

ANCHORAGE MUSEUM

INTRODUCTION TO SOUND AND SOUNDSCAPE ECOLOGY

BACKGROUND INFORMATION

Since 2018, the Anchorage Museum has partnered with schools and organizations around the state to record and collect the dynamic soundscapes of Alaska. This lesson introduces students to the scientific field of soundscape ecology and how to utilize hearing to understand different environments.

STUDENTS WILL:

- Learn what a soundscape is and how to categorize sounds from a place
- Discover how studying soundscapes helps scientists understand environments around the world
- Explore properties of sound and how sound is produced

MATERIALS

- Computer or tablet with Internet connection and ability to listen to audio files Writing utensil
- You can print the Appendix Sheets found at the end of this lesson or write down the Appendix questions on another sheet of paper

RECOMMENDED GRADE LEVEL

Eighth through twelfth

Adapt for K-12 and adult learners

KEY TERMS

Soundscape: all the sounds in a particular place

Biophony: sounds made by living things, but not people

KEY TERMS CONTINUED

Geophony: sounds made by the earth

Anthrophony: sounds made by people and machines

Soundscape ecology: the science of studying soundscapes to better understand a place and the relationships between organisms and that place

Wave: a disturbance that travels in space and transfers energy; vibrations of molecules cause sound waves to multiply and travel

Frequency: the number of wave cycles which pass in a given amount of time; typically measured in Hertz (cycles per second); for sound - the number of vibrations per second; high frequency or high pitch means faster vibration; low frequency or low pitch means slower vibration

Amplitude: the volume or energy of a sound wave; high amplitude means loud sounds and low amplitude means quiet sounds

STEPS

This lesson plan provides steps to introduce soundscape ecology and explains each of them in detail on the next page. Complete the steps in order to complete the full lesson plan.

1. **Step 1:** Introduction to Soundscapes
2. **Step 2:** Introduction to Soundscape Ecology
3. **Step 3:** Introduction to Sound

This lesson plan was created with support from:



STEP 1

Introduction to Soundscapes [10-15 minutes]

In this step, students will practice close-listening to learn about soundscapes and sound categories. Complete **Appendix A** to guide learning.

STEP 2

Introduction to Soundscape Ecology [15-20 minutes]

In this step, students will learn about the science of soundscape ecology and how studying sounds from a place can tell us more about that place. Complete **Appendix B** to guide learning.

STEP 3

Introduction to Sound [10-15 minutes]

In this step, students will learn about the basic properties of sound and how sounds can change. Complete **Appendix C** to guide learning.

ADDITIONAL SOUNDSCAPE ACTIVITIES

To continue learning about soundscapes, engage with these other Anchorage Museum lessons:

- Sounds of Place
- Sense of Place
- Sound Analysis
- Research Questions
- Art and Sound
- Summer



INTRODUCTION TO SOUNDSCAPES

1. Take 30 seconds wherever you are to listen to your surroundings. Try to be as still and quiet as possible. List all the sounds you hear:

You just listened to a soundscape. A soundscape is all the sounds in a particular place. Soundscapes are unique to a specific place and time. Watch [this video](#) to meet an Anchorage Museum Educator and learn about soundscapes.

2. Follow [this link](#) to listen to a sound clip recorded at Campbell Creek on April 16, 2019. You might not be able to identify all the sounds. List as many sounds as you can:

Soundscapes may contain many different sounds. Scientists who study soundscapes divide sounds into three categories:

Biophony: sounds made by living things (but not people); examples include birds and mosquitoes

Geophony: sounds made by the earth; examples include rain, waves, and landslides

Anthrophony: sounds made by people and machines; examples include laughter, footsteps, and cars

3. Take the list of sounds you made in question two and categorize these sounds into sound categories:

Biophony	Geophony	Anthrophony



INTRODUCTION TO SOUNDSCAPE ECOLOGY

Watch [this video](#) to learn why people study soundscapes.

Soundscape ecologists are people who study soundscapes. They use the sense of hearing as a way to understand a particular environment and observe how the unique soundscape may change over time. Studying soundscapes allows scientists to gain greater insight about an environment by providing information about that place that they may not otherwise observe.

The Anchorage Museum has recorded sounds near the Campbell Creek Science Center since 2018 in order to observe how the unique soundscape of this place may change over time. Answer the following questions as you listen to sound clips recorded at the Campbell Creek site on April 16 in three separate years: 2018, 2019, and 2020.

1. Follow [this link](#) to listen to the 2018 Campbell Creek soundscape. List the sounds you hear.

2. Follow [this link](#) to listen to the 2019 Campbell Creek soundscape. List the sounds you hear.

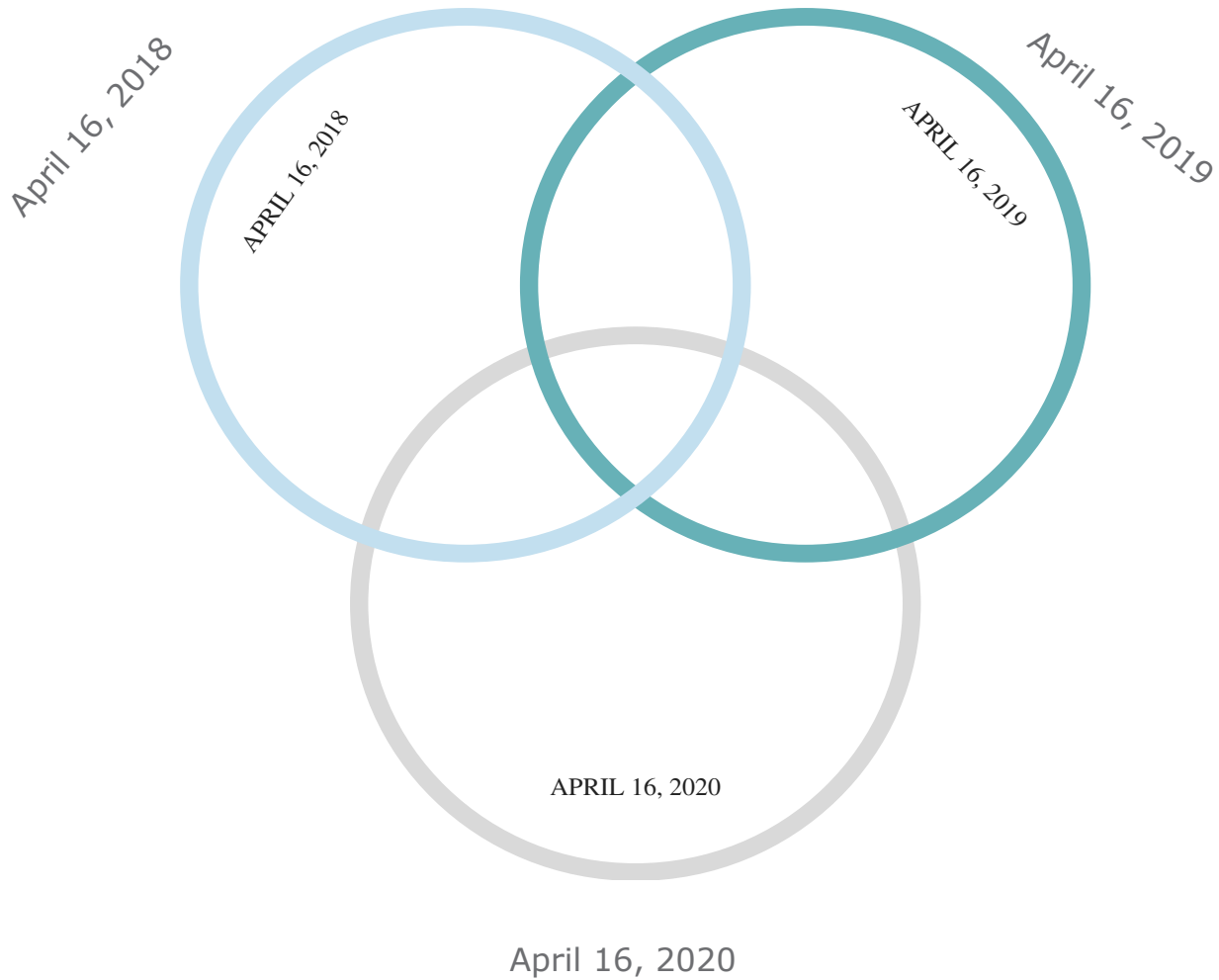
3. Follow [this link](#) to listen to the 2020 Campbell Creek soundscape. List the sounds you hear.

Soundscapes are unique to a time and place; not only do they change when you listen in a new environment, but the exact same environment has different soundscapes at different times. Places sound different throughout the day, in different seasons, and over years and decades.



INTRODUCTION TO SOUNDSCAPE ECOLOGY

4. Take all of the sounds you heard in the three Campbell Creek soundscapes and sort them into this Venn diagram.



5. Are there any sounds you heard in all three sound clips?

Although three years of recording captures only a small snapshot of the soundscapes of this place, these three clips suggest some of the key sounds of the Campbell Creek site in April.

INTRODUCTION TO SOUND

First understanding the basics of sound is necessary for understanding soundscapes and soundscape ecology. What is sound? Use [this](#) web interactive to investigate what causes sound. This demonstration shows how strings vibrate to create sounds. In fact, all sound is caused by vibrations. Anything which vibrates makes a sound, whether or not humans are able to hear it. . You may experience this by making your own sound. First blow a raspberry by gently closing your mouth and slowly blowing out air.

1. What do you feel? Look in a mirror and observe what this action looks like. Do these two observations make sense given what you know about how sound is produced?

2. As the air rushes out from the small opening, it causes your lips to vibrate back and forth, producing this sound. Now, place your fingers under your chin or on your throat to feel your vocal chords, and begin to hum. Write down what you feel and hear.

Sound waves have some basic properties, including frequency and amplitude. Frequency means the number of vibrations per second and is measured in Hertz (Hz). Higher frequency means the vibration is faster and lower frequency means the vibration is slower. Amplitude is the volume of the sound, or how much energy that sound has. High amplitude means a sound is loud and low amplitude means a sound is quiet.

3. Using either the raspberry or humming technique for producing sounds, can you change either the frequency or amplitude? How did you make these changes?

4. Look at the list of sounds from your first soundscape listening exercise. These sounds had many different frequencies and amplitudes, and some probably occurred at different times. If you were to make a visual representation of these sounds, and your soundscape, how might you do that? Sketch it on a blank piece of paper, making sure to label sounds.

