2005 Outdoor Classroom Symposium
Resource Guide

Frey Elementary School
Acworth, GA

October 14, 2005

Outdoor Classrooms:
Teaching Outside the Box

Teach outdoors and discover the gifts that outdoor classrooms have to offer.

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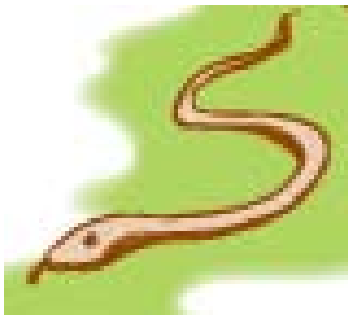
10:15 – 11:00 (short sessions)



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Presenter Information Sheet
Outdoor Classroom Symposium – 2005

Frey Elementary School, Acworth, Cobb County
Friday, October 14, 2005

Jean McDonald - FROGS, Christina Qualls, Judy Schroeder, Amanda Korb, Cindy Nolen, and Barbara Ketcham

Names

Frey Elementary	Volunteers and Teachers
Organization	**Title**

2865 Mars Hill Road, Acworth, GA 30101

Address

770-975-6655	770-975-6657
Phone	**Fax**

Freyoutdoors@bellsouth.net; Christina.Qualls@cobbk12.org

E-mail

Nuts and Bolts: A Quick and Dirty Approach to Creating Outdoor Classrooms

Topic/Title

Brief Description of Activity

Explore different ways to create outdoor classrooms, learning stations, and trails using castoff supplies, cool kits, and eco-friendly materials. Get the scoop on design, materials, and sustainability. Take a short tour of Frey's outdoor classrooms and help build a convertible bench/table during this hands-on session.

Morning Session – 45 minutes – (10:15 – 11:00)

Standards of Care for our Nature Area

How to Care for a Surfaced Trail

Installing Timbers

- Landscape timbers should be used to edge slate trails (except in the case of the big meadow, past the second bridge, where heavy equipment sometimes travels easements and could damage timbers).
- To install, pre-drill holes for timber spikes about 1' from each end of the 8' timbers, clear and level the ground where timber is to be positioned, put timber in place, adjust and level using a mattock to dig out under or to lift timber, then use a sledge hammer to pound spikes in. Note: drill bit, mattock and extra spikes available in storage shed on Whitetail Trail.
- Timbers which are adjacent to mowed areas should be dug into the ground and positioned so that the top surface is just 1.5" above grade, to avoid conflicts with mowing equipment and eliminate the need for weed whacking between grass and timber.
- If a timber is warped, turn it over and re-spike it. If the bow is too great, it may need to be replaced.
- If timbers are knocked out of place by mowers or trucks, they can simply be put back and re-spiked.
- Slate trails should be 60" wide (between inside edges of timbers). This allows for the passage of the occasional mowers or even a golf cart.

Installing Slate

- Stabilized slate is used for the surfaced trails, because it ensures wheelchair accessibility while still allowing water to percolate into the ground. (Please do not use bark mulch, crush run, or gravel, which are more difficult for wheeled equipment to roll over. Slate pieces are flat and pack down hard.
- The current vendor for stabilized slate is Rock and Earth Technologies. Please check with FROGS Chairperson, Jean McDonald, if additional slate is needed for repairs. When the budget allows, slate is purchased in quantities of 10 – 20 tons at a time.
- The path should be prepared for slate installation by tilling or leveling the ground and controlling or removing weeds. Earth moving equipment is not recommended for grading the trail bed, because of the piles of dirt which result and difficulty of avoiding a washboard surface effect or too wide a path.
- Slate for a new section of trail may be installed using a heavy duty spreader, towed behind a riding mower or tractor. Slate may also be manually installed by hauling it in a wheelbarrow, shoveling it on the trail, and spreading it with a rigid metal rake. Slate depth should be 1", for cost effectiveness and adequate erosion control. Shovel and rake are available in storage shed on Whitetail Trail.
- To prevent erosion on a slope, a 4" opening in the timber should be cut to allow a path for water to flow across and off the trail surface. Some slate will flow out with the run-off, but this technique will keep deep rivulets from being worn in the trail, if openings are positioned correctly. French drains and water bars are *not* typically used.
- In the case of wetlands, a drainage pipe may need to be installed under the trail and the surface elevated. For example, please see the trail structure after the second bridge, in the big meadow.

Weed Control

- A 12" cleared area on either side of slate trails keeps weeds from encroaching on the path. Please remove weeds from this area by pulling out the whole plant by the roots or cutting it off at ground level. In the case of blackberry canes, please be sure to remove the entire cane, even if it is rooted outside the 12" buffer zone and just extends into this

space. Apply a 2" to 3" layer of bark mulch annually in the buffer zone, to prevent recurrence.
- For guidelines on use of herbicides, please see the Weed Control page in this handbook.

Overhanging Branches

- Please prune overhanging branches back to the tree trunk, rather than lopping off midway along the branch. This will keep tall people from running into the cut end of a branch. Trails should be clear to 8' overhead, directly above the trail bed.

How to Care for Natural Tread Trails

Trail Surface

- No surface material is applied on natural-tread trails, which consist of compacted bare earth or trampled weeds. These trails are usually farthest from the schools, in wet areas or rugged terrain.
- The trail bed should be 36" to 48" wide, depending on the lay of the land (with the larger dimension preferred),
- The trail bed should be level, with switchbacks (long zig-zags across the face of a hill) provided so that no descent / ascent is too straight and steep for safety and erosion control. To level a trail bed which runs across a slope, the uphill side should be dug with mattocks or pulaskis, and soil borrowed from this area should transferred to the downhill side.
- Trails in shaded, woodland areas typically do not need any herbicides.
- Trails through meadows and open areas are easiest to manage when glyphosate herbicides are applied twice a year (early spring and mid to late summer). After spraying and weed whacking or mowing, these trails will remain clear for several months just with the trampling of little feet.
- For guidelines on use of herbicides, please see the Weed Control section in this handbook.

Overhanging Branches

- Please prune overhanging branches back to the tree trunk, rather than lopping off midway along the branch. This will keep tall people from running into the cut end of a branch. Trails should be clear to 8' overhead, directly above the trail bed.

How to Care for an Outdoor Classroom

Appearance

- The object is *not* to affect a European park look, with all the under-story shrubs cleared, snags (dead trees) dropped, rotting logs removed, and leaves blown. Minimal impact is the goal.

Weed Control and Pruning

- Weed control is important to the extent that students can freely access and use the outdoor classrooms. However, it is also important to identify and protect desirable native plants (some of which may be considered "weeds"). When in doubt, contact the FROGS chairperson for help.
- Pull weeds out by the roots or cut them back at ground level.
- Treat weeds with glyphosate herbicide, if necessary. See Weed Control section of handbook.
- Help eradicate non-native invasive species such as privet and kudzu by removing as much of these species as possible. Treat remaining stumps or roots with a glyphosate herbicide.

Maintenance and Repairs

- Repair benches, tables, and other structures or improvements, as needed, if in your ability to do so. (If not, report hazards so that the area can be closed or the damaged item removed). There is no maintenance crew to tend to things we cannot manage ourselves. It may be possible to get a project on the list for the next big volunteer work day, but we must be as self-reliant as possible.
- Remove litter and trash regularly, so continued littering is not encouraged by a shabby appearance.
- Clean moldy or mildewed wooden tables and benches by spraying on diluted bleach in a ratio of 1 part bleach to 9 parts water. Allow the bleach to remain on the furnishings for at least 15 minutes. Set in the sun, if possible. Then rinse with buckets of water from the nearest creek (or a rolling cooler).
- Protect the investment that your group and others have made in the nature area by refinishing wooden tables and benches with clear polyurethane, once a year.

Safety Hazards

- Report safety hazards, including active fire ant colonies, broken or un-repairable furnishings, etc. to the FROGS Chairperson, using the form in this handbook. Forms may be dropped in the FROGS folder in the PTSA Room or submitted by email to freyoutdoors@bellsouth.net

How to Care for a Garden

Planting

- Protect existing perennials
- Identify weeds before removing
- Mulch to retain moisture and prevent weeds.
- Deadhead flowers
- Choose perennial native species whenever possible

Weed Control in the Nature Area

Weeding

- Areas to weed include:
  - Slate-surfaced trails ~ in the trail bed and 12” outside the landscape timbers edging the trail,
  - Natural tread trails ~ in the trail bed
  - Outdoor classrooms ~ clear center and allow 3’ clearance around outside of tables or benches,
  - Gardens in the nature area,
  - Signs ~ 12” to 24” around posts,
  - Kiosks ~ 36” around posts
- When weeding by hand, try to remove entire plants by the roots. In the case of blackberry canes, please cut them off at the ground, even when that may be outside the area being cleared.
- Many weeds have stickers or thorns. Wear gloves and long sleeves when weeding, to avoid injury.
- When operating a string trimmer or brush cutter, always wear safety goggles and hard toed shoes. Never weed whack when children are in the vicinity, nor allow a child to weed whack. Keep appropriate distance from others (approximately three times the length of the tool). Use power equipment only if you are experienced, familiar with the manual, wearing safety gear, and willing to accept responsibility for injuries.

- When weed-whacking, cut woody stems close to the ground, so “toe-stubbers” are not created.
- Be able to recognize desirable native plants and especially avoid weeding out beautyberry, jewelweed, milkweed, wild roses, and cardinal flower. (See field guide portion of this handbook). When such plants occur in the 12” cleared buffer zone beside a trail, just leave them in place. Also leave trees in the buffer zone if they are 2”+ in diameter. Just prune branches back to the trunk, from ground level up to 8’ high.
- Dispose of weeded plants by tossing them into the woods in a variety of locations, so that dead brush is not visible from the trail or cleared area. Only poison ivy and non-native vegetation, such as privet or kudzu, should be disposed of in garbage bags and removed. Please do not take home weeds to burn. This contributes to air pollution and, if poison ivy is present, could cause skin and lung irritation.

Mulching

- After planting a garden area, water it and cover bare soil with newspaper three sheets thick. Wet the newspaper to keep it from blowing. Cover newspaper with 2” to 3” of bark mulch. Leave an inch around each plant, as wet mulch which comes in direct contact with the plant can cause fungus to grow.
- After weeding plants from a 12” border along slate-surfaced trails, apply mulch 2” to 3” thick to help prevent weeds from returning to the area.

Composting

- Do not put undesirable weeds with seed heads in a compost pile, so that they will not germinate and grow wherever the compost is applied.
- Grass clippings, garden foliage, and dead-headed flowers may be added to a compost pile.

Herbicides

- A systemic, glyphosate-based herbicide can be effective in controlling weeds, especially on natural tread trails in sunny areas. No other types of herbicides are permitted in the nature area. Glyphosates may be used by adults, at their own risk, but may not be sprayed by or in the presence of children, or within 20’ stream buffer areas, or on all the plants in an area. Wear safety gear when spraying (i.e. gloves, mask).
- When applying glyphosate-based herbicide, spray directly on leaves of plant or on a freshly cut stump.
- Do not spray when it is windy. Protect nearby desirable plants from drifting spray.
- Glyphosate-based herbicides are not effective once leaves start to turn colors in the fall.
- Plants sprayed with herbicides will brown within a few days. This foliage still needs to be removed, except in the case of a natural tread trail. Toss weeds in a variety of locations, so dead brush is not visible from the trail or cleared area. Note that plants with stickers can still hurt you when they are dead and poison ivy can still cause a skin rash when brown. Protect hands and arms when handling weeds. Do not burn.
- Glyphosate-based herbicides Rodeo and Accord reportedly do not harm stream macroinvertebrates or fish, while Round-Up is moderately toxic. Therefore, Rodeo or Accord is preferred. 20’ wide herbicide-free buffers should be maintained along each side of a creek.
- For more information on herbicides, see this Web site: http://infoventures.com/e-hlth/pestcide/glyphos.html

Presenter Information Sheet
Outdoor Classroom Symposium – 2005

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Friday, October 14, 2005

Amanda Kail

Names

Georgia Wildlife Federation | Education Program Coordinator

Organization | **Title**

11600 Hazelbrand Rd Covington, GA 30014

Address

770-787-7887 | 770-787-9229

Phone | **Fax**

akail@gwf.org

E-mail

Meet the Experts

Topic/Title

Brief Description of Activity

Hear a panel of school teachers and volunteers share the secrets of their successful outdoor classroom programs. Participants will be given the opportunity to ask the panel questions about the basics, including maintenance and challenges of outdoor classrooms.

Moderator: Amanda Kail
Panel:

Julie Newell, Southern Polytechnic State University
Carol A. Sowers, Gainesville Exploration Academy
Carolyn Cagle, Huntly Hills Elementary
Josephine Richardson, Huntly Hills Elementary

Morning Session – 45 minutes – (10:15 – 11:00)

Earth Week 2004:
Georgia Native Plants in the Tritt Nature Nook

As Southern Polytechnic's liaison to our Partner in Education, Tritt Elementary, it has been my pleasure to help Tritt's students add a variety of native plants within the Nature Nook. Most of the plants were collected, in cooperation with the Georgia Native Plant Society, from areas that are soon to be construction sites. A few came out of my own garden (a certified GNPS Native Plant Habitat!) or from the Chattahoochee Nature Center plant sale. As part of Tritt's celebration of Earth Week, I hope you'll take a few minutes to talk with your child about why saving and using native plants is a good idea. You might even consider adding native plants to your own gardening and landscaping activities in the future!

Dr. Julie Newell
Associate Professor, SPSU
(and Tritt Parent!)
jnewell@spsu.edu

Why Use Native Plants: The Top Five Reasons!

1. *Native plants are well adapted to local conditions—once established, they require less supplemental water and fewer garden chemicals. (Cheaper, easier,* and *better for the environment!)*
2. *Many non-native plants behave as "invasive exotics"—they don't stay where you plant them, but spread into surrounding areas, crowding out many other plants and the animals that depend on them.*
3. *Native plants are often important sources of food and shelter to wildlife, so when you use native plants you may well attract birds and butterflies, too!*
4. *Native plants are often endangered by human activities—by planting them we help to assure their survival.*
5. *There are many beautiful native plants from which to choose—and native plants make your garden unique and interesting as well as beautiful!*

SOUTHERN POLYTECHNIC STATE UNIVERSITY
University System of Georgia

Some of the Things We Planted

Giant Chickweed *(Stellaria pubera)*
Trout Lily (*Erythronium sp)*
Christmas Fern *(Polystichum acrostichoides)*
Merrybells *(Uvularia)*
Cranefly Orchid *(Tipularia discolor)*
Elderberry *(Sambucus canadensis)*
Butterfly Weed *(Asclepias tuberosa)*
Joe Pye Weed *(Eupatorium purpureum)*
Bee Balm *(Monarda didyma)*
Crossvine (*Bignonia capreolata*)
Lyreleaf sage (*Salvia lyrata)*
Cohosh (*Cimicifuga racemosa)*
Beauty-berry (*Callicarpa americana)*

Cranesbill *(Geranium maculatum)*
Bloodroot *(Sanguinaria canadensis)*
Wild Ginger *(Asarum (Hexastylis) spp.)*
Rue Anemone *(Anemonella thalictroides)*
Lady Fern (*Athyrium filix-femina*)
Yellowroot *(Xanthorhiza simplicissima)*
Purple Coneflower *(Echinacea purpurea)*
Black-Eyed Susan *(Rudbeckia fulgida)*
Sweet-shrub *(Calycanthus floridus)*
Climbing Hydrangea *(Decumaria Barbara)*
Foamflower (*Tiarella spp.)*
Native Azalea
Oak-leaf Hydrangea *(Hydrangea quercifolia)*

How many can you find in the Nature Nook?

A Few Reminders About Rescued Plants:

--never remove plants (or any part of a plant) from a State or National Park; not only does it mean that plant won't be there for others to enjoy, but it's against the law!

--never "rescue" a plant from private property without the permission of the property owner

--remember that you can't move or posses an endangered plant unless you have the proper paperwork (permits)

--when you buy native plants be sure you know where they came from! Plants that are collected in the wild further endanger native species. Reputable nurseries sell "nursery propagated" plants—they are helping to make more native plants and should be encouraged!

Native Plants on the Web:

The very best place to start is: The Georgia Native Plant Society: http://www.gnps.org/index.html . In addition to GNPS events and information, check out the "Resources" section. Under "Schoolyard Resources" you'll even find a list of recommended books for children. And the "Sites of Interest" section gives you links to many, many other useful web sites.

You can help native plants by what you <u>don't</u> plant, too.

These plants tend to escape from where we put them and become invasive non-natives, crowding out native plants. Try not to plant this "dirty dozen" even though some of them are very attractive to look at. Think Kudzu—it has nice leaves and pretty purple flowers!

Autumn Olive *(Eleagnus umbellate)*	Privet *(Ligustrum)*
Mimosa *(Albizia julibrissin)*	English Ivy *(Hedera helix)*
"Bradford' Pear *(Pyrus calleryana)*	Chinese Tallow Tree *(Sapium sebiferum)*
Nandina *(Nandina domestica)*	Multiflora Rose *(Rosa multiflora)*
Sweet Autumn Clematis *(Clematis terniflora)*	Vinca *(Vinca major* and *Vinca minor)*
Chinese Wisteria (*Wisteria sinensis*)	Japanese Honeysuckle *(Lonicera japonica)*

SOUTHERN POLYTECHNIC STATE UNIVERSITY

University System of Georgia

The Exploration Academy

"Where learning is an adventure!"

The Exploration Academy, located off McEver Road, uses children's natural curiosity to explore the world around them. Just as the atom is the basic building block of matter, the Exploration Academy has intellectual curiosity as its nucleus. Programs are provided that enable students to construct knowledge as they interact with their expanding world. Quality instruction revolves around integrated themes that are designed to be developmentally appropriate, student directed and highly motivating.

- Kindergarten – Exploring Ourselves and Our Community
- 1st Grade – Exploring Our State
- 2nd Grade – Exploring Our Region
- 3rd Grade – Exploring Our Nation
- 4th Grade – Exploring Our World
- 5th Grade – Exploring Our Universe

- Every child is provided with a quality instructional program meeting and exceeding the Georgia Quality core curriculum (QCC) Standards.
- Instruction is delivered using research based Best Practices of Instruction.
- The Balanced Literacy program incorporates small group instruction in reading/writing workshops to focus on learning to read in the primary grades and reading to learn in the intermediate grades.
- Teachers work directly with Science/Math/Technology Specialists to analyze student performance and to develop and deliver instruction.
- Program development draws on expertise from local, state and national resources such as Elachee, Georgia Department of Natural Resources, NASA and the National Wildlife Federation.
- Science, math and technology are incorporated into reading, language arts and social studies.
- Hands-on activities such as a school newspaper and television station are used to foster communication, critical thinking skills.
- Real world experiences including an outdoor classroom, garden, nature trail and weather station build a foundation for life-long learning.
- Extended day learning opportunities could include remedial and enrichment classes and special interest groups such as Science Olympiad, Adventure Club and Technology Club.
- The student is prepared to successfully face the challenges of advanced academic studies in the middle and high school.

The Exploration Academy is a family of knowledge seekers who enthusiastically construct and integrate knowledge through science, math and technology.

Come join the adventure!

For more information contact:
Laurie Stamsen 770-532-7711
Or www.gcssk12.net

Presenter Information Sheet
Outdoor Classroom Symposium – 2005

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Becky Blades

Name

Master Gardener Volunteer Cobb County | Lifetime Master Gardener

Organization | **Title**

3565 Velma Drive, Powder Springs, GA 30127

Address

Phone: 770 943-5335

gwblades@aol.com

E-mail

Organic Vegetable Gardening

Topic / Title

Brief Description of Presentation:

Learn which veggies will grow within the school year for a fall and spring harvest and even what will grow over the summer vacation!

Morning Session – 45 minutes - (10:15 – 11:00)

Learning About Plants

Grades K - 6. Allow 30 minutes. Science Standard – Life Science
Colorado State University Cooperative Extension 4-H Youth Development

Purpose:
• Recognize what plants need to live and grow
• Name basic parts of plants

Note: Before beginning activity, check with participants about any allergies they may have to plants.

Supplies:
• Bring plants (weeds are OK) for each participant

Ask the participants if they know what plants need to grow.
The four key components are:
• Water
• Soil (hydroponic plants are an exception)
• Sunlight
• Air -- more specifically carbon dioxide (CO2) from the air.

Discuss the uniqueness of plants as the only organisms that can produce their own food.

Here is the actual equation for photosynthesis:
$6CO_2 + 12H_2O + \text{sunlight} \rightarrow 6O_2 + C_6H_{12}O_6 + 6H_2O$
or
carbon dioxide+water+sunlight→oxygen+carbohydrate+water

Have participants identify basic parts of the plants they have been given, such as: leaves, roots, flowers, stems.

Expand discussion on the complexity of plants and look at:
Shape of leaves
Leaf opposition
Texture
Flowers
Edges
Stems

Flowers for a Special Occasion

Grades K - 6. Allow 30 minutes. Science Standard – Life Science
Colorado State University Cooperative Extension 4-H Youth Development

Supplies:
• Bring a potted petunia or other flowering plant for each participant
• Potting soil
• 16 oz. paper cup for each participant (may be donated by a fast-food restaurant)
• Colored plastic wrap
• String, yarn or ribbon, approximately 12" per participant

1. Demonstrate how to remove a potted plant from its container without damaging the plant.
2. Pull apart the roots to allow for better growth.
3. Have participants fill paper cups about 2/3 full with potting soil.
4. Use fingers to make a hole large enough to place the potted plant into.
5. Place the plant into the hole in the soil in the paper cup. Add more potting soil and carefully press the soil tightly around the plant.
6. Add a small amount of water.
7. Form a foot square piece of colored plastic wrap around the paper cup as a florist would. Use yarn, ribbon or string to tie the plastic wrap into place.
8. Participants can share their plants with friends or families for a special occasion.

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Walter Lane

Name

GA DNR | GA Project WILD Coordinator

Organization | **Title**

Charlie Elliott Wildlife Center, 543 Elliott Trail, Mansfield, GA 30055

Address

Phone: 770-784-3059 **Fax:** 770-784-3061

Walter_Lane@dnr.state.ga.us

E-mail

Conquer Your Fear of the Outdoor Classroom

Topic / Title

Brief Description of Presentation:

Learn common sense approaches to identifying and avoiding poisonous plants, things that sting, and snakes that shake. Free field guides and other resources available during the session.

Morning Session – 45 minutes – (10:15 – 11:00)

Fast Facts

Urushiol Oil is Potent

- Only 1 nanogram (billionth of a gram) needed to cause rash
- Average is 100 nanograms for most people
- 1/4 ounce of urushiol is all that is needed to cause a rash in every person on earth
- 500 people could itch from the amount covering the head of a pin
- Specimens of urushiol several centuries old have found to cause dermatitis in sensitive people.
- 1 to 5 years is normal for urushiol oil to stay active on any surface including dead plants
- Derived from **urushi**, Japanese name for lacquer

When the Japanese restored the gold leaf on the golden Temple in Kyoto, they painted the urushiol lacquer on it to preserve and maintain the gold. Guess you could say that you would be caught red handed if you stole it.

Poison Ivy, Oak, and Sumac

- Most common allergy in the country claiming half the population
- Sensitivity to urushiol can develop at any time
- Solutions or cures are those that annihilate urushiol
- Everyone appears to react slightly different to all the remedies.
- Covered by workers compensation in some states (CA, for example)
- First published records of poison ivy in North America date back to 1600s
- Poison Ivy coined by Captain John Smith in 1609
- Western Poison Oak discovered by David Douglas (1799-1834) on Vancouver Island. Douglas fir also named after him.
- People with serious deficiency in cellular (T-cell) immunity such as AIDS patients may not have problems with dermatitis.

Myths vs. Facts

Myth	Fact
Poison Ivy rash is contagious.	Rubbing the rashes won't spread poison ivy to other parts of your body (or to another person). You spread the rash only if **urushiol oil** -- the sticky, resinlike substance that causes the rash -- has been left on your hands.
You can catch poison ivy simply by being near the plants	Direct contact is needed to release **urusiol oil**. Stay away from forest fires, direct burning, or anything else that can cause the oil to become airborne such as a lawnmower, trimmer, etc.
Leaves of three, let them be	Poison sumac has 7 to 13 leaves on a branch, although poison ivy and oak have 3 leaves per cluster.
Do not worry about dead plants	**Urushiol** oil stays active on any surface, including dead plants, for up to 5 years.
Breaking the blisters releases **urushiol** oil that can spread	Not true. But your wounds can become infected and you may make the scarring worse. In very extreme cases, excessive fluid may need to be withdrawn by a doctor.
I've been in poison ivy many times and never broken out. I'm immune.	Not necessarily true. Upwards of 90% of people are allergic to urushiol oil, it's a matter of time and exposure. The more times you are exposed to urushiol, the more likely it is that you will break out with an allergic rash. For the first time sufferer, it generally takes longer for the rash to show up - generally in 7 to 10 days.

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Sarah Visser

Name

GA Dept of Community Affairs – Keep GA Beautiful Education Coordinator

Organization **Title**

60 Executive Park South, Atlanta, GA 30329-2231

Address

Phone: 404-679-4853

svisser@dca.state.ga.us

E-mail

Unwrap the Secrets of Grant Writing

Topic / Title

Brief Description of Presentation:

Maximize your chances of getting funded by finding the grant programs and grant makers that fit your projects. Learn the components that every funder will be looking for in your proposal and how to build on your successes to generate new funding for your school or organization.

Morning Session – 45 minutes – (10:15 – 11:00)

Unwrap the Secrets of Grant Writing

Sarah Visser
Keep Georgia Beautiful

Finding a Grant

- Types of Grants: Government, Foundation, Corporate
  - Government Grants – Catalog of Federal Domestic Assistance, Catalog of State Financial Assistance Programs
  - Foundations – The Foundation Directory
  - Corporate - Websites, Annual Reports
- www.schoolgrants.org
- Business and Personal Contacts

Researching the Grant Maker

- The more you know the better
- Visit websites or call for printed materials and request a list of previous grants if available
- Resources to help: Foundation Directory, Annual Reports, www.Guidestar.org
- Don't try to force a match

Before You Start

- Have a copy of the grant application/ RFP on hand
- Make sure you are aware of any special requirements
- Ready any necessary documentation such as tax returns, 501 c(3) letter etc.
- If appropriate, contact the grant maker to discuss your project

Seven Parts of a Grant

- Summary Statement
- Needs Assessment
- Background of Organization
- Program Description
- Evaluation Measures
- Budget
- Future Funding Statement

Summary Statement

- Summarizes the project: should state who you are, how much money you are requesting, and what you will do with it.
- Keep it short: a paragraph to a page
- Keep In Mind: The summary is the first and often the **only** part of a proposal that is read

Needs Assessment

- Perhaps the most important part of the proposal, describes the problem that requires action
- Provide supporting numbers and documentation
- Portray the need clearly, don't assume that the need is "obvious"

Background of Organization

- Who are you?
- Why are you the group to do this project?
- Prove you have the skills, expertise, and resources to implement the program successfully
- Mention any similar projects that you have implemented

Program Description

- 2 Parts - Objectives and Methods
    - Objectives – Be specific, what are your goals for the program? These must be concrete and measurable.
    - Methods – Description of your program. How will you achieve your objectives? Are these methods proven?
- Can include an implementation timeline

Evaluation Measures

- How will you know when you have met your objectives?
- Ideally, you should have an evaluation measure for each of your objectives
- Process evaluation versus outcome evaluation

Budget

- Detailed listing of all of the expenses and any revenue
- Funders will look for in-kind contributions on your part can be money, office space, administrative support, supplies etc.
- The budget should be clear, reasonable, and supported

Future Funding

- One time projects
- Have a plan (this is the hardest part)
- Reassure the Grant Maker: They want to know that good programs will continue on their own without additional expense to them

Additional Resources

- Grant Writers – Amateur and Professional
- EEA Conference
- DCA Grant Writing Seminar
- Packet
- Call Me (404) 6794853,
- svisser@dca.state.ga.us

Packet Contents

- Guide to the Web
- Sample Foundation Directory Page
- Essential Proposal Elements
- Summary Statement Questionnaire
- How to Write a Proposal
- Writing Winning Grant Proposals
- Additional References

Morning Concurrent Sessions
11:15 – 12:00 (Short Sessions)

- Daytime Astronomy – Wendy Delano
- Ladybug Mania – Lori Robinson
- Rain Gardens: Natural Solutions to Stormwater Problems – Diane Minick
- Staging a Schoolyard Science Day – Doris Thomas
- Surprise! Stream Bug Fun – Jennifer Porter and Lori Forester

Presenter Information Sheet
Outdoor Classroom Symposium – 2005

Frey Elementary School, Acworth, Cobb County
Friday, October 14, 2005

Wendy Delano

Name

--

Retired Science Curriculum Supervisor

Organization **Title**

270 Due West Court, Dallas, GA 30157

Address

Phone: 770 919-2025

wendydelano@cobbk12.org

E-mail

Daytime Astronomy

Topic / Title

Brief Description of Presentation:

Don't have a telescope? Can't get your students out in the evenings? Come learn strategies and activities for engaging your students in astronomy concepts during the day time.

Morning Session – 45 minutes - (11:15-12:00)

KidsAstronomy.com
Worksheet # 4

Name:_____Date:_____

Exploration

Read: The star commander has just sent you a secret message. To unscramble it you must answer the questions below. When you are finished place the letters in the correct order at the bottom of the page.

Hint: Visit http://www.KidsAstronomy.com/explore_index.htm for help finding the answers.

---

1. What was the name of the first satellite NASA sent to Mars?

   _ _ _ _ _ _ _ _
   1

2. What was the name of the first shuttle to be launched?

   _ _ _ _ _ _ _ _
   2

3. When scientists use more then one telescope to look at the same object it is called a

   _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
   3

4. What is the name of the probe which fell into the Atlantic Ocean after NASA attempted to send it to Mars?

   _ _ _ _ _ _ _ _
   4

5. The Space _____ will one day be replaced by cheaper, faster, and better space craft.

   _ _ _ _ _ _ _
   5

6. The most powerful telescope in the world is the

_ _ _ _ _ _ | _ _ _ _ _ | _ _ _ _ _ _ _ _ _ _
6

7. The first astronauts to travel to distant stars might use what to get up to light speed instead of engines.

_ _ _ _ _
7

8. Through the work done by astronauts during shuttle missions scientists learn the effects of weightlessness on

_ _ _ _ _ _
8

9. The Viking 1 and Viking 2 missions consisted of both an orbiter, and a

_ _ _ _ _ _
9

10. The biggest canyon on Mars is much bigger than the

_ _ _ _ _ _ | _ _ _ _ _ _
10 11

Secret Message:

_ _ _ | _ _ _ | _ _ _ _ _ _ | _ _ _ | _ _ _ _ _ _
10 11 5 | 4 9 1 | 2 7 1 4 9 | 3 11 9 | 7 4 5 8 2 6

Presenter Information Sheet
Outdoor Classroom Symposium – 2005

Frey Elementary School, Acworth, Cobb County
Friday, October 14, 2005

Lori Robinson
Name

The Ladybug Lady | Owner
Organization | **Title**

108 Henry Drive Gray, GA 31032
Address

478-936-9904 | 478-936-9910
Phone | **Fax**

ladybugs@bellsouth.net
E-mail

Ladybug Mania
Topic / Title

Brief Description of Presentation

Ladybugs in the classroom- everything you need to know and more. Participates receive hand-outs and freebies

Morning Session – 45 minutes - (11:15-12:00)

THE LADYBUG LADY

Lori Robinson
Biologist

Off. (478) 936-9904
Fax (478) 936-9910
www.ladybuglady.com

NAME _____

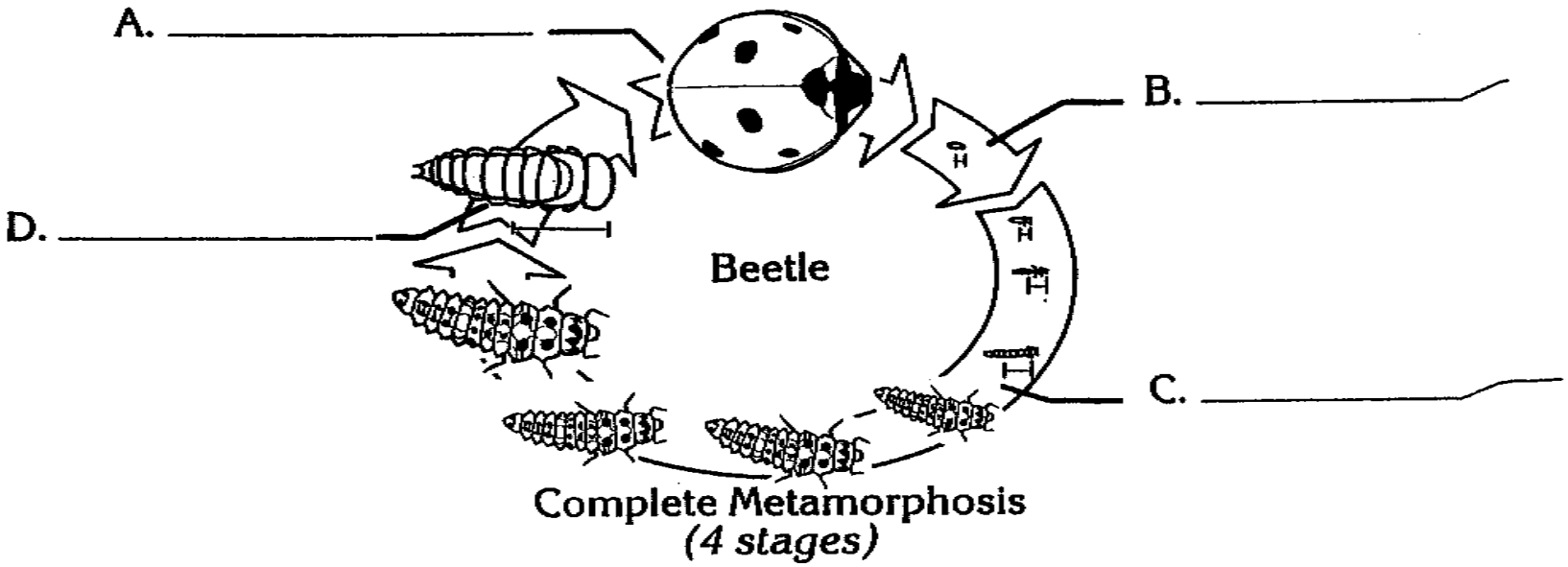
Circle 7 Ladybugs

THE LADYBUG LADY

Lori Robinson
Biologist

Off. (478) 936-9904
Fax (478) 936-9910
www.ladybuglady.com

NAME _____



Complete Metamorphosis
(4 stages)

Presenter Information Sheet
Outdoor Classroom Symposium – 2005

Frey Elementary School, Acworth, Cobb County
Friday, October 14, 2005

Diane Minick

Name

Environmental Impact Assessment, LLC Manager

Organization **Title**

317 North Brooke Drive, Canton, GA 30114

Address

Phone: 770 855-6128 **Fax:** 678 493-9066

dianeminick@msn.com

E-mail

Rain Gardens – Natural Solutions to Stormwater Problems

Topic / Title

Brief Description of Presentation:

Diane explains what rain gardens are and this unique method of bio-retention that protects rivers and streams and provides a beautiful solution to an ugly problem.

Morning Session – 45 minutes - (11:15-12:00)

Rain Garden Plant List(Georgia Natives)

Common Name	Scientific Name	Conditions
Trees		
Green Ash	Fraxinus pennsylvanica	Full Sun (FS)
Black Gum	Nyssa sylvatica	Part Shade (PSh), FS
Ironwood	Carpinus caroliniana	Full Shade (FSh)
Sweet Bay Magnolia	*Magnolia virginiana*	*PSh, FSh*
Swamp Chestnut Oak	*Quercus michanxii*	*PSh, PS (Part Sun)*
Silky Dogwood	*Cornus amomum*	*PSh*
Silverbell	*Halesia Carolina*	*FS, PSh*
Yaupon Holly	*Ilex vomitoria*	*FS, FSh, PS, PSh*
River Birch	*Betula nigra*	*FS, FSh, PS, PSh*
Possum haw	*Ilex decidua*	*PS, PSh*
Bald Cypress	*Taxodium distichum*	*FS, FSh, PS, PSh*
Willow Oak	*Quercus phellos*	*FS, PS, PSh*
Shrubs		
Beautyberry	*Callicarpa Americana*	*PSh, PS, FS*
Virginia Sweetspire	*Itea virginica*	*PS, PSh*
Spicebush	*Lindera benzoin*	*PSh, PS*
St. John's Wort	*Hypericum frondosum*	*FS, PS*
Sweetshrub	*Calycanthus floridus*	*FSh, FS*
Sweet Pepperbush	*Clethra alnifolia Hummingbird*	*PS, PSh*
Red Twig Dogwood	*Cornus sericea*	*PS, PSh, FS*
Arrowwood	*Viburnum dentatum,& nudum*	*FS, PS, PSh*
Herbaceous		
New England Aster	*Aster novea-angliae*	*FS*
Blazing Star	*Liatrus spicata*	*FS*
Cardinal Flower	*Lobelia cardinalis*	*FS, FSh, PS, PSh*
Swamp Hibiscus	*Hibiscus coccinea*	*FS, PS*
Blue Iris	*Iris virginica*	*FS*
Copper Iris	*Iris fulva*	*FS*
Joe Pye Weed	*Eupatorium fistulosum*	*FS*
Swamp Sunflower	*Helianthus angustifolius L.*	*FS*
River Oats	*Chasmantium latifolium*	*FS, PS*
Pink Muhly Grass	*Muhlenbergia capillaris*	*FS, PS*
Wild Geranium	*Geranium maculatum*	*PS, PSh*
Green and Gold	*Chrisogonum virginianum*	*PS, PSh*

Rain Gardens... Natural Solutions to Stormwater Problems

What are Rain Gardens?

- Bowl-shaped gardens.
- Between 4 and 8 inches deep.

What do Rain Gardens do?

- Collect stormwater from downspouts, driveways, parking lots, slopes or other hard surfaces.
- Slow the water down.
- Let the water sink into the ground and slowly make its way to a stream, giving plants a drink along the way.

How effective are they?

- They stop erosion problems 100%.
- They stop the destructive behavior of stormwater on streams, creeks and private property 100%
- They turn an eyesore into a beauty spot!

How can you find out if you need one?

- Look at your property and let the rain show you.
- Call Environmental Impact Assessment to come out and have a look.

Presenter Information Sheet
Outdoor Classroom Symposium – 2005

Frey Elementary School, Acworth, Cobb County
Friday, October 14, 2005

Doris Thomas, assisted by Dawn Rickard, Shari Tate, Leah Johnson, and Amy Keating

Names

Frey Elementary | 3rd grade teacher

Organization | **Title**

2865 Mars Hill Road, Acworth, GA 30101

Address

770-975-6655 | 770-975-6657

Phone | **Fax**

Doris.Thomas@cobbk12.org

E-mail

Staging a Schoolyard Science Day

Topic/Title

Brief Description of Activity

Tired of textbook-dependant, worksheet science? Sample hands-on activities to see how Frey teachers create an engaging and exciting outdoor classroom event to review for the CRCT tests.

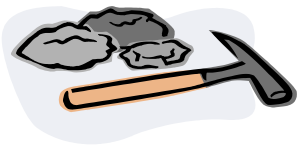
Morning Session – 45 minutes – (11:15 – 12:00)

How to Stage a Schoolyard Science Day
presented by Doris Thomas
with Dawn Rickeard, Shari Tate, Leah Johnson, and Amy Keating

Build a Cell Model

Students will build a cell model by using the following edible materials:
Knox gelatin
String licorice
Red Hots
Cake decorating Confetti
Chocolate Malted Milk Balls

First, prepare gelatin according to directions in see through cups. Then provide students with a paper plate and a plastic knife. Have them carefully remove this cytoplasm onto a paper plate. Cut the cytoplasm in half and add the chocolate malted milk ball to the center of one half for a nucleus. Then make a cell wall by outlining the cytoplasm with the string licorice. Sprinkle colored confetti for chloroplasts, mitochondria, and chlorophyll. Then add Red Hots for the vacuole. Ask kids to explain whether this is a plant or animal cell. Let them eat it if they're up to it.



Where Did That Rock Come From?

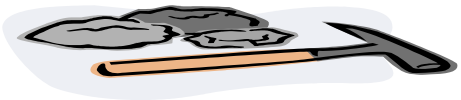
Students will have a big pile of rocks and three visuals to represent igneous, sedimentary, and metamorphic rocks. They will be provided with hand lenses and a field guide identifying the different types of rocks. After careful examination of each rock they will place igneous rocks in a volcano, metamorphic rocks next to a large iron bar, and sedimentary rocks in an aquarium.

Heat Up and Cool Down

Students will use density boxes to show how heat transfers. 1 cup of hot water that is dyed with red food coloring will be poured into one side of the density box. One cup of cold water that is dyed with blue food coloring will be poured into the other side of the density box. The divider in the middle will be removed and students will see watch the red go to the top and blue settle on the bottom. They will then color a picture and write an explanation to go with this.

ROCK HOUND

LESSON PLAN



Georgia QCC Objectives: 3.18, 3.19, 3.21

Georgia Performance Standard: S3E1.

Students will investigate the physical attributes of rocks and soils.

a. Explain the difference between a rock and a mineral.

b. Recognize the physical attributes of rocks and minerals using observation, measurement, and simple tests.

Materials in Kit

Rock samples, numbered and keyed (available from science supply companies or do it yourself)
Magnet (for Magnetic Attraction station)
Moe's Hardness Scale and hardness pick set OR penny and nail (for Hardness station)*
Streak plates (for StreakTest station) or unfinished side of ceramic floor/wall tiles
Vinegar in dropper bottles (for Acid Test station)
Hand lenses (for Color / Luster station)
Rock and mineral field guides
Lab sheet (one per student)

What will be accomplished (to be shared with students)

Students will test and identify rocks based on their physical properties.

Teacher Preparation

Number and key the rocks in advance. Divide class into five teams. Provide each team of students with several numbered rocks. (One rock per student is ideal!) Make sure that each team receives at least one rock specimen which is magnetic (such as magnetite), at least one which streaks differently than its apparent color (such as hematite or cinnabar), and one which reacts with a mild acid (such as calcite, limestone, or marble). Set up five rock testing stations through which the teams will rotate: Hardness, Magnetic Attraction, Color/Luster, Streak Test, and Acid Test.

Procedure for Students

Guess the identity of each rock sample, by comparing to a field guide.
For each rock sample, conduct the following tests:

magnetic attraction: use magnet to see if rock is attracted
color/luster: use hand lens to observe the color and luster (shininess) of rock
streak test: draw with the rock on a streak plate and observe color of mark
acid test: drop vinegar on rock and observe for bubbles, which indicate alkalinity
hardness*: use picks or common items to try to scratch rocks and rate hardness

At each station, complete the appropriate section of the lab sheet
Make a second prediction of the identity of each rock, based on tests and observations
Check rock sample number against the key to determine actual identity

Debriefing

Why might a rock's streak color be different from its outside color? ***(A streak is powdered mineral. A rock may contain several minerals, or a trace element may color a translucent mineral)***

Which rock reacted to the acid (vinegar) by producing bubbles, and why? **(*Calcite, marble or limestone would fizz, indicating their alkalinity).***

If a rock attracts a magnet, what element does it probably contain? ***(Iron)***

* Rocks can be rated on Moh's Hardness Scale by using common items such as a fingernail, a penny, and a metal object (i.e. scissors or a nail). If you can scratch the surface of the rock with your fingernail, it is a soft rock (1-2). If you can scratch the rock with a penny, it is medium soft (3-4). If you can scratch a rock with a metal object, it is a medium hard rock (5-6). A rock that won't scratch with any of these is a hard rock (7+.) -excerpted from www.GeorgiaStandards.org

ROCK IDENTIFICATION KEY

(for teacher)

Sample #	***Rock or Mineral***
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

HEAT TRANSFER: Convection
LESSON PLAN

Georgia QCC Objective 3.7
Georgia Performance Standard S3 P1

Students will:

- Investigate how heat is produced and the effects of heating and cooling.
- Understand a change in temperature indicates a change in heat.
- Investigate the transfer of heat energy from the sun to various materials.
- Use thermometers to measure the changes in temperatures of water samples (hot, warm, cold) over time.

Materials in Kit
Density boxes* (one for each group of four to six students)
Thermometer, quick-read, digital** (one for each group)
Food coloring in dropper bottles (one red and one blue for each group)
Beaker or pitcher, for pouring water

Bring Your Own . . .
Source for very cold and very hot water
Thermoses or insulated containers, for keeping water at temperature
Colored pencils and science journal for each student

What will be accomplished (to be shared with students)
Students will demonstrate how heat is convected through fluids.

Procedure
Predict what will happen when cold water and hot water meet. Record prediction in journal. Smear the edges of the divider with petroleum jelly, so that it will seal. Insert divider in the density box. Pour cold water in one half of the density box and color it with six drops of blue food coloring. Measure and record the temperature with a thermometer.** Pour hot water in the other half of density box and color it with six drops of red food coloring. Measure and record the temperature with a thermometer.** Remove the divider quickly. Observe and record results in science journal. Be sure to include labeled color drawings of the experiment before and after the divider is removed, and show water temperatures before.

Debriefing
Ask students the following questions:
What happened when the divider was removed? ***red (hot) water rose up and blue (cold) water sank OR red and blue water separated into layers***
What is the word for how heat is transferred through fluids? (NOTE: fluids can be liquids or gases) ***convection***
Guess the name for an ocean current which is caused when warm water flows into cold water? ***convection current***

When warm and cold water first meet, which expands and rises up? ***warm water (red)***
Which warm and cold water first meet, which becomes more dense and sinks below the other? ***cold water (blue)***
Use the example of a hot air balloon to explain how convection works with gases. ***A hot air balloon takes off because the air above its burner is heated and that hot air rises to inflate the balloon above, and push it up***

*A Density Box resembles a small aquarium with little depth (from front to back), and a removable inside wall which allows it to be divided in half. It is available from science supply companies such as Flinn Scientific (Item #AP 4784), for less than $30 each. For product information, see:
http://www.flinnsci.com/Sections/spotlightDisplay.asp?ID=42&cat=7 To fashion a similar device, use an aquarium or critter keeper, cut a cardboard divider to fit the depth from front wall to back, and secure in place with petroleum jelly.
** Quick-read digital thermometers with wide ranges are recommended for this activity. Such instruments are available from science supply companies such as Flinn Scientific (Item #AP6049 www.flinnsci.com) or Carolina Biological (Item #74-5360 www.carolina.com) for less than $15 each.

Presenter Information Sheet
Outdoor Classroom Symposium – 2005

Frey Elementary School, Acworth, Cobb County
Friday, October 14, 2005

Jennifer Porter (Fulton County) and Lori Forester (Cherokee County)

Names

Adopt-A-Stream (Fulton & Cherokee County) AAS Program Trainers

Organizations **Title**

Fulton County
141 Pryor St, suite 5001
Atlanta, GA 30303

Cherokee County
1957 Authority Dr
Woodstock, GA 30189

Address

Phone: 404 730-8745

jennifer.porter@co.fulton.ga.us , brenaucrew@hotmail.com

E-mail

Surprise – Stream Bug Fun

Topic / Title

Brief Description of Presentation:

Come and explore the amazing gifts that can be found living in your local creek, while teaching your students about a wonderful program called Adopt-A-Stream.

Morning Session – 45 minutes - (11:15-12:00)

Adopt-A-Stream Detectives

From the GA Adopt-A-Stream Educator Guide

Objectives: Students will conduct a biological assessment to determine the health of a stream.
Location: Outdoors
Time Needed: Two 60-minute sessions
Subject: Science, Math
Level: 3rd - 5th grade

Background:
Biological monitoring involves identifying and counting macroinvertebrates. The purpose of biological monitoring is to quickly assess both the water quality and habitat quality of a stream. Macroinvertebrates are aquatic insects, crayfish, and snails that live in various stream habitats and are used as indicators of stream quality. Macroinvertebrates are present during all kinds of stream conditions-- from drought to floods. These insects and crustaceans are impacted by all the stresses that occur in a stream environment, both man-made and naturally occurring.

Waterways with a diverse collection of aquatic creatures are considered a healthy environment, whereas waterways with just a few different species usually indicate conditions are less desirable. Pollution generally reduces the quality of the environment and in turn the diversity of life forms. In some cases the actual biomass or amount of living material will increase due to pollution, but the diversity of species inevitably goes down.

Scientists have learned that some species of macroinvertebrates are sensitive to pollution and will not be found in a polluted stream. Whereas other species are more pollution tolerant, being present in polluted and unpolluted streams, but will dominate in polluted streams. By looking for these pollution sensitive and tolerant species, we are able to evaluate the "health" of a stream.

Materials for each group:
• Pencil and clipboard
• White plastic dishwashing tub
• 2 white ice cube trays
• Plastic spoons and pipettes
• Hand lens
• Old tennis shoes or waders
• Rubber gloves
• Copies of the Stream Insect and Crustacean Guide laminated
• Kick net or D-frame net (See below)
• Buckets
• Optional: Collection jars with rubbing alcohol (baby food jars work well!)

Note:
This lesson plan will require the class to collect samples from nearby streams. It is vital to know the condition of the stream before sampling. Before taking the students to the stream, check the site. Visit the stream to determine the easiest access. Also, check for any dangers, such as broken glass. Animal waste, agricultural runoff (pesticides, herbicides, etc.), industrial wastes, or sewage leaks can be hazardous to you and your students. If you find a stream with any of the above contaminants, use proper precaution if you decide to collect samples in the stream. Finally, it is a must to check how fast the water is flowing through the stream. Fast moving water is dangerous and students should not get into the stream, especially after a rainstorm. A good tip to remember is not to let the student in the water above their knees. In addition, rocks can be slippery, therefore; students should not stand on rocks or play around in the water. Having an assistant or parent working with the class is advised. Students should wear protective boots, gloves, and goggles when necessary or when stream conditions are unknown. In case of serious water quality problems, notify local or state authorities.

Teachers may want to attend an Adopt-A-Stream workshop on biological monitoring to practice sampling methods and learn macroinvertebrate identification.

Procedures:
1. Make, Purchase or borrow a kick seine and/or D-Frame net from a local Adopt-A-Stream group or Regional Training Center. (Contact the State Adopt-A-Stream office for information)

2. Discuss the concept of metamorphosis with students. Introduce the concept of insect life cycles and growth. Distribute to the students laminated copies of the "Stream Insect and Crustacean Guide" to see what juvenile macroinvertebrates look like. Explain to students what stage the insect life cycle the different macroinvertebrates are at – most are nymph or larva stage but some are full adults. During the discussion the following terms should be introduced macroinvertebrate, gills, larva, nymph, pupa, metamorphosis, habitat, riffle and pool.

3. Once the students have been introduced to the Guide, have the students discuss what might be some of the key features they need to look for to help identify a particular macroinvertebrate. Key features include: number of legs, the location of the legs, shape of the body, does it have a tail or not, location and presence of 80 gills. Then have the students go to the Adopt-A-Stream website and play the "Name that Bug Game" at: www.riversalive.org/aas.htm#TEACHER'S%20CORNER. The game is a great way for students to hone their observation skills and learn how to use the "Stream Insect and Crustacean Guide" to correctly identify macroinvertebrates before going into the field.

4. Head outside to your stream site. At the stream site discuss with students the term habitat and point out that macroinvertebrates can be found in many different kinds of habitats including riffles (where shallow water flows quickly over rocks), packs of leaves, roots hanging into the water, old wood or logs, or the streambed. It is in these habitats

they are going to search for macroinvertebrates. But before they begin, ask the students the following questions and have them write their thoughts down in a journal:

- Based on their senses (except taste) do they think the stream is healthy or not?
- How do you think scientists determine if a stream is healthy or not?
- Why is it important to know if a stream is health or not?

Once everyone has written down their thoughts ask them to share them with the group. Possible answers for Number 2 include: testing water like you would a pool, testing for nutrients like nitrogen and phosphorous, taking it temperature.

Scientists usually conduct three types of surveys: visual surveys to look at physical changes like erosion on a stream bank, the color of water, its smell.

They are will also conduct chemical test to look at pH, temperature, dissolved oxygen, nutrients, sediments, ammonia and conductivity to name a few. The third survey is the biological survey like the one the students will be doing.

5. Now the students are ready to search for macroinvertebrates. Using the following information explain and demonstrate the instructions to the students.

Then divide the student into teams of five, distribute sampling equipment, and supervise and assist students in sampling, identifying macroinvertebrates and recording data. When complete, return to the classroom.

6. Determine Stream Type and Sampling Location - Macroinvertebrates can be found in many kinds of habitats—places like riffles (where shallow water flows quickly over rocks), packs of leaves, roots hanging into the water, old wood or logs, or the streambed. Based on the types of habitats that characterize your stream, determine if you have a muddy bottom or rocky bottom stream. Follow the directions that correspond with your stream type.

- Rocky bottom streams are generally found in North Georgia and the Piedmont Region. However, there are exceptions—some South Georgia streams possess rocky bottom characteristics. Rocky bottom streams are characterized by fast-moving water flowing over and between large rocks and boulders, interspersed with longer, smooth sections where the water forms pools.
- Muddy bottom streams include most South Georgia streams and many streams found in urban environments that have been degraded by the introduction of sediment. In muddy bottom streams the pool/riffle system is replaced by slow moving water with little or no disturbances. The substrate is generally composed of fine silt, sand or coarse gravel.

Sampling: Rocky Bottom Streams

In the “rocky bottom” method, the students will sample two different habitats - riffles and leaf packs. Riffle areas constitute shallow areas of a stream or river with a fast-moving current bubbling over rocks. The water in riffle areas is highly oxygenated and provides excellent habitat, shelter, and food for a variety of macroinvertebrates. Leaf packs include decomposing vegetation (leaves and twigs) that is submerged in the water. Leaf packs serve as a food source for organisms and provide shelter from predators.

Procedure for Rocky Bottom Streams:

a) Assign each team member one of the following jobs: Net holders, Rock Rubbers, Stream Dancers, Net Removers and Leaf Lifters.
b) Identify three riffle areas, an area where the water is 3 to 12 inches deep.
c) Have the Net Holders place the kick seine downstream and firmly wedge the seine into the streambed, weighting the bottom edge with rocks.
d) Have the Rock Rubbers gently rub any loose debris off rocks and sticks upstream from the net so that they can catch everything in the net. When they have "washed off" all the rocks in a 2 x 2 area, have the Stream Dancers kick the streambed with their feet. Push rocks around; shuffle their feet so that they really kick up the streambed.
e) Now have the Net Removers help the Net Holders gently lift the seine net, being careful not to loose any of the macroinvertebrates they have caught, so the water drains through the net. Place the net in a bucket and rinse the net with stream water to get everything off the net and into the bucket.
f) Repeat in two different riffle areas.
g) Now look for decayed (old, dead) packs of leaves next to rocks or logs or on the streambed. Have the Leaf Lifters gather two handfuls of old, black leaves and add the bucket.
h) Proceed to Step 7 on the following pages.

Sampling Muddy Bottom Streams:

In this method, the students will sample three different habitats, using a D-frame (or dip) net. The habitats are: vegetated margins, woody debris with organic matter, and sand/rock/gravel streambed (or substrate).

Vegetated margins - This habitat is the area along the bank and the edge of the water body consisting of overhanging bank vegetation, plants living along the shoreline, and submerged root mats. Vegetated margins may be home to a diverse assemblage of dragonflies, damselflies, and other organisms. Move the dip-net quickly in a bottom-to-surface motion (scoop towards the stream bank), jabbing at the bank to loosen organisms. Each scoop of the net should cover one foot of submerged (under water) area.

Woody debris with organic matter - Woody debris consists of dead or living trees, roots, limbs, sticks, leaf packs, cypress knees, and other submerged organic matter. It is a very important habitat in slow moving streams and rivers. The wood helps trap organic particles that serve as a food source for the organisms and provides shelter from predators such as fish. To collect woody debris, approach the area from downstream and hold the net under the section of wood you wish to sample, such as a submerged log. Rub the surface of the log for a total surface area of one square foot. It is also good to dislodge some of the bark as organisms may be hiding underneath. You can also collect sticks, leaf litter, and rub roots attached to submerged logs. Be sure to thoroughly examine any small sticks you collect before discarding them. There may be caddisflies, stoneflies, riffle beetles, and midges attached to the bark.

Sand/rock/gravel streambed - In slow moving streams, the substrate is generally composed of only sand or mud because the velocity of the water is not fast enough to transport large rocks. Sample the coarsest area of the streambed—gravel or sand may be all you can find. Sometimes, you may find a gravel bar located at a bend in the river. The streambed can be sampled by moving the net forward (upstream) with a jabbing motion to dislodge the first few inches of gravel, sand, or rocks. You may want to gently wash the gravel in your screen bottom bucket and then discard gravel in the water. If you have large rocks (greater than two inches in diameter) you should also kick the substrate upstream of the net to dislodge any burrowing organisms.

Remember to disturb only one square foot of upstream sample area.

Procedure for Muddy Bottom Streams:

a) Assign each team member one of the following jobs: Muddy Scooper, Woody
a) Scooper, Veggie Scooper, Bucket Monitor and Rinser
b) Muddy Scooper will sample in the substrate, Woody Scooper will sample the woody debris and the Veggie Scooper will sample the vegetative margins.
c) Each sample involves a quick forward motion of one foot (one scoop). Collect three (3) scoops from each habitat listed below. As you collect your samples, take them to the Bucket Monitor and Rinser to have contents of the net put in the bucket.
d) If the bucket gets too full of water – the Bucket Monitor, with the help of the Rinser, should first stir the water and then pour it through the D-Frame net, catching all the bugs but letting the water pass through. Once all the water is poured, dump the insects back into the bucket using a little water to get them out of the net.

7. Figuring out what you collected - Using white plastic dish tubs, pour a small amount of the water sample in to the pan making sure not to over fill it. Separate creatures that look similar into groups. Use the "Stream Insects and Crustaceans" sheet to help identify the creatures. Be sure to look at the number of tails, legs, size and shape of head and body.

8. Calculate Your Results - Using the clipboard and paper, record the types and numbers of each kind of insect. Have the students taking this data back into the classroom to analyze. As you sort through your collection, remember that each stream will have different types and numbers of macroinvertebrates.

9. Back in the classroom discuss with students what macroinvertebrates they found. Have each team make a chart on the board noting the macroinvertebrates they found and how many of each. Using the "Stream Insect and Crustacean guide" point out to the students that the macro invertebrates are divided into three groups based on their tolerance to pollution. For example, pollution organisms include caddis flies and mayflies – group 1 taxa – where as pollution tolerant include aquatic worms and midge flies – group 3 taxa. By looking at the types of macroinvertebrates found in a stream, one can determine the health of a stream.

Please note – pollution tolerant organisms can be found in healthy or impacted while sensitive organisms are only found in clean streams. With this knowledge, have the student reorganize their charts into three groups or taxa. Based on the results was the stream healthy or unhealthy? Also remind the students, the diversity (number of different kinds of macroinvertebrates) helps determine the health of a stream. Now have the students go back to their initial predictions they made when they went to the stream. Were they correct? If not what might be some reasons for the difference? Possible answers: even thought the water was clear, there may be toxins s in the water the students could not see, killing the pollution sensitive macroinvertebrates; not enough dissolved oxygen in the water for the macroinvertebrates to breathe; too much sediment; etc.

Morning Concurrent Sessions
10:15 - 12:00 (Long Sessions)

- Botanical Safari – Petey Giroux and Jerry Hightower
- Got Hummingbirds? – Kim Bailey
- Outdoor Classroom Creation Stations
- Orienteering on a Rope – Gary Jordan
- Solar Cookers – Naomi Thompson, Kerrie Anne Loyd, and Sara Nichol
- Teaching About Climate Change – Tim Grant

Presenter Information Sheet
Outdoor Classroom Symposium – 2005

Frey Elementary School, Acworth, Cobb County
Friday, October 14, 2005

Petey Giroux (Project WET) and Jerry Hightower (NPS)

Names

Georgia Project WET and Chattahoochee River National Recreation Area

Organizations

Project WET
4220 International Parkway, suite 101
Atlanta, GA 30354

National Park Service
1978 Island Ford Parkway
Atlanta, GA 30350

Address

Phone: 404 675-1638 (Petey) and 678-538-1245 (Jerry)

Petey_Giroux@dnr.state.ga.us ; Jerry_Hightower@nps.gov

E-mail

Botanical Safari

Topic / Title

Brief Description of Presentation:

Become an explorer! Discover diverse plant forms and exciting evidence. Work in teams to stalk a mystery plant using plant structures as clues.

Afternoon Session – 90 minutes - (10:15 – 12:00)

U.S. National Park Service
Chattahoochee River Environmental Education Center
Georgia Department of Natural Resources
Environmental Protection Division

Jerry Hightower
678-538-1245
jerry_hightower@nps.gov

Petey Giroux
404-675-1638
Petey_Giroux@dnr.state.ga.us

BOTANICAL SAFARI is an activity designed to strengthen student's observational skills, promote thinking and cooperation in a team setting, and to facilitate discussions as the students compare, analyze, and make decisions concerning plant structures in a natural setting. Signs hanging from plants do not foster learning and only mar the visual beauty of your outdoor learning areas. By learning the different plant structures students forge a comfortable familiarity with the plants. This removes fear and allows the students to observe the shapes, forms, textures, and then truly see the plants before them. If the student has an interest in learning the names of the plants, their role in the habitat, and their importance to the habitat; they now have a solid foundation to successfully learning more.

BOTANICAL SAFARI OBJECTIVE:

Students will learn to identify plant structures through field observation, comparing and contrasting shape, texture, edges, stem etc

MATERIALS:

Worksheets with plant structures, 5X7 cards or scrap/ recycled paper for Team Clue Cards, 5 or 6 stakes with a 6-8' rope attached at top.

PREPARATION:

Place plant structure diagram sheets on clipboard Activity I and pair students for field observations. Working as a team students try to find as many examples of the plant structures as possible. Students circle the diagrams on the worksheet when they see the plant structures matching the diagram drawings while they are in the outdoor learning center.

PROCEDURE:

1. Divide the class into teams. Teams with odd numbers seem to work best, 3 or 5. Teams should spread out so one team cannot see another team easily.

2. Give each team a number and a clue card.

3. Have each team find a plant in the outdoor learning center and as a team come up with 5 to 7 identity clues to describe the plant without giving it away.

Examples:
a. The plant is 1 foot high
b. The plant has lobed leaves
c. The plant has hairs on the underside of the leaf …and so on.

4. The team places the stake somewhere in the circle's circumference. The stake can be placed anywhere as long as the plant to be identified is within the rope's circle after the stake is placed in the ground. (forest floor is an excellent place to use this activity or anywhere there are a variety of plants.)

5. If there are 4 teams, have team 1 and team 3 work together and team 2 and team 4 work together. The idea is for each team to go to another team's staked area and try to find their plant by studying their clue cards. Teams cannot ask if they're warm or cold. Teams may only answer questions with a yes or no.

Presenter Information Sheet
Outdoor Classroom Symposium – 2005

Frey Elementary School, Acworth, Cobb County
Friday, October 14, 2005

Kim Bailey

Name

EEinGeorgia.org

Organization

Georgia DNR, Environmental Protection Division, Land Protection Branch, Suite 104, 4244 International Parkway, Atlanta, GA 30354

Address

Phone: 404-362-2788 **Fax:** 404-362-2580

kim@eeingeorgia.org

E-mail

Got Hummingbirds?

Topic / Title

Brief Description of Presentation:

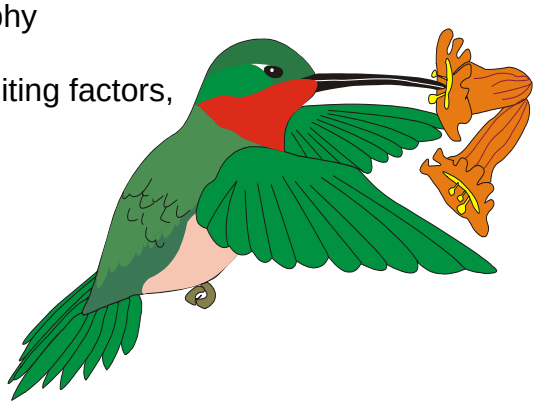
Learn all about hummingbirds' habitat needs, migration, and adaptations through engaging hands-on activities, inquires, and active games. Discover how to attract hummingbirds to the outdoor classroom.

Afternoon Session –90 minutes - (10:15 – 12:00)

Migration Mishaps

Overview: Migration Mishaps* is a game that helps to demonstrate why animals that migrate, such as hummingbirds, are threatened by habitat destruction.

Subject areas: science, physical education, math, geography



Key concepts: habitat, migration, survival, competition, limiting factors, population dynamics

Skills: graphing and map skills (extension activity)

Location: outdoors

Estimated time: 20 minutes

Materials: 2 paper plates or pieces of cloth ("habitat havens") for every 3 students plus 3-5 extra; migration cards; 3-5 soft foam balls (for adaptation); wipe-off board and marker (for extension activity)

Preparation: Review with students the definition of habitat (food, water, shelter, and space suitably arranged) and explain that many factors limit the survival of populations of hummingbirds, including changes in the two habitats on which they depend. Have students research wintering and breeding habitats of hummingbird species in your area. (Ruby-throated hummingbirds winter mainly in Mexico and Central America, and their nesting habitat is in eastern United States and southern Canada).

Procedure

1. Select a large area up to 70 feet (20 meters) in length. Designate one end of the area as the wintering grounds and the other end as the nesting grounds. Distribute the "habitat havens" (paper plates or cloth pieces) equally in the wintering and nesting grounds.
2. Begin the activity with all students at the wintering grounds, assigning no more than three players to each habitat haven. Explain that at your signal they are to migrate to a habitat haven in the nesting grounds.
3. Read aloud a migration card, and remove or add habitat havens in the area to which the hummingbirds will be migrating (in this round, the nesting grounds).
4. Give the signal to migrate. If players cannot find space at the new habitat (remind them that only three birds can share one habitat haven), they must die and move to the sidelines temporarily. These "dead" birds may re-enter the game as hatchlings when favorable conditions make more habitat havens available in the nesting grounds. ***Safety note:*** Even though hummingbirds are aggressive and territorial, caution students that

there should be no pushing or shoving over habitat. You may want to require students to migrate in slow motion by walking instead of running.

5. Play several more rounds, beginning each round by reading a card, and adding or removing habitat havens in the habitat to which students will migrate.

Wrap-up: Ask students to summarize what they have learned about some of the many factors that affect migrating birds and their habitat. Discuss what students can do about habitat loss and degradation. What can they do to improve hummingbird habitat?

Adaptation: Hummingbirds face perils along the migration route as well as in wintering and nesting grounds. Soft foam balls can represent such perils as storms or running out of energy. Let students in the "dead bird" zone take turns tossing the balls into the path of "migrating" students. When a ball makes contact with a migrating student, he/she becomes a "dead bird."

Extensions: Use a wipe-off board and marker to graph the shifting hummingbird population after each round. Students in the "dead bird" zone can help with this while they are waiting to re-enter the game.
Examine maps to chart the actual migration routes between the wintering and nesting areas of hummingbird species. Use the map scale to determine distances traveled.

**Adapted from Migration Headache*, *Project WILD Aquatic Activity Guide. This activity, written by Kim Bailey, is also published in Green Teacher magazine (Spring 2002) and included in Green Teacher's book, Teaching Green: The Middle Years.*

Migration Cards for Migration Mishaps Activity

A large habitat was designated as a wildlife preserve. Gain 3 habitat havens.	A wetland is filled so a new highway can be built. Lose 2 habitat havens.
Pollution severely damaged a riverside habitat. Lose 2 habitat havens.	The construction of a new subdivision and golf course destroys a forest habitat. Lose 3 habitat havens.
A concerned school group improved a damaged habitat by creating an outdoor classroom and garden. Gain 2 habitat havens.	A neighborhood creates backyard wildlife habitats. Gain 2 habitat havens.

Drought killed some flowering plants. Lose 2 habitat havens.	An apartment dweller plants hanging baskets with hummingbird-attracting flowers. Gain 1 habitat haven.
Tougher laws are passed to protect bird habitat. Gain 1 habitat haven.	A homeowner plants a row of trees for shelter. Gain 1 habitat haven.
Pesticides contaminated the flowers' nectar. Lose 2 habitat havens.	A late frost killed the first spring flowers. But sap is available through a sapsucker's holes in some trees. Gain 1 habitat haven.
Insecticides killed insects needed for protein. Lose 1 habitat haven.	A school hangs up hummingbird feeders. Gain 2 habitat havens.
Trees used for shelter and nesting are cut down to make paper. Lose 2 habitat havens.	A city-dweller hangs up a hummingbird feeder. But there are no trees for shelter in the area. Sorry, no habitat haven.

Access additional hummingbird lesson activities and tips for creating a schoolyard hummingbird habitat at:

www.kidsgardening.com/growingideas/PROJECTS/mar04/pg1.html

Find additional outdoor classroom resources (lessons, grants, awards, etc.) at www.EEinGeorgia.org.

It's hummingbird migration season! If you are interested in joining the Hummingbird Helper Survey program with the Georgia Dept. of Natural Resources, please mail a self-addressed stamped business sized envelope to:

Hummingbird Garden Seed Packet
GA DNR/WRD
116 Rum Creek Drive
Forsyth, GA 31029-6517

You will receive a 2005 survey form, hummingbird fact sheets, information on identifying 12 species of hummingbirds, hummingbird gardening information and a packet of seeds to start a garden to attract hummingbirds.

Presenter Information Sheet
Outdoor Classroom Symposium – 2005

Frey Elementary School, Acworth, Cobb County
Friday, October 14, 2005

Creation Stations:

- Debbie Lanier – Parts of an Insect
- Sharon Fuss – Going West
- Nikki Price – Butterfly Bracelets
- Shelley Whitener – Math Patterns with Nature
- Karen Garland – What is a Seed?
- Carla Rapp – Water Cycle
- Mary Gazaway – Water Cycle Bracelet
- Ann Driver – Solar Beads
- Sylvia Flanagan – These are Your Lungs…on Smog
- Gina Shumpert – Howling Fowl
- Sheri Henshaw & Missy Phillips – Going Buggy
- Suki Janssen
- Sheryl Coleman – Terrariums

Morning Session – 90 minutes - (10:15 – 12:00)

Presenter Information Sheet
Outdoor Classroom Symposium – 2005

Frey Elementary School, Acworth, Cobb County
Friday, October 14, 2005

Debbie Lanier

Name

Nature in a Nutshell | Owner

Organization | **Title**

3790 Tulip Tree Rd, Marietta, GA 30066

Address

770-973-2288

Phone

nananature@hotmail.com

E-mail

Creation Stations - Parts of an Insect

Activity Title

Brief Description of Presentation:

To teach parts of an insect and help students learn the characteristics of insects, students form an insect out of clay, pipe cleaners, and paper.

Morning Session – 90 minutes - (10:15 – 12:00)

Characteristics of an Insect

Materials: Live insects or accurate models of insects, pictures of insects, materials for insect model

Procedure:

Show some insects to students. Ask them to observe carefully and tell you some things that are alike about all of them. You may need to use leading questions to get them to notice that insects have 3 body parts, six legs, two antennae and most have wings.

To the tune of *Head Shoulders, Knees and Toes,* sing:

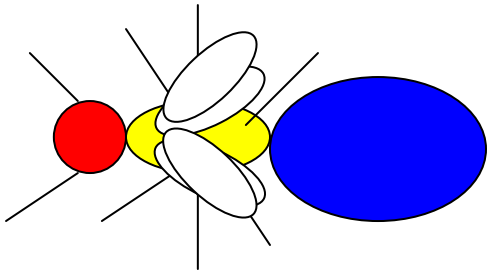
Head, thorax, abdomen
Abdomen
Head, thorax, abdomen
Abdomen
Two antennae, six wiggly legs,
Head, thorax, abdomen
Abdomen

Make a model of an insect

Materials: Pre-cut three different colors of clay; for the head a slice about 1/8 inch, for the thorax a slightly bigger slice and for the abdomen a ¼ inch slice. Cut pipe cleaners into pieces about 1 ½ inches long. Depending on age of students, either pre-cut wings out of stiff paper (index cards) or have students cut their own.

Procedure: For younger students you will need to go step by step giving out pieces of clay one at a time, showing how to form clay and put together to make the 3 body parts. With older students you can show how to make it and then give them all the pieces. Emphasis vocabulary while making model. Put a bunch of pipe cleaner pieces on each table and have each child count out 6 for legs and 2 for antennae. Legs should be attached to the thorax. They can draw in eyes if they want.

Next attach wings to the thorax.



Lesson by: Debbie Lanier **Nature *in a* Nutshell** **Science Lessons Delivered**

natureinanutshell.com

Presenter Information Sheet
Outdoor Classroom Symposium – 2005

Frey Elementary School, Acworth, Cobb County
Friday, October 14, 2005

Sharon Fuss
Name

Frey Elementary | 4th grade teacher
Organization | **Title**

2865 Mars Hill Road, Acworth, GA 30101
Address

770-975-6655 | 770-975-6657
Phone | **Fax**

Sharon.Fuss@cobbk12.org
E-mail

Creation Stations - Going West
Topic/Title

Brief Description of Activity:

Adaptation of the project WET activity "Water Crossings".

Morning Session – 90 minutes – (10:15 – 12:00)

“Going West”

An adaptation by Sharon Fuss from:
Project Wet
“Water Crossings”

For more information about Project Wet Training
Contact Coordinator:
Petey Giroux
4220 International Pkwy. STE 101
Atlanta, Ga. 30354
404-675-1638
Fax: 404-675-6245

• At the beginning of the unit I walk the children to the creek and observe how hard it would be to take a wagon across the creek without a bridge. We also observe/discuss the terrain on the other side and what obstacles they face, if there are no trails left by the Indians. We also compare the size of the trail, if there is one, and the size of a wagon. Does more work still need to be done before the wagon can go through? We then relate how this affects the distance traveled per day, which is approximately a ½ mile a day. We compare/contrast this to our travel today. Back in the classroom, we use the map to discuss approximately how long it would take them to move from the east coast to the west coast at ½ mile per day.

• When our unit is near the end we return to the creek to build rafts that must float our possessions (a hard boiled egg) down the creek.

• I tell them the day before to wear clothing that can get wet and dirty.

• The day before I discuss raft building with my students. We talk about the size of the egg to the raft, we talk about the weight of material used to build the raft and depth of the creek, etc. I might even have them discuss with their parents for homework the upcoming project. It just depends on my students’ abilities. I also remind them of these things right before we start building and I let them observe the creek depth.

• I put them in groups before we go to the creek, keeping in mind their ability levels.

• Using Part II (of the original lesson) I go over the rules for building their raft. They must use all natural material. No man made items can be used.

• Each team is given approximately thirty to forty minutes to complete their raft.

• I set the boundaries for locating materials to build the raft.

• I discuss safety rules such as not lifting large logs, rocks, etc. and being aware of snakes, their habitats, and what to do if they see one.

• I remind them to stay away from all plants with three leaves.

• I remind them of our lessons on caring for our earth and remind them that the items they use cannot be torn from trees, etc. If they need something from a tree they need to see me. I make suggestions where they can look and find material already on the ground.

• When raft making time is up, we all go to the creek to see which group is successful in floating their belongings, the longest, down the creek without capsizing, falling apart, etc.

• I give them safety rules about being around the creek.

• They vote for one person in their group to place the raft in the water. Everyone else stays up on the bank.

• I always use a shallow area of the creek where my main concern is getting wet and dirty.

• I usually have an earth parent with me, just in case of an emergency.

• After we determine whose raft won, we then do Step 4, under Part II, in the original lesson. We discuss why some were successful, why some were not, and how we could improve the different designs.

• Within the next few days, you could have the students write a fictional story about approaching a river and needing to get to the other side (In Part I of the original lesson).

• I usually have them compare and contrast "A Day of Travel in the Life of a Pioneer Boy or Girl to a Day of Travel for a Boy or Girl Today," using a Venn diagram. You could do this whole group, or individually, depending on the needs of your group.

• As our final activity, I then have them use this information to write a story about travel in the 1800s vs. travel today.

This project provides great hands on, higher level thinking instruction for your students. There are also numerous "mini-lessons" contained in this project that meet other GPS goals. These mini-lessons can be used to introduce new information to your students or used as a review. As you can see, Project Wet activities can be easily adapted to the needs of your students. Enjoy the great outdoors, and watch your students get excited about learning!

Presenter Information Sheet
Outdoor Classroom Symposium – 2005

Frey Elementary School, Acworth, Cobb County
Friday, October 14, 2005

Nikki Price

Name

Chattahoochee Nature Center | Grant Program Coordinator

Organization | **Title**

9135 Willeo Road, Rowell, GA 30075

Address

Phone: 770-992-2055 X 249

Creation Stations - Butterfly Bracelets

Topic / Title

Brief Description of Presentation:

Participants will make butterfly bracelets.

Morning Session – 90 minutes – (10:15 – 12:00)

Butterfly Bracelets

You Need:

- 1 piece of hemp or string, 24 in. long
- 11 pony beads
- 6 heart pony beads
- 2 flower shaped beads

Directions:

1. Fold the piece of hemp in half and tie knot at the folded end, leaving a small loop at that end.
2. Keeping the ends together, thread one of the flower beads.
3. Separate the ends of the string. Thread one pony bead on each strand.
4. Bring the ends together again. Thread one heart bead, with the point of the heart facing away from the beads you've already strung. This is one wing of our butterfly.
5. The ends are still together; thread one pony bead (the body) and another heart bead, with the point facing the other beads. We now have one complete butterfly.
6. Repeat this pattern, starting with the ends apart, until you have as many butterflies as you would like on your bracelet. (The materials list allows you to make three butterflies.)
7. To end, separate the strands, thread one pony bead on each strand, then put the ends together and string a flower bead. Tie a knot right after the flower bead.
8. You now have a butterfly bracelet!

Presenter Information Sheet
Outdoor Classroom Symposium – 2005

Frey Elementary School, Acworth, Cobb County
Friday, October 14, 2005

Shelley Whitener

Name

Frey Elementary	2nd grade teacher
Organization	**Title**

2865 Mars Hill Road, Acworth, GA 30101

Address

770-975-6655	770-975-6657
Phone	**Fax**

Shelley.Whitener@cobbk12.org

E-mail

Creation Stations - Math Patterns with Nature

Topic/Title

Brief Description of Activity

Children will learn about math patterns using leaves arranged in patterns.

Morning session – 90 minutes – (10:15 – 12:00)

Math Patterns with Nature

Adapted by Shelley Whitener
from Silver Burnett Kindergarten Math

Materials

Leaves of at least two distinct types, to be gathered by the class.
Construction paper (two sheets per student)
Glue (for each student)

Teacher Preparation

Scope out a safe place to walk and collect leaves.
Glue leaves to a piece of construction paper in a simple AB pattern:

Glue leaves to another piece of construction paper in an ABB pattern:

Activity Directions

- **Go on a nature walk with the class, taking the construction paper and glue with you.**
- **Have each child collect two different types of leaves (several specimens of each type).**
- **Teach children not to strip all the leaves from a branch, and let them know that leaves on the ground are great to use!**
- **Be sure to point out poison ivy or poison oak and make sure children do not pick leaves from these plants.**
- **Take the leaf collections to an outdoor classroom or other area where everyone can sit.**
- **Let children show their leaves, and discuss the differences among them.**
- **Tell students to make one pile of leaves that are all alike in some way.**
- **Then tell students to make a pile of different leaves that are all alike.**
- **(Any remaining leaves can be disregarded).**
- **Give each child a piece of construction paper.**
- **Show the leaves which you have previously glued in an AB pattern on construction paper.**
- **Have children arrange and glue their leaves in an AB pattern.**
- **Repeat the process for an ABB pattern.**
- **Note that leaves do not need to be sorted by species, for pattern work. Students may sort their leaves by color, shape, size, or any other criterion they can identify.**

Presenter Information Sheet
Outdoor Classroom Symposium – 2005

Frey Elementary School, Acworth, Cobb County
Friday, October 14, 2005

Karen Garland

Name

Georgia Conservancy | Environmental Education Coordinator

Organization | **Title**

817 West Peachtree St, suite 200, Atlanta, GA 30308

Address

404-876-2900 X113 | 404-872-9229

Phone | **Fax**

kgarland@gaconservancy.org

E-mail

Creation Stations - Living Necklace

Topic/Title

Brief Description of Activity

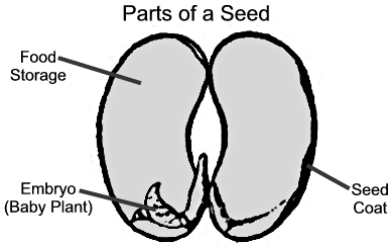
Living Necklace: Grow your own necklace! Given a few days and some water, the necklace will be alive with a growing sprout. An excellent activity for teaching soils, plant growth requirements, and nutrition (bread is made with wheat!).

Morning Session – 90 minutes – (10:15 – 12:00)

What is a Seed?

Karen Garland, Georgia Conservancy

A seed is to a plant what an embryo is to an animal: an organism in its earliest stages of development. As lifeless as a seed may look before germination it is a package of life, as each seed contains a tiny plant inside that has great potential. Seeds need air, water, and warmth to germinate, and they need these things in the right order.



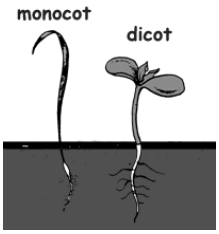
A seed consists of three main parts: the seed coat, the endosperm (food storage), and the embryo. Of these parts, the embryo is clearly the most important. Its cells will differentiate and develop into all the different tissues that will ultimately make up the mature plant. The other parts of the seed play merely supporting roles. These roles, nonetheless, are critical to the embryo's success.

The seed coat protects the internal parts of the seed during a period called dormancy, prior to germination from injury and from drying out. Dormancy is a protected state during which a seed "waits" for favorable growing conditions. Indeed, the seed coats of some seeds allow them to wait a very long time. The oldest known viable seeds were from an East Indian lotus. They were 466 years old when they germinated. Seed coats can be thin and soft as in beans or thick and hard as in locust or coconut seeds.

Germination usually begins when the embryo is exposed to water. The water swells the embryo inside, bursting the seed coat and setting growth into motion. During the earliest phase of growth, when the embryo has no leaves and therefore no means of photosynthesis, the endosperm serves as a food source. It serves the same function as the yolk in a bird egg, providing high-energy food to the developing embryo.

The embryo of a seed has three main parts: the primary root, the cotyledon(s) (there are two in many kinds of plants), and the embryonic leaves. The primary root, or radicle, is the first structure to emerge from the seed during germination. It penetrates the soil very rapidly, forming a slender, usually unbranched taproot, which, in some plants, may penetrate several feet into the soil during the first few weeks of growth.

During this period, the cotyledon serves a function similar to that of the endosperm, supplying food to other parts of the developing embryo. Not surprisingly, the embryonic leaves, also known as seed leaves, develop into the plant's first leaves above ground. These leaves open within a few days after the plant emerges from the soil and begin photosynthesizing almost immediately to provide the growing seedling with its new -- and renewable -- food source.



Questions for Discussion

- What function do seeds serve for plants?
- What structures do they need to perform that function?

A Seed from the Outside In

Students will look inside a seed to discover the beginning of a plant

Materials:

- Lima beans; soak in a cup of water overnight
- Magnifying hand lens

Procedures:

1. Give each student a lima bean that that has been soaked in water so it is easier to open. Ask them to describe what has happened to the outside of the seed. Demonstrate how to open the seed carefully by gently pulling it apart.
2. Ask students to see if they can locate the different parts of the seed: coat, endosperm (food storage), and embryo. Draw a picture of the seed, labeling each of these different parts.

Make a Seed Viewer

- Clear plastic cup
- Paper towels
- Seeds
- Black construction paper
- Water

Procedures:

1. Write your name, the type of seed and the date of planting on the side of the cup.
2. Line the inside of the cup with black construction paper. Crumple up some paper towels, one at a time, and fill the cup inside the construction paper with them. Cut the top edge of the construction paper so it is even with the top of the cup.
3. Slip each seed between the cup and the construction paper until it is an inch to an inch and one-half below the top edge of the cup. Pour water into the center of the paper towels until the construction paper is wet.
4. Set the seed viewer on a sunny windowsill. Check at the same time each day to see what is happening. Chart the growth and development of the plant. You must keep your paper towel moist for the seeds to germinate and grow properly!

Here's another idea! Try these different experiments.

- Find out if seeds need light to germinate.
- Will lima bean seeds germinate in the refrigerator?
- Do seeds need moisture to germinate?

Hunter-Gatherers in the Classroom

We are finally experiencing cooler weather after a long, hot summer. Flowers have, in most cases, gone through their useful life. Those dried-up flowers don't indicate a dead plant, of course, but the beginning of life. Now is the time to bring in seeds to examine and save over for next spring. Here are some ideas:

Seed Safari Have students put socks on over their shoes. Enjoy a walk through a field, park, or weedy part of the school grounds. Before returning to the classroom have them carefully take off their socks. They can either plant their socks in a flowerpot of soil to see what sprouts or shake their socks out over a large piece of white paper to observe what stuck to them.

Seed Center Have students draw pictures of plants, research the proper names and attach samples of seeds. How fast did the plants grow? What are the plants' dimensions? What are the root structures? Do they like shade or sun? What kind of conditions will likely cause the seeds to sprout?

Seed Comparison A quick walk through a garden will reveal different ways seeds form and are scattered. For example, you will find seeds in berries and fruits, those formed in the centers of flowers like sunflowers and some in seed pods that form after flowers have died off. Look at how the seeds are scattered...do they fall direct to the ground or do they have ways to make them mobile?

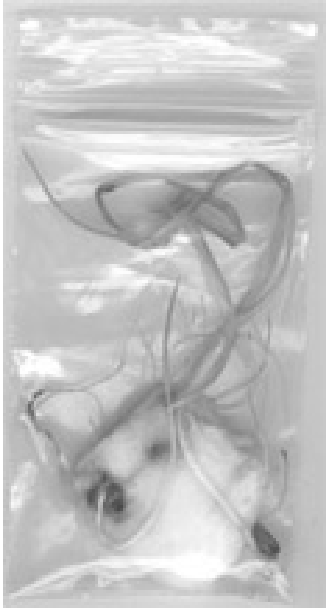
Winter Over Save seeds for planting next spring. Remember that some seeds need to freeze over the winter in order to germinate properly in the spring. What happens if seeds are planted now? Can they be frozen in a freezer for a few weeks, then forced to grow in the classroom? If so, will they grow all winter? What conditions: light, moisture, head, type of soil, etc. must be met for seeds to sprout?

Seed Math Estimate how many seeds are produced by an average plant. If they all grew, how many plants or how much area would be covered by plants in five years?

Seed Stories Write stories about seeds, from the seed's perspective. In a paragraph or two, cover the entire life process of the seed.

Seed Art Create a collage using a variety of seeds.

Living Necklace



- Mini Ziploc plastic bag
- String to create a necklace
- Cotton ball, slightly moistened with water
- 3 or 4 wheat seeds or other similar seeds

1. Punch 2 holes near the top of the small plastic bag, running the string through the holes to create a necklace.
2. Place the seeds on the slightly moistened cotton ball and carefully insert it into the bag. Zip the bag shut to create a mini greenhouse.
3. Have your students observe the various parts of the sprouting seeds. They can draw an illustration, labeling each part. Have them also note how many days it took for their seeds to sprout.
4. After they have completed their illustration they can plant their seeds in a pot with soil (cotton can be included).

Extensions:

1. Distribute a variety of seeds to observe different sprouting times.
2. Solve the following riddles using these terms: coat, leaves, germinate, roots, and stem.
    a. A seed doesn't have a hat, but it does have a _____.
    b. A seed has no flowers, but it does have a _____, _____, and _____.
    c. A seed doesn't have germs, but does _____.

Seed Shapes

- 10 damp paper towels
- Plastic plate or tray
- Various shaped cookie cutters
- Cress or alfalfa seeds

1. Pile ten damp paper towels onto a plastic plate or tray. Lay various shaped cookie cutters onto the towels.
2. Carefully sprinkle cress or alfalfa seeds into each cookie cutter shape, spreading the seeds to fill the shape.
3. Life the cookie cutter off of the paper towel. Place the plate or tray in a warm, sunlight place to germinate.
4. Carefully water around the seeds, as needed. However, don't sprinkle the water on the seeds.
5. When the plants are approximately 3 to 4-inches long, you can cut the sprouts and eat them. Yum!

Presenter Information Sheet
Outdoor Classroom Symposium – 2005

Frey Elementary School, Acworth, Cobb County
Friday, October 14, 2005

Carla Rapp
Name

Project Learning Tree | Co-coordinator
Organization | **Title**

P.O. Box 1217, Forsyth, GA 31029
Address

478-992-8110 | 478-992-8109
Phone | **Fax**

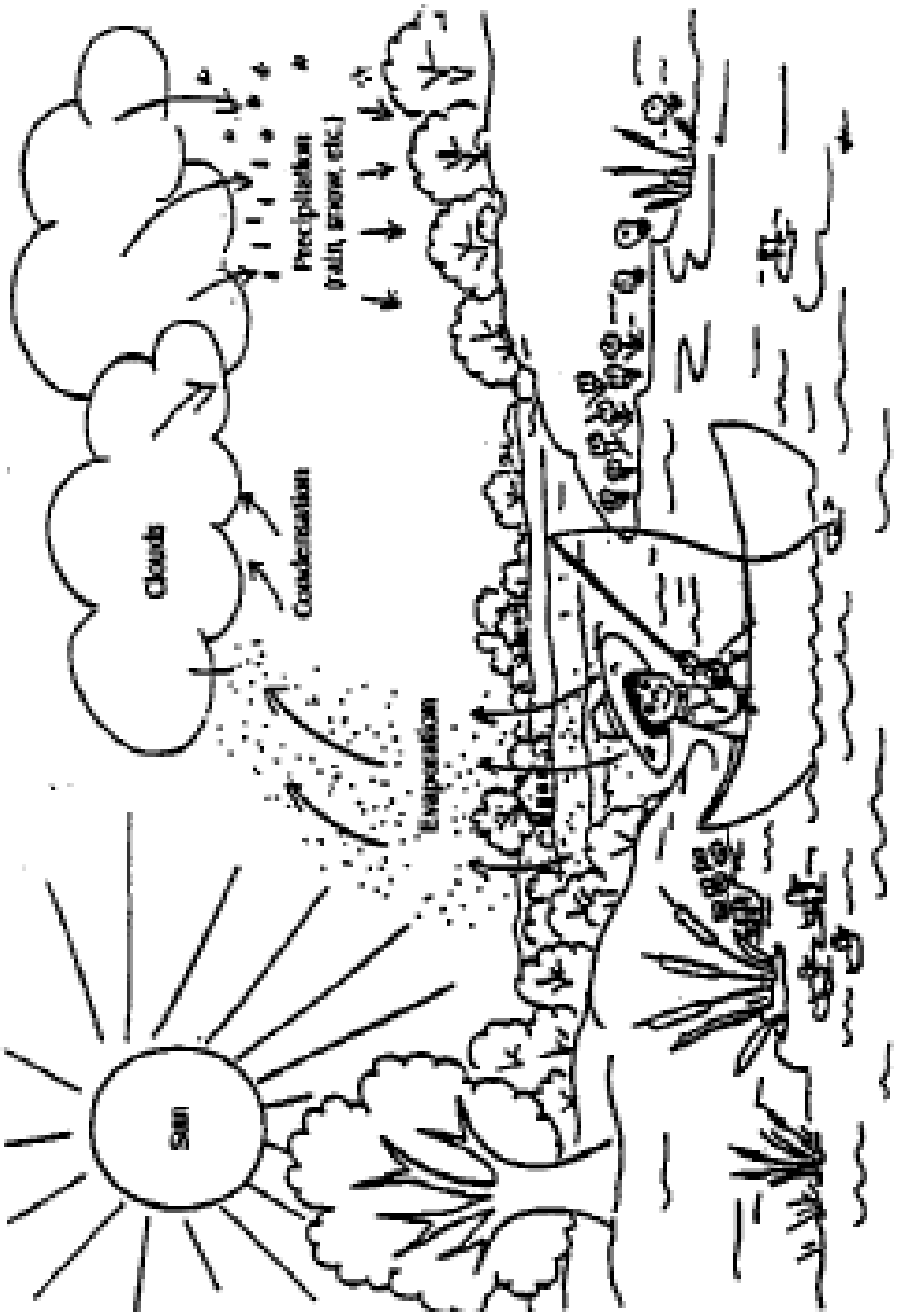
carla@gfagrow.org
E-mail

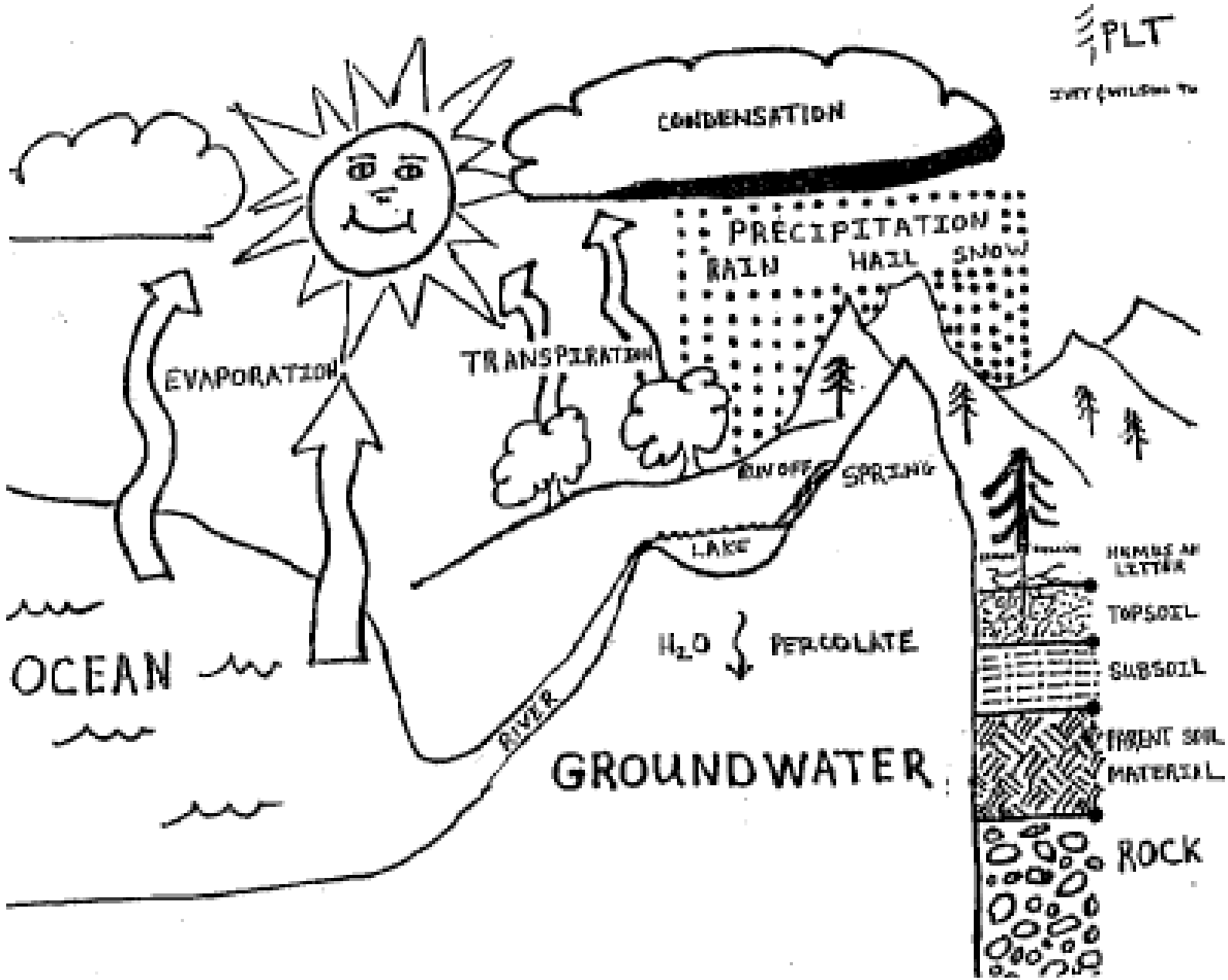
Creation Stations – Water Cycle
Topic/Title

Brief Description of Activity

We will create simple demonstration models that to show the water cycle and "how to make water from the air" - condensation.

Morning Session – 90 minutes – (10:15 – 12:00)


Sun
Clouds
Condensation
Precipitation
(rain, snow, etc.)
Evaporation


PLT
CONDENSATION
PRECIPITATION
RAIN
HAIL
SNOW
EVAPORATION
TRANSPIRATION
RUN OFF
SPRING
LAKE
RIVER
OCEAN
H_2O
PERCOLATE
GROUNDWATER
HUMUS AND LITTER
TOPSOIL
SUBSOIL
PARENT SOIL MATERIAL
ROCK

Presenter Information Sheet
Outdoor Classroom Symposium – 2005

Frey Elementary School, Acworth, Cobb County
Friday, October 14, 2005

Mary Gazaway

Name

GA DNR EPD | Environmental Outreach Coordinator

Organization | **Title**

Watershed Protection Branch – TMDL Implementation Program
4220 International Parkway, Suite 100, Atlanta, Georgia 30354
Address

Phone: 404-675-1745 **Fax:** 404-675-6247

Mary_Gazaway@dnr.state.ga.us

E-mail

Creation Stations – Water Cycle Bracelet

Topic/Title

Brief Description of Activity

Participants will journey through the water cycle.

Morning Session – 90 minutes – (10:15 – 12:00)

Water Cycle Bracelet

An adaptation from:
Project Wet
"Incredible Journey"

For more information about Project Wet Training
Contact Coordinator:
Petey Giroux
4220 International Pkwy. STE 101
Atlanta, Ga. 30354
404-675-1638
Fax: 404-675-6245

As liquid, gas or solid, powered by temperature, gravity and electromagnetic forces, water travels in clouds, glaciers, plants, and various locations over, under, and above the surface of Earth on an incredible journey called the Water Cycle.

Players: Pretend to be water molecules

Goal: Using beads strung on a pipe cleaner, players keep a record of the processes of condensation, precipitation, and evaporation that a water molecule follows as it transforms under conditions of temperature, gravity or electromagnetic force into a solid, liquid or gas and travels to oceans, soil, animals, and various other locations in the water cycle.

Materials: Beads, pipe cleaners, dice, station cards, water cycle poster.

Set Up: Arrange station cards over entire playing field. Put appropriate dice and colored beads at each station. Place water cycle poster in center of playing field.

How to Play: Hand out a pipe cleaner to each player. Divide players into nine equal groups. Line up one group at each station. First player at each station strings a bead, throws the dice and moves to the station pictured on the top surface of the dice. Players go to the back of the line at new stations and move forward until reach the front of the line where they string a bead and throw the dice to determine the next stations. Continue for 5-10 minutes.

Wrap Up: Players use beads on pipe cleaner to report what forms and pathways their water molecule took to travel to various stations, with each color bead representing a different station

Presenter Information Sheet
Outdoor Classroom Symposium – 2005

Frey Elementary School, Acworth, Cobb County
Friday, October 14, 2005

Ann Driver

Name

Frey Elementary | 4th grade teacher

Organization | **Title**

2865 Mars Hill Road, Acworth, GA 30101

Address

770-975-6655 | 770-975-6657

Phone | **Fax**

Ann.Driver@cobbk12.org

E-mail

Creation Stations-Solar Beads

Topic/Title

Brief Description of Activity

Morning Session – 90 minutes – (10:15 – 12:00)

SOLAR BEADS:

How Stratospheric Ozone Protects the Earth

..an activity adapted from "Ozone: The Good, The Bad, and The Ugly"
Earth Science (6/8 grade) lesson from the Clean Air Campaign

To download the full text of this lesson and receive a "goody bag" for providing feedback, go to www.cleanaircampaign.com; click "For Schools"; then Clean Air Lessons"; and "Download Lessons".

Materials

- Ultraviolet-detecting beads (three or more per student)*
- Pipe cleaners or chenille strips, long (one per student)
- Zip top bags (one per student)
- Lab Report form (one per student)
- Various ultraviolet-blocking items (different types of sun screen, sunglasses, fabrics, paper, etc.)

Procedure for Investigating "Good" Ozone

Explain to the class that ozone formed near the ground is an air pollutant that irritates lungs and can react with auto or power plant emissions and other vapors to form smog. However, ozone in the upper atmosphere is helpful because it shields the earth from ultraviolet light and keeps us from being burned. To remember this distinction, teach students, Good up high- bad nearby."

Distribute supplies to each student, including three UV-detecting beads, a pipe cleaner (for making bead bracelet), and a zip top bag (optional~ for testing the effect of sunscreen on beads without getting them messy)

Provide each student with a copy of the lab report form.

Allow each student to select more than one item from the stash of ultraviolet blocking items, including different brands or types of sunglasses, various kinds of sunscreen, a variety of fabric swatches, and different colors or weights of construction paper.

Allow students to observe the beads indoors and outdoors, and ask them to guess what makes them change color. *(Answer: the beads only react in the presence of ultraviolet light*).

Tell students that their assignment is to design and conduct an investigation to determine which of several materials has the greatest ability to block ultraviolet light from reaching the beads.

Students should be able to show parallels between the results of their investigations and the role of stratospheric ozone in absorbing ultraviolet light, which shields the Earth from effects of UV.

*** How to Order Ultraviolet (UV)-Detecting Beads**

Obtain ultraviolet detecting beads for this investigation. Many major science

supply catalogs carry these beads. One such source is Steve Spangler (250 beads for about $7).
URL: http://www.stevespanglerscience.com/product/1350

Teacher Note: *If students are unfamiliar with inquiry investigations, scientific method and experimental design, use the Web resource linked below to familiarize the class before they begin. Younger students may benefit from an inquiry lesson written by Kennesaw State Asst. Professor Tom Brown, called Magic Beads: http://webtech.kennesaw.edu/tbrown/curiosity/magicbeads.htm*

Science Inquiry- What It Is and How to Do It
http://www.wavcc.org/wvc/cadre/WaterQuality/scienceInq.htm#Science%20Process%20Skills
Background information for teacher or class about engaging students in the process of science inquiry.

Feedback
The Clean Air Campaign is pleased to provide standards-based air quality lesson plans for 4th through 8th grades. Please offer your feedback after implementing the full lesson plan, as there is no substitute for real classroom experience. Send teacher name, school name and address, grade level, lesson name, comments or suggestions, and number of students who completed the lesson to: schools@cleanaircampaign.com. Each teacher who responds will receive a Clean Air Campaign goody bag as a 'thank you.'

Lab Report

Question This Investigation Will Answer

_____

Hypothesis

If _____

then_____.

Control (that which is not subjected to the independent variable)

_____

Independent Variable (the one thing which is changed by the experimenter)

_____

Dependent Variable (the thing that is measured and which changes in response to the independent variable)

_____

Investigation Procedures (steps taken to test only one thing, such as "the effect of X on Y")

- _____
- _____
- _____
- _____
- _____

Continue Procedures on back, if necessary

Materials

_____
_____
_____
_____
_____
_____

Results

Qualitative Observations / Description

_____
_____
_____

Quantitative Observations / Data

Conclusion (Was hypothesis correct? What was the significance of what happened? What additional investigations would be useful?)

_____

_____

How Investigation Relates to Ozone (What, in this investigation, could represent ozone and why?)

_____

_____

Lab Report Answer Key

Question This Investigation Will Answer (10 pts)
Any question which investigates the relationship between the beads and ultraviolet radiation will do. Here are some examples: Will sunglasses shield a bead from ultraviolet radiation? Which brand or type of sunglasses shield beads from UV radiation most effectively? Does fabric provide a shield from ultraviolet radiation? Which brand of sunscreen works best to shield the beads from ultraviolet radiation? Does new sunscreen work better than old sunscreen to shield the beads from UV radiation? Which color paper more completely shields the beads from UV radiation?

Hypothesis (10 pts)
Any guess which answers the question presented above is acceptable, but use of the "If…then…" format is preferred. Examples: If we shield the beads with different brands of sunglasses, then there will be a difference in which glasses are most effective. If beads are covered, then they will not change color.

Control (the thing that stays the same) **(10 pts)**
At least one bead ~ the control~ should not be subjected to the independent variable (being covered with sunscreen, shielded by sunglasses, hidden under paper, or whatever the investigation calls for).

Independent Variable (the one thing that is changed and compared) **(10 pts)**
Sunglasses as independent variable: *The shielding of beads with one pair of sunglasses (ind.variable) compared to beads with no sunglasses (control), or shielding of several different types of sunglasses (ind variable) compared to no sunglasses (control), would be acceptable.*
Sunscreen lotion as independent variable: *Comparison of the effect of sunscreen on a bead (ind.variable) to no sunscreen on a bead (control) would be fine, as would comparison of various brands, or expiration dates, or strengths of sunscreen on a bead (ind. variables) to the absence of sunscreen on a bead (control).*
Fabric or paper as independent variable: *Comparison of the effect of beads being covered by paper (ind.variable), or the effect of being covered by different colors or different types of paper (ind. variable) compared to beads which are exposed (control).*

Dependent Variable (the thing you measure~ it changes in response to the independent variable) **(10 pts)**
Whether the color changed (or the extent of color change) is the dependent variable.

Investigation Procedures (remember to test only one factor) **(10 pts)**
Any step by step list of tasks is acceptable. Students should only test one variable.

Materials (10 pts)
List should include beads and any materials used for independent variables.

Results

Qualitative Observations (10 pts)

This section should contain a description of the results~ anything that can be seen or sensed.

Quantitative Observations / Data (10 pts)

This section should contain data, in chart form. The data may simply note color changes, or reflect time taken for color to change, or compare intensity of color.

Conclusion (10 pts)

Any statement which relates the investigation to the hypothesis is acceptable. If additional investigation ideas or directions are suggested, that is extraordinary.

How the Investigation Relates to Stratospheric Ozone ***(Bonus: 10 pts)***

Students should relate their independent variable to stratospheric ozone, because it acts as a shield to limit ultraviolet radiation reaching the Earth.

Presenter Information Sheet
Outdoor Classroom Symposium – 2005

Frey Elementary School, Acworth, Cobb County
Friday, October 14, 2005

Sylvia Flanagan

Name

Frey Elementary | 5th grade teacher

Organization | **Title**

2865 Mars Hill Road, Acworth, GA 30101

Address

770-975-6655 | 770-975-6657

Phone | **Fax**

Sylvia.Flanagan@cobbk12.org

E-mail

Creation Stations-These Are Your Lungs…On Smog

Topic/Title

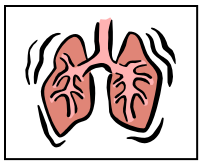
Brief Description of Activity

Adapted from the Clean Air Campaign's lesson, "Every Breath You Take" this activity includes making a working model of the lungs, researching the health effects of air pollution on the respiratory system, and modifying the lung model to demonstrate and explain one of these health effects.

Morning Session – 90 minutes – (10:15 – 12:00)

These Are Your Lungs…. On Smog

A lesson adapted from the Clean Air Campaign
"Every Breath You Take"
www.cleanaircampaign.org
with graphics used by permission
from the University of Arizona
http://student.biology.arizona.edu/sciconn/respiratory/lung.html

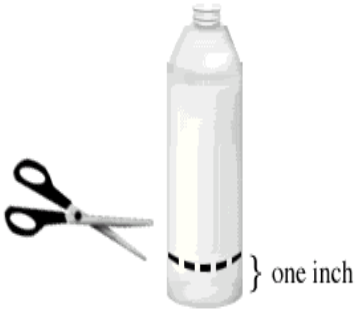


Step One: Gather these materials~

Old scissors, 3 large balloons, two rubber bands, one 1-liter bottle (Crystal Springs is widest and best), 2" cube of modeling clay or package of "tac", 3-way connector which will fit in bottle, 6" surgical or aquarium tubing

Step Two: Prepare the "chest cavity"

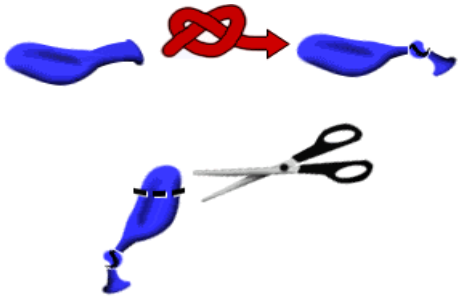
Carefully cut off the bottom 1 inch from the bottle, using the scissors. Make sure the cut edge of the bottle is smooth.



Place the lungs (balloons and connector) inside, and seal the plastic tube into the neck of the bottle with the rest of the clay to make an airtight fit.

Step Three: Prepare the "diaphragm"

Tie a knot in the neck of the third balloon, then carefully cut it in half, crossways.



Gently stretch the half of the balloon with the knot in it over the bottom of the bottle, pulling it up around the sides. Make the balloon as taut as you can - like the top of a drum.

Step Four: Start breathing!

throat

lungs

diaphragm

The lower part of the balloon represents the diaphragm, the main breathing muscle. Pull it down, as though you were inhaling.

This lowers the air pressure in the bottle. Air from outside rushes in and makes the two balloons expand, just like the real lungs inside your chest.

Step Five: Modify lung model to simulate the effects of air pollution

Learn about the health effects of air pollution by researching this subject on at http://trackstar.4teachers.org/ (track ID # 241703) or reading the summary chart below. Take the "diaphragm" off your model and use glue, staples, clips, cotton batting, corn starch and water, or any other supplies to simulate one effect of air pollution on the lungs. Then re-assemble your model, demonstrate the changes in lung function, and explain what causes this health effect, to your classmates.

Health Effects of Air Pollution

Learn more at: http://www.cleanaircampaign.com/documents/CAC_healthadvisory.doc

Health Effects of Smog	Health Effects of Ground Level Ozone	Health Effects of Particle Pollution
coughing *chest tightness, congestion* *wheezing* *inability to breathe deeply* *fatigue.* *changes in heart rhythm* *change in blood pressure* *excess deaths* *decreased lung growth (in children with chronic exposure)*	*irritated and inflamed airways* *decreased air flow* *shortness of breath* *coughing* *wheezing* *chest tightness* *decreased stamina*	*aggravate heart diseases* *aggravate lung diseases* *contribute to heart arrhythmias* *cause respiratory infections*

Symptoms of Asthma, which can be aggravated by any type of air pollution

Muscles around the airways tighten
Llining inside the airways swells
Airways get clogged with lots of thick mucous
Harder to move air in and out of the air sacs

Presenter Information Sheet
Outdoor Classroom Symposium – 2005

Frey Elementary School, Acworth, Cobb County
Friday, October 14, 2005

Gina Shumpert

Name

Frey Elementary

Organization **Title**

2865 Mars Hill Road, Acworth, GA 30101

Address

770-975-6655 770-975-6657

Phone **Fax**

Gina.shumpert@cobbk12.org

E-mail

Creation Stations - Howling Fowl

Topic/Title

Brief Description of Activity

Students will investigate light and sound and how vibrations produce sound.

Morning Session – 90 minutes – (10:15 – 12:00)

HOWLING FOWL

LESSON PLAN

Georgia QCC Objective: 1.5
Georgia Performance Standard: S1P1
Students will investigate light and sound.
c. Investigate how vibrations produce sound.

Materials in Kit

Plastic or paper cups (1 per student)
Cotton string (18" per student)
Glue
Skewer (for use by teacher)

Bring Your Own . . .

Craft materials (for feathers, eyes, beaks)
Water, sponges

What will be accomplished (to be shared with students)

Students will demonstrate how a vibrating string produces sound, and how a cup can be used to amplify sound.

Procedure

(Pre-activity: punch small holes in center of cup bottoms; soak string)
Decorate cups upside down, to look like chickens
Thread string through hole in bottom of cup and tie a large knot at end (on outside of cup)
With cup upside down, hold the wet string which dangles below cup between index finger and thumb, and give several small jerks
Listen for the sound of a squawking chicken

Debriefing

What makes the squawking sound? *(The string,which vibrates very fast when we pull it. Vibrate means to move back and forth quickly)*
What would happen if we jerk on a wet string <u>without</u> a cup? (hold a string and demonstrate) *(The sound it makes is very soft)*
How does the sound change when we put the string through a cup? *(It makes it louder).*
Can you "cup" your hands behind your ears, to make sounds louder? *(yes)*

Presenter Information Sheet
Outdoor Classroom Symposium – 2005

Frey Elementary School, Acworth, Cobb County
Friday, October 14, 2005

Sheri Henshaw/Missy Phillips

Name

Keep Bartow Beautiful — Sheri- Coordinator, KBB
Missy-Director TREESBartow, Program of KBB

Organization — **Title**

P.O. Box 786 Cartersville, GA 30120

Address

770-387-5167 — 770-606-2382

Phone — **Fax**

henshaws@bartowga.org — phillipsm@bartowga.org

E-mail

Creation Stations – Going Buggy

Topic/Title

Brief Description of Activity

We will make "bug-eye binoculars" out of toilet paper tubes, then conduct scavenger hunt(lesson and sample kit included) to find evidence of bug habitat. Will include info for making various bug traps for the outdoor classroom for more advanced collectors.

Morning Session – 90 minutes – (10:15 – 12:00)

Activity not submitted.
Please contact this presenter for their handouts.

Presenter Information Sheet
Outdoor Classroom Symposium – 2005

Frey Elementary School, Acworth, Cobb County
Friday, October 14, 2005

Suki Janssen

Name

Athens Clarke County Solid Waste Department | Program Education Specialist

Organization | **Title**

PO Box 1868, Athens, GA 30603-1868

Address

Phone: 706-613-3512 | **Fax:** 706-613-3513

suki@acc-recycle.org

E-mail

Creation Stations -

Topic / Title

Brief Description of Presentation:

Morning Session – 90 minutes – 10:15 – 12:00

Activity not submitted.
Please contact this presenter for their handouts.

Presenter Information Sheet
Outdoor Classroom Symposium – 2005

Frey Elementary School, Acworth, Cobb County
Friday, October 14, 2005

Sheryl Coleman

Name

Ford Elementary | Earth Parent

Organization | **Title**

1345 Mars Hill Rd, Acworth, GA 30101

Address

Phone: 770-590-3871

colemanjsz@msn.com

E-mail

Creation Stations - Terrariums

Topic / Title

Brief Description of Presentation:

1. The students will create their own terrarium to connect concepts of precipitation, condensation, and evaporation.
2. Students will be able to name and explain the stages of the water cycle.
3. Students will explain that water on earth moves in a continuous cycle.

Morning Session – 90 minutes – (10:15 – 12:00)

Activity not submitted.
Please contact this presenter for their handouts.

Presenter Information Sheet
Outdoor Classroom Symposium – 2005

Frey Elementary School, Acworth, Cobb County
Friday, October 14, 2005

Gary Jordan

Name

Frey Elementary School | 4th Grade Teacher

Organization | **Title**

2865 Mars Hill Rd, Acworth, GA 30101

Address

Phone: 770 422-5466

Garyjordan2001@yahoo.com

E-mail

Orienteering on a Rope

Topic / Title

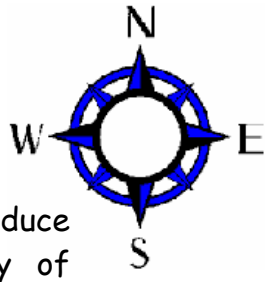
Brief Description of Presentation:

Does setting up your own orienteering course seem intimidating? Here's a simple way to introduce the skills of orienteering on a course laid out on a rope.

Morning Session – 90 minutes - (10:15 – 12:00)

Orienteering on a Rope

Gary Jordan



Orienteering or map reading using a compass is an excellent way to introduce students to both the basics of map reading and a wide variety of mathematical skills. In addition, it is an interesting way to introduce students to several of the map reading Georgia Performance Standards in grades 1 – 6 such as cardinal and intermediate directions, and the relationship of scale to distance.

Novices to orienteering are often intimidated by setting up their own course. The purpose of these activities is to make the introduction of orienteering as simple as possible. It involves the use of a rope with stations on it, and having students practice doing a series of closed loop courses. It couldn't be simpler.

Getting Started

After students have been thoroughly introduced to the basics of orienteering a map with a compass, they are ready to get started outside.
One needs to purchase a hundred-foot piece of rope and place large washers every ten feet. These washers will be stations that are numbered 1 to 11. The next step is to take the rope out to the playground and stake the first station into the ground. Next, walk to the north and pull the rope tight. Stake the last station into the ground. The rope needs to be accurately aligned south to north. The course is now ready to be run. These are series of closed loop courses. Students start at a station between #3 and #9. They will return to either where they started or to another station (see attachments and solutions). It is important that students get used to taking consistent steps.

Determining the Distance of Your Step

It is not important to know the distance of your step with a closed loop course as long as you take consistent steps. However, it is necessary for cross-country orienteering. The hundred-foot rope is also great tool for determining this. Have students walk the length of the rope and count their steps. Now, they divide 100 feet by their number of steps. This gives the

students the length of each of their steps. I normally have students do this five times and take the median number (see the attachment on determining the distance of your step).

Orienteering Cross-Country

Once students have mastered orienteering on a closed loop course and have determined the length of their step, they are ready for orienteering cross-country. There are a variety of ways to approach this. I set up my rope in a standard location each time, and have students start on the first station (#1). Next, they are given a map with the directions and the distance to a number of control points set up on the edge of the playground. I normally paint different color dots on trees for control points. Each student or team must find their control point before they go on to the next leg of the course. The last leg takes them back to one of the stations on the rope.

In Conclusion

The use of closed loop courses is an excellent method to introduce the basics of orienteering since students don't have to concern themselves with distance, but only have to walk consistently. It allows them the chance to familiarize themselves with the basics of map and compass before tackling more complicated courses. Setting up the stations on a length of rope is a fast and simple way to get started and is useful in running more complicated cross-country courses.

Useful Resources

Be an Expert with Map and Compass: The Orienteering Handbook by Bjorn Kjellstrom

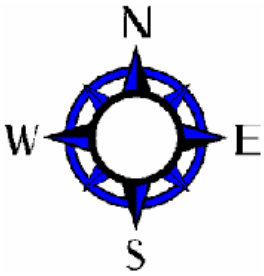
Find Your Bearings by the Aims Education Foundation

Orienteering and Map Games for Teachers by Mary E. Garrett

Orienteering Made Simple: An Instructional Handbook by Nancy Kelly

www.topozone.com - Great website for looking up the current magnetic declination of your location

Determining the Distance of Your Step



Directions: Walk the distance of the 100-foot rope and count your steps. Record the number of steps in the chart below. Find the median number of steps and then use a calculator to find the distance of your step. **It is important that you do this activity by yourself so someone else does not influence you**.

Trial #1 _____ steps

Trial #2 _____ steps

Trial #3 _____ steps

Trial #4 _____ steps

Trial #5 _____ steps

What was your median number of steps? _____

Now take a calculator and divide 100 by your median number of steps.

100 divided by _____(your median number of steps) = _____ (Distance of your step)

COMPASS-MAKING
LESSON PLAN

Georgia QCC Objective: 4.5

Materials in Kit
Bowls
Lids
Needles or pins
Magnets

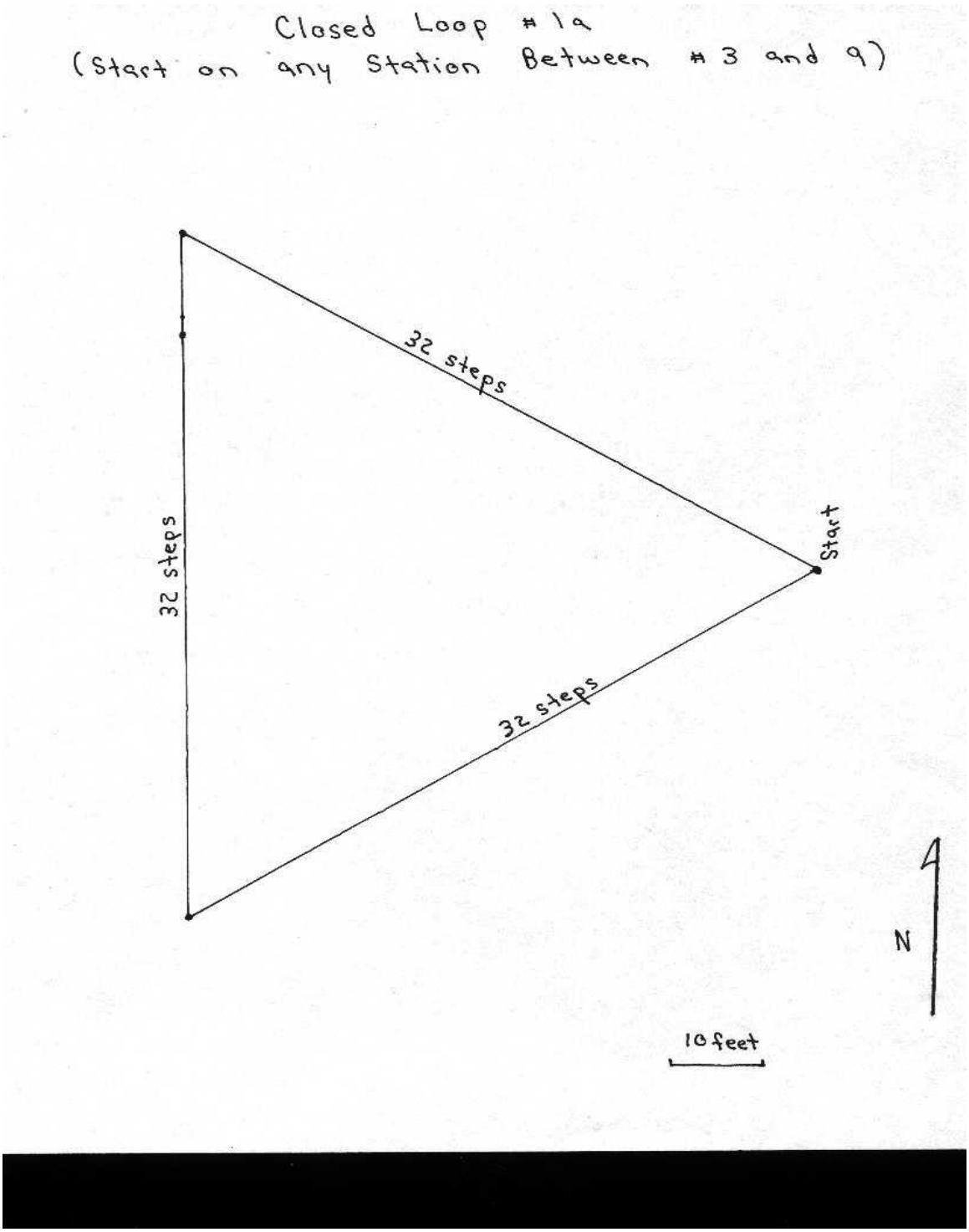
Bring your own . . .
Water

What will be accomplished
Students will investigate the relationship between compasses and magnets by making a compass and demonstrating how it works.

Procedure
Magnetize a needle by rubbing a strong magnet in one direction along it, approximately 120 times.
Fill a bowl half full of water, and float a plastic lid on the water.
Place the magnetized needle on the lid and allow it to turn the lid around
When all movement has stopped, determine in which direction (or along what axis) the needle is pointing.
Compare the homemade compass to a manufactured one, finding north
(Warning: DO NOT EXPOSE MANUFACTURED COMPASS TO THE MAGNET USED ON THE NEEDLE OF THE HOMEMADE COMPASS).

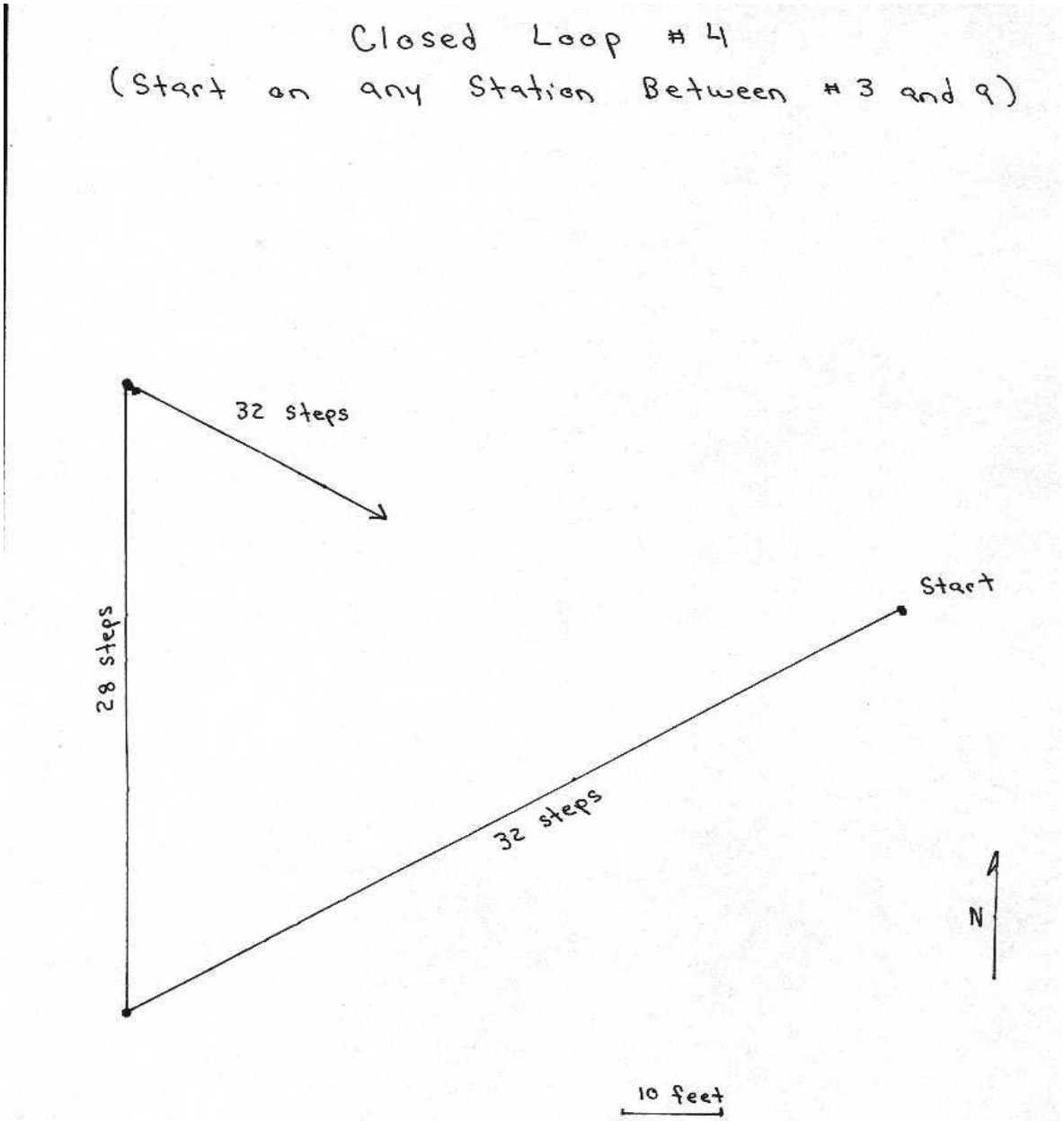
Debriefing
What is the connection between magnets and compasses? *(Compass needles are magnetized and, because the earth acts like a giant magnet, the needles align with Earth's north and south poles).*
How can one find direction with a compass? *(If you know which way is north, you can determine any other direction, use a map, etc.)*

Solution: You will return to the station you start on.



Solution: You will return two stations above where you started.

Solution: You return two stations below where you started.



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Presenter Information Sheet
Outdoor Classroom Symposium – 2005

Frey Elementary School, Acworth, Cobb County
Friday, October 14, 2005

Naomi Thompson, Kerrie Anne Loyd, Sara Nichol

Names

Stone Mountain Memorial Association | Instructor

Organization | **Title**

PO Box 689, Stone Mountain, GA 30086

Address

Phone: 770.498.5619 **Fax:** 770.498.5659

n.thompson@stonemountainpark.org : k.loyd@stonemountainpark.org

E-mail

Solar Cookers

Topic / Title

Brief Description of Presentation

Make your own solar cooker, see other cooker designs, eat a solar cooked treat, and receive lesson plans for using solar cookers with your class.

Morning Session – 90 minutes (10:15 – 12:00)

Solar Ovens Made From Pizza Boxes

The title of the book that we got the solar experiments from is *At Home with the Sun*, by Michael J. Daley. It has a good introduction to solar energy, a solar glossary and ten fun solar experiments and is designed for ages 6-12. Purchase this book for $7.90 from:

PSP: Professor Solar Press
RFD #3, Box 627
Putney, VT 05346

You will need:

- A medium size pizza box
- Black construction paper
- Extra-wide aluminum foil
- Plastic (plastic window covering from a hardware store works best)
- Glue
- Tape
- Scissors
- Ruler
- Magic Marker
- Ruler

Procedure:

- Tape foil to the inside bottom of the box. Cover the foil with black paper and tape in place.
- Put the box on the plastic. Draw the outline of the box on the plastic with the marker.
  Cut the plastic about 1/4 inch inside the marks.
- On the top of the box, draw a line one inch from all sides. Cut along front and side lines BUT NOT along the back. This will be the hinge for the flap. Carefully fold open the flap.
- Cut a piece of foil the size of the flap. Glue it to the side of the flap that faces INTO the box. Flatten out all the winkles. Wipe glue smears off with a damp towel before they dry.

- Tape the plastic to the inside of the box. Tape one side first, then the opposite side. Make it tight so it looks like glass. Tape the other edges. Seal tight so no air can get in.
- Cut a piece of string as long as the box. Tape one end to the top of the flap. Push a small nail into the back of the box so you have a place to tie the string.
- Give it a try ... (English muffin pizzas, melting rate of chocolate "s-mores," etc....)
- Can you improve your oven? (add insulation, add reflectors, etc...)
- What else can you cook?

Presenter Information Sheet
Outdoor Classroom Symposium – 2005

Frey Elementary School, Acworth, Cobb County
Friday, October 14, 2005

Tim Grant

Name

Green Teacher | Co-Editor

Organization | **Title**

95 Robert St, Toronto, ON m5S 2K5, Canada

Address

Phone: 416-960-1244 **Fax:** 416-925-3474

tim@greenteacher.com

E-mail

Teaching About Climate Change

Topic / Title

***Brief Description of Presentation*:**

Over the past few season, have you noticed a change in weather patterns – more or less rainfall, higher or lower temperatures? Discover the latest science of climate change through a variety of hands-on activities related to climate change science, including photosynthesis and decomposition, the impacts of climate change, energy conservation, and transportation alternatives.

Morning Session – 90 minutes - (10:15 – 12:00)

Is Climate Change Good for Us?

An activity for exploring how changes in climate could affect daily life and influence the economy of a region

by Jackie Oblak, environmental educator at the Bill Mason Centre of the Ottawa-Carleton District School Board in Ottawa, Ontario.

To many people, the thought of temperatures rising two or three degrees Celsius does not seem to be a big deal, and to those who live in areas with cold winters it may even sound appealing. Yet global climate change brings with it a number of uncertainties about how regions will be affected. This activity is designed to encourage students to consider how changes in climate could affect them personally. They are then asked to broaden their focus by looking at the big picture to see how changes could affect their regions, whether they live in a rural or urban community, in the interior or along a coastline.

Although this activity is designed as an introductory exercise for primary and junior students, it can be easily modified for other levels by increasing the depth of the classroom discussion and research requirements. The exercise should serve as a reminder that even with our advanced technologies we are dependent on the Earth's natural systems.

Background

We live in a world in which we expect a certain amount of climatic predictability. In temperate interior regions, we expect very warm summers and cold winters. In more southerly regions and along coastlines, we expect more rainfall in certain seasons than in others. For some, snow in May is typical; for others, annual droughts are the norm. Regardless of where we live, we have adapted our activities, economies and communities to seasonal cycles and climatic conditions which we have come to depend on.

One of the most important examples of our dependence on predictable weather patterns is found in agriculture. Plants have specific tolerances to rainfall, drought, and high and low temperatures, as well as to a number of other variables. As a result, farmers rely on having predictable seasonal weather patterns when they determine what type of crops they will grow and when they will plant them. Many other businesses rely on the weather as well. Tourist attractions, ski operations, theme parks and camping facilities all depend on a number of optimal days, whether they be snow days or sun days, to stay in business.

Think of how empty the beaches would be without the hot sunny days of summer, or how empty the ski hills would be if it rained most of the winter! Restaurants, hotels, transportation companies and other enterprises depend on these weather-reliant businesses to bring in customers. The design of buildings within a region is also based on an expected range of weather conditions. In areas with high winds, for example, new buildings are constructed in such a way that they can be expected to withstand these

winds. Flood-control dams are designed to handle a maximum amount of runoff within a certain period. Areas around rivers and lakes are often designated as being within in the "100-year plan," meaning that according to past trends, the area has only a one percent chance of flooding each year. Land use decisions depend on these designations and, like agriculture and tourism, are based on a certain amount of predictability in the weather. Major changes in weather patterns, such as large increases in rainfall, especially over a very short period of time, may increase the potential of flooding in these areas.

We tend to take it for granted that climate will stay the same within certain limits of variability; but if our climate does change, many other aspects of our lives could also change. Consider the occurrence of a hot, dry summer with many sunny days in a region that usually experiences rain about once a week. It may be great for us to have more sunny days than normal during summer vacation, but if there is more sun, there is potential for increased evaporation of moisture from the soil. Would farmers likely benefit from these wonderful sunny days? How might the resulting decline in crop yields affect the price and availability of food? What could happen if these weather conditions continued for a number of years? These are the types of details that this activity encourages students to consider when looking at climate change.

Activity

This activity can be done individually, but students will benefit from discussing their ideas in groups.

1. Using the chart (see next page) as a starting point, have students discuss and record what they think would be the consequences of various climate changes. Note that the chart is very general, and does not expect the students to quantify the changes, but only to consider general trends. You may want to add other weather conditions or events that are common in your region.

The following are examples of ideas that you might expect from primary or junior students:

Season: Summer

Type of Change: More rainstorms

How would this affect me?

- My baseball and soccer games are likely to be cancelled more often.
- Water may leak into our basement.
- The storm spillways will fill with water and it may be dangerous to go near them.
- The wind that comes with rainstorms may break branches on the large old trees near my house.

How would this affect things around me?

- Local tomato farmers may have their crops ruined by hail or flooding of the fields. Tomato plants need regular rainfall with periods of sunshine. More storms may make the tomatoes crack and rot.

- The local summer festival may not make as much money because more events will be rained out and fewer people will attend.

2. Once the groups have completed the chart, discuss the responses as a class. Ask if there are any categories in which there seem to be no negative effects.
Remind students to consider the effects of storms and other events on infrastructures such as drainage, roads, electricity and so on.

3. What adaptations would humans have to make if certain weather events became more common? This can be approached as a "What if?" brainstorming exercise, or students may contact local climatologists to ask about actual trends and long-term predictions for your area. Adaptations considered might include modifications to infrastructure and buildings; and changes in diet, dress, activities and transportation.

Extensions

1. Have students research the climatic tolerances and potential effects of climate change on a local crop or natural resource. Information to be gathered might include the maximum and minimum amounts of rainfall and the range of temperatures that the crop tolerates, the number of frost-free days it requires for maturation, and its susceptibility to weather-influenced pests such as insects and fungus. Compare these tolerances to the local norms for your area (obtain charts showing annual precipitation, temperature, and sun days from local weather offices). In areas where a specific crop or resource is the cornerstone of the local economy, consider the economic, social and environmental consequences of lower harvests due to climate change (e.g., many people might lose their jobs; if people have less money to spend, local businesses will suffer; if local crops suffer, more food may have to be imported to the region, resulting in higher prices and greater consumption of fossil fuel).

2. How could changes in climate affect wildlife? Choose two or three species of insects, plants or animals and consider whether and how they would be affected. Since all organisms depend on other things in their habitat, encourage students to look at requirements for food, shelter and water, as well as interdependence with other organisms. How might changes in climate influence these factors?

3. The media frequently report extreme weather events that cause difficulties for individuals and local economies. Choose a current weather-related event and have the students identify the cause (e.g., rain for three weeks in a region that usually has rain once a month) and the result (e.g., mudslides, flooding of rivers, loss of life, houses, crops, safe drinking water).

4. Have students select several different regions of the world, including their own, and identify features of architecture, dress, diet and culture that may have developed as adaptations to the climate.

Evaluation

At the end of the exercise, the students should show an understanding that climate changes which many individuals may consider desirable (more sun, more time on the beach) may not be good for farmers, other sectors of the economy or other organisms. Students should also understand that we depend on natural systems to be relatively predictable and to function within certain limits. Students should be able to identify, in general terms, what could occur to local structures such as dams and storm sewers if climate were to be more severe than expected within a certain time period.

Season: _____		
Type of Climate Change	**How would it affect me?**	**How would it affect things around me?**
More rainstorms or snowstorms 		
Less rainfall or snowfall 		
More sunshine 		
Less sunshine 		
Higher daytime temperatures 		
Lower daytime temperatures 		
Higher wind speeds 		
Other changes 		

Afternoon Concurrent Sessions
1:15 – 2:00 (Short Sessions)

- What to do in the Outdoor Classroom: Engaging Hands-On Field Study for K-5 – Frey Elementary Staff
- Introduction to Georgia Green and Healthy Schools – Trevor Williams
- Teach OUT THERE?? – Petey Giroux
- Bug Bonanza – Dr. Duane Jackson

Presenter Information Sheet
Outdoor Classroom Symposium – 2005

Frey Elementary School, Acworth, Cobb County
Friday, October 14, 2005

Darniele Scarpinato, assisted by Vickie Arjona, Cathy Ewers, Trish Crowe, Marianne Shipp, Claire Waldron, Pam Rountree, and Kelly Evans

Names

Frey Elementary	4th grade teacher
Organization	**Title**

2865 Mars Hill Rd, Acworth, GA 30101

Address

Phone: 770-975-6655

Darniele.Scarpinato@cobbk12.org

E-mail

What to Do in the Outdoor Classroom

Topic / Title

Brief Description of Presentation:

Wondering what to do with student in the outdoor classroom after you students have made those pinecone bird feeders? Investigate Frey's field study kits! Each kit is packed with a lesson and all the supplies needed to complete a hands-on activity which teaches one state science standard. Find out how teachers responded to a survey about what kept them from doing outdoor education, and how the field study kits were "backward designed" to match the state curriculum. Kits from six grade levels will be available for Symposium participants to try.

Afternoon Session – 45 minutes – (1:15 – 2:00)

SORTING BY CHARACTERISTICS

LESSON PLAN

Georgia QCC Objective K.6
Georgia Performance Standards:
SKP1. Students will describe objects in terms of the materials they are made of and their physical properties.

Materials in Kit

for color: *frogs in 6 colors (100), matching sort bowls (6)*
for shape: *shape-sorter box with various objects, sea shells, rocks*
for size: *plastic animals in small and large sizes*
for texture: *burlap, fur, sandpaper, laminate, feather, scrubber, chalk*
for mass/weight: *rocks, sponges, marbles, balls*
for extension leaf sorting activity*: paper plates and glue*

Bring Your Own . . .

Leaves of various shapes, sizes, colors, textures, glued one-to-plate in advance
Balance scales for mass/weight comparisons

What will be accomplished (to be shared with students)

Students will sort, match, group and describe objects by various physical characteristics.

Procedure

NOTE: Activities may be done with whole class or set up at stations.

- **For color:** Each student should have 5-20 color bears (depending on group size) and drop each bear into the bowl of matching color.
- **For shape**: Provide a shape sorter to each group and tell students to push the objects through matching-shaped openings.
- **For size:** Provide each group with plastic animals to group by size.
- **For texture:** Provide each student with textured items which they are to feel and compare, identifying the smoothest, roughest, softest, etc.
- **For mass/weight:** Ask students to predict lightest and heaviest items and let them weigh with balance to check.

Extension Activity- Leaf Sort: Students collect leaves and match them to sample leaves, glued on paper plates in advance.

Debriefing

Discuss how any two items are alike and how they are different.

NOTE: Re: Harcourt Materials- Kit K-E contains some supplies for this lesson, including cars, balls, shells, sponges, and marbles. See Activity Card K-35.

TO BE OR NOT TO BE

Georgia QCC Objective K.11
Georgia Performance Standards:

SKL1. Students will sort living organisms and non-living materials into groups by observable physical attributes.

a. Recognize the difference between living organisms and nonliving materials.
b. Group animals according to their observable features such as appearance, size, motion, where it lives, etc. (Example: A green frog has four legs and hops. A rabbit also hops.)
c. Group plants according to their observable features such as appearance, size, etc.

Materials in Kit

Zip bags (22, or one for each student), each containing an assortment of non-living items (such as ball, straw, spoon, rock, foam pellet, plastic stirrer)
Sorting bowls (11 green for living items, 11 white for non-living)
Lab reports (optional) and hand lenses (classroom set)

Bring Your Own. . .

Living items: 22 of each of 5 different living items, to be placed in the same zip top bags with non-living items (e.g. grass blade with roots, ant, ladybug, snail, small flowering plant/weed with roots)
Note: To avoid confusion do not use plant or animal *parts or products* (e.g. pencils or nuts)

What will be accomplished (to be shared with students)

Students will compare, sort and classify items as living or non-living.

Procedure

Provide each student with a zip bag including non-living and living things
Note: living things need to be added to bags on day of investigation
Provide each pair of students with two sorting bowls of different colors
Distribute lab reports (optional) and discuss how they are to be used (finding places on a chart, making a mark only if answer is yes).
Students are each to observe and classify items as living or non-living
After debriefing, living items must be removed from zip bags and discarded, and the assortment of non-living items returned to each zip bag. Release any insects or live creatures, where they were collected.

Debriefing

What can some living things do that non-living things cannot? g***row, move, poop, have babies/make seeds, eat/make food, drink, breathe***
What are some examples of living things? ***plants, people, insects, animals, etc.***
What are some examples of non-living things? ***rocks, metals, plastics, etc., and items made from these things***
Would you say that milk (or bread or a ruler or paper or a hamburger) is living or not? ***Although not alive anymore, these products are made from things which were once living. Discuss the origins of these products.***

NOTE: Re Harcourt Materials - Picture directions for similar activity available on Activity Card #6. No supplies provided. Extension activity: Card #18 - Growing plants from seed: plastic bags and grass seed & hand lenses can be found in kit K-B. Paper towels and construction paper needed.

EXPLORING MAGNETS AND MAGNETISM

Elementary school teachers

Grades 1-5

Workshop Objectives

This workshop will introduce the teacher to an inquiry-based exploration of magnets and magnetism. The primary goal will be to show how students can discover the properties of magnets and magnetic fields. This activity will allow participants to use the science process skills of observation, data collection and recording. Through inference, they will make generalizations based upon their results.

At the conclusion of the workshop, participants will be able to:

- understand that some materials are magnetic and some are not;
- identify natural magnets and manufactured magnets;
- test a sample to determine if it is magnetic;
- understand that magnets contain two opposite poles;
- understand the concept of the magnetic forces of attraction and repulsion;
- understand magnetic fields;
- make a temporary magnet;
- record data; and
- infer the magnetic properties of a material.

Learning Styles Accommodated by the Workshop

Visual: Visual learners will be stimulated by observation of the testing of materials and the magnetic field patterns.

Auditory: Auditory learners will benefit from small group discussion throughout the investigation.

Tactile/Kinesthetic: Kinesthetic learners will be stimulated by the materials testing collection experience.

Mathematics, Science and Technology Standards Addressed

National Standards - 1, 2, 3, 5, 6, 7, 8
State Standards - 1, 3, 4, 5, 6, 7
District 13 Standards - A, B, C, D, E

Classroom Setup

Cooperative learning in a classroom, followed by any other bounded location.

Materials

Various types of magnets (bar, donut, horseshoe, etc.), magnetic and non-magnetic objects/materials for testing (steel nails, aluminum nails, straws, cardboard, white paper sheets, coins, rubber bands, plastic spoons, silver spoons, assorted paper clips, etc.), lodestone, sand, iron filings, paper and desktops/flat surfaces.

Schedule

Introduction
Activity 1 - Magnetic observations
Activity 2 - Attractions
Activity 3 - How do magnets interact?
Activity 4 - Magnetic fields
Conclusion

Development of Theme Concepts

- Some materials are magnetic; these are attracted to magnets.
- There are naturally occurring magnets and manufactured magnets.
- Magnets contain two opposite poles (N and S).
- Like poles repel; opposite poles attract.
- Attraction and repulsion are forces.
- A magnetic field surrounds every magnet, creating a distinctive pattern around and between its poles.
- Some materials can take on the properties of a magnet temporarily.

Applications

Magnetism is an essential building block of physics. The principles of magnetism are embodied in all present day devices that contain motors, electrical energy production and transmission, computers, computer disks, in addition to simpler technologies such as the compass.

The strategies employed to study magnets and magnetism in these activities provides inquiry opportunities for the student to investigate the properties of magnets and to sort and classify those materials that are magnetic. Observation and data collection are followed by analysis and model/rule formulation. These science process skills are applicable to any science investigation.

Activities

The following activities examine the magnets and magnetism. In the first activity, participants discover that certain materials are magnetic while others are not magnetic. Through this discovery, they develop the rule/model for determining whether a given material is magnetic. In the second activity, the magnet's ability to attract is explored and quantified. In the third activity, participants explore those situations when magnets repel and when they attract. The final activity provides for the investigation of magnetic fields. Therefore, in all of these activities, participants use data collected as a result of observations to make inferences.

Note: some of these activities/materials may have to be adjusted for students' ages

Activity 1 - Magnetic observations

For each group of two participants, provide the magnets and testing materials as listed above.

Procedure:

- Distribute one magnet to each participant. Brainstorm for descriptive words about magnet. List words on board.
- Demonstrate how a magnetic material is attracted ("sticks to") to the magnet. Ask for an explanation of the observed phenomenon. Develop the concept through limited questioning and answering that promotes critical thinking.
- Distribute the testing materials to each group. Before any testing occurs, elicit predictions as to which objects will be attracted to the magnet. Record predictions.
- Participants test objects and record their observations.
- Review findings as a class. Through brainstorming, develop the rule for determining if an object is magnetic.
- Direct participants to identify objects around the room to test. Ask them to predict, based on the rule, whether they are magnetic. Record predictions.
- Participants test objects and record observations.
- Groups report out, comparing predictions with findings. Modify the rule as necessary.
- Demonstrate the ability of the lodestone to attract. Ask for explanations. Discuss natural and manufactured magnets.
- Participants predict what will happen with sand. Record predictions.
- Distribute sand to groups and test.
- Groups report results.
- Draw inferences through brainstorming.

Activity 2 – Attractions

Use various magnets and magnetic materials to quantify the attraction force. Procedure:

- Distribute the various magnets to the groups, along with a box of steel paper clips and steel washers.
- Predict how many paper clips a particular magnet will attract. Repeat for other magnets.
- Groups test and record observations.
- Groups report out to form aggregate data. Compare results to predictions. Elicit comments.
- Brainstorm how to record, compile and graph data to determine which type of magnet was able to attract the greatest number of paper clips.
- Elicit inferences based on data.
- Ask participants to explore moving the magnetic objects along the tabletop without touching. Participants explore by placing magnet a distance from the objects and under the tabletop.
- Participants draw inferences from data through brainstorming.

Activity 3 - How do magnets interact?
Use groups as above to explore how magnets interact with each other.
Procedure:

- Distribute two bar magnets only to each group.
- Ask participants to predict what will happen when the two magnets are placed near each other. Record predictions.
- Direct participants to place magnets near each other using three different orientations and to record observations.
- Groups report out and compare findings to predictions.
- Develop an explanation/rule for the observed phenomenon. Use the terms force, attract and repel.
- Ask participants how they might make a temporary magnet with a nail. Distribute nails and paper clips.
- Participants experiment until they get the nail to pick up paper clips (after rubbing one pole of magnet along the length of the nail).
- Participants provide explanation/reasoning.
- Participants draw inferences from findings.

Activity 4 - Magnetic fields
Groups use paper sheets, iron filings and bar magnets to explore magnetic fields.
Procedure:

- Distribute paper to groups.
- Distribute bar magnets to groups. Direct participants to place magnets 1"-2" apart, oriented so that they attract or repel.
- Ask participants to predict what will occur when iron filings are poured on the paper over the area where the magnets reside. Recall the rule(s) previously developed. Record predictions.
- Pour iron filings on the paper. Participants observe and record results.
- Groups report out and explain magnetic field phenomenon.

Source:

NYU STEM Program

PHOTOSYNTHESIS:

Chlorophyll Chromatography

LESSON PLAN

Georgia QCC Objective 2.10

Georgia Performance Standard S5L1

Students will classify organisms into groups and relate how they determined the groups with how and why scientists use classification.

b. Demonstrate how plants are sorted into groups.

Materials in Kit

Acetone (nail polish remover)
Food chopper, manual
Filter paper (cut into strips- one per student)
Clear plastic cups (one per student)
Tape
Droppers

Bring Your Own . . .

Leaves
Pencils and markers, crayons or colored pencils
Scissors

What will be accomplished (to be shared with students)

Students will learn about photosynthesis by extracting chlorophyll from leaves.

Procedure

Chop and press leaves finely until juice is produced
(alternative: dried leaves can be crushed into a powder)
Add 4 droppers-full of acetone to chopped leaves and leaf juice
(optional: filter out solids)
With filtered liquid or leaf mush in bottom of a cup, balance a pencil across top of cup.Tape a rectangular strip of filter paper to the pencil and let it hang into the cup, so that the end of the filter paper just barely touches the liquid
Observe, checking periodically for changes

Debriefing

Did your filter show evidence of chlorophyll? (Yes, if green)
Do animals have chlorophyll? (no)
Do all plants have chlorophyll? (Most do, but some parasitic plants do not. Carnivorous plants actually do have chlorophyll)
What does chlorophyll do for a plant? (Chlorophyll turns the energy of sunlight into chemical energy through photosynthesis.
What is photosynthesis? (In this process the energy absorbed by chlorophyll transforms carbon dioxide and water into carbohydrates (plant food!) and oxygen).



ANIMAL LIFE CYCLES

LESSON PLAN

Georgia QCC Objective 3.15a
Georgia Performance Standard:

S2L1. Students will investigate the life cycles of different living organisms.

a. Determine the sequence of the life cycle of common animals in your area: a mammal such as a cat or dog or classroom pet, a bird such as a chicken, an amphibian such as a frog, and an insect such as a butterfly.
b. Relate seasonal changes to observations of how a tree changes throughout a school year.
c. Investigate the life cycle of a plant by growing a plant from a seed and by recording changes over time.
d. Identify fungi (mushroom) as a living organism.

Materials in Kit

Mounted specimens showing stages of development (frog, fish, pig, butterfly, chicken)*
Mealworms, tadpoles, and/or caterpillars (catch or purchase)
Terrarium
Frog ball
Lab sheet

Bring Your Own . . .

Copy of lab sheet for each student;
Pencil for each student
Clipboard for each student
Coupon to be redeemed for live animals (submit approx. 2 weeks ahead of time)
Food for larvae

What will be accomplished (to be shared with students)

Students will observe, draw, and label stages of development for various animals, (including examples of complete metamorphosis, incomplete metamorphosis, and direct development).

Procedure

Play Frog Ball to review life cycle stages (Arrange the class in a circle, name an animal and toss the frog ball. The person who catches must say the name of that animal's first stage of development. Then s/he tosses to someone else, who must identify the animal's next stage of development and so forth. After "adulthood", next student chooses a new animal).

Position mounted specimens (and live specimens, if available) at several stations, so that small groups of students can rotate among them

Students will observe and draw specimens on student lab sheet

Debriefing

Discuss the changes students observed. Invite comments and sharing.
Ask the following questions:

What are some animals which undergo complete metamorphosis? ***Frogs, butterflies, ants, flies, mosquitoes, beetles, bees, flounder, lamprey***

What are some animals which undergo incomplete metamorphosis? ***Dragonflies, ladybugs, termites, grasshoppers, "true bugs" and other creatures which have a "nymph" stage and which molt***

What are some animals which undergo direct development? ***Cats, dogs, horses, pigs, chickens, reptiles, humans & others whose young look much like miniature adults***

* Plastimounts are available from Carolina Biological and other science supply houses.

ANIMAL LIFE CYCLES LAB SHEET

1) Observe, draw and label the stages of development of any creature which undergoes *incomplete metamorphosis* (animals which have a nymph stage and molt):

Name of Animal: _____

Stage: _____	Stage: _____	Stage: _____

2) Observe, draw and label the stages of development of any creature which undergoes *complete metamorphosis*

Name of Animal: _____

Stage: _____	Stage: _____	Stage: _____	Stage: _____

ANIMAL LIFE CYCLES LAB SHEET, Side 2

3) Observe, draw and label the stages of development of any creature which grows and matures through *direct development*.

Name of Animal: _____

Stage: _____	Stage: _____	Stage: _____

4) Observe, draw and label the stages of development of *any creature*. Identify the type of development.

Name of Animal:_____ Type of Development: _____

Stage: _____	Stage: _____	Stage: _____	Stage: _____	Stage: _____

5) Go back to each set of life cycle drawings and mark the stage where birth takes place with a *; mark the stage where reproduction (having babies) takes place with ^ ; and mark the last possible stage where death takes place with a #. Find the life span of each animal (how long it typically lives) from a field guide, and write it in the last block.

OWL PELLET DETECTIVES

Georgia QCC Objective 4.23
Georgia Performance Standard: 4th grade Life Science S4-L1
Students will describe roles of organisms and flow of energy within an ecosystem.
a. Identify the roles of producers, consumers, and decomposers in a community.
b. Demonstrate the flow of energy through a food web/food chain beginning with sunlight and including producers, consumers, and decomposers.
c. Predict how changes in the environment would affect a community (ecosystem) of organisms.
d. Predict effects on a population if some of the plants or animals are scarce or if there are too many.

Materials in Kit

- owl pellets (two students share one pellet.
- dissecting tools (bamboo skewers or tweezers / forceps)
- hand lens
- laminated charts for identification of bones of various prey animals
- dry erase marker for use with laminated charts
- hand sanitizer
- masks
- gloves

Bring your own…

- paper plate or white sheet of paper, per group of two
- metric ruler or tape measure, per group of two
- Mammals field guide, per group of two
- Water for clean-up and pellet softening

What will be accomplished (to be shared with students)

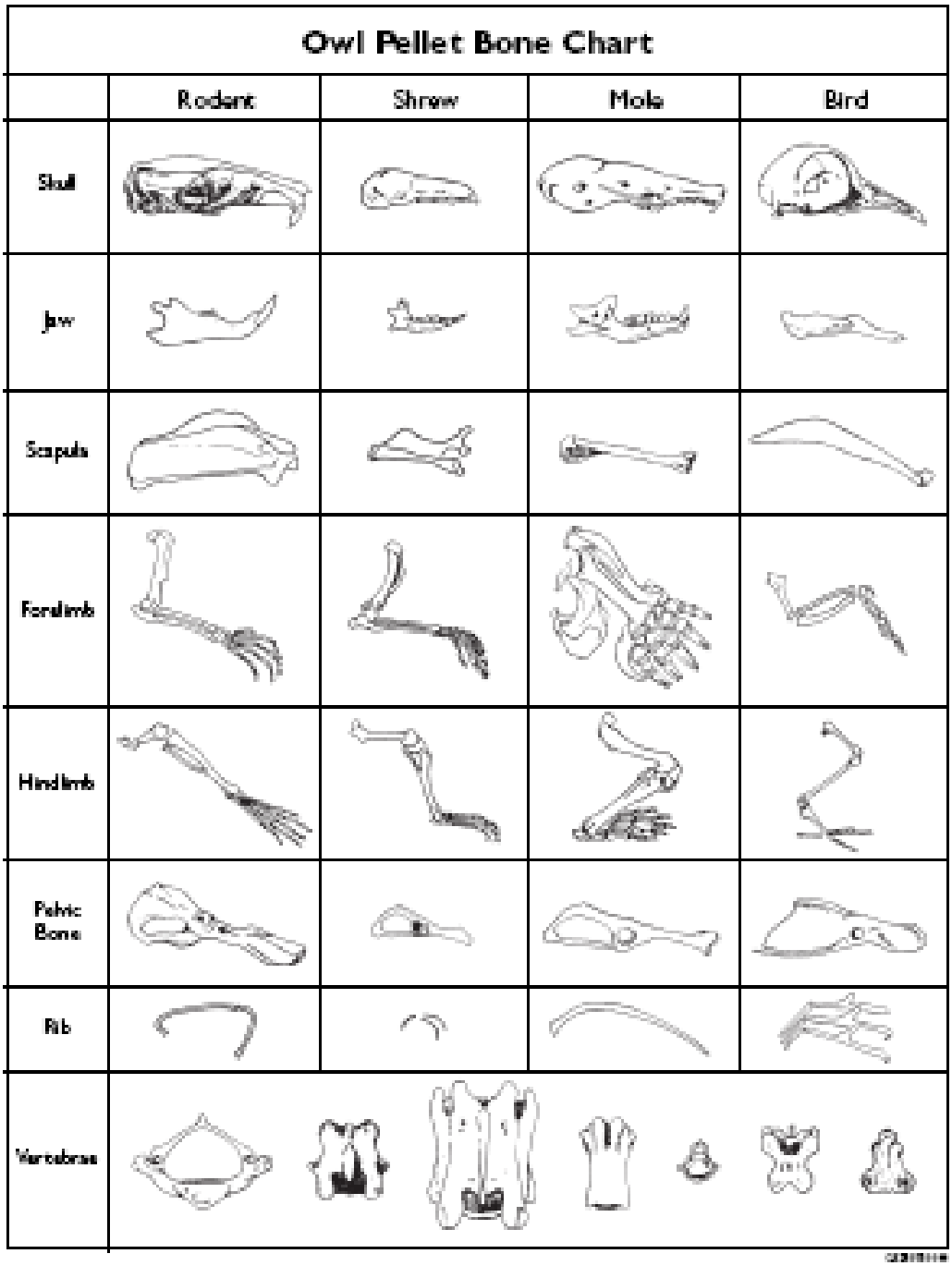
Students will dissect an owl pellet, identify the bones of the owl's prey, research the diet of those prey species using field guides, construct a simple food chain, infer the owl's role in the environment, and predict the impact of broken links in the food web.

Procedure

1. Order pellets in advance from vendor such as Carolina Biological or Flinn Scientific
2. Laminate bone charts (attached orhttp://www.carolina.com/manuals/manuals8/Owl_Pellet_Bone_Chart.pdf)
3. Play the Feeding Frenzy Game (http://www.glc.k12.ga.us/builderv03/LPTools/LPShared/attach-displayasp?attachID=79680)
4. To introduce the lesson, read **Tiger with Wings** or similar book to the class
5. Give each pair of students an owl pellet on a white paper plate.
6. Instruct students to break open the pellets (soaking may be necessary) and tease apart the contents, saving only the bones.
7. Have students match bones to the chart and identify prey which the owl has eaten.
8. Students will then look up what these prey animals eat, using a mammal field guide.

9. Instruct students to draw an owl food chain or web. Be sure to include the owl, its prey (as identified by bones), whatever each prey animal eats (from field guide), what *that* creature eats, and so forth, until a producer (green plant) and Sun are represented.

Debriefing To debrief the activity, discuss the following with students:
What is the owl's role in this food chain? *(consumer, predator, top of food chain, etc.)*
What important job does the owl have in helping to control the rodent population? *(predator)*
What would happen if there were no owls to eat the rodents*? (increase in rodent population)*
What would happen if there were no rodents for owls to eat? *(owls would adapt, leave or die)*
Help students draw conclusions and make inferences about the owl's niche in the food web



Carolina Biological Supply Company 2700 York Road, Burlington, North Carolina 27215

Water Quality Testing

Physical and Chemical Parameters

Materials

- Test kits: Nitrates, Phosphates, Temperature, pH, Dissolved Oxygen, Turbidity, Fecal coliform*
- Bucket for collecting water sample
- Vinyl gloves
- Hand sanitizer
- Stopwatches (3)
- Clipboards
- Lab sheets 1 and 2 (one copy per student)

Procedures

Step 1: Visual Survey

Make copies of Lab Report 1 for each student. Two days before the scheduled water quality testing, take the class to the monitoring site and conduct a visual survey, using Lab Report 1. Demonstrate safety procedures and allow students to practice the following protocols:

- ☐ use of vinyl gloves, safety goggles (needed when shaking capped sample), and rubber boots or waders;
- ☐ sample collection techniques, including holding container underwater without disturbing creek bottom, with opening facing upstream, and capping the container underwater.

Then demonstrate fecal coliform test, stressing importance of accurate measurement and time-keeping.

Step 2: Water Quality Testing – Physical and Chemical Parameters

Make copies of Lab Report 2 for each student. Place equipment needed for each test at a separate station. Divide the class into six groups. Begin each group a different station and rotate through the six stations to test for:

1. Nitrates,
2. Phosphates,
3. Temperature (at two locations),
4. pH,
5. Dissolved Oxygen (not Biological Oxygen Demand), and
6. Turbidity

Step 3: Assessment

A scoring rubric is provided, corresponding to Lab Report 2.

* We use the "GREEN Standard Water Monitoring Kit" with simple test tablets (no titration needed for DO test). color comparisons charts, and terrific interpretive info. It can be obtained from many science supply houses, including Earth Force (Phone: 703-299-9400 / Fax: 703-299-9485), for about $180.

Lab Report 2 for Physical & Chemical Water Quality Testing

(Short Version)

Name(s)_____

Stream Profile for:_____

(name of creek / sampling location)

Directions

1. Follow instruction cards to complete water quality tests; then record data in the first column.
2. Compare data collected to the range for the Conditions listed (Excellent, Good, Fair, Poor). In the Condition columns, circle the data range which best matches the data you collected.
3. Read the information about sources and effects of each type of pollutant.
4. Look back at the data for each factor. If any one factor is "fair" or "poor", you can conclude that the water is polluted. Answer the last three questions, based on the data you have collected and the information you have read.

Data Condition

		Excellent	Good	Fair	Poor
Temperature:					
Upstream:	_____				
Downstream:	_____				
Difference:	_____	0-2° diff	3-5° diff	6-10° diff	>10° diff
	Sources and Effects: Weather, lack of shade, and inflow cause temperature changes. Warmer water has lower oxygen levels.				
pH:	_____	7	6 or 8		4,5,9,10,11
	Sources and Effects: Fast-growing plants reduce CO_2 levels during photosynthesis, causing alkalinity (high pH); Acid rain causes acidity (low pH). Fish prefer neutral pH (7).				
Nitrate Level:	_____	0-1 ppm	2-4 ppm	5 ppm	20-40 ppm
	Sources and Effects: Decomposing plant and animal wastes & fertilizer run-off cause lots of algae growth, which depletes oxygen				
Phosphate Level:	_____	0-1 ppm	2 ppm	4 ppm	5 or > ppm
	Sources and Effects: Detergents act as nutrients or fertilizers for aquatic plants causing excess plant growth, which depletes oxygen				

Water Quality Lab Report 2, Page Two
Name: _____

	Data	Condition			
		Excellent	**Good**	**Fair**	**Poor**
Dissolved Oxygen:	_____	8 ppm	4ppm	2ppm	0ppm
% Saturated (see chart):	_____	91-110%	71-90%	51-70%	>50%
	Sources and Effects: Bacteria from sewage or rotting plants decrease DO in water; Fish need DO to breathe.				
Turbidity:	_____	0 jtu	1-40 jtu	41-100 jtu	>100 jtu
	Sources and Effects: Erosion, run-off, algae and disturbances cause turbidity, which makes water unclear.				
Fecal Coliform:	_____	Negative	Negative	Positive	Positive
	Sources and Effects: These digestive track bacteria indicate sewage or fecal matter in water.				

CONCLUSIONS

Overall water quality: Based on the test results, I think the overall condition of this water is _____ because _____.

The biggest problem with the water in this creek is**:** _____
which is caused by**:**_____**.**

One way to solve this problem would be: _____

_____

_____

_____

Scoring Rubric for
Physical and Chemical Water Quality Testing

Name: _____

Testing and Data Collection

	Data collected (5 pts)	Condition circled (5 pts)
Temperature	_____	_____
pH	_____	_____
Nitrate	_____	_____
Phosphate	_____	_____
Dissolved Oxygen	_____	_____
Turbidity	_____	_____
Fecal Coliform	_____	_____

	Points Earned		Points Possible
Subtotal, Data Collection	_____	**out of**	**70**

Conclusions about Water Quality based on Data

Overall water quality:	**Answered (5 pts)**	**Supported (5 pts)**
	_____	_____
Biggest problem:	**Identified (5 pts)**	**Explained (5 pts)**
	_____	_____
Solution:	**Answered in terms of prevention or treatment (10 pts)**	
	_____	

	Points Earned		Points Possible
Subtotal, Conclusions	_____	**out of**	**30**

	Points Earned		Points Possible
TOTAL SCORE:	_____	**out of**	**100**

Presenter Information Sheet
Outdoor Classroom Symposium – 2005

Frey Elementary School, Acworth, Cobb County
Friday, October 14, 2005

Georgia Green & Healthy Schools Steering Committee
(Trevor Williams, Kim Bailey, Susan Myers, Suki Janssen, Joe Krewer)

Names

Partnership of Organizations

Organization

Georgia DNR, Environmental Protection Division, Land Protection Branch, Atlanta Tradeport, Suite 104, 4244 International Parkway, Atlanta, GA 30354

Address

Phone: 404-362-2788 **Fax:** 404-362-2580

kim@eeingeorgia.org

E-mail

Introduction to "Georgia Green & Healthy Schools"

Topic / Title

Brief Description of Presentation:

Check out new tools to help teachers and students improve wildlife habitat, reduce runoff, compost waste, conserve water, etc. in outdoor classrooms. Earn recognition for your school's accomplishments too!

Afternoon Session – 45 minutes – (1:15 – 2:00)

A collaborative initiative to assist and support schools in understanding and practicing environmentally sound principles.

Who?

All public and private/independent schools in Georgia are invited to participate in the new "Georgia Green & Healthy Schools" program.

What?

To participate, schools choose to complete any or all of the following environmental self-assessments:

- Air
- Chemicals and Hazardous Materials
- Energy
- Integrated Pest Management
- School Grounds
- Waste Management
- Water

The self-assessments include components designed to assist students and teachers in conducting school-based investigations. After identifying any areas that could use improvement, students practice real life problem solving skills by making changes, collecting data, tracking progress, and sharing results. Schools earn awards for progress made.

How?

Please visit www.EEinGeorgia.org/gghs to learn how to get started!

Benefits for Schools:

1) Academic Achievement

Provide a meaningful real world context for engaging students in mastering state curriculum standards and improving academic achievement.

2) Healthy School Environments

Create and maintain healthy school environments for successful teaching and learning.

3) Environmental Protection

Conserve valuable natural resources by implementing environmentally sound practices.

4) Economic Savings

Save funds by improving school resource efficiency and recognizing opportunities for cost avoidances.

5) Community Involvement

Increase community involvement and opportunities for academic service learning.

6) Recognition

Earn awards and recognition for current accomplishments and improvements made through each step of the program.

Georgia Green & Healthy Schools

A collaborative initiative involving the following agencies, organizations and programs:

Local Partners

Athens-Clarke County Solid Waste Department, Recycling Division

Davidson-Arabia Mountain Nature Preserve (DeKalb County Parks and Recreation)

Evergreen School Network
(City of Alpharetta, City of Roswell, and Keep Sandy Springs-North Fulton Beautiful)

Gwinnett Clean & Beautiful

Keep Athens-Clarke County Beautiful

Keep Forsyth County Beautiful

State and National Partners

EEinGeorgia.org – The Online Guide to Environmental Education in Georgia

Environmental Education Alliance of Georgia

Georgia Adopt-A-Stream

Georgia Conservancy

Georgia Department of Community Affairs, Keep Georgia Beautiful Program

Georgia Department of Community Affairs, Environmental Assistance Program

Georgia Department of Human Resources, Division of Public Health

Georgia Department of Natural Resources, Pollution Prevention Assistance Division

Georgia Department of Natural Resources, Environmental Protection Division
(Air Protection, Hazardous Waste Management, Land Protection, and Watershed Protection Branches)

Georgia EIC - Using the Environment as the Integrating Context (EIC) for Improving Student Learning

Georgia Learn and Serve

Georgia Parent Teacher Association (PTA)

Georgia Project WET (Water Education for Teachers)

Georgia Recycling Coalition

Georgia Science Teachers Association

Georgia Wildlife Federation

National Wildlife Federation

Southface Energy Institute

The Clean Air Campaign

University of Georgia Department of Environmental Health Science

US Environmental Protection Agency, Southeast Region Office of Children's Health Protection

This initiative is modeled after the "Wisconsin Green and Healthy Schools" program developed by the Wisconsin Department of Natural Resources and Wisconsin Department of Public Instruction and "The Green Flag Program" coordinated by the Center for Health Environment and Justice. It is also designed to complement US EPA's new "Healthy School Environment Assessment Tools" for school district facilities managers.

Please visit www.EEinGeorgia.org/gghs to learn more.

Presenter Information Sheet
Outdoor Classroom Symposium – 2005

Frey Elementary School, Acworth, Cobb County
Friday, October 14, 2005

Petey Giroux

Name

Georgia Project WET

Organization

4220 International Parkway, suite 101, Atlanta, GA 30354

Address

Phone: 404 675-1638

Petey_Giroux@dnr.state.ga.us

E-mail

Teach OUT THERE??

Topic / Title

Brief Description of Presentation:

Yes, you can AND you can make every activity more meaningful and engaging. Learn a few simple outdoor classroom management skills and techniques to help you feel more in control and confident in the outdoor classroom

Afternoon Session – 45 minutes - (1:15 – 2:00)

The *Point and Name* Disease

DO YOU HAVE IT? CHANCES ARE, IF YOU DON'T, YOU KNOW SOMEONE WHO DOES, FOR THE DISEASE IS AT EPIDEMIC NUMBERS AND SPREADING! It has found its way across southeastern school campuses and into the hearts and minds of parents and teachers everywhere; it is quite debilitating, keeping teachers in for days on end.

The disease preys on the brain and affects psychomotor movement. The dreaded student question, "What is the name of that flower, tree or insect?" seems to ignite the fever. Another symptom is the desire to LABEL everything in the outdoor learning area creating a museum/botanical garden, NOT an environmental education discovery area. Labels are often visually intrusive in a natural area and are Red Flags for vandals. Labels, quite frankly, impede environmental education and are the mistaken antidote for the *Point and Name Disease.* If you must have labels to get well, then create a map, a diagram, or a discovery path notebook that can be kept in a media center for reference. Let your students create it and do the research. You can sink a small section of PVC pipe, fill with concrete and number it for a vandal-proof label if you must.

If you really want to get well, BELIEVE that you, as the teacher, are not responsible for knowing the names of all the plants and animals in the natural world. Also BELIEVE that the name is not the most important thing to know about a tree, for example. Much more important are things like how the tree works, how it cleans the air, is a habitat for wildlife, gives oxygen, how its bark feels, the shape and texture of its leaves, etc. The student in exploring these things forms a long lasting relationship with the plant. My fourth grade teacher assigned me a report on a tree with no name. I had to find out everything I could about this tree and then make up my own name for it. I called it the "Dancing Giraffe Tree". To this day I am prone to dash across creek beds or stop my car and run to the Sycamore Tree that needs a hug.

Students will learn and remember if they touch, smell, see and hear. Feeling the hairy underside of a leaf, touching the rough bark of the pine, counting the needles in a bundle, are marvelous lessons to knowing a plant. Keeping a Discovery Journal, drawing and writing about discoveries further impacts the learning. Seeing a tree labeled stops the learning process and is quickly forgotten. If a student wants to know the name, they can research it in a field guide. Learning to use field guides is an important lesson in itself. Media centers can provide field guide sets for outdoor discoveries. If a student has taken the time to learn through sensory exploration, the student will truly know the plant and be able to recognize it anywhere. If a student has looked at a labeled plant, they may not be able to recognize this plant again in its varied forms. With summer here and fall around the corner, you don't want to be laid up in the classroom. There has been a breakthrough and medicine is available! It's fun and easy and comes in inexpensive capsules of environmental education teacher training.

Petey Giroux – State Coordinator – Georgia Project WET – Petey_Giroux@dnr.state.ga.us

Georgia Department of Natural Resources/EPD/ Nonpoint Source Program

ORGANIZATION, PREPARATION, AND SAFETY IN OUTDOOR LEARNING

Outdoor Classroom Symposium 2005
Petey Giroux – Petey_Giroux@dnr.state.ga.us

Clipboards:

Clipboards are your desks outdoors. Get a classroom set of clipboards and have them ready to go. Put the papers you will need in them ahead of time, crate them, and attach a pencil. Older students can be responsible for taking the clipboards to the outdoor learning areas and keeping them organized (checking pencils, etc.).

Nature Journals:

Have your students make a Nature Journal with a created cover that relates to their natural world and a way to add pages. Have a hole punch handy so students can keep their Nature Notebooks/Journals up to date.

Sensory Exercises:

Use sensory exercises to quiet your students prior to beginning an outdoor lesson. For example, listen and share: Circle. Ask students to listen for at least 2 sounds. Everyone shares the sound they heard but no one can repeat exactly what another student says. If one student says, "I heard a bird singing", the next student who also heard a bird will have to say it differently such as, "I heard a bird that sounds like this ..." This exercise helps sharpen the students' skills of listening to each other.

Leading:

You are the leader. You need to make this clear to your students. This is important for outdoor learning safety. If your students crowd you and get ahead of you, you can't stop the group when you need to explain or point out something. If you are on your school discovery path, and there is a rabbit or something on the trail that you want everyone to see, you can stop the group and sign for them to be quiet. If you have classroom trail guide parent helpers, position them at the back of the line for support.

Parent Helpers:

Some schools have assigned Outdoor Classroom Parents to each classroom. These parents help with all the outdoor learning and classroom field trips and provide support when students are outdoors.

Trail

Keep students on the trail unless you are doing an activity that requires field work in a certain area that you have chosen. Make sure students know where they can and can't be during an activity. Field cones are an easy way to mark off boundaries for field work and can be set up prior to the activity.

Sitting on the ground:

Students worried about sitting on the ground, and there are some students who feel very uncomfortable, can learn to be more comfortable by carrying a folded trash bag cut out square. It is light and can be easily folded and returned to backpack or pocket. This is also good when the ground is damp early in the morning.

Dress:

Dress is important. Encourage students to be prepared for outdoor learning which includes proper clothes, shoes, rain gear, jackets, etc. You can lead by example. Keep an extra pair of outdoor shoes at school for outdoor exploration. Collect the clothes needed for the outdoors from unclaimed Lost and Found for students who come "dress" unprepared. Teach students the importance of layering clothes so they can remove a layer when they get too warm or add a layer when the weather is cool.

Role Model:

You are the role model! If you are enthusiastic about being outdoors and making discoveries, demonstrate respect for life, enjoy a walk in the rain, your students will do the same. But if you are annoyed by insects, fearful, and uncomfortable outdoors, your students will be annoyed, fearful, and uncomfortable. Be a role model for students and teachers. Sometimes you find that you are the teacher who feels comfortable outdoors and if you have learned some techniques that work you can share those with other teachers who are fearful or need some encouragement.

You can also role model respect for the site and leave it like you found it. Be careful when you collect and show care when looking at animal. Encourage releasing study items back to the environment.

Desk Outdoors:

Your backpack is an important tool. You can carry a first aid pack, magnifying lenses, blindfolds, lesson props, field guides, wipes, puppets, bones, insect cases, seeds etc. Get a crow or owl call whistle from a sporting goods store to use as a signal for gathering or ending an activity. Your vest or pockets are also valuable desk drawers that you can fill with teaching tools.

Ticks, Chiggers and Mosquitoes:

Ticks

Ticks are parasites, relatives to spiders, and they have a movable head with a 2 pronged back which they use to suck blood. They crawl up chosen bodies to a soft spot, then bite. A tick engorges with blood and looks like a large gray berry, then finally drops off. They like high grassy areas. Some ticks carry diseases such as Rocky Mountain Spotted Fever (wood ticks) and Lyme Disease (deer ticks). The odds, according to Todd Ballantine, are about 100 to 1 against catching a disease from a tick bite. Have students check their waste, armpits, head/scalp after hiking in the spring, summer or early fall. If you discover a tick with its head imbedded in the skin, drop rubbing alcohol on its rear end, wait a minute, then pull and twist the tick out with tweezers. Lately I have heard that you can scrap the tick out by going the same direction as the tick and pushing a credit card underneath the body until it dislodges. Sometimes wearing pants with socks pulled over the pant legs helps.

Chiggers

Chiggers or red bugs are mites and are also relatives to spiders. They are nearly microscopic and can be found in pine straw, leaves and tree bark. Red bugs that chew on humans are larvae, not adults, and they like to climb to places where clothes are tight and body heat is high. Showering or wiping skin with soap and water is always a good idea after hiking. You can treat chigger bites with "Chigger Rid," a liquid medication containing collodion, camphor, phenol, and oil of eucalyptus.

Mosquitoes

West Nile Virus (WNV) is a potentially serious illness according to the CDC. WNV is a seasonal epidemic in North America that flares up in the summer and fall. It comes from mosquitoes that have been infected by biting infected birds. Mosquitoes are most active at dusk and dawn and therefore precautions can be taken during those times by applying an insect repellent with an EPA registered active ingredient (children under 2 should not wear Deet) and by wearing protective clothes – long sleeves and pants. Good screens on windows make a difference and emptying standing water in pots, buckets and barrels. An outdoor school program during the day should not be a high traffic mosquito time. Parents should be consulted before mosquito repellent is used.

Eastern equine encephalitis (EEE) is a mosquito-borne viral disease that has a high fatality rate among humans. It is regarded as one of the more serious mosquito-borne diseases in the United States. Symptoms include high fever, stiff neck, headache, and lack of energy. The virus is carried by birds that live in natural wetlands, and it is usually found only in birds and mosquitoes that do not bite people. However, in years when the virus infects large number of birds, it may infect other species of mosquitoes that do bite horses and people.

- Symptoms range from mild flu-like illness to encephalitis (inflammation of the brain), coma and death
- The EEE case fatality rate (the % of persons who develop the disease who will die) is 35%, making it one of the most pathogenic mosquito-borne diseases in the US
- It is estimated that 35% of people who survive EEE will have mild to severe neurologic deficits

INCIDENCE: How many and where have human disease cases occurred?

- 200 confirmed cases in the US 1964-present
- Average of 4 cases/year, with a range from 0-14 cases
- States with largest number of cases are Florida, Georgia, Massachusetts, and New Jersey.
- The enzootic (animal-based) transmission cycle is most common to coastal areas and freshwater swamps.

- Human cases occur relatively infrequently, largely because the primary transmission cycle takes place in swamp areas where populations tend to be limited.

Poison Ivy:

Leaves of three, let 'em be! Poison ivy is a common plant and contact with skin can produce an annoying, itchy rash. The plant tissues are loaded with "urushiol," a poisonous oil similar to carbolic acid, irritating to the skin. The oil can be brushed on the skin from other folks clothes, or from dogs and cats. Teach students to recognize this plant and avoid touching it. Urushiol takes about 3 hours to get going so washing with soap and water will help. A cloth soaked in apple cider vinegar will help on blisters that have been opened. The vinegar dries up the itch in hours. Poison ivy does produce food for birds and deer. Animals aren't allergic.

Animals;

Establish the rule to observe. Don't touch. Any animal can bite and might bite if it feels threatened. If you see a snake, observe and stay at a safe distance. The snake will make every effort to get out of your way. Chances are the snake will be nonpoisonous but we do have copperheads in our area. Teach students to recognize them. Know which students are allergic to bee stings and make sure they have their medication. You can carry benadryl in your backpack.

Marketing and Public Relations;

Find ways to let others know what kind of learning and excitement is going on in your outdoor classroom. Newsletters, videos, morning news reports, bird counts, animal sitings, classroom projects, gardening news all help provide support for the outdoor classroom and learning. Invite the press to cover your outdoor classroom projects.

Resources;

Parent Teacher Associations can provide a budget and support to add environmental education curriculum for teachers in the Media Center and have classroom sets of field guides available for student outdoor investigations. PTAs can also provide funding for teacher and PTA training for the Outdoor Classroom. Many resources are available in Georgia. Go to our Georgia EE Clearing House website to learn more at EEinGEORGIA.org

Presenter Information Sheet
Outdoor Classroom Symposium – 2005

Frey Elementary School, Acworth, Cobb County
Friday, October 14, 2005

Dr. Duane Jackson

Name

Morehouse College | Associate Professor of Psychology

Organization | **Title**

Department of Psychology, Morehouse College, 830 Westview Dr, Atlanta GA 30314

Address

Phone: 404-681-2800 Ext. 2284

djackson@morehouse.edu

E-mail

Bug Bonanza

Topic / Title

Brief Description of Presentation:

Explore the exciting lives of our local insects. Receive a variety of activities that utilize insects in and out of the classroom.

Afternoon Session – 45 minutes – (1:15 – 2:00)

Activity not submitted.
Please contact this presenter for their handouts.

Afternoon Concurrent Sessions
1:15 – 3:00 (Long Sessions)

- Celebrate Reptiles in Your Outdoor Classroom – Mark Patterson and Brian Sterner – **Activity not submitted. Please contact this presenter for their handouts.**
- Out on a Limb: Identifying Trees in the Schoolyard – Eloise Carter
- Tree Planting for Habitat Benefit – Joe Burgess
- Salute to Salamanders – Mary Terry – **Activity not submitted. Please contact this presenter for their handouts.**
- Schoolyard Wetlands: Learn HOW with POW – The Planning of Wetlands – Karleen Vollherbst
- Worms in My Kitchen – Trecia Neal – **Activity not submitted. Please contact this presenter for their handouts.**

Presenter Information Sheet
Outdoor Classroom Symposium – 2005

Frey Elementary School, Acworth, Cobb County
Friday, October 14, 2005

Dr. Mark Patterson and Brian Sterner

Names

Gwinnett County Parks and Recreation

Organization **Title**

Address

Phone:

Mark.patterson@gwinnettcounty.com; brian.sterner@gwinnettcounty.com

E-mail

Celebrate Reptiles in Your Outdoor Classroom

Topic / Title

Brief Description of Presentation:

Learn the common reptiles of Georgia and explore ways to integrate reptiles into your classroom curriculum.

Afternoon Session – 90 minutes – (1:15 – 3:00)

Activity not submitted.
Please contact this presenter for their handouts.

Presenter Information Sheet
Outdoor Classroom Symposium – 2005

Frey Elementary School, Acworth, Cobb County
Friday, October 14, 2005

Eloise Carter

Name

Oxford Institute for Environmental Education, Oxford College — Professor of Biology

Organization — **Title**

Oxford College, 100 Hamill St., Oxford, GA 30054

Address

Phone: 770-784-8343 **Fax:** 770-784-8423

ecarter@emory.edu

E-mail

Out on a Limb: Identifying Trees in the Schoolyard

Topic / Title

Brief Description of Presentation

Using an investigative approach, participants will discover characteristics of trees, develop a simple key, and use the key to discover the diversity of woody plants in the schoolyard.

Afternoon Session – 90 minutes - (1:15 – 3:00)

Out on A Limb: Discovering Twigs (or Leaves)

M. Eloise Brown Carter
Oxford Institute for Environmental Education
Oxford College

Introduction

Identification of trees and shrubs usually begins with a lesson on the parts of a twig. After all don't students have to have some labels to use to describe the twigs and to follow even a simple key? The simplest way to teach this could be to give each student a twig and a diagram that's labeled. Then they can find the parts. Or you could live dangerously and let the students discover the parts of the twig by their own ability to carefully observe the interesting parts of twigs. The labels can come later. Try this exercise. The directions are written for twigs, but you could use plants with leaves. It's hard to know what to do with trees once the leaves are off, so this can be used in the late fall and winter!

Procedure

1. Each pair of students (or in a small class each student) selects a tree from the schoolyard and either cuts or is given a twig from the tree. (About 4-6 inches of twig should do.) Students may want to sketch the tree, photograph the tree, or describe the tree. Definitely do not tell them the name of the tree.
2. Students are given hand lenses and asked to carefully draw every feature of the twig. They should be encouraged to do what I call "close observation" (or what language arts teachers might call "close reading") of the twig. Is everything in their drawing? No need to criticize a drawing, the point is to observe closely and make "notes" through drawing as an aid to investigation and discovery. They can even share their drawing with another group and check to see how well they have done.
3. In a small class of students or with older students, they can actually draw their twigs on the board or post them for others to see.
4. Ask some students to describe their twig. They don't have to have the correct terms, just all the structures they will need to use in identifying their tree. Guide them to better observations and descriptions if they are not yet "seeing" all there is to see. Have faith, young eyes with a desire to discover, will actually see all the parts, recognize they are interesting or different and have creative ways and words to describe them.
5. Now that they actually see all the parts, you can share the labeled diagram with botanical terminology. Depending on the grade level this can be a little or a lot.

Students will remember the parts of the twig, and they will be able to locate structures on twigs. They will be much better observers of trees, leaves and twigs, and in general they will begin to see a part of the world that has been un-seeable to them until now. You are now ready to explore how to know the trees and shrubs.

Presenter Information Sheet
Outdoor Classroom Symposium – 2005

Frey Elementary School, Acworth, Cobb County
Friday, October 14, 2005

Joe Burgess

Name

Georgia Forestry Commission | Forester

Organization | **Title**

678 South Cobb Drive Suite 100, Marietta, GA 30060

Address

Phone: 770 528-3195

jburgess@gfc.state.ga.us

E-mail

Tree Planting for Habitat Benefit

Topic / Title

Brief Description of Presentation:

Trees are essential for wildlife habitat. Learn how to care for and plant trees correctly so that they will bring long lasting success to your outdoor classroom.

Afternoon Session – 90 minutes - (1:15 – 3:00)

“Tree Needs” Chart

SEED

WATER

SOIL

SUN

AIR

SPACE

Tree Chain Game

GRADE LEVEL: Grades 2-5
This game works best with 18-30 kids. A group that divides evenly by six is ideal**.**

OBJECTIVE: Students will be able be able to identify factors that are necessary for seed germination and plant growth.

TIME FRAME: About 15-20 minutes (longer with additional rounds of play).

MATERIAL NEEDS: Need an open area with space for game play.

- Index cards for making "Tree Needs" cards. (Make one card per student. With 18 children you would need 3 seed cards, 3 water cards, 3 soil cards, 3 sun cards, 3 air cards and 3 space cards.) If the group size does not divide evenly by six, make additional "tree needs" cards to hand out, starting from the top of the "Tree Needs Chart.")

Tree Need **SEED**	Tree Need **WATER**	Tree Need **SOIL**	Tree Need **SUN**	Tree Need **AIR**	Tree Need **SPACE**

- "Tree Needs Chart" showing in what order "Tree Needs" must be collected.

BACKGROUND:
A tree is a living organism. Like any living thing, a tree has certain needs that are essential for it to grow and thrive. Some trees can reproduce from cuttings, but most trees start from a seed. Starting as a seed, a tree requires water, soil, sun, air (carbon dioxide), and space to grow.

A **seed** can be described as a baby plant in a box with its lunch. A seed coat houses and protects the seed. There is enough food stored within the seed to feed and sustain the young plant as it begins to grow and until it develops leaves and can start to produce its own food through the process of photosynthesis. Sometimes seeds need a period of dormancy over the winter before they will germinate.

Water is an essential ingredient for life. Often water is required to soften the seed coat so the tiny plant inside can germinate. Water is a vital part of a tree's basic structure and is one of the main components of photosynthesis. It also transports nutrients from the soil to the tree roots.

Soil sustains and supports the tree. The soil holds the water and contains essential nutrients the tree needs to grow. Tree roots spread out in the soil, sucking up water and pulling in the nutrients. There are many different soil types, each capable of supporting different kinds of trees.

Trees, like all green plants, get their energy from the **sun.** It is the catalyst for the process of photosynthesis. Each of the tree's leaves is like a tiny factory - taking in sunlight and air (carbon dioxide) and mixing them with water and food from the tree's roots. When this happens, the leaves make a sugar-like food that feeds the tree**.**

Trees need **space** to grow. Without enough space, trees may have to compete with other plants for light, soil nutrients, and water.

DIRECTIONS:
Ask students what factors are needed for a tree to grow. (Answers will vary.) As students respond, elaborate briefly on the function of each "tree need" mentioned and direct discussion so all factors (seed, water, soil, sun, air and space) are reviewed.

Tell students that they are going to play a game where they have to collect all the things a tree seed needs to grow. Starting with a seed, they must collect water, soil, sun, air and space. Students must collect all these "tree needs" AND THEY MUST COLLECT THEM IN ORDER. (For example - a seed must first get water, then soil, then sun, then air, then space...in that order.)

Put up the "Tree Needs Chart" to help students remember in what order they need to collect the "tree needs".

Tell students that they will each be handed a card. Each student should look at his/her own card, but not let anyone else see what "tree need" is on that card. Hold cards face down and pass out one card to each student, distributing an equal number of the different "tree needs." (If the group size does not divide evenly by six, select additional "tree needs" cards to hand out, starting with requirements from the top of the "Tree Needs Chart.")

Students hold cards face down so no one can see what is on the card. Have the students make two lines facing each other across the room or across a field. Ask the students holding the seed cards to come stand in the middle between the two lines then give instructions to all the students.
Explain to the students that, at a given signal, each student holding a seed card must run to one line and may ask only ONE student in that line to show them his or her card. If the selected student is not holding a water card, the student with the seed card must run to the opposite line to ask someone there if they have a water card. If the selected student is holding a water card, the two students link arms and run together to the opposite line to try to find someone with a soil card, the next needed component for a tree to grow. Game continues with students going back and forth, adding "tree needs" to the tree chain in the order listed on the "Tree Needs Chart", until a chain of all six of the needed components has been made.
Winner is the team of six that completes the tree chain first.

Presenter Information Sheet
Outdoor Classroom Symposium – 2005

Frey Elementary School, Acworth, Cobb County
Friday, October 14, 2005

Mary Terry

Name

Davidson-Arabia

Organization

4158 Klondike Rd, Lithonia, GA 30038

Address

Phone: 770-484-3060 **Fax:** 770-484-3059

mjterry@co.dekalb.ga.us

E-mail

Salute to Salamanders

Topic / Title

Brief Description of Presentation:

Explore the terrestrial and aquatic world of salamanders and other amphibians in this informative, interactive celebration.

Afternoon Session – 90 minutes - (1:15 – 3:00)

Activity not submitted.
Please contact this presenter for their handouts.

Presenter Information Sheet
Outdoor Classroom Symposium – 2005

Frey Elementary School, Acworth, Cobb County
Friday, October 14, 2005

Karleen Vollherbst

Name

Environmental Concern, Inc. Wetlands Educator

Organization **Title**

PO Box P, Saint Michaels, MD 21663

Address

Phone: 410-745-9620

teachwetlands@wetland.org

E-mail

Schoolyard Wetlands: Learn HOW with POW – The Planning of Wetlands

Topic / Title

Brief Description of Presentation:

Wetlands are powerful places in which to learn. So why not build one with your students? Come learn the "how to's" of schoolyard wetland construction with the M.A.R.S.H. Project featuring some activities from *The Planning of Wetlands* Curriculum Guide.

WOW! The Wonders of Wetlands Curriculum Guides will be offered for sale at a special conference rate of only $15 (regularly $17 plus $6 S&H). Cash, check, Visa, and MasterCard will be accepted.

Afternoon Session – 90 minutes – (1:15 – 3:00)

Making Choices, Setting Goals
From POW! The Planning of Wetlands

SUMMARY
Wetland functions will be selected for incorporation in the planned wetland design. Goals for the wetland project will be established.

OBJECTIVES
Students will compare wetland functions and values, and select those to be incorporated in the planned wetland. Students will formulate goals for the project as they model decision-making skills.

MATERIALS
• Copies of *Choices* Student Page
• Overhead transparencies of *Group Choices* (optional)
• Overhead projector (optional)
• Copies of *Wetland Goals* Student Page

MAKING CONNECTIONS
Not all wetland functions are compatible, nor are all goals financially attainable. As with most decisions in our lives, choices must be made. Students have an opportunity to promote their personal interests in the planned wetland, as group goals are set for the wetland design.

BACKGROUND
Read Chapter 1, especially *Wetland Functions and Values* (pages 21-24). A wetland function is a task performed by a wetland regardless of how society values that task. The structure of a wetland determines which functions it can perform. If the wetland is to function as fish habitat, then it must be deep enough for the species of fish desired. If the wetland is to function as frog habitat, it needs gently sloping sides for young frogs to climb out. A wetland's value is subjective; it is the worth society places on the attributes of the wetland and may change over time. For instance, one wetland function is to provide a nursery for many creatures. Society sees this as valuable if the creatures are fish, frogs, and birds—but NOT valuable if biting insects like mosquitoes breed there.
One choice that must be made is whether the planned wetland will be created from a non-wetland area, or an existing wetland will be enhanced, or an area that was previously a wetland will be restored to wetland status. Created wetlands result from modification of a site where wetlands do not currently exist and where wetlands did not previously exist. Beavers create wetlands by flooding areas that were previously dry. At schoolyard sites, conditions can be created that cause a wetland to exist. This generally means providing water to a planned wetland site and ensuring that sufficient water will remain at the site to provide wetland conditions, as well as any other conditions needed to support the wetland community. This can be accomplished through several means, but generally includes excavation to lower the ground elevation and construction of an earthen dike or berm to impound water. Sometimes a liner of plastic or clay is needed. It is important to understand that just digging a hole does not create a wetland. Wetland restoration means

changing an altered wetland from its present impacted condition back to that of a functioning wetland. Restoration projects can be classified as hydrologic or biological. Hydrologic restoration usually involves removing barriers that block water flow to a site (as in some tidal wetland areas), or plugging tile drains or drainage ditches to restore preexisting water regimes (as in the Prairie Pothole Region of the Midwest and the swamp areas of the Eastern Coastal Plain). Although biological restoration generally means reestablishing wetland plant species along with hydrologic restoration, in some cases restoring the biological portion of a system may be all that is needed. Some marginal agricultural lands, which were at one time wetlands, have been successfully replanted with wetland tree saplings in an effort to increase the acreage of bottomland hardwood forests in the South. Wetland enhancement generally is a process by which some wetland functions are improved as part of an overall management plan. In the process, other wetland functions may be minimized. Wetlands may be enhanced by creating habitat for rare or endangered species through construction, placement, and maintenance of nesting structures. This may, however, cause a decline in other wetland species through predation or competition. A site dominated by invasive or alien plant species might be replanted with a variety of more desirable native species that support native wildlife. Wetland water levels are often managed (some seasons high, some seasons low) to support a variety of waterfowl in wildlife management areas. After choosing the type of planned wetland and identifying a potential wetland site, appropriate specific goals for the project should be set. For example, if the site chosen is a low area in the topography with predominantly silt/clay soil and water present only during the spring, then a goal of providing habitat for frogs, turtles, butterflies, and birds would be appropriate, but fish habitat would not be possible.

PROCEDURE

Warm-Up

A function is a job that is performed or a role that is filled. A value is the degree of importance (either positive or negative) that is associated with a function. Discuss the difference between a function and a value. Provide an example (such as the function and value of butterflies or cows) then have students suggest some wetland functions. As students offer suggestions, list them on the board.

Activity

Grades K-4

Using an overhead projector, do the following activity as a class. As an alternative, have students in higher grades interview younger students about what they want the wetland to accomplish.

Grades 5-12

1. Each student should consider the list provided on the *Choices* Student Page, placing a check under **My Choice** for eight wetland functions that they would like the planned wetland to perform. Add any that do not appear on the list. Do not limit possibilities even if some seem contradictory; this can be sorted out later.
2. Consult other teachers and other students, the administration, those in charge of maintenance, the parent-teacher organization, local garden clubs, etc. Listen to concerns

as well as desires. If the school administration says "no open water," make sure that appears on the list even if it is a negative characteristic.

3. Within small groups, discuss the appropriateness of each function, their importance, and their compatibility. Within each group select up to eight functions desired for the planned wetland. Mark these choices on the *Choices* Student Page under **Group Choice**.

4. Report back to the larger class each group's goals for the planned wetland. Compare lists by writing them on the board, on an overhead transparency of *Group Choices*, or on large (poster-size) sheets of paper that can be temporarily posted along a wall. Which goals are on most lists? Which are on only one? Why? Which items are too expensive? Consider postponing them until a later date when more funds may be available. Which items are inconsistent with the amount and timing of water available within the planned wetland? These must be eliminated unless an additional supply of water is available.

5. As a class, select a final list of wetland functions that are consistent with the water supply, administrative parameters, and available funds. Mark these in the column **Class Choice** on the *Choices* Student Page.

Wrap-Up

Will you be creating, restoring, or enhancing a wetland? Record the type of planned wetland to be designed on the *Wetland Goals* Student Page. Using information from **Figure 8.2** and the NWI maps, determine the type of wetland to be designed. Record this on the *Wetland Goals* Student Page. Circle the water sources available and the potential water losses on *Wetland Goals*. Now record the wetland functions and any special characteristics selected by the class as goals. Keep these goals in mind as the planned wetland is designed. If unsure how to attain each goal, then individuals or small groups should investigate and report back to the class.

Assessment

Did each student participate in the decision-making process? Are the wetland goals compatible? Is the wetland project reasonable in view of the muscle power and financial resources available?

E**XTENSIONS**

Visit a nearby planned wetland, such as a stormwater runoff pond, and identify the functions of that wetland. This can also be accomplished with pictures or videos of wetlands.

RESOURCES

Mitsch, W.J. and J.G. Gosselink. 1986. *Wetlands.* Van Nostrand Reinhold Co., New York, NY.

Salvesen, David. 1990. *Wetlands; Mitigating and Regulating Development Impacts*. LI–the Urban Land Institute, Washington, DC.

Sather, J.H. and R.D. Smith. 1984. *An Overview of Major Wetland Functions and Values.* U.S. Fish and Wildlife Service, Washington, DC.

Smith, R.D., A. Ammann, C. Bartoldus, and M.M. Brinson. 1995. *An Approach for Assessing Wetland Functions Using Hydrogeomorphic Classification, Reference Wetlands, and Functional Indices.* Technical Report WRP-DE-9. U.S. Army Corps of Engineers, Vicksburg, MS.

Tiner, R.W., Jr. 1984. *Wetlands of the United States: Current Status and Recent Trends.* U.S. Fish and Wildlife Service, National Wetlands Inventory, Springfield, VA (#PB90-198201).

STUDENT PAGE

CHOICES

In the first column, place a check mark next to the functions and values that are important to you as an individual. After discussion, list the group choices. Record class choices when they are made.

	My Choice	Group Choice	Class Choice
WETLAND FUNCTIONS:			
Shoreline erosion control	____	____	____
Sediment stabilization	____	____	____
Water quality	____	____	____
Pollution abatement	____	____	____
Physical filter of impurities	____	____	____
Flood water storage	____	____	____
Groundwater recharge	____	____	____
Mammal habitat	____	____	____
Bird habitat	____	____	____
Reptile habitat (turtles)	____	____	____
Amphibian habitat (frogs)	____	____	____
Fish habitat	____	____	____
Butterfly habitat	____	____	____
Aquaculture (fish, crayfish, clams)	____	____	____
Food production (rice, cranberries)	____	____	____
Aesthetics (beauty)	____	____	____
Active recreation (fishing, ice skating)	____	____	____
Passive recreation (relaxation, bird watching)	____	____	____
Open space buffer	____	____	____
Educational activities	____	____	____
Research	____	____	____
_____	____	____	____
_____	____	____	____
_____	____	____	____
_____	____	____	____
_____	____	____	____
_____	____	____	____
_____	____	____	____
_____	____	____	____
_____	____	____	____

STUDENT PAGE

GROUP CHOICES

After listing choices for each group, circle or highlight the functions selected by the class.

GROUPS

Wetland Functions:	**1**	**2**	**3**	**4**	**5**	**6**
Shoreline erosion control	__	__	__	__	__	__
Sediment stabilization	__	__	__	__	__	__
Water quality	__	__	__	__	__	__
Pollution abatement	__	__	__	__	__	__
Physical filter of impurities	__	__	__	__	__	__
Flood water storage	__	__	__	__	__	__
Groundwater recharge	__	__	__	__	__	__
Mammal habitat	__	__	__	__	__	__
Bird habitat	__	__	__	__	__	__
Reptile habitat	__	__	__	__	__	__
Amphibian habitat	__	__	__	__	__	__
Fish habitat	__	__	__	__	__	__
Butterfly habitat	__	__	__	__	__	__
Aquaculture	__	__	__	__	__	__
Food production	__	__	__	__	__	__
Aesthetics	__	__	__	__	__	__
Active recreation	__	__	__	__	__	__
Passive recreation	__	__	__	__	__	__
Open space buffer	__	__	__	__	__	__
Educational activities	__	__	__	__	__	__
Research	__	__	__	__	__	__
_____	__	__	__	__	__	__
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_____	__	__	__	__	__	__
_____	__	__	__	__	__	__

STUDENT PAGE

WETLAND GOALS
Circle the choices that are appropriate and fill in the blanks.

Our planned wetland: created, restored, enhanced

The type of planned wetland:
System _____
Subsystem _____
Class _____

Water sources: precipitation, surface water inflow, groundwater inflow

Water losses: evapotranspiration, surface water outflow, groundwater outflow

Our goals:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Marsh Market
From WOW! The Wonder of Wetlands

Summary
Students construct a "living" wetland food web, then create their own web by tracing components of their lunches.

Objectives
Students will:
- Appreciate the interdependence of the organisms, including humans, involved in a food web.
- Make the connection between the importance of natural resources and the ways we impact them.

Materials
- large ball of string or yarn
- large file cards or strips of paper
- students' lunches or lists of every item each student ate in a recent meal
- drawing paper and markers
- tape

Grade Level: 2-8

Subject Areas: Ecology, Biology

Duration:
Part I: 40 minutes;
Part II: 40-60 minutes

Setting: Classroom

Skills: Gathering, analyzing, and interpreting information

Charting the Course:
Advanced students may do "Marsh Mystery," a lesson on bioaccumulation. You may also play the "Marsh Munchies" game to learn more about nutrients and energy flow.

Vocabulary: herbivore, carnivore, omnivore, insectivore, predator, prey, producer, consumer, decomposer, food web

Making Connections
Wetland habitats provide the necessities of life: abundant food source, adequate water supply, space to live and grow, safe cover for resting and nurturing young. Without wetlands, we would not have many of our own sources of food and income. Your students may be surprised to find out how many familiar things we derive from wetland resources. This activity introduces the importance of wetland community. This study of

interactions of organisms in a habitat leads to an understanding of our own roles in, and potential effects on, the environment.

Background

A wetland is a great marketplace of food sources. The vast number of plants growing in a healthy wetland form the basis of this food web. (A food web is a complex system of many food chains.) Resident and visiting animals can find a wide array of food choices in a wetland, whether they eat plants, animals, or both. A wetland with a great diversity of plant life will attract higher numbers and more species of animals. Plants are called primary producers because they supply food at the lowest level of a food chain. It takes an enormous number of individual plants to support the other parts of the web. Wetland habitats are extremely productive in terms of plant life. At the next level of a food chain are primary consumers: plant eaters or herbivores. Primary consumers include rabbits, mice, deer, and certain other mammals, some insects and fish, and ducks, geese, and certain other birds. Primary consumers are eaten by secondary consumers, or carnivores (meat-eaters). This group includes predators such as birds of prey, some snakes, foxes, wild cats, and people. Secondary consumers are eaten by tertiary consumers, which may be predators or scavengers such as turkey vultures, crabs, and sometimes people. Note that these categories are very broad and general. Many animals fit into more than one group, and there are more complex levels of the web. Any of the food web components mentioned above can be broken down by decomposers, organisms such as bacteria and fungi that reduce dead plant or animal matter into smaller particles. A decaying plant, for example, will be broken down into nutrients that enrich the soil. This process supports the growth of more plants. People are also part of the wetland food web! Many regional economies depend upon wetland foods. Are you a seafood lover? Oysters, shrimp, bluefish, flounder, and other popular, commercially important fish and shellfish are produced in wetlands, especially coastal marshes. Waterfowl, deer, and other game species that visit wetlands provide a source of food and income. Wetland mammals such as beaver, mink, and muskrat are valued for their fur—and muskrat is even becoming a popular gourmet dish. Cattail shoots, wild rice, and many other wetland plants that grow in wetlands are edible. Next time you get the munchies, visit a wetland for a snack!

Procedure

Warm Up

Have the class discuss the concept of a food web—what animals eat and who eats them. Introduce or review the terms herbivore, carnivore, omnivore, insectivore, predator, prey, producer, and consumer. Have older students discuss the flow of energy from primary producers through tertiary consumers and decomposers (see diagram).

The Activity

Part I: ***Make a "Living" Wetland Food Web***

1. Make a list of plants and animals (birds, mammals, reptiles, amphibians, fish, insects, and other invertebrates) that live in or use wetlands. Assign items on the list to students and have them research the animals' food habits and predators. Then place the animals in a chart of "carnivores," "herbivores," etc.

2. Write the name of each plant and animal on the list on a separate card or strip of paper.
Tape the cards or strips on the board and ask students to select one name. Have students stick their selection on their clothing.
3. Have the class stand in a circle. Select a "plant" to begin the web and give that student a ball of string. Ask him to wrap the end once around his hand, then pass the ball to an organism that eats his plant, connecting the one who is consumed to the consumer.
This student should wrap the string around her hand and pass the ball either to an organism that eats her organism or to her own organism's food source.
Remember that many of the plants and animals should be connected to several others; if a student receives the ball of string a second time (or more), he should pass it to a student he hasn't already passed it to. As the activity progresses, those who researched the organisms involved can help decide where to pass the string. Continue in this manner to create a "living" wetland food web.
4. Once the web has been completed (all possible connections have been made), have the students shift around until the web is taut. Have students discuss the fact that sometimes a plant or animal's role in the web may change, or disappear entirely.
What effect would this have on the web? Use the following scenarios to describe what can happen to parts of the web when the wetland habitat is disturbed. With each description, have the students decide which organism would be affected by the change first (suggested answers appear in parentheses). Have the student wearing this sign tug on the string. Anyone who feels the tug should raise her or his free hand. Have each of these students tug on the string, and so on. When the third scenario has been covered, have the class sit down and discuss the web.

Scenarios:
• It is raining. A lawn-care company's truck skids and crashes near the wetland, spilling hundreds of gallons of weed killer. The rain washes the chemicals into the wetland (plants).
• A stream is blocked by a huge pile of dumped garbage. The part of the stream that usually flows through the wetland dries up (fish).
• The wetland is destroyed when someone buys the land and builds a shopping mall there (everything).

Part II: ***What's For Lunch?***
1. Ask the students to take out their lunches (don't eat them now!) or list foods eaten at a recent meal. Have students draw self-portraits at the top of a piece of paper. Below this, have them draw and label pictures of each item in their meal and label each one (or draw a circle for each item and write the item's name inside). Be sure to include all items; i.e., instead of "sandwich," list or draw "ham," "cheese," "mayonnaise," "whole wheat bread," and so forth.
2. Decide what each item is made from. What is cheese? Where do frozen peas come from? What went into the can of soup? Break down each component of the meal, tracing each ingredient to its most fundamental sources. For example, mayonnaise is made of eggs and vinegar. Eggs come from chickens, which eat grain, which grows in the soil.

Chickens come from eggs which come from chickens . . . let's not get into that. Vinegar can be made from apples, which grow on trees, which need air, soil, sun, and water.

3. Students should label the consumers and the producers in the diagram. Ask which category shows up most. There should be more primary producers, since the foods were probably made from or raised on primary producers. Explain that it takes a lot of grain to raise one cow, and many primary producers to support the higher levels of a food web!

4. Ask students to imagine that one of the natural resources in the diagram has been depleted. Have them choose one and put an *X* beside it. Then go through the food web and put an *X* beside each item they would not have without that resource. Would their meals have been the same? Would they lose things they need, things they just like to have, or both?

Wrap Up and Action

Ask students to describe ways that the food web might be affected by a change in one of its links. Help students understand that a change in the availability of even one food source could affect many wetland residents. Stress that parts of an ecosystem are interconnected and interdependent, and every link is vital to the health of the whole.

Assessment

Have students:

- identify animals and plants in a wetland food web and describe their role (carnivores, herbivores, omnivores, insectivores, etc.).
- describe interrelationships among wetland organisms (consumers, producers, decomposers, predator, prey).
- demonstrate how several components in a wetland food web can be affected when even one is disturbed.
- draw a diagram identifying how their own lunches fit in a food chain.

Extensions

Nature in Your Neighborhood

Take a trip to a nearby wetland or other natural area. Observe, list, and diagram the components of the area's food web. You may not see many animals, but look for signs that they were there— droppings, footprints, feathers, nibbled leaves and twigs, remnants of a meal (bones, fur, etc.), even a tunnel or other pathway. You may find signs that people are part of this food chain. Fishing line caught in trees or shrubs and empty shotgun shells on the ground can be signs of human predation. Does this area offer other natural resources that people need, use, or want? Are there signs that resources here are being misused, or cared for? Do you see ways in which the food web in this area might be harmed? What can you do to help preserve the resources and the food web? See chapter 6, or "Helping Wetland Habitats," p. 288, for some ideas.

Presenter Information Sheet
Outdoor Classroom Symposium – 2005

Frey Elementary School, Acworth, Cobb County
Friday, October 14, 2005

Trecia Neal
Name

Fernbank Science Center | Biologist
Organization | **Title**

156 Heaton Park Dr. NE , Atlanta, GA 30307
Address

Phone: 404-929-6305 **Fax:** 678-874-7110

t.neal@fernbank.edu
E-mail

Worms in My Kitchen
Topic / Title

Brief Description of Presentation:

Come learn how to integrate vermicomposting (worm composting) into your classroom. Lessons on math, language arts, and science are included. Participants will take home a worm bin, worms and many resources.

Afternoon Session – 90 minutes - (1:15 – 3:00)

Activity not submitted.
Please contact this presenter for their handouts.

Cobb County...Expect the Best!

COBB COUNTY – GEORGIA
Cobb County Water System
www.cobbcounty.org
662 South Cobb Drive, Marietta GA 30060