

Tide Pools

ACTIVITY OVERVIEW

STEM Focus Area: Animals

Facilitator Learning Goal: Youth will learn about the ecosystem of a tide pool.

Youth Learning Target:

- “I can learn about the effects that the rising and falling tides have on the animals that live in tide pools.”

LEARNING ENVIRONMENT

Activity Duration: 45 minutes

Class Size: Any size

Minimum Group Size: 2

Type of Space: Indoor

Age of Youth: Grades 3-4

Guiding Question: What is the question to explore OR the problem or challenge to solve?

What is life like for animals that live in tide pools?

Through this activity, youth will:

- Predict & hypothesize what will happen to the animals in their tide pool when tide comes in.
- Develop and use models to demonstrate what life is like in tide pools
- Observe and record observations of what they see when tide comes in and goes out
- Analyze and infer what adaptations animals might need to survive life in a tide pool

Facilitator Prep

Facilitators will need to watch the videos for the introduction prior to the lesson to be sure they know where to start the videos and where to stop them.

Literacy Connection: Great books to support learning about tide pools (*available on Amazon*).

- Tide Pool Secrets by Narelle Oliver
- Tide Pools by Laura F. Marsh
- What's in the Tide Pool? by Anne Hunter

DoS:

- ✓ Predict and hypothesize
- ✓ Develop and use models
- Measure materials
- ✓ Observe
- Investigate
- ✓ Record observations
- ✓ Analyze and infer

Share and communicate data

Interpret data

Test and revise

Draw conclusions and relationships

✓ **Have voice and agency, make decisions and guide their own learning**

PREPARATION

Materials

Computer, projector, [In One Tide Pool](#) by Anthony Fredericks, aluminum pans or dish tubs (some container around the dimensions of 10x18x4), rocks (sizes ranging from pebbles to large 2-3 inch diameter rocks), sand (around 5-6 cups per group), plastic sea animals, sea shells, water (around a gallon per group), cups, pencils and observation sheets.

Room

This activity will need to take place in a room with access to water and is easy to clean up in case of water spills. Room will need tables for youth to stand or sit at.

Content

Good resource with information about tide pools with [Sea World](#).

- Intertidal areas are divided into 4 main zones:
- Splash zone – never covered by water and only sprayed with saltwater during high tides.
- High intertidal zone – only covered with saltwater during high tides.
- Middle intertidal zone – covered and uncovered twice a day by tides.
- Low intertidal zone – only uncovered during the lowest of tides.

Tide pools can be found at any of the different intertidal zones but mostly occur in the low intertidal zone.

What is a tide? Tides are the rise and fall of the levels of the ocean. They are caused by the gravitational pull of the moon and sun, as well as the rotation of the Earth.

High tide is when the water level is at its highest. Low tide is when the water level is at its lowest. Most places experience 2 tide cycles a day - meaning 2 high tides and 2 low tides a day.

The pools of water that remain during low tide are called *tide pools*. The tide pools and surrounding areas are referred to as *intertidal zones*.

The shallow pools and surrounding areas that are uncovered by retreating tides are often teeming with animals and plants that must adapt to the extreme changes in their environment in order to survive.

For more information about what tides are and what causes tides visit:

https://oceanservice.noaa.gov/education/tutorial_tides/

Common misconceptions:

- All organisms in tide pools can survive out of water – many small fish live in tide pools and cannot survive out of water.
- All tide pool organisms can be found at all intertidal zones – the distribution of organisms in the intertidal zones is determined by how long that organism can survive without water and the distribution of predators in those zones.
- Tide pool organisms are capable of withstanding the pressure of walking feet – many organisms in tide pools can withstand the pressures and stress levels caused by changing water levels, changes in salinity, pounding waves, temperature changes caused by the reduction or addition of water but that does not mean they can handle the weight and pressure of humans standing on them. People should always proceed with care and caution when exploring tide pools.

Inquiry:

Your primary goal as facilitator is to encourage youth to think critically about organisms in a tide pool. You can prompt those discussions with questions like the following:

- What do you notice about the animals living in the tide pool?
- How do you think these animals got into the tide pool?
- Do you think these animals ever leave the tide pool?

DoS:

- ✓ Organization: I practiced the activity/technology, prepared materials/extras/place to record youth ideas, completed an activity (including timings).
- ✓ Materials: Materials are appropriate for teaching the learning goals; youth will be able to use them and will think they are appealing.
- ✓ Space Utilization: The space is set up appropriately for the activity and there will be no safety issues or distractions.
- ✓ Relevance: I have researched why the content matters to youth's everyday lives.
- ✓ Content Learning: I have become familiar with the content.
- ✓ Inquiry: I have become familiar with how authentic, age-appropriate inquiry practices look in this activity.

INTRODUCTION TO ACTIVITY (15 MINUTES)

Many children may have never been to the ocean. To introduce the topic, show a video of the ocean waves and what high and low tide looks like on a beach.

Videos: [Kingsport, Nova Scotia, 52 seconds](#), [Halls Harbour, Nova Scotia, 30 seconds](#), [Hopewell Rocks, Nova Scotia, 54 seconds](#)

What is a tide? Tides are the rise and fall of the levels of the ocean. They are caused by the gravitational pull of the moon and sun, as well as the rotation of the Earth.

High tide is when the water level is at its highest. Low tide is when the water level is at its lowest. Most places experience 2 tide cycles a day. Meaning 2 high tides and 2 low tides a day.

After watching the videos ask the children what they noticed about the beaches during times of high tide. Low tide?

Did the water completely disappear during times of low tide? (Refer to the Kingsport video)

The pools of water that remain during low tide are called *tide pools*. The tide pools and surrounding areas are referred to as *intertidal zones*.

The shallow pools and surrounding areas that are uncovered by retreating tides are often teeming with animals and plants that must adapt to the extreme changes in their environment in order to survive.

Read [In One Tide Pool](#) by Anthony Fredericks.

DoS:

- ✓ Space Utilization: I will use the space informally avoiding the lecture hall format.
- ✓ Purposeful Activities: This intro section gets youth on track for the learning goal.
- ✓ Content Learning: If age appropriate, I will accurately present content.
- ✓ Inquiry: In this or another section of the activity, youth carry out one or more inquiry practices.
- ✓ Relationships: I will make each youth feel welcome.
- ✓ Relevance: In this or another section, I will guide the youth in a sustained discussion of how the activity relates to their everyday lives.
- ✓ Youth Voice: In this or another section, I will allow youth the opportunity to make decisions about their learning experiences.

ACTIVITY ENGAGEMENT (25 MINUTES)

Divide youth into small groups of 2-4.

Provide each group with a pan, sand, animals, shells, rocks and water.

Instruct the groups they need to build a tide pool using sand and rocks. Should all their rocks be on one level? Should they make varying levels within their pool? Should all of their sand be piled in one corner? What will happen to the sand when water is added if they did that?

After they have built their pool, start adding shells and animals. Where do they think these animals might live in their pool?

After they have built their pool, they will need to discuss which animals they think will be underwater first as the tide comes in.

Then they will begin mimicking the tide by adding small amounts of water. Then once they've reached high tide – they will need to make their observations of their tide pool.

Then they will need to begin to slowly take the water out until they are back at low tide and note their observations.

DoS:

- ✓ Space Utilization: I will use the space informally avoiding the lecture hall format.
- ✓ Participation: All youth will have access to the activity.
- ✓ Purposeful Activities: This core section helps youth to move toward the learning goal.
- ✓ Engagement: This activity has youth physically engaged with their hands and their minds.
- ✓ Inquiry: In this or another section of the activity, youth carry out one or more inquiry practices.
- ✓ Reflection: If appropriate, I will ask youth questions during the core activity that will help them make sense of what they are learning.
- ✓ Relationships: I will take steps to share my enthusiasm and create a nurturing, safe learning environment.
- ✓ Relevance: In this or another section, I will guide the youth in a sustained discussion of how the activity relates to their everyday lives.
- ✓ Youth Voice: In this or another section, I will allow youth the opportunity to make decisions about their learning experiences.

FINAL REFLECTION AND RELEVANCE (5 MINUTES)

Discuss the following questions with youth and work together to come up with the answers based on their observations. Information to the questions below is from Sea World (<https://seaworld.org/animals/ecosystems/tide-pools/intertidal-ecology/>)

What's going on? Sea animals and plants that live in these intertidal zones have to deal with fluctuating tides. Because the water level changes, these animals are sometimes in air and sometimes in water.

What are the advantages to living in an intertidal zone?

- Plants grow in the abundant sunlight and provide food for animals.
- Constant waves provide nutrients and oxygen to the pools.
- Food is abundant.
- There are lots of hiding places and surfaces to cling to.

What are the challenges to living in an intertidal zone? The rapidly changing conditions of a tide pool make survival a challenge. Exposure to surf and sun varies considerably.

- All the sunlight that allows the plants to grow quickly also quickly dries up any water and raises the water temperature.

- Waves that bring in nutrients and oxygen can also carry unprotected animals out to the sea.
- Animals are exposed to predators while the tide is out.

What adaptations would be useful to animals living in a tide pool? Animal adaptations to living in tide pools:

- Some animals like crabs, snails and clams have thick outer coverings to avoid drying out. Others, like barnacles, cluster together to reduce exposure.
- Adaptations to prevent being washed away by waves: sea stars cling fast to rocky surfaces and others find shelter in crevices or hide under thick mats of seaweed.
- Most animals in the area live in the low intertidal zones that remain under water so they are only exposed to air for short periods of time.
- Many fishes that inhabit tide pools, such as tide pool sculpin and young opaleyes, can breathe air at the surface—an adaptation that enables them to survive in oxygen poor water when the tide is out.

DoS:

- ✓ Space Utilization: Again, I will use the space informally.
- ✓ Participation: I will prompt youth who do not have access to the activity to participate.
- ✓ Purposeful Activities: The closing section helps youth to reach the learning goal.
- ✓ Content Learning: I will help youth make connections between different ideas. I will create opportunities for youth to ask questions/provide ideas that show a deeper level of understanding.
- ✓ Inquiry: In this or another section of the activity, youth carry out one or more inquiry practices.
- ✓ Reflection. I will provide youth with a sustained opportunity to make sense of their learning.
- ✓ Relevance: In this or another section, I will guide the youth in a sustained discussion of how the activity relates to their everyday lives.
- ✓ Youth Voice: In this or another section, I will allow youth the opportunity to make decisions about their learning experiences.

Tide Pool Observation Sheet

Draw a picture of your tide pool before you add water:

Which animals do you think will be covered by water first?

Draw a picture of your tide pool at high tide:

Which animals do you think will be exposed to air first when high tide goes out?