Georgia's Natural Communities and Associated Rare Plant and Animal Species: Thumbnail Accounts

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BLUE RIDGE ECOREGION

UPLAND FORESTS OF THE BLUE RIDGE ECOREGION

BLUE RIDGE NORTHERN HARDWOOD FORESTS AND BOULDERFIELD FORESTS

Northern hardwood forests are found in Georgia above 3,500 feet, on some cool, moist, north-facing slopes. The tree canopy often includes a large number of deciduous hardwood species, including yellow birch, American beech, yellow buckeye, white basswood, northern red oak, sugar maple, white ash, and black cherry; low elevation species, such as tulip tree and cucumber magnolia, are unusual or absent. Because of the higher elevation and exposed location, trees in these forests are often blown over in storms or heavily pruned by ice and snow; the gaps formed when trees are damaged are sunny patches where shrub and ground layer species flourish, young trees get a head start, and the forest renews itself. Boulderfields, rocky areas at the heads of high elevation, north-facing coves, also support northern hardwood forests, differing primarily in the greater abundance of shrub species and the dense mats of mosses covering the tightly packed boulders. Northern hardwood forests are especially interesting in the spring when the ground is carpeted with spring ephemerals, such as trout lily, Dutchman's britches, and spring beauty, as well as other spring wildflowers, such as trillium, bellwort, umbrella-leaf, and bead lily. Few examples of old-growth northern hardwood forest remain in Georgia; these forests, as well as second-growth stands, should be protected from logging, clearing, road-building, fire, and development.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: Northern Hardwood Forests, Boulderfield Forests

Special Concern Plant Species Associated with Blue Ridge Northern Hardwood Forests and Boulderfield Forests:

American false hellebore, *Veratrum viride*
American fly-honeysuckle, *Lonicera canadensis*
American mountain-ash, *Sorbus americana*
Bearberry, *Vaccinium erythrocarpum*
Broad-leaved tickseed, *Coreopsis latifolia*
Chokecherry, *Prunus virginiana*
Fire cherry, *Prunus pensylvanica*
Hispid hedge-nettle, *Stachys hispida*
Large purple fringed orchid, *Platanthera grandiflora*
Limber honeysuckle, *Lonicera dioica*
Masterwort, *Heracleum lanatum*
Mountain maple, *Acer spicatum*
Northern shorthusk grass, *Brachyelytrum septentrionale*
Purple giant hyssop, *Agastache scrophulariifolia*
Red elderberry, *Sambucus racemosa* ssp. *pubens*
Roan Mountain sedge, *Carex roanensis*
Rosy twisted-stalk, *Streptopus lanceolatus*
Rough sedge, *Carex scabrata*
Small purple fringed orchid, *Platanthera psycodes*
Spotted coralroot, *Corallorhiza maculata*
Squirrel-corn, *Dicentra canadensis*
Starflower, *Trientalis borealis*
White woodsorrel, *Oxalis montana*
Wild sarsaparilla, *Aralia nudicaulis*
Witch-hobble, *Viburnum lantanoides*
Yellow bead-lily, *Clintonia borealis*

Special Concern Animal Species Associated with Blue Ridge Northern Hardwood Forests and Boulderfield Forests:

Amphibians

Red-legged salamander, *Plethodon shermani*
Southern graycheek salamander, *Plethodon metcalfi*
Southern Appalachian salamander, *Plethodon teyahalee*

Northern Hardwood Forests and Boulderfield Forests, continued

Birds
Cerulean warbler, *Dendroica caerulea*
Winter wren, *Troglodytes troglodytes*

Mammals
Appalachian cottontail, *Sylvilagus obscurus*
Hairy-tailed mole, *Parascalops breweri*
Long-tailed or rock shrew, *Sorex dispar*
Masked shrew, S*orex cinereus*
Pygmy shrew, *Sorex hoyi*
Red squirrel, *Tamiasciurus hudsonicus*

BLUE RIDGE MONTANE OAK FORESTS

Montane oak forests occupy ridgelines, peaks, and south- and west-facing slopes above 3,500 feet in Georgia. They are dominated by northern red, scarlet, white, and, less frequently, rock chestnut oaks. High winds, snow, and ice stunt tree growth, prune back limbs, and topple trees, creating gaps that allow sunlight to reach the forest floor and encourage diverse herb and shrub layers. At some sites, the oaks are gnarled and widely spaced, forming picturesque "orchard forests" with a diverse ground layer of herbs and ferns. Other sites may have a dense thicket of heath family shrubs – rhododendron, mountain laurel, blueberries, or huckleberries – beneath the oaks. These natural communities support many plant species at the southern edge of their ranges and provide nesting habitat for birds that do not breed further south. Few examples of old-growth montane oak forest remain in Georgia; these forests, as well as second-growth stands, should be protected from logging, clearing, road-building, and development.

Comprehensive Wildlife Conservation Strategy High Priority Habitats: Oak Forests and Woodlands (in part), High Elevation Forested Heath Thickets (in part), High Elevation Rocky Summits and Shrub Balds (in part).

Special Concern Plant Species Associated with Blue Ridge Montane Oak Forests:

American lily-of-the-valley, *Convallaria majuscula*
Beadle's mountain-mint, *Pycnanthemum beadlei*
Beaked dodder, *Cuscuta rostrata*
Bearberry, *Vaccinium erythrocarpum*
Broad-leaved tickseed, *Coreopsis latifolia*
Ginseng, *Panax quinquefolius*
Ground cedar, *Diphasiastrum tristachyum*
Ground pine, *Lycopodium clavatum*
Limber honeysuckle, *Lonicera dioica*
Liverwort, *Frullania appalachiana*
Manhart's sedge, *Carex manhartii*
Ovate catchfly, *Silene ovata*
Recurved dog-hobble, *Leucothoe recurva* (syn. *Eubotrys recurva*)
Roan Mountain sedge, *Carex roanensis*
Spotted coralroot, *Corallorhiza maculata*
Staghorn sumac, *Rhus typhina*
White-leaved sunflower, *Helianthus glaucophyllus*

Special Concern Animal Species Associated with Blue Ridge Montane Oak Forests:

Birds

Bewick's wren, *Thryomanes bewickii*
Common raven, *Corvus corax*
Golden-winged warbler, *Vermivora chrysoptera*

Mammals

Appalachian cottontail, *Sylvilagus obscurus*
Long-tailed or rock shrew, *Sorex dispar*
Masked shrew, *Sorex cinereus*
Pygmy shrew, *Sorex hoyi*
Rafinesque's big-eared bat, *Corynorhinus rafinesquii*
Red squirrel, *Tamiasciurus hudsonicus*

BLUE RIDGE COVE FORESTS – FERTILE VARIANT

Rich cove forests occur throughout Georgia's Blue Ridge between 1,800 and 3,500 feet, in cool, north-facing (occasionally east-facing) coves and on moist, lower slopes. Soils in rich cove forests are moist and rich in nutrients and organic matter, supporting one of the most biologically diverse environments in North America. These forests are distinguished from acidic coves by the presence of many nutrient-loving canopy species, such as yellow buckeye, basswood, white ash, black cherry, bitternut hickory, cucumber magnolia, yellowwood, northern red oak, and sugar maple. Coves that were logged in the last two centuries are dominated by tulip tree, yellow buckeye, red maple, and silverbell, with other tree species filling the gaps created when trees die. Spectacular displays of wildflowers appear in rich cove forests in the early spring before the canopy leaf outs. These include blue cohosh, doll's eyes, Clinton's bead lily, trout lily, Canada wild ginger, yellow mandarin, spotted mandarin, and numerous trilliums, orchids, violets, and bellworts; mid- to late-summer displays include turk's cap lily, Carolina lily, bellflower, black cohosh, and bunchflower. Few examples of old-growth rich cove forest remain in Georgia; these forests, as well as second-growth stands, should be protected from logging, clearing, road-building, fire, and development.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: Rich Mesic Hardwood Forests (Cove Hardwoods).

Special Concern Plant Species Associated with Blue Ridge Cove Forests–Fertile Variant:

American fly-honeysuckle, *Lonicera canadensis*
Broad-leaved bunchflower, *Veratrum latifolium* (syn. *Melanthium latifolium*)
Broad-leaved phlox, *Phlox amplifolia*
Broad-leaved sedge, *Carex platyphylla*
Broad-leaved tickseed, *Coreopsis latifolia*
Broad-toothed hedge-nettle, *Stachys latidens*
Brock sweetshrub, *Calycanthus brockiana*
Butternut, *Juglans cinerea*
Divided toothwort, *Cardamine dissecta*
Dwarf ginseng, *Panax trifolius*
Filiform hypnum moss, *Hypnum cupressiforme* var. *filiforme*
Fraser's sedge, *Cymophyllus fraserianus*
Ginseng, *Panax quinquefolius*
Goldenseal, *Hydrastis canadensis*
Hooked harvest-lice, *Agrimonia gryposepala*
Large-leaved waterleaf, *Hydrophyllum macrophyllum*
Leatherleaf meadowrue, *Thalictrum coriaceum*
Longstalk sedge, *Carex pedunculata*
Manhart's sedge, *Carex manhartii*
Northern shorthusk grass, *Brachyelytrum septentrionale*
Ovate catchfly, *Silene ovata*
Phlox-leaved aster, *Symphyotrichum phlogifolium* (syn. *Aster phlogifolius*)
Radford's sedge, *Carex radfordii*
Showy skullcap, *Scutellaria serrata*
Small purple fringed orchid, *Platanthera psycodes*
Squirrel-corn, *Dicentra canadensis*
Sweet white trillium, *Trillium simile*
Toccoa Falls moss, *Herpetineuron toccoae*
White Bear Lake sedge, *Carex albursina*
Yellow lady's slipper, *Cypripedium parviflorum*

Special Concern Animal Species Associated with Blue Ridge Cove Forests–Fertile Variant:
Amphibians

Green salamander, *Aneides aeneus*
Red-legged salamander, *Plethodon shermani*
Southern Appalachian salamander, *Plethodon teyahalee*
Southern gray-cheeked salamander, *Plethodon metcalfi*

Blue Ridge Cove Forests–Fertile Variant, continued

Birds
Cerulean warbler, *Dendroica cerulea*

Mammals
Hairy-tailed mole, *Parascalops breweri*
Masked shrew, *Sorex cinereus*
Rafinesque's big-eared bat, *Corynorhinus rafinesquii*
Red squirrel, *Tamiasciurus hudsonicus*
Southern red-back vole, *Clethrionomys gapperi*
Star-nosed mole, *Condylura cristata*

Reptiles
Northern coal skink, *Eumeces anthracinus anthracinus*

BLUE RIDGE COVE FORESTS – ACIDIC VARIANT

Acidic cove forests occur in cool, north-facing (occasionally east-facing) coves and ravines and along streams throughout Georgia's Blue Ridge, usually between 1,800 and 3,500 feet. Eastern hemlock is the most conspicuous tree, but black birch, tulip tree, red maple, Fraser magnolia, sourwood, and white pine are also important. Rhododendron and mountain laurel often form dense thickets beneath the trees; blueberries and huckleberries are also common shrubs. Herbs are typically sparse with only a few species – such as pipsissewa, rattlesnake plantain, Indian cucumber-root, galax, trailing arbutus, partridge-berry, and round-leaved violet – thriving in the deep shade and acid soils of these communities. Acid cove forests are under severe threat as the hemlock woolly adelgid, an exotic pest insect, is rapidly infesting and killing the hemlocks; every effort should be made to support hemlock woolly adelgid eradication efforts. Few examples of old-growth acidic cove forest remain in Georgia; these, as well as second-growth stands, should be protected from logging, clearing, road-building, fire, and development.

Comprehensive Wildlife Conservation Strategy High Priority Habitats: Hemlock-Hardwood-White Pine Forests

Special Concern Plant Species Associated with Blue Ridge Cove Forests–Acidic Variant:

Carolina hemlock, *Tsuga caroliniana*
Climbing fern, *Lygodium palmatum*
Dwarf ginseng, *Panax trifolius*
Edna's trillium, *Trillium persistens*
Fraser's sedge, *Cymophyllus fraserianus*
Oconee bells, *Shortia galacifolia*
Small whorled pogonia, *Isotria medeoloides*
Small's twayblade, *Listera smallii*
Three birds orchids, *Triphora trianthophora*

Special Concern Animal Species Associated with Blue Ridge Cove Forests–Acidic Variant:

Amphibians
Green salamander, *Aneides aeneus*
Mountain chorus frog, *Pseudacris brachyphona*
Red-legged salamander, *Plethodon shermani*
Southern Appalachian salamander, *Plethodon teyahalee*
Southern gray-cheeked salamander, *Plethodon metcalfi*

Birds
Cerulean warbler, *Dendroica cerulea*

Mammals
Hairy-tailed mole, *Parascalops breweri*
Masked shrew, *Sorex cinereus*
Red squirrel, *Tamiasciurus hudsonicus*
Southern red-back vole, *Clethrionomys gapperi*
Star-nosed mole, *Condylura cristata*

Reptiles
Northern coal skink, *Eumeces anthracinus anthracinus*

BLUE RIDGE LOW TO MID-ELEVATION OAK FORESTS

Oak forests are the most extensive forest type in Georgia's Blue Ridge, covering slopes, ridges, and ravines between 1,800 and 3,500 feet. Dry, exposed, and west- and south-facing slopes and ridgelines are usually dominated by chestnut, scarlet, and southern red oaks, often with a large number of Virginia, pitch, or shortleaf pines present. Heath shrubs such as rhododendron, mountain laurel, blueberry, and huckleberry are usually abundant in dry oak forests, and herbs are usually sparse. Cooler, moister sites on protected or north- and east-facing slopes support an oak-dominated forest that includes northern red, black, and white oaks often with an abundance of hickories and tulip trees, making it difficult to distinguish some moist oak forests from cove forests. Moister oak forests have more species-rich shrub and herb layers than do the dry oak forest type and are not likely to have burned. Gypsy moths are a serious threat to oak forests, as is oak decline, which especially affects oaks in the dry forest type. Feral hogs, which severely disturb the soil and herb layer, degrade the forest and should be eradicated. Few examples of old-growth oak forest remain in Georgia; these forests, as well as second-growth stands, should be protected from logging, clearing, road-building, and development. Dry sites only should be burned periodically.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: Oak Forests and Woodlands, Mixed Pine-Hardwood Forests

Special Concern Plant Species Associated with Low to Mid-Elevation Blue Ridge Oak Forests:

American lily-of-the-valley, *Convallaria majuscula*
Appalachian sedge, *Carex appalachica*
Ash-leaf golden-banner, *Thermopsis fraxinifolia*
Beadle's mountain-mint, *Pycnanthemum beadlei*
Bittersweet, *Celastrus scandens*
Broad-leaved tickseed, *Coreopsis latifolia*
Brock sweetshrub, *Calycanthus brockiana*
Downy bush-pea, *Thermopsis mollis*
Ginseng, *Panax quinquefolius*
Ground cedar, *Diphasiastrum tristachyum*
Ground pine, *Lycopodium clavatum*
Manhart's sedge, *Carex manhartii*
Masterwort, *Heracleum lanatum*
Mountain witch-alder, *Fothergilla major*
Ovate catchfly, *Silene ovata*
Pink ladyslipper, *Cypripedium acaule*
Scarlet Indian-paintbrush, *Castilleja coccinea*
Sedge, *Carex aestivaliformis*
Silky bindweed, *Calystegia catesbiana* ssp. *sericata*
Smith's sunflower, *Helianthus smithii*
Staghorn sumac, *Rhus typhina*
Sweet fern, *Comptonia peregrina*
Yellow giant hyssop, *Agastache nepetoides*

Special Concern Animal Species Associated with Blue Ridge Low to Mid-Elevation Blue Ridge Oak Forests:

Amphibians

Mountain chorus frog**,** *Pseudacris brachyphona*

Birds

Bewick's wren, *Thryomanes bewickii*

Blue Ridge Low to Mid-Elevation Blue Ridge Oak Forests, continued

Birds
Golden-winged warbler**,** *Vermivora chrysoptera*
Least flycatcher, *Empidonax minimus*

Mammals
Appalachian cottontail, *Sylvilagus obscurus*
Least weasel, *Mustela nivalis*
Rafinesque's big-eared bat, *Corynorhinus rafinesquii*
Red squirrel, *Tamiasciurus hudsonicus*

BLUE RIDGE PINE-OAK WOODLAND

Many of the dry, rocky ridges and steep, west- and south-facing slopes of Georgia's Blue Ridge support woodlands with less than 60% tree cover dominated by a mix of pines – shortleaf, Virginia, white, Table Mountain, or pitch pine – and oaks, including chestnut, scarlet, black, southern red, post, and blackjack oaks. Sourwood, black gum, and red maple may also be present. The understory of pine-oak forests and woodlands may consist of extensive thickets of heath shrubs such as rhododendron, mountain laurel, blueberry, and huckleberry, or it may be open, with a species-rich ground cover of grasses and other herbs. These are relatively harsh communities, vulnerable to storm and lightning damage and with thin, acidic soils. They are prone to periodic infestations by southern pine beetles, which are a natural part of a pine-dominated ecosystem. Prescribed burning is the most important management tool in pine-oak woodlands, which will develop into mixed hardwood forests without fire. These communities were once extensive but are now uncommon, and all examples should be protected from clearing, development, and road building.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: Mixed Pine-Hardwood Forests, Xeric Pine Woodlands, Pine-Oak Woodlands and Forest

Special Concern Plant Species Associated with Blue Ridge Pine-Oak Woodlands:
Alabama grape fern, *Botrychium jenmanii*
Ash-leaf golden-banner, *Thermopsis fraxinifolia*
Carolina hemlock, *Tsuga caroliniana*
Hoary frostweed, *Helianthemum bicknellii* (syn. *Crocanthemum bicknellii*)
Downy bush-pea, *Thermopsis mollis*
Eastern turkeybeard, *Xerophyllum asphodeloides*
Edna's trillium, *Trillium persistens*
Pink lady's-slipper, *Cypripedium acaule*
Rough hawkweed, *Hieracium scabrum*
Silky bindweed, *Calystegia catesbiana* ssp. *sericata*
Small whorled pogonia, *Isotria medeoloides*
Spreading pogonia, *Cleistes bifaria*
Sweet pinesap, *Monotropsis odorata*
Sweet-fern, *Comptonia peregrina*

Special Concern Animal Species Associated with Blue Ridge Pine-Oak Woodlands:
Birds
Red crossbill, *Loxia curvirostra*

Mammals
Rafinesque's big-eared bat**,** *Corynorhinus rafinesquii*
Red squirrel, *Tamiasciurus hudsonicus*

Reptiles
Northern pine snake, *Pituophis melanoleucus melanoleucus*

BLUE RIDGE ULTRAMAFIC BARRENS AND WOODLANDS

Ultramafic barrens and woodlands occur as a mosaic of openings and wooded areas over ultramafic bedrock, an unusual type of rock that is high in magnesium and iron. Soils that develop over ultramafic bedrock are thin and dry with a relatively high pH and low levels of phosphorus, potassium, nitrogen, and calcium. These soils support a sparse forest of pines, primarily pitch pine, and dry-site oaks, such as post, scarlet, and southern red oaks, with only a few shrubs and a dense ground layer of grasses and other sun-loving, flowering plants. Although most plant species in ultramafic forests are typical of Georgia's dry uplands, there are a number of midwestern prairie, Coastal Plain, and Special Concern species. Prescribed fire is the most important tool for the management and restoration of ultramafic woodlands. Frequent fire can increase the extent of grass- and herb-dominated groundcover and encourage characteristic woodland species such as post oak and pitch pine, while reducing weedy tree species such as Virginia pine.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: Pine-Oak Woodlands and Forest

Special Concern Plant Species Associated with Blue Ridge Ultramafic Barrens and Woodlands:
Alabama grape fern, *Botrychium jenmanii*
Canada burnet, *Sanguisorba canadensis*
Fringed gentian, *Gentianopsis crinita*
Purple sedge, *Carex purpurifera*
Woodland muhly, *Muhlenbergia sylvatica*
Virginia mountain mint, *Pycnanthemum virginianum*

Special Concern Animal Species Associated with Blue Ridge Ultramafic Barrens and Woodlands:
No Special Concern animals have been recorded from this environment.

GLADES, BARRENS, AND ROCK OUTCROPS OF THE BLUE RIDGE ECOREGION

BLUE RIDGE ROCKY SUMMITS

Rocky summits are large expanses of vertical or horizontal rock outcroppings found on a few peaks and upper slopes above 4,000 feet in Georgia's Blue Ridge. They are among the rarest habitats in Georgia and harbor many rare plant species. These high outcrops are subject to extremes of wind, temperature, and moisture. Plants grow primarily in hollows and crevices in the rock where moisture and organic material accumulate, while lichens expand across the surface of the outcrops. Trees are short and twisted, shrubs are typically evergreen, and herbs exhibit a number of harsh-weather survival tactics including low growth form, hairiness, and leathery leaf textures. Rocky summits are threatened by overuse from hikers and climbers; they should be protected from development, trail construction, and recreational overuse.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: High Elevation Rocky Summits and Shrub Balds, High Elevation Forested Heath Thickets; Caves, Rock Shelters, Talus Slopes

Special Concern Plant and Lichen Species Associated with Blue Ridge Rocky Summits:

American mountain-ash, *Sorbus americana*
Bearberry, *Vaccinium erythrocarpum*
Biltmore's sedge, *Carex biltmoreana*
Bleeding heart, *Dicentra eximia*
Blue Ridge golden ragwort, *Packera millefolia*
Blue Ridge St. John's-wort, *Hypericum buckleyi*
Cliffside goldenrod, *Solidago simulans*
Fir clubmoss, *Huperzia appalachiana*
Fire cherry, *Prunus pensylvanica*
Minniebush, *Menziesia pilosa*
Mountain cinquefoil, *Sibbaldiopsis tridentata*
Northern bush-honeysuckle, *Diervilla lonicera*
Pale corydalis, *Corydalis sempervirens* (syn. *Capnoides sempervirens*)
Recurved dog-hobble, *Leucothoe recurva* (syn. *Eubotrys recurva*)
Red elderberry, *Sambucus racemosa* ssp. *pubens*
Rock gnome lichen, *Cetradonia linearis* (syn. *Gymnoderma lineare*)
Sand myrtle, *Leiophyllum buxifolium*
Silverling, *Paronychia argyrocoma*
Spinulose shield fern, *Dryopteris carthusiana*
Taylor's filmy fern, *Hymenophyllum tayloriae*
Wretched sedge, *Carex misera*

Special Concern Animal Species Associated with Blue Ridge Rocky Summits:

Birds

Common raven, *Corvus corax*

Mammals

Eastern small-footed myotis, *Myotis leibii*

BLUE RIDGE CLIFFS

Cliffs and large rock outcrops are steep or vertical expanses of non-mafic rock below 4,000 feet that often form the walls of gorges or bluffs of river valleys. Overhanging rock outcrops are also included. Vegetation in this natural community is highly variable because conditions can be hot and dry at upper levels and on south- and west-facing outcrops and walls, and cool and damp near the bottom of gorges and on north- and east-facing outcrops and walls. Plants are mainly limited to species that can root in crevices or in soil accumulation on narrow ledges. Species that live directly on bare rock, such as lichens, mosses, and liverworts, are also common. Cliffs provide nesting sites for numerous birds. Because of the generally harsh conditions, this natural community is slow to recover from disturbance. Threats include overuse by climbers, invasion by exotic plant species, and loss of hemlock trees to hemlock woolly adelgid, an alien insect.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: Rocky Bluffs and Streambanks (in part)

Special Concern Plant and Lichen Species Associated with Blue Ridge Cliffs:

Biltmore's sedge, *Carex biltmoreana*
Bleeding heart, *Dicentra eximia*
Brown sedge, *Carex brunnescens*
Canada burnet, *Sanguisorba canadensis*
Carey's saxifrage, *Micranthes* (*Saxifraga*) *careyana*
Carolina hemlock, *Tsuga caroliniana*
Dwarf filmy fern, *Trichomanes petersii*
Fir clubmoss, *Huperzia appalachiana*
Gorge leafy liverwort, *Plagiochila caduciloba*
Ground cedar, *Diphasiastrum tristachyum*
Northern bush-honeysuckle, *Diervilla lonicera*
Northern shorthusk grass, *Brachyelytrum septentrionale*
Pale corydalis, *Corydalis* (*Capnoides*) *sempervirens*
Roan Mountain sedge, *Carex roanensis*
Rock gnome lichen, *Cetradonia linearis* (syn. *Gymnoderma linearis*)
Sand myrtle, *Leiophyllum buxifolium*
Scarlet Indian-paintbrush, *Castilleja coccinea*
Southern fibrous-root sedge, *Carex lucorum*
Spinulose shield fern, *Dryopteris carthusiana*
Sullivant's leafy liverwort, *Plagiochila sullivantii*
Tufted club-rush, *Trichophorum caespitosum* (syn. *Scirpus cespitosus*)
Wretched sedge, *Carex misera*

Special Concern Animal Species Associated with Blue Ridge Cliffs:

Amphibians
Green salamander, *Aneides aeneus*

Birds
Common raven, *Corvus corax*
Peregrine falcon, *Falco peregrinus*

Mammals
Eastern small-footed myotis, *Myotis leibii*
Eastern woodrat, *Neotoma floridana illinoensis*
Southern Appalachian woodrat, *Neotoma floridana haematoreia*

BLUE RIDGE MAFIC DOMES, GLADES, AND BARRENS

Mafic domes, glades, and barrens develop where mafic bedrock – with its high levels of magnesium, iron, calcium, and silica – is at or close to the surface, producing soils that are thin and droughty. Due to these soil conditions, trees are sparse (glades) or nearly absent (barrens and domes). The ground layer includes an interesting mix of dry-site plants (such as Appalachian rock-pink and pineweed) and seepage plants (such as sphagnum moss and Michaux's saxifrage) where water seeps across the rock surface. Because of the unusual combination of minerals in mafic rocks, these high pH sites also support plant species such as red cedar, white ash, coralberry, and American columbo. Several Southern Appalachian endemics such as creeping aster, dwarf mountain dandelion, and twisted-hair spike moss also occur on mafic sites. Mafic domes, glades, and barrens should be protected from clearing, development, and overuse by hikers and climbers.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: High Elevation Rocky Summits and Shrub Balds, Pine-Oak Woodlands (in part), Oak Forests and Woodlands (in part), and Xeric Pine Woodland (in part)

Special Concern Plant and Lichen Species Associated with Blue Ridge Mafic Domes, Glades, and Barrens:
American barberry, *Berberis canadensis*
Beadle's mountain-mint, *Pycnanthemum beadlei*
Biltmore's sedge, *Carex biltmoreana*
Bittersweet, *Celastrus scandens*
Blue Ridge ragwort, *Packera millefolium*
Broad-leaved bunchflower, *Veratrum latifolium* (syn. *Melanthium latifolium*)
Ground cedar, *Diphasiastrum tristachyum*
Pale corydalis, *Corydalis sempervirens* (syn. *Capnoides sempervirens*)
Porter's reed-grass, *Calamagrostis porteri* ssp. *porteri*
Rock muhly, *Muhlenbergia sobolifera*
Rough sedge, *Carex scabrata*
Roundleaf serviceberry, *Amelanchier sanguinea*
Small's beardtongue, *Penstemon smallii*
Spreading rockcress, *Arabis patens*
Staghorn sumac, *Rhus typhina*
Stone Mountain mountain-mint, *Pycnanthemum curvipes*
Tufted club-rush, *Trichophorum caespitosum* (syn. *Scirpus cespitosus*)
Wretched sedge, *Carex misera*

Special Concern Animal Species Associated with Blue Ridge Mafic Domes, Glades, and Barrens:
Birds
Common raven, *Corvus corax*

WETLANDS OF THE BLUE RIDGE ECOREGION

BLUE RIDGE MOUNTAIN BOGS

Mountain bogs are one of Georgia's rarest natural communities, known from fewer than a dozen locations. Bogs are characterized by mats of sphagnum moss and by deep, peaty, acidic soils that are usually saturated year-round by rain, downslope seepage, beaver impoundment, and overbank stream flooding. Historically, mountain bogs were kept free of shrubs and trees by occasional re-flooding by beavers or by fire. Today, most bogs are densely vegetated by rhododendron, mountain laurel, and other shrubs, with a thin canopy of trees such as green ash, tulip tree, red maple, and eastern hemlock. Where the understory is open, a variety of grasses, sedges, and herbs, including pitcherplants and orchids, dominate the ground layer. All of Georgia's mountain bogs have been degraded or destroyed by drainage and conversion to agriculture or by encroachment of woody plants. Feral hogs severely disturb the soil and herb layers in wetlands and should be eradicated. Efforts are underway to save several bogs by restoring hydrology, clearing woody plants, and re-planting native vegetation. Little is known about the long-term management of restored bogs but such efforts may involve the use of prescribed fire, periodic manual clearing of shrubs, and maintenance of perennially saturated soil.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: Mountain Bogs and Wet Meadows

Special Concern Plant Species Associated with Blue Ridge Mountain Bogs:

Bog candles, *Lysimachia terrestris*
Bog goldenrod, *Solidago uliginosa* var. *uliginosa*
Bog oat-grass, *Danthonia epilis*
Bog sedge, *Carex folliculata*
Broad-leaved white spirea, *Spiraea alba*
Canada burnet, *Sanguisorba canadensis*
Carolina arrow-wood, *Viburnum carolinianum*
Carolina bog laurel, *Kalmia carolina*
Cuthbert's turtlehead, *Chelone cuthbertii*
Green pitcherplant, *Sarracenia oreophila*
Hardhack, *Spiraea tomentosa*
Hispid hedge-nettle, *Stachys hispida*
Marsh bellflower, *Campanula aparinoides*
Northern white beaksedge, *Rhynchospora alba*
Purple fringeless orchid, *Platanthera peramoena*
Purple pitcherplant, *Sarracenia purpurea*
Roundleaf sundew, *Drosera rotundifolia*
Spreading pogonia, *Cleistes bifaria*
Sticky false asphodel, *Tofieldia glutinosa*
Swamp pink, *Helonias bullata*
Tawny cotton-grass, *Eriophorum virginicum*

Special Concern Animal Species Associated with Blue Ridge Mountain Bogs:

Amphibians

Four-toed salamander, *Hemidactylium scutatum*
Northern Coal Skink, *Eumeces anthracinus*

Invertebrates

Hagen's bluet, *Enallagma hageni*

Mammals

Masked shrew, *Sorex cinereus*
Pygmy shrew, *Sorex hoyi*
Southern bog lemming, *Synaptomys cooperi*
Star-nosed mole, *Condylura cristata*
Water shrew, *Sorex palustris*

Reptiles Bog turtle, *Glyptemys muhlenbergii*

BLUE RIDGE SEEPAGE WETLANDS

Seepage wetlands are usually small natural communities that develop where groundwater emerges from fractures in exposed bedrock, or where water is forced to the soil surface by shallow bedrock or an abrupt change in the steepness of a slope. These communities remain wet nearly year-round except in drought years. Seepage wetlands differ from mountain bogs in that there is nearly constant (although often nearly imperceptible) water flow and little accumulation of peat. Seepages in rich hardwood coves support herbs such as umbrella leaf, turk's-cap lily, bee balm, and Canadian wood nettle as well as several orchid species. Mafic sites include base-loving species such as Virginia mountain-mint, swamp lousewort, and naked-fruit rush. Sunny seeps on rock ledges may support grass pinks, sundews, and goldenrods. Seeps on gentle, open slopes where there is some accumulation of organic matter provide habitat for the rare green pitcherplant as well as a variety of wetland herb, grass, and sedge species. Seepage wetlands are vulnerable to destruction by logging, off-road vehicle traffic, highway right-of-way maintenance, road and trail construction, and invasion by exotic pest plants. Feral hogs severely disturb the soil and herb layers in wetlands and should be eradicated.

Comprehensive Wildlife Conservation Strategy High Priority Habitats: Low Elevation Seepy Thickets and Wet Woods, Moist Cliff Faces and Spray Cliffs (in part)

Special Concern Plant and Lichen Species Associated with Blue Ridge Seepage Wetlands:

American false hellebore, *Veratrum viride*
Bighorn hornwort, *Megaceros aenigmaticus*
Bog candles, *Lysimachia terrestris*
Bog goldenrod, *Solidago uliginosa*
Broom sedge, *Carex scoparia*
Canada burnet, *Sanguisorba canadensis*
Cliffside goldenrod, *Solidago simulans*
Epling's hedge-nettle, *Stachys eplingii*
Fir clubmoss, *Huperzia appressa* (syn. *Huperzia appalachiana*)
Fringed gentian, *Gentianopsis crinita*
Golden saxifrage, *Chrysosplenium americanum*
Green pitcherplant, *Sarracenia oreophila*
Large-leaf grass-of-parnassus, *Parnassia grandifolia*
Large purple fringed orchid, *Platanthera grandiflora*
Monkeyface orchid, *Platanthera integrilabia*
Mountain wavy-leaf moss, *Plagiomnium carolinianum*
Naked-fruit rush, *Juncus gymnocarpus*
Northeastern mannagrass, *Glyceria melicaria*
Porcupine sedge, *Carex hystericina*
Pringle's platyhypnidium, *Platyhypnidium pringlei*
Rock gnome lichen, *Cetradonia linearis* (syn. *Gymnoderma linearis*)
Roundleaf leafy liverwort, *Cephaloziella obtusilobula*
Roundleaf sundew, *Drosera rotundifolia*
Small purple fringed orchid, *Platanthera psycodes*
Spreading pogonia, *Cleistes bifaria*
Sticky false asphodel, *Tofieldia glutinosa*
Sullivant's leafy liverwort, *Plagiochia sullivantii*
Swamp lousewort, *Pedicularis lanceolata*
Tufted club-rush, *Trichophorum caespitosum* (syn. *Scirpus cespitosus*)
Virginia mountain-mint, *Pycnanthemum virginianum*

Special Concern Animal Species Associated with Blue Ridge Seepage Wetlands:

Amphibians

Band-winged meadowhawk, *Sympetrum semicinctum*
Seepage salamander, *Desmognathus aeneus*
Dwarf blackbelly salamander, *Desmognathus folkertsi*

Invertebrates

Diana fritillary, *Speyeria diana*
Georgia beloneurian stonefly, *Beloneuria georgiana*
Ruby meadowhawk, *Sympetrum rubicundulum*

BLUE RIDGE SPRAY CLIFFS

The spray cliff environment includes the rocks and cliff faces behind, around, and beneath waterfalls that are kept wet and cool by mist, spray, and splashing. Because of their sheltered location and the moderating effect of water, they are protected from extremes of both summer and winter temperatures. Some spray cliffs lack vegetation but most support trees and shrubs that can root in crevices, such as eastern hemlock and rhododendron, as well as a variety of moisture-loving herbs such as foamflower, alumroot, jack-in-the-pulpit, branch lettuce, and yellow-root. Southern Appalachian spray cliffs are noted for a great number of unusual, disjunct, or endemic ferns, mosses, and liverworts. Spray cliffs are degraded by climbing and other recreational activities and should be protected from overuse.

Comprehensive Wildlife Conservation Strategy High Priority Habitats: Moist Cliff Faces and Spray Cliffs

Special Concern Plant and Lichen Species Associated with Blue Ridge Spray Cliffs:
Appalachian filmy fern, *Trichomanes boschianum*
Bighorn hornwort, *Megaceros aenigmaticus*
Blomquist's leafy liverwort, *Lejeunea blomquistii*
Dwarf filmy fern, *Trichomanes petersii*
Fir clubmoss, *Huperzia appressa* (syn. *H. appalachiana*)
Golden saxifrage, *Chrysosplenium americanum*
Gorge leafy liverwort, *Plagiochila caduciloba*
Mountain wavy-leaf moss, *Plagiomnium carolinianum*
Pringle's platyhypnidium, *Platyhypnidium pringlei*
Rock clubmoss, *Huperzia porophila*
Rock gnome lichen, *Cetradonia linearis* (syn. *Gymnoderma lineare*)
Roundleaf leafy liverwort, *Cephaloziella obtusilobula*
Sharp's leafy liverwort, *Plagiochila sharpii*
Sullivant's leafy liverwort, *Plagiochia sullivantii*
Taylor's filmy fern, *Hymenophyllum tayloriae*
Tufted club-rush, *Trichophorum caespitosum* (syn. *Scirpus cespitosus*)

Special Concern Animal Species Associated with Blue Ridge Spray Cliffs:
Amphibians
Dwarf black-bellied salamander, *Desmognathus folkertsi*
Seepage salamander, *Desmognathus aeneus*

BLUE RIDGE FLOODPLAINS AND BOTTOMLANDS

Floodplains and bottomlands include wooded wetlands bordering streams and rivers, as well as sandbars and rocky areas in the stream channel. At higher elevations, they are often narrow, steep, rocky habitats, with a canopy of eastern hemlock, black birch, black gum, and tulip tree, and a dense shrub layer of tag alder, rhododendron, and mountain laurel. In lower elevation valleys, some floodplains are broader and flatter with a canopy of typical streamside species – such as tulip tree, green ash, sycamore, red maple, and sweet gum – mixed with other hardwoods. Sandbars and rocky borders support grasses, sedges, composites, Virginia sweet-spire, buttonbush, witch-hazel, and other shrubs. A few floodplains still include thickets of giant cane, called canebrakes, a once widespread habitat that is especially important to migratory birds. Almost all low-elevation floodplains in Georgia's Blue Ridge have been converted to farmland or residential areas. Streams that are lined by eastern hemlocks are threatened by the hemlock woolly adelgid, which has the potential to eradicate these trees; without the overhanging hemlocks, the temperature and pH of many streams will rise, killing fish and other aquatic animals; every effort should be made to support hemlock woolly adelgid eradication efforts. Feral hogs, which severely disturb the soil and herb layer in floodplains and bottomlands, should be eradicated. Floodplains are especially sensitive to hydrologic disturbances and should be protected from damming, road-building, and development. Floodplain and bottomland forests should be preserved for flood control and for use by wildlife.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: Floodplain Hardwood Forests; Canebrakes; Rocky Bluffs and Streambanks

Special Concern Plant Species Associated with Blue Ridge River and Stream Floodplains:

Aaron's rod**,** *Thermopsis villosa*
Bighorn hornwort**,** *Megaceros aenigmaticus*
Bog candles, *Lysimachia terrestris*
Butternut, *Juglans cinerea*
Carolina quillwort, *Isoetes valida*
Fraser's loosestrife, *Lysimachia fraseri*
Leafy southern tubercled orchid, *Platanthera flava* var. *herbiola*
Mountain witch-alder, *Fothergilla major*
Purple giant hyssop, *Agastache scrophulariifolia*
Twisted sedge, *Carex torta*

Special Concern Animal Species Associated with Blue Ridge River and Stream Floodplains:

Amphibians
Green salamander, *Aneides aeneus*

Birds
Cerulean warbler, *Dendroica cerulea*
Willow flycatcher, *Empidonax traillii*

Mammals
Rafinesque's big-eared bat, *Corynorhinus rafinesquii*

AQUATIC ENVIRONMENTS OF THE BLUE RIDGE ECOREGION

BLUE RIDGE SPRINGS, SPRING RUNS, AND SEEPS

Springs and seeps develop where groundwater emerges from fractures in exposed bedrock, or where water is forced to the soil surface by shallow bedrock or an abrupt change in the steepness of a slope. There is usually year-round (although often nearly imperceptible) water flow, except in drought years, and little accumulation of peat around seeps and springs. Herbs and ferns, such as pale jewelweed, umbrella leaf, turk's-cap lily, bee balm, grass-of-parnassus, Canadian wood nettle, royal fern, and cinnamon fern, may establish around springy or seepy areas but the soils are usually too wet to support trees. Base-loving plant species such as Virginia mountain mint, fringed gentian and swamp lousewort may thrive in or around spring runs and seeps that develop over mafic bedrock. The cool, clean waters of springs and seeps provide important habitat for a number of animal species, particularly salamanders such as Blue Ridge two-lined salamander, Ocoee salamanders, seepage salamanders, and spring salamanders. Springs and seeps are vulnerable to destruction by logging, off-road vehicle and horse traffic, and invasion by exotic pests such as Nepal grass and feral hogs.

Comprehensive Wildlife Conservation Strategy High Priority Habitats: Blue Ridge Springs and Spring Runs; Gravelly Seeps; Low Elevation Seepy Thickets and Wet Woods

Special Concern Plant Species Associated with Blue Ridge Springs, Spring Runs, and Seeps:
American false hellebore, *Veratrum viride*
Bighorn hornwort, *Megaceros aenigmaticus*
Bog candles, *Lysimachia terrestris*
Epling's hedge-nettle, *Stachys eplingii*
Fringed gentian, *Gentianopsis crinita*
Golden saxifrage, *Chrysosplenium americanum*
Green pitcherplant, *Sarracenia oreophila*
Large-leaved grass-of-parnassus, *Parnassia grandifolia*
Large purple fringed-orchid, *Platanthera grandiflora*
Monkeyface orchid, *Platanthera integrilabia*
Naked-fruit rush, *Juncus gymnocarpus*
Porcupine sedge, *Carex hystericina*
Small purple fringed orchid, *Platanthera psycodes*
Swamp lousewort, *Pedicularis lanceolata*
Virginia mountain-mint, *Pycnanthemum virginianum*
Bog goldenrod, *Solidago uliginosa* var. *uliginosa*
Broom sedge, *Carex scoparia*
Cliffside goldenrod, *Solidago simulans*
Epling's hedge-nettle, *Stachys eplingii*
Fir clubmoss, *Huperzia appressa* (syn. *H. appalachiana*)
Fringed gentian, *Gentianopsis crinita*
Golden saxifrage, *Chrysosplenium americanum*
Large-leaf grass-of-parnassus, *Parnassia grandifolia*

Blue Ridge Springs, Spring Runs, and Seeps, continued

Special Concern Plant Species Associated with Blue Ridge Springs, Spring Runs, and Seeps, continued
Large purple fringed orchid, *Platanthera grandiflora*
Monkeyface orchid, *Platanthera integrilabia*
Mountain wavy-leaf moss, *Plagiomnium carolinianum*
Naked-fruit rush, *Juncus gymnocarpus*
Northeastern mannagrass, *Glyceria melicaria*
Porcupine sedge, *Carex hystericina*
Pringle's platyhypnidium, *Platyhypnidium pringlei*
Rock gnome lichen, *Cetradonia linearis* (syn. *Gymnoderma lineare*)
Roundleaf leafy liverwort, *Cephaloziella obtusilobula*
Roundleaf sundew, *Drosera rotundifolia*
Small purple fringed orchid, *Platanthera psycodes*
Spreading pogonia, *Cleistes bifaria*
Sticky false asphodel, *Tofieldia glutinosa*
Sullivant's leafy liverwort, *Plagiochia sullivantii*
Swamp lousewort, *Pedicularis lanceolata*
Tufted club-rush, *Trichophorum caespitosum* (syn. *Scirpus cespitosus*)
Virginia mountain-mint, *Pycnanthemum virginianum*

Special Concern Animal Species Associated with Blue Ridge Springs, Spring Runs, and Seeps:
Amphibians
Dwarf black-bellied salamander, *Desmognathus folkertsi*
Seepage salamander, *Desmognathus aeneus*

Invertebrates
Diana fritillary, *Speyeria diana*
Georgia beloneurian stonefly, *Beloneuria georgiana*
Hiwassee crayfish, *Cambarus hiwasseensis*
Rock crayfish, *Cambarus parrishi*

Reptiles
Bog turtle, *Glyptemys muhlenbergii*
Northern coal skink, *Eumeces anthracinus*

BLUE RIDGE SMALL STREAMS

The cool, clear streams of Georgia's Blue Ridge can drop several hundred feet per mile, forming riffles, pools, cascades, and waterfalls along the way. Typically, they flow over rocky substrate and around boulders but microhabitats of sand and gravel deposits are created in quieter waters, providing breeding habitat for native trout and other fish. Small streams in the Blue Ridge rarely have floodplains and are often bordered by great laurel, mountain laurel, and eastern hemlock, plants that shade the streams and maintain their cool temperatures. The imminent loss of eastern hemlock throughout the region to the Hemlock Woolly Adelgid threatens the health of many of Georgia's Blue Ridge streams. Many small streams are degraded by cattle when they break down stream banks and pollute the water; by feral hogs whose digging on adjacent slopes increases sedimentation into streams; and by off road vehicles, which also pollute streams and increase erosion and sedimentation. Stream impoundment and construction of paved surfaces negatively impact these small streams and should be closely regulated.

Comprehensive Wildlife Conservation Strategy High Priority Habitats: Blue Ridge Streams

Special Concern Plant and Lichen Species Associated with Blue Ridge Small Streams:
Bighorn hornwort, *Megaceros aenigmaticus*

Special Concern Animal Species Associated with Blue Ridge Small Streams:
Amphibians
Dwarf black-bellied salamander, *Desmognathus folkertsi*
Eastern hellbender, *Cryptobranchus alleganiensis alleganiensis*
Four-toed salamander**,** *Hemidactylium scutatum*
Shovel-nosed salamander, *Desmognathus marmoratus*

Fish
Banded darter, *Etheostoma zonale*
Blotched chub, *Erimystax insignis*
Blue shiner, *Cyprinella caerulea*
Cherokee darter, *Etheostoma scotti*
Greenbreast darter, *Etheostoma jordani*
Greenfin darter, *Etheostoma chlorobranchium*
Fatlips minnow, *Phenacobius crassilabrum*
Holiday darter, *Etheostoma brevirostrum*
Rock darter, *Etheostoma rupestre*
Rosyside dace, *Clinostomus funduloides*
Sicklefin redhorse, *Moxostoma* sp.
Silver shiner, *Notropis photogenis*
Telescope shiner, *Notropis telescopus*
Wounded darter, *Etheostoma vulneratum*

Mammals
Long-tailed or rock shrew, *Sorex dispar*
Water shrew, *Sorex palustris*

Mollusks
Skirted hornsnail, *Pleurocera pyrenella*
Spindle elimia, *Elimia capillaris*

Blue Ridge Small Streams, continued

Other Invertebrates
Berner's two-winged mayfly, *Heterocloeon berneri*
Chauga River crayfish, *Cambarus chaugaensis*
Coosawattee crayfish, *Cambarus coosawattae*
Etowah crayfish, *Cambarus fasciatus*
Beautiful crayfish, *Cambarus speciosus*
Cherokee clubtail, *Gomphus consanguis*
Hiwassee crayfish, *Cambarus hiwasseensis*
Margarita River skimmer, *Macromia margarita*
Mitten crayfish, *Cambarus asperimanus*
Mountain crayfish, *Cambarus conasaugaensis*
Mustached clubtail, *Gomphus adelphus*
Rock crayfish, *Cambarus parrishi*
Edmund's snaketail, *Ophiogomphus edmundo*
Georgia springfly, *Remenus duffieldi*

Reptiles
Bog turtle, *Glyptemys muhlenbergii*
Northern coal skink, *Eumeces anthracinus anthracinus*

BLUE RIDGE MEDIUM TO LARGE RIVERS

Principal rivers with their headwaters in Georgia's Blue Ridge include the Chattahoochee River (draining to the Gulf of Mexico); the Chattooga and Tallulah Rivers (draining to the Atlantic Ocean via the Savannah River); the Etowah, Conasauga, Coosa, and Coosawattee Rivers (draining to the Gulf of Mexico via the Mobile River basin), and the Hiwassee, Nottely, Toccoa, and Little Tennessee Rivers (draining north and west to the Mississippi River and thence to the Gulf of Mexico). These rivers can drop several hundred feet per mile, forming beautiful waterfalls and dramatic rapids, and carving deep, V-shaped valleys along the way. Only a few of the lower gradient rivers, such as Nottely River, Arkaqua Creek, Brasstown Creek, and Hiwassee River, have wide floodplains. River corridors are important migration pathways for wildlife, and the boulders, gravel, and pebbles that form riverbeds create habitat for a variety of fish and other aquatic organisms. Many of the largest rivers in north Georgia have been impounded to create recreational lakes and hydroelectric power, and some are further degraded by polluted runoff from agricultural and residential areas. Reducing nonpoint source pollution, expanding vegetated stream buffers, and restricting livestock access to streams will improve water quality and protect the health of aquatic animals.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: Medium to Large Rivers

Special Concern Plant Species Associated with Blue Ridge Medium To Large Rivers:
No Special Concern plant species have been recorded in this natural community

Special Concern Animal Species Associated with Blue Ridge Medium To Large Rivers:

Amphibians
Eastern hellbender, *Cryptobranchus alleganiensis alleganiensis*
Common mudpuppy, *Necturus maculosus maculosus*

Birds
Bald eagle, *Haliaeetus leucocephalus*

Fish
Banded Darter, *Etheostoma zonale*
Blotched chub, *Erimystax insignis*
Blue shiner, *Cyprinella caerulea*
Fatlips minnow, *Phenacobius crassilabrum*
Halloween darter, *Percina crypta*
Holiday darter, *Etheostoma brevirostrum*
Olive darter, *Percina squamata*
Sandbar shiner, *Notropis scepticus*
Sicklefin redhorse, *Moxostoma* sp.
Silver redhorse, *Moxostoma anisurum*
Silver shiner, *Notropis photogenis*
Tangerine darter, *Percina aurantiaca*
Wounded darter, *Etheostoma vulneratum*

Other Invertebrates
Arrow clubtail, *Stylurus spiniceps*
Berner's two-winged mayfly, *Heterocloeon berneri*
Cherokee clubtail, *Gomphus consanguis*
Coosawattee crayfish, *Cambarus coosawattae*
Etowah crayfish, *Cambarus fasciatus*
Beautiful crayfish, *Cambarus speciosus*
Edmund's snaketail, *Ophiogomphus edmundo*
Georgia springfly, *Remenus duffieldi*
Little Tennessee crayfish, *Cambarus georgiae*
Maine snaketail, *Ophiogomphus mainensis*
Margarita River skimmer, *Macromia margarita*
Mountain crayfish, *Cambarus conasaugaensis*
Rapids clubtail, *Gomphus quadricolor*
Ski-tailed emerald, *Somatochlora elongata*

CUMBERLAND PLATEAU AND RIDGE & VALLEY ECOREGIONS

UPLAND FORESTS OF THE CUMBERLAND PLATEAU and RIDGE & VALLEY ECOREGIONS

CUMBERLAND PLATEAU and RIDGE & VALLEY MESIC FORESTS

Mesic forests of the Cumberland Plateau and the Ridge & Valley ecoregions develop in the moist, nutrient-rich soils of coves, ravines, valley floors, and sinkholes. The canopy contains a large number of tree species, including basswood, beech, yellow buckeye, tulip-tree, southern sugar maple, black cherry, white oak, shagbark hickory, northern red oak, white oak, and bigleaf magnolia. Striking displays of spring-flowering herbs such as Virginia bluebell, celandine poppy, golden-seal, fernleaf phacelia, blue phlox, columbine, twinleaf, and several trillium species – many of which grow nowhere else in Georgia – often occur in mesic forests. Salamanders are also especially abundant in this natural community. Mesic forests are threatened by residential and commercial development in the Atlanta/Chattanooga/I-75 corridor and associated areas. They are also threatened by exotic pest plants and feral hogs, which are especially destructive to the moist soils and rich herb layer found in mesic forests. These are ecologically rich communities that should be protected from fire, clearing, and other disturbance; every effort should be made to control or eradicate exotic pest plants and feral hogs.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: Mesic Hardwood Forests

Special Concern Plant Species Associated with Cumberland Plateau and Ridge & Valley Mesic Forests:

Alabama snow-wreath, *Neviusia alabamensis*
American dropseed, *Diarrhena americana*
Barksdale trillium, *Trillium sulcatum*
Bent trillium, *Trillium flexipes*
Blue ash, *Fraxinus quadrangulata*
Broad-leaved bunchflower, *Veratrum latifolium* (syn. *Melanthium latifolium*)
Broad-leaved gromwell, *Lithospermum latifolium*
Broad-leaved phlox, *Phlox amplifolia*
Broad-leaved sedge, *Carex platyphylla*
Butternut, *Juglans cinerea*
Canada lily, *Lilium canadense*
Carey's sedge, *Carex careyana*
Celandine poppy, *Stylophorum diphyllum*
Dwarf larkspur, *Delphinium tricorne*
Few-fruit sedge, *Carex oligocarpa*
Fringed phacelia, *Phacelia fimbriata*
Goldenseal, *Hydrastis canadensis*
Hairy mock orange, *Philadelphus pubescens*
Harbinger-of-spring, *Erigenia bulbosa*
Hooked harvest-lice, *Agrimonia gryposepala*
Jacob's ladder, *Polemonium reptans*
Lanceleaf trillium, *Trillium lancifolium*
Large-leaved waterleaf, *Hydrophyllum macrophyllum*
Limerock arrowwood, *Viburnum bracteatum*
Limerock milkvine, *Matelea obliqua*
Log fern, *Dryopteris celsa*
Miami-mist, *Phacelia purshii*
Narrow-leaved wild coffee, *Triosteum angustifolium*
Nuttall's hedge-nettle, *Stachys nuttallii*
Ohio buckeye, *Aesculus glabra*
Ozark bunchflower, *Veratrum woodii*
Purple sedge, *Carex purpurifera*
September elm, *Ulmus serotina*
Spreading chervil, *Chaerophyllum procumbens*
Tennessee leafcup, *Polymnia laevigata*
Three-flowered hawthorn, *Crataegus triflora*

Cumberland Plateau and Ridge & Valley Mesic Forests, continued

Special Concern Plant Species Associated with Cumberland Plateau and Ridge & Valley Mesic Forests, continued
Trailing meadowrue, *Thalictrum debile*
Twinleaf, *Jeffersonia diphylla*
Virginia bluebells, *Mertensia virginica*
White Bear Lake sedge, *Carex albursina*
Wild hyacinth, *Camassia scilloides*
Willow-leaf aster, *Symphyotrichum praealtum* (syn. *Aster praealtus*)
Yellow corydalis, *Corydalis flavula*
Yellow Giant Hyssop, *Agastache nepetoides*
Yellow ladyslipper, *Cypripedium parviflorum*

Special Concern Animal Species Associated with Cumberland Plateau and Ridge & Valley Mesic Forests:
Amphibians
Green salamander, *Aneides aeneus*
Pigeon Mtn. salamander, *Plethodon petraeus*

Mammals
Gray bat, *Myotis grisescens*
Indiana bat, *Myotis sodalis*

CUMBERLAND PLATEAU and RIDGE & VALLEY
DRY CALCAREOUS FORESTS

Dry calcareous forests occur in the Cumberland Plateau and Ridge & Valley ecoregions where limestone-derived soils have relatively high levels of calcium and low to moderate moisture levels. They are most common at low to mid-elevations because the limestone bedrock has eroded to form valleys and to expose strata on lower slopes. The tree canopy often includes calcium-loving species such as chinquapin oak, Shumard oak, and white ash, as well as an abundance of elms and hickories, with chalk maple, eastern red cedar, Carolina buckthorn, and redbud in the subcanopy. Because of the closed forest canopy, the herb layer tends to be sparse but may include some calcium-loving species such as dwarf larkspur and nettle-leaf sage. Dry calcareous forests have been heavily impacted by logging and conversion to pine plantations; intact examples should be protected from further damage.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: Forested Limestone Slopes and Terraces

Special Concern Plant Species Associated with Cumberland Plateau and Ridge & Valley Dry Calcareous Forests:

American barberry, *Berberis canadensis*
Alabama snow-wreath, *Neviusia alabamensis*
American smoketree, *Cotinus obovatus*
Ashe's hawthorn, *Crataegus ashei*
Big-leaf black-eyed Susan, *Rudbeckia fulgida* var. *umbrosa*
Blue ash, *Fraxinus quadrangulata*
Broad-leaved gromwell, *Lithospermum latifolium*
Canada milkvetch, *Astragalus canadensis*
Cream-flowered tick-trefoil, *Desmodium ochroleucum*
Creamy meadow-parsnip, *Thaspium chapmanii*
Downy arrowwood, *Viburnum rafinesquianum* var. *rafinesquianum*
Georgia aster, *Symphyotrichum georgianum*
Glade meadow parsnip, *Thaspium pinnatifidum*
Hairy mock-orange, *Philadelphus pubescens*
Jacob's ladder, *Polemonium reptans*
Limerock arrow-wood, *Viburnum bracteatum*
Limerock downy arrowwood, *Viburnum rafinesquianum* var. *affine*
Limerock milkvine, *Matelea obliqua*
Long-sepal beardtongue, *Penstemon calycosus*
Marble-seed, *Onosmodium molle* ssp. *occidentale*
Mullein foxglove, *Dasistoma macrophylla*
Purple foxglove, *Agalinis decemloba*
Pale beardtongue *Penstemon pallidus*
Rock muhly, *Muhlenbergia sobolifera*
Rome hawthorn, *Crataegus aemula*
Roughstem rosinweed, *Silphium radula*
September elm, *Ulmus serotina*
Shining indigo-bush, *Amorpha nitens*
Spreading rockcress, *Arabis patens*
Tennessee leafcup, *Polymnia laevigata*
Three-flowered hawthorn, *Crataegus triflora*
Wild coffee, *Triosteum aurantiacum*

Special Concern Animal Species Associated with Cumberland Plateau and Ridge & Valley Dry Calcareous Forests:

Amphibians

Green salamander, *Aneides aeneus*

Mammals

Gray bat, *Myotis grisescens*
Indiana bat, *Myotis sodalis*

CUMBERLAND PLATEAU and RIDGE & VALLEY
DRY OAK - PINE - HICKORY FORESTS

Dry oak-pine-hickory forests usually occur on ridges, cap rocks, and upper slopes underlain by sandstone, chert, or shale. Both the landscape position and acidic bedrock contribute to the formation of the thin, dry or submesic, soils that characterize these forests, which are dominated by chestnut oak, black oak, post oak, blackjack oak, southern red oak, and scarlet oak; more mesic sites support white oak. Pignut, sand, and mockernut hickories and Virginia and shortleaf pine are also common in these forests, as is black gum, persimmon, and red maple. Heath family shrubs – such as Catawba rhododendron, mountain laurel and several species of blueberry – are abundant, as are the goldenrods, asters, sunflowers, and grasses which dominate the herb layer. Fire was once an important factor in maintaining oak-pine-hickory forests, especially in the drier sites found on south- and west-facing slopes and ridge tops, and should be re-introduced. This natural community is threatened by development which destroys these forests directly and also indirectly by limiting the use of fire as a management tool.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: Pine-Oak Woodlands and Forest; Oak Woodlands

Special Concern Plant Species Associated with Cumberland Plateau and Ridge & Valley Dry Oak-Pine-Hickory Forests:
Bluehearts, *Buchnera americana*
Cumberland rose gentian, *Sabatia capitata*
Fraser's loosestrife, *Lysimachia fraseri*
Georgia aster, *Symphyotrichum georgianum*
Large-flowered skullcap, *Scutellaria montana*
Mountain witch-alder, *Fothergilla major*
Pink ladyslipper, *Cypripedium acaule*
Purple foxglove, *Agalinis decemloba*
Roughstem rosinweed, *Silphium radula*
Smith’s sunflower, *Helianthus smithii*
Tennessee leafcup, *Polymnia laevigata*
Three-flowered hawthorn, *Crataegus triflora*
Wood lily, *Lilium philadelphicum*

Special Concern Animal Species Associated with Cumberland Plateau and Ridge & Valley Dry Oak-Pine-Hickory Forests:
Birds
Bewick's wren, *Thryomanes bewickii*

Mammals
Gray bat, *Myotis grisescens*
Indiana bat, *Myotis sodalis*

CUMBERLAND PLATEAU and RIDGE & VALLEY PINE - OAK WOODLANDS AND FORESTS

Pine-oak forests and woodlands occur on dry, rocky, exposed sites and are typically dominated by stunted Virginia and shortleaf pines, often accompanied by oaks (chestnut, black, post, blackjack, southern red, and scarlet) and other hardwoods such as sand hickory, pignut hickory, black gum, sourwood, and red maple. Many pine-oak forests in Georgia developed as the result of human activities, such as logging, clearing, and fire-setting, which encourage the growth of pioneer species like pines; these stands may eventually develop into acidic oak-pine forests, especially on moister sites. However, some pine-oak forests are the natural result of dry soil conditions coupled with occasional wildfire and other natural disturbances such as windthrow and ice breakage. Mountain laurel, rhododendron, and blueberries are common shrubs in these forests as are grasses, composites, and a diversity of other wildflowers. Pine-oak forests and woodlands are dependent on occasional fire and other natural disturbances to create open conditions that support pines and the diverse shrub and herb layers. Fire suppression and development, which limits the use of fire in surrounding natural areas, are the greatest threats to this natural community.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: Pine-Oak Woodlands and Forest

Special Concern Plant Species Associated with Cumberland Plateau and Ridge & Valley Pine - Oak Woodlands and Forests:
Bluehearts, *Buchnera americana*
Pink ladyslipper, *Cypripedium acaule*
Purple foxglove, *Agalinis decemloba*
Smith's sunflower, *Helianthus smithii*

Special Concern Animal Species Associated with Cumberland Plateau and Ridge & Valley Pine - Oak Woodlands and Forests:
Birds
Bewick's wren, *Thryomanes bewickii*

Mammals
Gray bat, *Myotis grisescens*
Indiana bat, *Myotis sodalis*

RIDGE & VALLEY and PIEDMONT
LONGLEAF PINE FORESTS

Ridge & Valley and Piedmont longleaf pine forests and woodlands occur on dry ridges and steep, rocky slopes in several areas of Georgia's western Piedmont, such as Paulding Forest and Pine Mountain, and on Lavender Mountain and Simms Mountain in the Ridge & Valley ecoregion. Longleaf pine is common only where fire has not been suppressed. Other characteristic tree species include scarlet oak, chestnut oak, post oak, blackjack oak, loblolly pine, and shortleaf pine. In areas that are burned, the ground cover is often open with a variety of herbs typically found in dry sites, including grasses, composites, legumes, and bracken fern. Fire once played a critical role in the reproduction and maintenance of these longleaf pine forests, but occurred less frequently and burned smaller areas than in the longleaf forests of the Coastal Plain. Even so, prescribed fire is the most important management tool in this environment, although it should be applied with care as fires are less predictable in rolling, hilly terrain and tend to burn into the crowns of trees more easily. Selective removal of tree species that are not native to these natural communities will also play a role in restoration. Piedmont and Ridge & Valley longleaf pine forests have been largely destroyed by logging, fire suppression, and conversion to agriculture and development; remaining examples should be protected from development and managed for conservation.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: Montane Longleaf Pine-Hardwood Forest

Special Concern Plant Species Associated with Ridge & Valley and Piedmont Longleaf Pine Forests And Woodlands:
Eastern turkeybeard, *Xerophyllum asphodeloides*
Georgia aster, *Symphyotrichum georgianum*
Indian Grave Mountain wild basil, *Clinopodium* sp. 1
Pink ladyslipper, *Cypripedium acaule*
Schwerin's indigo-bush, *Amorpha schwerinii*
Shining indigo-bush, *Amorpha nitens*
Silky bindweed, *Calystegia catesbiana* ssp. *sericata*

Special Concern Animal Species Associated with Ridge & Valley and Piedmont Longleaf Pine Forests And Woodlands:
Birds
Bachman's sparrow, *Aimophila aestivalis*
Loggerhead shrike, *Lanius ludovicianus migrans*
Red-cockaded woodpecker, *Picoides borealis* (historic only)

Reptiles
Coral snake, *Micrurus fulvius*
Northern pine snake, *Pituophis melanoleucus melanoleucus*

ROCK OUTCROPS, PRAIRIES, AND BARRENS OF THE CUMBERLAND PLATEAU and RIDGE & VALLEY ECOREGIONS

RIDGE & VALLEY COOSA VALLEY PRAIRIES

Coosa Valley prairies occur in Floyd County, Georgia and in adjacent areas of Alabama. Prairies develop in lower, flat areas that have thick, shrink-swell soils; related communities, known as glades and barrens, form in drier, shallower soils. Prairies, glades, and barrens are open, largely treeless grasslands that have developed over high pH soils derived from limestone or calcareous shales. Although smaller and embedded in an otherwise wooded landscape, they resemble prairies found further west and support a number of midwestern prairie plant species. Prairie grasses, such as big bluestem, switchgrass, Indian grass, and little bluestem, and sun-loving wildflowers, such as goldenrods, coneflowers, sunflowers, asters, and milkweeds, dominate prairies and barrens and include many rare, disjunct, and Special Concern species. Protecting the soils and hydrology of Coosa Valley prairies is a priority and entails excluding off-road or other vehicle traffic, and preventing ditching and draining, road building, and clearing. Prescribed fire should be applied periodically to discourage encroachment by woody species, return nutrients to the soil, and promote flowering.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: Calcareous Prairies (Coosa Valley Prairies)

Special Concern Plant Species Associated with Ridge & Valley Coosa Valley Prairies:

Barrens milkweed, *Asclepias hirtella*
Barrens St. John's-wort, *Hypericum sphaerocarpum*
Black-seed sedge, *Carex eburnea*
Bluehearts, *Buchnera americana*
Broad-leaved beardgrass, *Gymnopogon brevifolius*
Carolina boltonia, *Boltonia caroliniana*
Carolina thistle, *Cirsium carolinianum*
Cumberland rosinweed, *Silphium mohrii*
Fremont's virgin's-bower, *Clematis fremontii*
Glade blue indigo, *Baptisia australis* var. *aberrans*
Glade gay-feather, *Liatris squarrosa* var. *hirsuta*
Glade St. John's-wort, *Hypericum dolabriforme*
Great Plains ladies-tresses, *Spiranthes magnicamporum*
Hairy wingstem, *Verbesina helianthoides*
Little River black-eyed susan, *Rudbeckia heliopsidis*
Meadow golden ragwort, *Packera paupercula*
Michigan lily, *Lilium michiganense*
Mohr's Barbara's buttons, *Marshallia mohrii*
New England aster, *Symphyotrichum novae-angliae*
Prairie cordgrass, *Spartina pectinata*
Prairie dropseed, *Sporobolus heterolepis*
Prairie purple coneflower, *Echinacea simulata*
Purple coneflower, *Echinacea purpurea*
Purple milkweed, *Asclepias purpurascens*
Riddell's goldenrod, *Oligoneuron riddellii*
Side-oats grama, *Bouteloua curtipendula*
Spreading yellow foxglove, *Aureolaria patula*
Swamp thistle, *Cirsium muticum*
Texas plains rush, *Juncus filipendulus*
Thorne's beakrush, *Rhynchospora thornei*
Whorled sunflower, *Helianthus verticillatus*
Wild hyacinth, *Camassia scilloides*

Special Concern Animal Species Associated with Ridge & Valley Coosa Valley Prairies: No Special Concern animals have been recorded from this natural community.

RIDGE & VALLEY CALCAREOUS GLADES AND BARRENS

Calcareous glades and barrens occur where limestone is at or near the surface, forming pavements of bare rock embedded in a mosaic of thin-soiled barrens, shrub and tree islands, and woodlands. These environments are widely known as "cedar glades" after their most conspicuous tree, eastern red cedar. Vegetation on cedar glades varies with the depth of soil, producing four habitats: **gravel glades** have very thin soil and support plants such as winter annuals that have adapted to seasonal extremes of temperature and moisture; **barrens** have somewhat deeper soils that support perennial grasses and herbs; **shrub thickets** occur as small islands within the rock outcrops and support shrubs such as southern privet, fragrant sumac, Carolina buckthorn, and coralberry, as well as tree seedlings; **glade woodlands** are small wooded patches where the soils are deep enough to support trees such as eastern red cedar, Georgia hackberry, chinquapin oak, winged elm, Virginia pine, shortleaf pine, post oak, and eastern redbud, though these are usually stunted. Calcareous woodlands, glades, and barrens are rare habitats that support a large number of rare, endemic, disjunct, and Special Concern plant species. Although in Georgia, most cedar glades are protected on federal land (Chickamauga-Chattanooga National Military Park), these natural communities are threatened by fire suppression, trash dumping, and off-road vehicle use. Prescribed fire is essential to limit encroachment by woody plants and to discourage invasion by exotic pest plants, especially Chinese privet.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: Limestone Glades and Barrens (Cedar Glades)

Special Concern Plant Species Associated with Ridge & Valley Calcareous Glades and Barrens:

American smoketree, *Cotinus obovatus*
Barrens milkweed, *Asclepias hirtella*
Barrens silky aster, *Symphyotrichum pratense*
Barrens St. John's-wort, *Hypericum sphaerocarpum*
Barrens sunflower, *Helianthus occidentalis*
Black-seed sedge, *Carex eburnea*
Blue ash, *Fraxinus quadrangulata*
Glade quillwort, *Isoetes butleri*
Cedar glade daisy fleabane, *Erigeron strigosus* var. *calcicola*
Compressed spikerush, *Eleocharis compressa*
Cream-flowered tick-trefoil, *Desmodium ochroleucum*
Creamy meadow-parsnip, *Thaspium chapmanii*
Delicate heliotrope, *Heliotropium tenellum*
Elliott's fanpetals, *Sida elliottii*
Engelmann's adder's-tongue, *Ophioglossum engelmannii*
Gattinger prairie clover, *Dalea gattingeri*
Glade blue indigo, *Baptisia australis* var. *aberrans*
Glade cress, *Leavenworthia uniflora*
Glade gay-feather, *Liatris squarrosa* var. *hirsuta*
Glade larkspur, *Delphinium carolinianum* ssp. *calciphilum*
Glade meadowparsnip, *Thaspium pinnatifidum*
Glade quillwort, *Isoetes butleri*
Glade skullcap, *Scutellaria leonardii*
Glade St. John's-wort, *Hypericum dolabriforme*
Glade violet, *Viola egglestonii*
Goldenrod, *Solidago speciosa* var. *rigidiuscula*
Great plains ladies-tresses, *Spiranthes magnicamporum*
Large-flowered coneflower, *Rudbeckia grandiflora*
Least glade-cress, *Leavenworthia exigua* var. *exigua*
Little River black-eyed susan, *Rudbeckia heliopsidis*
Marble-seed, *Onosmodium molle* ssp. *occidentale*
Nashville breadroot, *Pediomelum subacaule*
Pale beardtongue, *Penstemon pallidus*

Ridge & Valley Calcareous Glades and Barrens, continued

Special Concern Plant Species Associated with Ridge & Valley Calcareous Glades and Barrens, continued

Prairie clover, *Dalea candida*
Prairie dropseed, *Sporobolus heterolepis*
Purple Foxglove, *Agalinis decemloba*
Purple prairie-clover, *Dalea purpurea*
Rock Muhly, *Muhlenbergia sobolifera*
Rough-leaved dogwood, *Cornus drummondii*
Royal catchfly, *Silene regia*
Showy orange coneflower, *Rudbeckia fulgida v*ar. *speciosa*
Side-oats grama, *Bouteloua curtipendula*
Spreading rockcress, *Arabis patens*
Wall rue spleenwort, *Asplenium ruta-muraria*
Western silky aster, *Symphyotrichum sericeum*
White heath aster, *Symphyotrichum ericoides*
Wild daisy, *Astranthium integrifolium*

Special Concern Animal Species Associated with Ridge & Valley Calcareous Glades and Barrens:

No Special Concern animal species are recorded from this natural community.

RIDGE & VALLEY ACIDIC GLADES AND BARRENS

Acidic glades and barrens occur on the expanses of sandstone and conglomerate that cap many of the ridges in Georgia's Ridge and Valley region. These are harsh, dry communities with thin, sandy, acidic soils where plants grow in shallow sandy depressions or root in crevices where soil and moisture collect. Trees, such as Virginia pine and chestnut oak, are often stunted, and shrubs and herbs are limited to those species adapted to high sunlight and prolonged drought alternating with brief wet periods. Although primarily kept open by harsh growing conditions, fire also played a role historically in maintaining its open, grassy character by limiting tree and shrub growth. Acidic glades and barrens are threatened by residential and infrastructure development, which limits the use of prescribed fire as a management tool and creates corridors for invasive exotic species.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: Acidic Meadows Over Sandstone or Shale, Sandstone Barrens and Outcrops

Special Concern Plant Species Associated with Ridge & Valley Acidic Glades and Barrens:
Roundleaf catchfly, *Silene rotundifolia*
Silverling**,** *Paronychia argyrocoma*

Special Concern Animal Species Associated with Ridge & Valley Acidic Glades and Barrens:
No Special Concern animal species are recorded from this natural community.

CUMBERLAND PLATEAU and RIDGE & VALLEY CALCAREOUS CLIFFS

Calcareous cliffs occur in the Ridge & Valley on bluffs and along valley walls above streams where limestone strata have been exposed by erosion. They range from dry to moist and usually include small wet seeps. Calcium-loving trees, such as red cedar, white ash, and red bud, commonly root in crevices or on ledges, as do shrubs such as bladdernut, Appalachian mock-orange, and buckthorn bumelia. Calcareous cliffs support beautiful displays of spring-blooming wildflowers, including columbine, fernleaf phacelia, sharp-lobed hepatica, rue anemone, crested iris, wild geranium, bloodroot, blue phlox, and long-spurred violet, among many others. Caves often form at the base of calcareous cliffs and provide habitat for a number of rare and unusual animals. Cliffs are threatened with excessive use by cavers and climbers; they are also threatened by logging and development in the surrounding mesic forests. Calcareous cliffs and caves are rare in Georgia and support a large number of rare species; they should be protected from overuse and disturbance.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: Caves, Rock Shelters, and Talus Slopes

Special Concern Plant Species Associated with Cumberland Plateau and Ridge & Valley Calcareous Cliffs:
Alabama lipfern, *Cheilanthes alabamensis*
Alabama snow-wreath, *Neviusia alabamensis*
American smoketree, *Cotinus obovatus*
Black-seed sedge, *Carex eburnea*
Blue ash, *Fraxinus quadrangulata*
Downy arrowwood, *Viburnum rafinesquianum* var. *rafinesquianum*
Dwarf larkspur, *Delphinium tricorne*
Georgia rockcress, *Arabis georgiana*
Hairy mock orange, *Philadelphus pubescens*
Limerock arrow-wood, *Viburnum bracteatum*
Long-sepal beardtongue, *Penstemon calycosus*
Mullein foxglove, *Dasistoma macrophylla*
Palamocladium moss, *Palamocladium leskeoides*
Pale beardtongue, *Penstemon pallidus*
Pennsylvania pellitory, *Parietaria pensylvanica*
Rock muhly, *Muhlenbergia sobolifera*
September elm, *Ulmus serotina*
Tennessee fragile fern, *Cystopteris tennesseensis*

Special Concern Animal Species Associated with Cumberland Plateau and Ridge & Valley Calcareous Cliffs:
Amphibians
Green salamander, *Aneides aeneus*
Pigeon Mountain Salamander, *Plethodon petraeus*
Tennessee cave Salamander, *Gyrinophilus palleucus*

Cumberland Plateau and Ridge & Valley Calcareous Cliffs, continued

Fish
Southern Cavefish, *Typhlichthys subterraneus*

Invertebrates
Cave obligate amphipod, *Stygobromus dicksoni*
Cave obligate amphipod, *Stygobromus grandis*
Cave obligate amphipod, *Stygobromus minutus*
Cave obligate isopod, *Amergoniscus curvatus*
Cave obligate isopod, *Amergoniscus georgiensis*
Cave obligate isopod, *Amergoniscus proximus*
Cave obligate isopod, *Caecidotea cyrtorhynchus*
Georgian cave beetle, *Pseudanophthalmus georgiae*
Hobb's cave isopod, *Caecidotea hobbsi*
Nickajack cave isopod, *Caecidotea nickajackensis*
Tapered cave beetle, *Pseudanophthalmus fastigatus*

Mammals
Eastern small-footed, *Myotis leibii*
Gray myotis, *Myotis grisescens*
Indiana myotis, *Myotis sodalis*
Rafinesque's big-eared bat, *Corynorhinus rafinesquii*
Southeastern myotis, *Myotis austroriparius*

CUMBERLAND PLATEAU and RIDGE & VALLEY ACIDIC CLIFFS

Acidic cliffs are vertical rock outcrops that occur along the Cumberland Escarpment and also form bluffs above rivers and streams, where they sometimes contain caves; they also occur as large sculpted outcrops in some sites, such as Rocktown and the Zahnd Natural Area. Vegetation on cliffs and vertical outcrops is typically sparse due to the dry, low-nutrient conditions, but may be more abundant where moisture is higher, such as near waterfalls, and on crevices and ledges where soil accumulates. Trees and shrubs that root in crevices include black birch, Virginia pine, rock chestnut oak, mockernut hickory, fringe tree, mountain laurel, and sparkleberry. Crevices and moist areas near waterfalls support herbs – such as early saxifrage, jack-in-the-pulpit, bluets, spiderworts, and rock alumroot – and ferns, such as mountain spleenwort, marginal woodfern, royal fern, and New York fern. Caves and rockhouses, occasionally present at the base of cliffs, are included within this environment and offer habitat to a number of rare animals. Cliffs and vertical rock outcrops are threatened by excessive or careless use from climbers and cave explorers. Some moist cliffs have been invaded by the exotic pest plant, Nepal grass (*Microstegium vimineum*), which displaces native species, and should be eradicated.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: Sandstone Barrens and Outcrops; Caves, Rock Shelters, Talus Slopes

Special Concern Plant Species Associated with Cumberland Plateau and Ridge & Valley Acidic Cliffs:
Appalachian cliff fern, *Woodsia scopulina* ssp. *appalachiana*
Carey's saxifrage, *Micranthes careyana*
Mexican brachymenium moss, *Brachymenium systylium*
Roundleaf catchfly, *Silene rotundifolia*
Tennessee fragile fern, *Cystopteris tennesseensis*

Special Concern Animal Species Associated with Cumberland Plateau and Ridge & Valley Acidic Cliffs:
Amphibians
Green salamander, *Aneides aeneus*
Pigeon Mountain Salamander, *Plethodon petraeus*

Mammals
Eastern Small-footed, *Myotis leibii*
Gray Myotis, *Myotis grisescens*
Indiana Myotis, *Myotis sodalis*
Rafinesque's Big-eared Bat, *Corynorhinus rafinesquii*
Southeastern Myotis, *Myotis austroriparius*

WETLANDS OF THE CUMBERLAND PLATEAU and RIDGE & VALLEY ECOREGIONS

RIDGE & VALLEY FLATWOODS

Ridge & Valley flatwoods are relatively open, seasonally wet forests occurring on flat to slightly undulating terrain in the vicinity of the Conasauga, Coosawattee, Oostanaula, and Coosa Rivers. Flatwoods soils, typically underlain by the Conasauga shale formation, are high in calcium and shrink-swell clays, wet during winter and early spring, and dry and cracked in the summer. The flatwoods canopy is dominated by hardwoods such as willow oak, Shumard oak, cherrybark oak, shagbark hickory, American elm, and southern hackberry, often with buttressed bases. The undulating terrain of hummocks and depressions coupled with variable hydrology creates numerous microhabitats that support a great diversity of shrub and herb species. Flatwoods are vulnerable to invasion by a number of exotic pest plants such as Chinese privet and Nepal grass. Ridge & Valley flatwoods are one of the rarest natural communities in Georgia, supporting numerous threatened, endangered, disjunct, and narrowly endemic plant species. They should be protected from logging and other clearing and monitored closely and treated when necessary for exotic pest plants.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: Calcareous Flatwoods (Hardwood Flats)

Special Concern Plant Species Associated with Ridge & Valley Flatwoods:

Alabama leatherflower, *Clematis socialis*
Alabama warbonnet, *Jamesianthus alabamensis*
Asa Gray sedge, *Carex grayi*
Barbed rattlesnake root, *Prenanthes barbata*
Barrens milkweed, *Asclepias hirtella*
Bigspore Engelmann's quillwort, *Isoetes appalachiana*
Big bishopweed, *Ptilimnium costatum*
Carolina boltonia, Boltonia caroliniana
Cumberland rose gentian, *Sabatia capitata*
Dwarf trillium, *Trillium pusillum*
Fremont's leatherflower, *Clematis fremontii*
Harbinger-of-spring, *Erigenia bulbosa*
Lanceleaf trillium, *Trillium lancifolium*
Meadow golden ragwort, *Packera paupercula*
Michigan lily, *Lilium michiganense*
Mohr's Barbara's buttons, *Marshallia mohrii*
Nutmeg hickory, *Carya myristiciformis*
Prairie cordgrass, *Spartina pectinata*
Purple milkweed, *Asclepias purpurascens*
Shingle oak, *Quercus imbricaria*
Spreading chervil, *Chaerophyllum procumbens*
Spreading yellow foxglove, *Aureolaria patula*
Trailing meadowrue, *Thalictrum debile*
Warty slender spikerush, *Eleocharis tenuis* var. *verrucosa*

Special Concern Animal Species Associated with Ridge & Valley Flatwoods:

Invertebrates
Conasauga blue burrower, *Cambarus cymatilis*

RIDGE & VALLEY CALCAREOUS SEEPAGE FENS

Calcareous seepage fens are wet, open communities that occur around seeps, springs, and spring runs; they also develop around first-order streams that emerge from limestone bedrock. Fens naturally support few trees and shrubs and are characterized by a diversity of herbs, grasses, and rushes. However, in the absence of natural processes, such as beaver activity, flooding, and fire, fens are invaded by woody plants. Spring runs and first-order streams that flow through calcareous seepage fens support a large number of animal species, particularly salamanders and fish, many of which are rare. Calcareous seepage fens are the rarest wetland community in Georgia; although probably never common, they have been nearly extirpated by grazing, draining, and conversion to agriculture and pine plantations. Efforts should be made to locate and restore any fens that remain. Most calcareous seepage fens have been invaded by exotic pest plants, especially Nepal grass and small carp grass; eradication of these invaders is complicated by the presence of threatened and endangered plant species and may have to be achieved through hand-removal.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: Springs and Spring Runs, Gravelly Seeps

Special Concern Plant Species Associated with Ridge & Valley Calcareous Seepage Fens:
Asa Gray sedge, *Carex grayi*
Georgia alder, *Alnus maritima* ssp. *georgiensis*
Large-leaved grass-of-parnassus, *Parnassia grandifolia*
Tennessee yellow-eyed grass, *Xyris tennesseensis*
Thorne's beaksedge, *Rhynchospora thornei*

Special Concern Animal Species Associated with Ridge & Valley Calcareous Seepage Fens:
Fish
Bridled darter, *Percina kusha*
Burrhead shiner, *Notropis asperifrons*
Coldwater darter, *Etheostoma ditrema*
Flame chub, *Hemitremia flammea*
Lined chub, *Hybopsis lineapunctata*
Tennessee dace, *Phoxinus tennesseensis*
Trispot darter, *Etheostoma trisella*

Mollusks
Coosa moccasinshell, *Medionidus parvulus*
Finelined pocketbook, *Hamiota altilis*
Interrupted rocksnail, *Leptoxis foremani*
Southern creekmussel, *Strophitus subvexus*
Tennessee heelsplitter, *Lasmigona holstonia*

Other Invertebrates
Cherokee clubtail, *Gomphus consanguis*
Chickamauga crayfish, *Cambarus* (*Puncticambarus*) *extraneus*
Conasauga blue burrower, *Cambarus* (*Depressicambarus*) *cymatilis*

CUMBERLAND PLATEAU and RIDGE & VALLEY
ACIDIC SEEPAGE FORESTS AND MEADOWS

Acidic seepage forests are wetlands that occur in shallow swales and depressions, or near streamheads, on the sandstone, conglomerate, and shale caps of ridges in the Ridge and Valley and uplands in the Cumberland Plateau. They are often small habitats embedded within Dry Oak-Pine-Hickory Forests or Pine-Oak Woodlands and Forests. Seepage forests are dominated by red maple, black gum, and sweet gum with an understory of blueberries, mountain laurel, and Catawba rhododendron, and a ground cover of sphagnum moss and wetland ferns, grasses, and sedges. Where these environments are kept open by fire, they are called seepage meadows – trees and shrubs are nearly absent and a diverse ground layer of flowering plants and wetland ferns develops. Seepage meadows are best managed with periodic prescribed fire but are often surrounded by development, which limits the use of fire as a management tool. Seepage forests and seepage meadows are small but ecologically important environments that should be protected from artificial disturbances such as logging, clearing, and development.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: Acidic Meadows Over Sandstone or Shale; Red Maple/Black gum Swamps

Special Concern Plant Species Associated with Cumberland Plateau and Ridge & Valley Acidic Seepage Forests and Meadows:
Cumberland rose gentian, *Sabatia capitata*
Monkeyface orchid, *Platanthera integrilabia*
Wood lily, *Lilium philadelphicum*

Special Concern Animal Species Associated with Cumberland Plateau and Ridge & Valley Acidic Seepage Forests and Meadows:

Invertebrates
Ruby meadowhawk, *Sympetrum rubicundulum*

Mammals
Gray bat, *Myotis grisescens*

CUMBERLAND PLATEAU and RIDGE & VALLEY
SAG PONDS AND SINKHOLES

Sag ponds are depressions or swales in a surface layer of rock, such as chert or sandstone, that formed when underlying layers of dolomite or limestone collapsed, resulting in a depression in the surface layer. Sinkholes are depressions that form directly in surface layers of limestone or dolomite. Sag ponds may hold water permanently or for short periods, depending on many factors; vegetation typically occurs in concentric zones corresponding to length and depth of inundation. Forested sag ponds are usually dominated by willow oak, green ash, sycamore, sweet gum, swamp black gum, and red maple; open sag ponds are characterized by a variety of herbs, grasses, and sedges, many of which are rare or disjunct from the Coastal Plain. Sag ponds and sinkholes are surrounded by upland forests whose condition directly affects the included wetlands. Protection and restoration of sag ponds and sinkholes depends on limiting clearing, development, and hydrologic alterations in surrounding uplands. Sinkholes are linked to subterranean streams, caves, and aquifers; protection of these interlinked environments from groundwater withdrawal, sedimentation, and contamination is a priority.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: Sag Ponds (Isolated Depressional Wetlands)

Special Concern Plant Species Associated with Cumberland Plateau and Ridge & Valley Sag Ponds and Sinkholes:
Bigleaf pondweed, *Potamogeton amplifolius*
Bluets, *Oldenlandia boscii*
Brown bog sedge, *Carex buxbaumii*
Featherfoil, *Hottonia inflata*
Pale manna-grass, *Glyceria pallida*
Pin oak, *Quercus palustris*
Sagpond spikerush, *Eleocharis erythropoda*
Sharp-scaled manna-grass, *Glyceria acutiflora*
Tussock sedge, *Carex stricta*

Special Concern Animal Species Associated with Cumberland Plateau and Ridge & Valley Sag Ponds and Sinkholes:

Invertebrates
Amber-winged spreadwing, *Lestes eurinus*
Band-winged meadowhawk, *Sympetrum semicinctum*
Spotted spreadwing, *Lestes congener*
Sweetflag spreadwing, *Lestes forcipatus*

Mammals
Gray myotis, *Myotis grisescens*

CUMBERLAND PLATEAU and RIDGE & VALLEY
FLOODPLAINS AND BOTTOMLANDS

Floodplains and bottomlands are found along streams of all sizes; they differ widely depending on the size of the stream, the frequency and length of flooding, and the velocity of moving water. Floodplains with lengthy periods of soil saturation and low velocity flooding support canopies of swamp chestnut oak, overcup oak, cherrybark oak, water oak, willow oak, Shumard oak, swamp tupelo, green ash, red maple, American elm, and southern hackberry. Some areas that are rarely flooded due to higher topography will include species such as basswood, bitternut hickory, black walnut, hickories, tulip tree, beech, white oak, and southern sugar maple. In areas scoured by high-velocity floods, vegetation is sparser and sunlight is high; trees in these areas include pioneer species such as silver maple, box elder, river birch, and sycamore, as well as a diversity of shrubs and herbs including Virginia sweetspire, buttonbush, southern wild raisin, yellowroot, tag alder, joe-pye-weed, switch grass, giant cane, river oats, cinnamon fern, and royal fern. Floodplain forests have been severely altered by centuries of agriculture and impoundment and by invasion of exotic pest plants, especially Chinese privet. Floodplains and bottomlands in Georgia's northwest region support large numbers of rare animals and plants. Restoration and management of floodplains and bottomlands should be a priority and must be based on a watershed-wide approach that addresses all the factors that threaten water quality and floodplain integrity.

Comprehensive Wildlife Conservation Strategy High Priority Habitats: High Gradient First- and Second-Order Streams, Medium to Large Rivers, Streams, Canebrakes

Special Concern Plant Species Associated with Cumberland Plateau and Ridge & Valley Floodplains and Bottomlands:

American Bugleweed, *Lycopus americanus*
Asa Gray sedge, *Carex grayi*
Bigspore Engelmann's quillwort, *Isoetes appalachiana*
Bottomland skullcap, *Scutellaria nervosa*
Broad-leaved Barbara's-buttons, *Marshallia trinervia*
Dwarf trillium, *Trillium pusillum*
Fraser's loosestrife, *Lysimachia fraseri*
Jacob's ladder, *Polemonium reptans*
Kral's water-plantain, *Sagittaria secundifolia*
Little River black-eyed Susan, *Rudbeckia heliopsidis*
Purple fringeless orchid, *Platanthera peramoena*
Shellbark hickory, *Carya laciniosa*
Shingle oak, *Quercus imbricaria*
Spreading chervil, *Chaerophyllum procumbens*
Streamside blue indigo, *Baptisia australis* var. *australis*
Virginia spirea, *Spiraea virginiana*
Willow-leaf aster, *Symphyotrichum praealtum* (syn. *Aster praealtus*)

Special Concern Animal Species Associated with Cumberland Plateau and Ridge & Valley Floodplains and Bottomlands:

Amphibians
Eastern hellbender, *Cryptobranchus alleganiensis*
Mammals
Gray bat, *Myotis grisescens*
Reptiles
Map turtle, *Graptemys geographica*
Alabama map turtle, *Graptemys pulchra*

AQUATIC ENVIRONMENTS OF THE CUMBERLAND PLATEAU and RIDGE & VALLEY ECOREGIONS

CUMBERLAND PLATEAU and RIDGE & VALLEY UNDERGROUND STREAMS

The Cumberland Plateau and Ridge & Valley regions contain most of Georgia's 400+ caves. Underground streams flow through caves and other underground passages that are created by the solution of the limestone bedrock that underlies much of these regions. They are important habitats for a wide variety of fish, salamanders, and invertebrate animals. All of these species are particularly sensitive to changes in the quantity or quality of water in underground streams and are dependent on nutrients that are brought in from outside the caves. Underground streams and their fauna are threatened by groundwater pollution and by groundwater withdrawal for industrial, municipal, and residential use. Careless or excessive use by cavers also pose a threat. Every effort should be made to protect these highly sensitive environments from pollution and overuse by recreationists. The impacts of groundwater withdrawal should be monitored and regulated if necessary.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: Underground Streams

Special Concern Plant Species Associated with Cumberland Plateau and Ridge & Valley Underground Streams:
No Special concern plant species have been recorded from this natural community

Special Concern Animal Species Associated with Cumberland Plateau and Ridge & Valley Underground Streams:
Amphibians
Tennessee cave salamander, *Gyrinophilus palleucus palleucus*

Fish
Southern cavefish, *Typhlichthys subterraneus*

Invertebrates
Cave Obligate Amphipod, *Stygobromus dicksoni*
Cave Obligate Amphipod, *Stygobromus grandis*
Cave Obligate Amphipod, *Stygobromus minutus*
Cave Obligate Isopod, *Amergoniscus curvatus*
Cave Obligate Isopod, *Amergoniscus georgiensis*
Cave Obligate Isopod, *Amergoniscus proximus*
Cave Obligate Isopod, *Caecidotea cyrtorhynchus*

CUMBERLAND PLATEAU and RIDGE & VALLEY
SPRINGS, SPRING RUNS, AND GRAVELLY SEEPS

Springs are highly localized points of groundwater discharge that typically feed spring runs, while seeps may be broader or less defined areas of perennial or seasonal flows. Springs, which derive from pressurized water movement through cave systems in the limestone that underlies much of the Ridge & Valley, are an important hydrologic feature of this region. Some springs in the Ridge & Valley are large, discharging as much as 14 million gallons per day, while others are quite small. Spring runs tend to have more stable temperatures and flow rates than larger streams, and support a wide diversity of animals, especially salamanders and fish. Springs, seeps, and spring runs may create a wetland vegetation community known as a fen that is rich in plant species, including the rare Tennessee yellow-eyed grass (*Xyris tennesseensis*). Springs, spring runs, and seeps have been degraded by ditching, draining, cattle access, pollution, and invasion by exotic pest plants such as Elodea (*Egeria densa*) and Parrot-feather (*Myriophyllum aquaticum*). Protection and management activities that will improve water quality and bio-diversity in these aquatic habitats include: monitoring and regulating groundwater withdrawals, limiting cattle access, protecting and expanding stream bank vegetation buffers, eradicating invasive pest plants, removing drainage systems and dams, and controlling pollution, erosion, and sedimentation.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: Springs, Spring Runs, and Gravelly Seeps

Special Concern Plant Species Associated with Cumberland Plateau and Ridge & Valley Springs, Spring Runs, and Gravelly Seeps:
Georgia alder, *Alnus maritima* ssp. *georgiensis*
Tennessee yellow-eyed grass, *Xyris tennesseensis*

Special Concern Animal Species Associated with Cumberland Plateau and Ridge & Valley Springs, Spring Runs, and Gravelly Seeps:

Amphibians
Brownback salamander, *Eurycea aquatica*
Seepage salamander, *Desgnathus aeneus*

Fish
Coldwater darter, *Etheostoma ditrema*
Flame chub, *Hemitremia flammea*
Trispot darter, *Etheostoma trisella*

Mollusks
Etowah heelsplitter, *Lasmigona etowaensis*

Other Invertebrates
Band-winged meadowhawk, *Sympetrum semicinctum*
Boxclaw crayfish, *Cambarus distans*
Cherokee clubtail, *Gomphus consanguis*
Ruby meadowhawk, *Sympetrum rubicundulum*

CUMBERLAND PLATEAU and RIDGE & VALLEY
HIGH GRADIENT FIRST- AND SECOND-ORDER STREAMS

A first-order stream has no other streams feeding into it; second-order streams are formed when two first-order streams flow together. In the Cumberland Plateau and Ridge & Valley regions, these small, clear, cold streams are found at higher elevations and at the upper ends of steep ravines and slopes. They receive input from springs and other groundwater sources as well as overland flow and may experience wide seasonal variations in flow. They usually have bedrock riffles and sandy pools that support a diversity of fish, salamanders, and invertebrate animals. Protection of these small streams and their aquatic life entails monitoring and regulating groundwater withdrawals, limiting cattle access to stream banks, protecting and expanding stream bank vegetation buffers, eradicating invasive pest plants, removing drainage systems and dams, and controlling pollution, erosion, and sedimentation in the watershed. High numbers of fish and mollusk species in these streams are threatened, endangered, or of special concern; every effort should be made to protect them from the effects of pollution, sedimentation, and other disturbances.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: High Gradient First- and Second-Order Streams

Special Concern Plant Species Associated with Cumberland Plateau and Ridge & Valley: High Gradient First- and Second-Order Streams:
Bigleaf pondweed, *Potamogeton amplifolius*
Bigspore Engelmann's quillwort, *Isoetes appalachiana*

Special Concern Animal Species Associated with Cumberland Plateau and Ridge & Valley: High Gradient First- and Second-Order Streams:

Fish

Black darter, *Etheostoma duryi*
Blacktip shiner, *Lythrurus atrapiculus*
Cherokee darter, *Etheostoma scotti*
Coldwater darter, *Etheostoma ditrema*
Conasauga logperch, *Percina jenkinsi*
Greenbreast darter, *Etheostoma jordani*
Highscale shiner, *Notropis hypsilepis*
Holiday darter, *Etheostoma brevirostrum*
Lined chub, *Hybopsis lineapunctata*
Mountain shiner, *Lythrurus lirus*
Redline darter, *Etheostoma rufilineatum*
Rock darter, *Etheostoma rupestre*
Scarlet shiner, *Lythrurus fasciolaris*
Shoal chub, *Macrhybopsis hyostoma*
Spotfin chub, *Erimonax nachus*
Tallapoosa darter, *Etheostoma tallapoosae*
Tallapoosa shiner, *Cyprinella gibbsi*
Tangerine darter, *Percina aurantiaca*
Telescope shiner, *Notropis telescopus*
Tennessee dace, *Phoxinus tennesseensis*
Trispot darter, *Etheostoma trisella*
Yellowfin madtom, *Noturus flavipinnis*

Mollusks

Brook floater, *Alasmidonta varicosa*
Brook hornsnail, *Pleurocera vestita*
Coosa creekshell, *Villosa vanuxemensis umbrans*
Cylindrical lioplax, *Lioplax cyclostomaformis*
Etowah heelsplitter, *Lasmigona etowaensis*
File elimia, *Elimia striatula*
Interrupted rocksnail, *Leptoxis foremani*
Mountain creekshell, *Villosa vanuxemensis*
Ornate elimia, *Elimia ornate*
Rayed kidneyshell, *Ptychobranchus foremanianus*
Savannah pebblesnail, *Somatogyrus tenax*
Skirted hornsnail, *Pleurocera pyrenella*
Spindel elimia, *Elimia capillaries*
Sulcate hornsnail, *Pleurocera trochiformis*

Cumberland Plateau and Ridge & Valley: High Gradient 1st- and 2nd-Order Streams, continued

Special Concern Animal Species Associated with Cumberland Plateau and Ridge & Valley: High Gradient First- and Second-Order Streams, continued

Other Invertebrates
Chickamauga crayfish, *Cambarus extraneus*
Chattooga River crayfish, *Cambarus scotti*
Blackbarred crayfish, *Cambarus unestami*
Etowah crayfish, *Cambarus fasciatus*
Faraway crayfish, *Cambarus distans*
Longnosed crayfish, *Cambarus longirostris*
Mountain crayfish, *Cambarus conasaugaensis*
Plateau crayfish, *Cambarus parvoculus*

CUMBERLAND PLATEAU and RIDGE & VALLEY STREAMS

Streams in the Cumberland Plateau and Ridge & Valley regions run through lower coves and valleys and have lower gradients, slower current, and fewer shoals than streams in areas with steeper topography. Substrates of these streams include gravel, pebbles, boulders, and bedrock. Riffles, pools, and shoals are often present, providing habitat for a diversity of fish. Aquatic plants, such as American bur-reed (*Sparganium americanum*) and pondweed (*Potamogeton* spp.), may also be present. Because they flow through limestone-based valleys, the waters of these streams are usually more productive than those of headwater streams. Most streams in these regions have experienced some amount of degradation, whether from industrial pollution, sedimentation, stream bank erosion and vegetation destruction, damming, or draining and clearcutting of floodplains. Even with their history of disturbance, streams in this region are in better condition than those in the Piedmont and upper Coastal Plain and support an amazing diversity of aquatic animals, especially fish, salamanders, and mollusks. Protection and management activities that will improve water quality and biodiversity in these streams include: limiting cattle access to stream banks, protecting and expanding stream bank vegetation buffers, eradicating invasive pest plants from floodplains and stream banks, removing drainage systems and dams, and controlling pollution, erosion, and sedimentation.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: Streams

Special Concern Plant Species Associated with Cumberland Plateau and Ridge & Valley Streams:
Bigleaf pondweed, *Potamogeton amplifolius*
Bigspore Engelmann's quillwort, *Isoetes appalachiana*

Special Concern Animal Species Associated with Cumberland Plateau and Ridge & Valley Streams:

Amphibians
Hellbender, *Cryptobranchus alleganiensis*
Mudpuppy, *Necturus maculosus*

Fish
Ashy darter, *Etheostoma cinereum*
Black darter, *Etheostoma duryi*
Blacktip shiner, *Lythrurus atrapiculus*
Blotched chub, *Erimystax insignis*
Blue shiner, *Cyprinella caerulea*
Blueside darter, *Etheostoma jessiae*
Bridled darter, *Percina kusha*
Burrhead shiner, *Notropis asperifrons*
Cherokee darter, *Etheostoma scotti*
Conasauga logperch, *Percina jenkinsi*
Coosa chub, *Macrhybopsis* sp. 1
Coosa darter, *Eheostoma coosae*
Coosa madtom, *Noturus* sp. cf. *munitus*
Dusky darter, *Percina sciera*
Emerald shiner, *Notropis atherinoides*
Etowah chub, *Hybopsis* sp. 9
Etowah darter, *Etheostoma etowahae*
Gilt darter, *Percina evides*
Greenbreast darter, *Etheostoma jordani*
Highscale shiner, *Notropis hypsilepis*
Holiday darter, *Etheostoma brevirostrum*
Lipstick darter, *Etheostoma chuckwachatte*
Mimic shiner, *Notropis volucellus*
Mountain shiner, *Lythrurus lirus*
Muscadine darter, *Percina smithvanizi*
Northern studfish, *Fundulus catenatus*
Popeye shiner, *Notropis ariommus*
Pretty shiner, *Lythrurus bellus*
Redline darter, *Etheostoma rufilineatum*
Rock darter, *Etheostoma rupestre*

Cumberland Plateau and Ridge & Valley Streams, continued

Fish, continued

Scarlet shiner, *Lythrurus fasciolaris*
Shoal chub, *Macrhybopsis hyostoma*
Spotfin chub, *Erimonax nachus*
Tallapoosa darter, *Etheostoma tallapoosae*
Tallapoosa shiner, *Cyprinella gibbsi*
Telescope shiner, *Notropis telescopus*
Wounded darter, *Etheostoma vulneratum*

Mollusks

Alabama rainbow, *Villosa nebulosa*
Anthony's riversnail, *Athearnia anthonyi*
Brook floater, *Alasmidonta varicosa*
Brook hornsnail, *Pleurocera vestita*
Coosa creekshell, *Villosa umbrans*
Cumberland bean, *Villosa trabalis*
Cylinder campeloma, *Campeloma regulare*
Cylindrical lioplax, *Lioplax cyclostomaformis*
Interrupted rocksnail, *Leptoxis foremani*
Longsolid, *Fusconaia subrotunda*
Rayed kidneyshell, *Ptychobranchus foremanianus*
Savannah pebblesnail, *Somatogyrus tenax*
Skirted hornsnail, *Pleurocera pyrenella*
Spindel elimia, *Elimia capillaries*
Spindelimia, *Elimia capillaries*
Sulcate hornsnail, *Pleurocera trochiformis*
Tennessee pigtoe, *Fusconaia barnesiana*

Other Invertebrates

Chattahoochee crayfish, *Cambarus howardi*
Chickamauga crayfish, *Cambarus extraneus*
Blackwater sandfiltering mayfly, *Hoeoneuria dolani*
Faraway Boxclaw crayfish, *Cambarus distan*
Chickamauga crayfish, *Cambarus extraneus*
Elegant stonefly, *Acroneuria arida*
Etowah crayfish, *Cambarus fasciatus*
Mountain crayfish, *Cambarus conasaugaensis*
Surgeon crayfish, *Orconectes forceps*

Reptiles

Alabama map turtle, *Graptemys pulchra*
Map turtle, *Graptemys geographica*

CUMBERLAND PLATEAU and RIDGE & VALLEY MEDIUM TO LARGE RIVERS

Most of the Cumberland Plateau and Ridge & Valley regions are drained by the Coosa River system, which includes the Conasauga, Coosawattee (which join to form the Oostanaula), the Etowah (which joins the Oostanaula to form the Coosa), and the Little River, all of which ultimately join the Alabama River to flow into the Gulf of Mexico. Chickamauga Creek flows northeast to the Tennessee River, which eventually flows into the Mississippi. Large and medium-sized rivers in these two regions have low gradients and therefore slower currents and fewer shoals than streams in areas with steeper topography. Because they follow the valley floors and are fed by tributaries that run more or less perpendicularly from nearby ridges, Ridge and Valley rivers form the spine of a lattice-like network of streams. Although these rivers do not have large dams on them in Georgia, most have suffered a loss of water quality and biological diversity due to polluted discharges from industrial and sewage treatment facilities, draining and clearcutting of floodplains, and sedimentation and runoff from roads, fields, and pastures. Even with their history of disturbance, rivers in this region are in better condition than those in the Piedmont and upper Coastal Plain and support an amazing diversity of aquatic animals, especially fish, salamanders, and mollusks. Protection and management activities that will improve water quality and sustain biodiversity in these rivers include: restoring hydrological connections between rivers and their floodplains, limiting cattle access to stream banks, protecting and expanding stream bank vegetation buffers, eradicating invasive pest plants from floodplains, removing drainage systems and dams, and controlling pollution and sedimentation.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: Medium to Large Rivers

Special Concern Plant Species Associated with Cumberland Plateau and Ridge & Valley Rivers
No Special Concern plants have been recorded from this natural community

Special Concern Animal Species Associated with Cumberland Plateau and Ridge & Valley Rivers

Amphibians
Hellbender, *Cryptobranchus alleganiensis*
Mudpuppy, *Necturus maculosus*

Birds
Bald eagle, *Haliaeetus leucocephalus*

Fish
Blue shiner, *Cyprinella caerulea*
Amber darter, *Percina antesella*
Ashy darter, *Etheostoma cinereum*
Banded darter, *Etheostoma zona*
Blueside darter, *Etheostoma jessiae*
Bridled darter, *Percina kusha*
Burrhead shiner, *Notropis asperifrons*
Coosa darter, *Etheostoma coosae*
Coosa madtom, *Noturus* sp. cf. *munitus*
Dusky darter, *Percina sciera*
Emerald shiner, *Notropis atherinoides*
Frecklebelly madtom, *Noturus munitus*
Freckled darter, *Percina lenticula*
Freckled madtom, *Noturus nocturnus*
Gilt darter, *Percina evides*
Goldline darter, *Percina aurolineata*
Greenbreast darter, *Etheostoma jordani*
Holiday darter, *Etheostoma brevirostrum*

Cumberland Plateau and Ridge & Valley Rivers, continued

Fish, continued

Lake sturgeon, *Acipenser fulvescens*
Lipstick darter, *Etheostoma chuckwachatte*
Mimic shiner, *Notropis volucellus*
Mooneye, *Hiodon tergisus*
Mountain madtom, *Noturus eleutherus*
Ohio lamprey, *Ichthyomyzon bdellium*
Olive darter, *Percina squamata*
Popeye shiner, *Notropis ariommus*
Pretty shiner, *Lythrurus bellus*
River darter, *Percina shumardi*
River redhorse, *Moxostoma carinatum*
Shoal bass, *Micropterus cataractae*
Silver chub, *Macrhybopsis storeriana*
Snail darter, *Percina tanasi*
Spotfin chub, *Erimonax nachus*
Spotfin shiner, *Cyprinella spiloptera*
Stargazing minnow, *Phenacobius uranops*
Stippled studfish, *Fundulus bifax*
Bridled darter, *Percina kusha*
Wounded darter, *Etheostoma vulneratum*

Mollusks

Alabama creekmussel, *Strophitus connasaugaensis*
Alabama heelsplitter, *Lasmigona alabamensis*
Alabama moccasinshell, *Medionidus acutissimus*
Alabama spike, *Elliptio arca alabamensi*
Anthony's riversnail, *Athearnia anthonyi*
Black sandshell, *Ligumia recta*
Coosa creekshell, Villosa *umbrans*
Coosa fiveridge, *Amblema elliottii*
Coosa moccasinshell, *Medionidus parvulus*
Cumberland bean, *Villosa trabali*
Cumberland moccasinshell, *Medionidus conradicus*
Cylinder campeloma, *Campeloma regulare*
Fawnsfoot, *Truncilla donaciformis*
Finelined pocketbook, *Lampsilis altilis*
Georgia pigtoe, *Pleurobema hanleyianum*
Longsolid, *Fusconaia subrotunda*
Onyx rocksnail, *Leptoxis praerosa*
Pale lilliput, *Toxolasma cylindrellus*
Purple lilliput, *Toxolasma lividus*
Ridged mapleleaf, *Quadrula rumphiana*
Rough hornsnail, *Pleurocera foremani*
Southern clubshell, *Pleurobema decisum*
Southern pigtoe, *Pleurobema georgianum*
Southern purple lilliput, *Toxolasma corvunculus*
Tennessee pigtoe, *Fusconaia barnesiana*
Upland hornsnail, *Pleurocera showalter*
White heelsplitter, *Lasmigona complanata*

Other Invertebrates

Beautiful crayfish, *Cambarus speciosus*
Blackwater sandfiltering mayfly, *Hoeoneuria dolani*
Chattooga crayfish, *Cambarus scotti*
Chickamauga crayfish, *Cambarus extraneus*
Coosawattee crayfish, *Cambarus coosawattae*
Elegant stonefly, *Acroneuria arida*
Elusive clubtail, *Stylurus notatus*
Greensaddle crayfish, *Cambarus manningi*
Mayfly, *Apobaetis etowah*

Reptiles

Alabama map turtle, *Graptemys pulchra*
Map turtle, *Graptemys geographica*

PIEDMONT ECOREGION

UPLAND FORESTS AND WOODLANDS OF THE PIEDMONT ECOREGION

PIEDMONT MESIC FORESTS

Piedmont mesic forests occur on north-facing and lower slopes and in well drained stream bottoms where soils are moist and richer in nutrients than the surrounding uplands. They support a diversity of trees, including beech, basswood, northern red oak, silverbell, red mulberry, hop hornbeam, white ash, and tulip poplar. Piedmont mesic forests often have rich shrub and herb layers and can be especially interesting in the early spring when many shrubs and wildflowers are in bloom. They are threatened by logging and by clearing for residential and commercial development as well as by excessive deer browsing, which kills young trees, shrubs, and herbs. Mesic forests are especially vulnerable to invasion by exotic pest plants such as Chinese privet, Japanese honeysuckle, Chinese wisteria, English ivy, and autumn olive. Landowners with mesic forests are encouraged to control these invaders through hand removal such as privet and ivy "pulls" and by the careful use of herbicides. Fire is not a natural occurrence in mesic forests due to their moist soils and vegetation and to their proximity to streams that act as natural firebreaks.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: Mesic Hardwood Forests

Special Concern Plant Species Associated with Piedmont Mesic Forests:
Bay star-vine, *Schisandra glabra*
Beak-fruit sanicle, *Sanicula trifoliata*
Broad-leaved bunchflower, *Veratrum latifolium* (syn. *Melanthium latifolium*)
Croomia, *Croomia pauciflora*
Fringed campion, *Silene polypetala*
Ginseng, *Panax quinquefolius*
Goldenseal, *Hydrastis canadensis*
Granite gooseberry, *Ribes curvatum*
Ocmulgee skullcap, *Scutellaria ocmulgee*
Ohio buckeye, *Aesculus glabra*
Ozark bunchflower, *Veratrum woodii*
Pale yellow trillium, *Trillium discolor*
Radford's sedge, *Carex radfordii*
Relict trillium, *Trillium reliquum*
White-leaved mountain-mint, *Pycnanthemum albescens*

Special Concern Animal Species Associated with Piedmont Mesic Forests:
Amphibians
Green salamander, *Aneides aeneus*
Mountain chorus frog, *Pseudacris brachyphona*
Southeastern myotis, *Myotis australis*
Webster's salamander, *Plethodon websteri*

PIEDMONT OAK-PINE-HICKORY FOREST

Oak-pine-hickory forests occur on upper slopes, ridges, and other relatively dry, upland sites in Georgia's Piedmont. The canopy in these forests usually consists of varying mixtures of white oak, southern red oak, black oak, chestnut oak, post oak, pignut hickory, mockernut hickory, shortleaf pine, and loblolly pine, depending on soil moisture, nutrient levels, and recent land uses. Winged elm, red maple, black gum, sourwood, and flowering dogwood often occur in the understory. Oak-pine-hickory forests once covered approximately 50-75% of Georgia's Piedmont, but were largely cleared and converted to agriculture in the 19th and early 20th centuries. Many of those fields and pastures are now occupied by pine plantations or residential developments, although extensive stands of second- or third-growth oak-pine-hickory forest can still be found, especially in areas remote from cities. Remaining examples of these forests should be protected from the habitat destruction and fragmentation that results from residential and commercial development. Exotic pest plants, especially Japanese honeysuckle, English ivy, autumn olive, kudzu, and bush honeysuckle, also threaten these forests, and should be controlled by hand removal and careful use of herbicides.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: Oak-Hickory-Pine Forest, Xeric Pine Woodlands

Special Concern Plant Species Associated with Piedmont Oak-Pine-Hickory Forest:
Alabama grape fern, *Botrychium jenmanii*
Cuthbert's holly, *Ilex cuthbertii*
Dwarf chinkapin oak, *Quercus prinoides*
Eastern turkeybeard, *Xerophyllum asphodeloides*
Georgia aster, *Symphyotrichum georgianum*
Indian olive, *Nestronia umbellula*
Mountain witch-alder, *Fothergilla major*
Northern prickly-ash, *Zanthoxylum americanum*
Piedmont bigleaf aster, *Eurybia jonesiae*
Pink ladyslipper, *Cypripedium acaule*
Schwerin's indigo-bush, *Amorpha schwerinii*
Shining indigo-bush, *Amorpha nitens*
Sweet pinesap, *Monotropsis odorata*
Yellow ladyslipper, *Cypripedium parviflorum*

Special Concern Animal Species Associated with Piedmont Oak-Pine-Hickory Forest:
No Special Concern animals have been recorded from this habitat

PIEDMONT PINE-OAK WOODLANDS AND FORESTS

Pine-oak woodlands (with less than 60% canopy cover) and forests (more than 60%) occur on dry, narrow, exposed ridges and on dry slopes with sandy, stony soils. These natural communities resemble Piedmont Oak-Hickory-Pine Forests, but they are dependent on fire to maintain their somewhat different species composition. Post oak, blackjack oak, and shortleaf pine are typically the dominant species because they can best survive the frequent fires, exposure to sunlight, and dry soil conditions found in these communities; rock chestnut oak, scarlet oak, black oak, and loblolly pine are also common. Sourwood, sparkleberry, and flowering dogwood are common in the subcanopy; other woody species include deerberry, mountain laurel, lowbush and hillside blueberry, poison ivy, and muscadine. The herb layer in fire-managed sites may be dense and diverse, including bracken fern, Virginia goat's rue, tickseed sunflower, flowering spurge, pipsissewa, eastern needlegrass, veined hawkweed, pipsissewa, poverty oat-grass, and broomstraws. Pine-oak woodlands were once a common forest type in Georgia's Piedmont but most have been lost to fire exclusion and widespread conversion to agriculture and development. Restoration of pine-oak woodlands and forests depends on the introduction of frequent fire after thinning, to minimize the possibility of catastrophic fire, and cool-season burning to reduce duff and kill fire intolerant understory species, while preserving the naturally fire-tolerant species that typify these communities.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: Oak-Hickory-Pine Forest, Xeric Pine Woodlands

Special Concern Plant Species Associated with Piedmont Oak-Pine-Hickory Forest:
Cuthbert's holly, *Ilex cuthbertii*
Dwarf chinquapin oak, *Quercus prinoides*
Eastern turkeybeard, *Xerophyllum asphodeloides*
Georgia aster, *Symphyotrichum georgianum*
Indian olive, *Nestronia umbellula*
Mountain witch-alder, *Fothergilla major*
Piedmont bigleaf aster, *Eurybia jonesiae*
Pink lady's-slipper orchid, *Cypripedium acaule*
Schwerin's indigo-bush, *Amorpha schwerinii*
Shining indigo-bush, *Amorpha nitens*
Sweet-fern, *Comptonia peregrina*
Sweet pinesap, *Monotropsis odorata*

Special Concern Animal Species Associated with Piedmont Oak-Pine-Hickory Forest:
Birds
Bachman's sparrow, *Aimophila aestivalis*
Red-cockaded woodpecker, *Picoides borealis*

PIEDMONT AND RIDGE & VALLEY
LONGLEAF PINE FORESTS AND WOODLANDS

Piedmont and Ridge & Valley longleaf pine forests and woodlands occur on dry ridges and steep, rocky slopes in several areas of Georgia's western Piedmont, such as Paulding Forest and Pine Mountain, and on Lavender Mountain and Simms Mountain in the Ridge & Valley ecoregion. Longleaf pine is common only where fire has not been suppressed. Other characteristic tree species include scarlet oak, chestnut oak, post oak, blackjack oak, loblolly pine, and shortleaf pine. In areas that are burned, the ground cover is often open with a variety of herbs typically found in dry sites, including grasses, composites, legumes, and bracken fern. Fire once played a critical role in the reproduction and maintenance of these longleaf pine forests, but occurred less frequently and burned smaller areas than in the longleaf forests of the Coastal Plain. Even so, prescribed fire is the most important management tool in this environment, although it should be applied with care as fires are less predictable in rolling, hilly terrain and tend to burn into the crowns of trees more easily. Selective removal of tree species that are not native to these natural communities will also play a role in restoration. Piedmont and Ridge & Valley longleaf pine forests have been largely destroyed by logging, fire suppression, and conversion to agriculture and development; remaining examples should be protected from development and managed for conservation.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: Montane Longleaf Pine-Hardwood Forest

Special Concern Plant Species Associated with Piedmont and Ridge & Valley Longleaf Pine Forests And Woodlands:
Eastern turkeybeard, *Xerophyllum asphodeloides*
Georgia aster, *Symphyotrichum georgianum*
Indian Grave Mountain wild basil, *Calamintha* sp. 1
Pink ladyslipper, *Cypripedium acaule*
Schwerin's indigo-bush, *Amorpha schwerinii*
Shining indigo-bush, *Amorpha nitens*
Silky bindweed, *Calystegia catesbiana* ssp. *sericata*

Special Concern Animal Species Associated with Piedmont and Ridge & Valley Longleaf Pine Forests And Woodlands:
Birds
Bachman's sparrow, *Aimophila aestivalis*
Loggerhead shrike, *Lanius ludovicianus migrans*
Red-cockaded woodpecker, *Picoides borealis* (historic only)

Reptiles
Coral snake, *Micrurus fulvius*
Northern pine snake, *Pituophis melanoleucus melanoleucus*

PRAIRIES, GLADES, BARRENS, AND ROCK OUTCROPS OF THE PIEDMONT ECOREGION

PIEDMONT OAK-PINE PRAIRIES AND SAVANNAS

Prairies and savannas are environments with only a few scattered trees and a dense, species-rich herb layer. These natural communities lack the expanses of rock found in glades, barrens, and granite outcrops. Prairies and savannas are striking in the late summer and fall, when numerous asters, sunflowers, goldenrods, legumes, and grasses are in flower. Originally created by a combination of lightning and human-set fires, and, in a few instances, stressful soil conditions, prairies and savannas provide important habitat and species diversity to Georgia's Piedmont. They have nearly disappeared due to fire suppression, exotic pest plant invasion, and development, and should be protected from development, logging, road building, and other disturbances. Restoration of prairies and savannas that have been long fire-suppressed requires a careful reduction in fuels followed by consistent application of prescribed fire.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: Oak Woodlands and Savannas (in part)

Special Concern Plant Species Associated with Piedmont Oak-Pine Prairies and Savannas:
American barberry, *Berberis canadensis*
Carolina birdfoot-trefoil, *Lotus helleri*
Carolina thistle, *Cirsium carolinianum*
Curly-heads, *Clematis ochroleuca*
Dwarf sumac, *Rhus michauxii*
Fraser's loosestrife, *Lysimachia fraseri*
Georgia aster, *Symphyotrichum georgianum*
Schwerin's indigo-bush, *Amorpha schwerinii*
Smith's sunflower, *Helianthus smithii*
Smooth purple coneflower, *Echinacea laevigata*

Special Concern Animal Species Associated with Piedmont Oak-Pine Prairies and Savannas:
Birds
Red-cockaded woodpecker, *Picoides borealis*
Loggerhead shrike, *Lanius ludovicianus migrans*
Bachman's sparrow, *Aimophila aestivalis*
Kirtland's warbler, *Dendroica kirtlandii*
Northern pine snake, *Pituophis melanoleucus melanoleucus*

PIEDMONT GLADES, BARRENS, AND WOODLANDS

Piedmont glades and barrens and associated woodlands are small, open natural communities, usually less than one acre in size, with scattered patches of plants growing in shallow, rocky soils interspersed with rock outcrops. Trees, such as oaks, hickories, and pines, are usually stunted and rooted in soil pockets or around the edges of these habitats. Grasses and composites, such as goldenrods, goldenasters, and sunflowers, are especially abundant in these sunny environments. Mosses and lichens occupy otherwise unvegetated rock expanses. Bedrock may be either acidic or mafic; where mafic (composed of amphibolite and hornblende gneiss), rare and disjunct plant species and plant communities may occur. Glades, barrens, and associated woodlands add both habitat and species diversity to the Piedmont landscape and should be protected from development and recreational overuse. Periodic prescribed fire should be used to help maintain the open conditions and species diversity of many of these sites.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: Oak Woodlands and Savannas, in part

Special Concern Plant Species Associated with Piedmont Glades, Barrens, and Woodlands:
American barberry, *Berberis canadensis*
Carolina thistle, *Cirsium carolinianum*
Creamy meadow-parsnip, *Thaspium chapmanii*
Dwarf horse-nettle, *Solanum pumilum*
Georgia aster, *Symphyotrichum georgianum*
Georgia rockcress, *Arabis georgiana*
Glade windflower, *Anemone berlandieri*
Little River black-eyed Susan, *Rudbeckia heliopsidis*
Lyre-leaf rockcress, *Arabidopsis lyrata*
Missouri rockcress, *Arabis missouriensis*
Schwerin's indigo-bush, *Amorpha schwerinii*
Shining indigo-bush, *Amorpha nitens*
Smith's sunflower, *Helianthus smithii*
Sun-loving draba, *Draba aprica*

Special Concern Animal Species Associated with Piedmont Glades, Barrens, and Woodlands:
Birds
Bachman’s sparrow, *Aimophila aestivalis*

PIEDMONT GRANITE OUTCROPS

Piedmont granite outcrops occur across the southeastern U.S. from Virginia to Alabama, with 90% of these occurring in Georgia's Piedmont. Usually composed of granite or a granitic gneiss, outcrops occur as flatrocks, low domes, and monadnocks (isolated "mountains"). All support a diverse mosaic of habitats, including lichen-encrusted rocks, ephemeral pools, and vegetation "islands" supported by soils formed by the weathering of rock over thousands of years. A large number of rare and endemic plants and animals have adapted to the extreme temperature and moisture conditions on granite outcrops. Granite outcrops are endangered by quarrying, air pollution, trash and mulch dumping, cattle trampling and grazing, development, off-road vehicle and bicycle traffic, and invasion by exotic pest plants, especially Chinese privet. Granite outcrops should be preserved by conservation easement or purchase and, once purchased, protected from overuse, vehicle traffic, and trampling by fencing, signage, and frequent monitoring.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: granite outcrop

Special Concern Plant Species Associated with Piedmont Granite Outcrops:
Alexander rock aster, *Eurybia avita* (syn. *Aster avitus*)
American pillwort, *Pilularia americana*
Black-footed quillwort, *Isoetes melanopoda*
Black-spored quillwort, *Isoetes melanospora*
Bog oat grass, *Danthonia epilis*
Dwarf pipewort, *Eriocaulon koernickianum*
Flatrock fimbry, *Fimbristylis brevivaginata*
Flatrock onion, *Allium speculae*
Glade windflower, *Anemone berlandieri*
Granite stonecrop, *Sedum pusillum*
Harper's dodder, *Cuscuta harperi*
Harperella, *Ptilimnium nodosum*
Longstem waterwort, *Elatine triandra*
Louisiana blue star, *Amsonia ludoviciana*
Mat-forming quillwort, *Isoetes tegetiformans*
Missouri rockcress, *Arabis missouriensis*
Snorkelwort, *Amphianthus pusillus*
Sun-loving draba, *Draba aprica*
Texas saxifrage, *Saxifraga texana*
Wingpod purslane, *Portulaca umbraticola* ssp. *coronata*
Wolf's spikerush, *Eleocharis wolfii*

Special Concern Animal Species Associated with Piedmont Granite Outcrops:
Invertebrates
No Special Concern animals have been recorded in this natural community.

PIEDMONT ULTRAMAFIC BARRENS AND WOODLANDS

Piedmont ultramafic barrens and woodlands occur where ultramafic bedrock occurs at or near the soil surface. Soils that form over this unusual bedrock are high in iron and magnesium, and low in phosphorus, potassium, nitrogen, and calcium – a combination of nutrients that supports a rare and unique plant community. Scattered pines and oaks create a relatively open canopy over a dense ground layer of grasses, such as little bluestem and three-awn, and other sun-loving, flowering plants, including a number of midwestern prairie, Coastal Plain, and endemic species. The open, grassy character of ultramafic woodlands is created by the stressful soil conditions and is maintained, at least historically, by occasional fires that sweep through the ground vegetation, promoting the spread of grasses and herbs, limiting the number of shrubs and trees, and enriching the soil. Frequent prescribed fire is the most important tool for the management and restoration of ultramafic barrens and woodlands. Fire will increase the extent of grass- and herb-dominated groundcover while encouraging characteristic woodland species such as blackjack oak, post oak, longleaf pine, and shortleaf pine.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: Serpentine Outcrops/Woodland/Savanna

Special Concern Plant Species Associated with Piedmont Ultramafic Barrens And Woodlands:
Dixie Mountain breadroot, *Pediomelum piedmontanum*
Georgia plume, *Elliottia racemosa*
Pineland Barbara's buttons, *Marshallia ramosa*
Yellow nailwort, *Paronychia virginica*

Special Concern Animal Species Associated with Piedmont Ultramafic Barrens And Woodlands:
No Special Concern animals have been recorded in this natural community

PIEDMONT CLIFFS AND BLUFFS

Piedmont cliffs and bluffs are steep, vertical, or overhanging rock outcrops, often above rivers. The bedrock is typically acidic and composed of quartzite, gneiss, or schist, although some basic cliffs occur. Vegetation is sparse and largely limited to ledges and crevices where soil and moisture accumulate; species composition varies depending on location. Upper cliff faces, as well as those facing south and west, are typically hotter and drier, and include dry-site species such as Virginia and shortleaf pines, eastern red cedar, rock chestnut oak, sourwood, and sparkleberry. Sheltered, lower positions and north-facing cliffs include more moisture-loving plants. Expanses of rock may be colonized by lichens and mosses. Cliffs and bluffs are usually inaccessible but are sometimes visited by climbers, bikers, and hikers and should be protected from recreational overuse. Exotic pest plants, such as princess tree, tree-of-heaven, Japanese honeysuckle, and multiflora rose, also pose a threat to these natural communities and should be controlled with a combination of hand removal and careful use of herbicides.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: Rocky/Sandy River Bluffs (in part)

Special Concern Plant Species Associated with Piedmont Cliffs and Bluffs:
Broomlike sedge, *Carex scoparia*
Georgia rockcress, *Arabis georgiana*
Ground juniper, *Juniperus communis* var. *depressa*
Lyre-leaf rockcress, *Arabidopsis lyrata*
Nevius' stonecrop, *Sedum nevii*

Special Concern Animal Species Associated with Piedmont Cliffs and Bluffs:
Birds
Bald eagle, *Haliaeetus leucocephalus*
Peregrine falcon, *Falco peregrinus*

WETLANDS OF THE PIEDMONT ECOREGION

PIEDMONT UPLAND DEPRESSION WETLANDS

Piedmont upland depression wetlands form in low-lying areas in soils derived from mafic or other base-rich rocks; these soils swell and hold water during wet months, and shrink to a pavement-like hardness during dry months. These swamps are also known as Monticello Glades, Iredell Flatwoods, and Gabbro Glades. Canopy trees include willow oak, southern shagbark hickory, Oglethorpe oak, Shumard oak, swamp chestnut oak, and white ash. Shrubs include several Coastal Plain species, such as dwarf palmetto, parsley haw, and buckthorn bumelia. Many of these plants reflect the high pH of the soils, as do other common upland depression species, such as red cedar, redbud, hackberry, and rattan vine, as well as an abundance of elms. Upland depression wetlands are rare communities; they should be protected from logging and from ditching, draining, and other disturbances to their hydrology. The role of fire in this natural community is not well understood and should be investigated.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: Upland Depression Swamp

Special Concern Plant Species Associated with Piedmont Upland Depression Wetlands:
Carolina windflower, *Anemone caroliniana*
Oglethorpe oak, *Quercus oglethorpensis*

Special Concern Animal Species Associated with Piedmont Upland Depression Wetlands:
No Special Concern animals have been recorded in this natural community.

PIEDMONT SEEPS AND SPRINGS

Piedmont seeps and springs occur where water emerges at the soil surface – along stream banks, at the base of slopes, around and above streamheads, and at the margins of granite outcrops. Vegetation in these small wetlands varies depending on the volume of water, pH of the soil, duration of soil saturation, and mineral composition of the underlying bedrock. They are usually shaded by a canopy of red maple, green ash, tulip tree, and sweet gum, with an herb layer including jack-in-the-pulpit, sensitive fern, netted chain fern, and cinnamon fern. Where they are open and sunny, herbs such as orange jewelweed, tearthumb, climbing hempweed, cut-leaf coneflower, and lizard's tail flourish. Piedmont seeps and springs, and the spring pools and runs immediately downstream, are important habitats for fish, crayfish, aquatic insects, and other invertebrates. Most Piedmont seeps, springheads, and spring runs have been severely impacted by draining and filling, livestock grazing and trampling, road building, exotic pest plant invasion, feral hog digging, and development. Restoration may include filling drainage ditches, restoring natural surface water flow, removing impoundments, excluding livestock, and eradicating exotic pest species.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: Springs and Spring Runs

Special Concern Plant Species Associated with Piedmont Seeps and Springs:
Alexander's rock aster, *Eurybia avita* (syn. *Aster avitus*) (granite outcrop seeps)
Black-footed quillwort, *Isoetes melanopoda* (granite outcrop seeps)
Dwarf pipewort, *Eriocaulon koernickianum* (granite outcrop seeps)
Log fern, *Dryopteris celsa*
Monkeyface orchid, *Platanthera integrilabia*
Southern twayblade, *Listera australis*
Tennessee yellow-eyed grass, *Xyris tennesseensis*
Virginia mountain mint, *Pycnanthemum virginianum*

Special Concern Animal Species Associated with Piedmont Seeps and Springs:
Amphibians
Four-toed salamander, *Hemidactylium scutatum*
Seepage salamander, *Desmognathus aeneus*

Invertebrates
Lean crayfish, *Cambarus strigosus*
Piedmont blue burrower, *Cambarus harti*

PIEDMONT FLOODPLAINS AND BOTTOMLANDS

Floodplains and bottomlands along Georgia's Piedmont rivers and creeks range from narrow, rocky zones to broad areas with well developed levees, sloughs, and terraces. Floodplain forests provide food and habitat for a large number of animals and support a diverse flora. Floodplain plants must be adapted to survive in occasionally flooded and saturated soils; these include trees such as sweet gum, river birch, sycamore, red maple, cherrybark oak, tulip tree, green ash, water oak, and swamp chestnut oak, and a diversity of shrubs and herbs. Because of their rich, moist soils and flat terrain, nearly all Piedmont floodplains have long since been converted to agriculture or other human uses. Floodplains have also been heavily impacted by the invasion of exotic pest plants, especially Chinese privet and Japanese honeysuckle. Eradication of these invasive species is an important first step in floodplain restoration and requires a combination of mechanical removal and herbicide application that must be carried out consistently over a period of several years to be successful. Restoration and management of floodplains and bottomlands should be based on a watershed-wide approach that addresses all the factors that threaten water quality and floodplain integrity.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: Bottomland Hardwood Forests and Canebrakes

Special Concern Plant Species Associated with Piedmont Floodplains and Bottomlands:

Aaron's rod, *Thermopsis villosa*
Bottomland skullcap, *Scutellaria nervosa*
Broad-leaved Barbara's-buttons, *Marshallia trinervia*
Harper's wild ginger, *Hexastylis shuttleworthii* var. *harperi*
Oglethorpe oak, *Quercus oglethorpensis*
Bay starvine, *Schisandra glabra*
Piedmont barren-strawberry, *Waldsteinia lobata* (*Geum lobatum*)
Marsh wild pea, *Lathyrus palustris*
Pin oak, *Quercus palustris*
Self-pollinating oval ladies-tresses**,** *Spiranthes ovalis* var. *erostellata*
Shining indigo-bush, *Amorpha nitens*
Silky camellia, *Stewartia malacodendron*
Southern twayblade, *Listera australis*
Trepocarpus, *Trepocarpus aethusae*
Yellow corydalis, *Corydalis flavula*

Special Concern Animal Species Associated with Piedmont Floodplains and Bottomlands:

Invertebrates

Broad River burrowing crayfish, *Distocambarus devexus*
Piedmont blue burrower, *Cambarus harti*
Reverse pebblesnail, *Somatogyrus alcoviensis*
Savannah pebblesnail, *Somatogyrus tenax*
Variegated meadowhawk, *Sympetrum corruptum*

Mammals

Southeastern myotis, *Myotis austroriparius*

Reptiles

Barbour's map turtle, *Graptemys barbouri*
Alligator snapping turtle, *Macrochelys temminckii*

AQUATIC ENVIRONMENTS OF THE PIEDMONT ECOREGION

PIEDMONT ROCKY OR COBBLY RIVER SHOALS

Rocky and cobbly shoals occur in Piedmont streams and rivers where the stream gradient is steep and water moves swiftly over a streambed of resistant bedrock, with excellent examples occurring on and Sweetwater Creek, the Amicalola and Chestatee Rivers, and parts of the upper Chattahoochee, Apalachee, Ocmulgee, Savannah, Broad and Flint Rivers. Shoals are important spawning areas for numerous fish, including several very rare species, and provide fishing areas for wading birds and sunning sites for turtles. Shoals may contain dense growths of pondweed, and a few large shoals near the Fall Line support spectacular populations of the endangered shoals spider-lily. Many shoals have been degraded by stream impoundments, altered water quality, and recreational use, especially by ORVs and ATVs. Erosion and sedimentation from agricultural areas has buried many rocky shoals under sediment up to 12 feet thick in some rivers, although this situation has improved with recent efforts at erosion control. Protection of shoals and their associated plants and animals depends on the restoration of natural hydrologic conditions, continued erosion control efforts, and preservation of vegetated stream buffers.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: Piedmont Rocky or Cobbly River Shoals

Special Concern Plant Species Associated with Piedmont Rocky or Cobbly River Shoals:
Shoals spiderlily, *Hymenocallis coronaria*

Special Concern Animal Species Associated with Piedmont Rocky or Cobbly River Shoals:
Fish
Bluestripe shiner, *Cyprinella callitaenia*
Brassy jumprock, *Moxostoma* sp. 4
Cherokee darter, *Etheostoma scotti*
Frecklebelly madtom, *Noturus munitus*
Robust redhorse, *Moxostoma robustum*
Rock darter, *Etheostoma rupestre*
Tallapoosa darter, *Etheostoma tallapoosae*
Tallapoosa shiner, *Cyprinella gibbsi*

Mollusks
Purple bankclimber, *Elliptoideus sloatianus*
Reverse pebblesnail, *Somatogyrus alcoviensis*
Savannah pebblesnail, *Somatogyrus tenax*

Other Invertebrates
Brook floater, *Alasmidonta varicosa*
Chattahoochee crayfish, *Cambarus howardi*
Tallapoosa crayfish, *Cambarus englishi*

BEAVER PONDS AND FRESHWATER MARSHES

Beavers build ponds on small to medium-sized streams, or on small channels in floodplains, in order to raise water levels so they can reach their dens and food sources by safely swimming. Ponds may be less than an acre in size to more than 100 acres, depending on the size of the stream and local topography, and will be inhabited by beavers until nearby food sources are depleted, ten years or longer. Active beaver ponds provide many ecological benefits; they improve downstream water quality and provide habitat for a wide variety of amphibians, fish, reptiles, bats, and birds. Once abandoned, beaver ponds continue to provide habitat for a variety of animals, especially birds who use the snags for nesting and foraging. Beaver ponds, and the marshes that develop around their edges, provide habitat diversity in a region of the state where ponds and lakes do not otherwise occur naturally. Beaver ponds are dominated by wetland grasses, sedges, and rushes, and frequently support shrubs such as buttonbush, swamp dogwood, and tag alder; wetland trees, such as red maple and green ash, may be present, depending on the successional stage of the pond. Many beaver ponds and marshes have been invaded by marsh dayflower (*Murdannia keisak*), an exotic pest plant.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: Beaver Ponds and Freshwater Marshes

Special Concern Plant Species Associated with Piedmont Beaver Ponds and Freshwater Marshes:
Featherfoil, *Hottonia inflata*

Special Concern Animal Species Associated with Piedmont Beaver Ponds and Freshwater Marshes:

Amphibians
Four-toed salamander, *Hemidactylium scutatum*

Birds
American bittern, *Botaurus lentiginosus*
Black rail, *Laterallus jamaicensis*
King rail, *Rallus elegans*
Least bittern, *Ixobrychus exilis*

Mammals
Southern bog lemming, *Synaptomys cooperi*

Mollusks
Beaverpond marstonia, *Pyrgulopsis castor*

Other Invertebrates
Sharpnose crayfish, *Procambarus acutissimus*
Variegated meadowhawk, *Sympetrum corruptum*

PIEDMONT STREAMS AND RIVERS

Numerous small streams, formed by surface water flow, dissect the Piedmont and combine to form larger streams and rivers, and, eventually, Georgia's major rivers. Streams and rivers in the Piedmont have low to moderate gradients, with substrates of gravel, pebbles, sand, and silt in runs and pools, with bedrock exposed at shoals. The floodplains along Piedmont streams and rivers are relatively narrow compared to rivers in the Coastal Plain, although some, such as the Ocmulgee, Oconee, Flint, Broad, and South Rivers, have well developed point bars, levees, and back swamps. Many of Georgia's streams and rivers have been severely degraded by channelization and by erosion and sedimentation, which has dumped millions of tons of sediment into streams; most streams and rivers become highly turbid after rains. Destruction of vegetated stream buffers and the rapid increase in development near streams have led to increased pollution, flash flooding, and stream bank erosion. Numerous dams have disrupted stream flow, altered sediment transport, prevented movement of aquatic animals, and destroyed floodplains. Restoration and management of streams and rivers should be based on a watershed-wide approach that includes restoration of natural hydrologic regimes, maintenance of vegetated stream buffers, restoration of floodplain vegetation, and continued improvements in erosion and sedimentation control. Careful planning of future reservoirs combined with a major commitment to water conservation will be essential for conservation of Piedmont streams and rivers and the animals that depend on them.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: Piedmont Streams, Piedmont Medium and Large Rivers

Special Concern Plant Species Associated with Piedmont Streams and Rivers:
Shoals spider lily, *Hymenocallis coronaria*

Special Concern Animal Species Associated with Piedmont Streams and Rivers:
Birds Bald eagle, *Haliaeetus leucocephalus*

Fish
Altamaha shiner, *Cyprinella xaenura*
Bluestripe shiner, *Cyprinella callitaenia*
Brassy jumprock, *Moxostoma* sp. 4
Bridled darter, *Percina kusha*
Cherokee darter, *Etheostoma scotti*
Coosa madtom, *Noturus sp. cf. munitus*
Etowah darter, *Etheostoma etowahae*
Frecklebelly madtom, *Noturus munitus*
Halloween darter, *Percina crypta*
Highscale shiner, *Notropis hypsilepis*
Holiday darter, *Etheostoma brevirostrum*
Muscadine darter, *Percina smithvanizi*
Pretty shiner, *Lythrurus bellus*
Robust redhorse, *Moxostoma robustum*
Rock darter, *Etheostoma rupestre*
Sandbar shiner, *Notropis scepticus*
Stippled studfish, *Fundulus bifax*
Tallapoosa darter, *Etheostoma tallapoosae*
Tallapoosa shiner, *Cyprinella gibbsi*

Mollusks
Brother spike, *Elliptio fraterna*
Purple bankclimber, *Elliptoideus sloatianus*
Reverse pebblesnail, *Somatogyrus alcoviensis*
Savannah pebblesnail, *Somatogyrus tenax*

Piedmont Streams and Rivers, continued

Special Concern Animal Species Associated with Piedmont Streams and Rivers, continued

Other Invertebrates
Appalachian snaketail, *Ophiogomphus incurvatus incurvatus*
Blackwater sandfiltering mayfly, *Homoeoneuria dolani*
Broad River burrowing crayfish, *Distocambarus devexus*
Chattahoochee crayfish, *Cambarus howardi*
Elegant stonefly, *Acroneuria arida*
Lean crayfish, *Cambarus strigosus*
Mountain crayfish, *Cambarus conasaugaensis*
Rock crayfish, *Cambarus halli*
Tallapoosa crayfish, *Cambarus englishi*

Reptiles
Alligator snapping turtle, *Macrochelys temminckii*
Barbour's map turtle, *Graptemys barbouri*

COASTAL PLAIN ECOREGION

UPLAND FORESTS OF THE COASTAL PLAIN ECOREGION

COASTAL PLAIN SANDHILLS AND RIVER DUNES

Sandhills and river dunes are longleaf pine woodlands that occur largely in two major locations in Georgia: (1) the Fall Line sandhills that stretch in a broken band from Columbus to Augusta, and (2) on the sand ridges that occur on the eastern and northeastern banks of major streams such as the Altamaha, Ohoopee, Flint, and Canoochee Rivers. They are also occasionally found elsewhere in the Coastal Plain on very dry, sandy hills and knolls. These communities are characterized by their deep, infertile sandy soils and by an open canopy of scattered longleaf pine with a subcanopy of stunted turkey oak, sand live oak, sassafras, and persimmon. Some sites have only a few pines and reflect the harvest of longleaf pine decades earlier with little to no subsequent regeneration due to the infertile site conditions. The groundcover is characteristically sparse and often dominated by lichens. Herbs and shrubs include wiregrass, tread-softly, pink sandhill lupine, savanna hair-sedge, sandhill wild-buckwheat, gopher apple, and sandhill rosemary. Plants often have adaptations – such as small, inrolled leaves; waxy or hairy leaves and stems; and vertical leaf orientation – that protect the plant from excessive sunlight and prevent water loss. Many of the animals that inhabit these communities adjust to their harsh conditions by inhabiting burrows, including a wide range of species that live in gopher tortoise burrows. Fire plays a key role in preserving this environment; a natural fire-return interval of 5 - 10 years prevents encroachment by woody plants and retards fuel build-up that can lead to catastrophic fires.

Comprehensive Wildlife Conservation Strategy High Priority Habitats: Xeric Aeolian Dunes (sand ridges and dunes along rivers), Longleaf Pine-Scrub Oak Woodlands (Fall Line sandhills)

Special Concern Plant Species Associated with Coastal Plain Sandhills and River Dunes:

Canadian frostweed, *Helianthemum canadense*
Carolina redtop, *Tridens carolinianus*
Chapman's oak, *Quercus chapmanii*
Chapman's gay-feather, *Liatris chapmanii*
Clustered poppy-mallow, *Callirhoe triangulata*
Deckert's pinweed, *Lechea deckertii*
Dwarf goat's-rue, *Tephrosia mohrii*
Feay's pink-tassels, *Dalea feayi*
Few-flower gay-feather, *Liatris pauciflora*
Florida senna, *Chamaecrista deeringiana*
Franklin tree, *Franklinia alatamaha*
Georgia milkwort, *Polygala leptostachys*
Harper's grooved flax, *Linum sulcatum* var. *harperi* (syn. *Linum harperi*)
Leconte's wild indigo, *Baptisia lecontei*
Ohoopee bumelia, *Sideroxylon macrocarpum*
Ohoopee wild basil, *Calamintha ashei*
Palafoxia, *Palafoxia integrifolia*
Pennyroyal, *Piloblephis rigida*
Pickering's morning-glory, *Stylisma pickeringii*
Pineland purple foxglove, *Agalinis divaricata*
Pink-tassels, *Dalea carnea* var. *carnea*
Radford's mint, *Dicerandra radfordiana*
Rosy spiderwort, *Tradescantia roseolens*
Rugel's nailwort, *Paronychia rugelii*
Sandhill gay-feather, *Liatris secunda*
Sandhill golden-aster, *Pityopsis pinifolia*
Sandhill ground-cherry, *Physalis arenicola*
Sandhill milk-vetch, *Astragalus michauxii*
Sandhill rosemary, *Ceratiola ericoides*
Sandhill skullcap, *Scutellaria arenicola*
Sandy-woods chaffhead, *Carphephorus bellidifolius*
Seminole purple foxglove, *Agalinis filifolia*
Sessile-leaf tick-trefoil, *Desmodium sessilifolium*
Short-leaved blazing star, *Liatris laevigata* (syn. *Liatris tenuifolia* var. *quadriflora*)

Coastal Plain Sandhills and River Dunes, continued

Special Concern Plant Species Associated with Coastal Plain Sandhills and River Dunes, continued
Sprawling goat's-rue, *Tephrosia chrysophylla*
Sprawling white-tassels, *Dalea carnea* var. *gracilis*
Trailing bean-vine, *Phaseolus polystachios* var. *sinuatus*
Trailing milkvine, *Matelea pubiflora*

Special Concern Animal Species Associated with Coastal Plain Sandhills and River Dunes:
Amphibians
Gopher frog, *Rana capito*
Northern mole skink, *Eumeces egregius similis*
Striped newt, *Notophthalmus perstriatus*

Birds
Bachman's sparrow, *Aimophila aestivalis*
Red-cockaded woodpecker, *Picoides borealis*
Southeastern American kestrel, *Falco sparverius paulus*

Invertebrates
Arogos Skipper, *Atrytone arogos arogos*

Mammals
Sherman's fox squirrel, *Sciurus niger shermani*
Sherman's pocket gopher, *Geomys pinetis fontanelus*
Southeastern pocket gopher, *Geomys pinetis*

Reptiles
Central Florida crowned snake, *Tantilla relicta neilli*
Eastern diamond-backed rattlesnake, *Crotalus adamanteus*
Eastern indigo snake, *Drymarchon couperi*
Florida pine snake, *Pituophis melanoleucus mugitus*
Florida worm lizard, *Rhineura floridana*
Gopher tortoise, *Gopherus polyphemus*
Island glass lizard, *Ophisaurus compressus*
Slender glass lizard, *Ophisaurus attenuatus attenuatus*
Southern hognose snake, *Heterodon simus*

COASTAL PLAIN DRY UPLAND LONGLEAF PINE FORESTS AND WOODLANDS

Dry upland longleaf pine forests occur on level to rolling terrain throughout the Coastal Plain in a variety of settings: knolls, rolling hills, slopes above rivers, depressions within sandhills, and in the transition zones between sandhills and moister habitats (such as pine flatwoods and seepage slopes). Widely spaced longleaf pines form a canopy over a scattered understory of turkey oak, bluejack oak, sand post oak, southern red oak, persimmon, and sassafras. Where fire is frequent and soil disturbance minimal, the groundcover is continuous and species-rich. Two particularly important groups of plants are grasses and legumes. Grasses, such as wiregrass, slender bluestem, Indian grass, dropseed, and hairgrass, provide fuel for the fires that sustain this community; and legumes, such as butterfly pea, dollarweed, milkpea, rabbitbells, and lespedeza, deliver nitrogen to the nutrient-poor soils and furnish food for wildlife. Dry upland longleaf pine forests differ from the similar but drier sandhills and river dunes community by its continuous, wiregrass-dominated groundcover, the presence of blue-jack oak, and by fewer stunted trees. As is the case with all longleaf pine communities, this community is threatened by fire suppression and by conversion to residential, agricultural, and commercial land use. Prescribed fire applied every 2-3 years will promote longleaf pine regeneration and prevent encroachment of hardwood species that would otherwise shade out the species-rich ground cover.

Comprehensive Wildlife Conservation Strategy High Priority Habitats: Longleaf Pine-Wiregrass Savannas

Special Concern Plant Species Associated with Coastal Plain Dry Upland Longleaf Pine Forests and Woodlands:

Alabama milkvine, *Matelea alabamensis*
Blueberry hawthorn, *Crataegus brachyacantha*
Carolina pink, *Silene caroliniana*
Catesby bindweed, *Calystegia catesbeiana*
Chaffseed, *Schwalbea americana*
Chapman's three-awn grass, *Aristida simpliciflora*
Corkscrew three-awn grass, *Aristida gyrans*
Crestless plume orchid, *Pteroglossaspis ecristata*
Cutleaf beardtongue, *Penstemon dissectus*
Dwarf goat's-rue, *Tephrosia mohrii*
Florida feather-shank, *Schoenocaulon dubium*
Florida finger grass, *Eustachys floridana*
Florida leadbush, *Amorpha herbacea* var. *floridana*
Florida senna, *Chamaecrista deeringiana*
Georgia beaksedge, *Rhynchospora culixa*
Georgia indigo-bush, *Amorpha georgiana*
Georgia milkwort, *Polygala leptostachys*
Georgia plume, *Elliottia racemosa*
Harper's grooved flax, *Linum sulcatum* var. *harperi* (syn. *Linum harperi*)
Leconte's wild indigo, *Baptisia lecontei*
Long-beard bluestem, *Andropogon longiberbis*
Ohoopee bumelia, *Sideroxylon macrocarpum*
Palafoxia, *Palafoxia integrifolia*
Pale umbrella-wort, *Mirabilis albida*
Pan-American balsamscale, *Elyonurus tripsacoides*
Pickering's morning-glory, *Stylisma pickeringii*
Pineland nailwort, *Paronychia patula*
Pineland purple foxglove, *Agalinis divaricata*
Pink-tassels, *Dalea carnea* var. *carnea*
Sandhill angelica, *Angelica dentata*
Sandhill milk-vetch, *Astragalus michauxii*
Sandhill skullcap, *Scutellaria arenicola*
Sandhill-cress, *Warea sessilifolia*
Sandy-woods chaffhead, *Carphephorus bellidifolius*
Savanna milkweed, *Asclepias pedicellata*
Scale-leaf purple foxglove, *Agalinis aphylla*
Seminole purple foxglove, *Agalinis filifolia*
Sessile-leaf tick-trefoil, *Desmodium sessilifolium*
Short-leaved blazing star, *Liatris tenuifolia* var. *quadriflora* (syn. *Liatris laevigata*)
Slender purple foxglove, *Agalinis tenuifolia* var. *leucanthera*
Sprawling goat's-rue, *Tephrosia chrysophylla*
Sprawling white-tassels, *Dalea carnea* var. *gracilis*
Tallahassee hedge-nettle, *Stachys hyssopifolia* var. *lythroides*
Trailing bean-vine, *Phaseolus polystachios* var. *sinuatus*
Virginia thistle, *Cirsium virginianum*

Coastal Plain Dry Upland Longleaf Pine Forests and Woodlands, continued

Special Concern Animal Species Associated with Coastal Plain Dry Upland Longleaf Pine Forests and Woodlands:

Amphibians

Eastern tiger salamander, *Ambystoma tigrinum tigrinum*
Gopher frog, *Rana capito*
Northern mole skink, *Eumeces egregius similis*
Striped newt, *Notophthalmus perstriatus*

Birds

Bachman's sparrow, *Aimophila aestivalis*
Red-cockaded woodpecker, *Picoides borealis*
Southeastern American kestrel, *Falco sparverius paulus*

Invertebrates

Arogos Skipper, *Atrytone arogos arogos*

Mammals

Sherman's fox squirrel, *Sciurus niger shermani*
Sherman's pocket gopher, *Geomys pinetis fontanelus*
Southeastern pocket gopher, *Geomys pinetis*

Reptiles

Central Florida crowned snake, *Tantilla relicta neilli*
Eastern diamond-backed rattlesnake, *Crotalus adamanteus*
Eastern indigo snake, *Drymarchon couperi*
Florida pine snake, *Pituophis melanoleucus mugitus*
Florida worm lizard, *Rhineura floridana*
Gopher tortoise, *Gopherus polyphemus*
Island glass lizard, *Ophisaurus compressus*
Slender glass lizard, *Ophisaurus attenuatus attenuatus*
Southern hognose snake, *Heterodon simus*

COASTAL PLAIN MESIC LONGLEAF PINE FORESTS AND WOODLANDS

Mesic longleaf pine forests and woodlands occur on upland sites with loamy sand soils in the Coastal Plain. Relative to areas with deep sandy soils, the soils in these forests and woodlands retain more moisture and nutrients. The canopy consists of widely spaced longleaf pines. Depending on soil type, slash, shortleaf, or loblolly pines may occasionally co-dominate. A sparse understory of southern red oak, live oak, water oak, and bluejack oak is common. Where fire has been frequent and the soil has seen little or no disturbance, the wiregrass-dominated ground cover may have as many as 50 plant species per square yard, including a wide array of showy composites, legumes, lilies, orchids, grasses, and other wildflowers, many of which are endemic to this environment and threatened by its degradation and disappearance. Numerous rare animal species, such as gopher tortoises, Sherman fox squirrels, and the federally listed red-cockaded woodpecker and eastern indigo snake, inhabit these woodlands. Mesic longleaf pine forests and woodlands depend on frequent fire (every 2-3 years) to promote longleaf pine regeneration and prevent encroachment of woody plants that shade out herbs and grasses. The relatively fertile soils led to early conversion of many of these woodlands to agriculture and silviculture; their proximity to growing population centers currently poses the threat of residential and commercial development. As one of the most species-rich environments in North America, longleaf pine forests and woodlands deserve special protection from development and disturbance and careful management planning to preserve their ecological values.

Comprehensive Wildlife Conservation Strategy High Priority Habitats: Longleaf Pine-Wiregrass Savannas

Special Concern Plant Species Associated with Coastal Plain Mesic Longleaf Pine Forests and Woodlands:

Alabama milkvine, *Matelea alabamensis*
Blueberry hawthorn, *Crataegus brachyacantha*
Carolina pink, *Silene caroliniana*
Catesby bindweed, *Calystegia catesbeiana* ssp. *catesbeiana*
Chaffseed, *Schwalbea americana*
Chapman's three-awn grass, *Aristida simpliciflora*
Corkscrew three-awn grass, *Aristida gyrans*
Crestless plume orchid, *Pteroglossaspis ecristata*
Cutleaf beardtongue, *Penstemon dissectus*
Dwarf goat's-rue, *Tephrosia mohrii*
Florida feather-shank, *Schoenocaulon dubium*
Florida finger grass, *Eustachys floridana*
Florida leadbush, *Amorpha herbacea* var. *floridana*
Florida senna, *Chamaecrista deeringiana*
Georgia beaksedge, *Rhynchospora culixa*
Georgia indigo-bush, *Amorpha georgiana*
Georgia milkwort, *Polygala leptostachys*
Georgia plume, *Elliottia racemosa*
LeConte wild indigo, *Baptisia lecontei*
Long-beard Bluestem, *Andropogon longiberbis*
Ohoopee bumelia, *Sideroxylon macrocarpum*
Palafoxia, *Palafoxia integrifolia*
Pale umbrella-wort, *Mirabilis albida*
Pan-American balsamscale, *Elyonurus tripsacoides*
Pickering's morning-glory, *Stylisma pickeringii*
Pineland nailwort, *Paronychia patula*
Pineland purple foxglove, *Agalinis divaricata*
Sandhill angelica, *Angelica dentata*
Sandhill milk-vetch, *Astragalus michauxii*
Sandhill skullcap, *Scutellaria arenicola*
Sandhill-cress, *Warea sessilifolia*
Sandy-woods chaffhead, *Carphephorus bellidifolius*
Savanna milkweed, *Asclepias pedicellata*
Scale-leaf purple foxglove, *Agalinis aphylla*
Seminole purple foxglove, *Agalinis filifolia*
Slender purple foxglove, *Agalinis tenuifolia* var. *leucanthera*
Spindly purple foxglove, *Agalinis filicaulis*

Coastal Plain Mesic Longleaf Pine Forests and Woodlands, continued

Special Concern Plant Species Associated with Coastal Plain Mesic Longleaf Pine Forests and Woodlands, continued
Sprawling goat's-rue, *Tephrosia chrysophylla*
Tallahassee hedge-nettle, *Stachys hyssopifolia* var. *lythroides*
Trailing bean-vine, *Phaseolus polystachios* var. *sinuatus*
Virginia thistle, *Cirsium virginianum*

Special Concern Animal Species Associated with Coastal Plain Mesic Longleaf Pine Forests and Woodlands:
Amphibians
Eastern tiger salamander, *Ambystoma tigrinum tigrinum*
Gopher frog, *Rana capito*
Northern mole skink, *Eumeces egregius similis*
Striped newt, *Notophthalmus perstriatus*

Birds
Bachman's sparrow, *Aimophila aestivalis*
Red-cockaded woodpecker, *Picoides borealis*
Southeastern American kestrel, *Falco sparverius paulus*

Invertebrates
Arogos skipper, *Atrytone arogos arogos*
Tortoise commensal scarab, *Onthophagus polyphemi*

Mammals
Sherman's fox squirrel, *Sciurus niger shermani*
Sherman's pocket gopher, *Geomys pinetis fontanelus*
Southeastern pocket gopher, *Geomys pinetis*

Reptiles
Central Florida crowned snake, *Tantilla relicta neilli*
Eastern diamond-backed rattlesnake, *Crotalus adamanteus*
Eastern indigo snake, *Drymarchon couperi*
Florida pine snake, *Pituophis melanoleucus mugitus*
Florida worm lizard, *Rhineura floridana*
Gopher tortoise, *Gopherus polyphemus*
Island glass lizard, *Ophisaurus compressus*
Slender glass lizard, *Ophisaurus attenuatus attenuatus*
Southern hognose snake, *Heterodon simus*

COASTAL PLAIN DRY EVERGREEN OAK FORESTS

Dry evergreen oak forests, sometimes called xeric hammocks or broadleaf evergreen hammocks, develop on sites with dry, sandy, infertile soils that have been excluded from fire for a long time. They generally occur in the transition zones between wetlands and fire-maintained communities such as sandhills; on sandy ridges in pine flatwoods; or on sandy river banks and dunes. The canopy in these forests is usually dominated by laurel oak, live oak, and sand live oak, while the subcanopy may include devilwood, sparkleberry, red bay, myrtle oak, and Chapman's oak. Somewhat moister sites may include spruce pine, dwarf pawpaw, southern magnolia, pignut hickory, sweet gum, hop hornbeam, water oak, muscadine grape, greenbrier, and saw palmetto. Herbs and grasses which could carry fire are largely absent due to the deep shade and heavy layer of oak leaf litter which is relatively non-flammable and further contributes to fire exclusion. Despite the dry, infertile soils, most of these sites in Georgia have been converted to pine plantations; others are threatened by residential development, feral hog rooting, livestock grazing, trash dumping, and off-road vehicle use. Management and restoration of undeveloped dry evergreen hardwood forests will entail a consideration of their original vegetation, their fire history, and the desired management outcomes.

Comprehensive Wildlife Conservation Strategy High Priority Habitats: Evergreen Hammocks and Mesic Hardwood Forests (in part), Rocky/Sandy River Bluffs (in part)

Special Concern Plant Species Associated with Coastal Plain Dry Evergreen Oak Forests:
(Note: rare plant species associated with sandhills and other dry upland sites may persist in long-unburned Dry Evergreen Oak Forests.)
Arkansas oak, *Quercus arkansana*
Georgia plume, *Elliottia racemosa*
Pale green ladies-tresses, *Spiranthes sylvatica*
Pennyroyal, *Piloblephis rigida*
Trailing bean-vine, *Phaseolus polystachios* var. *sinuatus*
Velvet sedge, *Carex dasycarpa*
Whisk fern, *Psilotum nudum*

Special Concern Animal Species Associated with Coastal Plain Dry Evergreen Oak Forests:

Amphibians
Gopher frog, *Rana capito*
Northern mole skink, *Eumeces egregius similis*

Reptiles
Central Florida crowned snake, *Tantilla relicta neilli*
Coral snake, *Micrurus fulvius*
Eastern diamondback rattlesnake, *Crotalus adamanteus*
Florida pine snake, *Pituophis melanoleucus mugitus*
Florida worm lizard, *Rhineura floridana*
Gopher tortoise, *Gopherus polyphemus*
Pine woods snake, *Rhadinaea flavilata*

COASTAL PLAIN DRY DECIDUOUS HARDWOOD FORESTS

Dry deciduous hardwood forests occur on upland sites with sandy or loamy soils that are naturally protected from fire by their landscape position, such as on river bluffs and steep slopes. They are also embedded within longleaf pine forests and woodlands where streams and other natural firebreaks shield them from fire. Once uncommon, this community is more widespread in the Coastal Plain now than in the past due to human fire-suppression. The canopy is usually dominated by a mix of deciduous hardwood trees, including southern red oak, post oak, white oak, pignut hickory, mockernut hickory, and sand hickory, but, depending on soil moisture and fertility, may also include evergreen or tardily deciduous species such as water oak, laurel oak, live oak, devilwood, sand live oak, sparkleberry, and loblolly or longleaf pine. Herbs and grasses are not conspicuous in these forests, but shrub species may be diverse and include deerberry, fringe tree, blue huckleberry, witch hazel, dwarf pawpaw, yucca, blue palmetto, saw palmetto, horse sugar, and red bay. Dry deciduous hardwood forests have been impacted by fire suppression; prescribed fires in adjacent sandhills should be allowed to burn into the edges of these forests and naturally self-extinguish. Where pine is a component of the dry deciduous hardwood forest, occasional prescribed fires (between 3-10 years) would maintain an open canopy and understory. Invasive non-native species such as Chinese privet, Japanese climbing fern, heavenly bamboo, and kudzu have invaded some dry deciduous hardwood forests and should be eradicated or controlled.

Comprehensive Wildlife Conservation Strategy High Priority Habitats: Evergreen Hammocks and Mesic Hardwood Forests (in part), Rocky/Sandy River Bluffs (in part)

Special Concern Plant Species Associated with Coastal Plain Dry Deciduous Hardwood Forests:

Alabama grape fern, *Botrychium jenmanii*
Alabama milkvine, *Matelea alabamensis*
Arkansas oak, *Quercus arkansana*
Bluff white oak, *Quercus austrina*
Durand oak, *Quercus sinuata*
Pineland skullcap, *Scutellaria altamaha*
Carrion-flower, *Smilax lasioneura*
Georgia rockcress, *Arabis georgiana*
Skullcap, *Scutellaria mellichampii*
Heartleaf brickellia, *Brickellia cordifolia*
Rosy sedge, *Carex rosea*
Trailing bean-vine, *Phaseolus polystachios* var. *sinuatus*
Florida sedge, *Carex floridana*
Indian olive, *Nestronia umbellula*
Georgia aster, *Symphyotrichum georgianum*
Cuthbert holly, *Ilex cuthbertii*
Woods poppy-mallow, *Callirhoe papaver*
Carolina redtop, *Tridens carolinianus*

Special Concern Animal Species Associated with Coastal Plain Dry Deciduous Hardwood Forests:

Amphibians

Four-toed salamander, *Hemidactylium scutatum*

Birds

Painted bunting, *Passerina ciris*

COASTAL PLAIN MESIC SLOPE FORESTS

Mesic slope forests occur in steep north- or northeast-facing river bluffs, ravines, lower bluffs and slopes above seepages and streams, upper walls of limesinks, and in steepheads on well drained soil. The moist, nutrient-rich soils in these environments support a diversity of trees, including American beech, southern magnolia, white oak, spruce pine, sweet gum, swamp chestnut oak, basswood, Shumard oak, pignut hickory, and American holly. The shrub layer is also diverse, with a mix of evergreen and deciduous species such as Carolina buckthorn, needle palm, oakleaf hydrangea, leatherwood, red buckeye, southern wax myrtle, hop tree, fringe tree, bigleaf storax, horse sugar, devilwood, two-wing silverbell, blue palmetto, witch hazel, Florida azalea, Piedmont azalea, and Alabama azalea. The herb layer in some mesic slope forests is very species-rich and showy, with Indian paintbrush, green dragon, blue phlox, southern maidenhair fern, atamasco lily, sarsaparilla vine, Christmas fern, and several species of orchids, toothworts, and trilliums. The combination of deep shade, cooler temperatures, and rich soils in these forests create conditions that support some plant species that are more typical of the Southern Appalachians than the Coastal Plain, such as bloodroot, wild ginger, May apple, spring beauty, trout lily, doll's eyes, liverleaf, Solomon's seal, mountain laurel, shagbark hickory, and basswood. Mesic slope forests have been degraded by timber harvest, trash dumping, erosion from upland disturbances, urban development, and the impoundment of rivers and streams associated with the ravines. Exotic pest plant species, such as Japanese climbing fern, Japanese honeysuckle, and Chinese privet, and feral hogs, which root out bulbs and roots of wildflowers, threaten to destroy the floristic diversity in these forests, and should be eradicated or controlled.

Comprehensive Wildlife Conservation Strategy High Priority Habitats: Beech-Magnolia Slope Forests, Evergreen Hammocks and Mesic Hardwood Forests (in part)

Special Concern Plant Species Associated with Coastal Plain Mesic Slope Forests:

Allegheny-spurge, *Pachysandra procumbens*
Baltzell's sedge, *Carex baltzellii*
Bartram's air-plant, *Tillandsia bartramii*
Bay star-vine, *Schisandra glabra*
Beautiful haw, *Crataegus pulcherrima*
Bigpod wild indigo, *Baptisia megacarpa*
Bluff white oak, *Quercus austrina*
Bog spicebush, *Lindera subcoriacea*
Bottlebrush buckeye, *Aesculus parviflora*
Broad-leaved bunchflower, *Veratrum latifolium* (syn. *Melanthium latifolium*)
Carolina crownbeard, *Verbesina walteri*
Carrion flower, *Smilax lasioneura*
Chattahoochee trillium, *Trillium decipiens*
Croomia, *Croomia pauciflora*
Elliott's fanpetals, *Sida elliottii*
Few-fruit sedge, *Carex oligocarpa*
Florida anise, *Illicium floridanum*
Florida torreya, *Torreya taxifolia*
Fringed campion, *Silene polypetala*
Ginseng, *Panax quinquefolius*
Greenfly orchid, *Epidendrum conopseum*
Heartleaf brickellia, *Brickellia cordifolia*
Indian olive, *Nestronia umbellula*
Ocmulgee skullcap, *Scutellaria ocmulgee*
Ovate catchfly, *Silene ovata*
Ovate maiden fern, *Thelypteris ovata*
Ozark bunchflower, *Veratrum woodii*
Pine-needle air-plant, *Tillandsia setacea*
Plumleaf azalea, *Rhododendron prunifolium*
Pygmy-flower vetch, *Vicia minutiflora*
Relict trillium, *Trillium reliquum*
Roundleaf meadowrue, *Thalictrum subrotundum*
Silky camellia, *Stewartia malacodendron*
Smooth aster, *Symphyotrichum laeve*
Velvet sedge, *Carex dasycarpa*

Coastal Plain Mesic Slope Forests, continued

Special Concern Animal Species Associated with Coastal Plain Mesic Slope Forests:
Amphibians
Apalachicola dusky salamander, *Desmognathus apalachicolae*
Chamberlain's dwarf salamander, *Eurycea chamberlaini*
Four-toed salamander, *Hemidactylium scutatum*
Many-lined salamander, *Stereochilus marginatus*
Southern coal skink, *Eumeces anthracinus pluvialis*
Southern dusky salamander, *Desmognathus auriculatus*

Mammals
Rafinesque's big-eared bat, *Corynorhinus rafinesquii*
Northern yellow bat, *Lasiurus intermedius*
Southeastern myotis, *Myotis austroriparius*

Reptiles
Southern coal skink, *Eumeces anthracinus pluvialis*

ROCK OUTCROPS, PRAIRIES, AND BARRENS OF THE COASTAL PLAIN ECOREGION

COASTAL PLAIN BLACKLAND PRAIRIES

Blackland prairies are among the rarest natural communities in Georgia, occurring in only a few locations in the Fall Line Red Hills of Houston, Peach, Twiggs, and Bleckley Counties. They are small open grasslands surrounded by hardwood and pine forests (now primarily pine plantations). Blackland prairies are characterized by their chalky, clay-rich soils, derived from marl, chalk, or limestone, which shrink and crack when dry and expand when wet, becoming very sticky. Shrink-swell soils have limited the growth of trees and shrubs, but have supported the formation of an interesting and rare plant community dominated by showy wildflowers such as gray-headed coneflower, starry rosinweed, butterfly-weed, whorled milkweed, blue sage, eastern coneflower, and eastern gray goldenrod, as well as prairie grasses such as Indian grass, big blue stem, broomsedge, three-awn, and muhly grass. Fire played a role in creating and maintaining the open, grassy character of chalk prairies and should be re-introduced to these communities every few years preferably during the growing season.

Comprehensive Wildlife Conservation Strategy High Priority Habitat: Black Belt Prairies

Special Concern Plant Species Associated with Coastal Plain Blackland Prairies:
Carrion-flower, *Smilax lasioneura*
Creamy meadow-parsnip, *Thaspium chapmanii*
Dakota vervain, *Glandularia bipinnatifida*
Drummond's skullcap, *Scutellaria drummondii*
Durand oak, *Quercus sinuata*
Elliott's fanpetals, *Sida elliottii*
Englemann's adder-tongue fern, *Ophioglossum engelmanii*
Fringed campion, *Silene polypetala*
Georgia aster, *Symphyotrichum georgianum*
Heart-leaved noseburn, *Tragia cordata*
Lanceleaf trillium, *Trillium lancifolium*
Limestone bedstraw, *Galium virgatum*
New England aster, *Symphyotrichum novae-angliae*
Orange fruticose bark lichen, *Teloschistes exilis*
Pygmy-flower vetch, *Vicia minutiflora*
Rough-fruited spermolepis, *Spermolepis inermis*
Three-flowered hawthorn, *Crataegus triflora*
Wedgeleaf whitlow grass, *Draba cuneifolia*

Special Concern Animal Species Associated with Coastal Plain Blackland Prairies:
No Special Concern animals are recorded from this community

COASTAL PLAIN ACIDIC GLADES, BARRENS, AND ROCKY WOODLANDS

Acidic glades, barrens, and rocky woodlands are longleaf pine-dominated communities that occur on and around outcrops of sandstone, ironstone, and "flint" kaolin in the Coastal Plain. These rare communities are dominated by a mix of blackjack oak and longleaf pine, and some sites include rare, disjunct, or endemic plant species. Sandstone outcrops, also known as Altamaha Grit, are aboveground exposures of a geologic formation that underlies 15,000 square miles in Georgia's Coastal Plain; they consist of a cemented conglomerate of sandstone, clay, sand, quartz, and iron oxide pebbles that surface as boulders or flat rocks on hillsides, gently rolling terrain, or along river banks. Similarly, plate-like masses of ironstone protrude as outcrops in several areas of Georgia. These thin layers of iron ore are particularly associated with highly weathered soils on rolling landscapes. "Flint" kaolin occurs with other kaolin deposits just south of Georgia's Fall Line; its high opaline-silica content makes it too hard for commercial use and also prone to form erosion-resistant outcrops that support vegetation similar to that of Piedmont granite outcrops and Altamaha Grit. Prescribed fire should be applied every 2-3 years to woodlands surrounding Coastal Plain outcrops and allowed to burn across the outcrops to maintain open, sunny conditions. Rock outcrops should be protected from off-road vehicles, logging, trash dumping, and other mechanical disturbances.

Comprehensive Wildlife Conservation Strategy High Priority Habitats: Altamaha Grit Outcrops, Flint Kaolin outcrops

Special Concern Plant Species Associated with Coastal Plain Acidic Glades, Barrens, and Rocky Woodlands:
Black-footed quillwort, *Isoetes melanopoda*
Bluff white oak, *Quercus austrina*
Cutleaf beardtongue, *Penstemon dissectus*
Dwarf filmy fern, *Trichomanes petersii*
Georgia indigo-bush, *Amorpha georgiana*
Georgia plume, *Elliottia racemosa*
Green-fly orchid, *Epidendrum conopseum*
Grit portulaca, *Portulaca biloba*
Harper's dodder, *Cuscuta harperi*
Liverwort, *Gymnocolea inflata*
Michaux's orchid, *Habenaria quinqueseta*
Pineland Barbara's buttons, *Marshallia ramosa*
Sandhill awned moss, *Campylopus carolinae*
Shoestring fern, *Vittaria lineata*
Silky morning-glory, *Evolvulus sericeus*
Texas pipewort, *Eriocaulon texense*
Wingpod purslane, *Portulaca umbraticola* ssp. *coronata*
Wire-leaf dropseed, *Sporobolus teretifolius*

Special Concern Animal Species Associated with Coastal Plain Acidic Glades, Barrens, and Rocky Woodlands:
Amphibians
Gopher frog, *Rana capito*
Striped newt, *Notophthalmus perstriatus*

Coastal Plain Acidic Glades, Barrens, and Rocky Woodlands, continued

Birds
Bachman's sparrow, *Aimophila aestivalis*
Red-cockaded woodpecker, *Picoides borealis*
Southeastern American kestrel, *Falco sparverius paulus*

Invertebrates
Arogos skipper, *Atrytone arogos arogos*
Tortoise commensal scarab, *Onthophagus polyphemi*

Mammals
Sherman’s fox squirrel, *Sciurus niger shermani*

Reptiles
Central Florida crowned snake, *Tantilla relicta neilli*
Eastern diamond-backed rattlesnake, *Crotalus adamanteus*
Eastern indigo snake, *Drymarchon couperi*
Florida pine snake, *Pituophis melanoleucus mugitus*
Florida worm lizard, *Rhineura floridana*
Gopher tortoise, *Gopherus polyphemus*
Island glass lizard, *Ophisaurus compressus*
Northern mole skink, *Eumeces egregius similis*
Slender glass lizard, *Ophisaurus attenuatus*
Southern hognose snake, *Heterodon simus*

WETLANDS AND LOWLANDS OF THE COASTAL PLAIN ECOREGION

COASTAL PLAIN PINE FLATWOODS

Pine flatwoods occur largely in the outer Coastal Plain, where they occupy low, flat areas with sandy, acidic, infertile soils that are often droughty during the summer and saturated during the winter. The canopy in relatively undisturbed pine flatwoods is dominated by longleaf pine, slash pine, or pond pine. In the understory, extensive swathes of saw palmetto are interspersed with patches of other shrubs, such as runner oak, staggerbush, gallberry, and dwarf blueberries; without frequent fire, shrubs and hardwood trees will develop into nearly impenetrable thickets. When fire is frequent (every 2-3 years) and soil disturbance is kept to a minimum, grasses and wildflowers, such as wiregrass, toothache grass, Florida dropseed, chaffhead, blazing stars, sunflowers, and legumes, are abundant, particularly on drier soils. Frequently burned pine flatwoods are inhabited by many amphibians and reptiles, including pine woods tree frog, oak toad, box turtle, pine woods snake, eastern diamondback rattlesnake, and black racer, as well as a variety of birds, including the rare red-cockaded woodpecker and Bachman's sparrow. Once occupying vast stretches of the outer Coastal Plain, pine flatwoods in Georgia have largely been converted to slash or loblolly pine plantations, their plant diversity and natural fire and hydrologic regimes altered and disrupted. Restoring pine flatwood communities often requires a combination of frequent prescribed fire and hydrological restoration.

Comprehensive Wildlife Conservation Strategy High Priority Habitats: Pine Flatwoods

Special Concern Plant Species Associated with Coastal Plain Pine Flatwoods:

Chapman's skeleton grass, *Gymnopogon chapmanianus*
Chapman's yellow fringed orchid, *Platanthera chapmanii*
Death-camus, *Zigadenus leimanthoides*
Downy slender ladies-tresses, *Spiranthes brevilabris*
Dwarf pawpaw, *Asimina pygmaea*
Eaton's ladies-tresses, *Spiranthes eatonii*
Florida feather-shank, *Schoenocaulon dubium*
Florida finger grass, *Eustachys floridana*
Florida milk-pea, *Galactia floridana*
Georgia beaksedge, *Rhynchospora culixa*
Giant spiral ladies-tresses, *Spiranthes longilabris*
Hairy rattleweed, *Baptisia arachnifera*
Lavender lady, *Carphephorus pseudoliatris*
LeConte thistle, Cirsium lecontei
Many-flowered grass-pink, *Calopogon multiflorus*
Michaux's cupgrass, *Eriochloa michauxii* var. *michauxii*
Netleaf pawpaw, *Asimina reticulata*
Night-blooming wild petunia, *Ruellia noctiflora*
Pineland dropseed, *Sporobolus pinetorum*
Savanna milkweed, *Asclepias pedicellata*
Scale-leaf purple foxglove, *Agalinis aphylla*
Shortspike bluestem, *Andropogon brachystachyus*
Simpson rain lily, *Zephyranthes simpsonii*
Slender leather-root, *Orbexilum virgatum*
Southeastern sunflower, *Helianthus agrestis*
Southern bog-button, *Lachnocaulon beyrichianum*
Spindly purple foxglove, *Agalinis filicaulis*
Torrey beakrush, *Rhynchospora torreyana*
White milkwort, *Polygala balduinii*

Coastal Plain Pine Flatwoods, continued

Special Concern Animal Species Associated with Coastal Plain Pine Flatwoods:
Amphibians
Eastern tiger salamander, *Ambystoma tigrinum tigrinum*
Frosted flatwoods salamander, *Ambystoma cingulatum*
Gopher frog, *Rana capito*
Striped newt, *Notophthalmus perstriatus*

Birds
Bachman's sparrow, *Aimophila aestivalis*
Henslow's sparrow, *Ammodramus henslowii*
Red-cockaded woodpecker, *Picoides borealis*
Southeastern American kestrel, *Falco sparverius paulus*

Invertebrates
Arogos skipper, *Atrytone arogos arogos*

Mammals
Blackbeard's whitetailed deer, *Odocoileus virginianus nigribarbis*
Sherman's fox squirrel, *Sciurus niger shermani*

Reptiles
Eastern diamond-backed rattlesnake, *Crotalus adamanteus*
Eastern indigo snake, *Drymarchon couperi*
Gopher tortoise, *Gopherus polyphemus*
Island glass lizard, *Ophisaurus compressus*
Mimic glass lizard, *Ophisaurus mimicus*
Pine woods snake, *Rhadinaea flavilata*
Slender glass lizard, *Ophisaurus attenuatus attenuatus*

COASTAL PLAIN SEEPAGE SLOPE HERB BOGS

Seepage slope herb bogs are open wetlands that develop on lower slopes or in swales within rolling, longleaf pine-dominated uplands. Soils are acidic, nutrient-poor, and saturated most of the year by seepage from the sandy soils of adjacent uplands; a subsurface hardpan confines seepage to the upper layers of soil. Seepage slope herb bogs are kept open by frequent fire that prevents shrub and tree invasion, discourages peat formation, and fosters an amazing diversity of grasses, sedges, and herbs, including three-awn grasses, toothache grass, hatpins, pipeworts, yellow-eyed grasses, meadowbeauties, colic-roots, milkworts, and dozens of showy composites, orchids, lilies, and mints. These communities are often called pitcher plant bogs because of the presence of many species of carnivorous plants, including pitcher plants, sundews and butterworts. Many of Georgia's seepage slope herb bogs have been destroyed by fire suppression, impoundment, and conversion to pasture and farm ponds. Exotic species, such as Chinese privet and feral hogs, are extremely destructive to seepage slope herb bogs, and should be controlled or eradicated. Protection of these rare and significant environments depends on the frequent application of prescribed fire (every 2-3 years) and preservation of the seepage source in nearby pine uplands.

Comprehensive Wildlife Conservation Strategy High Priority Habitats: Hillside Seeps, Wet Pine Savannas, Herb and Shrub Bogs

Special Concern Plant Species Associated with Coastal Plain Seepage Slope Herb Bogs:

Bog bluestem, *Andropogon mohrii*
Bog sneezeweed, *Helenium brevifolium*
Bog St. John's-wort, *Hypericum adpressum*
Broom sedge, *Carex scoparia*
Chaffseed, *Schwalbea americana*
Chapman's beakrush, *Rhynchospora stenophylla*
Chapman's yellow-eyed grass, *Xyris chapmanii*
Chapman's yellow fringed orchid, *Platanthera chapmanii*
Coastal beaksedge, *Rhynchospora pleiantha*
Coppery St. John's-wort, *Hypericum denticulatum*
Death-camus, *Zigadenus leimanthoides*
Downy slender ladies-tresses, *Spiranthes brevilabris*
Drummond yellow-eyed grass, *Xyris drummondii*
Feather-bristle beaksedge, *Rhynchospora oligantha*
Georgia St. John's-wort, *Hypericum erythraeae*
Goldcrest, *Lophiola aurea*
Hammock sedge, *Carex fissa* var. *aristata*
Harper yellow-eyed grass, *Xyris scabrifolia*
Hartwrightia, *Hartwrightia floridana*
Hooded pitcherplant, *Sarracenia minor*
Hummingbird flower, *Macranthera flammea*
Lamance iris, *Iris brevicaulis*
LeConte thistle, *Cirsium lecontei*
Long-beak beaksedge, *Rhynchospora scirpoides*
Long-beard bluestem, *Andropogon longiberbis*
Many-flowered grass-pink, *Calopogon multiflorus*
Monkeyface orchid, *Platanthera integrilabia*
Narrow-fruit swamp sedge, *Carex collinsii*
Narrow-leaved golden-aster, *Pityopsis oligantha*
Narrow-leaved water-willow, *Justicia angusta*
Nuttall's meadowbeauty, *Rhexia nuttallii*
Parrot pitcherplant, *Sarracenia psittacina*
Pineland beaksedge, *Rhynchospora punctata*
Pineland dropseed, *Sporobolus pinetorum*
Purple honeycomb head, *Balduina atropurpurea*
Purple pitcherplant, *Sarracenia purpurea*
Red milkweed, *Asclepias rubra*
Savanna cowbane, *Oxypolis ternata*
Shortspike bluestem, *Andropogon brachystachyus*
Snowy orchid, *Platanthera nivea*
Solitary beakrush, *Rhynchospora solitaria*

Coastal Plain Seepage Slope Herb Bogs, continued

Plants, continued
Southeastern panic grass, *Panicum tenerum*
Southern white beaksedge, *Rhynchospora macra*
Spindly purple foxglove, *Agalinis filicaulis*
Stokes aster, *Stokesia laevis*
Sweet pitcherplant, *Sarracenia rubra*
Thorne's beakrush, *Rhynchospora thornei*
Torrey beakrush, *Rhynchospora torreyana*
Tracy's dew-threads, *Drosera tracyi*
Wetland sunflower, *Helianthus heterophyllus*
White fringed orchis, *Platanthera blephariglottis*
White sunnybell, *Schoenolirion albiflorum* (syn. *Schoenolirion elliottii*)
Whitetop pitcherplant, *Sarracenia leucophylla*
Wire-leaf dropseed, *Sporobolus teretifolius*
Yellow flytrap, *Sarracenia flava*
Yellow fringeless orchid, *Platanthera integra*

Special Concern Animal Species Associated with Coastal Plain Seepage Slope Herb Bogs:
Amphibians
Carpenter frog, *Rana virgatipes*
Chamberlain's dwarf salamander, *Eurycea chamberlaini*
Four-toed salamander, *Hemidactylium scutatum*
One-toed amphiuma, *Amphiuma pholeter*

Invertebrates
Bog crayfish, *Procambarus truculentus*
Knotty burrowing crayfish, *Cambarus nodosus*
Oconee burrowing crayfish, *Cambarus truncatus*
Pine savannah crayfish, *Cambarus reflexus*
Say’s spiketail, *Cordulegaster sayi*
Vidalia crayfish, *Procambarus advena*

Mammals
Round-tailed Muskrat, *Neofiber alleni*

Reptiles
Mimic glass lizard, *Ophisaurus mimicus*
Southern coal skink, *Eumeces anthracinus pluvialis*
Striped crayfish snake, *Regina alleni*

COASTAL PLAIN SEEPAGE SWAMPS AND SHRUB BOGS

Seepage swamps and shrub bogs, also known as baygalls, bayheads, and pocosins, occur where water seeps from the base of a slope in depressions and ravines, at the head of blackwater streams, and, occasionally, along the edges of creek floodplains. Soils are saturated nearly year-round and organic matter accumulates, creating a wet, acidic, peaty substrate that is often underlain by a clay hardpan. Seepage swamps and shrub bogs often have a dense, nearly impenetrable shrub layer of red bay, buckwheat tree, shining fetterbush, southern maleberry, coastal doghobble, possumhaw, gallberry, dahoon, titi, wax myrtle, bamboo-vine, and coral greenbrier; occasionally thickets of river cane, called canebrakes, develop in these habitats. The canopy includes trees such as red maple, swamp tupelo, loblolly pine, pond pine, swamp laurel oak, and water oak; Atlantic white cedar occurs in Fall Line Sandhill seepage swamps. The ground layer is usually dominated by sphagnum moss, with a scattering of ferns such as Virginia chain fern, cinnamon fern, and sensitive fern. Seepage swamps and shrub bogs depend on a constant flow of groundwater from adjacent sandy uplands that are threatened by conversion to agricultural and residential development and by fire suppression. Protection of seepage swamps and shrub bogs depends on protecting the source of seepage in nearby uplands and allowing fire in adjacent uplands to burn into the edges of this habitat and self-extinguish.

Comprehensive Wildlife Conservation Strategy High Priority Habitats: Hillside Seeps, Herb and Shrub Bogs, Atlantic White Cedar Swamps, Canebrakes

Special Concern Plant Species Associated with Coastal Plain Seepage Swamps and Shrub Bogs:

Atlantic white cedar, *Chamaecyparis thyoides*
Bog sneezeweed, *Helenium brevifolium*
Bog spicebush, *Lindera subcoriacea*
Bog St. John's-wort, *Hypericum adpressum*
Canby's club-rush, *Scirpus etuberculatus*
Carolina bog mint, *Macbridea caroliniana*
Carolina bog-myrtle, *Kalmia carolina*
Chapman's yellow-eyed grass, *Xyris chapmanii*
Chapman's beakrush, *Rhynchospora stenophylla*
Clearwater butterwort, *Pinguicula primuliflora*
Coppery St. John's-wort, *Hypericum denticulatum*
Dark-green sedge, *Carex venusta*
Death-camus, *Zigadenus leimanthoides*
Dwarf witch alder, *Fothergilla gardenia*
Florida anise-tree, *Illicium floridanum*
Harper's wild ginger, *Hexastylis shuttleworthii* var. *harperi*
Kentucky ladyslipper, *Cypripedium kentuckiense*
Narrow-fruit swamp sedge, *Carex collinsii*
Narrow-leaved golden-aster, *Pityopsis oligantha*
Odorless bayberry, *Morella inodora*
Social sedge, *Carex socialis*
Solitary beakrush, *Rhynchospora solitaria*
Southern white beaksedge, *Rhynchospora macra*
Sweet pitcherplant *Sarracenia rubra*
Tawny cotton-grass, *Eriophorum virginicum*
Torrey beakrush, Rhynchospora torreyana

Special Concern Animal Species Associated with Coastal Plain Seepage Swamps and Shrub Bogs:

Amphibians

Carpenter frog, *Rana virgatipes*
Dwarf siren, *Pseudobranchus striatus*
Four-toed salamander**,** *Hemidactylium scutatum*
Many-lined salamander, *Stereochilus marginatus*
One-toed amphiuma, *Amphiuma pholeter*

Coastal Plain Seepage Swamps and Shrub Bogs, continued

Birds
Bachman's warbler, *Vermivora bachmanii*
Swainson's Warbler, *Limnothlypis swainsonii*

Invertebrates
Bog crayfish, *Procambarus truculentus*
Knotty burrowing crayfish, *Cambarus nodosus*
Oconee burrowing crayfish, *Cambarus truncatus*
Say's spiketail, *Cordulegaster sayi*
Vidalia crayfish, *Procambarus advena*

Reptiles
Eastern indigo snake, *Drymarchon couperi*
Florida redbelly turtle, *Pseudemys nelsoni*
Mimic glass lizard, *Ophisaurus mimicus*
Southern coal skink, *Eumeces anthracinus pluvialis*
Spotted turtle, *Clemmys guttata*
Striped crayfish snake, *Regina alleni*

COASTAL PLAIN CYPRESS-TUPELO RIVER SWAMPS

Cypress-tupelo river swamps, ranging in width from one-half mile to several miles, are forests that occupy the back swamps, secondary channels, sloughs, and swales found in the floodplains of the larger brown- and blackwater rivers and streams in Georgia's Coastal Plain. These seasonally to nearly permanently flooded forests are dominated by trees that tolerate prolonged flooding, such as bald cypress, water tupelo, Ogeechee lime, swamp tupelo, Carolina ash, and water locust. Giant cypress trees, up to 1000 years old, are still found in a few locations, testifying to the grandeur of these forests before the advent of large-scale timber operations. Because of prolonged inundation and frequent scouring by floodwaters, river swamps often have a sparse understory with only a few shrubs, such as titi, Virginia willow, southern maleberry, and shining fetterbush, rooted on stumps and hummocks above the level of flood waters. River swamps support many animals, including otters, mink, alligators, and a large number of birds, mussels, turtles, crayfish, and fish. These communities have been polluted by agricultural runoff, invaded by exotic pest plants (especially Chinese privet), and degraded by the construction of roads, canals, levees, and dams that have altered the hydrology of the streams which support them. Effective restoration and management requires a watershed-wide approach that addresses multiple factors that threaten water quality and floodplain integrity.

Comprehensive Wildlife Conservation Strategy High Priority Habitats: Non-alluvial (Blackwater) Rivers and Swamps, Alluvial (Brownwater) Rivers and Swamps, Calcareous Swamps, Canebrakes

Special Concern Plant Species Associated with Coastal Plain Cypress-Tupelo River Swamps:

Bog spicebush, *Lindera subcoriacea*
Broad-leaved marsh St. John's-wort, *Triadenum tubulosum*
Catbird grape, *Vitis palmata*
Cayaponia, *Cayaponia quinqueloba*
Cypress-knee sedge, *Carex decomposita*
Floating manna-grass, *Glyceria septentrionalis*
Floodplain tickseed, *Coreopsis integrifolia*
Florida adders-mouth orchid, *Malaxis spicata*
Lake-cress, *Neobeckia aquatica* (syn. *Armoracia lacustris*)
Lamance iris, *Iris brevicaulis*
Louisiana spikemoss, *Selaginella ludoviciana*
Meager hop flatsedge, *Cyperus lupulinus* ssp. *macilentus*
Munson grape**,** *Vitis rotundifolia* var. *munsoniana*
Reniform sedge, *Carex reniformis*
Serviceberry holly, *Ilex amelanchier*
Smooth buttonweed, *Spermacoce glabra*
Social sedge, *Carex socialis*
Swamp-forest beaksedge, *Rhynchospora decurrens*
Serviceberry holly *Ilex amelanchier*
Weak stellate sedge, *Carex seorsa*

Special Concern Animal Species Associated with Coastal Plain Cypress-Tupelo River Swamps:

Amphibians

Brimley's chorus frog, *Pseudacris brimleyi*
Carpenter frog, *Rana virgatipes*
One-toed amphiuma, *Amphiuma pholeter*

Coastal Plain Cypress-Tupelo River Swamps, continued

Special Concern Animal Species Associated with Coastal Plain Cypress-Tupelo River Swamps, continued

Birds

Bachman's warbler, *Vermivora bachmanii*
Bald eagle, *Haliaeetus leucocephalus*
Black-crowned night-heron, *Nycticorax nycticorax*
Glossy ibis, *Plegadis falcinellus*
Limpkin, *Aramus guarauna*
Swainson's warbler, *Limnothlypis swainsonii*
Swallow-tailed kite, *Elanoides forficatus*
Wood stork, *Mycteria americana*
Yellow-crowned night-heron, *Nyctanassa violacea*

Fish

Apalachicola redhorse, *Moxostoma* sp. cf. *M. poecilurum* "grammarion"
Banded topminnow, *Fundulus cingulatus*
Blackbanded sunfish, *Enneacanthus chaetodon*
Eastern mudminnow, *Umbra pygmaea*
Golden topminnow, *Fundulus chrysotus*
Gulf sturgeon, *Acipenser oxyrinchus desotoi*
Highscale shiner, *Notropis hypsilepis*
Ironcolor shiner, *Notropis chalybaeus*
Redface topminnow *Fundulus rubrifrons*
Russetfin topminnow *Fundulus escambiae*
Sawcheek darter, *Etheostoma serrifer*
Shortnose sturgeon *Acipenser brevirostrum*

Invertebrates

American sand-burrowing mayfly, *Dolania americana*
Blackwater sand-filtering mayfly, *Homoeoneuria dolani*
Bog crayfish, *Procambarus truculentus*
Coppery emerald, *Somatochlora georgiana*
Duke's skipper, *Euphyes dukesi*
Fat threeridge, *Amblema neislerii*
Oconee burrowing crayfish, *Cambarus truncatus*
Okefenokee zale moth, *Zale perculta*
Riverine clubtail, *Stylurus amnicola*
Variegated meadowhawk, *Sympetrum corruptum*
Vidalia crayfish, *Procambarus advena*

Mammals

Florida panther, *Puma concolor coryi*
Star-nosed mole, *Condylura cristata*

Reptiles

Alligator snapping turtle, *Macrochelys temminckii*
American alligator, *Alligator mississippiensis*
Common rainbow snake, *Farancia erytrogramma erytrogramma*
Eastern indigo snake, *Drymarchon couperi*
Florida redbelly turtle, *Pseudemys nelsoni*
Spotted turtle, *Clemmys guttata*
Striped crayfish snake, *Regina alleni*
Suwannee river cooter, *Pseudemys concinna suwanniensis*

COASTAL PLAIN BOTTOMLAND HARDWOOD FORESTS

Bottomland hardwoods are forested communities that occur along blackwater and alluvial streams in Georgia's Coastal Plain on relatively high areas in floodplains, such as terraces, levees, and ridges, that do not experience prolonged flooding. Vegetation varies with soil texture and fertility, length and timing of flooding, and topographic position, but usually includes a wide diversity of canopy species, such as red maple, sweet gum, green ash, American elm, swamp tupelo, water hickory, southern magnolia, spruce pine, loblolly pine, and several oak species (including water, live, swamp chestnut, cherrybark, willow, Shumard, overcup, and diamond-leaf). The understory is typically species-poor due to frequent flooding and shading from the dense canopy, but often includes poison ivy, Virginia willow, rattan vine, coastal white-alder, dwarf palmetto, dog hobble, and giant cane, which sometimes forms large and ecologically important stands known as canebrakes. Bottomland hardwood forests are extremely important wildlife corridors for mammals and reptiles and serve as major migration routes for millions of birds each spring and fall. Most of Georgia's bottomland hardwood forests have been severely impacted by construction of dams, clearing for agriculture and timber, conversion to pine plantations, and invasion by exotic pest plant species such as privet, Japanese honeysuckle, and Nepal grass. Preservation of this diverse and ecologically significant community should be encouraged by conservation easements, pest plant eradication, and long-rotation timber management.

Comprehensive Wildlife Conservation Strategy High Priority Habitats: Bottomland Hardwood Forests, Canebrakes

Special Concern Plant Species Associated with Coastal Plain Bottomland Hardwood Forests:

Bigpod wild indigo, *Baptisia megacarpa*
Brown's savory, *Clinopodium brownei* (syn. *Micromeria brownei* var. *pilosiuscula*)
Carolina crownbeard, *Verbesina walteri*
Catbird grape, *Vitis palmata*
Cayaponia, *Cayaponia quinqueloba*
Curtiss' loosestrife, *Lythrum curtissii*
Dark-green sedge, *Carex venusta*
Floodplain tickseed, *Coreopsis integrifolia*
Florida water-parsnip, *Sium floridanum*
Florida willow, *Salix floridana*
Fog-fruit, *Phyla lanceolata*
Grooved-stem Indian-plantain, *Arnoglossum sulcatum*
Heartleaf climbing hempweed, *Mikania cordifolia*
Louisiana spikemoss, *Selaginella ludoviciana*
Meager hop flatsedge, *Cyperus lupulinus* ssp. *macilentus*
Meisner's tear-thumb, *Persicaria meisneriana* var. *beyrichiana* (syn. *Polygonum meisnerianum* var. *beyrichianum*)
Munson grape**,** *Vitis rotundifolia* var. *munsoniana*
Pennsylvania pellitory, *Parietaria pensylvanica*
Pipe-stem fetterbush, *Agarista populifolia*
Rush quillwort, *Isoetes junciformis*
Serviceberry holly, *Ilex amelanchier*
Shadow-witch orchid, *Ponthieva racemosa*
Social sedge, *Carex socialis*
Swamp black-eyed susan, *Rudbeckia auriculata*
Swamp buckthorn, *Sideroxylon thornei*
Trepocarpus, *Trepocarpus aethusae*
Variable-leaf Indian-plantain, *Arnoglossum diversifolium*

Coastal Plain Bottomland Hardwood Forests, continued

Special Concern Animal Species Associated with Coastal Plain Bottomland Hardwood Forests:

Amphibians
Brimley's chorus frog, *Pseudacris brimleyi*

Birds
Bachman's warbler, *Vermivora bachmanii*
Bald eagle, *Haliaeetus leucocephalus*
Ivory-billed woodpecker, *Campephilus principalis*
Swainson's warbler, *Limnothlypis swainsonii*
Swallow-tailed kite, *Elanoides forficatus*

Mammals
Eastern cougar, *Felis concolor cougar*
Rafinesque's big-eared bat, *Corynorhinus rafinesquii*

Reptiles
Eastern indigo snake, *Drymarchon couperi*

COASTAL PLAIN RIVER BANK AND LEVEE FORESTS

Riverbank and levee forests are hardwood-dominated forests that border river channels. They develop on the active levees and stable banks of medium to large blackwater and alluvial streams, as well as on sandbars that form on the inward sides of river meanders. Areas that receive frequent flooding support pioneer species such as willow, cottonwood, and titi, while more stable soils support sycamore, red maple, silver maple, river birch, catalpa, and planertree. Vines are common along riverbanks because of the availability of sunlight and include pepper vine, trumpet creeper, cross vine, grape vines, rattan vine, poison ivy, and greenbriers. Because of frequent flooding and scouring, ground layer species are uncommon, usually limited to a few grasses and sedge. These communities are especially vulnerable to invasion by exotic pest plants such as Japanese honeysuckle, Chinese privet, Nepalese browntop, and Japanese climbing fern. Vegetation on river banks and levees plays an important role in bank stabilization, prevention of erosion, and preservation of water quality, as well as providing wildlife cover and nesting. Disturbances, such as logging, home-building, and cattle grazing that open these communities to invasion by exotic pest plants and undermine the stability of the soils, should be discouraged.

Comprehensive Wildlife Conservation Strategy High Priority Habitats: Bottomland Hardwood Forests, Canebreaks

Special Concern Plant Species Known From Coastal Plain River Bank And Levee Forests:
Brown's savory, *Clinopodium brownei* (syn. *Micromeria brownei* var. *pilosiuscula*)
Catbird grape, *Vitis palmata*
Cayaponia, *Cayaponia quinqueloba*
Florida leadbush, *Amorpha herbacea* var. *floridana*
Georgia indigo bush, *Amorpha georgiana* var. *georgiana*
Greenfly orchid, *Epidendrum conopseum*
Louisiana spikemoss, *Selaginella ludoviciana*
Meager hop flatsedge, *Cyperus lupulinus* ssp. *macilentus*
Munson grape**,** *Vitis rotundifolia* var. *munsoniana*
Serviceberry holly, *Ilex amelanchier*

Special Concern Animal Species Known From Coastal Plain River Bank And Levee Forests:

Birds
Bachman’s warbler, *Vermivora bachmanii*
Bald eagle, *Haliaeetus leucocephalus*
Swainson’s warbler, *Limnothlypis swainsonii*
Swallow-tailed kite, *Elanoides forficatus*

Reptiles
Barbour's map turtle, *Graptemys barbouri*
Florida brown snake, *Storeria dekayi victa*
Florida green water snake, *Nerodia floridana*
Florida river cooter, *Pseudemys nelsoni*

COASTAL PLAIN SMALL STREAM FLOODPLAIN FOREST

Small stream floodplain forests occur along small, tannin-stained streams and in the headwaters of small creeks and streams where soils are sandy or mucky and highly acidic. Because these floodplains are narrow, there is little or no development of floodplain features such as levees, ridges, or back sloughs, although there may be a braided network of small stream channels flowing around hummocks, cypress knees, and surficial tree roots. The canopy of these forests is dominated by a mix of broadleaved evergreen trees, such as loblolly bay, sweet bay, and red bay, and deciduous trees, especially bald cypress, swamp tupelo, Ogeechee lime, red maple, sweet gum, cherrybark oak, and laurel oak. Often there is a dense understory of shrubs and vines, such as witch hazel, titi, Virginia-willow, buckwheat tree, dahoon, rattan vine, and various greenbriers; herbs are sparse and limited to a few species such as cinnamon fern, sensitive fern, and lizard's tail. Small stream floodplain forests are important wildlife habitats: they provide roosting, foraging, and nesting sites for numerous species of birds and act as corridors for dispersal and migration for many other animals. These forests have been polluted by farm runoff and degraded by stream channelization, cattle trampling, exotic pest plant invasion (especially Japanese climbing fern and Chinese privet), feral hog rooting, and conversion to farm ponds. Important in their own right, these forests and the streams that support them are also essential components of Coastal Plain blackwater river systems; restoration and management must be based on a watershed-wide approach that addresses all the factors that threaten water quality and floodplain integrity.

Comprehensive Wildlife Conservation Strategy High Priority Habitats: Bayheads and Titi Swamps, Streams (Blackwater), Canebrakes

Special Concern Plant Species Associated with Coastal Plain Small Stream Floodplain Forests:

Bigpod wild indigo, *Baptisia megacarpa*
Bog spicebush, *Lindera subcoriacea*
Boom's quillwort, *Isoetes boomii*
Carolina bogmint, *Macbridea caroliniana*
Carolina crownbeard, *Verbesina walteri*
Cayaponia, *Cayaponia quinqueloba*
Dark-green sedge, *Carex venusta*
Florida anise-tree, *Illicium floridanum*
Florida water-parsnip, *Sium floridanum*
Fog-fruit, *Phyla lanceolata*
Harper's wild ginger, *Hexastylis shuttleworthii* var. *harperi*
Hummingbird flower, *Macranthera flammea*
Kentucky ladyslipper, *Cypripedium kentuckiense*
Meager hop flatsedge, *Cyperus lupulinus* ssp. *macilentus*
Meisner's tear-thumb, *Persicaria meisneriana* var. *beyrichiana* (syn. *Polygonum meisnerianum* var. *beyrichianum*)
Odorless bayberry, *Morella inodora*
Pipe-stem fetterbush, *Agarista populifolia*
Reniform sedge, *Carex reniformis*
Rush quillwort, *Isoetes junciformis*
Serviceberry holly, *Ilex amelanchier*
Shadow-witch orchid, *Ponthieva racemosa*
Social sedge, *Carex socialis*
Swamp-forest beaksedge, *Rhynchospora decurrens*
Tawny cotton-grass, *Eriophorum virginicum*
Trepocarpus, *Trepocarpus aethusae*
Wintergreen quillwort, *Isoetes hyemalis*

Coastal Plain Small Stream Floodplain Forests, continued

Special Concern Animal Species Associated with Coastal Plain Small Stream Floodplain Forests:

Amphibians

One-toed amphiuma, *Amphiuma pholeter*
Dwarf waterdog, *Necturus punctatus*
Dwarf siren, *Pseudobranchus striatus*
Carpenter frog, *Rana virgatipes*
Brimley's chorus frog, *Pseudacris brimleyi*

Birds

Bachman's warbler, *Vermivora bachmanii*
Black-crowned night-heron, *Nycticorax nycticorax*
Swainson's Warbler, *Limnothlypis swainsonii*
Wood stork, *Mycteria americana*
Yellow-crowned night-heron, *Nyctanassa violacea*

Fish

Apalachicola redhorse, *Moxostoma* sp. cf. *M. poecilurum* "grammarion"
Banded topminnow, *Fundulus cingulatus*
Blackbanded sunfish, *Enneacanthus chaetodon*
Bluenose shiner, *Pteronotropis welaka*
Eastern mudminnow, *Umbra pygmaea*
Golden topminnow, *Fundulus chrysotus*
Highscale Shiner, *Notropis hypsilepis*
Ironcolor shiner, *Notropis chalybaeus*
Redface topminnow, *Fundulus rubrifrons*
Russetfin topminnow, *Fundulus escambiae*
Sawcheek darter, *Etheostoma serrifer*

Invertebrates

Apalachicola floater, *Anodonta heardi*
Bog crayfish, *Procambarus truculentus*
Cedar Creek crayfish, *Procambarus chacei*
Sandhills crayfish, *Procambarus angustatus*
Dougherty burrowing crayfish, *Cambarus doughertyensis*
Duke's skipper, *Euphyes dukesi*
Humpback crayfish, *Procambarus epicyrtus*
Muckalee crayfish, *Procambarus gibbus*
Oconee burrowing crayfish, *Cambarus truncatus*
Okefenokee Zale Moth, *Zale perculta*
Ogeechee crayfish, *Procambarus petersi*
Vidalia crayfish, *Procambarus advena*

Mammals

Rafinesque's big-eared bat, *Corynorhinus rafinesquii*

Reptiles

Eastern indigo snake, *Drymarchon couperi*
Common rainbow snake, *Farancia erytrogramma erytrogramma*
Spotted Turtle, *Clemmys guttata*
Florida redbelly turtle, *Pseudemys nelsoni*
Striped crayfish snake, *Regina alleni*

COASTAL PLAIN CYPRESS SAVANNAS AND DEPRESSION MARSHES

Cypress savannas and depression marshes occur in shallow depressions that are underlain by impervious clay layers that hold water in the depressions. Known by a variety of names such as Carolina bay, limesink pond, isolated wetlands, Grady pond, karst pond, flatwoods pond, depression meadow, and sinkhole pond, these wetlands are not usually connected by surface flow to streams or lakes. Water levels in marshes, savannas, and ponds depend heavily on rainfall and fluctuate over the seasons and years, creating unique habitats for plants, and animals. Depression marshes lack trees and support numerous species of grasses, sedges, orchids, carnivorous plants, milkworts, bog buttons, and floating plants, depending on water depth, while cypress savannas have a scattered canopy of pond cypress, black gum, or pond pine over an herb layer of grasses and sedges. They are particularly important habitat for amphibians and wading birds. These isolated wetlands currently do not receive protection from ditching, draining, and other disturbance under federal or Georgia state wetland regulations; many of Georgia's cypress savannas and depression marshes have been severely impacted or destroyed by ditching, dredging, filling, and conversion to fish ponds, agriculture, or pine plantations. Management of isolated wetlands should include prescribed fire, particularly when the wetlands are embedded within fire-maintained uplands. Fire breaks should not be cut around the wetlands, and fire should be allowed to burn from the upland into the wetland to preserve the biologically rich transition areas between uplands and wetlands.

Comprehensive Wildlife Conservation Strategy High Priority Habitats: Open-Water Ponds and Lakes, Forested Depressional Wetlands, Freshwater Prairies (in part)

Special Concern Plant Species Associated with Coastal Plain Cypress Savannas and Depression Marshes:

Algal bulrush, *Websteria confervoides*
Awned meadowbeauty, *Rhexia aristosa*
Bluets, *Oldenlandia boscii*
Bog bluestem, *Andropogon mohrii*
Bog St. John's-wort, *Hypericum adpressum*
Boykin's lobelia, *Lobelia boykinii*
Canby's dropwort, *Oxypolis canbyi*
Canby's club-rush, *Schoenoplectus etuberculatus*
Chapman's beakrush, *Rhynchospora stenophylla*
Chapman's yellow fringed orchid, *Platanthera chapmanii*
Coastal beaksedge, *Rhynchospora pleiantha*
Cooley meadowrue, *Thalictrum cooleyi*
Creeping smallflower seedbox, *Ludwigia spathulata*
Dwarf burhead, *Echinodorus parvulus*
Elliott's croton, *Croton elliottii*
Elliott's fanpetals, *Sida elliottii*
Evergreen lowbush blueberry, *Vaccinium crassifolium*
Feather-bristle beaksedge, *Rhynchospora oligantha*
Floating manna-grass, *Glyceria septentrionalis*
Halberd-leaf tear-thumb, *Persicaria arifolia*
Hammock sedge, *Carex fissa* var. *aristata*
Harperella, *Ptilimnium nodosum*
Harper's beaksedge, *Rhynchospora harperi*
Harper's fimbry, *Fimbristylis perpusilla*
Hirsts' witch grass, *Dichanthelium hirstii*
Hygrophila, *Hygrophila lacustris*
Lamance iris, *Iris brevicaulis*
Lavender bladderwort, *Utricularia resupinata*
Lax water-milfoil, *Myriophyllum laxum*
Leafless dwarf bladderwort, *Utricularia olivacea*
Limesink spikerush, *Eleocharis atropurpurea*
Littleleaf mecardonia, *Mecardonia acuminata* var. *microphylla*
Longbeak beaksedge, *Rhynchospora scirpoides*
Loomis loosestrife, *Lysimachia loomisii*
Narrow-leaved miterwort, *Mitreola angustifolia*
Narrow-leaved naiad, *Najas filifolia*

Coastal Plain Cypress Savannas and Depression Marshes, continued

Special Concern Plant Species Associated with Coastal Plain Cypress Savannas and Depression Marshes, continued

Narrow-leaved obedient plant, *Physostegia angustifolia*
Nodose spikerush, *Eleocharis montana*
Ovate-leaved arrowhead, *Sagittaria platyphylla*
Panic grass, *Panicum neuranthum*
Pentodon, *Pentodon pentandrus*
Pineland beaksedge, *Rhynchospora punctata*
Pond spice, *Litsea aestivalis*
Pond spicebush, *Lindera melissifolia*
Reniform sedge, *Carex reniformis*
Savanna iris, *Iris tridentata*
Sharpscale bulrush, *Schoenoplectus hallii*
Shortspike bluestem, *Andropogon brachystachyus*
Small-flowered white meadowbeauty, *Rhexia parviflora*
Solitary beakrush, *Rhynchospora solitaria*
Southern beaksedge, *Rhynchospora microcarpa*
Southeastern panic grass, *Panicum tenerum*
Southern bog-button, *Lachnocaulon beyrichianum*
Southern umbrella-sedge, *Fuirena scirpoidea*
Tallahassee hedge-nettle, *Stachys hyssopifolia* var. *lythroides*
Thorne's beakrush, *Rhynchospora thornei*
Torrey beakrush, *Rhynchospora torreyana*
Torrey dropseed, *Muhlenbergia torreyana*
Water smartweed, *Persicaria amphibia*
White sunnybell, *Schoenolirion albiflorum* (syn. *Schoenolirion elliottii*)
Zenobia, *Zenobia pulverulenta*

Special Concern Animal Species Associated with Coastal Plain Cypress Savannas and Depression Marshes:

Amphibians

Broad-striped dwarf siren, *Pseudobranchus striatus*
Eastern tiger salamander, *Ambystoma tigrinum tigrinum*
Carpenter frog**,** *Rana virgatipes*
One-toed amphiuma, *Amphiuma pholeter*

Birds

American bittern, *Botaurus lentiginosus*
Black rail, *Laterallus jamaicensis*
Black-crowned night-heron, *Nycticorax nycticorax*
Glossy ibis, *Plegadis falcinellus*
Henslow's sparrow, *Ammodramus henslowii*
Limpkin, *Aramus guarauna*
Little blue heron, *Egretta caerulea*
Sandhill crane, *Grus canadensis*
Swallow-tailed kite, *Elanoides forficatus*
Wood stork, *Mycteria americana*
Yellow-crowned night-heron, *Nyctanassa violacea*

Fish

Banded topminnow, *Fundulus cingulatus*
Redface topminnow, *Fundulus rubrifrons*

Invertebrates

Baracoa skipper, *Polites baracoa*
Bog crayfish, *Procambarus truculentus*
Oconee burrowing crayfish, *Cambarus truncatus*
Vidalia crayfish, *Procambarus advena*

Mammals

Red wolf, *Canis rufus*
Round-tailed muskrat, *Neofiber alleni*

Reptiles

American alligator, *Alligator mississippiensis*
Florida green water snake, *Nerodia floridana*
Striped crayfish snake, *Regina alleni*
Northern Florida swamp snake, *Seminatrix pygaea pygaea*
Spotted turtle, *Clemmys guttata*

COASTAL PLAIN CYPRESS-GUM DEPRESSION SWAMPS

Cypress-gum depression swamps are isolated wetlands that occur in seasonally and semi-permanently flooded depressions that have mucky or peaty, acidic soils underlain by an impervious clay layer. Known by a variety of names such as Carolina bay, limesink pond, and Grady pond, these communities are dominated by a closed canopy of pond cypress and swamp black gum, either alone or in combination. Often, they form a dome-shaped canopy, thus earning another name, "cypress dome." Generally, they pond water longer than marshes or cypress savannas and consequently fire is less frequent in these environments. The shrub layer may be relatively open or dense with thickets of blaspheme vine, greenbrier, titi, shining fetterbush, sweet pepperbush, and myrtle leaf holly over a sparse herb layer of ferns and sedges. Much of the plant diversity, including a high number of rare plant species, is associated with the edges or ecotones that surround the ponds, particularly where the adjacent longleaf pine wiregrass upland is managed with frequent fire. Cypress - gum depression swamps provide important habitat for migrating waterfowl and for wading birds such as herons, ibis, egrets, and wood storks, which use these sites for rookeries. These swamps rarely support fish and therefore provide safe breeding habitats for frogs and salamanders. Many of Georgia's cypress-gum swamps have been degraded by cypress harvest, drainage, and conversion to agriculture and pine plantations. In some cases, the hydroperiod has been altered through changes in regional water tables. Restoration of these wetlands often require plugging drainage ditches. Connections with upland habitats are important in maintaining wildlife corridors.

Comprehensive Wildlife Conservation Strategy High Priority Habitats: Forested Depressional Wetlands

Special Concern Plant Species Associated with Coastal Plain Cypress-Gum Depression Swamps:

Bluets, *Oldenlandia boscii*
Boykin lobelia, *Lobelia boykinii*
Canby's dropwort, *Oxypolis canbyi*
Coastal beaksedge, *Rhynchospora pleiantha*
Creeping smallflower seedbox, *Ludwigia spathulata*
Evergreen lowbush blueberry, *Vaccinium crassifolium*
Floating manna-grass, *Glyceria septentrionalis*
Harperella, *Ptilimnium nodosum*
Harper's beaksedge, *Rhynchospora harperi*
Hirsts' witch grass, *Dichanthelium hirstii*
Leafless dwarf bladderwort, *Utricularia olivacea*
Narrow-leaved miterwort, *Mitreola angustifolia*
Narrow-leaved water-willow, *Justicia angusta*
Nodose spikerush, *Eleocharis montana*
Panic grass, *Panicum neuranthum*
Pond spice, *Litsea aestivalis*
Pond spicebush, *Lindera melissifolia*
Raynal's bulrush, *Schoenoplectus erectus* ssp. *raynalii* (syn. *Scirpus erismanae*)
Reniform sedge, *Carex reniformis*
Savanna iris, *Iris tridentata*
Serviceberry holly, *Ilex amelanchier*
Small-flowered white meadowbeauty, *Rhexia parviflora*
Southeastern panic grass, *Panicum tenerum*
Southern beaksedge, *Rhynchospora microcarpa*
Swamp buckthorn, *Sideroxylon thornei*
Woodland bulrush, *Scirpus expansus*
Zenobia, *Zenobia pulverulenta*

Coastal Plain Cypress-Gum Depression Swamps, continued

Special Concern Animal Species Associated with Coastal Plain Cypress-Gum Depression Swamps:

Amphibians

Broad-striped dwarf siren, *Pseudobranchus striatus striatus*
Carpenter frog**,** *Rana virgatipes*
Eastern tiger salamander, *Ambystoma tigrinum tigrinum*
Flatwoods salamander, *Ambystoma cingulatum*
One-toed amphiuma, *Amphiuma pholeter*
Slender dwarf siren *Pseudobranchus striatus spheniscus*
Southern dusky salamander, *Desmognathus auriculatus*

Birds

Black-crowned night-heron, *Nycticorax nycticorax*
Glossy ibis, *Plegadis falcinellus*
Little blue heron, *Egretta caerulea*
Wood stork, *Mycteria americana*
Yellow-crowned night-heron, *Nyctanassa violacea*

Fish

Blackbanded sunfish, *Enneacanthus chaetodon*

Invertebrates

Bog crayfish, *Procambarus truculentus*
Dougherty burrowing crayfish, *Cambarus doughertyensis*
Oconee burrowing crayfish, *Cambarus truncatus*
Okefenokee zale moth, *Zale perculta*
Variegated meadowhawk, *Sympetrum corruptum*
Vidalia crayfish, *Procambarus advena*

Reptiles

Florida green water snake, *Nerodia floridana*
Northern Florida swamp snake, *Seminatrix pygaea pygaea*
Spotted turtle, *Clemmys guttata*

COASTAL PLAIN OAK DEPRESSION WETLANDS

Oak depression wetlands occur in shallow, occasionally inundated, depressions within longleaf pine-dominated uplands where live oak, swamp laurel oak, and water oak form “islands” or “hammocks” of evergreen hardwoods. This community is particularly common in the Dougherty Plain, developing in fire-suppressed limesink depressions. Heavy shade, periodic standing water, and a thick layer of live oak leaf litter lead to a species-poor ground layer. Depression oak wetlands do not support many wildlife species due to the relative absence of cover and food, but some species such as squirrels, owls and turkey do make use of the acorns and roosting sites. These communities probably became more abundant during the last several decades as the result of fire suppression or a long-term practice of burning uplands during the winter when standing water in the depressions exclude fire. Seed bank studies have shown that these depressions once supported herb species found in open, fire-maintained wetlands typical of those occurring within the longleaf pine ecosystem, such as depression marshes and flatwoods ponds. In the absence of ground cover to carry fire, this community is likely to persist once established. Removal of the hardwood canopy, herbicide application to stumps, and applying fire when conditions will carry fire will encourage the development of herbaceous ground cover, if management as a more natural, herb-dominated community is desired.

Comprehensive Wildlife Conservation Strategy High Priority Habitats: Forested Depressional Wetlands

Special Concern Plant Species Associated with Coastal Plain Oak Depression Wetlands:
No Special Concern plants have been recorded in this environment.

Special Concern Animal Species Associated with Coastal Plain Oak Depression Wetlands:
No Special Concern animals have been recorded in this environment.

COASTAL PLAIN OKEFENOKEE SWAMP

The Okefenokee Swamp is one of the most significant wetland systems in the United States. Largely protected as the Okefenokee National Wildlife Refuge, it encompasses more than 700 square miles. Its acidic, tea-colored waters, stained by tannins released from decaying vegetation, are derived primarily (70%) from rainwater and flow southeast and southwest to form, respectively, the St. Mary's River and the Suwannee River. The swamp, which lies in an enormous peat-filled basin, harbors numerous rare and endangered plants and animals and is famous for its tremendous diversity of animal species: more than 20 species of frogs, 235 species of birds, 60 species of reptiles, and 48 species of mammals. Lightning-set fires, whether surficial during wetter years or catastrophic during drought years, play a major role in creating and maintaining the shifting mosaic of plant communities that make up the "swamp" – pine/oak uplands, cypress and bay swamps, scrub-shrub wetlands, and vast freshwater prairies of aquatic plants. Despite its current appearance of pristine remoteness, the Okefenokee Swamp was severely disturbed in the past by timber harvest, turpentining, construction of drainage canals, installation of water control devices, and fire suppression. As recognition of the importance of natural fire to the swamp has increased, management efforts are focused on containing fire within the refuge boundaries, managing smoke, and working with adjacent landowners to reduce the likelihood of wildfire damage to private property. Future management efforts may focus on restoring ecological connections between wetlands and uplands, monitoring water quality, and limiting air, light, and noise pollution from nearby urban areas.

Comprehensive Wildlife Conservation Strategy High Priority Habitats: The Okefenokee is a mosaic of several CWCS habitats, including Bayheads and Titi Swamps, Evergreen Hammocks, Freshwater Prairies, Longleaf Pine-Wiregrass Savannas, Open-Water Ponds and Lakes, Pine Flatwoods, Blackwater Rivers and Swamps, Wet Pine Savannas, Herb and Shrub Bogs

Special Concern Plant Species Associated with the Coastal Plain Okefenokee Swamp:

Arrow arum, *Peltandra sagittifolia*
Ball-moss, *Tillandsia recurvata*
Bartram's air-plant, *Tillandsia bartramii*
Bluff white oak, *Quercus austrina*
Canby's club-rush *Scirpus etuberculatus*
Chapman's oak, *Quercus chapmanii*
Chapman's skeleton grass, *Gymnopogon chapmanianus*
Crestless plume orchid, *Pteroglossaspis ecristata*
Dwarf pawpaw, *Asimina pygmaea*
Florida ladies-tresses, *Spiranthes floridana*
Florida milk-pea, *Galactia floridana*
Florida orange-grass, *Ctenium floridanum*
Greenfly orchid, *Epidendrum conopseum*
Hartwrightia, *Hartwrightia floridana*
Hooded pitcherplant, *Sarracenia minor*
Many-flowered grass-pink, *Calopogon multiflorus*
Marl spleenwort, *Asplenium heteroresiliens*
Northern white beaksedge, *Rhynchospora alba*
Parrot pitcherplant, *Sarracenia psittacina*
Pennyroyal, *Piloblephis rigida*
Pineland plantain, *Plantago sparsiflora*
Pond spice, *Litsea aestivalis*
Purple honeycomb head, *Balduina atropurpurea*
Quill-leaf air-plant, *Tillandsia fasciculata*
Red milkweed, *Asclepias rubra*
Sand spikerush, *Eleocharis montevidensis*
Savanna iris, *Iris tridentata*
Savanna milkweed, *Asclepias pedicellata*
Scale-leaf purple foxglove, *Agalinis aphylla*
Silver buckthorn, *Sideroxylon alachuense*
Snakeroot-leaf aster, *Eurybia eryngiifolia*
Snowy orchid, *Platanthera nivea*
Southern bog-button, *Lachnocaulon beyrichianum*
Southern umbrella-sedge, *Fuirena scirpoidea*
Sprawling goats'- rue, *Tephrosia chrysophylla*
Sticky joint-vetch, *Aeschynomene viscidula*
Sweet flag, *Acorus americanus*

Coastal Plain Okefenokee Swamp, continued

Special Concern Plant Species Associated with the Coastal Plain Okefenokee Swamp, continued

Tawny cotton-grass *Eriophorum virginicum*
Three-birds orchid, *Triphora trianthophora*
Tracy's dew-threads, *Drosera tracyi*
Whisk fern, *Psilotum nudum*
White spikerush, *Eleocharis albida*
Yellow flytrap, *Sarracenia flava*
Yellow fringeless orchid, *Platanthera integra*

Special Concern Animal Species Associated with the Coastal Plain Okefenokee Swamp:

Amphibians

Broad-striped dwarf siren, *Pseudobranchus striatus striatus*
Carpenter frog, *Rana virgatipes*
Flatwoods salamander, *Ambystoma cingulatum*
Gopher frog, *Rana capito*

Birds

American bittern, *Botaurus lentiginosus*
Bachman's sparrow, *Aimophila aestivalis*
Black-crowned night-heron, *Nycticorax nycticorax*
Florida Sandhill crane, *Grus canadensis*
Glossy ibis, *Plegadis falcinellus*
Greater sandhill crane, *Grus canadensis tabida*
Ivory-billed woodpecker, *Campephilus principalis*
Limpkin, *Aramus guarauna*
Little blue heron, *Egretta caerulea*
Red-cockaded woodpecker, *Picoides borealis*
Swallow-tailed kite, *Elanoides forficatus*
Wood stork, *Mycteria americana*
Yellow-crowned night-heron, *Nyctanassa violacea*

Fish

Banded topminnow, *Fundulus cingulatus*
Blackbanded sunfish, *Enneacanthus chaetodon*
Golden topminnow, *Fundulus chrysotus*
Redface topminnow, *Fundulus rubrifrons*
Eastern mudminnow, *Umbra pygmaea*

Invertebrates

Okefenokee zale moth

Mammals

Florida black bear, *Ursus americanus floridanus*
Rafinesque's big-eared bat, *Corynorhinus rafinesquii*
Red wolf, *Canis rufus*
Round-tailed muskrat, *Neofiber alleni*
Sherman's fox squirrel, *Sciurus niger shermani*
Southeastern myotis, *Myotis austroriparius*
Star-nosed mole, *Condylura cristata*

Reptiles

Alligator snapping turtle, *Macrochelys temminckii*
American alligator, *Alligator mississippiensis*
Eastern indigo snake, *Drymarchon couperi*
Florida green water snake, *Nerodia floridana*
Florida pine snake, *Pituophis melanoleucus mugitus*
Florida redbelly turtle, *Pseudemys nelsoni*
Gopher frog, *Rana capito*
Gopher tortoise, *Gopherus polyphemus*
Indigo snake, *Drymarchon couperi*
Island glass lizard, *Ophisaurus compressus*
Northern Florida swamp snake, *Seminatrix pygaea pygaea*
Pine woods snake, *Rhadinaea flavilata*
Spotted turtle, *Clemmys guttata*
Striped crayfish snake, *Regina alleni*
Striped newt, *Notophthalmus perstriatus*

AQUATIC ENVIRONMENTS OF THE COASTAL PLAIN ECOREGION

COASTAL PLAIN CAVES

Georgia's Coastal Plain caves, found primarily in the southwestern part of the state, form when rainwater percolates through soil to reach limestone bedrock, dissolving calcium carbonate and forming an underground cavern. Caves are stable environments: terrestrial caves have constant air temperatures and humidity, and aquatic caves have water with stable temperatures and pH. Caves support many animals that are uniquely adapted to live in complete darkness, such as blind or albino crayfish, blind cave salamanders, cave amphipods, cave shrimp, cave snails, and cave isopods; even minor disturbances to their environment can have drastic consequences to cave dwellers. Caves also provide shelter for mammals such as two rare species of bats and bears. Georgia's Cave Protection Act was passed in 1977, making it a crime to disturb caves and their fauna without permission of the landowner; however, owners are free to damage their caves by mining or other destructive practices under this law. Caves and their inhabitants are also threatened by groundwater withdrawals, vandalism, sedimentation, point and nonpoint pollution, vandalism, and by disruption of nutrient input into the caves; every effort should be made to protect these fragile and unique ecosystems.

Comprehensive Wildlife Conservation Strategy High Priority Habitats: Caves

Special Concern Plant Species Associated with Coastal Plain Caves:
Marl spleenwort, *Asplenium heteroresiliens*
Varicolor spleenwort, *Asplenium heterochroum*

Special Concern Animal Species Associated with Coastal Plain Caves:
Amphibians
Georgia blind salamander, *Haideotriton wallacei*

Invertebrates
Dougherty plain cave crayfish, *Cambarus cryptodytes*

Mammals
Rafinesque's big-eared bat, *Corynorhinus rafinesquii macrotis*
Southeastern myotis, *Myotis austroriparius*

COASTAL PLAIN OPEN WATER PONDS AND LAKES

Coastal Plain open-water lakes and ponds include beaver ponds, Carolina bays, limesink ponds, and oxbow lakes. Carolina bays are oval in shape with a northwest to southeast axis and a deep sandy berm following the eastern and southern rim, suggesting to some researchers that they were formed by powerful unidirectional winds in an earlier geological age. Limesink ponds develop when the underlying limestone bedrock collapses. Oxbow lakes are created when river meanders join across a floodplain, creating a new channel and leaving behind a narrow, curved lake in the old river bed that is isolated from the new channel of the river. Vegetation in open-water lakes and ponds is usually confined to the shoreline except for floating plants or plants that root in the bottom of the lake, sending leaves and flowers to the lake surface. Lakes and ponds are critical to many species of wildlife and their sandy rims or fluctuating shorelines provide habitat for a variety of plant species. Open-water lakes and ponds are threatened by exotic species invasion, especially by water hyacinth and hydrilla which can form extensive floating mats on the surface of lakes and ponds, competing with native plants for nutrients, light, and oxygen.

Comprehensive Wildlife Conservation Strategy High Priority Habitats: Open Water Ponds and Lakes

Special Concern Plant Species Associated with Coastal Plain Open Water Ponds and Lakes (also see Coastal Plain Cypress Savannas and Depression Marshes):
Clonal thread-leaved beakrush, *Rhynchospora pleiantha*
Cypress-knee sedge, *Carex decomposita*
Florida quillwort, *Isoetes flaccida* var. *flaccida*
Lake-cress, *Neobeckia aquatica* (syn. *Armoracia lacustris*)
Lax water-milfoil, *Myriophyllum laxum*
Narrowleaf naiad, *Najas filifolia*
Pondberry, *Lindera melissifolia*
Round-leaved peat-moss, *Sphagnum cyclophyllum*

Special Concern Animal Species Associated with Coastal Plain Open Water Ponds and Lakes (also see Coastal Plain Cypress Savannas and Depression Marshes):
Amphibians
Broad-striped dwarf siren, *Pseudobranchus striatus striatus*
Carpenter frog, *Rana virgatipes*

Birds
American bittern, *Botaurus lentiginosus*
Bald eagle, *Haliaeetus leucocephalus*
Black-crowned night-heron, *Nycticorax nycticorax*
Black-necked stilt, *Himantopus mexicanus*
Little blue heron, *Egretta caerulea*
Tricolored heron, *Egretta tricolor*
Wood stork, *Mycteria americana*
Yellow-crowned night-heron, *Nyctanassa violacea*

Coastal Plain Open Water Ponds and Lakes, continued

Fish
Banded topminnow, *Fundulus auroguttatus*
Bluebarred pygmy sunfish, *Elassoma okatie*
Bluefin killifish, *Lucania goodei*
Eastern mudminnow, *Umbra pygmaea*

Mammals
Northern yellow bat, *Lasiurus intermedius*

Mollusks
Apalachicola floater, *Anodonta heardi*
Beaverpond marstonia, *Marstonia castor* (syn. *Pyrgulopsis castor*)
Florida floater, *Utterbackia peggyae*
Tidewater mucket, *Leptodea ochracea*
White heelsplitter, *Lasmigona complanata complanata*

Other Invertebrates
Diminutive clubtail, *Gomphus diminutus*
Florida bluet, *Enallagma pollutum*
Sandhill bluet, *Enallagma davisi*
Sepia baskettail, *Epitheca sepia*
Sharpnose crayfish, *Procambarus acutissimus*
Sphagnum sprite, *Nehalennia gracilis*
Variegated meadowhawk, *Sympetrum corruptum*

Reptiles
Alligator snapping turtle, *Macrochelys temminckii*
American alligator, *Alligator mississippiensis*
Florida green water snake, *Nerodia floridana*
Florida redbelly turtle, *Pseudemys nelsoni*
Northern Florida swamp snake, *Seminatrix pygaea pygaea*
Spotted turtle, *Clemmys guttata*
Striped crayfish snake, *Regina alleni*

COASTAL PLAIN SPRINGS AND SPRING RUNS

Georgia's Coastal Plain is underlain by limestone bedrock that serves as a giant aquifer, supplying water for the entire region. Where bedrock is near the surface, water often emerges as springs, especially in the Dougherty Plain area of southwest Georgia where 20 large springs between Albany and Bainbridge discharge millions of gallons per day. Water also springs from the base of some sandhills, especially in the upper Coastal Plain and Fall Line regions, carving out steepheads and forming small, clear water streams with cool, stable temperatures and constant flow regimes. Springs and spring runs rarely have floodplains but are often lined with shrub bogs or small swamps that are important habitat for a large number of rare plants and animals (see Seepage Swamps and Shrub Bogs). Many of the larger springs are important cool-water refuges for species such as striped bass. Springs are severely affected by sedimentation and point and nonpoint pollution as well as excessive groundwater withdrawals that reduce the flows from springs and significantly alter downstream habitat.

Comprehensive Wildlife Conservation Strategy High Priority Habitats: Springs and Spring Runs

Special Concern Plant Species Associated with Coastal Plain Springs and Spring Runs:
Bearded beakrush, *Rhynchospora crinipes*
Clearwater butterwort, *Pinguicula primuliflora*
Florida willow, *Salix floridana*
Lax water-milfoil, *Myriophyllum laxum*
Meisner's tear-thumb, *Persicaria meisneriana* var. *beyrichiana* (syn. *Polygonum meisnerianum* var. *beyrichianum*)
Pygmy pondweed, *Potamogeton pusillus*

Special Concern Animal Species Associated with Coastal Plain Springs and Spring Runs:
Fish
Bluefin killifish, *Lucania goodei*
Goldstripe darter, *Etheostoma parvipinne*
Savannah darter, *Etheostoma fricksium*
Suwannee bass, *Micropterus notius*

Invertebrates
Beaverpond marstonia, *Marstonia castor*
Dougherty Plain cave crayfish, *Cambarus cryptodytes*
Downy rainbow, *Villosa villosa*
Ocmulgee marstonia, *Marstonia agarhecta*
Say's spiketail, *Cordulegaster sayi*
Winged spike, *Elliptio nigella*

Reptiles
Rainbow snake, *Farancia erytrogramma erytrogramma*
Southern coal skink, *Eumeces anthracinus pluvialis*

COASTAL PLAIN BROWNWATER (ALLUVIAL) RIVERS AND STREAMS

Brownwater (alluvial) rivers and streams originate in the Piedmont and carry large amounts of sediments, mostly eroded from Piedmont agricultural lands, that color the water brown and contribute to the creation of extensive floodplain swamps. These usually large, meandering rivers have sand and silt substrates and floodplains that are inundated for long periods. Extensive cypress-gum swamps can be found on most major alluvial rivers in Georgia's Coastal Plain. The Altamaha River, one of the largest rivers on the eastern seaboard, with its complex system of oxbow lakes, sandbars, sand ridge scrub forests, hardwood levee forests, cypress-gum swamps, limestone shoals and, at its coastal terminus, freshwater and tidal marshes and estuaries, is an exemplary brownwater river system. Brownwater rivers and their floodplain communities support a wide variety of fish and other aquatic organisms, including many species of rare and endangered fish and mussels. These rivers have been heavily impacted by the many upriver dams which alter hydroperiods, disrupt sediment transport regimes, and negatively impact the coastal sand-sharing system and the productivity of estuarine areas. Impoundments have negatively impacted aquatic fauna by lowering dissolved oxygen and impeding migration. Brownwater rivers and streams have also been degraded by point and nonpoint source pollution and invasion of exotic plant and animal species. Safeguarding these important aquatic environments will depend on limiting the effects of impoundment, protection of stream buffers, control of exotic pest species, and reduction of pollution sources.

Comprehensive Wildlife Conservation Strategy High Priority Habitats: Alluvial (Brownwater) Rivers and Swamps

Special Concern Plant Species Associated with Coastal Plain Brownwater (Alluvial) Rivers:
No Special Concern plant species have been recorded in this natural community.

Special Concern Animal Species Associated with Coastal Plain Brownwater (Alluvial) Rivers and Streams:

Birds

Bald eagle, *Haliaeetus leucocephalus*
Swallow-tailed kite, *Elanoides forficatus*

Fish

Highscale shiner, *Notropis hypsilepis*
Halloween darter, *Percina crypta*
Broadstripe shiner, *Pteronotropis euryzonus*
Bluenose shiner, *Pteronotropis welaka*
Shortnose sturgeon, *Acipenser brevirostrum*
Ironcolor shiner, *Notropis chalybaeus*
Spotted bullhead, *Ameiurus serracanthus*

Mollusks

Altamaha arcmussel, *Alasmidonta arcula*
Altamaha spinymussel, *Elliptio spinosa*
Apalachicola floater, *Anodonta heardi*
Atlantic pigtoe, *Fusconaia masoni*
Black-crest elimia, *Elimia albanyensis*
Brook floater, *Alasmidonta varicosa*
Brother spike, *Elliptio fraternal*
Fat threeridge, *Amblema neislerii*
Gulf moccasinshell, *Medionidus penicillatus*
Halloween darter, *Percina crypta*
Ochlockonee moccasinshell, *Medionidus simpsonianus*
Oval pigtoe, *Pleurobema pyriforme*
Purple bankclimber, *Elliptoideus sloatianus*
Savannah lilliput, *Toxolasma pullus*
Southern elktoe, *Alasmidonta triangulata*

Coastal Plain Brownwater (Alluvial) Rivers and Streams, continued

Special Concern Animal Species Associated with Coastal Plain Brownwater (Alluvial) Rivers and Streams, continued

Other Invertebrates

Big bluet, *Enallagma durum*
Blackwater sand-filtering mayfly, *Homoeoneuria dolani*
Coppery emerald, *Somatochlora georgiana*
Wallace's deepwater mayfly, *Anepeorus simplex*

Reptiles

Alligator snapping turtle, *Macrochelys temminckii*
Barbour's map turtle, *Graptemys barbouri*

COASTAL PLAIN BLACKWATER (NON-ALLUVIAL) RIVERS AND STREAMS

Georgia's Coastal Plain blackwater streams originate in the Coastal Plain and are named for the clear, tea-colored waters that contrast so strikingly with their sandy, white streambeds. The black, reddish-brown, or amber color is due to dark-staining, organic acids that are leached from plants and leaf litter and released into the water. Floodplains are small or moderately sized, often with dense thickets of evergreen vegetation and networks of runnels that flow around hummocks, cypress knees, and surficial tree roots (see Small Stream Floodplain Forest). Microhabitats, such as pools, runs, beaver ponds, and limestone outcrops and shoals, support a wide variety of fish and other aquatic organisms, including many species of rare and endangered fish and mussels. Many blackwater streams have been degraded by point and nonpoint source pollution, reduction of dissolved oxygen, sedimentation, channelization, impoundment, and exotic plant and animal species, such as parrot feather and flathead catfish. Safeguarding these important environments will depend on protection of stream buffers, control of exotic pest species, regulation of ground- and surface water withdrawals, and reduction of pollution sources.

Comprehensive Wildlife Conservation Strategy High Priority Habitats: Blackwater Streams

Special Concern Plant Species Associated with Coastal Plain Blackwater (Non-alluvial) Rivers and Streams:
Boom's quillwort, *Isoetes boomii*
Meisner's tear-thumb, *Persicaria meisneriana* var. *beyrichiana*
(syn. *Polygonum meisnerianum* var. *beyrichianum*)
Pygmy pondweed, *Potamogeton pusillus*
Winter quillwort, *Isoetes hyemalis*

Special Concern Animal Species Associated with Coastal Plain Blackwater (Non-alluvial) Rivers and Streams:

Amphibians
Carpenter frog, *Rana virgatipes*
Gulf coast waterdog, *Necturus beyeri complex*
Dwarf waterdog, *Necturus punctatus*
Many-lined salamander, *Stereochilus marginatus*
Southern dusky salamander, *Desmognathus auriculatus*

Fish
Banded topminnow, *Fundulus cingulatus*
Blackbanded sunfish, *Enneacanthus chaetodon*
Bluebarred pygmy sunfish, *Elassoma okatie*
Bluenose shiner, *Pteronotropis welaka*
Broadstripe shiner, *Pteronotropis euryzonus*
Golden topminnow, *Fundulus chrysotus*
Goldstripe darter, *Etheostoma parvipinne*
Highscale shiner, *Notropis hypsilepis*
Ironcolor shiner, *Notropis chalybaeus*
Lowland shiner, *Pteronotropis stonei*
Metallic shiner, *Pteronotropis metallicus*
Savannah darter, *Etheostoma fricksium*
Sawcheek darter, *Etheostoma serrifer*

Coastal Plain Blackwater (Non-alluvial) Rivers and Streams, continued

Special Concern Animal Species Associated with Coastal Plain Blackwater (Non-alluvial) Rivers and Streams, continued

Mollusks

Altamaha arcmussel, *Alasmidonta arcula*
Apalachicola floater, *Anodonta heardi*
Black-crest elimia, *Elimia albanyensis*
Blackwater needlefly, *Leuctra moha*
Blackwater sand-filtering mayfly, *Homoeoneuria dolani*
Brook floater, *Alasmidonta varicosa*
Fat threeridge, *Amblema neislerii*
Flaxen elimia, *Elimia boykiniana*
Grainy crayfish, *Procambarus verrucosus*
Gulf moccasinshell, *Medionidus penicillatus*
Inflated spike, *Elliptio purpurella*
Ochlockonee moccasinshell, *Medionidus simpsonianus*
Oval pigtoe, *Pleurobema pyriforme*
Sly crayfish, *Procambarus versutus*
Southern elktoe, *Alasmidonta triangulata*

Other Invertebrates

Big bluet, *Enallagma durum*
Coppery emerald, *Somatochlora georgiana*
Diminutive clubtail, *Gomphus diminutus*
Florida baskettail, *Epitheca stella*
Humpback crayfish, *Procambarus epicyrtus*
Muckalee crayfish, *Procambarus gibbus*
Ogeechee crayfish, *Procambarus petersi*

Reptiles

Alligator snapping turtle, *Macrochelys temminckii*
Suwannee River Cooter, *Pseudemys concinna suwanniensis*
Florida Redbelly Turtle, *Pseudemys nelsoni*
Striped Crayfish Snake, *Regina alleni*

COASTAL ECOREGION:

BARRIER ISLANDS AND ADJACENT MAINLAND

COASTAL ESTUARINE AND NEAR-SHORE MARINE WATERS

Estuaries, sounds, and other near-shore waters where fresh water from the mainland mixes with salty ocean waters are rich in nutrients delivered daily by rivers and ocean currents and tides. Together with salt marshes, which are connected to Georgia's estuaries by thousands of miles of tidal creeks, estuaries are one of the most biologically productive environments in the world. They provide critical habitat for a wide variety of fish, turtles, birds, and mammals; more than 70% of the fish, shrimp, crabs, and shellfish that comprise Georgia's fishery spend some portion of their life in estuarine waters. Fishes typically found in Georgia's estuaries include black drum, croaker, flounder, red drum, sheepshead, spotted sea trout, striped mullet, whiting, and red drum. Marine mammals such as manatees and dolphins also depend on these waters as do many thousands of acres of salt marsh vegetation that thrive on the twice daily delivery of tidal waters from the estuaries. Estuarine and near-shore waters are extremely vulnerable to the impacts of upstream contamination, dam-building, and agricultural and municipal water withdrawals. Because these types of activities have led to an abrupt decline since the 1980s in the quality and productivity of Georgia's estuaries and near-shore waters, state and regional water use planning should take into account the impact of development throughout the state on the health of Georgia's coastal waters.

Comprehensive Wildlife Conservation Strategy High Priority Habitats: Estuarine and Inshore Marine Waters

Special Concern Plant Species Associated with Coastal Estuarine and Near-shore Marine Waters: No Special Concern plant species are recorded from this community

Special Concern Animal Species Associated with Coastal Estuarine and Near-shore Marine Waters:

Birds

Bald eagle, *Haliaeetus leucocephalus*
Swallow-tailed kite, *Elanoides forficatus*

Fish

Rainwater killifish, *Lucania parva*
Short-nosed sturgeon, *Acipenser brevirostrum*

Mammals

Atlantic Hawksbill sea turtle, *Eretmochelys imbricata imbricata*
Atlantic spotted dolphin, *Stenella frontalis*
False killer whale, *Pseudorca crassidens*
Finback whale, *Balaenoptera physalus*
Humpback whale, *Megaptera novaeangliae*
Manatee, *Trichechus manatus*
Northern Atlantic right whale, *Eubalaena glacialis*
Sei whale, *Balaenoptera borealis*
Sperm whale, *Physeter macrocephalus*

Reptiles

American alligator, *Alligator mississippiensis*
Diamondback terrapin, *Malaclemys terrapin*
Green sea turtle, *Chelonia mydas*
Kemp's / Atlantic ridley sea turtle, *Lepidochelys kempii*
Leatherback sea turtle, *Dermochelys coriacea*
Loggerhead sea turtle, *Caretta caretta*

COASTAL BEACHES, SAND BARS, AND INTERTIDAL FLATS

Georgia's wide, gently sloping, Atlantic coast beaches are the most visible manifestation of the powerful natural forces – twice-daily tides, ocean currents, waves, and wind – that shape our coastline. Although beaches are harsh environments for plants and animals, they are critical foraging and nesting habitat for a large number of animals, such as shorebirds (nearly 90 species), shrimp, crabs, clams, sea cucumbers, beach clams, and horseshoe crabs. Beach wrack, a line of dead salt marsh grasses and other organic debris that accumulates at the high tide line, promotes dune formation and also provides shelter and food to a host of invertebrates that support shorebirds. Beaches are largely unvegetated, except at the transition to dunes where a few salt-tolerant plants, such as American searocket, dune marsh-elder, beach morning glory, fiddle-leaf morning glory, and sea purslane, can survive. Sand bars and intertidal mud flats, found offshore and at the mouths of tidal rivers, are also a significant part of the coastal environment. Although generally unvegetated and rarely visited by the public, sand bars and mud flats provide especially important foraging habitats for coastal shorebirds, such as plovers, sandpipers, sanderlings, American oystercatchers, ruddy turnstones, willets, and American knots, that feed on mollusks, crustaceans, and other invertebrates at low tide. The natural processes – sand sharing, river sediment transport, and longshore currents – that sustain beaches, sand bars, and mud flats should be protected by limiting coastal development, channelization of coastal rivers, upstream impoundment, seawall and jetty construction, and artificial beach renourishment, all of which interfere with the natural movement of sands, sediments, and currents.

Comprehensive Wildlife Conservation Strategy High Priority Habitats: Coastal Beaches and Sand Bars

Special Concern Plant Species Associated with Coastal Beaches, Sand Bars, and Intertidal Flats:

Bluehearts, *Buchnera americana*
Carolina wolf-berry, *Lycium carolinianum*
Sand spikerush, *Eleocharis montevidensis*
Sea-beach knotweed, *Polygonum glaucum*
Sticky jointvetch, *Aeschynomene viscidula*
Sweet acacia, *Acacia farnesiana*
Wild yellow cowpea, *Vigna luteola*

Special Concern Animal Species Associated with Coastal Beaches, Sand Bars, and Intertidal Flats:

Birds

American oystercatcher, *Haematopus palliatus*
Black skimmer, *Rynchops niger*
Gull-billed tern, *Sterna nilotica*
Least tern, *Sterna antillarum*
Long-billed curlew, *Numenius americanus*
Piping plover, *Charadrius melodus*
Red knot, *Calidris canutus*
Wilson's plover, *Charadrius wilsoni*

Reptiles

Carolina diamond-backed terrapin, *Malaclemys terrapin centrata*
Green sea turtle, *Chelonia mydas*
Kemp's / Atlantic ridley, *Lepidochelys kempii*
Leatherback sea turtle, *Dermochelys coriacea*
Loggerhead sea turtle, *Caretta caretta*

COASTAL MARITIME DUNES

Maritime dunes include the sand dunes, swales, sand flats, and shrub-scrub zones that lie landward of Georgia's Atlantic coast beaches and seaward of the maritime forests. The primary dunes, closest to the beach, are vegetated by salt-tolerant and sand-holding species such as sea oats, bitter panic grass, beach morning-glory, and railroad vine, and provide nesting or foraging habitat for a variety of animals, such as loggerhead and leatherback turtles, terns, American oystercatchers, Wilson's and piping plover, black skimmers, and willets. Low, protected areas between dunes – known as interdune meadows, swales, and flats – support a diversity of plants such as camphor weed, sea pink, wild bean, pennywort, dune primrose, muhly grass, butterfly pea, grass-leaved golden aster, and spurge-nettle. Between the interdune zone and the maritime forest, lies a shrub-scrub zone that consists of a dense tangle of wax myrtle, Hercules' club, yaupon, groundsel-tree, tough buckthorn, and saw palmetto intermixed with a few trees, such as live oak, cabbage palm, pine, eastern red cedar, and red bay. Few native mammals are found in maritime dune environments; introduced animals such as feral hogs, horses, and cattle inflict considerable damage on dunes and should be removed or controlled where possible. Maritime dunes are among the most picturesque and heavily visited environments of the coastal region; protecting their economic value depends on also conserving their ecological values. The natural processes – sand sharing, sediment transport, and longshore currents – that sustain maritime dunes can be protected by limiting coastal development, channelization of coastal rivers, upstream impoundment, seawall and jetty construction, and artificial beach renourishment, all of which interfere with the natural movement of sands, sediments, and currents.

Comprehensive Wildlife Conservation Strategy High Priority Habitats: Coastal Dunes and Bluffs

Special Concern Plant Species Associated with Coastal Maritime Dunes:

Climbing buckthorn, *Sageretia minutiflora*
Florida wild privet, *Forestiera segregata*
Godfrey's wild privet, *Forestiera godfreyi*
Sea-beach knotweed, *Polygonum glaucum*
Sand spikerush, *Eleocharis montevidensis*
Sweet acacia, *Acacia farnesiana*
Wild yellow cowpea, *Vigna luteola*

Special Concern Animal Species Associated with Coastal Maritime Dunes:

Birds

American oystercatcher, *Haematopus palliatus*
Gull-billed tern, *Sterna nilotica*
Least tern, *Sterna antillarum*
Piping plover, *Charadrius melodus*
Wilson's plover, *Charadrius wilsoni*

Reptiles

Carolina diamond-backed terrapin, *Malaclemys terrapin centrata*
Island glass lizard, *Ophisaurus compressus*
Leatherback sea turtle, *Dermochelys coriacea*
Loggerhead sea turtle, *Caretta caretta*
Northern mole skink, *Eumeces egregius similis*
Eastern Diamondback Rattlesnake, *Crotalus adamanteus*

COASTAL INTERDUNAL WETLANDS

Interdunal wetlands, also known as freshwater sloughs or barrier island ponds, are marshes and ponds that develop between dune ridges on Georgia's barrier islands and occasionally on the mainland where old dunes persist. Most of these wetlands are fresh water habitats sustained by rain, but periodic overwash of seawater during storms may make them temporarily brackish. Vegetation in interdunal wetlands varies widely depending on the depth and extent of open water, degree of salinity, fluctuating water levels, and surrounding plant communities. Typical herbs found in these wetlands include arrowheads, bladderworts, water lilies, sedges, sawgrass, yellow-eyed grasses, pickerelweed, soft rush, sand cordgrass, and cattails; shrubs and trees include Carolina willow, wax myrtle, buttonbush, cabbage palm, red maple, red bay, and swamp black gum. Interdunal wetlands provide a unique freshwater habitat as well as critical drinking water for the animals of barrier islands, including frogs, water snakes, alligators, wading birds and other waterfowl, bobcats, raccoons, and white-tailed deer. Preservation of interdunal wetlands depends on protecting and restoring natural hydrology in coastal areas; avoiding construction of seawalls which interfere with the integrity of the dune system; and protecting them from polluted runoff. Invasive species, especially feral hogs and Chinese tallow, threaten to destroy the vegetation and hydrology of interdunal wetlands; they should be controlled or eradicated.

Comprehensive Wildlife Conservation Strategy High Priority Habitats: Barrier Island Freshwater Wetlands and Ponds

Special Concern Plant Species Associated with Coastal Interdunal Wetlands:

Flag, *Thalia dealbata*
Michaux's cupgrass, *Eriochloa michauxii* var. *michauxii*
Mock bishop-weed, *Ptilimnium ahlesii*
Narrow-leaved obedient plant, *Physostegia leptophylla*
Salt-marsh bulrush, *Bolboschoenus novae-angliae* (syn. *Scirpus cylindricus*)
Salt-marsh spikerush, *Eleocharis fallax*
Sand spikerush, *Eleocharis montevidensis*
Sticky joint-vetch, *Aeschynomene viscidula*
Swamp hibiscus, *Hibiscus grandiflorus*
White spikerush, *Eleocharis albida*
Wild yellow cowpea, *Vigna luteola*

Special Concern Animal Species Associated with Coastal Interdunal Wetlands:

Birds

Black rail, *Laterallus jamaicensis*
Black-crowned night-heron, *Nycticorax nycticorax*
Glossy ibis, *Plegadis falcinellus*
Little blue heron, *Egretta caerulea*
Long-billed curlew, *Numenius americanus*
Sandhill crane, *Grus canadensis*
Swallow-tailed kite, *Elanoides forficatus*
Tricolor heron, *Egretta tricolor*
Wood stork, *Mycteria americana*
Yellow-crowned night-heron, *Nyctanassa violacea*

Fishes

Banded topminnow, *Fundulus cingulatus*
Bluefin killifish, *Lucania goodei*

Coastal Interdunal Wetlands, continued

Special Concern Animal Species Associated with Coastal Interdunal Wetlands, continued
Mammals
Blackbeard's whitetailed deer, *Odocoileus virginianus nigribarbis*
Round-tailed muskrat, *Neofiber alleni*

Reptiles
American alligator, *Alligator mississippiensis*

COASTAL MARITIME FORESTS

Georgia has the largest portion of intact maritime forest of any state along the Atlantic coast due to the fact that most of our barrier islands are in some form of conservation ownership and protection. Maritime forests are found on stabilized dunes on barrier islands, on marsh hammocks (small islands in the salt marsh), and on ridges and bluffs on the mainland near the coast. Vegetation in these areas is influenced by the harsh effects of wind, salt spray, and storms; by the frequency of fire; and by land use history (most of Georgia's coastal areas, including the barrier islands, were once planted in cotton or other crops). Usually characterized by a salt spray-pruned canopy of intertwined live oak branches, maritime forest also may include cabbage palm, laurel oak, red bay, southern magnolia, pignut hickory, and southern pines, with a dense understory of saw palmetto, sweet bay, wax myrtle, staggerbush, sparkleberry, buckthorn, red cedar, and scrub oaks. Maritime forests provide important habitat for birds with up to 240 neotropical migrants and year-round residents documented in these forests and adjacent habitats. Preservation of Georgia's exemplary maritime forests depends primarily on limiting the residential and commercial development that fragments these forests; also important are the careful use of prescribed fire and the control of invasive species, especially Chinese tallow tree and feral hogs. Also of great concern is the recent introduction of laurel wilt disease, a deadly fungal infection spread by a nonnative beetle, which kills red bay, sassafras, and other members of the laurel plant family and has had a huge impact on the understory of the maritime forest.

Comprehensive Wildlife Conservation Strategy High Priority Habitats: Maritime Forest and Coastal Hammocks

Special Concern Plant Species Associated with Coastal Maritime Forests:

Ball-moss, *Tillandsia recurvata*
Carolina wolf-berry, *Lycium carolinianum*
Climbing buckthorn, *Sageretia minutiflora*
Florida coontie, *Zamia integrifolia*
Florida wild privet, *Forestiera segregata*
Godfrey's wild privet, *Forestiera godfreyi*
Goldfoot fern, *Phlebodium aureum*
Heartleaf climbing hempweed, *Mikania cordifolia*
Pale green ladies-tresses, *Spiranthes sylvatica*
Savanna milkweed, *Asclepias pedicellata*
Silver buckthorn, *Sideroxylon alachuense*
Soapberry, *Sapindus marginatus*
Sweet acacia, *Acacia farnesiana*
Velvet sedge, *Carex dasycarpa*
Whisk fern, *Psilotum nudum*

Special Concern Animal Species Associated with Coastal Maritime Forests:

Birds

Painted bunting, *Passerina ciris*

Mammals

Blackbeard's white-tailed deer, *Odocoileus virginianus nigribarbis*

Reptiles

Eastern diamondback rattlesnake, *Crotalus adamanteus*
Island glass lizard, *Ophisaurus compressus*
Northern mole skink, *Eumeces egregius similis*

COASTAL SALT AND BRACKISH TIDAL MARSHES

Although Georgia's coastline is only 100 miles long – less than 5% of the U.S. Atlantic seaboard – its coast supports 33% of the tidal marsh along the Atlantic. Nearly a half-million acres of salt and brackish tidal marshes occupy the estuaries between the mainland and barrier islands and the edges of tidal rivers and sounds. Varying levels of salinity within the tidal marshes create interesting patterns of vegetation. Areas that are inundated twice daily by tides support vast, uniform swathes of smooth cordgrass, while brackish marshes, with irregular inundation and lower salinity levels, are usually dominated by black needlerush. Brackish marshes are more diverse, supporting a variety of grasses (such as salt grass), sedges (salt marsh bulrush, softstem bulrush, and three-square bullrush), herbs (seaside lavender), and shrubs (yaupon, marsh elder) are also found in the marshes. Hypersaline areas (salt flats) support small succulent plants, such as saltwort, glasswort, and seaside oxeye. Scrub-shrub patches of red cedar, groundsel-tree, and wax myrtle may occur on higher ground on the fringes of tidal marshes. Salt and brackish marshes are vital to both the natural and human environments, buffering the impacts of storms and tidal surges and providing nurseries for large numbers of fish and other marine life. They also provide some of the most serenely beautiful vistas in Georgia. Tidal marshes are impacted by inland damming of the rivers that feed the estuaries, by dredging and ditching of tidal rivers, and by residential and commercial development. They are also threatened by rising sea levels caused by global climate change. Intensive and long-range land use planning are needed to minimize impacts from development and to anticipate the effects of climate change.

Special Concern Plant Species Associated with Coastal Brackish Tidal Marshes: (note: all of these plant species are associated with brackish rather than with salt marshes)

Flag, *Thalia dealbata*
Michaux's cupgrass, *Eriochloa michauxii* var. *michauxii*
Narrow-leaved obedient plant, *Physostegia leptophylla*
Salt-marsh bulrush, *Bolboschoenus novae-angliae* (*Scirpus cylindricus*)
Salt-marsh spikerush, *Eleocharis fallax*
White spikerush, *Eleocharis albida*

Special Concern Animal Species Associated with Coastal Salt and Brackish Tidal Marshes:

Birds

American oystercatcher, *Haematopus palliatus*
Black rail, *Laterallus jamaicensis*
Glossy ibis, *Plegadis falcinellus*
Gull-billed tern, *Sterna nilotica*
Henslow's sparrow, *Ammodramus henslowii*
Long-billed curlew, *Numenius americanus*
Nelson's sharp-tailed sparrow, *Ammodramus nelsoni*
Saltmarsh sharp-tailed sparrow, *Ammodramus caudacutus*
Seaside sparrow, *Ammodramus maritimus*

Fish

Rainwater killifish, *Lucania parva*
Shortnose sturgeon, *Acipenser brevirostrum*

Mammals

Blackbeard's whitetailed deer, *Odocoileus virginianus nigribarbis*
Manatee, *Trichechus manatus*

Reptiles

Diamondback terrapin, *Malaclemys terrapin*

COASTAL TIDAL SWAMPS

Tidal swamps are forested, freshwater wetlands found along rivers and creeks that are regularly flooded and drained as a result of daily tides and occasional storm events. The canopy in tidal swamps is usually dominated by bald cypress and water tupelo and may also include sweet gum, swamp tupelo, and red maple; the subcanopy and shrub layers include tag alder, stiff dogwood, buttonbush, dahoon, swamp redbay, possumhaw, and musclewood. Herbs are sparse in these frequently flood-scoured habitats and are limited to a few species such as sensitive fern, royal fern, cinnamon fern, netted chain fern, water-willow, green dragon, green arrow arum, and yellow stargrass. Tidal swamps support a wide variety of mammals, including red bat, least shrew, marsh rabbit, eastern woodrat, opossum, raccoon, gray fox, rice rat, white-tailed deer, and black bear, and birds such as blue heron, snowy egret, Lousiana heron, common egret, white ibis, belted kingfisher, pileated woodpecker, Mississippi kite, anhinga, mallard, and black duck. Although vast areas of tidal swamp have been logged or converted to rice fields over the last 250 years, Georgia still has about 59,000 acres of tidal swamp, with the largest tracts found along the lower Altamaha, Ogeechee, Savannah, and Satilla Rivers. Tidal swamps are threatened by construction of upstream dams, dredging, drainage, construction of tidal flapgates, and rising sea levels. Exotic species, especially feral hogs, flathead catfish, Asian clam, water hyacinth, and alligatorweed, threaten the natural diversity of plant and animal species in tidal swamps and should be eradicated or controlled.

Comprehensive Wildlife Conservation Strategy High Priority Habitats: Tidal Swamp

Special Concern Plant Species Associated with Coastal Tidal Swamps:
Arrow-arum, *Peltandra sagittifolia*
Bartram's air-plant, *Tillandsia bartramii*
Corkwood, *Leitneria floridana*
Greenfly orchid, *Epidendrum conopseum*
Narrow-leaf obedient plant, *Physostegia leptophylla*

Special Concern Animal Species Associated with Coastal Tidal Swamps:
Birds
Bald eagle, *Haliaeetus leucocephalus*
Black-crowned night-heron, *Nycticorax nycticorax*
Glossy ibis, *Plegadis falcinellus*
Limpkin, *Aramus guarauna*
Swallow-tailed kite, *Elanoides forficatus*
Wood stork, *Mycteria americana*
Yellow-crowned night-heron, *Nyctanassa violacea*

Fish
Blackbanded sunfish, *Enneacanthus chaetodon*
Eastern mudminnow, *Umbra pygmaea*
Shortnose sturgeon, *Acipenser brevirostrum*

Coastal Tidal Swamps, continued

Special Concern Animal Species Associated with Coastal Tidal Swamps, continued
Invertebrates
Duke's skipper, *Euphyes dukesi*
Tidewater mucket, *Leptodea ochracea*

Mammals
Manatee, *Trichechus manatus*

Reptiles
American alligator, *Alligator mississippiensis*
Spotted turtle, *Clemmys guttata*
Florida redbelly turtle, *Pseudemys nelsoni*
Northern Florida swamp snake, *Seminatrix pygaea pygaea*
Rainbow snake, *Farancia erytrogramma erytrogramma*

COASTAL TIDAL FRESHWATER MARSHES

Although Georgia's coastline accounts for less than 5% of the Atlantic coastline, it has the third highest area of tidal freshwater marsh (47,000 acres) on the Atlantic coast (after New Jersey and South Carolina). Tidal freshwater marshes are found along the edges of tidally influenced rivers, upstream of salt and brackish marshes, and have little or no salt in their waters. With an abundance of sunlight, water, and nutrients – and lacking the salt stress of estuarine marshes – freshwater tidal marshes are extremely productive ecosystems that support a high diversity of plants and animals. More birds use tidal freshwater marshes for feeding, nesting, and breeding than any other type of marsh. A diversity of fish, amphibians, and mammals such as marsh rabbits, opossum, raccoon, marsh rice rat, mink, white tailed deer, and beaver also thrive in these marshes. Vegetation varies depending on season, depth of water, and duration of flooding, and includes a variety of grasses and sedges, such as giant cutgrass, wild rice, giant cordgrass, rice cutgrass, and sawgrass, and other herbs such as pickerelweed, cattail, arrow-arum, spatterdock, waterweed, pondweed, smartweeds, water hemp, bur marigold, golden club, tearthumb, clearweed, and rose-mallow. Tidal freshwater marshes are threatened by salt-water intrusion, groundwater pumping for commercial and industrial uses, drainage for development and agriculture, and invasion by exotic pest species such as marsh dewflower, common reed, and Chinese tallow.

Comprehensive Wildlife Conservation Strategy High Priority Habitats: Tidal Rivers and Freshwater Tidal Marshes

Special Concern Plant Species Associated with Coastal Tidal Freshwater Marshes:
Carolina lilaeopsis, *Lilaeopsis carolinensis*
Corkwood, *Leitneria floridana*
Michaux's cupgrass, *Eriochloa michauxii* var. *michauxii*
Mock bishop-weed, *Ptilimnium ahlesii*
Narrow-leaf obedient plant, *Physostegia leptophylla*
Swamp hibiscus, *Hibiscus grandiflorus*
Water smartweed, *Polygonum amphibium* var. *emersum*
Wild yellow cowpea, *Vigna luteola*

Special Concern Animal Species Associated with Coastal Tidal Freshwater Marshes:
Birds
Bald eagle, *Haliaeetus leucocephalus*
Black rail, *Laterallus jamaicensis*
Black-crowned night-heron, *Nycticorax nycticorax*
Glossy ibis, *Plegadis falcinellus*
Least bittern, *Ixobrychus exilis*
Little blue heron, *Egretta caerulea*
Sandhill crane, *Grus canadensis*
Swallow-tailed kite, *Elanoides forficatus*
Tricolored heron, *Egretta tricolor*
Yellow-crowned night-heron, *Nyctanassa violacea*

Fish
Short-nosed sturgeon, *Acipenser brevirostrum*

Coastal Tidal Freshwater Marshes, continued

Special Concern Animal Species Associated with Tidal Freshwater Marshes, continued
Mammals
Round-tailed muskrat, *Neofiber alleni*

Mollusks
Tidewater mucket, *Leptodea ochracea*

Other Invertebrates
Rare skipper, *Problema bulenta*

Reptiles
American alligator, *Alligator mississippiensis*
Diamondback terrapin, *Malaclemys terrapin*
Rainbow snake, *Farancia erytrogramma*
Florida redbellied cooter, *Pseudemys nelsoni*