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California Drought: Hydrologic and Regulatory Issues in 2009

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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

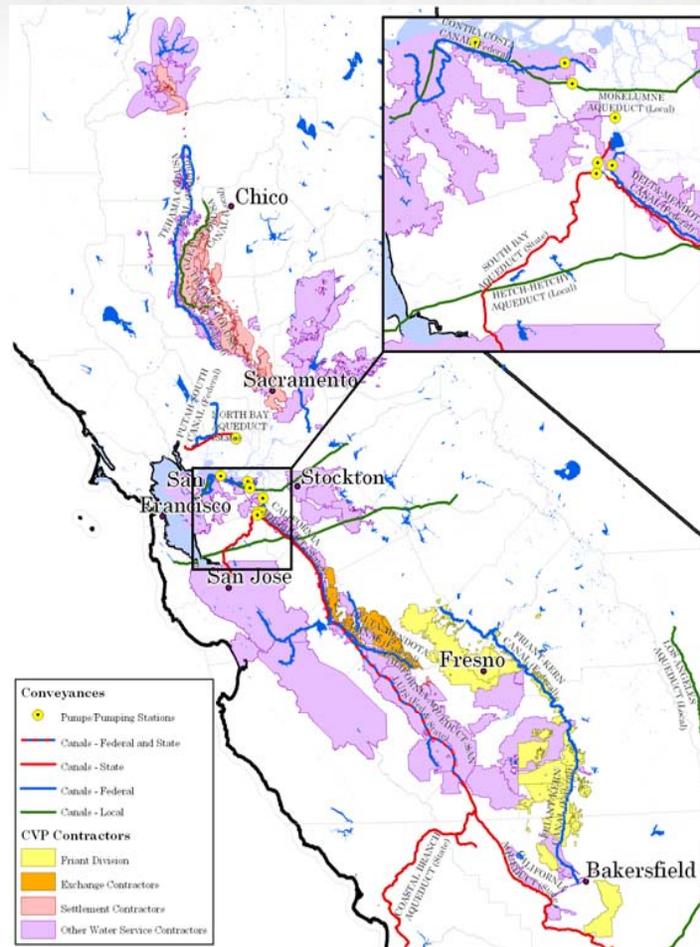


Overview of Water Supply System

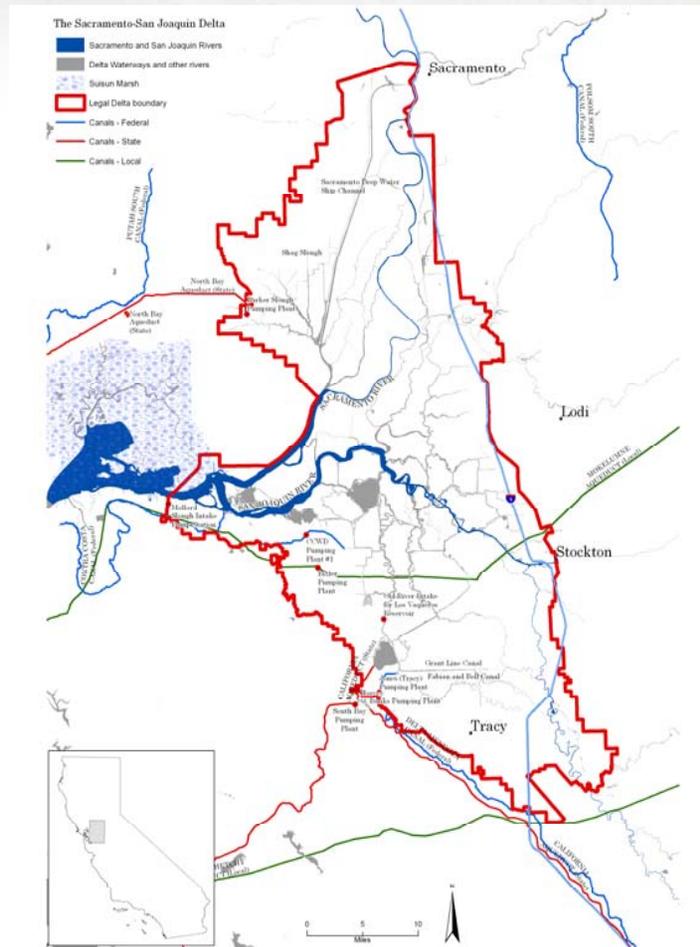
- Major storage reservoirs release water to Delta
- Delta water pumped to Central Valley and Southern CA
- Some water used in-Delta (Ag, M&I, F&W)



CVP Service Area by Contract Type



San Francisco Bay/Sacramento and San Joaquin Rivers Delta (Delta)



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)

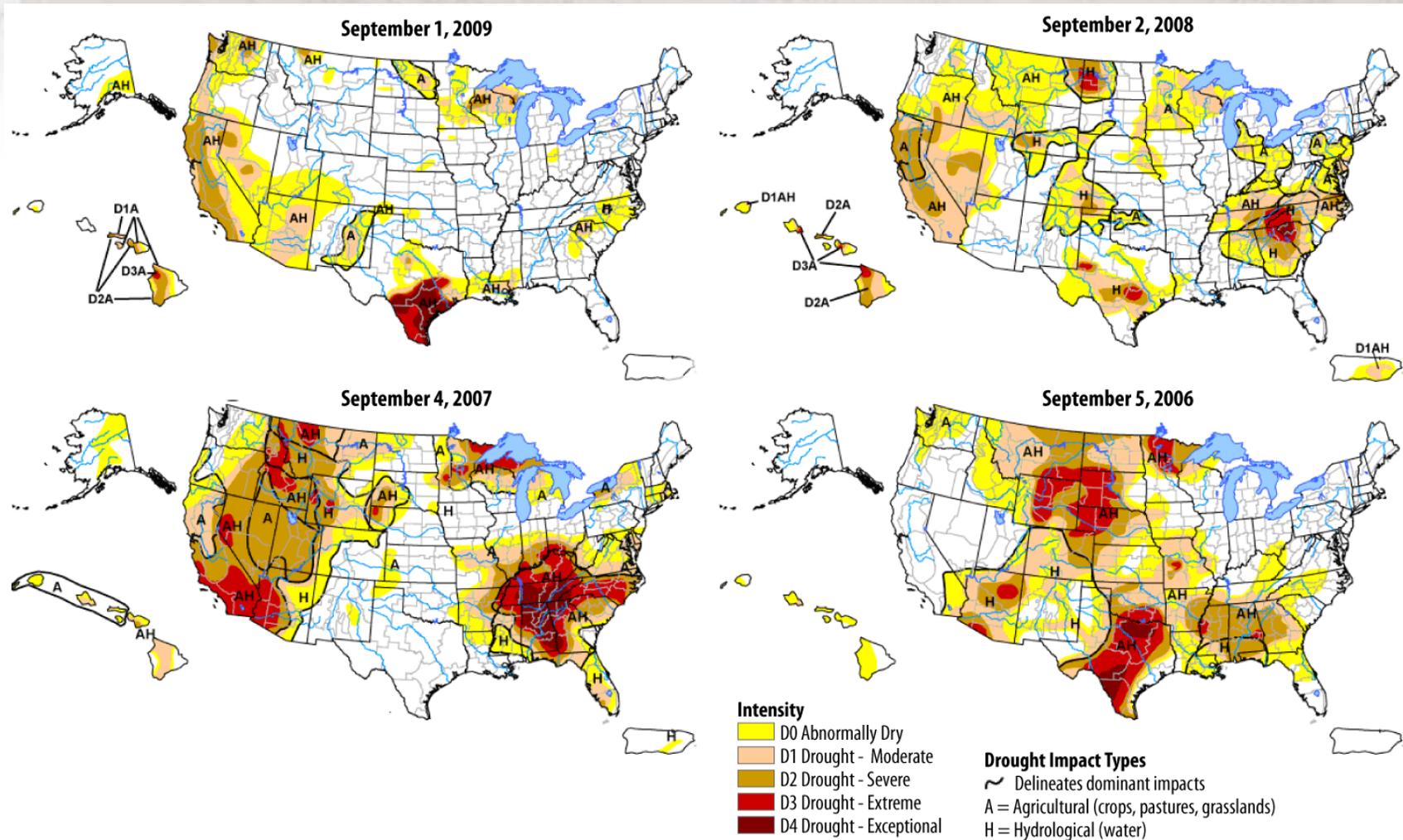


2009 Management Factors: Drought

- 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



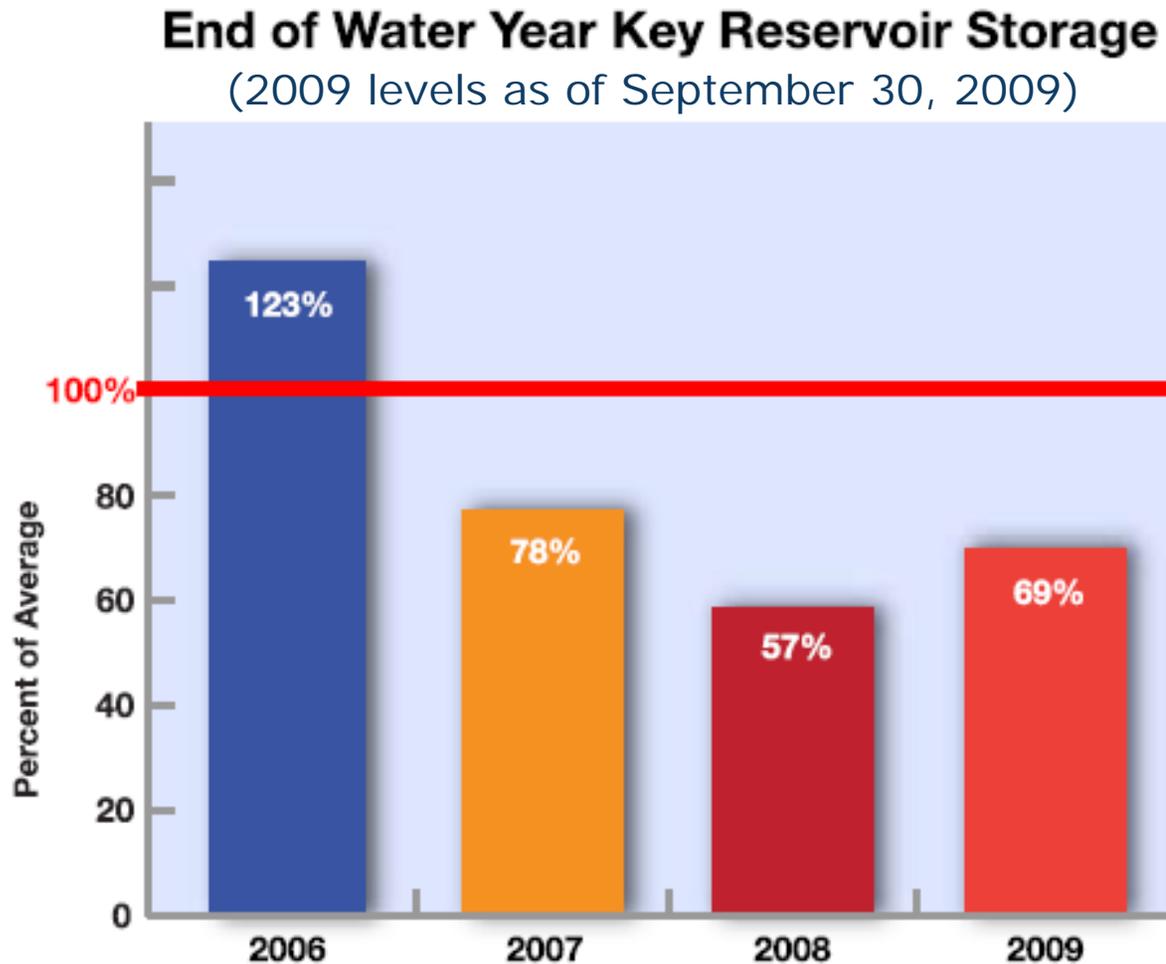
Figure I. U.S. Drought Monitor Maps for Early September 2006-2009



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)



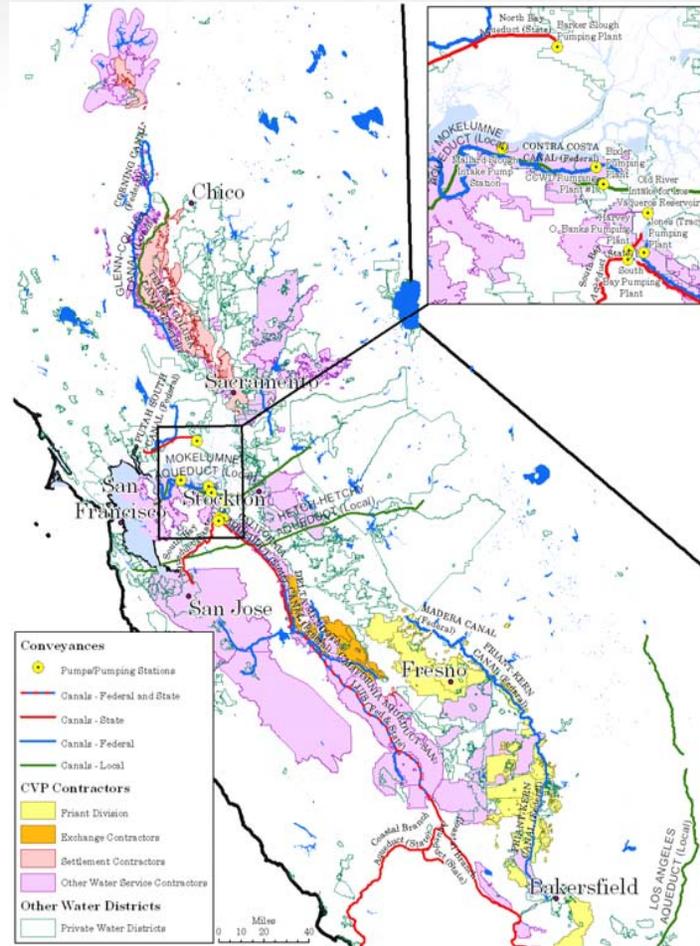
CVP Contractor 2009 Water Allocations

CVP Contractors	February	March	April	May
Senior Water Rights				
San Joaquin Exchange Contractors	75%	100%	100%	100%
Sacramento River Settlement Contractors	75%	100%	100%	100%
Wildlife Refuges				
NOD Refuges	75%	100%	100%	100%
SOD Refuges	75%	100%	100%	100%
Friant Division				
Class I Contractors	25%	65%-85%	90%	100%
Class II Contractors	0%	0%	0%	18%
Other CVP Water Service Contractors				
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)

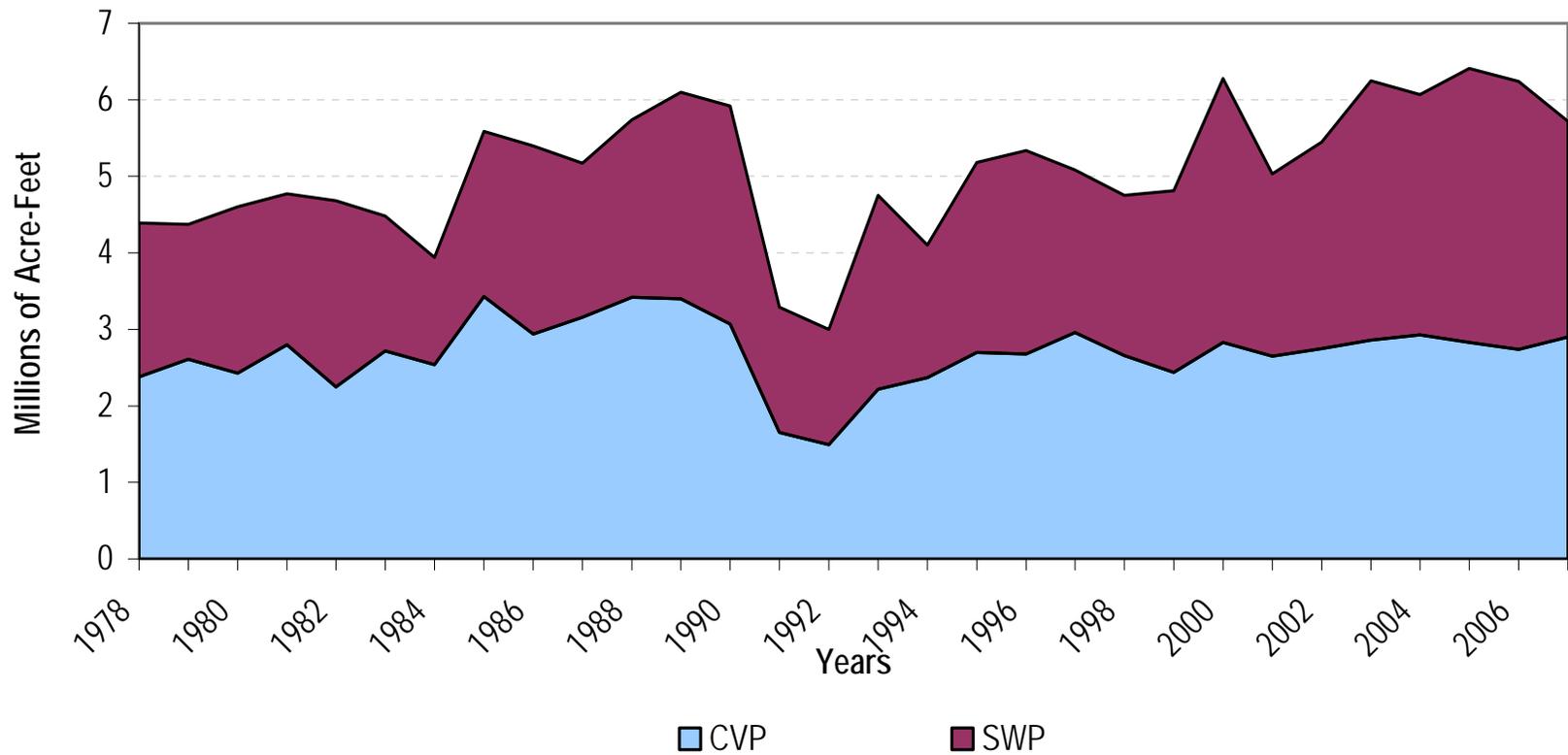


2009 Delta Exports Compared to 1987-1992 Drought

- 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)



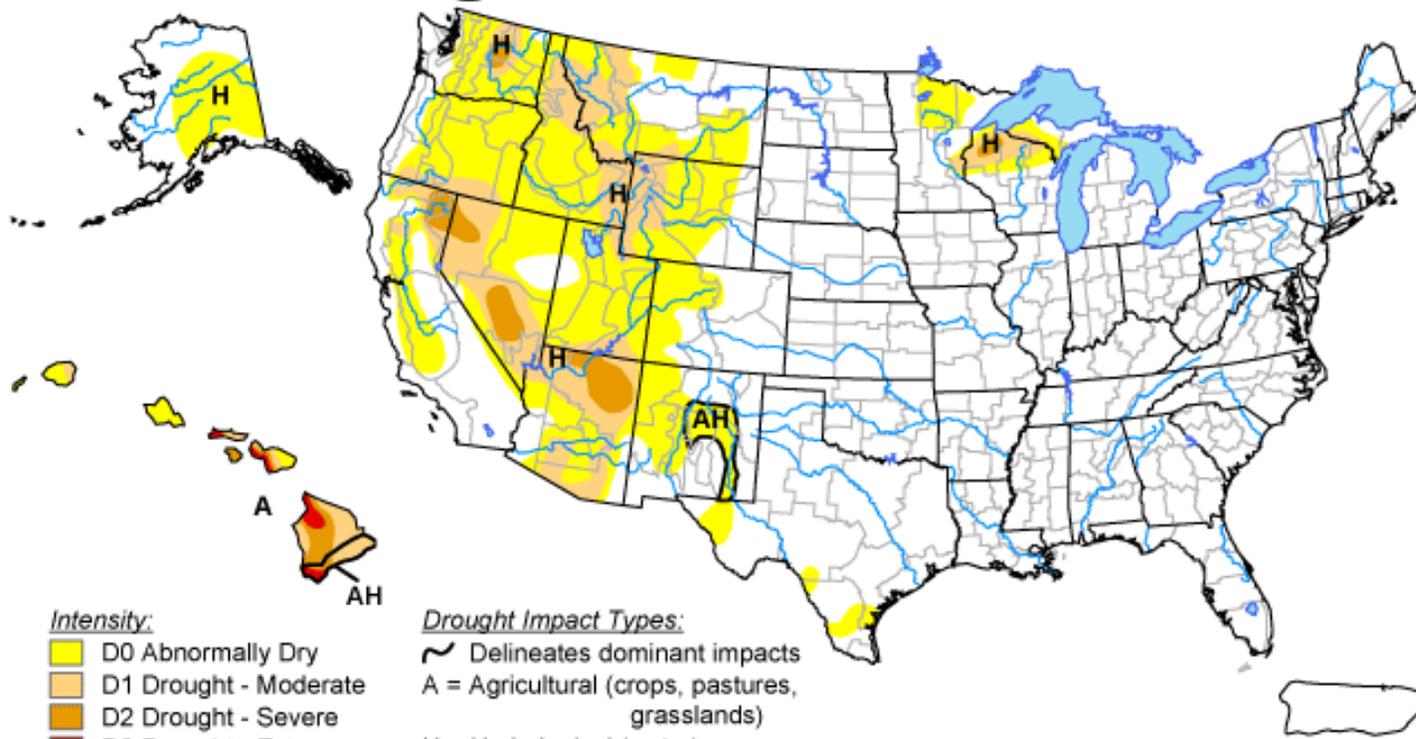
Outlook for 2010

- 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>

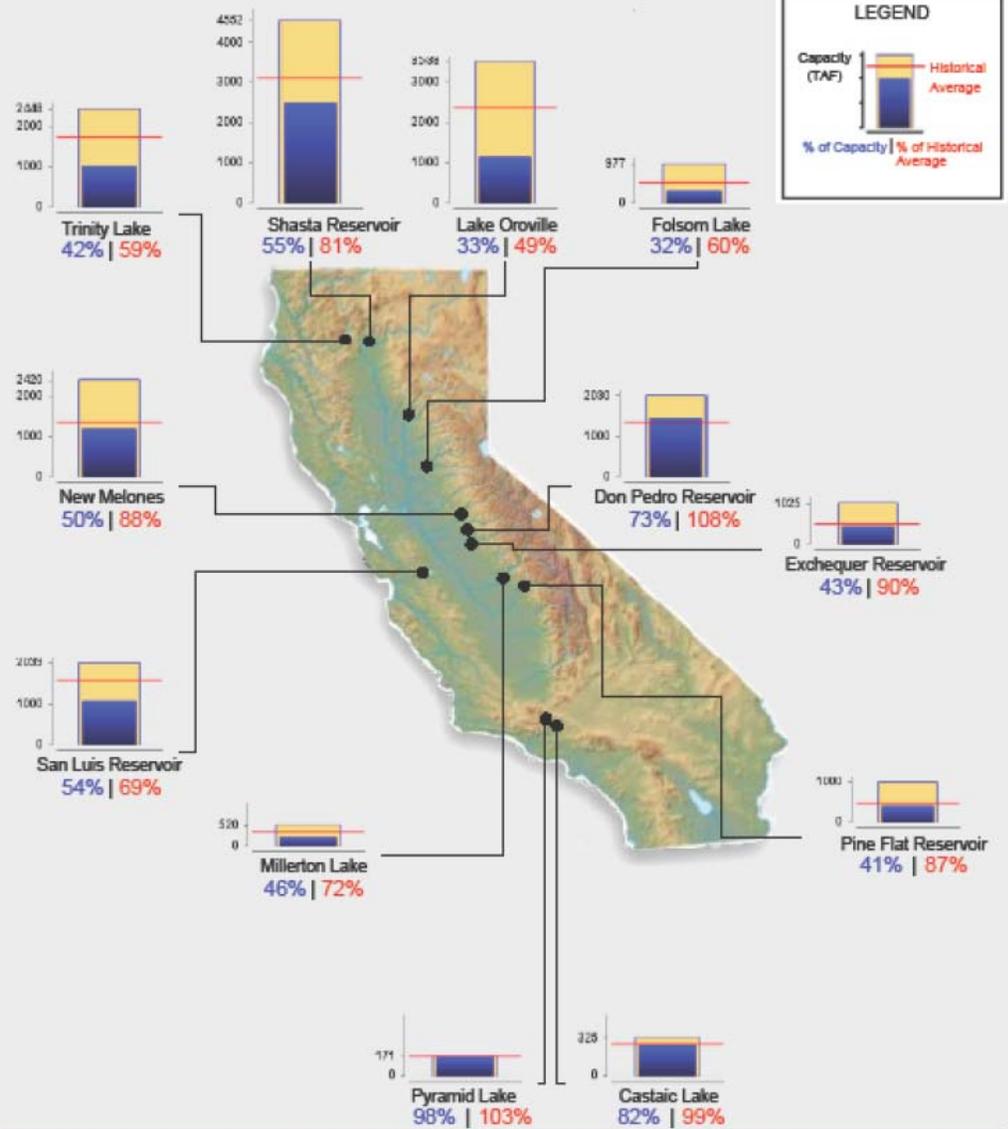


Released Thursday, February 18, 2010

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
FLOW/OPERATIONAL												
• Fish and Wildlife												
SWP/CVP Export Limits				1,600cfs ^[1]								
Export/Inflow Ratio ^[2]	65%	35% of Delta Inflow ^[3]					65% of Delta Inflow					
Minimum Delta Outflow	^[4]						3,000 - 8,000 cfs ^[4]					
Habitat Protection Outflow			7,100 - 29,200 cfs ^[5]									
Salinity Starting Condition ^[6]	^[6]											
River Flows:												
@ Rio Vista									3,000 - 4,500 cfs ^[7]			
@ Vernalis - Base	710 - 3,420 cfs ^[8]					^[8]						
- Pulse					^[9]				+28TAF			
Delta Cross Channel Gates	^[10]	Closed									Conditional ^[11]	
WATER QUALITY STANDARDS												
• Municipal and Industrial												
All Export Locations	≤ 250 mg/l Cl											
Contra Costa Canal	150 mg/l Cl for the required number of days ^[12]											
• Agriculture												
Western/Interior Delta	Max 14-day average EC mmhos/cm ^[13]											
Southern Delta ^[14]	1.0 mS		30 day running avg EC 0.7 mS					1.0 mS				
• Fish and Wildlife												
San Joaquin River Salinity ^[15]	14-day avg; 0.44 EC											
Suisun Marsh Salinity ^[16]	12.5 EC	8.0 EC	11.0 EC					19.0 EC ^[17]		^[17]	15.5 EC	

