



Atlantic Ocean

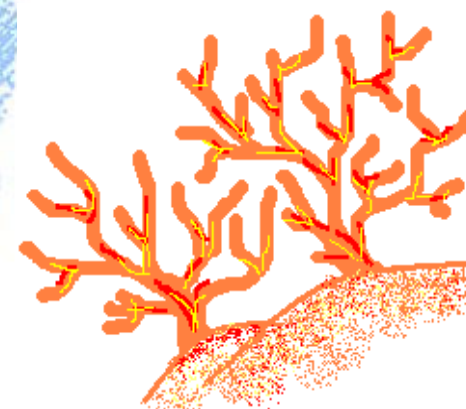


NOAA
CORAL REEF
CONSERVATION PROGRAM



Conserve Our Conch

St. John, USVI



Caribbean Sea



NOAA
FISHERIES SERVICE
SOUTHEAST FISHERIES SCIENCE CENTER

QUEEN CONCH LESSON PLAN



CLASSROOM PRESENTATION

Objective: By the end of this project, students will be able to:

- describe the life cycle of the queen conch
- describe the habitat types that queen conch use
- explain how queen conch grow and what their approximate age is by their shell length
- describe movement patterns of conch at different ages (life stages)

Grade Level: 7-10

Materials:

- none

Teaching Time: 30 minutes in the classroom

Background Information

Queen conch (*Strombus gigas*) are found throughout the Caribbean, into Florida, Bermuda, and central and South American waters. They are an extremely valuable fishery resource in the Caribbean, second only to the spiny lobster. Unfortunately, queen conch populations have consistently been declining since the 1970's. Past efforts to rebuild conch populations have included stopping all fishing for several years, catch restrictions, size restrictions, increased production of conch by aquaculture facilities, and outplanting of hatchery-raised conch into areas where they used to live.

Habitat Use

Small juvenile queen conch are primarily found in shallow waters (< 4 meters) in seagrass beds and mixed macroalgae plains, where they are able to locate abundant food and receive protection from predators. Habitat use patterns for larger juveniles seem to vary by region. In the U.S. Virgin Islands they can be found in seagrass beds, macroalgae plains, coral rubble, or sand. Adult queen

conch are typically found in macroalgae plains and sand flats in depths ranging from 5-20 meters.

Life Cycle

Adult conch in deeper water migrate inshore to spawn in shallower waters with clean sand substrate. Reproductive movements begin in the spring as water temperatures begin to increase and peak, in the Virgin Islands, from June to September. Fertilization is internal, and males and females may mate with multiple individuals during a single season. Females lay long egg masses (10-20 meters in length) over a 24-36 hour period, which are highly coiled and covered with sand grains. Each egg mass may contain anywhere from 300,000 to 700,000 individual eggs. Baby conch hatch in 3-5 days as *planktonic veligers*. They float in the water column for 20-30 days, drifting with the oceanic currents. In response to environmental cues (food, algae) they settle into historic nursery grounds and become *benthic* animals. Here they begin feeding on *epiphytes* growing on seagrass and macroalgae blades. *Postlarvae* bury in the sand among the seagrass roots and may remain there for up to 1 year.

Growth

Growth is highly variable and depends on a combination of environmental factors. Conch at 1 year of age can measure anywhere from 6-10 cm long. After 2 years they are between 11-17 cm, and after 3 years from 18-21 cm. Conch begin to mature after 3 years, during which growth in length slows and eventually stops, and only the lip continues to grow and thicken. Individuals can reproduce at 3.5-4 years of age, and are thought to live for 25-30 years although this is still largely unknown. Older conch actually decrease in shell length and body size, as their shell erodes and the lip continues to thicken.

Movement Patterns

Movement of conch less than 1 year old is minimal. They are thought to remain buried during the day and emerge from the sand only at night to feed. After 1 year of age, conch emerge from the sediment and begin to move about in seagrass and macroalgae habitats as they search for an adequate food supply. At this age, conch can move from 0-15 meters in a single day. Adult conch have been found to travel from 50-100 meters per day, especially during the peak of the reproductive season.

Links and Resources

Visit the following sites for additional information on queen conch.

http://www.nmfs.noaa.gov/fishwatch/species/queen_conch.htm

<http://www.caribbeanfmc.com>

<http://bellsouthpwp.net/c/u/culpsb/conchnews/welcome.html>

<http://www.savetheconch.org>

http://www.mda.cinvestav.mx/biblioteca/strombus/QueenConch_eng/g-introduccion_in.htm

<http://www.strombusgigas.com/index.html>

<http://www.floridakeystreasures.com/conch/conchpics.shtml>

http://www.fws.gov/international/DMA_DSA/CITES/animals/queen_conch.html

<http://www.communityconch.org>



Jennifer Doerr and Ron Hill
NOAA Fisheries Service
4700 Avenue U
Galveston, TX 77551
Contact: Jennifer.Doerr@noaa.gov



QUEEN CONCH LESSON PLAN



FISH BAY CONCH TRACKING PROJECT

Objective: By the end of this project, students will be able to:

- explain movement and migration patterns of various ages of queen conch in Fish Bay
- describe growth rates of queen conch
- explain how the size and age of queen conch influences their habitat selection patterns

Grade Level: 7-10

Materials:

- habitat maps of Fish Bay, USVI
- list of conch tag numbers (10 per student or group)
- tag number tracking charts

Teaching Time: 50 minutes in the classroom

Background Information

In general, queen conch utilize many different types of benthic habitats throughout their geographic range. For juveniles, these habitats include shallow seagrass beds, macroalgae plains, and occasionally sandy areas near mangrove prop roots. Smaller conch use these habitats not only for their plentiful food, but also as protection from predators (including sting rays, sea turtles, octopus, crabs, lobsters, and other snails). Adult conch can be found in a wide variety of habitats, but primarily occur in deeper water where there might be macroalgae, seagrass, clean sand, or coral rubble. There are few predators besides man that can consume an adult conch, so they may select a habitat more for its available food and reproductive potential.

Queen conch are widely distributed throughout much of Fish Bay. Very small juveniles (4-7 cm) are rarely seen, but are thought to bury themselves among the roots of the shallow seagrasses. Juveniles from 8-14 cm begin to move around and occupy seagrass beds and macroalgae within the central area of

Fish Bay. Large juveniles (15-22 cm) are found in these areas as well, but may be found in slightly deeper water (4-7 m). Adult conch (23+ cm) in Fish Bay can be found in seagrass, macroalgae, or sand habitats. Mature adults migrate into deep water (8-12 m) at the entrance to Fish Bay to reproduce and lay egg masses in clean sand. These reproductive migrations typically begin in the early spring as water temperatures begin to increase, and peak in August and September.

Classroom Activities

Tag numbers from 10 queen conch in Fish Bay will be assigned to each student, or group of students. Accompanying the tag numbers will be data on each individual conch including its shell length, lip thickness, tagging location, and habitat where it was found. Approximately once per month, students will receive updated information (shell length, lip thickness, location, habitat type) via email for each tagged conch. The information the students receive will simulate results from previous research completed in Fish Bay.

Exercise 1 – Growth

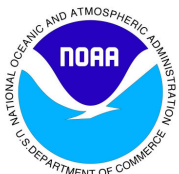
Have the students prepare a tracking chart listing each tag numbered conch with its accompanying physical data including shell length, lip thickness, location, and habitat type (depth?). When monthly updates are received, have each student enter the new information into their tracking chart. Using the date and length information given, students can calculate how much each conch grew in the time period between updates. Have them answer the following research questions:

- ✦ How much was the increase in shell length and lip thickness for each conch?
- ✦ What was the daily growth rate for each conch?
- ✦ Did certain sizes of conch grow more/faster than others?
- ✦ Did conch from any specific habitat type grow more/faster than others?

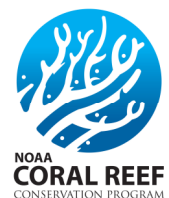
Exercise 2 – Movement Patterns

Using the given habitat and depth profile maps from Fish Bay, have the students plot the updated locations for each of their tagged conch. Have them answer the following research questions:

- ✦ Did your conch move to a new habitat type or stay in the same location?
- ✦ How far did each of your conch travel between locations?
- ✦ How far did each of your conch travel per day?



Jennifer Doerr and Ron Hill
NOAA Fisheries Service
4700 Avenue U
Galveston, TX 77551
Contact: Jennifer.Doerr@noaa.gov



Fish Bay Location, Depth, and Habitat Map



QUEEN CONCH LESSON PLAN



FISHING ACTIVITY RESEARCH PROJECT

Objective: By the end of this exercise, students will be able to:

- understand how to collect scientific data in a field setting.
- understand how to organize scientific data into a database.
- explain the effects of fishing activity on local populations of queen conch.
- describe ways to promote sustainable fishing practices among local fishermen.

Grade Level: 7-10

Materials:

- clipboard with data collection sheets
- pencils
- “Reg. Ruler”
- scissors or clippers
- baggies
- computer with spreadsheet software (e.g. Microsoft Excel)

Teaching Time: 30 minutes in the classroom, variable in the field

Background Information

Around the world, the long-term *sustainability* of many fisheries is threatened due to fishing practices and ecosystem damage. Overfishing and habitat destruction are thought to be the primary causes of the decline in population levels of queen conch throughout their geographic distribution, including the U.S. Virgin Islands. In order to insure that any fishery will exist for future generations, management organizations must continuously pass and update existing laws that regulate fishing activities.

Laws That Protect Queen Conch in the U.S. Virgin Islands (as of July 2009)

SIZE LIMITS:

- ✦ minimum size of 9 inch shell length or $\frac{3}{8}$ inch lip thickness
- ✦ NO HARVEST OR SALE of undersized conch (juveniles)

LANDING RESTRICTIONS:

- ✦ must be landed alive and whole in the shell
- ✦ no disposal of shell at sea
- ✦ no transport of conch meat out of the shell over open water

FISHING SEASON:

- ✦ season closed from June 1 to October 31
- ✦ possession of any conch during this period is illegal

CATCH LIMITS:

Territorial waters – shore to 3 miles offshore

- ✦ 6 per day per fisher, not to exceed 24 per boat per day (recreational)
- ✦ 200 per boat per day (commercial)

Federal waters – from 3 to 200 nautical miles offshore

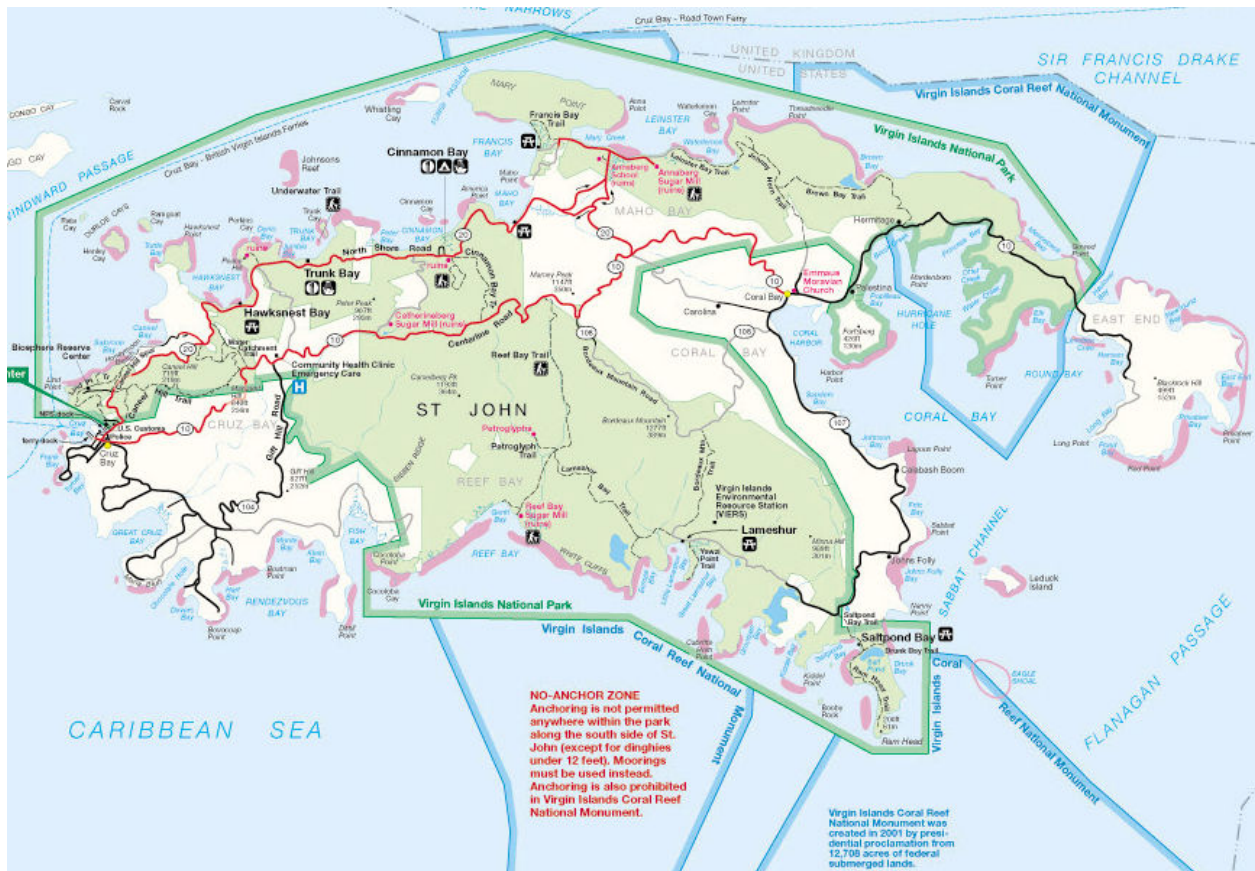
- ✦ 3 per day per fisher, or 12 per boat if there are more than 4 people on board (recreational)
- ✦ 150 per boat per day (commercial)
- ✦ no dive gear allowed

CAN be fished in the *Virgin Islands National Park* areas except *Trunk and Jumbie Bays* (see map for locations).

- ✦ Catch limit – 2 per day per fisher (recreational only)

CAN NOT be fished within the boundaries of the *Virgin Islands Coral Reef National Monument*.

CAN NOT be fished in *Frank Bay Pond* within the *Frank Bay Wildlife & Marine Sanctuary*.

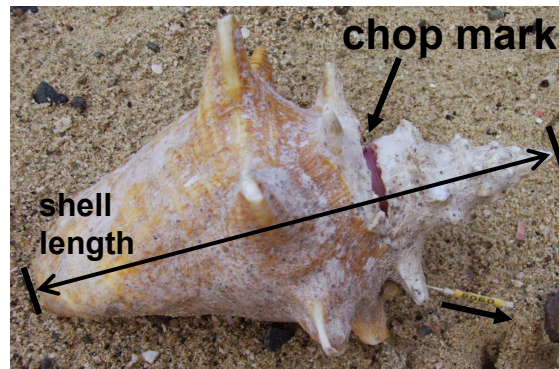


The types of habitats that queen conch live in, particularly around St. John, make them easy targets for fishers. These areas include shallow seagrass beds and mangrove prop roots, where juvenile conch are typically found. In order for managers to understand annual trends in population sizes, and decide if existing regulations need to be changed, they need to know how much and where fishing is happening. Since shorelines and mangrove beaches are common places to find fished shells, surveying these areas is an easy way of tracking fishing activities. Finding, recording, and reporting fished conch is an important part of making sure that queen conch are still around for future generations.

Field Activity

Divide the students into teams of 2 (or up to 4). One student will measure the shells, and the other will record the measurements onto a data sheet. Separate the teams along the shoreline and have each group survey the surrounding beach and mangrove prop roots for empty conch shells. To determine if each shell was fished, look for a slit near the top (see picture below), and then have the students look for acoustic tags, T-bar tags, or disk tags (there are pictures of each type on the Reg. Ruler). The T-bar tag will be the most common type

found, and may be encrusted with growth. This can be lightly scratched off with a thumbnail in order to read the tag number. Important: for T-bar tags, each tag number must be read beginning at the base and going toward the tip of the tag (see arrow on picture below).



Have the students record the tag number (if present), then clip off the tag with scissors and place in a baggie. Measure and record the length of each shell, from the tip of the spire to the bottom of the shell opening. Students may measure to the nearest centimeter or quarter of an inch. For large shells, have them check the lip thickness using the notch cut into the end of each Reg. Ruler. Once the shells have been measured, count the number of tagged and untagged shells and record the total. Then record the general location of the shells, and the date and time.

Classroom Activity

Have each group enter the data they collected into a spreadsheet format. Be sure they include their location, dates and times the data was collected, the number of conch they found, shell lengths, and tag numbers. E-mail the spreadsheet to Jennifer.Doerr@noaa.gov.

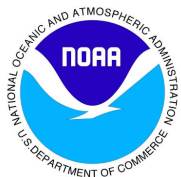
Groups can post the data as it's collected in their classroom or school building. New data sets can be added as more conch are found and measured over time. This will allow current and future field crews to determine if there are any long-term trends in the data. Possible questions for discussion include:

- ✦ Are conch being fished in the same bays and locations?
- ✦ Is there a certain size that is fished more than others?
- ✦ Are there certain times during the year when more fishing is seen?
- ✦ Based on the number of shells that are found, how do you think the population of conch in that bay is doing?
- ✦ What can be done to make sure that everyone is informed about fishing regulations?
- ✦ How can these laws be enforced?

Links and Resources

The complete USVI Commercial and Recreational Fishers Information Booklet is available online through the Division of Fish and Wildlife (DNRP-USVI) at <http://www.vifishandwildlife.com>.

Information on the USVI National Park and Coral Reef National Monument, including boundaries and fishing regulations, can be found at <http://www.nps.gov/viis>.



Jennifer Doerr and Ron Hill
NOAA Fisheries Service
4700 Avenue U
Galveston, TX 77551
Contact: Jennifer.Doerr@noaa.gov



FISHING REGULATIONS



U.S. Virgin Islands - St. John, St. Thomas, St. Croix
NOAA Fisheries Service - Fishery Ecology Branch - Galveston, TX



Whelk
must be larger
than this circle
to keep = 2 7/16"

Whelk
Season open
Oct. 1 to March 31

Red hind
Spawning area south of St. Thomas closed year round. Area east of St. Croix closed Dec. 1 to Feb. 28 each year.



Mutton snapper
Spawning area south of St. Croix closed March 1 to June 30 each year



Nassau grouper
No harvest in federal waters

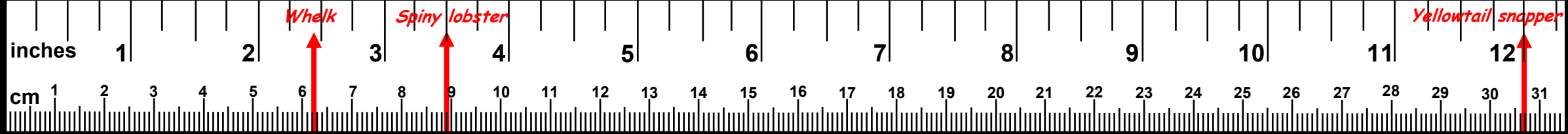


Yellowtail snapper
12" total length



Spiny lobster
Must be landed whole. Females with eggs must be returned to the water. No hooks, gigs or spear fishing. Carapace must be at least 3.5" long.

Goliath grouper
No harvest



Length 7-11 cm

T-bar tag

Length 13-17 cm

Acoustic tag

Length 20+ cm

Disk tag

Queen Conch *Strombus gigas*

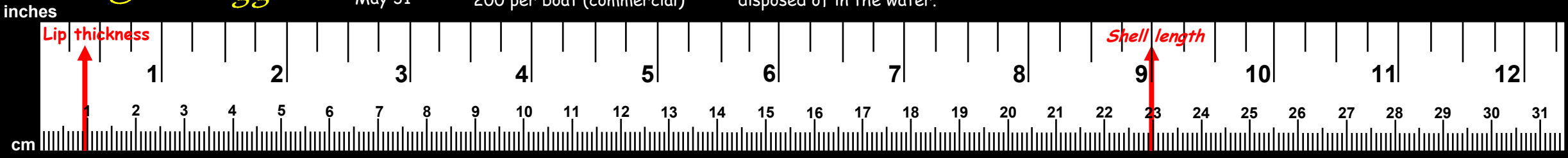
Season Open
November 1 to May 31

Max Catch Per Day
6 per person
24 per boat (personal)
200 per boat (commercial)

All Queen Conch
Must be landed in the shell.
Empty shells cannot be disposed of in the water.

Conch shell MUST be at least 9" long or have a lip thickness of 3/8"

To report offenders to local enforcement, call (340) 774-3320.



QUEEN CONCH LESSON PLAN



STUDENT AND TEACHER EVALUATION FORM

1. Did you learn anything about queen conch that you didn't already know?

YES NO

2. Is there anything we didn't discuss that you would like to learn more about?

YES NO

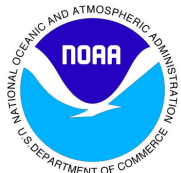
If yes, what:

3. Did you enjoy the classroom visits and/or field trip?

YES NO

4. If given the opportunity, would you like us to visit your classroom again?

YES NO



Jennifer Doerr and Ron Hill
NOAA Fisheries Service
4700 Avenue U
Galveston, TX 77551
Contact: Jennifer.Doerr@noaa.gov

