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Central Valley Project (CVP) Operations: In Brief

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Summary

California is in its fifth year of drought. Rain and snowstorms in Northern and Central California in the winter of 2015-2016 improved hydrologic conditions but did not eliminate the state's ongoing drought. As of March 29, 2016, approximately 73% of the state was suffering from severe drought conditions. This figure represents an improvement from one year ago, when 93% of the state fell under the severe drought designation.

The stress on water supplies due to the drought has resulted in cutbacks in water deliveries to districts receiving water from federal and state facilities, in particular the federal Central Valley Project (CVP, operated by the Bureau of Reclamation within the Department of the Interior) and the State Water Project (SWP, operated by the state of California). These cutbacks are continuing in 2016, although their exact magnitude has yet to be finalized. In 2015, California Governor Jerry Brown mandated a 25% reduction in water use for nonagricultural users. In November 2015, Governor Brown directed the State Water Resources Control Board (SWRCB) to extend restrictions if drought conditions persisted. The SWRCB extended and revised emergency conservation regulations on February 2, 2016. A drought declaration made by Governor Brown on January 17, 2014, also remains in effect.

On April 1, 2016, the Bureau of Reclamation announced its initial allocations for CVP contractors for the 2016 water year. Despite the improved precipitation and water supplies in 2016, especially in the northern and central parts of the state, some CVP contractors (in particular those south of the Sacramento and San Joaquin Rivers' Delta) are projected to see a fourth straight year of significant curtailments to their water supplies.

Several bills proposed to address drought in the 114th Congress (as well as in previous Congresses) have included, among other approaches, CVP-related provisions that would alter the Bureau of Reclamation's authorities to operate the project. The ongoing cutbacks to CVP contractors during a time of increased precipitation have caused some to criticize the Bureau of Reclamation and question the extent to which other factors beyond drought (e.g., restrictions to protect endangered species and other regulatory requirements) are the underlying cause of water shortages. Some supporters of the CVP-related provisions in these bills contend that the provisions would make available needed water for agriculture and municipal contractors. Opponents argue that the provisions would undercut environmental regulations, result in harm to fish and wildlife, and potentially lower water quality. Opponents further contend that operations related to protecting endangered species are guided by science and should not be altered to increase water supplies.

This report provides an abbreviated summary of hydrologic conditions (including precipitation and reservoir levels) in California as of early April 2016 and their effect on water deliveries, in particular those related to the federal CVP. The report also provides a table specifying initial water allocation estimates for water contractors associated with the CVP in recent years (see **Table 1**). In addition, it includes a summary of some of the issues pertaining to CVP operations that are being debated in the 114th Congress.

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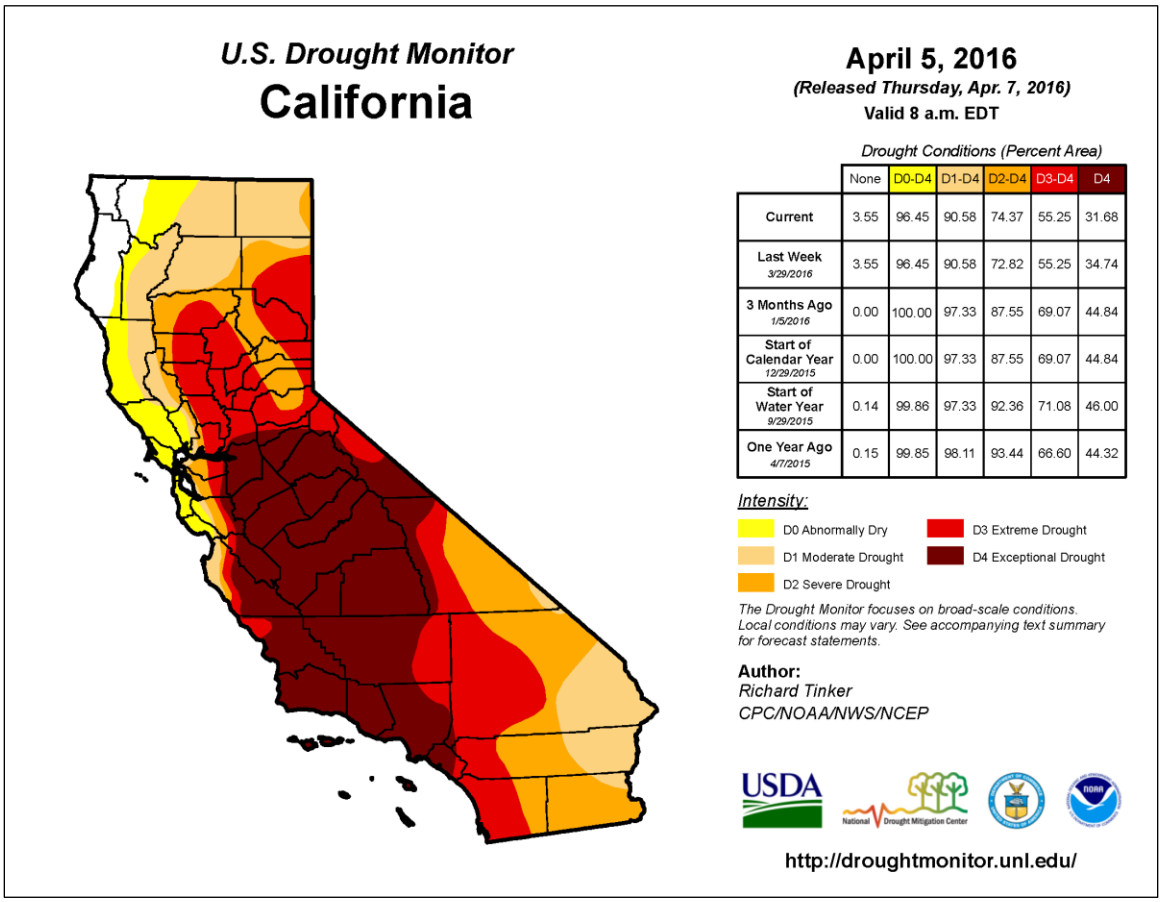
Background

California is in its fifth year of drought. Rain and snowstorms in Northern and Central California in the winter of 2015-2016 improved hydrologic conditions but did not eliminate the state's ongoing drought. As shown below in **Figure 1**, as of April 5, 2016, approximately 74% of the state was suffering from severe drought conditions. This figure represents an improvement from three months ago, when 88% of the state was in the severe drought category, and one year ago, when 93% of the state fell under this designation. The current drought is the result of extensive dry conditions in recent years. The previous four years have been classified as below normal (2012), dry (2013), and critically dry (2014 and 2015).

Figure 1. U.S. Drought Monitor: California

(conditions as of April 5, 2016)



Source: United States Drought Monitor, "U.S. Drought Monitor: California," at http://droughtmonitor.unl.edu/Home/StateDroughtMonitor.aspx?CA.

The stress on water supplies due to the drought has resulted in cutbacks in water deliveries to districts receiving water from federal and state facilities. These cutbacks are continuing in 2016, although their exact magnitude remains to be seen in some cases. A drought declaration made by California Governor Jerry Brown on January 17, 2014, remains in effect. In 2015, the governor also mandated a 25% reduction in water use for nonagricultural users. In November 2015, he directed the State Water Resources Control Board (SWRCB) to extend restrictions if drought

conditions persisted. The SWRCB extended and revised emergency conservation regulations on February 2, 2016.[1]

On April 1, 2016, the Bureau of Reclamation (Reclamation; part of the Department of the Interior) announced its estimated annual water allocations for federal Central Valley Project (CVP) contractors in water year 2016 (October 2015 through September 2016).[2] For many contractors, allocations are expected to be significantly below contracted amounts.

This report provides high-level summary information on precipitation and reservoir levels in California and their impact on water deliveries (in particular, on those deliveries related to the federal CVP). It also summarizes some of the issues pertaining to CVP operations that are being debated in the 114th Congress.

Hydrologic Status

As noted above, as of early April 2016, 74% of California remained in *severe* drought, with 54% in *extreme* drought and 35% in *exceptional* drought.[3] These figures all represent improvements over both the beginning of the water year and one year ago. Improvements are due in part to the El Niño-Southern Oscillation phenomenon, which has led to increased precipitation and streamflows in some parts of the state in the winter of 2015-2016.

As a result of the recent uptick in precipitation, water levels at several of California's largest reservoirs rebounded in early 2016 (see **Figure 2**). In particular, heavy rains in Northern and Central California in January and March 2016 significantly improved conditions at the state's two largest reservoirs: Shasta Reservoir (operated by Reclamation) and Lake Oroville (operated by the state of California). As of early April 2016, both reservoirs held more water than 100% of their historical averages for that date. Notably, other major reservoirs (especially those south of the Sacramento and San Joaquin Rivers' Delta confluence with the San Francisco Bay, known as the Bay-Delta) did not benefit to the same extent from the higher precipitation levels, and the southern part of the state is expected to remain under drought status.[4]

[1] See California Environmental Protection Agency, State Water Resources Control Board (SWRCB), "Water Conservation Portal—Emergency Conservation Regulation," at http://www.waterboards.ca.gov/water_issues/programs/conservation_portal/emergency_regulation.shtml, and California Environmental Protection Agency, SWRCB, "Adopted Text of Emergency Regulation: Article 22.5, Drought Emergency Water Conservation," at http://www.waterboards.ca.gov/water_issues/programs/conservation_portal/docs/emergency_reg/final_reg_enacted.pdf.

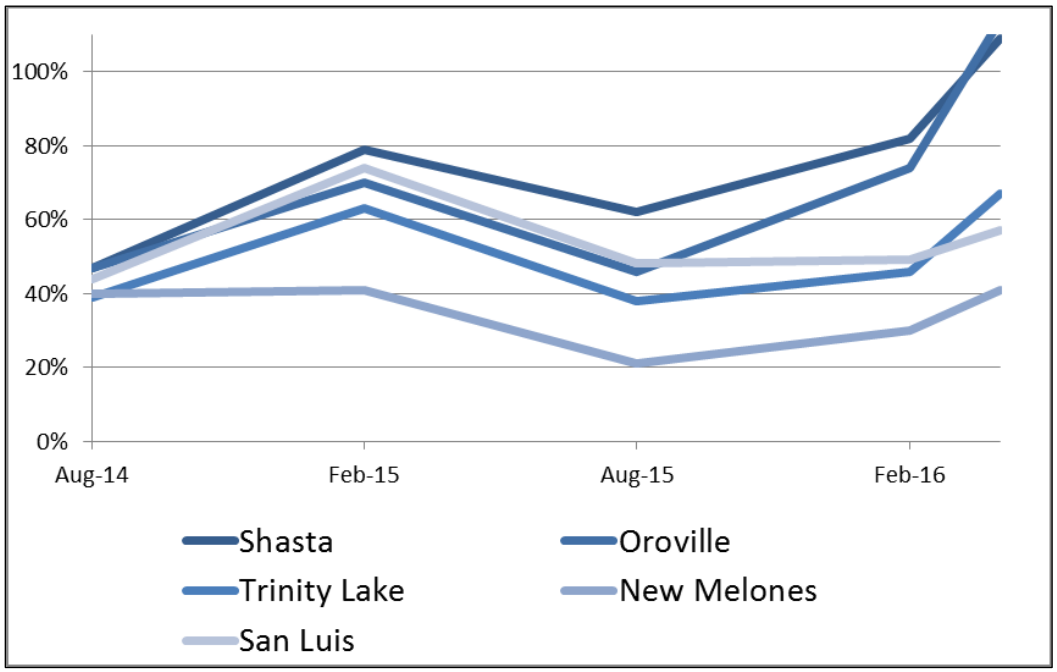
[2] The contract year for most Central Valley Project (CVP) contractors runs from March 1 to February 28.

[3] United States Drought Monitor, "U.S. Drought Monitor: California," April 5, 2016, at http://droughtmonitor.unl.edu/Home/StateDroughtMonitor.aspx?CA.

[4] National Weather Service, Climate Prediction Center, "U.S. Seasonal Drought Outlook: March 17-June 30, 2016," at http://www.cpc.ncep.noaa.gov/products/expert_assessment/sdo_summary.php.

Figure 2. Water Levels at California's Five Largest Reservoirs

(percentage of historical average, August 2014-April 2016)

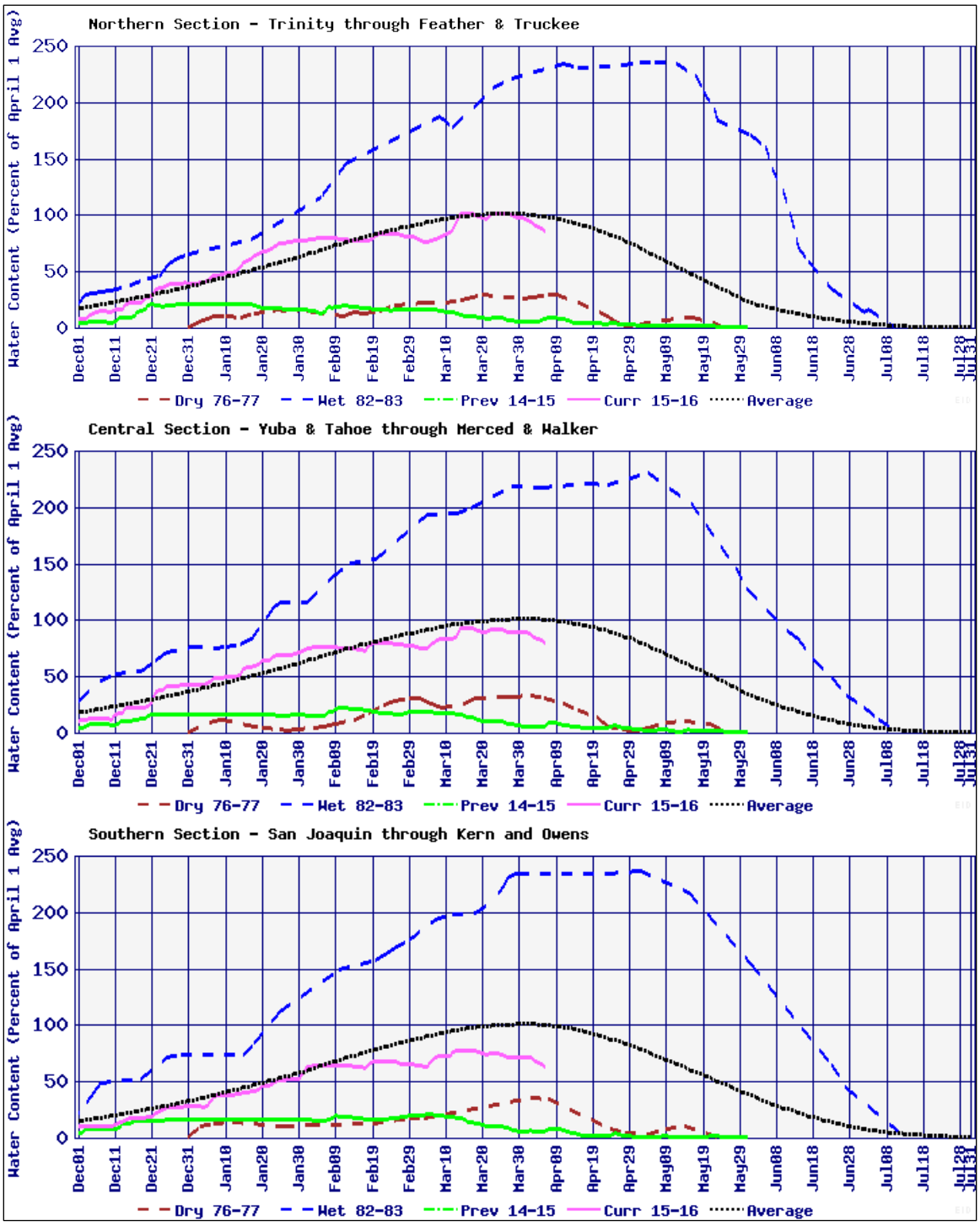


Source: CRS, based on data from California Department of Water Resources, "California Data Exchange Center—Reservoirs," at http://cdec.water.ca.gov/reservoir.html.

Another important hydrologic metric is the water content in snow in the Sierra Nevada Mountains. In normal years, the snowpack provides for approximately 30% of California's water needs. Water from snowpack typically melts in the spring and early summer, thus addressing water needs for the state in the late summer and fall. As of early April 2016, statewide snow-water equivalent was 19.4 inches, or 70% of normal for this time of year. This figure represents a significant improvement from this time in recent years but still falls short of both normal levels and the record precipitation that would likely be needed to end the current drought. A comparison of snow-water content as of April 1, 2016, in the northern, central, and southern Sierra Nevada Mountains is shown below in **Figure 3**.

Figure 3. Snow-Water Content Comparison

(December 2015- April 2016, compared to other years of note)



Source: California Department of Water Resources, California Data Exchange Center, "California Snow Water Content," at http://cdec.water.ca.gov/cgi-progs/snow/PLOT_SWC.

Note: Years of note represent totals for a typical dry year (1977-1978) and wet year (1982-1983).

Federal and State Water Project Deliveries

Each year, Reclamation announces estimated deliveries for its CVP contractors in the upcoming water year.[5] The CVP—which covers approximately 400 miles in California, from Redding to Bakersfield—supplies water to hundreds of thousands of acres of irrigated agriculture throughout the state, as well as to some wildlife refuges and municipal and industrial (M&I) water users. In a normal water year, the CVP delivers, on average, approximately 7 million acre-feet of water to contractors (including 5 million acre-feet to agricultural contractors). In recent years, Reclamation has made significant cutbacks to water deliveries for many CVP contractors due to the drought, among other factors.

On April 1, 2016, Reclamation announced its initial allocations for the upcoming water year (allocations for 2016 are shown below in **Table 1**). In contrast to recent years, Reclamation estimated that, as a result of recent rains, it would be able to provide some level of water supplies for most CVP agricultural and M&I water service contractors. Sacramento River Settlement Contractors and San Joaquin River Exchange Contractors with senior water rights predating the CVP are expected to receive their full contract allotments in 2016.[6] (These contractors saw reduced allocations in 2014 and 2015.) However, most CVP South-of-Delta contractors,[7] including those in many of the state's largest and most prominent agricultural areas, will see severely curtailed water supplies for the fourth consecutive year.

Table 1. Water Allocations for CVP Contractors, 2012-2016

(percentage of maximum contract allocation)

	2012	2013	2014	2015	2016 (est.)
North-of-Delta Users					
Agricultural	100%	75%	0%	0%	100%
M&I	100%	100%	50%	25%	100%
Settlement	100%	100%	75%	75%	100%
Refuges	100%	100%	75%	75%	100%
American River M&I	100%	75%	50%	25%	100%
In Delta-Contra Costa	100%	75%	50%	25%	100%
South-of-Delta Users					
Agricultural	40%	20%	0%	0%	5%

[5] Reclamation typically estimates these deliveries as a percentage of the total contract allocation to be made available for contractors within certain divisions, geographic areas, and/or contractor types (e.g., South-of-Delta Agricultural Contractors).

[6] Senior water rights holders are those known as the Sacramento River Settlement Contractors north of the Bay-Delta and the Exchange Contractors south of the Bay-Delta. Senior water rights holders have a combined first priority to approximately 3.0 million acre-feet of CVP water.

[7] South-of-Delta refers to contractors who reside south of the Bay-Delta, or south of the pumping stations that convey water into the CVP and the State Water Project (SWP).

	2012	2013	2014	2015	2016 (est.)
M&I	75%	70%	50%	25%	55%
Exchange	100%	100%	65%	75%	100%
Refuges	100%	100%	65%	75%	100%
Eastside Division	100%	100%	55%	0%	0%
Friant Class 1	45%	45%	0%	0%	30%
Friant Class 2	0%	0%	0%	0%	0%

Source: U.S. Bureau of Reclamation, "Summary of Water Supply Allocations," at http://www.usbr.gov/mp/cvo/vungvari/water_allocations_historical.pdf.

Notes: CVP = Central Valley Project. "M&I" indicates municipal and industrial water service contractors. "Settlement" refers to contractors on the Sacramento River (North-of-Delta), and "Exchange" refers to contractors on the San Joaquin River (South-of-Delta) with special contracts and minimum delivery levels recognizing state water rights predating those acquired by the Bureau of Reclamation for construction and operation of the CVP. Contra Costa, Eastside Division, and Friant Class 1 and Class 2 represent individual or groups of water contractors.

The other major water project serving California, the State Water Project (SWP, operated by the state of California), announced a slight increase in water deliveries for 2016 over 2015, but its deliveries remain very low (15% of contracted supply).[8] The SWP primarily provides water to M&I users and some agricultural users. Major CVP and SWP pumps that supply water for Central and Southern California are located at the southern portion of the Bay-Delta. Approximately 22 million people receive water from the Bay-Delta annually.

What Is at Stake?

The widespread nature of drought conditions—coupled with previous low water supplies in the state's major reservoirs and regulatory restrictions on CVP and SWP operations—has affected sectors and areas throughout California. Many cities and counties have instituted water rationing, some species populations have declined, and mandatory cutbacks have been put in place.

Although agriculture constitutes a much smaller percentage of California's economy than it did historically, California agriculture is still the nation's largest producer in terms of cash farm receipts—accounting for 12% of the U.S. total in 2014, the last year for which national data are available. According to the U.S. Department of Agriculture/National Agricultural Statistics Service Crop Year Report, California farm and ranch receipts totaled $56 billion in 2014, an increase of $2 billion over 2013.[9] Those agricultural users with access to groundwater or other supplies have seen receipts grow despite the drought, but others have had to fallow land or uproot trees and shrubs. Some livestock producers have had to purchase supplemental hay and grain. Hundreds of thousands of acres have been fallowed because sufficient water was not available.[10] Fruit and nut orchards continue to rely on irrigation to keep trees alive.

[8] See Association of California Water Agencies, "DWR Increases 2016 State Water Project Allocation from 10% to 15%," January 26, 2016, at http://www.acwa.com/news/ca-drought-update/dwr-increases-2016-state-water-project-allocation-10-15-0.

[9] See U.S. Department of Agriculture, Economic Research Service, "State Fact Sheets," at http://www.ers.usda.gov/data-products/state-fact-sheets.aspx.

[10] One study has reported that the 2015 drought resulted in an estimated 550,000 acres fallowed. See Richard Howitt et al., *Economic Analysis of the 2015 Drought for California Agriculture*, UC Davis Center for Watershed Sciences, (continued...)

The availability of other water supplies (e.g., groundwater or transferred surface water) has helped some agricultural users adjust to dry conditions. However, with much of the state categorized as a drought disaster area, whether other supplies will continue to be available is uncertain. Some areas already are experiencing low groundwater levels and land subsidence due to increased groundwater pumping. Groundwater provides about 45% of California's water supply in an average year; however, under drought conditions, such as in 2015, groundwater may supply as much as 65% of the state's water needs. Further, groundwater supplies may be limited or become too expensive to pump. California has enacted a statewide law that will increase groundwater planning and monitoring, but implementation will take many years.[11]

Drought also affects sectors other than agriculture. Certain water flows are critical for hydropower, recreation, and fish and wildlife. For example, cool temperatures are needed in waterways and lakes to maintain aquatic ecosystems and species viability. Some salmon runs experienced a 95% loss of eggs laid in 2015, and surveys of Delta smelt found fewer than five fish that year. In addition, recreational reservoirs, river-rafting opportunities, and recreational and commercial fisheries are all potentially at risk. California wetlands also provide Pacific Flyway habitat, which is critical to migrating birds.

Regulatory Factors

Complicating the hydrologic situation and water supply allocations is a complex web of state and federal regulatory requirements on CVP and SWP operations. These requirements affect how much water is delivered from the projects. They address releases of water from reservoirs and limits on pumping from the Bay-Delta to protect habitat, threatened and endangered species (e.g., salmon and Delta smelt), and water quality. In some years, pumping restrictions to protect state-set water quality levels, particularly increases in salinity levels, are greater than restrictions to protect endangered species.[12]

In wet years, however, restrictions under the federal Endangered Species Act (ESA; 16 U.S.C. §§1531 et seq.) may have a higher nominal impact on exports than water quality restrictions, and they may have proportionally higher impacts in certain months. Due to overlapping state and federal restrictions, there is disagreement over how much water might be available absent such restrictions. Further, the percentage of restrictions due to ESA varies in most water years. Reclamation estimated that ESA restrictions accounted for a reduction of 62 thousand acre-feet from the long-term average for CVP deliveries in 2014; in 2015, it estimated that ESA accounted for approximately 144 thousand acre-feet of total reductions.[13] The SWP estimated that ESA restrictions resulted in a reduction of 47 thousand acre-feet in water year 2014 and a reduction of

(...continued)

August 17, 2015.

[11] California's groundwater law establishes a framework that requires local agencies to manage groundwater in a sustainable manner. The law sets out a schedule that begins with the California Department of Water Resources adopting regulations for evaluating groundwater sustainability plans by June 1, 2016. It also requires formation of regional groundwater sustainability agencies, identifies high- and medium-priority basins in critical groundwater overdraft status, and implements the plans.

[12] Through the Porter-Cologne Act (a state law), California implements federal Clean Water Act requirements and authorizes the SWRCB to adopt water quality control plans, or basin plans (see Cal. Water Code §13160). The SWRCB oversees the allocation of water resources to various entities, has regulatory authority to protect water quality, and addresses flow requirements for fish.

[13] These data are typically calculated and released by Reclamation at the end of the water year. Thus, no year-to-date data are available on reductions related to the Endangered Species Act in 2016.

92 thousand acre-feet in water year 2015. Such figures are not readily available for water quality restrictions.[14]

The ongoing cutbacks to CVP contractors in 2016 despite the recent increases in precipitation and water supplies in Northern and Central California have led some to criticize Reclamation's operation of the CVP and highlight the extent to which factors other than the drought (e.g., endangered species and water quality requirements) may bear responsibility for the curtailments. To address these concerns and provide more water to agricultural and municipal contractors, some have proposed, among other approaches, that Congress change Reclamation's authorities to operate the CVP, including its implementation of certain regulatory requirements under ESA. Others, however, are opposed to modifying the implementation of ESA regulations and propose water conservation, water recycling, and increased storage, among other strategies, to provide more water for users.

Federal Response

Congress plays a role in CVP water management and has addressed the drought by facilitating water banking, water transfers, and new storage. In recent years, Congress has enacted other drought-related provisions, including extending authorization for the Emergency Reclamation States Drought Relief Act (P.L. 102-250), providing authority to incorporate water storage into dam safety projects (P.L. 114-113), and providing additional funding to Reclamation for western drought response in the FY2015 ($50 million) and FY2016 ($100 million) Energy and Water appropriations bills.

Legislation that addresses SWP and CVP operations, among other drought-related issues, has been introduced and is under consideration in the 114th Congress. Several bills in the House and Senate address SWP and CVP issues. Selected bills include H.R. 2898, which was passed by the House on July 17, 2015; S. 1894, which was introduced in the Senate on July 29, 2015; and S. 2533, which was introduced on February 10, 2016. These bills propose similar approaches to addressing drought on some issues and different approaches on other issues, including how federal agencies would deliver CVP water supplies in relation to existing laws and regulations. For more on these bills and other drought-related issues, see CRS Report R44180, *Drought Legislation: Comparison of Selected Provisions in H.R. 2898 and S. 1894*, and CRS Report R43649, *Federal Response to Drought in California: An Analysis of S. 2198 and H.R. 3964*.

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[14] Personal communication between the author and the California Department of Water Resources, March 30, 2016.