Terrestrial Species Viability (Fine Filter)

INTRODUCTION

As noted in the *Terrestrial Ecosystem Diversity* section, the National Forest Management Act (NFMA) and its implementing regulations require national forests to preserve and enhance the diversity of plant and animal communities to meet multiple use objectives based on the suitability and capability of the land. The regulations further require maintenance of viable populations of existing native and desirable non-native species (16 U.S.C. 1600(6)(g)(3)(B); 36 CFR 219.19, 219.26, and 219.27(g)).

Species viability was not identified as a major Need for Change issue. It was identified as a minor Need for Change issue, not because it is not important, but because the 1986 Forest Plan, including its recent amendment for threatened and endangered species, was believed to provide for viability. Also, viability issues are partly addressed by the Vegetation Management and Backcountry Recreation issues.

The species viability fine-filter analysis is the second half of the coarse filter/fine filter approach to conserving biological diversity (see *Terrestrial Ecosystem Diversity* section). Fine-filter analysis focuses on maintaining viable populations of individual species that are identified as having potential viability concerns. Fine-filter analysis can serve as verification that the coarse-filter component is working, as well as a safety net to identify species-specific conservation actions that are necessary for maintaining viable populations of species that are not adequately conserved by the coarse-filter approach (Haufler et al. 1999).

This section analyzes overall effects of the Forest Plan alternatives to viability of all terrestrial species with potential viability concerns. Viability evaluations for aquatic species are described in the *Water, Riparian, and Aquatic Resources* section of this chapter. Cave-dwelling species were grouped with the terrestrial species, even though many of them are associated with aquatic systems within caves.

This analysis considers differences in broad patterns of viability risk across alternatives, and relates those patterns to management effects on ecological communities. While viability risks experienced by individual threatened and endangered species contribute to these patterns, detailed species-by-species analyses for threatened and endangered species are contained in the *Threatened and Endangered Species* section of this chapter.

Issues and Indicators

Issue Statement

Forest Plan management strategies may affect the level of risk to species with potential viability concerns, and may also be used to provide a mix of habitats for the species found on the Forest.

Background

Maintenance of species viability is an integral component of the Forest Service's responsibility to conserve biological diversity. The fine-filter analysis focused on species that may have viability concerns within the Forest boundary or have been identified by others as species of concern due to declining populations or other factors.

As part of its strategy to address NFMA viability requirements and avert the need for listing under the Endangered Species Act (ESA), each region of the Forest Service has developed a list of Regional Forester's Sensitive Species (RFSS), which are species for which population viability may be a concern. Direction in the Region 9 supplement to the Forest Service Manual emphasizes maintaining viability for RFSS and ensuring that management activities do not result in trends toward federal listing (FSM 2670.22, 2670.32). Manual direction requires Forests to determine whether their actions will affect RFSS, and if so, whether the actions will result in a loss of viability or a trend toward federal listing (FSM 2670.32).

Indicators

Distribution of viability outcomes by alternative - As a measure of the aggregate level of risk to species viability, the numbers of A, B, C, D, and E viability outcomes (explained below under Analysis Methods) were compared across the alternatives. For each alternative, we assessed the number of species that showed increased or decreased risk relative to existing conditions, and we interpreted these changes relative to projected trends in key communities. Particular emphasis was placed on species that changed to a higher risk viability outcome.

Effect determinations for Regional Forester's Sensitive Species by alternative - Viability outcomes, the rating information used to develop the outcomes, and changes relative to existing conditions were used to make effect determinations for RFSS. These effect determinations were used as a direct measure of each alternative's potential to impact RFSS. See the Current Conditions section below for elaboration on viability outcomes and effects determinations, and how they were determined.

Scope of Analysis

After screening hundreds of species for potential viability issues, the Species Viability Evaluations (see project record) assessed and documented in detail the past and ongoing threats to over 200 species and their habitats across their known ranges. These ranges varied from specific local caves to wintering habitat as far away as Central and South America. The viability outcomes were applied to the species' range within the Monongahela National Forest (MNF) proclamation boundary and purchase units in order to determine the potential effects of activities that may occur on National Forest System (NFS) lands and other land ownerships within and adjacent to that boundary. Therefore, these outcomes address the direct and indirect potential effects of National Forest management under the plan alternatives, but they also integrate the cumulative effects of National Forest management with other past, present, and reasonably foreseeable future actions on other land ownerships. Rationales for the viability factor ratings (in

project record) explain the relative contributions of direct effects due to Forest management and cumulative effects that arise when actions on other land ownerships are considered.

Viability outcomes were developed for the current condition/immediate future as part of the Analysis of the Management Situation (AMS). For this EIS analysis, viability outcomes for each alternative were projected for the 100-year planning horizon. In making these projections across the planning horizon, habitat trends and fluctuations that are projected to occur in the middle of the planning horizon were considered, as well as the amounts projected to occur at the end of the planning horizon. Therefore, the outcomes account for habitat bottlenecks or deviations that might occur during the planning horizon, in addition to the overall trends. Analysis of viability risks for the entire planning horizon allowed us to evaluate the effects of management through a period when existing forest communities will age substantially relative to current conditions. The entire planning horizon also allowed time for management strategies to make progress toward desired conditions. Limiting the analysis to the early decades of the planning horizon would have ignored important changes in the age structure of forested communities in later decades that will result from the current condition and the effects of management activity in the early decades. However, projections beyond the first decade or two must be viewed with caution because of the potential for changes in management emphasis, as well as substantial uncertainty over factors beyond the control of the Forest, such as continued acid deposition, global climate change, human population growth, effects from non-native invasive species and other disturbance agents, and changes in wintering habitat for migratory species.

CURRENT CONDITIONS

Analysis Methods

We began the fine-filter analysis by selecting a group of species that may have viability concerns within the Forest boundary or have been identified by others as species of concern due to declining populations or other factors. In addition to globally rare species and other species with range-wide population concerns, this group also included species that are rare on the Forest, but common elsewhere. Such an approach ensured that we were considering all species with possible viability concerns on the Forest. Specifically, we selected species for individual analysis if they met one or more of the following criteria:

- Species that are federally listed as threatened or endangered, as well as species that have been formally proposed for such listing.
- Species that are listed by the Forest Service as RFSS for the Monongahela.
- Species with a NatureServe/Natural Heritage Program global abundance ranking of G1 (critically imperiled), G2 (imperiled), or G3 (vulnerable).
- Species with a West Virginia Natural Heritage Program state rank of S1, S2, or S3.

- Species with a NatureServe/Natural Heritage Program Forest rank for the MNF of F1, F2, or F3. Forest ranks were developed by NatureServe as part of a species viability evaluation database constructed for Region 8 of the Forest Service (NatureServe 2002). Although the MNF is not part of Region 8, the database covered many of the species with potential viability concerns on the MNF and assigned F ranks specific to the MNF.

- Birds on the Audubon Society's watch list.

- Birds identified by Partners in Flight as priority species for the Mid-Atlantic Ridge and Valley physiographic area (which includes the Monongahela).

- Migratory birds identified by the U.S. Fish and Wildlife Service as Birds of Conservation Concern for the Appalachian Mountains.

- For migratory birds, only breeding season populations were assessed.

Within this group of species, any that had previously been evaluated for the RFSS list, but were found not to warrant inclusion on that list, were dropped from further consideration. The RFSS process continually considers G1-G3, N1-N3, and S1-S2 species using a risk evaluation process that considers abundance, distribution, population trends, habitat integrity, and population vulnerability. RFSS risk evaluations are key building blocks in an ongoing process for addressing viability issues. Therefore, species that had already been considered but not selected for the RFSS list were deemed to have been evaluated adequately prior to this viability evaluation. However, a few exceptions to this rule were made for species of high public interest (e.g., cerulean warbler), which were carried through the analysis even if they had previously been dismissed from the RFSS list.

Based on comments on the Draft EIS, we added five plant species to the detailed analysis. The information sources listed above did not show occurrences of these species within the MNF, but the The Nature Conservancy presented information indicating that they do occur on the MNF and that they meet one or more of the rarity criteria outlined above. Also based on public comments, we added a crayfish that was evaluated only as an aquatic species in the Draft EIS.

A total of 457 species were screened specifically for this analysis, all of which came from either the NatureServe Region 8 viability database, one of the lists mentioned above, or public comments on the Draft EIS. Therefore, the species screened were those that have been identified as species with viability concerns somewhere within the southern United States, the Appalachian Mountains, or West Virginia. A comprehensive list of all species that occur on the Forest does not exist. However, the NatureServe/Natural Heritage Program rankings that were the main basis for the screening are considered to be the authoritative source on rare and declining species. In effect, the work done by NatureServe to identify rare and declining species means that essentially all species have been screened. From the 457 potentially rare or declining species that were considered in this analysis, the screening process produced a list of 219 species to be evaluated in detail (see Appendix D). These species included 14 mammals, 60 birds, 5 amphibians, 5 reptiles, 53 invertebrates, 75 vascular plants, and 7 nonvascular plants.

Each species carried forward for detailed analysis was assigned to one or more habitat associations. Habitat associations were based on those presented in NatureServe's viability database for Region 8 (NatureServe 2002). Habitat associations from this database were modified to better reflect known species-habitat relationships on the Monongahela (see Appendix D). The habitats used for the fine-filter analysis generally equate to the communities used in the coarse-filter analysis.

Because of the large number of species evaluated and a lack of detailed information for many of them, quantitative population viability analysis was not a practical way to assess species viability. Instead, we chose to use a qualitative rating system that produced a viability outcome for each species. Terrestrial viability outcomes were modified from those used in forest plan revision for the White Mountain National Forest, the Chippewa and Superior National Forests, and the Midewin National Tallgrass Prairie. These in turn were based on viability outcomes developed for the Interior Columbia River Basin Ecosystem Management Project (Quigley et al. 1996). The distribution and abundance combinations contained in the outcomes represent a range of likely risk to viability. The outcomes do not make a yes-or-no determination of viability, which is generally precluded by a lack of detailed demographic information.

Outcome A: The species is generally common and broadly distributed within its historic range in the planning area. Occurrences within the planning area interact as a metapopulation.

Outcome B: The species is either broadly distributed or locally common across its historic range in the planning area, but gaps exist within this distribution. For species associated with unique habitats, such gaps may represent the natural condition. Many occurrences are large enough and close together enough to permit metapopulation interactions, but a minority of occurrences may be isolated.

Outcome C: The species has low abundance and/or is distributed in a patchy pattern of disjunct occurrences. For species associated with unique habitats, low abundance and patchy distribution may be the natural condition. Many occurrences are isolated, whereas others are still able to interact as a metapopulation.

Outcome D: The species has low abundance and is distributed as isolated occurrences. While some occurrences may be self-sustaining, metapopulation interactions are not possible for most occurrences. This outcome may represent the natural condition for some species associated with unique habitats.

Outcome E: The species has very low abundance and is distributed as isolated occurrences. Many occurrences have a strong potential for extirpation, and metapopulation interactions are not possible.

Insufficient Information: Lack of information precludes assigning a viability outcome.

To arrive at viability outcomes in a consistent fashion for all species, we developed a set of factors upon which each species was rated:

- Habitat abundance refers to the total amount of habitat for the species within the Forest boundary. The rating was based on individual species' needs and considered the amount of habitat relative to the historic maximum and minimum amounts. Trends in habitat amount from presettlement times to the present were considered. If known threats made a portion of the habitat unsuitable for the species, we attempted to exclude that portion of the habitat from the estimate of habitat abundance. Habitat abundance was rated as common, occasional, or rare.

- Habitat distribution and connectivity describes the arrangement of habitat on the landscape. Essentially, it gauges how well the habitat satisfies NFMA's "well distributed" criterion. It is intended to represent the potential for interaction and genetic interchange among occurrences within the planning area. Therefore, this factor rating is strongly tied to the dispersal distance and mobility of the species being considered. In formulating this rating, we also considered the degree of connectivity relative to the historic maximum and minimum. Habitat connectivity was rated as connected, patchy, or isolated.

- Population factors represent the ability of the species to fully occupy available habitat. Having abundant, well-connected habitat does not ensure a species' viability if its mortality is so high or reproductive and dispersal rates are so low that it cannot produce enough individuals to fill the habitat. In this context "threats" refer to factors that cause abnormally high mortality, abnormally low reproductive rates, or restrict dispersal, to the extent that these factors are not already accounted for in the habitat ratings. Threats might include such factors as human disturbance, competition from exotic species, or micro-scale fragmentation that cannot be captured in the habitat ratings. To the extent allowed by available information, the population factors ratings considered historic and current trends in species distribution and abundance. Population factors were rated as low, moderate, or high risk.

The species viability chapter of the AMS contains additional detail on the factor ratings and how they were used to assign viability outcomes.

Distribution of Viability Outcomes

For the assessment of current conditions, 86 percent (189 of 219) of the fine-filter species evaluated in detail were assigned viability outcomes of C, D, or E (see Appendix D), indicating low abundance and some degree of risk to viability. Fifty-nine percent (129) of the species were assigned outcomes of D or E, indicating low abundance, fragmentation/isolation problems, and a relatively high risk to viability. These results are not surprising given that only species with potential viability concerns were evaluated in detail in this analysis. Numerous more common species occur on the Forest, but they were assumed to have little or no risk to viability and were screened out in the initial stages of this evaluation. Considering all 457 species that were screened specifically for this analysis, 41 percent received C, D, or E outcomes, and 28 percent were assigned D or E outcomes. Because the total number of species on the Forest is not known, it is not possible to calculate the percentage of all species on the Forest that received outcomes indicating risk to viability, but it is likely to be much lower than the percentage of species that

were screened specifically for this analysis. The project record contains the data forms for all species that were evaluated in detail.

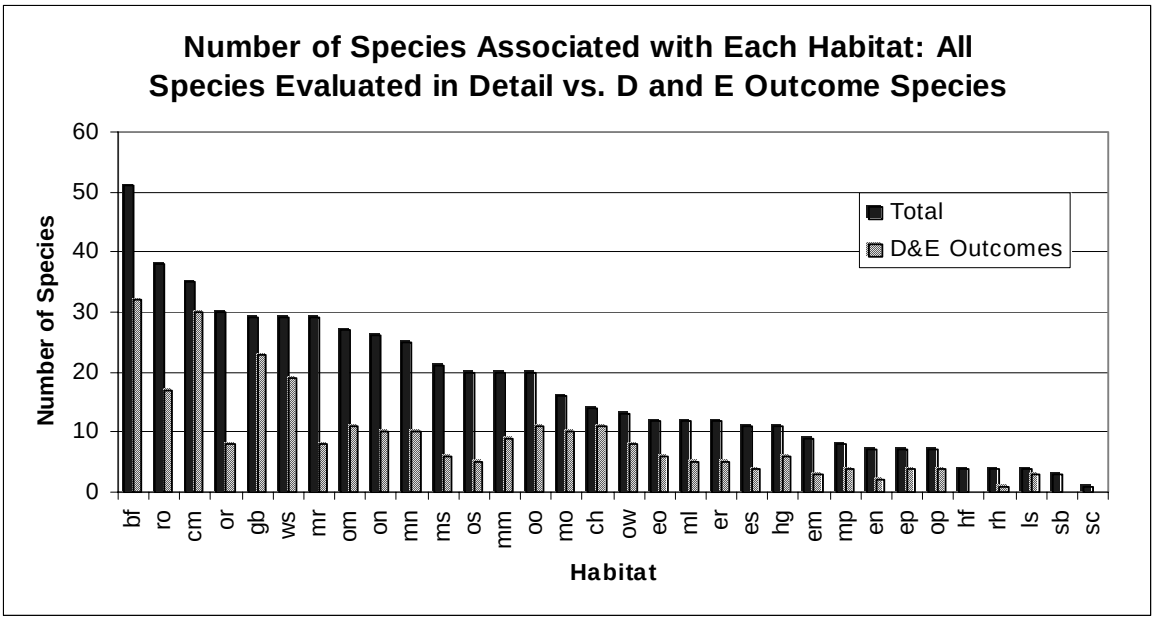
Although the best available information was used, lack of information also may have contributed to the high proportion of high-risk outcomes. Many species are known from only a few occurrences on the Forest. It is likely that little systematic survey work has been done for many of these species, so it is possible that the low number of known occurrences could overstate the degree of rarity for these species. In such cases, viability outcomes were assigned by erring on the side of caution; we assumed in most cases that the paucity of records indicated rarity instead of lack of survey effort. However, by being consistent in this application of caution when alternatives were analyzed, we preserved the ability to detect differences in risk to viability among alternatives. Also, the isolation and metapopulation concerns implied by outcomes C, D, and E may be overstated for the 44 bird species that were assigned one of these outcomes. They were assigned to these outcomes because of low abundance and/or patchy distributions, but in general these species are highly mobile and not particularly vulnerable to isolation within a landscape the size of the Forest.

Examining the species' associations with habitats showed which habitats harbor large numbers of species with viability concerns (Figure SV-1). Because all species evaluated in detail have a potential viability concern on the Forest, simply looking at the total number of evaluation species associated with each habitat may be the most straightforward way to gain insight into the relative importance of the habitats for those species. The top ten habitats in terms of total number of species evaluated were bogs, fens, seeps, and seasonal ponds (51 species); rock outcrops and cliffs (38 species); caves and mines (35 species); old riparian forest (30 species); glades and barrens (29 species); woodlands, savannas, and grasslands (29 species); mature riparian forest (29 species); old mesophytic and cove forest (27 species); old northern hardwood forest (26 species); and mature northern hardwood forest (25 species). It is important to note that because most species are associated with more than one habitat, there is some overlap in the number of species associated with the various habitats. For example, many of the 29 species that use mature riparian forest are also among the 30 species associated with old riparian forest. Of these top ten habitats, many are rare and unique habitats that do not cover large areas of the Forest.

Perhaps the most important aspect of species viability evaluation is identifying any species with viability concerns that are likely to be affected by Forest Service management, or lack thereof. A total of 58 species with D or E outcomes are associated with at least one community that is likely to be affected by active or passive Forest vegetation management (Table SV-1). These species occur in a wide variety of communities. A little over half of them (32 species) occur primarily in disturbance-dependent habitats, mostly semi-open oak or pine-oak woodlands, although several are species of open grasslands or openings in boreal forests. The other species occur in a wide variety of mature and old forests; several of them require cool, moist micro-sites. Of these 58 species, three are federally listed, and 22 are listed as RFSS on the Forest. Potential effects to these 25 listed threatened, endangered, and sensitive species currently are considered in Biological Evaluations (BEs) for project-level actions. The remaining 33 species currently are not included in BEs and could be affected by project-level actions. The Species Viability chapter of the AMS recommended that these 33 species be considered for possible inclusion on the RFSS list. Such consideration would not necessarily result in all of them being added to the

RFSS list, but would evaluate the need for protection from typical management activities, as well as the potential for typical conservation measures to mitigate effects.

Figure SV-1.



BF = Bogs, fens, seeps, and seasonal ponds
CH = Stream channels and banks
CM = Caves and mines
GB = Glades and barrens
HF = Hemlock forests
HG = High elevation grasslands
LS = Lakes and ponds
ML = Mixed successional landscapes
MM = Mature mixed mesophytic and cove forests
MN = Mature northern hardwood forests
MO = Mature oak forests
MP = Mature pine-oak forests
MR = Mature riparian forests
MS = Mature spruce forests
OM = Old mixed mesophytic and cove forests
ON = Old northern hardwood forests
OO = Old oak forests
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OR = Old riparian forests
OS = Old spruce forests
OW = Open wetlands
RH = Remote habitats
RO = Rock outcrops and cliffs
SB = Shrub balds
SC = Spray cliffs
WS = Woodlands, savannas, and grasslands
YM = Young mixed mesophytic and cove forests
YN = Young northern hardwood forests
YO = Young oak forests
YP = Young pine-oak forests
YR = Young riparian forests
YS = Young spruce forests

Table SV-1. Species with D or E Viability Outcomes that Occur in One or More Communities that are Likely to be Subject to Active or Passive Vegetation Management

Scientific Name	Common Name	T&E or RFSS	Habitat Associations	Key Habitat Needs
Sorex hoyi winnemana	Southern pigmy shrew		MM, OM, MN, ON, MO, OO	Cool, moist microhabitats
Spilogale putorius	Spotted skunk		RO, MM, OM, MO, OO	Den sites (rock crevices, hollow trees and logs, etc.)
Ammodramus henslowii	Henslow's sparrow		WS	Tall grass habitat in patches > 74 acres
Colinus virginianus	Northern bobwhite		WS, ML	Mixed landscapes of grassland, cropland, brush, and woods
Contopus cooperi	Olive-sided flycatcher		YS, ML, BF	Openings in boreal forests with standing snags
Eremophila alpestris	Horned lark		HG, WS	Mixture of sparse herbaceous vegetation and bare ground
Falco peregrinus	Peregrine falcon	RFSS	RO, RH	Remote cliffs for nest sites
Haliaeetus leucocephalus	Bald eagle	T	MR, OR, LS, CH	Large super-canopy trees for roosting and nesting; good water quality in feeding areas
Lanius ludovicianus	Loggerhead shrike	RFSS	WS	Herbaceous-dominated habitats with scattered trees and shrubs
Limnothlypis swainsonii	Swainson's warbler		OM, MM	Moist cove forests with dense shrubby understory
Lophodytes cucullatus	Hooded merganser		CH, MR, OR	Snags/den trees for nesting; good water quality in feeding areas
Melanerpes erythrocephalus	Red-headed woodpecker		OO, OP, WS	Open oak woods with large trees and snags
Pandion haliaetus	Osprey		MR, OR, LS	Snags or platforms for nesting; good water quality in feeding areas
Petrochelidon pyrrhonota	Cliff swallow		ML, YR, WS	Nest sites on cliffs, bridges, dams, buildings, etc.; open situations for foraging
Pooecetes gramineus	Vesper sparrow		HG, WS	Grasslands > 30 acres
Riparia riparia	Bank swallow		CH, WS, BF, OW	Dirt or gravel banks for nesting; open situations for foraging
Sphyrapicus varius	Yellow-bellied sapsucker		YN, MN, YS, MS	Snags for nesting
Tyto alba	Barn owl		WS	Snags and old buildings for nesting; grassland for foraging
Vermivora ruficapilla	Nashville warbler		BF, YS, ML	Shrubby openings in boreal forests
Plethodon nettingi	Cheat Mountain salamander	T	MS, OS	Moist spruce forests with downed logs and/or flat rocks
Glyptemys insculpta	Wood turtle		MR, OR	Riparian areas with sandy stream banks
Heterodon platirhinos	Eastern hog-nosed snake		YO, MO, YP, MP, WS, ML	Sandy soils in openings or open woodlands
Brachionycha borealis	Boreal fan moth		YO, MO, OO, YP, MP, OP, WS	Oak and pine-oak forests and woodlands with blueberries
Calephelis borealis	Northern metalmark		CH, GB, WS	Forest openings containing squawweed
Cicindela patruela	Barrens tiger beetle	RFSS	GB, RO, WS	Bare ground with sand, gravel, or eroding sandstone within open woodlands
Cicindela purpurea	Tiger beetle		GB, YO, YP	Barrens and open woodlands
Cicindela unipunctata	Tiger beetle		MO, OO, MP, OP, WS	Oak and pine-oak forests and woodlands
Erynnis lucilius	Columbine duskywing		BF, GB, RO, YM	Open areas containing columbine
Hadena ectypa	Noctuid moth		MN, ON	Northern hardwoods with high concentrations of starry campion
Hesperia metea	Cobweb skipper		GB, YO, YP, WS	Dry, grassy openings containing bluestem or broomsedge

Scientific Name	Common Name	T&E or RFSS	Habitat Associations	Key Habitat Needs
Polygonia faunus smythi	Smyth's green comma		BF, MS, OS, MN, ON	Small openings in spruce or northern hardwoods
Speyeria diana	Diana fritillary	RFSS	OM	Mesic forests with dense midstory and small openings
Abies fraseri	Fraser fir	RFSS	YS, MS, OS	Southern Appalachian boreal forests – not native to West Virginia
Agrostis mertensii	Arctic bentgrass	RFSS	RO, HG, YR	High elevation openings
Baptisia australis var. australis	Blue wild indigo		CH, YM, YN, YR	Moist early successional habitats
Botrychium lanceolatum var. angustisegmentum	Lance-leaf grape fern	RFSS	MM, OM, MN, ON	Moist forests
Botrychium oneidense	Blunt-lobe grape fern	RFSS	OM, MM, ON, MN, BF	Moist to wet microsites within northern hardwoods or mesophytic forests
Cornus rugosa	Roundleaf dogwood		RO, GB, ON	Rocky areas within forests
Cypripedium parviflorum var. parviflorum	Small yellow lady's slipper		BF, OM	Moist to wet sites in late-successional forests
Delphinium exaltatum	Tall larkspur	RFSS	GB, WS	Woodlands and barrens on dry, rocky, calcareous soils
Euphorbia purpurea	Darlington's spurge	RFSS	BF, HG, MR, OR	Wet areas; pastures underlain by limestone
Gymnocarpium appalachianum	Appalachian oak fern	RFSS	ON, MN	Cool, moist, shaded microclimates with exposed rock and boulders. Almost always growing on or near moss-covered logs and rocks.
Hasteola suaveolens	False Indian-plantain	RFSS	CH, YR, MR, OR	Flood scour zones
Hexalectris spicata var. spicata	Crested coral root	RFSS	MO, OO, GB	Dry glade woodlands and margins of limestone barrens.
Hypericum mitchellianum	Blue Ridge St. John's-wort	RFSS	HG, BF, MS, OS, MN, ON	Seeps and moist banks, occasionally on rock outcrops, at high elevations.
Isotria medeoloides	Small whorled pogonia	T	MM, OM, MO, OO, MP, OP	Dry oak and oak-pine forests.
Juglans cinerea	Butternut	RFSS	YM, MM, OM, MR, OR	Mesic forests; requires openings for establishment
Juncus filiformis	Thread rush	RFSS	BF, YR, MR, OR, OW	High elevation wet areas
Juncus trifidus	Highland rush	RFSS	RO, HG	Rock crevices and meadows at high elevations
Paxistima canbyi	Canby's mountain-lover	RFSS	RO, MO, OO	limestone cliffs; limestone ledges in open forests under white cedar or hemlocks
Phlox buckleyi	Sword-leaved phlox	RFSS	GB, MO, OO	Shaley slopes in open woods
Piptatherum canadense	Canada mountain ricegrass	RFSS	RO, WS	Dry, semi-open habitats
Rhamnus lanceolata ssp. lanceolata	Lance-leaved buckthorn		GB, WS	Semi-open habitats on limestone or dolomite; shale barrens
Scutellaria saxatilis	Rock skullcap	RFSS	MM, OM, MN, ON	Moist, rocky microhabitats in northern hardwoods and mixed mesophytic forests
Taxus canadensis	American yew		BF, MS, OS, MN, ON	Cool, moist, climax conditions in high-elevation forests and bogs
Trichostema setaceum	Narrow-leaved blue-curls		GB, WS, YO, MO, OO	Shale barrens; sandstone woodlands and glades, and dry oak forests
Triphora trianthophora	Nodding pogonia	RFSS	MM, OM	Rich humus in moist woods with filtered sunlight
Cetraria arenaria	Foliose lichen		YO, OO	Semi-open, fire-maintained oak forests/woodlands

BF = Bogs, fens, seeps, and seasonal ponds MO = Mature oak forests

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Effect Determinations for Regional Forester's Sensitive Species

The 2004 Threatened and Endangered Species Amendment to the Forest Plan evaluated effects of the 1986 Forest Plan on RFSS. The BE for this amendment concluded that the 1986 Forest Plan, as amended, would have both beneficial and minor negative impacts on various RFSS (USDA Forest Service 2003b). For all RFSS, the BE reached a determination of "may impact individuals; not likely to lead to loss of viability or a trend towards federal listing." The rationale for these determinations was that because of the Forest's need to balance benefits derived from management of the Forest, some minor impacts to RFSS may occur. However, it is the policy of the Forest and the agency to avoid or minimize such impacts to the extent possible, and mitigate unavoidable impacts such that viability is maintained for all species. The BE for the 2004 Threatened and Endangered Species Amendment contains more detailed discussions of potential effects on RFSS associated with particular habitat groups (USDA Forest Service 2003b).

ENVIRONMENTAL CONSEQUENCES

Resource Protection Methods

Laws, Regulations, and Policies

Numerous laws, regulations, and policies govern the management of species diversity and viability on NFS lands. National laws and regulations have also been interpreted for implementation in the Forest Service Manual and Handbook. Some of the more influential laws, regulations, and policies governing species diversity and viability are listed in Table SV-2.

Table SV-2. Major Laws, Policies, and Regulations Influencing Management of Species Viability on NFS Land

Act/Law/Regulation/Policy	Law/CFR/FSM/FSH Number
Migratory Bird Treaty Act	16 U.S.C. 703-712
Fish and Wildlife Coordination Act	16 U.S.C. 661-667e
Multiple Use-Sustained Yield Act	16 U.S.C. 528-531
Sikes Act	16 U.S.C. 670a-670o
Endangered Species Act	16 U.S.C. 1531-1544
National Forest Management Act	16 U.S.C. 1600-1614
Fish and Wildlife Conservation Act	16 U.S.C. 2901-2911
Federal Cave Resources Protection Act	16 U.S.C. 4301-4310
NFMA implementing regulations regarding wildlife, diversity, viable populations, threatened and endangered species, and habitat management	36 CFR 219.19; 219.26; 219.27(a)(5), (a)(6), (a)(8), (b)(6), (g)
Directives for Habitat Planning and Evaluation	FSM 2620
Directives for Management of Fish and Wildlife Habitat	FSM 2630
Directives for Threatened, Endangered, and Sensitive Species	FSM 2670
Directives for Cave Management	R9 Supplement to FSM 2350

Forest Plan Direction and Implementation

Forest Plan direction for the protection of species diversity and viability occurs primarily at the Forest-wide level. Forest-wide direction emphasizes protection, maintenance, and enhancement of habitat for threatened, endangered, proposed, and RFSS species. Direction calls for avoiding and minimizing negative impacts to the extent possible, and mitigating any unavoidable negative effects. While the general emphasis of the existing and revised Forest-wide direction is very similar, the revised direction contains more specific goals and objectives for identifying and implementing habitat enhancement and restoration opportunities for RFSS. Also, the 2006 Forest Plan direction includes similar goals, objectives, standards and guidelines for Migratory Birds of Conservation Concern, which were not a management issue when the 1986 Forest Plan's direction was written.

Effects Common to All Alternatives

Many Forest management activities have at least some potential to affect individuals and habitat for RFSS and other species with potential viability concerns. NFMA regulations require maintenance of viable populations. In addition, Forest Service Manual direction requires that management actions not cause trends toward federal listing, and Forest Plan direction emphasizes avoiding, minimizing, and mitigating any negative effects on RFSS. Because of these requirements, management activities will be carefully evaluated for any potential negative effects on RFSS or species viability. Therefore, no activities are expected to result in loss of viability or a trend toward federal listing for any species. The effects discussed below indicate where viability risks may increase or decrease, but in all cases the effects attributable to Forest management are expected to remain below the threshold where loss of viability or a trend toward federal listing occurs.

Mineral Exploration, Development, and Leasing

Natural gas leasing is the most common form of mineral development on the Forest. In any given area subject to gas development, typically only a small percentage of the habitat is affected. Usually the maximum surface disturbance associated with each gas well is about 15.5 acres. This includes about 2 acres for the well site, 2 acres for access roads, and 11.5 acres of pipelines. Pipelines are approximately 15 to 40 feet wide, and monitoring on the Forest has shown that the tree canopy usually closes over the pipeline within three to five years. Thus the long-term effects of each gas well amount to the conversion of about 4 acres of forested habitat to non-forested habitat. The maximum density of gas wells in most areas is about one well per 640 acres. Therefore, the long-term effects to major forested communities are estimated to include the conversion of less than 1 percent of the forested habitat in a given area to non-forested habitat. Loss of such small percentages of habitat is not expected to appreciably affect viability outcomes for species with potential viability concerns. For RFSS, individuals may be impacted, but population effects sufficient to cause a loss of viability or trend toward federal listing are unlikely. Direction in the Forest Service Manual and the Forest Plan require that unavoidable negative effects on RFSS be mitigated such that loss of viability and trends toward federal listing do not occur.

Other forms of mineral development are currently rare on the Forest, but could occur. Potential effects could vary widely depending on the degree of surface disturbance. Certain activities such as surface mining could have locally intense effects on habitat and could affect individuals, but such intense effects are not likely to occur over large areas. Because of their localized nature, effects from mineral development are not likely to substantially affect viability outcomes. For RFSS, individuals may be impacted, but loss of viability and trends toward federal listing are not expected.

Vegetation/Timber Management – Mechanical Treatments

Mechanical vegetation treatment is the main tool used to manage plant and animal habitats on the Forest. Vegetation management will occur over broad areas and has the potential to substantially modify the age class distribution and composition of some forested communities. Therefore, vegetation management could affect viability outcomes and effects to RFSS for some species. Such effects will not be uniform across all alternatives for all species, therefore effects of vegetation management on viability outcomes are covered below under Direct and Indirect Effects by Alternative.

Vegetation/Timber Management – Salvage Harvest

Salvage harvesting has the potential to change habitat amounts and characteristics for RFSS and species with potential viability concerns. The effects of the change, as well as whether the effects are viewed as positive or negative, vary among species. The extent and magnitude of potential effects due to salvage harvesting are impossible to predict because the natural disturbances that trigger salvage harvesting are not predictable. However, requirements to maintain viability and Forest Plan direction to mitigate negative effects would prevent loss of viability and trends toward federal listing.

Range Management – Livestock Grazing

Acreage devoted to range allotments has been declining slowly over several decades, and the revised Forest-wide management direction calls for maintenance of existing grazing capacity. Based on current trends and the revised management direction emphasis, new allotments likely would be limited to newly acquired lands that contain pastures. Given that current range allotments cover less than 7,000 acres and the trend in range acreage is expected to be flat to declining, active range management is not likely to substantially affect viability outcomes or RFSS. If the decline in range acreage continues, the replacement of open land with forest could increase viability risks for some species that require open, grassy habitat. However, the vast majority of such habitat in the Forest boundary occurs on private land, so any effects due to decline of range acreage on NFS lands are likely to be minor. Because the amount of range land that might revert to forest is tiny compared to existing forests, any positive effects on viability of forest species would not be measurable.

Fire Management – Fire Suppression

Fire suppression prevents intense wildfires from converting mature and old forests to openings and young forests, potentially preventing increased risk to viability for species associated with mature forests. Fire suppression in fire-adapted landscapes can cause degradation or loss of fire-maintained communities, thereby increasing viability risk for species associated with such habitats. Fire suppression activities (e.g., fire lines) can also cause localized direct impacts to habitats and individuals. However, because such impacts usually are limited to small areas, they are not expected to substantially increase viability risks, unless they happen to damage an occurrence of a species that is very rare on the Forest. Because of requirements to maintain viability and Forest Plan direction to mitigate negative effects to RFSS, fire suppression is not expected to cause loss of viability and trends toward federal listing.

Fire Management – Prescribed Fire Use

Prescribed fire in fire-adapted communities maintains natural habitat structure and composition, thereby reducing viability risks for species associated with such communities. Prescribed fire in fire-sensitive communities can degrade or destroy natural habitat structure and composition, which can increase viability risks for species that inhabit those communities. However, Forest Plan goals and objectives do not encourage prescribed burning in fire-sensitive communities, so widespread effects on such habitats are unlikely. Prescribed fire also presents a risk of direct mortality to rare plants or animals that cannot escape the fire. However, the presence of such species is one of the factors considered in planning prescribed fire. Because of requirements to maintain viability and direction in the Forest Plan to avoid and mitigate negative effects, any increases in viability risk due to prescribed fire are expected to be minor and would not cause a loss of viability or trend toward federal listing.

Roads – Construction, Reconstruction, Maintenance, and Decommissioning

Road construction and reconstruction converts small amounts of forested habitat to non-habitat, and creates edges and fragmentation in surrounding forest. These habitat changes can cause minor increases in viability risk for species that require unbroken forest. However, such habitat changes can reduce viability risk for forest species that require scattered canopy gaps or openings. Road construction and reconstruction in semi-primitive non-motorized areas can increase viability risk for species that require remote habitat. Road construction and reconstruction can create disturbed habitat along road shoulders and cut/fill slopes, possibly reducing viability risks for species that use disturbed habitats. Also, road construction and reconstruction provide access necessary for managing disturbance-dependent habitats, thereby reducing viability risks for species associated with those habitats.

Road maintenance perpetuates the habitat changes caused by road construction. Because it prevents re-colonization of road beds by forests, it maintains viability risks caused by roads for species that require unbroken forest. Road maintenance prevents reversion to semi-primitive non-motorized conditions, thereby sustaining existing viability risks to species that require remote habitats. However, road maintenance can prevent increases in viability risk for species that use canopy gaps and disturbed areas along roads. Road maintenance preserves access for habitat management, which prevents increased viability risk to species associated with disturbed habitats that must be maintained through active management.

Road decommissioning restores forested habitat that was previously reduced and fragmented by road construction. Therefore, road decommissioning can reduce viability risks to forest interior species. Where road decommissioning creates semi-primitive non-motorized areas, viability risks to species requiring remote habitat can be reduced. Over the long term, road decommissioning eliminates canopy gaps and disturbed habitats associated with roads, therefore it can increase viability risk for species associated with such habitats. Road decommissioning can also eliminate access necessary for managing disturbance-dependent habitats, which can increase viability risks for species associated with those habitats.

Recreation – Developed Recreation

Depending on the intensity of developed recreation activities, the associated facilities can have effects ranging from minor alteration of habitat (e.g., a small picnic area) to replacement of habitat with structures and maintained landscaping (e.g., a visitor center). Effects on viability risks at the low end of the intensity scale are expected to be negligible. Activities at the high end of the intensity scale have the potential to remove habitat for species with viability concerns, but the developments typically occupy small, localized areas. Therefore, they generally can be located such that they avoid substantial impacts to habitat for RFSS and other species with viability concerns. Developed facilities could create small areas of habitat for species with viability concerns that require disturbed habitats.

Recreation – Dispersed Recreation

Habitat changes associated with dispersed recreation generally are so minor that they are not expected to have measurable effects on viability risks. However, more noticeable effects on habitat could occur in and around areas that are subject to localized heavy use. Such use could increase viability risk to the extent that it occurs in habitats occupied by RFSS or other species with viability concerns. Efforts to avoid and mitigate negative effects to RFSS should relocate damaging recreational use, thereby limiting any increased risk to viability.

Recreation – Motorized Recreation Use

Effects associated with motorized recreation are largely due to the roads that are necessary to facilitate motorized access. These effects are discussed above in the Roads subsection. Because roads are rarely constructed solely for motorized recreational use, motorized recreation is likely to occur on roads that would have been constructed anyway for management access reasons. Therefore, effects of roads used for motorized recreation would not be additive to the road effects already discussed.

However, off-road motorized use could have additional effects on viability risks. The Forest does not allow off-road motorized vehicle use except on designated routes. Currently there are no designated routes, so authorized off-road motorized recreation would require construction of a dedicated trail system to accommodate off-road vehicles. The effects of constructing and maintaining such a system would be similar to the effects of road construction and maintenance, but the effects would be in addition to the effects of roads that are constructed for management access. However, per mile of trail, effects would be less extensive than road construction effects because off-road vehicles generally do not require trails as wide as most roads. Although no plan alternative contains specific goals, objectives, or limitations regarding the amount of off-road vehicle trails to be constructed, it is considered unlikely that the Forest would construct enough off-road vehicle trails to measurably affect viability for any species.

Soil, Water, Riparian, Aquatic – Active Restoration

Active soil, water, riparian, and aquatic restoration typically is conducted on very localized sites. Therefore, it is likely that such activities would be designed to completely avoid adverse impacts to individuals and habitat for RFSS and other species with viability concerns. To the extent that habitat for RFSS and viability concern species is restored, viability risks could be reduced. However, restoration that reforests disturbed areas could increase viability risk for species associated with disturbed habitat. Because active restoration is likely to affect only small, localized areas, it is unlikely that such restoration of disturbed areas would cause substantial viability risk.

Soil, Water, Riparian, Aquatic – Passive Restoration

Effects of passive soil, water, riparian, and aquatic restoration would be similar to those discussed above for active restoration.

Wildlife/Fish Habitat Restoration

Traditional maintained wildlife openings convert forested habitat to non-forest habitat and contribute to fragmentation of remaining forested habitat. These activities could cause a small increase in viability risk for species that require forest interior habitat. However, wildlife openings generally would be designed to avoid negative impacts to occurrences of RFSS and species with viability concerns. Wildlife openings could reduce viability risks for species that need open, herbaceous habitats.

Habitat restoration for species that require forested habitat could reduce viability risks for forest interior species. If such restoration involves reforesting open areas, it could increase risk for species that require herbaceous openings or other disturbed habitats. However, such restoration projects generally would be designed to avoid negative effects to occurrences of RFSS and other species with viability concern.

Direct and Indirect Effects by Alternative

Distribution of Viability Outcomes

Projected viability outcomes under all alternatives showed little change from current conditions (Table SV-3). Each of the alternatives had 188 species with viability outcomes of C, D, or E, indicating low abundance and some degree of risk to viability. This is a net decrease of one species from the 189 species with C, D, or E outcomes under existing conditions. Considering just the higher-risk D and E outcomes, Alternatives 1 and 3 each had 128 species with these outcomes, whereas Alternatives 2, 2M, and 4 each had 127 species. These results show a slight projected improvement from the 129 species that currently have D or E outcomes. Compared to current conditions, Alternatives 1 and 3 each had three species with decreased risk to viability and one species with increased risk to viability, while Alternatives 2, 2M, and 4 each had four species with decreased risk and one species with increased risk. Viability outcomes for all species evaluated in detail are contained in Appendix D. Data forms displaying the ratings and rationale that formed the basis for the outcomes are contained in the project record and are incorporated by reference.

Table SV-3. Viability Outcomes by Alternative and Comparison to Current Outcomes

Outcome	Number of Species With the Specified Outcome					
	Current	Alt. 1	Alt. 2	Alt. 2M	Alt. 3	Alt. 4
A	3	3	3	3	3	3
B	17	18	18	18	18	18
C	60	60	61	61	60	61
D	71	71	70	70	71	70
E	58	57	57	57	57	57
Insufficient Information	10	10	10	10	10	10
Number of species with decreased risk relative to current	--	3	4	4	3	4
Number of species with increased risk relative to current	--	1	1	1	1	1

Five species had projected viability outcomes under one or more alternatives that differed from outcomes based on current conditions (Table SV-4). Information from the viability data forms for these species is summarized below.

Black-Billed Cuckoo – The black-billed cuckoo (*Coccyzus erythropthalmus*) is a bird that breeds in deciduous forest areas of the northeastern United States and southern Canada, as well as riparian areas and shrubby habitats in the Great Plains (NatureServe 2003). It migrates to South America for the winter. In the Appalachians, this species prefers a dense understory and midstory characteristic of old forests undergoing gap-phase regeneration, but it is also known to use anthropogenic forest gaps (NatureServe 2002).

For this evaluation, the black-billed cuckoo was assigned to the old stages (stand age 120+ years) of mixed mesophytic and cove forest, northern hardwood forest, and oak forest. Currently, old stands are uncommon on the Forest, but old forest alone probably underestimated habitat for this species because it did not account for use of mature (40-119 years old) forest with a dense understory and midstory due to anthropogenic disturbance or other factors. However, information was not available to identify the portion of mature forest that provides habitat, and using all mature forest likely would have greatly overestimated habitat for this species. Therefore, habitat abundance for the current condition was rated as occasional as a compromise between the relative rarity of old forest and the species' ability to use disturbed areas and edges in mature stands. Habitat distribution was rated as connected because of the species' high mobility, and because potential habitat is scattered throughout the Forest within a forested landscape matrix.

Population factors for the current condition were rated as moderate risk. *The West Virginia Breeding Bird Atlas* (Buckelew and Hall 1994) and breeding bird point count data compiled by the West Virginia Division of Natural Resources (WVDNR unpublished data 2003) showed that the species is known to occur across the northern and southern ends of the Forest, with no records known from potential habitat in the central part of the Forest. The apparent gap in the distribution could be because surveys missed occupied habitat, or it could indicate that an unidentified population factor is preventing the species from occupying habitats in that area. Breeding Bird Survey data from 1980 to 2002 (Sauer et al. 2003) showed declining population trends in the central Appalachians and continent-wide.

By the later decades of the planning horizon, old hardwood forest habitat on NFS land is projected to increase at least fifteen-fold under all alternatives. While precise estimation is not possible for the future cumulative amount of habitat on all land ownerships within the Forest boundary, the current trend on private land is toward an increase in large-diameter trees (data from USDA Forest Service Forest Inventory and Analysis website 2004), which presumably means an aging forest. Should this trend continue, the cumulative effect of this trend combined with the large increase on NFS land would cause a large increase in total habitat within the Forest boundary. The habitat is projected to be so abundant on NFS land that it would cover a quarter to a third of all land in the Forest boundary even if no habitat were present on private land. Therefore, the habitat abundance rating for black-billed cuckoo was upgraded to common under all alternatives. Because habitat would be common and connected, the viability outcome

was upgraded from C to B under all alternatives. Outcome A was not chosen because lack of information did not allow upgrading the moderate risk rating for population factors.

Yellow-Breasted Chat – The yellow-breasted chat (*Icteria virens*) is a bird that breeds in shrub-sapling habitats with little or no tree canopy across much of the continental United States and northern Mexico. It migrates to Central America for the winter. The chat does not occur in gaps in mature and old forest; a breeding population requires a patch of shrubby habitat 12 acres or larger (NatureServe 2003).

The yellow-breasted chat was assigned to the young stages (0-39 years) of mixed mesophytic and cove forest, oak forest, pine-oak forest, and riparian forest. This probably overestimated habitat somewhat because it includes pole-sized stands that do not provide habitat suitable for this species. The identified potential habitat covers about 6 percent of NFS land and about 6 percent of all land in the Forest boundary. Habitat abundance was rated occasional for the current condition. Habitat distribution was rated connected because the chat is a highly mobile long-distance migrant, and it specializes in exploiting patchy, ephemeral habitats (NatureServe 2003).

Current condition population factors were rated moderate risk. The *West Virginia Breeding Bird Atlas* (Buckelew and Hall 1994) documented possible, probable, or confirmed breeding in widely scattered locations within the Forest boundary, which may indicate that some potential habitat is unoccupied. Breeding Bird Survey data from 1980 to 2002 showed a population decline of 2.2% per year in West Virginia (Sauer et al. 2003).

During the middle and later decades of the planning horizon, potential habitat on NFS land is projected to increase two- to three-fold under all alternatives. This increase would be due to timber harvesting associated with meeting age class diversity objectives. If the trend toward declining amounts of young forest on private land continues, it would offset some of the habitat gains on NFS land. However, even if no habitat remained on private land, the increase on NFS land would maintain the current cumulative amount of habitat on all land ownerships under Alternative 3, and increase the cumulative amount under the other alternatives. Based on the likelihood that at least some habitat is likely to remain on private land, a cumulative increase in habitat seems likely under all alternatives, and habitat abundance for all alternatives was rated common. To reflect the common and connected habitat, the viability outcome was upgraded from C to B for all alternatives. Outcome A was not chosen because of the population factors risk indicated by the Breeding Bird Survey population declines.

Red-Headed Woodpecker – The red-headed woodpecker (*Melanerpes erythrocephalus*) inhabits semi-open forest and woodland habitats throughout much of the eastern two-thirds of the continental United States. It typically does not occur in dense forests. Mast is an important food source for this woodpecker, so it is closely associated with oak-dominated communities. Other important habitat attributes include snags for nest cavities and trees with large dead limbs that provide insects, which are another important dietary component (NatureServe 2003). This species is believed to be a permanent resident in much of its range, including West Virginia, though populations on the northern and western fringes of the range migrate to the southeastern states for the winter (Buckelew and Hall 1994, NatureServe 2003).

For this analysis, potential habitat was considered to be the old stage of oak forest and pine-oak forest, as well as the woodlands, savannas, and grasslands community. These communities probably overestimated habitat because it is likely that much of the old oak and pine-oak forest is unsuitably dense due to decades of fire suppression. Also, the woodlands, savannas, and grasslands community is largely comprised of pasture and hay land, some of which may be too open and lacking in snags. The identified potential habitat covers about 3 percent of NFS land and about 6 percent of all land in the Forest boundary. However, because this was considered to be an overestimate of suitable habitat, habitat abundance was rated rare for the current condition. Habitat distribution was rated patchy because potential habitat is concentrated in several distinct clusters where oaks or farmland dominate the landscape. Also, the species is known to have high breeding site fidelity (NatureServe 2003) and is believed to be non-migratory in West Virginia, both of which could limit its ability to colonize vacant habitat. However, the species is a highly mobile bird and should be able to disperse to habitats that are in reasonably close proximity to each other; therefore, habitat distribution was not rated isolated.

Population factors for the current condition were rated moderate risk. The West Virginia Breeding Bird Atlas (Buckelew and Hall 1994) and breeding bird point counts (WVDNR unpublished data 2003) found the species in a total of only three locations within the Forest boundary, indicating that much of the identified potential habitat appears to be vacant. Breeding Bird Survey data from 1980 through 2002 showed a continent-wide decline of 4.5 percent per year (Sauer et al. 2003).

Under Alternatives 2, 2M, and 4, potential habitat on NFS land in the middle and later decades of the planning horizon would increase about five- to six-fold over the current condition. Most of this increase would be due to aging of oak and pine-oak stands into the old stage, though a small part of the increase would be due to projected increases in wildlife openings and savannas, which are included in the woodlands, savannas, and grasslands community. Unlike the current condition, much of the potential habitat would be suitable if goals and objectives for prescribed burning are met. Alternatives 2 and 2M would raise the limit on prescribed fire from the current 300 acres per year to 30,000 acres per decade (average of 3,000 acres per year). Alternative 4 would allow an average of 7,500 acres of prescribed fire per year and would seek to treat all high priority areas in need of prescribed fire on a 29-year cycle. Such increases in prescribed fire, if achieved, would mean that under Alternatives 2 and 2M, about half of the potential habitat on NFS land likely would be suitable for red-headed woodpeckers. Under Alternative 4, a large majority of the identified potential habitat likely would be suitable. The cumulative amount of habitat on all land ownerships in the Forest boundary is difficult to predict, but given that a large, coordinated prescribed burning program is unlikely to occur on private land, it is likely that the private land contribution to habitat would not increase. However, even if no habitat were available on private land, the increase in habitat on NFS land would still increase the cumulative habitat amount relative to the current condition. Due to the large projected increase in habitat amount on NFS land, habitat abundance under Alternatives 2, 2M, and 4 was rated occasional. Habitat abundance was not rated common because of the assumed scarcity of habitat on private land. Because the current patchy distribution of habitat is largely related to topographic factors that influence tree species composition, the patchy habitat distribution rating was retained, even though some local-scale improvement in connectivity likely would occur in conjunction with the

large increase in habitat amount. Because of the large increase in habitat, viability outcomes under Alternatives 2, 2M, and 4 were upgraded from D to C. Outcome B was not chosen due to the possible population risks implied by the Breeding Bird Survey decline and the current sparse distribution within potential habitat.

Under Alternatives 1 and 3, potential habitat would increase in magnitude similar to the increases projected for Alternatives 2, 2M, and 4, but the limit on prescribed fire would not increase. Therefore, very little of the potential habitat would actually be suitable. The habitat abundance ratings remained rare under these alternatives, and the current D outcome was maintained.

Mourning Warbler – The mourning warbler (*Oporornis philadelphia*) is a small songbird that breeds in dense woodland thickets and shrubby bogs across southern Canada and the north-central and northeastern United States (NatureServe 2003). A disjunct population breeds in the higher mountains of eastern West Virginia, western Maryland, and western Virginia (NatureServe 2003, National Geographic Society 1999). The mourning warbler migrates to Central and South America for the winter. In West Virginia, the species is limited to high-elevation forests, where it nests in regenerating stands and small wind-throw patches (Buckelew and Hall 1994). The key habitat feature is dense shrubby vegetation.

Potential habitat was identified as the young stages of spruce forest and northern hardwood forests, plus the bogs, fens, seeps, and seasonal ponds community. For the current condition, this habitat was estimated to cover about 2 percent of all NFS land and about 3 percent of all land ownerships in the Forest boundary. These communities may have underestimated suitable habitat because they do not include small gaps in mature stands that could provide habitat. Habitat abundance for the current condition was rated occasional. Habitat distribution was rated connected because the species is a highly mobile long-distance migrant and is adapted to exploiting patchy, ephemeral habitats.

Population factors for the current condition were rated moderate risk. The species occurs in many areas of potential habitat within the Forest boundary, but appears to be rare or absent in apparently suitable habitat on the Allegheny Front (Hall 1983, Buckelew and Hall 1994). Breeding Bird Survey data for 1980 through 2002 showed declines of 2.3 percent per year for eastern North America and 2.4 percent per year continent-wide.

By the middle and later decades of the planning horizon, potential habitat would decline to about 1 percent of all NFS land under Alternatives 1 and 4, and less than 1 percent under Alternatives 2, 2M, and 3. This decline is due to lack of even-aged timber harvest in essentially all spruce forest and most northern hardwood forest. Potential habitat resulting from natural disturbances is not accounted for in these projections, but without even-aged harvesting the amount is likely to decline relative to the current amount. The cumulative amount of habitat on all land ownerships within the Forest boundary is difficult to predict, but if the current trend toward aging forests on private land continues, the cumulative habitat amount is likely to decline as well. Because of this projected decline in habitat amount, the habitat abundance rating was lowered to rare for all alternatives, and the viability outcome was downgraded from B to C for all alternatives.

Diana Fritillary – The Diana fritillary (*Speyeria diana*) is a butterfly whose range is centered on the southern Appalachian mountains. Historically it was known to range as far north as southwestern Pennsylvania, but currently it is not known to occur north of Pocahontas County, West Virginia (NatureServe 2003, Allen 1997). This species requires mesic forest that provides a dense midstory for breeding sites and small openings for feeding on flower nectar. Prior to large-scale industrial logging in the late 19th and early 20th Centuries, such habitat likely was provided by old-growth forests. Large-scale logging of old growth forests is believed to have been responsible for major population declines in the 20th Century. Currently, mature second growth forests with small natural or anthropogenic openings provide habitat (NatureServe 2003, NatureServe 2002).

The current habitat amount was difficult to estimate because the species has an affinity for old-growth forests, but is also able to use mature forests with scattered openings. Old mixed mesophytic and cove forest covers only about 0.5 percent of NFS land and about 0.5 percent of all land ownerships in the Forest boundary. In contrast, mature mixed mesophytic and cove forest covers about 35 percent of all NFS land and about 32 percent of all land in the Forest boundary. Habitat abundance was rated occasional as a compromise estimate between these two extremes. Because the specific areas that provide habitat within mature forests could not be identified, habitat distribution could not be evaluated accurately enough to develop a current conditions rating.

Population factors were rated high risk for the current condition. West Virginia Natural Heritage Program records (unpublished data) show only two occurrences for Diana fritillary within the Forest boundary, both near the southern end of the Forest. Based on these records, most of the potential habitat on the Forest appears to be vacant. Pesticide spraying for gypsy moth control is believed to be a major threat to the recovery of Diana fritillary populations (NatureServe 2003). Because of the apparent high risk to populations, the species was assigned a current conditions viability outcome of E.

During the middle and later decades of the planning horizon, old mesophytic and cove forest would increase more than 30-fold under all alternatives. Because much of this old forest would be beginning gap-phase regeneration, most of it is expected to provide suitable habitat. Potential habitat for the Diana fritillary would cover 20 to 25 percent of all NFS land. The cumulative amount of habitat on all land ownerships in the Forest boundary is difficult to predict, but if the current trend toward aging forests on private land continues, the cumulative habitat amount would increase also. Even if no habitat existed on private land, the increase on NFS land would raise the cumulative habitat amount to 12 to 13 percent of all land in the Forest boundary. Because of the large projected increase in habitat, the habitat abundance rating was raised to common for all alternatives. Also, because old mixed mesophytic and cove forest would form one of the dominant landscape matrix communities, habitat distribution was rated connected for all alternatives. Based on common and connected habitat, the viability outcome was upgraded to C for all alternatives. Outcomes A and B were not chosen because of uncertainty over the future threat posed by spraying for gypsy moth, and uncertainty over the species' ability to re-colonize areas from which it has been extirpated.

Table SV-4. Species with Projected Viability Outcomes that Differed from Current Conditions

Species	Viability Outcome					
	Current Condition	Alt.1	Alt. 2	Alt. 2M	Alt. 3	Alt. 4
Birds						
Black-billed cuckoo	C	B	B	B	B	B
Yellow-breasted chat	C	B	B	B	B	B
Red-headed woodpecker	D	D	C	C	D	C
Mourning warbler	B	C	C	C	C	C
Invertebrates						
Diana fritillary[1]	E	C	C	C	C	C

[1]Regional Forester's Sensitive Species.

Species With Habitat Abundance Rating Differences – Eleven species had a habitat abundance rating under one or more alternatives that differed from the current condition, but a viability outcome that remained the same as the current condition across all alternatives (Table SV-5). Generally, this was because the outcome was driven by the population factors or habitat distribution ratings. While risk to viability for these species is not expected to change appreciably from current conditions based on available information, unforeseen changes in the conditions that drove the population factors or habitat distribution ratings could enable changes in habitat abundance to exert more influence over risks to viability.

Habitat abundance ratings for these species differed from existing conditions for varied reasons. The Allegheny woodrat (*Neotoma magister*) uses oak mast for a food source. Its habitat abundance rating was downgraded from occasional to rare under all alternatives because of the projected decline in the amount of oak and pine-oak forest in the optimum mast-producing age range. The northern goshawk (*Accipiter gentilis*) is believed to rely on remote forests. Therefore, its habitat rating was upgraded from rare to occasional under Alternative 3 because of that alternative's strong emphasis on remote backcountry. The whip-poor-will (*Caprimulgus vociferus*) relies on the young and mature stages of oak and pine-oak forest. Because the mature stage is expected to decline substantially as stands reach the old stage, habitat abundance for this species was downgraded from common to occasional under all alternatives. The yellow-bellied sapsucker (*Sphyrapicus varius*), brown-lined dart moth (*Anaplectoides brunneomedia*), and Atlantis fritillary (*Speyeria atlantis*) all depend on young or mature spruce and northern hardwood forests to meet at least part of their habitat requirements. Because of the projected lack of even-aged management in these communities, habitat abundance for these species was downgraded under four or more alternatives. The black vulture (*Coragyps atratus*), worm eating warbler (*Helmitheros vermivorus*), small yellow lady's slipper (*Cypripedium parviflorum* var. *parviflorum*), and foliose lichen (*Cetraria arenaria*) all depend on old forests for part or all of their habitat requirements. Because old forests would increase substantially under all alternatives, habitat abundance ratings for these species have been upgraded under all alternatives.

Table SV-5. Species Whose Habitat Abundance Ratings under One or More Alternatives Differed from the Current Condition, but Whose Viability Outcome Did Not Change from the Current Condition

Species	Habitat Abundance Rating						Viability Outcome – All Alternatives
	Existing Condition	Alternative 1	Alternative 2	Alternative 2M	Alternative 3	Alternative 4	
Mammals							
Allegheny woodrat[1]	Occasional	Rare	Rare	Rare	Rare	Rare	C
Birds							
Northern goshawk[1]	Rare	Rare	Rare	Rare	Occasional	Rare	C
Whip-poor-will	Common	Occasional	Occasional	Occasional	Occasional	Occasional	B
Black vulture	Rare	Occasional	Occasional	Occasional	Occasional	Occasional	C
Worm-eating warbler	Occasional	Common	Common	Common	Common	Common	B
Yellow-bellied sapsucker	Common	Rare	Rare	Rare	Rare	Rare	D
Invertebrates							
Brown-lined dart moth	Occasional	Rare	Rare	Rare	Rare	Rare	C
Early hairstreak	Common	Occasional	Occasional	Occasional	Occasional	Occasional	C
Atlantis fritillary	Occasional	Occasional	Rare	Rare	Rare	Rare	C
Vascular Plants							
Small yellow lady's slipper	Rare	Occasional	Occasional	Occasional	Occasional	Occasional	D
Non-vascular plants							
Foliose lichen	Occasional	Common	Common	Common	Common	Common	D

[1]Regional Forester's Sensitive Species.

Effect Determinations for Regional Forester's Sensitive Species

Currently there are 83 terrestrial species that are listed as RFSS on the Forest. All of these RFSS were assessed individually as part of the species viability evaluation, and viability outcomes were assigned. Viability outcomes for RFSS are contained in Appendix D. Table SV-6 summarizes viability outcomes by alternative for RFSS.

Viability outcomes for RFSS showed no differences among alternatives, and only one RFSS had a viability outcome under the alternatives that differed from the existing condition. The assigned outcome for this species, Diana fritillary, improved from E under the existing condition to C under all alternatives. Reasons for this change are discussed above.

A large number of RFSS were assigned viability outcomes of D or E, indicating very low abundance and possible fragmentation/isolation problems. About three-quarters of these occur in naturally rare habitats such as wetlands or caves. The rarity of such species generally is not

attributable to past or current management activity, although management activity has the potential to impact these species if the species' habitat is affected. However, Forest Plan direction generally protects most rare habitats. Most of the remaining D and E outcome RFSS are sensitive due to a limited distribution within potential habitat. For most of these species, the reasons for the limited distribution are not well-known. Because these species are not necessarily limited to protected rare habitats, management activity has a higher likelihood of affecting potential habitat for these species.

Table SV-6. Summary of Viability Outcomes for RFSS

Viability Outcome	Number of RFSS With Outcome Shown					
	Existing Condition	Alternative 1	Alternative 2	Alternative 2M	Alternative 3	Alternative 4
A	0	0	0	0	0	0
B	2	2	2	2	2	2
C	13	14	14	14	14	14
D	26	26	26	26	26	26
E	41	40	40	40	40	40
Insufficient Information	1	1	1	1	1	1

The species viability evaluation considered broad-scale risks to viability of RFSS and other species based primarily on an assessment of each alternative's potential to affect the amount and distribution of potential habitat. A more detailed analysis of potential effects to RFSS and occupied habitat is not possible at the Forest Plan level because of the programmatic nature of the plan. The plan does not propose or authorize any specific actions, so site-specific effects cannot be evaluated. Because no potential management action can be completely ruled out at the Forest Plan level, the potential for adverse or beneficial effects to any RFSS would exist under each of the plan alternatives. The potential for adverse effects is small due to Manual and Plan direction that requires assessment of possible effects to RFSS, avoidance of effects where possible, mitigation of unavoidable effects, and avoidance of any loss of viability or trend toward federal listing. Therefore, for all RFSS, we have determined that each alternative is not likely to cause a trend toward federal listing or a loss of viability.

Cumulative Effects

Distribution of Viability Outcomes

The viability outcomes presented above apply to each species' range within the Forest boundary (proclamation boundary and purchase units). Because species do not recognize land ownership boundaries, the viability outcomes were developed by considering all habitats, occurrences, activities, and threats within the Forest boundary, regardless of land ownership. It was assumed that activities and threats adjacent to the boundary would be similar in effect. The viability outcomes also were developed considering changes in habitat amount and distribution that have occurred from presettlement to present, and also considering the best possible projections of

future changes due to activities on all land ownerships within the analysis area. Therefore, these outcomes represent an integrated assessment of the direct and indirect effects of National Forest management under the plan alternatives, and the cumulative effects of past, present, and reasonably foreseeable future actions on all land within the analysis area. The project record contains viability data forms that document for each species analyzed the consideration of direct and indirect effects of Forest Service actions, as well as the cumulative effects of other appropriate past, present, and reasonably foreseeable future actions within this area.

Effect Determinations for Regional Forester's Sensitive Species

Effect determinations for RFSS were made considering each species' current habitat, threats, and occurrences within the analysis area, as well as the potential for Forest Service management to affect individuals and habitat. Activities that occur on other land ownerships within and adjacent to the Forest have the potential to affect the overall habitat-occurrence-threat context within which effects of Forest Service management are considered. Such reasonably foreseeable activities include, but are not limited to, timber harvest, residential development, mining, oil and gas development, livestock grazing, row-crop agriculture, and highway construction. Typically these activities have the potential for mostly negative impacts on RFSS and their habitat, though some disturbance-dependent species could be benefited by some of these activities. Current levels of these activities suggest that, when combined with projected Forest Service management, cumulative effects sufficient to change RFSS effect determinations are not likely to occur. However, the future extent and intensity of such activities is difficult to predict. If they affect large areas of habitat or jeopardize important occurrences for a particular species, the cumulative effects of these activities combined with Forest Service activities could downgrade the effect determination. If this occurs, Forest Service management activities may have to be reviewed to ensure that cumulative effects do not cause loss of viability or trends toward federal listing.