

Saving a Species: Imperiled Salamander Breeds in Captivity for First Time

ATLANTA – February 3, 2022 - The Amphibian Foundation has successfully bred one of the world's most imperiled species, the frosted flatwoods salamander, in captivity for the first time. The Atlanta-based nonprofit's success marks the first phase of a conservation strategy aimed at saving a unique species at imminent risk of extinction.

Staff at the Amphibian Foundation have been working for nearly a decade on a captive breeding protocol to protect frosted flatwoods salamanders (*Ambystoma cingulatum*). The species has declined by an estimated 90% since 2000 and is now known from only three populations, one in Georgia and two in Florida. The salamander was listed under the Endangered Species Act as threatened in 1999. The ultimate goal is to produce offspring that can be released into managed habitat and thrive in the wild.

The frosted flatwoods salamander is difficult to breed in the laboratory because of its secretive nature and the limited information about its lifestyle. Amphibian Foundation executive director and co-founder Mark Mandica said that other organizations can replicate the foundation's successful captive breeding protocol, speeding up the recovery process.

"This conservation accomplishment is a thrilling moment of scientific achievement for our team, partners, and these special salamanders," Mandica said.

Stirring Hope for an Imperiled Species

Mandica began discussing the urgent need for a frosted flatwoods salamander propagation, or breeding, program with the U.S. Fish and Wildlife Service in 2012. Two years later, the federal agency asked him to lead a captive assurance program for the species. Captive assurance refers to a drastic measure in which a species at high risk of extinction needs safeguarding in captivity until other conservation and restoration measures can guarantee the species' persistence in the wild.

The Amphibian Foundation established the first potential frosted flatwoods salamander breeding groups in 2017. It takes years to rear eggs into reproductively active adults. By December 2021, the groups had produced 24 eggs in the lab. Since then, Mandica has counted almost 70 eggs, many of which are healthy.

Harold Mitchell, a U.S. Fish and Wildlife Service ecologist and the agency's lead for frosted flatwoods salamander recovery, called the latest news "an incredible achievement by the dedicated staff at the Amphibian Foundation."

"It is on the same conservation level with the captive achievements of the black-footed ferret and the California condor, which were on the verge of extinction and are now on the road to recovery," Mitchell said.

Frosted flatwoods salamanders have disappeared primarily because of loss of the southeastern longleaf pine ecosystem, which has shrunk to 3% of its original range. The species was originally found in South Carolina, Georgia, and Florida. Today, it is down to two populations in Florida and another in a single Georgia wetland. The salamanders have not been detected in South Carolina in more than 12 years.

In addition to habitat loss, the salamander's population declines have been exacerbated by irregular weather patterns. The species breeds on the edge of dry temporary pools in longleaf pine savannas. The eggs hatch when seasonal rains fill the small pools. When the pools are not filled, the eggs fail to hatch

and that year's offspring are lost. This is happening more often, which is shortening the species' breeding season.

The work done at the Amphibian Foundation is a significant step toward being able to repopulate restored habitats throughout the salamander's range, according to Daniel Sollenberger, a senior wildlife biologist with the Georgia Department of Natural Resources. "We are glad to have been able to support the project by providing natural vegetation for breeding enclosures, and we're eager to see the momentous successes that follow," Sollenberger said.

Researchers Join Forces to Save Salamander

The Amphibian Foundation worked closely with many partners to establish the captive propagation colonies. In addition to the Georgia Department of Natural Resources and U.S. Fish and Wildlife Service, those partners included the U.S. Geological Survey, Florida Fish and Wildlife Conservation Commission, the U.S. Army's Fort Stewart, the University of Georgia's Savannah River Ecology Laboratory, the Orianne Society, and others.

The Amphibian Foundation currently has two frosted flatwoods salamander groups that are producing eggs. One group was rescued from desiccation by Florida Fish and Wildlife, brought to the foundation, and raised in the lab from eggs. The other group was collaboratively rescued as larvae from the species' last remaining wetland in Georgia. The pond was drying up too fast for the larvae to complete metamorphosis.

"The successful propagation is a great accomplishment by the Amphibian Foundation and we are very excited to hear this impactful news," said Bradley O'Hanlon, reptile and amphibian conservation coordinator at Florida Fish and Wildlife. "We look forward to continued partnership and collaboration to further the species' recovery in the wild."

The captive propagation colony is in the Foundation's conservation laboratory, which is supported by the Amphibian and Reptile Conservancy, the Turner Foundation, and the Andrew Sabin Family Foundation.

Mandica credited the achievement to passionate and supportive partnerships, focus, and perseverance. "We at the Amphibian Foundation appreciate and value everyone's contributions and are excited to collaborate with additional partners as we move forward in helping the extraordinary frosted flatwoods salamander thrive in the wild."

The Amphibian Foundation collaborates with partners in the fight against amphibian extinction. The organization founded by Mandica and his wife Crystal has a strong focus on leading one-of-a-kind conservation research programs to address amphibian threats.

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[High Resolution Images Here](#)

Credit all to Mark Mandica, Amphibian Foundation Executive Director

Image 1 series (a-c): The threatened frosted flatwoods salamander (*Ambystoma cingulatum*), which has suffered a 90% population loss since 2000, has been bred in captivity at the Amphibian Foundation in Atlanta for the first time.

Image 2 series (a-b): The first eggs ever produced *ex situ* for the frosted flatwoods salamander. The eggs will be left to develop in the breeding chambers until just before hatching.

Image 3: Longleaf pine ecosystem undergrowth and breeding habitat was recreated in the lab with the help of plant collections by the Florida Fish and Wildlife Conservation Commission, Georgia Department of Natural Resources, the U.S. Fish and Wildlife Service and the U.S. Army's Fort Stewart.

For more information, visit

Amphibian Foundation: [Frosted flatwoods salamander profile](#)

U.S. Fish and Wildlife Service: [Species Status Assessment for the Frosted Flatwoods Salamander](#)