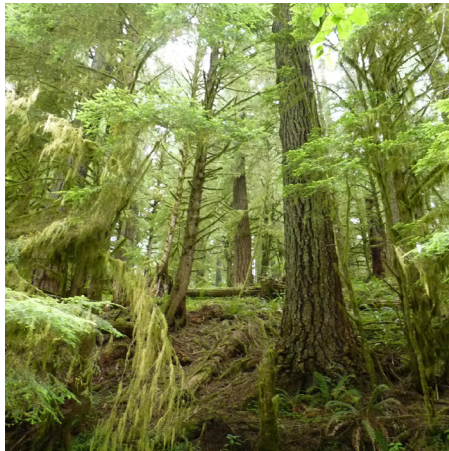


Planning for Diversity

A guide to national forest planning to conserve America's wildlife



ACKNOWLEDGEMENTS

Planning for Diversity is a product of Defenders of Wildlife's Forests for Wildlife Initiative, an effort to ensure that national forests are managed to conserve at-risk species and their habitat. This guide focuses on requirements established under the 2012 National Forest System land management planning rule to provide for a diversity of plant and animal communities on national forests. Its purpose is to help people inside and outside the Forest Service who are working on forest plan revisions navigate these complex diversity requirements.

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Defenders of Wildlife is a national, nonprofit membership organization dedicated to the protection of all native wild animals and plants in their natural communities.

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INTRODUCTION

The U.S. Forest Service manages more than 193 million acres—over 8 percent of all U.S. lands—an area about the size of Texas and twice the size of the National Park System. The National Forest System comprises 154 national forests, 20 national grasslands and one national prairie (collectively referred to as “national forests”). Located in 42 states, Puerto Rico and the U.S. Virgin Islands, these lands are essential to the conservation of wildlife habitat and diversity. National forests encompass three-quarters of the major U.S. terrestrial and wetland habitat types—including alpine tundra, tropical rainforest, deciduous and evergreen forests, native grasslands, wetlands, streams, lakes and marshes. This variety of ecosystems supports more than 420 animals and plants listed under the Endangered Species Act (ESA) and 3,250 other at-risk species.

To guide the management of each national forest, the Forest Service is required by law to prepare a land management plan (forest plan). Forest plans detail strategies to protect habitat and balance multiple forest uses to ensure the persistence of wildlife, including at-risk and federally protected species.

In April 2012, the Forest Service finalized regulations implementing the National Forest Management Act (NFMA). These regulations, commonly referred to as the “2012 Planning Rule,” established a process for developing and updating forest plans and set conservation requirements that the plans must meet to sustain and restore the diversity of ecosystems, plant and animal communities and at-risk species. NFMA established diversity as a primary concept in Forest Service planning and management. Federal courts have also identified the maintenance of diversity on national forests as a substantive standard the Forest Service must meet.

This guide provides a roadmap and recommendations for people inside and outside the Forest Service who are working on forest plan revisions and navigating the complex diversity requirements of the planning rule. It begins with a summary of the 2012 Planning Rule and its ecosystem and species conservation concepts, covers

the three phases of the planning process and offers recommendations for addressing these concepts and the requirements of the rule during each phase.

Defenders of Wildlife compiled this guide to offer the perspective of a conservation organization involved in the process. We are actively engaged in forest plan revisions on national forests across the country and serve on the 2012 Planning Rule Federal Advisory Committee. Recognizing the need for a reference focused exclusively on the conservation requirements of the rule, we decided to share information and insights we have gained.

Our intent is to add value to official agency policies on implementing the planning rule consistent with NFMA and the Final Agency Directives for Implementation of the 2012 Planning Rule published by the Forest Service in January 2015. While this guide may offer different approaches than those offered by the Forest Service, we believe our recommendations are consistent with agency policies governing forest planning.

References to regulatory requirements are provided throughout (abbreviated by omitting “36 C.F.R. §” as a preface). Visit www.defenders.org/forestplanning for additional resources, including a companion guide that addresses ecosystem and wildlife connectivity issues associated with the planning rule.

How to Use This Guide

If you are just becoming familiar with the 2012 Planning Rule, start with the background information (pages 5 to 9) and supplement with the rule itself and other resources associated with forest planning, many of which are available online at www.fs.usda.gov/planningrule. If you are already familiar with the planning rule, you can proceed directly to the sections on each planning phase and its specific requirements and issues.

THE 2012 FOREST PLANNING RULE

The 2012 Planning Rule (planning rule) is a federal regulation implementing NFMA (1600 U.S.C. § 1600 et seq.). NFMA was enacted in 1976 in large part to elevate the value of ecosystems, habitat and wildlife on our national forests to the same level as timber harvest and other uses. NFMA codified an important national priority: forest plans must provide for the diversity of habitat and animals found on national forests.

NFMA established a process for integrating the needs of wildlife with other multiple uses in forest plans. Most important, the law set a substantive threshold Forest Service management actions must comply with for sustaining the diversity of ecosystems, habitats, plants and animals on national forests. However, the law gave discretion to the Forest Service, through the development of forest planning regulations and forest plans, to define that threshold.

THE PLANNING PROCESS

According to NFMA, forest plans must be revised on a 15-year cycle. The planning rule provides a process for developing, revising or amending plans that is adaptive and science-based, engages the public and is designed to be efficient, effective and within the agency's ability to implement (77 Fed. Reg. 21162).

The rule establishes a three-phase planning process:

- 1. Assessment.** The assessment identifies and evaluates information relevant to the development of a forest plan. The assessment is used during plan revision to evaluate what needs to change in the current plan, including what is needed to meet the requirements of the planning rule.
- 2. Development.** During the plan development stage, the Forest Service develops and finalizes the forest plan and plan monitoring program. A draft proposal is developed and management alternatives are evaluated through the National Environmental Policy Act (42 U.S.C. § 4321 et seq.) (NEPA) process.
- 3. Implementation/monitoring.** After finalizing the forest plan, the agency begins to implement the plan, including the development and implementation of

management projects. Projects must be consistent with the forest plan and implementation of the plan must be evaluated through a monitoring program. Monitoring information is then evaluated to determine if aspects of the forest plan should be changed.

In addition, the Forest Service must use the best available scientific information to inform the planning process (219.3) throughout all three phases.

The planning rule describes these phases as iterative, complementary and sometimes overlapping. The intent is to provide a planning framework that is responsive to new information and changing conditions.

FOREST PLAN COMPONENTS

Forest plans guide subsequent project and activity decisions on Forest Service lands, which must be consistent with the forest plan. Forest plans do this through the use of plan components, the basic building blocks of the plans. Plan components (Table 1) shape implementation of the forest plan and are the means of meeting the requirements of the 2012 Planning Rule.

Two fundamental types of plan components are associated with the diversity requirements of the rule: landscape components and project components.

Landscape components relate to the vision and priorities for the plan area, a landscape larger than individual project areas. These components are outcome-oriented, describe how the Forest Service would like the plan area to look and function, and include desired conditions and objectives. Projects to be initiated under the forest plan are designed to contribute to achieving one or more of these outcomes. It is important that desired conditions and objectives be specific enough to establish a purpose and need for projects that will be designed to contribute to achieving them.

Project components pertain to how individual projects are designed and implemented under the forest plan. These components include standards, guidelines and suitability determinations that prohibit specific uses. They can preclude or regulate particular management options,

Table 1. Plan components under the 2012 Planning Rule

Plan Component	Description (219.7(e))
Desired Conditions (Landscape-level)	A description of specific social, economic and/or ecological characteristics of the plan area (or a portion of the plan area) toward which management of the land and resources should be directed. Desired conditions must be described in terms specific enough to allow progress toward their achievement to be determined, but do not include completion dates.
Objectives (Landscape-level)	A concise, measurable and time-specific statement of a desired rate of progress toward a desired condition or conditions. Objectives should be based on reasonably foreseeable budgets.
Standards (Project-level)	A mandatory constraint on project and activity decision-making established to help achieve or maintain the desired condition or conditions, to avoid or mitigate undesirable effects or to meet applicable legal requirements.
Guidelines (Project-level)	A constraint on project and activity decision-making that allows for departure from its terms as long as the purpose of the guideline is met. Guidelines are established to help achieve or maintain a desired condition or conditions, to avoid or mitigate undesirable effects or to meet applicable legal requirements.
Suitability of Lands (Project-level)	Specific lands within a plan area are identified as suitable for various multiple uses or activities based on the desired conditions applicable to those lands. The plan also identifies lands within the plan area as not suitable for uses that are not compatible with desired conditions for those lands.

dictate the outcome specifications for project areas, or establish procedures that must be followed in preparing projects. It is very important to note that project plan components, especially standards, are most useful where greater certainty is important, such as for meeting diversity requirements needed to protect at-risk species. Under the planning rule, every action proposed on Forest Service lands must comply with standards and guidelines, and may not occur on lands unsuitable for that action.

DIVERSITY

NFMA requires that the Forest Service's planning regulations shall "provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives" (16 U.S.C. § 1604(g)(3)(B)). This diversity requirement has been interpreted by the agency in the NFMA planning regulations and by the courts.

The Forest Service has interpreted the diversity requirement of NFMA through the development of the 2012 Planning Rule, which offers an approach to meeting the diversity requirement described in more detail in the next section on the ecosystem-species approach. A pivotal piece of the diversity interpretation is the persistence of individual species on national forest lands. Maintaining viable populations of native species is the scientifically accepted method of achieving the conceptual goal to maintain species diversity. According to a 1999 Committee of Scientists report commissioned for the purposes of forest

planning, "[d]iversity is sustained only when individual species persist; the goals of ensuring species viability and providing for diversity are inseparable" (Committee of Scientists 1999: 38).

Court interpretations of the diversity requirement of the rule include a ruling that the NFMA diversity mandate not only imposes a substantive standard on the Forest Service, it "confirms the Forest Service's duty to protect [all] wildlife" (*Seattle Audubon Society v. Moseley*, 1489). Courts have also recognized that the Forest Service's "statutory duty clearly requires protection of the entire biological community" (*Sierra Club v. Espy*, 364).

THE ECOSYSTEM-SPECIES APPROACH

Three overarching substantive requirements (Table 2) in the planning rule pertain to NFMA's diversity requirement:

1. Maintain or restore the ecological integrity of terrestrial and aquatic ecosystems (219.9(a)).
2. Maintain or restore the diversity of ecosystems and habitat types (219.9(a)).
3. Provide the ecological conditions necessary for at-risk species (219.9(b)).

The fundamental premise of the planning rule for meeting the NFMA diversity requirement is that plan components for ecosystem integrity and diversity will provide the ecological conditions to maintain the diversity of plant and animal communities and to support the persistence

Table 2. Ecological concepts and requirements of the 2012 Planning Rule¹

Ecological Concept	Definition and Requirement from the Planning Rule (219.9, if applicable)
Ecosystem	<i>Definition:</i> A spatially explicit, relatively homogeneous unit of the Earth that includes all interacting organisms and elements of the abiotic environment within its boundaries. An ecosystem is commonly described in terms of its composition, structure, function and connectivity. <i>Requirement:</i> The plan must include plan components, including standards or guidelines, to maintain or restore the diversity of ecosystems and habitat types throughout the plan area. In doing so, the plan must include plan components to maintain or restore key characteristics associated with terrestrial and aquatic ecosystem types, rare aquatic and terrestrial plant and animal communities, and the diversity of native tree species similar to that existing in the plan area.
Ecological Integrity	<i>Definition:</i> The quality or condition of an ecosystem when its dominant ecological characteristics (e.g., composition, structure, function, connectivity, species composition and diversity) occur within the natural range of variation and can withstand and recover from most perturbations imposed by natural environmental dynamics or human influence. <i>Requirement:</i> The plan must include plan components, including standards or guidelines, to maintain or restore the ecological integrity of terrestrial and aquatic ecosystems and watersheds in the plan area, including plan components to maintain or restore their structure, function, composition and connectivity.
At-risk Species ▪ Threatened and Endangered ▪ Candidate and Proposed ▪ Species of Conservation Concern	<i>Definition:</i> Threatened and endangered species are federally listed under the ESA; proposed and candidate species have been either formally proposed or are being formally considered for listing under the ESA. Species of conservation concern are species for which the regional forester has determined that the best available science indicates substantial concerns over the species' capability to persist over the long-term in the plan area. <i>Requirement:</i> The responsible official shall determine whether or not the (ecosystem) plan components provide the ecological conditions necessary to: contribute to the recovery of federally listed threatened and endangered species, conserve proposed and candidate species, and maintain a viable population of each species of conservation concern within the plan area. If the responsible official determines that the (ecosystem) plan components are insufficient to provide such ecological conditions, then additional, species-specific plan components, including standards or guidelines, must be included in the plan to provide such ecological conditions in the plan area.
Ecological Conditions	<i>Definition:</i> The biological and physical environment that can affect the diversity of plant and animal communities, the persistence of native species and the productive capacity of ecological systems. Ecological conditions include habitat and other influences on species and the environment, e.g., the abundance and distribution of aquatic and terrestrial habitats, connectivity, roads and other structural developments, human uses and invasive species.
Viable Population	<i>Definition:</i> A population of a species that continues to persist over the long term with sufficient distribution to be resilient and adaptable to stressors and likely future environments.
Focal Species	<i>Definition:</i> A small subset of species whose status permits inference to the integrity of the larger ecological system to which it belongs and provides meaningful information regarding the effectiveness of the plan in maintaining or restoring the ecological conditions to maintain the diversity of plant and animal communities in the plan area. Focal species would be commonly selected on the basis of their functional role in ecosystems.

1. Ecological “conditions” are defined broadly to include human structures and uses, while “ecological integrity” stresses dominant “characteristics” that suggest natural conditions and should not include human structures and uses. The term “key ecosystem characteristics” is commonly used in discussions of ecological integrity, but should not be understood to apply to human structures and uses in that context. Human structures and uses are nevertheless relevant to species viability and persistence, and therefore to diversity.

of most (but not all) native species in a plan area (219.9). To meet the rule's requirements for at-risk species (which include federally listed threatened and endangered species, proposed and candidate species, and species of conservation concern (SCC)), additional "species-specific" plan components may be necessary. The rule's two-tiered conservation approach (alternatively called the "ecosystem-species" or "coarse-fine filter" planning method) relies on the use of surrogate measures, or key characteristics, to represent the condition of ecosystems, as well as the identification of at-risk species and evaluation of whether those species will be sustained through ecosystem-level plan components or whether they require specific management attention in the form of species-level plan components.

At the ecosystem scale, the rule requires forest plans to have plan components to maintain or restore the integrity of the terrestrial and aquatic ecosystems in the plan area (219.9(a)(1)) and the diversity of ecosystems and habitat types throughout the plan area (219.9(a)(2)). Essentially this requires forest plans to maintain or restore the variety of ecosystems and habitat types found on the forests (e.g., conifer forests, wetlands, grasslands), as well as the condition of the ecosystems themselves. If the ecosystem-scale plan components are not sufficient to provide ecological conditions (i.e., meet the conservation needs) for at-risk species, additional plan components to do so are required

(219.9(b)(1)). In some cases, the Forest Service may determine that it is beyond its authority or "not within the inherent capability of the plan area" to provide those conservation conditions and thus other requirements apply (219.9(b)(2)).

The rule's approach to conservation planning relies on the use of key characteristics in assessment, planning and monitoring to represent the condition of ecosystems. It will be necessary for forest plans to identify key characteristics of ecosystem connectivity, structure, function and composition (Table 3).

The concept of ecosystem integrity is used to represent the condition of an ecosystem. When its key ecosystem characteristics occur within the natural range of variation (NRV), an ecosystem is considered to have integrity (219.19). NRV can be thought of as a reference condition reflecting "natural" conditions that can be estimated using information from historical reference ecosystems or by other science-based methods. For example, some present forest ecosystems have deficits of old-growth trees, compared to historical abundances, and would therefore be considered as having diminished integrity for that key characteristic. The 2012 Planning Rule directs the Forest Service to manage key characteristics in light of these reference conditions, for the purpose of sustaining ecosystems and wildlife. Example A, from the San Juan National Forest plan revision (final,

Table 3. The use of key characteristics in forest planning

Ecosystem Character	Definition (219.19)	Examples of Key Characteristics
Composition	The biological elements within the different levels of biological organization, from genes and species to communities and ecosystems.	A description of major vegetation types, patches, habitat types, soil types, landforms and wildlife populations.
Structure	The organization and physical arrangement of biological elements such as snags and down woody debris, vertical and horizontal distribution of vegetation, stream habitat complexity, landscape pattern and connectivity.	Arrangement of patches within a landscape, habitat types within a forest, trees within a forest stand, wildlife within a planning area.
Function	Ecological processes that sustain composition and structure such as energy flow, nutrient cycling and retention; soil development and retention; predation and herbivory; and natural disturbances such as wind, fire and floods.	Types, frequencies, severities, patch sizes, extent and spatial pattern of disturbances such as fires, landslides, floods and insect and disease outbreaks.
Connectivity	Ecological conditions that exist at several spatial and temporal scales that provide landscape linkages that permit the exchange of flow, sediments and nutrients; the daily and seasonal movements of animals within home ranges; the dispersal and genetic interchange between populations; and the long-distance range shifts of species, such as in response to climate change.	Structural: size, number and spatial relationship between habitat patches, mapped landscape linkages and corridors. Functional: measure of ability of native species to move throughout the planning area and cross into adjacent areas.

2013), illustrates plan components, in this case desired conditions for vegetation type, based on estimates of the historic range of variation.

The 2012 Planning Rule recognizes that managing selected ecosystem characteristics for the diversity and integrity of ecosystems may not sustain populations of all native plant and animal species. The rule therefore requires species-specific plan components, if necessary, to provide the ecological conditions necessary to meet the various conservation requirements for individual at-risk species (219.9(b)). Ecological conditions are not just the biophysical ecosystem and habitat features that the species needs to persist over time, but also other influences on species persistence, including human uses, invasive species and structural developments such as roads.

To meet the requirements for the three types of at-risk species, forest plans must provide the ecological conditions necessary to (219.9(b)):

- Contribute to the recovery of federally threatened and endangered species.
- Conserve federally proposed and candidate species.
- Maintain a viable population of each SCC within the plan area or, if that is not possible, contribute to maintaining a viable population of that species within its range.

According to the planning rule, if the ecosystem plan components do not meet the applicable requirements for one of these at-risk species, the forest plan must include additional plan components specific to the needs of that species. Together, the ecosystem plan components and the species-specific plan components should provide ecological conditions to meet the NFMA requirement for diversity of plant and animal communities.

To evaluate the effectiveness of the plan in meeting the diversity requirements, the rule also includes requirements for using focal species in the monitoring program (219.12(a)(5)(iii)).

Example A. Desired vegetation conditions derived from historic reference conditions

Conditions for Development Stages on the San Juan National Forest				
Vegetation Type	Development Stage	Current Condition (% of vegetation type)	Historic Range of Variation (% of vegetation type)	Desired Condition (% of vegetation type)
Spruce-fir forest	Young	2	0-45	10-20
	Mid-open	4	5-47	10-15
	Mid-closed	3	5-47	10-15
	Mature-open	15	-	15-20
	Mature-closed	77	-	15-20
	Old growth*	26.5	-	25-35
Cool-moist mixed conifer forest	Young	0	1-36	10-20
	Mid-open	1	8-49	10-15
	Mid-closed	5	8-49	10-15
	Mature-open	7	-	15-20
	Mature-closed	87	-	15-20
	Old growth	17	-	20-30
Warm-dry mixed conifer forest	Young	0	1-10	5-10
	Mid-open	1	5-14	5-10
	Mid-closed	6	5-14	5-10
	Mature-open	11	-	35-45
	Mature-closed	82	-	15-25
	Old growth	13.1	-	20-30
Ponderosa pine forest	Young	0	1-14	5-10
	Mid-open	3	4-14	5-10
	Mid-closed	2	4-14	5-10
	Mature-open	42	-	40-60
	Mature-closed	53	-	15-25
	Old growth	4.3	-	10-15
Aspen forest	Young	10	1-55	15-25
	Mid-open	3	4-55	10-15
	Mid-closed	19	4-55	15-20
	Mature-open	7	35-86	25-30
	Mature-closed	61	35-86	25-30
	Old growth	4.3	-	5-15

* Old growth inclusions may be found in various habitat structural stages within each vegetation type.

Source: San Juan Public Lands 2013: Vol. 2, 26, Table 2.2.1

THE ASSESSMENT PHASE

Assessments are the basis for developing forest plan components. During the assessment phase, the Forest Service collects and evaluates ecological information to develop plan components associated with ecosystem diversity, integrity and species persistence. Assessments evaluate conditions and trends for ecosystems and species in the context of a broader landscape (219.5(a)(1)). They are used during plan revision to determine if changes to the existing plan are needed and to inform the development of plan components (219.7(c)(2)).

An assessment is also used to guide the development of the monitoring program (219.5(a)(3)). A monitoring evaluation report must in turn be used to “inform adaptive management of the plan area” (219.12(d)(2)). The assessment should therefore be developed with adaptive management in mind—by identifying assumptions associated with ecosystem integrity or species persistence that could be tested during plan implementation and monitoring, for example. The assessment should also identify missing information so that it can be collected and evaluated later to determine if the plan components need to change. The assessment report must document that missing information (219.6(a)(3)) and address other key considerations (Table 4).

ASSESSING CLIMATE CHANGE

Section 219.5(a)(1) provides direction on how to evaluate the information compiled during the assessment about “trends, and their sustainability and their relationship to the land-management plan within the context of the broader landscape.” This provision requires the Forest Service to evaluate “existing and possible future conditions and trends of the plan area.” Section 219.6(b)(3) requires the assessment to identify and evaluate information regarding “the ability of terrestrial and aquatic ecosystems on the plan area to adapt to change.” It is therefore critically important that the assessment consider possible future scenarios for climate change and other so-called “system drivers” and identify those most likely to occur based on the best available scientific information. That information should be incorporated into projections

for ecosystem and species sustainability, so that the revised forest plan and plan components can address the vulnerability and sustainability of ecosystems and species under probable climate-change scenarios.

DIVERSITY ASSESSMENT STEPS

STEP 1: Identify target species.

While the planning rule addresses individual species at the end of the diversity section, to improve the effectiveness of ecosystem plan components in meeting the needs of individual species and to generally improve the efficiency of the planning process, we strongly recommend that the “coarse filter” conservation strategy be designed with selected species in mind. Consequently, the first factor that should be considered in assessing diversity is the set of target species for the forest plan. Specifically, the habitat and other ecological needs of some individual species should be an important consideration in defining ecosystems and selecting their key characteristics.

Target species would be selected from three categories, each one representing different levels of responsible official authority and discretion for inclusion:

1. Federally threatened, endangered, proposed and candidate species and SCC identified pursuant to 219.9(b).
2. Focal species selected pursuant to 219.12(a)(5)(iii).
3. Public interest species (species commonly enjoyed and used by the public) selected pursuant to 219.10(a)(5).

Public interest species are chosen entirely at the discretion of the responsible official (219.10(a)(5)). They can be included in the assessment as ecosystem services (219.6(b)(7)) or multiple uses (219.6(b)(8)), but their requirements for ecological conditions may overlap those of at-risk species, and they should be integrated into the assessment of diversity factors.

Focal species are also determined by the responsible official. However, they must meet the requirements spelled out in the planning rule definition (219.19).

Table 4. Assessment process checklist

✓	Assessments are the best opportunity to contribute ecological information for use in the planning process. This is especially important in cases where this information could help resolve uncertainty. Information from both governmental and nongovernmental sources must be identified and considered.
✓	Assessments should be done rapidly (219.5(a)(1)); expected turnaround is about six months (77 Fed. Reg. 21199). Consequently, assessments are only required to consider existing information rather than undertaking research to gather new data.
✓	Assessments must consider information from studies, monitoring reports, plans, other assessments and documents (219.6(a)(1)). Assessments should also include the review of the conservation planning and land-use policies of other entities required by 219.4(b)(2).
✓	Assessments must take the broader landscape into account in evaluating ecological integrity (219.8(a)(ii)-(iii)). To support the development of species plan components, they must look beyond the plan area to determine how the plan can contribute to the recovery of listed species, conserve proposed and candidate species and help maintain viable populations of some species of conservation concern (219.9(b)).
✓	The assessment should consider the results of prior monitoring of the existing plan. The assessment report should include a summary of what was learned from that monitoring, focusing on the effects of existing plan components.
✓	The assessment must be informed by the best available scientific information (219.3, 219.6(a)(3)). The assessment report must document which information is the most accurate, reliable and relevant to the issues considered, the basis for that determination and relevant information needs (219.6(a)(3)).

Federally recognized species (endangered, threatened, proposed, candidate) must be identified through coordination with the ESA consulting agencies required during the assessment by 219.4. Any that “may be present” in the plan area must be addressed by plan components in accordance with 50 C.F.R. § 402.12 and should be included as target species.

This initial assessment step is an ideal opportunity for the consulting agencies to begin contributing information that may be used to design the forest plan. These early contributions to a forest plan by the consulting agencies can help streamline the Section 7(a)(2) consultation process for the plan and increase the likelihood of contributing to recovery of listed species and avoiding listing of proposed and candidate species under Section 7(a)(1) of the ESA (16 U.S.C. §§ 1536(a)(1)-(2)).

While the responsible official for most forest planning decisions is the supervisor of the national forest, identifying SCC is the responsibility of the regional forester (219.7(c)(3)). It is part of the “process for plan development or revision,” but the rule does not specify when during the process it should occur.

The regional forester should identify SCC early enough that integrating them into the assessment, including the identification of key ecosystem characteristics, does not delay the assessment process.

The rule contains only two criteria the regional forester can use to identify SCC (219.9(c)):

- The species must be known to occur in the plan area.
- The best available scientific information indicates substantial concern about the long-term persistence capability of the species in the plan area.

The responsible official does not have the discretion to exclude species the regional forester has found meet these regulatory criteria.

Our interpretation is that it is the role of the responsible official to provide the regional forester with information about species occurrence and capability to persist in the plan area and to identify “potential” SCC.² Species with recent occurrence records can be excluded if the best available science indicates they are accidental occurrences.

For some species, range-wide viability risk has already been reliably determined using the best available scientific information. Under our interpretation of the rule, these species should be identified as SCC if they are known to occur in the plan area based on the ecological principle that a species at-risk range-wide is necessarily at-risk wherever it is found.

Under the ESA, species with positive “90-day findings” demonstrate a concern for range-wide viability based on the five factors for making listing decisions for species

2. The term “potential” SCC is used in the rule as a requirement for assessments, but is not defined (219.6(b)(5)). It should apply to any species that *may* meet the two criteria in 219.19(c). The assessment should include relevant information about the status and trend of all species considered for SCC so that the regional forester can review it and use it in making the decision.

or distinct population segments.³ In our opinion, these species should be identified as SCC. In addition, recently delisted species that may be considered for relisting by the consulting agencies are also considered at-risk and should be included.

Other less familiar species that have not triggered ESA petitions or processes may also be facing range-wide risks to viability. NatureServe has designed an independent process that reviews the extinction risk of species throughout their ranges based on factors addressing rarity, trends and threats.⁴ In this scheme, species are “vulnerable” and not “secure,” if they are at moderate risk of extinction or elimination due to a restricted range, relatively few populations or occurrences, recent and widespread declines or other factors.

To ensure a comprehensive protection of viability for all species in a plan area, plan components should provide necessary ecological conditions for species that are classified under the NatureServe system as critically imperiled, imperiled or vulnerable globally or nationally (G/N/T 1-3). NatureServe S1 and S2 (state) rankings should be included as well, because it stands to reason that a species imperiled at the state level would raise similar concerns for its viability on Forest Service lands within that state.

The regional forester should also include species listed as sensitive by the Forest Service. A sensitive species is a “plant or animal species identified by a regional forester for which population viability is a concern” due to significant current or predicted downward trends in population numbers or density, or habitat capability (FSM 2670.5). If a sensitive species is known to occur in a plan area, it should therefore be identified as an SCC for that area. State or tribal sensitive species lists should also be considered.

There may also be concerns about risks to persistence for other species known to occur in a plan area. Thus we strongly recommend that forest planners cast a wide net to ensure that all potential at-risk species are at least considered for attention in the planning process. Existing information for potential SCC from any source (including indigenous knowledge (219.4(a)(3)) or anecdotal information) should be provided to the responsible official or the regional forester and reviewed for relevance to this determination. The regional forester should evaluate any suggested potential species against the criteria in 219.9(c) on request.

If the information about a species’ abundance, distribution, threats, trends or response to management indicates that the species may not continue to persist over the long term in the plan area with a sufficient distribution to be resilient, the regional forester must either select it as an SCC or document the rationale for finding it does not meet the SCC criteria. When credible organizations express concern for a species, the burden should be on the Forest Service to demonstrate that the species is secure in the plan area. Species considered as potential SCC but not meeting the criteria in 219.9(c) may be selected as public interest species or focal species.

It is not appropriate under the planning rule to determine that a species is secure in the plan area simply because the Forest Service chooses to minimize impacts on the species. That calculus plays into the viability determination for a proposed plan (i.e., a finding that the forest plan sufficiently protects the species) rather than the preliminary identification of SCC.

Existing information relevant to the plan area for potential SCC must be part of the assessment (219.6(b)(5)). This includes the information compiled by the responsible official that is applicable to the criteria for identification of SCC. The assessment should also document the application of best available science concerning the SCC and any uncertainty associated with the inclusion or exclusion of SCC that should be addressed in the monitoring program (219.12(a)(4)(i)).

To develop a more effective and efficient SCC planning and monitoring program, we strongly recommend that the regional forester compile information about the ecological conditions necessary to comply with 219.9(b) for each species during the process of determining if it is at-risk in the plan area. This information should include ecosystem composition, structure, function and connectivity, the most important habitat elements for each species and limiting factors or threats to those elements that may be influenced by plan components. This information

It is not appropriate under the planning rule to determine that a species is secure in the plan area simply because the Forest Service chooses to minimize impacts on the species.

3. Listing factors include: 1) the present or threatened destruction, modification or curtailment of its habitat or range; 2) overutilization for commercial, recreational, scientific, or educational purposes; 3) disease or predation; 4) the inadequacy of existing regulatory mechanisms to conserve the species; and 5) other natural or anthropogenic factors affecting its continued existence.

4. See <http://explorer.natureserve.org/ranking.htm>.

should be largely applicable to a species that occurs across multiple plan areas and relevant to broader scale monitoring strategies (219.12(b)).

Identification of SCC by the regional forester is a preliminary planning step. It involves applying regulatory criteria to species in the plan area based on best available scientific information. Identifying SCCs requires the exercise of professional judgment, but permits no discretion. In our opinion, it is appropriate and necessary for this determination to occur prior to most of the assessment process. However, selection of SCC may be revisited throughout the planning process as required by new information applicable to the two criteria in 219.9(c) and would not become final until the forest plan is approved.

The rule only discusses focal species in conjunction with the plan monitoring program developed by the responsible official (219.12(a)(5)(iii)). However, the purposes of a focal species are to permit “inference to the integrity of the larger ecological system to which it belongs” and to provide “meaningful information regarding the effectiveness of the plan in maintaining or restoring the ecological conditions to maintain the diversity of plant and animal communities in the plan area” (219.19). Therefore we strongly recommend that focal species be part of the overall strategy for identifying at-risk species and key ecosystem characteristics, and recommend that the regional forester play a role in identifying focal species as well as SCC. It is also important to note that effective monitoring may require that some SCCs be selected as focal species.

STEP 2: Identify land units.

The planning rule specifies evaluating the integrity of three kinds of land units: 1) terrestrial ecosystems and watersheds; 2) aquatic ecosystems and watersheds; 3) riparian areas. It also requires an evaluation of the diversity of ecosystems and habitat types.

Ecosystems are defined by ecological features rather than political or administrative boundaries. The evaluation of ecological integrity and species viability requires an understanding of the broader landscape influencing and influenced by the ecosystems in the plan area. Consequently, selected ecosystems must include portions of the plan area but are likely to extend beyond it (see definition of “landscape” in 219.19).

The choice of ecosystems should consider the appropriate scale for assessing and planning for ecosystem characteristics. The rule allows planning at the most appropriate scale to address issues and resource concerns specific to a plan area (77 Fed. Reg. 21191), and these planning topics should be identified early in the assessment process. The scale for evaluating ecosystem integrity should recognize

the scale of dominant disturbance regimes. To describe the relative contribution of the plan area to ecological sustainability, ecosystems may also need to be delineated at a broader scale. Nested ecosystems at multiple scales may

need to be identified. We strongly recommend that the assessment include maps identifying the various ecosystem units that will be used in the planning process.

The rule also states that plans must include plan components to maintain or restore the ecological integrity of riparian areas (219.8(a)(3)) and identify riparian management zones where riparian-dependent resources receive primary emphasis (219.19). The assessment must therefore identify riparian areas, which may include parts of both terrestrial and aquatic ecosystems (219.19). To comply with the requirements for riparian areas in the plan, the assessment then must also address the seven factors listed in 219.8(a)(3)(i) for riparian areas, including “aquatic and terrestrial habitats,” “ecological connectivity” and widths of potential riparian zones (219.8(a)(3)(ii)).

To facilitate planning across unit and jurisdictional boundaries, we strongly recommend that regional foresters take the lead in identifying ecosystems and watersheds in coordination with states and other entities operating at a broad scale. Consistent use of ecosystems for planning will also facilitate the regional forester’s identification of SCC and lead to better and more efficient broader-scale monitoring of ecosystems and wildlife.

STEP 3: Identify key ecosystem characteristics and ecological conditions necessary for at-risk species.

During the assessment phase, the planning rule requires the Forest Service to identify and evaluate 15 categories of existing information relevant to the plan area (219.6(b)). The categories that relate most directly to diversity include:

1. Terrestrial ecosystems, aquatic ecosystems and watersheds (219.6(b)(1)).
2. System drivers, including dominant ecological processes and stressors and the ability of ecosystems to adapt to change (219.6(b)(3)).
3. Threatened, endangered, proposed and candidate species and potential SCC (219.6(b)(5)).

The assessment process must identify relevant information on attributes of ecosystem diversity, ecological integrity and species persistence. An ecosystem attribute is a

Ecosystems are defined by ecological features rather than political or administrative boundaries.

Table 5. Diversity requirements and types of ecological information

Rule Requirement	Information Type
Ecosystem and Habitat Type Diversity (219.(a)(2))	▪ Key characteristics of terrestrial and aquatic ecosystem types ▪ Rare aquatic and terrestrial plant and animal communities ▪ Diversity of native tree species
Ecosystem Integrity (219.(a)(1))	▪ Composition ▪ Structure ▪ Function ▪ Connectivity ▪ Species composition and diversity ▪ Focal species
Species Persistence (219.(b))	Ecological conditions necessary to: 1. Contribute to recovery of each threatened and endangered species. 2. Conserve each proposed and candidate species. 3. Maintain a viable population of each species of conservation concern in the plan area.

measurable characteristic that serves as an indicator of the condition of that ecosystem, such as overstory canopy closure, number of large dead trees, degree of habitat fragmentation within an ecosystem or the distribution of a species.

Other attributes are associated with the ecological conditions necessary for the persistence of at-risk species. Ecological conditions include “habitat and other influences on species and the environment,” including structural developments and human uses (219.19). It is critical that the assessment identify the specific ecological conditions most relevant and useful for developing plan components that meet the diversity requirements of the rule.

It is very important that the assessment carefully consider human structures and uses as an attribute of ecological conditions. Identification of these ecological conditions during the assessment is necessary to provide a basis for plan components that manage human structures and uses. In most cases, roads and their use are likely to be the predominant direct human influence on diversity in the plan area, so information concerning the impact of roads on species persistence should be incorporated into the assessment.

There will be overlap between biophysical ecosystem characteristics and ecological conditions necessary

for at-risk species. The ecosystem and species-based ecological attributes identified are then considered in the development of plan components and the monitoring program (Table 5).

The suitability of habitat for at-risk species cannot be divorced from the spatial distribution of that habitat. The rule does not directly address the landscape pattern of ecosystems and patches, but these patterns are inherent to the concepts of ecosystem and landscape composition, structure, function and, especially, connectivity. The spatial arrangement, size, shape, number and kind of patches determine the structure of a landscape. Consequently, it is of paramount importance that the assessment identifies appropriate patch metrics as key ecosystem characteristics for at-risk species.

The species composition and diversity aspects of ecological integrity should be addressed by identifying the necessary ecological conditions for the at-risk species identified in Step 1 of this section (219.9(b)). Amount, quality, distribution and connectivity of habitat should be included among these conditions. The nature of the relationship between these attributes and the actual condition of the species should be documented so that this fundamental relationship can be tested as a “relevant assumption” under the monitoring program (219.12(a)(2)).

During the planning phase, the responsible official must determine whether the likely future ecological conditions under the plan will maintain a viable population of SCC in the plan area that will persist over the long term with sufficient distribution to be resilient and adaptable to stressors and likely future environments (219.19). It is therefore critical that the assessment address species population distributions as key ecosystem characteristics.

STEP 4: Identify key areas that support target species.

For many species, some places within the plan area will be more important than others. These places may serve as source habitat, secure habitat, breeding grounds or strongholds that export individuals or may be areas where survival and successful reproduction are more challenging. Similarly, some portions of the planning area may provide connectivity between populations or source habitats. It is vital that the assessment pinpoint these areas of high-value to at-risk species so that plan components can be developed with the benefit of this information.

The assessment must also recognize the relative importance of different areas at scales appropriate to each species. The assessment must identify the relative contribution of the plan area to range-wide species persistence to be able to invoke the provisions of 219.9(b)(2), which describes how

the agency should contribute to the persistence of certain types of species. The assessment should identify specific ecosystems, watersheds or sites that provide relatively high-quality habitat for a target species in the plan area. Providing this context for developing plan components may indicate that species diversity or viability depends on more protective management of portions of the plan area or of the plan area as a whole relative to other areas.

STEP 5: Evaluate the conditions and trends.

For each of the key ecosystem characteristics and ecological conditions for at-risk species, the assessment should 1) identify existing relevant information and 2) evaluate that information (219.6(b)). A key purpose is to identify the causes of trends in the attributes and to distinguish areas important to at-risk species if conditions and trends for such areas differ.

For each attribute, this evaluation should answer seven questions that address conditions, trends and sustainability and their relationship to the land management plan (219.5(a)(1)):

1. What was the historic condition (when such information exists)?

2. What is the current condition?
3. What are the relevant drivers and stressors of these conditions?
4. How has management of the plan area contributed to the current condition?
5. What scenario is most likely for future drivers and stressors, including climate change?
6. What will the future trend be as a result of those drivers and stressors?
7. What will the likely future condition be managing under the current plan?

Section 219.5 imposes a requirement to “assess the sustainability of social, economic, and ecological systems” Ecological sustainability “refers to the capability of ecosystems to maintain ecological integrity.” Therefore, the final question about expected future ecological integrity considers all of the key ecosystem characteristics. All of these conditions, trends and findings about sustainability are then used to determine what changes are needed in the existing forest plan.

THE PLANNING PHASE

The planning phase includes plan development, plan amendment and plan revision (219.5(a)(2)). This section primarily covers the plan development or revision process. It specifically focuses on the need to change an existing plan based on the assessment and the development of plan components that satisfy the diversity requirements of the planning rule.

NEED FOR CHANGE

The planning phase for forest plan revision begins with a “review of the relevant information from the assessment and monitoring to identify a preliminary need to change the existing plan and to inform the development of plan components and other plan content” (219.7(c)(2)(i)). The development of plan components specifically relies on the assessment to identify the presence and importance of resources in the plan area (the key ecosystem characteristics) (iii) and conditions, trends and stressors (iv). A need for change should also be based on existing plan components and their effectiveness, effects and role in the trend and status of key ecosystem characteristics and conditions for at-risk species.

ECOSYSTEM OR SPECIES PLAN COMPONENTS?

The combination of ecosystem and species-specific plan components must provide ecological conditions necessary for at-risk species. Given the importance of meeting this legal requirement, we strongly recommend that the early steps of the planning process focus on how to accomplish this.

Ecosystem plan components are intended to maintain or restore the structure, function, composition and connectivity of ecosystems or watersheds and the diversity of ecosystems and habitat types (219.9(a)). Ecosystem components are generally those that describe biological conditions at the scale of the selected ecosystems. It is often appropriate to include them as desired conditions and objectives, i.e., as landscape plan components.

The only distinguishing characteristic of species-specific plan components in the planning rule is that they are designed for species not otherwise fully provided for by ecosystem plan components. Species-specific components may tend to be project components: standards and

guidelines that provide mitigation for certain activities known to cause adverse effects on the species or its habitat. They may also be desired conditions for species populations or for conditions at a finer scale relevant to a species’ conservation needs. Plan components to address ecological conditions related to human uses and structures may also tend to be directed at the needs of specific species.

The distinction between ecosystem and species-specific plan components is not particularly useful to make, because it is the combination of ecosystem and species-specific plan components that must meet the species requirements of 219.9(b). Although the rule describes these components as if they are developed as successive steps, an approach to plan-component development that is more integrated than iterative is likely to be more efficient, more effective at meeting diversity requirements and less controversial.

A “coarse filter” conservation strategy that relies heavily on ecosystem plan components is appealing because of the apparent efficiency of addressing multiple species in an integrated manner, and because it can be developed using familiar available metrics such as those describing vegetation attributes. However, a single, generalized characterization of habitat is unlikely to provide a reliable basis for multi-species conservation efforts (Cushman et al. 2008). Reliance on habitat or ecosystem characteristics can be expected to conserve a species only if certain assumptions are met:

- The selected characteristics are adequate as surrogates for the species.
- The selected characteristics include those threatening the persistence of the species.
- The spatial resolution of the “coarse filter” matches the scale at which the species responds to environmental heterogeneity (Noon 2003).

The likelihood of these assumptions being valid for most species is low (Noon 2003). Therefore some at-risk species are likely to require species-specific plan components.

The “coarse filter” approach is more defensible as a primary conservation strategy for at-risk species if a robust set of plan components is explicitly developed

with an understanding of the specific conservation needs of those species. The process of developing plan components is more efficient if it generally moves from components that will benefit the most species to those that are most specific to individual species rather than first focusing on ecosystems independent of species. Grouping or organizing at-risk species around key ecosystem characteristics or ecological conditions facilitates development of plan components that are the same or similar for groups of species.

PLAN COMPONENTS FOR DIVERSITY

The key to a successful forest plan conservation strategy for at-risk species lies in the intelligent and specific design of the plan area landscape. Therefore, we recommend that the first plan components developed are the desired conditions for the key characteristics of each ecosystem and ecological conditions for at-risk species. Other plan components for diversity can then be objectives for achieving those desired conditions, desired conditions at a finer scale or project components. Example B, from the

Example B. Species conservation strategies

Threatened and Endangered Species, Associated Ecological Systems and Objectives		
Species	Ecosystem	Forest Plan Objectives
Red-cockaded woodpecker	All pine dominated ecological systems occurring on the Bienville, Chickasawhay, De Soto, and Homochitto National Forests.	Improve structural condition to create open canopy conditions in mature and old-growth pine forests and woodlands with 1- to 3-year fire intervals. Improve structural condition to create open canopy conditions in mature and old-growth pine forests and woodlands and maintain an understory by fire.
Gopher tortoise	Upland longleaf pine forest and woodland and the embedded xeric sandhills.	Restore and improve canopy conditions on priority soils and surrounding areas to the acreage with 1- to 3-year fire intervals.
Mississippi sandhill crane	Wet Pine Savanna	Restore near-coast pine flatwoods to an open condition.
Dusky gopher frog	All pine dominated ecological systems and ponds and emergent wetlands occurring on the De Soto National Forest.	Restore and improve canopy conditions and conversion to appropriate ecological system with 1- to 3-year fire intervals and management of embedded ponds and emergent wetlands.
Indiana bat	Floodplain, riparian, lowland, and upland ecosystems and ponds and emergent wetlands occurring on the Holly Springs Ranger District.	Manage naturally occurring tree species composition to provide a continuous supply of suitable roost trees and foraging habitat for Indiana bats. Achieve vegetative diversity that maintains or improves Indiana bats habitat. Where consistent with management prescription emphasis, use a variety of silvicultural methods to create desired age class diversity.
Louisiana black bear	Lower Mississippi River bottomland and floodplain forest and embedded cypress dominated wetlands.	Manage and improve species composition of ecological system and management of embedded cypress dominated wetlands.
Pallid sturgeon	Rivers and streams	Improve stream habitat, stream channel habitat and watersheds.
Gulf sturgeon	Rivers and streams	Improve stream habitat, stream channel habitat and watersheds.
Louisiana quillwort	Rivers and streams	Improve stream habitat, stream channel habitat and watersheds.
Pondberry	Lower Mississippi River bottomland and floodplain forest.	Manage and improve species composition of ecological system.

Source: Mississippi National Forests 2014: 60, Table 4

final revised plan for Mississippi National Forests (final, 2014), provides a format for beginning the development of plan components for at-risk species. The “objectives” are actually a mixture of goals, desired conditions and objectives that can be used as a basis for developing a full set of plan components (ecosystem or species components) necessary for the species in each ecosystem.

It is very important to note that desired conditions within a plan area must not work against each other and must be mutually achievable. In addition, all of the

other plan components must be based on desired conditions and must be integrated with each other.⁵ That means, for example, that a plan component for livestock forage must be consistent with the desired condition for fish habitat.

There should also be desired conditions for diversity of ecosystems and habitat types. Example C, also from the final revised plan for Mississippi National Forests, is a model of how to portray desired conditions for ecosystem diversity across a plan area.

Example C. Desired conditions for ecosystem diversity

Desired Percent of Ecological Systems by Unit on the National Forests in Mississippi									
Desired Percent of Ecological System by Unit									
Ecological System	Bienville	Chickasawhay	De Soto	Homochitto	Delta	Holly Springs	Yalobusha	Ackerman	Trace
Upland Longleaf Pine Forest and Woodland	20-30	65-73	64-74	69-78					
Shortleaf Pine-Oak Forest and Woodland	5-15					34-52	34-52	30-47	28-43
Loblolly Pine Forest	0-5	0-5	0-5	0-5		0-5	0-5	0-5	0-5
Southern Loblolly-Hardwood Flatwoods	35-45								
Slash Pine Forest		0-5	1-7				0	0	0
Northern Dry Upland Hardwood Forest						34-51	34-52	30-46	28-43
Southern Dry Upland Hardwood Forest	0-5	0-5	0-5	3-12					
Southern Loess Bluff Forest				3-10					
Southern Mesic Slope Forest	5-15	0-5	1-8	2-10					
Northern Mesic Hardwood Forest						6-13	1-8	6-12	18-24
Floodplain Forest	10-20	23-32	12-20	9-16		6-13	11-18	16-22	7-13
Lower Mississippi River Bottomland and Floodplain Forest					100				
Near-Coast Pine Flatwoods			3-9						
Wet Pine Savanna			0.6-7						

Source: Mississippi National Forests 2014: 12, Table 2

5. See NFMA Section 6(f)(1) (16 U.S.C. § 1604(f)(1)), which requires “one integrated plan,” as described in 219.1(b) and 219.2(b) in the rule. The rule describes all of the other required plan components in terms of the desired condition in 219.7(e).

Within an ecosystem or watershed, it is critical to develop desired conditions for one or more key ecosystem characteristics in each of the categories of dominant conditions for ecological integrity (composition, structure, function, connectivity, species composition and diversity) (219.19). Ecological function may tend to be overlooked due to challenges of measurement and a preference for other more common attributes, but for fire-dependent ecosystems desired conditions for fire return interval or severity or fire regime condition class should be considered.

We understand that there may be an inclination to focus the development of desired conditions on the best-documented characteristics of vegetation, such as dominant tree species or size class. This approach may be sufficient for common species or for at-risk species with a key stressor related to these characteristics, but it is extremely important that the desired conditions include key ecosystem characteristics that would benefit most at-risk species. Most important, the desired levels of the selected desired conditions should be based on the best available scientific information about the habitat needs of at-risk species.

Most important, the desired levels of the selected desired conditions should be based on the best available scientific information about the habitat needs of at-risk species.

Whenever the need is identified, species-specific plan components can then be developed for the different types of plan components: *desired conditions*, *objectives* and *standards* or *guidelines*. (The procedures for developing these components are described in the section on “Evaluating Diversity,” beginning on page 26.)

For northern goshawks in the Southwest, for example, the Forest Service identified specific desired conditions for canopy cover in three different areas used by the goshawks (Ecological Sustainability Work Group 2008):

- Nesting areas: mature and old mixed conifer forest will have a canopy cover of between 50 and 70 percent with mid-aged trees of 200-300 years old.
- Post-fledging family areas (PFAs): canopy cover will be 60 percent or greater in mid-seral to old forest.
- Outside of nesting areas and PFAs: average canopy cover for mid-seral stands will be a third of the area at 60 percent or greater and two-thirds of the area at 40 percent or greater. For mature forest, canopy cover will average 50 percent or more. In old forest, canopy cover will measure 60 percent or more.

A good example of species-specific vegetation objectives

are those for Colorado River cutthroat trout in the final revised plan for San Juan National Forest (2013: Vol. 2, 60: 2.5.17):

“Over the life of the Land and Resource Management Plan, establish two self-sustaining meta-populations on National Forest System lands, each consisting of five separate but interconnected sub-populations. In addition, establish one new population in each Geographic Management Unit within the historic range.”

Example D shows species-specific standards and guidelines (depending on whether or not they are described in mandatory terms) for disturbance by management activities on the Idaho Panhandle National Forests (draft, 2011).

LANDSCAPE PATTERN AND CONNECTIVITY

Forest plans should provide guidance for landscape pattern and structure, and plan components that do this may be necessary for some at-risk species. The structure of a landscape is determined by the spatial arrangement, size, shape, number and kind of patches. Key ecosystem characteristics should include aspects of spatial pattern, and the responsible official should include plan components for landscape patterns that promote long-term ecological integrity and ecosystem diversity like those illustrated in Example E from the forest plan revision for the Okanogan-Wenatchee National Forest (proposed action, 2011) in Washington.

Providing connectivity is critical to the conservation of species diversity, and is also one of the most important means of providing for the adaptation of species to effects of climate change (Heller and Zaveleta 2009). National forest management can contribute to connectivity in two primary ways: by providing for permeability within national forest lands or by providing for corridors or linkages that facilitate movement between national forests across other jurisdictions.

In the first case of “within forest” connectivity, assessments will likely show the primary stressors linked with connectivity are vegetation management and national forest roads and associated developments and their use. In the second case involving other jurisdictions, i.e., “between forests,” connectivity stressors may include developments within the plan area but would mostly consist of major public highways and permanent developments on intervening other lands. A forest plan should include plan components that address both connectivity situations if they are relevant to species persistence in the plan area (Example F).

Connectivity across other ownerships presents a key opportunity for an “all lands” planning approach. The Forest Service can identify in its assessment the areas where such

Example D. Species-specific standards or guidelines for disturbance by management activities

Species for Which Management Activities Should Avoid or Minimize Disturbance at Known Active Nesting or Denning Sites			
Species	Location	Time	Distance
Wolverine	Predicted denning	2/15 through 5/15	Areas with persistent spring snow through 5/15 in an average of 5 out of 7 years.
Grizzly bear	Spring emergence	4/1 through 5/1	Areas of predicted denning habitat
Bald eagle	Known active nest site	2/1 through 7/14	½ mile
	Known active communal night roost areas (winter habitat)	11/1 through 2/15	¼ mile
Gray wolf	Known active occupied den	2/1 through 5/30	½ mile
	Known rendezvous sites	5/15 through 7/15	½ mile
Peregrine falcon	Known active nest	3/1 through 8/31	½ mile
Harlequin duck	Known active nesting and rearing	4/15 through 8/15	300 feet
Common loon	Known active nesting	4/15 through 7/15	500 feet
Northern goshawk	Known active nesting area	4/1 through 8/15	Post fledging area (PFA)
Townsend's big-eared bat and fringed myotis	Known active roosts and hibernacula	Year-round	Minimize activities in caves/abandoned mines
Mountain goat	Known active winter habitat use	12/1 through 4/1	Minimize disturbance (over-snow vehicle use, other winter recreation activities)
Flammulated owl	Known active owl nesting	5/1 through 7/31	¼ mile

Source: Idaho Panhandle 2011: 28, Table 5

connectivity is important to species that use the plan area. We strongly recommend that the Forest Service proactively engage with highway departments, state wildlife agencies and county planning organizations that influence the ability of wildlife to cross intervening landscapes. These parties and others have likely identified potential linkage areas that should be recognized in forest plans for appropriate management.

IMPORTANT AREAS

One of the key decisions to be made about both landscape

and project plan components is the location where the plan component applies. The possibilities include the following (219.7(e), see 219.19 for definitions):

- The entire “plan area.”
- Contiguous portions of the plan area within which plan components may differ, especially suitability (“geographic areas”).
- Contiguous or noncontiguous portions of the plan area which have the same set of plan components (“management areas”).

Example F. Plan components to address connectivity within the plan area

Connectivity Issue	Plan Component Description
Amount, size and juxtaposition of patches of old forest habitats.	Desired conditions for the amount and patch size of old forest habitats, including old forest-associated focal species, based on natural range of variation.
Dry forests with uncharacteristically high fuel loads that occur adjacent to cool/moist forests may facilitate the spread of uncharacteristically severe fires to American marten source habitats.	Considerable emphasis on the restoration of dry and mesic forests. Desired conditions for the amount, patch size and distribution of habitats based on natural range of variation. Objectives describe the amount and location of restoration treatments.
The number and distribution of bighorn sheep populations limits the potential for interactions among populations.	Desired conditions and objectives maintain or restore habitat effectiveness in current bighorn sheep ranges and reduce the potential for disease spread from domestic to wild sheep.
Fire exclusion has reduced the amount of old forest single story habitat within dry and mesic forests.	Considerable emphasis on the restoration of dry and mesic forests. Desired conditions for the amount, patch size and distribution of habitats based on natural range of variation. Objectives describe the amount and location of restoration treatment.
Amount, patch sizes and juxtaposition of structural stages in boreal forest habitats.	Desired conditions for the extent and distribution of structural stages within the boreal forests for lynx based on natural range of variation.
Extent and location of areas with a persistent snowpack.	The plan emphasizes restoration of forest disturbance regimes and resiliency to changing climate. Green forests retain snowpack longer than forests with extensive high-severity fire.

Source: Gaines 2012: 15

- “Designated areas,” which may be geographic areas or management areas, but require specific authority for designation.⁶

Management areas are typically defined based on management emphasis, and land is then “allocated” to these areas. Diversity criteria should be included when allocating land to management areas so that areas important for at-risk species (identified in the assessment) are managed consistent with the needs of those species.

We strongly recommend that plans identify the specific places within the plan area where certain ecological conditions or individual species are the primary management emphasis. This includes areas important for connectivity, core/source areas or strongholds or refugia for at-risk species, areas of high existing ecological integrity, and other areas important for contributing to ecosystem and species diversity.

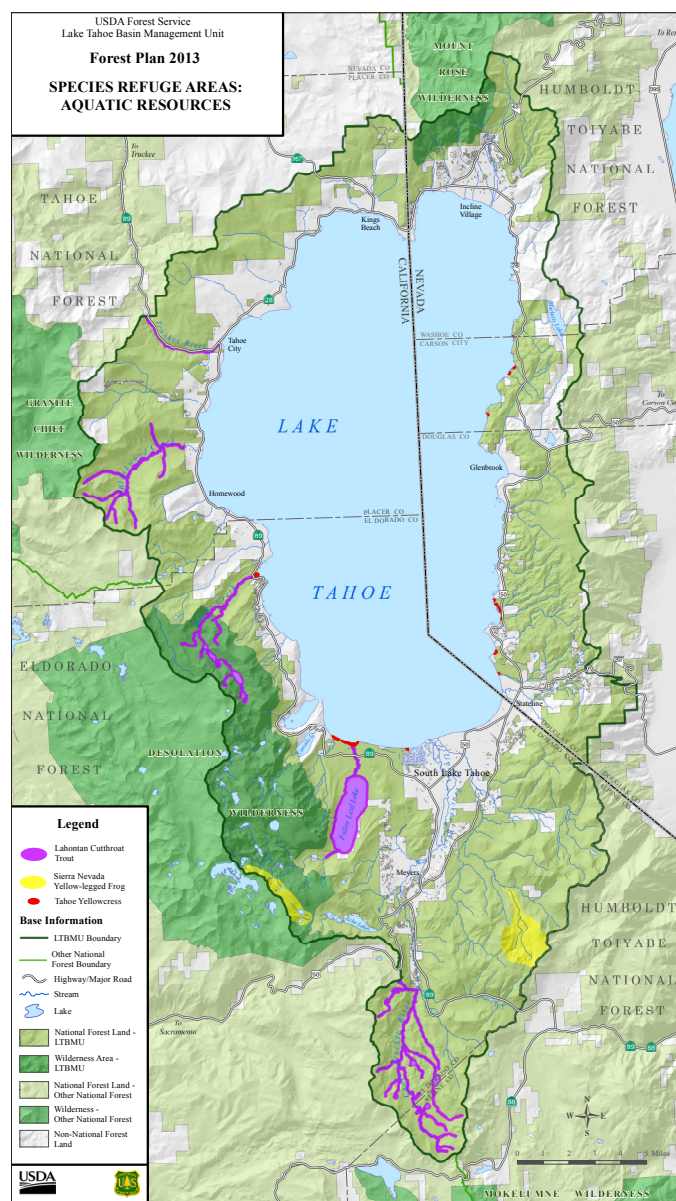
Example E. Desired condition for spatial pattern

Desired Condition for Spatial Patterning for Areas 10 Acres (4 Hectares) and Larger		
Percent of Landscape	Range of Patch Size (acres)	Range of Patch Size (hectares)
91-98	10-470	4-190
1.4-5.6	470-1,160	190-470
0.5-1.1	1,160-1,830	470-740
0.2-0.5	1,830-2,200	740-890

Source: Okanogan-Wenatchee 2011: 34, Table 3

6. Plan components may also be applied to “other areas as identified in the plan” (219.7(e)). It is not clear how these could not be either management areas or geographic areas. In current plans it is common to apply plan direction to areas defined in a plan by characteristics without identifying specific areas having those characteristics. Characteristics should be used to determine where plan components apply only where they can be objectively identified in the future, and where information about where they occur is not currently available or is likely to change.

Example G. Special refuge areas for Lahontan cutthroat trout, Sierra Nevada yellow-legged frogs and Tahoe yellow cress



Source: Lake Tahoe Basin 2013: Vol. 1, Map 13

It can also include areas where active management should be avoided. To communicate this management emphasis, important areas should be designated and mapped as management areas and assigned an appropriate set of plan components to provide ecological conditions for that species.⁷

Example G, from the Lake Tahoe Basin Management Unit revised plan (final, 2013), illustrates the importance of mapping management areas important to wildlife. The

plan includes components for these species in the mapped areas (Lake Tahoe Basin 2013: Vol. 2, 35-36, 60-61, 63, 117-118).

Conservation strategies commonly designate specific locations to be managed as reserves. We suggest establishing reserves in forest plans as either management areas or geographic areas. Designation of research natural areas is also appropriate in some cases. A decision to designate reserves must define what species these areas are reserved for (which supports the development of landscape plan components), what activities they are reserved from (which supports the need for project plan components), and the degree of active management allowed.

AQUATIC ECOSYSTEMS AND RIPARIAN AREAS

Plan components that provide for the integrity of aquatic ecosystems based on sustainable hydrologic regimes and connected aquatic habitat should also be developed. The influence of adjacent terrestrial and aquatic ecosystems on riparian areas and the role of riparian areas in the adjacent terrestrial and aquatic ecosystems, particularly connectivity, must be considered in identifying and developing plan components for riparian areas.

At the landscape scale, a desired condition for aquatic resources could include a network of watersheds that would support viable populations of target species. Such a network is typically designed in a plan using existing species strongholds as a foundation and connecting and restoring adjacent and tributary watersheds. These networks—often referred to as key watersheds or priority watersheds—should be identified as management areas where maintenance and restoration of aquatic integrity is an important management emphasis (connectivity is also likely to be important). While the Forest Service chose not to require this kind of strategy for all national forest units (77 Fed. Reg. 21171), it is likely to be the most scientifically defensible approach for the conservation of many aquatic species.

When spatial requirements for aquatic species are less important, a desired condition could be described in terms of aquatic ecological conditions across the plan area or portions of it. Desired conditions should also be described for aquatic integrity in terms of conditions of aquatic habitat at the stream or reach level.

In addition to the requirements for plant and animal diversity, plan components for ecological sustainability must

7. A plan could instead provide criteria for areas where plan components should be applied to benefit at-risk species, and a current map could be included in the NEPA document for use in effects analysis. However, at least two federal district courts (in Idaho, *Native Ecosystems Council v. U.S. Forest Service* and Oregon, *Oregon Natural Resources Council Fund v. Forsgren*) have held that changes in habitat maps trigger NEPA review and possible plan amendment if plan components are associated with them—whether or not the original maps are incorporated into the forest plan.

prohibit management practices that would seriously and adversely affect water conditions or fish habitat (219.8(b)(3)(ii)(B)). They must also “ensure implementation of best management practices” for water quality (219.8(b)(4)). Project plan components would be needed to meet these requirements for aquatic ecosystems.

Under the 2012 Planning Rule, areas managed to benefit riparian resources are referred to as “riparian management zones.” They are required for ecological sustainability (219.8(a)(3)). Plan components—at either the landscape or project scale—must be included to maintain or restore the ecological integrity of riparian areas, including their structure, function, composition and connectivity.

Plans must also define the management area recognized as the riparian management zone subject to these plan components. An assessment may indicate that some riparian areas are more important than others with respect to diversity, and responsible officials should take this information into account when determining widths of riparian management zones and plan components for them. The rule suggests that there may be subsequent site-specific re-delineation of riparian zones (219.8(a)(3)(ii)(a)), but does not explicitly require a plan amendment or other public involvement. The plan should therefore include criteria that must be used for such future changes (see discussion of “Important Areas,” page 20).

INFRASTRUCTURE AND HUMAN USES

Although ecosystem components may tend to focus on natural resource conditions and management, the plan must also address infrastructure and human uses, if they affect necessary conditions for at-risk species. These are included in the definition of “ecological conditions” that must be provided to achieve diversity (219.19).

We note that it is especially important to coordinate land-management planning with travel-management planning pursuant to 36 C.F.R. § 212. Travel planning results in the designation of specific roads and trails open to motorized vehicles and is used to provide infrastructure that supports the land-management plan. Travel planning decisions must be consistent with the forest plan. Where transportation systems and their use may be stressors to at-risk species, forest plan components should be designed to influence travel management decisions, such as describing desired road densities or placing limits on road construction. Example H shows desired secure habitat conditions in bear management units on the Okanogan-Wenatchee National Forest.

PREDICTABILITY

The planning process involves balancing the flexibility to

adapt management practices to site-specific circumstances against the need for predictability of management actions. However, in our opinion, vaguely written plan components and direction can lead to more points of disagreement and conflict. The apparent flexibility sought with vague plan direction is likely to create significant responsibility and workload at the project level to conduct additional analysis to demonstrate consistency. This leads to less efficiency and higher project costs in addition to the risk of not achieving substantive conservation outcomes.

More important, determinations of compliance with the NFMA diversity requirements must be based on plan components. Compliance determinations are difficult to support when plan components leave discretion for important decisions about diversity to be made on a

Example H. Desired conditions for bear management units

Bear Management Unit (BMU)	Long-Term Core Desired Conditions (percent of BMU)*
Ashnola	>70
Chiwawa	>70
Cle Elum	>55
Granite Creek	>70
Icicle	>70
*Based on absence of human infrastructure and use, primarily density of roads open to public use.	

Source: Okanogan-Wenatchee 2011: 41

project-by-project basis. These determinations are even more difficult to support when plan components refer to discretionary actions of third parties, including requirements set forth in other agency documents.

Similar considerations of certainty apply to the section 7 requirements of the ESA and to the listing of threatened and endangered species. To comply with the ESA at the plan level, the plan consultation should be on the effects of plan components not on separate “agreements” included in consultation documents not enforceable through NFMA consistency requirements. If plan components that limit project effects on listed species are included, the plan can then be used to streamline the project consultation process.

Under the ESA, delisting or preventing listing requires adequate regulatory mechanisms, which courts have determined forest plans can provide—if plan components are

legally binding (*Greater Yellowstone Coalition v. Servheen*). For example, the following standard was designed as a regulatory mechanism for conserving federally listed Canada lynx and has been used to streamline project consultation:

Timber management projects shall not regenerate more than 15 percent of lynx habitat on NFS lands within an LAU [lynx analysis unit] in a ten-year period (Northern Rockies Lynx Management 2007: Attach. 1, 3, internal references omitted).

Consequently, when developing plan components to provide ecological conditions for plant and animal diversity in accordance with 219.9, planners should avoid vague or discretionary plan components. When spatial considerations are important to diversity, plans that include maps provide greater certainty on the application of plan components.

Standards (and determinations of unsuitability) should be encouraged as a means of meeting requirements to provide “necessary” ecological conditions for at-risk species. Using standards to meet this diversity requirement in 219.9 is consistent with the rule’s emphasis on using standards when mandatory constraints are needed to meet legal requirements (219.7(e)(1)(iii)).

A key standard that could be included to reduce uncertainty related to any at-risk species is one that prohibits adverse effects on at-risk species if a threshold for a monitoring indicator has been reached, a scheduled monitoring evaluation report has not been completed, or a report documents that monitoring for a species has not been completed.

EXISTING CONSERVATION STRATEGIES

For any species that meets the requirement of 219.9 that substantial concern exists about its capability to persist over the long-term in the plan area, existing information about its habitat needs and threats should be available to use in developing plan components. Sources of this information include independent assessments of species status and trends that provide information about habitat and research reports that recommend conservation strategies. The best available science to address necessary ecological conditions is likely to be found in these kinds of documents, and they should be used as a starting point for plan components.

In addition, other jurisdictions may have adopted conservation strategies for some species and coordination

of such direction across jurisdictions facilitates “all-lands,” landscape-level conservation planning. These strategies include existing recovery plans for ESA-listed species (which may lead to plan components for species that are not currently present in the plan area). Conservation measures identified in prior project-level consultation should also be considered for application as plan components. Forest plans should also incorporate strategies that include regulatory mechanisms designed to avoid listing of proposed or candidate species or SCC.⁸

Existing conservation assessments, strategies and plans are likely to include and address key ecosystem characteristics and conditions for the species. These documents come in many forms, but their recommended conservation measures can be readily used or adapted as plan components in forest plans. We recommend incorporating relevant, specific measures from these strategies and plans directly into forest plans rather than making vague references to entire documents.

For example, forest plans in the Southwestern Region include the following desired conditions from the Mexican spotted owl recovery plan:

In all the Basin and Range East Recovery Unit ..., 10 percent of the total stands of mixed conifer will have a basal area of 170 square feet/acre, and 10 percent of the total mixed conifer stands will have a basal area of 150 square feet/acre. In either case, these stands will have a minimum of 20 trees that are 18 inches dbh or larger. (Ecological Sustainability Work Group 2008: 74)

This is less ambiguous and more effective than simply referencing a recovery plan in general terms as part of a plan component.

BROADER CONTEXT

The planning rule challenges planning teams to look beyond the boundaries of the plan area to plan for ecosystem integrity (219.8(a)(1)) and diversity (219.9(b)(2)). If a plan area is disproportionately important to a species as a whole, it is extremely important that forest plans place equivalent emphasis on ecological conditions needed for that species. To “contribute to maintaining a viable population of the species within its range” (219.9(b)(2)(ii)), the forest plan may also have to compensate for degraded conditions on the broader

8. The responsible official should consider consulting the U.S. Fish and Wildlife Service’s Policy for Evaluation of Conservation Efforts When Making Listing Decisions when designing strategies to conserve listed and at-risk species (68 Fed. Reg. 15100).

landscape or include plan components to mitigate the effects of downstream and off-unit stressors on a species.

OTHER PLAN CONTENT

The planning rule specifically authorizes and requires identification of priority watersheds for maintenance or restoration (219.7(f)(i)). In identifying these watersheds, the urgent need to improve conditions for aquatic and riparian species should be integrated with other needs. Although not required by the planning rule, “other plan content” could also include similar priority areas for terrestrial maintenance or restoration efforts.

The ecological role of the plan area in the larger landscape is a key part of describing the plan area’s distinctive roles and contributions (219.7(f)(ii)). This could include critical habitat for listed species, areas recognized as core habitat for a species (source areas), the role of the plan area in connecting populations and habitats (particularly in the context of climate change), and social and economic implications of the persistence of species in the plan area.

ESA Section 7 consultation on projects has often relied on, or tiered to, analysis done for consultation at the plan level. This streamlined project consultation process has saved Forest Service and consulting agencies resources and has been upheld through judicial review. Plan components should be designed to facilitate this process, and a section in the plan on potential management approaches (219.7(f)(2)) should include a description of how the ESA Section 7 consultation process for projects will use plan components and the plan consultation documents. If there are specific plan components that will play a role in project consultation, they should be described in this section of the plan.

PLAN AMENDMENTS

The scope of plan amendments is determined by the responsible official (219.13), but these amendments must meet any applicable requirements of the planning rule (219.1(a)). With regard to diversity, an amended plan must either continue to meet the viability requirements of the 1982 planning rule or demonstrate compliance with the new provisions of the 2012 Planning Rule (219.17(b)).

As stated in the Record of Decision (ROD) for the planning rule, “[a]ny significant change in resource management would need to be consistent with the sustainability and other requirements in the final rule” (77 Fed. Reg. 21237). This arguably refers to any amendment that requires an EIS (219.13(b)(3)). It suggests that if an amendment would adversely affect an at-risk species, the diversity requirements of the 2012 Planning Rule are applicable, and therefore the identification of SCC should be ongoing for all national forests so these adverse effects can be determined. However, for amendments that affect only an individual project, the effects of the amendment could be considered in relation to the 1982 planning rule viability requirements (subject to the results of monitoring effects of cumulative amendments discussed in the section on “The Monitoring Phase,” beginning on page 30).

If there is new information about an at-risk species or any species not included as a SCC because of lack of information, or if there is new information suggesting viability concerns for any additional species, that information should be used to determine if the current plan provides the necessary ecological conditions for the species. If not, the responsible official is obligated to initiate an amendment or revision process to achieve compliance. A similar review and possible amendment is required when a new species is listed under the ESA.⁹

9. In this situation, the amendment process needs to be less discretionary and work efficiently to protect the species at-risk. It may be possible to use administrative changes when changes in the plan are required by NFMA or ESA (219.13(c)). For an amendment that would protect a species at-risk by preventing the Forest Service from undertaking actions with adverse environmental effects, use of a categorical exclusion under NEPA may be appropriate (36 C.F.R. § 220.6(e)(16)).

EVALUATING DIVERSITY

The responsible official must conduct and document a diversity evaluation to support a conclusion that the 2012 Planning Rule’s overarching, substantive requirements for ecological integrity, ecosystem and habitat diversity, and additional, species-specific plan components (Table 6) have been met.

This diversity evaluation is used at three different points in the process of developing a plan.

1. To evaluate the effects of continued management under the current plan. This is part of reviewing relevant information from the assessment and monitoring to identify a preliminary need to change the existing plan (219.7(c)(2)(i)).
2. To evaluate the effects of plan components in the proposed plan (219.9). This occurs a) during development of the proposed plan, and b) when considering the environmental effects of the proposal and alternatives in the NEPA process.
3. To demonstrate that plan components comply with the diversity requirements of the final plan, which will be documented in the ROD (219.14(a)(2)).¹⁰

The diversity evaluation results in a future¹¹ “status” projection for ecosystem diversity, ecological integrity and species persistence and viability. If diversity cannot be achieved for reasons that are beyond the authority of the Forest Service or the capability of the plan area, these reasons and their scientific basis must be documented.¹²

ECOLOGICAL INTEGRITY

The planning rule requires that plan components maintain or restore ecological integrity, which occurs (by definition,

TABLE 6. Substantive diversity requirements in the planning rule

Diversity Requirement	Planning Rule Language
Ecological integrity	The plan must include plan components, including standards and guidelines, to maintain or restore the ecological integrity of terrestrial and aquatic ecosystems and watersheds in the plan area, including plan components to maintain or restore their structure, function, composition and connectivity.
Ecosystem and habitat diversity	The plan must include plan components, including standards or guidelines, to maintain or restore the diversity of ecosystems and habitat types throughout the plan area.
Additional, species-specific plan components	The responsible official shall determine whether or not the (ecological integrity and ecosystem and habitat diversity) plan components provide the ecological conditions necessary to: contribute to the recovery of federally listed threatened or endangered species, conserve proposed and candidate species, and maintain a viable population of each species of conservation concern within the plan area.

10. After adoption of the plan, the diversity evaluation process may be revisited using new information from monitoring. In addition, there is also a *sustainability evaluation* that will be used in a similar manner to show compliance with 219.8. It incorporates the analysis and conclusions regarding ecological integrity and includes additional requirements for air, soil, water and riparian areas.

11. The current status may also be determined as part of the assessment, and may be useful in these projections.

12. Note that while 219.1(g) includes a general exception in the planning rule for limits to fiscal capability, 219.9 permits exceptions only based on lack of authority or the capability of the plan area. This recognizes the substantive legal nature of the diversity requirement and places a fiscal priority on achieving diversity.

219.19) when the dominant ecological characteristics (such as composition, structure, function, connectivity and species composition and diversity) are within a range of reference conditions that allow them to recover from perturbations. This set of reference conditions is referred to as the natural range of variation (NRV).

The NRV is generally based on natural disturbance regimes during a historic reference period, but can be based on other information. When necessary because of the projected influence of climatic fluctuations or altered disturbance regimes, alternatives to a reference period can be used to establish reference conditions that characterize ecological integrity. If the NRV is established in this manner, the reference conditions should be derived from scientific principles, such as representing all ecosystem types throughout the plan area (219.9(a)(2)) and providing redundancy in ecosystem functionality.

The NRV requires identification of a range of values that occur over time in a defined area. Such ranges are often best displayed as frequency distributions for the selected ecosystem characteristics showing the portion of the plan area within each category of values. This important process can involve extensive evaluation of the assessment information, especially information compiled for key ecosystem characteristics. The determination of the NRV, like all aspects of the planning process, is subject to the requirement for using best available scientific information to inform the process (219.3).

The status of ecological integrity is determined by comparing the expected future conditions of the selected biological characteristics to the NRV for those characteristics. In determining the status, it is critically important that the responsible official consider the effects of *all* plan components on the biological characteristics; not just those intended to be beneficial.

Departures from the NRV for key ecosystem characteristics indicate that the ecological integrity of the ecosystem may not be sustainable (219.8(a)), and therefore diversity would not be achieved (219.9(a)). Changes in plan components must be adopted to achieve the NRV unless the responsible official documents that the best available scientific information substantiates that damage to an ecosystem has impaired the capability of the plan area to the point that the NRV is not achievable within the authority of the Forest Service (219.1(g)). The responsible official must document the basis of that conclusion in accordance with 219.3, and should discuss the effects of such a finding in the context of the broader landscape.

It is important to recognize that the requirement for ecological integrity applies to the ecosystems identified at the outset. Analysis of integrity for smaller areas is not

required, and portions of ecosystems may be managed for conditions outside of the NRV (such as the wildland-urban interface), as long as the ecosystem as a whole is managed for integrity. While plan components only apply to the national forest plan area, they should be designed to provide ecological integrity for the ecosystem as a whole to the extent possible.

Species composition and diversity are elements of ecological integrity. Ecosystem characteristics that are necessary for individual at-risk species should be included in the integrity evaluation. A failure to provide ecological conditions for at-risk species (see below) results in failure to provide for species composition and diversity and thus a failure to provide for ecological integrity.

Evaluating ecological integrity should provide a foundation for evaluating species persistence and viability. However, integrity is a “coarse filter” approach; additional analysis is needed at a species level.

SPECIES PERSISTENCE AND VIABILITY

The planning rule requires that plan components provide the ecological conditions necessary for at-risk species (219.9(b)(1)). These ecological conditions are more encompassing than the “dominant ecological characteristics” used to evaluate integrity, which are limited to biological characteristics. “Ecological conditions” are more broadly defined to include all elements of the biological and physical environment that can affect the diversity of plant and animal communities. They include human structures and uses as well as biological characteristics (219.19).

Looking solely at the NRV for dominant biological characteristics ignores how other human factors can affect diversity. Roads and other human uses and structures can affect connectivity by reducing the ability of wildlife to reach habitat with desired biological characteristics and the security that allows wildlife to fully utilize those characteristics if they do reach it. The assessment should have identified stressors related to these conditions, including stressors from outside of the plan area that may affect a species.

Since it is usually not possible to return human structures and uses to levels of some historic reference period, in some cases it may be necessary to manage biological characteristics differently (toward one end of or even outside of the NRV) to provide diversity in conjunction with the presence of human-created ecological conditions. If ecosystems are strongly influenced by human structures and uses outside National

Species composition and diversity are elements of ecological integrity.

Forest System boundaries, additional management requirements in forest plans may be needed to offset the effects of such other uses and structures in the larger ecosystem. Plan components may also require future coordination with other landowners and managers and their plans.

We recommend using a crosswalk of the species requirements and the plan components to facilitate the species evaluation. If necessary ecological conditions for at-risk species (identified in the assessment) have been incorporated into plan components that describe habitat needs and address the most important stressors, and if plan components that promote competing uses of the plan area have been integrated with those for species, a plan should meet species persistence and viability requirements.

The species evaluation should employ appropriate models to project effects and use the best available science to interpret those effects on the at-risk species.

However, there must be more to support this determination than simply restating the plan components.

A species diversity evaluation also requires an analysis of effects. Effects analysis is required by the ESA for listed and proposed species, by the Forest Service sensitive species programs for such species

(see FSM 2620 and 2670), and by NEPA where effects on species are identified as environmental issues. Effects analysis is also necessary to demonstrate compliance with the NFMA requirements for at-risk species. This analysis should include effects on kinds and numbers of species as well as habitat. It is extremely important that this effects analysis include consideration of the effects of all plan components, not just the ones designed for diversity. The proposed and possible actions included as other plan content (219.7(f)(iv)) should be considered as information or assumptions that may assist in this analysis.

The species evaluation should employ appropriate models to project effects and use the best available science to interpret those effects on the at-risk species. In some cases, a formal population viability analysis of future conditions may be appropriate. In others, the best available science may consist of professional opinions. Substantial credibility is required to demonstrate compliance with legal requirements for at-risk species under NFMA and ESA, especially when the potential for controversy is high. This species evaluation is therefore a key step during which outside scientific review of conclusions about ecological

conditions and species persistence is extremely important.

It must be recognized that this species evaluation is probabilistic, depends on assumptions and, therefore, can be highly uncertain. The assumptions should be clearly documented, as should the assignment of risk using the precautionary principle or other approaches. Monitoring related to these assumptions is extremely important.

If the necessary ecological conditions have not been provided for one or more species, the responsible official must add, remove or change plan components, and reevaluate the effects of the plan. Additional components to provide ecological conditions for individual species at a fine scale may be needed, including project plan components, especially standards.

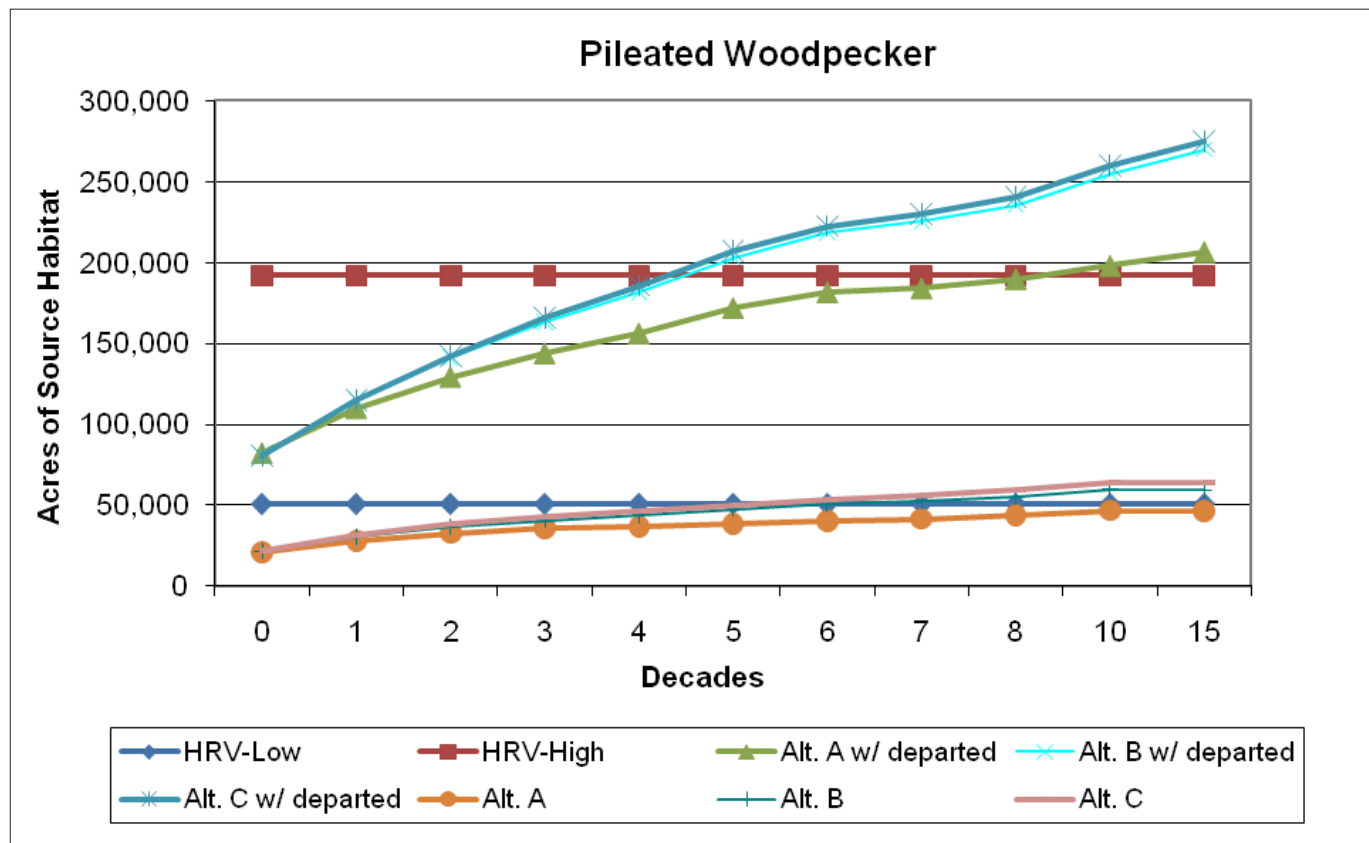
The responsible official may ultimately determine that it is not within the authority of the Forest Service and the inherent capability of the plan area to maintain a viable population of SCC in the plan area. When this possibility arises, it is important to recognize that the question is about the ability to provide ecological conditions, such as where a plan area lacks sufficient land area with the ecological capacity to produce enough habitat for an adequate number of breeding individuals. It is *not* about the likelihood that species will use those conditions in the plan area. Off-site factors that reduce species numbers are not directly relevant to this question. As long as members of the species are known to occur in the plan area, appropriate ecological conditions must be provided.

When it is not possible to provide necessary ecological conditions for SCC, the responsible official must document support for this conclusion. The official should then determine, in coordination with other relevant land managers, that the last best set of plan components evaluated demonstrably contributes to maintaining a viable population of the species within its range (219.9(b)(2)). There can be additional fine-tuning of the plan components, such as requirements to coordinate with planning on other jurisdictions or guidance for land adjustments or conservation easements, but these changes can not reduce the substantive contribution of the plan area to species viability from that last set of plan components.

Plan components must contribute to recovery of listed species and conserve proposed and candidate species. We strongly recommend undertaking an ESA Section 7(a)(1) conservation review with the appropriate consulting agency to ensure compliance with these NFMA requirements.¹³ Although not explicitly required by the rule, the responsible official should also conduct the same analysis for federally

13. See U.S. Fish and Wildlife Service; National Marine Fisheries Service. 1998. Endangered Species Consultation Handbook, Procedures for Conducting Consultation and Conference Activities Under Section 7 of the Endangered Species Act: Section 5-1.

Example I: Acres of source habitat for pileated woodpeckers over time by alternative



Source: Boise National Forest 2010: Vol. 1, 266, Figure 3-62

threatened, endangered, proposed and candidate species that it does for SCC, since the goal is to move these species into the SCC category through conservation and recovery.

DOCUMENTATION OF EFFECTS

Visual summaries of information facilitate the process of selecting plan components and evaluating their effects. These include:

- A matrix showing which key ecosystem characteristics are relevant to which species.
- A list of key ecosystem characteristics, their stressors and trends and the plan components that will address them.
- A list or matrix of species and plan components that may adversely affect each species.
- A list or matrix of species and the plan components designed for, or expected to benefit, these species.

The final product will be an evaluation of the effects of the complete set of plan components on each species, including a discussion of efforts made to integrate ecosystem and species-specific plan components with plan components for multiple uses. The documentation of effects includes two main conclusions. The first is about the effects of the plan components on the trend and status of key ecosystem characteristics for each species. This should be included for public review as part of the effects disclosure in the NEPA documents. The second is a determination of whether or not those effects demonstrate that plan components provide the necessary ecological conditions for at-risk species. This finding must be based on the effects analysis and documented in the decision document (219.14(a)(2)).

Example I shows how the effects of the complete set of plan components can be displayed for individual species and how those effects can be translated into conclusions about persistence in the plan area.

THE MONITORING PHASE

The purpose of monitoring is to provide information the responsible official can use to “determine if a change in plan components or other plan content that guides management of resources on the plan area may be needed” (219.12(a)).

Specifically, a plan monitoring program is developed to:

- Test relevant assumptions.
- Track relevant changes.
- Measure management effectiveness and progress toward achieving or maintaining the plan’s desired conditions or objectives.

PLAN MONITORING PROGRAM

In developing the monitoring program, the responsible official must consider the information needs identified through the planning process as being those most critical for informed management of resources on the plan area (219.12(a)(4)). This should clearly include the need for information about at-risk species. In particular, if information (such as presence in the plan area) needed to determine an SCC is unavailable, that should be addressed in the monitoring program.

The primary focus of the monitoring program may be to determine whether desired plan outcomes are being achieved, but it should also be designed to determine *why* or *why not* and to validate the assumptions on which plan components are based. Thus the program should encompass monitoring of changes in conditions that are independent of management but relevant to at-risk species.

ECOSYSTEMS AND AT-RISK SPECIES

The “coarse filter” approach is based on the assumption that ecological conditions similar to those under which native species have evolved (or other reference conditions) usually maintain the vast majority of species in an area (77 Fed. Reg. 21212). This hypothesis about ecological integrity, adopted to streamline the process of planning for diversity, should be tested and validated through monitoring.

The planning rule does not explicitly require monitoring of ecosystem diversity or integrity or species viability or

persistence. It does require that the monitoring program address the status of selected ecological conditions that include key characteristics of terrestrial and aquatic ecosystems and watersheds, and selected ecological conditions for at-risk species (219.12(a)(5)). The monitoring program should be designed so that the set of questions and indicators selected for monitoring fully addresses the ecological conditions needed for plant and animal diversity.

Under 219.9(b), plan components must be provided to maintain or restore ecological conditions, but this is for the purpose of maintaining viable populations of species. It is extremely important that monitoring programs be designed to determine whether that purpose is being achieved. According to Schultz et al (2012, internal citations omitted),

“Research indicates that the coarse-filter approach is unlikely to provide a reliable basis for multi-species conservation planning, only limited testing of the approach’s validity has occurred, and the monitoring of a select group of species is necessary to determine the efficacy of coarse-filter approaches.” Therefore, some kind of monitoring of populations of at-risk species is necessary to verify that plan components provide the necessary ecological conditions for their persistence in the plan area.

The primary focus of the monitoring program may be to determine whether desired plan outcomes are being achieved, but the program should also be designed to determine why or why not and to validate the assumptions on which plan components are based.

FOCAL SPECIES

A key element of the monitoring program designed to address ecosystem integrity is focal species. The status of focal species “permits inference to the integrity of the larger ecological system to which it belongs and provides meaningful information regarding the effectiveness of the plan in maintaining or restoring ecological conditions to maintain the diversity of plant and animal communities in the plan area” (219.19).

As incorporated into the 2012 Planning Rule, selection

of focal species, and their monitoring must be designed to “assess the ecological conditions required under 219.9” (219.12(a)(5)(iii)). This necessarily requires that focal species monitoring provide a means for determining whether or not these ecological conditions actually lead to recovery, conservation or viability of populations of at-risk species.

Population monitoring should be designed to address the rule’s specific species viability requirements for long-term persistence with sufficient distribution (219.19). The ROD for the planning rule states that a population “trend” is “extremely difficult to determine” and “not useful to inform management for meeting the diversity requirements of the rule” (77 Fed. Reg. 21233). However, the ROD also states that, “[m]

The most effective triggers can be incorporated into standards that tie the implementation of projects with adverse effects on at-risk species to the results of monitoring.

onitoring methods for evaluating the status of focal species may include measures of abundance, distribution, reproduction, presence/absence, area occupied, survival rates, or others” (77 Fed. Reg. 21176). Where risk or uncertainty is highest, population monitoring should be most intensive.

Since focal species are selected to make inferences about diversity, they should be part of the overall diversity conservation strategy that includes identifying at-risk species and key ecosystem characteristics. The selection of SCC as focal species can provide population information about SCC without adding additional species for forest plans to address. The regional forester should play a role in selecting focal species in conjunction with the identification of SCC.

MONITORING TRIGGERS

Where species monitoring is necessary for compliance with 219.9(b) because of unproven effectiveness of “coarse filter” proxies for species populations, plans must provide greater certainty that such monitoring will occur. A greater level of commitment to monitoring can be achieved by using monitoring triggers. According to the ROD, triggers were deemed not appropriate for all monitoring elements and indicators in the rule (77 Fed. Reg. 21231), but they are not precluded. Triggers are warranted, and may be necessary, to comply with the NFMA diversity requirements.

The most effective triggers can be incorporated into standards that tie the implementation of projects with adverse effects on at-risk species to the results of monitoring. The monitoring program can also state that actions

must be taken when a threshold of effects is reached on at-risk species or key ecosystem characteristics; however, unlike standards, there is no requirement to be consistent with monitoring programs, and such actions are necessarily dependent on available funding.

PROJECT MONITORING

The rule attempts to distinguish plan monitoring from project monitoring by stating that requirements for plan monitoring do not apply to projects (219.12(a)(7)), but in our opinion it is not entirely possible to separate them. Monitoring questions must address whether or not standards and guidelines are effective in achieving their purposes. Since standards and guidelines are directed at how projects are implemented, plan monitoring has to include monitoring of both compliance with project design requirements and the effects of the project that the plan component was intended to address. In this sense some plan monitoring requires project monitoring.

This same part of the rule also specifically states that, “the monitoring requirements of this section are not a prerequisite for making a decision to carry out a project or activity.” That does not preclude a plan from containing such monitoring requirements, and, as described above, monitoring may be necessary to meet diversity requirements.

MONITORING EVALUATION REPORT

Each monitoring evaluation report should revisit the list of potential SCC. Maintaining current knowledge of SCC and potential SCC is important to meeting the requirement to provide for persistence of native species. The report should also use the diversity evaluation process described above to re-evaluate whether plan components provide ecological conditions for each SCC based on any new information.

The monitoring program and report should also include an evaluation of the overall effect of plan amendments, (including project-specific amendments), the reasons for them, and whether they warrant a broader need for change analysis. This should specifically address the cumulative effects of amendments on at-risk species.

BROADER SCALE MONITORING STRATEGIES

The planning rule requires a broader scale monitoring strategy for plan monitoring questions best answered at a geographic scale broader than one plan area (219.12(b)). The regional forester makes this determination, but public involvement is required (219.12(b)(1)). In particular, the regional forester should coordinate with other monitoring efforts to facilitate similar coordination at the plan level (219.12(c)(3)).

An independent look at large-landscape issues in collaboration with other entities operating at this broader scale is very important. Without it, it is possible to overlook cumulative effects. In addition, there might be a broader-scale issue that should be addressed through plan monitoring questions that might not appear important at an individual plan level. We therefore recommend that the regional forester identify regional issues that individual monitoring programs should address. In particular, since the regional forester is responsible for identifying SCC, we recommend that the regional forester develop consistent questions and indicators for SCC for use in multiple plan areas.

As part of the coordination with the regional forester required by 219.12(a)(1), the role of other officials

responsible for the forest plan is to recommend questions from plan monitoring strategies to be addressed in broader scale monitoring, particularly if the broader scale strategy does not yet exist when the plan monitoring program is developed. The appropriate scale of monitoring should be considered as part of developing the plan monitoring questions and indicators.

While the rule does not require broader-scale monitoring reports, we strongly recommend that regional foresters prepare them. Unit reports may miss the bigger picture. Also, given the cross-jurisdictional collaboration needed to conduct broader-scale monitoring, these reports are good communication tools.

REFERENCES

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FOREST SERVICE DIRECTION

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