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Viability Assessment Report For Dry-Mesic Oak Forest Habitat Association

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I. Description of Habitat Association

Dry-mesic oak forests occur throughout the South in all ecological sections, most commonly in the mountains. They are usually found on dry, upland sites on southern and western aspects, and ridgetops. The species composition of this forest type varies greatly due to its wide distribution. The major species include chestnut oak, northern red oak, black oak, white oak, and scarlet oak. Additional associates include southern red oak, post oak, blackjack oak, pignut hickory, mockernut hickory, and red maple. Coniferous species such as shortleaf pine, and eastern white pine may occur as a mixture, with an overstory coverage of less than 25 percent. American chestnut was a major species in this community type up until the 1930's (USDA Forest Service, 1997).

The frequency of fire is important in the disturbance regime for this community type. The dry sites on which this community type occurs are conducive to recurring, low-intensity surface fires thought to have been quite common prior to European settlement. These fires helped maintain the oak component by eliminating fire-sensitive competitors and stimulating oak regeneration. Blowdowns of single or multiple trees result in gap phase regeneration, and infrequent tornadoes can alter an entire stand. Other important disturbances for this community type include oak decline, infestations by gypsy moths and ice storm damage (USDA Forest Service, 1997). Water on these sites is primarily from surface sources (rainfall). On some sites, limited amounts of ground water help maintain the sites. Sunlight, which drives photosynthesis, is the major source of energy. Decay of vegetation and byproducts of fires, which may pass through the Dry-Mesic Oak Habitat Association, also provides energy sources.

The Daniel Boone National Forest (DBNF) occurs in three ecological sections: Interior Low Plateau and Highland Rim, Cumberland Mountains and Northern Cumberland Plateau. On the DBNF, Interior Low Plateau and Highland Rim, dry-mesic oak habitat occurs in the following landtype associations (LTAs) (see USDA Forest Service, 1997a; 1996):

- Triplett Creek Knobs (222En02)
- Knob Flats (222En01)
- Fox Creek Knobs (222En03).

In the Cumberland Mountain ecological section of the DBNF, dry-mesic oak habitat occurs in the following LTA (USDA Forest Service, 1997a; 1996):

- Northern Jellico Mountains (M221Cd001).

The majority of the dry-mesic oak habitat on the DBNF occurs in the Northern Cumberland Plateau ecological section. Dry-mesic oak habitat occurs in the following LTAs (USDA Forest Service, 1997a; 1996):

- Northern Escarpment (221Hb004)
- Northern Low Hills / Cliff Transition (221Hb005)
- Central Knobstone Escarpment (2212Hb001)
- Northern Rolling Hills (221 He003)
- North Fork Kentucky Cliffs (221Hb003)
- Central Cliff (221Hb002)
- London-Corbin Plain Transition (221Hc007)
- Rolling Low Hills (221He001)
- Low Hills (221He002)
- Low Hills – Rugged Hills Transition (221Ha002)
- Southern Middle Breathitt Rugged Hills (221Ha001)
- London-Corbin Plain (221Hc006)
- Rockcastle Hills (221Hc005)
- Southern Knobstone Escarpment Transition (221Hc002)
- Southern Cliff (221Hc003)
- Southern Knobstone Escarpment (221Hc001).

On the DBNF, dry-mesic oak habitat occurs from low to high elevations on dry-mesic sites, frequently on linear or convex landforms on north- and east-facing slopes or at high elevations, and sometimes on concave landforms on southerly and westerly aspects. This forest type is concentrated on slopes of moderate exposure, mostly on colluvial Jefferson or Shelocta soils, or on upper slopes or broader ridges with Whitley, Gilpin, Latham or Berks soil series. These soils are mostly derived from sandstone and shale. Since this forest type

occupies average soil conditions, it intergrades with most other forest types (USDA Forest Service et al., 1989).

Dry-mesic oak habitat is common; 40 percent of the forested land on the DBNF is considered dry-mesic oak. Dry-mesic oak forests grade into mesophytic cove hardwoods, white pine-hemlock-hardwoods, and xeric oak forests at low to moderate elevations. On the DBNF, typical dominant species in the Dry-Mesic Oak Habitat Association is white oak with pignut hickory, mockernut hickory, red maple and black gum. Drier, flatter areas are characterized by chestnut oak, scarlet oak and perhaps southern red oak as a minor component. In disturbed areas, *Pinus* spp., persimmon and sassafras are frequent. Moister phases, grading into yellow-poplar or beech forest have frequent red oak, shagbark hickory, and bitternut hickory. In disturbed areas, black locust, black cherry, and smooth sumac are common. Flowering dogwood is often dominant in the understory, other frequent shrubby species include witch hazel, serviceberry, American hazelnut, summer grape, maple leaf viburnum, and greenbrier. Herb cover is generally sparse except on better soils. Frequent species include grape fern, ebony spleenwort, Christmas fern, tall anemone, lance leaved loosestrife, star chickweed, fire pink, three lobed violet, naked flowered tick trefoil, round leaf tick trefoil, common cinquefoil, hairy skullcap, false foxglove, small headed sunflower, wreath goldenrod, calico aster, cornel leaf aster and sedge (USDA Forest Service et al., 1989).

II. Current Status of the Habitat Association on the Daniel Boone National Forest

Dry-mesic oak habitat is widespread occurring on most geologic, topographic and edaphic situations. The dry-mesic oak forest types on the Daniel Boone National Forest are tracked in the Continuous Inventory of Stand Conditions (CISC) and are represented as post oak/blackjack oak (51), white oak/red oak/hickory (53), white oak (54), and northern red oak (55). The management types identified as dry-mesic oak forest types are defined as follows:

(51) = 70+ percent of the dominant and co-dominant basal area is hardwood, and 50+ percent is post oak and/or blackjack oak;

(53) = 70+ percent of the dominant and co-dominant basal area is hardwood, and 50+ percent is white oak/red oak/hickory species;

(54) = 70+ percent of the dominant and co-dominant basal area is hardwood, and 50+ percent is white oak; and

(55) = 70+ percent of the dominant and co-dominant basal area is hardwood, and 50+ percent is northern red oak (USDA Forest Service, 1992).

On the DBNF, approximately 665,000 acres are in forested land. Of this acreage, approximately 40 percent or 266,620 acres are within the dry-mesic oak forest types as described. Utilizing the CISC database, the dry-mesic oak forest type occurring on the Daniel Boone National Forest was further separated by age class and acreage (USDA Forest Service, 1998).

Table 1. Forest types in the Dry-Mesic Oak Habitat Association by age and acre.

Age	Post Oak / Black Oak (51)	White Oak / Northern Red Oak / Hickory (53)	White Oak	Northern Red Oak
0-10	36	25229	429	78
11-20	0	18437	100	0
21-30	0	8177	137	0
31-40	0	13723	102	0
41-50	34	7881	114	25
51-60	0	14356	564	0
61-70	0	31295	2139	0
71-80	113	36639	2542	0
81-90	120	38050	3137	0
91-100	80	34456	1885	22
101-110	106	18734	674	60
111-120	24	5035	598	0
121-130	0	995	132	0
131-140	0	181	31	0
141-150+	0	124	26	0
TOTAL	513	253312	12610	185

III. Management Needs: Recommendations for the Conservation of Habitat to Ensure Species Viability

The desired future condition for this habitat association would be to provide amounts of suitable habitat in the proper stages of succession to ensure that the species dependant on the association have a high probability of persistence on the forest. This would involve maintaining a structured age class distribution with emphasis on maintaining a significant component of habitat that contains the habitat modifiers required by various species.

- Evaluate habitats to determine those capable of supporting reintroduction of species at risk.
 - *Rationale: Specific species management within this habitat association may require reintroduction efforts to ensure continued persistence of that particular species or group of species in this association.*
- Dry-Mesic oak types need to be represented in a range of age classes.
 - *Rationale: Dry-mesic oak makes up approximately 40 percent of the forest type on the DBNF. The species identified in this habitat association (insect, plants, amphibian, mammals and birds) require a variety of age classes, elevations and tract*

sizes. Species from the cerulean warbler, which are rarely found in tracts less than 250 hectares (617.5 acres) to the least flycatcher which most of its breeding population is located above 2500 feet elevation. A range of age classes, along with their accompanying attributes, is a necessary component of this habitat association. Age distribution management along with implementation of best management practices should ensure continued persistence of the species identified in this habitat association.

- Where applicable, leave project unit boundaries with irregular and feathered edges.
 - *Rationale: Abrupt habitat changes can create barriers to wildlife passing through the unit.*

IV. Management Needs: Monitoring and Inventory to Ensure Species Viability

Monitoring and inventory of the Dry-Mesic Oak Habitat Association will need to be implemented at a level sufficient to provide data to track the current condition of the habitat. The following items are considered necessary to ensure that the association can be properly evaluated and decisions supported.

- Inventory should be conducted in each stand (or analysis unit) at least once every 10 years. Stand (or analysis unit) inventory should also be conducted in response to events that have potential to alter the landscape i.e., windstorms, winter storms, and infestations (high priority).
 - *Rationale: Inventory to identify and update baseline data or assess changed conditions after non-prescribed major disturbances. Inventory may be at the stand level or larger units may be used (such as ecological or habitat units) as long as the data is sufficient to assess the required parameters. Current data from past inventory work may need to be supplemented to include additional habitat modifier data. This inventory may be part of the prescription process but should not be limited to project planning efforts.*
- Employ GIS and vegetation management databases to track the condition and composition of the Dry-Mesic Oak Habitat Association (high priority).
 - *Rationale: The use of FSVeg (CISC or best available science) in concert with our GIS coverage of stands should be adequate to assess the composition, age class and spatial distribution of the pine habitat and habitat modifiers. This makes the assumption that the inventory data collects the necessary information regarding habitat modifiers.*
- Continue to implement R8 landbird monitoring program (high priority).
 - *Rationale: This monitoring program will help track the persistence of the avian species in this habitat association. This may be a critical element in documenting avian species trends in this association. This monitoring program contains points*

linked to this association it would be considered an excellent tool for both species-specific and association monitoring.

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Attachment A.**Species List: Dry-Mesic Oak Habitat Association**

Class	Common/Species
ANIMALS	
Birds	Eastern Wood Pewee/ <i>Contopus virens</i> Cerulean Warbler/ <i>Dendroica caerulea</i> Least Flycatcher/ <i>Empidonax minimus</i> Acadian Flycatcher/ <i>Empidonax virescens</i> Worm-eating Warbler/ <i>Helmitheros vermivorus</i> Wood Thrush/ <i>Hylocichla mustelina</i> Swainson's Warbler/ <i>Limnothlypis swainsonii</i> Red-headed Woodpecker/ <i>Melanerpes erythrocephalus</i> Kentucky Warbler/ <i>Oporornis formosus</i> Summer Tanager/ <i>Piranga rubra</i> Ovenbird/ <i>Seiurus aurocapillus</i> American Redstart/ <i>Setophaga ruticilla</i> Yellow-throated Vireo/ <i>Vireo flavifrons</i>
Insects	Diana Fritillary/ <i>Speyeria diana</i>
Mammals	Rafinesque's Big-eared Bat/ <i>Corynorhinus (Plecotus) rafinesquii rafinesquii</i> Appalachian Cottontail/ <i>Sylvilagus obscurus</i>
Reptiles	Northern Coal Skink/ <i>Eumeces anthracinus anthracinus</i>
PLANTS	
Dicots	Sweetshrub/ <i>Calycanthus floridus</i> var. <i>glaucus</i> American Chestnut/ <i>Castanea dentata</i> Chinquapin (generic)/ <i>Castanea pumila</i> Sweet-fern/ <i>Comptonia peregrina</i> Beech Drops/ <i>Epifagus virginiana</i> Red-disked Sunflower/ <i>Helianthus atrorubens</i> Southern Heartleaf/ <i>Hexastylis contracta</i> Goldenseal/ <i>Hydrastis canadensis</i> Smooth Veiny Peavine/ <i>Lathyrus venosus</i> American Gromwell/ <i>Lithospermum latifolium</i> Cow-wheat/ <i>Melampyrum lineare</i> (generic) American Cow-wheat/ <i>Melampyrum lineare</i> var. <i>pectinatum</i> Sweet Pinesap/ <i>Monotropsis odorata</i> Gaywings/ <i>Polygala pauciflora</i> Racemed Milkwort/ <i>Polygala polygama</i> var. <i>polygama</i> Wafer Ash, Hop-tree/ <i>Ptelea trifoliata</i> Cumberland Azalea/ <i>Rhododendron cumberlandense</i>

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Class	Common/Species
Dicots	Hairy Snout Bean/ <i>Rhynchosia tomentosa</i> American Chaffseed/ <i>Schwalbea americana</i> Ovate Catchfly/ <i>Silene ovata</i> Wasioto Rosinweed/ <i>Silphium wasiotense</i> Big-flowered Snowbell/ <i>Styrax grandiflorus</i> Spiked Hoary-Pea/ <i>Tephrosia spicata</i> Cutleaf Meadow Parsnip/ <i>Thaspium pinnatifidum</i> Velvet Bush Pea/ <i>Thermopsis mollis</i> var. <i>mollis</i> Running Buffalo Clover/ <i>Trifolium stoloniferum</i> Toothache-tree/ <i>Zanthoxylum americana</i>
Monocots	Purple Caric Sedge/ <i>Carex purpurifera</i> Appalachian Spreading Pogonia/ <i>Cleistes bifaria</i> Spotted Coralroot/ <i>Corallorrhiza maculata</i> Wood Lily/ <i>Lilium philadelphicum</i> var. <i>philadelphicum</i> Wild Lily-of-the-valley/ <i>Maianthemum canadense</i> Rough Dropseed/ <i>Sporobolus clandestinus</i>
Mosses	Dog Paw or Elegant Moss/ <i>Dicranum scoparium</i>
FUNGI	Sulphur Shelf/ <i>Laetioporus sulphureus</i> Morel/ <i>Morchellus esculentus</i>

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Attachment B.

Dry-Mesic Oak Forest Species/Habitat Relationship with References

ANIMALS

Birds

Eastern Wood Pewee – *Contopus virens* – This species preferred habitat is rather open mature woodland in a rather dry situation (Hamel, 1992). This species may be absent from younger, second growth forest where an open midstory has not yet developed. In such habitat they often frequent edges and road or stream corridors (Palmer-Ball, 1996). They typically utilize large deciduous trees for the nest site but may use conifers in mixed forest types. This species may be found in numbers in most major forest types examined in Kentucky (Mengel, 1965). This species would be attracted to the hardwood dominance of these forests for nesting, especially where drier, more open conditions prevail.

Cerulean Warbler – *Dendroica caerulea* – Cerulean warblers depend primarily on extensive tracts of mature, relatively undisturbed, deciduous forest. These birds occur in floodplains and upland sites that have large trees (> 20" dbh) in which to nest. Both nesting and foraging take place in the canopies of hardwoods. Stands are usually somewhat open, with little understory; however, according to Buehler and Nicholson, monitoring data suggest that breeding territories in the Cumberland Mountains tend to have fewer canopy trees and greater shrub coverage than those elsewhere. The birds are rarely found in tracts less than 250 hectares, whereas maximum population densities occur in tracts greater than 3000 ha (1997). Hamel gives a minimum tracts size of 1750 ha (1992). This species would be attracted to the hardwood dominance of these forests, especially where drier, more open conditions prevail.

Least Flycatcher – *Empidonax minimus* – This is a species of open conditions; it is rarely encountered deep in the forest. Open, deciduous woods (particularly those that have been disturbed by burning or logging), forest edge, fields with scattered large trees, and other habitats that provide early successional conditions are utilized. During spring migration, Mengel observed male birds in alders and willows in a marshy, Laurel County meadow (1965). Most of the breeding population frequents elevations above 2500 feet. This species would be attracted to the hardwood dominance of these forests, especially where drier, more open conditions prevail.

Acadian Flycatcher – *Empidonax virescens* – This species is usually found near water generally near a stream course or some small waterway (Hamel, 1992). It generally uses an open, moderate understory for feeding in a stand with tall trees and closed canopy (DeGraaf et. al., 1991). It is associated with forested tracts at least 37 hectares (91.4 acres) in size (Hamel, 1992). DBNF monitoring data indicates that the greatest number of occurrences for this species were in mesophytic-cove habitats greater than 80 years old. Assuming a stream is nearby, this species would be attracted to the dry-mesic oak forest where a closed canopy exists and a dense, thick understory and more mesic conditions prevail

Worm-eating Warbler – *Helmitheros vermivorus* – Worm-eating warblers inhabit moist, shady forest on moderate to steep slopes. In Eastern KY, the birds are common on deeply shaded slopes in mixed mesophytic woods and moist ravines (Mengel 1965). They are usually found in fairly

mature deciduous or mixed forest with a dense understory, preferably of *Rhododendron* and Mountain Laurel, but will also use younger forest and forest edge. Nesting is typically on sloping ground among leaf litter, while foraging is carried out on the ground or among understory vegetation. Although the species occurs in dissected woodland, it avoids isolated tracts (Palmer-Ball 1986). Hamel lists the minimum necessary tract size as 370 ha (1992). This species would be attracted to the hardwood dominance of these forests, especially where damp, shaded and more mesic conditions prevail.

Wood Thrush – *Hylocichla mustelina* – The wood thrush is found in a wide variety of forest types, provided a well-developed understory is present. Moderately shaded, deciduous and mixed stands of mature trees with a dense shrub and/or sapling understory are typical habitat, particularly when occurring on moist sites. Rich hardwood and bottomland forests are favored; however, drier sites may be used, so long they have the relatively dense shrub layer. Nesting is in shrubs, vines, and small trees. Although the species will tolerate some fragmentation of habitat, it is most common in extensive forest and requires a minimum tract size of 3 hectares (Hamel 1992). This species would be attracted to the hardwood dominance of these forests, especially where damp, shaded, and more mesic conditions and a dense hardwood understory prevail.

Swainson's Warbler – *Limnothlypis swainsonii* – This forest interior species is found within tracts of moist, extensive forest that have dense understory (Palmer-Ball, 1996). Hemlock ravines, having dense growths of rhododendron and laurel, and bottomland forest, with a well-developed understory and/or thickets of small trees, are favored locations. Dense cane breaks are also used. On the DBNF, this bird is often observed in damp, shady hemlock ravines with an understory of rhododendron, near small streams (L.Perry, pers. obs.). Assuming a stream is nearby, this species would be attracted to the dry-mesic oak forest where a closed canopy exists and a dense, thick understory and more mesic conditions prevail.

Red-headed Woodpecker – *Melanerpes erythrocephalus* – Semi-open to open habitat with an abundance of large (> 14" dbh), dead trees is preferred for both breeding and wintering purposes. Relatively open, mature woods, swamps, clearings within mixed woodland, forest edges, and places where groves of trees are present, such as park-like settings, are commonly used. On the DBNF, the birds are often observed in pine-dominated stands that have been frequently burned (L. Perry, pers. obs.). Nesting is in dead trees, or in dead limbs of live trees (Mengel 1965). This species generally avoids mature closed canopy forest during the breeding season (Palmer-Ball 1986). This species would be attracted to dry and more open conditions often found in this habitat association.

Kentucky Warbler – *Oporornis formosus* – Kentucky warblers are most frequent in moist, shady, deciduous and mixed (with pine or hemlock) forest types with dense, shrubby understory. However, in Eastern KY they occur in virtually all major associations except the most xeric pine and pine-oak communities, and may even invade them (Mengel 1965). Mature stands are required, though some younger stands and shrubby woodland borders are used, as well. These ground-nesting birds forage in understory vegetation, leaf litter, and soil. By providing a well-developed shrub layer, many tracts disturbed by selective logging are suitable for nesting even though the canopy has been disrupted (Palmer-Ball 1986). In general, these birds have adjusted better to landscape disturbance than other woodland warblers. This species would be attracted to the hardwood dominance of these forests, especially where damper, more mesic conditions prevail along with a dense hardwood understory.

Summer Tanager – *Piranga rubra* – Relatively dry sites, which tend to produce stands of a semi-open condition, are frequented by this species. Uplands are commonly used, but the birds may occur in a variety of habitats, including bottomlands and wooded residential areas. Forest types range from hardwood to pine-hardwood stands of open to medium density. On the DBNF, the birds are frequently found in mature, mixed pine stands that have been burned and undergone midstory removal (L. Perry, pers. obs.). Oaks are often chosen for nesting, in open woodland or forest edge and often over open spaces such as roads and clearings (Mengel 1965). This species would be attracted to the oak dominance of these forests, especially where drier, more open conditions prevail.

Ovenbird – *Seiurus aurocapillus* – Mature and second growth forest conditions are utilized, on dry to moderately moist sites with light to moderate understory. Birds are more common in stands with closed canopies and open ground—This is a ground nesting species that forages in the leaf litter or on the soil. Mengel observed nests on logging roads and under small logs, sheltered by ferns, on steep, mesophytic slopes (1965); however, Baker and Lacki note that birds are more abundant in non-harvested than in harvested areas (1997). Upland stands and sloping terrain are preferred, but a variety of deciduous and mixed (e.g., pine-oak) forest types are used. This is a forest interior species having a minimum necessary tract size of 15 ha (Hamel 1992). This species would be attracted to the hardwood dominance of these forests.

American Redstart – *Setophaga ruticilla* – This species typically utilizes younger forest and forest in early to mid stages of succession (Palmer-Ball, 1996). It usually occurs near water or streams preferring moist situations to dry ones (Barbour et. al., 1973)(Hamel, 1992). Occurs in altered forest situations including selectively logged areas (Palmer-Ball, 1996). DBNF monitoring data indicates this species most common in forests 41 to 80 years old. This species would be attracted to the hardwood dominance of these forests, especially where damper, more shaded and mesic conditions prevail.

Yellow-throated Vireo – *Vireo flavifrons* – Extensive tracts of relatively mature woodland are necessary for this interior breeding bird. Large, deciduous trees within a variety of forest types, including mixed mesophytic cove, pine-oak, and oak hickory upland forest, are favored. Isolated or much-dissected tracts are avoided; however, the bird will tolerate a certain amount of disturbance (from fire, selective logging) without being dramatically affected (Palmer-Ball 1986). Rather, activities that serve to result in a fairly open midstory/understory can be beneficial, as the birds frequent trees within relatively open settings. Yellow-throated vireos on the DBNF are often observed in hardwoods within mixed pine-hardwood stands that have been burned or had midstory reduction (L.Perry, pers. obs.). This species would be attracted to the hardwood dominance of these forests, especially where drier, more open conditions prevail.

Insects

Diana Fritillary- *Speyeria diana* -On the Daniel Boone, this butterfly is found in open areas and within the forest especially those that are open and well-lit. These conditions mimic open prairies and pine barrens from which the species is known further west and may be found along grassland/forest edge or in forests that have been maintained in an open condition by repeated fires. The caterpillar feeds almost exclusively on violets and overwinter above-ground making them sensitive to spring and fall fires. Midstory removal and prescribed fire can create high quality foraging habitat for adults by increasing nectar sources. A variety of species are used,

including common and swamp milkweeds, ironweed, red clover, coneflowers and butterfly bush. Individuals will use small openings and roadsides along forest edges in search of nectar plants, but do not go far from the woods.

Mammals

Rafinesque Big-eared Bat – *Corynorhinus (Plecotus) rafinesquii rafinesquii* – This bat is a year-round resident throughout the DBNF. During the summer it forages in a variety of forested habitats and in forest edges and open areas. During the day it will roost in limestone and sandstone rockhouses and caves, in hollow trees and under exfoliating bark. During the summer males tend to be solitary roosters while females form maternity colonies. Several maternity colonies, usually associated with cliffline caves and rockhouses, occur on the forest. This species is insectivorous and feeds primarily on moths. Foraging sites often occur along clifflines or ridgelines in an oak-hickory habitat. Cliffline associated rock shelters are used as feeding sites. Clifflines are also thought to provide travel corridors for the Rafinesque's big-eared bat. During the summer this species normally forages within about one mile of the roost site. Hibernation sites occur mainly in caves, but some sites occur in rockshelters and in large cracks in sandstone cliffline. This species is very sensitive to human disturbance of both its hibernation and maternity colony sites.

Appalachian Cottontail Rabbit – *Sylvilagus obscurus* – This mammal is a forest dwelling species that occurs on the DBNF in areas ranging from conifer-northern hardwood to mixed mesophytic to dry-mesic oak forest. It is regarded as a forest interior species susceptible to habitat fragmentation. It prefers relatively cool, understory areas of ericaceous vegetation such as mountain laurel, rhododendron and blueberries. Large tracts of contiguous, relatively old forest overstory vegetation are needed to provide viable populations of this species.

Reptiles

Northern Coal Skink - *Eumeces anthracinus anthracinus* - The Appalachian population of this subspecies extends into eastern KY, while a disjunct population occurs in the west-central part of the State. Suitable habitat includes damp forests of oak, oak-poplar, oak-hickory-pine, and mixed pine-hardwood with moist soils, abundant leaf litter, logs, and/or loose stones; humid wooded or rocky hillsides; rocky bluffs; and similar areas near water sources, such as streams, springs, swamps, and bogs. These skinks seek the cover of rocks, logs, stumps, brush, and rock slabs. When pursued, they will take refuge in shallow water, hiding under rocks at the bottom. Various rocky areas in which they have been found include: on limestone ledges; in dry leaves beneath rock ledges; beneath flat slabs of sandstone; under rocks in sunlit forest openings and in grassy cut over areas in hardwoods; and under rocks in the slope of a road cut through a mixed forest (VA Dept. of Game and Inland Fisheries 2001). Use of fire to maintain grassy openings within forested stands is of benefit to this species. Coal skinks feed primarily on insects and spiders.

FUNGI

Sulfur Shelf – *Laetioporus sulphureus* – Sulfur shelf is a widely distributed fungus. It is a shelf fungus, and grows on decadent or dead oak trees. On the DBNF, it is somewhat uncommon,

occurring usually on large oaks near some kind of open space, such as a field, road corridor, or stream.

Common Morel – *Morchellus esculentus* – The common morel is a widely distributed species. It is generally found in dry-mesic forest. On the DBNF, the species is widespread, usually found in dry-mesic oak forest on mid to lower slope. The species may be more common than perceived, as it does not produce ascocarps except under the correct conditions of moisture and temperature.

PLANTS

Dicots

Sweetshrub or Carolina Allspice – *Calycanthus floridus* var. *glaucus* – Sweetshrub or Carolina Allspice is a southern species found in a variety of habitats, but usually along waterways. It often grows in large colonies. On the DBNF is found on stream terraces that are well-drained and seldom subject to flooding. The overstory is usually open and composed of mixed oak-hardwoods, sometimes with southern yellow pine. One site occurs on the upper portions of a toe slope in oak forest.

American Chestnut - *Castanea dentata* – American chestnut is far less common today than it once was. A fungal disease introduced from Asia in 1904 decimated the species in about 30 years. The species sprouts prolifically and sprouts are still found through its range. American chestnut once dominated much of what is now upland oak forest. On what is now Daniel Boone National Forest land, American chestnut was found on narrow sandstone and conglomerate ridges along the edge of the escarpment and in the Redbird area. It was associated with chestnut oak. Scarlet and black oaks replaced it on these sites. Today on the Daniel Boone National Forest, sprouts are common to scarce on upper slopes and ridges near the escarpment and on portions of the Redbird District. The species grows on acid soils that are generally poor, dry, and located on sites subject to fire. It is believed that fire promoted the species.

Chinquapin – *Castanea pumila* (generic) – This tree occurs in upland hardwood forest. It is usually found on dry sites, and usually under a partially open canopy. On the DBNF the species occurs as the variety *pumila*, which is discussed under other habitat associations.

Sweet Fern – *Comptonia peregrina* – The sweet fern is associated with open, sterile, sandy ground throughout most of its range, where it forms dense, low thickets. In this habitat, fires probably helped maintain the habitat. On the DBNF, this species inhabits open cobble/boulder bars along free-flowing rivers. The plants are found rooted deep in the crevices between boulders. The cobble/boulder bars are subject to periodic scouring during high water events. Scouring prevents or retards the establishment of trees in these habitats helping to maintain the open condition.

Beech Drops – *Epifagus virginiana* – This plant is found throughout the range of American beech in eastern North America. It is parasitic, deriving nutrients from an association with American beech (*Fagus grandifolia*) roots. The species, to maintain itself, depends on forests that include Fagus. These can be upland or lower slope forests.

Red-disked Sunflower - *Helianthus atrorubens* – This sunflower is a southern and prairie species commonly occurring in warm season grassland. It also is found in open yellow pine forest. On the Daniel Boone National Forest, this species is most abundant in warm season grassland. This habitat in powerline rights-of-way holds most of the Daniel Boone National Forest population. Scattered plants and clumps are found in open yellow pine and yellow pine-oak forest. Fire enhances flowering of this species and maintains its habitat.

Southern Heartleaf – *Hexastylis contracta* – Distribution of the southern heartleaf is centered on the Cumberland Plateau. In Kentucky most of the population is found in land managed by the Big South Fork National River and Recreation Area. It grows in open to closed yellow pine and yellow pine-oak forest in the vicinity of a stream. It is also known to grow in fescue-dominated roadsides in Tennessee. On the DBNF, the species is known from one drainage. It grows above the stream in moderate to heavy shade provided by mountain laurel and great bay under a canopy of yellow pine-oak forest with scattered eastern hemlock.

Goldenseal – *Hydrastis canadensis* – Goldenseal grows in a variety of habitats ranging from well-drained floodplain to mesic cove forest. On the DBNF, it is known from floodplain sites, mixed mesophytic forest, and drier hardwood forest on limestone. It usually occurs in clusters of not more than a few dozen plants, but a few sites have been found with 1000s of plants. The species is a moderate calciphile and does best in well drained soils with ample available moisture. Shade is usually moderate, and the largest colonies have little or no midstory.

Smooth Veiny Peavine – *Lathyrus venosus* – The smooth veiny peavine is widespread in eastern North America. It is often found in open dry forest, but may also be found in moist mesic or terrace forest, and sometimes on stream banks. On the DBNF, it is found in dry-mesic oak and mixed mesophytic forest, often near gaps or other areas of higher light levels.

American Gromwell – *Lithospermum latifolium* – This plant occurs in the northeastern US down through the central Appalachians. It grows in open, dry-mesic forest. On the DBNF, it is usually found on calcareous sites in dry-mesic oak forest or mesic mixed hardwoods.

Cow-wheat – *Melampyrum lineare* (generic) – This plant is somewhat confused with numerous uses by various authors. Following Medley (1993), only the var. *pectinatum* is likely to present on the DBNF. Specimens not identified to variety from the DBNF area are assumed to be this variety. Habitat details are described below for the variety.

American Cow-wheat – *Melampyrum lineare* var. *pectinatum* – This variety, the one found on the DBNF, has been carried as var. *lineare* on the DBNF based on a literature citation. Medley (1993) argues against this and places all plants in the DBNF area in var. *pectinatum*. This is a coastal plain species. It is found in sandy, open yellow pine forest. On the DBNF, the sole station for the species is from ridgetop dry-xeric oak and oak-yellow pine forest.

Sweet Pinesap – *Monotropsis odorata* – Sweet Pinesap is a central and southern Appalachian provinces species. It is saprophytic, gaining carbohydrate nutrients from associations with soil fungi. The species appears to be associated with ericaceous shrubs and or yellow pine in dry forest. It is usually found in or at the base of dense thickets of *Rhododendron maximum*, *R. catawbiense*, or *Kalmia latifolia*, usually with yellow pine, but sometimes with upland oaks. Populations on the DBNF are found in similar habitat with the exception of one or two which are

moist microhabitat associated with shaded cliffs. Fire likely is important to the maintenance of the community in which *Monotropsis* lives and is unlikely to harm the species as it occurs mostly underground except for flowering.

Gaywings – *Polygala pauciflora* – Gaywings is a northern species with extend range through the southern Appalachians. It is found in rich moist forest. On the DBNF, one station is known from a mesic ravine in oak-hardwood forest.

Racemed Milkwort – *Polygala polygama* var. *polygama* – This plant has a midwestern and coastal plain distribution. It is usually found on dry, sandy soil in open forest or grassland. The DBNF sites are on sandy soil in open, ridge top, yellow pine-oak forest or sandy, grassy openings.

Wafer Ash or Hop-tree – *Ptelea trifoliata* (as ssp. *trifoliata* var. *trifoliata* per Medley, 1993) – The wafer ash or hop-tree is found in eastern North American. It is found in moist or rich forest. On the DBNF, it is infrequent but locally abundant on limestone outcrops in open dry-mesic forest or along roadsides.

Cumberland Azalea – *Rhododendron cumberlandense* – This azalea is restricted to the central Appalachian Mountains. It grows in open oak and oak-yellow pine forest, usually on dry, rocky slopes or ridges. It usually occurs as scattered individuals, but may form small clumps. The DBNF populations are in the same habitat. Most occurrences are in the Jellicos and on the Redbird District.

Hairy Snout Bean – *Rhynchosia tomentosa* (var. *tomentosa*) – The hairy snout bean is found throughout most of the southeastern US. It grows in dry, open, often sandy, oak or yellow pine forest, at forest margins, in sandhills, and occasionally in mesic forest. The DBNF sites are all in warm season grassland, or low disturbed vegetation along roads or under powerline rights-of-way.

American Chaffseed – *Schwalbea americana* – This plant occurs in two general kinds of habitats, wet and dry. In all cases, soils are sandy and somewhat sterile. In wet habitats, the combination of constant water and periodic fire maintain the site in an open condition. The overstory is open as are the midstory and shrub layers beneath it. Generally wet sites are grassy with few shrubs. Periodic fire helps to maintain the open condition of the sites. It also plays a role in triggering flowering. This habitat type is not known from the DBNF. Dry habitats likewise are open with a thin overstory and open midstory and shrub layers. These sites are generally a mixture of forbs, grasses, and low shrubs. Some dry habitats are subjected to periodic burns, which help to maintain the open condition. Fire here also helps to trigger flowering. In other dry habitats, the openness is more edaphically controlled. The historic sites on the DBNF fall into this group. Here fire would have triggered flowering. Other dry DBNF sites could, with periodic fire, support *Schwalbea* populations.

Ovate Catchfly – *Silene ovata* – The ovate catchfly is uncommon throughout its range. It is found in open oak woods, often on limestone substrates. It grows in light to moderate shade. The DBNF sites are in open oak woods on limestone and appear to have burned in past years. The midstory and shrub layers are thin, and the canopy somewhat open.

Wasioto Rosinweed – *Silphium wasiostense* – This plant is known only from Kentucky and Tennessee. Most populations are in eastern Kentucky, but one or two are known from the Ridge and Valley of Tennessee. Many of the Kentucky populations are on the DBNF. The plant is found on well-drained river terraces in open forest, scattered in open upland oak forest and on lower slopes. It occurs as one or two-leafed plants except in open areas along roadways, utility rights-of-way or stream terraces. In open areas the plants flower, reaching 6-7 feet tall. The species has a deep taproot suggesting is fire tolerant like many of the prairie silphiums. It is probable that fire once maintained habitat for the species-open oak forest or woodland.

Big-flowered Snowbell – *Styrax grandiflorus* – The big-flowered snowbell is southern Appalachian Mountains and southeastern coastal plain species. It commonly grows in mixed or deciduous forest in upland locations. There is at least one reliable record for the species in Kentucky from the DBNF area (McCreary County). Here is growing in mixed mesophytic forest on a north aspect above the Cumberland River.

Spiked Hoary-pea – *Tephrosia spicata* – This plant is a southern species with a number of more northern stations. It is commonly found in dry to wet, open yellow pine or yellow pine-hardwood forest, roadsides, clearings and fields. On the DBNF, the species is found on boulder/cobble bars along larger streams and rivers of the Cumberland River drainage. A few sites are known from sandy, sparsely shaded openings on ridges.

Cutleaf Meadow Parsnip – *Thaspium pinnatifidum* – The cutleaf meadow parsnip is associated throughout its range with calcareous bedrock including limestone, siltstone, and dolomite. It is a species of moderately shaded forestland. On the DBNF, it is found in open oak or oak-cedar forest on limestone and calcareous siltstone on the Morehead District.

Velvet Bush Pea – *Thermopsis mollis* var. *mollis* – The velvet bush pea is Piedmont species that occurs in the mountains and coastal plain as well. It grows on sandy slopes and in dry oak or oak-yellow pine forest usually on ridges. The DBNF sites, the only Kentucky locations, are on broad, sandy ridges in dry-xeric to dry-mesic oak forest. The species only flowers in open areas such as along roads or in tree gaps. It has been observed to form dense patches on disturbed sandy ground. The rhizome is stout and several inches below the surface, suggesting along with the habitat, that fire is beneficial for the species.

Running Buffalo Clover – *Trifolium stoloniferum* – Running buffalo clover inhabits open grassland, open woodland and the transition area between them. Light shade does not harm the plant. The species throughout its range is a calciphile, i.e., it shows a preference for limestone or otherwise base cation-rich soils. Periodic disturbance such as might have occurred while large ungulates passed through a population appears to benefit the plant. A large population in central Kentucky appears to do best with moderate disturbance from grazing/resting cattle. The sole population within the Daniel Boone NF proclamation boundary occurs in an open field.

Toothache-tree – *Zanthoxylum americana* – The toothache tree is found in much of northern North America south to the Gulf coastal plain. It grows in moist forest and forest edges. On the DBNF, it is infrequent but locally abundant on limestone outcrops in open dry-mesic forest or along roadsides.

Monocots

Purple Caric Sedge – *Carex purpurifera* – This sedge has a narrow range in the Central Hardwoods area. It grows in mesic forests, primarily hardwood. On the DBNF, it is known from several scattered locations all in dry-mesic oak or mixed oak-yellow pine forest. Shade is moderate to light.

Appalachian Spreading Pogonia – *Cleistes bifaria* – The Appalachian spreading pogonia ranges from the Appalachian Plateaus to the Piedmont. It is found in a variety of sites ranging from glades to open forest to warm season grassland to streamhead wetlands. It occurs on well-drained substrates (on hummocks in wetlands) usually in open or partially open conditions. The plants can be single or occur in colonies. On the DBNF, it is known from glades, streamhead wetlands, seep slopes, and on road cuts in upland oak forest. Fire enhances flowering and total numbers of plants. Fire probably helps to maintain habitat as well.

Spotted Coralroot – *Corallorhiza maculata* – The spotted coralroot is mostly a northern species with extensions into the Appalachian Mountains. Its habitat is hardwood forest, but occurs under a variety of conditions. In Kentucky, it is known only from Pine Mountain within the DBNF proclamation boundary. It occurs on dry-mesic oak-hardwood forest in rich soil.

Wood Lily – *Lilium philadelphicum* var. *philadelphicum* – This lily occurs from New England to NC and Kentucky. It is found in open, usually dry forest or in open fields or warm season grass areas. On the DBNF, it is known from open yellow pine-oak forest, roadsides, warm season grassland, and old fields. It requires open conditions and is soon choked out by heavy cover of herbaceous or woody species. Fire maintains its habitat and promotes the plant.

Wild Lily-of-the-valley – *Maianthemum canadense* – This plant is a northern North American species with range extensions south along the Appalachian Mountains. It is found in acid, well-drained sites under eastern hemlock and mixed hardwood forest. It is commonly found on rotten logs or hummocks in wet woods. On the DBNF, it is found on lower slopes and upper terraces in eastern hemlock or mixed mesophytic forest. These sites are cool and shady.

Rough Dropseed – *Sporobolus clandestinus* – Rough dropseed is tall grass prairie species, which also occurs on the coastal plain. It is found in dry sandy soil of prairies, openings, barrens, and along roadways and other rights-of-way. On the DBNF, the species is found in McCreary and Pulaski Counties on limestone cliffs and open, sandy yellow pine or yellow pine-oak forest.

Mosses

Dog Paw Moss or Elegant Moss – *Dicranum scoparium* – This moss is found throughout most of eastern North America. It is relatively common on shaded sandstone boulders, outcrops and cliffs. It also occurs on soil in upland forest. It appears to require moderate shade and acid conditions, but will live in moist to dry environments. The species is often subject to fire and frequently portions of clumps are burned, but not the entire clump. The species is collected for the horticultural industry. It may serve as a refugium for some species during fire events, and act as water reservoir and soil stabilizer following fire.

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Attachment C.

Dry-Mesic Oak Habitat Association Matrix

Association	Habitat	Modifier	Class	Common/Species
4-Dry-Mesic Oak	Dry-Mesic Oak Forest	(blank)	BIRD	Eastern Wood Pewee/ <i>Contopus virens</i>
			FUNGI	Morel/ <i>Morchellus esculentus</i>
			INSEC	Diana Fritillary/ <i>Speyeria diana</i>
			P-DIC	Sweetshrub/ <i>Calycanthus floridus</i> var. <i>glaucus</i>
				Chinquapin (generic)/ <i>Castanea pumila</i>
				Beech Drops/ <i>Epifagus virginiana</i>
				Smooth Veiny Peavine/ <i>Lathyrus venosus</i>
				American Gromwell/ <i>Lithospermum latifolium</i>
				Cow-wheat/ <i>Melampyrum lineare</i>
				American cow-wheat/ <i>Melampyrum lineare</i> var. <i>pectinatum</i>
				Sweet Pinesap/ <i>Monotropsis odorata</i>
				Big-flowered Snowbell/ <i>Styrax grandiflorus</i>
				Velvet Bushpea/ <i>Thermopsis mollis</i> var. <i>mollis</i>
				Running Buffalo Clover/ <i>Trifolium stoloniferum</i>
			P-MON	Wild Lily-of-the-Valley/ <i>Maianthemum canadense</i>
		Acidic Substrate	P-MOS	Dog Paw Moss, Elegant Moss/ <i>Dicranum scoparium</i>
		Basic Substrate	P-DIC	Goldenseal/ <i>Hydrastis canadensis</i>
				Ovate Catchfly/ <i>Silene ovata</i>
				Cutleaf Meadow-parsnip/ <i>Thaspium pinnatifidum</i>
				Toothache-tree/ <i>Zanthoxylum americana</i>
		Basic Substrate	P-MON	Purple Caric Sedge/ <i>Carex purpurifera</i>
		Closed Forest Canopy	BIRD	Acadian Flycatcher/ <i>Empidonax virescens</i>
				Ovenbird/ <i>Seiurus aurocapillus</i>
		Dense shrub understory		Worm-eating Warbler/ <i>Helmitheros vermivorus</i>
				Wood Thrush/ <i>Hylocichla mustelina</i>
				Swainson's Warbler/ <i>Limnithlypis swainsonii</i>
				Kentucky Warbler/ <i>Oporornis formosus</i>
				Ovenbird/ <i>Seiurus aurocapillus</i>
		Dry		Ovenbird/ <i>Seiurus aurocapillus</i>
				Summer Tanager/ <i>Piranga rubra</i>
			P-DIC	Spiked Hoary-pea/ <i>Tephrosia spicata</i>
			P-MON	Appalachian Spreading Pogonia/ <i>Cleistes bifaria</i>
				Rough Dropseed/ <i>Sporobolus clandestinus</i>
		Elevation (above 2300 ft)	BIRD	Least Flycatcher/ <i>Empidonax minimus</i>
			P-DIC	Gaywings/ <i>Polygala pauciflora</i>
		Ericaceous Shrub Associate		Southern Heartleaf/ <i>Hexastylis contracta</i>
		Fire Tolerant/Enhanced	BIRD	Least Flycatcher/ <i>Empidonax minimus</i>

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<u>Association</u>	<u>Habitat</u>	<u>Modifier</u>	<u>Class</u>	<u>Common/Species</u>
				Red-headed Woodpecker/ <i>Melanerpes erythrocephalus</i>
				Yellow-throated Vireo/ <i>Vireo flavifrons</i>
			P-DIC	Wasioto Rosinweed/ <i>Silphium wasiotense</i>
		Forb/Grass Condition	P-DIC	Velvet Bushpea/ <i>Thermopsis mollis</i> var. <i>mollis</i>
		Forest Interior (Minimal Edge)	BIRD	Cerulean Warbler/ <i>Dendroica caerulea</i>
				Worm-eating Warbler/ <i>Helmitheros vermivorus</i>
				Swainson's Warbler/ <i>Limnothlypis swainsonii</i>
				Ovenbird/ <i>Seiurus aurocapillus</i>
				Yellow-throated Vireo/ <i>Vireo flavifrons</i>
			MAMM	Appalachian Cottontail/ <i>Sylvilagus obscurus</i>
		High Shade	BIRD	Worm-eating Warbler/ <i>Helmitheros vermivorus</i>
		High/Constant Humidity (Microclimate)	REPT	Northern Coal Skink/ <i>Eumeces antracinus anthracinus</i>
		Large Decadent Trees	BIRD	Eastern Wood Pewee/ <i>Contopus virens</i>
			FUNGI	Sulphur Shelf/ <i>Laetioporus sulphureus</i>
		Leaf Litter	BIRD	Worm-eating Warbler/ <i>Helmitheros vermivorus</i>
				Ovenbird/ <i>Seiurus aurocapillus</i>
		Mature forest		Eastern Wood Pewee/ <i>Contopus virens</i>
				Cerulean Warbler/ <i>Dendroica caerulea</i>
				Red-headed Woodpecker/ <i>Melanerpes erythrocephalus</i>
				Kentucky Warbler/ <i>Oporornis formosus</i>
				Ovenbird/ <i>Seiurus aurocapillus</i>
				American Redstart/ <i>Setophaga ruticilla</i>
		Mid-age Forest		Eastern Wood Pewee/ <i>Contopus virens</i>
		Mid-age Forest	BIRD	Ovenbird/ <i>Seiurus aurocapillus</i>
				Yellow-throated Vireo/ <i>Vireo flavifrons</i>
		Moderate Shade	P-DIC	Velvet Bushpea/ <i>Thermopsis mollis</i> var. <i>mollis</i>
			P-MON	Wood Lily/ <i>Lilium philadelphicum</i> var. <i>philadelphicum</i>
		Moist	BIRD	Worm-eating Warbler/ <i>Helmitheros vermivorus</i>
				Wood Thrush/ <i>Hylocichla mustelina</i>
				Kentucky Warbler/ <i>Oporornis formosus</i>
			P-MON	Spotted Coralroot/ <i>Corallorrhiza maculata</i>
		Old Growth Condition	MAMM	Rafinesque's Big-eared Bat/ <i>Corynorhinus (Plecotus) rafinesquii rafinesquii</i>
		Open (Little or No Shade)	BIRD	Summer Tanager/ <i>Piranga rubra</i>
			P-DIC	Red-disked Sunflower/ <i>Helianthus atrorubens</i>
				Wasioto Rosinweed/ <i>Silphium wasiotense</i>
				Cutleaf Meadow-parsnip/ <i>Thaspium pinnatifidum</i>
			P-MON	Purple Caric Sedge/ <i>Carex purpurifera</i>
			P-MOS	Dog Paw Moss, Elegant Moss/ <i>Dicranum scoparium</i>
		Open Forest Canopy	BIRD	Least Flycatcher/ <i>Empidonax minimus</i>
				Red-headed Woodpecker/ <i>Melanerpes erythrocephalus</i>
				Summer Tanager/ <i>Piranga rubra</i>
			P-DIC	American Chestnut/ <i>Castanea dentata</i>
		Open Forest Canopy	P-DIC	Sweet-fern/ <i>Comptonia peregrina</i>

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<u>Association</u>	<u>Habitat</u>	<u>Modifier</u>	<u>Class</u>	<u>Common/Species</u>
		Open Midstory/Understory	BIRD	Eastern Wood Pewee/ <i>Contopus virens</i>
				Cerulean Warbler/ <i>Dendroica caerulea</i>
				Acadian Flycatcher/ <i>Empidonax virescens</i>
				Summer Tanager/ <i>Piranga rubra</i>
				Yellow-throated Vireo/ <i>Vireo flavifrons</i>
			P-DIC	Cumberland Azalea/ <i>Rhododendron cumberlandense</i>
		Rich Soil	P-DIC	American Chestnut/ <i>Castanea dentata</i>
			P-MON	Spotted Coralroot/ <i>Corallorhiza maculata</i>
		Riparian	BIRD	American Redstart/ <i>Setophaga ruticilla</i>
		Rocky/Rocks	P-DIC	Wafer Ash, Hop-tree/ <i>Ptelea trifoliata</i>
			P-MON	Rough Dropseed/ <i>Sporobolus clandestinus</i>
			REPT	Northern Coal Skink/ <i>Eumeces antracinus anthracinus</i>
		Sandy Soil	P-DIC	Sweet-fern/ <i>Comptonia peregrina</i>
				Racemed Milkwort/ <i>Polygala polygama</i> var. <i>polygama</i>
				Hairy Snout Bean/ <i>Rhynchosia tomentosa</i>
				American Chaffseed/ <i>Schwalbea americana</i>
			P-MON	Rough Dropseed/ <i>Sporobolus clandestinus</i>
		Shrub/Sapling Condition	BIRD	Least Flycatcher/ <i>Empidonax minimus</i>
				American Redstart/ <i>Setophaga ruticilla</i>
		Shrub/Sapling Condition	BIRD	Ovenbird/ <i>Seiurus aurocapillus</i>
			REPT	Northern Coal Skink/ <i>Eumeces antracinus anthracinus</i>
		Slope (hillside, steepness)	BIRD	Worm-eating Warbler/ <i>Helmitheros vermivorus</i>
				Ovenbird/ <i>Seiurus aurocapillus</i>
		Snags > 6" dbh		Red-headed Woodpecker/ <i>Melanerpes erythrocephalus</i>
		Tract Size (Area Sensitive)		Cerulean Warbler/ <i>Dendroica caerulea</i>
				Acadian Flycatcher/ <i>Empidonax virescens</i>
				Swainson's Warbler/ <i>Limnothlypis swainsonii</i>
				Worm-eating Warbler/ <i>Helmitheros vermivorus</i>
				Ovenbird/ <i>Seiurus aurocapillus</i>
		Tree and Snags (Cavity Nesters)		Red-headed Woodpecker/ <i>Melanerpes erythrocephalus</i>
		Trees > 20" dbh		Cerulean Warbler/ <i>Dendroica caerulea</i>
		Upland (usually mesic to dry, not subject to holding water)		Cerulean Warbler/ <i>Dendroica caerulea</i>
				Ovenbird/ <i>Seiurus aurocapillus</i>
				Yellow-throated Vireo/ <i>Vireo flavifrons</i>
		Water (Distance Sensitive)		Acadian Flycatcher/ <i>Empidonax virescens</i>
				American Redstart/ <i>Setophaga ruticilla</i>
			REPT	Northern Coal Skink/ <i>Eumeces antracinus anthracinus</i>