

SEINING THE RIVER WILD

LESSON OVERVIEW

OBJECTIVE

Students will identify the parts of a fish and the purpose each feature serves.

RECOMMENDED GRADE LEVELS

4-8

DURATION

30-60 minutes

MATERIALS

- East River Fish print outs (provided)
- East River Identification Guide (provided)
- Fish Anatomy student worksheet (provided)
- White paper and lined paper
- Pencils, crayons, or markers
- Optional: construction paper, scissors, glue, sequins, pipe cleaners, toothpicks, glitter, foam, clay

TOPIC BACKGROUND

During your field trip to Brooklyn Bridge Park, students will be exploring and learning about the ecology of East River estuary. An **estuary** is a special name given to a body of brackish water. **Brackish** water is a mix of saltwater and freshwater. The brackish water creates a very unique environment for a variety of organisms. Many fish even **migrate** to estuaries to breed or lay eggs.

Historically, the New York Harbor has been polluted by humans. Oil from ships, chemicals from factories, and

plastic debris are a few examples of pollutants in the waterways. Since the early 1970's, scientists and communities have worked together to clean these waterways. Overtime there has been an increase in species **biodiversity** (variety of species) and **populations** (number of species).

There are over 100 species of fish and invertebrates in the East River. Some examples of estuary **invertebrates** are crabs, snails, clams, mussels, and shrimp.

GETTING READY

Activity 1:

1. Prepare a classroom board with a picture of an unlabeled fish or venn diagram.
2. **Optional:** Print one copy of the Fish Anatomy worksheet for each student.
3. Print & cut east river fish (be sure to cut away fish name)

Activity 2:

1. Print, fold, and assemble copies of the "Fish Identification Guide"

Activity 3:

1. Print copies of Fish Morphology and Function for students to review.
2. Collect art materials for fish design such as paper, crayons or colored pencils, scissors, glue, sequins, glitter, pipe cleaners, and/or clay.

ACTIVITY 1: INTRODUCTION TO FISH ANATOMY

1. Draw or put a picture up on the board of a fish without any labels.
**Modifications: you could also form a Venn Diagram of fish vs human instead of labeling a fish on the board.*
2. Ask students if they can think of any similarities between the bodies of humans and bodies of a fish. Begin to label things they might mention such as, eyes, mouth, nostrils, or spine. Next ask them to think of other body parts unique to fish and what purpose these serve. Answers include: fins (help to swim and balance), scales (provide protection), gills (extracts oxygen, allows the fish to breathe). See teacher guide on pages 6-8 for in-depth anatomy guide.
**Optional: Have students each complete the fish anatomy worksheet during the discussion or as a take home.*
3. Explain to students that we usually can tell different types of fish apart from one another by focusing on (1) the position, size, and presence of a fish's various **fins**, (2) by looking at the **face** to observe the positioning of mouth and eyes, and (3) the fish's **form** or overall body shape. We call these the 3 F's for Figuring Out a Fish.
4. Give each student one fish picture. Have them examine their fish for a few moments individually to make observations about the fins, form, and face of their fish. Then turn and talk to a neighbor and share out some observations they made. For younger students, concentrate on features such as fish color, patterns, and shape instead of mouth and fin positions.

ACTIVITY 2: USING A DICHOTOMOUS KEY TO DISTINGUISH FISH

1. Place students into small groups of 2 or 3. Give each group an East River fish and an East River Identification Guide (Note: Multiple groups will be identifying the same fish because there are only 6 different types of fish provided.) If students have already been examining a fish card, consider switching up the cards so every group has a new fish to look at.
2. Explain that teams will work together to answer questions about their fish using the guide, also known as a **dichotomous key**. Each page will have two options; it is up to the students to decide which answer best describes their fish and follow the directions on the page to turn to, accordingly. Eventually students will reach an end where their fish will be identified and pictured.
3. Page 1 of the booklet includes directions on how to use the dichotomous key. It is best to go over these directions with the entire class before breaking them up into their groups.
4. Create columns on the board with the 6 fish names. Have students come up and tape their fish under the identification they determined. Discuss any misidentifications and ask students to share one or two features about their fish that helped lead them to their identification (i.e. the questions they had to answer in their dichotomous key such as eye placement, snout present, body shape, and number of fins.)

PROCEDURE CON'T

ACTIVITY 3: FISH DESIGN

1. Take a deeper dive into fish anatomy by using the 2 page sheet, Fish Morphology and Function. Have students read along to learn the ways different body parts can influence fish behavior and movement.
2. Challenge students to design their own fish. Remind students to be thinking about the 3 F's and what benefit each feature provides the fish.
3. Provide students paper and coloring materials. If resources permit, consider giving students the options of using additional materials such as construction paper, sequins or glitter, googly eyes, clay, toothpicks, pipe cleaners, etc.
4. Require students to write a few sentences (or few paragraphs) describing their fish's form and function. Descriptions should include details on: number of fins and fin shape, mouth shape, body shape, coloration, diet, and habitat.

RECOMMENDED VIDEO

Seining the River (How we will fish during your field trip!)

<https://www.youtube.com/watch?v=fhPM5CbL4z0>

RECOMMENDED BOOKS

- *DK Eyewitness Books: Fish* by Steve Parker
- *Biome Beasts: Estuary Animals About* by Lisa Colozza Cocca

RECOMMENDED WEBSITES

Clearwater's Key to Common Hudson River Fishes

An Interactive, Digital Dichotomous Key !

<http://clearwater.org/fishkey>

NYS DEC Hudson River Estuary

<https://www.dec.ny.gov/lands/4923.html>

East River Crew Estuary Guide

<http://bit.ly/ERCGuide>

The River Project

<https://www.riverprojectnyc.org/>

TEACHER NOTES:

ADDITIONAL VOCABULARY

Biodiversity: The variety of life in a particular habitat or ecosystem.

Brackish: Slightly salty water; the mixture of river water and seawater in estuaries.

Camouflage: The use of any combination of materials, coloration, or illumination for concealment, either by making animals or objects hard to see or by disguising them as something else. Animals often camouflage to hide from predators or to sneak up on prey.

Ecosystem: a biological community of interacting organisms and their physical environment.

Estuary: A semi-enclosed body of water containing both fresh and salt water.

Habitat: The area or environment where an organism or ecological community normally lives or occurs.

Horizontal: Moving across or a left to right movement. Horizontal lines are parallel to the horizon.

Migrate: To move from one region or habitat to another. Animals migrate to find food or more livable conditions. Some animals migrate to breed.

Population: A group of organisms of a species that live in the same place at a same time.

Vertical: An up and down movement. Vertical lines are perpendicular to the horizon.

***View Fish Anatomy Teacher's Guide on the following pages for additional terminology.

STANDARDS

COMMON CORE ELA

- Reading Informational Text
- Speaking and Listening
- Literacy in Technical Subjects
- Literacy in Science
- Writing Standards

COMMON CORE MATH

- Counting and Cardinality
- Ratios & Proportional Relationships

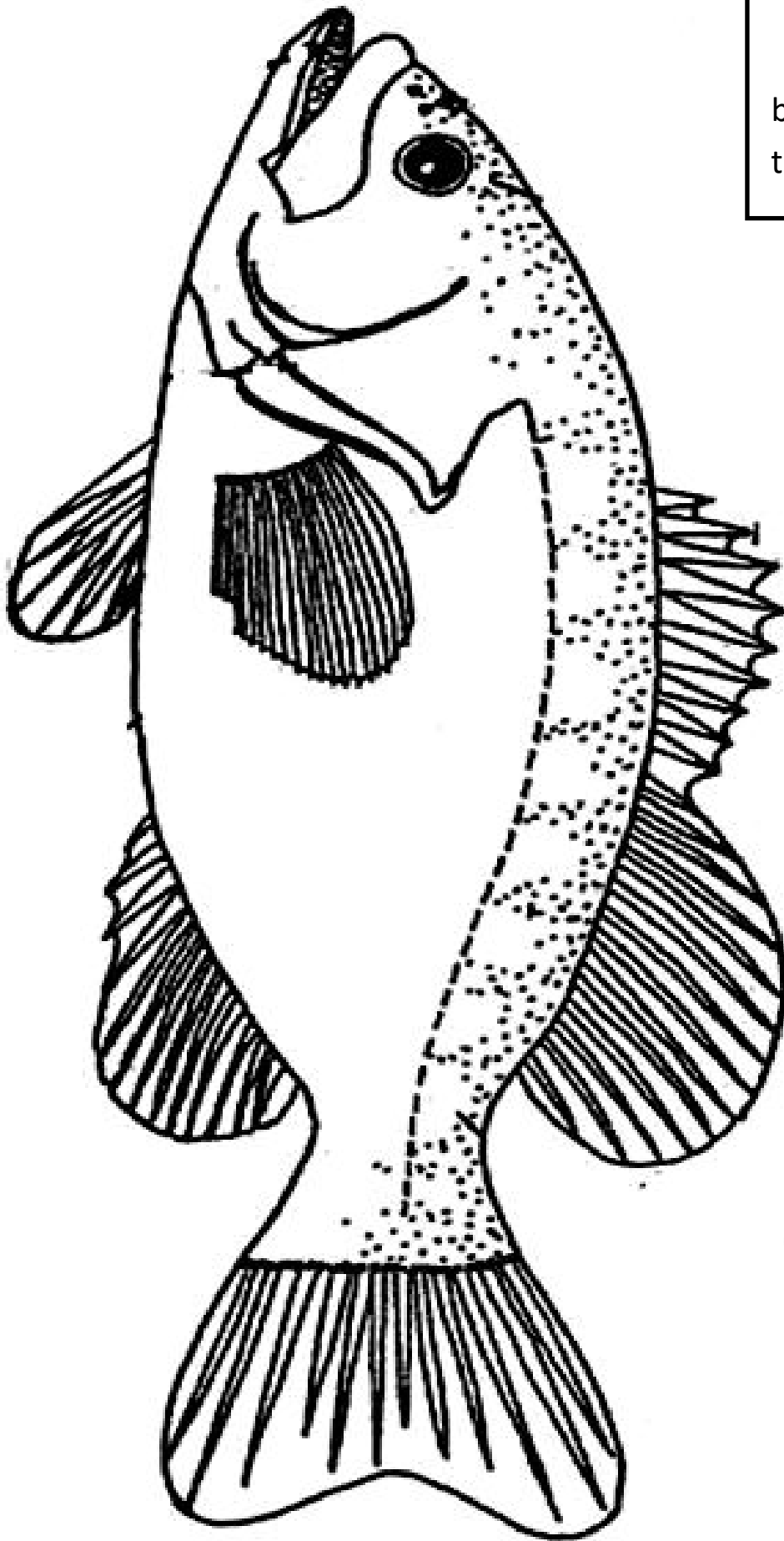
NYC K-8 SCIENCE & SOCIAL STUDIES SCOPE & SEQUENCE

- Animals, Plants in their Environments
- The Nature of Science
- Exploring Ecosystems
- Diversity of Life
- Interdependence
- Animal Diversity
- Plant and Animal Adaptations

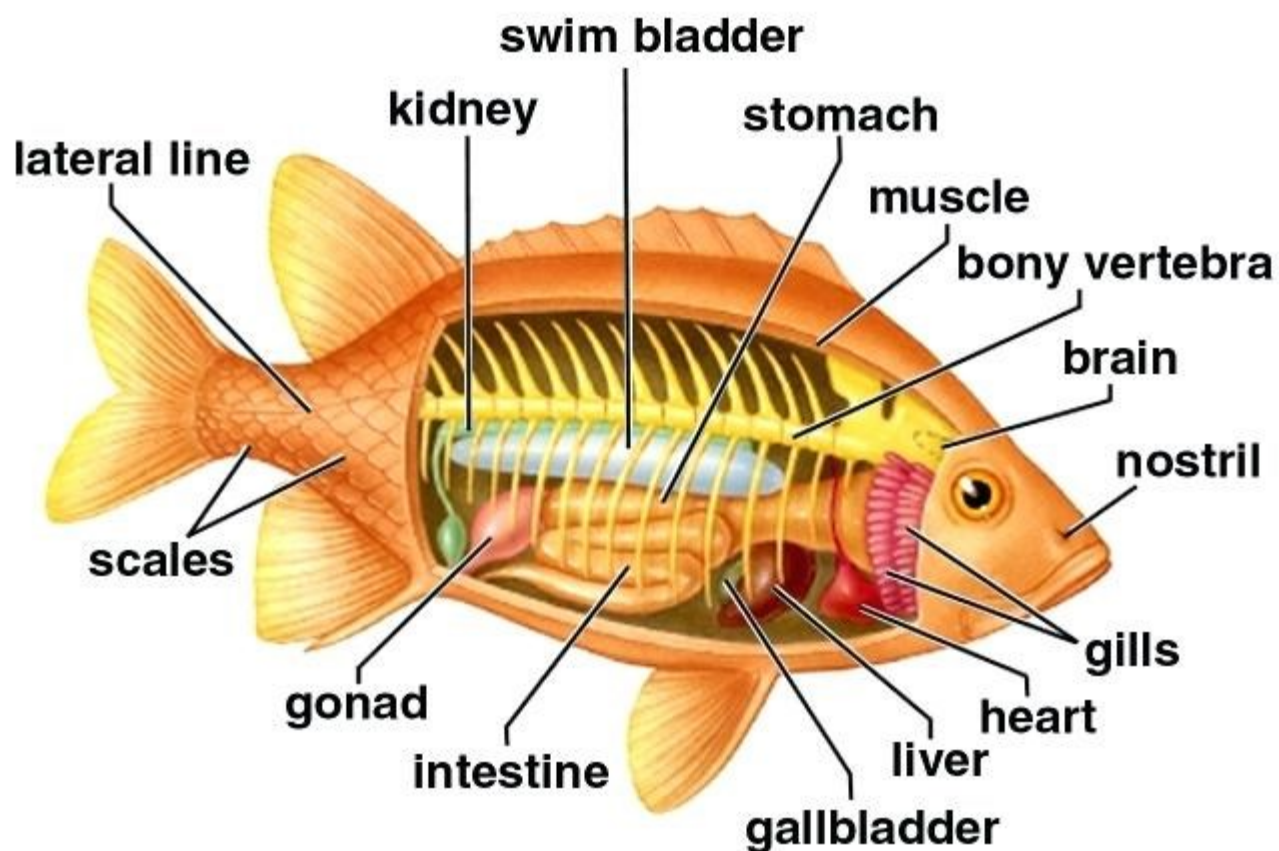
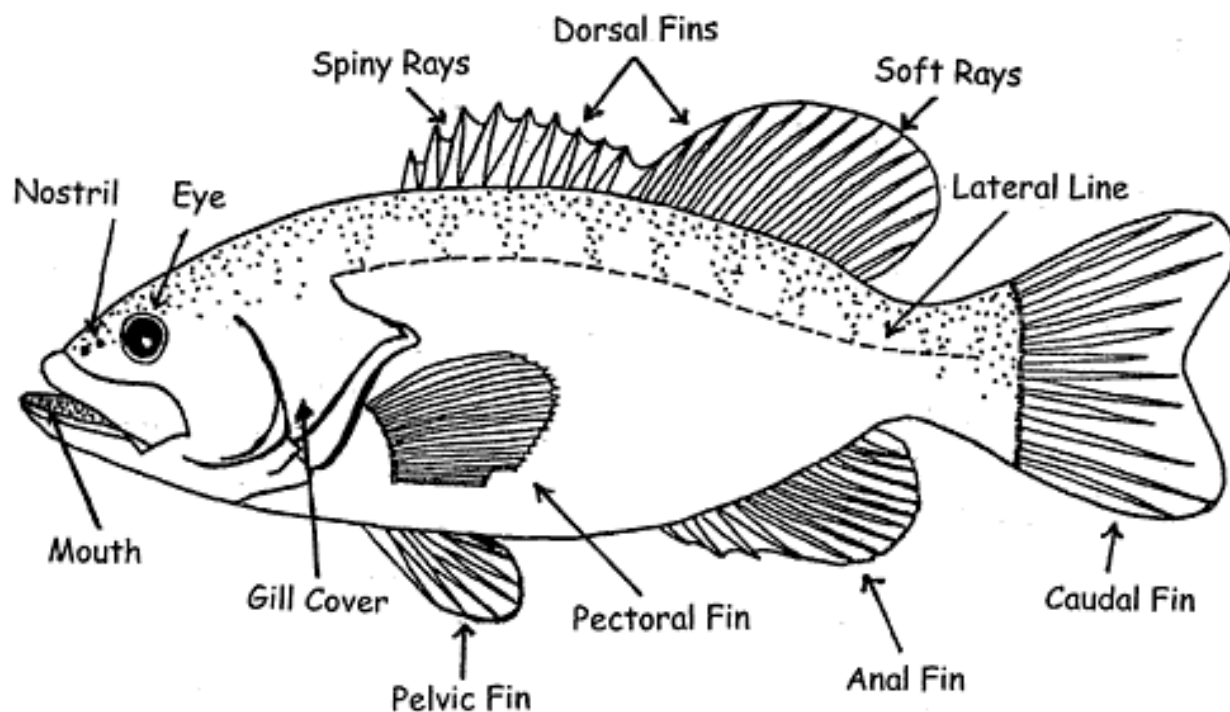
NEXT GENERATION SCIENCE STANDARDS

- 3. Inheritance and Variation of Traits: Life Cycles and Traits
- 4. Structure, Function, & Information Processing
- 5. Matter and Energy in Organisms & Ecosystems
- MS. Matter and Energy in Organisms & Ecosystems
- MS. Interdependent Relationships in Ecosystems
- MS. Growth, Development, and Reproduction of Organisms
- MS. Natural Selection and Adaptations

Use on white board,
projector, or smart
board to label parts of
the fish with the class.



FISH ANATOMY TEACHER GUIDE



FISH ANATOMY TEACHER GUIDE



Dorsal Fin: Top fins which are used for steering and stabilization.

Anal Fin: Bottom fin near the tail, provides stabilization and balance.

Caudal Fin: Also known as the tail. Propels or pushes the fish forward during swimming.

Pelvic Fin: A pair of bottom fins that helps with up and down movement in the water.

Pectoral Fin: A pair of side fins behind the gills. Help the fish balance and move side to side.

Lateral Line: Senses vibrations or movements in the water and aids fish in traveling in schools or locating predators. Found along the body from gills to tails.

Gills: Feathery organ that allows the fish to breathe. As water travels over the gills, the oxygen is pulled out.

Mouth: Used to consume food.

Eyes: Used for sight. Fish can use each eye independently, meaning each eye can focus on a different object, unlike humans.

Nostrils: Used for scent only, not breathing.

Barbel: Whisker-like sensory organ that help track prey and food.

Otolith: Bony plates inside the head that can sense sounds in the water.

Scales: Provide a layer of protection from injury and disease.

Swim Bladder: A long, skinny organ that can inflate/deflate with air allowing fish to float at different levels in the water column.

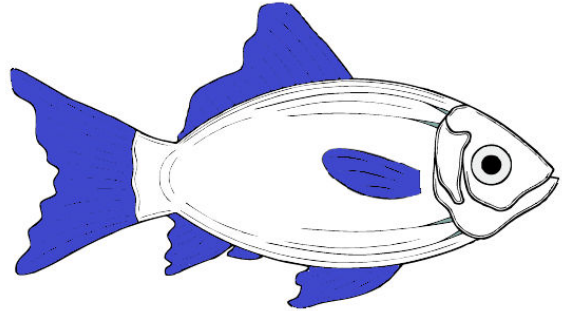
Vertebrae: The spine or backbone.

3 F's TO FIGURING OUT A FISH

FINS

Look for:

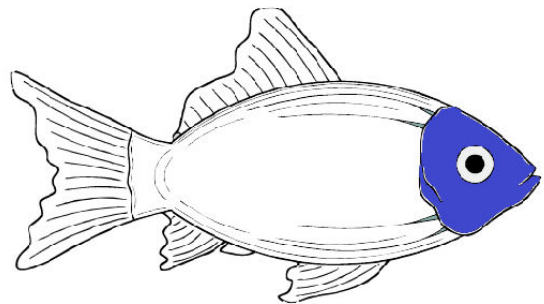
- Shape of caudal fin (tail)
- Number of dorsal fins (top fins)
- Size of pectoral fins
- Is there a pelvic fin?



FACE

Look for:

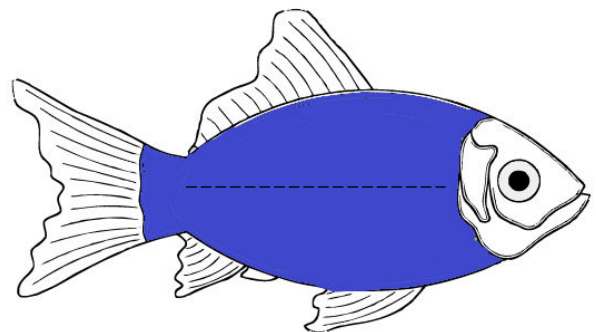
- Positioning of mouth
- Are there teeth?
- Eye size
- Location of eyes
- Whiskers or barbels present



FORM

Look for:

- Shape of body
- Is there a visible lateral line?
- Scales or mucous layer

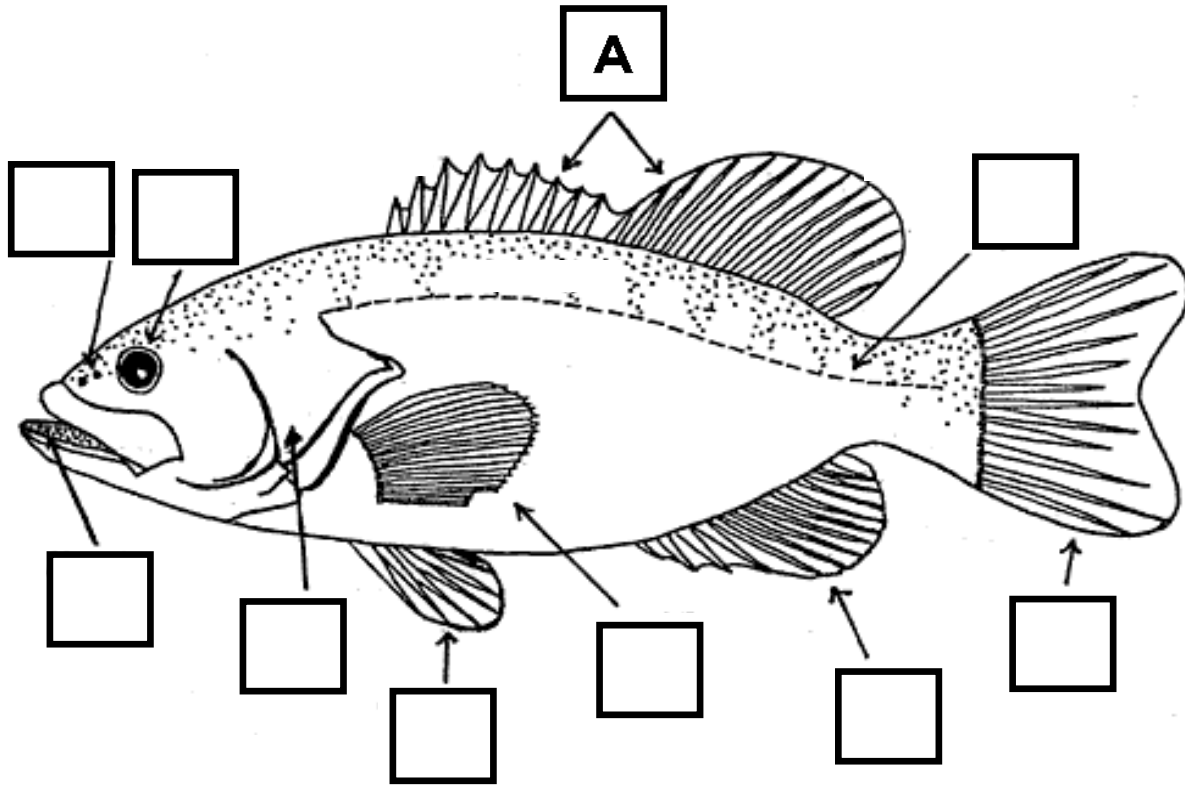


NAME: _____

FISH ANATOMY

DIRECTIONS:

Match the words to the correct spot on the fish by using the letters assigned to each term. The first one is done for you.



A — Dorsal Fin: Top fins which are used for steering and stabilization.

B — Anal Fin: Bottom fin near the tail, provides stabilization and balance.

C — Caudal Fin: Also known as the tail. Propels or pushes the fish forward during swimming.

D — Pelvic Fin: A pair of bottom fins that helps with up and down movement in the water.

E — Pectoral Fin: A pair of side fins behind the gills. Help the fish balance and move side to side.

F — Lateral Line: Senses vibrations or movements in the water and aids fish in traveling in schools or locating predators. Found along the body from gills to tails.

G — Gills: Feathery organ that allows the fish to breathe. As water travels over the gills, the oxygen is pulled out.

H — Mouth: Used to consume food.

I — Eyes: Used for sight. Fish can use each eye independently, meaning each eye can focus on a different object, unlike humans.

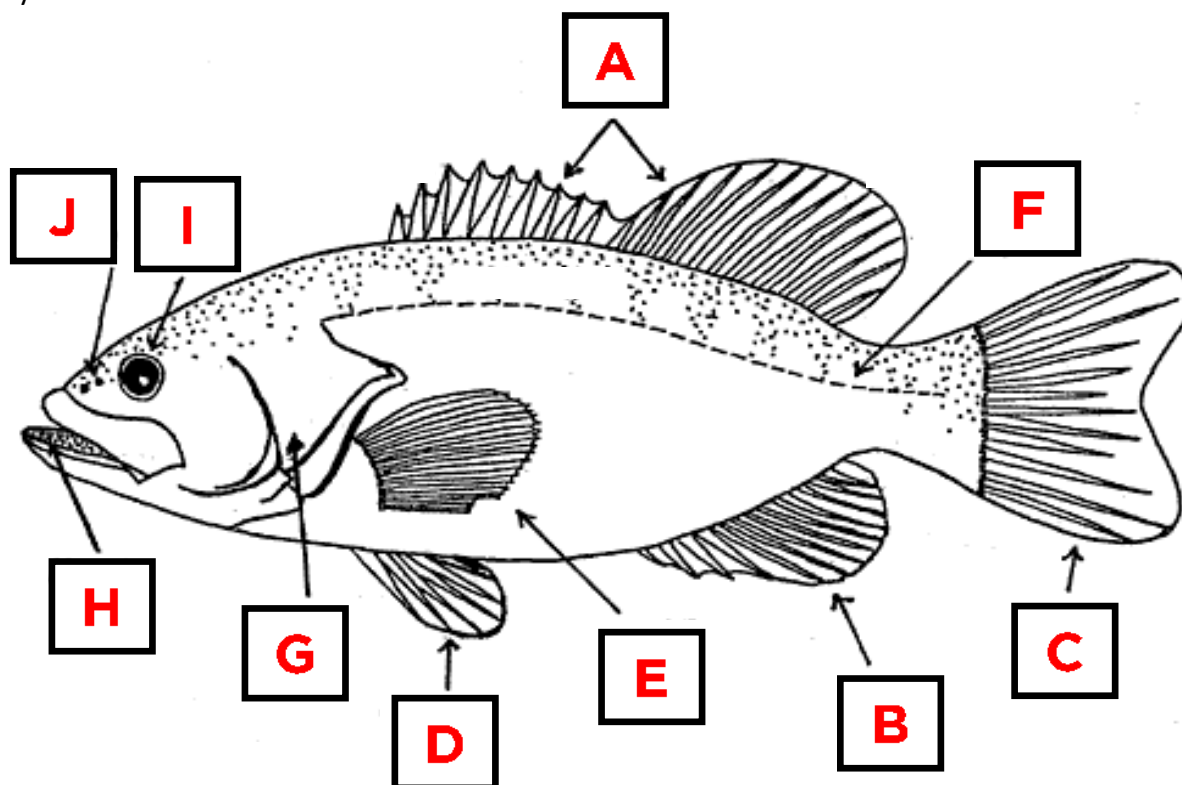
J — Nostrils: Used for scent only, not breathing.

NAME: _____

FISH ANATOMY ANSWER KEY

DIRECTIONS:

Match the words to the correct spot on the fish by using the letters assigned to each term. The first one is done for you.



A — Dorsal Fin: Top fins which are used for steering and stabilization.

B — Anal Fin: Bottom fin near the tail, provides stabilization and balance.

C — Caudal Fin: Also known as the tail. Propels or pushes the fish forward during swimming.

D — Pelvic Fin: A pair of bottom fins that helps with up and down movement in the water.

E — Pectoral Fin: A pair of side fins behind the gills. Help the fish balance and move side to side.

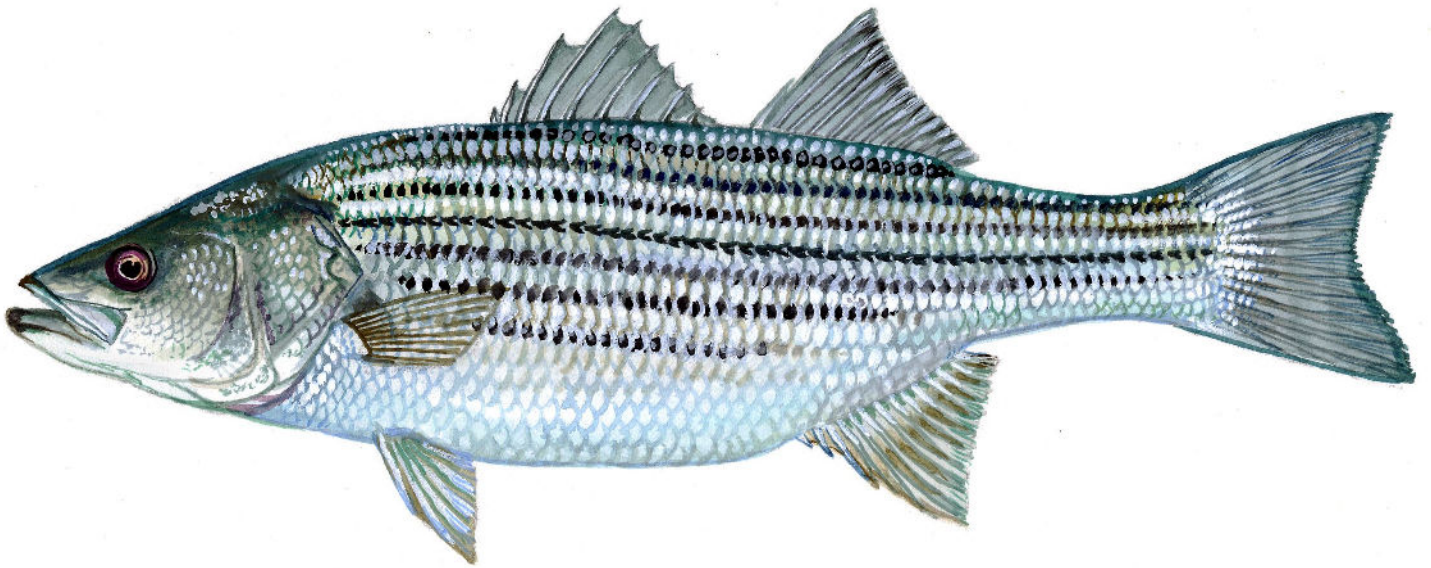
F — Lateral Line: Senses vibrations or movements in the water and aids fish in traveling in schools or locating predators. Found along the body from gills to tails.

G — Gills: Feathery organ that allows the fish to breathe. As water travels over the gills, the oxygen is pulled out.

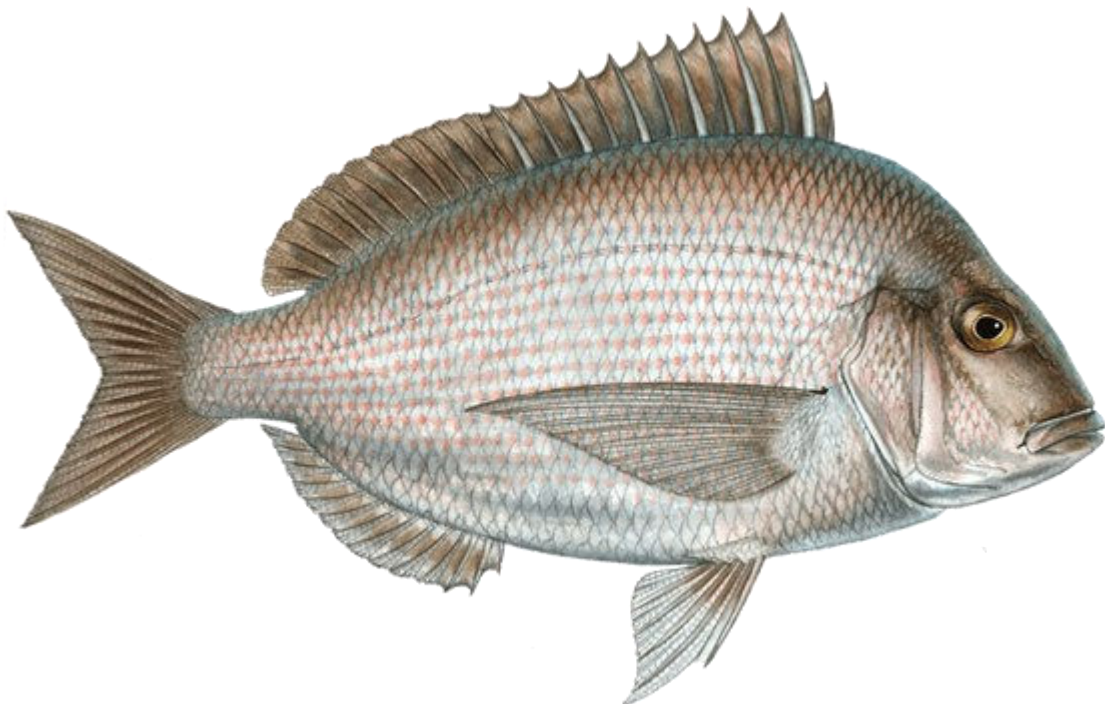
H — Mouth: Used to consume food.

I — Eyes: Used for sight. Fish can use each eye independently, meaning each eye can focus on a different object, unlike humans.

J — Nostrils: Used for scent only, not breathing.



STRIPED BASS



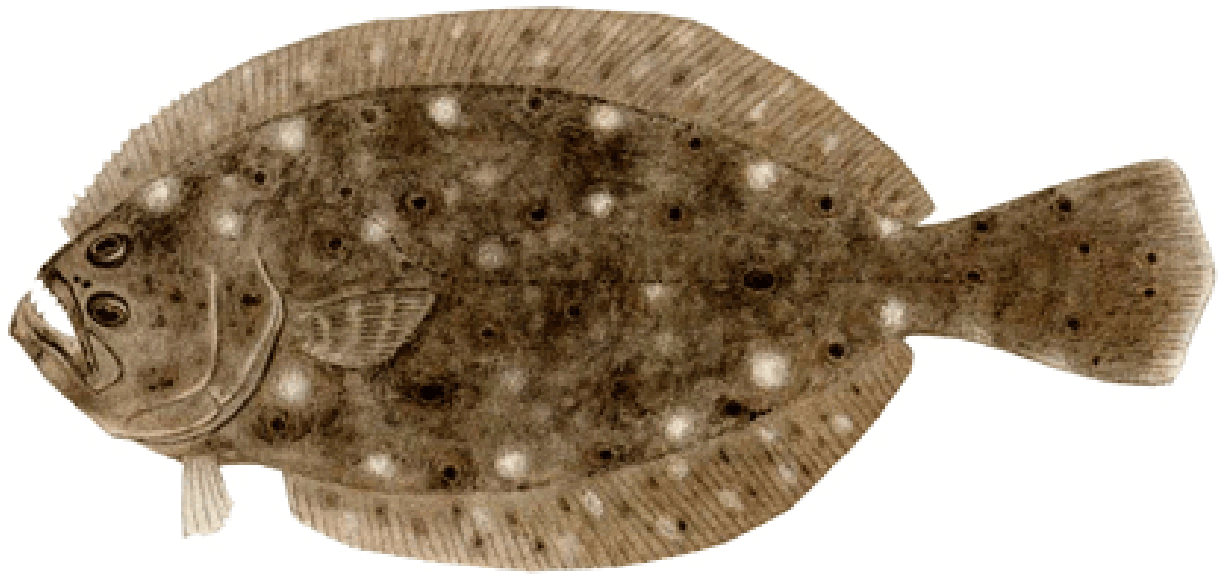
PORGY



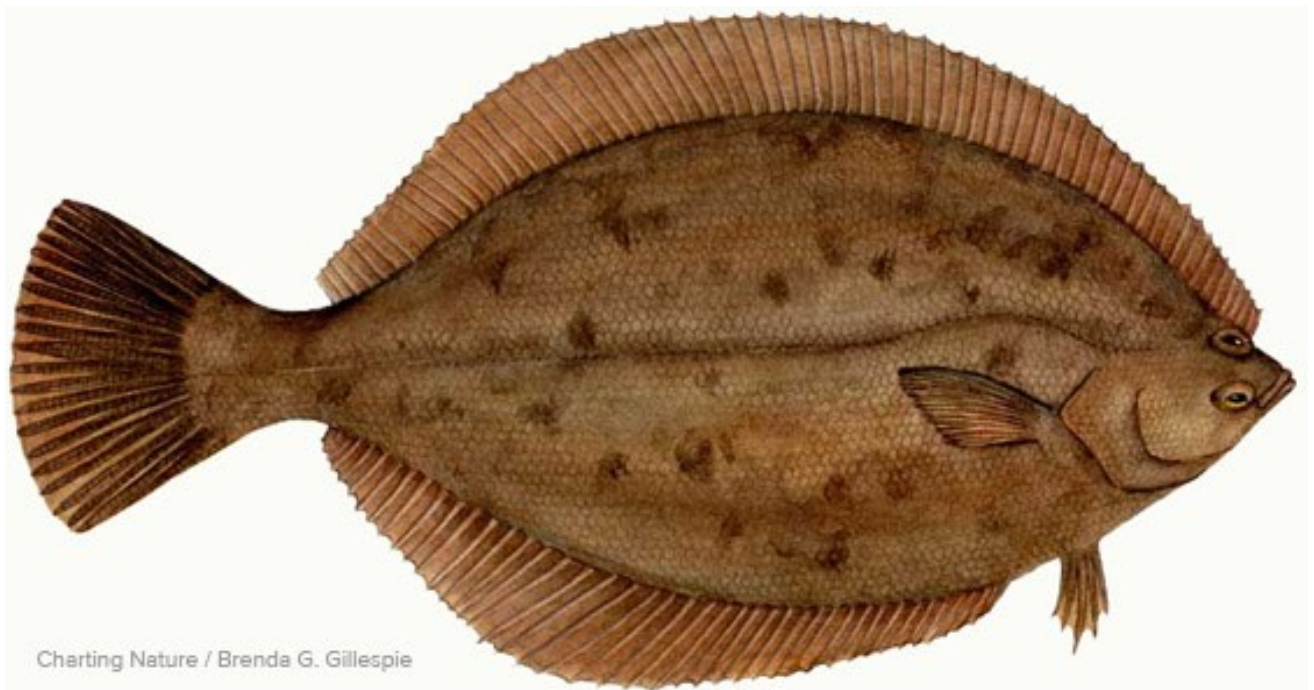
AMERICAN EEL



NORTHERN PIPEFISH

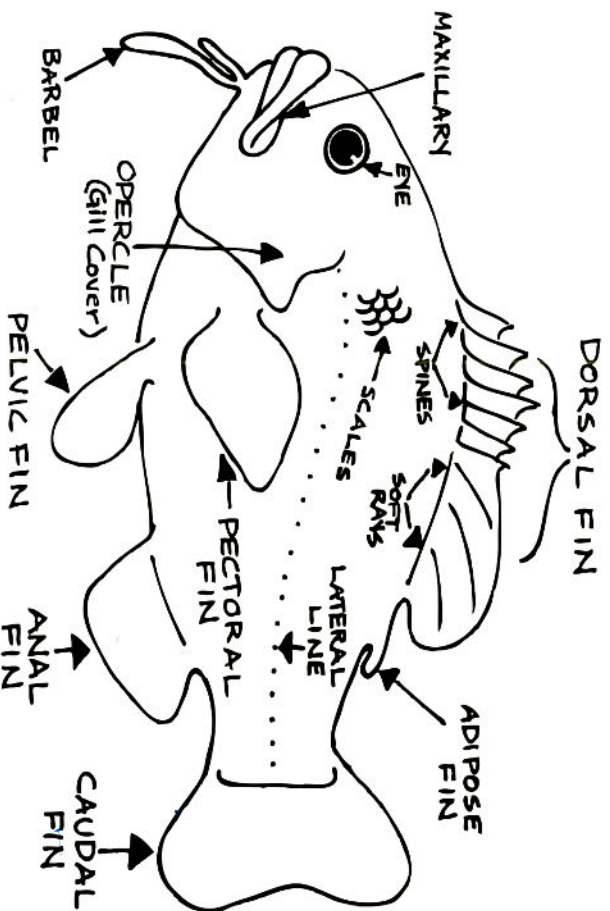


SUMMER FLOUNDER



WINTER FLOUNDER

FISH IDENTIFICATION GUIDE



Images courtesy of Hudson River Sloop Clearwater

HOW TO USE A DICTOMOUS KEY:

Begin on PAGE 1.

Read all blue boxes
and decide which
matches your fish.

Eyes on left side
of body

Follow the page directions
based on your answers.

GO TO PAGE

3

When your answer says
stop, look at the green
box to learn your fish!

STOP!

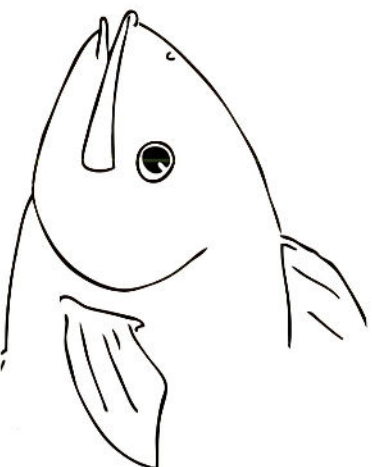
SUMMER FLOUNDER

DOES YOUR FISH HAVE.....

Eyes on opposite
sides of head

GO TO PAGE

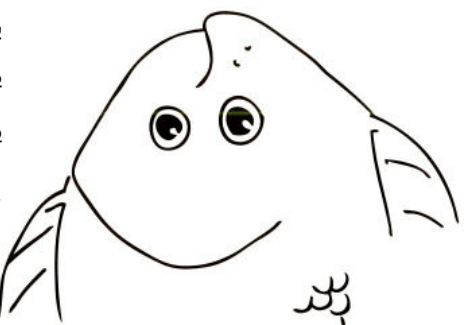
2



Eyes on same side
of head

GO TO PAGE

5

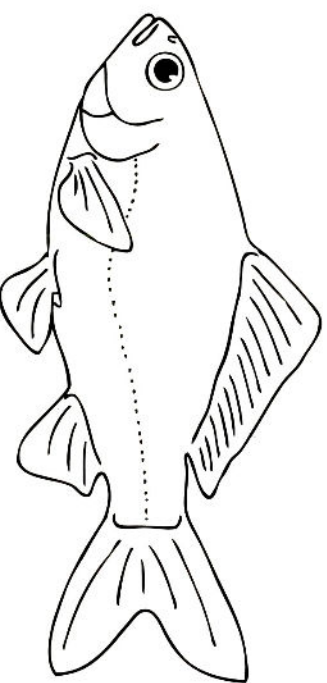


DOES YOUR FISH HAVE.....

A round or oval body

GO TO PAGE

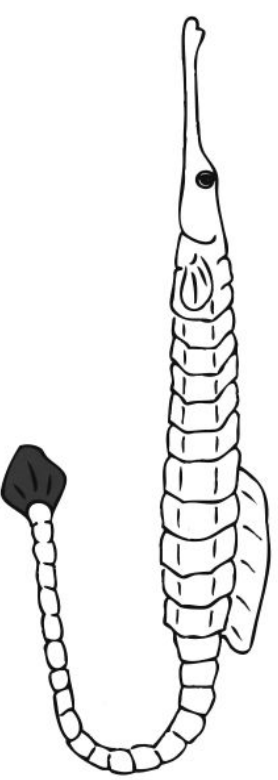
3



A long, snake-like
body

GO TO PAGE

4



1

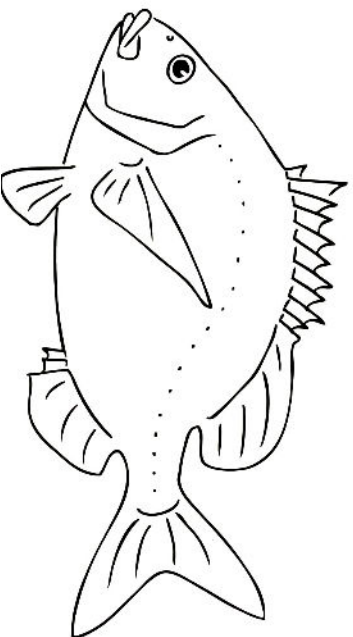
2

DOES YOUR FISH HAVE.....

One dorsal fin (top fin)

STOP!

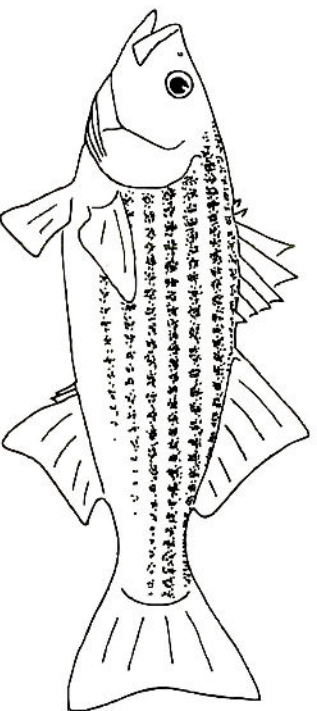
PORGY



Two dorsal fins

STOP!

STRIPED BASS



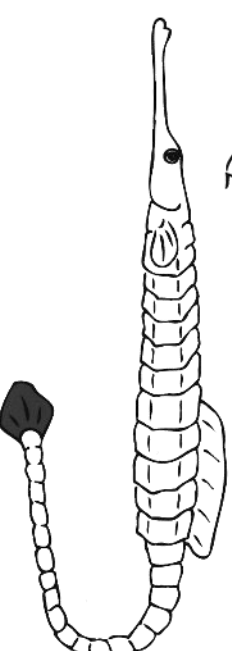
3

DOES YOUR FISH HAVE.....

Tube-like mouth, far from the eyes

STOP!

NORTHERN PIPEFISH



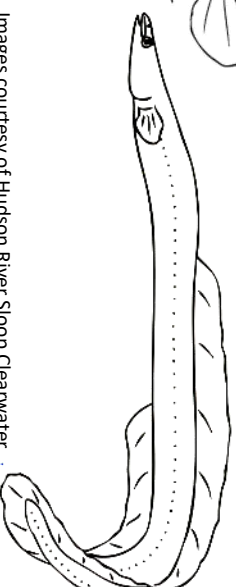
Mouth not tube-like, close to the eyes

STOP!

AMERICAN EEL



4

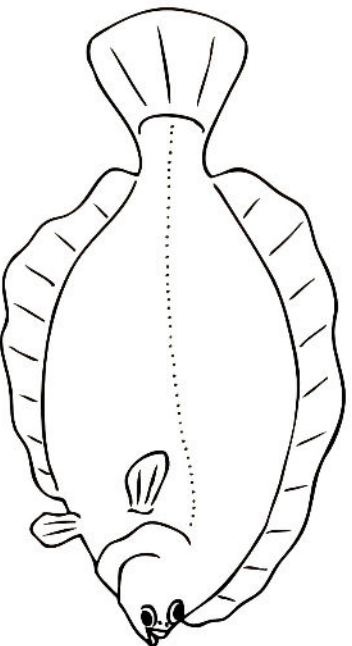


DOES YOUR FISH HAVE.....

Eyes on right side
of body

STOP!

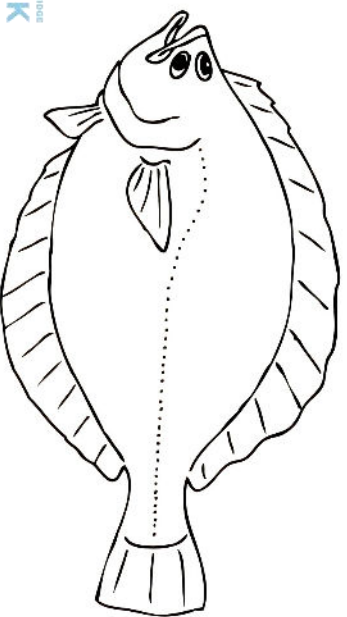
WINTER FLOUNDER



Eyes on left side
of body

STOP!

SUMMER FLOUNDER

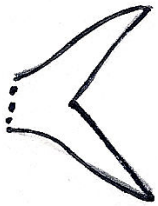


5

FISH MORPHOLOGY & FUNCTION

CAUDAL FINS

Most fish have 1 caudal fin (tail), 1 pelvic fin, 1 anal fin, 2 pectoral fins, and 1-3 dorsal fins. Fins help a fish balance, swim, and turn.



FORKED

Fast swimmer



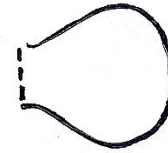
LUNATE

Long distance
cruising



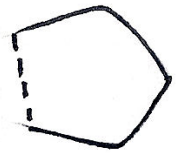
TRUNCATE

Good at turning
& acceleration



ROUNDED

Fast in short
distances



POINTED

Able to get around
tight spaces

MOUTH

The mouth shape tells us what the fish likes to eat. A fish's diet can also give insight to where the fish likes to hang out.



SUPERIOR

Catches prey from
above or eats near
the surface



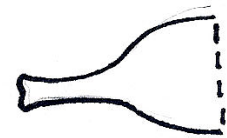
TERMINAL

Eats what is in
front of them



INFERIOR

Eats what is below
or off the bottom

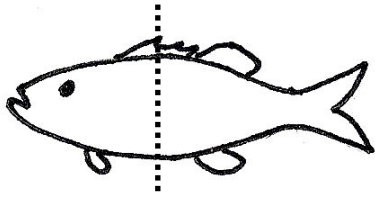


TUBULAR

Sucks in small,
floating organisms

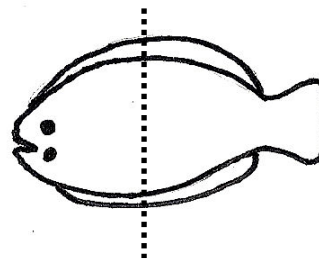
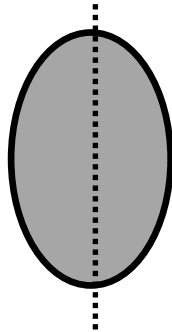
BODY SHAPE

The form of a fish influences how a fish can move, swim, and maneuver between objects. When observing a fish's body, it is important to think about the horizontal shape (mouth to tail) as well as vertical shape (top to bottom).



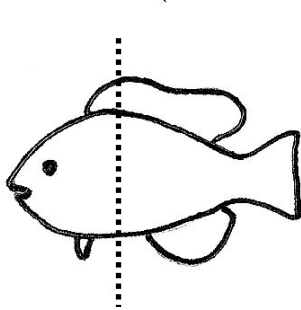
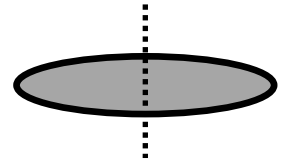
STREAMLINED

A torpedo shaped body provides speed



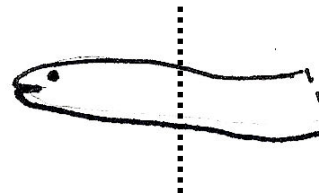
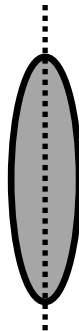
VERTICALLY COMPRESSED

Thin body designed for easy burial or bottom dwelling.



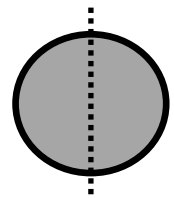
LATERALLY COMPRESSED

Hard for predators to swallow, but easy to move through narrow areas



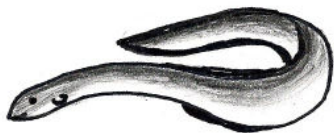
ELONGATED

Ideal for moving in and out of small spaces



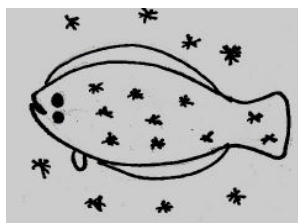
COLORATION AND CAMEOFLAUGE

A fish's color and patterns help them avoid predators.



COUNTERSHADING

Dark top and light belly helps the fish blend in when seen above by prey above or below by predators



CYRPTIC COLORATION

Lives in an environment that matches their natural color or can change color to match the surroundings



DISTRUPTIVE COLORATION

Presence of spots, lines and other patterns can confuse predators