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Managing Water in the West

Sacramento and San Joaquin Basins Study & Climate Adaptation Options

Presentation to MCWRA and ACWA Region 3

March 11, 2014

U.S. Department of the Interior
Bureau of Reclamation

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WaterSMART – Basin Study Program Overview

Basin Studies Authorized in SECURE Water Act, Public Law 111-11, Section 9503

- **Established in 2010 by Secretary Salazar to…**
  - **Analyze existing and future basin-wide water supplies and demands**
  - **Identify potential climate impacts to supplies and demands**
  - **Identify adaptive strategies in response to climate impacts**

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Basin Study Programs

Activities under the Basin Study Program:

- **West-Wide Climate Risk Assessments**
- **Basin Studies**
  - **Basin Studies**
  - **WaterSmart follow up Special Studies**
- **Landscape Conservation Cooperatives**

Basin Studies - Mandated Elements

- **Each Basin Study "will assess specific risks to water supplies in each major river basin including":**
  - **Changes in snowpack**
  - **Changes in timing and quantity of runoff**
  - **Changes in groundwater recharge and discharge**

- **Any increase in:**
  - **Demand for water due to increasing temperatures**
  - **Rates of reservoir evaporation**

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Background

The Sacramento and San Joaquin Basins Study

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The Sacramento and San Joaquin Basins Study:

- Sacramento River Basin
- San Joaquin River Basin
- Tulare Lake Basin

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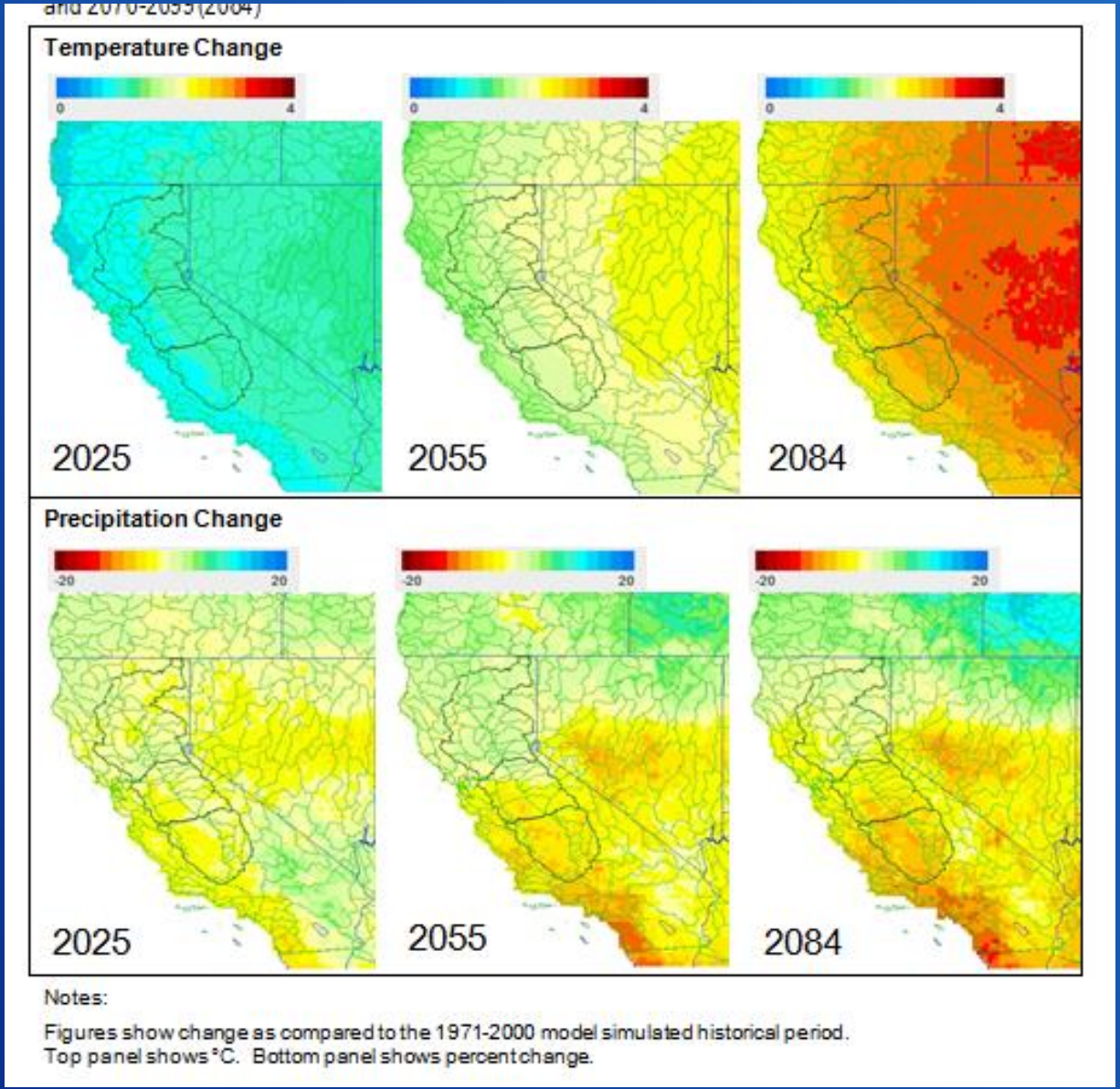
Climate Projections

Sacramento and San Joaquin Basins Study: Phase 1- CMIP3 Climate Assessment



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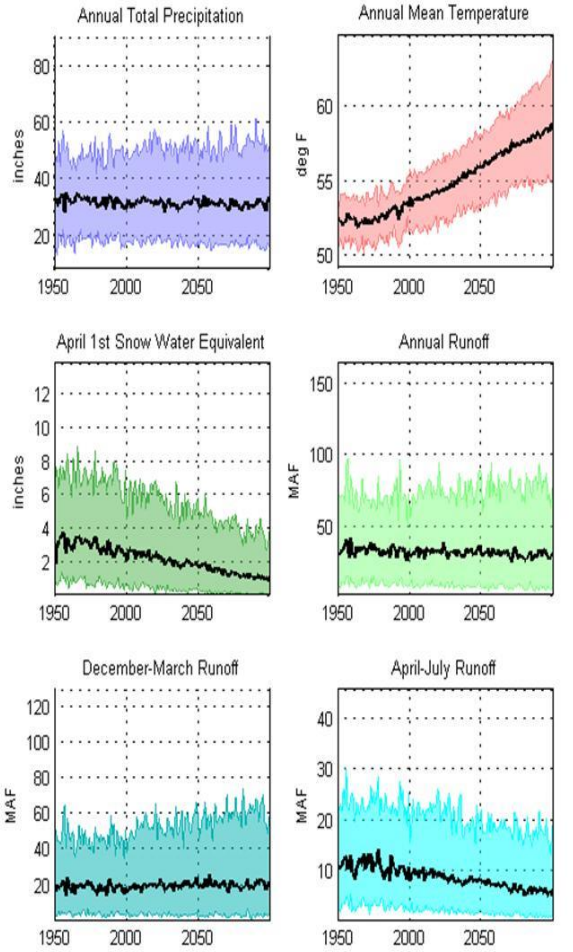
Climate Projections – Implications

- **Changes in Precipitation Patterns** (warming= more precip as rain, less snow at elevation)
- **Changes in Snowpack** (earlier melt and runoff)
- **Overall Precipitation:**
  1. Declines in the San Joaquin and Tulare Lake Basins
  2. Uncertain in the Sacramento Basin
- **Changes in Storm Track and Characteristics**

Sacramento-San Joaquin Basins



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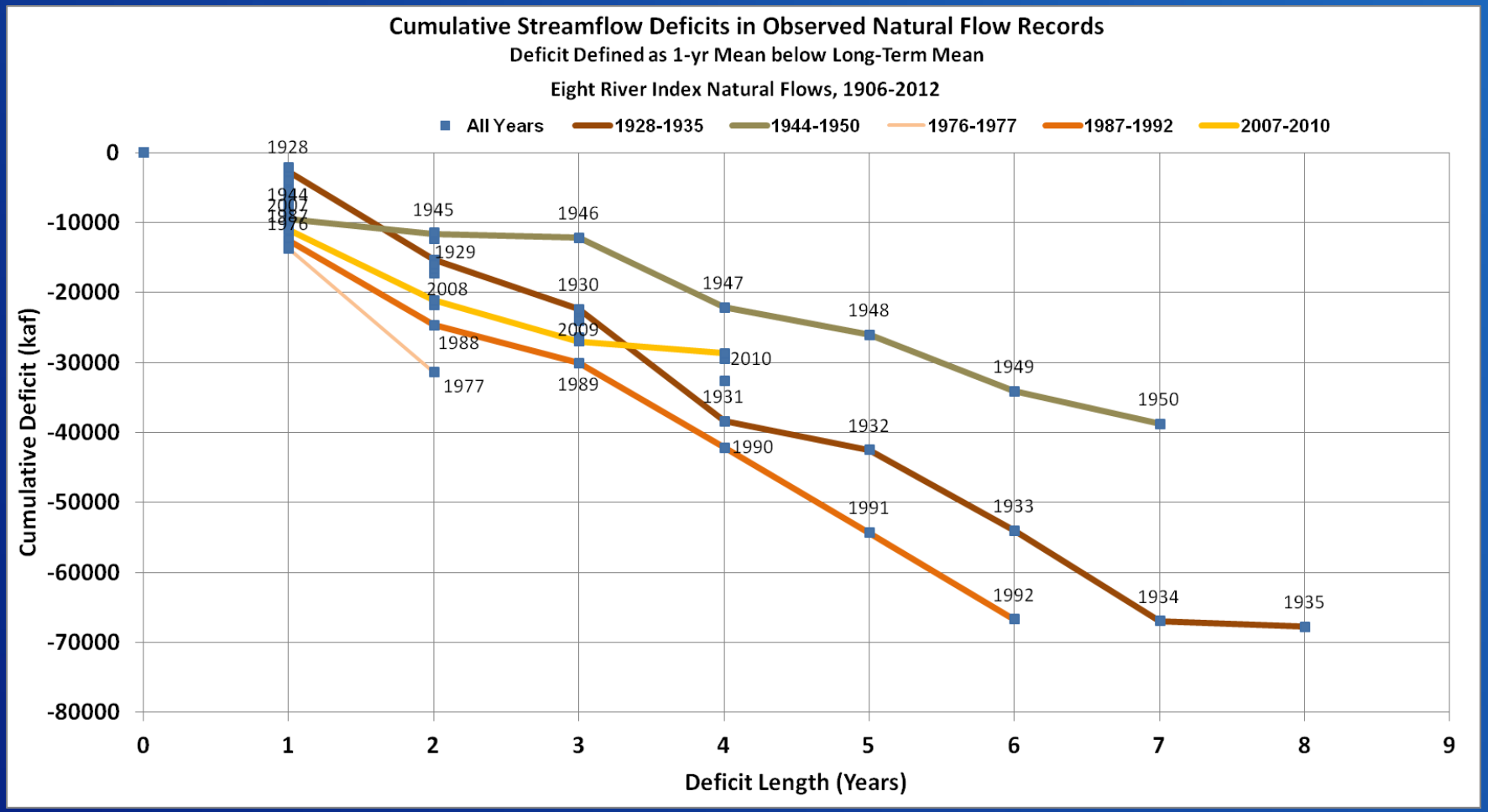
Climate Impacts-

Significant Droughts



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Projected Precipitation Changes

Simulated Changes in Decade-Mean Hydroclimate for the Sacramento River at Freeport

Hydroclimate Metric (Change from 1990)	2020's	2050's	2070's
Mean Annual Precip. (%)	-0.3	0.6	-2.7
Mean April 1st Snow Water Equiv. (%)	-53.4	-75.9	-88.6
Mean Annual Runoff (%)	3.5	2.5	-3.6
Mean December - March Runoff (%)	9.0	13.6	11.0
Mean April - July Runoff (%)	-11.1	-23.0	-36.1

SECURE Water Act, Section 9503, Report to Congress, April, 2011

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Basin Study Adaptation Strategies – Mitigating Climate Impacts

- Announcement for Adaptation Strategies and Options
- Starting April 1st through Mid May
- Public, Stakeholders and Partner Agencies
- Options and Strategies Proposed –Analyzed in Basin Study Process
- See: http://www.usbr.gov/mp/SSJBasinStudy or contact Arlan Nickel (anickel@usbr.gov)

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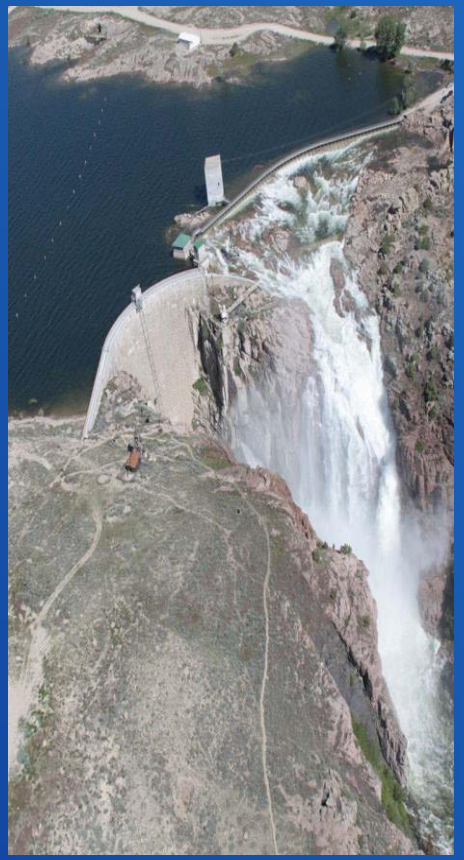
Adaptation Strategy: High Elevation Storage

What is it?
What makes it different?
What are its advantages?
How is it adaptable to climatic shifts?



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What is High Elevation Storage?

- Located in Headwater catchments of mainstem tributaries
- Western slopes of the Sierra Nevada/Southern Cascades
- Upstream of all existing terminal reservoirs

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What is High Elevation Storage?

Gerle Creek Reservoir

Bowman Reservoir

Hell Hole Reservoir

Ice House Reservoir

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What makes it different?

- First area to experience hydrologic shifts

Largely unaffected by:

- Delta operations/water quality needs
- OCAP BiOp fish passage concerns
- ESA issues – anadromous fish
- Empty space reservation flood control

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What makes it different?

- Smaller Watersheds, relatively isolated
- Steeper draining valleys
- Inflows – seasonal/non-perennial
- Distinct hydrograph – shorter refill period
- Excellent hydropower potential
- Snow dominated
- Receive first annual melt pulse

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System-Wide Benefits
From High Elevation Storage

Water Supply Benefits

- Local water supply reliability
- Augments regional water supplies
- Enhances export and water transfer opportunities

Downstream Flood Control

- Provides opportunity to relax flood space in downstream reservoirs
- Buffers high inflow rates to downstream reservoirs
- Reduce peak flow events on upper tributaries
- Reduce downstream levee failure risks

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System Wide Benefits
From High Elevation Storage

Hydropower

- Large or small-scale hydropower projects
- Local revenue generation source
- Clean renewable energy
- Use topographic characteristics – pumped storage opportunities?

Instream Benefits

- Augment seasonal instream flows
- Improve ability to meet downstream riparian/aquatic minimum flow needs
- Reduce flow ramping extremes from downstream reservoirs

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System Wide Benefits
From High Elevation Storage

Reservoir Coldwater Pool Assets

- Improve the ability to meet downstream target temps.
- Enhance ability for targeted species recovery
- Enhance late summer/fall coldwater management

Delta Water Quality Enhancements

- Increased managed Delta Inflow potential:
- Salinity Standards (Vernalis/X2)
- Habitat Protection flows

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System-Wide Benefits
From High Elevation Storage

Enhance CVP/SWP Flexibility

- Increased Retention Upstream of CVP/SWP Facilities:
  - Enhance water yield allocation
  - Increase later-season transfer potential
  - Relax downstream flood reservations
  - Lessen coldwater pool depletion

Recreational Benefits

- Water-related recreational activities
  - Whitewater rafting
  - Fishing
  - Boating
  - Water craft
  - Swimming/Camping
- Related Tourism benefits

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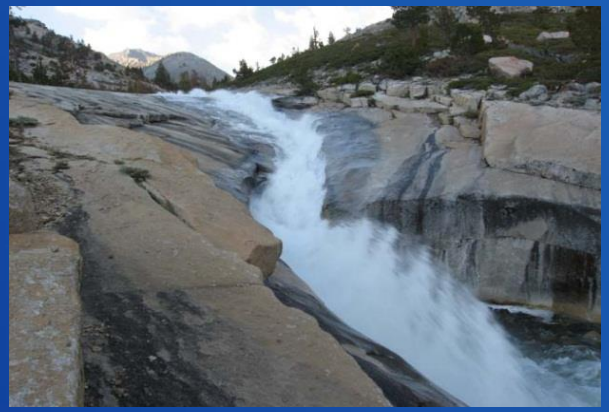
Adaptation Strategy: High Elevation Storage

Concluding Comments:

- ***New era of water storage investigations***
- ***Capture outflow during times of excess***
- ***Integrates Water Supply & Flood Control***
- ***Target the exact areas where climatic shifts will alter watershed response***
- ***Multiple public benefits – Local Water Supply Reliability, Recreation, Environment, Flood Control***
- ***Hydro Generation***



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High Elevation Storage

Next Steps:

- As proposed adaptation strategy:
  -Request Partner agencies provide locations of Proposed/Potential/Planned High Elevation Reservoirs

- Reclamation will Inventory the High Elevation Sites proposed (need watershed location, elevation and approx. AF volume)

- Analyzed in the Sacramento and San Joaquin Basins Study - one of many climate adaptation strategies

- Contact: Arlan Nickel anickel@usbr.gov or (916) 978-5061
- Basin Study Web Site: http://www.usbr.gov/mp/SSJBasinStudy

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End of Presentation

Supplemental Information Following

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