Getting to Know Your Local Fish
Adapted from Ohio Sea Grant's Oceanic Education Activities for Great Lakes Schools

Objectives.
Participating young people and adults will:
1. Develop and use a dichotomous key
2. List general characteristics of fish
3. List distinguishing characteristics of fish families.

Youth Development Objectives
Participating young people will:
1. Enhance ability to acquire, analyze and apply information
2. Develop analytical skills
3. Develop/enhance communication skills and working with others
4. Enhance enjoyment of fishing and other aquatic resource related outdoor recreation

Roles for Teen and Junior Leaders
!. Assist with preparing materials (making fish cards)
2. Assist members with sorting and key construction
3. Share how important it is to correctly identify fish

Potential Parental Involvement
1. See ARoles for Teen and Junior Leaders@ above.
2.

Evaluation Activities/Suggestions

Best Time: after basic fish biology activities: fish prints, etc., before fishing trip and/or aquatic sampling trip.

Best Location: Indoors, outdoors with picnic tables

Time Required: Part 1 20-30 minutes, Part II, at least 30 minutes. May be conducted over two separate meetings.

Equipment/Materials
For Demonstration: Several pieces of one of the following:
- fruit (apples, oranges, etc.) writing instruments
- music cd=s

easel pad & markers or chalkboard and chalk

Enough for Each Group
- Photos or illustrations of fish native to area
- Information about the fish families
- Paper and pencil
- Assortment of different shapes of pasta or assortment of nails and screws.
- Any or all References listed below or other source of information on local fish

1. Youth should demonstrate the use of their key
2. Each group should be able to switch keys and items, and the keys work with other groupsBthe keys are not dependent on who does keying
3. Brainstorm characteristics of all fish
4. List different families of fish found locally.

Safety Considerations
If fasteners are used, caution should be exercised with nails and screws

References

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Lesson Outline

Presentation **Application**

I. Definition of a Key

A. Make one of two choices

B. Sort into smallest possible groups

Introductory Activity

EXPLAIN that scientists use tools called keys to identify things. These keys are made up of a series of questions with two choices, with each choice leading to another question. The choices are often based on characteristics of the things being sorted. Ultimately the choices end with the things being sorted down to the smallest groups, usually toB*species.* **EXPLAIN** that a key can be constructed to sort anything.

II. Classify familiar things

A. Start with largest group

B. Look for small differences so can be sorted into two groups.

C. Identify characteristics for each smaller group that allows for further sorting.

D. Continue sorting until items can=t be sorted any further.

E. Write steps down as questions with two choices or flow chart or tree.

DEMONSTRATE how a key works with the demonstration items (in this case we will use fruit).

All these items are fruit.

1a. Eat the skin go to 2

1b. Peel the skin go to 3

2. Seeds in core or covered by hard case-- APPLE

3. Seeds not in core or hard caseBORANGE

WRITE these questions/choices on easel pad/blackboard. A tree diagram can also be constructed (this may be easier)

EXPLAIN THAT THE GOAL OF BUILDING A KEY IS TO SORT ITEMS UNTIL THEY CAN=T BE SORTED ANY FURTHER.

EXPLAIN that they will construct a key to sort out common things (nails or pasta). **DIVIDE GROUP** in smaller groups of four or five. **PROVIDE EACH GROUP** with collection of items to sort & construct key with, paper and pencil.

DIRECT each group to prepare a key using sorting and grouping techniques based on characteristics of the items they are sorting. **LET THE GROUPS GET STARTED, THEN STOP THEM AFTER A FEW MINUTESBMAKE SURE THEY ARE USING TERMS THAT ARE UNIVERSAL OR WELL DEFINED.** ***For example: colors, sizes, shapes.***

EXPLAIN that scientists use a common set of termsBtheir own languageBeveryone using the key will know what the characteristics mean.

II. Classify familiar things

A. Start with largest group

B. Look for small differences so can

be sorted into two groups.

C. Identify characteristics for each group that allows for further sorting.

D. Continue sorting until items can=t be sorted any further.

E. Write steps down as questions with two choices each or as tree with two branches each

Listed below is a sample key for fasteners (nails and screws)

Fasteners

1a. Has head and smooth shank go to 2
1b. Has threads go to

2a. Head is twice as big as the shank go to 3
2b. Head is less than twice as big as the shank go to

3a. Shank is less than 1" long shingle nail (roofers nail)
3.b Shank is longer than 1" common nail

4a. Made of galvanized metal or coated galvanized finishing nail
4b. Not made of galvanized metal or coated finishing nail

III. Keys should be universalBothers can use and sort into same smallest groups.

Pasta Example:
1a. Hollow go to---.2a
1b. Not hollow go to---.3a

2a. Objects with a bend.....elbow macaroni
2b. Objects without a bend.....rigatoni

3a. Thin and round.....spaghetti
3b. Flattened go to-----4a

4a. Long and wide.....lasagna noodle
4b. Short and narrow.....egg noodle

IV. Things to use to classify Fish

A. All Fish Have

1. Backbones
2. Scales or plates
3. Slimy skin
4. Fins
5. Gills
6. Live in water
a. freshwater
B. saltwater

DIRECT GROUPS to switch keys and mixed up items with other groups. Other groups should be able to **SORT** items using key into the same smallest group. Once all groups are finished **DIRECT ONE GROUP TO SHARE AND DEMONSTRATE THEIR KEY.**

B. Fish characteristics

1. Color pattern
a. stripes

b. spots
2. Fin arrangement
3. Body shape
a. streamlined
b. flattened

EXPLAIN that they will now make a key for fish found in their area.
BRAINSTORM characteristics that all fish have. The attached glossary and references can provide youth with source of this information. **LIST** other features or characteristics that they can use to sort and classify into smaller groups

V. Group sorts fish illustrations/photos

A. First level

B. Second level

C. Additional levels as needed

DISTRIBUTE FISH CARDS, PHOTOS OR ILLUSTRATIONS and glossary. Be sure that each in the group gets a good look at the fish.

1. **GROUP DECIDES HOW BEST** to divide the fish into two groups based on one characteristic. **GROUP SORTS** fish pictures into two piles according to that characteristic. **WRITE THAT CHARACTERISTIC**, which will be the first question on their key, or branch on the tree. On line 1a and 1b fill in the characteristic and the next step to identification.

2. Next, take the fish from one pile and divide them into two more piles and fill in the key with 2a and 2b or two additional branches. Continue dividing until remaining fish can=t be sorted any further.

3. Have the youth check their keys when they are finished. They should be able to pick up any fish picture and follow the key to find the name of the fish. For the key to be correct, this should work with all the fish in the group's pile. (Keys may differ from group to group, but as long as it works within the group for all the fish, it should be correct.)

4. Groups may exchange their keys and set of pictures, but ask the youth not to turn the cards over until they have identified the fish and want to check their answer. See if others can identify the fish using only the descriptions in the key.

5. From their dichotomous keys, the youth will be able to see the major characteristics that help in identifying fish. They will also be able to see similarities between fish and this will help them to group the fish according to family.

6. By looking back through the steps used to key out an item, you can get a list of the item's characteristics. From the example above, the egg noodle is described as not hollow, flattened, short and narrow. This is easily done by looking at the set of choices and writing down the one that is true for a specific item. Follow the numbers through the steps they will be able to do later in the evaluation chart and continue writing down characteristics true to the item until you reach the identification stage. Explain and practice this with the youth so.

7. Now pass out the information about fish families. Have the youth first physically group the fish cards by family, then develop another key to identify fish families. Again, for the key to be correct, the key will have to work for all fish in the family. Finally, groups may exchange keys and fish cards to test each other's keys.

Lesson Narrative

Background:
Scientists use keys to identify things and put them in groups based on how they are alike. This activity will introduce youth to a dichotomous key. In dichotomous keys, things are divided into two groups each time a characteristic is considered. This concept is sometimes difficult for youth to grasp. It is most easily conveyed by having the youth physically group the items as they are discussed. Begin by choosing one characteristic that will be represented by two piles -- items that have this characteristic and items that do not. Separate one of the piles into the same type grouping as the original and keep subdividing the pile until all of the items have been identified. Then go to the second pile and do the same thing, all the way down to the identification stage. Many variations are possible when developing a dichotomous key. The best way to check your key is to give it to someone else, along with one or more items, and have that person identify the item(s) using the key. By looking back through the steps used to identify an item, you can get a list of the item's characteristics.

Dichotomous keys can be used to classify anything. Youth will have the opportunity to construct a key that classifies a variety of fish and then a key to identify fish families of local area. All fish are alike in some ways. All fish have gills and scales (with a few exceptions). Fish differ from each other in several characteristics: head shape, spines, number and placement of fins, and fin types. Color is not a good distinguishing characteristic because it will vary with changes in the physical or physiological state of each fish, or with environmental changes. Youth may need to be reminded of this often since it is a very popular way of grouping things. The pictures, descriptions and glossary of distinguishing characteristics are included to help with developing a key and identification.

Sixteen families of fish are typically recognized in local area.

1. Sturgeon family – Acipenseridae
   Upper lobe of the tail fin is longer than the lower. Five rows of bony plates shield the body. A shovel-shaped snout and sucker-like mouth with four barbels in front of the mouth aid in locating food. Fish of this family in local area are shortnose sturgeon, lake sturgeon and Atlantic sturgeon.

2. Gar family – Lepisosteidae
   The upper and lower jaws form a long, slender snout. The body is covered with thick bony scales. These fish range from 30 - 50 inches in length. Fish of this family in local area are longnose gar and spotted gar.

3. Bowfin family -- Amiidae
   The body is covered with heavy scales. The single long dorsal fin is separated from the broadly rounded tail fin. A pair of short barbels are found in the nostril area. The fish of this family in local area is bowfin.

4. Herring family -- Clupeidae

These fish have mid-belly scales that are sharpened in "saw-tooth" arrangements. There is no lateral line along the sides. The body is compressed from side to side and is very narrow when look at from head on. These fish have bright silvery scales.

5. Trout and salmon family -- Salmonidae

These fish have an adipose fin, small scales, a squarish or forked tail (depending upon the species), and an axillary process at the base of the pelvic fins.

6. Smelt family -- Osmeridae

These fairly small fish may grow to be 9 inches long, have an adipose fin but no axillary process, have large silvery scales, a large mouth with strong teeth and a slender body. The fish of this family in local area is rainbow smelt.

7. Pike family -- Esocidae

Local area is the only place in the world where all members of the pike family can be found. They have a duck-bill snout and a single dorsal fin placed far back and above the anal fin, with a forked tail. Fish of this family in local area are northern pike, muskellunge, tiger muskellunge, chain , grass and redfin pickerel.

8. Minnow family -- Cyprinidae

Fish from the minnow family make up 25 percent of our total fish fauna by species in local area. They have a single, soft-rayed dorsal fin and several rows of hard teeth (or tooth-like structures) found on the hindmost gill arches. They are important food for many larger fish. Fish of this family in local area are common carp, river chub, golden shiner, common shiner, creek chub, and fallfish.

9. Sucker family -- Catostomidae

A single soft-rayed dorsal fin, single row of teeth, and an anal fin placed farther back on the belly than on minnows is characteristic of fish in this family. They also have a mouth that is directed downward, thick fleshy lips, are robust and of moderate size. Fish of this family in local area are quillback carpsucker, white sucker, hog sucker, and redhorse sucker.

10. Catfish family -- Ictaluridae

These fish have well-developed pectoral spines, an adipose fin directly joined to the tail fin or not connected (depending upon the species), eight flashy head appendages (barbels, or "whiskers"), and a well-developed spine in t he dorsal fin. Fish of this family in local area are white catfish, channel catfish, brown bullhead, black bullhead, yellow bullhead, and flathead catfish.

11. Temperate bass family -- Percichthyidae

Members of the temperate bass family have a spine on the outer rear portion of the gill cover, and a conspicuous patch of gill-like, secretion-emitting tissue found under the surface of the gill cover. Fish of this family in local area are white perch, white bass, striped bass (rockfish), and striped bass hybrid.

12. Sunfish family -- Centrarchidae

These fish have a single dorsal fin composed of soft and spiny rays and have three or more spines in the anal fin. They lack a spine on the gill cover. Fish of this family in local area are largemouth bass, smallmouth bass, spotted bass, rock bass, redbreast sunfish, green sunfish, pumpkinseed sunfish, bluegill sunfish, redear sunfish, white crappie, and black crappie.

13. Perch family -- Percidae

These fish have one or two spines in the anal fin. The majority of the species in this family belong to a group called darters which are important as forage for other fishes and as water quality and habitat indicators. Local area has at least 18 species of darters. Yellow perch and walleye are highly regarded for their sporting and eating qualities.

Fish of this family in local area are yellow perch, walleye, sauger, and darters.

14. Drum family -- Sciaenidae

The freshwater drum is the only representative of a large group of marine species found in temperate and tropical coastal waters around the world. The spiny and soft-rayed portions of its dorsal fin are narrowly joined. The soft-rayed portion of the dorsal fin is much longer than the spiny-rayed portion and the lateral line continues to the end of the tail. The first anal spine is very small and the second very large. The only fish of this family in local area is the freshwater drum.

15. Sculpin family -- Cottidae

Members of this family have large, flattened heads and large pectoral fins. The body is largely scaleless with some scattered areas having small, sharp scales called prickles. Fish of this family in local area are mottled sculpin and slimy sculpin.

16. Freshwater eel family -- Anguillidae

Very long and slender bodies are characteristic of this family. Also, minute scales embedded in the skin, no pelvic fins, and the dorsal fin co anal fin. The only representative of this family in local area is the American eel.

Glossary

adipose fin -- small, fleshy fin on the back and near the tail of certain fishes.
anal fin -- single fin on underside of fish between the vent and tail.
axillary process -- elongated, membranous material occurring at base of pectoral and pelvic fins.
barbel -- slender, fleshy projection on the head, usually around the mouth.
bony plates -- hard, heavy scales.
caudal fin -- tail of a fish.
dorsal fin -- fin on the back of a fish; bay be divided into parts on some species.
fauna -- animals living in a particular area.
gill arches -- bony structures that give internal support to the gills.
gills -- organs through which oxygen is absorbed from the water; protected by gill cover.

lateral line -- line of scales running lengthwise on each side of a fish with openings or pores connected to a sensory canal.
pectoral fin -- uppermost fins on either side of the body and usually just behind the gill.
pelvic fin -- fins on either side of the body, below and often behind the pectoral fins.
ray -- bony structure supporting the membranes of the fin.
soft-ray -- flexible, jointed rays supporting a fin.
spine -- sharp, pointed structure.
spiny-ray -- stiff, hard and unjointed bones supporting a fin.

Exhibit or Sharing Suggestions

1. Gather photos and create a poster or display
2. Have youth demonstrate the construction and use of a key

Community Service and AGiving Back@ Suggestions

1. Create bulletin board or display for local bait and tackle shops, to assist anglers with fish identification, especially fish that are hard to identify, and identification is important.

Extensions or Ways Of Learning More

1. Using the same techniques, sort aquatic insects collected in AAquatic Adventures@ activity
2. Create keys and laminate or put in sheet protectors. Use these keys when fishing to assist with fish identification.
3. Invite a biologist to speak on how keys are used in their occupation.