



Travel:
*Venture north
of Arctic Circle*

Page F-4

OUTDOORS

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F

INSIDE

Bower
In the parks
Outdoor briefs
Solunar tables
Travel F-

What the ...?

Hellbenders – prehistoric creatures living right in PA

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Living in Central Pennsylvania is a creature so unique, so prehistoric looking, it's hard to believe that it exists. Some say its grotesque, others become intrigued by its mysterious nature.

The eastern hellbender is the one of the largest species of salamander in the world and the only salamander of its size in North America.

A hellbender can grow to lengths of 29 inches and weigh up to 5 pounds. Only the giant salamander found in China and Japan is larger. Those can grow up to 5 feet long and weigh up to 100 pounds.

The hellbender is thought to live anywhere from 30 to 50 years, possibly longer, and is believed to have existed for millions of years.

Hellbenders are native to streams within the Allegheny, Ohio and Susquehanna river drainages of Pennsylvania.

Disbelief? It's true, but the reason the hellbender isn't seen or commonly known is that it is a very shy and secretive animal. It is fully aquatic and can be found in clean flowing rivers and streams that have lots of large rocks or boulders.

"They live in streams that have a moderate gradient ... a really good flow to the current," says Dr. Peter Petokas, a biologist at Lycoming College who has studied the animals in this area for two years. "For that reason you would not find them in the slower streams that are typical along the coast."

"Hellbenders have a flattened body, paddle-like tail and small eyes. They have lungs, but breathe entirely through their skin and almost never leave the water. They have fleshy folds of skin on the sides and backs of their arms and legs that are filled with capillaries. These folds are used for oxygen uptake," said Dr. W. Jeffrey Humphries of Clemson University in South Carolina.

Humphries said they were first described by Sonninni (Sonninni and Latreille, 1801) and called, in French, "la salamandre des monts Alleghanis."

Here they are most active at night, or just when the sun just goes down. Petokas said in this area they usually are active for the first couple hours after sundown. However scientists found in other states that the hellbender is most active during the day.

"Otherwise they remain hidden underneath large rocks and in rock crevices," Petokas said.

Their diet consists of mostly crayfish, worms and insects, and sometimes small fish like minnows.

Humphries says hellbenders have few predators as adults, except humans, but young hellbenders are eaten by fish, snakes and other hellbenders.



Local hellbender researcher Jim Rogers holds an adult caught May 18 in Loyalsock Creek. The creature was 24 inches long – the longest yet found by Rogers and Dr. Peter Petokas of Lycoming College. In inset, Petokas holds a small juvenile caught in July. It measured 5.5 inches long.

"They are unique and, in essence, harmless. They are at the top of the food chain," Petokas said.

"A lot of anglers in the past and today catch and kill them with mistaken belief that they eat trout. Actually, the hellbender has a very specialized diet," Dr. Arthur C. Hules, professor of herpetology at Indiana State University. "Out of all the animals I examined, I have never seen one contain any type of game fish."

Most fishermen or outdoorsmen have never seen one because of where they live and how well they are camouflaged with mudbrown to olive coloration and wetrock appearance.

"Most people have never heard of a hellbender because you really have to be looking to find one. Fishermen are the only people who regularly run into them, because they will bite nightcrawlers and other bait. They are also not very common anymore, so even if people are within their range, they're not likely to see one unless they really look," Humphries said.

"It's hard to tell when they are in water because they don't move much," Petokas said. "If anything, fishermen should be happy to have hellbenders around, as they are a great indication of a very healthy stream," Humphries said. All three biologists said if one is caught while fishing, it should be returned to the water unharmed.

Breeding, growth

Petokas said he conducted hellbender surveys in the North Branch of the Susquehanna River for the state's Department of Environmental Conservation and has worked with the animals casually for about 15 years total. He says the animals breed during the last week of August and the first two weeks of September.

"During the breeding season, they become more active during the day. The males tend to congregate into to groups around rocks, in an attempt to entice females," he said. "The male selects the nest rock under which to breed."

He said the males guard the eggs after they are fertilized and will fight viciously for the females. He has seen scars on some the hellbenders from biting and fighting.

The females deposit between 200 to 500 marblesized eggs.

Hellbender facts (*Cryptobranchus alleganiensis alleganiensis*)

• The hellbender is one of the largest species of salamander in North America found in China and Japan can grow to be 5 feet long and weigh up to 100 pounds. The giant salamander is critically endangered.

• Adult hellbenders can range in lengths from 11 to 29 inches.

• Males select the nest rock and guard the nest after the eggs have been fertilized.

• Common names people use for hellbenders: waterdog, mud devil, mudpuppy and alligator, also know as Allegheny alligator.

• There are two species of hellbender in North American — the eastern hellbender and the Ozark hellbender, which is found only in southcentral Missouri and rivers in Arkansas.

• Hellbenders have lungs, but do not use them to breath. It is the only

species of salamander in North America to do so. Scientist think that they may use their lungs for buoyancy.

• It is hard to tell the sex of a hellbender. The male and female look very much alike. Only during breeding season, they can sometimes be told apart.

• Hellbenders have two sets of small teeth located on the upper and lower jaws.

• Hellbenders loose their gills when they reach two years of age. The organs are absorbed into the body. They then breath thorough blood vessels in their skin.

• Hellbenders breed in the late summer and early autumn. The eggs stake 4 to 6 weeks to hatch.

• Scientist believe hellbenders can live 35 years or more.

• Contrary to myth, hellbenders are not poisonous and are completely harmless.

Hellbender range

• Eastern hellbender

• Ozark hellbender

"They develop into larvae after 60 days of incubation. In about November, the larvae will appear in the streams," Petokas said. "When they first hatch out they are an inch long, and by the summer they are 3inches."

It takes four or five years for a larva to grow to about 12 inches and become a sexually mature adult.

Hules said the juveniles live in the stream gravel, where they feed on larval insects and other small water creatures.

Hellbender reproduction has biologists worried here and other places where the animals live.

"We are finding reproduction here but we are not finding big adults," Petokas said. "We don't know what is happening because we are finding dead ones but we don't know why they are dying."

"Hellbenders probably used to be extremely common in most streams in the Appalachians, but today they are mainly only found in remote areas, such as national forests," Humphries said.

Petokas said in Missouri and Arkansas, they had populations of 500 animals in a place and now there are none.

"We were down there this summer and they are not reproducing," he said.

Petokas and his partner Jim Rodgers have witnessed hellbenders with skin disorders, sores and wounds that won't heal and skin tumors.

"Those hellbenders are in serious trouble," Petokas said.

Myths and legends

Humphries said the major myth about the hellbender is that they are poisonous.

"That is a very common misconception. They may be distasteful but there is no evidence that they are poisonous," Petokas said.

"Another legend is the misconception is that they bite. Very rarely has anyone ever been bitten by one," he said.

The hellbender has two rows of teeth in the upper part of the mouth and one row on the bottom. They are very small sharp. They grab their prey with their teeth and swallow it whole.

"They have a very thick mucus and when you catch them they increase the mucus secretion," Petokas said. "They can become very slippery."

"In reality, their skin secretions are somewhat toxic, but they're not dangerous unless you put a hellbender in your mouth," Humphries said.

Another common misconception is that they crawl on land.

"Most people think they come out of the water and crawl on the rocks, but they don't. They are always on the bottom," Petokas said.

Hellbender bones have been found in middens — the trash deposits left around American Indian villages. Scientists think they could have been used as food.

"There is no other possible use we can think of. It's not like a turtle shell that can be used for a rattle or a bowl," Petokas said.

He said he has heard of some people who do eat them today or in the recent past.

He said he recently received an e-mail from colleagues saying they found a family living in the mountains who eat hellbenders. It said they fileted the flanks off the backs and cook them.

A retired professor at St. Bonaventure University in New York wrote in a letter that when he first came to the university in the 1950s, they held a hellbender feast once a year.

The hellbenders are commonly referred to as a mudpuppy, but that is incorrect. The mudpuppy is another species of salamander.

"There are no mudpuppies where you guys are. They are found in the Allegheny and Ohio drainages, but never got into the Susquehanna," Hules said. "On rare occasion, some may have caught one (mudpuppy) but it is not native to Susquehanna."

Mudpuppies are recognized by red frilly external gills. Hellbenders do not have gills and are much larger than mudpuppies.



PHOTO PROVIDED



PHOTO PROVIDED



Hellbenders have folds of skin on their sides, top photo, that enhance the exchange of oxygen and carbon dioxide in water. In center photo, local researcher Jim Rogers holds a small adult captured while scuba diving Nov. 4. Above, Dr. Peter Petokas, a biologist at Lycoming College, readies his diving equipment on Monday for a hellbender search in Loyalsock Creek. Hellbender larvae hatch this time of year, requiring researchers to scour cold creeks to find evidence of reproduction, which has declined sharply.

Environmental issues

The hellbender population is becoming very vulnerable in our state.

"They are found basically in good quality streams, rivers with minimum sedimentation, good water quality and moderate current," Hules said. "The temperature can vary from cold to lukewarm type."

"The main danger for hellbenders in Pennsylvania is specifically the incredible pollution of rivers and streams," he said.

He said industrial waste, acid mine drainage, land development and impoundments are all harmful to hellbenders. Impoundments or construction of dams can increase in sedimentation rates in a stream. If the stream becomes heavy with silt, the rocks the hellbenders live under can become buried.

Hules said studies show that in some places the numbers of hellbenders are down 50 to 60 percent. That has happened probably in the last 15 years. Also their range has been reduced about 60 to 70 percent.

"Populations are known to have declined drastically over the last century, mainly due to habitat degradation – siltation from agriculture and home building is probably the biggest problem," Humphries said. "Historically, damming of many rivers in the eastern U.S. destroyed thousands of miles of hellbender habitat. Today, overcollection for the pet trade may also be a major issue."

"You can walk a stream for a mile or two or three and not find any ... If the habitat is good, then you will find them," Petokas said. "They are kind of restricted by the quality of habitat in a lot of the streams in this part of Pennsylvania."

He said most streams around here are cobble streams, in which the stones are about the size of your fist. The hellbender needs big stones or boulders ."

They (adults) need the big stones, the big stones are very important," he said. "The juveniles live in the cobble."

Hules found that it is most common that there is an aging population with no signs of young animals.

"In some studying, I don't find anything but big adults. You can go to a stream with no reproduction in 10 or 20 years. It still looks like a healthy population, but what you are doing you are getting old individuals ... As they die, there is no recruitment."

Petokas and Rodgers are among the few people studying hellbenders who are finding juveniles.

Out in the Midwest, the Ozark hellbender is now listed as an endangered species. In this state a lack of quality habitat and lack of breeding are of special concern.

The hellbender does not have federal protection, but some are trying to change that.

"They were definitely much more abundant going back to the 1930s and very way back to the 1800s," Petokas said. "You could go out and in one spot catch 10 and the next day catch 10 more in same spot."

It is possible for a person to turn over one rock and find a hellbender, he said, "but we could go to the same places and turn 5,000 rocks and never find one."

Protection and studies

"They do not have any federal protection," Humphries said.

"They should be in a category of at least special concern," Dr. Petokas said.

In this state, especially, there is virtually no protection.

"Currently a licensed fishermen can take two hellbenders a day. There is no reason to do it and we are battling that," Dr. Petokas said.

Petokas and Rodgers working to obtain a grant from the state Fish and Boat Commission to study the hellbender's distribution and status in the tributaries of the West Branch of the Susquehanna.

The two use scuba diving equipment to find and study hellbenders. They can live in up to 30 feet of water in what Petokas calls scour holes, which most of the time are found around bridges. Such holes



A hellbender is stretched out on a measuring board, top photo. At 24 inches, it was unusually large, even for the second-largest salamander species in the world. Above, a hellbender's head pokes out from a crevice between two large rocks. The photo gives a good idea of why the mudbrown, bottom-dwelling creatures are seldom seen even by experienced outdoors folks.

Hellbender facts

(Cryptobranchus alleganiensis alleganiensis)

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- Adult hellbenders can range in lengths from 11 to 29 inches.
- Males select the nest rock and guard the nest after the eggs have been fertilized.
- Common names people use for hellbenders: waterdog, mud devil, mudpuppy and alligator, also know as Allegheny alligator.
- There are two species of hellbender in North American — the eastern hellbender and the Ozark hellbender, which is found only in southcentral Missouri and rivers in Arkansas.
- Hellbenders have lungs, but do not use them to breath. It is the only species of salamander in North America to do so. Scientist think that they may use their lungs for buoyancy.
- It is hard to tell the sex of a hellbender. The male and female

contain large rocks and bedrock, the perfect hiding place for hellbenders.

"The water can be anywhere from 6 inches to 30 feet deep." Petokas said. "Adults we find here in the deeper water. In New York, that's not true; we find them where it can only be a foot deep."

According to the grant application "occurrence, distribution, and habitat and water quality data will be collected, along with population demographic data and an assessment of reproductive success and recruitment. Project results will provide information needed for management and conservation of the eastern hellbender in Pennsylvania."

The studies are being planned for June through September of 2006.

The hellbenders found in the field studies will be characterized by population size, density, age structure, sex ratio and recruitment.

The hellbenders that are captured in the study will be fitted with a "passive integrated transponder," which is a tiny chip, and tags. They will use GPS coordinates to record movement and population.

"They're completely harmless and are a really important part of river ecosystems. If you see one, consider yourself very lucky," Humphries said.

"I think people who live within the range of this 'living dinosaur' should be really proud that they're still doing pretty well in some streams. Just like many other species, though, we really need to pay more attention to our environment and make sure they remain here for our kids and grandkids to see."

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- Hellbenders lose their gills when they reach two years of age. The organs are absorbed into the body. They then breathe through blood vessels in their skin.
- Hellbenders breed in the late summer and early autumn. The eggs take 4 to 6 weeks to hatch.
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JESSICA LAMEY/Sun-Gazette

Jim "Toolbox" Reynolds of Forksville, left, and Dr. Peter Petokas, right, a biologist at Lycoming College, head across Loyalsock Creek Monday to a pool about 11 feet deep where they found several hellbenders. It was cold work in their wetsuits and scuba gear. The water was 38 degrees.