

Eastern Hellbender

Cryptobranchus alleganiensis



T.R. Russ

New River State Park

North Carolina Division of Parks

Introduction to Hellbenders

- Giant Salamanders, that live in the water.
- The second largest salamander found in North Carolina and the US.
- Also known as Devil Dogs or Allegheny Alligators, Mud Puppies, and Mud Dogs.
- Classified into two genera, one species of *Cryptobranchus* in North America, and two endangered species of *Andrias* in Asia.



Hellbender Identification

- Hellbenders belong to the Amphibian order Caudata, meaning “tailed ones”, the family name Cryptobranchidae, means giant salamander.

- The hellbender’s body and head are flat with a loose flap of skin, called “frill” along lower sides of the body. The frill increases the surface area of the skin, making it easier for the hellbender to get oxygen.

- Hellbenders range in color from gray brown to red brown, dark spots or mottled patches may also be present on its back. The belly is usually lighter and all one color.



Hellbender Basics

- Ranges between 12- 29 inches.
- Mature at about 5 or 6 years
- Female are larger then male.
- Grows very gradually at a rate of 2 cm per year.
- Diet is strictly carnivorous consisting of crayfish, snails, insects, and worms, mudpuppies and small fish.
- Have very poor eyesight; rely on smell and touch to locate their prey.



Anatomy & Physiology



Teeth

Not true teeth.
Boney Ridge

Anatomy & Physiology

Limbs

- Hellbenders short stout legs are adapted perfectly for its environment.

Gills

- When born larvae have gills.
- Gill slits located at the base of the throat replace the gills when the young reach 1½ years.



Skull

- Like other salamanders hellbenders lack any ear opening, so no outer or middle ear is present they are deaf to airborne sounds.

Anatomy & Physiology

Eye

- Adults lack eyelids. The eyes are small and poorly developed and are located on the top of its head and used to detect light,

Skin

- Numerous folds of skin create more surface area which aids in the intake of oxygen from which the Hellbender breaths.

- Extremely slimy due to mucous excreted by the skin, which helps from not being caught by a predator and not drying out quickly.

- Skin is slightly toxic not to be confused with being Poisonous.

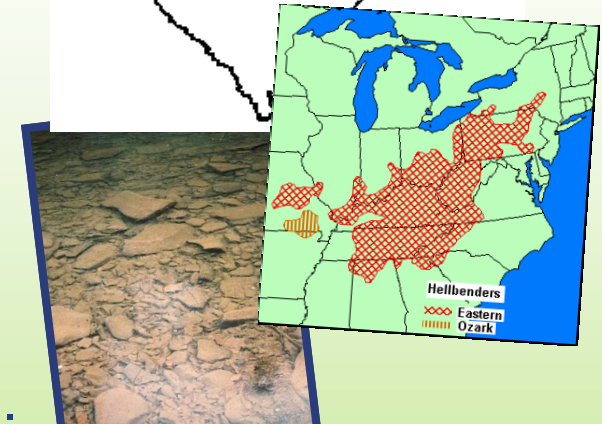
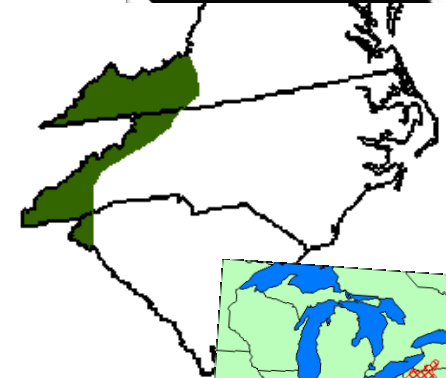
Body/Tail

- The tail is long, compressed, and rudder like which helps it live in the swift flowing streams. The body is flat to maneuver under rocks and in fast moving water.



Range and Habitat

- In North Carolina they can be found in the New and Watauga River Drainage Systems
- US populations can be found in NY, Illinois, Mississippi, Georgia Alabama, Missouri, and in the Ozarks
- Hellbenders prefer cool, swift running, well oxygenated, unpolluted streams and rivers.
- These waterways must also have rocky bottoms, abundant large flat rocks, or logs for cover and nesting sites.



Images: hellbenderhome.org



Mating & Reproduction

- Hellbenders breed in late summer early fall (September to November)
- Male hellbenders construct and defends the nest site for up to 84 days
- The eggs are between 5-7 millimeters in size.
- One female can lay between 200-500 eggs
- The larvae at hatching are approximately 1-1¼" in length
- Under the right conditions they can survive for as long as 30 years.



Anti Predator Mechanisms

- Hellbenders produce skin secretions that are lethal when injected into white mice and are probably unpalatable to some predators (Brodie, 1971a.)
- Skin secretions also make them extremely slimey and difficult to capture.
- Coloration is of a rocky river bottom making the animal well camouflaged.



Fishing & Hellbenders

Generations of anglers have believed the hellbender to be a **voracious predator of fish that is dangerous to touch and is capable of a venomous bite. *False!***



- It is **not** a significant predator of game fish and neither has a venomous bite nor poisonous skin. ***True!***
- Anglers using live bait who encounter a hellbender are asked to ***Please:***
 - Carefully remove the hook or cut the line as close to the mouth as possible
 - Release this unique and harmless animal back into the river.



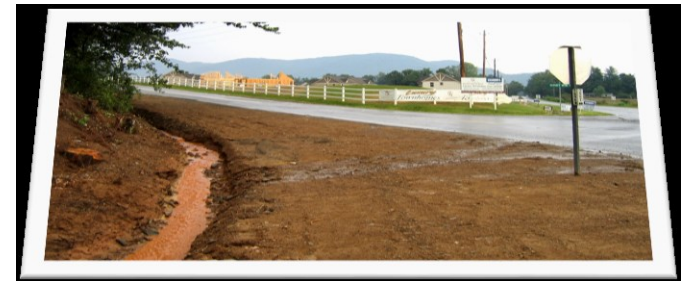
Status

In NC the Hellbender is listed a species of Special Concern.

Contributing Factors include:

- **Over collection**
- **Stream sedimentation:**

Sedimentation is the number one pollutant, it chokes the eggs and fills in the spaces among rocks and gravel in the substrate that are crucial for nesting as well as survival of the hellbender's prey base.
- **Wanton Killing**
- **Acid Rain**
- **Climate Change**
- **Agricultural and Industrial run off**
- **Formation of dams**
- **Pharmaceutical Waste Public Water**



Initial findings indicate that some fish and amphibian species are affected by becoming feminized.

Conservation Efforts



Inventory-

- Projects the health of a population.

Tag individuals-

- Determines age, sex, size and health. Track variable for the life of an individual
- E DNA- test water sample for Hellbender DNA to determine population density

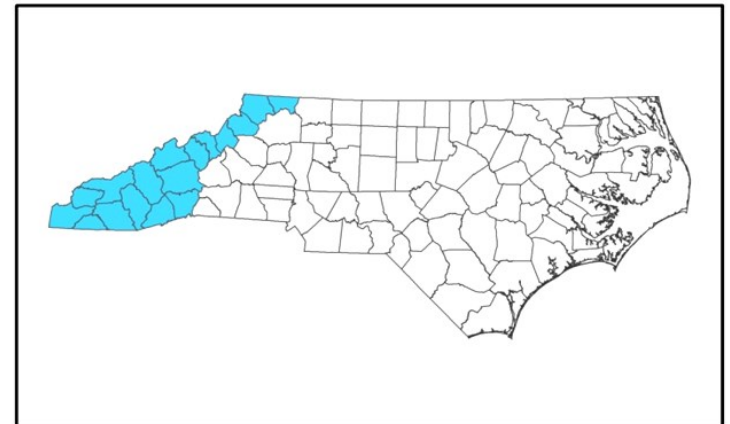
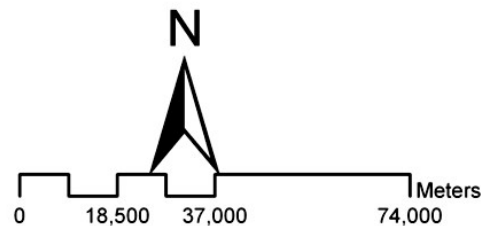
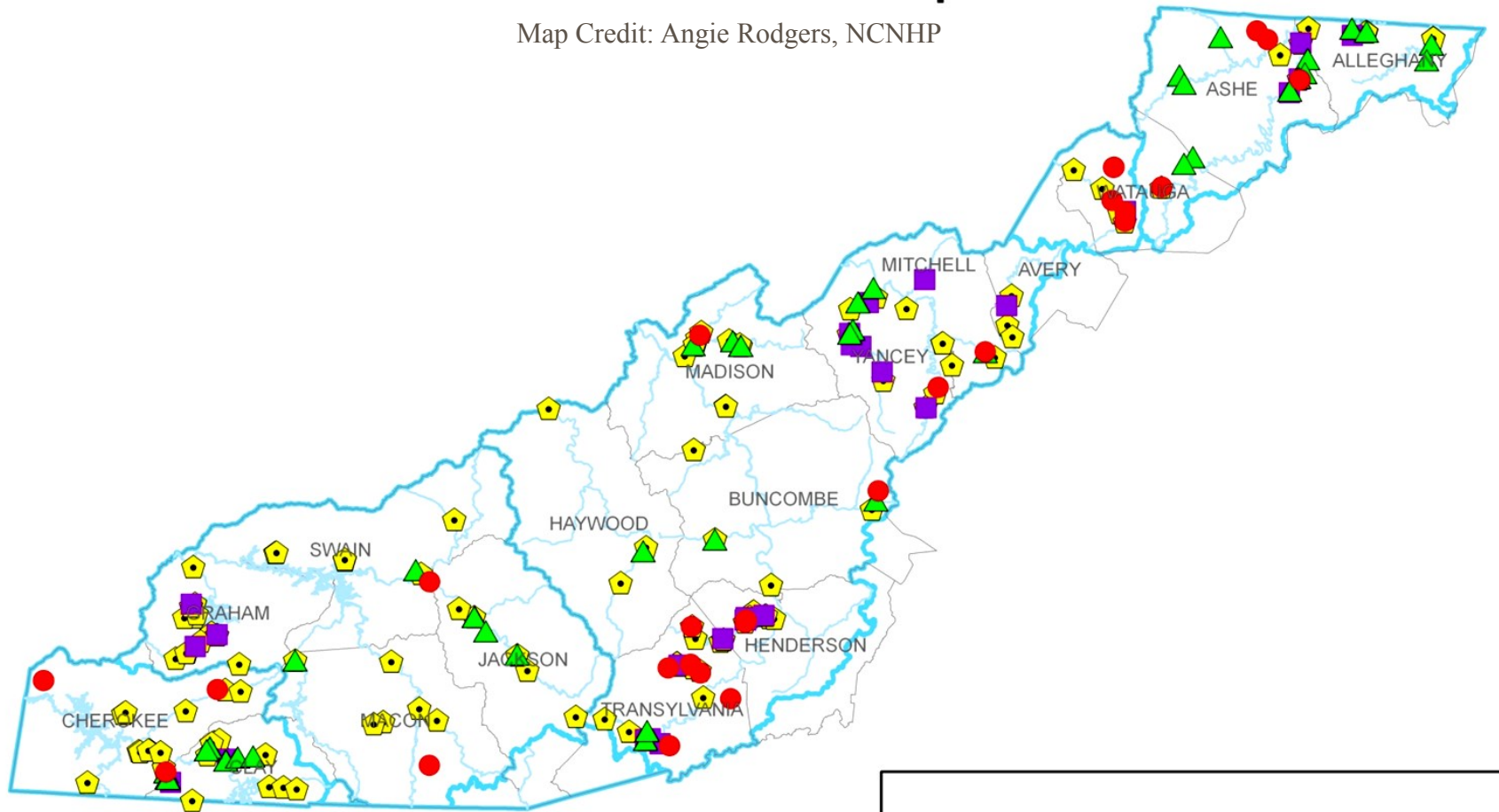
Captive Breeding Programs

- Ozark Hellbender
- NC Fisheries at McDowell Co.

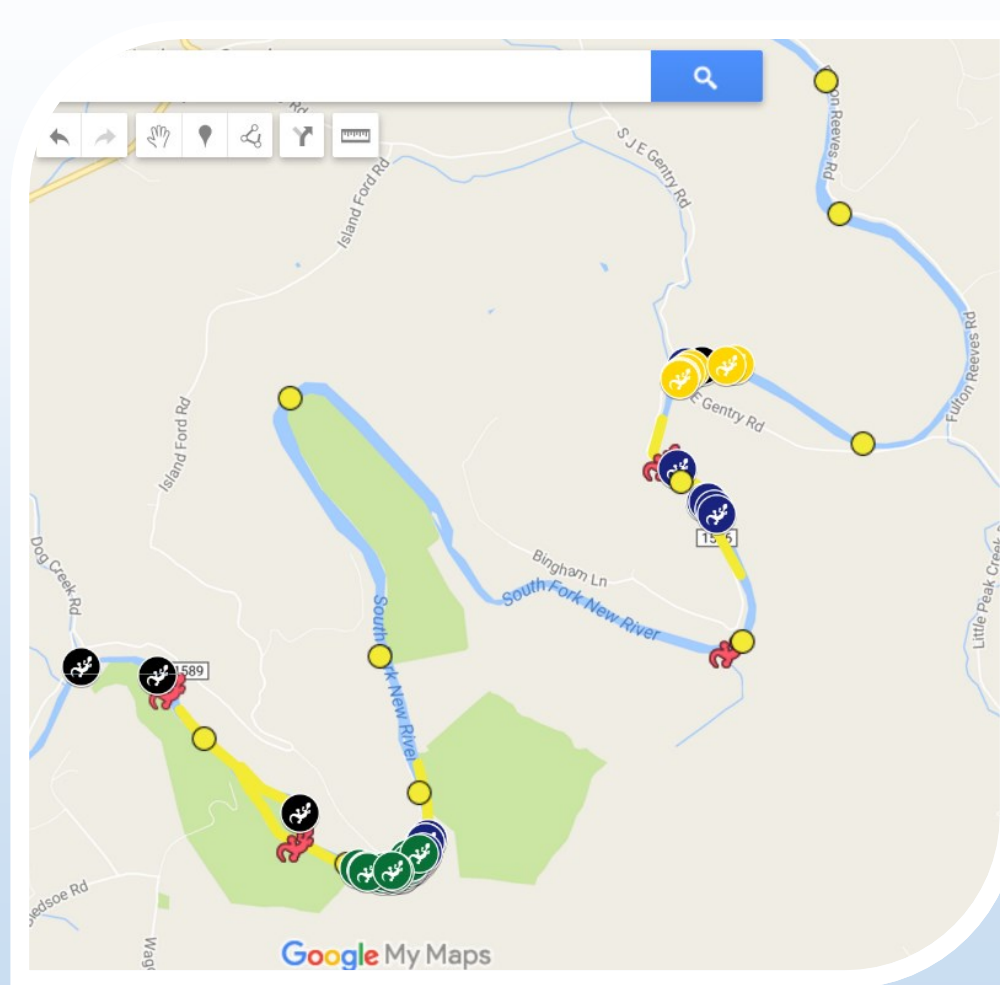
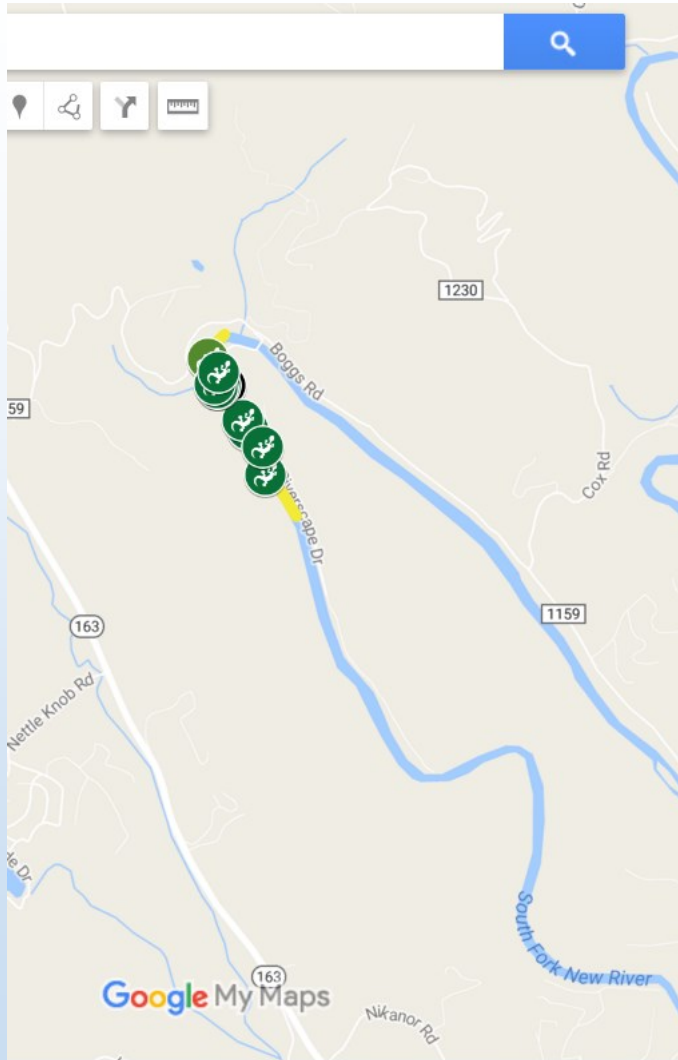
The Hellbender Homepage

All Hellbender Captures

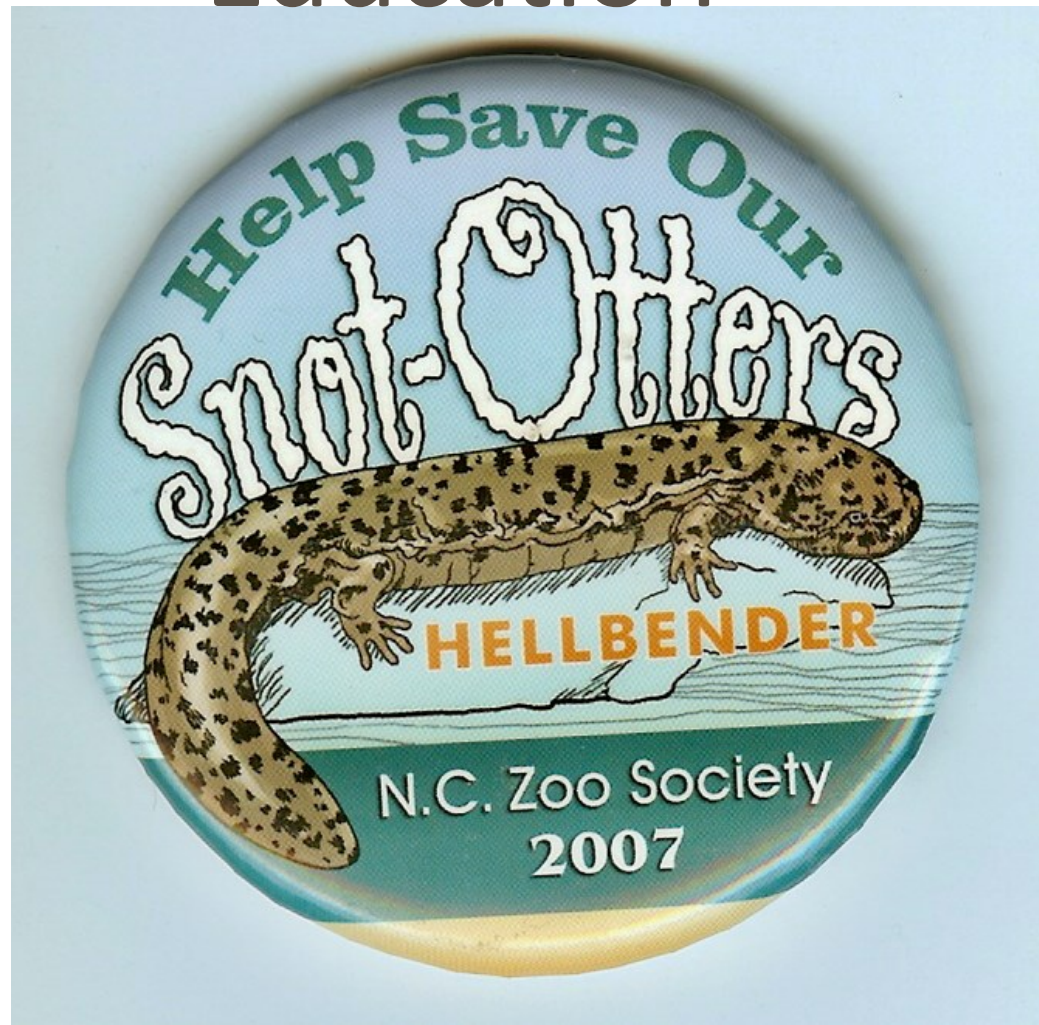
Map Credit: Angie Rodgers, NCNHP



Location Patterns



Awareness and Education



Eastern Hellb

NORTH CAROLINA WILDLIFE RESOURCES COMM

The hellbender is one of only three salamanders found in the world. North Carolina is home to more than 65 of salamanders, with 50 species in our region alone. The Eastern hellbender (*Cryptobranchus a. alleganiensis*) is one of the largest salamanders found in North Carolina and the United States. Only the amphiuma, a salamander shaped like an eel, is longer.

DESCRIPTION

Hellbenders are 16 to 17 inches long on average but they can grow to be more than 2 feet long and weigh more than 2 pounds. The hellbender's back ranges in color from grayish blue to reddish brown. Darker spots or mottled patterns may also be present on the back. The belly is usually one color and generally lighter than the back.

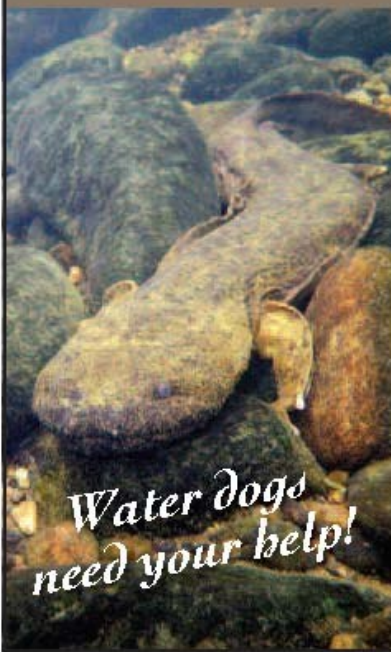
The hellbender's head and body are flattened with a rounded snout and a pair of small, reduced eyes. Hellbenders are mostly nocturnal and rely on touch and smell to catch food. The hellbender absorbs dissolved oxygen found in fast-running waters into its lungs through its skin. A layer of skin called a "frill" runs from the base of the neck down to the tail. The frill increases the surface area of the skin, helping the hellbender get oxygen.

Hatchling hellbenders have external gills. Gill slits are located at the base of the throat and replace external gills when the young reach 1½ years. The young hellbender is then able to absorb oxygen through its skin. The hellbender is mature at about 6 to 8 years of age, at which time it is about 1 foot long. It will continue to grow for many years to come.

1 • eastern hellbender



TROUT ANGLERS



Water dogs need your help!

Did you know "water dogs" are giant, crayfish-like creatures that are indicators of healthy stream and diverse fish populations? The Wildlife Resources Commission conserves this species and needs your help. If you catch a hellbender, please release it immediately if possible or report the catch to the Commission if possible. Let us know where you caught a hellbender by submitting a map of the location.

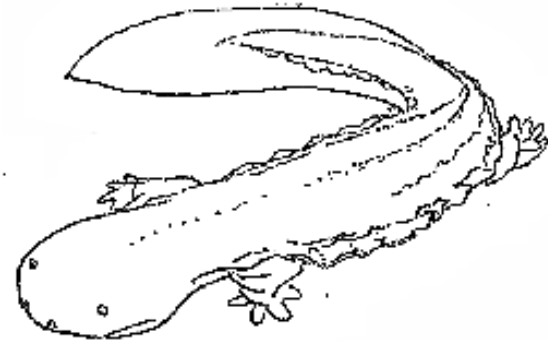
REGULATIONS

Effective 10/1/11
Find the Regulations

This publication is furnished free of charge.

ATTENTION ANGLERS

Eastern Hellbender ("water dog") scientific research in progress



These harmless, nonvenomous, giant salamanders are indicators of good water quality, and as a state **Special Concern Species**, are **protected**.

If you catch a hellbender on hook and line:

- Please immediately release the animal at the spot of capture by
 - carefully removing the hook if possible or
 - cutting the line as close as possible

Report sightings at 1-828-712-9117
Report violations at 1-800-662-7137

Visit the N.C. Wildlife Resources Commission at www.ncwildlife.org for more information



EASTERN HELLBENDER

GIANT OF THE APPALACHIANS



Living in Appalachian rivers and streams is a creature as ancient as the dinosaurs. The Eastern Hellbender (*Cryptobranchus alleganiensis alleganiensis*), the largest salamander in North America, can measure 29 inches long and live over 30 years. These harmless, aquatic amphibians shelter under boulders during the day and are active at night. Because hellbenders require clean, well oxygenated water, they serve as barometers of stream health. Water pollution, damming, and indiscriminate killing by anglers have caused this species to decline throughout its range.

Educational poster from Virginia Dept. of Game & Inland Fisheries



Hellbender eggs with developing embryos.



Larval hellbenders have gills that are lost by age 2 or 4 inches in length.



Crayfish are the main food source for hellbenders.



Prime hellbender habitat containing large boulders and clean water.

You can do your part to protect hellbenders by vegetating streambanks, preventing runoff into rivers, and releasing unharmed individuals caught on hook and line. Together we can ensure the survival of this unique species.

To keep every cog and wheel is the first precaution of intelligent tinkering - Aldo Leopold

For more information about hellbenders and their conservation visit our website at www.dgif.virginia.gov/hellbenders



Conservation Efforts

What's being done?

- Captive breeding programs
- Education programs,
- Habitat cleanup,
- Reestablishment of riffle areas
- Provide adequate stream flow.
- Development of better WWTP's filters.

What you can do!

- Private land owners can reduce sedimentation.

Leave riparian zones along river banks

- Support Conservation of the New River: legislation, volunteer, join conservation groups.

- Release unharmed if caught while fishing
- Plant Trees
- Report Violations: Water and Wildlife

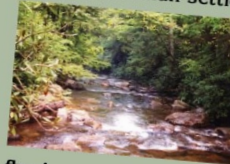
Let's Protect Hellbenders!



What's a hellbender? Hellbenders are extremely large, slimy, four-legged, flat-headed salamanders. The species found here is the eastern hellbender.

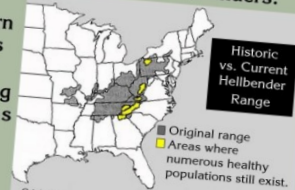
How big is it? The eastern hellbender is one of the largest salamanders in the world, growing to more than two feet in length. Completely aquatic, it feeds mostly on crayfish, but also eats small fish, invertebrates, and other hellbenders.

Where does it live? At one time, the eastern hellbender lived throughout the Appalachian Mountains and across the midwestern United States. Today, however, it exists in small pockets of habitat (including the New River) and is restricted to mountainous areas with little human settlement.



Why is the hellbender disappearing?

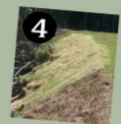
Hellbenders survive only in cool, fast-flowing, unpolluted streams and rivers with many large rocks and logs for cover and nesting. Over the years, these habitats have become harder and harder to find. **RUNOFF OF SEDIMENT** from irresponsible agricultural practices, housing developments along streams, poor forestry practices, and road-building is the major culprit polluting hellbender streams. When sediment washes into streams, it covers rocks and aquatic plants and chokes out habitat hellbenders and other stream-dwellers need for survival. Other causes of hellbender decline include the building of dams (because they alter stream habitats), the killing of hellbenders by fishermen, and the overcollection of hellbenders for the pet trade.



Original range map from Petranka, 1996 (Salamanders of the United States and Canada); yellow shaded areas added by J. Humphries, based on surveys by numerous researchers.



How can I help? In North Carolina, hellbenders are a species of Special Concern. This means it is against the law to kill them and you can't catch or possess them without a permit. Hellbenders are non-poisonous and pose no threat to humans. If you catch one while fishing, cut the line as close to its mouth as possible or remove the hook with a pair of pliers and release it back into the water.



You can also reduce the amount of runoff entering streams by: 1) avoiding disturbing land near streams; 2) leaving vegetative buffers along the banks of streams when you do clear land; 3) installing silt fences to reduce the amount of sediment entering streams; and 4) replanting quickly to stabilize streambanks.

Report Hellbender Sightings!

Information Needed

- Date
- Time of Day
- Air Temperature
- Size, Weight
- Location (GPS), River, Town, Co.
- Photograph
- Identifying Marks: Injuries, abnormalities
- Attempted to bite when Captured
- Shelter Type
- Water Clarity, Temperature, Ph

Contact: New River State Park

336-982-2587, neri@ncdenr.gov

EASTERN HELLBENDER (*Cryptobranchus a. alleganiensis*) DATA SHEET

SITE DATA
Date: _____ Start Time: _____ End Time: _____
Weather: _____
River/Creek Name: _____ Nearest Town: _____
County: _____ Elevation: _____ ft
GPS (DD): _____
Collectors: _____

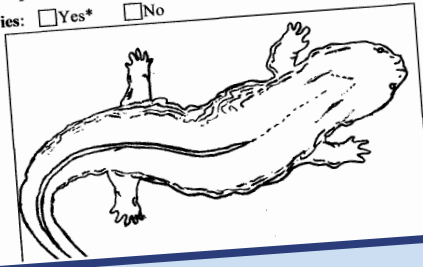
Collection Method: _____
Water Depth: _____ ft Water Clarity: _____
Water Flow: Slow Medium Fast Crayfish: None Few Average Abundant

Habitat composition:
Sand: None Little Moderate Abundant Gravel: None Little Moderate Abundant
Cobble: None Little Moderate Abundant Boulders: None Little Moderate Abundant
Bedrock: None Little Moderate Abundant Siltation: None Little Moderate Abundant
Dead leaves: None Little Moderate Abundant

Habitat Comments: _____

SPECIMEN DATA
PIT #: _____ * _____ * _____ Recapture: Yes No
Shelter Size: _____ (m) Distance to Nearest Shelter: _____ (m)
Total Length: _____ (cm) SVL: _____ (cm) Weight: _____ (g)
Sex: Male Female Unknown Age Class: _____
Parasites: Yes # _____ No Attempted to bite when captured: Yes No
Abnormalities: Yes* No Injuries: Yes* No
Chrytrid sample: Yes* No
Sample Number: _____

*Indicate all abnormalities and injuries on illustration.
Fish and other Macroinvertebrates observed: _____



- Education, outreach, and media efforts have resulted in dozens of observations, encounters, and captures being reported, some with photos, some with GPS locations...word is spreading and more reports are coming in each year from the public

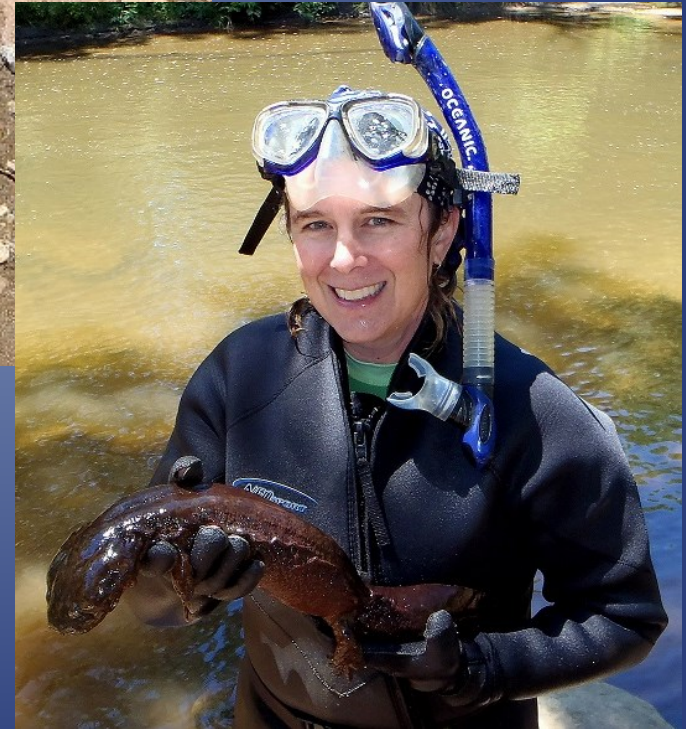
Photo courtesy: D. Colfey



Photos courtesy of New River State Park



Photo courtesy: E. Wantland



Isn't She a Beauty!

♀ ~2 ft.

3.1 lbs.

>30 years old

NC Hellbenders in the Media

Joint Hellbender Captive Breeding Effort Under Way at Marion Hatchery

Working cooperatively with the N.C. Zoo, the Commission is trying to raise 10 juvenile hellbender that it received from a Texas zoo, with the ultimate goal of breeding them in captivity to create more hellbenders.

Media Contact: Jodie B. Owen

919-707-0187

jodie.owen@ncwildlife.org

MARION, N.C. (Sept. 6, 2012) — Breeding Eastern hellbenders in captivity isn't for the faint of heart.

For one thing, these odd-looking animals, also called “water dogs” or “snot otters,” are notoriously difficult to keep in captivity. For another, they're relatively hard to find in the wild, including North Carolina where they're protected and listed as a species of special concern, so obtaining animals for captive breeding can be quite difficult.

But those factors aren't deterring biologists with the N.C. Wildlife Resources Commission. Working cooperatively with the N.C. Zoo, the Wildlife Commission is trying to raise to sexual maturity 10 juvenile hellbenders that it received from a Texas zoo in June, with the ultimate goal of breeding them in captivity to create more hellbenders.

Biologists are not interested in propagating hellbenders to augment wild populations, but rather to meet the increasing demand for these large, aquatic salamanders as educational and display animals for qualified state agencies, universities and other facilities.

“The Wildlife Commission has no plans or intentions to breed hellbenders for release into the wild,” said Lori Williams, a mountain wildlife diversity biologist with the Commission's Division of Wildlife Management. “We are simply trying to eliminate the need for any facility to yank a hellbender from the wild for display purposes. There is no need for that practice anymore if captive stock is available.”



Photo: Lori Williams

Education & Outreach

“Snotty”



Conservation Partners



North Carolina ZOO



Lots of volunteers!





Credits

- www.hellbenderhome.org/index.html, Biologist Jeff Humphries. Most Photos.
- [U.S. Geological Survey](#), Herb Buxton, coordinator of the USGS Toxic Substances Hydrology Program report published in 2002. Wikipedia.com
- Berkeley, California: AmphibiaWeb. Available: <http://amphibiaweb.org/>. (Accessed: Jan 9, 2007).
<http://www.amphibiaweb.org/index.html>,
- HEMATOLOGY AND SERUM CHEMISTRY OF OZARK AND EASTERNHELLBENDERS
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