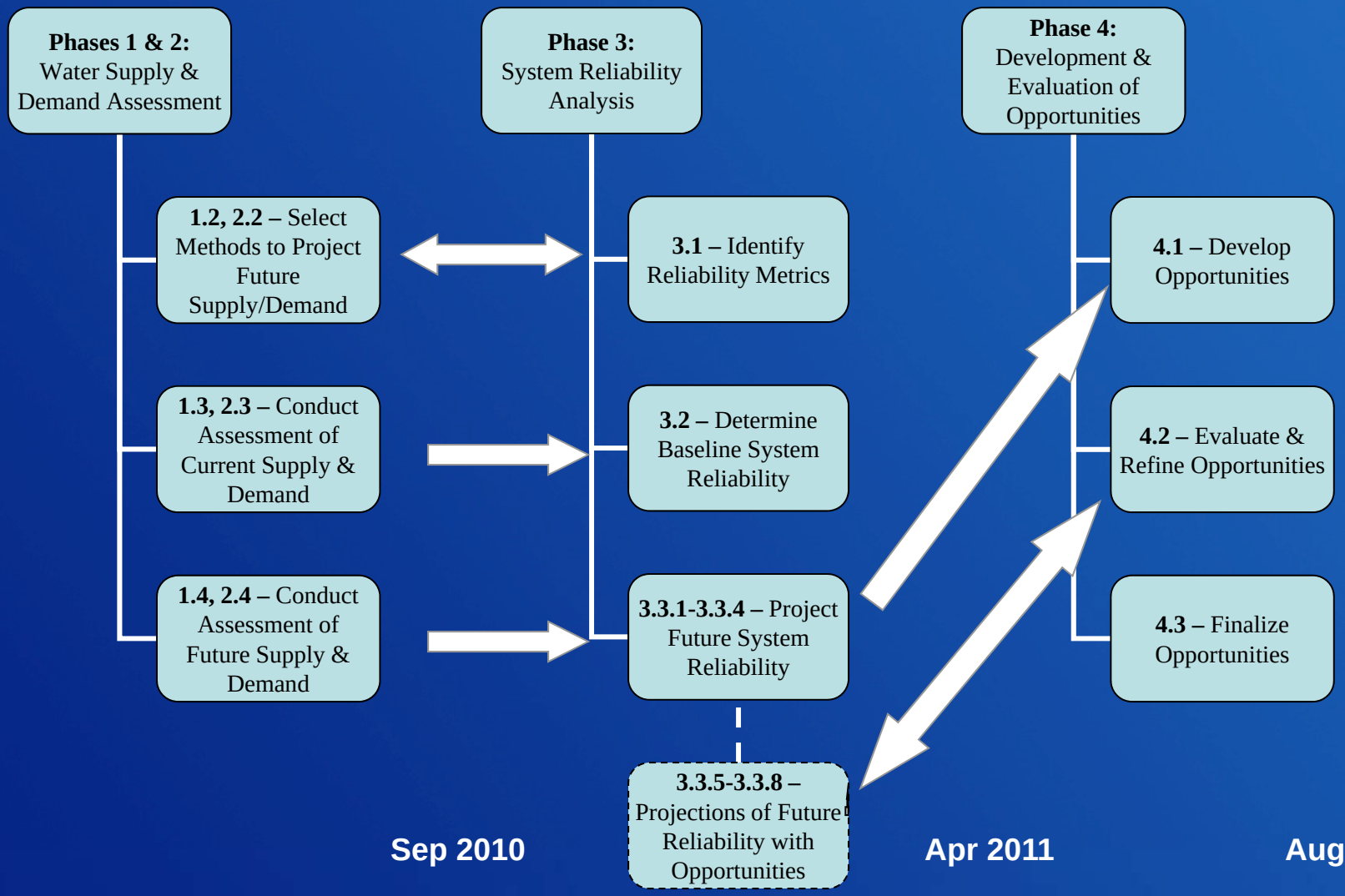
Plan of Study: Study Phases



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Public Involvement Plan

- Goals:
  - Effectively provide, seek, receive, and consider information from all interested stakeholders
  - Promote further dialog regarding water supply-demand imbalances and potential solutions, particularly post-2026
- Approach:
  - Multi-faceted communication including website, email, points-of-contact, news releases, public meetings, and additional meetings with interested stakeholder groups
- All information received will be considered and feedback will be provided

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Timeline

Milestone	Deliverable Description
September 2010	Report describing findings from current and future water supply assessment
September 2010	Report describing findings from current and future water demand assessment
April 2011	Report describing findings from system reliability analysis
August 2011	Report describing findings of opportunities analysis
October 2011	Draft Study report and appendices available for review
December 2011	Final Study report and appendices complete

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Status and Near-Term Schedule

- Study will run from January 2010 through January 2012
- Contacts to interested stakeholder groups in progress
- A Request for Proposal (RFP) to provide support for the Study has been announced through GSA
  - Proposals due April 1, 2010
- 2nd Public Meeting targeted for end of summer 2010
- Sub-teams investigating:
  - Methods for investigating current water supply and demand
  - Methods for projecting future water supply and demand
  - Metrics for assessing system reliability

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Study Update

- Possible Methods to Assess Current & Future Supply
- Possible Methods to Assess Current & Future Demand
- Possible System Reliability Metrics

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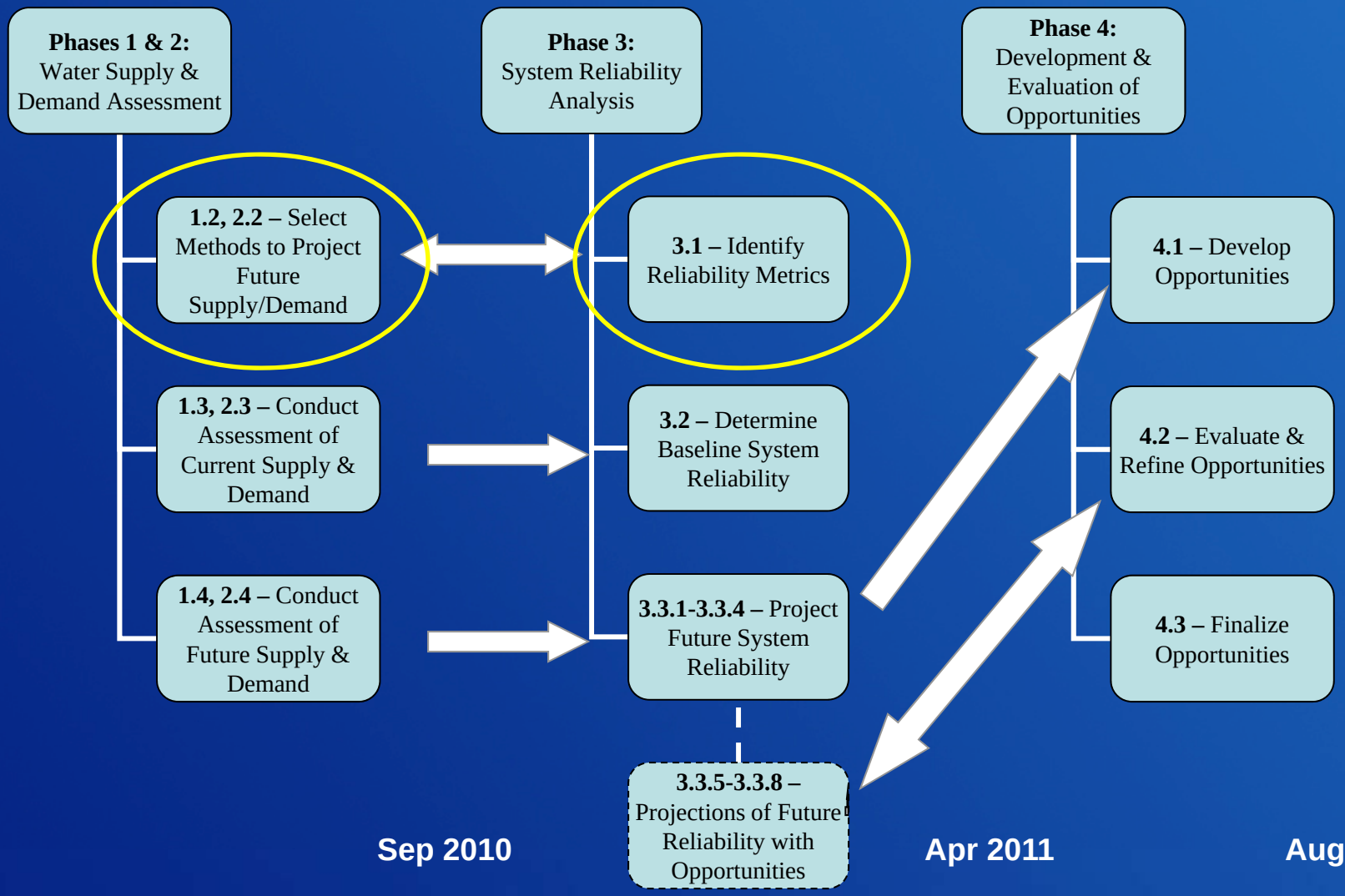
Plan of Study: Study Phases



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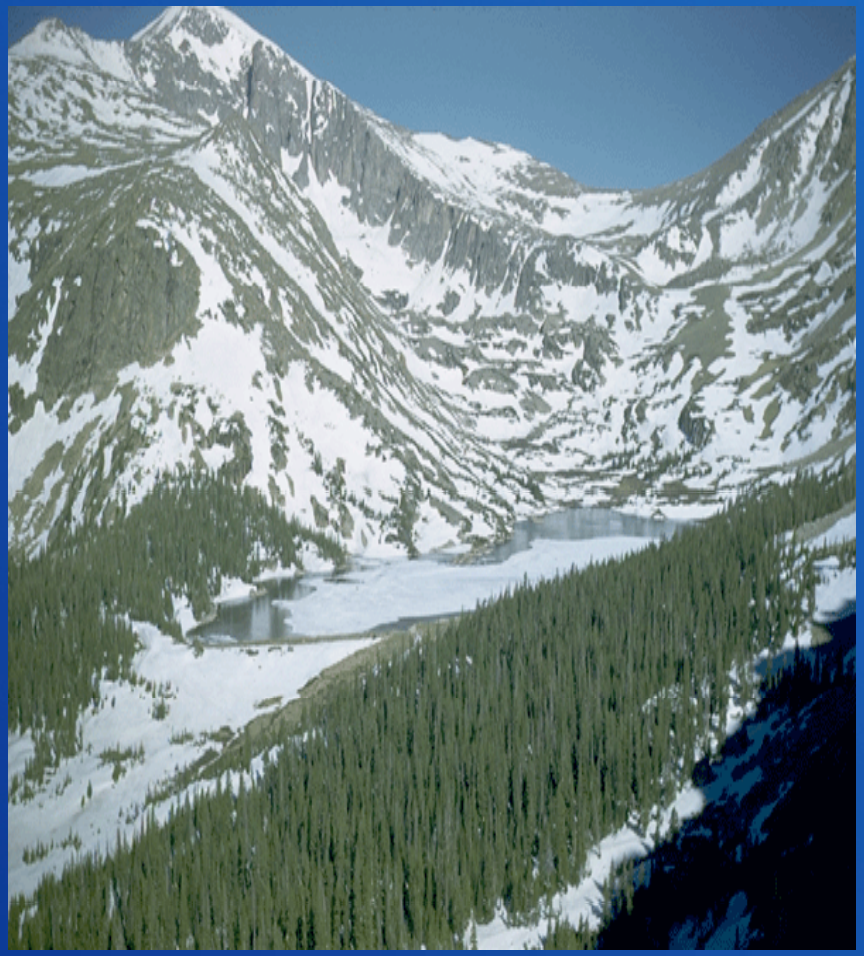
Current and Future Water Supply

- Assess current and future “Natural” water supply
  - Inflow absent human activities
- Focus on runoff and factors affecting runoff (supply indicators)



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Natural Water Supply Indicators

- Runoff (natural flow)
- Snowpack
- Precipitation
- Temperature
- Evapotranspiration
- Climate patterns
- Landscape characteristics

- Current Supply
  - Analyze indicators over history
- Future Supply
  - Project how indicators may change in the future and compare to history

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Current Supply
Analyze Indicators Over History
(for Runoff)

- Determine current runoff conditions by natural flow over historic period
  - 102-year observed historic record
  - 1244-year tree-ring reconstructed record
- Analyze volume, frequency of drought and wet spells, and seasonal timing characteristics
- Analyze at 29 sites throughout the Basin

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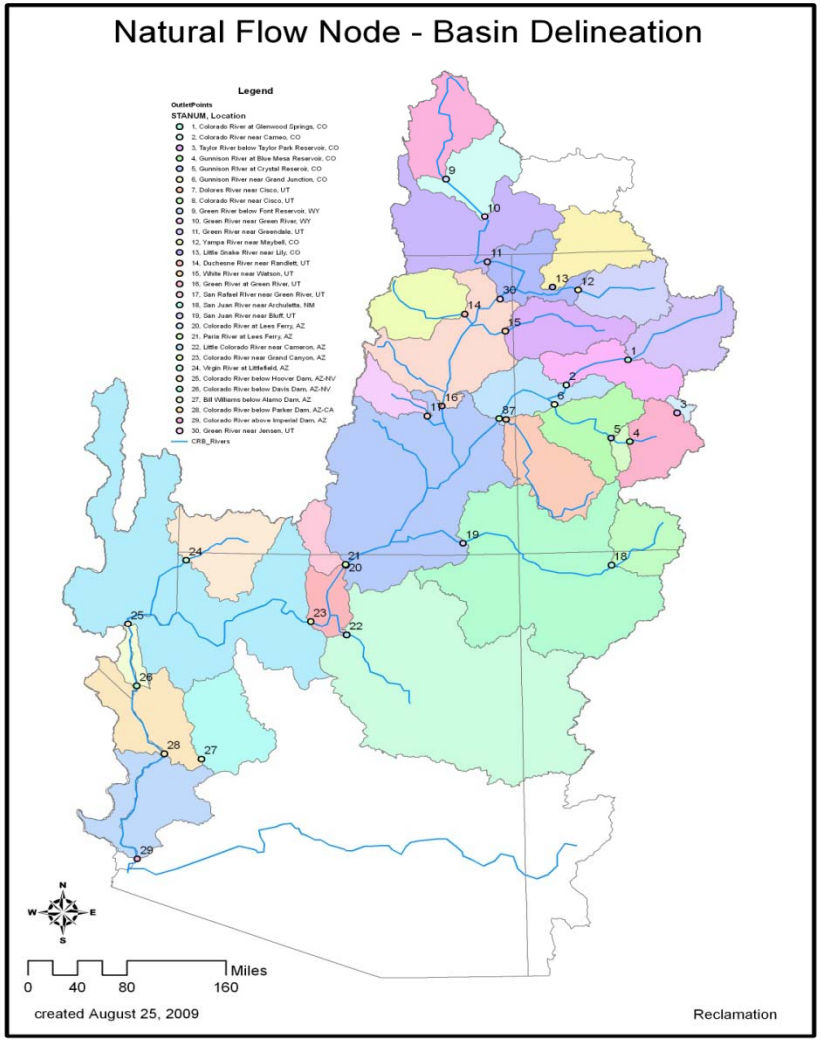
Colorado River Simulation System (CRSS)



- Reclamation's official long-term planning model
- Full basin model from the headwaters of the mainstem and major tributaries, down to the Northerly International Boundary with Mexico
  - Reservoirs: 12
  - Diversions: ~225
  - Natural inflow points: 29
- Simulates on a monthly timestep over decades to assess long-term system conditions

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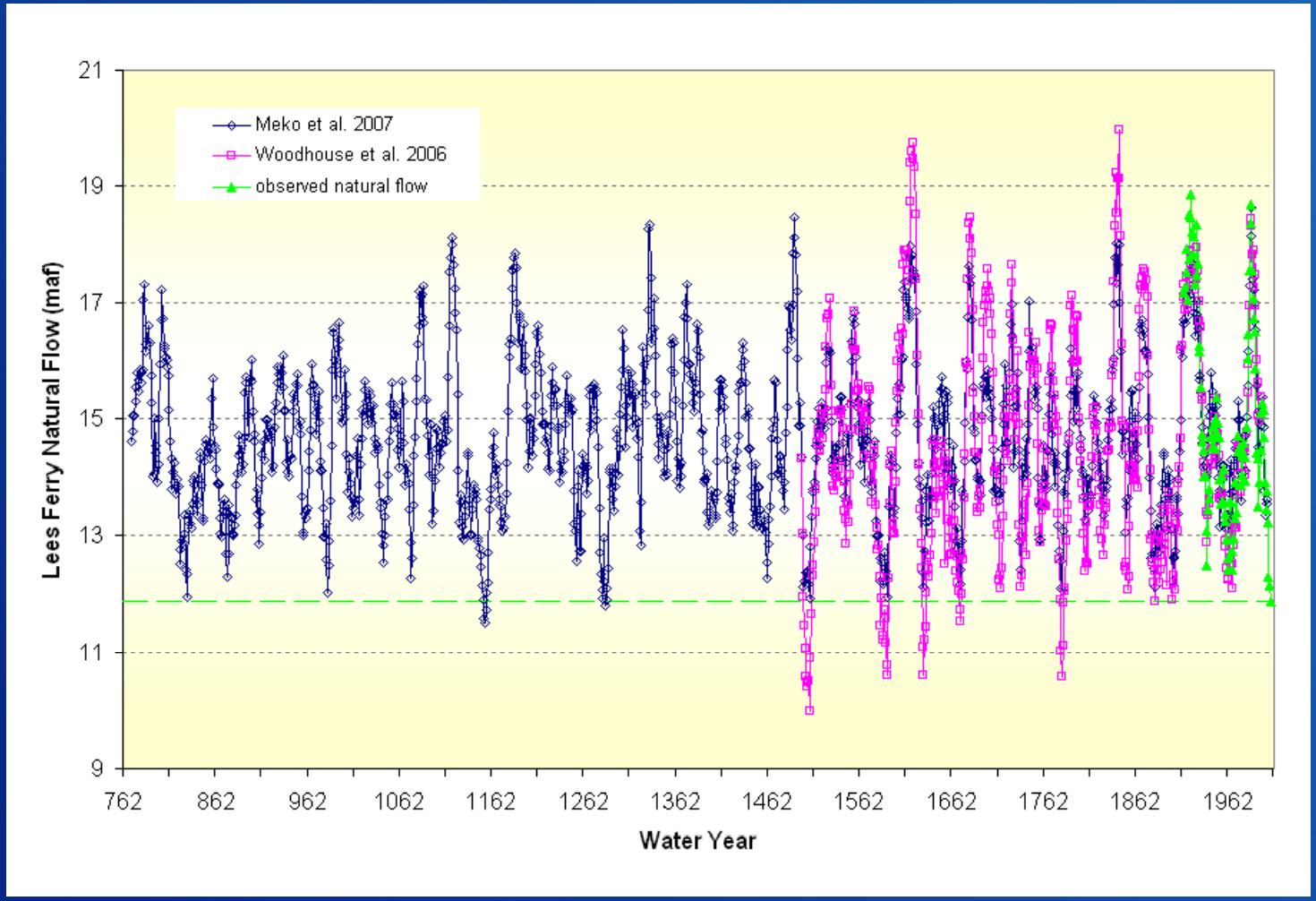
Annual Natural Flow at Lees Ferry (762-2005)
Tree-ring Reconstruction and Observed Record
10-Year Running Mean



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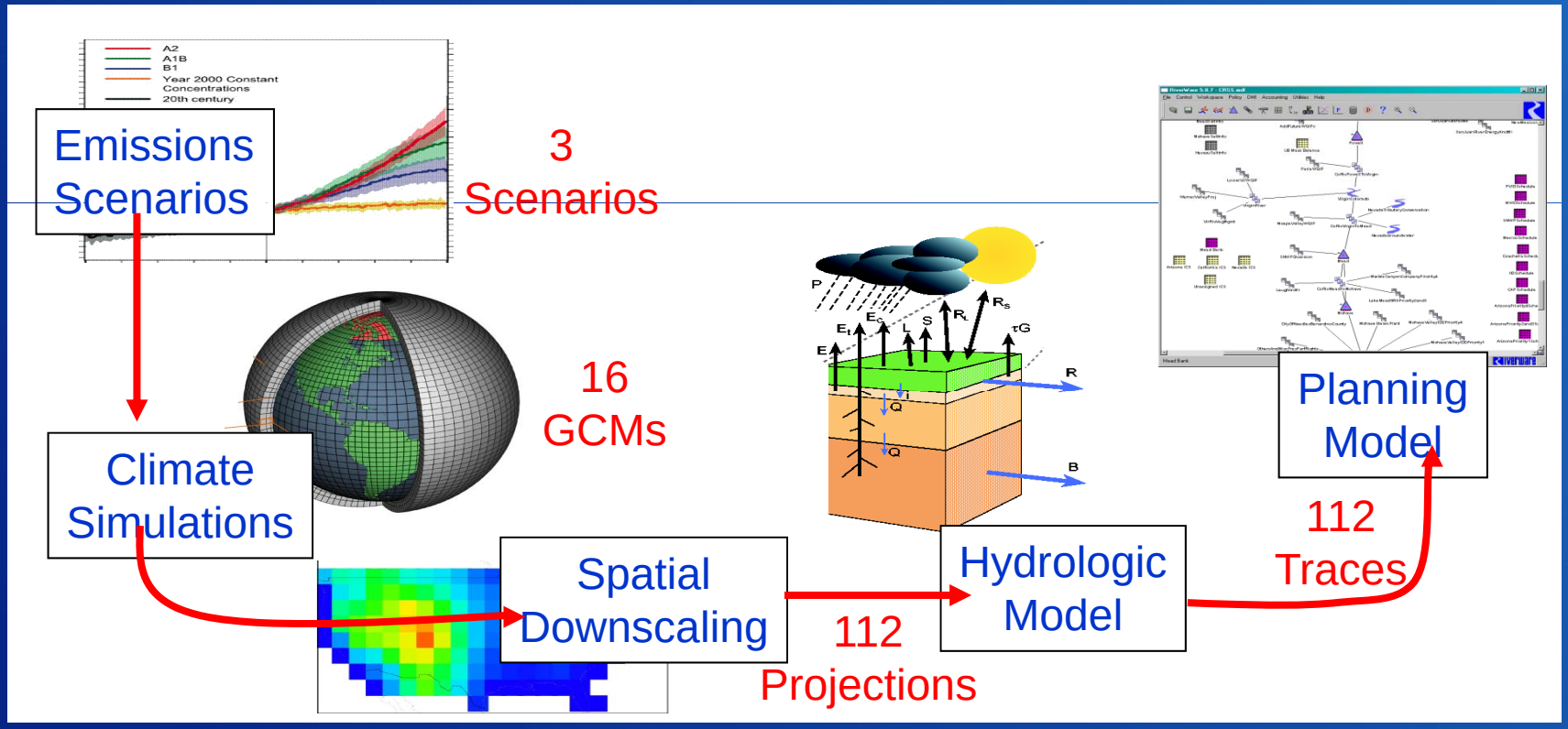
Possible Methods for Projecting Future Runoff

- Based on 102-year historic observed record
  - Sample directly from historic record to generate future runoff sequences
- Based on 1244-year tree-ring record
  - Incorporate runoff sequences outside of the historic record by sampling from the tree-ring record
- Based on combining historic and tree-ring records
  - Generate runoff sequences by combining strengths of historic (magnitudes) and tree-ring (state information) records
- Based on modeled future projections of climate change

Methodology to Incorporate Modeled Future Projections of Climate Change into Water Supply Projections



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Current and Future Water Demand

- Assess current and future demands for Colorado River water
- Project future demands including the potential impacts of climate change

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Representation of Water Demands

- The Colorado River supports many important resources
  - Some resources necessitate the “depletion” of the water from the system (e.g., water is used by irrigated agriculture to grow crops)
  - Other resources need the presence of water that does not deplete the system (e.g., flow requirements for native fish)
- A complete representation of all resource needs is required to assess system reliability
  - Withdrawals are represented by “demand” curves
  - Other resource needs are represented through system targets and constraints, as well as via system reliability metrics
- The largest demands on the river system are for deliveries to agriculture, municipal, and industrial use

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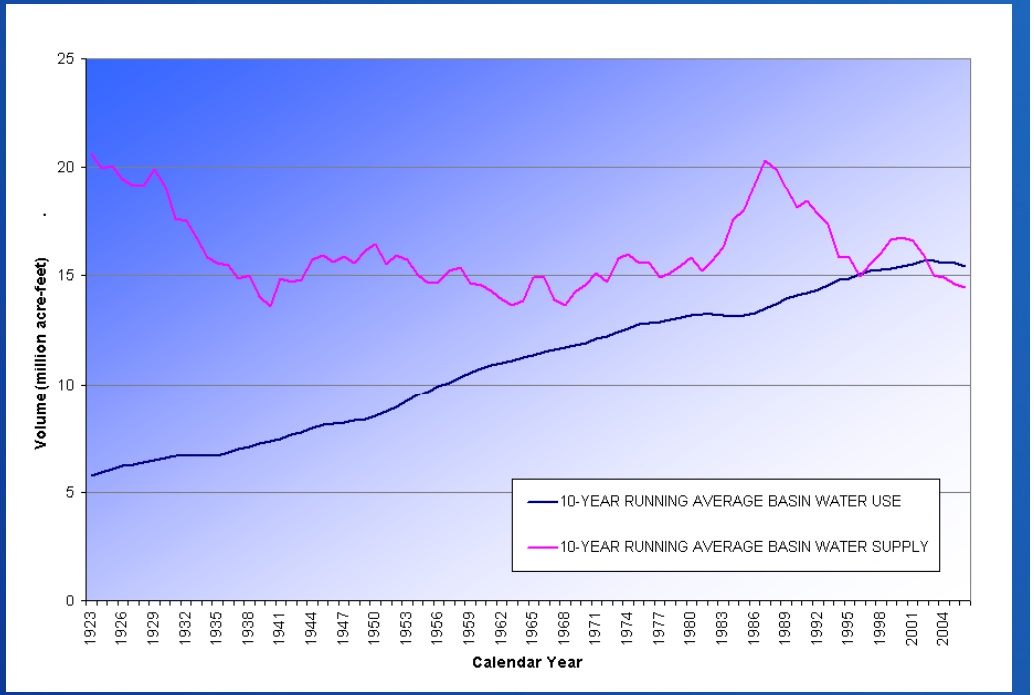
Historic Demands for Agriculture, Municipal, and Industrial Uses (including evaporation and other losses)

- In the Lower Basin, demands from the system are accounted for annually via the Colorado River Water Accounting Report ("Decree accounting")
- In the Upper Basin, demands from the system are accounted for annually via the Colorado River Consumptive Uses and Losses Report



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Future Demands for Agriculture, Municipal, and Industrial Uses

- Each of the Basin States make projections of their future needs for Colorado River water
- Current demand projections are generally based on state and water agency "resource plans"
  - Each state or agency may not use the same assumptions in formulating their future demand (i.e., with respect to conservation, use of local water supplies, etc.)
  - Assumptions will be clearly documented to facilitate understanding and comparison
  - These projections are the "baseline" projections for agriculture, municipal, and industrial uses in the United States
- Projections for deliveries to Mexico in accordance with the 1944 Treaty with Mexico

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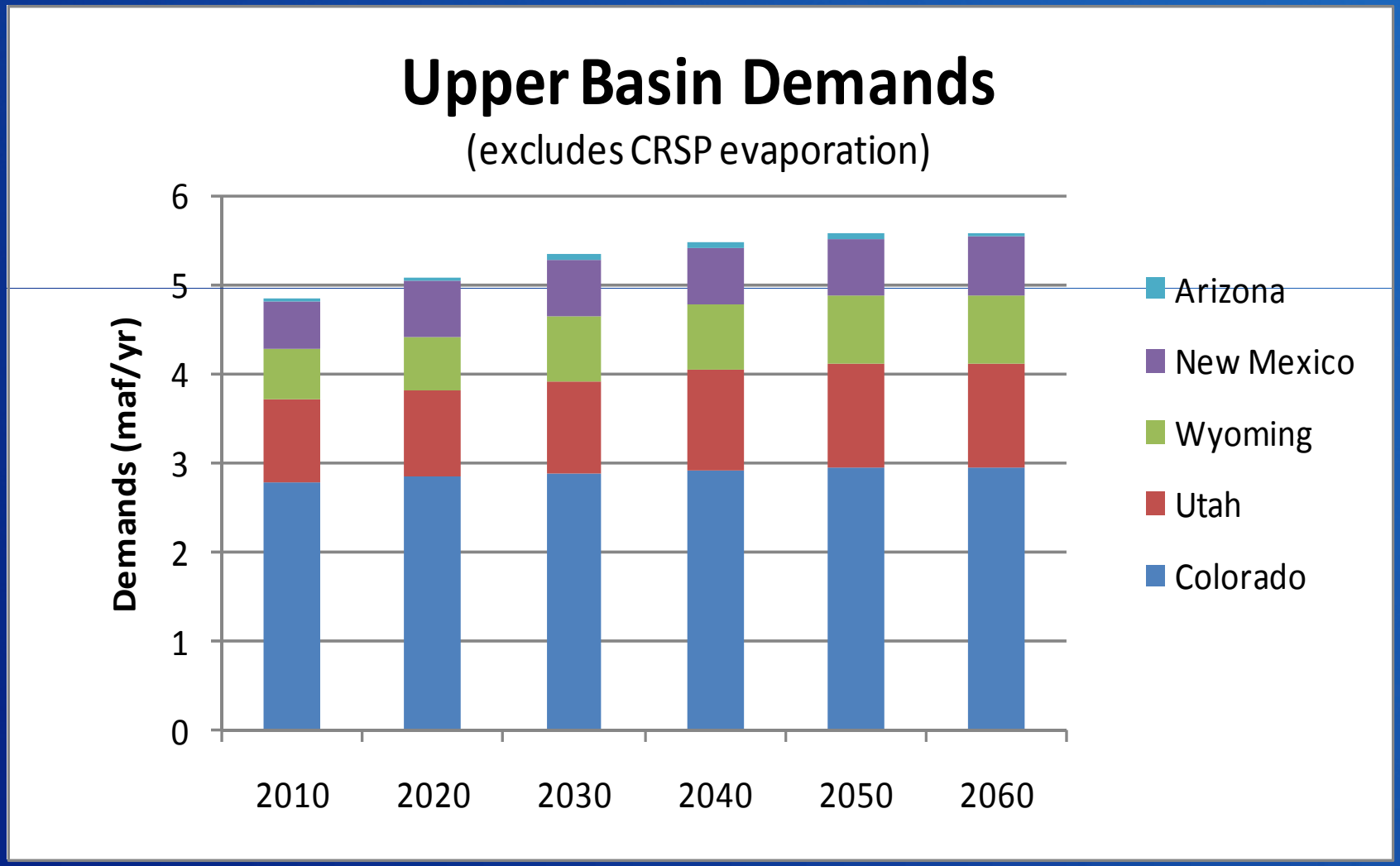
Current Demand Projections



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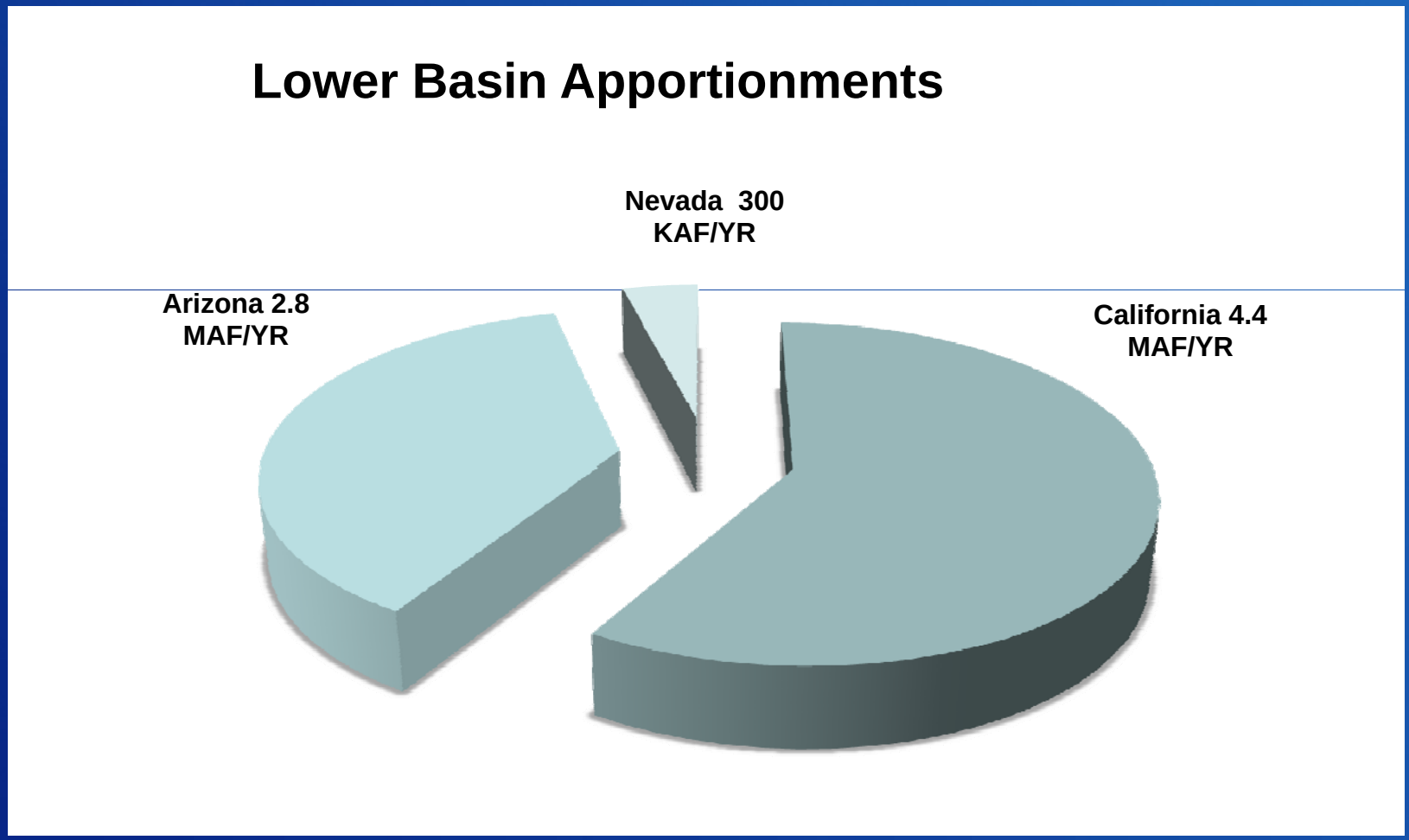
Lower Basin Apportionments



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Potential Impacts of Climate Change on Future Agriculture, Municipal, and Industrial Demands

- Future agricultural demand may be affected by changes in temperature, precipitation, and use rates (i.e., evapotranspiration of crops, irrigation efficiency, etc.)
- Future municipal demands may be affected by changes in temperature, precipitation, use rates (i.e., evapotranspiration of landscapes, conservation, etc.)
- Future industrial demands may be affected by changes in temperature and precipitation, as well as potential shifts in source for energy generation

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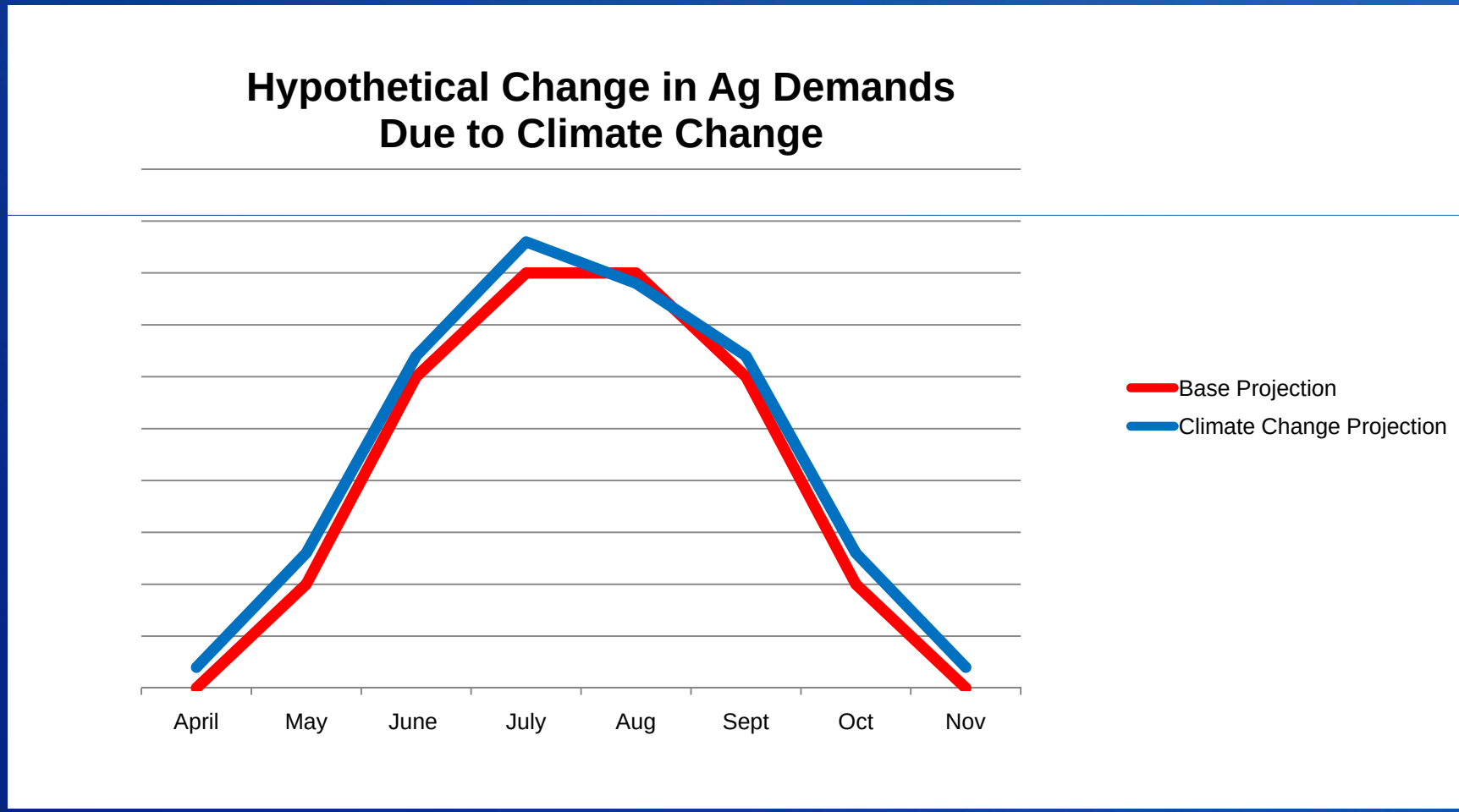
Example of Possible Future Change in Agricultural Demand Due to Climate Change



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System Reliability Metrics

- What is a Metric?
- Approach
- Major Categories

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What is a Metric?

- Evaluation criteria that are used to determine baseline and future system reliability
- Represents something that can be measured for a particular resource to quantify the reliability (susceptibility to supply/demand imbalances) of that resource

What is a Metric?

- Example
  - Category: Recreation in Lake Powell
  - Metric: Ability to reach Rainbow Bridge by water
  - Evaluation Criteria: Probability of Lake Powell's Elevation being >=3,650 feet
- Acceptable thresholds for metrics not yet identified

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Approach

- Develop a comprehensive list of metrics for evaluating system reliability
- Include information from:
  - Existing literature/compliance documents
  - Current operational analyses
  - Modeling capabilities
  - Knowledge of existing concerns on the river
- Categorize metrics as primary and secondary

Major Categories

- Water Allocations and Deliveries
- Hydroelectric Power Generation
- Water Quality
- Flood Control Management
- Recreation
- Fish and Wildlife Habitat
- Candidate Threatened and Endangered Species
- Flow and Water Dependent Ecological Resiliency
- Operational Risk
- Socioeconomic

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Considerations to Define Metrics in Major Categories

- Identify changes needed in planning model to support metrics
- Identify other models/resources needed
- Determine where outside expertise is needed and additional parties and experts that should be consulted

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Questions and Comments

Website:
http://www.usbr.gov/lc/region/programs/crbstudy.html
Email:
ColoradoRiverBasinStudy@usbr.gov

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