

Eco-Meet 2017
Herpetology
STUDY PACKET



Reed Creek Nature Park and Interpretive
Center

South Carolina Common Core Standards

6.L.4: The student will demonstrate an understanding of how scientists classify organisms and how the structures, processes, behaviors, and adaptations of animals allow them to survive.

6.L.4A.1 Obtain and communicate information to support claims that living organisms (1) obtain and use resources for energy, (2) respond to stimuli, (3) reproduce, and (4) grow and develop.

6.L.4B.1 Analyze and interpret data related to the diversity of animals to support claims that all animals (vertebrates and invertebrates) share common characteristics.

6.L.4B.2 Obtain and communicate information to explain how the structural adaptations and processes of animals allow for defense, movement, or resource obtainment.

6.L.4B.3 Construct explanations of how animal responses (including hibernation, migration, grouping, and courtship) to environmental stimuli allow them to survive and reproduce.

6.L.4B.4 Obtain and communicate information to compare and classify innate and learned behaviors in animals.

6.L.4B.5 Analyze and interpret data to compare how endothermic and ectothermic animals respond to changes in environmental temperature.

7.EC.5B.4 Define problems caused by the introduction of a new species in an environment and design devices or solutions to minimize the impact(s) to the balance of an ecosystem.

8.E.6B.1 Construct explanations for how biological adaptations and genetic variations of traits in a population enhance the probability of survival in a particular environment.

8.E.6B.2 Obtain and communicate information to support claims that natural and human-made factors can contribute to the extinction of species.

Georgia Curriculum Correlations

S6CS4. Students will use tools and instruments for observing, measuring, and manipulating equipment and materials in scientific activities. S

6CS10. Students will enhance reading in all curriculum areas by (c) Building vocabulary knowledge

S7CS10. Students will enhance reading in all curriculum areas by (c) Building vocabulary knowledge, and (d) Explore understanding of new words found in subject area texts

S7L1. Students will investigate the diversity of living organisms and how they can be compared scientifically

S7L4. Students will examine the dependence of organisms on one another and their environments

S7L5. Students will examine the evolution of living organisms through inherited characteristics that promote survival of organisms and the survival of successive generations of their offspring; (b) Describe ways in which species on earth have evolved due to natural selection, and (c) Trace evidence that the fossil record found in sedimentary rock provides evidence for the long history of changing life forms.

S8CS2. Students will use standard safety practices for all classroom laboratory and field investigations.

S8CS10. Students will enhance reading in all curriculum areas by; (a) reading technical texts related to various subject areas, and (c) building vocabulary knowledge

Introduction: What is Herpetology?

—**Herpetology** - is the study of reptiles and amphibians

—**Herpeton** – Greek: to creep

—What are “herps”?

—Amphibians

—Reptiles



Herp Characteristics

- Reptiles and Amphibians are **ectothermic**.
- An **ectotherm** is an animal that regulates body temperature from outside sources, like sunlight or a heated rock surface. Conversely, mammals are endothermic. The turtle in the photo is basking in the sun on a warm rock to help regulate its body temperature.



Section I: Amphibians

A. Taxonomy/Classification

a. Kingdom: Animalia

i. Phylum: Chordata

1. Subphylum: Vertebrata

a. Class: Amphibia

i. Order Anura

ii. Order Caudata

iii. Order Apoda

B. Characteristics

a. Skin

- Amphibians lack scales. They have thin, glandular skin that produces mucus from mucus cells



Mucus
Cells

- The skin is moist and **permeable**: allows the transfer of oxygen and carbon dioxide to allow respiration (breathing). The permeability of amphibian skin also leads to the uptake of environmental contaminants

b. Reproduction & Life cycle

- They lay **anamniotic** eggs. These eggs lack a shell, and must be laid in or very near to water.
- **Metamorphosis**: the change of shape during an animal's life. Amphibians such as frogs and salamanders display this brilliantly. For example, the tadpole will develop back legs first, and then front legs. Around 6 weeks of life the mouth starts to widen. Sometime around 10 weeks the froglet's eyes start to bulge out and the tail begins to shrink and eventually disappear. When the lungs finish developing the froglet makes it's way onto the land and, Ta-da! It's an adult frog!



Anamniotic eggs (frog)

c. Feeding habits

- Insects, other amphibians
- Anything else that will fit into their mouths



C. Groups of Amphibians

- Salamanders



- Frogs and toads



- Caecilians



D. Frogs and Toads: Order Anura

a. General Characteristics

- Anura means “tailless”. As an adult they have NO TAIL!
- Elongated hind limbs. This means the hind limbs are longer than their front limbs. They are modified for hopping, jumping or swimming.



- **Communication:** Frogs and toads communicate with others of their species. Their "calls" fall into categories of attraction calls and aggression calls, as well as release calls, which are used by both males and females to signal non-readiness to mate.
 - Some frogs emit their attraction calls separately and others join a group in an immensely loud "chorus" of calls.
 - For some frogs, making a call inflates and pulsates a vocal sac located on their throat, which you can see in the photo:
- **Defenses:** Frogs have few defenses, so most are active at night.
 - Camouflage coloration allows them to sometimes hide in plain sight. Some change color to match their background.
 - Many play dead when approached by a predator, relying on most predators' preference for live food. Some frogs hop away, others may dive into the water. Some puff up to appear bigger. Others have toxins in their skin that make them less delectable to predators.
- **Estivation:** In summer and in warmer climates, frogs become inactive when weather conditions are too dry or too cold.
 - They go into a dormant state known as estivation, which differs from hibernation in that it's a shallower "sleep."
 - They burrow into mud or sand, or enter cracks or holes in logs and rocks, while some may hide under leaf litter or in abandoned burrows.
 - Some species develop a hard "cocoon" that locks in moisture.
- **Hibernation:** Frogs who live in temperate areas dig down into the soil or move into such places as caverns, abandoned burrows, a crevice in a log, under a rock, under leaf litter or debris, anywhere they think they'll be safe through the winter. They hibernate there, some of them up to eight long months



c. Habitat

- Frogs, including tree frogs, live near ponds, lakes and streams. If you live close to water or in an area with plenty of dew and rain, you'll encounter frogs.
- Tree frogs spend most of their time in trees or tall vegetation, while other frogs may be seen on the ground.
- If your environment is dry, you're unlikely to see amphibians. If any, they'll be toads, who are willing to move farther from water.
- Frogs are considered **bio-indicators** because their disappearance in an area indicates that something unhealthy is going on in the environment. When their populations decline, something has gone amiss. Their **permeable skin** absorbs toxins easily while in water and on land. When they start dying off, or develop mutations, scientists take note. Broadly speaking, where frogs are safe, humans are safe.



d. Frogs vs. Toads: How are they different?

• **Frogs:**

- Live near water
- Long tongues
- Have smooth, moist skin
- Narrow body
- Highly webbed back feet (tree frogs have toe pads)
- Have longer hind legs
- Take long high jumps
- Lay eggs in clumps

• **Toads:**

- May live away from water
- Short tongues
- Rough, dry bumpy skin
- Wider body
- Short, less powerful hind legs
- Can run or take small hops
- Lays eggs in chains

e. Common Frogs and Toads of GA/SC: Use a field guide such as Peterson's Reptiles and Amphibians of Eastern/Central North America, other field guides, or the internet for reference

- Green Tree Frog
- Gray Tree Frog
- Spring Peeper
- Southern Chorus Frog
- Southern Cricket Frog
- American Bullfrog
- American Toad
- Southern Toad

Frog Life Cycle



Frog eggs floating in a pond: these clusters of floating eggs are called "**egg masses**".
Frogs lay up to 4,000 eggs at one time!



Tadpoles hatch from the eggs and live in the pond.



The tadpoles turn into **Froglets**. The body shrinks and legs form.



The Froglet's tail shrinks, the lungs develop and the back legs grow and then we have a **Frog**.

E. Salamanders: Order Caudata

a. General Characteristics

- Most salamanders have four legs, a long tail, and a reduced skull.
- Larvae have external gills

- Usually found in moist or arid habitats in the northern hemisphere, most salamanders are small, some species can be very large.
 - The Chinese giant salamander can grow to 5 ft long.



- Live in or near water, or find shelter on moist ground and are typically found in brooks, creeks, ponds, and other moist locations such as under rocks.
- Salamander comes from the Greek work for “Fire Lizard”.
- Some species are aquatic throughout life, others take to the water periodically, and a few are completely terrestrial (live on land) as adults. They lay shell-less eggs (anamniotic eggs).
- Salamanders are capable of regenerating lost limbs within a few weeks, including tails and toes, allowing them to survive attacks from predators.

b. Common Salamanders of GA/SC: Use a field guide such as Peterson’s Reptiles and Amphibians of Eastern/Central North America, other field guides, or the internet for reference

- Spotted salamander
- Marbled salamander
- Tiger salamander
- Slimy salamander
- Red salamander
- Dusky salamander
- Eastern hellbender
- Two-toed amphiuma

F. Caecilians: Order Apoda

- Live in tropics (South America/Asia)
- Legless and blind, look like big earthworms



Section II: Reptiles

A. Taxonomy/Classification

a. Kingdom: Animalia

i. Phylum: Chordata

1. Subphylum: Vertebrata

a. Class: Reptilia

i. Order Chelonia
(Turtles)

ii. Order Squamata
(Lizards & Snakes)

iii. Order Crocodylia
(Alligators & Crocs)

iv. Order Rhynchocephalia
(Tuatara)



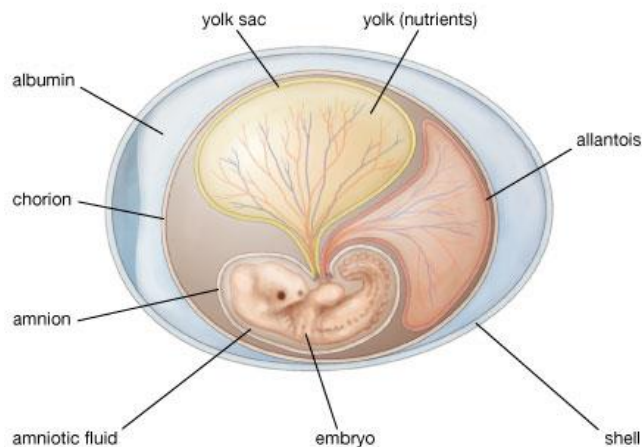
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B. Common reptile characteristics

a. General Characteristics

- Reptile skin is covered with scales which are made of keratin
- Reptiles lay an amniotic egg, which is shelled allowing reptiles to lay eggs on land

Amniotic egg



Close up of keratinized

b. Similarities

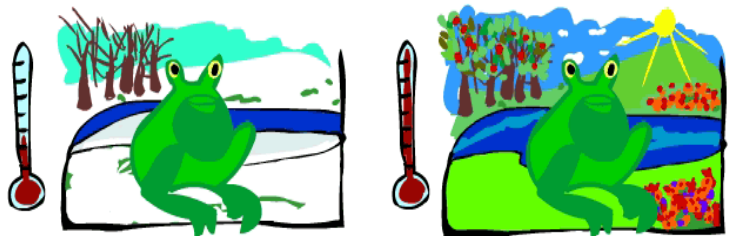
between

Amphibians and Reptiles

- Reptiles and Amphibians are **ectothermic**. Also known as “cold-blooded”.
- An **ectotherm** is an animal that regulates body temperature from outside sources, like sunlight or a heated rock surface. Conversely, mammals are endothermic. The turtle in the photo is basking in the sun on a warm rock to help regulate its body temperature. Basking must occur to help with digestion.
- They both have low metabolism which requires less energy to keep the body functioning
- Small body size
 - Having a small body size has its advantages, because having a large size takes longer to heat up (larger reptiles live in warmer tropical regions.)



Cold-blooded ANIMALS

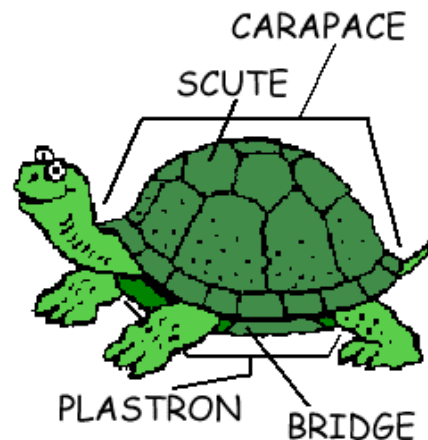


Body Temperature depends on whether its cold or hot outside.

C. Turtles (Order: Chelonia)

a. Characteristics

- They have a bony shell covered (or keratinized)
 - **Carapace**: top of the shell
 - **Plastron**: bottom of the shell
- Many turtle species (not all) can hide their heads inside



their shells when attacked by predators.

- Turtles have existed for around 215 million years.
- They have a 3 chambered heart
- The largest turtle is the leatherback sea turtle, it can weigh over 900 kg! (2000 lb)
- In some species of turtle the temperature determines if the egg will develop into a male or female, lower temperatures lead to a male while higher temperatures lead to a female.



- Young turtles make their way to the top of the sand and scramble to the water while trying to avoid predators.
- Sea turtles have special glands which help remove salt from the water they drink.
- Nearly all species of sea turtles are classified as



Endangered. They are killed for their eggs, meat, skin, and shells.

b. Common Turtles of GA/SC: Use a field guide such as Peterson's Reptiles and Amphibians of Eastern/Central North America, other field guides, or the internet for reference.

- Yellow bellied slider
- Eastern Box turtle
- River Cooter
- Diamond back terrapin
- Eastern Soft shell turtle
- Musk turtle
- Mud turtle
- Gopher Tortoise
- Common Snapping Turtle
- Loggerhead sea turtle
- Green sea turtle

D. Lizards and Snakes (Order: Squamata)

a. *Characteristics of Lizards*

- Four legs with five toes on each foot, although a few, such as the worm lizard and the so-called glass lizard, are limbless, retaining only internal vestiges of legs.
- Short body, long tail
- 2 lungs
- Lizards are also distinguished from snakes by having ear openings, movable eyelids, and less flexible jaws.
- Scaly skin and in most species, skin is molted in irregular patches.
- Some species of lizards have a weak tail. A small bump or tug will break it off. This will puzzle the predator, allowing the lizard to escape.
- Eat insects, while others eat plants, small animals, or even other lizards. Most lizards use their eyesight to look for food. Some use their sense of smell.
- Lizards have jaws with teeth. They also have teeth on the roof of their mouth
- Lizards can run, climb, and cling. A few can swim.
- Lizards live in deserts, forests, prairies, marshes, and rocky areas. Most lizards live on the ground or in trees.
- As in snakes, there is a chemosensory organ opening in the roof of the mouth. The tongue, which may be short and wide, slender and forked, or highly extendible, conveys particles from the environment to this organ.
- Members of several lizard families, notably the chameleons, undergo color changes under the influence of environmental and emotional stimuli.
- Reproduction: Fertilization is internal in lizards. In most species females lay eggs, which they bury in the ground.



b. Common Lizards of GA/SC : Use field guides such as Peterson's Reptiles and Amphibians of Eastern/Central North America, other field guides, or the internet for reference.

- Green anole
- Brown anole (invasive)
- Six-lined racerunner
- Five-lined skink
- Coal skink
- Ground skink
- Eastern fence lizard
- Eastern Glass Lizard
- Slender Glass Lizard

c. Characteristics of Snakes

- Physical characteristics:
 - 1 lung
 - Long body, short tail
 - No limbs
 - The skin is covered in scales, which is shed several times a year
 - Larger number of vertebrae than most vertebrates.
 - No ears or movable eyelids; the eyes are covered by transparent "spectacles", or ocular scales.
- Senses:
 - Snakes have good vision
 - They do not hear airborne sound waves, but can perceive low-frequency vibrations transmitted from the ground to the bones of the skull.
 - Snakes can smell with their nostrils, but their tongue can pick up tiny chemical particles.
 - The tongue is flicked out and brought back into the mouth into a special organ on the roof of the mouth. The special organ is called the vomer nasal system (Jacobson's organ).
- Movement: A snake moves by means of muscular contraction, which can produce several types of locomotion, the commonest types being undulation and straight-line movement.
- Reproduction:



- Fertilization is internal in snakes. Females of some species can store sperm for several years to insure future fertilization.
- In most species the female lays eggs; in some the eggs are incubated and hatched within the mother's body; in a few there is true viviparity, or live birth, with young nourished by means of a placenta rather than an egg.
- Some egg-laying snakes brood the eggs, but there is no parental care of the young.

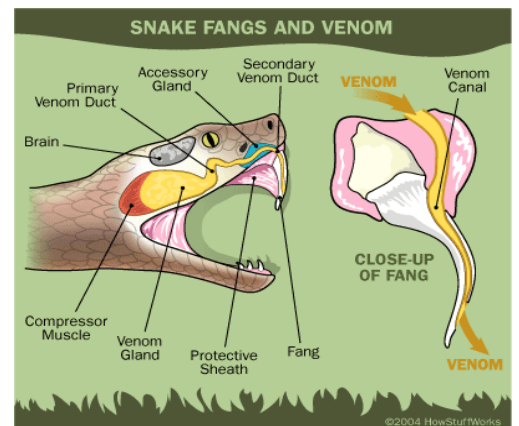


- Diet and feeding behavior:

- Small snakes feed on insects and larger ones on proportionately larger animals.
- Teeth are designed for catching and holding prey, but not for chewing.
- The construction of the jaws, the ribs, and the expandable skin enable them to swallow very large prey whole.
- Some snakes capture animals by pinning them to the ground; some—the constrictors—crush them by wrapping their bodies around them and squeezing; still others—the venomous snakes—inject poison into their victims.



- The **poison**, or **venom**, is produced by modified salivary glands from which it passes through either a groove or a hollow bore in the fangs, the enlarged, specialized teeth found in venomous snakes.



- A snake may bite a person when threatened or alarmed; if the snake is venomous the bite can sometimes prove fatal.
- Only by familiarity with the appearance of particular species, or by examination of the fangs, can the venomous snakes be distinguished from the harmless ones.

d. Common Snakes of GA/SC: Use a field guide such as Peterson's Reptiles and Amphibians of Eastern/Central North America, other field guides, or the internet for reference.

- Rat snake
- Corn snake
- Mud snake
- Black racer
- Eastern hognose snake
- Eastern Kingsnake
- Milk snake/scarlet kingsnake
- Red-bellied water snake
- Brown water snake
- Coachwhip
- Eastern Garter snake
- Rough Green snake
- Ringneck snake
- Eastern Ribbon snake
- Pine snake
- Copperhead
- Cottonmouth/Water moccasin
- Eastern Dimaondback Rattlesnake
- Canebrake/Timber Rattlesnake
- Pigmy Rattlesnake
- Coral snake

E. Alligators/Crocodiles (Order: Crocodylia)

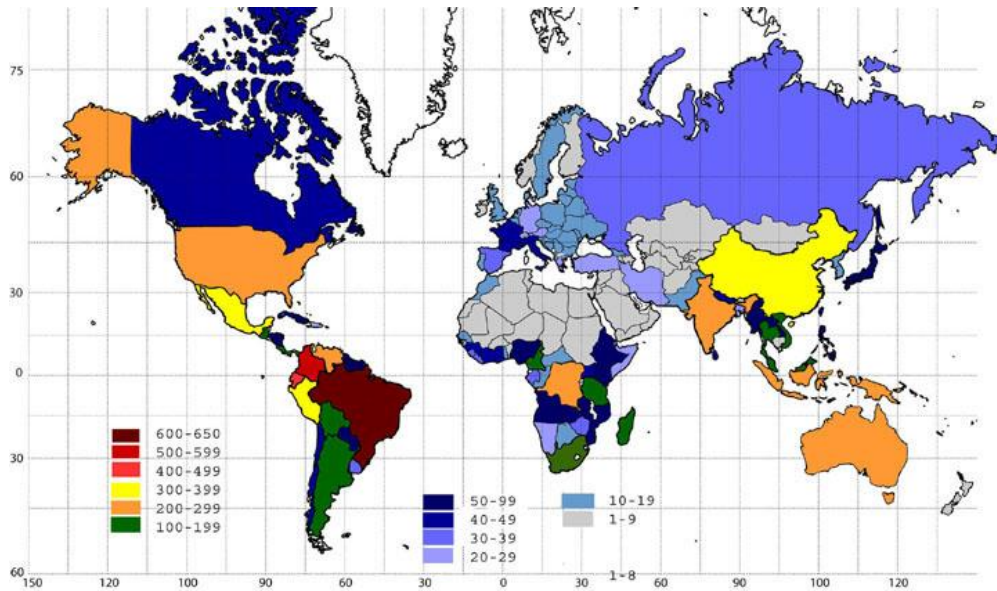
a. Characteristics

- These reptiles have a 4 chambered heart
- They have crop for the storage of food (like birds)
- They also have a gizzard that grinds up food (like birds)
- Their body is covered with scales called osteoderms (bony deposits forming scales)
- Powerful jaws



Section III: Herp Diversity

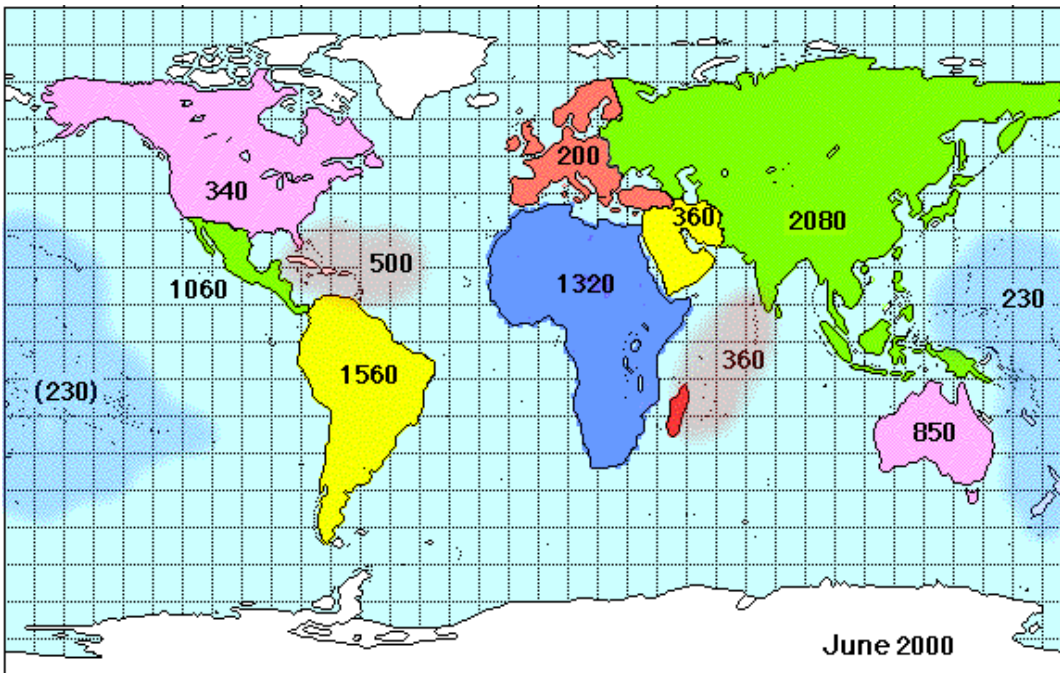
Amphibian species per Region:



Total Number of Amphibian Species per Country
Map by Tiwari, Gross, Vredenburg and Van der Meijden

- Amphibians need warmth and precipitation
- Tropics and Southeast US are hot spots for herps.

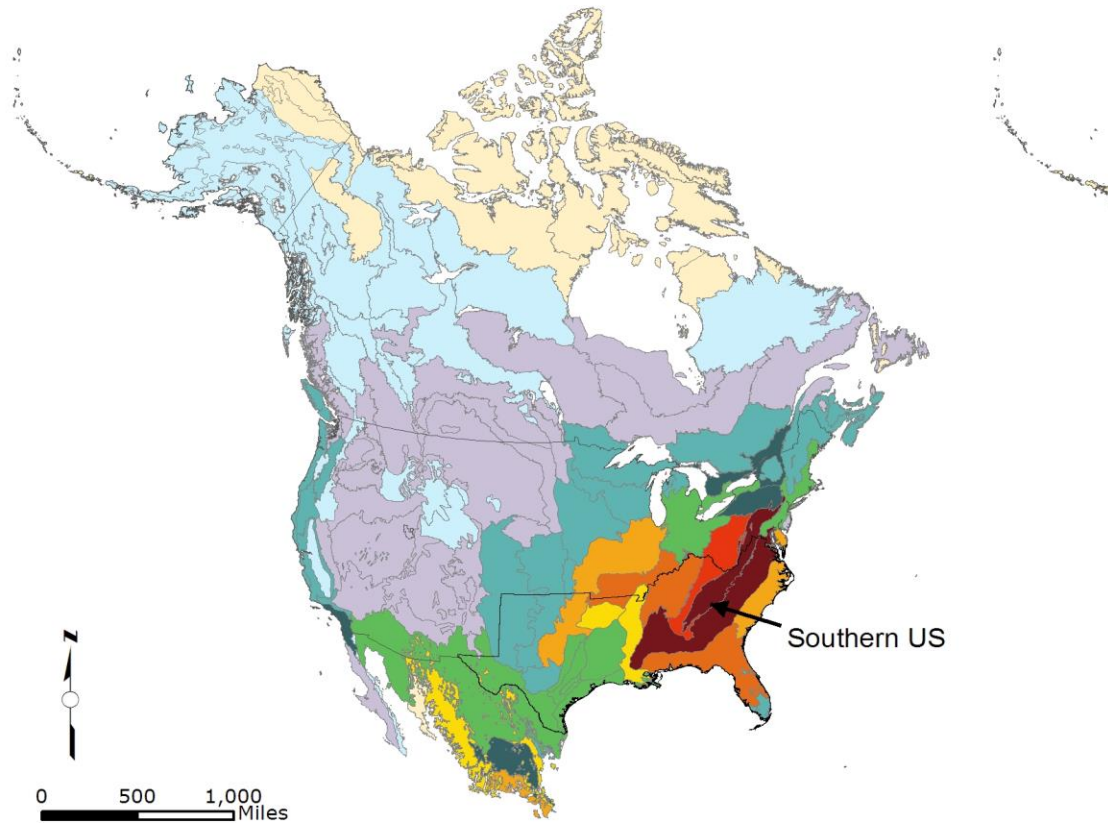
Reptile species per Region:



- Increase diversity in desert
- Can tolerate dryness
- Cannot tolerate colder temperatures

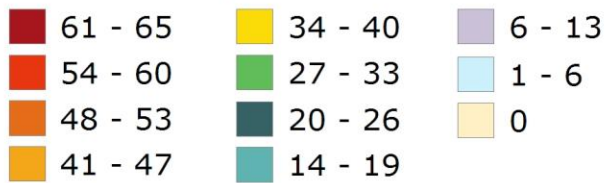
Section IV: Herp Diversity

Amphibian Diversity in the Southern United States



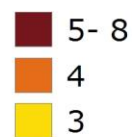
a. Amphibian richness of ecoregions

Number of species:



b. Amph

Number



Section V: Conservation

Threats

–Habitat loss

• **Habitat loss and fragmentation** are the primary causes of the decline of reptiles and amphibians. The loss of wetlands due to draining for development can deplete herp populations. Particularly isolated wetlands that are not connected to rivers, are not protected by law.

–Road mortality

• Vehicles kill countless reptiles and amphibians on roads every year. As habitats shrink more herps are found using roads to travel from place to place.

–Pet trade

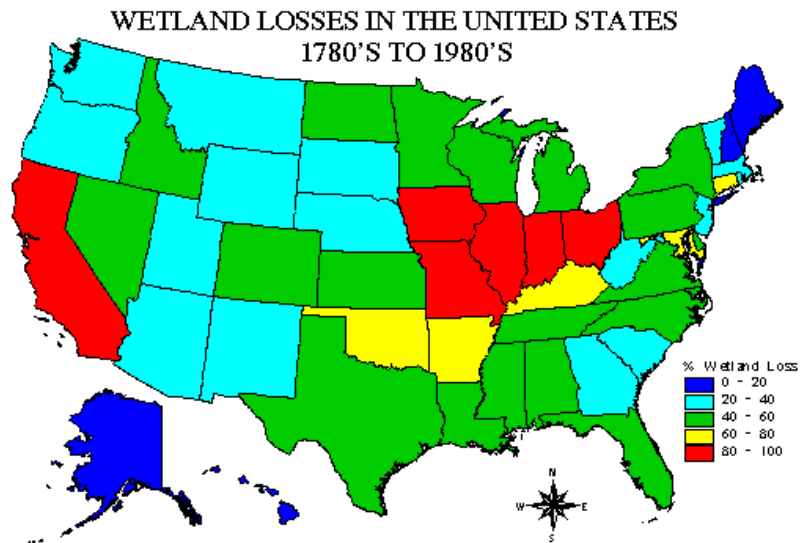
• Some reptile and amphibian species are illegally collected and sold in the pet trade. Poachers do significant damage, since the species they target generally are already very rare.

–Pollution

• Pollution is a serious threat to amphibians, which have moist, absorptive skin that quickly takes up any toxins in the environment. Amphibian eggs lack the protective shell that bird and reptile eggs have, and are more susceptible to toxins in the environment. Furthermore, amphibians rely heavily on aquatic habitats, which are often polluted due to leaching, runoff or intentional dumping of chemicals into lakes and streams.

–Invasive species

• Hogs prey upon herps
• Chytrid fungus: brought over to US by African Dwarf frog (hypothesis) and responsible for death of various species of amphibians. It primarily causes disorders of the epidermis (skin) of amphibians and can be fatal.



Other resources

The following resources may be used to enhance knowledge and interest in herps.

Eco-meet test questions will not be drawn from these sources but they may be helpful to study.

–Peterson Field Guides: Reptiles and Amphibians Eastern/Central North America

–Audubon Society Field Guide to North American Reptiles and Amphibians

–Smithsonian Handbooks of Reptiles and Amphibians

–Snakes of Georgia and South Carolina By Whit Gibbons

–srelherp.uga.edu/

–wwknapp.home.mindspring.com/GAFrog.Toad.html