DEPARTMENT OF
# WATER RESOURCES

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Presentation to
Regional Advisory Committee
San Diego Integrated Regional Water Management Plan

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San Diego, California

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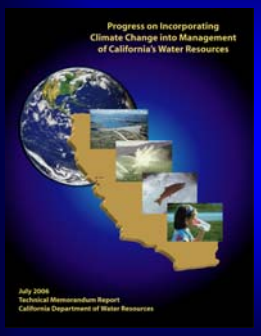
**2006 Report**
**350+ pages**
4 climate change scenarios




**2008-2009 Report**
**54 pages**
12 climate change scenarios


GCM=Global Climate Model GHG= Green House Gas Emission Scenario



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## Today's Topics

- Climate change impacts to State Water Project
- Climate change and water quality
- Reducing the carbon footprint of the SWP

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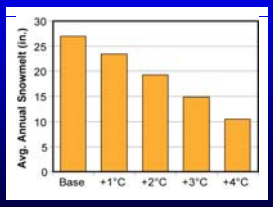
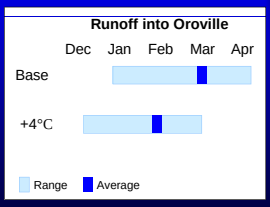
## Effect of Increasing Temperature on Upper Feather River Basin Runoff

Annual snowmelt decreased
- 15% for +1°C
- 60% for +4°C

Runoff shifts earlier in year
- Flood control vs. water supply
- For +4°C, mean runoff shifts from mid-March to mid-Feb.



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## How would climate change affect SWP-CVP water supply reliability?


SWP=State Water Project
CVP= Central Valley Project



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## SWP and CVP Water Supply Impacts

- Delta exports ↓
  - Mid-century: ~ -10%
  - End of century: ~ -25%
- Reservoir carryover storage ↓
  - Mid-century: ~ -20%
  - End of century: ~ -40%
- Sac Valley Groundwater Pumping ↑
  - Mid-century: ~ +10%
  - End of century: ~ +15%

SWP=State Water Project CVP=Central Valley Project

## SWP-CVP water supply may be vulnerable under climate change


Without changing the infrastructure and operating rules of the SWP and CVP, at times reservoirs levels are so low that no water can be released

Mid-century: 1 in every 6-8 years

End of the century: 1 in every 3-4 years

7

## Climate Change & Water Quality
### Indirect Effects

**Water system operations**
- Flood control
- Fisheries/ecosystem needs
- Recreation
- Ambient water quality

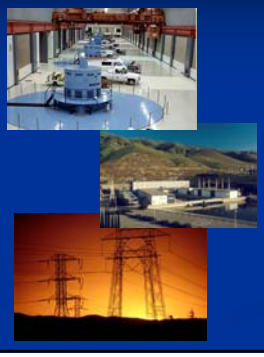
**Alternative water supplies**
- Groundwater
- Recycled water
- Desalination

**Energy use**
- Advanced water treatment technologies
- Treatment plant operations

## Climate Change Impacts on California's Water Resources

- Reduced snowpack, impacting water supply and hydropower
- Earlier snowmelt results in increased flood control demand on reservoir space
- Higher water temperatures impacts ecosystem
- Sea level rise impacts the Delta, threatens levees and increases salinity
- Increased demand in all sectors

## Water, Energy and Climate Change



Future water management activities must carefully consider strategies to reduce greenhouse gas emissions

## Climate Change & Water Quality
### Direct Effects

**Watershed responses**
- Changes in vegetation, soil moisture, groundwater infiltration, erosion

**Runoff timing**
- Less dilution during during the dry season, droughts
- More (and more polluted) runoff during flood season
- Infrastructure damage from flooding

**Influent water quality**
- Changes in temperature, pH, turbidity, dissolved oxygen, nutrients
- Impacts to treatment processes

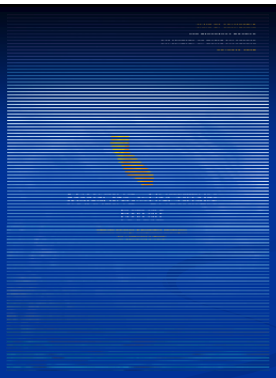
**Sea level rise/salinity**
- Sacramento-San Joaquin Delta
- Coastal aquifers

## California Climate Action Registry Overview

- The California Climate Action Registry (CCAR) is a private non-profit organization originally formed by the State of California.
- The CCAR serves as a voluntary greenhouse gas (GHG) registry to protect and promote early actions to reduce GHG emissions by organizations.
- In 2007, DWR joined the CCAR to ensure that its annual carbon footprint could be estimated using credible, accurate, and consistent GHG reporting standards and tools to measure, and monitor its emissions.
- As a CCAR member DWR annually measures, verifies (through an independent third party certifier), and publicly reports its GHG emissions.
- Each annual report cites the data from the previous year. DWR's 2007 submission was delayed due to contractual problems with the Department of General Services.

## CDWR GHG Emissions Sources

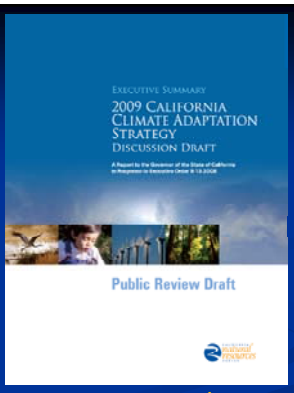
- CDWR organized and reported its 2007 inventory of $CO_2$ emissions to the CCAR based upon its energy consumption data associated with the seven Divisions with traceable emissions
- Emissions are assigned according to the smallest aggregate units possible (e.g., regional District Offices, or Field Divisions)
- Where energy consumption could be traced to a specific site, CDWR reported emissions at the facilities level.
- Altogether, CDWR reported its inventory for 57 different sites, ranging from field offices, to entire Divisions



**Climate Change Water Adaptation White Paper**
**www.climatechange.water.ca.gov**

## CDWR GHG Emissions Detail

| DWR 2007 Sources | MT $CO_2$ | Percentage |
|---|---|---|
| SWP Portfolio Purchases | | |
| *Reid Gardner Unit No. 4* | 1,400,930 | 43.213% |
| *Contractual/Market Purchases* | 1,822,667 | 56.222% |
| | **3,223,597** | **99.436%** |
| DWR Facilities | | |
| *Metered Facilities* | 3,659 | 0.113% |
| *Estimated Facilities* | 935 | 0.029% |
| | **4,594** | **0.142%** |
| DWR Vehicular Fuel Purchases | | |
| *Voyager Fuel (Retail)* | 4,098 | 0.126% |
| *SAP Fuel (Bulk)* | 9,506 | 0.293% |
| | **13,604** | **0.420%** |
| DWR Stationary Equipment | | |
| *Back-up Generators* | 91 | 0.003% |
| ***Grand Total*** | ***3,241,886*** | ***100%*** |




**www.climatechange.gov/adaptation**