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Ecozones

Background

Ecological zones (ecozones) are defined as units of land that can support a specific plant community or plant community group based upon environmental factors such as geology, temperature, moisture, fertility, and solar radiation that control vegetation distribution. These conditions in turn, support a range of habitat conditions. Each of the ecozones was modeled and mapped based on data collected from more than 5,800 plots across the Southern Blue Ridge. The modeling identifies areas with similar patterns of environmental attributes, such as landform, geology, and elevation, and assigns ecozones, which is the potential natural vegetation type (PNV) for that piece of the landscape.

Table 1 identifies eleven ecozones that include a majority of the lands across the Nantahala and Pisgah National Forests. These eleven ecozones were derived by analyzing the diversity of types and combing those with similar abiotic environments and ecological function. It is important to note that a diversity of plant communities can be represented in any single ecozone.

Table 1. Plant communities represented within eleven ecological zones, as derived from Natureserve.org, the Guide to the Natural Communities of North Carolina, 4th Approximation, or the Ecological Zones in the Southern Blue Ridge, 3rd Approximation.

Ecological Zones	Plant Communities
Spruce-Fir	Fraser Fir Forest (Rhododendron and Herb Subtypes), Red Spruce – Fraser Fir Forest (Herb, Rhododendron, Birch Transition Herb, & Low Rhododendron Subtypes)
Northern Hardwood	Northern Hardwood Cove Forest (Typic & Rich Subtypes), Blue Ridge Hemlock Northern Hardwood Forest (acidic subtype)
High Elevation Red Oak	High Elevation Red Oak Forest (Typic Herb, Rich, Heath, Orchard, & Stunted Woodland Subtypes)
Acidic Cove	Acidic Cove Forest (Typic Subtype), Canada Hemlock Forest (Typic & White Pine Subtypes), Chestnut Oak Forest (Rhododendron Subtype)
Rich Cove	Rich Cove Forest (Montane Rich, Montane Intermediate, Foothills Intermediate, Foothills Rich, Red Oak, & Boulderfield Subtypes)
Mesic Oak	Montane Oak-Hickory Forest (Acidic, Basic, Low Dry, & White Pine Subtypes)
Dry-Mesic Oak	Dry-Mesic Oak Hickory Forest, Low Montane Red Oak, Montane Oak-Hickory Forest (Low Dry Subtypes)
Dry Oak	Chestnut Oak Forest (Dry Heath, Herb, & White Pine Subtypes)
Pine-Oak Heath	Pine-Oak /Heath (Typic & High Elevation Subtypes)
Shortleaf Pine-Oak Heath	Low Mountain Pine Forest (Shortleaf Pine & Montane Subtypes), Southern Mountain Pine-Oak Forest
Alluvial Forest and Floodplain	Montane Alluvial Forest (Small River & Large River Subtypes)

Ecozones and their inherent resiliency are shaped by multiple drivers and stressors across the landscape (e.g. fire frequency and intensity, weather events, insect and disease, etc.). They contribute to landscape integrity and diversity through varied age classes and structural components, susceptibility to various

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disturbance regimes, and separate species composition and diversity. Ecozones are consistent with other modeled habitats on other Forest Service units in the southern Appalachians.

By differentiating ecozones, it is possible to identify restoration potential and management opportunities based on departure from a desired condition such as composition (as represented by PNV, see previous discussion), or structural diversity (as represented by Natural Range of Variability (NRV). The Natural Range of Variation (NRV), simply put, is the amount and distribution of structural and age diversity that can be expected across the landscape based on the frequency and intensity of relevant natural disturbances. This NRV model analysis refines ecozone definitions and is an aid in the identification of restoration potential and management opportunities based on departure from a desired condition.

In developing a NRV model specific to the Nantahala and Pisgah National Forests, age and structural class categories were developed for each ecozone by examining relevant natural disturbance patterns and their frequency across the landscape (including public and private lands). These conditions were then correlated to the biophysical settings (BPS) needed to develop a NRV for each ecozone and applying state and transition models (STSMs). From this modeling, ranges of the percent of each BPS were derived for each ecozone.

The NRV as built into the desired conditions can provide a guide to restore a landscape's health and resiliency by providing insight into temporal dynamics and key characteristics of ecological systems, and is part of the definition of ecological integrity in the 2012 planning rule. Application of NRV principles at smaller scales (i.e. during plan implementation) are useful in guiding individual project objectives and prescriptions, but it should be noted that NRV percentages apply to larger landscape scales, and are not expected to be represented at smaller project scales. That is to say, smaller projects should contribute cumulatively representation of the NRV at the larger landscape scale. To put this another way, age and structural class desired conditions within each ecozone are intended to be used at a forestwide level, rather than future desired conditions provided for each individual project.

Fire frequency as detailed in the desired conditions for individual ecozones is the disturbance regime which is the average across the southern Appalachians. This range may vary across individual project areas depending on local conditions, and restoration or maintenance ecozone needs. Given the lack of numerous appropriate burn days during the burning season it may not be possible to achieve the desired fire frequency per ecozone forest-wide.

Wildlife habitat considerations have been built into ecozone sections, both in the "all ecozones section" and by addressing the habitat needs in each ecological community.

Desired Conditions for All Ecozones

- Each ecozone, classified by composition of <u>overstory</u> and <u>understory</u> species, provides a variety of habitats distributed across a range of ages and functioning structural layers. These age and structural conditions, denoted as classes, represent the (NRV) or when the NRV is not apparent, another appropriate distribution of conditions.

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- Collectively, ecozones provide guidance for achieving a sustained mix of habitats forest-wide across space and time, and support restoration of associated communities, plant and animal populations, and production of forest products.
- Wildlife habitat conditions are present in amounts, arrangements, and conditions to support a diversity of native species typical of the Southern Appalachians within the planning area, resulting in natural population dynamics.
- Individual age and structural classes may be under or over represented at smaller scales, but will be within their appropriate ranges across each forest-wide ecozone.
- Tree and herbaceous species are regenerating in the understory and midstory.
- Open forests have less than 60-70% canopy cover.
- Structural features that support animal diversity, such as snags, dens, and downed wood are present.
- Habitats such as young forest and old growth forests are present.
- Open understory conditions exist across all elevations and/to enhance wildlife habitat conditions such as bird nesting and foraging, bat roosting and foraging, and deer migration routes.
- Habitat supports breeding, wintering, migration, staging, and stop-over for migratory birds and year-round habitat for resident bird species in ways that contribute to their long-term conservation.
- Ecosystems provide a haven for an array of native at-risk, impacted by pests or diseases, species such as eastern and Carolina hemlocks, butternut, American beech, American chestnut, ash, black walnut, Gray's lily, and other at-risk species.
- Grassy and shrubby areas, and early successional and young forests, are present across all ecozones and elevations, but particularly in montane oak areas and at higher elevations for species requiring this habitat for nesting and foraging such as bobwhite quail, ruffed grouse, golden-winged warbler, and elk.
- Interior forest across age classes and ecozones provide conditions for species such as cerulean warbler and wood thrush. For example, a variety of gap sizes and residual stand structural diversity, including larger diameter trees, are achieved.
- Native trees with exfoliating bark provide roosting habitat for bats.
- Hard and soft mast producing trees and shrubs are present and bearing fruit in each ecozone.
- Native animal populations are stable or increasing over time, and their known range is stable or increasing over time. This does not discount temporary downward trends associated with natural population dynamics or when diseases such as white-nose syndrome exceed a species' ability to be resilient.

Nantahala and Pisgah NF Forest Plan Revision

- Population levels of game species, such as deer and grouse, support sustainable hunting levels.
- The amount of habitat suitable for elk on the Forests is maintained or expanded.
- A system of old growth forests representing all the 11 ecozones and the unique habitats are dispersed across the planning unit in the existing medium (17 areas varying in size from 200 to 1700 acres) and large patches (32 areas with a minimum size of 2500 acres).
- Old growth characteristics, such as large downed woody debris, abundant snags, variable gap sizes, and tip-up mounds, are readily evident over time within old growth patches.

Standards

- Provide at least 0.5% of wildlife habitat forest-wide in permanent grass/forb openings at any one time, including fields and mowed landings and roads, except where desired conditions for interior forest or old growth conditions are specified. These conditions may be present in different amounts in specific ecozones, but shall equal or exceed 0.5% across the planning area.
- Permanent grass/forb openings shall be located such that wildlife habitat diversity is enhanced through the juxtaposition of grassy, brushy, open, and forested habitats; conflicts with recreation uses are limited; and stream temperature and channel integrity are not compromised.
- Retain and/or increase the diversity of native tree species in rich cove and acidic cove ecozones.
- Retain ¼ acre or larger patches of live eastern hemlock when completing vegetation management projects within ecozones with this species, such as acidic coves.
- Native plant material, if available, shall be gradually transitioned to a greater component in wildlife openings and other wildlife habitat enhancements unless the nonnative material is desired for a historical, wildlife or other identified resource benefit.
- Removal of beavers or beaver dams occurs only when needed to protect critical values, infrastructure, or public health or safety. Legal, permitted trapping, as defined and regulated by the North Carolina Wildlife Resources Commission, is not affected.

Guidelines

- When developing objectives and goals for site specific habitat, restoration or vegetation projects, social, economic factors will be considered with ecological and functional resilience as the overarching goal. . Past habitat conditions, future disturbance patterns, the existing habitat, and social and economic factors should be considered.
- Existing open grassy areas should be managed to provide adjacent shrub/sapling habitats, where practical, to benefit species requiring these conditions in proximity to each other, such as ruffed grouse, wild turkey, and golden-winged warblers.

- Open understory conditions should be enhanced, through a reduction in <u>ericaceous</u> shrubs such as *Rhododendron spp*. and *Kalmia latifolia* to benefit many species of birds, bats, and other animals.
- To minimize hybridization between golden-winged warbler (GWWA) and blue-winged warblers (BWWA), management activities between 2,500' and 3,000' elevation should be designed to avoid colonization by BWWA.
- Native nectaring and host plants should be incorporated into plantings and seed mixes to enhance pollinator opportunities.

Management Approaches
- "Irregular" forest edges (i.e. not straight) and vegetative transition (e.g. open area to brushy area to forest) should be emphasized to maximize structural diversity in smaller landscapes for wildlife species depending on a variety of habitats in proximity to each other such as ruffed grouse, golden-winged warbler, and black bear. The degree to which this is applied will depend on project-level restoration objectives for compositional and structural restoration and the applicable tools to achieve them.
- Expand existing or create new grass/forb openings to restore or enhance wildlife habitat diversity that are compatible with the surrounding management area and landscape features, emphasizing brushy and shrubby inclusions and edges.
- When restoring woodlands with mechanized equipment in pine-oak/heath, shortleaf pine, dry oak, and dry-mesic oak ecozones minimize disturbance in dense patches of native grasses, such as little bluestem and Indian grass, if present.
- To maintain connectivity, management activities within interior forests mimic natural disturbances when possible.
- Management activities maintaining or restoring, old growth forest values and characteristics, allow for the enhancement of open understory, downed logs in all stages of decay, old trees, standing snags, undisturbed soils, uneven-aged structure and canopy species, single and multiple tree-fall gaps, abundant fungal component, large trees, appropriate density and basal area of canopy trees.
- Wildlife habitat characteristics for species identified in other landscape-scale planning efforts such as the Nature Conservancy's Optimal United States Forest Service Management and Restoration in Priority Core Forests on the Nantahala and Pisgah National Forests, the proposed amphibian and reptile conservation areas identified by Partners in Amphibian and Reptile conversation (PARC), and the North Carolina Natural Heritage Program's Natural Heritage Areas (registered and unregistered) are considered.
- Within Appalachian Mountains Joint Venture (AMJV) focal areas for the GWWA, based on landscape capability and considering multiple use objectives, consider incorporating Best Management Practices for Golden-winged Warbler Habitats in the Appalachian Region into during project design.
- Within AMJV focal areas for the cerulean warbler (CERW), based on landscape capability and considering multiple use objectives, consider incorporating Cerulean

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Warbler Management guidelines for Enhancing Breeding Habitat in Appalachian Hardwoods into project design.

See also related sections: Aquatic Resources, Streamside Zones, Threatened and Endangered Species & Species of Conservation Concern, Unique Habitats, Vegetation Management, Fire, Forest Health and Invasive Species, and Forest Products

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Floodplain Forest Ecozone

Desired Conditions

- A diversity of hardwood tree species occurs in the canopy, midstory, and understory. Shrub densities are highly variable, ranging from less than 25 to more than 75 percent, depending on site productivity. Evergreens are the dominant shrub species. The understory contains a well-developed herbaceous layer with many annuals that is typically dense and rich in species diversity.
- Young forest is represented, 6-8% across the landscape, in amounts that reflect natural disturbance regimes and support species diversity.
- Potential old-growth conditions, from 31-43% of the landscape, are present in amounts that support species diversity. With the older closed-canopy forest, a mosaic of different size openings are dispersed throughout providing structural and age class diversity. A portion of this old growth type, 9-13% across the landscape, is classified as open.
- A greater portion of the landscape supports closed canopy forest, ranging from 60-75%, compared to open canopy forest, representing 5-8% of the landscape. Open canopy forests occur in all age classes.
- Non-timber forest products, such as ginseng, are distributed in population densities that are stable or increasing.
- Fire is very infrequent in this ecozone due to its landscape position.

Table 1. Floodplain Age and Structural Classes

Age/Structural Classes	Young	Mid Closed	Mid Open	Late Closed	Late Open	OG Closed	OG Open
Age (years)	0-10	11-100	11-100	100-140	100-140	140+	140+
Landscape %	6-8	30-36	9-14	8-9	3-4	22-30	9-13

See also: Water and Watersheds, Aquatic Systems, Non-Timber Forest Products

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Rich Cove Forest Ecozone

Desired Conditions

- The overstory consists of hardwood canopy trees, with tulip poplar and red maple present but not dominant. Shrub density is less than 50 percent and primarily consists of deciduous species. The understory contains a herbaceous layer that is dense and rich in species diversity.
- Young forest is represented, 4-5% across the landscape, in amounts that reflect natural disturbance regimes and support species diversity, however this might be exceeded in the short term to achieve compositional restoration.
- Potential old-growth conditions, from 46-54% of the landscape, are present in amounts that support species diversity. With the older closed-canopy forest, a mosaic of different size openings are dispersed throughout providing structural and age class diversity.
- A much greater portion of the landscape supports closed canopy forest, ranging from 82-97%, compared to open canopy forest, representing 5-8% of the landscape.
- Non-timber forest products, such as ginseng, are distributed in population densities that are stable or increasing.

    Fire is infrequent in this system. Landscape level burns prescribe low intensity ground fires with high intensity fires very rare.

    Table 2. Rich Cove Age and Structural Classes

Age/Structural Classes	Young	Mid Closed	Mid Open	Late Closed	Late Open	OG Closed
Age (years)	0-10	11-100	11-100	101-140	101-140	140+
Landscape %	4-5	27-32	4-6	9-11	1-2	46-54

See also: Non-timber forest products, Silviculture

Acidic Cove Forest Ecozone

Desired Conditions

- A diversity of hardwood tree species occurs in the canopy and midstory. Shrub densities, primarily evergreens, vary from 30 to more than 75 percent. Herbaceous species are present in the understory in low densities. Bryophytes are abundant and occupy the forest floor, tree bark, and shrub leaf surfaces.
- Eastern hemlock conservation areas persist within the species' historic and natural range .
- Young forest is represented, 4-5% across the landscape, in amounts that reflect natural disturbance regimes or other appropriate condition and support species diversity.
- Potential old-growth conditions, from 46-54% of the landscape, are present in amounts that support species diversity. With the older closed-canopy forest, a mosaic of different size openings are dispersed throughout providing structural and age class diversity.
- A much greater portion of the landscape supports closed canopy forest, ranging from 82-97%, compared to open canopy forest, representing 5-8% of the landscape.
- Fire is very infrequent in this ecozone. A dense evergreen shrub layer serves as a barrier to the spread of ground fires.

Table 3. Acidic Cove Age Structure and Classes

Age/Structural Classes	Young	Mid Closed	Mid Open	Late Closed	Late Open	OG Closed
Age (years)	0-10	11-100	11-100	101-140	101-140	140+
Landscape %	4-5	27-32	4-6	9-11	1-2	46-54

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Northern Hardwood Forest Ecozone

Desired Conditions
- Numerous hardwood canopy trees dominant the canopy and subcanopy with a small evergreen component, either red spruce or eastern hemlock. Shrub density is variable ranging from 20 to greater than 70 percent and is represented by deciduous, and/or evergreen species. The understory contains a well-developed herbaceous layer that is typically dense and rich in species diversity.
- Young forest is represented, ranging from 5-7%, across this ecozone in amounts that reflect natural disturbance regimes and support species diversity.
- Potential Old-growth, from 51-64% of the landscape, is the primary age class within this ecozone. With the older closed-canopy forest, a mosaic of different size openings are dispersed throughout providing structural and age class diversity. A portion of this type, 11-14% across the landscape, is classified as open.
- A much greater portion, ranging from 68-87%, of the landscape supports closed canopy forest compared to open canopy forest, representing 15-20% of the landscape. Open canopy forests occur in all age classes.
- Non-timber forest products, such as ramps in open shrub sites to Galax in denser shrub sites, are well distributed in population densities that are stable or increasing.
- Fire is rare because of high elevation and concave slopes found in this ecozone. Landscape level burns prescribe low intensity ground fires with high intensity fires very rare.

Table 4. Northern Hardwood Age and Structural Classes

Age/Structural Classes	Young	Mid Closed	Mid Open	Late Closed	Late Open	OG Closed	OG Open
Age (years)	0-15	16-75	16-75	76-130	76-130	130+	130+
Landscape %	5-7	17-23	2-3	11-14	2-3	40-50	11-14

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Spruce-Fir Forest Ecozone

Desired Conditions

- Fraser Fir and/or Red Spruce are the primary dominant species representing greater than 70 percent of the canopy. They occur in the canopy, mid-story, and understory. Shrub densities, primarily evergreens, vary from 30 to more than 75 percent. Herbaceous species are present in the understory in very low densities in shrub dominated sites while moderately diverse in more open sites. Bryophytes are very abundant and occupy the forest floor, tree bark, and rock surfaces.
- Young forest is represented across this ecozone in amounts, 14-17%, that reflect natural disturbance regimes and support species diversity.
- Potential Old-growth, from 48-61% of the landscape, is the most frequent age class within this ecozone. With the older closed-canopy forest, a mosaic of different size openings are dispersed throughout providing structural and age class diversity. A portion of this type, 12-16% across the landscape, is classified as open.
- A much greater portion, ranging from 55-67%, of the landscape supports closed canopy forest compared to open canopy forest, representing 19-28% of the landscape. Open canopy forests occur in all age classes.
- Non-timber forest products, such as Fraser fir seedlings and cones, are well distributed in population densities that are stable or increasing.
- Fire is very rare in this ecozone. Landscape level burns within this ecozone are rare and prescribe low intensity ground fires. High severity fire could result in the extirpation of a site within this ecozone.

Table 5. Spruce-Fir Forest Age and Structural Classes

Age/Structural Classes	Young	Mid Closed	Mid Open	Late Closed	Late Open	OG Closed	OG Open
Age (years)	0-35	36-70	36-70	71-120	71-120	120+	120+
Landscape %	14-17	10-11	2-4	9-11	5-8	36-45	12-16

See also: Non-Timber Forest Products

High Elevation Red Oak Ecozone

Desired Conditions

- Red oak is the dominant species, occurring in the canopy, midstory and understory, with the overstory representing greater than 50 percent, often 75% of the canopy. Shrub densities, mixed with deciduous and evergreen species, vary from 30 to more than 75 percent. Herbaceous species are present in the understory varying from low densities in shrub dominated sites while moderately diverse in more open sites.
- Young forest is represented, ranging from 14-18% across the landscape, within this ecozone.
- Potential Old-growth, from 24-36% of the landscape, is evenly distributed with other age classes within this ecozone. With the older closed canopy forest, a mosaic of different size openings are dispersed throughout providing structural and age class diversity. A larger portion of this type, 18-26% across the landscape, is classified as open.
- A slightly greater portion, ranging from 40-53%, of the landscape supports open canopy forest compared to closed canopy forest, representing 33-44% of the landscape. These open canopy forests have similar distribution ranges across all age classes.
- Non-timber forest products, such as Galax, are well distributed in population densities that are stable or increasing.
- Wildland fire occurs across this ecozone at intervals ranging from 11-20 years. Periodic burns regenerate red oak and reduce densities of more aggressive northern hardwood species, such as sugar maple and American beech.

Table 6. High Elevation Red Oak Forest Age and Structural Classes

Age/Structural Classes	Young	Mid Closed	Mid Open	Late Closed	Late Open	OG Closed	OG Open
Age (years)	0-20	21-70	21-70	71-130	71-130	130+	130+
Landscape %	14-18	16-21	11-14	11-13	11-13	6-10	18-26

See also: Non-Timber Forest Products

Mesic Oak Ecozone

Desired Conditions

- The overstory is dominated by both red and white oak and contains a variety of hickory and other deciduous tree species. Aggressive native tree species, such as red maple, tulip poplar, and white pine, are present but do not dominate. Deciduous shrubs occur in groups and generally provide less than 30 percent cover. Herbaceous species are diverse both within open and closed canopy forests. Grasses are a minor component.
- Young forest is represented, 4-6% of the landscape, across this ecozone.
- Potential Old-growth conditions, from 47-61% of the landscape, are present in amounts that support species diversity. With the older closed canopy forest, a mosaic of different size openings are dispersed throughout providing structural and age class diversity. About half of the old-growth class, representing 20-25% of the landscape, is open canopy.
- A greater portion of the landscape supports closed canopy forest, 47-59%, compared to open canopy forest, 37-48%. Open canopy conditions are distributed across all age classes.
- Wildland fire occurs across this ecozone at intervals ranging from 18-25 years. Periodic burns regenerate the dominant oak species.

Table 7. Mesic Oak Forest Age and Structural Classes

Age/Structural Classes	Young	Mid Closed	Mid Open	Late Closed	Late Open	OG Closed	OG Open
Age (years)	0-10	11-80	11-80	81-130	81-130	130+	130+
Landscape %	4-6	12-15	12-16	8-10	5-7	27-34	20-25

See also:

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Dry-Mesic Oak Ecozone

Desired Conditions

- The overstory consists of oak and other deciduous hardwood canopy trees. Aggressive native tree species, such as red maple and white pine, are present but not dominant. Shrub densities, primarily deciduous species, range from 25 to 50 percent. A diverse herbaceous layer occurs within open canopy sites while a sparser layer occurs within closed canopy sites. Grasses are dispersed and evident within fire-maintained sites.
- Young forest is represented, 5-7% of the landscape, across this ecozone.
- Potential Old-growth conditions, from 50-61% of the landscape, are present in amounts that support species diversity. With the older closed-canopy forest, a mosaic of different size openings are dispersed throughout providing structural and age class diversity. Greater than half of the old-growth class, representing 28-33% of the landscape, is open canopy.
- A greater portion of the landscape supports open canopy forest, 48-59%, compared to closed canopy forest, 36-45%. Open canopy conditions are distributed across all age classes.
- Wildland fire occurs across this ecozone at intervals ranging from 14-20 years. Periodic burns regenerate the dominant oak species.

Table 8. Dry-Mesic Oak Forest Age and Structural Classes

Age/Structural Classes	Young	Mid Closed	Mid Open	Late Closed	Late Open	OG Closed	OG Open
Age (years)	0-15	16-75	16-75	76-130	76-130	130+	130+
Landscape %	5-7	7-9	13-17	7-8	7-9	22-28	28-33

See also:

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Dry Oak Ecozone

Desired Conditions
- The overstory consists of oak and other deciduous hardwood canopy trees, with pitch pine and table mountain pine present but not abundant. Aggressive native tree species, such as red maple and white pine, are not evident. Shrub densities generally range from 10 to 75 percent. Grasses, particularly species such as little bluestem and Indian grass, are abundant in the understory. A diverse herbaceous layer occurs within open canopy sites while a sparse herbaceous layer occurs within closed canopy sites.
- Young forest is represented, 9-22% of the landscape, across this ecozone.
- Potential Old-growth conditions, from 45-73% of the landscape, are present in amounts that support species diversity. A large proportion the old-growth class, representing 40-57% of the landscape, is open canopy.
- A much greater portion of the landscape supports open canopy forest, 58-85%, compared to closed canopy forest, 8-26%.
- Wildland fire occurs across this ecozone at intervals ranging from 14-20 years. Periodic burns create an open canopy structure with numerous grasses.

Table 9. Dry Oak Forest Age and Structural Classes

Age/Structural Classes	Young	Mid Closed	Mid Open	Late Closed	Late Open	OG Closed	OG Open
Age (years)	0-20	21-70	21-70	71-100	71-100	>100	>100
Landscape %	9-22	2-7	12-19	1-3	6-9	5-16	40-57

See also:

Pine-Oak/Heath Ecozone

Desired Conditions
- The overstory consists of a mix of pine and oak canopy species with pines dominating. Aggressive native tree species, such as red maple and white pine, are not evident. Shrub densities generally are less than 50 percent and quite open in frequently fire-maintained sites. A diverse herbaceous layer occurs within fire-maintained sites while a sparse layer occurs within closed canopy sites. Grasses are abundant in the understory, particularly in fire-maintained sites.
- Young forest is represented, 11-19% across the landscape, across this ecozone.
- Potential Old-growth, from 12-29% of the landscape, represents a small portion of different age classes.
- A very large proportion of this old-growth class, representing 11-26% of the landscape, is open canopy.
- A much greater portion of the landscape supports open canopy forest, 65-95%, compared to closed canopy forest, 3-13%.
- Southern pine beetle outbreaks are limited due to management for appropriate species composition, density, structure, and age classes.
- Wildland fire occurs across this ecozone at intervals ranging from 4-7 years. Periodic burns create an open canopy structure with numerous grasses at high densities, greater than 50% cover.

Table 10. Pine- Oak/Heath Forest Age and Structural Classes

Age/Structural Classes	Young	Mid Closed	Mid Open	Late Closed	Late Open	OG Closed	OG Open
Age (years)	0-20	21-70	21-70	71-130	71-130	>130	>130
Landscape %	11-19	1-5	34-42	1-5	20-27	1-3	11-26

See also:

Shortleaf Pine Ecozone

Desired Conditions

- The overstory consists of greater than 50% shortleaf pine mixed with aggressive native tree species, such as red maple and white pine, not evident. Shrub densities range from 10 to 50 percent. A diverse herbaceous layer occurs within fire-maintained sites while a sparse layer occurs within closed canopy sites. Grasses are abundant in the understory, particularly in fire-maintained sites.
- Young forest is represented, occurring across 8-13% of the landscape, within this ecozone.
- Potential Old-growth, from 17-33% of the landscape, represents a small portion of different age classes.
- A very large proportion of this old-growth class, representing 16-29% of the landscape, is open canopy.
- A much greater portion of the landscape supports open canopy forest, 72-97%, compared to closed canopy forest, 3-12%.
- Southern pine beetle outbreaks are limited due to management for appropriate species composition, density, structure, and age classes.
- Wildland fire occurs across this ecozone at intervals ranging from 4-7 years. Periodic burns create an open canopy structure with numerous grasses at high densities, greater than 50% cover.

Table 11. Shortleaf Pine Forest Age and Structural Classes

Age/Structural Classes	Young	Mid Closed	Mid Open	Late Closed	Late Open	OG Closed	OG Open
Age (years)	0-15	16-70	16-70	71-100	71-100	100+	100+
Landscape %	8-13	1-4	34-42	1-4	22-26	1-4	16-29