



# Discovering Alabama

Teacher's Guide

## Red Hills Salamander

### Suggested Curriculum Areas

History  
Social Studies  
Science

### Suggested Grade Levels

4–12

### Key Concepts

Habitat  
Ecological Adaption  
Extinction

### Key Skills

Research  
Classification  
Communication

### Synopsis

The Red Hills Salamander (species name *Phaeognathus hubrichti*) is unique to the Red Hills region of Alabama. This species is a relatively recent discovery, being first identified by scientists in 1960. By the 1970s, the salamander's population was



determined to be in serious decline, and it was listed as a threatened species, although much remains unknown about this creature's habits, needs, and life history.

Continuing research is helping to increase our knowledge of the salamander and spur cooperative efforts for its protection. This video follows a team of research scientists as they go on an actual search for the Red Hills Salamander, conduct related laboratory work, and consider the ecological significance of such a special animal. Also presented are cooperative efforts by wildlife officials and private landowners to develop mutually acceptable strategies to conserve habitat for the Red Hills Salamander.



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## Before Viewing

1. Have each student write a brief description of what they believe are typical characteristics of a salamander. Encourage them to include their thoughts about salamander size, shape, habits, smell, feel, etc.

2. Take the class on a salamander hunt to find and examine a real salamander. Several salamander species are common across Alabama and can often be found burrowing in the moist humus of aging hardwood forests, under rotting logs, and sometimes even under flower pots or other such items outside the home or school building. (Be careful to also watch for snakes, spiders, and scorpions. The copperhead snake and the black widow spider, for example, are extremely poisonous.)

3. Once you have located a salamander, collect it, place it in a container of moist soil, and bring it to the classroom for further study. Divide students into small groups and have the groups take turns doing the following:

A. Examine and describe the captured salamander up close (this should be done by peering into the container—excessive handling can harm or kill salamanders) and discuss how the salamander’s actual features compare to the written descriptions from 1 above.

B. Using a field guide book about amphibians, determine how salamanders differ from lizards and skinks, and learn your captured salamander’s species name, range, and preferred habitat.

C. Discuss the possible role and importance of salamanders in nature.

4. After the groups have completed the above tasks, introduce the video by explaining that it is about a very rare species of salamander, newly discovered and seen by relatively few people.

## While Viewing

Have students watch for information indicating how the Red Hills Salamander is special/unique.

**Video Mystery Question:** How is an Alabama beach vacation often connected with the Red Hills Salamander? Answer: Many vacationers in route to coastal Alabama travel highways that traverse the Red Hills region of the state.

## After Viewing

1. Carefully return your salamander to its place of capture or to a similar setting. Have students compare this setting/habitat to the habitat of the Red Hills Salamander. Using nature field guides, determine the names, descriptions, and preferred habitats of several salamanders common in Alabama.

2. Reflecting on the video, discuss differing viewpoints about the importance of protecting rare species such as the Red Hills Salamander.

## Extensions

1. Have each small group of students conduct a “salamander study”; assign each group a particular salamander species found in Alabama and have them research their species to find out such information as: a) when the species was discovered and by whom, b) whether its preferred habitat has improved or declined over time,

c) the current status of its population, and d) who in Alabama is most knowledgeable about the species.

2. Invite a herpetologist, a specialist in herpetofauna (amphibians and reptiles), to visit the class for a discussion of salamanders and their role in nature.

## Philosophical Reflections

As the video presents, the habitat of the Red Hills Salamander is found only in the Red Hills region of Alabama. Here this salamander requires the cool shady cover of hardwood forests and the moist clay and silt-bearing soil of the Tallahatta geological formation. Timber harvesting and other changes in the Red Hills region have altered the delicate temperature and moisture requirements of the salamander’s habitat and caused the animal’s population to decline to the point of becoming a threatened species.

Meanwhile, many other creatures that live in the Red Hills region (squirrels and birds, for example) have not become threatened. One way these animals adapt to change in the region is by simply moving to new locations. However, the Red Hills Salamander is unable to do this because it is a less mobile animal entirely dependent upon a particular type of habitat that is very limited in range. Thus, the Red Hills Salamander is like a number of species that have become threatened or endangered partly as a consequence of being very specialized in their adaptation to nature. This fact has prompted some people to offer the observation that such species have invited their own demise by being incapable of adapting to change.

Is this an accurate observation? Is this a responsible observation? What differing assumptions might apply in determining whether this observation would be appropriate?

## Nature in Art

Many early naturalists are known for their artistic renderings of animals. The works of William Bartram, for example, include amphibians and reptiles native to Alabama and can be viewed in various books presenting Bartram's sketches.

Another, more recent rendering of nature sometimes recognized as a "work of art" is the colorful geological map of Alabama, available from the Geological Survey of Alabama (see **Additional References and Resources**). Not only is this map a beautiful portrayal of our state and a valuable guide to the diverse geological regions of the state, it is also a good tool for purposes of art in the classroom. Have your students examine the map to determine the boundaries of the Red Hills region and then identify the geological region of your part of the state. Create an enlarged county map colorfully replicating local geology. You might also wish to study how local variations in geology and related soils are associated with differing landscapes, forest types, and animal habitats.

## Community Connections

1. Though the Red Hills Salamander requires a very specialized habitat in a particular region, many salamander species can live in a great variety of settings as long as they have the general requirements of cool moist soil. Aging hardwood forests typically provide such soil conditions. Conduct a land survey of your community or county to determine areas of hardwood forest that are suitable for salamander habitat.

2. Unless your community is in the Red Hills region, there will be no Red Hills Salamanders in your

local area. However, it is likely that your area does have suitable habitat for other threatened or endangered species. Consult local authorities to find out about such species and their special requirements. Have students prepare public education materials (news articles, slide show, etc.) to help raise awareness about these species. Invite local conservation groups to work with the class in this project.

## Complementary Aids and Activities

**Project WILD.** K–12 Activity Guide. Activity "Here Today, Gone Tomorrow." Available through Alabama Department of Conservation and Natural Resources, 64 N. Union St., Montgomery AL 36130; phone: 334–242–3623.

**Project Learning Tree.** Environmental Education Activity Guide K–8. Activity #8, "The Forest of S.T. Shrew." Available through Alabama Forestry Association, 555 Alabama St., Montgomery AL 36104; phone: 334–265–8733.

## Additional References and Resources

Geological Survey of Alabama, *Geological Map of Alabama*. Order from P.O. Box 86999, University of Alabama, Tuscaloosa, AL 35486-9999; phone: 205–349–2852.

*William Bartram: Travels and Other Writings*, edited by Thomas P. Slaughter (1996).

## Parting Thoughts

*Ecologists say many trends and changes associated with modern society are affecting our environment in ways that threaten sensitive species and pose serious consequences for native natural diversity. But maybe such disturbance to our natural surroundings runs a risk of losing more than rare creatures like the Red Hills Salamander. Maybe there is a connection between vanishing landscapes and vanishing values. Perhaps the gradual disappearance of native Alabama countryside is linked with the gradual disappearance of many positive aspects of our southern outdoor heritage and traditions. You might want to consider this possibility next time you notice that today's youth often seem preoccupied with video games, shopping malls, and designer fashions.*

*Oh yeah, I almost forgot. Fortunately, many private landowners and industry leaders already recognize the broader values of maintaining our native natural heritage. This is why such folks have often taken voluntary initiatives to protect the habitat of endangered species. These people are deserving of our praise and appreciation for their responsible stewardship.*



*Happy outings,*

*Dr. Doug*



## Discovering Alabama

Activity/Information Sheet

### Red Hills Salamander

Biologists divide plants and animals into major groupings called phyla. Each phylum is divided into classes which in turn are subdivided into orders, orders into families, families into genera (singular: genus), and genera into species. The species (plural: species) is the basic unit of our classification system and is generally what people have in mind when they talk about a “kind” of animal. A species is a population of animals that possess common characteristics and freely interbreed in nature and produce fertile offspring. (If species cross breed, the hybrid offspring are usually sterile.) The scientific name of a species may consist of two or three Latin words; these words are always italicized. The first word, the genus, is capitalized while succeeding words are not. Often the last word is the latinized version of the discoverer’s name.

The Red Hills Salamander belongs to the phylum Chordata, which includes all fishes, amphibians, reptiles, birds, and mammals. Amphibians belong in the class Amphibia. As is true for all amphibians, salamanders, in the order Caudata, are cold-blooded vertebrates with characteristics that fall between fishes and reptiles. Superficially, salamanders resemble lizards in such characteristics as slender bodies, long tails, distinct body regions, and usually, front and hind legs of nearly equal size. As is common with related amphibians, salamanders have a moist scaleless skin, and lack the claws and external ear openings of the reptiles.

There are eight families of salamanders that live within North and South America, and the north temperate zones of Europe, Asia, and North Africa. Of these eight, seven families are found in North America:

- 1) **Cryptobranchidae** (Giant Salamander family);
- 2) **Sirenidae** (Siren family);
- 3) **Salamandridae** (Newt family);
- 4) **Proteidae** (Mudpuppy and Waterdog family);
- 5) **Amphiumidae** (Amphiuma family);
- 6) **Ambystomidae** (Mole Salamander family); and
- 7) **Plethodontidae** (Lungless Salamander family).

As a family, the lungless salamanders are characterized

by their ability to breathe entirely through their thin, moist skin. They are thought to have originated in eastern North America, and there are 23 genera and about 215 species, 80 of which occur in this range.

The Red Hills Salamander is a member of the lungless salamanders. Its genus is *Phaeognathus*, and the species is *hubrichti*; therefore, the Red Hills Salamander’s biological name is: *Phaeognathus hubrichti*.

The elusive Red Hills Salamander is between 4 to 10 in. long. The body is elongated, and the legs are very short. It is uniformly dark brown, and the males have many tiny glands on the tail and body. A nocturnal animal, the Red Hills Salamander feeds primarily on spiders and insects.

Although their breeding habits are largely unknown, it is thought that they mate on land in the spring. The male deposits spermatophores, jellylike pyramidal structures capped with a packet of sperm in a sheltered area. The female retrieves the sperm cap, and her eggs are fertilized as the caps pass through her cloaca. She then lays her eggs in a sheltered, moist cavity of earth or leaves. Because breeding takes place entirely on land, the resulting larvae bypass the aquatic stage and hatch as miniature replicas of the adults.

from: *The Audubon Society Field Guide to North American Reptiles and Amphibians*, (1979)