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**COUNTY OF INYO
WATER DEPARTMENT**

March 27, 2015

TO: Inyo County Board of Supervisors
Inyo County Water Commission

FROM: Bob Harrington, Water Director

SUBJECT: Drought

The past three years have been extremely dry, both in terms of precipitation on the Owens Valley floor and in terms of winter snow accumulation in the mountains. Runoff in Owens Valley during 2012, 2013, and 2014 runoff has been 57%, 54%, and 52% of normal according to LADWP's stream flow measurements. This is the lowest runoff for three consecutive years in the record starting in 1935. These conditions have resulted in extremely low stream flows, reduced groundwater recharge, and diminished water availability.

Things very likely are going to get worse.

Based on the present state of the snowpack, water availability is likely to be even lower over the next twelve months than it has been during the past three years. Snow accumulation in the Sierra Nevada is far below normal and warm temperatures have caused the snow pack to dissipate unusually early. Figure 1, from LADWP's LA Aqueduct web site, shows that the snow pack at four of five snow measurement sites in the Owens Valley watershed are at less than 10% of normal, and two of those sites have no snow at all remaining at the site.

Snow accumulation at three representative sites is shown in Figures 2, 3, and 4. At the lower elevation sites (South Lake and Cottonwood, Figures 2 and 3), the snowpack has melted unusually early, and both sites are at record lows for March 25. Historically, April 1 has been the date of maximum snow accumulation; therefore, LADWP has based runoff forecasts largely on April 1 snowpack water content. This year, snow accumulation has apparently peaked before April 1 and, at lower elevation sites, declined quickly due to unusually warm temperatures. Snow water content at all three sites peaked in late-February or early-March. Additional snowfall could produce peak snow accumulations later in spring, but that is becoming increasingly unlikely as we are past the peak snowfall period. The higher elevation site, Upper Tyndall Creek (Figure 4), is in the Kern River watershed, near the crest of the Sierra, and is

indicative of conditions at high elevations in the Sierra Nevada west of Independence and Lone Pine. The snow pack at Upper Tyndall Creek is currently far below normal and slightly less than last year. Snowpack and runoff conditions in the Owens watershed are part of a statewide pattern of severe drought resulting from low (though not unprecedented) precipitation and record high temperatures.

Unless there is a drastic change in the weather, current snow conditions will result in reduced water availability over the next twelve months. The California Department of Water Resources March 1 snowmelt runoff forecast for the Owens River watershed is 28% of normal. For comparison, March 1 forecasts for 2012, 2013, and 2014 were respectively 53%, 55%, and 35% percent of normal. Over the next several weeks, LADWP, Southern California Edison, and state and federal agencies will be producing their April 1 water supply forecasts. All indicators are that the forecasts will come in very low.

Probable negative effects of reduced precipitation and runoff coupled with warm temperatures include:

- Low reservoir levels, negatively effecting recreational fishing, boating, and hydropower generation.
- Low creek flows, negatively affecting fisheries, aquatic ecosystems, and water uses supplied by surface water, including agricultural irrigation, water for livestock, groundwater recharge, and residential uses (Bishop Creek Water Association, Big Pine Water Association, Big Pine Irrigation and Improvement Association). Reduced surface water availability may also induce LADWP to increase groundwater pumping.
- Low water tables, which may affect public and private supply wells and groundwater-dependent habitat. Based on the experience last summer in the South Barlow area of Bishop, many older homes are supplied by relatively shallow private wells, which may become inoperable if groundwater levels decline. Declining water levels in aquifers may also reduce flow from springs and flowing wells, with negative effects on habitat.
- Reduced productivity of native vegetation, which has negative effects on grazing and wildlife.
- Early snow melt, which will likely result in early closure of Mammoth Mountain Ski Area.
- Dry soil and vegetation, which increases fire risk.

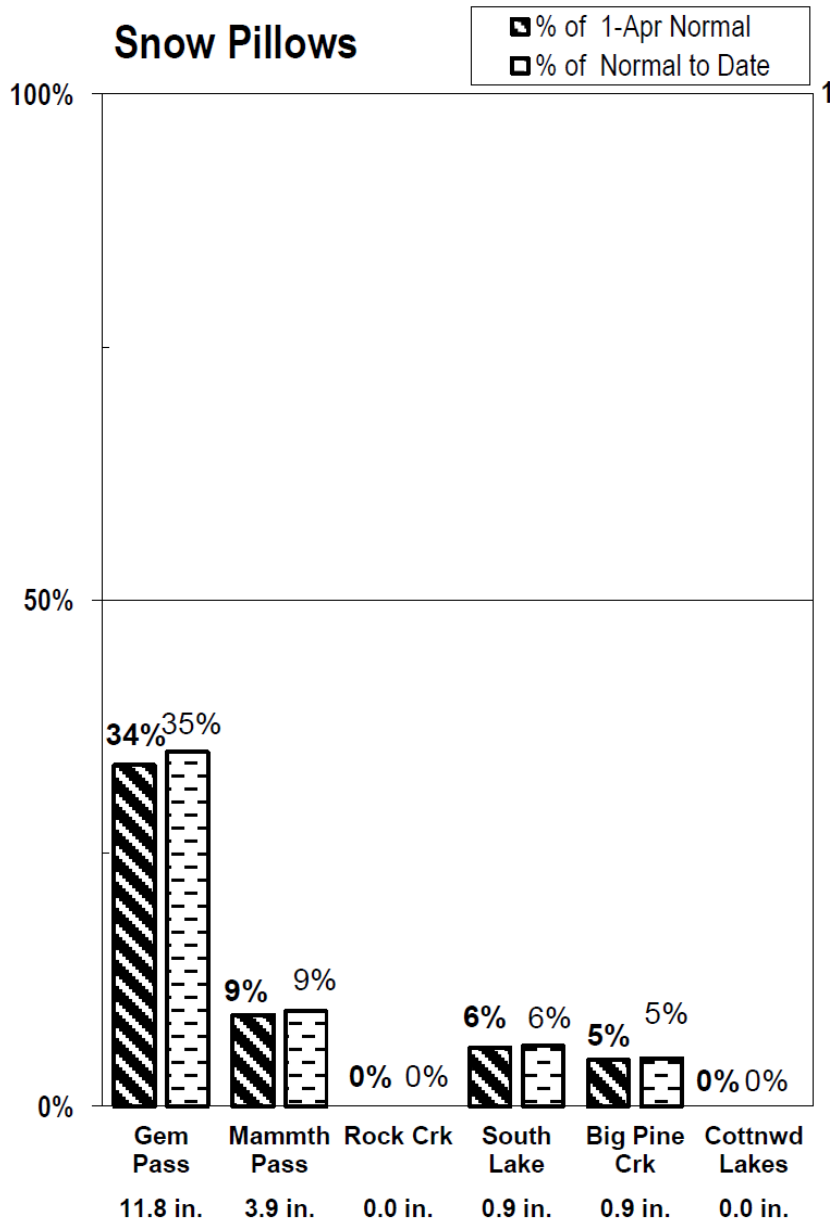


Figure 1. Snow accumulation in terms of percent of normal as of March 24, 2015 at Sierra Nevada sites in the Owens River watershed. This figure is from the LADWP LA Aqueduct web site. A “snow pillow” is a pressure-sensing device that measures the weight of the snowpack over the area of the device, from which the water-equivalent of the snowpack can be calculated.

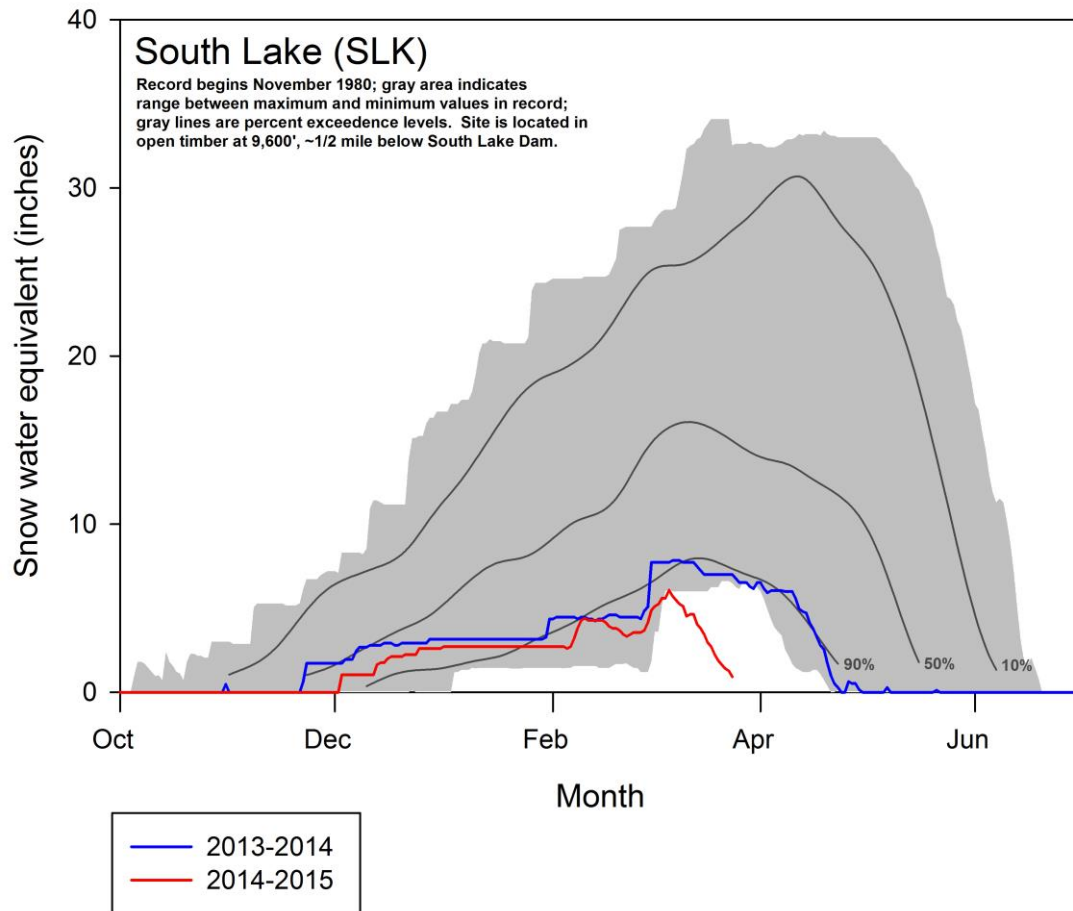


Figure 2. Snow accumulation at South Lake, in inches of water equivalent. Gray area indicates maximum and minimum snow accumulation for each day since the site was established in 1980. Percent exceedence levels indicate the percent of years that exceed the given level. The snowpack for the winter of 2014-2015 is less than the previous year and dissipating unusually early. It is currently at record low for the current date (March 25).

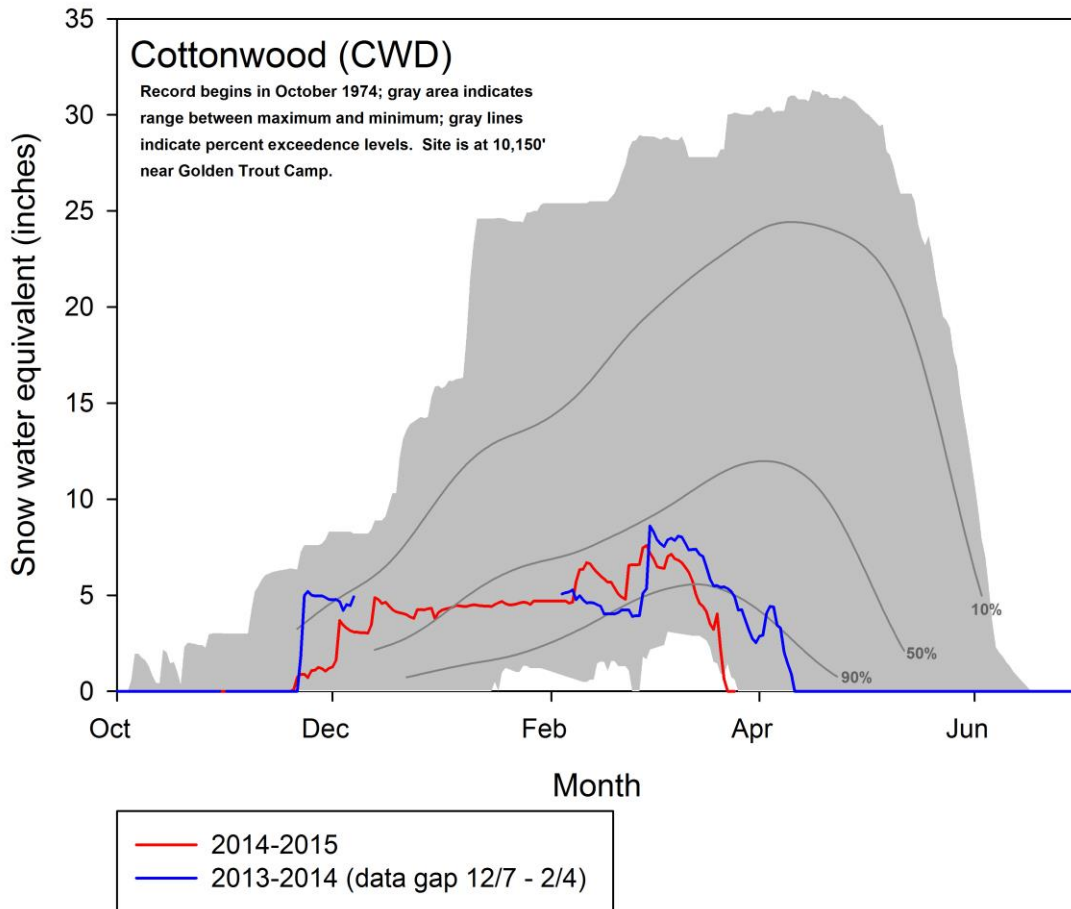


Figure 3. Snow accumulation at Cottonwood Lakes, in inches of water equivalent. See Figure 2 for explanation. Peak snow accumulation in 2014-2015 was slightly less than the previous year, but melted several weeks earlier. Snow was gone from this site by March 23, the earliest the site has been snow free since the site was established in 1974.

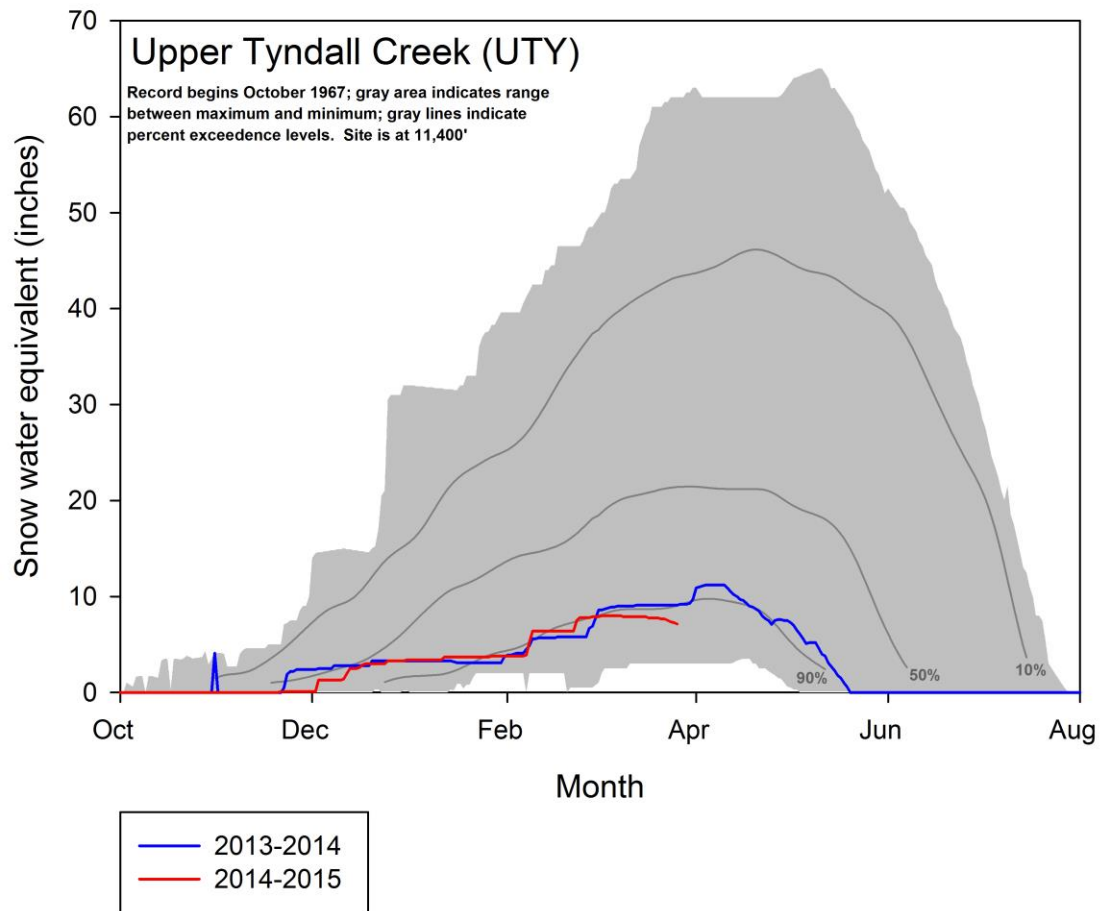


Figure 4. Snow accumulation at Upper Tyndall Creek, in inches of water equivalent. See Figure 2 for explanation. This site is in the Kern River watershed, near the crest of the Sierra, and is indicative of conditions at high elevations in the Sierra Nevada west of Independence and Lone Pine. The snow pack is currently slightly less than last year. Snow melt at this site has not occurred as fast as at South Lake and Cottonwood because of this site's high elevation.