Parts of Speech Poem

Write a poem about ice fishing using parts of speech!

Parts of speech review:

Noun: a person, place, thing or idea
Adjective: a word that describes a noun (tells how many, what kind, which one)
Conjunction: a connecting word (and, or, but)
Verb: describes an action or state of being
Adverb: describes a verb or another adverb (tells when, where or how)

Directions for a Parts of Speech Poem:

Line 1: Noun (title)
Line 2: Adjective, conjunction, adjective
Line 3: Verb, conjunction, verb
Line 4: Adverb
Line 5: Rename title

Your turn!

_____

_____ _____ _____

_____ _____ _____

_____

_____

Fishing T-shirt

Subjects: Art & Language Arts

Objectives:

Art: Gain a basic understanding of design concepts.
Language Arts: Write in a variety of formats to record, generate and reflect upon ideas.

Materials:

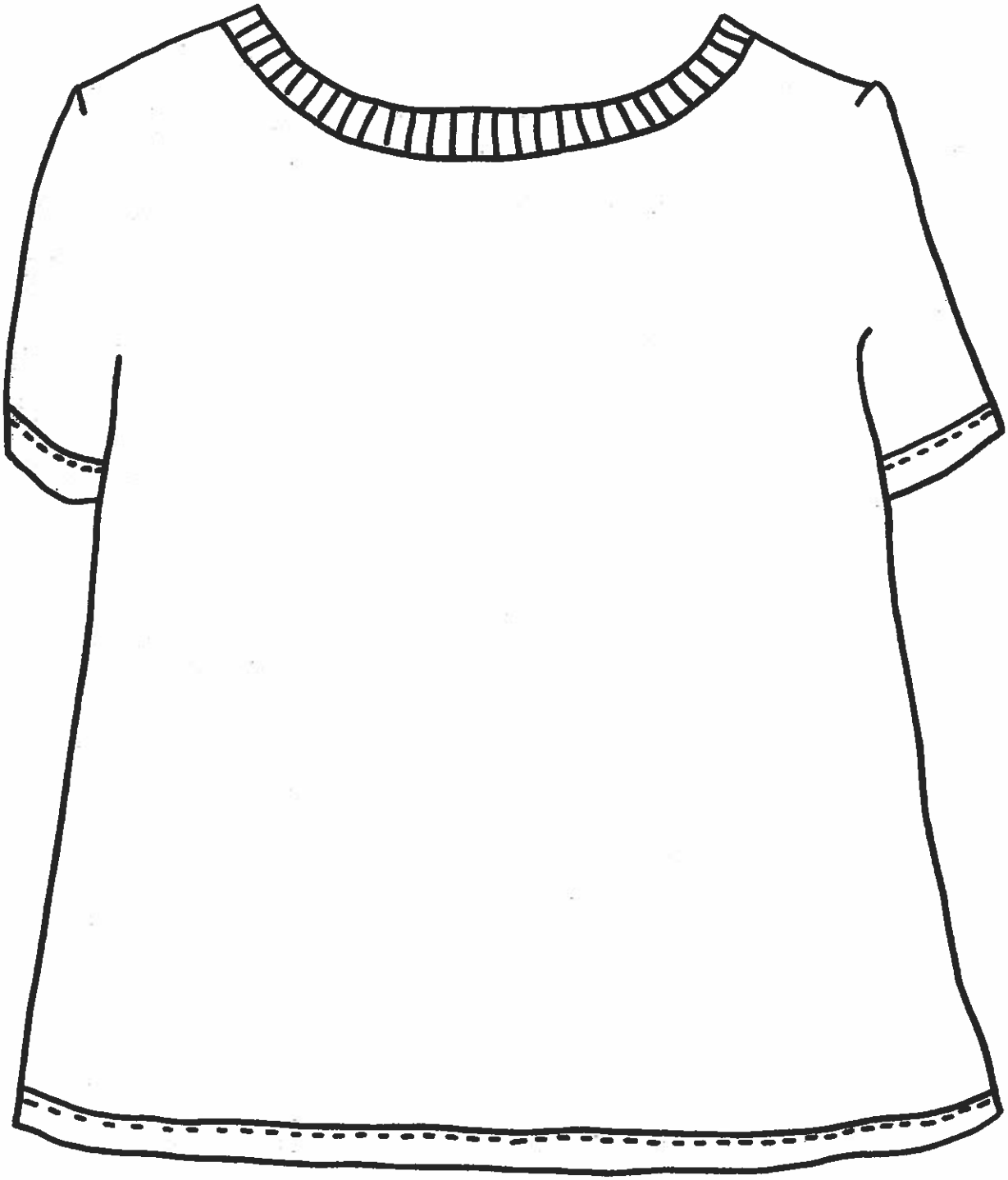
- Fishing T-shirt worksheet
- Colored pencils or markers

Procedure:

1. Discuss t-shirt logos that students have seen before.
2. Instruct students to design a t-shirt supporting ice fishing or informing people of safety rules to follow while ice fishing. They should come up with a slogan and logo.
3. When the students' rough drafts meet with your approval, have students transfer their designs onto the t-shirt worksheet.
4. Hang the t-shirts on a piece of clothesline!

Ice Fishing T-shirt

Transfer your ice fishing slogan and logo onto the t-shirt below. Write your name on the back of the shirt. Color and cut out the t-shirt.



Fishable Waters

See Resource list on cover page for information on checking out a trunk for this activity. (optional)

Grade Level:
Middle School, High School

Subject Areas:
Government, Environmental Science, Life Science, Ecology

Duration:
Preparation time: 30 minutes

Activity time: one or two 50-minute class periods

Setting: Classroom

Skills:
Gathering information (reading); organizing (conceptual map, drawing); analyzing (discussing); application; evaluation; problem-solving

Charting the Course
Prior knowledge about nonpoint source pollution ("Sum of the Parts") will help students get the most from this activity. In "Urban Waterway Checkup" students examine water quality factors specific to the needs of fish and other aquatic species. Following this activity students can learn more about how they can take action at home ("A-maze-ing Water") and how water management issues are addressed ("Dilemma Derby").

Vocabulary
biodiversity, Clean Water Act, dissolved oxygen, fishway (fish ladder), nonpoint source pollution, nutrients, point source pollution, riparian zone, runoff, turbidity

You want to go fishing…in the city? Here's the catch: it takes a city to maintain "fishable" waters.

Summary

Students evaluate how healthy fish populations provide multiple benefits for their community and engage in a card game to explore the connection between water quality, habitat and "fishable and swimmable" waters, as stated in the Clean Water Act of 1972.

Objectives

Students will:

- identify and describe the value of clean water and healthy fish populations in their community.
- infer that populations and species compositions are not static but ever changing.
- differentiate between harmful and positive impacts on water quality and fish populations, and know that human activities accelerate natural processes such as runoff, sedimentation and nutrient cycles.
- know that management of aquatic species and their habitats is directly influenced by land-based activities in the surrounding watershed.
- learn that legislation, such as the Clean Water Act and fishing regulations, is a tool used to manage resources for the benefit of present and future generations.

Materials

For each student:

- *Copy of* ***Sample Fishing Report***

For each group of 4-6 students:

- *1 copy of* ***Fishable Waters Game Rules***
- *2 or 3 copies of* ***Urban Fish Species & License Cards*** (2 copies if groups of 4; 3 copies if groups of 5 or 6)
- *1 copy of each page of* ***Fishable Waters Action Cards****, cut apart*
- *40 "fish" tokens* (e.g. poker chips, fish-shaped crackers, pennies, paper clips [see **Game Options**])

NOTE: You may want to copy group sets of cards on different colors of cardstock and laminate them for easy tracking and repeated use.

Other optional materials:

- *Copies of state fishing regulations* (free from natural resource management agency or sporting goods stores)
- *Pictures of common local fish or field guides*

Making Connections

Fishing can literally bring people in touch with nature—imagine dipping your hand in a river or lake to hold the fish you just caught! Fishing is also a way for friends and family of all ages and abilities to recreate together, reconnecting by sharing fish stories, recipes, and stewardship. For some, fishing is a way of life. In some areas, the economic benefits of fishing support the livelihoods of many families and even entire communities, not to mention that fishing also supplies a valuable food source to many restaurants and markets. Since a majority of our population lives in urban or suburban areas, many people who fish, whether for recreation or vocation, live in urban areas. To go fishing, you need fishable water and, of course, fish. Most urban areas have both.

Background

Most major cities in the U.S. were established along water—rivers, bays or large lakes. People settled along waterways for a variety of reasons: water-based transportation was easier and faster than traveling overland; water was easily accessible for drinking and other household uses, as well as for agriculture and livestock; and fish and wildlife found in or near water supplemented the diet and livelihoods of early communities.

The waters that supported such bounty also provided an easy way to get rid of waste. By the mid-1800s sewage in rivers caused water-borne diseases to reach epidemic proportions. By the 1960s many of our nation's waterways were so contaminated they were closed to swimming. Signs were posted along the Potomac River in Washington, D.C., warning the public not to inhale the air. Ohio's Cuyahoga River was so polluted with chemical wastes that it caught fire. The rivers, lakes, and bays that once sustained communities and provided welcome recreational opportunities had become places to avoid; our nation's fisheries were in trouble.

The Cuyahoga River fire sparked a movement toward regulating industrial pollution and resulted in the passage of the Clean Water Act of 1972. The Act called for a reduction in the direct discharge of pollutants into waterways and to achieve "fishable and swimmable" waters. The Act primarily addressed "point source pollution," pollution that can be traced to a definite point where it enters the environment, such as a factory or sewage discharge pipe.

With point source pollution regulated, water quality in many urban waterways improved dramatically. Today, there are nearly twice as many waterways that meet standards for fishing and swimming as there were before the passage of the Clean Water Act. Yet, approximately 44 percent of U.S. waterways that have been assessed are still too polluted for those activities. Where is all this pollution coming from? Urban sprawl and increasing populations require more energy, overload old sewage treatment facilities, and result in more paved and impervious surfaces. Storm water and snowmelt runoff from a variety of urban, suburban, and rural sources—from city streets, homes, construction sites, lawns, parking lots, and farms—is a form of general "people pollution" that results from activities people do every day. Because you can't necessarily point to any one source, we call this nonpoint source pollution or runoff pollution. The Environmental Protection Agency warns that unless communities take action, water quality is likely to return to pre-Act levels by the year 2016.

The major problem associated with runoff is the soil, nutrients, and pollutants it often carries. Soil erosion from agriculture and urban development causes fine silt to wash into waterways, where it may settle to the bottom, smothering fish eggs and covering up rocks that provide habitat for small aquatic organisms. When silt doesn't settle, the water will look muddy or turbid. Turbidity blocks light from reaching oxygen-producing aquatic plants, and fine silt particles may clog the gills of aquatic species.

Agricultural runoff, containing manure and crop fertilizer, is considered the main source of harmful nutrients (nitrogen and phosphorus) in our waters. Urban pet wastes and fertilizers from lawns and golf courses also contribute significantly. These excess nutrients fuel rapid growth of algae. Like turbidity, floating algal mats block sunlight needed by submerged aquatic vegetation. When algae and grasses die, the decomposition process consumes oxygen from the water, causing "dead zones" where few fish or other aquatic species can survive.

What can be done to address such a large and ambiguous challenge? Communities can "adopt" and clean up local waterways; citizens can vote for change, making tough decisions that balance local economics with sound resource management; and people can educate each other about nonpoint source pollution and how to take preventative action. Specific actions individuals can take to reduce runoff include planting buffer zones

Discover an Urban Fishing Program Near You

A young angler proudly displays her catch, a black crappie.
US FISH AND WILDLIFE SERVICE

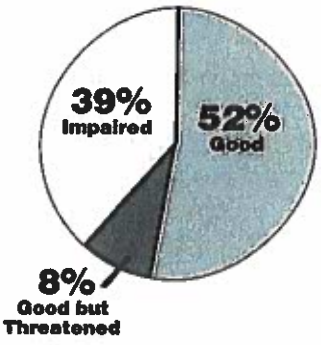
To learn about urban fishing programs in your area, visit <www.takemefishing.org>. Click on "Fishing," then on "Urban Fishing," to see a list of states that offer urban fishing opportunities. Though information varies, clicking on the name of your state will yield information such as: highlights of fishing programs in different cities; recommended fishing sites organized by region; information about fishing clinics and free fishing days; links to state fishing license requirements and other fishing regulations; and contacts for tackle loaner programs.

Assessment of U.S. Waterbodies

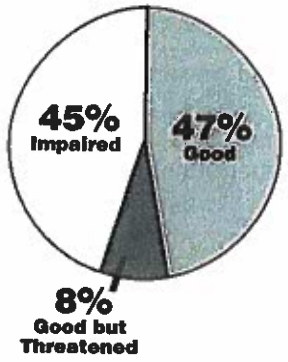
Waterbody Type	Total Size	Amount Assessed*	% of Total	Assessed Good	Assessed Good but Threatened	Assessed Polluted
Rivers (miles)	3,692,830	699,949	19%	367,129	59,504	269,258
Lakes (acres)	40,603,893	17,339,080	43%	8,026,988	1,348,903	7,702,370
Estuaries (sq. miles)	87,369	31,072	36%	13,850	1,023	15,676

** Includes waterbodies assessed as not attainable for one or more uses.*
Note: percentages may not add up to 100% because of rounding.

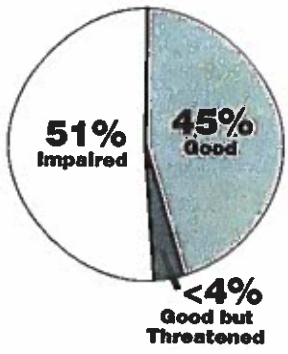
Assessed River and Stream Miles



Assessed Lake, Pond, and Reservoir Acres



Assessed Estuary Square Miles



Good
The waterbody fully supports its intended uses.

Good but Threatened
The waterbody fully supports its intended uses, but one or more of its uses is threatened.

Polluted
The waterbody in partially or fully unable to support one or more of its uses.

The data above were obtained from a factsheet prepared by the U.S. EPA to summarize the National Water Quality Inventory: 2000 Report, *prepared under Section 305(b) of the Clean Water Act. The Water Quality Report characterizes U.S. water quality, identifies widespread water quality problems of national significance, and describes various programs implemented to restore and protect our waters. Both the factsheet and full report are available at <www.epa.gov/305b/>. United States Environmental Protection Agency Office of Water (4503F) EPA-841-F-02-003 • August 2002*

Please note: <www.epa.gov/305(b)> also provides data from individual states through the 2002 National Assessment Database.

<www.epa.gov/waters/> provides access to WATERS, U.S. EPA's Watershed Assessment, Tracking & Environmental ResultS, an interactive tool that connects water quality data from several databases and displays information by generating maps and reports.

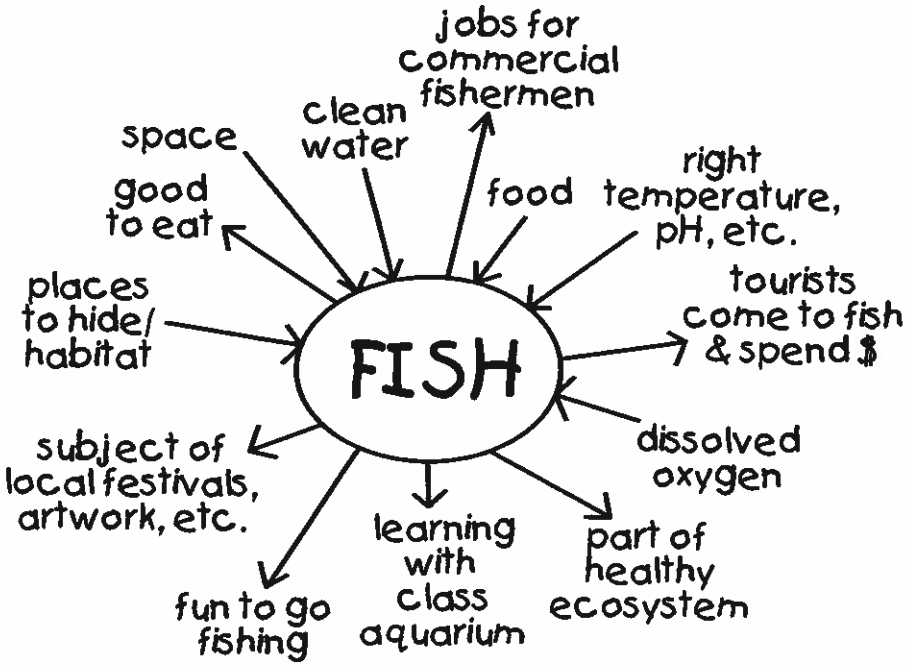
of trees and vegetation between homes and businesses and storm drains or bodies of water; replacing impermeable hardscape (concrete, asphalt, etc.) with gravel, vegetation, or other permeable materials; and installing ponds, wetlands, or rainwater catchment systems to collect excess water. To reduce the amount of pollution collected by runoff, individual citizens can limit fertilizer and pesticide use (especially before it rains), pick up trash and pet waste, and properly dispose of household and other chemical wastes.

Across America many citizens, and even entire cities, have taken action to improve waterways. Riverfront and waterfront revitalization projects have improved communities' water quality and recreational access to these remarkable water resources. The recreation and tourism industry is the second largest employer in the nation, and a significant portion of recreational spending comes from water-related activities, such as swimming, boating, sport fishing, and hunting. Ensuring that local waters are fishable is a sound investment for any community.

Procedure

▼ *Warm Up*

Ask students to name species of fish found in local waterways and write the name of the species on the board. (Hint: Teachers can contact their State Department of Fish and Wildlife to learn about the types of local fish species.) Write the word "FISH" in the center of the board and draw several lines with arrows radiating outward from the word (similar to spokes on a wheel; see Diagram A). Ask student volunteers to describe the values of fish for the local com-



munity, and write or draw a different value at the end of each spoke. Encourage students to consider how certain species might be of cultural, religious, economic, or recreational importance in their community.

Next, draw a set of spokes with arrows pointing toward the "FISH" hub. Have volunteers indicate factors necessary for fish survival. Encourage students to describe specific water quality factors (e.g., pH, temperature, turbidity, concentrations of oxygen, nitrates, phosphorus, etc.).

Facilitate a discussion about the importance of good water quality for fish in your community. Describe the Clean Water Act of 1972, legislation that set a goal for "fishable and swimmable waters" (see **Background**). Ask students the following question: *If waters are suitable for fishing and swimming, what other benefits—for wildlife and people—might be implied?* Fish can be thought of as indicators of a healthy aquatic ecosystem that includes the food web necessary for survival and reproduction of fish and other species.

▼ *The Activity*

1. **Divide the class into small groups of 4-6 students. Distribute copies of *Sample Fishing Report* and instruct students to read independently or in their groups.**

2. **Facilitate a class discussion about the reading.** Make sure students understand the connections between water quality, fish populations, and different natural and human impacts affecting both.

3. **Explain that groups will play a card game to simulate the different ways human activity can impact water quality and fish populations in urban waterways.** The challenge is to have the best "fishable waters" possible—indicated by lots of "fish" added to the waterway or by "fish" caught and distributed among players.

NOTE: Make sure students understand that results of actions on "Fishable Waters Action Cards" are presented solely from the perspective of impact on water quality, fish habitat, or fish populations. The cards are not intended to imply generalized judgment of any of the actions featured. For instance, hydropower dams generate power and store water for municipal and agricultural needs and also often adversely affect fish populations. Determining the pros and cons of building a dam in any particular area and determining whose water needs are most important are, of course, open for debate and beyond the scope of this simulation.This point can be made prior to or immediately following the simulation.

4. **Distribute a copy of *Fishable Waters Game Rules* to each group.** Review and discuss the rules aloud.

5. **Distribute a set of cards, 40 tokens ("fish"), and other game materials to each group** (See **Game Options** for variations). **Allow groups to start the simulation and play until at least one student from each group gets to "go fishing."** Circulate among your students to make certain the game runs smoothly. You may pretend to be a fisheries biologist "stocking" waterways with fish. If you do stock fish, be certain to include the impact of stocking when discussing the results of the simulation.

6. **After 10 or 15 minutes (or after all cards have been read), stop the simulation. Ask groups to report the number of fish in their urban waterways, the number of fish in their lost fish pile, the number of fish "caught" and stored in their ice chests, and the number of people in their group who had the opportunity and chose to go fishing. Compile class data on the board.**

▼ *Wrap Up and Action*

Discuss the results of the simulation, including reasons for any differing results among groups. You may use the following questions to guide the discussion.

- What did a big pile of playing tokens represent?

Game Options

1. Use pennies as tokens to represent the economic value of "fishable and swimmable" waters in your community.
2. Use fish-shaped crackers or other snacks to represent an important product of "fishable and swimmable waters," food for wildlife and humans. If you use snack food as tokens, ask students to refrain from eating their "catch" until the end of the game and class discussion. This enables students to tally and compare their catches at the end of the simulation.
3. Enhance the sense of "fishing" by making fishing rods using a pencil, string (approximately 1 foot in length), flat thumb tack and small magnet. Use metal paper clips to represent fish. You might use both large and small paper clips, stipulating that large paper clips represent keeper-size fish and that small paper clips represent fish sized below the legal limit. Players should put back (or release) any small paper clips they "catch."
4. At times during the simulation, a student may answer a question on a Fishable Waters Action Card correctly, but still be required to subtract a "fish" from his or her urban waterway because of the detrimental effect an action has on fish populations. If you feel your students will object to this, you might consider an alternative tracking and reward system to recognize students for providing correct answers to questions.

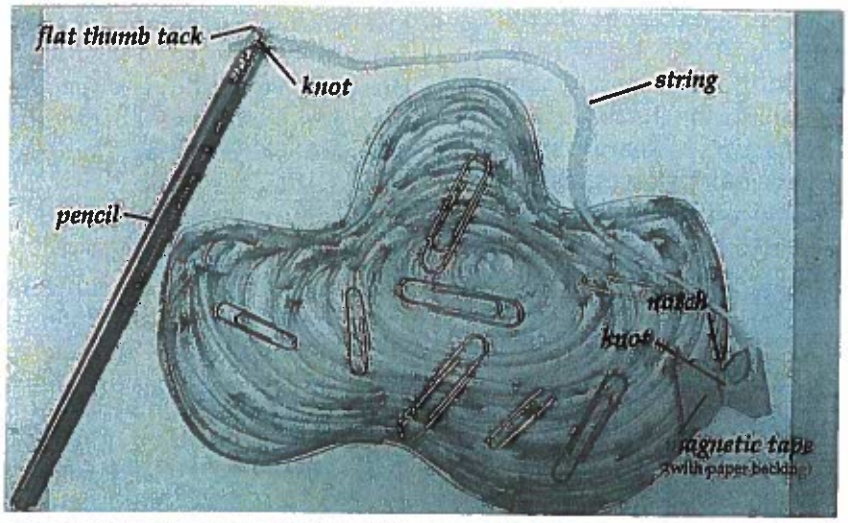
Directions for making a fishing rod:

A. Tie a small knot in one end of a string. Insert a thumbtack into the knot, and then push the tack into the eraser end of a pencil.

B. Cut a piece of magnetic tape about an inch in length. Don't take the paper backing off the tape—the adhesive is very sticky.

C. Cut two small "v" shaped notches on either side of the piece of magnetic tape (like an hour glass).

D. Tie the string onto the tape, securing it in the notch. Make sure the knot is on the paper side of the magnet so that the magnet can work effectively to "catch" paper clips.



A large, healthy (and diverse) fish population resulting from improved water quality and habitat, sustainable harvesting practices, effective stocking or some combination thereof—a large fish population indicates "fishable and swimmable" waters with a variety of community benefits.

- What did few tokens represent?
  A small fish population (likely lacking in diversity) resulting from poor water quality, habitat destruction, overfishing or some combination thereof—indicating the need for habitat and community improvement projects and/or development of sustainable fishing practices.
- Was obtaining fishable waters hard? How long did it take your group to have a "fishable" waterway?
- What happened as the game progressed and the deck got smaller?
  More cards in the deck were fish and license cards, resulting in more opportunities to go fishing. Increased fishing without continued action projects or positive influences on fish populations causes fish populations to decline.
- Which activities were more effective at improving water quality than others (more tokens added)?
- Which activities were more detrimental to healthy water and fish populations (more tokens removed)?
- How does this simulation represent the real world of water quality and fish populations?
  Water quality and fish populations are not static: they change over time because of both natural and human influences.
- How does this activity differ from the real world?
  Resource managers and communities make and implement plans for managing water quality and fish populations, whereas actions in the simulation were more random; reproduction and other natural events would occur, causing fish populations to fluctuate differently.

- How do fishing regulations influence the availability of fish? *Regulations serve to distribute and/or limit fishing opportunities for the purpose of maintaining viable and/or sustainable fish populations. Note: some habitats have changed so drastically that sustaining populations by natural reproduction alone is not possible. In other cases, the demand for fish is higher than the number of fish that is naturally sustainable. In both instances resource agencies may raise and stock fish to maintain populations.*

Assessment

Have students:

- draw a new "fish wheel" (***Warm Up***), highlighting areas of possible concern regarding fishable waters in their community.
- list or describe a variety of reasons why fish are important to their community (***Warm Up***).
- identify and describe five negative impacts on water quality or fish populations (***Wrap Up***).
- describe ways to address negative impacts on water quality or fish populations (***Wrap Up***).
- relate how human activities are connected to water quality and how water quality is connected to fish populations (***Wrap Up***).

Extensions

Students may conduct research on a recreationally or economically important local fish species. Are populations stable and sustainable? Have populations or biodiversity changed over time? If so, why? What management strategies (regulations, stocking, habitat improvement projects, etc.) are used to ensure viable populations? Or, invite a fisheries biologist to visit your classroom and speak about managing local fish populations and what they do to attain or maintain fishable waters.

Challenge students to identify and report on local water quality or fish population issues. After hearing student reports, encourage the members of the class to decide how they would like to take action. Sample projects include: raising fish in the classroom; organizing a river cleanup; monitoring water quality or fish populations; designing projects on runoff/erosion control (building and installing rain barrels, planting rain gardens and trees, etc.).

Plan a fishing trip. Most states have resources for urban fishing, including: tackle loaner programs; free "how-to" fishing clinics; lists and maps of places to fish; free fishing days; and print materials, such as fish posters or identification cards.

Have students quiz each other, using their state's fishing regulations booklet.

Conduct your own fishing simulation using "Backyard Bass" (by Ironwood Pacific). Children and adults learn to operate reels and cast a special weight that "hooks" (using a non-hooking device) a plastic fish. You may also make your own fish using felt and Velcro.

Work with your school's physical education teacher to apply for a grant to acquire fishing rods so students can practice the life skill of casting.

Resources

Clean Water Action Plan (1998) <www.epa.gov/history/topics/cwa/03.htm>

American Rivers, <www.americanrivers.org>

Environmental History Timeline <www.radford.edu/~wkovarik/envhist/>

Anacostia Watershed Society <www.anacostiaws.org>

Fishing regulation booklets can be obtained free of charge from your state's natural resource agency, bait and tackle, and sporting goods stores.

Basic Fishing: Catch the Fishing Fever is a "how-to-fish" booklet applicable for any state (note: the first two pages are Kentucky-specific). <fw.ky.gov/pdf/basicfishingbook.pdf?lid=861&NavPath=C101C109>

Take Me Fishing is a clearinghouse for fishing information and links to states for related services and fishing programs. <www.takemefishing.org>

FishAmerica provides grants for fishing equipment, field trips and habitat improvement projects. <www.fishamerica.org>

Boat US provides a loaner program for personal floatation devices (PFD's). <www.boatus.com/foundation/LJLP/>

Sample Fishing Report

What's the Catch in the D.C. Metro Area?

-A Fishing Report for April 2005 -

Cool spring water temperatures in the Potomac River and nearby tributaries mean fishing is "hot." Cold waters hold more dissolved oxygen than warm waters—meaning fish are breathing easily. In the Potomac, largemouth bass are hitting lures, including soft plastic jigs and vertically jigged spoons, with frenzy! D.C. and Maryland regulations limit a daily take of five fish measuring at least 12 inches (15 inches after June 15th), and conservation officers will ticket anglers over their limit!

The mouth of Little Hunting Creek (VA) is usually a great spot for catching bass, but runoff from a nearby construction project is washing soil into the river causing high turbidity (muddy water) even after light rains. To compensate for the turbidity, anglers are using dark lures. Later in the season, bass anglers know they can catch fish in the grass beds (submerged aquatic vegetation) near the Woodrow Wilson Bridge.

Yellow perch have spawned out, but a few are still being caught in Piscataway Creek (MD). Anglers reported strong bluegill action at Cameron Run (VA) when casting small jigs toward the grass edges, shoreline vegetation or under overhanging trees. This riparian zone provides shade that cools the water. Roots prevent bank erosion and are perfect structure for hiding or resting perch.

TROUT IN WASHINGTON? - Paint Branch Creek (MD) is a unique urban cold-water fishery with wild brown trout. Nonpoint source pollution from urban runoff continues to threaten these pollution-intolerant fish. Fisheries biologists and local conservation groups have educated people living along the creek about the need to reduce fertilizer use, especially before a rain. Nutrients in fertilizers, manure, leaky septic tanks, and pet wastes cause explosive algal blooms. Eventually, this algae rots causing a stinking mess that consumes dissolved oxygen—suffocating fish and other aquatic critters. To find trout, focus on riffles, the swift, bubbly areas that help oxygenate water.

The Anacostia Park (D.C.) is always good for channel catfish. Serious anglers fish right from the shore, using surf rods to get their lines into the river channel. A weighted line with cut bait works best. These fish are fun to catch, but D.C. has published a fish consumption advisory against eating catfish, as they may harbor harmful toxins.

American Shad caught in net.

This past spring biologists reported record numbers of spawning American shad just below Chain Bridge off Fletcher's Boathouse (D.C.). The return of this historic fish is due in part to the hundreds of students raising fish in the classroom and the fishway or ladder at the Little Falls Dam that helps spawning fish navigate the 12 foot dam upstream to their preferred habitat.

Other local improvement plans include a shoreline revitalization project along the Anacostia River. Once completed, people will be able to enjoy fishing piers, boardwalks, and parks—the perfect spot to grill up your catch. In the meantime, we encourage anglers to join a river cleanup organized by the Earth Conservation Corps—Riverkeepers. To date, Riverkeepers have hauled out 536 tons of trash and 8,103 tires.

HOMEGROWN HEROES

Since 1989, the Anacostia Watershed Society—along with thousands of volunteers—has aimed to make D.C.'s Anacostia River more "fishable and swimmable." Their projects include:

- Wetland Nursery Project
- Urban Forests Project
- Streambank Stabilization
- Non-native Plant Removal
- Water Quality Flagging
  (blue flags = water is safe for boating)
- River Cleanups
- Stormdrain Stenciling
- Shad & Herring Awareness and Restoration Effort (SHARE)

Source: <www.anacostiaws.org>

GOOD OLD DAYS? - Old timers might remember when fishing our nation's rivers wasn't this good. Back in the 1950's, the Potomac ran foul with factory discharge and poorly treated sewage (point source pollution). The Clean Water Act in 1972 regulated this pollution, and now 60% of U.S. waterways are "fishable and swimmable"—twice the number of fishable waters as before the Act. Today, the Potomac is considered one of the nation's premier bass fisheries, and anglers can watch nesting bald eagles while they fish—an indication that water quality has improved. Biodiversity in a waterway is not just about lots of different fish species—but includes all other animals and plants living in or near the waterway.

Fishable Waters Game Rules

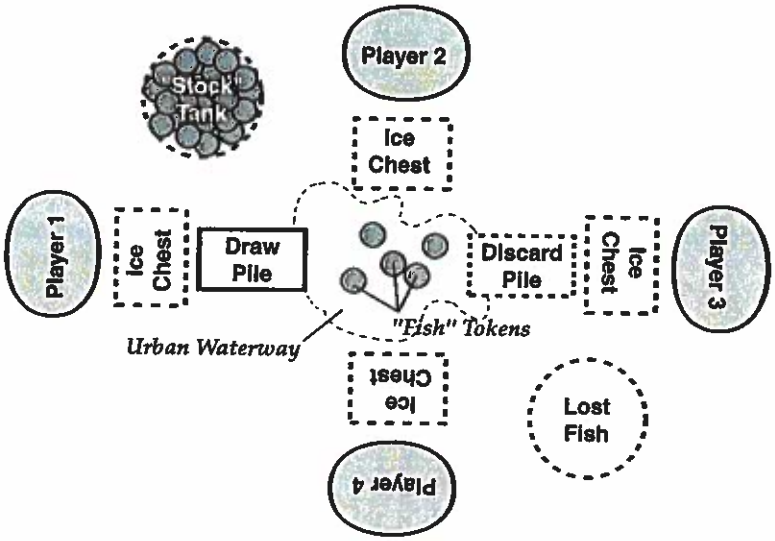
Discover how human activities impact fish populations. Take turns drawing cards, answering questions, taking action, and going fishing. The group with the most "fishable" waterway at the end of the game wins!

Set Up the Game:

1. Place 10 tokens (15 for groups with 5 or 6 players) in the center of your group. The tokens represent "fish" in your urban waterway. Place the deck of cards face down to serve as your Draw Pile.
2. Place remaining tokens in a Stock Tank. You will add these fish to your urban waterway, as directed on cards.

Your group's goals are:

- **To improve your fishable waters—indicated by increasing the fish population (# of tokens) in your waterway**
- **To have each individual in your group collect three (3) fish cards and one (1) fishing license card in order to "go fishing."**



Playing the Game:

1. Decide who will go first. Begin the game by drawing a card from the Draw Pile.
2. If the card has a ★, read it aloud and ask the player to your left to answer the question. Instruct the player to add or subtract fish from your urban waterway, as directed on the card. Subtracted tokens represent fish lost because of negative impacts on water quality and habitat. Make a separate pile of "Lost Fish" for later comparison. Place the used question card face up in a Discard Pile.
3. If the card has a ●, read it aloud and do what it says.
4. If you draw a **fish** or **license** card, read it aloud and keep it.
5. Play moves clockwise (to player's left). Take turns drawing cards, answering questions, and collecting **fish** and **license** cards.
6. When you collect 3 **fish** cards and 1 **license** card, you may "go fishing." Fishing regulations limit your "catch" to 5 fish. If using large and small tokens, keep only large fish; release small fish back into the waterway.

   Before going fishing, decide whether waters are "fishable."
   - What if there aren't enough fish in the waterway to take your limit of five?
   - Should you take fewer than five?
   - Should you take any?
   - What if you practice "catch and release" where you return all fish "caught" back into the waterway?

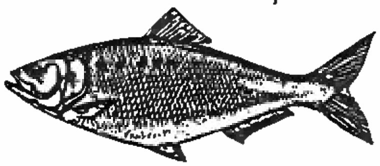
   Decide whether to take what's available or wait to go fishing until the waters get more "fishable."
7. If you do go fishing, shuffle your **fish** and **license** cards back into the Draw Pile. Keep all fish in your "Ice Chest" for later comparison.
8. If you draw an extra **fish** (you have more than 3) or **license** card (you have more than 1), shuffle it back into the Draw Pile and draw a new card.
9. If you draw a **Wild Card!**, you may go fishing right away. Keep any fish or **license** cards you have accumulated, but shuffle the **Wild Card!** back into the Draw Pile.
10. When your teacher calls time to end the game, count and record the number of fish in your Urban Waterway, Lost Fish pile, and Ice Chests. Also record how many people went fishing.

RULES AT A GLANCE

- **You may go fishing only when you have 3 fish cards AND 1 fishing license (fish cards can be any species)—OR when you draw a Wild Card! After fishing, return your collected cards to the Draw Pile and reshuffle.**
- **When fishing you must follow regulations (possession limit of 5 fish), but you may take fewer if you choose.**
- **Players must immediately shuffle extra fish and license cards into the Draw Pile so that others can collect them.**

Urban Fish Species & License Cards

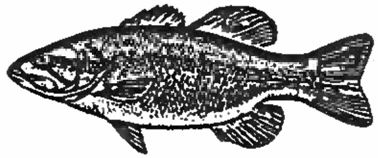
American Shad
Scientific Name: *Alosa sapidissima*



Bait/Lures: American shad live in the ocean but reproduce (spawn) in freshwater. The best time to fish for them is during their spawning run when they congregate near dams or fishways. Fish for shad with flutter spoons, shad darts, or small Clouser flies.

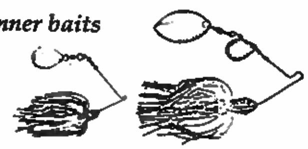
flutter spoon

Largemouth Bass
Scientific Name: *Micropterus salmoides*

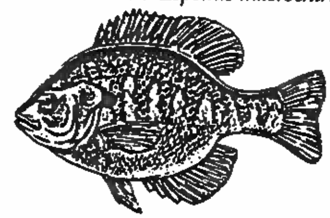


Bait/Lures: Largemouth are predators that lurk in weedy, quiet waters and feed mainly on other fish. Minnows are great bait, but live or plastic worms work, too. Bass are often caught on spinner baits and crankbaits.

spinner baits

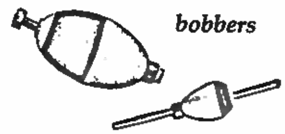


Bluegill
Scientific Name: *Lepomis macrochirus*

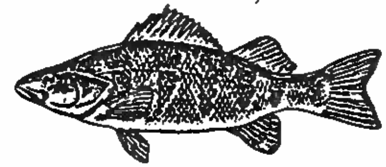


Bait/Lures: Fish for bluegill near "structure" (brush piles, weeds, docks), using worms you dig from your yard or small jigs and spinners. Using a sinker, fish about a foot from the bottom and attach a bobber so you can see when they hit.

bobbers

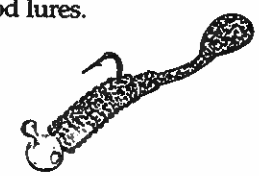


Yellow Perch
Scientific Name: *Perca flavescens*



Bait/Lures: Perch are delicious eating and easy to catch, especially during spawning season. Fish near structures using minnows, grass shrimp, or worms. Jigs, small plugs that imitate small fish (minnows) or crayfish, are good lures.

jig



Fishing License

Most states require an annual fishing license (check your local regulations for specific age requirements).

Did you know that license sales help fund fish research, restoration and stocking programs, access sites (parks, piers, docks, etc.), and education programs? By buying a license, you're not only obeying the law but also helping fish and habitat as well.

Fishing license sales help fish. (Add 1 "fish")

Fishing License

Most states require an annual fishing license (check your local regulations for specific age requirements).

Did you know that license sales help fund fish research, restoration and stocking programs, access sites (parks, piers, docks, etc.), and education programs? By buying a license, you're not only obeying the law but also helping fish and habitat as well.

Fishing license sales help fish. (Add 1 "fish")

Brown Trout
Scientific Name: *Salmo trutta*

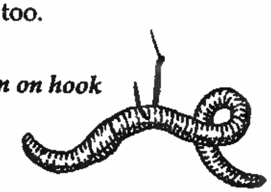
Bait/Lures: Trout are smart predators, so you need to think like a trout. Is it winter? Then don't fish with grasshoppers. Your best bet is lures that mimic local baitfish: small crankbaits (crawfish and minnows), spinners, and flies (not *real* flies, ones made with feathers and fur).

trout fly

Channel Catfish
Scientific Name: *Ictalurus punctatus*

Bait/Lures: Catfish are active mainly at night, during twilight hours, and during or right after a rain. These are bottom feeders, so fish them deep with a sinker. Cut bait, like herring or chicken liver, work great, but worms, stinkbait, and cheese are good, too.

worm on hook



Where's the River?

In many urban areas it can be hard to find any rivers. Many urban rivers have been converted into concrete channels or metal culverts. Channelization prevents natural processes like the growth of aquatic vegetation and the formation of pools and riffles; in other words, fish habitat. During times of high water, culverts can also:

a. increase erosion
b. increase flooding
c. increase turbidity of water
d. all of the above

Answer: d. all of the above

Channelization can harm fish.
(Subtract 2 "fish")

Shoreline Revitalization

Urban shorelines were once ideal sites for factories—oftentimes because factory waste could be released directly into the water (point source pollution). Today, many of these areas are being turned into shoreline parks, boardwalks, and community centers, providing access to fishing and other recreation.

Your city is considering a shoreline revitalization project, though taxes would be raised to pay for it. You head to the voting booth to decide on a referendum to support the project. Do you vote **yes** or **no**?

Yes: Revitalization can help fish.
(Add 3 "fish")

No: The status quo is maintained
(Don't do anything)

Tough Decisions

As money taken out of a bank, water is withdrawn from waterways for a variety of human uses: agriculture, hydroelectric power, manufacturing, public drinking water, etc. During drought or in drier states, communities are faced with tough decisions: do they continue to "spend" water resources to provide for increasing human needs, or do they restrict additional development so that fish and habitat have adequate water? If put to a vote, which would you choose:

restrictions or **more development**?

Restrictions can help fish.
(Add 3 "fish")

More development can harm fish.
(Subtract 3 "fish")

Diversity is the Spice of Life

Your class finds high biodiversity in your local waterway.

True or False: This likely indicates a very healthy habitat with a healthy fish populations.

True: Having lots of <u>different</u> species of plants and animals is called "biodiversity." Biodiversity results in a complex and interdependent food web of different predators and prey, producers, consumers, and decomposers. High biodiversity often indicates healthy habitat.

High biodiversity often means healthy fish populations.
(Add 2 "fish")

Wild Card!

Your state's natural resource agency offers FREE FISHING DAYS. The agency, along with partners, host fishing clinics to teach you how to fish and may have a tackle loaner program to help you get acquainted with the equipment you'll need.

Check your state fishing regulation booklet or the agency's website to find out when these days are scheduled.

Go Fishing!

(Add 1 "fish")

Adopt A Stream

True or False: Your class can help state biologists manage fish.

True: School classes and other groups can adopt a stream and collect data to share with state biologists. Your class might test for pH, dissolved oxygen, turbidity, and other water quality factors. You might also search for certain aquatic critters; the presence of "biological indicators" is evidence of the health of the stream. Sharing data about streams with state biologists helps them manage fish.

Collecting data and sharing it with state biologists help fish.
(Add 2 "fish")

Fish Ladders

Imagine trying to exit the freeway but having all the off ramps blocked. You'd be trapped. That's what happens to fish when they encounter a dam.

True or false: Fish ladders can help fish get around a dam.

True: Special structures called fish ladders or fishways can be built to help fish get around a dam. These structures are important for fish that need to get farther upstream to reproduce or spawn.

Fish ladders help fish.
(Add 2 "fish")

Fishable Waters Are Good Business

How much does fishing contribute to your state's economy?

Florida	$14 billion
California	$ 9 billion
Texas	$ 8 billion
Minnesota	$ 5 billion
N. Carolina	$ 4 billion
Wisconsin	$ 4 billion
Michigan	$ 4 billion
New York	$ 4 billion
Ohio	$ 3 billion

(your state) *(contribution to economy)*

A booming fishing industry may mean more $ spent on stewardship of fish and fish habitat. This helps fish.
(Add 1 "fish")

Algal blooms

You discover algae growing out of control in your favorite fishing hole. It is beginning to rot and stink. You see a dead fish floating on the surface of the water and remember that the rotting process (called decomposition) uses up oxygen. This means there is less dissolved oxygen for aquatic animals, such as fish. What is the likely cause of this algal bloom?

a. too much sunlight
b. excess nutrients, including nitrogen and phosphorus
c. emptying aquarium water into the fishing hole
d. none of the above

Answer: b. excess nutrients

Algal blooms harm fish.
(Subtract 3 "fish")

Fishing Regulations

You know someone who keeps all the fish they catch—no matter how large or small the fish are. *What if everyone did this?*

How can you learn about current fishing regulations?

a. Read your state's current fishing regulations booklet.
b. Ask your fishing buddy.
c. Ask your uncle (he hasn't gone fishing in 5 years).
d. none of the above

Answer: a. Read your state's current fishing regulations booklet.

Following fishing regulations helps fish.
(Add 1 "fish")

Stream Cleanups

We can't prevent all pollution from entering our water—but we can take action.

Your group decides to organize a local cleanup event to help get the trash out. You invite the local media so that your community can learn how they can help maintain "fishable and swimmable waters," too.

Stream cleanups can help fish.
(Add 1 "fish")

Storm Drain Stenciling

True or False: It is easier and more cost effective to prevent pollution from getting in our water than to restore water quality, habitat, and fish populations later.

True: Pollution prevention, including public education and storm drain stenciling, can help reduce the often enormous costs of restoring waterways after they have been polluted.

You can help by educating your community about the harm in using sewers as dumps by stenciling:

"all drains lead to
name your waterway here"

Pollution prevention helps fish.
(Add 1 "fish")

In Hot Water

Thermal pollution, adding warm water to a waterway, reduces dissolved oxygen, changes habitat, and can stress fish if the temperature rises too much. Which of the following cause thermal pollution?

a. direct discharge of warm water from factories and power plants
b. runoff from hot city streets and pavement
c. a summer heat wave
d. both a. and b.

Answer: d. both a. and b.

Thermal pollution harms fish.
(Subtract 2 "fish")

Fish in the Classroom

Native fish in your area are in trouble—they aren't reproducing at a rate that maintains a sustainable population.

Your class wants to help by hatching eggs and raising fish in the classroom and then releasing them back into your local waterway. Who might you work with to achieve this goal?

a. environmental education center
b. state fish and game offices
c. local fishing clubs
d. all of the above

Answer: d. all of the above

Raising and releasing fish helps maintain fish populations.
(Add 3 "fish")

Riparian Buffer Zones

How can trees, shoreline vegetation, and wetlands help fish and improve water quality?

a. Trees and shoreline vegetation trap runoff before it gets to our waterways.
b. Wetlands absorb and filter out pollutants and protect young fish.
c. Trees shade waterways, keeping them cooler.
d. all of the above

Answer: d. all of the above

Riparian buffer zones help fish.
(Add 3 "fish")

Litter: Trash or Treasure?

True or False: Litter may look ugly, but it poses no harm to fish and other aquatic wildlife.

False: Many types of litter can cause great harm to aquatic wildlife. Litter may be mistaken for food and ingested, such as when sea turtles eat floating plastic bags, thinking that they are jellyfish. Wildlife can also become ensnared in plastic rings used to package beverages or in discarded fishing line.

Litter harms fish.
(Subtract 2 "fish")

Conservation Officer

True or False: Conservation officers can't ticket people.

False: Conservation officers are like police officers, but their main duty is to protect our natural resources. They ticket people who don't follow regulations and can arrest poachers—people who don't follow fishing or hunting regulations.

Enforcing fishing regulations helps fish.
(Add 1 "fish")

Clean Water Act

The Clean Water Act of 1972 did much to regulate point source pollution—pollution that can be traced to a definite point where it enters the environment. An example of point source pollution is:

a. chemicals leaking from a factory's discharge pipe
b. runoff from fields
c. sewage from a discharge pipe
d. both a and c.

Answer: d. both a and c. Both chemicals and sewage from discharge pipes can be traced to their sources. Regulating this type of pollution has led to a dramatic improvement in water quality in many waterways.

The Clean Water Act helps fish.
(Add 3 "fish")

Keep or Release?

Many anglers choose to practice "catch and release." After reeling in a fish, they carefully unhook their catch and gently return it to the waterway. When practiced properly, catch and release does not harm fish. There are no limits on catch and release fishing.

Go fishing and practice catch and release!

Catch and release helps fish.
(Add 2 "fish")

Fish Consumption Advisories

True or False: All fish are good for you to eat.

False: Some fish may contain high levels of mercury and other toxins, which make them unsafe to eat. Each state publishes "fish consumption advisories." Check your regulations to know which fish are listed as unsafe to eat.

Fish under consumption advisories are living in polluted waters.
(Subtract 1 "fish")

Permeable or Impermeable Materials?

You are a member of the city planning commission. A vote has come up to decide whether new parking lots should be made of permeable or impermeable materials. Permeable materials allow some rain to seep into the ground whereas impermeable materials do not absorb water and can cause runoff. You know that controlling runoff helps reduce erosion, but permeable materials can be very costly. Which way will you vote?

permeable or impermeable

Impermeable materials: Increasing runoff can harm fish.
(Subtract 2 "fish")

Permeable materials: Controlling runoff can help fish.
(Add 2 "fish")

Construction and Water Quality

Which of the following would help your construction company win a *"Water Steward of the Year Award"*?

a. Leaving as much native vegetation and trees on site as possible
b. Installing silt fencing or wattles to prevent erosion and reseeding after construction
c. Installing raingardens and catchment basins that take up excess storm water
d. all of the above

Answer: d. all of the above

Environmentally responsible construction helps fish.
(Add 2 "fish")

Water Conservation

Water conservation increases the availability of water for all life forms, but sometimes there just isn't enough to go around.

During times of drought, should your city restrict certain water uses, like watering lawns, washing cars, and filling swimming pools?

Yes or No

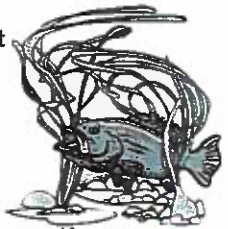
Yes: Conserving water, especially during drought, helps fish.
(Add 3 "fish")

No: Using water for nonessential purposes, especially during drought, harms fish.
(Subtract 3 "fish")

Aquatic Vegetation

True or False: Submerged aquatic vegetation, like grasses, is messy and should be cleaned out of rivers and lakes.

False: Fish need a place to hide from predators and to rest. If you've ever gone fishing, you know that many species of fish hang out near grasses and other aquatic plants. This structure is "home sweet home" to fish.



Submerged aquatic vegetation helps fish.
(Add 2 "fish")

Nonpoint Source Pollution

Which is an example of nonpoint source pollution?

a. oil leaking from a docked ship
b. chemicals seeping from a landfill
c. motor oil washing from driveways, streets, and parking lots
d. sewage overflow from a sewage treatment plant

Answer: c. When we can't point to the source of pollution in waterways—which may come from many different streets, lawns, construction sites, parking lots, and farms—we call it nonpoint source pollution. Most water pollution today comes from nonpoint sources.

Nonpoint source pollution harms fish.
(Subtract 2 "fish")

Impermeable Surfaces

An example of an impermeable surface is:

a. a wetland
b. a dirt road
c. a concrete parking lot
d. none of the above

Answer: c. concrete parking lot Many urban and suburban areas are concrete: streets, sidewalks, parking lots, and buildings. These impermeable surfaces don't allow rain or snowmelt to seep into the ground. During heavy rains, city storm drains are often flooded by runoff that has picked up chemical pollution and street trash, too.

Impermeable surfaces on land can harm fish.
(Subtract 2 "fish")

Off-season fishing

It's a week before bass season opens. Your buddy hooks a trophy-sized bass. This is:

a. illegal
b. called poaching
c. a great opportunity for his uncle, a taxidermist
d. both a. and b.

Answer: d. both a and b. Poaching means fishing or hunting out of season, taking more than the legal limit, and fishing or hunting without a license. Seasons and limits are set by resource managers to prevent overfishing. License sales help pay for management and track the number of anglers.

Poaching harms fish.
(Subtract 1 "fish")

Hydropower Dams

True or False: A dam provides extra water, which is good for the native fish that lived in the river before it was blocked by the dam.

False: Large dams generate power and store water for municipal and agricultural needs. But most fish and other native species prefer their natural river environment—not a warm, still reservoir. Some dams drain rivers virtually dry, allowing only a trickle to pass below—not good for fish or other aquatic species.

Dams can harm fish.
(Subtract 1 "fish")

Turbidity

Turbidity means:

a. cloudy or muddy water
b. still or slow moving water
c. cranking a fishing reel slowly

Answer: a. Another word for muddy water is "turbidity." Storms can stir up sediments from the bottom of waterways, and heavy runoff erodes banks and washes soil into streams and rivers. Some fish have a hard time feeding in turbid, muddy water, and sediments can smother fish eggs as well as reduce resting and hiding places.

Turbid water may harm fish.
(Subtract 2 "fish")

Attack of the Aliens

True or False: It's okay to dump or release your live bait when you're done fishing.

False: If bait is not native to your waterway, it is called an "alien species." Unfortunately, some aliens can become invasive, meaning they out-compete native species for food and habitat. They can take over and distrupt the natural ecological balance.

Alien species may harm fish.
(Subtract 1 "fish")

Go Green!

Your neighbor removed the trees and shrubs from her yard that were blocking her river view.

True or False: She can be fined and forced to replant.

True. In many areas setback laws require that businesses and residents maintain a "buffer zone" of trees and other plants along waterways. This vegetation filters pollutants and stabilizes banks, preventing erosion.

A single tree can keep more than 4,000 gallons of water out of the sewer each year. Just imagine what a whole shoreline of trees can do!

Setback laws help fish.
(Add 2 "fish")

Nutrient-rich Wastes

Excess nutrients in waterways can cause algal blooms, which in turn may cause "dead zones" and "fish kills" by depleting dissolved oxygen. How can we prevent excess nutrients from entering our waterways?

a. Maintain or upgrade wastewater treatment plants.
b. Limit fertilizer use on lawns, golf courses and farms, especially before a rain.
c. Scoop pet and livestock droppings.
d. all of the above

Answer: d. all of the above

Keeping excess nutrients out of waterways helps fish.
(Add 2 "fish")