



FOR EXCELLENCE IN MIAMI-DADE PUBLIC SCHOOLS

2023
2024

Ideas with

IMPACT

STEM

**Coral
City
Camera**

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Coral City Camera in the Classroom

Using an underwater camera to create “coral heads”.



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Table of Contents:

- Goals and Objectives - pg 3
- Florida Standards - pg 3 and 4
- Course Outline/Overview - pg 5
- Lesson Plans - pg 8
- Resource List - pg 14

Goal and Objectives

The purpose of Coral City Camera in the Classroom is to create what we affectionately refer to as “coral heads”. By incorporating the 24-hour camera in the PortMiami we hope students will hone their scientific skills (Big Idea 1 - Practice of Science) and learn to become better caretakers of Florida’s renewable resources such as our reef system (Big Idea 6 - Earth Structures). They will learn how organisms are adapting to the different changes due to global warming and human activities (Big Idea 15- Diversity and Evolution of Living Things). Additionally, they will also learn and trace the flow of energy from the coral through several reef food chains (Big Idea 17 - Interdependence).

Florida Standards

SC.3.N.1.7 Explain that empirical evidence is information, such as observations or measurements, that is used to help validate explanations of natural phenomena.

SC.4.N.1.3 Explain that science does not always follow a rigidly defined method (“the scientific method”) but that science does involve the use of observations and empirical evidence.

SC.4.N.1.7 Recognize and explain that scientists base their explanations on evidence.

(SC.4.E.6.3).Recognize that humans need resources found on Earth and that these are either renewable or nonrenewable.

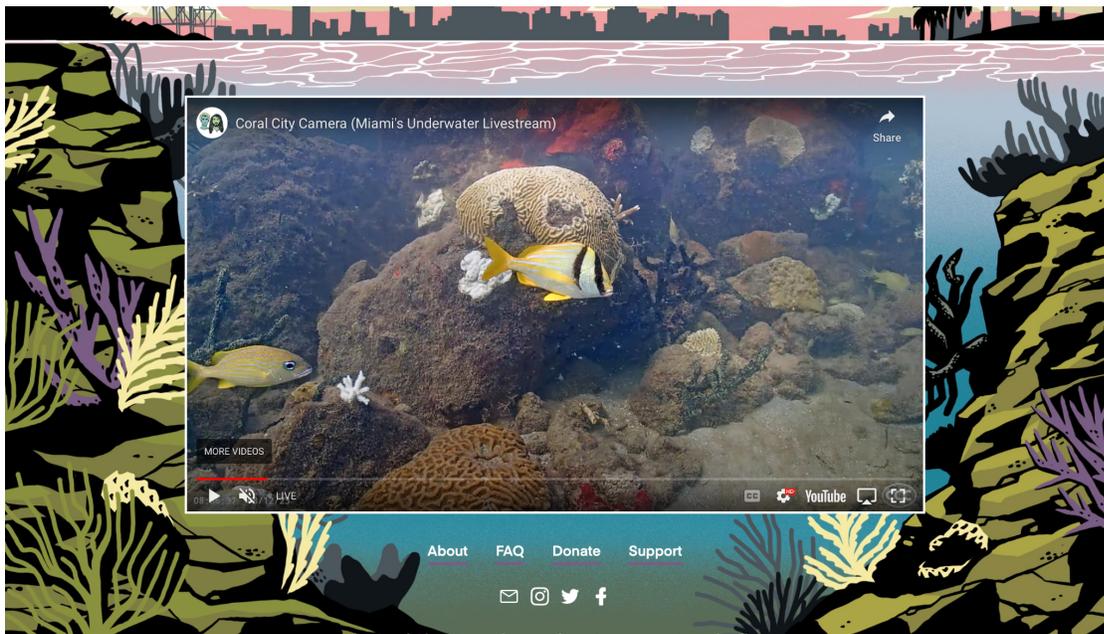
(SC.4.L.17.3) Trace the flow of energy from the Sun as it is transferred along the food chain through the producers to the consumers.

(SC.3.L.15.1.)(SC4.L.17.4).Classify animals into major groups (mammals, birds, reptiles, amphibians, fish, arthropods, vertebrates and invertebrates, those having live births and those which lay eggs) according to their physical characteristics and behaviors.Recognize ways plants and animals, including humans, can impact the environment.

Course Outline and Overview

Before we get into the lesson, let's get a little history on CCC.....

- It is about 10 feet underwater near PortMiami and was deployed in late 2019 as a way to showcase the biodiversity of our urban landscape. It was moved about 300 feet in the beginning of 2021.
- These limestone rocks were placed in 2010 and all the colonization by marine life happened naturally within the last decade.
- Additionally, CCC is working with DERM and Rescue a Reef to study coral genotypes and their ability to thrive in an urban location.
- Despite high traffic, run-off, and other anthropogenic factors, this location has thrived.



And a little bit about coral:

- Earth is about 5 BYA and coral is about 1/2BYA
- Considered the “city planners” of the ecosystems

- Simple animals that pull calcium out of the water to make their structures
- Can catch microscopic animals and larvae in the water, but get a majority of their energy from the zooxanthellae that live inside them.
- This microscopic algae (zooxanthellae) photosynthesizes and the coral benefit from this. It's a mutualistic relationship because the coral gets nutrition and the zooxanthellae get shelter. This is why coral is found in the sun-lit areas of the ocean.
- [CCC clip on National Geo](#) showcasing the cosmic sunscreen of the coral reefs.

...now how is watching an aquarium beneficial?

- Research indicates a link between viewing fish in aquariums and benefits such as reduced blood pressure and increased relaxation according to the National Institute of Health.
- According to Science Daily "People who spend time watching aquariums and fish tanks could see improvements in their physical and mental wellbeing, according to new research published in the journal *Environment & Behavior*. In the first study of its kind, experts from the National Marine Aquarium, Plymouth University and the University of Exeter assessed people's physical and mental responses to tanks containing varying levels of fish."

.....but maintaining fish tanks is not for everyone nor every classroom.....

According to Petco:

- Fresh water tank set up is about \$546 with an annual maintenance of about \$83.
- Saltwater tanks are about triple that at \$1,395 with annual cost of \$203.
- Since most classrooms are run on shoestring budgets, this could be cost prohibitive. Coral City Camera reduces the pressure on teachers by providing a **free resource.**



Oval was a beloved doctor fish that everyone came to love and was a celebrity on Coral City Camera!

The lessons listed below are geared toward a 5th grade classroom, but can easily be adapted to suit any grade level and subject area.

Lesson 1: Observation Station

This lesson will require students to develop their observation skills as CCC is displayed on the promethean board. Teachers will project the live feed from YouTube onto the board for 15-20 mins and allow the students time to observe and collect data. This data collection can be done whole class or individually in notebooks.

If your students do not have a strong grasp of coral use this [presentation](#) to introduce them.

1. After first exposure, ask students to journal the various organisms they viewed. Leave this lesson very general and allow students to grapple with the concept of corals being alive.
2. For their second exposure, watch [national geographic and coral](#) and give students access to the [CCC aquascope document](#) Allow students to watch CCC and identify as many varieties of coral as possible.
3. For their third exposure, allow students to watch CCC and to document the varieties of fish and invertebrates. Allow students to describe their organisms and if they feel compelled to name them you can use [Florent's Guide to the Tropical Reefs](#)
4. For their fourth exposure, ask the students to observe the water conditions (clear vs turbid) and the creatures that are visible. Compare this to the same view on a day with the opposite conditions.
5. For their fifth exposure, allow the students to analyze the colors visible. This might be easier using a screenshot and you could give each student a different shot and have them use a grid to compare color percentages.

After each of these observations, allow students to discuss and articulate their findings with their peers. This is where great discussions and ideas flourish!

Extra ideas: compare creatures during different times of the year (moon jellies in the fall versus Portuguese Man-O-Wars in the winter), compare weather conditions using the weather links found in the Resources section, juveniles versus adults, amount of creatures prior, during, and post passing of ships (use the port camera and Biscayne Bay Pilot Schedule in the Resources section).

If you and the students are curious about the names of creatures, there are a few documents you should become familiar with:

1. [CCC- timestamp from that day](#)
2. [CCC - Public Catalog of species](#)
3. [Florent's Guide to the Tropical Reefs](#)

An added resource is the Live Chat on YouTube. It has moderators and is extremely helpful when you have a question.

Once students become proficient with the CCC and the species that are present, students can analyze trends over the school year and even complete bingo cards with identified species.

B I N G O

French Angelfish	Tomtate Grunt	Porcupine fish	Crevalle Jack	Atlantic Spadefish
Spotfin Butterflyfish	Tarpon	Dog Snapper	Horse-eye Jack	Hogfish
Grunt Mouth Fight	Lemon Shark	Free!	Midnight Parrotfish	Bar Jack
Blue Parrotfish	Rainbow Parrotfish	Sharpnose Puffer	Scrawled Filefish	Gray Snapper
Sergeant Major	French Grunt	Yellow Stingray	Porkfish	Manatee

Lesson 2: Human impact

1. Passing of ships

The signal from the camera is broadcast across Government Cut to the Marina on Miami Beach and then uploaded to YouTube. In this lesson you are going to investigate short term effects of ships as well as long term effects of human behavior such as coral bleaching and pollution.

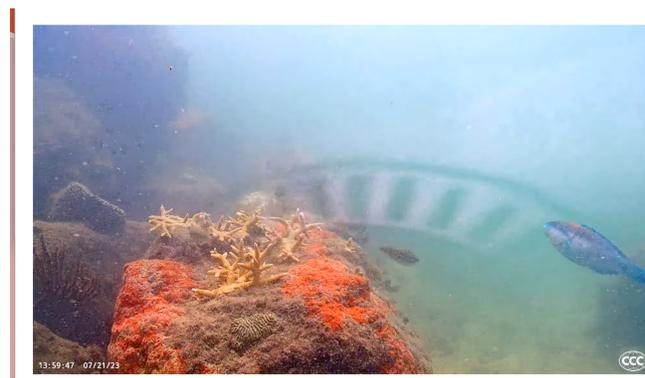
Open the [Biscayne Bay Pilots Schedule](#) and [PortMiami Live stream](#)

Using the resources, observe CCC before, during, and after a ship has passed. Ask the students to make observations and share.

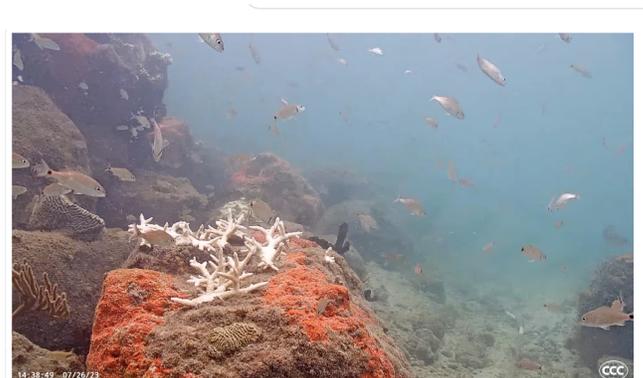


2. Coral Bleaching of 2023

Watch [What is Coral Bleaching? By Time](#) and then allow students to make observations of CCC. The two images below were taken 5 days apart in July of 2023 during one of the warmest summers on record. Using these



Coral City Camera (Miami's Underwater Livestream)



Coral City Camera (Miami's Underwater Livestream)

images compare the corals then and now.

Want to learn more about the struggles of coral? [Check out Corals in Crisis.](#)

2. Pollution

Watch [Keep the Plastic at Bay by CCC](#) and allow students to observe any evidence of man-made pollution (pink lure in the gill of the barracuda). Have students create informational posters to teach others about the dangers of pollution on our coral ecosystems.



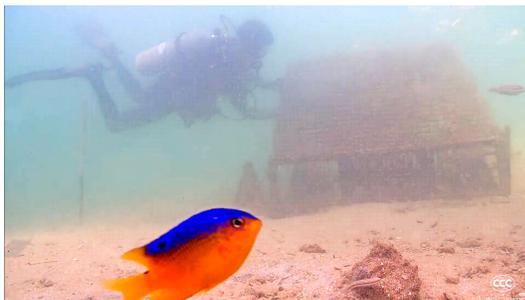
Lesson 3: Meme Away

Using the images or videos provided (or ones you have taken) allow students to create clever memes. The [Public Catalog of Species](#) has a wealth of images that students can utilize.

Tank

Resting lemon sharks

<https://youtu.be/GrWm05duoOQ>



Lesson 4: Art

Help students solidify their understanding of coral reefs by incorporating art.

- For a simple exercise the students can use egg cartons and paper to [model corals and their symbiotic zooxanthellae](#).
- For a more advanced lesson use the [lesson](#), [powerpoint](#), [checklist](#), and [fish cards](#) from Southeast Florida Coral Reef Initiative

Resources

[Coral City Camera](#)

[CCC- timestamp from that day](#)

[CCC - Public Catalog of species](#)

[CCC Perspectives](#)

[Coral Morphologic](#)

[Government Cut - Weather/Tides](#)

[NOAA - Buoy Data](#)

[Windy](#)

[Florent's Guide to the Tropical Reefs](#)

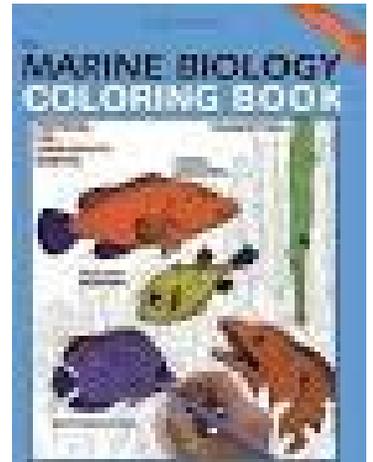
[Biscayne Bay Pilots Schedule](#)

[PortMiami Live stream](#)

Marine Biology Coloring Book -

This book can be found on Amazon and has fantastic coloring pages that talk about the types of coral reefs, the creatures that inhabit them, and their behaviors. While it is a coloring book, the content is quite advanced for elementary students. It can be adapted for any level of student.

A great video demonstrating different careers in science that pertain to coral reefs:



[Chat with a Scientist: Life in the Coral Reefs](#)

[Rescue a Reef](#)- UM coral conservation group

[Florida Department of Environmental Protection](#)

[Florida's Coral Reef](#)

[Marine MegaFauna](#)

Want to tie in pH and corals and limestone?

[Everglades Foundation](#)

[Adaptations lesson on colors and patterns](#)

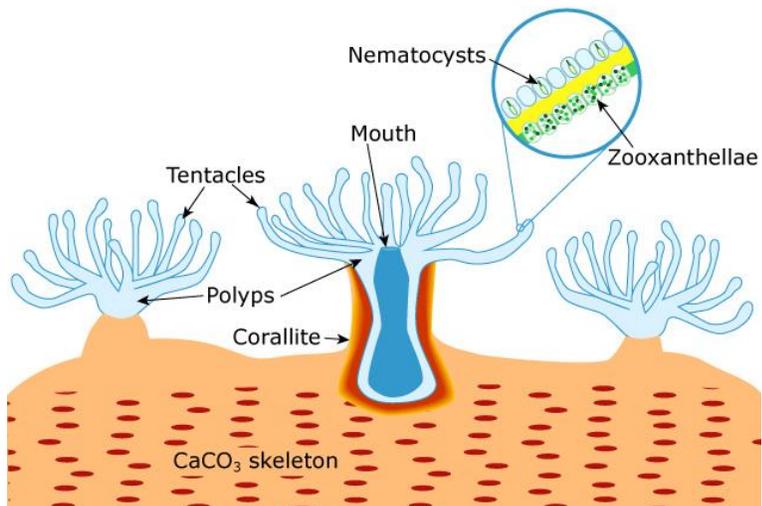
Drama- [Reef Story Play](#)

[Gizmos with Explore Learning-](#) Two different gizmos that simulate changes to a coral reef.

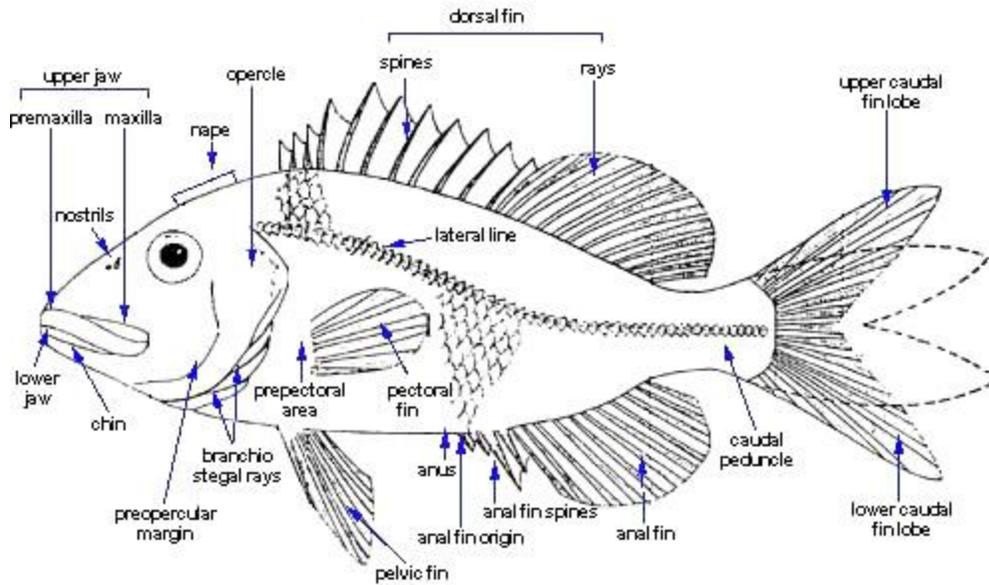
**Coral Trunks are available through Florida Department of Environmental Protection-
Link not out yet....**

Background info for teachers and students:

[Courtesy USGS.gov](https://www.usgs.gov)

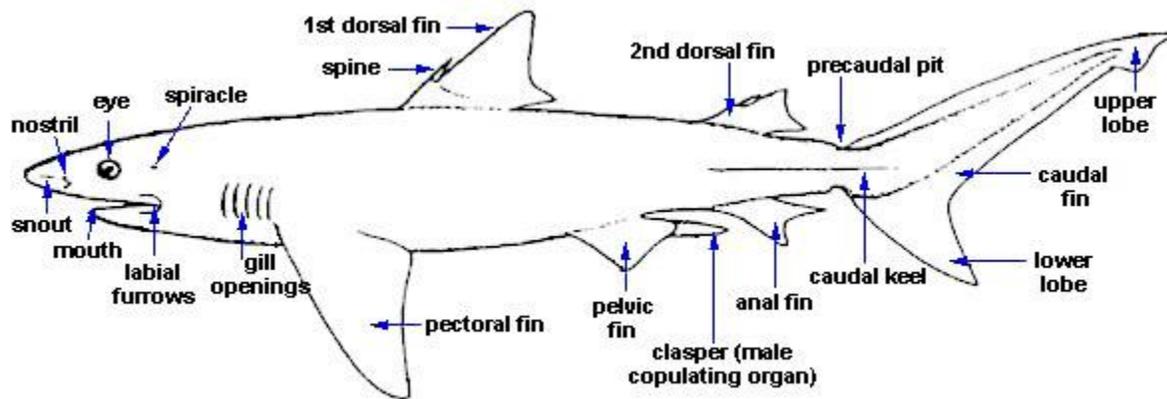


[Fish Anatomy](#)



Courtesy of Florida Museum

[Shark Anatomy](#)



Courtesy of Florida Museum

[Biofluorescence video](#)

[Newsletter from Marine Mega Fauna](#)

