MEMORANDUM

TO: **City of Santa Fe Public Utilities Committee**
City of Santa Fe Water Conservation Committee
Buckman Direct Diversion Board

FROM: **Rick Carpenter, Water Resources and Conservation Manager** RC

VIA: **Nick Schiavo, Public Utilities Department and Water Division Director** NSA

DATE: **April 23, 2015**

SUBJECT: **44th Monthly Update on Drought and Water Resource Management**

ESA/Silvery Minnow Update

There are no new updates on endangered species related to our water supply (e.g., silvery minnow, SW willow fly catcher, yellow billed cuckoo, etc.). River and wetland conditions are still expected to be challenging unless significant monsoonal activity occurs. All resource agencies will attempt compliance with the prevailing Biological Opinion.

CURRENT UPDATE – GENERAL WATER RESOURCE MANGEMENT

As the Committee/Board is aware, our region is still suffering through a drought. Our region has gone through four consecutive years of record drought and heat, and it appears that we are in our fifth year of drought – albeit drought conditions have eased slightly. This drought is likely present significant challenges to all water purveyors, utilities, and irrigators going forward into the rest of this water-year.

Most models are still predicting the likelihood of a return of an El Nino weather pattern, 50%-60% chance of a return to El Nino conditions with normal to above normal precipitation over the spring and summer. The most recent April NOAA ENSO update states that:

ENSO- (El Nino) conditions continue to improve with increasing equatorial sea surface temperature (SST) anomalies continuing across the Pacific Ocean. There is an approximate 50%-60% chance of El Nino conditions will continue through summer 2015.

It is worth noting that City of Santa Fe has invested in a robust and diverse portfolio of four distinct water supply sources that allows for flexibility in meeting demand: Buckman well field, City well field, Canyon Road Water Treatment Plant on the Upper Santa Fe River, and the

Buckman Direct Diversion on the Rio Grande. Supply from these groundwater and surface water sources are expected to be adequate in meeting local demands. The City also has a considerable amount of SJCP water stored ("banked from previous years") in reservoirs upstream from the BDD diversion, and that water could be called for if needed over the coming 2 or 3 years.

LOCAL CONDITIONS

Source of Supply Utilization Summary

March 2015

City Wells	0.276mg/m	0.85af/m
Buckman Wells	0.00mg/m	0.00af/m
CRWTP	99.24mg/m	304.56af/m
BRWTP	34.84mg/m	357.70af/m
Other Wells(Osage, MRC, etc)	*0.00mg/m*	*0.00af/m*

Upper Santa Fe River/CRWTP

	Total Combined Reservoir Level	Santa Fe Snow Gage	Reservoir Inflow
April 23, 2015	14.3.0%	31.00 inches	4.78 MGD
5-Year Average for This Date (2010 – 2014)	54.37 %	23.02 inches	6.13 MGD

As of April 23, 2015 total combined storage in Nichols and McClure reservoirs is 14.3% of total (or about 572 acre-feet of storage out of 4,000 acre-feet of capacity). Some flows have been by-passed or released due to construction on the new intake facilities and the start of irrigation season. Inflows are expected to continue for the near future and so the reservoirs have been managed to allow for water treatment plant production, active construction, irrigation, and draining/drying.

Buckman Regional Water Treatment Plant (BDD)

Flows in the Rio Grande are relatively high for this time of year (earlier than normal runoff), and turbidity has been generally good. The BDD has been able to divert and treat in line with demand with the exception of time off-line for repairs/maintenance to the diversions structure.

REGIONAL CONDITIONS

Rio Grande Basin

Surface flows in the Rio Grande and its tributaries through mid-April have been relatively good. However, storage levels in regional reservoirs are still very low (see attached figure). There was very little carry-over storage from 2014 into 2015. There are no new updates regarding Wild Earth Guardians legal actions or endangered species issues.

San Juan Basin

It should be stressed that, conditions could significantly worsen for San Juan Chama Project deliveries this coming year, if the drought persists, due to a lack of carry-over storage in Heron from last year to this year. Heron Reservoir is currently at a very low level. Recent estimates by the BoR suggest that the deliveries from the San Juan-Chama Project should be about 50%- 55% of normal firm yield, but if there are dry conditions and unseasonably warm temperatures, these figures will likely continue to be revised downward.

Rio Grande Water Fund/Watershed Management Update

The Rio Grande Water Fund Charter will be going before Santa Fe City Council on Wednesday, April 29, 2015.

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April Southwest Climate Outlook

Precipitation: In the past 30 days, most of the southwestern U.S. received below-average precipitation (Fig. 1). The winter wet season is wrapping up, and instead of above-average precipitation (as many of the El Niño influenced seasonal forecasts suggested), water year observations since October 1 show below-average precipitation across much of Arizona and portions of New Mexico. The situation is direr in other western regions, with California, the Pacific Northwest, and the Intermountain West recording significantly below-average winter precipitation (Fig. 2).

Temperature: In the past 30 days, temperatures were above-average across Arizona and New Mexico, with anomalies between 4 to 8 degrees F above average across most of the region (Fig 3). In the six months since the water year began on October 1, Arizona, California, Nevada, Oregon, and Washington saw record-warm average temperatures (Fig. 4).

Snowpack: High temperatures and below-average precipitation led to limited snowpack across the western U.S. As of April 16, snow water equivalent (SWE) is below average in every basin in the West (Fig. 5). In our region, SWE ranged from 0 to 32 percent of average in Arizona and 0 to 50 percent of average in New Mexico.

Drought & Water Supply: The U.S. Drought Monitor highlights persistent drought conditions across the West and identifies both short- and long-term drought conditions in Arizona and New Mexico. Total reservoir storage in March was 45 percent in Arizona (same value as last year) and 26 percent in New Mexico (compared to 24 percent last year) (see reservoir storage on page 5 for details).

Wildfire: There is potential for wildfire in any month of the year, but March through June is the windiest time of year (see page 4), which increases likelihood of red flag warning days. This is also one of the driest times of the year, so all eyes are on fire risk potential from now through the onset of the monsoon.

El Niño: Despite a relatively late start, El Niño continued for a second consecutive month, with potential for a stronger event as we look forward towards summer and fall of this year (see page 3 for details).

Precipitation & Temperature Forecasts: The April 16 NOAA-Climate Prediction Center seasonal outlook predicts above-average precipitation this spring into summer for most of the Southwest and Intermountain West, although California and southern Arizona are notable exceptions. Temperature forecasts remain split across the region, with elevated chances for above-average temperatures along the West Coast and eastward into Arizona (and most of the western U.S.), and increased chances for below-average temperatures in western Texas and into eastern New Mexico.

Streamflow Forecasts: The April 1 forecast for the Colorado, Rio Grande, and Arkansas river basins project well below-average streamflow for Arizona and New Mexico. This pattern is repeated across much of the western U.S., especially in Utah, Nevada, California, New Mexico, and Arizona (Fig. 6), following the unusually warm and dry conditions in March.

Tweet April SW Climate Outlook

CLICK TO TWEET

Apr 2015 @CLIMAS_UA SW Climate Outlook - El Niño Sticks Around, Snowpack, Drought, Streamflow, and Wildfire http://bit.ly/1DNxUNI

ARIZONA CLIMAS Climate Assessment for the Southwest THE UNIVERSITY OF ARIZONA CALS COOPERATIVE EXTENSION NM STATE UNIVERSITY

Online Resources

Portions of the information provided in this figure can be accessed at the Natural Resources Conservation Service

Arizona: http://1.usa.gov/19e2Bdu

New Mexico: http://www.wcc.nrcs.usda.gov/cgibin/resv_rpt.pl?state=new_mexico

Notes

The map gives a representation of current storage for reservoirs in Arizona and New Mexico. Reservoir locations are numbered within the blue circles on the map, corresponding to the reservoirs listed in the table. The cup next to each reservoir shows the current storage (blue fill) as a percent of total capacity. Note that while the size of each cup varies with the size of the reservoir, these are representational and not to scale. Each cup also represents last year's storage (dotted line) and the 1981–2010 reservoir average (red line).

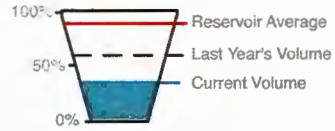
The table details more exactly the current capacity (listed as a percent of maximum storage). Current and maximum storage are given in thousands of acre-feet for each reservoir. One acre-foot is the volume of water sufficient to cover an acre of land to a depth of 1 foot (approximately 325,851 gallons). On average, 1 acre-foot of water is enough to meet the demands of 4 people for a year. The last column of the table lists an increase or decrease in storage since last month. A line indicates no change.

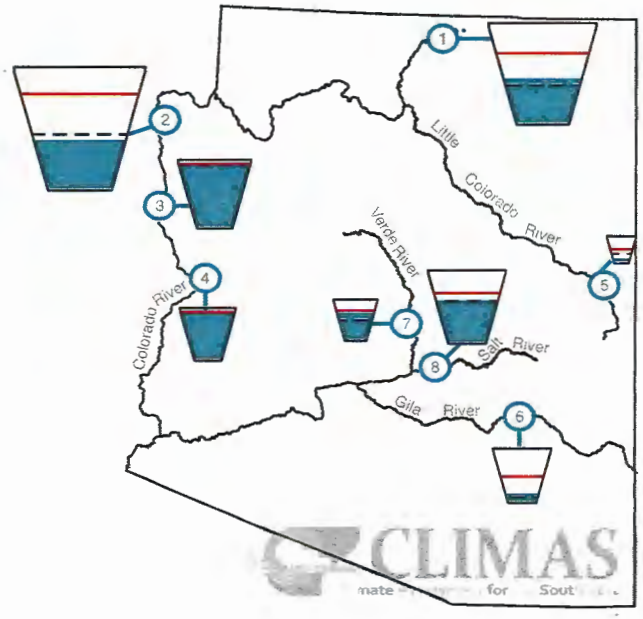
These data are based on reservoir reports updated monthly by the National Water and Climate Center of the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS).

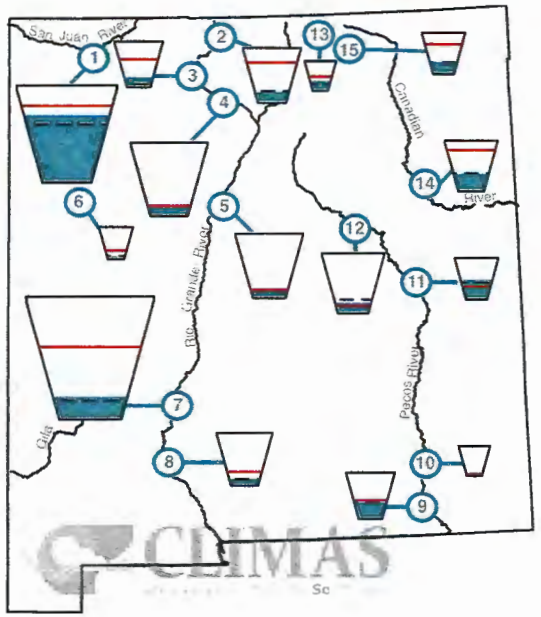
Reservoir Volumes

DATA THROUGH MAR 31, 2015

Data Source: National Water and Climate Center, Natural Resources Conservation Service







Reservoir	Capacity	Current Storage*	Max Storage*	One-Month Change in Storage*
1. Lake Powell	45%	10,917.0	24,322.0	-107.0
2. Lake Mead	40%	10,419.0	26,159.0	-349.0
3. Lake Mohave	94%	1,692.7	1,810.0	34.7
4. Lake Havasu	93%	577.9	619.0	-0.1
5. Lyman	16%	4.8	30.0	0.6
6. San Carlos	16%	138.4	875.0	-3.3
7. Verde River System	66%	188.5	287.4	62.4
8. Salt River System	57%	1,146.5	2,025.8	43.2

*KAF: thousands of acre-feet

Reservoir	Capacity	Current Storage*	Max Storage*	One-Month Change in Storage*
1. Navajo	68%	1,150.4	1,696.0	54.0
2. Heron	17%	67.6	400.0	6.3
3. El Vado	20%	37.3	190.3	20.1
4. Abiquiu	11%	133.5	1,192.8	-0.3
5. Cochiti	10%	48.7	491.0	-0.2
6. Bluewater	6%	2.4	38.5	0.0
7. Elephant Butte	17%	368.1	2,195.0	39.4
8. Caballo	11%	36.1	332.0	0.8
9. Lake Avalon	33%	1.3	4.0	-1.9
10. Brantley	8%	84.9	1,008.2	0.4
11. Sumner	45%	45.6	102.0	-2.7
12. Santa Rosa	16%	71.2	438.3	1.9
13. Costilla	30%	4.8	16.0	0.8
14. Conchas	33%	84.4	254 2	-0.1
15. Eagle Nest	26%	20.5	79.0	2.2

* in KAF = thousands of acre-feet

Online Resources

Figure 1.
Australian Bureau of Meteorology
http://www.bom.gov.au/climate/enso/index.shtml

Figure 2.
NOAA - National Climatic Data Center
http://www.ncdc.noaa.gov/teleconnections/enso/

Figure 3.
International Research Institute for Climate and Society
http://iri.columbia.edu/our-expertise/climate/forecasts/enso/

Figure 4.
NOAA - Climate Prediction Center
http://www.cpc.ncep.noaa.gov/products/NMME/current/plume.html

2014-15 El Niño Tracker

Strong signals in early 2014 stalled, delaying El Niño's onset until last month, when ocean-atmosphere coupling and an additional Kelvin wave indicated more favorable conditions. Despite this late start, El Niño continued for a second consecutive month. Recent increases in sea surface temperature (SST) anomalies (Fig.1 - 2) and ongoing convective activity associated with El Niño-favorable conditions indicate we might be witnessing a two-year El Niño event. These forecasts rely on projections during a time of increasing uncertainty, and the so-called "spring predictability barrier" continues to make it difficult to anticipate how seasonal changes will help or hinder El Niño.

The most recent forecasts continue to offer mixed signals regarding El Niño, but are more bullish this spring than last year. On April 9, the NOAA-Climate Prediction Center (CPC) issued an El Niño advisory with a 70 percent chance that El Niño will continue through summer 2015 and more than a 60 percent chance the event would last through fall. They pointed to the large Kelvin wave, along with ongoing ocean-atmospheric coupling, as an indication a weak El Niño event would linger, with potential for further development in the long term. On April 10, the Japan Meteorological Agency declared the El Niño event likely to have ended in winter 2015, with current conditions being ENSO-neutral, but also projected El Niño conditions could return by summer. On April 14, the Australian Bureau of Meteorology upgraded their tracker to "alert" status (one below an official El Niño designation), with warming in the tropical Pacific, weak trade winds, and projected additional ocean warming listed as contributing factors. On April 16, the International Research Institute for Climate and Society (IRI) and CPC forecasts highlighted increasingly favorable oceanic and atmospheric conditions, with an 80 percent probability of El Niño extending from summer into fall, and a 70 percent probability of El Niño extending into next winter (Fig. 3). The North American multi-model ensemble shows a weak event extending through the spring, with potential for a moderate or even strong event by summer or early fall (Fig. 4).

This El Niño event continues to defy expectations, with some models indicating conditions are strengthening rather than weakening during the spring transition. Forecasting or characterizing this event remains difficult given the lack of analog events in the historical record, and the complexity of this El Niño guarantees it will be of interest to climatologists for years to come. Seasonal forecasts continue to indicate an increased chance of above-average precipitation through much of the Southwest, likely tied to the presence of El Niño favorable conditions. Perhaps more interesting is the possibility of a repeat of 2014's tropical storm season, when conditions favorable to El Niño were thought to have been driving increased storm activity in the Southwest.

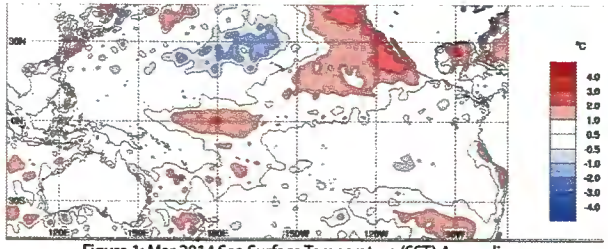


Figure 1: Mar 2014 Sea Surface Temperature (SST) Anomalies

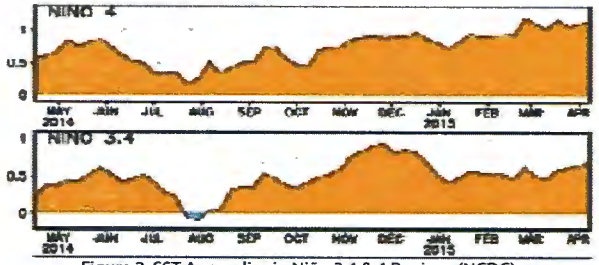


Figure 2: SST Anomalies in Niño 3.4 & 4 Regions (NCDC)

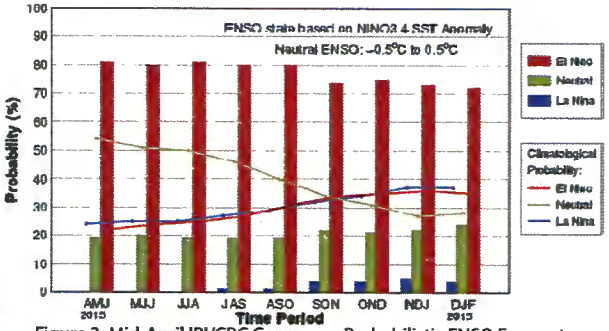


Figure 3: Mid-April IRI/CPC Consensus Probabilistic ENSO Forecast

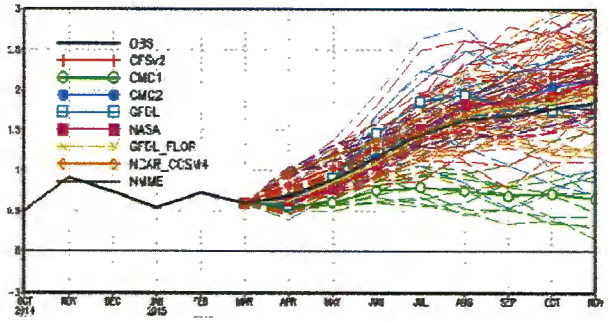


Figure 4: North American Multi-Model Ensemble Forecast for Niño 3.4