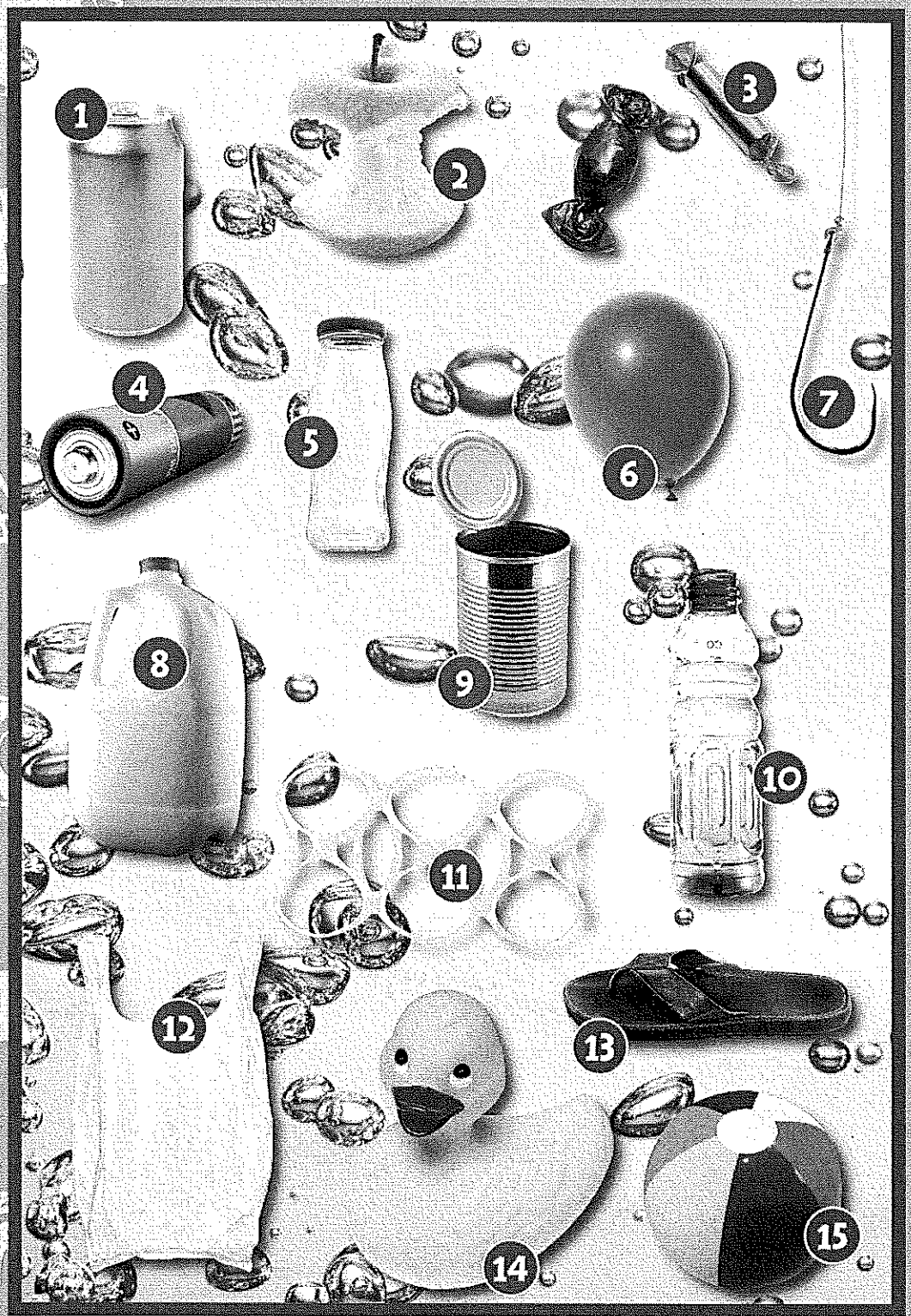
How Long Does Trash Last in our Aquatic Ecosystems?



1. Aluminum Can
   200–500 Years
2. Apple Core
   2 Months
3. Mylar Candy Wrapper
   Forever
4. Battery
   100 Years
5. Glass Jar
   Forever
6. Latex Balloon
   6 Months
7. Fishing Hook
   100 Years
8. Milk Jug
   Forever
9. Tin Can
   80–100 Years
10. Water Bottle
    Forever
11. Plastic Can Holder
    Forever
12. Plastic Bag
    Forever
13. Leather Sandal
    40–50 Years
14. Rubber Ducky
    Forever
15. Beach Ball
    Forever

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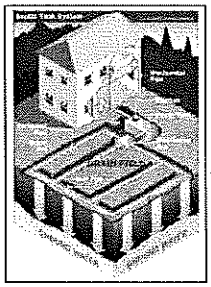
Name: _____ Hour: _____

Water Pollution: Culprit Number 1

How too Much *Nitrates* get into the Water System

Nitrate from septic system discharge

- Human wastes
- Pharmaceuticals and personal care products

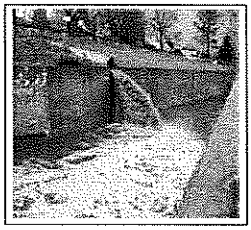


Hazardous Materials

- Spills and leaks of chemicals and fuels on the ground surface
- Spills and leaks from buried tanks and pipelines
- Chemical application on land for agricultural, industrial, or residential purposes
- Unlined landfills
- Illegal disposal and dumping

Stormwater Pollution

- Industrial or residential run-off
- Illegal disposal



1. What are Nitrates? _____
2. Why are Nitrates in our water bad? _____
3. What is a septic system used for? _____
4. Where is a septic system located? _____
5. How would a pharmaceutical product get into the septic system? _____
6. Go To: http://www.mnn.com/earth-matters/wilderness-resources/stories/the-13-largest-oil-spills-in-history

   Name the top 5 Largest Oil Spills in History and a summary of the accident:

   1. Name: _____ When it occurred: _____
      Where it occurred: _____ Amount spilled: _____
      _____ Summary of Incident: _____
      _____
      _____
      _____

   2. Name: _____ When it occurred: _____
      Where it occurred: _____ Amount spilled: _____

_____ Summary of Incident: _____

_____

_____

_____

3. Name: _____ When it occurred: _____
   Where it occurred: _____ Amount spilled: _____
   _____ Summary of Incident: _____

   _____

   _____

   _____

4. Name: _____ When it occurred: _____
   Where it occurred: _____ Amount spilled: _____
   _____ Summary of Incident: _____

   _____

   _____

   _____

5. Name: _____ When it occurred: _____
   Where it occurred: _____ Amount spilled: _____
   _____ Summary of Incident: _____

   _____

   _____

   _____

7. Why would companies dispose of hazardous materials illegally? _____

   _____

Name: _____ Hour: _____

Solutions: What is already being done?

1. What did the Safe Drinking Water Act do to protect water? _____
   _____
   _____
2. What does MCL mean? _____
3. What year was the Safe Drinking Water Act put into effect? _____
4. What year was the Clean Water Act put into effect? _____
5. What did the Clean Water Act do to protect water? _____
   _____
   _____
6. What does Non-Point Sources mean? _____

Did Laws and Education Work?

Name: _____ Hour: _____

A possible method for monitoring and/or minimizing pollution in our waterways:

According to your research, what is still the biggest problem with keeping all of our waters protected and safe from pollution? _____

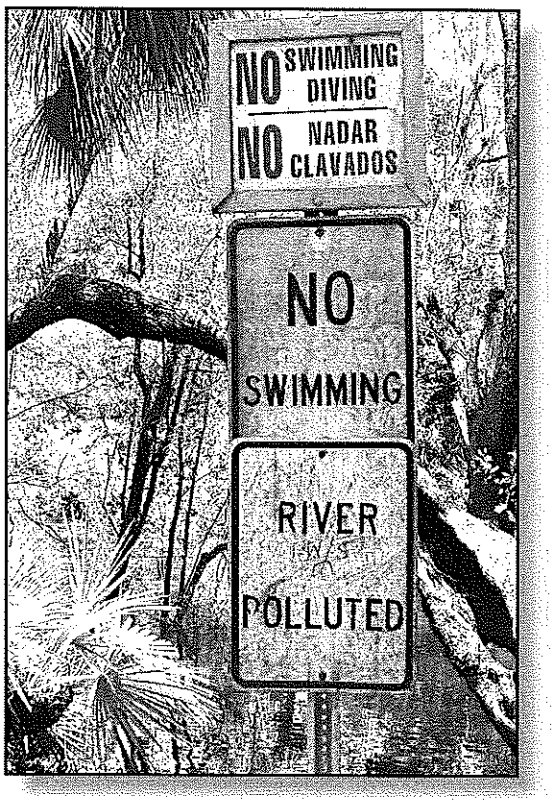
_____

Brainstorm possible ***methods to monitor or minimize*** the pollution that is either in or going into our waterways: _____

NAME: _____

Changes In Freshwater Aquatic Ecosystems Caused By Human Activity

In the past, many factories in the United States dumped pollutants directly into streams and rivers. In the worst cases, some streams became so polluted, they supported almost no life. There were even rivers covered in such heavy oil slicks that they sometimes caught fire. The law called the Clean Water Act has eliminated almost all such direct pollution.



Indirect pollution, by way of the atmosphere, is still a problem. We have already learned that burning fossil fuels has changed aquatic ecosystems by raising global temperature. Fossil fuels can harm freshwater aquatic ecosystems in another way. **Sulfur dioxide** and **nitrous oxide** gases are released when some fossil fuels are burned. These gases dissolve in raindrops that fall to earth as **acid rain** which flows into streams and lakes. As the water becomes more acidic, many species are unable to survive in the aquatic habitat.

Agricultural **runoff** is another source of pollution of freshwater habitats. When water from fertilized fields runs into streams and lakes, it carries nutrients that encourage algae growth. When the algae die, the decomposition process removes oxygen from the water. If the oxygen content drops far enough, the water will no longer support fish and other organisms that take their oxygen directly from water.

When people build dams, they change freshwater ecosystems. To begin with, a dam changes part of a lotic (flowing) system into a lentic (still) system. This makes the habitat suitable for a different group of organisms. Dams can also disrupt the reproductive cycles of organisms. Dams can cause water temperatures to be unseasonably warm or cold. This confuses organisms whose growth and reproduction is triggered by temperature changes.

Many fish leave large lakes and oceans and swim up streams to lay their eggs. Dams can keep these fish from reaching their **spawning** grounds. Spawning grounds can also

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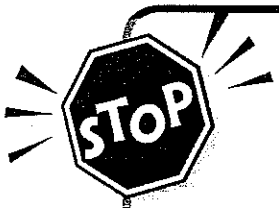
NAME: _____

Changes In Freshwater Aquatic Ecosystems Caused By Human Activity

be damaged by logging operations. When trees that shade stream banks are cut down, the water temperature of the stream changes. This can also interfere with spawning.

Overfishing can be a problem for any aquatic ecosystem. When Europeans first arrived at the Great Lakes, they were amazed at the quantity and variety of fish they found. The Great Lakes fishing industry provided great quantities of fish for early America, but overfishing and other problems have caused the number and variety of fish to decline greatly, beginning about 100 years ago.



How does decaying algae harm fish?

_____

_____

Introduction of foreign species into an aquatic ecosystem can completely change the numbers and type of organisms in the food web. Foreign species can even cause native species to become extinct. Some species are introduced intentionally and some by accident.

Lake Victoria in Africa is the largest tropical lake in the world. Several species of fish from the Nile River were introduced into this lake to improve the local fishing industry. The fish did well, but many native fish species populations were greatly reduced and others became extinct. European settlers in Africa introduced **water hyacinth** as an ornamental plant in their garden ponds. The plant spread to Lake Victoria, where it now clogs much of the shoreline, changing the ecosystem and interfering with navigation.

More than 160 foreign species have been introduced to the Great Lakes, mostly by accident. These species often travel from other countries in the water that ships carry in their holds to help balance the ship. The **zebra mussel** is a non-native shellfish that has caused many expensive problems. Zebra mussels have pushed out native mussels, damaged spawning grounds, and clogged factory pipes.

The **lamprey** is an eel-like parasite that entered the Great Lakes from the ocean through the canals that people built. These animals attach themselves to large fish and eventually kill them. Lampreys have greatly reduced the lake trout population in the Great Lakes.

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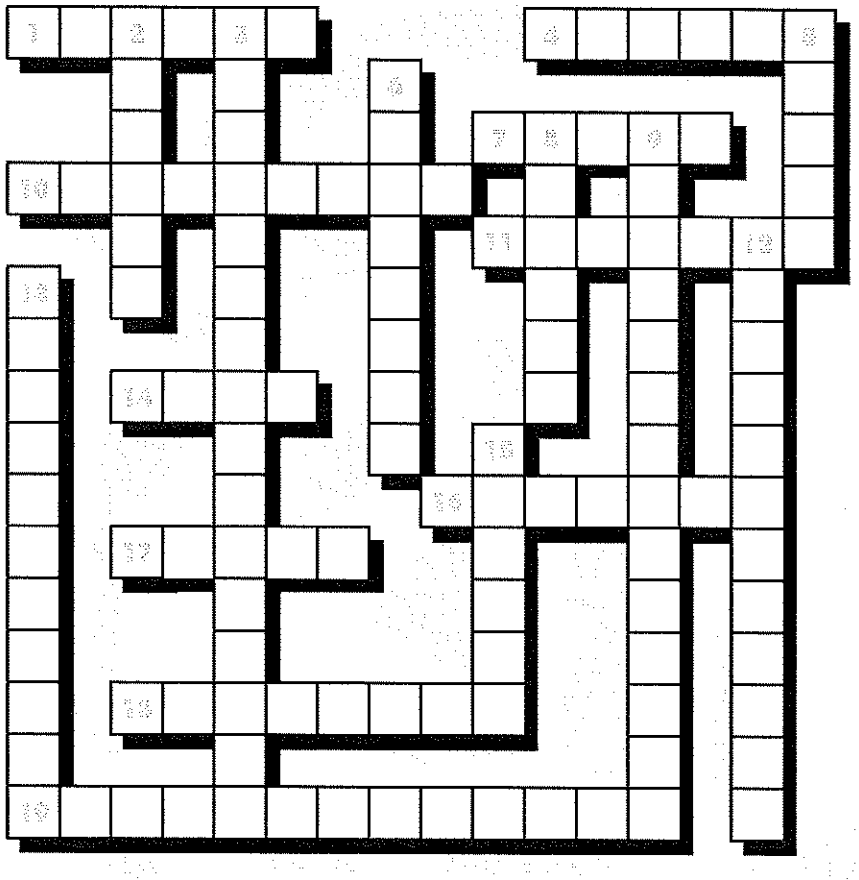
NAME: _____

Crossword Puzzle!

Word List

ABIOTIC
ACID RAIN
ADAPT
DEBRIS
EVOLUTION
EXTINCT
FISH
FRESH
GREENHOUSE GAS
INVERTEBRATE
LOTIC
MARINE
MUSSEL
NATURAL SELECTION
OVERFISHING
OXYGEN
PHOTOSYNTHESIS
PRODUCER
RUNOFF



Across

1. The type of ecosystem located in the ocean.

4. Zebra _____ s have invaded the Great Lakes.

7. What a species must do to survive an environmental change.

10. Gradual change of a species over time.

11. The nonliving factors in an ecosystem.

14. _____ ladders are installed at some dams.

16. What can happen to a species if it can't do 7 across.

17. The type of water that is less than 1% salt.

18. The result of releasing nitrous oxide and sulfur dioxide.

19. These compounds in the atmosphere help hold Earth's heat.

Down

2. Water leaving a farm field and entering a stream.

3. The process that allows 10 across to happen.

5. The word to describe an ecosystem in flowing water.

6. The role of plants in an ecosystem.

8. Ocean trash.

9. The process that only 6 down can do.

12. Spineless creatures.

13. Catching fish faster than they can reproduce.

15. A product of 9 down that all animals need.

(Note: For answers of more than one word, do not put a space between the words.)

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NAME: _____

Word Search

Find all of the words in the Word Search. Words are written horizontally, vertically, diagonally, and some are even written backwards.

abiotic	biotic	fresh (water)	nurdles	salt (water)
acid rain	carbon dioxide	greenhouse gas	overfishing	spawn
adapt	debris	invertebrates	oxygen	system
algae	estuary	lotic	photosynthesis	vertebrates
aquatic	fish (ladder)	marine	runoff	

A	V	E	R	T	E	B	R	A	T	E	S	A	B	C
I	Q	S	I	H	A	N	S	G	A	F	E	S	S	D
N	K	U	A	D	E	L	E	G	L	O	T	I	C	M
V	T	S	A	G	R	Q	L	F	P	O	S	R	N	O
E	U	P	Y	T	E	A	D	C	I	E	Y	B	N	V
R	T	X	V	W	I	S	R	I	H	S	X	E	I	E
T	O	D	C	B	A	C	U	T	W	Z	H	D	A	R
E	D	I	X	O	I	D	N	O	B	R	A	C	R	F
B	E	M	E	T	S	Y	S	I	H	F	O	G	D	I
R	M	L	O	K	S	P	M	B	J	N	I	H	I	S
A	N	I	O	O	A	A	P	A	S	Q	E	R	C	H
T	B	W	T	W	R	V	L	H	U	T	S	E	A	I
E	X	O	N	I	Y	Z	M	T	W	X	Y	Z	R	N
S	H	D	N	C	B	E	S	T	U	A	R	Y	A	G
P	E	E	F	G	R	U	N	O	F	F	R	E	S	H

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a) FALSE

b) TRUE

c) FALSE

d) FALSE

e) FALSE

f) TRUE

2.

a) sulfur dioxide, acid rain

b) runoff, fertilizer, algae

c) overfishing

d) spawning

Decaying algae removes oxygen from the water, which fish need to survive.

1.

a) ✓ B

b) ✓ C

2.

1. C

2. A

3. E

4. B

5. D

3.

a) Sulfur dioxide and nitrous oxide dissolve in raindrops forming acids, then fall and run into streams.

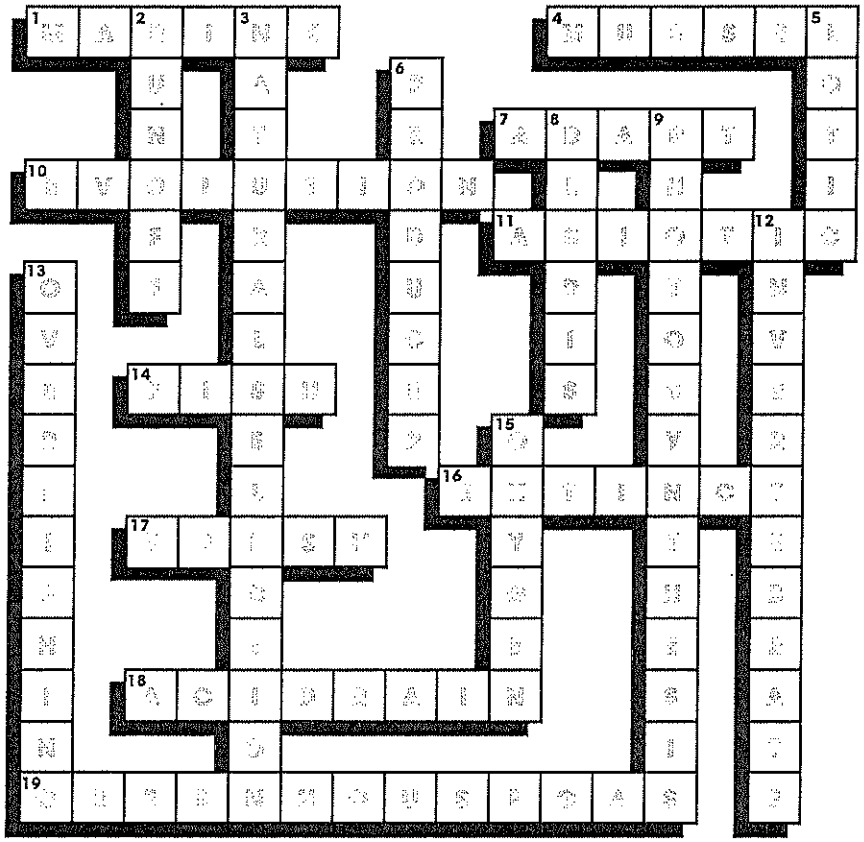
b) (Answers will vary.) Non-native species can travel in the holds of boats. Non-native species can travel through canals from the ocean.

Extension & Applications

Answers will vary:
Any four of the following:

- Invasive species caused by boat traffic and canals
- Oxygen depletion caused by agricultural runoff and sewage discharge
- Acid rain caused by burning fossil fuels
- Loss of spawning grounds caused by dams and logging
- Reduced biodiversity caused by overfishing
- Higher water temperature caused by burning fossil fuels

Crossword Puzzle!



Conservation: Waterway Habitat Resources CCP5775-4