



Scales, Scutes & Skins

Program Purpose:

The purpose of this program is to learn about adaptations of reptiles and amphibians while dispelling common fears about them through hands-on experiences with live animals.

Program Length: 1-1½ hours

Ages: Grades 1st - 12th

Maximum Number of Participants: 35

Objectives:

After completion of this activity students should be able to:

- Explain the difference between reptiles and amphibians
- Identify at least 3 adaptations of reptiles and 3 adaptations of amphibians
- Demonstrate proper herp handling techniques

Preparation:

Before the class arrives:

- Lay objects for “A herp never forgets” game on a table and cover them with a blanket.
- Put animals you will be using for the program into easily accessible containers (pillow case, clear plastic bucket with lid, etc.) or make sure that the animal room is unlocked

***Note: Do not leave animals unattended.** Either keep them locked in animal room or stay with them.

Basic Outline:

- I. Introduction (10 min)
- II. A herp never forgets game/discuss adaptations (30 min)
- III. Bring out Reptiles and Amphibians (40 min)
- IV. Threats to our amphibians and reptiles (5 min)
- V. Conclusion
- VI. Tour animal room (if time)

Materials:

- 1 Dry Erase Board and Marker
- 1 Spray bottle of water
- 1 Blanket
- 1 Photo of snake on tree
- 1 Coral Snake
- 1 Rubber snake in pillowcase
- 1 Snake skin (yellow)
- 1 Snake shed (clear)

1 Pair of sunglasses with lenses covered with waxed or tissue paper

Cartoons:

- Snake eating mouse
- Snake movements (3)
- Snake organs
- Snake tongue and Jacobson’s organ

Various turtle shells

1 Wooden snake jaw

1 Sponge

1 Slinky

1 Flipper

Frog metamorphosis toy (4 stages)

Pictures of different reptiles and amphibians

Introduction:

Have the students raise their hands if they like snakes, frogs, and turtles. Ask them why they think that these animals are not liked by much of population? Listen to their answers and explain that today they are going to be learning about reptiles and amphibians because they are often misunderstood animals but, that are very important to our ecosystems.

Ask them to picture a lizard and a frog in their minds. Ask them to name some differences between these two animals or, in general, reptiles and amphibians. Write these up on the board.

Reptiles: A group of animals evolved from amphibians.

- Have claws on their feet
- Dry skin covered in scales
- Lay shelled eggs on land
- Newly hatched reptiles look like a miniature version of the adults

Amphibians:

- Have clawless feet
- Moist skin
- Eggs they are shell-less and often laid in the water.
- Amphibian means “double life” referring to the fact that most amphibians go through metamorphosis before becoming adults.

Next, list different examples of reptiles and amphibians up on the board. Hold up the various pictures that correspond with each animal that can be found in the program box.

Reptiles: snakes, lizards, turtles, crocodiles and the tuatara

Amphibians: frogs and toads (grouped together by scientists), and salamanders. Newts and mud puppies fall into the category of salamanders.

Explain why the class is called “scales, scutes, and skins.” A **scale** is a plate-like unit on the skin of reptiles that helps protect them. A **scute** is any plate on a reptile including the belly plates on a snake and the plates that form a turtle’s shell. The reason **skin** is in the title of this class is because of the special adaptations of amphibian skin we will be discussing later in the class.

A Herp Never Forgets:

After you have finished the introduction, explain that you will be playing a game that will help you learn about some of the incredible adaptations of reptiles and amphibians. Explain that an **adaptation** is something an animal has or does to help it survive in its environment. Have the class split up into two teams. Instruct the students to choose a team name that has something to do with reptiles or amphibians. Give them about 30 seconds to choose a name. Next explain the rules of the game:

- Each team will be given 20 seconds to come to the front of the room and look at the items under the blanket. Students should try to remember as many of the items as possible and think of ways they might be related to reptiles and amphibians.
- While one team is looking under the blanket, all members of the other team must face the back of the room.
- After each team has had an opportunity to look at the items, you will begin calling on one team at a time to tell you what they can remember from under the blanket. You can keep score in several ways. For younger students you can give a point for remembering an item that was under the blanket and just have them guess how it is related. For older students, you may wish to give a point only if they can come up with some way that it is related. See **Appendix A** for a list of items and what adaptations they may represent.

After explaining all of the rules, play the game discussing each adaptation as you go.

For high school students you may want to skip the game and simply discuss adaptations using the materials from the game.

Live Reptile and Amphibians:

When you have finished playing “a herp never forgets,” explain to the students that next they will have an opportunity to meet some live reptiles and amphibians. Have the students sit either in a circle or rows with space for you to walk between (whichever you are most comfortable with). Make sure to tell the students that they need to follow directions during this part so that they do not scare any of the animals. You do not want to put yourself, the students, or any of the animals in danger.

As you bring out each animal, explain to the students the proper way of handling it:

- Students should wash their hands between groups of animals (turtles, snakes, frogs, salamanders) in order to prevent the spreading of disease. Also this will prevent the animals from thinking the student is food since many of our animals would eat each other in the wild.
- Before allowing the students to touch the amphibians, spray their hands with water. Explain that amphibians have very delicate skin. It is not covered with scales, fur, or feathers like most other animals. Many amphibians can breathe through their skin and the oils on our hands will clog their pores. Wetting our hands before we touch them will prevent this from happening.
- Snakes should only be pet in the directions the scales are lying, from head to toe, never against the scales.
- Students should not pet the snakes on or near the head, and they should not stare the snake in the eyes (human noses make good targets).
- When handling the turtles, students again should not touch near the head.
- **DO NOT** let the students hold or touch the snapping turtle.
- If students feel uneasy about handling the animals, reassure them and allow them to watch their classmates, but don’t force them to handle the animals.

While the students are handling the animals, have them discuss the specific adaptations the herps have (see Appendix B). This is also a good time to answer any questions they have.

Threats to our Amphibians and Reptiles

These animals are very important to our ecosystem but, many people think of them as pests and gross. Ask the students if they think of ways that they are important?

- Play important roles as predators and prey
- Keep insect and rodent populations in control
- Indicator species of local environmental conditions
- Aesthetics

Ask the students that if they had to guess what the biggest threats to Wisconsin's amphibian and reptiles, what would they think they are? Some answers could be habitat loss, roads and automobiles, increase of predators, invasive species, climate change, pollution from a variety of sources (mercury, acid rain, salt, nutrient loads, and fossil fuel spillage).

- Five of Wisconsin's eleven turtle species are listed as endangered or threatened (Blanding’s turtle, wood turtle, midland smooth softshell turtle, ornate box turtle, false map turtle)

- 12 species of snakes are listed as endangered threatened, or are of special concern (eastern massasauga rattlesnake, northern ribbon snake, queen snake, western ribbon snake, Butler's garter snake, western worm snake, yellow-bellied racer, timber rattlesnake, northern ringneck snake, black rat snake, bullsnake)
- There is one endangered amphibian (Blanchard's cricket frog) in Wisconsin and two of special concern (bullfrog and four-toed salamander).

Until 1975 there was a bounty (a fee paid to people who kill "pest" species) in Wisconsin on rattlesnakes, paying up to 5 dollars a tail. In 1975 the bounty was lifted and the massasauga was placed on the Wisconsin endangered and threatened species list.

Explain that there are some ways that they and their family can help protect Wisconsin's amphibians and reptiles. Here's how.

- Leave fallen trees and woody debris along the edges of prairies and in prairie open areas. As leaves and trees decompose they provide lizards with valuable nesting and feeding areas.
- Leave fallen trees in place along shorelines so turtles have places to bask in the sun.
- Be on the lookout for reptiles crossing roadways.
- Leave wild animals in the wild! Don't try to bring a turtle or lizard home as a pet.
- And, don't let your dog or cat run free where they can kill wildlife. Keep them on a leash.
- Help scientists out monitor these animals by helping with inventories
- Report deformed animals that you find.
- Prevent soil erosion by seeding for grass or planting shrubs.
- Avoid dumping chemicals down drains.

Conclusion:

Answer any last questions that the students have and ask some review questions:

- What are some differences between reptiles and amphibians?
- Why are reptiles and amphibians important?
- Name some species that are of special concern in Wisconsin?
- What are some ways to help these animals?

Tour Animal Room:

Sometimes there will be time left at the end of class depending on how many questions the students ask. During this time, if there is another adult present, have them supervise the other students while you tour the animal room with about 3 kids at a time. Make sure students do not touch things in the animal room. While students are touring the animal room the others can

inspect the "herp never forgets" items again, or begin washing their hands.

Make sure all of the materials from "a herp never forgets" are returned if they were passed around. Give the students time to wash their hands.

References:

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- Hammerson, Geoffrey A. (1999). Amphibians and Reptiles in Colorado. Niwot: University Press of Colorado.
- Harding, J. H. (1997). Amphibians and reptiles of the great lakes region. Ann Arbor: University of Michigan Press.
- National Wildlife Federation.(1997). Let's hear it for herps. McGraw-Hill: Learning Triangle Press.
- Wisconsin Department of Natural Resources website (2006). Environmental Education for Kids (EEK!). <http://www.dnr.state.wi.us/org/caer/ce/eeek/critter/amphibian/index.htm>

Appendix A

A Herp Never Forgets

Cartoon of snake eating mouse – shows how a snake can unhinge its jaw and open to 180 degrees to fit prey animals into its mouth whole. Each side of the lower and upper jaw can move independently to work the food down into the throat.

Flipper – shows the webbed feet of some amphibians (no claws though) which are useful in swimming.

Frog Metamorphosis Toy (4 stages) – An example of all amphibians starting their life in the water. The obvious part of metamorphosis is the formation of four legs in order to support the body on land. But, there are several other changes.

- The gills are replaced by other respiratory organs
- The skin changes and develops glands to avoid dehydration.
- The eyes get eyelids and adapt to vision outside the water
- An eardrum is developed
- In frogs and toads, the tail disappears

Goggles – some amphibians have transparent eyelids, which come up from the bottom of the eye. These lids work as a pair of goggles so they can see underwater while they are swimming.

Photo of snake on tree – shows the ability of snakes to use their scutes to climb up trees. The scutes act like tire treads, gripping the ground and giving the snake the traction necessary to push itself forward and protect the snake as it moves along rough surfaces.

Rubber snake – using a rubber snake you can discuss how to tell if a snake is poisonous or not. One way to tell is by the shape of their pupils. Vertical pupils (slit-like) indicate a poisonous snake while round ones do not. Coloration can also be an indicator for some species. For example, the red by yellow is a common way to recognize the poisonous coral snake, while red by black appears on the harmless corn snake, even though both can contain red, yellow, and black. It is important to note however, that not all poisonous snakes have these colors.

Ask the students how many poisonous snakes are found in Wisconsin. Have them show with their fingers. There are only two the timber and massauga rattlesnake. There has only been one rattlesnake reported death in Wisconsin since 1900.

Rubber snake in a pillowcase – this shows the proper way of transporting a snake, so that it cannot escape and it feels safe. Make sure the top of the pillowcase is

twisted before the knot is tied so the snake cannot crawl up into the knot and strangle itself. It is sometimes fun to have a volunteer from the audience pull the rubber snake from the pillowcase.

Slinky – used to represent motion of snakes. *Use the snake laminated cards to show how snakes move in several different ways.* They can push off nearby rocks and sticks to propel themselves (serpentine), they can coil and spring (concertina), they can move sideways (sidewinders), or they can crawl like a caterpillar. This is a good time to have the students move like a snake. Have them lie on their stomachs while holding their legs behind them with their hands on their ankles. Now have them move to a certain point in the room. This is good for some laughs, plus it will help students realize how useful scutes are.

Snake skin – the snake skin will show the color that the snake was (it contains pigment) while a shed will not. The only way to get the skin is to take it off of the (dead) snake.

Snake shed – use this to compare to the snake skin. Use the shed to demonstrate how a snake crawls out of its skin when it grows. The snake shed is inside-out when the snake is done crawling out. The snake will begin shedding by snagging the skin around their head on a rough object (log, rock, etc...) and then begin crawling out of its skin. All amphibians and reptiles shed their skin, but many amphibians will eat the skin after it is shed! This is another way to determine if reptiles are living in the area that you are exploring.

Snake tongue and Jacobson's organ – snakes smell using their tongues. When a snake flicks its tongue out, it brings a scent back into its mouth and inserts the tips of its forked tongue into the two little holes in the roof of its mouth called the Jacobson's organ. This is how the snake smells.

Sponge – this is used to represent an amphibian's skin. Amphibians have unusual skin because unlike fish, reptiles, birds, and mammals, amphibian skin has no covering of scales, feathers, or hair. Amphibian skin contains numerous glands, the two major kinds being mucous and poison glands. The mucous glands help to keep the skin moist, even slippery to help escape from predators. One way that amphibians regain moisture in their body is by sitting in water or sitting in damp soil, absorbing water through their skin like a sponge! The poison glands will secrete during stressful situations.

Sunglasses with lenses covered – these are to show that snakes are blind while they are shedding. Snakes have no eyelids, so when the skin on their heads is ready for shedding, the skin over their eyes also begins to separate, thus they cannot see through this layer of skin.

Turtle shells – show the turtle shells (2 snapping, 2 box turtles). Both shells (the carapace-top and plastron-bottom) are actually made of many fused bones. The scutes, are made of keratin, do not precisely overlap the bones. Instead, they are staggered, which helps give the shell more rigidity. The shell will help protect the turtle. Most turtles cannot close their shells all the way, but box turtles have a hinge that allows them to close their shell further than other turtles (a good defense since they live on land and cannot swim away from their predators).

Wooden snake jaw – shows the backward angle of teeth that holds prey in the snake’s mouth. These curved teeth facilitate snaring and moving prey into the mouth and resist slippage as swallowing proceeds.

Demonstrate the retractable fangs in poisonous snakes. The fangs are hinged and are folded back when not in use. They can be rotated together or independently during a strike. This action is lightning fast and can be described as more of a stab than a bite.

Appendix B

Specific Animal Facts

Common Garter Snake – Garrett was found along with his former cage-mate basking on a rock between Varney and Ranger Mac cabins. This feisty snake ate his former cage-mate during feeding time one day after they had been living together for years.

Habitat: It is found in every county of the state and in nearly every habitat type, although they have a preference for forest and woodlot edges.

Food: They will eat earthworms, frogs, toads, salamanders, fish, and insects.

Gender: The female common garter snake is usually much larger than the male.

- They have many predators including large fish, bullfrogs, snapping turtles, other snakes, birds, foxes, raccoons, bears, dogs, cats, and pigs.
- They defend themselves using speed, anal musk, and camouflage.
- Wisconsin's most abundant snake. They can sometimes be found communally "denning" in very large numbers.

Corn Snake – Cornflakes is on loan from Ryan Walden. These snakes usually live to be about 20 years old in captivity if properly cared for. He was born in 1986.

Habitat: Corn snakes may be found in wooded groves, rocky hillsides, meadowlands, woodlots, barns, and abandoned buildings. They are very secretive and spend most of their time underground prowling through rodent burrows. They also often hide under loose bark and beneath logs, rocks, and other debris during the day.

Food: Young hatchlings tend to feed on lizards and tree frogs, while adults feed on larger prey, such as mice, rats, birds, and bats.

Gender:

The most foolproof way it to “probe” the snake in the vent area to figure out if it is a female or a male in which a hemipenes will be found. Only a professional should attempt this!

Another way is to examine the "tail" area - from the vent back to the most posterior part of the snake, you may see larger bulges in the male due to the hemipenes just behind the vent. The male's tail will also generally be slightly longer and broader at the vent because of these organs. Lastly, the males may be thinner overall than the typically more bulky females.

- Not naturally found this far north.
- They are extremely popular pet snakes.
- The name corn snake is believed to have originated from the similarity of the markings on the belly to the checkered pattern of kernels of maize or Indian corn.
- They are also sometimes called the red rat snake

Painted Turtle – Timmy has been at Upham Woods since 2000? Gomez was a pet turtle that was given to us about 2003.

Habitat: The painted turtle is the most common turtle in Wisconsin. They are found in marshes, ponds, shallow bays in lakes and even in the backwaters of some rivers.

Food: Turtles are toothless. They have sharp, horny beaks, kind of like a bird beak. They can grab and slice food. Painted turtles like to eat aquatic plants, snails, crayfish, insects, and small fish as food.

Gender: On male turtles, the vent is located beyond the rear edge of the carapace with tail extended and has very long claws on the forefeet. The female turtle vent is at or inside the rear edge of the carapace and claws on forefeet are relatively short.

- The painted turtle is the most common turtle in Wisconsin.
- Painted turtles spend lots of time basking in the sun on logs and on mats of floating plants. This helps

them keep warm, speed egg development, digest food, and maintain their shells.

- When courting a female turtle, the male uses his long claws to stroke her head and neck to entice her.
- The sex of the hatchling turtle depends on the temperature that the egg was incubated at. Males need incubation of 25-27 degrees C and females need incubation of 30-32 degrees C.
- 11 species of turtles in Wisconsin, 55 native to the U.S., and 260 worldwide
- Turtles are believed to be one of the longest living creatures alive, some live to be over 100 years old!

Common Snapping Turtle – Egor is a long-time Upham Woods resident who cannot be released.

Habitat: Snappers can be found in most aquatic habitats throughout Wisconsin. But, they seem to prefer ponds, lakes and the backwaters of rivers.

Food: It eats mostly aquatic animals and plants. But, a snapper will eat almost any animal it can catch. Slow-swimming, small fish, or fresh dead fish are also on the menu.

Gender: Male turtles anal opening farther from base of tail than in female. The female anal opening is under the rear edge of the carapace. Males grow larger than females.

- The common snapping turtle is Wisconsin's largest and heaviest turtle species.
- Snapping turtles lay from 30-80 eggs
- Raccoons, foxes, and skunks eat many of their eggs resulting in a 60% to 100% loss of eggs before hatching.
- His neck is as long as his shell.
- Turtles swallow their food under water.

Eastern Tiger Salamander – Sal was found by a naturalist in the spring of 2006 and brought to Upham Woods to replace Manders, the previous resident salamander who had passed away. Tiger salamanders have been known to live over 20 years in captivity.

Habitat: They don't just hang out in wet areas though. They burrow under leaf litter or underground in burrows of crayfish or mammals. They live in prairie ponds, marshes, lakes, woodland ponds, and even farm ponds in central to southeastern Wisconsin.

Food: They're voracious eaters, quite like the tiger (mammal), except their prey is earthworms, small mice and other amphibians. Grasshoppers, moths, flies, spiders, beetles, and cicadas beware!

Gender: Male tiger salamanders are slightly larger in body size and have considerably higher and longer tails than females. The male also has longer, stouter hind legs than the female.

- This salamander is the world's-largest land-dwelling salamander.
- Tiger salamanders have poison glands on the upper side of their tails. Some may raise and thrash their tails while others display no defensive behavior.
- The tiger is somewhat of a chameleon, its colors and pattern can change throughout its lifecycle. The young are definitely spotted and as they age the spots turn to bars (like the tiger cat) or irregular blotches. Adults have a dark brown or dark green coloration with spots, bars, or irregular blotches that can be dark brown to yellow-green or yellow-gold.
- Look for them in early March to mid-April after the ground thaws and the weather warms. Salamanders are on the move during the first warm, hard, and long nighttime rain. Tiger salamanders usually crawl across roadways and fields in groups when they're ready to breed, heading for the nearest breeding pond. This can cause hazardous road conditions for drivers. pond until an evening brings warm and hard rainfall.

Eastern American Toad – It is unknown where or when T.J. was acquired.

Habitat: Common in a variety of habitats from prairies to forests... wherever there are insects, moisture, and a variety of shallow waters for breeding.

Food: Toads eat a variety of invertebrates, especially ants, beetles, slugs, spiders and mites.

Gender: Breeding males have dark colored throats, of black or brown, while females have white throats and are lighter overall. Also, female American toads are larger than male American toads.

- Their thick skin, which traps in body fluids better than most amphibians, allows toads to live greater distances from water than most frogs
- Toad tadpoles form schools, also unique among Wisconsin frogs
- Some people call these common creatures "hop toads", and they do indeed move about in short hops rather than long leaps.
- Lay eggs in long strands, unique among Wisconsin amphibians

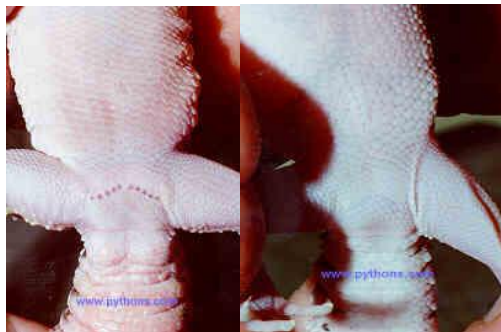
Leopard Geckos – The Leopard Geckos were given to Upham Woods in the summer of 2006 by a naturalist to be used as a teaching tool. At that time they were 10 years old.

Habitat: Leopard geckos are found in dry areas such as India, Pakistan, Afghanistan, Iraq, and Iran where they are native. They prefer rocky desert and semi-arid grassland over open stretches of sand. They're crepuscular (becoming active at twilight or before sunrise) and nocturnal, spending the daytime in rock crevices or burrows.

Leopard geckos are named after the leopard because the adult geckos have spots. These spots and their coloration allow them to blend in with their native environment. Leopard geckos are members of the sub-family Eublepharinae, or the eye-lidded geckos. Many geckos lack eyelids, but the leopard geckos' are movable, which allow them to blink and close their eyes while sleeping. Toe pads, which are useful in climbing vertical walls and glass, are not present in the leopard gecko. Instead they have tiny claws on the end of their toes.

Food: Leopard Geckos are carnivorous. In the wild they eat insects, spiders, smaller lizards, birds, bird eggs, and fruit. Here at Upham they eat mostly crickets, mealworms and occasionally, pinky mice.

Gender: Males generally are stouter with a slightly broader head and thicker neck than females. Males have a V shaped row of pre-anal pores which exude a waxy secretion. Males also have hemi penile swelling at the base of the tail.



Male

Female

Cool Facts:

- They can live well over 20 years in captivity.
- Leopard Geckos store fat in their tails and can release their tail to distract a predator or escape from a deadly grasp.
 - A muscular spasm separates the tail from the body.
 - Specialized muscles then clamp the blood vessels so hemorrhaging doesn't occur.
 - A newly lost tail twitches violently until the nerve impulses run down. Providing a distraction and allowing the gecko to escape.

- After several weeks a new tail will grow. However, it will never be as attractive as its original tail.
- Geckos can see better than any other lizard.
- The gecko family, as traditionally defined, includes more than 700 species-20% of the world's living lizards.
- Another interesting feature of the leopard gecko is the ear - due to the auditory system structure, when viewed from the side, light shines right through the gecko's head

Appendix C Frequently Asked Questions

Can you tell how old a turtle is by his shell?

As a shell grows, the number of scutes generally does not change, but their size does. In some turtles, old scutes are shed and replaced by larger, new ones. In other species, including box turtles, tortoises, and wood turtles, scutes enlarge in diameter as new keratin is laid down. The "growth rings" in scutes have been used by some experts to help determine the age of a turtle. Age estimation based on growth layers, however, can be erroneous for several reasons:

- Some turtles produce multiple growth zones per year.
- Growth is determined by changes in the environment (seasons), so age determination by examination of growth rings would be more accurate in wild turtles, than those kept in environments, which do not change significantly.
- Growth layers may wear with age, so older turtles may be estimated to be younger than they really are.

Where do turtles go in the winter?

Ten of Wisconsin's 11 turtle species spend the winter under water. Some bury themselves under the bottom while others lie on the bottom and remain motionless. Recent studies show that many turtles don't actually hibernate. They remain semi-active, moving about during the winter. Because winter takes a toll on body reserves, many species begin to emerge as soon as the ice starts to melt around lakes, ponds, and streambanks. Turtles will come to bask on sunny days in early spring when air temperatures near 50 degrees Fahrenheit. Of course, the ice has to have melted enough so that they can get to the shoreline.

Where do the animals go for the winter?

Since cold-blooded animals can't warm themselves up, they need to find a way to protect themselves from the cold. Frogs and turtles bury themselves in the mud below the frostline. They get oxygen from air trapped in the mud. In the spring when the sun warms the mud, out they'll come. Some snakes head underground to

hibernate, others gather together in sheltered places, like rotted out logs.

So what's the difference between a frog and a toad?

There are no hard and fast rules, but in general: Toads have dry, warty skin and relatively short legs for hopping. Frogs have smooth, damp skin and long legs for swimming or leaping.

Can toads *really* give you warts?

Toads do not give people warts. Amphibians have many glands in their skin, and several species produce highly toxic secretions for protection. Toads do secrete a substance from the skin that can be very irritating if it comes into contact with mucous membranes like the eyes, nose, mouth, etc.

How do frogs make their calls, or "ribbets"?

In some species, such as Spring Peepers, the lower part of the mouth can become a large resonating vocal sac. When the frog closes its mouth and nostrils, and then forces air from the lungs over the vocal chords, the sac inflates and vibrates like a drum, producing long, loud trills. Other species just produce calls with the vocal chords.

Why do frogs call?

Frogs and toads make a variety of sounds, depending on the situation. The most common are "advertisement" calls, and "alarm" calls. Frogs and toads advertise their presence either to ward off challengers to their territories, or to attract mates. Alarm calls serve to startle predators.

How fast can a turtle go? The average turtle swims at a pace of 10 to 12 mph and walks at 3 to 4 mph.