

## Fish Basic Lesson Plan

**Audience:** 7<sup>th</sup> grade students that are involved in Trout in the Classroom (most likely ALL 7<sup>th</sup> grade Science classes)

**Duration:** 2-40min. class periods

**Objective:** Introduce students to general characteristics of fish such as anatomy and adaptations, while at the same time stressing that different fish need different habitat requirements for survival.

**Materials:** list is designed for groups of 5-6 students working together

- “Fish Basics” worksheet packet – 1 for every student
- Five index cards each labels with number 1-5, to label stations around the room
- Masking tape

### Station 1: Fish of PA

- “Ponds and Stream Study Guide”- need 3-4 (from PA Fish and Boat Commission)
- Laminated chart, “Tolerant Designations for Specific Fish”-need 3-4 (see “PA fish” file)
- Laminated descriptions of PA Fish- 1 copy of each for 10-12 fish (see “PA fish” file or Fish and Boat Commission website)

### Station 2: Fish Adaptations

- Laminated black and white puzzle pieces to create 5 different PA fishes: Northern Hog Sucker, Brook Trout, Lake Sturgeon, Longnose Gar and Pumpkinseed (pictures were taken from the PA Fish and Boat Commission website and were chosen because of their differing adaptations) (See “Adaptation puzzle” file)
- Laminated cards with physical descriptions of each fish, and how these characteristics benefit the individual fish
- Answer card inside an envelope: colored picture of each of the 5 fish including their names.

### Station 3: Swim Bladder

- 2 containers of water- (either larger beaker, or small bucket), preferably transparent (not too deep as students must retrieve a container from the bottom of the container)
  - 2 smaller containers with lids- preferably transparent
- (small container must be small enough and the bucket must be large enough so that the small container has space to sink and float without hitting the bucket sides)
- 3-4 computers with access to the internet
  - 3-4 paper towels or a hand towel to place wet small containers on when not in use

#### Station 4: Fish Anatomy

- An electronic matching board for internal anatomy pictures with terms/function (already created)
- An electronic matching board for external anatomy pictures with terms/function (already created)
- 4 C-Batteries, 1 for each board, and 2 extra



Or

- Velcro matching poster with internal and external anatomy pictures and corresponding terms/definitions (see Anatomy file)
- Answer Key

#### Station 5: Jeopardy

- Computer, with the PowerPoint Jeopardy Game-questions are Trout in the Classroom based, a review of topics already discussed this year.
- Counter bell or a noise maker that can be used to signal the correct answer (1 per student would be good, or only 1 noise maker within reach of all players)

**Set-up:** About 5-10 minutes (after all materials have been created)

- Create five separate station areas within the room
  - When deciding on station placement, consider: Jeopardy station near a wall outlet, Swim bladder station near wall outlets for laptops, as well as easy access to paper towels and garbage can, Adaptation station needs to be on a flat surface, no cracks (need lab table, not desks pushed together)
- Place all necessary materials neatly at each station area (see materials section)
- At swim bladder station
  - turn on/log on to computers, so they can quickly be used by the students
  - Fill the 2 buckets with water
- At Jeopardy station, on the computer-open up the jeopardy game so it is ready to play

## **Procedure:**

- Distribute the “Fish Basics” worksheet packet, 1 to each student
- Starting at station 1, explain what the students need to do at each station and provide any background necessary

### Station 1: “Fish of Pennsylvania Scavenger Hunt”

Objective: Students will be able to comprehend that waterways and fish are a broad category. Different bodies of water have different chemical compositions. Different fish have different necessities for survival even when just looking at fish found in Pennsylvania.

- Student will use the 3 provided documents to answer the “Scavenger Hunt” questions about PA fish. Stress that there are 3 documents that must be used by showing each of the documents
- Students will need to interpret the graphs and charts to figure out answers
- When showing the document, “Tolerance levels” asks the students to define tolerance

### Station 2: “Fish Adaptation Puzzles”

Objective: Students will be able to infer that certain fish characteristics, or adaptations, are advantages that help that fish live in a specific environment.

- Students will build 5 different fish puzzles using the description cards as clues to help them decide which pieces belong to which fish. STRESS using the description cards as a guide.
- After they have built all 5 puzzles they can look at the answer card to see if they were correct, see the fish in color, and learn the fish names
- Students need to then answer the question in their worksheet packet pertaining to adaptation
  - Review with students the definition and examples of adaptations as this may be a new term for some students
  - STRESS using the description cards as a guide
- Before switching stations make sure to scramble the puzzles pieces and put the answer card back in it’s envelop.

### Station 3: “Swim Bladder, To Sink or Float” (inquiry based activity)

Objective: Students will be able to deduce the function and importance of a fish’s swim bladder.

- Explain that the small contain represents a fish’s swim bladder.
- Explain that not all fish have swim bladders but it can be an advantage to have one, Do not tell the students exactly what the swim bladder is, that is what they need to determine from this station.
- Students will answer questions 1 and 2 by experimenting with the small container and lid in the bucket of water.
- Using the answers from question 1 and 2, the students will answer questions 3 and 4.
- After they have created a hypothesis (question 3) of how a swim bladder works the students will go online to find out the correct answer and research other functions of the swim bladder (lung like, help with hearing, etc.)

#### Station 4: Fish Anatomy

Objective: Students will be able to identify and describe the functions of internal and external anatomy of a fish.

- Students will use the electronic board to correctly match the term/definition with the correct location on the diagram. To do so, put 1 probe on the gold button on the diagram, the other probe place on the gold button at the term, if it is correct the light bulb will light up.
- Use the terms/definitions to answer the matching questions
- Remind student to be respectful of the board, do not put holes in it, or throw it around. It took a lot of time to make, and “you” don’t want to be the person responsible for breaking it.

#### Station 5: Brook Trout Jeopardy

Objective: Students will be able to review and refresh their memories about the trout life cycle, water chemistry, watersheds, and general brook trout knowledge.

- One student will be the host of the show, Alex Trebek. This student will be responsible of the computer, moving the slides to different questions and answers and reading the questions aloud. If there is any conflict on who rang the bell first, or if an answer is acceptable, “Alex” is the judge.
- The remaining students in the group are game show contestants (work as individuals, not as pairs). Make sure they position themselves so that they are in easy reach of the bell and can see the computer screen.
- At any point in reading of the question, the contestant can ring the bell to answer. Make sure the answer in the form of a question
- If the question is answered correctly, the contestant adds the points to his score. If the contestant answered the question incorrectly, subtract the point from his score
- The person who answered the last question (either correctly or incorrectly) chooses the next question
- Daily Double: If a contestant selects the daily double, that person must first bet a specific amount of their total, and that person is the only one allowed to answer the question.
- If the group finishes the entire game (not likely), have a final jeopardy question in the back of your mind.

#### General Instructions

- Separate the students into 5 groups
- Each group will have 12-15 minutes at each station, students should not rotate to the next station before told to do so
- When switching stations, teachers need to go around and reset the Jeopardy game.
- The teachers will walk around the room answering questions, leading students to the correct answers, and making sure students are on task
- Continually remind students to answer ALL the questions within each station.
- With one minute remaining give the students a warning, to finish up what they are working on and to clean up their station, putting everything back the way it was found.
- On Day 1 the students will rotate through 2 stations, on Day 2 they will rotate between their remaining 3 stations

**Summary and Closure:**

- On Day 2, with 5-10 minutes remaining in class, have students return to their seats
- As a class quickly review each station, asking the students questions that refer to the main points of each station.
- Collect the packets for grading.

Using the descriptions and the puzzle pieces correctly build 5 Pennsylvania Fishes. After all the puzzles are complete, look in the answer envelop to see if the fish are correct, then complete the question in your packet.

**Fish A:**

- Uses its mouth to vacuum up plant and animal material off the bottom of the streambed.
- Has only 1 dorsal fin
- Has a flat belly and low pectoral fin as it spends most of its life resting on the stream bottom
- The caudal fin (tail fin) is fork-shaped making this fish suited for fast swimming and quick turns

## **Fish B:**

- Crescent-shaped caudal fin (tail fin) suited for swimming fast for long distances
- As a form of protection, it has five rows of bony plates running along the body, one along the back, two on the sides and two on the underside.
- Has four soft barbells (whiskers) between the front of the snout and the toothless mouth, which are used to pick up food

## **Fish C:**

- Torpedo shaped body that helps it move quickly and is well suited for fast-moving water
- Has elongated lower jaw to feed on prey above it
- Caudal fin (tail fin) has a straight edge to it
- One of the only fish at have an adipose fin, a small fin between the dorsal and caudal fin (tail fin)
- To help camouflage in the rocks, it has spots of color on its back

## **Fish D:**

- Body shape is similar to a flattened disk or “pan” shaped (narrow when viewed head on and wide when viewed from the side). This makes it hard for predators to see them.
- The eyes are large.
- As a form of camouflage, it has an eye spot near its gills.
- The dorsal fin has two sections, the front section sharp, spiny rays for protection, and a back section, which is soft-rayed.
- Has a forked caudal fin (tail fin)

## **Fish E:**

- Has a rounded caudal fin (tail fin) as it is built for swimming slowly
- Long, cylindrical body
- Carnivorous, preying on other fish by lying in wait for prey to move close. Then they rush in and slash their sharp-toothed “beak” from side to side, killing or injuring the target fish.



## **ADAPTATIONS AND HOW THEY HELP**

### **ADAPTATION ADVANTAGE EXAMPLES**

#### **Mouth**

sucker shaped mouth feeds on very small plants sucker, carp and animals

elongated upper jaw feeds on prey below it sturgeon

elongated lower jaw feeds on prey above it trout

duckbill jaws grasps prey muskellunge, pike

extremely large jaws surrounds prey largemouth bass

#### **Body Shape**

torpedo shape fast moving trout, salmon

flat-bellied bottom feeder catfish, sucker, sculpin

vertical disk feeds above or below bluegill, sunfishes

humped back stable in fast moving water chubs, coho salmon

snake-like streamlined for long distances American eel

#### **Coloration**

light-colored belly predators have difficulty minnows, perch seeing it from below

dark upperside predators have difficulty bluegill, catfish seeing it from above

vertical stripes can hide in vegetation musky, bluegill,

yellow perch, smallmouth

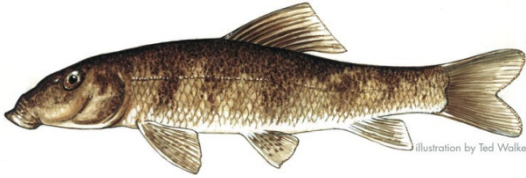
bass

horizontal stripes camouflage in open water largemouth bass, striped bass

mottled coloration can hide in rocks trout, rock bass, crappie

# Answer Key

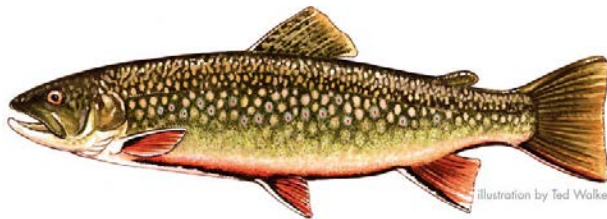
Northern Hog Sucker (A)



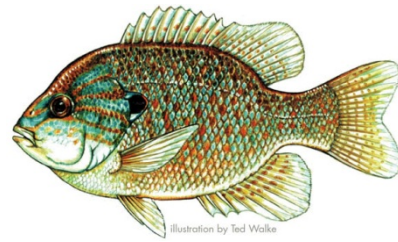
Lake Sturgeon (B)



Brook Trout (C)



Pumpkinseed (D)



Longnose Gar (E)



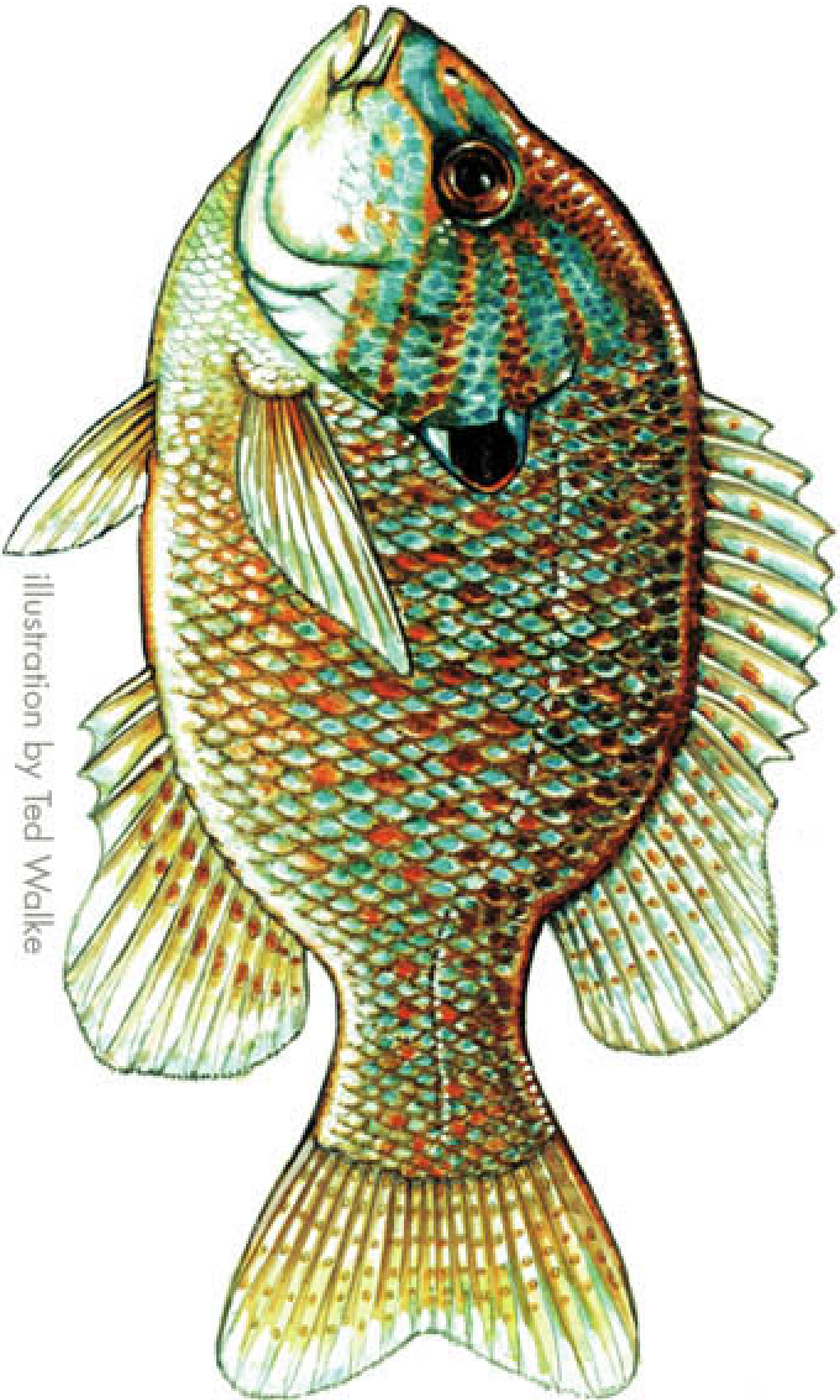


Illustration by Ted Walke



illustration by Ted Walke

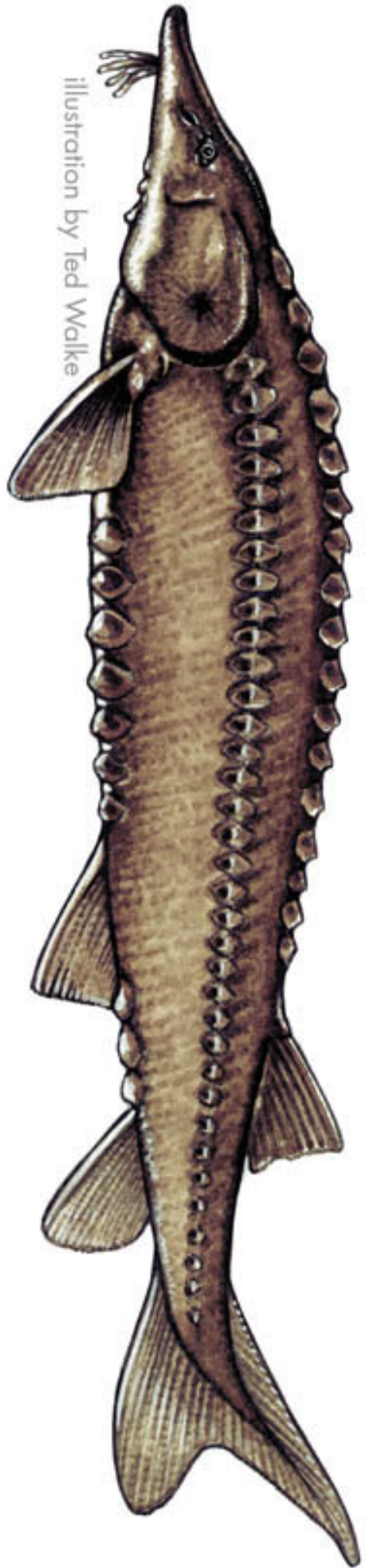


illustration by Ted Walke

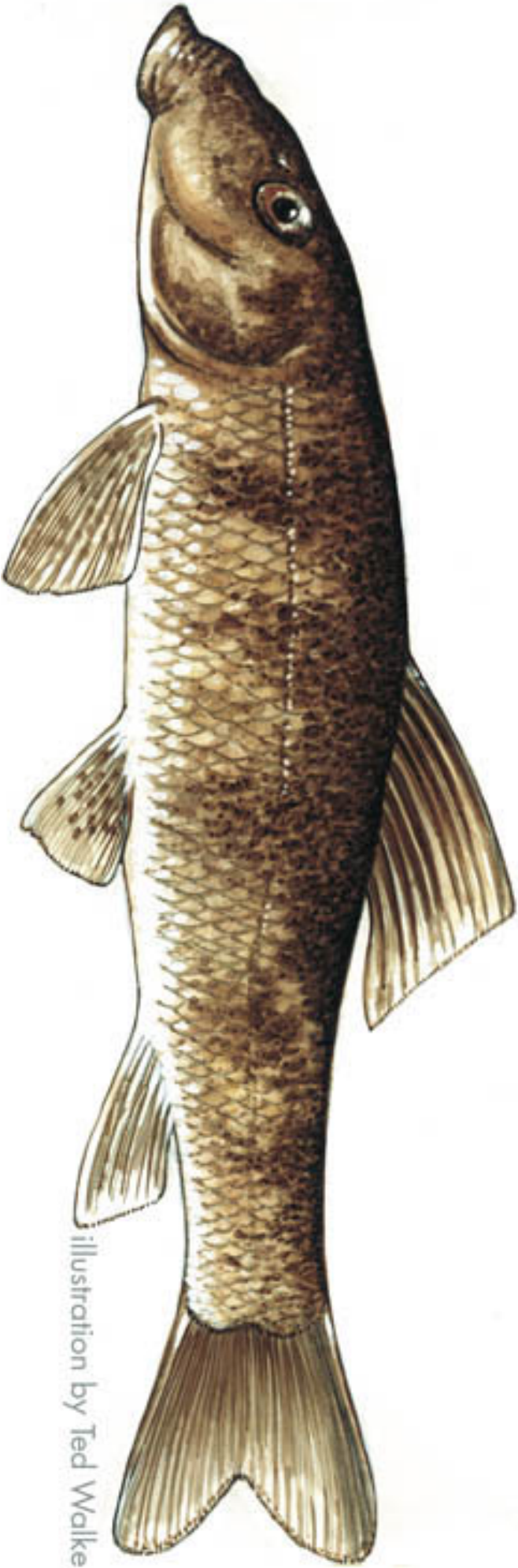


illustration by Ted Walke

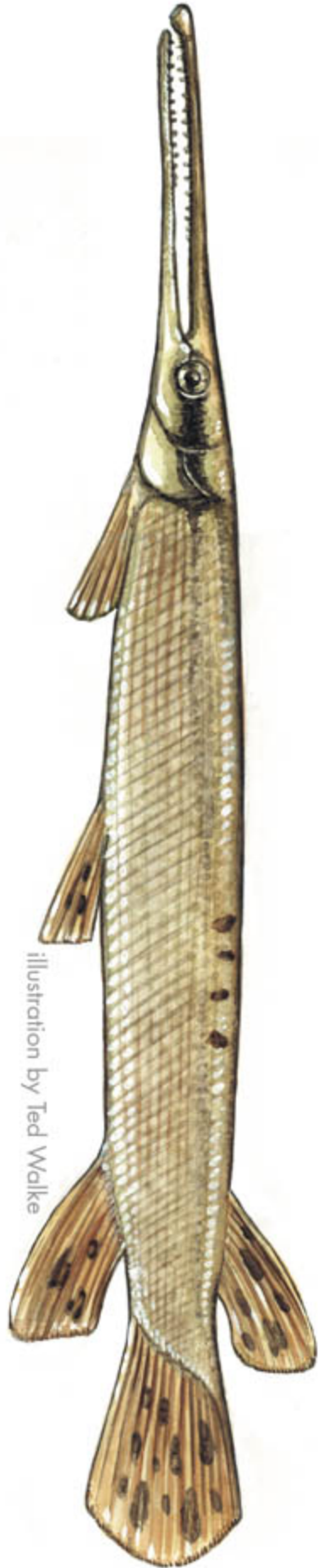
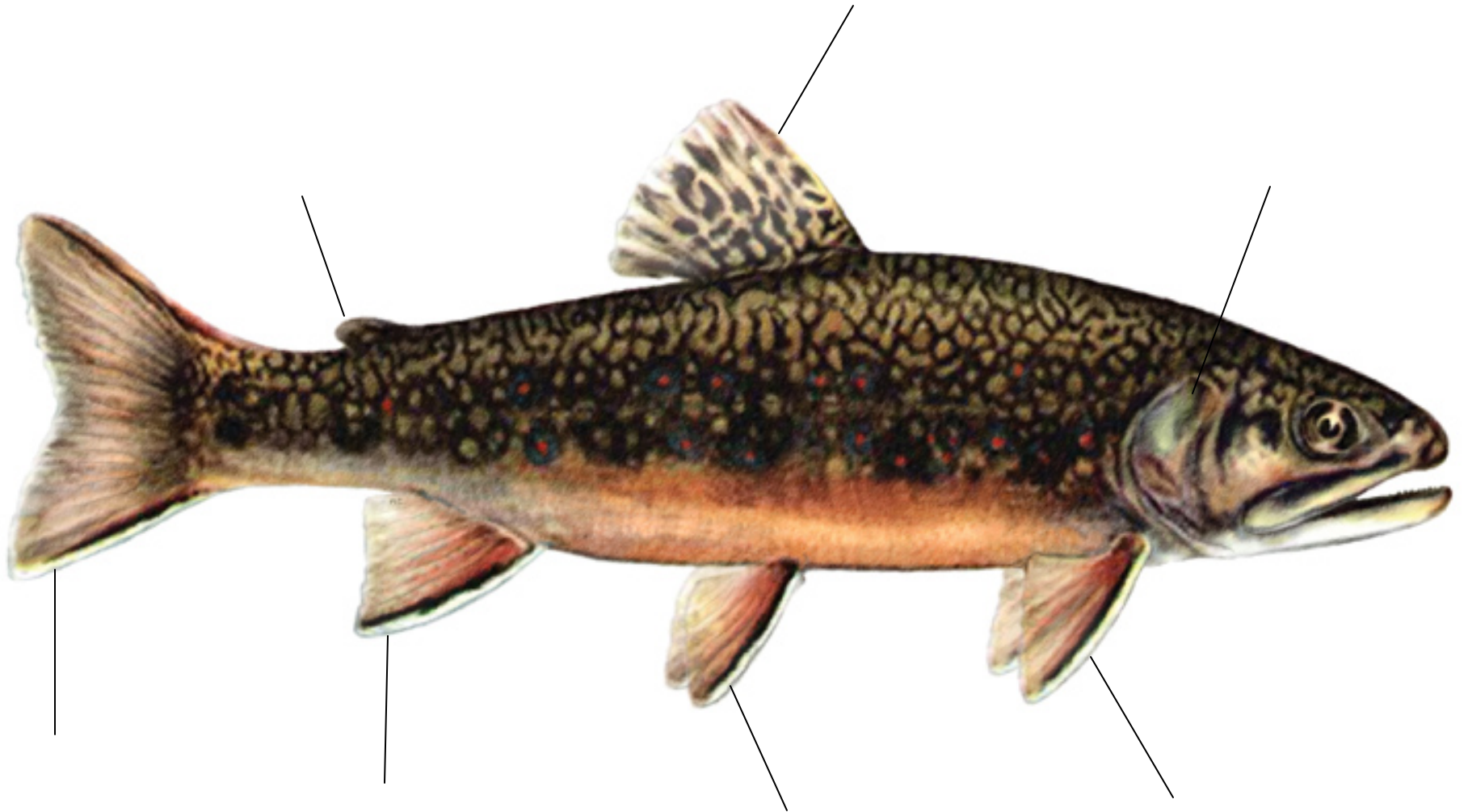
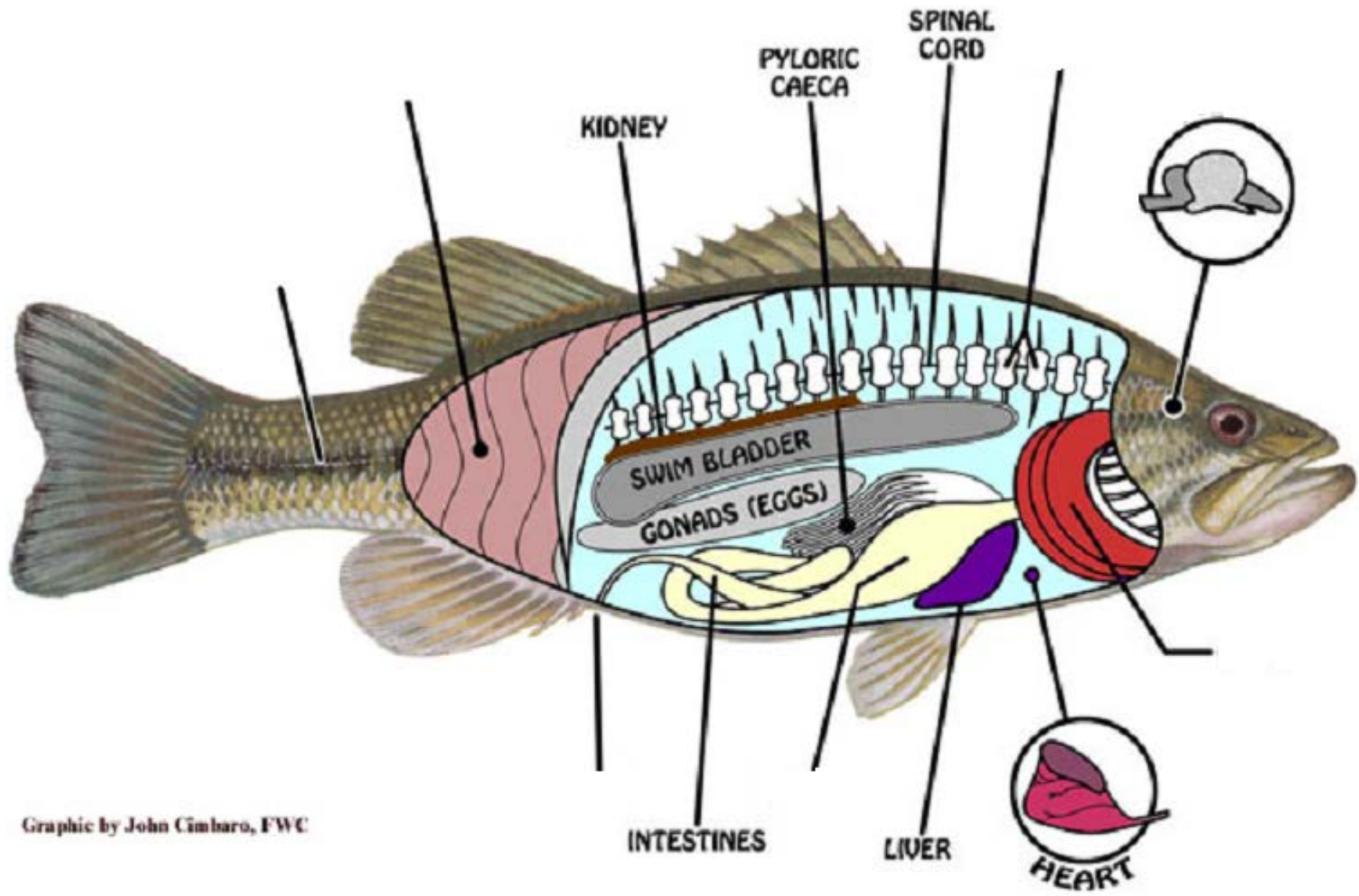


illustration by Ted Walke





Graphic by John Cimbaro, FWC

**Backbone:** goes from skull through body to tail, since fish live in water, bones do NOT support entire body weight, just support muscles and give fish its shape

**Lateral Line:** sense organ, used to detect movement and vibration in the water. It is a line of pores that are openings of tiny tubes that go through scales, into body, and connect to nerves.

**Brain:** Small compared to body size (the brain of brook trout is about size of pea). Fish brains have a larger lobe for smell compared to humans (we leave space for thinking and reasoning).

**Operculum (gill cover):** made of hard, bony plate that protects gills. Opens and closes to pump water from gills out of body

**Adipose Fin:** unique to the trout and salmon family, scientists have yet to discover its function

**Dorsal Fin:** It's main purpose is to stabilize the fish against rolling and to assist in sudden turns. Fish can have up to 3 dorsal fins.



**Stomach:** organ helps to digest food  
(just like humans)

**Caudal Fin:** Used for propulsion.  
Different fin shapes are adaptations to  
specific environments and behaviors.

**Vent/Anus:** Where waste is removed  
from body

**Pelvic Fin:** assists the fish in going up  
or down through the water, turning sharply,  
and stopping quickly. (1 on each side of  
body)

**Gills:** respiratory organ that extracts  
dissolved oxygen from water, and expels  
carbon dioxide. Fish opens mouth to let  
water flow across the gills (internally)

**Anal Fin:** located behind the anus.  
This fin is used to stabilize the fish while  
swimming.

**Muscle:** fish have more muscle than any other vertebrate (by weight), which is one reason why fish are so good to eat.

**Pectoral Fin:** located behind the operculum, its function depends on the species: assist in maintaining depth, walking, or gliding (one on each side of the body)

Name: \_\_\_\_\_

Teacher: \_\_\_\_\_

Pd: \_\_\_\_\_



## Trout in the Classroom: Fish Basics

### Station 1: Fish of Pennsylvania Scavenger Hunt

Using the information provided, answer the following questions about fish that are found in PA.

1. Based on temperature, fish are divided into how many categories?
2. What is an example of a coldwater fish?
3. What is an example of a warm water fish?
4. According to the "Pond and Stream Study Guide" which trout has the smallest range for pH tolerance (pH tolerant range- is the pH range the fish can comfortable live in, without getting stressed)
5. Can warm water contain more or less dissolved oxygen than cold water?
6. Name a fish that is tolerant of pollution (can live in polluted water).

Fish Name: \_\_\_\_\_

- In what type of water is this fish found? (ex. pond/stream, cold/warm, surface/bottom)
- What does this fish eat?

7. Name a fish that is intolerant of pollution (will die in polluted water)

Fish Name: \_\_\_\_\_

- In what type of water is this fish found? (ex. pond, fast flowing stream)
- What does this fish eat?

8. List an interesting fact about a specific fish  
Fact:

Fish name: \_\_\_\_\_

**Station 2: Fish Adaptation Puzzles**

Using the puzzle pieces build 5 different fish. USE THE FISH DESCRIPTIONS to help.

After building the puzzles and reading the descriptions, answer the following question.

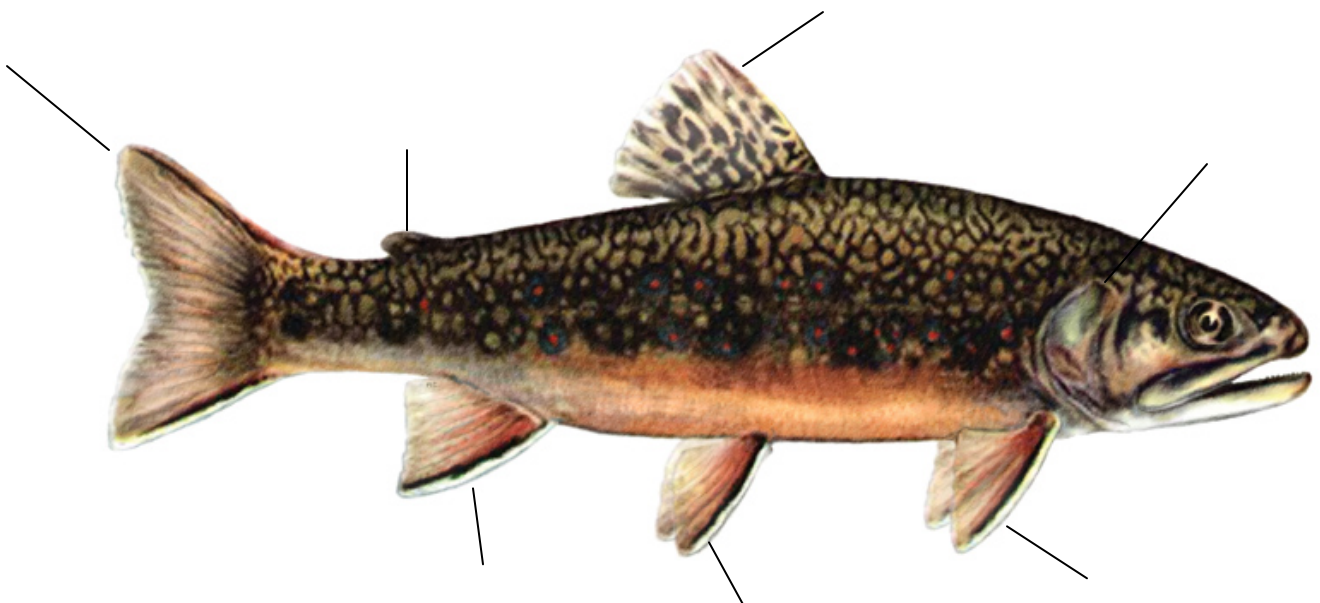
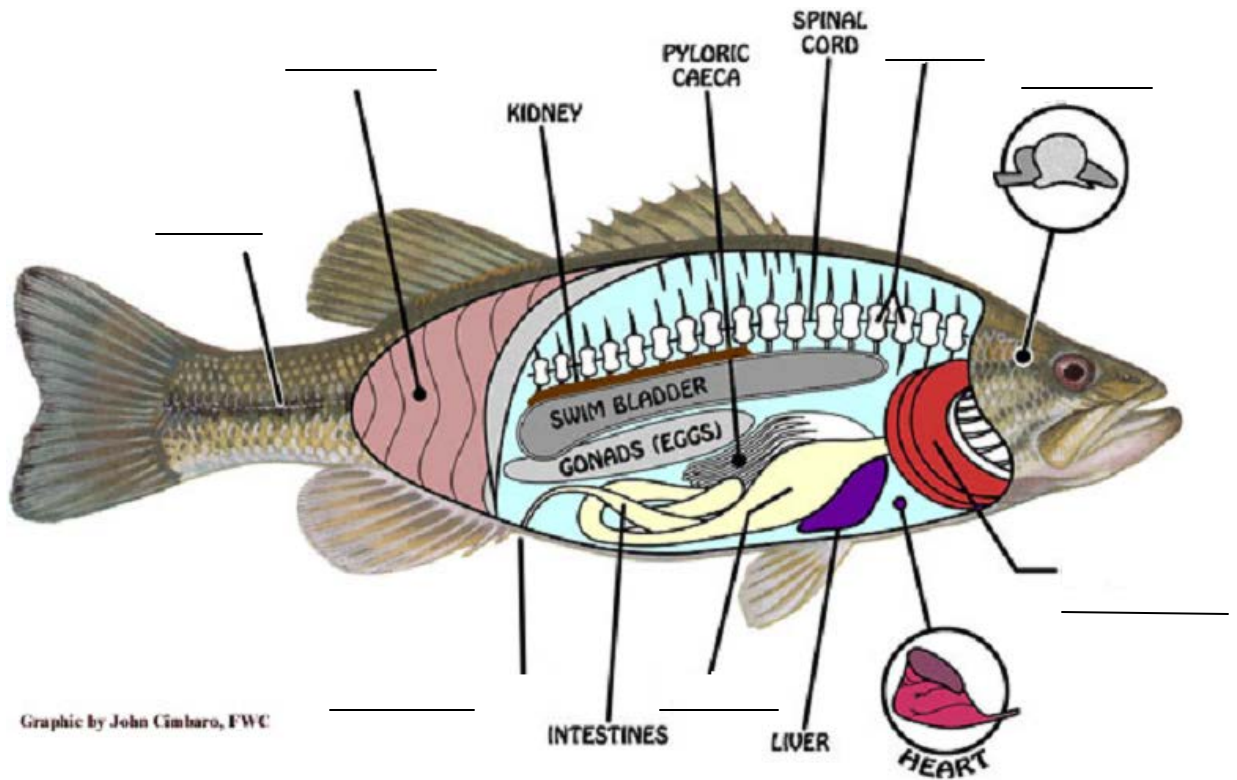
In general, how are a fish's mouth, body shape, tail shape, and coloration examples of adaptations, characteristics that make survival easier? (use the five fish puzzles as examples)

**Station 3: Swim Bladder: To Sink or Float:** Using the bottle, its lid and the container of water to experiment with, answer the following questions.

1. What must be inside the bottle to make it float?
2. What must you take out of the bottle to make it sink?
3. Most fish (including brook trout) have a swim bladder (air bladder) that helps a fish move through the water. Thinking of your experiment with the bottle representing a swim bladder, how do you think a swim bladder work?
4. What is the advantage for fish to control rising and sinking without having to swim up or down.
5. Now go online to find out how a swim bladder works. How does it help a fish navigate in the water? Does it have any other functions?

### Station 4: Fish Anatomy (2 pages)

Fill in the blanks for each diagram and complete the matching questions



(Section 4 cont.) Match the term with the appropriate definition.

- |                       |  |
|-----------------------|--|
| 1. _____ Lateral Line | A. Protects fish from the infection, and helps with camouflage                                   |
| 2. _____ Dorsal Fin   | B. Sensory organ, senses vibrations in the water   |
| 3. _____ Backbone     | C. Assists fish with turning sharply and stopping quickly  |
| 4. _____ Brain        | D. Supports fish's muscles and gives fish its shape  |
| 5. _____ Gills        | E. Respiratory organ, absorbs oxygen from water to be used by body                               |
| 6. _____ Swim bladder | F. Unique to trout and salmon family, use of fin is unknown                                      |
| 7. _____ Operculum    | G. Body temperature is based on temperature of environment (cold-blooded), example: fish, snakes |
| 8. _____ Scales       | H. Stabilize the fish against rolling  |
| 9. _____ Caudal fin   | I. Very Small, but largely devoted to smell  |
| 10. _____ Adipose fin | J. Protects gills  |
| 11. _____ Ectothermic | K. Body temperature is regulated by the body (warm blooded)                                      |
| 12. _____ Pelvic fin  | L. Used for propulsion   |
|                       | M. Helps the fish float in one place, or assists in changing depths                              |

### **Station 5: Brook Trout Jeopardy**

Use this space to keep track of your score

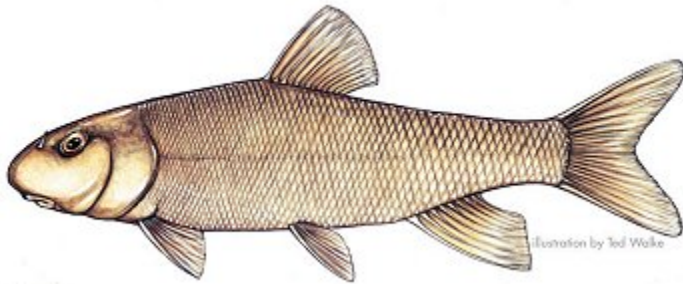
**Bonus:**

**Scenario:** The year is 3045. To protect us from the harmful UV rays of the sun, a manmade ozone layer has been created. Unfortunately this new, manmade layer reduces the sun's ability to heat the earth's surface. Therefore, the waters of PA have changed drastically. The water temperature has decreased by 15-20<sup>0</sup>F and the water freezes for part of the year. Without direct sunlight there are little or no plants in the water; reducing the amount of oxygen for the fish to breath and eliminating a food source. Many insects that found their homes in the water have migrated to warmer habitats, also reducing a food source for many fish. Without the sunlight, it is also very dark underwater, reducing the ability for the fish to see.

Based on the scenario, draw a fish that has adapted or changed to this new environment. List at least 3 new adaptations or changes. Keep in mind, scales, gills, fins, ectothermic (cold-blooded), body and mouth shape. HAVE FUN WITH THIS, BE CREATIVE!!!

## White Sucker *Catostomus commersoni*

**Species overview:** The white sucker is found across Pennsylvania. It is the most common and widely distributed sucker in the state. Its natural range is from northern Canada to Florida, throughout the uplands of eastern North America, and west to the Plains region. It grows large enough to be sought by anglers, who usually fish for them during the white sucker's spring spawning run. The genus name "Catostomus" means "inferior mouth," referring to the bottom position of the mouth on the head. The species name "commersoni" recognizes an early French naturalist, P. Commerson.



**Identification:** White suckers have a stout cylindrical or tube-shaped body. They reach a maximum length of about 24 inches and five pounds. The upper part of the head and back is olive-brown, shading to light-yellow. There is a dull, silvery sheen on the scales on the sides, and the belly is whitish. In the white sucker, the lower lip is wider than it is high, and is split into two parts. The rounded snout projects very little, or not at all, beyond the tip of the fleshy upper lip. There is a single dorsal fin with 10 to 13 soft rays. During spawning, the male white sucker's back becomes olive with a bright-lavender sheen, and there is a band of pink or red along each side. Suckers do not have teeth in the mouth. They have a single row of more than 16 pharyngeal teeth, which are toothlike structures located in the throat that aide in digestion. The fleshy-lipped mouth is small, low and directed downward, which suits the way suckers feed. Most obtain food by "vacuuming" or "sucking" it into the mouth.

**Habitat:** White suckers live in many habitats, from cool, clear headwater streams to warm rivers, to lakes, ponds and reservoirs. They are tolerant of pollution, low oxygen and silted water. Not particularly choosy about their home, white suckers can be found in dense weed beds, or in the rocky pools and riffles of streams.

**Life history:** In spring, when water temperatures reach about 50 degrees, white suckers make their spawning runs, or migrations. They sometimes enter small gravel-bottomed streams by the thousands. The fish may home in on spawning sites they have visited before. The fish spawn from early May to early June, which has given the white sucker one of its nicknames, "June sucker." In lakes, they spawn along the edges or on shallow shoals, over gravel.

Spawning runs take place at night, with the actual spawning done after dark as well, in shallow water, sometimes with the fish's back out of the water. Two or more males spawn with each female, pressing against her as eggs and milt are released. The tiny, slightly adhesive eggs scatter over the gravel, generally 20,000 to 50,000 per female. The eggs adhere to the rocks or drift downstream before settling to the bottom. The motions of the spawning act disturb the gravel and help to cover the eggs slightly.

Neither parent cares for the eggs or young, which is typical of the sucker family. After they hatch, young white suckers remain in the safety of the gravel for a week or two. Then they move off. White suckers can grow rapidly with sufficient food, and they themselves are an important food for game fish. If not caught or eaten, white suckers can live up to 12 years.

White suckers are moderately active in the daytime, but do most of their feeding at sunrise and sunset, when they can move into shallow water in dim light. They are bottom-feeders. They eat both plant and animal material, like zooplankton, aquatic insects, mollusks and crustaceans. White suckers are schooling fish, and can sometimes be seen in groups in the pools of clear streams

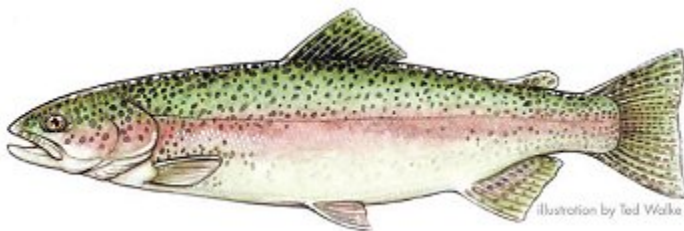
(Text and pictures taken from the Fish & Boat Commission's reference book "*Pennsylvania Fishes*")



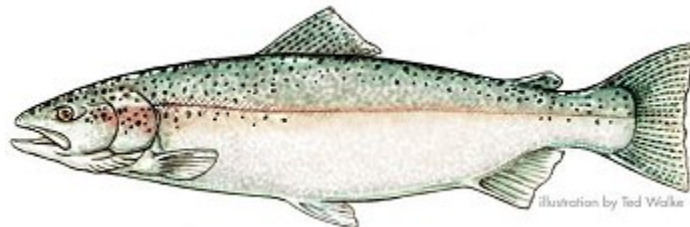
## Rainbow Trout *Oncorhynchus mykiss*

**Species overview:** Rainbow trout are a western North American species, native to the Pacific slope from California to Alaska. In a turn-of-the-century effort to restore Pennsylvania's degraded trout fishery, rainbows were introduced throughout the state. But today, as wild fish, rainbows sustain reproducing populations only in a handful of fast-falling creeks scattered around the state. As stocked, hatchery-reared fish, rainbows are found throughout Pennsylvania's watersheds.

For many years the rainbow was considered a near relative of the brown trout, and it was given the scientific name *Salmo gairdneri*, which still appears in some reference books. Today, biologists consider the rainbow more closely akin to the Pacific salmon and the cutthroat trout of the West. Its scientific name was changed to reflect that link. Like those salmon, some rainbows (steelhead) run to the ocean or a large sealike lake, like the Great Lakes, if they have access, returning upstream for spawning. Then they are called "steelhead" (they appear steel-colored, or more silvery, than stream rainbows). Rainbows are flashy fighters when hooked, jumping out of the water more than other trout. The genus name "Oncorhynchus" means "hooked snout," referring to the hooked lower jaw of big, breeding males.



**Identification:** Rainbow trout are silvery-gray to dark-green on the back and sides. They have a pinkish or reddish lateral stripe, sometimes with lavender or orange overtones, from the gill cover running the length of the fish to the tail. The caudal fin has rows of small dark spots, and there are more small blackish spots sprinkled on the head and sides, and spotting on the dorsal and adipose fins. The belly is whitish. The lower fins are pale-pink without spots. At spawning time, males become deeply colored with an intensely red side stripe. Steelhead can be separated from similar-looking coho and chinook salmon by looking at the inside of the mouth. The mouth is completely white in the steelhead. In the salmon, the mouth has some gray or black. Steelhead and other deepwater, big-lake rainbows are more silvery than stream fish, with less of a side stripe. Great Lakes steelhead can grow to 30 inches and larger. The state record, taken from Lake Erie, is over 19 pounds.



**Steelhead**

**Habitat:** Rainbows are considered fastwater fish, preferring the swift runs and riffle areas of streams. They may live in small creeks, as well as suitable spots in large rivers, the tailwaters of dams, and in lakes and reservoirs. As trout, rainbows live in cold, clean, well-oxygenated water. Their optimum water temperature is about 55 degrees. Although they do best when the water is under 70 degrees, they can withstand temperatures into the 70s if there is plenty of oxygen and a cool, shady place to which they can retreat. Rainbows are the trout least tolerant of acidity. They do best in slightly alkaline waters. As steelhead, rainbows inhabit the cool waters of large lakes, especially Lake Erie and other Great Lakes, as well as oceans. Rainbow trout respond well to hatchery culture and have been introduced for sport fishing throughout the world. In some places, especially the mountains of the southeastern United States, introduced rainbows have encroached on native brook trout populations.

**Life history:** Rainbow trout are considered spring spawners, but steelhead may enter streams to spawn from late fall through spring. Spawning takes place when the water temperature is about 50 degrees, over gravel beds with good

water flow. Rainbow trout move upstream to find the proper spawning area. Rainbows in lakes seek tributary streams. Like other trout, the female rainbow prepares the nest depression by turning on her side and "kicking" against the bottom gravel with her body and fins. Male rainbows are aggressive on the spawning grounds, driving other males away from the female's nest. When the actual spawning takes place, several males may be beside the female. The females produce several hundred to over 12,000 eggs, depending on their size. After the eggs are deposited into the gravel and fertilized, no parental care is given. The eggs hatch in four to seven weeks. The fry take up to another week in the gravel to absorb the yolk sac. Then they become free-swimming. Most rainbows are sexually mature when they reach about three to five years old.

Documentation of successful natural reproduction in Pennsylvania is rare. Self-sustaining populations of rainbow trout are found only in a few scattered streams. But mature rainbows, especially steelhead that have run up Lake Erie tributaries, successfully spawn and produce young. However, adult returns are mostly comprised of hatchery-released fish. Unlike salmon, which die after spawning, steelhead can spawn again, returning to the ocean or large lake to grow even bigger before the next year's spawning run. Steelhead also follow other spawning fish migrating upstream and prey on their eggs and young. Rainbows feed on aquatic and terrestrial insects, crayfish and other crustaceans. Rainbows also eat fish, as well as plankton, snails, leeches and fish eggs. They take a variety of anglers' flies, lures and baits.

Rainbows have been intensively cultured in fish hatcheries. Strains have been developed that are of various colors, are tolerant of warm water, grow rapidly, resist disease and spawn at times different from the rainbow's natural spawning time.

The lifespan of the steelhead in the Great Lakes is six to eight years. Small-stream rainbows may live only to be three or four years old.

(Text and pictures taken from the Fish & Boat Commission's reference book "*Pennsylvania Fishes*")

# Longnose Gar



## CANDIDATE

(could achieve endangered or threatened PA status in the future)

The **longnose gar** ranges widely through the Mississippi River watershed and lower Great Lakes. It is also found along the Atlantic Coast north to New Jersey. In Pennsylvania, it has been reported from scattered locations including Lake Erie, and the Allegheny and Ohio River watersheds. It has also been reported to be in the extreme southern portion of the Susquehanna River watershed. Never abundant, the longnose gar's primary Pennsylvania haunt is the shallow, weedy waters of Presque Isle Bay in Lake Erie.

One oddity of the gar is its tolerance of low oxygen conditions. Gars have a swim bladder that connects to the throat by an open tube. When hard-pressed for oxygen in the water, gars can go to the surface and gulp air into the swim bladder, which then acts as a lung.

The genus name "Lepisosteus" means "bony-scaled."

**Identification:** The gar has a long, relatively thin-looking, cylindrical body that is "armored" with large, thick, diamond-shaped scales. Its beaklike or swordlike snout is filled with fine, sharp teeth. The single dorsal fin and the anal fin are located far back toward the tail.

The spotted gar is usually olive-green on its back and silvery-white on the belly. There are large, roundish dark spots on the top and sides of the head, and on the upper part of the body. The fins have dark spots and may display orange tints. The spotted gar grows almost to four feet long.

Longnose gar are grayish to olive-green on the back and white on the belly. They may have dark spots or blotches on their fins and especially toward the rear along their sides. The fins may show yellow or orange tints. They can grow to about 50 inches long.

**Life history:** Longnose gar adults live in lakes or sluggish pools and backwaters in rivers. They spawn in the spring, in the vegetated shallows of lakes, or they may migrate upstream to find a gravel bottom. Males mature in three to four years. Females mature a year or so later. No nest is built. Females may spawn with several males over the long spawning season. Up to 30,000 tiny dark eggs are released by each female. The eggs stick to underwater objects and plants. The eggs, which are poisonous to humans and other mammals, take six to eight days to hatch. Then the young gars attach themselves, by means of a suction disk at the tip of the snout, to something submerged. There they await the absorption of the yolk sac. Young longnose gars grow fast, nearly to two feet the first year. They may live to be 20 years old.

Spotted gars also spawn in the spring, with large groups of males and females appearing over riffles and in the shallows along lake shores. They make no nest for the eggs, but the gravel is cleaned by their spawning activity. They also spawn over underwater vegetation. The spotted gar grows more slowly than the longnose.

Gars are voracious carnivores, preying on other fish. Their hunting tactic is to lie in wait for prey to move close, or they may stalk it slowly. Then they rush in and slash their sharp-toothed "beak" from side to side, killing or injuring the target fish. The prey is then grabbed crosswise in the gar's teeth and maneuvered in the jaws to be swallowed headfirst. Gars also occasionally feed on crustaceans. Gars are sometimes seen on sunny days, apparently basking, just beneath the water's surface.

(Text and pictures taken from the Fish & Boat Commission's reference book "*Pennsylvania Fishes*")

## Smallmouth Bass *Micropterus dolomieu*

**Species overview:** The smallmouth bass was native to and found only in the Great Lakes and Ohio River watersheds until the mid-1800s. When the railroads spread around the country in the second half of the 19th century, so did the smallmouth. It was transported by train and eventually became a popular sport fish throughout the United States. It is now found all across Pennsylvania. Because of its body's brownish-gold tints, the smallmouth has been nicknamed "bronzeback." Its species name recognizes a French naturalist, M. Dolomieu.



**Identification:** The robust-looking smallmouth has a brownish or bronze cast to its back. It is lighter on the sides and has a white or pale-yellow belly. There is a goldish sheen to its scales, and smallmouths have a series of eight to 15 olive-colored vertical, broken bars along each side. The end of the upper jaw of a smallmouth does not extend beyond the back edge of the eye. The dorsal fin sections are separated by a shallow notch, not a deep notch as in the largemouth. The smallmouth's eye is orange-red, and dark lines radiate from the eye backward. In young smallmouths, the vertical side bars are prominent, and the tail fin has three colors: Orange at the base, then a black band, then white to yellow at the tip.

**Habitat:** Although largemouths and smallmouths may live in the same rivers or lakes, they are found in different habitats. Smallmouths prefer rocky locations, more water depth and heavier current than largemouths. In Pennsylvania, smallmouth bass are found in medium to large streams and clear, deep lakes and reservoirs with a summer water temperature between 60 and 80 degrees. In lakes, they hang around downed logs, stumps, stone rubble and rock outcrops, and along the steep sides of submerged creek channels. They prefer streams with riffles flowing over gravel or boulders, where they are found in the pools, pockets behind rocks, or in the deeper moving water.

**Life history:** Smallmouth bass spawn in spring, May to early June, when water temperatures reach 60 to 70 degrees. The male builds the nest. The male fans a circular depression in gravel or sand with his fins. The nest is 14 to 30 inches in diameter and usually in three or four feet of water, although it may be more than 20 feet deep in clear water, as in Lake Erie. Smallmouths in lakes often move into tributary streams to spawn. Several females spawn on the same nest, adding 2,000 to 7,000 eggs per pound of body weight. Because the females spawn at different times, the eggs the male is guarding do not all hatch at the same time. Depending on water temperature, the eggs hatch in two to nine days. The young fish are ready to leave the nest five or six days after that.

In rivers and streams, flow and temperature can affect the survival of young smallmouth bass. High flows can sweep eggs and fry downriver, where they may perish. Conversely, moderate flows may lead to high fry survival. These early season events frequently lead to low or high densities of adult smallmouth bass.

Young smallmouths eat tiny crustaceans. Then they graduate to insect larvae, crayfish and fish. Smallmouths may reach 20 inches or more in length. The Pennsylvania smallmouth angling record is over seven pounds.

(Text and pictures taken from the Fish & Boat Commission's reference book "*Pennsylvania Fishes*")

## Brook Trout *Salvelinus fontinalis*

**Species overview:** The brook trout is Pennsylvania's official state fish. It is technically a char. It is related to the Arctic char of the Far North, the Dolly Varden and bull trouts of the West, and the lake trout. The chars live farther north than most other trout and salmon family members. The brook trout's original home was northeastern North America, through the Great Lakes, and south along the Appalachian Mountains to Georgia. It is the only stream trout that is native to Pennsylvania. The genus name "Salvelinus" is derived from an old name for char. The species name "fontinalis" means "of springs." Brook trout are sometimes called speckled trout, squaretails or just "brookies."



**Identification:** The brook trout's general body color is dark-green. Looking closer, its back is dark olive-green or gray-green, mottled with dark, squiggly or wormlike markings from head to tail. The sides and belly shade lighter, sometimes with green, gray or even lavender tones, and additional irregular marks. The sides also have scattered red dots, surrounded by bright-blue halos. The belly is usually pale yellow-orange, with a blackish or gray streak down the middle. The pectoral, pelvic and anal fins are pale to bright-orange with a white leading edge followed by a black stripe. There are dark blotches on the dorsal and caudal fins. The brook trout's tail fin is less forked than that of most trout and salmon. It's even squarish. In spawning males, colors become more intense and the belly becomes deep-orange. At maturity, wild brook trout may be from five inches to 18 inches long, according to the availability of food in the home stream.

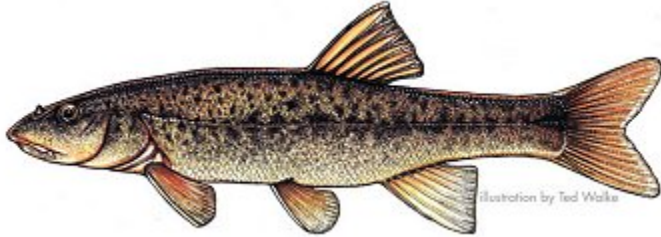
**Habitat:** The brook trout lives naturally in small, cold, clean streams. It also adapts to ponds and lakes, as well as instream beaver ponds. Brook trout are found in Pennsylvania as wild populations in the Ohio, Susquehanna, Genesee, Potomac and Delaware River watersheds. Brook trout are also found throughout the state as hatchery-raised, stocked fish. The habitat of wild brook trout has been greatly reduced in Pennsylvania since European settlers arrived, with land-use changes, mining, and warming and silting of streams, and with other pollution and stream habitat degradation. Naturally self-sustaining populations can still be found in limestone spring-fed streams and cold, mountain creeks. Brook trout can tolerate relatively acidic waters, but not temperatures much over 65 degrees.

**Life history:** Brook trout spawn in the fall, from mid-September through November and may travel to upstream headwaters to find the right spawning spot. Similar to other trout, with violent motion of the body and tail, the female digs a shallow nest depression in the bottom gravel where there is good water flow to bring oxygen to the eggs. The males become aggressive on the spawning grounds, chasing one another, but several males may accompany the female in the spawning act. After fertilization, the eggs receive a small additional covering of gravel, often from females digging new areas just upstream. The eggs are given no further parental care. Eggs develop over the winter and hatch in late winter or early spring. In small streams, sexually mature fish may be only four or five inches long, and produce only a few hundred eggs. A brook trout over 18 inches might produce around 4,000 eggs. In headwater, infertile streams, few brook trout may reach "legal" keeping size for anglers. Large brook trout caught by anglers in Pennsylvania are mostly hatchery-stocked fish. But they may have spent some time in the stream since their planting, grown bigger, and become wary of anglers. Brook trout feed on aquatic and terrestrial insects, both under and on the water's surface, crustaceans and small fish. They can be caught on a variety of artificial flies, lures and natural baits. Brook trout are relatively short-lived. Few survive in the wild longer than five years.

(Text and pictures taken from the Fish & Boat Commission's reference book "*Pennsylvania Fishes*")

## Longnose Dace *Rhinichthys cataractae*

**Species overview:** The longnose dace can be found throughout North America and northern Mexico. It occurs more often in the eastern United States than in our western states. In Pennsylvania the longnose dace is most abundant in swift-flowing streams with gravelly bottoms, although it does appear in some lakes.



**Identification:** Adults reach a length of four or five inches. On the upper sides and back, the longnose dace is reddish brown to dark-olive. The sides are lighter, sometimes with a faint darker lateral band, fading to silver or white on the bottom. Dusky scales are scattered along the sides, making the longnose dace appear mottled. The fins are transparent to light-green. The anal, pectoral and pelvic fins of spawning males are red, as are the lips. Spawning males develop large tubercles on the rays of the pectoral fins. The mouth is nearly horizontal, and the snout projects well beyond the mouth. The pelvic and dorsal fins have eight rays. The pectoral fins have 13 to 15 rays. The longnose dace has a barbel at the tip of the jaw.

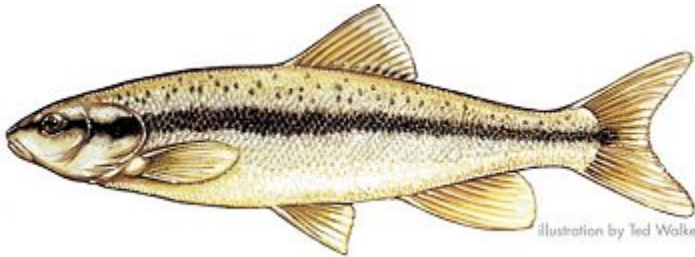
**Habitat:** The longnose dace prefers swift riffles in cold or cool fast-moving streams, most often trout streams in Pennsylvania. Their downward-sloping head assists them in maintaining their position in the water column in the fast riffles they prefer. Longnose dace feed on aquatic insects, including mayflies, blackflies and midge larvae. Longnose dace occur throughout Pennsylvania.

**Life history:** Longnose dace usually spawn in the spring, from April into June. Spawning sites include areas over gravel or sand in fast water. Males defend the spawning site by butting and biting intruders. Each female lays some 200 to 2,000 adhesive, transparent eggs, which hatch in seven to 10 days at about 60 degrees.

(Text and pictures taken from the Fish & Boat Commission's reference book "*Pennsylvania Fishes*")

## Blacknose Dace *Rhinichthys atratulus*

**Species overview:** The blacknose dace is a common small minnow, distributed throughout the Mississippi and Great Lakes watersheds, and along the Atlantic Coast to North Carolina. There are two subspecies in Pennsylvania—*Rhinichthys atratulus meleagris* in western Pennsylvania and *Rhinichthys atratulus atratulus* in the eastern part of the state. Both look virtually alike. The blacknose dace's genus name "Rhinichthys" means "snout-fish," and the species name "atratulus" is derived from a word that means "clothed in black." Local Pennsylvania nicknames for this species are "redfin" and "redfin dace."



**Identification:** The blacknose dace is a small, slender minnow that grows to about three inches long. They have the typical minnow's short, single dorsal fin and a forked tail. The back is light or dark-brown, or gray. The sides shade lighter, toward a silvery-white belly. Sprinkled along the sides are dark scales that give the fish a spotted appearance. The blacknose dace's most obvious characteristic is its black side stripe. The stripe runs from the snout through the eye, and along the length of the side to the tail. At breeding time, the males also have a rusty-orange or red stripe immediately below the black side stripe. In spawning season, males also acquire pads on the upper surface of the pectoral fins, and the pectoral and pelvic fins become yellow-white or orange. The blacknose dace's cousin, the longnose dace, grows up to five inches long and is reddish brown to dark-olive, with scattered dark spots and a light belly. But it does not display the blacknose's prominent black "racing" stripe on its side.

**Habitat:** Blacknose dace are creatures of flowing water. They are found in most of the small streams in Pennsylvania, but are typically in the moderate current of headwaters and springfed runs. Although they thrive in stream pools as well as rocky riffles, they won't be found in the still water of lakes. The blacknose dace shares Pennsylvania with the longnose dace (*Rhinichthys cataractae*). Both dace are most often found in the same streams, but they use different habitats.

**Life history:** Blacknose dace spawn in spring, May to June, choosing a shallow, sandy or gravelly riffle. The males assemble over the spawning area and stake out territories, guarding a bit of underwater turf against other blacknose dace males. The males circle and seem to "dance" to attract females. Several females spawn on the male's nest site or in a nearby similar area. Each female deposits some 750 eggs. The eggs fall in or on the gravel and the parents abandon them to develop on their own. Blacknose dace live only three or four years. They feed on the tiny invertebrate animal life they find on the stream bottom, including blackfly and midge larvae, as well as diatoms and algae.

(Text and pictures taken from the Fish & Boat Commission's reference book "*Pennsylvania Fishes*")

# Largemouth Bass *Micropterus salmoides*

**Species overview:** Largemouth bass were originally distributed in the Ohio River and Lake Erie watersheds in Pennsylvania. The largemouth has been established statewide in appropriate habitat. The largemouth bass is Pennsylvania's biggest sunfish. The state angling record is over 11 pounds, and the fish can grow two feet or more in length. The largest largemouths are generally females. The species name "salmoides" refers to trout ("salmo"), because the largemouth is sometimes called a "trout" in the southern United States. One nickname is "bucketmouth," which, like the common name "largemouth," is well-deserved by the fish's gaping jaw, with which it can swallow sizable prey.



**Identification:** Along with growing larger, the largemouth is more rotund and less flattened laterally (side to side) than other members of the sunfish family. The largemouth's head and back are a bright-green to olive-green. Its sides are lighter green, and the belly is whitish or pale-yellow. The largemouth's upper jaw extends beyond the back edge of its eye. It has a broad black stripe or a line of broken splotches running along its side from head to tail. In the largemouth, the two sections of the dorsal fin are nearly separate.

**Habitat:** The largemouth bass lives throughout Pennsylvania in suitable warmwater habitat, which is usually a pond or small, weedy lake. It is also found in the shallow backwaters and coves of large lakes and in the sluggish sections of big rivers. Largemouths are almost always associated with aquatic weeds, a soft bottom or stumps and downed logs. They are rarely found over rocks or in depths of more than 20 feet.

**Life history:** In true sunfish style, the male largemouth fans a circular nest for spawning and aggressively defends the nest site, eggs and young fish. Largemouths spawn in spring and early summer, when water temperatures remain at 60 degrees for about three days. The typical nest is on gravel, sand or even soft mud. It is two to three feet in diameter, about six inches deep, and in one to four feet of water. Largemouths usually spawn within eight feet of a shoreline and keep their nests at least 20 feet apart.

Several largemouth bass females may spawn on one nest, each contributing 2,000 to 7,000 eggs per pound of body weight. Egg hatching takes about 10 days in 65-degree water. The young largemouths stay at the bottom of the nest for about a week, until the yolk sac is absorbed. Then they rise above the nest in a school and begin feeding. The male continues to guard them for as long as a month. Young bass feed on zooplankton, insects and small fishes, and they are cannibalistic on one another.

Frequently, spring lake conditions determine the abundance of these forage items. Thus, the abundance of these forage items also determines the abundance of young largemouth bass. The number of young largemouth bass produced each year varies according to lake conditions and ultimately leads to changes in adult largemouth bass abundance.

Adult largemouths are predators and eat mostly fish and crayfish, but they also take frogs, snakes, and even small mammals and birds, like mice and ducklings that happen onto the water's surface. Largemouth bass feed day and night.

Attention-attracting, splashy surface plugs, minnowlike lures and soft-plastic worms or other slithery imitations, snaked through the weeds, all appeal to the aggressive largemouth.

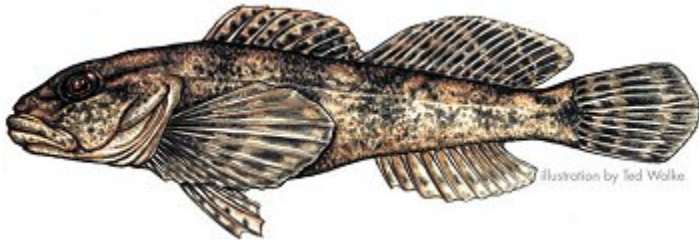
(Text and pictures taken from the Fish & Boat Commission's reference book "*Pennsylvania Fishes*")



# Sculpins

## Family Cottidae

**Family overview:** Most members of the sculpin family are Northern Hemisphere saltwater fishes, but some species have adapted to living in fresh water. Most freshwater sculpins are small bottom-dwellers that prefer cool, headwater streams. In Pennsylvania there are three common sculpin species for sure: The mottled sculpin (*Cottus bairdi*), the slimy sculpin (*Cottus cognatus*) and the Potomac sculpin (*Cottus girardi*), which is a candidate species. The spoonhead sculpin (*Cottus ricei*) and deepwater sculpin (*Myoxocephalus thompsoni*) live in the depths of the Great Lakes and might be present in Lake Erie. They are extirpated species in Pennsylvania.



The **mottled sculpin** has a wide range over the central United States and Canada. It is common in clear, clean upland and mountain streams. Mottled sculpins often live in company with brook and brown trout, but they can also live in waters too warm for trout. In Pennsylvania, the mottled sculpin is found in all of the state's watersheds.

**Identification:** Sculpins are small, camouflaged fish reaching four or five inches in length. Their dark-and-light mottled color pattern helps them hide on the stream bottom. The broad head, fleshy mouth and upward-peering eyes look large for the rest of the body. Sculpins are compressed top to bottom, tapering quickly from a robust head to a narrow tail. The large, fanlike pectoral fins and the sculpin's flattened body shape allow it to stay pressed against the stream bottom, maintaining its position when in swift water—a hydrodynamic adaptation. Sculpins have no swim bladder, so they are nonbuoyant and move over the bottom in short spurts. There are two dorsal fins. The front fin is spiny and the rear one is soft. Both are held erect. The pelvic fins have a single spine and soft rays. The sculpin's body is scaleless, except for some scattered areas that have small, sharp scales called "prickles." The tail is straight or rounded.

The mottled sculpin is light to dark-brown with darker mottling on its back and sides, and a belly that is pale-brown or whitish. Its chin has irregular dark pigment, and there are spots and streaks of darker color on the dorsal, caudal, pectoral and anal fins. Mottled sculpins also have a short patch of teeth on each of the paired bones (palatine) in the forward roof of the mouth.

Slimy sculpins are dark-brown with darker mottling. They are lighter on the sides, blending to whitish on the belly. The spiny dorsal fin is dark at the base, and clear along its top edge. The second dorsal fin, caudal fin and anal fin may have light bars, and the pectoral fins are widely barred. There is no mottling on the chin, and no teeth on the palatine bones. The mottled sculpin and the slimy sculpin are difficult to tell apart in the field.

**Life history:** Mottled sculpins spawn in early spring. The males choose a hollow beneath a rock in a stream riffle. They invite females to spawn there by enacting an elaborate courtship ritual. The male moves his head quickly, bites the female, and may even grab her head and pull her toward the nest cavity. The eggs are laid on the underside of the rock, in a sticky mass. They hatch in two or three weeks. The male guards the nest as the eggs develop. Slimy and Potomac sculpins spawn similarly.

(Text and pictures taken from the Fish & Boat Commission's reference book "*Pennsylvania Fishes*")

## Brown Bullhead *Ameiurus nebulosus*

**Species overview:** The brown bullhead is the most widely distributed bullhead, found across Pennsylvania in suitable habitat. It is native to Atlantic and Gulf Coast watersheds, from eastern Canada to Alabama. It was also originally found in the Great Lakes system, Hudson Bay and the Mississippi River watershed. It has also been widely introduced. Its species name "nebulosus" means "clouded," referring to the fish's mottled sides.



**Identification:** An 18-inch and three-pound brown bullhead is a trophy, and is near the size maximum of the species. Brown bullheads average 12 to 15 inches. The upper part of the head, back and sides are dark to light yellow-brown or olive-brown, shading to grayish white or yellowish white on the belly. The sides have brown or black mottling. The brown bullhead's chin barbels are dark, grayish black, but may have whitish color at the base. These help to distinguish the brown bullhead from the black bullhead, which is known from a few northwestern Pennsylvania counties. The black bullhead's chin barbels are all black. The brown bullhead's caudal fin is square-tipped, or slightly rounded. Its strong pectoral fin spines have five to eight sawlike teeth on their rear edges. The anal fin has 18 to 24 rays, usually 22 or 23.

**Habitat:** Brown bullheads live in several habitat types, but they are found mostly in ponds and the bays of larger lakes, and in slow-moving sections and pools of warmwater streams. They are bottom-dwellers, usually living over soft mud or muck, where there is plenty of underwater vegetation. Brown bullheads can sometimes be found as deep as 40 feet. They are tolerant of very warm water temperatures, high carbon dioxide and low oxygen levels, and levels of pollution that other fish cannot tolerate.

**Life history:** Brown bullheads spawn in late spring, May to June, when water temperatures reach 70 degrees. Both males and females participate in nest construction, which can be a shallow saucer on the bottom mud or sand, or among roots of aquatic plants, near the protection of stumps, rocks or downed trees. Nests can also be excavated holes or natural burrows. Spawning can also occur under sunken boards and logs, and in hollow stumps. The water depth for spawning ranges from six inches to several feet. The nests are usually around the shoreline or in coves, or in the mouth of a creek.

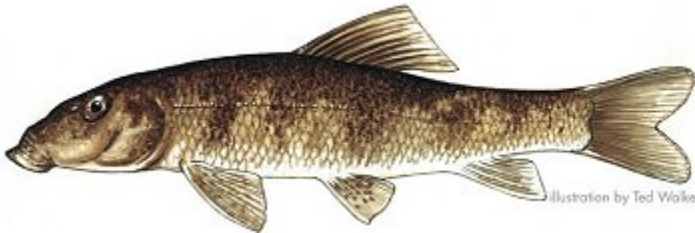
Brown bullheads usually spawn in the daytime. Their courtship includes the male and female caressing each other with their barbels. They spawn beside each other, but facing in the opposite direction. The females produce from 2,000 to 13,000 cream-colored, mucous-covered eggs. Sometimes one or both parents eat some of the eggs. Both male and female brown bullheads cooperate in protecting the nest, eggs and young. The parents fan and stir the eggs with their fins, aerating them. The parents have also been seen to take the eggs into their mouths, presumably cleaning them, and to blow the eggs back into the nest again. Hatched brown bullheads are pitch-black and may be mistaken for tadpoles. One or both parents shepherd the loose ball of fry for several weeks, until the young are about one inch long.

Like other catfish, brown bullheads are active mostly at night, when their sensitive barbels help them find food in the darkness. They are omnivorous bottom-feeders and eat a wide variety of plant and animal material, including aquatic insects and larvae, worms, minnows and other small fish, crayfish, snails, freshwater clams and even algae. Brown bullheads are able to exist on atmospheric air for a time. They can remain alive for hours if kept moist when they are out of the water.

(Text and pictures taken from the Fish & Boat Commission's reference book "*Pennsylvania Fishes*")

## Northern Hog Sucker *Hypentelium nigricans*

**Species overview:** Northern hog suckers seem to be misnamed, because they don't like mud. Instead, they are a clean-stream fish. They are abundant, in suitable habitat, over the eastern half of the United States and southern Canada, from central Minnesota eastward through the Great Lakes region to New York, and down the Mississippi River watershed to the Gulf of Mexico. Hog suckers are common over most of Pennsylvania, but they are missing from most of the Delaware River watershed. The genus name "Hypentelium" is of Greek origin and means "lower lip five-lobed." The species name "nigricans" means blackish.



**Identification:** Northern hog suckers can grow to about 22 inches and four pounds. They are not as silvery as most other suckers, but are well-camouflaged to disappear against the gravel and rocks of their underwater home. The back and upper part of the hog sucker's head is brownish, with dark mottling. Across the back are four oblique dark bars, or saddles, which shade to lighter brown on the sides. The conical body has a dull, bronze sheen, and there are dark blotches above the whitish belly. Hog suckers have a large, long head with a slight depression between the eyes. The snout is long and their fleshy lips protrude more than most other suckers' lips. The lower fins are dull-red, and all except the anal fin have dark mottling or spotting. During breeding, both sexes develop tubercles—tough, fleshy nobs—on some fins, and in the male on the body scales as well.

**Habitat:** Because they cannot tolerate siltation and move out of water that becomes tainted with pollutants, hog suckers are considered indicators of good water quality. They are especially associated with gravelly riffles and adjacent shallow gravel or rubble areas in streams. When hog suckers live in lakes or reservoirs, they can usually be found near the mouth of tributary streams where there is some water movement. Hog suckers have a small home range, limiting their traveling to a few hundred feet. Hog suckers don't mind cold water and can be found in trout streams.

**Life history:** Hog suckers spawn in spring, when the water temperature warms to 60 degrees, over gravel-and-sand riffles, in shallow water. When they live in a large stream, hog suckers may make an upstream run to spawn in smaller headwaters. Two or three males move alongside a female as she releases her eggs. The spawning activity produces violent thrashing and splashing. This helps to dig a shallow depression in the bottom gravel, into which the non-adhesive eggs fall. Waiting minnows may rush in to eat any eggs that are exposed. After spawning, hog suckers leave, allowing the eggs to hatch on their own.

Northern hog suckers are prolific egg-producers. Their many small young are used as food by other fish. Hog suckers themselves are bottom-feeders, feasting on immature aquatic insects, snails and mollusks, crustaceans, algae and other plant material. Hog suckers use their large head and strong snout to range through the riffles, turning over rocks. They scrape material off the rocks and eat the plant and tiny animal material underneath. This form of foraging dislodges other insects, crayfish, minnows and stream life. Other fish follow feeding northern hog suckers and grab the food left or dislodged by the hog suckers.

Northern hog suckers have a reduced swim bladder. With their bulky head, tapered body, and low, spreading pectoral and pelvic fins, a reduced swim bladder suits them well for life on the bottom of fast-flowing streams. Like darters, hog suckers rest on their fins on the stream bottom, but dart away when disturbed. Hog suckers become inactive when the water temperature falls below 50 degrees.

(Text and pictures taken from the Fish & Boat Commission's reference book "*Pennsylvania Fishes*")

## Muskellunge *Esox masquinongy*

**Species overview:** A voracious predator, the muskellunge is one of Pennsylvania's largest and fastest-growing fish, with the state record standing at over 54 pounds. The muskellunge's original North American range was the St. Lawrence River, throughout the Great Lakes and Hudson Bay, and the Mississippi River basin, but it has been widely propagated and stocked elsewhere for sport fishing. In Pennsylvania, muskies were originally restricted to the northwest region, the Lake Erie and Ohio River watersheds, especially in the large glacier-formed lakes, like Conneaut Lake in Crawford County and Presque Isle Bay in Lake Erie. The species name "masquinongy" comes from an Ojibwa (Chippewa) name for the fish—"mas," meaning "ugly," and "kinononge," meaning "fish."



**Identification:** The musky is streamlined with a dorsal and anal fin that are set so far back toward the tail that the fish is almost missile-shaped. Its flat, ducklike snout has many strong, sharp teeth. The musky has no scales on the lower half of its cheek and the lower half of its gill cover, which helps to distinguish it from the northern pike. Also, the musky has six to nine pores, tiny sensory openings, beneath each side of its jaw; the northern pike has five or fewer pores. Muskies vary in the color and the intensity of their markings. The base color on the back and sides is light greenish gray or yellow-green to olive-brown, the sides shading lighter. The flanks have more or less vertical rows of darker spotting, or indistinct bars. The striping is more pronounced in younger fish. In older fish it may fade, giving the fish a uniform color. The musky's belly is white. Its fins are greenish cream to brownish orange, with dark blotches. There is no dark teardrop mark below the eye. Instead, a black horizontal streak runs through the eye. A musky of 20 to 35 pounds is not unusual, and they may grow over four feet long.

**Habitat:** Muskies are coolwater fish, found in clear natural lakes, reservoirs and rivers. They frequent quiet backwaters and slow pools that have plenty of aquatic weed growth, which the musky uses for cover and which attracts its prey. Muskies are usually found in fairly shallow water, 15 feet or less, but they have been caught 40 or 50 feet deep. They also associate with rocky or boulder-strewn shoals. Muskies use a restricted home range, rarely moving more than two miles from their summer feeding areas, with the large ones often remaining in one pool.

**Life history:** Muskellunge are solitary, territorial predators. They are very aggressive and will even attack and eat one another. Their main diet is fish, but they will take what opportunity gives them, including snakes, frogs, muskrats, mice and waterbirds.

Muskies spawn in the spring, after the northern pike, when water temperatures are in the high 50s to high 60s. They spawn at night in shallow water, often just six to 12 inches deep. Relatively long-distance spawning migrations have been documented because adults tend to return to the same spawning locations each year. As the male and female swim over the spawning site, which usually features underwater stumps and logs on a muck bottom, the eggs are released to fall as they will. Female muskies 25 to 53 inches long produce 22,000 to 180,000 eggs. The adhesive eggs hatch in eight to 14 days, and as is usual for the pike family, the fry attach themselves to sunken debris as they absorb their egg sacs.

Mortality of fry is high, because fish eat the vulnerable musky young. When muskies are about four days old, they turn the tables, and begin eating fish. On that diet they can grow to one foot long in only four months. Muskies are sexually mature at about three years old and a little over 20 inches long. Females grow faster than males, and all muskies grow best in the early summer and fall, when water temperatures reach about 68 degrees.

Muskies naturally hybridize with northern pike, producing the "tiger musky" (see page 97). Tiger muskies are also bred artificially in fish hatcheries and stocked for sport. The usual age of a musky that is caught is three to six years, but some have reached nearly 20 years old.

(Text and pictures taken from the Fish & Boat Commission's reference book "*Pennsylvania Fishes*")

# Tolerant Designations for Specific Fish

(According to EPA- Biological Indicators of Watershed Health  
<http://www.epa.gov/bioindicators/html/fish>)

| Common Name         | Pollution Tolerant | Habitat Disturbance |
|---------------------|--------------------|---------------------|
| Northern Hog Sucker | I                  | I                   |
| White Sucker        | T                  | I                   |
|                     |                    |                     |
| Longnose Gar        | M                  | T                   |
|                     |                    |                     |
| Muskellunge         | M                  | NR                  |
|                     |                    |                     |
| Rainbow Trout       | M                  | I                   |
| Brook Trout         | M                  | NR                  |
|                     |                    |                     |
| Large Mouth Bass    | M                  | M                   |
| Small Mouth Bass    | M                  | I                   |
|                     |                    |                     |
| Longnose Dace       | I                  | NR                  |
| Blacknose Dace      | T                  | NR                  |
|                     |                    |                     |
| Mottled Sculpin     | I                  | NR                  |
|                     |                    |                     |
| Brown Bullhead      | T                  | MI                  |

## KEY:

### **Pollution Tolerance    Habitat Disturbance**

T = Tolerant

M = Intermediate

I = Intolerant

NR = No ranking

T = Tolerant

MT = Moderately Tolerant

MI = Moderately Intolerant

I = Intolerant

NR = No ranking