

A photograph of two men in a small boat on a wide river. The man in the foreground is wearing a white shirt with a Minnesota Department of Natural Resources patch and a cap, looking at a clipboard. The man behind him is wearing a grey polo shirt and a cap, also looking at the clipboard. A fishing net is visible in the boat. The background shows a dense line of trees on the riverbank under a clear sky.

EDUCATOR'S GUIDE

FISH OF THE MINNESOTA RIVER BASIN

ASK^{an} EXPERT
ABOUT THE MINNESOTA RIVER

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Ask an Expert: About the Minnesota River is produced by the Water Resources Center (WRC) at Minnesota State University, Mankato. Created in 1987, the WRC serves as a regional center for environmental research and information exchange.

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ASK AN EXPERT INTRODUCTION

Ask an Expert: About the Minnesota River is an on-line field trip featuring scientists and experts answering questions on the health of the Minnesota River Basin. A dramatically changed landscape has impacted the waterbodies of the Minnesota River Basin whether for recreation use, drinking water or the health of aquatic organisms. Today, the Minnesota River contributes a significant level of pollutants including sediment and nutrients downstream to Lake Pepin, the Mississippi River and the Gulf of Mexico.

Water quality can be a complicated and confusing issue to students and the general public. Terms like Total Maximum Daily Load (TMDL), Best Management Practices (BMPs), Total Suspended Solids (TSS) to name a few don't make it any easier. Government agencies responsible for coordinating the effort to protect, improve, and restore the health of our lakes and rivers struggle to find a balance between the science and citizen understanding these complex issues. *Ask an Expert: About the Minnesota River* will strive to bridge that gap by focusing on a set of themes to tell the story of how a dramatically changed landscape here in the Minnesota River Basin has resulted in water pollution problems we are being asked to deal with in many different ways.

The story of the Minnesota River Basin is one of sorrow, hope, and great patience. *Ask an Expert* uses videos, fact sheets, and educational modules to help clarify what is happening to this state and national significant resource. Experts answer questions about a host of issues organized in 20 major themes.

Landscape History recalls how glaciers formed the basin and the Dakota making their home on a vast prairie-wetland landscape dotted by shallow lakes and forested areas.

Landscape Today is dominated by agricultural production involving the growing of corn and soybeans long with some urban development.

Bio indicators of our rivers and lakes (fish, mussels, macroinvertebrates, etc.) provide a window into the health of the ecosystem and how much it has been impacted by water pollution and landscape change.

Water Quality is a term used to measure the impact of pollutants (sediment, nutrients, bacteria, etc.) on our rivers and lakes including the aquatic organisms like fish, mussels and macroinvertebrates.

Making a Difference explores efforts by government agencies and citizens to improve water quality in our rivers and lakes.

Ultimately, *Ask an Expert: About the Minnesota River* highlights the dedicated scientists and citizens working hard to better understand our impact on the resource and how all of us can make a difference for today and for future generations.

For more information about *Ask an Expert: About the Minnesota River*, go to <http://mrbdc.mnsu.edu/learn>

ASK AN EXPERT THEMES

Ask an Expert: About the Minnesota River captures scientists and citizens in the field answering questions about the health of the Minnesota River. This online field trip incorporates video of the experts answering questions related to a particular theme. Images, graphics, charts, and maps along with fact sheets, field guides, power point presentations, 360 panoramas, and website will be used along with the videos to tell this story.

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Landscape History

- Geology
- Prairie
- Wetlands

Landscape Today

- Agriculture

Water Quality

- Monitoring
- Impaired Waters
- Sediment
- Nitrogen
- Phosphorus
- Downstream Impacts
- Hydrology

Bio Indicators

- Fish
- Mussels
- Macroinvertebrates

Making a Difference

- Pollution Problems
- Clean up Solutions
- Case Studies

EDUCATOR'S GUIDE OVERVIEW

This educator's guide is designed to directly link high school students with scientists and citizens' experts studying what is happening about the health of the Minnesota River Basin through lesson plans, videos, and fact sheets by concentrating on these goals:

- What happens on the landscape has a direct impact on the rivers and lakes including water quality and the living resources.
- These impacts are being studied by scientists and citizens throughout the Minnesota River Basin to identify how it affects the resource and what can be done to improve it.
- Conservation efforts are being implemented on both a small and large scale to improve, protect and restore our rivers and lakes. This will benefit the living resources and the public's ability to effectively address the consequences of how we manage landscape changes.

How to Use the Educator's Guide

The goal of *Ask an Expert: About the Minnesota River* is to increase the public awareness about the health of the Minnesota River through video interviews of scientists and citizens working in the field. These experts answer questions related to their particular topic of study in an engaging manner that brings the students and public right into this world of scientific research. This Educator's Guide provides a step by step process of navigating through a particular theme involving videos, lesson plans, fact sheets/field guides and much more.

I. Project Overview highlights each of the different themes selected to tell the story of the Minnesota River Basin through the eyes of our experts.

II. Theme Orientation will help guide the teacher and students in their use of the educator's guide and what each of the products offers for the classroom.

- Video Overview
- Key Terms
- Discussion Questions
- Fact Sheets and Field Guides

III. Lesson Plans are designed to give students a chance to learn about the particular theme through specific questions and hands-on activities.

IV. Additional Resources will allow students to conduct additional research on the various themes through websites, books, reports and more.

ASK AN EXPERT: FISH VIDEO SEGMENTS

<http://mrbdc.mnsu.edu/fish>

FISH VIDEOS

[How does water quality effect fisheries in the Minnesota River Basin?](#) (02:00 minutes)

[How does sediment effect fish in the Minnesota River Basin?](#) (01:41 minutes)

[What are some indicator fish species of water quality?](#) (01:57 minutes)

[What do you use to rate the health of the fisheries in the Minnesota River Basin?](#) (01:58 minutes)

[How do dams impact fisheries?](#) (02:12 minutes)

[Where are the dams located on the Minnesota River?](#) (03:26 minutes)

[Is the fisheries of the Minnesota River better than it was 20 years ago?](#) (03:13 minutes)

VIDEO OVERVIEW

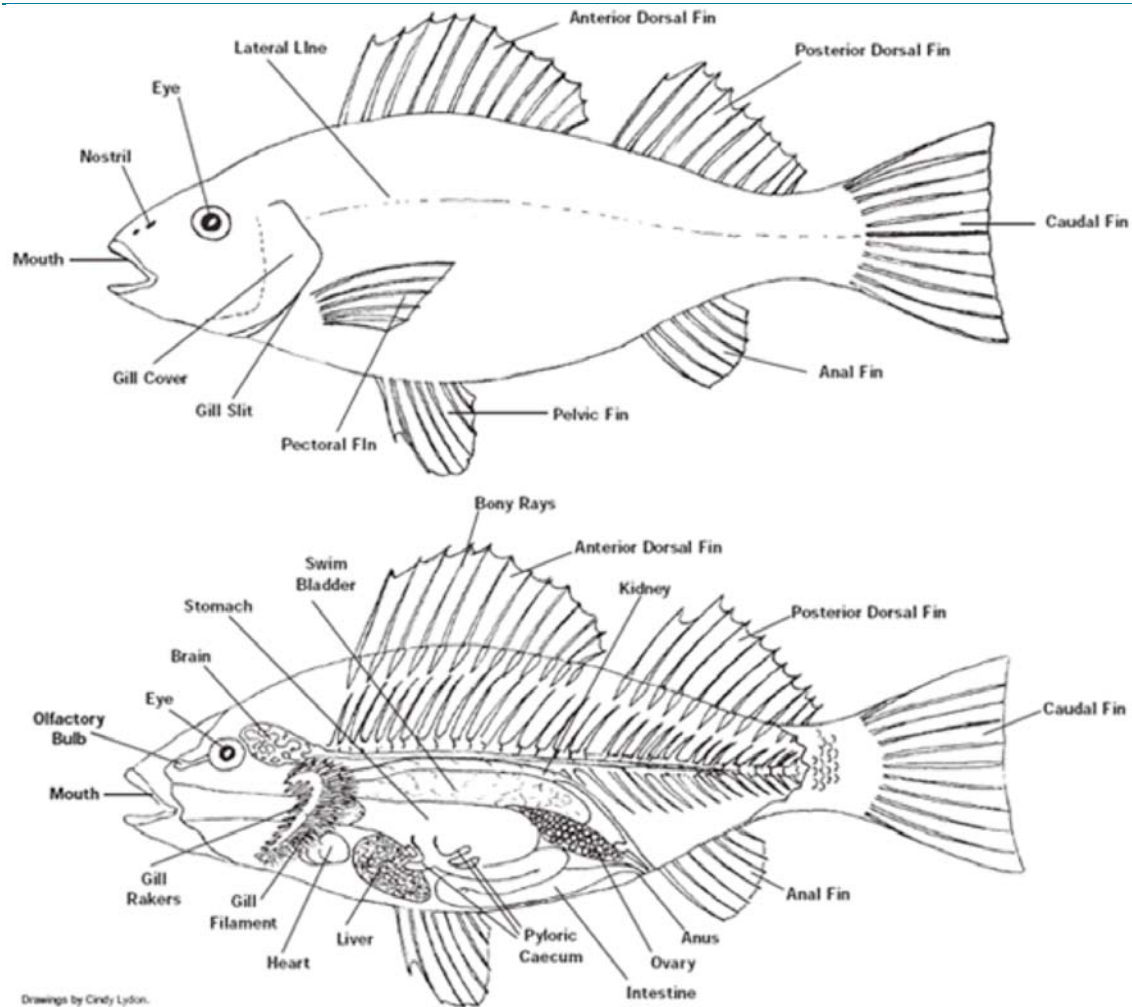
Species diversity is what fishery experts and citizens alike point to as an important indicator of how the fisheries of the Minnesota River Basin have changed over the last 50 or more years. A basin-wide survey in the 1990s found close to 100 different species living in the main stem and tributaries. The Minnesota River has come far from the 1950s when peas, carrots and fecal matter floated in the water. Today, indicator species like the Blue Sucker, Paddle Fish and Lake Sturgeon are being snagged at increasing rates and the Minnesota River is being celebrated for its thriving catfish population. DNR fishery biologists conduct surveys on the river and identify sediment as one of the biggest concerns for maintaining and increasing a healthy fishery.

Questions:

- How do dams impact the health of the fisheries? “Fish in this part of the country on the prairies evolved in flat flowing streams and not to jump five or six feet to get over a barrier like a dam. Fish migrate in the spring and fall of the year to complete important parts of their lifecycle and dams prevent them from doing that. One thing we know is our species diversity the number of species goes up above a dam once we take it out.” - Chris Domeier, MN DNR Fisheries Biologist
- What is one unique characteristic about the Minnesota River fishery? “You can’t look at the Minnesota River and not talk about its diversity. A total of just about a hundred species were found during a river-wide sampling effort in the 1990s with a lot of those found in the tributaries. Typically, we see between 50 and 60 species during our electro fishing surveys on the main stem. I think people genuinely excited about some of the unusual species. The one I am always amazed at is the shovelnose sturgeon.” - Brad Koenan, MN DNR Fisheries Technician
- How far has the fishery improved in the Minnesota River? “We have come a long way with the Minnesota River you know as recently as the 50s a professor at the University that wrote a book about the distribution of Minnesota fishes did seine hauls out there and really found peas and carrots and stuff from canning factories as well as human waste from unsewered communities in his seine hauls. Not surprisingly very few fish and since then recent surveys have shown seventy different species of fish are now found in the Minnesota River. Some of them are really sensitive to water quality and other habitat parameters and are even surprising to us that they are reentering the river like paddle fish, black buffalo and some of these other species that are really quite sensitive to habitat conditions. We are seeing in our lifetime you know a resurgence of the Minnesota River.” - Dirk Peterson, MN DNR Fisheries Chief

- What are some of the reasons behind this resurgence of the Minnesota River fishery? "It is the result of many factors whether it would be good sewage treatment plants that our communities are reducing phosphorus and other waste materials. It also good targeting of government programs like Minnesota CREP easements throughout the watershed to the tune of 100,000 acres, protecting riparian lands, permanent vegetation all of those things contributing to limiting the movement of sediment and nutrients to the river that are ultimately harmful to the health and wellbeing of the fish community." - Dirk Peterson, MN DNR Fisheries Chief
- What is the biggest water quality issue for the Minnesota River fishery? "Our biggest issue when it comes to fisheries in the Minnesota River is the amount of sediment that is moving down the river and its effect on everything from mussel species that need somewhat clean water to live and filter food out to fish spawning and fish food itself. It changes the whole makeup of the whole food chain of the river when you have a lot of silt. A cleaner river you see a cleaner food system, you see better species, more desirable species." - Chris Domeier, MN DNR Fisheries Biologist
- What are some of the pollution sensitive species that might provide an insight for improving water quality? "Some of the more unique species that we're finding in the river and we like to see and are good indicators of water quality is the blue sucker for sure. They are a real unique species. We are seeing more paddle fish. Lake Sturgeon are a great indicator. We are seeing more Lake Sturgeon showing up more often in the catches by anglers. This isn't the river that was when I was 10 years old when we took our poles down in New Ulm to fish." - Chris Domeier, MN DNR Fisheries Biologist
- What type of information are you collecting during a fish survey? "We are basically measuring all the fish. All the fish are measured. The smaller fish are counted and weighed. The weight portion of this especially on individual fish gives us what we call K-factors or condition factors on fish. Basically it speaks up the relative health of the fish. If you have walleyes that are very, very fat, very heavy for their length obviously we have excellent growing conditions and if we have fish that are emaciated or very skinny than we are looking at fish that obviously are struggling. It is important to us to get those weights on individual fish to make those decisions on the health of the system as a whole." - Brad Koenan, MN DNR Fisheries Technician

KEY TERMS



Adipose fin: Small, fleshy fin. When present, the adipose fin is located between a fish's dorsal and caudal fin.

Anal fin: Fin located on a fish's underside behind the pelvic fins.

Barbels: These "whiskers" are used by bottom-feeding fish to sense food.

Biodiversity: The number and variety of all living things.

Career: A chosen profession or occupation.

Caudal fin: Tail fin.

Dichotomous key: Classification "tool" used to sort, organize and identify a collection of objects or living organisms. (Dichotomous: Divided into two parts. **Key:** (Biol) A systematic classification of the significant characteristics of the members of a group of organisms to facilitate identification and comparison.)

Dorsal fin: Large fin or fins on a fish's back that vary in shape and size and may be connected or separate.

Ecosystem: An ecosystem is a community of organisms interacting with one another and the physical environment.

Family: (Biol) A taxonomic category ranking below an order and above a genus.

Fry: Newly hatched young after the yolk sac has been fully absorbed, and the fish shifts from the bottom to swim freely and search for food.

Genus (*Biol.*): Major subdivision of a family or subfamily in the classification of organisms, usually consisting of more than one species.

Geographic Information System (GIS): A database system with software that can analyze and display data using digitized maps and tables for planning and decision-making. A GIS can assemble, store, manipulate and display geographically referenced data, tying this data to points, lines and areas on a map or in a table. GIS software uses locations (typically recorded in latitude and longitude). **Example:** Using GIS, fisheries scientists can plot information on a map to study the location and movement of fish and overlay different types of geographical data (rivers, lakes, human populations, roads, etc.). GIS software helps scientists display and manipulate information about an area (e.g., Lake Michigan). Scientists in Michigan use GIS to study coho salmon distribution in Lake Michigan.

Global Positioning System (GPS): A technology that uses the position of satellites to determine locations on Earth. GPS is an essential tool for GIS because it allows for the gathering of data that location-wise is highly accurate. **Example:** Scientists in Michigan used a Global Positioning System (GPS) to determine the exact location for the construction of fish spawning reefs for lake sturgeon and other fish in the Detroit River.

Habitat: An area that provides life requirements such as appropriate food, water, shelter and space for a particular organism.

Hydro-acoustics: A technique used by scientists that uses transmitted sound to sense fish in the water column. Researchers use hydro-acoustics to study the size of individual fish, fish movement, spatial distribution and swimming speed. Hydro-acoustic equipment is used in either mobile surveys or fixed locations (usually in rivers or at fish passages). Also referred to as fisheries sonar.

Ichthyologist: Scientist who studies fish.

Juvenile: The time fish spend developing from fry to reproductively mature adults.

Larval fish: Stage in a fish's life cycle just after hatching from an egg. Larval fish live off a yolk sac attached to their bodies.

Latitude: Gives the location of a place on Earth in relation to its distance north or south of the Equator. A line of latitude is horizontal, parallel to the Equator, and is also referred to as a *parallel*. Latitude is expressed in degrees ranging from 0 degrees at the Equator to 90 degrees at the poles (90 degrees N or 90 degrees S).

Life cycle: The continuous sequence of changes undergone by an organism from one primary form (such as an egg) to the development of the same form again.

Life history: A continuous, descriptive account of a life cycle of an organism.

Longitude: Describes the location of a place on Earth in relation to its distance east or west of a north-south line called the Prime Meridian, located in Greenwich, England. Longitude is expressed as an angular measurement ranging from 0 degrees at the Prime Meridian to +180 eastward and -180 degrees westward.

Mark-recapture: Method of monitoring fish populations that requires catching fish and marking them in some way, either by attaching a tag or clipping a fin. Once fish are tagged, scientists release them back into their habitat. When these fish are recaptured, either by researchers or fisherman, it is possible, based on satellite data, to determine how far that fish has traveled or, using simple math, estimate the number of fish living in that habitat. Some tags do not remain permanently on fish. These tags are programmed to pop off the fish, float to the surface and transmit data via satellite back to researchers.

Pectoral fins: Side fins mainly used for direction or “steering.”

Pelvic fins: Paired fins located on the belly of a fish or under the pectoral fins.

Population: A group of individual organisms of the same species living in a particular area.

Profile: A biographical essay presenting the subject's most noteworthy characteristics and achievements.

Spatial: Pertaining to distribution, distance, direction, areas and other aspects of space on the Earth's surface. Ecologists are interested in the spatial arrangement of features in landscapes. The arrangement of elements is important because it affects ecological processes.

Spawn: To deposit eggs; to produce offspring in large numbers.

Species: A fundamental category of taxonomic classification ranking after a genus and consisting of organisms capable of interbreeding.

Yolk sac: a membranous sac attached to an embryo, providing early nourishment in the form of yolk. In many fish the yolk sac is retained for a period after hatching.

Discussion Questions

1. What factors caused the disappearance of so many different types of fish from the Minnesota River?
2. What does the reappearance of native species mean?
3. How does this help the economy?
4. What does the type of fish in a water system tell us?
5. How do we record the different fish we have in the river?
6. What can you, as a student, do to prevent invasive species spreading?
7. How do invasive species get here?
8. Why are invasive species bad/good? Examples

LESSON 1: CIVIC ACTION PROJECT

Lesson Objective

Upon completion of this lesson students will understand:

- How the environment influences human actions; and humans both adapt to, and change, the environment.
- Why democratic government depends on informed and engaged citizens who exhibit civic skills and values, practice civic discourse, vote and participate in elections, apply inquiry and analysis skills, and take action to solve problems and shape public policy.

Materials

Access to the internet

Paper, pencils, markers

Fish of Minnesota Guide: <http://www.dnr.state.mn.us/fish/index.html>

Background

The students will create a brochure, poster, or infographic to educate others on a specific fish in the Minnesota River.

Procedure

1. Brainstorm ideas of what actions the students could take to help prevent the extinction of native fish. Write the list so students can reference it later on.
2. Your job is to educate others. You will be working in a small group of three students. It is up to your group as to what you create. You have a choice of a poster, a brochure, or an infographic.
3. Your creation must include:
 - At least three ways humans have affected the fish; positively and negatively (migration-dams, sediment-agriculture, etc.).
 - A minimum of two images, either drawings or pictures
 - A paragraph describing why it is important to take action for this specific fish and what students can do to help

Follow-up

- How have humans affected the fish population?
- What fish have we harmed the most?
- Which fish are the most resilient? Why?
- What is being done to improve migratory effects that dams have caused?

State Standards for 9th to 12th grade

- Science
 - 9.3.4.1.1, 9.3.4.1.2, People consider potential benefits, costs and risks to make decisions on how they interact with natural systems.

- 9.1.3.1.1, 9.1.3.1.2, 9.1.3.1.3, Natural and designed systems are made up of components that act within a system and interact with other systems.
- 9.4.2.1.1, 9.4.2.1.2, The interrelationship and interdependence of organisms generate dynamic biological communities in ecosystems.
- Language Arts
 - 9.5.1.1, Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.
 - 9.9.1.1, Initiate and participate effectively in a range of collaborative discussion (in groups) with diverse partners.
 - 9.9.5.5, Make strategic use of digital media (textual, graphical, audio, visual and interactive elements in presentations to enhance understanding of findings, reasoning and evidence to add interest.

LESSON 2: FRED THE FISH

Lesson Objectives

Upon completion of this lesson, students will understand:

- What types of nutrients and toxic substances contribute to storm water pollution
- Understand the need for clean water
- Determine methods to improve storm water quality.

Materials

Script pages (included) • Scissors
Nine index cards
Glue sticks or tape
Light colored sponge
Yarn needle
Small weight such as a metal nut • String
Wide-mouthed jar or beaker
Cold tap water
Pencil
Five small plastic cups or baby food jars • Soil
Brown sugar to emulate pet waste
Pancake syrup or molasses to emulate motor oil
Salt
Punched paper dots to emulate litter
Medium beaker or glass jar
Detergent
Warm tap water
Red food coloring to emulate household hazardous waste
Green food coloring to emulate fertilizer
Paper and pen or pencil per students

Background

Storm water is the water that is produced by rainstorms or snowmelt. When storm water falls or runs through urban areas, it often washes nutrients and toxic substances from streets, parking lots and lawns into storm drains. The water that enters the storm drains is piped into the nearest stream or river. In most cases, the storm water never is treated at a sewage treatment facility. The result of polluted storm water, or “Urban Stew,” entering streams and the Minnesota River is damage to ecosystems. When the streams are polluted, plants, aquatic insects, birds and other animals that depend on the streams for survival, suffer.

Procedure

1. Copy and cut apart the nine roles from the script provided. Attach them with glue or tape to index cards. Laminate them if you choose.
2. Cut the sponge into a fish shape. Using the yarn needle, thread a string through the bottom of the fish. Then, attach the metal nut or small weight so that it hangs below the fish.

3. Fill the large glass jar or beaker 2/3 full with cold water. Thread another string through the top of the fish and suspend it in the water by tying it to a pencil positioned across the mouth of the jar. Adjust the length of the string until the fish is suspended midway in the jar of water.
4. Place the soil in a plastic cup or baby food jar and label it. Put brown sugar in a cup and label it "pet waste"; syrup ("oil") in third cup; salt in a fourth cup; and paper dots ("litter") in cup five. Pour detergent and warm water into the medium sized jar, and set out red and green food coloring – "household hazardous waste" and "fertilizer."

Performing the Activity:

1. Introduce Fred the Fish to the class. Tell them that he has grown up in a protected stream in a nature preserve, but he is about to leave the preserve and journey downstream. The class has been invited to share his adventures. Have the students list several words to describe Fred and the water in the jar.
2. Distribute the script cards, cups, food coloring, and jar of soapy water, to seventeen volunteers. Ask all of the students in the class to number a piece of paper from one to nine. As the students with the script cards read, those with the appropriate ingredients should dump them into Fred's jar on cue. Every student should write down a different descriptive adjective each time that the or she is asked the question, "How is Fred?"
3. After all of the ingredients have been dumped in the jar, lift Fred out of the jar, and discuss the change in his appearance and that of the water. Ask students to compare their lists of adjectives. Where does storm water go from Blue Earth County? Is it treated?
4. Recap with students the sources of the water pollution in the story. Ask the students to brainstorm others specific to their area. Ask the students to list ways in which each form of pollution in the story and those from their list could be prevented.

Follow Up

- What can you, as a student, do to help protect fish?
- Which type of sediment harmed Fred the fish the most?
- What were the causes for this sediment build up? How did it affect Fred the Fish?

State Standards for 9th to 12th grade

- Science
 - 9.3.4.1.1, 9.3.4.1.2, People consider potential benefits, costs and risks to make decisions on how they interact with natural systems.
 - 9.1.3.1.1, 9.1.3.1.2, 9.1.3.1.3, Natural and designed systems are made up of components that act within a system and interact with other systems.

FRED THE FISH SCRIPT PAGE

1. Imagine a clean river as it meanders through a protected wilderness area. In this river lives Fred the Fish. HOW IS FRED? Fred has lived in this stretch of the river all of his life. But now he is going on an adventure traveling downstream.
2. Fred swims past a large construction site, where a new mall will be built. There is a lot of loose soil where the land has been leveled. It begins to rain and some of the soil washes into the river. (Dump soil into Fred's jar.) HOW IS FRED?
3. Fred nears a suburban housing development. Some fertilizer from the gardens and lawns washed in to the river a few months back. (Squirt two drops of green food coloring into Fred's jar.) The fertilizer made the plants in the river grow very fast and thick. Eventually the river couldn't furnish them with all the nutrients they needed, so the plants died and started to decay. Their decomposition is using up some of Fred's oxygen. HOW IS FRED?
4. Fred swims under a highway bridge. Some cars traveling across it are leaking oil. The rain is washing the oil into the river below. (Pour syrup into Fred's jar.) HOW IS FRED?
5. During a recent cold spell, ice formed on the bridge. County trucks spread salt on the road to prevent accidents. The rain is now washing salty slush into the river. (Put salt in Fred's jar.) HOW IS FRED?
6. Fred swims past the city park. Some picnickers didn't throw their trash into the garbage can. The wind is blowing it into the river. (Sprinkle paper dots onto Fred's jar.) HOW IS FRED?
7. As Fred nears another neighborhood, he sees bubbles floating in the water. They're soap bubbles coming from a storm drainpipe that runs from the neighborhood to the river. Someone in the neighborhood is washing her car on the street and the soapy water is running into the river. (Pour warm, soapy water into Fred's jar.) HOW IS FRED?
8. Up ahead, a stream joins the river. Fred wants to swim fast through this stretch, because he knows that the stream runs along a trail where people don't clean up after their pets! (Place brown sugar in Fred's jar.) HOW IS FRED?
9. Finally, Fred swims past a trash pile, where people have dumped everything from soda bottles to paint cans. Much of the trash is household hazardous waste that should have gone to the county hazardous waste collection, so it would not pollute the river. (Squeeze three drops of red food coloring into Fred's jar.) HOW IS FRED?

POWER-POINT PRESENTATION

Slide 1- Ask an Expert

Slide 2- Fish on the River

- Species diversity is what fishery experts and citizens alike point to as an important indicator of how the fisheries of the Minnesota River Basin have changed over the last 50 or more years.

Slide 3- How do dams impact the health of the fisheries?

- “Fish in this part of the country on the prairies evolved in flat flowing streams and not to jump five or six feet to get over a barrier like a dam. Fish migrate in the spring and fall of the year to complete important parts of their lifecycle and dams prevent them from doing that. One thing we know is our species diversity the number of species goes up above a dam once we take it out.” - Chris Domeier, MN DNR Fisheries Biologist

Slide 4- What is a unique characteristic about the Minnesota River fishery?

- “You can’t look at the Minnesota River and not talk about its diversity. A total of just about a hundred species were found during a river-wide sampling effort in the 1990s with a lot of those found in the tributaries. Typically, we see between 50 and 60 species during our electro fishing surveys on the main stem. I think people genuinely excited about some of the unusual species. The one I am always amazed at is the shovelnose sturgeon.” - Brad Koenan, MN DNR Fisheries Technician

Slide 5 - Has the fishery improved in the Minnesota River?

- “We have come a long way with the Minnesota River you know as recently as the 50s a professor at the University that wrote a book about the distribution of Minnesota fishes did seine hauls out there and really found peas and carrots and stuff from canning factories as well as human waste from unsewered communities in his seine hauls. Not surprisingly very few fish and since then recent surveys have shown seventy different species of fish are now found in the Minnesota River. Some of them are really sensitive to water quality and other habitat parameters and are even surprising to us that they are reentering the river like paddle fish, black buffalo and some of these other species that are really quite sensitive to habitat conditions. We are seeing in our lifetime you know a resurgence of the Minnesota River.” - Dirk Peterson, MN DNR Fisheries Chief

Slide 6 - What are some of the reasons behind this resurgence of the Minnesota River fishery?

- “It is the result of many factors whether it would be good sewage treatment plants that our communities are reducing phosphorus and other waste materials. It also good targeting of government programs like Minnesota CREP easements throughout the watershed to the tune of 100,000 acres, protecting riparian lands, permanent vegetation all of those things contributing to limiting the movement of sediment and nutrients to the river that are ultimately harmful to the health

and wellbeing of the fish community.” - Dirk Peterson, MN DNR Fisheries Chief

Slide 7- What is the biggest water quality issue for the Minnesota River fishery?

- “Our biggest issue when it comes to fisheries in the Minnesota River is the amount of sediment that is moving down the river and its effect on everything from mussel species that need somewhat clean water to live and filter food out to fish spawning and fish food itself. It changes the whole makeup of the whole food chain of the river when you have a lot of silt. A cleaner river you see a cleaner food system, you see better species, more desirable species.” - Chris Domeier, MN DNR Fisheries Biologist

Slide 8 - What are some of the pollution sensitive species that might provide an insight for improving water quality?

- “Some of the more unique species that we’re finding in the river and we like to see and are good indicators of water quality is the blue sucker for sure. They are a real unique species. We are seeing more paddle fish. Lake Sturgeon are a great indicator. We are seeing more Lake Sturgeon showing up more often in the catches by anglers. This isn’t the river that was when I was 10 years old when we took our poles down in New Ulm to fish.” - Chris Domeier, MN DNR Fisheries Biologist

Slide 9 - What type of information are you collecting during a fish survey?

- “We are basically measuring all the fish. All the fish are measured. The smaller fish are counted and weighed. The weight portion of this especially on individual fish gives us what we call K-factors or condition factors on fish. Basically it speaks up the relative health of the fish. If you have walleyes that are very, very fat, very heavy for their length obviously we have excellent growing conditions and if we have fish that are emaciated or very skinny than we are looking at fish that obviously are struggling. It is important to us to get those weights on individual fish to make those decisions on the health of the system as a whole.” - Brad Koenan, MN DNR Fisheries Technician