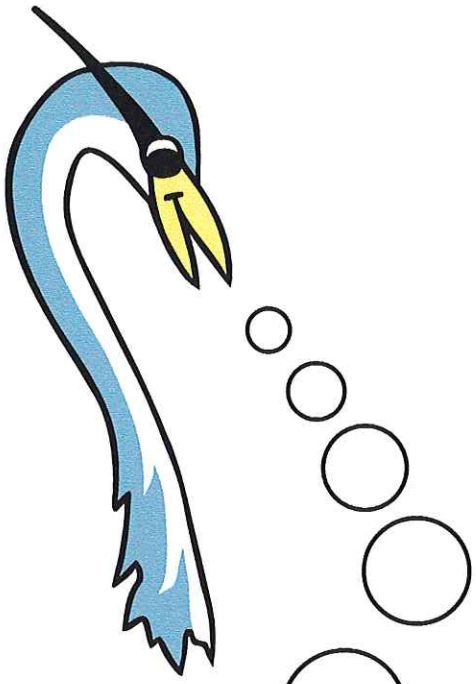
How To Be A Clean Water Rainger

Activity Book

Save this booklet! It contains valuable information you can use!

Who Are the Clean Water Raingers?



Hi! I'm Howie Heron. My friends and I have joined the Clean Water Rainger Team and we're here to share what we've learned about the water quality of the great state of New Jersey. The Clean Water Raingers team is dedicated to protecting New Jersey's water. In this booklet, you'll learn how your everyday activities affect water.

CLEAN WATER RAINGERS

Dear Clean Water Rainger Candidate,

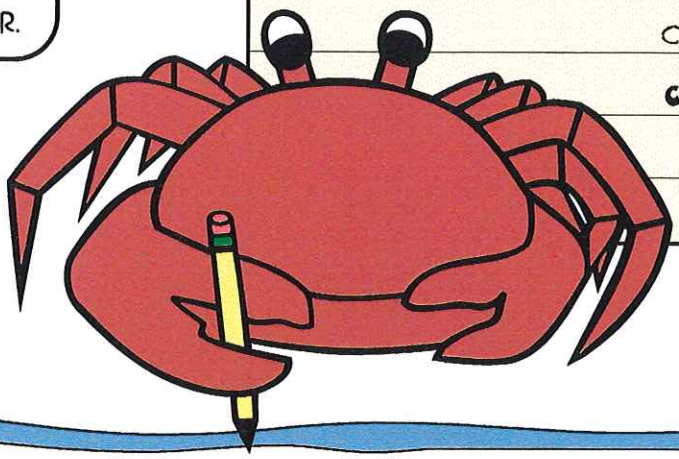
Are you interested in keeping New Jersey's water clean? Well, we need your help! Not long ago, my friends and I discovered that one of New Jersey's biggest water pollution problems comes from people -- from how we live our daily lives. That means things like littering, not cleaning up after pets, using too many pesticides, and dumping motor oil down storm drains. With almost nine million people living in the state, what everybody does can really add up.

We hope you will use the information in this booklet to improve water quality in your neighborhood. Join the Clean Water Rainger Team and make New Jersey a better place to live, work, and play!

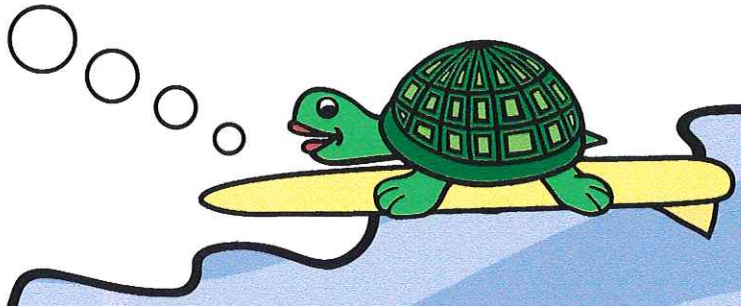
Your Friend,

Claudius Crab

Clean Water Rainger



HI! I'M DIESHA DIAMONDBACK. DID YOU KNOW THAT ALL OF THE STREAMS, CREEKS, RIVERS, LAKES, AND BAYS IN NEW JERSEY EVENTUALLY FLOW TO THE ATLANTIC OCEAN? WHAT YOU DO IN YOUR HOME TOWN CAN AFFECT THE JERSEY SHORE, EVEN IF YOU LIVE FAR AWAY!



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ACKNOWLEDGMENTS

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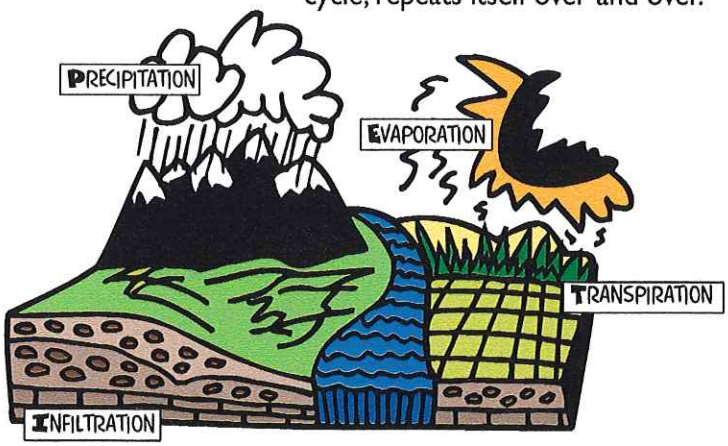
APRIL 2009

The Water Cycle

For millions of years, water has been recycled and reused. It is important to understand how water moves through the Earth's water cycle. When it rains, the rainwater flows on top of the land surface into waterways or is absorbed by the ground or plants. Water evaporates from land and water, becoming water vapor in the atmosphere. Water is also released from trees and other plants through "transpiration." The water vapor from evaporation and transpiration forms clouds in the atmosphere which in turn provide precipitation (rain, hail, snow, sleet) to start the cycle over again. This process of water recycling, known as the water cycle, repeats itself over and over.



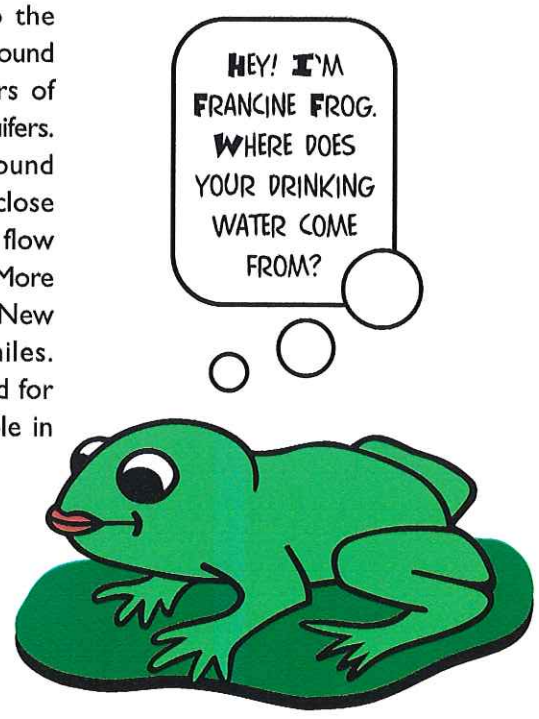
Water. It's an essential part of our lives. We use it to drink, to cook, to bathe, and to clean. It's used by industry and businesses to make their products. Farmers and gardeners use it to water their crops. Fish live in it and other animals need it to survive.

The earth has a lot of water - approximately 1.4 quintillion cubic meters of it. Yet, less than 1% of that is fresh, usable water. The oceans, glaciers, and ice caps account for greater than 99% of all water on Earth. That remaining small fraction accounts for every cloud, river, lake, pond, swamp, and aquifer. Of that, more than two thirds is below the Earth's surface.

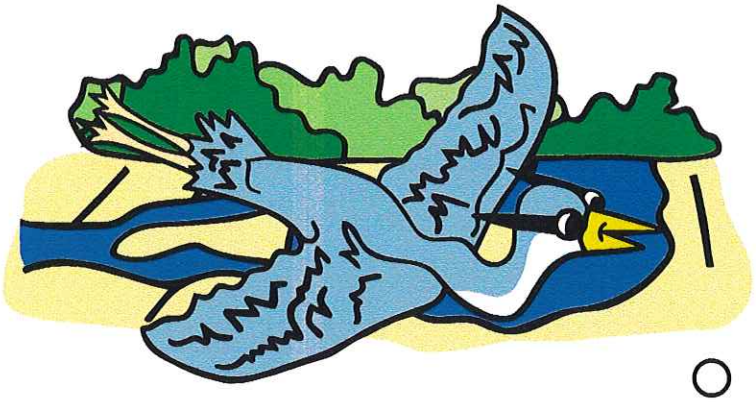
In New Jersey, an average of 44 inches of precipitation per year replenishes the state's 6,500 miles of streams and rivers, 61,000 acres of lakes and an extensive network of underground aquifers.

What is Ground Water?

Some rainwater runoff seeps into the ground to become ground water. Ground water moves into water-filled layers of porous rock or soil that are called aquifers. Aquifers are not flowing underground streams or lakes. If the aquifer is close to the surface, its ground water can flow into nearby waterways and wetlands. More than 100 aquifers are below us in New Jersey, covering 7,500 square miles. Through wells, ground water is used for drinking water for half of the people in New Jersey.



What is a Watershed?



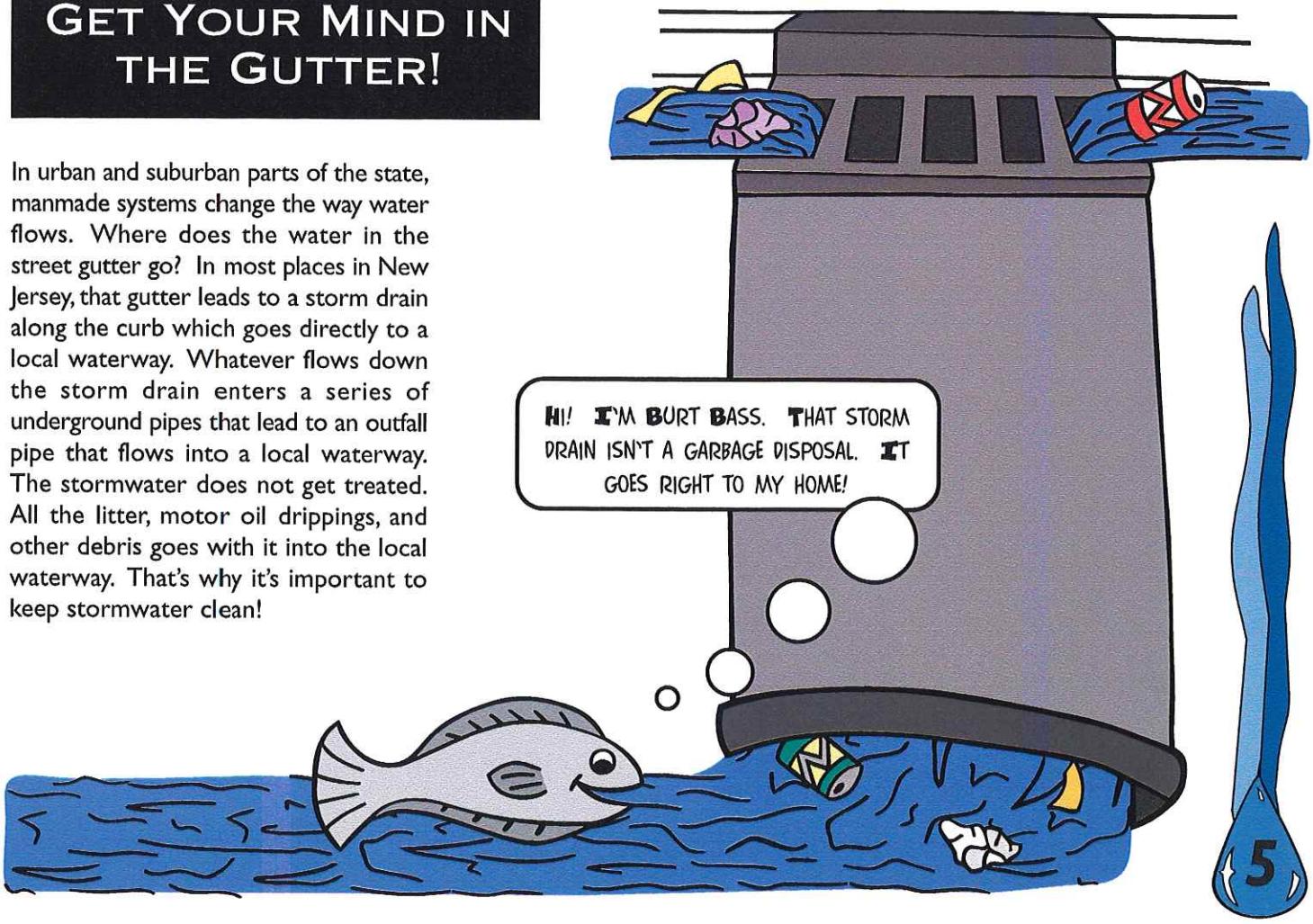
A watershed is the area of land that drains into a waterway. A watershed includes not only the waterway itself but also the entire land area that drains to it. For example, the watershed of a lake would include not only the streams entering into that lake but also the land area that drains into those streams and eventually the lake.

A watershed can be as small as a backyard that drains to a puddle or as large as the sections of New York, Pennsylvania, New Jersey and Delaware that drain into the Delaware River.

So what happens on the land in a watershed affects the waterway. For example if too many fertilizers are used on lawns, the extra fertilizer can end up in the local waterway. The same thing goes for ground water. The extra fertilizer could end up in ground water and maybe someone's well.

Get Your Mind in the Gutter!

In urban and suburban parts of the state, manmade systems change the way water flows. Where does the water in the street gutter go? In most places in New Jersey, that gutter leads to a storm drain along the curb which goes directly to a local waterway. Whatever flows down the storm drain enters a series of underground pipes that lead to an outfall pipe that flows into a local waterway. The stormwater does not get treated. All the litter, motor oil drippings, and other debris goes with it into the local waterway. That's why it's important to keep stormwater clean!



What's Wrong With Our Water?

On his flights over New Jersey, Howie Heron sees that many water pollution problems begin upstream and accumulate as water flows toward the bays and the ocean. He has seen improvement as regulation of industries and improved sewage treatment have helped clean up the water. Now the number one problem in many areas is "polluted runoff."

Polluted runoff is stormwater runoff that picks up pollution as it washes over lawns, parking lots, roadways, farmland and other surfaces. There are four basic types of pollution in runoff: soil particles, nutrients, bacteria and toxic substances.

Soil Particles

Construction sites, farms, and eroded stream banks can be large sources of pollution. Because bare ground lacks plants to hold soil in place, rain and waves can easily lead to soil erosion.

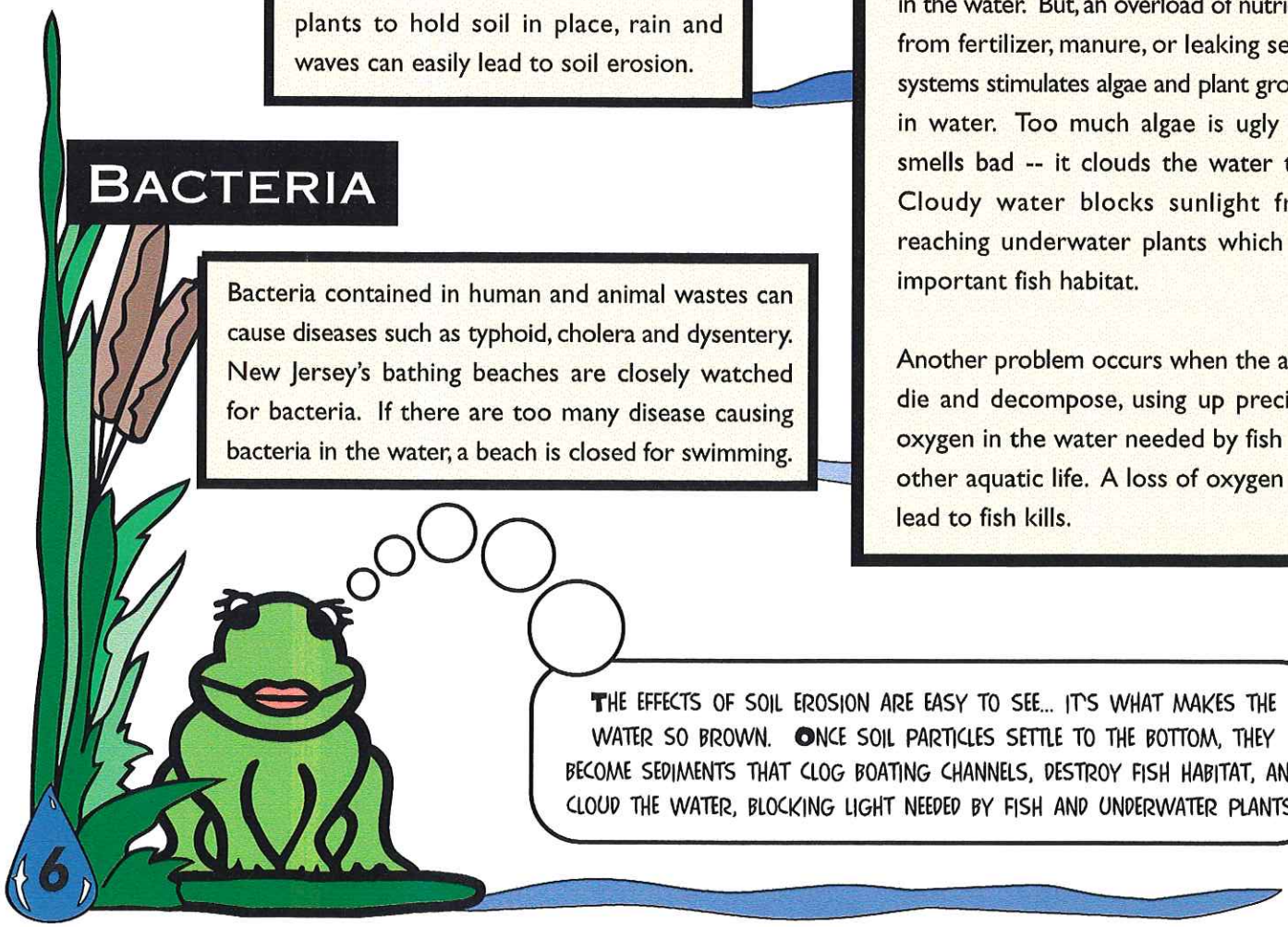
Nutrients

Nutrients, like potassium, phosphorous, and nitrogen, help plants grow. Just like we need food to survive, so do plants in the water. But, an overload of nutrients from fertilizer, manure, or leaking septic systems stimulates algae and plant growth in water. Too much algae is ugly and smells bad -- it clouds the water too! Cloudy water blocks sunlight from reaching underwater plants which are important fish habitat.

Another problem occurs when the algae die and decompose, using up precious oxygen in the water needed by fish and other aquatic life. A loss of oxygen can lead to fish kills.

Bacteria

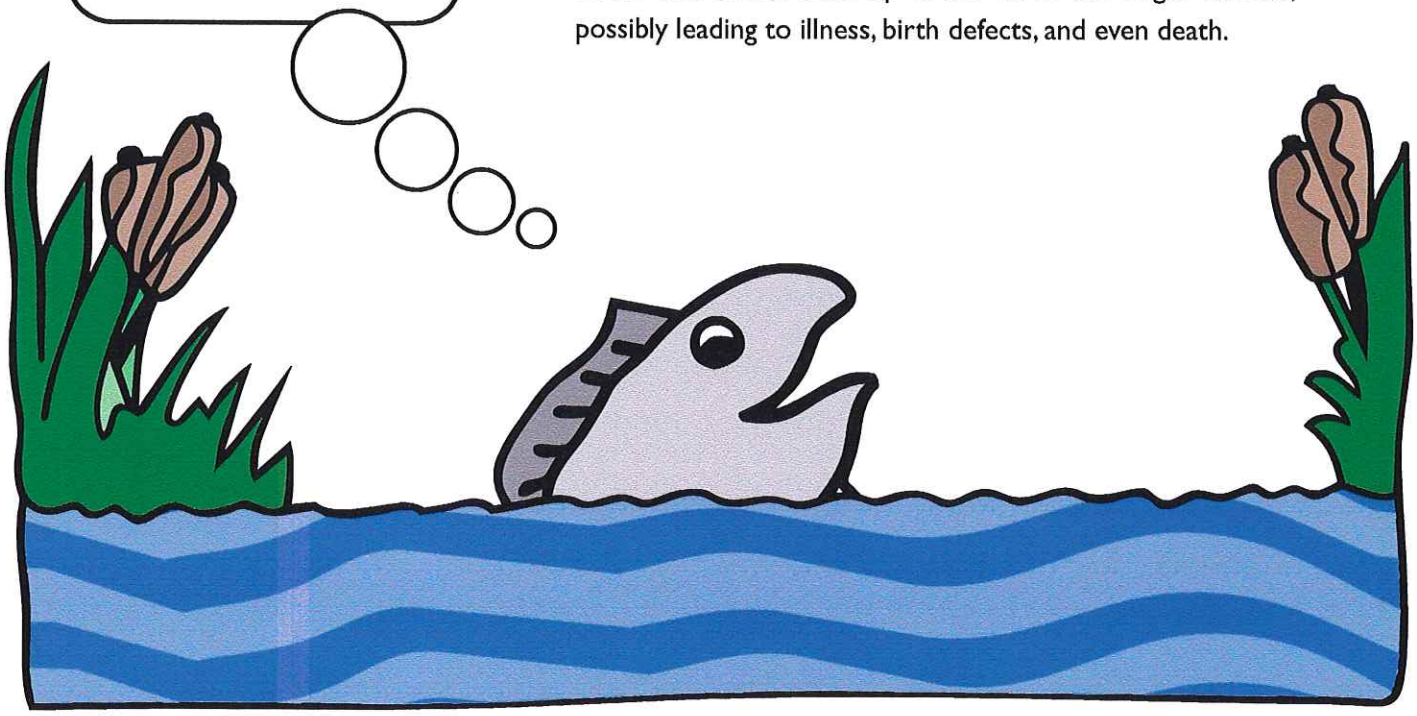
Bacteria contained in human and animal wastes can cause diseases such as typhoid, cholera and dysentery. New Jersey's bathing beaches are closely watched for bacteria. If there are too many disease causing bacteria in the water, a beach is closed for swimming.



THE EFFECTS OF SOIL EROSION ARE EASY TO SEE... IT'S WHAT MAKES THE WATER SO BROWN. ONCE SOIL PARTICLES SETTLE TO THE BOTTOM, THEY BECOME SEDIMENTS THAT CLOG BOATING CHANNELS, DESTROY FISH HABITAT, AND CLOUD THE WATER, BLOCKING LIGHT NEEDED BY FISH AND UNDERWATER PLANTS.

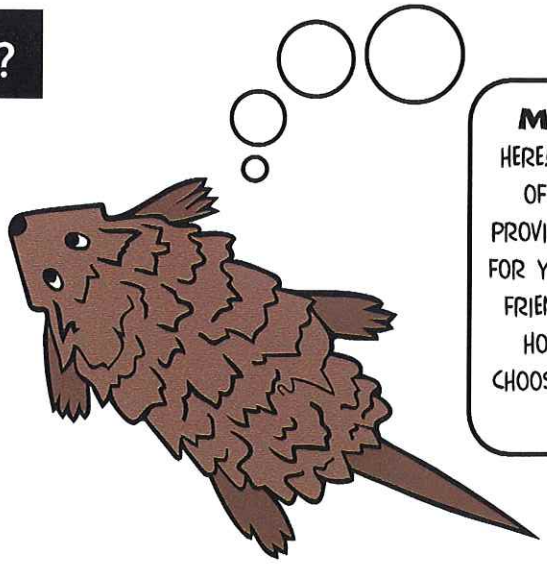
Toxic Substances

Toxic substances include oil and gas, heavy metals (zinc, mercury, cadmium, lead, etc.) and pesticides. When these substances are washed off sidewalks, parking lots, lawns, gardens, and cropland, they can end up in nearby streams and lakes and can even soak into the ground. Once in the water system, these pollutants can be carried downstream to settle into lakes, bays, and aquifers. Toxic substances can contaminate small organisms, which are eaten by fish and birds. The toxins build up in the fat of the larger animals, possibly leading to illness, birth defects, and even death.

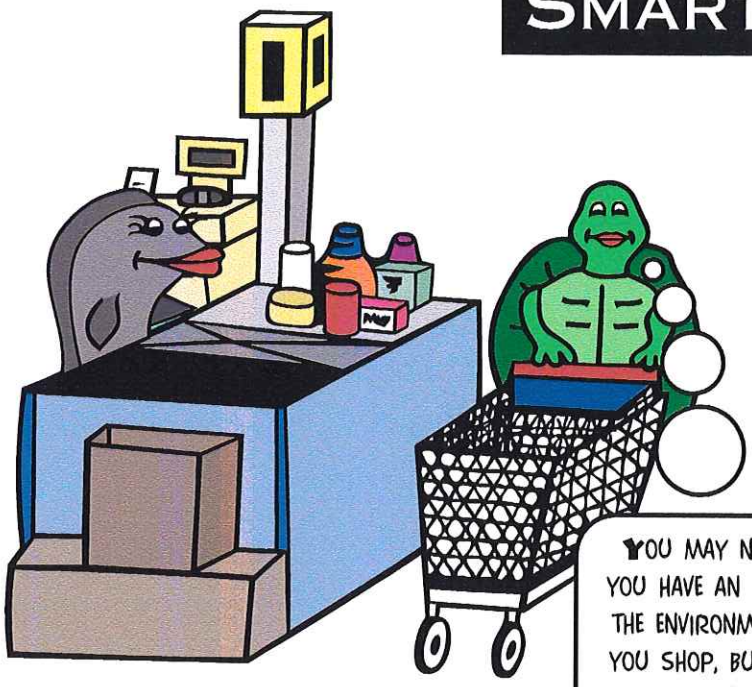


What Can You Do?

The most important thing you can do to improve New Jersey's water is to learn about the ways in which you and others affect the environment. Lots of little changes will make the biggest difference!



Smart Shopping Tips



YOU MAY NOT THINK YOU HAVE AN IMPACT ON THE ENVIRONMENT WHEN YOU SHOP, BUT YOU DO. FOLLOW THESE SMART SHOPPING TIPS TO HELP PROTECT NJ'S WATER.

Buy products that use the least amount of packaging. This helps by reducing water pollution from manufacturing and trash disposal problems.

Recycle! Find out what is recyclable in your community. Buy products in recyclable containers. Buy containers or products made from recycled materials.

Read labels and be aware of what they mean before you buy. Watch for signal words such as "caution," "warning," and "danger." These indicate that an item is a potentially hazardous product that consumers need to be concerned about.

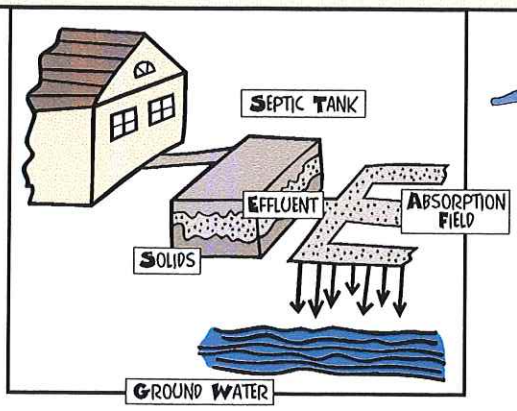
Thank You For Shopping Smart!

Don't Dump It Down the Drain

About 500,000 New Jersey homes use septic systems for the wastewater from their sinks, toilets, dishwashers, washing machines and showers. Rather than send their wastewater to a sewage treatment plant, homes with septic systems treat their wastewater in their own backyard.

How does a septic system work?

Septic systems work by using bacteria to decompose wastes sent into the system. A typical septic system has underground pipe leading from the home to an underground holding tank where most of the pollutants are treated. An underground system of small pipes leads from the tank into the backyard. These pipes allow treated water to soak into the ground.



Treat them with respect.

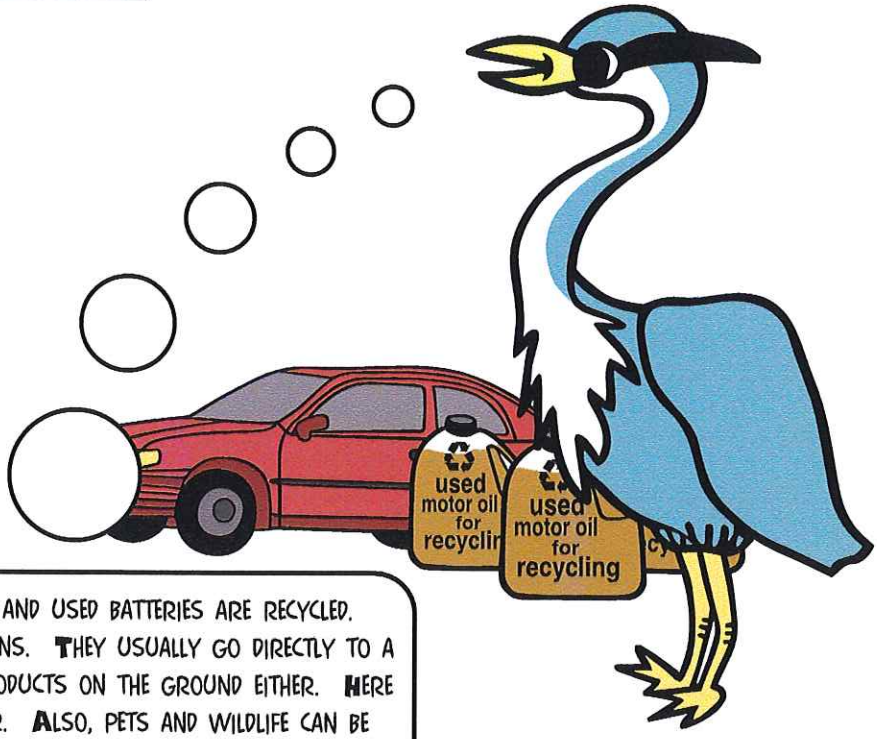
In order to keep these systems working, it's important to treat them right. To do this, you must be careful about what is put down the drain. The following things should not be put down household drains: hazardous household chemicals (for example, paints, varnishes, pesticides, drain cleaners), motor oil and other automotive fluids, cooking oils and grease, and large amounts of bulky materials such as kitter litter, diapers, or paper towels. These items may cause a septic system to stop working and can contaminate ground water.

Conserve

It's also important to conserve water with a septic system. The less water the septic system treats, the longer the system will last.

Getting Around

You may not think of cars as a source of water pollution but they can be. Think of a parking lot or street. All that oil, grease, and other fluids that stain the pavement are washed into local waterways when it rains or as snow melts. Little bits of tires and brakes that wear off the car drop onto the pavement and are washed into waterways too. How do you avoid this pollution? Cars should be maintained properly and leaks fixed as soon as possible. That makes safety and environmental sense!



BE SURE USED MOTOR OIL, ANTIFREEZE, AND USED BATTERIES ARE RECYCLED. NEVER DUMP ANYTHING DOWN STORM DRAINS. THEY USUALLY GO DIRECTLY TO A LOCAL WATERWAY. NEVER DUMP THESE PRODUCTS ON THE GROUND EITHER. HERE THEY CAN SOAK INTO THE GROUND WATER. ALSO, PETS AND WILDLIFE CAN BE ATTRACTED TO SWEET TASTING ANTIFREEZE, BUT IT'S TOXIC TO THEM.

Scoop the Poop

Feces, guano, dung, poop, and road apples are all forms of animal waste which can be a serious water pollution problem. Too much animal waste from pets, wildlife, or livestock adds too many nutrients and disease-causing bacteria to the water.

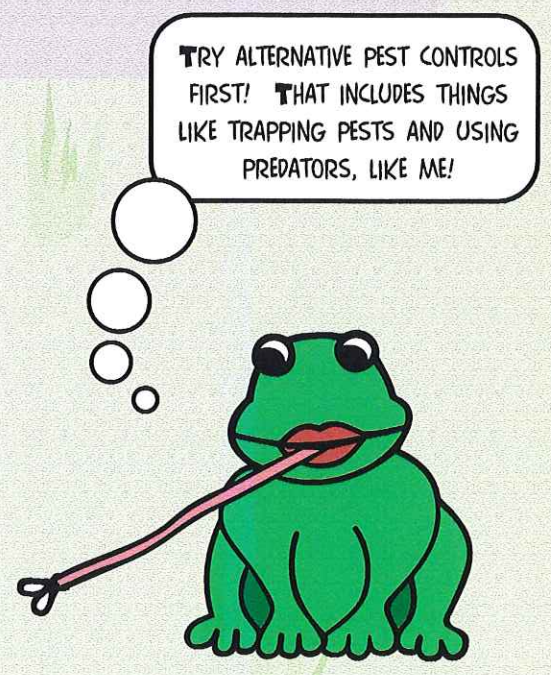
If you walk your pet near a lake or stream, it's important to clean up after your dog. Don't leave animal waste on the sidewalk or roadway either. When it rains, the waste can be washed down the storm drain to the nearest waterway.

Trees, Turf, Bugs and Birds

Most people like a healthy landscape surrounding their home. It can increase the value of your home and produce environmental benefits such as preventing soil erosion, keeping your home cooler in the summer, and filtering pollutants from runoff. The right combination of plants can even attract wildlife, butterflies, and birds.

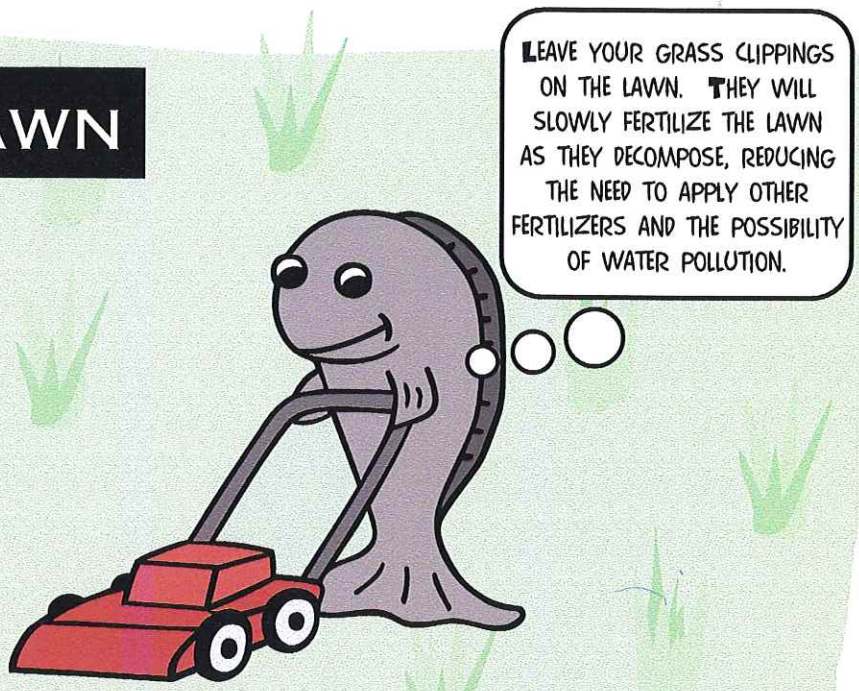
Unfortunately using too many fertilizers and pesticides on lawns and gardens can also be a source of pollution. It's important to use these products wisely - at the right time and the right amount - if they're needed at all. Make sure the products are needed and, if so, use them according to the label.

Many people consider all insects to be harmful to the lawn or garden, but most insects are not harmful. In fact, many of them eat other harmful insects. Don't automatically turn to pesticides. These chemicals can also be dangerous to human health and the environment. All home and garden pesticides are poisonous to some degree. The most important thing to remember is to read and follow the label carefully if you are going to use a pesticide.



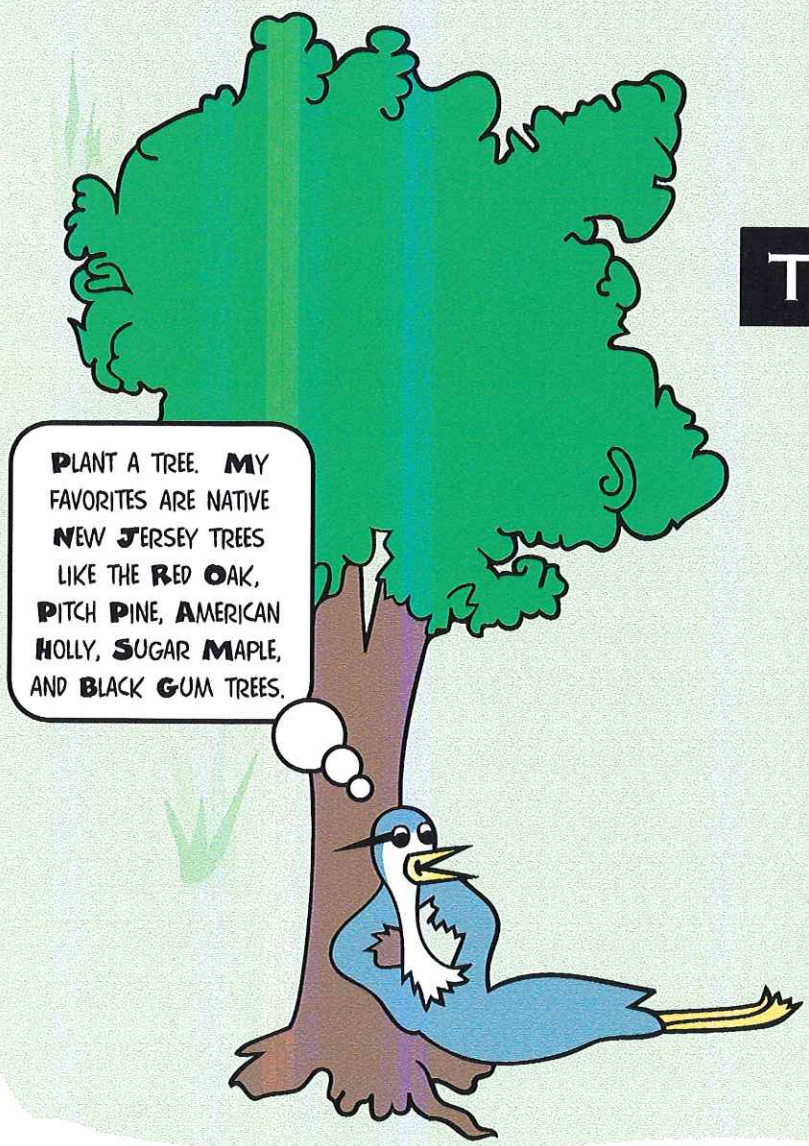
Mowing the Lawn

Always mow with a sharp blade set at the right height (about 2 to 3 inches). Never mow more than one third of the grass height. Cutting more will stress you lawn's health, opening the door to weeds and disease. A healthy lawn doesn't need pesticides.



Trees Are Tops

Trees provide a whole range of environmental benefits. They provide shade - especially important during a hot summer day. This keeps your house cooler and shelters other plants from the drying sun. Trees use nutrients and can prevent those nutrients from entering waterways. Their roots hold the soil in place, thereby preventing soil erosion.

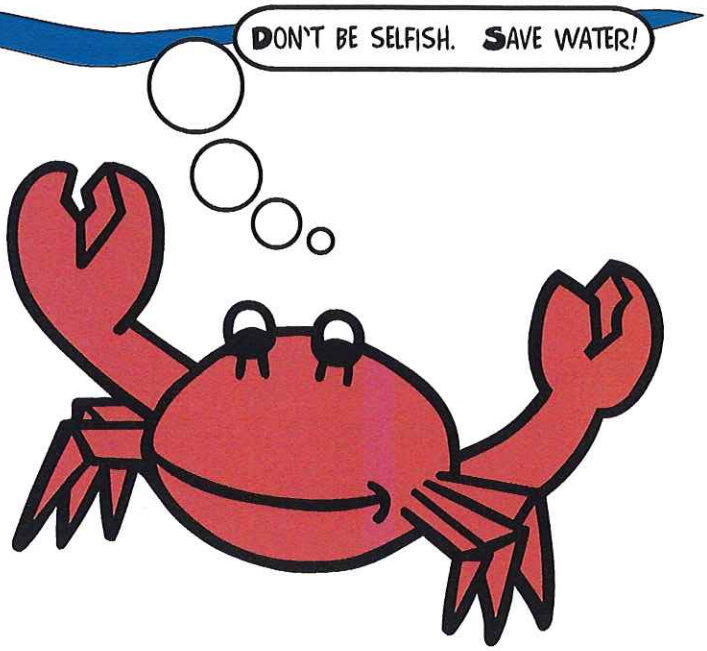


Slow the Flow

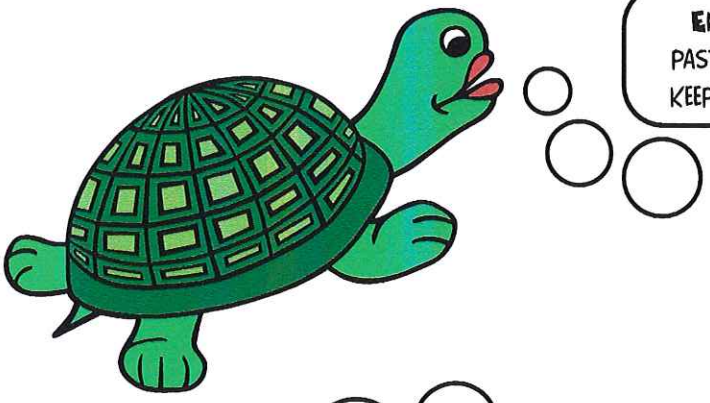
Like any valuable resource, water should be conserved both outdoors and indoors. We can't make new water so we need to conserve the clean water that's available to us.

Inside the home: Don't let the water run while you brush your teeth. Take short showers. Flush only when necessary. Don't use the toilet as a trash can.

Outside the home: Don't overwater the yard. Sweep sidewalks and driveways rather than hose them down. Use plants that don't need a lot of water.



Boating and Fishing Tips

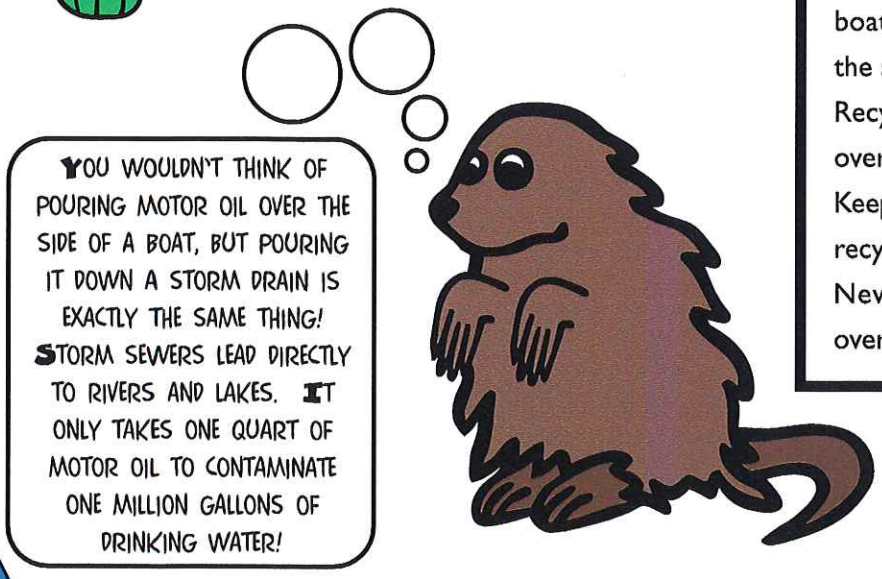


Slow down and observe "No Wake" zones, which are designated to protect the shore. A wake is the wave caused by a boat moving too quickly through the water. Fast moving boats cause large waves that can cause the shoreline to erode.

Recycle old fishing line. Never throw it overboard.

Keep a trash bag handy and remember to recycle.

Never dispose of bait or fish waste overboard.



GLOSSARY

AQUIFER - water filled underground layers of cracked rock, sand, gravel, or clay. Wells tap into aquifers to provide water for people to use.

EROSION - movement of soil commonly caused by running water or wind.

EVAPORATION - movement of water from land to the air when the sun heats up water and it becomes water vapor.

FERTILIZER - nutrient source for plants.

GROUND WATER - water that lies beneath the earth's surface.

PESTICIDE - chemical used to control a pest, such as an insect, weed or rodent.

POLLUTED RUNOFF - rain water or snow melt that carries pollutants.

PRECIPITATION - water that falls back to land from clouds as snow, sleet, hail or rain.

RECYCLE - reuse of materials such as plastic, glass or metal in either its original or different form rather than putting them in the garbage.

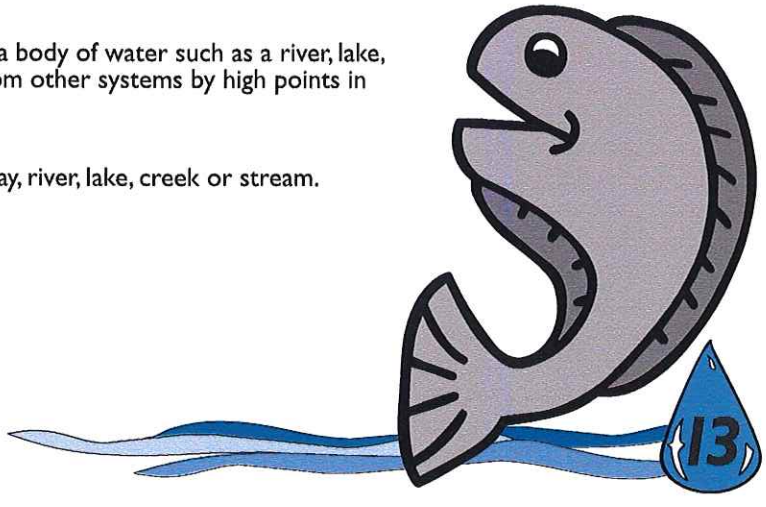
STORM SEWERS - underground pipe system that carries stormwater from streets and parking lots to local waterways.

TRANSPIRATION - movement of water from plants to the air.

WATER CYCLE - natural process of recycling water from the land to the air and back again, also called the hydrologic cycle.

WATERSHED - the area of land that drains into a body of water such as a river, lake, stream or bay. It is separated from other systems by high points in the area such as hills or slopes.

WATERWAY - a body of water, for example a bay, river, lake, creek or stream.

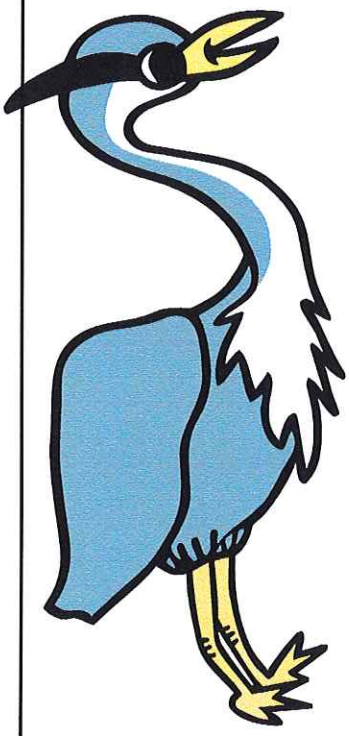


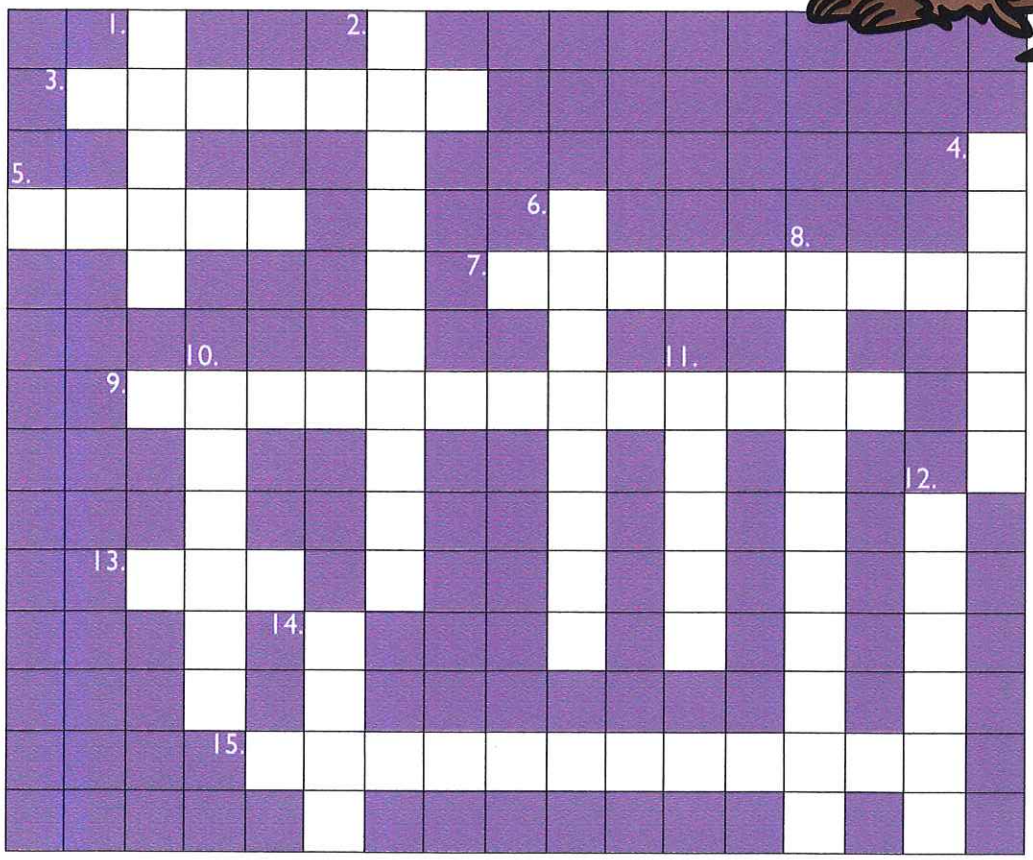
CLEAN WATER RAINGERS

CROSSWORD

DOWN

1. FOR MILLIONS OF YEARS, _____ HAS BEEN REUSED AND RECYCLED.
2. USING TOO MUCH _____ ON YOUR LAWN CAN CAUSE WATER POLLUTION.
4. _____ YOUR USE OF PESTICIDES.
6. _____ , NUTRIENTS, SOIL PARTICLES AND TOXIC SUBSTANCES ARE FOUR TYPES OF POLLUTION IN RUNOFF.
8. A _____ _____ IS NOT A GARBAGE DISPOSAL.
10. RAINWATER _____ CAN BECOME POLLUTED AS IT FLOWS ACROSS THE LAND.
11. _____ CAN HELP PREVENT WATER POLLUTION BY USING NUTRIENTS AND HOLDING SOIL IN PLACE.
12. RAINWATER SEEPS INTO THE SOIL TO BECOME _____ WATER.
14. FRANCINE ____ EATS INSECTS AND IS AN ALTERNATIVE PEST CONTROL.





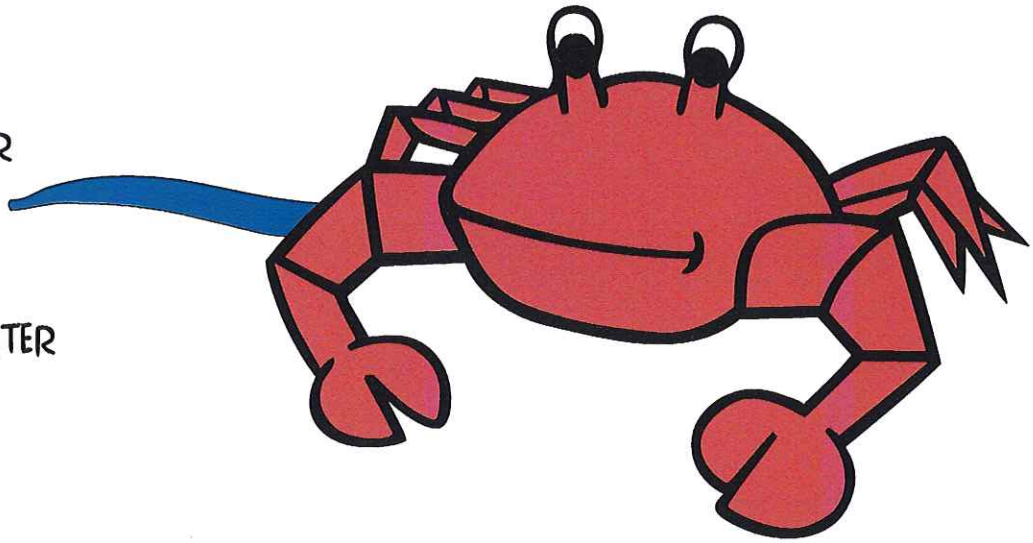
ACROSS

3. THE CLEAN WATER _____ TEAM IS WORKING TO KEEP NJ'S WATER CLEAN.
5. _____ UP AFTER PETS.
7. THE LAND SURROUNDING A WATERWAY IS ITS _____ .
9. RAIN AND SNOW ARE TWO TYPES OF _____ .
13. ____ CAN HELP KEEP WATER CLEAN.
15. USING PLANTS THAT DON'T USE A LOT OF WATER IS ONE WAY TO PRACTICE WATER _____ .

CLEAN WATER RAINGERS WORD SEARCH

FIND THESE WORDS ACROSS, DOWN, UP OR DIAGONALLY.

AQUIFER
BACTERIA
CLEAN WATER
CONSERVE
EROSION
FERTILIZER
GROUND WATER
LITTER
PESTICIDE
RAIN
RAINGERS
RECYCLE
RUNOFF
STORM DRAIN
STORM SEWER
WATER CYCLE
WATERSHED



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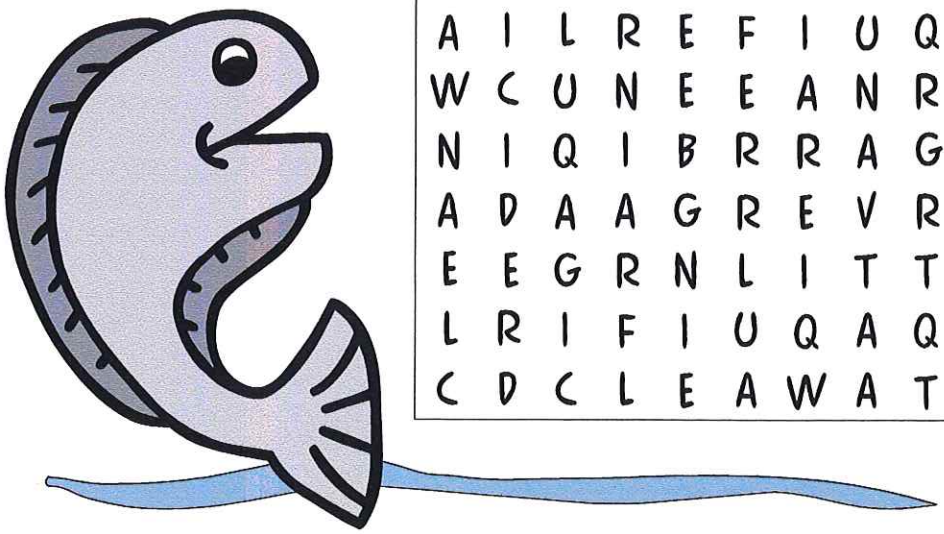

CROSSWORD ANSWERS

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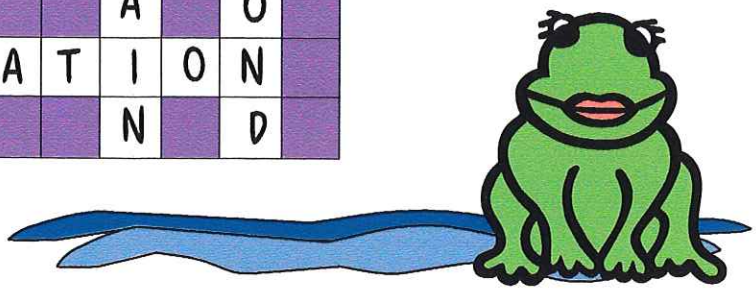
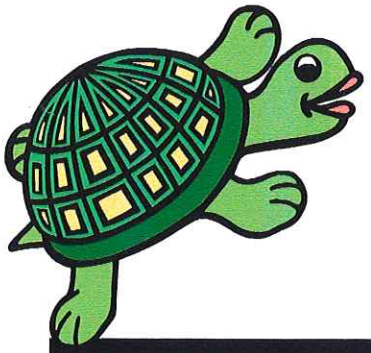


WORD SEARCH ANSWERS



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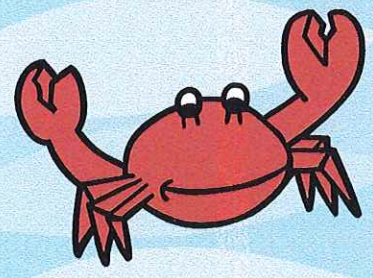
cut along the dotted line for your own official Clean Water Raingers member certificate

OFFICIAL MEMBER

_____

name

As an official member of the Clean Water Raingers Team, I pledge to follow all the rules of the Clean Water Raingers, and to work hard to keep the water and the world free from the dangers of pollution.



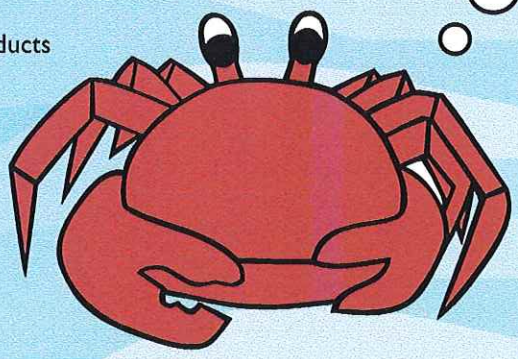
Claudius Crab

Claudius Crab,
Member of the Clean Water
Raingers Team

CLEAN WATER RAINGERS

1. Never throw anything down storm drains. They are for rainwater only.
2. Don't litter. Always put trash where it belongs.
3. Always clean up after your pets. Obey your town's "pooper scooper" laws.
4. Tell others how important it is to keep our land and water clean.
5. Plant a tree. They take pollutants out of ground water, provide shade, and clean the air.
6. Find out what waterway you live near. Where does your water come from?
7. Buy products that use the least amount of packaging.
8. Recycle. Find out what is recyclable in your community. Buy products in recycled or recyclable containers.
9. Learn about environmental issues. Get involved in local organizations.
10. Conserve water whenever possible. For example, turn off the water while brushing your teeth and don't linger in the shower.

BECOME AN OFFICIAL MEMBER OF THE CLEAN WATER RAINGERS BY FOLLOWING THESE IMPORTANT TIPS TO HELP PROTECT CLEAN WATER.



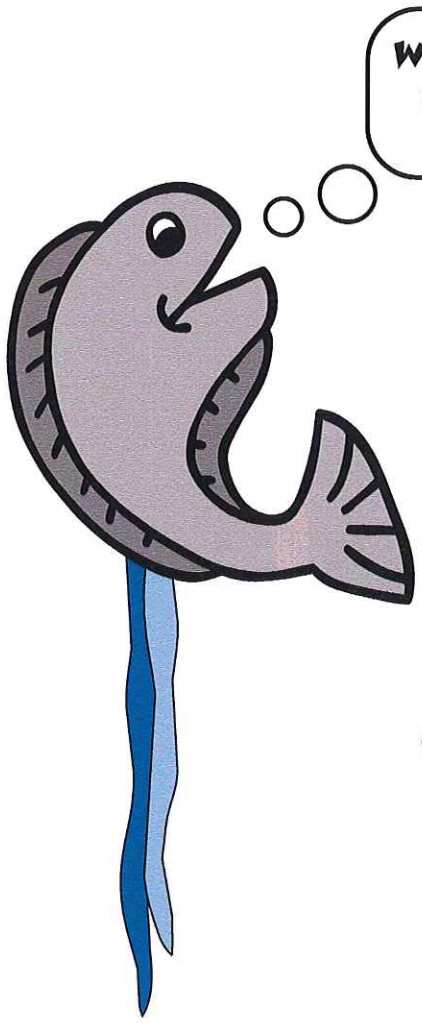
YOU'VE GOT THE KNOW-HOW NOW!

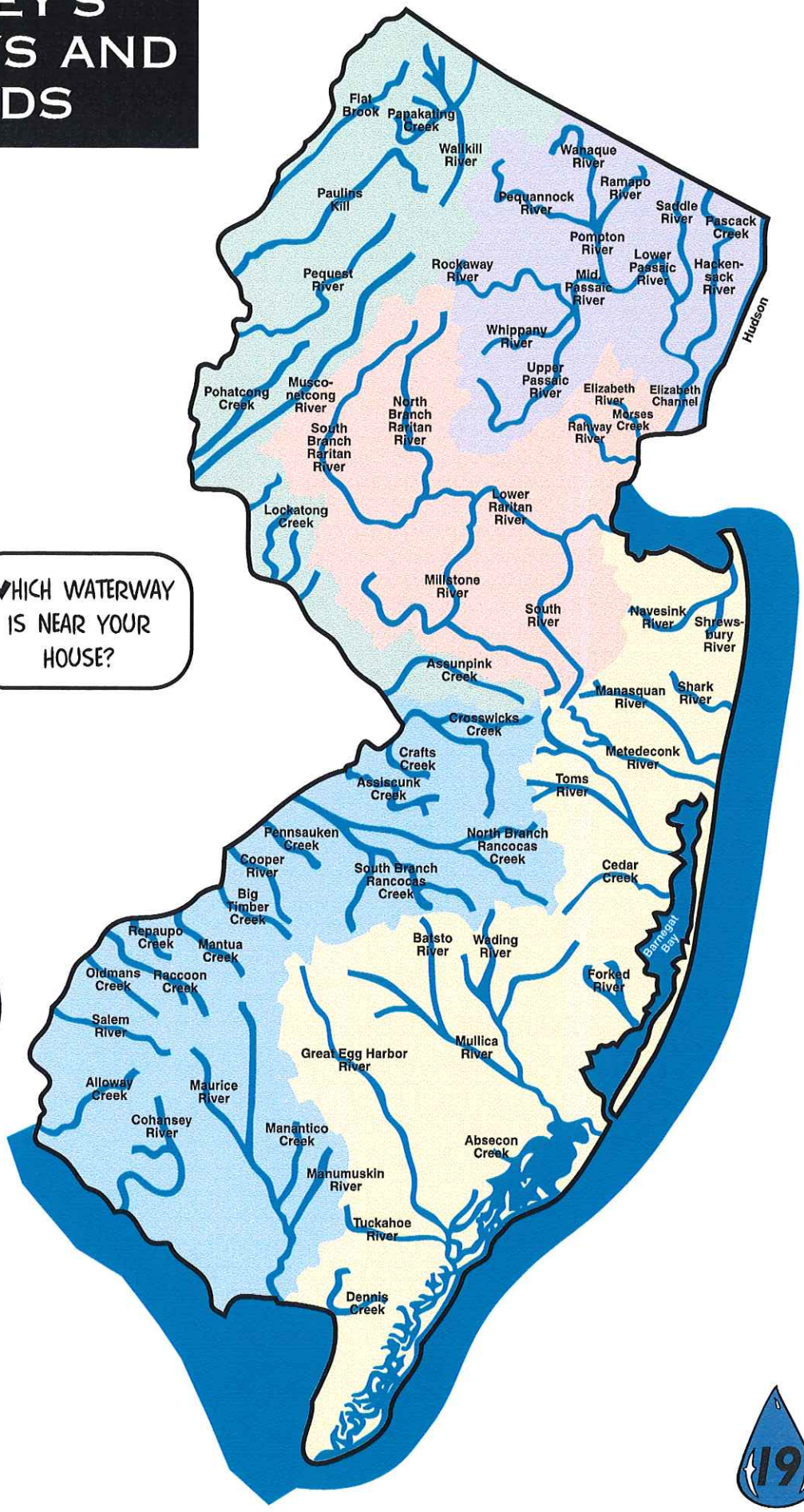
Now you know how to be a Clean Water Rainger! Join the team. Thanks for taking the time to read about how you can become a member of the team that's part of the solution to water pollution.

New Jersey's Waterways and Watersheds

Watersheds

- Atlantic Coastal
- Lower Delaware
- Northeast
- Northwest
- Raritan





New Jersey Department of Environmental Protection
Division of Watershed Management
PO Box 418
Trenton, NJ 08625-0418
www.nj.gov/dep/watershedmgt

CLEAN WATER RAINGERS

THIS BOOK BELONGS TO:

Learn more using Stormwater Lessons and Resources

Stormwater lessons that can be used in conjunction with this Clean Water Rainger Activity Book can be found on the New Jersey Department of Environmental Protection website at www.nj.gov/dep/seeds/strmwtr/edres.htm
Additional water education resources are also available through this website.

More general information about watersheds, nonpoint source pollution and stormwater can be found at www.cleanwaternj.org/ or www.nj.gov/dep/watershedmgt/

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