ACTIVITIES

The following activities will help your students understand the physical and behavioral characteristics and life cycles of reptiles and amphibians. Activities are included to help your students understand the environmental issues affecting reptiles and amphibians and how human activities can help or hinder the survival of these animals. The heading for each activity is organized in the following manner:

TITLE OF THE ACTIVITY

Italicized background information for teachers.
Grade Level; Subject Codes
Materials needed for the activity

We have suggested appropriate grade levels for each activity, but we encourage you to adapt activities for the level of your class. The subject codes list the different core subjects covered by the activity. These codes are based on core subjects outlined in Washington State's Essential Academic Learning Requirements (EALRs). Codes are as follows:

A = arts, crafts, drama, dance, music
C = communication
E = social studies - economics
F = health and fitness
G = social studies - geography
H = social studies - history
M = math
R = reading
S = science
W = writing
V = social studies - civics

If a certain part of an activity addresses a specific component or components under one of the Essential Learnings, the component(s) will be listed in parentheses following that part of the activity. For example, if one section of an activity targets the third component under Essential Learning 2 in the core subject of mathematics, (Math 2.3) would be listed after that section of the activity. (Refer to your copy of the Washington State Essential Academic Learning Requirements or see http://www.k12.wa.us/curriculuminstruct/ for listings of the Essential Learnings and components.)

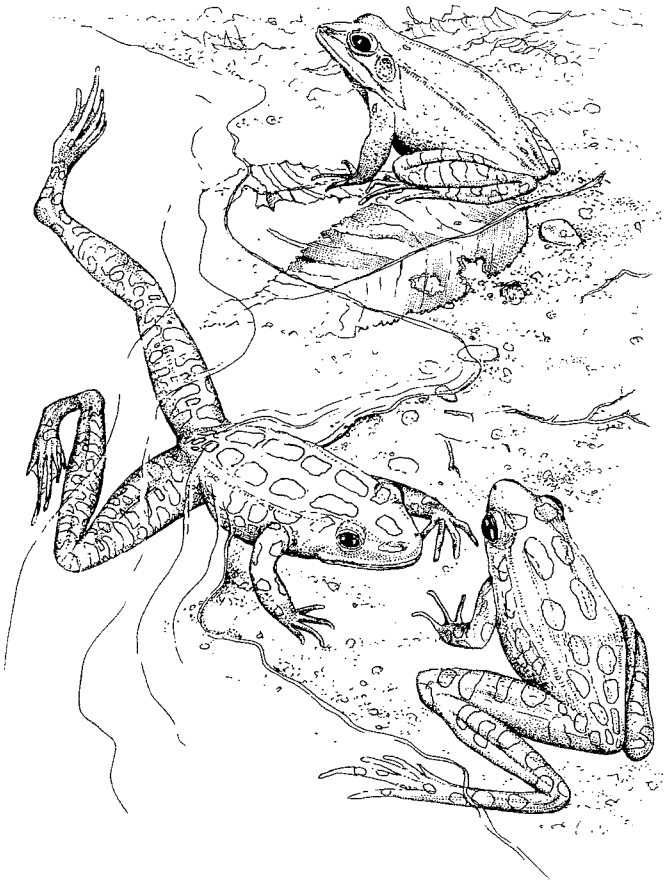
Important note: Although the activities presented here do not require you to obtain reptiles or amphibians for observation in your classroom, you may choose to do so. Please refer to the brochures in this packet for information about wise choices of reptiles and amphibians for the classroom. When obtaining animals from pet stores or biological supply companies, **ensure that the species have been bred in captivity and not captured from the wild**. You may want to ask the pet store or supply company if you can return your animals when you are done with your observations. If you no longer need your reptiles or amphibians in the classroom, **please do not turn them loose in the wild**. Introduced, nonnative species have the potential to negatively impact native species and habitats. You can give the animals to another responsible teacher or school, return them the place where you purchased them, or keep them as classroom pets.

1) Reporting on Reptiles and Amphibians
Grades 3-12; R, W, C, S

Research reports on groups of reptiles and amphibians can be assigned as projects for students to work on throughout a unit on reptiles and amphibians or as culminating projects that can aid in assessment.

Materials: access to resources for research (books, nature magazines, Internet access, CD-ROMs, videos, etc.), materials for visual aids (cameras, poster-making materials, computer presentation software, etc.)

- Individually, or in groups, have your students research and prepare reports on a group of reptiles or amphibians. Students can choose their specific topic or you may assign topics such as "freshwater turtles," "tropical frogs," "snakes of South America," etc.
- Students can prepare written reports and/or give oral presentations to the rest of class using visual aids such as posters, photographs, PowerPoint presentations or other presentation aids. (Reading 1.5, Reading 3.1, Writing 1.1, Communication 2.2, Communication 2.4, Communication 2.5, Science 1.1, Science 1.3)
- Reports should include information such as descriptions of species in the group, common characteristics of the group, diet, roles in ecosystem, life cycle/reproduction, status in the wild and relevant conservation issues.
- In their reports and/or presentations, students should include information that they have gathered on people's attitudes towards the group of animals they are reporting on. Can students find examples of people's perspectives on these animals (see the list of books in the following activity for possible resources)? Do people generally seem to view them in a positive or negative light? Students can also share their own perspectives — do they think this group of animals should be considered in a positive or negative light? What are some positive points about this group of animals (this might include roles in ecosystems and ways these animals may benefit humans)?



2) Reptiles and Amphibians in Literature
Grades K-6; R

Materials: one or more books from the following list

Read aloud, or have your students read, one or more of the following fiction books about reptiles or amphibians. A selection of several of these books could be used to explore people's attitudes towards reptiles and amphibians and how reptiles and amphibians are used to convey different ideals in different cultures (Reading 2.2, Reading 2.3, Geography 3.3).

FICTION: GRADES K-6

Aruego, Jose and Ariane. *A Crocodile's Tale: A Philippine Folk Story.* New York: Scholastic Inc., 1972. ISBN 0-590-42696-6

A boy helps a crocodile, is tricked and is saved by making a deal with a monkey.

Cannon, Jannell. *Verdi.* New York: Scholastic Inc., 1997. ISBN 0-590-11749-1

Young Verdi, a tree python, doesn't want to grow up to be big and green. He likes his bright yellow skin and black stripes. Besides, all the green snakes he meets are lazy, boring and rude. Despite his efforts, Verdi turns as green as the leaves on the trees, but to his delight, he discovers that being green doesn't mean he has to stop being himself.

Cecil, Laura. *The Frog Princess.* New York: Greenwillow Books, 1994. ISBN 0-688-13506-4

Forced to marry an ugly frog, the youngest son of the queen is astounded to learn that the frog is really a beautiful princess.

Diakite, Baba Wague. *The Hunterman and the Crocodile: A West African Folktale.* New York: Scholastic Press, 1997. ISBN 0-590-89828-0

Donso, a West African hunter, learns the importance of living in harmony with nature and the necessity of placing humans among, not above, all other living things.

Dunphy, Madeleine. *Here is the Wetland.* New York: Hyperion Books for Children, 1996. ISBN 0-7868-0164-6

Uses a cumulative approach to describe the ecology of a freshwater marsh, the most common type of wetland in North America.

Erickson, Russell E. *A Toad for Tuesday.* New York: Beech Tree, 1974. ISBN 0-688-41569-5

On Thursday a toad is captured by an owl who saves him to eat on Tuesday, the owl's birthday, but the intervening five days change his mind.

Kalan, Robert. *Jump, Frog, Jump!* New York: Scholastic Inc., 1981. ISBN 0-590-40063-0

Searching for a tasty insect to eat, an enthusiastic green frog pursues a promising bug while trying to avoid being caught himself, in a cumulative tale about predators and prey.

Kent, Jack. *The Caterpillar and the Polliwog.* New York: Simon & Schuster, 1982. ISBN 0-671-66280-5

Impressed by the proud caterpillar's boast that she will turn into a butterfly when she grows up, a polliwog determines to watch the caterpillar very carefully and turn into a butterfly too.

Lee, Jeanne M. *Toad is the Uncle of Heaven: A Vietnamese Folk Tale.* New York: Holt, Rinehart and Winston, 1985. ISBN 0-03-004652-1

Toad leads a group of animals to ask the King of Heaven to send rain to the parched earth.

Lobel, Arnold. *Frog and Toad All Year.* New York: Scholastic Inc., 1976. ISBN 0-590-31207-3

Stories of Frog and Toad throughout the seasons.

Lobel, Arnold. *Frog and Toad Are Friends.* New York: HarperCollins, 1979. ISBN 0-064-44020-6

Five stories highlighting the true friendship of Frog and Toad.

Mollel, Tololwa M. *The Flying Tortoise: An Igbo Tale.* New York: Clarion Books, 1994. ISBN 0-395-68845-0

Mbeku, the greedy tortoise, gets himself invited to the banquet in Skyland, but is trapped with no way to get back to Earth in this Igbo tale of why tortoise has a checkered shell.

Waber, Bernard. *Lovable Lyle.* Boston: Houghton Mifflin Company, 1969. ISBN 0-590-75774-1

Lyle, the crocodile, thought everyone loved him until the day he received a hate note from an anonymous despiser.

3) Amphibian Life Cycle: Wheel or Stick

Use this craft activity to help your students learn the amphibian life cycle.

Grades K-4; A, S

Materials: For Wheel: paper plates (2 per student), old nature magazines (such as Ranger Rick, National Geographic, National Wildlife, etc.), markers, brass brads, glue sticks. For Stick: green construction paper, colored tissue paper, pipe cleaners (black, green, brown), black electrical tape, scissors, wooden dowels (3' long, 1/16" diameter), split peas (green or yellow), white glue

Life Cycle Wheel:

1) Before your students begin the craft, use a sharp edge to cut a triangular window in one quarter of a paper plate (make one for each student). Stack two paper plates (one with a window, one without) together so that the plate with the window is on top. Then use a brass brad to attach the two paper plates together in the center so that the top plate (with the window) can be rotated around.
2) Give each student a paper plate wheel and review the amphibian life cycle, including eggs, tadpole, froglet (with tail and back legs), and adult frog (or use a salamander as an example: egg, larva, juvenile, adult.
3) Using old nature magazines and/or markers, have each student illustrate the four stages of an amphibian life cycle on the top face of the bottom plate (students may need to take their wheels apart to do their illustrations). Each stage should be at a different place on the bottom paper plate, such that when the top wheel is moved around in a circle, the window reveals the life stages in the proper order.

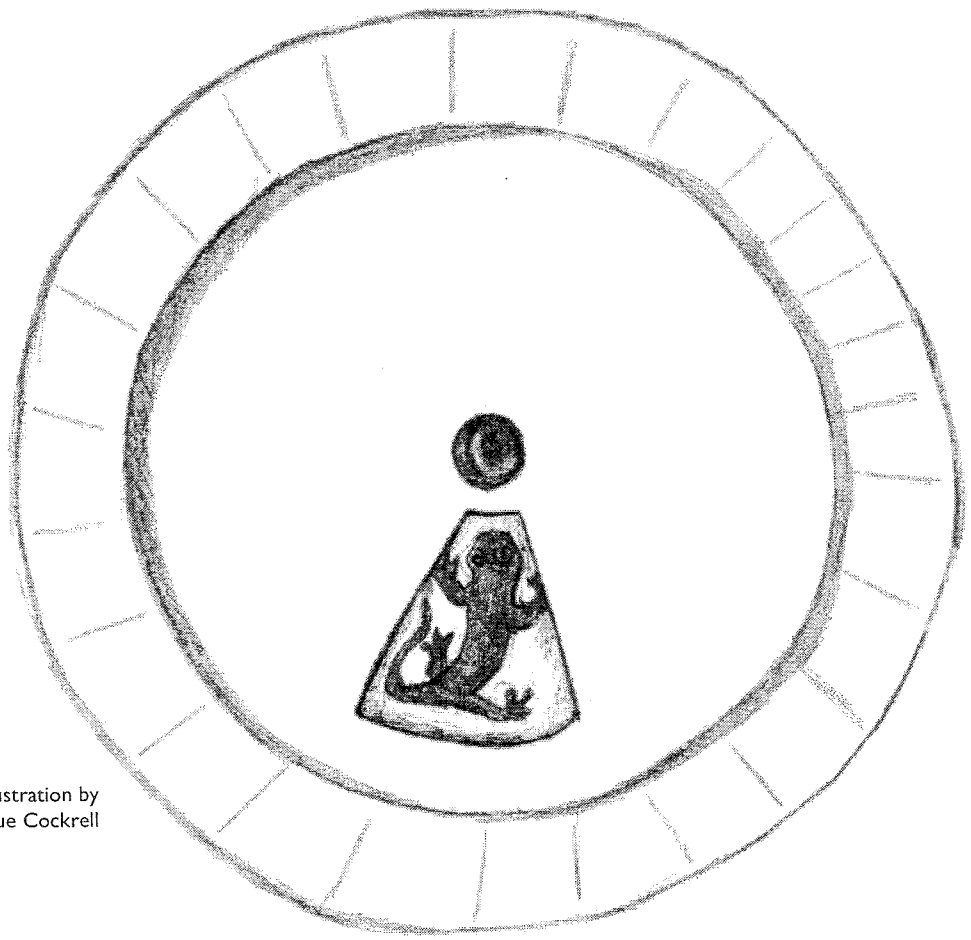


Illustration by Sue Cockrell

Life Cycle Stick:

Have each student complete the following steps:

1) For eggs: glue several split peas onto the dowel, about 12 inches below one end.
2) For tadpole/larva: use construction and/or tissue paper or pipe cleaners to make a tadpole or salamander larva. Glue the tadpole or larva onto the stick about four inches up from the eggs.
3) For froglet/juvenile: use construction and/or tissue paper or pipe cleaners to make a froglet or juvenile salamander (very similar to adult but smaller in size and may be different colors). Glue the froglet/juvenile onto the stick about four inches up from the tadpole/larva.
4) For adult frog or salamander: use construction and/or tissue paper or pipe cleaners to make a large adult frog or salamander. Attach the adult frog or salamander onto the end of the stick (up from the froglet/juvenile). The frog or salamander can move and bend when the stick is waved around.
5) You now have the life cycle of a frog or a salamander on a stick!

4) Amphibian Life Cycle: Act It Out
Grades K-3; A

This activity will help your students to learn about the basic amphibian life cycle in an active way.

Materials: none

- Review the life cycle of an amphibian, such as a frog, with your students. Have your students create their own actions for each stage of the life cycle, or assign actions for students to act out together as a group.
- Have each student create a poem or song describing the life cycle stages. Students can take turns reciting their poems or songs as the class performs the life cycle actions.
- Keep repeating the life cycle stages while students repeat their actions and poems or songs. (Arts 1.5)

Basic Amphibian Life Cycle Stages:
1) egg
2) aquatic larva (tadpole)
3) metamorphosis into juvenile/froglet
4) terrestrial adult

Illustration by Sue Cockrell

5) Reptiles, Amphibians or Both?

In this activity, the class assembles a large Venn diagram, which helps students to learn the characteristics that are shared by reptiles and amphibians, as well as the characteristics that differentiate them.

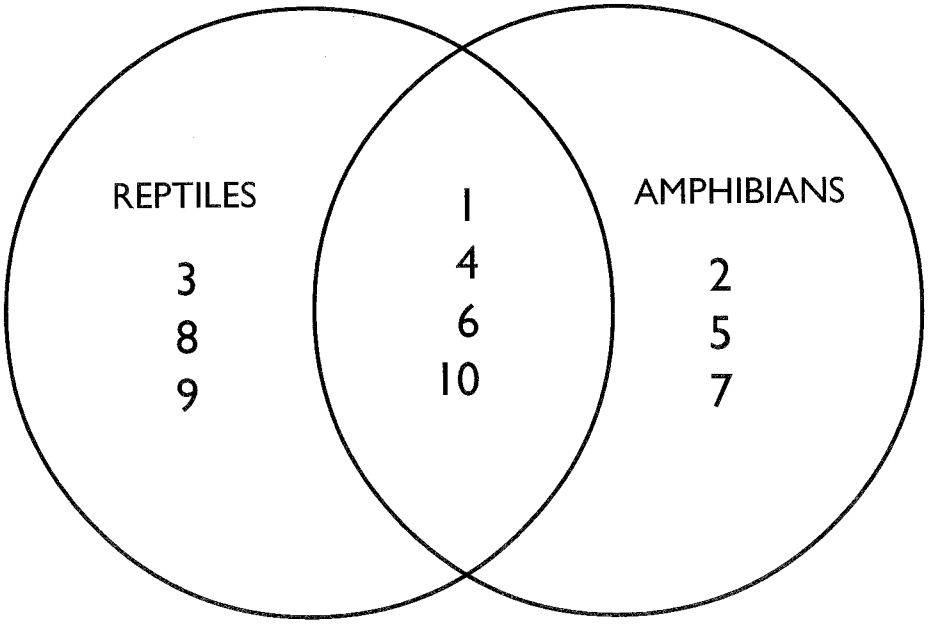
Grades 1-4; S

Materials: yarn, pictures from magazines or calendars of reptiles and amphibians, "Reptiles, Amphibians or Both?" statement cards (included in this packet)

- Copy and cut out the "Reptiles, Amphibians or Both?" statement cards provided in this packet.
- Using wall space or floor space, make two large circles that overlap by several inches with the yarn. In the middle of one circle put a few pictures of different types of reptiles. In the middle of the other circle, put pictures of different types of amphibians. (Students could also make their own worksheets by drawing two overlapping circles on a large piece of paper and gluing or drawing pictures in the circles.)
- As a class (or individually if students are doing their own worksheets) determine which of the statements apply to reptiles, which apply to amphibians and which apply to both (Science 1.1). Glue or tape each statement into the appropriate circle or into the overlapping area if the statement applies to both reptiles and amphibians.
- Through a class discussion, summarize the similarities and differences between reptiles and amphibians. Students may also wish to discuss similarities and differences between reptiles, amphibians and other groups of animals such as arthropods, fishes, birds and mammals.

Extension: Have your students write a short essay comparing and contrasting amphibians and reptiles based on the results of this activity.

Answer Key:



Reptiles, Amphibians or Both?

Statement Cards

1. Some species spend most of their lives in water.

2. Some species have poisonous skin glands.

3. Some species have venom that is injected by special teeth called fangs.

4. Some species are carnivorous, some species are herbivorous.

5. Many species lay their eggs in water.

6. Some species have legs, some species don't have legs.

7. In most species, the young are physically very different from the adults.

8. Most species have very scaly skin.

9. Most species (except for legless species) have claws.

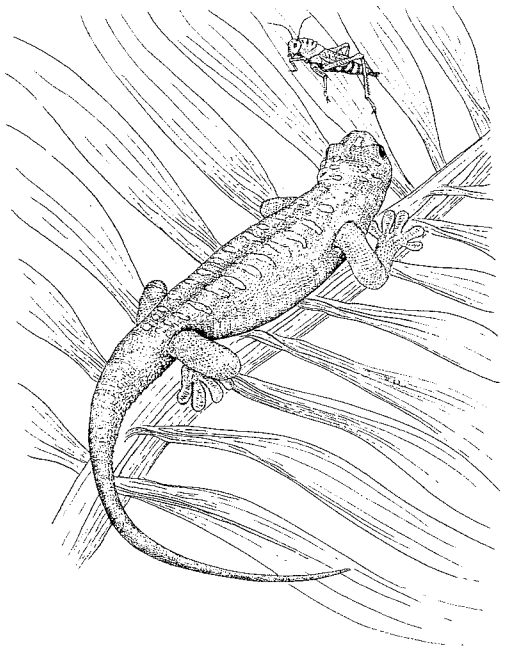
10. Some species live in deserts.

6) Graphing - Ectothermic vs. Endothermic Animals

By creating and comparing graphs of daily body temperature patterns, students learn about ectothermic versus endothermic strategies for survival.

Grades 5-12; M, S

Materials: thermometers (for taking human body temperatures), chart of reptile body temperatures (below), pencil and paper



- To gather data, have your students take their own temperatures at five designated times throughout the day (for example, 8:00 a.m., 11:00 a.m., 2:00 p.m., 5:00 p.m. and 8:00 p.m.) (Math 1.2, 4.1). Have each student graph his or her own results in a line graph (Math 1.4).

Time	Human body temperature		Reptile body temperature*	
5:00 a.m.	—	—	19°C	°F
8:00 a.m.	°C	°F	22°C	°F
11:00 a.m.	°C	°F	32°C	°F
2:00 p.m.	°C	°F	32°C	°F
5:00 p.m.	°C	°F	32°C	°F
8:00 p.m.	°C	°F	26°C	°F
11:00 p.m.	—	—	24°C	°F

*Data adapted from Christian, K. A., C. R. Tracy, and W. P. Porter. 1982. "Seasonal shifts in body temperature and use of microhabitats by Galapagos land iguanas *(Conolophus pallidus)*." Ecology 62(3): 463-468

*Air temperature ranged from a maximum of approximately 24°C (75°F) to a minimum of approximately 18°C (65°F).

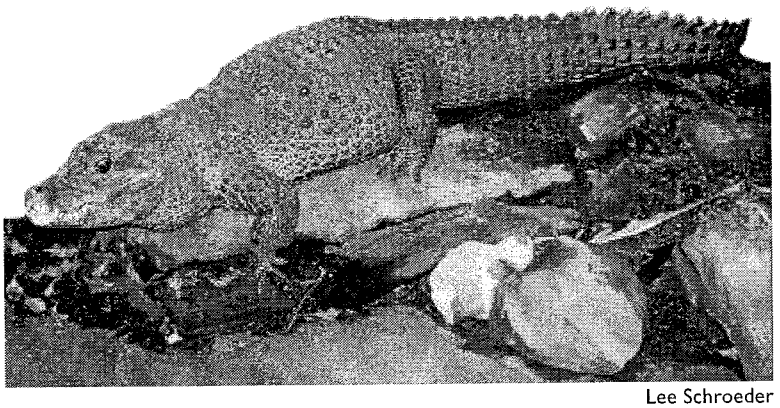
- Using the data from the chart above, have each student make a line graph showing the body temperature of a Galapagos land iguana throughout the day. In small or large group discussions, have your students compare the graphs of their own body temperatures versus those of the land iguana. (Math 4.2, Match 4.3) (Students may need to convert their body temperature data into Celsius or the iguana body temperature data into Fahrenheit in order to compare.) A few ideas for discussion questions are:
  - ♦ How do humans (and other mammals) regulate their body temperatures versus reptiles (and amphibians)?
  - ♦ What does ectothermic mean? What does endothermic mean? What type of energy do ectothermic animals use to regulate body temperature? *(Heat energy directly from the sun's rays or radiated from objects in their environment).* What type of energy do endothermic animals use to regulate body temperature? *(Metabolic energy from the food the animals eat.)* (Science 1.3)
  - ♦ Do you think that "cold-blooded" and "warm-blooded" are accurate terms? Why or why not?

The following two experiments (#7 and #8) can help your students to understand how two adaptations of reptiles enable them to inhabit terrestrial habitats. These adaptations, ectothermic body temperature regulation and amniotic eggs with leathery or hard shells, permit reptiles to maintain optimal body temperature while conserving energy and permit reptile eggs to conserve water.

7) Ectothermic Body Temperature Regulation: Measuring Solar Radiation
Grades 3-8; S, M

Materials: small or large soda bottles (20 fluid ounces or 2 liters; six of the same size per group), matte black and matte white spray paint, modeling clay or dough, rubber bands (six per group), laboratory thermometers (six per group), water

- *Preparation:* Spray paint three soda bottles white all over and the other three black all over. Allow painted bottles to dry overnight before beginning the experiment.
- Fill each bottle with the same of volume water. Make a stopper out of the clay or dough and use it to close up the top of the bottle. Insert a thermometer through the center of each stopper so that the thermometer is submerged in the water. Wrap a rubber band around the upper part of each thermometer to help hold the thermometer in place.
- Record the initial water temperature of each bottle.
- Place a pair of black and white bottles together in a sunny location outside. Place the bottles so that they are receiving the sun's rays from approximately the same angle. Also make sure that the bottles will remain in the sun for at least the next couple of hours (i.e. no shadows will fall over them).
- Place another pair of black and white bottles in a shady location not far from the first pair. Place the bottles so that they will stay in the shade for the next couple of hours.
- For the last pair of black and white bottles, find a sunny spot (ideally near the first pair of bottles) where you can bury the bottles in soil. (If necessary, the bottles can be buried in sand or potting soil in a bucket.)
- Record the water temperature of each bottle every 15 minutes for as long as time allows (at least one hour).
- Before taking the first temperature readings, have your students discuss or write down their predictions as to how the water temperature will change for each pair of bottles. How will the temperature changes compare between the black and white bottles in each location? (Science 2.1)
- Graph the temperature results from each bottle. Compare the black and white bottles in each pair to one another and then compare all the black bottles to one another and all the white bottles to one another. (Math 1.4)
- Repeat this activity at different times of day and compare results. This activity could also be repeated at the same time of day throughout the year to compare solar radiation during different seasons.
- Wrap up this activity with a discussion about body temperature regulation in reptiles (see the "Graphing — Ectothermic vs. Endothermic Animals" activity in this packet). Ask your students to describe where you might find a reptile at different times of day and night in a hot and sunny part of the world (such as a desert) and in a cooler ecosystem (such as a temperate prairie grassland). How might burrowing underground affect a reptile's body temperature? How might dark pigmented skin versus light pigmented skin affect a reptile's body temperature? *Some reptiles, such as the western fence lizard found in western North America, can regulate the distribution of pigments in their skin, making areas darker or lighter in color and therefore increasing or decreasing absorption of solar radiation.*



Lee Schroeder

8) Eggshells
Grades 3-8; M, S

Materials: cotton balls, chicken eggs, water, measuring spoons, masking tape, illustrations of reptile and amphibian eggs

- Crack open two chicken eggs. Try to crack the eggs open as cleanly as possible so they can be closed up again and discard the yolks and the whites (or set aside and bring home for use). Gently rinse out and dry the eggshells.
- Set two cotton balls on a small plastic tray (such as the lid of a yogurt container) and place a cotton ball in each of the clean eggshells. Slowly pour one tablespoon of water over each of the cotton balls. Gently close up each eggshell and secure the shell back together with masking tape.
- Set the cotton balls on the tray and the eggshells containing the other cotton balls close to each other and let them sit **overnight**. (To add complexity to the experiment, you could arrange a second set of cotton balls and eggshells and put them in a different location, such as a sunny versus shady location or a hot versus a cool location.)
- Older students could weigh the cotton balls and eggshells initially and after they have sat out to compare the amount of water lost. (Math 1.2)
- Have each student write a few sentences stating their predictions of what will happen to the water on the cotton balls in each situation. (Science 2.1)
- After approximately 24 hours, check the cotton balls and compare the degree of wetness or dryness of each. How do the results compare with the students' predictions?
- Display illustrations or examples of different reptile and amphibian eggs. What do the eggs look like? What do they have in common? What is different about them? Where do reptiles lay their eggs? Where do amphibians lay their eggs? Based on the results of the experiment, what is one advantage that shelled eggs provide for animals?

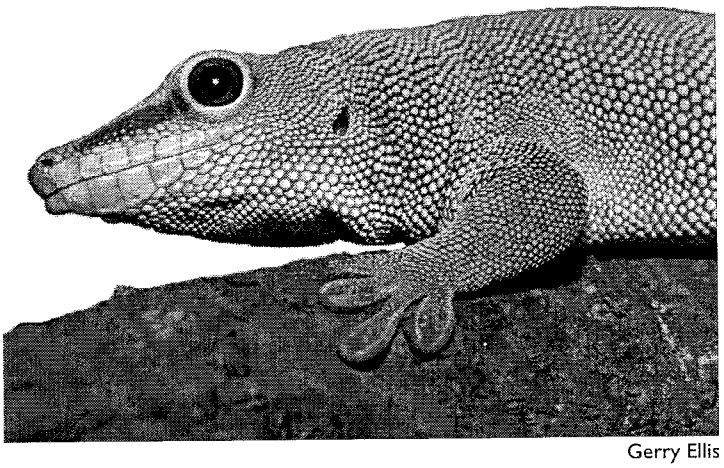
9) Staying Wet — Evaporation Exploration

Amphibians have permeable skin and are vulnerable to drying out if they lose too much water through evaporation. However, not all amphibians live in wetlands — some are found in forests and even in deserts. Some amphibians have special adaptations to prevent them from drying out. In this experiment, students will investigate rates of water loss under different environmental conditions.

Grades 3-6; M, S

Materials: sponges (4 of the same type per group), heating pads (2 per group), small glass tanks or baking dishes (4 of the same type per group), spray bottles with water (one per group), scale (one per group)

- Set up four tanks/baking dishes, each with one sponge resting at the bottom of the tank/dish:
  1. Tank with heating pad underneath; four squirts of water onto the sponge
  2. Tank with heating pad underneath; no water (control)
  3. Unheated tank; four squirts of water onto the sponge
  4. Unheated tank; no water (control)
- Before and after the sponges are squirted, measure and record the initial weight of each sponge (Math 1.2).
- Measure and record the weight of each sponge periodically over the next 24 hours or until the weight of the sponges that were squirted with water nears their initial weights (Math 1.2).
- Create graphs of the weights of the sponges over time (Math 1.4).
- Discuss with your students the results of their experiments. What could happen to an amphibian in an arid environment?



Gerry Ellis

10) Beating The Heat: Burrowing

Many reptiles and amphibians that live in regions with hot and/or dry periods beat the heat (and conserve moisture) by spending time buried underground or in underground burrows. Some species spend their whole lives underground, while others spend the heat of the day underground and emerge to find food in the morning, the evening or at night. This activity demonstrates the temperature difference between the surface of the substrate (sand or soil) and the interior of the substrate.

Grades 1-6; M, S

Materials: sand (and/or potting soil; 4 cups per student or group), bowls (2 per student or group), water (approximately 1 cup per student or group), lamps (desk lamp with bulb that emits some heat or heat lamp; 2 per student or group), thermometers (4 per student or group, if available), pencil and paper

- This activity can be completed individually, in pairs, in small groups or as a class.
- Have each group/student set up two bowls with approximately two cups of sand or soil in it.
- To one of the bowls, have the students add a small, measured amount of water (such as 1/8 cup) — just enough to moisten the sand/soil.
- Set up the bowls and the lamps so that the bulbs of the lamp are near enough to the bowls so that the lamps heat the sand/soil. Let the bowls sit under the lamps for approximately half an hour, or until the surface of the sand/soil is slightly warm to the touch.
- Turn off the lamps once the soil has become warm. Then, as a group, in small groups, or individually, have the students measure the temperature difference between the surface of the sand/soil and a few inches under the sand/soil in each bowl. (Math 1.2) This can be done by resting one thermometer on the sand/soil surface and sticking one thermometer a few inches into the sand/soil and letting the thermometers sit for a few minutes before reading the temperature.
- Students can also feel the difference in temperature after they have taken their measurements by resting one finger on the surface of the sand/soil and poking another finger down into the sand/soil. (With younger students, or if thermometers are not available, students can just feel the differences instead of measuring.)
- As the sand/soil cools off, have students take surface and subsurface temperatures every 5 minutes until the sand/soil has cooled down completely (or as long class time allows).
- Have each group/student report their/his/her findings to the rest of the class. Students may wish to graph their results in order to present their data. (Math 1.4)
- Follow up the activity with a discussion or read a story about reptiles and amphibians that burrow (many species that live in deserts burrow). What are some advantages of burrowing underground? *Keep cool, conserve water, avoid predators.* (Science 1.3)

11) Reptile and Amphibian Diets

In this brief activity, students categorize reptiles and amphibians according to their feeding habits (diet), helping students to understand how reptiles and amphibians fit into food chains.

Grades 3-8; S

Materials: pencil and paper

Make two columns on the board or an overhead: 1) "Carnivorous" and 2) "Some species carnivorous, some species herbivorous" (or have each student write these two headings on a piece of paper. Using the following list, have your students place each type of animal in the correct column according to the feeding habits of that group of animals. (Science 1.1) Students can use the background information in this packet to research the feeding habits of these animal groups.

- Turtles
- Snakes
- Lizards
- Tuataras
- Crocodiles
- Adult frogs and toads
- Larval frogs and toads (tadpoles)
- Caecilians
- Adult newts and salamanders
- Larval newts and salamanders

Answer Key:

Carnivorous	Some species carnivorous/ some species herbivorous
Crocodiles	Larval frogs and toads
Caecilians	Turtles
Adult newts and salamanders	Lizards
Larval newts and salamanders	
Adult frogs and toads	
Snakes	
Tuataras	

12) Camouflaged Pipe Cleaners

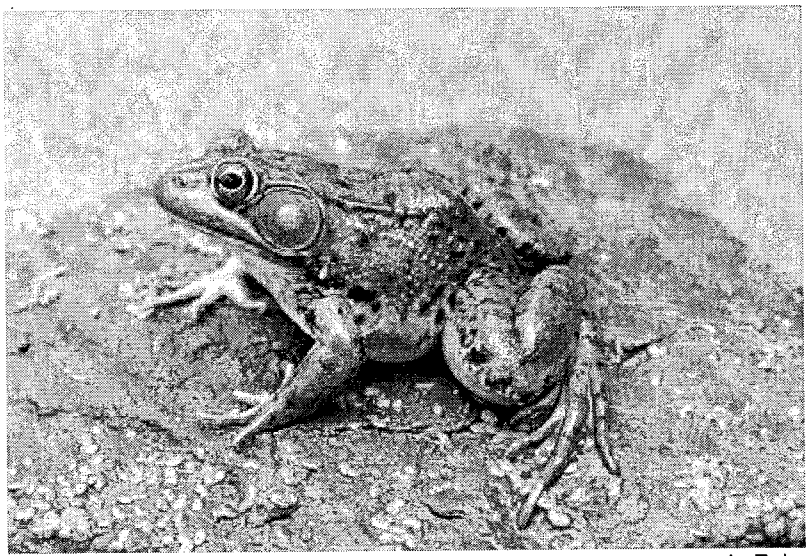
This active game helps students to explore the concept of camouflage.

Grades K-4; M, S

Materials: a large number of pipe cleaners of various colors (bright and earth tones, cut into 3" pieces), stopwatch, pen and paper or flip chart

Steps:

1. Count out a set number of pipe cleaner pieces. This number will depend on the age of the students and how much time you will give them to hunt. Record how many of each color of pipe cleaner you will be using. (For a fun snowy day activity, you can also use white pipe cleaners along with the bright colors and earth tones.)
2. Find a large, grassy area outdoors that has clear boundaries.
3. Without your students watching you, randomly spread the pipe cleaner pieces around inside the boundaries. (You might want to sketch a quick map of the area and the pipe cleaners so you can retrieve them all at the end of the game.)
4. Divide students into three groups. Have one group at a time complete this activity. Use the stopwatch (or have one of the students use the stopwatch) to keep time. Allow 15 to 30 seconds for the students to collect as many pipe cleaners as they can.
5. After they have finished collecting, ask the group to count how many pipe cleaners of each color were collected and record this information. (Math 1.1) Then students should compare the number of each color pipe cleaner their group collected to how many of each color you had dispersed.
6. Collect all the pipe cleaners from the first group and repeat the activity with the other groups.
7. After finishing the activity make sure the students find ALL the pipe cleaners — forgotten pipe cleaners could be harmful to wildlife. Save the pipe cleaners for reuse.
8. As a group, you can organize the data gathered from the activity into a chart and/or graph. (Math 1.4) Discuss which color pipe cleaners were easier to find and which were the hardest. Why were some pipe cleaners easier to find than others?
9. Have students imagine that the pipe cleaners they were collecting were reptiles and amphibians. Students can try to think of reptiles and amphibians that are the same colors as the pipe cleaners that were used in the game. Can the students explain the significance of different colors for different reptiles and amphibians? Discuss the concepts of camouflage and warning colors with your students. Camouflage refers to coloration that helps an animal blend into its surroundings. Camouflage can aid prey animals in hiding from predators, or can aid predators in ambushing prey. Animals that have defensive chemicals that make them poisonous or make them taste bad to predators are often brightly colored (usually with reds, oranges and/or yellows). These colors are referred to as warning colors.
10. At home or at a local zoo or museum, students can look for reptiles and amphibians that are camouflaged and reptiles and amphibians that have warning colors. Students may choose to record their observations in a nature journal.



ArtToday

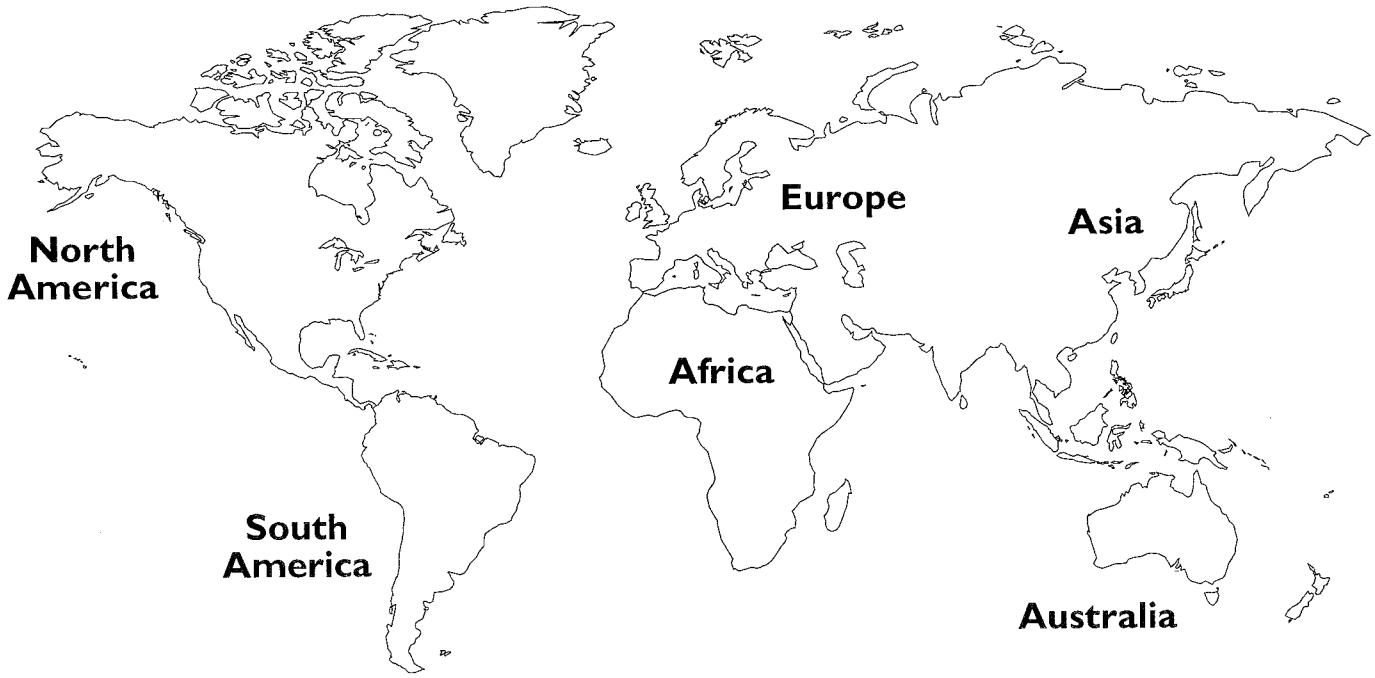
13) Amphibians and Reptiles Around the World

Grades 4-8; R, G

In this activity, students will research information about amphibian and reptile species and match the species with the geographic areas of the world they inhabit. Students will become familiar with continents and countries and will gain a better understanding of where amphibian and reptile species live and where they coexist.

Materials: large map of the world (preferably laminated), clear tape, 60 2-foot long pieces of colored yarn (30 of one color, 30 of another color) reptile and amphibian field guies, Web access

- Post the world map on a bulletin board or wall. Assign each student one species of amphibian and one species of reptile. You can find reptile and amphibian species in this packet, on the Web, or in reptile and amphibian field guides from different areas of the world.
- Have each student research information about his/her species of amphibian and reptile, including the geographic range of the species (Reading 3.1). Each student should prepare an outline of the information they find on each species (Reading 2.2). Reptile and amphibian field guides from around the world can be useful for this project.
- Have each student make a label for each species out of scrap paper. The labels should be approximately 1"x 3" and should include both the common and scientific names of the species.
- One at a time, have each student post his/her species labels off to the side of the world map with a length of yarn connecting each species label to the continent or region in which it is found (be sure that all students use the same color of yarn for amphibians and the other color for reptiles) (Geography 1.1). Students can use clear tape to fasten each end of the yarn. (For some species students may want to attach multiple pieces of yarn to indicate multiple regions that the species inhabits.)
- If time allows, have each student present some information about their species alout to the class after they post their labels. Or, students could write a few short sentences about each species to be posted next to the labels.
- This map can be displayed in the school hallway for other students to see or kept up in the classroom while students are studying reptiles and amphibians.



14) Salamanders: Importance in Ecosystems

This activity will help your students to explore the role of amphibians, specifically salamanders, in ecosystems through creation of a food web and calculating and comparing the biomass of different groups of animals in a temperate deciduous forest ecosystem.

Grades 8-12; M, S

Materials: paper, pencils and colored pencils or paints

Part I: Food Web

- Have your students use colored pencils or paints to illustrate a food web in a temperate deciduous forest ecosystem of eastern North America. Each food web should include an eastern red-backed salamander *(Plethodon cinereus)*. Students may need to conduct research in the library or on the World Wide Web about some of the animals and plants in this ecosystem before illustrating their food webs. Alternatively, students could describe a food web in a nonfiction essay.
- The following information may help to get your students started:

  Salamanders eat: insects, worms, snails, other salamanders, small mammals (such as mice), small fish

  Salamanders are eaten by: fish, snakes, small mammals, birds (such as herons), foxes and other salamanders
- In their food webs, students should draw arrows representing the passage of energy around the food web. (Science 1.2, Science 1.3) The arrow should point towards the organism the energy is transferring to (so an arrow pointing from an earthworm to a salamander signifies that the salamander eats the earthworm). The following example shows a small food web:

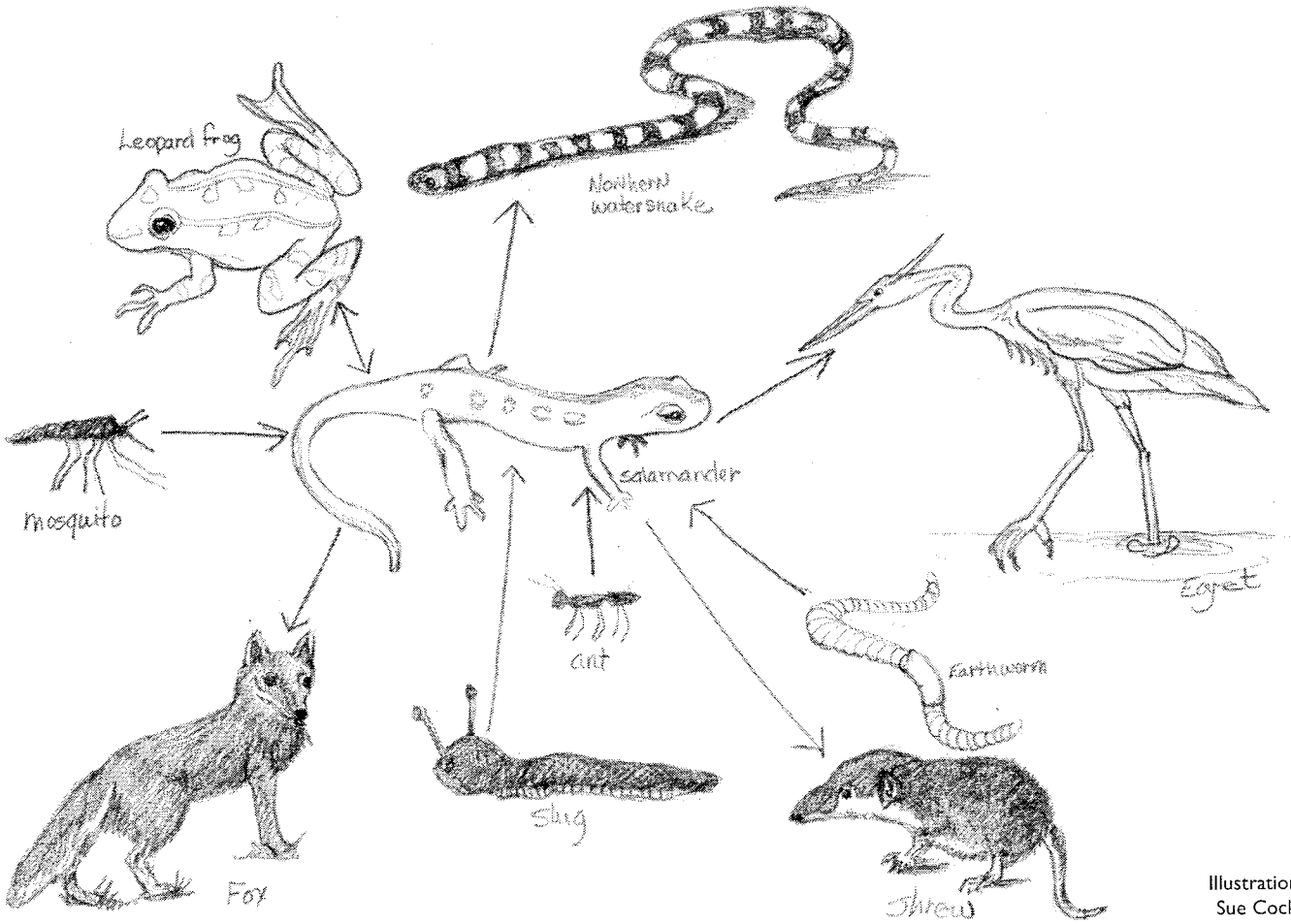


Illustration by Sue Cockrell

Part II: Comparing Biomass

- Using the following data, have your students calculate the biomass of salamanders per hectare and the total biomass of salamanders in the study area (a typical temperate deciduous forest of the eastern United States). (Math 1.1, Math 3.1, Math 5.2, Match 5.3)
- Have the students address the following questions in small groups, in a class discussion or in a written assignment:
  - ♦ What is the total biomass of salamanders in the study area in a temperate deciduous forest of the eastern United States?
    (Answer: 2,950 sal x 36 ha x .6g = 63,730 grams)
  - ♦ How does this compare to the biomass of birds within the study area during the peak breeding season (approximately 24,000 grams) and the biomass of mice and shrews within the study area (approximately 60,000 grams)?
  - ♦ Based on these statistics, what might you conclude about the importance of salamanders in the nutrient and energy cycles in this ecosystem as compared with other animal groups (birds and small mammals)?
  - ♦ What questions about salamanders (or other animal groups) in this ecosystem arise based on the findings of this study? What further studies might you want to conduct to answer these questions?

Eastern United States temperate deciduous forest
Salamanders: 2,950 salamanders per hectare
Average wet weight of a salamander = .6 grams (this average includes adults and larvae; on average, adults would have a higher weight than this and larvae would have a lower weight than this)
Study area = approximately 36 hectares

Data adapted from Burton, T.M. and Likens, G.E. 1975. "Salamander populations and biomass in the Hubbard Brook Experimental Forest, New Hampshire." *Copeia* 1975: 541-546.

THREATS TO SURVIVAL

15) Endangered Species Detectives
Grades 5 -12; R, G, S

This activity is based on the Endangered Species School Program, focused on the western pond turtle, offered for grades 5 and up at Woodland Park Zoo. If your class is planning to come to the zoo and participate in the Endangered Species School Program, please do not complete this activity in your classroom.

In this activity, students act as "environmental detectives," examining clues and deducing the causes behind the endangerment of a species of plant or animal. At the conclusion of the program, students become aware of the fact that species throughout the world suffer from common threats, which can cause them to become endangered.

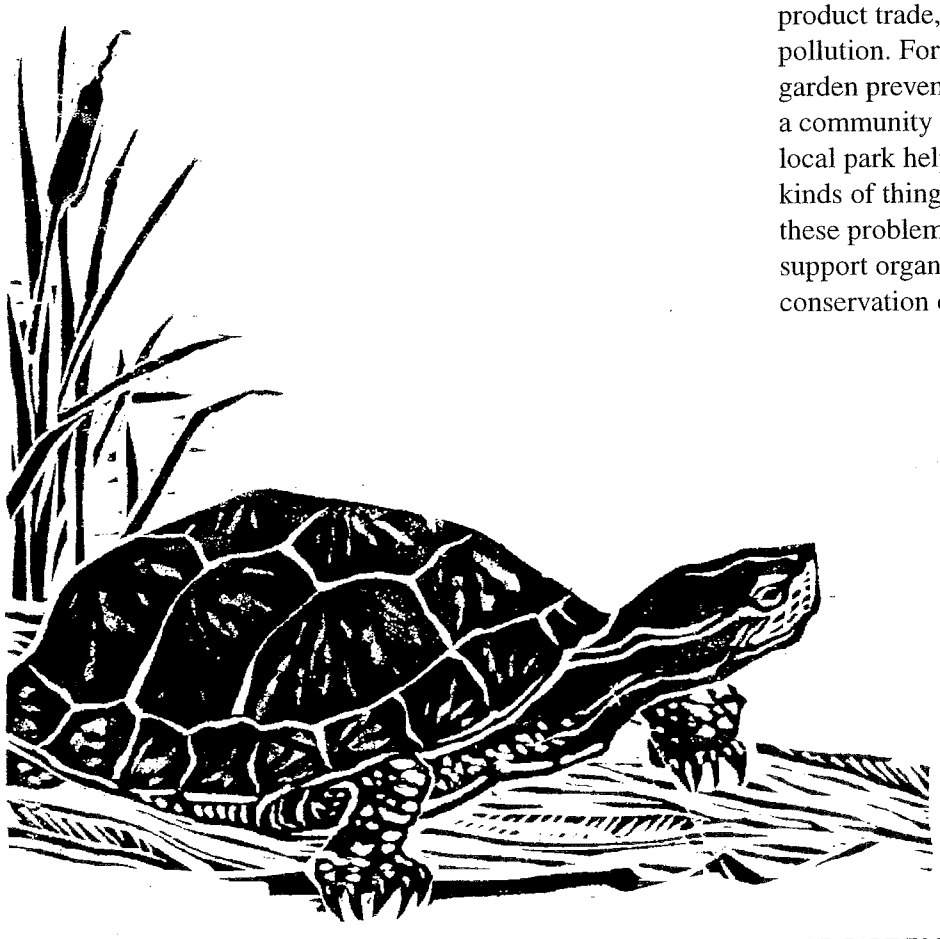
Materials: "Endangered Species Clue Sheet" included in this packet, pencils or pens

In preparation for the activity:

- Choose (or have the class choose) one endangered species of reptile or amphibian to be the focus of the mystery. You may want to choose an animal that your students are not very familiar with so that they don't already know the solution to the mystery. Depending on the grade level and abilities of your students, you can divide them into three or four groups and have each group design their own mystery for the rest of the class to solve. Or you can set up a mystery for the entire class.
- Through research, have each group find out what has caused the animal to become endangered. There are many factors which can cause the endangerment of species, but the major reasons include habitat loss, introduced species, pet/product trade, over-hunting/overharvesting, and pollution which are all directly related to human population growth.
- Once each group is familiar with the history of the decline of the species, have students in each group design and make "clues" which relate to the causes of the species' decline. For example, if you were to use a crocodile as a focus, clues might include a

model of a crocodile skin shoe, a drawing of a swamp being cleared, etc. If need be, make descriptive tags for the clues.
- Have each group set out their clues on a table.

Conducting the activity:
- Introduce the game to your students by asking them what they know about endangered species. Do they think it matters if species disappear? Why or why not?
- Lead your class in a discussion of human population growth. Do they think that the world population of humans is increasing at a fast rate? If you wish to include a short video which illustrates the speed of human population growth in recent times, contact Zero Population Growth Seattle, 4426 Burke Avenue North, Seattle, WA 98103, (206) 548-0152. http://cn.org/zpg or order online at http://www.zpg.org/Catalog/Items/item6.html
- Explain to your students that they are going to be environmental detectives. Tell them about the endangered species you (or they) have chosen and explain to them its status in the wild (how it is listed under the federal Endangered Species Act and/or your state endangered species list). If the groups set up their own mysteries, each group should introduce their animal to the class.
- Using the same groups used for the preparations above, pass out one Endangered Species checklist to each group. One student should be the recorder and reporter for the group. Have each group visit one table (not their own) for about 10 minutes. First, the recorder should write the name or a description of each clue in the far left clue column. Then, instruct the students to examine the "clues" and mark the boxes on their clue sheet according to which of the common causes of endangerment the clue is related. For example, in the crocodile case, the students might check the box under habitat destruction for the drawing of a swamp being cleared.
- Once each group has finished examining the clues at their table, have the reporters tell the rest of the class their group's results. Which factors received the most checks? Ask the class if they think that any of the factors are interrelated. What kinds of effects do increasing human populations have on each of the causes of species endangerment? (Science 1.3, Geography 3.1) The group that designed the mystery can then explain to the class what they learned about the species and its status while they were creating the mystery.
- As a class, make a list of ways that individuals or groups can become a part of conservation solutions. Relate actions directly to the common causes of endangerment: habitat loss, introduced species, pet/product trade, over-hunting/overharvesting, and pollution. For example, not using chemicals in the garden prevents pollution and getting together with a community group to remove exotic plants at a local park helps to control introduced species. What kinds of things are already being done to address these problems? (Science 2.2) How can students support organizations that are working for the conservation of biodiversity?



Endangered Species Clue Sheet

Woodland Park Zoo

	Related to human population?	Hunting/Harvesting (Pet and product trade)	Pollution	Introduced Species	Habitat Destruction
Clue #1					
Clue #2					
Clue #3					
Clue #4					
Clue #5					
Clue #6					
Clue #7					
Clue #8					
Clue #9					
Clue #10					

16) Reptiles and Amphibians Around Washington

See "Reptiles and Amphibians Around the World" in this packet — use a map of Washington state (included in this packet) instead of a world map and assign each student a reptile and an amphibian native to Washington. Students can use the following resources for information:

1. Storm, Robert M. and William P. Leonard, eds. *Reptiles of Washington and Oregon.* Seattle: Seattle Audubon Society, 1995.
2. Leonard, William and Herbert Brown, Lawrence Jones, Kelly McAllister, Robert Storm. *Amphibians of Washington and Oregon.* Seattle: Seattle Audubon Society, 1993.

REPTILES OF WASHINGTON

Common Name	Scientific Name	State Status*	Federal Status**
TURTLES			
Snapping Turtle (introduced)	*Chelydra serpentina*	—	—
Painted Turtle	*Chrysemys picta*	—	—
Western Pond Turtle	*Clemmys marmorata*	E	SC
Common Slider (introduced)	*Trachemys scripta*	—	—
Loggerhead	*Caretta caretta*	T	T
Green Turtle	*Chelonia mydas*	T	T
Pacific Ridley	*Lepidochelys olivacea*	—	T
Leatherback	*Dermochelys coriacea*	E	—
LIZARDS			
Northern Alligator Lizard	*Elgaria coerulea*	—	—
Southern Alligator Lizard	*Elgaria multicarinata*	—	—
Short-horned Lizard	*Phrynosoma douglasii*	—	—
Sagebrush Lizard	*Sceloporus graciosus*	—	SC
Western Fence Lizard	*Sceloporus occidentalis*	—	—
Side-blotched Lizard	*Uta stansburiana*	—	—
Western Skink	*Eumeces skiltonianus*	—	—
SNAKES			
Rubber Boa	*Charina bottae*	—	—
Racer	*Coluber constrictor*	—	—
Sharptail Snake	*Contia tenuis*	C	—
Ringneck Snake	*Diadophis punctatus*	—	—
Night Snake	*Hypsiglena torquata*	—	—
California Mountain Kingsnake	*Lampropeltis zonata*	C	—
Striped Whipsnake	*Masticophis taeniatus*	C	—
Gopher Snake	*Pituophis catenifer*	—	—
Western Terrestrial Garter Snake	*Thamnophis elegans*	—	—

SNAKES continued

Northwestern Garter Snake	*Thamnophis ordinoides*	—	—
Common Garter Snake	*Thamnophis sirtalis*	—	—
Northern Pacific Rattlesnake	*Crotalis viridis oreganus*	—	—

AMPHIBIANS OF WASHINGTON

Common Name	Scientific Name	State Status*	Federal Status**
SALAMANDERS			
Tiger Salamander	*Ambystoma tigrinum*	—	—
Northwestern Salamander	*Ambystoma gracile*	—	—
Long-toed Salamander	*Ambystoma macrodactylum*	—	—
Cope's Giant Salamander	*Dicamptodon copei*	—	—
Pacific Giant Salamander	*Dicamptodon tenbrosus*	—	—
Olympic Torrent Salamander	*Rhyacotriton olympicus*	—	—
Columbia Torrent Salamander	*Rhyacotriton kezeri*	C	SC
Cascade Torrent Salamander	*Rhyacotriton cascadae*	C	—
Rough-skinned Newt	*Taricha granulosa*	—	—
Dunn's Salamander	*Plethodon dunni*	C	—
Larch Mountain Salamander	*Plethodon larselli*	S	SC
Van Dyke's Salamander	*Plethodon vandykei*	C	SC
Western Red-backed Salamander	*Plethodon vehiculum*	—	—
Ensantina	*Ensatina eschscholtzii*	—	—
FROGS and TOADS			
Tailed Frog	*Ascaphus truei*	—	—
Great Basin Spadefoot	*Scaphiopus intermontanus*	—	—
Western Toad	*Bufo boreas*	C	SC
Woodhouse's Toad	*Bufo woodhousii*	—	—
Pacific Treefrog	*Pseudacris regilla*	—	—
Red-legged Frog	*Rana aurora*	—	SC
Oregon Spotted Frog	*Rana pretiosa*	E	C
Columbia Spotted Frog	*Rana luteiventris*	C	SC
Cascades Frog	*Rana cascadae*	—	SC
Northern Leopard Frog	*Rana pipiens*	E	—
Bullfrog (introduced)	*Rana catesbeiana*	—	—
Green Frog (introduced)	*Rana clamitans*	—	—

*State Status
E = Endangered
T = Threatened
S = Sensitive
C = Candidate
http://www.wa.gov/wdfw/wlm/diversty/soc/concern.htm

**Federal Status
E = Endangered
T = Threatened
C = Candidate
SC = Species of Concern

http://endangered.fws.gov

17) Wild Animals Do Not Make Good Pets
Grades 5-12; E

This activity allows students to make informed choices about pets and to realize that, although habitat destruction is the primary cause for species endangerment, there are other contributing factors, including the pet trade.

Materials: pamphlets included in this packet

- Based on the information provided in "Pet/Product Trade" in the "Threats to Survival" section of this packet and the handout "Some Perspectives on Keeping Reptiles and Amphibians, In the Classroom or at Home" included in this packet, discuss with your students the pros and cons of domestic, wild and exotic reptiles and amphibians as pets. Can your students describe the differences between wild animals and exotic animals? Students may need to look up definitions in the dictionary to help with this discussion. (Reading 1.2)
- To avoid supporting the harmful trade of animals, suggest that students:
  - ♦ Buy only traditional pets such as dogs, cats, guinea pigs or rabbits. Most wild animals have a difficult time adjusting to life in captivity and soon die. Many wild aninals also die during capture or transport to pet stores.
  - ♦ Never take animals from the wild as pets.
  - ♦ If you are interested in buying a bird or reptile, make sure that the animal is captive bred. Choices for captive-bred bird species include: budgerigars (parakeets), canaries or cockatiels. Choices for captive-bred reptile and amphibians species include: bearded dragons, horned frogs, corn snakes, boa constrictors and leopard geckoes. Ask shop owners for documentation proving that the animals were born in captivity.
  - ♦ To avoid contributing to the problem of invasive species, suggest that students:
  - ♦ Never release pets, such as reptiles, amphibians or insects into the wild.
  - ♦ Never release aquarium pets or plants into the wild. Bag plants and put them in the trash and pour aquarium water down the drain.
- Discuss with your students the concepts of supply and demand. What do they think would happen if everyone in the world stopped buying exotic pets taken from the wild? What changes might owners of exotic pet stores make in the way they run their shops? Do the students think that their economic choices might affect the decisions of shop owners? How would populations of some endangered animals be affected? What would happen if a certain species of reptile, which was not easily bred in captivity, became popular as a pet and the demand for it increased? How might shop owners address the increased demand for that reptile? How might wild populations of the reptile be affected? (Economics 1.1)

Extension: Have students visit pet stores in their neighborhoods and talk with the owners about the native habitats of the reptiles and amphibians that are in the store. If the animals are exotic, were they captive bred? Do the shop owners have documentation showing that the animals were born in captivity? Encourage students to also do their own research to find information on the native habitats of reptiles and amphibians they see in the pet stores in order to cross-check the information they obtain from the shop owners. Students can report their findings to the class.

Wildlife for Sale: An Educator's Guide to Wildlife Trade and Suitcase for Survival

World Wildlife Fund (WWF) has developed an educational module that explores human relationships with plants and animals and how international trade in plants and animals affects biodiversity around the world. Many of the issues explored in *Wildlife for Sale* directly involve, or can be applied to, reptiles and amphibians. *Wildlife for Sale* is a part of WWF's Windows on the Wild set of environmental education materials, which have been developed to help students explore the social, political, scientific, economic and ethical issues surrounding biodiversity and to give people the knowledge and skills they need to build a more sustainable future. The module includes 15 interdisciplinary activities, such as:

- a role-play that explores the ethical dilemmas surrounding wildlife trade,
- a personal career survey of skills and interests highlighting wildlife-related jobs, and
- a worldwide mapping game to learn about real-life individuals caught in the act of smuggling wildlife.

Wildlife for Sale includes a colorful slide show and script highlighting wildlife trade issues that are covered by the module activities. The show provides an overview of wildlife trade and it's significance at local and global levels by following four characters who are consumers of wildlife products — both knowingly and unknowingly. The slide show also offers ideas about how individuals can become better-informed citizens.

Wildlife for Sale: An Educator's Guide to Wildlife Trade is also a component of the *Suitcase for Survival* program. In order to educate people about the wildlife product trade, the U.S. Fish and Wildlife Service, World Wildlife Fund, the National Fish and Wildlife Foundation and the American Zoo and Aquarium Association (AZA) collaborated to produce a wildlife trade education package, the *Suitcase for Survival*, for distribution to zoological parks in key U.S. cities. Each suitcase contains wildlife products, several examples of substitutes for the "real thing" and the *Wildlife for Sale* module and slides. *Suitcase for Survival* is targeted for grades 6 to 8 but the slide program and activities can be modified to fit the age and needs of most classes.

Suitcase for Survival makes use of the confiscated, illegal wildlife products that often end up in storage in various USFWS facilities around the country. The wildlife items in storage include products such as mounted trophies, elephant ivory tusks, stuffed sea turtles, shoes and other leather goods made from snake, crocodile or lizard, and a wide variety of tourist souvenirs fashioned from an astounding array of wildlife. Many of these items were seized from tourists returning from abroad who purchased them without realizing it is illegal to bring them back into the United States. Others came from commercial shipments destined for places such as department stores. Still others were confiscated from people attempting to smuggle them into the United States. Some of the wildlife items kept in storage, such as those in the *Suitcase for Survival*, are eventually lent or donated to schools, zoos and other institutions for use in displays or for other educational purposes. However, many of the products may remain in storage or be destroyed.

Suitcase for Survival provides a hands-on way to show young people that what they buy can make a difference in saving endangered species. When given proper information people can make wise consumer decisions. We do not want students to get the impression that it is wrong to use wildlife under any circumstances. Rather, the aim is for students to understand the concept of sustainable use and learn the importance of proper management and wise use of wildlife.

Once students have the facts about wildlife trade, they can exercise their ability to choose! When considering the purchase of a wildlife item or pet, they can choose to buy it if they are sure it entered the country legally, was captive-bred, or is not harmful to wildlife populations. They can also decide to buy a substitute or they may choose not to buy anything at all.

Suitcase for Survival, including Wildlife for Sale and the accompanying slides, can be checked out from Woodland Park Zoo after completing *Suitcase for Survival* training sponsored by Woodland Park Zoo. Please contact the zoo's Education department at (206) 684-4850 for more information on educational resources and teacher training opportunities. For information about World Wildlife Fund's Windows on the Wild educational materials see http://www.worldwildlife.org/windows/. Windows on the Wild materials can be ordered through Acorn Naturalists at http://www.acornnaturalist.com/ or call 1-800-422-8886.