CREATURES OF THE DEEP

EDUCATORS GUIDE

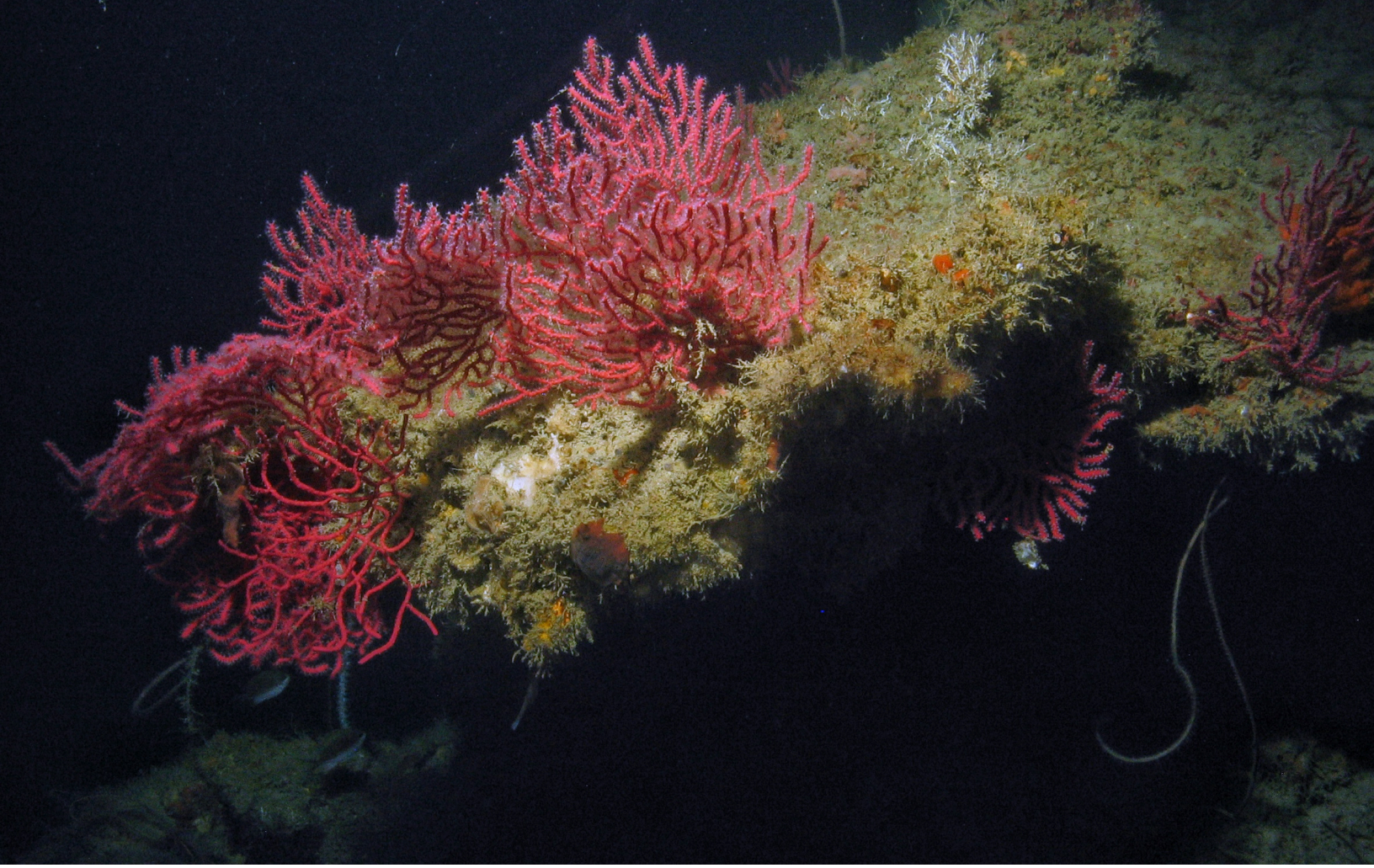
MIDDLE SCHOOL

NOAA National Oceanic and Atmospheric Administration U.S. Department of Commerce

National Marine Sanctuary Foundation

STATE TELEVISION CENTER

MARINE EDUCATION CENTER Southern Miss.



This activity was created in 2025 through a grant from the National Marine Sanctuary Foundation with funding to restore natural resources injured by the 2010 *Deepwater Horizon* (DWH) oil spill from the DWH Open Ocean Trustees.

National Marine Sanctuary Foundation

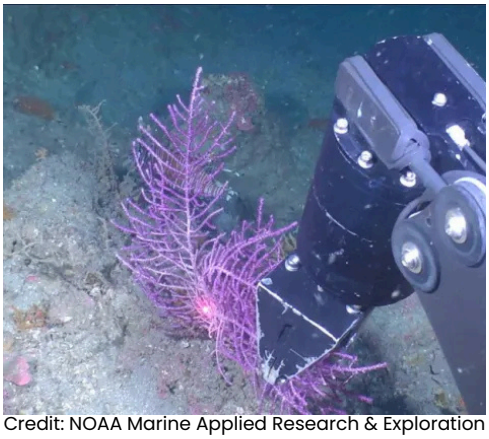
For additional information and activities, visit:
https://marinesanctuary.org/mdbc/

UNIT 1

RESTORING THE DEPTHS

INTRODUCTION

The "Exploring the Depths" unit introduces students to Mesophotic and Deep Benthic Communities (MDBC) found deep in the ocean. Due to their challenging environments, these ecosystems require specialized technology, like remotely operated vehicles (ROVs), for exploration. Students will participate in hands-on activities to learn ROV piloting, data collection, and scientific communication, gaining insights into deep-sea restoration and the significance of these communities.



Credit: NOAA Marine Applied Research & Exploration

OBJECTIVES

- Describe the role and challenges of scientists studying and restoring Mesophotic and Deep Benthic Communities.
- Demonstrate ROV piloting skills for sample collection and underwater observations.
- Explain the significance of technology in deep-sea exploration and restoration.
- Collaborate and communicate effectively during a simulated science mission. Reflect on the learning experience and summarize the mission in a report.

LESSON SUMMARY

In this lesson, students simulate marine scientists' tasks through an underwater exploration mission. They start with a video introducing ROVs and their role in deep-sea exploration, then practice piloting an ROV to collect samples at simulated depths. The lesson concludes with a class discussion to share findings, watching a documentary for reinforcement, and compiling a Mission Report to showcase their work and understanding.

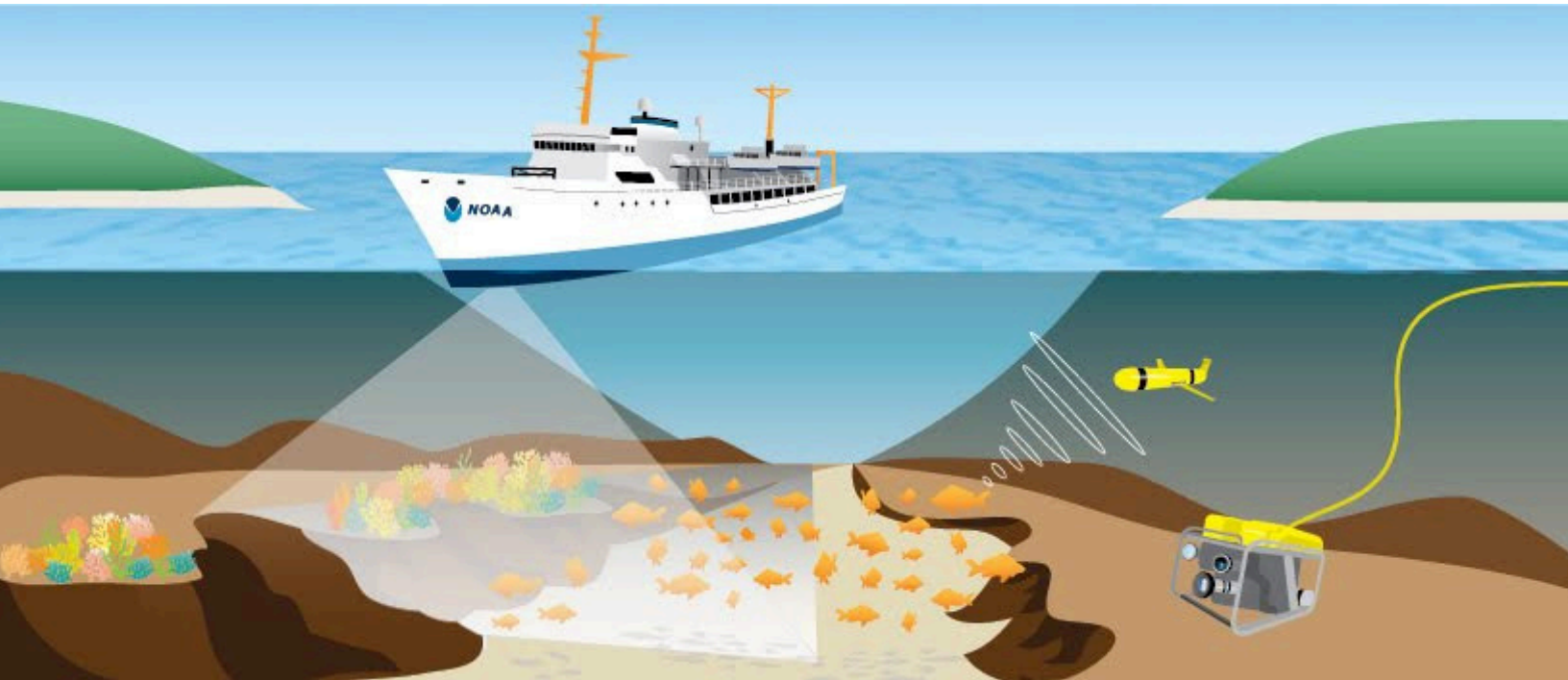
UNIT PLAN

Day 1: Engage and Explore Task 1
Day 2: Explore Task 2
Day 3: Explain and Extend
Day 4: Evaluate
*Plan based on 50 min class periods.

STANDARDS ADDRESSED

6th Grade
Science
- P.6.6

8th Grade
Science
- P.5.6



ENGAGE

WHAT IS AN ROV?

ESTIMATED TIME

5 minutes

FOCUS QUESTION

What is an ROV (Remotely Operated Vehicle)?

MATERIALS

- Video link to “What is an ROV?” vignette
- KWL Chart

PREPARATION

- Print a graphic organizer for each student or load the fillable slide into your online classroom
- Pull up the “What is an ROV Vignette?” and make sure the video is working.

*You can post the video in your virtual classroom for students to complete as independent or morning work.

FACILITATION

STEP 1. Introduce the unit to the students and have them complete the Know column of their graphic organizer.

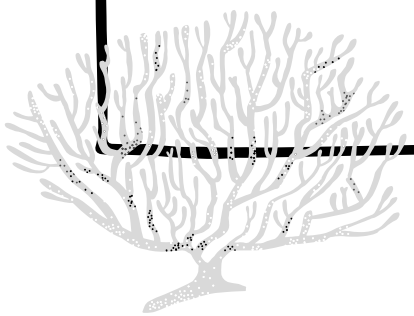
Step 2. Have the students view the video and complete the Want to Know column Graphic organizer

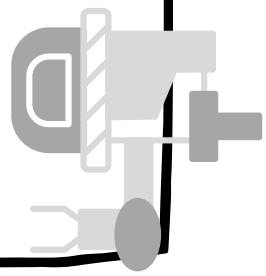
Step 3. After the students have completed the Graphic organizer, ask a few to share what they notice and identify a common theme between student understanding.

Step 4. Reinforce the key ideas: This community is important and worth studying. Scientists that studies these communities face challenges.

KWL CHART

K	W	L
What do you know?	What do you want to know?	What have you learned?





EXPLORE

ROV'S & RESTORATION

ESTIMATED TIME

Two 45 minute class periods

FOCUS QUESTIONS

How are remotely operated vehicles (ROVs) used to restore and explore the ocean, and what challenges do scientists and other deep-sea experts face when using them?

How can we work together as a team to solve problems during our ocean exploration mission?

MATERIALS

- Remote Control Robots with Screens (one for every 4 students)
- Markers for ocean waypoints (cones).
- Stopwatches
- Tape Measure
- Pencils and paper
- Masking tape
- Student Worksheets
- Calculators

PREPARATION

- Set-up calibration area in a large open space.
- Set up Blind Mission Course
- Print student worksheets
- Print turn guides
- Make Team Supply kits for each group
- Charge Robots

FACILITATION

Task 1: Calibrate the ROV

Step 1. Tell the students that they will be divided into teams to complete a mission to a deep benthic community to collect coral samples to bring to the surface for propagation and experiments.

Step 2. Divide the students into teams of 3 to 4.

Step 3. Explain Calibration

Calibration is essential for restoration experts because it helps ensure the ROV (remotely operated vehicle) is working accurately before it operates in deep underwater environments. Imagine trying to steer a car in a straight line but finding out the steering wheel pulls to one side; without fixing it, you might not reach your destination! Similarly, when scientists calibrate an ROV, they're making sure its sensors and controls are set correctly, so it can navigate accurately and gather reliable data. Calibration helps the ROV avoid mistakes and makes the information more dependable, which is crucial when exploring areas that are difficult to reach and observe directly.

Step 4. Have the students calibrate the ROV and record their data on the calibration sheet.

Step 5. Have the team set up the Calibration course that is included in the trunk.

Step 6. Each team will complete the Mission Plan for the calibration course. They will fill in the missing information by measuring the distance between way points and calculating the amount of time they think it will take them to complete the course.

Step 7. Have each driver complete the calibration course 2 times. The first trial they will be watching the robot. The second trial will be a blind trial.

Step 8.After each team has completed the calibration course, have the students fill out the Calibration Course data sheet for their team.

ROV'S & RESTORATION

TEAM NAME: _____

CALIBRATION MISSION DATA SHEET

In the calibration area, each student will take turns as the driver.
For each driver, you will do these three tasks three times (these are called trials):

a. Measure how far the ROV travels in 5 seconds.
b. Time how long it takes the ROV to make a left turn.
c. Time how long it takes the ROV to make a right turn.
d. Time how long it takes the ROV to spin in a complete circle.

Using a stopwatch and measuring tool, consistently record the time or distance of the remote vehicle during tests. Ensure measurements are taken from the same starting point, marked with masking tape, for accuracy.

Write down your results after each trial.

CALIBRATION TEST	DISTANCE OR TIME
How far did the remote vehicle travel in 5 seconds?	Distance trial # 1= meters
How far did the remote vehicle travel in 5 seconds?	Distance trial # 2= meters
How far did the remote vehicle travel in 5 seconds?	Distance trial # 3= meters
Add the three distances together and divide by 3 (the number of distance trials) to get the average distance the remote vehicle traveled in 5 seconds =	meters
Divide the average distance (answer in box above) by 5 seconds to get the distance per second =	meters/seconds

ROV'S & RESTORATION

CALIBRATION MISSION DATA SHEET (CONT)

CALIBRATION TEST	DISTANCE OR TIME
Time needed to turn 45˚ = Time needed to turn 90˚ =	seconds seconds
Time needed to turn 135˚ = Time needed to turn 180˚ =	seconds seconds
Time needed to turn 225˚ = Time needed to turn 270˚ =	seconds seconds
Time needed to turn 315˚ = Time needed to turn 360˚ =	seconds seconds
Time needed to come to a full stop =	seconds

TEAM NAME: _____

ROV'S & RESTORATION

CALIBRATION MISSION PLANNING SHEET

You're going to help plan your rover's trip to each target (waypoint)!

1. Write down how far the rover needs to go to each waypoint (in meters).
2. Use your rover's speed (meters per second) to figure out how many seconds to drive that far.
   - Formula: Time = Distance ÷ Speed
3. If the rover needs to turn, use your calibration test to figure out how many degrees to turn and how many secondsthat takes.
4. For each move, write:

ROV MISSION PLAN

1. Distance to waypoint #1 = _____ meters

   Remote vehicle time to waypoint #1 =_____ seconds

2. Turn _____ degrees for next waypoint

   Remote vehicle time to turn degrees = _____ seconds

3. Distance to waypoint #2 = _____ meters

   Remote vehicle time to waypoint #2 = _____ seconds

4. Turn _____ degrees for next waypoint

   Remote vehicle time to tum degrees = _____seconds

5. Distance to waypoint #3 = _____ meters

   Remote vehicle time to waypoint #3 = _____seconds

TEAM NAME: _____

ROV'S & RESTORATION

CALIBRATION MISSION DATA

Fill in the chart using the data your team collected!

1. Write the measurements your team took before driving the rover.
2. (These are the distances between each waypoint on the course.)
3. Write what really happened when the rover drove the course.
4. (How far did it actually go?)
5. Check for any differences.
    - Was the rover's path longer or shorter than you planned?
    - Write the difference in the "Difference in Results" box.

CALIBRATION MISSION DATA TABLE

Actual Measurements to Way Points	Actual Distance Traveled by ROV	Difference in Results
Waypoint #1 measurement		
Waypoint #2 measurement		
Waypoint #3 measurement		

FACILITATION

Task 2: Mission Course

Step 1. The teacher will set up the Mission course using the guide. This will simulate a coral community on the seafloor beyond the reach of sunlight (a “deep benthic” community. Make sure that the mission course cannot be seen by the students.

Step 2.The students will select or be given a role on the Mission Crew.

Step 3. Using the calibration summary from the Calibration course data sheet, have the students complete the Deep Benthic Mission Plan.

Step 4. The teacher will place the ROV at the designated start line and have the students use the mission plan to collect the coral samples at each way point. This is a blind trial so the team should not be able to see the course. Each team member will perform a different role to make sure the mission is a success.

Step 5. The students will collect the Deep Benthic mission data that is assigned to their role and use it to write their final mission brief.

Step 6. Have the students reflect as a team on the following topics: How they could make the ROV more accurate in reaching the waypoints. Encourage them to think about challenges in the ocean (currents, obstacles).

ROV Pilot

Pilots the ROV during the mission The Pilot follows the commands that are read to them by the Comm Officer. .

Data Scientist

Use the stopwatch to time the ROV during its transits between the waypoints and records the data on the data sheet.

Comm Officer

Reads the mission plan instructions aloud to the ROV Pilot.

Chief Scientist

Can see the mission course and give feed back to the team between trials during the mission.

TEAM NAME: _____

ROV'S & RESTORATION

DEEP BENTHIC MISSION PLANNING SHEET

You're going to help plan your rover's trip to each target (waypoint)!

1. Write down how far the rover needs to go to each waypoint (in meters).
2. Use your rover's speed (meters per second) to figure out how many seconds to drive that far.
   - Formula: Time = Distance ÷ Speed
3. If the rover needs to turn, use your calibration test to figure out how many degrees to turn and how many secondsthat takes.
4. For each move, write:

ROV MISSION PLAN

1. Distance to waypoint #1 = _____ meters

   Remote vehicle time to waypoint #1 =_____ seconds

2. Turn _____ degrees for next waypoint

   Remote vehicle time to turn degrees = _____ seconds

3. Distance to waypoint #2 = _____ meters

   Remote vehicle time to waypoint #2 = _____ seconds

4. Turn _____ degrees for next waypoint

   Remote vehicle time to tum degrees = _____seconds

5. Distance to waypoint #3 = _____ meters

   Remote vehicle time to waypoint #3 = _____seconds

TEAM NAME: _____

ROV'S & RESTORATION

DEEP BENTHIC MISSION DATA

Fill in the chart using the data your team collected!

1. Write the measurements your team took before driving the rover.
2. (These are the distances between each waypoint on the course.)
3. Write what really happened when the rover drove the course.
4. (How far did it actually go?)
5. Check for any differences.
    - Was the rover's path longer or shorter than you planned?
    - Write the difference in the "Difference in Results" box.

DEEP BENTHIC MISSION DATA TABLE

Actual Measurements to Way Points	Actual Distance Traveled by ROV	Difference in Results
Waypoint #1 measurement		
Waypoint #2 measurement		
Waypoint #3 measurement		

EXPLAIN

MISSION DEBRIEF

ESTIMATED TIME

15 minutes

FOCUS QUESTION

How was this activity like real-world deep-sea restoration?

What lessons did you learn?

How do scientists share what they learn on restoration missions.

MATERIALS

- Mission Summary Guide

PREPARATION

Print a copy of the Mission Summary guide for each group

FACILITATION

STEP 1. Have each team complete the Mission Summary guide and share their experience with the class.

TEAM NAME: _____

ROV'S & RESTORATION

DEEP BENTHIC MISSION SUMMARY GUIDE

Directions: Use your test results to answer the questions below. Try your best and explain what you noticed!

What Did You Learn?

What is calibration, and why is it important for the ROV?

About the ROV Test

What did you notice when you measured the ROV's movements during the test? (Think about how far it traveled, how long it took to turn, etc.)

Mission Experience

What was different between the first time you drove the ROV (when you could see it) and the blind trial (when you couldn't see it)?

What was the most challenging part of the ROV mission?

ROV'S & RESTORATION

DEEP BENTHIC MISSION SUMMARY GUIDE CONTINUED

Working as a Team

What role did you play in the team during the mission?

How did your team work together to complete the mission?

Looking Ahead

What would you change next time to make the ROV mission even better?

What do you think would be the hardest part of using an ROV in the deep ocean (like in the Gulf)?

Final Thoughts

What's one thing you learned from this activity that you didn't know before?

EXTEND

CREATURES OF THE DEEP FILM

Coming Soon!

ESTIMATED TIME

45 minutes

FOCUS QUESTION

How do scientists work in, explore, and restore the deep sea?

MATERIALS

- Video link to “Creatures of the Deep” film

PREPARATION

- Pull up the documentary and make sure the video is working.

FACILITATION

STEP 1. Show the documentary and make connections to the ROV activity and discuss how ROVs help restore the deep coral habitats injured by the *Deepwater Horizon* oil spill.

Step 2. Give students their See, Think, Wonder graphic organizer and see if any of their wonder questions were answered.

DEEP WATER EXPLORATION LIVE STREAM OPTION

- Pull up the ROV Livestream on YouTube. *Be sure you have access from your district.
- YouTube Channel: Inner Space Center
- Video Title: Gulf Restoration Live! Robots Restoring the Deep: Remotely Operated Vehicles

EVALUATE MISSION REPORT

ESTIMATED TIME

45 minutes

FOCUS QUESTIONS

What is an ROV?

How was this activity like real-world deep-sea restoration?

How do scientists share what they learn on restoration missions?

How are remotely operated vehicles (ROVs) used to explore the ocean, and what challenges do scientists face when using them?

How can we work together as a team to solve problems during our ocean exploration mission?

MATERIALS

- All student worksheets, data and graphic organizers from the previous activities
- Mission Report Rubric
- Online survey link for students to provide lesson feedback.

FACILITATION

STEP 1. Have teams create a presentation that summarizes their learning about ROV's and how scientists work on deep sea restoration.

Step 2. Allow each team to share their Mission Report

Step 3. Have students complete the online survey.

ROV'S & RESTORATION MISSION REPORT RUBRIC

NAME:_____
ROLE:_____

Each team member will complete the section of the report that corresponds to their assigned role. Students can create a slide, write a sentence or write a paragraph depending on the grade level and the learning objectives

Category	4 - Excellent	3 - Good	2 - Fair	1 - Needs Improvement
Introduction	Provides a clear and thorough introduction to the mission, explaining objectives, relevance, and background information. Demonstrates a strong understanding of the activity's purpose.	Provides a clear introduction with most objectives and relevance but lacks some background detail. Demonstrates a good understanding of the activity.	Gives a brief introduction with limited details on objectives or relevance, showing only a basic understanding.	Provides little or no information about the mission or objectives, showing limited understanding of the activity's purpose.
Procedure	Describes each step of the activity in a detailed, logical order, showing clear understanding of procedures and demonstrating strong observation skills.	Describes most steps of the activity in a logical order, with some details missing or lacking full clarity. Demonstrates good observation skills.	Describes only a few steps or presents them in a confusing order. Lacks detail and only demonstrates a basic level of observation.	Provides minimal or unclear description of the activity steps, lacking detail or logical order. Demonstrates weak observation skills.
Results	Accurately records all data, measurements, and results, using clear labels and units. Provides analysis or explanation for results.	Records most data accurately, with some labels or units missing. Attempts some analysis or explanation.	Records some data, but with errors or missing labels/units. Provides little analysis or explanation.	Fails to record data accurately, with many errors or missing information. Lacks analysis or explanation.
Conclusions	Clearly explains what was learned, providing specific examples or insights from the activity. Reflects on challenges or improvements for future missions.	Explains what was learned with some examples or details, but lacks depth in reflection on challenges or improvements.	Mentions what was learned but lacks specific details or examples. Limited reflection on challenges or improvements.	Provides minimal or no information on what was learned, lacking reflection or insight.

UNIT 2

MESOPHOTIC MYSTERIES

INTRODUCTION

The "Mesophotic Mysteries" lesson introduces students to the unique coral ecosystems of mesophotic and deep benthic communities through engaging activities, videos, and hands-on learning. Students explore the challenges scientists face in studying and restoring these habitats, while gaining insight into the role of technology, such as remotely operated vehicles (ROVs), in deep-sea exploration.

OBJECTIVES

- Understand the unique qualities of coral communities in the mesophotic and deep benthic zones.
- To explore the challenges scientists face when conducting restoration of these communities.
- Gain insight into the role of technology in deep-sea restoration.

LESSON SUMMARY

The lesson includes a board game that simulates a mission to restore coral, a documentary on deep-sea creatures, and articles to deepen students' understanding of coral restoration. By the end of the unit, students will have strengthened their science inquiry skills, learned about the importance of these ecosystems, and gained an appreciation for the complexities of deep-sea research and conservation.

UNIT PLAN

Day 1: Engage and Explore
Day 2: Explain and Extend
Day 3: Extend and Evaluate
*Plan based on 50 min class periods.

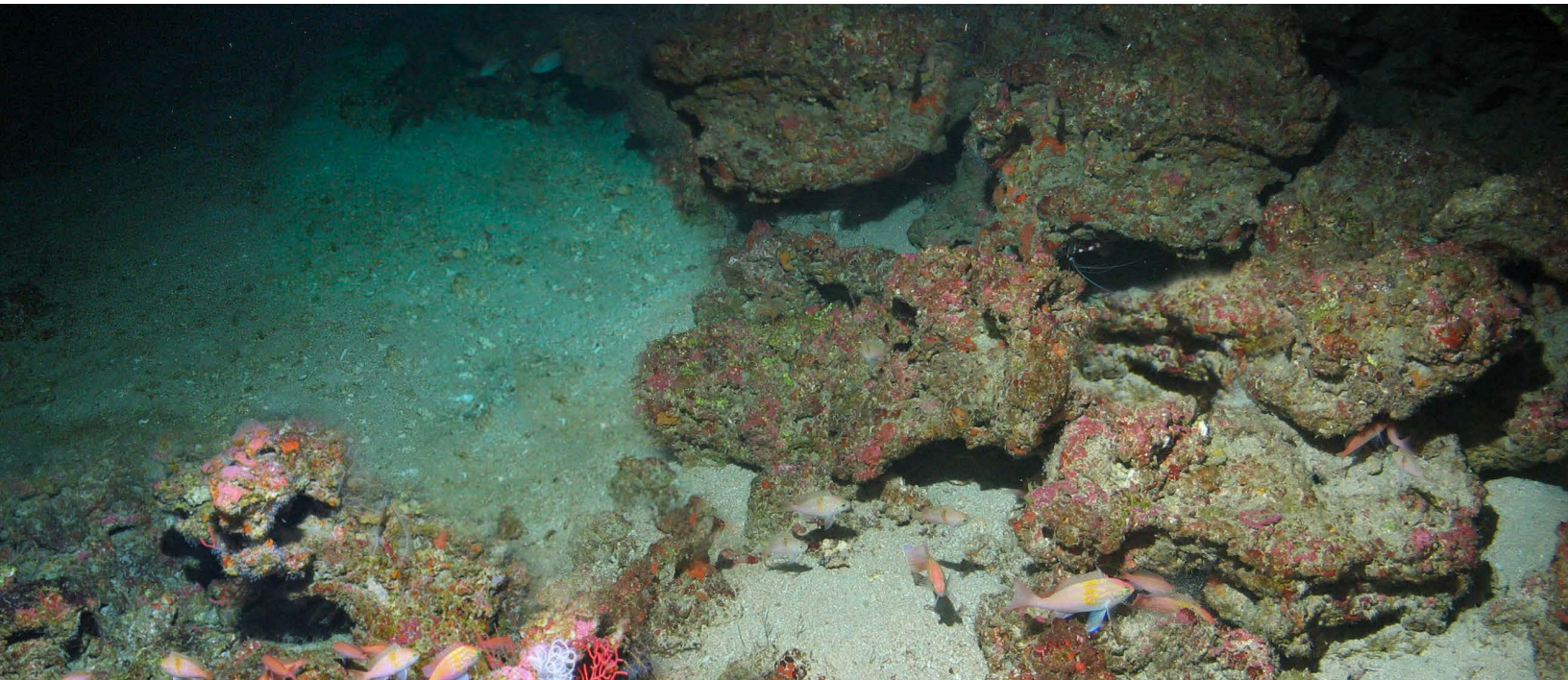
STANDARDS ADDRESSED

6th Grade
Science

- P.6.6

8th Grade
Science

- P.5.6



ENGAGE

DEEP SEA CORALS

ESTIMATED TIME

5 minutes

FOCUS QUESTION

Why might scientists find it challenging to study these deep-sea environments?

What tools or technology do you think they might need?

MATERIALS

- Video link to “Deep Sea Corals” vignette
- KWL Chart Graphic organizer

PREPARATION

- Print a graphic organizer for each student or load the fillable slide into your online classroom
- Pull up the “What is an ROV Vignette?” and make sure the video is working.

*You can post the video in your virtual classroom for students to complete as independent or Morning work.

FACILITATION

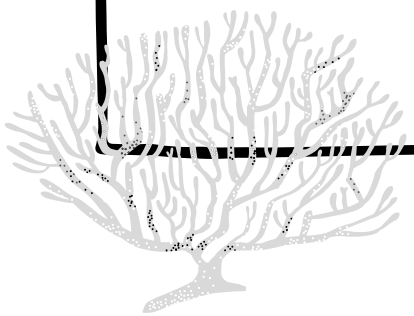
STEP 1. Have the students view the video and complete the See, Think, Wonder Graphic organizer.

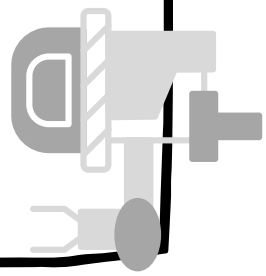
Step 2. After the students have completed the Graphic organizer, ask a few to share what they notice and identify a common theme between student understanding.

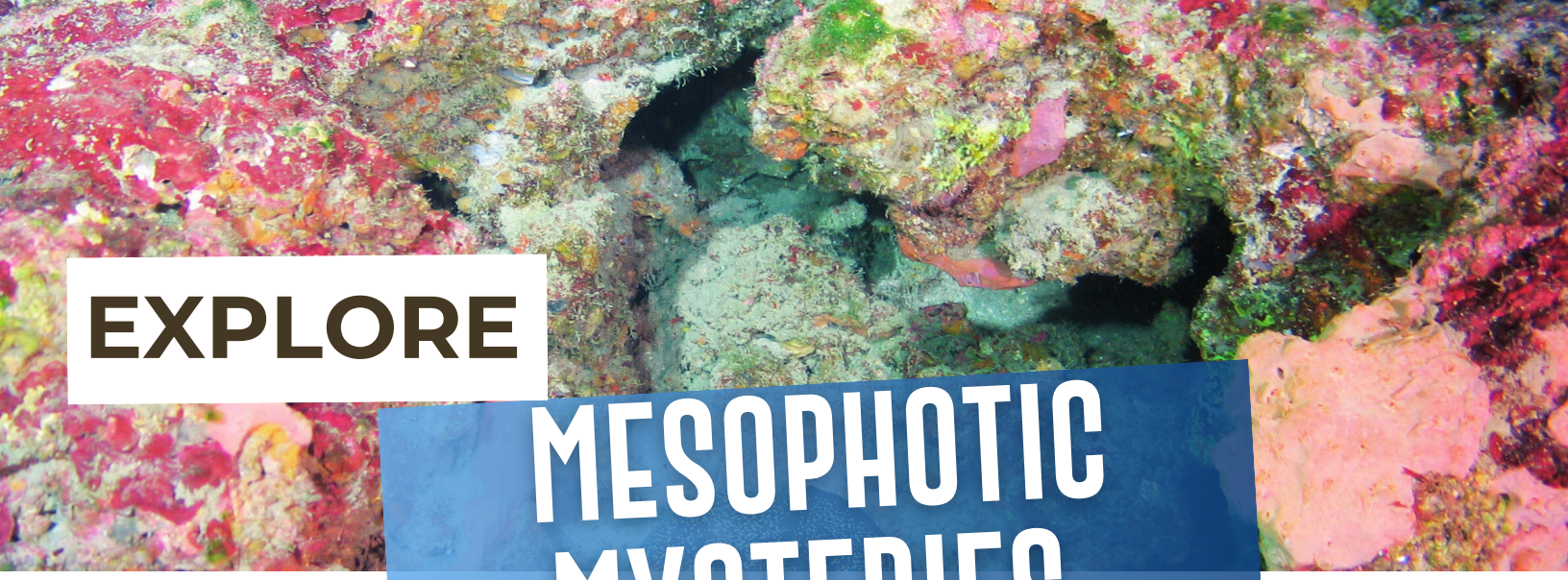
Step 3. Reinforce the key ideas: This community is important and worth studying. Scientists that studies these communities face challenges.

KWL CHART

K	W	L
What do you know?	What do you want to know?	What have you learned?







EXPLORE MESOPHOTIC MYSTERIES

ESTIMATED TIME
30 minutes

FOCUS QUESTIONS
What technology is used when learning about deep benthic and mesophotic communities?

What challenges do scientists encounter when doing deep water coral restoration?

What is needed to restore Deep Sea Coral?

MATERIALS

- Mesophotic Mysteries Board Game
- Game Pieces
- Game Cards

PREPARATION

- Set up board Game

FACILITATION

Step 1. Tell the students that they will be divided into groups to complete a board game that simulates a mission to a deep benthic community to collect coral samples to bring to the surface for propagation and experiments.

Step 2. Divide the students into groups of up to 6 players.

Step 3. Explain game rules and instructions.

Step 4. Have the group play the board game.

Step 5. After all the groups finish the game, ask the students to describe the challenges and the milestones that they learned about. Make connections to related ideas and concepts.

MESOPHOTIC MYSTERIES BOARD GAME INSTRUCTIONS

OBJECTIVE

Players act as scientists collecting coral from the seafloor to return to their vessel. The first to successfully bring back a coral sample wins!

SETTING UP

- Place the game board on a flat surface.
- Each player selects a game piece.
- Shuffle the game cards and place them face-down beside the board.

WHO GOES FIRST

- Each player rolls a die.
- The player with the highest number goes first.
- If it's a tie, roll or draw again.
- Play will continue clockwise from the first player.

QUICK REMINDERS

- Take turns in clockwise order.
- Always follow the instructions on the card you draw.
- Have fun and learn about the challenges and successes of coral restoration projects!

HOW TO PLAY

1. **Start Your Turn**: On each turn, draw a card from the deck and read it aloud
2. **Follow the Card's Instructions**:
   * Some cards will ask you to move forward toward the coral, while others may send you back or delay your mission.
   * Move your game piece according to the card's instructions.
3. **Take Turns**: After following the instructions on your card, place it in the discard pile. The player to your left then takes their turn.

SPECIAL RULES

- **Collecting the Coral**: When you reach the "Coral Site" space on the board, you've collected your coral sample! Now, you must head back to the vessel to complete your mission.
- **Returning to the Vessel**: Continue drawing cards and moving according to their instructions until you make it back to the " Vessel" space.

WINNING THE GAME

The first player to return to the "Vessel" space with their coral sample wins the game!

IMPORTANT NOTES

- **Multiple Players on One Space**: More than one player can be on the same space at any time.
- **Shuffle the Cards**: If you run out of cards in the deck, shuffle the discard pile and continue playing.

MESOPHOTIC MYSTERIES
6-12 Grade Mission Cards

New Coral Fragment Discovered!

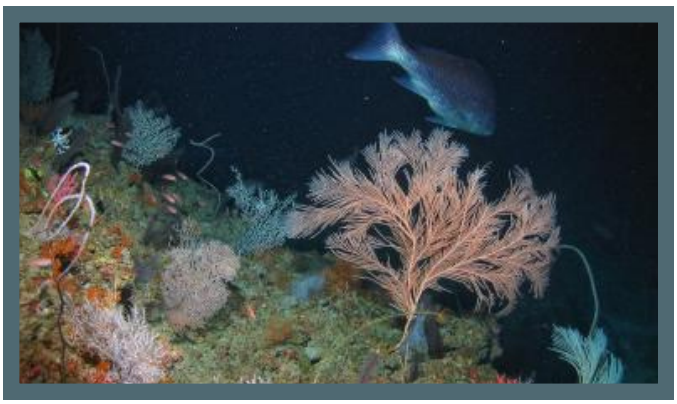
During a dive, your team finds a healthy colony of Muricea pendula and successfully collects a coral fragment for restoration.

Move forward 3 spaces.

Successful ROV Collection Mission

Your ROV completes a smooth dive, collecting essential coral samples without technical issues. The team celebrates the flawless operation!

Move forward 2 spaces.



Environmental Data Acquired

Your team successfully collects water samples using a CTD rosette, providing vital data to replicate deep-sea conditions in the lab.

Move forward 2 spaces.

Promising Laboratory Experiment

A newly implemented feeding protocol in the lab helps coral samples stay healthy and grow faster. Your lab results improve restoration techniques.

Move forward 4 spaces.

Coral Propagation Success

A coral fragment undergoes successful asexual reproduction in the lab, creating new coral polyps for future restoration.

Move forward 5 spaces.

Settlement of Coral Larvae Observed

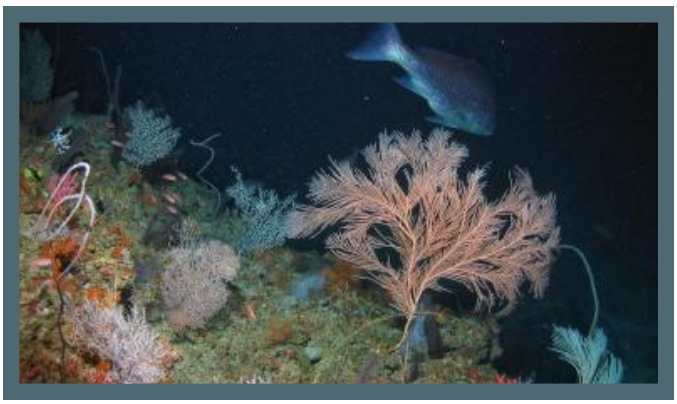
Coral larvae settle successfully onto experimental tiles in the lab, marking a significant step in coral restoration.

Move forward 3 spaces.

Efficient Mapping with Multibeam Technology

Your team successfully uses a multibeam echosounder to map a vast area of the seafloor, identifying new coral sites for future exploration.

Move forward 3 spaces.



Coral Spawning Success in Lab

Coral samples in the lab undergo a successful spawning event, producing hundreds of coral larvae for restoration and restoration.

Move forward 4 spaces.

Coral Health Assessment Completed

After careful monitoring, your team completes a health assessment for multiple coral colonies, collecting essential data on their resilience.

Move forward 2 spaces.

Laboratory Water Quality Issue

Maintaining water chemistry proves challenging, and coral specimens show signs of stress. Lab procedures are paused for adjustments.

Move back 4 spaces.

Sediment Disruption

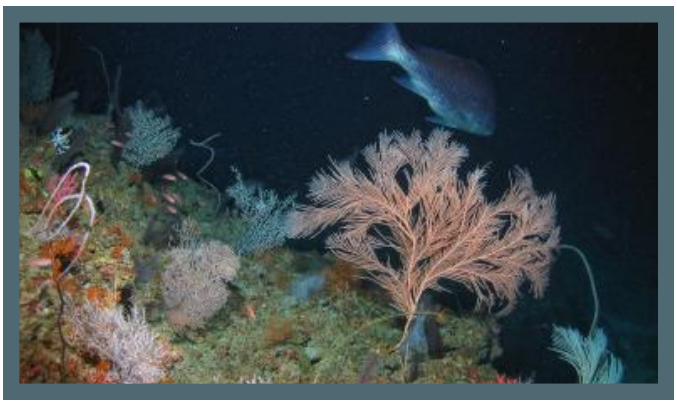
When approaching the coral collection site, sediment is accidentally stirred up, obscuring visibility and halting sample collection.

Move back 2 spaces.

COVID-19 Outbreak on Ship

A crew member tests positive for COVID-19, forcing an emergency return to port and delaying further restoration dives.

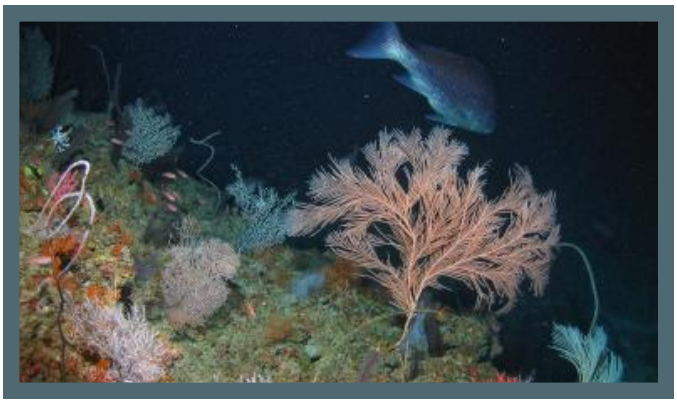
Move back 3 spaces.



Unstable Coral Samples

Coral samples collected for genetic analysis did not survive the journey back to the lab.

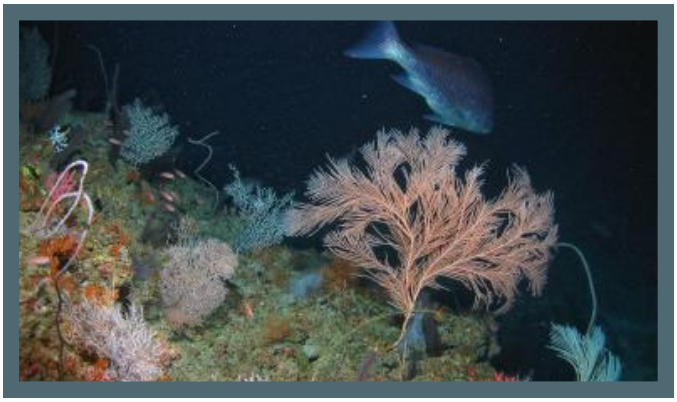
Move back 4 spaces.



High Sediment Levels Detected

The team encounters high sediment levels near coral sites, which could disrupt coral health and visibility during dives.

Move back 2 spaces.



Breakthrough in Coral Propagation Techniques

A new method of coral fragmentation yields promising results, with faster growth and higher survival rates for coral fragments.

Move forward 5 spaces.

Weather Conditions Optimal

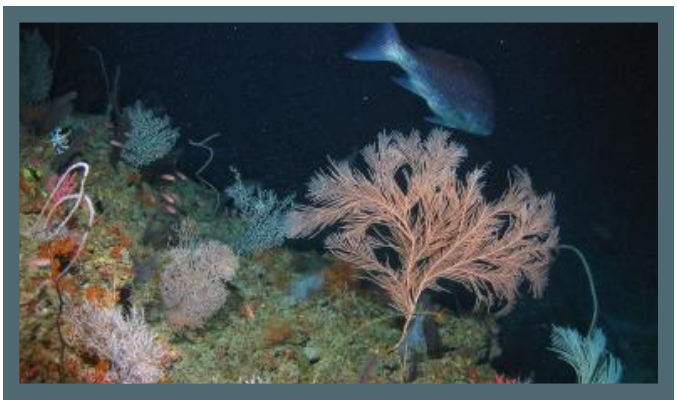
Clear skies and calm seas make for ideal diving conditions, allowing the team to complete a full schedule of ROV dives.

Move forward 2 spaces.

Coral Transplantation Shows Promise

Transplanted coral fragments display strong health and growth in the new site, demonstrating the potential for large-scale restoration.

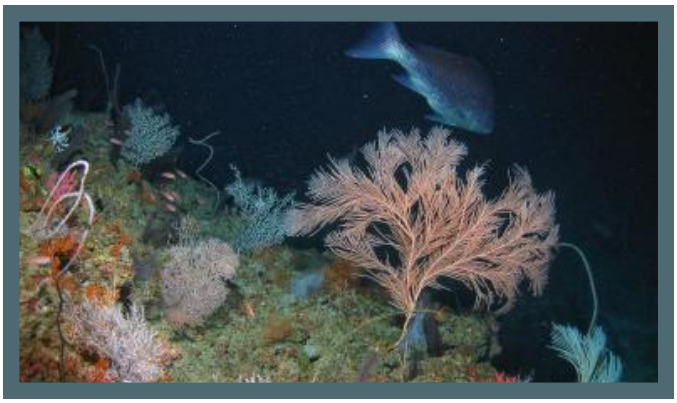
Move forward 3 spaces.



Technical Malfunction on ROV

During a dive, the ROV's manipulator arm fails to operate, delaying coral collection. The team has to return to the surface for repairs.

Move back 3 spaces.



Strong Ocean Currents

Unpredictable ocean currents make it impossible to safely navigate the ROV to the target coral site. Dive is postponed.

Move back 2 spaces.

Unexpected Equipment Failure

One of the underwater cameras fails, preventing your team from documenting important coral growth stages. Replacement is required

Move back 3 spaces.

Contaminant Found in Water Samples

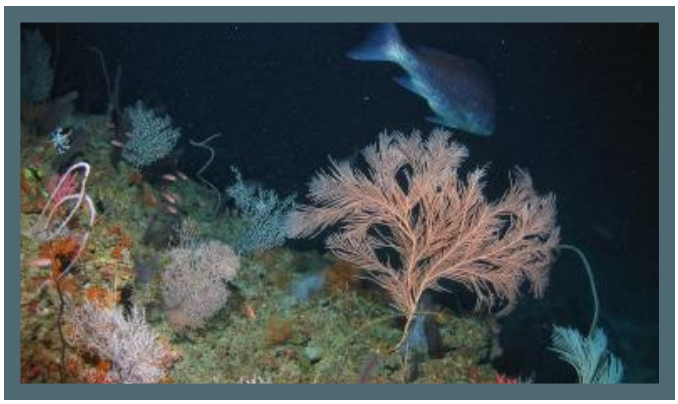
Elevated levels of contaminants are detected in water samples, causing stress to coral specimens in the lab. Restoration is temporarily paused.

Move back 4 spaces.

Oil Found on Coral

During a routine check, a coral colony has oil covering several pieces, complicating the restoration plan.

Move back 2 spaces.



Data Misinterpretation Delays Progress

A miscalculation in environmental data leads to inaccurate conditions, setting back coral growth experiments. The team has to recalibrate.

Move back 3 spaces.

High Current Compromises Sampling

Strong currents at the dive site make it impossible to retrieve coral samples safely. The team decides to return and try again another day.

Move back 2 spaces.

EXPLAIN

CREATURES OF THE DEEP FILM

Coming Soon!

ESTIMATED TIME

30 minutes

FOCUS QUESTION

How do scientists work in, explore, and restore the deep sea?

MATERIALS

- Video link to “Creatures of the Deep” film

PREPARATION

- Pull up the documentary and make sure the video is working.

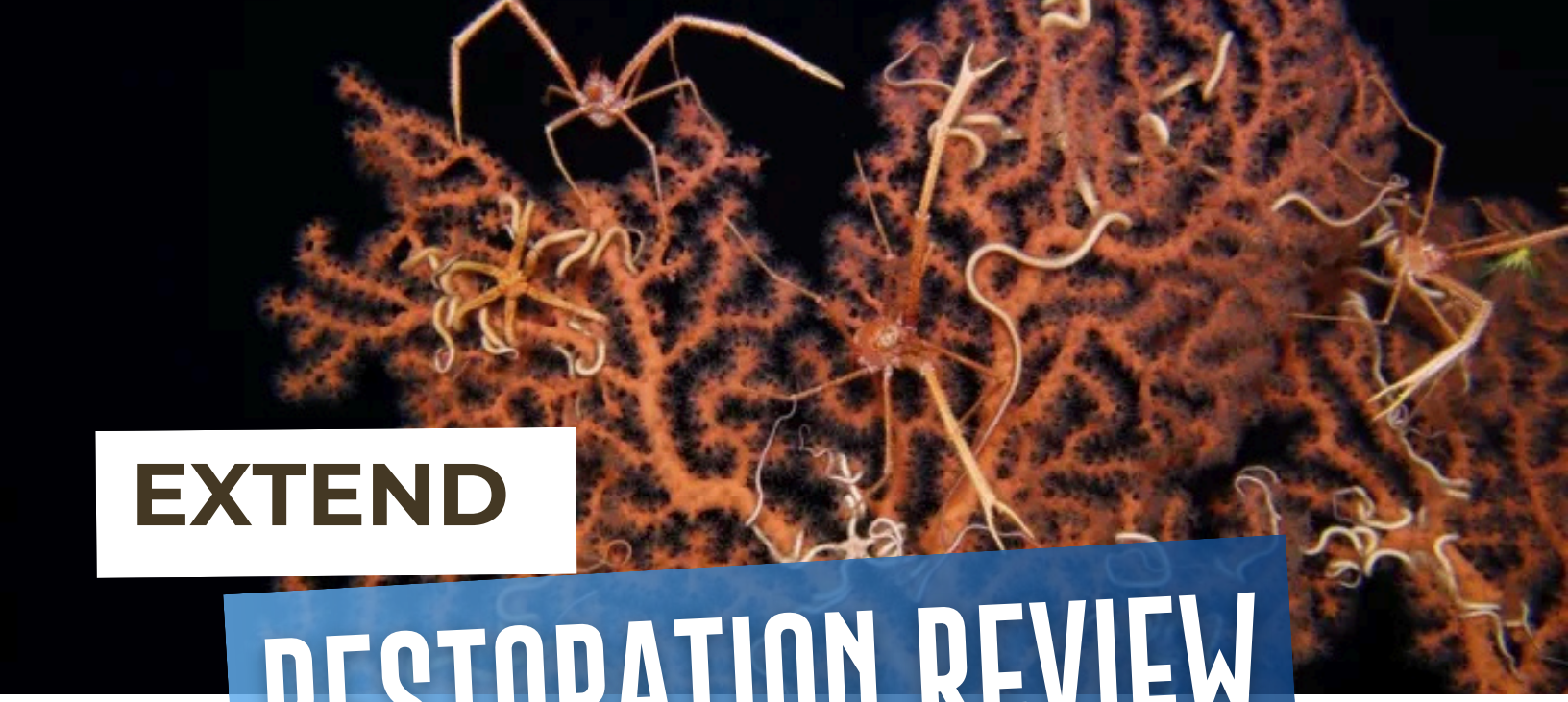
FACILITATION

STEP 1. Show the documentary and make connections to the ROV activity and discuss how ROVs help restore the deep coral habitats injured by the Deepwater Horizon oil spill.

Step 2. Give students their See, Think Wonder graphic organizer and see if any of their wonder questions were answered.

DEEP WATER EXPLORATION LIVE STREAM OPTION

- Pull up the ROV Livestream on YouTube. *Be sure you have access from your district.
- YouTube Channel: Inner Space Center
- Video Title: Gulf Restoration Live! Robots Restoring the Deep: Remotely Operated Vehicles



EXTEND

RESTORATION REVIEW

ESTIMATED TIME

40 minutes

FOCUS QUESTION

How do scientists share what they learn on restoration missions?

MATERIALS

Articles & Infographics from NOAA & National Marine Sanctuary Foundation.
Non-Fiction Article Graphic Organizer

PREPERATION

Print a copy of the Non-Fiction Article Review worksheet for each student

FACILITATION

STEP 1. Have the students read their assigned articles independently.

Step 2. Either independently or in pairs have them complete the graphic organizer.

Step 3. Have them share what they learned from their article.

Glass sponge

MESOPHOTIC MYSTERIES

TEAM NAME: _____

NON-FICTION ARTICLE REVIEW

Directions: Read your article, review it and share what you learned.

Article Information

Article Title	Author	Publishing Information

Pre-Reading

Before your read the article, look at the title, headings, tables, and illustrations. Describe what you think the article is going to be about.

What do you already know about this topic? If you don't know anything, explain what you are interested in learning from this article.

Article Breakdown

Chunk your article into 4 main sections and write a 2 sentence summary of each section.

Summary of Section 1	Summary of Section 2	Summary of Section 3	Summary of Section 4

MESOPHOTIC MYSTERIES

NON-FICTION ARTICLE REVIEW CONT

Main Idea

Based on your section summaries, what is the main idea of the article?

Text Evidence

Write a quote from each section that supports the main idea.

Quote from Section 1	Quote from Section 2	Quote from Section 3	Quote fromSection 4

Text Features

Pick one of the figures, tables, or illustrations that explains the main idea of the article.

Description

Explanation

Article Summary

Summarize the entire article in your own words.

EVAULATE

EXPLAIN-IT POSTER

ESTIMATED TIME

30 minutes

FOCUS QUESTION

What was the most surprising or interesting thing you learned about deep-sea corals?

How did each activity help you understand the role of scientists in restoring these deep-sea communities?

MATERIALS

- Poster paper
- Markers
- Online survey link for students to provide lesson feedback.

FACILITATION

STEP 1. Have each student use what they learned to create a paper or digital Explain-it poster.

Step 2. Display each poster and have the students do a gallery walk.

Step 3. After the gallery walk, allow students to ask each other questions.

Step 4. Have students complete the online survey.

MESOPHOTIC MYSTERIES

TEAM NAME: _____

EXPLAIN IT POSTER INSTRUCTIONS

Directions: You will create a poster (paper or digital) that shows what you learned during the Mesophotic Mysteries unit. Use what you saw, played, and read to make your poster informative and creative.

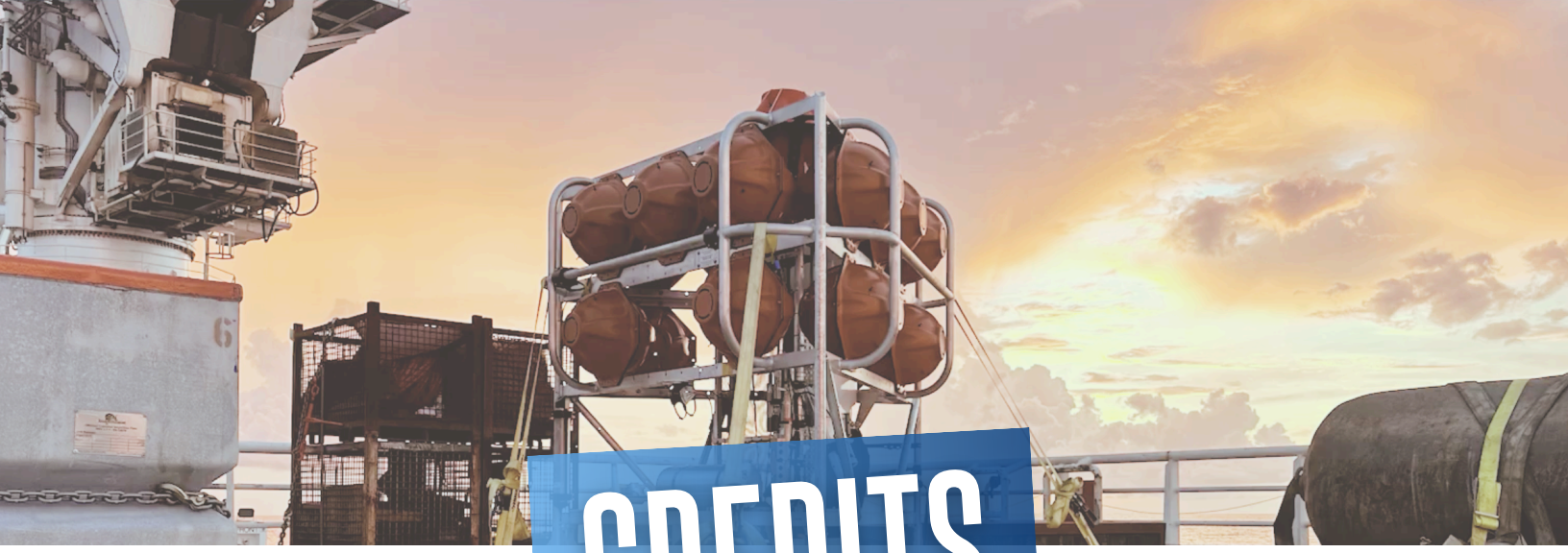
Poster Check List

Poster Must Include:

- A Title
- One thing you learned that surprised you
- Tools or technology scientists use
- Challenges scientists face in the deep sea
- A picture (you can draw or use digital tools)
- A sentence that explains why these coral communities are important

Poster Gallery Walk Reflection

I noticed most posters had...	I have questions about..	I wanted my classmates' to notice _____ about my poster.	One thing I would do differently next time is...
1.	1.		
2.	2.		
3.	3.		



CREDITS

These activities were created in June 2025 by the staff at the University of Southern Mississippi Marine Education Center to be used as supporting documents for the film “Creatures of the Deep” and short vignette videos created by the Mississippi State Televison Center.

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