



## U.S. Fish & Wildlife Service

# The Tennessee Partners for Fish and Wildlife Program Tennessee Ecological Services Field Office Cookeville, Tennessee

Tennessee is a biodiversity hotspot with over 100 species classified as federally threatened or endangered and over 50 species at-risk. More than a thousand other species have been identified in the Tennessee State Wildlife Action Plan as Species of Greatest Conservation Need (GCN), a little over a third of which are plant species. The majority of animal species of GCN are found in freshwater aquatic habitats, which are some of the most diverse and sensitive aquatic ecosystems in the nation. Many are also found in terrestrial and karst habitats (e.g., cave, springs, limestone glades) shared by federally listed or at-risk species of plants. The future of healthy fish, wildlife, and plant populations in Tennessee, where more than 90% of the land in the State is privately owned, is in the hands of private landowners.

The Partners for Fish and Wildlife (PFW) Program provides technical and financial assistance to private landowners with their primary land management goals, while also improving habitat for federally listed and at-risk species and migratory birds. The Tennessee Ecological Services Field Office delivers conservation within a Strategic Habitat Conservation (SHC) framework. This framework draws on existing biological planning documents such as Service recovery

plans, Tennessee's State Wildlife Action Plan, and other species and habitat focused conservation plans. Conservation delivery practices that will improve or maintain the resiliency, redundancy, or representation of federally listed and at-risk species are designed using spatial analyses regarding locations of species, habitats, and threats affecting them. The Tennessee Field Office currently supports two biologists fully dedicated to implementing the PFW Program in Tennessee. Both biologists are stationed in Cookeville, Tennessee, and coordinate conservation delivery across two work areas that encompass four focus areas. Depending on future funding, an additional position may be co-located with a partner organization in southern Middle Tennessee, or northern East Tennessee.

The goal of the PFW Program in Tennessee is to improve habitat quantity, condition, and connectivity for federally protected and at-risk species, consistent with the SHC framework. This plan identifies focal species for each focus area, representing aquatic and terrestrial ecosystems where the PFW Program will target work. Objectives within aquatic ecosystems are providing riparian habitats that will reduce sediment and nutrient inputs, stabilizing and restoring

instream habitat, removing or replacing dams or culverts that are barriers to aquatic organism passage, and restoring vegetation structure and hydrology in headwater wetland habitats. In terrestrial ecosystems, the objectives are expanding and restoring optimal conditions within limestone glade and wetland habitats and providing terrestrial breeding and non-breeding habitat for federally listed and at-risk species. Additional biodiversity goals of the PFW Program in Tennessee are supported through collaborative efforts with the Asheville Ecological Services Field Office in the Southern Blue Ridge Mountains, and the Georgia Ecological Services Field Office in the upper Conasauga watershed. The PFW Program leverages its resources through other partner initiatives, including Farm Bill programs, to broaden its reach in delivering habitat conservation using science-based approaches.

Evaluating the biological outcomes of our conservation delivery is a fundamental element of SHC. Through targeted monitoring, the PFW Program will gauge the progress and success of our actions, validate assumptions used in our conservation design, and incorporate learning into future planning efforts and decision making.



### Focus Areas

- Lower Tennessee River Basin
- Central Basin Karst
- Cumberland Plateau
- Upper Tennessee River Basin

### Work Areas

- East Tennessee
- West and Middle Tennessee
- PFW Program Biologists

The result will be to improve conservation outcomes and help prioritize the efforts that are most likely to produce the greatest return on investments. The PFW Program will collaborate with partners including State natural resource agencies, academia, and others to focus monitoring efforts on measurable outcomes anticipated to result from our conservation delivery. Detecting positive, population-level responses is the ultimate measure of conservation delivery effectiveness.

However, population-level responses are often lagging indicators of physical and biological improvements in habitat conditions, that may not be detectable for several years once a project has been completed. For this reason, the PFW Program will integrate monitoring approaches capable of measuring incremental changes in habitat conditions, structured such that outcomes from individual projects can be aggregated to assess outcomes at the focus area/landscape scale. This integrated approach will allow for timely detection of incremental changes in habitat conditions that are needed to improve or maintain the resiliency and/or representation of target populations, while also providing a means to detect population changes at ecologically meaningful scales sufficient to promote species recovery.

### East Tennessee Work Area

There are two focus areas in the East Tennessee Work Area: the Upper Tennessee River Basin and Cumberland Plateau Headwaters. The focus areas, and wider work area, have a diversity of habitat types including aquatic, riparian, karst, and upland hardwood forests. Within these focus areas, agricultural runoff and stream modifications are widely recognized as leading factors behind population declines of many focal species. PFW Program projects are primarily concentrated in intermittent and perennial streams that host numerous federally listed or at-risk species.



*Partners with a limestone glade restoration project, credit USFWS/Robby Cogburn.*

### Key Partners for Tennessee

- American Forestry Foundation
- The Clinch and Powell Resource Conservation and Development Council
- Defenders for Wildlife
- Natural Resources Conservation Service
- National Wild Turkey Federation
- The Nature Conservancy
- Quail Forever
- Southeastern Grasslands Initiative
- Tennessee Aquarium
- Tennessee Department of Agriculture
- Tennessee Department of Environment and Conservation
- Tennessee Division of Forestry
- Tennessee Forestry Association
- Tennessee Plant Conservation Alliance
- Tennessee River Basin Network
- Tennessee Soil and Water Conservation Districts
- Tennessee Valley Authority
- Tennessee Wildlife Resources Agency



*Bumbee Creek culvert replacement, credit USFWS/Emily Granstaff.*



Monitoring a project for the endangered fluted kidneyshell, credit USFWS/Dustin Boles.

### Upper Tennessee River Basin Focus Area

The Upper Tennessee River Basin includes portions of the Upper Clinch, Powell, and Nolichucky watersheds, harboring one of the most diverse assemblages of fishes and mussels in North America. Specifically, these rivers support over 130 species of fish and at least 46 extant species of freshwater mussels, with 27 under federal protection. These watersheds have been prioritized for conservation efforts due to high richness of federally listed and at-risk species and well-established partnerships. The PFW Program will aim to improve aquatic habitat conditions throughout this focus area by addressing threats from nonpoint source pollution and increasing habitat connectivity.

### Cumberland Plateau Headwater Focus Area

The Cumberland Plateau Headwater focus area includes portions of the Emory, Sequatchie, Upper Caney Fork, Clear Fork, and Wolf River watersheds, the majority of which originate in the Cumberland Plateau ecoregion. The highly connected, forested habitats of the Cumberland Plateau, and the waters they feed, host some of the nation's greatest diversity of fish, mussel, and plant species. The PFW Program will implement recovery actions to restore wetland habitats for terrestrial species, also benefiting downstream aquatic systems, where the focus will be reducing nutrient and sediment input, stabilizing substrates, and connecting isolated habitats. Work in this focal area will also enhance land protection efforts of the Open Space Institute's Southern Cumberland Land Protection Fund and the National Fish and Wildlife Foundation's Cumberland Plateau Stewardship Fund. These initiatives emphasize the need for a well-managed, connected mosaic of working and protected lands to maintain this resilient landscape for species conservation in the face of a changing climate.

## U.S. Fish & Wildlife Service

### Upper Tennessee River Basin Focus Area

**Habitat Type:** Aquatic Ecosystem

**Total Listed & At-Risk Species in Focus Area:** Endangered (24), Threatened (3), At-Risk (6)

Focal Species: ESA Status, Common Name ( <i>Scientific Name</i> )	Taxa Group
<b>Endangered:</b>	
Birdwing Pearlymussel ( <i>Lemiox rimosus</i> )	Mussel
Fluted Kidneyshell ( <i>Ptychobranchus subtentum</i> )	Mussel
Oyster Mussel ( <i>Epioblasma capsaeformis</i> )	Mussel
Purple Bean ( <i>Villosa perpurpurea</i> )	Mussel
Pygmy Madtom ( <i>Noturus stanauli</i> )	Fish
<b>Threatened:</b>	
Spotfin Chub ( <i>Cyprinella monacha</i> )	Fish
Yellowfin Madtom ( <i>Noturus flavipinnis</i> )	Fish
<b>At-Risk:</b>	
Cumberland Moccasinshell ( <i>Medionidus conradicus</i> )	Mussel
Spiny Riversnail ( <i>Io fluvialis</i> )	Snail

**Focal Area Counties:** Campbell, Claiborne, Greene, Hancock, Hawkins

**Types of Habitat Improvement:** Fish passage enhancement and barrier removal, streambank stabilization, in-stream habitat restoration, livestock exclusion fencing, alternative water sources, reforestation, forested and natural regeneration riparian buffer establishment and enhancement. Application of Best Management Practices (BMPs) in soil eroded areas through heavy use areas, filter strips, and cover crops, etc.

### Cumberland Plateau Focus Area

**Habitat Type:** Aquatic and Terrestrial Ecosystems

**Total Listed & At-Risk Species in Focus Area:** Endangered (13), Threatened (10), At-Risk (13)

Focal Species: ESA Status, Common Name ( <i>Scientific Name</i> )	Taxa Group
<b>Endangered:</b>	
Bluemask Darter ( <i>Etheostoma akatulo</i> )	Fish
Laurel Dace ( <i>Chrosomus saylori</i> )	Fish
Cumberland Elktote ( <i>Alasmidonta atropurpurea</i> )	Mussel
Purple Bean ( <i>Villosa perpurpurea</i> )	Mussel
Fluted Kidneyshell ( <i>Ptychobranchus subtentum</i> )	Mussel
Anthony's Riversnail ( <i>Atheurnia anthonyi</i> )	Snail
<b>Threatened:</b>	
Spotfin Chub ( <i>Cyprinella monacha</i> )	Fish
White Fringeless Orchid ( <i>Platanthera integrilabia</i> )	Plant
<b>At-Risk:</b>	
Pristine Crayfish ( <i>Cambarus pristinus</i> )	Crayfish
Cumberland Moccasinshell ( <i>Medionidus conradicus</i> )	Mussel

**Focal Area Counties:** Bledsoe, Cumberland, Fentress, Grundy, Marion, Morgan, Pickett, Rhea, Sequatchie, Van Buren, White

**Types of Habitat Improvement:** Fish passage enhancement and barrier removal, streambank stabilization, in-stream habitat restoration, livestock exclusion fencing, alternative water sources, reforestation, forested and natural regeneration riparian buffer establishment and enhancement, soil erosion Best Management Practices heavy use areas, filter strips, cover crops, etc.). Wetland restoration including hydrologic restoration such as converting impounded areas back to a natural flow, and installing native vegetation in swales on the Plateau for the reintroduction of the white fringeless orchid. Application of BMPs in soil eroded areas through heavy use areas, filter strips, and cover crops, etc.

## West and Middle Tennessee Work Area

The West and Middle Tennessee Work Area hosts a myriad of aquatic, riparian, karst, and bottomland and upland hardwood forest habitats. Within the broader work area, there are two focus areas, the Lower Tennessee River Basin and Central Basin Karst. Aquatic and terrestrial habitats are heavily impacted by land uses related to agriculture, forestry, and other development within the focus areas. Specifically, nonpoint source pollution, stream modifications, and aquatic organism barriers contribute to the decline of focal species. Urban and residential development are also prevalent threats to unique terrestrial ecosystems, especially near metropolitan areas that are experiencing rapid growth. The Lower Tennessee River Basin Focus Area includes portions of four tributary watersheds to the Tennessee River, where we will work with others to improve habitat conditions in intermittent and perennial streams that support focal species. Within the Central Basin Karst Focus Area priorities include restoring limestone glades and barrens for the benefit of pollinators, listed plants, and other federal at-risk species that depend on well-lit habitats, as well as protecting intermittent streams, sinkholes, and caves.

### Lower Tennessee River Basin Focus Area

The Lower Tennessee River Basin, represented by the Duck, Elk, Cypress Creek, and Buffalo River watersheds, hosts over 150 species of fish and over 60 species of freshwater mussels, ranking these systems among the highest conservation priorities in the Southeast.

The goals in this focus area are to:

- 1) protect headwater spawning habitats for focal fish species,
  - 2) improve instream habitat conditions and water quality by increasing riparian buffers and reducing livestock access to streams, and
  - 3) increase connectivity of aquatic habitats by removing aquatic migration barriers.
- Field staff will collaborate with partners to enhance aquatic habitat through the Southeastern Hellbender Conservation Initiative and the Elk and Duck River Watershed Forest Initiative. PFW field staff in both Tennessee and Alabama work in the counties identified in this focus area.



Field surveys in Hatfield Creek with Tennessee Wildlife Resources Agency (TWRA), credit TWRA.

### Lower Tennessee River Basin Focus Area

**Habitat Type:** Aquatic Ecosystem

**Total Listed & At-Risk Species in Focus Area:** Endangered (13), Threatened (4), At-Risk (15)

Focal Species: ESA Status, Common Name ( <i>Scientific Name</i> )	Taxa Group
<b>Endangered:</b>	
Birdwing Pearlymussel ( <i>Lemiox rimosus</i> )	Mussel
Cracking Pearlymussel ( <i>Hemistena lata</i> )	Mussel
Pale Lilliput ( <i>Toxolasma cylindrellus</i> )	Mussel
Slabside Pearlymussel ( <i>Pleuonaia dolabelloides</i> )	Mussel
Pygmy Madtom ( <i>Noturus stanauli</i> )	Fish
<b>Threatened:</b>	
Rabbitsfoot ( <i>Quadrula cylindrica cylindrica</i> )	Mussel
Slackwater Darter ( <i>Etheostoma boschungii</i> )	Fish
Spotfin Chub ( <i>Cyprinella monacha</i> )	Fish
<b>At-Risk:</b>	
Tennessee Pigtoe ( <i>Fusconaia barnesiana</i> )	Mussel
Striated Darter ( <i>Etheostoma striatulum</i> )	Fish

**Focal Area Counties:** Bedford, Coffee, Franklin, Giles, Hickman, Lawrence, Lewis, Lincoln, Marshall, Maury, Moore, Wayne

**Types of Habitat Improvement:** Fish passage enhancement and barrier removal, streambank stabilization, in-stream habitat restoration, livestock exclusion fencing, alternative water source installation, reforestation, forested and natural regeneration riparian buffer establishment and enhancement. Application of BMPs in soil eroded areas through heavy use areas, filter strips, and cover crops, etc.

Tennessee field staff will be collaboratively working with the Alabama PFW Program to promote habitat connectivity and address

habitat and species conservation needs across state lines within the Tennessee River Basin.

### Central Basin Karst Focus Area

Tennessee's Central Basin (aka Nashville Basin) is a hotspot for plant and animal diversity that is adapted to the basin's assortment of interwoven karst habitats, ranging from caves, springs, and sinkholes to limestone glades and barrens (aka limestone glades).



The endangered leafy prairie clover at project site visit, credit USFWS/Robby Cogburn.

Found within the region's caves are numerous endemic species of insects, fishes, and salamanders, many of which require stable thermal environments and unpolluted waters to support life. Above ground, springs and limestone glades are home to plant species found nowhere else globally. The PFW Program will continue applying a variety of habitat improvement practices to protect streams and subsurface water quality and reduce the abundance of eastern red cedar and other trees and shrubs that have taken over limestone glades in the absence of fire.

The Duck River Streambank Stabilization Project targeting the endangered pygmy madtom, credit USFWS/Robby Cogburn.



A livestock exclusion project, credit USFWS/Emily Granstaff.

#### Central Basin Karst Focus Area

**Habitat Type:** Karst

**Total Listed & At-Risk Species in Focus Area:** Endangered (7), Threatened (1), At-Risk (8)

Focal Species: ESA Status, Common Name ( <i>Scientific Name</i> )	Taxa Group
<b>Endangered:</b>	
Pyne's Ground-Plum ( <i>Astragalus bibullatus</i> )	Plant
Leafy Prairie-Clover ( <i>Dalea foliosa</i> )	Plant
Spring Creek Bladderpod ( <i>Lesquerella</i> (=Paysonia) <i>perforata</i> )	Plant
Indiana Bat ( <i>Myotis sodalis</i> )	Bat
<b>At-Risk:</b>	
Streamside Salamander ( <i>Ambystoma barbouri</i> )	Salamander
Tennessee Cave Salamander ( <i>Gyrinophilus palleucus</i> )	Salamander
Water Stitchwort ( <i>Stellaria fontinalis</i> )	Plant
Prairie Warbler ( <i>Setophaga discolor</i> )	Bird

**Focal Area Counties:** Rutherford, Wilson

**Types of Habitat Improvement:** Forestry mulching, herbicide application, mechanical vegetation management, forested riparian buffer enhancement/establishment, livestock exclusion fencing, and reforestation.

