

Education

Fish Fun!



Photo by Joyce and Frank Burek

Grade Level

3-5

Timeframe

4 - 5 Hours

Materials

- Dry erase board and markers or substitute display
- Student Packets and/or Science Journals (1 per student)
- Fish pictures (1 each)
- Cut-outs of sea creature, weather, and ocean pictures (variety)
- Tweezers (3)
- Racquetball (3)
- Kitchen tongs (3)
- Pencils (1 per student)
- Plastic tubs with lids-12 qt. size is good (3)
- Uncooked rice
- Oil based modeling clay
- 2cm fishing bobber (12)
- 5cm fishing bobber (12)
- Paper towels
- Water
- FGBNMS Critter Collage (1 per student)
- Tape or magnets



Photo: Joyce and Frank Burek

Activity Summary

In this lesson, students will learn about three different types of mouths and eating styles in fish. They will also learn about the relationship between a fish's mouth and its eating style. There are four fun activities in this lesson to teach students about form and function.

Learning Objectives

Students will be able to:

- Demonstrate an understanding of the relationship between form and function among fish in reference to mouth size, shape, feeding style, and food choice (diet).
- Demonstrate an understanding of how different fish feeding styles fit into the larger concepts of food webs and ecosystems.
- Demonstrate an understanding of models and how they are used to represent elements of real life, as well as the limitations of models.

Background Information

Flower Garden Banks National Marine Sanctuary (FGBNMS) is a system of coral reefs found in the northwestern Gulf of Mexico. It is home to many animals, including over 200 species of fish! But is a fish simply a fish? Are all fish alike? Of course not! There are many similarities among fish, but there are also many differences.



Photo by G.P. Schmahl

Key Words

- Form
- Function
- Pickers
- Gulpers
- Snatchers
- Prey

Let's use fish mouths as an example. Animal mouths are generally used for eating, but they can be used in different ways. Sometimes, the size and shape of a mouth determine how it is used. This relationship is known in science as form and function. The size and shape of a mouth is considered form, and how the mouth is used is considered function.

The form and function of a fish mouth can have great impacts on a fish's life. Are all fish mouths the same? No way! So, are all feeding styles among fish the same? Not a chance!

Some mouths are tiny and have a puckered appearance; it almost looks like they are waiting for a kiss. These fish nibble small bits of food in a picking style and typically eat parasites or algae. Spanish hogfish have this type of mouth. As juveniles (youngsters), they pick off and eat parasites and dead scales from other fish. So, Spanish hogfish are pickers.

Other mouths are shaped like a frown when closed, but open quite wide. These fish swallow their food whole in a gulping fashion. Groupers have this type of mouth. Marbled groupers

swallow small fish and crustaceans (crabs and shrimp) whole. So, marbled groupers are gulpers. Still other mouths open like a hinge and are narrow with sharp teeth. Moray eels have this type of mouth. Goldentail morays snatch fish as they pass by then hold onto them with their teeth. If the prey happens to be too large to swallow whole, they use their teeth to cut dinner into smaller, bite-size pieces. So, goldentail morays are snatchers.

Why are feeding styles so important, anyway? Well, they help determine what food a fish can eat. Sometimes, these traits can also determine where fish are located on the food chain. For example, fish that use a picker feeding style eat small food particles. Picker fish are also usually small. This means they can become food for other fish that can eat them whole, like a grouper that uses a gulper feeding style. In turn, the grouper can be eaten by a fish that is capable of biting him into smaller pieces. Which fish is able to do this? The eel that uses a snatcher style can.

Mouth size, shape, and feeding style also influence where a fish lives. After all, a fish needs to live close to its food source.

In summary, we know that all fish are not the same. Mouth shape and size (form) relate to feeding styles (function) of fish and this can impact what a fish eats, its position in the food chain, and where it lives. Will you ever look at a fish mouth the same way again?

Vocabulary

Form – The size and shape of a fish's mouth

Function – How a fish's mouth is used

Pickers – Fish that have tiny puckered mouths, and eat by nibbling small bits of food in a picking style

Gulpers – Fish that have mouths shaped like a frown, when closed, and swallow their food whole in a gulping fashion

Snatchers – Fish that have narrow, hinged mouths with sharp teeth, and eat by grabbing their prey then using their teeth to tear food into smaller pieces, if needed

Preparation

- Collect and prepare materials as noted in the Appendices
- Print FGBNMS Critter Collages

Learning Procedure

Activity 1 – Engage:

Students will...

- compare and contrast pictures of different fishes focusing on the animals' mouths,
- make funny fish faces as they model fish mouths.
- look at the models for the *Explore* activity and note similarities and differences, and
- come to a consensus of which tool represents which fish.

Materials needed...

- Appendix 1 fish pictures
 - Appendix 2 mouth models
 - Dry erase board and markers
 - Science journals and/or student packets
 - Pencils
1. Place a picture of each fish (Appendix 1) on the board and have students make observations about the fish, paying close attention to the mouths. Write these observations on the board under the corresponding picture or have students come up to the board to list their comments.

2. Discuss with the students the feeding style that each fish uses and list these under each picture. Show video clips, if available.
 - a. Spanish hogfish – picker
 - b. Marbled grouper – gulper
 - c. Goldentail moray eel – snatcher
3. Lead the students in making funny fish faces that represent each fish, its mouth, and its feeding style. Be creative and have fun!
4. Distribute mouth models (Appendix 2) and have students examine them. Have a discussion about each model and how it could be used to represent a fish mouth. How are these models similar? How are they different?
5. Have the class compare each model with each fish mouth. As a class, come to a consensus about which tool represents which fish based on the similarities. The correct models for each fish are as follows:
 - Spanish hogfish – tweezers
 - Marbled grouper – racquet ball
 - Goldentail moray eel – kitchen tongsUse prompting to lead students to these determinations if they do not get there on their own.
6. Add the correct model for each fish to the list on the board.
7. Have students copy the information from the board into their science journals or complete Student Sheet #1 from the Student Packet.
8. If possible, keep the information in a visible format (i.e. on board, poster, chart, or Smartboard) for the duration of this lesson.

Activity 2 – Explore:

Students will...

- explore the roles that mouth size and shape play in feeding styles and food choice, and
- document their findings.

Materials needed...

- Appendix 1 fish pictures
- Appendix 2 mouth models
- Appendix 3 food models
- Appendix 4 stations
- Paper towels
- Water
- Science journals and/or student packets
- Pencils

NOTE: Prepare feeding stations ahead of time. Add water beforehand, then add the food models when the activity begins. It helps to experiment with this activity before having students do it. If it's a nice day, take the activity outside to minimize clean-up.

1. Start with a review of each fish, its feeding style, and the model that was selected to represent it.
2. Briefly discuss the food models and what they represent.
3. Give a short version of instructions and expected behavior for the activity.
4. Group students and assign each group to its first feeding station.
5. Have students individually predict which mouth model will be the most effective at collecting the food at their station.
6. Give students time to try out all mouth models at their station. As students collect food, they may place it on the tub lid or a paper towel. Students may use repeated dips to collect as much food as possible but may not use the sides/bottom of container, hands, or a scooping motion. If students try these

“illegal” methods, remind them that they are testing how a fish would eat and fish can't use hands to catch food, or something to that effect.

7. After every student has tried each of the mouth models at his/her station, have the students record their observations and rankings for each tool on Student Sheet #2.
8. Rotate groups to their next station.
9. Repeat this process until every student has been to all three stations and tried all three models, recording their data along the way.

Activity 3 – Explain:

Students will...

- analyze and attempt to interpret their findings,
- explain how mouth size and shape impact what food can be eaten by fish,
- discuss how the models are similar to and different from real life, and
- discuss the benefits of using models.

Materials needed...

- Appendix 2 mouth models
- Appendix 5 reading passage
- Science journals and/or student packets
- Pencils

1. Begin with a brief review of the previous *Explore* activity.
2. Help students analyze their data by asking them questions such as, “Which feeding style was the most effective at collecting large fish?”
3. In discussion, have the students relate the data they collected with mouth size and shape and the types of food that can be eaten by fish. Make sure they relate the models in the activity to real-life fish and food.

Corresponding fish and food are as follows:

- Spanish hogfish – parasites and algae
- Marbled grouper – small fish

- Goldentail eel – large and small fish
4. Models are not always an accurate representation. If results from the *Explore* activity do not accurately reflect these relationships, discuss and identify possible reasons why with the students.
 5. Have students compare the results with their predictions. How did they do?
 6. Ask students to add the fish's food to Student Sheet #1 from the *Engage* activity.
 7. Have students read and discuss Student Sheet #3 (same information as the *Introduction* in this lesson plan).
 8. Have the students discuss and explain how the models were similar to and different from real life. How well did the models represent fish mouths? How well did the models represent feeding styles?
 9. Have students discuss the benefits of using models.
 10. Have students complete Student Sheet #4.

Activity 4 – Elaborate:

Students will...

- extend their understanding of this topic to other animals in the ocean,
- brainstorm possible effects that mouth size and shape may have on where animals live or where they fit in a food web, and
- participate in a class storytelling activity that features fish, what they eat, and where they can be found based on what they eat.

Materials needed...

- FGBNMS Critter Collage or other pictures of fish
- Cut-outs of fish, sea creatures, weather, ocean features, etc.
- Dry erase board and markers
- Tape or magnets

- Science journals and/or student packets
 - Pencils
1. Begin with a brief review of the previous activities.
 2. Show students pictures of other fish and ask them to make observations about these fish. (Suggestions: Flower Garden Banks National Marine Sanctuary fish species list at <http://flowergarden.noaa.gov/about/fishlist.html> or the Critter Collage at http://flowergarden.noaa.gov/document_library/edddocuments.html)
 3. Ask students to compare the mouths of the new fishes to those of the fishes represented in earlier activities. Have the students direct you in grouping the new fish with the previous fish based on mouth shape and suspected feeding styles.
 4. Discuss the results.
 5. Ask students to brainstorm the possible effects of mouth size and shape. How does this affect their diet? Does it affect where they live? Does it affect their position in the food chain? How far reaching are the effects of mouth shape and size? How does form and function play into the “big picture”? Write down their thoughts on the board.
 6. Have students copy the results of the brainstorming session into their science journals or on a piece of paper.
 7. Explain to students that they will now use what they have learned to tell a group story. Give instructions and behavioral expectations for the storytelling activity. This activity is in the style of “pass-the-story.
 8. Students will have multiple characters to choose from including: fish, coral, crustaceans, ocean, weather, etc. These characters used together will help students learn about ecosystems.
 - You may start the story and then pass it to a student.
 - Each student should contribute at least

one line before passing it on. They may choose any character that has not yet been chosen, modify a character that has already been placed in the story, or simply add to the plot.

- Encourage stories that are funny, scary, original, etc. but make sure students include feeding styles and diet.
 - Characters can eat other characters as long as they stick to the correct diet (this will help students learn about food chains and food webs).
9. Have a place for the story to unfold (a dry erase board works well) and place the cut-outs so that students can see them (fix them to the board with magnets or tape). An example is provided in Appendix 6. As students add to the story, have them come up to the board to animate their part with the characters. They can even use markers on the board to help with the action.
 10. Students should have fun with this and may want to do it several times, making different stories. Encourage lots of creativity!

Activity 5 – Evaluate:

Students will...

- create their own short stories to demonstrate their understanding of the relationships between form and function learned in this lesson.

Materials needed...

- FGBNMS Critter Collage
- Cut-outs of fish, sea creatures, weather, ocean features, etc.
- Appendix 6 creative writing rubric
- Paper
- Pencils

1. Give a copy of the Critter Collage to each student or group of students to serve as a list of characters. The evaluation will be individual so make sure students are only sharing the character list and not their thoughts.
2. Review what was learned over the course of this lesson.
3. Have students write their own creative stories. The main character of each story must be one of the three fish pictured in Appendix 1 (Spanish hogfish, marbled grouper, or goldentail moray eel). Other characters may be used to support the story. The story should demonstrate that the student understands the relationship between form and function among fish as it relates to mouth size, shape, feeding style, and food choice.
4. Give students a copy of the grading rubric (Appendix 6) and go over it with them before they start. This allows them to know what you expect and how they will be graded.
5. Determine the length of the story based upon your students' abilities.
6. If a student finishes early, have him/her draw a picture to go along with the story.

Connections to Other Subjects

- English Language Arts

Related Links

Flower Garden Banks National Marine Sanctuary
<http://flowergarden.noaa.gov>

FGBNMS Critter Collage
http://flowergarden.noaa.gov/document_library/edocs/collage.pdf

National Marine Sanctuaries
<http://sanctuaries.noaa.gov>

For More Information

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Education Standards

National Education Standards	<ul style="list-style-type: none">• Science: NS. K-4.1 Science as Inquiry• Science: NS. K-4.3 Life Science• Science: NS. 5-8.1 Science as Inquiry• Science: NS. 5-8.3 Life Science• English: NL-ENG. K-12.4 Communication Skills• English: NL-ENG. K-12.5 Communication Strategies• English: NL-ENG. K-12.12 Applying Language Skills
Texas Essential Knowledge and Skills (TEKS)	<ul style="list-style-type: none">• Science: 3.3C Represent the natural world using models and identify their limitations, including size, properties, and materials.• Science: 3.10A Explore how structures and functions of plants and animals allow them to survive in a particular environment.• Science: 4.3C Represent the natural world using models and identify their limitations, including size, properties and materials.• Science: 4.10A Explore how adaptations enable organisms to survive such as comparing birds' beaks and leaves on plants.• Science: 5.10A Compare the structures and functions of different species that help them live. • English, Language Arts and Reading: 3.18 Write imaginative stories that build the plot to a climax and contain details about the character and setting.• English, Language Arts and Reading: 3.30 Listening and Speaking/Speaking.• English, Language Arts and Reading: 3.31 Listening and Speaking/Teamwork.• English, Language Arts and Reading: 4.16A Write imaginative stories that build the plot to a climax and contain details about the character and setting.• English, Language Arts and Reading: 4.28 Listening and Speaking/Speaking.• English, Language Arts and Reading: 4.29 Listening and Speaking/Teamwork.• English, Language Arts and Reading: 5.16A Write imaginative stories that include:<ul style="list-style-type: none">○ a clearly defined focus, plot, and point of view;○ a specific, believable setting created through the use of sensory details; and○ dialogue that develops the story
Ocean Literacy Principles	<ul style="list-style-type: none">• 5. The ocean supports a great diversity of life and ecosystems.

Acknowledgements

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GISD Summer Island Adventure Camp, Parker Elementary School

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If you have any questions or need additional information, email flowergarden@noaa.gov

Appendix 1 – Fish Pictures



Spanish Hogfish: Photo by Joyce and Frank Burek



Marbled Grouper: Photo by Joyce and Frank Burek

Appendix 1 (continued)



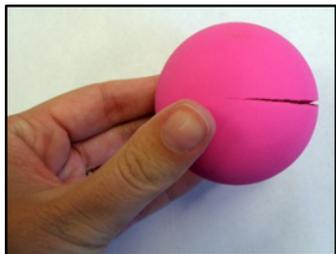
Goldentail Moray Eel: Photo by Joyce and Frank Burek

Appendix 2 – Mouth Models

Spanish Hogfish - Picker



Goldentail Moray Eel - Snatcher



Marbled Grouper – Gulper

Cut a slit in the middle of a racquet ball circling halfway around. A box cutter was used to cut this ball. **BE CAREFUL WITH THE BLADE!** To open the mouth, simply press on either side.

Appendix 3 – Food Models

Parasites and Algae – oil based modeling clay rolled in uncooked rice. A ball of clay can represent coral with algae on it and a fish shaped piece of clay can represent a fish with parasites. Use either one or both of these for Feeding Station #1.



Small and Large Fish – small and large fishing floats.



Appendix 4 – Station Set-up



This is the basic set-up for each of the three feeding stations. The lid can be used as a mini work area, which helps to keep water from getting everywhere.

Each feeding station will have a different food. Feeding Station #1 is parasites and algae. Feeding Station #2 is small fish. Feeding Station #3 is large fish.

Fill each tub with about 3 inches of water (or enough to cover the clay in Feeding Station #1).

Have students work in groups at each station to complete this activity.

<u>Feeding Station #1</u>	<u>Feeding Station #2</u>	<u>Feeding Station #3</u>
Parasites and Algae	Small Fish	Large Fish
<ul style="list-style-type: none"> - Plastic tub with lid next to it - Small ball of modeling clay (approx. 1-2 inches diameter) rolled firmly in rice - models for each fish - paper towels 	<ul style="list-style-type: none"> - Plastic tub with lid next to it - 12 small fishing floats - Models for each fish - Paper towels 	<ul style="list-style-type: none"> - Plastic tub with lid next to it - 12 large fishing floats - Models for each fish - Paper towels

Appendix 5 – Example of Pass-the-Story



Appendix 6 – Creative Writing Rubric

	5-4	3-2	1-0
Understanding: The student demonstrates an understanding of the relationship between form and function among fish as it relates to <u>mouth size</u> , <u>shape</u> , <u>feeding style</u> , and <u>food choice</u> .	Excellent Shows evidence of understanding all parts. Includes all four underlined concepts in the story.	Moderate Shows evidence of some understanding. Includes two or three underlined concepts in the story.	Poor Shows little or no evidence of understanding. One or no underlined concepts are used in the story.
Creativity	Very Creative	Some Creativity	Little or No Creativity
Length: The student meets length requirements set by the instructor.	Meets minimum length	Does not meet minimum length	No effort shown
Grammar and Spelling: The student meets grade appropriate levels	Satisfactory	Mostly Satisfactory	Non Satisfactory

Total _____ / 20

Fish Fun! Student Sheet 1

List your observations for each fish mouth. Then list the tool that best represents each mouth.

Spanish Hogfish	Marbled Grouper	Goldentail Moray Eel
		
Photo by Joyce and Frank Burek	Photo by Joyce and Frank Burek	Photo by Joyce and Frank Burek
Feeding Style:	Feeding Style:	Feeding Style:
Observations:	Observations:	Observations:
Tool:	Tool:	Tool:

Fish Fun! Student Sheet 2

As a group, use the mouth models at each station to pick up food. Write down your observations in the spaces provided. In the boxes, give each fish mouth model a number based on how well it works. (1 = good, 2 = fair, 3 = bad.) You may use the numbers more than once.

Station #1 Algae and Parasites (rice)

Make observations for the eel (snatcher).

Make observations for the grouper (gulper).

Make observations for the Spanish hogfish (picker).

Station #2 Small Fish (small fishing floats)

Make observations for the eel (snatcher).

Station #2 Small Fish continued (small fishing floats)

Make observations for the grouper (gulper).

Make observations for the Spanish hogfish (picker).

Station #3 Large Fish (large fishing floats)

Make observations for the eel (snatcher).

Make observations for the grouper (gulper).

Make observations for the Spanish hogfish (picker).

Fish Fun! Student Sheet 3

Flower Garden Banks National Marine Sanctuary (FGBNMS) is a system of coral reefs found in the northwestern Gulf of Mexico. It is home to many animals, including over 200 species of fish! But is a fish simply a fish? Are all fish alike? Of course not! There are many similarities among fish, but there are also many differences.

Let's use fish mouths as an example. Animal mouths are generally used for eating, but they can be used in different ways. Sometimes, the size and shape of a mouth determine how it is used. This relationship is known in science as form and function. The size and shape of a mouth is considered form, and how the mouth is used is considered function.

The form and function of a fish mouth can have great impacts on a fish's life. Are all fish mouths the same? No way! So, are all feeding styles among fish the same? Not a chance!

Some mouths are tiny and have a puckered appearance; it almost looks like they are waiting for a kiss. These fish nibble small bits of food in a picking style and typically eat parasites or algae. Spanish hogfish have this type of mouth. As juveniles (youngsters), they pick off and eat parasites and dead scales from other fish. So, Spanish hogfish are pickers.

Other mouths are shaped like a frown when closed, but open quite wide. These fish swallow their food whole in a gulping fashion. Groupers have this type of mouth. Marbled

groupers swallow small fish and crustaceans (crabs and shrimp) whole. So, marbled groupers are gulpers.

Still other mouths open like a hinge and are narrow with sharp teeth. Moray eels have this type of mouth. Goldentail morays snatch fish as they pass by then hold onto them with their teeth. If the prey happens to be too large to swallow whole, they use their teeth to cut dinner into smaller, bite-size pieces. So, goldentail morays are snatchers.

Why are feeding styles so important, anyway? Well, they help determine what food a fish can eat. Sometimes, these traits can also determine where fish are located on the food chain. For example, fish that use a picker feeding style eat small food particles. Picker fish are also usually small. This means they can become food for other fish that can eat them whole, like a grouper that uses a gulper feeding style. In turn, the grouper can be eaten by a fish that is capable of biting him into smaller pieces. Which fish is able to do this? The eel that uses a snatcher style can.

Mouth size, shape, and feeding style also influence where a fish lives. After all, a fish needs to live close to its food source.

In summary, we know that all fish are not the same. Mouth shape and size (form) relate to feeding styles (function) of fish and this can impact what a fish eats, its position in the food chain, and where it lives. Will you ever look at a fish mouth the same way again?



Spanish Hogfish



Goldentail Moray Eel



Marbled Grouper

Photos by Joyce & Frank Burek



Fish Fun! Student Sheet 4

Answer each question.

1. Which fish is the best at eating parasites and algae? Why?
2. Which fish is the best at eating large fish? Why?
3. If the Spanish hogfish (picker) had a larger mouth, do you think it could eat larger food? Why or why not?
4. Was the grouper (gulper) able to catch any large fish? Would it be able to swallow and eat these large fish? Why or why not?
5. How does a fish's mouth size and shape relate to the type of food it can eat?

Fish Fun! Student Sheet 1 Answer Key

List your observations for each fish mouth. Then list the tool that best represents each mouth.

Spanish Hogfish	Marbled Grouper	Goldentail Moray Eel
		
Photo by Joyce and Frank Burek	Photo by Joyce and Frank Burek	Photo by Joyce and Frank Burek
Feeding Style: Picker	Feeding Style: Gulper	Feeding Style: Snatcher
Observations: Student observations will vary Small Doesn't open very much Eats parasites and algae	Observations: Student observations will vary Medium to large Some teeth Shaped like a frown Eats small fish and crustaceans	Observations: Student observations will vary Long Narrow Sharp Teeth Eats small and large fish
Tool: Tweezers	Tool: Racquet Ball	Tool: Kitchen Tongs

Fish Fun! Student Sheet 2

Answer Key

As a group, use the mouth models at each station to pick up food. Write down your observations in the spaces provided. In the boxes, give each fish mouth model a number based on how well it works. (1 = good, 2 = fair, 3 = bad.) You may use the numbers more than once.

Station #1 Algae and Parasites (rice)

- 3** Make observations for the goldentail eel (snatcher).
Answers will vary.
The goldentail eel was not very good at picking up the parasites. The mouth was too big and the parasites were too small.
- 3** Make observations for the marbled grouper (gulper).
Answers will vary.
The marbled grouper's mouth was too big to pick up the tiny parasites.
- 1** Make observations for the Spanish hogfish (picker).
Answers will vary.
The Spanish hogfish was the best at picking up the small parasites and algae. This mouth was small enough to pick up the food easily.

Station #2 Small Fish (small fishing floats)

- 1** Make observations for the goldentail eel (snatcher).
Answers will vary.
The goldentail eel snatched up the small fish easily.
- 1** Make observations for the marbled grouper (gulper).
Answers will vary.
The marbled grouper was able to swallow the small fish whole.
- 3** Make observations for the Spanish hogfish (picker).
Answers will vary.
The Spanish hogfish's mouth was too small to pick up the small fish and eat them

Station #3 Large Fish (large fishing floats)

1 Make observations for the goldentail eel (snatcher).
Answers will vary.
The goldentail eel was the only one with a big enough mouth to catch the large fish.

3 Make observations for the marbled grouper (gulper).
Answers will vary.
The marbled grouper's mouth was too small to catch and eat the large fish.

3 Make observations for the Spanish hogfish (picker).
Answers will vary.
The Spanish hogfish's mouth was too small to catch and eat the large fish.

Fish Fun! Student Sheet 3

Sample Answers

Answer each question.

1. Which fish is the best at eating parasites and algae? Why?

The Spanish hogfish is the best at eating parasites and algae because it has a small mouth and can easily pick off the small food particles.

2. Which fish is the best at eating large fish? Why?

The goldentail eel is the best at eating large fish because it has a large mouth that opens like a hinge. It is easy to pick up large fish.

3. If the Spanish hogfish (picker) had a larger mouth, do you think it could eat larger food? Why or why not?

Yes, the Spanish hogfish would be able to eat larger food if it had a larger mouth. Fish that have big mouths are able to eat big items. Fish that have small mouths are limited to eating small items.

4. Was the grouper (gulper) able to catch any large fish? Would it be able to swallow and eat these large fish? Why or why not?

Yes, the grouper caught large fish but it wouldn't be able to swallow and eat them because they did not fit completely into its mouth.

5. How does a fish's mouth size and shape relate to the type of food it can eat?

Fish that have large mouths are able to eat large food items and fish that have small mouths are able to eat small food items.