



Why Stripers Go by Liz Duff

Learning Goals:

Concept: Ocean biology provides many unique examples of life cycles, adaptations, and important relationships among organisms (such as symbiosis, predator-prey dynamics and energy transfer) that do not occur on land.

Objectives:

Timeframe: (Prep, implementation)

Prep: 30 minutes to review the materials.

Implementation: One Class time.

Grade Level(s): Middle School and High School

Engaging Experience: Look at a map of the country and discuss: Why do you think the striped bass travel from as far south as Maryland to Massachusetts?

Materials: On-Line Video at <http://www.massaudubon.org/saltmarsh/fish.php>
Print worksheets for students.

Facilitation Guidelines: Have students take notes on the worksheet as they watch the video. Discuss the answers at the end.

Assessment: You may choose to use the handout as a quiz.

Connections to Frameworks:

Life Science Gr. 3-5 Adaptations of Living Things, Energy and Living Things, Life Science Gr. 6-8 Living Things & Their Environment, 13, 14, H.S. Ecology 6.3

Vocabulary: abundance, anesthetic, caloric, coastal migratory stock, distribution, ectotherm, estuary, foraging, gastric lavage, invertebrates

Handouts (attached):



“Why Stripers Go” Vocabulary

Abundance: The number of individuals in a stock or a population.

Anesthetic: a drug that causes temporary loss of bodily sensations

Caloric: a measurement of energy in your food!

Coastal Migratory Stock: Striped Bass that migrate north each year and then migrate south to spawn.

Distribution: In biology, the range or distribution of a species is the geographical area within which that species can be found.

Ectotherm: An organism that regulates its body temperature largely by exchanging heat with its surroundings. Scientists used to call this a “cold-blooded” animal.

Estuary: Coastal water body where ocean tides and river water merge;

Foraging: Act of searching for food

Gastric Lavage: Stomach pumping

Invertebrates: Animals lacking a backbone or spinal column; not vertebrate.

“Bass Habitat Use” Vocabulary:

Acoustic telemetry: Telemetry is the science and technology of automatic measurement and transmission of data by wire, radio, or other means from remote sources. Acoustic means sound.

Angling: fishing with a hook and line (and usually a pole)

Contingent: a group forming part of a larger group

Estuary: Coastal water body where ocean tides and river water merge;

Foraging: Searching for food

Migratory: animals that move seasonally

Natal Ground: Area of water where fish come each year to produce their eggs.

Schoolie: “Teenager” fish, probably not spawning. 3-5 years old

Spawn: To produce or deposit (eggs), as fishes or frogs do.

Spawning or Natal Ground: Area of water where fish come each year to produce their eggs.

Telemetry: The science and technology of automatic measurement and transmission of data by wire, radio, or other means from remote sources.

Trajectory: the path that a moving object follows as it moves.

Name _____

Date _____

Why Stripers Go Part 1

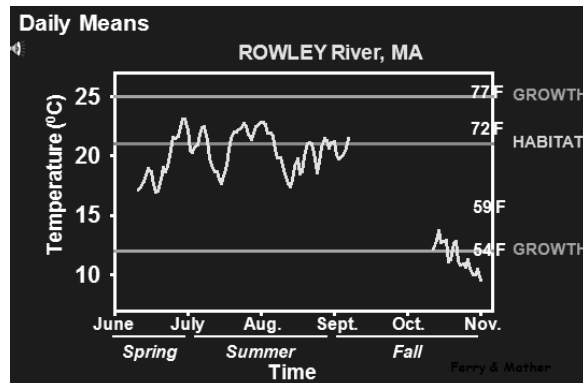
1. What kind of scientist is Dr. Martha Mather? _____
2. What Long Term Ecological Research Group is Dr. Mather working in partnership with?

3. Where are most striped bass born?
 - a. _____
 - b. _____
 - c. _____
4. What percent of striped bass are currently born in each location.
 - a. 80-85% born in the _____
 - b. 15% born in the _____
 - c. Just making a comeback in the _____
5. Temperature affects how much striped bass _____ and how fast they _____
6. **In Lab:** What temperatures are the range in which striped bass grow well?

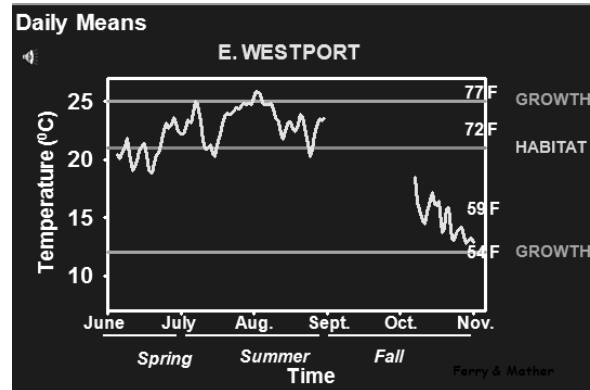
7. **In field:** What temperature have fish selected?

8. What two seasons have the best temperatures for striped bass in Rowley?

9. It's too cold for optimal growth of striped bass in what month?



10. On this graph, what month(s) reach temperatures that are too warm for optimal striped bass growth in East Westport?



11. What does gastric lavage mean? _____

12. What question are the scientists trying to answer by doing gastric lavage?

13. What fish do striped bass eat only in the spring? _____

14. If those fish populations declined, how might that impact striped bass?

15. What are striped bass eating?

a. _____

b. _____

c. _____

Name _____

Date _____

Why Stripers Go Part 2

1. What question are the fish ecologists investigating?

2. What are some factors that might affect this?

- a. _____
b. _____
c. _____

3. What are ways that physical conditions change in an estuary?

4. When do striped bass feed the most?

_____ and _____

5. What are some conditions that change with changes in season?

6. How many fish had their stomachs pumped for this study?

7. What do striped bass eat in Plum Island Sound each season?:

Spring: _____

Summer _____

Fall: _____

8. What is another study these scientists are interested in? _____

9. Why do you think people care about striped bass?

10. What are three things you learned?

11. Two questions you have?

12. Do you think you would like to be a fish ecologist? Why or why not?

13. What are ways people impact fish?

Negatively: _____

Positively

Name _____

Date _____

Why Stripers Go Part 1

1. What kind of scientist is Dr. Martha Mather? Fish Ecologist
2. What Long Term Ecological Research Group is Dr. Mather working in partnership with?

Plum Island

3. Where are most striped bass born?

a. Chesapeake Bay

b. Delaware Bay

c. Hudson River

4. What percent of striped bass are currently born in each location.

a. 80-85% born in the Chesapeake Bay

b. 15% born in the Delaware Bay

c. Just making a comeback in the Hudson River

5. Temperature affects how much striped bass can eat and how fast they grow

6. **In Lab:** What temperatures are the range in which striped bass grow well?

54° F. to 77° F.

7. **In field:** What temperature have fish selected?

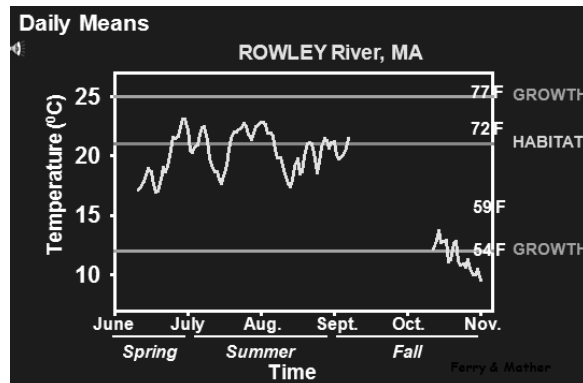
72° F.

8. What two seasons have the best temperatures for striped bass in Rowley?

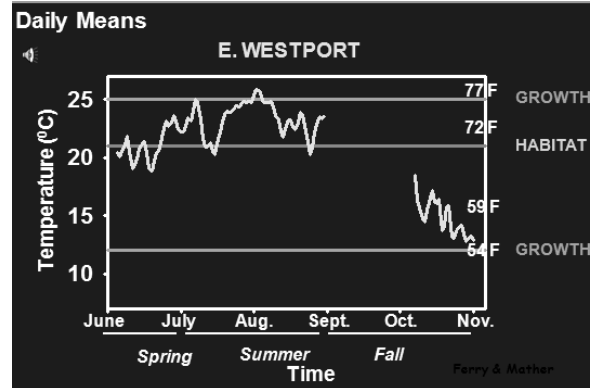
Spring & Summer

9. It's too cold for optimal growth for striped bass in what month?

November



10. On this graph, what month(s) reach temperatures that are too warm for optimal striped bass growth in East Westport?



11. What does gastric lavage mean? stomach pumping

12. What question are the scientists trying to answer by doing gastric lavage?

What are striped bass eating?

13. What fish do striped bass eat only in the spring? River herring

(FYI: These are also known as alewives. They arrive in the spring to spawn upstream in rivers.)

14. If those fish populations declined, how might that impact striped bass?

This answer is not in the video. Answers will vary. The bass populations may decline, they may need to go elsewhere in the spring. They may need to eat other things. Bass populations may still grow but may be limited at some future point.

15. What are striped bass eating?

a. crabs, shrimp, fish.

Name _____

Date _____

Why Stripers Go Part 2

1. What question are the fish ecologists investigating?

Why are striped bass distributed the way they are?

2. What are some factors that might affect this?

Temperature and diet, weather, food quantity, food quality, size of the environment, distance needed to travel, how crowded it is (competition for food) predation.

3. What are ways that physical conditions change in an estuary?

Water movement. (There may be higher feeding rewards when tides concentrate prey.)

Amount of light

4. When do striped bass feed the most?

dawn and dusk

5. What are some conditions that change with changes in season?

Different foods are available in different seasons.

Temperature changes.

6. How many fish had their stomachs pumped for this study?

4000

7. What do striped bass eat in Plum Island Sound each season?:

Spring: Shrimp

Summer: Invertebrates: shrimp, green crabs,

A few fish (menhaden)

Fall: Lots of fish, example: sand lance



8. What is another study these scientists are interested in? How are fish that stay distributed in the estuary? Are they distributed randomly or clumped in “hot spots”.

9. Why do you think people care about striped bass? (Answers will vary)

10. What are three things you learned? (Answers will vary)

11. Two questions you have?

12. Do you think you would like to be a fish ecologist? Why or why not?

13. What are ways people impact fish?

Negatively: Answers will vary. Some answers include: Overharvesting, pollution including allowing chemicals to enter oceans and estuaries via storm drains, withdrawing too much water, warming temperatures, habitat destruction, global warming, increased threat of disease, invasive species.

Positively

Answers will vary. People are restocking fish to try to restore fish populations, researching fish to try to learn how to help them, preventing pollution with storm drain stencils, setting fish limits to allow fish populations to rebound.

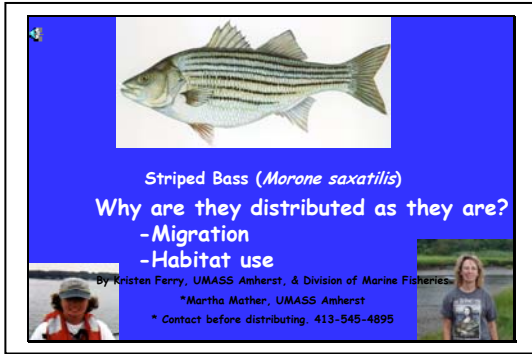
Suggested Reading: *Striper Wars* by Dick Russell

An American Fish Story The remarkable story of how one species was brought back from the brink of extinction – only to face new and even more daunting threats...

<http://www.amazon.com/exec/obidos/ASIN/1597260908/howardfastwebsit>

Name _____
 Date _____

Slide 1



What kind of scientist is Dr. Martha Mather?

Distribution: In biology, the range or distribution of a species is the geographical area within which that species can be found.

Abundance: The number of individuals in a stock or a population.

Foraging: act of searching for food
 What Long Term Ecological Research Group is Dr. Mather working in partnership with?

Slide 2



Slide 3



Where are most striped bass born?

Estuary: Coastal water body where ocean tides and river water merge;

Why Stripers Go Name _____ Date _____

Slide 4



Slide 5



What percent of striped bass are currently born in each location.

80-85% born in the _____

15% born in the _____

Just making a comeback in the _____

Coastal Migratory Stock: Striped Bass that migrate north each year and then migrate south to spawn.

Temperature affects how much striped bass _____ and how fast they _____

Scientists used to call **ectotherms** “coldblooded”.

Slide 6

Temperature

Why is this important?

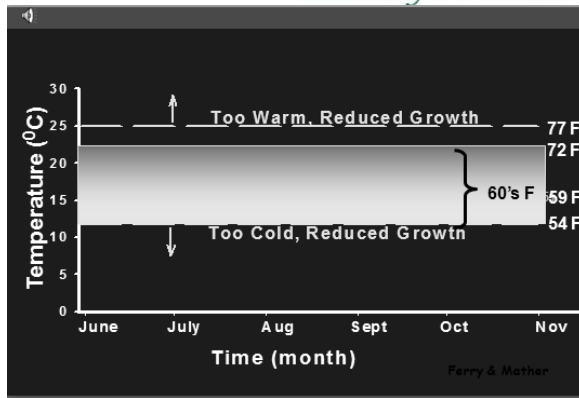
Fish are ectotherms and temperature affects consumption and growth.

What temperatures are important?

Ectotherm: An organism that regulates its body temperature largely by exchanging heat with its surroundings.

Ferry & Mather

Slide 7



Lab Study:

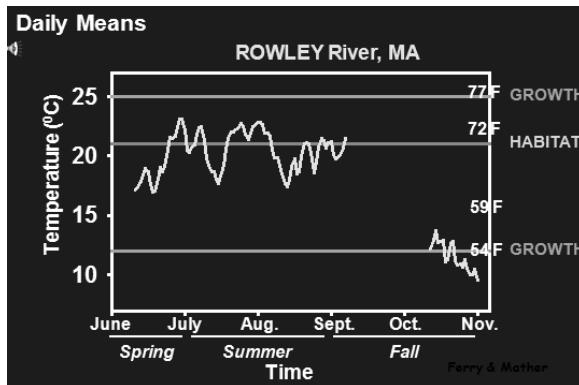
What temperatures are the range in which striped bass grow well?

If adequate food.

In field:

What temperature have fish selected?

Slide 8

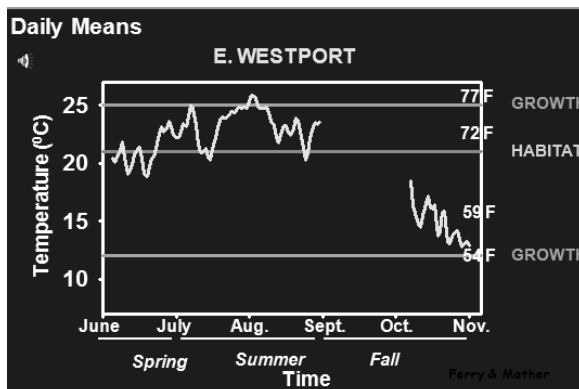


Continuously recording thermometers collected this data.

What two seasons have the best temperatures for striped bass in Rowley?

Too cold in what month?

Slide 9



On this graph, what months reach temperatures that are too warm for optimal striped bass growth in East Westport?

Slide
10



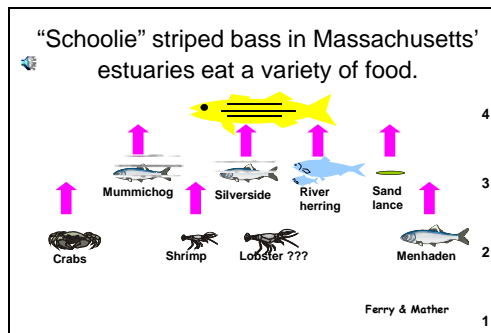
What does gastric lavage mean? _____

What question are the scientists trying to answer by doing gastric lavage?

Anesthetic: a drug that causes temporary loss of bodily sensations

What fish do striped bass eat only in the spring? _____

Slide
11



If those fish populations declined, how might that impact striped bass?

Slide
12



What are striped bass eating?

End of Part 1

Why Strippers Go Part 2

Slide
14

RESTAURANT / TRAVEL GUIDE Ferry & Mather

HUMAN FACTOR	FACTOR	STRIPED BASS
Weather (Sun icon)	Weather	
All you can eat just \$3.99	Food Quantity	Food Quantity (Fork and knife vs Fish icon)
vs ★★★★★	Food Quality	Food Quality (Fork and knife vs Fish icon)
Las Vegas: 100 mi Rio: 1000 mi	Desirability	Desirability (Small fish vs Large fish icon)
	Distance	Distance (Small fish vs Large fish icon)
	Crowds	
Health/Safety Concerns (Warning sign icon)	Health/Safety Concerns	

Estuary: Coastal water body where ocean tides and river water merge

Caloric: a measurement of energy in your food!

What question are the fish ecologists investigating?

What are some factors that might affect this?

Slide
15

Tide x Light Conditions Ferry & Mather

Light	Tide			
	Flood	High Slack	Ebb	Low Slack
Crepuscular (Dawn)				
Light				
Crepuscular (Sunset)				
Dark				

What are ways that conditions change?

When do striped bass feed the most?

Slide
16

Prey availability changes with time, tide, and season Ferry & Mather

Spring (May-June)
Summer (July-Aug.)
Fall (Sept.-Oct.)

What are some conditions that change with changes in season?

Slide
17



How many fish had their stomachs pumped for this study?

What do striped bass eat each season:

Spring: _____

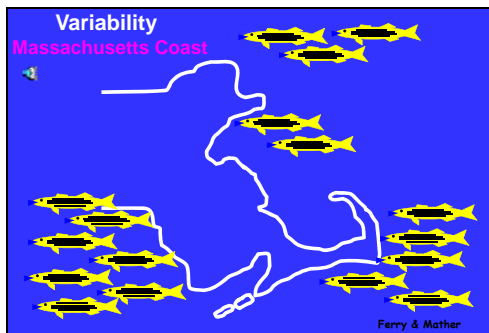
Summer _____

Fall: _____

Invertebrates: Animals lacking a backbone or spinal column; not vertebrate.

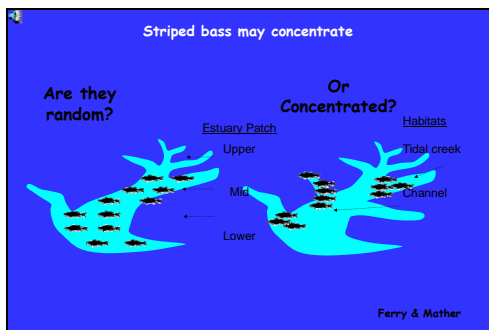
Caloric: a measurement of energy in your food!

Slide
18

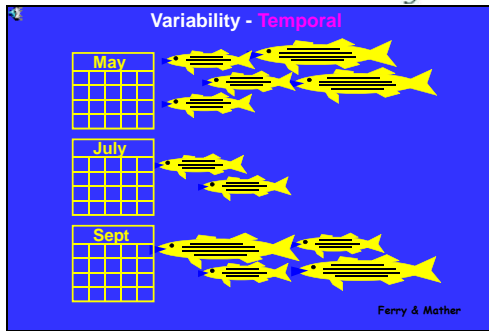


What is another study these scientists are interested in? _____

Slide
19



Slide
20



Slide
21



To think about

- Why are fish distributed as they are?
- Why do we care?
- What does this variability mean
 - For science?
 - For management?
 - For general human use?

Why do you think people care about striped bass?

What are three things you learned?

Two questions you have?

Would you like to be a fish ecologist? Why or why not?


What are ways people impact fish?

Positively

Negatively:



Why Stripers Go Answers

Slide 1



Striped Bass (*Morone saxatilis*)
Why are they distributed as they are?
-Migration
-Habitat use

By Kristen Ferry, UMASS Amherst, & Division of Marine Fisheries.
*Martha Mather, UMASS Amherst
* Contact before distributing. 413-545-4895

What kind of scientist is Dr. Martha Mather?

Fish Ecologist

Distribution: In biology, the range or distribution of a species is the geographical area within which that species can be found.

Abundance: The number of individuals in a stock or a population.

Foraging: act of searching for food

What Long Term Ecological Research Group is Dr. Mather working in partnership with?

Plum Island

Slide 2



Slide 3



Where are most striped bass born?

Chesapeake Bay

Delaware Bay

Hudson River

Estuary: Coastal water body where ocean tides and river water merge;

Slide 4



Humans travel seasonally and select some habitats over others.

Why Stripers Go Answers

Slide

5



What percent of striped bass are currently born in each location.

80-85% born in the Chesapeake Bay

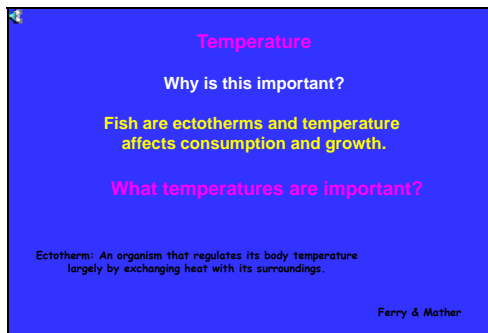
15% born in the Hudson River

Just making a comeback in the Delaware Bay

Coastal Migratory Stock: Striped Bass that migrate north each year and then migrate south to spawn.

Slide

6



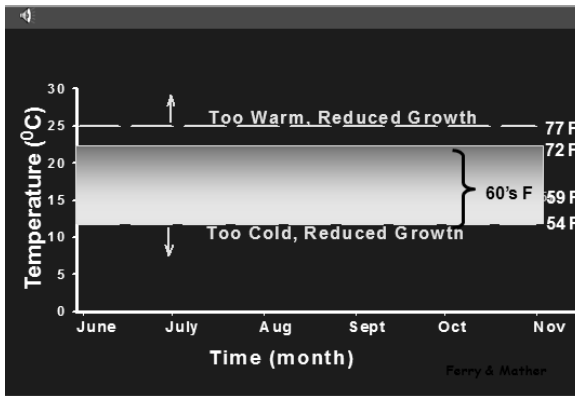
Temperature affects how much striped bass

can eat and how fast they grow

Scientists used to call **ectotherms** "coldblooded".

Slide

7



Lab Study:

What temperatures are the range in which striped bass grow well? 54°F to 77°F

If adequate food.

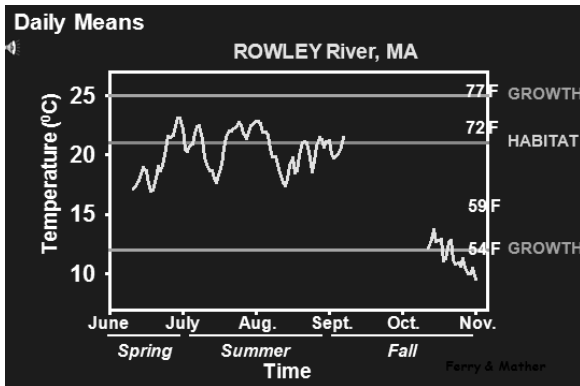
In field:

What temperature have fish selected?

72° F

Why Stripers Go Answers

Slide 8



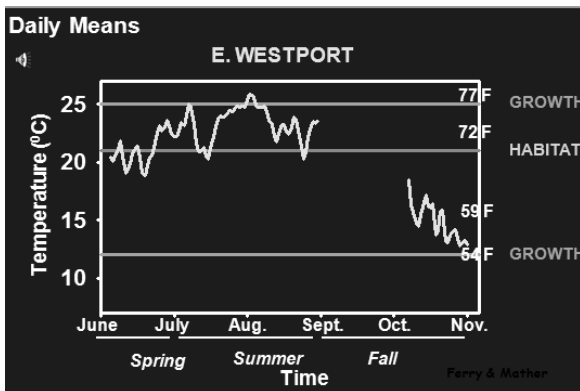
Continuously recording thermometers collected this data.

What two seasons have the best temperatures for striped bass in Rowley? Spring & summer

The graph shows it is too cold for striped bass in what month?

November

Slide 9



On this graph, what months reach temperatures that are too warm for optimal striped bass growth in East Westport?

July and August

Slide 10



What does gastric lavage mean?_

stomach pumping

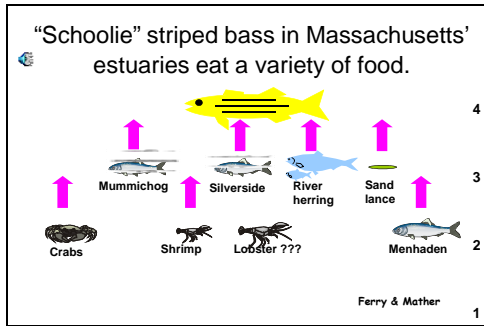
What question are the scientists trying to answer by doing gastric lavage?

What are striped bass eating?

Anesthetic: a drug that causes temporary loss of bodily sensations

Why Stripers Go Answers

Slide 11

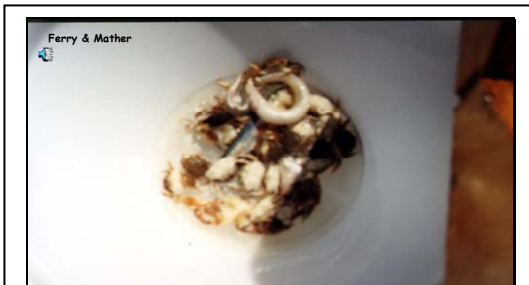


What fish do striped bass eat only in the spring? River herring

If those fish populations declined, how might that impact striped bass?

This answer is not in the video. Answers will vary: The bass populations may decline, they may need to go elsewhere in the spring, they may need to eat other things. Bass populations may still grow but may be limited at a certain point.

Slide 12



What are striped bass eating? crabs, shrimp, fish

End of Part 1

Why Stripers Go Part 2

Slide 14

RESTAURANT / TRAVEL GUIDE

HUMAN FACTOR	STRIPED BASS
Weather	Weather
Food Quantity	Food Quantity
Food Quality	Food Quality
Desirability	Desirability
Distance	Distance
Crowds	Crowds
Health/Safety Concerns	Health/Safety Concerns

Ferry & Mather

What question are the fish ecologists investigating?

Why are striped bass distributed the way they are ?

What are some factors that might affect this? Temperature and diet, (And all the things listed to the left.)

Estuary: Coastal water body where ocean tides and river water merge

Caloric: a measurement of energy in your food!

Why Stripers Go Answers

Slide 15

Tide x Light Conditions

Light	Tide			
	Flood	High Slack	Ebb	Low Slack
Crepuscular (Dawn)				
Light				
Crepuscular (Sunset)				
Dark				

Ferry & Mather

What are ways that conditions change? Water movement.

(such as higher feeding rewards when tides concentrate prey.)

When do striped bass feed the most?

dawn and dusk.

Crepuscular: active in low

light: describes fish and land mammals that are active at dusk and dawn, when the light level is low

What are some conditions that change with changes in season?

Different foods are available in different seasons and temperature changes.

Slide 16



Slide 17



How many fish had their stomachs pumped for this study?

4000

What do striped bass eat each season:

Spring: Invertebrates (shrimp)

Summer Invertebrates shrimp/green crabs, A few fish: menhaden

Fall: Lots of Fish: Sand lance.

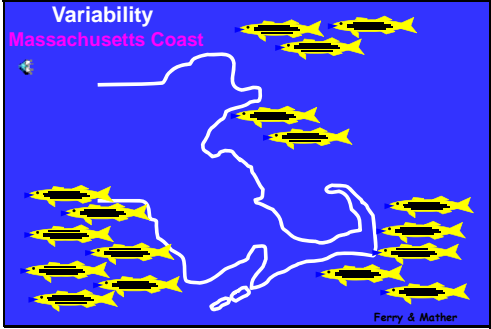
Invertebrates: Animals lacking a backbone or spinal column; not vertebrate.

Caloric: a measurement of energy in your food!

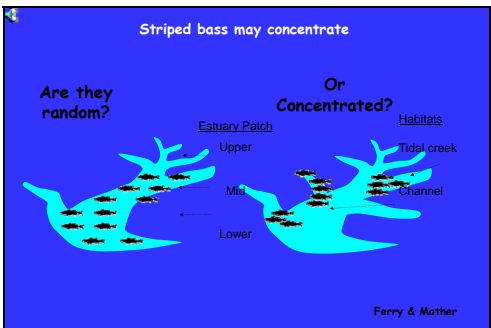
Shrimp have fewer calories than fish.

Why Stripers Go Answers

Slide 18

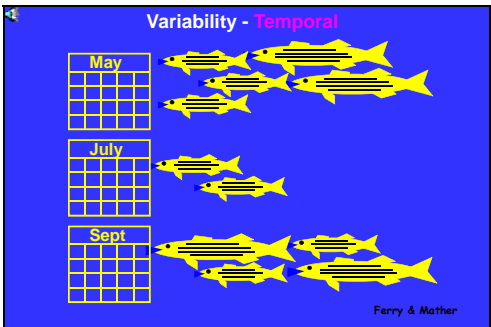


Slide 19



What is another study these scientists are interested in? How are fish that stay distributed in the estuary? Are they distributed randomly or clumped in hot spots?

Slide 20



Why Stripers Go Answers

Slide
21

To think about

- Why are fish distributed as they are?
- Why do we care?
- What does this variability mean
 - For science?
 - For management?
 - For general human use?

Ferry & Mather

Why do you think people care about striped bass?

Slide
22



Answers will vary. Discuss with class.

What are three things you learned?

Two questions you have?

Would you like to be a fish ecologist? Why or why not?

What are ways people impact fish? (Discuss, and/or have students research further.)

Negatively: Answers may include: Overharvesting, pollution (including allowing chemicals to enter the ocean and estuaries via storm drains). Withdrawing too much water, Warming temperatures decrease how much oxygen water holds and can harm fish. Habitat destruction, global warming leading toncreased diseases etc.

Positively: Answers may vary

People are restocking fish to try to restore fish populations, researching fish to try to learn how to help