Junior Ranger

Sounds Explorer

National Park Service
U.S. Department of the Interior

This book belongs to: _____

Become a Sounds Explorer

As a Sounds Explorer, you will...

explore

sounds you hear in parks;

learn

the science of sound, and why sound is important to parks; and

protect

sounds you hear in parks and at home.

National Park Service Natural Sounds and Night Skies Division:

- Listens to and records sounds in parks.
- Helps reduce noise in national parks.
- Studies the sounds of wildlife.
- Shares tips on how to enjoy sounds in nature.

Let's Get Started

Do as much as you can
as best as you can.
Ask a ranger or an adult
if you have questions.

Each activity is rated by difficulty.

Ages 5 and up

Ages 8 and up

Ages 10 and up

Look for the arrowheads throughout the book. Choose the activities that are right for you!

Your Guide: Lucy the Listening Owl

Hello, Sounds Explorer!
Follow me, Lucy the Listening Owl, and explore the exciting world of sound. **Remember:** keep your ears open, you don't want to miss anything.

Listen for a few seconds. Draw a picture of your favorite sound.

How did this sound make you feel? _____

_____

What did you think when you heard this sound?_____

_____

Sound Maker Matching

Many words describe sounds. Draw a line from the sound makers below to their matching words.

Sound maker: Anything that produces a sound.

Talking

Whoosh

Drip

Ribbit

Howl

Tweet

Crackle

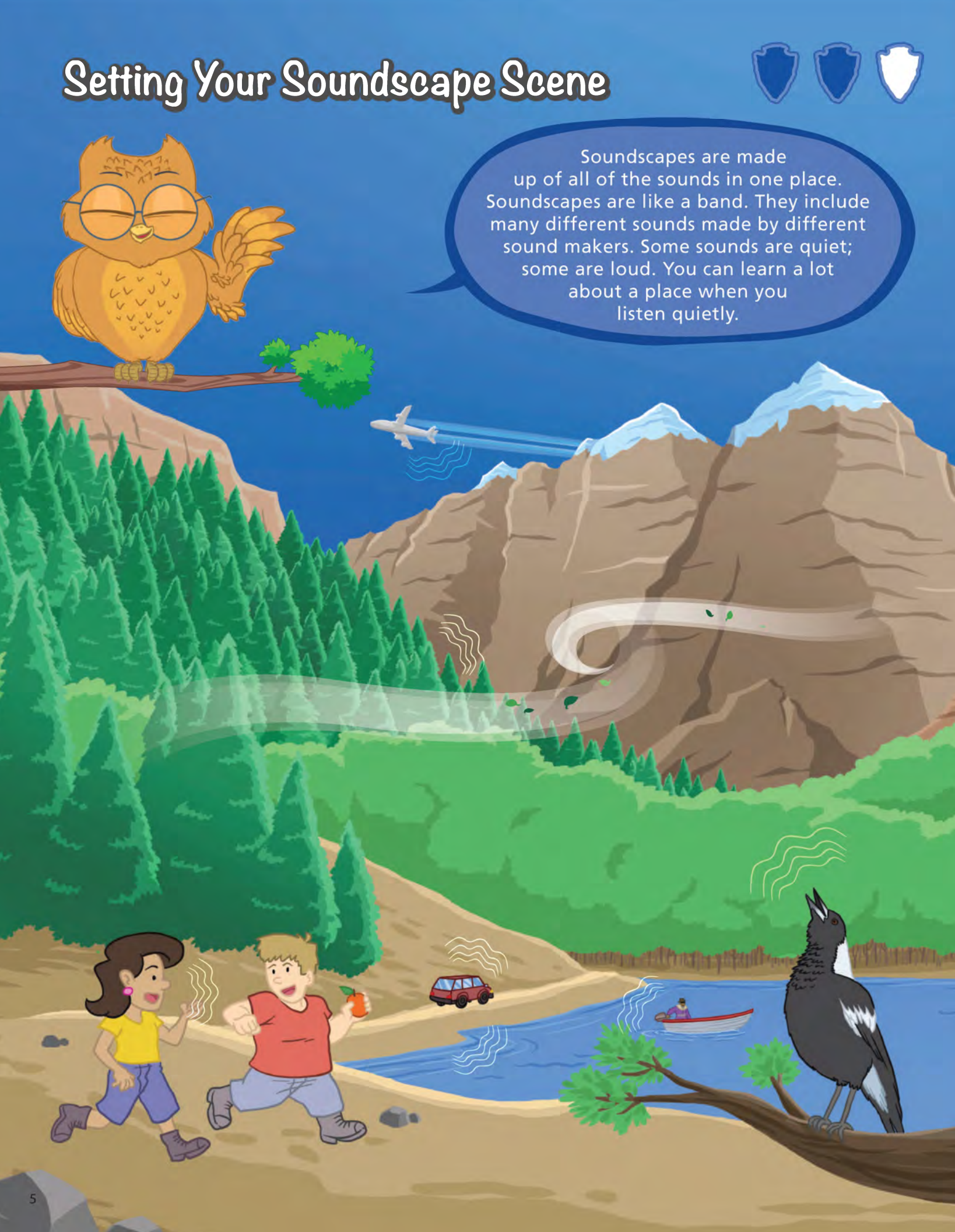
Rattle

Ring

Vroom

Buzz

Setting Your Soundscape Scene



Find a place outside where you will not be distracted by activity or other people. Draw or write about your spot.

Sit quietly. In the box below, "X" marks where you are sitting. When you hear a sound, mark its location compared to where you are sitting. Use words or draw a picture to show what made the sound!

X

If you can, return to the same spot at night. What different sounds did you hear?

What is Sound?

Sound begins with a vibration.
Put your hands on the front of your neck and hum. Do you feel the vibration?
Pull on a very tight string or rubber band.
Then let go.
Can you see the vibrations?

Those vibrations make sound. Sound vibrations move in waves. When sound waves run into an object, they bounce back, slow down, or even stop.

Start

Moving Sound

Help the coyote find her way to her pack. Watch out for dead ends. Mountains, rain, thunder, thick forests, cars, and airplane noise will stop her from hearing the sounds of her pack. If you run into one of these, you will have to try another way.

Mad Sound-tist

Let's explore how sound travels through solids, liquids, and gases.

Try the activities below!

Can sound travel through solids?

☐ yes ☐ no

TRY: Find something solid around you like a tree, rock, table, or door. Put your ear against it and tap the solid object. Now tap the object with your ear away from the object. **What difference did you hear?**

_____

_____

_____

Can sound travel through liquids?

☐ yes ☐ no

TRY: Find two objects to hit together. Either in the sink, bath, a lake or river, tap the two objects together underwater. Tap them together above water. **What difference did you notice?**

_____

_____

_____

Can sound travel in space?

☐ yes ☐ no

Yes, but we can't hear it! Sound travels through air by making air molecules vibrate. In deep space there are very few molecules to vibrate. Scientists can use instruments to see the sound waves, but we can't hear them. So, for our ears, space is silent.

How Loud Is It?

In a soundscape, some sounds are loud and some are quiet. Listen carefully!

Look at the picture.
Circle three sound makers. Order the sounds from quietest to loudest. Draw or write them in the boxes below.

Quietest		Loudest

Science of Sound

Great work so far, Sounds Explorer! Let's look closer at sound waves. Sound has two parts, volume and pitch.

Volume - The height of the sound wave tells you how loud the sound is. Volume is also known as amplitude.

Tall wave = loud **Short wave** = quiet

Pitch – The number of waves in one second. Pitch is also known as frequency.

More waves = high pitch sound, like a squeak
Fewer waves = low pitch sound, like a boom

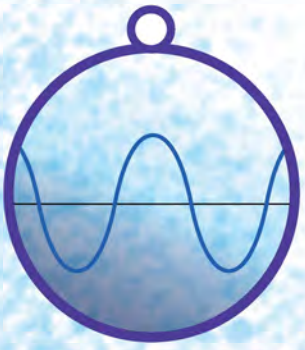
Match the sound wave with the correct sound makers.

Ambulance siren
Loud,
high-pitched

Mouse squeak
Quiet,
high-pitched

Cello
Quiet,
low-pitched

Thunder
Loud,
low-pitched



Sounds in the Soundscape

Animals and humans use sound for many reasons. Some animals use sound to communicate. Some use it to find their way at night. Others use it to find prey!

Match the sound makers on the left with the descriptions on the right.

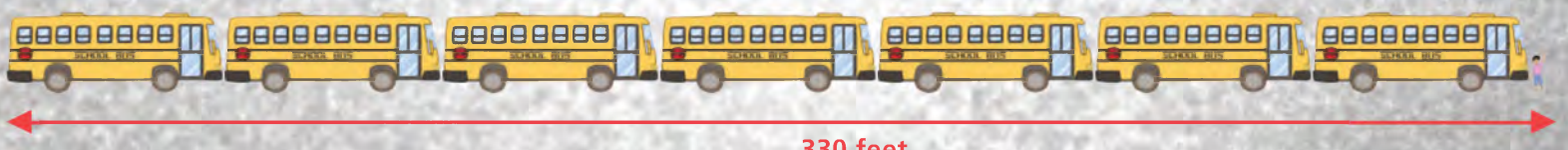
I use sound to tell predators not to attack me. If you get too close, I rattle my tail and hiss to say, "Stay away!" I do not have ears. I use my jawbone to feel sound vibrations. That is how I hear what is around me.

I live in the desert. I spend most of my days underground! To communicate with my friends, I thump my big feet on the ground. This is called "foot drumming." Sometimes foot drumming will scare away predators!

I travel with my friends. I use whistles to communicate with my pod. I also use high-pitched clicks that echo back to me. The echoes tell me what is around me and help me catch fish.

I can be very loud. American Indians use me in different events. I also help keep the beat in your favorite music.

I use my sense of hearing to locate prey above and below ground. I can hear a mouse squeaking 330 feet away. I use sound to communicate with my friends. I have 28 different barks, growls, whines, cackles, and howls.



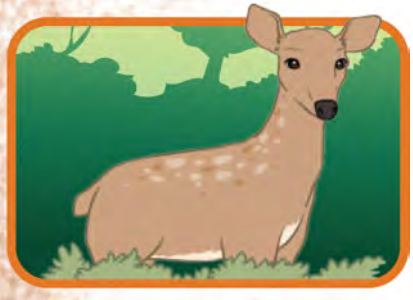
Animal Ears

Animal ears have evolved to hear sounds that are important. Most of the time, predators have ears that face forward. Prey have ears that can move around in different directions. Owls like me have excellent hearing for hunting at night.

Try the activities below. What do you notice when your ears are like different animal ears?

To hear like me, cup your hands behind your ears. Move around quietly to hear all the sounds around you.

To hear like me, roll up pieces of paper into a cone. Place the smaller end over your ears. Do not stick them in your ears!



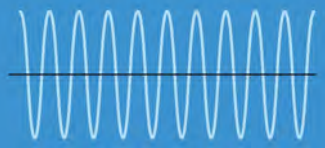
To hear like me, cup one hand behind one ear to hear sounds in front of you, and one hand in front of the other ear to hear sounds behind you.

Make your own ears! Experiment with different shapes and sizes of paper, or by using your hands in different ways!

Sound We Can't Hear

Did you know many animals make sounds we can't hear? Let's read about a few.

Ultrasound:
High-pitched sounds we can't hear.



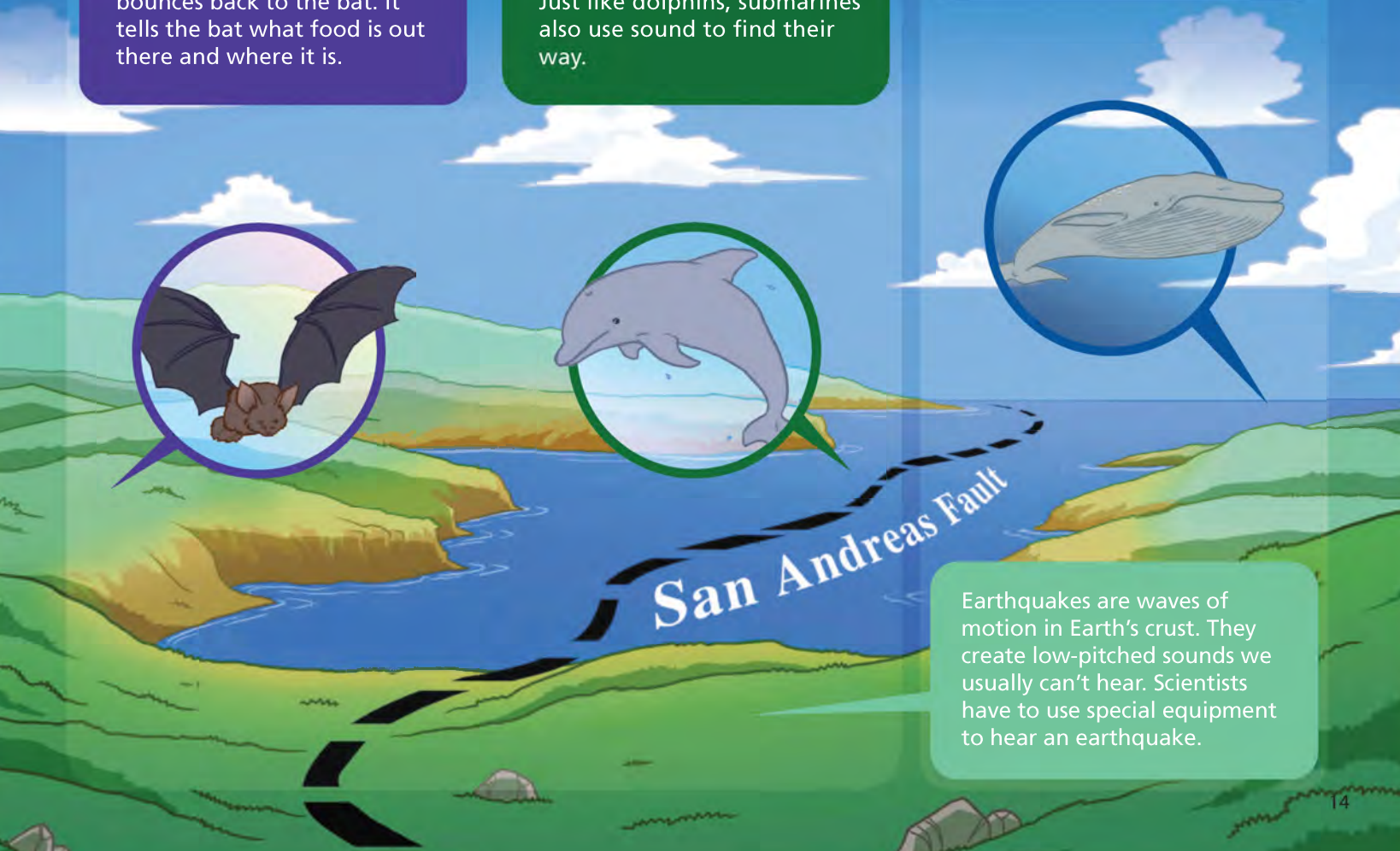
Bats use echolocation to fly at night and find food. Their sound travels quickly until it hits an object. The sound then bounces back to the bat. It tells the bat what food is out there and where it is.

Dolphins use echolocation, too. High-pitched clicks help them find food.

Just like dolphins, submarines also use sound to find their way.

Infrasound:
Low-pitched sounds we can't hear.

Blue whales use infrasound to communicate over long distances, up to 1,000 miles!



Earthquakes are waves of motion in Earth's crust. They create low-pitched sounds we usually can't hear. Scientists have to use special equipment to hear an earthquake.

Stories of Sound

Many parks share American Indian culture and history. American Indians tell stories of the environment, traditions, and spirituality. They use objects such as stone carvings, shells, rugs, or pottery to tell stories. Read the story and create your own.

Story of the Drum

It is said that when Creator was giving a place for all the spirits to dwell who would be taking part in the inhabitance of Mother Earth, there came a sound, a loud BOOM, from off in the distance.

As Creator listened, the sound kept coming closer and closer until it finally was right in front of the Creator. “Who are you?” asked the Creator. “I am the spirit of the drum” was the reply. "I have come here to ask you to allow me to take part in this wonderful thing." "How will you take part?" Creator questioned. “I would like to accompany the singing of the people. When they sing from their hearts, I will too sing as though I was the heartbeat of Mother Earth. In that way, all creation will sing in harmony.“ Creator granted the request, and from then on, the drum accompanied the people’s voices.

Throughout all of the indigenous people of the world, the drum is the center of all songs. It is the catalyst for the spirit of the songs to rise up to the Creator so that the prayers in those songs reach where they were meant to go. At all times, the sound of the drum brings completeness, awe, excitement, solemnity, strength, courage, and the fulfillment to the songs. It is Mother’s heartbeat giving her approval to those living upon her. It draws the eagle to it, who carries the message to Creator.

The Story of the Drum is a story of the Western Abenaki Tribes.
The Western Abenaki tribes originally inhabited all of Vermont and New Hampshire and parts of western Maine, southern Quebec, and upstate New York.

What sound is an important part of your life?
Create a story using pictures or words to tell the story of that sound. Share what you created with your family.

Time Machine

What did it sound like in the past? Soundscapes have changed as new inventions became part of our lives. Let's travel back in time to imagine what our homes and national parks used to sound like.

Abraham Lincoln was president (1861-1865)

1800s 1810 1820 1830 1840 1850 1860 1870

Recreation

Hiking or walking

Travel

Horses

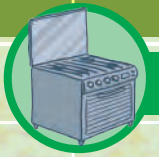
Trains

Communication

Storytelling

Cooking

Fire, stone, and brick ovens



Gas ovens

1800s 1810 1820 1830 1840 1850 1860 1870

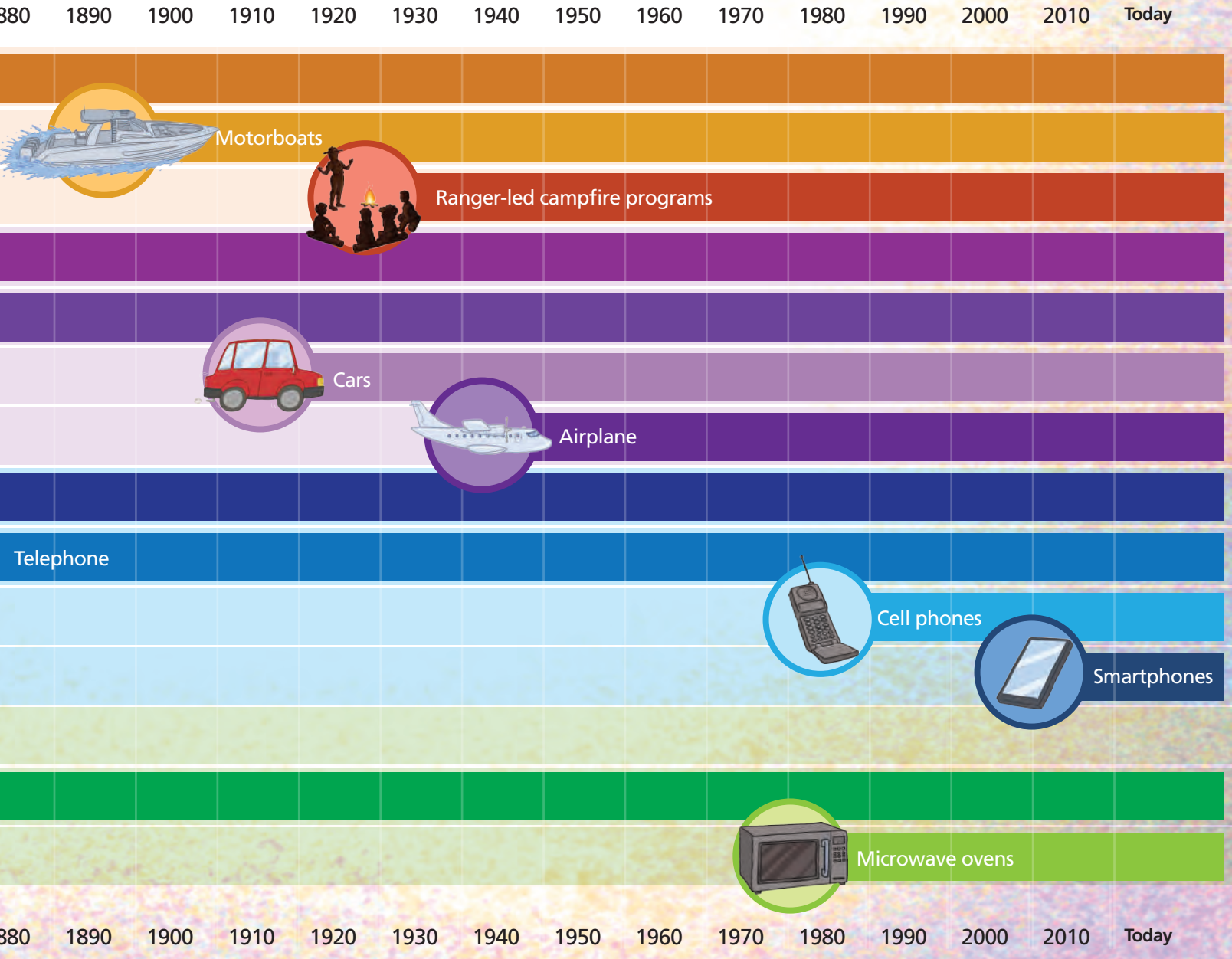
Write your age: _____.

Ask your parent or an adult what year they were the same age as you. Circle the year on the timeline.
What sounds did they hear as a kid? _____

Ask your parent or an adult what year their parents (your grandparents) were the same age as you.
Circle the year on the timeline.
What sounds did they hear as a kid? _____

What did Abraham Lincoln hear when he was president (1861-65)?
_____

Ask a ranger or look at a park's website to find out when the park was established.
What sounds were in that place at that time? _____



A noisy park

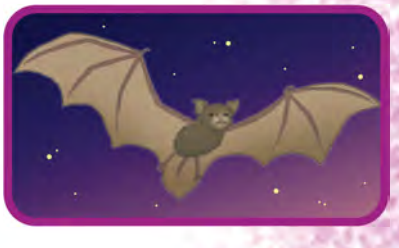
We have heard
many great sounds.
We have also heard some sounds
that do not belong in a park.
Read below to learn how too
much noise is a problem
for animals.

Noise makes it hard to communicate. Sometimes I change my song to adjust to the noise, but this song is not attractive to my mates.

Noise, like ship motors, interrupts my communication, making it hard to find mates and to hear predators.

Noise makes me stressed, so I change my call and sometimes my skin color. This makes it hard to attract females.

Noise interrupts my echolocation, making it hard to find food and my way at night.



Noise makes it hard for me to hear predators. I could be caught and eaten.

What are some things that make it hard to hear sounds in parks?

What are two things you can do to hear these sounds better in parks?

Your own soundscape

Wow! You have done a great job exploring, learning, and listening to sounds! Let's see all that you learned by creating your own soundscape.

Draw your perfect soundscape.
Do you want birds singing, a rushing river, or rustling leaves? Use sounds you have heard during your visit or when listening to nature near your home.

Awesome Exploring!

You have learned a lot about park soundscapes.
To protect them, all you have to do is practice being quiet. In return, you will hear the sounds of the park, see more wildlife, and experience your world.
We hope you share what you have learned and continue protecting important sounds in our national parks and at home!

To become a Junior Ranger Sounds Explorer:
Check your answers at **nps.gov/subjects/sound/juniorrangersound.htm**
Have a parent or guardian sign your certificate.
Show off your Junior Ranger Sounds Explorer sticker.
And, email us at soundscapesupport@nps.gov with a picture of a completed page for a digital high five.

Want to explore more junior ranger programs?
You can earn badges and patches at parks all across the country.
junior ranger programs are also available online:
http://www.nps.gov/kids/jrRangers.cfm

Sounds Explorer Certificate of Achievement

_____

has successfully completed the requirements to be an official Sounds Explorer.

_____ _____

Signature *Date*

National Park Service
Natural Sounds and Night Skies Division

This book was created through an agreement between the U.S. National Park Service and Colorado State University.

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