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## KEYWORDS

- Abiotic Factor
- Algal Ridge
- Atoll
- Back Reef
- Barrier Reef
- Calcium Carbonate (CaCO<sub>3</sub>)
- Drop-off
- Fore Reef
- Fringing Reef
- Lagoon
- Patch Reef
- Reef Crest
- Reef Flat
- Reef Front
- Spur and Groove Reef

# REEF ZONATION

This unit explains the characteristics and location of the reef zones.

## STANDARDS

- **CCSS:** RST.9-10.1, 2, 3, 4, 5, 7, 8, 10; RST.11-12.1, 2, 3, 4, 8, 10; SL.9-10.1, 2, 3, 6; SL.11-12.1, 2, 3, 6
- **NGSS:** HS-ESS2-1, HS-LS2-6
- **OLP:** 5.B.7, 5.B.8, 5.C.33, 7.A.5, 7.C.2, 7.C.3

## MULTIMEDIA RESOURCE

- *Coral Reef Zones* YouTube video ([https://youtu.be/1wMrB37\\_GvI](https://youtu.be/1wMrB37_GvI))

## LEARNING OBJECTIVES

- Identify the three main types of coral reefs.
- List the abiotic factors that influence the distribution of organisms in each zone.
- Define reef flat and explain the conditions that corals have adapted to in this zone.
- Define lagoon and explain the conditions that corals have adapted to in this area.
- Define reef crest and explain the conditions that corals have adapted to in this zone.
- Define algal ridge
- Define spur and groove reef.
- Define reef front/fore reef and explain the conditions that corals have adapted to in this zone.
- Define drop-off.
- Define back reef and explain the conditions that corals have adapted to in this zone.
- Label the vertical zones for each of the main types of coral reefs.

## UNIT PROCEDURE

1. Show *Coral Reef Zones* YouTube video.
  - a. Complete **Watch It! Coral Reef Zones** student worksheet.
2. Teach *Unit 11: Reef Zonation - Background Information*.
  - a. Complete **Lesson 1: Modeling the Reef** student worksheet.
  - b. Complete **Lesson 2: GIS Mapping** student worksheet
3. Teach students how to read and critique blogs.
  - a. Complete **Read It! Let's Name the Zones** student worksheet.
4. Evaluate students using **Unit 11: Reef Zonation Quiz** (found online at [www.lof.org/education/portal/quiz/reef-zonation-assessment-1/](http://www.lof.org/education/portal/quiz/reef-zonation-assessment-1/)).  
NOTE: User must be logged in.




# LESSON 2

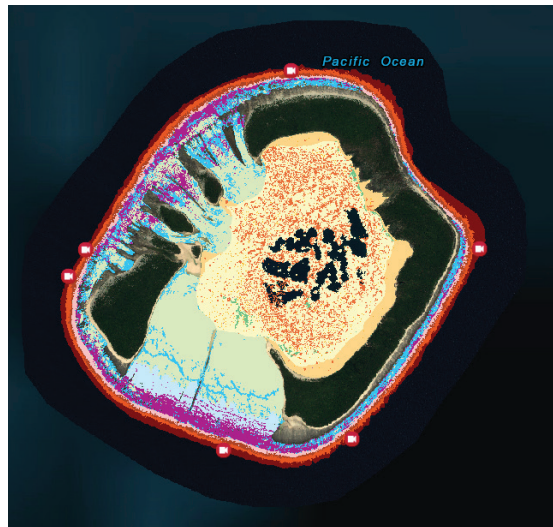
# GIS MAPPING

## ADDITIONAL BACKGROUND INFORMATION:









GIS stands for Geographic Information System. It is a tool used by scientists and other experts to display and analyze a large data set that is linked to a latitude and longitude. GIS mapping allows visualization of data so that patterns may become more easily visible. The data on a GIS map can often be manipulated and analyzed on the map itself, which allows it to be presented and displayed better than traditional graphs and tables. Often the data is stored in layers. For instance, the Khaled bin Sultan Living Oceans Foundation's World Web Map starts with a map of the world and then you can choose whether to show benthic habitat data, bathymetry, and/or depth contours on top of the map. In addition, our map has videos and photos embedded into it so you can see what the coral reef looks like in specific areas of the world.

## PROCEDURES:

1. Go to <http://maps.lof.org/lof>.
2. In the upper-right hand corner is the menu. (If it is not already open, click on the  icon.) Click on *Select a Location*, then *French Polynesia*, and then *Bellingshausen*, which looks like the image below. (Be patient, it may take a moment to load.)



3. In the menu, click *View Legend* to see what habitat each color on the map indicates. (You may need to click on *Select a Location* again to close that section of the toolbar.) What three habitats look like they take up the most area on Bellingshausen?
4. Use what you have learned from *Unit 11: Reef Zonation* to define the reef zone in the left-hand column of *Table 1*.
5. Use the legend to list the habitats on the Bellingshausen map that correspond with each reef zone. Fill in the second column in *Table 1*.

6. In the menu, click *Toolbar*, and then click on the  icon for the *Identify Tool*. Now if you click on the different colors on the map, a description of the individual habitats will pop up. (You may need to zoom in to accurately click on a specific habitat. The zoom bar is on the left-hand side of the map.)
7. In *Table 1*, fill in the appropriate columns to compare the topography and depth range of the different habitats in each zone. NOTE: Topography and depth range are the last topics described in the *Habitat Description*.
8. Click on one of the  video icons. (If you see an *Identify Tool* information box, and not the video, click on *Next Feature*   in the top right of the pop-up window until you get to the video.) How does this visual information compare to the written information that you get from the *Identify Tool*?
9. In the menu, click *Toolbar*, and then click on the  icon for the *Measure Tool*. Then click on the  icon and change the unit to meters. Use this tool to measure the widest part of each zone. To measure the width:
  - a. Change the zoom until the zone you are measuring takes up as much space on the screen as possible while still being able to see the whole thing.
  - b. Click on the edge of the widest part of the zone. A green flag will appear.
  - c. Without clicking again, move the mouse until a blue line has been drawn across the widest part of the zone.
  - d. Double click to plant a second green flag. (If you only click once, that is ok. Without moving your mouse, double click.)
  - e. You can find your *Measurement Result* in the menu.
  - f. Record the measurement in the right-hand column of *Table 1*.
10. In the menu, click *Toolbar*, and then click on the  icon for the *Habitat Analysis Tool*. To use the tool:
  - a. Zoom out until you can see all of Bellingshausen reef.
  - b. In the menu, change the radius to 3 km.
  - c. Click on the  icon.
  - d. Move your mouse to the map. A box should tell you “*Click to add a point*”.
  - e. Estimate where the center of Bellingshausen is and click on that spot. A red circle should appear around the entire reef.
  - f. Wait a few moments for the report to appear.
  - g. Excluding “*Area not mapped*” and “*Terrestrial vegetation*”, what three habitats take up the most area on Bellingshausen and how many square meters do they occupy?

**TABLE 1:**

| Reef Zone                 | Habitats | Topography | Depth Range | Width of Habitat |
|---------------------------|----------|------------|-------------|------------------|
| Lagoon:                   |          |            |             |                  |
| Reef Crest (Algal Ridge): |          |            |             |                  |



| Reef Zone  | Habitats | Topography | Depth Range | Width of Habitat |
|------------|----------|------------|-------------|------------------|
| Fore Reef: |          |            |             |                  |
| Back Reef: |          |            |             |                  |





**TABLE 2:**

| Reef Zone  | Habitats | Width of Habitat |
|------------|----------|------------------|
| Lagoon     |          |                  |
| Reef Crest |          |                  |
| Fore Reef  |          |                  |
| Back Reef  |          |                  |

3. Why do scientists create GIS maps and how might they be used?