

# OCEAN CLASSROOM

## **The Study of Corals**

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### **Where do corals live?**

STUDENT GUIDE

THE  
UNIVERSITY  
OF RHODE ISLAND  
GRADUATE SCHOOL  
OF OCEANOGRAPHY

## Guiding Question

## “Where do corals live?”

### Essay

Take turns reading aloud. Highlight important facts.

#### Where do warm water corals live?

Coral reefs are found in all of the world’s oceans, but most are found in the clear, warm water near the tropics. They are called **warm water, reef building coral**. Coral reefs made by warm water corals are found in more than 100 countries around the world. Most reefs are located between the Tropics of Cancer



and Capricorn, in the Pacific Ocean, the Indian Ocean, the Caribbean Sea, the Red Sea, and the Persian Gulf. These corals are also found farther from the equator in places where warm currents flow out of the tropics, such as in Florida and southern Japan. Worldwide, coral reefs cover an estimated 110,000 square miles!

#### What do warm water corals need to survive?

There are **five main conditions** that warm water, reef building coral need to grow and survive.

##### 1. Sunlight:

Corals need to grow in shallow water (0-150feet or 45 meters deep. Here, sunlight can reach them. Corals depend on the zooxanthellae (algae) that grow inside of them for oxygen, food (through photosynthesis) and waste removal. Since these algae need sunlight to survive, corals also need sunlight to survive. Corals rarely develop in water deeper than 165 feet (50 meters). Reefs need calcium from the water to grow, which is more often available in shallow warm waters.

##### 2. Clear water:

Corals need clear water that lets sunlight through; they don’t thrive well when the water is cloudy. Sediment and plankton can cloud water, which

decreases the amount of sunlight that reaches the zooxanthellae(algae).Reefs usuallydevelop in areas that have a lot of wave action because the waves bring in food, nutrients and oxygen to the reef. Waves also prevent sediment from falling on the reef.

##### 3. Warm water temperature:

Reef-building corals require warm water conditions to survive. Different corals living in different regions can withstand various temperature fluctuations. However, corals generally live in water temperatures of 68–90° F or 28-32° C, which is often found along the eastern shores of land.However, corals generally live in water temperatures of 68–90° F or 28-32° C, which is often found along the eastern shores of land.

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## Essay

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### 4. Clean water:

Corals are sensitive to pollution and sediments. Sediment can create cloudy water and be deposited on corals, blocking out the sun and harming the polyps. Wastewater discharged into the ocean near the reef can contain too many nutrients that cause seaweeds to overgrow the reef.

### 5. Saltwater:

Corals need saltwater to survive and require a certain balance ( ratio of salt to water). This is why corals don't live in areas where rivers drain fresh water into the ocean ("estuaries")

## Did you know?

- The **shape** of coral colonies also depends on the **location** of the coral. For example, in areas with strong waves, corals tend to grow into strong mounds or flattened shapes. In more sheltered areas, the same species may grow into more complex shapes with delicate branches.
- Different species of coral grow at different rates depending on water temperature, salinity, water clarity, and sunlight. The massive corals are the slowest growing species, while Branching and Staghorn corals can grow much faster.
- The ancestors of today's coral reef ecosystems were formed at least 240 million years ago. Most established coral reefs are between 5,000 and 10,000 years old!

## Short videos about *warm water coral*

Khaled bin Sultan Living Oceans Foundation: Where Are Coral Reefs Found?

- [https://www.youtube.com/watch?v=Xn7Ie\\_KOWvc&ab\\_channel=KhaledbinSultanLivingOceansFoundation](https://www.youtube.com/watch?v=Xn7Ie_KOWvc&ab_channel=KhaledbinSultanLivingOceansFoundation)

Real Wild: Alien Inhabitants of Our Coral Reefs (Ocean Documentary)

- [https://www.youtube.com/watch?v=Sn807Vasc9E&ab\\_channel=RealWild](https://www.youtube.com/watch?v=Sn807Vasc9E&ab_channel=RealWild)

Ocean Today: Rainforests of the Sea

- <https://oceantoday.noaa.gov/fullmoon-rainforestsofthesea/welcome.html>

National Geographic: Coral Reefs 101

- [https://www.youtube.com/watch?v=ZiULxLLP32s&t=97s&ab\\_channel=NationalGeographic](https://www.youtube.com/watch?v=ZiULxLLP32s&t=97s&ab_channel=NationalGeographic)

Explore Oceans: Live Coral Predators Cam

- <https://youtu.be/vhZPwHyDV9Q>

## Essay

*Take turns reading aloud. Highlight important facts.*

### **Can corals live in cold water?**

The habitat of **deep water** corals, also known as **cold water** corals, are found in all the world's oceans. Large reefs/beds of deep water coral can be found in the far North and far South Atlantic, as well as in the tropics in places such as the Florida coast. They are generally found in the deeper, darker, cooler depths along the edges of continental shelves. They can also be seen in very deep water at the bottom of fjords, around offshore banks under the surface, and near hydrothermal vents and seamounts. So far, besides being found in international waters, they've been discovered in the seas of 41 countries including Japan, Spain, Seychelles, New Zealand, Mauritania, Canada, Australia, Colombia, Brazil, Norway, Angola, Russia, Sweden, United Kingdom, Ireland, and the United States. Most of the research so far has been done in high latitudes and these corals were only discovered 250 years ago.

Deep water coral need two main conditions to survive:

#### **1. Deeper water:**

While most of these corals live at depths between 660 feet (200 m) and 3,300 feet (1,000 m), some species, found off the coast of California, can live as shallow as 132 feet (40 m) or less. At the other extreme, some species have been found at depths few research subs can reach, at around 21,000 feet (6,367 m)!

#### **2. Colder water temperature:**

These coral thrive in temps of 29-55° F (minus 1.8-13° C) Although some cold-water reefs have been found in tropical waters, they live at greater depths than warm water, reef building coral

## Did you know?

- **Deep-sea corals**, like warm water corals, are actually colonies of small animals that build a common skeleton, which grows into many shapes and colors. Scientists believe that 95% of cold water corals, as well as the array of unique inhabitants that live there, have not been discovered yet!
- Deep water corals grow more slowly and tend to live longer than warm water coral. According to scientific estimates, one particular colony of gold coral (*Gerardia* sp.) found off the coast of Hawaii was about 2,742 years old. Marine researchers determined that another deep-sea coral colony in Hawaii—this one a black coral (*Leiopathes* sp.)—was about 4,265 years old. These coral colonies are the oldest marine organisms on record. Due to the continuous formation of new polyps, some deep-sea coral reefs have been actively growing for as long as 40,000 years!
- **Corals** can't move, so they must live near nutrient-rich water currents. **Deep-water corals** feed on zooplankton and rely on ocean currents to bring food. The currents also aid in cleaning the corals.
- Scientists have discovered nearly as many species of deep-sea corals as shallow, warm-water species. . To date, however, more than 3,300 species of deep-sea corals have been identified, and the numbers keep climbing.

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## Short videos about *cold water coral*

NOAA Ocean Today: Coral Forests of the Deep

- <https://oceantoday.noaa.gov/coralforestsforthedeep/welcome.html>

NOAA Ocean Exploration: Deep-sea Corals Multimedia

- <https://oceanexplorer.noaa.gov/edu/themes/deep-sea-corals/multimedia.html>

MBARI (Monterey Bay Aquarium Research Institute): Bioluminescence in the deep sea: Glow-in-the-dark corals light up the deep ocean

- [https://www.youtube.com/watch?v=GD7g1c5-CJU&feature=emb\\_title&ab\\_channel=MontereyBayAquariumResearchInstitute%28MBARI%29](https://www.youtube.com/watch?v=GD7g1c5-CJU&feature=emb_title&ab_channel=MontereyBayAquariumResearchInstitute%28MBARI%29)

NOAA Fisheries: Habitat Exploration: Deep-Sea Corals

- [https://www.youtube.com/watch?v=LVmvaNYcjeg&ab\\_channel=NOAAFisheries](https://www.youtube.com/watch?v=LVmvaNYcjeg&ab_channel=NOAAFisheries)

**Resource:**

**Where Do Coral Live?  
Vocabulary Terms**

*Below are terms you will encounter and learn in this unit . Add any new words you feel should be included here. Also, use these terms on sites like [Kahoots.com](http://Kahoots.com), [Puzzlemaker.com](http://Puzzlemaker.com), and [Quizlet.com](http://Quizlet.com) to create study sheets and games.*

- Algae
- Cold Water Coral
- Equator
- Photosynthesis
- Salinity
- Tropics Zone
- Tropic of Cancer
- Zooxanthellae
- Calcium
- Density
- Molecule
- Polar Region
- Sediment
- Tropic of Capricorn
- Warm Water Coral

Also: \_\_\_\_\_

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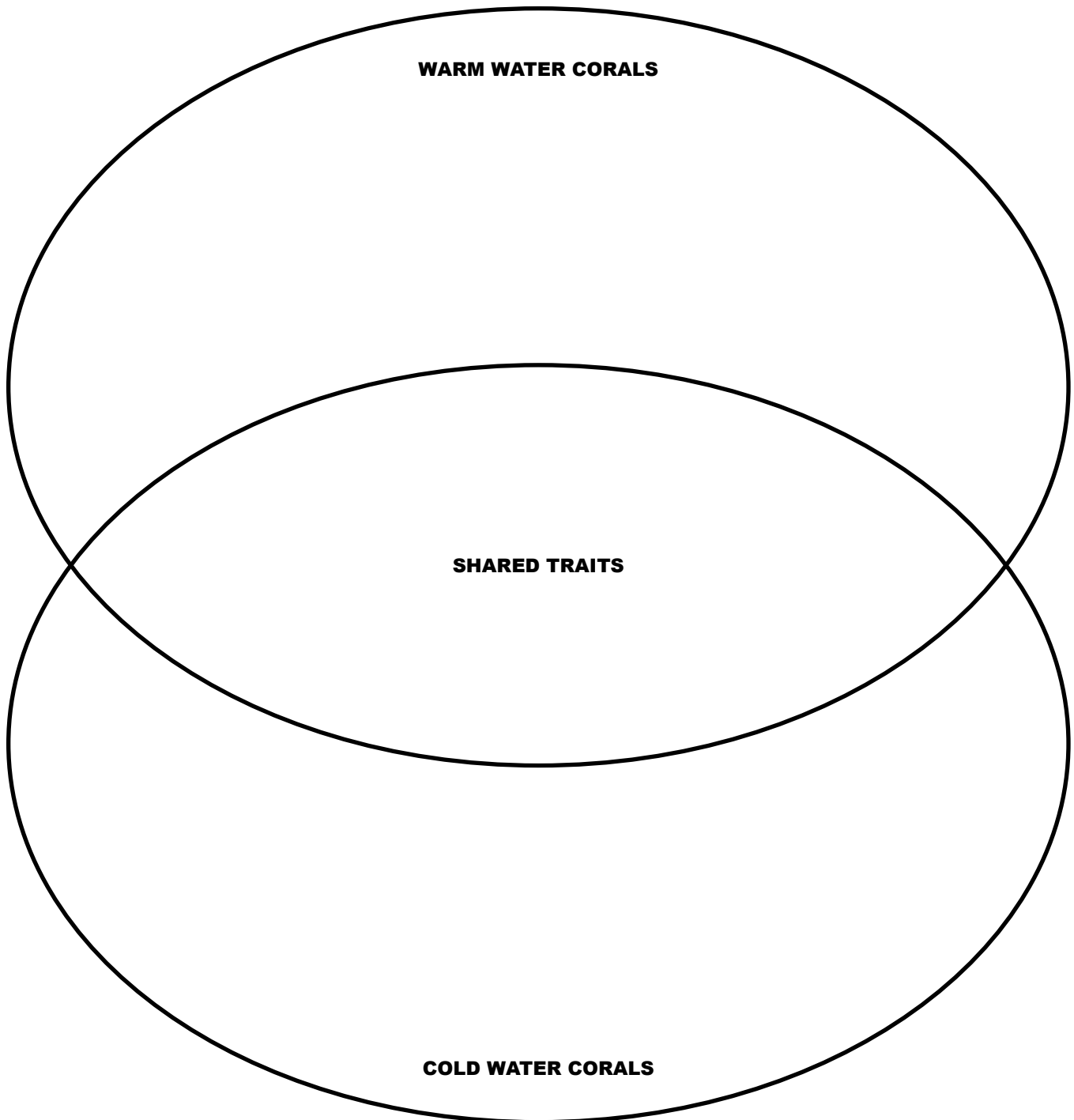
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**Activity:**

**Comparing Warm Water and Cold Water Corals**

*Use what you have read about corals and where they live. Fill in each area of the Venn Diagram (below) with at least four traits of the corals. You can talk quietly within your group.*



**Activity:**

**Where in the World Do Corals Live?**

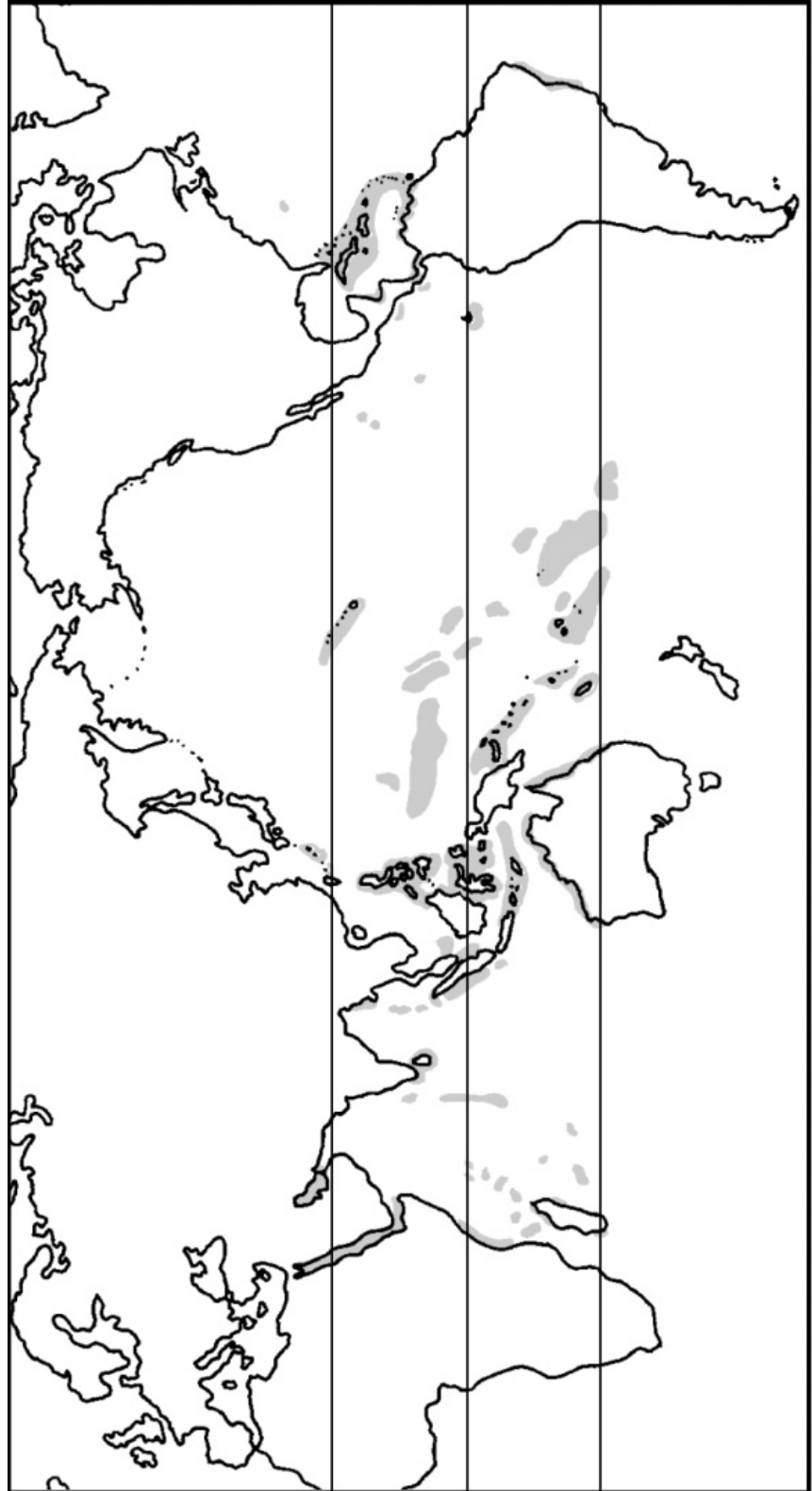
Follow the directions above this map.

**COLOR KEY TO THE MAP:**

- Coral Reefs - Pink
- Great Barrier Reef - Yellow
- Water - Blue
- Land - Green
- Where You Live - Red

**FIND AND NUMBER:**

- 1. Africa
- 2. Asia
- 3. Antarctica
- 4. Australia
- 5. Europe
- 6. North America
- 7. South America
- 8. Arctic Ocean
- 9. Atlantic Ocean
- 10. Indian Ocean
- 11. Pacific Ocean
- 12. Equator (0 degrees)
- 13. Tropic of Cancer (23°27' North)
- 14. Tropic of Capricorn (23°27' South)





**Activity: Where in the World Do Corals Live?**

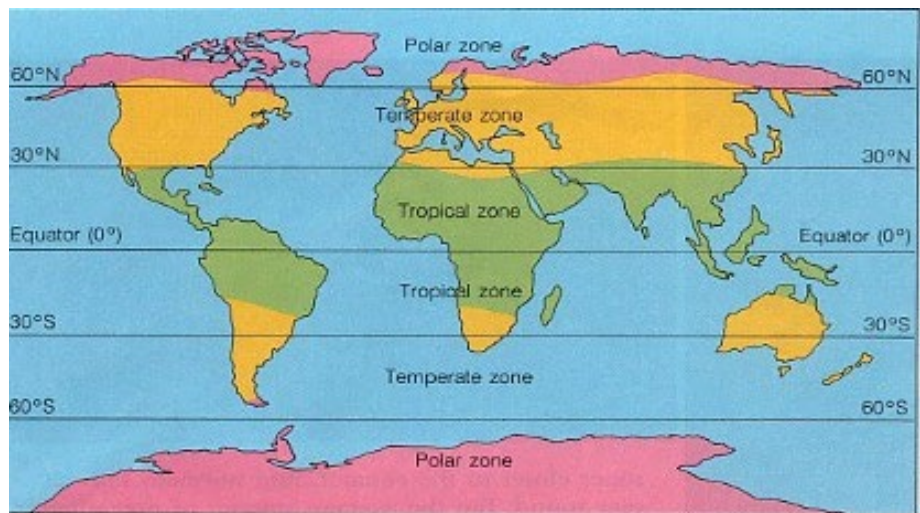
*Refer to these maps to answer the questions that follow.  
You can work quietly within your group.*

**Locations of Warm and Cold Water Reefs of the World**

Warm water ■  
Cold water ■



**The Climate Zones of the World**



# Questions: **Where in the World Do Corals Live?**

*Refer to the maps provided to answer the questions that follow.  
You can work quietly within your group.*

1. What do we call the area between approximately 30 degrees N latitude and 30 degrees S latitude?

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2. Give two reasons why we call it this. \_\_\_\_\_

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3. What type of coral live along the Equator? \_\_\_\_\_

4. Give four reasons why they thrive there. \_\_\_\_\_

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5. What is the temperature like at the higher latitudes? (ie. 60 degrees N latitude or 60 degrees S latitude)?

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6. What is the climate zone called? Give two reasons why we call it this. \_\_\_\_\_

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7. What type of coral live there? \_\_\_\_\_

8. Give two reasons why they thrive there. \_\_\_\_\_

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9. Why do you think scientists have not studied deep-water coral as much as warm-water coral?

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10. As a group, discuss where you **think** MOST of the oceans' pollution occurs — In the atmosphere, near the land, on the ocean's surface, or below the ocean's surface. Give at least one reason for your answer.

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**Activity:****Interactive Reef Site**

The scientists in the Coral Conservation Reef Program at NOAA have developed a unique interactive site where students can learn about the inhabitants of a coral reef. You will be able to see their unique characteristics, learn about their place/job in the coral reef ecosystem and discover the various threats to each organism's well-being.

Read the instructions below, and then click on the link and get started.

**How to use “Interactive Reef”**

As you move your mouse to hover over the painting, ten of the species will 'light up' as you pass the mouse over them. By clicking on these species, a feature page is brought up. The page includes a photograph of that species, a fact about it, its role in a reef ecosystem, and a threat to the species. To view information on another species, simply click on the red 'X' at the top of the feature page to return to the main image.

**Go to the Website**

- <https://coralreef.noaa.gov/interactivereef/interactivereef.html>

## Activity: Mapping Coral Reefs

Use the latitudes and longitudes in the table below to mark the location of these coral reefs. Study the finished map and identify the area of the world where most reef-building corals grow. Use colored pencils or crayons to color in the "reef belt."

Between what latitudes is the reef belt?

Location	Latitude	Longitude
Great Barrier Reef	19° 10' S	149° E
Maui, Hawaii	20° 45' N	156° 20' W
Key West, Florida	24° 33' N	81° 48' W
French Polynesia	16° S	145° W
Red Sea	25° N	38° W
Jamaica	18° 15' N	77° 30' W
Belize	17° 15' N	88° 45' W
Cabo San Lucas	23° N	110° W
Seychelles Islands	8° S	55° E
Philippines Islands	13° N	122° E
Java	7° 20' S	110° E
Celebes Islands	2° S	121° 10' E
Bahama Islands	24° 15' N	76° W

