

WETLANDS — A 4-H Marine Science Project

INTRODUCTION

This is a special project designed for youths interested in learning-doing marine science activities that can help the environment. In fact, ANYONE CAN TACKLE THIS PROJECT AND LEARN HOW TO HELP THE ENVIRONMENT.

The project is arranged to give some basic information about wetlands with one or more activities for each of the six sections.

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HIGHLIGHTS OF PROJECT ACTIVITIES

- Activity 1
(page 5) **MAKE YOUR OWN WETLAND**—Demonstrate how wetlands are formed and show their unique properties. Use 4 jars with varying amounts of different soils, organic matter, and water.
- Activity 2
(page 5) **WETLANDS NEED WATER**—Add varying amounts of water to 4 more jars with similar soils with added peat moss or other organic matter. Note: Save jars for Activity 7.
- Activity 3
(page 6) **TYPES OF WETLANDS**—Inventory wetland types in your community. Identify at least 4 types.
- Activity 4
(page 8) **LIFE IN A WETLAND SOIL**—Investigate the life forms in a wetland soil and observe the activity of some of the organisms.
- Activity 5
(page 11) **HIDE AND SEEK**—Demonstrate the value of wetlands to wildlife. Set up an aquarium and show how animals use wetlands for protection.
- Activity 6
(page 11) **EAT A CATTAIL**—Eat a cattail (plant)—product of wetlands. Learn how to prepare it, and share it with your friends.
- Activity 7
(page 14) **DESTRUCTION OF A WETLAND**—Use your jars from Activities 1 and 2. Demonstrate what happens to wetlands when they are drained. Stop watering. Add sand to jars and show how “filling” changes the wetland. Note: You may also demonstrate what happens to toxic materials in a wetland by adding indigo dye or food coloring to some “wetland jars.”
- Activity 8
(page 16) **GUEST SPEAKER**—Help preserve, maintain, and develop wetlands in your community. Take action. Work for EQ (Environmental Quality).

“Wetland Conservation” is the wise use of our wetlands. It includes the preservation, the maintenance, and development of wetlands for a quality environment.

SECTION I

WHAT IS A WETLAND?

Michigan's wetlands teem with life and support many animals and plants that cannot live in any other environment.

More than twice as many threatened or endangered species are associated with our wetlands than are associated with any other habitat.

QUESTION:

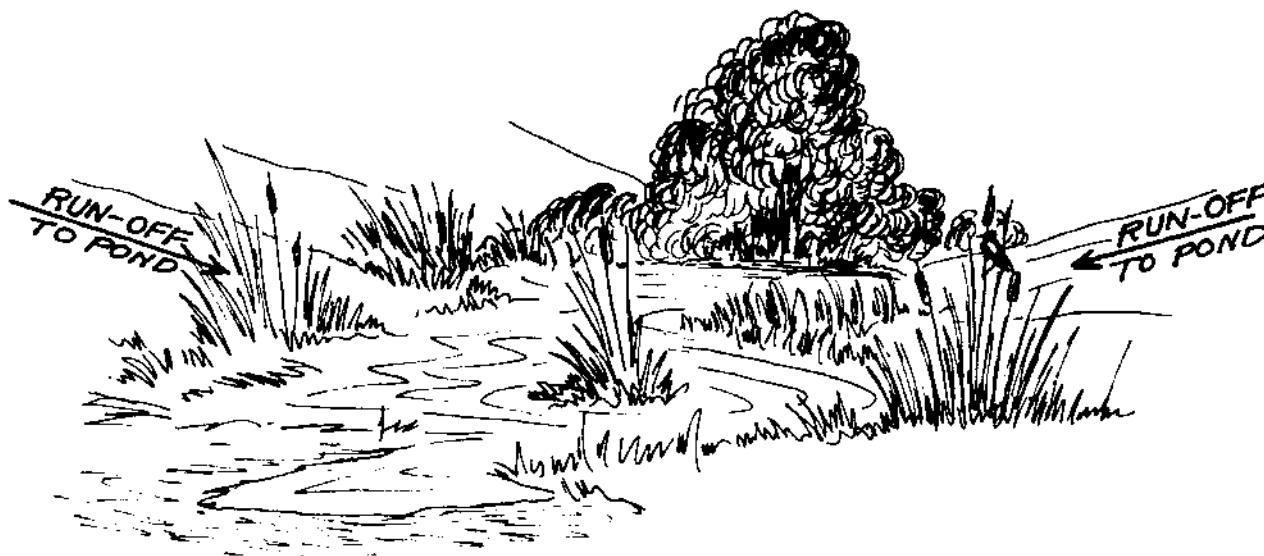
What do you think a wetland is? Can you define a wetland?

ANSWER:

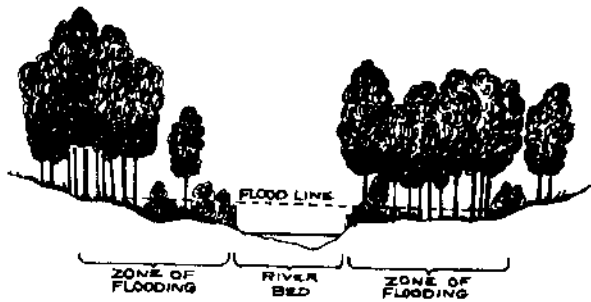
In simplest terms, a wetland is land which is wet all or part of the time and supports the type of vegetation or aquatic life that requires **wet** or **seasonally wet** conditions for growth and reproduction.



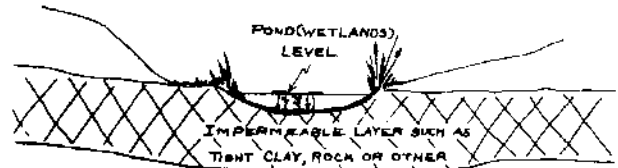
Generally, wetlands develop when water is a dominating factor, such as when all the surrounding land slopes toward a basin or low area so that water funnels into it;



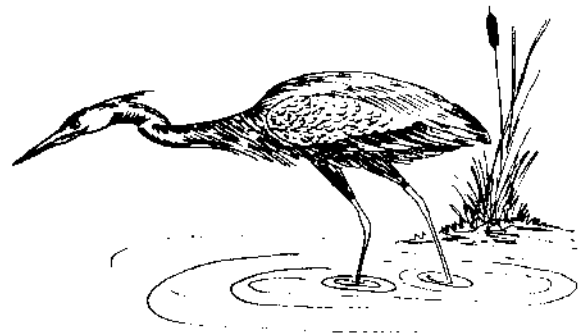
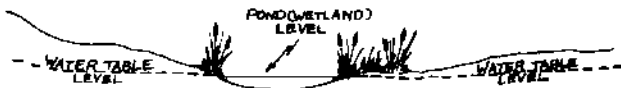
Or the land is flat and adjacent to a lake or river so that the land is covered during floods;



Or when the soil types prohibit the water from seeping into the ground.



Or when the water table occurs very near or above the surface;



DISCUSSION:

Discuss river areas you know either in Michigan or in other states where annual flooding has caused damage to homes and other property and what can be done about this problem.

OPTIONAL:

Select as a subject one or more of the bad floods that have plagued the nation, and discuss how man's activities may have contributed to the(se) flood(s).

Activity 1 — MAKE YOUR OWN WETLAND

This activity demonstrates some of the properties of wetlands and how they are formed.

MATERIALS NEEDED:

- 4 wide-mouth canning jars or the bottom halves of 4 plastic milk jugs
- 4 kinds of soil: sand, sandy loam, loam, clay, or clay loam
- Organic material: sphagnum moss or peat moss
- Gravel (to put in the bottom of each jar)

PROCEDURE:

1. Place 1 inch of gravel in the bottom of each jar. Add soil (different for each jar) until half full. Add one inch of organic material.
2. Add tap water in 50 ml increments to each container of soil. Wait at least two minutes between additions. Which soil type drains most quickly? Why? Which soil type absorbs the most water before showing puddles?

All of these containers now satisfy one of the conditions for being a wetland. Discuss what other conditions would be required for these containers to be "real" wetlands.

Save these containers, as they now are, for use later in the wetlands unit.

Activity 2 — WETLANDS NEED WATER

MATERIALS NEEDED:

- 4 wide-mouth canning jars or the bottom halves of 4 plastic milk jugs
- Soil — either sandy loam or a sandy loam/sphagnum moss or peat moss mixture, enough to half fill each container

PROCEDURE:

1. Add tap water to the containers in the following increments:

Container 1	—	10 ml
Container 2	—	50 ml
Container 3	—	100 ml
Container 4	—	200 ml

2. After adding the above amounts of water, wait two minutes. If there is no standing water, add the same increments again. When there is standing water on the surface of the soil in one of the containers, stop adding water. Discuss the amounts of water necessary for the formation of a "real" wetland.

These containers do not have any drainage. How would small holes in the bottom of the container affect your results? Large holes?

SECTION II

WETLAND TYPES

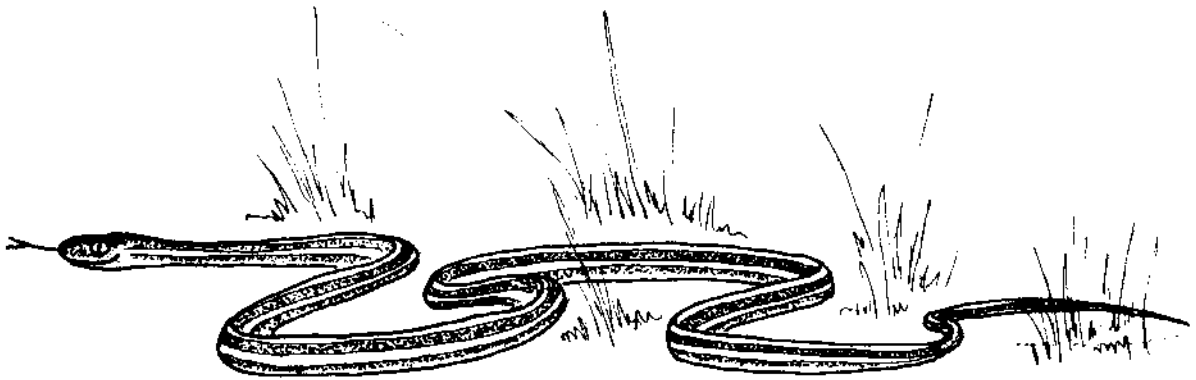
Michigan is blessed with a variety of wetlands. The different types of wetlands are productive or beneficial to us in different ways.

Wetlands are changeable and may not always be wet. But they are wet enough of the time to support vegetation and wildlife which requires water-saturated soils to grow and reproduce.

Numerous small wetlands dot the state of Michigan and may be found in every county of the state, along most lakes and streams, and all around the Great Lakes.

Shallow lakes, natural ponds, bogs, marshes, sloughs, potholes, mud flats, wet meadows, wooded swamps, stream margins, and flood plains are all wetlands.

The St. Johns Marsh in St. Clair County is one of the largest Great Lakes wetlands in southeastern Michigan. The Dead Stream Swamp, along the Muskegon River in Missaukee and Roscommon Counties, is a large inland wetland composed mostly of trees and brush.



DISCUSSION:

1. You may have a wetland near your home. How do you know it is a wetland?
2. Can you name any large wetlands other than those listed above?

Activity 3 — TYPES OF WETLANDS

List and describe each type of wetland. Identify an example in your area. Hint: Deep marshes, shallow marshes, wooded swamps, shrub swamps, fresh or wet meadows, bogs, river flood plains, and seasonally wet areas (ponds).

Cut out magazine or newspaper pictures of wetlands. Or you may want to take pictures of nearby wetlands. Display the pictures. Below each one, write the name of the type of wetland.

Wetlands are often created by highway construction. Can you think of any places like this? (Hint: where do you see cattails along the highway.)

SECTION III

VALUE OF WETLANDS

Wetlands provide important benefits often overlooked. They may serve as floodwater retention areas, for storing excess water, and may serve as groundwater recharge areas and act to moderate flows in associated streams.

Wetlands may also serve as sediment traps by filtering out various solids and other impurities and chemicals from the water before it actually reaches a lake or stream.



Wetlands sometimes serve as an effective shoreline barrier against wave action, thus acting as a buffer to protect animal life.



Wetlands are the homes of countless forms of plants and animals. Without these wetlands, many species of both plants and animals would become extinct.

QUESTION:

Do you know of a wetland that may be performing one of these functions? Where is it?

DISCUSSION:

Discuss how man has interfered with nature. Where wetlands have been eliminated, man must pay to provide the same benefits, such as storm water retention ponds and waste water treatment plants, or suffer the consequences of polluted water and damage from storms and floods. We all know about the high costs of construction of storm water control systems, waste water treatment plants, and the cost of destructive floods.

DID YOU KNOW THAT ALL OF THESE BENEFITS PROVIDED BY WETLANDS ARE "FREE WORK" OF A NATURAL SYSTEM?

Activity 4 — LIFE IN A WETLAND SOIL

Many wetland life forms spend part of their annual life cycle in “resting” stages in the soil. Try the following activity to observe some of these organisms.

MATERIALS NEEDED:

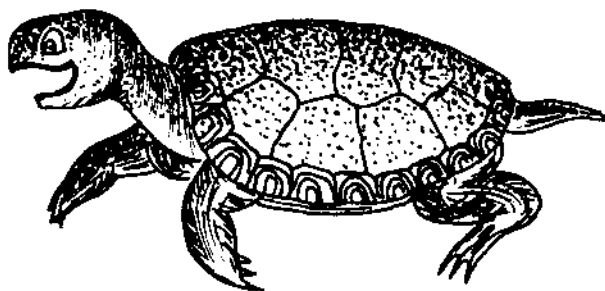
- A 5- or 10-gallon aquarium
- A chunk of soil about 1 foot x 1 foot x 8-inches deep from an undeveloped area which floods every year (a river bank is excellent)
- A pond guide or some booklet which will help you to identify different kinds of pond life (recommended)
- A magnifying glass or low-power microscope (recommended)

PROCEDURE:

1. Place the soil in the aquarium and the aquarium on a window sill to get sunlight.
2. Add about 3 gallons of tap water which has been standing in jars or jugs for at least three days (this is to let some of the water treatment chemicals break down).
3. Look closely at the aquarium water each day for two weeks. What life forms do you see? Where did they come from?

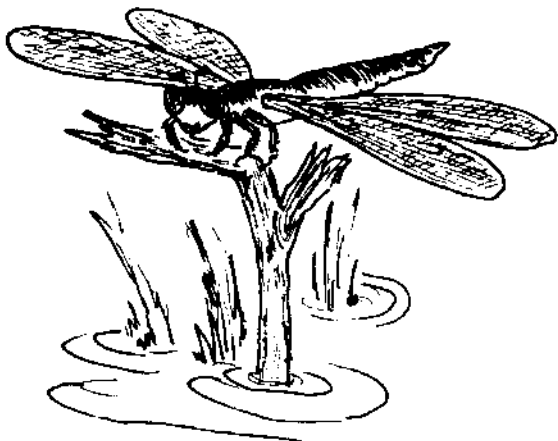
OPTION:

Do a library research project on life cycles of wetland/pond dwellers.



OPTIONAL PROJECTS:

1. Learn more about wetlands. Select one of the following wetland types and write a paper on it: a marsh, swamp, bog, or small pond. Discuss your papers in class or in a 4-H meeting. OR.
2. Learn about more common wetland plants and animals. Select one of the following species and write a paper on it: cattails, pitcher plant, sundew, sphagnum moss, water lily, American lotus, cedar tree, wild rice, canary reed grass, northern pike, black bullhead, muskrat, wood duck, otter, American bittern or Great blue heron, beaver, bull frog, spring peeper, common water snake, tiger salamander, dragon fly, or mosquito. Discuss your paper in class or in a 4-H meeting.



SECTION IV

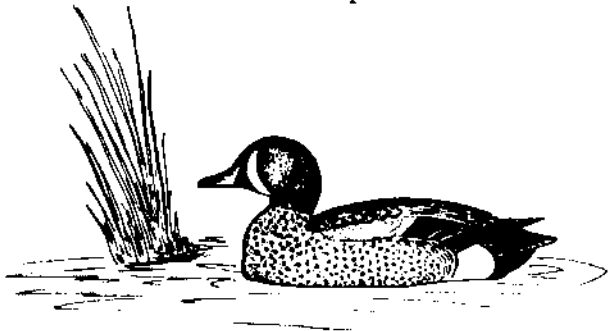
PRODUCTS FROM WETLANDS

Most wetlands are extremely productive without help from man. The soils of these natural areas are rich from the nutrients carried to them in surface water run-off from surrounding higher lands.

Wetlands rival in productivity the yield of modern agricultural fields which require intensive cultivation and fertilization each year.

Various wetlands are noted for a variety of cash crops. Among the more important crops are hay, timber, fur bearers, and other food and fishery resources.

Wetlands yield fish and wildlife. It is estimated that the Great Lakes wetlands annually produce about 32,000 ducks and geese and more than 1.8 million pounds of fish.



Many species of fish need wetlands for spawning, feeding, resting, or hiding. Northern pike, for instance, spawn in the wetlands in



early spring. After hatching, the young pike remain in the wetlands, feeding on small organisms, until they are large enough to leave the protective cover.

Many thousands of angler-days are spent each year by sportsmen fishing for wetland-dependent species. Furriers obtain close to 400,000 muskrat and raccoon pelts a year from Great Lakes wetlands.

With their multitude of plants, animals, and open space, wetlands also offer aesthetic values to both lake and river front communities, especially in areas of intensive development. So, in addition to hunting and fishing, thousands of people enjoy wetlands for bird-watching, hiking, photography, and just looking.

Wetlands generate economic values estimated at \$490 per acre per year for those uses. Nature lovers come to the wetlands to observe herons, shore birds, reptiles and amphibians, and to glimpse osprey and otters.



Deer in Northern Michigan "yards" in cedar swamps during winter are dependent on wetlands for survival. These swamps also provide natural products such as posts for fences and logs for a thriving cabin industry. The soft wood in forested wetlands, such as spruce and fir trees, is much in demand by the paper industry. Certain wild fruits, including cranberries, grow only in wetlands.

QUESTIONS:

1. What makes a cedar swamp, which is a type of wetland, valuable?
2. Wetlands are important to northern pike. Why?
3. How many plants, animals, and insects can you name that depend on wetlands for food, shelter, breeding, or living?

DISCUSSION:

1. In reference to question No. 3, discuss how the wetland is important to each, such as for food, cover, or in other ways.
2. Discuss how certain insects, such as mosquitoes, are important in a wetland. Discuss their conflict with man relative to health problems and the dangers of insecticide controls in wetlands.

Activity 5 — HIDE AND SEEK

This activity, involving a fish tank and native Michigan fish, should be especially helpful in exploring wetland products.

MATERIALS NEEDED:

- A large aquarium (preferably 10 gallons or larger)
- Several native fish, along with some bottom soil and weeds or grasses which grow in the water where the fish were caught. (Contact your nearest Department of Natural Resources fishery biologist. He or she will probably be able to supply the live materials. Group members who fish might be encouraged to bring in several freshly caught fish in a bucket of water.)

PROCEDURE:

1. Arrange your aquarium so that all the grasses and weeds are in the left half of the tank.
2. Introduce the fish. Where do the fish go? Is there an advantage (especially to the smaller fish) to living among the weeds? How does this relate to the fact that some marshes are important pike-spawning grounds?

Another value of wetlands to young pike involves the "Life From Wetland Soil" activity. What do very young pike eat? (Invertebrate animals in the water) What do these invertebrates eat? (Microscopic plants in the water)

If you wish to expand upon the concept of a "food chain" begun in the previous paragraph, you may want to study the "Animals" unit in the 4-H Basic Environment Series.

Activity 6 — EAT A CATTAIL

The late wild-food expert, Euell Gibbons, called the cattail the "supermarket of the swamp." Why is this wetland plant a good food resource?

Obtain some of his books from the library and read what he had to say about cattails.¹

Your leader might be able to bring in some cattails. Using Euell's directions, you might want to taste parts of the cattail.

What other products of wetlands can you eat?

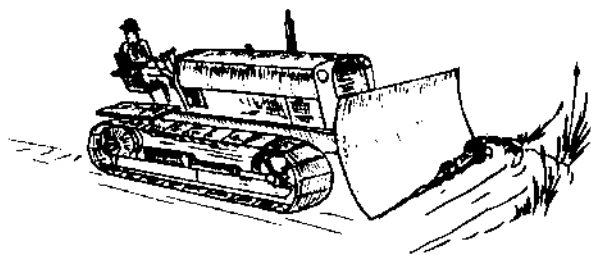
1. *Stalking the Wild Asparagus*. Euell Gibbons. David McKay Co., New York, NY, 1962.

SECTION V

WETLANDS DESTRUCTION

Thousands of acres of Michigan's wetlands are destroyed each year. Already millions of acres of wetlands have been permanently altered or destroyed in Michigan since the state's settlement.

Man is the greatest single destroyer of wetlands through his diking, draining, filling, and polluting.



A study of old maps and records indicates that about 40 percent of the wetlands in the lower 48 states have been destroyed since pioneers began settling the continent. In Michigan, Little Bay DeNoc (Delta County in northern Lake Michigan's Green Bay), the Les Cheneaux Islands (Mackinac County in northern Lake Huron), Saginaw Bay (Lake Huron), Lake St. Clair, the Detroit River, and Lake Erie once included 70,125 acres of coastal wetlands. Now only 28,500 acres of those wetlands remain. Sadly, vast acreages of wetlands also have been lost in the inland areas of the state as well.

Most of Michigan's wetlands have been destroyed through man's activities. Wetlands have been viewed as wastelands and drained or filled for agriculture, business and industry, housing, or waste disposal.

Unfortunately, many people do not realize the natural values of wetlands. Usually, this is because they have not had the opportunity to

learn about the benefits derived from wetlands and are aware only of what they consider negative aspects—that wetlands have mosquitoes and snakes, and they believe this land is not good for anything unless it is filled.

In some cases, there have been benefits from the changes. Wetlands drained for agriculture produce part of our food supply, and those dredged to build harbors provide transit centers for industry and recreation. Unfortunately, many wetlands have been destroyed because of their location between lakes or rivers and the land—an area that seemed to be prime areas for homes, harbors, or industries dependent on water transportation.

However, the public must eventually pay for water quality improvement, erosion control, flood control, groundwater recharge, sedimentation control, and fish and wildlife habitat improvement—all of which normally are provided by wetlands.

Wise and informed choices must be made to regulate man's use of the remaining wetlands because they are irreplaceable. Attempts to re-establish wetlands seldom succeed.

QUESTIONS:

1. What percentage of wetlands has been lost in the lower 48 states since settlement?
2. Unfortunately many people consider wetlands as waste lands. Do you know why?
3. What is the greatest single destroyer of wetlands?
4. Who must eventually pay for the loss of wetlands?

DISCUSSION:

What areas do you know that were once wetlands but have been filled in, or are presently being filled, drained, or otherwise destroyed?

OPTIONAL:

Select an area ($\frac{1}{4}$, $\frac{1}{2}$, or 1 square mile in size) near where you live. Try to determine the amount of wetlands that have been altered or destroyed. This can be done by talking to area farmers, your parents, grandparents, uncles, aunts, area businessmen, or others who have been living in the area for a relatively long period of time. Map the wetlands for this area as they were in the past and how they are at the present time. Also try to predict what will happen to the wetlands in the future, based on adjacent land uses, ownership, etc. Monitor the wetlands use for a period of time and see what changes occur.



Activity 7 — DESTRUCTION OF A WETLAND

Learn how easily wetlands can be destroyed. Also learn why this is usually a permanent loss of the wetlands.

MATERIALS NEEDED:

- The wetland models from "Make Your Own Wetland" Activity 2. (Sandy loam and loam/moss from Activity 1 may be used but will be harder to compare.)
- About a quart of dry sand or kitty litter
- Red food coloring

PROCEDURE:

Start by making sure that all the models are equally "wet."

1. **Drainage**

Draining a wetland takes the "wet" out of "wetland." What is left? Model this by allowing one of the jars to dry out. Discuss the effects of drainage on the fish in Section IV.

2. **Filling**

Have a group member pretend to be a bulldozer (sound effects permitted!) and pour sand onto the next wetland container. What does this do to the wetland? Can this ever be reversed? (Try to get **all** the sand out of the jar if you think so.)

3. **Contamination**

Some people have even used wetlands as places to dump wastes. To show what happens when chemical wastes are dumped in wetlands, **pretend** that the food coloring is a poisonous chemical. Place several drops of food coloring at one edge of the container. What happens? How would a poison act in a "real" wetland?

4. **The last wetland**

The group members have now destroyed three out of four wetlands. Remind them that almost three-fourths of Michigan's original wetlands have been destroyed. What will we do with the remaining wetland?

SECTION VI

WETLANDS REGULATION

In 1977, President Carter issued an Executive Order to all federal agencies calling for the protection of wetlands. He directed that no federal funds be spent on projects that directly or indirectly would destroy wetlands unless "no prudent alternative exists." The United States Fish and Wildlife Service initiated a national wetlands inventory to identify the wetland resource base and allow for informed management decisions.

The United States Army Corps of Engineers was given responsibility to regulate the discharge of spoil (i.e., stuff dredged out of channels) materials into navigable waters of the United States, including adjacent wetlands. That authority does not regulate dredging or draining of wetlands, however. In Michigan, the Department of Natural Resources has been given responsibility to protect and manage natural resources. The Department administers fish and wildlife management programs, monitors and controls water quality, and regulates those activities in and adjacent to waters of the state. The Great Lakes Submerged Lands Act regulates activities involving the Great Lakes bottomlands.

Some wetlands are protected under those laws, but only those lying below a legally established high-water mark along a lake or stream. Wetlands that are not contingent (not connected in any way) to our inland lakes and streams, at the present, are not regulated by any specific state law.

The Great Lakes Shorelands Protection and Management Act partially regulates "environmental areas" important for fish and wildlife or the shoreline of the Great Lakes. The Soil Erosion and Sedimentation Control Act requires erosion control measures for "earth change" projects. These laws require Department of Natural Resources permits or approved erosion control plans for various land use activities.

Michigan's Environmental Protection Act is landmark legislation designed to prevent pollution, impairment, or destruction of air, water, and other natural resources. The Act may be invoked to protect some wetlands but requires court proceedings which cost time and money. A wetlands protection program based solely on this Act would be unwieldy and inefficient.

Economic incentives might present an alternative to laws designed to preserve wetlands. Some owners of wetlands have received tax relief under the Farmland and Open Space Preservation Act, and some are eligible for direct subsidies to maintain wetlands under the Federal Water Bank Program. For the most part, however, owners of wetlands are taxed at the same rate as owners of uplands.

Conservationists believe an ideal wetlands protection law would call for an inventory of all Michigan wetlands, an appraisal of their values in order of priority, and more inclusive regulation of their uses. An accelerated program is needed to increase public awareness of the value of wetlands. Citizens who realize that wetlands losses are permanent can make better informed decisions about exchanging them for developments such as harbors, power plants, industrial sites, shopping centers, or housing subdivisions. The Department of Natural Resources has prepared printed and audio-visual materials on wetlands for use by the public. Be a good citizen and report man-made changes in or near wetlands to the nearest Department of Natural Resources office.

Note: None of Michigan's statutes provides a comprehensive approach to the critical wetlands management issue. Some states have enacted stringent wetlands protection laws, but Michigan has yet to pass a law to protect all wetlands.

DISCUSSION:

Consider what is being done to regulate man's use of wetlands. Discuss what wetlands in Michigan are not being protected by law and what you, as the public, could do to better preserve and protect our wetlands.

OPTIONAL:

What can we do to protect and preserve our wetlands? Hint: Write a letter to your legislator and congressman and let them know what you think about wetland protection and proposed laws.

Activity 8 — GUEST SPEAKER

Have a representative of the DNR, the Soil Conservation Service, your local Soil Conservation District or your Marine Advisory agent talk to your group. Learn about the history and present status of wetlands regulation and management. Before having the group members write letters to their congressmen, learn what specific recommendations should be made. Your speaker may be able to describe the potential and historical effectiveness of citizens' actions on the political process.

