Wildlife and Plant Species and Important Habitats

Question 1:

Based on available information and referenced material, what plant and animal species occur within the range of the Southern Appalachian Assessment (SAA) area, and what are their habitat associations?

The Southern Appalachian area contains an estimated 80 species of amphibians and reptiles, 175 species of land birds, 65 species of mammals, 2,250 species of vascular plants, and possibly as many as 25,000 species of invertebrates (Boone and Aplet 1994, USDA FS 1993b, Hamel 1992). It was not possible to identify and develop habitat relationships for all of these individual species. As an alternative, the team used an approach that has been likened to coarse and fine filtration (The Nature Conservancy 1982, Noss 1987). Hunter (1990) describes this approach.

The coarse filter component looks at broad habitat types in various stages of succession, rare communities, and ecological units. The purpose is to identify the full range of habitat types across the region. The underlying theory is that most plant and animal species in a region can be maintained by providing an appropriate mixture of habitats. Coarse filtration avoids the need to fully examine every species–a nearly impossible assignment. Two problems with the coarse filter component are that some species requirements may not be adequately addressed, and species of particular interest to the public may be omitted. A fine filter component was used to identify individual species and special habitat parameters. The coarse-fine filter approach resulted in a list of special individual plant and animal species; a list of broad vegetation classes; a list of ecological section and subsection units; and a list of rare communities. A detailed species/habitat matrix was developed to relate the special individual species to various habitat elements. With this information, the individual species were then organized into groups based on habitat associations to simplify the assessment.

Broad Vegetation Classes

To help describe the structure of SAA ecosystems, 16 broad land cover classes were identified to characterize "macro" habitats across the SAA area (table 2.1, column 2).These included nine forest classes and seven non-forest classes. Brief descriptions of these 16 classes are included in appendix C. Each forest class was subdivided into four successional stages because individual species often require a particular successional stage of a habitat. The four successional stages recognized in the analysis were: (1) grass, shrubs, and seedlings; (2) saplings and poletimber; (3) mid-succession; and (4) late-succession, including old forests. Criteria for placement into successional stages are shown in table 2.2. An analysis for possible old growth on National Forest System (NFS) lands was performed using classes of old-growth forests based on classes developed by Nowacki (1993). Table 2.3 shows the relationship of these old-growth classes (column 3) to broad vegetation classes (column 1) and USDA Forest Service (FS), Region 8, forest cover types (column 2).

Rare Community Types

In cooperation with The Nature Conservancy, 31 rare ecological groups (rare communities) were identified in the SAA area. Abbreviated descriptions are included in appendix C. A detailed description of each is included in the SAA process file. These 31 communities are broad "umbrella" descriptions of groups of communities and do not replace finer scale community units described by state natural heritage programs or those developed as part of The Nature Conservancy national classification. They do not detail all the

able 2.1 The relationship of the Southern Appalachian Assessment (SAA) area remote sensing imagery vegetation classes with the habitat groups in the SAA plant nd animal species/habitat matrix and Southern National Forest forest–type codes.

errestrial Habitat Groups Used in ant and Animal Species/Habitat Matrix	Classes Mapped in SAA Remote Sensing Imagery	Classes[1]	Southern Region NFS Forest Types Code	Name
orthern Hardwood Forests	Northern Hardwood Forests	(1) (6)	81	Sugar Maple–Beech–Yellow Birch
ixed Mesophytic Hardwood Forests	Mixed Mesophytic Hardwood Forests	(1) (6)	50	Yellow Poplar
			56	Yellow Poplar–White Oak–Red Oak
eric Oak Forests	Oak Forests	(1) (6)	51	Post Oak–Black Oak
			52	Chestnut Oak
			57	Scrub Oaks
			59	Scarlet Oak
			60	Chestnut Oak–Scarlet Oak
esic Oak Forest	Oak Forests	(1) (6)	53	White Oak-Red Oak-Hickory
			54	White Oak
			55	Northern Red Oak–Hickory
ottomland Hardwood Forests	Bottomland Hardwood Forests	(1) (6)	58	Sweetgum–Yellow Poplar
			71	Black Ash–American Elm-Red Maple
			72	River Birch-Sycamore
			73	Cottonwood
			76	Silver Maple-American Elm
ontane Spruce–Fir Forests	Montane Spruce–Fir Forests	(1) (7)	6	Fraser Fir
			7	Red Spruce-Fraser Fir
	White Pine–Hemlock–Hardwood Forest	(1) (8)	17	Red Spruce-Northern Hardwoods
outhern Yellow Pine Forests	Southern Yellow Pine Forests	(1) (7)	31	Loblolly Pine
			32	Shortleaf Pine
			33	Virginia Pine
			38	Pitch Pine
			39	Table Mountain Pine
ountain Longleaf Pine Forests	Southern Yellow Pine Forest	(1) (7)	21	Longleaf Pine
	Mixed Pine–Hardwood Forests	(1) (8	26	Longleaf Pine
/hite Pine–Hemlock–Hardwood Forests	White Pine–Hemlock Forests	(1) (7)	3	White Pine
			4	White Pine–Hemlock
			5	Hemlock
	White Pine–Hemlock-Hardwood Forests	(1) (8)	8	Hemlock–Hardwood
			9	White Pine–Cove Hardwoods
			10	White Pine–Upland Hardwoods
			41	Cove Hardwoods–White Pine-Hemlock
			42	Upland Hardwoods–White Pine

able 2.1 (cont.) The relationship of the Southern Appalachian Assessment (SAA) area remote sensing imagery vegetation classes with the habitat groups in the SAA lant and animal species/habitat matrix and Southern National Forest forest–type codes.

errestrial Habitat Groups Used in ant and Animal Species/Habitat Matrix	Classes Mapped in SAA Remote Sensing Imagery	Classes	Southern Region NFS Forest Types Code	Name
eric Mixed Pine–Hardwood Forests	Mixed Pine-Hardwood Forests	(1) (8)	12	Shortleaf Pine–Oaks
			15	Pitch Pine–Oaks
			16	Virginia Pine–Oaks
			20	Table Mountain Pine–Hardwoods
			44	Southern Red Oak–Yellow Pine
			45	Chestnut Oak–Scarlet Oak–Yellow Pine
			49	Bear Oak–Southern Scrub Oaks–Yellow Pine
esic Mixed Pine–Hardwood Forests	Mixed Pine-Hardwood Forests	(1) (8)	13	Loblolly Pine–Hardwoods
			46	Bottomland Hardwoods–Yellow Pine
			47	White Oak–Black Oak–Yellow Pine
			48	Northern Red Oak–Hickory–Yellow Pine
edar Woodlands	Mixed Pine-Hardwood Forests	(1) (8)	11	Eastern Redcedar–Hardwoods
	Southern Yellow Pine Forest	(1) (7)	35	Eastern Redcedar
	Mixed Pine–Hardwood Forests	(1) (8)	43	Oaks-Eastern Redcedar
ld Fields	Grass, Forbs, Cedar Woodlands, Early Successional			
igh Elevation Grasslands	with less than 25% woody vegetation.	(2)		
igh Elevation Shrubs				
arly Successional with <25% woody vegetation				
ock Outcrops	Rock Outcrops, Bare Soil	(3)		
allus Slopes				
aves				
ray Cliffs				
are Soil, Sand, Gravel				
rchards, Croplands	Croplands			
astures	Pastures			
nergent Wetlands	Wetland	(4)		
ountain Bogs				
oring Heads and Springs				
0% or more Synthetic Surface	Developed	(5)		
akes, Rivers, Ponds	Water			

emote Sensing Imagery Classes:
= Greater than 25% is woody vegetation.
= Consists of grasses, forbs, woody vegetation with less than 25% woody vegetation
= Greater than 25% is non-vegetation (bare soil, rock, sand).
= Land where the vegetation is less than 60% AND water is present.

5 = Where vegetation is less than 25%, and more than 50% is synthetic surface.
6 = Of the vegetation present, 70% or more is deciduous.
7 = Of the vegetation present, 70% or more is evergreen
8 = Of the vegetation present, 31 to 69% or is a mix of deciduous and evergreen.

Table 2.2 The ages for successional classes of the 9 forest classes in the Southern Appalachian Assessment area.

Forest Classes Mapped in Remote Sensing Imagery	Grass/ Shrub/ Seedling	Sapling /Pole	Mid Successional	Late Successional including Old Forests	Old Forest are Believed to be About
Northern Hardwood Forests	0-10 years	11-40 years	41-90 years	91+ years	180 years
Mixed Mesophytic Hardwood Forests	0-10 years	11-40 years	41-80 years	81+ years	130 years
Oak Forests	0-10 years	11-40 years	41-80 years	81+ years	130 years
Bottomland Hardwood Forests	0-10 years	11-20 years	21-60 years	61+ years	100 years
White Pine–Hemlock Forests	0-10 years	11-40 years	41-90 years	91+ years	180 years
Montane Spruce–Fir Forests	0-10 years	11-40 years	41-80 years	81+ years	130 years
Southern Yellow Pine forests	0-10 years	11-20 years	21-60 years	61+ years	100 years
White Pine–Hemlock–Hardwood Forests	0-10 years	11-30 years	31-90 years	91+ years	180 years
Mixed Pine–Hardwood Forests	0-10 years	11-40 years	41-80 years	81+ years	130 years

(Source: Developed by SAA TPAR team, in coordination with Southern Station Forest Inventory and Analysis (FIA) Unit)

variation in the relatively broad groups; but, where possible, this variation is addressed in the description. The 31 communities are: beaver pond and wetland complexes; beech gap forests; boulder fields (forested); calcareous cliffs; calcareous woodlands and glades; Carolina hemlock forest; caves; granitic domes; granitic flatrocks; grassy balds; heath balds; high-elevation rocky summits; mafic and calcareous fens; mafic cliffs; mafic woodlands and glades; mountain lakes; mountain longleaf pine woodlands; mountain ponds; river gravel cobble bars; sandstone cliffs; seasonally dry sinkhole ponds; serpentine woodlands and glades; shale barrens; sinkholes and karstlands; sphagnum and shrub bogs; spray cliffs; spruce-fir forests; swamp forest-bog complexes; Table Mountain pine-pitch pine woodlands; talus slopes (nonforested); and wet prairies.

The Selection of Wildlife and Plant Species for Emphasis in the SAA

List of Special Species

The fine filtration resulted in a list of special species. To be included, a species had to meet one of six criteria:

1. Federally proposed threatened and endangered species (T&E)
2. Other species with viability concerns (VC), including federal candidate species in

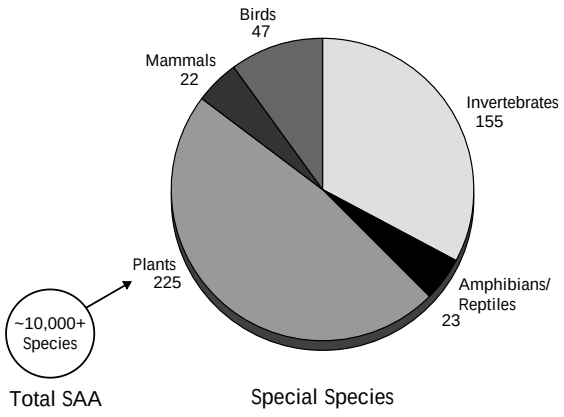

Figure 2.1 A taxonomic summary of the terrestrial plant and animal short list for the Southern Appalachian Assessment (SAA)

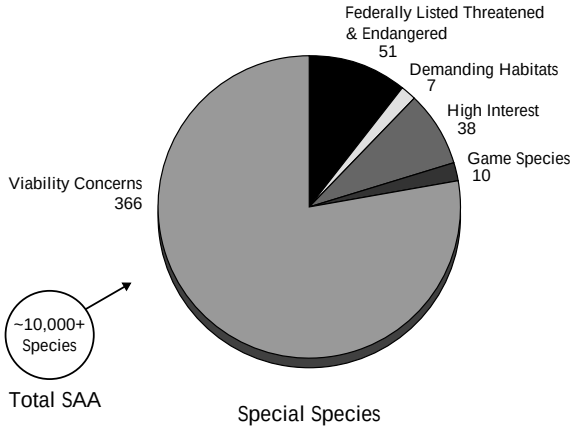

Figure 2.2 The number of terrestrial plant and animal species from the short list for the Southern Appalachian Assessment (SAA)

able 2.3 The relationship of the Southern Appalachian Assessment area remote sensing imagery vegetation classes with the old growth forest type groups and the outhern National Forest forest–type codes.

rest Classes Mapped in mote Sensing Imagery	NFS Southern Region's Forest Types Code	Name	Southern Region's Old Growth Forest Type Groups [1] Code	Name
orthern Hardwood Forests	81	Sugar Maple-Beech-Yellow Birch	1	Northern Hardwood Forests
ixed Mesophytic Hardwood	50	Yellow Poplar	5a	Mixed Mesophytic forests
	56	Yellow Poplar-White Oak-Red Oak	5a	Mixed Mesophytic forests
ak Forests	Xeric:			
	51	Post Oak–Black Oak	22b	Dry and Xeric Oak Forests
	52	Chestnut Oak	21, 22b	Dry-Mesic/Dry & Xeric Oak Forests
	57	Scrub Oaks	22b, 22c	Dry and Xeric Oak Forest
	59	Scarlet Oak	21, 22b	Dry-Mesic Oak/ Dry & Xeric Oak Forests
	60	Chestnut Oak-Scarlet Oak	21,22b	Dry-Mesic Oak/ Dry & Xeric Oak Forests
	Mesic:			
	53	White Oak-Red Oak-Hickory	21	Dry-Mesic Oak Forests
	54	White Oak	21	Dry-Mesic Oak Forests
	55	Northern Red Oak-Hickory	21	Dry-Mesic Oak Forests
	N/A	Mixed Oaks that we should code as 53	21	Dry-Mesic Oak Forests
ottomland Hardwood Forests	58	Sweetgum-Yellow Poplar	13	River Floodplain Hardwood Forests
	71	Black Ash-American Elm-Red Maple	10	Hardwood (Elm-Ash-Maple) Wetland Forests
	72	River Birch-Sycamore	28	Eastern Riverfront Forests
	73	Cottonwood	28	Eastern Riverfront Forests
	76	Silver Maple-American Elm	28	Eastern Riverfront Forests
hite Pine-Hemlock Forests	3	Eastern White Pine	2b	Conifer-Northern Hardwoods
	4	Eastern White Pine-Hemlock	2a, 2b	Conifer-Northern Hardwoods
	5	Eastern Hemlock	2a, 5a	Conifer-Northern Hardwoods/Mixed Mesophytic Forests
ontane Spruce-Fir Forests	6	Fraser Fir	31	Montane and Allied Spruce-Fir Forests
	7	Red Spruce-Fraser Fir	31	Montane and Allied Spruce-Fir Forests
uthern Yellow Pine Forests	21	Longleaf Pine	26	Upland Longleaf Pine Forests
	31	Loblolly Pine	25	Dry and Dry-Mesic Oak-Pine Forests
	32	Shortleaf Pine	24, 25	Xeric Pine & Pine-Oak/Dry & Dry-Mesic Oak-Pine Forests
	33	Virginia Pine	24, 25	Xeric Pine & Pine-Oak/Dry & Dry-Mesic Oak-Pine Forests
	38	Pitch Pine	24	Xeric Pine and Pine-Oak Forests
	39	Table Mountain Pine	24	Xeric Pine and Pine-Oak Forests
hite Pine-Hemlock-Hardwood forests	8	Hemlock-Hardwood	2a	Conifer-Northern Hardwoods
	9	White Pine-Cove Hardwoods	5a	Mixed Mesophytic Forests
	10	White Pine-Upland Hardwoods	24, 25	Xeric Pine & Pine-Oak/Dry & Dry-Mesic Oak-Pine Forests
	17	Red Spruce-Northern Hardwoods	2c	Conifer-Northern Hardwoods
	41	Cove Hardwoods-White Pine-Hemlock	5a	Mixed Mesophytic Forests
ixed Pine-hardwood Forests	Xeric:			
	11	Eastern Redcedar-Hardwoods	37	Rocky, thin-soiled, excessively drained cedar woodlands
	12	Shortleaf Pine-Oaks	24	Xeric Pine and Pine-Oak Forests
	15	Pitch Pine-Oak	24, 25	Xeric Pine & Pine-Oak/Dry & Dry-Mesic Oak-Pine Forests
	16	Virginia Pine-Oak	24, 25	Xeric Pine & Pine-Oak/Dry & Dry-Mesic Oak-Pine Forests
	20	Table Mountain Pine-Hardwoods	24, 25	Xeric Pine & Pine-Oak/Dry & Dry-Mesic Oak-Pine Forests
	26	Longleaf Pine-Hardwoods	24, 25	Xeric Pine & Pine-Oak/Dry & Dry-Mesic Oak-Pine Forests
	43	Oaks-Eastern Redcedar	37	Rocky, thin-soiled, excessively drained cedar woodlands
	44	Southern Red Oak-Yellow Pine	24, 25	Xeric Pine & Pine-Oak/Dry & Dry-Mesic Oak-Pine Forests
	45	Chestnut Oak-Scarlet Oak-Yellow Pine	24, 25	Xeric Pine & Pine-Oak/Dry & Dry-Mesic Oak-Pine Forests
	49	Bear Oak-Southern Scrub Oaks-Yellow Pine	22b, 22c, 24	Dry and Xeric Oak/Xeric Pine & Pine-Oak Forests
	Mesic:			
	13	Loblolly Pine-Hardwoods	25	Dry and Dry-Mesic Oak-Pine Forests
	42	Upland Hardwoods-White Pine	24, 25	Xeric Pine & Pine-Oak/Dry & Dry-Mesic Oak-Pine Forests
	46	Bottomland Hardwoods-Yellow Pine	13	River Floodplain Hardwood Forests
	47	White Oak-Black Oak-Yellow Pine	25	Dry and Dry-Mesic Oak-Pine Forests
	48	Northern Red Oak-Hickory-Yellow Pine	24, 25	Xeric Pine & Pine-Oak/Dry & Dry-Mesic Oak-Pine Forests

Group codes and names are the same as used by the Nature Conservancy

categories 1 or 2 and species with a Nature Conservancy global rank of 1, 2, or 3

3. Game species
4. Species with high management or public interest
5. Species with demanding habitat parameters
6. Keystone species

The list of special species includes species of terrestrial plants and animals (table B-1). Among these are 225 plants, 47 birds, 22 mammals, 21 amphibians, 2 reptiles, and 155 invertebrates (fig. 2.1). Federal T&E species and species with viability concerns account for 88 percent of the species identified (fig. 2.2).

A matrix was created to develop habitat associations and relationships for the special species. The SAA species/habitat matrix was developed on spreadsheet software and is available in the SAA CD-Rom.

Species/Habitat Matrix

The matrix used 12 forest habitats and 31 rare communities. Table 2.1 lists some of them in the left column. The center column indicates how each habitat group is identified in remote sensing imagery. The right column lists the FS forest types in each habitat group. The forest habitats were subdivided into six successional classes for the matrix.

To define conditions adequately for certain species, 15 special habitat characteristics were recognized:

- Remoteness (for species sensitive to human disturbance)
- Tract size (for species needing large, contiguous tracts)
- Open canopy
- Closed canopy
- Forest interior
- Riparian
- Springs, heads, and seeps (small wet habitats)
- Water (flowing, standing, or both)
- Large trees (18+ inches in diameter at breast height)
- Trees and snags for cavity nesters
- Large snags
- Downed trees
- Leaf litter
- Elevation class:

  Greater than 4,500 feet

  Greater than 3,500 feet

  Greater than 2,500 feet

  Less than 4,500 feet

  Less than 3,500 feet

  Less than 2,500 feet
- Aspect (north or south)

Species Groups Based on Habitat Association

To simplify the assessment process the 472 selected species were assigned to groups based on habitat associations using information in the species/habitat matrix. Thirty species could not be associated with some type of habitat parameter due to lack of information on habitat relationships. Nineteen species groups were defined:

- Cave Species: 122 species associated with cave habitats.
- Mountain Bog Species: Eighteen species associated with swamp forest-bog complexes and/or sphagnum and shrub bog rare communities.
- Spray Cliff species: Nineteen species associated with spray cliffs.
- Fen or Pond Wetland Species: Six species associated with nonforested habitat and primarily with mafic and calcareous fens, wet prairies, seasonally dry sinkhole ponds, mountain ponds, mountain lakes, and beaver pond and wetland complexes.
- High-Elevation Bald and Rocky Summit Species: Twenty species associated primarily with grassy balds, heath balds, and high-elevation rocky summits. This species group is associated with high-elevation, early successional habitats.
- High pH or Mafic Species: Thirty-six species associated with the cedar woodlands calcareous woodlands and glades, calcareous cliffs, sinkholes and karstlands, and mafic woodlands and glades.
- Rock Outcrop and Cliff Species: Thirty-six species associated with shale barrens, granitic domes, mafic cliffs, boulder fields, talus slopes, and granitic flatrocks.
- Early Successional Grass/Shrub Species: Ten

species associated with the grass/shrub/seedling successional class. Other associated habitat groups include old fields, improved pastures, and agricultural crops.

- Wide-Ranging Area-Sensitive Species: The red wolf (*Canis rufus*), eastern cougar (*Felis concolor cougar*) and black bear (*Ursus americanus*). The red wolf occurs in the Southern Appalachians only in re-introduced populations. The eastern cougar is probably extirpated since there have been no confirmed sightings for several years. These species are associated with most forest types and successional stages.
- Mid- to Late-Successional Deciduous Forest Species: Seven species associated with deciduous forest habitats in the following successional classes: Sapling pole, mid-successional, and late-successional. The group includes two salamanders, one plant, two squirrels, and two birds.
- Seep, Spring, and Streamside Species: Fifty-one species associated with the same five rare communities found in the fen or pond wetland species group but generally associated with forested habitat and/or spring heads, seeps, some type of flowing water, or other riparian habitat. This group also includes species associated with the river gravel cobble bars.
- Habitat Generalist Species: Seven species associated with a variety of forest habitat groups and successional stages and not closely associated with a particular rare community. Three game species (ruffed grouse, turkey, and deer), three birds, and a plant comprise this group.
- Area-Sensitive Mid- to Late-Successional Deciduous Forest Species: Sixteen bird species comprise this group. All are area-sensitive, and many are forest interior species. They are associated with sapling pole, mid-successional, and late-successional deciduous forest habitats.
- General High-Elevation Forest Species: Seven species at elevations greater than 3,500 feet and not associated with a particular forest type or rare community.
- High-Elevation Spruce-Fir Forest Species: Twenty-three species associated with montane spruce-fir forests and the spruce-fir forests rare community. Two species, a fern and a moth, are associated with northern hardwood forests and with the spruce-fir forests rare community. All species are at elevations greater than 3,500 feet, and many require elevations greater than 4,500 feet.
- Bottomland Forest Species: Two species found primarily in bottomland hardwood forests: the Virginia cup-plant (*Silphium connatum*) and the prothonotory warbler (*Protonotaria citrea*).
- Southern Yellow Pine Forest Species: Two bird species, the red cockaded woodpecker (*Picoides borealis*) and the brown-headed nuthatch (*Sitta pusilla*), dependent on southern yellow pine forests, especially longleaf pine (*Pinus palustris*).
- Mixed Mesic Species: Forty-six plant and invertebrate species primarily associated with mesic mixed pine/hardwood forests, mesic oak forests, northern hardwood forests, or mixed mesophytic hardwood forests.
- Mixed Xeric Species: Twelve species associated with xeric oak, xeric mixed pine-hardwood, and southern yellow pine forest habitat groups. Ten are plants, one is an invertebrate, and one is a reptile, the northern pine snake (*Pituophis m. melanoleveus*).

Ecological Mapping Units of the SAA

The National Hierarchical Framework of Ecological Units is a classification and mapping system developed to provide a scientific basis for ecosystem management at multiple geographic scales (USDA FS 1993a). The framework was designed to assist scientists and managers in addressing scale-related resource planning and management questions and to evaluate potential uses for land and water resources. Lands within the SAA area have been classified to five levels from domain to subsection of the National Hierarchical Framework of Ecological Units. The ecological units are representations of an association of biological and environmental factors that directly affect or indirectly express energy, moisture and nutrient gradients which regulate the structure and function of ecosystems. Ecological units at all levels are defined by a combination of physical and biological components including climate, geology, soils,

geomorphology, hydrology and vegetation. One domain, 2 divisions, 3 provinces, 10 sections, and 29 subsections are in the SAA area (fig. 2.3). A brief description of these ecological units is given in appendix D. A more detailed description of each unit is available in the SAA process file.The ecological units for the SAA are:

Humid Temperate Domain (200)
- Hot Continental Division (220)
  - Eastern Broadleaf Forest Province (221)
    - Northern Cumberland Plateau Section (221H)
      - Southwestern Escarpment Subsection (221Hc)
      - Sesquatchie Valley Northern Subsection (221Hd)
    - Southern Cumberland Mountains Section (221I)
      - Pine Mountain Thrust Block Subsection (221Ia)
      - Cleveland Subsection (221Ib)
    - Central Ridge and Valley Section (221J)
      - Rolling Limestone Hills Subsection (221Ja)
      - Sandstone Hills Subsection (221Jb)
      - Holston Valley Subsection (221Jc)
  - Central Appalachian Broadleaf Forest–Coniferous Forest–Meadows Province (M221)
    - Northern Ridge and Valley Section (M221A)
      - Appalachian Ridges Subsection (M221Aa)
      - Great Valley of Virginia Subsection (M221Ab)
    - Allegheny Mountains Section (M221B)
    - Northern Cumberland Mountains Section (M221C)
      - Central Coalfields Subsection (M221Ca)
    - Blue Ridge Mountains Section (M221D)
      - Northern Blue Ridge Mountains Subsection (M221Da)
      - Central Blue Ridge Mountains Subsection (M221Db)
      - Southern Blue Ridge Mountains Subsection (M221Dc)
      - Metasedimentary Mountains Subsection (M221Dd)
- Subtropical Division (230)
  - Southeastern Mixed Forest Province (231)
    - Southern Appalachian Piedmont Section (231A)
      - Midland Plateau Central Uplands Subsection (231Aa)
      - Piedmont Ridge Subsection (231Ab)
      - Schist Plains Subsection (231Ac)
      - Lower Foothills Subsection (231Ad)
      - Schist Hills Subsection (231 Ag)
      - Lynchburg Belt Subsection (231Ak)

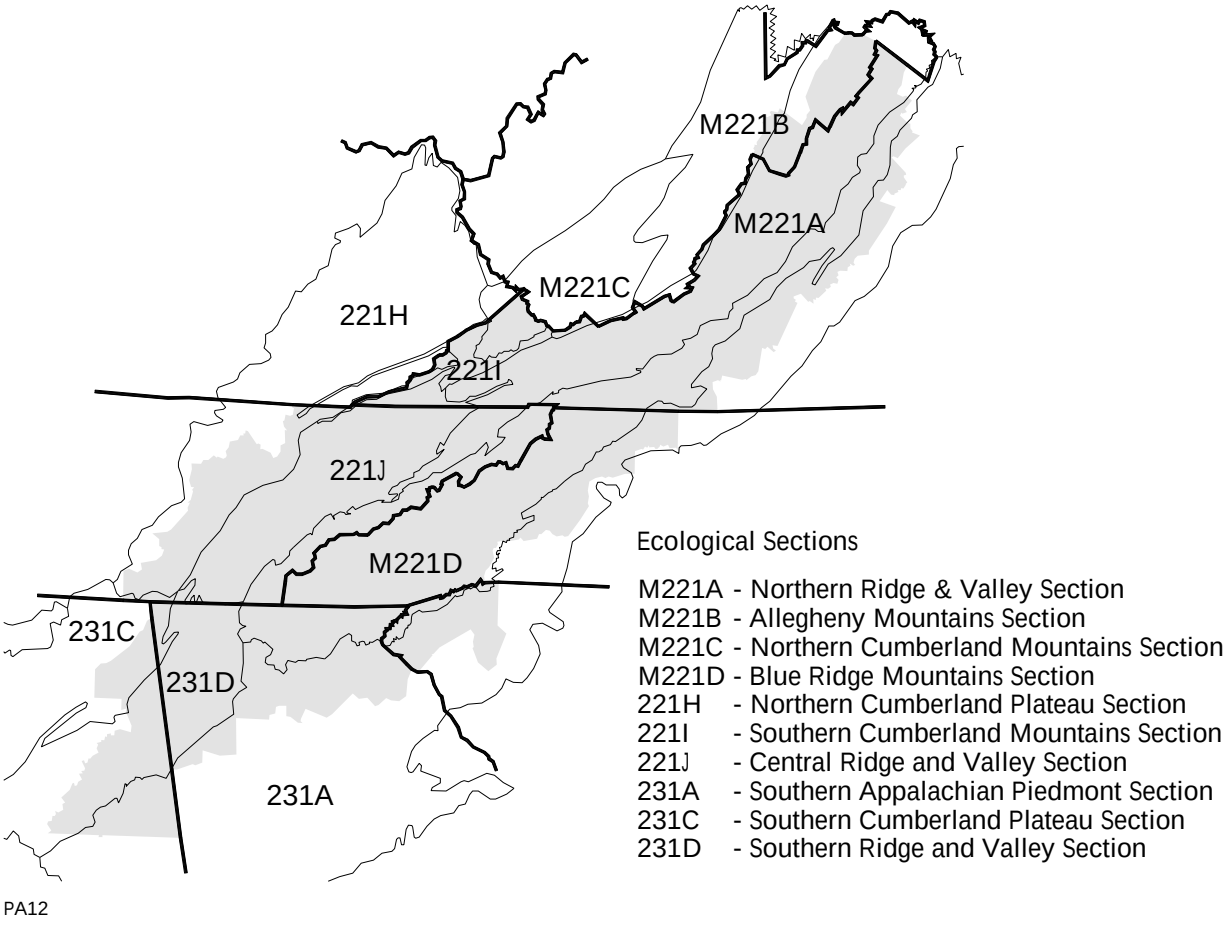

Figure 2.3 National hierarchical framework of ecological units from domain to subsection for the Southern Appalachian Assessment Area.

- Northern Piedmont Subsection (231Al)
- Triassic Basins Subsection (231Ap)

Southern Cumberland Plateau Section (231C)

- Table Plateau Subsection (231Cc)
- Southern Cumberland Valleys Subsection (231Cf)

Southern Ridge and Valley Section (231D)

- Chert Valley Subsection (231Da)
- Sandstone, Shale and Chert Ridge Subsection (231Db)
- Sandstone Ridge Subsection (231Dc)
- Quartzite and Talledega Slate Ridge Subsection (231Dd)
- Shaley Limestone Valley Subsection (231De)