

# Fisheries Management and You

---

*When it comes to fisheries management, we're all part of the solution.*



## Table of Contents

<b>Fisheries Management and You .....</b>	<b>4:5-A</b>
Minnesota Academic Standards .....	4:5-C
Environmental Literacy Scope and Sequence .....	4:5-D
Instructor’s Background Information .....	4:5-1-15
Summary .....	4:5-1
Student Objectives .....	4:5-1
Materials .....	4:5-2
Procedure.....	4:5-16
Activity.....	4:5-16
Assessment Options .....	4:5-18
Checklist.....	4:5-19
Scoring Rubric.....	4:5-20
Extensions .....	4:5-21
K-2 Option.....	4:5-21
Roleplaying Cards .....	4:5-22
Weigh Your Fish With a Ruler Chart .....	4:5-28
Size Limit Fish Cutouts .....	4:5-29
Fisheries Management and You Gameboard.....	4:5-34

## Chapter 4 • Lesson 5

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)

# Fisheries Management and You

## Minnesota Academic Standards

- ☉ Lesson *introduces* this Benchmark.
- ☪ Lesson *partially* addresses this Benchmark.
- ☑ Lesson *fully* addresses this Benchmark.

### Language Arts

Grade 3, 4, and 5

#### I. Reading and Literature

##### A. Word Recognition, Analysis, and Fluency:

**Benchmark 2**—The student will read aloud narrative and expository text with fluency, accuracy, and appropriate pacing, intonation, and expression. ☑

##### B. Vocabulary Expansion:

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

#### III. Speaking, Listening and Viewing

##### A. Speaking and Listening:

**Benchmark 1**—The student will participate in and follow agreed-upon rules for conversation and formal discussions in large and small groups. ☑

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

### Math

Alignment to the 2007 Minnesota Academic Math Standards coming soon.

Grade 3

#### V. Spatial Sense, Geometry, and Measurement

##### C. Measurement:

**Benchmark 1**—The student will select an appropriate tool and identify the appropriate unit to measure time, length, weight and temperature. ☑

### History and Social Studies

Grade K—3

#### VII. Government and Citizenship

##### A. Civic Values, Skills, Rights and Responsibilities:

**Benchmark 1**—Students will demonstrate knowledge of civic values that facilitate thoughtful and effective participation in civic life. ☑

##### B. Belief and Principles of United States Democracy:

**Benchmark 1**—Students will give examples of rules in the classroom/school and community, provide reasons for the specific rules, and know the characteristics of good rules. ☑

**Benchmark 2**—Students will explain that rules and laws apply to everyone and describe consequences for breaking the rules or laws. ☑

##### D. Government Institutions and Processes of the United States:

**Benchmark 1**—Students will describe examples of specific services provided by government. ☑

Grade 4—8

#### II. Minnesota History

##### G. Post-World War II to the Present:

**Benchmark 4**—Students will identify and describe significant land use changes in Minnesota, issues related to land use, and analyze the impact of those changes and issues. ☑

#### V. Geography

##### D. Interconnections:

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

#### VI. Economics

##### B. Economic Choices:

**Benchmark 2**—Students will apply a decision-making process to make informed choices. ☑

## Science

### Grade 3

#### *IV. Life Science*

##### *C. Interdependence of Life:*

**Benchmark 1**—The student will know that organisms interact with one another in various ways besides providing food. 🌱

**Benchmark 2**—The student will know that changes in a habitat can be beneficial or harmful to an organism. 🌱

### Grade 4

#### *I. History and Nature of Science*

##### *A. Scientific World View:*

**Benchmark 1**—The student will explore the uses and effects of science in our interactions with the natural world. 🌱

**Benchmark 2**—The student will discuss responsible use of science. 🌱

**Benchmark 3**—The student will recognize the impact of scientific and technological activities on the natural world. 🌱

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

##### *A. Earth Structure and Processes:*

**Benchmark 1**—The student will identify and investigate environmental issues and possible solutions. 🌱 (Depends on which cards are drawn during the game).

### Grade 5

#### *I. History and Nature of Science*

##### *C. Scientific Enterprise:*

**Benchmark 1**—The student will describe different kinds of work done in science and technology. 🌱

## 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 4 • Lesson 5

# Fisheries Management and You

**Grade Level:** 3-5

**Activity Duration:** 40 minutes

**Group Size:** classroom (each gameboard accommodates two to six students)

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

**Academic Skills:** communication, listening, measuring, reading, roleplaying, small group skills

**Setting:** indoor or outdoor gathering area

**Vocabulary:** bag limit, carrying capacity, conservation, electrofishing equipment, fingerling stocking, fishing regulations, fry stocking, gill nets, harvest slot limit, lunger structure, maximum size limit, minimum size limit, one-over limit, possession limit, preservation, protected slot limit, seines, stewardship, trap nets, trawls, trotlines, water analysis, winterkill, year class

**Internet Search Words:** Minnesota Department of Natural Resources, fisheries management, fish surveys

## Instructor's Background Information

Each state has agencies responsible for managing and protecting natural resources. In Minnesota, one of the key agencies is the Department of Natural Resources. But did you know that you're a steward of natural resources, too? Well, you are! **Stewardship** is defined as the careful and responsible management of anything entrusted to one's care.

Fish are one of Minnesota's many valuable natural resources. Fisheries resources include fish populations, water bodies, shoreline habitat, stream habitat, watersheds, and aquatic plants and other organisms.

In Minnesota, lakes, wetlands, and watercourses that meet criteria stated in Minnesota Statutes, Section 103G.005, subd. 15, and 17b are public waters. The Minnesota Department of Natural Resources Division of Waters has regulatory jurisdiction over public waters. Public waters include waters with public access, navigable waters, designated basins, including scientific and natural areas, trout streams or trout lakes, water basins designated as wetlands of ten acres or larger outside incorporated areas (city boundaries) or larger than two and one-half acres within incorporated areas, and water basins totally surrounded by public lands. Public waters belong to all state citizens.

## Summary

Play a game of Fisheries Management and You to become familiar with fisheries management tools and techniques. Find out that aquatic resource management is an ongoing partnership between government agencies charged to protect these resources and the citizens that use and enjoy them.

## Student Objectives

The students will:

- 1 Define preservation, conservation, stewardship, and sustainable use of natural resources.
- 2 Discuss a variety of the management tools that fisheries managers use in their work.
- 3 Write a Natural Resources Department mission statement that includes the following points:
  - working with the citizens of Minnesota
  - conserving natural resources
  - using natural resources in a sustainable way
  - one original goal for natural resources management.
- 4 Conclude that, as citizens, we're all responsible for managing our natural resources.

This lesson is best utilized as a review for students after they've completed at least one lesson from Chapter 1, Chapter 3, and Chapter 4 (Fish Management). Lessons from these chapters expose students to topics and vocabulary that appear in this lesson.

## Materials

- **Fisheries Management and You Gameboard**, one for every two to six students
- **Fisheries Management and You Roleplaying Cards**, one set per gameboard
- Six place-holders (buttons, beans, or beads) per gameboard
- One six-sided die per gameboard
- **Size Limit Fish Cutouts**, one set for every four or five students (Each set should contain three cutouts less than four inches long, four cutouts six to eight inches long, and two cutouts longer than twelve inches.)
- Twelve-inch ruler, one per group
- **Weigh Your Fish With a Ruler Chart**, one per group

Fisheries management focuses on managing or controlling aquatic habitats—and people's use of them—so that fish will always be available for angling and enjoyment. Based upon scientific and conservation principles, good fisheries management considers every component of a watershed or ecosystem.

Whether a person works for the Minnesota DNR, goes fishing, uses water, enjoys recreation in or near the water, or participates in land-based activities affecting watersheds, that person shares ownership—and management responsibility—for Minnesota's fisheries resources.

Continued use and enjoyment of our natural resources depends on all of us. Sometimes this means something as simple as doing everyday things responsibly, such as taking household chemicals to a toxic disposal facility instead of pouring them down the drain. Other times, complex issues arise, demanding difficult decisions ranging from preservation of fragile habitats to allowing unrestricted access for development or recreational uses. To practice personal and civic responsibility for environmental decisions, all Minnesotans must develop critical-thinking and problem solving skills, and become informed, active citizens.

The terms preservation and conservation are often confused. It is important to know the difference when making natural resource management decisions. **Preservation** refers to complete protection with little human disturbance. In some cases, preservation is a necessary management tool, to ensure, for example, that wilderness areas remain wild, and that certain unique habitats remain intact for wildlife. Animals threatened with extinction are totally protected to ensure the survival and recovery of those species. **Conservation** refers to responsible and sustainable uses of resources. For example, fish are a renewable resource that can be used, managed and replenished. As with most living things, the reproductive potential of fish exceeds the carrying capacity of the ecosystem. **Carrying capacity** is the maximum number of individuals or inhabitants that a given environment can support without detrimental effects to the habitat or to the organisms. Predation, disease, competition or other natural causes hold populations in check. In most cases, anglers and commercial fishing enterprises can safely harvest a certain amount of surplus fish while still leaving a viable population and a healthy aquatic ecosystem. The fisheries resource is used in a sustainable way and conserved for the benefit and enjoyment of future generations. Sustainable use of resources means using natural resources in a way that meets the needs and aspirations of the present without compromising the ability of our environment to meet future needs and aspirations. Sustainability means conserving and restoring the natural environment, while enhancing economic opportunity and community well-being.

The Minnesota DNR endorses natural resource management that sustains ecosystem integrity through partnerships and interdisciplinary teamwork. This approach seeks to sustain ecological health as well as to satisfy socioeconomic needs. This means that the DNR operates as both a science- and a community-based organization. We all have a

stake in natural resource management—and we share responsibility for environmental stewardship.

This lesson describes what the Minnesota DNR does to manage the state’s aquatic resources and the individual citizen’s role in aquatic stewardship. The mission statement of the Minnesota DNR is:

*“The mission of the Minnesota Department of Natural Resources is to work with citizens to conserve and manage the state’s natural resources, to provide outdoor recreation opportunities, and to provide for commercial uses of natural resources in a way that creates a sustainable quality of life.”*

In the long run, government alone cannot protect and conserve Minnesota’s resources. Every Minnesota citizen is responsible for being an informed, active environmental steward.

### Minnesota Aquatic Resources Statistics (2004)

Resident and nonresident anglers .....	1.5 million
Number of anglers including children .....	2.3 million
Game fish lakes .....	5,400
Miles of streams and rivers .....	90,223
Miles of managed trout streams .....	3,600
Public water access sites.....	3,000
Fishing piers and shore fishing sites .....	288
DNR fisheries staff.....	320
Area fisheries offices .....	28
State fish hatcheries.....	18

### How the Minnesota DNR Manages Minnesota’s Fisheries and Aquatic Resources

#### Information Gathering

If two anglers catch their limit, does this mean that the lake is packed with fish and has no need for limit reduction? Of course not—no more so than the instance of an angler not catching anything on a fishing trip would mean the lake contained few or no fish.

The observations of a few anglers’ catches aren’t an accurate indication of fish population status. Successful fishing may be due to a hungry fish, extraordinary skill, or simple good luck rather than an abundance of fish.

The unreliability of casual observation is the main reason the DNR invests so much time and money in gathering information by means of comprehensive, scientific lake and stream surveys. Observations by anglers can be valuable, but such information must be balanced, and supported with methodical, consistent surveys of fish populations, fish habitat, and fishing activity.

**Natural resources** are the elements of the environment (such as plants, animals, land, water, and air) that people value because they:

- sustain life
- provide food, clothing, building materials, energy, trade, and recreation
- have aesthetic or economic worth
- add quality to our lives

#### Public Waters

The waters within the Ordinary High Water Level (OHWL) boundary “belong” to all Minnesota citizens. The OHWL is the highest water level maintained for a period of time sufficient to leave evidence on the landscape. Public Waters Inventory (PWI) maps show the general location and area of public waters and wetlands on a county-by-county basis. PWI maps are available for viewing at all County Auditors’ offices, the Minnesota DNR Division of Waters regional, area, and central offices, Soil and Water Conservation District offices, and Watershed District offices. These maps can also be purchased from Minnesota’s Bookstore, 660 Olive Street, St. Paul, MN 55155, 1-651-297-3000 (metro area) or 1-800-657-3757 (statewide)



**A gill net.**



**A trap net.**



**A trawl.**



**An electrofishing boat.**

Surveys gather information from lakes and streams. They're the foundation of every DNR fisheries management effort to improve fishing—from stocking fish to restoring aquatic habitat. The surveys provide long-term information on fish population size, structure, reproductive success, species abundance, growth and movement, and habitat conditions. Fisheries field staff conduct surveys by netting, seining, trawling, electrofishing, interviewing anglers (creel surveys), and analyzing water. (These survey methods are described below.) Fisheries managers use survey information to develop resource management plans. These plans provide the foundation and guidance for the work of the fisheries staff. As one fisheries manager observed, “Without the lake and stream surveys, everything we do would be guesswork.”

### Lake and Stream Surveys

Each year, field crews of biologists throughout the state survey several hundred lakes and several dozen streams or rivers. Most lakes are surveyed every three to nine years, although large lakes with heavy fishing pressure are monitored yearly. There is now a database of survey information for 4,500 lakes and streams—more than any other state—and biologists add new information every year.

In the short term, surveys show the relative proportion of large and small fish, and whether each year's new generation of fish (a **year class**) is relatively weak (a small population) or strong (showing a high survival rate). By compiling many years' information, long-term trends and patterns appear, such as how quickly fish grow in various lakes, or gradual losses sustained to important spawning habitat.

### Survey Techniques

Fisheries managers and their crews use different survey techniques for various fish species or sizes.

**Gill nets**, usually 250 feet long, are used to capture walleyes, northern pike, whitefish, and yellow perch. Biologists release live fish after measuring them and taking fish scales, that will be viewed in a lab, to determine age. Some fish die in gill nets—these are further analyzed to determine sex, stomach contents, parasites, and diseases.

**Trap nets** are smaller than gill nets. They capture bluegills, bullheads, and other near-shore species, allowing fish to be released unharmed.

**Trawls and shoreline seines** are small-meshed nets used to capture young fish.

**Electrofishing equipment** generates an electrical charge that temporarily stuns fish so they can be measured and weighed. Often used in streams and rivers, the equipment is also used in lake surveys

of bass, crappies, and young walleyes. Fish recover quickly and are released unharmed.

**Trotlines and angling** are used to survey catfish and other species that aren't often effectively captured by other means.

**Water analysis** consists of chemical and physical tests, including percentage of dissolved oxygen, amounts of nitrates and phosphorus, and water clarity.

### Creel Surveys

Throughout the summer, on selected lakes across the state, DNR creel clerks ask anglers for the times they began and ended their fishing, the number of people in their parties; their home zip codes, the fish species they sought; the fishing equipment used; the weight, length, and number of fish they either kept or released, and where they fished in the lake. Creel survey data helps fisheries managers determine fishing pressure, the size and number of fish harvested on a particular lake, and angler catch rates. This information aids in determining how to best manage the harvest of fish populations.



**A creel.** *Creel* is an old term describing a basket, usually wicker, that anglers used to hold their catches.

### Habitat Improvement

Years ago, hunters recognized the link between healthy habitat and abundant wildlife. Today, anglers are making the same connection, noticing that the best fishing lakes and streams have the healthiest fish habitats. Unfortunately, this realization has come too late in many areas where habitat degradation has harmed fish populations.



**Using a backpack electrofishing unit.**



**A trotline.**



**An angler.**



**A Secchi disc measures the clarity of the water.**

Pesticides, fertilizers, and soil from agricultural fields drain into lakes and rivers, killing aquatic insects, depleting dissolved oxygen, and smothering fish eggs. Dams that have outlived their usefulness may needlessly restrict fish migration. Leaves, grass, and fertilizer wash off urban and suburban lawns through storm drains into lakes, where these excessive nutrients fuel massive algae growth, or “algae blooms.” Rapid housing development on fishing lakes is converting native lakeshore and shallow-water vegetation to lawns, rocky riprap, and sand beaches. Many lakeshore owners remove native plants, which they consider “weeds.” But these native plants are actually vital in sustaining healthy fish populations.



©MN DNR, C. Iverson

There is some good news to report, however. Each year, fisheries managers collaborate with growing numbers of homeowners, fishing clubs, lake associations, local units of government (LUGs), and a variety of state and federal agencies to conserve and restore fish habitat on dozens of lakes and streams statewide.

### **Aquatic Plant Restoration**

To restore the natural features of lakeshores, which provide habitat and protect shorelines from erosion, fisheries managers work with local lakeshore owners on lake-friendly landscaping. This new approach replaces either portions or entire lakeside lawns and beaches with native wildflowers, shrubs, grasses, and aquatic plants. More and more lakeshore owners are finding that the restored natural vegetation cuts maintenance costs, discourages pests such as Canada geese, attracts butterflies and songbirds, prevents erosion and loss of shore land, and improves shallow water fish habitat.

### **Spawning-area Improvement**

Fisheries managers work to prevent eroding shorelines from shedding sediment into the water, where it smothers the fishes’ eggs and underwater insect prey. Cooperating landowners learn how state or federal conservation programs make it cost effective to convert cleared or mowed lake edges to native grasses and trees that anchor the soil and prevent erosion.

### **River and Stream Habitat Improvement**

On large rivers, fisheries managers work with ecological services staff, local units of government, state and federal agencies, and other organizations to improve fish access to spawning habitat. On the Red River in northern Minnesota, for example, several lowhead dams have been replaced with a series of rapids that allow fish to successfully migrate to upstream spawning tributaries.

In other cases, natural curves, or meanders, have been restored in stretches of rivers and streams formerly straightened and distorted by artificial channels. The DNR also works with anglers to improve streams for trout by installing box frames, or **lunker structures**, where

fish can hide from predators as they grow. Other forms of stream improvement involve placing boulders along eroding stream banks, or installing underwater rocks to force currents to deepen and scour streambeds, which creates pools for trout.

### Lake Aeration

Thick ice and snow can prevent sunlight from reaching underwater plants. As bacterial decomposers break down these dead plants, they consume oxygen that fish need. As a result, many shallow lakes lack sufficient oxygen to support fish. This is known as **winterkill**, and it usually takes three or four years for the lake's fish population to recover. One solution involves adding oxygen with an aeration system. There are sub-surface units (bubblers) and surface agitators that use propellers. The dissolved oxygen of a water basin can be depleted in summer, too, when overabundant algae dies and decays. (Elevated levels of nutrients enter the water in runoff containing phosphates, nitrates, and other materials, causing this excessive growth, or algae bloom.) Again, bacterial decomposers break down dead algae and consume oxygen.

**Summerkill** occurs when dissolved oxygen levels drop too low to support fish populations.

### Lake Rehabilitation

Some of Minnesota's shallow lakes are being destroyed by a combination of human behavior and fish behavior. Many activities on land cause erosion and release excess nutrients into lakes. Carp and black bullheads then burrow in silty lake bottoms, stirring up this nutrient-laden sediment. Murky water prevents sunlight from reaching the aquatic plants, which would normally stabilize the lake bottom and provide oxygen and habitat for other species of fish and water insects. Bluegills and bass population numbers then decrease as bullheads and carp thrive in the turbid water. Although carp are well-established in many Minnesota waters, this species isn't native to North America. Bullheads are a native fish species that, at normal population levels, don't harm the environment and are integrated into the ecosystems they inhabit. Problems arise when the population of any fish species increases dramatically enough to create an ecosystem imbalance.

The only proven method of restoring ecological balance to these unbalanced lakes is to kill the entire fish population and restock the lake with more desirable fish. This process, known as lake rehabilitation requires appropriate permits. Rotenone, a natural chemical derived from a South American tree species, kills gilled animals by blocking their ability to utilize dissolved oxygen. In the concentrations used by the DNR, the chemical is harmless to humans—or to any wildlife that happen to eat dead fish that have consumed it. Rotenone breaks down to carbon dioxide and water within a few weeks, and is then completely harmless. Barriers are often placed at inlets and outlets to prevent the re-entry of unwanted species after rehabilitation. Barriers are also



©MN DNR, C. Iverson

installed to prevent new connections to other water bodies that result from road building, agricultural drainage, or construction.

Lake rehabilitations aren't long-term solutions because the carp and bullheads eventually return to lakes through connected waters, or during large flooding episodes. Also, Rotenone treatment is very costly. Fisheries managers increasingly focus on reducing nonpoint source pollution and sediments and habitat restoration as part of a long-term solution to improving fishing in these problem lakes.

## **Habitat Conservation**

### **Land Acquisition**

In 1992, the Minnesota Legislature created a new public land classification called aquatic management areas (AMAs). Modeled after wildlife management areas, AMAs are purchased from willing sellers to protect environmentally vital shorelines and littoral (shallow water) edges of lakes, streams, and rivers. The focus of AMA acquisitions is critical shoreline habitat, muskellunge spawning areas, and walleye fingerling production. When purchased, AMAs are owned by the state and are protected from development and other human degradation.

Another purpose of land acquisition is to provide public access areas to water bodies. The Minnesota DNR has also been working with private landowners since the early 1900s to purchase easements providing public access to streams, lakes and rivers.

### **Fish Stocking**

Fisheries managers also use stocking to manage Minnesota's lakes and rivers. Stocking is the practice of adding a particular species of fish to lakes or rivers capable of producing fish in addition to the native fish originally present.

The goal is usually to increase numbers of a particular species, or to introduce a new species. Most lakes have established fish populations that use all of the lake's available food resources. In these situations, stocked fish will either displace native fish, or the stocked fish won't survive. Lakes lacking food, spawning habitat, or good water quality may not respond to stocking. Stocking isn't effective in lakes containing natural populations of fish and adequate habitat. (When stocked fish are added to populations already in the lake, the stocked fish can replace the existing fish populations, wasting existing natural reproduction. This can be a costly mistake.) But occasionally, stocking can be an effective management tool. Some Minnesota lakes now contain populations of game fish that wouldn't have naturally occurred without stocking. For example, several lakes in southern Minnesota now have excellent walleye fisheries. And there are trophy tiger muskies in many Twin Cities metro area lakes. Stocking can restore

extirpated populations such as Lake Superior's native lake trout. Fisheries managers stock our state fish, the walleye, in roughly 900 lakes throughout the state, adjusting stocking levels as necessary. The goal is to find stocking levels that increase or maintain marginal walleye populations while not being detrimental to the rest of the fish in the community. Walleye stocking shouldn't be done in lakes with well-established, healthy walleye populations. Many large, windswept northern lakes already have good natural reproduction, making stocking unnecessary. Any lake, regardless of size, can sustain only a certain number of fish and other organisms. This is known as **carrying capacity**. If managers were to add fish to a lake already at carrying capacity, most of the new fish would die from starvation, lack of habitat, or overcrowding—this would be a waste of time and money. There is also the possibility that genetically inferior stocked fish could displace natural fish, resulting in reduced natural reproduction.

On each lake, fisheries managers weigh the costs against the benefits of walleye stocking, the likely effects on other fish populations, and the effectiveness of previous stockings. Only then do they decide whether or not to stock the lake. Some lakes aren't stocked with walleyes because they don't have good walleye habitat and may be better suited to other species such as black crappie, largemouth bass, catfish, muskellunge, smallmouth bass, stream trout, lake trout, or salmon.

### Red Lake's Remarkable Comeback

"In the early 1990s, Red Lake in northern Minnesota in Beltrami County suffered a dramatic drop in the walleye population due to overharvest. State, federal, and tribal resource managers joined together in 1999 to develop the Red Lake Recovery Plan. They prescribed a total walleye harvest moratorium, stepped-up enforcement, and science-based fry stocking (newly hatched fish, less than ¼ inches in length). And they let nature take its course. Recent DNR test netting indicates the stocking of 41 million walleye fry in 1999, the stocking of 32 million fry in 2001, and stocking again in 2003 was a huge success. 'In only five years Upper and Lower Red Lakes held the largest year class of mature walleye in well over a decade, and two strong year classes are right behind,' noted Henry Drewes, DNR regional fisheries manager at Bemidji. 'We gave the lake the rest and the shot of fish it needed,' said Drewes. 'That was the cure. Now we need to work on stable, sustainable, and collaborative forms of fish management. We want anglers to enjoy this fishery as soon as possible but not at the expense of a population setback. Inherently, this means conservative fishing regulations at first, followed by monitoring and data evaluation.' The big question is: Can anything be done to prevent the walleye population from collapsing again? Yes. The DNR, Red Lake Band of Chippewa, and the Bureau of Indian Affairs are committed to complete recovery and sustainability. They have also enlisted the expertise of the University of Minnesota, U.S. Fish and Wildlife Service, and Red Lake Fisheries Association to achieve that goal.

'There are more players and cooperation than ever before,' said Drewes. 'Together, we want to put the collapse behind us and a lot of good fishing ahead of us.'

—C.B. Bylander, "Field Notes: Red Lake Update,"  
*Minnesota Conservation Volunteer*, January-February  
2004

Lake Region	Time to Reach One Pound
South	2-4 years
North	4-5 years
Northern border	5-6 years

## Common Walleye Stocking Questions

### What's the difference between stocking walleye fry and stocking walleye fingerlings?

It's more cost effective to stock fry (newly hatched fish less than one-quarter-inch long) than fingerlings (four- to six-inch fish). Stocking walleye fry costs approximately one tenth as much as stocking fingerlings, and fry are more likely to establish large year classes. So fry are stocked most often.

### How long does it take a stocked fish to reach catchable size?

It takes several years for walleyes stocked each spring or fall to reach one pound, or about fourteen inches. Southern lakes are more productive and have longer growing seasons, so walleyes reach a catchable size sooner in those waters.

### How many fish are stocked in a lake?

Most lakes receive an average of 1,000 fry, or one pound of fingerlings per littoral acre (a surface area less than fifteen feet deep).

### Why are some lakes stocked with more walleyes than others?

Larger lakes usually receive more stocked fish than smaller lakes. Stocking levels vary, though, depending on available prey and lake productivity.

### Why doesn't the DNR stock lakes every year?

A generation of walleyes stocked or hatched one year (a year class) can eat much of the food needed by the next year class. This phenomenon, known as year class suppression, is prevented with a one- or two-year elapse between stockings. This also allows fisheries managers to check the lake's natural reproduction. Walleye in a year class from a non-stocked year are naturally reproduced. If natural reproduction adequately maintains the walleye population, it's less expensive and more efficient to let nature do the stocking.

## Enacting and Enforcing Regulations

### Fishing regulations

Laws that place limits and seasons on angling activity—exist primarily to protect fish populations from overharvest. Regulations also reduce the harvest per angler, creating an opportunity for sharing the harvest among the growing number of Minnesota anglers.

### **More Pressure, Better Gear**

Fishing pressure has been experiencing an upward trend. Although the number of anglers has risen moderately over the years, there has been an apparent and dramatic increase in the average number of days each angler is on the water. Meanwhile, continual improvements in fishing gear have made anglers more effective at finding and catching fish. Anglers have graduated from rowboats to comfortable fishing rigs, from steel poles to graphite rods, from braided Dacron to monofilament, and from using a rock on a string to gauge lake depth to sophisticated depth finders and fish locators. As fishing pressure and technological advances increase, the number of fishing waters remains constant. One result is that, on many lakes, the average size of the fish caught has become smaller.

### **Bag Limits**

Why are Minnesota's bag limits set at their current levels? Many bag limits were set more than 50 years ago, so the rationale for them isn't exactly clear. It's likely that past managers set limits based on the best scientific research and biological data available at the time, and in addition to their own knowledge and experience.

DNR Fisheries continues to examine the biological and social ramifications of existing and proposed bag limits. Because most anglers rarely catch their limit on a given day, and many catch no fish, or only a few per day, lowering limits (such as the fifteen-fish bag limit for crappies), by just one or two fish usually does little to reduce harvest. Most anglers support reducing bag limits by a few fish, but they don't tend to support major reductions that would significantly reduce harvest and promote conservation. As anglers learn how restricted bag limits could spread the harvest among more anglers, they might be more likely to accept significant bag limit reductions.

### **Experimental Regulations**

Special harvest regulations are tailored to individual lakes and streams and to different fish species. On Lake Winnibigoshish, for instance, all walleyes between 17 and 26 inches must be released immediately. Biological research shows that limiting the harvest of some sizes of fish is the most effective way to improve the average size of fish that anglers catch. Managers then set the sizes of harvest regulations based on considerable public input from anglers, ranging from those who don't want to release "keeper" sized fish, to those who say it's worth releasing those fish in order to be able to catch larger ones from that lake in the future, to resort owners who believe the regulations drive away customers who will just go fish on another lake, and still others who see the regulations as the best way to increase fish size and attract future customers. A delicate balance is needed between regulations—simplifying them to make them more universal to ensure better compliance—and meeting the management needs of specific lakes. Meanwhile, managers continue to study how regulations can best serve various waters and species.

## Species-Specific Regulations

The Minnesota DNR is committed to providing the quality fishing demanded by our fishing public. To that end, a new effort was developed to improve Minnesota's walleye, bass, crappie, and sunfish populations through a simplified set of special possession limits and length-based regulations. These regulations aim for fewer variations of special regulations (which are easier for the public to remember), as well as a broader sweep of lakes and rivers with common population goals. These science-based regulations are implemented with public input and support, and are used to enhance or improve local fish populations.

### Terminology of Limits

- **Bag, or possession limit**, is the total number of a species that an angler may possess. Possession may be regulated over one day or over several days, and usually includes all fish in possession, on the water and off. For example, an angler may not possess more than six walleyes, including the fish in a live well (a boat's water-filled fish storage compartment), and at home in the freezer.
- **Protected slot limit** indicates the size range, or slot, of fish that must be released. A twelve- to sixteen-inch slot limit for bass calls for the release of all bass from twelve to sixteen inches long.
- **Harvest slot limit** is the size range of fish may be kept. For example, a fourteen- to eighteen-inch harvest slot indicates that fish between fourteen and eighteen inches may be kept and all others released.
- **Minimum size limit** requires that all fish below a set length must be released. For example, the statewide minimum size limit for muskellunge is 40 inches, meaning that you must release muskies shorter than 40 inches.
- **Maximum size limit** requires that all fish above a set length must be released. A 24-inch maximum size limit for northern pike means that you must release any northern longer than 24 inches.
- **One-over limit** indicates that you may keep just one fish over a specified length.

### Controlling Invasive Species

Invasive species are those species, or types of organisms, that are not native and that have been intentionally or accidentally introduced into a place they did not originally inhabit. Invasive species, such as the zebra mussel, Eurasian milfoil, round goby, spiny water flea, bighead carp, and ruffe can permanently damage Minnesota's fish populations and fishing as they overtake or substantially alter fish habitats. Anglers and boaters must help prevent the spread of invasive species by removing plants and draining the live wells of their boats prior to leaving the water.

## Informing and Educating

Why is it not in the public interest to stock walleye in every Minnesota lake? Why are aquatic shoreland plants so important to small walleye, bass, northern pike, perch and sunfish? How can a private landowner protect shoreland vegetation and fish populations? Will a slot limit increase fish size in my lake? Which farming practices ease erosion and benefit fish populations? DNR fisheries managers throughout the state answer questions like these continually. Providing information to anglers, lakeshore owners, other citizens, and kids is one of the most important functions of DNR Fisheries.

Anglers are always searching for information. They appreciate having access to DNR Fisheries lake survey information. Each day, the DNR website receives more than 60,000 page hits, primarily from people checking lake survey reports. In the spring, the DNR Information Center receives hundreds of phone calls and e-mail requests daily. Local fisheries managers meet regularly with more than 300 fishing groups and 600 lake associations throughout the state. The managers listen to the concerns of anglers and lakeshore owners, present lake survey information, propose experimental regulations, and discuss the state of local lakes and streams. Fisheries managers also educate school and civic groups, speak on radio shows, provide information to reporters, and field questions from visiting anglers and real estate agents.

### MinnAqua

According to the 2000 U.S. Census, most rural counties in Minnesota showed population decreases as urban counties gained residents. One result of Minnesota's growing urbanization is that fewer children spend time outdoors. The MinnAqua aquatic education and angling program was developed to increase public knowledge of lakes, streams, and fisheries, particularly for the urban public. MinnAqua's main goal is to provide basic instruction on lake and stream ecology, fisheries conservation, and angling stewardship as it teaches people to fish. Fishing is a recreational sport that can become a lifelong activity connecting participants with their local aquatic environment. Fishing also encourages stewardship and appreciation of natural resources. Anglers learn what kind of habitat and foods enable fish survival. MinnAqua has grown since its inception in 1990, and is now a statewide program whose education efforts have reached more than 450,000 people. Its educational approaches emphasize developmentally appropriate hands-on learning, the development of critical thinking and problem-solving skills, and the grasp of concepts spanning academic disciplines.

“By helping more people understand how our natural world works, we will encourage environmental stewardship, assuring healthier habitats for fish and wildlife—as well as humans—for generations to come.”

—Ron Payer,  
Minnesota DNR  
Fish and Wildlife Division

## 8. Increasing Access

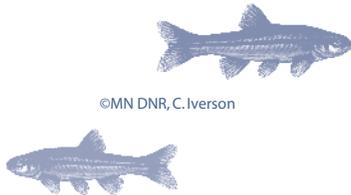
It doesn't matter how good the fishing may be if anglers can't get to the water. To provide angler access to Minnesota's lakes, rivers and trout streams, and other public waters—the DNR buys lakeshore and stream easements from willing sellers, then installs and maintains fishing piers and boat ramps.

### Boat Ramps

Half of the 3,000 public boat ramps on Minnesota lakes and streams were built by and are maintained by the DNR—counties or local units of government administer the rest.

### Fishing Piers and Shore-fishing Sites

Anglers can fish from hundreds of fishing piers and shore-fishing sites throughout Minnesota. New piers and shore-fishing sites are designed to meet the needs of anglers with disabilities. They are generally within 300 feet of a paved parking area, and can be reached via a solid, wheelchair-accessible surface.



©MN DNR, C. Iverson

### FiN

The Minnesota DNR's FiN (Fishing in the Neighborhood) Program was initiated in 2001 in the Twin Cities Metro Area to improve public access and fishing opportunities in area neighborhoods. FiN works with local partners to develop safe, family-friendly ponds situated in residential areas where people can enjoy a day in the park and some good fishing. With its partners, FiN stocks fish, installs fishing piers and platforms, restores shoreline habitat, and sponsors MinnAqua aquatic education programs to create high-quality fishing opportunities.

### Conducting and Utilizing Scientific Research

The DNR's fisheries research scientists study how to make fisheries management more successful and efficient. Fisheries managers tell research scientists which management tools they need—special regulations, hatchery applications, best stocking practices, fish population dynamics, new technology, or statistical modeling—and the research scientists evaluate which tools will be most effective. Minnesota's fisheries research scientists tackle the most significant management problems facing fisheries managers and anglers today.

Researchers conduct studies under major fisheries resource issue headings, including status of fish populations, fish stocking, new technologies, regulations, habitat issues and watersheds, genetics, and human dimensions.

Researchers conduct experiments that answer specific questions posed by managers, anglers, and academics, such as:

- What is the current status of fish populations in Minnesota?
- How are improved fishing technologies affecting the fish population?
- How can regulations, habitat and watershed work, and genetic research improve fish populations?
- How can we measure the cumulative effect of habitat loss on fisheries?

### Some Significant Minnesota DNR Fisheries Research Findings

- **Habitat improvement techniques:** Research showed that trout numbers rise dramatically (per mile of stream) if channels are narrowed, banks stabilized, riffles kept free of silt, and brush allowed to grow along stream banks.
- **Stocking:** Researchers studied conditions in walleye-rearing ponds used for walleye stocking and refined hatchery techniques to increase egg fertilization rates, enabling more walleyes to be produced at a lower cost.
- **Fish genetics:** Fish (such as muskie) have numerous genetic strains, or variations within the species. Some strains do better than others in Minnesota waters. Researchers have determined which strains are the best to stock.
- **Human Dimension:** A joint study by the University of Minnesota and the Minnesota DNR recently enabled research personnel to work with angling constituents in southeast Minnesota. This cooperative effort resolved some of the angling groups' long-standing concerns about balancing quality trout fishing opportunities and sustainability of trout resources.

Research findings are disseminated by presentations at area and regional managers' meetings, at professional meetings, through publication of Investigational Reports, and publications in peer-reviewed journals. The Fisheries Research Unit has published more than 500 Investigational Reports, and in the past twenty years, more than 85 papers in scientific journals. These are widely cited by other researchers and scientists.

Through research and careful monitoring of the fishery, the DNR can conduct a fish management program that relies on science and clearly expressed goals. Working with an informed citizenry to manage fisheries resources eventually produces positive results. Fishing will be better, and future generations of Minnesotans will enjoy a healthier environment.



©MN DNR, C. Iverson



## Procedure

### Preparation

- 1 Copy the **Fisheries Management and You Gameboard** and glue it to tag board or cardboard backing. You may want to provide printed game instructions on the back of each gameboard, or as a separate sheet. Make one board for each group of two to six students. For reuse, laminate all materials.
- 2 Copy the **Fisheries Management and You Roleplaying Cards**, one set per gameboard.
- 3 Make, find, or purchase suitable place markers for each player, one set per gameboard. Differently colored buttons, dried beans, or glass beads make good place markers.
- 4 Copy the **Size Limit Fish Cutout** and make one set per group that contains:
  - three cutouts less than four inches long
  - four cutouts six to eight inches long
  - two cutouts longer than twelve inches
- 5 Collect one twelve-inch ruler per group.
- 6 Copy one **Weigh Your Fish With a Ruler Chart** per group.
- 7 Collect one die per gameboard.

## Activity

### Warm-up

- 1 Talk to students about what they think a fisheries manager does during a typical day. Use information provided in the background to suggest various management activities that the students may not be familiar with. Review terminology found in the **Fisheries Manager and Citizen Roleplaying Cards** before students play the game. Define and discuss ecosystem-based management, sustainability, preservation, and conservation.
- 2 Review the information presented in the Terminology of Limits section of the Instructor's Background Information with students so that they understand the meaning of each scenario: bag or possession limit, protected slot limit, harvest slot limit, minimum size limit, maximum size limit, and one-over limit.
- 3 Supply photocopies of various-sized fish and have students use a ruler to measure the fish to determine if they are within the limit specifications. For the purposes of the game, use a protected slot limit in which all sunfish from six to eight inches long must be released. Ask students why it might be important to have these regulations like this for one lake. Why wouldn't we have them on all lakes?
- 4 Anglers often want to know the weight of a fish they catch. But, if the fish will be released, it is important to remember that weighing can hurt fish. Ask students what tools are used to weigh things. Answers might include different types of scales and balances. They may be surprised to learn that anglers can estimate a fish's

weight by measuring it with a ruler! Have students use the **Weigh Your Fish With a Ruler Chart** to determine the approximate weight of the fish based on its length. Ask students why an angler would want to know how much a fish weighs. Answers could include: to be able to tell others about the fish they caught, or to help determine if they've caught a record fish. Students may wish to search the Minnesota DNR website or Minnesota Fishing Regulations Booklet for Minnesota record fish sizes and weights. Ask students if they can determine how a chart that helps you weigh fish with a ruler might have been created. Weights on the chart are approximate for corresponding sizes of fish. Many fish were measured and weighed to determine average weight per length for each fish species on the chart.

- 5 Discuss the DNR mission statement:  
*The mission of the Minnesota Department of Natural Resources is to work with citizens to conserve and manage the state's natural resources, to provide outdoor recreation opportunities, and to provide for commercial uses of natural resources in a way that creates a sustainable quality of life.* What does “work with citizens” mean? Ask students why the DNR should work with citizens to manage the state's natural resources.
- 6 Have students rewrite the Minnesota DNR mission statement in their own words.
- 7 Discuss the definition of stewardship. Ask students how each of them could “work with the DNR to protect and manage the state's natural resources” as a citizen of Minnesota.

### Lesson

Divide students into groups and allow them to play several rounds of Fisheries Management and You. Students will take turns rolling a die to determine how many spaces they will move. If they land on a space indicating a Fisheries Manager or Citizen, they will draw a roleplaying card from the corresponding deck, read the card out loud to the group, and follow the directions. The first student to reach Lake Sustainability wins. Before play begins, make a point of telling the students that the game includes situation cards that direct the player to move back spaces when they land on the game spaces that reflect poor decision making by a citizen or fisheries manager, or a setback or barrier to completing a task.

### Wrap-up

Upon completion of the games, bring student groups back together to discuss how a fisheries manager's job complements what we do as individual stewards of our aquatic resources. Ask them if they think an individual citizen can make a difference in conserving natural resources in a sustainable way. Should citizens be involved in managing natural resources? Why or why not? Ask students to list ways they can participate in managing our state's fisheries and water resources. Review the definitions of preservation, conservation, stewardship, sustainable use of resources, and ecosystem-based management.



©MN DNR

## Assessment Options

- 1** Assess student participation and discussion during the Warm-up and Wrap-up portions of the lesson. Evaluate whether the students' discussion demonstrated understanding of stewardship, sustainability, ecosystem-based management, preservation, and conservation, and their roles as citizens in helping to manage our natural resources.
- 2** Observe and assess student participation in group discussions, as well as understanding of terms during the game time.
- 3** Evaluate the students' mission statements to include the following points: a mission statement that includes working with the citizens of Minnesota, conserving natural resources and using them in a sustainable way, and at least one additional original goal for natural resources management.
- 4** Ask students to create their own board game about environmental stewardship and the decisions they make in their own homes, schools, and neighborhoods that impact natural resources in Minnesota.
- 5** Assessment options include the Checklist and Rubric on the following pages.

## Fish Management and You Checklist

Possible Points	Points Earned	Points Earned	
	Student	Instructor	
4	_____	_____	Student reviews terms and vocabulary words from previous MinnAqua Lessons completed with class.
4	_____	_____	Student plays board game with understanding of vocabulary words and terms used on playing cards.
4	_____	_____	Student plays board game respectfully with other students and helps others understand vocabulary words and terms during the game.
4	_____	_____	Student can define preservation, conservation, stewardship, and sustainable use of natural resources.
4	_____	_____	Student creates a mission statement that includes working with the citizens of Minnesota, conserving natural resources and using them in a sustainable way.
2	_____	_____	Mission statement is original, stating at least one additional goal for natural resources management.
<b>Total Points</b>			
22	_____	_____	<b>Score</b> _____

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

#### 19-22 points = A

Excellent. Work is above expectations.

#### 15-18 points = B

Good. Work meets expectations.

#### 14-17 points = C

Work is generally good. Some areas are better developed than others.

#### 10-13 points = D

Work does not meet expectations; it's not clear that student understands objectives.

#### 0-9 points = F

Work is unacceptable.

*Fish Management and You Scoring Rubric*

Criteria	4 Excellent	3 Good	2 Fair	1 Poor	0 Unacceptable
<b>Knowledge</b>	Understands at least 75% of the game terms, including <i>preservation, conservation, stewardship</i> and <i>sustainable use of natural resources</i> , and especially <i>limits</i> as referring to fishing regulations. Can explain why limits are important and why some lakes have different limits than others.	Understands at least 75% of the game terms. Knows what <i>limits</i> are, and can give one reason why they're important.	Understands less than 50% of the situation card terms during the game. Has some understanding of the term <i>limits</i> , but can't give reasons why they're important.	Understands less than 30% of the terms. Can't define <i>limits</i> . Needs frequent help to participate in the game with understanding.	Understands no new terms. Can't define <i>limits</i> .
<b>Group participation</b>	Respectful of others; asks questions. Helps others with questions.	Respectful of others; asks one question or shows interest in lesson.	Has a hard time respecting others; doesn't show much interest in the board game.	Shows no participation in board game.	Disrupts others in the group during the game.
<b>Mission statement</b>	Creative in writing the statement. Had the same goals as current DNR statement and added at least one more goal.	Created original statement promotion and protection of natural resources.	Created a statement, but used little creative thought. Statement addressed stewardship of natural resources in a limited way.	Created a statement, but short and incomplete; didn't address stewardship, conservation or sustainable use of natural resources.	Didn't create a mission statement.

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

## Diving Deeper

### Extensions

- 1 Invite a local fisheries manager to come and speak to the class about the job.
- 2 Visit a DNR Hatchery or Aquatic Management Area to observe some of the tools that fisheries managers use to protect our aquatic resources. You can find your area Fisheries office by visiting the Minnesota DNR website ([mndnr.gov](http://mndnr.gov)) or by calling 1-888-MINN-DNR. Obtain a Fisheries Tour Packet curriculum guide available for loan from the Minnesota DNR MinnAqua Program prior to a hatchery tour to prepare your students for the experience.

## For the Small Fry

### K-2 Option

Laminate the bag limit fish and put paper clips on the mouth of each fish. Make a set of fishing poles out of dowels, string, and magnets. Make a large fish ruler to measure the laminated fish when the students catch them. Have the students catch fish and work together to determine if it's okay to keep the fish. Each round can have different bag limits and size limits.



## Fisheries Management and You

### Roleplaying Cards

Copy these Fisheries Manager Cards and the Citizen Cards on two different colors of paper.

#### Fisheries Manager

A lake in your area has more people fishing on it now than it did five years ago. You decide to do more creel surveys to ask anglers how many fish they're catching—and to make sure they're not harvesting too many. *Move ahead 3 spaces.*

#### Fisheries Manager

A small lake in your area has been a good kids' fishing spot for many years. In recent years, the fish population is mostly bullheads and carp. You use lake rehabilitation to create balanced sunfish and bass populations. *Move ahead 2 spaces.*

#### Fisheries Manager

There's a pond in your neighborhood where kids could walk to go fishing. You work with the Parks Department to build a fishing pier and a walking path. You stock the pond with bluegill and black crappies. *Move ahead 3 spaces.*

#### Fisheries Manager

A Conservation Officer tells you that they've been working on a lake with a new regulation, and that most anglers are obeying the new 10-inch minimum regulation. Draw a fish from the pile. Decide if you're going to keep it. Now measure it. *If it's less than 10 inches long, move back 1 space. If it's more than 10 inches, move forward 1 space.*

#### Fisheries Manager

You think a lake in your area has a good largemouth bass population, so you decide to do an electrofishing survey. This gives you better information to make lake management decisions. *Move ahead 2 spaces.*

#### Fisheries Manager

You see an area of aquatic plants that makes good largemouth bass spawning habitat. You talk to the landowner and the two of you decide to create an Aquatic Management Area (AMA) to protect this habitat. *Move ahead 3 spaces.*

#### Fisheries Manager

You find a great spot for a fishing pier on a kids' fishing pond, but due to other management priorities, it will have to wait until next year. *Move back 1 space.*

#### Fisheries Manager

Management priorities require that you must survey a popular fishing lake and skip a smaller lake this year. *Move back 2 spaces.*

**Fisheries Manager**

A creel survey shows that kids fish a pond frequently. You decide to stock some extra fish into the pond to make fishing better.

*Move ahead 2 spaces.*

**Fisheries Manager**

You are a summer intern for the MinnAqua program and you teach hundreds of kids how to fish safely. *Move ahead 3 spaces.*

**Fisheries Manager**

You have so many meetings this week that you're unable to attend a citizen lake association meeting to which you were invited. *Move back 1 space.*

**Fisheries Manager**

You organize a public meeting to see how citizens feel about your plans to stock muskies in their lake. *Move ahead 2 spaces.*

**Fisheries Manager**

A fish survey and a creel survey show that the sunfish are getting smaller due to overharvesting by anglers. You ask for a special regulation to change the possession limit to five fish.

*Move ahead 2 spaces.*

**Fisheries Manager**

You get several phone calls from citizens wanting a boat ramp on a nearby lake. You meet with other members of the community, look at your lake survey, and work with the county planners. You decide to ask for money to put in the new boat ramp. *Move ahead 2 spaces.*

**Fisheries Manager**

Anglers discover an invasive fish from another part of the world in the rivers of your state. You work with neighboring states to try to keep them from spreading. *Move ahead 2 spaces.*

**Fisheries Manager**

You hire a summer intern to help with lake surveys. This gives her experience working for the Department of Natural Resources. *Move ahead 3 spaces.*

**Fisheries Manager**

You work with a citizen lake association to monitor the water quality of a lake.

*Move ahead 3 spaces.*

**Fisheries Manager**

You discover that stocked lake trout fingerlings don't survive well in some parts of the state. You make suggestions about where it's best to stock them. *Move ahead 3 spaces.*

**Fisheries Manager**

You go to an elementary school and talk to students about your job as a fisheries manager.

*Move ahead 2 spaces.*

**Fisheries Manager**

Your research scientists did a study on black crappie spawning and have been invited to show their results at a National Fisheries Society meeting.

*Move ahead 2 spaces.*

**Fisheries Manager**

You notice that the only way to get to one of the fishing piers you've installed is a bumpy gravel path. You work with the county to get a paved trail so wheelchairs can travel it, too.

*Move ahead 3 spaces.*

**Fisheries Manager**

It was a very long, cold winter. Several shallow lakes in your area had winterkills for the first time in many years. It will take a number of years for fish populations in these lakes to recover.

*Move back 2 spaces.*

**Citizen**

The lake that you're fishing has a six-inch to eight-inch protected slot limit for sunfish. Draw a fish from the pile. Decide if you're going to keep it. Now measure it. If it's in the slot, *Move back 2 spaces.*

**Citizen**

Your family has a dairy farm. Drought has reduced the amount of pasture grass for your cows. You decide that you need to let them eat the grass closer to the stream. The cows' feet stir up sediment in the water as they graze, making it hard for fish to spawn. *Move back 2 spaces.*

**Citizen**

You live on a lake and don't like to swim around aquatic plants. You ask your parents to remove all the plants from the water. *Move back 2 spaces.*

**Citizen**

You don't know very much about fishing. You go to a Take A Kid Fishing Clinic with your mom. You learn a lot and have a fun time too. *Move ahead 2 spaces.*

**Citizen**

While fishing on Lake Mille Lacs, you have the best luck ever and catch a 30-inch fish and a 31-inch fish. The regulations say you can only have one fish over 28 inches, so you release the second fish immediately so it will survive. *Move ahead 3 spaces.*

**Citizen**

You went fishing with friends and left your empty lunch bag and candy wrappers on the pier instead of putting them in the trash container. *Move back 3 spaces.*

**Citizen**

You see some tangled fishing line laying near the place you fish, but you choose not to pick it up and throw it away or take it with you to recycle at a bait shop. *Move back 2 spaces.*

**Citizen**

You're fishing on the river with some friends and notice that other anglers are throwing fish on the bank and letting them die. You tell them it is illegal to do that, and that it will make the fishing spot stinky. *Move ahead 3 spaces.*

**Citizen**

Your little brother got a goldfish for his birthday, but doesn't take care of it anymore. He wants to put it in the lake. You tell him that that would hurt the other fish populations and it would be illegal. He decides to give it to a friend. *Move ahead 3 spaces.*

**Citizen**

The DNR is considering special fishing regulations for a lake near your house. You attend a public meeting with your parents to share your opinion. *Move ahead 2 spaces.*

**Citizen**

Mercury pollution in water comes from power plants that burn coal to make electricity. You often forget to turn off the lights when you leave a room. *Move back 1 space.*

**Citizen**

You live on a lake and don't like to swim around aquatic plants. You ask your parents to remove all the plants from the water. *Move back 2 spaces.*

**Citizen**

You help your dad wash the car. You remind him that it's better to wash the car on the lawn instead of on the driveway so the soap and dirt don't run directly into the storm sewer that drains to the river. *Move ahead 2 spaces.*

**Citizen**

You're a lakeshore owner and you decide to put the area in front of your property into an Aquatic Management Area (AMA) to save fish habitat instead of making a sandy beach. *Move ahead 4 spaces.*

**Citizen**

Your mom asks you to rake leaves. If you choose to collect the leaves into bags for composting, *Move ahead 1 space* If you rake the leaves into the street for the street sweeper, many of the leaves will enter the storm sewer, so *Move back 1 space.*

**Citizen**

A large number of yellow perch eggs hatch in the lake, which means more food for the walleye. Walleye like to eat perch. The walleye are very full and they're not biting on lures. Anglers aren't happy. *Move back 1 space.*

**Citizen**

Your teacher assigns a project for Science. You choose to research water quality and share how our decisions affect the water quality in the watershed where we live. *Move ahead 3 spaces.*

**Citizen**

When you return home from your fishing trip, you put your leftover worms in the trash because they could damage the forests near your home if you release them on the ground. Worms are invasive species in Minnesota. *Move ahead 3 spaces.*

**Citizen**

The lake that you are fishing has a six-inch to eight-inch protected slot limit for sunfish. Draw a fish from the pile. Decide if you're going to keep it. Now measure it. If it's in the slot, *Move back 2 spaces.*

**Citizen**

You're fishing on a small pond, and you only catch small fish that keep swallowing the hook. With the next fish, instead of cutting the line and handling the fish gently, you get frustrated, rip out the hook, and throw the fish on shore. *Move back 3 spaces.*

**Citizen**

You live on a beautiful trout stream, but do not fish much yourself. You decide to let trout fisherman cross your property so they can enjoy fishing on the stream, too. *Move ahead 3 spaces.*

**Citizen**

You're a Boy Scout or Girl Scout who organizes a group of people to plant aquatic plants in a storm water pond. This helps the pond to remove extra pollution. *Move ahead 3 spaces.*

**Citizen**

While you're out fishing, you take the time to answer a creel survey so there's more information about the fish in the lake that you love to fish. *Move ahead 3 spaces.*

**Citizen**

You're a member of a 4-H club that organizes a group to clean up trash along the river near your home. *Move ahead 3 spaces.*

**Citizen**

You're a member of a fishing club. You suggest that your club raise money to put a new fishing pier on a local lake for everyone to enjoy. *Move ahead 2 spaces.*

**Citizen**

You know your shoreline is eroding (washing away) more and more each year. You contact a fisheries manager and work with them to plant native plants along your shoreline to stop the erosion. *Move ahead 3 spaces.*

**Citizen**

You're a city planner and you work with a fisheries manager and a local fishing club to get an aeration system (bubbler) installed on a popular kids' fishing pond in your town. This aeration system will prevent fish kills in the winter. *Move ahead 3 spaces.*

**Citizen**

You go out fishing for walleye and they're biting like crazy! You could take home six fish, but you remember that you have two in the freezer at home. You only take four fish so that you don't go over your total possession limit of six walleye. *Move ahead 3 spaces.*

**STUDENT COPY**

*Weigh Your Fish With a Ruler Chart*

**Why weigh fish with a ruler rather than a scale?**  
 Fish can get hurt when weighed with scales. By using this chart, you can quickly find approximate weight of your fish by measuring it with a ruler or a tape measure.

This chart can be found in the Minnesota fishing regulations booklet available from the Minnesota DNR.



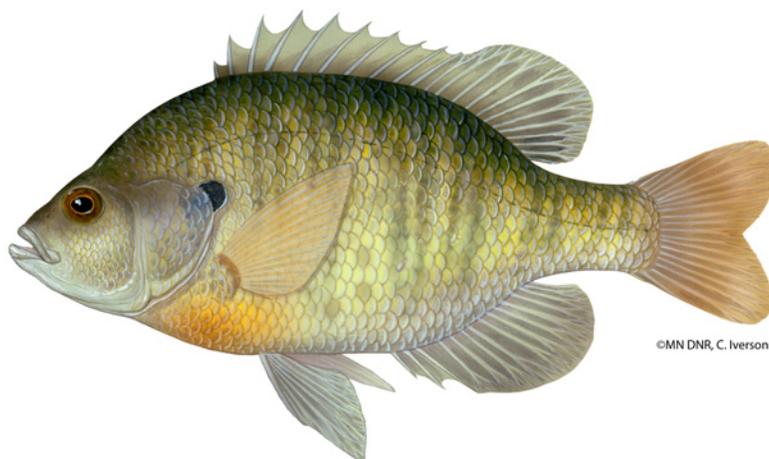
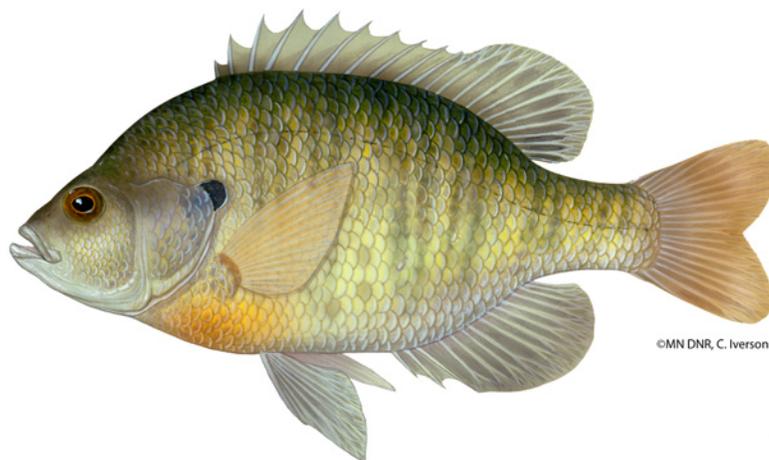
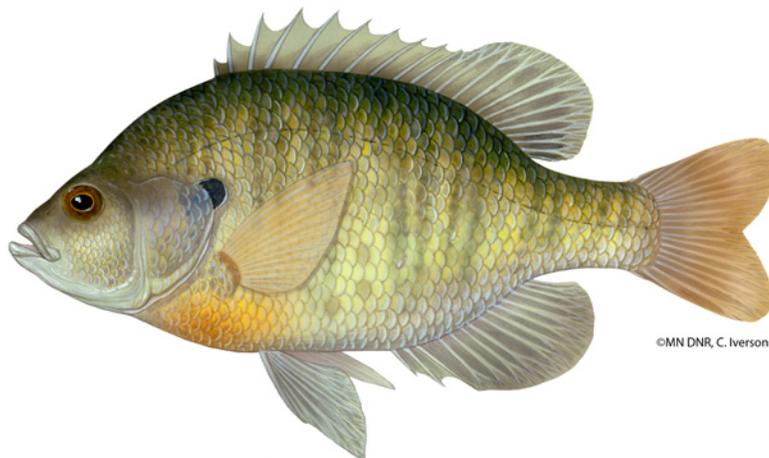
These figures are rough estimates only. Actual weights vary slightly by lake and stream.

Crappie		Trout		Bass		Walleye		Northern Pike		Sunfish	
length (inches)	weight (lbs.)										
8	0.3	8	0.2	12	1.0	14	1.0	24	3.2	8	0.4
9	0.4	9	0.3	13	1.3	15	1.2	25	3.6	9	0.6
10	0.6	10	0.4	14	1.7	16	1.5	26	4.0	10	0.8
11	0.8	11	0.6	15	2.1	17	1.8	27	4.6	11	1.1
12	1.1	12	0.8	16	2.5	18	2.2	28	5.2	12	1.5
13	1.4	13	0.9	17	3.0	19	2.5	29	5.8	13	1.9
14	1.8	14	1.1	18	3.6	20	3.0	30	6.4	14	2.4
15	2.2	15	1.4	19	4.2	21	3.5	31	7.1	15	3.0
16	2.7	16	1.6	20	5.0	22	4.1	32	7.8	16	3.7
17	3.3	17	1.8	21	5.7	23	4.7	33	8.6		
		18	2.3	22	6.6	24	5.4	34	9.4		
				23	7.6	25	6.1	35	10.3		
						26	6.9	36	11.2		
						27	7.8	37	12.2		
						28	8.8	38	13.3		
						29	9.8	39	14.4		
								40	15.6		
								41	16.8		
								42	18.1		

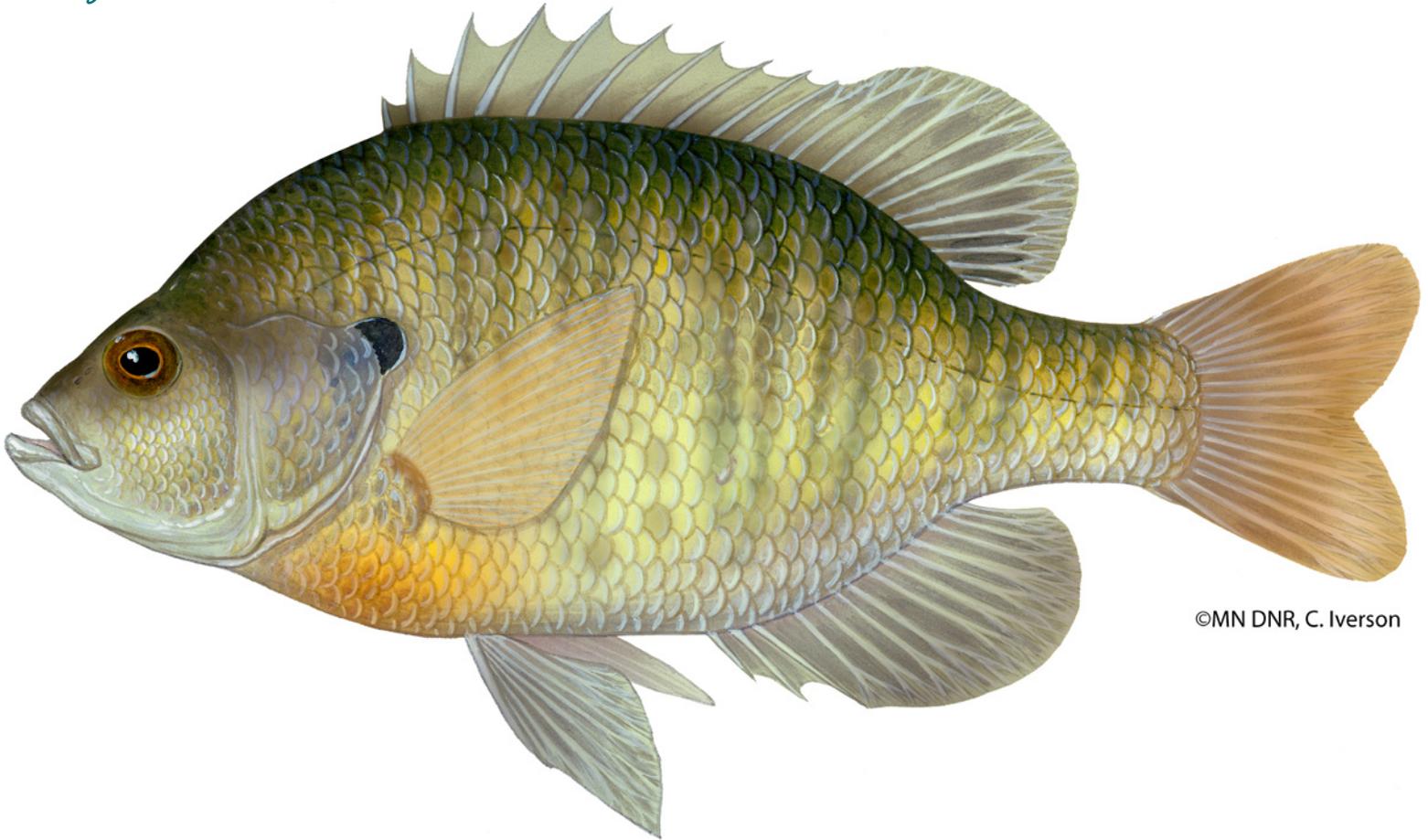
## Size Limit Fish Cutouts

Copy these Size Limit Fish Cutouts, and make one set per group containing:

- three fish less than four inches long
- four fish six to eight inches long
- two fish longer than twelve inches



## Size Limit Fish Cutouts



©MN DNR, C. Iverson

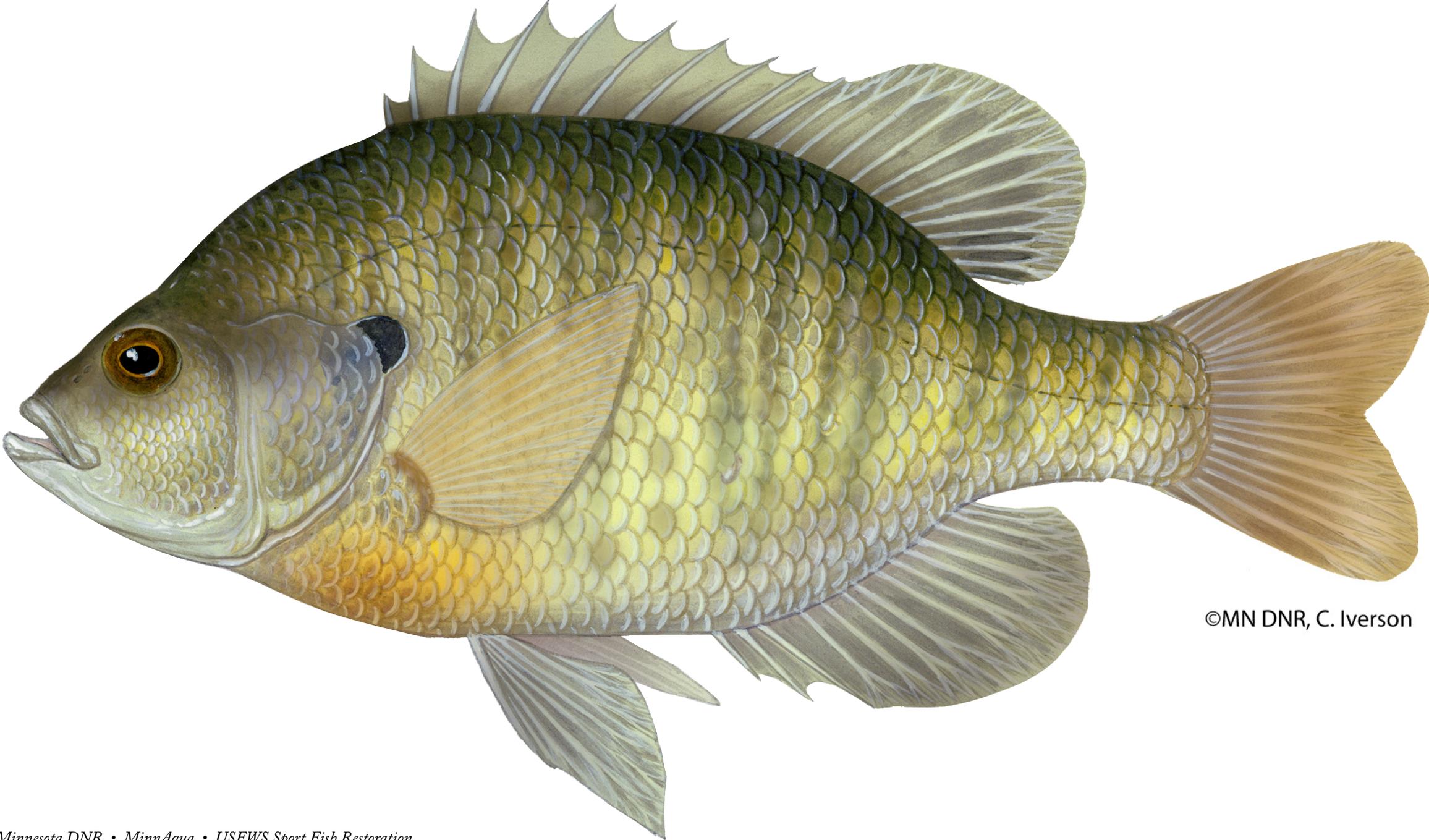


©MN DNR, C. Iverson

*See Size Limit Fish Cutout*



*Size Limit Fish Cutout*



©MN DNR, C. Iverson