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**Forest Service Handbook 1909.12 – Land Management Planning Handbook
Chapter 10 - Assessments**

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Digest: Following is an explanation of the changes throughout the directive by section.

Zero code: Revises chapter in its entirety.

08: Displays major statutes, regulations, and guidelines needed to carry out the procedures in this Handbook. Replaces chapter 9 of 08/03/1992.

10: Changes chapter caption from “Land Management Plan” to “The Assessment.” Revises the chapter in its entirety. Changes captions and sets forth new direction throughout the chapter.

10.5: Establishes code, caption, and sets forth new terminology in “Definitions.”

10.6: Establishes code, caption, and sets forth new cited “References.”

14: Establishes code, caption, and sets forth new direction for “Assessing Designated Areas. This chapter describes the procedures for writing an assessment to develop, amend, or revise land management plans. See FSH 1909.12, zero code, for a discussion of the adaptive planning framework (assessment, planning, and monitoring) of the Planning Rule.

20: Changes chapter caption from “Adaptive Planning Process” to “Land Management Plan.” Revises chapter in its entirety.

28 through 28.3: Removes codes, captions, and obsolete direction.

29 through 29.2: Removes codes, captions, and obsolete direction.

30: Revises chapter in its entirety. Changes chapter caption from “Public Participation and Collaboration” to “Monitoring.” Removes codes, captions, and obsolete direction and establishes codes, captions, and sets forth new direction throughout the chapter.

40: Changes chapter caption from “Science and Sustainability” to “Public Participation.” Revises chapter in its entirety.

50: Revises direction throughout the entire chapter. Reorganizes direction and changes captions throughout the chapter.

51.5 through 51.8: Establishes codes, captions, and sets forth new direction on the objection process involving comments, resolution of objections, and maintaining records.

60: Revises chapter in its entirety.

70: Revises chapter in its entirety. Removes codes, captions, and obsolete direction and establishes codes, captions, and sets forth new direction throughout the chapter.

80: Revises chapter in its entirety. Removes codes, captions, and obsolete direction and establishes codes, captions, and sets forth new direction.

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10.2 – Objectives

1. Identify and assess a solid base of available information relevant to the plan development or plan revision, by:
 - a. Identifying available, relevant information by reviewing a range of sources and information provided by the public and other governmental entities, including potential information sources in 36 CFR 219.6(a);
 - b. Assessing available information with the public and other interested parties relevant to the assessment requirements of 36 CFR 219.6(b); and
 - c. Developing an understanding of the conditions and trends of the assessment topics that is useful to making decisions about plan components and other content of the plan (36 CFR 219.5(a)(1)).
2. Build an understanding of relevant information with the public and other interested parties before starting plan development or plan revision.
3. Develop relationships with interested parties to facilitate public and government participation among government entities, Indian Tribes, private landowners, and other partners and interested parties.
4. Develop readiness of both the Agency and the public to focus on topics appropriate to a plan or plan revision.

10.4 – Responsibilities

It is the responsibility of the Responsible Official to organize and manage the assessment process as follows:

1. Set the scale, scope, and timing of the assessment early in the process based on what has been learned from monitoring and implementation of projects.
2. Assign an Interdisciplinary Team Leader and Interdisciplinary Team to carry out the assessment process.
3. Identify a systematic, interdisciplinary approach, with the Team and Team Leader to complete the assessment within one year.
4. Identify, throughout the assessment process, the topics to be analyzed in depth.
5. Supervise the process so that the assessment is an analysis and synthesis of the most important relevant information.

6. Engage the public and governmental entities early to encourage participation in the gathering of information for the assessment process (36 CFR 219.4; FSH 1909.12, ch. 40).
7. Manage the assessment process so that the assessment report is promptly available to the public.
8. Ensure the report is written in plain language so that people readily understand it.
9. Ensure the report has concise findings useful to identify the need to change the plan.
10. Ensure that the assessment is within Forest Service authority, the inherent capability of the plan area, and the fiscal capability of the unit.
11. Ensure that the assessment is complete before starting the planning phase.

10.5 – Definitions

See the zero code chapter of this Handbook for definitions.

10.6 – References

1. Cleland, D.T.; Avers, P.E.; McNab, W.H.; Jensen, M.E.; Bailey, R.G., King, T.; Russell, W.E. 1997. National hierarchical framework of ecological units. In, Boyce, M.S.; Haney, A., eds. Ecosystem management applications for sustainable forest and wildlife resources. Yale University Press, New Haven, CT. pp. 181-200.
2. U.S. Department of Agriculture Forest Service. 2011a. Watershed condition classification technical guide. FS-978. Washington, DC: U.S. Department of Agriculture, Forest Service. 49 p. Available at http://www.fs.fed.us/publications/watershed/watershed_classification_guide.pdf
3. U.S. Department of Agriculture, Forest Service. 2011b. Watershed condition framework. FS-977. Washington, DC: U.S. Department of Agriculture, Forest Service. 34 p. Available at http://www.fs.fed.us/publications/watershed/Watershed_Condition_Framework.pdf
4. U.S. Department of Agriculture, Forest Service. 2012. Climate projections FAQ. Gen. Tech. Rep. RMRS-GTR-277WWW. Rocky Mountain Research Station. Fort Collins, CO. 32 p. Available online at <http://www.treesearch.fs.fed.us/pubs/40614>.
5. Weins, J.A., G.D. Hayward, H.D. Safford, and C.M. Giffen. 2012. Historical environmental variation in conservation and natural resource management. Wiley-Blackwell. Chichester, West Sussex, UK. 337 p.

6. Winthers, E.; Fallon, D.; Haglund, J.; DeMeo, T.; Nowacki, G.; Tart, D.; Ferwerda, M.; Robertson, G.; Gallegos, A.; Rorick, A.; Cleland, D. T.; Robbie, W. 2005. Terrestrial ecological unit inventory technical guide. Washington, DC: U.S. Department of Agriculture, Forest Service, Washington Office, Ecosystem Management Coordination Staff. 245 p.

11 – Assessment

The assessment is defined at 36 CFR 219.5(a)(1).

(1) Assessment. Assessments rapidly evaluate existing information about relevant ecological, economic, and social conditions, trends, and sustainability and their relationship to the land management plan within the context of the broader landscape. The responsible official shall consider and evaluate existing and possible future conditions and trends of the plan area, and assess the sustainability of social, economic, and ecological systems within the plan area, in the context of the broader landscape (§ 219.6). (36 CFR 219.5(a)(1)).

The planning requirement at 36 CFR 219.6(a) describes the process requirements of the assessment for plan development and plan revision.

The responsible official has the discretion to determine the scope, scale, and timing of an assessment described in § 219.5(a)(1), subject to the requirements of this section.

(a) Process for plan development or revision assessments. An assessment must be completed for the development of a new plan or for a plan revision. The responsible official shall:

(1) Identify and consider relevant existing information in governmental or non-governmental assessments, plans, monitoring reports, studies, and other sources of relevant information. Such sources of information may include State forest assessments and strategies, the Resources Planning Act assessment, ecoregional assessments, non-governmental reports, State comprehensive outdoor recreation plans, community wildfire protection plans, public transportation plans, State wildlife data and action plans, and relevant Agency or interagency reports, resource plans or assessments. Relevant private information, including relevant land management plans and local knowledge, will be considered if publicly available or voluntarily provided.

(2) Coordinate with or provide opportunities for the regional forester, Agency staff from State and Private Forestry and Research and Development, federally recognized Indian Tribes and Alaska Native Corporations, other governmental and non-governmental parties, and the public to provide existing information for the assessment.

The planning requirement at 36 CFR 219.6(b) describes the content of the assessment for plan development and plan revision.

(b) Content of the assessment for plan development or revision. In the assessment for plan development or revision, the responsible official shall identify and evaluate existing information relevant to the plan area for the following:

- (1) Terrestrial ecosystems, aquatic ecosystems, and watersheds;**
- (2) Air, soil, and water resources and quality;**
- (3) System drivers, including dominant ecological processes, disturbance regimes, and stressors, such as natural succession, wildland fire, invasive species, and climate change; and the ability of terrestrial and aquatic ecosystems on the plan area to adapt to change;**
- (4) Baseline assessment of carbon stocks;**
- (5) Threatened, endangered, proposed and candidate species, and potential species of conservation concern present in the plan area;**
- (6) Social, cultural, and economic conditions;**
- (7) Benefits people obtain from the NFS planning area (ecosystem services);**
- (8) Multiple uses and their contributions to local, regional, and national economies;**
- (9) Recreation settings, opportunities and access, and scenic character;**
- (10) Renewable and nonrenewable energy and mineral resources;**
- (11) Infrastructure, such as recreational facilities and transportation and utility corridors;**
- (12) Areas of tribal importance;**

(13) Cultural and historical resources and uses;

(14) Land status and ownership, use, and access patterns; and

(15) Existing designated areas located in the plan area including wilderness and wild and scenic rivers and potential need and opportunity for additional designated areas. (36 CFR 219.6(b)).

The assessment is the first phase of the three-phase adaptive planning process; the assessment's purpose is to:

1. Before beginning the planning phase, rapidly identify and evaluate existing, available, and relevant information (hereafter referred to as "available information").

a. The term "evaluate" means that the Interdisciplinary Team describes the on-the-ground conditions and estimates the trends, assuming the existing plan remains in place and assuming the influence of a changing climate.

b. The term "trend" means the Interdisciplinary Team describes a general direction in which something is changing or describes the general direction as a range of trend lines.

c. The term "relevant" means the information must have a demonstrable relationship to the required topics and to the land management plan.

(1) If a resource topic is not applicable to the local situation, the Responsible Official should explain why it is not applicable in the assessment.

(2) Review information sources such as the examples listed in 36 CFR 219.6(a)(1), those listed in this Handbook, and those found at the Washington Office planning technical information for planning (TIPS) website for content that is relevant. The TIPS website is found at <http://www.fs.fed.us/TIPS>.

c. The term "available" means that the information is currently and readily accessible by the Forest Service in a form useful for the planning process without further data collection, modification, or validation. If no available information exists for the topic areas described in 36 CFR 219.6(b), there is no requirement to begin new studies to acquire or develop such information.

2. Provide opportunities for the public and governmental entities to participate (FSH 1909.12, ch. 40).

3. Provide information to identify the need to change the plan (FSH 1909.12, ch. 20, sec. 21.21); and

4. Provide information for a plan amendment, if the Responsible Official deems an assessment is necessary to determine the need for an amendment (see FSH 1909.12, ch. 10, sec. 15).
5. The assessment report should identify information needs relevant to assumptions made in addressing the 15 topics listed in 36 CFR 219.6(b). The Responsible Official may handle such information needs in the planning process through the plan monitoring program or outside the planning process through inventories or research.

The process for evaluating the 15 topics listed in 36 CFR 219.6(b) is often iterative, because as analysis proceeds, or the public or governmental entities provide information, new questions may arise.

Compliance with the Paperwork Reduction Act (PRA) is required for the collection of information of ten or more persons, whether such collection of information is mandatory, voluntary, or required to obtain or retain a benefit. The term information is defined in FSH 1909.12, zero code, section 05. The Responsible Official shall review the PRA (5 CFR 1320) requirements to ensure that methods for obtaining information to meet the requirements of 36 CFR 219.6 and this Handbook are consistent with the Act (see, in particular, 5 CFR 1320.3(h)).

The Responsible Official shall not use any method of obtaining information that is prohibited (absent approval) by the Act. The Office of Management and Budget has approved a generic clearance to collect feedback related to land management planning and the assigned control number is #0596-0234.

11.1 – Spatial Scales for the Assessment

Spatial scales for the assessment may vary by topic for several reasons.

1. Spatial scales to be considered by topic should:
 - a. Be sufficiently large to adequately address the interrelationships between conditions in the plan area and the broader landscape, but not so large that these interrelationships lose relevance in guiding land management planning; and
 - b. Consider the extent to which social, economic, and ecological attributes of the broader landscape support, or are supported by, conditions in the plan area.
2. Factors that may affect the determination of appropriate spatial scales include:
 - a. Characteristics of public access to plan area resources or uses that are of public interest,

- b. Characteristics (composition, structure, function, and connectivity) and geographic scale of the relevant ecosystems,
- c. Economic value of plan area resources and available commercial markets for them,
- d. Fire and other forms or patterns of disturbance,
- e. Landform patterns or landtype associations,
- f. Plant, animal, species, or community distribution and abundance,
- g. Public interest in one or more specific resources or uses,
- h. Social connectivity to National Forest System lands, and
- i. Watersheds.

11.2 – Considerations of Existing Plans, Assessments, and other Sources of Relevant Information

Identify and consider relevant existing information in governmental or non-governmental assessments, plans, monitoring reports, studies, and other sources of relevant information.

Such sources of information may include relevant State forest assessments and strategies, the Resources Planning Act assessment, ecoregional assessments, State, county, or other local plans, tribal plans, and non-governmental reports, State comprehensive outdoor recreation plans, public transportation plans, State wildlife data and action plans, and relevant Agency or interagency reports, resource plans or assessments.

Relevant local, regional, and national wildland fire management plans should be used in development of the assessment and to inform key sections. Such plans may include community wildfire protection plans and the National Cohesive Wildland Fire Management Strategy.

Relevant private information, including relevant land management plans and local knowledge, will be considered if publicly available or voluntarily provided.

11.3 – Assessment Report for Plan Development and Plan Revision

The assessment report must be a concise public document that supports the development of a new plan or plan revision. The Planning Rule requires the report to be public:

(3) Document the assessment in a report available to the public. The report should document information needs relevant to the topics of

paragraph (b) of this section. Document in the report how the best available scientific information was used to inform the assessment (§ 219.3). Include the report in the planning record (§ 219.14). (36 CFR 219.6).

The assessment report:

1. Is a concise summary of the assessment;
2. Is not a decision document;
3. Describes a clear base of information for identifying a need to change the plan;
4. Integrates the 15 required topics together in the assessment report, as appropriate;
5. Describes the nature, extent, and role of existing conditions and trends within the plan area and in the broader landscape;
6. Summarizes how the best available scientific information and other information informs the assessment (FSH 1909.12, zero code, sec. 07);
7. Identifies information needs as required by 36 CFR 219.6(a)(3);
8. Identifies key assumptions, risks, areas of uncertainty, and how the assessment can inform the development of the monitoring program (for example by suggesting assumptions for testing, as discussed in FSH 1909.12, zero code, section 07;
9. Helps describe the existing conditions in the environmental impact statement;
10. May be brief for some topics of the assessment (for example, utility corridors may only require a map);
11. Is written in plain language and uses appropriate graphics so the public readily understands it; and
12. May include reference maps, tables, charts, or references to other information relevant to the plan area.
13. Summarizes what information was provided by the public during the assessment process and briefly describes how it was used.

11.31 – Public Participation for the Assessment

Public notice that the assessment is beginning is required in the Federal Register, newspaper of record, and online (see FSH 1909.12, ch. 40, sec. 42 for additional detail on notice requirements).

The Planning Rule requires the Responsible Official to provide opportunities for other Agency staff, governmental entities, Indian Tribes and Alaska Native Corporations, and the public to provide existing information for the assessment. Public participation during the assessment also presents an opportunity for people to develop a common understanding of the complex topics across landscapes that are relevant to planning on the unit. Relationships established during the assessment process may contribute to the readiness of both the Agency and the public to focus on priority topics during the planning process.

Refer to 36 CFR 219.4 and FSH 1909.12, chapter 40, section 42.11 for additional direction and guidance on public participation and assessments.

In addition, the Responsible Official should engage the public and governmental entities by:

1. Using traditional and non-traditional sources of information including user-generated content (such as blogging, social media, and wikis).
2. Reaching out to a variety of communities, including low-income and underserved communities, communities with a social, economic, or cultural connection to the plan area, and communities of interest (such as mountain bikers) to obtain their perspective on:
 - a. Social, economic, and cultural needs and values; and
 - b. Ecological sustainability and plant and animal communities.

11.32 – Tribal Consultation for the Assessment

For information on Tribal consultation see 36 CFR 219.4 and FSH 1909.12, chapter 40, section 44.3.

12 – Assessing Ecological Sustainability and Diversity of Plant and Animal Communities

The Planning Rule contains specific requirements for assessing ecosystem characteristics; air, soil, water; system drivers, carbon stocks; and diversity of plant and animal communities. See 36 CFR 219.6(a) and 36 CFR 219.6(b)(1) through (b)(5). FSH 1909.12, zero code, section 05 defines the terms sustainability and ecological integrity.

Sections 12.1 through 12.55 of this Handbook describe considerations for assessing ecological topics. While these sections cover topics individually, Responsible Officials are encouraged to integrate these topics together in the assessment report.

12.1 – Assessing Terrestrial Ecosystems, Aquatic Ecosystems, and Watersheds

The Interdisciplinary Team shall determine the extent to which terrestrial and aquatic ecosystems relevant to the plan area have integrity (36 CFR 219.6(b)) and document the assessment in the planning record.

It is important to recognize that the conditions of the terrestrial, aquatic, and riparian ecosystems are interconnected with geologic foundation, watershed conditions, water quality, and water resources. Section 12.23 of this Handbook gives additional direction for assessing watershed condition and function.

In addition, knowledge of the extent to which there is ecological integrity both within the plan area and at scales broader than the plan area is important to identify opportunities or limitations for lands in the plan area to contribute to the integrity of the broader ecological systems, as well as the impacts of the broader landscape on the sustainability of resources within the plan area. In some instances, a unique role of the plan area may become apparent at this scale.

The Interdisciplinary Team's approach to assessing for ecological integrity should involve considering available information from a range of sources about terrestrial, aquatic, and riparian ecosystems relevant to the plan area. The required tasks for assessing the status of ecological integrity are as follows (see guidance on each task at the sections indicated:

1. Identify the relevant terrestrial, aquatic, and riparian ecosystems to be assessed (sec. 12.11 of this Handbook).
2. Select key ecosystem characteristics that can be used to predict whether future conditions will have ecological integrity (sec. 12.13 of this Handbook).
3. Identify possible system drivers and stressors (36 CFR 219.6(b)(3)) and assess their influences on key ecosystem characteristics (sec. 12.3 of this Handbook).
4. Describe the natural range of variation for selected key ecosystem characteristics or a suitable alternative to establish a context for whether ecosystems are functioning properly (sec. 12.14a and 12.14b of this Handbook).
5. Assess and document the projected status of the ecosystem based on projected trends of key ecosystem characteristics after considering the current plan and influence of climate change (sec. 12.14c of this Handbook).

12.11 – Identifying the Ecosystems to Assess

The appropriate spatial scale for identifying the ecosystem to assess depends upon the specific issues or concerns being assessed at various stages of the planning process.

The Interdisciplinary Team should use existing Forest Service tools when identifying ecosystems for the assessment. A variety of Forest Service tools are available to support identification of important ecosystems in a plan area, including the Watershed Condition Classification Technical Guide (USDA Forest Service 2011a), Terrestrial Ecological Unit Inventory Technical Guide (Winthers et al. 2005), Aquatic Ecological Unit Inventory, National Hierarchical Framework of Ecological Units (Cleland et al. 1997), and other existing classification and assessment tools (FSM 2060.3). External resources such as Coastal Zone Marine Spatial Planning, Landscape Conservation Cooperatives, or other tools created by other Federal and State agencies, communities, federally recognized Tribes, Alaska Native Corporations, and other entities are also available to identify ecosystems. Finer spatial scales of the National Hierarchical Framework of Ecological Units or other appropriate national or regional assessments (for example, National Fish Habitat Action Plan and Watershed Condition Classification Technical Guide (USDA Forest Service 2011a)) may be appropriate.

Based on the information about ecosystems identified with the appropriate tool, the Interdisciplinary Team should consider the following in identifying ecosystems:

1. Terrestrial, aquatic, groundwater, riparian, and atmospheric aspects of ecosystems that exist and operate at the broader landscape scale;
2. The variety of habitat types (FSH 1909.12, zero code, sec. 05) occurring within the plan area;
3. Presence of rare aquatic and terrestrial plant and animal communities; and
4. The amount, distribution, and connectivity of ecosystems, forests, rangelands, habitat types, and plant and animal communities.

12.12 – Spatial Scales when Assessing for Ecological Integrity

Ecological integrity may be considered at a range of spatial and temporal scales. The Interdisciplinary Team should identify the hierarchical levels for the ecosystems that are relevant to the plan area and:

1. Select the appropriate scale(s) at which to assess for ecological integrity by considering:
 - a. The scales of the disturbance processes that impact the plan area;

- b. The geographic ranges and habitats of at-risk species present within the plan area;
 - c. The scales at which key ecosystem characteristics are relevant to developing plan components.
- 2. Assess an area of analysis large enough to capture:
 - a. Broad-scale trends; and
 - b. Encompass the natural range of variation (or suitable alternative) in disturbance intensity, frequency, and areal extent.

12.13 – Identifying and Selecting Key Ecosystem Characteristics

Key ecosystem characteristics provide a mechanism for assessing status of ecosystem conditions regarding ecological integrity. They are identified, selected, and accessed during the assessment phase, brought forward to help develop plan components, and may be useful when developing monitoring questions and indicators. Key ecosystem characteristics may be added or modified during the planning phase.

- 1. Key ecosystem characteristics:
 - a. Are important specific elements of an ecosystem that sustain the long-term integrity of the ecosystems (sec. 12.14 of this Handbook).
 - b. Include dominant ecological characteristics of composition, structure, function, and connectivity of terrestrial, aquatic, and riparian ecosystems, and
 - c. May be stressors and possible effects of stressors.
- 2. Document the key ecosystem characteristics selected for evaluation and the rationale for their selection. Select a manageable set of ecosystem characteristics that, if maintained or restored, sustain the integrity of terrestrial, aquatic, and riparian ecosystems in the plan area (36 CFR 219.8) and appropriately match the scale at which the projected status of the ecosystem integrity is being assessed for the plan decision. See exhibit 01 for examples of key ecosystem characteristics related to composition, structure, function, and connectivity.

12.13 - Exhibit 01

Examples of Potential Key Ecosystem Characteristics for Composition, Structure, Function, and Connectivity¹

Composition

- Distribution and extent of major vegetation, including shrubland, forestland, rangeland, grassland.
- Presence and abundance of rare and unique habitat types, such as fens, bogs, and talus slopes/scree.
- Species richness, which is the identity and number of individual species native to – or characteristic of – the plan or evaluation area.
- Species diversity, including both richness and evenness.
- Presence and distribution of non-desirable invasive species
- Presence and abundance of species at risk. (sec. 12.5 of this Handbook)
- Presence and distribution of species that have a significant effect on species diversity and ecosystem function (for example, keystone species and ecological engineers).
- Landforms, including those adjacent to stream channels, such as floodplains and inner gorges.
- Types and locations of wetlands, lakes, and ponds.
- Distribution and extent of major soil types and landforms.
- Type, distribution, and interrelationships (contacts, faulting, folding) of geologic formations or rock types and surficial geology.
- Road density.

Structure

- Vertical and horizontal distribution and size of grasses, shrubs, trees, and understory vegetation in selected vegetation types (such as early (pre-forest) and late (mature and old-growth) successional stages).
- Density, size, decomposition class, and distribution of dead wood.
- Fragmentation characteristics such as patch size, edge length, percent forest interior, amount and distribution of vegetation seral/structural stages, proportion of forest interior, and connectivity (such as, the five seral stages defined in the Fire Regime Condition Class process).
- Landscape patch adjacency and context, connectivity, and compatibility of nearby land uses.
- Rangeland conditions and trends.
- Stream habitat complexity.
- Stream connectivity for fish passage and transport of nutrients and bedding substrates for aquatic species
- Riparian, wetland, and groundwater- dependent habitat structure.
- Locations of tributaries and tributary junctions.
- Lake morphometry including depth, width, and shoreline development.
- Soil texture, bulk density, and microtopography as they influence soil available water or other soil functions.
- Missing or diseased vegetation due to tropospheric ozone impacts.
- Distribution of stream diversions and impoundments.
- Extent of stream dewatering and channel alteration.
- Watershed morphometry and hydrology attributes, such as elevation, aspect, drainage patterns, patterns of groundwater recharge and discharge, distribution of perennial, intermittent, and ephemeral channels.

12.13 - Exhibit 01—Continued¹

Structure (Continued)

- Quality, quantity, timing, and distribution of water resources across watersheds and aquifers.
- Air quality as measured in concentration and deposition of pollutants over an area.
- Landslides, fault-influenced streams, and geologic characteristic that influence groundwater dependent ecosystems.

Function (Ecological Processes)

- Types, frequencies, severities, patch sizes, extent, and spatial pattern of disturbances such as fires, grazing, timber harvest, landslides, floods, and insect or disease outbreaks.
- Ability of native species to move throughout the plan area, and cross into adjacent areas, to use habitat that fulfills their life cycle needs (for example, breeding, foraging, migration, and sheltering).
- Successional pathways and stand development of major vegetation types, longevity, and turnover of habitats.
- Pollination.
- Predation at multiple trophic levels.
- Fire regime condition class, as a measure of departure from the reference conditions in vegetation types and fire frequency and severity.
- Stream and lake temperature and nutrient regimes.
- Hydrologic flow regimes including time, duration, magnitude.
- Sediment transport including timing and duration.
- Biogeochemical cycling, including nitrate and phosphate concentrations, methylmercury, and acid neutralizing capacity.
- Rate of invasion by invasive species.
- Soil productivity.
- Energy flow.

Connectivity

- Proximity and size characteristics such as patch size, edge length, percent forest interior, amount and distribution of vegetation seral/structural stages, proportion of forest interior, (such as, the five seral stages defined in the Fire Regime Condition Class process).
- Landscape patch adjacency, distribution, and context, connectivity, and compatibility of nearby land uses.
- Distribution of streams and size of stream network with unimpeded aquatic organism passage.
- Stream length with adequate flow for beneficial uses.
- Watershed morphometry and hydrology attributes, such as such as drainage patterns, location of groundwater discharge, and distribution of stream channels.
- Available habitat to enable native species to move throughout the plan area, and cross into adjacent areas, to use habitat that fulfills their life cycle needs (for example, breeding, foraging, sheltering).
- Hydrologic flow regimes including time, duration, magnitude.
- Ability of streams to transport nutrients and bedding substrates for aquatic species.
- Stressors that reduce or truncate connectivity.

¹ Including those not observed directly but inferred from appropriate indicators.

3. Selected key ecosystem characteristics should be limited to those characteristics where:

- a. The information regarding the characteristic is available.
- b. The characteristic is measurable or can be mapped, and may be analyzed at the scale appropriate to the plan decision or can be ranked and assessed by experts.
- c. The characteristic responds to direct or indirect management or will inform management by the Forest Service.

4. One or more of the following criteria should guide the selection of key ecosystem characteristics:

- a. The conditions and trends of the characteristic are important to sustaining integrity and meaningful in developing plan components. For example, the characteristic is important:
 - (1) To the functions and ecological processes that create or maintain ecosystems and their associated services;
 - (2) To indicate representativeness (FSH 1909.12, zero code, sec. 05);
 - (3) To understanding the possible effects of stressors (sec. 12.32 of this Handbook);
 - (4) To indicate redundancy (FSH 1909.12, zero code, sec. 05); or
 - (5) For using biological or ecological indices.
- b. The characteristic includes ecological conditions needed for threatened, endangered, proposed, candidate, or species of conservation concern (sec. 12.5 of this Handbook).
- c. The characteristic is useful for serving multiple purposes of the assessment.
- d. The characteristic is useful for monitoring trends, such as monitoring of the status of focal species (FSH 1909.12, ch. 30, sec. 32.13c).

12.14 – Assessing Ecosystems for Ecosystem Integrity

The purpose of assessing for ecosystem integrity is to determine whether ecosystems are functioning normally and are uncompromised. Ecosystems have integrity when their composition, structure, function, and connectivity are operating normally over multiple spatial and temporal scales. There are two steps to assess whether an ecosystem has integrity:

1. Use the natural range of variation or alternative approach to determine conditions that sustain the integrity of the selected key ecosystem characteristics. The conditions that sustain integrity are also referred to as the ecological reference model (sec. 12.14a and 12.14b of this Handbook).
2. Assess and document the current condition and status of ecosystems using key ecosystem characteristics and then project their future conditions and trends (sec. 12.14c of this Handbook).

12.14a – Describing the Natural Range of Variation

When assessing whether an ecosystem has integrity, the Interdisciplinary Team should use the natural range of variation as the ecological reference model, unless the past information regarding the selected key ecosystem characteristic is lacking, or the system is no longer capable of sustaining key ecosystem characteristics identified as common in the past based upon likely future environmental conditions.

The natural range of variation (NRV) is part of the definition of ecological integrity (FSH 1909.12, zero code, sec. 05). A description of the natural range of variation provides insight into the temporal dynamics and key characteristics of an ecological system and provides a context for assessing whether an ecosystem has integrity. For instance, the natural range of variation can be compared to existing conditions and recent disturbance processes, allowing the Interdisciplinary Team to identify important compositional, structural, and functional ecosystem elements for developing plan components (FSH 1909.12, ch. 20, sec. 23.11a).

The natural range of variation does not represent a management target or desired condition. A description of the natural range of variation alone is not sufficient to determine whether there is ecological integrity.

The Interdisciplinary Team may use alternatives to the natural range of variation approach for assessing integrity as described in section 12.14b, when past information for key ecosystem characteristics is missing or the system is no longer capable of sustaining key ecosystem characteristics identified as common in the past.

The Interdisciplinary Team should describe the natural range of variation based on review and synthesis of available information for selected key ecosystem characteristics of terrestrial,

aquatic, and riparian ecosystems. Information used to determine the natural range of variation may be drawn from many sources including scientific journal articles, historical records and photographs, early surveys, pollen and sediment records, tree ring analyses, or descriptions of reference areas. The Interdisciplinary Team may adapt the natural range of variation analysis from another National Forest System unit for specific ecosystems that are shared and make adjustments to fit the local conditions. Refer to Wiens et al. 2012 for further discussion and examples.

The natural range of variation should be described as a range of conditions and dominant processes occurring over the period selected for analysis. Some conditions may have occurred frequently, and others may have occurred rarely. When describing the natural range of variation, the Interdisciplinary Team may consider the following approach:

1. Determine the temporal scale for the natural range of variation description. Refer to Wiens et al. 2012 for discussion of ecological insights that can be developed by examining historical ecology at different temporal scales.
2. Describe the natural range of variation of disturbance regimes within the selected period. Describe how dominant disturbance regimes (defined in FSH 1909.12, zero code, sec. 05) influence key ecosystem characteristics that operate at the selected spatial scales and the disturbance regimes variability. Descriptions of disturbance regimes may include:
 - a. Type of disturbance (such as insects and diseases, geologic hazards, weather, flooding, and fires),
 - b. Frequency and range in time intervals between disturbances,
 - c. Severity, including the range of the area or patch sizes impacted and intensity of the disturbance,
 - d. Landscape pattern (including patch size distribution, connectivity, and association with the physical environment), and how patterns change over time due to variations in disturbance frequency and severity, and
 - e. The manner in which the disturbance regime influence the structure, composition, and successional states of terrestrial vegetation and aquatic and riparian systems

12.14b – Alternative to the Natural Range of Variation Approach

In some situations, there is not enough information to understand the natural range of variation under past disturbance regimes for selected key ecosystem characteristics or the system is no longer capable of sustaining key ecosystem characteristics identified as common in

the past based upon likely future environmental conditions. In these cases, the Interdisciplinary Team should establish an alternative ecological reference model for context for assessing for integrity by identifying the conditions that would sustain these key ecosystem characteristics. In this case, the ecological reference model may include the following factors:

1. Representativeness (defined in FSH 1909.12, zero code, sec. 05).
2. Effects of stressors on the integrity of ecosystems in terms of composition, structure, function, and connectivity.
3. Redundancy (defined in FSH 1909.12, zero code, sec. 05).
4. Habitat associations of particular species or species groups with different home ranges, migration patterns, and/or habitat affinities.
5. Existing biotic integrity, using biological or ecological indices.

Several of these factors may be used in combination with each other.

12.14c – Assess the Status of the Ecosystems and their Trend.

Section 12.14a and 12.14b of this Handbook gives guidance for determining the ecological reference model (natural range of variation or suitable alternative) used to compare key ecosystem characteristics against when determining the status of ecosystem integrity. The Interdisciplinary Team should assess the status of each key ecosystem characteristics concerning ecosystem integrity. Then, the Interdisciplinary Team should assess whether projections of future conditions indicate ecological integrity. When assessing existing conditions of key ecosystem characteristics, and identifying trends, the Interdisciplinary Team should assume existing plan direction remains in place and the influence of climate change and other large-scale threats and stressors continues. The following list describes the process.

1. Using the ecological reference model as the normal for ecological integrity the Interdisciplinary team should consider:
 - a. Whether the key ecosystem characteristics and associated physical, chemical, and biological processes are functioning and would likely continue to function in a way that contributes to long-term integrity of ecosystems and provide conditions for species adaption to a changing climate;
 - b. Whether the key ecosystem characteristics and associated processes have been altered, eliminated, or are declining or increasing in extent and/or quality, or have declined or increased in the past, including changes in the spatial pattern;

- c. Whether there are existing and reasonably foreseeable barriers to ecological connectivity for terrestrial and aquatic organisms;
 - d. If the key ecosystem characteristics or ecological functions (processes) are rare in the plan area or otherwise clearly vulnerable to future environmental change;
 - e. If projects or activities would be necessary to maintain or restore key ecosystem characteristics or ecological functions (processes);
 - f. How the existing role or contributions of the plan area affects the key ecosystem characteristics or ecological functions (processes) relevant to the broader landscape;
 - g. The influences on key ecosystem characteristics or processes that are from existing conditions, threats, or stressors, which can be within or beyond the plan area; and
 - h. The possible trend of those key ecosystem characteristics or processes.
2. To determine the existing condition of riparian and aquatic ecosystems, the Interdisciplinary Team may consider:
- a. Describing the ecological connectivity, using the spatial distribution and barrier effects of obstructions to aquatic organisms and other biotic (transport or dispersal processes) and abiotic (sediment, nutrients, water, and material) passage;
 - b. Describing the stressors such as changes in flow regime and dewatering, channelization, invasive species, changes in sediment delivery to channels, herbivory, wildfire, and fuel buildup, changes in water quality due to pollutants, and sediment buildup; and
 - c. Comparing overall riparian condition to the natural range of variation or some other ecological reference model. Stream, wetland, and waterbody classifications may be useful in identifying “like systems” for comparison with those of interest.
3. The assessment of the status of ecosystem integrity should do the following:
- a. Compare the existing conditions of each key ecosystem characteristic with the natural range of variation information. When natural range of variation information is lacking or the system is no longer capable of sustaining key ecosystem characteristics identified as common in the past based upon likely future environmental conditions, use an alternative ecological reference model to assess whether the existing condition of each characteristic would sustain ecosystem integrity.

b. Describe the projected future status of each key ecosystem characteristic assuming:

(1) Existing plan direction remains in place, and

(2) The influence of climate change and other large-scale threats and stressors will continue, based on best available scientific information regarding trends (sec. 12.3 of this Handbook).

c. Describe the proportional occurrence of each key ecosystem characteristic both beyond and within the plan area by:

(1) Comparing the occurrence of the characteristic in the plan area to the occurrence at the broader ecological scales to place the occurrence within the plan area in a larger landscape context;

(2) Identifying patterns in the occurrence of the key ecosystem characteristic in the plan area and identify deviations from its fully functional form in the ecosystem; and

(3) Identifying which key ecosystem characteristic(s) are abundant or rare in the plan area and at the broader ecological scales.

d. Determine whether existing ecological conditions sustain ecological integrity (or sustain fully functional ecosystems), and if not, the extent to which existing conditions vary from conditions that would do so, and what the projected future ecosystem conditions would be. See FSH 1909.12, chapter 20, section 23.11 for a discussion of functional ecosystems. Indicate if one of the following is true for each key ecosystem characteristics:

(1) The key ecosystem characteristic is functioning in a way that contributes to long-term integrity of ecosystems and species adaption to a changing climate and is expected to continue to do so under existing plan direction;

(2) The key ecosystem characteristic is not currently contributing to ecological integrity, but with changes in management or plan direction, could do so in the future; or

(3) The key ecosystem characteristic is not expected to contribute to ecological integrity in the future due to threats or stressors that cannot be changed because they are outside Forest Service authority, the inherent capability of the plan area, or the fiscal capability of the unit.

12.14d – Assessing Riparian Areas and Groundwater-dependent Ecosystems

The assessment should describe the status of riparian areas (ecosystems) using the guidance of section 12.14d, paragraphs 1, 2, and 3 of this Handbook in relation to the ecological reference model, assuming existing plan direction remains in place. When there is available information, the Interdisciplinary Team should identify and assess riparian areas and groundwater-dependent ecosystems in the plan area for the assessment. Groundwater-dependent ecosystems include springs, perennial streams, fens, caves, and many riparian areas and wetlands. This identification must be relevant to the development of plan components under 36 CFR 219.8(a)(3). To identify riparian areas and groundwater-dependent ecosystems consider one or more of the following methods:

1. Identify the location and extent of surface waterbodies, vegetation, geology, soils, geomorphology, and topography.
2. Identify vegetation indicators of riparian areas and groundwater-dependent ecosystems that include distinctive riparian or groundwater-dependent vegetation or the potential to support distinctive vegetation.
3. Identify fluvial geomorphic indicator criteria for riparian areas that may include break in slope, evidence of fluvial deposition, high water marks, lack of upland soil formation, and lichen growth on rocks.
4. Identify 100-year recurrence interval flood stage where available and relevant to identification of groundwater-dependent ecosystems for the development of plan components.
5. Identify any existing site-specific riparian area or groundwater dependent ecosystem delineations, buffers, or riparian management areas and existing plan direction related to them.

12.2 – Assessing Air, Soil, and Water Resources

The Interdisciplinary Team shall assess available information about air, soil, geologic, and water resources that is useful to developing plan components and other plan content. For additional information see 36 CFR 219.6(b) and section 11 of this Handbook.

12.21 – Assessing Air Quality

The assessment should describe the existing conditions and trends of airshed conditions and air quality. FSM 2580 - Air Resource Management gives direction about air management. Information is available online at <http://www.fs.fed.us/air/index.htm>. The terms discussed in this section, “airshed” and “critical loads,” are defined in FSH 1909.12, zero code, section 05.

Also, Regional air staff may have developed geographically refined critical load information appropriate for the plan area that should be considered.

The Interdisciplinary Team should use available information from governmental agencies, regional planning organizations, and Washington Office Air staff website at <http://www.fs.fed.us/air/portal.htm>. In addition, the Interdisciplinary Team should do the following at the airshed scale:

1. Identify the airsheds relevant to the plan area.
2. Identify within the relevant airsheds the location and extent of known sensitive air quality areas, such as class I areas, nonattainment areas, and air quality maintenance areas.
3. Identify emission inventories, conditions, and trends within the relevant airsheds.
4. Identify the relevant Federal, State, and Tribal agency implementation plans for regional haze, nonattainment, or maintenance areas and determine whether Forest Service emission estimates have been included in the appropriate agency implementation plans.
5. Identify critical load exceedances for the plan area. If critical load exceedances occur on the plan area, assess the extent and severity of these exceedances.
6. Using the information gathered from items 1 through 5, document the conditions and trends of relevant airsheds assuming existing plan direction remains in place.

12.22 – Assessing Soil

The Interdisciplinary Team should identify and assess available information on soils, geology, landforms (geomorphology), and other such ecological conditions important to support key ecosystem characteristics.

1. The Interdisciplinary Team may consider the following information when assessing soils and soil productivity:
 - a. Existing interpretations of soil surveys certified by the National Cooperative Soil Survey.
 - b. Existing information on vegetation suitability and productivity, and natural range of variation, in addition to the standard soil interpretations from a terrestrial ecological unit inventory).

- c. Existing approximations of soil-landform units and attribute data derived from remotely sensed data or from expert opinion (FSH 1909.12, ch. 10, sec. 13.22).
 - d. Ecological site descriptions of the plan area developed in cooperation with USDA Natural Resources Conservation Service (<https://esis.sc.egov.usda.gov/About.aspx>).
2. When identifying and assessing the available information, the Interdisciplinary Team should:
- a. Identify existing inventories of soil conditions and improvement needs;
 - b. Identify important attributes, characteristics, or processes of soils including soil erosion and sedimentation that make them susceptible to loss of integrity resulting from specific uses, disturbances, or environmental change; and
 - c. Using the information gathered from items a and b, describe in the assessment the existing conditions and trends of soil resources and soil quality assuming existing plan direction remains in place.

12.23 – Assessing Watersheds and Water Resources

The Interdisciplinary Team should identify and assess available information for watersheds and water resources (surface and groundwater) and their role in sustaining the structure and function of terrestrial, riparian, and aquatic ecosystems within the plan area and beyond the plan area where relevant to the plan. The assessment should describe the existing conditions and trends of watersheds and water resources in the plan area.

In addition, the Team should assess information about the influence of the larger area of analysis on the status of watersheds and water resources within the plan area and the influence of the plan area on the larger area of analysis.

Watersheds relevant to the plan should include those lands outside the National Forest System that contribute surface or subsurface water flows to the plan area, and those that receive surface or subsurface water flows from the plan area. Groundwater-dependent ecosystems should also be considered (<http://www.fs.fed.us/geology/groundwater.html>).

When there is available information that is useful to develop plan components and other plan content, the Interdisciplinary Team should consider the following at the appropriate watershed scale:

- 1. Information about watersheds and water resources, including information generated through the Watershed Condition Classification Technical Guide (USDA Forest Service 2011a), step A of the Watershed Condition Framework (USDA Forest Service 2011b),

and information associated with designated Watershed Condition Framework priority watersheds. Other information to consider includes:

- a. Condition of watersheds relevant to the plan.
 - b. Presence of impaired or contaminated surface and ground waters within or adjacent to the plan area and the larger area of analysis.
 - c. Quantity, quality, timing, and distribution of water across the plan area and the area of analysis, including for groundwater resources and groundwater-dependent ecosystems.
 - d. Flow regimes needed to sustain ecosystems.
 - e. Available information for relevant species at risk (sec. 12.5 of this Handbook).
 - f. Existing documented refugia for aquatic species.
2. The historical context (such as the natural range of variation) for ecological conditions under which the hydrologic systems developed;
 3. The nature, extent, and role of existing and reasonably foreseeable future consumptive uses and non-consumptive uses (such as recreation, habitat conservation, restoration), including water withdrawals, diversions, storage, and the associated infrastructure (sec. 13.34 of this Handbook). The Interdisciplinary Team should pay particular attention to the influence on aquatic species at risk and human population centers in proximity to the area of analysis;
 4. The nature and distribution of Federal and non-Federal water rights across the plan area;
 5. Essential fish habitat of managed fisheries identified by National Marine Fisheries Service (NMFS);
 6. Spawning, rearing, and other necessary habitat for native fish assemblages identified by U.S. Fish and Wildlife Service, State, or Tribal fish and wildlife agencies;
 7. The reasonably anticipated future patterns of perturbation (such as, altered precipitation, changing climate, drought, evapotranspiration patterns, flood, and temperature changes);
 8. The municipal watersheds, sole source aquifers, and source water protection areas within the plan area and the area of analysis (sec. 13.34 of this Handbook);

9. The effects of land use, projects, and activities, and reasonably foreseeable future water withdrawals and diversions, and water storage facilities (surface and subsurface) on hydrologic and geomorphic processes and water resources (sec. 13.34 of this Handbook);
10. The ecological, social, and economic roles (both process and services) that water resources play in the context of the broader landscape (sec. 13.34 of this Handbook); and
11. Based on the above information, the assessment should describe the existing conditions and trends of watersheds and water resources assuming existing plan direction remains in place.

12.3 – Assessing System Drivers, Stressors, including Risks related to Climate Change

The planning regulation at 36 CFR 219.6(b) requires that the Responsible Official identify and evaluate available information relevant to the plan area for system drivers of key ecosystem characteristics of terrestrial, aquatic, and riparian ecosystems and watersheds including the influence of a changing climate:

(3) System drivers, including dominant ecological processes, disturbance regimes, and stressors, such as natural succession, wildland fire, invasive species, and climate change; and the ability of terrestrial and aquatic ecosystems on the plan area to adapt to change. . . (36 CFR 219.6(b)(3))

The assessment should answer the following questions—what are system drivers and stressors that influence the plan area, and what is known about the opportunities to reduce risk and adapt to system drivers, stressors and the influence of climate change?

12.31 – Consideration of System Drivers

When identifying and evaluating system drivers, consider:

1. Natural disturbance regimes. The Interdisciplinary Team should:
 - a. Describe the natural disturbance regimes such as wildfire and wind during the reference period used for determining the natural range of variation (sec. 12.14 of this Handbook);
 - b. Compare these natural disturbance regimes to the type and frequency of current natural disturbances; and

- c. Describe whether disturbance regimes have changed since the reference period to a degree that impairs the function of key ecosystem characteristics or other ecological conditions needed to support the terrestrial, aquatic, and riparian ecosystems relevant to the plan area.
2. Predominant climatic regimes. The Interdisciplinary Team should assess predominant climatic regimes by reviewing existing information such as vulnerability assessments and scenario planning. The Interdisciplinary Team should coordinate with the Research and Development staff on available climate change information. General technical report “Climate projections FAQ” may be helpful in understanding predominant climate regimes. The report is available online at the Treesearch website at <http://www.treesearch.fs.fed.us/pubs/40614>. Note that climate change is both a system driver and a stressor. The Interdisciplinary Team shall document the assumptions used to assess predominant climate regimes.
3. Broad-scale system drivers or disturbance regimes. The Interdisciplinary Team should:
 - a. Describe broad-scale disturbance regimes, such as wide ranging flooding, geologic hazards, insects, and disease, wildfire, and wind where applicable; and
 - b. Identify uncharacteristic conditions that influence system drivers, such as where fire exclusion by human action causes conditions that offer few opportunities for regenerating early seral stages.
4. Natural vegetation succession. The Interdisciplinary Team should:
 - a. Describe the influence of age or size-class condition on key ecosystem characteristics;
 - b. Identify human-caused changes in successional pathways that may maintain vegetation in an uncharacteristic age or size-class condition; and
 - c. Consider scarcity and abundance of successional states relative to the reference period used for determining the natural range of variation (sec. 12.14 of this Handbook).

12.32 – Consideration of Stressors

FSH 1909.12, zero code, section 05, defines “stressors.” Examples of stressors include invasive species impacts, loss of spatial connectivity, disruption of natural disturbance regimes, and influence of climate change. The Responsible Official shall identify and assess available information for stressors that directly or indirectly degrade or impair key ecosystem characteristics and ecological sustainability.

1. When identifying and assessing information and trends of stressors the Interdisciplinary Team may consider the following:
 - a. Ability of ecosystems within the plan area to adapt to changes imposed by stressors while retaining their composition, structure, and function;
 - b. Duration and return interval of stressors;
 - c. Environmental consequences of stressors, including whether the changes in conditions of key ecosystem characteristics caused by stressors are close to causing abrupt fundamental changes in the ecosystem;
 - d. Geographic extent of the stressor and the geographic effects of the stressor;
 - e. Influence of changing climate, such as alterations of precipitation patterns or changes in the number of frost-free days, and other large-scale stressors on the key ecosystem characteristics, and their resulting vulnerability to likely future conditions;
 - f. Reversibility (if management action is taken to mitigate effects (manageability));
 - g. Severity and trends in severity according to their impact on key ecosystem characteristics;
 - h. Stressors associated with irreversible conditions, beyond which ecosystems reorganize and transition to an alternate state;
 - i. Stressors not controllable through management of the plan area that may affect conditions within the plan area, changing land-use patterns adjacent to National Forest System units, water storage facilities, or hydropower facilities upstream or downstream from National Forest System units;
 - j. Stressors and threats to riparian conditions, such as changes in flow regime, hydrograph timing, water withdrawals and dewatering, channelization, invasive species, changes in sediment delivery to channel, herbivory, water temperature or chemistry (such as heavy metals), wildfire, and fuels;
 - k. Stressors associated with the impacts of human uses, including energy (renewable and nonrenewable), infrastructure, minerals, outdoor recreation, range, timber, watershed, wildland fire, wildland-urban interface, wildlife, fish, and reduction in occurrences of prescribed fire in fire-dependent ecosystems due to proximity of human habitation, and;

- l. Stressors that are a result of other stressors, overlapping stressors, or accumulating stressors. For example, the presence of forage disease is a result of herbivore concentration due to drought-induced loss of habitat. Stress-related disease directly affects available forage species and indirectly affects occurrence of fire (disturbance), resulting in an invasive species (stressor) outcompeting and further diminishing the forage species; and
 - m. Stressors that are a result of successive additions of stressors.
2. The Interdisciplinary Team should use existing climate change information such as vulnerability assessments and scenario planning during the evaluation of stressors and should identify information gaps, uncertainties, and assumptions when evaluating existing and future stressors. Note that climate change is both a system driver and a stressor. In addition, the Responsible Official may consider the following resources:
- a. Forest Service guidance on climate change available online at <http://www.fs.fed.us/climatechange/>.
 - b. Forest Service climate change resource center website at <http://www.fs.fed.us/ccrc/>.
 - c. USDA, Forest Service, 2012, Future of America's Forest and Rangelands: Forest Service 2010 Resources Planning Act Assessment, Gen. Tech. Rep. WO-87. Washington, DC. 198 p. Available online at <http://www.treeseearch.fs.fed.us/pubs/41976/>.
 - d. US Global Change Research Program (USGCRP) Assessment at <http://scenarios.globalchange.gov/scenarios/climate>.
 - e. National Climate Assessment – Forest Sector Technical Report—Vose, James M.; Peterson, David L.; Patel-Weynand, Toral, eds. 2012. Effects of climatic variability and change on forest ecosystems: a comprehensive science synthesis for the U.S. forest sector. Gen. Tech. Rep. PNW-GTR-870. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 265 p. Available online at <http://www.fs.fed.us/research/climate-change/assessment/>.
 - f. Daniels, A.E. et al 2012, Climate Projections FAQ, Gen. Tech. Rep. RMRS-GTR-277WWW. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 32 p. Available online at <http://www.treeseearch.fs.fed.us/pubs/40614>.

12.4 – Assessing Carbon Stocks

Carbon sequestration and storage is an ecosystem service provided by forests and rangelands. The Responsible Official shall identify and assess available information relevant to the plan area for baseline assessment of carbon stocks (36 CFR 219.6(b)(4)). A baseline assessment estimates existing carbon stocks and recent changes in carbon stocks on the land and in harvested wood products. If an assessment of carbon stocks in the plan area is already available, the Interdisciplinary Team may use such an assessment. Tools for analyzing carbon may be found at the Northern Research Station's Carbon website at <http://www.nrs.fs.fed.us/carbon/tools/>. Additional information about carbon sequestration is available at the Forest Service's Carbon Sequestration website at <http://www.fs.fed.us/ecosystemservices/carbon.shtml>.

1. The assessment of carbon stocks is developed to understand how:
 - a. The plan area plays a role in sequestering and storing carbon;
 - b. Disturbances, projects, and activities influenced carbon stocks in the past and may affect them in the future; and
 - c. Where the carbon is stored, how the storage is changing, and how the storage might be influenced by management.
2. The Interdisciplinary Team may consider:
 - a. Whether existing conditions and trends of vegetation (aboveground carbon pool) indicate that the plan area is a carbon sink or carbon source; and
 - b. The future trend of the plan area in sequestering and storing carbon under existing plan guidance.

12.41 – Identifying Carbon Pools

The Interdisciplinary Team should identify the carbon pool from where the plan area's carbon stocks are assessed.

The Interdisciplinary Team may use previously identified carbon stocks for the plan area, a multi-plan area, State, or Regional basis, or other appropriate ecological scale so long as the results can be separated by plan area.

The Interdisciplinary Team may consider developing separate estimates of carbon pools for forest and nonforest (for example, grassland, and shrubland) ecosystems. The following sources of information at the plan area or other scale that overlaps the plan area may be useful for estimating carbon pools:

1. Allometric equations or models (for example, Forest Vegetation Simulator or Northeast Decision Model).
2. Forest and range vegetation maps and stand exam data.
3. Forest Inventory and Analysis (FIA) data, publications, and reports.
4. Fuel management reports.
5. Landscape Fire and Resource Management Planning Tools (LANDFIRE) vegetation maps.
6. Scientific literature applicable to the plan area.
7. Soil surveys conducted by the USDA Natural Resources Conservation Service for soil carbon.
8. Timber cut and sold reports for the harvested wood products pool.
9. Wildlife habitat information for dead and down trees carbon pools.

12.42 – Assessing the Plan Area Influences on Carbon Stocks

The Interdisciplinary Team should identify influences on carbon stocks. Influences on the carbon or carbon-bearing compounds of the carbon pool may include disease, insects, growth, management, timber harvest, vegetation, and wildfire. Consider using information assessed according to section 12.3 of this Handbook, regarding system drivers and stressors. If information is available, the assessment may include the potential change over time (flux) of carbon stocks within those pools. Examples of potential information sources include:

1. Wildfire history maps and other information (for example, trends in burn severity).
2. Forest health information (for example, aerial detection maps of recent insect and disease mortality).
3. Timber harvest cut and sold report.
4. Other vegetation treatment data and reports.

12.5 – Identifying and Assessing At-risk Species

The Interdisciplinary Team shall identify and assess available information relevant to the plan area for threatened, endangered, proposed, and candidate species and potential species of conservation concern present in the plan area (36 CFR 219.6(b)).

Based on the information, the Interdisciplinary Team shall identify and document the set of at-risk species and assess plan area ecological conditions for these species in the assessment. The set of at-risk species for assessment purposes are:

1. Federally recognized threatened, endangered, proposed, and candidate species (sec. 12.51 of this Handbook).
2. Potential species of conservation concern (sec. 12.52 of this Handbook).

12.51 – Identifying Federally Recognized Species

As a part of the assessment and planning process, the Responsible Official shall coordinate with the U.S. Fish and Wildlife Service and the National Oceanic and Atmospheric Administration NMFS, as appropriate, to identify federally listed threatened and endangered species, species proposed for Federal listing, and candidate species in the plan area.

12.52 – Identifying Species of Conservation Concern

The Planning Rule defines species of conservation concern as follows:

(c) Species of conservation concern. A species of conservation concern is a species, other than federally recognized threatened, endangered, proposed, or candidate species, that is known to occur in the plan area and for which the regional forester has determined that the best available scientific information indicates substantial concern about the species' capability to persist over the long-term in the plan area.
(36 CFR 219.9).

The rule requires the Responsible Official to identify potential species of conservation concern and assess existing information for them in the assessment (36 CFR 219.6 (b)(5)). Direction about potential species of conservation concern and species of conservation concern is found in two chapters of this Handbook as follows:

1. Responsibilities of Responsible Official for potential species of conservation concern during the assessment are found in section 12.52a of this Handbook.
2. Requirements for developing the list of potential species of conservation concern are found in section 12.52b of this Handbook.
3. Criteria for identifying a species of conservation concern are found in section 12.52c of this Handbook.
4. Species to consider when identifying potential species of conservation concern are found in section 12.52d of this Handbook.

5. Guidance regarding the Regional Forester's identification of the species of conservation concern is found in FSH 1909.13, chapter 20, section 21.22a.
6. Guidance on evaluating new information on species of conservation concern is found in FSH 1909.12, section 21.22b.

12.52a – Responsibilities for Species of Conservation Concern During the Assessment

The Responsible Official has the authority and responsibility to:

1. Identify potential species of conservation concern (36 CFR 219.9(c)).
2. Identify and assess information relevant to species that occur in the plan area and when the best available scientific information raises a substantial concern about a species' capability to persist over the long term in the plan area. This information serves as a filter during the assessment process to aid in the efficiency and efficacy of the process used to identify potential species of conservation concern.
3. Leverage expertise of the public, including local, State, Tribal, and other Federal natural resource agencies, for identifying species of conservation concern.
4. Engage the public and consider public input on the assessment including the identified potential species of conservation concern (see FSH 1909.12, ch. 40, sec. 42 for guidance on public participation).

FSH 1909.12, chapter 20, section 21.22a describes the responsibilities of the Regional Forester for species of conservation concern.

12.52b – Developing the List of Potential Species of Conservation Concern

Unless the Regional Forester has identified the species of conservation concern before the assessment process, during the assessment phase the Responsible Official shall:

1. Coordinate with the Regional Forester when identifying the potential species of conservation concern. This coordination may be conducted in several ways including:
 - a. The Regional Forester and Responsible Official may jointly identify the potential species of conservation concern for the plan area.
 - b. The Responsible Official may provide an initial list of potential species of conservation concern for review by the Regional Forester, who may concur or request modifications.

- c. The Responsible Official and Regional Forester may review and adjust a previously developed list of potential species of conservation concern derived from plan area or multi-plan area studies or broad-scale assessments.
 - d. The Regional Forester may develop an initial list of potential species of conservation concern for each plan area within the Region and the Responsible Official may analyze the species on this list and any additional species, as appropriate.
2. Use the criteria in section 12.52d of this Handbook to select the species to consider, and the criteria in section 12.52c of this Handbook to identify the potential species of conservation concern.
 3. Document the best available scientific information supporting the identification of a species as a potential species of conservation concern.
 4. Document the best available scientific information that supports not identifying a species that was considered but not identified as a potential species of conservation concern. Such rationale may include:
 - a. Knowledge of the species abundance, distribution, lack of threats to persistence, trends in habitat, and responses to management, or
 - b. Lack of sufficient scientific information available about the species' status.

12.52c – Criteria for Identifying a Species of Conservation Concern

The criteria for identifying species of conservation concern are also the criteria for identifying potential species of conservation concern.

1. The species is native to, and known to occur in, the plan area.

A species is known to occur in a plan area if, at the time of plan development, the best available scientific information indicates that a species is established or is becoming established in the plan area. A species with an individual occurrences in a plan area that are merely "accidental" or "transient," or are well outside the species' existing range at the time of plan development, is not established or becoming established in the plan area. If the range of a species is changing so that what is becoming its "normal" range includes the plan area, an individual occurrence should not be considered transient or accidental.

2. The best available scientific information about the species indicates substantial concern about the species' capability to persist over the long term in the plan area. See FSH 1909.12, zero code, section 07, for guidance on best available scientific information.

If there is insufficient scientific information available to conclude there is a substantial concern about a species' capability to persist in the plan area over the long-term that species cannot be identified as a species of conservation concern.

If the species is secure and its continued long-term persistence in the plan area is not at risk based on knowledge of its abundance, distribution, lack of threats to persistence, trends in habitat, or responses to management that species cannot be identified as a species of conservation concern.

12.52d – Species to Consider when Identifying Potential Species of Conservation Concern

1. When identifying potential species of conservation concern, the Responsible Official shall consider only species native to, and known to occur in, the plan area.
2. Species in the following categories must be considered:
 - a. Species with status ranks of G/T1 or G/T2 on the NatureServe ranking system. See exhibit 01 for description of NatureServe Conservation Status Ranks.
Note: Species with NatureServe G/T1 or G/T2 status ranks are expected to be included unless it can be demonstrated and documented that known threats for these species, such as those threats listed for the species by NatureServe, are not currently present or relevant in the plan area.
 - b. Species that were removed within the past 5 years from the Federal list of threatened or endangered species, and other delisted species that the regulatory agency still monitors.

12.52d - Exhibit 01

NatureServe Conservation Status Ranks

| <p>NatureServe conservation status ranks are based on a scale of one to five, ranging from critically imperiled (G1) to demonstrably secure (G5). Status is assessed and documented at three distinct geographic scales: global (G), national (N), and State/province (S). The conservation status of a species or ecosystem is designated by a number from 1 to 5, preceded by a letter reflecting the appropriate geographic scale of the assessment. (http://www.natureserve.org/explorer/ranking.htm)</p> | |
|---|---|
| Status Rank | Status Rank Definition |
| 1 | <p><i>Species is Critically Imperiled</i></p> <p>At very high risk of extinction or elimination due to very restricted range, very few populations or occurrences, very steep declines, very severe threats, or other factors.</p> |
| 2 | <p><i>Species is Imperiled</i></p> <p>At high risk of extinction or elimination due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.</p> |
| 3 | <p><i>Species is Vulnerable</i></p> <p>At moderate risk of extinction or elimination due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.</p> |
| 4 | <p><i>Species is Apparently Secure</i></p> <p>At fairly low risk of extinction or elimination due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.</p> |
| 5 | <p><i>Species is Secure</i></p> <p>At very low risk of extinction or elimination due to a very extensive range, abundant populations or occurrences, and little to no concern from declines or threats.</p> |
| <p>Intraspecific taxa refer to subspecies, varieties, and other designations below the level of the species. The status of intraspecific taxa (subspecies or varieties) are indicated by a T-rank following the species' global rank. Rules for assigning T-ranks follow the same principles outlined above. For example, the global rank of a critically imperiled subspecies of an otherwise widespread and common species would be G5T1.</p> | |

3. Species in the following categories should be considered:

- a. Species with status ranks of G/T3 or S1 or S2 on the NatureServe ranking system. See exhibit 01 for description of NatureServe Conservation Status Ranks.
- b. Species listed as threatened or endangered by relevant States, federally recognized Tribes, or Alaska Native Corporations.
- c. Species identified by Federal, State, federally recognized Tribes, or Alaska Native Corporations as a high priority for conservation.
- d. Species identified as species of conservation concern in adjoining National Forest System plan areas (including plan areas across regional boundaries).
- e. Species that have been petitioned for Federal listing and for which a positive “90-day finding” has been made.
- f. Species for which the best available scientific information indicates there is local conservation concern about the species' capability to persist over the long-term in the plan area due to:
 - (1) Significant threats, caused by stressors on and off the plan area, to populations or the ecological conditions they depend upon (habitat). These threats include climate change.
 - (2) Declining trends in populations or habitat in the plan area.
 - (3) Restricted ranges (with corresponding narrow endemics, disjunct populations, or species at the edge of their range).
 - (4) Low population numbers or restricted ecological conditions (habitat) within the plan area.

12.53 – Evaluating Relevant Information for At-risk Species

The Interdisciplinary Team shall consider available information on the set of at-risk species to understand the ecological conditions necessary to sustain them. The assessment phase focuses on rapidly evaluating available information, not on developing new information, about ecological conditions or about individual species. The assessment report should document information gaps relevant to at-risk species that may be filled in through inventories, plan monitoring program, or research.

Information may come from a variety of sources, including Federal and State agencies, literature, local information on occurrence and population status, subbasin analyses, broad-

scale assessments, and information available from local species experts and other organizations.

The Interdisciplinary Team should consider information about at risk species such as the following, when available:

1. Current taxonomy.
2. Distribution (including historical and current trends), especially species known from only a relatively few, discrete locations, and the status of those locations.
3. Abundance (including historical and current trends).
4. Demographics and population trends, including population effects resulting from hunting, fishing, trapping, and natural population fluctuations if available.
5. Diversity (phenotypic, genetic, and ecological).
6. Ecological condition (habitat) requirements at appropriate spatial scales (fine-scale, home range, geographic range).
7. Ecological condition (habitat) amount, quality, distribution, connectivity, status, and trends in the plan area.
8. Ecological function of at-risk species.
9. Important biological interactions and ecological processes, such as periodic fire, flooding, groundwater discharge, and so on.
10. Ecological conditions that are threats or limiting factors to persistence.
11. Influence and occurrence of uncharacteristic natural events like severe wildfire or insect epidemics.
12. Effects of climate change and susceptibility to stressors caused by human disturbances or activities like air and water pollution, invasive species, trails, roads, and dams.
13. Endangered Species Act information, such as reasons for listing and species status, set out in recovery plans and biological opinions, and critical habitat designations.

12.54 – Optional Grouping of Species

In some cases, it may be practical or efficient to group at-risk species for identifying and evaluating relevant information about them because they have similar ecological conditions

and habitat needs. If used, groupings should be made based on the ecological conditions necessary to maintain or, in the case of federally listed threatened or endangered species, recover each group member. As a basic approach, groupings may be based on species' needs, for example, with respect to vegetation, successional stage of vegetation, stream size, valley bottom configuration, lake size, proximity, or access to groundwater, or wetland type. Such groupings should consider other key ecosystem conditions used by each species such as vegetation types, structural stages, and hydrogeomorphic factors. Grouping at-risk species in the assessment phase is strictly an analysis and evaluation tool that may be used to improve planning efficiency. When species are grouped in an assessment, the assessment must provide the rationale for doing so. The rationale must:

1. Identify the critical assumption(s) made for the grouping, or for including a species in the group, and explain why the assumption(s) is (or are) reasonable, and
2. Identify any uncertainties associated with including a species in the group and why the grouping is nonetheless reasonable.

Once groups are identified, ecological conditions for individual species in each group may be further described using attributes such as those set out in section 12.53 of this Handbook.

12.55 – Determining the Status of At-risk Species

The Interdisciplinary Team shall determine the status of at-risk species, by considering the existing plan direction, ecological conditions needed to support the species (sec. 12.53 of this Handbook), status of ecological conditions in the plan area (sec. 12.14c of this Handbook), and other relevant information. The assessment should identify influences on ecological conditions needed to support the species, key risk factors to those ecological conditions, and limiting factors both on and off the plan area.

The following is a suggested approach to determining the status of each at-risk species:

1. Describe current distribution of each at-risk species in the plan area.
2. Identify ecological conditions in the plan area necessary to meet the requirements of 36 CFR 219.9(b) for each at-risk species (sec. 12.53 of this Handbook) and at-risk species grouping (sec. 12.54 of this Handbook). These are the ecological conditions to be considered for at-risk species in the assessment.
3. Identify those ecological conditions assessed by the assessment of key ecosystem characteristics. Refer to sections 12.1 and 12.2 of this Handbook for their evaluation.

4. Identify ecological conditions in the plan area necessary to meet the requirements of 36 CFR 219.9(b) for each at-risk species that were not addressed by the assessment of key ecosystem characteristics as follows:

- a. Describe the current and likely future status of the ecological conditions necessary to meet the requirements of 36 CFR 219.9(b) for each at-risk species, assuming management continues under the current plan.
- b. Compare the species' current and likely future status described in paragraph 4a for each at-risk species to the ecological conditions of the natural range of variation, or an alternative ecological reference model (sec. 12.14b of this Handbook).
- c. Assess human-related stressors (for example, roads, human disturbance and displacement, dams) and whether they can be managed under Forest Service authorities.
- d. Identify other threats or limiting factors (for example, naturally small and isolated populations, climate change) and whether they can be managed under Forest Service authority.

5. Describe the current and projected overall status of the ecological conditions necessary to meet the requirements of 36 CFR 219.9(b) for at-risk species considering the combined ecological conditions addressed through the assessment of key ecosystem characteristics and, if needed, for specific at-risk species or groupings.

6. For those ecological conditions not currently meeting or expected to meet the requirements of 36 CFR 219.9(b) for at-risk species, describe the potential outcome of the at-risk species status and identify the key risk factors, taking into account factors such as time (for example, short-term, long-term, planning period, generations of species), affected life history requirement (for example, loss of part of foraging habitat, loss of all spawning habitat), or affected population dynamic (for example, loss of recolonization routes).

7. Identify those key risk factors influencing the ecological conditions not expected to meet the requirements of 36 CFR 219.9(b) for at-risk species that are or can be influenced by Forest Service management of the plan area.

8. Describe any differences in likely future status of groups of individuals in the plan area that are known to be or highly suspected to be reproductively isolated and separate from the rest of the individuals of at-risk species.

9. Summarize the overall status of each at-risk species or species group (sec. 12.54 of this Handbook) with explanations of which key risk factors weighed most heavily in determining status. Describe the effect of key risk factors on species in simple terms

such as the level of resulting vulnerability and the trend in that vulnerability. State the conclusions of the vulnerability status process for each species in a way that is helpful in identifying the need for change and in developing plan components that provide the ecological conditions necessary to sustain the species. The Interdisciplinary Team may support conclusions using the “Issue-Rule-Analysis/Application-Conclusion” model (IRAC) as described in FSH 1909.12, chapter 20, section 21.42. Document the resulting information and status evaluation in the planning record.

13 – Assessing Social and Economic Sustainability and Multiple Uses

Management of the plan area contributes to social and economic sustainability by contributing to social, cultural, and economic conditions in the area(s) of influence and the broader landscape and managing a set of desired social, cultural, and economic conditions within the plan area.

1. These contributions include primarily:
 - a. Multiple uses,
 - b. Ecosystem services,
 - c. Infrastructure, and
 - d. The management operations of the National Forest System unit.
2. The assessment should identify and assess available information such as:
 - a. Contributions of the plan area to social and economic sustainability,
 - b. Social, cultural, and economic conditions affected by management of the plan area,
 - c. Risks, stressors, or drivers affecting the contributions or the conditions, and
 - d. Sustainability of the contributions .

Exhibit 01 shows examples of this approach.

13 - Exhibit 01

Examples of the plan area's contributions to social and economic sustainability

Recreation

Plan Area Contribution: High quality scenery in the plan area attracts visitors to the area of influence.

Social, Cultural, and Economic Conditions: Recreation and tourism jobs, derived from visitor spending, are a large and increasing percentage in the local economy.

Risk, Driver, or Stressor: Risk of severe fire continues to increase, threatening the quality of the scenery.

Sustainability Issue: Can the plan area be managed to maintain the quality of scenery?

Water Supply and Quality

Plan Area Contribution: Watersheds in the plan area supply neighboring communities with water that meets local water quality standards.

Social, Cultural, and Economic Conditions: Downstream communities and agricultural areas relying on this water source.

Risk, Driver, or Stressor: Increase in population growth and downstream development threatens to reduce downstream flow of water so that demand for water would exceed current public water source capacity.

Sustainability Issue: Can the plan area maintain or increase its delivery of downstream water while maintaining ecological integrity of aquatic habitats?

The assessment should help to focus the work of planning by identifying relationships between the management of the plan area and social, cultural, and economic conditions outside the plan area.

An important source of information for topics related to social and economic sustainability and multiple uses is the Forest Service Natural Resource Manager (NRM). The public may access information about NRM at <http://www.fs.fed.us/nrm/index.shtml>. Forest Service employees may access support and training at <http://fsweb.nrm.fs.fed.us/>.

All of the other information sources referenced in the following individual sections can be found using this general link: <http://www.fs.fed.us/emc/nfma/TIPS/directives.shtml>.

13.1 – Plan Area Contributions to Social, Cultural, and Economic Conditions

National Forests and Grasslands provide a number of contributions that affect social, cultural, and economic conditions. These contributions include ecosystem services and multiple uses from the plan area that provide benefits to people either directly or indirectly. Infrastructure within a plan area may also be important in contributing benefits to people. Management of the planning unit, in terms of its operations, employees, and connection to institutions and

people outside the plan area may also be an important contribution. Exhibit 01 displays some examples of the types of plan area contributions to social and economic sustainability.

13.1 - Exhibit 01

Examples of Plan Area Contributions to Social, Cultural, and Economic Conditions

Multiple Uses

- Recreational settings and opportunities for recreational activities
- The provision of fresh water provided to downstream uses
- Forage for domestic livestock grazing
- Volume of timber or biomass offered for sale
- Opportunities for hunting and fishing

Ecosystem Services

- Amount of carbon sequestered and rate of sequestration of carbon stocks mitigating expansion of greenhouse gases in the atmosphere
- Water quality and aquatic organisms sustained from watersheds in properly functioning condition
- High-quality scenery
- Cultural sites preserved for human use and enjoyment

Infrastructure

- Forest road system that provides recreational access
- Trail system that provides diverse opportunities for recreation
- Utility infrastructure such as powerlines and pipelines that transfers energy to communities
- Water infrastructure that conserves water, provide fishing and boating opportunities, and flood control
- Developed facilities that provide access for recreation, cultural interpretation, and education

Forest Service Presence in the Community

- Contracts to local business from the planning unit
- Engagement of Forest Service employees with local community institutions

The Interdisciplinary Team may also identify and assess existing information that describes the benefits of, or social and economic conditions affected by these contributions. For example, a study may exist that describes the importance to the economy of a ski area in the plan area. The benefits may be described in the form of estimates of monetary value or other descriptions

of benefit or social and economic outcomes. This information can help the Interdisciplinary Team to evaluate which contributions of the plan area are important.

The Interdisciplinary Team may identify a set of plan contributions to social and economic sustainability that are most likely to affect the social, cultural, and economic conditions in the area(s) of influence (described in sec.13.2 of this Handbook). These contributions can be a focus for the development of plan components or retaining parts of an existing plan that provide these contributions. The methods or indicators used to describe or quantify contributions in the assessment should also help during subsequent steps in the planning process. The assessment should identify and evaluate existing information about the contributions and convey the manner in which the contribution is likely to affect social, economic, and cultural conditions.

13.11 – Multiple Uses

Multiple use management contributes a range of benefits and services under the Multiple-Use Sustained-Yield Act of 1960 and the National Forest Management Act of 1976. The multiple-use mandate is not exclusive to a single resource or use, and the sustained-yield principle applies to all multiple-use purposes for which the National Forest System lands are administered.

Outdoor recreation, range, timber, watershed, wildlife, and fish, identified in the Multiple-Use Sustained-Yield Act, can all contribute to social and economic sustainability. These uses and other resources contribute to maintaining social cultures and long-standing traditions, connecting people to the land, and providing jobs, income, and quality of life for many Americans and their communities.

Management of the plan area will affect the mix and type of uses that occur in the plan area, which will affect social, cultural, and economic conditions in the area(s) of influence and the broader landscape. In addition, management choices regarding multiple uses influence other multiple uses and elements of ecological sustainability. For example, National Forests and Grasslands are often a source of forage for grazing livestock, which benefit ranchers and local communities. However, such grazing also affects the attractiveness of the grazed area for recreation and the structure and composition of the ecosystem in the grazed area.

The scope of the assessment for each of these multiple uses should be commensurate with the relevance of the use in the plan area. The impacts of multiple uses on ecological sustainability must also be assessed. More detail about assessing these types of stressor impacts is contained in section 12.3 of this Handbook. Sections 13.31 through 13.35 of this Handbook describe what the Responsible Official should identify and evaluate for those multiple uses identified in the Multiple-Use Sustained-Yield Act of 1960.

13.12 – Ecosystem Services

Ecosystem services are a product of functioning ecosystems that affect social, cultural, and economic conditions both within the plan area, in the area(s) of influence and the broader landscape. They are defined in the Planning Rule as:

Ecosystem services. Benefits people obtain from ecosystems, including:

(1) Provisioning services, such as clean air and fresh water, energy, fuel, forage, fiber, and minerals;

(2) Regulating services, such as long term storage of carbon; climate regulation; water filtration, purification, and storage; soil stabilization; flood control; and disease regulation;

(3) Supporting services, such as pollination, seed dispersal, soil formation, and nutrient cycling; and

(4) Cultural services, such as educational, aesthetic, spiritual and cultural heritage values, recreational experiences and tourism opportunities. (36 CFR 219.19).

These definitions and categories for ecosystem services provide a framework for considering a range of benefits people may derive from the plan area. Although management actions affect the ecosystem and the level or quality of an ecosystem service, these actions themselves are not ecosystem services.

Management of the plan area will affect the contribution of some ecosystem services, which affect social, cultural, and economic conditions. For example, a cultural service such as access to and protection of a cultural site or area can benefit tourism businesses, cultural values, and traditional uses of nearby communities. A regulating service, such as flood control, can have important beneficial consequences both within and beyond the plan area.

To focus the assessment and, ultimately, the plan development or revision phase of the planning process, the Responsible Official should identify and evaluate key ecosystem services provided by the plan area; rather than trying to identify and evaluate information about all ecosystem services that may be present in the plan area. Key ecosystem services are the ecosystem services that are important in the area(s) of influence or the broader landscape and that are likely to be influenced by the land management plan. The key ecosystem services identified in the assessment are expected to be the initial set of ecosystem services considered in the plan development or plan revision phase of planning. Additional information obtained at later stages of planning may lead to adding or removing key ecosystem services from this initial set.

The Interdisciplinary Team should identify and evaluate available information about each of the identified key ecosystem services such as:

1. The geographic scale at which the plan area contributes the key ecosystem service (for example, watersheds, counties, regional markets, or ecoregions).
2. The conditions and trends of the key ecosystem service.
3. The drivers and stressors (see secs. 12.3 and 13.13 of this Handbook) likely to affect future demand for and availability of the key ecosystem service.
4. The current conditions and trends of the ecosystems or key characteristics of ecosystems (sec. 12.14 of this Handbook) that currently maintain the plan area's key ecosystem service.
5. The influence of lands outside the plan area or other conditions beyond the authority of the Forest Service that influence the plan area's ability to provide the key ecosystem services.
6. The relationship of the key ecosystem service to key social, cultural, and economic conditions (sec. 13.23 of this Handbook).

Guidance related to the assessment of various ecosystem services can be found throughout chapter 10. See exhibit 01 for cross references.

13.12 -Exhibit 01

Sections Where Guidance on Assessing Ecosystem Services Is Located

| Topic | Section of this Handbook |
|---|--------------------------|
| Provisioning Services | |
| Range | Section 13.32 |
| Timber | Section 13.33 |
| Watershed | Section 13.34 |
| Fish, Wildlife, and Plants | Section 13.35 |
| Energy, Minerals, Geologic Hazards | Section 13.5 |
| Regulating and Supporting Services | |
| Terrestrial, aquatic and riparian ecosystems and watersheds | Section 12.1 and 12.1 |
| Air, soil and water resources | Section 12.2 |
| Carbon | Section 12.4 |
| Cultural Services | |
| Recreation | Section 13.4 |
| Areas of tribal importance | Section 13.7 |
| Cultural and historic resources and uses. | Section 13.8 |

13.13 – Infrastructure

Infrastructure within the plan area can have a substantial impact on social, cultural, economic, and ecological conditions both within the plan area and in the broader landscape.

Infrastructure can include facilities for energy generation or transport, communications, water delivery, transportation (including airstrips), or recreation. These facilities directly affect conditions and uses within the plan area and may support delivery of goods and services in the broader landscape. Guidance related to the assessment of infrastructure is described in the sections on energy and minerals (sec. 13.5 of this Handbook) and infrastructure (sec. 13.6 of this Handbook). Trends in land use (sec. 13.9 of this Handbook) are an influence that may indicate future needs for infrastructure that should also be recognized in the assessment of infrastructure.

13.14 – Forest Service Presence in the Community

Employees of the Forest Service, partnerships, contracts, or agreements with the Forest Service, and other operations directly and indirectly influence the social, cultural, and economic conditions of the affected communities through demand for local goods and services, contributions to the tax base, and participation in community institutions and activities. While plans do not include staffing and procurement strategies, the presence and impact of Agency resources in the area of influence should be considered.

13.2 – Assessing Social, Cultural, and Economic Conditions

The Responsible Official shall identify and evaluate available information regarding:

1. The social, cultural, and economic conditions in the area(s) of influence (sec. 13.21 of this Handbook),
2. The important social, cultural, and economic influences affecting the plan area (sec. 13.22 of this Handbook), and
3. How the plan area influences social, economic, and cultural conditions in the area of influence and in the broader landscape (secs. 13.23 and 13.24 of this Handbook).

13.21 – Social, Cultural, and Economic Conditions in the Area(s) of Influence

The Responsible Official should identify and describe a primary area of influence to serve as the spatial scale to evaluate social, cultural, and economic conditions. The primary area of influence is where the management of the plan area substantially affects social, cultural, and economic conditions.

The Responsible Official may choose to identify and evaluate other areas of influence if there are different spatial areas for certain important economic, social, or cultural influences of the plan area.

The Responsible Official shall solicit public input and conduct intergovernmental outreach to determine the appropriate boundaries of the area(s) of influence. The area(s) of influence should be commensurate with the important influences of the plan area on social, cultural, and economic conditions. Consider the availability of information when identifying boundaries; for example, demographic and some cultural information are often available at the level of counties, so the primary area of influence may be a set of counties. This area of influence can be used later to describe social, cultural, and economic effects of the plan alternatives in the environmental impact statement (EIS) for a plan revision.

The area of influence does not include distant areas where members of the public have an interest in, or occasionally use the plan area unless social, cultural, and economic conditions in that more distant area would be substantially affected by the management of the plan area. For example, the interest of mountain bicyclists in Texas who travel to a national forest in Colorado for recreation, does not lead to parts of Texas being included in the area of influence of that national forest unless the potential change in mountain biking would substantially affect the social, cultural and economic conditions in Texas. Such influences of the plan area to more distant interests can be recognized as a consideration of the effect of the plan on the broader landscape (sec. 13.24 of this Handbook) , but it does not lead to evaluation of social, cultural and economic conditions in the distant area as part of the area of influence.

The Interdisciplinary Team should identify and evaluate available information about the area of influence that may include, but is not limited to:

1. Basic demographic data such as age, gender, population migration or density, education, and home ownership.
2. Minority and low-income populations as defined by Executive Order 12898 that warrant particular consideration for environmental justice.
3. Safety information about risks to the public related to the plan area.
4. Important cultural traditions.
5. Communities within the area of influence and their characteristics (for example, urban, rural, suburban).
6. Important sectors of the economy.
7. Employment and unemployment.
8. Levels and sources of household or per capita income (such as wages and transfer payments).
9. Language diversity and English proficiency, consistent with Executive Order 13166 (Improving Access for Persons with Limited English Proficiency).

13.22 – Important Social, Cultural, and Economic Influences on the Plan Area

The Interdisciplinary Team should briefly describe the types of social, economic, or cultural dynamics that affect the plan area, in all seasons. This information can also be used to help identify how social and economic trends may impact ecological conditions and integrity.

These may include:

1. Demand from local, regional, State, tribal, and national interests, and the public for specific resources and ecosystem services including, but not limited to, clean air and water, flood risk management, recreation opportunities (motorized and nonmotorized, passive and active) forest products, minerals and food, and fiber production.
2. Interest in specific uses, environments, or management, including requests for specific treatments, restoration activities, or fire management strategies.
3. Cultural needs related to traditional and historic uses of the plan area by various communities, Indian Tribes, and Alaska Native Corporations.

4. Economic trends such as fragmentation from land use changes and broader economic conditions that are influencing the plan and the area of influence.

13.23 – Influence of the Plan Area on Social, Cultural, and Economic Conditions in the Area(s) of influence

Information about the social, cultural, and economic conditions in the area(s) of influence (sec. 13.22 of this Handbook) should be used to help identify what are the social, cultural, and economic conditions that are most affected by the management of the plan area. Some social, cultural, and economic conditions in the area of influence are sensitive to changes in the management of the plan area while others are not. Social, cultural, and economic conditions in the area of influence that are neither sensitive to, nor affect, the management of the plan area may not merit further detailed analysis in the planning process. The assessment should identify the social, cultural, and economic conditions that are sensitive to the management of the plan area.

1. The Interdisciplinary Team should identify and evaluate available information about the plan area's relationship to the social, cultural, and economic conditions in the area(s) of influence, such as:
 - a. Connection between the contributions of the plan area and the social, cultural, and economic conditions.
 - b. Trends affecting the social, cultural, and economic conditions.
 - c. Opportunities for the plan area contributions to help in sustaining social, cultural, and economic conditions.
2. When identifying and evaluating the relationship of the plan area to social conditions, the Interdisciplinary Team may consider conditions such as:
 - a. Activities and traditions that connect people to the plan area such as recreation, education, and interpretation activities and opportunities.
 - b. Sense of place (special value people associate with an area) within the plan area.
 - c. Settlement patterns, land-use change, and land-use conflicts within or near the plan area.
 - d. Influence of the plan area on community health and safety, including conditions such as frequency of accidents, pollution, or crime. This includes consideration of impacts from the plan area on environmental justice populations as identified in Executive Order 12898.

- e. Other conditions and trends described in sections 13.3 and 14 of the Handbook.
3. When identifying and evaluating the relationship of the plan area to cultural conditions, the Interdisciplinary Team may consider conditions such as:
- a. Activities, traditions, cultural events, and values of the community that are linked to the plan area.
 - b. Historical legacies and cultural or artistic connections between the plan area and communities.
 - c. Location of and access to fishing, hunting, or plant harvesting areas within or near the plan area.
 - d. Other conditions and trends described for the resources and designated areas described in sections 13.3 through 14 of this Handbook, including section 13.8 about cultural and historic resources and uses in the plan area.
4. When identifying and evaluating the relationship of the plan area to economic conditions, the Interdisciplinary Team may consider conditions such as:
- a. Economic contributions of multiple uses and ecosystem services in the plan areas as described in sections 13.3 through 14 of this Handbook and opportunities derived from recreational visitors that generate local business opportunities.
 - b. Role of infrastructure within the plan area in supporting economic activity in the area of influence.
 - c. Economic contributions from Forest Service expenditures of the plan unit including employment and income of Forest Service employees, nonsalary expenditures of the Forest Service, and payments to local governments if influenced by the land management plan.
 - d. Aesthetics of the plan area that may enhance the attractiveness of the area for residents or businesses.
 - e. Indirect and induced economic impacts generated by the direct contributions of plan area in items a, b, and c of this list.

13.24 – Influence of the Plan Area on Social, Cultural, and Economic Conditions in the Broader Landscape

In addition to the influence of the plan area on social, cultural, and economic conditions in the area of influence, the management of the plan area may have substantial influences that

extend beyond the area(s) of influence. These influences may include an influence to communities of interest who have a particular relationship to the plan area, such as the example of mountain bicyclists in Texas related to national forests in Colorado (sec. 13.21 of this Handbook). In some cases, these contributions may be important at a national or international scale. The assessment should identify these social, cultural, and economic connections of the plan area to the broader landscape and evaluate how management of the plan area may affect these connections. These connections may include some of the relationships described in section 13.23 of this Handbook considered at a broader scale.

1. The Interdisciplinary Team should identify and evaluate available information about the plan area's contributions to the social, cultural, and economic conditions in the broader landscape, such as:
 - a. Recreation opportunities present in the plan area that are sought by distant recreationists and recreational interests. These may include opportunities such as mountain climbing, river rafting, downhill or cross country skiing, riding off highway vehicles, or scenic driving. These opportunities help to support distant businesses connected with the manufacture or sale of recreation equipment or services related to recreation.
 - b. Unique landscape scenery in the plan area that is widely known and recognized as contributing the attractiveness of the broader landscape. This may include designated areas within the plan area.
 - c. Resources within the plan area such as fish, game, and plants that attract distant visitors not only for recreation but also for food.
 - d. Resources within the plan area that may be used as goods and services and contribute to the economy of the broader landscape. This can include contributions of water, timber, livestock, mineral or energy resources that are used in various agricultural, manufacturing, or other businesses.
 - e. Infrastructure that provides transportation between distant areas or delivers goods and services such as energy or electricity to more distant locations.

13.25 – Sources of Existing Information for Social, Cultural, and Economic Conditions

A variety of sources related to social, cultural, and economic conditions may provide relevant information for the assessment (secs. 13.2 through 13.9 of this Handbook). References to these sources of information can be found at:

<http://www.fs.fed.us/emc/nfma/TIPS/directives/ch10social.shtml>.

13.3 – Assessing Multiple Uses

The scope of the assessment for each of the following uses listed in the Multiple-Use Sustained-Yield Act should be generally commensurate with the current levels and potential of use in the plan area.

13.31 – Outdoor Recreation

See section 13.4 of this Handbook for guidance regarding assessment of the plan area's recreation settings, opportunities, access, and scenic character.

13.32 – Range

Range encompasses permanent forage-producing rangelands and temporary or transitory forage-producing conditions (such as after timber harvest or fire) that may sustain ungulate species of wildlife or to graze domestic livestock. If domestic livestock grazing occurs in the plan area, the assessment should identify and evaluate available information about how the plan area currently provides grazing forage for domestic livestock and ungulate species on both permanent rangelands and transitory range in forested landscapes. Section 12.1 of this Handbook gives guidance about assessing sustainability of specific ecosystems associated with rangelands, such as sagebrush, grasslands, and meadows.

The Interdisciplinary Team should identify and evaluate available information about range such as:

1. The current range condition in the plan area and trends influencing the range conditions. Relevant information can include current diversity and proportion of grazing arrangements within the plan area (for example, collaborative experiments, conventionally grazed lands, non-use areas).
2. The current level of grazing activity in the plan area and within the broader landscape.
3. The capability and productivity of the plan area to support grazing activity.
4. The impacts of grazing on ecological integrity and species diversity.
5. The contribution of grazing in the plan area to social, economic, and ecological sustainability. This may include the contributions of grazing in the plan area to social, cultural and economic conditions of communities outside the plan area.

References to a variety of internal and external sources related to range that may provide relevant information for the assessment can be found at:

<http://www.fs.fed.us/emc/nfma/TIPS/directives/ch10range.shtml>.

13.33 – Timber

Timber harvest and production can play an important role in attaining desired conditions for ecological sustainability and can contribute to social and economic sustainability. The assessment should identify and evaluate available information about how timber harvest and production contribute to social, economic, and ecological sustainability.

The Interdisciplinary Team should identify and evaluate available information such as:

1. The current condition of forests in the plan area including standing inventory, age classes, growth, and mortality.
2. The current levels of timber harvest and production in the plan area, including the purposes of timber harvest, outcomes of harvest activity, and ways in which timber is harvested (such as timber sales, stewardship contracts, or harvest incidental to other uses).
3. The current levels timber harvest and production in the broader landscape.
4. The GIS data and other information relevant to identifying land that may be suitable for timber production. (See FSH 1909.12, ch. 60).
5. The ability of timber harvest to affect forest resistance and resilience to stressors such as fire, insects, and disease.
6. The ability of timber harvest to maintain or restore key ecosystem characteristics of ecological sustainability (sec. 12 of this Handbook).
7. The current capacity and trend for logging and restoration services and infrastructure for processing wood within the broader landscape.
8. Trends that drive the supply and demand for timber in the plan area.
9. The impacts of timber harvest on ecological integrity and species diversity.
10. Contribution of timber harvest and production in the plan area for ecological, social, and economic sustainability.

References to a variety of internal and external sources related to timber that may provide relevant information for the assessment can be found at:

<http://www.fs.fed.us/emc/nfma/TIPS/directives/ch10range.shtml>.

13.34 – Watershed

The assessment should identify and evaluate available information about the contribution of watersheds and water resources to social and economic sustainability. This evaluation can build on information developed to support that part of the assessment that addresses ecological sustainability (sec.12.23 of this Handbook). The Interdisciplinary Team should identify and evaluate available information such as:

1. The contribution of water resources within the plan area for use and enjoyment by the public, both consumptive use including water withdrawals and diversions for agricultural, municipal, and commercial uses and non-consumptive use including water storage for flood control, hydropower, and recreation.
2. The conditions and trends related to water use and enjoyment in the plan area and the broader landscape.
3. The impacts of human water use on watersheds, ecological integrity and species diversity.
4. The impacts of human activities and multiple uses on watershed.
5. The role of water and watersheds in supporting other uses (recreation, hunting and fishing, special uses, cultural uses, and scenery).
6. Contribution of use and enjoyment of water from the plan area to social and economic sustainability

References to a variety of internal and external sources related to water and watershed that may provide relevant information for the assessment can be found at:

<http://www.fs.fed.us/emc/nfma/TIPS/directives/ch10watershed.shtml>.

13.35 – Fish, Wildlife, and Plants

The fish, wildlife, and plants of National Forest System lands are an important resource enjoyed by people in a variety of ways. This section provides guidance for assessing the contribution of fish, wildlife, and plants to social and economic sustainability. Guidance for assessing ecological conditions that support fish, wildlife, and plants is within sections 12.1 through 12.42 of this Handbook. Guidance for identifying at-risk species is within sections 12.5 through 12.55 of this Handbook.

The Interdisciplinary Team should identify and evaluate available information such as:

1. Fish, wildlife, and plant species commonly enjoyed and used by the public for hunting, fishing, trapping, gathering, observing, or sustenance, including cultural or tribal uses.
2. The conditions and trends in the plan area associated with these species and their uses.
3. The impacts of hunting, fishing, or plant collection on ecological integrity and species diversity
4. The contribution of the use and enjoyment of these species to social and economic sustainability.

References to a variety of internal and external sources related to fish, wildlife, and plants that may provide relevant information for the assessment can be found at:

<http://www.fs.fed.us/emc/nfma/TIPS/directives/ch10wildlife.shtml>.

13.4 – Assessing Recreation Settings, Opportunities and Access, and Scenic Character

Recreation contributes to social and economic sustainability and provides opportunities to connect people with nature. The focus of the assessment for recreation is to identify and evaluate available information about existing conditions, trends and sustainability of recreation settings, opportunities, uses, preferences, access, and scenic character. Conditions and trends are assessed within the plan area as well as in relation to the broader landscape. Information pertaining to both recreation and scenery can also be found in sections 12.3, 13.1 to 13.3, 13.6, 13.8, 13.9, and 14 of this Handbook.

The Interdisciplinary Team shall identify and evaluate available information about recreational settings and opportunities, including seasonal variation, using the Recreation Opportunity Spectrum (ROS). The Team shall also identify and evaluate available information about the existing and potential scenic character of the plan area based on maps and other information using the Scenery Management System. The Team shall also consider information provided by the public regarding recreation opportunities, activities, and scenery that are not covered in the Recreation Opportunity Spectrum, the Scenery Management System or the National Visitor Use Monitoring system.

Based on this information and other information as described below or identified by the public, the Responsible Official should assess the extent to which the plan area meets the demand for recreational opportunities and the ability of the plan area to sustain these recreation settings, opportunities, access, and scenic character.

1. The Interdisciplinary Team should identify and evaluate additional available information about recreation and scenic character of the plan area such as:
 - a. The types of recreational opportunities including both motorized and nonmotorized opportunities currently available in the plan area including their distribution and seasonal variation and the natural features and topography that enable the recreational opportunities.
 - b. The important recreational sites or areas in the plan area and their condition, including their safety for recreational activities.
 - c. The relationship among recreation activities, including the degree of compatibility or incompatibility.
 - d. The nature, extent, and condition of trails, roads, facilities, and other transportation and other infrastructure to provide recreational access (see also sec. 13.6 of this Handbook).
 - e. The opportunities within the plan area to foster greater connection between people and nature through education, experience, recreation, and stewardship.
 - f. The conditions and trends that are affecting the quality of recreational settings and scenic character in the plan area.
 - g. Information about the sustainability of the set of recreation settings, opportunities, access, and scenic character.
 - h. The potential of the plan area to expand or enhance existing, sustainable recreational opportunities and to offer new, sustainable recreational opportunities consistent with present or anticipated future public demand.
 - i. The impacts of recreation on ecological integrity and species diversity.
 - j. The contribution of recreation in the plan area to social, economic and ecological sustainability.
2. In addition, the Interdisciplinary Team should consider how influences outside the plan area may influence the demand for recreation in the plan area or the ability of the plan area to meet those demands. The Interdisciplinary Team should consider information such as:
 - a. The preferences of the public and demand for specific recreation opportunities or settings.

- b. The availability of recreation opportunities on other lands within the broader landscape.
- c. The stated goals in approved plans or other published reports of Tribes, States, or local governments for recreational opportunities in the plan area.
- d. The social, cultural, and economic conditions or trends such as changing population demographics, traditional uses, or income levels that influence the demand for various types of recreation activities.
- e. The emerging new or unique recreational trends or interests that may affect future demand for recreation in the plan area.
- f. The issues or dynamics involved in social, cultural, or economic conditions that may prevent or preclude minorities and, other underrepresented groups from seeking, accessing, or participating in recreational activities typically demanded by others.
- g. The regional, national, or international significance of the recreation settings and opportunities in the plan area when viewed within a larger landscape.

References to a variety of internal and external sources related to recreation and scenic character that may provide relevant information for the assessment can be found at:

<http://www.fs.fed.us/emc/nfma/TIPS/directives/ch10recreation.shtml>.

13.5 – Assessing Renewable and Nonrenewable Energy Resources, Mineral Resources and Geologic Hazards

The assessment should identify and evaluate available information about the contribution of renewable and nonrenewable energy and mineral resources to social and economic sustainability. Internal and external information resources related to renewable and nonrenewable energy, minerals, and geologic hazards are available.

References to a variety of internal and external sources related to renewable and nonrenewable energy resources, mineral resources and geologic hazards that may provide relevant information for the assessment can be found

at: <http://www.fs.fed.us/emc/nfma/TIPS/directives/ch10energy.shtml>.

13.51 – Renewable Energy Resources

Renewable energy sources may include wind, hydropower, solar, biomass, and geothermal. Federally-managed geothermal resources are managed under mineral regulations and are discussed at section 13.52 of this Handbook.

The Interdisciplinary Team should identify and evaluate available information such as:

1. Projections of renewable energy activity.
2. Potential of the plan area to provide renewable energy.
3. Trends that affect renewable energy activity in the plan area.
4. Existing energy transmission corridors and the potential need for new transmission corridors.
5. The impacts of renewable energy on ecological integrity and species diversity.
6. The contribution of renewable energy in the plan area to social and economic sustainability.

13.52 – Nonrenewable Energy and Mineral Resources

Energy and mineral resources provide raw materials that contribute to modern society. Each type of nonrenewable energy or mineral resource within the plan area requires consideration of applicable laws, jurisdiction of other Federal or State agencies, and valid existing rights, including non-Federal (that is, reserved and outstanding, or other private) mineral rights. The Forest Service has sole discretion in managing mineral materials or salable minerals in the Federal estate. Forest Service authority varies for other nonrenewable and energy resources based on the class of mineral involved (locatable, or leasable), the land status, and mineral ownership. Since the Forest Service does not have its own regulations for leasable commodities other than oil and gas, the Forest Service implements its program responsibilities for coal, geothermal, oil shale, tar sands, and other solid minerals through statutory language and via references to surface management agency responsibilities contained in Chapter 43 of the Code of Federal Regulations.

1. Regulations pertinent to specific mineral and nonrenewable resources are detailed below:
 - a. Coal resource management (43 CFR part 3420),
 - b. Geothermal resource leasing (43 CFR part 3201),
 - c. Solid leasable minerals other than coal and oil shale (43 CFR 3501.17),
 - d. Oil shale (43 CFR 3900.5),
 - e. Tar sands (43 CFR 3140),
 - f. Locatable minerals (36 CFR part 228, subpart A),

- g. Disposal of mineral materials (36 CFR part 228, subpart C), and
 - h. Oil and gas (36 CFR part 228, subpart E, section 228.102(c) and 43 CFR 3100).
- 2. Nonrenewable energy resources and mineral resources to be identified and evaluated in the assessment include the following:
 - a. Locatable minerals on public domain lands subject to the general mining laws and regulations (36 CFR 228 and 30 U.S.C. 22 et seq.) that include gold, silver, copper, molybdenum, and other minerals with unique properties.
 - b. Nonrenewable energy resources that generally include oil, natural gas, coal, oil shale, and tar sands. Where these minerals are part of the Federal mineral estate, they fall within the category of leasable minerals.
 - c. Non-energy leasable minerals that include phosphate, potassium, sodium, sulfur, gilsonite, asphalt, and hardrock minerals on acquired lands where the subsurface is owned by the Federal Government.
 - d. Geothermal energy resources.
 - e. Mineral materials (also referred to as salable minerals) that include common varieties of sand, gravel, stone, and other similar materials.
- 3. The Interdisciplinary Team should identify and evaluate available information about nonrenewable energy resources and mineral resources in the plan area such as:
 - a. Potential for occurrence of nonrenewable energy and mineral resources.
 - b. Current type, extent, and general location of nonrenewable energy and mineral activity and energy facilities in the plan area.
 - c. Information on previous decisions related to the Federal mineral estate including oil and gas availability decisions and coal suitability evaluations.
 - d. Projections of potential of nonrenewable energy and mineral activity or reasonably foreseeable development in the case of oil and gas.
 - e. Trends in nonrenewable energy and mineral activity in the plan area.
 - f. Known abandoned mines or mining related hazards in need of reclamation or restoration.
 - g. Noncommercial mineral collecting activities.

- h. The impacts of nonrenewable energy and mineral developments on ecological integrity and species diversity.
- i. The contribution of nonrenewable energy and mineral activity in the plan area to social and economic sustainability, including taxes, royalties, and fees.

The Bureau of Land Management (BLM) manages the Federal mineral estate for locatable and leasable mineral resources and has specific authorities and expertise in managing Federal minerals. Depending on the type and amount of the mineral resource occurrence in the plan area, coordination with BLM during the assessment may be warranted. For plan areas with Federal coal resource potential, the Responsible Official shall request an estimate of the coal development potential from the BLM for the plan assessment (43 CFR 3420.1-4((e)(1))).

13.53 – Geologic Hazards

The Interdisciplinary Team should also identify and evaluate available information about large, broad-scale, and major geologic hazards, including landslides, rock falls, mud flows, debris flows, snow avalanches, earthquakes, karst collapse, volcanoes, flooding, subsidence, acid-producing rock, and naturally occurring gases and minerals, such as asbestos, erionite, radon, and methane. In particular, the team should identify and evaluate hazardous geologic conditions in proximity to communities, infrastructure, established recreation areas, and other high use areas.

13.6 – Assessing Infrastructure

The assessment should identify and evaluate available information about the contribution of infrastructure to social and economic sustainability. The Interdisciplinary Team should identify and evaluate available information such as:

1. The location and condition of infrastructure within the plan area. The plan area's infrastructure includes the forest road system, recreational infrastructure (such as developed facilities, trails, resorts, and recreational residences), airstrips, administrative facilities, dams, water diversions, fences, communication towers, and bridges within the plan area. This information is for basic understanding of the role of infrastructure in the plan area, not to make evaluations about specific facilities.
2. The influence of infrastructure external to the plan area or outside of Forest Service authority that is relevant to the management of the plan area. An example of such infrastructure is a State or county road with important connections to the Forest Service road network.
3. Trends that may affect the condition or development of infrastructure within the plan area. These trends include increasing populations or land use changes affecting

needs for access and infrastructure to support current and future potential resource uses such as recreation, grazing, and mineral and energy development.

4. Information about the sustainability of the infrastructure, including planning unit's fiscal capability to maintain existing infrastructure and the current backlog of infrastructure maintenance.
5. Previously developed plans, assessments, reports or other materials such as travel management plans related to infrastructure in the plan area.
6. The impacts of infrastructure on ecological integrity and species diversity.
7. The infrastructure's contribution to social and economic sustainability.

References to a variety of internal and external sources related to infrastructure that may provide relevant information for the assessment can be found at: <http://www.fs.fed.us/emc/nfma/TIPS/directives/ch10infrastructure.shtml>.

13.7 – Assessing Areas of Tribal Importance

The assessment must recognize areas of tribal importance. The Interdisciplinary Team should identify and evaluate available information about:

1. Federally recognized Tribes, intertribal organizations, and Alaska Native Corporations associated with the plan area.
2. Existing tribal rights, including those involving hunting, fishing, gathering, and protecting cultural and spiritual sites.
3. Areas in the plan area or affected by management of the plan area that are known to be of importance to federally recognized Indian Tribes, intertribal organizations, and Alaska Native Corporations.
4. Conditions and trends of resources that affect areas of tribal importance and tribal rights.

The Responsible Official shall protect confidentiality regarding information that is culturally sensitive information to an Indian Tribe or Tribes as required by 36 CFR 219.1(e):

(e) During the planning process, the responsible official shall comply with Section 8106 of the Food, Conservation, and Energy Act of 2008 (25 U.S.C. 3056), Executive Order 13007 of May 24, 1996, Executive Order 13175 of November 6, 2000, laws, and other requirements with respect to disclosing or withholding under the Freedom of Information Act (5

U.S.C. 552) certain information regarding reburial sites or other information that is culturally sensitive to an Indian Tribe or Tribes.

The Responsible Official should request information from Indian Tribes about these areas of tribal importance. If available, memoranda of understanding with local Tribes may be helpful sources of information about such areas. The Responsible Official should also consider relevant tribal consultation reports and analysis from Forest Service Research Stations.

FSH 1909.12, chapter 40, section 43 of, has additional information on tribal consultation for planning.

References to sources of information related to areas of tribal importance that may provide relevant information for the assessment can be found at:

<http://www.fs.fed.us/emc/nfma/TIPS/directives/ch10tribal.shtml>.

13.8 – Assessing Cultural and Historic Resources and Uses

The assessment should identify and evaluate available information about the contribution of cultural and historic resources and uses to social and economic sustainability. These cultural resources include priority heritage assets as defined in FSM 2360.5 within the plan area and all officially designated historic properties. Priority heritage assets would include those cultural and historic assets that have already been recognized as having importance in the plan area.

Benefits of cultural and historic resources can include expanded knowledge and understanding of history, cultural, and spiritual connections to our heritage, scientific data about past cultures or historical conditions, human adaptation to past climatic events and similar matters, and tourism that benefits rural economies.

The Interdisciplinary Team should identify and evaluate available information such as:

1. The cultural and historical context of the plan area within the broader landscape.
2. The cultural and historic resources, including heritage assets present in the plan area.
3. The condition of known cultural and historic resources, including historic properties in the plan area identified as eligible or listed in the *National Register of Historic Places* at <http://www.nps.gov/nr/> and designated traditional cultural properties.
4. The trends that affect the condition of, or the demand for, cultural and historic resources or cultural uses, including influences of public use and Forest Service management.
5. The opportunities within the plan area to foster greater connection between people and cultural and historic resources and landscapes beyond the plan area.

6. The contribution of the use and enjoyment of cultural and historic resources to social, economic, and ecological sustainability.

References to a variety of internal and external sources related to cultural and historic resources and that may provide relevant information for the assessment can be found at: <http://www.fs.fed.us/emc/nfma/TIPS/directives/ch10cultural.shtml>.

Some information in these internal and external sources of information may be considered protected or confidential and may not be made available for public dissemination even under the Freedom of Information Act. See FSM 2360.91 concerning the use, storage, and dissemination of information concerning cultural and historic resources.

13.9 – Assessing Land Status and Ownership, Use, and Access Patterns

The assessment should include information describing how land status, ownership, use, and access patterns influence the plan area and how management of the plan area may influence land use and access.

Land ownership and land status are the basic pattern of public and private ownership of both surface and subsurface estates and legal restrictions and permissions on the use of the land. Land ownership and land status includes public domain lands, acquired lands (and the authority under which they were acquired), lands with the reserved or outstanding mineral rights, existing rights of way, leased lands, withdrawals of lands from mineral entry or other uses, and lands in designated areas described in section 14. Land ownership and land status also includes Indian Trust lands and Treaty rights to animals and fish of the plan area. Private land inholdings within the proclaimed boundaries of National Forests and Grasslands but outside of the plan area are also part of land ownership considerations as they influence management of the plan area.

Land status also refers to planning, zoning, easements, or other legal designations for private lands and formal management status of other public lands (such as national parks, state forests, and local parks).

Land use is the current use of land, such as residential, commercial, industrial, or agricultural use for private lands, and current land allocations and the uses permitted in existing land management plans for National Forest System or other public lands. Permitted land uses under local government authorities may provide important information about how future changes in land use may affect management of the plan area.

Access is the ability to move to, from, or through the plan area by any means including pedestrian access from properties adjacent to the plan area and air access to airstrips in the plan area.

The Interdisciplinary Team should identify and evaluate available information such as:

1. Existing patterns of land ownership, status, and use both within the plan area and outside the plan area in neighboring lands.
2. Trends affecting land status, ownership, and use with particular attention to trends within or near the plan area's boundary.
3. Influence of the plan area on land ownership, status, and use within the broader landscape.
4. Access to, from or through the plan area for various modes of transportation (ranging from pedestrian to aircraft) and from urban and rural locations near the plan area.
5. Opportunities to provide open space connections with lands in other ownerships.
6. Trends of land status and ownership affecting access to the plan area and how these trends affect use of the plan area.
7. Influence of these conditions and trends of land ownership, status, use, and access on social, cultural, economic, and ecological conditions.

References to a variety of internal and external sources related to land ownership, status, use and access that may provide relevant information for the assessment can be found at <http://www.fs.fed.us/emc/nfma/TIPS/directives/ch10land.shtml>.

14 –Assessing Designated Areas

Designated areas are specific areas or features within the plan area that have been given a permanent designation to maintain its unique special character or purpose. Some categories of designated areas may be established only by statute (statutorily designated areas or often called Congressionally designated areas) and other administrative processes of the Federal executive branch may establish some categories administratively (administratively designated areas). Certain purposes and restrictions are usually established for designated areas, which greatly influence management needs and opportunities associated with them.

Exhibit 01 of this section lists the types of statutorily designated areas and administratively designated areas that may be present or potentially designated in National Forest System plan areas; and the administratively designated areas that the Regional Forester may designate. This exhibit is not comprehensive, as plan areas may have other types of existing designated areas established by specific legislation or other administrative action that is unique to the plan area.

The assessment should identify designated areas established within the plan area.

The Interdisciplinary Team should identify and evaluate available information about designated areas including:

1. Types, purposes, and locations of established designated areas within the plan area. The Responsible Official should use a map to identify these locations, unless the location of the designated area must remain confidential for resource protection.
2. Range of uses, management activities, or management restrictions associated with the established designated areas in the plan area.
3. Existing plans for the management of established designated areas within the plan area, such as comprehensive plans for national scenic or historic trails.
4. Potential need and opportunity for additional designated areas. The Interdisciplinary Team should identify and evaluate available information to answer questions such as:
 - a. Are there published documents or proposals that identify an important need or potential for a designated area? For example, a research report may indicate a need for an experimental forest within the plan area.
 - b. Are there other proposals for designated areas before Congress, in proposals from collaborative efforts or from previous plans?
 - c. Are there specific land types or ecosystems present in the plan area that are not currently represented or minimally represented?
 - d. Are there rare or outstanding resources in the plan area appropriate to specific types of designated areas?
 - e. Are there known opportunities to highlight unique recreational or scenic areas in the plan area to provide for sustainable recreation opportunities?
 - f. Is there scientific or historical information that suggests a unique opportunity to highlight specific educational, historic, cultural, or research opportunities?
 - g. Has a need or opportunity for specific designated areas been identified in the plans of States, Tribes, counties, and other local governments?
 - h. Are there known important ecological roles such as providing habitat or connectivity for species at risk that could be supported by designation?
5. How do designated areas contribute to social, economic, and ecological sustainability?

Forest Service Handbook 1909.12 – Land Management Planning Handbook

Chapter 10 - Assessments

Amendment: 1909.12-2015-1

Effective date: January 30, 2015

Assessing designated areas under items 4 and 5 in the preceding list does not require an identification and evaluation of every potential designated area that could apply in the plan area. It is a review of existing information to evaluate what opportunities have been identified in the area and what needs could be met with designated areas.

Before the Responsible Official invites comments on the proposed plan, an inventory and evaluation is required for lands that may be suitable for inclusion in the National Wilderness Preservation System (see FSH 1909.12, ch. 70), and an inventory of the eligibility of rivers for inclusion in the Wild, and Scenic Rivers System is required (see FSH 1909.12, ch. 80). These inventories may begin during or after the assessment using existing information to the extent possible, and must provide opportunities for public and intergovernmental participation. The inventories may only become final and evaluation of the inventories may only begin after the assessment is complete. The inventories and evaluation are not completed until the final environmental impact statement is published.

14 - Exhibit 01

Designated Areas

| Designated Areas |
|--|
| Statutorily Designated Areas |
| National Heritage Area |
| National Monument* |
| National Recreation Area |
| National Scenic Area |
| National Scenic and Historic Trails |
| Wild and Scenic River |
| Wilderness, or Wilderness Study Areas |
| Highway Systems, Interstate and National |
| Administratively Designated Areas |
| Critical Habitat under ESA |
| Experimental Forest or Range |
| Inventoried Roadless Areas or Roadless Areas designated under state rules in 36 CFR Part 294 |
| National Natural Landmark |
| National Historic Landmark |
| National Monument* |
| National Recreation Trails |
| Research Natural Area |
| Scenic Byway – Forest Service |
| Scenic Byway – National |
| Significant Caves |
| Wild Horse and Burro Territories |
| Regional Forester Administratively Designated Areas |
| Botanical Area |
| Geological Area |
| Scenic Area |
| Zoological Area |
| Paleontological Area |
| Historical Area |
| Recreational Area |

* National Monuments may be congressionally or administratively designated.

15 – Assessments for Plan Amendments

(c) Plan amendment assessments. Where the responsible official determines that a new assessment is needed to inform an amendment, the responsible official has the discretion to determine the scope, scale, process, and content for the assessment depending on the topic or topics to be addressed. (36 CFR 219.6)

An assessment is not required to amend a plan (FSH 1909.12, ch. 20, sec. 21.2. Other documentation, such as a monitoring evaluation report or other source of new information indicating changed conditions in the plan area, may suffice to determine the need for an amendment. However, the Responsible Official may determine that an assessment is useful, to identify relevant available information and evaluate conditions and trends of social, cultural, economic, and ecological systems relevant to the issues that indicate an amendment may be needed. The breadth, scale and complexity of the issues would typically determine the breadth, scale, and complexity of the assessment.