



# WEATHER & CLIMATE CHANGE

BOREDOM BUSTER FOR 1:1 OR INDIVIDUAL ACTIVITIES

ACTIVITY DIRECTORS QUICK GUIDE

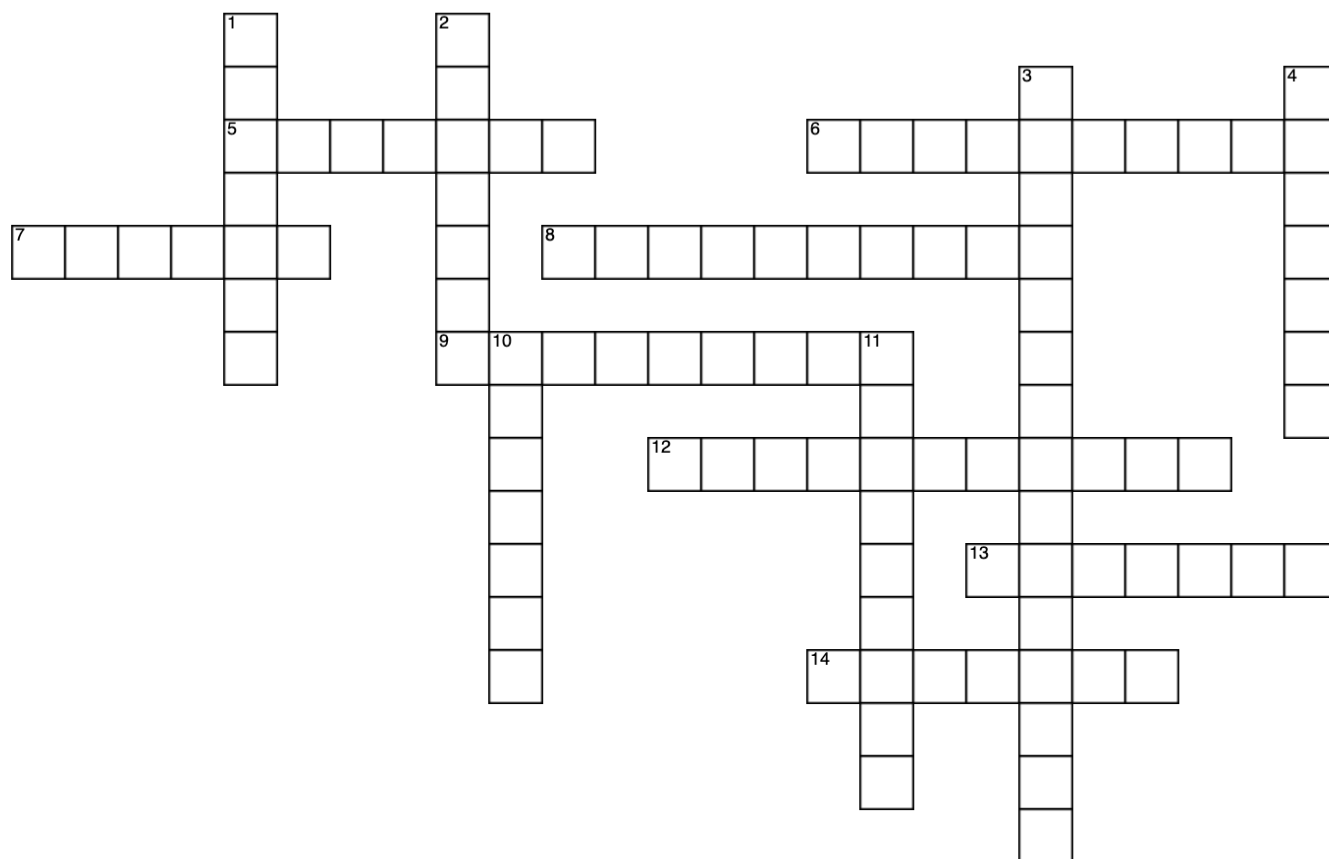


## **WEATHER & CLIMATE CHANGE!**

*"Climate change is the single greatest threat to a sustainable future but, at the same time, addressing the climate challenge presents a golden opportunity to promote prosperity, security and a brighter future for all."*

–Ban-Khi Moon

## Crossword – Answers page 25



### **Across**

5. The average of weather patterns over a long period of time.
6. Energy harnessed from the sun.
7. Building block of all organisms on Earth.
8. The gaseous 'envelope' surrounding Earth.
9. These resources naturally replenish, such as wind, and are considered forms of \_\_\_\_\_ energy.
12. Coal, oil and natural gas are examples of \_\_\_\_\_.
13. A go-to topic for small talk
14. Colloquially referred to as 'twisters' or 'whirlwinds.'

### **Down**

1. Another name for a hurricane.
2. A slowly moving mass of ice
3. Gases that trap heat from the Earth and warm the surface.
4. A period of abnormally dry weather marked by little or no rain.
10. Global warming has contributed to an increase in \_\_\_\_\_ weather such as hurricanes and wildfires.
11. Substances released into the air that are measured by their concentrations in the atmosphere.

## Sudoku - Answers on page 26

How to play:

- Use Numbers 1-9 to fill empty boxes.
- Don't Repeat Any Numbers in any 3x3 square, row or column.
- Use Process of Elimination.

				9		7		3
123456789	123456789	123456789	123456789		123456789		123456789	
			2			4	6	
123456789	123456789	123456789		123456789	123456789			123456789
	7		6	1		2	5	
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## Daily Jumble

O	S	N	M	O	N	O
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N	O	R	T	A	O	D
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R	T	H	Q	A	U	E	E	K
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C	C	L	N	E	O	Y
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L	A	N	V	N	C	H	E	A
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**Answers:** Monsoon, Tornado, Earthquake, Cyclone, Avalanche

## Reflections

What do thunderstorms remind you of?

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Have you ever witnessed a natural phenomenon?

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What is one thing you think everyone should do to prevent climate change?

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What type of natural disaster are you most intrigued by? Afraid of?

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How has climate change affected you?

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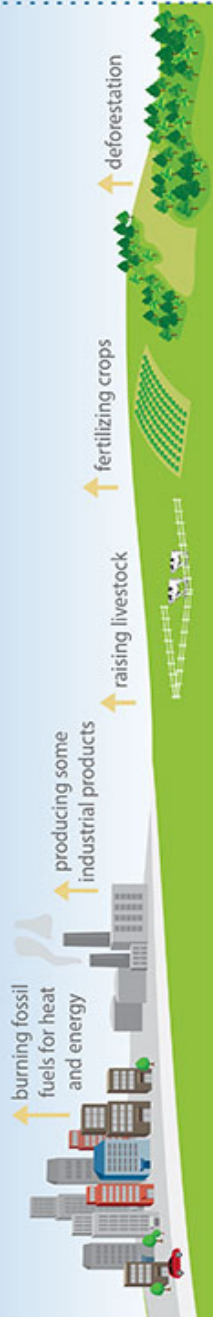
# Climate Change & The Coral Reefs

## Courtesy of the NOAA

# THREATS TO CORAL REEFS CLIMATE CHANGE

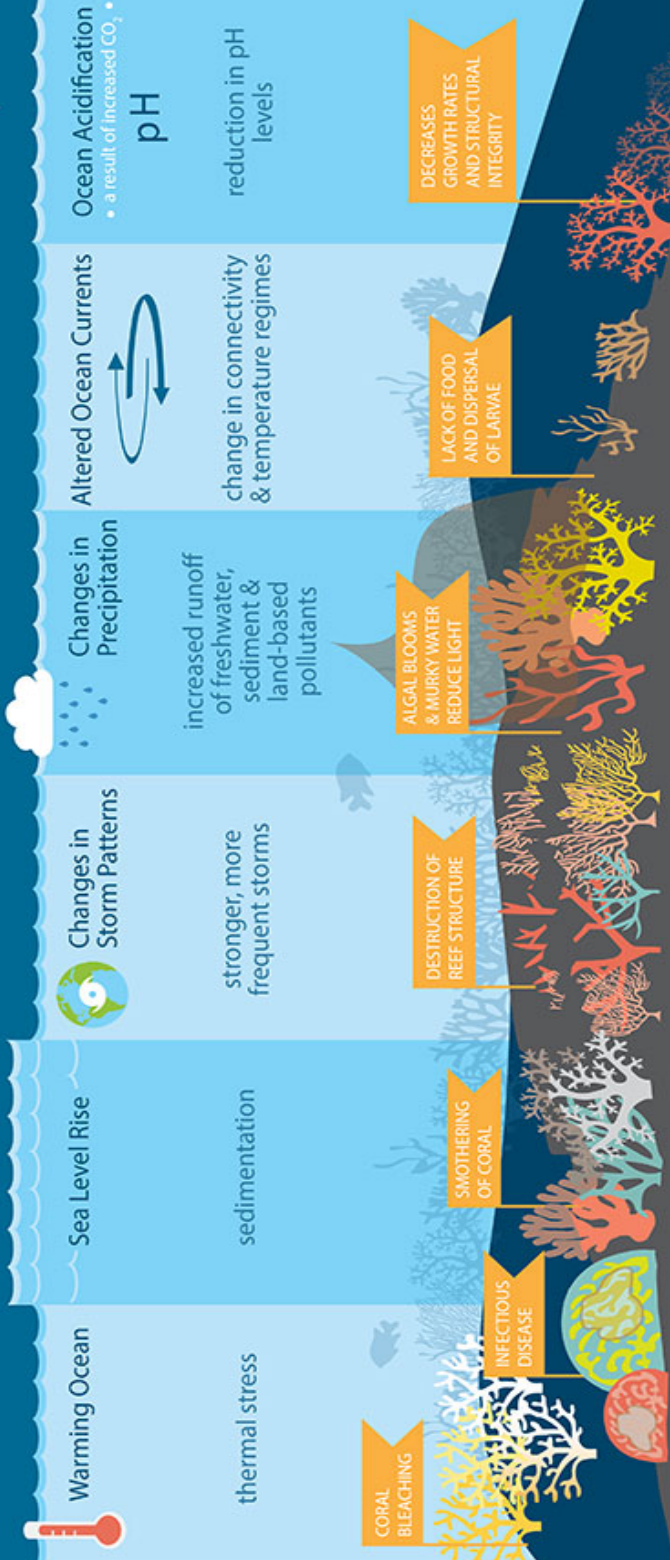
Increased greenhouse gases from human activities result in climate change and ocean acidification.

CLIMATE CHANGE = OCEAN CHANGE



**CO<sub>2</sub>**  
The world's ocean is a massive sink that absorbs carbon dioxide (CO<sub>2</sub>). Although this has slowed global warming, it is also changing ocean chemistry.

## CLIMATE CHANGE dramatically affects CORAL REEF ECOSYSTEMS



## HOW YOU CAN HELP

Shrink your carbon footprint to reduce greenhouse gases.

- Drive less.
- Reduce, reuse or recycle.
- Purchase energy-efficient appliances and lightbulbs.
- Print less. Download more. Use less water.

Do your part to help improve overall coral reef condition.

- Reduce the use of lawn and garden chemicals.
- DO NOT dump household chemicals in storm drains.
- Choose sustainable seafood.
- www.FishWatch.gov
- Learn about good reef etiquette and practice it when in the water.
- Volunteer for beach and waterway clean ups.

## Trivia!

*How much do you know?*

1. In which of these directions is a US tornado most likely to travel?
  - a. Westward
  - b. Eastward
  - c. Northward
  - d. Southward
  
2. What is the difference between hurricanes and typhoons?
  - a. Location
  - b. Wind speed
  - c. Storm size
  - d. Amount of precipitation
  
3. Where will you find the Zonda winds?
  - a. Himalayas
  - b. Andes
  - c. Rockies
  - d. Sierra Nevada
  
4. Which wind scale, originally categorized wind by the effect it would have on the sails of a frigate?
  - a. Beaufort
  - b. Anemometer
  - c. Gale
  - d. Ordinal



5. From which generic type of cloud do thunderstorms/tornados come from?
- a. Cirrocumulus
  - b. Nimbostratus
  - c. Stratocumulus
  - d. Cumulonimbus
6. What effect on global precipitation does the increase in average global temperature have?
- a. Higher temperatures have no effect on global precipitation
  - b. Higher temperatures decrease the amount of global precipitation
  - c. Higher temperatures give rise to a more active water cycle, which means faster and greater evaporation and precipitation and more extreme weather events.
  - d. None of the above
7. Where have some of the strongest and earliest impacts of global warming occurred?
- a. In northern latitudes
  - b. Impacts of global warming are distributed equally
  - c. In the tropics
  - d. In the Americas
8. 1. Which of the following gases DOES NOT trap heat?
- a. Carbon dioxide
  - b. Nitrogen
  - c. Water vapor
  - d. Methane

9. The average American contributes approximately how much CO<sub>2</sub> to the atmosphere per year?
- a. 1 ton
  - b. 20 tons
  - c. 50 tons
  - d. 100 tons
10. Which renewable energy source contributes the most energy to the U.S.?
- a. Windpower
  - b. Solar power
  - c. Hydropower
  - d. Electric power

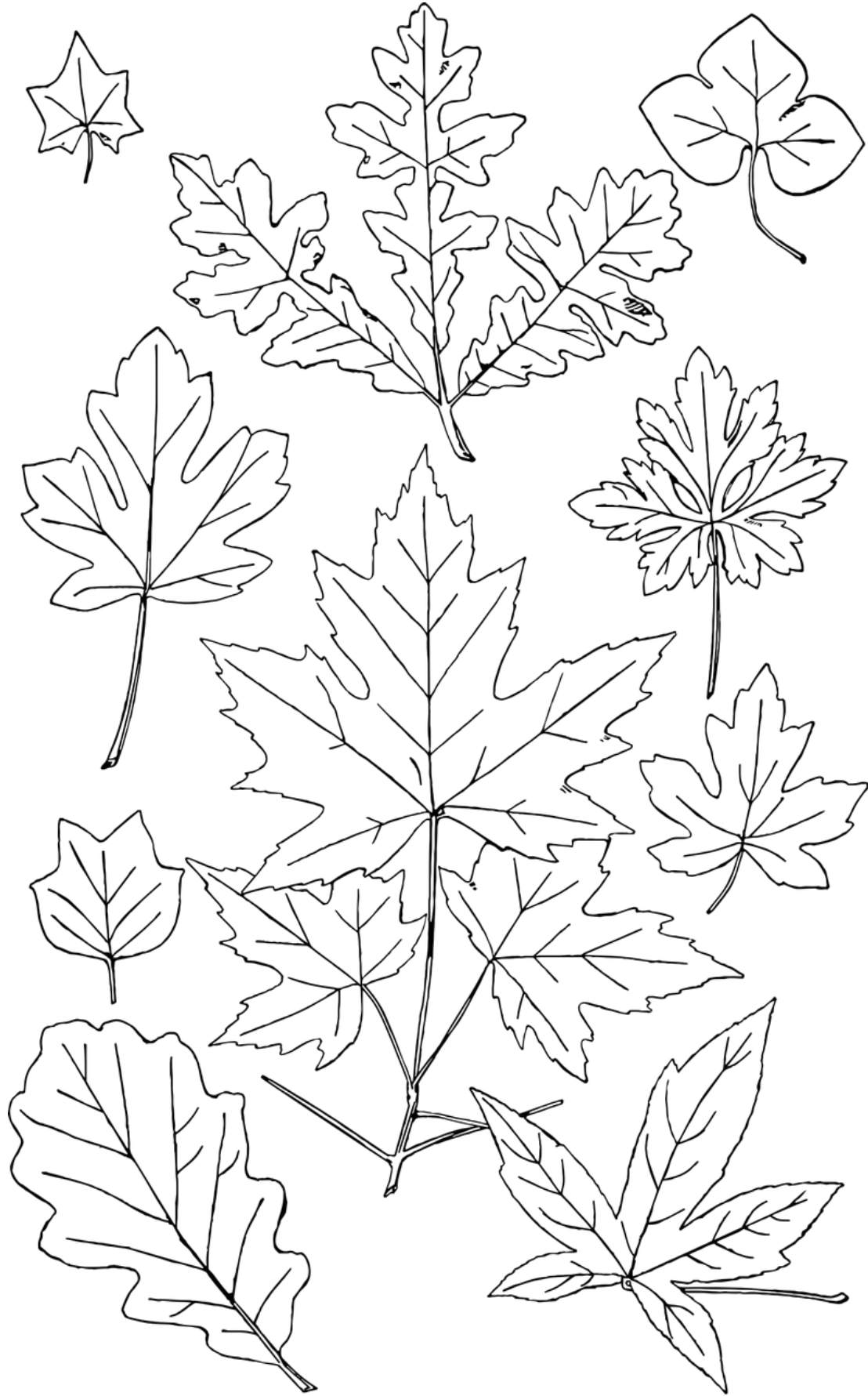
**Answers:** 1. B / 2. A / 3. B / 4. A / 5. D / 6. C / 7. A / 8. B / 9. B / 10. C

## Jello Bird Feeders!

- 1) Working with your Activity Director, open the gelatin pack into a bowl and add boiling water until dissolved.
- 2) Add your bird seed and mix thoroughly.
- 3) Take a cookie cutter mold of your choice and add some of the bird seed/gelatin mixture. Leave a small hole for string to be threaded through.
- 4) Allow to cool, usually a few hours. Remove from the mold and hang in the window!
- 5) Wait for visitors! Bonus if you can name which types of visitors come your way!



# Coloring for Mindfulness



## Matching Game!

- |    |                     |   |
|----|---------------------|---|
| 1. | _____ Barometer     | A. Amount of water vapor in the air                   |
| 2. | _____ Meteorologist | B. All gases and air around the Earth                 |
| 3. | _____ Cold Front    | C. Weight of air above a given point                  |
| 4. | _____ Thermometer   | D. Someone who studies weather                        |
| 5. | _____ Humidity      | E. Where cold air replaces hot air                    |
| 6. | _____ Atmosphere    | F. Measures the temperature of the air                |
| 7. | _____ Air Pressure  | G. The line along which two different air masses meet |
| 8. | _____ Front         | H. Fluffy fair weather clouds                         |
| 9. | _____ Cumulus       | I. Used to measure air pressure                       |

**Answers:** 1. I / 2. D / 3. E / 4. F / 5. A / 6. B / 7. C / 8. G / 9. G

## Increasing or Decreasing?

Decide which climate factor is increasing or decreasing.

<b>Climate Factor</b>	<b>Increasing/Decreasing</b>
<b>Rainfall</b>	
<b>Air temperature</b>	
<b>Heat Waves</b>	
<b>Growing season length</b>	
<b>Runoff</b>	
<b>Lake ice cover</b>	

## Increasing or Decreasing? Answers & Facts

Climate Factor	Increasing/Decreasing	Fast Facts
<b>Rainfall</b>	<b>Increasing</b>	Up overall, but variable by season. Summers are drier, winter and fall are wetter
<b>Air temperature</b>	<b>Increasing</b>	Summer warming faster than winter
<b>Heat Waves</b>	<b>Increasing</b>	Heat waves are likely to be more frequent, longer-lasting and more severe
<b>Growing season length</b>	<b>Increasing</b>	Likely to increase by 3-6 weeks by the end of the century
<b>Runoff</b>	<b>Increasing</b>	Lake Superior warming fastest; warmer water holds less oxygen for fish
<b>Lake ice cover</b>	<b>Decreasing</b>	Variable by lake; Lake Michigan likely to be the ice-free soonest

## The Man in the Woods

Billy Barr is the citizen scientist you may have never heard of but has made a lot of noise within the climate science community. He spent 40 years in the Colorado woods collecting critical observations of the weather from an abandoned mining shack at the base of Gothic Mountain.

Billy fled to the mountains to find solitude and while he did find peace, he could not escape the boredom. This boredom sparked his 40-year hobby that has helped countless conservation scientists. Every day, he measured various data points including snow levels, animal tracks and bird sightings, creating some of the most accurate and historical recordings of the area.

Billy, an aspiring environmental scientist at Rutgers University, had only planned to spend one summer in Gothic for his research. Although, Billy has said in interviews his extended stay and escape had more to do with stabilizing his mental health.



What kept Billy longer than expected was a job posted by the Rocky Mountain Biological Laboratory (RMBL) who were looking for help with a water chemistry project although he ultimately ended up doing odd jobs over the years. He dropped out of college in 1973 and became the only full-time resident of Gothic.

As that first summer gave way to winter, Billy tried to stay in a tent for as long as he could bear but eventually took up lodging in an abandoned mining shack which he shared with the local wildlife. He was able to remain in the shack for years primarily because the ownership alluded both the RBLM and the National Forest Service, both of which believed belonged to the other.

The site of RMBL, once a booming mining town, had been abandoned by the early 1900s and was rediscovered in 1928 by a biology professor. Since then, professors and scientists would flock to the site to conduct conservation studies each summer, but come winter, Billy was Gothic's only remaining resident. By the late 1970s, he became an unofficial caretaker of the RMBL, as the lab and its finances fell into disarray. By the 1980s, he became the RBLM's accountant.

Billy was considered the area's eclectic mountain man. His propensity for solitude left locals in the nearby town curious but by the 1980s he had become more relaxed around people. By then he had also moved into his own home, equipped with the necessities of everyday living. He unofficially became the face of RMBL, all the while keeping up his private hobby.

Billy developed his own system and code for keeping track of the various weather metrics. He had his own legend and his own number system. First sightings of birds or mammals were circled in red.

Although he began his records in 1972, it wasn't until a serendipitous conversation with Inouye in the late 1990s did this treasure cove of data come to light.

To date, Billy's notes have been cited in dozens of research papers. His papers have helped inform climate science and has helped influence future understanding of the world's warming future.

In Gothic alone, Billy's research has helped predict the potential impacts of climate change on the local ecosystem. Billy has tracked the return of the broad-tailed hummingbird each spring which relies on nectar from the glacier lily. The hummingbird arrives in Gothic just before it blooms. Since the 1970s, the lily now flowers 17 days earlier, implying that in the next few decades the hummingbird will miss the lily's nectar. This type of observation, known as a phenological mismatch, has become a major concern for scientists.

Each day, he continues to log his observations on snowpack, animal migration and flower bloomage. The RMBL has named a building after him and he is the star of the documentary, *End of Snow*. Despite all the recognition, Billy is still the only full-time resident in Gothic and has gone from the eccentric mountain man to the local legend. He jokes in an interview with NPR,

*"I'm the mayor and chief of police," he said. "I hold elections every year, but I don't tell anybody when they are, so it works out really well."*

## Categories

Name an item that fits in each category and starts with the corresponding letter! Example: For "Something Hot" put "Hot chocolate" for "H"

	<b>H</b>	<b>E</b>	<b>A</b>	<b>T</b>
Weather related				
Something hot				
Something cold				
Places by the ocean				
Natural Disaster				
Weather forecast				

## Word Search

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

### WEATHER

GREENHOUSE GAS

DROUGHT

SEA

WARMING

### OZONE

ENVIRONMENT

POLLUTION

HURRICANE

METHANE

### SUSTAINABILITY

EXTINCTION

GLACIER

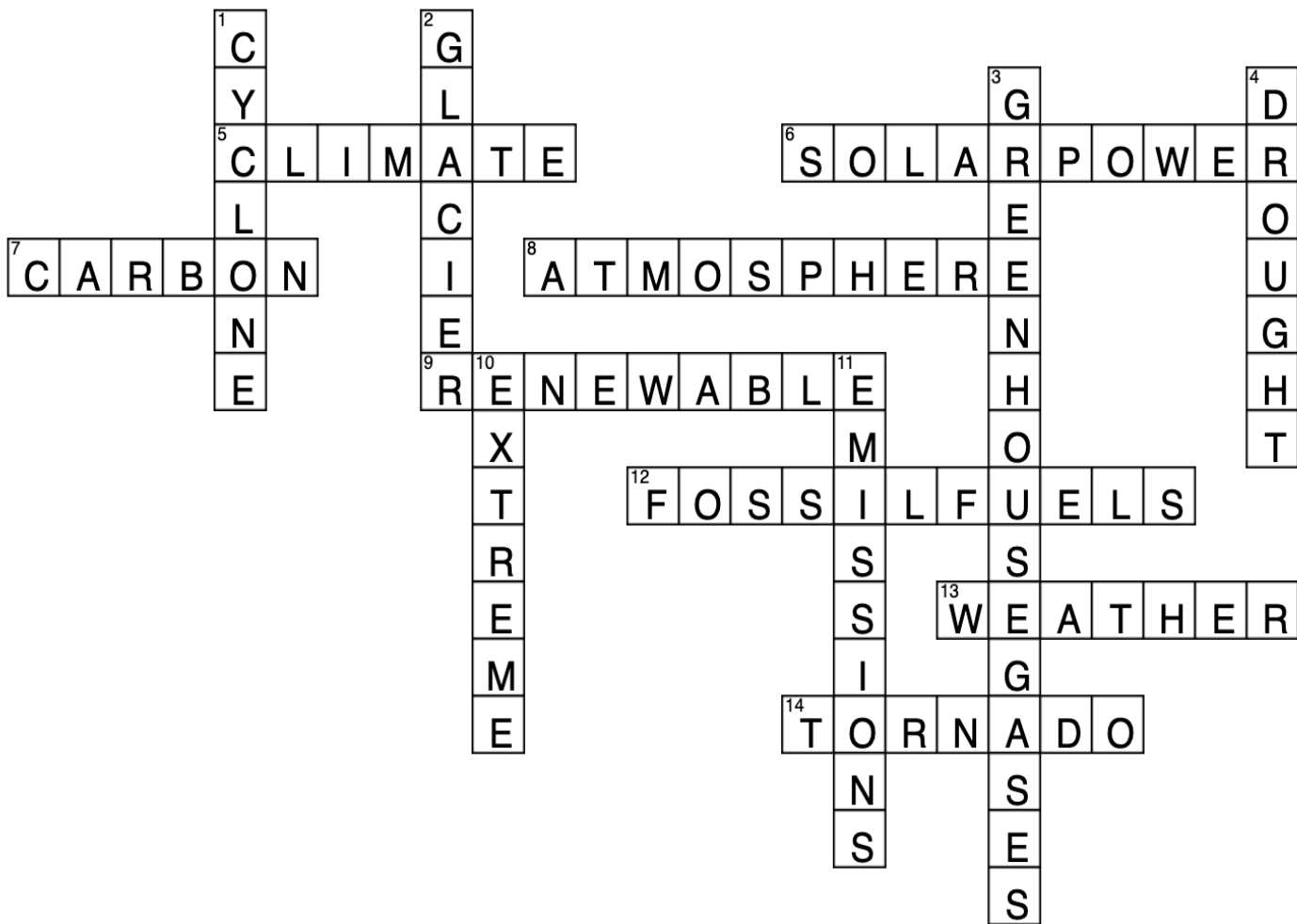
POPULATION

CLIMATE



# ANSWER KEY

## Crossword Answers



## Sudoku Answers

2	6	5	8	9	4	7	1	3
3	8	1	2	7	5	4	6	9
4	7	9	6	1	3	2	5	8
8	1	7	4	3	2	6	9	5
6	9	4	5	8	7	1	3	2
5	2	3	9	6	1	8	7	4
1	4	2	3	5	6	9	8	7
9	5	6	7	4	8	3	2	1
7	3	8	1	2	9	5	4	6