United States
Environmental Protection
Agency

Office of Water
(4501F)
Washington, DC 20460

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April 2001

Water Drop Patch Project

photo by Sally LaBaugh

Making A Difference

Girl Scouts.

This project was jointly developed by the United States Environmental Protection Agency (EPA) and the Girl Scout Council of the Nation's Capital (GSCNC). The purpose of the project is to encourage girls to:

- Make a difference in their communities by becoming watershed and wetlands stewards
- Use their skills and their knowledge to educate others in their communities about the need to protect the nation's valuable water resources
- Explore the natural world to gain an interest in science and math
- Use the Internet as a source of information

TROOP LEADERS SHOULD CONSULT WITH *SAFETY-WISE* BEFORE CONDUCTING ANY OF THESE ACTIVITIES. ANY PROJECTS IN OR NEAR THE WATER MAY POSE SERIOUS SAFETY HAZARDS. CHECK WITH YOUR COUNCIL TO SEE IF PERMISSION IS REQUIRED FOR ANY OF THE FIELD ACTIVITIES.

Girl Scouts.

Additional copies of this booklet can be obtained by calling the National Service Center for Environmental Publications at 1-800-490-9198. Comments or questions can be directed to Patricia Scott, USEPA, at (202) 566-1292.

Thanks to the passage of the Clean Water Act 25 years ago, America has seen much progress in cleaning up the nation's rivers, lakes, streams, and coastal waters. In 1972, the Potomac River was too dirty for human contact, aquatic life in Lake Erie was dying and Ohio's Cuyahoga River was so polluted it caught fire. Many rivers and beaches were little more than open sewers. Conditions in these and thousands of other waterbodies are much better today. The nation has made tremendous progress in addressing pollution from sewage treatment plants and industrial facilities.

Despite these accomplishments, many challenges remain, including threats to human health. Approximately 40 percent of monitored waters still fail to meet state water quality standards, which means that they do not support basic uses like swimming and fishing. Although wetlands losses have slowed, the nation continues to lose about 60,000 wetlands acres per year. A disturbing number of freshwater fish species are now threatened or endangered.

Many of the remaining pollution problems come from many different sources–not just from a pipe. Polluted runoff from city and suburban streets, construction sites, and farms is the primary reason many of our waters are not fishable or swimmable. Tackling these problems will not be easy. But Girl Scouts can help make a difference by becoming watershed stewards in their communities.

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To order Water Drop patches (at $1.00 each), please write to:

Membership, Program, & Diversity, 15th floor, Girl Scouts of the USA, 420 Fifth Avenue, New York, NY 10018-2798

Name: _____

Address: _____

Girl Scount Council: _____

Number of patches needed: _____ Total amount enclosed: $ _____

Background Information

What is a Watershed?

A watershed is a land area from which water drains into a receiving body of water. Receiving bodies of water can include streams, lakes, wetlands, estuaries, and groundwater. Watersheds come in different shapes and sizes, and local watersheds are subwatersheds (or subbasins) of larger, regional ones. The Potomac watershed, for example, is a subbasin of the larger Chesapeake Bay watershed.

What is Nonpoint Source Pollution?

Unlike pollution from factories and sewage treatment plants, nonpoint source pollution comes from many different areas with no particular place of origin. It is caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, coastal waters, and even underground sources of drinking water. These pollutants include:

- Excess fertilizers, herbicides, and insecticides from farms, cities, and suburban streets
- Oil, grease, and toxic chemicals from urban runoff and energy production
- Sediment from improperly managed construction sites, crop and forest lands, and eroding streambanks
- Salt from irrigation practices and acid drainage from abandoned mines
- Bacteria and nutrients from livestock, pet wastes, and faulty septic systems

Acid rain and changes to stream flow, such as dams and concrete channels, are also sources of nonpoint source pollution. Acid rain, much of which comes from cars and power plants, is rich in nitrogen, which can overstimulate the growth of aquatic weeds and algae. This in turn can deplete oxygen and kill aquatic life. Channelization reduces the ability of streams to assimilate or absorb waste and disturbs fish breeding areas.

What is a Wetland?

Wetlands are areas of land that are wet at least part of the year. Wetlands are populated by plants well adapted to grow in standing water or saturated soils. There are many different types of wetlands, including marshes, bogs, fends, swamps, prairie potholes, and bottomland hardwood forests. Wetlands may not always appear to be wet. Many dry out for extended periods of time. Others may appear dry on the surface but are saturated underneath.

What are the Basic Characteristics of Wetlands?

Wetlands share three basic characteristics: 1) hydrology (water), 2) hydric soils (soils that form due to presence of water), and 3) hydrophytic vegetation (plants adapted to living in saturated soils).

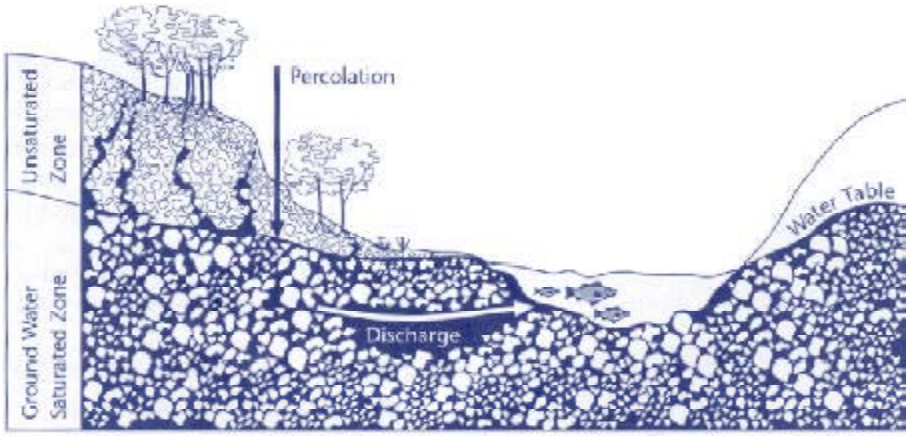
Wetland Benefits

These complex ecosystems play an important role in the health of our environment and the quality of our water. Wetlands provide support for:

- Fish and wildlife habitats
- Complex food webs
- Water absorption to reduce storm flooding and damage
- Sediment traps
- Erosion control
- Water quality
- Groundwater replenishment; maintaining flows in streams by releasing water during dry periods
- Open space and aesthetic value

What is Groundwater?

Beneath the land's surface, water resides in two general zones, the saturated and the unsaturated. The unsaturated zone lies directly beneath the land surface, where air and water fill in the pore spaces between soil and rock particles. Water saturates the zone beneath the unsaturated one.



The term "groundwater" refers to water in the saturated zone. This water is an important natural resource and used for many purposes, including drinking water, irrigation and livestock raising.

Half the water used in the United States for drinking water comes from groundwater.

Surface water replenishes (or recharges) groundwater when it percolates through the unsaturated zone. Therefore, the unsaturated zone plays an important role in groundwater hydrology and may act as a pathway for groundwater contamination. Groundwater can move laterally and emerge at discharge sites, such as springs on hill sides, or seep in from the bottoms of streams, lakes, wetlands, and oceans. Therefore, groundwater affects surface water quantity and quality because polluted groundwater can contaminate surface waters. Conversely, some surface waters, such as wetlands, hold flood waters and allow them to soak slowly into the groundwater. When wetlands are filled or drained, groundwater may dry up.

Did You Know?

Half the drinking water in the United States comes from groundwater.

The Environmental Protection Agency is requiring water suppliers to put annual drinking water reports in the hands of their customers. Between April and October 1999, and by July 1, thereafter, water suppliers will be providing "Consumer Confidence Reports." These reports, to be issued with utility bills, will provide fundamental information, including, for example, the source of your local drinking water (lake, river, aquifer, or other source), its susceptibility to contamination, and the level or range of any contaminants found.

Girl Scout Patch Requirements

Brownies—Do any **four** of the first nine requirements
Juniors—Do any **five** of the first nine requirements
Cadettes—Do any **six** of the first thirteen requirements
Seniors—Do any **seven** of the twenty requirements

1. After answering the questions on the Home and Lawn Care checklist (pages 10-11), plan how you and your family can change three to five "no" answers to "yes." Share your plan with your troop and members of your neighborhood. See how many "yes" answers others girls in your troop have. Or, use *Give Water a Hand Action Guide* to identify changes you can make on your farm, at your school or in your community (page 12).

2. Wetlands provide many benefits. They help reduce flooding, sustain stream flow, filter polluted waters, provide habitat for wildlife, and support biological diversity. Visit a National Wildlife Refuge (NWR) or a locally-protected wetland. Using the list on page 4, see how many wetland characteristics you can identify. Call EPA's Wetlands Helpline at 1-800- 832-7828 for help in finding the nearest NWR or wetland resource.

3. Enter the international "River of Words" Poetry and Art contest. The contest, open to youth between the ages of 5 to 19, invites children to explore and interpret their local watershed through the arts. To obtain an entry form or more information, contact River of Words, P.O. Box 4000-J, Berkeley, CA 94704; Tel: (510) 548-POEM or download an entry form at ***www.riverofwords.org***

4. Find out what different plants and animals live in your watershed. The Chesapeake Bay, for example, is home to more than 27,000 species of plants and animals. How many kinds of wildlife can you identify? (e.g., crabs, oysters, waterfowl and fish)? Why are underwater bay grasses (SAV) important? Check your answers by visiting EPA's Chesapeake Bay Office online at ***www.chesapeakebay.net***. Or call 1(800)YOUR-BAY.

5. Go on a hike with your troop and follow a local creek or stream. Where does the stream ultimately drain? What does it pick up along the way? What happens when it rains? How does the stream change? What insects, birds, plant or aquatic life do you observe? Use a United States Geological Survey (USGS) map or draw your own to illustrate your local watershed. USGS topographic maps can be obtained by calling 1-888-ASK-USGS (cost is $4). Share with others what you have learned.

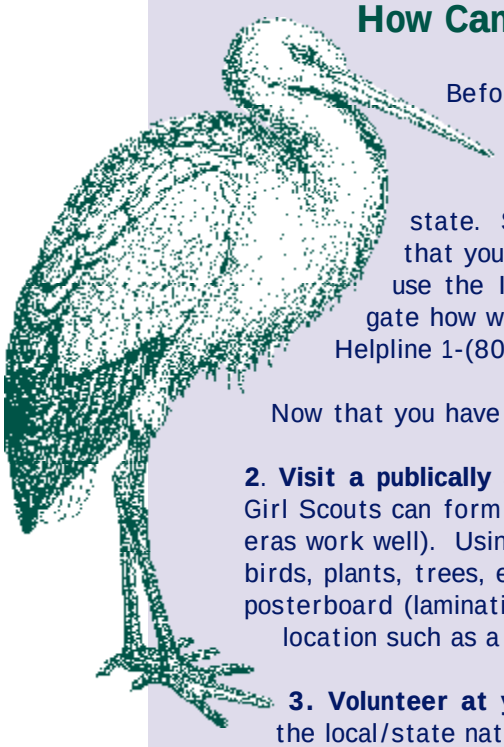
6. The USGS has developed a series of full color water education posters to help you learn about water. The topics include: oceans, watersheds, hazardous waste, wetlands, water use, wastewater treatment, navigation, ground water, and water quality (watersheds, hazardous waste, and oceans posters are also available in Spanish). The colorposters include activities on the back and are available in two versions; one for students in grade school (grades 2-5) and the other for students inmiddle school (grades 6-8). The water use poster is available in blackand

white and can be colored. The full color posters attach together to create a large wall mural. Get together with your troop and put up a water mural where others in your community can see it. Individual posters can be ordered by calling 1-888-ASK-USGS. (Not all the posters are currently available, and orders are limited to one poster per individual.)

7 Visit a local aquarium or a natural history museum to see specimens of aquatic life. Share your experiences with your troop and family. Consider visiting one of *Coastal America's* Coastal Ecosystems Learning Centers if there is one near you. Check out *Coastal America* on-line at ***www.coastalamerica.gov*** or call (202) 401-9928. Find out how Coastal America, a partnership of eleven federal agencies and the Executive Office of the President, is helping to protect the manatee, the whooping crane, salmon and the right whale.

8 Visit a local sewage treatment plant or water filtration plant to see how wastewater is treated or drinking water is purified. Look at the treated water as it is being discharged into your river, stream or estuary. Is it clear? Does it stink?

9 Participate in a special activity during May to celebrate American Wetlands Month or during the third week of October to celebrate National Wildlife Refuge (NWR) week. For wetlands ideas, see the list below, visit the Terrene Institute's Web Page at ***www.terrene.org*** or call (703) 548-5473. For NWR week, contact the Fish and Wildlife Service at 1-800-344-WILD or visit ***www.fws.gov.***



How Can I Help Protect Wetlands?

Before you can protect them, you have to understand them...

1. Be a Wetlands Detective! Investigate why wetlands are unique. Research what kinds of animals and plants live in the wetlands in your state. Start a journal to record the names of birds, frogs, insects, and plants that you might find in a local wetland. Try to draw them! Go to the library or use the Internet to uncover the mysteries of wetlands. Don't forget to investigate how wetlands function to keep a healthy watershed. Call the Wetlands Helpline 1-(800) 832-7828 for a list of websites and educational materials.

Now that you have learned about wetlands, go explore one...

2. Visit a publically accessible wetland and design a photograph posterboard display. Girl Scouts can form teams of 2-3, each team carrying their own camera (disposable cameras work well). Using a field guide, each team photographs 4-5 items, such as insects, birds, plants, trees, etc. Teams then label/describe the photos and mount onto posterboard (laminating posters is recommended). Finally, display the poster in a public location such as a library, church, or school!

3. Volunteer at your local wetland! Call your county's agricultural extension agent or the local/state natural resource management agency and get a list of ongoing wetland/stream restoration projects.

10 Work with your troop to organize a Storm Drain Stenciling Project in your neighborhood. Produce and distribute a flyer or door hanger for local households to make them aware of your project and to remind them that storm drains dump directly into your local waterbody. Guidelines for the project are on pages 14-15.

11 Go on a stream, wetlands, or lake walk and make observations and assessments of waterbody conditions. See Page 18 for streamwalk guidelines. Call EPA's Region 10 Office at (206) 553-1200 to request a teacher's guide, other manuals, and data collection sheets.

12 Do a display or presentation on groundwater and how pollutants threaten its purity. Show where your drinking water comes from. (Girl Scouts can check their family water utility bill or visit EPA's web page at ***http://www.epa.gov/ow/states.html***. Click on the map and link to information about local drinking water). Make an Aquifer Model (pages 30-31) part of your presentation. Or, contact the Blue Thumb project and participate in an activity to celebrate National Drinking Water week (see page 31).

13 Design a "mock-up" of your watershed. Share it with younger groups. Use EPA's Locate Your Watershed (***www.epa.gov/surf***) and Index of Watershed Indicators web sites (***www.epa.gov/iwi***) or the resources list (pages 40-41) to create it.

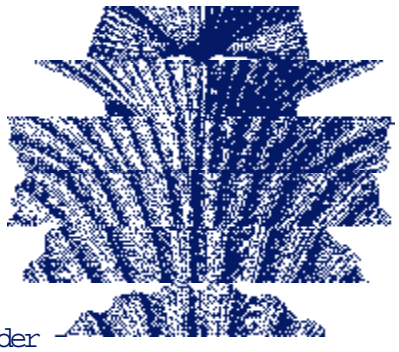
14 Share your knowledge of water pollution with younger children, perhaps Daisy or Brownie Girl Scouts or a local elementary school class. Consider doing a presentation about your local watershed. Discuss threats to its health, such as excess nutrients or habitat loss. Highlight things that Girl Scouts and their families can do to protect water quality (see checklist on pages 10 -12). Your watershed may even have its own web page. For example, you can visit the Chesapeake Bay's web page at ***www.chesapeakebay.net.*** If you live in the Mississippi River drainage basin, check out http://www.epa.gov/msbasin/. Or, visit EPA's Office of Water homepage at www.epa.gov/ow for other links and resources.

Did you Know?

- **The Chesapeake Bay is an estuary where salt and fresh water mix.**
- **The Bay receives about half of its water volume from the Atlantic Ocean (salt water). The rest (fresh water) drains into the Bay from an enormous 64,000-square-mile drainage basin or watershed.**
- **The watershed includes parts of six states (DE, MD, NY, PA, VA, and WV) and the District of Columbia.**
- **Ninety percent of the fresh water entering the Bay comes from five major rivers: the Rappahannock, the Susquehanna (responsible for 50%), the Potomac, the James, and the York.**
- **The Bay is the largest estuary in North America.**
- **The Bay is home to 27,000 species of plants and animals.**

Do you know your watershed address? If not visit the *Watershed Information Network Web Site* at *http://www.epa.gov/win*. Locate your watershed and learn about its health.

15 Work with troops in your service unit and your local government to organize or join in a stream, wetland or beach cleanup. Consider participaing in the annual International Coastal Cleanup sponsored by the Center for Marine Conservation (CMC) held every September. See resources list on pages 40-41. Be sure to follow safety guidelines on page 13.



- Keep track of the kinds of trash collected. If it primarily comes from fast food restaurants, consider working with local restaurant owners to put up signs encouraging people not to litter in their community.
- If possible, separate the trash for recycling. Have different colored bags for paper, plastic, glass, and aluminum
- Take "before and after" photos of your efforts. Send them to a local paper to publicize your efforts.

16 Create a wildlife habitat or another conservation project in your backyard or troop meeting location. Call the Natural Resources Conservation Service at 1-888-LANDCARE for a free backyard conservation booklet that outlines 10 conservation activities (See pages 32-37 for guidelines on creating a backyard wildlife habitat). Or consider joining the National Wildlife Federation's Backyard Habitat Program and receive a certificate and sign for your project (see page 37).

17 Find a watershed group in your community and volunteer to help with a project (e.g., tree planting, habitat restoration project, etc.) Use the Environmental Protection Agency's *Adopt Your Watershed* Internet site (**www.epa.gov/adopt**) to search for an organization active in your watershed.

18 Sponsor a Groundwater Festival or Watershed Festival in your community to raise awareness about the importance of clean water and watershed protection. (See list of resources on pages 40-41.)

19 Identify several women working in water resource protection and invite them to come to speak to your troop about their careers.

20 Become a volunteer water quality monitor. Help collect quality data and build stewardship for your local waterbody. Attend a training workshop to learn proper monitoring techniques and safety rules (See page 17).

Safety First!

Any activities in or near the water can pose serious safety hazards. Carefully read *Safety-Wise* before beginning any of the field activities. Heavy rubber gloves are strongly recommended for all cleanup activities. Check with your Council to see if permission is required for any of the field activities listed in this guide.

Home and Lawn Care Checklist "Personal Pollution" (All Ages)

When rain falls or snow melts, the seemingly small amounts of chemicals and other pollutants in your driveway, on your lawn and on your street are washed into storm drains. In many older cities, the stormwater runoff is not treated and runoff flows directly into rivers, streams, bays and lakes. Pollutants in this runoff can poison fish and other aquatic animals and make water unsafe for drinking and swimming.

What can you do to help protect surface and groundwaters from polluted runoff? Start at home. Take a close look at practices around your house that might contribute to polluted runoff. The following is a checklist to help you and your family become part of the solution, instead of part of the problem.

Household Products

1. **Do you properly dispose of household hazardous waste such as left over paint, excess pesticides, nail polish remover, varnish, etc. by taking them to your city or county's hazardous waste disposal site or by putting them out on hazardous waste collection days**? Labels such as **WARNING, CAUTION and DANGER** indicates the item contains ingredients that are hazardous if improperly used or disposed of.

   ☐ **Yes** ☐ **No**

2. **Do you select less toxic alternatives or use non-toxic substitutes?** Baking soda, distilled white vinegar, and ammonia are safe alternatives to caustic chemicals. And they save you money.

   ☐ **Yes** ☐ **No**

Do-It-Yourself Home Cleaning Products

General, multi-purpose cleaner (for ceramic tiles, linoleum, porcelain, etc.): Measure 1/4 cup baking soda, 1/2 cup white vinegar, and 1 cup ammonia into a container. Add to a gallon of warm water and stir until baking soda dissolves.

Window Cleaner: 3 tablespoons of ammonia, 1 tablespoon of white vinegar and 3/4 cup of water. Put into a spray bottle.

3. **Do you buy chemicals, fertilizers and pesticides only in the amount you expect to use, and apply them only as directed on the label?**

   ☐ **Yes** ☐ **No**

4. **Do you use low-phosphate or phosphate-free detergents?** Excess nutrients overstimulate the growth of aquatic weeds and algae, which can deplete oxygen in our stream and lakes and kill aquatic life.

   ☐ **Yes** ☐ **No**

5. **Do you recycle used oil, antifreeze, and car batteries by taking them to service stations and other recycling centers?**

   ☐ **Yes** ☐ **No**

Landscaping and Gardening

6. **Do you select plants with low requirements for water, fertilizers, and pesticides? (e.g. native plants)**
☐ **Yes** ☐ **No**

7. **Do you preserve existing trees and plant trees and shrubs to help prevent erosion and promote infiltration of water into the soil?**
☐ **Yes** ☐ **No**

8. **Do you leave lawn clippings on your lawn so that the nutrients in the clippings are recycled, less fertilizer is needed, and less yard waste goes to landfills?** If your community does not compost lawn trimming, it usually goes to landfills.
☐ **Yes** ☐ **No**

9. **Do you prevent trash, lawn clippings, leaves and automobile fluids from entering storm drains?** Most storm drains are directly connect to our streams, lakes, and bays.
☐ **Yes** ☐ **No**

10. **If your family uses a professional lawn care service, do you select a company that employs trained technicians and minimizes the use of fertilizers and pesticides?** ☐ **Yes** ☐ **No**

11. **Do you have a compost bin or pile? Do you use compost and mulch (such as grass clippings or leaves) to reduce your need for fertilizers and pesticides?** Compost is a valuable soil conditioner which gradually releases nutrients to your lawn and garden. In addition, compost retains moisture in the soil and thus helps conserve water and prevent erosion and runoff. Information about composting is available from your county extension agent.
☐ **Yes** ☐ **No**

Did You Know?

One quart of oil can contaminate up to two million gallons of drinking water!

12. **Do you test your soil before fertilizing your lawn or garden?** Over-fertilization is a common problem, and the excess can leach into groundwater and contaminate rivers or lakes.
☐ **Yes** ☐ **No**

13. **Do you avoid applying pesticides or fertilizers before or during rain?** If they run off into the water, they will kill fish and other aquatic organisms.
☐ **Yes** ☐ **No**

Water Conservation

Homeowners can significantly reduce the volume of wastewater discharged to home septic systems and sewage treatment plants by conserving water. If you have a septic system, you can help prevent your system from overloading and contaminating ground and surface water by ensuring that it is functioning properly and decreasing your water usage.

14. **Do you use low-flow faucets, shower heads, and reduced-flow toilet flushing equipment?**
☐ **Yes** ☐ **No**

15. **Do you wash your car on the lawn to help filter pollutants? Do you use a bucket**

instead of a hose to save water? If you go to a commercial carwash, do you use one that uses water efficiently and disposes of runoff properly?

☐ **Yes** ☐ **No**

16. **Do you use dishwashers and clothes washers only when fully loaded?**

☐ **Yes** ☐ **No**

17. **Do you take short showers instead of baths and avoid letting faucets run unnecessarily (e.g., when brushing teeth)?**

☐ **Yes** ☐ **No**

18. **Do you repair leaking faucets, toilets, and pumps to conserve water?**

☐ **Yes** ☐ **No**

19. **Do you conserve the amount of water you use on lawn and only water in the morning and evening to reduce evaporation?** Over-watering may increase leaching of fertilizers to groundwater.

☐ **Yes** ☐ **No**

20. **Do you use slow watering techniques such as trickle irrigation or soaker hoses?** These devices reduce runoff and are 20 percent more efficient than sprinklers.

☐ **Yes** ☐ **No**

Other Things You Can Do

21. **Do you always pick up after your pet (e.g., Rover's poop)? If so, be sure to put it in the trash, flush it down the toilet, or bury it at least 5 inches deep.** Pet waste contains viruses and bacteria that can contaminate surface and groundwater.

☐ **Yes** ☐ **No**

22. **Have you helped stencil stormdrains to alert people that they drain directly to your local waterbody?** If not, get involved with a local conservation group or organize your own stenciling project.

☐ **Yes** ☐ **No**

23. **Do you ride or drive only when necessary?** Try to walk instead. Cars and trucks emit tremendous amounts of airborne pollutants, which increase acid rain. They also deposit toxic metals and petroleum by-products ☐ **Yes** ☐ **No**

24. **Do you participate in local planning and zoning in your community?** If not, get involved! These decisions shape the course of development and the future quality of your watershed.

☐ **Yes** ☐ **No**

Give Water A Hand

What is your city or town or school doing to prevent polluted runoff? GIVE WATER A HAND ACTION GUIDE contains checklists for schools, communities and farms. This guide can help you and your troop identify potential problems in your community and help you take action.

You can download a free copy of *Give Water A Hand Action Guide* and *Leader Guidebook* at *www.uwex.edu/erc*. Or to order printed copies call: University of Wisconsin-Extension (608) 262-3346, Item #4-H450 & 4-H855, Leader Guide ($4.92) & Action Guide ($6.96) Price includes shipping.

Stream/Beach Cleanup Safety Checklist

(Cadettes and Seniors only—should not be done by Brownies or Juniors)

Please read Safety Wise before beginning this activity.

Before the cleanup...

- Check with your local Department of Health or State Environmental Office about potential health concerns with the waterbody (e.g., *pfiesteria,* poor water quality, currents, mosquitos, rats, etc.)
- Ask for necessary permission to cleanup at your site. Make arrangements with the appropriate local officials to let them know the location, days, and times of your cleanup so they can come haul away the trash. They may be willing to give a talk about the history, wildlife, or environmental conditions.
- Make sure that someone knows where, when, and for how long you will be out.
- Develop a safety plan. Find out the location and telephone number of the nearest phone. Locate the nearest medical center and write down directions.
- Have each member of the cleanup team complete a permission slip and a medical form that includes emergency contacts, insurance information, and pertinent health information such as allergies, diabetes, epilepsy, etc.
- Listen to weather reports. Never conduct a cleanup if severe weather is predicted or a storm occurs while at the site. You could drown.
- Have a first aid kit handy. **See SAFETY WISE.** It's best if at least one team member has first aid/CPR training.

At the cleanup site ...

- **Leave syringes and needles alone!** Notify someone in charge and mark the spot with a flag or a large rock so someone can find it later.
- Don't walk on unstable stream banks. This could be dangerous as well as cause erosion. Stay off dunes and avoid nesting areas.
- If you must walk across the stream, use a walking stick because the stream bottom could be slippery, treacherous, and even contain deep pools. Do not attempt to walk across streams that are swift and above the knee in depth. These can kill.
- Look out for plants like poison ivy, poison oak, sumac. These can cause rashes and skin irritation.
- Watch for wildlife–snakes, ticks, hornets, and wasps. Also beware of large animals like dogs, alligators, snapping turtles, and farm animals.
- **Wear rubber gloves (like dishwashing gloves) to protect hands and arms.** Be careful with broken glass and rusty cans.
- Always stay with a buddy. Teams of three or four are probably best.
- **If you see anything abnormal (e.g., dead fish, oil spills, leaking barrels, bulk trash) contact your city or county environmental department right away and report the nature and location of the problem.**

Suggested Items to Bring or Wear

Shoes or boots that offer coverage & support, at least over the ankles

Heavy Rubber gloves (like dishwashing gloves) to protect hands and arms

Safety vests (brightly colored); Day-glo orange is best!

Hats

Large Plastic Bags

Heavy sacks for sharp objects

Sunscreen

Medications (e.g. for bee allergies, diabetes, if needed)

Insect repellant

List of emergency contacts, including a telephone number nearest to the site

Cell Phone

Storm Drain Stenciling Project Guidelines

(Recommended for Cadettes and Seniors)

A storm drain stenciling project consists of stenciling a message next to the street drain reminding people **"Dump No Waste-Drains to River"** with the image of a fish. (Stencils are also available for lake, stream, bay, groundwater, ocean or simply "protect your water" with the image of a glass and faucet.) Steps to consider when conducting a stenciling project:

First, call for permission. For public streets, call the city or County Public Works Department (stormwater or road maintenance division). In some cases, the State Highway Administration has jurisdiction (see adjacent box for help). Public Works will probably issue a permit or letter of approval. They may even help by providing storm drain maps, traffic safety cones, flags and vests. Check to see if they prefer that you stencil on the sidewalk, or on the street next to the drain. For some drains on private property (e.g., business or apartment parking lots), get the permission of the property owner.

Consider safety. Especially when stenciling with children, seriously consider traffic safety issues when you select your site. Neighborhoods are usually safer than downtown city streets (many nonpoint sources go down storm drains in residential neighborhoods). Place traffic safety cones and assign at least one person with a traffic flag to watch traffic at all times.

Prepare materials. Before using stencils for the first time, "weed" remaining letters from the die cuts. This prevents small plastic or oilboard pieces washing into drains while you are stenciling. "Stencil weeding" is a good activity for a short training meeting before going out to paint. For painting, an aerosol can or traffic-zone latex paint (without chlorofluorocarbons (CFCs) that harm the ozone) is a good option. Some stencilers use a small roller or stencil brush with recycled latex based paints. Be careful that younger stencilers do not apply the paint too thickly, as it will run under the stencil or smear the letters.

Call the media. Notifying the media of a stenciling event can get your watershed protection message out to the whole community. Young people in the project enhance media photo opportunities. Remember to take your own pictures, too.

Help for Storm Drain Stenciling Projects

Many local watershed groups and county governments offer help with stenciling projects. In the metropotian D.C. area, the *Chesapeake Bay Foundation* provides stencils on loan, guidelines on how to conduct a project, and tips on who to contact to obtain permission. Call Heather Tuckfield at 410-268-8816.

The *Center for Marine Conservation* (CMC) sponsors a "Million Points of Blight" national storm drain stenciling campaign. Call Ron Ohrel at (757) 496-0920 to request stencils on loan and project guidelines. CMC's address: 1432 North Great Neck Road, Suite 103, Virginia Beach, VA 23454.

***Earthwater Stencils* produces stencils and other watershed education materials. Write to: 4425 140th Avenue, SW, Dept. V, Rochester, WA 98579-9703. Phone: (360)-956-3774. On the web at *www.earthwater-stencils.com*.**

Avoid a mess. Remind stencilers to wear old clothes. Rubber gloves and protective eye gear are helpful, as are plastic bags worn over expensive shoes. Bring rags to cleanup unexpected paint on your arms or fingers. Also include big litter bags to bring back used gloves and rags as well as any garbage you pick up that otherwise could go down the storm drain. Paint spray can drift onto nearby parked cars, so bring a large box opened flat to use as a shield around the stencil as you spray.

Work in teams of four to six. The team should include a traffic look-out. Another two team members accompanied by an adult may go together door-to-door explaining the watershed drainage, your monitoring findings, local river fish and wildlife, and actions neighbors can take to avoid pollution (see flyer information below). Rotate jobs for maximum enjoyment and experience.

Tips for applying stencils. Scrub the area briskly with a wire brush and dust it off with a whisk broom. Lay the mylar stencil on the sidewalk or street next to the storm drain. If using spray paint, shake the can and hold it about six to eight inches from the stencil. Use a series of short back and forth motions to spray one line at a time until the letters are uniformly covered. Do not use too much paint as it will run underneath and blur the letters. When finished, carefully lift the stencil up off the street. It may take a little experience in the beginning to adjust the amount of paint. After finishing all the stenciling for the day, lay the stencils out flat to dry in a warm place. When the paint is completely dry, gently roll the stencils to chip off the paint. This works best if the paint does not build up a thick layer between cleanings.

Prepare a flyer or doorhanger. After stenciling a message that tells neighborhood people what not to do (Dump No Waste), Girl Scouts can hand out and discuss a flyer or door hanger explaining:

- recycle used oil at nearby listed locations
- use fewer chemicals on lawns & gardens
- save household hazardous chemicals for collection days (give dates and location)
- pick up waste that would otherwise wash down storm drains
- other stewardship opportunities

Add local information for a sense of place:

- Where do neighborhood drains go—into what river, bay, lake or aquifer?
- If drains connect to combined sewer overflows (CSOs), how do they work? What happens with overflows during stormwater events? (They go straight to the river.)
- Who lives near or in the river? (Names of local species of fish, birds, and other critters.)
- What restoration projects are underway to clean up or replant streamsides, build and install bird or bat boxes, maintain local trails?
- How can community members help with projects?

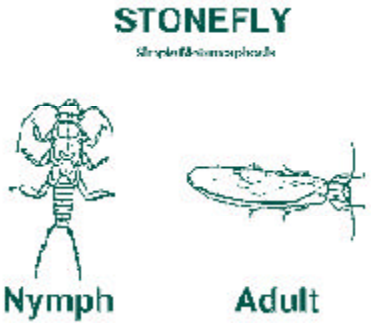
These guidelines were adapted and reprinted with permission from Rhonda Hunter, the founder of Earthwater Stencils, 4425 140th Avenue, SW, Dept. V, Rochester, WA 98579-9703. Phone: (360)-956-3774. On the WEB at www.earthwater-stencils.com. These guidelines were adapted from a story that appeared in* The Volunteer Monitor *newsletter, Volume 7, No. 2, Fall 1995.

Healthy Stream Critters (Cadettes & Seniors)

This activity can be done in conjunction with the Streamwalk (page 18). Be sure to observe the Streamwalk tips (page 25) and Safety-Wise before conducting this activity.

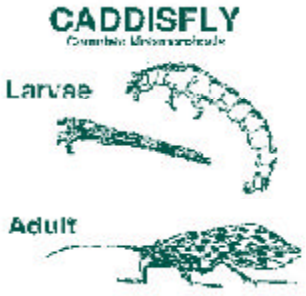
There's a whole world of life in rivers and streams. Living alongside fish, amphibians, reptiles, and wildlife are ***macroinvertebrates***—creatures that are large (macro) enough to be seen with the naked eye, and that lack a backbone (invertebrate). Aquatic insects, clams, snails, crayfish, worms and leeches are all macroinvertebrates. Some, like snails, live their whole lives in the water; others, like dragonflies, leave the water as adults to feed and reproduce. In streams, most macroinvertebrates live under or attached to submerged rocks, logs, and plants. Like all living things, they need oxygen to breathe, water of the right temperature to thrive and reproduce in, suitable habitat, and the right kind of food. When these requirements aren't met, these creatures will sicken and die.

Scientists and trained volunteers study macroinvertebrates to learn more about stream quality. The basic principle behind the study of macroinvertebrates is that some are more sensitive to pollution than others, so if you find lots of macroinvertebrates that can't tolerate pollution, you've found a pretty clean stream. On the other hand, if you find only macroinvertebrates that can live in polluted conditions, your stream may have a problem. Below are a few examples of macroinvertebrates that live in clean streams.



Description: The stonefly has six legs with strong claws, and their antennae are often long and easily seen. They have two hair-like tails and a smooth abdomen, their eyes are often big and widely separated, and many have strong color patterns.

Size: Stoneflies are .5 to 1.5 inches long

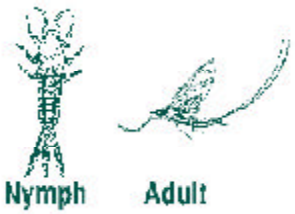


Description: Caddisfies have three pairs of segmented legs and two back hooks. Some have fluffy gill tufts on their abdomen and no tails. Their antennae are not visible, and they have rounded bodies and tiny eyes.

Size: Caddiflies grow up to 1.5 inches.

Visit http://water.nr.state.ky.us/ww/vm.htm for a listing of volunteer monitoring homepages, maintained by Kentucky Water Watch. Be sure to check out the on-line macroinvertebrate key at the bottom of the page!

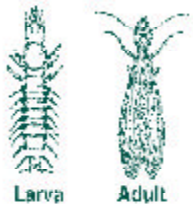
MAYFLY



Description: Mayflies can be brown, tan or mottled in color, and many have plate-like or feathery gills on their abdomen. They have six jointed legs, two long and delicate antennae, and three hair-like tails.

Size: Bodies of mayflies are .25 to 1 inch long.

DOBSONFLY



Description: The Dobson fly is dark brown, has six legs, large pinching jaws and eight pairs of feelers on the lower half of their bodies with gill tufts below them. They have short antennae and two pairs of hooks at the end of the abdomen that anchor them to the stream bottom.

Size: Dobsonflies can reach up to 4 inches long.

RIFFLE BEETLE

Description: Small oval body covered with tiny hairs. One pair of tiny antennae and 6 legs. Walks very slowly on the bottom; does not swim!

Size: Riffle beetles are about 1/4 inch.

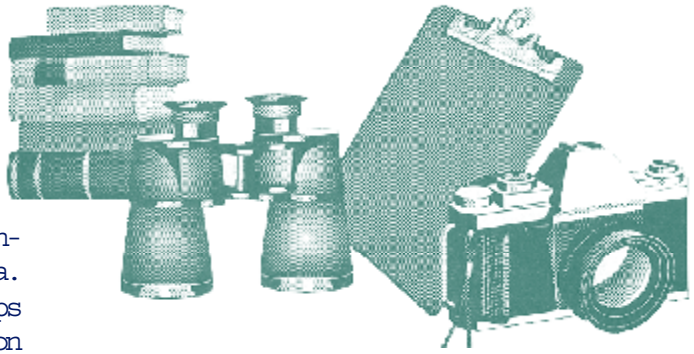
Getting Started in Volunteer Monitoring

Monitoring macroinvertebrates requires training in safety considerations, field methods, bug identification, and analysis of results. Troops interested in macroinvertebrate or other forms of stream monitoring should get in touch with a local program that trains volunteers in these activities. There are currently over 770 volunteer monitoring programs around the country, plus several that are national in scope. Check out EPA's National Directory of Volunteer Environmental Monitoring Programs to find a group near you that may help train your troop. (Call 1-800-490-9198 and ask for EPA publication 841-B-98-009.) EPA's Adopt Your Watershed web page at ***www.epa.gov/adopt*** can also link you up with volunteer groups in your watershed. Also check the resource list on pages 40-41.

Two national organizations that can also help you get started are: the Izaak Walton League of America's Save Our Streams program (for macroinvertebrate monitoring training and kits) at 1-800-BUG-IWLA; and EARTH FORCE (for low-cost water quality monitoring kits to test for pH, dissolved oxygen, and other substances in the water) at 1-800-23-FORCE.

Streamwalk

(Cadettes and Seniors)



Before the Streamwalk

1. We encourage you to contact local groups involved in environmental issues in your area. This serves two purposes: one, these groups may be able to provide you with information and background on your Streamwalk site; and two, you may be able to piggyback on an existing program. Visit EPA's Adopt Your Watershed web page at ***www.epa.gov/adopt*** to see if there is a group in your watershed you can team up with.

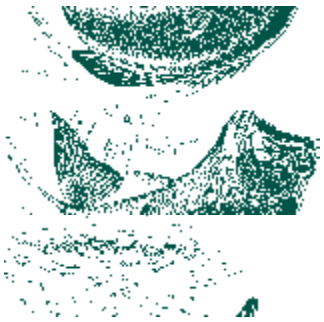
2. Choose the general area for your Streamwalk. **Troop leaders should carefully read Safety-Wise before beginning this activity. Also, it is strongly recommended that Troop leaders visit the stream walk site in advance.** You may wish to collect data along a familiar stream, one that is close to your troop meeting location, or one that does not cascade down a steep mountain side. You may decide to do a series of streams in a watershed to collect baseline data, or concentrate your efforts in areas suspected of being polluted. It is recommended that streamwalks be done four times a year (once each season) at your site.

3. Find a U.S. Geological Survey (USGS) topographic map of your area. These "topo" maps show such things as buildings, elevations, waterways and roads. Topo maps identify the latitude and longitude of your site. Help in defining longitude and latitude is provided on pages 23-24. We recommend a 7-1/2 minute quad map (1:24,000 scale where 11 inches = 4 miles), which are available at local sporting goods stores. The cost is approximately $4. You may also find one to photocopy at your local library, or you can order directly from USGS. For assistance, call **1-888-ASK-USGS**.

4. Now, find your specific Streamwalk site on the topo map. It will be easier for future streamwalkers to locate your site if it is near landmarks (roads, highways, and tributaries), especially those on the map. For purposes of Streamwalks, you will be characterizing 100 feet (or about 65 meters) in either direction from your site. You may do as many sites on the stream as you wish, just be sure that sites are at least 200 feet apart.

5. Finally, pull out a copy of the Streamwalk survey data form. **It is very important that you have gone through the instructions and the Streamwalk Tips on page 25 before you begin your walk.** You will use your map and one survey data sheet per Streamwalk site.

Note: *Several citizen groups and agency representatives worked with EPA's Region 10 office (Seattle, Washington) to develop Streamwalk. It is intended to be an easy-to-use screening tool for monitoring stream corridor health.*



Instructions for Filling out Streamwalk Survey Data Sheets

Below are directions on how to fill out the Streamwalk Survey Data sheet. Please read these thoroughly before you begin your walk. If, while conducting your Streamwalk, you are not able to determine what the response should be, or if the question itself is unclear, just leave that space blank–but don't stop your walk. Remember this is not a test, there are no right or wrong answers. ***Walks can be done along the stream–you do not need to enter the water. Please read Safety Wise before beginning this activity.***

Location

Give the stream name, county and state of your site, preferably as it appears on the topo map. Note: there are some unnamed streams; in these cases you can indicate the stream, lake or water body into which your stream flows and the name and number of the topo map. If you want to share your information with a local or state environmental agency, it is useful to include the longitude and latitude of your site(s). Computing this may present a challenge. See pages 23-24.

Weather

The concern with weather relates to amount of rainfall that potentially can affect flow, clarity and amount of water in a stream. Weather/rainfall reports are available in the daily newspaper or by calling the local weather service. Definitions of weather conditions established by the Weather Service are:

Rain - 1/3" in 24 hours - light steady rainfall.
Showers - 1/3" - 1" in 24 hours, intermittent and variable in intensity.
Storm - 1" or more rain in 24 hrs, usually accompanied by high winds.

Stream Description

Depth and Width Measurements

This information will give a description of the stream water at your site. Please indicate if your data is estimated or measured. Remember, it is best to estimate if taking measurements will disturb habitat, require that you wade in deep water, or disturb stream banks. Do not attempt to cross in high flows. **If it feels even slightly unsafe, do not try it at all. Please read Safety Wise.**

Water Clarity

The clearness of the water is observed to determine if sediment pollution is entering the stream. Cloudy or different colored water can be a result of natural processes or of land use in the surrounding watershed. Sediments can adversely affect habitat conditions such as food, health of fish, and breeding environment for macroinvertebrates. In some areas, grey or white water can be a result of natural processes such as glacial sources for streams.

Water Flow: Pools & Riffles

The variety of flow in relation to depth creates habitat to support fish and invertebrate life. Pools are deeper than adjacent areas. They provide feeding, resting and spawning areas for fish. Riffles and/or runs are flows swift in comparison to surrounding areas. Riffles are shallow and fast water, runs are deep and fast water and pools are slow and deep water.

Stream Channel Cross-section Shape

Please check the box which matches the shape of the stream channel. If you are unable to see the shape of the bottom and banks, please estimate. You can base your estimate on the flow of water. *The slower the water in the middle of the stream, the flatter the bottom.*

Stream Bottom (substrate)

Indicate the most common type of material on the stream bottom.

Silt/clay/mud: This substrate has a sticky, cohesive feeling. The particles are fine. The spaces between the particles hold a lot of water, making the sediments behave like ooze.

Sand (up to 1 inch): Sand is made up of tiny particles of rock. It feels soft underfoot.

Gravel (.1- 2 inches): A gravel stream bottom is made up of stones ranging from tiny quarter inch pebbles to rocks of about 2 inches.

Cobbles (2 - 10 inches): The majority of rocks on this type of stream bottom are between 2 and 10 inches. The average size is about that of a grapefruit.

Boulders (greater than 10"): Most of the rocks on the bottom will be large, greater than 10 inches.

Bedrock: This kind of stream bottom is solid rock.

Width of Natural Streamside Corridor

Streamside corridor, riparian area and zone of influence are terms that describe the natural vegetated area on either side of the stream. Along with the stream, it forms the habitat of the river. It includes vegetation that shades the water, holds the soil in place, adds nutrients to the stream in the form of leaves and during flooding, and provides living quarters for streamside wildlife. Estimate as best you can the width of the corridor at your site**. Indicate with an "x" on the bar graph. Note:** Left and right are based on looking down stream. If the vegetation is pasture or landscaped, this is not a natural state, so mark "o."

Streamside Vegetation

Vegetation acts as a filter for sediment and pollution coming in from the land nearby. It provides habitat for the many creatures that are dependent on and influence the stream. Branches, logs and leaves enter the stream from this region. Vegetation also provides shade, which keeps the water cool. On the data sheet mark all the categories that apply.

Conifer: A cone bearing, evergreen tree or shrub (e.g. a pine tree)

Deciduous: A tree which sheds its foliage at the end of the growing season

Small trees or Shrubs: Either conifers or deciduous bushes less than 20 feet high.

Grasses: Any of numerous plants with narrow leaves, jointed stems and spikes or clusters of inconspicuous flowers.

Overhead Canopy (Stream Cover)

This is the amount of vegetation that overhangs the stream. It offers protection and refuge for fish and other organisms, shades the stream and keeps the water cool, and provides "launching" areas for insects that might fall into the river. Estimate as best you can, about how much of the river is overhung by vegetation and whether it be grasses, shrubs or trees. Please check the category that is appropriate for the current condition of your site. For example, if in the winter there are no leaves on the trees in your segment, you might check 0 - 25%. However, in the summer when the trees have leaves, you might check 50 - 75%.

Artificial Bank Protection

This category includes such streamside modification as riprap (a retaining wall built of rocks or concrete) and bulkheads. It may also include deliberately placed auto bodies, refrigerators, and washing machines. People in the past have thought that such modifications helped stabilize stream banks. Unfortunately, not only do they drastically degrade habitat for streamside and in-stream dwellers, they can cause bank erosion in flood conditions. Mark the categories that best describe the condition of the stream bank within your 500 foot segment.

Presence of Logs or Woody Debris in Stream

Logs and woody debris (not twigs and leaves) can slow or divert water to provide important fish habitat such as pools and hiding places. So please mark the general amount of logs and woody debris in the stream. DO NOT REMOVE THEM.

Organic Debris in Stream

The presence of other organic matter in the stream can be both good and bad. If there are dumped grass clippings, it is not good for stream health. On the other hand, naturally failing leaves and twigs can be beneficial.

Fish in Stream

Can you see any fish? Mark it down! If you know what kind of fish it is, say so in the space next to the question. If you think there are fish but you cannot see them, mark "no."

Adjacent Land Uses

Adjacent land use has a great impact on the quality and state of the stream and riparian areas. Enter a "1" if the land use is present and a "2" if it is **clearly** impacting the stream. If you cannot determine the type of housing, industry or development, please make your best estimate.

Conditions

This section is designed to get information about potential problems at your Streamwalk site. Enter a **"1"** if the condition is present and **"2"** if it is severe.

Stream Banks

Natural plant cover degraded: Indicate if stream side vegetation is trampled, missing, or replaced by landscaping or cultivation.

Banks collapsed/eroded: Note if banks or parts of banks have been washed away or worn down.

Banks artificially modified: Indicate if banks have been artificially modified by construction or placement of rocks, wood or cement supports or lining.

Garbage or junk adjacent to stream: Describe human-made materials present.

Stream Channel

Mud/silt/sand on bottom/entering stream: Excessive mud or silt entering the stream and clouding the water can interfere with the ability of fish to sight potential prey. It can also clog fish gills and smother eggs in spawning areas on the stream bottom. Mud/silt/sand can be an indication of poor construction practices in the watershed, where runoff coming off the site is not adequately contained. It can also be a perfectly normal occurrence, especially if, for example, a muddy bottom is found along a very slow-moving segment or a wetland. Use your best judgement.

Artificial Stream modifications: Please note if the stream water has been dammed, dredged, filled, or channelized through culverts or if other large scale activities such as log removal are apparent.
Algae/scum floating/covering rocks: Evidence of algae (very tiny plants that can color the water green or can resemble seaweed) or scum in the water may point to an upstream source adding too much nutrient (fertilizer) to the water.
Foam or sheen: This is a bit of a tricky category because this type of thing can be naturally occurring or a problem. For example, an iridescent or shiny sheen on the water might be from rotting leaves or it might be from some upstream pollutant. If you are not sure, mark it on the checklist.
Garbage or junk in stream: This is your chance to point out very straight forward problems like batteries, tires, home appliances, car bodies, and garbage.

Other
Organic debris or garbage: The purpose is to determine if the stream is being used as a dump site for materials that would not be present naturally. Debris can be anything from a pop can to vegetation brought from outside the stream corridor.
Livestock in or with unrestricted access to stream: Are livestock present or is there an obvious path that livestock use to get to the water from adjacent fields? Is there stream-side degradation caused by access?
Actively discharging pipes: Are there pipes with visible openings dumping fluids or water into the stream? Please note, even though you may not be able to tell where they come from or what they are discharging. **Do not touch this effluent!**
Other pipes: Are there pipes entering the stream? Please mark even if you cannot find an opening or see matter being discharged.
Ditches: Any ditches draining into the stream?

Sick Stream Symptoms

Shiny surface or rainbow colors—If you see rainbow color on the water's surface or if you smell oil (a gas station smell), then oil might be polluting your stream. Oil can come from a pipeline leak, a storm sewer or illegal dumping. Oil kills fish and can make kids who play in the water sick.

Green water—Too much algae. Algae are small plants that are found in the water. Fertilizers from farms and lawns can get into streams and cause too much algae to grow. When algae break down or decompose, oxygen is used up and fish don't have enough to breathe.

Brown or muddy water—Too much dirt or sediment in the water. Dirt clogs fish gills so fish can't breathe. Dirt kills stream critters when it settles to the bottom and buries them. Dirt blocks light to underwater plants, and they die too.

Orange water—Orange water can indicate the presence of iron in the water. Iron can be naturally present where the soils are high in iron. This is not a pollution problem. However, orange water can indicate acidic runoff from mining activities. Acidic water kills fish and other stream life.

Foam or suds—Some foam or suds in the stream is natural. If you see foam in the stream that is more than three inches tall, looks like bubble bath and doesn't break apart easily, detergent may have entered the stream. Soap can come from homes, factories or car washes. Soap harms stream critters because it breaks the surface tension of the water and insects like water striders sink and drown.

Strange odors—A chemical smell can mean harmful chemicals are polluting your stream. A rotten egg smell can mean sewage is getting into the stream from cows, sewage treatment plants, or people's homes. Sewage or chemicals can make people and animals sick.

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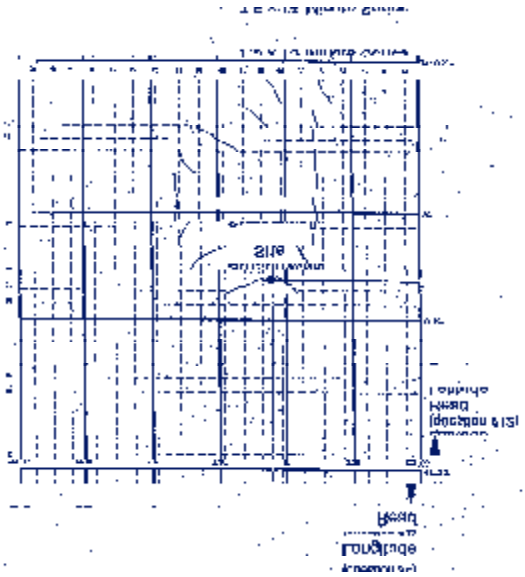
Instructions for Defining Latitude and Longitude



Latitude and longitude are defined in degrees, minutes and seconds. There are 60 seconds in a minute and 60 minutes in a degree. The symbols are as follows ° = degrees, ' = minutes, and " = seconds. The following example may help you determine the latitude and longitude for your walk.

Longitude

Look at the right side (upper or lower corner) under the map name, or the second of two numbers separated by "x", to find the width scale (longitude) of the map:

		Your Work	Example
1)	If "7.5 Minute Series," enter 450. If "15 Minute Series," enter 900. If "7.5x15" Minute Series," enter 900. If "15x30 Minute Series," enter 900.	_____	900
2)	Using a ruler, measure the width of your map east to west (exclude borders).	_____	10 cm
3)	Divide #1 by #2 to the nearest whole number	_____	90 sec/cm
4)	Enter the Longitude located in the lower right hand corner.	_____	122°00'
5)	Using a ruler, measure (centimeters) from your site, straight across, to the right hand side of the map.	_____	3.7 cm
6)	Multiply #5 by #3 (to the nearest whole number).	_____	3.7x90=333
7)	Convert #6 to minutes and seconds by dividing by 60. Your whole number after division is the number of minutes, and the remainder is the number of seconds. (Do not use a calculator.) For example, 215 can be divided by 60 three times. 215-180=35. So 215 converts to 3'35".	_____	333/60=5 (300 with 33 left over, or 5'33")
8)	Add #4 to #7.	_____ _____ _____	122° 5' 33"

The Answer for #8 is the longitude of your site.

Latitude

Look at the right side (upper or lower corner) under the map name, or the second of two numbers separated by "x", to find the height scale (latitude) of the map:

		Your Work		Example	
9)	If "7.5 Minute Series," enter 450. If "15 Minute Series," enter 900. If "7.5x15" Minute Series," enter 450.	_____		450	
10)	Using a ruler, measure the length of your map north to south (exclude borders).	_____	cm	10	cm
11)	Divide #9 by #10 to the nearest whole number	_____	sec/cm	45	sec/cm
12)	Enter the Latitude located in the lower right hand corner.	_____		47°30'	
13)	Using a ruler, measure (centimeters) from your site, straight down, to the bottom of the map.	_____	cm	4.8	cm
14)	Multiply #13 by #11 (to the nearest whole number).	_____		4.8x45=216	
15)	Convert #14 to minutes and seconds by dividing by 60. Your whole number after division is the number of minutes, and the remainder is the number of seconds. (Do not use a calculator.) For example, 215 can be divided by 60 three times. 215-180=35. So 215 converts to 3'35".	_____		216/60=3 (180 with 36 left over, or 3' 36"	
16)	Add #15 to #12.	_____ _____ _____		47° 33' 36"	

The Answer for #16 is the latitude of your site.

Streamwalk Tips

Please consider the following precautionary tips:

- Get the permission of landowners to cross any private land, posted or not. **Do Not Enter Areas Without Permission**. It is recommended that you use public access points (such as city/county/state parks and campgrounds).
- Only record what you see, not what you have previously seen. For example if you think fish are present but you can't see them, mark your sheet "no fish present."
- Always work with someone.
- Do not put yourself in danger to gather survey information.
- Be careful of ticks, poison oak, nettles, insects. Bring repellent. Wear long pants and boots: wind breakers help fend off nettles.
- Watch out for dogs.
- Do not drink the water–it is unsafe.
- Do not walk on unstable banks; your footsteps could speed erosion.
- Be alert for spawning areas (redds) in the stream. Do not walk on them. They will look like a round or elliptical area of clean gravel about 1-3 feet long. During fall through spring, when redds are evident, try not to walk in the stream. In the summer, if you are careful, the stream bed might be the easiest route for conducting your streamwalk. Be aware that the stream bed can be very slippery, uneven, and unpredictable.
- **Do not attempt to walk across streams that are swift and above the knee in depth. You can be swept away in an instant!**
- Be careful of streamside vegetation - disturb it as little as possible.
- **If for any reason you feel uncomfortable about the stream conditions or surroundings, please stop your Streamwalk. You and your safety are much more valuable than the Streamwalk!**

Recommended list of items to take along:

Photocopies of topo map of stream to be walked
Comfortable rubber boots
Snag and thorn-proof clothing that is appropriate for the weather
Clip board with waterproof cover
Streamwalk data forms
Two pencils
Folding ruler or tape measure
Camera and film in waterproof bag
Leather gloves
Whistle
First Aid Kit (See SAFETY- WISE for contents)
Cell Phone
If you are away from urban or residential areas, the following are also recommended for safety:
Extra clothes in a waterproof bag
Fire starter (candle, cheap lighter, tinder)
Flashlight and extra batteries
Global Positioning Device, compass
Aluminum-foil blanket (for winter excursions)

Site Survey Data Sheet (Complete One Sheet per Site)

Location

Stream name: _____ Date: _____

County: _____ State: _____

Troop Name: _____

Contact Name: _____ Phone: _____

Site (name, description or number): _____

_____

(See instructions on pages 23-24)

Latitude: _____ ° _____ ' _____ " **N**

Longitude: _____ ° _____ ' _____ " **N**

Weather *(see instructions on page 19)*

☐ Clear ☐ Overcast ☐ Rain ☐ Showers ☐ Storm

Stream Description *(see instructions on pages 19-21)*

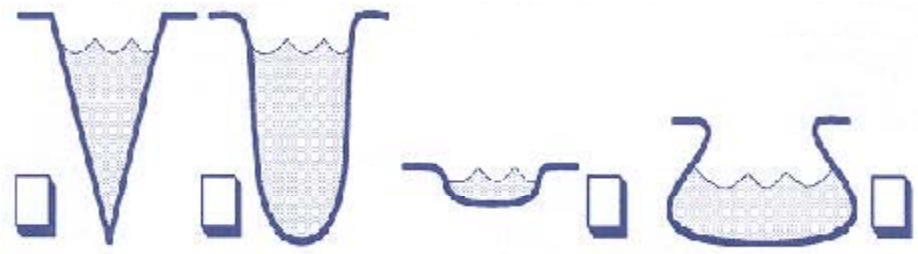
1 **Depth:** _____ feet ☐ measured (at site) ☐ estimated

Width: _____ feet ☐ measured (at site) ☐ estimated

2 **Clarity:** Does water appear ☐ Clear ☐ Cloudy

3 **Water Flow:** (check all that apply): ☐ Pools ☐ Riffles ☐ Runs

4 **Stream Channel Cross-Section Shape:** (at site)



Site Survey Data Sheet (Complete One Sheet per Site)

4 **Stream bottom:** (check the most common)

- ☐ Clay/Mud
- ☐ Sand (up to .1")
- ☐ Gravel (.1- 2")
- ☐ Cobbles (2 - 10")
- ☐ Boulders (over 10")
- ☐ Bedrock (Solid)

5 **Width of Natural Streamside Corridor:** (average)

Left looking downstream: _____ meters Right looking downstream: _____ meters

6 **Streamside Vegetation:**

	None/Sparse	Occasional	Common
Conifers	☐	☐	☐
Deciduous	☐	☐	☐
Small trees and Shrubs (<20')	☐	☐	☐
Grasses	☐	☐	☐

Vegetation appears ☐ natural ☐ cultivated ☐ mixed (w/weeds)

7 **Extent of Overhead Canopy:**

☐ 0-25% ☐ 25-50% ☐ 50-75% ☐ 75-1 00%

8 **Extent of Artificial Bank Protection:**

☐ 0-25% ☐ 25-50% ☐ 50-75% ☐ 75-1 00%

9 **Presence of Logs or Large Woody Debris in Stream:**

☐ None ☐ Occasional ☐ Common

10. **Presence of Other Organic Debris in Stream:**

☐ Occasional ☐ Common

11. **Any fish present?**

☐ Yes ☐ No

Other Comments? _____

_____

Site Survey Data Sheet (Complete One Sheet per Site)

Adjacent Land Uses

(see instructions on page 21)

Check "1" if present, "2" if clearly impacting stream:

1	2	
		Residential/Industrial
❑	❑	Single family housing
❑	❑	Multi-family housing
❑	❑	Commercial development
❑	❑	Light industry
❑	❑	Heavy industry
❑	❑	Road/bridge construction
		Roads, etc.
❑	❑	Paved roads or bridges
❑	❑	Unpaved roads
		Construction Underway on:
❑	❑	Single family housing
❑	❑	Multi-family housing
❑	❑	Commercial development
❑	❑	Light Industry
❑	❑	Heavy Industry
		Agricultural
❑	❑	Grazing land
❑	❑	Feedlots or animal holding areas
❑	❑	Cropland
		Other
❑	❑	Mining or gravel pits
❑	❑	Logging
❑	❑	Recreation

Conditions

(see instructions on pages 21-22)

Check "1" if present, "2" if impact seems severe:

1	2	
		Stream banks
❑	❑	Natural streamside cover degraded
❑	❑	Banks collapsed/eroded
❑	❑	Banks artificially modified
❑	❑	Garbage/junk adjacent to stream
		Stream channel
❑	❑	Mud, silt, or sand in or entering stream
❑	❑	Artificial stream modifications (dams, channels, culverts, etc.)
❑	❑	Algae or scum floating or coating rocks
❑	❑	Foam or Sheen
❑	❑	Garbage/junk in stream
		Other
❑	❑	Organic debris (garbage, grass clippings, etc.)
❑	❑	Livestock in or with unrestricted access to stream
❑	❑	Actively discharging pipe(s)
❑	❑	Other pipe(s) entering
❑	❑	Ditches entering

Other Comments? _____

_____

_____

_____

Build Your Own Aquifer

BACKGROUND: Many communities obtain their drinking water from underground sources called aquifers. Water suppliers or utility officials drill wells through soil and rock into aquifers to obtain groundwater for drinking water purposes. Home owners who cannot obtain their drinking water from a public water supply will have private wells drilled on their property. Unfortunately, groundwater can become contaminated by harmful chemicals, including household and lawn care products, paints, bleach, cleaners, fertilizers, pesticides, and oil. These chemicals can percolate down through the soil and rock and into the aquifer—and eventually the well. Such contamination can pose a significant threat to human health. The measures that must be taken by well owners and operators to either protect or clean up contaminated aquifers are quite costly.

NOTE: This demonstration should follow a troop discussion on potential sources of drinking water pollution.

OBJECTIVE: To illustrate how water is stored in an aquifer, how groundwater can become contaminated, and how this contamination ends up in the drinking water well. Ultimately, students should get a clear understanding that what happens above the ground can potentially end up in the drinking water below it.

MATERIALS NEEDED:

- 1 6"x8" clear plastic container that is at least 6-8" deep (shoe box or small aquarium)
- 1 lb. of modeling clay or floral clay
- 2 lbs. of white play sand
- 2 lbs. of aquarium gravel (natural color if possible) or small pebbles (As any small rocks may have a powdery residue on them, you may wish to rinse them and dry on a clean towel prior to use. It is best if they do not add cloudiness to water.)
- 1 drinking water straw
- 1 plastic spray bottle (be sure the stem that extends into the bottle is clear)
- 1 small piece (3 x 5) of green felt
- 1/4 cup of powered cocoa
- red food coloring
- 1 bucket of clean water and small cup to dip water from bucket
- scotch tape

PROCEDURE:

1. To one side of the container place the small drinking water straw, allowing approximately 1/8 of an inch clearance with the bottom of the container. Fasten the straw directly against to the long side of the container with a piece of tape. Explain to the students that this will represent two separate well functions later in presentation (if not placed at this time, sand will clog the opening).
2. Pour a layer of white sand completely covering the bottom of the clear plastic container, making it approximately 1 " deep. Pour water into the sand, wetting it completely, but there should be no standing water on top of sand. Let students see how the water is absorbed in the sand, but remains around the sand particles as it is stored in the ground and ultimately in the aquifer.
3. Flatten the modeling clay (like a pancake) and cover half of the sand with the clay (try to press the clay into the three sides of the

container in the area covered). The clay represents a "confining layer" that keeps water from passes through it. Pour a small amount of water onto the clay. Let the students see how the water remains on top of the clay, only flowing into the sand below in areas not covered by the clay.

4. Use the aquarium rocks to form the next layer of earth. Place the rocks over the sand and clay, covering the entire container. To one side of your container, slope the rocks, forming a high hill and a valley. Now pour water into your aquifer until the water in the valley is even with your hill. Let girl scouts see the water around the rocks that is stored within the aquifer. They will also notice a "surface" supply of water (a small lake) has formed. This will give them a view of both the ground and surface water supplies that can be used for drinking water purposes.

5. Next, place the small piece of green felt on top of the hill. If possible, use a little clay to securely fasten it to the sides of the container it reaches.

6. Using the cocoa, sprinkle some on top of the hill, while explaining to students that the cocoa represents improper use of lawn chemicals or fertilizers, etc.

7. Put a few drops of food coloring into the straw, explaining to students that often old wells are used to dispose of farm chemicals, trash and used motor oils. They will see that it will color the sand in the bottom of the container. This is one way pollution can spread throughout the aquifer over time.

8. Fill the spray bottle with water. Now make it rain on top of the hill and over the cocoa. students will quickly see the cocoa (fertilizer/pesticide) seep down through the felt and also wash into the surface water supply.

9. Take another look at the well you contaminated. The pollution has probably spread further. Now remove the top of the spray bottle and insert the stem into the straw, depress the trigger to pull up the water from the well. (Water will be colored and "polluted.") Explain that this is the same water a drinking water well will draw up for them to drink.

For other ideas and activities.....

The Blue Thumb Project

The Blue Thumb Project **is an international public awareness and education effort to encouarge people to take better care of our drinking water. Each year a set of materials on water—and its care—is developed and disseminated to organizations to help them plan community water education and action projects. Write to: The Blue Thumb Project, c/o AWWA, 6666 W. Quincy Ave., Denver, CO 80235 (303) 794-7711. http://www.awwa.org/bluethumb/**

The Groundwater Foundation

The Groundwater Foundation **is a nonprofit education foundation dedicated to educating the public about the conservation and management of groundwater. Contact the Groundwater Foundation, PO box 22558, Lincoln, NE 68542-2558, (402) 434-2740 or fax (402) 434-2742.** ***www.groundwater.org***

EPA's Groundwater/Drinking Water Web Page at ***http://www.epa.gov/ogwdw/*** **has dozens of games and activities and science and art projects.**

Backyard Conservation (Seniors)

Make a home for birds, butterflies and other of nature's creatures at your home or troop meeting location

Habitat is a combination of food, water, shelter, and space arranged to meet the needs of wildlife. Even a small yard can be landscaped to attract birds, butterflies, beneficial insects, and small animals. Trees, shrubs, and other plants provide shelter and food for wildlife.

The plants you use for food and cover will help determine the wildlife species attracted to your backyard. Nesting boxes, feeders, and watering sites be added to improve the habitat.

Planning your wildlife habitat

Planning is necessary for attractive and productive wildlife habitat. You have both a horizontal area to work with--the size of your lot--as well as a vertical area that stretches from your soil to the treetops. The vertical area is composed of the canopy formed by the tallest tree branches; understory vegetation consisting of smaller trees, shrubs, and vines; the floor, which is often dominated by groundcovers; and the basement where a variety of organisms exist in the soil. Different wildlife species live in each of these zones, so numerous habitats can be provided on a small piece of land.

Trees and shrubs are the backbone of any landscaping design and important for wildlife shelter. Many tree and shrub species are excellent sources of food for wildlife. Proper selection of plant material can meet both the aesthetic needs of the homeowner and the food and shelter needs of wildlife. *Remember that you are part of the habitat!*

This activity was taken from the Natural Resources Conservation Services' Backyard Conservation Program. To obtain a free, 28-page booklet that outlines 9 other conservation projects, call 1-888-LANDCARE. Or download "tip sheets" at www.nhq.nrcs.usda.gov/CCS/Backyard.html.

Steps to create habitat for wildlife:

1. Identify all existing plants, if any. Note the condition of the plants and their locations. How much shade the trees and shrubs provide? Are trees evergreen or do they drop their leaves in the fall? Do they provide valuable food sources? Do they need more light? Do they flower and bear fruit?

2. Make a sketch of your yard noting all existing plants, buildings, utilities, and pathways. Some species may be of little wildlife value and may not be particularly attractive. Once you have identified existing plants you want to save, start exploring options for plants that will work well with your backyard habitat (see lists of species on pages 33-34). The existing plants around your yard may be adequate to attract some wildlife, but a few changes can effectively enhance the existing habitat. Diversity in the landscape is necessary. Some plants provide food but very little cover; others provide cover but little food.

3. Refer to the species lists on pages 33-34 and add trees, shrubs, flowers, and groundcovers to your plan Not all the planting needs to be done at once. If money or time is limited, consider it a work in progress.

4. Plant a variety of trees first. Select evergreen species for year-round cover and shelter. Select fruit or nut-bearing plants for a food source. Native species are well suited for providing wildlife habitat because they are adapted to the local soil, climate, and wildlife. Additional considerations for choosing and placement include:

Neighboring Properties

Eventual size. Whether they are evergreen or deciduous (trees that drop their leaves). Deciduous trees planted on the south side of a house will provide summer shade, but will not completely block winter sun.

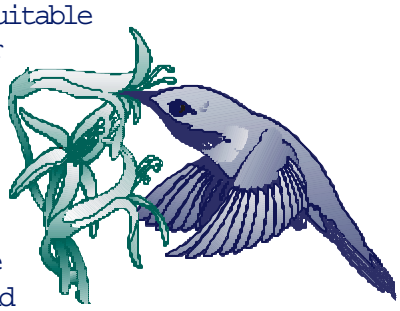
Flowering and fruiting habit. Select plants that flower and bear fruit at different times of the year. Some shrubs that produce berries can provide food throughout the year. Trees with nuts and fruit can also provide seasonal foods. (See the tip sheet on tree planting for suggested species.)

5. Fill in with smaller shade-tolerant understory trees and shrubs. Adding these to an existing landscape will enhance the vertical structure that is common in natural landscapes. Many smaller trees and shrubs are colorful in the spring when they flower, and provide berries for fall and winter feed.

6. Flowering annuals (plants that live one growing season) and perennials (plants that live for more than a year) add color to the yard and can be added at any stage to attract birds and butterflies. If your yard is large, consider using part of it for tall native grasses that provide beauty, as well as a natural source of food and shelter. A native wildflower garden provides the same function. Even on a small lot, native wildflowers, as well as some common garden species, can provide attractive habitat for a variety of birds and butterflies. Avoid straight lines and perfect symmetry. Natural habitat has curves and clumps of vegetation. Wildlife is not particularly attracted to a well-manicured lawn. Wildlife is more likely to come out into the open for viewing when the boundary of the yard is designed and maintained as a retreat for animals.

Landscaping for Birds

Food and cover are essential for the survival of all species. Loss of suitable nesting sites is a major factor in the decline of some bird species. In the wild, many species nest in cavities of dead trees. With the loss of hedgerows in some parts of the country and the removal of dead trees in towns, natural nesting sites are often limited. Also, some highly competitive, non-native species of birds have taken over some of the nesting sites once occupied by native birds.



Bird species are extremely variable in their habits. Some like deeply wooded areas; others prefer open fields and meadows. Many species are year-round residents, while others such as the cedar waxwing appear only for a few days a year during migration. Other species such as sparrows, blue jays, cardinals, robins, juncos, and chickadees are highly adaptable and found in many environments.

Many people are not aware of the value of dead, dying, and hollow trees, as well as logs on the ground, for birds and other wildlife. Dead trees provide homes to more than 400 species of birds, mammals, and amphibians. Fish, plants, and fungi also benefit from dead and dying trees. Consider leaving standing dead and dying trees in your yard unless they pose a human safety or property hazard, and use old logs and stumps in gardens and landscaping.

Plant Species for Birds

Below are some plant species to consider for wildlife habitat. **Check with a local nursery on plants suitable for your area.** Some of these plants, while suited for wildlife, may have characteristics such as shallow roots or weak limbs that make them inappropriate for small urban

properties—or they may not be winter hardy in all locations. Birds eat any flower seed, depending on the kind of bird and seed.

Trees for Birds:
American beech *(Fagus grandifolia)*
American holly *(Ilex opaca)*
Balsam fir *(Abies balsamea)*
Black cherry *(Prunus serotina)*
Black gum *(Nyssa sylvatica)*
Crabapple *(Malus spp.)*
Flowering dogwood *(Cornus florida)*
Hawthorns *(Crataegus spp.)*
Hickories *(Carya spp.)*
Live oak *(Quercus virginiana)*
Oaks *(Quercus spp.)*
Red mulberry *(Morus rubra)*

Shrubs for Birds:
Common juniper *(Juniperus communis)*
Highbush blueberry *(Vaccinium spp.)*
Hollies-- evergreen & deciduous species *(Ilex spp.)*
Pyracantha *(Pyracantha spp.)*
Red-osier dogwood *(Cornus stolonifera)*
Serviceberry *(Amelanchier arborea)*
Spicebush *(Lindera benzoin)*
Sumacs *(Rhus spp.)*
Viburnums *(Viburnum spp.)*
Wax myrtle *(Myrica cerifera)*

Vines for Birds:
American bittersweet *(Celastrus scandens)*
Trumpet honeysuckle *(Lonicera sempervirens & related spp.)*
Strawberry *(Fragaria spp.)*
Trumpet creeper or vine *(Campis radicans)*
Virginia creeper *(Parthenocissus quinquefolia)*
Wild grape *(Vitis spp.)*

Additional food and shelter for birds. Few yards will be able to supply sufficient food or shelter for a variety of birds all year long. However, **you can improve shelter and food supplies by building or purchasing feeders and houses, and by setting out certain foods.**

All bird species have specific nesting requirements. Because of these requirements, your yard may not accommodate certain species. For instance, Eastern bluebirds prefer nesting sites that border open fields or lawns with a tree or fence post nearby to provide feeding perches. Chickadees prefer to nest in brushy wooded areas. Before setting out nesting houses, find out which species are common in your area and can be encouraged to nest in your yard. **Make or buy a bird house specifically designed for the bird you wish to attract.** The size of the entrance hole is critical to prevent the eggs and young from being destroyed by larger birds—always check a list of appropriate hole sizes. Other considerations include box size, height above the ground, direction the entrance hole faces, and amount of sunlight. Boxes may need baffles or other protective devices to limit access by cats and other predators.

Many species of birds can be attracted by a variety of feed in different styles of feeders. There are many styles of bird feeders available, from window-mounted feeders to those that hang from branches and stands. Many birds will readily eat right off the ground. Bird feed comes in a variety of choices; however, sunflower seeds appeal to many birds, as well as small mammals. Woodpeckers, nuthatches, and chickadees are especially attracted to suet. Citrus fruit, chopped apples and bananas, and raisins will be eaten by numerous species, including robins, titmice, nuthatches, woodpeckers, and mockingbirds.

Buying a Bird House and Other Backyard Birding Tips

A good reference publication is "Homes for Birds" by the U.S. Fish and Wildlife Service. It is available along with other useful birding pamphlets at: ***www.fws.gov/r9mbmo/pamphlet/pamplets.html*** *or* ***birding.miningco.com/msub12.htm***

Feeders may also attract wildlife species you may not want to feed such as starlings, crows, and squirrels. **Feeder type and placement and the type of food can help deter unwanted species.**

Nectar pla
Hummingb
Butterflies,a

Aster (*Aster spp.*)
Azalea (*Rhododendron spp.*)
Bee balm (*Monarda spp.*)
Butterfly bush *(Buddleia alternifolia)*
Butterfly weed and other milkweeds
Cardinal flower *(Lobelia cardinalis)*
Clover and other legumes
Columbine (*Aquilegia spp.*)
Coneflower (*Echinacea spp.*)
Delphinium (*Delphinium spp.*)
Fuchsia (*Fuchsia spp.*)
Honeysuckle (*Lonicera spp.*)
Jewel weed (*Impatiens capensis or I. pallida*)
Lobelia *(Lobelia spp.)*
Lupine *(Lupinus spp.)*
Penstemon (*Penstemon spp.*)
Phlox (*Phlox spp.*)
Salvia (*Salvia spp.*)
Trumpet creeper or vine (*Campis radicans)*
Weigela (*Weigela spp.*)
Zinnia (*Zinnia spp)*

Unlike many other species of birds, hummingbirds rely on nectar as their source of food. These tiny, migratory birds are commonly seen in the summer in northern states gathering nectar from colorful flowers.

Hummingbirds are typically attracted to red and yellow tubular flowers, although they frequently visit others. Hummingbird feeders can be purchased and filled with a sugar-water solution, consisting of 1 part sugar to 4 parts water. Every 3 to 4 days, wash the feeder with soap and water, rinse thoroughly, and add new sugar water.

Food and shelter for butterflies

Colorful butterflies and moths add beauty and interest to your backyard. There are hundreds of different species of butterflies and moths in North America. Butterflies and moths are insects. They hatch into larvae (commonly referred to as caterpillars), eventually become pupae, and develop into colorful adults. How long the process takes depends on the species and the climate. Butterflies and moths are amazingly particular in their food choices. The larval stage of the butterfly may require food quite different from that of the adult. Some larvae consume tremendous amounts of plant material, seemingly devouring plants overnight. A common example in the garden is the tomato hornworm, which rapidly strips tomato plants of their leaves. An equally voracious, but beautiful, larvae is the Eastern black swallowtail, which is found only on plants in the carrot family, including celery, carrot, dill, and parsley. A close relative is the Eastern tiger swallowtail that eats the foliage of wild cherry, birch, poplar, ash, and tuliptrees.

Adult butterflies require food in liquid form such as plant-produced nectar. They get some of it from flowers and from juices of extra-ripe fruit. The types of flowering plants you grow will determine the kinds of butterflies you attract to your backyard. In addition to the plants listed for hummingbirds, the butterfly bush is especially attractive.

Find out what species are common in your area and use plants they like. Nectar feeders can be placed in the yard to attract butterflies. **Do not use insecticides near plants for butterflies**. Learn to recognize larval and egg forms. That large green and black caterpillar eating your dill may one day turn into the gorgeous butterfly you were hoping to attract!

Butterflies, like all insects, are most active when temperatures are warmer. While moths are commonly found at night, most butterflies are active on sunny, warm days. Butterflies will benefit from a basking site where they can warm up on cool mornings. Add a light-colored rock or concrete garden sculpture as a basking site. Butterflies also need a source of water. A shallow dish of water or a depression in a rock that retains water is all they need.

Attracting Bees

In the United States, there are nearly 5,000 different species of native bees. Most of them are solitary, friendly bees that nest in holes in the ground or burrows in twigs and dead tree limbs. These bees do not have hives to protect, so they are not aggressive and rarely sting.

Bumblebees, carpenter bees, sweat bees, leafcutter bees, digger bees, and others pollinate many different kinds of plants. They play a critical role in healthy wild plant communities and gardens. About 30 percent of our diet is the direct result of a pollinating visit by a bee to a flowering fruit tree or vegetable plant. Providing bee habitat in your yard can increase the quality and quantity of your fruits and vegetables.

Bees are extremely sensitive to many commonly applied insecticides. If you must use chemical insecticides in your garden, apply them in the evening when bees are less likely to be active.

Bees are attracted to most flowering plants, and are especially fond of blue and yellow flowers. Try planting your garden to have different species blooming in the spring, summer, and fall.

Bee houses

A good use for untreated scrap lumber (at least 3 to 5 inches thick) is to drill holes (from 1/8-inch to 5/16-inch in diameter) about 90 percent of the way into the thick wooden block. Space the holes about 1/2-inch to 3/4-inch apart. The 5/16-inch holes work best as homes for orchard bees which are excellent pollinators of fruit trees. Hang your bee blocks under the eaves of your house or garden shed, protected from direct sun and rain.

Attracting Reptiles and Amphibians

Toads, frogs, lizards, turtles, and snakes all have a place in the backyard. While many people may not want some of these animals in their yards, most species are harmless and often quite beneficial—feeding on destructive insects or rodents.

Shelter for reptiles and amphibians is easy to provide. Several rocks piled in a sunny spot will provide basking sites. Consider planting shade-tolerant groundcover under trees and leaving a thick layer of leaves to provide cool shelter. Stumps, logs, and rock piles in a shady spot can be valuable.

Water for Wildlife

Clean, fresh water is as important to birds, butterflies, and other wildlife as it is for people. Water in a saucer, bird bath, or backyard pond is adequate for wildlife. Be sure to change the water every few days to keep it fresh. In hot weather, it may be necessary to refill the container daily.

As with all wildlife, bats should be watched, but not handled or chased. Generally, bats are shy of humans and will not attack or fly after a person. However, if caught or picked up from the ground, a bat may bite and some carry rabies.

Logs, rocks, and water-holding structures provide drinking and basking habitat for turtles, butterflies, and songbirds. Stones with depressions that collect water will help attract butterflies.

As with all wildlife, cover is essential for the survival of these species. Small brush piles intended for amphibians and reptiles will also provide shelter for rabbits and mice. Chipmunks and woodchucks are adept at digging their own burrows. Trees may provide shelter for squirrels, opossums and other animals. Food set out for birds may attract many of these animals. Squirrels, chipmunks, and mice will readily eat bird seed. Woodchucks and rabbits will eat a variety of vegetation including garden vegetables and flowering plants. Deer are browsers and will nibble at trees, shrubs, hay, and grain. **A word about attracting mammals.** Squirrels, chipmunks, rabbits, raccoons, opossums, skunks, woodchucks, mice, and deer are commonly found in many urban environments. These species are highly adaptable and, in many cases, are becoming unwanted visitors rather than welcome guests.

Precautions to Remember!

A few precautions can be taken to avoid unwanted encounters with animals. Avoid setting out food that may attract scavengers such as raccoons. Keep garbage cans in a secure shed or garage or use metal cans that scavengers cannot chew through. Check the exterior of your house for loose or rotted boards that could allow access by mice or other rodents. Remember that these animals are wild, and if threatened they can bite. Raccoons can be particularly aggressive. All of these species can carry diseases. Do not handle them.

Laws vary from state to state on wildlife issues. If you have questions or concerns about wildlife, check with your state's Department of Natural Resources or Conservation Department before taking any action.

The National Wildlife Federation (NWF) sponsors a certification program designed to help individuals plan and apply a wildlife habitat plan for a home site or small acreage. On request, NWF will send you an application package and instructions. If your application and plan meet the criteria, you will receive a certificate and, if you wish, a sign to show your commitment to wildlife conservation. Contact:

Backyard Wildlife Habitat Program
National Wildlife Federation (703) 790-4582
8925 Leesburg Pike
Vienna, VA 22184-0001

On the web: ***www.nwf.org/habitats***

How the Water Drop Patch Project Links to the Girl Scout Program

I. Brownie Girl Scout Try-Its

Animals; Earth and Sky; Earth is Our Home; Eco-Explorer; Math Fun; Outdoor Adventurer; Plants; Senses; Water Everywhere; Watching Wildlife

II. Junior Girl Scout Badges

Eco-Action; Ecology; Geology; Math Whiz; Outdoor Creativity; Outdoor Fun in the City; Photography; Plants and Animals; Ready for Tomorrow; Water Fun; Water Wonders; Weather Watch; Wildlife

III. Cadette and Senior Girl Scout Interest Projects All About Birds; Backpacking; Digging Through the Past; Eco-Action; From Shore to Sea; Leadership; Math, Maps and More; Orienteering; Photography; Wildlife

OTHER RESOURCES

Outdoor Education in Girl Scouting
Fun and Easy Nature and Science Investigations*
Fun and Easy Activities: Nature and Science**
Exploring Wildlife Communities with Children

**English and Spanish versions of this leader's guide are available.*
***Bilingual book*

Glossary

Algae: A chlorophyll containing plant ranging from one to many cells in size, that lives in fresh or salt water.

Anadromous: Fish that return from salt water to fresh water to spawn (e.g., salmon, steelhead).

Aquatic Insect: Insect species whose larval and/or juvenile forms live in the water.

Aquifer: Any underground geological formation containing water.

Bedrock: Unbroken solid rock, overlain in most places by soil or rock fragments.

Benthic: Bottom-dwelling. The plant and animal life whose habitat is the bottom of a sea, lake, or river.

Channelized: The straightening and deepening of streams. Channelization reduces the ability of the stream to assimilate waste and disturbs fish breeding areas.

Clarity: The clearness of the water in the stream.

Conifers: A cone-bearing evergreen tree or shrub (a pine tree, for example).

Cover: Overhanging or instream structures (such as tree roots, undercut streambanks, or boulders) that offer protection from predators, shelter from strong currents, and/or shading.

Current: The velocity (speed) of the flow of water.

Deciduous: A tree that sheds its foliage at the end of the growing season.

Ecosystem: The interacting system of a biological community (plants, animals) and its non-living environment.

Effluent: The wastewater from a municipal or industrial source that is discharged into the water.

Erosion: The wearing away of the land surface by wind or water.

EPA: Environmental Protection Agency.

Filling: The process of depositing dirt and mud in marshy areas (wetlands) or in the water to create more land. Filling disturbs natural ecological cycles.

Gradient: The slope or steepness of the stream.

Groundwater: The supply of freshwater under the earth's surface in an aquifer or soil.

Habitat: The specific environment in which an organism lives and depends on for food and shelter.

Headwaters: Small creeks at the uppermost end of a stream system, often found in the mountains, that contribute to larger creeks and rivers.

Mass Wasting: Downward movement of dry soil and rock caused by gravity (often called slides or avalanches).

Monitor: To measure a characteristic, such as streambank condition, dissolved oxygen, or fish population, using uniform methods to evaluate change over a period of time.

Nonpoint Source Pollution: "Diffuse" pollution, generated from large areas with no particular point of pollutant origin, but rather from many individual places. Urban and agricultural areas generate nonpoint source pollutants.

Nutrient: Any substance, such as fertilizer, phosphorous, and nitrogen compounds, which enhances the growth of plants and animals.

Point Source Pollution: A discharge of water pollution to a stream or other body of water, via an identifiable pipe, vent, or culvert.

Pool: An area of relatively deep slow water in a stream that offers shelter to fish.

Quality Control (QC): A system of checks used to ensure excellence, or quality, in a program (a monitoring program for example. QC asks if we are doing things right).

Quality Assurance (QA): Quality Assurance is a way to see that QC is maintained and if we are monitoring the right things to detect changes in water quality.

Reach: A stream section with fairly homogeneous characteristics.

Redd: Shallow depression in the streambed gravel in which a female salmonid deposits her eggs.

Riffle: A shallow, gravely area of streambed with swift current. Used for spawning by salmonids and other fish species.

Riprap: A sustaining wall built of rocks.

Riparian Area: An area, adjacent to and along a watercourse, often vegetated and constituting a buffer zone between the nearby lands and the watercourse.

Run: A stretch of fast smooth current, deeper than a riffle.

Runoff: The portion of rainfall, melted snow, or irrigation water that flows across ground surface and eventually returned to streams. Runoff can pick up pollutants from the air or the land and carry them to streams, lakes, and oceans.

Salmonid: Fish that are members of the family ***Salmonidae*** (includes salmon, trout, char, and whitefish).

Sediment: Fine soil or mineral particles that settle to the bottom of the water or are suspended in it.

Stormwater Runoff: Water that washes off the land after a rainstorm. In developed watersheds it flows off roofs and pavements into storm drains that may feed directly into the stream; often carries concentrated pollutants.

Substrate: The material that makes up the bottom layer of a stream, such as gravel, sand, or bedrock.

Stream Corridor: The lower and upperbanks of a perennial or intermittent stream.

Stream Mouth: The place where a stream empties into a lake, ocean, or another stream.

Suspended Sediments: Fine material or soil particles that remain suspended by the current until deposited in areas of weaker current. They create turbidity and, when deposited, can smother fish eggs or alevins. Can be measured in a laboratory as Total Suspected Solids (TSS).

Topography: The configuration of a surface area including its relief, or relative elevations, and the position of its natural and man-made features.

U.S.G.S.: U.S. Geological Survey.

Wetlands: Wetlands are lands where saturation with water is the dominant factor determining the nature of soil development. They also can be identified by unique plants which have adapted to oxygen-deficient (anaerobic) soils. Wetlands influence stream flows and water quality.

Zoning: To designate, by ordinance, areas of land reserved and regulated for specific uses, such as residential, industrial, or open space.

RESOURCES

Polluted Runoff

Give Water a Hand Activity Guide includes activities for youth to learn about their watershed and ways to protect it. Download a free copy of the *Action Guide* and *Leader Guidebook* at ***www.uwex.edu/erc***. To order printed copies call: University of Wisconsin-Extension; (608) 262-3346; Item #4-H450 & 4-H855

Splash (CD Rom) interactive multi-media educational tool on nonpoint source pollution. Allows users to see what happens when it rains. Contact the Conservation Technology Information Center, 1220 Potter Drive, #170, West Lafayette, IN 47906. Phone: (765) 494-9555; e-mail: ctic@ctic.purdue.edu; $12.

Watersheds/General

Using EPA's *Watershed Information Network* (www.epa.gov/win), you can locate your watershed, discover its condition and learn about partnerships that are working to protect it. If you do not have Internet access, call 1-888-478-2051.

National Water Quality Inventory, 1998 Report to Congress. Published by EPA, this report includes detailed information about the condition of the nation's waters. Available by calling the National Service Center for Environmental Publications (NCSEP) at 1-800-490-9198. Internet: ***www.epa.gov/305b***.

Make Your Own Watershed kit. Available from the Terrene Institute. Phone: 703-548-5473. Internet www.terrene.org; $29.95 plus $5.50 s&h.

Watershed Festival

The Water Environment Federation has a step-by-step guide to hosting a Watershed Festival. Call 1-800-858-4844. Order No. ZS1603WW ($8.00 each).

Project WET (Water Education for Teachers) promotes stewardship of water resources through the development of classroom-ready teaching aids and the establishment of state and internationally sponsored programs. Montana Water Resources Research Institute (406) 994-5392. Internet:: http://www.montana.edu/wwwwet/.

Water Posters

To order, specify poster titles and grade level. Recommended full color posters with activities on the back include *Wastewater and Watersheds*. The *Water Use* poster, which is available in black & white, is used for coloring. Call 1-888-ASK-USGS. Posters are limited to one per person., and some posters are currently unavailable.

Wetlands Information

Call the Wetlands Helpline at 1-800-832-7828 to obtain free fact sheets, coloring books, and other useful materials on wetlands. Or, visit EPA's Wetlands Kids' Web page for fun projects and links to other sites and activities. ***www.epa.gov/OWOW/wetlands.***

The Izzak Walton League, 707 Conservation Lane,Gaithersburg, MD 20878 (1-800-BUG-IWLA).

Bill Nye "the Science Guy" video on Wetlands. Available from the Disney Corporation.

River of Words Poetry and Art Contest

Visit the River of Words Web Page or call below to get contest details, entry forms & tips:
ROW Contest
PO Box 4000-J
Berkeley, CA 94704 USA
Phone: 510-548-POEM
Internet: www.riverofwords.org

Cleanups/International Coastal Cleanups

Call the Center for Marine Conservation's toll-free hotline 1-800-CMC-Beach or visit the CMC Web Page (***www.cmc-ocean.org***) for information about sponsoring a beach cleanup or participating in the annual International Coastal Cleanup every September. CMC also provides storm drain stencils on loan and guidelines on how to conduct a project.

Turning the Tide on Trash: A Learning Guide on Marine Debris. Learn about marine debris and sponsor a local cleanup of marine and other water debris (free). Call NSCEP at 1-800-490-9198, 1-513-489-8190, Ref. EPA842-B-92-003. On the web at ***www.epa.gov/OWOW/OCPD/Marine/contents.html***

Volunteer Monitoring

Earth Force can offer youth groups low cost water quality monitoring kits and guidance in starting new watershed programs. For more information, call or write: Earth Force
1098 Mount Vernon Avenue, Second floor
Alexandria, VA 22301
Phone: 1-800-23-FORCE (***www.earthforce.org)***

Izaak Walton League of America (IWLA) sponsors monitoring workshops and training. 1-800-BUG-IWLA (***www.iwla.org/SOS***)
The following publications by IWLA may also be useful. Call 1-800-BUG-IWLA to order:

1) *Save Our Streams Monitor's Guide to Aquatic Macroinvertebrates,* by Loren Larkin Kellogg (IWLA, 1992)

2) *Save Our Streams Volunteer Trainer's Handbook*, by Karen Firehock (IWLA, 1994)

3) *Hands on Save Our Streams, the Save Our Streams Teacher's Manual for Grades One Through Twelve,* by Karen Firehock (IWLA, 1995)

EPA's Volunteer Monitoring HomePage ***at www.epa.gov/owow/monitoring/vol.html***
Getting Started in Volunteer Monitoring. EPA 841-B-98-002. Call (202) 260-7040 if you do not have Internet access. *The Volunteer Monitor* newsletter. ***www.epa.gov/owow/monitoring/volunteer/vm_index.html***

Wetlands, Lake and Stream Walk Manuals

Call US EPA's Region 10 Office at (206) 553-1200. Also ask for the "Teacher's Guide to Streamwalk." Wetland and Lake Walk Manuals and survey sheets are available on the Web at ***www.epa.gov/OWOW/wetlands/wqual.html#Volunteer***. Click on "Wetlands Walk Manual and Supplement Worksheets" under Volunteer Monitoring
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Groundwater Protection

EPA's groundwater/drinking water web page at ***www.epa.gov/ogwdw/kids/index.html*** has great science projects that can be downloaded

The Blue Thumb Project
The Blue Thumb Project is an international public awareness and education effort to encourage people to take better care of our water resources—and especially our drinking water supplies. Each year a set of material on water—and its care—is developed and disseminated to organizations to help them plan community water education projects. For information, contact The Blue Thumb Project, c/o AWWA, 6666 W. Quincy Ave., Denver, CO 80235, (303) 794-7711.
Internet: www.awwa.org/bluethumb/

Groundwater Festival
The Groundwater Foundation has a "how-to" book called "Making Waves: How to Put on a Water Festival." To order "Making Waves" or to receive additional information on their Children's Groundwater Festival, contact the Groundwater Foundation at info@groundwater.org or call 1-800-858-4844.
Internet: www.groundwater.org/

EPA's Safe Drinking Water Act Hotline
1-800-426-4791

This is not a complete list of available resources and mention of these products does not constitute endorsement by EPA. Visit the Adopt Your Watershed (www.epa.gov/adopt) or Office of Water web page (www.epa.gov/ow) for a more complete list or call toll-free 1-888-478-2051.

Application for Troop Recognition

Watershed or Waterbody Name: _____
Troop Name: _____
Contact Person/phone: _____
Address: _____
Number of Girl Scouts: _____
Brief Description of Troop Activities: (100 words or less). Should demonstrate an ongoing commitment to the protection or restoration of a watershed.

Project Highlights/Successes:

Please return to: Patty Scott, Adopt Your Watershed Project
US EPA, Ariel Rios Building, 1200 Pennsylvania Avenue, S.W. (4501F),
Washington, D.C. 20460, phone (202) 566-1292.