UNDERSTANDING YOUR ESTUARY
Level IC-MAPPING THE ESTUARY'S WATERSHED

Topo map showing the Fish Creek Estuary, Ashland, WI.

GOAL
To understand that the health of estuaries is dependent on the quality of water flowing into them from the entire watershed and that the primary sources of pollution come from "non-point" sources.

OBJECTIVES…students will:

1) Create a **MASTER ESTUARY MAP** of the adopted estuary's watershed

2) Explain how health of an estuary is dependent on the quality of water that drains into it from a much larger area of land called a watershed

3) Identify potential sources of non-point pollution within the watershed and understand the connection between upland uses and the estuary's water quality

SETTING
Classroom

MATERIALS
- USGS Topographic map of the estuary and surrounding geographic area *(Topo maps are available from The Wisconsin Geological and Natural History Survey at 608.263.7389 for a small fee).* Be sure the map is large enough to show the entire watershed drainage basin from upland areas to the mouth of the estuary where it meets the Lake.
- A clear sheet of mylar plastic to cover the map(s)
- A piece of cardboard as big as the map(s)
- Thumbtacks, lots of colored markers
- Optional: land use maps of the watershed (available from County or Municipal Land & Zoning Depts).

BACKGROUND
A watershed is an area of land where all water drains or "sheds" to the same river or lake. Estuarine watersheds are geographical areas where the water draining off the land flows into a river(s) that forms an estuary at the point where it meets and flows into a Great Lake.

The health of an estuary is dependent on the quality of water that flows into it. Every drop of water that falls within an estuarine watershed boundary, eventually ends up in the estuary and the Lake.

A great interactive tool for finding a watershed or creating a map, visit:
http://cfpub.epa.gov/surf/locate/index.cfm

ACTIVITIES
Mapping The Estuary's Watershed:

1. Secure a clear sheet of mylar plastic over the topo map(s) that show the estuary and tack it on to the cardboard.

2. Find the place where the estuary meets the Lake. Place a blue dot at this point on the mylar. Print the estuary's name in near its mouth with the Lake. Print the name of the Great Lake in the appropriate location on the map.

Your estuary's watershed will be within on of these larger watersheds or "basins".

3. Find the major river(s) that drains into the estuary. With a blue marker, trace the course of the main river flowing into the estuary upstream until you find its "source" on the map. Put an X on the highest point of land near the source. If the river has other branches or rivers flowing into it, trace these upstream to their source. Put X's on the highest points of land near the upper ends of these rivers. Label the names of each of these rivers.

4. On the plastic overlay, find and label the location of communities, major highways, and your school in a different colored marker. If you have land use maps available, draw in the general location of these land use types: agricultural lands, forested lands and wetlands.

5. Using a black marker, connect the X's and to create the boundaries of the estuary's watershed.

6. Within the watershed draw arrows to indicate the flow of water through the watershed to the estuary.

> Tip… Think like water. Water always flows downhill. It always takes the easiest path. The contours lines on the topo map show high points of land and low spots. Water will always flow from a higher point to a lower.

7. All of the water that falls within the boundaries marked by the X's will eventually flow downstream to the estuary and to the Lake!

8. Label your map with the name of your estuary followed by the word WATERSHED (for example: Fish Creek Watershed which is part of the larger Lake Superior Watershed).

This map will become the MASTER ESTUARY MAP that will be used for future investigations.

FOLLOW-UP ACTIVITY: LAND USE AFFECTS THE ESTUARY

Divide students into groups according to different land uses that are occurring within the watershed. Using the **MASTER ESTUARY MAP** have students investigate the general location of different land uses on the watershed map. Ask them to brainstorm how different land uses could contribute to non-point pollution entering the watershed and how each could affect the estuary and the Lake (a tickler list to get them started can be found below).

What actions could be taken to help prevent each cause of non-point pollution they've identified?

SOURCES OF NON-POINT POLLUTION

> Non-point pollution is pollution you can't point to! It does not come from a single, definable source like a smokestack or a pipe, but comes from general human action. Of all the pollution affecting the Great Lakes, 90% comes from non-point sources.

Communities or "At Home"

Sources of non-point pollution:
Excessive use of lawn and garden fertilizers, failing septic systems, improper disposal of household chemicals and hazardous wastes, improper disposal of pet wastes, erosion from new home construction.

> Communities and homes can be a significant source of non-point pollution.
> Test how well are you and your family preventing pollution at home.
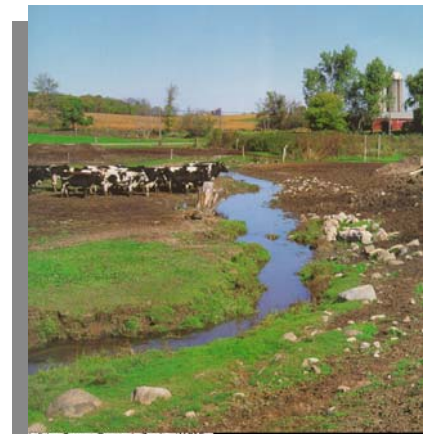> Take a quiz at http://www.epa.gov/adopt/patch/dosdonts.html and find out.
> What can you do to keeping non-point pollution spreading from your home to the waterways and estuaries?

Agriculture

Sources of non-point pollution:
Pesticide use, soil erosion off of farm fields, improper animal waste disposal

Improper animal waste disposal is a source of non-point pollution

Roads
Sources of non-point pollution:
 excessive use of road salt, gas or oil spills

Forests
Sources of non-point pollution:
Soil erosion from run-off from logged areas

Industry
Air pollution, chemical spills

Spills of industrial chemicals can pollute rivers and flow downstream to threaten estuaries

Soil sediment eroding off upland areas (visible as a red color in the Lake) is a type of non-point pollution that affects water quality in the Fish Creek Estuary and Lake Superior's Chequamegon Bay.