

# Flashy Fish Catchers

*It's been said that fishing lures are designed to catch anglers as well as fish!*



## Table of Contents

<b>Flashy Fish Catchers</b> .....	<b>5:5-A</b>
Minnesota Academic Standards .....	5:5-C
Environmental Literacy Scope and Sequence .....	5:5-D
Instructor’s Background Information .....	5:5-1-5
Summary .....	5:5-1
Student Objectives .....	5:5-1
Materials.....	5:5-1
Procedure.....	5:5-5
Activity.....	5:5-5
Assessment Options .....	5:5-9
Checklist.....	5:5-10
Scoring Rubric.....	5:5-11
Extensions .....	5:5-12
K-2 Option.....	5:5-12
Underwater Light Quality Sheet.....	5:5-13
Lure Types Reference Sheet .....	5:5-14

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](http://www.mndnr.gov/education/teachers/edstandards_intro.html)

## Chapter 5 • Lesson 5

# Flashy Fish Catchers

## Minnesota Academic Standards

- ☐ Lesson *introduces* this Benchmark.
- ◐ Lesson *partially* addresses this Benchmark.
- ◑ Lesson *fully* addresses this Benchmark.

### Language Arts

Grades 3, 4, 5

#### *I. Reading and Literature*

##### *B. Vocabulary Expansion:*

**Benchmark 1**—The student will acquire, understand and use new vocabulary through explicit instruction and independent reading. ◐

Grade 3

#### *III. Speaking, Listening, and Viewing*

##### *A. Speaking and Listening:*

**Benchmark 2**—The student will demonstrate active listening and comprehension. ◑

**Benchmark 3**—The student will follow multi-step oral directions. ◑

**Benchmark 4**—The student will give oral presentations to different audiences for different purposes. ◑

Grade 4

#### *III. Speaking, Listening and Viewing*

##### *A. Speaking and Listening:*

**Benchmark 2**—The student will demonstrate active listening and comprehension. ◑

**Benchmark 3**—The student will give oral presentations to different audiences for different purposes. ◑

Grade 5

#### *III. Speaking, Listening, and Viewing*

##### *A. Speaking and Listening:*

**Benchmark 2**—The student will demonstrate active listening and comprehension. ◑

**Benchmark 4**—The student will give oral presentations to different audiences for different purposes. ◑

### History and Social Studies

Grade 4—8

#### *V. Geography*

##### *D. Interconnections:*

**Benchmark 2**—Students will analyze how the physical environment influences human activities. ◐

### 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. ◐

##### *II. Physical Science*

##### *C. Energy Transformation:*

**Benchmark 2**—The student will know that light tends to maintain its direction of motion until it is absorbed, refracted or reflected by an object. ◑

##### *III. Earth and Space Science*

##### *C. The Universe:*

**Benchmark 3**—The student will observe that the sun supplies heat and light to the Earth. ◑

##### *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

#### *IV. Life Science*

##### *G. Human Organism:*

**Benchmark 1**—The student will understand that humans have structures that serve functions in growth, survival and reproduction. ◐

## 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](http://www.seek.state.mn.us/eemn_c.cfm)

## Chapter 5 • Lesson 5

# Flashy Fish Catchers

**Grade Level:** 3-5

**Activity Duration:** two 55-minute class periods

**Group Size:** any

**Subject Areas:** Expressive Arts, Science, Language Arts, Social Studies, Environmental Education

**Academic Skills:** application, construction, experimentation, invention, listening, observation, small group work, synthesis

**Setting:** indoor or outdoor gathering area with tables

**Vocabulary:** adaptation, gorge, light quality, light quantity, light spectrum, lure, turbidity, wavelength

**Internet Search Words:** antique lure, fishing lure

## Instructor's Background Information

Since the dawn of fishing, anglers have pondered which types of lures or artificial baits to use to attract fish. People have long practiced fishing as a means of subsistence. References to fishing and fishing implements occur throughout recorded history. One of the earliest depictions of fishing illustrates Egyptians fishing with rods, lines, and nets approximately 4,000 years ago. Another written account approximately 2,400 years old refers to silk line, a hook made from a needle, and a bamboo rod—with cooked rice as bait!

Selecting tackle to attract and catch fish has always been a primary concern for anglers. Some of the earliest fishing tools were pieces of bone or stone sharpened and used as a **gorge**. These were covered with numerous types of bait and tied to lines fashioned from a variety of readily available materials. A pull on the line wedged the gorge in a fish's throat—the fish was then pulled in with the line. Although North American native cultures had many available food resources, fish was extremely important. The techniques and tools used to catch fish varied widely and included gaffs, hooks, lines, sinkers, lures, floats, clubs, spears, harpoons, nets, and traps. *The Treatise of Fishing*, written in 1496 and attributed to Dame Julianna Berners, an Englishwoman, described fishing equipment and tackle and included instructions for making artificial lures and flies suited to the feeding behaviors of different types of fish. In 1653, Izaak Walton, another Englishman, wrote *The Compleat Angler*. This classic text—still in print—discusses the art of constructing tackle, the basic science of aquatic biology, and the philosophy of recreational angling. Walton spent many years observing fish in their natural habitats, using his observations to create detailed accounts of the feeding habits and life cycles of various species of fish. This knowledge also informed his ideas on tackle-making and fishing techniques.

## Summary

Using their knowledge of fish senses, students design their own fishing lures for a selected target fish species and the water conditions that allow lures to work most effectively.

## Student Objectives

The students will:

- 1 Name the senses fish use to locate prey (food).
- 2 Describe how the colors, sounds, and flashes of lures stimulate fish senses.
- 3 Describe how light is absorbed in water in terms of light quantity (brightness) and light quality (color).
- 4 Describe how water depth influences color perception.
- 5 Design and create a lure to attract a particular type of fish in specific habitat and water conditions.

## Materials

### Warm-up

- A variety of lures in different shapes, styles, and colors (or use the **Lure Types Reference Sheet**, if necessary)

### Part 1: Investigating the Physics of Light and Color in Water

- One large, transparent jar of turbid (dirty) water
- One large, transparent jar of clear water
- Darkened classroom
- Light source (flashlight or projector lens)
- Prism
- A variety of underwater photos (from fishing or

*continued*

## Materials (continued)

nature magazines) taken with natural light, including both close-ups and distance shots, to pass around and to display.

- **Underwater Light Quality Sheet**, one per student (or set up for projection)

Many of the materials used in this lesson can also be used in **Lesson 2:1—Design a Habitat.**

### Part 2: Making Flashy Fish Catchers

- Lure blanks, one per student



Lure blanks are 3/4-inch-diameter wooden dowels cut into three-inch lengths with eye screws placed in one end. Dowels are sold in three-foot lengths at hardware stores or lumberyards—you'll need to cut them into three-inch lengths.

- Fast-drying craft glue
- Pipe cleaners, various colors
- “Googly” eyes (plastic eyes used for crafts), two per student
- Sequins, various colors and sizes
- Sheets of self-adhesive Mylar in various colors; gold, copper, silver, and neon colors are suggested (Mylar is available in most art supply stores, or substitute foil-type wrapping paper)
- Colored feathers
- Assorted art scraps (cloth, tinsel, leather, plastic, ribbon, yarn)
- Scissors
- Books about fish and fishing (optional)

Fishing technology has evolved, but anglers still wonder which lures will attract the fish they want to catch. The more anglers and lure designers know about fish and fish behavior, the more effective the lures become.

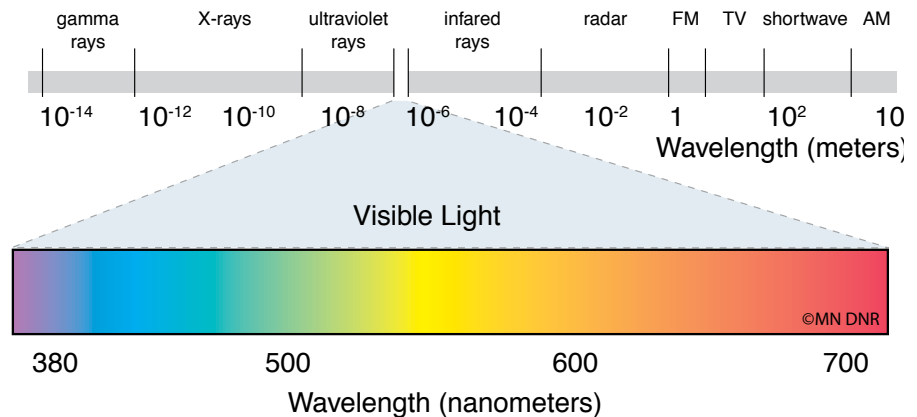
In lure design, some features to consider are color, flash, and sound. How do these features attract fish?

Fish use all of their sensory adaptations to find food. Signals sent by prey—or by lures—create stimuli in their eyes, ears, nose, taste buds, skin, or lateral lines. Hunger determines how fish react to the prey or stimuli-producing lures. Some fish species use some senses more effectively than others. This is connected to habitat conditions. A catfish, for example, will rely more on its keen sense of smell and taste than on sight due to the turbidity (solid particles suspended in water that scatter light rays) of its habitat.

### Color

Anglers frequently wonder which lure colors best attract fish. Most fish have excellent vision and can perceive color, although fish don't have predisposed attractions to particular colors. Contrast is critical—contrast between the background and the color of the prey, food, or lure, under various water and light conditions.

To help students understand this concept, the following provides a brief introduction to the interaction of the physical properties of water and light, and the role they play in attracting fish.



The primary source of all energy on the earth is the sun. Sunlight consists of the entire electromagnetic spectrum. Visible light makes up just a small portion of the light spectrum. The **light spectrum** is made up of electromagnetic radiation from approximately 380nm (violet) to approximately 700nm (red). This is the visible range. Natural, or ambient, light is referred to as white light, but is actually a combination of all the colors of the rainbow, or spectrum of visible light. Blackness is an absence of light or complete absorption of light. Each color of light (red, orange yellow, green, blue, indigo and violet—abbreviated as

ROY-G-BIV) is composed of light waves (also described as packets or particles) of different wavelengths. **Wavelength** refer to the distance between two successive points of an electromagnetic waveform, usually measured in nanometers (nm). Red colors have the longest wavelengths and violets have the shortest wavelengths. Short wavelengths (violets and blues) have high energy; long wavelengths (reds and oranges) have lower energy.

When sunlight strikes an object, some of that light is reflected and some of it is absorbed by the object. The eyes of humans and fish detect reflected light—the colors that an object reflects are the colors seen. But light behaves differently in water than it does in air because water is approximately 800 times denser than air.

Water can be transparent, allowing light to pass through it, but even clear water absorbs some light. Two important factors affect color visibility in water. First, general water clarity impacts visibility and light penetration in water and is a consideration when selecting a lure color. The amount of light that penetrates water depends on its **turbidity**, or the amount of silt, sediment, dissolved minerals, and debris suspended in the water. **Light quantity** refers to brightness or intensity of light transmitted or absorbed through water. Materials in the water scatter and absorb light rather than reflecting or transmitting it. Colors that are very visible in clear water include chrome, white, and pearl, plus shades of gray, brown, green, blue, and purple. In water stained with tannic acid from decomposing plant material (or clouded with algae or sediments), chartreuse, orange, red, lime green, and pink provide more contrast. In very turbid or murky water, the brightest and most visible colors, such as fluorescent orange, red, and pink, are often required to consistently attract fish.

The second factor affecting color visibility in water concerns color wavelength and water depth. Light color refers to **light quality**. The different colors or wavelengths of light within the light spectrum are absorbed at different depths by water and sediment particles as the light travels through water. The longest wavelengths contain less energy and are absorbed by water and sediment particles first. That explains why colors, such as reds and then oranges, are the first to “disappear” or become less visible, as light penetrates to greater depths. Loss of the color red is already noticeable at twenty inches, and red starts to significantly fade at a depth of about eight feet. Red is completely absorbed or filtered from the visible light spectrum at approximately fifteen to twenty feet. Orange light begins to disappear at 30 to 40 feet. As fish swim progressively deeper, yellows are the next to become invisible to them; yellow colors disappear at 60 to 70 feet. Finally, only green and blue colors (the wavelengths with the highest energy) are left—they remain visible to the depth that light penetrates the water.

As different colors are absorbed at increasing depths, the overall light



### Why do the air and sky appear blue?

Because blue light tends to bounce or scatter through air and water molecules.



See the **Underwater Light Quality Sheet** at the end of the lesson.



Fly fishing anglers often tie intricate lures with feathers, fur, tinsel, and yarn to make lures that imitate insect prey.

intensity also decreases. This means that the deeper a red lure is placed, the less bright its color appears. Red disappears at a depth of from fifteen to twenty feet. At depths greater than twenty feet, there's no advantage in using a red lure because it would appear to be blue and blend into the background, no matter how bright the light.

Time of day also determines how much light penetrates the water. When choosing a lure color, consider whether you'll be fishing at dawn, midday, or at night. A fish that is nocturnal and feeds at night will strike a different colored lure than a fish feeding during the day. Light-colored lures provide more contrast in dark water at night. Darker lures provide more contrast in clear water in daylight.

### Flash

A quality closely related to color is flash. Many lures, such as spinners, crankbaits, and spoons, create considerable flash as the lure rotates or wiggles through the water. Silver, gold, brass, copper, and chrome spinners produce a flash that often attracts fish. The flash of a lure mimics the flash that might come from the silvery scales on the sides of a prey species such as a golden shiner or fathead minnow.

### Vibrations or Sound

Fish also use their sense of hearing to help them find food. In addition to color and flash, it's important to determine if the prospective lure makes a sound that fish will associate with food. Fish have a bundle of sensory and supporting cells with projecting hairs encased in a gelatinous cap, called the **lateral line**, that run the length of their bodies. This sensory organ is an adaptation that allows them to detect very slight vibrations in the water. Predator fish can sense vibrations produced some distance away by potential prey such as smaller fish, crayfish, or other invertebrates moving in the water.

Lures such as spinners or poppers allow the angler to choose not only color and flash, but also lures that produce sounds that mimic wounded minnows or frogs. Spinner baits are used to attract fish in shallow or medium-depth water. They usually have one or two blades that spin and wiggle on swivels attached to the lure, sending vibrations through the water. Poppers are surface lures that are pulled along the surface of the water. They resemble insects or frogs and can be used for all species, particularly sunfish, bass, northern pike, and muskellunge. Their flat or scooped-out fronts splash as they're jerked across the water. Fish hear these lures, or sense the vibrations—even when they can't see them.

### Movement

The purpose of using lures is to mimic the appearance and behavior of prey, enticing fish to strike and take the lure. Various dressings are added to lures to control sink rates, action, and movement. Hair, feathers, fur, soft plastic tails, rubber legs, and metallic tinsel are used to imitate wiggling worms, minnows, insects, leeches, frogs, or other kinds



of potential fish food. Some lures are designed to dive, wiggle, sink, or float, depending on the fish food they're supposed to resemble.

### Odor and Flavor

Several kinds of fish rely heavily on their senses of smell and taste to find food. There are many soft plastic lures on the market today that are impregnated with scents, so they taste or smell good to a fish, too. A variety of scents can also be sprayed on any lure to add extra allure for stimulating fish senses.

By appealing to a variety of fish senses, an angler increases the chance that fish will not only notice lures, but bite them. Tackle companies have designed a staggering array of lures of many sizes, shapes, and colors made from many kinds of materials. With a well-chosen assortment of artificial lures in the tackle box, anglers are free to head to the lake or river without stopping for live bait. When they're done fishing, they don't have to deal with leftover bait. In some areas, such as select trout streams, using live bait is illegal, and lures are the only choice. As effective and appealing as lures can be, though, depending on conditions, there are many times when live bait will produce the best results. To be successful, anglers must get to know their target fish by learning its adaptations, habits, and behaviors, and by considering water conditions and temperature along with the amount of vegetation and woody debris in lakes, ponds, streams, and rivers.

### Procedure

#### Preparation

- 1 Gather materials.
- 2 Gather in a room with tables and chairs. An art classroom works well.

### Activity

#### Warm-up

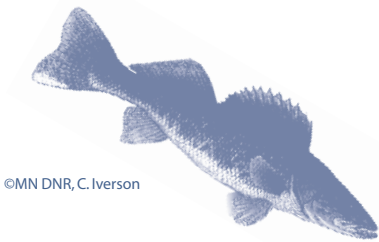
- 1 Ask students to review their five senses and compare them to those of a fish. Cover sight, smell, taste, touch, hearing, and the lateral line. Discuss how the lateral line contributes to a fish's ability to detect vibrations and what this means in terms of locating food. Drawing a fish on the whiteboard and labeling these parts as students discuss them can reinforce this information. Refer to **Lesson 2:1—Fish Sense** for additional information about fish senses and the lateral line.
- 2 Display a variety of fishing lures that you've borrowed or purchased. Include lures of different sizes, shapes, styles, and colors. Have students describe how these lures might stimulate a fish's appetite, or ask why a particular lure might be appealing to a particular fish. Use the **Lure Types Reference Sheet** to guide the conversation. Ask the students what could be significant about a lure's color.



You may prefer to do Step 2 of the Warm-up as a Wrap-up instead. This could leave the creative process more open when the students design their own lures. Students will have an opportunity to devise their own strategies for attracting fish that can then be discussed as a backdrop or set the stage for a Wrap-up discussion on fish adaptations, including senses and food preferences.



Students will learn more about the physics of light and color to help them learn how to correctly select lure colors when they go fishing. You can tailor the introduction to the lesson based on the background knowledge of your students.



©MN DNR, C.Iverson

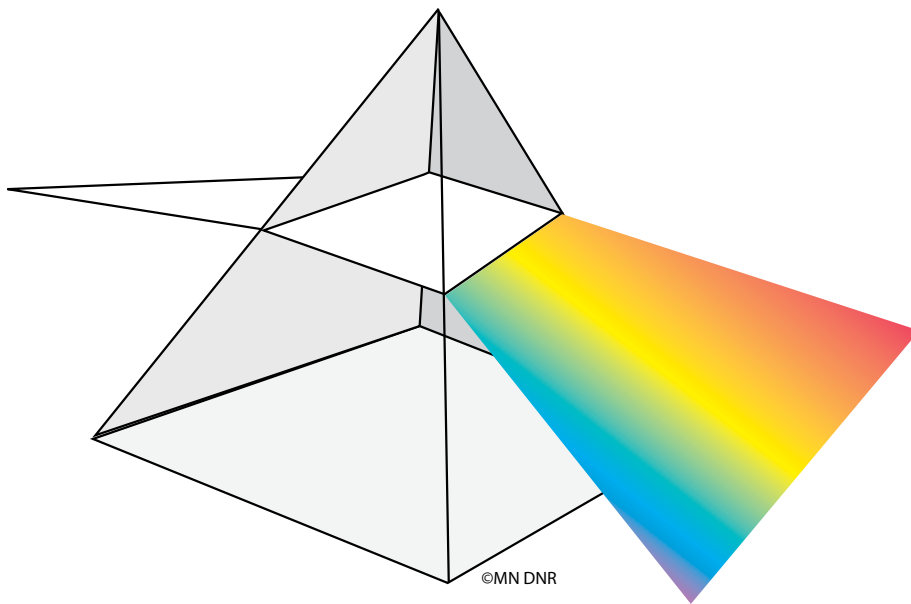
Remind students that, like people, fish can perceive color. Encourage them to start thinking about how they might design more effective lures than the ones displayed.

## Lesson

### Part 1: Investigating the Physics of Light and Color in Water

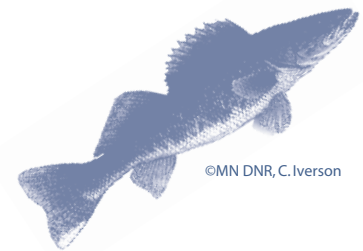
- 1 Divide the class into groups of no more than four students. Tell them that they'll be investigating one aspect of designing lures in more detail before they design their own. The color of lure to use is a common decision that anglers must make.
- 2 Have the students ever looked at a rainbow and wondered about the colors? A prism, a transparent object with two non-parallel flat sides, separates the various colors that make up natural (or white) light. A prism will create your own rainbow in the classroom. Ask students: What is the main source of light on earth? Discuss with the students how they see an object: the light bounces off the object and is reflected or transmitted to their eyes. Do they know that the color of an object is determined by which colors, or wavelengths, of light the object reflects? Review the difference between quantity of light (brightness or intensity) and quality of light (colors). Natural (white) light is made up of all the colors of the visible light spectrum.
- 3 To demonstrate light quality: prepare the students before you darken the room.
  - Tell them that you'll be making the room dark for the next demonstration.
  - Make sure the classroom is as dark as possible for the clearest results.
  - Shine a light (flashlight or projector light) through a prism.
  - Then turn off all of the other lights in the room.
  - Ask the students what colors they see. What is the order of the colors in the spectrum?
  - Have the students write the names of the colors in the order that they observe them.
  - Teach students the acronym ROY-G-BIV (Red, Orange, Yellow, Green, Blue, Indigo, Violet) to help them remember the colors of the light spectrum.
  - Explain that these colors are referred to as a light spectrum. When white light passes through a prism, it separates or refracts the white light into its component colors and arranges the different colors in order by wavelength and energy. A prism helps demonstrate that all the colors of the light spectrum combine to form white light. (Be aware of any participants that may have color blindness—they may not see red and/or green or yellow and/or blue.)





**Light refracted through a prism results in a light spectrum.**

- 4 Ask students if it would be a good idea to use a gray or blue lure in a lake or river with turbid water. (No. These colors are more visible in clear water because they contrast more sharply with the background and bottom of the water body). In water stained with tannic acid from decomposing plant material or clouded with algae or sediments, a lure of a brighter color is even more effective in attracting fish. Chartreuse, orange, red, green, and pink stand out in darker water. In very turbid or murky water, the brightest colors, such as fluorescent orange, red, and pink, are often required to consistently attract fish.
- 5 Pass around several underwater photos taken under natural light. Some photos can include objects in closer view that may show brighter colors in the objects in the foreground, but the objects in the background will show in hues of blue: the photographer may have used a flash to enhance the colors. Some photos can be underwater distance shots where everything looks blue. Ask students to consider what they know about light and colors that might explain the differences in the photos. (Colorful close-ups, blue backgrounds). (The water is absorbing more colors and reflecting or transmitting only blue from a distance, and light quality (or color) is changed as it is reflected or transmitted through the water.) Ask students if they can recall where blue light appeared on the light spectrum. Explain that light with short wavelengths (blues and violets) has the most energy and travels furthest through the water. What color might travel the shortest distance through the water, and be absorbed by (or disappear from) the water first? Why? (Red, because it's on the long wavelength side of the light spectrum, is absorbed by sediments and water first, and has less energy.)
- 6 How do fish see colors in water? They perceive colors in much the same way we do. But, light behaves differently in water than it does in air.



- To demonstrate light quantity: show students the jar of clear water and the jar of turbid water. (The turbid water could be tap water with enough tea added to cloud it.)
  - Put a sheet of white paper behind each jar. Tell the students that you're going to shine a light through each jar.
  - Ask the students to predict which reflected light will be brighter (more intense). Refer to quantity of light that will pass through the jars of water.
  - Can the students identify what might cause water to be turbid in a lake, river, or stream? They may discuss this in their groups.
  - Lead the students in a class discussion to help them understand that the particles suspended in the water absorb some of the particles of light, reducing the amount of light that is reflected or transmitted through the jar.
- 7 Explain how the different colors of the light spectrum are absorbed at different depths in water.
  - 8 Pass out the **Underwater Light Quality Sheet** to each student, or project the image for students to see. Red is absorbed first, at the shallower depths, because it has a long wavelength—and less energy—than the other colors in the spectrum. Red is completely absorbed at a depth of about fifteen to twenty feet. Would it make sense to use a red lure if you were fishing for walleyes in 25 feet of water? Why or why not? What would be a good lure color to use in 25 feet of water? Why? (Yellow, green, or orange. Those colors are still visible at a depth of 25 feet.)
  - 9 On a fishing trip, it's important to know about the quality of the water (clear, murky, or turbid) where you will fish, how light behaves in water of different depths, the behavior of your target fish (including what they eat and their preferred depths), weather conditions, and the time of day and year of the trip. By keeping track of fishing conditions, anglers can choose the most effective types, colors, and sizes of lures.
  - 10 It's important to remember that, no matter how scientifically the lures have been selected, fish sometimes have their own ideas about what they're interested in chasing and biting. You might have to try a few different colors or types of lures to see what works best. Experienced anglers know that, on any given day, one lure works better than another—for reasons we can't always discern.

### Part 2: Making Flashy Fish Catchers

- 1 Ask students to choose the species of fish they'd like to attract with their lure. They should know something about what that fish eats and what kind of habitat it prefers.
- 2 You may place several books about fish and fishing on a table in the room. Students can refer to these for information about the type of fish that they're designing their lure to catch. If students have already made fish habitat dioramas in **Lesson 1:1—Design a Habitat**, they can design a lure to catch the type of fish for which they designed their habitat diorama.



©MN DNR

A flashy fish catcher.

- 3 Many anglers have thought they could design a “better lure.” Tell students that they’ve taken jobs with a tackle manufacturer. They get to research fishing in rivers and lakes to learn about fish and fish habitat. (Their resource materials are available on the table). They can use the information they find about the behaviors and habits of their fish, what they know about fish senses, and what they’ve learned about light and color in water to design a new lure for the their chosen fish.
- 4 Give one wooden dowel and one set of “googly eyes” to each student for their lures.
- 5 Give students time to go to the materials table to collect things to use for their lures. Encourage them to be creative and to make their lure unique, thinking of the senses of the fish and how their lure might attract their fish by appealing to one or more senses. Students can also use paint in the design of the lures if other materials are not available to glue or attach to the wooden plug.
- 6 Optional: have students give their new lures catchy names to attract anglers in the sporting goods store!

### Wrap-up

- 1 Have the students present their lures to the rest of the class. They should discuss the characteristics of their lure that will stimulate a fish to eat it. How do different parts of the lure attract the fish? Why did they use these materials on their lures?
- 2 Ask the students the following questions as part of the wrap-up. Fish use the following senses to find food:
  - a) internal map and compass
  - b) sight, smell, hearing, lateral line
  - d) a stomach rumble
 (Answer: b)
 

Which color is easiest to see in deep water?

  - a) yellow
  - b) blue
  - c) red
  - d) green
 (Answer: b. The other colors will “disappear” first in shallower water depths.)
 

Why do lure manufacturers use flashy silver and gold in their lure designs?

  - a) silver and gold are cool colors
  - b) fish think that the flash comes from a minnow
  - c) these colors work better than copper
  - d) fish can’t smell silver or gold metal
 (Answer: b)

### Assessment Options

- 1 Evaluate the characteristics of the students’ lures and presentations.
- 2 Assessment options include the Checklist and Rubric on the following pages.

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**

**17-19 points = A**  
Excellent. Work is above expectations.

**14-16 points = B**  
Good. Work meets expectations.

**10-13 points = C**  
Work is generally good. Some areas are better developed than others.

**8-9 points = D**  
Work does not meet expectations; it’s not clear that student understands objectives.

**0-7 points = F**  
Work is unacceptable.

*Flashy Fish Catchers Checklist*

Possible Points	Points Earned	Points Earned	
	Student	Instructor	
4	_____	_____	Presentation names those characteristics of created lures that stimulate a fish to want to eat it.
4	_____	_____	Presentation includes how various parts of the lure attract the fish.
3	_____	_____	Presentation includes an explanation of why student used various materials to make the lure (to mimic scent, color, sound, flash, or taste) and how the lure relates to fish senses.
2	_____	_____	Materials used to create the lure actually mimic the student’s desired outcome.
2	_____	_____	Voice strength was good; presentation was easy to hear.
2	_____	_____	Visuals were easy to see and supported presentation.
2	_____	_____	The presentation length was equal to the time limit given.
<b>Total Points</b>			
<b>19</b>	_____	_____	<b>Score</b> _____

*Flashy Fish Catchers Scoring Rubric*

Lure Presentation Criteria	<b>4</b> Excellent	<b>3</b> Good	<b>2</b> Fair	<b>1</b> Poor	<b>0</b> Unacceptable
<b>Content</b>	Presentation includes the characteristics of the lure that stimulate a fish to want to eat it and how the different parts of the lure attract the fish.	Presentation includes 75% of required information.	Presentation includes half of required information.	Presentation contains less than half of required information.	Presentation doesn't demonstrate understanding of concepts.
<b>Materials</b>	Presentation includes why student used various materials on the lure (to mimic scent, color, sound, flash, or taste) and how the lure relates to fish senses. Lure actually mimics the student's desired outcome.	Presentation includes why student used various materials on their lure (to mimic scent, color, sound, flash, or taste) and how the lure relates fish senses. Lure slightly mimics the student's desired outcome.	Presentation includes why student used various materials on their lure (to mimic scent, color, sound, flash, or taste) and how the lure relates fish senses. Material doesn't mimic the student's desired outcome.	Presentation doesn't address why materials were used on the lure.	Materials not discussed in the presentation.
<b>Presentation style</b>	Voice strength good. Visuals easily seen. Presentation length equal to the time limit given.	Voice strength good. Visuals okay. Presentation length slightly under or over the time limit given.	Voice too soft or too loud. Visuals hard to see. Presentation shorter than the time limit given.	Voice too soft to hear. Visuals difficult to see. Presentation shorter than the time limit given.	Presentation not understandable or not completed.

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

## Diving Deeper

### Extensions

- 1 Fill a small child's swimming pool outside or walk to a local pond, lake, or swimming pool. Attach a fishing line to the eye screw and try each student's lure, pulling it through the water to see how it moves. Notice that the lure looks different now that it's wet. How did the lure move through the water? If you try this, it is a good idea to make sure the students construct waterproof lures. You may need to use water-resistant glue. (You can also do this with commercial fishing lures, even with the hooks removed.)
- 2 Design an experiment to test the students' lures in certain fishing conditions. The experiment should include a hypothesis, a question, a procedure to test the hypothesis, an explanation of what the experimental variable is, and a description of the controls.
- 3 Have students design an ad campaign to market their lures to anglers. They can design a poster to display in a sporting goods store, a radio or television commercial, a magazine ad, or packaging for their lures.
- 4 Invite a local fish decoy carver or someone who makes lures, jigs, or flies to do a demonstration for your class. Ask them to discuss their trade or hobby, and why they use certain colors and markings.
- 5 There are numerous tackle manufactures based in Minnesota. Ask students to research a local tackle manufacturer to find out how many people the company employs, what kind of tackle they make, and how they make tackle. Ask a company representative to come to your class and talk about the considerations that go into the making of their fishing lures.

### For the Small Fry

#### K-2 Option

Keep the lure-building activity simple. Omit Part 1: Investigating the Physics of Light and Color in Water. Remind younger students that fish use their senses to find food. What senses do fish have? Emphasize that lures attract fish by resembling foods that fish like to eat. Show students a variety of different lures and discuss how these might attract fish and which senses the fish would use to detect the lures. Be sure to remove or cover any hooks with tape before passing them around. Younger children may have a difficult time working on the scale of the one- by three-inch wooden dowel to design their lures. You might substitute an empty toilet paper roll or other cylindrical item for the children to paint and attach materials to design their lures. Students can share how their lure would attract fish, what type of fish food it mimics, and how it would work to catch fish.



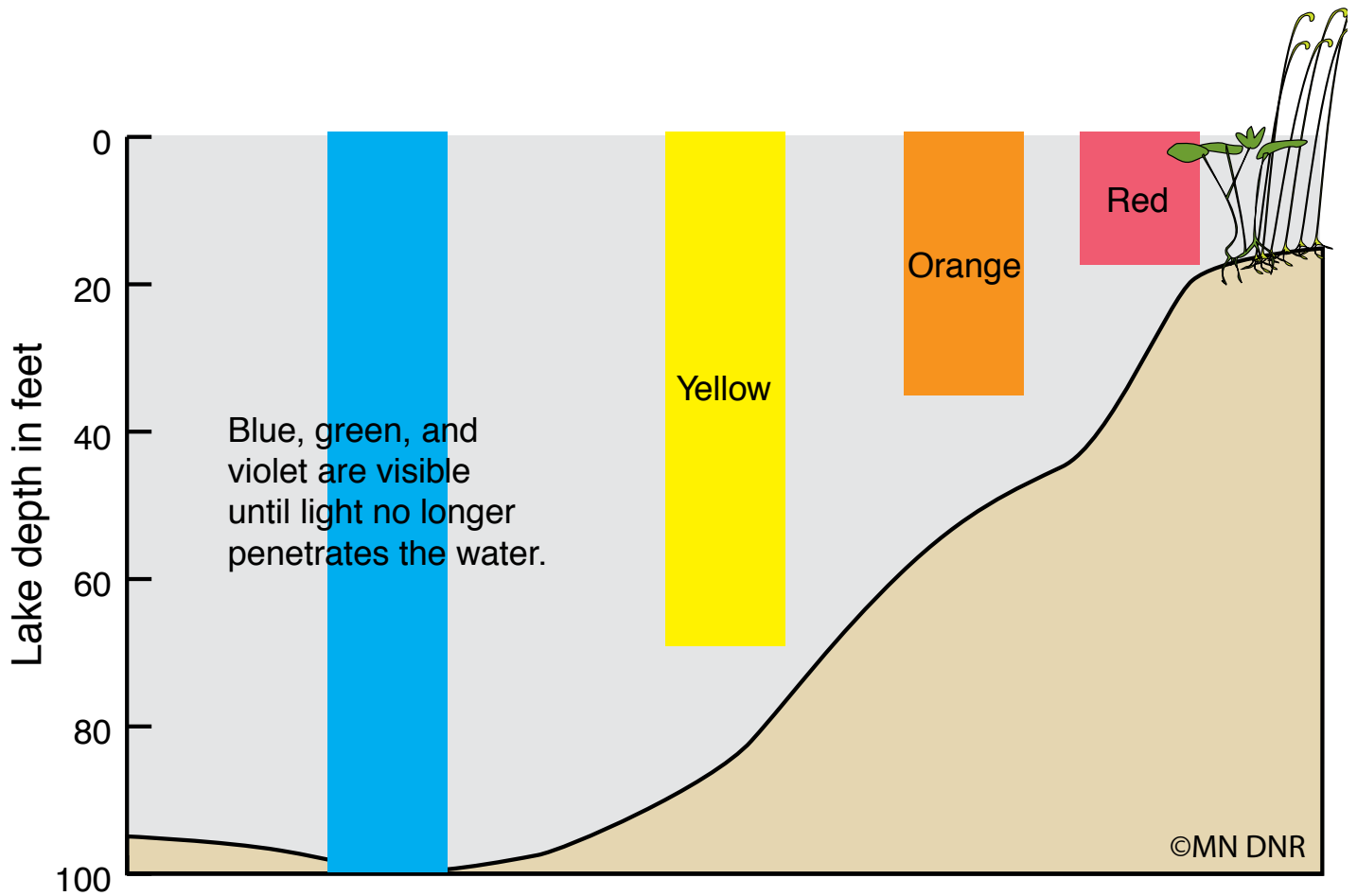
Before passing lures around, be sure to remove or cover any hooks with tape.



**STUDENT COPY**

*Underwater Light Quality Sheet*

# What Color Lure Should I Use?



<b>STUDENT COPY</b>
---------------------

## Lure Types Reference Sheet

Color, flash, vibration/sound, and movement can attract fish to lures.  
Lures shaped like natural foods also attract fish.



### Spinner

**Color:** May have colorful fur, feathers, or paint

**Flash:** Flash on blade

**Vibration/sound:** Blade makes a soft sound in the water as it spins

**Movement:** Blade moves, fur or feathers add movement as it's jerked through water



### Spoon

**Color:** Bright colored paint catches the fish's eye

**Flash:** Shiny surface reflects sunlight and makes a "flash"

**Vibration/sound:** Wobbling creates soft sound

**Movement:** Spoon shape wobbles through water



### Popper

**Shape:** Shape has head separate from body

**Color:** Paint looks like frog; has eyes; skirt is bright

**Vibration/sound:** Scooped-out front makes splashes and noise as it's jerked along the surface

**Movement:** Body floats on the surface like a frog's; skirt moves like legs



### Crankbait

**Shape:** Shaped like a fish

**Color:** Often painted to imitate the patterns and colors of baitfish

**Flash:** Some sides silver, gold, or iridescent to reflect light and resemble scales

**Vibration/sound:** Some types rattle

**Movement:** "Nose" or bib angle determines how deep the lure will travel



### Mayfly Nymph (A type of fly pattern)

**Shape:** Distinct head, thorax, abdomen, legs, and gills resemble a mayfly nymph

**Color:** Closely imitates the color of a mayfly larva

**Flash:** Some have a shiny bead head

**Movement:** Resembles the insect as it's jerked through the water