Dissect a River
Ontario Ministry of Natural Resources, *Fishways*

Objectives
Participating young people and adults will:
1. Isolate and order any stream or river system in their state or local area.
2. Predict the characteristics along various parts of a stream
3. List at least two human impacts affecting river systems.

Youth Development Objectives
Participating young people will:
1. Enhance ability to acquire and analyze information.
2. Enhance ability to work with others.
3. Enhance problem solving skills.

Roles for Teen and Junior Leaders
1. Assist with mapping activity
2. Assist with gathering materials

Potential Parental Involvement
1. See "Roles for Teen and Junior Leaders" above.

Evaluation Activities/Suggestions
1. Given a map of a simple watershed, have youths order the streams and give a brief description of each order.
2. Predict features of a stream or river, just by knowing its stream order

Best Time: after build a watershed activity, prior to fishing river or stream

Best Location: Indoors, outdoors with picnic tables

Time Required: 60 to 90 minutes

Equipment/Materials
State road map;
colored pencils.
local topographic or county maps (usually
available from County Extension, Conservation District) especially those with local/regional major streams/rivers etc.
tracing paper
tablet paper
pencils
easel pad
markers
masking tape

Safety Considerations

References
Caduto, M. J., 1985, Pond and Brook: a Guide to Nature in Freshwater Environments, Prentice Hall, Englewood Cliffs NJ
ISBN 0-87451-509-2

3. Prepare a chart of major stream orders with features and critters likely to be found there.

Schmidt, B, 1991, Sportfishing and Aquatic Resources Handbook, pp 43-44, 48-55, 72-73, Kendall Hunt Publishing, Dubuque IA
ISBN 0-8403-6599-3

Schmidt, B, 1997, Advanced Sportfishing and Aquatic Resources Handbook, pp 99-101,107-108, Kendall Hunt Publishing, Dubuque IA. ISBN 0-7872-3544-x

University of Wisconsin, *Give Water a Hand,* 1996, Madison WI

Lesson Outline

Outline	**Presentation**
I. IntroductionBtypes of flowing water **A. Brooks** **B. Creeks** **C. Streams** **D. Rivers** **1. small rivers** **2. Large rivers**	1. Have youth **BRAINSTORM AND DISCUSS** all the flowing that they=ve seen (that is, creeks, streams etc.). **LIST** these water bodies. What do they have in common? How do they differ? **ASK YOUTH** if these descriptions be organized in any way? Do the same For example, do similar sized streams have similar characteristics?
II. STREAM ORDER--Standard system for numbering/classifying streams **A. Stream order** **1. FirstBheadwaters** **2. SecondBform when two 1's join** **3. ThirdBtwo 2's join** **4. Fourth-two 3's join** **5. Fifth-two 4's join**	2. **EXPLAIN** that, for scientific purposes, a numerical system has been devised to standardize the various components of a moving water system. This numerical system allows scientists to roughly determine the types of fishes that may inhabit that environment. **DISCUSS** the characteristics (water temperature, volume, velocity, bottom type, channel width, community members, fish species, etc.) that might change as the stream order increases from the headwaters to the mouth of the river. **EXPLAIN** that the majority of trout streams are first or second and in some parts of the country, third order streams.
B. Changes occur as stream order increases. **1. Amount of water increases** **2. Water temperature increases** **3. Fish community changes** **4. Channel changes**	3. **DIRECT** youth to devise their own technique for ordering streams or you may follow this approach. **DISCUSS** the system of stream ordering by having the class build a simple river system. **REFER BACK TO WATERSHED ACTIVITY** to refresh their

memories. Using the blackboard or chart paper, **ASK FOR A VOLUNTEER** to draw two first order streams, which join to form a second order stream and label each. Then ask a second youth to draw a similar configuration and link it to the first to create a third order stream - and so on until a fourth or fifth order stream is reached. When this river system is complete, they should realize that the land the river system drains slopes downhill from a divide (highest points) as the stream order increases, creating a drainage basin or watershed. Draw a line around the river system and label it as the watershed.

III. MAPPING ACTIVITY

A. FIND local community on state map

B. IDENTIFY local waterways

4. **DIVIDE** the class into small groups and give each group a state road map, sheet(s) of tracing paper, and topographic map. **DIRECT** youth to find their own community on the map and find the nearest river system. Have youth find their watershed, using the road map for guidance.

Note: The youths= local community may be part of another drainage system but the river closest to their community on topo maps available should be selected.

III. MAPPING ACTIVITY continued.

A. Mark highest points (from contour lines)

B. Streams and rivers, color coded by stream order

C. Points of human impact

5. **TAPE** the topographic map to the desk or table. **PLACE** tracing paper over topo map and tape it into place.

6. **EXPLAIN THAT THEY ARE TO MARK THE FOLLOWING ON THE TRACING PAPER,** using a different color for each:

a. Highest points surrounding the river/stream (determined from contour lines) they made some assistance on this task.

b. All the streams and rivers, using the same color for each stream order (red-first, blue-second etc.)

IV. DISCUSSION SESSION

c. Major points of human impact (e.g. industrial plants, cattle crossing or watering locations, stream improvement projects, storm sewer outlets)

Once the exercise is complete, discuss the following questions with the class:

Could we identify fishing spots from these maps?

As the stream order increases, would humans= impact on the river system tend to increase or decrease?
What effect could this have on the local fish community?
Is there evidence of these effects near your local community?

Lesson Narrative

River, stream, freshet, creek - there are many names for flowing water. Some, like creek and brook, are used interchangeably; others have unique specific meanings. Scientists generally refer to smaller bodies of flowing water as streams and larger ones as rivers. The area of land from which rainfall and melted snow drain into a particular stream or river is called its watershed. The high ground separating watershed is called a divide. Every place on earth is part of some watershed. Every watershed reflects the land it drains. The quality of water within a watershed and the species of fishes that can be found within its boundaries are directly linked to the quality of the land and any use it is put to by humans. As streams join other streams, a branching network, or river system, forms.

Stream ordering is a way of indicating in numerical terms the relative position of a stream within a much larger river system. Headwater streams that have no tributaries or branches are called first order streams. They usually begin from cool springs arising in a hillside or wetland, or as an outlet from a lake or pond. First order streams are usually narrow, shallow and steeply graded; they may have grasses, shrubs or trees lining their banks, shading the stream from the sun and keeping the water cold. They may flow quickly, scouring the bottom of all but rocks and large particles of gravel, and are often inhabited by cold-water loving fish species such as trout.

When two first order streams join, a second order stream is formed. Similarly, a third order stream is created by the joining of two second order streams, and so on. Where two streams of differing orders meet, the downstream portion retains the higher of those two orders. For example, second and third order streams would join and form a third order stream.

When does a stream become a river? Most scientists feel that a third order stream can be classified as a river. The volume of water in a river is much greater than that of a stream and often a valley has been cut or eroded by a river=s flow. The rate of flow in a river is usually much less than in a stream. The flood plain, or land periodically flooded by a river, becomes flatter, and silt and sand eroded upstream are often deposited on the bottom of the river bed as the river slows. The river=s water tends to be turbid because of the suspended particles of clay, silt, finely divided organic and inorganic matter, etc. It is also often warmer from exposure to the sun and frequently contains less oxygen. Fish species like carp, walleye, brown bullheads, channel catfish and lake sturgeon, which have adapted to warmer water and more turbid conditions, tend to inhabit these warm water rivers.

A river goes through a number of changes from its headwater source to its mouth where it empties into a large body of water such as a lake. Similarly, the character and quality of its fish community may change as the stream order changes and as human activity within the catchment changes.

Exhibit or Sharing Suggestions

1. Draw maps of watersheds
2. Build more detailed models
3. Write essay or short narrative on path of a single raindrop beginning as it falls and moves through the watershed.

Community Service and "Giving Back" Activities

1. Label street storm drains with message reminding citizens where water goes.
   Example: *This water goes to the ___ river.*

Extensions or Ways of Learning More

1. Contact the local water authority, watershed association, or river basin commission and request information on their watershed management and protection programs.
2. Visit the sites mapped for what map makers call ground truthing. Were the discussions and predictions accurate?

Links to Other Programs

Fishing Skills: identify potential hotspots, those places that likely have good habitat for the fish being sought.