

## **Piedmont**

### Ecoregional Overview

The Piedmont ecoregion stretches approximately 10,990,373 acres across middle Georgia. Approximately 426,775 acres of this ecoregion are in permanent or long-term conservation ownership. Georgia DNR manages 71,760 acres owned in fee simple by the State of Georgia and an additional 142,847 acres through short-term leases or management agreements. Federal land ownership includes 180,221 acres managed by the USDA Forest Service, 188,400 acres managed by the U.S. Department of Defense (including the Army Corps of Engineers), 35,607 acres managed by the U.S. Fish & Wildlife Service, and 8,743 acres managed by the National Park Service. The Piedmont has the second lowest percentage of lands in permanent conservation status (5%) of all ecoregions in Georgia.

The Piedmont comprises a transitional area between the mountainous ecoregions to the northwest and the relatively flat Coastal Plain to the southeast. Geologically, it is a complex mosaic of Precambrian and Paleozoic metamorphic and igneous rocks with moderately dissected plains and isolated monadnocks (rounded hills). The soils tend to be finer-textured than in the coastal plain ecoregions. Once largely cultivated, much of this region has reverted to pine and hardwood woodlands, and, more recently, to sprawling urban and suburban areas. Subdivisions of the Piedmont ecoregion in Georgia include the Southern Inner Piedmont, the Southern Outer Piedmont, the Carolina Slate Belt, the Talladega Upland, and the Pine Mountain Ridges.

The rolling to hilly, well-dissected upland of the Southern Inner Piedmont contains mostly schist, gneiss, and granite bedrock. West of Atlanta and into Alabama, mica schist and micaceous saprolite are typical. To the east, biotite gneiss is more common. The region is now mostly forested with oak-pine, oak-hickory, and loblolly-shortleaf pine forests. Open areas are mostly in pasture, although there are some small areas of cropland. Hay, cattle, and poultry are the main agricultural products. Urban/suburban land cover has increased greatly within this ecoregion over the past twenty years.

The Southern Outer Piedmont ecoregion has lower elevations, less relief, and less precipitation than the Southern Inner Piedmont. Loblolly-shortleaf pine is the major forest type, with less oak-hickory and oak-pine than in the Southern Inner Piedmont. Gneiss, schist and granite are the dominant rock types, covered with deep saprolite and mostly red, clayey subsoils. The southern boundary of the ecoregion occurs at the Fall Line, where unconsolidated coastal plain sediments overlay the metamorphic and igneous rocks of the Piedmont.

As its name suggests, the Carolina Slate Belt is found primarily in the Carolinas, although a small portion extends into Georgia. The region's mineral-rich metavolcanic and metasedimentary rocks with slaty cleavage are finer-grained and less metamorphosed than most Piedmont regions. This area tends to be less rugged and dissected, with wider valleys than other Piedmont areas, and with more silty and silty clay soils.

The Talladega Upland contains dissected hills and tablelands that are mostly forested and at generally higher elevations than the Southern Inner and Southern Outer Piedmont. The geology is distinctive, consisting of mostly phyllite, quartzite, slate, metasilstone, and metaconglomerate, in contrast to the metamorphic and intrusive igneous rocks of the Southern Inner and Southern Outer Piedmont. The climate of the Talladega Upland is slightly cooler and wetter than the other ecoregions of the Georgia Piedmont. Oak-hickory-pine forest is the dominant natural vegetation type.

The Pine Mountain Ridges, a narrow region in the southwest portion of the Georgia Piedmont, contains quartzite-capped, steep-sloped ridges that rise 300-400 feet to elevations over 1300 feet. Pine Mountain and Oak Mountain are the primary linear ridges trending southwest to northeast, and several other smaller ridges and mountains between these, including Bull Trail Mountain, Indian Grave Mountain, Salter Mountain, and Huckleberry Pinnacle, add to the region's more mountainous appearance. The Flint River has cut narrow, steep gorges through the ridges. Streams in this region are generally of higher gradient than surrounding areas of the Southern Outer Piedmont and contain more rocky or gravelly substrates.

The predominant land cover types in the Piedmont are deciduous/mixed forest and evergreen forest (Kramer and Elliott, 2004). An analysis of land use changes from 1974 to 1998 based on satellite imagery indicate the following general trends:

- A decrease in row crop/pasture (from 19.47% of total land cover to 15.51%)
- An increase in high-intensity and low-intensity urban (from 4.86% of total land cover to 9.57%)
- An increase in clearcut/sparse vegetation (from 3.82% of total land cover to 7.38%)
- A decrease in deciduous/mixed forest (from 38.23% of total land cover to 33.98%)
- A slight decrease in evergreen forest (from 28.86% of total land cover to 28.17%)

These trends indicate a general decline in the total acreage devoted to active agricultural uses, a significant increase in residential and commercial development, an increase in cleared or sparsely vegetated habitats (likely from a wide range of activities, including construction, timber harvest, and abandonment of agricultural fields), a decline in deciduous/mixed forest, and little change in the total acreage of pine forest (represented primarily by loblolly pine plantations in this ecoregion).

### High Priority Species and Habitats

The technical teams identified 55 high priority animal species in the Piedmont ecoregion. These included 13 birds, 4 reptiles, 1 mammal, 3 amphibians, 5 mollusks, 23 fish, and 6 aquatic arthropods. These species are listed in Table 5, with information on global and state rarity ranks, protected status (if any) under federal or state law, and habitat and range in Georgia. In addition, 71 species of high priority plants were identified for the Piedmont. These are listed in Table 6.

High priority habitats for the Piedmont ecoregion are listed and briefly described below:

*1. Beaver Ponds; Freshwater Marsh*

Beaver ponds are temporary impoundments created by beaver on small to medium sized streams. Freshwater marshes develop in shallow beaver ponds and along the edges of larger lakes and ponds. Dominants include a variety of sedges, rushes, grasses, and forbs, with scattered buttonbush, red maple, swamp dogwood, and tag alder. Few Georgia examples exist that are not invaded by the exotic weed, *Murdannia*. These wetlands provide habitat for a wide variety of wildlife species.

*2. Bottomland Hardwood Forests*

Forested wetlands of alluvial river floodplains, characterized by a diverse association of deciduous hardwood trees. Canopy dominants vary, but may include water oak, willow oak, overcup oak, cherrybark oak, swamp chestnut oak, green ash, sweetgum, bitternut hickory, and pignut hickory. Shrub layer may be dense or relatively sparse, containing a variety of mesophytic or hydrophytic woody plants and often a significant woody vine component. Many of these habitats have been impacted by invasive exotic species such as Chinese privet and Nepalese browntop.

*3. Canebrakes*

Thickets of native river cane found along rivers and creeks under sparse to full tree cover. Canebrakes represent important wildlife habitat for a variety of neotropical birds and insects. These habitats require fire or other form of periodic disturbance for maintenance. Most canebrakes in this region are relatively small and fire-suppressed, often occurring along the edges of fields and other clearings.

*4. Granite Outcrops*

Diverse mosaics of exposed granitic rock, herb and shrub dominated patches, and wetland microhabitats. Most have shallow solution pits that collect soil and support various stages of plant succession. These environments support rare or endemic species of plants and animals. The most important of these habitats contain a variety of solution pits, seepage zones, and bare rock exposures. Some outcrops are monadnocks (rise above the ground) while others are flat rock exposures. The Georgia Piedmont is the center of granite outcrop species diversity.

*5. Medium to Large Rivers*

Low to moderate gradient meandering rivers, typically with heavy sediment loads. Floodplains are relatively narrow compared to similar rivers in the Coastal Plain. Extensive shoal habitats may occur, especially along the Fall Line. Dominant habitats include runs, pools, and shoals. Substrate is variable, but is dominated by sand in runs and pools and by bedrock in shoals. Aquatic vegetation may be present.

*6. Mesic Hardwood Forests*

Non-wetland forests of floodplains, ravines, and north-facing slopes in the Piedmont. These may include species such as American beech, white oak, northern red oak, bitternut hickory, pignut hickory, shagbark hickory, bigleaf magnolia, yellow poplar,

blackgum, dogwood, black cherry, and loblolly pine. Typical shrubs include spicebush, sweetshrub, pawpaw, Oconee azalea, rusty viburnum, and pinxter-flower.

#### *7. Montane Longleaf Pine-Hardwood Forest*

A subxeric or xeric mixed forest with longleaf pine, oaks, and hickories. Georgia examples are typically fire-suppressed. Pine Mountain is the most notable example, but occurrences can also be found along Dugdown Mountain and other. Includes a rare longleaf pine/Georgia oak subtype found on Hollis quartzite along the main Pine Mountain ridge.

#### *8. Oak Woodlands and Savannas*

Rare upland hardwood habitats found in scattered locations in the Piedmont. These xeric or subxeric oak-dominated woodland are influenced by edaphic conditions (i.e. thin soils, mafic rocks) and periodic fire. Dominants may include southern red oak, scarlet oak, post oak, and blackjack oak, sometimes with shortleaf pine. Sparkleberry and hawbushes are common shrub components. A particularly rare type, the post oak-blackjack oak savanna, was apparently much more common in pre-settlement times; only small, fire-suppressed remnants of these habitats exist today.

#### *9. Oak-Hickory-Pine Forest*

Considered the climax forest of the Piedmont, this forest type formerly covered 50% to 75% of the region; most examples on fertile soils were eliminated by conversion to agricultural uses. Remaining examples are often found in rocky areas that were difficult to convert to agricultural fields. Typically include a variety of hardwood species such as white oak, black oak, southern red oak, pignut hickory, shagbark hickory, mockernut hickory, red maple, blackgum, shortleaf pine, and loblolly pine, with dogwood, rusty viburnum, hog plum, dwarf pawpaw, and various hawbushes in the understory. American chestnut was formerly a major component of the canopy. Examples over circumneutral soils influenced by mafic or ultramafic bedrock are often floristically richer, and may contain species such as Oglethorpe oak, basswood, red mulberry, redbud, and fringetree.

#### *10. Rocky or Cobbly River Shoals*

Shallow, high gradient reaches with swift water and rocky substrates. These habitats are important spawning areas for fish, including darters, shiners, and suckers (such as the extremely rare robust redhorse). In addition, shoals provide foraging areas for wading birds, and sunning areas for turtles. May contain dense growths of riverweed (*Podostemum ceratophyllum*). The shoals spiderlily (*Hymenocallis coronaria*), a State-protected plant, is found on rocky shoals in the middle reaches of the Savannah, Flint, and Chattahoochee rivers. Many shoals have been degraded by stream impoundments, altered water quality, and excessive silt deposition.

#### *11. Rocky/Sandy River Bluffs*

Exposed rocky or sandy bluffs along rivers in the Piedmont are often characterized by mixed pine-oak vegetation with shortleaf pine, loblolly pine post oak, eastern redcedar, southern red oak, blackjack oak, and white oak. Small trees and shrubs may include

hornbeam, winged elm, sparkleberry, winged sumac, yucca, and century plant. More sheltered or east-facing bluffs may have mountain laurel and rosebay rhododendron.

#### *12. Serpentine Outcrops/Woodland/Savanna*

This globally rare habitat represents a complex mosaic of woodlands and savannas with scattered outcropping of serpentine rocks. The pine-mixed hardwood vegetation includes longleaf pine as a dominant. This type is maintained by fire and edaphic conditions. The only known Georgia examples are fire-suppressed. These habitats include disjunct coastal plain species such as pineland Barbara-buttons and Georgia plume.

#### *13. Springs and Spring Runs*

Springs are highly localized groundwater expressions. The waters of springs and associated habitats can be highly variable, depending on hydrology (hydroperiod and volume) and edaphic factors. Springs of the Piedmont have varying mineral content, chemical properties, and temperatures. Includes spring pools and first order streams immediately below springs where rare fish and invertebrates may occur.

#### *14. Streams*

In the upper Piedmont, streams are low to moderate gradient and typically contain well-defined riffles and pools. Substrate consists of gravel, pebble, sand, and silt; some bedrock may also be present. Lower Piedmont streams are lower gradient, have fewer riffles and pools, and their substrates have a higher proportion of silt, clay, and detritus than upper Piedmont streams. Turbidity is highly variable, but most of these streams become highly turbid after rain.

#### *15. Upland Depression Swamp*

A non-alluvial open swamp with water oak, southern shagbark hickory, Oglethorpe oak, and loblolly and shortleaf pine. Coastal plain elements in the understory include swamp palmetto and parsley haw. Usually found on Iredell or Enon soils in the lower Piedmont. These sticky, plastic soils pond water in the spring, resulting in swampy conditions for a portion of the year.

#### *16. Xeric Pine Woodlands*

Pine-dominated habitats of dry, rocky ridgetops and granitic outcrops. Dominants are loblolly, shortleaf, and Virginia pine. These woodland habitats are maintained by a combination of edaphic factors and periodic fire.

### Problems Affecting Wildlife Diversity

One of the primary factors impacting habitats and species in the Piedmont is the rapid pace of residential and commercial development. These development pressures have resulted in the loss or fragmentation of a number of habitats, including bottomland hardwood forest, oak-hickory-pine forest, granite outcrops, and mesic hardwood forest. Much of this is due to the development of new industrial and commercial sites along interstate highways and other major highways. Expansion of the Atlanta metropolitan area has resulted in development of subdivisions, roads, utility corridors, and retail

centers. Other metropolitan areas experiencing significant growth in this region include Augusta, Gainesville, Marietta, Columbus, Athens, Forsyth, and Conyers.

Point-source discharges into streams in this region include wastewater industrial facilities, and municipal treatment facilities. According to EPD stream monitoring data for 2002, 49% of streams meet designated uses (based on percentage of total monitored stream miles); 24% partially support designated uses, and 27% do not support designated uses. The percentage of monitored streams not meeting designated uses in the Piedmont falls in the middle of the range for the five Georgia ecoregions. The percentage of streams supporting designated uses is second highest in the five ecoregions.

Former conversion of forest and woodland habitats to agricultural uses resulted in the loss of most of the original upland forest (generally described as oak-hickory-pine forest, but containing a wide variety of subtypes) in this region. In addition, erosional soil losses buried many floodplains and river shoals in up to 12 feet of silt. Many of these habitats have recovered partially in the intervening decades. For example, reductions in the rates of sedimentation have resulted in reemergence of shoals in several areas of the Piedmont. However, reductions in streamflow fluctuations by upstream dams have resulted in isolation and dewatering of floodplains in many areas of this ecoregion. Restoration of more natural hydrologic conditions, maintenance of vegetated stream buffers, and continued improvements in erosion and sedimentation control are essential to the protection of aquatic diversity in this ecoregion.

Conversion of remaining upland hardwood and pine-hardwood forests to pine plantations also presents problems for wildlife. In particular, the Pine Mountain region has experienced a recent decline in longleaf pine-hardwood forest as a result of conversion to loblolly pine plantations. Specific problems associated with this forest conversion include loss of vegetative structure and nesting sites, decline in hard and soft mast production, loss of understory and groundcover diversity, and physical disturbance of habitat for organisms found in leaf litter or soil.

Fire suppression is also a significant problem in this region. The remarkable expansion of residential and commercial development zones from urban centers into surrounding suburbs has resulted in many fire-dependent habitats being surrounded by highways, subdivisions, or retail centers. Concerns about smoke management, air quality, and damage to structures make it difficult to implement prescribed burn plans for these habitats. For example, while a fire plan has been developed for Kennesaw Mountain National Military Park, concerns about smoke management problems and potential damage to historic structures and monuments in the park represent major impediments to implementation of the plan. Throughout the region, a lack of fire has resulted in the decline in the extent and quality of habitats such as oak-pine-hickory forest, oak woodlands and savannas, montane longleaf pine-hardwood forest, serpentine outcrops/woodland/savanna, and canebrakes.

Invasive/alien species pose significant problems to habitats in this region. The Asiatic clam and feral hogs are examples of exotic animal species. Most river floodplains and

valleys in the Piedmont are overrun with exotic plants such as Chinese privet and Nepalese browntop. Japanese honeysuckle, kudzu, and autumn olive are major components of the understory in many upland forest stands.

For some high priority species and habitats, unmanaged recreational use represents a serious problem. In the Piedmont, river shoals have traditionally been sites of concentrated recreational use (e.g., fishing, picnicking). Today, many of these shoal areas are being heavily impacted by ATV and ORV traffic as well as littering. Use of motorized vehicles or horses on granite outcrops can result in significant impacts to plant communities, substrates, and rare species associates.

### **Granite Rock Outcrops**

Georgia contains nearly 90% of known Piedmont granitic outcrops. Granite rock outcrops host unique microhabitats that are characterized by a granitic substrate with pockets of acidic, nutrient-poor mineral soil. These harsh environments can fluctuate between hydric and xeric several times a year. Vernal pools, or solution pits, are shallow, flat-bottomed depressions where water collects after a rain. These pools are formed naturally by erosion over millions of years and are home to several high priority species that are severely restricted in their range, including mat-forming quillwort, black-spored quillwort, and snorkelwort. Unfortunately, these species are in steady decline where populations are not protected.

Specific threats to these habitats include destruction of habitat from quarrying activities, recreational use (trail bicycles, ORV traffic, littering, vandalism, fire building, overuse for education), eutrophication resulting from conversion of habitat to pasture (cattle waste adds nutrients that favor competing vegetation), pollution (dumping of trash and airborne deposition), invasive exotic species, and shading due to tree growth.

The highest priority for management of granite outcrops is to preserve habitat and avoid disturbance. Efforts should be made to bring these important habitats into some kind of protection. Currently, only six granite rock outcrop sites are protected in Georgia.

Construction of dams or other structures altering stream flow represents another significant problem for aquatic species in this region. The Piedmont is the primary region of water supply reservoir construction in Georgia. These impoundments threaten the viability of populations of native aquatic species, including rare species such as the Cherokee darter, Etowah darter, and bluestripe shiner. The various impacts to these aquatic fauna from impoundments include direct loss of lotic habitat, barriers to dispersal, alteration of instream flows, and impaired water quality (altered temperature and dissolved oxygen regimes).

Incompatible road and utility corridor management represent potential problems for some high priority plants of open areas, such as Georgia rockcress, Georgia aster, harperella, and pool sprite. Indiscriminant use of herbicides or excessive ground disturbance along roads and in utility corridors may impact adjacent terrestrial and aquatic habitats. Vegetation management programs should be planned and implemented in a way that minimizes impacts to rare plant populations occurring in the road right-of-way or utility corridor.

Encroachment of vegetated stream buffers and general loss of permeable watershed surfaces are particularly significant problems in this ecoregion, due to intense development pressures and the resulting rapid increase in density of roads, utility corridors, lawns, and parking areas near streams. In many areas, the amount of impermeable surface in the local watershed provides very little capacity for amelioration of nonpoint source pollution, leads to flash flooding and streambank scouring, and greatly diminishes groundwater recharge capacity.

### High Priority Sites and Landscape Features

The current assessment and previous conservation planning efforts have identified a number of important sites and landscape features in this region. An ongoing assessment of the Piedmont ecoregion in the Southeast conducted by The Nature Conservancy in cooperation with state natural heritage programs in Alabama, Georgia, South Carolina, North Carolina, and Virginia has identified a number of high priority terrestrial and aquatic conservation areas. The following are examples of some of the important sites and landscape features that have been identified in Georgia's Piedmont.

#### *Burks Mountain/Dixie Mountain*

This site is highly significant, both geologically and ecologically. The ridge comprising Burks Mountain and Dixie Mountain is underlain with magnesium rich (ultramafic) rock known as "serpentine". This landform is reportedly the largest serpentine ridge east of the Appalachian Mountains and south of Maryland. The upper slopes of the ridge have a dry, open woods with scattered rock outcrops ("serpentine barrens"), as well as a xeric hardwood-pine forest with longleaf pine. This area contains the only Piedmont populations of two State-protected plants: Georgia plume (*Elliottia racemosa*) and pineland Barbara buttons (*Marshallia ramosa*) as well as the only known population of a plant new to science ("Dixie Mountain breadroot").

#### *Currahee Mountain/Lake Russell WMA*

This site, located in the upper Piedmont on the Chattahoochee National Forest, is an important area for restoration of shortleaf pine-post oak woodland habitat. This high priority habitat, formerly common in the upper Piedmont and Blue Ridge, has been greatly reduced in extent and condition due to decades of forest conversion and fire suppression. Restoration of shortleaf pine-post oak woodland habitat at this site will benefit the smooth purple coneflower (*Echinacea laevigata*), a federally listed plant.

### *Granite Outcrops (numerous sites)*

These small "islands" of biological diversity are found scattered across the Piedmont of Georgia, and contain some of the most imperiled species in the state. Granite outcrop habitats are threatened by quarrying, grazing, off-road vehicles and sedimentation. Protected examples of these habitats can be found at Panola Mountain State Park, Davison-Arabia Mountain Preserve, Stone Mountain, Rock and Shoals Outcrop Natural Area, Camp Meeting Rock Preserve, and Heggies Rock Preserve. Several other granite outcrop sites should be protected in order to preserve a representative portion of the native flora and fauna of these important ecosystems.

### *Oconee National Forest/Piedmont National Wildlife Refuge*

These two federal properties comprise the largest block of publicly owned land in the lower Piedmont. Much of the habitat in Oconee National Forest and Piedmont National Wildlife Refuge consists of loblolly pine stands on upland sites that have been severely impacted by previous agricultural practices. However, these federal lands also contain significant examples of oak-hickory-pine forest, mesic hardwood forest, bottomland hardwood forest, upland depression swamp, and other high priority habitats. High priority species known from this conservation landscape include red-cockaded woodpecker (*Picoides borealis*) Bachman's sparrow (*Aimophila aestivalis*), American ginseng (*Panax quinquefolius*), and Oglethorpe oak (*Quercus oglethorpensis*).

### *Pine Mountain/Flint River*

Pine Mountain is a series of linear ridges extending from Auburn, Alabama northeastward to Barnesville, Georgia. This mountain is composed largely of Hollis quartzite, an extremely hard rock of almost pure silica that is highly resistant to erosion. Pine Mountain rises 300 to 500 feet above the surrounding lands of the lower Piedmont. Toward its eastern end, Pine Mountain is cut by the Flint River in a series of twisting, narrow gorges approximately 400 feet deep. The biota of the Pine Mountain/Flint River region represents a diverse mixture of montane, piedmont and coastal plain elements. High priority plants known from the Pine Mountain/Flint River region include shoals spiderlily (*Hymenocallis coronaria*), Schwerin's indigo-bush (*Amorpha schwerinii*), fringed campion (*Silene polypetala*), and relict trillium (*Trillium reliquum*). Several coastal plain fishes, amphibians and reptiles have northward range extensions in this region. Rare vertebrates reported from the Pine Mountain/Flint River region include Barbour's map turtle (*Graptemys barbouri*) and bluestripe shiner (*Cyprinella callitaenia*). Several rare freshwater mollusks have also been documented from the Flint River.

### *Pool Mountain*

This conservation site in the eastern Piedmont contains a rich mesic hardwood forest more typical of the Blue Ridge, with several rare or uncommon plants, including state protected species such as Wood's false hellebore (*Veratrum woodii*). Pool Mountain has archaeological, historical, and geological significance. This exemplary site is surrounded by residential and commercial development in eastern Gwinnett County, but a portion of

the site was recently acquired by Gwinnett County for use as a park. Similar sites with rich mesic hardwood forests can be found in ravines along the Chattahoochee, Oconee, Flint, and Ocmulgee rivers.

### *Sheffield Tract WMA/Paulding Forest WMA*

This conservation site includes significant examples of montane longleaf pine-hardwood forest, mesic hardwood forest, oak-hickory-pine forest, and several important streams (e.g., Raccoon Creek). A portion of this site is owned by the State of Georgia and managed as Sheffield WMA. The adjacent Paulding Forest WMA is privately owned and operated under a short-term lease arrangement. Other high priority landscape features with montane longleaf pine-hardwood forest communities include Dugdown Mountain and Pine Mountain.

### High Priority Waters

Figure 11 shows the high priority streams and watersheds identified by the CWCS Fishes and Freshwater Invertebrates team for this ecoregion. These streams were chosen on the basis of documented occurrences of high priority aquatic species, high water quality rankings based on Index of Biotic Integrity scores, and designation as exemplary streams in a previous study by The Nature Conservancy. Examples of high priority stream in the Piedmont include Murder Creek, Whooping Creek, Hillabahatchee Creek, Oconee River, Mulberry Creek, Apalachee River, Falling Creek, Potato Creek, Flint River, Shoal Creek, Whitewater Creek, Centralhatchee Creek, Raccoon Creek, Chattahoochee River, Towaliga River, and North Oconee River. Refer to Table 1 of the Fishes and Freshwater Invertebrates Technical Team report in Appendix B for details on the factors contributing to the significance of these and other high priority streams.

### Conservation Goals

- Maintain known viable populations of all high priority species and functional examples of all high priority habitats through land protection, incentive-based habitat management programs on private lands, and habitat restoration and management on public lands.
- Increase public awareness of high priority species and habitats by developing educational messages and lesson plans for use in environmental education facilities, local schools, and other facilities.
- Encourage restoration of important wildlife habitats through reintroduction of prescribed fire, hydrologic restoration, and revegetation efforts.
- Combat the spread of invasive/noxious species in high priority natural habitats by identifying problem areas, providing technical and financial assistance, developing specific educational messages, and managing exotic species populations on public lands.
- Minimize impacts from residential and commercial development on high priority species and habitats by providing input on environmental assessments
- Continue efforts to recover federally listed species by implementation of recovery plans

## **Mature Pine and Upland Hardwood Forests**

Public lands are an important component of the Piedmont landscape and may serve as core areas from which to manage or expand wildlife habitat. Forest products companies are the largest private landowners in the Piedmont and provide tremendous opportunities for increased cooperative management strategies to accomplish wildlife conservation objectives. Private, non-industrial landowner incentive programs can be increased in key areas as well, further adding to core habitat for high priority Piedmont species.

Land tenure in this ecoregion is changing rapidly, however. Recent land divestitures by corporate landowners point to the need for conservation organizations to act quickly when properties containing high priority habitats and species are placed on the market. Partnerships with corporate landowners that involve technical and field assistance can facilitate identification of these habitats and development of specific proposals for long-term protection.

### Strategies and Partnerships to Achieve Conservation Goals

- Provide financial incentives and technical expertise to encourage prescribed burns for high priority fire-maintained habitats (e.g., serpentine woodlands/savannas, montane longleaf pine-hardwood forest) through participation in the Interagency Burn Team and other means.
- Complete the Etowah River Habitat Conservation Plan and begin implementation.
- Work with NRCS staff to identify high priority habitats and sites for implementation of habitat enhancement/restoration projects through Farm Bill programs (e.g., thinning and burning pine stands, restoration of oak and shortleaf pine-oak woodlands)
- Establish partnerships to assess and combat exotic species populations on public lands and provide technical assistance to private landowners to discourage use of invasive exotics.
- Use state parks, wildlife management areas, natural areas, and other public lands to showcase habitat restoration efforts (removal of exotic species, prescribed fires, reduction of deer populations, restoration of streams and stream buffers).
- Work with GDOT and local governments to minimize direct impacts to high priority species and habitats from road development projects
- Work with Georgia Power and private landowners to identify and conserve populations of rare species in and adjacent to utility corridors
- Develop educational materials on high priority species and habitats in the ecoregion and provide these to environmental educators at WRD educational facilities (e.g., Charlie Elliott Wildlife Center) and other facilities

- Work with EPD and local governments to assess potential impacts of stream buffer variances, with special emphasis on high priority streams and watersheds.
- Work with the Georgia Land Trust Service Center to apply monies from the Georgia Wetlands Trust Fund to provide protection for high priority wetlands and stream corridors.

### Highest Priority Conservation Actions

Highest priority conservation actions (actions ranked “Very High” or “High”) identified by the technical teams, Steering Committee, and other stakeholders specifically for this ecoregion include the following (see Appendix L for details):

- Conduct Broad River mussel survey and prioritize other streams for mussel surveys and monitoring projects. Determine species composition of mussels in the Broad River, an under-sampled tributary to the Savannah River.
- Implement diadromous fish restoration projects in Piedmont streams. Evaluate existing population status, commercial and recreational fisheries, and habitat limitations. Look for opportunities to enhance habitat through a suite of alternatives.
- Work with Robust Redhorse Conservation Committee to assure restoration of robust redhorse populations. Conduct research and management efforts to develop six self-sustaining populations of robust redhorse throughout its historic range.
- Continue and expand monitoring of rare species throughout the Coosa Basin, and evaluate this approach for use in other basins. Participate in TNC’s “Measures of Success” analysis for the Etowah River. Continue DNR’s Stream Team surveys throughout the Coosa River Basin. Evaluate the utility of this watershed-level approach for use in other basins.

For high priority conservation actions of a statewide scope, see Section V.

#### **Bottomland Hardwood Forests**

Bottomland hardwood forests provide habitat for a wide variety of terrestrial wildlife species, and provide protection for adjacent aquatic systems. Encroachment from expansion of urban and suburban development zones, and intensive silvicultural practices influence both the extent and connectivity of bottomland hardwood forests in the Piedmont. In addition, these forests are affected by altered hydrologic regimes created by upstream impoundments, excessive sedimentation from development, and invasive exotic plants such as Chinese privet, Nepalese browntop, and Japanese honeysuckle. Consideration must be given to connecting large blocks of riparian forest, development of management prescriptions to improve understory structure, control of exotic species, and protection of riparian zones.

**Table 5. Piedmont High Priority Animals (55 Records)**

Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Habitat in Georgia	Range in Georgia
AA	<i>Acroneuria arida</i>	Elegant stonefly	G3	S3			Streams/ivers in the northern portion of the state	Known from Chattooga Co., Summerville; Cherokee Co., Ball Ground; Clayton Co., Jonesboro; Gordon Co., Ranger
AA	<i>Cambarus fasciatus</i>	A crayfish	G2	S2			Lotic habitats under rocks in flowing water	Lumpkin, Dawson, Pickens, Cherokee, Bartow, & Polk Counties in Etowah River
AA	<i>Cambarus harti</i>	Piedmont blue burrower	G1	S1			Complex burrows in floodplain areas with sandy-organic soil	Meriwether associated with White Sulphur, Flatshoal, White Sulphur, Pigeon, and Cane Creeks; spring sites
AA	<i>Cambarus strigosus</i>	Lean crayfish	G2	S2			Complex burrows in sandy clay soil, often among roots; Savannah River drainage	Broad and Little River basins in Elbert, Oglethorpe and Wilkes counties, Georgia; Hobbs thinks it is probably more widespread in these basins in the Piedmont Province
AA	<i>Distocambarus devexus</i>	Broad River burrowing crayfish	G1	S1			Sandy-clay burrows in Broad River drainage	Broad River system in Oglethorpe and Wilkes counties
AA	<i>Homoeoneuria dolani</i>	Blackwater sand-filtering mayfly	G2	SNR			Shifting sand substrate of larger streams of piedmont and coastal plain with medium to fast current	Exact range uncertain
AM	<i>Desmognathus aeneus</i>	Seepage salamander	G3G4	S3			Seepage areas within hardwood forested ravines	Primarily BR and RV, but also PD
AM	<i>Plethodon websteri</i>	Webster's salamander	G3	S2*			Moist hardwood forests	PD, RV
AM	<i>Pseudacris brachyphona</i>	Mountain chorus frog	G5	S2*			Hardwood forests with fishless breeding pools	BR, RV, PD
BI	<i>Aimophila aestivalis</i>	Bachman's sparrow	G3	S3	SAR	R	Open pine or oak woods; old fields; grassy forest regeneration	RV, PD, CP: where appropriate habitat
BI	<i>Ammodramus savannarum</i>	Grasshopper sparrow	G5	S4			Grassland surrounded by open country (ag, grassland etc.)	CP, PD predominantly, less common in CU, RV, rare in BR
BI	<i>Catharus bicknelli</i>	Bicknell's thrush	G4	S2			Wide variety of forest and scrub habitats	Only 6 confirmed records for GA: CP (coast) - 2 spring and 1 fall; PD - 3 fall
BI	<i>Colinus virginianus</i>	Northern bobwhite	G5	S4			Early successional mixed grass/forb habitat; longleaf pine savanna	CP most numerous; uncommon in PD, RV; scattered in CU, BR
BI	<i>Dendroica kirtlandii</i>	Kirtland's warbler	G1	S1	LE	E	Scrub habitats during spring and fall; may be associated with pines	Isolated reports could occur anywhere in the northern half of state or coast
BI	<i>Haliaeetus leucocephalus</i>	Bald eagle	G4	S2	(PS:LT,P DL)	E	Edges of lakes & large rivers; seacoasts	CP - primarily and reservoirs and rivers PD, BR, RV
BI	<i>Ixobrychus exilis</i>	Least bittern	G4	S3			Freshwater and brackish marshes with tall, dense emergent vegetation. Nests close to open areas	Probably more common as a breeder in CP due to much more potentially suitable habitat than in PD
BI	<i>Lanius ludovicianus migrans</i>	Loggerhead shrike	G4T3Q	S?	SAR		Open woods; field edges; savannas	CP - primary area of abundance; scattered and low number in the PD (none in 20-county metro Atlanta area); low numbers in RV
BI	<i>Laterallus jamaicensis</i>	Black rail	G4	S2?	SAR		Freshwater marsh grassy margins; wet grassy meadows; brackish high marsh	PD, CP - most likely breeding would occur in eastern PD or along Coast
BI	<i>Limnothlypis swainsonii</i>	Swainson's warbler	G4	S3	SAR		Dense undergrowth with heavy litter (CP,M); canebrakes in swamps and river floodplains (CP)	Although found widespread, bulk of population restricted to river floodplains of CP and PD; small BR population
BI	<i>Picoides borealis</i>	Red-cockaded woodpecker	G3	S2	LE	E	Open pine woods; pine savannas	Found mostly in CP, also lower PD. Disjunct populations in counties of Muscogee, Chattahoochee (Ft Benning); Liberty, Long, Bryan (Ft Stewart); Charlton, Brantley (Okfeenokee NWR, private); Jones, Jasper (Piedmont NWR, Oconee NF, Hitchiti); Thomas, Grady

Group Codes: AA = aquatic arthropod; AM = amphibian; BI = bird; FI = fish; MA = mammal; MO = mollusk; RE = reptile

**Table 5. Piedmont High Priority Animals (55 Records)**

Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Habitat in Georgia	Range in Georgia
BI	<i>Rallus elegans</i>	King rail	G4G5	S3			Freshwater marshes, often cattail bulrush, cutgrass, for breeding; also brackish marshes non-breeding (saltmarshes?)	Principally Piedmont and CP; possibly R&V
BI	<i>Tyto alba</i>	Barn owl	G5	S3/S4			Grassland savanna with large cavity trees, also neighborhoods with large cavity trees, generally needs open country	Local: CP, PD, RV, CU, rare in BR
FI	<i>Cyprinella callitaenia</i>	Bluestripe shiner	G2G3	S2		T	Flowing areas in large creeks and medium-sized rivers over rocky substrates	Known from PD and CP of Apalachicola drainage
FI	<i>Cyprinella gibbsi</i>	Tallapoosa shiner	G4	S2S3		R	Medium-sized creeks in moderate to swift current over sand, gravel, or bedrock substrates	Upper Tallapoosa endemic
FI	<i>Cyprinella xaenura</i>	Altamaha shiner	G2G3	S2S3		E	Medium-sized streams in runs or pools over sand to gravel substrate	Endemic to upper Altamaha system
FI	<i>Etheostoma brevirostrum</i>	Holiday darter	G2	S2		T	Small creeks to moderate sized rivers in gravel and bedrock pools	Four disjunct restricted populations: Con, Coosawattee, Etowah mainstem, Amicalola; range may be much smaller if new taxa recognized (all A's)
FI	<i>Etheostoma chuckwachatte</i>	Lipstick darter	G2G3	S1		E	Medium to large streams with moderate to swift current over gravel, cobble, and boulder substrate	Upper Tallapoosa endemic
FI	<i>Etheostoma etowahae</i>	Etowah darter	G1	S1	LE		Small to medium-sized streams over cobble to gravel in areas of swift current	Main channel and tributaries of Etowah River upstream of Allatoona dam
FI	<i>Etheostoma jordani</i>	Greenbreast darter	G4	S2			Medium-sized creeks to rivers in riffle areas over gravel to bedrock substrate	Upper Coosa only
FI	<i>Etheostoma parvipinne</i>	Goldstripe darter	G4G5	S2S3		R	Small sluggish streams and spring seepage areas in woody debris, leaf material, mud, and silt	Known from CP and PD (rare) portions of the Apalachicola (Chattahoochee and Flint) and Altamaha (Ocmulgee only?) drainages.
FI	<i>Etheostoma rupestre</i>	Rock darter	G4	S2			Swift rocky riffles often associated with attached vegetation such as <i>Podostemum</i>	Etowah and Conasauga
FI	<i>Etheostoma scotti</i>	Cherokee darter	G2	S2	LT	T	Small to medium-sized creeks with moderate current and rocky substrates	PAB; 3 ESUs: lower, middle, and upper Etowah (map from Freemans)
FI	<i>Etheostoma tallapoosae</i>	Tallapoosa darter	G4	S2S3		R	Small to medium-sized streams over boulders, rubble, gravel, and sand	Upper Tallapoosa endemic
FI	<i>Fundulus bifax</i>	Stippled studfish	G2G3	S1		E	Slow eddies over sand or gravel along the margins of riffles and runs in medium-sized streams to small rivers	Upper Tallapoosa endemic; only 2 historic records in GA (Little Tallapoosa System)
FI	<i>Hybopsis lineapunctata</i>	Lined chub	G3	S2			Upland creeks over sandy substrate with gentle current	Endemic to Tallapoosa and upper Coosa
FI	<i>Hybopsis winchelli</i>	Clear chub ("etowah chub")	G5	S1			Generally in creeks and small to medium rivers over sand-silt bottom, usually in pools adjacent to riffle areas. Tends to occupy smaller streams in east than in west.	Narrow portion of the Etowah
FI	<i>Lythrurus bellus</i>	Pretty shiner	G5	S2		T	Flowing water over silt to gravel substrate in small streams to large rivers	Restricted to Tallapoosa River system in Georgia; Mettee et al (1996) shows a single record in Little Tallapoosa system
FI	<i>Macrhybopsis sp. cf. aestivalis</i>	Coosa chub		S2			Swift currents over gravel substrates	Mainstem upper Etowah, mainstem Conasauga

**Table 5. Piedmont High Priority Animals (55 Records)**

Group	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Habitat in Georgia	Range in Georgia
FI	<i>Moxostoma robustum</i>	Robust redbhorse	G1	S1		E	Lower PD and upper CP of medium to large rivers; shallow riffles to deep flowing water; moderately swift current	Native populations in lower Savannah (Richmond, Burke and Screven counties.), Oconee (Baldwin, Wilkinson, Washington, Johnson, and Laurens counties), and Ocmulgee (Houston, Twiggs, Bleckley and Pulaski counties) rivers; introduced into the Broad River (up
FI	<i>Notropis hypsilepis</i>	Highscale shiner	G3	S3		T	Flowing areas of small to large streams over sand or bedrock substrates	Primarily PD of Apalachicola (Flint and Chattahoochee); a few CP records from Apalachicola; also know from 1 tributary in BR of Savannah
FI	<i>Notropis scepticus</i>	Sandbar shiner	G4	S2		R	Large streams to medium-sized rivers in flowing pools over sandy to rocky substrates	Piedmont tributaries of the Savannah
FI	<i>Noturus sp. cf. munitus</i>	Coosa madtom	G3	S1		E	Shoals and riffles of moderate to large streams and rivers	Mainstem of Etowah (upstream of Allatoona) and mainstem of Conasauga River
FI	<i>Percina sp. 3</i>	Muscadine bridled darter	G2Q	S2		R	Flowing pool areas with substrate of sand, detritus, or bedrock in small rivers	Upper Tallapoosa endemic; occurs in mainstem and Little Tallapoosa systems
FI	<i>Percina sp. 9</i>	Upland bridled darter	G1Q	S1			Runs and flowing pools of medium-sized rivers	Etowah, Talking Rock, Conasauga
FI	<i>Percina sp. cf. P. palmaris</i>	Halloween darter	G2	S2			Swift waters of medium to large rivers	Disjunct pops - Chatt above Lanier, Flint above fall line, lower Flint/Ichawaynochaway
MA	<i>Sylvilagus obscurus</i>	Appalachian cottontail	G4	S1S2			Heath ( <i>Vaccinium</i> , <i>Kalmia</i> ) thickets within high elevation forests	High elevation (>3000ft) shrub cover in Rabun, Towns, Union, and Fannin counties. Has been found at much lower elevations in AL and SC
MO	<i>Alasmidonta varicosa</i>	Brook floater	G3	S2			Small rivers and creeks in sand and gravel shoals	Present distribution includes 4 sites in the Chattooga River in Rabun County (Savannah River drainage).
MO	<i>Elliptio fraterna</i>	Brother spike	G1	SU			Sandy substrates of river channels with swift current	Uncertain of range in Savannah River system
MO	<i>Elliptoideus sloatianus</i>	Purple bankclimber	G2	S2	LT		Small to large rivers with moderate current and substrate of sand, fine gravel, or muddy sand	Historic range included Flint, Chattahoochee, Ochlockonee rivers. Has been virtually extirpated from Flint tributaries and is very rare in the Chattahoochee system (Brim-Box and Williams 1997, Butler 1993). Recently found in upper Ochlockonee River near Thomasville in low numbers (Blalock-Herod, 2003).
MO	<i>Somatogyryus alcoviensis</i>	Reverse pebblesnail	G1	S1			Shoals with boulders, gravel, and riverweed	Known only from the upper Ocmulgee System; 1995 survey only found them at 2 sites
MO	<i>Somatogyryus tenax</i>	Savannah pebblesnail	G2	S2			Shallow rocky riffles; underside of cobbles and boulders	At scattered sites along the Hudson and Broad Rivers (Thompson 1969, Watson 1996); 6 total sites
RE	<i>Eumeces anthracinus</i>	Coal skink	G5	S2			Mesic forests; often near streams, springs or bogs	Very little known about range especially in CP
RE	<i>Graptemys barbouri</i>	Barbour's map turtle	G2	S2		T	Rivers & large creeks of Apalachicola River drainage	Restricted distribution, Apalachicola drainage within PD and CP
RE	<i>Macrochelys temminckii</i>	Alligator snapping turtle	G3G4	S3		T	Large streams and rivers; impoundments; river swamps	Gulf CP drainages
RE	<i>Pituophis melanoleucus melanoleucus</i>	Northern pine snake	G4T4	S2			Dry pine or pine-hardwood forests	BR, PD, RV

**Table 6. Piedmont High Priority Plants (71 Records)**

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Habitat in Georgia	Range in Georgia
<i>Aesculus glabra</i>	Ohio buckeye	G5	S2			Mesic forests in circumneutral soil	CU, RV, PD
<i>Allium speculae</i>	Flatrock onion	G2	S2		T	Granite outcrops (limited to Lithonia Gneiss types)	PD, found only in Rockdale, Walton and DeKalb Cos.
<i>Amorpha nitens</i>	Shining indigo-bush	G3?	S1?			Rocky, wooded slopes; alluvial woods	CU, RV, PD, reportedly, but verification needed to be certain
<i>Amorpha schwerinii</i>	Schwerin's indigo-bush	G3	S2			Rocky upland woods	PD
<i>Amphianthus pusillus</i>	Pool sprite, snorkelwort	G2	S2	LT	T	Vernal pools on granite outcrops	PD, restricted to piedmont across Georgia
<i>Amsonia ludoviciana</i>	Louisiana blue star	G3	S2			Open woods near granite outcrops (limited to Lithonia Gneiss types)	PD, restricted to Lithonia gneiss outcrops in 5 cos. in central piedmont.
<i>Anemone berlandieri</i>	Glade windflower	G4?	S1S2			Granite outcrop ecotones; also forests and openings over various metamorphic rock types	PD, UCP; widely scattered on piedmont, only one site on coastal plain, Clay Co.
<i>Arabis georgiana</i>	Georgia rockcress	G2	S1	C	T	Rocky or sandy river bluffs and banks, in circumneutral soil	PD, RV, UCP; along Coosa, Oostanaula and lower Chattahoochee Rivers
<i>Arabis missouriensis</i>	Missouri rockcress	G4G5Q	S2			Granite and amphibolite outcrops	PD, scattered across central to eastern piedmont from Cobb to Columbia Cos.
<i>Aster avitus</i>	Granite aster	G3	S3			Granite outcrops in seepy margins with <i>Solidago gracillima</i> and <i>Spiranthes cernua</i>	PD
<i>Aster georgianus</i>	Georgia aster	G2G3	S2	C		Upland oak-hickory-pine forests and openings; sometimes with <i>Echinacea laevigata</i> or over amphibolite	CU, RV, PD, UCP
<i>Aster jonesiae</i>	Piedmont bigleaf aster	G3?	S2?			Mixed oak-hickory forests	PD only?
<i>Baptisia megacarpa</i>	Bigpod wild indigo	G2	S1			Floodplain forests, adjacent wooded slopes	UCP, PD
<i>Berberis canadensis</i>	American barberry	G3	S1			Cherty, thinly wooded slopes	BR, PD; few sites from Towns Co. sw. to Meriwether Co.
<i>Calamintha</i> sp. 1	Indian Grave Mountain wild basil	G1G3	S1S3			Openings in longleaf pine-chestnut oak-Georgia oak woodlands	PD, appears to be restricted to Upson and Pike Cos.
<i>Carex biltmoreana</i>	Biltmore sedge	G3	S1		T	High elevation ledges and rock faces	BR
<i>Carex radfordii</i>	Radford's sedge	G2	S1?			Rich woods of marble ravines	PD
<i>Cirsium virginianum</i>	Virginia thistle	G3	S2?			Moist pinelands; moist longleaf pine/wiregrass savannas	UCP, LCP
<i>Croomia pauciflora</i>	Croomia	G3	S1		T	Mesic hardwood forests, usually with beech and basswood	PD, UCP; mostly in rich woods near Chattahoochee and Flint Rivers
<i>Cuscuta harperi</i>	Harper's dodder	G2	S1		T	Parasitic on <i>Bigelovia nuttallii</i> on Altamaha Grit outcrops; granite outcrops, usually with <i>Liatris microcephala</i> as host	PD, UCP
<i>Cypripedium acaule</i>	Pink ladyslipper	G5	S4		U	Upland oak-hickory-pine forests; piney woods	CU, RV, PD, UCP
<i>Cypripedium parviflorum</i> var. <i>parviflorum</i>	Small-flowered yellow ladyslipper	G5	S3		U	Upland oak-hickory-pine forests; mixed hardwood forests	BR, RV, PD, possibly CU?
<i>Cypripedium parviflorum</i> var. <i>pubescens</i>	Large-flowered yellow ladyslipper	G5	S3		U	Upland oak-hickory-pine forests; mixed hardwood forests	BR, CU, PD, RV
<i>Danthonia epilis</i>	Bog oat-grass	G3?	S1?			Moist, grassy depressions on granite outcrops	PD, confirmed in Georgia only from granite outcrops
<i>Draba aprica</i>	Open-ground whitlow-grass	G3	S1S2		E	Granite and amphibolite outcrops, usually in redcedar litter	PD, small areas, widely scattered sites

**Table 6. Piedmont High Priority Plants (71 Records)**

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Habitat in Georgia	Range in Georgia
<i>Echinacea laevigata</i>	Smooth purple coneflower	G2	S2	LE	E	Upland forests over amphibolite	PD
<i>Eleocharis wolfii</i>	Spikerush	G3?	S1			Shallow pools on granite outcrops	PD
<i>Eriocaulon koernickianum</i>	Dwarf pipewort	G2	S1			Granite outcrops	PD
<i>Fimbristylis brevivaginata</i>	Flatrock fimbry	G2	S2			Granite outcrops	PD
<i>Helianthus smithii</i>	Smith's sunflower	G2Q	S1			Dry open woods and thickets	BR, PD
<i>Hexastylis shuttleworthii</i> var. <i>harperi</i>	Harper's wild ginger	G4T3	S2S3		U	Low terraces in floodplain forests; edges of bogs	PD, UCP, from the foothills to central and west-central coastal plain
<i>Hydrastis canadensis</i>	Goldenseal	G4	S2		E	Rich woods in circumneutral soil	BR, CU, RV, PD with some sites now naturalized from original cultivated stands
<i>Hymenocallis coronaria</i>	Shoals spiderlily	G2Q	S2		E	Rocky shoals of broad, open rivers	PD, only on shoals in 3 major rivers - Chattahoochee, Flint and Savannah
<i>Ilex cuthbertii</i>	Cuthbert's holly	G1?	SH			Open, upland forests, circumneutral	PD, presumably just north of the Augusta area only
<i>Isoetes melanospora</i>	Black-spored quillwort	G1	S1	LE	E	Vernal pools on granite outcrops	PD
<i>Isoetes tegetiformans</i>	Mat-forming quillwort	G1	S1	LE	E	Vernal pools on granite outcrops	PD
<i>Juglans cinerea</i>	Butternut	G3G4	S1S2			Floodplain forests, cove hardwoods	RV, BR, PD (barely); known from a few isolated stands; mostly in mountains, southern stations disjunct on Sharp Top Mountain, Pickens Co. and south of C
<i>Juniperus communis</i> var. <i>depressa</i>	Ground juniper	G5T5	S1			Gneiss ledges	PD (only?); a BR report from south of summit of Rabun Bald needs verification
<i>Lotus helleri</i>	Carolina birdfoot-trefoil	G5T3	S1			Clayey soil over ultramafic rock; post oak-blackjack oak savannas; oaky flatwoods	PD
<i>Lysimachia fraseri</i>	Fraser's loosestrife	G2	S1S2		R	Moist, open, bouldery gravel bars and streambanks; edges of sandstone and granite outcrops	CU, BR, PD, RV; widely scattered sites from Currahee Mountain, Stephens Co. To top of Pigeon Mountain, Walker Co.
<i>Marshallia ramosa</i>	Pineland Barbara's-buttons	G2	S2		R	Altamaha Grit outcrops; open forests over ultramafic rock	UCP, plus PD on Dixie Mountain, Columbia Co.
<i>Melanthium woodii</i>	Ozark bunchflower	G5	S2		R	Mesic hardwood forests over basic soils	CU, PD, UCP
<i>Monotropsis odorata</i>	Sweet pinesap	G3	S1			Upland forests	PD, BR; few reports from Fulton Co. northeastward to Rabun Co.
<i>Nestronia umbellula</i>	Indian olive	G4	S2		T	Mixed with dwarf shrubby heaths in oak-hickory-pine woods; often in transition areas between flatwoods and uplands	PD, UCP
<i>Panax quinquefolius</i>	American ginseng	G3G4	S3			Mesic hardwood forests; cove hardwood forests	BR, RV, CU, PD, UCP; found, at least formerly, well into the coastal plain; now mostly in PD and across North Georgia
<i>Paronychia virginica</i>	Yellow nailwort	G4	S1			Serpentine outcrops	PD, Columbia Co.
<i>Pediomelum</i> sp. 2	Dixie Mountain breadroot	G1	S1			Shallow soils over mafic (serpentine) rock, upland longleaf pine-mixed oak savanna and powerline rights-of-way	PD, Columbia Co.
<i>Platanthera integrilabia</i>	Monkeyface orchid	G2G3	S1S2	C	T	Red maple-gum swamps; peaty seeps and streambanks with <i>Parnassia asarifolia</i> and <i>Oxypolis rigidior</i>	CU, BR, PD; few sites from Tallulah Gorge to Cumberland Plateau, south to , Carroll Co.

**Table 6. Piedmont High Priority Plants (71 Records)**

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Habitat in Georgia	Range in Georgia
<i>Portulaca umbraticola</i> ssp. <i>coronata</i>	Wingpod purslane	G5T2	S2			Granite outcrops; Altamaha Grit outcrops	PD, UCP
<i>Ptilimnium nodosum</i>	Harperella	G2	S1	LE	E	Granite outcrops; limesink depressions	PD, UCP, only known from single sites on piedmont and coastal plain
<i>Quercus oglethorpensis</i>	Oglethorpe oak	G3	S2		T	Broad River bottomlands; upland seepage swamps over Iredell and Enon soils with seasonally wet clay beds	PD
<i>Rhus michauxii</i>	Dwarf sumac	G2	S1	LE	E	Open forests over ultramafic rock	PD, two piedmont sites relocated, others too ambiguous
<i>Sabatia capitata</i>	Cumberland rose gentian	G2	S2		R	Meadows over sandstone or shale	CU, RV; from Coosa Valley prairies in Floyd Co. to sandstone caprock meadows in Dade Co
<i>Schisandra glabra</i>	Bay starvine	G3	S2		T	Rich woods on stream terraces and lower slopes	RV, PD, UCP
<i>Schwalbea americana</i>	Chaffseed	G2	S1	LE	E	Open pinelands, as in well-managed, somewhat moist longleaf pine-wiregrass forests seeps	UCP, formerly PD; now found only in Southwest Georgia
<i>Scutellaria ocmulgee</i>	Ocmulgee skullcap	G2	S2		T	Mesic hardwood forests; bluff forests	PD, UCP; mostly along Ocmulgee, Oconee and Savannah Rivers
<i>Sedum nevii</i>	Nevius' stonecrop	G3	S1		T	Gneiss ledges on river bluffs	PD, Harris and Muscogee Cos.
<i>Sedum pusillum</i>	Granite stonecrop, Puck's orpine	G3	S3		T	Granite outcrops, often in mats of Hedwigia moss under Juniperus virginiana	PD, across the piedmont; not as widespread as Amphianthus; some sites introduced
<i>Silene polypetala</i>	Fringed campion	G2	S2	LE	E	Mesic deciduous forests	PD, UCP; mostly along the Flint River just above the Fall Line; also from few sites in Chattahoochee and Ocmulgee watersheds
<i>Solanum pumilum</i>	Dwarf horse-nettle	G5T1	SH			Thickets; calcareous barrens	PD
<i>Solidago porteri</i>	Porter's goldenrod	GHQ	SH			Upland forests	PD(?), if extant
<i>Sphagnum cyclophyllum</i>	Round-leaved peat-moss	G3	S2			CP: bare sand where wet or submerged for part of the year and then drying, as around seasonal ponds in pine barrens.. PD: seepage over granite outcrops	PD, LCP, UCP
<i>Stewartia malacodendron</i>	Silky camellia	G4	S2		R	Along streams on lower slopes of beech-magnolia or beech-basswood-Florida maple forests	PD, UCP
<i>Thaspium pinnatifidum</i>	Cutleaf meadow-parsnip	G2G3	S1			Limestone outcrops and barrens	RV, Catoosa Co.
<i>Trillium persistens</i>	Persistent trillium	G1	S1	LE	E	Mesic hardwood forests, upland forests	BR, PD; limited to 7-mile stretch of Tallulah River
<i>Trillium reliquum</i>	Relict trillium	G2	S3	LE	E	Mesic hardwood forests; limesink forests; usually with Fagus and Tilia	PD, UCP, scattered from Augusta to Columbus near Fall Line; also along lower Chattahoochee and Flint Rivers
<i>Triphora trianthophora</i>	Nodding Pogonia	G3G4	S2?				
<i>Viburnum rafinesquianum</i> var. <i>affine</i>	Downy arrowwood	G5T?	S1			Limestone bluffs along major rivers	RV, Blacks Bluff, Floyd Co.
<i>Waldsteinia lobata</i>	Piedmont barren strawberry	G2	S3		T	Stream terraces and adjacent gneiss outcrops	BR (barely), PD, UCP (barely); mostly piedmont foothills
<i>Xyris scabrifolia</i>	Harper's yellow-eyed grass	G3	S1			Sedge bogs; pitcherplant bogs; pine flatwoods	UCP, LCP
<i>Xyris tennesseensis</i>	Tennessee yellow-eyed grass	G2	S1	LE	E	Seepy margins of limestone spring runs	RV, PD (barely)

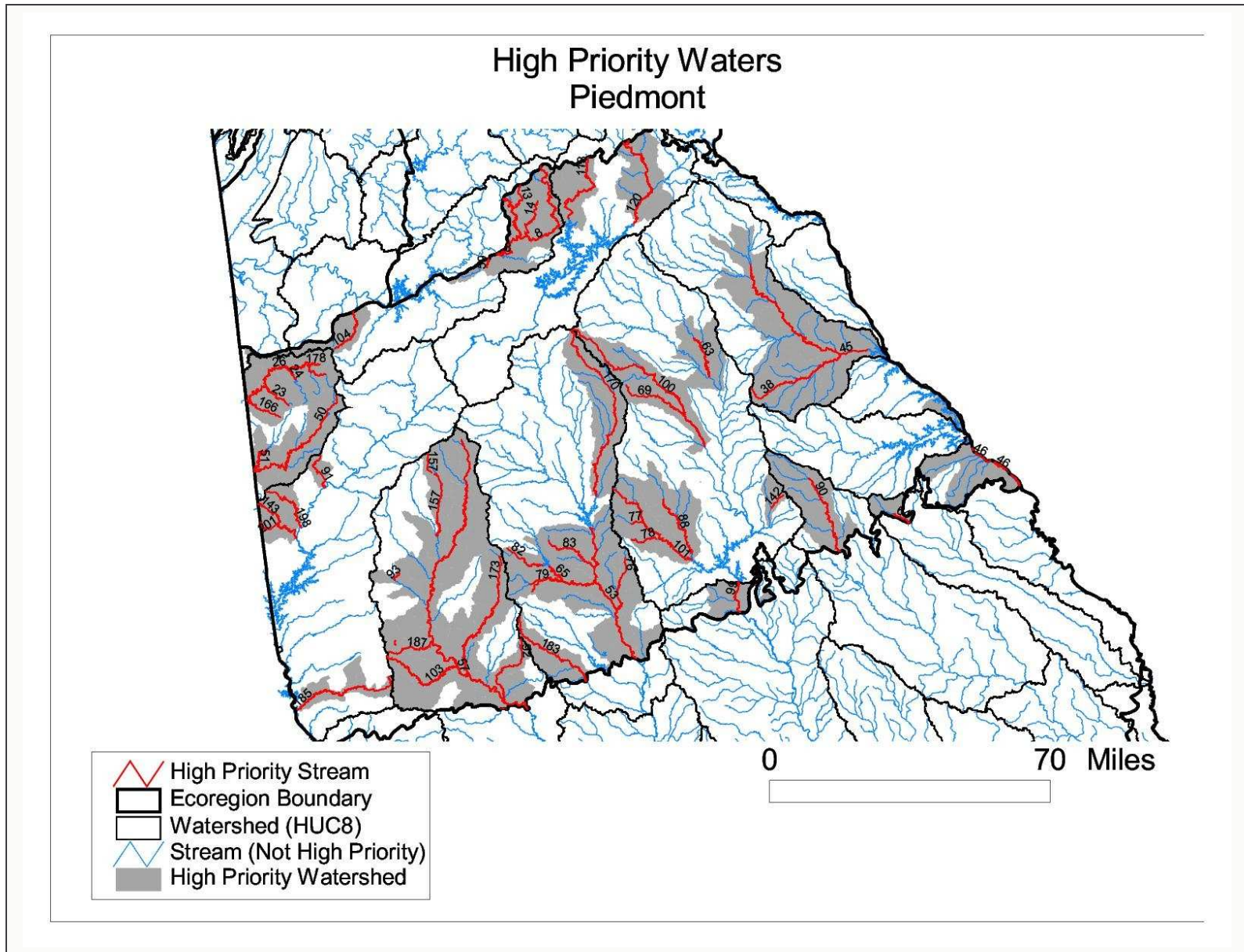


Figure 11. High Priority Waters, Piedmont Ecoregion