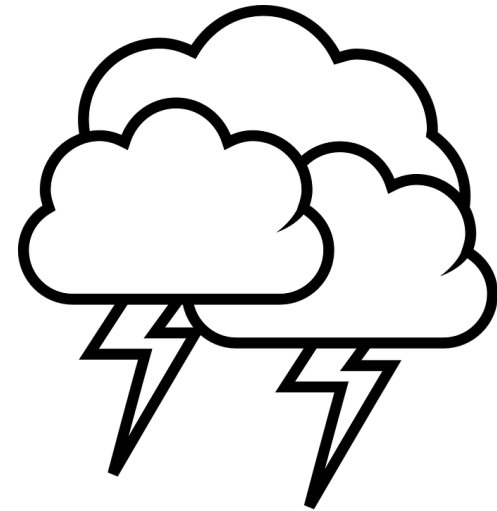


Keep Exploring!



Wicked Weather



Name: _____

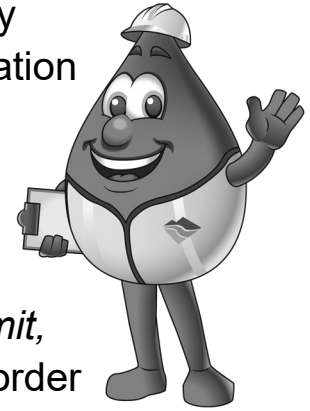
To explore other curriculum and activities developed by
Central Utah Water Conservancy District head to:
<https://cuwcd.com/education.html>

 Central Utah Water STEM Club Passport

Who is Central Utah Water?



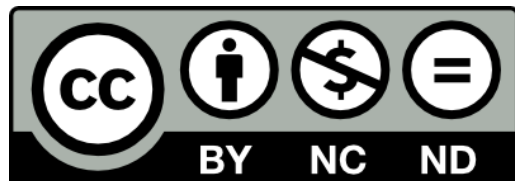
Central Utah Water Conservancy District is a government organization with the mission to move water across county boundaries. We have 8 counties located within the District (*Duchesne, Juab, Salt Lake, Sanpete, Summit, Uintah, Utah, and Wasatch*). In order to meet our mission of moving water, Central Utah Water stores water in 9 reservoirs, maintains over 180 miles of large diameter pipelines, and runs 3 regional drinking water treatment plants.



In addition to our primary responsibility to move water, Central Utah Water is the second largest producer of hydropower in the State of Utah, works to protect endangered species, supports community based water conservation projects, and is a regional leader in water education.

To learn more about Central Utah Water and our work in the community go to CUWCD.com

This curriculum is released by
Central Utah Water Conservancy District
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Further Adventures



Just because this club is done, doesn't mean you have to end the fun! H₂Joe has done his research and found you a bunch of other weather related activities and games that you can do at home.



NOAA - Hurricane Hero

<https://scijinks.gov/hurricane-hero/>



NOAA - Wild Weather Adventure

<https://scijinks.gov/wild-weather-adventure/>



NOAA - ZAP Lighting Simulator

<https://scijinks.gov/zap-game/>



NOVA - Cloud Lab

<https://www.pbs.org/wgbh/nova/labs/lab/cloud/>



NOVA - Sun Lab

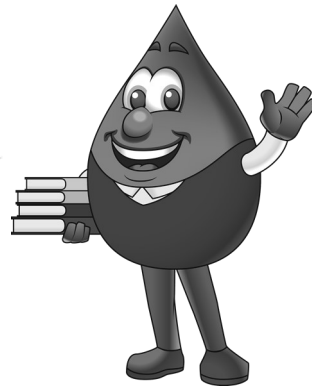
<https://www.pbs.org/wgbh/nova/labs/lab/sun/>



NWS - Young Meteorologist Challenge

<http://youngmeteorologist.org/>

I hope you continue to learn about weather!



20

Welcome to the Wicked Weather STEM Club! Together we will be tackling 4 unique activities, each diving into a different type of weather phenomenon. If you work as a team to defeat all 4 challenges a special surprise will greet you at the end of the club. So put on your 'rainboots' and let's jump in!



Activity 1 - When It Rains It May Flood



Activity 2 - The Earth Spins And So Does The Storm



Activity 3 - Mega Drought Detective



Activity 4 - Citizen Science Meteorology

Hi, I'm H₂Joe. I am looking forward to explore weather with you!



1



When It Rains It Might Flood

The first weather phenomenon the club is going to explore is floods. A flood happens when the weather brings more water than the rivers, lakes, and surrounding land can hold. While floods can do a lot of damage to homes, bridges, and other structures, seasonal floods are often important to local ecosystems.

For The Flood Activities I Need...

- | | |
|------------------|--------------------|
| A Coin | A Cookie Sheet |
| A 10-Sided Dices | 2 or 3 Dish Towels |
| Water | A Measuring Cup |

Fun Fact



The endangered June Sucker is only native to Utah Lake. In order to lay their eggs, they need a flood that is not too big and not too small. To save this fish from extinction, water managers use dams to artificially create a flood of just the right size for the June Sucker to reproduce!

Who Cares About Weather?



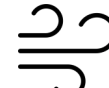
Regardless of who you are, we all use the same tools to help protect us from the weather Mother Nature sends our way. Take a moment and draw a line between the type of weather it's tool.



Rain



Snow



Wind



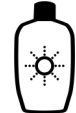
Sun



Heat



Lightning



Sunscreen



Wind Breaker



Umbrella



Sandals



Mittens



Building



Who Cares About Weather?

Lots of different type of people use weather information to make decisions. Find all 20 examples in the word search below!

F O R D Q A B R J S T R P I D
 I I R E B F E O N B S E A W Z
 X I S N B H X A O C I P R E J
 B G E H C M I E M Q G O E D H
 M W F A E R I Z X M O R N V R
 X B E G O R L L I T L T T Z E
 T T U T O D M Z C I O E S P K
 E S S I W D G A G Q R R C S C
 A I I D L H S T N E D U T S U
 H D A G O D U P B K Y Q G S R
 U B U D O X E X W G H F W K T
 F X U A R L T R A T T Q S S N
 T S I G O L O R O E T E M O H
 R Z Y B W T D T R E G N A R I
 E D X D O E H D A O L D Q E S
 M G F L N E M A J M T S D A Q
 R W I E I K U Y Y C I C I G C
 A P R A T H L E T E B L O H D
 F F T I U F A Y H A O B C D T
 V A C A T I O N E R B I K Z T

ATHLETE
 BUILDER
 CLIMATOLOGIST
 CLIMBER
 DOCTOR
 FARMER
 FISHERMAN

GARDENER
 HISTORIAN
 HYDROLOGIST
 METEOROLOGIST
 PARENT
 PILOT
 RANGER

REPORTER
 SAILOR
 STUDENT
 TEACHER
 TRUCKER
 VACATIONER

When It Rains It Might Flood



Record the frequency of your 'floods' in the chart below:

	1 in 2 (coin)	1 in 10 (10 sided dice)	1 in 100 (marbles)
Year 1			
Year 2			
Year 3			
Year 4			
Year 5			
Year 6			
Year 7			
Year 8			
Year 9			
Year 10			

Take this experiment to the next level by pulling out a piece of paper and simulating a 100 years worth of flood data!



When It Rains It Might Flood

Changes in the landscape can affect the amount, and severity of flooding. In our next experiment, we will make a model watershed to show how water flows across a parking lot vs a grassy park.

Paved Observations:
(Bare)

Grassy Observations:
(Towel)

Which landscape did the best job preventing flooding?



Citizen Science Meteorology



Humans aren't the only organisms that pay attention to the weather. The plants and animals around us do too!

For this activity you will pick a tree to make observations about all year long.

Tree Location: _____

Tree Type/Species: _____

Date Leaf Color Change: _____

Fall Leaf Color: _____

Draw a leaf from your tree

You can share your observations about changes you spot in the landscape with NASA scientists at ISeeChange.org





Citizen Science Meteorology

Measuring the amount of precipitation your home gets is another great Citizen Science Meteorology project. In order to accurately measure the amount of water you will need to create a calibrated rain gauge. Luckily, it is easy to make one with a empty tuna can and a ruler.

1 Week Rainfall Record

	Did It Rain?	Amount	Notes
Day 1			
Day 2			
Day 3			
Day 4			
Day 5			
Day 6			
Day 7			



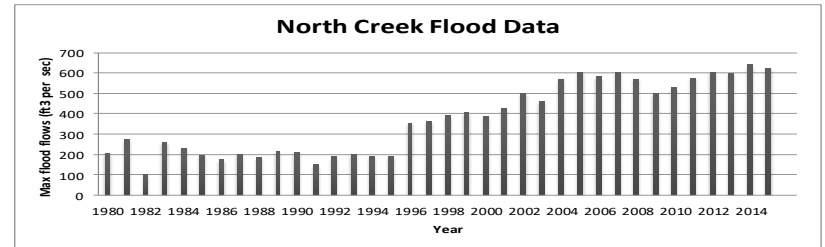
The wettest place on Earth is Mawsynram, India which gets an average of 39 feet of rainfall every single year!

16



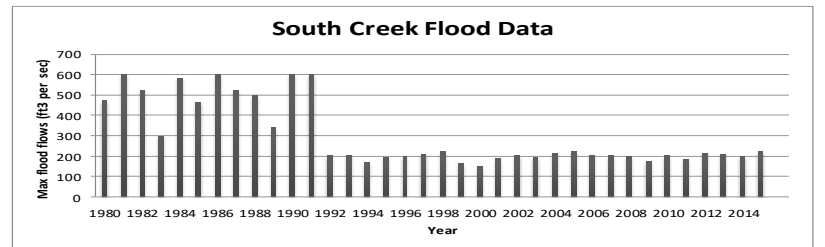
When It Rains It Might Flood

Scientists compare the size of floods using a tool called a hydrograph. Below are the hydrographs for two different watersheds. Using what you learned in the watershed model activity, create some hypothesis about what happened in the watershed.



What year did the change in the watershed happen?

What human actions could explain this hydrograph?



What year did the change in the watershed happen?

What human actions could explain this hydrograph?

5



The Earth Spins And So Does The Storm

The uneven heating of the Earth's surface and the Coriolis Effect work together to create our planet's weather. In this activity, we will build a model to let us observe how the Coriolis Effect causes weather systems to spin...then discover how those spinning weather systems create the violent storms like tornadoes, hurricanes, and cyclones.

For The Storm Activities I Need...

- Ice Cube
- Measuring Cup
- 2 1-Liter Bottles
- Water
- Packing Tape
- Dry Grass

Fun Fact

About 98% of tornadoes spin counterclockwise in the Northern Hemisphere and clockwise in the Southern Hemisphere. The remain 2% rotate in the opposite direction and are called Anticyclones. The relatively weak Anticyclones are though to be created by wind shear instead of the Coriolis Effect.



Citizen Science Meteorology



The first type of weather we will observe is wind. Scientists use a special tool called an anemometer to measure how fast the wind is moving. If they don't have their anemometer handy, they make observations about what the wind is moving to estimate its speed.

Beaufort Scale

Beaufort number	Wind Speed (mph)	Seaman's term		Effects on Land
0	Under 1	Calm		Calm; smoke rises vertically.
1	1-3	Light Air		Smoke drift indicates wind direction; vanes do not move.
2	4-7	Light Breeze		Wind felt on face; leaves rustle; vanes begin to move.
3	8-12	Gentle Breeze		Leaves, small twigs in constant motion; light flags extended.
4	13-18	Moderate Breeze		Dust, leaves and loose paper raised up; small branches move.
5	19-24	Fresh Breeze		Small trees begin to sway.
6	25-31	Strong Breeze		Large branches of trees in motion; whistling heard in wires.
7	32-38	Moderate Gale		Whole trees in motion; resistance felt in walking against the wind.
8	39-46	Fresh Gale		Twigs and small branches broken off trees.
9	47-54	Strong Gale		Slight structural damage occurs; slate blown from roofs.
10	55-63	Whole Gale		Seldom experienced on land; trees broken; structural damage occurs.
11	64-72	Storm		Very rarely experienced on land; usually with widespread damage.
12	73 or higher	Hurricane Force		Violence and destruction.



Citizen Science Meteorology

During the last club activity will explore how to observe weather as a citizen scientist. While professional meteorologists use scientific instruments to take their weather measurements, there is a lot of valuable observations you can make using things around your house.

For The Meteorology Activities I Need...

- A View of a Window String
- Scissors Empty Tuna Tin
- A 2-Liter Bottle Ruler
- Plastic Grocery Bags Permanent Maker

Fun Fact



Earth isn't the only planet with weather. Meteorologist also observe storms throughout the solar system. Some of the most unique weather they have spotted include a hexagon storm located at Saturn's North Pole, Jupiter's Giant Red Spot which is 1.3 times wider than the Earth, and planet-sized dust storms that can sweep across the entire surface of Mars!

The Earth Spins And So Does The Storm



The temperature of the air effects its density. Air that are more dense will sink, while air that are less dense will rise. In this experiment will use ice to cool air and see if it makes the air more or if cold makes it less dense.

Is the air cooler above or below the ice cube?

Based on your ice cube observations, how do you think the air would behave around a mug of hot cocoa?



During a winter inversion cold air collects in the valleys. Do these inversions create stormy or calm weather?



The Earth Spins And So Does The Storm

When enough warm air rises it creates a storm. When the storm gets big enough it starts to spin. The faster a storm spins, the more damage they can cause. The most dangerous of these cyclonic storms are hurricanes (*also known as cyclones or typhoons depending which ocean they are located in*), blizzards, and tornadoes. In this activity, we are going to build a tornado model using our plastic bottles.



Draw and write about your tornado observations below:

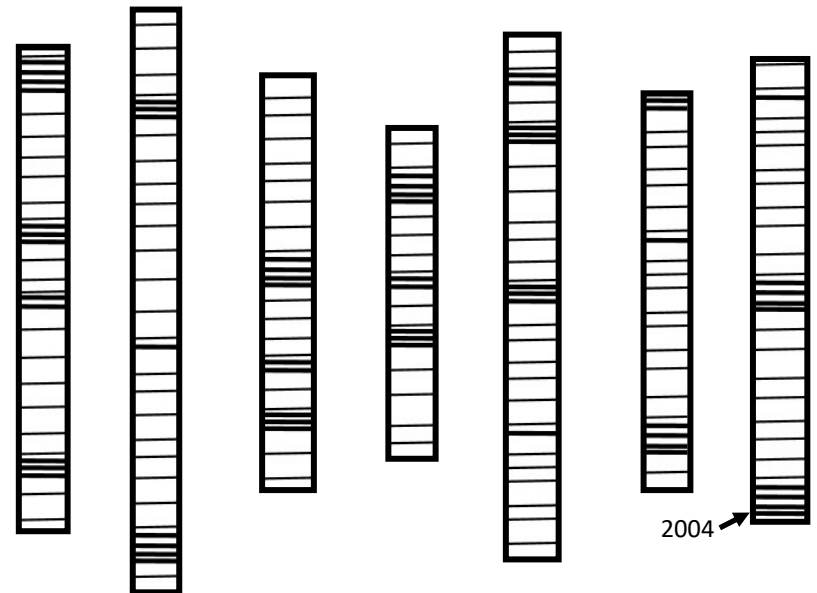


Mega Drought Detective



While scientists would love to get all their climate data from one tree, most tree species do not live long enough to provide a record that is over a thousand years long. To fix this, archeologists use patterns in the tree rings pair up dated pieces of wood to ones they find at dig sites.

Draw lines to show which tree rings match:



What year is the oldest tree ring in the record from?





Mega Drought Detective

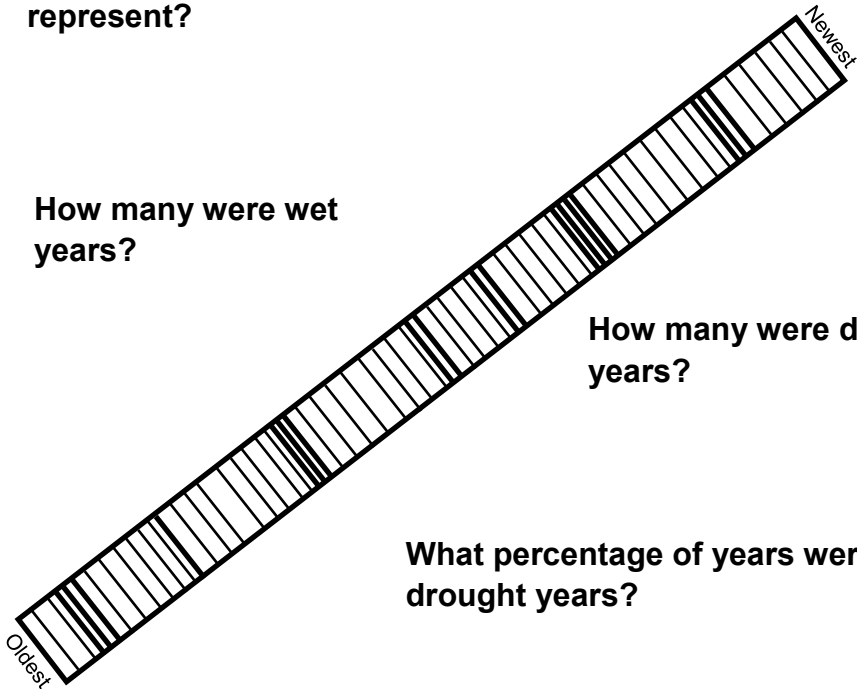
Droughts are multiyear weather disasters, but by understanding history, communities can create plans to help them manage their water resources during the length of the dry spell. One of the most important tools scientists have to understand the length of droughts is to look at the climate record in tree rings.

How many years does this tree ring core represent?

How many were wet years?

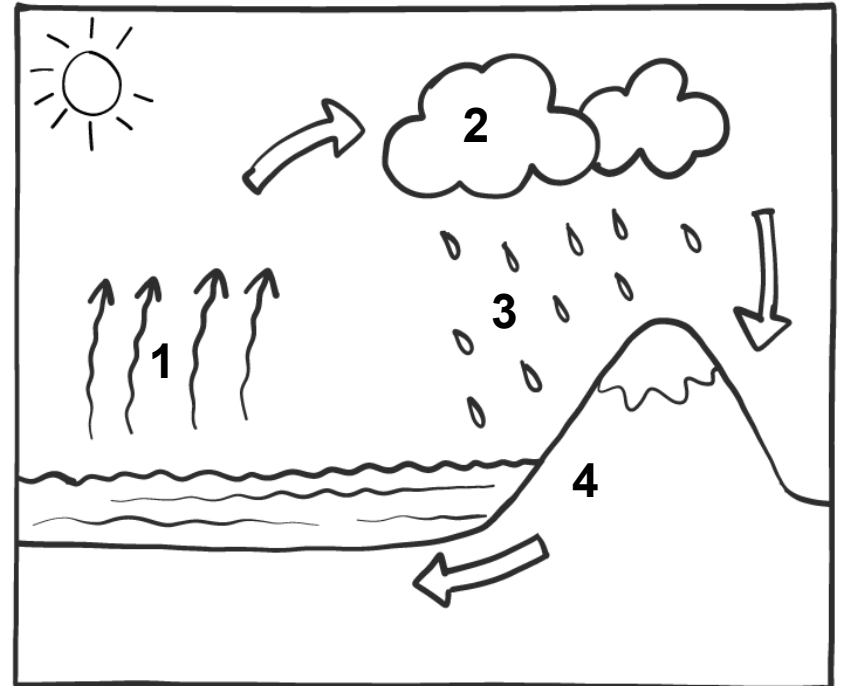
How many were dry? years?

What percentage of years were drought years?



The Earth Spins And So Does The Storm

As storms move around our planet they move water from the bottom of the watershed back to the top. We call this process the water cycle.



1.

3.

2.

4.





Mega Drought Detective

Some weather disasters move fast, others move slow. Today we are going to explore a weather disaster that lasts for months or even years...Droughts! Together we will learn how water managers plan for droughts, and how scientists use bioindicators to measure dry spells that have occurred in the past.

For The Drought Activities I Need...

- Sunny Spot
- Water
- Measuring Cup
- Plate
- Cup

Fun Fact

Even the dinosaurs had to deal with droughts. Paleontologists know that droughts occurred in the past through looking at tree rings in petrified wood, observing layers of wildfire charcoal preserved in the rock, and by identifying where groups of dinosaurs gathered and died.



Mega Drought Detective

Dams and reservoirs are one of a water managers greatest tools for making sure that communities have access to water during a drought...but not all reservoirs are as effective at protecting water against heat and dry air of a drought. In this activity we will test two reservoir models to see which one loses the least to evaporation.

Shallow Reservoir: (Plate)

Amount of Water Added:

Time Started:

Time Ended:

Water Left in Reservoir:

Deep Reservoir: (Cup)

Amount of Water Added:

Time Started:

Time Ended:

Water Left in Reservoir:

Which reservoir had the least evaporation?