



**AgEcon** SEARCH  
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

*The World's Largest Open Access Agricultural & Applied Economics Digital Library*

**This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.**

**Help ensure our sustainability.**

Give to AgEcon Search

AgEcon Search  
<http://ageconsearch.umn.edu>  
[aesearch@umn.edu](mailto:aesearch@umn.edu)

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*



**Congressional Research Service**

Assisting the Congress with its deliberations and legislative decisions

# ***California Drought: Hydrologic and Regulatory Issues in 2009***

Betsy A. Cody  
Congressional Research Service  
Library of Congress

February 19, 2010 Agricultural Outlook Forum

# California Case Study: Key Points

---

- Economic losses across the state
- Its Complicated -- More than farms vs. fish
- State law and State water rights play large role in water allocation decisions



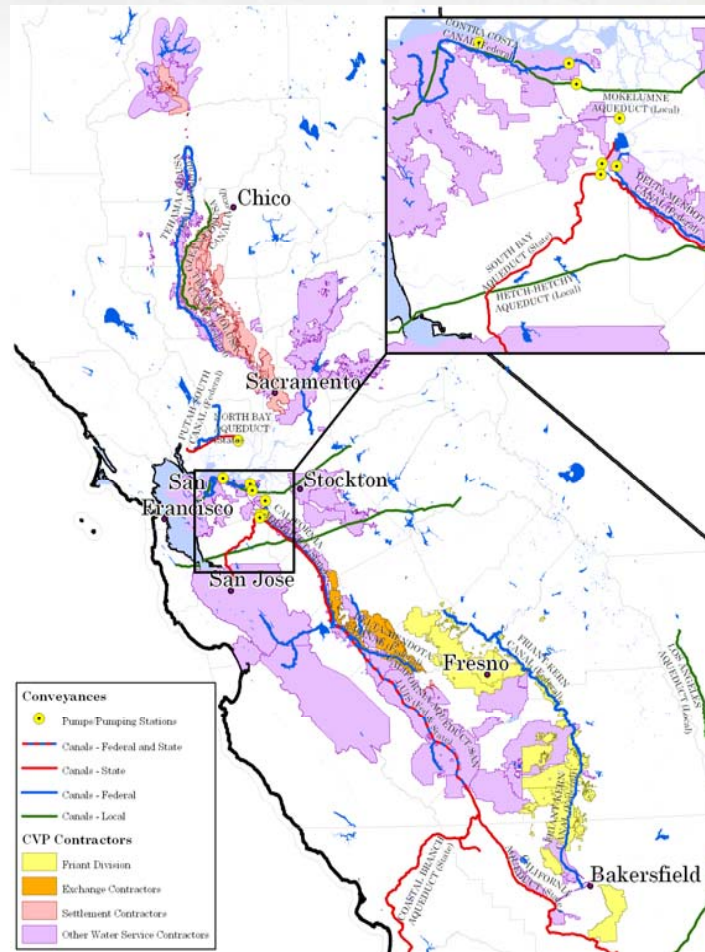
## Overview of Water Supply System

---

- Major storage reservoirs release water to Delta
- Delta water pumped to Central Valley and Southern CA
- Some water used in-Delta (Ag, M&I, F&W)



# CVP Service Area by Contract Type





# CVP Management Factors

---

- Water Availability (Drought factors)
- State & Federal Environmental regulations
- State water rights and Project Contracts
- Other rules, such as flood storage, timing of reservoir releases, etc. (not discussed)



## 2009 Management Factors: Drought

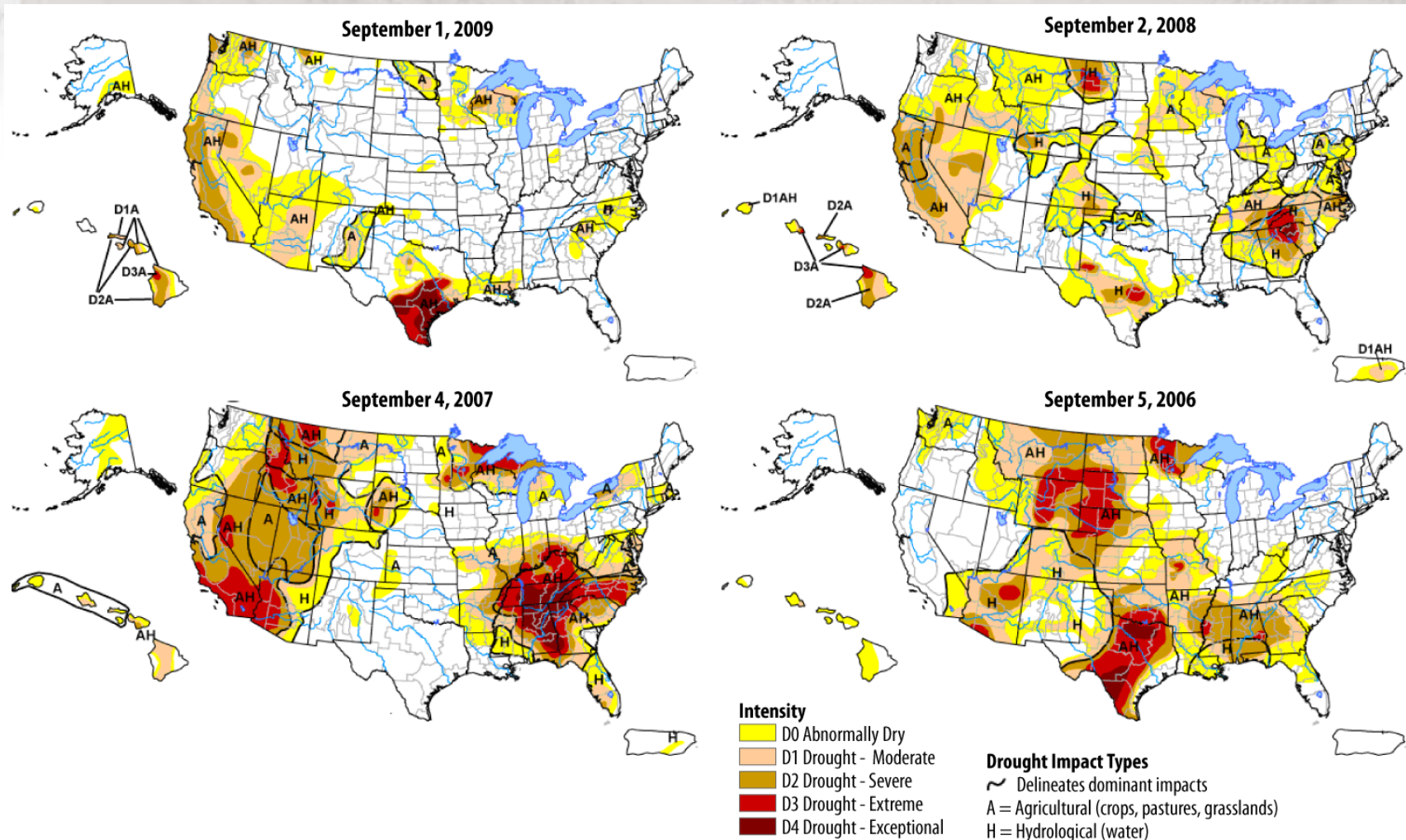
---

- Below average runoff, reservoir levels, and groundwater levels (2007-2009)
- Precipitation: 76% of normal for water year
- Key reservoirs at 69% of normal
- Sierra snowpack water content below normal





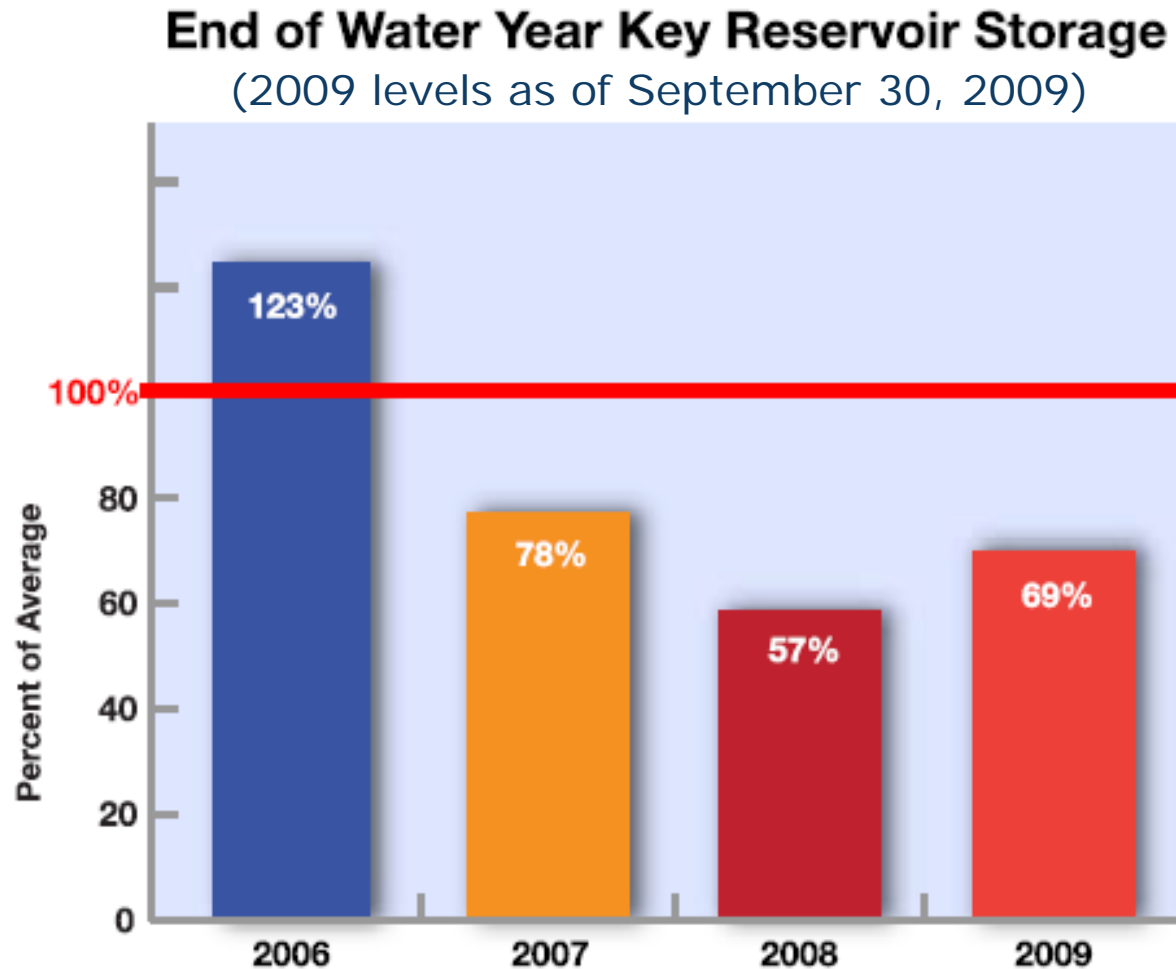
# Figure I. U.S. Drought Monitor Maps for Early September 2006-2009



Source: U.S. Drought Monitor, at <http://drought.unl.edu/DM/MONITOR.html>.



## Figure 2. Reservoir Storage at the End of the Water Year, as a Percent of Average, for Seven Reservoirs in California



**Source:** California Department of Water Resources, "California's Drought Update," Figure 2 (Nov. 30, 2009), at <http://www.water.ca.gov/drought/docs/DroughtUpdate-113009.pdf>.

**Notes:** The seven reservoirs identified as "key" by the California DWR are Trinity, Shasta, Oroville, Folsom, Don Pedro, New Melones, and San Luis.



## 2009 Management Factors: Environmental Regulations

---

- 1995 Delta Water Quality Control Plan & D-1641
- 1992 Central Valley Project Improvement Act (Title 34 of P.L. 102-575)
- Endangered Species Act (ESA)
  - Biological Opinions
  - Court Rulings



## 2009 Management Factors Environmental Regulations (cont.)

---

- 1995 Water Quality Control Plan & D-1641
  - Amends water rights of CVP & SWP
  - Requires export limits
  - Affects amount and timing of water “exported” from the Delta
  - Flow and water quality objectives for water supply and F&W purposes



## **CVP Management Factors** Environmental Regulations (cont.)

---

- 1992 Central Valley Project Improvement Act (CVPIA, Title 34 of P.L. 102-575)
  - Elevates fish & wildlife as official project purposes
  - Mandates mitigation of CVP damages to F&W resources (specific restoration activities)
  - Requires doubling of certain fish populations
  - Allocates 800 kaf of CVP water to F&W purposes and establishes supply levels for wildlife refuge areas



## 2009 CVP Management Factors Environmental Regulations (cont.)

---

- ESA Biological Opinions (BiOps)
  - State and Federal laws protect species
  - ESA requires BiOps (CVP/SWP operational changes proposed in 2004 triggered)
  - If “Jeopardy” found, BiOps will include “Reasonable and Prudent Alternatives”
  - Delta Smelt & NMFS BiOps found jeopardy resulting in pumping restrictions in RPAs



# CVP Management Factors

---

- California State Water Rights
  - Riparian rights
    - Depend on land ownership along waterways, generally met before appropriative rights;
    - Generally, proportional reduction in time of shortage
  - Appropriative rights
    - First in time, first in right
- Project Contract Obligations



## Effect of Management Factors on Delta Pumping Operations in 2009

---

- Exports reduced by 37% - 42%
  - Widespread economic losses
- 75% -81% of reduction (1.6 maf) due to “lack of run-off” and other factors (D-1641), etc.
- 19% - 25% reduction due to ESA (2008 Smelt BiOp .5 maf); likely higher in 2010)



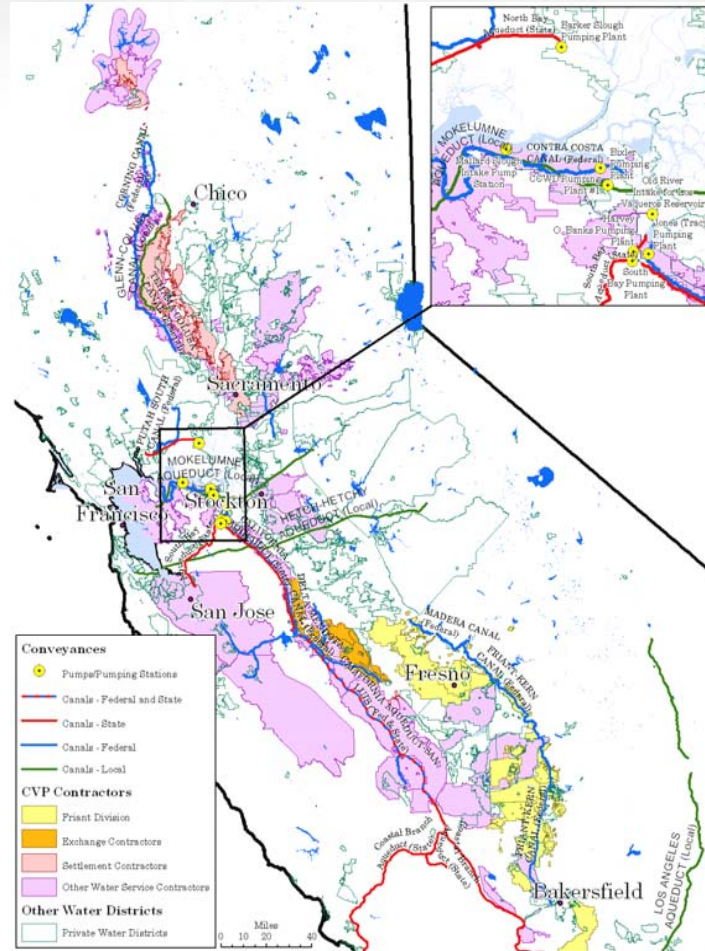


## CVP Contractor 2009 Water Allocations

<b>CVP Contractors</b>	<b>February</b>	<b>March</b>	<b>April</b>	<b>May</b>
<b>Senior Water Rights</b>				
San Joaquin Exchange Contractors	75%	100%	100%	100%
Sacramento River Settlement Contractors	75%	100%	100%	100%
<b>Wildlife Refuges</b>				
NOD Refuges	75%	100%	100%	100%
SOD Refuges	75%	100%	100%	100%
<b>Friant Division</b>				
Class I Contractors	25%	65%-85%	90%	100%
Class II Contractors	0%	0%	0%	18%
<b>Other CVP Water Service Contractors</b>				
NOD Ag. Service	0%	5%	15%	40%
NOD M&I	50%	55%	65%	75%- 100%
SOD Ag. Service	0%	0%	10%	10%
SOD M&I	50%	50%	60%	60%



# CVP Service Areas by Contract Type (includes major federal and state conveyance systems)



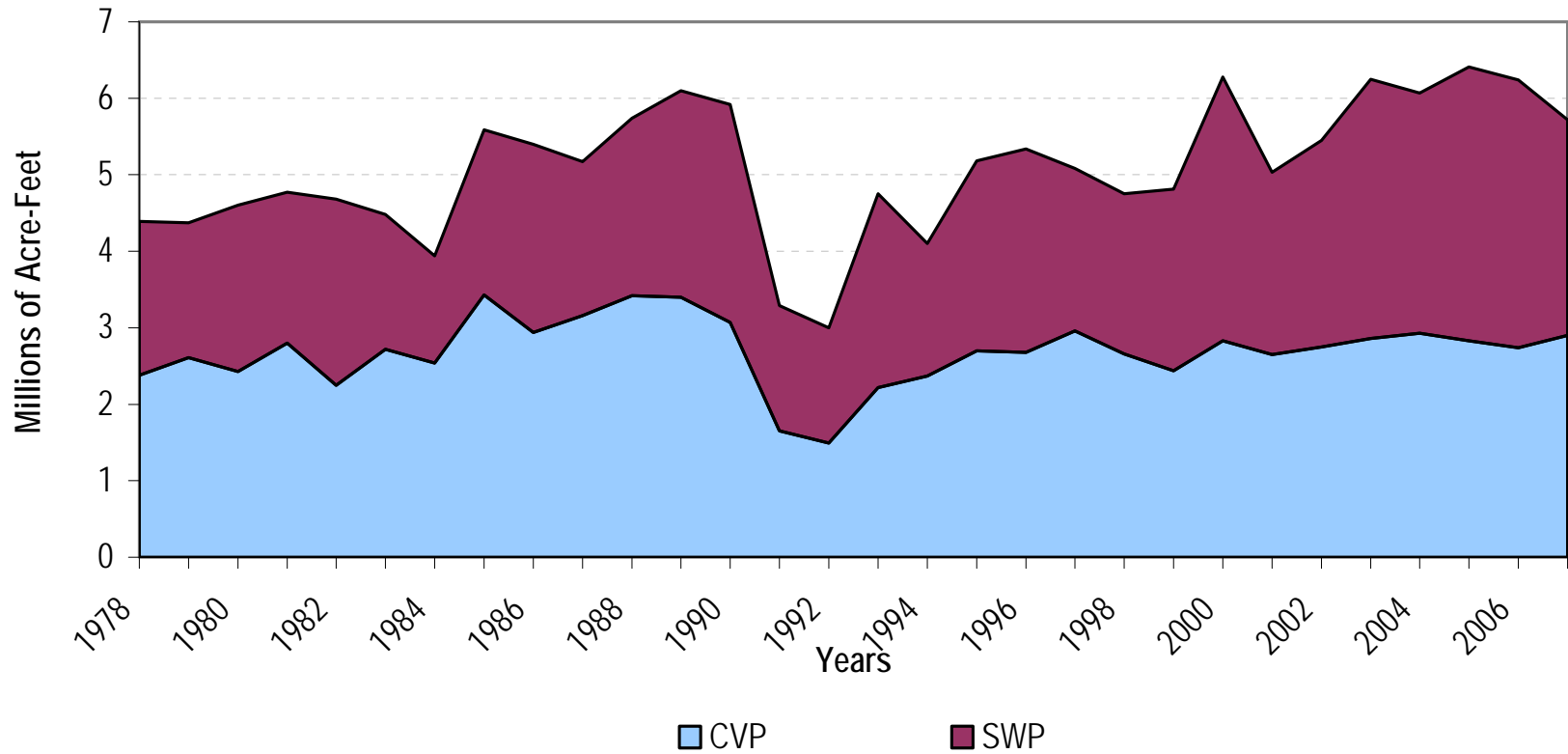
## 2009 Delta Exports Compared to 1987-1992 Drought

---

- 1991 and 1992, exports were 3.3 maf and 3.0 maf, respectively;
- 2009 exports estimated at 3.6 maf;
- Yet, lower reservoir levels south of Delta due to restrictions on pumping;
- More export water going to SWP;
- Harsh reductions for junior agricultural water service contractors Westside SJV.



# CVP and SWP Delta Water Exports 1978 – 2007



(Source: U.S. Dept. of the Interior, Reclamation)



## Outlook for 2010

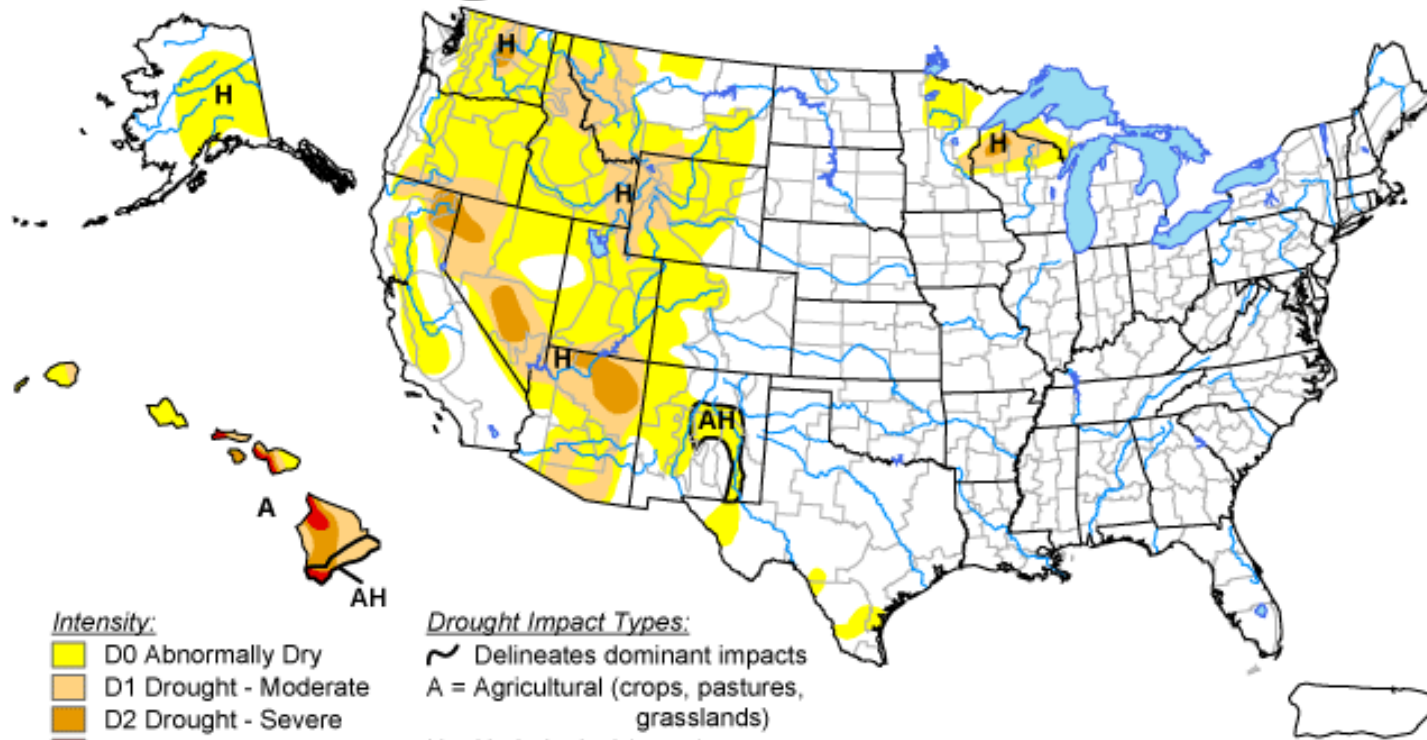
---

- Drought Conditions improved (U.S. Drought Monitor, Feb. 16, 2010)
- Precipitation and snowpack water content, are above average
- Reservoir levels below average
- ESA impacts higher in wetter year
- Projected run-off? Water allocations next week
- Significant reductions again for some water users --- SJV and possibly southern CA








# U.S. Drought Monitor


February 16, 2010  
Valid 7 a.m. EST



Intensity:

-  D0 Abnormally Dry
-  D1 Drought - Moderate
-  D2 Drought - Severe
-  D3 Drought - Extreme
-  D4 Drought - Exceptional

Drought Impact Types:

-  Delineates dominant impacts
- A = Agricultural (crops, pastures, grasslands)
- H = Hydrological (water)

*The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.*

<http://drought.unl.edu/dm>

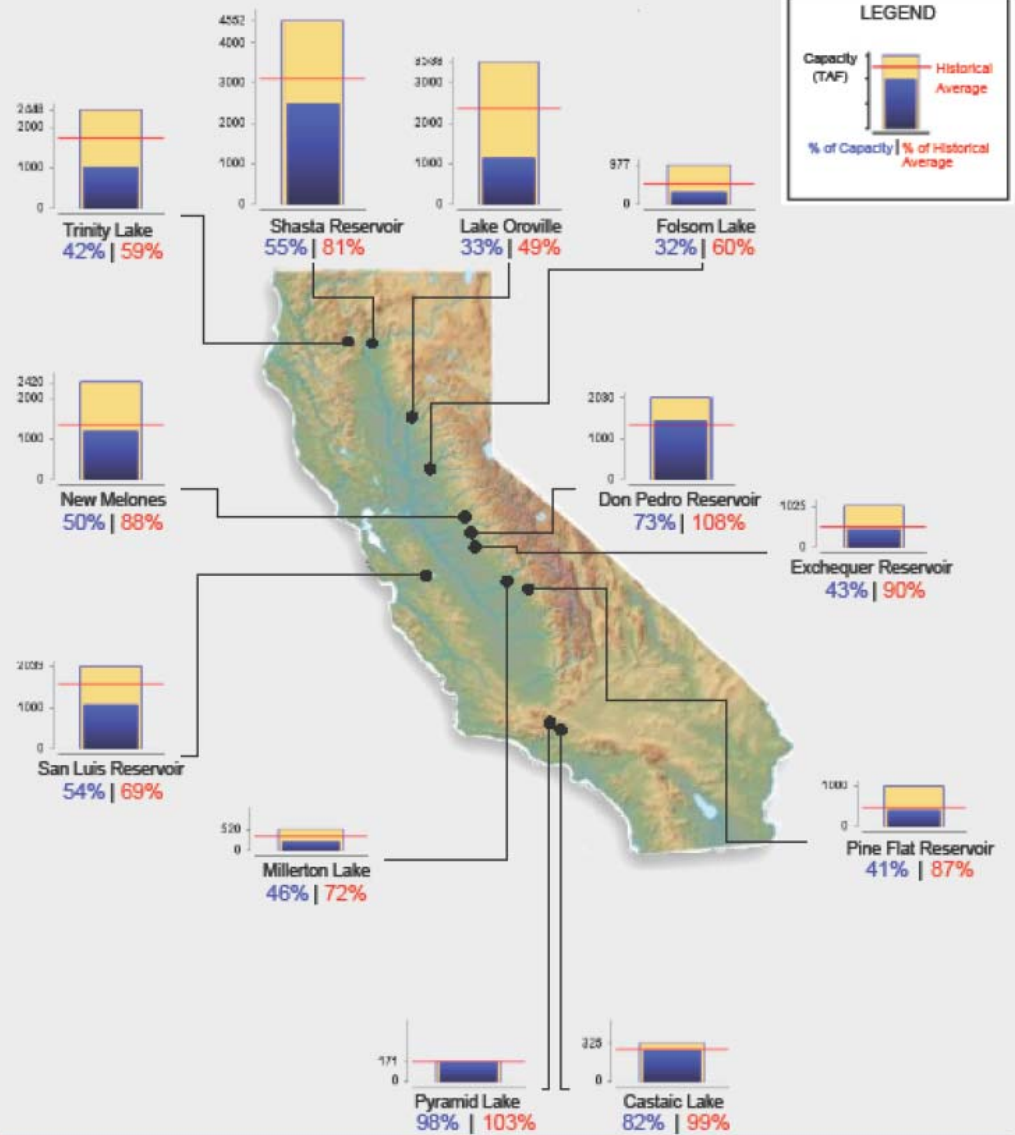


**Released Thursday, February 18, 2010**

**Author: Brian Fuchs, National Drought Mitigation Center**



# CURRENT RESERVOIR CONDITIONS



Graph Updated 01/28/2010 12:15 PM



# Conclusion

---

- 75% - 80% of Delta export reductions in 2009 due to hydrologic and non-ESA factors
- 20% - 25% due to Delta Smelt pumping restrictions (likely to be higher in 2010)
- Regulatory & court-ordered restrictions exacerbate effects of drought for water users, particularly junior water rights holders
- Lifting ESA restrictions will not solve water supply shortages; other State and Federal law, including state water rights system, still apply.





# Summary Bay-Delta Standards

Contained in D-1641

CRITERIA	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
<b>FLOW/OPERATIONAL</b>												
• Fish and Wildlife												
SWP/CVP Export Limits					1,600cfs <sup>[1]</sup>							
Export/Inflow Ratio <sup>[2]</sup>	65%		35% of Delta Inflow <sup>[3]</sup>						65% of Delta Inflow			
Minimum Delta Outflow	<sup>[4]</sup>								3,000 - 8,000 cfs <sup>[4]</sup>			
Habitat Protection Outflow			7,100 - 29,200 cfs <sup>[5]</sup>									
Salinity Starting Condition <sup>[6]</sup>		<sup>[6]</sup>										
River Flows:												
@ Rio Vista									3,000 - 4,500 cfs <sup>[7]</sup>			
@ Vernalis - Base		710 - 3,420 cfs <sup>[8]</sup>					<sup>[8]</sup>					
- Pulse					<sup>[9]</sup>					+28TAF		
Delta Cross Channel Gates	<sup>[10]</sup>		Closed									Conditional <sup>[10]</sup>
<b>WATER QUALITY STANDARDS</b>												
• Municipal and Industrial												
All Export Locations									≤ 250 mg/l Cl			
Contra Costa Canal									150 mg/l Cl for the required number of days <sup>[11]</sup>			
• Agriculture												
Western/Interior Delta									Max 14-day average EC in mg/l cm <sup>[12]</sup>			
Southern Delta <sup>[13]</sup>		1.0 mS				30 day running avg EC 0.7 mS				1.0 mS		
• Fish and Wildlife												
San Joaquin River Salinity <sup>[14]</sup>					14-day avg: 0.44 EC							
Suisun Marsh Salinity <sup>[15]</sup>	12.5 EC	8.0 EC			11.0 EC					19.0 EC <sup>[16]</sup>		15.5 EC

