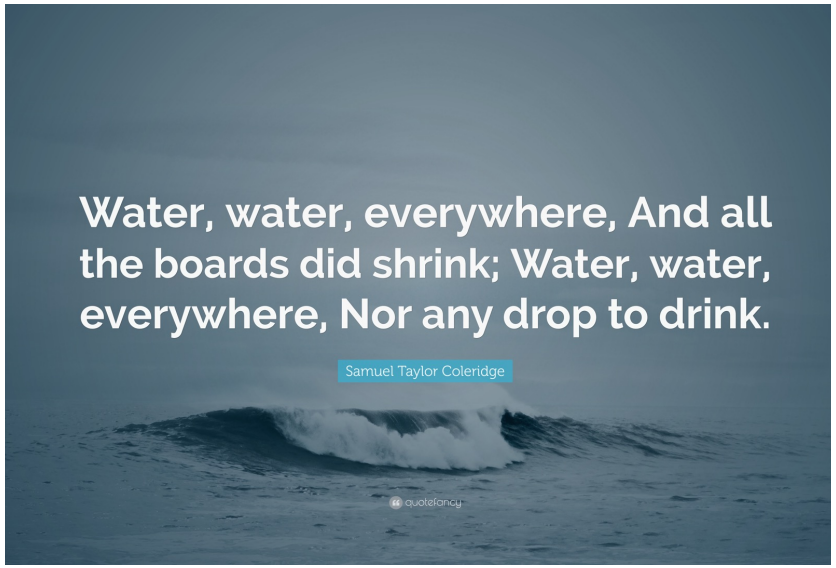
“New Mexico's Drought Toolbox”

Recorded for the Multi States Salinity Conference



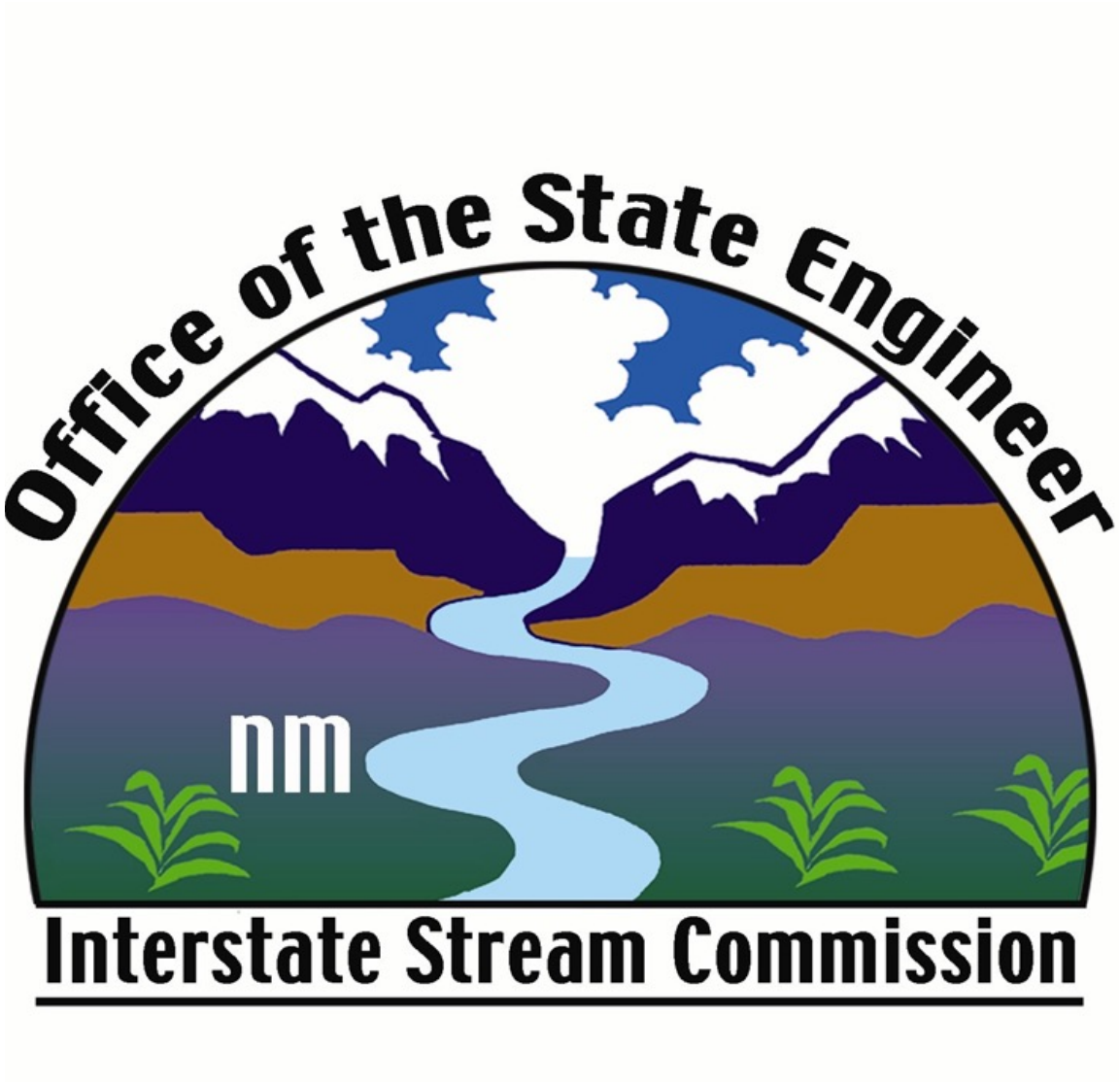
Jerri L. Pohl, Statewide Projects Supervisor
jerri.pohl@ose.nm.gov **505-827-7848**

Julie Valdez, Water Use & Conservation Bureau Chief
julie.valdez@ose.nm.gov **505-827-6790**

New Mexico Office of the State Engineer Water Resource Allocation Program

Andrew Erdmann, State Water Planner Andrew.Erdmann@ose.nm.gov **505-231-1910**

Interstate Stream Commission

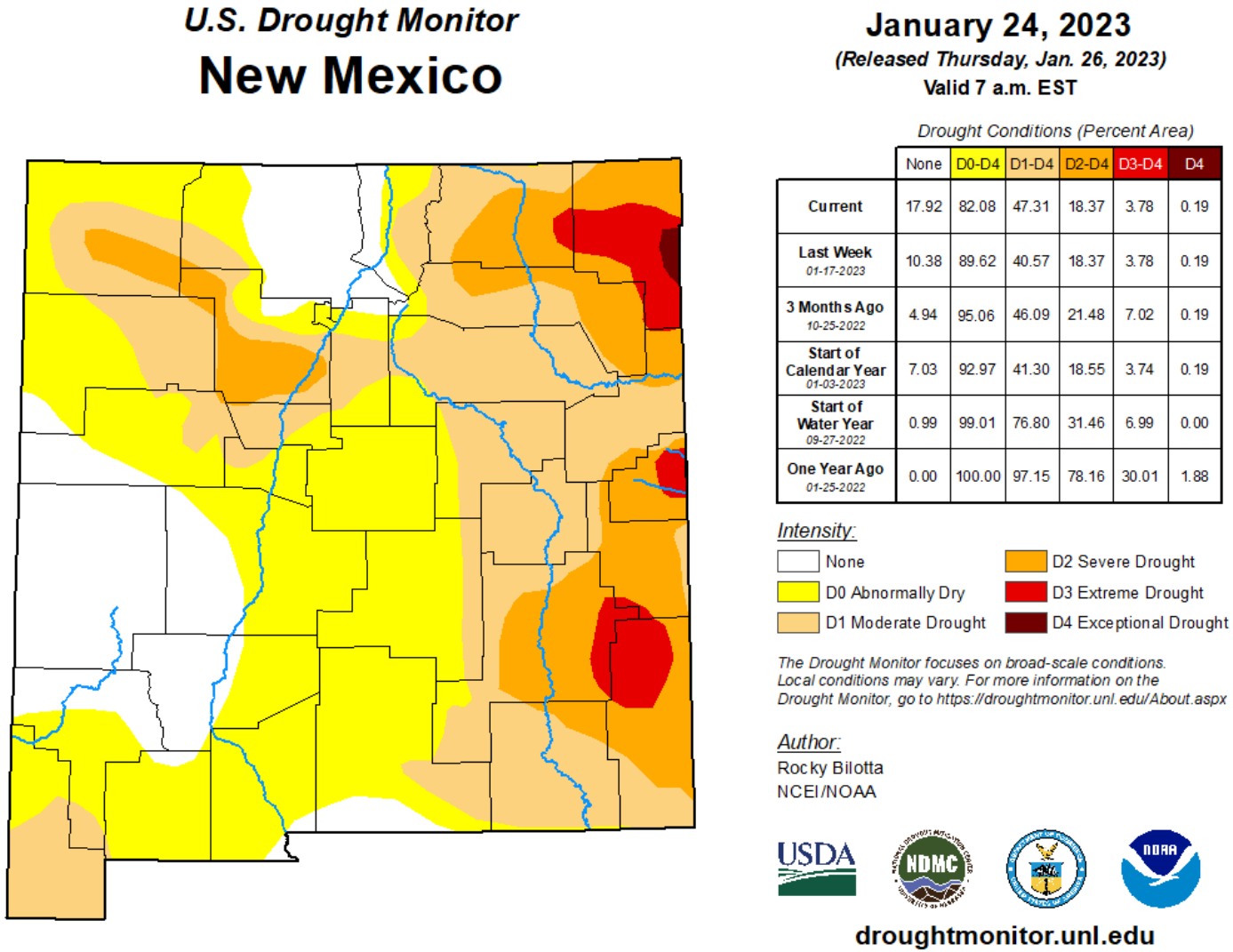


Brief Overview

- Current Drought Status
- Tools Designed Towards The Wise Use of Water
- Future and 50 year Water Planning
- Desalination
- Produced Water

Current Drought Conditions

U.S. Drought Monitor

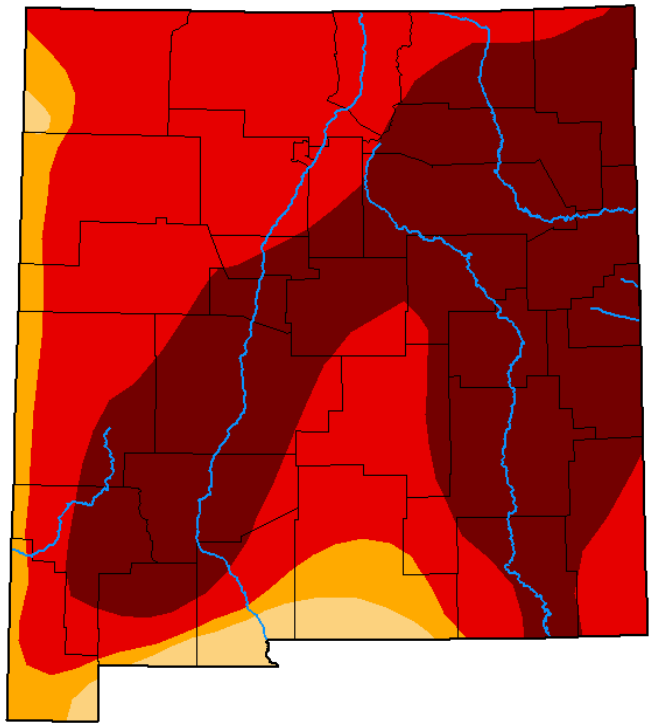


[New Mexico | U.S. Drought Monitor (unl.edu)]

Drought Comparison
June 2022 to January 2023

U.S. Drought Monitor

New Mexico



June 7, 2022

(Released Thursday, Jun. 9, 2022)

Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.00	100.00	100.00	97.18	90.06	46.76
Last Week 05-31-2022	0.00	100.00	99.26	97.20	90.06	45.84
3 Months Ago 03-08-2022	0.00	100.00	98.92	85.09	34.52	3.85
Start of Calendar Year 01-04-2022	0.00	100.00	97.83	75.86	20.91	0.00
Start of Water Year 09-28-2021	10.70	89.30	79.47	49.33	19.12	0.00
One Year Ago 06-08-2021	2.06	97.94	93.41	88.82	64.76	33.26

Intensity:

- None
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

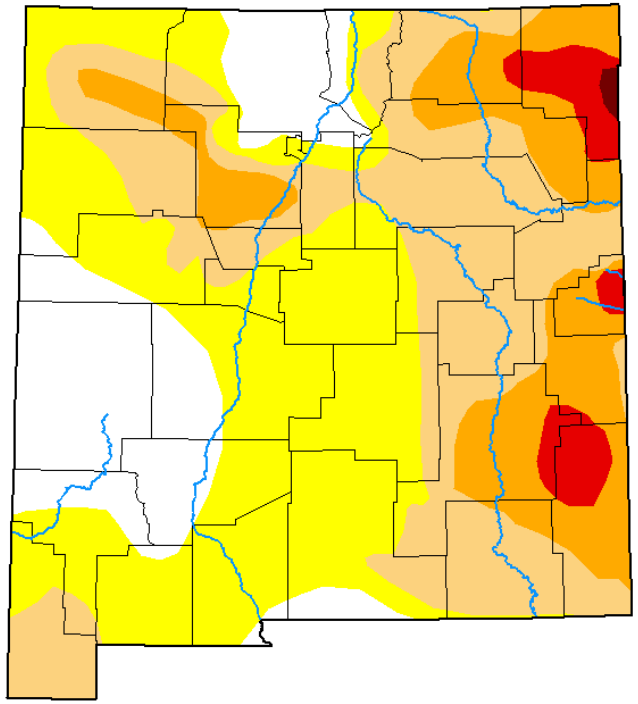
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to https://droughtmonitor.unl.edu/About.aspx

Author:
Brad Pugh
CPC/NOAA

droughtmonitor.unl.edu

U.S. Drought Monitor

New Mexico



January 24, 2023

(Released Thursday, Jan. 26, 2023)

Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	17.92	82.08	47.31	18.37	3.78	0.19
Last Week 01-17-2023	10.38	89.62	40.57	18.37	3.78	0.19
3 Months Ago 10-25-2022	4.94	95.06	46.09	21.48	7.02	0.19
Start of Calendar Year 01-03-2023	7.03	92.97	41.30	18.55	3.74	0.19
Start of Water Year 09-27-2022	0.99	99.01	76.80	31.46	6.99	0.00
One Year Ago 01-25-2022	0.00	100.00	97.15	78.16	30.01	1.88

Intensity:

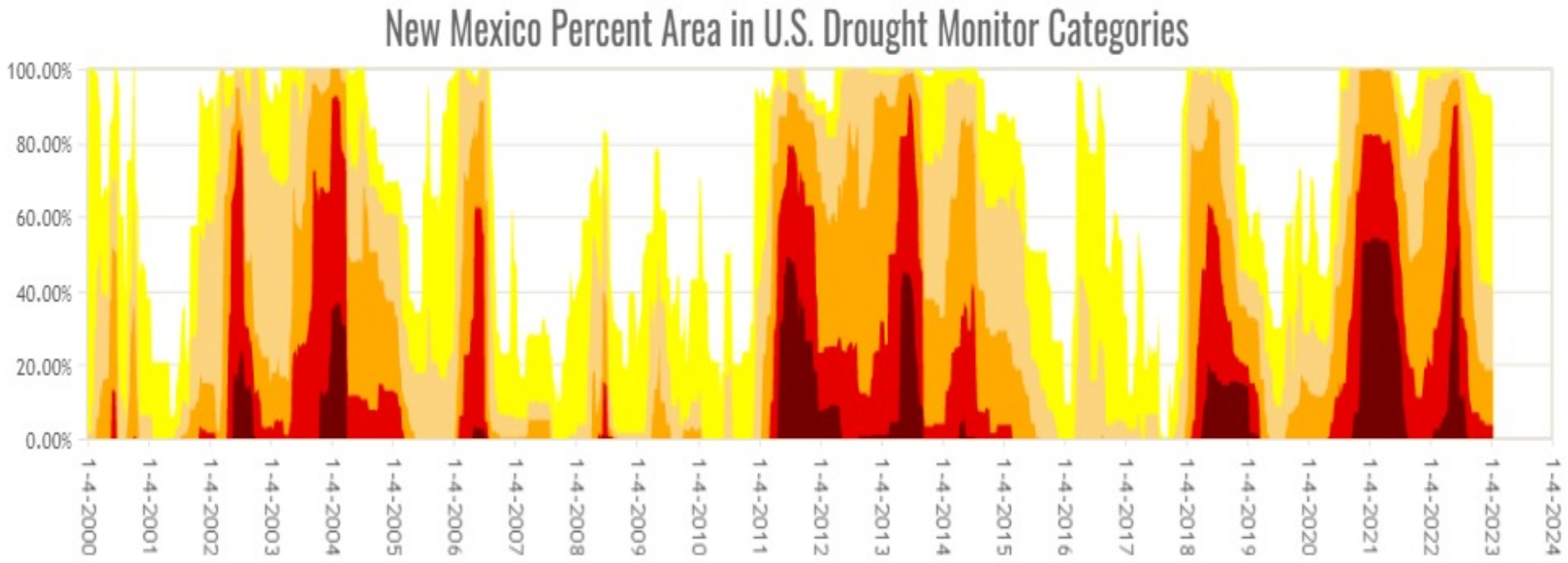
- None
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to https://droughtmonitor.unl.edu/About.aspx

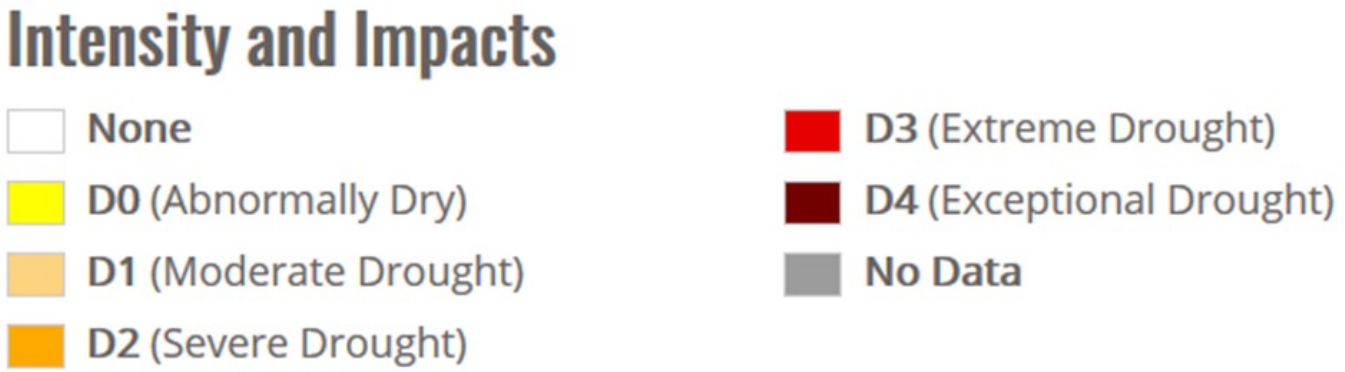
Author:
Rocky Bilotta
NCEI/NOAA

droughtmonitor.unl.edu

US Drought Monitor in NM since 2000

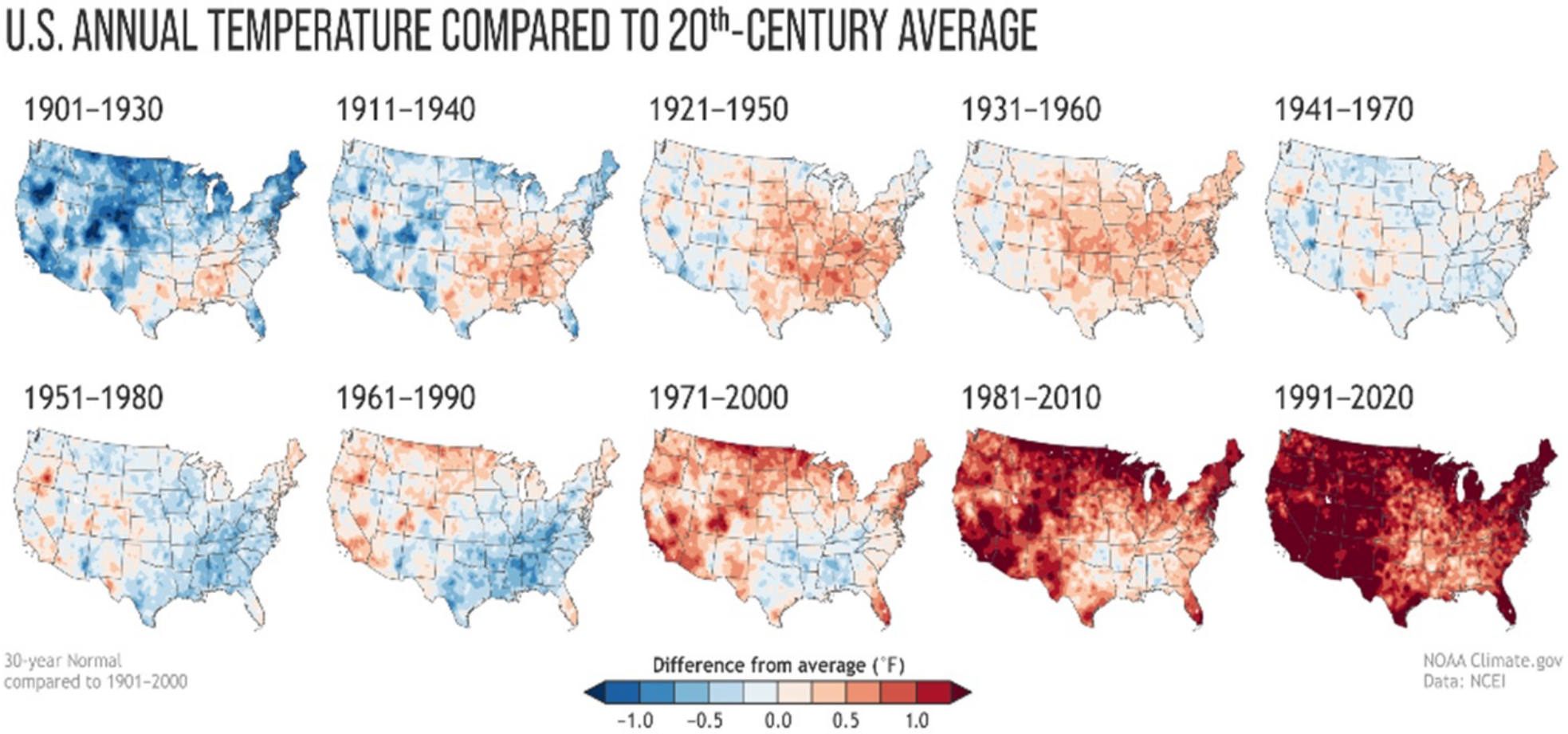


% area of NM in each category of the US Drought Monitor levels



Time Series | U.S. Drought Monitor (unl.edu)

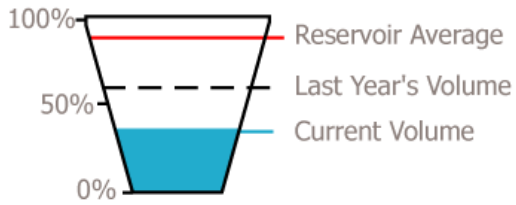
U.S. Climate Normals



[30-yrNormal_Temp_1901-2000_2480.png | NOAA Climate.gov]

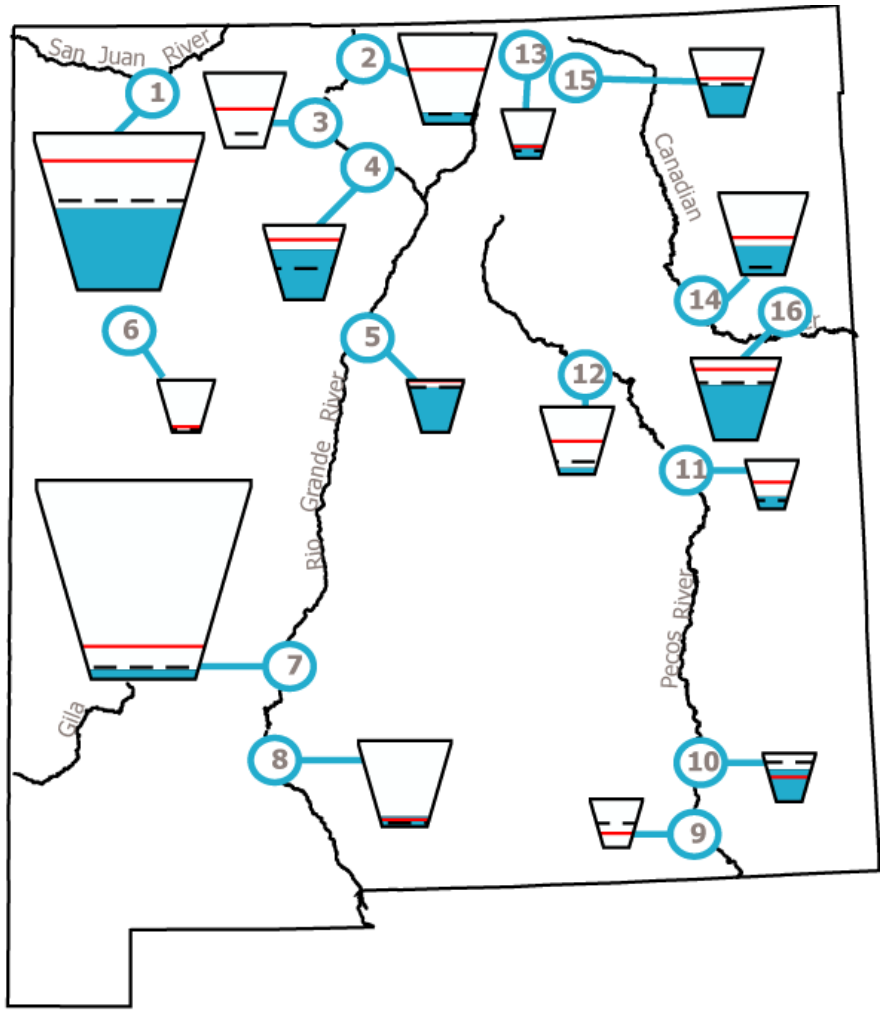
Reservoir Storage

Legend



size of cups is representational of reservoir size, but not to scale

Reservoir	Capacity	Current Storage*	Max Storage*	One-Month Change in Storage*
1. Navajo	51%	902.1	1,696.0	-30.1
2. Heron	12%	67.4	400.0	-20.8
3. El Vado	0%	0.2	190.3	0.2
4. Abiquiu	66%	105.5	186.8	+17.7
5. Cochiti	83%	41.4**	50.0	**
6. Bluewater	3%	1.3	38.5	-0.1
7. Elephant Butte	5%	95.0	2,195.0	+14.5
8. Caballo	11%	33.7	332.0	+1.7
9. Lake Avalon	**	**	4.5	**
10. Brantley	66%	25.5	42.2	+2.6
11. Sumner	25%	12.0	35.9	-2.9
12. Santa Rosa	9%	9.6**	105.9	**
13. Costilla	28%	4.8	16.0	+0.3
14. Conchas	34%	85.7**	254.2	**
15. Eagle Nest	44%	34.4**	79.0	**
16. Ute Reservoir	66%	133	200	-1.0

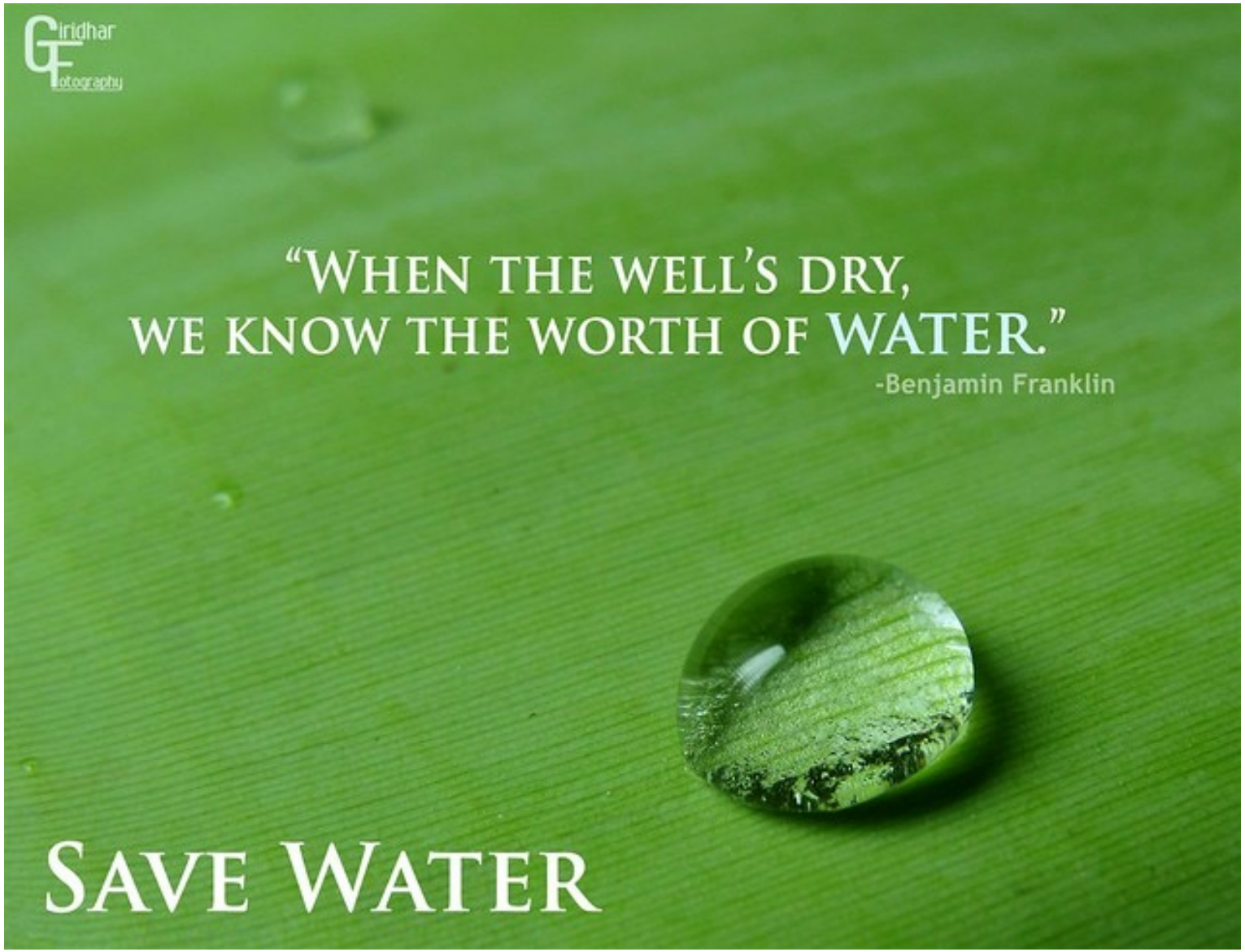


* in KAF = thousands of acre-feet, ** = missing/incomplete data this/last month

Figure 2. New Mexico reservoir volumes for end of September as a percent of capacity. The map depicts the average volume and last year's storage for each reservoir. The table also lists current and maximum storage, and change in storage since last month.

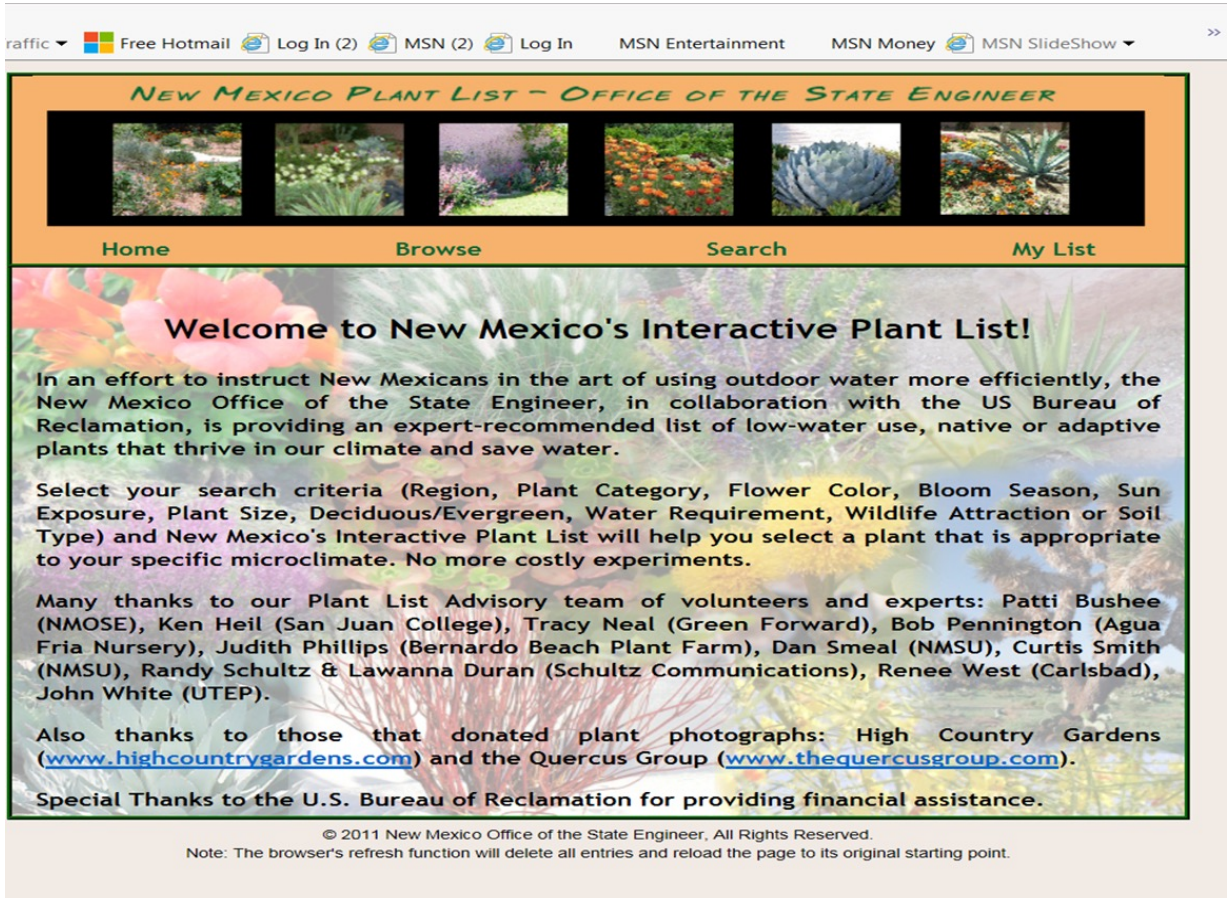
[New Mexico Reservoirs | CLIMAS (arizona.edu)]

Tools Designed Towards the Wise Use of Water



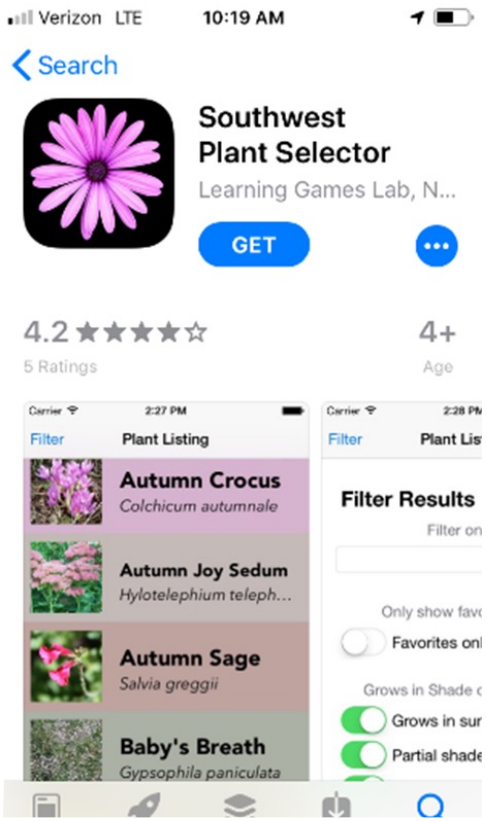
New Mexico's Enchanted Xeriscape Guide

XeriscapeGuide_ScreenResolution.pdf (state.nm.us)



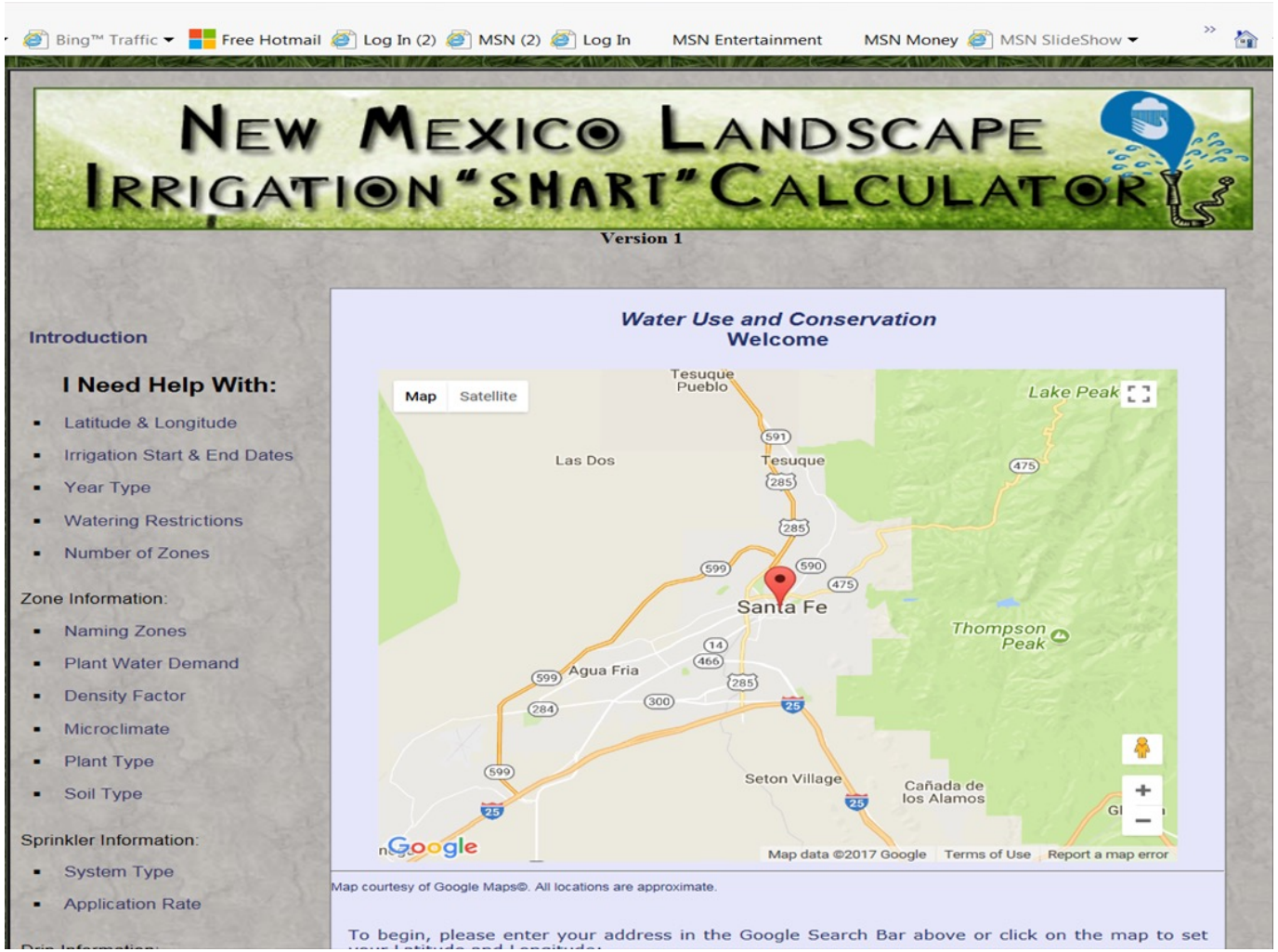
New Mexico's Interactive Plant List

http://wuc.ose.state.nm.us/Plants/



Plant App for iPhone

New Mexico's Landscape Irrigation Calculator



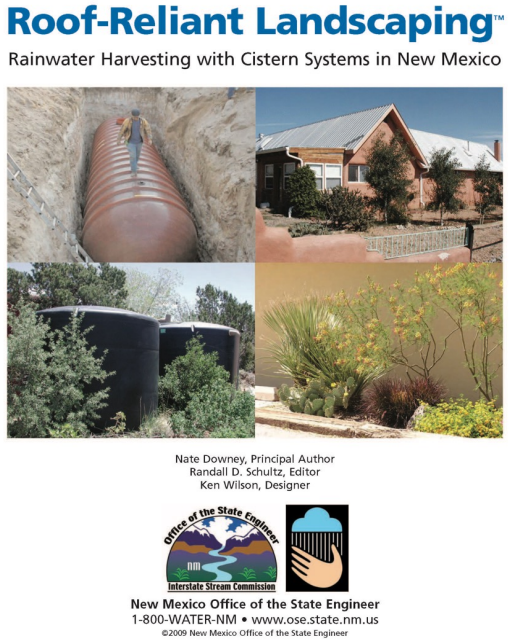
http://wuc.ose.state.nm.us/irrcalc/

Rainwater Harvesting

Rainwater/Snowmelt Harvesting Policy

- The New Mexico Office of the State Engineer supports the wise and efficient use of the state's water resources; and, therefore, encourages the harvesting, collection and use of rainwater from residential and commercial roof surfaces for on-site landscape irrigation and other on-site domestic uses.

- The collection of water harvested in this manner should not reduce the amount of runoff that would have occurred from the site in its natural, pre-development state. Harvested rainwater may not be appropriated for any other uses.



rainwater-harvesting.pdf (state.nm.us)

Water Use and Conservation - NM Office of the State Engineer

Active Water Resource Management (AWRM)

Real Time Measurements

-- Provisional Data Subject to Revision --

Rio Grande Basin

Upper Chama Subbasin

Station Name	Date & Time	Discharge (cfs)	Gage Height (ft)	Avg Daily Flow (cfs)
Chama Town Ditch	10/27 14:15	0.0	-0.01	0.0
M-B Ditch	10/27 14:45	0.0	-0.73	0.0
Chama Valley Ditch	10/27 15:15	0.01	0.02	0.01
Valley Ditch	10/27 14:45	0.0	-0.29	0.0
Chama Valley #1	10/27 13:15	0.0	-0.45	0.0
Ranch 101 Ditch	10/27 15:15	0.0	-0.14	0.0
Chama Valley #3	10/27 13:30	0.0	-0.48	0.0
Canones Creek #1	10/27 13:00	0.61	0.15	0.66
Barranco Ditch	10/27 13:29	0.25	NR	0.14
Sanchez y Chavez	10/27 14:30	0.0	NR	0.0
Willow Creek Mesa Ditch	10/27 16:16	3.11	1.59	3.24
Plaza Blanca	10/27 13:00	0.0	-0.48	0.0
Ensenada	10/27 14:00	2.92	0.34	2.73
Parkview	10/27 14:15	2.92	0.44	3.41
Porvenir	10/27 16:16	1.04	0.21	0.98
TA Community Ditch	10/27 13:30	1.28	0.34	1.17

Lower Chama Subbasin

Station Name	Date & Time	Discharge (cfs)	Gage Height (ft)	Avg Daily Flow (cfs)
Abeyta Trujillo	10/27 13:45	0.0	-0.21	0.0
J.P. Gonzales	10/27 13:30	0.0	-0.05	0.0
Gonzales	10/27 14:00	0.0	-0.19	0.0
Quintana	10/27 14:15	0.04	NR	0.05
Valentine Martinez	10/27 16:15	0.0	0.0	0.0
La Puente	10/27 14:45	0.0	-0.25	0.0
Mariano	10/27 15:45	0.0	-0.2	0.0
Ferran	10/27 14:30	0.0	-0.31	0.0
Tierra Azul	10/27 14:30	0.0	-0.33	0.0
J.V. Martinez	10/27 15:45	0.0	-0.18	0.0
Manzanares y Montoya	10/27 15:30	0.0	-0.03	0.0

NOTE: Click on the Upper Chama Subbasin, Lower Chama Subbasin, NPT Subbasin, Santa Fe Subbasin or Gallinas Subbasin to see a zoomed in map showing well/gage locations, and a clickable list of stations.

[AWRM Active Water Resource Management NM OSE/ISC (state.nm.us)]

[New Mexico Real-Time Water Measurement Information System (state.nm.us)]

Future and 50 Year Water Planning

What is 50-Year Water Planning?

- **Governor's Initiative**
- **Purpose –** Help NM plan for climate change impacts to water supplies
- **Audience –** Decision-makers and the general public

What the 50 Year Water Plan is *NOT*

- State Water Plan
- Regional Water Plans
- Technical Report
- All Gloom-and-Doom
- Able to Solve all the State's Water Problems
- Going to Just Sit on a Shelf

Partners

- NM Bureau of Geology & Mineral Resources
- Volunteer Research Experts
- New Mexico Indian Affairs Department
- Tribal Water Work Group Volunteers
- Other State Agencies – NMOSE, EMNRD, NMED, NMDA, DGF, DHSEM, EDD, DOH
- New Mexico Water Dialogue
- Water Resources Research Institute
- U.S. Army Corps of Engineers

NEW MEXICO'S WATER FUTURE = *DRIER / MORE VARIABLE*

- **Anticipated continued changes in climate will mean *less water is available* while demands continue to increase.**
- **Given this new reality, we must plan ahead to ensure continuing economic development and the needs of all New Mexicans are met.**

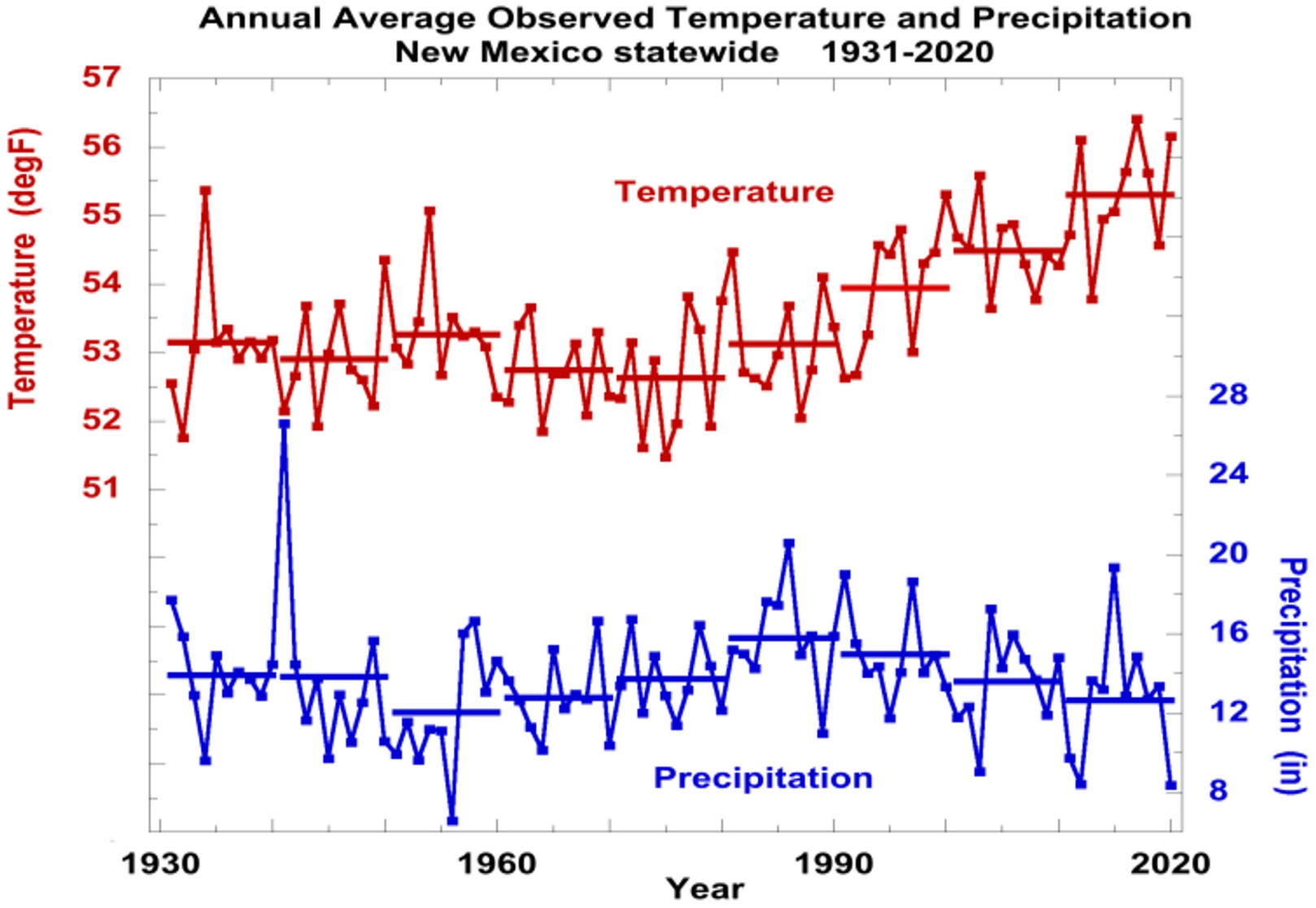


Image from [Climate Change in New Mexico over the Next 50 Years: Impacts on Water Resources]

Temperature Change in New Mexico

- Temperature increase will occur throughout the entire state.
- Especially high in the Northwest part of the state.

Annual average temperature simulated by 20 CMIP5 climate simulations by different models, spatially averaged over the state of New Mexico. Temperature change is defined as the difference between two thirty-year averages: (2040-2069) minus (1971-2000); the central years of these averaging periods are 70 years apart, so this plot represents 70-year temperature changes across the state.

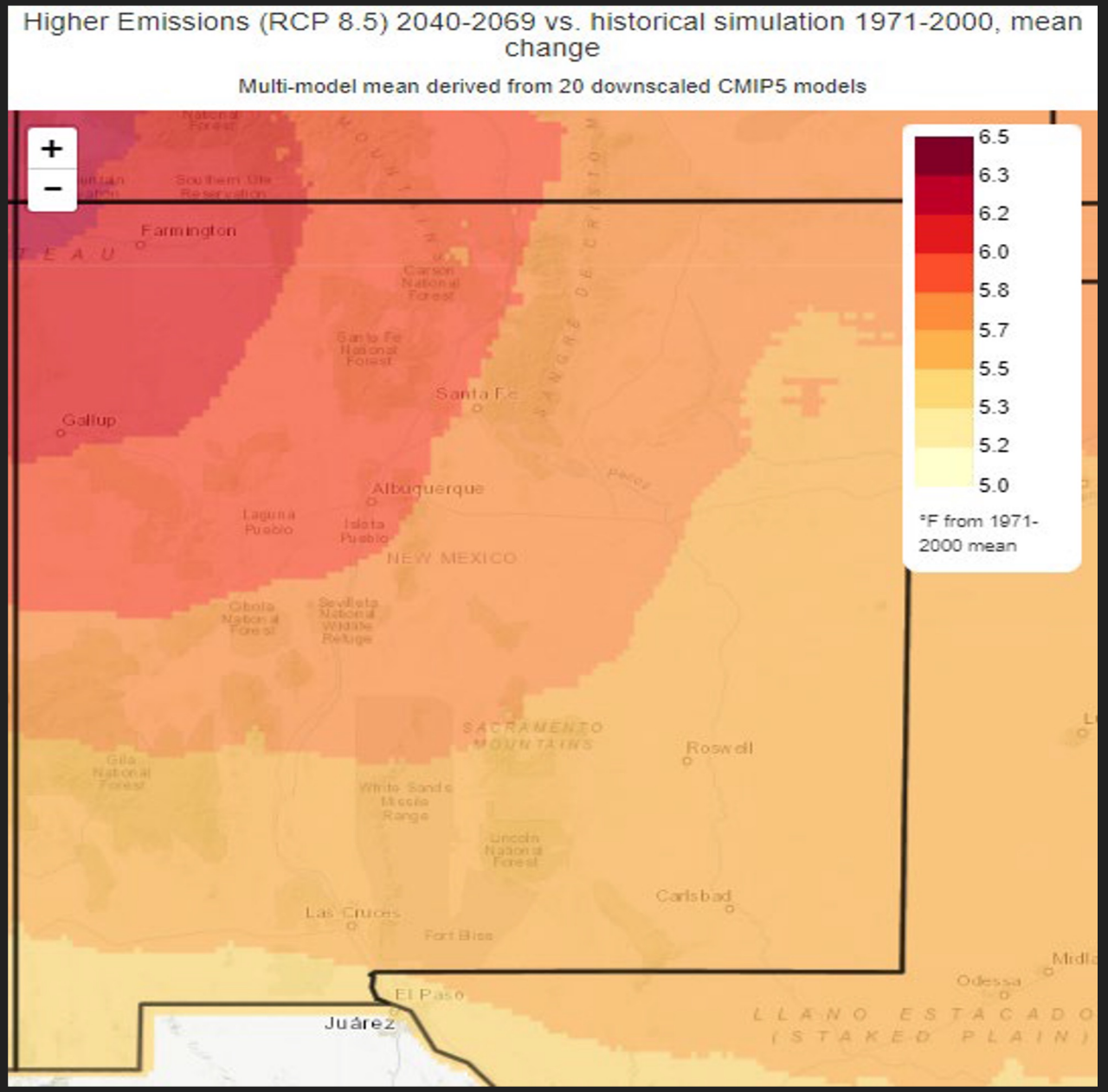
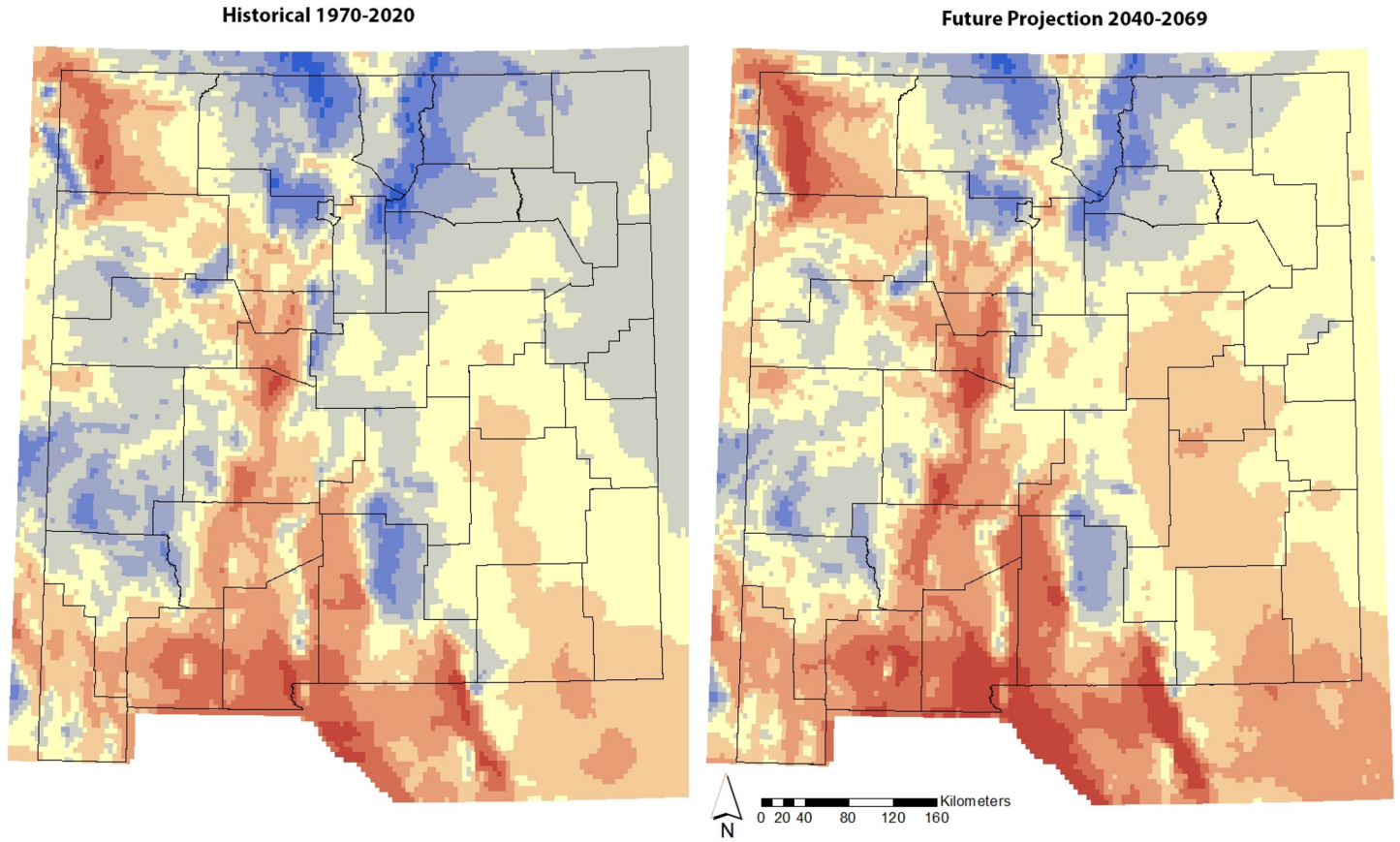


Image from Climate Change in New Mexico over the Next 50 Years: Impacts on Water Resources

Aridity in New Mexico



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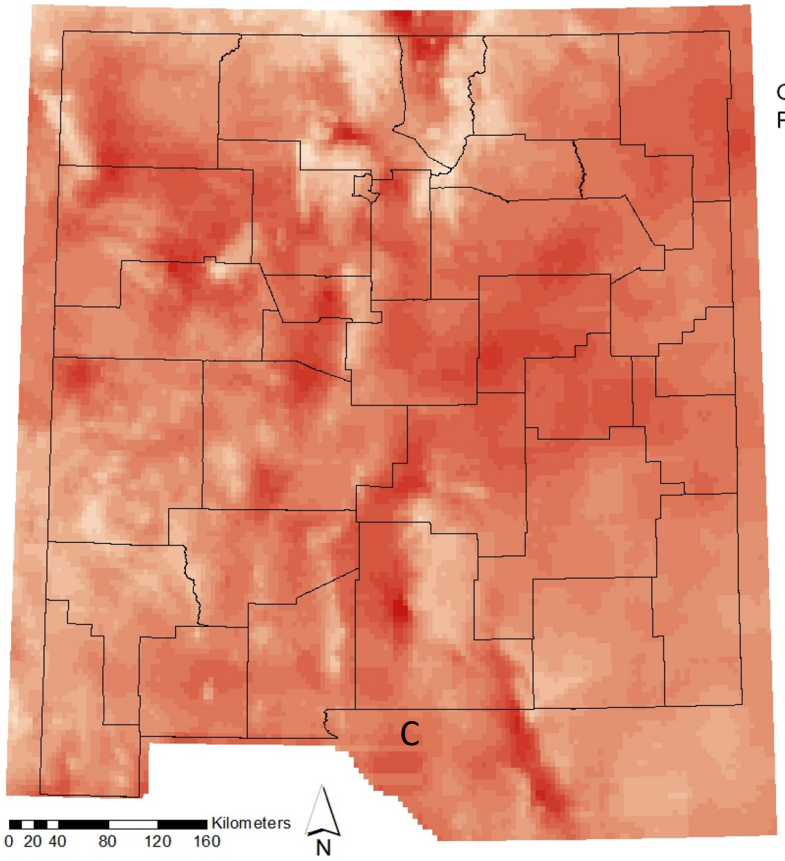


Projected change in the aridity index over New Mexico. (a) Average aridity index from 1970-2000 data, (b) Average aridity index from 2040-2069 projections, generated from 20-model ensemble RCP8.5. (c) Difference between 2040-2069 and 1970-2000 aridity indexes. Aridity index is defined as the ratio of average potential evapotranspiration to the average precipitation.

Image from [Climate Change in New Mexico over the Next 50 Years: Impacts on Water Resources]

National Water Stress Index

While the eastern half of the country can expect more water, the west can expect more water stress, and NM is no exception.

Projected change in water stress by mid-century (2040-2061) compared to historical average (1900-2668 1970). Lindsey, 2013.

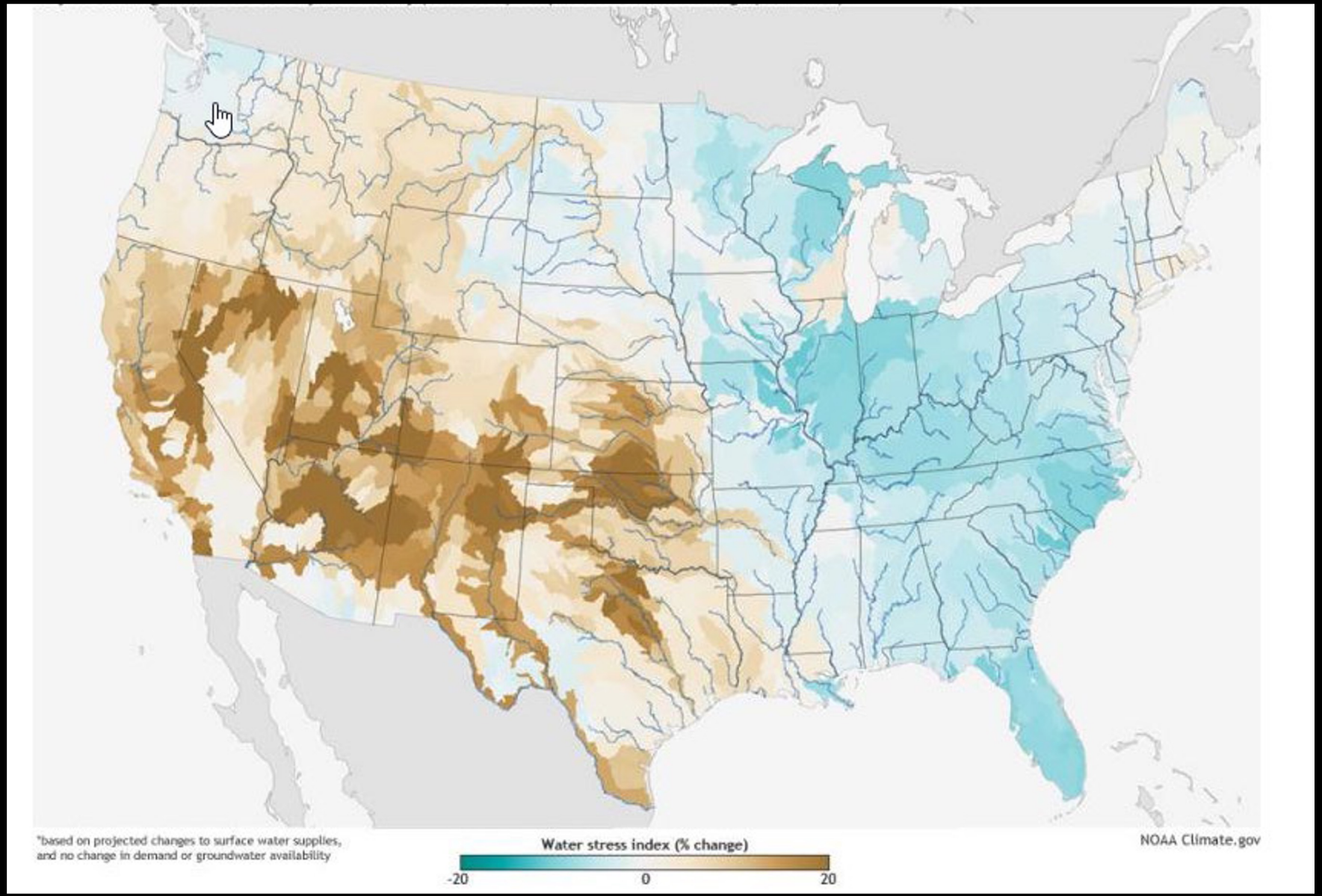


Image from Climate Change in New Mexico over the Next 50 Years: Impacts on Water Resources

Climate Change and Water in New Mexico: The Next 50 Years

- Average temperature rise of 5° to 7°F
- Lower streamflow and aquifer recharge
- Greater year-to-year variability in precipitation
- Hotter, more severe droughts
- Decreasing snowpack, earlier and diminishing runoff
- Greater demands on dwindling groundwater due to surface water shortfall
- Stress on natural vegetation caused by increasing temperature and decreased water availability
- Increasing catastrophic forest fire frequency resulting from heat and dryness
- Increasing flooding and sediment transport due to more intense storm events and fires
- Irreversible damage to soils through loss of vegetation and erosion
- Degraded quality of surface waters

Assessing Resilience

What contributes to resilience?

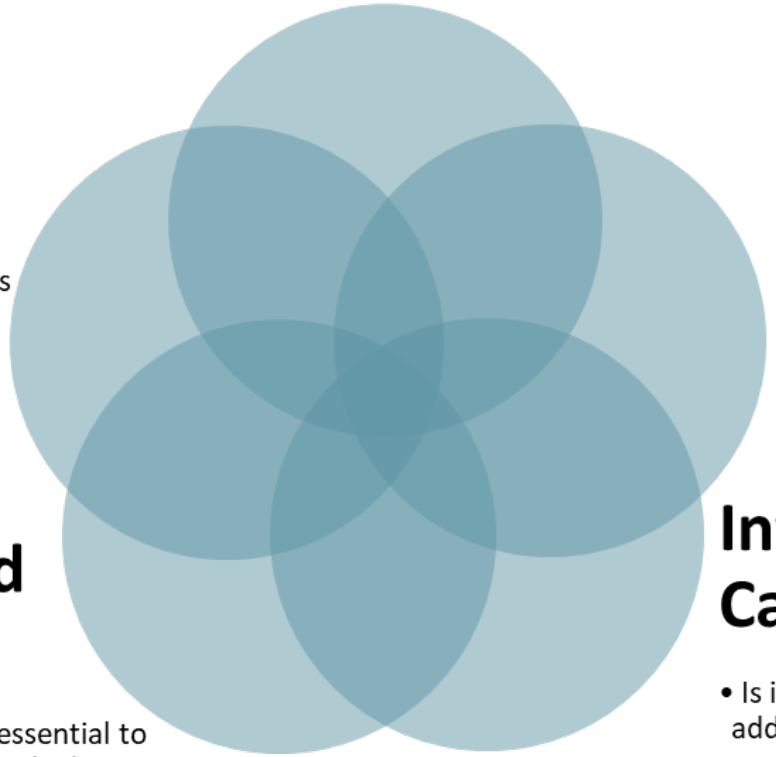
Each circle here represents a key factor of water resilience. The more factors a community/water user has, the more resilient they are likely to be.

Water Diversity

- How many sources of water does a user have access and rights to?

Demand Management

- Ongoing water conservation is key and needs to be a way of life for all New Mexicans. Are these mechanisms in place?



Water Availability

- How much water is available from those source(s)?

Watershed Health

- Ecosystem health is essential to providing often-overlooked ecosystem services including delivery of clean water, supporting groundwater recharge, and resistance to fire. Are these conditions present?

Infrastructure Capacity

- Is infrastructure sufficient to address the increasing demands associated with climate change?
- Is there equitable access to infrastructure/funding to address infrastructure needs?
- Does infrastructure have sufficient storage or an emergency supply

Note: Size of bubbles are not necessarily representative of degree of importance. Factors of resilience may vary in communities across the State.

50-Year Water Plan Recommendations

Desalination

The oldest tool in our toolbox to deal with the effects of drought and aridification.

HISTORY OF DESALINATION:

1958 United States authorized **Saline Water Conversion Act** funding the **Office of Saline Water**

REMARKS OF S. E. REYNOLDS AT THE
GROUNDBREAKING CEREMONY FOR THE
ROSWELL BRACKISH WATER DISTILLATION
PLANT - JULY 10, 1962

This ceremony inaugurating a plant for demonstrating the feasibility of converting brackish water to fresh water marks another event in the pioneering tradition of our state. It is particularly in keeping with tradition that this plant is being constructed in New Mexico where the tremendous energy of the atom was demonstrated and in Roswell, where, by Professor Goddard's rockets, the feasibility of the exploration of space was demonstrated.

New Mexico reportedly has about 15-billion acre-feet of saline ground waters of a quality ranging from brackish water to concentrated brine. If only one-third of these saline waters could be mined, desalinized, and conveyed to places where water will be needed, we could double our present uses and supply the new demand for a thousand years. These salt-laden waters, which in the past have usually been considered a curse in this arid land, may yet become one of our greatest blessings.

Salinity in the News

Rio Grande near Las Cruces, New Mexico

Rio Grande Basin Salinity Management Program
San Acacia, NM to Fort Quitman, TX

October 2012

Background and Purpose
Problems associated with elevated salinity in the Rio Grande from above Elephant Butte Reservoir, New Mexico, to Fort Quitman, Texas, have long been recognized and are increasing due to rapid urban growth and increasing water demand. Recent research has identified natural sources as the principal salinity contributor in the area, offering hope for intercepting salinity before it impacts water supplies.

The multi-state Rio Grande Project Salinity Management Coalition was formed to improve water quality in the New Mexico -Texas border region, and provides technical guidance. The Coalition is composed of TX, NM, and CO state water agencies; irrigation districts; El Paso and Las Cruces water utilities; and university researchers.

Rio Grande Salinity Management Program
The overall objectives of the Rio Grande Project Salinity Management Program are to reduce salinity concentrations, mass loading, and impacts in the Rio Grande Project area from San Acacia, New Mexico to Fort Quitman, Texas to increase usable water supplies for agricultural, urban, and environmental purposes. On behalf of the Salinity Coalition, the NM Interstate Stream Commission, NM Environment Department, Texas Commission on Environmental Quality, Texas Water Development Board and the U.S. Army Corps of Engineers (Corps) are working on a Water Resources Development Act Section 729; Phase 3 Rio Grande Basin, CO, NM, TX, San Acacia to Ft. Quitman, TX, Salinity Management Program to bring together existing information and develop a recommended strategy for moving forward with a salinity management program.

[WNR 110812 Item 0 Rio Grande Salinity Project.pdf (nmlegis.gov)]

SANTA FE NEW MEXICAN

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NEWS SPORTS OPINION PASATIEMPO OBITUARIES EMPTY STOCKING FUND LIFE CLASSIFIEDS REAL ESTATE JOBS LEGALS

Science on the Hill: Quenching New Mexico's thirst with brackish water

By Jeri Sullivan Graham
For The New Mexican Nov 15, 2015 Updated Nov 15, 2015 0

January 3, 2023

BROWNWOOD News.com

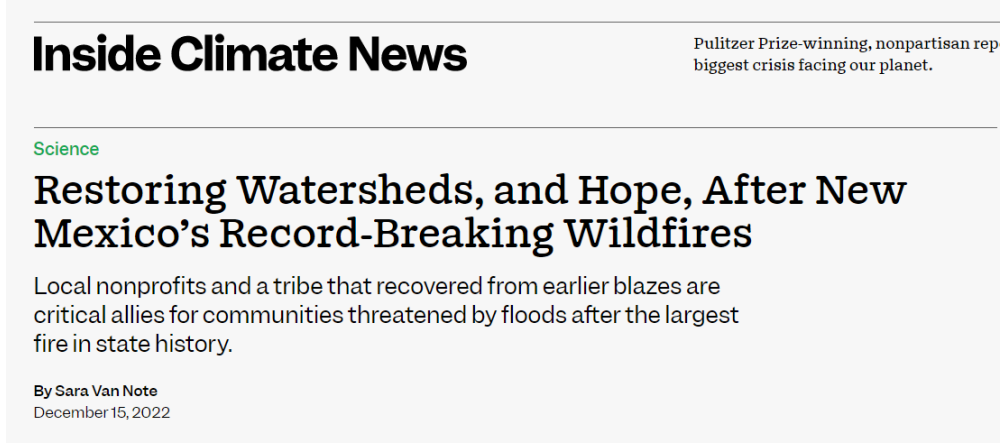
HOME NEWS OBITUARIES HOLIDAY HIGHLIGHTS COLUMNISTS BUSINESS DIRECTORY

Researchers Lead Study To Develop Climate-Adapted Pecan Trees

December 28, 2022 at 2:19 pm Derrick Stuckly Brown County Agri-Life Local News

Agriculture Drought and Salinity

https://www.thepacker.com/news/sustainability/will-leaving-farmland-fallow-save-water-long-run-new-mexico-researchers-given

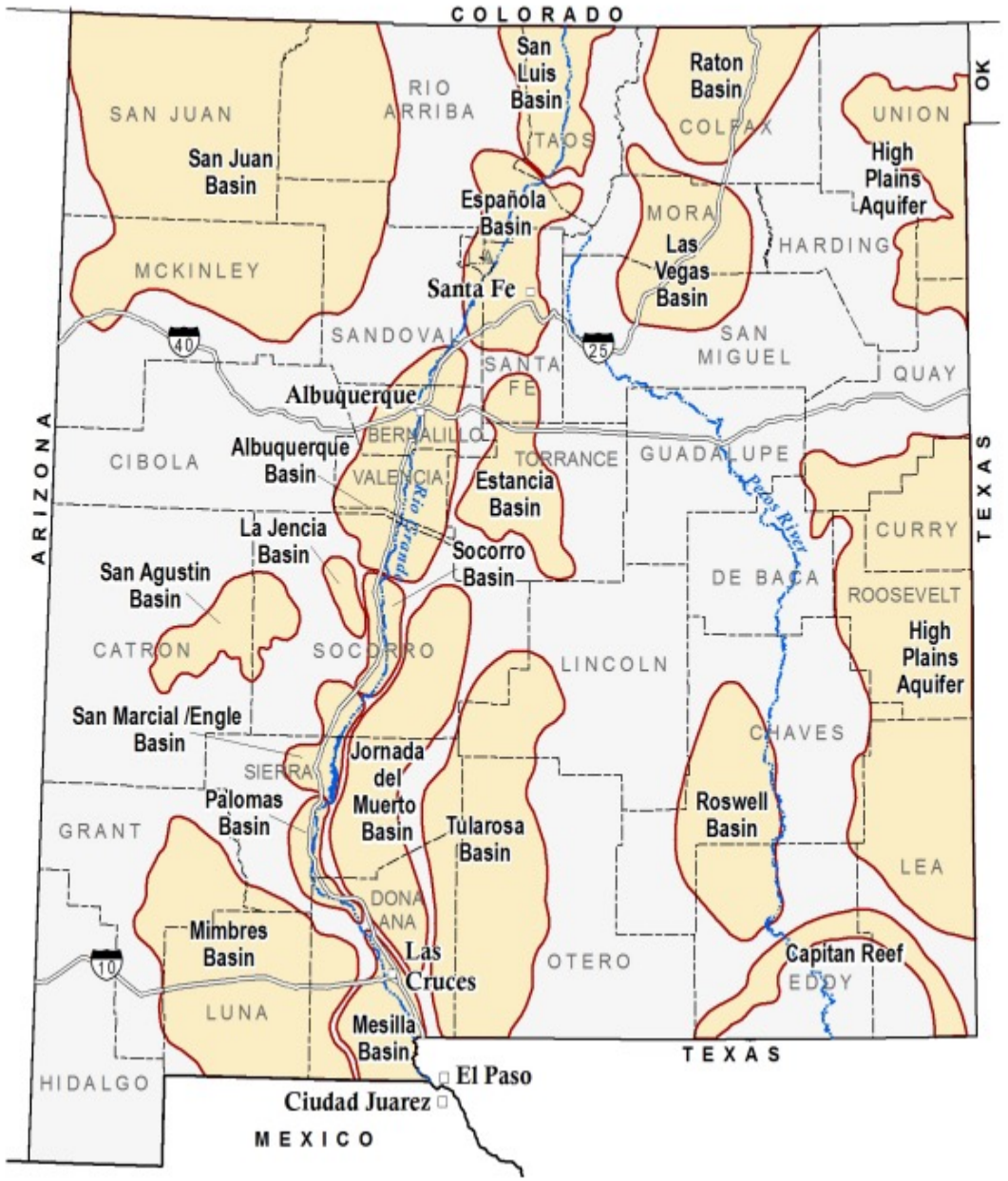


For New Mexico's Chiles, The Enemy Isn't Just Drought But Salt, Too : The Salt : NPR

https://insideclimatenews.org/news/15122022/new-mexico-wildfire-watershed-recovery/

BRACKISH AQUIFERS

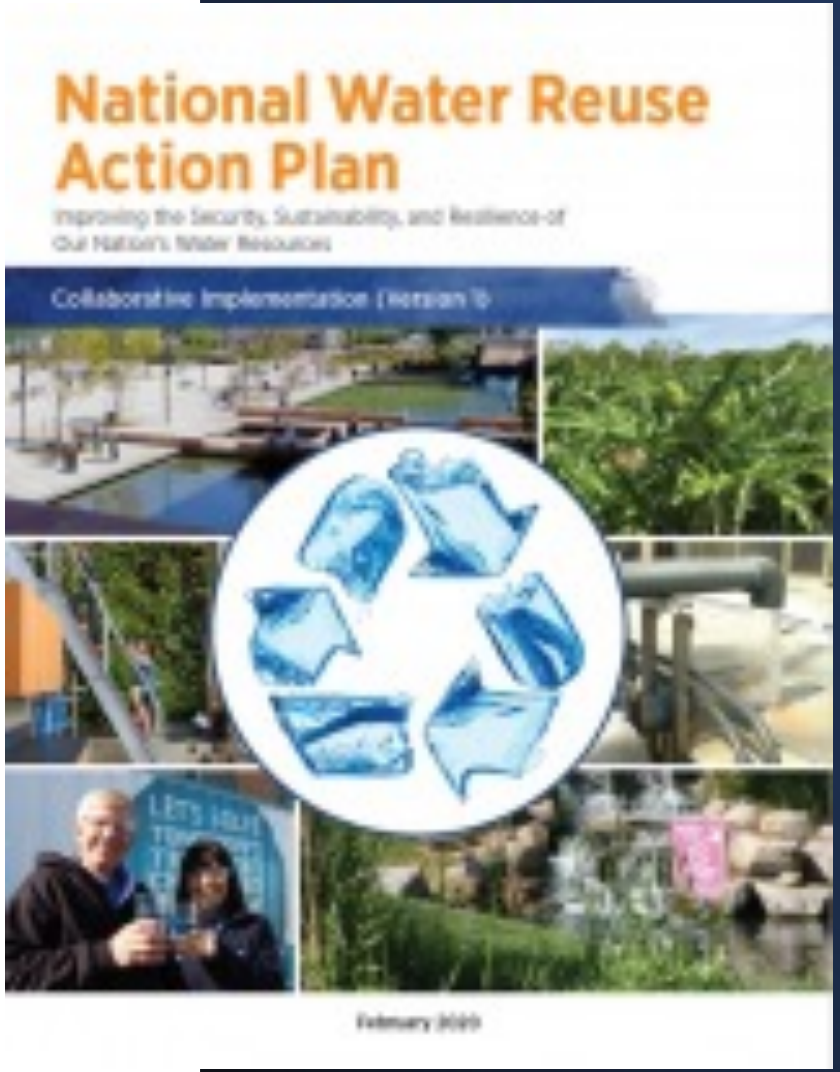
"The most saline water is found at shallower depths, and in some basins we observe an almost exponential decrease in dissolved solids at greater depths."



NMBGMR Open File Report 583, June 2016

EPA RESPONSE TO NATIONAL WATER STRESS – WATER REUSE ACTION PLAN

- Fit-for-purpose treatment and reuse of waste water in five major categories:
  - Thermo-electric cooling water
  - Agricultural waste water
  - Municipal waste water
  - Produced water
  - Storm water
- New Mexico is implementing these along with brackish and saline water treatment
- Most **new water resources** above will require desalination and concentrate management



https://www.epa.gov/waterreuse/national-water-reuse-action-plan-online-platform

EPA –WRAP update

2021 –1st year

- New Mexico stands alone as a national example of accomplishments toward:
  - Water **Security**
  - Water **Sustainability**
  - Water **Resilience**

2022 –2nd year

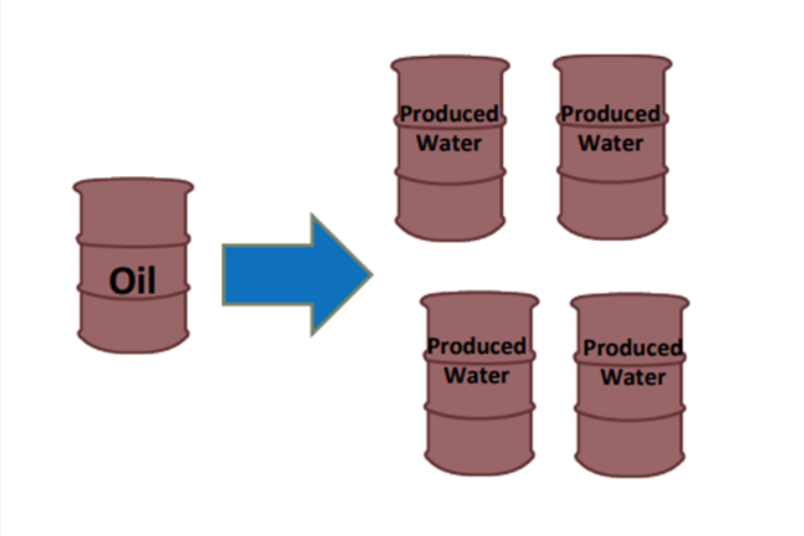
- New Mexico again stands out as successfully rolling out the New Mexico Produced Water Data Portal – giving the public access to information on wells, water quality and produced water volumes.

PRODUCED WATER

The newest potential tool to deal with the effects of drought and aridification.

HOW MUCH ARE WE TALKING ABOUT?

- In 2018, according to NMPWRC:
  - **42 billion gallons** in SE corner of the state.
  - **946 million gallons** in the NW corner of the state.
- In 2021, NM surpassed **67 billion gallons** of produced water, which equates to over **184 million gallons** per day — far exceeding the total daily municipal water consumption in the state.
- (Barrels per year = 42 gallons)



NM volumes from GWPC:

2007	665,685,000	BBL/YR
2012	775,930,000	"
2017	879,740,841	"
2021	**1,600,878,600**	"

Texas Railroad Commission Suspends Deep Disposal of Drilling Water In the Permian Basin

RISKS DUE TO SALT WATER INJECTION

- Seismic activity
- Sinkholes and collapses.
- Pollution in transport.
- Increased road traffic increases road damage.
- Inadequate roads causing accidents.
- New Mexico pore space is diminishing.

Office of the State Engineer

nm

Interstate Stream Commission

ALL WATER
HAS VALUE!

Andrew Erdmann ~ Water Planning Program Manager 505-231-1910 Andrew.Erdmann@ose.nm.gov

Julie Valdez ~ Water Use and Conservation Bureau Chief 505-827-6790 julie.valdez@ose.nm.gov

Jerri Pohl ~ Statewide Projects Supervisor 505-827-7848 jerri.pohl@ose.nm.gov

Contact us with any questions!