Which Fish Is This?

OBJECTIVES: Students will be able to:

- explain how biologists classify organisms into taxonomic groups
- identify fish using a key

METHOD: Students will use morphological characteristics to group unlabeled fish from the order Perciformes into families and present their groupings to the class. Students will check their work using a fish identification website and dichotomous key.

MATERIALS:

1) Fish Wildcards or images of fish from a fish field guide or in Appendix C, to make fish cards (see details below).

2) Fish identification website **wiscfish.org/fishid**

See Appendix C for **Which Fish is This?**
Fish Images and A Key to Common Wisconsin Fish, a dichotomous key to fish. (Laminate the key for outdoor activities.)

PREPARATION: Assemble fish card packs using images of two to five species (except goby) from each of the four Perciformes families found in Wisconsin (Centrarchidae, Moronidae, Percidae, and Gobiidae). (The Esocidae cards are part of the opening, not the main activity.) Each group will have a different assortment of fish. Make sure that none of the images is labeled. Make one pack for every two to three students.

Centrarchidae (Sunfish)

Bluegill *(Lepomis macrochirus)*

Pumpkinfish *(L. gibbosus)*

Green Sunfish *(L. cyanellus)*

White Crappie *(Pomoxis annulari)*

Black Crappie *(P. nigromaculatus)*

Rock Bass *(Ambloplites rupestris)*

Largemouth Bass *(Micropterus salmoides)*

Gobiidae (Gobies)

Round Goby *(Neogobius melanostomus)*

Percidae (Perch)

Iowa Darter *(Etheostoma exile)*

Walleye *(Sander vitreus)*

Sauger *(S. canadense)*

Ruffe *(Gymnocephalus cernuus)*

Yellow Perch *(Perca flavescens)*

Moronidae (Temp. Bass)

White Bass *(Morone chrysops)*

Striped Bass *(M. saxatilis)*

Yellow Bass *(M. mississippiensis)*

White Perch *(M. americana)*

*The underlined species are exotic.

SETTING: Indoors

DURATION: Two to three 45-minute sessions

VOCABULARY: Bag limits, morphology, taxonomic groups, dichotomous key

STANDARDS:
Science: F 8.5, 12.5, 12.6.
Environmental Education: B 8.2, 8.4, 8.8.

BACKGROUND: Charles Darwin and Alfred Wallace both used taxonomic groups to formulate their ideas about evolution and natural selection. By placing organisms in groups based on morphology, these biologists could see shared traits that were inherited from earlier generations. Today, taxonomic groups are established into domains, kingdoms, phyla, classes, orders, families, genera, and species.

Bony fish are in the class Osteichthyes, which contains more than 30 different orders. The order Perciformes (ray-finned fish) is the largest of these orders and can be divided into 156 different families. Within these families are thousands of salt- and freshwater species. Wisconsin hosts four families of Perciformes: Centrarchidae (sunfish), Moronidae (temperate bass), Percidae (perch), and the non-native Gobiidae (goby).

Technology is rapidly improving our understanding of the family trees of species around the world. Scientists are continually dividing and subdividing taxonomic groups as they learn

more about the molecular and cellular structure of organisms and as DNA evidence reveals connections that are difficult to see with the naked eye or even a microscope. Still, the most basic system of identifying an organism—looking at its morphology—is an important tool in all biological studies.

OPENING: Have students read **Which Fish Is This?** in its entirety. Introduce the concept of dichotomous keys with A Taxonomic Grouping of Esocidae. UsePowerPoint or handouts to show images of the musky, northern pike, and grass pickerel. (**See Appendix C**). Review the anatomical parts and terms from the previous lesson by comparing these species, which are all from the same family (Esocidae).

Have students look at body and mouth shape; the number, placement, and shape of fins; placement of the eye; and markings. What do they have in common? How are they different? Have students key out the species using the diagram in their booklets.

MAIN ACTIVITY: Divide students into groups of two or three. Distribute the packs of unlabeled fish images from Appendix C. Give the students 10 to 20 minutes to sort the fish into four families, using their classification skills and knowledge of anatomy. Have them take notes in their booklets about why they are dividing species into the categories they have chosen. If there is time, have them speculate about which of the families are more closely related and what traits a common ancestor might have shared with them. At the end of the small group sessions, have students present their results to the rest of the class.

Next, or in a subsequent class, have students identify their fish to determine if they have appropriately grouped them. Field guides, the dichotomous key, or the Wisconsin fish identification website are possible tools for identifying fish that require students to practice using morphological characteristics. If students incorrectly grouped species, discuss why these species were confusing.

CLOSING: Ask students why anglers should be able to identify fish and what supplies they would need to take on a fishing trip to identify their catch. Students could continue working on their fish profiles.

ASSESSMENT QUESTION: How do dichotomous keys work?

ANSWERS: *Using visual cues, identify a species by working from broad differences to specific distinctions.*

EXTENSIONS:

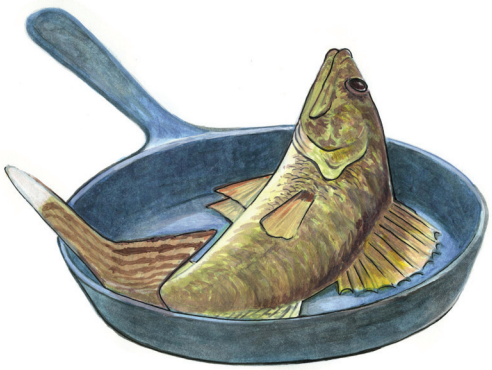
In Depth: Have students create family trees (Family Ties) for other orders of fish.

If you have downloaded this booklet, please see the appendix that follows for additional materials.

Which Fish Is This?

What did you catch? What does it matter, anyway? A trout doesn't care if you call it a trout, a carp, or a muskellunge, but conservation wardens do and so should you.

Many fish are subject to **bag limits** (the number of fish you may catch in a day), while others are superior in flavor, and still others can be unhealthy if eaten too frequently. Legal requirements, taste preferences, and health issues are a few important reasons to learn to identify what kind of fish you've caught. The problem is, anglers, conservation wardens, and scientists may all place different labels on the same fish.



Surely That's a GamePanMinnow-Fish

The easiest way to identify a fish is to place it in a category based on its purpose.

Anglers group fish by taste and how challenging they are to catch. To an angler, a panfish is generally a fish that is edible, fits in a frying pan, and is legal to keep. A game fish is generally any fish that is caught for sport. But, as you can imagine, definitions as broad as these can include many different fish and might mean something slightly different to each person. Ask around: is a walleye a panfish, a game fish, both, or neither?

To avoid confusion, Wisconsin conservation wardens use the following specific description of fish categories.

By Wisconsin law, **game fish** are defined as all varieties of fish except rough fish and minnows.

Rough fish include: dace, suckers, carp, goldfish, redhorse, freshwater drum, burbot, bowfin, gar, buffalo, lamprey, alewife, gizzard shad, smelt, mooneye, and carpsuckers.

Minnows include: suckers, mud minnow, madtom, stonecat, killifish, stickleback, trout perch, darter, sculpin, and all species of the minnow family (except goldfish and carp).

Wisconsin law is simplifying the identification process by calling *all* panfish game fish. This makes it easier to regulate the catch of the most popular species of fish. You might have noticed that the last sentence of the definition above hints of yet another way of identifying fish: by family.

For legal purposes, goldfish and carp are not considered minnows, but scientifically they are. Biologists identify fish by their **morphology** (structure) rather than by their purpose. Scientists use morphology to classify organisms into **taxonomic groups** (groups of closely related organisms) to build family trees and trace the evolutionary history of everything from plants to bugs to fish.

Once a scientist has built a family tree, she can use it to make a **dichotomous** (die-kot-o-mus) **key** (an identification tool). Keys begin with broad differences and work toward specific distinctions.

By scientific identification, no two fish of different structure will have the same name. A brook trout (Salvelinus frontalis) is in a separate taxonomic group from a smallmouth bass (Micropterus dolomieu). Of course anglers and conservation wardens also use this scientific system of identification, but not usually the scientific name.

Bag limits
The number of fish you may catch in a day

Morphology
Structure

Taxonomic groups
Groups of closely related organisms

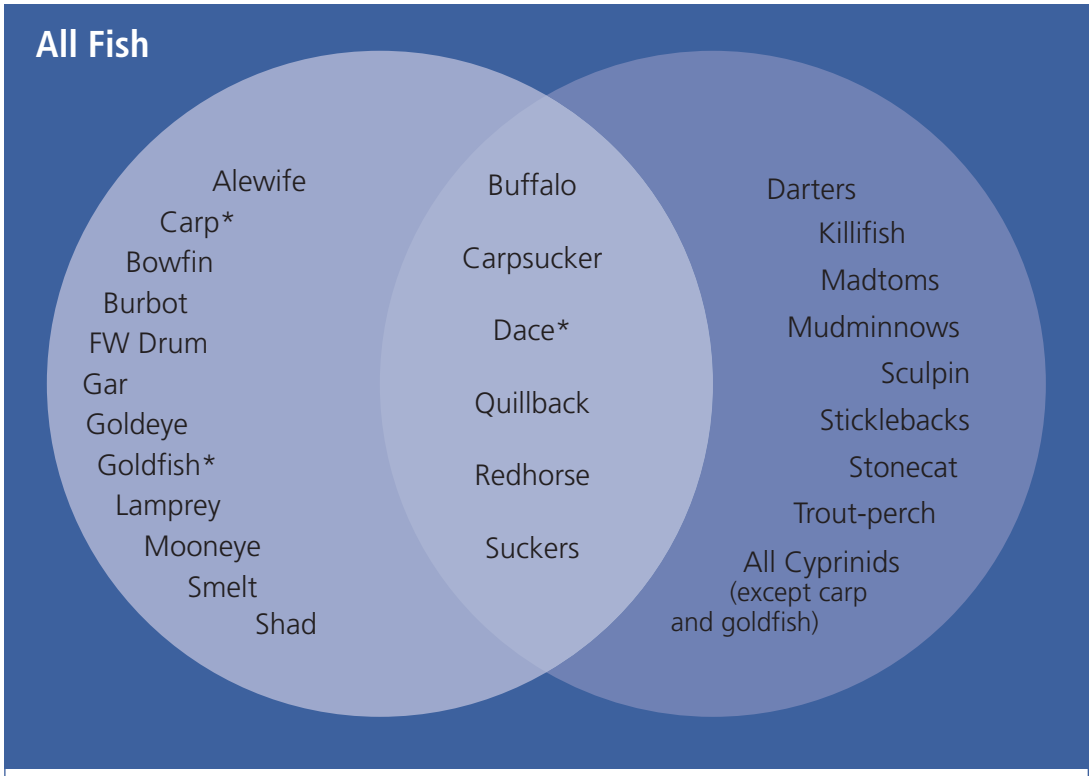
Dichotomous key
An identification tool

PLEASE SEE APPENDIX C
Which Fish is This? A Key to Common Wisconsin Fish

That's Rough

> The term "rough fish" seems to imply that these species have little or no value, but enlightened anglers, biologists, and chefs know better. Rough fish often inhabit a rough neighborhood, the murky bottom, but that doesn't mean they don't taste good. Take a chance and try one sometime!

Game Fish, Rough Fish, Minnows



By state law all fish are "game" fish if not "rough" fish or "minnows." Game fish may not be harvested unless an open season is specified in Administrative Code.

* Taxonomically, carp and goldfish are in the minnow family. Legally, however, they are classified as "rough" fish, but not as "minnows" in Wisconsin. Although dace are also members of the minnow family, legally, they are classified as both a minnow and a rough fish. All members of the sucker family are considered rough fish for legal purposes; they are in the same *order* as minnows. Other fish legally referred to as "minnows," are in several different taxonomic families.

What's That?

What would you expect to see if your friend said, "Hey I just caught an Animalia Chordata Actinopterygii Perciformes Centrarchidae Lepomis gibbosus!"

Your friend caught a pumpkinseed.

A Taxonomic Grouping of Esocidae

Identify this fish using the key below.

1. a. Body lacks large bony plates. . . . . Go to #2

   b. Body has large bony plates . . . . . **Lake Sturgeon** (not in Esocidae family)

2. a. Dorsal fin is short, much less than half the body length . . . . . Go to #3

   b. Dorsal fin is nearly half the body length or longer . . . . **Bowfin** (not in Esocidae family)

3. a. Teeth are visible and sharp . . . . . Go to #4

   b. Mouth is fleshy, teeth are not visible and sucker-like **White Sucker** (not in Esocidae family)

4. a. Tips of tail fin are rounded . . . . . Go to #5

   b. Tips of tail fin are pointed . . . . . **Muskellunge** (Esocidae family)

5. a. Cheek and gill cover are fully scaled . . . . . **Grass Pickerel** (Esocidae family)

   b. Cheek and only upper half of gill cover are scaled . . . **Northern Pike** (Esocidae family)

PLEASE SEE APPENDIX C
What Fish is This? Fish Images

INSTRUCTORS: Underlined content is not provided in student manual.

Family Ties

Construct your own taxonomic groups of fish.