Piscatorial Palate

On any given day, a fish might eat just about anything!

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Please note: Academic Standards are updated regularly and our alignments will be updated on the DNR Academic Standards Website at: www.mndnr.gov/education/teachers/edstandards_intro.html

Piscatorial Palate

Minnesota Academic Standards

◒ Lesson *introduces* this Benchmark.
◓ Lesson *partially* addresses this Benchmark.
● Lesson *fully* addresses this Benchmark.

Language Arts

Grades 3, 4, 5
III. Speaking Listening, and Viewing
A. Speaking and Listening:
Benchmark 1—The student will participate in and follow agreed-upon rules for conversation and formal discussions in large and small groups. ●

Science

Grade 3
I. History and Nature of Science
A. Scientific World View:
Benchmark 1—The student will explore the use of science as a tool that can help investigate and answer questions about the environment. ◓
I. History of Nature and Science
B. Scientific Inquiry:
Benchmark 1—The student will ask questions about the natural world that can be investigated scientifically. ◓
Benchmark 2—The student will participate in a scientific investigation using appropriate tools. ◓
Benchmark 3—The student will know that scientists use different kinds of investigations depending on the questions they are trying to answer. ◓
IV. Life Science
B. Diversity of Organisms:
Benchmark 1—The student will describe the structures that serve different functions in growth, survival and reproduction for plants and animals. ◓

Grade 4
I. History and Nature of Science
B. Scientific Inquiry:
Benchmark 2—The student will collect, organize, analyze and present data from a controlled experiment. ◓
Benchmark 3—The student will recognize that evidence and logic are necessary to support scientific understandings. ◓

Grade 5
I. History and Nature of Science
B. Scientific Inquiry:
Benchmark 1—The student will perform a controlled experiment using a specific step-by-step procedure and present conclusions supported by the evidence. ◒
Benchmark 2—The student will observe that when a science investigation or experiment is repeated, a similar result is expected. ◒

Environmental Literacy Scope and Sequence

Benchmarks

- Social and natural systems are made of parts. (PreK-2)
- Social and natural systems may not continue to function if some of their parts are missing. (PreK-2)
- When the parts of social and natural systems are put together, they can do things they couldn't do by themselves. (PreK-2)
- In social and natural systems that consist of many parts, the parts usually influence one another. (3-5)
- Social and natural systems may not function as well if parts are missing, damaged, mismatched or misconnected. (3-5)

For the full Environmental Literacy Scope and Sequence, see:
www.seek.state.mn.us/eemn_c.cfm

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Chapter 6 • Lesson 4

Piscatorial Palate

Grade Level: 3-5
Activity Time: 3 hours, including fishing trip
Group Size: any
Subject Areas: Science, Language Arts
Academic Skills: application, comparison, evaluation, experimenting, gathering, graphing, hypothesizing, observation, prediction, reporting, research
Setting: indoor or outdoor gathering area and water's edge
Vocabulary: barbels, control group, doughball, palate, piscatorial, stinkbait
Internet Search Words: carp bait recipes, doughball recipes, stinkbait recipes

Instructor's Background Information

In the world of fishing products, none have enjoyed greater success than the profusion of scented baits. Today's tackle industry has created a wide array of scents for dipping or spraying lures, as well as scents embedded in plastic baits to make them attractive to piscatorial palates. (**Piscatorial** comes from pisces, the Latin word for fish; **palate** refers to the sense of taste.)

Anglers have long realized that fish use their senses of smell and taste to search for food. This is even more pronounced in fish, such as catfish and carp, which have taste buds on their **barbels** (whiskers), as well as on their tongues and lips. Catfish rely on their many taste buds to locate food. Baits prepared by catfish anglers are often referred to as **stinkbaits**. The ingredients in some of these concoctions include a variety of smelly items (fish heads, for instance). All possible ingredients may not be appropriate for classroom use, but it can be fun for students to discuss why they might appeal to fish.

In this lesson, students will brainstorm a list of some common foods that they think might attract fish. Suggestions will vary. Encourage students to be creative and to open-mindedly consider some obscure answers. The only criterion for this experiment is that the suggested bait must stay on a hook for a minimum of five minutes. Suggested food items might be used alone if they can be cut to go on a hook. Otherwise, they can be puréed and mixed with flour (as a flavor carrier) to produce a **doughball**.

Summary

Many anglers have preconceived notions about which baits will attract a particular species of fish. Tackle industry researchers must often find and produce new and unique fishing baits that will be as productive—or more productive—than natural baits. In this lesson, students will have an opportunity to let their creativity run wild by suggesting common foods to try as alternatives to traditional baits. Some of these alternative baits just may help students catch the "big one!"

Student Objectives

The students will:

1. Design an experiment.
2. Make predictions about foods that will attract fish.
3. Record observations and draw conclusions.

Materials

- Box of zip-locking sandwich bags
- Knife for preparing bait
- Scented fishing bait (optional)
- **Piscatorial Palate Question Sheets,** one per student
- **Piscatorial Palate Data Sheets**, one per group
- Pencils or pens
- Clipboards

These are some foods you can use as baits if the students' lists are incomplete. (You can search for ideas on the Internet, too.)

- whole kernel corn
- strawberries, or other fruits
- cheese or cheese spread
- "gummy" candy products
- hot dogs
- bacon
- marshmallows
- potatoes
- angleworms or nightcrawlers (one group will use these as control bait)

Students will experiment to determine how well various baits perform on their fishing trip. Using the baits that they've suggested, student fishing teams will fish for one hour to determine if fish are attracted to the experimental baits. Meanwhile, one group, a **control group**, fishes with worms or nightcrawlers. A control group provides a standard against which other conditions can be compared in a scientific experiment. We know that fish will reliably eat worms or nightcrawlers, so they'll be useful to compare with other baits. Students will record the type of bait they used and the species of any fish that were enticed to bite. Data will be recorded on the **Piscatorial Palate Data Sheet**.

Procedure

Preparation

1. Purchase prospective bait supplies on the list created by the instructor and students.
2. Cut up new baits in sizes that will fit on a hook and in the mouth of a panfish.
3. Plan your fishing trip to test these new baits using the guidelines in **Lesson 6:3—Planning a Fishing Trip.**

Activity

Warm-up

1. Review the basics of fish senses as outlined in **Lesson 2:1—Fish Sense.**
2. Ask students why they think fish might go after a lure or bait. Answers will vary. Ask students what they think might taste good to a fish. Don't attempt to correct their ideas at this point—the students should begin thinking about the reasons that a fish might be attracted to a particular type of bait or lure. If you have the resources, purchase a sample of packaged, scented fishing bait and present it to the class. As you pass it around the classroom, encourage students to smell the contents and describe the scent. Why would a fish like to eat this? What else in the lake would smell like this?
3. Do all fish find food by smelling? Or do some concentrate on sight or vibration? Compare pictures of a visual predator, like a bass or northern pike (with large, well-developed eyes), to a smelling predator like catfish (which has smaller eyes). Ask students to describe the differences between these fish. Compare the habitats of these different types of fish, noting the water clarity they seem to prefer. Why do scent-oriented fish do better in turbid water than fish that depend on their eyesight to locate food?

Lesson

1. Work with the students to brainstorm a list of their favorite (or not so favorite) foods that might appeal to certain fish. Discuss the ways in which these food items could be attached to a hook and used as

bait. This should be done before you purchase the bait supplies.

2. Place students into fishing groups at this time. Limit group size to four or five students.
3. Limit the number of items on the list to the number of students in each group.
4. Pass out the **Piscatorial Palate Question Sheets** to each student. In their groups, have students answer Questions 1 and 2. These require students to make predictions about which baits they think will work best and why. Record these predictions and form them into a hypothesis: a statement that can be answered or can be proven or disproved in the experiment when the data have been collected and summarized.
5. In order to get enough data to be able to make a positive statement about the success of each new type of bait, every student group will fish with the same four or five types of baits. Each student in a group will use one of the baits for the entire length of the experiment.
6. Pass out **Piscatorial Palate Data Sheets**, one per group. During the fishing trip, have each group record on its data sheet the bait tried, number of nibbles felt, number of fish caught, species caught, and whether or not the bait stayed on the hook.

Wrap-up

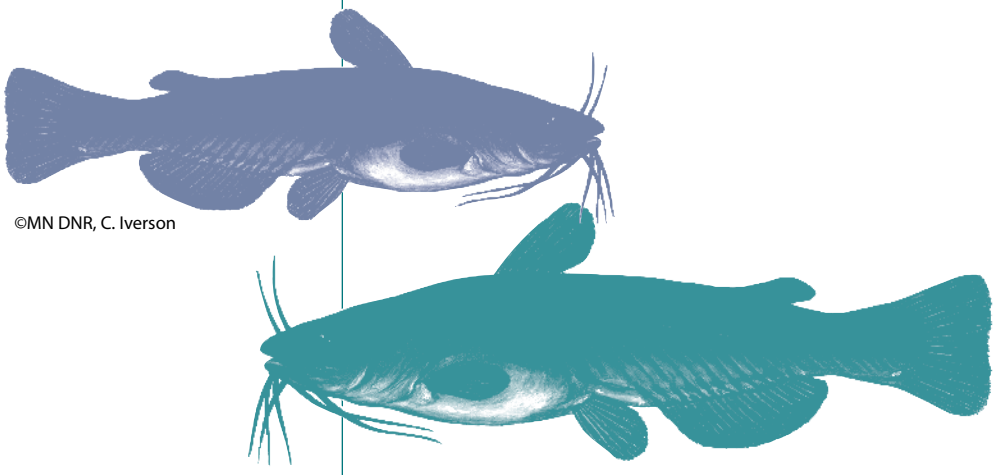
1. In the classroom, have the original groups gather to complete the **Piscatorial Palate Question Sheet** and prepare to report their findings to the class.
2. As each student group reports on their findings, make a master sheet on the whiteboard or overhead projector that includes all data collected by the individual groups.
3. Make a bar chart for the students, based on the data on the master sheet, that depicts the number of fish caught on each type of bait and the bait that caught the most species of fish. Then have the individual student groups make a similar graph from their data and compare their results to the combined results of the class.
4. Discuss the positives and negatives for each type of bait. Why did some effectively catch fish while others didn't? What problems did students encounter with the various baits? What recommendations could they make for the next fishing trip? What criteria would they use for choosing baits in the future?
5. What are the natural foods of the fish they are trying to catch? And how—if at all—did the new bait mimic those tastes, smells, and appearances?
6. If no one catches anything on the day of the experiment, what does this suggest? Were there no fish in the lake? Were none of the baits appetizing to fish? What reasons could there be for fish not feeding on a particular day? (Incoming weather systems often seem to make fish sluggish eaters, although there is little scientific data to help us understand why.)

In Minnesota, it is illegal to use game fish, carp or gold fish, or their parts for bait. In some areas—designated trout streams, for example—live bait use isn't allowed. Also, depositing entrails or fish parts into public waters or leaving them on lake or stream shores is prohibited. Refer to the Minnesota fishing regulations booklet for regulations concerning the use of bait.

It is recommended that one adult accompany every five children while fishing. (See **Lesson 6:1—Safety and Fishing at the Water's Edge** for more information.)

Assessment Options

1. Have students design an experiment to determine what type of artificial lure would best attract sunfish when shore-fishing at a specific local lake during a particular time of year. Evaluate the experimental design for its inclusion of a hypothesis or prediction, a control, clear experimental procedures, consideration for at least two variables (such as weather conditions or time of day), and a chart or table for recording observations and final results. Ask students to include an explanation of why good experimental design provides a better conclusion or result than poor experimental design.
2. Have students interview a family member, neighbor, instructor, or other adult at the school or in the community who is an avid angler, asking how they determine which baits or lures to use. Afterward, have students evaluate the method the angler uses to determine if the method would be effective. Have students improve upon the angler's method by using scientific experimental design criteria. Students can then write a letter to the angler, sharing their experimental design.
3. Have students communicate the results of the bait experiment in this lesson to the outdoor editor of the local newspaper by producing a news release announcing the findings of their bait experiment. Alternately, they could write a news column about their experimental process and results for the school newspaper or website.
4. Assessment options include the Checklist and Rubric on the following pages.



Piscatorial Palate Checklist

Possible Points	Points Earned Student	Points Earned Instructor	
2	_____	_____	Discuss what fish might like to eat. Define bait.
4	_____	_____	Work cooperatively in small group to make a prediction about which foods or bait will attract fish.
5	_____	_____	Work within a group to design an experiment including the following: • a prediction about bait • steps to test your prediction • making observations • recording data • drawing a conclusion
3	_____	_____	Conduct bait experiment, collect data, and record observations on the data sheet.
4	_____	_____	Work within a group to present the results and data from your experiment. Your presentation should: • list all the parts of your scientific experimental design • explain what a *control group* is, and why this experiment had a control group • state whether or not your experiment proves your group prediction about bait; why did it prove, or not prove, your prediction? • state two reasons for including all the parts of an experiment.
4	_____	_____	Make graphs to compare data from all groups.
2	_____	_____	Draw a conclusion about which bait will attract more fish to bite from the experimental results and graphs.
3	_____	_____	State why different types of fish prefer different types of food.
2	_____	_____	Give an example of why one type of fish might prefer a certain type of bait.
Total Points			
29	_____	_____	**Score** _____

Checklists are tools for students and instructors. Checklists involve students in managing their own learning. They help students understand and set learning goals before the lesson begins, and help them monitor their progress during the lesson, ensuring that they meet learning goals and objectives by the end of the lesson. Students can also use checklists to discover areas that may need improvement. Checklists help instructors monitor each student's progress throughout the lesson, facilitating appropriate adjustment of instruction to ensure learning by the end of the lesson. The instructor may wish to have students add several of their own learning goals to the checklist to personalize it, and to accommodate varied learning needs and styles.

Grade

26-29 points = A
Excellent. Work is above expectations.

22-25 points = B
Good. Work meets expectations.

18-21 points = C
Work is generally good. Some areas are better developed than others.

14-17 points = D
Work does not meet expectations, it isn't clear that student understands objectives.

0-13 points = F
Work is unacceptable.

Piscatorial Palate Scoring Rubric

Fish Bait Preferences Experiment	3 Excellent	2 Good	1 Fair	0 Unacceptable
Predictions: what does a fish like to eat?	Participates in class discussions about what fish might like to eat; works cooperatively within small group to predict which bait (food) will attract fish to bite.	With some encouragement and prompting, participates in class discussions about what fish might like to eat; works cooperatively within small group to predict which bait will attract fish to bite.	Listens in class during discussions about what fish might like to eat; doesn't contribute to small group to help predict which bait will attract fish to bite.	Doesn't listen in class during discussions about what fish might like to eat; disrupts small group.
Design an experiment	Works with group to design an experiment including prediction, how to test prediction, observations, recording data, comparing data, and drawing a conclusion.	Works with group to design an experiment including at least four of the following experiment components: prediction, how to test prediction, observations, recording data, comparing data, and drawing a conclusion.	Works with group to design an experiment, but experiment design doesn't contain listed components.	Doesn't work with group to design an experiment, or experiment isn't completed.
Record observations/ data	Participates in collecting data and recording observations on the data sheet for the bait experiment accurately and in an organized way.	Participates in collecting data and recording observations on the data sheet.	Doesn't participate as fully as other group members in collecting data and recording observations on the data sheet.	Doesn't participate in collecting data and recording observations on the data sheet.
Compare data and draw conclusions	Follows instructions to make graphs comparing data from different groups' results. Can draw three or more conclusions from results and graphs.	Follows instructions to make graphs comparing data from different groups' results. Can draw one or two conclusions from results and graphs.	Has some difficulty in completely following directions to make graphs from different groups' results. Doesn't draw conclusions from the results and graphs.	Doesn't follow directions or complete graphs. Draws no conclusions.

Fish Bait Preferences Experiment	3 Excellent	2 Good	1 Fair	0 Unacceptable
Reporting results	Works with group to communicate experimental results and conclusion in a clear, organized way, including explaining components of scientific experimental design. Also includes reasons for including a control group in the experiment. States whether conclusions support the original prediction, and offers reasons based on data or further predictions. States two reasons for designing an experiment using the scientific method.	Works with group to communicate experimental results and conclusion in an organized way, including explaining most components of scientific experimental design. States whether conclusions support the original prediction. States one reason for designing an experiment using the scientific method.	Works with group to communicate experimental results and conclusion. States whether conclusions support the original prediction. States one reason for designing an experiment using the scientific method.	Doesn't participate or cooperate within group to communicate experimental results and conclusion. Can't state a reason for using scientific method to design an experiment.
Bait	Demonstrates understanding that different fish prefer different types of food, based on their physical features and habitat type. Can give an example of why one type of fish prefers a certain type of bait (visually stimulating, odor, taste, etc.)	Demonstrates understanding that different fish prefer different types of food, based on their physical features and habitat type.	Demonstrates understanding that different fish prefer different types of food.	Doesn't demonstrate understanding that different fish prefer different types of food.

Score _____ (Calculate score by dividing total points by number of criteria.)

Diving Deeper

Extensions

1. Use the Internet to find catfish "stinkbait" recipes, and have students create these baits as well. It can be fun to make a recipe that they find, or to create a new one of their own.
2. Have students market their most successful new bait. Include a name, a drawing of the bait and the kinds of fish it may catch, and the recipe.
3. Have students create a "menu" for fish, in which they attempt to market each tested bait to fish that come to a "restaurant" to eat them. Have them use creative, appealing language like that used in real restaurant menus. (For example, "Crisp texture, with a savory crayfish aftertaste.") Have the class vote on the best new product.
4. Live Bait Hunt—have students search the school grounds for organisms that might make good bait, including worms, caterpillars, slugs, and other invertebrates.

For the Small Fry

K-2 Option

With younger students, omit the use of the worksheets; let them make predictions about the different foods and what fish will eat. Choose and try different food items as bait while fishing. Afterward, talk about which baits worked, which didn't, and possible reasons.

STUDENT COPY

Names _____ Date _____

Piscatorial Palate Question Sheet

1. Which bait(s) do you think will catch the most fish? Why?

2. Create a hypothesis based on your predictions in Question 1.

3. Which bait worked best? Why?

4. What conclusions can you make about the types of bait you tested?

STUDENT COPY

Names _____ Date _____

Piscatorial Palate Data Sheet

For each column, write the type of bait used. Then record the number and species of fish caught for each bait, along with whether the bait stayed on the hook or not.

	Bait #1 _____	**Bait #2** _____	**Bait #3** _____	**Bait #4** _____	**Bait #5** _____
Number and species of fish caught with each bait. **Example:** **bluegill** /// **bullhead** / **trout** //					
How many nibbles did you get?					
Did the bait stay on the hook?					