

Lesson 2.1

Geography and Habitat

Grades: 9-12

Integrated Subjects: Marine Science, Oceanography, Geography, Mathematics

Essential Skills: Research, Identification, Writing

Sunshine State Standards: SC.E.1.4.3, SC.G.1.4.1, SC.F.1.4.2, SC.G.2.4.4, SC.G.2.4.3, SC.H.1.4.1

National Science Education Standards: Meets Content Standards in: 1) Unifying concepts and processes; 2) Physical science; 3) Life science; and 4) Science as inquiry

Duration: 1 – 2 class periods

Objectives:

Students will be able to:

- ✿ Locate the major bodies of water in the world
- ✿ Construct the food web for conch
- ✿ Perform basic water quality tests
- ✿ Observe different life forms in the seagrass beds (if utilizing Activity 4)

Preparation:

Teacher Preparation:

- ✿ Duplicate appropriate materials
- ✿ Water samples with various salinities

Support materials:

- ✿ Lecture module with pictures/slides
- ✿ Survey grid (made from PVC or rope) of a known surface area
- ✿ Thermometer, refractometer, pH meter (if available)

Other materials:

- ✿ Map of the Caribbean

Information Sheets:

- ✿ No. 5 – Where are the Conch?
- ✿ No. 6 – Habitat Requirements

Activity Sheets:

- ✿ No. 4 – The World's Oceans
- ✿ No. 5 - Conch Family Tree
- ✿ No. 6 – What's for Dinner?
- ✿ No. 7 – Water Quality

Lesson Plan

Activity 1. Introduction (10 minutes)

Ask the students to identify the parts of the world where conch may be found. Discuss what latitudes and parts of the ocean/continental shelf are suitable for tropical animals and why.

Activity 2. Geography (20 minutes)

Distribute Activity Sheet No. 4 and discuss the vastness of the world's oceans. Have the students label the oceans. Our planet is unique in that we have liquid oceans. Life first evolved in the oceans, and they continue to serve many functions that affect the weather and temperature.

Distribute and discuss Information Sheet No. 5. Show the students the conch family tree (Activity Sheet No. 5), and look at the pictures of *Strombus* conch. Point out on your Caribbean map where queen conch can be found.

Activity 3. What's for Dinner? (10 minutes)

Ask the students to make a list of the food queen conch may eat, along with a separate list of animals that may eat the queen conch. You may want to point out that queen conch are susceptible to more types of predators while they are young. Once your list is complete, distribute Activity Sheet No. 6 and see how well the students did.

Activity 4. Where the Conch Are (45 – 60 minutes)

Distribute and discuss Information Sheet No. 6 on queen conch habitat requirements. Ask the students if they have seen conch in the wild before and point out the locations on the map. Read about the importance of water quality and seagrass density to the adult conch on the Information Sheet.

Distribute Activity Sheet No. 7. If the equipment is available, have the students test different water samples for temperature, salinity, and pH as practice for the fieldwork. Discuss the water quality parameters that are important for queen conch health and survival.

Have the students take a trip to a local seagrass bed or choose a couple of sites at the school. Using your grids, have the students count the number of seagrass blades that lay within a known surface area. Calculate the grass/seagrass density per m². You may want to examine several sites for comparison. Have the students count at least two times at

each location. When you return, discuss whether or not queen conch would be present at these sites if they were in a different (ocean) location. Refer to Information Sheet No. 6.

Conclusion

Discuss the importance of protecting queen conch habitat (seagrass beds, tropical reefs, etc.).

Bibliography

Berg, C. 1975. Behavior and ecology of conch (Superfamily Strombidacea) on a deep subtidal algal plain. *Bulletin of Marine Science* 25:307-317.

Brownell, W. N. 1977. Reproduction, laboratory culture, and growth of *Strombus gigas*, *S. costatus* and *S. pugilus* in Los Roques, Venezuela. *Bulletin of Marine Science* 2:668-680.

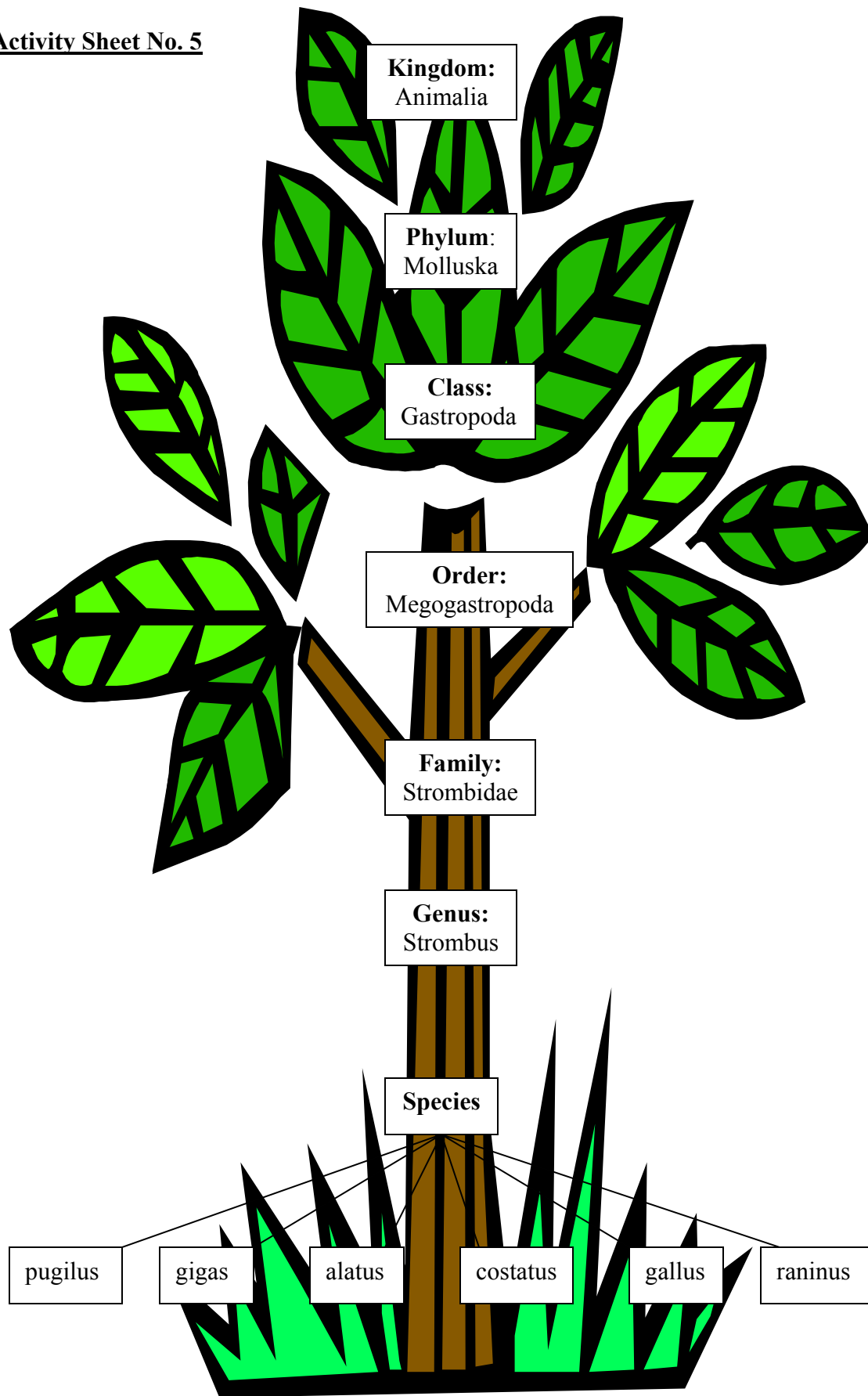
Jones, R.L. and A.W. Stoner. 1997. The integration of GIS and remote sensing in an ecological study of queen conch, *Strombus gigas*, nursery habitats. *Proceedings of the Gulf and Caribbean Fisheries Institute* 49:523-530.

Randall, J.E. 1964. Contributions to the biology of the "queen conch" *Strombus gigas*. *Bulletin of Marine Science of the Gulf and Caribbean* 14:246-295.

Stoner, A. W. 1997. The status of queen conch (*Strombus gigas*) research in the Caribbean. *Marine Fisheries Review* 59:14-22.

Stoner, A.W. and J.M. Waite. 1990. Distribution and behavior of queen conch, *Strombus gigas*, relative to seagrass stranding crop. *United States Fisheries Bulletin* 88:573-585.

Activity Sheet No. 5



Information Sheet No. 6

Habitat Requirements

Adult and juvenile queen conch reside in seagrass beds, sand plains, or coral rubble beds. As herbivorous gastropods, the juvenile and adult conch will feed on a variety of algae, such as *Batophora oerstedii*, or on detritus or diatoms commonly found on the blades of *Thalassia testudinum*. Adult queen conch can be found in waters from 3 – 30m (1 – 90 ft) deep. During the reproductive season, large aggregations of conch will migrate towards open sand patches near or around seagrass *Thalassia testudinum* beds to find mate and lay their eggs where they can be camouflaged. During the winter months, when the oceans are rough from storms, the adult conch will migrate into deeper waters for more protection.

Most queen conch nursery grounds are found in shallow water seagrass meadows (<6 m), although juveniles can also be found in algal flats and on deep banks. Once a juvenile conch settles out of the water column, they will remain buried for the majority of their first year of life. Juvenile queen conch abundance is dependent upon the amount of biomass present in seagrass meadows as well as the seagrass density. Juvenile queen conch prefer a medium seagrass density of 608 - 864 shoots/m². It is thought that juveniles have difficulty mobilizing in a dense seagrass bed. Scientists have also discovered that not all seagrass beds are suitable for juveniles and that juvenile queen conch aggregations tend to appear in the same location year after year.

Conch have a modified foot that is used for a unique type of locomotion in their habitats. They use the hardened tip of their foot, the operculum, to propel themselves forward in a “hopping” motion commonly referred to as a strombid leap. This movement is thought to help the conch make a quick escape from predators and also breaks up their scent trail.

Information Sheet No. 5

Where are the conch?



Strombus gigas (Queen conch)- Throughout Caribbean from Venezuela to Mexico, the west and east coasts of Florida, down through the lesser Antilles. Some small populations in Bermuda.

Strombus alatus (Florida fighting conch)- From North Carolina to the east coast of Florida, through the Gulf of Mexico.

Strombus costatus (Milk conch) – South Florida, the West Indies, Bermuda, and Brazil.

Strombus gallus (Rooster-tail conch)- South Florida to the West Indies, Bermuda, and Brazil.

Strombus pugilus (West Indian fighting conch)- Southeast Florida to the West Indies, south to Brazil.

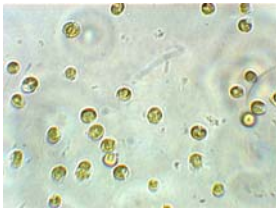
Strombus raninus (Hawk-wing conch)- Southeast Florida, the West Indies, Bermuda and Brazil.

Activity Sheet No. 6

What's For Dinner?



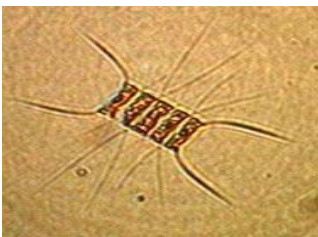
Leafy Green Ulva



Golden Brown Flagellates



Detritus on sea floor



Diatoms



Adult Conch



Veliger



Juvenile



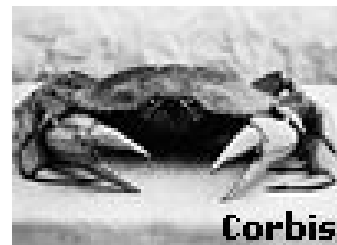
Lobster



Rays



Octopus

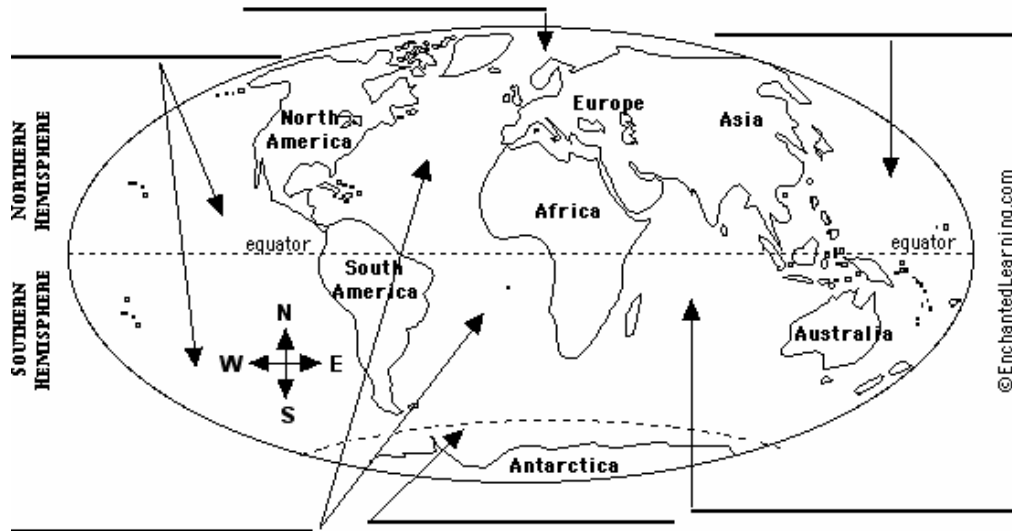


Crabs

**Match the
predator and
prey!**

Activity Sheet No. 4

THE WORLD'S OCEANS



Label the following on the map.

Atlantic Ocean
Indian Ocean
South China Sea

Pacific Ocean
Southern Ocean
Mediterranean Sea

Arctic Ocean
Caribbean Sea
Red Sea

Did you know....

Ocean	Area (square miles)	Average Depth (ft)	Deepest Depth (ft)
Pacific Ocean	64,186,000	15,215	Marianna Trench 36,200 ft deep
Atlantic Ocean	33,420,000	12,881	Puerto Rico Trench 28,231 ft. deep
Indian Ocean	28,350,000	13,002	Java Trench 25,344 ft. deep
Southern Ocean	7,848,300	13,100 - 16,400	South Sandwich Trench 23,736 ft deep
Arctic Ocean	5,106,000	3,953	Eurasia Basin 17,881 ft deep

* Information obtained from www.enchantedlearning.com

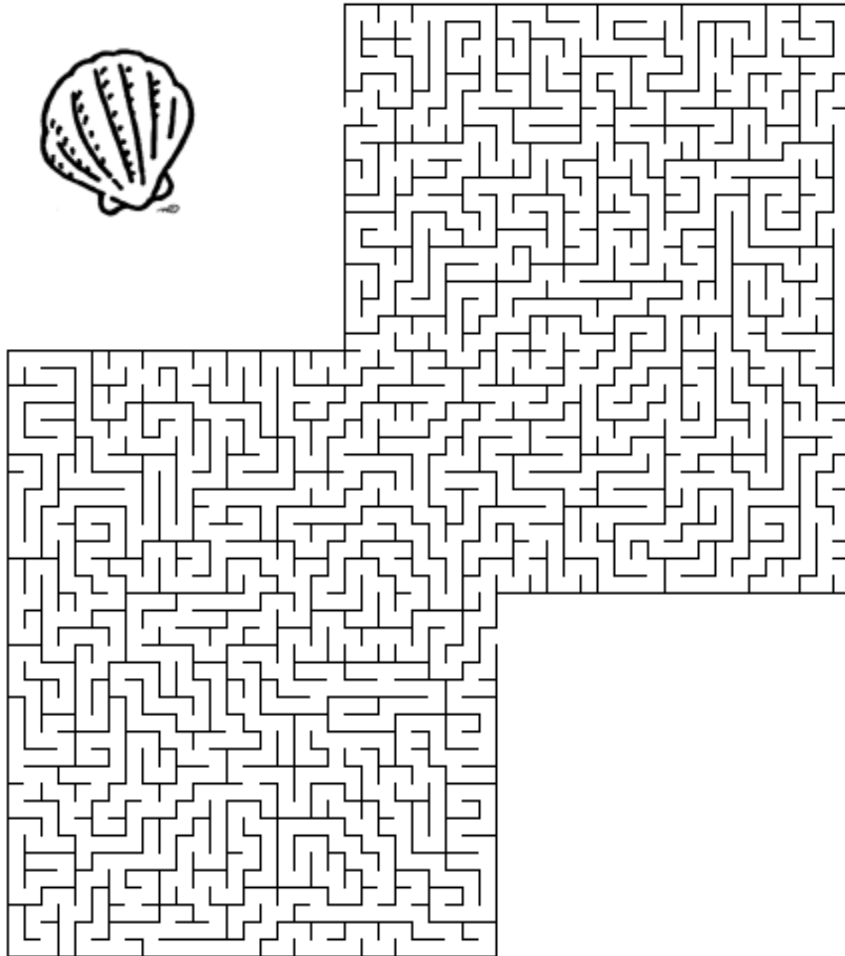
Activity Sheet No. 7

Average Water Conditions

Ocean	Temperature (Degrees °C)	pH	Salinity (ppt)
Pacific	28 to 30	7.3-7.9	38
Arctic	-3 to 3		34
Caribbean	27	8.2	34

Conch Migration

Nearshore



Offshore

