CASE STUDY

BREAKING NEW GROUND:

FIRST REINTRODUCTION OF THE RETICULATED FLATWOODS SALAMANDER TO PRIVATE LAND



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On January 17, 2025, 50 reticulated flatwoods salamander larvae swam into a wetland in Santa Rosa County, Florida. Released two or three at a time from Tupperware containers, they disappeared into the emergent vegetation. One week later, a record freeze swept through the area.







A FIRST FOR PRIVATE LAND CONSERVATION

When researchers returned, they found the salamanders had survived the freeze. In that moment, the budding hope that releasing this federally endangered species on private land could yield meaningful conservation results bloomed into genuine excitement as researchers recorded the first encouraging evidence that the released salamanders had survived.

Despite private lands comprising most of the salamander's historic range, 2025 marked the first time the species was reintroduced on privately owned property. It is the result of decades of relationship-building and three years of careful planning and approvals.

Resource Management Service (RMS) worked with the U.S. Fish and Wildlife Service (USFWS) to apply the Partners for Fish and Wildlife Program (Partners) in a way that had never been done before: using it to eliminate risk for private landowners willing to participate in species recovery. Until this agreement, Partners was traditionally a habitat improvement program. This agreement marked its evolution to include species recovery as a primary outcome.

Photos by Faith Flawn, Florida Fish and Wildlife Conservation Commission
(Top) *Team members from Resource Management Service (RMS) and U.S. Fish and Wildlife Service (USFWS) at release event* | (Middle) *Tupperware containers holding reticulated salamanders for release* | (Bottom) *Alex Hinson, Alex Hinson, RMS President & CEO*

TEN YEARS OF GROUNDWORK

As of 2025, viable reticulated flatwoods salamander populations existed only at Eglin Air Force Base and Escribano Point, both public lands in Santa Rosa County, Florida. The species has been federally listed since 1999, and after a taxonomic split, the reticulated flatwoods salamander was listed as endangered in 2009.

In 2006, RMS began management of a property in Santa Rosa County that had documented reticulated flatwoods salamander presence in 1945 and 1990. When the species received federal listing, a "historic pond" on the property gained critical habitat designation, even though salamanders hadn't been documented there for more than 20 years at the time of listing.



Santa Rosa County, FL | Photo by Faith Flawn, Florida Fish and Wildlife Conservation Commission



The Reticulated Flatwoods Salamander

The reticulated flatwoods salamander (Ambystoma bishopi) is a moderately sized salamander reaching up to 12 centimeters in length and weighing 1–12 grams. It has black to chocolate-black coloration with white or light gray lines on its back and sides, forming a net-like pattern.

Conserving reticulated flatwoods salamanders is challenging because they have aquatic and terrestrial life stages with varying habitat needs. Unlike most salamanders, they breed in the fall, during October and November in rainy weather rather than in the spring. For breeding, they require seasonal wetlands that dry up periodically, which keeps the areas clear of predatory fish. Females lay up to 225 eggs at the bases of emergent grasses within seasonal wetland depressions. When the depression fills with water, the eggs hatch and the larvae begin development. After metamorphosis, adult salamanders migrate to the upland pine flatwoods and retreat underground in crayfish burrows and root channels.

Taking fire out of the longleaf forest is akin to taking the rain out of the rainforest. The species requires pine flatwoods, preferably longleaf, which, unlike loblolly or slash pine, can be safely burned at any age. Regular prescribed fire maintains the grass-dominated herbaceous groundcover essential for successful breeding and supports the invertebrates salamanders feed on. Fire also prevents woody vegetation from overtaking wetland breeding sites.

Historically, lightning-strike fires created the frequent, low-intensity fire regime that maintained open canopy conditions and prevented woody encroachment. Prescribed burns now replicate that natural cycle, maintaining the pine flatwoods community the species requires. Adults can thrive in this fire-maintained landscape because they retreat underground in crayfish burrows and root channels during both dry periods and prescribed or naturally occurring fires, allowing them to survive late-summer and early-fall fires.

Habitat Restoration

In 2018, RMS selected the reticulated flatwoods salamander as the focal species for a Healthy Forest Reserve Program conservation easement under the Natural Resources Conservation Service's Regional Conservation Partnership Program. This easement balanced timber production with maintenance of a functional longleaf ecosystem in perpetuity. The easement, established in 2019, protects 3,179 acres of working longleaf pine forest in Santa Rosa County.

Before finalizing the easement, RMS had already planted longleaf and reintroduced prescribed burning around key wetlands. After execution of the easement, discussions began on reintroducing the salamander to its historic wetlands. Crews provided by the Gulf Coastal Plain Ecosystem Partnership (GCPEP) removed woody overstory from potential release sites.



Larval stage of the reticulated flatwood salamander

In 2023, RMS coordinated with the Florida Fish and Wildlife Conservation Commission (FWC), USFWS, the Department of Defense (DOD), GCPEP, Virginia Tech, Tangled Bank Conservation and other partners to reach consensus on release location and monitoring protocols.



RMS Staff participating in the reintroduction event | Photo by Faith Flawn, Florida Fish and Wildlife Conservation Commission

Creating a New Template

In March 2022, RMS invited USFWS to the property to discuss using the Partners for Fish and Wildlife Program as a reintroduction tool for endangered species on private land. Partners had never been utilized this way before.

The approach relied on a "zero baseline" population determination. Because no salamanders had been documented on the property for more than 20 years, if none of the reintroduced animals survived, the property and neighboring lands would simply return to zero-baseline status with no regulatory penalties. The agreement established a zero-baseline framework designed to provide regulatory certainty for the participating landowner and neighboring properties if the reintroduced population did not become established.

After USFWS solicitors and RMS's external legal counsel reviewed the framework, RMS secured the necessary internal and external approvals. RMS conducted four site visits with experts from FWC, USFWS and Virginia Tech to evaluate potential release sites. A wetland complex connected to the historic pond offered the best conditions for a January 2025 release.



Photo Credit: Jessica Sandoval, Longleaf Alliance



Ashlynn Moretti, of the Longleaf Alliance, takes part in the reintroduction event | Photo by Faith Flawn, Florida Fish and Wildlife Conservation Commission

The Right Property, The Right Partners

The perpetual conservation easement ensured longleaf management and prescribed fire would continue on the property indefinitely. Without this critical assurance, neither the state nor the Department of Defense would have provided salamanders for reintroduction.

Conservation Without Conflict, a coalition of approximately 70 organizations that RMS helped found, provided grant funding for habitat enhancement. GCPEP contributed in-kind labor to remove woody overstory from wetlands.

RMS has a deep network in the U.S. South wood basket and has worked with many of these partners for more than 20 years, including the Department of Defense, the Longleaf Alliance and GCPEP. Virginia Tech, GCPEP staff and Tangled Bank Conservation provided specialized knowledge of salamander ecology.

> *"Habitat loss and biodiversity decline are urgent threats to our forests', communities' and world's well-being. At RMS, our deep stewardship ethic drives us to take action, rather than stand on the sidelines. We believe private forestland owners have a responsibility to be part of the solution."*
>
> **Alex Hinson,**
> PRESIDENT AND CEO, RMS



Alex Hinson, RMS President & CEO | Photo by Faith Flawn, Florida Fish and Wildlife Conservation Commission



Colin Davis, RMS District Forester, Central Region | Photo by Faith Flawn, Florida Fish and Wildlife Conservation Commission

The Longleaf Alliance and FWC worked together to collect salamander eggs and head-start them in a controlled environment until they metamorphosed into juveniles. This approach gives young salamanders a much higher chance of survival. FWC, which manages Escribano Point, coordinated state involvement and facilitated access to the first 50 salamanders for the January 2025 release.

Second Release: March 2026

Following the January 2025 release, RMS and its partners completed a second release in March 2026, introducing an additional 100 reticulated flatwoods salamander larvae into the same wetland complex. The larvae originated from native populations at both Escribano Point Wildlife Management Area and Eglin Air Force Base. The second release brought the total number of larvae released on the property to approximately 150.

Partners in the second release included USFWS, FWC, GCPEP, the US Navy at Whiting Field and Eglin Air Force Base. RMS's forest managers are actively restoring additional surrounding wetlands with the goal of enabling the salamander population to expand further over time.

> *"The conservation of rare, threatened and endangered species depends on collaborative, trust-based public and private partnerships. Thank you to our partners for working with us on this conservation milestone."*
>
> **Jimmy Bullock,**
> VICE PRESIDENT OF SUSTAINABILITY, RMS

MONITORING & ONGOING RELEASES

Scientists collected genetic material from every released salamander in 2025 and will do so again to track reproduction and identify which release year produced any offspring. Tangled Bank Conservation conducts annual environmental DNA sampling, and GCPEP performs visual surveys when conditions allow. Many of the salamanders from the 2025 release have already developed into mature adults and can be spotted throughout the area.

The inland location protects the new population from hurricane storm surge that threatens coastal populations at Escribano Point and portions of Eglin Air Force Base, providing important climate resilience for the species.

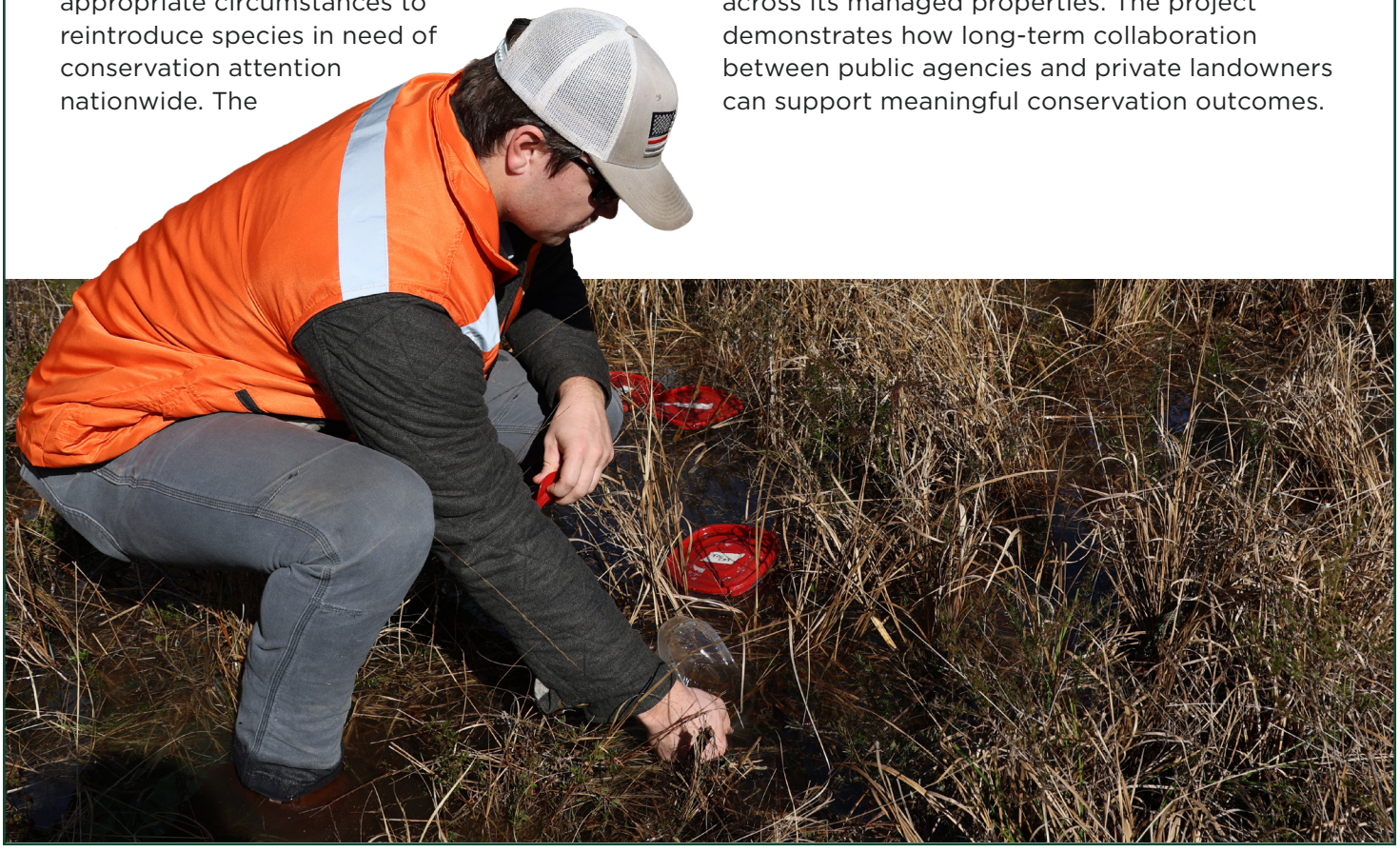
Additional releases will be evaluated on a five-year basis as monitoring continues and larvae become available.

OPENING A PATHWAY FORWARD

The reticulated flatwoods salamander has been reintroduced to private land for the first time, and the agreement that made it possible provides a model for other private landowners to participate in species recovery.

The Partners for Fish and Wildlife framework can be applied by private landowners in the appropriate circumstances to reintroduce species in need of conservation attention nationwide. The framework may provide a pathway for private landowners to participate in species reintroductions while addressing regulatory considerations associated with reintroduced populations.

Building on this success, RMS is considering future reintroductions of aquatic species (particularly mussels and fish) and reptiles across its managed properties. The project demonstrates how long-term collaboration between public agencies and private landowners can support meaningful conservation outcomes.



R.L. England, RMS Resource Forester | Photo by Faith Flawn, Florida Fish and Wildlife Conservation Commission

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