

# When Is Drought . . . Out?

## Reading and Graphing Option



**Summary:** Counting with dice, students experience the variability of weather and rainfall and how we all use water in the desert. Each year students use "water" from their lake for use indoors and out. Then they roll a die to see how much rain or snow they get to replace the water used from the lake. Watch as the drought causes the lakes to empty. Students guess or predict how long it will take for their lake to recover. (Answer -- It depends!)

**Grade 3 and up:** Adapt as needed

**Subjects:** Science, Social Studies

### Activity Materials:

- One pair of dice per group
- One usage mat per group
- One small cup per group ("lake" written on cup)
- Beads (water), 20 per group and the same number of beads in the sky
- One plate per group for rain or snow (sky)
- One plastic cup per group for wastewater ("drain")
- One set of 4 jobcards per group of 4 students
- A graphing page (optional)
- Water conservation handout (optional)

**Warm Up:** How do you use water in your home? What if there wasn't enough water? Could you use less?

**Preparation:** Each group of 4 students needs these things:

- One Water Use Mat
- One Lake (small clear cup) with 20 beads of water in it
- One Drain (large cup)
- One plate with about 20 beads in it
- One set of die
- One set of four job cards (Steps 1 – 4)

**Activity:** Put students in groups of 3 or 4. Give them their materials.

Explain that the beads represent the water we store in our lakes. When we need water we let it out so people can use it.

Ask students to each take a job card. Go over each step, making sure each student knows what to do.

1. **Step 1 Cardholder** takes 7 beads out of their lake. They put 1 bead in each box of the Water Use Map. Point out that we use slightly more water indoors (4) than outdoors (3).
2. **Step 2 Cardholder** collects their own 4 indoor beads from their Water Use mat and put them in the wastewater drain (cup). They will take the 3 outdoor beads and put them in the sky (water turns into a gas).
3. **Step 3 Cardholder** rolls one die to see how much rain and snow will replace the water they used. If students need more supervision, the teacher can roll and all groups get the amount teacher rolls. Step 3 cardholder gets beads from the sky (equal to number rolled) and puts them in the lake.
4. **Step 4 Cardholder** counts the beads in the lake. Students with lower math skills can actually count the beads. Students with higher math skills will want to start calculating. They may use the back of the graph paper to keep it all straight, or just do it mentally if they can.

You will notice that you cannot roll a number high enough to replace the 7 beads taken out each year, since the die only goes up to 6. These are drought years. The level of the lake will go down.

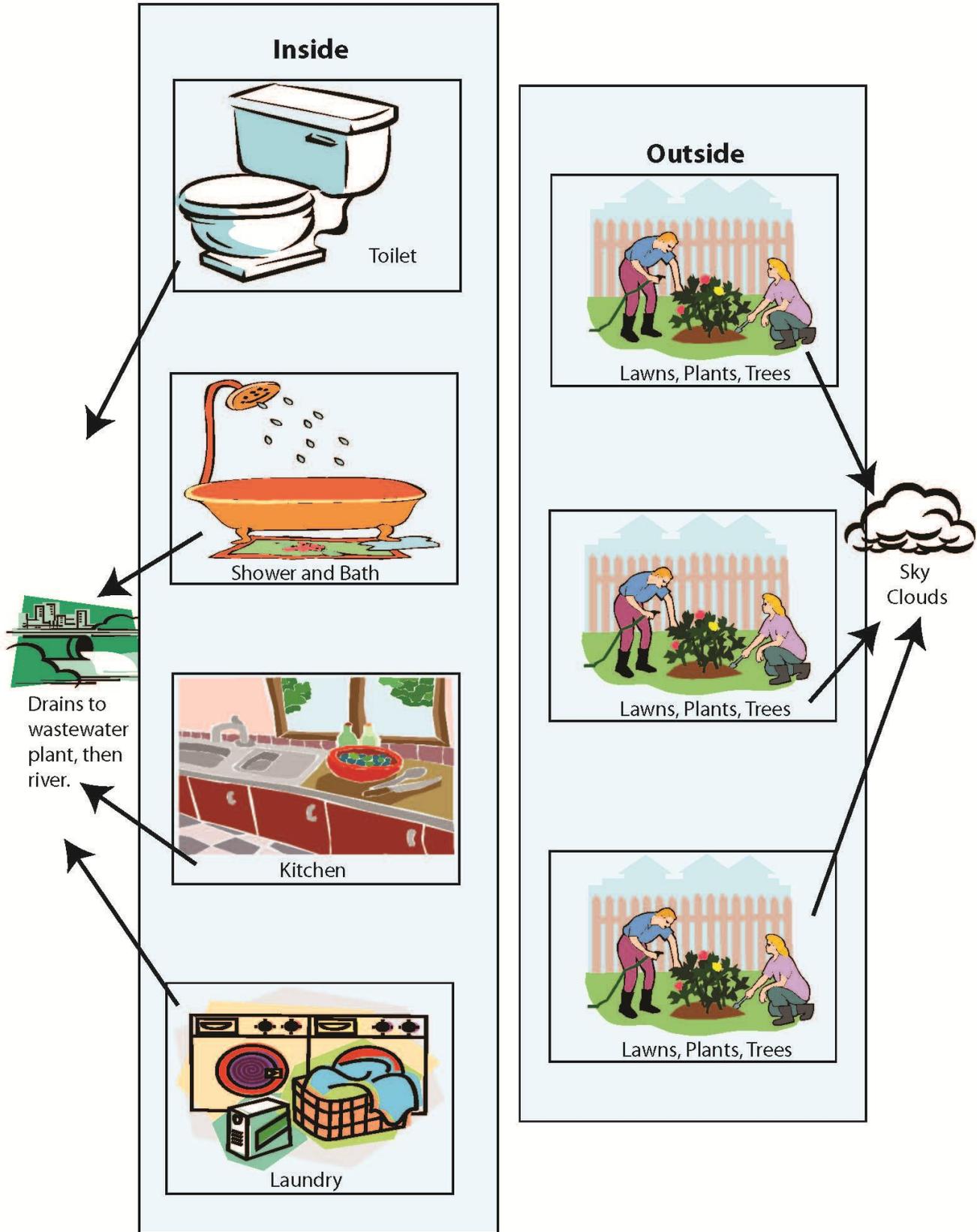
Repeat steps 1 – 4 until you have less than seven beads in each lake. When they don't have enough, ask students to choose which box(es) on the mat they leave empty. An empty box means that activity gets no water that year.

The weather is about to change. Put the water that went down the drain back up in the sky. It's moisture from the oceans, now that the wastewater has traveled downriver and into the ocean. (You can do this whenever the sky is looking dry.)

**Wet Years:** Now we are now getting rainy years. Ask students to guess how long it will take for their lakes to get back up to 20 beads. Keep track of their answers.

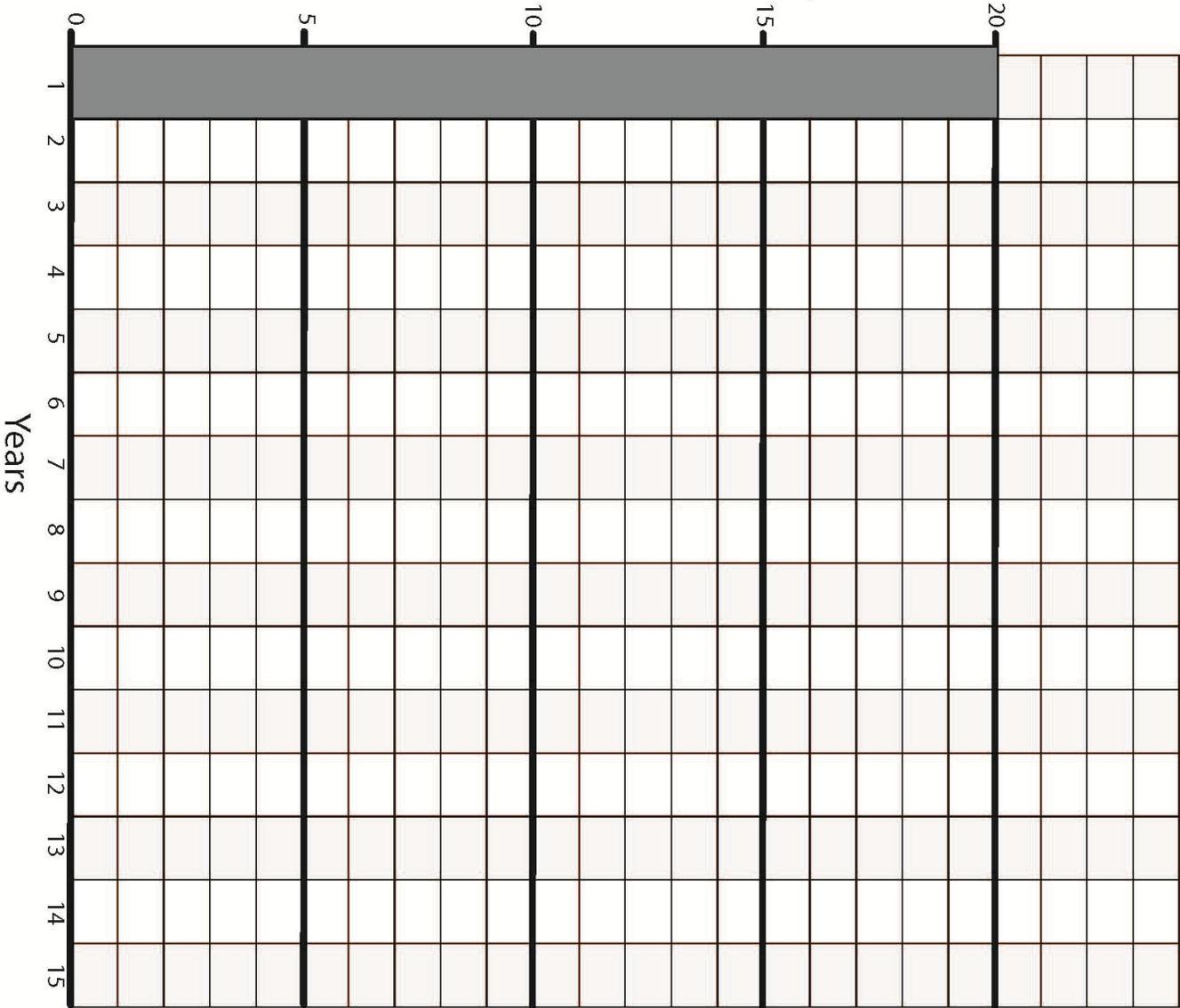
- For rainy years, students have the same jobs.
- Step 3 Cardholder will now be getting beads using 2 die. Set the one new die up so the 6 shows. This one will always be 6. Now roll the other die. If you roll a 1, the Step 3 Cardholder will take  $1 + 6 = 7$  beads from the sky and put them in their lake. If you roll a 5, the Step 3 Cardholder will take  $5 + 6 = 11$  beads from the sky and put them in their lake. Keep track of the number of beads in your lake. Continue with wet years until your lake is at or above 20. How long did it take to recover from the drought? How close was your prediction? Why doesn't one good rain fix the drought?
- Optional: Show students the graph of 2000 years of precipitation in New Mexico, based on tree ring data. Would their graph look like this if they did this 2000 times? Why or why not?
- Since we cannot control how much rain or snow we get, we need to control how much water we use. Talk about ways that you can conserve water. This would be a good time to watch the online movie about drought and how to save water. Visit <http://www.abcwua.org/education/drought.html>
- **Hand out the conservation coloring page if you choose to do so or just teach student the *Slow the Flow Song* on the page.**

# How We Use Our Water



<b>Step 1</b> Take 7 beads out of your lake. Put them on your mat.	<b>Step 2</b> Put the 4 indoor beads in the drain. Put the 3 outdoor beads in the sky.	<b>Step 3</b> Roll the die. Put that many beads in your lake.	<b>Step 4</b> Count the beads in your lake. Graph the beads in your lake now.
<b>Step 1</b> Take 7 beads out of your lake. Put them on your mat.	<b>Step 2</b> Put the 4 indoor beads in the drain. Put the 3 outdoor beads in the sky.	<b>Step 3</b> Roll the die. Put that many beads in your lake.	<b>Step 4</b> Count the beads in your lake. Graph the beads in your lake now.
<b>Step 1</b> Take 7 beads out of your lake. Put them on your mat.	<b>Step 2</b> Put the 4 indoor beads in the drain. Put the 3 outdoor beads in the sky.	<b>Step 3</b> Roll the die. Put that many beads in your lake.	<b>Step 4</b> Count the beads in your lake. Graph the beads in your lake now.
<b>Step 1</b> Take 7 beads out of your lake. Put them on your mat.	<b>Step 2</b> Put the 4 indoor beads in the drain. Put the 3 outdoor beads in the sky.	<b>Step 3</b> Roll the die. Put that many beads in your lake.	<b>Step 4</b> Count the beads in your lake. Graph the beads in your lake now.
<b>Step 1</b> Take 7 beads out of your lake. Put them on your mat.	<b>Step 2</b> Put the 4 indoor beads in the drain. Put the 3 outdoor beads in the sky.	<b>Step 3</b> Roll the die. Put that many beads in your lake.	<b>Step 4</b> Count the beads in your lake. Graph the beads in your lake now.
<b>Step 1</b> Take 7 beads out of your lake. Put them on your mat.	<b>Step 2</b> Put the 4 indoor beads in the drain. Put the 3 outdoor beads in the sky.	<b>Step 3</b> Roll the die. Put that many beads in your lake.	<b>Step 4</b> Count the beads in your lake. Graph the beads in your lake now.
<b>Step 1</b> Take 7 beads out of your lake. Put them on your mat.	<b>Step 2</b> Put the 4 indoor beads in the drain. Put the 3 outdoor beads in the sky.	<b>Step 3</b> Roll the die. Put that many beads in your lake.	<b>Step 4</b> Count the beads in your lake. Graph the beads in your lake now.

## Water Beads in your Lake



**When is the drought . . . out?**

How many years did it take for your lake to go from 20 beads to less than 7?

Predict how long it will take for your lake to recover.

Will everyone's lake recover in the same amount of time? Why or why not?

**Year 1 is already graphed**

20

**Year 2**  
Lake Total .....  
# from Lake ..  $\frac{-7}{-}$  .....  
Equals .....  
# from Sky ..... + .....  
New Lake Total.. graph this

**Year 3**  
Lake Total .....  
# from Lake ..  $\frac{-7}{-}$  .....  
Equals .....  
# from Sky ..... + .....  
New Lake Total.. graph this

use for year 4

**Year 4**  
Lake Total .....  
# from lake ...  $\frac{-7}{-}$  .....  
Equals .....  
# from Sky. + .....  
New Lake Total.. graph this

**Year 5**  
Lake Total .....  
# from Lake ..  $\frac{-7}{-}$  .....  
Equals .....  
# from Sky.. + .....  
New Lake Total.. graph this

**Year 6**  
Lake Total .....  
# from Lake ..  $\frac{-7}{-}$  .....  
Equals .....  
# from Sky .... + .....  
New Lake Total.. graph this

use for year 7

**Year 7**  
Lake Total .....  
# from lake ...  $\frac{-7}{-}$  .....  
Equals .....  
# from Sky.. + .....  
New Lake Total.. graph this

**Year 8**  
Lake Total .....  
# from Lake ..  $\frac{-7}{-}$  .....  
Equals .....  
# from Sky... + .....  
New Lake Total.. graph this

**Year 9**  
Lake Total .....  
# from Lake ..  $\frac{-7}{-}$  .....  
Equals .....  
# from Sky... + .....  
New Lake Total.. graph this

use for year 10

**Year 10**  
Lake Total .....  
# from lake ...  $\frac{-7}{-}$  .....  
Equals .....  
# from Sky.. + .....  
New Lake Total.. graph this

**Year 11**  
Lake Total .....  
# from Lake ..  $\frac{-7}{-}$  .....  
Equals .....  
# from Sky... + .....  
New Lake Total.. graph this

**Year 12**  
Lake Total .....  
# from Lake ..  $\frac{-7}{-}$  .....  
Equals .....  
# from Sky... + .....  
New Lake Total.. graph this

use for year 13

**Year 13**  
Lake Total .....  
# from lake ...  $\frac{-7}{-}$  .....  
Equals .....  
# from Sky... + .....  
New Lake Total.. graph this

**Year 14**  
Lake Total .....  
# from Lake ..  $\frac{-7}{-}$  .....  
Equals .....  
# from Sky... + .....  
New Lake Total.. graph this

**Year 15**  
Lake Total .....  
# from Lake ..  $\frac{-7}{-}$  .....  
Equals .....  
# from Sky... + .....  
New Lake Total.. graph this

# EZ Ways to Save Water Indoors!



- 1 Make sure your washer is full before you run it. If you run your washer half-full, it will take twice as much water to wash the same amount of clothes! Also, most frontloading washers use half as much water as toploaders!



- 2 Turn the water off when you brush your teeth, wash your hands, or shave! It's only a couple of gallons for you, but if we all do it, we'll save millions of gallons a day!



- 3 Take shorter showers! Five minute showers are usually enough. Make sure you have a low-flow showerhead.



- 4 Install a high efficiency toilet and never use your toilet as a garbage can! That wastes a flush.

# EZ Ways to Save Water Outdoors!



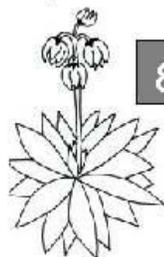
- 5 Move your sprinkler so it doesn't water the street or sidewalk. Your hose uses 20 gallons of water every minute! Be careful where it goes.

- 6 Water at night or in the early morning when it is cool. You will minimize water evaporation. And use our 1-2-3-2-1- guidelines!

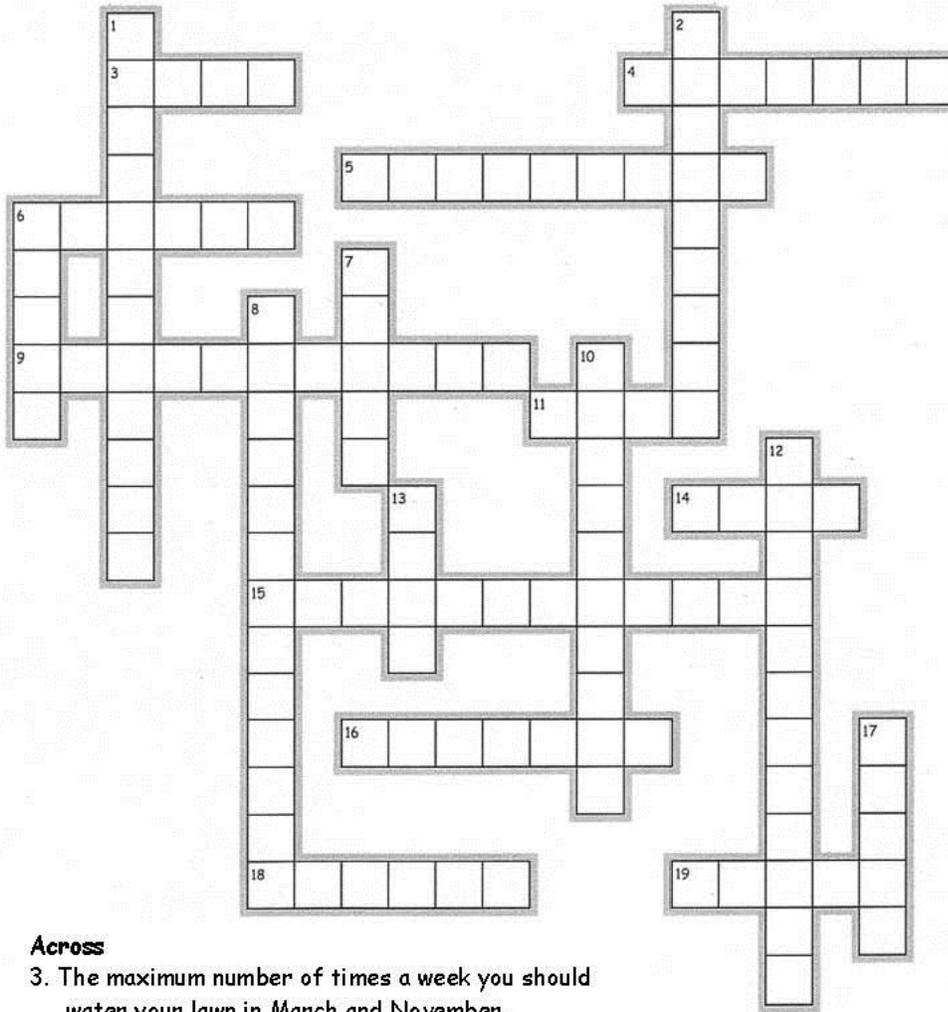
- 7 Use a nozzle on your hose so you don't have to run back and forth to turn it off or on. Only turn the hose on when you are using the water - don't let water run down the street.



- 8 Plant drought resistant trees and plants. Xeriscape plants use less water and are very hardy. Use drip irrigation to reduce evaporation. An automatic timer helps you remember to turn the water off.



# Test Your Water Conservation Knowledge!



## Word Bank

aquifer  
 automatic  
 condensation  
 dishwasher  
 drip  
 evaporation  
 five  
 frontloading  
 infiltration  
 nozzle  
 once  
 precipitation  
 rebates  
 river  
 three  
 twenty  
 twice  
 water  
 xeriscape  
 zero

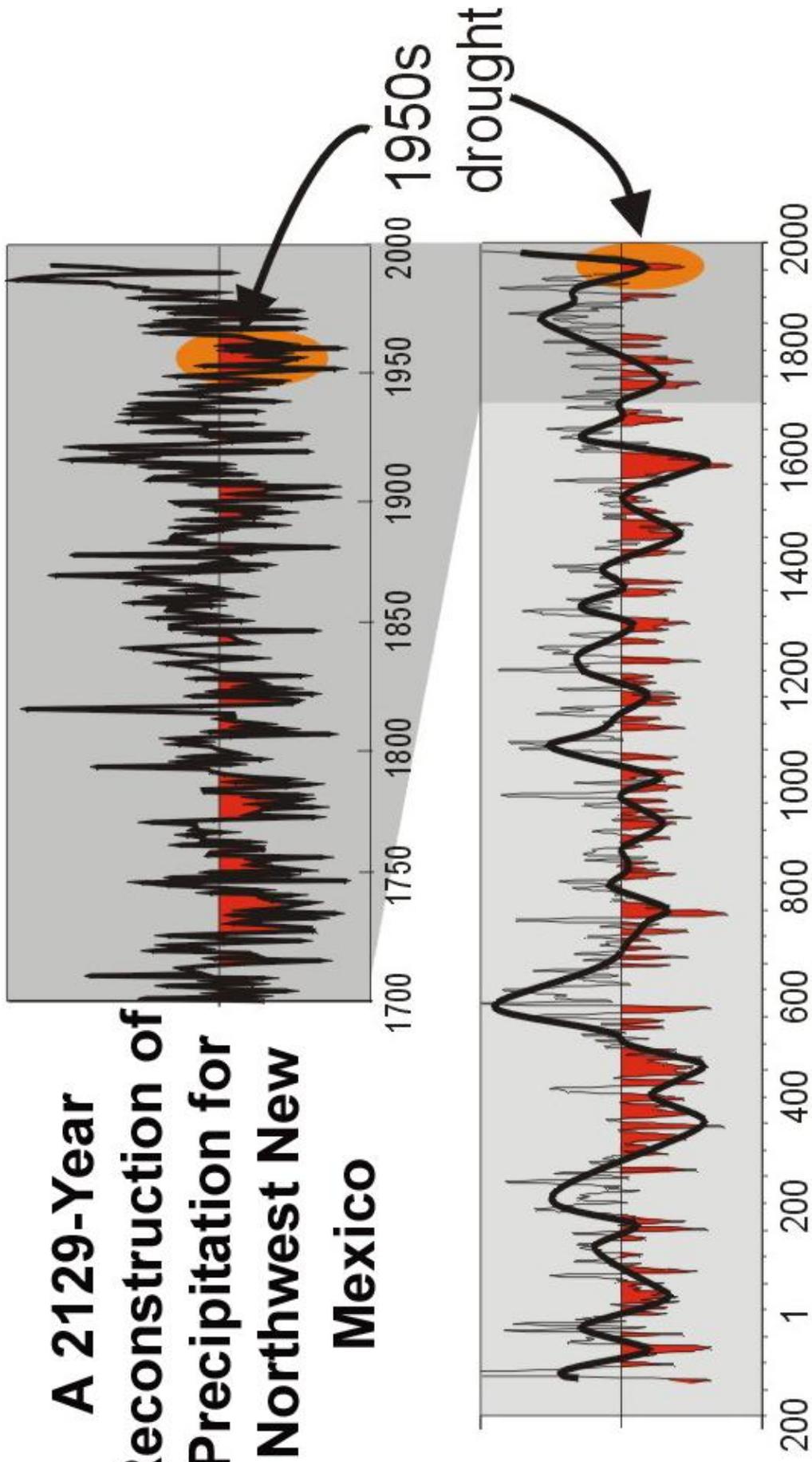
### Across

3. The maximum number of times a week you should water your lawn in March and November.
4. Money we give our customers who buy high efficiency toilets or washers or who xeriscape.
5. Timers that turn off your irrigation system.
6. The number of gallons a hose delivers in 1 minute.
9. When liquid water turns into a gas (water vapor).  
The hotter it is outside, the faster this happens.
11. The number of minutes you should shower.
14. The number of times you should water your lawn in December, January, and February.
15. When water sinks or percolates into the ground.
16. This is where all of the water in Albuquerque's faucets, toilets, washers, hoses, and sprinklers used to come from.
18. Use this on your outside hose to easily turn water off and on - don't let water run down the street.
19. The maximum number of times you should water your lawn in April/May and September/October.

### Down

1. When water vapor turns into liquid water.
2. Landscape that uses drought resistant plants in order to conserve water.
6. The maximum number of times a week you should water your lawn in June, July, and August.
7. Because we live in a desert, we must conserve this precious resource.
8. When water falls from the sky as rain, snow, sleet, or hail.
10. You should never run this appliance until it is full.
12. Most of these clothes washers use half as much water a typical toploading machine.
13. A type of irrigation that delivers water to the ground near the plant rather than to the air as most sprinklers do.
17. Where some of Albuquerque's water comes from now. This will allow our aquifer to replenish.

# A 2129-Year Reconstruction of Precipitation for Northwest New Mexico



Year

from Grissino-Mayer 1996