- In areas with insufficient fuels to carry fire, use mechanical treatment such as mowing to help maintain herbaceous ground cover and eliminate hardwood and shrub encroachment.
- Restore ground cover (e.g., wiregrass).
- Improve or close roads to eliminate heavy sedimentation, discharge of pollutants, and excessive off-road use through Flatwoods Salamander habitat.
- Control feral hogs.
- Restore longleaf pine.

INCENTIVES TO PRIVATE LANDOWNERS

- Potential funding of management activities through the Landowner Incentive Program.
- Potential involvement in a statewide Safe Harbor program.
- Probable delisting of the species if enough "new" populations are discovered and protected.
- The opportunity to contribute to the conservation of an imperiled wildlife species.
- Acknowledgment for their participation and efforts.

FOR MORE INFORMATION

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The FLATWOODS SALAMANDER

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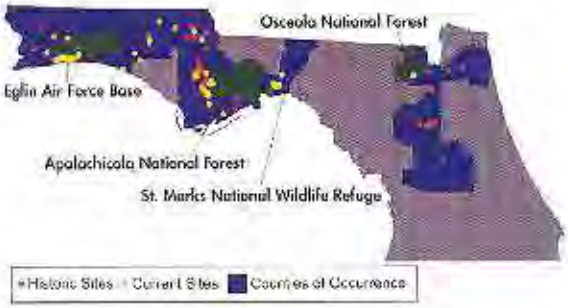
TIPS FOR ITS MANAGEMENT ON PRIVATE LANDS

A RARE AMPHIBIAN

The Flatwoods Salamander (*Ambystoma cingulatum*) was listed as Threatened by the U.S. Fish & Wildlife Service in 1999 and as Species of Special Concern by the Florida Fish and Wildlife Conservation Commission in 2001.

Private lands in Florida support almost half of all documented Flatwoods Salamander populations. Private lands' populations will play a vital role in the recovery of the species range-wide.



Locating and managing new populations are important to ensure this species does not decline further and to work towards its recovery range-wide.

This brochure was prepared to inform private landowners about the Flatwoods Salamander and what management activities will help it survive.

WHAT IT LOOKS LIKE

The Flatwoods Salamander is a small-headed, slender salamander ranging from 3.5 to 5 inches long. It has a dark gray or black background color with silvery-gray lines that form a net-like or banded pattern across its body.

The salamander baby (larva) lives in the water and can grow to nearly 3 inches long. It is boldly marked with distinct gold or tan and dark brown or black stripes. It has a tail fin

Larva © Dan Hipes, Florida Natural Areas Inventory

and bushy red gills that will be absorbed during metamorphosis.

ITS RANGE

The Flatwoods Salamander is restricted to the Southeastern Coastal Plain. It ranges through southern Alabama, Georgia, and South Carolina, across the Florida panhandle, and south in Florida's peninsula to Marion County.

WHERE IT LIVES

The Flatwoods Salamander lives in areas with widely spaced longleaf or slash pine trees where there is little or no understory and a dense ground cover of grasses, particularly wiregrass. Shrubs such as saw palmetto and gallberry may be present.

This unique environment contains seasonally wet areas that the Flatwoods Salamander uses for breeding. These temporary ponds are often dominated by cypress and gum, and they have the following features:

Pine Flatwoods © Michael R. Wilson

- Often dry, but fill with water during fall and early winter rains associated with cold fronts.
- Have grasses and sedges growing in the pond basin.
- Have a grassy margin ("ecotone") that becomes flooded with shallow water.
- Lack predatory fish.

HOW THEY LIVE

Adults and juveniles spend most of their time underground in the pine flatwoods, sometimes in crayfish burrows or under logs and leaf litter where it is damp and cool.

During fall and early winter rains, adults move at night to the dry basins of isolated wetlands to breed. Breeding occurs from October through December, after which adults return to their hidden retreats.

The female lays her eggs singly or in small clusters under soil, rotting leaves, logs, or at the base of grasses and sedges that will become covered with shallow water.

When the pond basin fills, eggs hatch into tiny larvae. The aquatic larvae hide in submerged vegetation during the daytime and emerge at night to feed on small aquatic animals. The

Pregnant female © Kevin M. Enge

larval period lasts 3-5 months, and newly transformed juveniles leave the pond in late March to early May.

THREATS THEY MAY FACE

The Flatwoods Salamander has declined throughout its range. Only an estimated 18% of historic Flatwoods Salamander habitat remains today. The following factors have been linked to its decline:

- Intensive silviculture that disrupts soil and groundcover vegetation and alters the natural hydrology.
- Suppression of fire, which allows for the invasion of hardwoods and dense shrubs into uplands and pond margins.
- Residential and commercial development that cause loss, degradation, and fragmentation of habitat.

Wetland choked by dense shrub invasion © Kevin M. Enge

- Pollution and habitat alteration of wetlands from agricultural operations.
- Destruction and fragmentation of upland and wetland habitats that connect possible breeding sites.
- Introduction of predatory fish.
- Highway and road mortality.
- Alteration of hydrology from firebreaks and roads.
- Damage from feral hogs.
- Prolonged natural droughts.
- Crayfish and earthworm harvest for fish bait.
- Disease-causing fungi and viruses.

Dipnetting for larvae © David Printiss

SURVEYS

The first step toward Flatwoods Salamander conservation is determining whether the property has suitable upland and wetland habitats to support a population. The biologist surveyor assesses the extent of ground cover, canopy closure, disturbance to natural water flow, and fire history.

Surveys done at any time of year can suggest a landscape's relative suitability. However, actual presence of Flatwoods Salamanders can usually only be confirmed through dipnet surveys of breeding ponds during the larval period January – April.

HOW CAN PRIVATE LANDOWNERS HELP?

Each site with confirmed or potential Flatwoods Salamander habitat must be approached on an individual basis because of differences in soil and hydrology, as well as past and present land-use and management practices.

The following recommendations can be used by private landowners to maintain and restore Flatwoods Salamander habitat :

- Establish a prescribed burning program that includes periodic growing season burns throughout upland and wetland habitats.

Good, fire-maintained wiregrass ecotone between uplands on the left and wetland on the right © David Printiss

- Cut timber selectively within the established "buffer zones" surrounding the breeding ponds, using methods that are the least destructive to ground cover and soil.
- Reduce shrub cover to help maintain open canopies and grassy ground cover.
- Plug ditches that alter the natural hydrology of the area.
- Eliminate deep firebreaks and roads that destroy or fragment the natural connections between potential breeding sites.