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Viability Assessment Report For General Forest Habitat Association

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I. Description of Habitat Association

The General Forest Habitat Association encompasses a wide range of forest conditions and can potentially include any soil, forest type, or land type association (LTA) which occurs on the Daniel Boone National Forest (DBNF) (see USDA Forest Service, 1997a). Forested terrain ranges from hilly to rugged in the Cumberland Plateau, which encompasses most of the DBNF and is intersected by cliffs in the higher elevations and by drainages of the Cumberland, Kentucky and Licking Rivers at lower elevations. Steepest terrain occurs in the Cumberland Mountains, which border the southeastern section of the DBNF. This habitat association includes both hardwood and pine trees, as well as stands that are a mixture of both, along with their associated plant and animal species. Hardwood predominates on all districts, with pine more abundant on the southern half of the DBNF (the London, Somerset, and Stearns Districts).

Because this is a broad and encompassing habitat association, general forest might best be described as the typical forest scene that comes to mind when one thinks about being out in woods within the DBNF. Many events may have shaped this forest scene including disturbance from storm events, natural tree mortality, wildfires, insect and disease mortality and natural succession. Management activities have also impacted this scene through timber harvest, prescribed burning, timber stand improvement treatments, trails and recreation developments, mineral extraction, and wildlife habitat improvement activities. This is an association in which species are found that utilize a wide range of general forested conditions. These species may be dependant on specific habitat attributes or modifiers, such as: proximity to water sources; soil moisture; stand age; density of forest canopy, midstory, and/or understory with corresponding degrees of exposure to sunlight; etc. but generally they show no preference for one forest type over another. Species that occur in this association fall into at least one of three categories: 1) they tolerate a wide variety of forest types and are primarily general forest dwellers; 2) they have very specific requirements (e.g. early successional habitat) but dwell in a variety of forest types when the modifier is present; 3) they have certain specific requirements not met within this broad association at all times, but do occur in general forest situations at least some of the time (e.g. when foraging).

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

The DBNF has approximately 664,984 acres of general forestland (USDA Forest Service, 1998), a figure that has increased over the previous planning period as a result of land acquisition. The General Forest Habitat Association is comprised of all the DBNF acres

considered forested. This represents the total DBNF ownership minus non-forested acres such as surface water, road and utility corridors, permanent openings and non-forested strip mines. It is composed primarily of hardwood stands, which make up about 70 percent (466,135 ac) of the total acreage. Pine stands comprise approximately 10 percent (68,681 ac) of the Forest. Mixed forest types account for the remaining 20 percent, which is fairly evenly divided between pine-hardwood (61,203 ac) and hardwood-pine (68,965 ac) stands. The DBNF is in the process of undergoing a significant change in composition, particularly in the southern half of the Forest, as a result of the Southern Pine Beetle infestations. Since the infestations' began in 1999-2000, tremendous yellow pine mortality has occurred. The estimates of predicted pine loss resulting from the beetle epidemic run as high as 75 - 90 percent. This has resulted in many of the pine and mixed pine/hardwood stands to become increasingly dominated by the hardwood groups.

Table 1. General Forest Age Class Distribution

Age Class	Acreage	Percent
0-10	51,441	8
11-20	46,818	7
21-30	43,664	7
31-40	35,211	5
41-50	26,853	4
51-60	41,984	6
61-70	88,041	13
71-80	98,094	15
81-90	93,279	14
91-100	75,169	11
101-110	41,855	6
111-120	13,883	2
121-130	4,481	1
131-140	1,578	< 1
141-150+	2,633	< 1

Four age classes within the Continuous Inventory of Stand Conditions (CISC) data show significantly higher percentages of the total acreage than other individual age classes. These classes indicate that approximately 53 percent (354,583 ac) of the total forested area is in stands of trees between 61 and 100 years of age (USDA Forest Service, 1998), an increase from 45 percent in 1980 (USDA Forest Service, 1985). About 25 percent (168,448 ac) of the total forested acreage is between 81 and 100 years of age, compared with 16 percent in 1980. Approximately 35 percent (232,878 ac) of the total acreage is in stands that are 81 years of age and older, compared with about 21 percent in 1980. The percentage of stands that are 100 years of age and older has risen from about 5 percent in 1980 to nearly 10 percent (64,430 ac). These older age classes provide attributes such as large trees, decadent trees with natural cavities and more open mid and understory conditions.

At the other end of the age class spectrum, early-successional conditions occur within the 0-10 year age class. For some species, suitable conditions may continue beyond ten years; whereas for others, advancing succession, the increased growth of saplings, and/or denser understory may be prohibitive as soon as 3 – 4 years. On the DBNF, approximately 8 percent (51,441 ac) of the total forested acreage falls within the 1-10 year age class, compared with about 9 percent in 1980. [Note that these figures represent early-successional conditions within forested stands; grassy-type openings and fields are addressed separately under the Grassland Habitat Association.] The slight decline is likely the result of the recent halt in new timber harvests, as timber harvesting initially results in the creation of early-successional conditions.

Approximately 7 percent of the total forested acreage is within each of the classes that generally correspond to the sapling/pole condition: the 11-20 year (46,818 ac) and 21-30 year (43,664 ac) age classes. By comparison, 8 percent and 4 percent of forested acreage occurred, respectively, in those classes in 1980. The age that corresponds to the change from sapling/pole to mid-age conditions varies between tree species and sites. Likewise, the cut-off for mid-age is variable--Although Virginia Pine is considered mature when it reaches 60 years of age, for other species the mid-age period will extend to 70 years or longer. But for the sake of comparison, the percentage of trees currently between 31 and 60 years old is about 16 percent (104,048 ac), down from approximately 28 percent in 1980.

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

Species associated with the general forest habitat are dependant on a forested condition and usually one or more specific attributes, or modifiers, of the general forest. Because the species linked to this habitat association are typically indifferent to dominate forest cover type (e.g. pine vs. hardwood vs. mixed), the specific modifiers become the element that determines the ability of this association to provide for a high probability of persistence for the associated species.

In order to provide for all the specific attributes necessary to sustain species, it is important that the general forest contain a variety of successional conditions. The general forest should contain early successional, sapling/pole, mid-age, mature and old-growth conditions. These conditions should be distributed in the various forest types found within this association. The exact distribution of age class will be influenced by several other factors. Distribution may be due to the species need for continuity of certain age classes and other factors that result from management of more specific associations that also fall under the broad scope of general forest. Other modifiers that can be affected by management activities will be provided for within the various age classes of general forest.

The early successional age class generally provides in the first 0-3 years, a forb and low shrub and/or short tree sprout dominated forest. Forbs, and some grasses provide for a short time, a condition similar to, but not the same as a grass or forbs opening, including forage, nectar flowers, and an open condition. Woody plant heights are generally less than 3-4 feet in this period. Generally between 3 and 10 years, woody vegetation begins rapid growth, filling in and choking out the herbaceous plants. The trees and shrubs also grow taller,

reaching 7 – 15 feet depending on the site. This condition provides a dense shrub like cover in the open, providing hiding and nest sites for many species.

Generally, forests from 11 to 30 years provide the sapling/pole stage of forest succession. This stage typically contains high woody stem density from 11 to 20 years and gradually begins to thin as it approaches 30 years due to the shading of more dominant overstory development. Trees may reach a diameter of 8 to 10 inches diameter at breast height (DBH) near the 30-year mark depending on species and site conditions. There is typically a well-developed shrub layer present during this stage but it is usually reduced in the latter years of this stage.

Mid age forest typically encompasses forests that are 30 to 80 years old. This stage contains trees greater than 10 inch DBH and typically has a well-shaded understory unless the area is being managed for sparse overstory conditions such as with prescribed fire. During this stage mast-producing species will typically begin to produce and snags and natural cavities will occur sporadically.

Mature to old growth stages are typically greater than 80 years old. Old growth conditions are usually related to species composition. Generally, shortleaf pine dominated forests are considered old growth after 100 years while mixed mesophytic forest are not considered old growth until 140 years (USDA Forest Service, 1997). The mature and old growth conditions typically provide larger trees, more open understory and higher numbers of snags and natural cavities. There is also usually more downed wood in the older stage of forest succession. Small canopy openings that result from downed large trees may occur throughout this stage.

The following recommendations will ensure that this association provides for the habitat conditions necessary to ensure a high probability of persistence for the species dependant on the General Forest Habitat Association. These are considered to be the items that will potentially have the most impact on the species group within the general forest association.

A. Existing Forest Plan Goals, General Direction and Standards & Guides (Forest-Wide)

- Forest Goals - # 3, 6, 8, 15, 16, 21, 22, 25 and 26 (USDA Forest Service, 1985- pp IV2 & IV3).
 - *Rationale: These goals place emphasis on the management of the general forest in a manner that will provide suitable habitat and habitat attributes necessary to allow associated species to persist on the forest. These goals should be carried into new plan revision, as they are applicable to the viability of species in the General Forest Habitat Association.*
- Management of mixed forest types (USDA 1985, amend. 6, pp 2 – 6)
 - *Rationale: This direction allows for the use of mixed management types within the general forest. This will allow for a more diverse forest that will help to ensure the persistence of the diverse species group associated with the general forest habitat association. Elements of this amendment will likely need to be adjusted to*

meet the requirements of other, more specific habitat associations. The intent here is to stress that this form of management needs to continue to some degree in the general forest.

B. Additional Recommendations

- Incorporate guidance found within “An Assessment and Strategy for Conservation of Aquatic Resources on the DBNF, Interim Report, April 2001” as direction for management activities which take place in terrestrial environments.
 - *Rationale: The guidance within this assessment represents the best science available for the management of riparian areas within the forest. This will help ensure that species associated with the general forest that require riparian areas as a modifier have a high probability of persistence on the forest. This direction is particularly important to several plant species that require the riparian area as a habitat modifier.*
- Maintain a variety of forest types to ensure adequate diversity and provide for habitat modifiers to support species group.
 - *Rationale: Where this composition occurs will be determined by site conditions and other species-specific management needs. Maintaining a variety of forest types and mixed conditions ensures a diverse habitat capable of sustaining species.*
- Maintain a distribution of age classes to provide for habitat modifiers related to various stages of succession.
 - *Rationale: Many of the species in this association group are specific to a particular stage of forest succession rather than forest cover type. The key point is to ensure a flow of the various age classes to cover the stages that include early successional, shrub/sapling, mid-age forest, mature forest and old growth. By providing these stages the habitat modifiers required by the species group will likely be present.*
- Maintain spatial arrangement of age class distribution to provide for continuity of age class habitat modifiers for species requiring minimum tract size.
 - *Rationale: A spatial arrangement of age classes that allows for contiguous older age habitat of 2500 acre blocks is important to some bird species in this habitat association. Blocks of this size should be provided for in the 80+ age class and distributed over the planning area.*
- Maintain distribution of younger age classes to provide for edge and early successional habitat modifiers.
 - *Rationale: Several species utilize the edge condition created by the juxtaposition of different age classes. This habitat will be provided for by the distribution of*

regeneration areas among older age classes. Regeneration areas should be small (10 – 40 acres) and interspersed in areas with stands at least 30 years old. Specific management emphasis, such as for Ruffed Grouse, may favor adjacent stands younger than 30 yrs.

- Focus land acquisition plans on areas of higher elevation forest habitat and areas to provide for contiguous blocks of mature habitat for species with viability concerns.
 - *Rationale: Some species in this association require higher elevation forest areas (2000 ft. +). This habitat is extremely limited within the DBNF proclamation boundary and should be considered a high priority for acquisition. Species that require large tracts and forest interior conditions would benefit from consolidation of land ownership that provides these conditions.*

C. Species Specific General Direction and Standards and Guidelines for the Indiana Bat

Protect, maintain and enhance Indiana bat roosting, foraging and maternity habitat in the general forest area. (Unless otherwise noted, the standards and guidelines are current Forest Plan direction.)

- Tree cutting activities, involving currently suitable or potential roost trees, will not be conducted within two and one half miles of an Indiana bat maternity colony between 1 May and 15 August.
 - *Rationale: Female Indiana bats frequently forage up to 2 ½ miles from their maternity colony site. Tree cutting activity in this area during the maternity period decreases their chance to successfully raise their young. (USFWS current best available knowledge)*
- Generally, currently suitable roost trees which are 6" or greater dbh (SHNS EA, Chapter VII) may be removed between 15 October and 31 March if they are greater than five miles from a significant hibernaculum and outside known Karst areas. If removal occurs at other times, trees must be evaluated for bat use by a trained observer immediately prior to tree removal.
 - *Rationale: During the 15 October to 31 March time period Indiana bats are either in hibernation or are concentrated in forest areas near hibernation caves, therefore they will not be routinely roosting under the bark of trees outside the five mile zone. At other times of the year Indiana bats may be utilizing currently suitable roost trees throughout the DBNF.*
- RCW midstory work within the HMA may remove all currently suitable roost trees less than 9" dbh between 1 Dec and 15 March. Outside this time period currently suitable roost trees are to be girdled and left standing.
 - *Rationale: Maintaining an open understory condition is important to RCW habitat management. To avoid conflict with roosting Indiana bats, currently*

suitable roost trees should not be cut down between 16 March and 30 November. Rather these trees will be killed, but left standing thereby providing Indiana bat roost trees and also maintaining open understory conditions desirable to the RCW.

- Every effort will be made to retain existing snags within project areas except where they would interfere with the project purpose and need.
 - *Rationale: Snags provide important habitat conditions for roosting Indiana bats and should be retained if at all possible within project areas. Snags should not be intentionally felled in these areas. It is also recognized that the purpose and need of some projects will preclude leaving any snags within the immediate project area.*
- Snags that are considered to be an immediate threat to human safety may be removed at any time.
 - *Rationale: While it is recognized that the removal could occur during the Indiana bat roosting season, the safety of humans is of paramount importance.*
- Snags identified as hazards but not immediate threats to human safety will only be removed during the hibernation season (December 1 - March 31 if within 5 miles of a hibernation site and between 15 October and 31 March if outside the 5 mile zone).
 - *Rationale: Snags within project areas that are designated for removal should be removed at a time when this activity does not present a threat to roosting Indiana bats.*
- Some snags may be removed as incidental loss associated with project activities such as skid trails, log landings and roads, etc. The accidental felling of a snag, that is 9 inches or greater dbh, is reportable to the Forest T&E biologist and the USFWS.
 - *Rationale: It is recognized that some inadvertent loss of snags will occur. The accidental felling a snag 9 inches or greater dbh is by definition not part of the analysis of the proposed action. Thus, these trees should be reported, as described above, in order to fully determine annual effects on the Indiana bat roosting/foraging habitat.*
- Prescribed burning will not occur in areas of Indiana bat roosting habitat between 1 May and 15 August.
 - *Rationale: During the maternity season non-volant juvenile Indiana bats roosting under tree bark or in snags may be killed by the heat or smoke associated with prescribed fire. (USFWS current best available knowledge)*

Maintain and enhance roosting and foraging habitat during projects designed to manage overstory vegetation. (Unless otherwise noted, the standards and guidelines are current Forest Plan direction.)

- No snags will be intentionally felled within project areas associated with timber management. Within these areas at least three snags per acre need to be over 9 inches in dbh.
 - *Rationale: Snags are important as Indiana bat roosting habitat and should be retained in timber sale areas.*
- Live trees within a regeneration project area will be girdled if the existing density of standing dead trees does not meet the three per acre standard.
 - *Rationale: If the area does not contain at least three, 9 inch dbh or greater snag per acre, additional trees will be killed to provide this needed habitat component.*
- Retain live trees adjacent to 1/3 of all snags over 12 inches dbh to provide partial shading.
 - *Rationale: A variety of microclimate conditions are needed by roosting Indiana bats, especially during the maternity season. By providing shade on some of the large snags a variety conditions will be maintained within the project area.*
- Retain a minimum of 10 to 15 square feet basal area of potential roost trees (where available: see Table 1, DN, SHNS Amendment) of a minimum size of 9 inches dbh per acre, on a stand average. Larger trees are preferred.
 - *Rationale: Retaining trees within the project area provides suitable habitat of foraging and future roosting habitat for Indiana bats. Trees do not need to be retained on a uniform distribution basis, but rather should occur on a stand average basis to maximize the ecological potential of the site.*
- Retain all shagbark, shellbark and red hickories that are at least pole size (6 inch dbh) or greater.
 - *Rationale: These species of hickory trees possess outstanding exfoliating bark characteristics and are highly desirable as roost sites by Indiana bats.*
- Retain all immediate roost trees regardless of size (SHNS EA, Chapter 7). These trees must be physically identified prior to project initiation. Should these trees be felled during project activity the Forest T & E Biologist and the USFWS shall be contacted.
 - *Rationale: Immediate roost trees provide the necessary characteristics to be use as roost sites by Indiana bats. These trees are marked prior to project initiation because they are difficult to recognize and marking will insure that they are retained during the duration of the project.*
- Design boundaries of harvested area shall be irregular in shape.

- *Rationale: Irregular boundaries provide additional linear area for Indiana bats to forage within a project area. Standing trees, utilized for overhead cover and roosting are immediately adjacent to open foraging areas.*
- Distribute some of the leave trees in clumps or strips containing 50 square feet of basal area per acre or 1/2 the density of the original stand whichever is greatest in order to provide travel/foraging habitat corridors.
 - *Rationale: Indiana bats travel and forage in areas where understory vegetation does not inhibit their flight path. Retaining overhead cover in clumps and strips will provide travel corridors and foraging areas not otherwise available in timber sale areas.*
- Some snags may be removed as incidental loss associated with project activities such as skid trails, log landings and roads, etc. The accidental felling of a snag, that is 9 inches or greater dbh, is reportable to the Forest T&E biologist and the USFWS.
 - *Rationale: It is recognized that some inadvertent loss of snags will occur. The accidental felling a snag 9 inches or greater dbh is by definition not part of the analysis of the proposed action. Thus, these trees should be reported, as described above, in order to fully determine annual effects on the Indiana bat roosting/foraging habitat.*

Restrict Indiana bat use of contaminated water sources (Unless otherwise noted, the standards and guidelines are current Forest Plan direction.)

- All sources of potentially toxic standing water or water sources that may entrap Indiana bats (e.g. brine pits, oil catch basins, etc.) should be filled, covered, or otherwise modified to prevent bats from attempting to drink from them.
 - *Rationale: These water sources pose a serious threat to bats or birds attempting to use them as a source of water. Highly toxic materials may be ingested with the water. Individuals may also become entrapped in ponds containing waste materials from mining or drilling operations.*

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

Monitoring of the general forest habitat association should provide enough information to adequately assess the composition, age class and presences of other habitat modifiers. This will allow basic determinations to be made regarding the ability of the habitat to support the group of species associated with the general forest. The following recommendations should be sufficient to allow these parameters to be tracked at a level necessary to determine if the association is providing the elements required for species persistence.

- Inventory should be conducted in each stand (or analysis unit) at least once every 10 – 15 years. (High priority)

- *Rational: Inventory may be at the stand level or larger units may be used (such as ecological management units or resources analysis 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.*
- Inventory to identify and update forest vegetation databases after non-prescribed major disturbances. (High priority)
 - *Rational: Changes in forest type or age class that result from unplanned disturbances may impact planned management activities for a given area. To ensure that planned management is still in queue with the desired future condition for a planning area, inventory of these areas is necessary.*
- Employ GIS and vegetation management databases to track the condition and composition of the general forest. (High priority)
 - *Rational: The use of FSVeg (or CISC currently) in concert with our GIS coverage of stands should be adequate to assess the composition, age class and spatial distribution of the general forest habitat and habitat modifiers. This makes the assumption that the inventory data collects the necessary information regarding habitat modifiers.*
- Annual monitoring reports should include an analysis of the general forest habitat association using the latest inventory data. Copies of the spatial and tabular databases will be copied and stored for future reference. (High priority)
 - *Rational: This annual check of the conditions of the forest will help ensure that any potential management problems regarding the composition or age class structure of the forest are readily identified. This information should be displayed using the most up to date spatial and tabular databases.*
- Conduct annual R8 landbird monitoring program. (Medium priority)
 - *Rational: These monitoring processes will not only monitoring trends in landbird populations, but may also indicate general forest habitat conditions. Habitat type and age class stratifies these monitoring points. Changes in species composition may be related to some degree to changes in the habitat condition. However, consideration of these trends must take into account if the birds being monitored are Neotropical migrants or year-round residents. Migrants may experience adverse impacts in the winter habitat that could extrapolate to the breeding trends on the forest and not be a true indicator of breeding habitat conditions.*

References:

USDA Forest Service. 1985. Land and resource management plan. U.S. Department of Agriculture, Forest Service, Daniel Boone National Forest. Winchester, KY.

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USDA Forest Service. 1997a. Landtype association map unit descriptions. Unpublished white paper. U.S. Department of Agriculture, Forest Service, Daniel Boone National Forest. Winchester, KY.

USDA Forest Service. 1998. Continuous inventory of stand conditions (CISC). Unpublished data. U.S. Department of Agriculture, Forest Service, Daniel Boone National Forest. Winchester, KY.

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Attachment A.

Species List: General Forest Habitat Association

Class	Common Name/Species
ANIMALS	
Amphibians	Jefferson Salamander/ <i>Ambystoma jeffersonianum</i> Marbled Salamander/ <i>Ambystoma opacum</i> Green Salamander/ <i>Aneides aeneus</i> Four-toed Salamander/ <i>Hemidactylum scutatum</i> Wehrle's Salamander/ <i>Plethodon wehrlei</i> Wood Frog/ <i>Rana sylvestris</i>
Birds	Sharp-shinned Hawk/ <i>Accipter striatus</i> Ruby-throated hummingbird/ <i>Archilochus colubris</i> Whip-poor-will/ <i>Caprimulgus vociferus</i> Lark sparrow/ <i>Chondestes grammacus</i> Northern flicker/ <i>Colaptes auratus</i> Northern Bobwhite/ <i>Colinus virginianus</i> Common Raven/ <i>Corvus corax</i> Black-throated Blue Warbler/ <i>Dendroica caerulescens</i> Prairie warbler/ <i>Dendroica discolor</i> Chestnut-sided warbler/ <i>Dendroica pensylvanica</i> Pileated Woodpecker/ <i>Dryocopus pileatus</i> Gray catbird/ <i>Dumetella carolinensis</i> Peregrine Falcon/ <i>Falco peregrinus</i> Common yellowthroat/ <i>Geothlypis trichas</i> Bald Eagle/ <i>Haliaeetus leucocephalus</i> Yellow-breasted Chat/ <i>Icteria virens</i> Red-headed woodpecker/ <i>Melanerpes erythrocephalus</i> Black-and-white Warbler/ <i>Mniotilta varia</i> Eastern Towhee/ <i>Pipilo erythrophthalmus</i> American Woodcock/ <i>Scolopax minor</i> Chipping sparrow/ <i>Spizella passerina</i> Bewick's Wren/ <i>Thryomanes bewickii altus</i> Golden-winged warbler/ <i>Vermivora chrysoptera</i> Canada Warbler/ <i>Wilsonia canadensis</i> Hooded Warbler/ <i>Wilsonia citrina</i>
Insects	Sixbanded Longhorn Beetle/ <i>Dryobius sexnotatus</i> Appalachian Grizzled Skipper/ <i>Pyrgus wyandot</i> Diana Fritillary/ <i>Speyeria diana</i>
Mammals	Rafinesque's Big-eared Bat/ <i>Corynorhinus (Plecotus) rafinesquii rafinesquii</i> Virginia Big-eared Bat/ <i>Corynorhinus (Plecotus) townsendii virginianus</i>

Class	Common Name/Species
	Eastern Cougar/ <i>Felis concolor couguar</i>
	Eastern Small-footed Bat/ <i>Myotis leibii</i>
	Indiana Bat/ <i>Myotis sodalis</i>
	Allegheny Woodrat/ <i>Neotoma magister</i>
	Masked Shrew/ <i>Sorex cinereus cinereus</i>
	Eastern Spotted Skunk/ <i>Spilogale putorius</i>
	Black Bear/ <i>Ursus americanus</i>
Reptiles	Northern Scarlet Snake/ <i>Cemphora coccinea copei</i>
	Timber Rattlesnake/ <i>Crotalus horridus</i>
	Corn Snake/ <i>Elaphe gutta gutta</i>
	Northern Coal Skink/ <i>Eumeces antracinus anthracinus</i>
	Southern Five-lined Skink/ <i>Eumeces inexpectatus</i>
	Scarlet Kingsnake/ <i>Lampropeltis triangulum elapsoides</i>
	Eastern Slender Glass Lizard/ <i>Ophisaurus attenuatus longicaudus</i>
	Northern Pine Snake/ <i>Pituophis melanoleucus melanoleucus</i>
	Southeastern Crowned Snake/ <i>Tantilla coronata</i>
	Eastern Earth Snake/ <i>Virginia valeriae valeriae</i>
Snails	Banded Globe/ <i>Anguispira kochi</i>
	Pine Mountain Disc/ <i>Anguispira rugoderma</i>
	Queen Crater/ <i>Mesodon chilhoweensis</i>
	Clifty Covert/ <i>Mesodon wetherbyi</i>
	Wrinkled Button/ <i>Mesomphix rugeli</i>
	Glossy Supercoil/ <i>Paravitrea placentula</i>
	Delicate vertigo/ <i>Vertigo bollesiana</i>
	Cupped Vertigo/ <i>Vertigo clappi</i>
FUNGI	Sulphur Shelf/ <i>Laetioporus sulphureus</i>
	Morel/ <i>Morchellus esculentus</i>
LICHENS	Reindeer Lichen/ <i>Cladina</i> spp (cf. <i>rangiferina, stellaris, subtenuis</i>)
PLANTS	
Dicots	Mountain Maple/ <i>Acer spicatum</i>
	Blue Monkshood/ <i>Aconitum uncinatum ssp. uncinatum</i>
	Running Serviceberry/ <i>Amelanchier stolonifera</i>
	Yellow Screwstem/ <i>Bartonia virginica</i>
	American Chestnut/ <i>Castanea dentata</i>
	Scarlet Indian Paintbrush/ <i>Castilleja coccinea</i>
	Carolina Allspice/ <i>Calycanthus floridanus</i>
	Sweetshrub/ <i>Calycanthus floridus var. glaucus</i>
	Chinquapin (generic)/ <i>Castanea pumila</i>
	Allegheny Chinquapin/ <i>Castanea pumila var. pumila</i>

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Class

Common Name/Species

Green-and-gold/ *Chrysogonum virginianum* var. *virginianum*
Black Cohosh/ *Cimicifuga racemosa*
Small Enchanter's-nightshade/ *Circaea alpina* ssp. *alpina*
White-leaf Leather-flower/ *Clematis glaucophylla*
Stoneroot/ *Collinsonia verticillata*
Sweet-fern/ *Comptonia peregrina*
Cumberland Rosemary/ *Conradina verticillata*
Beechdrops/ *Epifagus virginianus*
Yucca-leaved Rattlesnake Master/ *Eryngium yuccifolium*
Small-flowered Thoroughwort/ *Eupatorium semiserratum*
Mercury Spurge/ *Euphorbia mercurialina*
Box Huckleberry/ *Gaylussacia brachycera*
Yellow Gentian/ *Gentiana alba*
Red-disked Sunflower/ *Helianthus atrorubens*
Goldenseal/ *Hydrastis canadensis*
American Water-pennywort/ *Hydrocotyle americana*
St. Peter's-wort/ *Hypericum crux-andreae*
Butternut/ *Juglans cinerea*
Smooth Veiny Peavine/ *Lathyrus venosus*
American Gromwell/ *Lithospermum latifolium*
Fraser's Loosestrife/ *Lysimachia fraseri*
Carolina Anglepod/ *Matelea carolinensis*
Barbara's Buttons/ *Marshallia grandiflora*
American Cow-wheat/ *Melampyrum lineare* var. *lineare*
Sweet Pinesap/ *Monotropsis odorata*
Thread-leaf Sundrops/ *Oenothera linifolia*
Small Sundrops/ *Oenothera perennis*
Mountain Wood Sorrel/ *Oxalis montana*
Kidney-leaf Grass-of-Parnassus/ *Parnassia asarifolia*
Mock Orange/ *Philadelphus inodorus*
Gaywings/ *Polygala pauciflora*
Nodding Rattlesnake-root/ *Prenanthes crepidinea*
Wafer Ash, Hop-tree/ *Ptelea trifoliata*
Nettle-leaf Sage/ *Salvia urticifolia*
Sanicle/ *Sanicula canadensis*
Ovate Catchfly/ *Silene ovata*
Royal Catchfly/ *Silene regia*
Wasioto Rosinweed/ *Silphium wasiotense*
Bay Starvine/ *Schisandra glabra*
Big-flowered Snowbell/ *Styrax grandiflorus*
Snowberry/ *Symphoricarpos albus*
Synandra/ *Synandra hispidula*
Spiked Hoary-pea/ *Tephrosia spicata*
Cutleaf Meadow-parsnip/ *Thaspium pinnatifidum*
Velvet Bush Pea/ *Thermopsis mollis* (generic)

07/15/2003

Class	Common Name/Species
	Running Buffalo Clover/ <i>Trifolium stoloniferum</i>
	Slippery Elm/ <i>Ulmus rubra</i>
	Bird's-foot Violet/ <i>Viola pedata</i>
	Toothache-tree/ <i>Zanthoxylum americana</i>
Monocots	Wild Agave/ <i>Agave virginica</i>
	Cane/ <i>Arundinaria gigantea</i>
	Cypress-swamp Caric Sedge/ <i>Carex jorii</i>
	Boott's Caric Sedge/ <i>Carex picta</i>
	Caric Sedge/ <i>Carex seorsa</i>
	Appalachian Spreading Pogonia/ <i>Cleistes bifaria</i>
	Spotted Coralroot/ <i>Corallorhiza maculata</i>
	Pink Lady's-slipper/ <i>Cypripedium acaule</i>
	Small Yellow Lady's-slipper/ <i>Cypripedium parviflorum var. parviflorum</i>
	Wild Yam/ <i>Dioscorea villosa</i>
	Bearded Skeleton Grass/ <i>Gymnopogon ambiguus</i>
	Wood Lily/ <i>Lilium philadelphicum var. philadelphicum</i>
	Wild Lily-of-the-Valley/ <i>Maianthemum canadense</i>
	Small-flowered False Hellebore/ <i>Melanthium parviflorum</i>
	Clubspur Orchid/ <i>Platanthera clavellata</i>
	Small Purple-fringed Orchid/ <i>Platanthera psycodes</i>
	Swamp Wedgscale/ <i>Sphenopholis pensylvanica</i>
Mosses	Moss/ <i>Brothera leana</i>
	Feather Moss, Log Moss/ <i>Hypnum curvifolium</i>
	Feather Moss, Log Moss/ <i>Hypnum imponens</i>
	Juniper Hair Cap Moss/ <i>Polytrichum juniperinum</i>
	Moss/ <i>Syrrhopodon texanus</i>
	Fern Moss, Log Moss/ <i>Thuidium delicatulum</i>

Attachment B.

General Forest Species/Habitat Relationships with References

ANIMALS

Amphibians

Jefferson salamander -- *Ambystoma jeffersonianum* -- Jefferson salamander is found primarily in shady deciduous forests or mixed woods, low woods and bottomlands. This salamander requires abundant leaf litter, rocks, decomposing logs and stumps. During breeding season, the Jefferson salamander requires temporary ponds, ideally with a pH between 5 and 6 (DeGraff and Rudis, 1986). This salamander is an opportunistic feeder consuming small invertebrates. (Wilson, 1995).

Marbled salamander -- *Ambystoma opacum* -- The marbled salamander occupies a variety of habitats, ranging from pine forests to mixed pine-hardwoods and apparently does best in areas where abundant leaf litter and fallen logs provide shelter. This salamander will spend much of its' time in burrows, leaf litter or under bark and logs. During late fall, the marbled salamander moves into bottomland hardwoods and deposits it's eggs terrestrially. This salamander requires areas subject to fluctuating water levels for breeding and larvae development. The marbled salamander will eat a variety of food items such as insects, other small arthropods, earthworms, snails, and slugs. (Wilson, 1995).

Green salamander -- *Aneides aeneus*-- The green salamander lives in damp crevices in shaded rock outcrops and ledges. In cove hardwoods, this salamander can be observed under bark and cracks of trees (Gordan, 1967). In the general forested area, the green salamander occurs in mucky, boggy water among decaying leaves and logs around woodland streams and ponds (website. Biodiversity. Wku.edu). The green salamander has also been observed in upland pine areas, Virginia pine and white pine-hemlock with mountain laurel occupying the understory. Moist outcrops are required for egg depositing and larval development. (Wilson, 1995).

Four-toed salamander -- *Hemidactylum scutatum* -- The four-toed salamander is usually associated with sphagnum bogs or slow-moving streams with abundant moss or sedges adjacent to woodland areas. Adults live under rocks, logs, leaves or moss in maple-beech and other hardwood forests. They can also be observed in coniferous woods such as loblolly, short-leaf pine, and Virginia pines. The larvae live in pools, bogs or slow-moving streams with moss or sedges (Neill, 1963). The four-toed salamander is terrestrial as an adult, requiring woodlands near sphagnum ponds, streams or bogs. The larvae are aquatic and require a permanent water source. The four-toed salamander is an opportunistic feeder with a diet consisting of small arthropods and worms. (Wilson, 1995).

Wehrle's salamander -- *Plethodon wehrlei* -- The Wehrle's salamander is found in the Appalachian Mountains from extreme southwestern New York southward through Pennsylvania, southeastern Ohio, West Virginia, and Virginia to Stokes County, North Carolina. A disjunct enclave occurs along the Kentucky-Virginia-Tennessee border. Wehrle's salamander is commonly found on wooded hillsides where it hides under rocks and less frequently under and

within logs. It has been found near cave entrances, within deep rock crevices and in old second growth, mixed deciduous and coniferous forests. Wehrle's salamander requires moist wooded hillsides with surface debris in the form of rocks, logs and leaf litter. In early summer, the female will deposit a small cluster of eggs in damp logs, soil, or moss. She will remain with the eggs until they hatch. This salamander's diet consists of small invertebrates, especially insects, spiders and earthworms. (Wilson, 1995)

Wood Frog -- *Rana sylvatica* -- The wood frog lives in or near moist woods, hardwood valleys and occasionally white pine-hemlock, and upland pine forest types. The wood frog breeds in open-water ponds, slow-moving portions of streams and roadside ditches. The wood frog's diet consists mainly of insects. Adults require upland forest areas with logs, stumps and rocks for overwintering and moist woods with standing water during the late winter months. (Wilson, 1995)

Birds

Sharp-shinned Hawk (*Accipiter striatus*) This species occurs in pine, hemlock/pine, and oak woods in Kentucky. Pines and hemlock seem to be preferred for nesting and over-wintering in Kentucky. Nesting is typically in the canopy of a large tree within an extensive tract of mature forest. On the DBNF, Sharp-shinned Hawks are observed foraging most frequently in mature forests of both mixed pine-hardwood and pure hardwood, generally where the midstory is fairly open, allowing the birds to swoop below the forest canopy (L. Perry, pers. obs.). Sharp-shinned hawks do forage within areas having a mix of forested and semi-open habitat; however, they more frequently occupy forested areas and are considered a Forest Interior species. While this species is relatively specific in its nesting habitat requirements, it is much less restrictive in where it forages and is likely to be found foraging throughout the general forest, regardless of forest type.

Ruby-throated Hummingbird (*Archilochus colubris*) Ruby-throated Hummingbirds can be found in a variety of habitats--including wooded wetlands, fields, ravines, and upland woods—where there is an abundance of tubular flowers from which to feed. Sites are usually moist, although this is not a strict requirement. In areas of human habitation, artificial feeders and garden plantings are utilized. Nests are built in deciduous trees and shrubs, usually in undisturbed areas of mature forest, and are often located over streams or openings (Palmer-Ball, 1996). While this species is relatively selective in its nesting habitat requirements, it is much less selective in where it forages and is likely to be found foraging throughout the general forest, regardless of forest type.

Whip-poor-will (*Caprimulgus vociferus*) Whip-poor-wills occupy areas with medium growth hardwood and mixed forest, often in upland and edge habitats. The birds forage for insects in grassy forest openings and fields. Breeding is in forest and forest edges, usually near fields and open habitat. This species requires areas of extensive forest. This species would be expected to nest in any forest type, as long as early successional habitat or edge habitat is provided.

Lark Sparrow (*Chondestes grammacus*) Although Lark Sparrows occur in grasslands, this is not a typical grassland species. These birds seem to require disturbance habitats--such as rock outcrops, sandhills, and erosion gullies--that provide sparse groundcover interspersed with bare

soil or rock (Mengel 1965). Early successional stage upland woods, forest openings, meadows, pastures, roadsides, waste areas with bare, rocky soil, and old fields with scattered shrubs or trees are among the habitats utilized. This species would be expected to nest in any forest type, as long as early successional habitat or edge habitat is provided.

Northern Flicker (*Colaptes auratus*) This is a species that occurs in open and semi-open woodlands and groves with relatively large trees. It occurs most frequently in areas with a combination of dissected wooded tracts and open ground—suppression of fire has likely contributed to a general decline of habitat (Palmer-Ball, 1996). These birds frequently feed off the forest floor, as well as in trees. Nesting is in dead trees or dead limbs of live trees. Forests and groves (usually hardwood), wood edges, and clearings within mature forest are typically used. This species is not particularly attracted to any single forest type and could be expected to occur throughout the general forest, provided that semi-open to open conditions and suitable dead trees are present.

Northern Bobwhite (*Colinus virginianus*) Bobwhite utilize a variety of open and semi-open habitats, including woodland (especially pine), fields, fencerows, cedar thickets, and forest edges. Bobwhite prefer abandoned fields, warm season grasses and clover, although they do occur in smaller numbers in fescue. They are particularly fond of brushy conditions. Nests are made in grassy/weedy, fairly open areas near cover provided by forest edge or brushy borders. On the DBNF, birds are frequently observed with broods in open, pine-hardwood stands that have been heavily burned and have open, well-lit understory with scattered grasses and forbs (L. Perry, pers. obs.). This species is not particularly attracted to any single forest type and could be expected to occur throughout the general forest, provided that open conditions with a sparse, grassy understory are present.

Common Raven (*Corvus corax*) This species is typically found at elevations above 3500 feet but may occur down to 1500 feet (Hamel, 1992). Typically utilizes rocky and remote cliffline and is rarely found in areas without rocky outcrops. In Kentucky, they are typically birds of remote places and are rarely seen away from extensively forested portions of the mountains (Palmer-Ball, 1996). This species is more typical of the high elevation areas along Pine and Black Mountain. While this species is relatively selective in its nesting habitat requirements, it is much less selective in where it forages and is likely to be found foraging throughout the general forest, regardless of forest type.

Black-throated Blue Warbler (*Dendroica caerulescens*) Although the breeding population of this bird extends into Southeastern KY, it is primarily restricted to higher elevations (e.g., on Pine, Black, and Cumberland Mountains). Records of individuals occurring below 2500 feet are scarce. The species utilizes a wide variety of forest types, including forest edge and second growth-type habitats, provided a moderate to dense understory is present—Rhododendron and Mountain Laurel being favored understory species. Areas having denser understory are chosen for nesting. Extensive tracts of medium-growth/mid-age forest are necessary for this forest interior species, which requires a minimum tract size of 2500 hectares (Hamel 1992). This species is not particularly attracted to any one forest type and could be expected to occur throughout the general forest, provided a dense ericaceous shrub understory is present.

Prairie Warbler (*Dendroica discolor*) Prairie Warblers occur in semi-open, early successional, and woodland habitats. Mixed forest types—especially those that have been cut-over or burned--with pines and cedars are occupied. Forest edges, clearings, brushy borders, and overgrown fields with scattered saplings or small trees are commonly used. On the DBNF, the birds are nearly always found in early successional habitat, especially young clearcuts and the undergrowth of shelterwood cuts, and often at wood edges and in stands that have been burned (L. Perry, pers. obs.). This species is not particularly attracted to any one forest type and could be expected to occur throughout the general forest, provided that early successional habitat in the form of young forest or old field and edge situations are present.

Chestnut-sided Warbler (*Dendroica pensylvanica*) This is typically a bird of early successional openings and forest edge where a dense shrub layer of weeds, briars, and young trees predominate (Palmer-Ball, 1996). This species is usually found in the mountains above 3500 feet but may occur sparingly down to 2000 feet (Hamel, 1992). Tends to inhabit rather open and dry areas having some woody vegetation in the form of shrubs and small trees (DeGraaf et. al., 1991). This species is not particularly attracted to any one forest type and could be expected to occur throughout the general forest, provided that early successional habitat in the form of young forest or old field and edge situations are present.

Pileated Woodpecker (*Dryocopus pileatus*) Pileated Woodpeckers require extensive tracts of mature, primarily deciduous, forest. Hamel lists the minimum required tract size as 405 ha (1992). A variety of forest types are used, from upland woods to wooded wetlands, provided large trees (at least 20" dbh) are available for nesting, roosting, and perching. Birds nest in standing, large, dead trees, usually within heavily forested areas, and forage in both standing and fallen trees. This species is not particularly attracted to any single forest type and could be expected to occur throughout the general forest, provided that large tracts of mature forest and suitable nest trees are provided.

Gray Catbird (*Dumetella carolinensis*) This species most frequently inhabits old fields, woodland edge, forest clear-cuts and rural settlement areas. Wherever it occurs the species is typically associated with dense brushy cover (Palmer-Ball, 1996). Prefers moist, dense, dark, tangled vegetation especially in shrubbery (Hamel, 1992). Monitoring records on the DBNF indicate that this species is most common in the non-forested habitat group. This indicates that most occurrences were in old fields or openings. This species is not particularly attracted to any one forest type and could be expected to occur throughout the general forest, provided that early successional habitat in the form of young forest or old field and edge situations are present.

Peregrine Falcon (*Falco peregrinus*) Historically, this species likely inhabited clifflines in the Cumberland Mountains and Cliffs section of the Cumberland Plateau, as well as bluffs along the Kentucky and Ohio Rivers and hollow trees of cypress swamps in Western KY (Palmer-Ball, 1996). Mengel mentions observing the presence of nesting Peregrine Falcons in cliff overlooking the Rockcastle River (1965). The birds nest only in remote sandstone or limestone cliffs that have ledges. Foraging is in open areas with a mix of forest and fields. Reintroduction efforts in the State, primarily on tall buildings in urban areas but also on cliff on the Stanton R.D. are increasing Kentucky populations of falcons, which were decimated by the effects of DDT. While this species is relatively selective in its nesting habitat requirements, it is much less selective in

where it forages and is likely to be found foraging throughout the general forest, regardless of forest type.

Common Yellowthroat (*Geothlypis trichas*) This species is typical of areas with shrubs, brush or tall herbs generally in more open country that is somewhat moist in nature (Hamel, 1992). Usually found in abandon fields, areas with grassy or shrubby borders, marshes, low damp meadows with a profusion of rank growth, and remnants of tallgrass prairies (Palmer-Ball, 1996). Monitoring data collected on the DBNF indicates that this species was most common in non-forested areas less than 10 years old. This species is not particularly attracted to any one forest type and could be expected to occur throughout the general forest, provided that early successional habitat in the form of young forest or old field and edge situations are present.

Bald Eagle (*Haliaeetus leucocephalus*) This federally listed species is dependent on aquatic habitat, primarily river floodplains, lakes, and natural and human-built reservoirs. It utilizes both standing and flowing fresh water sources (and salt water, in coastal areas) that have large trees suitable for nesting, perching and roosting. Suitable trees are at least 20" dbh in size and usually growing near the water (Hamel, 1992). In Kentucky, the birds have nested and wintered around wetland/floodplain habitats and reservoirs resulting from the impoundment of rivers (e.g., Laurel River Lake on the DBNF). Wintering birds are known to occur on major impoundments on the DBNF. Records of attempted nesting exist for Laurel River Lake although no active nests are currently known to exist. While this species is relatively selective in its nesting habitat requirements, it is much less selective in where it forages and is likely to be found foraging throughout the general forest, regardless of forest type, provided that a body of water such as a large river or lake is present.

Yellow-breasted Chat (*Icteria virens*) This is a species of early successional habitats, including: thickets; overgrown fields; hedgerows; forest edges; and openings. The key requirement is dense cover of shrubs and/or saplings. These birds avoid mature forest interiors and nest in shrubby, brushy areas. On the DBNF, they are often encountered in thickets, (regenerating) clearcuts, and dense undergrowth of shelterwood cuts—nearly always in cut-over or early successional habitat (L. Perry, pers. obs.). The species tends to be more abundant in harvested than in non-harvested areas (Baker and Lacki 1997). This species is not particularly attracted to any one forest type and could be expected to occur throughout the general forest, provided that early successional habitat in the form of young forest or old field and edge situations are present.

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, 1996). This species is not particularly attracted to any single forest type and could be expected to occur throughout the general forest, provided that open conditions and suitable nest trees are present.

Black and White Warbler (*Mniotilta varia*) This species may occur in a variety of forest age classes. It may inhabit younger forest as well as forest recovering from selective logging (Palmer-Ball, 1996). Typically, it is thought of as being more common in mature hardwood forest (Mengel, 1965). Records on the DBNF indicate that it is most common in regenerating forest less than 10 years old. It also appears to be more common in forests with slopes rather than in areas with little or no relief (Palmer-Ball, 1996). The black-and-white warbler would be expected to occur throughout the forest, regardless of forest type.

Eastern Towhee (*Pipilo erythrophthalmus*) This species typically occurs in managed or artificial situations such as brushy forest edge, regenerating clear-cuts, and forest disturbed by selective logging (Palmer-Ball, 1996). It may also be found in the lower growth of open or cutover forest (Mengel, 1965). This species is dependent on dense brushy cover (DeGraaf et. al., 1991) that may be found in a variety of situations. Monitoring data collected on the DBNF indicates that this species is most common in mixed pine habitat less than 10 years old. This species is not particularly attracted to any one forest type and could be expected to occur throughout the general forest, provided that early successional habitat in the form of young forest or old field and edge situations are present.

American Woodcock (*Scolopax minor*) This species typically requires moist woodlands in early stages of succession. It may use open fields, cultivated land, pastures and clearings at least ¼ acre in size (DeGraaf et. al., 1991). It generally requires poorly drained soils with an abundance of earthworms for feeding, nearby fields or small forest openings for courtship and roost site (DeGraaf et. al., 1991) and is largely absent from extensive areas of mature forest (Palmer-Ball, 1996). The presences of edge habitat and a high shrub stem density may be important for nest site selection in some areas (NatureServe, 2001). Appears to be partial to sheltered wet thickets along meandering streams (Barbour et. al., 1973). This species is not particularly attracted to any one forest type and could be expected to occur throughout the general forest, provided that soil conditions are moist and early successional habitat in the form of young forest, old field and forest edge situations are present.

Chipping Sparrow (*Spizella passerina*) This species occurs mainly in grassland areas with scattered trees (DeGraaf et. al., 1991) or in open woodlands where the understory is sparse as a result of grazing, burning or soil conditions (Mengel, 1965). It may occur in moderate numbers in open pine-oak upland forest on dry ridges of the Cumberland Plateau (Mengel, 1965). In KY this species is frequently found in forested areas dissected by numerous small to moderate sized openings (Palmer-Ball, 1996). DBNF monitoring data indicates that the greatest number of occurrences were in mixed-pine habitat less than 10 years old. This species is not particularly attracted to any one forest type and could be expected to occur throughout the general forest, provided that open conditions with a sparse, grassy understory are present.

Bewick's Wren (*Thryomanes bewickii altus*) Habitat requirements for this species are open country with shrubs, saplings and/or brushpiles and snags at least 6 inches in diameter (Hamel, 1992). May occur in open forests but requires a brushy understory (DeGraaf et. al., 1991). Nest are built in cavities, crannies, or placed on ledges. This species does not construct its own cavities (Hamel, 1992). In KY small numbers may also inhabit suburban yards in towns, brushy forest margins and forest clear-cuts (Palmer-Ball, 1996). This species is not particularly attracted

to any one forest type and could be expected to occur throughout the general forest, provided that understory of early successional habitat in the form of young forest or old field and edge situations are present.

Golden-winged Warbler (*Vermivora chrysoptera*) This species favors abandon fields with scattered deciduous trees (Hamel, 1992). It occurs in greatest numbers at elevations between 2000 and 4000 feet but may rarely occur lower (Hamel, 1992). In Kentucky the species is generally a bird of the drier slopes that have been cleared in the recent past, including reverting clear-cuts (Palmer-Ball, 1996). Kentucky populations are basically restricted to the higher elevations in the mountainous region in the southeastern part of the state. This species is not particularly attracted to any one forest type and could be expected to occur throughout the general forest, provided that early successional habitat in the form of young forest or old field and edge situations are present.

Canada Warbler (*Wilsonia canadensis*) This species is more common in the mountainous regions north of Kentucky, but the breeding population does extend into the Southeast part of the State, in the Cumberlands—on Black Mountain and Cumberland Mountain. Canada Warblers only become common at elevations above 3500 feet, as they do on top of Black Mountain. They occur in a variety of mesic forest types, within stands of differing age classes, and in forest edge habitat, as well. The common requirement is that the stands have a dense shrub/understory layer, especially of rhododendron and, to a lesser extent, laurel. The minimum required tract size for the species is 1000 hectares (Hamel 1992). This species is not particularly attracted to any one forest type and could be expected to occur throughout the general forest, provided a dense ericaceous shrub understory is present.

Hooded Warbler (*Wilsonia citrina*) Hooded Warblers are most frequent in deciduous and mixed forest, usually on mesic sites. However, they occur in a variety of different habitat types on the Forest that possess a dense, deciduous understory. Disturbed, regenerating areas, the margins of cut-over stands, and moist sites often provide the thick, shrubby understory that the species requires (Hamel, 1992). This species is not particularly attracted to any one forest type and could be expected to occur throughout the general forest, provided that early successional habitat in the form of a deciduous understory is present.

Mammals

Rafinesque Big-eared Bat – *Corynorhinus (Plecotus) rafinesquii rafinesquii* – 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.

Virginia Big-eared Bat – *Corynorhinus (Plecotus) townsendii virginianus* – is a year-round resident on the northern half of the DBNF. Foraging habitat occurs in many different forest overstory types, but is commonly associated with sandstone and limestone clifflines and ridgetops. This species also forages over grassy forest openings (old fields) and along forest edge. Forest openings may provide uncluttered foraging space where preferred prey species occur and can be more easily captured. Sandstone rockshelters and small caves are utilized as temporary feeding roosts. In the summer female and young Virginia big-eared bats form nursery colonies while males are ordinarily solitary although some bachelor colonies do occur. Maternity colonies usually roost near the entrance of rockshelters or caves at the edge of the light zone. Thus, they are very susceptible to human disturbance. Food habits consist primarily of small moths, but also include butterflies, flies and beetles. Forest canopy around roost sites may provide important protection from potential predators such as owls. Virginia big-eared bats hibernate in large clusters in a few limestone caves on the DBNF. As in the summer, they are highly susceptible to human disturbance and may abandon a colony site after repeated human intrusion. Maintaining stable microhabitat conditions and forested communities around the maternity and hibernation caves is important to maintaining these sites.

Eastern Cougar – *Felis concolor couguar* – historically, ranged throughout the DBNF. No documented record of this species has occurred on the forest for more than 100 years. This species requires large areas of wilderness-like habitat relatively undisturbed by humans. Due to the interspersed ownership and high public use of the DBNF current levels of human disturbance seem to preclude the return of the eastern cougar to its formally inhabited range. Programmatically, the USFWS has determined that all actions on the DBNF have a “no effect” finding for the eastern cougar.

Eastern Small-footed Bat – *Myotis leibii* – likely occurs in forested areas throughout the DBNF. Foraging habitat is often associated with riparian areas, but may occur elsewhere in the forest or forest edge. Summer roosting habitat includes caves, under rocks, bridges (in expansion joints), hollow trees and under exfoliating bark. Food habits are thought to be almost exclusively flying insects associated with riparian habitats. Reproducing females have been found in Eastern Kentucky, but the species is believed to be most common on the DBNF during the winter. Winter hibernation often occurs in relatively cold areas of low humidity just within the entrance of caves or mines. Thus, the eastern small-footed bat may be vulnerable to freezing in severe winters and to human disturbance. The species also hibernates in rock shelters and in fissures within clifflines.

Indiana Bat – *Myotis sodalis* – is known to be present on the DBNF in both winter and summer colonies of the Indiana bat. During the non-hibernation season Indiana bats are likely to occur throughout the DBNF. Some males periodically roost in caves during the summer, but most, along with females, roost under exfoliating bark or in hollow cavities in a variety of dead and alive trees. Roost trees with some sun exposure seem to be preferred because they are warmer. Indiana bats forage for insects in a wide variety of forest habitats ranging from riparian corridors to upland oak to higher elevation ridgetops. Forest canopy ranges from relatively closed to fairly open and Indiana bats sometimes forage in and near grass areas at the forest edge. An open forest understory enhances the bats ability to navigate within the forest stands. Available water in the form of shallow waterholes or ponds enhances general habitat suitability and utilization. Maternity populations are known to exist on the DBNF. Female Indiana bats are known to use

multiple roost trees during the lactation period and may forage and roost up to 2 ½ miles from their primary roost trees. During the winter Indiana bats hibernate in several cool/cold limestone caves on the DBNF. These bats gather in large clusters on cave ceiling and need protection from human disturbance during this time of year. Significant hibernation caves occur on the Stanton, London and Somerset Ranger Districts. Hibernation caves are most often, but not always, associated with limestone cliffines. Maintaining forest canopy around hibernation caves helps maintain microclimate conditions and provides nearby roosting and foraging habitat, particularly during the fall swarming season.

Masked Shrew – *Sorex cinereus cinereus* – is associated with higher elevations of the conifer-northern hardwood habitat association. They are found in deep, moist woodlands and prefer areas of thick leaf mold and decaying fallen logs. Masked shrews may occur in small populations on the Redbird Ranger District, DBNF. The species may occur in other forested habitats, particularly near stream head seeps, that have the right conditions to support numerous invertebrate food species and moisture conditions. The dens of masked shrews are located in cavities in logs or snags, under logs or in shallow burrows. In streamside areas they may be found in communities dominated by hemlock/rhododendron. The diet of this species consists of a variety of invertebrates and small vertebrate animals. They prefer moist habitats and access to free water may be important.

Eastern Spotted Skunk – *Spilogale putorius* – likely occurs in low population numbers in the general forest area throughout the DBNF. It is often associated with rocky areas and cliffines. This species prefers forest borders and brushy fields and avoids heavy timber. Forest openings offer a good combination of preferred habitat types. Natural cavities in cliffines, down logs and hollow snags provide shelter and den sites. They also use abandoned underground burrows of other species as den sites. Several skunks may den together in the winter, but they do not hibernate. Eastern spotted skunks forage for food throughout their habitat and are omnivorous. Food items include beetles, small rodents, ground dwelling birds, eggs, lizards, snakes salamanders mushrooms and fruit.

Black Bear – *Ursus americanus* – although not common, once inhabited much of the forested area, which is now the DBNF. In recent years black bears have once again been seen in low numbers throughout much of the DBNF. This species prefers relatively remote forested areas away from human disturbance. However, black bears can adapt to the human presence in the forest. Escape cover, in the form of dense thickets under relatively open forest canopy, is an important component of black bear habitat. Winter dens may be shallow caves, large hollow logs, large standing hollow snags or a cavity under the roots of a downed tree. All forested habitats on the DBNF could provide suitable habitat for black bears. The black bears food habitats can be characterized as opportunistic omnivore commonly including berries, nuts, insects, carrion and other vegetable and animal matter.

Reptiles

Northern Scarlet Snake -- *Cemophora coccinea copei* -- This is a burrowing species that is rarely seen, typically venturing out only at night or after heavy rains. It is usually found under logs, stones, leaf litter, pine needles, or bark; it is occasionally turned up during plowing or excavation work (Behler and King 1979; Conant and Collins 1991). While they have occasionally been

found in open fields and residential areas, Scarlet Snakes primarily occur in woodlands, including pine, hardwood, and mixed forests (Barbour 1971) with sandy or other friable, well-drained soils that are suitable for burrowing. They are most common in open habitat and benefit from management practices, such as periodic burning and selective thinning, that retain open canopy, early successional conditions (Wilson 1995). Scarlet Snakes feed on the eggs of other reptiles, and on mice, insects, smaller snakes, lizards, and salamanders.

Timber Rattlesnake -- *Crotalus horridus* -- The timber rattlesnake occurs from central Vermont to Iowa in the north and northern Florida to eastern Texas in the south. This rattlesnake inhabits a variety of habitats. In the mountains and foothills it prefers moderately steep, rocky ridge tops with light ground cover. During the fall and spring, timber rattlesnakes are frequently found around rocky ledges with southern exposure. Additional habitats include sphagnum swamps, agricultural fields and second growth clearings. Rock outcrops, old buildings or logs are necessary for winter denning. The timber rattlesnake feeds primarily on small mammals, as well as an occasional bird, amphibian or snake (Mount, 1975; Wilson, 1995).

Corn Snake -- *Elaphe guttata guttata* -- Although this subspecies occurs in disjunct populations in eastern and west-central KY, Corn Snakes in general are much more common in other southeastern States. Typical habitat includes pine and pine-hardwood forests, rocky hillsides, old fields, openings within bottomland hardwoods, and, to a lesser extent, forested swamps. Open woodland, ranging from uplands to lowlands, with an abundance of rocks and logs for cover is preferred--especially when bordering old or cultivated fields that increase foraging success. Corn snakes are fairly secretive, spending much of their time concealed under surface cover, in stumps, under bark, or in the burrows of other animals (Wilson 1995). However, they readily climb trees and enter abandoned houses and barns in search of prey: mice, rats, birds, and bats (Behler and King 1979). These snakes are most often encountered along woodland edges, overgrown fencerows, and around farmsteads (Barbour 1971).

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.

Southern Five-lined Skink -- *Eumeces inexpectatus* -- The southern five-lined skink ranges from Virginia south to the Florida Keys, and westward to the Mississippi River. This skink is most abundant in dry habitats, such as pine clearings, beaches, ridge tops and well-drained, sandy places. This species has been documented around man-made structures, field and wood edges, urban woodlots, dry pine forests, mixed pine-hardwood forests, early stages of lowland pine communities and sawdust piles. (Virginia website.) This skink is considered terrestrial and

arboreal. The southeastern five-lined skink diet consists of a variety of arthropods. (Wilson, 1995)

Scarlet Kingsnake -- *Lampropeltis triangulum elapsoides* -- This snake's size and ecology vary considerably from those of the Milk Snake *L. triangulum*, of which it is considered a subspecies (Wilson 1995). The Scarlet Kingsnake prefers wooded areas, including pine, oak and other hardwoods, and mixed stands. It is typically found under rotting logs and debris, in stumps, and underneath the bark of dead trees. It is apparently a burrower in upland forests with deep sandy soils (Morehead Cooperative Inventory 1992). This small species appears to utilize pine snags to a great extent for hibernation and spring activity; management practices should include leaving a certain number of snags in pine habitat (Wilson 1995). The Scarlet Kingsnake is shy and secretive, normally emerging from hiding only at night or after a heavy rain, and is adept at worming its way into small cracks and crevices, either into logs or rocks, or to considerable depths in the ground (Barbour 1971). Its diet includes small snakes and lizards, mice, insects, and earthworms.

Eastern Slender Glass Lizard – *Ophisaurus attenuatus longicaudus* – This is a species of dry, often sandy, soil conditions. It occurs in relatively open, typically upland, habitats--including Virginia and Shortleaf Pine and pine-oak stands, forest edges, grassy fields and prairies--which have loose, friable soils. This secretive, legless lizard tends to stay in old rodent burrows and under mats of dead grass and decomposing plants; when it basks in the sun, it is often hidden in tall grass or with only part of its body showing (VA Dept. of Game and Inland Fisheries 2001). Slender Glass Lizard diets include insects, spiders, birds' eggs, smaller lizards, and snakes. Prescribed burning and other management practices that help to create open canopy conditions benefit this lizard species.

Northern Pine Snake – *Pituophis melanoleucus melanoleucus* – Pine Snakes inhabit dry, sandy pine and pine-oak forest types with open canopies and patchy to dense ground cover. Eastern KY sites are typically upland or ridgetop; whereas, at lower elevations the snakes utilize pine flatwoods and sandhill areas. Forest openings with scattered areas of well-drained sand and little shrub cover are required for nesting and hibernation sites (NatureServe 2001). These secretive snakes spend much of their time in burrows, emerging to hunt for small mammals, birds and eggs; they climb trees well. Loose or friable soil is needed, since the snakes excavate their own burrows as well as use those made by small mammals. This species requires a relatively large area in which to forage (Wilson 1995). Management practices, including midstory control and prescribed burning, which serve to promote and maintain barrens-like conditions—open stands with well-lit, grassy understories—are necessary to support the species.

Southeastern Crowned Snake -- *Tantilla coronata* -- The southeastern crowned snake ranges from south-central Virginia and southern Illinois to the Florida panhandle and eastern Louisiana. This secretive snake is an excellent burrower, spending much of its time concealed in rotting logs, under bark, stones, leaf litter, pine needles, or burrowed in the soil. The southeastern crowned snake apparently prefers relatively xeric, well-drained soils in pine flatwoods, sandhills and dry hillsides. This snake requires dry habitats with friable soil and sufficient debris for shelter. Females deposit eggs in rotting logs or sawdust piles. The southeastern crowned snake's diet consists of centipedes, spiders, termites, and other small, soft-bodied arthropods. (Wilson, 1995).

Eastern Earth Snake -- *Virginia valeriae valeriae* -- This is a small, highly secretive snake about whose habits much remains unknown. It is sometimes seen on the ground surface following heavy rains, but spends most of its time under leaf litter, logs, warm rocks and stones. Diet consists of earthworms, insects and their larvae, and other small arthropods. Its habitats include: damp, open, deciduous and pine-hardwood forests; abandoned fields; trail and back roads areas; wooded residential areas; forest edge and openings; moist, rocky slopes and hillsides with open canopies. Earth Snakes may congregate in small numbers prior to hibernation in pockets of woodland debris or under large rocks (Behler and King 1979)

Snails

Banded Globe Snail – *Anguispira kochi* – requires steep slopes with bluffs and rock talus. It is generally restricted to limestone areas and can be found buried in soft soil, especially during hibernation. The Banded Globe Snail appears to be extirpated throughout much of its former range, especially in the Bluegrass Counties of Kentucky. Extant colonies are known from the Kentucky River corridor from Frankfort east to the Furnace Mountain Area in Estill County and the species may also persist along the Salt River.

Pine Mountain Disc- *Anguispira rugoderma* is restricted to the cool habitat offered at Pine Mountain. This species utilizes downed logs and does not tolerate forest fires.

Queen Crater Snail – All records for living *Mesodon chilhoweensis* are in McCreary County, with the best populations in the Yahoo Falls area and along Rock Creek south of White Oak Junction. Shells have also been collected from the Tennessee side of Pine Mountain. The Queen Crater is a species of acid woodlands, usually found in mature forests on the steep slopes along rock outcrops or boulder talus areas.

Clifty Covert Snail – *Mesodon wetherbyi* – is known from several scattered locations along the Cumberland and Rockcastle Rivers, the Jellico Mountains, Pine Mountain, and Big South Fork. In Kentucky, its total range includes portions of Laurel, Whitley, Pulaski, and McCreary Counties. Populations are not continuous, and the species is absent from much apparently suitable habitat within its limited range. All sites are located on extremely steep forested slopes adjacent to rock outcrops or boulder talus areas. All but one site is located in sandstone areas.

Wrinkled Button Snail- *Mesomphix rugeli* is abundant in many counties on the southern end of the Daniel Boone. It requires wooded hillsides, and can be readily found under the leaf litter within its distribution.

Glossy Supercoil Snail- *Paravitrea placentula* has been collected on Black and Pine Mountains and is restricted to Letcher, Harlan, and Bell Counties. It appears to require wooded slopes of hillsides and ravines, and may be collected under leaf litter.

Delicate and Cupped Vertigo Snails- Both *Vertigo bollesiana* and *Vertigo clappi* are restricted to Bell and Harlan Counties. They can be found in leaf litter and moss on wooded hillsides within the general forest. *V. bollesiana* has also been recorded from marshes.

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* – 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 condition of moisture and temperature.

LICHENS

Reindeer Lichens – *Cladina* spp. (*cf. rangiferina, subtenuis*) – are widespread in North America, forming the primary ‘vegetation’ in some parts of the tundra. These symbiont organisms are usually found on harsh sites, often dry and sterile. On the DBNF, they are most common on the thin soils of sandstone or conglomerate glades. They may also occur on bare rock or on woody material on the glades. The sites are usually open with little canopy. These lichens do not seem to grow under shrubs or dense tree growth. They are sometimes found on soils that were exposed to high heat during fire events. Large colonies are considered indicative of areas of infrequent fire. Fires destroy these large colonies, but over many years, colonies are reestablished.

PLANTS

Dicots

Mountain Maple – *Acer spicatum* – is a northern and montaine species that requires cool conditions. On the DBNF, the species is restricted to cool ravines, places where air temperatures are below the average ambient temperature.

Blue Monkshood – *Aconitum uncinatum* ssp. *uncinatum* – is a northern species that requires cool temperatures. On the DBNF, the species is restricted to mesic hardwood forest in sandy soil near streams. Most locations are at the southern end of the forest, but one is more northern.

Running Serviceberry – *Amelanchier stolonifera* – is montaine Appalachian species that is found in rocky and sandy soil in dry, open hardwood forest. The only Kentucky record is from the DBNF area. It is located on rocky soils on a limestone ridge in dry open oak-cedar forest.

Cane – *Arundinaria gigantea* – is wide spread in the southeast. However, it seldom occurs in the large ‘cane brake’ communities in which it was once found. It is most abundant in riparian areas, but does form thick patches in upland areas, usually under open canopy forest.

Yellow Screwstem – *Bartonia virginica* – is a coastal plain species commonly found in moist to wet pine savannas. On the DBNF, it occurs, if at all, in streamhead wetlands and slope seeps. It requires constantly moist conditions and no more than moderate shade. There is some taxonomic confusion between this species and *B. paniculata*, which is more common and which definitely occurs on the forest in the habitat described above.

Sweetshrub – *Calycanthus floridanus* (generic) – occurs as var. *glaucus* on the DBNF. Species-habitat relationships are described for that that variety below.

Sweetshrub or Carolina Allspice – *Calycanthus floridus* var. *glaucus* – 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, which 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* – is far less common today than it once was. A fungal disease introduced from Asia 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 DBNF 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 DBNF, 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) – The chinquapin occurs in upland hardwood forest. It is usually found on dry sites, and usually under a partially open canopy. On the Daniel Boone National Forest, the species occurs as variety *pumila*. Species-habitat relationships are discussed for this variety below.

Allegheny Chinquapin – *Castanea pumila* var. *pumila* – is found in dry upland oak or oak-yellow pine forests. It usually occurs where midstory and shrub layers are sparse, or the canopy is open. The species at least somewhat adapted to fire, sprouting readily after fire. It may respond to fire in the way American chestnut and oaks do.

Scarlet Indian Paintbrush – *Castilleja coccinea* – is found in warm season grasslands, open upland hardwood or pine forest and occasionally along roadsides. The species requires moderate to high levels of light. It responds favorably to fire, which helps to maintain the species habitat.

Green-and-gold – *Chrysogonum virginianum* var. *virginianum* – is a species of the eastern US that is found in forests with sandy soils, often on river terraces. On the DBNF, it is found along streams in sandy terrace forest. The habitat is seldom subject to flooding.

Black Cohosh – *Cimicifuga racemosa* – grows in mesic woods throughout its range of much of the eastern North America. It appears to be a moderate calciphile and does best on well-drained soils. On the DBNF, it occurs in mixed mesophytic forest and at the transition from this forest to river floodplain forest. The species will grow in near open conditions, but is usually found in moderate shade. Root diggers have put pressure on populations of this species, but the extent of the collection is unknown. Collection of this species is currently allowed on the DBNF.

Small Enchanter's-nightshade – *Circaea alpina* ssp. *alpina* – is a northern species with a range extending southward along the Appalachian Mountains. It requires cool, moist conditions. On the DBNF, it is found associated with cold air drainage and narrow sandstone hollows with high

shade and humidity. Almost always it is near a stream, but usually out of the floodplain.

White-leaf Leather-flower – *Clematis glaucophylla* – is a southern species. On the DBNF, it occurs associated with sandstone or conglomerate cobble-boulder bars along larger rivers, and at the edge of prairie-like areas.

Stoneroot – *Collinsonia verticillata* – is a southern Appalachian species. The single Kentucky station is in the DBNF area. It occurs on lower slopes in mixed mesophytic forest in the Jellico Mountains area. The species requires moist soil, and moderate shade.

Sweet Fern – *Comptonia peregrina* – throughout most of its range, is associated with open, sterile, sandy ground 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.

Cumberland Rosemary – *Conradina verticillata* – inhabits open cobble/boulder bars along free-flowing rivers. 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. Scouring also helps to spread pieces of the shrub, which when broken and carried downstream to suitable habitat, often root and establish new populations. Currently, this species does not occur on the DBNF, but habitat for the species may occur on some streams within the Cumberland River drainage.

Beech Drops – *Epifagus virginiana* – Beech drops 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.

Yucca-leaved Rattlesnake Master – *Eryngium yuccifolium* – is coastal plain and prairie species associated with moist to wet warm season grassland. It is also found in open, wet yellow pine savanna and moist to wet fields. On the DBNF, it is known from two sites, one, a moist warm season grassland in a powerline right-of-way, and the other in a moist area of an old field. The species requires moderate to high light and moist conditions.

Small-flowered Thoroughwort – *Eupatorium semiserratum* – is a coastal plain species which extends into prairie regions and open forest of the Cumberland Plateau. It is rare in Kentucky and known only from one location on the DBNF. Here it occurs in an open area in an oak-yellow pine forest on well-drained soil.

Mercury Spurge – *Euphorbia mercurialina* – is an Appalachian Plateaus and Mountains species which ranges from Kentucky to Alabama, and by some accounts to the coastal plain of Florida. It is known from just a few locations in Kentucky, and only one on the DBNF. It is found in dry-mesic oak forest and mixed mesophytic forest. The species probably is a weak calciphile.

Box Huckleberry – *Gaylussacia brachycera* – is a central Appalachian species. It occurs in upland yellow pine and yellow pine-oak woods. Yellow pine is present in or adjacent to all sites

on the DBNF. It is also found on sandstone glades and in the upland portions of utility rights-of-way. The species appears to require well-drained, sandy soils. *Gaylussaccia* will grow in closed canopy (yellow pine) conditions if the midstory and shrub layers are more or less absent. On the DBNF, the densest, and apparently the healthiest populations, are found in these sites. It also grows under more open canopy conditions where it is tolerant of thicker midstory and shrub layers. The rhizomes are positioned at the transition between the duff and mineral soil. Fire maintains the general habitat in which it grows. The species is top killed by fire, but does resprout, at least if the duff layer is not removed. Recovery appears to be slower than for other *Gaylussaccia* species or *Vaccinium* species, but with the proper interval and intensity of fire, populations should be maintained while enhancing habitat.

Yellow Gentian – *Gentiana alba (flavida)* – is a prairie species with range extensions into the Appalachian Plateaus. It occurs in open warm season grassland and open oak or oak-yellow pine forest. On the DBNF it occurs in prairie-like areas, dominated by warm season grasses.

Red-disked Sunflower – *Helianthus atrorubens* – is a southern and prairie species commonly occurring in warm season grassland. It also is found in open yellow pine forest. On the DBNF, this species is most abundant in warm season grassland. This habitat in powerline rights-of-way holds most of the DBNF 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.

Goldenseal – *Hydrastis canadensis* – 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.

American Water-pennywort – *Hydrocotyle americana* – is a northern species that extends south along the Appalachian Mountains. It grows on usually damp sandy soil, often along streams. On the DBNF, it occurs in only one area, on the sandy floodplain of a stream. The overstory is oak-yellow pine and the midstory is sparse.

St. Peter's-wort – *Hypericum crux-andreae* – is a coastal plain species with scattered populations in the interior. The species grows on usually damp sandy soil, in roadside ditches, and in open, wet yellow pine forest. On the DBNF, it occurs in open, wet warm season grassland. These sites were likely forested, but open prior to their current condition.

Butternut or White Walnut – *Juglans cinerea* – is distributed from southern Ontario to the southern Appalachians. In the northern portions of the range, the species is usually found on well-drained floodplains, either in open areas or as part of a forest canopy. To the south, the species also occurs in rich, mesic hollows. As young trees, they are intolerant, require high light. On the DBNF, it is found in both habitat types, but most trees are infected with butternut canker.

Smooth Veiny Peavine – *Lathyrus venosus* – 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* – 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.

Fraser's Loosestrife – *Lysimachia fraseri* – is a southern Appalachian Mountains species. It is found in open meadows and along roadsides. On the DBNF, one site is known from open, forested river terrace.

Barbara's Buttons -- *Marshallia grandiflora* – This species inhabits open cobble/boulder bars along free-flowing rivers. 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. Currently this species is not known from the DBNF, but habitat for it may exist on some streams within the Cumberland River drainage.

Carolina Anglepod – *Matelea carolinensis* – is a coastal plain species with range extensions along the southern Appalachian Plateaus. It grows in moist, open forest, either yellow pine or hardwood, and in sandy old fields and waste areas. On the DBNF, the single station is on a sandy roadside adjacent to open yellow pine-oak forest.

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* – 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.

Thread-leaf Sundrops – *Oenothera linifolia* – is a central US species found in sandy grassland and open rocky areas. On the DBNF, the species is found in sandy warm season grassland and on sandstone glades.

Small Sundrops – *Oenothera perennis* – is a midwestern species found in open forest, prairies, meadows and fields. On the DBNF, it is known from open dry-mesic ridge top oak forest. The species requires moderate to full sunlight. It and its habitat are probably enhanced by fire.

Mountain Wood Sorrel – *Oxalis montana* – is a northern species that extends south through the Appalachian Mountains. The species is generally found in rich mesic forest. On the DBNF, the

species is found in deep, shaded hollows under a canopy of mixed mesophytic species. It is frequently found on terraces above small streams.

Kidney-leaf Grass-of-Parnassus – *Parnassia asarifolia* – is a species of the Appalachian and Ozarkian provinces. It is commonly found on stream banks and in boggy habitat. On the DBNF, the few locations are from streamhead wetlands in open yellow pine-oak forest. The species requires constantly moist soil and moderate light.

Mock Orange – *Philadelphus inodorus* var. *grandiflorus* (per Medley, 1993) – is an Appalachian provinces species. It is found along stream banks, on moist soil in open forest, and on cliffs. On the DBNF, the species is found on limestone cliffs and glades.

Gaywings – *Polygala pauciflora* – 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.

Nodding Rattlesnake-root – *Prenanthes crepidinea* – is northern midwest species with disjunct populations to the south. It is found in moist, usually floodplain forest. On the DBNF, all locations are from open, mesic, terrace forest, mixed mesophytic forest, or the transition between them. The plants flower best in open conditions such as forest edge, but occur as vegetative plants in heavier shade.

Wafer Ash or Hop-tree – *Ptelea trifoliata* (as ssp. *trifoliata* var. *trifoliata* per Medley, 1993) – 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.

Nettle-leaf Sage – *Salvia urticifolia* – is a species of the central and southern Appalachians. It grows in dry-mesic forest or shrubby areas. The DBNF sites are in open, dry oak woods on limestone.

Sanicle – *Sanicula canadensis* – is widespread across eastern North America. It occurs in dry-mesic to mesophytic forest. On the DBNF, it is locally common, usually occurring in dry-mesic oak and oak-mixed hardwood forest. It also occurs in mixed mesophytic forest, and occasionally in old fields.

Bay Starvine – *Schisandra glabra* – is a piedmont and Gulf coastal plain species with outlying populations along the Mississippi River, the Atlantic Ocean and the Cumberland Plateau. In the main part of its range, the species is found in beech-magnolia forest. Elsewhere it is found on loess soils. The single population in Kentucky, partially located on the DBNF, is on talus slopes below sandstone cliffs in mesic tulip poplar-hemlock-beech-oak forest. While the plant can be high climbing, it will creep along the ground. Light to moderate shade with well-drained soils and ample moisture is needed.

Ovate Catchfly – *Silene ovata* – 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.

Royal Catchfly – *Silene regia* – is rare to uncommon throughout its range. It is found in warm season grasslands or in grassy areas of barrens. No extant populations of the species are present on the forest. There are historical records for it from the southern end of the forest. It requires open, high light conditions, and fire, in addition to maintaining habitat, probably also promotes the species.

Wasioto Rosinweed – *Silphium wasiostense* – 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 it 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* – 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 it is growing in mixed mesophytic forest on a north aspect above the Cumberland River.

Synandra – *Synandra hispidula* – is more or less distributed along the Ohio River basin and the eastern Cumberland and Tennessee River basins. It is generally found in rich woods, often on limestone or on base rich soils. On the DBNF, most sites are on limestone along intermittent, upland streams, rich lower slopes in mixed mesophytic woods, or on rarely flooded stream terraces in mesophytic forest.

Snowberry – *Symphoricarpos albus* var. *albus* – is a northern species that has a range extension south into the Appalachian provinces. It is found on dry or rocky soil, often of calcareous nature. It is usually found in open or lightly shaded forest, or sometimes in open areas. The DBNF area records are from Estill and Madison counties, all from narrow limestone ridges in open forest or in thickets.

Spiked Hoary-pea – *Tephrosia spicata* – 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* – is throughout its range associated 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* (generic) – exists as two varieties, a piedmont variety discussed in other habitat associations that is found on in Kentucky, and a montane variety. The latter occurs in dry-mesic forest on slopes and ridges.

Nettle-leaf Noseburn – *Tragia urticifolia* – is a prairie species with scattered stations eastward. It is commonly found in dry prairies and open (low tree density) rocky areas. It is known to Kentucky from only one site in the DBNF area. Here it occurs on a limestone glade above the Big South Fork River.

Running Buffalo Clover – *Trifolium stoloniferum* – 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.

Slippery Elm – *Ulmus rubra* – is widespread in eastern and central North America. It is found typically in moist woods such as floodplain forest. On the DBNF, the species is commonly found in floodplain forest, at forest edge along roadsides, and often in mesic hardwood forest on limestone or base rich soils.

Bird's-foot Violet – *Viola pedata* – occurs over most of the eastern US in dry, well-drained soils. On the Daniel Boone NF, it is most frequently encountered along sandy road banks and slopes in open yellow pine or yellow pine-oak forests. High light levels appear to be required by the species. The species also occurs in dry, upland pastures or grassy slopes that have thin vegetation.

Toothache-tree – *Zanthoxylum americana* – 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

Wild Agave – *Agave virginica* – occurs in small to large colonies. The plant is a strong calciphile and is usually found on limestone. It is found in crevices in bedrock, in heavy clay or clay loam soils found on limestone. The sites are usually lightly to moderately shaded. In most cases, the species grows where it is well drained. It is often found in glades, at the base of and on cliffs, and in old quarries.

Pond Caric Sedge – *Carex jorii* – is a coastal plain species found associated with areas that remain wet throughout its range, primarily swamps and wet woods. On the DBNF, it is a semi-aquatic species found only in and at the edge of, a few, apparently natural, ponds. These ponds occasionally dry, but the soil remains saturated.

Boott's Sedge – *Carex picta* – is scattered across the forest. It grows in clumps, which over time spreads outward while dying in the center, leaving a doughnut-shaped ring. It was considered uncommon throughout its range until rare plant surveys on the DBNF located many populations. Most of these populations are small with a few plants, but a few are large (0.4-1 ha, 1-2.5 ac). The species appears to survive in heavy shade, but does poorly. It does best under an open canopy with little midstory on slopes. This habitat is probably maintained by fire, especially

since the plant appears to promote fire. The leaves contain a volatile oil, which readily allows even green leaves to burn, and old leaves form a loose mound of fine fuels around the plants.

Caric Sedge – *Carex seorsa* – is a wet forest species with a range over much of the eastern US. It grows in areas that remain wet throughout the year. On the DBNF, it is associated with a few streamhead wetlands and slope seeps. It grows in clumps forming thick to thin mats of vegetation. Shade is usually moderate to light.

Appalachian Spreading Pogonia – *Cleistis bifaria* – 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* – 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.

Pink Lady's-slipper – *Cypripedium acaule* – across its range, occurs in acid forests or wetlands (usually sphagnum bogs). On the DBNF, pink lady-slipper is found in upland oak and mixed pine-oak woods, and occasionally on hummocks within seeps and streamhead wetlands. It occurs in light to heavy shade, but does not seem to flower unless in somewhat open conditions. This species responds well to burning. It is not uncommon to find 3-4 dozen plants in flower and as many more in vegetation condition following a fire where only a dozen or so were found before. The species is experiencing collection pressure from root diggers. Digging of this species is not permitted on the DBNF.

Small Yellow Lady's-slipper – *Cypripedium parviflorum var. parviflorum* – ranges from Canada to the southern Appalachian Mountains. It is most common to the north. It grows in sphagnum bogs and hemlock- white pine woods northward. On the DBNF, a few sites are known, all from open oak forest on lower slopes.

Wild Yam – *Dioscorea villosa* – is a widespread species, occurring in a variety of forested habitats throughout its range. It occurs as single plants or in small clumps. It appears to be at least a weak calciphile. On the DBNF, it is most frequent in drier oak forest, under moderate to light shade. The tuber produced by the plant is collected for medicinal purposes.

Bearded Skeleton Grass – *Gymnopogon ambiguous* – Bearded skeleton grass is a coastal plain species that generally occurs in dry, sandy, open forest. It may also occur in open grassland. On the Daniel Boone National Forest, it occurs in open warm season grassland and open, sandy ground with or without light forest cover.

Wood Lily – *Lilium philadelphicum var. philadelphicum* – 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.

Small-flowered False Hellebore – *Melanthium parviflorum* – The small-flowered false hellebore is a central and southern Appalachian Mountains species. It is associated with moist slopes in mesic hardwood forest. On the DBNF, it is known from a few areas from mixed mesophytic forest.

Wild Lily-of-the-Valley – *Maianthemum canadense* – 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.

Clubspur Orchid – *Platanthera clavellata* – occurs in a wide variety of habitats across its range. On the DBNF, it occurs in streamhead wetlands, in seeps, on streambanks, and in swamps. It is usually found in mucky soil under moderate to heavy shade. The soil in which it occurs is always damp or wet. This species is an alternative host to the endophyte fungus that is the sole fungal associate for white fringeless orchid (*P. integrilabia*). Maintaining this orchid helps to maintain a diverse stock for the fungal symbiont.

Small Purple-fringed Orchid – *Platanthera psycodes* – is a northern species with a range extension south along the Appalachian Mountains. It is found in wet meadows and wet, open forest. On the DBNF, there are tentative records for this species from wet stream terraces under high canopy closed forest. The identity of the plants in question is not certain.

Swamp Wedgscale – *Sphenopholis pensylvanica* – is an eastern US species. It is usually found in swamps or wet forest. On the DBNF, the single locale in McCreary County is on a seepy streambank in mesic forest.

Mosses

Moss – *Brothera leana* – is uncommon throughout its range. It is known from a few sites in the DBNF at the mouths of limestone caves. Cool airflow and moist (at least high humidity) conditions are provided at these locations.

Feather or Log Moss – *Hypnum curvifolium* – has a wide distribution in North America. The species is uncommon to common and occurs in a variety of habitats. It is usually found in moderate to heavy shade under hardwood or hardwood-pine canopy. It frequently grows on downed logs from which it is increasingly stripped for the horticultural industry. It is also found on rocks and boulders and occasionally soils and tree bases. The habitat occupied on the DBNF is usually downed logs or rocks.

Feather or Log Moss – *Hypnum imponens* – has a wide distribution in North America. The species is common to abundant and occurs in a variety of habitats. It is usually found in moderate to heavy shade under hardwood or hardwood-pine canopy. It frequently grows on downed logs from which it is increasingly stripped for the horticultural industry. It is also found on rocks and

boulders and occasionally soils and tree bases. The habitat occupied on the DBNF is usually downed logs or rocks.

Juniper Hair Cap Moss – *Polytrichum juniperinum* – is widely spread in North America, Europe and Asia. It is generally found on soil or humus, usually overlying rock. It is generally found in dry woods along trails, or old woods roads, usually on at the edge or on a bank. It is sometimes found in dry pasture or woods. On the DBNF, it is infrequent on ridges in light shade along old woods roads and trails.

Moss – *Syrrhodon texanus* – is a coastal plains species with disjunct distribution in the Appalachian and Ozarkian provinces. It commonly occurs on moist rotten logs and stumps, on rock and the bark of trees, especially in low ground. On the DBNF, the species is almost always encountered on the back walls of moist, shaded sandstone or conglomerate rockhouses or cliff faces.

Fern Moss or Log Moss – *Thuidium delicatulum* – is a northern US and Canadian species which extends southward in the eastern US to the Gulf coast (and south to northern South America). It is a usually common species in its habitat, which is on moist soil, humus, rocks, or logs in forest or sometimes meadows or fields. On the DBNF, it is most common in mixed mesophytic forest on rocks, logs and soil, but is also found in dry-mesic forest, and rarely in xeric forest. It also occurs on the DBNF in old fields and meadows, sometimes ruderal areas. This species is widely collected for the horticultural industry and in some areas is becoming scarce.

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Attachment C.

General Forest Habitat Association Matrix

Association	Habitat	Modifier	Class	Common/Species		
12-General Forest	Forest Edge	(blank)	BIRD	Cerulean Warbler/ <i>Dendroica caerulea</i>		
				Black-throated Blue Warbler/ <i>Dendroica caerulescens</i>		
				Eastern Towhee/ <i>Pipilo erythrophthalmus</i>		
				Chipping Sparrow/ <i>Spizella passerina</i>		
				Golden-winged Warbler/ <i>Vermivora chrysoptera</i>		
				INSEC	Diana Fritillary/ <i>Speyeria diana</i>	
				MAMM	Rafinesque's Big-eared Bat/ <i>Corynorhinus (Plecotus) rafinesquii rafinesquii</i>	
				P-DIC	Sweetshrub/ <i>Calycanthus floridus var. glaucus</i>	
				Dense shrub understory	BIRD	Cerulean Warbler/ <i>Dendroica caerulea</i>
						Black-throated Blue Warbler/ <i>Dendroica caerulescens</i>
						Gray Catbird/ <i>Dumetella carolinensis</i>
				Downed Logs		Bewick's Wren/ <i>Thryomanes bewickii altus</i>
				Drainage Good	INSEC	Appalachian Grizzled Skipper/ <i>Pyrgus wyandot</i>
					REPT	Eastern Slender Glass Lizard/ <i>Ophisaurus attenuatus longicaudus</i>
				Dry		Southern Five-lined Skink/ <i>Eumeces inexpectatus</i>
				Elevation (above 2300 ft)	BIRD	Cerulean Warbler/ <i>Dendroica caerulea</i>
						Black-throated Blue Warbler/ <i>Dendroica caerulescens</i>
						Chestnut-sided Warbler/ <i>Dendroica pensylvanica</i>
						Golden-winged Warbler/ <i>Vermivora chrysoptera</i>
				Forb/Grass Condition		American Woodcock/ <i>Scolopax minor</i>
						Field Sparrow/ <i>Spizella pusilla</i>
				Mid-age Forest	BIRD	Whip-poor-will/ <i>Caprimulgus vociferus</i>
				Moist		Gray Catbird/ <i>Dumetella carolinensis</i>
						American Redstart/ <i>Setophaga ruticilla</i>
				Open (Little or No Shade)	INSEC	Appalachian Grizzled Skipper/ <i>Pyrgus wyandot</i>
				Open Forest Canopy	BIRD	Northern Flicker/ <i>Colaptes auratus</i>
						Red-headed Woodpecker/ <i>Melanerpes erythrocephalus</i>
						Eastern Towhee/ <i>Pipilo erythrophthalmus</i>
				Rich Soil		Northern Flicker/ <i>Colaptes auratus</i>
				Rocky/Rocks	REPT	Corn Snake/ <i>Elaphe gutta gutta</i>
				Sandy Soil	INSEC	Appalachian Grizzled Skipper/ <i>Pyrgus wyandot</i>
				Shrub/Sapling Condition	BIRD	Northern Bobwhite/ <i>Colinus virginianus</i>
						Prairie Warbler/ <i>Dendroica discolor</i>
						Yellow-breasted Chat/ <i>Icteria virens</i>
						Eastern Towhee/ <i>Pipilo erythrophthalmus</i>
						American Woodcock/ <i>Scolopax minor</i>
					REPT	Southern Five-lined Skink/ <i>Eumeces inexpectatus</i>
				Snags > 6" dbh	BIRD	Red-headed Woodpecker/ <i>Melanerpes erythrocephalus</i>

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Association	Habitat	Modifier	Class	Common/Species
				Bewick's Wren/ <i>Thryomanes bewickii altus</i>
		Tree and Snags (Cavity Nesters)		Red-headed Woodpecker/ <i>Melanerpes erythrocephalus</i>
				Bewick's Wren/ <i>Thryomanes bewickii altus</i>
		Upland (usually mesic to dry, not subject to holding water)		Whip-poor-will/ <i>Caprimulgus vociferus</i>
	Regeneration area/early seral	(blank)		Gray Catbird/ <i>Dumetella carolinensis</i>
				Kentucky Warbler/ <i>Oporornis formosus</i>
				Golden-winged Warbler/ <i>Vermivora chrysoptera</i>
			P-DIC	Wasioto Rosinweed/ <i>Silphium wasiotense</i>
		Dense shrub understory	BIRD	Gray Catbird/ <i>Dumetella carolinensis</i>
		Dry		Lark Sparrow/ <i>Chondestes grammacus</i>
		Elevation (above 2300 ft)		Golden-winged Warbler/ <i>Vermivora chrysoptera</i>
		Exfoliating bark, (trees dead or alive), trees with broken branches or hollow cavities	MAMM	Indiana Bat/ <i>Myotis sodalis</i>
		Moist	BIRD	Gray Catbird/ <i>Dumetella carolinensis</i>
		Open (Little or No Shade)		Lark Sparrow/ <i>Chondestes grammacus</i>
		Rocky/Rocks		Lark Sparrow/ <i>Chondestes grammacus</i>
		Shrub/Sapling Condition		Chipping Sparrow/ <i>Spizella passerina</i>
				Field Sparrow/ <i>Spizella pusilla</i>
	Woods/Forest (general)	(blank)	AMPHI	Wehrle's Salamander/ <i>Plethodon wehrlei</i>
				Wood Frog/ <i>Rana sylvestris</i>
			BIRD	Canada Warbler/ <i>Wilsonia canadensis</i>
				Hooded Warbler/ <i>Wilsonia citrina</i>
			FUNGI	Morel/ <i>Morchellus esculentus</i>
			GASTR	Wrinkled Button/ <i>Mesomphix rugeli</i>
				Delicate vertigo/ <i>Vertigo bollesiana</i>
			MAMM	Rafinesque's Big-eared Bat/ <i>Corynorhinus (Plecotus) rafinesquii rafinesquii</i>
				Eastern Small-footed Bat/ <i>Myotis leibii</i>
				Virginia Big-eared Bat/ <i>Plecotus townsendii virginianus</i>
			P-DIC	Carolina Allspice/ <i>Calycanthus floridanus</i>
				Green-and-gold/ <i>Chrysogonum virginianum var. virginianum</i>
				Black Cohosh/ <i>Cimicifuga americana</i>
				Black Cohosh/ <i>Cimicifuga racemosa</i>
				White-leaf Leather-flower/ <i>Clematis glaucophylla</i>
				Yellow Gentian/ <i>Gentiana alba</i>
				Smooth Veiny Peavine/ <i>Lathyrus venosus</i>
				American Gromwell/ <i>Lithospermum latifolium</i>
				Carolina Anglepod/ <i>Matelea carolinensis</i>
				Nettle-leaf Sage/ <i>Salvia urticifolia</i>
				Ovate Catchfly/ <i>Silene ovata</i>
				Big-flowered Snowbell/ <i>Styrax grandiflorus</i>
				Cutleaf Meadow-parsnip/ <i>Thaspium pinnatifidum</i>
				Running Buffalo Clover/ <i>Trifolium stoloniferum</i>

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Association	Habitat	Modifier	Class	Common/Species
				Bird's-foot Violet/ <i>Viola pedata</i>
			P-MON	Appalachian Spreading Pogonia/ <i>Cleistes bifaria</i>
				Spotted Coralroot/ <i>Corallorhiza maculata</i>
				Wild Yam/ <i>Dioscorea villosa</i>
				Small-flowered False Hellebore/ <i>Melanthium parviflorum</i>
		Acidic Substrate	AMPHI	Four-toed Salamander/ <i>Hemidactylum scutatum</i>
			P-DIC	Yellow Screwstem/ <i>Bartonia virginica</i>
				Yucca-leaved Rattlesnake Master/ <i>Eryngium yuccifolium</i>
				Box Huckleberry/ <i>Gaylussacia brachycera</i>
				Sweet Pinesap/ <i>Monotropsis odorata</i>
				Mountain Wood Sorrel/ <i>Oxalis monatana</i>
			P-DIC	Kidney-leaf Grass-of-Parnassus/ <i>Parnassia asarifolia</i>
			P-LICH	Reindeer Lichen/ <i>Cladina</i> spp (cf. <i>rangiferina</i> , <i>stellaris</i> , <i>subtenuis</i>)
			P-MON	Pink Lady-slipper/ <i>Cypripedium acaule</i>
				Wood Lily/ <i>Lilium philadelphicum</i> var. <i>philadelphicum</i>
			P-MOS	Fern Moss, Log Moss/ <i>Thuidium delicatulum</i>
		Aspect (SE to NW)	P-DIC	Wasioto Rosinweed/ <i>Silphium wasiotense</i>
			REPT	Southeastern Crowned Snake/ <i>Tantilla coronata</i>
		Aspect (NW to SE)	P-DIC	Stoneroot/ <i>Collinsonia verticillata</i>
				Box Huckleberry/ <i>Gaylussacia brachycera</i>
		Basic Substrate		Cutleaf Meadow-parsnip/ <i>Thaspium pinnatifidum</i>
				Toothache-tree/ <i>Zanthoxylum americana</i>
		Burrows, Holes, Tunnels (Secondary Users)	MAMM	Eastern Spotted Skunk/ <i>Spilogale putorius</i>
			REPT	Eastern Slender Glass Lizard/ <i>Ophisaurus attenuatus longicaudus</i>
				Northern Pine Snake/ <i>Pituophis melanoleucus melanoleucus</i>
		Closed Forest Canopy	MAMM	Indiana Bat/ <i>Myotis sodalis</i>
		Cold Air Drainage	P-DIC	Small Enchanter's-nightshade/ <i>Circaea alpina</i> ssp. <i>alpina</i>
				Mountain Wood Sorrel/ <i>Oxalis monatana</i>
		Cool Temperatures	GASTR	Pine Mountain Disc/ <i>Anguispira rugoderma</i>
		Dense shrub understory	BIRD	Chestnut-sided Warbler/ <i>Dendroica pensylvanica</i>
				Eastern Towhee/ <i>Pipilo erythrophthalmus</i>
				Bewick's Wren/ <i>Thryomanes bewickii altus</i>
				Canada Warbler/ <i>Wilsonia canadensis</i>
				Hooded Warbler/ <i>Wilsonia citrina</i>
			REPT	Corn Snake/ <i>Elaphe gutta gutta</i>
		Downed Logs	AMPHI	Marbled Salamander/ <i>Ambystoma opacum</i>
				Green Salamander/ <i>Aneides aeneus</i>
				Wehrle's Salamander/ <i>Plethodon wehrlei</i>
			BIRD	Pileated Woodpecker/ <i>Dryocopus pileatus</i>
			GASTR	Pine Mountain Disc/ <i>Anguispira rugoderma</i>
			MAMM	Masked Shrew/ <i>Sorex cinereus cinereus</i>
				Eastern Spotted Skunk/ <i>Spilogale putorius</i>
				Black Bear/ <i>Ursus americanus</i>
			P-MOS	Feather Moss, Log Moss/ <i>Hypnum imponens</i>

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Association	Habitat	Modifier	Class	Common/Species
				Moss/ <i>Syrhropodon texanus</i>
			REPT	Northern Scarlet Snake/ <i>Cemphora coccinea copei</i>
				Corn Snake/ <i>Elaphe gutta gutta</i>
				Northern Coal Skink/ <i>Eumeces antracinus anthracinus</i>
				Southern Five-lined Skink/ <i>Eumeces inexpectatus</i>
				Scarlet Kingsnake/ <i>Lampropeltis triangulum elapsoides</i>
				Southeastern Crowned Snake/ <i>Tantilla coronata</i>
				Eastern Earth Snake/ <i>Virginia valeriae valeriae</i>
		Dry	BIRD	Lark Sparrow/ <i>Chondestes grammacus</i>
				Prairie Warbler/ <i>Dendroica discolor</i>
			P-DIC	Running Serviceberry/ <i>Amelanchier stolonifera</i>
				Chinquapin (generic)/ <i>Castanea pumila</i>
				Allegheny Chinquapin/ <i>Castanea pumila var. pumila</i>
				Sweet-fern/ <i>Comptonia peregrina</i>
				Beechdrops/ <i>Epifagus virginianana</i>
				Goldenseal/ <i>Hydrastis canadensis</i>
				St. Peter's-wort/ <i>Hypericum crux-andreae</i>
				Thread-leaf Sundrops/ <i>Oenothera linifolia</i>
				Royal Catchfly/ <i>Silene regia</i>
				Spiked Hoary-pea/ <i>Tephrosia spicata</i>
				Velvet Bush Pea/ <i>Thermopsis mollis (generic)</i>
				Nettle-leaf Noseburn/ <i>Tragia urticifolia</i>
				Bird's-foot Violet/ <i>Viola pedata</i>
			P-MON	Wild Agave/ <i>Agave virginica</i>
				Cane/ <i>Arundinaria gigantea</i>
				Boott's Caric Sedge/ <i>Carex picta</i>
				Appalachian Spreading Pogonia/ <i>Cleistes bifaria</i>
				Bearded Skeleton Grass/ <i>Gymnopogon ambiguus</i>
			P-MOS	Juniper Hair Cap moss/ <i>Polytrichum juniperinum</i>
			REPT	Timber Rattlesnake/ <i>Crotalus horridus</i>
				Southern Five-lined Skink/ <i>Eumeces inexpectatus</i>
				Eastern Slender Glass Lizard/ <i>Ophisaurus attenuatus longicaudus</i>
				Northern Pine Snake/ <i>Pituophis melanoleucus melanoleucus</i>
				Southeastern Crowned Snake/ <i>Tantilla coronata</i>
		Elevation (above 2300 ft)	BIRD	Common Raven/ <i>Corvus corax</i>
				Chestnut-sided Warbler/ <i>Dendroica pensylvanica</i>
				Golden-winged Warbler/ <i>Vermivora chrysoptera</i>
				Canada Warbler/ <i>Wilsonia canadensis</i>
			P-DIC	Mountain Maple/ <i>Acer spicatum</i>
		Ericaceous Shrub Associate	INSEC	Diana Fritillary/ <i>Speyeria diana</i>
			P-MON	Pink Lady's-slipper/ <i>Cypripedium acaule</i>
		Exfoliating bark, (trees dead or alive), trees with broken branches or hollow cavities	MAMM	Rafinesque's Big-eared Bat/ <i>Corynorhinus (Plecotus) rafinesquii</i>
				Eastern Small-footed Bat/ <i>Myotis leibii</i>

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Association	Habitat	Modifier	Class	Common/Species
				Indiana Bat/ <i>Myotis sodalis</i>
		Fire Tolerant/Enhanced	BIRD	Northern Flicker/ <i>Colaptes auratus</i>
				Prairie Warbler/ <i>Dendroica discolor</i>
			INSEC	Appalachian Grizzled Skipper/ <i>Pyrgus wyandot</i>
		Forb/Grass Condition	BIRD	Northern Bobwhite/ <i>Colinus virginianus</i>
				Golden-winged Warbler/ <i>Vermivora chrysoptera</i>
			MAMM	Indiana Bat/ <i>Myotis sodalis</i>
				Eastern Spotted Skunk/ <i>Spilogale putorius</i>
		Forest Interior (Minimal Edge)	BIRD	Sharp-shinned Hawk/ <i>Accipiter striatus</i>
				Pileated Woodpecker/ <i>Dryocopus pileatus</i>
				Wood Thrush/ <i>Hylocichla mustelina</i>
		High Shade	INSEC	Sixbanded Longhorn Beetle/ <i>Dryobius sexnotatus</i>
				Diana Fritillary/ <i>Speyeria diana</i>
			P-MON	Appalachian Spreading Pogonia/ <i>Cleistes bifaria</i>
			P-MOS	Feather Moss, Log Moss/ <i>Hypnum curvifolium</i>
		High/Constant Humidity (Microclimate)	REPT	Northern Coal Skink/ <i>Eumeces antracinus anthracinus</i>
		Large Decadent Trees	FUNGI	Sulphur Shelf/ <i>Laetioportus sulphureus</i>
		Leaf Litter	AMPHI	Green Salamander/ <i>Aneides aeneus</i>
				Wehrle's Salamander/ <i>Plethodon wehrlei</i>
			GASTR	Banded Globe/ <i>Anguipira kochi</i>
				Queen Crater/ <i>Mesodon chilhoweensis</i>
				Wrinkled Button/ <i>Mesomphix rugeli</i>
				Glossy Supercoil/ <i>Paravitrea placentula</i>
				Cupped Vertigo/ <i>Vertigo clappi</i>
			REPT	Northern Scarlet Snake/ <i>Cemphora coccinea copei</i>
				Northern Coal Skink/ <i>Eumeces antracinus anthracinus</i>
				Eastern Slender Glass Lizard/ <i>Ophisaurus attenuatus longicaudus</i>
				Southeastern Crowned Snake/ <i>Tantilla coronata</i>
				Eastern Earth Snake/ <i>Virginia valeriae valeriae</i>
		Low (wet, i.e. subject to holding water)	P-DIC	Sweetshrub/ <i>Calycanthus floridus var. glaucus</i>
				Small Sundrops/ <i>Oenothera perennis</i>
			P-MON	Cane/ <i>Arundinaria gigantea</i>
				Cypress-swamp Caric Sedge/ <i>Carex jorii</i>
				Caric Sedge/ <i>Carex seorsa</i>
		Mature forest	BIRD	Sharp-shinned Hawk/ <i>Accipiter striatus</i>
				Pileated Woodpecker/ <i>Dryocopus pileatus</i>
				Red-headed Woodpecker/ <i>Melanerpes erythrocephalus</i>
				Black-and-white Warbler/ <i>Mniotilta varia</i>
		Mid-age Forest		Whip-poor-will/ <i>Caprimulgus vociferus</i>
				Black-and-white Warbler/ <i>Mniotilta varia</i>
				Eastern Towhee/ <i>Pipilo erythrophthalmus</i>
		Moderate Shade	P-MON	Appalachian Spreading Pogonia/ <i>Cleistes bifaria</i>
				Pink Lady-slipper/ <i>Cypripedium acaule</i>

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Association	Habitat	Modifier	Class	Common/Species
				Small Yellow Lady's-slipper/ <i>Cypripedium parviflorum</i> var. <i>parviflorum</i>
			P-MOS	Fern Moss, Log Moss/ <i>Thuidium delicatulum</i>
		Moist	BIRD	Ruby-throated hummingbird/ <i>Archilochus colubris</i>
			GASTR	Glossy Supercoil/ <i>Paravitrea placentula</i>
				Cupped Vertigo/ <i>Vertigo clappi</i>
			INSEC	Diana Fritillary/ <i>Speyeria diana</i>
			MAMM	Masked Shrew/ <i>Sorex cinereus cinereus</i>
			P-DIC	Mountain Maple/ <i>Acer spicatum</i>
				Yellow Screwstem/ <i>Bartonia virginica</i>
				Scarlet Indian Paintbrush/ <i>Castilleja coccinea</i>
				Beechdrops/ <i>Epifagus virginianana</i>
				Yellow Gentian/ <i>Gentiana alba</i>
				Goldenseal/ <i>Hydrastis canadensis</i>
				American Water-pennywort/ <i>Hydrocotyle americana</i>
				Barbara's Buttons/ <i>Marshallia grandiflora</i>
				Carolina Anglepod/ <i>Matelea carolinensis</i>
				Sweet Pinesap/ <i>Monotropsis odorata</i>
				Small Sundrops/ <i>Oenothera perennis</i>
				Mountain Wood Sorrel/ <i>Oxalis montana</i>
				Mock Orange/ <i>Philadelphus inodorus</i>
				Gaywings/ <i>Polygala pauciflora</i>
				Nodding Rattlesnake-root/ <i>Prenanthes crepidinea</i>
			P-MON	Small Yellow Layd's-slipper/ <i>Cypripedium parviflorum</i> var. <i>parviflorum</i>
				Wild Yam/ <i>Dioscorea villosa</i>
				Wild Lily-of-the-Valley/ <i>Maianthemum canadense</i>
				Clubspur Orchid/ <i>Platanthera clavellata</i>
				Small Purple-fringed Orchid/ <i>Platanthera psychodes</i>
				Swamp Wedgscale/ <i>Sphenopholis pensylvanica</i>
			P-MOS	Feather Moss, Log Moss/ <i>Hypnum curvifolium</i>
				Feather Moss, Log Moss/ <i>Hypnum imponens</i>
				Moss/ <i>Syrrhopodon texanus</i>
				Fern Moss, Log Moss/ <i>Thuidium delicatulum</i>
		Neutral substrate	P-DIC	Toothache-tree/ <i>Zanthoxylum americana</i>
			P-MON	Boott's Caric Sedge/ <i>Carex picta</i>
		Old Growth Condition	GASTR	Pine Mountain Disc/ <i>Anguispira rugoderma</i>
		Open (Little or No Shade)	BIRD	Lark Sparrow/ <i>Chondestes grammacus</i>
				Prairie Warbler/ <i>Dendroica discolor</i>
			INSEC	Appalachian Grizzled Skipper/ <i>Pyrgus wyandot</i>
				Diana Fritillary/ <i>Speyeria diana</i>
			MAMM	Rafinesque's Big-eared Bat/ <i>Corynorhinus (Plecotus) rafinesquii</i>
			P-DIC	Small-flowered Thoroughwort/ <i>Eupatorium semiserratum</i>
				Red-disked Sunflower/ <i>Helianthus atrorubens</i>
				American Cow-wheat/ <i>Melampyrum lineare</i> var. <i>lineare</i>
				Wasioto Rosinweed/ <i>Silphium wasiotense</i>

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Association	Habitat	Modifier	Class	Common/Species
				Spiked Hoary-pea/ <i>Tephrosia spicata</i>
				Bird's-foot Violet/ <i>Viola pedata</i>
			P-LICH	Reindeer Lichen/ <i>Cladina</i> spp (cf. <i>rangiferina</i> , <i>stellaris</i> , <i>subtenuis</i>)
			P-MON	Wood Lily/ <i>Lilium philadelphicum</i> var. <i>philadelphicum</i>
				Small Purple-fringed Orchid/ <i>Platanthera psychodes</i>
			REPT	Northern Scarlet Snake/ <i>Cemphora coccinea copei</i>
				Corn Snake/ <i>Elaphe gutta gutta</i>
		Open Forest Canopy	BIRD	Northern Flicker/ <i>Colaptes auratus</i>
				Peregrine Falcon/ <i>Falco peregrinus</i>
				Red-headed Woodpecker/ <i>Melanerpes erythrocephalus</i>
			INSEC	Diana Fritillary/ <i>Speyeria diana</i>
			MAMM	Indiana Bat/ <i>Myotis sodalis</i>
				Virginia Big-eared Bat/ <i>Plecotus townsendii virginianus</i>
				Black Bear/ <i>Ursus americanus</i>
			P-DIC	Yellow Screwstem/ <i>Bartonia virginica</i>
				Yucca-leaved Rattlesnake Master/ <i>Eryngium yuccifolium</i>
				Yellow Gentian/ <i>Gentiana alba</i>
				Small Sundrops/ <i>Oenothera perennis</i>
				Royal Catchfly/ <i>Silene regia</i>
				Spiked Hoary-pea/ <i>Tephrosia spicata</i>
				Cutleaf Meadow-parsnip/ <i>Thaspium pinnatifidum</i>
				Velvet Bush Pea/ <i>Thermopsis mollis</i> (generic)
			P-MON	Cane/ <i>Arundinaria gigantea</i>
				Appalachian Spreading Pogonia/ <i>Cleistes bifaria</i>
				Small Purple-fringed Orchid/ <i>Platanthera psychodes</i>
			P-MOS	Juniper Hair Cap moss/ <i>Polytrichum juniperinum</i>
			REPT	Eastern Slender Glass Lizard/ <i>Ophisaurus attenuatus longicaudus</i>
				Southeastern Crowned Snake/ <i>Tantilla coronata</i>
		Open Midstory/Understory	BIRD	Sharp-shinned Hawk/ <i>Accipiter striatus</i>
			P-DIC	Scarlet Indian Paintbrush/ <i>Castilleja coccinea</i>
				Royal Catchfly/ <i>Silene regia</i>
			P-MON	Wild Yam/ <i>Dioscorea villosa</i>
		Regeneration area/early seral	BIRD	Chestnut-sided Warbler/ <i>Dendroica pensylvanica</i>
				Bewick's Wren/ <i>Thryomanes bewickii altus</i>
				Golden-winged Warbler/ <i>Vermivora chrysoptera</i>
		Remote Habitat		Common Raven/ <i>Corvus corax</i>
			MAMM	Eastern Cougar/ <i>Felis concolor cougar</i>
				Black Bear/ <i>Ursus americanus</i>
		Rich Soil	BIRD	Northern Flicker/ <i>Colaptes auratus</i>
			GASTR	Banded Globe/ <i>Anguispira kochi</i>
			INSEC	Diana Fritillary/ <i>Speyeria diana</i>
			P-DIC	Blue Monkshood/ <i>Aconitum uncinatum</i> ssp. <i>uncinatum</i>
				American Chestnut/ <i>Castanea dentata</i>
				White-leaf Leather-flower/ <i>Clematis glaucophylla</i>

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Association	Habitat	Modifier	Class	Common/Species
				Goldenseal/ <i>Hydrastis canadensis</i>
				Butternut/ <i>Juglans cinerea</i>
				Mock Orange/ <i>Philadelphus inodorus</i>
				Sanicle/ <i>Sanicula canadensis</i>
				Bay Starvine/ <i>Schisandra glabra</i>
				Ovate Catchfly/ <i>Silene ovata</i>
				Slippery Elm/ <i>Ulmus rubra</i>
		Riparian	MAMM	Masked Shrew/ <i>Sorex cinereus cinereus</i>
			P-DIC	Small-flowered Thoroughwort/ <i>Eupatorium semiserratum</i>
				Nodding Rattlesnake-root/ <i>Prenanthes crepidinea</i>
			REPT	Eastern Slender Glass Lizard/ <i>Ophisaurus attenuatus longicaudus</i>
		Rocky/Rocks	AMPHI	Marbled Salamander/ <i>Ambystoma opacum</i>
				Wehrle's Salamander/ <i>Plethodon wehrlei</i>
			BIRD	Lark Sparrow/ <i>Chondestes grammacus</i>
			GASTR	Queen Crater/ <i>Mesodon chilhoweensis</i>
				Glossy Supercoil/ <i>Paravitrea placentula</i>
			MAMM	Eastern Spotted Skunk/ <i>Spilogale putorius</i>
			P-DIC	Mountain Maple/ <i>Acer spicatum</i>
				Running Serviceberry/ <i>Amelanchier stolonifera</i>
				American Chestnut/ <i>Castanea dentata</i>
				Mercury Spurge/ <i>Euphorbia mercurialina</i>
				Fraser's Loosestrife/ <i>Lysimachia fraseri</i>
				Thread-leaf Sundrops/ <i>Oenothera linifolia</i>
			P-DIC	Wafer Ash, Hop-tree/ <i>Ptelea trifoliata</i>
				Royal Catchfly/ <i>Silene regia</i>
				Snowberry/ <i>Symphoricarpos albus var. albus</i>
				Slippery Elm/ <i>Ulmus rubra</i>
				Toothache-tree/ <i>Zanthoxylum americana</i>
			P-MON	Pink Lady-slipper/ <i>Cypripedium acaule</i>
				Swamp Wedgscale/ <i>Sphenopholis pensylvanica</i>
			P-MOS	Moss/ <i>Brothera leana</i>
				Juniper Hair Cap moss/ <i>Polytrichum juniperinum</i>
				Moss/ <i>Syrrophodon texanus</i>
				Fern Moss, Log Moss/ <i>Thuidium delicatulum</i>
			REPT	Northern Scarlet Snake/ <i>Cemphora coccinea copei</i>
				Corn Snake/ <i>Elaphe gutta gutta</i>
				Northern Coal Skink/ <i>Eumeces antracinus anthracinus</i>
				Southeastern Crowned Snake/ <i>Tantilla coronata</i>
				Eastern Earth Snake/ <i>Virginia valeriae valeriae</i>
		Sandy Soil	AMPHI	Marbled Salamander/ <i>Ambystoma opacum</i>
			P-DIC	Running Serviceberry/ <i>Amelanchier stolonifera</i>
				Chinquapin (generic)/ <i>Castanea pumila</i>
				Cumberland Rosemary/ <i>Conradina verticillata</i>
				Box Huckleberry/ <i>Gaylussacia brachycera</i>

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Association	Habitat	Modifier	Class	Common/Species
				Fraser's Loosestrife/ <i>Lysimachia fraseri</i>
				Small Sundrops/ <i>Oenothera perennis</i>
			P-DIC	Bird's-foot Violet/ <i>Viola pedata</i>
			P-MON	Pink Lady-slipper/ <i>Cypripedium acaule</i>
			REPT	Northern Scarlet Snake/ <i>Cemphora coccinea copei</i>
				Scarlet Kingsnake/ <i>Lampropeltis triangulum elapsoides</i>
		Seasonal (water)	AMPHI	Jefferson Salamander/ <i>Ambystoma jeffersonianum</i>
				Marbled Salamander/ <i>Ambystoma opacum</i>
				Four-toed Salamander/ <i>Hemidactylum scutatum</i>
				Wood Frog/ <i>Rana sylvestris</i>
		Seep/Constant Water		Green Salamander/ <i>Aneides aeneus</i>
			P-DIC	Kidney-leaf Grass-of-Parnassus/ <i>Parnassia asarifolia</i>
				Synandra/ <i>Synandra hispidula</i>
			P-MON	Clubspur Orchid/ <i>Platanthera clavellata</i>
			P-MOS	Bartlett's Sphagnum Moss/ <i>Sphagnum bartlettianum</i>
				Red Sphagnum/ <i>Sphagnum bartlettianum</i>
		Shrub/Sapling Condition	BIRD	Northern Bobwhite/ <i>Colinus virginianus</i>
				Prairie Warbler/ <i>Dendroica discolor</i>
				Common Yellowthroat/ <i>Geothlypis trichas</i>
				Yellow-breasted Chat/ <i>Icteria virens</i>
				Black-and-white Warbler/ <i>Mniotilta varia</i>
				Eastern Towhee/ <i>Pipilo erythrophthalmus</i>
			INSEC	Diana Fritillary/ <i>Speyeria diana</i>
			P-MON	Wild Yam/ <i>Dioscorea villosa</i>
			REPT	Southern Five-lined Skink/ <i>Eumeces inexpectatus</i>
		Slope (hillside, steepness)	BIRD	Black-and-white Warbler/ <i>Mniotilta varia</i>
			GASTR	Banded Globe/ <i>Anguispira kochi</i>
				Clifty Covert/ <i>Mesodon wetherbyi</i>
				Glossy Supercoil/ <i>Paravitrea placentula</i>
				Cupped Vertigo/ <i>Vertigo clappi</i>
			P-DIC	American Chestnut/ <i>Castanea dentata</i>
				Snowberry/ <i>Symphoricarpos albus var. albus</i>
		Snags > 6" dbh	BIRD	Northern Flicker/ <i>Colaptes auratus</i>
				Red-headed Woodpecker/ <i>Melanerpes erythrocephalus</i>
				Bewick's Wren/ <i>Thryomanes bewickii altus</i>
		Snags, Any Size		Northern Flicker/ <i>Colaptes auratus</i>
		Snags, Large (> 20 in DBH)	FUNGI	Sulphur Shelf/ <i>Laetioporus sulphureus</i>
			MAMM	Black Bear/ <i>Ursus americanus</i>
		Sphagnum Associate	AMPHI	Four-toed Salamander/ <i>Hemidactylum scutatum</i>
		Tract Size (Area Sensitive)	BIRD	Ruby-throated hummingbird/ <i>Archilochus colubris</i>
				Whip-poor-will/ <i>Caprimulgus vociferus</i>
				Pileated Woodpecker/ <i>Dryocopus pileatus</i>
				Wood Thrush/ <i>Hylocichla mustelina</i>
				Yellow-throated Vireo/ <i>Vireo flavifrons</i>

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Association	Habitat	Modifier	Class	Common/Species
		Tree and Snags (Cavity Nesters)		Northern Flicker/ Colaptes auratus
				Pileated Woodpecker/ Dryocopus pileatus
				Red-headed Woodpecker/ Melanerpes erythrocephalus
				Bewick's Wren/ Thryomanes bewickii altus
			MAMM	Eastern Spotted Skunk/ Spilogale putorius
		Trees > 20" dbh	BIRD	Pileated Woodpecker/ Dryocopus pileatus
				Bald Eagle/ Haliaeetus leucocephalus
		Upland (usually mesic to dry, not subject to holding water)		Whip-poor-will/ Caprimulgus vociferus
			P-DIC	Running Serviceberry/ Amelanchier stolonifera
			REPT	Scarlet Kingsnake/ Lampropeltis triangulum elapsoides
				Eastern Slender Glass Lizard/ Ophisaurus attenuatus longicaudus
		Water (Distance Sensitive)	BIRD	Bald Eagle/ Haliaeetus leucocephalus
			MAMM	Indiana Bat/ Myotis sodalis
			REPT	Northern Coal Skink/ Eumeces antracinus antracinus
				Eastern Slender Glass Lizard/ Ophisaurus attenuatus longicaudus