



Year of the Snake Program Materials

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THE WILDERNESS CENTER
a non-profit nature center

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Presentation Report Form



Name(s):

Affiliation:

Date of Program:

Program Location:

Number attending:

Age range of attendees:

Program Length:

Please describe program (slide show, crafts, touch table, etc):

Comments:

Thank you so much for being part of Year of the Snake!

Please return this form to Carrie Elvey at The Wilderness Center, PO Box 202, Wilmot, OH 44689 or carrie@wildernesscenter.org

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Year of the Snake Slide Show Script

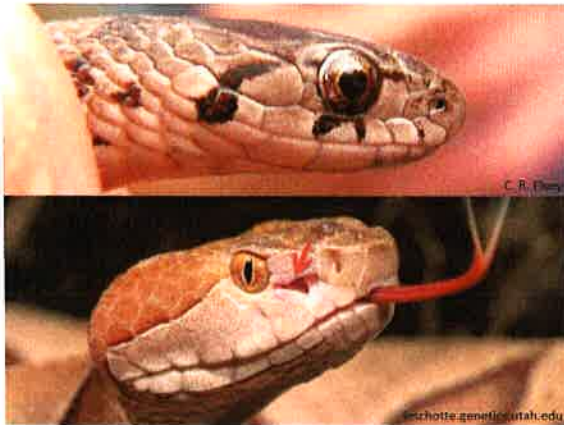
Created for PARC's Year of the Snake campaign – 2013

1. **Welcome to this Year of the Snake program.** Partners in Amphibians and Reptile Conservation (PARC) is working hard this year to raise awareness about snakes and their important role in our world. (Introduce yourself and the host organization). Today we will talk about how snakes live and interact with their environment, as well as some challenges and successes in snake conservation.
2. **Snakes are fascinating creatures and can be found in many habitats around the world.** They live in many different types of habitats; forests, deserts, jungles, even the ocean. Snakes live in almost all countries except islands like Iceland, Greenland, Newfoundland, Ireland, and New Zealand, and very cold places like Antarctica and the far reaches of the arctic. There are around 2,700 species of snakes in the world. The United States is home to about 115 of these. We'll look at some basic snake biology and then move on to snakes' role in our ecosystem.
3. **How well a snake sees varies among species.** Some snakes which rely on sight to hunt like Garter Snakes have large eyes and appear to have fairly clear vision. Pit vipers (like rattlesnakes) can also see in the infrared spectrum. Their pit organs allow them to detect heat sources very accurately.
4. **Snakes do not have external ear openings,** although they do have an ear bone. Snakes hear with vibration – sounds travel along the ground and are transferred by muscle and bone to the ear.
5. **Snakes can smell with their noses, but they have developed an alternative method too.** Snakes use their tongues to collect particles in the air. These particles are passed to the Jacobson's organ on the roof of the mouth, which then processes the smell. The forked tongue allows them more accurately determine the location of scents.
6. **Snakes have specially designed jaws that allow them to swallow prey much larger than their heads.** The lower jaw is made of two parts which can move independently, allowing snakes to work food into their mouths. Because of the unique jaw attachment, snakes can swallow food larger than their heads. Snakes swallow their food whole and don't chew it. The powerful digestive juices can consume the whole animal--bones, fur, feathers, and even teeth. Some snakes are generalists and will eat whatever they find, other specialists and have unique adaptations to eat certain types of food.

7. **Snakes use three basic methods of subduing prey.** Grab and Go eaters feed on prey that generally doesn't back – like worms or frogs. They simply swallow the prey without killing it first. Constrictors squeeze their prey, killing by either suffocation or cardiac arrest before eating it. Venomous snakes use different types of venoms to subdue or kill prey before swallowing.
8. **One of the most common questions about snakes concerns the differences between venomous and non-venomous snakes.** Only about 1/5th of the world's snakes are venomous. Venomous snakes have fangs used to deliver venom. Other general characteristics of venomous snakes include slit pupils, and pit vipers have heat-sensing pits between the eyes and nostril. Venomous snakes typically have arrow-shaped heads to accommodate venom glands. Of course rattlesnakes have rattles. These are basic generalizations (the elapids – cobras, coral snakes, etc. – do not have heat pits and slit pupils) - the best way to identify a venomous snake is to learn what snakes inhabit your area and become familiar with their markings.
9. **Snakes have a variety of reproductive techniques.** Many snakes (like milk snakes and kingsnakes) lay eggs which develop outside the mother's body (oviparity). Other embryos develop inside eggs retained in the mother's body. They babies are born live, but they are nourished by egg yolk, not the mother's body (ovoviviparity). This is common among pit vipers. Other snakes (boa constrictors) have truly live birth, where the babies are nourished by the mother inside her body, resulting in true live birth (viviparity).
10. **Snakes can climb, slither, crawl, and swim.** Snakes use special belly scales in conjunction with muscle movements to push against the ground or anchor them as they climb. The Flying Snake of Southeast Asia glides through the air.
11. **What good are snakes? Snakes, like all other species, are an important part of their native ecosystems.** Snakes are both predator and prey – thus an important part of food webs. They feed mostly on small mammals, birds, amphibians, other snakes, lizards, fish and insects and in turn are prey for other species, primarily birds, snakes, and medium-sized mammals. In some ecosystems, they are very important for control of rodent and insect populations. Removing snakes from the food-web can lead to the changes in other animal populations, which can in turn lead to changes in plant communities, often resulting in degraded or altered environments.
12. **We are only now scratching the surface of medicinal uses of venom.** For example, Malayan Pit Viper venom is being used to break down blood clots in the form of a drug called Ancrod. Copperhead venom shows promise in the fight against breast cancer. Other diseases or disorders which may benefit from venom-derived drugs include Alzheimer's, Parkinson's, asthma, arthritis, and high blood pressure.

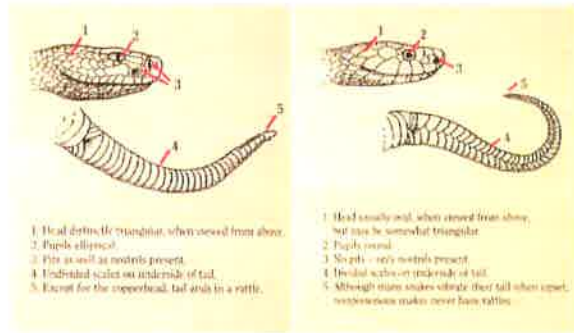
13. **Snakes are a great tool for teaching people the value of conservation.** Children are often fascinated by snakes. Snakes used in educational displays evoke a great deal of emotion and can give people an opportunity to observe, touch, and interact with an animal they don't get to see every day—and perhaps begin to lose their fear of the creatures. This creates a fantastic environment for people to learn more about and appreciate the value of these species. Snakes are also model organisms for the study of certain aspects of biology such as spatial, thermal, and foraging ecology.
14. **Snakes are very aesthetically appealing, with a variety of patterns and colors and graceful movements.** Imagine yourself in a rainforest in Indonesia—lush trees and the smell of the damp earth. Complete the picture with a beautiful Green Tree Python draped over a branch, its lovely scales shimmering like emeralds. At that moment, there could be no denying the beauty of these animals and the thrill of seeing a snake wild and free in its natural habitat.
15. **Snakes have intrinsic value, meaning they are important just because they are,** because they belong here like all other species on our planet, and we, as fellow animals, do not have the right to be a part of their decline. Snake species deserve to flourish just as all other species do, because they belong in their natural habitat.
16. **Like most species, snakes suffer from loss and fragmentation of habitat.** Snakes need to hunt for prey, mate, and travel from overwintering sites to summer foraging sites and in doing so, they often move widely across a landscape. This can force snakes to cross roads, agricultural lands, and other developed or degraded areas, which can all result in increased mortality rates or reduced gene flow.
17. **Human Persecution is rampant – particularly against venomous snakes.** Many people have an irrational fear of snakes. An excellent example of the extent of human persecution against snakes involves a study conducted in Kansas, where 8 out of 10 drivers were found to intentionally hit snakelike objects placed on the road. Unless you accidentally or intentionally harass a snake, chances are, the snake wants to avoid you more than you want to avoid the snake. If you see a snake in the wild, leave it alone.
18. **Some snake species are so charismatic and unique that they are heavily exploited for the pet and skin trade.** Currently, the use of snakes is not managed as well as game species are. Frequently there are no seasons, or limits established. Worse, the take of snakes is largely untracked, so we don't know all the impacts of removing snakes from the wild. This threat is manageable; it is possible to implement collection regulations that still allow the sustainable use of snakes. This slide shows snake dealers in Indonesia.

19. **The introduction of invasive species into an ecosystem can often harm snakes.** The introduction of feral hogs into the Longleaf Pine ecosystem has affected many species, including Eastern Indigo Snakes. Feral hogs uproot Eastern Indigo nests, and may kill and eat juvenile snakes as well. In addition, there are invasive snake species that affect other native snakes, such as the invasion of pythons (pictured) into the Everglades in Florida, USA. Pythons have essentially taken over this ecosystem and decimated rodent and bird populations, minimizing prey availability for other snake species.
20. **Because snakes are ectotherms (obtaining most of their body heat from the environment), they make great indicators of climate change** Studies indicate that snakes will be negatively affected by climate change because they cannot evolve or migrate fast enough to keep up with the changes in suitable habitat. For example, a study conducted by the University of Indiana Bloomington found that, although an initial increase in temperature may expand the range of Timber Rattlesnakes in the eastern United States, an increase of 6.4 degrees in temperature would eventually displace this species from its range entirely.
21. **An example of a snake conservation success story can be found in the Lake Erie Watersnake** which was removed from the U.S. endangered species list in August of 2011, after being listed in 1999. Found only on the islands of Lake Erie, this species was most threatened by human persecution in the form of intentional killing, and loss of habitat due to shoreline development. The federal government and state agencies implemented intensive public outreach programs aimed at educating people about the importance of this species to local ecosystems and afforded protection to the remaining habitat used by Lake Erie Watersnakes. The local community became enthusiastic about the protection of this species when informed of its importance in keeping in check populations of Round Gobies, an invasive fish species in Lake Erie.
22. **What can you do?** Become a member of a snake conservation group, Don't collect snakes from the wild, Report your findings, create habitat, and most importantly, educate yourself and spread the word to friends, co-workers, and family.
23. **Thank you for your interest in Year of the Snake.** To learn more, follow YOS on Facebook, or log onto the website to get updates and download the YOS monthly newsletter and calendar.





Venomous vs. Nonvenomous



ODNR - Reptiles of Ohio



Dr. Alan Francis



Jim Mahoney



Erik C. Blazina



Photograph by Bruce Landis



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http://www.rocketry.blogspot.com



Marcel Burkhard



The Wilderness Center



Carl Brune



www.paulhiltonphotography.com



What can you do?

- Don't collect snakes from the wild
- Report your snake observations to a Natural Heritage Program
- Work to create or protect snake habitats in your neighborhood
- Locate yourself and spread the word!

Visit www.yearofthesnake.org to learn more about these topics



PARCyearofthesnake@gmail.com

Snake Myths

Contributed by Carrie Elvey, The Wilderness Center



Because of their unique lifestyle, snakes are prone to being the subject of myth and legend. Some of these myths have a kernel of truth, others have no discernible origin. Read on to learn the truth about these myths.

#1 Snakes are Slimy

If you are looking for slime, check out a fish or amphibian. These animals have slime which serves as a protective barrier for their more sensitive skin. As with other reptiles, snakes have dry scaly skin – no slime here. A snake’s protective scales are made from keratin, the same material as your fingernails and hair. The origin of this myth is likely the sliminess and snake-like appearance of eels. Some snakes also have iridescent coloration which may look slimy from a distance.

#2 Snakes Hypnotize Their Prey

Snakes don’t have moveable eyelids, so they don’t blink or close their eyes in the traditional sense. Even though this imparts a somewhat hypnotic stare, snakes cannot hypnotize their prey. Some prey animals may freeze when they see a predator, but this is a protective mechanism of the prey animal – not the gaze of the snake. Sorry Jungle Book fans – Kaa could never have put Mowgli to sleep!

#3 You Can Make a Venomous Snake Harmless by Pulling Out Its Fangs

A venomous snake has several spare sets of fangs hidden in the roof of its mouth which will replace those that a snake loses. So whether the fangs are pulled, shed, or lost during a meal, there will be a set waiting to take their place.

#4 You Can Tell the Age of a Rattlesnake by Counting Its Rattles

A rattle is a series of interlocking, modified scales. A rattlesnake is born with one segment, which quickly falls and is replaced with the first real rattle. Unless it falls off, this rattle “button” will always be the end of the rattle. Each time the snake sheds, a new rattle is added. If all the segments remain in place, the number of rattles will tell you how many times the snake has shed. However, because snakes shed more than once each year, this will only tell you the number of times the snake has shed, not how old it is. In addition, old segments may break off, further complicating matters.

#5 Milk Snakes Drink Milk from Cows at Night

Milk Snakes got their name from the folktale that they could drain a cow of milk. Such tales are completely false. While it is true the milk snakes may be found in barns where cows are kept, the snakes are likely eating rodents, which actually helps the farmer. Not convinced? Consider these facts: Cow udders are tender – no bovine is going to stand still while a snake chews on it. Snakes drink by immersing their mouths or heads in water and sucking in fluid by expanding the body wall. Snakes drink only a little – they could never drink the gallons of milk it would take to drain a cow.

#6 Injured Snakes Never Die Before Sundown

Nerve reflexes can cause muscle twitches in dead snakes for several hours after death – this can result in jerking movements of the mouth and body. (Think chicken-with-its-head-cut-off). These muscle spasms are probably the source of this myth. Like all animals, snakes can die anytime of the night or day.

#7 You Can Tell a Venomous Snake by the Diamond Pattern on Its Back

Although some venomous snakes (rattlesnakes) do have diamond patterns, others (coral snakes) do not. Also, some non-venomous snakes (water snakes) have a distinct diamond pattern. It is important to learn the other characteristics of venomous snakes (elliptical pupils, pits in addition to nostrils, single scales in the underside of the tail, etc.). The most efficient way to distinguish venomous from non-venomous snakes is to learn the species in your area and become familiar with those snakes' distinguishing characteristics.

#8 Snakes Don't Have Bodies, Just Tails

Snakes do have tails. In most species the tail is relatively short – a small proportion of the body length. A snake's tail starts at the cloaca (the sole opening for both intestinal and reproductive tracts.) Ever wonder how many ribs a snake has? Count the number of long belly scales - most snakes have a pair of ribs corresponding to each belly scale (up to the cloaca).

#9 Snakes Sting Enemies with Forked Tongues and Pointed Tails

Snakes don't have "stingers" on either end. The soft, flicking tongue is used in odor detection and the tail is just that – a tail. Some snakes (worm snakes) do have hardened, pointed scales on their tails. However, these scales do not have venom and are not dangerous.

#10 Garter Snake Mothers Swallow their Young to Protect Them

There are several probable origins of this myth. Perhaps observations of large snakes eating smaller ones were mistaken for maternal care. It is also possible that well-developed fetuses were discovered in the female's body. This type of parental care has never been verified, either through trained observation or dissection. Swallowing young would not protect them; there's nothing maternal about being digested by stomach acid and enzymes. Some snake species do exhibit varying degrees of parental care.

#11 You Can Cure a Headache by Wrapping a Shed Snake Skin Around Your Ankle/Head/...

While the origin of this myth is unclear, a man apparently made his living during the late 19th century selling snake skins for just this purpose in Cambridge. Obviously this does not cure a headache, but perhaps it would draw your attention away from a pounding skull.

#12 The Division of Wildlife Drops Rattlesnakes from Planes to Control the Turkey Populations

While this particular rumor seems to circulate mainly in the Ohio, Kentucky and Virginia area, rumors about the secretive re-establishment of venomous snakes are pervasive. Wildlife agencies are not using rattlesnakes to control turkey populations, and they are certainly not dropping them from airplanes – even low flying ones.

Bubble Wrap Print Paper Snake Craft for Kids

What you will need:

Card stock (Heavy Paper)

Bubble Wrap with small bubbles

Acrylic Paint

Red Paper

Black Marker

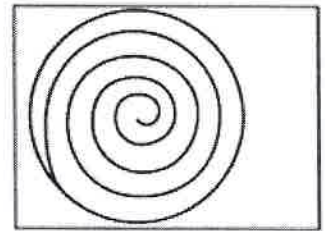
Scissors

One-inch Paint Brush



How to make the Bubble Wrap Snake Craft:

1. Cut the biggest circle you can from the card stock. Cut a piece of bubble wrap the same size as the circle. You may want to experiment with different color combinations so make more than one circle. You can use the spiral snake pattern if you prefer. Just print it out on card stock (Heavy Paper) and then cut bubble wrap to match the size of the pattern.



2. Squirt paint into a container and fill your brush or paint roller with paint.

3. Spread the paint over the bumpy side of the bubble wrap. Cover only the top of the bubbles with the paint. Add a lighter color for accents.

4. Place the painted side of the bubble wrap on the pattern paper and press down on the bubble wrap to press the paint onto the paper.

5. Slowly peel the bubble wrap off the pattern paper and let the paint dry.

6. You can add another accent color over the first color after the first colored has dried. Paint the accent color lightly and randomly over the bubble wrap, and then press it over the first bubble wrap print. You can also try just using both colors of paint on the bubble wrap.

7. When the paint is dry cut out the snake out, and add a red snake tongue and eyes.

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Cardboard Tube Coiled Snakes

Author: Amanda Formaro

Materials:

- cardboard tubes
- tube from wrapping paper or similar tubular item
- 6 googly eyes
- Toothpick
- White craft glue
- Scissors
- Acrylic craft paint in colors of your choice



Instructions:

1. Paint the inside and outside of the cardboard tubes. Apply second coat if needed.
2. Cut the tubes into coils, but if your cardboard is still a little damp it might not hold it's round shape. Using a tube from wrapping paper, or something similar, and wrap the cut cardboard around the tube loosely. Use the handle end of a paintbrush to add polka dots with a contrasting color of paint. Let dry completely then flip over on the other side and finish your polka dots.
3. Remove from tube and wrap the painted cardboard in coil fashion around your fingers. Place coiled cardboard on table. Paint the end with red and let it dry. Meanwhile, glue on googly eyes, adding the glue with a toothpick since they are small.
4. Now that the red paint is dry, use some small scissors to snip the red end into a forked tongue. An easier option, if your kids are smaller, is to cut a forked tongue from red construction paper, snip the end of the card board to cut off the point, and glue that paper tongue in place instead.



Neck Tie Snakes

Stuff an old necktie.

Glue or sew the mouth (bottom of tie) shut.

Glue on a red tongue and googly eyes.

If you put a wire inside before stuffing, you can make your snake poseable

You can also buy kits from Oriental Trading Company that include all the materials.



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Make a Slinky Snake

Use toilet paper rolls and paper fasteners to make a movable snake.

Ages:
Advanced

Materials:

- toilet paper rolls
- scissors
- paper punches
- paper fasteners
- thin cardboard or manila folders
- tape
- crayons, markers, or paint and paintbrushes
- pictures of snakes

Subjects:
Arts and Crafts

Your kids can make a movable snake that will wrap around their arms and slither across the floor. Just have them follow these easy steps:

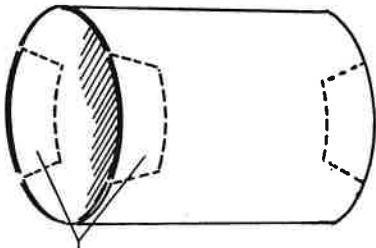
1. Cut five toilet paper rolls into fifteen 1½-inch (4-cm) long pieces. (These will be the snake's body segments.)
2. Cut two side notches in each end of thirteen of the pieces. The notches should be about ¼ to ½ inch (.6-1.3 cm) deep and 1 inch (2.5 cm) wide (see diagram 1). Then punch four holes in each segment as shown in the diagram.
3. Make end pieces by cutting two side notches in just one end of the two remaining segments. Then punch two holes in each of these segments (see diagram 2).
4. Starting with an end piece, assemble the body segments one by one. Fit the pieces together as shown in diagram 3. Then insert paper fasteners into the holes and spread the ends of the fasteners apart inside the snake. (Be sure to fit the cardboard pieces together as shown in the diagram. And

don't fasten the paper fasteners too tight or your snake will not be able to move easily.)

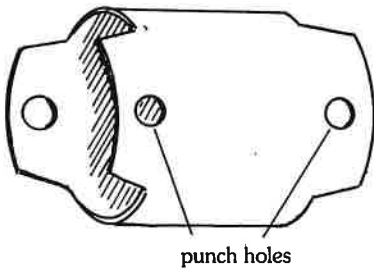
5. To make the head, cut out a 5 × 6-inch (13 × 15-cm) piece of thin cardboard or manila folder and roll it into a tube. (The tube should be slightly wider than the toilet paper roll.) Fit one end of the tube over one of the end segments and tape the edges of the tube together. Then tape the head to the end segment and cut out the snake's mouth (see diagram 5).
6. Cut out a forked tongue from the cardboard and tape it inside the snake's mouth.
7. To make a tail, cut out a 5 × 6-inch (13 × 15-cm) piece of cardboard and roll it into a cone. Tape the cone together and then trim off the top so that it's even (see diagram 4). Fit the larger end over the other end segment and tape it in place (see diagram 5).
8. Use crayons, markers, or paints to decorate the snake. (Provide pictures of snakes for the kids so they can decorate their snakes accurately.)

You can also just use whole tubes!

Diagram 1

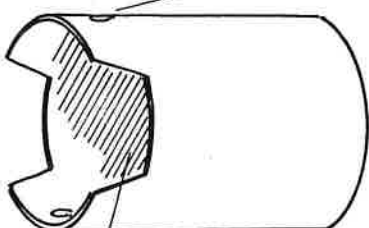


cut notches on both sides



punch holes

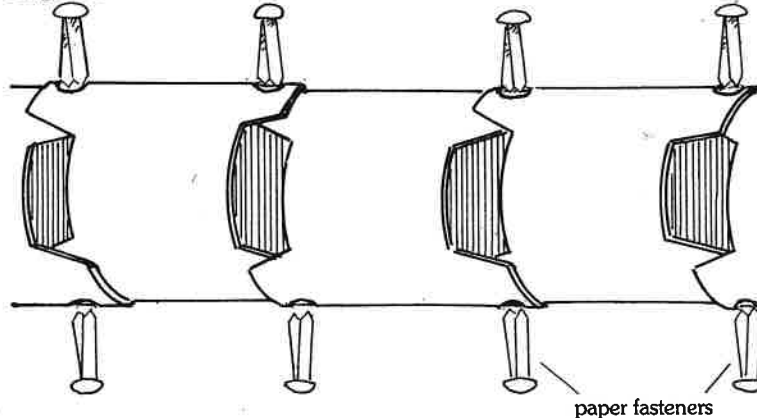
Diagram 2



cut notch

finished end piece

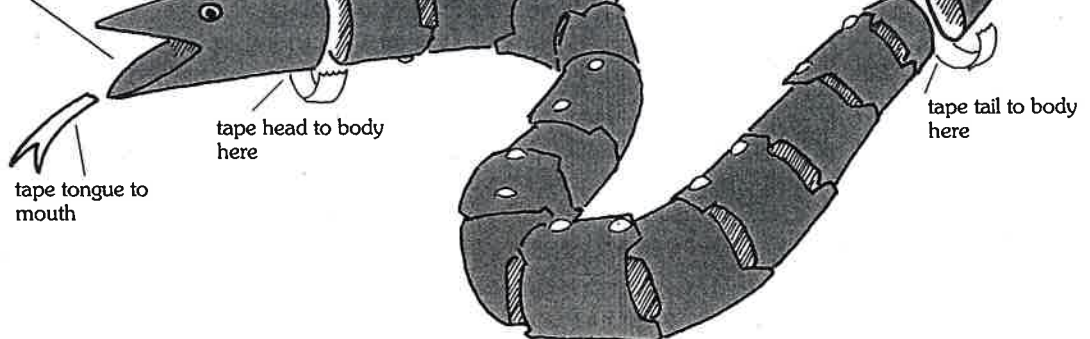
Diagram 3



paper fasteners

Diagram 5

cut mouth



tape tongue to mouth

tape head to body here

tape tail to body here

Diagram 4

cut

The Short Version of Hot 'n' Cool Herps

- 1) Cut out paper snakes + write a range of temps on them (one temp range/snake)
- 2) Tape the snakes to thermometers
- 3) Give a snake thermometer to each group
- 4) Have them find a location where their snake could survive.
- 5) Discuss

Hot 'n' Cool Herps - Ranger Rick's Nature Scope



Keep a "thermometer lizard" within a certain temperature range.

Objectives:

Define the terms cold-blooded, warm-blooded, ectotherm, and endotherm.
Describe the behaviors of some reptiles and amphibians use to regulate their body temperatures.

Ages:

Intermediate and Advanced

Materials:

- sunny day
- thermometers with metal backings
- slips of paper
- chalkboard or easel paper

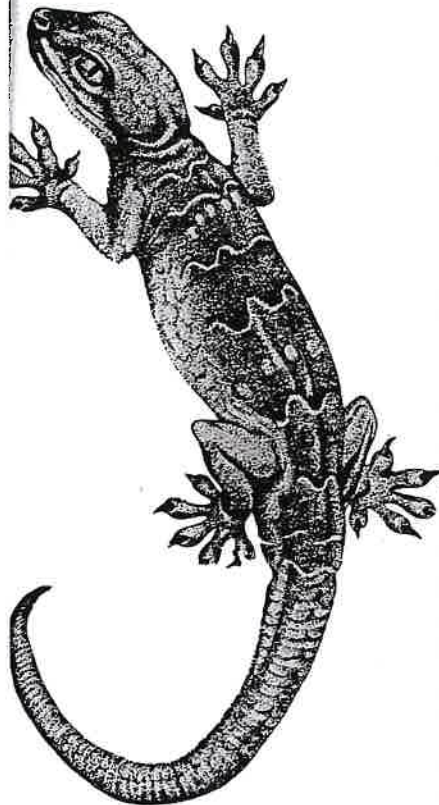
Some reptiles and amphibians keep their body temperatures within a "preferred" temperature range. For example, the desert iguana usually keeps its temperature between 104° and 106° F (40° and 41° C), and the rosebelly lizard's temperature usually doesn't vary more than a degree or two from 98° F (37° C). How do they do it?

Most herps use a variety of techniques, such as basking in the sun when cool and retreating to shade or burrowing underground when hot, to stay within their preferred range. In this activity your kids can use "thermometer lizards" to discover for themselves how herps control their body temperatures. (Note: This activity will work best on a sunny day.) Here's how to do it:

GETTING READY

1. Choose an area with a mixture of sunny and shady places. There should be enough room for the kids to spread out. Take temperatures around the area to find the lowest and highest temperatures. Allow enough time for the thermometer readings to stabilize (about two minutes) before you record the temperatures. (Note: The highest and lowest temperatures should be taken no more than one hour from the time that the kids start using their thermometers.)
2. Next decide on a series of five-degree temperature ranges. The lower limit of the first range should be five degrees below the coldest temperature you recorded. (For example, if your lowest temperature was 60° F, the first range would be 55-59° F.) Continue making

Subject:
Science



Indian house gecko

non-overlapping five-degree ranges until you've reached a temperature that is five degrees warmer than the highest temperature you recorded (see example in lower margin).

3. Assign each temperature range to an imaginary lizard (for example, Lizard A would have a temperature interval of 55-59° F). Then copy each lizard's let-

ter and its temperature range on a separate slip of paper.

4. Later you'll assign a range to each pair of kids in your group. If you have a large group, you can assign more than one pair to a range. And if you have more ranges than pairs of kids, leave out some of the middle ranges.

INTRODUCING YOUR KIDS TO THE LIZARDS

Use the information under "External Energy" on page 3 and the information under "The Ups and Downs of Temperature Control" on page 12 to discuss the terms *cold-blooded*, *warm-blooded*, *ectotherm*, and *endotherm* and how they relate to amphibians and reptiles. Then divide the kids into pairs and tell them that each pair will pretend their thermometer is a different type of lizard. Also explain what a preferred temperature range is and what happens if a lizard gets too hot or cold. Be sure to point out that although many herps have a preferred range, the kids will be focusing on lizards because they're some of the "best" temperature regulators. But also explain that not all lizards have a narrow preferred range.

Next give each team a thermometer and one of the lizard slips that you made earlier. Tell the kids that they will be going

outside to try to find places where they can keep their lizards within their preferred range.

Ask the kids if they can think of some ways to regulate their lizard's body temperature. (Encourage them to be creative, but don't tell them what techniques to use.) The kids may come up with ideas such as putting the thermometer in direct sun; alternating it between shade and sun; keeping it in cool, shady areas; putting it underground; or looking for areas with no grass that will be very hot.

Also point out that, depending on their lizard's range, they'll probably have to use different techniques to stay within range. Some teams might be able to find one spot and stay there, but others may have to move from place to place to keep their temperatures in range. And some may not be able to stay within their range at all.

SETTING UP TEMPERATURE RANGES

lowest temperature
measured: 60° F
highest temperature
measured: 100° F

RANGES (° F)

55-59
60-64
65-69
70-74
75-79
80-84
85-89
90-94
95-99
100-104
105-109

LIZARDS IN ACTION

Have the teams spread out over the area and start taking temperatures. Emphasize that they should get their temperatures within their preferred range and keep them in range until time is up. (You may want to set a time limit of about 10 minutes for the teams to get within range.)

Give them these tips to follow as they take temperatures:

- Leave the thermometers in place for at least a minute so they will register an accurate temperature.
- Touch only the metal backing, not the bulbs of the thermometers.
- Keep the thermometers close to the ground or other surfaces to avoid taking air temperatures.

BACK INSIDE: WHO MADE IT?

Copy the chart in the upper margin of the next page on a chalkboard or piece of easel paper. Then fill in the information as a group, using the following questions to discuss what happened.

- Which lizards were able to stay within their preferred range? Have the "successful" pairs describe how they kept their thermometers within range.

(continued next page)

SAMPLE CHART

| LIZARD | RANGE (° F) | DID IT STAY IN RANGE? | WHERE DID YOU PUT IT? |
|--------|-------------|-----------------------|-----------------------|
| A | 55-59 | no | under a bush |
| B | 60-64 | yes | in shady grass |
| | | | |
| | | | |

Luise Woelflein



- Which lizards might have a tough time surviving in your area? (The ones with the lowest ranges probably couldn't survive above ground, and the ones with the highest ranges might find even the open areas to be too cool.)
- Depending on the time of year and where you live, some lizards may have been assigned temperature ranges as high as 120–124° F (49–51° C). Ask the kids if they think many real lizards have a preferred temperature range that's so high. (No. Most lizards can't

survive if their body temperature reaches more than 115° F [46° C]. And if they can, it's only for a short time.)

- If none of the teams tried less obvious techniques, such as placing their thermometer lizards underground or under leaves, take them back outside for another try after the discussion. For example, have them take temperatures at different ground depths, and see if the team with the lowest temperature interval could stay “in-bounds” by burrowing.

THE UPS AND DOWNS OF TEMPERATURE CONTROL

- Most amphibians and reptiles instinctively keep their body temperatures within a specific temperature range. This is called their *preferred range* or *normal activity range*. To be active (i.e., find and digest food, escape from predators, and so on) a herp must stay within this range. If its body gets too hot or too cold, the animal won't function as well as it should. And if its body temperature goes above a *critical maximum* or below a *critical minimum*, it won't be able to move at all and will eventually die from the extreme temperature.
- A herp's preferred temperature range

is related to where it lives. Reptiles and amphibians that live in cooler places, such as high altitude forests, have lower preferred ranges. And those with higher preferred ranges are found in warmer areas, such as deserts.

- In general, amphibians have lower preferred ranges than reptiles. And many amphibians don't keep their body temperatures as constant as some reptiles do.
- Many reptiles, especially some lizards, have narrow preferred ranges and behave in ways that keep their bodies at an almost constant temperature.

TEMPERATURE TACTICS

Different kinds of herps use different combinations of the “tactics” listed below to stay within their preferred range. For example, most snakes can't change color, but they do burrow and/or bask.

Sun and Shade: Alternating between hot, sunny areas and cool, shady spots is the most common way that reptiles control their body temperature.

Many amphibians also bask in the sun to warm up. But, since they are vulnerable to water loss through their skin, amphibians usually bask only if they're in a moist place where they can replenish lost water.

It's All in the Timing: Some herps are active only when the temperature is “right.” For example, many desert-dwelling reptiles are active at night or in the early morning to avoid scorching daytime temperatures.

Underground: Many amphibians and reptiles retreat to cool burrows when daytime

temperatures get too hot. They also go underground at night, when burrows are warmer than the air above ground.

Color Changes: By changing the color of their skin, many herps can adjust the amount of heat they absorb from the sun. (Dark surfaces absorb more of the sun's rays than lighter surfaces.)

Body Basics: Some reptiles adjust the position of their bodies to heat up or cool down. For example, marine iguanas press their bodies against warm rock to warm up after a cold swim. If they get too warm, they raise their bodies away from the hot surface and cool off in the breeze.

Water Dwellers: Turtles, frogs, and alligators may warm up in shallow water that has been heated by the sun. To cool off, they can move to deeper, colder water.

“Hot 'n' Cool Herps” was adapted with permission from an activity called “Cool It” by OBIS (Outdoor Biology Instructional Strategies).

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Project Wild adaptations

If you are already Project Wild certified, consider modifying some of the program to focus on snakes. Below are some simple adaptations.

Color Crazy (Project Wild pg 2)

- Use pictures of various snakes (green snake, copperhead, water snake) as examples of habitat-specific camouflage.
- Give the students different habitats, (desert, rainforest, temperate forest, the classroom, etc) and have them create a snake that could hide there.
- Use snakes as the examples for the Extension activities.

Interview a Spider (Project Wild pg 12)

- This one is easy – just interview a snake 😊

Oh Deer (Project Wild pg 36)

- Snakes need the same things a deer – so you can basically play the game the same way.
- Extension: instead of hunters taking deer, use either predators (hawk) or people collecting for the pet trade.
- Extension: include a road – in the middle of the playing field, set up a 3 foot wide strip – have adults or students be the cars – they just walk back and forth along the strip of road. If they touch a snake – the snake dies. You can vary the vehicle traffic patterns (rush hour, etc) and the speed of the “cars” – have students brainstorm ways they could help the snakes cross more safely

Quick Frozen Critters (Project Wild pg 122)

- Use Snakes and Hawks as the predator/prey system.
- Instead of freezing the students can ‘play dead’ as if they were hog-nose snakes
- You can also do away with the freezing aspect of this game entirely – and use the temporary habitat as fragments of forest or marsh.