Gulf Restoration Livestream & Worksheet - Survival Mode: Life in the Deep Sea

Subject (Focus/Topic):	Marine Science (Deep-Sea Habitat Restoration)
Grade Level:	6-12
Average Learning Time:	1-2 class periods
Creation Date:	Fall 2024

For this activity, please view the Mesophotic and Deep Benthic Communities (MDBC) recording on Life in the Deep Sea (39 Minutes) which aired live on August, 2nd 2024 and features habitat restoration experts working aboard the *Island Intervention* vessel in the Gulf of Mexico. The MDBC work is focused on the restoration of deep Gulf coral habitats injured by the 2010 *Deepwater Horizon* oil spill. Use the prompts below and links to resources (page 2) to guide student engagement and exploration of relevant background information before, during, and after the video viewing.

Pre-Film Discussion:

1. **What does NOAA stand for and what is its mission?**
   What do you think is the main focus of the Mesophotic and Deep Benthic Communities (MDBC) restoration and how do the projects connect to the mission of NOAA? Discuss potential career tracks.
2. **Where is the Gulf of Mexico?**
   Can you locate it on a map? How do you think it relates or compares to the Pacific and Atlantic oceans?
3. **How do you think the water quality in the Gulf compares to your local body of water?** Identify local water bodies and have students share their observations/inferences.
4. **Why is a coral considered an animal?**
   What is a colonial animal? Where do corals live and what do they need to survive? What role do corals play in the ecosystem (their niche)?
5. **What are some of the threats to coral and ocean life in general?** What human actions can harm organisms in the ocean? Discuss marine debris, ocean acidification, harmful fishing practices, pollution, or climate change.

During the Film:

6. **What is the "twilight zone" (mesophotic zone) in the ocean?**
   How do environmental conditions differ between deeper zones and the ocean's surface? Have students create or label a diagram of the oceanic zones.
7. **What are some of the main concerns or threats to deep-sea habitats?**
   What are some of the reasons studying or working in these habitats is challenging?
8. **What kind of life exists on the seafloor in the Gulf of Mexico?** How are deep-sea corals different from shallow water corals? Create a food chain of “coral associates”/organisms (draw and label) using examples from the film.
9. **What technologies or methods are helping us learn more about the deep sea?** How can we map and observe regions too deep for divers to descend without harming the habitat? What are some of the tools and the techniques these experts are using to restore deep-sea habitats in the Gulf?

Post-Film Discussion:

10. **What are some of the impacts of oil spills on benthic (seafloor) habitats?**
    How are experts in the video working to restore benthic habitats, and why is this work important?
11. **How do these restoration projects impact marine life and people?** What methods are they using to propagate coral and restore their populations? How can protecting coral populations impact life on land?
12. **What do you think life is like on a scientific vessel?**
    Which career paths align with deep-sea exploration and restoration? What are pros and cons of working at sea?

Gulf Restoration Livestream - Survival Mode: Life in the Deep Sea

Time stamps: Jump to the action to focus on specific topics or review main concepts:

Time	Action		Time	Action
00:00	Introductions		19:00	Specialty Divers & Coral Propagation
02:12	Project Overview Presentation		21:45	Marine Debris
05:15	Meet the Experts		24:50	Deep-sea Critters
08:20	Deep-sea Coral		28:35	Q&A
10:10	Clip of Coral Polyp Feeding		31:10	Collections
12:00	Countershading & Wavelengths of Light		32:12	More on Coral Propagation
12:35	Coral Habitat & Associates		34:20	Depths (between 300 & 3000 feet!)
15:35	ROVs		37:00	Outro

Next Generation Science Standards *(NGSS)* *https://www.nextgenscience.org/*

Middle School:

- MS-LS2 Ecosystems: Interactions, Energy, and Dynamics
    - *MS-ESS3-3:* Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

High School:

- HS-ESS3: Earth and Human Activity
    - HS-ESS3-3: Create a computational simulation to illustrate the relationships among the management of natural resources, the sustainability of human populations, and biodiversity.
    - HS-ESS3-4: Evaluate or refine a technological solution that reduces impacts of human activities on natural systems
    - HS-ESS3-6 Use computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.

Ocean Literacy Principles Addressed

http://www.coexploration.org/oceanliteracy/documents/OceanLitChart.pdf

- Principal 2: The ocean and life in the ocean shape the features of Earth
- Principal 5: The ocean supports a great diversity of life and ecosystems

Background Resources

Mesophotic & Deep Benthic Communities Restoration
Gulf Spill Restoration
NOAA - About Us
NOAA Restoration Center
National Marine Sanctuaries
National Marine Sanctuary Foundation
Click-A-Coral Community Science Site
Deepwater Horizon Oil Spill Information
News Article: The Texas Tribune, 9/27/24

Acknowledgments

The Deepwater Horizon (DWH) Open Ocean Trustees, led by NOAA and the Department of the Interior, are restoring deep-sea communities in the Gulf of Mexico with funding to restore natural resources injured by the 2010 DWH oil spill. This educational resource was made possible by a grant from the National Marine Sanctuary Foundation with funding from the NOAA Restoration Center.

This activity was developed by Roy Arezzo, NOAA Teacher at Sea Alumni Association Fellow, with support from the staff of the Mesophotic and Deep Benthic Communities restoration projects. Learn more about NOAA's Teacher at Sea program here

Gulf Restoration Livestream - Survival Mode: Life in the Deep Sea

Student Worksheet

For this activity, please view the Mesophotic Deep and Benthic Community (MDBC) recording on Life in the Deep Sea (39 Minutes) which aired live on August, 2nd 2024 and features habitat restoration experts working aboard the *Island Intervention* vessel in the Gulf of Mexico to restore deep coral habitats injured by the 2010 *Deepwater Horizon* oil spill.

Name_____ Class_____ Date_____

Pre-Film Discussion:

1. What does NOAA stand for and what is their mission?

2. Where is the Gulf of Mexico?

3. How do you think the water quality in the Gulf compares to your local body of water?

4. Why is a coral considered an animal?

5. What are some of the threats to coral and ocean life in general?

During the Film:

6. What is the "twilight zone" (mesophotic zone) in the ocean?

7. What kind of life exists on the seafloor in the Gulf of Mexico?

8. What are some of the main concerns or threats to deep-sea habitats?

9. What technologies or methods are helping us learn more about the deep sea?

Post-Film Discussion:

10. What are some of the impacts of oil spills on benthic (seafloor) habitats?

11. How does this restoration project impact marine life and people?

12. What do you think life is like on a scientific vessel?