

## Sea Floor Graveyard - Student Worksheet #3

### Hypoxia - Engineering Considerations of Monitoring Equipment

Explore how to problem solve equipment challenges.

1. Oceanographers at the Ocean Observatories Initiative would like to measure everything everywhere all of the time. However, each of OOI's research platforms is limited by engineering challenges, including waves, biofouling, power, and deployability. Based on the images shown of different equipment, explain how each challenge may interfere with the collection of data.

- a. Waves \_\_\_\_\_  
\_\_\_\_\_
- b. Biofouling \_\_\_\_\_  
\_\_\_\_\_
- c. Power \_\_\_\_\_  
\_\_\_\_\_
- d. Deployability \_\_\_\_\_  
\_\_\_\_\_

2. Jigsaw. Your job is to read the information found on [this PDF](#) and become the expert on **Gliders**. You will share with the rest of your group and help answer the questions. They will share with you as well and you will record information about each type of equipment. [Click here](#) to see the images again about all equipment types.

- Type of Equipment: **Gliders**

What is a glider? \_\_\_\_\_  
\_\_\_\_\_

What depth will gliders be operating at? \_\_\_\_\_  
\_\_\_\_\_

Will gliders be deployed for long term or short-term projects? How do you know? \_\_\_\_\_  
\_\_\_\_\_

What kind of data will gliders be collecting? \_\_\_\_\_  
\_\_\_\_\_

Would it be easy to deploy a glider? How do you know? \_\_\_\_\_  
\_\_\_\_\_

What seem to be the biggest challenges for gliders? \_\_\_\_\_  
\_\_\_\_\_

- Type of Equipment: **Wire following profilers**

What is a wire following profiler? \_\_\_\_\_

What depth do you think wire following profilers are operating at? \_\_\_\_\_

Will wire following profilers be deployed for long term or short-term projects? How do you know?

What kind of data will wire following profilers be collecting?  
\_\_\_\_\_

Would it be easy to deploy wire following profilers? How do you know?  
\_\_\_\_\_

What seem to be the biggest challenges for wire following profilers? \_\_\_\_\_

- Type of Equipment: **Coastal Surface Piercing Profiler**

What is a coastal surface piercing profiler? \_\_\_\_\_

What depth do you think coastal surface piercing profilers are operating at? \_\_\_\_\_

Will coastal surface piercing profilers be deployed for long term or short-term projects? How do you know?  
\_\_\_\_\_

What kind of data will coastal surface piercing profilers be collecting? \_\_\_\_\_

Would it be easy to deploy coastal surface piercing profilers? How do you know? \_\_\_\_\_

What seem to be the biggest challenges for coastal surface piercing profilers?  
\_\_\_\_\_

- Type of Equipment: **Inshore Surface Mooring**

What is an inshore surface mooring?  
\_\_\_\_\_

What depth do you think inshore surface moorings are operating at?  
\_\_\_\_\_

Will inshore surface moorings be deployed for long term or short-term projects? How do you know?  
\_\_\_\_\_

What kind of data will inshore surface moorings be collecting? \_\_\_\_\_

---

Would it be easy to deploy inshore surface moorings? How do you know?

---

---

What seem to be the biggest challenges for inshore surface moorings? \_\_\_\_\_

---

- **Type of Equipment: Coastal Surface Mooring**

What is a coastal surface mooring? \_\_\_\_\_

---

What depth do you think coastal surface moorings are operating at? \_\_\_\_\_

---

Will coastal surface moorings be deployed for long term or short-term projects? How do you know?

---

What kind of data will coastal surface moorings be collecting? \_\_\_\_\_

---

Would it be easy to deploy coastal surface moorings? How do you know? \_\_\_\_\_

---

What seem to be the biggest challenges for coastal surface moorings? \_\_\_\_\_

---

**Your turn to problem solve!**

3. The following scenarios present unique situations in which researchers would need to decide what kinds of monitoring they want to help inform their understanding of the causes and effects. With your group, decide which equipment types would be the most useful and what challenges would need to be overcome. Consider where these events might be happening, the depth of the water, what sort of data would be useful to understand the entire problem, and how long the event might last.

- Scenario 1: Crab fishermen have been reporting unusually low numbers of Dungeness crab during a fishing season.
- Scenario 2: Whale watching trips have been unsuccessful in locations where whales are usually abundant.
- Scenario 3: There is an algae bloom occurring near shore.



## Sea Floor Graveyard - Student Worksheet #3

### Hypoxia - Engineering Considerations of Equipment Used to Monitor

Explore how to problem solve equipment challenges.

1. Oceanographers at the Ocean Observatories Initiative would like to measure everything everywhere all of the time. However, each of OOI's research platforms is limited by engineering challenges, including waves, biofouling, power, and deployability. Based on the images shown of different equipment, explain how each challenge may interfere with the collection of data.
  - a. Waves \_\_\_\_\_  
\_\_\_\_\_
  - b. Biofouling \_\_\_\_\_  
\_\_\_\_\_
  - c. Power \_\_\_\_\_  
\_\_\_\_\_
  - d. Deployability \_\_\_\_\_  
\_\_\_\_\_
  
2. Jigsaw. Your job is to read the information found on [this PDF](#) and become the expert on **Wire following profilers**. You will share with the rest of your group and help answer the questions. They will share with you as well and you will record information about each type of equipment. [Click here](#) to see the images again about all equipment types.

- Type of Equipment: **Gliders**

What is a glider? \_\_\_\_\_  
\_\_\_\_\_

What depth will gliders be operating at? \_\_\_\_\_  
\_\_\_\_\_

Will gliders be deployed for long term or short-term projects? How do you know? \_\_\_\_\_  
\_\_\_\_\_

What kind of data will gliders be collecting? \_\_\_\_\_  
\_\_\_\_\_

Would it be easy to deploy a glider? How do you know? \_\_\_\_\_  
\_\_\_\_\_

What seem to be the biggest challenges for gliders? \_\_\_\_\_  
\_\_\_\_\_

- Type of Equipment: **Wire following profilers**

What is a wire following profiler? \_\_\_\_\_

What depth do you think wire following profilers are operating at? \_\_\_\_\_

Will wire following profilers be deployed for long term or short-term projects? How do you know?

What kind of data will wire following profilers be collecting?

Would it be easy to deploy wire following profilers? How do you know?

What seem to be the biggest challenges for wire following profilers? \_\_\_\_\_

- Type of Equipment: **Coastal Surface Piercing Profiler**

What is a coastal surface piercing profiler? \_\_\_\_\_

What depth do you think coastal surface piercing profilers are operating at? \_\_\_\_\_

Will coastal surface piercing profilers be deployed for long term or short-term projects? How do you know?

What kind of data will coastal surface piercing profilers be collecting? \_\_\_\_\_

Would it be easy to deploy coastal surface piercing profilers? How do you know? \_\_\_\_\_

What seem to be the biggest challenges for coastal surface piercing profilers?

- Type of Equipment: **Inshore Surface Mooring**

What is an inshore surface mooring?

What depth do you think inshore surface moorings are operating at?

Will inshore surface moorings be deployed for long term or short-term projects? How do you know?

What kind of data will inshore surface moorings be collecting? \_\_\_\_\_

Would it be easy to deploy inshore surface moorings? How do you know?  
\_\_\_\_\_

What seem to be the biggest challenges for inshore surface moorings? \_\_\_\_\_

- Type of Equipment: **Coastal Surface Mooring**

What is a coastal surface mooring? \_\_\_\_\_

What depth do you think coastal surface moorings are operating at? \_\_\_\_\_

Will coastal surface moorings be deployed for long term or short-term projects? How do you know?  
\_\_\_\_\_

What kind of data will coastal surface moorings be collecting? \_\_\_\_\_

Would it be easy to deploy coastal surface moorings? How do you know? \_\_\_\_\_

What seem to be the biggest challenges for coastal surface moorings? \_\_\_\_\_

**Your turn to problem solve!**

3. The following scenarios present unique situations in which researchers would need to decide what kinds of monitoring they want to help inform their understanding of the causes and effects. With your group, decide which equipment types would be the most useful and what challenges would need to be overcome. Consider where these events might be happening, the depth of the water, what sort of data would be useful to understand the entire problem, and how long the event might last.

- Scenario 1: Crab fishermen have been reporting unusually low numbers of Dungeness crab during a fishing season.
- Scenario 2: Whale watching trips have been unsuccessful in locations where whales are usually abundant.
- Scenario 3: There is an algae bloom occurring near shore.



## Sea Floor Graveyard - Student Worksheet #3

### Hypoxia - Engineering Considerations of Equipment Used to Monitor

Explore how to problem solve equipment challenges.

1. Oceanographers at the Ocean Observatories Initiative would like to measure everything everywhere all of the time. However, each of OOI's research platforms is limited by engineering challenges, including waves, biofouling, power, and deployability. Based on the images shown of different equipment, explain how each challenge may interfere with the collection of data.

- a. Waves \_\_\_\_\_  
\_\_\_\_\_
- b. Biofouling \_\_\_\_\_  
\_\_\_\_\_
- c. Power \_\_\_\_\_  
\_\_\_\_\_
- d. Deployability \_\_\_\_\_  
\_\_\_\_\_

2. Jigsaw. Your job is to read the information found on [this PDF](#) and become the expert on **Coastal Surface Piercing Profilers**. You will share with the rest of your group and help answer the questions. They will share with you as well and you will record information about each type of equipment. [Click here](#) to see the images again about all equipment types.

- Type of Equipment: **Gliders**

What is a glider? \_\_\_\_\_  
\_\_\_\_\_

What depth will gliders be operating at? \_\_\_\_\_  
\_\_\_\_\_

Will gliders be deployed for long term or short-term projects? How do you know? \_\_\_\_\_  
\_\_\_\_\_

What kind of data will gliders be collecting? \_\_\_\_\_  
\_\_\_\_\_

Would it be easy to deploy a glider? How do you know? \_\_\_\_\_  
\_\_\_\_\_

What seem to be the biggest challenges for gliders? \_\_\_\_\_  
\_\_\_\_\_

- Type of Equipment: **Wire following profilers**

What is a wire following profiler? \_\_\_\_\_

What depth do you think wire following profilers are operating at? \_\_\_\_\_

Will wire following profilers be deployed for long term or short-term projects? How do you know?

What kind of data will wire following profilers be collecting?

Would it be easy to deploy wire following profilers? How do you know?

What seem to be the biggest challenges for wire following profilers? \_\_\_\_\_

- Type of Equipment: **Coastal Surface Piercing Profiler**

What is a coastal surface piercing profiler? \_\_\_\_\_

What depth do you think coastal surface piercing profilers are operating at? \_\_\_\_\_

Will coastal surface piercing profilers be deployed for long term or short-term projects? How do you know?

What kind of data will coastal surface piercing profilers be collecting? \_\_\_\_\_

Would it be easy to deploy coastal surface piercing profilers? How do you know? \_\_\_\_\_

What seem to be the biggest challenges for coastal surface piercing profilers?

- Type of Equipment: **Inshore Surface Mooring**

What is an inshore surface mooring?

What depth do you think inshore surface moorings are operating at?

Will inshore surface moorings be deployed for long term or short-term projects? How do you know?

What kind of data will inshore surface moorings be collecting? \_\_\_\_\_



---

Would it be easy to deploy inshore surface moorings? How do you know?

---

---

What seem to be the biggest challenges for inshore surface moorings? \_\_\_\_\_

---

- **Type of Equipment: Coastal Surface Mooring**

What is a coastal surface mooring? \_\_\_\_\_

---

What depth do you think coastal surface moorings are operating at? \_\_\_\_\_

---

Will coastal surface moorings be deployed for long term or short-term projects? How do you know?

---

What kind of data will coastal surface moorings be collecting? \_\_\_\_\_

---

Would it be easy to deploy coastal surface moorings? How do you know? \_\_\_\_\_

---

What seem to be the biggest challenges for coastal surface moorings? \_\_\_\_\_

---

**Your turn to problem solve!**

3. The following scenarios present unique situations in which researchers would need to decide what kinds of monitoring they want to help inform their understanding of the causes and effects. With your group, decide which equipment types would be the most useful and what challenges would need to be overcome. Consider where these events might be happening, the depth of the water, what sort of data would be useful to understand the entire problem, and how long the event might last.

- Scenario 1: Crab fishermen have been reporting unusually low numbers of Dungeness crab during a fishing season.
- Scenario 2: Whale watching trips have been unsuccessful in locations where whales are usually abundant.
- Scenario 3: There is an algae bloom occurring near shore.



## Sea Floor Graveyard - Student Worksheet #3

### Hypoxia - Engineering Considerations of Equipment Used to Monitor

Explore how to problem solve equipment challenges.

1. Oceanographers at the Ocean Observatories Initiative would like to measure everything everywhere all of the time. However, each of OOI's research platforms is limited by engineering challenges, including waves, biofouling, power, and deployability. Based on the images shown of different equipment, explain how each challenge may interfere with the collection of data.

- a. Waves \_\_\_\_\_  
\_\_\_\_\_
- b. Biofouling \_\_\_\_\_  
\_\_\_\_\_
- c. Power \_\_\_\_\_  
\_\_\_\_\_
- d. Deployability \_\_\_\_\_  
\_\_\_\_\_

2. Jigsaw. Your job is to read the information found on [this PDF](#) and become the expert on **Inshore Surface Moorings**. You will share with the rest of your group and help answer the questions. They will share with you as well and you will record information about each type of equipment. [Click here](#) to see the images again about all equipment types.

- Type of Equipment: **Gliders**

What is a glider? \_\_\_\_\_  
\_\_\_\_\_

What depth will gliders be operating at? \_\_\_\_\_  
\_\_\_\_\_

Will gliders be deployed for long term or short-term projects? How do you know? \_\_\_\_\_  
\_\_\_\_\_

What kind of data will gliders be collecting? \_\_\_\_\_  
\_\_\_\_\_

Would it be easy to deploy a glider? How do you know? \_\_\_\_\_  
\_\_\_\_\_

What seem to be the biggest challenges for gliders? \_\_\_\_\_  
\_\_\_\_\_

- Type of Equipment: **Wire following profilers**

What is a wire following profiler? \_\_\_\_\_

What depth do you think wire following profilers are operating at? \_\_\_\_\_

Will wire following profilers be deployed for long term or short-term projects? How do you know?

What kind of data will wire following profilers be collecting?  
\_\_\_\_\_

Would it be easy to deploy wire following profilers? How do you know?  
\_\_\_\_\_

What seem to be the biggest challenges for wire following profilers? \_\_\_\_\_

- Type of Equipment: **Coastal Surface Piercing Profiler**

What is a coastal surface piercing profiler? \_\_\_\_\_

What depth do you think coastal surface piercing profilers are operating at? \_\_\_\_\_

Will coastal surface piercing profilers be deployed for long term or short-term projects? How do you know?  
\_\_\_\_\_

What kind of data will coastal surface piercing profilers be collecting? \_\_\_\_\_

Would it be easy to deploy coastal surface piercing profilers? How do you know? \_\_\_\_\_

What seem to be the biggest challenges for coastal surface piercing profilers?  
\_\_\_\_\_

- Type of Equipment: **Inshore Surface Mooring**

What is an inshore surface mooring?  
\_\_\_\_\_

What depth do you think inshore surface moorings are operating at?  
\_\_\_\_\_

Will inshore surface moorings be deployed for long term or short-term projects? How do you know?  
\_\_\_\_\_

What kind of data will inshore surface moorings be collecting? \_\_\_\_\_

---

Would it be easy to deploy inshore surface moorings? How do you know?

---

---

What seem to be the biggest challenges for inshore surface moorings? \_\_\_\_\_

---

- **Type of Equipment: Coastal Surface Mooring**

What is a coastal surface mooring? \_\_\_\_\_

---

What depth do you think coastal surface moorings are operating at? \_\_\_\_\_

---

Will coastal surface moorings be deployed for long term or short-term projects? How do you know?

---

What kind of data will coastal surface moorings be collecting? \_\_\_\_\_

---

Would it be easy to deploy coastal surface moorings? How do you know? \_\_\_\_\_

---

What seem to be the biggest challenges for coastal surface moorings? \_\_\_\_\_

---

**Your turn to problem solve!**

3. The following scenarios present unique situations in which researchers would need to decide what kinds of monitoring they want to help inform their understanding of the causes and effects. With your group, decide which equipment types would be the most useful and what challenges would need to be overcome. Consider where these events might be happening, the depth of the water, what sort of data would be useful to understand the entire problem, and how long the event might last.

- Scenario 1: Crab fishermen have been reporting unusually low numbers of Dungeness crab during a fishing season.
- Scenario 2: Whale watching trips have been unsuccessful in locations where whales are usually abundant.
- Scenario 3: There is an algae bloom occurring near shore.



## Sea Floor Graveyard - Student Worksheet #3

### Hypoxia - Engineering Considerations of Equipment Used to Monitor

Explore how to problem solve equipment challenges.

1. Oceanographers at the Ocean Observatories Initiative would like to measure everything everywhere all of the time. However, each of OOI's research platforms is limited by engineering challenges, including waves, biofouling, power, and deployability. Based on the images shown of different equipment, explain how each challenge may interfere with the collection of data.

- a. Waves \_\_\_\_\_  
\_\_\_\_\_
- b. Biofouling \_\_\_\_\_  
\_\_\_\_\_
- c. Power \_\_\_\_\_  
\_\_\_\_\_
- d. Deployability \_\_\_\_\_  
\_\_\_\_\_

2. Jigsaw. Your job is to read the information found on [this PDF](#) and become the expert on **Coastal Surface Moorings**. You will share with the rest of your group and help answer the questions. They will share with you as well and you will record information about each type of equipment. [Click here](#) to see the images again about all equipment types.

- Type of Equipment: **Gliders**

What is a glider? \_\_\_\_\_  
\_\_\_\_\_

What depth will gliders be operating at? \_\_\_\_\_  
\_\_\_\_\_

Will gliders be deployed for long term or short-term projects? How do you know? \_\_\_\_\_  
\_\_\_\_\_

What kind of data will gliders be collecting? \_\_\_\_\_  
\_\_\_\_\_

Would it be easy to deploy a glider? How do you know? \_\_\_\_\_  
\_\_\_\_\_

What seem to be the biggest challenges for gliders? \_\_\_\_\_  
\_\_\_\_\_

- Type of Equipment: **Wire following profilers**

What is a wire following profiler? \_\_\_\_\_

What depth do you think wire following profilers are operating at? \_\_\_\_\_

Will wire following profilers be deployed for long term or short-term projects? How do you know? \_\_\_\_\_

What kind of data will wire following profilers be collecting? \_\_\_\_\_

Would it be easy to deploy wire following profilers? How do you know? \_\_\_\_\_

What seem to be the biggest challenges for wire following profilers? \_\_\_\_\_

- Type of Equipment: **Coastal Surface Piercing Profiler**

What is a coastal surface piercing profiler? \_\_\_\_\_

What depth do you think coastal surface piercing profilers are operating at? \_\_\_\_\_

Will coastal surface piercing profilers be deployed for long term or short-term projects? How do you know? \_\_\_\_\_

What kind of data will coastal surface piercing profilers be collecting? \_\_\_\_\_

Would it be easy to deploy coastal surface piercing profilers? How do you know? \_\_\_\_\_

What seem to be the biggest challenges for coastal surface piercing profilers? \_\_\_\_\_

- Type of Equipment: **Inshore Surface Mooring**

What is an inshore surface mooring? \_\_\_\_\_

What depth do you think inshore surface moorings are operating at? \_\_\_\_\_

Will inshore surface moorings be deployed for long term or short-term projects? How do you know? \_\_\_\_\_

What kind of data will inshore surface moorings be collecting? \_\_\_\_\_

Would it be easy to deploy inshore surface moorings? How do you know?  
\_\_\_\_\_

What seem to be the biggest challenges for inshore surface moorings? \_\_\_\_\_

- **Type of Equipment: Coastal Surface Mooring**

What is a coastal surface mooring? \_\_\_\_\_

What depth do you think coastal surface moorings are operating at? \_\_\_\_\_

Will coastal surface moorings be deployed for long term or short-term projects? How do you know?  
\_\_\_\_\_

What kind of data will coastal surface moorings be collecting? \_\_\_\_\_

Would it be easy to deploy coastal surface moorings? How do you know? \_\_\_\_\_

What seem to be the biggest challenges for coastal surface moorings? \_\_\_\_\_

**Your turn to problem solve!**

3. The following scenarios present unique situations in which researchers would need to decide what kinds of monitoring they want to help inform their understanding of the causes and effects. With your group, decide which equipment types would be the most useful and what challenges would need to be overcome. Consider where these events might be happening, the depth of the water, what sort of data would be useful to understand the entire problem, and how long the event might last.

- Scenario 1: Crab fishermen have been reporting unusually low numbers of Dungeness crab during a fishing season.
- Scenario 2: Whale watching trips have been unsuccessful in locations where whales are usually abundant.
- Scenario 3: There is an algae bloom occurring near shore.