



Credit: Bryan Pollard/Shutterstock

Activity 2: Click, Whistle, Call

Students describe the various sounds in their neighborhood and how noise pollution affects them personally. After learning how Southern Residents communicate, students participate in a simulation to experience how Southern Residents are being disturbed by human activities.

Warning

This activity may not be suitable for students who experience sensory overload. If your students experience sensory overload, consider using the audio clips at a low volume or only use the introduction to this activity.

Key Student Questions

- How are people affected by noise pollution?
- What are the purposes of the Southern Resident's clicks, whistles, and calls?
- How are the Southern Residents affected by noise pollution?

Key National Standards

NGSS

- [ESS3.C](#): Human Impacts on Earth Systems
- [ETS1.B](#): Developing Possible Solutions

Keywords

Communication—The act or process of using words, sounds, signs, or behaviors to express or exchange information or to express your ideas, thoughts, feelings, etc., to someone else.

Echolocation—The sonar-like system used by some animals to detect and locate objects by emitting usually high-pitched sounds that reflect off the object and return to the animal’s ears or other sensory receptors.

Noise pollution—Unwanted or excessive sound that can harm human health, wildlife, or environmental quality.

Supporting Vocabulary

Calls—Pulsed signals which have discrete patterns that can be recognized by ear and by spectrogram. They are the main component of the orca communication repertoire.

Clicks—Part of the whale’s sonar and are used for echolocation: for finding and locating food sources, for defining other objects in the ocean and locating the whale in its environment.

Whistles—Continuous tone emissions that may last for many seconds.

Preparation

1. Cut out the Pod Letters.
2. Download the Underwater Noise audio files and have them readily available on your device.

Introduction

1. Ask students to close their eyes and to think about their neighborhood. What does it look like? What does it smell like? What does it sound like?



Materials

- Audio files:**
Underwater Noise
- Speaker** to play the audio files
- Timer**
- Driving Question poster** from Activity 1

2. Give students a few minutes to write down all of the sounds that they might hear while walking around their neighborhood. *Vehicles driving and honking, dogs barking, birds chirping, airplanes overhead, police or ambulance sirens, leaf blowers, lawn mowers, trains, etc.*
3. In Think-Pair-Share, free write, or popcorn format, have students respond to the following prompts:
 - What might it feel like if these noises were quieter or stopped all together?
 - What might it feel like if these noises suddenly became much louder?
 - What might it feel like if a loud, unrecognizable sound emerged?
4. Ask a few students to share their responses.
5. Share the following excerpt with the class:²⁴

Noise pollution is an invisible danger. There are many sounds in our environment, from rustling leaves (20 to 30 decibels) to a thunderclap (120 decibels) to the wail of a siren (120 to 140 decibels). Sounds that reach 85 decibels or higher can harm a person's ears. Noise pollution impacts millions of people on a daily basis. The most common health problem it causes is hearing loss.

Exposure to loud noise can also cause high blood pressure, heart disease, sleep disturbances, and stress. These health problems can affect all age groups, especially children. Many children who live near noisy airports or streets have been found to suffer from stress and other problems, such as impairments in memory, attention level, and reading skill. Noise pollution also impacts the health and well-being of wildlife.

6. Ask for a volunteer to recall how killer whales communicate. *Echolocation or*

clicks, whistles, and calls.

Option: Play examples of clicks, whistles, and calls from [Orca Sound](#).

7. Share the following excerpt:

Killer whales rely on underwater sound to feed, communicate, and navigate. Pod members use clicks, known as echolocation, to find prey. They communicate with each other through whistles and pulsed calls. Each pod possesses a unique set of calls that are learned and culturally transmitted. These calls maintain group cohesion and serve as family badges. They also use these calls to coordinate hunting strategies and work as a team to catch prey.

8. Ask students to hypothesize how Southern Residents might be affected by noise pollution.

Activity

1. On the board, draw the following table:

Round	Time	Sound	Feelings/ Observations
1			
2			
3			
4			
5			
6			

2. Explain that the class will participate in a simulation to better understand how noise pollution affects the Southern Residents.
3. Have students move their desks to the side to create a big open space in the middle of the classroom.

4. Review the following directions with the class and/or write them on the board:

- Everyone will receive a letter. This letter corresponds to the letter of your pod (i.e., J, K, or L).
- Do not share this letter with anyone.
- When the activity starts, you will close your eyes and try to find the other members of your pod by repeating the name of your pod (i.e., J, K, or L) in a normal volume. We are closing our eyes to simulate swimming in deep water, where visibility is reduced.
- When you find your pod, stay together.
- We will repeat this exercise a few different times.

5. Give each student a pod letter.

6. Repeat the following steps for rounds 1-3 of the activity:

- Play the sound corresponding to each round.
 - **Round 1:** Light rain
 - **Round 2:** Large commercial ship
 - **Round 3:** Submarine
- Ask students to begin finding their pod.
- Start the timer.
- Once all students have found their pod, stop the timer and the noise.
- Record the time in the corresponding column on the whiteboard.
- Ask a few students to record their thoughts or feelings on the board.
- Ask students to trade their card with someone outside of their pod.
- Repeat these steps until Round 3 has been completed.

7. Share the following excerpt:

Now that you have a sense of how hard it is to communicate with noise pollution, you will try and hunt for Chinook salmon. A few students will be salmon instead of Southern Residents. These salmon will quietly say salmon while the rest of the class makes a click or whistle. To catch a salmon, a Southern Resident will gently tap the salmon on the shoulder. The salmon will move

Additional Resources



Audio Files

[Discovery of Sound in the Sea](#)

Listen to different natural and human-made sounds in the ocean.

Articles

[Communication and Echolocation](#)

This article describes different killer whale sounds and their purposes.

[Noise Pollution](#)

This National Geographic article highlights the sources and dangers of noise pollution in urban environments.

[Ocean Noise](#)

This brief tutorial describes sources and effects of natural and human-made noise pollution.

[Sound Waves - Listening to Orcas](#)

This article highlights underwater noise and killer whale communication research near San Juan Island in WA.

outside of the game area to indicate it has been caught.

8. Ask the class to close their eyes.
9. Secretly give a few students a salmon card.
10. Repeat the following steps for rounds 4-6 of the activity:
 - a. Play the noise corresponding to each round.
 - **Round 4:** Lightning
 - **Round 5:** Sonar
 - **Round 6:** Tanker
 - b. Ask students to close their eyes and find their prey.
 - c. Start the timer.
 - d. Once all of the salmon have been hunted, stop the timer and the noise.
 - e. Record the time in the corresponding column on the whiteboard.
 - f. Ask a few students to record their thoughts or feelings on the board.
 - g. Repeat these steps until Round 6 has been completed.
11. Collect the J, K, L, and salmon cards.
12. Have students return their desks to their original locations.
13. If desired, repeat the sounds and have students guess what they might be. Otherwise, simply write the sounds on the table:

Round	Time	Sound	Feelings/ Observations
1		Light Rain	
2		Large Commercial Ship	
3		Submarine	
4		Lightning	
5		Sonar	
6		Tanker	

14. Have the class brainstorm how chronic noise pollution might affect the Southern Residents, beyond their ability to communicate.

15. Share the following excerpt:

Because water is denser than air, sound travels very efficiently underwater. Sound in the ocean travels 25 times faster than it does on land. Animals in the ocean have evolved over hundreds of millions of years to make use of this acoustic environment. Humans have rapidly evolved marine acoustics with tankers, submarines, cruise ships, sonar, and seismic exploration. This noise pollution can impair marine mammals' ability to find prey, avoid danger, communicate, rest, reproduce, and navigate.²⁵ This can result in changed behaviors, hearing loss, increased stress levels, moving to quieter waters, injury, or death.²⁶

16. Lead a brainstorm, free write, or Think-Pair-Share activity about potential solutions to noise pollution.

Driving Question

Review the list of questions from Activity 1. Cross off any questions that were answered in today's activity. Add additional questions that may have arisen.

Discussion Questions

1. How does noise pollution in your community make you feel?
2. How would the size, speed, and design of a boat affect the amount of noise pollution it produces?
3. How do individuals, even those without boats, contribute to marine noise pollution? Encourage students to think about where products come from and how they arrive at their local store or home (e.g., products shipped from overseas).
4. How could companies work together to reduce marine noise pollution?
5. How could individual boaters and paddlers reduce their impact on marine mammals?

Public Product Option

To help build empathy for marine mammals who are grappling with noise pollution, students can write a journal entry from the perspective of a Southern Resident about what it is like to live with noise pollution. Alternatively, students can create a comic or advertisement to depict these issues. The journal entries and artwork can be used as part of a boater education campaign.

Engineering Extension

Researchers estimate that ocean noise being produced by commercial ships could double between 2016 and 2030.²⁷ Students can research and design ways to dampen ocean noise and then test out their designs. Students could consider modifying propellers, creating bubble curtains, designing devices that slow ship speeds around marine mammals, etc. [RoboNation](#), [International Quiet Ocean Experiment](#), and [NOAA's Ocean Noise Strategy Roadmap](#) are great starting points.

Maps

[Listen to How Loud the Sea Is](#)

This interactive sound map explores the busy marine soundscape, from kayaks to cruise ships.

[MarineTraffic](#)

This map displays near real-time positions of ships worldwide.

Videos

[Do Whales Communicate In Different Accents?](#)

(3:56)

Whales have a complex system of speech that even includes regional dialects. This video highlights how these dialects work.

[Marine Noise and Southern Resident Killer Whales](#)

(10:21)

This TEDx talk focuses on how vessel noise affects the lives of Southern Residents and highlights the impact vessels are having on this endangered population of marine mammals.

