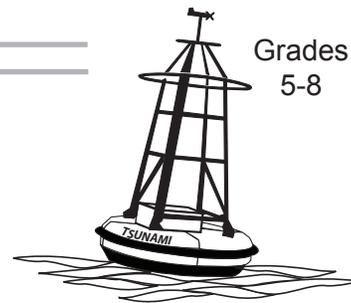


# Tsunami or Tidal Wave?

Grades  
5-8



## Overview:

In this lesson students dispel the misconception that tidal waves and tsunamis are one and the same. Students compare and contrast the two types of waves then research examples of tidal bores to understand how people may perceive them as being the same thing.

## Targeted Alaska Grade Level Expectations:

### *Science*

- [5] SA2.1 The student demonstrates an understanding of the attitudes and approaches to scientific inquiry by supporting the student's own statements with facts from a variety of resources and by identifying their sources.
- [7] SB4.3 The student demonstrates an understanding of motions, forces, their characteristics, relationships, and effects by describing the characteristics of a wave (i.e., amplitude, wavelength, and frequency).

### *Writing*

- [5-6] 2.5.1 The student documents sources by giving credit for others' ideas, images, and information by citing title and source (e.g., author, storyteller, translator, songwriter, or artist). (L)
- [7] 3.5.1 The student documents sources by giving credit for others' ideas, images, and multimedia information by citing sources, including author, title, and publishing information (using simplified MLA or APA style). (L)
- [8] 3.5.1 The student documents sources by giving credit for others' ideas, images, and multimedia information, including others' ideas directly quoted or paraphrased by student, by citing sources, including author, title, publishing information, and page number (using simplified MLA or APA style). (L)

## Objectives:

The student will:

- compare and contrast tsunamis and tidal waves;
- research information on tidal bores; and
- present information using PowerPoint.

## Materials:

- Internet access
- PowerPoint
- STUDENT WORKSHEET: "Tsunami or Tidal Wave?"
- STUDENT WORKSHEET: "Tidal Bore Checklist"

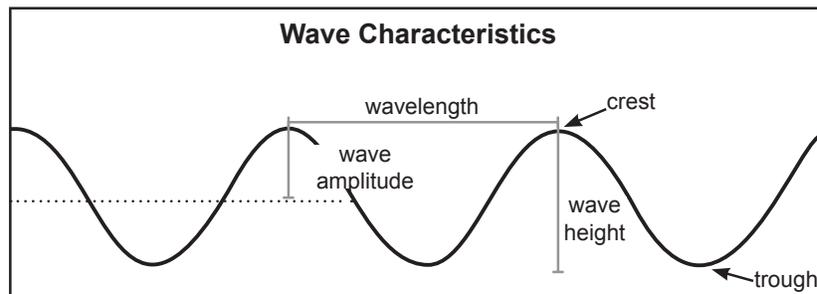
## Science Basics:

Tsunamis and tidal waves are both long ocean waves. Tidal waves, or tides, are a predictable, common occurrence along coastal communities, generated by forces beyond Earth—the gravitational pull of the sun and moon. However, tsunamis are not predictable. They are often generated by earthquakes, volcanic activity, and slope failure.

The appearance of both types of waves can be similar. Most often, tsunamis and tidal waves appear as a surge. Rarely do they appear as an enormous breaking wave. The shape of the ocean floor greatly influences the run-up of a wave as it approaches shore. Bays, inlets, and the mouths of rivers can act as funnels, focusing the energy of the wave into a smaller area, increasing the amplitude of

the wave. For tidal waves, this may become quite dramatic as the wave may develop a single wave front called a bore. For tsunamis occurring in bays, the results can be devastating. The greatest wave amplitude for a tsunami was recorded in Lituya Bay in 1958, when people witnessed a tsunami reach 524 meters (1,720 feet) high. The highest tides have been recorded in the Bay of Fundy in New Brunswick, Canada. The waves reach 16 meters (52 feet) at the head of the bay.

Tsunamis and tides have some similarities and differences in their characteristics. The period of a wave refers to the time it takes for one wavelength (from crest to crest) to pass a given point. The period of a tsunami wave ranges from 5 to 60 minutes. For a tidal wave, the period ranges from 12 to 24 hours. Both have very large wavelengths, but a tsunami's wavelength is smaller than a tide's. Tsunami wavelengths range from 20 kilometers to over 300 kilometers. The wavelength of the tide is thousands of kilometers long. Within the water column, both are similar in that their depth of influence reaches the bottom of the ocean. Because they are so long, the small amplitude of both types of waves would be difficult to notice from a boat out on the open ocean.



### Activity Procedure:

NOTE: For this activity, it is assumed that students will have previous experience using PowerPoint.

1. Explain today's lesson will address the difference between tsunamis and tidal waves.
2. Distribute STUDENT WORKSHEET: "Tsunami or Tidal Wave?" for students to complete, then discuss student responses.
3. Distribute STUDENT WORKSHEET: "Tidal Bore Checklist." Review the list of common tidal bores. Assign a tidal bore to each student or pair of students, or allow them to choose. Assign a format for citing resources. Students create a short PowerPoint presentation to present to the class.
4. Following student presentations, pose questions to the class that emphasize the differences between tsunamis and tidal waves.

---

**Critical Thinking: Wait Time Method.** To give students time to think about their answers, ask a question but do not call for answers immediately. The wait time may be 15 seconds or more. When the time is up, ask for a show of hands or select a student to answer. Possible questions: What generates a tsunami wave? What generates a tidal wave? Which wave is predictable? Which has a greater period? Which has a greater wavelength? Where should you go during a tsunami? (go uphill)

---

### Answers:

1.	Tsunami	With regards to...	Tidal Wave
	<i>Earthquakes, slope failure (landslides), volcanic activity</i>	Generation	<i>Gravitational force of the sun and moon</i>
	<i>5-60 minutes</i>	Period	<i>12-24 hours</i>
	<i>20-300+ kilometers</i>	Wavelength	<i>thousands of kilometers</i>
	<i>524 meters (1,720 feet)</i>	Maximum recorded height	<i>16 meters (52 feet)</i>
	<i>Lituya Bay, Alaska</i>	Location of maximum recorded height	<i>Bay of Fundy, New Brunswick</i>

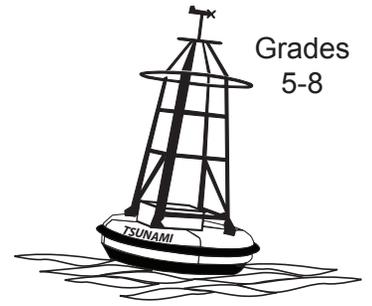
2. Answers will vary, but possible answers may include:

With regards to...	Similarities
<i>Depth of influence in the water column</i>	<i>Down to the bottom</i>
<i>Appearance or size</i>	<i>large</i>

# Tsunami or Tidal Wave?

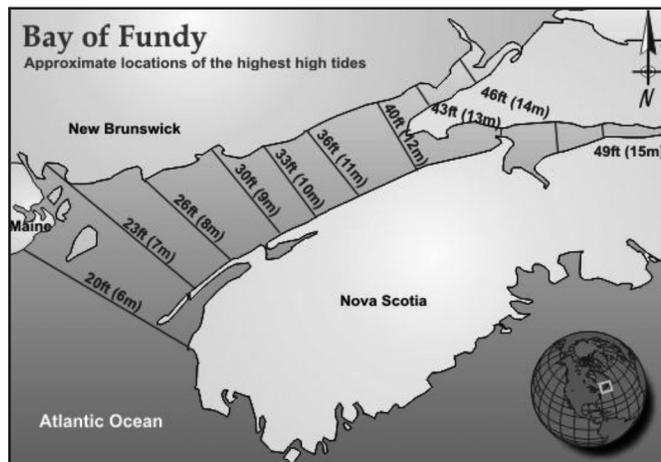
## Student Worksheet

Grades  
5-8



Tsunamis and tidal waves are both long ocean waves. Tidal waves, or tides, are a predictable, common occurrence along coastal communities generated by forces beyond Earth—the gravitational pull of the sun and moon. However, tsunamis are not predictable. They are often generated by earthquakes, volcanic activity, and slope failure.

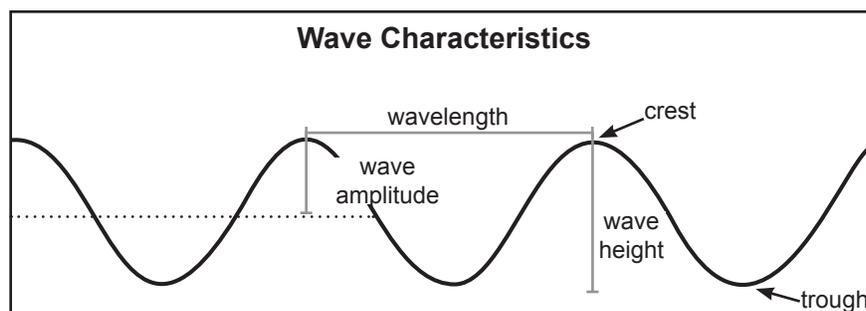
The appearance of both types of waves can be similar. Most often, tsunamis and tidal waves appear as a surge. Rarely do they appear as an enormous breaking wave. The shape of the ocean floor greatly influences the run-up of a wave as it approaches shore. Bays, inlets, and the mouths of rivers can act as funnels, focusing the energy of the wave into a smaller area, increasing the amplitude of the wave. For tidal waves, this may become quite dramatic as the wave may develop a single wave front called a bore. For tsunamis occurring in bays, the results can be devastating. The greatest wave amplitude for a tsunami was recorded in Lituya Bay in 1958, when people witnessed a tsunami reach 524 meters (1,720 feet) high. The highest tides have been recorded in the Bay of Fundy in New Brunswick, Canada. The waves reach 16 meters (52 feet) at the head of the bay.



The greatest wave amplitude for a tsunami was recorded in Lituya Bay in 1958, when people witnessed a tsunami reach 524 meters (1,720 feet) high. The highest tides have been recorded in the Bay of Fundy in New Brunswick, Canada. The waves reach 16 meters (52 feet) at the head of the bay.

Tsunamis and tides have some similarities and differences in their characteristics. The period of a wave refers to the time it takes for one wavelength (from crest to crest) to pass a given point. The period of a tsunami wave ranges from 5 to 60 minutes. For a tidal wave, the period ranges from 12 to 24 hours. Both have very large wavelengths, but a tsunami's wavelength is smaller

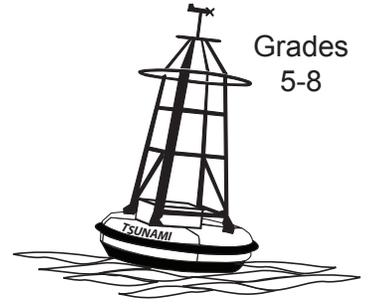
than a tide's. Tsunami wavelengths range from 20 kilometers to over 300 kilometers. The wavelength of the tide is thousands of kilometers long. Within the water column, both are similar in that their depth of influence reaches the bottom of the ocean. Because they are so long, the small amplitude of both types of waves would be difficult to notice from a boat out on the open ocean.



Name: \_\_\_\_\_

# Tsunami or Tidal Wave?

## Student Worksheet



**Directions:** Use the information on the preceding page to identify differences and similarities among tsunamis and tidal waves.

1. Contrast: How are they different?

<b>Tsunami</b>	<b>With regards to...</b>	<b>Tidal Wave</b>
	<b>Generation</b>	
	<b>Period</b>	
	<b>Wavelength</b>	
	<b>Maximum recorded height</b>	
	<b>Location of maximum recorded height</b>	

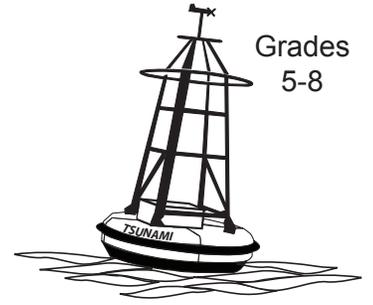
2. Compare: How are they similar?

<b>With regards to...</b>	<b>Similarities</b>

Name: \_\_\_\_\_

# Tidal Bore Checklist

## Student Worksheet



Tides can be dramatic in different places around the world. The mouths of rivers enhance the tide. In some areas, the change of water level can be more dramatic than in others. Very few rivers have an obvious tidal bore. A tidal bore happens as the leading edge of a tide travels up a river or narrow bay. The following list includes locations where significant tidal bores occur.

- Turnagin Arm of Cook Inlet, Alaska
- Petitcodiac River, Bay of Fundy, New Brunswick, Canada
- Shubenacadie River, Bay of Fundy, New Brunswick, Canada
- The Pororoca, mouth of Amazon River
- The Macareo, Orinoco Delta
- Seine Mascaret, France
- Gironde Mascaret, France
- Trent Aegir, United Kingdom
- Severn River, United Kingdom
- Qiantang River, China
- Lupar Benak, Sarawak, Malaysia
- Hugli (Hooghly), India

**Directions:** Create a PowerPoint presentation that displays the following information on one of the tidal bore locations listed above.

- \_\_\_\_\_ Title Page
- \_\_\_\_\_ Map
- \_\_\_\_\_ Visual Aids
- \_\_\_\_\_ Location
- \_\_\_\_\_ Maximum Height
- \_\_\_\_\_ Time of Year for Greatest Occurrence
- \_\_\_\_\_ Speed
- \_\_\_\_\_ List of Sources
- \_\_\_\_\_ Format for citations: