

Drought Impacts

Anderson-Cottonwood Irrigation District Main Canal Lining Project

- At risk of not meeting existing agricultural water demands:

At the project location, the Anderson-Cottonwood Irrigation District Main Canal is an earthen structure that runs generally north to south, and is intersected perpendicularly by an unnamed drainage from the foothills to the west. The canal was constructed over an existing alluvial fan deposited by the unnamed drainage; these deposits consist primarily of sand and gravel that provide an unimpaired conduit for seepage water from the canal. When seepage occurs and the water percolates to the alluvial layer, it moves downslope and surfaces as sheet flow to the east.

Clay-bearing materials within the canal profile and overlying the alluvial stratum provide a barrier of varying impermeability that prevents or reduces seepage. However, these materials shrink when dried and swell when saturated, which results in seasonal variations in the impermeability of the canal profile. During April and May of 2014 the seepage that occurred at the project location was of unprecedented volume and duration due to significant drying and shrinking of the clay-bearing materials that compose the canal profile. Water losses at the project location in 2014 are calculated to be 891 acre feet.

Seepage at the project location in 2014 compromised the District's ability to meet existing agricultural water demands, causing a reduction to the available supply that will contribute directly to an inability to meet existing demand.

- Groundwater basin overdraft

Numerous growers within the ACID service area maintain groundwater extraction capabilities to supplement surface water provided by the District. In years of short supply, including 2014, such growers operate their groundwater pumps to augment their surface water. The Redding Area Groundwater Basin has not experienced basin overdraft at any time in the past, but additional extraction that is occurring as a result of reduced surface water supply certainly raises the risk of basin overdraft, particularly if the drought extends to 2015 or beyond.

- Discharge water TMDL violations

Seepage from the main canal at the project location was emerging as surface sheet flows on an area of approximately 12 acres, all of which comprises developed land within the Verde Vale subdivision consisting of homes, yards, driveways, and streets. Verde Vale is within an unincorporated area of Shasta County without municipal services including sewer and water. As such, all of the homes utilize septic systems; these systems were inundated by the sheet flows and the use and effectiveness of the systems were compromised by the inundation.

Seepage sheet flows generally ran to a drainage path that runs diagonally through the subdivision in a southwesterly direction and into an underground storm drain system that flows directly to the Sacramento River.

It is possible that seepage sheet flows were contaminated by the inundated septic systems, although no evidence of contamination was documented. Such contamination, if present, could have been carried by the drainage system to the Sacramento River. River flows, controlled by releases at Keswick Dam, were being held at artificially low volume in April and May to conserve storage for water quality and water temperature control in the hotter months.

The combined effects of the drought, including increased seepage from the main canal and reduced flows in the Sacramento River, increased the possibility of TMDL exceedances from the project location due to the inundation of adjacent septic systems and reduced dilution within the river.

City of Live Oak Water Supply Reliability Well

The City has been impacted by the 2014 Drought and anticipates more severe impacts if drought conditions or dry year conditions continue into 2015. The most notable impacts include an inability to meet existing drinking water demands, potential MCL violations, and potential groundwater basin overdraft.

The 2014 drought has exacerbated the City's risk of not meeting drinking water demands. Prior to the drought, the City did not meet the state's requirements for source capacity since the state requires the City to provide adequate supply assuming the City's most productive well (Well #4) is offline. Because of the drought and resultant declining water levels, the pumps of two of the City's four wells have had to be lowered 40 feet in order to prevent cavitation. The City's four wells have a trend of declining production, especially with the addition of wellhead treatment for arsenic, which has limited peak production and caused fire flow issues. With the drought, the City's existing challenge to meet drinking water demands will be made worse. This year, the City's neighboring agricultural water users generally received only 70% of their surface water allocations for crop irrigation which meant that groundwater pumping by the agricultural users noticeably increased from previous years. The City is very concerned that if dry or drought conditions continue into 2015 and surrounding farmers receive little to no surface water, the basin's groundwater levels will rapidly decline which will make groundwater extraction for the City both more expensive and difficult.

Groundwater quality was already an issue before the drought as Well #5 was shut down due to nitrate MCL violations and Well #6 was never completed due to poor water quality. With declining water levels due to the drought, Wells #1 and #2 are at risk for violating MCLs because they may begin pumping sand unless the pumps are lowered even further.

The North Central Region office of DWR measures water levels twice a year (spring and fall) in Sutter County's 172 monitoring wells. To-date, there are no clear signs of groundwater basin overdraft – although water levels between Spring 2013 and the Spring 2014 have dropped significantly as a result of the 2014 drought. If the drought continues in 2015, the County is at risk of groundwater basin overdraft.

City of Shasta Lake Water Supply Reliability Project

The City of Shasta Lake's (City) sole source of municipal and industrial (M&I) water is surface water obtained from intakes within Shasta Dam, which is operated by the US Bureau of Reclamation (USBR) as the northernmost anchor of the Central Valley Project (CVP). The City is located outside of the Redding groundwater basin, and studies have shown that supplementing the City's supplies with wells is not possible.

The City's ability to withdraw contract water from its intakes in Shasta Dam is significantly impacted by the Cold Water Pool (CWP). The CWP consists of a large layer of cold subsurface water that exists in Shasta Lake. In the spring months, a thermocline is established in Shasta Lake whereby the temperatures stabilize and stay fairly consistent through the summer months.

The City's existing water contracts with ACID and MCM Inc. requires approval by the USBR Contracting Officer before any water delivery can occur (that is, prior to the City actually receiving the water from the contracting agency). This approval would be a discretionary action by USBR, requiring National Environmental Policy Act (NEPA) compliance, which in turn requires USBR to maintain certain river temperatures at various compliance points in the Sacramento River and make a finding that withdrawal of the additional water at the City's intake location would result in 'No Significant Impact' to these river temperatures. Upon review of the ACID and MCM Inc. contracts, USBR had concerns that allowing additional withdrawals from the City's intakes in Shasta Dam (generally at 750 elevation) would negatively impact the CWP, and, in turn, the temperature targets in the River.

To validate these concerns, USBR ran computer simulations that modeled the additional water withdrawals contained in the City's contracts with ACID and MCM, Inc. from the City's intakes in Shasta Dam. USBR's paraphrased conclusion: "The reduction in CWP volumes during drought periods can result in a release temperature increase of 0.1°–0.5° F between July and September. This increase could measurably affect the ability of the project to meet temperature requirements at the downstream compliance locations." As a result, the agency was unable to make a finding of that withdrawal of the additional water at the City's current intake location would result in "No Significant Impact" to the river temperatures, and was unable to sign off on the transfers.

As noted above, during low precipitation years when the City's CVP allocation is reduced, the City is unable to withdraw water from existing water contracts that were entered into with the specific goal of securing the City's long-term supply and to provide drought protection because of Cold Water Pool compliance issues that arose after those contracts were executed. As a result, the City is forced to purchase additional water from other sources to supplement the cutback supply. In Shasta County, the only unrestricted water contractor (meaning that its water allocations are not affected by the Cold Water Pool) is the McConnell Foundation, and during cutback years the City ends up paying nearly 5 times as much for raw water as it does for water supplied through the CVP allocation.

Drought Impacts

The ongoing drought has had the following impacts to the City of Shasta Lake:

- **At risk of not meeting existing drinking water demands:** The City of Shasta Lake is at severe risk of not meeting existing drinking water demands as a result of the drought. As noted above, during low precipitation (i.e. drought) years when the City's CVP allocation is reduced, the City is unable to withdraw water from existing water contracts that were entered into with the specific goal of securing the City's long-term supply and to provide drought protection because of Cold Water Pool compliance issues that arose after those contracts were executed. As a result, the City is forced to purchase additional water from other sources to supplement the cutback supply. In Shasta County, the only unrestricted water contractor (meaning that its water allocations are not affected by the Cold

Water Pool) is the McConnell Foundation, and during cutback years the City ends up paying nearly 5 times as much for raw water as it does for water supplied through the CVP allocation. The cost for purchasing water from the McConnell Foundation is not stable, and has the potential to become a significant burden to ratepayers as drought conditions continue. In addition, the availability of water from the McConnell Foundation to the City is not a certainty. It is possible that the McConnell Foundation could find a willing customer willing and able to pay \$1000/ac-ft and sell to that customer, thereby resulting in no water being available for the City. These issues will become mute after this project is constructed.

- At risk of not meeting existing agricultural water demands: The City of Shasta Lake is an M&I water supplier only, and does not supply any agricultural water demands within our service area. However, the fact that the City must purchase water from the McConnell Foundation (the only unrestricted water contractor in Shasta County) impacts agricultural users in other areas of Shasta County and southerly down the Sacramento River watershed, because that water is not available to other users.
- At risk of not meeting ecosystem water demands: As noted above, the ONLY alternative water supply currently available to the City to supplement our existing cutback allowance created by the drought is the purchase of contract water from the McConnell Foundation. Unfortunately, any withdrawal of McConnell Foundation water impacts the CWP, because it is diverted at the existing intakes inside Shasta Dam. There is no contract language between USBR and the McConnell Foundation to address CWP issues related to this withdrawal, and NEPA clearance is not required due to the nature of the contract. According to USBR's modeling, this has a direct impact on the temperature of the Sacramento River and directly affects the salmon spawning grounds several miles downstream of the City's diversion point within Shasta Dam.
- Other drought-related adverse impacts: Overall, the City of Shasta Lake's project clearly meets all of the goals envisioned by Governor Brown and the California Legislature when they passed the expedited drought funding bill, and will result in a project that allows the City to minimize the impact of California's ongoing drought, both now and into the future. This will directly impact the daily lives of more than 10,000 people within the City, and through conjunctive water use will allow the NSV region to better plan and address drought conditions in the North State.

DROUGHT IMPACTS

RIO ALTO WATER DISTRICT WASTEWATER IMPROVEMENTS AND CONSTRUCTED WETLANDS PROJECT

The Northern Sacramento Valley Regional Integrated Water Management Group has acknowledged the need to ensure affordable, sustainable water supply that supports agriculture, business, environmental, recreational and domestic needs of the Northern Sacramento Valley.

The Rio Alto Water District supplies domestic groundwater to the community of Lake California, in Tehama County. Water levels in aquifers are dependent on precipitation for recharge. The drought has decreased winter snowpack and glaciers that have long term impacts on groundwater. The District is not currently at risk of not meeting existing drinking water demands.

Rio Alto Water District is not an agricultural water supplier so the impact is non-applicable.

This year's drought has reduced deliveries to managed wetlands in the region to 40% of their normal year. This reduction and the lack of precipitation are not sufficient to maintain the health of the remaining wetlands. The Nature Conservancy has paid farmers to keep their fields wet longer, but with agribusiness interest dependent on publicly subsidized water, this will further reduce the habitat to the millions of birds that migrate annually in the Pacific Flyway. The wetlands created from our project will maintain in perpetuity 39 wetted acres through wastewater reuse within the Pacific Flyway.

Removal of our effluent discharge will assist in meeting water quality standards for downstream users.

Rio Alto Water District is dependent on the Bowman sub-basin for their groundwater. While this basin is currently not experiencing overdraft, continued reduced surface water allotments from the Central Valley Project to neighboring agencies are increasing the demand on the aquifer.

Rio Alto Water District currently has a cease and desist order on its NPDES permit. Rio Alto Water District Wastewater Treatment Plant was unable to meet the newly increased stringent effluent limits placed on discharges to the Sacramento River prior to the drought. Drought conditions magnify the effects of pollution loading from point sources. Low flows combined with lack of major flushing events are decreasing the dilution factor of the contaminants in the river. Removal of our discharge will reduce contaminants introduced into the river for surface water users below our point of discharge.