**ACTIVITY OVERVIEW**

This activity, which is aligned to the Common Core State Standards (CCSS) for English Language Arts, introduces students to scientific knowledge and language related to how scientists study the ocean.

This activity has three components:

1. **BEFORE YOUR VISIT**, students will read a content-rich article that will provide context for the visit, and also help them complete the post-visit writing task.
2. **AT THE MUSEUM**, students will read and engage with additional texts (including printed text, digital and physical/hands-on interactives, video, diagrams, models). This information will help them complete the post-visit writing task.
3. **BACK IN THE CLASSROOM**, students will draw on the first two components of the activity to complete a CCSS-aligned explanatory writing task.

**Materials in this packet include:**

**For Teachers**
- Activity overview (pp. 1-2)
- Article with teacher notes: “Listening to Life in the Deep” (pp. 3-9)
- Assessment rubric for student writing task (pp. 10-11)

**For Students**
- Article: “Listening to Life in the Deep” (pp. 12-17)
- Student worksheet for the Unseen Oceans exhibition visit (pp. 18-19)
- Student writing task and rubric (pp. 20-22)

**1. BEFORE YOUR VISIT**

Students will read a content-rich article about how scientists study the ocean and its inhabitants. This article will provide context for the visit, and will help them complete the post-visit writing task.

**Preparation**
- Familiarize yourself with the student writing task and rubric (pp. 20-22).
- Familiarize yourself with the teacher version of the article (pp. 3-9), and plan how to facilitate the students’ reading of the article.

**Instructions**
- Explain the goal: to complete a writing task about how scientists use tools to meet the challenges of studying the ocean.
- Tell students that they will read an article before visiting the Museum, and will read additional texts during the visit.
- Distribute the article, student writing task, and rubric to students.
- Review the rubric with students and tell them that it will be used to grade their writing.
- Read and discuss the article, using the teacher notes to facilitate.
2. DURING YOUR VISIT
At the Museum, students will read and engage with additional texts (including printed text, digital and physical/hands-on interactives, video, diagrams, models). The information they gather from these multiple sources will help them complete the post-visit writing task.

Preparation
- Review the educator’s guide to see how themes in the exhibition connect to your curriculum and to get an advance look at what your students will encounter. (Guide is downloadable at amnh.org/unseen-oceans-educators)
- Familiarize yourself with the student worksheets (pp. 18-19) and the map of the exhibition.

Instructions
- Explain the goal of the Museum visit: to read and engage with texts (including printed text, digital and physical/hands-on interactives, video, diagrams, models), and to gather information to help students complete the post-visit writing task.
- Distribute and review the worksheet and map. Clarify what information students should collect, and where.

Additional Suggestions for Facilitating the Museum Visit
- Have students explore the exhibition in pairs, with each student completing his or her own student worksheet.
- Encourage student pairs to ask you or their peers for help locating information. Tell students they may not share answers with other pairs, but may point each other to places where answers can be found.

3. BACK IN THE CLASSROOM
Students will use what they have learned from the pre-visit article and at the Museum to complete a CCSS-aligned explanatory writing task about how scientists use tools to meet the challenges of studying the ocean.

Preparation
- Plan how you will explain the student writing task and rubric (pp. 20-22) to students.

Instructions
- Distribute the student writing task and rubric. Explain that they will use it while composing, and will also use it to evaluate and revise what they have written.

Suggestions for Facilitating Writing Task
- Before they begin to write, have students use the writing task to frame a discussion around the information that they gathered at the Museum. They can work in pairs, small groups, or as a class, and can compare their findings.
- Referring to the writing prompt, have students underline or highlight all relevant passages and information from the article and from the notes taken at the Museum.
- Students should write their essays individually.

Supports for Diverse Learners
This resource has been designed to engage all learners with the principles of Universal Design for Learning in mind. It represents information in multiple ways and offers multiple ways for your students to engage with content as they read about, discuss, view, and write about scientific concepts. Different parts of the experience (e.g. reading texts, or locating information in the Museum) may challenge individual students. However, the arc of learning is designed to offer varied opportunities to learn. We suggest that all learners experience each activity, even if challenging. If any students have an Individualized Education Program (IEP), consult it for additional accommodations or modifications.
Listening to Life in the Deep

When Dr. Kelly Benoit-Bird was in third grade, her family took a vacation at SeaWorld. There she learned how animals like dolphins use sound instead of light to sense their world, a process called echolocation. They make clicking noises that bounce off objects and animals, then listen for the echoes. She was fascinated by the idea that dolphins can’t see very well underwater, even during the day, so they use sound instead. “I got really excited about how different the ocean world was from ours. It’s like another planet—really alien,” she says.

Kelly Benoit-Bird is an ocean ecologist at Oregon State University and the Monterey Bay Aquarium Research Institute.

Today Kelly Benoit-Bird is an ocean ecologist, a scientist who studies how living things interact with one another in a marine environment. It’s easy to observe dolphin behavior in a place like SeaWorld, but Benoit-Bird wanted to know how they use echolocation in their natural environment. For example, how do dolphins find food when there aren’t any humans around feeding them from a bucket? How do they tell the difference between two species of fish?
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Such questions about animal behavior can be difficult to investigate. That’s especially true in the open ocean, the vast expanse of water beyond the continental shelf. There are no landmarks or fixed boundaries to help scientists keep track of where things are. Most sunlight penetrates only the top 200 meters (650 feet) of the water. Further down in the ocean’s depths, it’s too dark for cameras to help much. It’s also hard for people to get there, because the farther down you go, the more water presses down on you from above. This increased

Word Wall: Put echolocation and ocean ecologist on the word wall. Invite students to locate the definition of each in the text, and then to work with a partner to paraphrase that definition and add it to the bottom section of their worksheet. (Prompt students to study the diagram on page 10 representing echolocation).

Think-Pair-Share: What practices do you think Dr. Benoit-Bird is engaging in so far? (Listen in and select students to share out. Students should notice that Dr. Benoit-Bird is asking questions and identifying problems).

Stop and Jot: Look at your worksheet and identify questions that you think you can answer based on what you have read so far. Answer the questions. Students should be able to answer “What are they studying” and “What are the challenges of studying this?” You might:

• Invite students to share their responses with their partners
• Select students to share out their responses
Using Sound to Study Life Underwater

Benoit-Bird wanted to know: How do animals interact in the complex and mysterious world beneath the waves? The difficulties of studying the ocean’s depths don’t scare her. Instead, they excite her, because there’s so much new to discover.

First she needed the right tools. That’s where her love of tinkering came in. The only child of a mechanic, she grew up helping her father in his garage. “My dad can fix and build pretty much anything,” she says. “Some of the best memories I have of my childhood are of being his ‘second pair of hands.’” When she can’t find the tools she needs, she makes new ones.

Sonar uses echolocation in the same way that dolphins use clicks.

Most of Benoit-Bird’s tools involve sound. Unlike light, which travels only a few meters through water, sound can travel long distances. Engineers have developed a tool called sonar that works much the same way as dolphins use clicks. Sonar operators send out sound waves and then record and analyze the echoes. That allows them to create images of the physical environment and of the animals living and interacting underwater. Early sonar operators discovered something very surprising: The ocean floor seemed to be rising at night and falling during the day! This turned out not to be the ocean floor at all. Instead, their sonar was bouncing off a vast layer of small marine organisms that were rising at night to feed at the surface. The ocean floor was sitting still, of course—only the animals were moving. Scientists called this group of animals that travel daily up and down the “deep scattering layer.”
The tools that Benoit-Bird and her colleagues developed help them tell marine organisms apart. Different animals reflect sound in different ways. Mammals such as dolphins, for example, with their air-filled lungs, create a very strong echo. Many bony fish have swim bladders, gas-filled organs that help them maintain their buoyancy and also create distinctive echoes. Large squid, with their soft, airless bodies, and tiny shrimp-like krill also bounce back distinctive echoes.

How Dolphins Herd Their Prey

Benoit-Bird wanted to know how predators such as marine mammals and large fish find enough to eat in the ocean, where food is spread out over a large area. She compares the dolphins’ prey to a single bag of popcorn in a big movie theater. Instead of being collected neatly in a bag, however, the popcorn is scattered unevenly all through the theater, from floor to ceiling—and instead of sitting still and waiting to be eaten, the popcorn is fleeing for its life! So how do predators eat enough to survive, without spending more energy hunting the food than they get from eating it?

Spinner dolphins, for example, live in the subtropics and hunt at night. They eat small prey such as lanternfish, shrimp, and squid, which are part of the deep scattering layer. The prey are so small that to keep from starving, each dolphin must eat, on average, about 1.25 of them every minute. From prior observations and research, Benoit-Bird knew that groups of dolphins hunt together in the same areas at the same time. She now wanted to investigate the following question: Were spinner dolphins helping each other catch their food?

Think-Pair-Share: What more have you learned about Dr. Benoit-Bird’s use of science practices? Students should notice that Dr. Benoit-Bird is continuing to ask questions (“How do animals interact in the complex and mysterious world beneath the waves?”) and is designing solutions (sonar operators).

Stop and Jot: Look at your worksheet and identify questions that you think you can answer based on what you have read so far. Answer the questions. Students should be able to begin to answer the questions under the heading “How do they study the ocean?” (Include “Tool/Technology used; Draw and label the tool; Describe the tool: What is it made of? How does it work? What does it do?”) You might:

- Invite students to share their responses with their partners
- Select students to share out their responses
Food is especially scarce in the oceans of the subtropics, which lie roughly between the tropics at latitude 23.5° and the temperate zones at latitudes 35–66.5° north and south of the Equator.

To do this Benoit-Bird and her team used their acoustic techniques to study groups of spinner dolphins hunting off the coast of Oahu, Hawaii. During this study they repeatedly observed the following behavior: Groups of 16 to 28 dolphins would line up in pairs and swim together until they found a spot where prey happened to be more densely clustered than usual. Then the dolphins would tighten the line. Each pair would swim closer to the next pair. They would push forward fast, plowing the fleeing prey ahead of them into an even denser clump. Next they would surround the prey, swimming in circles in a column. The confused prey, trying to flee and swimming chaotically, would head into the center of the column. This dance would create a high concentration of prey inside the circle, on average 60 times the ordinary density. The pairs of dolphins would take turns diving in and feeding for a few seconds. It was as if they’d herded their popcorn into an imaginary bag and were taking turns diving in to chow down. The whole thing would last four to five minutes at a time. Then the dolphins would swim back to the surface for a lungful of air. This led the scientists to make the exciting conclusion that the spinner dolphins were indeed cooperating to herd fish and other prey.

Pairs of dolphins swim in circles to create a column of fish that is 20 to 40 meters (65 to 130 feet) in diameter.
How Prey Work Together to Foil Hunters

These days, Benoit-Bird is studying how prey in the deep scattering layer avoid being eaten in a different part of the world: the California coast. She and her team put their acoustic instruments on an underwater robot. Cramming the equipment into the slender vehicle took some doing, but fortunately, Benoit-Bird is an expert tinkerer. Then they sent the robot down into the deep scattering layer off the eastern coast of Catalina Island, California. Previously, scientists looking down at the deep scattering layer from their ships at the surface had believed that the animals were all jumbled together in it like different colored M&Ms in a bag. Benoit-Bird's underwater robot was able to dive below the surface and look at the deep scattering layer from the inside. The robot showed the scientists that the deep scattering layer is made up of distinct groups of organisms side by side. Each group consists of the same type of animal of the same size. It was as if the M&Ms were sorted into small patches, each of a single color and size. These schools of marine animals coordinate their movements in a highly organized way.
Just as interesting was the animals' behavior when a predator appeared. In California the researchers often noticed a different species of dolphins, called Risso's dolphins. These dolphins seemed to be hunting their favorite food, squid. Kelly Benoit-Bird and her colleagues asked a question: Do the squid try to avoid being eaten, and if so, how do they do it? During their study they discovered that when the Risso's dolphins approached a school of squid, the squid moved nearer to their fellows. This highly organized behavior is called “flash compression.” The behavior makes it more difficult for predators to target individual prey. The squid arranged themselves into dizzying patterns. This way they confused the dolphins' senses, making it hard for the dolphins to single out any one squid to attack.

Benoit-Bird’s research into how animals behave in the mesopelagic zone, 200 and 1000 meters (660 and 3300 feet) beneath the ocean's surface, is important. Ten billion metric tons of animals live there, making up more than half the total weight of all the fish on Earth. These animals are a vital food source for many predators, from tuna and salmon to dolphins, whales, and penguins. But in 2018, for the first time, countries began issuing fishing permits for access to the mesopelagic. We are in a race, says Benoit-Bird, to figure out what impact that harvest might have on the ecosystem, and how to make it sustainable. She says, “Now is the perfect time to address these questions before we've made potentially irreversible changes.”

**Think-Pair-Share:**
- **What did you learn from this article that surprised you?**
- **What questions do you have after reading this article?**

Listen in to peer conversations and facilitate a whole-group discussion based on ideas you select from students’ stop and jots and/or peer conversations. You can also invite students to check their understanding by discussing Dr. Benoit-Bird’s use of science practices (referring to the notes on their worksheets). You might do this by using discussion prompts such as:
- What discoveries did Dr. Benoit-Bird and her team make? How did their use of science practices lead to these discoveries?
- What obstacles motivated Dr. Benoit-Bird and her team to use innovation and design solutions?
- Why is Dr. Benoit-Bird’s research important at this moment in time?

**Vocabulary Term**

<table>
<thead>
<tr>
<th>Vocabulary Term</th>
<th>Definition from article (verbatim)</th>
<th>Explanation of this term in my own words</th>
</tr>
</thead>
<tbody>
<tr>
<td>Echolocation</td>
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<tr>
<td>Ocean Ecologist</td>
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<tr>
<td>SEP: Asking Questions</td>
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<td>SEP: Defining Problems</td>
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<tr>
<td>SEP: Designing Solutions</td>
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</table>

SEP = Science and Engineering Practice

(select additional terms from the article that you think are most essential for your students to know)
## ESSAY SCORING RUBRIC: TEACHER VERSION - page 1

<table>
<thead>
<tr>
<th></th>
<th>Exceeds</th>
<th>Meets</th>
<th>Approaches</th>
<th>Needs Additional Support</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Research: “Listening to Life in the Deep” Article</strong></td>
<td>Accurately presents information relevant to all parts of the prompt with effective paraphrased details from the article</td>
<td>Presents paraphrased information from the article relevant to the prompt with sufficient accuracy and detail</td>
<td>Presents information from the article mostly relevant to the purpose of the prompt with some lapses in accuracy or completeness AND/OR information is copied from the text</td>
<td>Attempts to present information in response to the prompt, but lacks connections to the article or relevance to the purpose of the prompt</td>
</tr>
<tr>
<td><strong>Research: Unseen Oceans Museum Exhibition</strong></td>
<td>Accurately presents information relevant to all parts of the prompt with effective paraphrased details from the exhibition</td>
<td>Presents paraphrased information from the exhibition relevant to the prompt with sufficient accuracy and detail</td>
<td>Presents information from the exhibition mostly relevant to the purpose of the prompt with some lapses in accuracy or completeness AND/OR information is copied from the text</td>
<td>Attempts to present information in response to the prompt, but lacks connections to the exhibition content or relevance to the purpose of the prompt</td>
</tr>
<tr>
<td><strong>Science Explanations</strong></td>
<td>Integrates relevant and accurate science content with thorough explanations that demonstrate in-depth understanding of scientists and the tools they use to study the ocean</td>
<td>Presents science content relevant to the prompt with sufficient accuracy and explanations that demonstrate understanding of scientists and the tools they use to study the ocean</td>
<td>Presents science content mostly relevant to the prompt; shows basic or uneven understanding of scientists and the tools they use to study the ocean</td>
<td>Attempts to include science content in explanations, but lacks understanding of scientists and the tools they use to study the ocean</td>
</tr>
<tr>
<td></td>
<td>Consistent and effective use of precise and domain-specific language</td>
<td>Some or ineffective use of precise and domain-specific language</td>
<td>Little use of precise and domain-specific language</td>
<td>No use of precise and domain-specific language</td>
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<tr>
<td></td>
<td>Uses labeled and captioned illustrations of two tools that scientists use to study the ocean to effectively communicate relevant information</td>
<td>Uses captioned illustrations of two tools that scientists use to study the ocean to sufficiently communicate relevant information</td>
<td>Illustrations are unlabeled or uncaptioned</td>
<td>Only one illustration OR no illustrations</td>
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# ESSAY SCORING RUBRIC: TEACHER VERSION - page 2

<table>
<thead>
<tr>
<th>Development</th>
<th>Exceeds</th>
<th>Meets</th>
<th>Approaches</th>
<th>Needs Additional Support</th>
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<tbody>
<tr>
<td>Includes an opening section that clearly previews the essay to follow</td>
<td>Includes a relevant opening section about scientific exploration of the oceans</td>
<td>Includes an opening section that is insufficient or irrelevant</td>
<td>Does not include an introduction</td>
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<tr>
<td>Includes relevant, highly detailed descriptions of scientists and the tools they use to study the ocean to address the writing prompt</td>
<td>Includes sufficient descriptions of scientists and the tools they use to study the ocean to address the writing prompt</td>
<td>Includes descriptions of scientists and the tools they use to study the ocean, but not sufficient to fully address the prompt</td>
<td>Does not include any descriptions of scientists and the tools they use to study the ocean</td>
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<tr>
<td>Provides a concluding section that follows from and effectively supports the information or explanation presented</td>
<td>Provides a concluding section that follows from and sufficiently supports the information or explanation presented</td>
<td>Provides a concluding section that mostly supports the information or explanation presented</td>
<td>Provides a concluding section that does not support the information or explanation presented OR provides no concluding section</td>
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<table>
<thead>
<tr>
<th>Conventions</th>
<th>Exceeds</th>
<th>Meets</th>
<th>Approaches</th>
<th>Needs Additional Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demonstrates and maintains a well-developed command of standard English conventions and cohesion, with few errors; response includes language and tone consistent with purpose and specific requirements of the prompt</td>
<td>Demonstrates a command of standard English conventions and cohesion, with few errors; response includes language and tone appropriate to the purpose and specific requirements of the prompt</td>
<td>Demonstrates an uneven command of standard English conventions and cohesion; uses language and tone with some inaccurate, inappropriate, or uneven features</td>
<td>Attempts to demonstrate standard English conventions, but lacks cohesion and control of grammar, usage, and mechanics</td>
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ARTICLE

Listening to Life in the Deep

When Dr. Kelly Benoit-Bird was in third grade, her family took a vacation at SeaWorld. There she learned how animals like dolphins use sound instead of light to sense their world, a process called *echolocation*. They make clicking noises that bounce off objects and animals, then listen for the echoes. She was fascinated by the idea that dolphins can’t see very well underwater, even during the day, so they use sound instead. “I got really excited about how different the ocean world was from ours. It’s like another planet—really alien,” she says.

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Using Sound to Study Life Underwater

Benoit-Bird wanted to know: How do animals interact in the complex and mysterious world beneath the waves? The difficulties of studying the ocean’s depths don’t scare her. Instead, they excite her, because there’s so much new to discover.

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The tools that Benoit-Bird and her colleagues developed help them tell marine organisms apart. Different animals reflect sound in different ways. Mammals such as dolphins, for example, with their air-filled lungs, create a very strong echo. Many bony fish have swim bladders, gas-filled organs that help them maintain their buoyancy and also create distinctive echoes. Large squid, with their soft, airless bodies, and tiny shrimp-like krill also bounce back distinctive echoes.

**How Dolphins Herd Their Prey**

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To do this Benoit-Bird and her team used their acoustic techniques to study groups of spinner dolphins hunting off the coast of Oahu, Hawaii. During this study they repeatedly observed the following behavior: Groups of 16 to 28 dolphins would line up in pairs and swim together until they found a spot where prey happened to be more densely clustered than usual. Then the dolphins would tighten the line. Each pair would swim closer to the next pair. They would push forward fast, plowing the fleeing prey ahead of them into an even denser clump. Next they would surround the prey, swimming in circles in a column. The confused prey, trying to flee and swimming chaotically, would head into the center of the column. This dance would create a high concentration of prey inside the circle, on average 60 times the ordinary density. The pairs of dolphins would take turns diving in and feeding for a few seconds. It was as if they’d herded their popcorn into an imaginary bag and were taking turns diving in to chow down. The whole thing would last four to five minutes at a time. Then the dolphins would swim back to the surface for a lungful of air. This led the scientists to make the exciting conclusion that the spinner dolphins were indeed cooperating to herd fish and other prey.

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Scientists equip an underwater robot with acoustic instruments.

Each color of M&Ms represents a different species of animal. From the ocean surface, it looks like the species are all jumbled together (A). But from the point of view of the underwater robot, it’s clear that individuals within each species are actually grouped together (B).
Just as interesting was the animals’ behavior when a predator appeared. In California the researchers often noticed a different species of dolphins, called Risso’s dolphins. These dolphins seemed to be hunting their favorite food, squid. Kelly Benoit-Bird and her colleagues asked a question: Do the squid try to avoid being eaten, and if so, how do they do it? During their study they discovered that when the Risso’s dolphins approached a school of squid, the squid moved nearer to their fellows. This highly organized behavior is called “flash compression.” The behavior makes it more difficult for predators to target individual prey. The squid arranged themselves into dizzying patterns. This way they confused the dolphins’ senses, making it hard for the dolphins to single out any one squid to attack.

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Welcome to the *Unseen Oceans* exhibition! Today you will dive beneath the waves and learn about the scientists who study this fascinating underwater world. Your task is to pick two different scientists (or teams of scientists) who use tools to meet the challenges of studying the ocean. Use the **map** below to help you select and locate the scientists; there are six options. Use the **worksheets** to gather information about each scientist (or team).

<table>
<thead>
<tr>
<th>Location</th>
<th>Scientist (or Team of Scientists)</th>
<th>Tool / Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>David Gruber and John Sparks</td>
<td>high resolution underwater camera</td>
</tr>
<tr>
<td>2</td>
<td>Ari Friedlaender and Jeremy Goldbogen</td>
<td>whale tag</td>
</tr>
<tr>
<td>3</td>
<td>Kakari Katija and Aran Mooney</td>
<td>jellyfish tag</td>
</tr>
<tr>
<td>4</td>
<td>Kaitlyn Becker</td>
<td>soft gripper</td>
</tr>
<tr>
<td>5</td>
<td>Dawn Wright</td>
<td>submersible</td>
</tr>
<tr>
<td>6</td>
<td>Jules Jaffe</td>
<td>m-AUEs (mini autonomous underwater explorers)</td>
</tr>
</tbody>
</table>

Kelly Benoit-Bird

sonar
How do they study the ocean?

Tool / technology used:

Describe the tool: What is it made of? How does it work? What does it do?

Scientist(s):

What are they studying? Where?

What are the challenges of studying this?

Why do the scientists need to use this tool? What challenge are they trying to address?

What are the scientists learning by using this tool?

Why are they studying? Where?

What are the challenges of studying this?

Interesting details and quotes you find important or work and what motivates them. Record any scientists’ stories who they are, where their story takes place, etc.

Record additional information about the tool:

Caption:

Additional information:

Who?

Name:

STUDENT WORKSHEET
STUDENT WRITING TASK

Exploring the deep ocean and the animals that live there is difficult, but scientists design solutions to meet the challenges. Write an essay in which you describe two different scientists (or teams of scientists) and explain how they use different tools to meet the challenges of studying the ocean.

Be sure to:

• Describe two different scientists who study the ocean using different tools: Kelly Benoit-Bird from the article and one scientist (or a team of scientists) of your choice from the Unseen Oceans exhibition.

• Provide any relevant information about the scientists. Who are they? Where do they work? What motivates them? Include additional details that you think are important or interesting.

• Discuss what each scientist (or team) studies. Explain the importance and the challenges of studying it.

• Describe and draw the tools that each scientist (or team) uses and explain how these tools address specific challenges.

• Discuss what each scientist (or team) is learning using the tools.

• Include an introduction and a conclusion in your essay.
## ESSAY SCORING RUBRIC: STUDENT VERSION

<table>
<thead>
<tr>
<th></th>
<th>Exceeds</th>
<th>Meets</th>
<th>Approaches</th>
<th>Needs Additional Support</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Research:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>“Listening to Life in the Deep” Article</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>I have used information correctly from the article to write my essay; I have given a lot of detail to explain the information in my own words.</td>
<td>I have used information correctly from the article to write my essay in my own words.</td>
<td>I have used information from the article to write my essay, but not all of my information is correct AND/OR I didn’t use my own words.</td>
<td>I did not use information from the article to write my essay.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Research:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unseen Oceans Museum Exhibition</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>I have used information correctly from the exhibition to write my essay; I have given a lot of detail to explain the information in my own words.</td>
<td>I have used information correctly from the exhibition to write my essay in my own words.</td>
<td>I have used information from the exhibition to write my essay, but not all of my information is correct AND/OR I didn’t use my own words.</td>
<td>I did not use information from the exhibition to write my essay.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Science Explanations</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>All of the information I included about the scientists and the tools they use to study the ocean is correct and relevant. It clearly shows my understanding of the topic.</td>
<td>Most of the information I included about scientists and the tools they use to study the ocean is correct and relevant.</td>
<td>Some of the information I included about scientists and the tools they use to study the ocean is correct, but my understanding is uneven.</td>
<td>None of the information I included about scientists and the tools they use to study the ocean is correct.</td>
</tr>
<tr>
<td></td>
<td>I used relevant science vocabulary whenever possible, and I used all words correctly.</td>
<td>I used most science vocabulary words correctly.</td>
<td>I used some science vocabulary words correctly.</td>
<td>I did not use any science vocabulary words.</td>
</tr>
<tr>
<td></td>
<td>I included two labeled and captioned illustrations that effectively help the reader understand the tools scientists use to study the ocean.</td>
<td>I included two captioned illustrations that help the reader understand the tools scientists use to study the ocean.</td>
<td>My illustrations do not have captions or labels.</td>
<td>I included one illustration OR did not include any illustrations.</td>
</tr>
</tbody>
</table>
# ESSAY SCORING RUBRIC: STUDENT VERSION

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<tbody>
<tr>
<td><strong>Development</strong></td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>I included a clear introduction that previews the essay to follow.</td>
<td>I included a relevant introduction in the essay.</td>
<td>I included an irrelevant introduction to the essay.</td>
<td>I did not include an introduction.</td>
<td></td>
</tr>
<tr>
<td>I included many highly detailed descriptions of scientists and the tools they use to study the ocean.</td>
<td>I included enough descriptions of scientists and the tools they use to study the ocean.</td>
<td>I included some, but not enough descriptions of scientists and the tools they use to study the ocean.</td>
<td>I did not include any descriptions of scientists and the tools they use to study the ocean.</td>
<td></td>
</tr>
<tr>
<td>I have written a concluding paragraph that relates to all of the information in my essay.</td>
<td>I have written a concluding paragraph that relates to some of the information in my essay.</td>
<td>I have written a concluding paragraph or sentence at the end of the essay.</td>
<td>I have not written a concluding sentence at the end of the essay.</td>
<td></td>
</tr>
<tr>
<td><strong>Conventions</strong></td>
<td>I have edited my essay for spelling, punctuation, and grammar; there are no errors.</td>
<td>I have edited my essay for spelling, punctuation, and grammar; there are some minor errors but the reader can still understand my writing.</td>
<td>I have not carefully edited my essay for spelling, punctuation, and grammar; there are errors that may make the essay hard for readers to understand.</td>
<td>I have not edited my essay for spelling, punctuation, and grammar; there are many errors that make the essay hard for readers to understand.</td>
</tr>
</tbody>
</table>