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After Hurricane Hugo



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Francis Marion
National Forest

Final Revised Land Management Plan



Forest
Service

Region 8

Francis Marion
National Forest

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Francis Marion National Forest Final Revised Land Management Plan

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Chapter 1. Purpose of and Need for Action

1.1 Introduction

The Forest Service has developed this land management plan (also referred to as the “forest plan” or “the plan”) to guide the general management direction of the Francis Marion National Forest during the next 15 years. This document, developed under the 2012 Planning Regulations outlined in 36 CFR 291 (“2012 planning rule” or “2012 planning regulations”), is a second revision of the original forest plan prepared in 1985 under the National Forest Management Act (NFMA). The 1996 forest plan focused on recovery efforts from Hurricane Hugo. During the past 19 years, some aspects of this forest plan have remained valid; however, some issues, conditions and practices have changed. This plan revision incorporates new information, addresses evolving issues and trends, accounts for changes in national policy and direction and includes updated views from the public.

This revised forest plan is the result of a multi-year planning process and collaboration with the public including other federal agencies and state and local government. It differs from the previous plan by focusing more on an integrated vision of ecological, social and economic sustainability and connecting people to nature. Desired conditions describe how we want the national forest to look and function in the future rather than how individual projects would be implemented. This plan uses a new format and emphasizes an adaptive management approach that will continue to include public participation and technical adjustments as needed.

1.2 Location of the Plan Area

The Francis Marion National Forest (referred to as the Francis Marion or the Forest) is located along South Carolina’s coast, within a one-hour drive northeast of Charleston. Located within Berkeley and Charleston counties, the forest contains 259,625 acres (see Figure 1-1). The triangle-shaped forest is bounded by the Santee River to the north, the Intracoastal Waterway to the east and Lake Moultrie and the Cooper River to the west.

The forest comprises about 1.2 percent of South Carolina’s land base. Major roads in the forest include U.S. highways 17, 17A and 52, as well as state highways 41 and 45. The area on the southern and western edge of the Francis Marion is predominantly urban. Private lands within the proclamation boundary of the Francis Marion are rural, but includes the larger communities of Awendaw, Huger, Jamestown and McClellanville and many smaller crossroad (unincorporated) communities.

1.3 Purpose of the Forest Plan

The purpose this plan is to guide future projects, practices, uses and protection measures to assure sustainable multiple-use management on national lands on the Francis Marion. This plan describes activities that would likely be implemented to achieve outcomes or desired conditions on national forest lands, as well as the resulting public benefits from the Francis Marion. Direction within the forest plan apply only to national forest land and do not imply any form of direction for other ownerships. Per direction in 36 CFR 219.2. A plan does not authorize projects or activities or commit the Forest Service to take action. A plan may constrain the Agency from authorizing or carrying out projects and activities, or the manner in which they may occur. Projects and activities must be consistent with the plan (36 CFR 219.15). *A plan does not regulate*

uses by the public, but a project or activity decision that regulates a use by the public under 36 CFR Part 261, Subpart B, may be made contemporaneously with the approval of a plan, plan amendment, or plan revision....The supervisor or district ranger is the responsible official for project and activity decisions, unless a higher-level official acts as the responsible official.

This plan supports an adaptive management approach, which emphasizes checking results as conditions change and making the plan more adaptable to changes in social, economic and environmental conditions.

The required components (hereafter referred to as “plan components”), which guide future projects and activities on national forest land for the Francis Marion are described below and include the following:

- Desired conditions (Chapter 2);
- Objectives (Chapter 3);
- Standards and Guidelines (Chapter 4);
- Suitability of national forest lands for timber production and for various other uses (Chapter 4).

The plan must identify where these plan components apply in either Management Areas or Geographic Areas (Chapter 2). Plan components are further defined below.

Desired Conditions. A desired condition is a description of specific social, economic and/or ecological characteristics of the plan area, or a portion of the plan area, toward which management of the land should be directed. Desired conditions must be specific enough to measure progress toward their achievement but do not include completion dates. As noted above, desired conditions do not commit the Forest Service to take action.

Objectives. An objective is a concise, measurable and time-specific statement of a desired rate of progress toward a desired condition or conditions. Objectives should be based on reasonably foreseeable financial considerations. Specific objectives and management strategies outlined in this plan describe our approach for moving the Francis Marion's resources toward the desired conditions—they are stepping stones of achievement. Objectives do not commit the Forest Service to take action. Site-specific decisions to implement the forest plan are required.

Standards. A standard is a mandatory constraint on project and activity decision-making, established to help achieve or maintain desired conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.

Guidelines. A guideline is a constraint on project and activity decision-making that allows for departure from its terms, so long as the purpose of the guideline is met.

Goals. Goals are optional plan components that we are using in the Resource Integration Zones. Goals are broad statements of intent, other than desired conditions, usually related to process or interaction with the public. Goals are expressed in broad, general terms, but do not include completion dates.

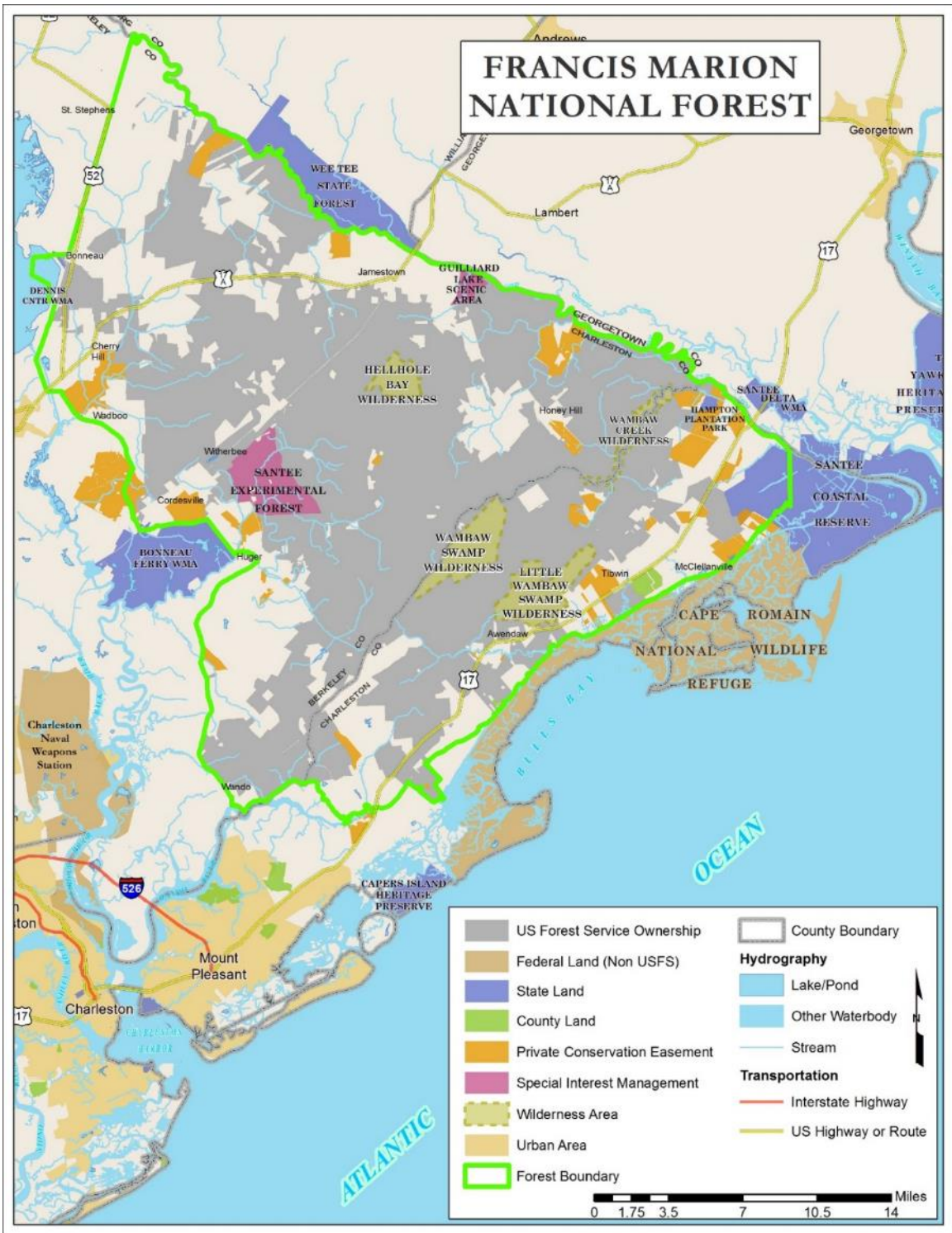


Figure 1-1. Map of the Francis Marion National Forest

Suitability of Lands. Specific lands within a plan area are identified as suitable for various multiple uses or activities based on the desired conditions applicable to those lands. The plan identifies lands as not suitable for uses that are not compatible with desired conditions for those lands. Suitability determinations are not made for all uses, but by law, there must be a determination of the lands that are suitable and not suitable for timber production. The fact that lands are considered suitable for a use or uses is not a commitment to authorize such use.

Management Areas or Geographic Area. This plan has 2 management areas (Management Areas 1 and 2) and 4 geographic areas (Resource Integration Zones). The plan identifies whether the plan components apply to the entire plan area, to specific management areas or geographic areas, or other areas identified in the plan.

- *Management Areas:* A land area identified within the planning area that has the same set of applicable plan components. A management area does not have to be spatially contiguous.
- *Geographic Areas:* A spatially contiguous land area identified within the planning area. A geographic area may overlap with a management area.

In addition to the plan components, the forest plan also identifies the following:

- Areas recommended for inclusion in the wilderness preservation system;
- Eligible wild and scenic rivers (Chapter 2);
- Existing and recommended designated areas (Chapter 2);
- The maximum quantity of timber that may be removed from the plan area (Chapter 2, Appendix B);
- Watersheds that are a priority for restoration Chapter 2);
- Distinctive roles and contributions within the broader landscape (Chapter 1);
- A monitoring program (Chapter 5); and
- Probable activities (Appendix C);

This plan includes optional information about management strategies and partnership opportunities that can be used to coordinate the achievement of desired conditions and objectives. Management strategies describe how the Forest Service intends to move the Forest's resources toward desired conditions, including objectives and management approaches to implementation. Management strategies are not plan components and do not require compliance, but instead, they describe potential ways about how objectives may be achieved (Chapter 3, Management Strategies per objective).

1.4 Consistency of Projects with the Forest Plan

All projects and activities authorized by the Forest Service must be consistent with the forest plan (16 USC 1604(i) and 36 CFR 219.15(b-c)). If a proposed project or activity is not consistent with the forest plan, the Responsible Official has the following options (subject to valid existing rights):

- Modify the proposed project or activity to make it consistent with the applicable plan components;
- Reject the proposal or terminate the project or activity;

- Amend the plan so that the project or activity will be consistent with the plan as amended; or
- Amend the plan contemporaneously with the approval of the project or activity so that the project or activity will be consistent with the plan as amended. This amendment may be limited to apply only to the project or activity.

The following criteria should be used in determining if a project or activity is consistent with the forest plan (36 CFR 219.15(d)):

Goals, desired conditions, and objectives – The project or activity contributes to the maintenance or attainment of one or more goals, desired conditions, or objectives, or does not foreclose the opportunity to maintain or achieve any goals, desired conditions, or objectives, over the long term.

Standards – The project or activity complies with the applicable standards.

Guidelines – The project or activity complies with the applicable guidelines as set out in the plan, or is designed in a way that is as effective in achieving the purpose of the applicable guidelines.

Suitability – A project or activity can occur in an area that the plan identifies as suitable for that type of project or activity; or for which the plan is silent with respect to its suitability for that type of project or activity.

1.5 Forest Plan Structure

The plan is divided into 5 chapters, a glossary, references and several appendices as follows.

Chapter 1 – Purpose of and Need for Action. The introduction provides an overview of the Francis Marion and describes the purpose and structure of this revised land and resource management plan. This chapter also describes distinctive roles and contributions of the plan area, as well as themes generated from public involvement.

Chapter 2 – Vision. Chapter 2 outlines the desired conditions at the forestwide level; for management areas (Management Areas 1 and 2) and for geographic areas (Resource Integration Zones). Desired conditions provide for ecological integrity and contribute to social sustainability.

Chapter 3 – Objectives and Management Strategies. The objectives for making progress toward desired conditions are documented here. The objectives provide measurable amounts and timing for achieving all or portions of the desired conditions. Management strategies, which are not plan components, but instead potential means for how to achieve objectives are discussed here.

Chapter 4 – Design Criteria. This section lists standards and guidelines that establish sideboards for framing projects and activities and ensure resource protection as the agency implements projects that move the forest toward desired conditions. Chapter 4 also points to existing management direction (e.g., public laws, regulations, Forest Service manuals and handbooks and federal policies) and are generally not restated in this plan. The suitability and non-suitability of lands for certain uses is also documented in this chapter

Chapter 5 – Monitoring. This section describes the plan's adaptive management strategy and monitoring program which will provide information to determine whether programs and projects

are meeting forest plan direction and whether the plan should be amended or revised. Chapter 5 also establishes monitoring questions for the agency to answer during plan implementation.

Appendices.

Appendix A: Ecosystems of the Francis Marion

Appendix B: Timber Analysis

Appendix C: Estimated Vegetation Management Activities

Appendix D: Francis Marion National Forest At-risk Species (Threatened and Endangered Species and Species of Conservation Concern)

Appendix E: Maps

Appendix F: Monitoring Criteria, Broad-scale Monitoring, and Research Needs

Appendix G: Acronyms and Definitions

Appendix H: Description of the Resource Integration Zones

Appendix J: Reasonable and Prudent Measures

1.6 Distinctive Roles and Contributions of the Francis Marion

The forest provides environmental, social and economic benefits to local and regional communities, as well as to people across the nation, making the Francis Marion an important and unique part of South Carolina's Lowcountry.

1.6.1 Environmental Benefits

Core areas of the forest's natural habitats represent some of the last and best examples of native ecosystems in the Southeast. For this reason, the Francis Marion is a haven for native plant and animal species including many that are rare and declining. These lands are especially important to:

1. Species requiring large areas of undeveloped habitat (e.g., black bear);
2. Species requiring core areas of mature forest (e.g., some forest songbirds and the endangered red-cockaded woodpecker (RCW)); and
3. Ecosystems and species dependent on appropriate kinds of ecological disturbance such as frequent fire or flooding. Some high-quality examples of these ecosystems and species found on the Francis Marion include:
 - a. Carolina bays and limestone sinks, 2 special geological features found throughout the forest. Carolina bays are home to many rare plants such as the endangered Canby's dropwort.
 - b. Poorly drained areas such as swamps, floodplains, upland flats and coastal marshes. These areas provide wintering and breeding habitat for many waterfowl species, osprey and wading birds, as well as foraging and nesting habitats for the bald eagle, the northernmost established nesting population of the American swallow-tailed kite, frosted flatwoods salamander and the Carolina gopher frog.

- c. The fire-adapted longleaf pine ecosystem, one of the most diverse ecosystems in the United States. This ecosystem, which supports RCW and American chaffseed, is found on ridges and better drained areas throughout the forest, as well as on wet, seasonally saturated mineral soils.

1.6.2 Social Benefits

Today, the Francis Marion continues to improve the quality of life for Americans in the following ways:

1. Protecting scenic, historic and culturally important landscapes;
2. Sustaining traditional ways of life by providing hunting and fishing opportunities and creating jobs through restoration efforts and ecotourism; and
3. Providing places to engage in outdoor recreation, including opportunities to get away from the hectic pace of city life, find peace and solitude and enjoy the natural environment by picnicking, kayaking, fishing, hunting and bird watching.

The Francis Marion's proximity to the Cape Romain National Wildlife Refuge (managed by U.S. Fish and Wildlife Service (USFWS)) and the Santee Coastal Reserve Wildlife Management Area (South Carolina Department of Natural Resources) enhances its recreation role. These publicly owned lands provide access to the Atlantic Ocean, the Intracoastal Waterway, Santee River and Cooper River and numerous canoe, hiking, biking and horseback riding trails. The Francis Marion provides a variety of recreational offerings such as fishing, boating and swimming. Approximately 90 miles of trails on the Forest offer hiking, canoeing, horseback riding, motorcycling and off-highway vehicle (OHV) riding opportunities. Four wildernesses in the Forest totaling 13,812 acres consist mostly of wetland areas with swamps, creeks and some bottomland forests and provide solitude opportunities.

The forest is also home to many small communities within the proclamation boundary. These crossroads communities have for generations benefited from the unique cultural settings of the Lowcountry and the Francis Marion National Forest.

The forest offers one of the largest and most consolidated, contiguous areas of publicly owned land available for hunting and fishing in the state. It also provides excellent opportunities to hunt wild turkey, whitetail deer, gray squirrel and other small mammals and to fish in hundreds of miles of clear streams, as well as several lakes and ponds.

Forest Service personnel work closely with state and local agencies to promote Community Wildfire Protection and Planning (community wildfire planning) and Firewise Communities (Firewise), which encourage local solutions for homeowners to reduce wildfire risk. Community wildfire planning uses a collaborative approach that works across boundaries to create fire-adapted communities.

An enduring asset within the Francis Marion is the Santee Experimental Forest, a part of the U.S. Forest Service Southern Research Station's Center for Forested Wetlands Research. Its mission is to develop, quantify and synthesize ecological information needed to sustainably manage and restore the structure, function and productivity of wetland-dominated forested landscapes. In addition, the Santee Experimental Forest provides opportunities for research and education.

On a local, regional and national scale, the forest provides additional assets. For example, the Francis Marion:

1. Is within one day's drive for millions of people and is a common destination for outdoor recreation enthusiasts from the growing major metropolitan areas in South Carolina (Charleston, Columbia and Greenville); North Carolina (Charlotte, Raleigh, Durham and Greensboro); and Georgia (Savannah, Augusta, Athens and Atlanta). A significant number of visitors also visit from across the country.
2. Connects to the East Coast Greenway, a 2,500-mile traffic-free path linking East Coast cities from Maine to Florida, as well as the Palmetto Trail, a 500-mile hiking and bicycling trail from South Carolina's mountains to the coast. Forest personnel are working with Mount Pleasant, Awendaw, Moncks Corner and other neighboring communities to connect people to the forest via trails and partnerships.
3. Provides water recharge for groundwater basins that provide drinking water to local residences and agricultural and industrial users.
4. Is part of the Gullah-Geechee Heritage Corridor which extends from Wilmington, North Carolina to Jacksonville, Florida. According to the Gullah-Geechee Heritage Corridor website, "People who identify as Gullah or Geechee represent the many ways that Africans in the Americas have held on to and amalgamated the traditions of Africa with the cultures they encountered both during and after enslavement." <http://www.nps.gov/guge/learn/historyculture/index.htm>
5. Works with the South Atlantic Landscape Conservation Cooperative, Sewee Longleaf Landscape Cooperative, Longleaf Alliance and other partners to develop conservation opportunities across landscapes.
6. Provides habitat for one of the largest RCW populations in the world. Juvenile woodpeckers are translocated to suitable sites across the Southeast.

1.6.3 Economic Benefits

The Francis Marion generates products and services that provide economic opportunities, jobs and benefits through sustainable recreation, tourism and timber harvest, as well as restoration activities and other forest products. Timber harvest from the Forest has contributed to the local economy for more than 70 years. Trees established after Hurricane Hugo devastated the South Carolina coast in 1989 have grown to a merchantable size; today, timber is being sold from this post-Hugo forest. The forest also is an important source of high-quality wood products for local and regional economies. Timber sale revenues contribute to local economies; ecotourism provides employment opportunities.

1.7 Future Direction of the Forest

The organization of this forest plan reflects the interconnected nature of the ecological, social and economic conditions and the integrated approach that is critical to carrying out future on-the-ground projects.

1.7.1 Emerging Themes

This section describes 6 emerging themes that were developed from public involvement efforts; changes in laws, policy or regulations; changing conditions, such as increased development; or new information. These 6 themes are broad concepts relating to public preferences and forest management needs and were used as guidance as this revised forest plan was developed.

Theme 1: Maintain or restore the Francis Marion’s unique landscapes and features.

With approximately 260,000 acres of natural landscapes adjacent to the Atlantic Ocean and the major metropolitan area of Charleston, the Francis Marion has many natural features that are unique in local and regional settings. These landscapes form important ecological and historical centerpieces for the surrounding area. For example, the Francis Marion’s restored longleaf pine ecosystems provide not only habitat for animals like the endangered RCW, but also outstanding scenery of open pine stands with grasses and rare plants. Wetland drainage, stream and other hydrologic modifications have altered habitats and function. The aquatic ecosystem, watershed and riparian area restoration are included in this theme.

Theme 2: Improve the quality of life and health for the public.

During the public involvement and collaboration process, the public indicated that interacting with the forest environment improves quality of life, health and wellbeing. Individuals specifically cited the following: getting away from congestion and reducing stress; enjoying the benefits of silence; becoming healthier through exercise; learning about the natural environment; and sustaining income and other basic needs for living. Along with the Cape Romain Wildlife Refuge, the Francis Marion provides the largest consolidated tract of publicly owned land in South Carolina. The forest provides the ecosystem services (benefits), among them are: clean water and air, sustainable recreation, wood and special forest products. The forest provides a sense of place for stakeholders—a place to connect with nature.

Theme 3: Respond to challenges.

The public is keenly interested in how the forest plan addresses today’s major challenges which include the following: a) maintaining fire-adapted natural systems in the face of severe prescribed fire restrictions in areas adjacent to development; b) responding to a changing climate, such as sea level rise, as well as responding to natural disturbances of hurricanes, wildfire, floods and droughts; c) reducing non-native invasive species as a major threat of native ecosystems; d) controlling effects of insects and disease and, f) increasing pressures for more recreation opportunities in challenging economic times of low funding capabilities.

Theme 4: Share operational and planning resources among partners; keep ongoing collaborative efforts vibrant and develop new ones.

Integrating Forest Service planning efforts with other planning efforts are important to the public, especially during this time of expanding communication technology. The public is interested in a forest plan that considers cooperative efforts that can “make a bigger pie.” Examples include landscape scale restoration and community wildfire protection planning.

Theme 5: Develop a monitoring strategy that provides information for rapid responses to changing conditions.

A broad-scale and local-level monitoring strategy is needed to respond to changing conditions. The public are interested in how the careful crafting of a broad-scale monitoring program can provide information for local level adjustments on the Francis Marion. Moreover, individuals would like to know how information from other government agencies and NGOs can support a robust adaptive management system.

Theme 6: Integrate and coordinate resource management.

The public wants an integrated approach to manage for multiple use of the forest's various natural resources. The basic premise for this theme is how the desired conditions for landscapes and compatible multiple uses are packaged in the resource integration zones in order to derive public benefits while protecting sensitive areas.

Chapter 2. Vision

Introduction

The desired conditions for management of the Francis Marion National Forest are documented in this chapter. The desired conditions lay out the vision for the forest over the next 10 to 15. Desired Conditions can apply forest-wide or at different scales that apply to portions of the Francis Marion. Chapter 2 is organized by Ecological Sustainability and Social and Economic Sustainability.

Forest plans are strategic in nature and do not compel the agency to undertake any site-specific projects. Rather plans establish overall desired conditions and objectives that the individual national forest strives to meet. Forest plans also establish limitations on what actions would be authorized and what conditions would be met during project level decision-making. Future projects will follow direction contained in the Plan but actual activities accomplished will be determined by annual budgets and site-specific project analyses and decisions.

This forest plan contributes social, economic, and ecological sustainability within Forest Service authority and consistent with the inherent capability of the plan area. This forest plan strives to integrate resource management which recognizes the interdependence of ecological resources and need for integrated consideration of ecological, social, and economic factors in management of national forest lands.

Major sections of Chapter 2 are:

2.0 Overview of Desired Conditions

2.1 Ecological Sustainability

Ecosystem Maintenance and Restoration

Management Areas

Species Diversity

Watershed Restoration

Stressors and Threats

2.2 Social and Economic Sustainability

Sustainable Recreation

Multiple Use Benefits

Connecting with Communities and Partners

2.3 Resource Integration

Coastal

Wando

Wambaw

Santee

Overview

Desired Conditions can apply forest-wide or at different scales. For this forest plan, three “layers” of direction are used: Ecosystems and Management Areas and Resource Integration Zones. Below is a brief overview of these three layers of plan direction and how this direction is organized in the forest plan.

2.1 Ecological Sustainability

Our forest plan direction provides for a complementary ecosystem and species-specific approach for maintaining the diversity of plant and animal communities and the persistence of native species in the plan area. This complimentary system is also referred to as a coarse-filter/fine-filter approach. Desired conditions to provide ecological sustainability are described in 5 subsections:

2.1.1 Ecosystem Maintenance and Restoration meets the coarse-filter conditions. At the coarse-filter level, we used a native ecosystem and terrestrial ecological unit framework because native plants and wildlife evolved and adapted within the limits established by natural landforms (rivers, streams, marine terraces, floodplains, etc.) and disturbance patterns (fires, extreme storm events, etc.) which existed before extensive human alterations. For more information on the ecological sustainability analysis, see Appendix A of this forest plan. Below is a terrestrial ecological inventory unit map (Figure 2-1) that displays the distribution of potential native ecosystem restoration on the forest (not existing conditions).

2.1.2 Management Areas provides additional direction on the coarse-filter conditions based on our ability to provide the desired fire return intervals in Table 2-1. While there are several important ecological processes (fires, storms, floods, insect outbreaks, etc.), the desired conditions focus on ones that we can actively manage notably fire through prescribed burning. The restoration of fire-adapted ecosystems (desired fire return interval of 5 years or less) is closely linked to our ability to apply frequent (1-3 years), low-intensity fire at a landscape level. To address the role of fire in restoration of these ecosystems, two management areas (See Figure 2-2 and Table 2-2 below and Appendix E for additional map) were developed based on our ability to apply frequent, low-intensity fire on a landscape level and how that would affect our ability to achieve desired conditions for these ecosystems.

- **Management Area 1** is the portion of the Francis Marion where frequent, low-intensity fire can be used at the desired fire return interval for various ecosystems including the fire-adapted ecosystems. These desired conditions are labeled as DC-ECO and are described in the Ecosystem Restoration and Maintenance section below.
- **Management Area 2** is the portion of the Francis Marion where management efforts will have to focus on providing wildlife habitats using herbicides, mechanical methods, etc. The desired conditions for the fire-adapted ecosystems in this portion of the Francis Marion are labeled DC-MA2 and are described in the Management Area section.

2.1.3 Species Diversity describes fine-filter desired conditions for at-risk species. Additional fine-filter provisions can be found in the Objectives, Resource Integration Zones and Design Criteria sections. We developed fine filter scale provisions, as needed, to ensure the persistence of Francis Marion at-risk species including federally-listed T&E, proposed and candidate species and Species of Conservation Concern known to occur on the forest. See Appendix D for lists of Francis Marion at-risk species and the relationships to forest plan components. These desired conditions are labeled DC-T&E for federally listed Threatened and Endangered Species and DC-SCC for species of conservation concern that occur on the Francis Marion.

2.1.4 Watersheds Restoration includes desired conditions for restoration of watersheds and hydrologic function. These desired conditions are labeled DC-WAT.

2.1.5 Stressors and Threats includes desired conditions that respond to ecosystem stressors and threats. These desired conditions are labeled DC-THR.

Table 2-1. Forestwide ecosystem amount and distribution and including historic and desired fire return intervals on the Francis Marion National Forest

Potential Ecosystem ³	Administrative Boundary (acres rounded to nearest hundred unless noted)	Historic Fire Return Interval (years)	Desired Fire Return Interval (Average number of years) ¹
Upland Longleaf Ecosystems and Loblolly Pine Woodlands	51,500	1-3	2
Wet Pine Savanna and Flatwoods	86,200	1-3	2
Depressional Wetlands and Carolina Bay	8,700	1-6	3
Pocosins	9,200	2-10	5
Oak Forests and Mesic Hardwood Forests	5,800	2-35	8
Narrow Forested Swamps and Blackwater Stream Floodplain Forests	44,200	1-25	5
Broad Forested Swamps and Large River Floodplain Forests	49,200	1-218	21
Maritime Forests and Salt Marsh	4,000	2-52	10
Rivers and Streams (<i>includes aquatic and riparian ecosystems and riparian management zones</i>)	2,499 miles	N/A	N/A
Total	259,300		

1 Represents the geometric mean; fire return intervals vary by landscape position and ecosystem type. Historic fire return intervals were developed with input from LandFire and Southeastern Fire Ecologists. Ecosystems with desired fire-return intervals of 5 years or less are referred to throughout the forest plan as fire-adapted ecosystems.

2 Includes other ownerships, such as private and other public lands.

3 Boundaries for ecosystems will be field verified.

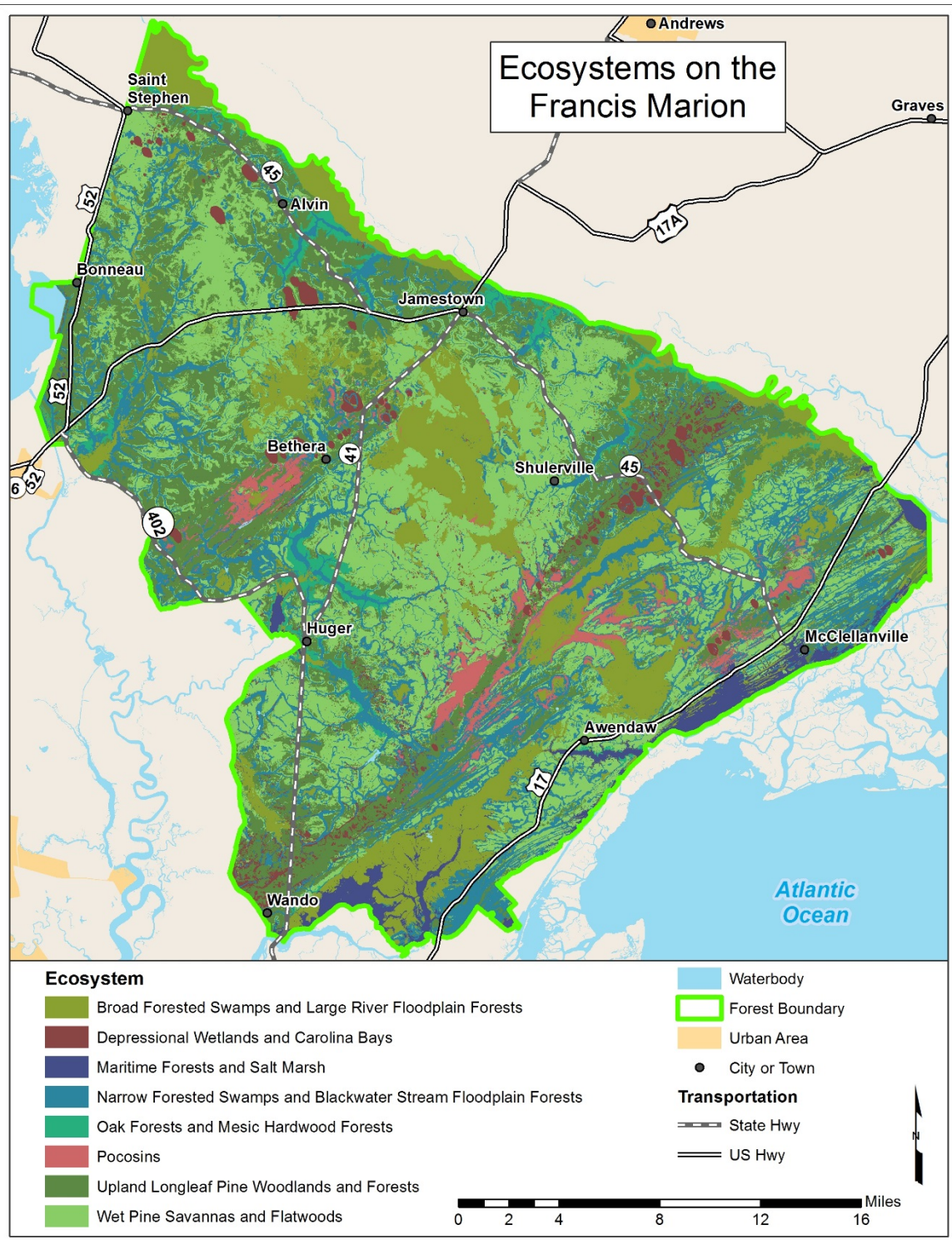


Figure 2-1. Ecosystems (not including rivers and streams) on the Francis Marion National Forest

Chapter 2. Vision and Strategy

Table 2-2. Management Area 1 and forestwide acreages for each ecosystem

Potential Ecosystem	Management Area 1	Forestwide
Upland Longleaf Pine Woodlands and Forests	33,400	52,000
Wet Pine Savannas and Flatwoods	58,100	86,200
Depressional Wetlands and Carolina Bays	6,400	8,800
Pocosins	7,200	9,100
Narrow Forested Swamps and Blackwater Stream Floodplain Forests	26,100	44,200
Oak Forests and Mesic Hardwood Forests	1,900	5,800
Maritime Forests and Salt Marsh	50	4,000
Broad Forested Swamps and Large River Floodplain Forests	23,000	49,200
Grand Total	156,150	259,300

2.2 Social and Economic Sustainability

In this section, desired conditions balance human interactions with ecosystem integrity and diversity across the Francis Marion. In order to achieve the desired condition, forest personnel work with partners to meet common objectives, such as providing outdoor recreation opportunities, mitigating storm-water run-off and flooding impacts and reducing fire hazards.

Forest-wide desired conditions for social and economic sustainability are described in 3 subsections:

2.2.1 Sustainable Recreation contains desired conditions for recreation settings, scenery and opportunities provide sustainable recreation opportunities that connect people to nature and history. These desired conditions are labeled DC-REC.

2.2.2 Multiple Use Benefits includes desired conditions describe desired services and benefits that people receive from the Forest. Desired conditions for healthy ecosystems provide benefits to the communities, such as jobs through eco- and heritage tourism. These desired conditions are labeled DC-MUB.

2.2.3 Connecting with Communities and Partners describes desired conditions considers the role of Francis Marion in the broader landscape and how to work across boundaries by establishing working partnerships with local, county, state and federal agencies, individuals and non-profits on common goals, such as reduction in hazardous fuels and community wildfire protection planning. These desired conditions are labeled DC-COM.

2.3 Resource Integration

Resource integration zones (RIZs) are contiguous geographic areas differentiated by access patterns, influences surrounding the borders of the Francis Marion and the interactions between humans and ecosystems. These zones provide context for how people use and benefit from the Francis Marion and how the desired conditions relate to settings, landscapes and ecosystem restoration. It provides a finer scale to estimate how the desired conditions the Ecological Sustainability and Social and Economic Sustainability integrate across a contiguous area. Four zones, Coastal, Wando, Wambaw and Santee, are delineated in Figure 2-3 and Figure 2-4.

Major subsections are:

2.3.1 Coastal Resource Integration Zone is located just miles away from the city of Charleston and easily accessed by US Highway 17, this zone includes the Atlantic Intracoastal Waterway and borders the Cape Romain Wildlife Refuge and the Santee Coastal Reserve. The desired conditions in this zone are labeled DC-RIZ-Coastal.

2.3.2 Wando Resource Integration Zone encompasses the southernmost area of the Francis Marion, which along with the Coastal Zone, are the closest National Forest lands to Charleston and Mount Pleasant. The desired conditions in this zone are labeled DC-RIZ-Wando.

2.3.3 Wambaw Resource Integration Zone encompasses a large coastal floodplain bordered by the Santee River to the North, the Wando Zone to the South, U.S. Hwy 17 to the East, and S.C. Hwy. 41 to the West. The desired conditions in this zone are labeled DC-RIZ-Wambaw.

2.3.4 Santee Resource Integration Zone is located in farthest northwest portion of the Francis Marion, which encompasses 145,600 acres of public and private lands, and includes 29% of all lands administered as the Francis Marion. The desired conditions in this zone are labeled DC-RIZ-Santee.

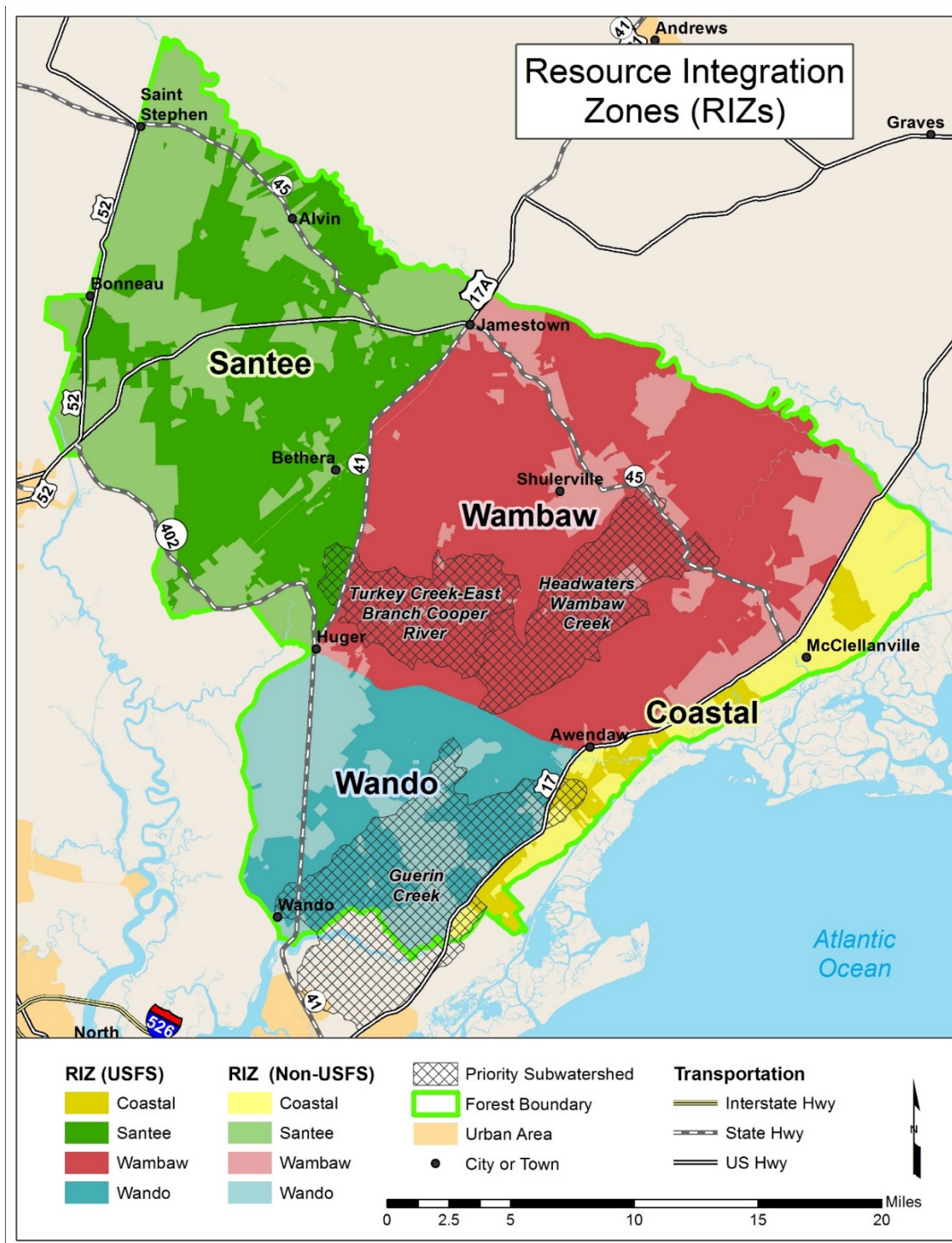


Figure 2-3. Resource Integration Zones on the Francis Marion National Forest

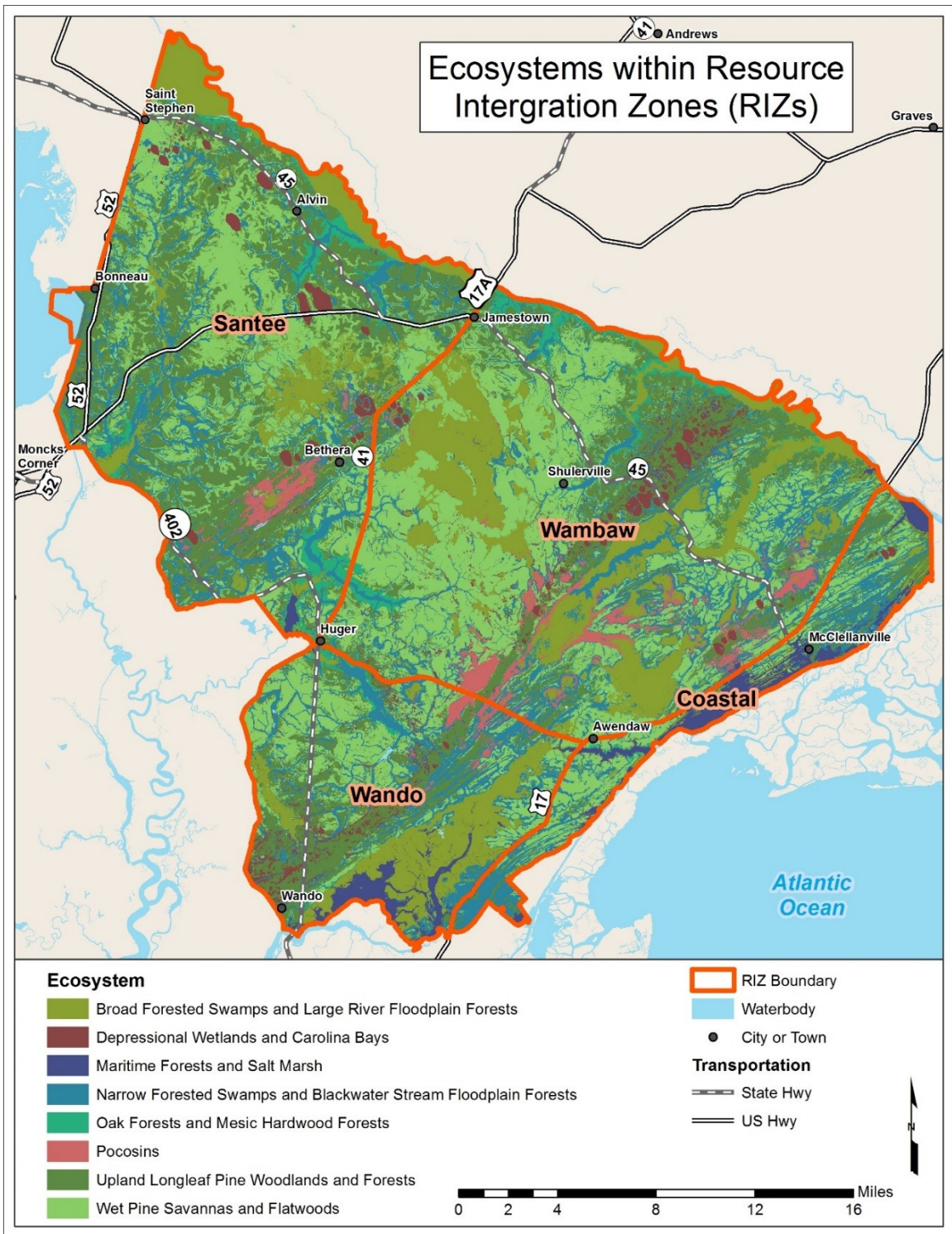


Figure 2-4. Ecosystems (not including rivers and streams) by Resource Integration Zone

2.1 Ecological Sustainability

The direction on Ecological Sustainability uses a complementary ecosystem and species-specific approach that provides for the diversity of plant and animal communities and the persistence of native species in the plan area. This complimentary system is also referred to as a coarse-filter/fine-filter approach.

2.1.1 Ecosystem Maintenance and Restoration

Desired conditions for old growth and nine native ecosystems are described in terms of the desired composition, structure, ecological processes, and landscape structure and connectivity, as well as our anticipated response to stressors. Sometimes the existing condition is close to desired condition, so direction in the forest plan focuses maintenance of those ecosystems. In other instances, the existing condition is not close to the desired condition, so the forest plan focuses on restoration of those ecosystems.

Old growth communities provide reference conditions for a diversity of ecosystems and plant and animal communities across the landscape. Old-growth conditions in reference maintenance conditions for ecosystems occur as large (greater than 2500 acres), medium (100-2,499 acres), and small-sized areas (<100 acres) across the landscape.

While desired conditions vary with ecosystem, the desired conditions within Management Area 1 are old growth compatible and provide old growth conditions, but typically include the following:

- Old growth conditions are represented for each ecosystem and occur across the landscape.
- Old trees (more than 100 years old);
- Large trees for the species or site;
- Hollow trees and snags;
- Variation in tree size and spacing within stands; and
- A low incidence of non-native invasive species.

Restoration opportunities are identified for all ecosystems. Past land use actions altered ecosystem composition, structure, ecological processes and landscape structure, through conversion of longleaf pine to loblolly pine, suppression of or lack of fire and hydrologic modifications (particularly ditching and dikes used for roads and trails). Most of the ecosystem restoration work focuses on:

- Restoring the historic tree cover, particularly longleaf pine;
- Improving stand structural diversity and native understory composition;
- Returning fire on desired fire return intervals (See Table 2-1 at the beginning of Chapter 2) as well as season of burn; and
- Restoring hydrologic function, aquatic passage and historic waterflows; and
- Maintaining and improving habitats for endangered and native plants and animals.

The two longleaf pine ecosystems (i.e. Upland Longleaf and Loblolly Pine Woodlands and Wet Pine Savanna and Flatwoods) comprise 137,000 acres or 53% of the forest; of which 91,500 acres (66%) occur in Management Area 1. The longleaf pine ecosystems functions as the matrix, across which frequent (1-3 years), low intensity fire is an important ecological driver. Frequent low intensity fire was also an important driver in maintaining and restoring, depressional

wetlands and Carolina bays, pocosins, and corridors of narrow swamps and wet hardwood within the longleaf matrix. Desired conditions for fire-adapted ecosystems are vary based on our ability to apply frequent low-intensity fire at a landscape level.

- **Management Area 1** is the portion of the Francis Marion where frequent, low-intensity fire can be used at the desired fire return interval for various ecosystems. These desired conditions are labeled as DC-ECO and are described in the subsection below.
- **Management Area 2** is the portion of the Francis Marion where frequent fire is unlikely to be present on the landscape due to interspersed communities and highways. The desired conditions for the fire-adapted ecosystems in this portion of the Francis Marion are labeled DC-MA2 and are described in subsection 2.1.2 Management Areas.

Along large river corridors and within broad non-riverine swamps, flooding was the primary driver and historic fire return intervals were much less frequent. The desired conditions for these ecosystems are described below and apply across the Francis Marion. Guidance for Riparian Management Zones (RMZ) is located in DC-ECO-10 Rivers and Streams and in Chapter 3 Design Criteria.



Figure 2-5. Riparian management zones protect water quality and aquatic habitats

DC-ECO-1. Old Growth Conditions

Old growth conditions provide habitat for DC-SCC-9. Wildlife Snag and Large Diameter Hollow Tree Associates.

A network of small and medium sized old growth areas will be found across the Francis Marion National Forest. Areas identified as existing old growth during project-level planning, and areas within old growth compatible designations (where old growth conditions will be found over time) contribute to the old growth network.

Reference old growth conditions occur as high quality plant and animal communities on ecologically-appropriate sites consistent with the Guidance for Conserving and Restoring Old-Growth Forest Communities in the Southern Region. Old growth patches are of different sizes and include eight ecosystems and nine old growth community types exhibiting characteristic composition, structure, ecological processes, and landscape structure and connectivity.

Future fire-adapted old growth conditions and associated community types are promoted within Management Area 1, primarily as upland longleaf woodlands and seasonally wet pine savannas within ½ mile foraging partitions for red-cockaded woodpecker, but also as depressional wetlands and Carolina bays, particularly those dominated by pond cypress. The structure of these old growth communities within Management Area 1 is open woodland or savanna. Within longleaf pine woodland and savanna old growth communities, the minimum basal area is 10 ft²/acre - with longleaf pine diameter at breast height (DBH) ≥ 16 inches on upland sites, and ≥ 20 inches DBH in wet pine savannas and flatwoods, and the minimum age class of the oldest age class of trees is one hundred and ten years. Scattered large flat-topped longleaf trees providing old growth conditions are present in the canopy of all pine ecosystems. The minimum age class of trees within old growth communities associated with depressional wetlands and Carolinas bays dominated by pond cypress is 120 years.

Future forested wetland old growth ecosystems and associated community types are relatively abundant within designated wilderness areas and riparian management zones forestwide. The minimum age class of the oldest existing age class of trees ranges from 200 years for bald cypress to 100 years for bottomland hardwood species. The minimum basal area in associated old growth stands is typically 40 ft²/acre and DBH of largest trees is typically ≥ 16 inches but may exceed 30 inches.

Old growth conditions for oak and mesic hardwood forests and maritime forests are promoted on unsuitable lands (not in wildlife openings) and as rare communities. The minimum age class of trees of the oldest age class of trees is 120 years in mesic hardwood forests, the minimum basal area is 40 ft²/acre, and the DBH of largest trees is typically ≥ 24 inches.

DC-ECO-2. Upland Longleaf and Loblolly Pine Woodlands

This ecosystem provides habitat for DC-T&E-1. Frosted Flatwoods Salamander, DC-T&E-2. Red-Cockaded Woodpecker, DC-T&E-3. American Chaffseed, and DC-SCC-7. Upland Pine Woodlands Associates. See Figure 2-6 for Desired Conditions of this ecosystem.

The upland longleaf pine woodland ecosystems occur on upland landforms of sandy flats with occasional low rolling hills. A key feature of this ecosystem is the drier, non-wetland sites with coarse, well-drained soils that naturally support frequent fire. The vegetation in this system is adapted to frequent, low intensity fires. The extent of this ecosystem within Management Area 1 is an estimated 33,500 acres.

Open, loblolly pine-dominated woodlands, which support diverse plant and animal communities, will occur until conversion to longleaf pine can be completed. Where open loblolly pine

woodlands provide high-functioning nesting and foraging habitat for red-cockaded woodpeckers and other plant and animal species, the conditions are maintained. In the long term, loblolly pine forest types are converted to longleaf pine.

Variations in upland longleaf plant communities within an ecosystem differ somewhat in composition on xeric to dry, dry-mesic to mesic, and dry to dry-mesic sites, but generally the overstory is dominated by longleaf pine. The mesic phase occurs on moderately well-drained soils, dry-mesic phase on well-drained soils and the xeric phase on excessively to somewhat excessively drained soils.

Composition. Vegetation is most often dominated by:

Overstory: Longleaf pine is the most common and dominant tree canopy species, but many associations have an understory of scrub oaks, including runner oak, blackjack oak, bluejack oak or turkey oak on the most xeric examples. Shortleaf pine may occur as a canopy species. Ericaceous shrubs, including dwarf and black huckleberry, dangleberry and deerberry, and runner oak or oak tree sprouts may be common in these systems. Upland longleaf woodlands, along with loblolly woodlands and wet pine savanna, form a matrix of pine forests which support a primary core population of the federally endangered red-cockaded woodpecker and provide ecological conditions needed by many other wildlife species (e.g., Bachman's sparrow and Northern bobwhite quail) and at-risk species (e.g., American chaffseed).

Understory: Native grasses and forbs, including a ground cover dominated by bunchgrasses (such as little and big bluestem, and golden and slender Indian grass) and with abundant native legumes and forbs (e.g., grass-leaved golden aster, spurred butterfly pea, Maryland golden aster, bush clover, silvery lespedeza, downy trailing lespedeza, stiff coreopsis, goat's rue and black root).

Structure. The structure of these ecosystems is dominated by open-canopy woodland or savanna conditions.

Canopy: Mature components of upland longleaf pine woodlands are open, with canopy closure typically less than 60 percent (40-70 ft² of basal area/acre). Snags (dead pine and hardwood trees) occur throughout the forest as a result of abiotic and biotic forces. Scattered large flat-topped longleaf (minimum of 20 ft² of basal area/acre consisting of trees \geq 14 inches in DBH) are present in the canopy.



Figure 2-6. Desired conditions for upland longleaf pine ecosystem

Midstory: Shrub and mid-story cover are low, though advanced longleaf regeneration is present. Shrub or low tree cover averages < 30 percent cover and < 3 feet tall.

Groundcover: Groundcover is herbaceous and abundant (>65 percent cover) with diverse native wildflowers and legumes. Some areas have sparse herb layers due to excessively drained soils; the most xeric are dominated by scrub oaks. Scattered clumps of scrub oaks (turkey, bluejack, post scrub, upland laurel and runner oaks) form an understory in these associations.

Ecological Processes. Landscape-level; low-intensity fire averaging every 1 to 3 years is common during the dormant season, but growing prescribed burns occur periodically. Fires burn the parts of herbs and shrubs that are above ground, but have little effect on fire-tolerant trees. Vegetation recovers very quickly from fire, with live herbaceous biomass restored in just a few weeks. Flowering plants are encouraged by frequent burning and result in diverse pollinator habitat and foraging habitat and cover for a number of wildlife species. Longleaf pine colonizes sites over time due to its fire-adapted characteristics and is a relatively long-lived tree species. Prescribed burning mimics the spread of natural fire, beginning in the uplands and spreading into the wetlands.

Landscape Structure and Connectivity. Upland longleaf woodlands form a mosaic with wet pine savannas and flatwoods and other fire-adapted wetland and riparian systems (depressional wetlands and Carolina bays, pocosins and narrow forested swamps and blackwater stream floodplain forests, including canebrakes). Landscapes have a diversity of age classes, though 80 percent are in mid-to-late successional open woodland condition. Old growth upland longleaf pine woodlands and forests occur as low density, park-like woodlands and savannas and harbor red-cockaded woodpeckers and a species-rich herbaceous layer.

Multiple age classes may occur within stands. In the long term, the young age component (0-10) of the forest comprises about 6-8.5 percent of the ecosystem. In the short term, this proportion is higher due to conversion to longleaf pine. Areas being converted to longleaf pine may exceed the normal opening size limitation of 80 acres. Open road densities are low to moderate (less than 1 mile/mile²) over time.

Stressors. Longleaf pine-dominated woodlands, savannas and flatwoods are highly diverse and resilient to the effects of climate change, wildland fire and hurricanes. Occurrence of non-native invasive species is low.

DC-ECO-3. Wet Pine Savanna and Flatwoods

This ecosystem provides habitat for DC-T&E-1. Frosted Flatwoods Salamander, DC-T&E-2 Red-Cockaded Woodpecker, and DC-SCC-5. Mesic to Wet Pine Savanna and Flatwoods Associates. See Figure 2-7 for a picture of the desired conditions.

The wet pine savanna and flatwoods system is abundant on the forest, occurring on seasonally wet mineral soils on low areas within beach ridge systems and aeolian sand deposits, and on poorly drained clayey, loamy or sandy flats, particularly across the Cainhoy ridge, where many high-quality examples may be found. The vegetation is adapted to frequent, low-intensity fire. The potential extent in Management Area 1 is approximately 58,100 acres. Variations in wet pine savanna and flatwoods communities occur on mesic and wet sites where they may differ somewhat in composition, structure and function.



Figure 2-7. Desired conditions in wet pine savannas

Loblolly Pine on Mesic to Wet Sites. Open loblolly pine-dominated flatwoods and savannas may occur until conversion to longleaf pine can be completed. Where open loblolly pine woodlands provide high-functioning nesting and foraging habitat for endangered red-cockaded woodpeckers and other plant and animal species, existing overstory conditions are maintained. In the long term, the loblolly pine forest types are converted to longleaf pine on the mesic sites and pond cypress or pond pine on the wettest sites.

Wet pine savannas and flatwoods fire-adapted ecosystems support a very high diversity of plant and animal species per unit area, including red-cockaded woodpecker, frosted flatwoods salamander, Carolina gopher frog and monarch butterfly. These areas are popular for wildflower viewing and include several species of orchid (grass pink, rosebud, fringed and fringeless) and carnivorous plants (yellow trumpet and hooded pitcher plants and yellow and purple butterworts), and several species of milkweed. Toothache grass is a common indicator plant. Many game species such as Northern bobwhite quail, Eastern wild turkey and white-tailed deer are common.

Composition. Variations in plant communities occur on wet, mineral, seasonally saturated, poorly drained soils, on mesic to wet somewhat poorly drained soils, and include imbedded wet marl savannas.

Canopy: Wet pine savannas and flatwoods are dominated by longleaf pine or pond pine and pond cypress on wetter sites, though loblolly pine may occur. Some of these wetter sites are wetlands.

Understory: With frequent burning (1 to 3-year fire return interval including a growing season burn every third burn), grasses and sedges, flowering plants and low shrubs dominate the ground cover. Advanced longleaf regeneration is present, but is less common on the wettest sites of this ecosystem. Herbaceous species indicative of wet pine savanna conditions are common, including toothache grass, wetland white bluestem, savanna hairgrass, rattlesnake master, few-flower milkweed, Barbara's buttons, orange milkwort, hat pins, sunbonnets, foxtail clubmoss and yellow colicroot. Several at-risk species are dependent on these ecosystems (including bearded and many-flowered grass pinks; pineland and short-leaved yellow-eyed grass; frosted flatwoods salamander; pineland and Carolina dropseed; and red-cockaded woodpecker).

Structure. The structure of these ecosystems is dominated by open canopy woodland or savanna conditions. In the short-term when restoring these ecosystems, higher densities of trees may be needed to establish longleaf pine regeneration.

Canopy: The canopy is open and park like. In wet pine savannas, areas of mature trees typically have 30-60 ft² of basal area/acre and may range down to 10 ft² of basal area/acre. In the short term these densities may be higher to help achieve restoration objectives. In flatwoods, areas of mature trees typically have 40-70 ft² of basal area/acre. Scattered large flat-topped longleaf (20 ft² of basal area/acre of trees >14 DBH) are present in the canopy on mesic sites.

Midstory: The midstory is low and sparse and consists of shrub species, including inkberry or scattered tree sprouts. Shrub or low tree cover averages <30 percent cover and <3 feet tall.

Groundcover: Groundcover is herbaceous and abundant (>65 percent cover), dominated by bunchgrasses with diverse native wildflowers and carnivorous plants, including pitcher plants and orchids.

Ecological Processes. Frequent, low intensity fire averaging every 1 to 3 years is common. Fires are low to moderate intensity resulting in topkill of woody midstory. Associated plants and animals, including longleaf pine, are long lived and colonize available sites over time. Flowering plants and associated pollinators are abundant, triggered by burning and provide foraging habitat and cover for a number of wildlife species. Prescribed burning mimics the spread of natural fire, beginning in the uplands and spreading into the wetlands. These ecosystems are seasonally wet, sometimes with a high water table. Flooding and fire may cause changes in vegetation, particularly at ecotones.

Landscape Structure and Connectivity. Wet pine savannas and flatwoods form a mosaic with upland longleaf and loblolly woodlands, and pond cypress savannas associated with depressional wetlands and Carolina bays; they form continuous blocks of fire-adapted habitat with intact native groundcover well distributed throughout the management area (particularly throughout the Cainhoy ridge, including Halfway Creek, Conifer and Steed Creek Roads).

Wet pine savanna and flatwoods ecosystems consist of various ages, but 70 percent is mid-late successional and open woodlands or savannas. Old growth Wet Pine Savannas and Flatwoods

occur as low density, park-like woodlands and savannas and harbor red-cockaded woodpeckers and a species-rich herbaceous layer.

In the long term, the young age component (0-10 age class) of the forest comprises about 6 to 9 percent of the ecosystem. In the short term, this proportion may be higher due to conversions to longleaf pine. Areas being converted to longleaf pine may exceed the normal opening size limitation of 80 acres. Open road densities are low to moderate (less than 1 mile/mile²) over time.

Stressors. Longleaf pine-dominated woodlands, savannas and flatwoods are highly diverse and resilient to the effects of climate change, such as hurricanes, alterations in rainfall and temperature patterns. Occurrence of non-native invasive species is low. Hydrologic patterns are restored where feasible to follow natural breaks between drainages. Few ruts are present.

DC-ECO-4. Depressional Wetlands and Carolina Bays

This ecosystem provides habitat for DC-T&E-1 Frosted Flatwoods Salamander, DC-T&E-4. Pondberry, and DC-T&E-5. Canby's Dropwort, and DC-SCC-6. Pond Cypress Savannas Associates. See Figure 2-8 for a picture of the desired conditions.



Figure 2-8. Desired conditions for depressional wetlands and known breeding wetlands for Carolina gopher frog and frosted flatwoods salamander

Carolina bays and depressional wetlands occur as isolated patches across the landscape, but generally occur in the sand ridges of the longleaf pine matrix and include an herbaceous ecotone or transition area between these and upland and wet-to-mesic longleaf pine ecosystems. Depressional wetlands and Carolina bay ecosystems are characterized by soils that are semi-permanently or permanently saturated from processes such as groundwater seepage, perched water tables, rainfall or beaver activity. Some are contained within riparian areas as depressional features. The patch size ranges from 1 to 50 acres and the potential extent is approximately 6,400 acres within Management Area 1.

Some important examples of this ecosystem are dominated by pond cypress savannas or herbaceous meadows, and are included as designated critical habitat for the frosted flatwoods salamander including Old Railroad Pond and Sunset Pond. Because the basins are often isolated from larger water bodies and most dry out occasionally, their aquatic fauna does not include fish

unless fish have been introduced through hydrologic modifications and flooding. Pond cypress savannas are important for a number of at-risk plants, including 2 federally listed plants, Canby's dropwort and pondberry. Notable high-quality pond cypress savannas on the Francis Marion include Florida Bay, Tibwin Bay, Echaw Road Bay, Halfway Creek Road pond cypress savanna, McConnell Sink and Honey Hill. Several at-risk plants are also associated with fire-maintained herbaceous ecotones occurring between depressional wetlands and Carolina bay ecosystems, and fire-maintained upland and wet to mesic wet pine savanna and flatwoods.

Many depressional wetlands were originally isolated from rivers and streams, but are now connected through ditching. Connecting ditches are removed and depressional wetlands are isolated from rivers and streams. The system is important as amphibian breeding habitat, may support a distinctive aquatic invertebrate community and generally does not support fish. The bays and wetlands provide breeding habitat for Carolina gopher frog and frosted flatwoods salamander. This system supports populations of amphibians and reptiles, including frogs such as the ornate chorus frog, tree frog species such as the barking tree frog, salamanders such as Mabee's salamander, turtles such as the chicken turtle, and snakes such as the crayfish snake.

Composition. A variety of vegetation types are present, depending on the size, depth and frequency of fire, but highest quality examples have an intact native herbaceous groundcover, both within ponds and in the adjacent upland ecotone. Vegetation composition often varies from year to year in response to differences in water levels and drawdown times. Seed banking plays an important role in component communities. The ecotone of these depressions is intact and predominantly herbaceous. Carolina bays have a sand rim often dominated by xeric upland longleaf pine. Wetland-associated species such as panic grasses, rushes, spikerushes, beak-rushes, meadow beauties and marsh-pinks are present and dominate the herbaceous layer. Incidents of non-native invasive species within these ecosystems are low.

Structure. Vegetation includes a series of primarily herbaceous and woodland associations, sometimes strongly zoned. The center or wettest area of these wetlands typically has open water and floating-leaved aquatic vegetation or marsh vegetation of tall grasses.

Canopy: Some trees or shrubs tolerant of standing water, especially baldcypress, pond cypress or tupelo, may grow in the basins, either as scattered individuals, or as a forested canopy over the whole basin. Drier, fire-maintained sites often have an open canopy of pond cypress, with a dense, often fairly species-rich herbaceous layer beneath.

Midstory: few occurrences are shrubby, but none contain the dense shrub layers of characteristic pocosin species that occur in the bays with organic soils.

Groundcover: The understory consists of herbaceous groundcover, including a wide variety of wildflowers, sedges, grasses and legumes.

Ecological Processes. Flooding and persistent saturation is dominant. Frequent, low-intensity fire is maintained at 3 year average fire return intervals. Hydrologic function remains intact; therefore, a diversity of native species, especially vascular plants and amphibians, are found here. During drought, woody species may invade into the depressional ponds and Carolina bays, altering hydrology and groundcover dynamics.

Landscape Structure and Connectivity. Depressional wetlands and Carolina bays are maintained and restored wherever they occur, which is on 3.4 percent of the Francis Marion's forested acres. Where they occur within a fire-maintained landscape (73 percent of which occurs

in Management Area 1) frequent, low-intensity fire is used to prevent encroachment from trees and encourage herbaceous ecotones and ground-cover, important to at-risk amphibians and vascular plants. Wetlands are connected to adjacent habitats, including the continuity of herbaceous understory and intact hydrology, to provide habitat for a number of plant and animal species. Low to moderate road densities (less than 1 mile/mile²) occur over time.

Stressors. These systems and breeding habitats are resilient to the impacts of climate change, primarily alterations in hydrology. Few ruts are present. The incidence of non-native invasive species is low. Hydrologic patterns are intact and follow natural breaks between drainages. OHV trail densities within 0.5 miles of these systems are low to moderate (less than 1 mile/mile²).

DC-ECO-5. Pocosins

This ecosystem provides habitat for DC-SCC-3. Pine Upland/Wetland Ecotones Associates. See Figure 2-9 for a picture of the desired conditions.

Pocosins are evergreen, shrub-dominated ecosystems which occur in small basins with seasonal to permanent standing water where the accumulation of organic matter exceeds decomposition, resulting in up to 10 feet or more of peat over a period of decades. Vegetation is typically zoned. The lowest strata vegetation occurs in the center of the system, often called “low pocosin” and in areas that are most nutrient poor and averaging 3 feet in height. Along outer zones, “tall pocosin” (including woodlands with pond pine) may be found. The most common tree in these ecosystems is pond pine which has serotinous cones, meaning the cones open and release seed after being exposed to the heat from fire. Other embedded plant communities include native canebrakes and seepage swamp, pocosin and baygall ecosystems. Pocosin ecosystems occur as patches across the landscape, but generally within the wetlands portion of the forest matrix. Some pocosin ecosystems can be extensive, ranging in size from the 1,200-acre Ocean Bay to the 40-acre pocosins found in the interior of some Carolina bays or depression ponds; the potential extent is approximately 9,300 acres within Management Area 1.

Patches of herbaceous and open water habitat maintained with periodic fire along the ecotones and outer zones of these ecosystems provide habitat for a number of at-risk species as well as black bear.

Composition. Evergreen shrubs, including sweet bay, red bay, loblolly bay, inkberry, honeycup and fetterbush lyonia are common. Herbaceous associations including pitcher plants and orchids may occur as patches or within fire-maintained ecotones. Component communities tend to be low in plant species richness; woody species richness exceeds herbaceous in most associations, with herbs being limited to small open patches, both throughout and in the ecotone. Pond pine is common in pocosin ecosystems.

Structure: The ecosystems are dominated by open and shrub-dominated, but pond pine may occur scattered throughout or more abundantly in the absence of frequent low intensity fire.

Canopy and Midstory: Vegetation is predominantly dense evergreen shrubland and very shrubby open woodlands.

Groundcover: Herbaceous associations or open water are present only as small patches, both throughout and in the ecotone.

Ecological Processes. Fire is an important factor in these systems, in the order of a decade or 2 in the wettest areas, though peripheral areas are subject to fire as often as the surrounding vegetation

burns. Fires during droughts may ignite peat, creating open patches which take longer to recover. Peat buildup raises the water table in the center, creating the domed structure of more extensive pocosins and allowing water to spread out as increased wetness at the edges.

Landscape Structure and Connectivity. Connectivity of the wetlands with adjacent fire-maintained longleaf pine ecosystems facilitates the continuity of herbaceous understory and intact hydrology provide landscape connections a number of plant and animal species. Open road densities are low to moderate (less than 1 mile/mile²) over time.

Stressors. Pocosins are resilient to the impacts of climate change, particularly changes in rainfall patterns, which in turn affect the frequency and intensity of fires. Incidents of non-native species are low. Hydrologic patterns are intact and follow natural breaks between drainages. Few ruts are present.



Figure 2-9. Desired conditions for pocosins

DC-ECO-6. Oak Forests and Mesic Hardwood Forests

This ecosystem provides habitat for DC-SCC-4. Calcareous Mesic Forest Associates. See Figure 2-10 for a picture of the desired conditions.

Oak-dominated and mesic hardwood forests are relatively uncommon on the Francis Marion landscape (5,800 acres or 2.2 percent of the total forested acres). They occur in areas that are naturally sheltered from frequent prescribed fire, as determined by interactions of local topography and soil texture. Due to the limited extent of these ecosystems on the Francis Marion, restoring, improving or maintaining them is a priority.

Composition. Depending on soil moisture regime and topographic position, vegetation consists of forests dominated by a diversity of hardwood tree species, and may include shortleaf pine on dry sites or spruce pine on mesic sites. Combinations of upland oaks (particularly white, Southern red and post oaks) occur on more xeric sites. Mesic forests are more diverse and may be dominated by American beech; oaks (cherrybark, laurel, Shumard's and upland laurel); and hickories (pignut, nutmeg and mockernut). Other woody plants may include basswood, Southern

sugar maple and American holly; with occasional shortleaf, loblolly and spruce pine. Woody shrubs are typically present and include beauty-berry, red buckeye, sweetshrub and horse-sugar

Structure.

Canopy: Overstory is occupied by mid- to late-successional closed canopy; hardwood forest covers more than 60 percent of the area. The young age component (0-10 years) of the forest is 8-10 percent.

Midstory and Groundcover: Groundcover is usually well developed, though shrub and groundcover may be sparse in some examples. Some imbedded plant communities are associated with calcareous geology and phosphate deposits, and harbor habitat for at-risk plant species, including nutmeg hickory.

Ecological Processes. Natural vegetation succession is a dominant force. Natural fire regimes are infrequent (2-35 years) and most natural disturbances lead to small gap openings. Prescribed fires are low intensity.

Landscape Structure and Connectivity. Mid- to late-successional conditions predominate; mesic slope hardwood forests are linear in nature, occurring on sheltered slopes bordering blackwater stream floodplain forests. Mesic forests occur on slopes, bluffs or sheltered ravines or on moist, non-wetland sites where fire is naturally uncommon, such as near the Santee River, Echaw Creek and Guilliard Lake Scenic Area and within the Santee Experimental Forest. Old growth oak forests and mesic hardwood forests have a higher prevalence of snags and downed trees. Open road densities are low to moderate (less than 1 mile/mile²) over time.

Stressors. These ecosystems are resilient to the force of hurricanes. Occurrence of non-native invasive species is low. Natural succession is allowed to occur in existing examples. Hardwood forests dominate though shortleaf pine is encouraged on existing sites.



Figure 2-10. Desired conditions for mesic hardwood forests

DC-ECO-7. Narrow Forested Swamps and Blackwater Stream Floodplain Forests

This ecosystem protects habitat for DC-SCC-3. Pine Upland/Wetland Ecotones Associates and DC-SCC-10. River and Stream Associates. See Figure 2-11 for a picture of the desired conditions.

Narrow forested swamps are areas of saturated soils generally due to low relief, poor soil drainage and a seasonally high water table. Hydrology is dominated by rainfall and sheetflow; overbank flooding, tidal flooding and seepage are a secondary influence, if at all. Blackwater stream floodplain forests occur along small streams and rivers and include imbedded riparian areas and riparian management zones. These corridors weave throughout the entire landscape with the potential extent of approximately 26,100 acres within Management Area 1.

In these ecosystems, aquatic species and community biological diversity, density and distribution are maintained, enhanced or restored. The amount, distribution and characteristics of aquatic habitats for all life stages are present to maintain populations of native species.



Figure 2-11. Desired conditions for blackwater streams with floodplain

Composition. This ecosystem can occur as a fire-generated patch mosaic in which the various patch dominants are a variable combination of tupelo, pond pine, red maple and, most frequently, pond cypress, but sometimes bald cypress. The original vegetation constituted a true shifting mosaic. Less wet sites have canopies of wetland oaks such as laurel oak, swamp chestnut oak and cherrybark oak. Most communities have a well-developed shrub layer that has more floristic affinities with pocosins or baygalls than with river floodplain communities that have similar canopies. The shrub layer is usually dominated by summersweet, fetterbush, Coastal sweet pepperbush, or species shared with pocosins. The herb layer is not usually well-developed but may be dense where shrubs are atypically sparse. Wetland ferns, such as royal and netted chain, and sedges usually dominate.

Blackwater stream floodplain vegetation consists largely of forests dominated by wetland trees species. The lowest, wettest areas have some combination of bald cypress, pond cypress, or tupelo. Higher portions of the floodplain have forests with combinations of a small set of wetland oaks and other species including loblolly pine. The wettest forests are sometimes simple in structure, with an understory but little shrub or herb layer, but the other communities tend to have well-developed understories, shrub and herb layers. Woody vines are usually prominent.

Structure.

Canopy: Closed canopy hardwoods with mature ages are most common.

Midstory and Groundcover: Except in the wettest examples, native understory, shrub and herbaceous layers are well developed. Native woody vines are prominent.

Ecological Processes. Flooding ranges from semi-permanent in the wettest floodplains to intermittent and short in higher gradient streams. Tidal flooding, regular or irregular, can be an ecological factor in some of the associated systems. Sometimes, fire during droughts may be a significant natural disturbance within these areas.

Fire is more important here than in larger river systems because distances to uplands are short and stream channels and sloughs are smaller and less effective as firebreaks. Some of these areas apparently were once canebrakes, presumably maintained by periodic fire. Because of their relatively narrow nature on the landscape, natural fire may burn into them but seldom through them, except during times of drought.

Natural fire regimes vary in this ecosystem group (1-25 years), are less frequent than in uplands and are most common at the ecotones with longleaf pine ecosystems.

Landscape Structure and Connectivity. For cypress and tupelo, 4 to 8 percent of the forest is young age component (0 to 10 years). For other hardwoods and loblolly pine, the young age component of the forest is 8 to 12 percent. Old growth Narrow Forested Swamps and Blackwater Stream Floodplain Forests provide travel corridors for wildlife and have a higher prevalence of open water, snags, downed trees and canopy gaps, providing habitat and cover for black bear, American swallow-tailed kite, American black duck, Southeastern myotis, Eastern woodrat and big-eared bat.

Blackwater stream floodplains occur as corridors across the landscape. On appropriate sites, blackwater stream forests occur along floodplains, headwaters and associated headwaters and tributaries of small blackwater streams. They also occur as floodplains of medium to small coastal plain rivers. Depositional landforms may be absent; if they are present, they are limited in variety and small in size. Narrow non-riverine forests may occur on broad interfluvial flats, sometimes bordering both blackwater streams and floodplain systems and pine-dominated ecosystems, forming a mosaic of vegetation across the landscape. Open road densities are low to moderate (less than 1 mile/mile²) over time.

Stressors. These ecosystems are resilient to the impacts of climate change, particularly changes in rainfall. Hydrologic patterns are intact and follow natural breaks between drainages. Few cuts are present. Incidents of non-native species are low. These ecosystems are generally uninterrupted by roads. a

DC-ECO-8. Broad Forested Swamps and Large River Floodplain Forests

This ecosystem protects habitat for DC-SCC-10. River and Stream Associates. See Figure 2-12 for a picture of the desired conditions.

These are forested wetland ecosystems which can occupy large, seasonally inundated basins with peaty substrates, or lower reaches of river floodplains and along estuary shorelines, in places regularly or irregularly flooded by lunar or wind tides. Examples of these ecosystems are generally forested with stands of baldcypress and tupelo, bottomland hardwood species and other

trees tolerant of flooding. Although most examples of this system may be thought of as acidic, some flow through regions with sufficient calcareous influence to effect vegetation composition.

In these areas, aquatic species and community biological diversity, density and distribution are maintained, enhanced or restored. The amount, distribution and characteristics of aquatic habitats for all life stages are present to maintain populations of native species. These areas include embedded riparian areas and riparian management zones.



Figure 2-12. Flooding is an important ecological process in floodplains

Composition. Trees dominating stands are wetland associates such as green ash, baldcypress and tupelo and can include box elder, red maple, river birch, water hickory, sugarberry, sweetgum, cottonwood, loblolly pine and various bottomland oaks including cherrybark oak, swamp chestnut oak and Shumard's oak. Lower strata of large river floodplains are generally denser and more species rich than those of river or non-riverine swamps, containing species from those systems as well as a variety of shrubs and herbs shared with freshwater marshes. Characteristic shrubs may include buckwheat-tree, titi, wax myrtle, native swamp rose and fetterbush. Some examples may have extensive open herbaceous areas dominated by various grasses, ferns, sedges and aquatic plants.

Structure. For cypress and tupelo, 4 to 8 percent of the forest is young age component (0 to 10 years). For other hardwoods and loblolly pine the young age component of the forest is 8 to 12 percent. Except in the wettest examples, native understory, shrub, and herbaceous layers are well developed, and native woody vines are prominent.

Ecological Processes. Natural succession is the dominant process. Many species live in or rely on access to riparian or aquatic areas. Natural fire regimes vary in this ecosystem group, but tend to be infrequent (1 to 218 years) and are most common at the ecotones with longleaf pine ecosystems. Tidal flooding, regular or irregular, can be an ecological factor in some of the associated systems. Portions of these systems can have a shifting relationship with tidal freshwater marshes of the same region. In areas not too strongly affected by salt-water intrusion or salt-water influx, drowning by rising sea level or fire, the communities may exist as old-growth, multi-aged forests.

Landscape Structure and Connectivity. Broad forested swamps and floodplain forests are common on the forest (approximately 19 percent or 49,300 forested acres). Large river

floodplains associated with this group include the Santee River corridor, which is linear in nature. Old growth Broad Forested Swamps and Large River Floodplain Forests provide travel corridors for wildlife and have a higher prevalence of open water, snags, downed trees and canopy gaps, providing habitat and cover for black bear, American swallow-tailed kite, American black duck, Southeastern myotis, Eastern woodrat and big-eared bat. Open road densities are low to moderate (less than 1 mile/mile²) over time.

Stressors. It is anticipated that rising sea level will drive shifts in the communities of this system, causing more inland swamps to develop into this system and causing parts of this system to turn into marshes. Hydrologic patterns are intact and follow natural breaks between drainages. Few ruts are present.

DC-ECO-9. Maritime Forests and Salt Marshes

See Figure 2-13 for a picture of the desired conditions.

Given their relatively rarity on the forest (3,978 acres or 1.5 percent of forested acres), their associated shell mounds, marine and estuarine systems, and function as migratory pathways for migrant birds, maritime forests and salt marsh are some of the most valuable ecosystems on the coastal fringe of the national forest. Maintaining, improving or restoring these ecosystems is a priority. These ecosystems are influenced by salt spray, extreme disturbance events, and the distinctive climate of the immediate coast.

Composition. Salt marsh is dominated by salt marsh cordgrass; black needlerush may dominate along brackish portions of tidal creeks and rivers. Salt marsh systems may support inclusions of shrublands dominated by yaupon, stunted live oak and groundsel tree or seaside oxeye. A few of the most sheltered areas near the northern end of the range have forests with deciduous species such as American beech and Southern red oak. Communities tend to be low in species richness, with all strata limited to a set of salt-tolerant species.

Maritime forests include shrublands and forests. Vegetation may also include forests dominated by a small set of salt-tolerant evergreen trees, mainly live oak, upland laurel oak, loblolly pine and sabal palmetto (cabbage palm). Shrublands dominated by salt-tolerant shrubs such as wax myrtle and yaupon or by stunted trees often occur at the seaward edge. Also included within these ecosystems are embedded freshwater depressional wetlands dominated by shrubs or small trees.

Structure. Vegetation ranges from salt marsh along brackish portions of tidal creeks and rivers, sometimes with inclusions of shrublands. Maritime forests are dominated by mid- to late successional forested conditions.

Ecological Processes. The primary disturbance for salt marsh is frequent tidal flooding with salt or brackish waters. Storms can bring seawater to brackish areas, acting as a disturbance to vegetation. Where salt marshes are connected to the mainland, occasional fires are possible, but most salt marshes are too wet to burn. Maritime Forests are relatively stable but are adversely impacted by extreme salt spray and destruction of dunes by storms but can also colonize areas created by sand redistribution. Natural fire in these systems is infrequent with a 2 to 52 year fire return interval. Wind, weather and salt spray are dominant influences on these systems.

Landscape Structure and Connectivity. Maritime forests and salt marsh systems border Wando River, Awendaw Creek, Tibwin tracts and Intracoastal Waterway, and typically occur as small to medium patches. These ecosystems connect to Cape Romain National Wildlife Refuge to the east

allowing for passage of native species. Old growth for the maritime forests component of the Maritime Forests and Salt Marsh ecosystem, adjacent to Cape Romain Wildlife Refuge, are dominated by large live oak and provide habitat for seaside sparrow, diamondback rattlesnake, island glass lizard and painted buntings. Open road densities are low to moderate (less than 1 mile/mile²) over time.

Stressors. Occurrence of non-native invasive species is low. Effects from salt-water intrusion and influx as well as sea-level rise are minimal; this system recovers quickly from hurricanes. While salt marshes and maritime forests are expected to be influenced by sea-level rise in the future, living coastal lines allow for migration of these ecosystems in response to changes in salinity levels. Signs of urban development are minimal.



Figure 2-13. Desired conditions for maritime forest and salt marsh located adjacent to Tibwin creek and the Intracoastal Waterway

DC-ECO-10. Rivers and Streams (aquatic lotic systems)

This ecosystem provides habitat for DC-SCC-10. River and Stream Associates. See Figure 2-14 for a picture of the desired conditions.

Rivers and streams consist of all lotic (flowing water) aquatic systems on the Francis Marion, including ephemeral channels. These systems provide habitat for fish, mussels, crayfish, benthic macroinvertebrates/ invertebrates, reptiles and amphibians. They also provide habitat for a variety of aquatic plants and fauna such as beavers and water birds, as well as periodic use by others such as raccoons.

Aquatic ecosystems occur across the forest and consist of fresh, brackish and tidal rivers and streams including ephemeral streams. Tannic stained blackwater streams are the most common stream type on the Francis Marion; they originate in the Coastal Plain, primarily on the forest itself. The Santee River is considered the only brownwater system as it originates in South Carolina's mountain region.

Associated riparian areas are 3 dimensional ecotones of interaction that include terrestrial and aquatic ecosystems that extend down into the groundwater, up above the canopy, outward across the floodplain, up the near slopes that drain to the water, laterally into the terrestrial ecosystem and along the water course at variable widths. Riparian areas associated with open water

wetlands, salt marshes, maritime forests, depressional wetlands, Carolina bays and perennial and intermittent streams may occur imbedded within narrow forested swamps and blackwater stream floodplain forested ecosystems and broad forested swamps and large river floodplain forested ecosystems. They occur less commonly in wet pine savanna and flatwoods ecosystems and pocosins.

Riparian management zones are portions of a watershed where riparian-dependent resources receive primary emphasis to maintain or restore riparian and ecological functions. For the Francis Marion, these zones are defined as the area within 100 feet of perennial streams or open water wetlands, or within 50 feet of intermittent streams. Riparian management zones will help maintain the ecological integrity of rivers and streams and their associated aquatic systems.

Desired conditions for aquatic ecosystems and riparian management zones (biological, physical and chemical) are described in narrative form below. Desired conditions for riparian management zones will vary by ecosystem, landscape position, and management area.

Biological. Mature bottomland hardwood - or pond cypress and baldcypress on wetter sites - dominate vegetation in riparian management zones. A diversity of trees and shrubs including loblolly pine, pond pine, and sweet bay, and native cane may be present. Vegetation consists primarily of a diversity of mature hardwood trees and multiple canopy layers that will provide for present and future large wood recruitment and a variety of leaf litter for macroinvertebrates. Intermittent streams are often in close proximity to uplands and prescribed fire may more commonly enter the riparian management zones along them. For this reason, tree composition near intermittent streams may include a more significant pine component.

Aquatic species and community biological diversity, density and distribution are maintained, enhanced or restored. The amount, distribution and characteristics of aquatic habitats for all life stages are present to maintain populations of native species. Aquatic nuisance species are controlled and managed according to Forest Service national and regional guidance, as well as South Carolina state direction. Rivers and streams provide spawning and rearing areas for aquatic species and influence downstream ecological conditions and processes.

Physical. Instream large wood (>10 cm diameter and >1 m length) is distributed throughout riparian management zones. Instream wood is large enough to create stable habitat diversity and drought resistance. Low intensity fire may occur when streams are used as natural firebreaks, as long as hardwood vegetation persists and soil humus is maintained.

Aquatic organism passage is not hindered as stream habitat connectivity and hydrologic function are maintained or restored. Past hydrologic modifications are restored to natural conditions. The natural range of instream flows is maintained to support channel function, floodplain function and aquatic biota habitat and movement. The physical integrity of aquatic systems, stream banks and substrate is intact and stable. New and replaced road and trail stream crossings are evaluated for aquatic organism passage.

Streams are in dynamic equilibrium (i.e.; stream systems function within natural ranges of flow, sediment movement, temperature and other variables). The geomorphic condition of some channels may reflect the process of long-term adjustment from historical watershed disturbances (e.g., past intensive farming practices and dike and ditching practices). The combination of geomorphic and hydrologic processes with land management activities within the watersheds creates a diverse physical environment, which maintains function and fosters biological

sustainability and diversity. The physical integrity of aquatic systems, stream banks and substrate (including shorelines, flow permanence and other components of habitat) is intact and stable.

Canopy cover in riparian management zones provides shade and moisture that regulates stream temperatures. Riparian management zones function as filters to water bodies from sediments and pollutants. To maintain stream bank and channel integrity and water quality, livestock grazing in riparian management zones does not occur. Existing recreational areas, trails and facilities are maintained or improved to minimize impacts on stream banks and water quality.

Chemical. Water quality (e.g., water temperatures, sediment, turbidity, methyl mercury, fecal coliform, dissolved oxygen and pH) remains within a range that ensures survival, growth, reproduction and migration of aquatic and riparian-dependent species, and contributes to the biological, physical and chemical integrity of aquatic ecosystems. It meets or exceeds state and federal standards and is evaluated and improved where necessary and possible to benefit impaired waters and associated aquatic communities.



Figure 2-14. Desired conditions for rivers and streams

2.1.2 Management Areas

Two management areas are established for the Francis Marion National Forest (see Figure 2-2 and Figure 2-3). The primary difference between the 2 management areas is the ability to safely apply landscape-level, low-intensity, frequent prescribed fire to maintain or restore fire-adapted ecosystems.

- **Management Area 1 (MA1)** - Management Area 1 encompasses ecosystems that include longleaf pine in the maintenance condition class and provides the most benefit to habitats for at-risk species and fire-adapted terrestrial ecosystems. Desired conditions for ecosystems in MA1 are described in subsection 2.1.1.

The Forest Service is technically and fiscally capable to manage smoke and public safety associated with prescribed fire in this management area. Therefore natural fire regimes are mimicked, including frequent, low-intensity fire to provide historic fire return intervals across to restore fire-adapted terrestrial ecosystems. See Table 2-3 and Figure 2-15.

- **Management Area 2 (MA2)** - Most of the ecosystems in Management Area 2 are influenced by adjacent development and human activities; therefore, frequent, low-intensity fire is less likely to be practiced, even though it is desired to restore fire-adapted ecosystems where they have occurred historically. Forest plan direction in Management Area 2 emphasizes the protection of human communities from wildfire and a flow of early- to late-successional habitats and a sustainable flow of timber for local economies. Use of herbicides, mechanical methods and other management tools will be used more often in MA2 to provide habitats for rare plants and animals. The desired conditions ecosystems in MA2 are described below.

Because applying low-intensity frequent fire at a landscape level may not be feasible, deviation from the desired conditions for fire-adapted longleaf ecosystems would be likely to occur. As management strategies and partnerships are implemented, it may be possible to introduce fire in portions of MA2. *If conditions change such that frequent, low intensity fire can be used, then the desired conditions for the appropriate fire-adapted terrestrial ecosystem applies.*

Table 2-3. Fire-adapted ecosystems¹ by Management Area

Potential Ecosystem	Management Area (acres)	
	MA1	MA2
Upland longleaf and loblolly woodlands	33,400	18,600
Wet pine savannas and flatwoods	58,100	28,100
Pocosins	7,200	1,900
Narrow Forested Swamps & Blackwater Stream Floodplain Forests	26,100	18,100
Carolina bays and depressional wetlands	6,400	2,400

¹ Field inventory is needed to verify the acreages

DC-MA2-1. Mixed Pine/Hardwood or Loblolly Pine Forests

Outside Red-cockaded Woodpecker Clusters: Loblolly pine or mixed pine-oak is the dominant species. To provide early successional habitat and a flow of habitats and forest products over time, 12-20 percent of the forest is young age component (0-10 years old). (Note: these systems would have occurred historically as either upland longleaf ecosystems (DC-ECO-1) or wet pine savanna and flatwoods ecosystems (DC-ECO-2)). Forest canopies are typically closed.

Understories are typically woody vegetation with little herbaceous cover. Forests generally have densities of 50-100 ft² of basal area/acre.

Within Red-cockaded Woodpecker Clusters: Guidelines for the management of cavity trees and clusters from the most recent species recovery plan are implemented. (See OJB-T&E-2 and G35, G36 and G38 for exceptions). All potential cavity trees (pines greater than 60 years in age) within clusters are retained, unless pine basal area is above 50 ft²/acre, and all trees are above 60 years in age. Hardwoods do not exceed 10 ft² of basal area/acre on pine sites and do not occur within 50 feet of the cavity trees. Soil disturbance that negatively impacts native ground cover is avoided.

DC-MA2-2. Depressional Wetlands, Carolina Bays and Pocosins

Due to less frequent fire return intervals than in Management Area 1, depressional wetlands and Carolina bays are often forested and pocosins have a larger component of pond pine. Flooding continues to be a major driver within these ecosystems, though hydrology in isolated wetlands is driven by rainfall patterns, shallow groundwater, substrate patterns and the amount of forested vegetation, which influences evapotranspiration. While climate change impacts cannot be eliminated, corridors allow for migration of species. Embedded riparian areas, riparian management zones and aquatic habitats are maintained and restored.



Figure 2-15. Open pine forest after prescribed burning

DC-MA2-3. Narrow Forested Swamps and Blackwater Stream Floodplain Forests

Narrow forested swamps and blackwater stream floodplain forests occur on approximately 19,200 acres within Management Area 2. On appropriate sites, blackwater stream forests occur along floodplains, headwaters and associated headwaters and tributaries of small blackwater streams, and as floodplains of medium to small coastal plain rivers. These features result from erosion into marine terraces; therefore, normal depositional landforms may be either absent or present in only limited variety and small size. Embedded riparian areas, aquatic habitats and riparian management zones are maintained and restored.

Vegetation is dominated by wetland tree species, including baldcypress and tupelo on the wettest sites and bottomland hardwoods including oaks, with loblolly pine, in drier portions of the floodplain. On sites not dominated by baldcypress and tupelo, oaks are favored over other species, though other species except sweetgum and red maple are desired. Fire seldom occurs in Management Area 2, resulting in less understory development.

Forests have a variety of age components. For cypress and tupelo, 4-8 percent of the forest is young age component (0-10 years). For other hardwoods and loblolly pine the young age component of the forest is 8-12 percent. Forests containing old growth characteristics are common.

Flooding and associated excess rainfall are the most important ecological driver in these systems; water levels range from semi-permanent in the wettest floodplains to intermittent, short term or ephemeral in higher gradient streams. Fire was important in a subset of this system (narrow forested swamps) and some areas of bottomlands were once canebrakes when maintained by periodic fire.

2.1.3 Species Diversity

The Francis Marion National forest occurs on the Atlantic Coastal Plain, recognized as the world's 36th biodiversity hotspot (www.cepf.net), and is known to support some of the highest levels of biodiversity outside the tropics (Glitzenstein et.al., 2012; Sorrie and Weakley, 2001). To identify forest plan strategies needed for ensuring species diversity, we used the best available scientific information - and collaboration with federal, state, and non-government agencies and publics - to identify species most "at-risk" of extinction. For purposes of the forest plan, at-risk species include federally-listed species, proposed or candidate species, and species of conservation concern - all native species, known to occur in the planning unit, and for which the best available scientific information indicates a substantial concern for their persistence in the planning area.

Our list of at-risk species known to occur on the Francis Marion National Forest is in Appendix D, and may change over time as we gain additional information about these species - and their rarity. Ecological conditions for all at-risk species will be conserved by maintaining and restoring the composition, structure, function and connectivity of a diversity of ecosystems in the plan area. Where needed, additional fine-filter strategies contribute to the recovery of threatened and endangered species, conserve proposed and candidate species and maintain a viable population of each species of conservation concern.

The following fine-scale provisions address uncertainties in regard to at-risk species:

Federally Listed Threatened and Endangered Species – Federally-listed species are addressed through fine-filter provisions to ensure compliance with Endangered Species Act provisions including the conservation and recovery of federally-listed species and any associated critical habitat. Section 7 of the Endangered Species Act requires that federal land management agencies do not jeopardize the continued existence of federally-listed species or adversely modify their critical habitat.

At-risk Species Associates and Rare Plant Communities – We grouped at-risk species "Associates" according to similar ecosystem and habitat needs, limiting factors, threats, or key characteristics. Most often appropriate habitat conditions for At-risk Species Associates are maintained and restored at the coarse-filter scale (ecosystem). Additional fine-filter-scale

direction was developed to further emphasize habitats for at-risk species associates, locations for known high quality rare plant communities, and populations. The majority of at-risk plants and animals are limited in distribution on the forest and occur only in Management Area 1. Over 50% (41) of the at-risk species have only 1 or 2 known occurrences on the forest, and 66% have less than 5 known occurrences.

High-quality rare plant communities are areas of finer-scale known biodiversity often found imbedded within ecosystems. Rare communities are also special areas for public use and enjoyment, providing opportunities for viewing native pollinators, wildflowers, and wildlife (See Figure 2-15).

Federally Listed Threatened and Endangered Species

Optimal ecological conditions and viable populations for the following federally-listed will occur within Management Area 1, where the prescribed fire needed to maintain and restore them is most likely to occur. See the desired conditions in DC-MA2-1. Mixed Pine/Hardwood or Loblolly Pine Forests for more information on management of RCW clusters in Management Area 2.

DC-T&E-1. Frosted Flatwoods Salamander

Maintain and restore ecological conditions as described in DC-ECO-2 through 4 for the federally threatened frosted flatwoods salamander within 1,175 acres of designated critical habitat on the forest (See Figure 2-17 below). Guidelines in the most recent Recovery Plan (not released yet) are implemented during project development within the Wando Resource Integration Zone. Within this zone seasonally flooded isolated wetlands provide high quality breeding habitat, while surrounding fire-maintained longleaf-pine dominated woodlands and savannas provide migration routes between breeding habitats. Restore continuous native herbaceous ground-cover and soil and hydrologic characteristics which support the natural function and connectivity of these groundwater-dependent ecosystems. Information is obtained through the forest-wide monitoring program used to establish baselines for habitat trends and conditions (MQ 6-7), measure the quality of salamander habitat, and will assess the stability of populations (MQ 14) to ensure successful reproduction and recruitment of the frosted flatwoods salamander.

DC-T&E-2. Red-Cockaded Woodpecker

Upland longleaf and loblolly pine woodlands and wet pine savanna and flatwoods ecosystems within Management Area 1 support a recovered population for red-cockaded woodpecker of 350 potential breeding groups and 450 active clusters. See Figure 2-16. The Francis Marion supports the third largest population of the federally endangered red-cockaded woodpecker in the United States and is 1 of 13 designated primary core recovery populations identified in the Red-cockaded Woodpecker Recovery Plan posted on <http://www.fws.gov/rcwrecovery/>. High quality nesting and foraging habitat occurs as upland pine and wet pine savanna ecosystems within 0.5 miles of cluster centers and includes large, live old pines which provide cavity trees for nesting, low densities of small pines, little to no hardwood mid-story, and diverse and abundant herbaceous ground-cover. Project development is based on implementing guidelines in the most recent Recovery Plan in the management of cavities, clusters, and foraging habitat.

DC-T&E-3. American Chaffseed

Upland longleaf pine ecosystems within Management Area 1 support viable populations for the federally-endangered American chaffseed at known and historic locations. High quality habitats for the species are maintained which have a very open forest canopy with a diverse native herbaceous component maintained with low intensity, 1-3 year prescribed fire desired return interval or mowing. Opportunities to expand populations are explored with the USFWS.

American chaffseed is maintained along roadsides in coordination with the South Carolina Department of Transportation.

DC-T&E-4. Pondberry

Depressional wetlands and Carolina Bays within Management Area 1 support viable populations for the federally-endangered pondberry at known existing and historic locations. High quality habitats are maintained and restored as pond cypress savannas and include an open canopy and an abundant herbaceous groundcover. Opportunities to expand populations are explored with the USFWS.



Figure 2-16. A red-cockaded woodpecker flies toward a cavity tree

DC-T&E-5. Canby's Dropwort

Depressional wetlands and Carolina Bays within Management Area 1 support viable populations for the federally Canby's dropwort within pond cypress savannas at known existing and historic locations for the species. High quality habitats are maintained and restored as pond cypress savannas with an open canopy and an abundant herbaceous groundcover. Opportunities to expand populations are explored with the USFWS.

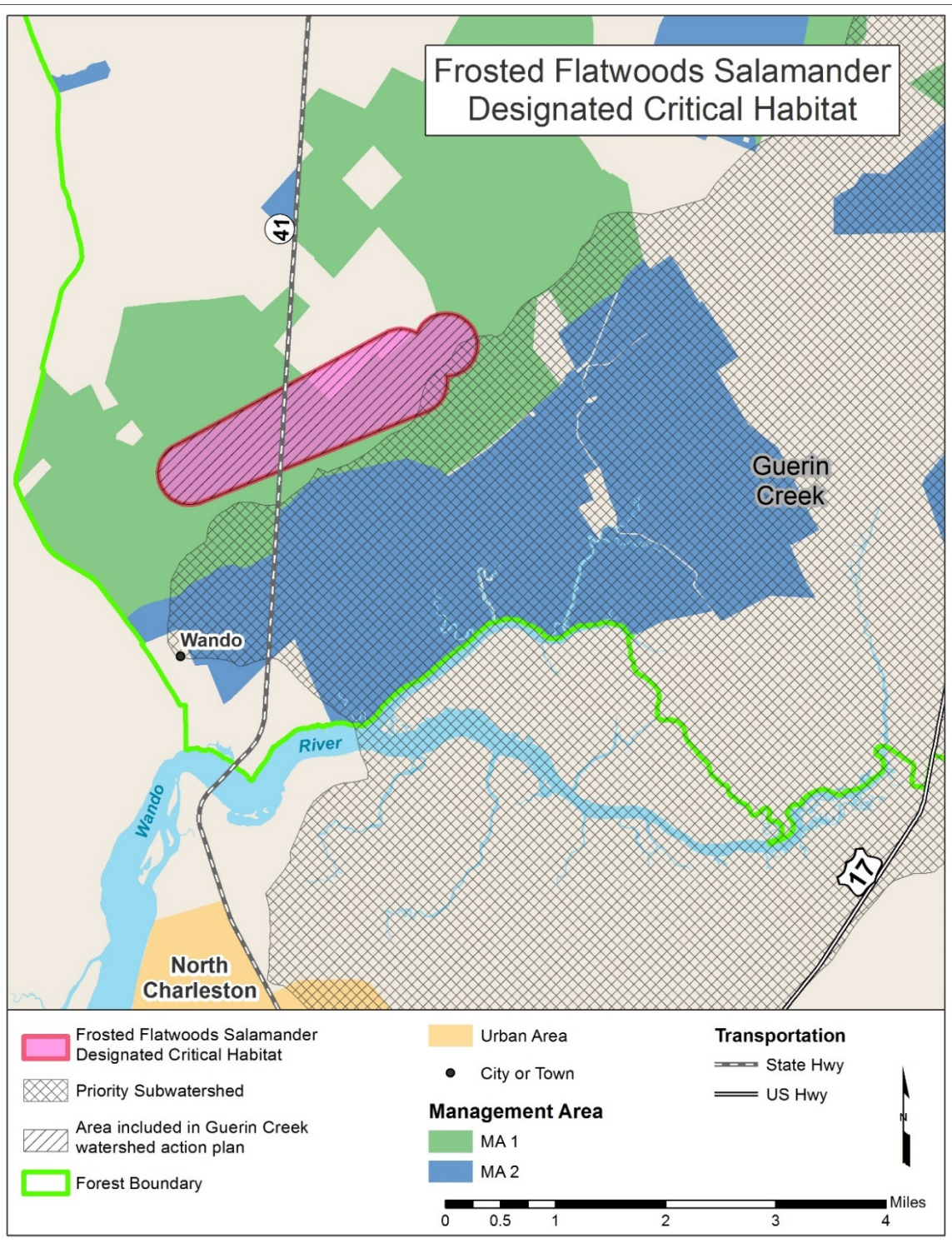


Figure 2-17. Designated critical habitat for the frosted flatwoods salamander

At-risk Species Associates and Rare Plant Communities

DC-SCC-1. Wildlife Stump and Root Mound Associates

Downed wood, stumps, stump holes and root mounds are maintained at densities of an approximate range of 34 to 44 stumps and/or root mounds per acre to support associated at-risk species. Coarse woody debris root mounds and stump holes provide critical refugia for numerous wildlife species. See Figure 2-18. Where frequent fire occurs, they provide essential escape cover for slow-moving wildlife such as reptiles, amphibians and small mammals. Creating underground refugia may be needed in areas that were previously stumped or where frequent prescribed fire occurs.



Figure 2-18. Stump holes provide habitat for wildlife stump and root mound associates

DC-SCC-2. Wildlife Species Sensitive to Road Use Associates

Particularly along Cainhoy Ridge and Steed Creek Road, integrated resource solutions, such as installing culverts that allow safe animal passage under roads, closing Forest Service road during peak migrations and using educational materials to inform the public about techniques to minimize impacts to wildlife, are used to mitigate impacts to species sensitive to road use. Where roads are necessary in highly populated areas, roads provide for safe passage of these species and are designed as to minimize impacts to at-risk species habitats.

DC-SCC-3. Pine Upland/Wetland Ecotones Associates

High quality habitat for a number of at-risk species is maintained and restored at the fire-maintained ecotone between pine-dominated ecosystem and wetland ecosystems within Management Area 1. See Figure 2-19. Restoration and maintenance of known locations and rare plant communities provide habitat important to species in this group, including but not limited to Morgan Creek Seepage Bog. Open habitat conditions are maintained and restored with frequent and growing-season fire which begins in the uplands and burns into the wetlands, creating open conditions with patches of intact herbaceous groundcover.

DC-SCC-4. Calcareous Mesic Forests Associates

Optimal habitats for associated at-risk species are maintained and restored along gentle mesic hardwood slopes near the Santee River and along the Echaw Creek drainage to the confluence with the Santee River, and in the Huger Creek drainage sub-basin (Huger Creek, Nicholson Creek, Turkey Creek and Fox Gully Branch, Wadboo Swamp, Whiskinboo Creek, mostly west of Hwy. 41). Calcareous hardwood and marl plant communities are maintained and restored in conjunction with the Santee Experimental Forest and along Wambaw Creek and the Santee River. Calcareous mesic hardwood communities contain plant species of limited distribution on calcium-influenced sites, including pinewoods oxeye (*Heliopsis helianthoides* var. *gracilis*), yellow spinypod (*Matelea flavidula*) and Appalachian blazing star (*Liatris squarrulosa*). The 113-acre “Poplar Dam Area,” the 22-acre “Huger Creek Scenic Area,” and the 20-acre “Nicholson Creek Southern Mixed Hardwood Area” (older growth calcareous mesic hardwood communities) support a variety of spring wildflowers not typically found in the outer coastal plain.

Along Whiskinboo Creek, an older 37-acre wet marl forest, an area mildly influenced by calcium and dominated by shagbark hickory and swamp chestnut oak is maintained. Rare, small hardwood remnants that are less than 10 acres in size occur across the Santee Zone and are maintained in mature mesic white oak-hickory and an older-growth shortleaf pine-oak conditions.



Figure 2-19. Desired conditions for pine upland/wetland ecotone

DC-SCC-5. Mesic to Wet Pine Savanna and Flatwoods Associates

High quality mesic to wet pine savannas provide optimal habitat for the highest number of at-risk amphibians, birds, mammals, pollinators, reptiles and vascular plants, particularly within designated plant rare communities (Awendaw Savanna, Wardfield Savanna, Little Wambaw Marl Savanna, Halfway Creek Savanna, Gumville Road Savanna, Compartment 140, and Compartment 149 savannas). (See map of rare plant communities in Appendix E). Most wet longleaf pine savannas are moderate in size (50-100 acres), but some are large, particularly in the 666-acre Compartment 140 complex and the 678-acre Compartment 149 complex). Herbaceous groundcover is intact, contains a high diversity of native forbs and benefits native pollinators. Other small high-quality wet longleaf pine savanna remnants along Bullhead Road (3.5 acres and 11.5 acres) provide habitat for the uncommon sweet red pitcher plant, Carolina fluffgrass and crested fringed orchid. Frequent prescribed fire is used to maintain intact.

Flooding and associated excess rainfall are primary ecological drivers in these habitats and provide from semi-permanent conditions in the wettest floodplains to intermittent, short term or ephemeral condition in higher gradient streams. Non-native invasive species have a low incidence across the landscape and open road densities are moderate to low (less than 1 mile/mile²) over time.

DC-SCC-6. Pond Cypress Savannas Associates

High quality pond cypress savannas occur as rare communities imbedded within Management Area 1 supporting a number of at-risk amphibians, birds, insects, mammals, vascular plants and reptiles. Restoration and maintenance of known locations for at-risk species as rare plant communities include but are not limited to, pond cypress savannas and limesinks supporting pondberry at Honey Hill, Canby's dropwort at Tibwin Bay, and various species of conservation concern at Florida Bay. (See map of rare plant communities in Appendix E). See Figure 2-20.



Figure 2-20. Pond cypress wetland is overly dense due to the exclusion of fire

DC-SCC-7. Upland Pine Woodlands Associates

Open pine woodlands provide highly quality habitat is provided for a number of at-risk amphibians, birds, insects, mammals and vascular plants, particularly in the Wando Resource Integration Zone. Herbaceous groundcover is intact, contains a high diversity of native forbs, and benefits native pollinators. Restoration and maintenance of known locations of at-risk species, include, but is not limited to, active clusters and foraging habitat for red-cockaded woodpecker and stands containing American chaffseed. Herbaceous groundcover in upland pine woodlands in the Wando Resource Integration Zone provides migration routes for at risk amphibians, such as Carolina gopher frog and frosted flatwoods salamander.

DC-SCC-8. Forested Wetlands Associates

Aquatic species and community biological diversity, density and distribution are maintained, enhanced or restored. Vegetation is often dominated by baldcypress and tupelo on the wettest sites, and bottomland hardwoods including oaks mixed with loblolly pine in drier portions of the floodplains. See Figure 2-21. On sites not dominated by baldcypress and tupelo, oaks are common. Where floodplain headwaters reach into fire-maintained uplands, native cane is found in abundance. Except in the wettest examples, native understory, shrub and herbaceous layers are well developed; native woody vines are prominent. Natural fire regimes vary in this ecosystem group, but tend to be infrequent (1 to 218 years), and are most common at the ecotones with

longleaf pine ecosystems. The species in this group are linked to desired conditions and management objectives associated with the following ecosystems: large river floodplain forests and tidal swamps; narrow non-riverine swamp and wet hardwood forests; and broad non-riverine swamp and wet hardwood forests.



Figure 2-21. Loblolly pine is encroaching on a wetland

DC-SCC-9. Wildlife Snag and Large Diameter Hollow Tree Associates

Dead and dying trees and/or large diameter hollow trees provide for optimal cover, foraging and roosting habitat. Bridges; cisterns; culverts; leaf litter; snags and branches; bark and cavities of live tree; and old abandoned houses provide roosts and bat-friendly management considerations are use. Snags or hollow trees are maintained at a density of approximately 2 to 4 per acre. Artificial bat and bird houses provide habitat needs where snags and hollow trees are absent.

DC-SCC-10. River and Stream Associates

Water coming from national forest land meets state water quality standards and maintains habitat quality for at-risk aquatic species. Optimal aquatic habitats are provided for Large River/Main channel Associates and Streams and Smaller Water Associates. Associated riparian management zones contribute to the protection of aquatic habitats. Hydrologic function is restored to improve species diversity, stream and headwater protection and enhancement, stream connectivity, an aquatic organism passage. Aquatic nuisance species have a low incidence across the forest.

DC-SCC-11. Forest Opening Associates

The Forest maintains 379 permanent openings ranging from 0.25 to 63 acres in size for a total of 675 acres. Most openings are in the 0.25 to 2.0 acre range with no canopy (for bat foraging) and composed of early successional vegetation and desirable non-native or native plants.

DC-SCC-12. Rare Plant Communities

High quality rare plant communities will be managed to maintain their plant and animal diversity wherever they occur and include 97 locations on 4,690 acres. (See Table 2-4 below and map of rare plant communities in Appendix E). Rare plant communities include high quality examples of wet pine savannas, pond cypress savannas, calcareous mesic hardwood and calcareous bottomland hardwood forests, marl forests and shell mounds, and some of these provide habitats for at-risk species. A map of rare plant communities documented for the forest plan is included in

Appendix E. This list may change over time. Each rare community will be managed consistent with the ecosystem composition, structure, and function with which they are associated.

Table 2-4. Rare plant communities across the Francis Marion National Forest

Resource Integration Zone	Description	Acres
Coastal	Rare Communities	9
Wando	Rare Communities	171
Wambaw	Rare Communities	4,138
Santee	Rare Communities	481

2.1.4 Watershed Restoration

Forestwide desired conditions address soil and water, hydrologic function and aquatic habitats.

DC-WAT-1. Watershed Condition

On the approximately 2,500 stream miles estimated to occur across national forest and on adjacent private lands, hydrologic function is maintained or restored. Riparian areas and forested wetlands provide functioning ecosystems on approximately 56% of the Francis Marion. Improvements to the hydrologic function of wetlands and streams and aquatic habitats are considered during project-level planning across the forest. See Figure 2-22. Riparian Management Zones (RMZ), which are approximately 100 feet from the edges of all perennial streams and lakes, and 50 feet from all intermittent streams, receive special consideration during project level planning to maintain hydrologic function and restoration of ecosystems.

DC-WAT-2. Restoration of Hydrologic Function

Blackwater rivers and streams and their associated floodplains are maintained and restored. These ecosystems provide corridors that meander across the landscape and connect habitats that facilitate movement of species. Water flows are relatively unimpeded by obstructions. Intact, broad forested swamps and large river floodplain forests (DC-ECO-8) function as riparian/wetland ecosystems with high water tables, moist soils, except during drought conditions. Narrow forested swamps and floodplain forests (DC-ECO-7) dominated by mid- to late-seral hardwood tree species occur adjacent to smaller blackwater streams. Taken together, these ecosystems capture, store and release water, sediment, coarse wood and nutrients, and function as habitats that support diverse populations of native aquatic and riparian-dependent species. Soil and hydrologic function of wetlands and other groundwater-dependent ecosystems are maintained and restored.



Figure 2-22. A tram bed is impacting a wetland

DC-WAT-3. Soil and Water Quality

Exposed mineral soil and soil compaction or rutting from human activity are limited and do not impair the productivity and fertility of the soil, nor do they damage other resources. Any human-caused disturbances or modifications that cause environmental degradation through concentrated actions with heavy equipment, soil exposure, drainage modification, erosion, excessive rutting or sediment transport to the channel or water body are promptly rehabilitated or mitigated to reduce or eliminate impacts.

DC-WAT-4. Priority Watersheds

An integrated approach to management activities improve forest health and watershed conditions in the three “priority watersheds” –Turkey Creek-East Branch of Cooper River, Guerin Creek (including French Creek, and the headwaters of Wambaw Creek). See Figure 2-23. Watershed indicators and attributes that are rated poor, such as aquatic passage, large wood, etc., are improved through an integrated approach to management activities detailed in watershed restoration action plans.

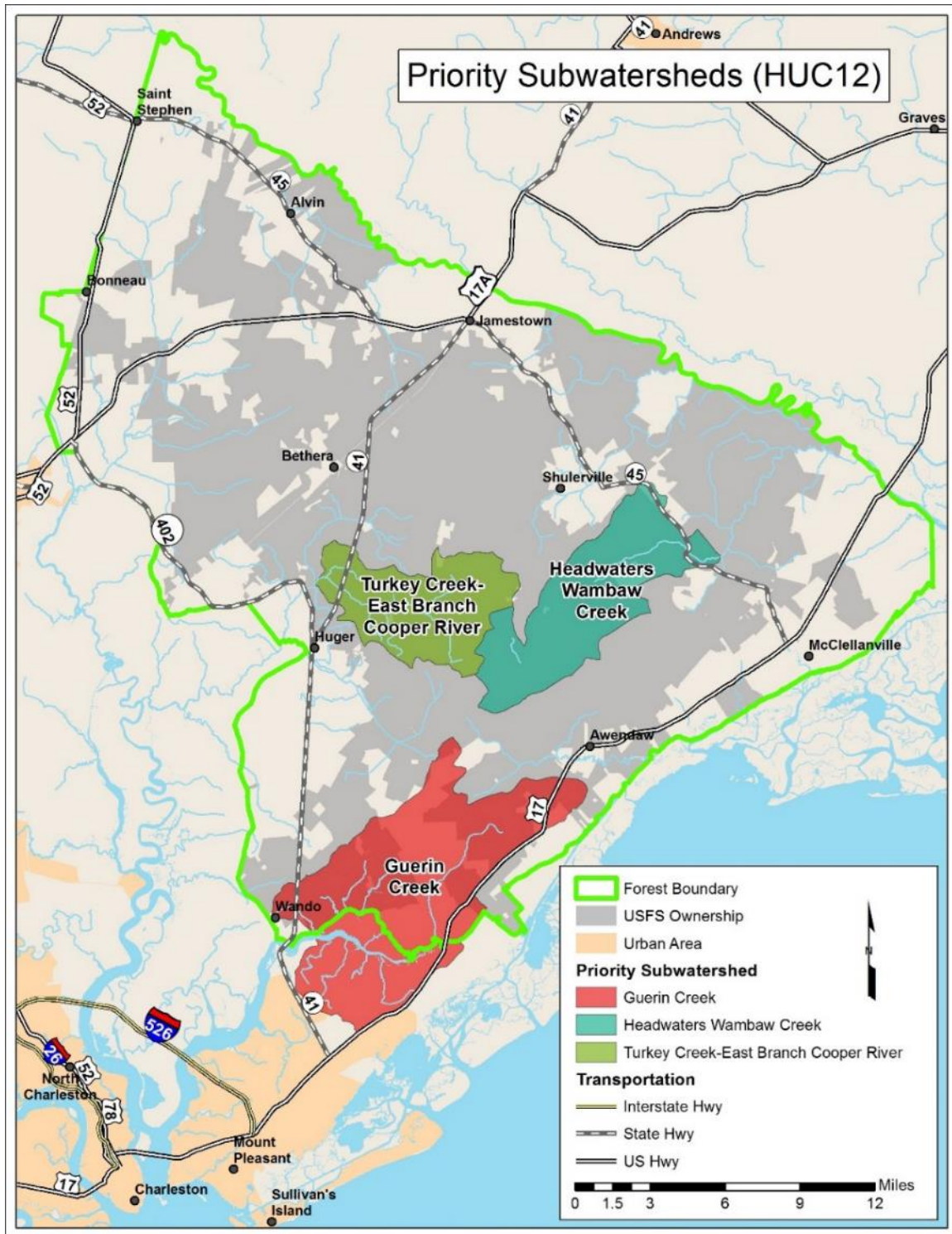


Figure 2-23. Priority watersheds on the Francis Marion National Forest

2.1.5 Stressors and Threats

DC-THR-1. Non-Native Invasive Species Management

Non-native invasive species are reduced on the landscape. Populations of non-native invasive species, such as feral hogs, are reduced through partnerships with appropriate state, local and private organizations. Through collaboration with partners on education, timely treatment and control, equipment cleaning and early detection and rapid response, the spread and introduction of non-native invasive species is minimized. Proactive management activities and monitoring reduce the number of non-native species and improve the integrity of ecosystems and forest health. Guidance from the regional noxious and invasive strategy is incorporated into project planning and implementation.

In partnership with the U.S. Department of Agriculture Animal and Plant Health Inspection Service, Clemson University Department of Plant Industry, South Carolina Cogongrass (See Figure 2-24) and Wild Hog Task Forces, the South Carolina Department of Natural Resources Aquatic Nuisance Species Program, and the South Carolina Exotic Pest Plant Council, the forest will reduce resource damage due to non-native invasive species through a combination of education, research, and management, not only on national forest lands but with cooperating landowners. Educational materials are provided to the publics which encourage the use of weed-free feed for horses, boat cleaning at landings, and the use of local firewood (cut within 50 miles of where it will be burned). The Forest Service works with state and industry partners on the development of weed-free certifications for soil, gravel, mulch and feed to reduce the introduction of non-native invasive species on national forest lands.



Figure 2-24. Cogongrass can alter ecosystems

DC-THR-2. Climate Change—Ecosystem Resilience

To increase resiliency to climate change: the forest is healthy, free of excessive insect and disease pressure, and tree densities are moderate; longleaf pine is favored over loblolly pine in the upland longleaf pine forest and wet pine savanna ecosystems; refuge conditions are promoted to extent feasible for climate sensitive species; bottomland hardwoods and native grasses and forbs within fire-adapted low-density forests and grasslands are desired.

Prescribed fire activities needed to restore and maintain fire adapted ecosystems are adjusted to respond to trends in climate influences, such as extended droughts and increased air temperatures;

tree densities are moderate and managed where needed through thinning and prescribed fire which reduces the susceptibility of forest stands to water stress, insect and disease outbreaks, and wildfire; piles of natural woody debris and wetlands are promoted in areas of high amphibian diversity to supplement habitats that retain cool, moist conditions; invasive species are rapidly detected in areas where they were not traditionally found, especially following disturbance events such as hurricanes and fire.

Ecosystems are resistant and resilient to the effects of climate changes (particularly hurricanes, storms and drought). Restored longleaf pine ecosystems are more resistant to high winds, beetle outbreaks and extended drought while providing economic benefit to the local communities. Bottomland hardwoods are resilient, adapt to shifts in hydrology and readily sprout when damaged. Native grasses and forbs within fire-adapted, low-density forests and grasslands are also very resilient to stress and damage. Systems and associated species that are sensitive to changes in hydrology are particularly vulnerable to alterations in climate, particular Carolina bays and designated wetlands.

Broad-scale management strategies which are developed in conjunction with partners, such as the Eastern Forest Environmental Threat Assessment Center (EFETAC), can support ecosystem resistance and resilience on the Forest. Monitoring and research coordinated with groups such as the Forest Service Southern Research Station, the South Atlantic Landscape Conservation Cooperative, and the USFWS can promote adaptive management strategies that respond to a changing climate.

DC-THR-3. Response to Rising Sea Level and Salt-water Intrusion and Influx

Existing coastal marshes are healthy and natural hydrology is restored where necessary to maintain coastal land buffers to allow for the natural inland migration of salt marshes as sea levels rise. Management activities respond to influences from storm surges, sea-level rise and salt-water influxes and intrusions further inland. Working closely with partners, releases from dams are timed to provide freshwater recharge that limits the movement of seawater inland.

Management strategies with Cape Romain Wildlife Refuge address sea-level rise impacts that alter forest habitats. The impacts of existing dikes and dams on aquatic passage and wetland habitats are considered along with the potential movement of sea water further inland are carefully considered during project-level planning.

DC-THR-4. Respond to Population Growth and Development

The Francis Marion serves as an ecological hub with greenways (or other natural connections) to other publicly owned lands as well as private lands that are conserved as natural areas during development. Natural habitats are linked across boundaries. Access to the Francis Marion from new developments minimizes impact on native ecosystems, plants, animals and cultural resources. The Forest Service maintains or improves community well-being and health. The forest is a good neighbor to local crossroads communities and the forest balances the human needs with ecological needs.

2.2 Social and Economic Sustainability

Desired Conditions provide the following: sustainable recreation; the relevant multiple uses of the Francis Marion; and the benefits derived from healthy ecosystems; and opportunities to improve

the quality of life and health of the public. Today, the Francis Marion continues to improve the quality of life for Americans in the following ways:

1. Protecting scenic, historic and culturally important landscapes;
2. Sustaining traditional ways of life by providing hunting and fishing opportunities and creating jobs through restoration efforts and ecotourism; and
3. Providing places to engage in outdoor recreation, including opportunities to get away from the hectic pace of city life, find peace and solitude and enjoy the natural environment by picnicking, kayaking, fishing, hunting and bird watching.

2.2.1 Sustainable Recreation

DC-REC-1. Recreation Settings

The forest's recreation niche showcases the coastal plain's diverse ecosystems through dispersed recreation opportunities in a range of recreation settings from semi-primitive to occasionally urban. See Figure 2-25. Semi-primitive areas are where visitors can experience solitude and unconfined recreation are protected and enhanced as these settings are rare in South Carolina's Lowcountry. Recreation settings allow a range of experiences to be achieved from remote and challenging to easily travelled and convenient, thus appealing to various user preferences. Recreation settings that have been impacted by declining ecosystem health or physical impacts, such as roads, are restored to improve ecological integrity and the quality of outdoor experiences.



Figure 2-25. Native ecosystems can provide desired scenery on the Francis Marion National Forest

DC-REC-2. Sustainable Recreation Opportunities

For generations to come, the Francis Marion NF is recognized as the premier place for quality nature-based outdoor recreation. In partnership with people and communities, the Forest provides unparalleled outdoor experiences that showcase the natural and cultural heritage of South Carolina's Lowcountry. The Forest helps to meet the growing demands for outdoor recreation by offering a range of desired opportunities – from navigating blackwaters to exploring backcountries- which cannot be found elsewhere.

The Forest provides opportunities which inspire an appreciation for the coastal plain's unique ecosystems, contribute to the area's sense of place, respond to community values, and align to its distinctive roles as a recreation provider, including the following:

- Providing public access to navigable rivers and creeks such as Awendaw Creek, Echaw Creek, Santee River, Wambaw Creek, and Wadboo Creek and the Intra-coastal Waterway;
- Providing opportunities for solitude and remoteness, especially within designated Wilderness and Inventoried Roadless Areas and semi-primitive areas;
- Providing opportunities to view and photograph diverse vegetation and wildlife, particularly plants, wildflowers, birds, and amphibians found in salt marsh, maritime forest, longleaf pine, and Carolina bay ecosystems;
- Providing opportunities for learning about ecological and historical resources found in South Carolina's Lowcountry;
- Providing opportunities to participate in the management and stewardship of natural and cultural resources through high-quality Volunteer and Service Programs, acknowledging that people use volunteering as a form of recreation.
- Providing access to lands and waters for hunting and fishing; and
- Providing hiking, bicycling, motorized and paddling trails which offer a way for communities to connect with the forest, such as along the Palmetto Trail, East Coast Greenway, and Southeast Coast Saltwater Paddling Trail.

Recreation opportunities are sustainable ecologically, economically and socially. High use recreation sites and trails are supported more and more by communities through shared infrastructure development, delivery of information, and provision of recreation services. "Green technology" for facility and trail construction results in cost savings over time. Backlog maintenance needs decrease over time as work is performed to bring high priority facilities to standard. The adverse impacts of visitor use to natural, cultural, and scenic resources are actively managed, monitored, and/or mitigated to prevent long-term modification or degradation of these resources.

Recreation opportunities contribute toward the health and vitality of individuals and communities by promoting physical exercise, adventure, community connections, and personal well-being. Forest recreation enriches the quality of life for South Carolina residents, attracts tourists from other states and countries and contributes to local economies.

The forest provides high-quality dispersed recreation opportunities throughout the forest that connect people and communities to nature including hiking, hunting, backpacking, mountain and road biking, horseback riding, OHV riding, flat-water boating, bird and wildlife viewing, nature study, driving for pleasure and primitive camping.

DC-REC-3. Developed Recreation Sites (Facilities and Infrastructure)

The Francis Marion NF provides safe, clean, and well-maintained recreation facilities to support the desired conditions for the four Resource Integration Zones: Coastal, Wando, Wambaw, and Santee. Visitor use does not adversely impact natural or cultural resources. High priority recreation sites meet Forest Service national quality standards.

Recreation facilities, trails and constructed features minimally affect resources, especially ecological integrity and cultural resources.

- Recreation operations exhibit the smallest environmental footprint possible.
- Developed facilities are energy and cost efficient. Recreation facilities reflect design principles outlined in the U.S. Forest Service Built Environment Image Guide, as well as, the unique characteristics in each of the four zones which contribute towards sense of place.
- New recreation facilities are rare and considered only after careful review takes into account: overall facility life-cycle costs, operational maintenance costs, support of a niche opportunity/management emphasis, fulfill a need which cannot be realistically met elsewhere, long-term partner support as well as alignment with demographic shifts, changing values and recreation demands.

DC-REC-4. Dispersed Recreation - Trail System

The forest provides a system of designated, sustainable trails that deliver safe motorized and non-motorized public access to the forest. Trails are properly designed and maintained to minimize and avoid adverse environmental impacts. User-created trails are restored to natural conditions; unnecessary system trails are decommissioned. Trails are located where they: respond to demand; minimize conflicts between users; are environmentally sustainable; and are operationally efficient.

When appropriate, forest trails connect to those owned by others and across jurisdictions. Trails vary in length and include trail complexes and interconnected systems with multiple access points. Travel routes to and from trailheads are appropriately signed; trails are well marked and easy to follow. Trails and trailhead parking areas are free from hazards and litter. Trails minimize impacts to natural and cultural resources. Forest personnel work with state and county highway departments to provide safe and enjoyable road bike riding experiences on paved roads.

DC-REC-5. Dispersed Recreation - Hunting Opportunities

The forest provides excellent opportunities to hunt wild turkey, white-tailed deer, Eastern gray squirrel, Northern bobwhite and other species of game animals. The forest offers one of the largest and most consolidated core areas of publicly owned land available for hunting and fishing in the state. With the exception of a few small areas, the entire Francis Marion National Forest is designated as a state Wildlife Management Area.

DC-REC-6. Dispersed Recreation - Fishing Opportunities

Visitors are able to fish in hundreds of miles of blackwater streams, as well as several lakes and ponds. Lakes and man-made ponds are stocked and managed for sustainable recreational fishing opportunities. Primary desired species include bluegill, redear sunfish, largemouth bass and channel catfish. Bass-to-bluegill ratios are monitored and maintained at desirable levels. The introduction and spread of aquatic nuisance species are controlled and managed through effective monitoring, responsive treatment, and public education. These efforts are informed by and in accordance with the most current and appropriate Forest Service guidance and South Carolina

Department of Natural Resources Aquatic Nuisance Species Program. Vegetation around pools is managed to be ecologically and functionally sufficient to filter adverse levels of sediment and pollution from entering water bodies. Water quality parameters (water temperature, dissolved oxygen, turbidity, hardness, alkalinity and pH) are monitored and used as a basis to improve conditions within ponds for sustainable fisheries.

2.2.2 Multiple Use Benefits

DC-MUB-1. Fish and Wildlife Habitats

Restoration of ecosystems maintain and improve habitats for animal populations that are commonly viewed, photographed, hunted or fished. See Figure 2-26.

- Late successional habitat supports species dependent on older pine stands such as pine warbler, Eastern wild turkey, Eastern fox squirrel and red-cockaded woodpecker;
- Early successional habitat support white-tailed deer and Northern bobwhite quail;
- Riparian areas, marshes and wetlands provide habitat for wintering waterfowl, bald eagles, shorebirds, wading birds, prothonotary warblers, Southern dusky salamanders, several bat species, swallow-tailed kite and black bear; and
- Rivers, streams and swamps provide habitat to native fish populations, as well as species such as the American alligator.



Figure 2-26. A Cope's tree frog rests on a leaf

DC-MUB-2. Cultural Resources

Cultural resources, or heritage assets, are identified and stabilized to protect their significant cultural, historical and archaeological values. Cultural resources listed or eligible for the National Register of Historic Places are maintained. Cultural resources identified as priority heritage assets (PHAs) have distinct public values that are protected and actively maintained (see Table 2-5). Knowledge about the past is synthesized and readily available for public interpretation.

Fascination with the past is transformed into understanding and appreciation through the following quality experiences: on-site interpretation; educational tours; partnership and volunteer opportunities to assist with the research and management of cultural resources; and special events. In order to prevent the illegal taking of artifacts the use of metal detectors is prohibited unless specifically authorized under a special use permit.

The Francis Marion takes into account how cultural resources influence the sense of place, cultural continuity and identity. The forest works in conjunction with the Gullah-Geechee Cultural Heritage Corridor and local communities to protect cultural landscapes as physical reminders of the area's prehistory and history and the human story of the Lowcountry. The public knows that the Forest Service takes care of its cultural heritage, a precious gift from the past. See Figure 2-27.

Forest personnel identify and evaluate the cultural resources, assessing resources within their larger cultural, chronological, and geographic contexts. The resulting inventories will provide the substantive data required for (1) nominating resources to the National Register of Historic Places; (2) general forest planning and specific historic preservation plans for preserving, protecting, and treating cultural resources to achieve desired conditions; (3) land acquisition planning; (4) interpretation, education, and natural and cultural resource management activities; and (5) compliance with legal requirements.

Table 2-5. Priority heritage assets on the Francis Marion National Forest

Priority Heritage Asset	Site Type	Management Use
Sewee Shell Ring	Prehistoric site	Enhancement - interpretation
Battery Warren	Civil War earthwork	Enhancement - interpretation
Tibwin House	Historic 19th and 20th century house	Enhancement – interpretation/ adaptive reuse
Walnut Grove	Mid 20th century lodge	Enhancement – adaptive reuse
Witherbee Tower	20th century Fire Lookout Tower	Enhancement – adaptive reuse
Honey Hill Tower	20th century Fire Lookout Tower	Enhancement – adaptive reuse



Figure 2-27. Battery Warren is a Civil War earthwork

DC-MUB-3. Road System

The National Forest Transportation System is sustainable and properly sized; provides public and administrative access for visitor enjoyment and forest management; and minimizes adverse resource effects. The road system is a network of well-maintained roads that provide safe travel and reasonable access to the national forest and private lands within the national forest boundary. See Figure 2-28. Forest roads at operational maintenance levels 3 to 5 meet public safety road standards; those at operational maintenance levels 1 and 2 are sustained for high clearance and require operator judgment and skill. Forest roads will be periodically evaluated to modify maintenance levels based on administrative, ecological, species and public needs.



Figure 2-28. Well-maintained roads provide access to the Francis Marion National Forest

DC-MUB-4. Wood Products

Trees that provide high-quality wood products are available for harvest. Timber harvest produces a sustainable flow of timber and stable, financial benefits to the local economy and accomplishes multiple objectives. See Figure 2-29. Tree harvest can accomplish the following:

- Capture carbon sequestered by the forest;
- Create new young forest to provide diverse habitats;
- Produce a flow of biological habitats over time;
- Make the forest more resilient to stresses, such as tornados, hurricanes, etc.;
- Maintain moderate or open tree densities;
- Reduce risk from some insect pests;
- Remove fuel that has accrued as biomass;
- Favor desired species;
- Reduce hazardous fuels for community wildfire protection; and
- Provide a sustainable flow of timber for local communities



Figure 2-29. Timber harvesting provides jobs

DC-MUB-5. Special Forest Products

Special forest products including forest botanical products may be authorized for use consistent with FSM 2409.18 Chapter 80. These include but are not limited to: firewood, pine straw, pine cones, grape vines, mushrooms, various ferns, other plant materials and seeds. Special forest products permits must be sold in a manner that maintains these products on a sustainable basis (36 CFR 223.219).

DC-MUB-6. Clean Air

Forest visitors experience clean air and clear vistas. Activities on the forest meet all National Ambient Air Quality Standards designed to protect human health and public welfare. Smoke impacts from prescribed burning on national forest lands are minimal and short term.

DC-MUB-7. Public Drinking Water

Groundwater is maintained and used sustainably. Abundant clean water is produced on the forest. High-quality public water is provided at facilities and via 1 artesian public groundwater source. Practices to prevent contamination of drinking water sources are applied and monitored. Significant potential sources of drinking water contamination are identified and the susceptibility of the water supply to contamination from these sources is determined. Forest management activities to restore hydrology on the national forest slow the movement of floodwaters, delay flooding further downstream; promote increased water tables and recharge of area aquifers.

DC-MUB-8. Energy and Minerals

The Francis Marion National Forest manages minerals and energy development to optimize their use in a manner that contributes to public needs in an environmentally sound manner.

DC-MUB-9. Paleontological Resources

Paleontological resources, or fossil assets, are identified and stabilized to protect their significant scientific and paleontological values. Fossils and other paleontological resources are identified and protected throughout the forest. The public is provided opportunities to learn about the past through educational interpretation and tours. Encourage partnership and volunteer opportunities to assist with research and management; and special events.

DC-MUB-10. Infrastructure (Administrative Facilities)

Administrative buildings are in good condition, safe, clean and structurally sound, as well as energy and cost efficient. Structures are accessible. Facility structures and operations exhibit the smallest environmental footprint possible and are energy and cost efficient. Construction and reconstruction of facilities meet universal standards for accessibility.

DC-MUB-11. Scenery

Landscapes reflect healthy ecosystem diversity and contribute to visitors' sense of place. See Figure 2-30. The scenic characteristics are conserved, maintained and enhanced to retain the distinctive landscape character and sense of place associated with the four Resource Integration Zones on the Francis Marion. The Forest's landscapes are incredibly diverse including many unique features like longleaf pine ecosystems, Carolina Bays, pocosins, salt marsh and blackwater swamps.



Figure 2-30. Eagle flies along the water at the Tibwin impoundment on the Francis Marion

2.2.3 Connecting with Communities and Partners

DC-COM-1. Consider the broader landscape

The Francis Marion is part of a large, intact native landscape comprised of integrated, connected lands owned by multiple landowners in the South Carolina coastal plain. See Figure 2-31. The resulting large, integrated landscape of connected lands allows ecological processes to occur naturally and shape the composition and structure of the coastal plain ecosystems. Habitats and ecosystems are connected across boundaries to allow for migration of species.

Forest Service personnel work closely with adjacent landowners and other federal, state and local agencies that share similar ecosystem restoration objectives to maintain and restore large, intact native ecosystems and provide dispersed recreation opportunities that allow people to enjoy numerous outdoor activities. Protected public and private lands inform land adjustment decisions. Landscape structure, ecosystem connectivity, and recreation opportunities are considered in any potential land acquisition and exchange proposals. Any properties that are acquired will help to optimize public benefits and provide multiple ecosystem services. Figure 1-1 in Chapter 1 shows the Francis Marion National Forest in the context of a broader landscape with other publicly owned and privately protected lands (conservation easements).

DC-COM-2. Fire-Adapted Human Communities

Risk to human populations and infrastructure from wildfire is low. Through fire regime condition class maintenance and restoration, vegetative conditions are within or near historical range, resulting in reduced risks of wildfire to developments, private property and Forest Service infrastructure in interface and intermix areas. Through education and outreach, communities and publics are receptive to, knowledgeable about and accept the role of fire and its short-term impacts. See Figure 2-31. Wildland fire, as an essential ecological process and natural change agent, is incorporated into the planning process and wildfire response. Appropriate management response to wildland fire is based on the ecological, social and legal consequences of the fire.

Local, state, tribal and federal agencies support one another with wildfire response, including engagement in collaborative planning and decision-making processes. Wildfire response takes into account all lands and recognizes the interdependence and statutory responsibilities among jurisdictions.

DC-COM-3. Community Participation and Collaboration

Community participation and collaboration build long lasting partnerships and working relationships to move together toward sustainable conditions. The Francis Marion works with other federal, state, and local agencies that share similar recreation objectives to maintain and improve recreation opportunities on and connected to the forest. The demographic diversity of recreation visitors is continuously expanding by establishing relationships with new partners, providing opportunities which attract non-traditional users, and strengthening physical connections to surrounding communities. Recreation opportunities are enhanced to be more accessible to persons with disabilities and inclusive of a culturally diverse population. Collaborative efforts help guide development of program priorities, promote a connection to place, and foster a sense of stewardship. Community outreach efforts and realignment of recreation offerings lead to an involved citizen population that, over time, is more representative of the communities the national forest serves. Volunteer and partnership opportunities continue to expand over time but remain within the forest capacity to manage.

DC-COM-4. Community Health

Communities, both large and small, gain benefits from the Forest but also add to the Forest's cultural uniqueness. Large communities are able to connect easily to the many opportunities on the Forest. Small and very small crossroads communities (within and neighboring) the forest survive and thrive. Crossroads communities are acknowledged as a valuable part of the larger community's health. Impacts to local communities are considered during acquisitions of national forest lands.

DC-COM-5. Human Health and Safety

Health of citizens are improving as Charleston and Berkeley Counties lead efforts with cooperation from the Forest. The transmission of vector-borne illnesses is low among residents. This coordination may include controlling the transmission of diseases that affect public health, such as diseases carried by feral hogs, rabies-vector species or mosquitos



Figure 2-31. Coordination is required to complete prescribed burning

2.3 Resource Integration

Resource integration zones (RIZs) are contiguous geographic areas differentiated by access patterns, influences surrounding the borders of the Francis Marion and the interactions between humans and ecosystems. These zones provide context for how people use and benefit from the Francis Marion and how the desired conditions relate to settings, landscapes and ecosystem restoration. It provides a finer scale to describe how the desired conditions for Ecological Sustainability and Social and Economic Sustainability integrate across a contiguous area. Four zones, Coastal, Wando, Wambaw and Santee, are delineated in Figure 2-32.

More detailed descriptions of the four zones are provided in Appendix H.

Coastal Resource Integration Zone is located just miles away from the city of Charleston and easily accessed by US Highway 17, this unique area features isolated forested lands and coastal marshes interspersed with small rural communities along a portion of the 3,000-mile Atlantic Intracoastal Waterway. The identity of this zone is closely tied to the sights, sounds, and smells of the coastal environment, but with much considerable evidence of people, as well.

Wando Resource Integration Zone borders the Coastal Zone to the Southwest, is the second smallest zone on the forest and includes 38,320 acres of National Forest System lands, zero acres of other publicly owned lands, and approximately 31,500 acres of land in private ownerships.

This zone encompasses the southernmost area of the Francis Marion, which along with the Coastal Zone, are the closest National Forest lands to Charleston and Mount Pleasant.

Wambaw Resource Integration Zone encompasses a large coastal floodplain bordered by the Santee River to the North, the Wando Zone to the South, U.S. Hwy 17 to the East, and S.C. Hwy. 41 to the West. This highly diverse and productive ecoregion includes 171,655 acre of scenic bottomland hardwood forests, depression ponds, Carolina bays and longleaf pine savannas. Nearly 86 percent of the Wambaw Zone is held under public ownership or protected through conservation easements, with the majority of lands administered by the Forest Service. The 138,255 acres of national forest lands within the Wambaw Zone are attributed with being the Francis Marion's most remote and natural settings and include 4 congressionally designated wilderness areas.

Santee Resource Integration Zone is located in farthest northwest portion of the Francis Marion, which encompasses 145,600 acres of public and private lands, and includes 29% of all lands administered as the Francis Marion. Much of Santee's private lands are forested or held in agricultural use. The Santee includes 73,900 acres of national forest lands, 6,000 acres of experimental forest and 71,600 acres of privately owned lands. While large tracts of private lands exist within the Santee zone, approximately 7,300 of these privately owned acres are protected under conservation easements.

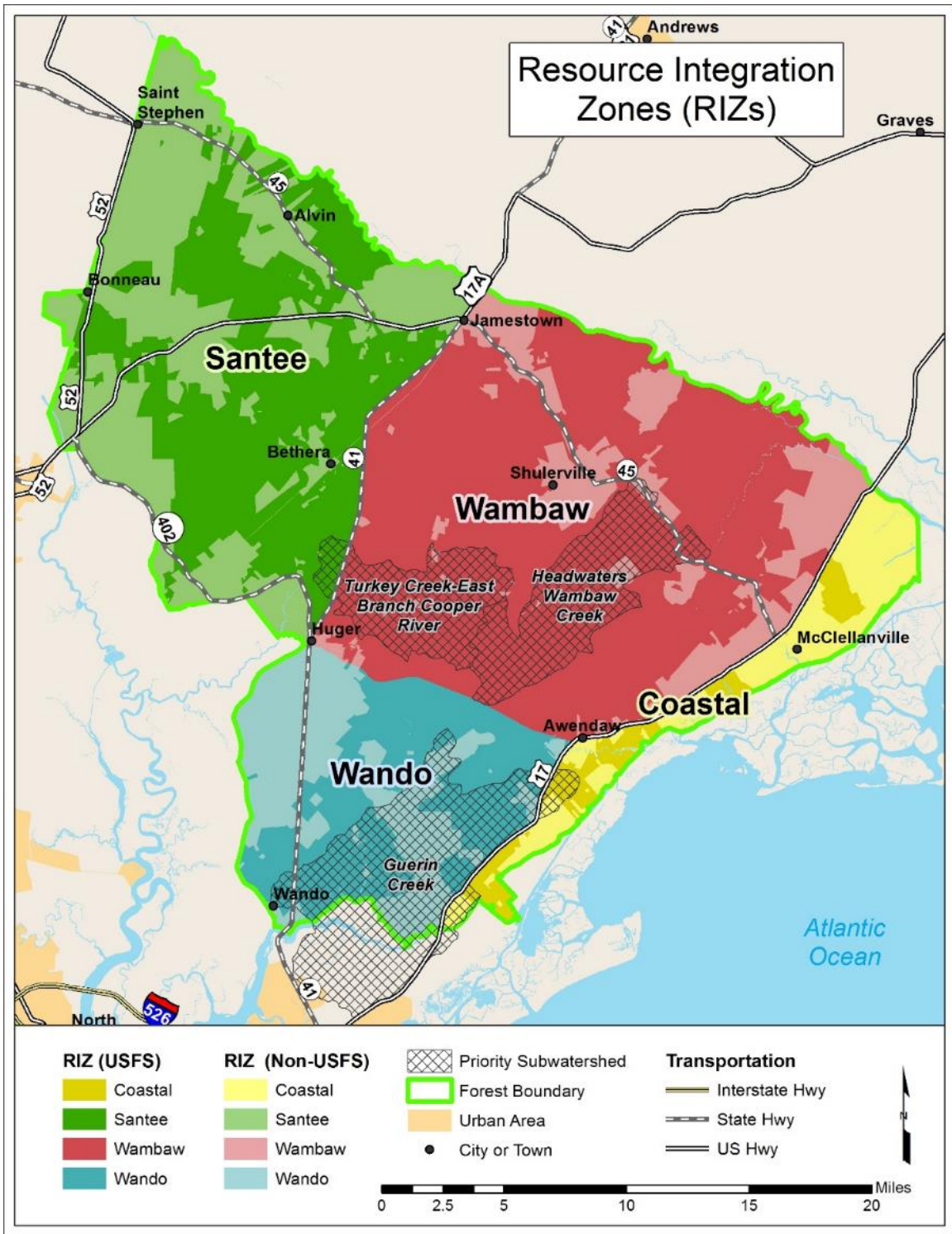


Figure 2-32. Resource integration zones on the Francis Marion

2.3.1 Coastal Resource Integration Zone

See Table 2-6 for a summary of desired conditions, Table 2-7 for a list of special or designated areas and Figure 2-33 for a map. Desired conditions are labeled DC-RIZ-Coastal.

Emphasis in this zone focuses on providing developed as well as dispersed recreation opportunities while reducing the risk of wildfires. It is not anticipated that low-intensity fire can be used frequently due to the presence of US Highway 17, but timber management and other treatments will reduce the risk of wildfires and maintain wildlife habitats. Isolated forested lands and coastal marshes are maintained and restored to provide wildlife habitat, but also buffer the impacts of extreme storm events and sea-level rise. Three national register historic districts will be proposed that connect to the East Coast Greenway and provide opportunities for interpretation for priority heritage assets. Ecotourism opportunities that provide access to the Atlantic Intracoastal Waterway as well as connection to the East Coast Greenway are a high priority. These opportunities are being developed through partnerships with the Town of Awendaw and Charleston County Park and Recreation Tourism in order to promote ecotourism and jobs.

Goals for the Coastal RIZ:

- Work with partners on moving the East Coast Greenway off US Highway 17 onto lands managed by The Nature Conservancy, Charleston County Parks and Recreation, Town of Awendaw and USDA Forest Service.
- Work with partners to create an interconnected trail network that provide safe biking and hiking opportunities suitable for families;
- Work with Charleston County to implement the Parks and Recreation's bike/pedestrian plan.
- Maintain Buck Hall Recreation Area and public access to the Atlantic Intracoastal Waterway.
- Work with partners to implement the Community Wildfire Protection Plan for the Awendaw Fire District.
- Nominate three priority heritage assets as National Register Districts through the National Park Service.
- Complete Comprehensive Road Planning with input from Charleston County and the Public.
- Work with the Cape Romain Wildlife Refuge and Federal, State, Charleston County and local governments on addressing the impacts of sea-level rise and extreme weather events.
- With Charleston County as the lead agency work to assess mosquito control needs.
- Work with local and county governments to implement Smart Growth and sustainable development principles.
- Coordinate with SC Department of Natural Resources on the management of the Tibwin Impoundment.

Table 2-6. Desired conditions for the Coastal Resource Integration Zone

Resource	Description	Measure
Ecosystem Restoration	Longleaf Pine Restoration	1,000 acres
	Percent of Coastal Zone in Management Area 1 (for other fire-adapted communities)	21 percent
	Priority Watershed Restoration Action Plan (Guerin Creek/French Creek)	1
	Maritime Forest	950 acres
	Salt Marsh	890 acres
Fish and Wildlife	Wildlife Management Areas	Wambaw and Waterhorn
	Streams	27 stream miles
	Ponds	9 acres
Wood Products	Percent of Projected Timber Sale Quantity	3 percent
	Suitable land (approx.)	6,000 acres
Hazardous Fuel Reduction	Amount (MA2)	100 acres
Fire Regime Condition Class (by year 2026)	FRCC 1 (low departure)	2,500 acres
	FRCC 2 (moderate departure)	1,100 acres
	FRCC 3 (high departure)	4,200 acres
Recreation Settings	Rural	286 acres
	Roaded Natural	8,674 acres
	Moderate	472 acres
	Low	2,646 acres
Key Recreation Opportunities	Sewee Visitor and Environmental Education Center	Visitor Center
	Buckhall	Recreation Area
	Tibwin	Trails and Wildlife Viewing
	Sewee Shell Ring	Historic Area
	Palmetto Trail (Portions of Swamp Fox National Recreation Trail)	Hiking and Biking Trail
Scenic Integrity Objective	High	5,843 acres
Cultural & Historic	Historic Districts	Nominate 3 Historic Districts (see Special or Designated Areas)

Table 2-7. Special or designated areas in the Coastal Resource Integration Zone

Resource Area	Description	Measure
National Register Districts (Nominated)	Sewee District	262 acres
	Tibwin District	1,048 acres
	Walnut Grove District	1,048 acres
Eligible Wild and Scenic River	Awendaw Creek	7 Miles
Botanical	Rare Communities	9 acres
National Recreation Trail	Swamp Fox (See desired conditions for trails in this zone)	0 Miles

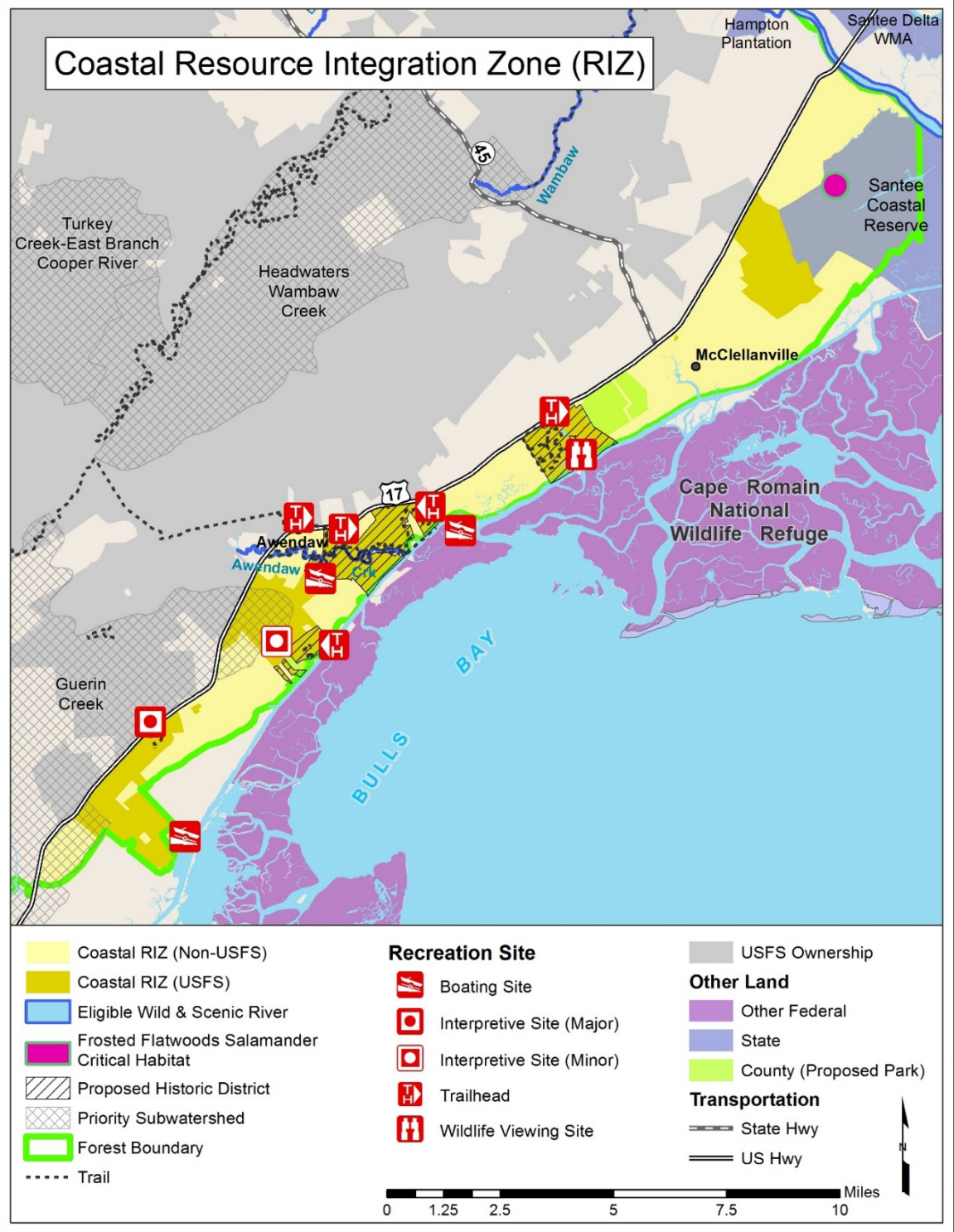


Figure 2-33. The Coastal Resource Integration Zone on the Francis Marion National Forest

DC-RIZ-Coastal-1. Desired Conditions for Ecological Sustainability in the Coastal RIZ Ecosystem Restoration. Forest Service staff work closely with the Santee Coastal Reserve and the Cape Romain Wildlife Refuge to provide connections across national forest boundaries.

Approximately 1,000 acres (11 percent of the Francis Marion in this zone) is restored to longleaf pine ecosystems. These restored systems connect with the Santee Coastal Reserve lands in the northern part of the zone. Forest Service staff work with the Sewee Longleaf Conservation Cooperative to connect longleaf pine ecosystems with adjacent landowners who are restoring longleaf pine.

More than 1,800 acres of salt marsh and maritime forests are maintained or restored and connect with the Cape Romain National Wildlife Refuge, forming a larger, connected ecosystem along the coast.

Priority Watershed. Desirable ecological and social conditions are restored in the Guerin Creek priority watershed with portions of the French Creek subwatershed incorporated. Watershed action plans include a full range of management activities that restore wildlife habitats, maintain and improve hydrologic function and provide for a sustained flow of timber and early-successional habitats in compliance with the watershed condition framework.

Aquatic Ecosystems and Watersheds. Streams are evaluated for restoration. Groundwater is protected and regularly checked for salt-water intrusion. Salt-water marsh ecosystems are adequately protected from boat wakes and shifting tide water changes.

Rapid Response to Climate Change and Sea-Level Rise. Rising sea levels are anticipated and adaptation strategies are in place to protect significant cultural sites and existing facilities.

Respond to Human Population Growth and Development. State and private landowners' open spaces or natural areas link with the Francis Marion to connect ecosystems across property lines. The Francis Marion collaborates with the towns of Awendaw and McClellanville and with Charleston County to implement Smart Growth and sustainable development principles. Unincorporated communities are acknowledged as a valuable part of the larger social landscape.

DC-RIZ-Coastal-2. Desired Conditions for Social, Cultural and Economic Sustainability in the Coastal RIZ

Sustainable Recreation

Recreation Settings. Because it includes so much of the surrounding rural communities and private land ownership, recreational settings in the Coastal Zone are almost entirely roaded natural, which provide visitors with many opportunities to interact with other visitors and the environment. Visitors have opportunities to see many unique ecosystems that are rare on national forests, including salt marsh and the maritime forest. Health and resilient forests provide a sustained delivery of roaded natural recreational settings and opportunities. Restored longleaf pine ecosystems provide significant opportunities to see and explore the forest due to its open condition.

Sustainable Recreation Opportunities. The visitor experience in this zone is very much focused on the transition from "land to sea" with one's movement almost always headed east towards the Waterway. See Figure 2-34. In many cases, travel is along water routes such as the 7.3 mile free flowing Awendaw Creek, eligible as a wild and scenic river, or along trails such as the Palmetto Trail. While the areas of this zone are predominately natural, developed facilities, trails, and roads

are intensively managed to ensure resource protection and contribute towards public safety. Appealing to a diversity of users, well-defined trails located not far from one's car or conveniences, offer short-distance hiking opportunities which lead to scenic vistas and the Waterway. Once at the Waterway, visitors can find paddling, hiking/biking, and fishing/shrimping opportunities which are available almost any time of the year due to the area's mild humid, subtropical climate.

The Coastal Zone is the forest's epicenter for interpretation and environmental education because of its convenient location and significant cultural resources and diverse ecosystems. Over time, the Coastal Zone contributes greatly to the region's tourism market through increased delivery of guided services and developed attractions where they can be accommodated.



Figure 2-34. Kayaking on the Francis Marion National Forest

Trails. Forest trails within the Coastal Zone serve as conduits to regionally significant trails like the East Coast Greenway, Southeast Coast Saltwater Paddling Trail, Coastal Birding Trail and the statewide Palmetto Trail for recreationists and the communities of Awendaw and McClellanville. Loop trails with easy access from main travelways such as Hwy. 17 offer a variety of lengths for hiking and biking. Sustainable Trail systems are maintained through partnerships with communities, user groups and other agencies. These partnerships contribute to increased stewardship of national forest lands. The Swamp Fox National Recreation Trail, which is co-located with the Palmetto Trail, provides outstanding hiking opportunities. The trail system promotes recreation tourism by showcasing the forest's natural and cultural resources and supporting private ventures in nature-based tourism such as permittees.

Multiple Use Benefits

Fish and Wildlife. In partnership with the South Carolina Department of Natural Resources (SCDNR), 123 acres of wildlife openings are maintained to enhance wildlife habitat and hunting opportunities. Maintenance of some wildlife areas, such as Tibwin, creates open, mowed fields, which provide ideal opportunities and access for periodic closed hunts for persons with disabilities. The projected timber sale quantity provides a flow of early, mid- and late-seral habitats. Approximately 27 miles of streams with riparian management zones and popular,

stocked fishing ponds (approximately 9 acres) provide aquatic habitat and ideal fishing opportunities. See Figure 2-35. In partnership with the South Carolina Department of Natural Resources (SCDNR), the Wambaw Wildlife Management Area (WMA) and a small portion of the Waterhorn WMA provide high quality hunting opportunities. Timber harvests provide high quality wildlife habitats by creating early-successional habitats and maintaining desired tree densities.



Figure 2-35. Impoundment at the Tibwin historical area

Cultural Resources. All cultural resources aid in public understanding and appreciation of the interplay between human history and forest ecosystems. Restored ecosystem enhance the historic character of the cultural resources.

Three areas within the coastal zone are nominated to the National Register of Historic Places as historic districts. These three proposed National Register Districts comprise 2,400 acres or nearly one-quarter of the national forest land in this zone. These historic districts connect to local county parks and the East Coast Greenway, so visitors can easily move from one to other. The three National Register Districts include:

1. Sewee Shell Ring and the surrounding tracts;
2. Walnut Grove House and surrounding tract; and
3. Tibwin House as well as the North and South Tibwin tracts.

Access (Roads). Forest Service roads connect with state and federal highways to provide access to abundant recreation sites and cultural/historic areas throughout the zone.

Scenery. Scenic landscape conditions vary across the zone. In the northern portion where longleaf pine ecosystems are restored on about 11 percent of the zone, open, longer viewsheds offer appealing landscapes for viewing. See Figure 2-36. Salt marsh offers appealing landscapes for their longer viewsheds on nearly 20 percent of the Francis Marion ownership. Viewsheds are also longer due to open areas adjacent to communities as hazardous fuels are removed. Areas in the southern portion of this zone are a mix of private land fields, plantations and canopy openings on the national forest. A high or very high scenery emphasis as viewed from trails or other high-use areas occurs within this zone. A variety of ecologically sound, resilient and visually appealing

forest landscapes support the forest's distinctive roles and contributions, especially in the Coastal Zone. The variety of ecosystems, especially longleaf pine, salt marsh and maritime forest, offer a diversity of visually appealing landscapes that complement one another while juxtaposing adjacent private fields, pine plantations, and residences. Rare communities including Sewee Shell Ring and Awendaw Oak-Hickory Bluff are found within the Coastal Zone.



Figure 2-36. Desired scenery in the Coastal Resource Integration Zone

Connecting with Communities and Partners

Fire-Adapted Human Communities. Through partnerships and the resulting hazardous fuels reduction treatments, nearly 30 percent (1,800 acres) of Fire Regime Condition Class (FRCC) 2 and 3 ecosystems in the wildland urban interface are moved closer to historic disturbance levels. The local communities of Awendaw, McClellanville, Tibwin and Germantown, along with adjacent landowners and unincorporated communities are provided greater wildfire protection by becoming fire-adapted and fire-resilient. With ecosystem restoration and hazardous fuel reduction, more than 2,500 acres would have low departure (FRCC 1).

Community Participation and Partnerships. The forest's connection to local communities is strong in the Coastal Zone. The rural, gateway communities of Awendaw and McClellanville provide a vital link to the Coastal Zone's natural and cultural resources. Their small-town qualities, cultural resources, and close ties to fishing, shrimping, and crabbing are preserved. While each town has a distinct and unique sense of community, both aim to preserve quality of life through conservation of cultural/historic resources and the natural environment. Embracing the principles of SmartGrowth and sustainable development, these communities actively safeguard open spaces, wetlands, riparian buffers and cultural resources.

Within the Coastal Zone, the forest aims to:

- Expand and strengthen partnerships with the towns of Awendaw and McClellanville, as well as other smaller crossroads communities, specifically focused on water, cultural, and recreation resources;
- Contribute towards their sustainability by providing benefits such as preservation of area waterways and forests and protection of cultural resources;
- Contribute towards their sense of community by making decisions sensitive to their unique character and identity and supporting local, cultural events;
- Contribute towards their quality of life by providing recreation opportunities which contribute to healthy living; and

- Seek opportunities to strategically and sustainably connect forest lands with local residents through creating and enhancing physical linkages, such as the East Coast Greenway, and cultural linkages, such as the Gullah Geechee Cultural Heritage Corridor. See Figure 2-37.



Figure 2-37. Community outreach is critical to implementing the forest plan

Coastal Zone: Special Areas or Designated Areas

DC-RIZ-Coastal-S-1. National Register Districts

Three National Register Districts aid in public understanding and appreciation of the interplay between human history and forest ecosystems: Sewee National Register District, Tibwin National Register District, and Walnut Grove National Register District. Two historic plantations are protected and interpreted to aid in public understanding. Significant prehistoric sites are protected and some are interpreted for public interest. The extensive trail system is outstanding with views of salt marsh and maritime forest ecosystems and offers connections to long-distance trails.

- The Sewee National Register District features the Sewee Shell Ring Trail where visitors can meander through upland maritime forest and salt marsh to learn about this prehistoric settlement dating back to at least 4,000 years ago.
- The Tibwin National Register District showcases one of the oldest coastal plantations in the St. James Santee Parish surrounded by open fields, a series of water impoundments ideal for birding and hunting, and an extensive trail system. See Figure 2-38.
- The Walnut Grove National Register District, lying on both sides of the mouth of Awendaw Creek, includes historic settlements, as well as evidence of thousands of years of prehistoric occupation which are all protected and interpreted for public enjoyment.



Figure 2-38. Historic Tibwin house is a priority heritage asset

DC-RIZ-Coastal-S-2. Awendaw Creek (Eligible Wild and Scenic River)

The 7.3-mile Awendaw Creek is maintained as an eligible wild and scenic river. (See map of eligible wild and scenic rivers in Appendix E). With a classification of recreational, its free-flowing conditions and outstandingly remarkable value of recreation are protected, maintained or enhanced. The creek has unimpaired water quality.

DC-RIZ-Coastal-S-3. Rare Plant Communities

Rare plant communities - including Sewee Shell Mound and Awendaw Oak-Hickory Bluff - are maintained and restored to protect their diversity and provide opportunities for wildflower viewing. The incidence of non-native invasive plant species is low.

2.3.2 Wando Resource Integration Zone

See Table 2-8 for a summary of desired conditions, Table 2-9 for designated areas and Figure 2-40 for a map. Desired conditions are labeled DC-RIZ-Wando.

Emphasis for this zone balances the introduction of fire to provide habitat for at-risk plants and animals with an increased demand for an interconnected trail system and nearby urban development. Notably there is the highest concentration of fire-adapted plants and animals as well as the greatest pressure for urban development in this zone. Charleston and Berkeley Counties have programs that promote outdoor recreation opportunities that complement the desired conditions for sustainable recreation in this zone.

Goals include:

- Introduce prescribed burning to maintain designated critical habitat restore breeding wetlands for the Frosted Flatwoods Salamander. This management will benefit at-risk amphibians.
- Coordinate with partners on prescribed burning and smoke management concerns in the Wando and Huger communities.

- Develop a watershed action plan for Guerin Creek and French Creek watersheds on coordinated management activities, such as wildlife habitat management, timber harvesting and prescribed burning.
- Coordinate with partners on creating an interconnected trail system to provide sustainable horseback riding, biking and hiking opportunities.



Figure 2-39. Fringed orchid in compartment 96

Table 2-8. Desired conditions for the Wando Resource Integration Zone

Resource Area	Description	Measure
Ecosystem Restoration	Potential Longleaf Pine Restoration	10,000 acres
	Percent of Wando Zone in Management Area 1	46 percent
	Priority Watershed Restoration Action Plan	1
Fish and Wildlife	Wildlife Management Areas	Northhampton and Wambaw
	Streams	132 stream miles
	Ponds	9 acres
Wood Products	Percent of PTSQ	15 percent
	Suitable land (approx.)	29,000 acres
Hazardous Fuel Reduction	Amount (MA2)	300 acres
Fire Regime Condition Class (by year 2026)	FRCC 1 (low departure)	13,900 acres
	FRCC 2 (moderate departure)	12,000 acres
	FRCC 3 (high departure)	11,800 acres
Recreation Settings	Roaded Natural	38,230 acres
Scenery	High	17,388 acres
	Moderate	6,275 acres
	Low	14,567 acres
Recreation Settings	Roaded Natural	38,230 acres
Scenery	High	17,388 acres
	Moderate	6,275 acres
	Low	14,567 acres
Key Recreation Opportunities	Ion Swamp	Interpretive Trail
	Tuxbury	Equestrian and Hiking Trail
	Palmetto Trail (Co-located with the Swamp Fox National Recreation Trail)	Hiking and Biking Trail
National Recreation Trail	Swamp Fox (See desired conditions for Sustained Recreation Opportunities including Trails in this zone)	12 Miles
Cultural & Historic	Naval Stores Industry and logging	

Table 2-9. Special or designated areas in the Wando Resource Integration Zone

Resource Area	Description	Acres
Designated Critical Habitat	Frosted Flatwoods Salamander See DC-T&E-1.	1,173
Botanical	Rare Plant Communities	171

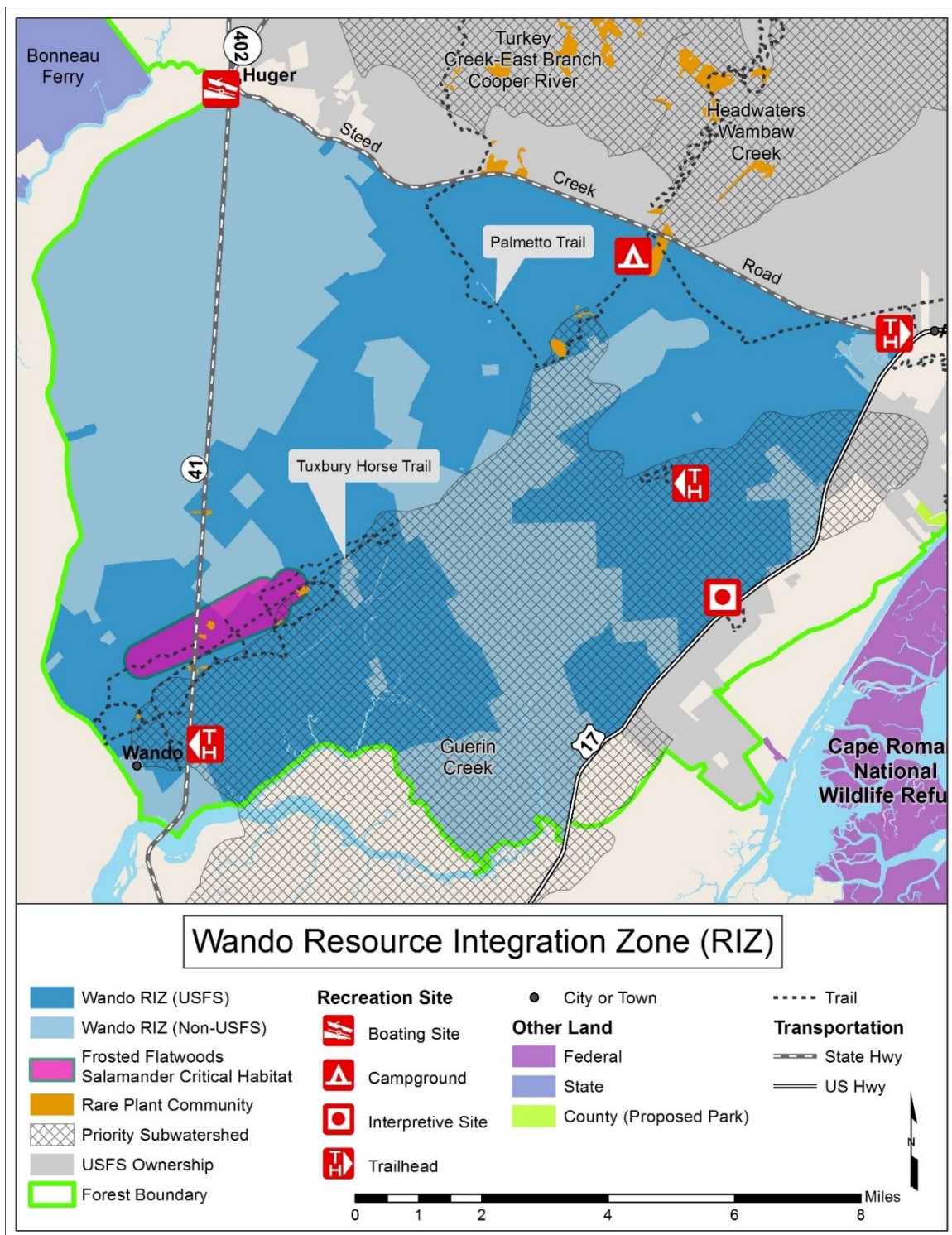


Figure 2-40. The Wando Resource Integration Zone on the Francis Marion National Forest

DC-RIZ-Wando-1. Desired Conditions for Ecological Sustainability in the Wando RIZ

Ecosystem Restoration. Adaptive management strategies are in place to allow migration of species further inland. Partnerships with adjacent landowners with conservation easement provide habitat connections across property lines. Greater connections are made with adjacent landowners are explored for joint management opportunities on approximately 1,200 acres of this zone. Joint management opportunities with adjacent landowners provide benefits and efficiencies of all interested parties and includes Wyden Amendment Agreements to accomplish burning or control erosion or partnerships on trail management.

- Approximately 10,000 acres of restored longleaf pine ecosystems provide 1,300 acres of critical habitat for the threatened frosted flatwoods salamander.
- Nearly 1,700 acres of depressional wetlands and Carolina bays are restored and provide habitat for amphibian and reptile species of conservation concern, such as the gopher frog. See Figure 2-41.
- Nearly 2,100 acres of salt marsh and maritime forest on the Francis Marion is maintained and monitored for impacts from sea-level rise

Aquatic Ecosystems and Watersheds. Streams are restored and provide habitat connections across the landscape. Best Management Practices are used to limit impacts from ground-disturbing activities. Management activities do not impact groundwater and groundwater dependent ecosystem are maintained.

Priority Watersheds. Desirable hydrologic, ecologic and social conditions are maintained and restored in the Guerin Creek/French priority watershed. Management activities improve habitat connections, waterflows and wildlife habitat, while providing for a sustained flow of wood products that improve the local economy. Stream are evaluated for restoration during project-level planning and integrated management activities form a watershed action plan.

Respond to Human Population Growth and Development. State and private landowners' open spaces or natural areas link with the Francis Marion to connect ecosystems across property lines. The Francis Marion collaborates with the town of Wando and with Berkeley County to implement Smart Growth and sustainable development principles and Berkeley County's Green Infrastructure and Blueway plan. Unincorporated communities are acknowledged as a valuable part of the larger social landscape.



Figure 2-41. Prescribed burning is used to restore an isolated wetland

DC-RIZ-Wando-2. Desired Conditions for Social, Cultural and Economic Sustainability

Sustainable Recreation

Recreation Settings. The area is interspersed with surrounding rural communities and private land ownership and recreational settings in the Wando Zone are almost entirely wooded natural. This setting provides visitors with many opportunities to interact with other visitors and the environment. Visitors have the opportunity to see many unique ecosystems including maritime forest and salt marsh in the Guerin's Creek area, a rarity on national forest lands. Healthy and resilient forest provide sustained delivery of wooded natural recreational settings and opportunities. Restored longleaf pine ecosystems, provide significant opportunities to see and explore the forest due to its open condition.

Sustainable Recreation Opportunities. The visitor experience in this zone is focused on the transition from the rapidly growing suburbs of Mount Pleasant to the oasis of the forest's rural nature. Visitors from neighboring communities find the opportunities of Ion Swamp Trail, Tuxbury Trail, hunting and scenic viewing on the forest roads plentiful. Neighboring communities, corporations, medical institutions, schools and other governing bodies use the trail system in their programs for improving citizens' health such as Eat Smart, Move More. Access from population centers, Highway 17 and SC State Hwy 41, allow for fast visitor access to the interior of the forest. While the areas of this zone are predominately natural, trails, and roads are intensively managed to ensure resource protection and contribute towards public safety. Well-defined trails located not far from one's home, or conveniences, offer multiple trail opportunities including trail complexes that connect multiple trails systems, like the long-distance Palmetto Trail. These trails have multiple opportunities for visitors to go out for 30 minutes or for several days, in some cases from one's own community trail system.

The Wando Zone contributes to interpretation due of its convenient location and interpreted trail. The Wando Zone contributes greatly to the local quality of life, as dispersed recreation, including trails, hunting wildlife viewing and fishing, allow people to enjoy the many benefits of the national forest. Hunting is popular and habitat is managed jointly within the Northampton and Wando Wildlife Management Area and 51 acres of wildlife openings. Ideal fishing opportunities are provided in stocked fishing ponds and 132 miles of rivers and stream aquatic habitats.

Trails. The Wando Zone offers a wide variety of land-based trail opportunities on the Francis Marion. Trails serve as gateways from growing communities to the forest's natural environs. The trail complex includes a diverse system of close-to-home offerings that respond to urban population outdoor recreation needs. Neighboring communities, corporations, medical institutions, schools and other governing bodies use the trail system in their programs for improving citizens' health such as Eat Smart, Move More. The trails system challenges all skill levels by offering varying degrees of challenge from fully accessible to difficult. The Swamp Fox National Recreation Trail, which is co-located with the Palmetto Trail, provides outstanding hiking opportunities.

Multiple Use Benefits

Cultural Resources. Significant cultural resources are identified and protected in compliance with the National Historic Preservation Act. While no priority heritage assets are currently identified in this zone, the forest will explore opportunities to identify priority heritage assets here.

Fish and Wildlife. Wildlife habitats are improved through the restoration of fire-adapted ecosystems. The timber sale program provides a flow of early, mid and late seral habitats. Approximately 132 miles of streams with riparian management zones and popular, stocked fishing ponds (approximately 9 acres) provide aquatic habitat and ideal fishing opportunities. Restoration of fire-adapted ecosystem in approximately provides high quality wildlife habitat. Where frequent fire cannot be applied, timber harvests maintain habitats and reduce fuel loading.

Wood Products. About 13 MMCF of the PTSQ (98 MMCF) is provided from lands suitable for timber production. About three-quarters of Francis Marion ownership in this zone is suitable for timber production. As more than half of this zone is in Management Area 2, tree harvest is used to reduce hazardous fuels, providing openings in the canopy and conditions for healthy tree growth.

Roads (access). Open roads are well maintained and offer easy access to the forest, especially in areas of landscape restoration and frequent management activities, such as prescribed fire and the trail complexes of the area. Some roads are closed to provide habitat conditions for threatened or endangered species, or species of conservation concern. Neighboring communities, corporations, medical institutions, schools and other governing bodies use well-maintained, sustainable forest service roads as connectors to state and federal highways.

Scenery. Scenic landscape conditions vary across the zone. Longleaf pine ecosystems are restored on nearly 50 percent of the zone, open, longer viewsheds offer appealing landscapes for viewing. Salt marsh offers appealing landscapes for their longer viewsheds. Viewsheds are also longer due to open areas adjacent to communities as hazardous fuels are removed. Areas other parts of this zone are a mix of private lands, forested lands and canopy openings on the national forest. A high or very high scenery emphasis as viewed from trails or other high-use areas occurs within this zone. A variety of ecologically sound, resilient and visually appealing forest landscapes support the forest's distinctive roles and contributions, especially in the Wando Zone. The variety of ecosystems, especially longleaf pine, salt marsh and maritime forest, offer a diversity of visually appealing landscapes that complement one another while juxtaposing adjacent private lands both forested and open and residences.

Connecting with Communities and Partners

Fire-Adapted Human Communities. Through partnerships and the resulting hazardous fuels reduction treatments, nearly 30 percent (5,200 acres) of Fire Regime Condition Class 2 and 3 ecosystems in the wildland urban interface are moved closer to historic disturbance levels. The local communities of Awendaw and Wando, along with adjacent landowners and unincorporated communities are provided greater wildfire protection by becoming fire adapted and fire resilient. With ecosystem restoration and hazardous fuel reduction, more than 13,900 acres would have lower departure (FRCC 1).

Community Participation and Partnerships. The gateway communities of Mount Pleasant provide a vital link to the legacy of the Wando Zone's natural and cultural resources. Within the Wando Zone, the forest aims to expand and strengthen partnerships with the town of Mount Pleasant, as well as other smaller crossroads communities and incorporated towns, specifically focused on water, and dispersed recreation resources. The forest will contribute towards communities' sustainability by providing benefits such as preservation of area waterways and forests. The forest will contribute towards their sense of community by making decisions sensitive to their unique character and identity and supporting local, cultural events. Contribute towards their quality of life by providing recreation facilities which contribute to healthy living. The forest will seek opportunities to strategically and sustainably connect forest lands with local

residents through creating and enhancing physical linkages, such as the East Coast Greenway, and cultural linkages, such as the Gullah Geechee Cultural Heritage Corridor.

Wando Zone: Special Areas or Designated Areas

DC-RIZ-Wando-S-1. Critical habitat for Frosted Flatwoods Salamander.

Within the federally-designated critical habitat for the frosted flatwoods salamander, management activities improve the condition of breeding wetlands and migratory habitat.

DC-RIZ-Wando-S-2. Rare Plant Communities.

Rare plant communities - including high quality fire-maintained open pine savannas, upland longleaf woodlands, pond cypress savannas, and pocosins - are maintained and restored in this zone to protect their diverse values and provide opportunities for wildflower viewing. (See Figure 2-42) The incidence of non-native invasive plant species is low.



Figure 2-42. Rare plant communities provide opportunities for wild flower viewing

2.3.3 Wambaw Resource Integration Zone

See Table 2-10 for a summary of desired conditions and Table 2-11 for special or designated areas and Figure 2-43 for a map. Desired conditions are labeled DC-RIZ-Wambaw.

Emphasis is on providing opportunities for solitude through semi-primitive, motorized areas that border the wildernesses and enhance their wilderness character. Action plans for the two priority watershed will maintain and improve habitat for Red-cockaded Woodpecker through coordinated prescribed burning and timber harvests efforts. It is anticipated that timber revenue and fire management will create jobs and promote the quality of life in rural crossroad communities.

Goals are:

- Improve wilderness character by creating two semi-primitive, motorized areas
- Through coordinated efforts with partners and volunteers, maintain and improve the Wambaw OHV Trail
- Develop and implement watershed actions plans for the two priority watersheds.
- Acknowledge unincorporated communities as a valuable part of the larger social landscape.
- Coordinate with the SC Department of Natural Resources on the management of the Twin Ponds Rifle Range and the four wildlife management areas.
- Maintain or improve wilderness character in the 4 wildernesses.
- Maintain or improve roadless character in the two inventoried roadless areas.
- Coordinate with Berkeley County on trail and road maintenance.



Table 2-10. Desired conditions-for the Wambaw-Resource Integration Zone

Resource Area	Description	Measure
Ecosystem Restoration	Potential Longleaf Pine Restoration	62,000 acres
	Percent of Wambaw Zone in Management Area 1 (for other fire-adapted communities)	80 percent
	Priority Watershed Restoration Action Plan (Turkey Creek and Headwaters of Wambaw Creek)	2
Fish and Wildlife	Wildlife Management Areas	Waterhorn, Wambaw, Northhampton, and Hellhole
	Streams	309 stream miles
	Ponds	27 acres
Wood Products	Percent of PTSQ	52 percent
	Suitable land (approx.)	98,000 acres
Hazardous Fuel Reduction	Amount (MA2)	300 acres
Fire Regime Condition Class (by year 2026)	FRCC 1 (low departure)	108,700 acres
	FRCC 2 (moderate departure)	20,500 acres
	FRCC 3 (high departure)	7,700 acres
Recreation Settings	Roaded Natural	113,404 acres
	Semi Primitive Motorized	11,198 acres
	Semi Primitive Non-motorized	13,649 acres
Scenic Integrity Objectives	Very High	13,653 acres
	High	46,606 acres
	Moderate	43,815 acres
	Low	34,181 acres
Key Recreation Opportunities	Palmetto Trail	Hiking and Biking Trail
	Wambaw Cycle Trail	OHV Trail
	Wambaw Creek Trail	Wilderness Canoe Trail
	Twin Ponds	Shooting Range
Cultural & Historic	National Register Districts	Battery Warren (see Special or Designated Areas)

Table 2-11. Special or designated areas in the Wambaw Resource Integration Zone

Resource Area	Description	Measure
Wilderness Areas	Wambaw Swamp	4,815 acres
	Little Wambaw Swamp	5,407 acres
	Wambaw Creek	1825 acre
	Hellhole Bay	2,125 acres
Remote Special Area	Wambaw/Little Wambaw Semi-Primitive Area	6,069 acres
	Hellhole Bay Semi-Primitive Area	3,650 acres
Eligible Wild and Scenic Rivers	Wambaw Creek	12 stream miles
	Echaw Creek	8 stream miles
	Santee River	50 stream miles
National Register District	Battery Warren Historic District	39 acres
Scenic Area	Guilliard Lake Scenic Area	1,032 acres
Research Natural Area	Guilliard Lake Research Natural Area	23 acres
	Little Wambaw Swamp	60 acres
Inventoried Roadless Areas ¹	Hellhole Bay extension	890 acres
	Wambaw Swamp Extension	530 acres
Botanical	Rare Communities	4,138 acres
National Recreation Trail	Swamp Fox (See desired conditions for trails in this zone)	10 Miles
National Game Preserve	Francis Marion National Forest Wildlife Preserve ²	55,000 acres

¹ While the two inventoried roadless areas are located within the two semi-primitive, motorized areas, the acreages for the semi-primitive areas do not include the acreages for the two inventoried roadless areas.

² The Francis Marion National Forest Wildlife Preserve was declared by Harry Truman in 1948 by Proclamation 2785 (Proclamation No. 2785, 13 Fed. Reg. 2563 (May 12, 1948)). The purpose of this designation was to protect depleted populations of game species from overhunting. The Francis Marion National Forest Wildlife Preserve encompasses approximately 55,000 acres located on the former Wambaw Ranger District.

Note: See Appendix E for maps of eligible Wild and Scenic Rivers, rare plant communities and the Francis Marion National Wildlife Preserve

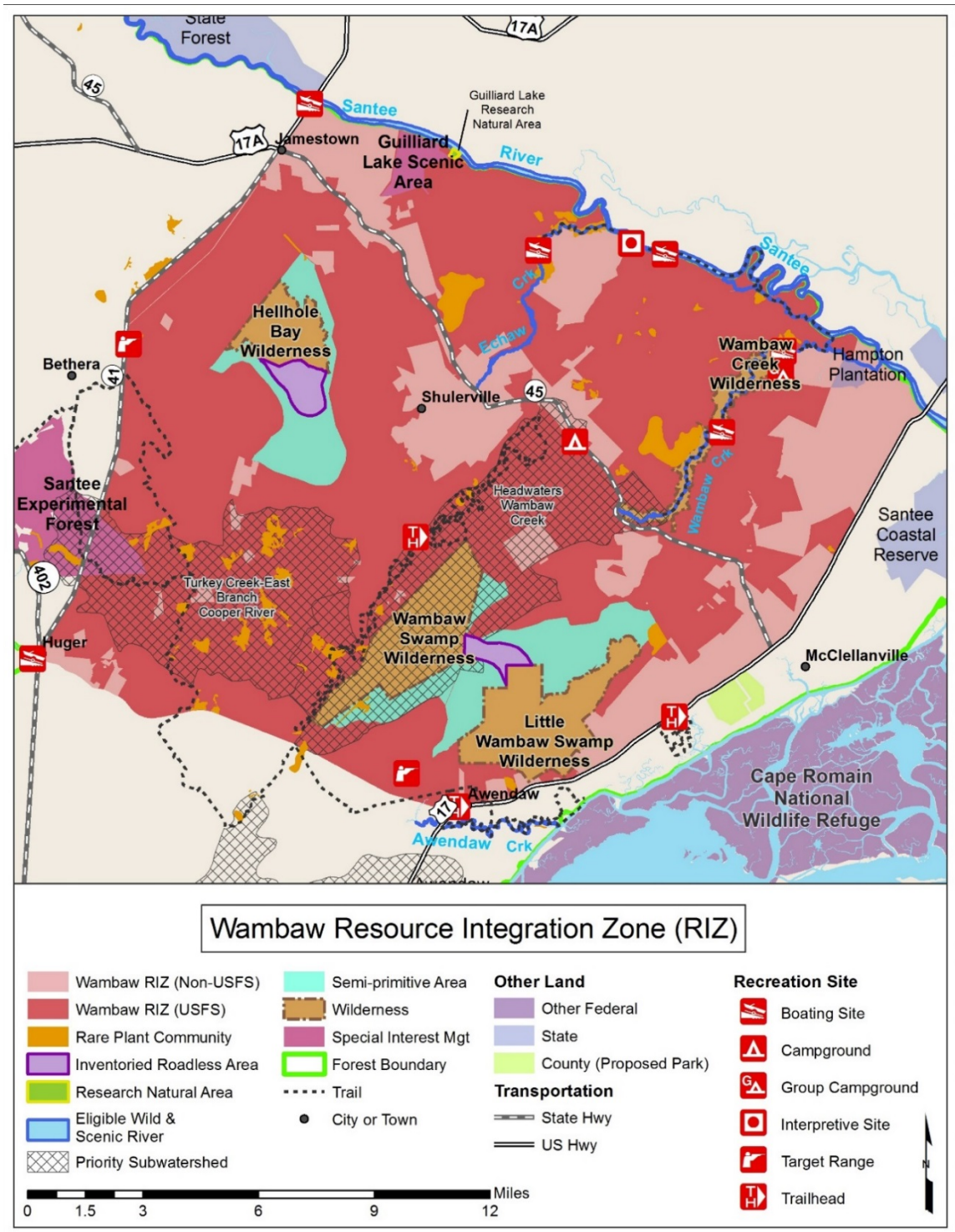


Figure 2-43. Wambaw Resource Integration Zone on the Francis Marion National Forest

DC-RIZ-Wambaw-1. Desired Conditions to Maintain Ecological Sustainability

Ecosystem Restoration. By restoring the natural fire regime, longleaf ecosystems are restored on over 62,000 acres or approximately 45 percent of this zone. These restored systems form a core, contiguous area of functioning ecosystems that provide the needs for most plant and animal species dependent on them. Greater connections are made with adjacent landowners with conservation easements. Approximately 8,600 acres of this zone are explored for joint management opportunities. Joint management opportunities with adjacent landowners would provide benefits and efficiencies of all interested parties and includes Wyden Amendment Agreements to accomplish burning or control erosion or partnerships on trail management.

Priority Watersheds. Desirable hydrologic, ecological and social conditions are maintained and restored. Innovative watershed action plans provide for an integrated approach to restore ecosystems while balancing the needs of local communities. Timber harvests not only provide for a sustained flow of early-successional habitats, but also create jobs to create thriving local communities. Restored ecosystems link habitats across the landscape that provide migration corridors for a wide variety of species. Non-native species are promptly treated and found at low incidence across the landscape. The Wambaw Zone has 2 sub-watersheds with a high priority for watershed restoration: Turkey Creek-East Branch of Cooper River (approximately 15,000 acres) and Headwaters of Wambaw Creek (approximately 21,500 acres).

Aquatic Ecosystems and Watersheds. Stream miles and adjacent floodplains are improved through watershed restoration on the Francis Marion. Hydrologic function is maintained and restored. Groundwater dependent ecosystems are functioning and provide wildlife habitat for a variety of species. Approximately 309 miles of stream are maintained through compliance with guidance on riparian management zones contained in the desired conditions.

Respond to Human Population Growth and Development. State and private landowners' open spaces or natural areas link with the Francis Marion to connect ecosystems across property lines. The Francis Marion collaborates with the community of Honey Hill and with Berkeley County to implement Smart Growth and sustainable development principles and Berkeley County's Green Infrastructure and Blueway plan. Unincorporated communities are acknowledged as a valuable part of the larger social landscape.

DC-RIZ-Wambaw-2. Desired Conditions for Social, Cultural and Economic Sustainability

Sustainable Recreation

Recreation Settings. The Wambaw Zone has the most diverse recreation settings on the forest, from roaded natural settings to the semi-primitive settings of 4 congressionally designated wilderness areas. One of the best ways to see the most remote areas is by water trail through the Wambaw Creek Wilderness. Settings and scenery along the trails within the fire-maintained systems are optimal with open, park-like conditions, which include outstanding settings for scenic driving, hunting wildlife viewing and birding. Healthy and resilient forests provide sustained delivery of its roaded natural recreational settings and opportunities. Restored longleaf pine ecosystems, provide significant opportunities to see and explore the forest due to its open condition.

Sustainable Recreation Opportunities. The visitor experience in this zone is very much focused on the enjoying the core of forest through dispersed recreation such as trails, wildlife and nature viewing, hunting and fishing. In many cases, travel is along water routes such as the free-flowing, wild and scenic eligible rivers, or along trails such as the Palmetto Trail. While the areas of this

zone are predominately natural, developed facilities, trails, and roads are intensively managed to ensure resource protection and contribute towards public safety. Appealing to the visitor that likes a challenge, including visiting the four designated wilderness areas, the Wambaw Zone is the forest's hub for remote settings.

Hunting, scenic driving, wildlife and nature viewing are popular in this zone. Three hundred and nine (309) miles of stream with riparian management zones, along with popular, stocked fishing ponds, provide aquatic habitat and ideal fishing opportunities.

The forest's only OHV trail, the Wambaw Cycle Trail is maintained through strong partnerships, as do several developed recreation sites, including Elmwood Campground and Twin Ponds Rifle Range. See Figure 2-44.

Trails. Water trails are emphasized in this zone and provide intimate experiences in forest areas that are hard to penetrate on foot such as Wambaw Creek Wilderness, Mechaw Swamp and Cedar Hill Island on the Santee River. Connections in this zone tie all the water trails into a water trail complex and eventually to the East Coast Saltwater Paddling Trail of the Intracoastal Waterway. The water trails in this zone leave soft footprints; foot travel is minimal and not emphasized. The Wambaw Cycle Trail is maintained. The Swamp Fox National Recreation Trail, which is co-located with the Palmetto Trail, provides outstanding hiking opportunities.



Figure 2-44. Volunteers are critical to maintaining facilities

Multiple Use Benefits

Cultural Resources. Significant cultural resources are identified, protected, and monitored in compliance with the National Historic Preservation Act. Battery Warren is maintained and interpreted for public understanding of this historic site.

Fish and Wildlife Habitats. Wildlife habitats are improved through the restoration of ecosystems, primarily fire-adapted ecosystems. Managed in coordination with SCDNR, approximately 338 acres of wildlife openings are maintained. Early successional habitat is abundant as forested stands are restored. Approximately 309 miles of streams and popular,

stocked fishing ponds (approximately 27 acres) provide aquatic habitat and ideal fishing opportunities. Managed in coordination with SCDNR, four of the 5 Wildlife Management Areas (Wambaw, Hellhole, Northhampton and Waterhorn) provide sustainable hunting and fishing opportunities. Management activities, such as timber harvest create a steadyflow of early successional habitat as forested stands are restored.

Wood Products. About 60 MMCF of timber provides a sustained flow of timber products. As most of this zone is in Management Area 1, tree harvest is used primarily for restoring or maintaining ecosystems.

Roads (access). With the emphasis on remote recreational opportunities in the zone, the open road density is lower than surrounding forest. Open roads are well maintained.

Scenery. Where longleaf pine ecosystems are restored, open, longer viewsheds offer appealing landscapes for viewing. Like the other integrated resources zones, a high or very high scenery emphasis as viewed from trails or other high use areas occurs within this zone. Viewsheds are also longer due to open areas adjacent to communities as hazardous fuels are removed. The forest has a larger intermix of private and national forest lands in the Santee Zone. A variety of ecologically sound, resilient and visually appealing forest landscapes support the forest's distinctive roles and contributions. The variety of ecosystems, especially longleaf pine, offers a diversity of visually appealing landscapes that complement one another.

Connecting with Communities and Partners

Fire-Adapted Human Communities. Restoration and maintenance of natural fire regimes is a primary focus in this zone. Hazardous fuels are maintained within historic ranges and do not pose significantly high risks of wildfire. Through partnerships and resulting hazardous fuels reduction treatments, nearly 30 percent (5,700 acres) of Fire Regime Condition Class 2 and 3 ecosystems in the wildland urban interface are moved closer to historic disturbance levels. See Figure 2-45. The local communities of Shulerville, Honey Hill and Germantown, along with adjacent landowners are provided greater wildfire protection by becoming fire-adapted and fire-resilient. With ecosystem restoration and hazardous fuel reduction, more than 108,700 acres have lower departure (FRCC 1).

Community Participation and Partnerships. Moncks Corner is a gateway to the Wambaw Zone's natural and cultural resources. Within the Wambaw Zone, the forest aims to expand and strengthen partnerships with smaller crossroads communities and incorporated towns, specifically focused on water and dispersed recreation resources. The forest will contribute towards communities' sustainability by providing benefits such as preservation of area waterways and forests. The forest will contribute towards their sense of community by making decisions sensitive to their unique character and identity and supporting local, cultural events. Contribute towards their quality of life by providing recreation facilities which contribute to healthy living. The forest will seek opportunities to strategically and sustainably connect forest lands with local residents through creating and enhancing physical linkages, such as the canoe/kayak trails through partnership with Berkeley County.



Figure 2-45. Prescribed burning reduces hazardous fuel buildup

Wambaw Zone: Special Areas or Designated Areas

DC-RIZ-Wambaw-S-1. Existing Wilderness Areas

The following 4 existing wilderness areas are protected for their wilderness qualities and characteristics:

1. Wambaw Swamp (4,815 acres)
2. Little Wambaw Swamp (5,047 acres)
3. Wambaw Creek (1,825 acres)
4. Hellhole Bay (2,125 acres)

Natural ecological processes (e.g., plant succession) and disturbance (e.g., fire, insects and disease) are the primary forces affecting vegetation composition, structure and pattern. Large remote areas with little human disturbance, such as those found in wilderness, are retained.

The landscape character theme is natural evolving, which includes retaining a natural forested appearance while allowing ecological and biological processes to progress naturally with little or no human intervention. Recreation management provides solitude and remoteness in the most primitive and natural setting possible. Access is non-mechanized; visitors must rely on their personal physical abilities and primitive skills. Facilities are generally limited to trailheads and are designed to set the tone for a primitive recreation experience. The desired Recreation Opportunity Spectrum emphasis is semi-primitive non-motorized for the wilderness areas. Very high quality natural scenery is emphasized in wilderness.

DC-RIZ-Wambaw-S-2. Wambaw Semi-Primitive Areas

Recreation opportunities are provided in large remote areas where users can obtain a higher degree of solitude. These areas, all adjacent to existing designated wilderness, provide large tracts of recreation opportunities with a semi-primitive emphasis. Visitors choose from a variety of non-motorized recreation opportunities such as hunting, hiking, wildlife viewing, mountain bike riding, nature study and fishing. These areas provide semi-primitive recreation opportunities, the

only such experiences on the forest. The roads (gated) in the area are available for both non-motorized uses (hunting, hiking, wildlife viewing, etc.) as well as administrative access.

Vegetation management occurs to restore the native ecosystems, including fire-dependent and fire-adapted communities. Prescribed fire plays an important role in the maintenance of forested communities found throughout this area. Prescribed fire is used to restore and maintain threatened and endangered species habitats, to ensure the continued presence of fire-dependent ecosystems, to maintain fire-adapted forested communities and to reduce fuel buildups. Naturally ignited wildland fires are used for achieving ecological objectives when possible.

Wildlife openings are maintained. The protection of rare communities and species associates are provided, along with protection measures for population occurrences of threatened, endangered and sensitive species.

DC-RIZ-Wambaw-S-3. Eligible Wild and Scenic Rivers

The following 3 eligible wild and scenic rivers are managed to protect their free-flowing condition and outstandingly remarkable values:

1. Wambaw Creek (12 miles)
2. Echaw Creek (8 miles)
3. Santee River (50 miles)

The outstandingly remarkable values, which include ecological, scenic, recreation and cultural, are maintained, protected or enhanced. These waterways have unimpaired water quality. (See map of eligible wild and scenic rivers in Appendix E)

DC-RIZ-Wambaw-S-4. Battery Warren Historical District

Trails do not negatively impact the cultural resource, its historic integrity or interpretation of the site. The more remote cultural resources of the area have only a non-motorized hiking or interpretive trail with no additional facilities. The historic site is safeguarded from vandalism, looting and environmental damage through monitoring, condition assessment, protection and law enforcement. Surrounding landscapes are maintained in a forested condition to enhance scenery. Metal detecting is prohibited. The proposed Battery Warren Historical District includes Battery Warren priority heritage asset, an impressive, “L” shaped, Civil War fortification consisting of an earthen wall about 20 feet high and 300 feet long with excavated areas along the wall for 6 gun emplacements.

DC-RIZ-Wambaw-S-5. Guilliard Lake Scenic Area

Scenic qualities, such as the unusual Santee River limestone outcrop identified in the Inventory of Unique Natural Areas are preserved. See Figure 2-46. A high or very high scenery emphasis is maintained and scenic views can be seen from trails or other high use areas within this scenic area. The scenic qualities which led the Guilliard Lake Scenic area to be established are maintained. Its primary feature is a small, finger-shaped lake that runs parallel to the Santee River and is connected to it by an early, hand-dug canal. Surrounding the lake is a scenic landscape consisting of large, old-growth bottomland hardwoods on 3 sides.

DC-RIZ-Wambaw-S-7. Research Natural Areas (RNA)

- Little Wambaw Swamp Research Natural Area. Located within the boundaries of the Little Wambaw Wilderness, the wilderness character is maintain. Research opportunities are provided.

- Guilliard Lake Research Natural Area. The remnant of old growth located in a narrow strip of bottomland along the Santee River is preserved and maintained and accommodates research on cypress-tupelo ecological systems.

DC-RIZ-Wambaw-S-8. Inventoried Roadless Areas (IRAs)

The remote characters of 2 inventoried roadless areas (Hellhole Bay Extension (890 acres) and Little Wambaw Swamp Extension (530 acres)) are maintained and enhance the wilderness character of adjacent wildernesses. Semi-primitive areas surrounding these IRAs enhance the opportunities for solitude and remote recreation opportunities. Older forest conditions are most apparent in these areas. Outdoor skills are important for visitors in these areas. Facilities are generally limited to trailheads or where needed to protect the area from resource damage or provide for health and sanitation. Management activities meet the direction in the 2001 Roadless Area Conservation Rule (RACR), which allows for prescribed fire, wildlife improvements and other treatments that do not require new road construction or removal of any trees beyond ‘generally small diameter’ trees.

DC-RIZ-Wambaw-S-9. Rare Plant Communities

Rare plant communities including extensive high quality wet pine savannas, marl savannas, and pond cypress-dominated Carolina bays and depression ponds, are maintained and restored using frequent prescribed fire to conserve their biodiversity and provide public opportunities for wildflower and pollinator viewing. Rare calcareous hardwood plant communities along Echaw Creek, Echaw Road, and Wambaw Creek Slopes are maintained with infrequent fire. The incidence of non-native invasive plant species is low.

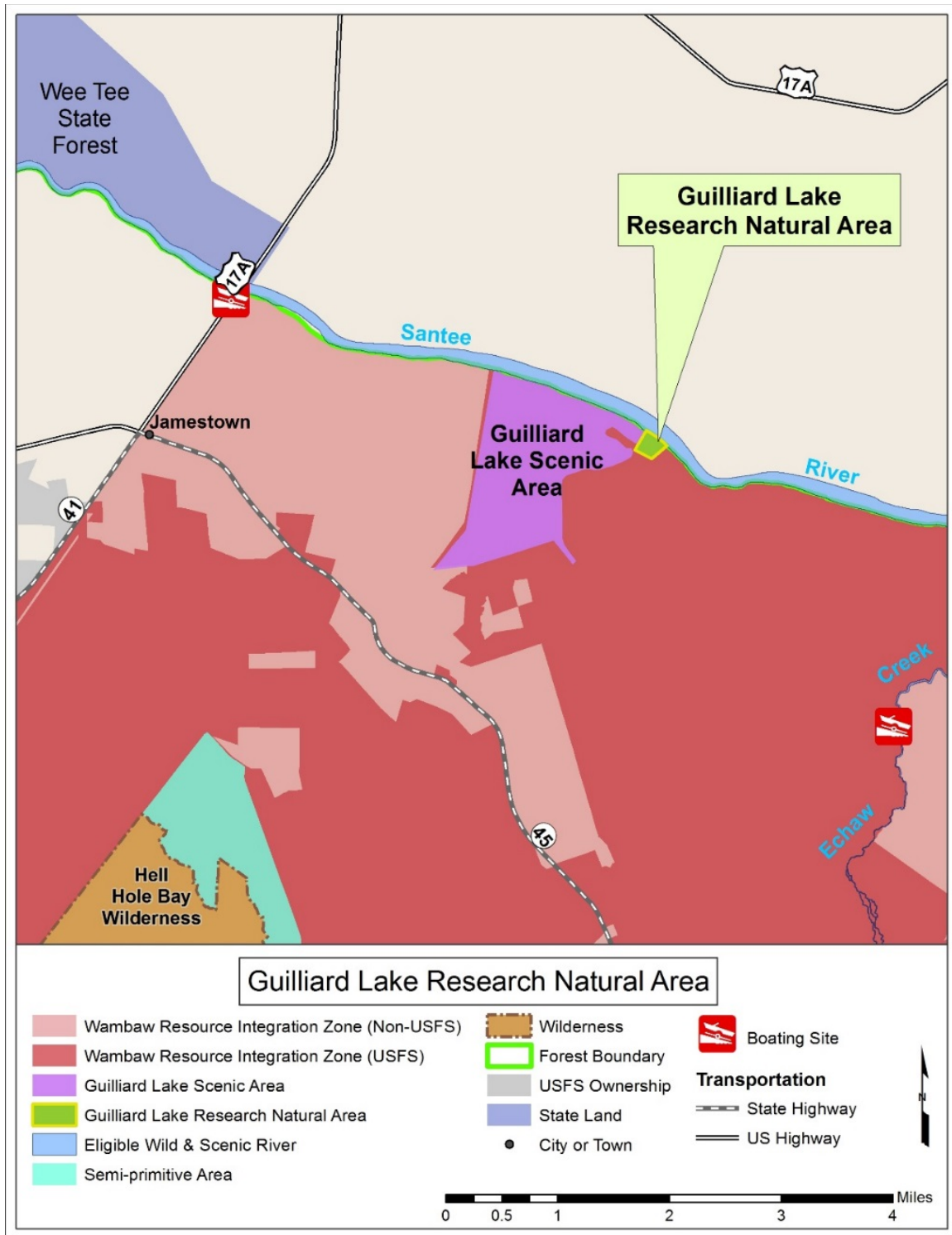


Figure 2-46. Guilliard Lake Scenic Area and Research Natural Area

2.3.4 Santee Resource Integration Zone

See Table 2-12 for a summary of desired conditions, Table 2-13 for designated areas and Figure 2-47 for a map. Desired conditions are labeled DC-RIZ-Santee.

Emphasis in this zone is on the traditional uses of hunting and fishing and timber production along with providing opportunities for kayaking and canoeing. The intermixed ownership pattern lends itself to providing the dispersed recreation opportunities as well as restoring ecosystems and the resulting timber harvests. Canoeing and kayaking opportunities are created in partnership with Berkeley County as an effort to develop ecotourism and job opportunities in rural crossroad communities. These desired conditions are labeled DC-RIZ-Santee.

Goals for this zone:

- Work with Berkeley County Soil & Water Conservation District, SC Forestry Commission and other partners to complete a countywide community wildfire protection plan to reduce hazardous fuels and create Firewise homes and businesses.
- Work with partners, including Berkeley County on completing work to improve trail systems, provide access to blueways and create ecotourism opportunities.
- Work with Santee Experimental Forest to complete restoration of longleaf pine ecosystems on portions of the experimental forest.
- Coordinate with Berkeley County to maintain roads in conjunction with comprehensive road planning.
- Coordinate with SC Department of Natural Resources on the management of two wildlife management areas.
- Acknowledge unincorporated communities as critical to the unique character of the Francis Marion.

Table 2-12. Desired conditions for the Santee Resource Integration Zone

Resource Area	Description	Measure
Ecosystem Restoration	Potential Longleaf Pine Restoration	18,645 acres
	Santee Zone in Management Area 1 (for other fire-adapted communities)	46 percent
Fish and Wildlife	Wildlife Management Areas	Santee and Hellhole
	Streams	309 stream miles
	Ponds	3 acres
Wood Products	Percent of PTSQ	30 percent
	Suitable land (approx.)	56,000 acres
Hazardous Fuel Reduction	Amount (MA2)	300 acres
Fire Regime Condition Class (by year 2026)	FRCC 1 (low departure)	108,700 acres
	FRCC 2 (moderate departure)	20,500 acres
	FRCC 3 (high departure)	7,700 acres
Recreation Settings	Roaded Natural	73,900 acres
Scenic Integrity Objectives	High	22,319 acres
	Moderate	7,002 acres
	Low	44,579 acres
Key Recreation Opportunities	Wadboo Creek Trail	Canoe Trail
	Palmetto Trail	Hiking and Biking Trail

Table 2-13. Designated and special areas in the Santee Resource Integration Zone

Resource Area	Description	Measure
Experimental Forest	Santee Experimental Forest	6,053 acres
Eligible Wild and Scenic River	Wadboo Creek	8 stream miles
Botanical	Rare Communities	481 acres
National Recreation Trail	Swamp Fox (See desired conditions for trails in this zone)	26 Miles
Priority Heritage Asset	Witherbee Fire Lookout	1 acre

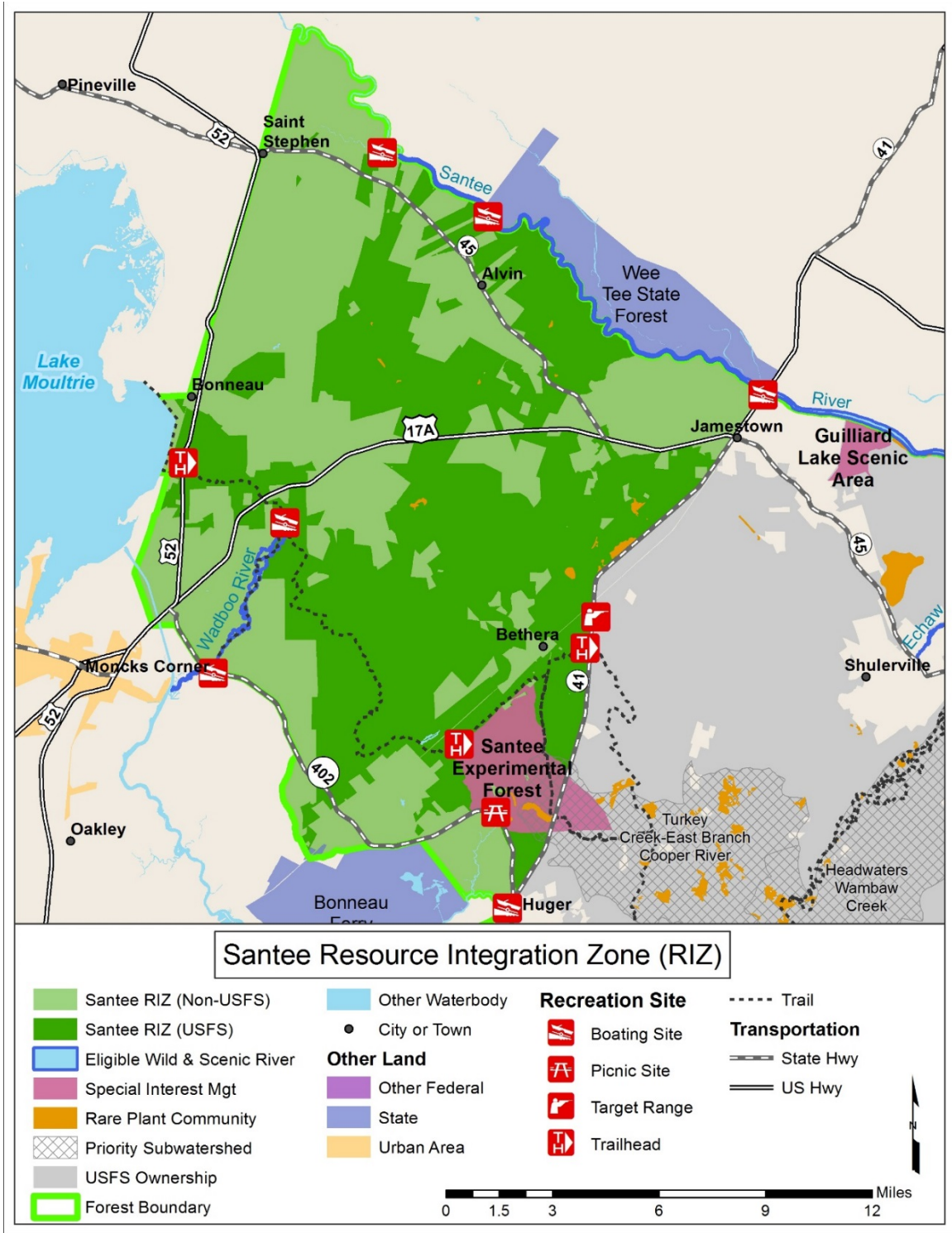


Figure 2-47. The Santee Resource Integration Zone on the Francis Marion National Forest

DC-RIZ-Santee-1. Desired Conditions for Ecological Sustainability

Ecosystem Restoration. Restoration connects of fire-adapted ecosystems are made to the western and northern boundaries of the Francis Marion. Less than half of this zone is in Management Area 1, with frequent fire, approximately 45,700 acres of potential longleaf pine ecosystem are maintained and restored. See Figure 2-48.

Priority Watershed. Approximately 1,400 acres of the Turkey Creek-East Branch of Cooper River watershed with 10 stream miles are restored to provide desirable hydrologic, ecological and social condition. Activities within the watershed action plan consider not only restoration of ecosystems, but also the needs of local communities. Timber harvests provide a sustained flow of early successional habitats as well as wood products that provide jobs in the local area. Approximately 1,400 acres of the Turkey Creek-East Branch of Cooper River watershed and 10 stream miles are restored to improve hydrologic function. Restoration of hydrologic function mitigates downstream flooding and provides recharge of the water table.

Aquatic Ecosystems and Watersheds. Planning of management activities uses an integrated approach that considers the broader landscape. Hydrologic function is maintained and restored. Groundwater-dependent ecosystems are functioning and provide habitats for a variety of plants and animals. The forest serves as partner with the Santee Experimental Forest on hydrologic research on more than 6,000 acres on the experimental forest. See DC-RIZ-Santee-S.1. Approximately 240 miles of streams are protected through an emphasis on riparian values in the riparian management zones.

Respond to Human Population Growth and Development. State and private landowners' open spaces or natural areas link with the Francis Marion to connect ecosystems across property lines. The Francis Marion collaborates with the communities of Witherbee and Cordesville and with Berkeley County to implement Smart Growth and sustainable development principles and Berkeley County's Green Infrastructure and Blueway plans. Unincorporated communities are acknowledged as a valuable part of the larger social landscape.



Figure 2-48. Frogs need wet areas isolated from rivers and streams for breeding

DC-RIZ-Santee-2. Desired Conditions for Social, Cultural and Economic Sustainability

Sustainable Recreation

Recreation Settings. The Santee Zone, which lies on the northern-most end of the forest, provides outstanding hunting, fishing, scenic driving and paddling in a roaded natural setting. The roaded natural setting gives visitors many opportunities to interact with others and the environment. The health and resiliency of the forest's natural resources provide sustained delivery of roaded natural recreation settings and opportunities. Restored longleaf pine ecosystems, provide significant opportunities to see and explore the forest due to its open condition.

Sustainable Recreation Opportunities. The visitor experience in this zone is very focused on dispersed recreation opportunities, such as trails (both land and water based), hunting, fishing and viewing scenery. Travel along water routes such as the free flowing Wadboo Creek, eligible as a wild and scenic river, or along trails such as the Palmetto Trail are provided and maintained. While the areas of this zone are predominately natural, trails, and roads are maintained to ensure resource protection and contribute towards public safety. Managed in partnership with SCDNR, the Santee and Hellhole Wildlife Management Areas provide high quality hunting opportunities. Approximately 240 miles of streams with riparian management zones, along with popular, stocked fishing ponds, provide high quality aquatic habitat and ideal fishing opportunities.

Trails. Trail systems focus on access to water-based trails, such as Santee River and Wadboo Creek, for fishing, boating, canoeing and kayaking. Trail systems are sustained through partnerships with communities, user groups and other agencies.

Multiple Use Benefits

Scenery. Scenic landscape conditions vary across the Santee zone. Longleaf pine ecosystems are restored on almost half percent of the zone, open, longer viewsheds offer appealing landscapes for viewing. See Figure 2-49. Viewsheds are also longer due to open areas adjacent to communities as hazardous fuels are removed. Other parts of this zone are a mix of private lands and fields, forested lands and canopy openings on the national forest. A high or very high scenery emphasis as viewed from trails or other high-use areas occurs within this zone. A variety of ecologically sound, resilient and visually appealing forest landscapes support the forest's distinctive roles and contributions. The variety of ecosystems, from restored longleaf pine to rarer calcareous mesic hardwoods and wet pine savanna provide diversity that in the scenery.

Cultural Resources. Significant cultural resources are identified and protected in compliance with the National Historic Preservation Act.

Fish and Wildlife. The timber sale program provides a flow of early, mid and late seral habitats. Approximately 125 acres of wildlife openings are maintained through the partnership with SCDNR. Approximately 240 miles of streams with riparian management zones and popular, stocked fishing ponds (approximately 3 acres) provide aquatic habitat and ideal fishing opportunities. Timber sale program provides a flow of early seral habitats.

Wood Products. About 24 MMCF of the PTSQ (98 MMCF) provides a sustainable flow of wood products that benefit the local economy. Tree harvest is used to meet multiple objectives, including ecosystem restoration, hazardous fuel reduction, the flow of seral stages of wildlife habitats and healthy forest growing conditions.

Roads (access). Access by roads in this zone supports ecological restoration, as well as public use. Most roads are open, well maintained and offer easy access to the forest; however, some

roads are closed for the protection of plant or animal species at risk. The Swamp Fox National Recreation Trail, which is co-located with the Palmetto Trail, provides outstanding hiking opportunities.



Figure 2-49. Open longleaf pine provides desired scenery conditions

Connecting with Communities and Partners

Community Participation and Partnerships. The forest's connection to local communities is strong in the Santee Zone. The gateway community of Moncks Corner, as well as smaller unincorporated communities provides strong ties to the forest. While all these communities have a distinct and unique sense of community, they aim to preserve quality of life through conservation of cultural/historic resources and the natural environment. Embracing the principles of SmartGrowth and sustainable development, communities actively safeguard open spaces, wetlands, riparian buffers and cultural and cultural resources.

Within the Santee Zone, the forest aims to expand and strengthen partnerships with the towns of Moncks Corner, Bonneau, Jamestown, St. Stephens, as well as other smaller crossroads communities, specifically focused on water, cultural, and recreation resources. The forest contributes towards their sustainability by providing benefits such as preservation of area waterways and forests and protection of cultural resources. The forest contributes towards their sense of community by making decisions sensitive to their unique character and identity and supporting local, cultural events. The forest contributes towards their quality of life by providing recreation facilities which contribute to healthy living. The forest seeks opportunities to strategically and sustainably connect forest lands with local residents through creating and enhancing physical linkages, such as the East Coast Greenway, and cultural linkages, such as the Gullah Geechee Cultural Heritage Corridor.

Fire-Adapted Human Communities. Through partnerships and the resulting hazardous fuels reduction treatments, nearly 30 percent (11,300 acres) of Fire Regime Condition Class 2 and 3 ecosystems in the wildland urban interface are moved closer to historic disturbance levels. The local communities of Huger, Cordesville, Bethera, St. Stephen and Jamestown, along with

adjacent landowners are provided greater wildfire protection by becoming fire adapted and fire resilient. With ecosystem restoration and hazardous fuel reduction, more than 39,200 acres have lower departure (FRCC 1).

Santee Zone: Special Areas or Designated Areas

DC-RIZ- Santee-S-1. Santee Experimental Forest

The Santee Experimental Forest conducts studies and experiments to develop/expand needed information and tools to assess, manage, restore and conserve the functions and values of coastal plain forests. See Figure 2-50. While specific study goals and objectives are determined by the Southern Research Station, the general objectives of the Santee Experimental Forest are:

1. Provide data/information that can serve as a reference for documenting ecological and hydrological conditions/functions and potentially developing BMPs in an urbanizing landscape;
2. Provide a basis for experimentation to develop information and tools to address emerging specific science or management question relevant to coastal landscapes; and
3. Provide data to assess forest health conditions and related ecosystem functions in a changing climate.

Work focuses on sustainable management of the coastal plain forests, with emphasis on productivity, biodiversity community dynamics, hydrologic function and nutrient and carbon cycling; research spans the spectrum of management intensity and restoration prescriptions and scaling effects on hydrologic and nutrient/carbon dynamics including effects of extreme events. Accordingly, the Santee Experimental Forest itself contains a mosaic of forest conditions that are representative of the region. Areas within the Santee Experimental Forest that are not allocated to specific studies are managed based on potential ecosystems restoration including fire-maintained ecosystems when possible. See Figure 2-50.

DC-RIZ-Santee-S-2. Wadboo Creek (Eligible Wild and Scenic River)

Wadboo Creek (8 miles) is maintained as an eligible wild and scenic river. Vegetation management and recreation opportunities maintain and enhance the classifications of wild and recreation. The creek's free-flowing conditions and outstandingly remarkable values—ecological, scenic and cultural—are protected, maintained and enhanced. The waterway has unimpaired water quality.

DC-RIZ-Santee-S-3. Rare Plant Communities

Calcareous hardwood plant communities are maintained and restored along Huger Creek, Nicholson Creek, and Turkey Creeks within the Santee Experimental Forest, including the 113-acre "Poplar Dam Area," the 22-acre 'Huger Creek Scenic area', and the 20-acre 'Nicholson Creek Southern Mixed Hardwood' forest, and along Whiskenboo and Wadboo Creeks (37-acre wet marl forest), provide optimal habitats for at-risk species and opportunities for wildflower and pollinator viewing. Longleaf pine savannas bordering Hwy.41 and along Gumville Road and Bullhead Road provide optimal habitats for at-risk species and opportunities for wildflower and pollinator viewing. The incidence of non-native invasive plant species is low.

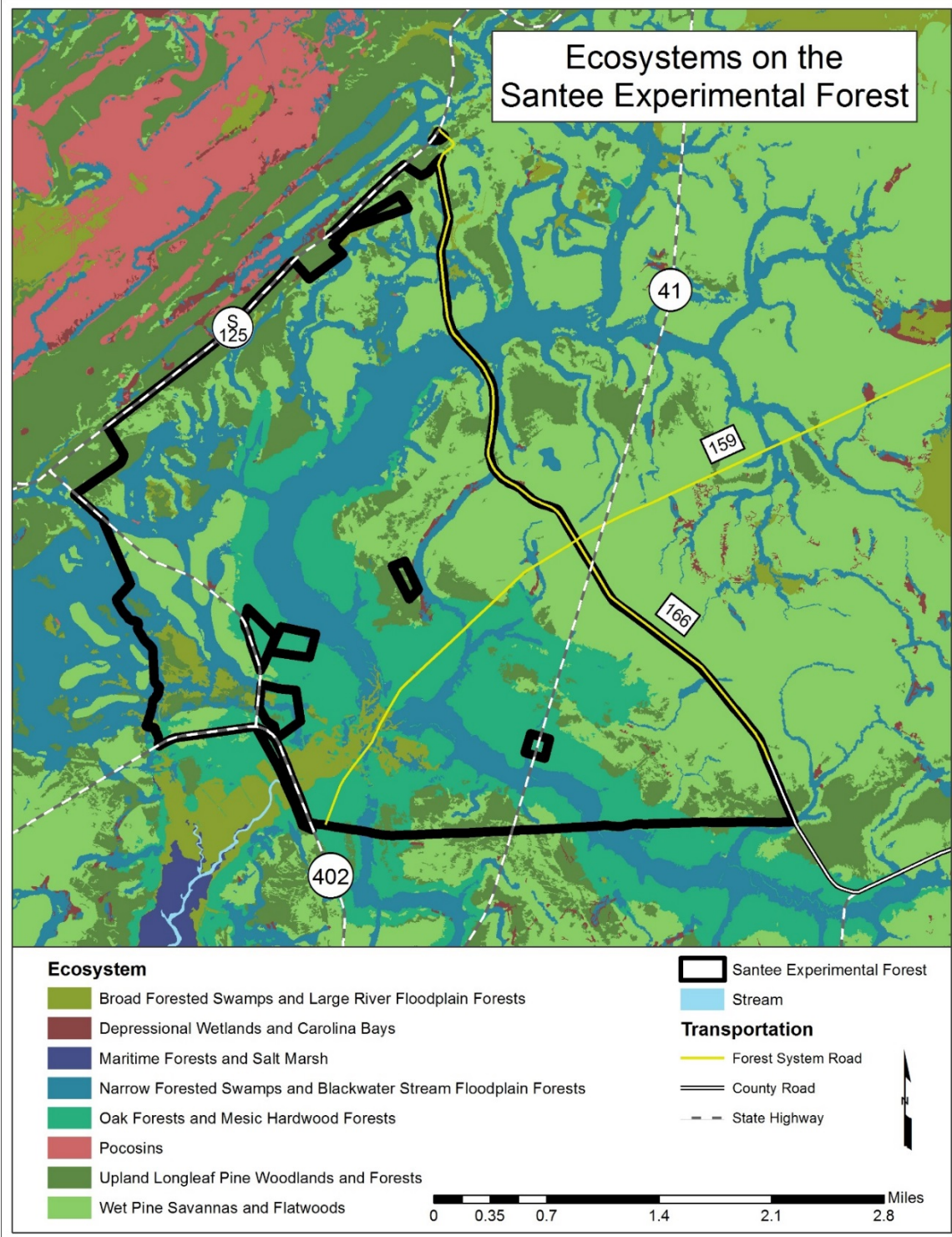


Figure 2-50. Ecosystems on the Santee Experimental Forest

Chapter 3. Objectives and Management Strategies

For some objectives, management strategies describe approaches as potential options to achieve the desired condition within a specified time framework.

3.1 Ecological Sustainability

3.1.1 Ecosystem Restoration

OBJ-ECO-1. Old Growth Conditions

Over the next 10 years, contribute to a network of small (between 1 and 99 acres) and medium (between 100 and 2,499 acres) – sized areas providing future old growth conditions during project or activity planning.

Management Strategy: Old growth reference conditions for longleaf pine ecosystems are maintained or restored within 0.5 mile foraging partitions for the endangered red-cockaded woodpecker in Management Area 1 (53% of the total ecosystem extent), wilderness and riparian management zones and other unsuitable lands and rare communities.

OBJ-ECO-2. Frequent Prescribed Fire for Ecosystem Maintenance or Restoration

Prescribed Fire-Base level: Apply prescribed fire on at least 30,000 acres per year to maintain or restore fire-adapted ecosystems including longleaf pine woodlands, savannas and flatwoods, Carolina bays and depression ponds, and narrow river floodplains and swamps. Include at least 4,500 acres of those 30,000 acres (or approximately 15%) as growing season burns (April 1 – September 30) annually.

Prescribed Fire above base level: Within 3 years of plan approval, increase the amount of prescribed fire by 20,000 acres per year for a range of 30,000 to 50,000 acres per year of prescribed fire. Include approximately 10,500 to 16,500 acres of those 50,000 acres (or approximately 33 percent) as growing season burns annually. Check if any new burn blocks that are currently in Management Area 2 and should be converted to Management Area 1 conditions.

Management Strategy: The *Prescribed Fire-Base level* is based on the current prescribed burning program and that the fire program can be developed to achieve the *Prescribed Fire above base level*. Due to factors, such as weather conditions, it is anticipated that the prescribed burning program would typically vary annually between 30,000 to 50,000 acres total. Similarly, the amount growing season burning would vary between 10,500 to 16,500 acres annually of the total amount. Stewardship contracting has the potential to increase funding opportunities, while partnerships and Wyden amendments could create efficiencies, such as reducing the amount of bladed fireline needed, in order to increase the prescribed fire potential. Collaboration with adjacent landowners and regulatory agencies requires particular attention in areas that have not had prescribed fire.

OBJ-ECO-3. Upland Longleaf and Wet Pine Savanna and Flatwoods Ecosystems

Maintain or restore upland longleaf and mesic wet pine savanna and flatwoods ecosystems and loblolly pine forest on approximately 91,500 acres in MA1 within 10 years of plan approval. Provide 68,500 acres in maintain condition class of the Upland Longleaf and Wet Pine Savanna Flatwoods ecosystems in MA1 within ten years of plan approval. Maintain open pine woodlands or savannas with a canopy closure less than 60 percent (10-60 ft² of basal area/acre) in Management Area 1.

Longleaf Pine Base Levels: Maintain an existing 42,500 acres of longleaf pine by using the ecological processes of landscape-level, frequent, low-intensity prescribed fire, or by using other vegetation management practices to reach desired densities.

Loblolly Pine Base Levels: Maintain ecologically functioning loblolly pine woodlands on 49,000 acres by using the ecological processes of landscape-level, frequent, low-intensity prescribed fire or by using other vegetation management practices to reach desired densities.

Longleaf Pine above base level: Restore 26,000 acres of longleaf pine ecosystems by moving loblolly pine, mixed pine and longleaf pine forest-types to the desired structure and composition for longleaf pine ecosystems in Management Area 1 (15,000 acres of wet pine savanna longleaf and 11,000 acres of upland longleaf ecosystems) within 10 years of plan approval;

Management Strategy: Maintenance and restoration efforts can be achieved through a timber sale program and prescribed burning in Management Area 1. A priority is to maintain longleaf pine ecosystems in the maintain condition class and restore longleaf ecosystems improve condition class (as defined in the rangewide strategy for longleaf pine). To restore longleaf pine on xeric to mesic sites, different approaches are needed depending on the existing conditions:

- Open loblolly pine-dominated flatwoods and savannas would be maintained to provide suitable habitat conditions for at-risk species until conversion to longleaf pine can be completed in the long-term.
- Some longleaf pine stands have the desired overstory composition, but not the desired structure, due to lack of fire. Introducing prescribed fire back into these stands will create the desired structure and move toward meeting the desired conditions.
- Some stands consist of younger mixed loblolly-longleaf pine overstory that can be moved toward the desired overstory composition by favoring longleaf pine during thinning.

OBJ-ECO-4. Pond Cypress Savannas and Carolina Bays

Maintain, improve, or restore Pond cypress savannas within Carolina bays and depressional wetlands on 6,400 acres within Management Area 1 within 10 years of plan approval.

Management Strategy: Provide desired conditions through frequent and growing season fire that controls the encroachment of woody species in and adjacent to wetlands within Management Area 1.

OBJ-ECO-5. Pocosins

Maintain or restore Pocosins on appropriate sites on at least 7,200 acres within 10 years of plan approval.

Management Strategy: Strategies to restore or maintain are similar to strategies described for wetlands and Carolina bays. Natural fire return intervals are more frequent for restoration burns (2-10 year fire return intervals, including a growing season burn every third burn).

OBJ-ECO-6. Oak, Mesic Hardwood, and Maritime Forests

Maintain or restore oak and mesic hardwood forests on 5,800 acres and maritime forests on approximately 1,190 acres within 10 years of plan approval.

Management Strategy: Improve hardwood composition and late successional age class structure by thinning or removing off-site loblolly pine, maintaining with characteristic infrequent fire, and controlling non-native invasive plant species. Collaborate with the Santee Experimental Forest on conservation of calcareous mesic forests supporting at-risk plant species. Management Strategies for Maritime Forests are similar to those for oak forests and mesic hardwoods, and include:

- Improve composition by removing loblolly pine and encouraging hardwood;
- Maintain with infrequent fire regimes;
- Treat non-native invasive species to encourage native composition;
- Encourage a predominance of late successional, closed canopy conditions.

OBJ-MA2-1. Hazardous Fuels

Maintain or provide for low to moderate fuel loads (Fire Regime Condition Class 2 or better) on approximately 15,000 acres within 10 years of plan approval in Management Area 2. Prioritize treatments to protect cities and towns (highest density of human communities) and adjacent landowners.

Management Strategy: Some potential strategies to achieve this objective may be to: prescribed burn in smaller burn blocks; Use mechanical methods to reduce fuel loading such as mastication or chipping; Herbicides could be used to reduce fuel buildup in the understory.

OBJ-MA2-2. Flow of Age Class

Provide at least 5,000-6,000 acres of young age component (0-10) forest in loblolly pine or mixed pine-hardwood forests within Management Area 2 within 10 years of plan approval.

Management Strategy: The strategy is to provide a flow of early to late-successional habitats; reducing hazardous fuels; and providing a sustainable amount of high-quality timber for local economies using primarily timber harvest.

3.1.2 Species Diversity**OBJ-T&E-1. Frosted Flatwoods Salamander**

Restore 1 to 2 additional breeding sites for frosted flatwoods salamander breeding wetlands along the Talbot Terrace within 10 years of plan approval. Maintain the 6 known breeding wetlands.

Management Strategies: It is anticipated that the USFWS will release a recovery plan for frosted flatwoods salamander. When a recovery plan is released the Francis Marion will evaluate the need to add or modify plan components to meet recovery goals. The Francis Marion will work toward meeting the recovery goals when a recovery plan is released and coordinate with partners to expand the population.

OBJ-T&E-2. Red-Cockaded Woodpecker

Provide open longleaf woodlands for a red-cockaded woodpecker population of at least 450 active clusters and 350 potential breeding groups with 10 years of plan approval. Support an average red-cockaded woodpecker group size greater than 3 birds per group and reproductive success averages greater than 2 fledglings per successful nest with 10 years of plan approval.

Management Strategy: The forest supports a recovered population for the red-cockaded woodpecker in upland longleaf and wet pine savanna ecosystems within Management Area 1 and contributes towards range-wide recovery efforts. Every project with the potential to affect RCW, will implement the Reasonable and Prudent Measures and Terms and Conditions in the biological opinion, and guidelines in the most recent species recovery plan. If site specific conditions do not allow for the implementation of the Reasonable and Prudent Measures and Terms and Conditions or conditions dictate a different management strategy, project-level formal consultation will be reinitiated with USFWS. A project specific decision will not be signed until the Forest Service has received a project specific non-jeopardy biological opinion. If the population declines to 450 active clusters, the FS would initiate actions to turn around declines. If the population declined further to 400 active clusters, this level would trigger re-initiation of formal consultation with USFWS and stop all actions that could adversely affect RCW. (See Appendix J and MQ 15)

OBJ-T&E-3. Threatened and Endangered Plant Species

Provide ecological conditions to support maintain and restore 9 stable to increasing populations for the federally endangered American chaffseed; 5 stable to increasing populations for the federally endangered pondberry; and 3 stable to increasing populations for the federally endangered Canby's dropwort within 10 years of plan approval.

Management Strategy: Management strategies for maintaining and restoring T&E Plants include frequent prescribed fire, open canopies, and population enhancement and propagation conducted in close coordination with the USFWS. The Forest will coordinate with SCDOT in the maintenance of American chaffseed along roadsides, and will manage habitats adjacent to roadsides to facilitate the management and movement of stable to increasing populations within natural stands. Management activities should reduce woody shrubs in pondberry locations to improve habitat.

OBJ-SCC-1. Carolina Gopher Frog

Restore 1 to 2 additional breeding wetlands for Carolina Gopher Frog in Management Area 1 within 10 years of plan approval and maintain the 9 known breeding wetlands. Management activities connect breeding wetlands in the Wando Resource Integration Zone.

Management Strategy: Opportunities for captive rearing, head-starting and translocation will be explored with partners to accomplish population expansion to improve connectivity between Carolina gopher frog meta-populations.

OBJ-SCC-2. Swallow-tailed Kite

Maintain ecological conditions to provide a stable or increasing population of American swallow-tailed kites with approximately 120 birds (60 pairs), which equates to approximately 15,000 to 20,000 acres of habitat within 10 years of plan approval.

Management Strategy: The desired conditions of forested wetlands (as described in Management Area 1), along with riparian management zones, provide the habitat needed for swallow-tailed kite. The intent is to document current swallow-tailed kite habitat associations

and reproduction in the Francis Marion National Forest and compare with 1980s and 1990s data to inform current forest management in and beyond the Francis Marion.

OBJ-SCC-3. At-risk Species

Maintain or restore ecological conditions needed to provide stable to increasing populations for at-risk species on at least 25,000 acres per year. Prioritize habitat restoration for declining species (listed in order of priority): 1). Federally-listed T&E species; 2). Species of Conservation Concern with fewer than 5 known forest occurrences; 3) At-risk Species of high public and external interest.

Maintain and restore ecological conditions for species of conservation concern as rare plant communities on 4600 acres identified across the RIZs and at-risk species associates. See Appendix D for At-risk species and Appendix E for map of rare plant communities.

Management Strategy: Collaborate with federal, state, non-government agencies (NGO's), and private partners to maintain and restore associated habitats for at-risk species using an all-lands approach.

- Collect and share inventory and monitoring information which documents locations, trends, habitat condition, threats, and management responses.
- Conduct propagation and population enhancement activities to maintain and enhance genetic diversity, encourage gene flow, and improve resistance to climate change and population resilience.
- Conduct widespread inventories for at-risk species populations to improve our understanding of distribution, habitat condition, threats and management needs.
- Maintain up-to-date digital databases of species occurrences and trends to share with State Wildlife and Heritage Programs, USFWS, the South Atlantic Landscape Cooperative, NatureServe, and others.
- Align land ownership adjustments to improve connectivity among habitats for at-risk species where needed.
- Adapt our management of T&E species, SCC and their habitats in response to monitoring information.

3.1.3 Watershed Restoration

OBJ-WAT-1. Priority Watershed Restoration

Restore or improve watershed conditions by developing and implementing a watershed restoration action plan for each priority watershed identified in this Plan within 10 years of plan approval.

Management Strategy: This forest plan identifies 3 “priority watersheds” –Turkey Creek, Guerin Creek, and the headwaters of Wambaw Creek that will be accomplished over the next 10 years. See Figure 2-51 below. The management intent is to follow the process identified in the Watershed Condition Framework and develop watershed restoration action plans for each watershed. These watershed restoration action plans will contain a list of projects to be implemented over 3-5 years and will work towards improving watershed indicators and attributes that are rated poor, such as aquatic passage, large wood, etc. Appropriate NEPA processes will be completed for site-specific projects.

Most of the designated critical habitat for the frosted flatwoods salamander lies in the French Creek subwatershed. Due to the limited amount of national forest land in this subwatershed, French Creek would be incorporated into the Guerin Creek watershed restoration action plan.

OBJ-WAT-2. Restore Hydrologic Function

Within 10 years of plan approval, improve soil and water conditions on 400 acres of wetlands and aquatic habitat on approximately 50 miles of streams. Improvements to aquatic habitats will include at least 5 aquatic organism passage projects.

Management Strategy: While the forest plan identifies 3 “priority watersheds,” it is anticipated that improvements to the hydrologic function of wetlands and streams and aquatic habitats will occur across the forest. Opportunities to improve hydrologic function and aquatic habitats are considered during project-level planning. Potential management activities to improve:

- Soil and water conditions may include but are not limited to: adding sinuosity back to streams that have been channelized, stabilizing banks; restoring access to the historic floodplain and closing, rehabilitating, decommissioning or obliterating unauthorized travel ways.
- Wetland conditions may include, but are not limited to plugging ditches, recontouring riparian areas that have been altered, and creating depressions within the floodplain to mimic historical conditions.
- Aquatic habitats may include, but are not limited to: girdling, felling, pushing over and harvesting trees within the RMZ; placing large diameter trees within the stream to provide for habitat and stream structure and function; replacing road/stream crossings identified as barriers to aquatic passage, retrofitting crossings to allow for aquatic passage and removing human trash from the channel and surrounding riparian areas that could harm aquatic organisms.

3.1.4 Stressors and Threats

OBJ-THR-1. Reduce Forest Stand Densities

Achieve low to moderate stand densities on approximately 17,000 acres of stands within 10 years of plan approval, in stands that are at densities higher than their desired conditions.

Management Strategy: Tree thinning in Management Area 1 is used to maintain or restore the ecosystems. In Management Area 2, stands are thinned to improve forest structure and health and reduce hazardous fuels.

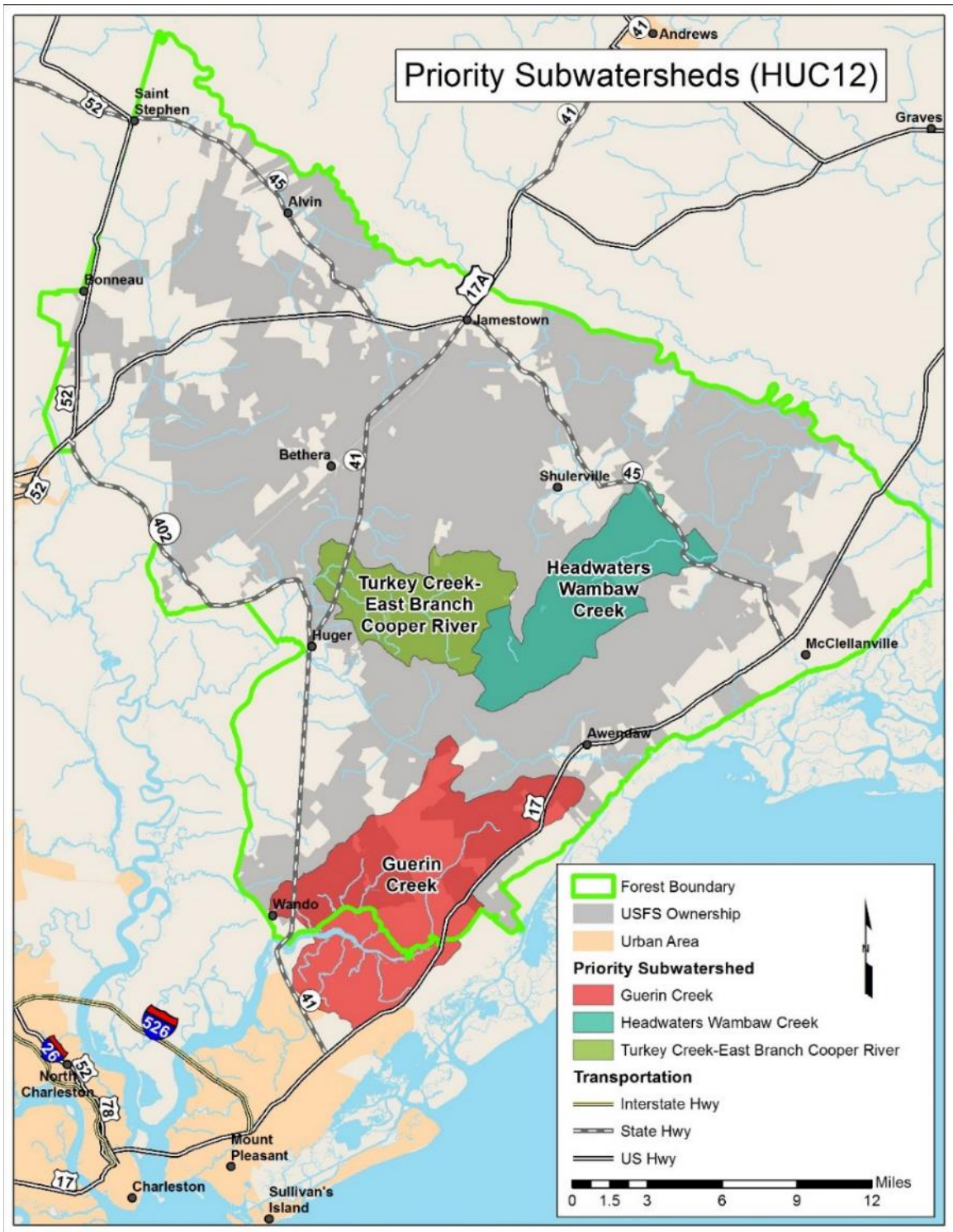


Figure 2-51. Priority watersheds in the Francis Marion National Forest

3.2 Social and Economic Sustainability

3.2.1 Sustainable Recreation

OBJ-REC-1. Recreation Settings

Within 15 years of plan approval, maintain or restore the characteristics that are consistent with approximately 220,000-240,000 acres of high-quality roaded natural settings, 300-350 acres of high-quality urban settings, and 10,000-15,000 acres of high-quality semi-primitive, non-motorized settings.

OBJ-REC-2. Semi-Primitive Motorized Settings

Restore characteristics that are consistent with semi-primitive motorized settings on approximately 10,000 to 15,000 acres within 15 years of plan, approval.

Management Strategy: Because remote recreational settings are rare on the Francis Marion, adjust open road density to provide remote recreational opportunities near existing wilderness areas. Most of the remaining settings are roaded natural and the quality of these settings would be coordinated with ecosystem restoration efforts.

OBJ-REC-3. National Quality Standard at Developed Recreation Sites

Meet national quality standards at forest priority developed recreation sites within the five years of the plan approval.

Management Strategy: Development of new infrastructure for developed recreation is not likely and some less frequently used, economically or environmentally unsustainable sites may be closed in the future. Additional facilities would be provided only after evaluating their long-term financial and environmental sustainability operational effectiveness and the Forest Service's ability to adequately maintain additional infrastructure. Use the Propose, Assemble, Cost and Evaluate or "PACE It" decision-making process on proposed projects to ensure Forest Supervisor concurrence. Reconfigure developed sites or alter operations to retain and/or improve visitor experiences at a lower long-term cost.

OBJ-REC-4. Volunteers

Increase volunteer in-kind contributions of 8,500 hours by 100% within 10 years of the plan approval.

Management Strategy: Acknowledging that volunteering is a form of recreation, the forest will invest in the internal capacity to be a good partner and strive to develop a new partnership to assist with the operation and maintenance of recreation sites, trails, and natural resources.

OBJ-REC-5. Developed Recreation Deferred Maintenance

Reduce deferred maintenance needs of \$330,000 (FY2015) at forest priority recreation sites by at least 30% within 10 years of plan approval.

Management Strategy: Prioritize the maintenance of recreation sites based on public use and how the recreation sites contribute to forest-wide and RIZ desired conditions. Evaluate reducing operational costs and deferred maintenance through implementation of green measures and technology. The forest maintains an updated facility master plan to determine maintenance needs according to regional guidelines. The forest also maintains a current Infra database to reflect needs and changes.

OBJ-REC-6. Dispersed Recreation – Trail Deferred Maintenance

Increase percentage of trails maintained to standard to 45% within 10 years of plan approval. (The trails maintained to standard on the entire FMS in FY2015 was 38%).

Management Strategy: Prioritize the maintenance of trails based on public use and how they contribute to forest-wide and RIZ desired conditions. Evaluate reducing operational costs while reducing deferred maintenance through implementation of green measures and technology.

OBJ-REC-7. Recreation Partnerships

Increase the number of recreation partners (non-profit or for-profit organizations or companies) by 4 to 5 partnerships within 10 years of plan approval.

Management Strategy: Work with partners to better align programming/outreach with the demographic diversity of the surrounding communities in Berkeley and Charleston Counties.

3.2.2 Multiple Use Benefits**OBJ-MUB-1. Scenery**

Provide landscapes that meet the following scenic integrity objectives: Very high (14,000 acres); high (92,000 acres); moderate (58,000 acres); and low (96,000 acres) within 3 years of plan approval.

Management Strategy: Scenic landscapes and ecosystem restoration complement each other. The result of ecological restoration in the coastal plain is generally open, scenic, intact landscapes. The strategy is to prioritize restoration work to complement roaded natural settings, particularly along well-travelled roads and trails.

OBJ-MUB-2. Hunting Opportunities

Coordinate with SCDNR to manage the Francis Marion for native wildlife, including the management of 5 South Carolina Wildlife Management Areas and maintenance of approximately 675 acres of wildlife openings on an annual basis.

Management Strategy: The Forest maintains 379 permanent openings ranging from 0.25 and 63 acres in size for a total of 675 acres. Most openings are in the 0.2 to 2.0 acre range with no canopy (for bat foraging) and composed of early successional vegetation and desirable non-native or native plants. Additional partners who can maintain and improve fish and wildlife habitat (annual planting and maintaining wildlife openings and collecting data to determine population, condition and habitat trends) include The Nature Conservancy, Quail Forever, Longleaf Alliance and The National Wild Turkey Federation.

OBJ-MUB-3. Fishing Opportunities

Maintain or improve 41 acres of pond habitat and angler access on an annual basis to provide high-quality sustainable angling opportunities on at least 15 managed recreational fishing ponds and coordinate with SCDNR.

OBJ-MUB-4. Cultural Resources

Develop a heritage program plan with communities, partners and federally-recognized tribes with ancestral connections to the area within 10 years of plan approval.

OBJ-MUB-5. Historic Property Plan

Develop historic property plans for each priority heritage asset on national forest land with communities, partners and federally-recognized tribes with ancestral connections to the area within 10 years of plan approval. Reduce deferred maintenance needs at the Tibwin priority heritage asset.

OBJ-MUB-6. Comprehensive Roads Planning and Maintenance

Within 3 years of plan approval, develop an action plan for management of the road system on the Francis Marion following guidance in FSM 7703 on transportation and using the following priorities:

Maintenance of forest priority open roads (in priority order):

1. Roads needed for ecosystem restoration, maintenance of wildlife openings, fishing ponds and access to administrative and developed recreation sites.
2. Roads accessing private inholdings.

Priorities for road closures (e.g. seasonal, intermittent, permanent; not in priority order):

1. Restoring semi-primitive motorized settings for enhancement of remote recreational experiences.
2. Reducing road use in areas of at-risk species that are sensitive to road use.
3. Improving connectivity of ecosystems where roads are significantly altering current ecosystem function or reducing impacts to resources.
4. Improving human health and safety (e.g., prescribed burn, wildfires, storm damage, etc.).

Management Strategy: Francis Marion motor vehicle use map (MVUM) is updated annually. Work with the South Carolina Department of Transportation and local counties to transfer forest roads where the majority of the traffic is not related to forest use. Coordinate with state and county partners to reduce impacts to at-risk species and ecosystems. Explore opportunities with county and state agencies to add bike lanes on some paved roads to allow for safe road-bike use and to minimize impacts to at-risk species and their habitats.

OBJ-MUB-7. Wood Products

Wood Products Base Level: Within 10 years of plan approval, provide 60 MMCF of wood products from lands suitable for timber production. This level is established in recognition of current fiscal capability and organizational capacity.

Wood Products Desired level: Within 10 years of plan approval, provide a projected timber sale quantity (PTSQ) of 98 million cubic feet (MMCF) from lands suitable for timber production. In the second decade this quantity is 95 MMCF.

Management Strategy: The PTSQ is used to achieve desired conditions for ecological restoration and forest health objectives on national forest lands. Tree harvest is also used for other resource objectives, such as reducing hazardous fuels and establishing a sustainable flow of early and late seral habitats. The projected timber sale quantity is estimated using a variety of assumptions (see Appendix B for supplemental information).

Timber harvest priorities in the first decade are:

1. Convert loblolly pine to longleaf pine in Management Area 1; See OBJ-ECO-3. Upland Longleaf and Wet Pine Savanna and Flatwoods Ecosystems;
2. Thin 17,000 acres of pine stands to desired densities;
3. Regenerate pine stands in Management Area 2 to provide early-successional habitat; and
4. Improve composition of maritime forests and oak and mesic hardwood forests.

3.2.3 Connecting with Communities

OBJ-COM-1. Community Health

Sponsor or co-sponsor at least one community based event per year for ongoing dialogue with partners including (but not limited to) Gullah Geechee Heritage Corridors, Center for Heirs Property Preservation, Sewee Longleaf Conservation Cooperative and local and county governments.

Assist in the formation of a community-based group/model that maintains an ongoing dialogue with forest decision makers to ensure that the unique social, cultural, and economic concerns of adjacent, local and crossroads communities are considered in Forest management decisions within 5 years of forest plan approval.

Management Strategy: Francis Marion employees would work with county planners, crossroad communities to envision a larger landscape design that blends land uses and environmental goals (e.g., the green infrastructure project underway in 2015 in Berkeley County). In addition, the Forest Service State and Private Forestry Program is an important collaborator.

Measureable objectives for the land use changes caused by rapid population growth and development are nonexistent; however, the forest has developed a land ownership adjustment strategy (LOAS) that prioritizes exchanges and acquisitions of national forest lands. Lands that have lost their national forest character or are isolated tracts are a priority for conveyance. Lands that consolidate national forest and connect ecosystems are a priority for acquisition. Lands near the historic districts in the coastal zone are not a priority for exchange.

OBJ-COM-2. Wyden Amendment Agreements

Increase Wyden Amendment agreements by 3 to 5 agreements for prescribed burning within 10 years of plan approval, which increases the prescribed burning program by additional 3 to 5% on private land within the administrative boundary.

Management Strategy: Wyden Amendment agreements allow the Forest Service to coordinate with adjacent landowners on prescribed burning efforts. For instance, the Forest Service may be able to prescribe burn private land if it reduces the amount of constructed fireline need to burn national forest land. To increase a core area of restored ecosystems that are fire-adapted, the Forest Service can use resources to prescribed burn on private lands adjacent to the forest. These agreements usually result in saving more money than is spent. The intent is to work with adjacent landowners, the aforementioned green infrastructure project in Berkeley County, the Forest Service State and Private Forestry Program and the SCFC to increase restored fire-adapted ecosystems.

OBJ-COM-3. Reduce Wildfire Risk

Assist counties with developing 1 county-wide community wildfire protection plan (CWPP) for Berkeley County and 1 county-wide CWPP for Charleston County within 10 years of plan approval.

Management Strategy to Reduce Risks of Wildfire: A CWPP helps to develop partnerships with local city, county and state agencies to identify ways to reduce wildfire risks and assist adjacent property owners to adapt for wildfire readiness.

OBJ-COM-4. Consider the Broader Landscape

Complete a land ownership adjustment strategy within 3 years of forest plan approval.

Management Strategy: Francis Marion employees would work with other agencies, partners, county planners and crossroad communities to envision a larger landscape design that blends land uses and environmental goals (e.g., the green infrastructure project underway in 2015 in Berkeley County). In addition, the Forest Service State and Private Forestry Program is an important collaborator.

As part of this collaborative effort, the national forests in South Carolina are developing a Land Ownership Adjustment Strategy (LOAS) that uses land acquisition and conveyance as tools to achieve optimal ownership patterns to promote efficient administration of National Forest System (NFS) lands, protect critical ecological/cultural values, enhance public benefits, provide access to forest resources, balance land uses, manage encumbrances and special uses, and collaborate with adjacent landowners. Isolated tracts and/or lands that have lost their national forest character or are a priority for conveyance. Lands that consolidate national forest and connect ecosystems are a priority for acquisition. Lands near the historic districts in the coastal zone are not a priority for exchange out of public ownership. Lands are also identified as priority for protection without regard to ownership, with an ideal ownership pattern of public lands being buffered by privately protected tracts. Land adjustments are made through land exchanges or a willing buyer-seller basis.

Some areas that have been identified as priorities for conservation work:

- Developers are proposing significant new construction on the southern end of Cainhoy Ridge (along Highway 41 between the communities of Wando and Huger) and in the Bulls Bay Corridor near the town of Awendaw. Both are important longleaf habitat. Cainhoy Ridge has a high density of federally listed Threatened and Endangered species with Safe Harbor agreements throughout the ownerships. The Forest prioritizes acquisitions to buffer the southern Cainhoy Ridge from urbanization and maintain the ability to use prescribed fire in this area, which contains the greatest number of historic flatwood salamander and gopher frog ponds. Restoring these habitats is critical for the health of these species.
- Dredging in the Intracoastal Waterway and the impending deepening of the Charleston harbor will impact wetlands, so conservation efforts will prioritize protecting and restoring wetlands on the Francis Marion.
- The State Wildlife Action Plan (SWAP) focus areas include the Santee, Wando, and Cooper River Basins. Five major waterways on the Francis Marion are potentially eligible for wild and scenic designation: Santee, Wambaw, Echaw, Wadboo and Wando. Land protection and restoration of habitats will protect the outstandingly remarkable values that make them eligible for designation as wild and scenic rivers. Restoration and land protection along these rivers and streams would also enhance water quality.

- Conservation efforts have focused on improving recreation access. Some needs include:
 - Opportunities exist to increase recreational access along the Palmetto Trail.
 - Partner groups are currently seeking trail easements from the Santee River to the Ravenel Bridge to support the East Coast Greenway.
 - Additional access to waterways would provide public recreation benefits.

3.3 Resource Integration Zones

OBJ-RIZ-Coastal 1. Community Participation and Partnerships

Engage with communities and partners to create a collaborative recreation resource action plan, which include trails, for the Coastal Resource Integration Zone within 5 years of plan approval. The plan should identify a shared vision for providing outdoor experiences, trail complexes and connections (including connections from East Coast Greenway to Palmetto Trail and Tuxbury Trail). The plan should also identify a marketing strategy to guide messaging and delivery of visitor information to target audiences through multiple media formats. Partners identify services key to enhancing these experiences, support needed to manage the opportunities, and actions for implementation.

Management Strategy: The intent of the recreation resource action plan is to increase and continue existing partnerships and seek out new ones to help provide opportunities through developed sites and trails, especially partnerships that improve the racial and gender composition of forest visitors. Maintenance backlogs are reduced based on the emphasis of the resource integration. New recreation facilities are considered only after careful review takes into account overall facility life cycle costs, as well as operational maintenance costs, and when resources are available to sustain them for the long term without compromising the integrity of existing ones.

OBJ-RIZ-Coastal–S2. Cultural Resources

Nominate 3 priority heritage assets, Sewee Shell Ring; Walnut Grove House; and Tibwin House as National Register Districts within 3 years of plan approval. Engage with communities, partners and federally-recognized tribes with ancestral connections to the area to develop historic property plans for each priority heritage asset within the plan area.

Management strategy: Three new national register districts would be nominated (see DC-RIZ-Coastal-S-1) and stewardship and partnership opportunities would be provided for these areas. Vegetation is managed to enhance and protect cultural resources within these districts in compliance with the National Historic Preservation Act. Public outreach or interpretive projects would continue for enhancing public understanding and awareness.

OBJ-RIZ-Coastal–S3. Vulnerable Cultural Resources

Complete an assessment of historic and archaeological sites within 5 years of forest plan approval.

Management Strategy: Over time, sea-level rise may impact historical and archaeological sites located along the coast. Some researchers estimate a sea level rise of up to one meter within this century. An examination of the South Carolina archaeological site files found that a one meter rise in sea level will impact over 1,500 recorded archaeological sites and 100 properties currently listed on the National Register of Historic Places (Anderson et al. 2015). This total includes approximately 200 sites on the forest. The effects to these sites, including the National Historic Landmark eligible Sewee Shell Ring, will be devastating. Forest

personnel should prepare an assessment of these 200 sites on the coastal margin of change so informed decisions can be made about how to address the effects of sea-level rise.

OBJ-RIZ-Wando-1. Community Participation and Partnerships

Engage with communities and partners to create a collaborative recreation resource action plan, which include trails, for the Wando Resource Integration Zones within 5 years of plan approval. The plan should identify a shared vision for providing outdoor experiences, trail complexes and connections (including connections from East Coast Greenway to Palmetto Trail and Tuxbury Trail systems), priority sites and services key to enhancing these experiences, support needed to manage the opportunities, and actions for implementation.

Management Strategy: The intent is to increase and continue existing partnerships and seek out new ones to help provide opportunities through developed sites and trails, especially partnerships that improve the racial and gender composition of forest visitors. Maintenance backlogs are reduced based on the emphasis of the resource integration. New recreation facilities are considered only after careful review takes into account overall facility life cycle costs, as well as operational maintenance costs, and when resources are available to sustain them for the long term without compromising the integrity of existing ones. The plan should also identify a marketing strategy to guide messaging and delivery of visitor information to target audiences through multiple media formats.

OBJ-RIZ- Wambaw–S1. Cultural Resources

Nominate Battery Warren as a National Register District within 3 years of plan approval. Engage with communities, partners and federally-recognized tribes with ancestral connections to the area to develop a historic property plan for Battery Warren.

Management Strategy: One new historical district would be nominated (see DC-RIZ-Wambaw-S-1) and stewardship and partnership opportunities would be provided for this area. Vegetation is managed to enhance and protect cultural resources within this historical area in compliance with the National Historic Preservation Act. For other cultural resources, public outreach or interpretive projects would continue for enhancing public understanding and awareness.



Figure 3-1. Wagon on a portion of the Kings Highway located within the proclamation area of the Francis Marion in the Wambaw RIZ. This road was used by Native Americans and Early European Settlers.

Chapter 4. Design Criteria

4.1 Introduction

Chapter 4 focuses on restrictions placed on management activities and is divided into Standards and Guidelines, and Suitability.

4.2 Standards and Guidelines

Standards and guidelines are constraints placed on project and activity decision making. They help achieve or maintain the desired condition or conditions, avoid or mitigate undesirable effects or meet applicable legal requirements.

Standards are mandatory; deviation from a standard is not allowed or the forest plan must be amended.

Guidelines differ from standards in that, on a case by case basis, a project need not adhere to the terms of a guideline, as long as the project design meets the guideline's intent; and is documented in a suitable NEPA document. The project record must support the finding that the guideline's intent is being met.

4.2.1 Standards

4.2.1.1 Standards for Vegetation Management

S1. Do not exceed 80 acres for even-aged openings for pine and pine-hardwood types and 40 acres for hardwood and hardwood-pine forest types except as follows:

- Where the forest type is being converted to longleaf pine or for other restoration activities
- Where areas are managed as permanent openings (e.g., meadows, pastures, food plots, rights-of-way, woodlands, savannas and grasslands) even when within or next to created openings.
- Where natural catastrophic conditions such as fire, insect or disease attack or windstorm have occurred.

Proposals to exceed the even-aged opening limitations stated above are subject to 60 days public notice and review by the regional forester. Even-age regeneration areas are no longer considered openings when the reestablished stand has reached an age of 5 years. Even-aged or two-aged regeneration cutting may be scheduled next to uneven-aged stands at any time. Uneven-age harvest areas have no size limitations or dispersion requirements.

S2. Do not allow timber harvest for the purpose of timber production on lands not suited for timber production. Timber harvest may occur on lands not suited for timber production for salvage or sanitation harvest, or for the purpose of achieving desired conditions or objectives other than timber production.

S3. Select harvest systems for a project to achieve desired conditions and objectives or to meet site specific project needs, but not primarily for the greatest dollar return or timber output.

S4. Use the clearcut method of timber harvest only when it is the optimum method of timber harvest for the project areas and that determination is documented in the decision document.

S5. Seed tree, shelterwood or methods of even-aged regeneration timber harvest other than clearcutting must be appropriate for the project area. This determination will be documented in the decision document.

S6. Do not exceed the sustained yield limit of 113.8 million cubic feet (MMCF) of the quantity of timber sold in a decade. This amount does not including salvage or sanitation harvest.

S7. Do not implement any vegetation management activities on the Santee Experimental Forest without approval from the team leader for the Santee Experimental Forest.

4.2.1.2 Standards for Pesticide Use

S8. Require contractors or workers to carry mix water from off-forest sources to the site.

S9. Do not park or store trucks containing pesticides or mix-tank pesticides within 200 feet of an intermittent or perennial stream or pond or within a riparian management zone.

S10. Post notice signs at points where public access is likely in areas treated with pesticide.

S11. Monitor weather and suspend the project if temperature, humidity or wind become unfavorable as shown in Table 4-1.

S12. Use aquatically labeled herbicides and surfactants where spray may be applied to standing or flowing water.

Table 4-1. Unfavorable conditions for application of pesticides, herbicides and other surfactants

Application Type	Temperatures Higher Than	Humidity Less Than	Wind (at Target) Greater Than
Ground			
Hand (cut surface)	Not applicable	Not applicable	Not applicable
Hand (other)	98° F	20%	15 mph
Mechanical			
Liquid	95° F	30%	10 mph
Granular	Not applicable	Not applicable	10 mph
Aerial			
Liquid	90° F	50%	5 mph
Granular	Not applicable	Not applicable	8 mph

4.2.1.3 Standards for Soil and Water and Aquatics

S13. Use seed mixtures that contain genetically and ecologically appropriate native species. Use of non-native plants is allowed when it complies with Forest Service policy.

S14. Enforce timber sale contract clauses to remove logging debris added by harvest activities to streamcourses unless it is compatible with native vegetation and aquatic habitat objectives and approved by a biologist. This is an exception to state BMPs.

S15. Do not allow livestock grazing, feeding troughs, watering troughs or salt and mineral blocks inside the riparian management zone or within 50 feet of channeled ephemeral streams.

S16. Do not allow livestock to expose mineral soil or displace soil by trampling on more than 10% of the area.

S17. Do not use mechanical equipment on plastic soils when the water table is within 12 inches of the surface, or when soil moisture exceeds the plastic limit. Soil moisture exceeds the plastic limit if the soil can be rolled to pencil size without breaking or crumbling.

S18. Do not construct fire lines along the length of stream channels.

S19. Meet or exceed State Best Management Practices for water quality. See Standard S14 above.

S20. Prior to authorizing or re-authorizing municipal, public service or commercial water withdrawal permits or diversions of water from streams, lakes, wetlands, or groundwater, determine the environmental flow or level (surface water levels or groundwater levels) needs sufficient to protect stream processes, aquatic and riparian habitats and communities, groundwater-dependent ecosystems, and recreation and aesthetic values. Maintain environmental flows and levels to ensure ecological integrity.

S21. Do not remove instream large wood (>10 cm diameter and >1 m length) unless it poses a risk to water quality, degrades habitat for aquatic or riparian wildlife species, impedes water recreation (e.g. rafting) or poses a threat to human health and safety, private property or Forest Service infrastructure (e.g. bridges). The need for removal must be determined on a case-by-case basis.

4.2.1.4 Standards for Riparian Management Zones

S22. Identify and designate riparian management zones (RMZs) during the appropriate stages of project planning for all perennial and intermittent waterbodies (streams, ponds, lakes, springs, and open water wetlands). Maintain RMZs of at least 50 feet on each side of intermittent waterbodies and 100 feet on each side of perennial waterbodies. The following direction applies to RMZs:

- Retain at least 50 ft² of basal area/acre within the RMZ when available unless a removal below 50 ft² of basal area/acre is needed for restoration or public safety.
- Vegetation within 10 feet of the stream bank will not be removed unless it is required for designated crossings, ecological or stream restoration or human safety.
- No mechanical site preparation, such as drum chopping or mechanical planting is allowed within the RMZ.
- Do not allow construction of new motorized trails within a riparian management zone except at designated crossings. Existing motorized trails within a riparian management zone must have effective erosion control measures installed and maintained.
- No log landings are allowed within the RMZ.
- No broadcast application of any pesticide unless applied for human safety.
- Concurrent with road construction, install silt barriers at the base of the cut and fill slopes within the RMZ.
- Handle and store toxic and hazardous materials such as fuels, lubricants, and solvents outside the RMZ.
- No more than ten percent of the mineral soil within the RMZ will be exposed during ground disturbing activities except for restoration activities, such as stream or wetland restoration.

- Within the RMZ, cross with roads and skid trails only at designated crossings identified during planned activities. Cross at a 90 degree angle and utilize temporary structures to maintain bank stability.
- Within the RMZ, firelines will be constructed manually within 50 feet of the streambank and not with mechanical equipment.

During the application of fire retardants, waterways will be avoided and are given a minimum of a 300-foot buffer, including perennial streams, intermittent streams, lakes, ponds, identified springs, reservoirs, and vernal pools in compliance with the 2011 Record of Decision for the Nationwide Aerial Application of Fire Retardant (<http://www.fs.fed.us/fire/retardant/>). Buffer areas may be increased based on local conditions in coordination with the USFWS and NOAA Fisheries local offices.

In-stream use of heavy equipment or other in-stream disturbance activities is limited to the amount of time necessary for completion of the project. Construction of crossings is completed on all streams as soon as possible after work has started on the crossings. Permanent and temporary roads on either side of the stream crossing within the RMZ are graveled.

4.2.1.5 Standards for Channeled Ephemeral Stream Zones

The following standards apply to 25 feet on each side of a recognizable channeled ephemeral stream. For a definition of a channeled ephemeral stream, see Glossary.

S23. Allow skidders to cross channels only at designated crossings.

S24. Do not construct new motorized trails within ephemeral stream zones except at designated crossings or where the trail location requires some encroachment.

4.2.1.6 Standards for At-risk Species and Ecological Sustainability

S25. Do not permit the helicopter used for firing to pass within 500 vertical feet and 1,000 horizontal feet of active bald eagle nests October through May.

S26. No firelines, temporary roads, or log landings in population sites for at-risk plant species, except as needed to protect facilities, private property, or public safety.

S27. Protect existing RCW cavity trees during prescribed burning operations. Only use low-intensity fire within the cluster and around cavity trees to keep hazardous fuels at acceptable levels. Prior to prescribed burning clear vegetation and fuels around cavity trees or mulch around cavity trees.

S28. Survey for at-risk bats before buildings, bridges, wells, cisterns and other man-made structures are structurally modified or demolished. If bats are found, then consider installing bat gates and/or erecting bat houses. Once the bat houses are being use, then demolish or replace structures.

S29. Do not issue forest product permits for collection of carnivorous plants, orchids, or at-risk plant species unless for scientific and educational purposes and approved by a forest or district biologist/botanist.

S30. Use only aquatically labeled herbicides and surfactants within designated critical habitat for frosted flatwoods salamander and known habitat for Carolina gopher frog.

S31. Conduct no logging within 300 feet of known active American swallow-tailed kite nests from April 1 through June 30 or until fledging is completed. When nests are found in active sales, logging will be coordinated with timber purchasers to protect the kite nesting site. Inactive nest-site trees may be harvested.

S32. Ensure each RCW in an active cluster has a suitable cavity, but maintain a minimum of 4 suitable cavities at all times.

S33. Retain all potential red-cockaded cavity trees (pines greater than 60 years in age) within RCW clusters, unless pine basal area is above 50 ft²/acre and all trees are above 60 years within the clusters; protect RCW cavity trees by shielding cavities with restrictors, painting known cavity trees with highly visible paint, or replacing lost cavities with artificial ones.

S34. Require equipment cleaning practices on equipment, using equipment cleaning clauses in contracts, permits and agreements, when moving equipment from areas infested with non-native invasive plants (FSM 2903).

S35. No new permanent roads, trails, or recreational sites are allowed in rare plant communities and population sites for at-risk plant species.

S36. Use plant materials that contain genetically appropriate native plant species when maintaining and restoring vegetation. Use of non-native plants is allowed only when in compliance with Forest Service native plant policy (FSM2070).

S37. Maintain stands meeting criteria for old growth during project planning using the criteria in the Region 8 Old Growth Guidance. Consider the contribution of old growth communities to the future network of small and medium-sized areas of old growth conditions including the full diversity of ecosystems across the landscape.

S38. Cutting of active RCW cavity trees is prohibited unless removal is needed for public or employee safety. Written authorization by the USFWS is required after project consultation. Prior to cutting an active RCW tree, it must be replaced with an artificial cavity.

S39. Use low psi ground pressure logging equipment when operating in these ecosystems and special areas: depressional wetlands, Carolina bays, pocosins, and at-risk plants population sites.

S40. Do not use soil active herbicides (imazapyr, imazapic) in population sites for at-risk plant species.

S41. Within Management Area 1, prescribe burn habitat for fire-adapted at-risk species associates and rare communities at desired seasons (growing vs. dormant) and fire return intervals for associated ecosystems (Table 2-1; DC-ECO-2; DC-ECO-3; DC-ECO-4; DC-ECO-5; DC-ECO-7).

S42. Identify and mark at risk plants in locations of federally list plant species in order to avoid negative impacts to plants from management activities.

4.2.1.7 Standards for Recreation and Scenic Character

S43. Limit off-highway vehicles and mountain bikes to designated routes.

S44. Allow dispersed camping on the forest only with a permit.

S45. Allow motorized use of the non-motorized trail system for administrative purposes and emergencies.

S46. Management activities meet or exceed the Scenic Integrity Objectives (SIOs) of Very High on approximately 14,000 acres, High on approximately 93,000 acres, Moderate on approximately 58,000 acres and Low on approximately 96,000 acres, (See Appendix E).

4.2.1.8 Standards for Wilderness and Inventoried Roadless Areas

S47. For those lands within Inventoried Roadless Areas, apply the timber harvest and road management restrictions from the 2001 Roadless Area Conservation Rule (RACR).

S48. Use special use authorizations to limit commercial and organized group size to 12 within wildernesses.

S49. Do not use pesticides without Regional Forester approval;

S50. Do not use motorized equipment or mechanical transport for non-emergency purposes without Regional Forester approval.

S51. Do not use chainsaws to reopen trails following a catastrophic natural occurrence without Regional Forester approval.

S52. The Forest Supervisor is authorized to approve the use of motorized equipment or mechanical transport for emergencies where the situation involves an inescapable urgency and temporary need for speed beyond that available by primitive means or for exploration (categories include fire suppression, health and safety, law enforcement involving serious crime or fugitive pursuit, removal of deceased persons, and aircraft accident investigations).

4.2.1.9 Standards for Eligible Wild and Scenic Rivers

S53. Protect or enhance outstandingly remarkable values in eligible wild and scenic river corridors.

S54. Do not authorize construction of stream impoundments, diversions, or other water resource projects that would adversely modify free-flowing character of eligible rivers.

S55. In wild river segments in Awendaw Creek, Wambaw Creek and Wadboo Creek:

- a. Continue maintenance of existing old fields, wildlife openings and other habitat improvements for fish and wildlife only if they enhance the outstanding scenic values of the river corridor.
- b. Do not create new permanent wildlife openings.
- c. Do not construct permanent roads, subject to valid existing rights.
- d. Do not approve new utility corridors, utility rights-of-way, communication sites or energy and mineral development. Existing uses may continue unless removal is necessary to protect the river's outstandingly remarkable values.

4.2.1.10 Standards for Land Ownership Adjustments

S56. Future acquired lands will be managed according to the ecosystem, management area and resource integration zone direction within which the newly acquired lands are located.

4.2.1.11 Standards for Cultural Resource

S57. Use of a metal detector is prohibited unless a special use permit is authorized.

4.2.2 Guidelines

4.2.2.1 Guidelines for Trails, Roads, and Special Uses

Guidelines G1 to G3 reduce erosion and sedimentation from trails and roads and provide for the desired conditions in DC-REC-1, DC-REC-4 and DC-MUB-3.

G1. Resource damage should be avoided or addressed in a section of trail or road once it has been identified. Appropriate management responses could include: close, mitigate, reconstruct, reroute or obliterate that section. Examples of resource damage include a blown-out culvert due to flooding, extensive rutting due to vehicle use, unauthorized off trail uses, or trail-tread erosion due to over use.

G2. Designated trails should not be used as skid trails. The number of designated trails crossings should be minimized. Crossings should occur at right angles to the trail to the extent feasible. Implement needed restorative measures to damaged trail tread and profile upon completion of vegetation management activities.

G3. Use access controls (e.g., gating and fencing) along utility corridors and road rights of way when needed to prevent resource damage.

4.2.2.2 Guidelines for Vegetation Management Activities

Guidelines G4 to G7 ensure that stands are adequately restocked within 5 years and are maintained at appropriate basal areas for forest health and addresses desired conditions in DC-MUB-4 Wood Products. Guidelines G8 to G11 reduce impacts to soil and water quality and address desired conditions in Section 2.1.3 Watershed Restoration.

G4. Tree stands planned for regeneration harvest should generally have reached culmination of mean annual increment of growth. Typically, even-age regeneration harvests should not be made prior to age 35 for loblolly pine or age 50 for longleaf pine. However, plantations of loblolly pine on longleaf pine sites may be harvested for restoration purposes as soon as they are merchantable. Generally, hardwood regeneration harvests will not be made prior to age 50.

G5. Stands of any species meeting the Southern Region criteria for damaged, sparse or low quality may be regenerated prior to culmination of mean annual increment unless needed for threatened, endangered or other wildlife species habitat needs. Salvage and sanitation harvest of timber stands substantially damaged by fire, windthrow or other catastrophe or those in imminent danger from insect or disease attack are not subject to the culmination of mean annual increment requirement.

G6. Follow the guidance in Table 4-2 for the minimum number of trees per acre (stocking level) for reforestation and stand improvement treatments. This guide should be used with professional judgment to determine adequate stocking levels following the third growing season.

Table 4-2. Minimum stocking levels for reforestation and stand improvement treatments

Forest Type	Minimum Number of Seedlings for Adequate Stocking
Loblolly pine	200 per acre
Longleaf pine	200 per acre
Mixed pine and hardwood	100 per acre
Hardwoods	100 per acre

G7. Where overstory oak, hickory or other overstory hardwoods are desired to be retained, imazapyr should not be applied within the driplines of these trees.

G8. Low ground pressure equipment, activity suspension or other soil protection measures, such as mats, bridges, woody fill, etc. should be used to minimize the effects of soil compaction, rutting and puddling during activities when saturated or wet soil conditions cannot be avoided. Indicators that may signal caution include the following:

- a. The water table within 18 inches of the surface;
- b. Difficulty in walking across the site without compacting, seeing or hearing surface or groundwaters under foot;
- c. The presence of wetland indicator plant species, hydric soils and/or saturated or flooded hydrologic conditions during activity; and
- d. Events which flood or saturate soils.

G9. Skid trails, log landings and log ramps should not be located on wet sites, except where necessary. They should be designated only by a forest officer using the following criteria:

- a. Locate permanent log landings on elevated terrain generally at 0.5-mile intervals;
- b. Construct log ramps on the best drained sites to facilitate access to log landings from system roads and
- c. The number of log landings will be the minimum needed to harvest any area.

G10. Use best management practices to minimize detrimental impacts to soil productivity.

G11. Soil disturbance within the RMZ will be treated with erosion control measures with five days if needed.

4.2.2.3 Guidelines for Prescribed Burning and Wildfire Suppression

Guidelines G12 to G18 reduce impacts to soil and water quality primarily from fireline construction and rehabilitation and address desired conditions in Section 2.1.3 Watershed Restoration. Prescribed burning improves habitat for numerous plants and animals and specifically addresses desired conditions listed in Sections 2.1.1 Ecosystem Maintenance and Restoration and 2.1.2 Species Diversity.

G12. Existing natural fire control barriers should be used such as roads, streams and trails when feasible.

G13. Firelines that cross or tie into streams or other water bodies should be blocked to prevent illegal use.

G14. Bladed or disked firelines that minimally disturb the surface should be used as the preferred method of construction over plowed firelines.

G15. Firelines should be rehabilitated to ensure sustainability and to avoid resource impacts. When feasible use disc harrows to rehabilitate existing prescribed fire lines. Allow fire lines to seed naturally.

G16. Firelines should be avoided when possible in riparian management zones along lakes, perennial or intermittent streams, springs, wetlands or water-source seeps. If unavoidable minimize the length of firelines in riparian management zones.

G17. Low-intensity, low-severity backing fires should be used in existing and restorable hardwood-dominated ecosystems, including: oak forests; mesic forests; broad forested swamps; and large river floodplains, including riparian management zones.

G18. Plowed and bladed firelines associated with wildfire suppression should be rehabilitated as needed to provide for natural surface water movement.

4.2.2.4 Guidelines for Soil and Water, Aquatic Habitats and Riparian Management Zones

Guidelines G19 to G20 and G23 to G26 reduce impacts to soil and water quality and address desired conditions in Section 2.1.3 Watershed Restoration. Guidelines G21 to G22 reduce the impacts of non-native invasive species and address the desired conditions in DC-THR-1 Non-Native Invasive Species Management.

G19. During project-level planning, mitigation measures for ground-disturbing activities should be developed when Best Management Practices are not specifically identified for those activities. These mitigation measures should limit effects to water quality, riparian management zones and soils and should be similar to the following: National Best Management Practices and South Carolina Forestry Commission's BMP concerning forestry; measures outlined in the Southern Region soil and water conservation guide; measures required by the Coastal Zone Management Act; and measures prescribed by the Army Corps of Engineers on restoring wetlands and streams.

G20. South Carolina Forestry Commission, South Carolina Department of Natural Resources and South Carolina Department of Health and Environmental Control should be consulted on variances needed during stream or hydrologic restoration, which potentially impact water quality.

G21. Dikes or dams should be maintained if they are needed to prevent inland movement of invasive marine species (e.g., lionfish).

G22. After a timber sale is completed, compacted soil at log landings and skid trails should be mitigated using mechanical methods as needed.

G23. Drainage structures should provide adequate surface water conveyance or movement.

G24. Soil surface should not be exposed or substantially alter the soil properties from temporary roads, skid trails, landings, rutting, and compaction on no more than 15 percent of forest vegetation management treatment areas except for chopping, watershed improvements, or other treatments designed to correct soil and water problems.

G25. Generally, for new projects water is not diverted from streams (perennial or intermittent), lakes, wetlands, or groundwater. However, water may be diverted to meet desired conditions such as watershed restoration and restoration of historic waterflows.

G26. To the extent possible, design harvest areas so that perennial and intermittent streams do not have to be crossed.

G27 . The removal of large woody debris (>10 cm diameter and >1 m length) in the RMZ is allowed only if it otherwise poses a risk to water quality, degrades habitat for aquatic or riparian wildlife species, impedes water recreation (e.g. rafting) or poses a threat to human health and safety, private property or Forest Service infrastructure (e.g. bridges). The need for removal must be determined on a case-by-case basis.

4.2.2.5 Guidelines for Channeled Ephemeral Stream Zones

Guideline G28 applies to 25 feet on each side of a recognizable channeled ephemeral stream. For a definition of a channeled ephemeral stream, see glossary. Guideline G27 reduces impacts to soil and water quality, maintain aquatic habitats; and address desired conditions described in Section 2.1.3 Watershed Restoration.

G28. Partial suspension when practical, should be used when yarding logs over ephemeral streams (including swampy areas that are connected to streams). Large wood and logging slash may be used in crossing ephemeral streams. Remove material after use unless it improves aquatic organism habitat.

4.2.2.6 Guidelines for Wildlife Habitat Management

Guidelines G29 to G31 provide habitat conditions for plants and animals and specifically address desired conditions described in DC-SCC-1 Stump and Root Mount Associates; DC-SCC-9 Wildlife Snag and Large Diameter Hollow Tree Associates, and DC-SCC-10 River and Streams Associates.

G29. Skid trails, haul roads, log landings and mechanical firelines should be reused when feasible. Rehabilitate these disturbed areas using appropriate methods.

G30. Bat-friendly technology and construction materials should be included in new road bridge construction.

G31. Stumps, standing snags, and den trees should be retained during vegetation management activities. Exceptions may be made where necessary to control insects or disease outbreaks or to provide public and employee safety.

4.2.2.7 Guidelines for At-risk Species and Ecological Sustainability

Guidelines G32 to G45 address additional coarse and fine filter restrictions for ensuring ecological sustainability including at-risk species persistence in conjunction with desired conditions and objectives for ecological maintenance and restoration and species diversity. Guidelines G38 to G41 reduce the impacts of non-native invasive species and address the desired conditions in DC-THR-1 Non-Native Invasive Species Management.

G32. Unpaved system roads should be considered for seasonal to permanent closure to conserve at-risk wildlife species sensitive to road use.

G33. Temporary or new system roads, log landings and firelines should be located outside primary (538 feet) and secondary zones (1,476 feet) from the edge of known breeding ponds for frosted flatwoods salamander.

G34. Within Swallowed-tail kite habitat, clumps of canopy trees should be retained during timber harvest treatments to provide for current and/or future nesting/roosting needs. Swallowed-tail kite nest trees should be protected from high intensity prescribed fire by implementing protection measures such as raking leaves and woody debris from around the nest tree.

G35. Guidelines and recovery objectives in the most up-to-date recovery plan should be implemented for all federally-listed species, when available and feasible. If site specific conditions preclude implementing recovery tasks, consult with the USFWS field office using the appropriate consultation tool. Collaborate with USFWS in the conservation of at-risk species.

G36. Mechanical activities within active red-cockaded woodpecker clusters are not allowed during the nesting season (April 1– July 31). Exceptions may be made at the project level with written authorization from the USFWS after project consultation.

G37. Special forest products permits should be monitored to ensure species and ecological sustainability. Appropriate monitoring protocol should be included as part of forest products management plan for that permit.

G38. Use of local firewood (firewood grown and cut within 50 miles of where it will be burned) should be encouraged on the Francis Marion to limit the spread of non-native, invasive insects and diseases.

G39. Non-native, invasive plants on existing sites should be removed or treated before they become widespread within recreation sites.

G40. Encourage the use of weed-free materials (including but not limited to gravel, mulch, seeds, plant materials) to limit the accidental introduction and spread of non-native invasive plant species (including but not limited to gravel, mulch, seeds, plant materials)(FSM 2900). If certified weed-free materials become available in SC, then the use of those certified weed-free materials would be required for use on national forest lands.

G41. Commercially-purchased seed mixes should be tested by a certified seed laboratory for purity, viability, and noxious weed seed.

G42. Ensure forest management activities are consistent with the most up-to-date recovery plan for the red-cockaded woodpecker at the time of the activities. In some instances there may be a need to deviate from The Red-cockaded Woodpecker Recovery Plan to provide long term benefits for the red-cockaded woodpecker (RCW) and its habitat (e.g., longleaf pine restoration or timber harvest which could reduce foraging below the Managed Stability Standard in the Red-cockaded Woodpecker Recovery Plan). Consult with USFWS.

G43. In MA1, open loblolly pine woodlands providing high-functioning nesting and foraging habitat for red-cockaded woodpeckers and other plant and animal species are maintained. Loblolly pine forest types are converted to longleaf pine over time.

G44. Ground-disturbing activities (e.g. drum chopping) during vegetation management should be minimized within the Frosted Flatwoods Salamander Designated Critical Habitat.

G45. Within Frosted Flatwoods Salamander Designated Critical Habitat, the preferred time for prescribed burning is when the salamanders are least active on the ground (typically between April and October).

4.2.2.8 Guidelines for Cultural Resources

Guidelines G46 to G48 provide direction on protection and interpretation of cultural resources and historical areas and specifically address desired conditions described in DC-MUB-2. Cultural Resources.

G46. Trails, firelines, roads, skid trails or log landings should not be located within the boundaries of cultural resources (sites or buildings) or unevaluated cultural resources.

G47. Land exchanges should not be considered on properties within the boundaries of the proposed historical districts.

G48. A minimum 5-meter buffer around cultural resources and unevaluated cultural resources should be used during ground-disturbing activities.

4.2.2.9 Guidelines for Human Health and Safety

Guideline G49 provides direction on human health concerns and addressed DC-F-5 Human Health and Safety.

G49. The forest should cooperate with Charleston County, who is the lead agency, to develop an approach to control mosquito-borne illnesses.

4.3 Suitability

Certain specific uses (timber harvest and production, prescribed fire, special uses, minerals and energy) are more compatible with some areas of the national forest than others. The discussion below identifies where specific uses are compatible or not compatible with the desired conditions for a particular land classification.

4.3.1 Suitability for Timber Production

Forest Service direction provides that most National Forest System lands are available for timber harvest. See Appendix B for more detailed analysis and Appendix C for Possible and Probable Activities. Lands cannot be suitable for timber production where:

1. Statute, executive order or regulation generally prohibits timber production, or the land has been withdrawn from timber production by the Secretary of Agriculture or the Chief of the Forest Service;
2. Soil, slope, or other watershed conditions would be irreversibly damaged by timber harvest or it would cause substantial and permanent impairment of the productivity of the land;
3. There is no reasonable assurance that such lands can be adequately restocked within 5 years after harvest; or
4. The land is not forest land. For instance trees are unable to grow due to environmental conditions.

For the Francis Marion, 13,000 acres in the 4 designated wilderness areas fall under item 1 above, as does the Guilliard Lake Research Natural Area. No lands fall under items 2 or 3. Some lands, such as salt marsh and non-forest land, fall under item 4. The remainder of the forest is classified as lands that may be suitable for timber production.

FS Planning Handbook direction provides that if timber production is compatible with or contributes to the achievement of desired conditions and objectives, and a flow of forest products can be reasonably predicted, those lands should be identified as suitable for timber production, even if timber production is not the primary emphasis.

On the other hand, there are some lands where timber production is generally not compatible with achieving the desired conditions. These lands are categorized as not suitable for timber production.

Lands identified as not suitable for timber production might have trees cut for reasons other than timber production, including to:

1. Salvage trees killed or damaged,
2. Control insect and disease outbreaks,
3. Protect human health and safety,
4. Protect resource protection or
5. Move toward the desired conditions.

Table 4-3 lists the different timber suitability categories. See Appendix E for a map of lands suitable for timber production.

4.3.2 Special Uses and Special Forest Products Suitability

Generally, national forests are suitable for a variety of special uses if the use cannot be accommodated on private land. Because an area is considered suitable for a use, it does not mean that use will be authorized. Special uses include, but are not limited to easements, rights of-way, wells, events, military exercises, college classes and commercial activities such as outfitter guide businesses or commercial filming. Each request for a special use authorization needs individual consideration and evaluation. Special uses that require permanent structures or facilities are not suitable in wilderness areas, special areas, or designated areas unless the special use would support the relevant special attributes.

Generally, national forests are suitable for a variety of special forest products for personal use. Special forest products include, but are not limited to collecting firewood and ferns. Each request for special forest products needs individual consideration and evaluation. Special forest products for commercial use are not suitable.

4.3.3 Utility Corridors and Communication Sites Suitability

Existing communication sites and major utility corridors are identified as suitable for such uses. A map of these sites and corridors is available in the planning record. Special uses that require permanent structures or facilities are not suitable in designated wilderness areas, special areas, or designated areas unless the special use would support the relevant special attributes. Preference is to use existing utility corridors.

4.3.4 Minerals Materials Suitability

Most of the Francis Marion National Forest is suitable for mineral sales and development, except for in the Special and Designated Areas identified in Chapter 2, such as designated wilderness and Guilliard Lake Research Natural Area. Table 4-3 lists the areas suitable or not suitable for development of mineral materials for commercial use, such as peat, sand, gravel, clay or limestone, on the Forest (36 CFR 228 C). Administrative and personal uses of mineral materials is considered on a site-specific basis except where prohibited by law or policy. The Forest has full authority to manage mineral materials such as sand and limestone which are construction materials to build and maintain road, trails and other facilities (36 CFR 228C). Locations for administrative and personal use will be determined through site-specific analysis and exclude designated wilderness, Guilliard Lake Research Natural Area and any other areas determined to be unsuitable for such an activity.

This plan does not make a decision regarding federal leasable minerals, which are authorized by Bureau of Land Management (BLM). Should interest in exploration or development of federal leasable minerals, such as oil and gas, be expressed, a decision for Forest Service consent to the BLM authorization will be made on a case-by-case basis.

Energy generation such as wind turbines or solar that are not authorized under federal leasable mineral laws are a type of special use and will be evaluated on a site specific basis as a special use (see 4.3.2).

4.3.5 Outdoor Recreation Suitability

Francis Marion National Forest lands are suitable for outdoor recreation. Wilderness is unsuitable for motorized and developed recreation. Off-highway vehicle use is limited to the designated road and trail system. Standards and guidelines limit impacts to natural resources.

Table 4-3. Timber suitability for the Francis Marion National Forest

Classification	Acres
Total National Forest System Lands	259,625
Nonforest lands	
Water and marsh	817
Brush	6,757
Wildlife openings	555
Rights-of-way	126
Administrative sites	20
Developed recreation sites	80
Borrow pits	6
Cemeteries	6
Lands Withdrawn From Timber Production	
Wilderness areas	13,649
Guilliard Lake Research Natural Area	23
Lands That May be Suitable for Timber Production	237,586
Lands where timber production is not compatible with achieving desired conditions and objectives (lands not appropriate for timber production.)	43,563
Santee Experimental Forest	5,966
Recommended Wilderness	
Pond pine forest types	6,132
Riparian management zones (w/in 100' of perennial waterbodies or within 50' of intermittent waterbodies)	21,401
Inventoried roadless area	1,394
Red-cockaded woodpecker clusters	6,481
Genetic resource management area (seed orchard)	673
Special uses	18
Cedar Hill Island	802
Guilliard Lake Scenic Area	1,054
Battery Warren Historic Area	74
Lands Suitable for Timber Production	193,483
Lands Not Suitable for Timber Production	66,142

Table 4-4. Suitability for mineral materials development for commercial use on the Francis Marion National Forest (does not include leasable minerals)

Geographic Area or Description	Mining for Minerals
Forested lands	Suitable
Water, wetlands and marshes	Not suitable
Non-forested lands	Suitable
Administrative areas	Not suitable
Developed recreation areas	Not suitable
Designated and Special Interest areas	Not suitable
Wilderness/Inventoried Roadless Areas	Not suitable
Guilliard Lake Scenic Area	Not suitable
Historic Districts including Battery Warren, Tibwin, Walnut Grove and Sewee; Archaeological sites	Not suitable
Research natural area(s)	Not suitable
Seed orchard and helibase	Not suitable
Santee Experimental Forest	Not suitable
Botanical (rare plant communities)	Not suitable
Red-cockaded woodpecker clusters	Not suitable
Riparian Management Zones	Not suitable

Chapter 5. Monitoring

5.1 Introduction

Monitoring program focuses on providing information necessary to evaluate whether plan direction and management are effective in maintaining or achieving progress toward the desired conditions and objectives for the plan area. The monitoring program includes the specific monitoring questions and associated indicators that are to be used for forest plan evaluations, feedback for adaptive responses, and reporting. Monitoring questions and associated indicators are based on one or more plan components, but not every component has a corresponding monitoring question.

Monitoring will provide information needed to accomplish these outcomes:

1. The plan's effectiveness - Measure conditions of the Francis Marion to ensure that they are moving toward the desired conditions outlined in Chapter 2;
2. Possible needs for change to the forest plan- Detect changing conditions, risks, and uncertainties that require adaptive responses; and
3. Whether a change to the plan monitoring program is warranted based on new information. Monitoring questions and indicators may be modified through the adaptive management approach over time as determined in the biennial reports and evaluations.

Some monitoring needs benefit from a perspective that is at scales larger than the Francis Marion National Forest. This is justified on the basis that some questions are more efficiently addressed for multiple national forests at the same time and that some issues are more meaningful at larger scales. To support needs of this kind, the 2012 Planning Rule requires that Regional Foresters develop broad-scale monitoring strategies (219.12 (b)). These broad-scale monitoring strategies are further evaluated in Appendix F.

In addition to broad scale monitoring, Appendix F also includes the following: 1) criteria used for the development of the monitoring program; and 2) research needs.

5.2 Biennial Monitoring Reports and Evaluations

Periodic evaluations of conditions and trends of the monitoring questions form the basis for continuous plan improvement and provide information for rapid responses to change. Using these evaluations, the agency will develop biennial reports with evaluations that reflect the current status and trends of desired conditions described in this forest plan.

These biennial reports will be developed by interdisciplinary teams (ID team) using collaborative engagement with the public. The ID teams will develop a comprehensive evaluation of plan implementation and effectiveness, identifying any needs for adaptive responses. The agency will document the monitoring results and evaluations in the biennial report and make the report available to the public on the forest's website.

Monitoring and evaluations will build off previous reports and could lead to changes in forest plan direction or the monitoring program. For instance, desired conditions, objectives, standards and guidelines described in the forest plan may be modified and/or monitoring questions and indicators changed through the adaptive management approach. Significant findings that could

lead to a change in the forest plan will be vetted through an open public involvement process before proposed changes are initiated.

5.3 Monitoring Program

The monitoring questions shown in Table 5-1 address the nine requirements of the 2012 Planning Rule, use the best scientific information available and meet the criteria described in Appendix F. Thus every question to some degree is important for ecological, social and/or economic sustainability; addresses a stressor or threat; has some risk of non-attainment; public interest; management has the technical and fiscal capability to achieve; partners who are willing to work with us; and reflects a long-term commitment.

Monitoring questions are aggregated within the table according to the predominant required monitoring item and has six columns as described below.

Question is the plan level monitoring question.

Indicators are performance measures or other methods associated with monitoring questions that the agency will use to gauge or track accomplishments that address the monitoring question. They provide a measureable quantitative or qualitative parameter. Monitoring indicators will be monitored at different frequencies and scale.

Desired Conditions and Objectives are selected Desired Conditions that track long-term progress of the forest plan. Objectives are projections of measureable and time-specific outcomes or accomplishments that, if achieved, would contribute to maintaining or reaching desired conditions during the life of the plan.

Sources/Partners are the data repositories or information bases for calculating indicators. Collaborative partners are those who would be involved in providing potential data or information for the monitoring process. Broad scale monitoring is also identified where applicable.

Frequency describes the timing of evaluating and reporting of monitoring efforts. Most data are collected annually, while other data are collected at longer or shorter intervals based on the length of time needed to discern a measureable change.

Adaptive Management Strategies are composed of alerts and responses. Alerts are changes, expressed as a direction or magnitude of change that identify potential needs for management response that may include additional assessment, modifications to the monitoring, need for change in the plan, or a change in plan implementation. When an alert is reached, the agency will develop a response based on the cause of the alert and the practical implications for forest management moving forward. The adaptive management strategies presented in the table will be improved upon over time. Presently for a few questions strategies still need to be developed and for many others the strategies are not as specific as would be desirable in terms of measurable thresholds and direct actions. However, as the long term monitoring results are better understood the alerts and responses will be become better defined.

Table 5-1. Monitoring questions and indicators for the Francis Marion monitoring plan

Monitoring Questions	Indicators	Desired Conditions and Objectives	Sources/Partners	Frequency	Adaptive Management Strategies
The status of select watershed condition					
MQ 1: What are the trends in condition classes of the three priority watersheds (Guerin Creek, Turkey Creek and the headwaters of Wambaw Creek)? Have action plans been developed and initiated to improve the condition classes?	<p>(I-1) Percent of the aquatic ecosystem functioning properly (FP), functioning at-risk (FR), or function impaired (FI) using the following key characteristics based on the Watershed Condition Reference Guide:</p> <p>Water Quality (see MQ 4)</p> <ol style="list-style-type: none"> Impaired Waters Water Quality Problems (not listed as (impaired)) <p>Water Quantity (see MQ 4)</p> <ol style="list-style-type: none"> Flow characteristics <p>Aquatic Habitat (see MQ 3)</p> <ol style="list-style-type: none"> Habitat Fragmentation Large Woody Debris Channel Shape and Function <p>Aquatic Biota (see MQ 5)</p> <ol style="list-style-type: none"> Life Form Presence Native Species Exotic and/or Invasive Species <p>Riparian/Wetland Vegetation</p> <ol style="list-style-type: none"> Vegetation Condition <p>Roads and Trails (See MQ 38)</p> <ol style="list-style-type: none"> Open Road Density Road Maintenance Proximity to Water Mass Wasting <p>Soils (See MQ 42)</p> <ol style="list-style-type: none"> Soil Productivity Soil Erosion Soil Contamination <p>Fire Regime (See MQ 28)</p> <ol style="list-style-type: none"> Fire Condition Class <p>Forest Cover</p> <ol style="list-style-type: none"> Loss of Forest Cover <p>Terrestrial Invasive Species (see MQ 17)</p> <ol style="list-style-type: none"> Extent and Rate of Spread <p>Forest Health (see MQ 24 and MQ 39)</p> <ol style="list-style-type: none"> Insects and Disease Ozone 	<p>DC-WAT-1 DC-WAT-2 DC-WAT-4</p> <p>OBJ-WAT-1 OBJ-WAT-2</p>	<p>Site specific surveys including BVET Habitat survey: SCDHEC; Stream gage USGS and Santee Experimental Forest);USFS; Annual Target Reporting; Barriers - forest - aop (aquatic organism passage) GIS; WIT data base</p> <p>Partners include the following: SALCC Southern Research Station</p> <p>USFWS SCDNR SCDHEC</p>	Every 5 years reassess watershed conditions and review if the action plans have been initiated. Reported at the 6 year monitoring reporting period.	<p>Alert: In the reassessment of the watershed condition, the trend in condition is not improving.</p> <p>Response: Determine what key characteristics are not improving and develop a strategy for resolution.</p> <p>Alert: No action plan has been developed or initiated.</p> <p>Response: Decide when action plan will be completed.</p>
MQ 2: What are the trends in the condition classes of watersheds outside of priority watersheds?	<p>(I-1) Percent of the aquatic ecosystem functioning properly (FP), functioning at-risk (FR), or function impaired (FI) using the following key characteristics based on the Watershed Condition Reference Guide:</p> <p>Water Quality (see MQ 4)</p> <ol style="list-style-type: none"> Impaired Waters Water Quality Problems (not listed as (impaired)) <p>Water Quantity (see MQ 4)</p>	<p>DC-WAT-1 DC-WAT-2</p> <p>OBJ-WAT-2</p>	<p>GIS</p> <p>Partners include the following: SALCC Southern Research Station</p> <p>USFWS SCDNR SCDHEC</p>	Every 5 years reassess watershed conditions. Reported at the 6 year monitoring reporting period.	<p>Alert: In the reassessment of the watershed condition, the trend in condition is declining</p> <p>Response: Determine what key characteristics are declining and develop a strategy for resolution.</p>

Monitoring Questions	Indicators	Desired Conditions and Objectives	Sources/Partners	Frequency	Adaptive Management Strategies
	a. Flow characteristics Aquatic Habitat (see MQ 3) a. Habitat Fragmentation b. Large Woody Debris c. Channel Shape and Function Aquatic Biota (see MQ 5) a. Life Form Presence b. Native Species c. Exotic and/or Invasive Species Riparian/Wetland Vegetation a. Vegetation Condition Roads and Trails (See MQ 38) a. Open Road Density b. Road Maintenance c. Proximity to Water d. Mass Wasting Soils (See MQ 42) a. Soil Productivity b. Soil Erosion c. Soil Contamination Fire Regime (See MQ 28) a. Fire Condition Class Forest Cover a. Loss of Forest Cover Terrestrial Invasive Species (see MQ 17) a. Extent and Rate of Spread Forest Health (see MQ 24 and MQ 39) a. Insects and Disease b. Ozone				
MQ 3: How much instream large wood and potential large woody debris recruitment (especially hardwood) are distributed throughout the riparian management zones?	(I-1) Large woody debris	DC-WAT-2 DC-ECO-10 OBJ-WAT-2	Habitat diversity (riffle run, riffle glide) through BVET Habitat surveys Partners include the following: Southern Research Station Virginia Tech	2 years	Alert:: If past survey data decline in large woody debris (LWD) per mile volume by 20% Response: Then add more LW, determine why decline is occurring through hydrologic and fire reasons , mitigate with low intensity burns
MQ 4: What are the physical and chemical characteristics of rivers and streams (water quality)?	(I-1) Parameters for water quality include: Temperature, Dissolved Oxygen mg/L, pH, Turbidity - NTU, 5 Day BOD Streams mg/L, Alkalinity mg/L, Ammonia as N mg/L, Ammonia, Manual Distillation, as N mg/L, Total Kjeldahl Nitrogen in Water as N mg/L, Nitrate/Nitrite as N mg/L, Total Phosphorus as P in Water mg/L, Total Suspended Solids mg/L, Cadmium in Water mg/L, Chromium in Water mg/L, Copper in Water mg/L, Lead in Water mg/L, Nickel in Water mg/L, Zinc in Water mg/L, Mercury in Water mg/L, E. coli Bacteria by Quanti-Tray #/100 mL Increases in salinity within surface waters located within the Margin of Charge (I-2) Stream gage water flows	DC-WAT-2 DC-ECO-10 OBJ-WAT-2	(I-1) SCDHEC (I-2)Stream gage -- USGS and Santee Experimental Forest) Partners include the following: USGS EPA SCDHEC	(I-1) 2 years (I-2) 2 years	(I-1) Alert: If Parameters exceed water quality standards Response: Then work with state and private citizens to identify and mitigate the cause if possible. Most effects are from off forest (I-2) Alert: If Stream gage - two consecutive years of decreasing flow Response: Then notify DEHC or other state and/or federal agency's that draw water or responsible for water quality

Monitoring Questions	Indicators	Desired Conditions and Objectives	Sources/Partners	Frequency	Adaptive Management Strategies
MQ 5: How much habitat has been maintained, enhanced, and restored; How are aquatic species responding to management activities?	(I-1) Miles of stream habitat maintained, improved, and/or restored (I-2) Fish, crayfish and mollusk species presence and abundance;	DC-WAT-2 DC-ECO-8 DC-ECO-10 DC-SCC-10 OBJ-WAT-2	USFS Partners include the following: SCDNR USFWS	2 years	Alert: If aquatic species decline rapidly over one survey period Response: Then monitor habitat surveys and if habitat is lacking plan project to improve habitat conditions. Water quality should be analyzed and work with partner to identify problem and mitigate.
The status of select ecological conditions including key characteristics of terrestrial and aquatic ecosystems					
MQ 6: What are the trends in the conditions of the upland longleaf pine and wet pine savanna ecosystems?	(I-1) Acreage and % of the total ecosystem extent in the Maintain Condition Class (i.e. meets desired conditions) using the following key characteristics as further described in Appendix E of the FEIS: Composition and Structure: • Canopy is open, dominated by woodland savanna or grassland conditions • Herbaceous native ground cover (>65 percent cover) * Landscape structural departure compared to reference condition (NRV) * Characteristic Native forest type greater than 50% of the ecosystem Ecological processes: • Prescribed fire every one to three years, with growing season burn every third year	DC-ECO-2 DC-ECO-3 DC-SCC-5 DC-SCC-7 DC-T&E-1 DC-T&E-2 DC-T&E-3 DC-MA2-1 OBJ-ECO-2 OBJ-ECO-3	Forest digital data (GIS) layers on ecosystem extent, ecosystem condition, and key characteristics are maintained and queried;	Baseline conditions will be measured for the first two years of the plan. Trends in the status of key characteristics and acreage in the maintain condition class is collected and compiled every 5 years. . Reported at the 6 year monitoring reporting period.	Alert: Amount in the maintain condition class is less than the prior reporting period. Response: Determine the reason for the reduction (e.g. targeted burn levels, thinning, midstory control, climate change and etc.) and develop an action plan to address issues and identify solutions.
MQ 7: What are the trends in the conditions of the depressional wetlands and Carolina bay ecosystems?	(I-1) Acreage and % of the total ecosystem extent in the Maintain Condition Class (i.e. meets desired conditions) using the following key characteristics as further described in Appendix E of the FEIS: Composition and Structure: • Herbaceous native ground cover (>65 percent cover) * Characteristic Native forest type greater than 50% of the ecosystem. Ecological processes: • Prescribed fire every one to three years, with growing season burn every third year	DC-ECO-4 DC-SCC-6 DC-T&E-1 DC-T&E-4 DC-T&E-5 DC-MA2-2 OBJ-ECO-2 OBJ-ECO-4	Forest GIS digital data layers on ecosystem extent, ecosystem condition, and key characteristics are maintained and queried	Baseline conditions will be measured for the first two years of the plan. Trends in the status of key characteristics and acreage in the maintain condition classes is collected and compiled every 5 years. . Reported at the 6 year monitoring reporting period.	Alert: Amount in the maintain condition class is less than the prior reporting period. Response: Determine the reason for the reduction and assess the reasons why targeted burn levels, are not being met, and develop an action plan to address issues and identify solutions
MQ 8: To what extent is landscape structural diversity meeting desired conditions for structural diversity?	(I-1) Percent of each ecosystem in successional stages, including canopy conditions and old growth conditions	DC-ECO-2 DC-ECO-3 DC-ECO-4 DC-ECO-5 DC-ECO-6 DC-ECO-7 DC-ECO-8 DC-ECO-9	1. The structural departure of ecosystems (using age class data and canopy opening determined through ground-sampling, field sampling, or LiDAR). 2. Trends in ecosystem structural departure – considering both age classes and % in woodland,	(I-1) Compiled biannually (I-2) Every five years is collected in relation to NRV.	

Monitoring Questions	Indicators	Desired Conditions and Objectives	Sources/Partners	Frequency	Adaptive Management Strategies
		Sections on Landscape Structure and Connectivity	savanna, and grassland, are collected and reported		
MQ 8a: What is the status and condition of old growth communities across the landscape?	(I-1) Trends in the abundance, distribution, and condition of old growth communities. (I-2) Acres of existing old growth identified during project-level planning	DC-ECO-1 OBJ-ECO-1	Partners include the following: Defenders of Wildlife SCTNC USFWS SCDNR (I-1) Forest GIS digital data layers on ecosystem extent, ecosystem condition, and key characteristics; (I-2) FSVEG database on stand conditions; Project-level decision documents	Trends in Old Growth Conditions is collected every 5 years. Reported at the 6 year monitoring reporting period.	Alert: Amount of Old Growth Conditions declines from previous reporting period. Response: Determine the reason for the reduction and assess the reasons why Old Growth conditions are declining, and develop an action plan to address issues and identify solutions
MQ 9: What are the trends in the conditions of pocosin and narrow non-riverine ecosystems?	(I-1) Acreage and % of the total ecosystem extent in the Maintain Condition Class (i.e. meets desired conditions) using the following key characteristics as further described in Appendix E of the FEIS: Composition and Structure: * Characteristic Native forest type greater than 50% of the ecosystem. Ecological processes: • Prescribed fire at 2-10 year fire return intervals, including a growing season burn every third burn.	DC-ECO-5 DC-SCC-3 DC-MA2-2 OBJ-ECO-2 OBJ-ECO-5	Forest GIS digital data layers on ecosystem extent, ecosystem condition, and key characteristics; fire data from FACTS	Baseline conditions will be measured for the first two years of the plan. The status of growing and dormant season fire is compiled biannually; Trends in growing and dormant season burning and acreage in the maintain condition class is collected every 5 years. . Reported at the 6 year monitoring reporting period.	Alert: Amount in the maintain condition class is less than the prior reporting period, Response: Determine the reason for the reduction and assess the reasons why targeted burn levels, are not being met, and develop an action plan to address issues and identify solutions
MQ 10: What are the trends in the conditions of upland hardwood, mesic slopes, and maritime ecosystems	(I-1) Acreage and % of the total ecosystem extent in the Maintain Condition Class (i.e. meets desired conditions) using the following key characteristics as further described in Appendix E of the FEIS: Composition and Structure: * Characteristic Native forest type greater than 50% of the ecosystem (i.e. % Ecosystem acres dominated by desirable hardwood forest types.)	DC-ECO-6 DC-ECO-9 DC-SCC-4 OBJ-ECO-6	Forest GIS digital data layers on ecosystem extent, ecosystem condition, and key characteristics are maintained and queried	Baseline conditions will be measured for the first two years of the plan. Acreage in the maintain condition class is collected and compiled every 5 years. Reported at the 6 year monitoring reporting period.	Alert: Amount in the maintain condition class is less than the prior reporting period, Response: Determine the reason for the reduction and develop an action plan to address issues and identify solutions
MQ 11: What are the trends in the conditions of forested wetland ecosystems?	(I-1) Acreage and % of the total ecosystem extent in the Maintain Condition Class (i.e. meets desired conditions) using the following key characteristics as further described in Appendix E of the FEIS: Composition and Structure: * Characteristic Native forest type greater than 50% of the ecosystem (i.e. Acres dominated by desirable hardwood forest types.)	DC-ECO-7 DC-ECO-8 DC-SCC-3 DC-SCC-10 DC-MA2-3	Forest GIS digital data layers on ecosystem extent, ecosystem condition, and key characteristics are maintained and queried	Baseline conditions will be measured for the first two years of the plan. Acreage in the maintain condition class is collected and compiled every 5 years. . Reported at the 6 year monitoring reporting period.	Alert: Amount in the maintain condition class is less than the prior reporting period, Response: Determine the reason for the reduction and develop an action plan to address issues and identify solutions
The status of focal species to assess the ecological conditions under 36 CFR 219.					

Monitoring Questions	Indicators	Desired Conditions and Objectives	Sources/Partners	Frequency	Adaptive Management Strategies
<p>MQ 12: What is the status of focal species in the following ecosystems</p> <p>1) For ecosystem function in longleaf pine and wet pine savanna RCW Bachman Sparrow Pitcher plants Longleaf pine</p> <p>2) For ecosystem function in depressional wetlands and Carolina bay and Carolina gopher Frog</p> <p>3) For ecosystem function in aquatic habitat American Eel</p>	<p>(I-1) RCW - Active cluster, potential breeding pairs Bachman Sparrow - Presence/Absence Pitcher plants - Presence/Absence Longleaf pine - Canopy dominance/ presence of advanced regeneration</p> <p>(I-2) Carolina Gopher Frog - Presence/absence</p> <p>(I-3) American Eel - Presence/Absence</p>	<p>DC-ECO-2 DC-ECO-3 DC-ECO-4 DC-ECO-10 DC-T&E-2 DC-SCC-3 DC-SCC-5 DC-SCC-7 DC-SCC-10</p>	<p>(I-1 and I-2) GIS: NRIS TESP and Fauna Databases (I-3) USFS</p>	Every 2 years	
The status of a select set of ecological conditions required under 36 CFR 219.9 to contribute to the recovery of federally listed threatened or endangered species, conserve proposed and candidate species, and maintain a viable population of species of conservation concern.					
MQ 13: To what extent are habitat conditions provided that support stable populations of at-risk plant species?	(I-1) Population status and trends of at-risk plant species (i.e. American chaffseed, pondberry and Canby's dropwort) and relationship to habitat/ecological conditions as further described in Appendix D of the forest plan.	<p>DC-SCC-12 DC-T&E-3 DC-T&E-4 DC-T&E-5 DC-RIZ-Coastal-S3 DC-RIZ-Wando-S2 DC-RIZ-Wambaw-S9 DC-RIZ-Santee-S3</p> <p>OBJ-T&E-3 OBJ-SCC-3</p>	<p>Standardized forest and regional data bases including NRIS and GIS, Corporate data bases - (i.e. Nature Serve data)</p> <p>Partners include the following: USFWS SCDNR TNC College of Charleston The Citadel Volunteers local botanists</p>	Monitor federally-listed plant species and habitat on average every 2 years; Species of conservation concern and associated habitat every 5 years. Report status of at-risk plant species and associated ecological conditions every 6 years.	<p>Alert: Desired habitat conditions are not being met at locations for at-risk plant species. Populations for at-risk plant species are not sustainable.</p> <p>Response: Document the extent to which habitat threats are responsible for species declines. Develop projects and partnerships to address management, inventory, and monitoring needs.</p>
MQ 14: To what extent are habitat conditions provided that support stable populations of at-risk amphibian species?	<p>(I-1) Frosted Flatwoods Salamander –quality of designated critical habitat</p> <p>(I-2) Carolina Gopher Frog – presence and absence of species within the known breeding habitat. Quality of known breeding habitat.</p>	<p>DC-ECO-3 DC-ECO-4 DC-ECO-10 DC-T&E-1 DC-SCC-1 DC-SCC-5 DC-SCC-6 DC-SCC-7 DC-RIZ-Wando-S1</p> <p>OBJ-T&E-1 OBJ-SCC-1 OBJ-SCC-3</p>	<p>Surveys at the Forest Level. Charleston and Berkeley counties within the forest proclamation boundary.</p> <p>Partners include the following: ARC SCDNR USF&WS College of Charleston Riverbanks Zoo</p>	Every 2 years	<p>Alert: Quality of habitat is declining over the next 5 years.</p> <p>Response: Document the extent to which habitat threats are responsible for habitat declines. Identify why this is occurring. Develop projects and partnerships to address management, inventory, and monitoring needs.</p>

Monitoring Questions	Indicators	Desired Conditions and Objectives	Sources/Partners	Frequency	Adaptive Management Strategies
MQ 15: To what extent are habitat conditions provided to continue supporting a recovered population of RCWs?	(I-1) Population trends	DC-ECO-2 DC-ECO-3 DC-T&E-2 DC-SCC-7 DC-MA2-1 OBJ-T&E-2	Surveys at the Forest Level State and Range wide populations. Partners include the following: SCDNR USFWS	20% of population is monitored during year round monitoring activities: Random 20% survey "without replacement". ID cavity trees, their activity, group status (number of active cavity trees: potential breeding group)	Alert: Decline of RCW Population by a certain percent (2 consecutive years population declined by 5%. Desired habitat conditions are not being met. Response: Determine source of population decline, develop appropriate management actions if applicable. Contact partners and initiate sessions to see if similar trends are occurring. Alert: RCW population declines to 450 active clusters, Response: The FS would initiate actions to turn around declines. Alert: RCW population declines to 400 active clusters, Response: The Forest Service would reinitiate formal consultation with USFWS and stop all actions that could adversely affect RCW.
MQ 16: What are the habitat conditions and trends for supporting native migratory and non-migratory bird species?	(I-1) Population trends – presence and absence with emphasis on avian species of conservation concern (i.e. Bachman sparrow, swallow-tailed kite and bald eagle).	DC-MUB-1 DC-ECO-9 OBJ-SCC-2	Surveys at the Forest Level including breeding bird points, spring breeding bird surveys, mid-winter bald eagle surveys and swallow-tail kite roost surveys. State and Range wide population monitoring including BBS trend data Broad scale reports published periodically by partners such as Audubon, American Bird Conservancy, USFWS, and USGS. Other partners include: SCDNR TNC Avian Conservation Center	Surveys are done annually with population trends reported every two years.	Alert: Decline in relative abundance by a certain percent (e.g., 2 consecutive years showing a decline of 5% or more). Desired habitat conditions are not being met. Response: Determine source of population decline, develop appropriate management actions if applicable. Contact partners and initiate sessions to see if similar trends are occurring.
MQ 17: What are the trends in Non-Native Invasive Species (NNIS) infestations and are they threatening native ecosystems and at-risk species?	(I-1) Acres occupied by non-native invasive species by ecosystem (I-2) Records of threats to at-risk species	DC-THR-1	(I-1) GIS: Ecosystem and rare community data intersected with NNIS Data from NRIS (I-2) TES database :threat and comment column Partners include: APHIS SCDNR SC EPPC SC TNC Clemson University State Cogongrass Task Force	Every 3 years and reported at the 4 year monitoring reporting period.	(I-1) Alert: Increase in acres by ecosystem for total and individual NNIS species, and presence of new rapidly spreading NNIS, Response: Determine if increase is impacting native ecosystems and prioritize treatment, (I-2) Alert: Documented threats to at-risk species. Response: Determine degree of threat to at-risk species and prioritize treatment response

Monitoring Questions	Indicators	Desired Conditions and Objectives	Sources/Partners	Frequency	Adaptive Management Strategies
MQ 18: Are habitat conditions provided for populations of at-risk pollinator insect species?	(I-1) Habitat status of suitable host plants for at-risk pollinator insects including the Dusky skipper (Pickerel weed), Okefenokee zale moth (climbing fetterbush), and Dusky roadside skipper (broadleaf beardgrass).	DC-ECO-2 DC-ECO-3 DC-SCC-5 DC-SCC-7 OBJ-SCC-3	Surveys at the Forest Level; Partners include: The Xerces Society The Carolina Butterfly Society College of Charleston	Habitat status of at-risk pollinator species and relationship to ecological/habitat conditions monitored at minimum every 5 years and reported at the 6 year monitoring reporting period.	Alert: Desired habitat conditions are not being met at locations for at-risk pollinator insect species. Response: Monitoring results should disclose the extent to which management activities are responsible for species declines. Develop projects and partnerships to address management, monitoring, and inventory needs.
MQ 19: To what extent is suitable habitat provided to maintain a viable population of at-risk mammals including bats?	(I-1) Ecological/habitat conditions including number of Forest opening, snags and den trees and man-made structures (I-2) Population trends – presence and absence of bat species	DC-SCC-9 DC-SCC-11 DC-MUB-1 OBJ-SCC-3	Bat surveys at the Forest Level; State and Range wide population monitoring Partners include the SCDNR and Southern Research Station (Clemson)	Annual surveys are conducted with habitat conditions and population trends reported every two years.	(I-1) Alert: Desired habitat conditions are not being met at locations for at-risk bat species. Response: Monitoring results should disclose the extent to which management activities are responsible for species declines. Develop projects and partnerships to address management, monitoring, and inventory needs. (I-2) Alert: Decline in population trends of at-risk bat species. Response: Develop projects and partnerships to improve conditions for at-risk species.
The status of visitor use, visitor satisfaction, and progress toward meeting recreation objectives					
MQ 20: What are the changes in conditions of Recreation Opportunity Spectrum (ROS) in the Fully Compatible, Inconsistent, or Unacceptable Spectrum (ROS) settings in the Wambaw Zone?	(I-1) Acreage in recreation setting by Recreation Opportunity Spectrum (ROS) in the Fully Compatible, Inconsistent, or Unacceptable conditions using the following key characteristics: * Access * Remoteness * Naturalness * Facilities and site management * Social encounters * Visitor impacts * Visitor management <u>Fully Compatible</u> - Meets desired conditions and no inconsistencies in physical, social, or managerial components of the settings. Settings are to be maintained or improved. <u>Inconsistent</u> - Inconsistencies exist in physical, social, or managerial components of the settings and the consequences of those inconsistencies are a problem for the setting. Consider if management changes can improve or restore the setting by removing the inconsistency. <u>Unacceptable</u> - Unacceptable inconsistency in physical, social, or managerial components of the settings. Determine what management actions are	DC-REC-1 DC-RIZ- Wambaw-2 OBJ-REC-1 OBJ-REC-2	USFS Partnerships with TNC and Long Leaf Pine Alliance	For the first two years of the plan addressing the following questions: a. What is the amount of each ROS class in the Wambaw Zone? What percent of the forestwide objectives are these amounts? b. Describe inconsistencies by ROS class. What is the baseline for inconsistencies? For every two-year period after establishing the baseline, address the following questions: b. What and where are the inconsistencies by ROS class? c. What is the difference in amounts from the last two-year increment and in long term trends? d. What percent of the objectives for the two-year period have been achieved?	Alert: If the amounts in "inconsistent" or "unacceptable" conditions increase then determine the reason for the departure, document and post on the monitoring website. Determine whether to adjust the strategy for obtaining the objectives and post the results of this assessment on the monitoring website. Response: Conduct a review to assess the reasons why recreation settings are not being met, and develop an action plan to address issues and identify solutions.

Monitoring Questions	Indicators	Desired Conditions and Objectives	Sources/Partners	Frequency	Adaptive Management Strategies
	needed to restore the setting by removing the inconsistency.				
MQ 21: What are the changes in conditions of the scenic integrity levels in the Wambaw Zone? Is the rate of restoration affecting the scenic integrity levels in the Wambaw Zone?	<p>(I-1) Acreage of existing scenic integrity levels (ESI) vs desired scenic integrity objectives (SIO) in the High existing scenic integrity, Moderate existing scenic integrity and Low existing scenic integrity conditions.</p> <p><u>High existing scenic integrity</u> - Few to no deviations between existing scenic integrity and the scenic integrity objective.</p> <p><u>Moderate existing scenic integrity</u> - Moderate amount of deviations between existing scenic integrity and scenic integrity objective).</p> <p><u>Low existing scenic integrity</u> - Many deviations between existing scenic integrity and scenic integrity objective</p>	<p>DC-MUB-11 DC-RIZ-Wambaw-2 OBJ-MUB-1</p>	<p>GIS</p> <p>Partnerships with TNC and Long Leaf Pine Alliance</p>	<p>For the first two years of the plan, address the following:</p> <p>a. Map existing scenic integrity (the degree of intactness and wholeness of the landscape character) for the Wambaw Zone.</p> <p>b. Compare ESI and the plan's SIO to determine the acres where the most deviations occur.</p> <p>For every two-year period after establishing the baseline, address the following:</p> <p>a. Compare existing ESI and SIO to determine the acres where the deviations occur.</p>	<p>Alert: If the amounts in "moderate" or "low" conditions increase then determine the reason for the deviation, document and post on the monitoring website.</p> <p>Consider scenic rehabilitation when deviations occur between the baseline ESI and proposed SIO's (see moderate and low ESI).</p> <p>Response: Conduct a review to assess the reasons why ESI is not improving and the SIO's are not being met, and develop an action plan to address issues and identify solutions.</p>
MQ 22: What are the trends in the conditions for sustainable recreation opportunities?	<p>(I-1) Amount of deferred maintenance for recreation infrastructure.</p> <p>(I-2) Amount of high-priority recreation sites meeting national quality standards.</p> <p>(I-3) Number of recreation-related partnerships.</p> <p>(I-4) Increased connections of trails to communities and other trails.</p> <p>Measure the trends in the following conditions:</p> <p><u>Improving trends in key indicators</u> - Meets desired conditions. Several or all key indicators have moderate to large gains. No indicators show large decline.</p> <p><u>Maintaining trend in key indicators</u> - Several key indicators have small gains and some indicators may have small declines.)</p> <p><u>Negative trends in key indicators</u> - Several key indicators have moderate to large declines.)</p>	<p>DC-REC-2 DC-RIZ-Coastal-2 DC-RIZ-Wando-2 DC-RIZ-Wambaw-2 DC-RIZ-Santee-2</p> <p>OBJ-REC-3 OBJ-REC-4 OBJ-REC-5 OBJ-REC-6 OBJ-REC-7 OBJ-RIZ-Wando-1 OBJ-RIZ-Coastal 1</p>	<p>GIS, INFRA, Number of grants and partnership agreements</p> <p>Partnerships with TNC and Long Leaf Pine Alliance</p>	<p>Data collection yearly and reported every 4 year to show trend</p>	<p>Alert: If there are negative trends determine the reason for the trends document and post on the monitoring website. Determine whether to adjust the strategy for obtaining the objectives and post the results of this assessment on the monitoring website.</p> <p>Response: Conduct a district review to assess the reasons why sustainable recreation indicators are not being met, and develop an action plan to address issues and identify solutions.</p>
MQ 23: What are the trends in customer satisfaction? Are we responding to changes in visitors' needs and use?	(I-1) Recreation use and Satisfaction	<p>DC-REC-1 DC-REC-2 DC-REC-3 DC-REC-4 DC-REC-5 DC-REC-6 DC-MUB-11</p> <p>OBJ-REC-1 OBJ-MUB-1 OBJ-REC-3 OBJ-REC-5 OBJ-REC-6</p>	<p>NVUM Forest level information</p> <p>Some partners and volunteers contribute to current recreation and other programs.</p>	Every 6 years	

Monitoring Questions	Indicators	Desired Conditions and Objectives	Sources/Partners	Frequency	Adaptive Management Strategies
Measurable changes on the plan area related to climate change and other stressors that may be affecting the plan area					
MQ 24: Is climate change, including changes in drought frequency and severity, influencing maintenance and restoration of ecosystems?	(I-1) Trends in climate, including extremes, disturbance patterns, and long-term ecological processes (I-2) Trends in forest health status and risk (I-3) Trends in fire return intervals and seasonality (I-4) Status and trend of isolated wetlands (I-5) Status of Frosted Flatwood Salamander Habitat (I-6) Focal Species: Longleaf Pine, Red-cockaded Woodpeckers, Bachman Sparrow, Pitcher plants and American Eel	DC-THR-2	Region 8 Broad Scale Monitoring Strategy (I-1) NOAA – State of the Climate Reports/NOAA - U.S. Climate Extremes Index/ NOAA - Severe Weather Data Inventory/South Carolina Drought Response Committee/Remote Sensing and Change Detection Products (e.g., ForWarn) (I-2) FHETET Forest Pest Conditions/FHETET National Insect and Disease Risk Map/University of Georgia - Center For Invasive Species and Ecosystem Health - Early Detection & Distribution Mapping System (see MQ 17) (I-3) Monitoring Trends in Burn Severity (MTBS) (see MQ 28) (I-4) NRCS Groundwater Monitoring (see MQ 7) (I-5) see MQ 14 (I-6) see MQ 12	Every 6 years	(I-1) Alert: Increasing trends in frequency /magnitude of climate extremes and related disturbance, Response: Strengthen disturbance response capabilities and assess implications during project development, (I-2) Alert: NNIS introductions/increases in forest health risk, Response: Rapid detection and treatment, (I-3) Alert: Inability to meet desired fire return intervals, Response: Adjust prescribed burning schedules and take advantage of desirable conditions, (I-4) Alert: Wood encroachment/changes in hydrology, Response: Vegetation management if feasible/ hydrologic restoration, (I-5) Alert: Habitat degradation or loss due to climate influences, Response: Promote amphibian habitat through placement of coarse woody material piles and other features that retain moisture during dry periods, (I-6) Alert: Declines attributable to climate influences Response: See species specific adaptive management strategies
MQ 25: How is sea level rise influencing the ecosystems and related management in the margin of change?	(I-1) Changes in condition/extent of systems in the margin of change: broad forested swamps, large river floodplain forested ecosystems, maritime forests, salt marsh ecosystems and depressional wetlands (I-2) Trends in sea level rise and land cover changes (I-3) Trends in salinity (specific conductance) in surface water (rivers and streams) or groundwater (aquifers) (I-4) Hydrologic connectivity (I-5) External hydrologic influences (Santee Cooper release management, Cooper River dredging, sand mining)	DC-THR-3	Region 8 Broad Scale Monitoring Strategy (I-1)Pulse Plots/ Cape Romain National Wildlife Refuge – Monitoring Program/Baruch Institute (see MQs 9, 10 and 11) (I-2) NOAA - Tides and Currents: Sea Level Rise Trends/Sea Level Rise Affecting Marshes Model (SLAMM)/SCDHEC (I-3) USGS Stream Gauges/SRS Santee Experimental Forest/NRCS Groundwater Monitoring (I-4) see MQs 1 and 2	Every 6 years	(I-1) Alert: Declining health of bald cypress (check for salinity above 2PPT)/acceleration of coastal marsh erosion/Changes in ecological classification, Response: Coordinate with Cape Romain NWR on monitoring, land transfer, and management strategies, (I-2) Alert: Rate of sea level rise increases above 2mm/year long-term average, Response: Examine land-cover impacts based on accelerated sea level rise rate. (I-3) Alert: Detection of increasing levels of salinity in areas of historically low salinity, Response: Hydrologic restoration and coordination of water releases,

Monitoring Questions	Indicators	Desired Conditions and Objectives	Sources/Partners	Frequency	Adaptive Management Strategies
			(I-5) Army Corps of Engineers/SCDHEC		<p>(I-3) Alert: Changes in salinity of drinking water from either surface water (rivers and streams) or groundwater (aquifers) withdrawals,</p> <p>Response: Examine land-cover impacts based on increased salinity levels,</p> <p>(I-4) Alert: Presence of hydrologic modifications that are clearly impeding sediment transport and marsh accretion processes,</p> <p>Response: Restore hydrologic connectivity where feasible to support marsh accretion,</p> <p>(I-5) Alert: Attribution of salinity encroachment to external hydrologic influence</p> <p>Response: Work with Santee Cooper on water release strategy to maintain minimum flows (especially during drought/low flow events) to minimize intrusion/Evaluate potential role of hydrologic modification</p>
MQ 26: Is the Francis Marion a sink or a source of carbon?	(I-1) FIA derived carbon status and trend reports	DC-THR-2	Region 8 Broad Scale Monitoring Strategy (I-1) FIA derived carbon status and trend reports	Every 6 years	
Social, economic, and cultural sustainability must also be addressed in the monitoring program					
MQ 27: Are communities gaining benefits from the Forest and adding to the Forest's cultural uniqueness?	(I-1) Number and type of education and youth programs (I-2) Number of recreation-related partnerships. (I-3) Number of volunteers. (I-4) Number of youth participating in various forest education and youth programs including employment.	DC-THR-4 DC-COM-3 DC-COM-4 DC-RIZ-Coastal-2 DC-RIZ-Wando-2 DC-RIZ-Wambaw-2 DC-RIZ-Santee-2 OBJ-COM-1 OBJ-REC-4 OBJ-REC-7 OBJ-RIZ-Wando-1 OBJ-RIZ-Coastal 1	Region 8 Broad Scale Monitoring Strategy INFRA, GIS, FSVEG, NVUM - Forest level PAO, Partnership Coordinator, Social Scientist	Every 4 years	
MQ 28: Are the fire regime condition class (FRCC) maintenance and restoration, vegetative conditions within or near historical range, resulting in reduced risks of wildfire	(I-1) Acres in FRCC 1, 2 and 3	DC-COM-2 OBJ-COM-2 OBJ-MA2-1	FSVEG spatial; Rx fire history, All activities that are ground disturbing Partners include counties, state, local and NGOs on community wildfire protection plans. Specifically Nature Conservancy, South Carolina Forestry	Every 2 years	<p>Alert: Negative trend in FRCC (i.e.) from FRCC 1 to FRCC 2 or FRCC 2 to FRCC 3); Higher composite FRCC number for communities;</p> <p>Response: Identify where and why negative trends are occurring.</p>

Monitoring Questions	Indicators	Desired Conditions and Objectives	Sources/Partners	Frequency	Adaptive Management Strategies
to developments, private property and Forest Service infrastructure in interface and intermix areas?			Association and Local Fire Departments		
MQ #29 What are the trends in the condition of cultural resources and heritage assets? Are disturbances declining?	(I-1) Condition of cultural resources (i.e., benign neglect) (I-2) Disturbed or damaged cultural resources by human and/or environmental (I-3) Sea Level Rise (see MQ 25)	DC-MUB-2 OBJ-MUB-4 OBJ-MUB-5 OBJ-RIZ- Coastal –S-2 OBJ-RIZ- Coastal –S3 OBJ-RIZ- Wambaw –S1	INFRA heritage module - Annual Heritage Program Managed to Standard Measure	Once every 5 years for Priority Heritage Assets and reported at the 6 year monitoring reporting period. As needed for Heritage Assets.	(I-1,I-2) Alert: Damage to cultural resource Response: Condition assessment is needed (I-3) Alert: Sea level rise approaching lowest depth of historic cultural deposits Response: Tribal consultation and treatment of adverse effects.
MQ 30: What assistance has been provided to counties for developing and implementing mitigation and protection in county-wide community wildfire protection plan (CWPP) for Berkeley County and one county-wide CWPP for Charleston County	(I-1) Counties providing technical and monetary assistance (i.e. agreements or other instruments). This includes needing to know acres treated and location to infrastructure.	DC-COM-2 OBJ-COM-3	Government-local and county SC Forestry Association Non-government organizations (NGOs) Local fire departments,	Every 2 years	Alert: No CWPPs are being completed Response: Do a CWPP equivalence including identifying areas of high risk for wildfire.
MQ 31: For recreation sites and trail planning is the Forest initiating a collaborative, partner-backed recreation planning process with outcomes that include connections from the East Coast Greenway to the Palmetto Trail and Tuxbury Trail Systems?	(I-1) Number of partners engaged in collaborative planning for recreation.	DC-REC-2 DC-REC-3 DC-REC-4 DC-COM-3 OBJ-REC-3 OBJ-REC-6 OBJ-REC-7 OBJ-RIZ-Wando-1	USFS Partnerships, including Palmetto Conservation Foundation, CORA, Friends of Sewee, USFWS.	Every 3 years and reported at the 4 year monitoring reporting period.	
Progress toward meeting the desired conditions and objectives in the plan, including providing for multiple use opportunities.					
MQ 32: Are habitat conditions provided for a harvestable level of game species?	(I-1) Acres of early successional habitat for deer and Bobwhite quail and late successional habitat for turkey; (I-2) Population trends – presence and absence of quail and turkey	DC-MUB-1 OBJ-MUB-2	Surveys at the Forest Level including the following: 1) Spring breeding bird surveys for quail and turkey, 2) Summer brood surveys done in conjunction with SCDNR, 3)	Annual surveys are conducted. Report every two years.	Alert: Decline in habitat and/or population for 4 consecutive years. May be delayed 1-3 years because of the data gap between years. The data is already a year-old in most cases before we can see a need for change.

Monitoring Questions	Indicators	Desired Conditions and Objectives	Sources/Partners	Frequency	Adaptive Management Strategies
	(I-3) Population trends – presence and absence of deer.		Bobwhite quail whistling cock surveys, and 4) Deer spotlight surveys. State and Range wide surveys including harvest surveys by the SC DNR. Partners include SCDNR		Response: Determine source of population and/or habitat decline, develop appropriate management actions. Contact partners and initiate sessions to see if similar trends are occurring. Maybe a need for a harvest change and not a habitat;
MQ 33: In mixed pine/hardwood or loblolly pine forests, what is the young-age forest component in Management Area 2?	(I-1) Acres of young age (0-10 years) forest component.	DC-MA 2-1 OBJ-MA2-2	FS Veg Spatial	Every 2 years	Alert: Less than half of objective OBJ-MA2-2. Response: Review of causes of why the objective is not being met and develop an appropriate response
MQ 34: What is the trend in the density of pine stands resulting from ecosystem restoration, hazardous fuel reduction, and timber management?	(I-1) Acres of thinning harvest sold.	DC-ECO-2 DC-ECO-3 DC-ECO-6 DC-MA2-1 OBJ-THR-1 OBJ-MUB-7	Annual Timber Sale Records	Every 2 years	Alert: Presence of stands in a high density condition. Response: Prioritize high density stands for thinning
MQ 35: To what extent have fishing ponds been enhanced to provide for the desired game fish populations and recreational fishing opportunities?	(I-1) Fish species presents and abundance. (I-2) Water quality (I-3) Acres of habitat improved	DC-REC-6 OBJ-MUB-3	USFS	(I-1) Water quality – annual (I-2) Population monitoring – annual (I-3) Acres of habitat improved – every two years	
MQ 36: Is wilderness character being preserved in designated wilderness areas?	(I-1) Refer to specific wilderness performance elements (these are specific to each wilderness)	DC-RIZ- Wambaw-S-1	GIS, INFRA, FSVEG and other Forest databases depending on performance measure	Annual	
MQ 37: Are Wild and Scenic River ORVs and free flowing rivers being maintained?	(I-1) Monitor project level planning and implementation within river corridors, (including but not limited to prescribed fire, maintenance of trails and recreation of facilities, restoration of native communities, control of NNIS, etc.)	DC-RIZ-Coastal-S-2 DC-RIZ- Wambaw-S-3 DC-RIZ-Santee-S-2	Ground sampling and NEPA, and FACTS, FSVEG	Every three years and reported at the 4 year monitoring reporting period	
MQ 38: To what extent is the National Forest Transportation System moving toward a sustainable and properly sized system; that provides public and administrative access for visitor enjoyment and forest management; and	(I-1) Open Road Mileage and Density (I-2) Deferred Road Maintenance	DC-MUB-3 OBJ-MUB-6	INFRA Database and Forest Map, TAP and Institutional knowledge,	Every 5 years reassess the road conditions and report at the 6 year monitoring reporting period.	

Monitoring Questions	Indicators	Desired Conditions and Objectives	Sources/Partners	Frequency	Adaptive Management Strategies
minimizes adverse resource effects?					
MQ 39: What are the trends in air quality and acidic deposition on the National Forest? Are conditions improving?	(I-1) Fine Particulate Matter (I-2) Acidic Deposition (I-3) Ozone	DC-MUB-6	EPA Air Data, EPA CASTNET, National Atmospheric Deposition Program (NADP), IMPROVE monitoring network Partners include: EPA USFWS National Park Service	Annual and report every 2 years.	(I-1) Alert: Measured values of particulate matter and ozone do not meet the National Ambient Air Quality Standards. Response: Work with EPA and state regulatory agencies to ensure that the state implementation plan adequately reduces pollution impacting the forest. (I-2) Alert: Acidic deposition on and near the Forest is increasing. Response: Do water quality and soil surveys to determine potential impacts and develop possible management strategies. If surveys further verify acidic deposition then work with EPA on development of secondary air quality standards to reduce impacts.
MQ 40: How does the Francis Marion NF fit in the broader landscape, including measures of landscape connectivity and success towards shared restoration objectives?	(I-1) South Atlantic Landscape Conservation Cooperative - Conservation Blueprint Indicators (I-2) Lands acquired and exchanged	DC-COM-1 OBJ-COM-4	(I-1) South Atlantic Landscape Conservation Cooperative - Conservation Blueprint (I-2) Land Ownership Adjustment Strategy (LOAS)	(I-1) Every 6 years (I-2) Every 4 years	
The effects of each management system to determine that they do not substantially and permanently impair the productivity of the land (16 USC 1604(g) (3) (C).					
MQ 41: Are BMP's for water quality being planned and implemented properly?	BMP's	Legal requirement (Addressed by standards and guidelines)	National Best Management Practices for Water Quality Management on National Forest System Lands Database	Annual	Alert: Any instance where there is non-compliance with BMP's for water quality. Response: Use and IDT approach, consider how finding from one site compares to another. Review the entire process to find any deficiencies or recurring problems that may be addressed through adaptive management.
MQ 42: What is the extent of detrimental soil disturbance from ground disturbing activities and is this less than 15 percent limit?	Soil Disturbance	DC-WAT-3	Forest Soil Disturbance Monitoring Protocol Database	Annual	Alert: When detrimental soil disturbance thresholds are exceeded.

Appendix A: Ecosystems of the Francis Marion

Throughout the forest plan, desired conditions ensure the ecological integrity of three terrestrial upland ecosystems, six riparian/wetland/terrestrial mix ecosystems, and one aquatic ecosystem that have been identified for the Francis Marion National Forest.

The NatureServe Ecological System classification was consulted initially to identify native ecosystems that occur on the Francis Marion National Forest (NatureServe, 2012). Much variation can occur within these ecosystems as habitats, plant associations, and riparian areas. Ecosystems were mapped on the Forest by Simon and Hayden (2014) at the scale of landtype and landtype phase, consistent with the National framework of ecological units developed by the Forest Service of the U.S. Department of Agriculture in 1993 (Cleland et.al., 1997), using LiDAR hillshade imagery, soils, geology, FS stands data, and vegetation sampled from over 1000 locations. This mapping is an approximation. Field judgment of the applicable ecosystem will be used to select the appropriate desired conditions. Associated structure and disturbance regimes for ecological systems considered descriptions from NatureServe (2012), local and expert knowledge, and relevant biophysical setting descriptions from LANDFIRE ([LANDFIRE Program: Home](#)). Some of the finer detail associated with small streams and associated riparian areas could not be separated out at these scales.

Table A-1. Ecosystems on the Francis Marion National Forest

Ecosystems	NatureServe Ecological Systems
DC-ECO-2. Upland Longleaf Ecosystems and Loblolly Pine Woodlands DC-MA2-1. Mixed Pine/Hardwood or Loblolly Pine¹	Atlantic Coastal Plain Upland Longleaf Woodland
DC-ECO-3. Wet Pine Savanna and Flatwoods DC-MA2-1. Mixed Pine/Hardwood or Loblolly Pine¹	Southern Atlantic Coastal Plain Wet Pine Savanna and Flatwoods
DC-ECO-4. Depressional Wetlands and Carolina Bays DC-MA2-2. Depressional Wetlands, Carolina Bays and Pocosins¹	Atlantic Coastal Plain Clay-based Carolina Bay Wetland; Southern Atlantic Coastal Plain Depression Pond
DC-ECO-5. Pocosins DC-MA2-2. Depressional Wetlands, Carolina Bays and Pocosins¹	Atlantic Coastal Plain Peatland Pocosin and Canebrake; Streamhead Seepage Swamp, Pocosin, and Baygall
DC-ECO- 6. Oak Forests and Mesic Hardwood Forests	Southern Atlantic Coastal Plain Dry and Dry-Mesic Oak Southern Coastal Plain Mesic Slope Forest
DC-ECO-7. Narrow Forested Swamps and Blackwater Stream Floodplain Forests DC-MA2-3. Narrow Forested Swamps and Blackwater Stream Floodplain Forests	Southern Atlantic Coastal Plain Nonriverine Swamp and Wet Hardwood Forest; Atlantic Coastal Plain Blackwater Stream Floodplain Forest; Small Blackwater River Floodplain Forest
DC-ECO-8. Broad Forested Swamps and Large River Floodplain Forested Ecosystems	Southern Atlantic Coastal Plain Nonriverine Swamp and Wet Hardwood Forest; Southern Coastal Nonriverine Basin Swamp; Southern Atlantic Coastal Plain Large River Floodplain Forest; Southern Atlantic Coastal Plain Tidal Wooded Swamp
DC-ECO-9. Maritime Forests and Salt Marsh	Central Atlantic Coastal Plain Maritime forest; Southern Atlantic Coastal Plain Salt and Brackish Marsh;

Ecosystems	NatureServe Ecological Systems
	Southern Atlantic Coastal Plain Fresh and Oligohaline Tidal Marsh
DC-ECO-10. Rivers and Streams (aquatic lotic systems)	The NatureServe Ecological System Classification does not address aquatic ecosystems

¹ The desired conditions for these ecosystems apply where frequent, low intensity fire cannot be managed across the landscape in Management Area 2. If circumstances change where frequent fire can be applied then the desired conditions for Management Area 1 apply.

Appendix B: Timber Analysis

This appendix describes the analysis of lands suitable and not suitable for timber production, the quantity of timber that may be harvested from the Forest, and probable methods of forest vegetation management.

Suitability for Timber Production

During forest land management planning, the Forest Service is required to identify lands not suited for timber production (36 CFR 219.11). See Table B-1 and Figure B-1.

Table B-1. Lands suitable and unsuitable for timber production

Classification	Approximate Acres
Total National Forest System Lands	259,625
Nonforest lands	
Water and marsh	817
Brush	6,757
Wildlife openings	555
Rights-of-way	126
Administrative sites	20
Developed recreation sites	80
Borrow pits	6
Cemeteries	6
Lands Withdrawn From Timber Production	
Wilderness areas	13,649
Guilliard Lake Research Natural Area	23
Lands That May be Suitable for Timber Production	237,586
Lands where timber production is not compatible with achieving desired conditions and objectives (lands not appropriate for timber production.)	43,563
Santee Experimental Forest	5,966
Recommended Wilderness	
Pond pine forest types	6,132
Riparian management zones (w/in 100' of perennial waterbodies or within 50' of intermittent waterbodies)	21,401
Inventoried roadless area	1,394
Red-cockaded woodpecker clusters	6,481
Genetic resource management area (seed orchard)	673
Special uses	18
Cedar Hill Island	802
Guilliard Lake Scenic Area	1,054
Battery Warren Historic Area	74
Lands Suitable for Timber Production	194,023
Lands Not Suitable for Timber Production	65,602

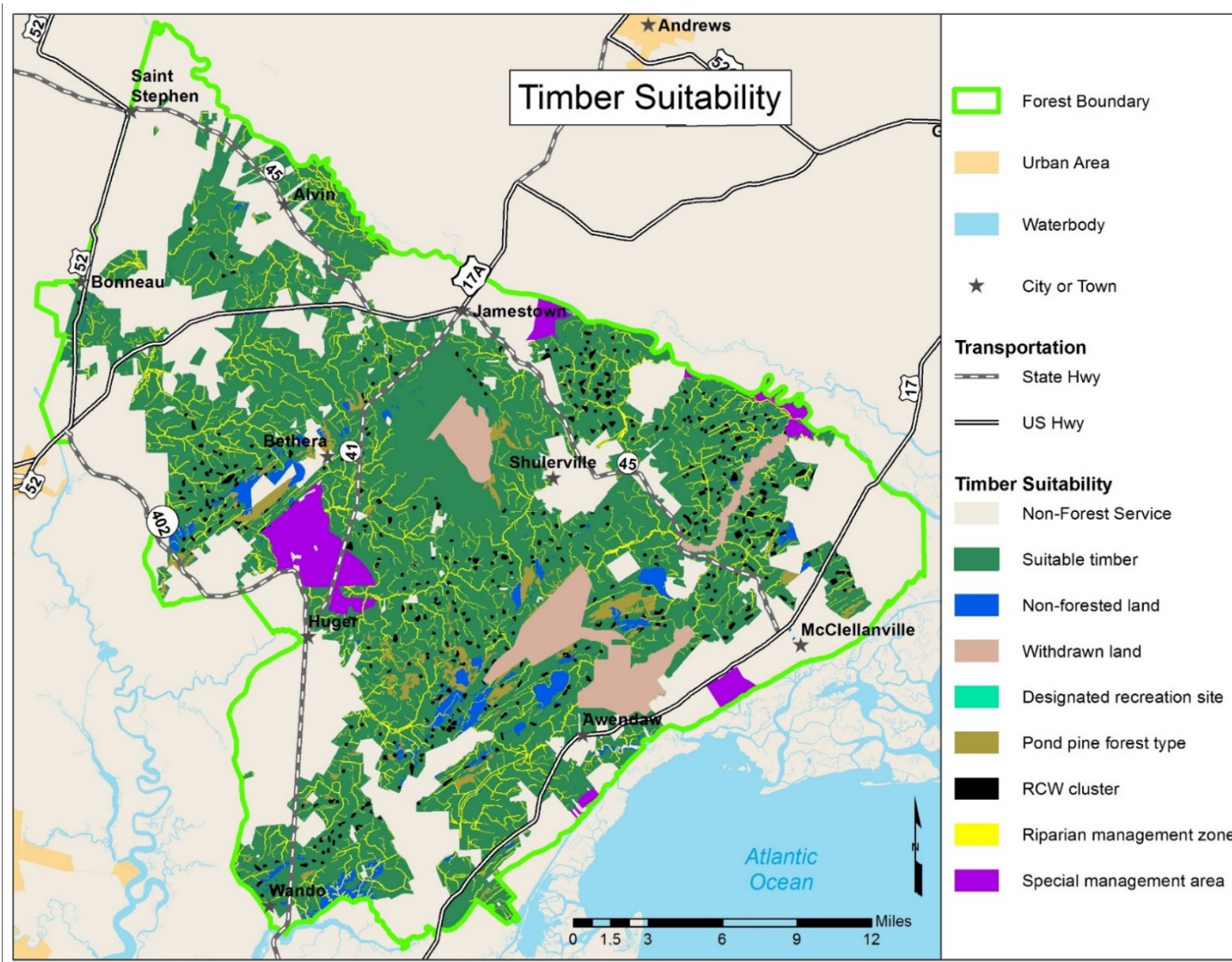


Figure B-1. Timber suitability

The status of land as suitable for timber production does not mean that timber production is the primary purpose of management on those lands. It means that timber production is compatible with the achievement of desired conditions and objectives established by the plan for those lands (36 CFR 219.11(a)(1)(iii)), and some regular flow of timber products may be expected.

Following is discussion of several specific areas that are either designated in the plan or addressed in the plan.

In frosted flatwoods salamander designated critical habitat, the desired condition is fire maintained, open canopy longleaf pine habitat. Trees grow through the years, their crowns expand, and younger trees come into the forest. Gradually the density of trees exceeds the desired open canopy condition. Periodic timber harvest helps reduce this density to maintain an open canopy and provide enough light for a herbaceous understory and for young longleaf pine to eventually replace the older trees in the forest. For these reasons timber production is compatible with this desired condition.

The same is true for most rare plant communities. These fire-adapted species need a fire-maintained open-canopy longleaf pine overstory, which requires some form of timber management to maintain the open canopy.

For RCW, nesting clusters were not considered suitable for timber production, but foraging habitat was considered suitable for timber production. Similar to the rare plant communities, RCW need a fire-maintained open-canopy longleaf pine overstory. As described above, regular planned harvest entries are needed to create and maintain the desired habitat conditions.

The intent with the semi-primitive areas is to gate the roads accessing the area to provide the semi-primitive motorized recreation experience. The desired condition is otherwise the same for the vegetation in this area. It is in Management Area 1, and an open canopy longleaf pine forest is generally the desired condition for the uplands. This area contains red-cockaded woodpeckers. Regular periodic harvest entries are needed to maintain this habitat. This will produce a flow of timber, and the production of timber when meeting the vegetative desired conditions is compatible with this recreation experience.

The Forest Archaeologist has articulated that the desired condition for the historic districts includes maintaining these forests in a managed condition described for the rest of Management Area 2. Regular, planned harvest entries are needed to maintain these desired conditions. Therefore, timber production is compatible with the desired conditions. Harvest operations will take more coordination here than in most places, but timber management is desired to maintain the ecological conditions within these historic districts.

In team discussion about the wild and scenic rivers, the team concluded that they have maintained their outstandingly remarkable values while being managed for the last 70 or 80 years in a way similar to what is proposed. Wambaw Creek is in the middle of a wilderness, so it is not suitable for timber production. National Forest lands near the other eligible rivers are suitable for timber production, at least in the context of eligibility for wild, scenic or recreational river status, because the desired condition of the surrounding lands include a component of young age forest. Creating this young age component is most readily achieved with regular, planned harvest entries. The same is true for maintaining desired stand densities described in many of the desired conditions.

The outcome of the team discussion on the Ion Swamp special area was that it should be managed like the remainder of the Forest and not be maintained as a special area.

Desired conditions for old growth are not expected to affect acres suitable for timber production. All of the 1) upland longleaf pine and 2) flatwoods and wet-pine savanna ecosystems will be managed so that the older trees will be at least 120 years old, as recommended in the 2003 revision of the Recovery Plan for the Red-cockaded Woodpecker. In time, most of these longleaf pine types in MA1 should have old growth conditions, even though they are managed.

Timber Sale Program

The timber sale program for the Francis Marion National Forest is based on the vegetation management practices envisioned in the desired conditions and objectives described in this revised forest plan. Sustained yield limit calculations, timber scheduling and changes in vegetation species composition, condition and age were modeled using an excel workbook. Formulas that moved 2014 acres in 10-year increments were entered by vegetation type and age. The formulas accounted for acres modeled to change vegetation types due to restoration treatments. Table B-2 displays the estimated harvest quantities that resulted from modeling plan direction.

Table B-2. Planned timber sale program; decadal volume outputs for 1st and 2nd decade

	First Decade		Second Decade	
	MMCF	MMBF	MMCF	MMBF
Sustained Yield Limit (SYL), Decadal Volume	113.8 MMCF			
Timber Products	Volumes other than salvage or sanitation volumes that meet timber product utilization standards			
Lands suitable for timber production				
A1. Sawtimber	54.1	270.5	72.0	360.0
A2. Other products	44.2		23.1	
Lands not suitable for timber production				
B1. Sawtimber	0	0	0	0
B2. Other products	0		0	
Projected Timber Sale Quantity (PTSQ) (A1+A2+B1+B2)	98.3	270.5	95.1	360.0
Other Estimated Wood Products	Fuelwood, biomass, and other volumes that do not meet timber product utilization standards.			
	MMCF	Tons	MMCF	Tons
Fuelwood	0.3	9,900	0.3	9,900
Projected Wood Sale Quantity (PWSQ) (C + D)	98.6		95.4	

Timber Modeling and Related Notes

Following are notes on the assumptions used in modeling the timber outputs for the forest plan. It is important to recognize, however, that this forest plan does not make decisions on silvicultural systems. Those decisions are made at the project level. Plan direction in desired conditions and objectives drive project decisions. Modeling assumptions do not. Also bear in mind that while ecological systems have been mapped, this mapping is an imperfect approximation. Field

verification and judgement of the applicable ecosystem will be used to select the appropriate desired conditions.

In modeling the desired conditions, the primary first decade needs for harvest are to:

- Convert loblolly pine stands in MA1 to longleaf pine
- Thin pine stands to maintain desired densities
- Regenerate pine stands in MA2

So that the modeled harvest would not exceed sustainable levels, harvest in hardwood and cypress-tupelo stands was deferred in the first decade. The 3 types of harvest described above should probably be priority in most project harvest decisions.

The following paragraphs discuss where uneven-aged management was assumed and rotations assumed for even-aged management. In contrast, desired conditions typically express rotations as a range.

In **MA1 upland longleaf pine**, the assumption was made that loblolly pine age 20 to 50 would be converted to even-aged longleaf pine. Most loblolly pine over age 50 is assumed to be functional longleaf pine ecosystem. Loblolly pine over age 100 was converted to even-aged longleaf pine. For existing longleaf pine, uneven-aged management was assumed once stands reach 120 years of age.

In **MA1 wet pine savannas and flatwoods**, the assumption was made that most loblolly pine stands age 20 to 50 would be converted to even-aged longleaf pine. 30% was assumed to be too wet for planting or immediate conversion. Remaining assumptions are the same as for upland longleaf pine except that 30% of age 100+ loblolly pine stands are assumed to be too wet for prompt conversion and so were modeled as regenerated to loblolly pine.

MA2 mixed pine/hardwood or loblolly pine stands (loblolly pine and longleaf pine in upland longleaf pine systems or wet pine savanna and flatwoods systems) are assumed to be managed on a 60 year rotation.

For:

- Bottomland hardwood types, and
- Loblolly pine in the (1) broad forested swamps and large river floodplain forests, (2) narrow forested swamps and blackwater stream floodplain forests, and (3) oak forests and mesic hardwood forests ecological systems

The assumed rotation age is 100 years. Note that in the 2nd approximation of the Francis Marion ecological systems, there are almost 25,000 acres of loblolly pine stands in the 3 systems just listed. Desired density in these pine stands is 100 ft² of basal area/acre or less.

For *upland hardwoods* a rotation of 100 years is assumed.

For *cypress-tupelo* the assumed rotation is 140 years.

Much of the maritime forest ecological system is currently in loblolly pine plantations. Desired density for these pine stands is 100 ft² of basal area/acre or less. While loblolly pine is a normal component of maritime forests, live oak and other components described in the desired condition should be encouraged and favored until the desired composition of these forests is attained.

Appendix C: Estimated Vegetation Management Practices

Land management planning direction (36 CFR 219.7(f)) states that forest plans will “Contain information reflecting proposed and possible actions that may occur on the plan area during the life of the plan, including: “the proportion of probable methods of forest vegetation management practices expected to be used.” These estimates are displayed in Table C-1.

Table C-1. Estimated vegetation management practices, annual average per decade (acres)

Vegetation Management Practice	1st Decade	2nd Decade
Regeneration Harvest (even- or two-aged)	2,826	1,368
Uneven-aged Management	9	41
Commercial Thinning	1,786	4,334
Site Preparation, Herbicide	2,276	1,015
Site Preparation, Mechanical	456	221
Prescribed Burning, Total	40,000	40,000
Prescribed Burning, Growing Season	16,500	16,500
Invasive Plant Control, Herbicide	2,500	2,500

Appendix D: Francis Marion National Forest – At-risk Species

Table D-1. List of at-risk species on the Francis Marion*

Taxa	Scientific Name	Common Name	Rank
Amphibian	<i>Ambystoma cingulatum</i>	Frosted Flatwoods Salamander	Federally Threatened; Critical Habitat
Amphibian	<i>Lithobates capito</i>	Gopher Frog	Species of Conservation Concern
Amphibian	<i>Pseudobranchius striatus</i>	Dwarf Siren	Species of Conservation Concern
Bird	<i>Aimophila aestivalis</i>	Bachman's Sparrow	Species of Conservation Concern
Bird	<i>Elanoides forficatus</i>	American Swallow-tailed Kite	Species of Conservation Concern
Bird	<i>Haliaeetus leucocephalus</i>	Bald Eagle	Species of Conservation Concern
Bird	<i>Mycteria americana</i>	Wood Stork	Federally Threatened
Bird	<i>Picoides borealis</i>	Red-cockaded woodpecker	Federally Endangered
Fish	<i>Anguilla rostrata</i>	American eel	Species of Conservation Concern
Fish	<i>Acipenser brevirostrum</i>	Shortnose sturgeon	Federally Endangered
Fish	<i>Acipenser oxyrinchus</i>	Atlantic sturgeon	Federally Endangered
Invertebrate	<i>Amblyscirtes alternata</i>	Dusky roadside skipper	Species of Conservation Concern
Invertebrate	<i>Danaus plexippus</i>	Monarch Butterfly	Species of Conservation Concern
Invertebrate	<i>Euphyes berryi</i>	Berry's Skipper	Species of Conservation Concern
Invertebrate	<i>Zale perculata</i>	Okefenokee Zale Moth	Species of Conservation Concern
Mammal	<i>Corynorhinus rafinesquii</i>	Rafinesque's big-eared bat	Species of Conservation Concern
Mammal	<i>Myotis austroriparius</i>	Southeastern myotis	Species of Conservation Concern
Mammal	<i>Trichechus manatus</i>	West Indian Manatee	Species of Conservation Concern
Reptile	<i>Clemmys guttata</i>	Spotted Turtle	Species of Conservation Concern
Reptile	<i>Crotalus adamanteus</i>	Eastern Diamondback Rattlesnake	Species of Conservation Concern
Reptile	<i>Heterodon simus</i>	Southern Hognose Snake	Species of Conservation Concern
Vascular Plant	<i>Agalinis aphylla</i>	Coastal Plain False-foxglove	Species of Conservation Concern
Vascular Plant	<i>Andropogon gyrans</i> var. <i>stenophyllus</i>	Elliott's Bluestem	Species of Conservation Concern
Vascular Plant	<i>Andropogon mohrii</i>	Mohr's Bluestem	Species of Conservation Concern

Taxa	Scientific Name	Common Name	Rank
Vascular Plant	<i>Anthraenantia rufa</i>	Purple Silkyscale	Species of Conservation Concern
Vascular Plant	<i>Asclepias pedicillata</i>	Savanna Milkweed	Species of Conservation Concern
Vascular Plant	<i>Asplenium resiliens</i>	Black-stem Spleenwort	Species of Conservation Concern
Vascular Plant	<i>Burmannia biflora</i>	Northern Burmannia	Species of Conservation Concern
Vascular Plant	<i>Calopogon barbatus</i>	Bearded Grass-pink	Species of Conservation Concern
Vascular Plant	<i>Calopogon multiflorus</i>	Many-flower Grass-pink	Species of Conservation Concern
Vascular Plant	<i>Carex basiantha</i>	Widow Sedge	Species of Conservation Concern
Vascular Plant	<i>Carex crus-corvi</i>	Ravenfoot Sedge	Species of Conservation Concern
Vascular Plant	<i>Carex elliotii</i>	Elliott's Sedge	Species of Conservation Concern
Vascular Plant	<i>Carex granularis</i>	Meadow Sedge	Species of Conservation Concern
Vascular Plant	<i>Carex stricta</i>	Tussock Sedge	Species of Conservation Concern
Vascular Plant	<i>Carya myristiciformis</i>	Nutmeg Hickory	Species of Conservation Concern
Vascular Plant	<i>Chasmanthium nitidum</i>	Shiny Spikegrass	Species of Conservation Concern
Vascular Plant	<i>Cladium mariscoides</i>	Twig-Rush	Species of Conservation Concern
Vascular Plant	<i>Coreopsis integrifolia</i>	Ciliate-leaf Tickseed	Species of Conservation Concern
Vascular Plant	<i>Eryngium aquaticum</i> var. <i>ravenelii</i>	Ravenel's Eryngo	Species of Conservation Concern
Vascular Plant	<i>Eupatorium anomalum</i>	Florida Thorough-wort	Species of Conservation Concern
Vascular Plant	<i>Helenium pinnatifidum</i>	Southeastern Sneezeweed	Species of Conservation Concern
Vascular Plant	<i>Lachnocaulon minus</i>	Small's Bog Button	Species of Conservation Concern
Vascular Plant	<i>Lindera melissifolia</i>	Pondberry	Federally Endangered
Vascular Plant	<i>Listera australis</i>	Southern Twayblade	Species of Conservation Concern
Vascular Plant	<i>Lobelia boykinii</i>	Boykin's Lobelia	Species of Conservation Concern
Vascular Plant	<i>Ludwigia lanceolata</i>	Lance-leaf Seedbox	Species of Conservation Concern
Vascular Plant	<i>Lysimachia hybrida</i>	Lance-leaf Loosestrife	Species of Conservation Concern
Vascular Plant	<i>Lysimachia loomisii</i>	Loomis' loosetrife	Species of Conservation Concern
Vascular Plant	<i>Macbridea caroliniana</i>	Carolina Bird-in-a nest	Species of Conservation Concern
Vascular Plant	<i>Matelea flavidula</i>	Yellow Carolina Milkvine	Species of Conservation Concern
Vascular Plant	<i>Myriophyllum laxum</i>	Piedmont Water-milfoil	Species of Conservation Concern

Taxa	Scientific Name	Common Name	Rank
Vascular Plant	<i>Oxypolis canbyi</i>	Canby's Dropwort	Federally Endangered
Vascular Plant	<i>Platanthera integra</i>	Yellow Fringeless Orchid	Species of Conservation Concern
Vascular Plant	<i>Ponthieva racemosa</i>	Shadow-witch Orchid	Species of Conservation Concern
Vascular Plant	<i>Pteroglossapsis ecristata</i>	Crestless Plume Orchid	Species of Conservation Concern
Vascular Plant	<i>Quercus similis</i>	Bottom-land Post Oak	Species of Conservation Concern
Vascular Plant	<i>Rhynchospora breviseta</i>	Short-bristle Baldrush	Species of Conservation Concern
Vascular Plant	<i>Rhynchospora globularis</i> var. <i>pinetorum</i>	Beakrush	Species of Conservation Concern
Vascular Plant	<i>Rhynchospora harperi</i>	Harper Beakrush	Species of Conservation Concern
Vascular Plant	<i>Rhynchospora oligantha</i>	Few-flowered Beaked-rush	Species of Conservation Concern
Vascular Plant	<i>Rhynchospora pleiantha</i>	Brown Beaked-rush	Species of Conservation Concern
Vascular Plant	<i>Rhynchospora scirpoides</i>	Long-beaked Beaksedge	Species of Conservation Concern
Vascular Plant	<i>Rhynchospora stenophylla</i>	Chapman Beakrush	Species of Conservation Concern
Vascular Plant	<i>Ruellia strepens</i>	Limestone Petunia	Species of Conservation Concern
Vascular Plant	<i>Schwalbea americana</i>	American Chaffseed	Federally Endangered
Vascular Plant	<i>Spiranthes laciniata</i>	Lace-lip Ladies'-tresses	Species of Conservation Concern
Vascular Plant	<i>Sporobolus curtisii</i>	Pineland Dropseed	Species of Conservation Concern
Vascular Plant	<i>Sporobolus pinetorum</i>	Carolina Dropseed	Species of Conservation Concern
Vascular Plant	<i>Tridens chapmanii</i>	Chapman's Redtop	Species of Conservation Concern
Vascular Plant	<i>Triphora trianthophora</i>	Threebirds	Species of Conservation Concern
Vascular Plant	<i>Utricularia macrorhiza</i>	Greater Bladderwort	Species of Conservation Concern
Vascular Plant	<i>Xyris brevifolia</i>	Short-leaved Yellow-eyed Grass	Species of Conservation Concern
Vascular Plant	<i>Xyris difformis</i> var. <i>floridana</i>	Florida Yellow-eyed Grass	Species of Conservation Concern
Vascular Plant	<i>Xyris flabelliformis</i>	Savannah Yellow-eyed Grass	Species of Conservation Concern
Vascular Plant	<i>Xyris stricta</i>	Pineland Yellow-eyed Grass	Species of Conservation Concern

*At-risk Species for the Francis Marion National Forest include federally threatened and endangered, proposed and candidate species, or Species of Conservation Concern known to occur on the Forest.

Table D-2. Species groups and associated ecosystems on the Francis Marion National Forest

Species Group	Ecosystems	Acres
DC-SCC-3 Pine Upland/Wetland Ecotone Associates	DC-ECO-5. Pocosins DC-ECO-7. Narrow Forested Swamps and Blackwater Stream Floodplain Forests	7,200 26,100
DC-SCC-4 Calcareous Mesic Forests Associates	DC-ECO-6. Oak Forests and Mesic Hardwood Forests	4,200
DC-SCC-5 Mesic to Wet Pine Savanna and Flatwoods Associates	DC-ECO-3. Wet Pine Savanna and Flatwoods	58,100
DC-SCC-6 Pond Cypress Associates	DC-ECO-4. Depressional Wetlands and Carolina Bays	6,400
DC-SCC-7 Upland Pine Woodland Associates	DC-ECO-2. Upland Longleaf and Loblolly Pine Woodlands	33,400
DC-SCC-8 Forested Wetland Associates	DC-ECO-7. Narrow Forested Swamps and Blackwater Stream Floodplain Forests	44,200
	DC-ECO-8. Broad Forested Swamps and Large River Floodplain Forests	49,200
DC-SCC-10 River and Streams Associates	DC-ECO-10. Rivers and Streams (aquatic lotic systems)	
At-risk Species Groups that cross Ecosystems:		
DC-SCC-1. Wildlife Stump and Root Mound Associates DC-SCC-2. Wildlife Species Sensitive to Road Use Associates DC-SCC-8 Forest Opening Associates DC-SCC-9. Wildlife Snag and Large Diameter Hollow Tree Associates		

Table D-3. At-risk species groups and associated species

Taxa	Latin Name	Common Name
Pine Upland/Wetland Ecotone Associates (DC-SCC-3 Pine Upland/Wetland Ecotone Associates)		
Bird	<i>Elanoides forficatus</i>	American Swallow-tailed Kite
Insect	<i>Amblyscirtes alternata</i>	Dusky Roadside Skipper
Insect	<i>Danaus plexippus</i>	Monarch butterfly
Insect	<i>Euphyes berryi</i>	Berry's Skipper
Mammal	<i>Corynorhinus rafinesquii</i>	Rafinesque's big-eared bat
Mammal	<i>Myotis austroriparius</i>	Southeastern myotis
Reptile	<i>Crotalus adamanteus</i>	Eastern Diamondback Rattlesnake
Vascular Plant	<i>Andropogon mohrii</i>	Mohr's Bluestem
Vascular Plant	<i>Asclepias pedicillata</i>	Savanna Milkweed
Vascular Plant	<i>Carex elliotii</i>	Elliott's Sedge
Vascular Plant	<i>Coreopsis integrifolia</i>	Ciliate-leaf Tickseed
Vascular Plant	<i>Eupatorium anomalum</i>	Florida Thorough-wort
Vascular Plant	<i>Lysimachia loomisii</i>	Loomis' loosestrife
Vascular Plant	<i>Rhynchospora cephalantha</i> var. <i>attenuata</i>	Small bunched Beak Sedge
Vascular Plant	<i>Rhynchospora oligantha</i>	Few-flowered Beaked-rush
Vascular Plant	<i>Rhynchospora stenophylla</i>	Chapman Beakrush
Calcareous Mesic Hardwood Associates (DC-SCC-4 Calcareous Mesic Forests Associates)		
Vascular Plant	<i>Asplenium resiliens</i>	Black-stem spleenwort
Vascular Plant	<i>Carex basiantha</i>	Widow sedge
Vascular Plant	<i>Carex granularis</i>	Meadow sedge
Vascular Plant	<i>Carya myristiciformis</i>	Nutmeg hickory
Vascular Plant	<i>Listera australis</i>	Southern twayblade
Vascular Plant	<i>Matelea flavidula</i>	Yellow Carolina spinyrod
Vascular Plant	<i>Tridens chapmanii</i>	Chapman's Redtop
Vascular Plant	<i>Triphora trianthophora</i>	Threebirds orchid
Mesic and Wet Pine Savanna Associates (DC-SCC-5 Mesic to Wet Pine Savanna and Flatwoods Associates)		

Taxa	Latin Name	Common Name
Amphibian	<i>Ambystoma cingulatum</i>	Frosted Flatwoods salamander
Amphibian	<i>Lithobates capito</i>	Gopher frog
Amphibian	<i>Pseudobranchius striatus</i>	Dwarf Siren
Bird	<i>Picoides borealis</i>	Red-cockaded woodpecker
Vascular Plant	<i>Agalinis aphylla</i>	Coastal plain false-foxglove
Vascular Plant	<i>Anthraenantia rufa</i>	Purple silkyscale
Vascular Plant	<i>Calopogon barbatus</i>	Bearded grass-pink
Vascular Plant	<i>Calopogon multiflorus</i>	Many-flower grass-pink
Vascular Plant	<i>Carex stricta</i>	Tussock Sedge
Vascular Plant	<i>Chasmanthium nitidum</i>	Shiny spikegrass
Vascular Plant	<i>Cladium mariscoides</i>	Twig-rush
Vascular Plant	<i>Eryngium aquaticum</i> var. <i>ravenelii</i>	Ravenel's Eryngium
Vascular Plant	<i>Lachnocaulon minus</i>	Small's Bog Button
Vascular Plant	<i>Ludwigia lanceolata</i>	Lance-leaf seedbox
Vascular Plant	<i>Lysimachia hybrida</i>	Lance-leaf loosestrife
Vascular Plant	<i>Platanthera integra</i>	Yellow fringeless orchid
Vascular Plant	<i>Rhynchospora breviseta</i>	Short-bristle baldrush
Vascular Plant	<i>Rhynchospora globularis</i> var. <i>pinetorum</i>	Beakrush
Vascular Plant	<i>Sporobolus curtisii</i>	Pineland dropseed
Vascular Plant	<i>Sporobolus pinetorum</i>	Carolina dropseed
Vascular Plant	<i>Xyris brevifolia</i>	Short-leaved yellow-eyed grass
Vascular Plant	<i>Xyris flabelliformis</i>	Savannah yellow-eyed grass
Vascular Plant	<i>Xyris stricta</i>	Pineland yellow-eyed grass
Reptile	<i>Crotalus adamanteus</i>	Eastern Diamondback Rattlesnake
Pond Cypress Savanna Associates (DC-SCC-6 Pond Cypress Associates)		
Amphibian	<i>Ambystoma cingulatum</i>	Frosted Flatwoods salamander
Amphibian	<i>Lithobates capito</i>	Gopher frog
Amphibian	<i>Pseudobranchius striatus</i>	Dwarf Siren

Taxa	Latin Name	Common Name
Reptile	<i>Clemmys guttata</i>	Spotted turtle
Vascular Plant	<i>Andropogon gyrans</i> var. <i>stenophyllus</i>	Elliott's bluestem
Vascular Plant	<i>Anthraenantia rufa</i>	Purple silkyscale
Vascular Plant	<i>Burmannia biflora</i>	Northern burmannia
Vascular Plant	<i>Helenium pinnatifidum</i>	Southeastern sneezeweed
Vascular Plant	<i>Lindera melissifolia</i>	Pondberry
Vascular Plant	<i>Lobelia boykinii</i>	Boykin's lobelia
Vascular Plant	<i>Myriophyllum laxum</i>	Piedmont water-milfoil
Vascular Plant	<i>Oxypolis canbyi</i>	Canby's dropwort
Vascular Plant	<i>Rhynchospora harperi</i>	Harper beakrush
Vascular Plant	<i>Rhynchospora pleiantha</i>	Brown beaked-rush
Vascular Plant	<i>Rhynchospora scirpoides</i>	Long-beaked beaksedge
Vascular Plant	<i>Spiranthes laciniata</i>	Lace-lip ladies'-tresses
Vascular Plant	<i>Utricularia macrorhiza</i>	Greater bladderwort
Vascular Plant	<i>Xyris difformis</i> var. <i>floridana</i>	Florida yellow-eyed grass
Upland Pine Woodland Associates (DC-SCC-7 Upland Pine Woodland Associates)		
Bird	<i>Aimophila aestivalis</i>	Bachman's sparrow
Bird	<i>Picoides borealis</i>	Red-cockaded woodpecker
Insect	<i>Amblyscirtes alternata</i>	Dusky roadside skipper
Insect	<i>Danaus plexippus</i>	Monarch butterfly
Reptile	<i>Crotalus adamanteus</i>	Eastern Diamondback Rattlesnake
Reptile	<i>Heterodon simus</i>	Southern hognose snake
Vascular Plant	<i>Pteroglossapsis ecristata</i>	Crestless plume orchid
Vascular Plant	<i>Schwalbea americana</i>	American chaffseed
Forested Wetland Associates (DC-SCC-8 Forested Wetland Associates)		
Bird	<i>Elanoides forficatus</i>	American Swallow-tailed Kite
Bird	<i>Haliaeetus leucocephalus</i>	Bald Eagle
Bird	<i>Mycteria americana</i>	Wood Stork

Taxa	Latin Name	Common Name
Insect	<i>Zale perculata</i>	Okefenokee Zale Moth
Mammal	<i>Corynorhinus rafinesquii</i>	Rafinesque's big-eared bat
Mammal	<i>Myotis austroriparius</i>	Southeastern myotis
Vascular Plant	<i>Carex chapmanii</i>	Chapman's sedge
Vascular Plant	<i>Carex crus-corvi</i>	Ravenfoot sedge
Vascular Plant	<i>Macbridea caroliniana</i>	Carolina Bird-in-a nest
Vascular Plant	<i>Ponthieva racemosa</i>	Shadowwitch orchid
Vascular Plant	<i>Quercus similis</i>	Bottomland post oak
Vascular Plant	<i>Ruellia strepens</i>	Limestone Petunia
Reptile	<i>Clemmys guttata</i>	Spotted Turtle
River and Stream Associates (DC-SCC-10 River and Streams Associates)		
Fish	<i>Anguilla rostrata</i>	American eel
Fish	<i>Acipenser brevirostrum</i>	Shortnose Sturgeon
Fish	<i>Acipenser oxyrinchus</i>	Atlantic Sturgeon
Mammal	<i>Trichechus manatus</i>	West Indian Manatee
Reptile	<i>Clemmys guttata</i>	Spotted Turtle
Stump and Root Mound Associates (DC-SCC-1 Stump and Root Mound Associates)		
Amphibian	<i>Lithobates capito</i>	Carolina Gopher frog
Reptile	<i>Crotalus adamanteus</i>	Eastern Diamondback Rattlesnake
Wildlife Species Sensitive to Road Use Associates (DC-SCC-2 Wildlife Species Sensitive to Road Use Associates)		
Amphibian	<i>Ambystoma cingulatum</i>	Frosted Flatwoods salamander
Amphibian	<i>Lithobates capito</i>	Gopher frog
Reptile	<i>Clemmys guttata</i>	Spotted Turtle
Reptile	<i>Crotalus adamanteus</i>	Eastern Diamondback Rattlesnake
Reptile	<i>Heterodon simus</i>	Southern hognose snake
Forest Opening Associates (DC-SCC-8 Forest Opening Associates)		
Mammal	<i>Corynorhinus rafinesquii</i>	Rafinesque's big-eared bat
Mammal	<i>Myotis austroriparius</i>	Southeastern myotis

Taxa	Latin Name	Common Name
Wildlife Snag and Large Diameter Hollow Tree Associates (DC-SCC-9 Wildlife Snag and Large Diameter Hollow Tree Associates)		
Mammal	<i>Corynorhinus rafinesquii</i>	Rafinesque's big-eared bat
Mammal	<i>Myotis austroriparius</i>	Southeastern myotis

Appendix E: Maps

Note: Maps begin on the following page.

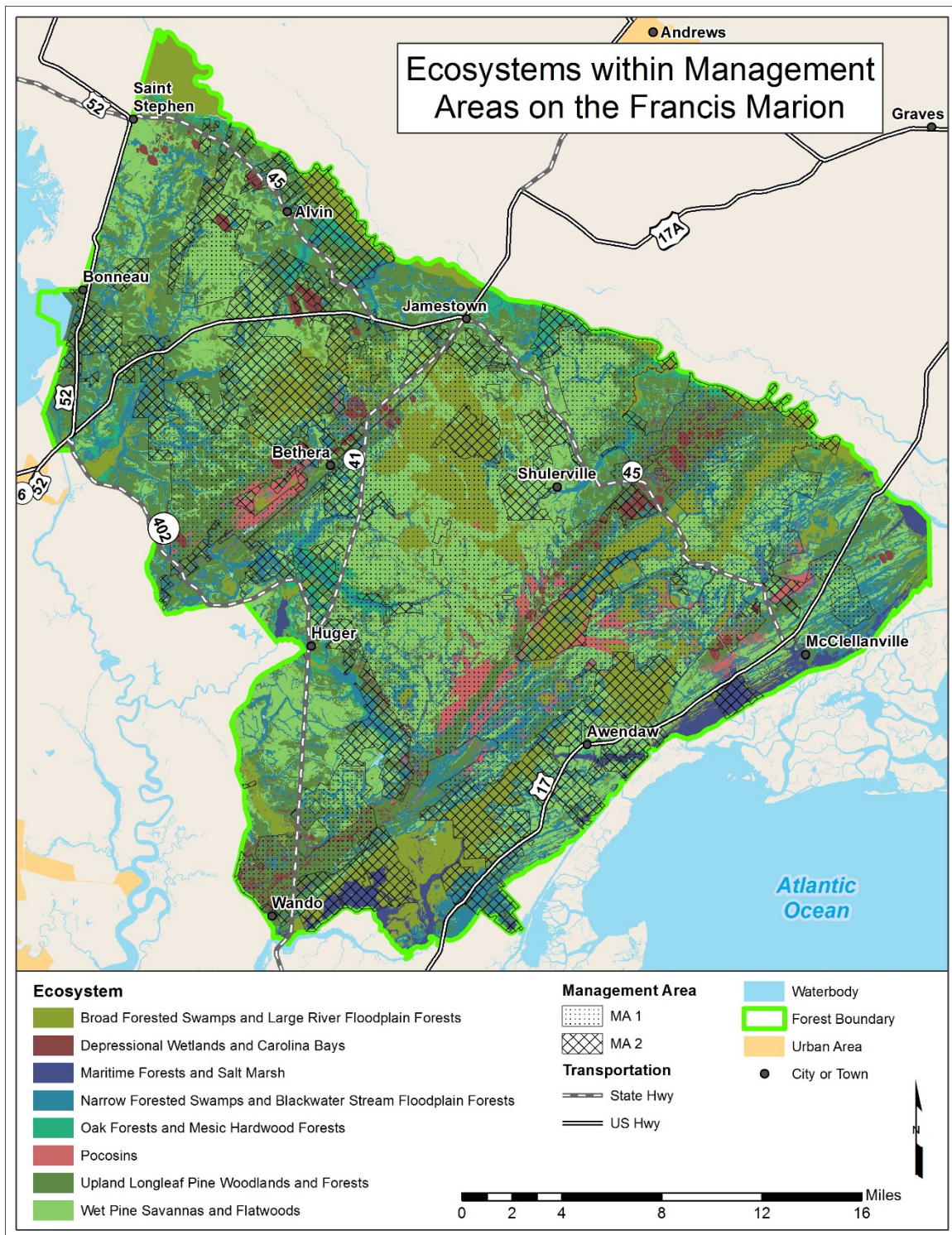


Figure E-1. Ecosystems (except rivers and streams) by management area

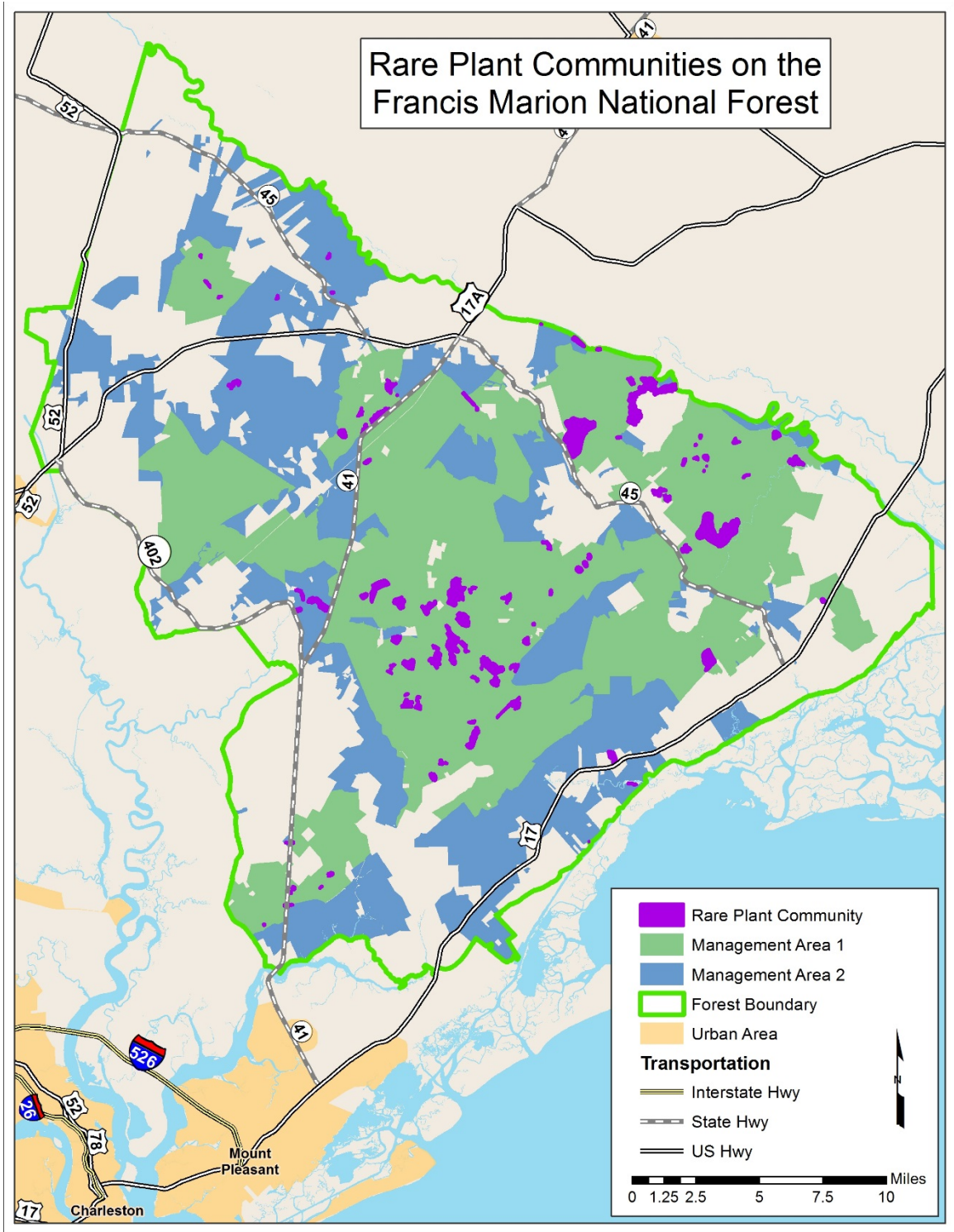


Figure E-2. Rare plant communities on the Francis Marion National Forest

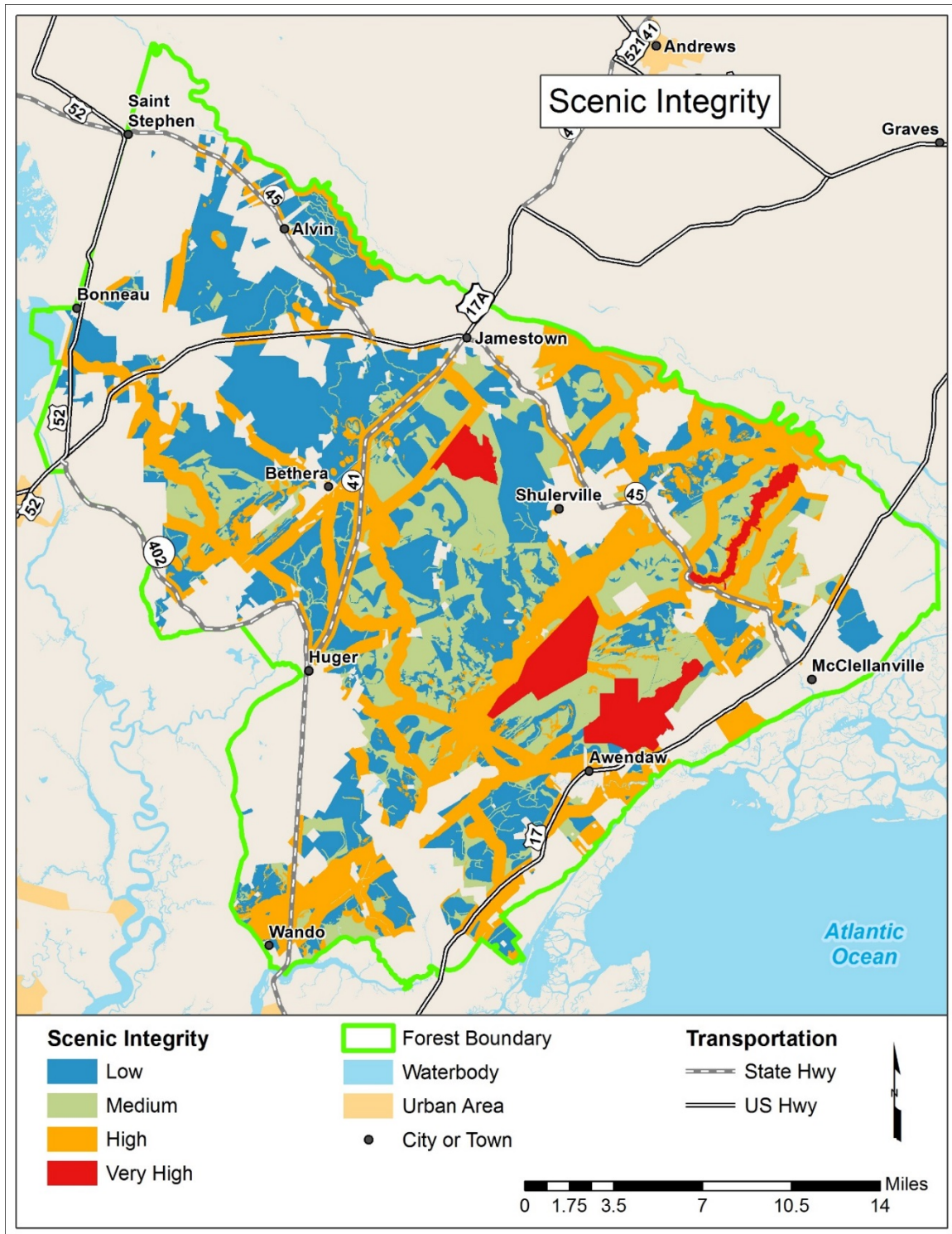


Figure E-3. Scenic integrity map

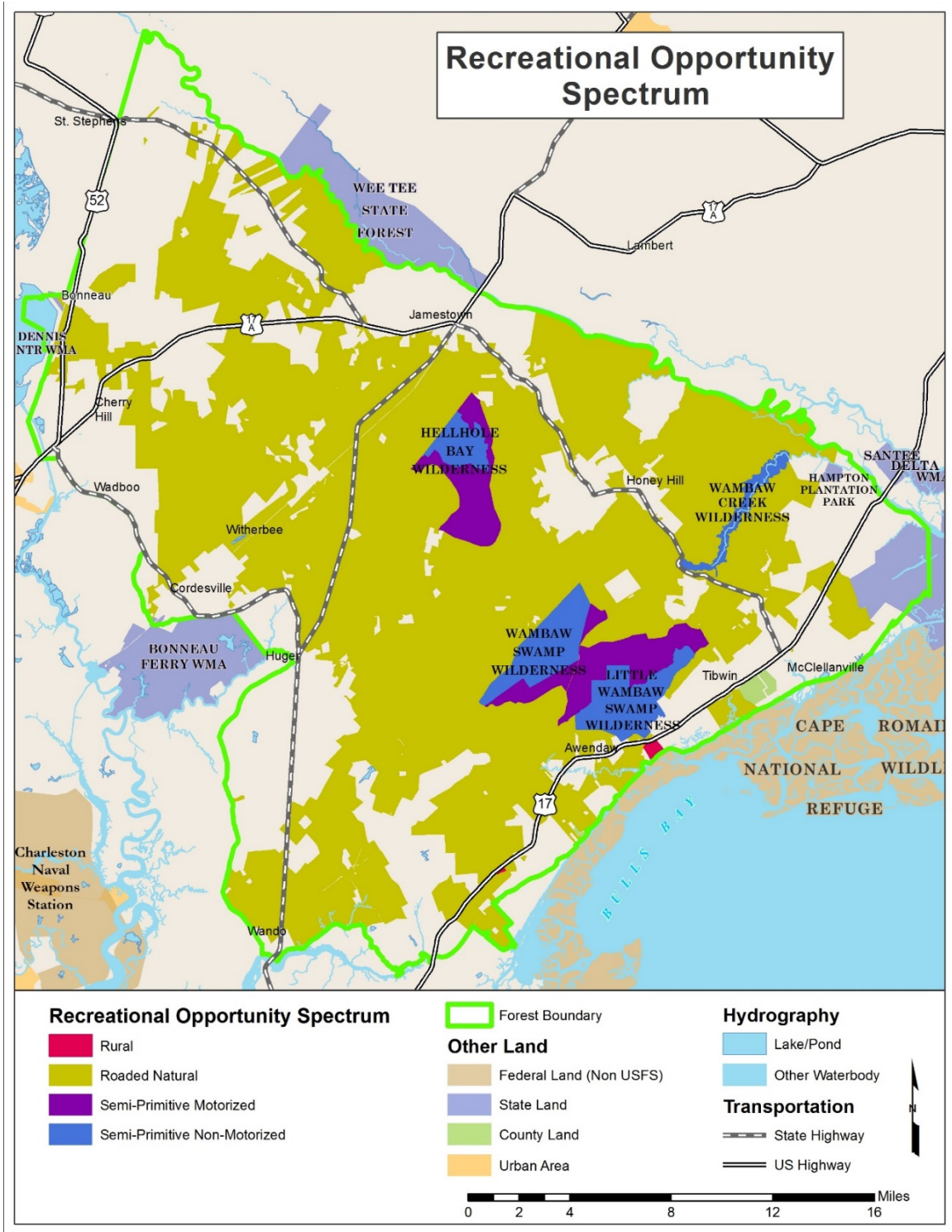


Figure E-4. Recreation opportunity spectrum on the Francis Marion National Forest

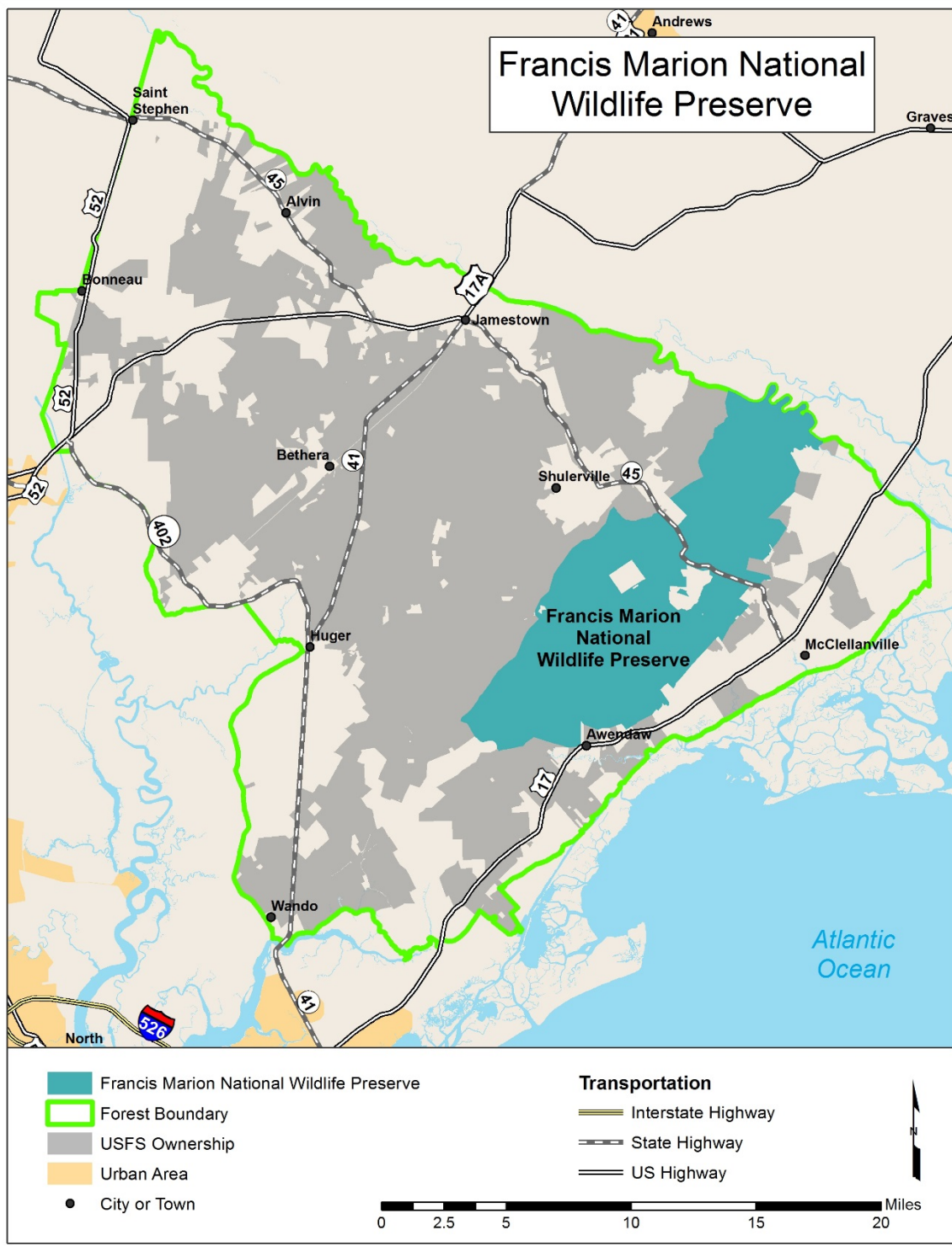


Figure E-5. Francis Marion National Game Preserve on the Francis Marion National Forest

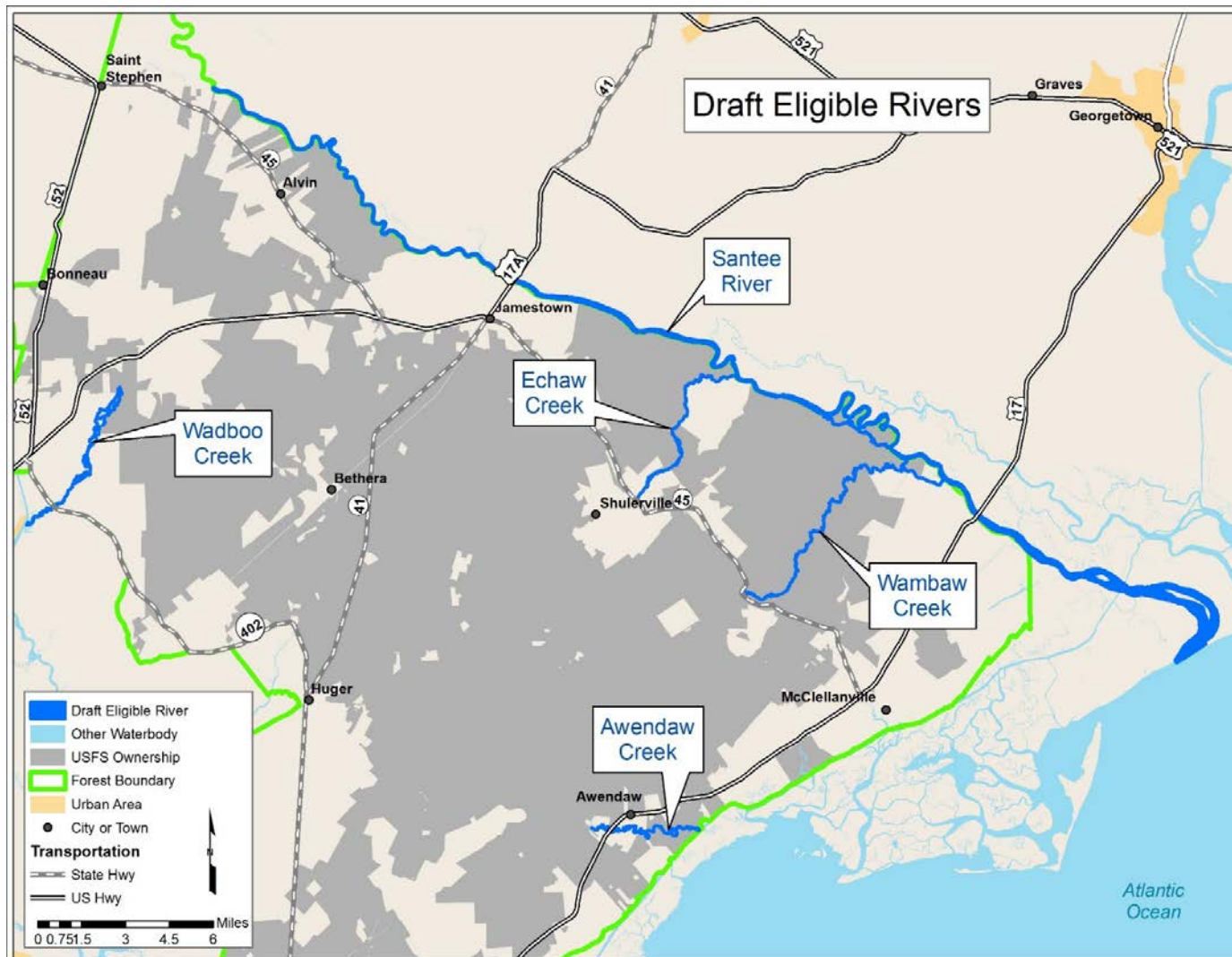


Figure E-6. Map of eligible wild and scenic rivers on the Francis Marion National Forest

Appendix F: Monitoring Criteria, Broad-scale Monitoring and Research Needs

Section I. Criteria for Developing Monitoring Program

The monitoring program was developed using the following criteria:

1. Important for sustainability

- Ecological: The ecosystem status is highly important from a global, state or sub-regional scale and supports the habitat needs for a variety of T/E and Species of Conservation concern.
- Social: Important for sustaining the multiple use of the natural resource or ecosystem service
- Economic: Important for ensuring long term economic stability.

2. Stressors or threats on an ecosystem or social system

- Likelihood that the scope of one or more stressor(s) is widespread with potential severe adverse consequences, or, there are uncertainties about the information and the objective or monitoring tracking could assist with responding to the stressor.

3. Risk of non-attainment of progress toward desired conditions and objectives

- Degree of change would have substantial negative consequences if the objective is not attained. (Conversely the degree of change could have substantial positive consequences if attained)

4. Public Interest/Management Feasibility

- Pursuit of the objective or monitoring tracking has high degree of public interest, broad support and management has the technical and fiscal capability to achieve.

5. Partnering

- One or more partners are willing to commit financial and/or organizational resources to pursue an objective or monitoring item.

6. Ongoing performance

- The objective or monitoring item reflects a long-term commitment that is relevant to ecological or social sustainability.

The monitoring questions listed in Chapter 5 meet each of these six criteria to some degree. This is further documented in the process record titled Screening Criteria by Monitoring Question.

Section II. Broad Scale Monitoring

Some monitoring needs benefit from a perspective that is at scales larger than the Francis Marion National Forest. This is justified on the basis that some questions are more efficiently addressed for multiple national forests at the same time and that some issues are more meaningful at larger

scales. To support needs of this kind, the 2012 Planning Rule requires that Regional Foresters develop broad-scale monitoring strategies (219.12 (b)).

Broad scale monitoring questions that address applicable forest level monitoring questions are also included in Table F-1.

Table F-1. Region 8 broad scale monitoring questions

Broad Scale Monitoring Questions	Forest level Monitoring Questions
What changes are occurring in the social, cultural, and economic conditions in the areas influenced by management units in the region?	MQ 27
How has climate variability changed and how is it projected to change across the region? How is climate variability and change influencing the ecological, social, cultural, and economic conditions and contributions provided by plan areas in the region?	MQ 24
How has climate variability changed and how is it projected to change across the region?	MQ 25
What effect do management units in the region have on a changing climate?	MQ 26

Section III. Monitoring System or Research Need

This section identifies areas where new protocols, procedures, systems of organization, or research that may be needed to address a monitoring question.

MQ 40 How does the Francis Marion NF fit in the broader landscape, including measures of landscape connectivity and success towards shared restoration objectives?

- Regional system for measuring and applying blueprint findings developed by the South Atlantic Landscape Conservation Cooperative (SALCC). The blueprint is cross-boundary, cross-organization plan that prioritizes areas for shared conservation action in the South Atlantic.

MQ 23 What are the trends in customer satisfaction? Are we responding to changes in visitors' needs and use?

- Regional system for intensifying NVUM.
- Regional system for relating NVUM with socio-economic influences.

MQ 24 Is climate change, including changes in drought frequency and severity, influencing maintenance and restoration of ecosystems, including the ability to maintain desired fire return intervals?

- Regional system for delivery and supporting evaluation of climate trend information (e.g., TACCIMO), including alerts when new information is available or trends are detected.
- Regional ecosystem status and trend reporting system based on intensified FIA sampling.
- System for evaluating patterns and trends in prescribed burning based on MTBS and corporate data.
- Regional system for evaluating trends in focal species.

MQ 25 How is sea level rise influencing the ecosystems and related management in the margin of change?

- Improved sea level rise impacts modeling (SLAMM) and other decision support science related to sea level rise impacts and coordination with partners. For example, the Southeast Climate Science Center is developing science resources to guide coastal refuge management on Cape Romain that should be evaluated and applied where appropriate.

Appendix G: Acronyms and Definitions

Acronyms

ACP ~ Agriculture Conservation Program	EPA ~ Environmental Protection Agency
AD ~ Administratively Determined	ESA ~ Endangered Species Act
ADA ~ Americans with Disabilities Act	EWPP ~ Emergency Watershed Protection Plan
APHIS ~ Animal and Plant Health Inspection Service	FEIS ~ Final Environmental Impact Statement
ATV ~ all-terrain vehicle	FH ~ Forest Highway
AUM ~ animal unit month	FIA ~ Forest Inventory and Analysis
BA ~ basal area	FMP ~ Fire Management Plan
BF ~ board foot	FRCC ~ Fire Regime Condition Class
BMP ~ best management practice	FC ~ Forestry Commission
BIO ~ biological oxygen demand	FSR ~ National Forest System Road
CAA ~ Clean Air Act	FSH ~ Forest Service Handbook
CCF ~ hundred cubic feet	FSM ~ Forest Service Manual
CEQ ~ Council on Environmental Quality	FTE ~ full-time employee
CF ~ cubic foot	FVS ~ Forest Vegetation Simulator
CFL ~ commercial forest land	FY ~ fiscal year
CFR ~ Code of Federal Regulations	GAO ~ Government Accounting Office
CFS ~ cubic feet per second	GFA ~ General Forest Area
CIP ~ Capital Investment Program	GIS ~ Geographic Information System
CMAI ~ culmination of mean annual increment	GPD ~ gross domestic product
CWA ~ Clean Water Act	HRP ~ Human Resource Program
CWD ~ Coarse Woody Debris	HU ~ Hydrologic Unit
DBH ~ diameter at breast height	HUC ~ Hydrologic Unit Code
DBRU ~ Drainage Basin Response Unit	IDT ~ Interdisciplinary Team
DC ~ Desired Conditions	IPM ~ integrated pest management
DEIS ~ Draft Environmental Impact Statement	IS ~ Interpretive Services
DEM ~ Digital Elevation Model	LAC ~ Limits of Acceptable Change
DHEC ~ Department of Health and Environmental Control	LE ~ law enforcement
DNR ~ Department of Natural Resources	LOAS ~ Land Ownership Adjustment Strategy
EA ~ Environmental Assessment	LMP ~ Land Management Plan
ECOMAP ~ Ecological Classification and Mapping Task Team	LTA ~ landtype association
ECS ~ Ecological Classification System	LTP ~ landtype phase
EIS ~ Environmental Impact Statement	LTSY ~ Long-term sustained yield
	L&WCF ~ Land and Water Conservation Fund

LW ~ Large Wood	NSO ~ no surface occupancy
LWD ~ Large Woody Debris	NTMB ~ neotropical migratory birds
M ~ thousand	NVUM ~ National Visitor Use Monitoring
M\$ ~ thousands of dollars	NWPS ~ National Wilderness Preservation System
MA ~ management area	NWCG ~ National Wildfire Coordinating Group
MAR ~ Management Attainment Report	OHV ~ off-highway vehicle
MAUM ~ thousand animal unit month	OMP ~ operation maintenance and protection
MBF ~ thousand board feet	PAOT ~ persons-at-one-time
MCF ~ thousand cubic feet	PL ~ public law
MIL ~ management intensity level	PM ~ particulate matter
MM ~ million	PNV ~ present net value
MM\$ ~ millions of dollars	PNW ~ present net worth
MMBF ~ million board feet	PRODCL ~ productivity class
MMCF ~ million cubic feet	PTSQ ~ Projected Timber Sale Quantity
MMR ~ minimum management requirement	PSI ~ pounds per square inch
MMRVD ~ million recreation visitor-day	RARE ~ Roadless Area Review and Evaluation
MOU ~ memorandum of understanding	RARE II ~ the second Roadless Area Review and Evaluation
MRVD ~ thousand recreation visitor-day	RBP ~ Rapid Bioassessment Protocol
MWFUD ~ thousand wildlife and fish user-day	RCW ~ red-cockaded woodpecker
MVUM ~ Motor Vehicle Use Map	RCW EIS ~ Final Environmental Impact Statement for the management of the Red-cockaded Woodpecker and its habitat on National Forests in the Southern Region
NAAQS ~ National Ambient Air Quality Standards	RD ~ Ranger District
NAPAP ~ National Acid Precipitation Assessment Program	RIM ~ Recreation Information Management
NEPA ~ National Environmental Policy Act	RIZ ~ Resource Integration Zone
NF ~ National Forest	RMO ~ Road Management Objectives
NFMA ~ National Forest Management Act	RNA ~ research natural area
NFRS ~ National Forest Recreation Survey	RNAT ~ roaded natural
NFS ~ National Forest System	ROD ~ record of decision
NFSR ~ National Forest System Road	ROS ~ Recreation Opportunity Spectrum
NIPF ~ Non-industrial Private Landowner	ROW ~ right-of-way
NLFCA ~ National Listing of Fish Consumption Advisories	RPA ~ Resources Planning Act
NOAA ~ National Oceanic and Atmospheric Agency	RVD ~ recreation visitor-day
NPL ~ National Priorities List	SCC ~ Species of Conservation Concern
NPS ~ National Parks Service	SCORP ~ State Comprehensive Outdoor Recreation Plan
NRCS ~ Natural Resources Conservation Service	
NRI ~ Natural Resource Inventory	

SC ~ South Carolina	UPLD ~ upland hardwood/mixed
S&G ~ standard and guideline	USC ~ United States Code
SH ~ state highway	USDA ~ U.S. Department of Agriculture
SHPO ~ State Historic Preservation Officer	USDI ~ U.S. Department of Interior
SIO ~ Scenic Integrity Objective	USFWS ~ U.S. Fish and Wildlife Service
SMS ~ Scenery Management System	USGS ~ U.S. Geological Survey
SPB ~ southern pine beetle	VIS ~ Visitor Information Services
SPMO ~ semiprimitive motorized	WFUD ~ wildlife and fish user-day
SPNM ~ semiprimitive non-motorized	WHI ~ wildlife habitat improvement
SMZ ~ Streamside Management Zone	WIN ~ Watershed Improvement Inventory
SYL ~ Sustained Yield Limit	WO ~ Washington Office
T&E ~ threatened and endangered	WRP ~ Wetlands Reserve Program
TAP ~ Transportation Analysis Process	WSA ~ wilderness study area
TNC ~ The Nature Conservancy	WURR ~ Water Use Rights and Requirements
TSI ~ timber stand improvement	YPIN ~ yellow pine

Definitions

Note: Definitions were taken from the following sources.

Code of Federal Regulations (CFR) Title 36, Parks, Forests, and Public Property, Chapter II, Forest Service, Department of Agriculture; Part 219, Planning, Section A–National Forest System Land and Resource Management Planning; Section 219.19, Definitions, Revised April 9, 2012. (Referred to as 36 CFR 219.3)

Society of American Foresters. 1998. The Dictionary of Forestry. Edited by John A. Helms. 210 p. (Referred to as SAF)

Forest Service Handbook (FSH) 1909.12 Land Management Planning Handbook, WO Amendment 1909.12-2015-1 Effective date: 1/30/2015 05 - Definitions. (Referred to as FSH 1909.12)

Forest Service Handbook (FSH) 1909.12 Land Management Planning Handbook, WO Amendment 1909.12-2015-1 Effective date: 1/30/2015 Chapter 10, Section 12.13. (Referred to as FSH 1909.12)

Forest Service Handbook (FSH) 2090.11, Ecological Classification and Inventory Handbook, WO Amendment 2090.11-91-1, Effective 4/26/91, 05 - Definitions. (Referred to as FSH 2090.11-05)

FSH 2409.13, Timber Resource Planning Handbook, WO Amendment 2409.13-92-1, Effective 8/3/92, 05 - Definitions. (Referred to as FSH 2409.13-05)

FSH 2409.15, Timber Sale Administration Handbook, Amendment No. 2409.15-96-2, Effective Sept. 19, 1996, 05 - Definitions. (Referred to as FSH 2409.15-05)

FSH 2409.17, Silvicultural Practices Handbook, 1/85 WO, Chapter 9 - Timber Stocking Guides and Growth Predictions, 9.05 - Definitions. (Referred to as FSH 2409.17-9.05)

FSH 2609.13, Wildlife and Fisheries Program Management Handbook, WO Amendment 2609.13-92-1, Effective 8/3/92, Chapter 70 - Analysis of Economic Efficiency of Wildlife and Fisheries Projects, 70.5 - Definitions. (Referred to as FSH 2609.70.5)

FSH 2709.12, Road Rights-of-Way Grants Handbook, 9/85 WO, Zero Code, 05 - Definitions. (Referred to as FSH 2709.12-05)

Forest Service Manual (FSM) 1900 - Planning, Amendment No. 1900-2009-2, Effective February 2, 2009 1905 - Definitions. (FSM 1905)

FSM 2200, Range Management, WO Amendment 2200-2205-8 Effective 09/09/2005, Chapter 2230, Grazing and Livestock Use Permit System, 2230.5 - Definitions. (Referred to as FSM 2230)

FSM 2300, Recreation, Wilderness, and Related Resource Management, Amendment No. 2300-2009-2 Effective 11/04/2009. Chapter 2350, Trail, River and Similar Recreation Opportunities 2353.05 definitions (Referred to as FSM 2350)

FSM 2300, Recreation, Wilderness, and Related Resource Management, Amendment No. 2300-2008-1 Effective 07/25/2008. Chapter 2350, Trail, River and Similar Recreation Opportunities. Chapter 2360 Heritage Program Management 2360.05 definitions (Referred to as FSM 2360)

FSM 2500, Watershed and Air Management, Amendment No. 2500-2004-1 05/26/2004. Chapter 2520, Watershed Protection and Management. 2521.1 - Watershed Condition Assessment. 2521.05 - Definitions. (Referred to as FSM 2521)

FSM 2500, Watershed and Air Management, Amendment No. 2500-2004-1, Effective 05/26/2005. Chapter 2520, Watershed Protection and Management. FSM 2526 - Riparian Area Management. 2526.05 - Definitions. (Referred to as FSM 2526)

FSM 2500, Watershed and Air Management, Amendment No. 2500-2004-1, Effective 05/26/2005. Chapter 2520, Watershed Protection and Management. FSM 2527 Floodplain Management and Wetland Protection. 2527.05 - Definitions. (Referred to as FSM 2527)

FSM 2600, Wildlife, Fish, and Sensitive Plant Habitat Management, Amendment No. 2600-2005-1 Effective 09/23/2005, Chapter 2670.5, Definitions. (Referred to as FSM 2670)

Glossary of Wildland Fire Terminology. [National Wildfire Coordinating Group](http://www.nwcg.gov/publications) (NWCG) PMS 205 October 2014. This publication is published electronically by NWCG on the NWCG Web site at <http://www.nwcg.gov/publications>

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A

accessibility – The relative ease or difficulty of getting from or to someplace, especially the ability of a site, facility or opportunity to be used by persons of varying physical and mental abilities.

acid deposition – Rain, snow, or dry particulate matter containing high concentrations of acid anions (e.g. nitrate and sulfate), usually produced by atmospheric transformation of the byproducts of fossil fuel combustion. Precipitation with a pH lower than 5.0 is generally considered to be acidic.

acid neutralizing capacity – The total capacity of a water sample to neutralize acids, as determined by titration with a strong acid. Acid neutralizing capacity includes alkalinity (e.g. carbonate) plus base cations.

acidification – To convert into an acid or become acid.

Agriculture Conservation Program – USDA cost-share program for streambank improvement.

acquisition of land – Obtaining full landownership rights by donation, purchase, exchange, or condemnation.

acre-equivalents – The number of acres of forest habitat improved or affected by the installation of various wildlife habitat improvements in an area. Determined by multiplying by various coefficients.

acre-foot – A measurement of water volume, equal to the amount of water that would cover an area of 1 acre to a depth of 1 foot (specifically 43,560 cubic feet or 325,851 gallons).

activity – A measure, course of action, or treatment that is undertaken to directly or indirectly produce, enhance, or maintain a desired resource management condition or objective.

adaptive management – An approach to natural resource management where actions are designed and executed and effects are monitored for the purpose of learning and adjusting future management actions, which improves the efficiency and responsiveness of management (36 CFR 219.16).

administrative unit – All the National Forest System lands where one forest supervisor has responsibility. The basic geographic management area within a Forest Service Region, station, or area.

advance regeneration (reproduction) – Seedlings or saplings that develop, or are present, in the understory.

adverse effect – An action that has an apparent direct or indirect adverse effect on the conservation and recovery of a species listed as threatened or endangered. Such actions include, but are not limited to:

- a. Any action that directly alters, modifies, or destroys critical or essential habitats or renders occupied habitat unsuitable for use by a listed species, or that otherwise affects its productivity, survival, or mortality.
- b. Any action that directly results in the taking of a listed species. See Title 50 Code of Federal Regulations, Section 17.3 for an explanation of what constitutes a taking.

c. Any action involving the disposal of land that is essential to achieving recovery objectives.

afforestation – Establishment of a forest or stand in an area not recently forested.

age class – A grouping of living things based on their age.

age class (cohort) – A distinct aggregation of trees originating from a single natural disturbance or regeneration cutting.

age dependent relationships – Complex yield composite relationships between independent and dependent variables that vary by the age of the understory and/or the overstory.

agricultural land – Areas used primarily for production of food and/or fiber (excludes wood fiber). Examples include cropland, pasture, orchards, vineyards, nurseries, confined feeding areas, farmsteads, and ranch headquarters.

air pollution – Any substance or energy form (heat, light, noise, etc.) that alters the state of the air from what would naturally occur.

air quality class – Three broad classifications used to prevent significant deterioration of air quality for all areas of the country.

Class I - All areas where essentially any degradation of air quality would be considered significant deterioration.

Class II - All areas where moderate degradation over baseline concentrations are allowed.

Class III - All others.

all-aged stand – A stand with trees of all, or almost all age classes, including those of exploitable age.

allocated fund – Funds transferred from one agency or bureau to another for carrying out the purpose of the parent appropriation and agency.

allopatric – Condition where one species lives in a section of stream without other closely related species. The species have disjunct distributions. Opposite of sympatric.

allotment management plan – The basic land unit used to facilitate management of the range resource on National Forest System and associated lands administered by the Forest Service.

all-terrain vehicle (ATV) – A type of off-highway vehicle that travels on three or more low-pressure tires; has handle-bar steering; is less than or equal to 50 inches in width; and has a seat designed to be straddled by the operator.

alternative – In forest planning, a mix of resource outputs designed to achieve a desired management emphasis as expressed in goals and objectives, and in response to public issues or management concerns.

amendment – A formal alteration of the forest plan by modification, addition, or deletion. Forest Plan amendment requires an environmental analysis. Significant findings require an environmental impact statement and the amendment will follow the same procedure used for plan

preparation. Insignificant findings allow the changes to be implemented following public notification. Amendments can take place at any time following plan approval.

analysis area – A collection of lands, not necessary contiguous, sufficiently similar in character, that they may be treated as if they were identical.

annual forest program – The summary or aggregation of all projects that make up an integrated (multifunctional) course of action for a given level of funding of a forest planning area that is consistent with the forest plan.

annual work planning process – Preparation of technical plans that serve to implement land management, and program decisions contained in the integrated land, resource plans, and budget allocations.

appropriated fund – Funds available for obligation or outlay by Congress to a given agency.

appropriate management response – The response to a wildland fire based on an evaluation of risks to firefighter and public safety. Circumstances under which the fire occurs, including weather and fuel conditions, natural and cultural resource management objectives, protection priorities, and values to be protected. The evaluation must also include an analysis of the context of the specific fire within the overall logic, geographic area, or national wildland fire situation.

aquatic ecosystems – The stream channel, lake or estuary bed, water, and biotic communities and the habitat features that occur therein.

aquatic habitat types – The classification of instream habitat based on location within channel, patterns of water flow, and nature of flow controlling structures. Habitat is classified into a number of types according to location within the channel, patterns of water flow, and nature of flow controlling structure. Riffles are divided into three habitat types: low gradient riffles, rapids, and cascades. Pools are divided into seven types: secondary channel pools, backward pools, trench pools, plunge pools, lateral scour pools, dammed pools, and beaver ponds. Glides, the third habitat type, are intermediate in many characteristics between riffles and pools. It is recognized that as aquatic habitat types occur in various parts of the country, additional habitat types may have to be described. If necessary, the regional fishery biologist will describe and define the additional habitat types.

area of influence – An area influenced by the management of the plan area that is used during the land management planning process to evaluate social, cultural, and economic conditions. The area is usually a grouping of counties.

arterial roads – Roads that provide service to large land areas and usually connect with public highways or other forest arterial roads to form an integrated network of primary travel routes. The location and standard are often determined by a demand for maximum mobility and travel efficiency rather than specific resource-management service. They are usually developed and operated for long-term land management purposes and constant service. These roads generally serve areas more than 40,000 acres.

artificial regeneration (reproduction) – Creation of a new age class by renewal of a tree crop by direct seeding, or by planting seedlings or cuttings.

assessment – An assessment is the identification and evaluation of existing information to support land management planning. Assessments are not decision-making documents, but provide

current information on select topics relevant to the plan area, in the context of the broader landscape (36 CFR 219.19).

at-risk species – The set of at-risk species for planning purposes includes federally recognized threatened, endangered, proposed and candidate species, and species of conservation concern.

authorized use – Specific activity or occupancy, including a ski area, historical marker, or oil and gas lease, for which a special authorization is issued.

B

background – The area after the middleground in a picture or landscape; generally over 4 miles distance from the viewer.

basal area – The area of the cross-section of a tree inclusive of bark at breast height (4.5 feet or 1.37 meters above the ground) most commonly expressed as ft²/acre, acre or square meters per hectare. Used to measure the density of a stand of trees. For shrubs and herbs it is used to determine phytomass. Grasses, forbs, and shrubs usually measured at or less than 1 inch above soil level. Trees—the cross- section area of a tree stem in square feet commonly measured at breast height (4.5' above ground) and inclusive of bark, usually computed by using diameter at breast height (DBH), or tallied through the use of basal area factor angle gauge.

basal spray – The application of a pesticide, usually a herbicide for controlling brush or weed trees, directed at the base of the stem.

best management practices for water quality (BMPs) – Methods, measures, or practices selected by an agency to meet its nonpoint source control needs. BMPs include but are not limited to structural and nonstructural controls and operation and maintenance procedures. BMPs can be applied before, during, and after pollution-producing activities to reduce or eliminate the introduction of pollutants into receiving waters. (36 CFR 219.19)

biodiversity – The variety of life in an area, including the variety of gene pools, species, plant and animal communities, ecosystems, and the processes through which individual organisms interact with one another, and their environments.

biological assessment – A "biological evaluation" conducted for major federal construction projects requiring an environmental impact statement, in accordance with legal requirements under section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1536(c)). The purpose of the assessment and resulting document is to determine whether the proposed action is likely to affect an endangered, threatened, or proposed species.

biological evaluation – A documented Forest Service review of Forest Service programs or activities in sufficient detail to determine how an action or proposed action may affect any threatened, endangered, proposed, or sensitive species.

biological opinion – An official report by the Department of the Interior, Fish and Wildlife Service (USFWS) or the Department of Commerce, National Oceanic and Atmospheric Administration Fisheries Service (NOAA Fisheries) issued in response to a formal Forest Service request for consultation or conference. It states whether an action is likely to result in jeopardy to a species or adverse modification of its critical habitat.

biological oxygen demand – Dissolved oxygen required by organisms for the aerobic biochemical decomposition of organic matter present in water.

bladed skid road – A travel way through the woods formed by loggers to facilitate dragging (skidding) logs from the stump to a log landing. Skid roads are generally used in steep terrain and are cut into mountainsides with a bulldozer.

board foot – A unit of timber measurement equaling the amount of wood contained in an unfinished board 1 inch thick, 12 inches long, and 12 inches wide. Commonly, 1,000 board feet is written as 1 MBF, and 1,000,000 board feet is written as 1MMBF.

browse – Young twigs, leaves and tender shoots of plants, shrubs or trees that animals eat.

C

candidate species –

1. For U.S. Fish and Wildlife Service candidate species, a species for which the USFWS possesses sufficient information on vulnerability and threats to support a proposal to list as endangered or threatened, but for which no proposed rule has yet been published by the U. S. Fish and Wildlife Service.
2. For National Marine Fisheries Service candidate species, a species that is:
 - a. The subject of a petition to list and for which the National Marine Fisheries Service has determined that listing may be warranted, pursuant to section 4(b)(3)(A) of the Endangered Species Act (16 U.S.C. 1533(b)(3)(A)), or
 - b. Not the subject of a petition but for which the National Marine Fisheries Service has announced in the Federal Register the initiation of a status review (36 CFR 219.19).

canopy cover – The percent of a fixed area covered by the crown of an individual plant species or delimited by the vertical projection of its outermost perimeter. Small openings in the crown are included. Used to express the relative importance of individual species within a vegetation community, or to express the canopy cover of woody species. Canopy cover may be used as a measure of land cover change or trend. Often used for wildlife habitat evaluations.

capability – The ability of a unit of land, based on defined physical and biological attributes, to support a particular use or suite of products while maintaining ecosystem sustainability.

carbon pool – Any natural region or zone, or any artificial holding area, containing an accumulation of carbon or carbon-bearing compounds or having the potential to accumulate such substances. Carbon pools may include live and dead above ground carbon, soil carbon including coarse roots, and harvested wood products.

carbon stocks – The amount or quantity of carbon contained in a carbon pool. For purposes of carbon stock assessment for National Forest System (NFS) land management planning, carbon pools do not include carbon in fossil fuel resources, lakes or rivers, emissions from agency operations, or public use of NFS lands (such as emissions from vehicles and facilities).

carrying capacity – The number of organisms of a given species and quality that can survive in, without causing deterioration of, a given ecosystem through the least favorable environmental conditions that occur within a stated interval of time.

channeled ephemeral stream – Ephemeral streams that have a defined channel of flow where surface water converges with enough energy to remove soil, organic matter, and leaf litter. Ones that exhibit an ordinary high watermark and show signs of annual scour or sediment transport are considered navigable waters of the United States (USACE, Part 330- Nationwide Permit program, 2000).

channelization – Artificial change of a stream channel profile.

characteristics of ecosystem diversity – Parameters that describe an ecosystem; composition (major vegetation types, rare communities, aquatic systems, and riparian systems), structure (successional stages, water quality, wetlands, and floodplains), principal ecological processes (stream flows and historical and current disturbance regimes), and soil, water, and air resources.

Clean Air Act of 1970 – A congressional act, along with the amendments passed in 1977 and 1990, that provides authority for the Environmental Protection Agency to develop specific regulations controlling air pollution.

classification – Identification of the class (wild, scenic, or recreational) that appropriately describes an eligible river or river segment, based on the criteria established in section 2(b) of the Wild and Scenic Rivers Act.

clearcutting – A regeneration harvest method that removes essentially all trees in a stand producing a fully exposed microclimate for the development of a new age class of trees. A clearcut may or may not have reserve trees left to attain goals other than regeneration.

clearcutting with reserves – A two-aged regeneration method in which varying numbers of reserve trees are not harvested to attain goals other than regeneration.

climate change adaptation – Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities. This adaption includes initiatives and measures to reduce the vulnerability of natural and human systems against actual or expected climate change effects. Adaptation strategies include the following:

1. Building resistance to climate-related stressors.
2. Increasing ecosystem resilience by minimizing the severity of climate change impacts, reducing the vulnerability, and/or increasing the adaptive capacity of ecosystem elements.
3. Facilitating ecological transitions in response to changing environmental conditions.

climax – The culminating stage in plant succession for a given environment with the vegetation having reached a highly stable condition.

closed road/trail – A road that is closed for public use.

co-dominant trees – Trees or shrubs with crowns receiving full light from above, but comparatively little from the sides. Crowns usually form the general level of the canopy.

cohort – a group of trees developing after a single disturbance, commonly consisting of trees of similar age, although it can include a considerable range of tree ages of seeding or sprout origin and threes that predate the disturbance.

collaboration or collaborative process – A structured manner in which a collection of people, with diverse interests share knowledge, ideas, and resources, while working together in an inclusive and cooperative manner toward a common purpose. Collaboration, in the context of this part, falls within the full spectrum of public engagement described in the Council on Environmental Quality's publication of October, 2007: Collaboration in NEPA— A Handbook for NEPA Practitioners. (36 CFR 219.19)

collector road – Roads that serve smaller land areas and are usually connected to a forest arterial or public highway. They collect traffic from forest local roads or terminal facilities. The location and standard are influenced by long-term multi-resource service needs, and travel efficiency. Forest collector roads may be operated for constant or intermittent service, depending on land-use and resource management objectives for the area served by the facility. These roads generally have two or more local roads feeding into them and generally serve an area exceeding 10,000 acres.

commercial forest land – Forest land that can produce crops of industrial wood, and has not been withdrawn by Congress, the Secretary of Agriculture, or the Chief of the Forest Service. Existing technology and knowledge must be available to ensure timber production without irreversible damage to soils productivity, or watershed conditions. Adequate restocking can be attained within five years after final harvesting.

commercial thinning – Any type of thinning producing merchantable material at least equal to the value of the direct cost of harvesting.

commercial tree species – (1) Tree species suitable for industrial wood produces. (2) Conifer and hardwood species used to calculate the commercial forest land allowable sale quality.

commodity outputs – A resource output with commercial value. All resource products that are articles of commerce.

community of interest – A group of people connected to each other by common interests, needs, or location; for example, local landowners, senior citizens, artists, conservationists, environmentalists, or recreational users.

compartment – A portion of a forest under one ownership, usually contiguous and composed of a variety of forest stand types, defined for purposes of locational reference.

composition (stand) – The proportion of each tree species in a stand expressed as a percentage of the total number, basal area, or volume of all tree species in the stand.

condition class – Depiction of the degree of departure from historical fire regimes, possibly resulting in alternations of key ecosystem components. These classes categorize and describe vegetation composition and structure conditions that currently exist inside the Fire Regime Groups. Based on the coarse-scale national data, they serve as generalized wildfire rankings. The risk of loss of key ecosystem components from wildfires increases from Condition Class 1 (lowest risk) to Condition Class 3 (highest risk).

connectivity – Ecological conditions that exist at several spatial and temporal scales that provide landscape linkages that permit the exchange of flow, sediments, and nutrients; the daily and seasonal movements of animals within home ranges; the dispersal and genetic interchange between populations; and the long distance range shifts of species, such as in response to climate change. (36 CFR 219.19)

conservation – The protection, preservation, management, or restoration of natural environments, ecological communities, and species. (36 CFR 219.19)

conserve – For the purpose of meeting the requirements of 36 CFR 219.9, to protect, preserve, manage, or restore natural environments and ecological communities to potentially avoid federally listing of proposed and candidate species. (36 CFR 219.19)

constraint – A restriction or limit that must be met.

consultation (in relation to the Endangered Species Act) – See Formal Consultation and Informal Consultation.

controlled surface use (CSU) – Use and occupancy is allowed (unless restricted by another stipulation), but identified resource values require special operational constraints that may modify the lease rights. CSU is used for operating guidance, not as a substitute for the NSO or Timing stipulation.

conventional logging – A term used to identify methods commonly used in an area to move logs from stump to mill.

conversion (forest management) – A change from one forest type to another in a stand on land that has the capability of both forest types.

coppice – A method of regenerating a stand in which all trees in the previous stand are harvested and the majority of regeneration is from stump sprouts or root suckers.

coppice with reserve – A two-aged regeneration method in which reserve trees are retained to goals other than regeneration. This method normally creates a two-aged stand.

cord – A unit of gross volume measurement for stacked, round wood based on external dimensions, generally implies a stack of 4 x 4 feet vertical cross section and 8 feet long. Contains 128 stacked cubic feet.

corridor – A linear strip of land identified for the present or future location of transportation or utility rights-of-way within its boundaries. It can also be identified for wildlife habitat connecting, or protecting forest resources.

Council on Environmental Quality – An advisory council to the president established by the National Environmental Policy Act of 1969. It reviews federal programs for their effect on the environment, conducts environmental studies, and advises the president on environmental matters.

critical habitat – For a threatened or endangered species, (1) the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the provisions of section 4 of the ESA, on which are found those physical or biological features (a) essential to the conservation of the species, and (b) which may require special management considerations or protection; and (2) specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provisions of section 4 of the ESA, upon a determination by the Secretary that such areas are essential for the conservation of the species. (ESA §3(5)). Critical habitat is designated through rulemaking by the Secretary of the Interior or Commerce.

crown class – A class of tree based on crown position relative to the crowns of adjacent trees.

- **dominant** - Trees with crowns extending above the general level of the main canopy of even-aged groups of trees. They receive full light from above, and partly from the sides.
- **co-dominant** - Trees with crowns forming the general level of the main canopy in even-aged groups of trees. They receive full light from above, and comparatively little from the sides.
- **intermediate** - Trees with crowns extending into the lower portion of the main canopy of even-aged groups of trees, but shorter in height than the co-dominants. They receive little direct light from above, and none from the sides.
- **overtopped (suppressed)** - Trees of varying levels of vigor that have their crowns completely covered by the crowns of one or more neighboring trees.

cubic foot – A unit of measure reflecting a piece of wood 12 inches long, 12 inches wide, and 12 inches thick.

culmination of mean annual increment of growth – See “Mean annual increment of growth.”

cultural/heritage resources – Such resources as archeological, historical, or architectural sites, structures, places, objects, ideas, and traditions that are identified by field inventory, historical documentation, or evidence and that are important to specified social or heritage groups or scientific and management endeavors.

cunit – Equivalent to 100 cubic feet of solid wood. Commonly, 100 cubic feet is expressed as 1 CCF.

cut-offs – Analysis constraints that prevent the valuation of non-timber outputs produced in excess of demand plus x percent. It ensures that the assumptions of a horizontal demand curve are not violated.

cutting cycle – The planned interval between partial harvest in a stand being managed with an uneven-aged regeneration method.

D

daylighting – The practices of cutting back edges of roads or trails by removing shrub and tree growth.

decision criteria – Rules or standards used to evaluate and rank alternatives.

decision document – A concise public record of decision made in accordance with the policies and purposes of the National Environmental Policy Act (NEPA) that contains the elements specified in 40 CFR part 1505 Section 1505.2.

decision memo – A concise written record of the responsible official’s decision to implement an action that is categorically excluded from further analysis and documentation in an environmental impact statement (EIS) or environmental assessment (EA), where the action is one of a category of actions which do not individually or cumulatively have a significant effect on the human environment, and does not give rise to extraordinary circumstances in which a normally excluded action may have a significant environmental effect. (36 CFR 219.62)

den trees – Trees having rainproof, weather- tight cavities used by wildlife.

designated area – An area or feature identified and managed to maintain its unique special character or purpose. Some categories of designated areas may be designated only by statute and some categories may be established administratively in the land management planning process or by other administrative processes of the Federal executive branch. Examples of statutorily designated areas are national heritage areas, national recreational areas, national scenic trails, wild and scenic rivers, wilderness areas, and wilderness study areas. Examples of administratively designated areas are experimental forests, research natural areas, scenic byways, botanical areas, and significant caves. (36 CFR 219.19)

designated right-of-way (ROW) corridor – A parcel of land with specific boundaries identified by law, Secretarial order, the land use planning process, or by some other management decision as being a preferred location for existing and future ROW facilities. The corridor may be suitable to accommodate more than one type of ROW use or facility or one or more ROW uses or facilities that are similar, identical, or compatible. A designated corridor may already be occupied by existing utility facilities. It has been adequately analyzed to provide for a high degree of assurance that in being identified as a “designated corridor,” it can accommodate at least one new additional utility facility.

designed use – The Managed Use of a trail that requires the most demanding design, construction, and maintenance parameters and that determines which design, construction, and maintenance parameters will apply to a trail.

desired conditions – For the purposes of the land management planning regulation at 36 CFR part 219 and this Handbook, a description of specific social, economic, and/or ecological characteristics of the plan area, or a portion of the plan area, toward which management of the land and resources should be directed. Desired conditions must be described in terms that are specific enough to allow progress toward their achievement to be determined, but do not include completion dates (36 CFR 219.7(e)(1)(i)). Desired conditions are achievable, and may reflect social, economic, or ecological attributes, including ecosystem processes and functions.

determination – A finding in a study report that a river segment does, or does not, meet the criteria found in this chapter to be eligible; or a finding that an eligible river is or is not suitable for inclusion in the National System.

developed recreation – Recreation use or opportunities occurring at developed sites.

developed recreation site – A discrete place containing a concentration of facilities and services used to provide recreation opportunities to the public and evidencing a significant investment in facilities and management under the direction of an administrative unit in the National Forest System.

development level – An indication of site modification based on classes in the Recreation Opportunity Spectrum. Development Level 1 equates to Primitive, with minimum site modification; 2 equates to Semi-Primitive Motorized/Nonmotorized, with little site modification; 3 equates to Roaded, with moderate modification; 4 equates to Rural, with heavy site modification; and 5 relates to Urban, with a high degree of site modification.

diameter at breast height (DBH) – A tree’s diameter measured at about 4.5 feet (1.37 m) above the forest floor on the uphill side of the tree. For the purposes of determining breast height, the

forest floor includes the duff layer that may be present, but does not include unincorporated woody debris that may rise above the ground line.

diameter class – Any of the intervals into which a range of diameters of tree stems may be divided for classification and use, (e.g., 10-inch class includes diameters from 9.5 inches to 10.49 inches.

dispersed recreation – Recreation opportunities or use occurring in the general forest area. Does not take place in developed sites.

disturbance – Any relatively discrete event in time that disrupts ecosystem, watershed, community, or species population structure and/or function and changes resources, substrate availability, or the physical environment. (36 CFR 219.19)

disturbance-recovery regime – A natural pattern of periodic disturbance followed by a period of recovery. Examples include fire or flooding.

disturbance regime – A description of the characteristic types of disturbance on a given landscape; the frequency, severity, and size distribution of these characteristic disturbance types; and their interactions. (36 CFR 219.19)

diversity of plant and animal communities – The distribution and relative abundance or extent of plant and animal communities and their component species, including tree species, occurring in an area (36 CFR 219.16).

dormant season burning – Prescribed burning early in the dry season before the leaves and undergrowth are completely dry or before the leaves are shed, as an insurance against more severe fire damage later on.

drainage area/basin – The total area above a given point on a stream that contributes to the flow at that point. Term is often used interchangeably with watershed.

drum chopping – Method used to prepare areas for reforestation. Large drums with cutting blades attached are pulled over areas by vehicles that include crawler-type tractors and rubber-tired skidders.

E

early succession forest – The biotic community that develops immediately following the removal or mortality of most or all forest canopy, resulting in a predominance of woody species regeneration. As used in the Environmental Impact Statement and the forest plan, a stand age of 0 to 10 years defines this condition. See successional stage.

early-successional habitat – A vegetative condition typically characterized by low density to no tree canopy cover and an abundance of herbaceous and/or woody ground cover. This condition may include early-successional forest, maintained openings, pastures, and open woodlands.

early successional species – Plant or animal species characteristic of early forest successional stages.

ecological classification system – A hierarchical system used to help organize and coordinate the classification of ecological types, units, and to make comparisons. Classification is ecologically based and integrates existing resource data including climate, topography, geology, soil,

hydrology, and vegetation. The system includes many levels (from the top-down approach): domain, division, province, section, subsection, land type, land type association, land type phase, and site.

ecological conditions – The biological and physical environment that can affect the diversity of plant and animal communities, the persistence of native species, and the productive capacity of ecological systems. Ecological conditions include habitat and other influences on species and the environment. Examples of ecological conditions include the abundance and distribution of aquatic and terrestrial habitats, connectivity, roads and other structural developments, human uses, and invasive species. (36 CFR 219.19)

ecological integrity – The quality or condition of an ecosystem when its dominant ecological characteristics (for example, composition, structure, function, connectivity, and species composition and diversity) occur within the natural range of variation and can withstand and recover from most perturbations imposed by natural environmental dynamics or human influence. (36 CFR 219.19)

ecological management unit – A grouping of one or more soil series that have similar characteristics including texture, structure, or water retention capacity. EMUs are used in soil mapping.

ecological sustainability – See sustainability.

ecological system – See ecosystem.

economic sustainability – See sustainability.

ecosystem – A spatially explicit, relatively homogeneous unit of the Earth that includes all interacting organisms and elements of the abiotic environment within its boundaries. An ecosystem is commonly described in terms of its:

1. Composition. The biological elements within the different levels of biological organization, from genes and species to communities and ecosystems.
2. Structure. The organization and physical arrangement of biological elements such as, snags and down woody debris, vertical and horizontal distribution of vegetation, stream habitat complexity, landscape pattern, and connectivity.
3. Function. Ecological processes that sustain composition and structure, such as energy flow, nutrient cycling and retention, soil development and retention, predation and herbivory, and natural disturbances such as wind, fire, and floods.
4. Connectivity. (see connectivity above). (36 CFR 219.19)

ecosystem diversity – The variety and relative extent of ecosystems. (36 CFR 219.19)

ecosystem integrity – See ecological integrity.

ecosystem services – Benefits people obtain from ecosystems, including:

1. Provisioning services, such as clean air and fresh water, energy, food, fuel, forage, wood products or fiber, and minerals;

2. Regulating services, such as long term storage of carbon; climate regulation; water filtration, purification, and storage; soil stabilization; flood and drought 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.

electronic sites – Areas designated for the operation of equipment which transmits and receives radio signals.

eligible river – A river segment that has been evaluated, and found to be free-flowing and, in combination with its adjacent land area, possesses one or more outstandingly remarkable values.

endangered species – Any species which is in danger of extinction throughout all or a significant portion of its range other than a species of the Class Insect determined by the Secretary to constitute a pest whose protection under the provisions of this Act would present an overwhelming and overriding risk to man. [ESA §3(6)]

Endangered Species Act of 1973 (ESA) – An act that enables endangered and threatened species to be conserved. It provides a program for the conservation of such species, and takes appropriate steps to achieve the purposes of the (relevant) treaties and conventions.

endemic – Species restricted to a particular geographic area. Usually limited to one or a few small streams or a single drainage.

environment – All the conditions, circumstances, and influences surrounding and affecting the development of an organism, or group of organisms.

environmental assessment (EA) – A public document that provides sufficient evidence and analysis for determining whether to prepare an EIS or a finding of no significant impact, aids an agency's compliance with the NEPA when no EIS is necessary, and facilitates preparation of a statement when one is necessary (40 CFR 1508.9; FSH 1909.15, chapter 40). (36 CFR 219.62)

environmental consequence – The result or effect of an action upon the environment.

environmental document – For the purposes of this part: an environmental assessment, environmental impact statement, finding of no significant impact, categorical exclusion, and notice of intent to prepare an environmental impact statement. (36 CFR 219.19)

environmental flows - The hydrologic regime required to protect, maintain, or enhance the ecological structure and function of an aquatic resource or a defined set of ecological or environmental benefits. Environmental flow refers to the rate of flow, volume, or water level regime that should be maintained in a stream, lake, pond, spring, wetland, or groundwater system to protect, restore, maintain, or enhance the ecological integrity of the system and its components.

environmental impact – Used interchangeably with environmental consequence or effect.

environmental impact statement (EIS) – A detailed written statement as required by section 102(2)(C) of the National Environmental Policy Act (NEPA) of 1969 (40 CFR 1508.11; 36 CFR 220). (36 CFR 219.62)

ephemeral streams – Streams having flows that occur for short periods of time in direct response to storm precipitation or snowmelt runoff. Their bottoms are always above the water table and do not contain fish or aquatic insects that have larvae with multiple-year life cycles. Ephemeral streams may have a defined channel, but may be manifested as a natural swale or depression with vegetation and organic material covering the bottom. They also may serve as a conduit for much of the sediment that enters the stream system. Large woody debris associated with ephemeral streams may also contribute significantly to the stability of a stream system. Ephemeral streams that exhibit an ordinary high watermark, show signs of annual scour or sediment transport, are considered navigable waters of the United States.

erosion – The wearing away of the land surface by the action of wind, water, or gravity.

essential fish habitat (EFH) – EFH means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (for Federally managed species as per 50 CFR 600, “Magnuson-Stevens Act Provisions.” For the purpose of interpreting the definition of essential fish habitat: “Waters” include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; “substrate” includes sediment, hard bottom, structures underlying the waters, and associated biological communities, “necessary” means the habitat required to support a sustainable fishery and the managed species’ contribution to a healthy ecosystem; and “spawning, breeding, feeding growth to maturity” covers a species full life cycle.

essential habitat – Habitat in which threatened and endangered species occur, but which has not been declared as critical habitat. Occupied habitat or suitable unoccupied habitat necessary for the protection and recovery of a federally designated threatened or endangered species.

eutrophication – Condition of a lake where deleterious effects are caused by increased nutrients (nitrogen and phosphorous), and a decrease in oxygen.

evapo-transpiration – The transfer of water vapor to the atmosphere from soil and water surfaces (evaporation), and from living plant cells (transpiration).

even-aged methods – Regeneration methods designed to maintain and regenerate a stand with a single age class.

even-aged stand – A stand of trees composed of a single age class (36 CFR 219.19).

even-aged system – A planned sequence of treatments designed to maintain and regenerate a stand with predominantly one age class. The range of tree ages is usually less than 20 percent of the rotation (length in years). Treatments include clearcutting, seedtree, shelterwood, and coppice regeneration methods.

executive leadership team – A decision-making group consisting of the forest supervisor, staff officers, and district rangers.

existing old growth – Individual stands currently recognized by the FS as meeting the parameters for existing old growth as described in the "Guidance for Conserving and Restoring Old-Growth Forest Communities on National Forests in the Southern Region".

extirpation – Extinction of a species from all or part of its range.

F

farmer-owned land – Owned by farm operators, excluding incorporated farm ownerships.

Federal Register - The designated document that notifies the public of federal actions and includes Notice of Intent, calls for public involvement, etc. It also publishes the regulations needed to implement those federal actions.

federally recognized Indian Tribe – An Indian Tribe or Alaska Native Corporation, band, nation, pueblo, village, or community that the Secretary of the Interior acknowledges to exist as an Indian Tribe under the Federally Recognized Indian Tribe List Act of 1994, 25 U.S.C. 479a. (36 CFR 219.19)

felling – The cutting down of trees.

final crop – That portion of the growing stock (to be) kept until final commercial harvest, (i.e., final product objective).

final regeneration harvest – The final timber harvest in a sequence of harvests designed to regenerate a timber stand or release a regenerated stand. A final regeneration harvest could be a clearcut, removal cut of a shelterwood or seedtree system, or a selection cut.

fire interval – The number of years between two successive fire events for a given area; also referred to as fire-free interval or fire return interval.

fire management plan (FMP) – A plan that identifies and integrates all wildland fire management and related activities within the context of approved land/resource management plans. A fire management plan defines a program to manage wildland fires (wildfire and prescribed fire). The plan is supplemented by operational plans, including but not limited to preparedness plans, preplanned dispatch plans, prescribed fire burn plans, and prevention plans. Fire management plans assure that wildland fire management goals and components are coordinated.

fire regime – Description of the patterns of fire occurrences, frequency, size, severity, and sometimes vegetation and fire effects as well, in a given area or ecosystem. A fire regime is a generalization based on fire histories at individual sites. Fire regimes can often be described as cycles because some parts of the histories usually get repeated, and the repetitions can be counted and measured, such as fire return interval.

fire regime condition class – Also referred to Fire Regime Current Condition Class. A qualitative measure classified into three classes describing the relative degree of departure from historical fire regimes, possibly resulting in alterations of key ecosystem components such as species composition, structural stage, stand age, canopy closure, and fuel loadings. An FRCC uses three condition classes to describe low departure (FRCC 1), moderate departure (FRCC 2) and high departure (FRCC 3):

1. Fire Regime Condition Class 1: Fire regimes are within the natural or historical range and risk of losing key ecosystem components is low. Vegetation attributes (composition and structure) are intact and functioning.
2. Fire Regime Condition Class 2: Fire regimes have been moderately altered. Risk of losing key ecosystem components is moderate. Fire frequencies may have departed by one or more fire intervals (either increased or decreased). This may result in moderate changes in fire and vegetation attributes.

3. Fire Regime Condition Class 3: Fire regimes have been substantially altered. Risk of losing key ecosystem components is high. Fire frequencies may have departed by multiple fire intervals. This may result in dramatic changes in fire size, fire intensity and severity, and landscape patterns. Vegetation attributes have been substantially altered.

Fire Regime Groups – 1 A classification of fire regimes into a discrete number of categories based on frequency and severity. The national, coarse-scale classification of fire regime groups commonly used includes five groups: I - frequent (0-35 years), low severity; II - frequent (0-35 years), stand replacement severity; III - 35-100+ years, mixed severity; IV - 35-100+ years, stand replacement severity; and V - 200+ years, stand replacement severity.

Fire Regime Group	Fire Regime	Fire Severity Type	Severity Description
I	0-35 years	Low/Mixed	Generally low-severity fires replacing less than 25 percent of the dominant overstory vegetation; can include mixed-severity fires that replace up to 75 percent of the overstory
II	0-35 years	Replacement	High-severity fires replacing greater than 75% of the dominant overstory vegetation
III	35-200 years	Low/Mixed	Generally mixed-severity; can also include low severity fires
IV	35-200 years	Replacement	High-severity fires
V	200+ years	Replacement/ Any	Generally replacement severity; can include any severity type in this frequency range

fire use – The combination of wildland fire use and prescribed fire application to meet resource objectives.

fire return interval – see: Fire Interval

fisheries classification – Water bodies and streams are classified as having cold, cool or warm water fishery.

fisheries habitat – Streams, lakes, and reservoirs that support fish.

floodplain –

a. Base Floodplain. The lowland and relatively flat areas joining inland and coastal water including the debris cones and flood-prone areas of offshore islands and, at a minimum, that area subject to a 1 percent (100-year recurrence) or greater chance of flooding in any given year.

b. Coastal Floodplain. A flood-prone area adjacent to estuaries or oceans. Flooding in these areas is due primarily to landward flows caused by unusually high tides, storm surges, tsunamis, or a combination of these causes.

c. Lake Shore Floodplain. A flood-prone area adjacent to lakes. Flooding in these areas is due primarily to inflow of water exceeding that of outflow. It may also be due to landward flows of water caused by strong winds, unusually high tides, or a combination of these causes.

focal species – A small subset of species whose status permits inference to the integrity of the larger ecological system to which it belongs and provides meaningful information regarding the effectiveness of the plan in maintaining or restoring the ecological conditions to maintain the diversity of plant and animal communities in the plan area. Focal species would be commonly selected on the basis of their functional role in ecosystems. (36 CFR 219.19)

forage – All browse and non-woody plants that are available to livestock or game animals used for grazing or harvested for feeding.

foreground – The area between the viewer and the middle ground in a landscape; generally from 0 to ½ mile distance.

forest – An area managed for the production of timber and other forest products, or maintained under woody vegetation for indirect benefits as protection of a watershed, recreation, or wildlife habitat.

Forest and Rangeland Renewable Resources Planning Act of 1974 – An act of Congress requiring the preparation of a program for the management of the national forests' renewable resources, and of land and resource management plans for units of the National Forest System. It also requires a continuing inventory of all National Forest System lands and renewable resources.

forest health – The perceived condition of a forest derived from concerns about factors as its age, structure, composition, function, vigor, presence of unusual levels of insects or disease, and resilience to disturbance.

forest land – Land at least 10 percent occupied by forest trees of any size or formerly having had such tree cover and not currently developed for non-forest uses. Lands developed for non-forest use include areas for crops, improved pasture, residential or administrative areas, improved roads of any width and adjoining road clearing, and power line clearings of any width. (36 CFR 219.19)

forest road – A road wholly or partly within or adjacent to and serving the National Forest System (NFS) that the Forest Service determines is necessary for the protection, administration, and utilization of the NFS and the use and development of its resources (36 CFR 212.1).

Forest Service Handbook (FSH) – A handbook that provides detailed instructions for proceeding with specialized phases of programs or activities for Forest Service use.

Forest Service Manual (FSM) – Agency manuals that provide direction for Forest Service activities.

forest supervisor – The official responsible for administering the National Forest System lands in a Forest Service administrative unit. It may consist of two or more national forests or all the forests within a state. The supervisor reports to the regional forester.

forest trail – A trail wholly or partly within or adjacent to and serving the NFS that the Forest Service determines is necessary for the protection, administration, and utilization of the NFS and the use and development of its resources (36 CFR 212.1).

forest type – A classification of forest land based upon and named for the tree species that forms the plurality of live-tree stocking. A forest type classification for a field location indicates the predominant live-tree species cover for the field location; hardwoods and softwoods are the first

group to be determine predominant group, and forest type is selected from the predominant group.

formal comments – See substantive formal comments. (36 CFR 219.62)

formal consultation – A process between the USFWS and/or NMFS and the Federal agency that 1) determines whether a proposed Federal action is likely to jeopardize the continued existence of listed species or destroy or adversely modify designated critical habitat; 2) begins with a Federal agency’s written request and submittal of a complete initiation package; and 3) concludes with the issuance of a biological opinion by USFWS and/or NMFS, that may include an incidental take statement by the USFWS or NMFS. If a proposed Federal action may affect a listed species or designated critical habitat, formal consultation is required, except when the USFWS or NMFS concurs, in writing, that a proposed action “is not likely to adversely affect” listed species or designated critical habitat. (50 CFR §402.02, §402.14)

free-to-grow – A seedling or small tree free from direct competition from other trees, shrubs, grasses, or herbaceous plants.

fuel break – Any natural or constructed barrier used to segregate, stop, and control the spread of fire, or to provide a control line from which to work.

fuel treatment – The rearrangement or disposal of fuels to reduce fire hazard. Fuels are defined as living and dead vegetative materials consumable by fire.

fuels management – The planned treatment of fuels to achieve or maintain desired fuels conditions.

fuelwood – Wood used for conversion to some form of energy.

future old growth – Areas on the Forest where development of old growth conditions are most likely to occur, based on the intent of the assigned ecosystem.

G

game species – Any species of wildlife or fish for which seasons and bag limits have been prescribed, and which are normally harvested by hunters, trappers, and fishermen under state or federal laws, codes, and regulations.

general forest area – National forest lands not categorized as developed recreation sites, trails or wilderness. It can be a logical working area, (i.e., a drainage, geographic area, forest district, etc.) Typically containing a wide spectrum of settings and opportunities, facilities and sites located inside the boundary of a GFA are sometimes considered concentrated use areas (CUA), that may include dispersed front- and/or backcountry campsites, parking areas, pullouts and landings, river and road corridors, lake surfaces, and day use areas including OHV areas, climbing areas, target shooting areas, etc. Amenities or constructed features inside GFAs are primarily for resource protection.

genetically appropriate- A plant adapted to target site conditions (e.g., has good establishment, vigor, and reproductive capabilities); sufficiently diverse to respond and adapt to changing climates and environment conditions; unlikely to cause genetic contamination and undermine local adaptations, community interactions, and function of resident native species within the ecosystem; unlikely to become (unnaturally or inappropriately) invasive and displace other native

species; unlikely to be a source of non-native invasive pathogens; likely to maintain critical connections with pollinators.

geographic area – A spatially contiguous land area identified within the planning area. A geographic area may overlap with a management area (36 CFR 219.19).

geologic features – Landforms or other features of significant geologic interest that may require special management to protect the special qualities, or provide interpretation to the public.

geologic formation – A mapable body of rock identified by distinctive characteristics, some degree of internal homogeneity, and stratigraphic position. The name normally consists of two parts. The first is the name of the geographic locality where the formation was first identified and described. This is followed by a descriptive geologic term, usually the dominant rock type.

geographic information system (GIS) – An information processing technology to input, store, manipulate, analyze, and display spatial resource data to support the decision-making processes of an organization. Generally, an electronic medium for processing map information, typically used with manual processes to affect specific decisions about land base and its resources.

geological area – A unit of land that has been designated by the Forest Service as containing outstanding formations or unique geological features of the earth's development, including caves and fossils. Areas of this type and all other special interest areas are identified and formally classified primarily because of their recreational and educational values. Areas with similar types of values of scientific importance are formally classified as research natural areas.

global ranks – Ranks assigned by the Nature Conservancy and state heritage programs based on number of occurrences.

goals – An optional plan component that are broad statements of intent, other than desired conditions, usually related to process or interaction with the public. Goals are expressed in broad, general terms, but do not include completion dates (36 CFR part 219.7(e)(2)).

grassland – Areas on which vegetation is dominated by grasses, grass-like plants, forbs, and/or cryptogams (mosses, lichens, and ferns), provided these areas do not qualify as built-up land or cultivated cropland. Examples include tall grass and short grass prairies, meadows, cordgrass marshes, sphagnum moss areas, pasturelands, and areas cut for hay.

grazing – Consumption of range or pasture forage by animals.

grazing permit – a document authorizing livestock to use NFS lands or other lands under Forest Service control for livestock production.

a. Grazing Permit With Term Status is a permit issued for periods up to 10 years. It grants the permittee priority for renewal. Types include the Term Grazing Permit (FSM 2231.11), Term Grazing Association Permit (FSM 2231.12), Term Permit with, On-and-Off Provision (FSM 2231.14), Term Private Land Grazing Permit

(FSM 2231.13), and Grazing Agreement (FSM 2232).

b. Temporary Permits are issued for a period not to exceed 1 year to graze specified number, kind, and class of livestock for a specific season and area of use (FSM 2233).

gross receipts – A total of all funds received by the U.S. Treasury as a result of Forest Service activities.

groundwater – Water in a saturated zone in a geologic stratum. Water stored below the water table where the soil (or other geologic material) is saturated.

groundwater-dependent ecosystem – Community of plants, animals, and other organisms whose extent and life processes depend on groundwater. Examples include many wetlands, groundwater-fed lakes and streams, cave and karst systems, aquifer systems, springs, and seeps.

growing season burning – Prescribed burning or use of wildland fire during the photosynthetically-active growing season, where live fuel moistures are relatively high and the dominant vegetation, grasses, forbs, and herbaceous vegetation are fully greened.

group selection – An uneven-aged regeneration method in which trees are removed periodically in small groups. Uneven age classes for trees are established in small groups. The width of groups is about twice the height of the mature trees, with small opening providing microenvironments suitable for tolerant regeneration, and the larger openings providing conditions suitable for more intolerant regeneration.

growing stock – All trees growing in a forest or in a specified part of it, usually commercial species, meeting specified standards of size, quality, and vigor, and generally expressed in terms of trees per acre, density, or volume.

guidelines – A guideline is a constraint on project and activity decisionmaking that allows for departure from its terms, so long as the purpose of the guideline is met. (§ 219.15(d)(3)). Guidelines are established to help achieve or maintain desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.

H

habitat – The native environment of an animal or plant.

habitat type – A land or aquatic unit, consisting of an aggregation of habitats having equivalent structure, function, and responses to disturbance.

harvest cutting – An intermediate for final cutting that extracts salable trees.

harvesting method – A procedure by which a stand is logged. Emphasis is on meeting logging requirements rather than silvicultural objectives.

herbicide – A pesticide used for killing or controlling the growth of undesirable plants.

heritage assets – Property, plant, and equipment that are unique for one or more of the following reasons: historical or natural significance; cultural, educational, or artistic (for example, aesthetic) importance; or significant architectural characteristics.

high-grading – The removal from the most commercially valuable trees, often leaving a residual stand composed of trees of poor condition or species composition.

historic properties – Any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places. This term includes artifacts, records, and remains that are related to and located within such properties. The

term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria. (36 CFR 800.16)

human resource programs – Any of the federal labor programs providing work experience for local people.

hydrologic condition – The current state of the processes controlling the yield, timing and quality of water in a watershed.

hydrologic function – The behavioral characteristics of a watershed described in terms of ability to sustain favorable conditions of water flow. Favorable conditions of water flow are defined in terms of water quality, quantity, and timing.

hydric soils – Soils developed in conditions where soil oxygen is limited by the presence of saturated soil for long periods during the growing season.

I

immediate foreground – The area in the landscape from the viewer out to 300 feet distance.

improvement cutting – The removal of less desirable trees in a stand of poles or larger trees, primarily to improve composition and quality.

incidental taking – A taking that the Department of the Interior, Fish and Wildlife Service or Department of Commerce, National Oceanic and Atmospheric Administration Fisheries Service formally recognizes in a biological opinion as incidental to, and not for the purpose of, carrying out an otherwise lawful activity conducted by an agency or applicant.

indicator – A measure or measurement of an aspect of a sustainability criterion. A quantitative or qualitative variable that can be measured or described and, when observed periodically, shows trends. Indicators are quantifiable performance measures of outcomes or objectives for attaining criteria designed to assess progress toward desired conditions.

infestation – The attack by macroscopic organisms in considerable concentration. Examples are infestations of tree crowns by budworm, timber by termites, soil or other substrates by nematodes or weeds.

informal consultation – An optional process that includes all discussions and correspondence between the USFWS/NMFS and a Federal action agency or designated non-Federal representative, prior to formal consultation, to determine whether a proposed Federal action may affect listed species or critical habitat. (FSW and NOAA Fisheries Endangered Species Consultation Handbook)

INFRA infrastructure – An integrated database for collection/storage/use of information about features, land units, facilities and utilities, accessibility and real property. For recreation management, INFRA holds information on O&M costs, recreation funding shortfalls, recreation use data, information on accessibility, and inventories of facilities. INFRA brings together Oracle, Arc Info and Arc View GIS technology, and supplements recreation management systems including SMS, ROS and Benefits Based Management.

inherent capability of the plan area – The ecological capacity or ecological potential of an area characterized by the interrelationship of its physical elements, its climatic regime, and natural disturbances (36 CFR 219.19).

initial attack – The aggressive response to a wildland fire based on values to be protected, benefits of response, and reasonable cost of response.

in-stream flow – The presence of adequate stream flow in channels necessary to maintain the integrity of the stream channel, and protection of downstream beneficial uses including fish and wildlife needs, outdoor recreation uses of water, and livestock watering needs.

integrated pest management – A process for selecting strategies to regulate forest pests in which all aspects of a pest-host system are studied and weighed.

intermittent stream – A stream or reach of stream channel that flows, in its natural condition, only during certain times of the year or in several years, and is characterized by interspersed, permanent surface water areas containing aquatic flora and fauna adapted to the relatively harsh environmental conditions found in these types of environments. Intermittent streams are identified as dashed blue lines on USGS 7 1/2-inch quadrangle maps.

integrated resource management – Multiple use management that recognizes the interdependence of ecological resources and is based on the need for integrated consideration of ecological, social, and economic factors. (36 CFR 219.19)

interdisciplinary team – A group of resource specialists (e.g.: forester, wildlife biologist, hydrologist, etc.) responsible for developing the forest plan/environmental impact statement, and for making recommendations to the forest supervisor.

intermediate treatments – A collective term for any treatment designed to enhance growth, quality, vigor, and composition of the stand after establishment of regeneration and prior to final harvest.

intermittent streams – Streams that flow in response to a seasonally-fluctuating water table in a well-defined channel. The channel will exhibit signs of annual scour, sediment transport, and other stream channel characteristics, absent perennial flows. Intermittent streams typically flow during times of elevated water table levels, and may be dry during significant periods of the year, depending on precipitation cycles.

interpretive association – A nonprofit, tax-exempt corporation or organization whose purpose is extending and enhancing the ability of the Forest Service to provide customer service to National Forest visitors. They work cooperatively with the Forest Service in educating the public about natural and cultural issues on public lands.

interpretive services – Visitor information services designed to present inspirational, educational, and recreational values to forest visitors in an effort to promote understanding, appreciation, and enjoyment of their forest experience.

intolerant – A plant requiring sunlight and exposure for establishment and growth.

invasive species – Executive Order 13112 defines an invasive species as “an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health.” The Forest Service relies on Executive Order 13112 to provide the basis for labeling

certain organisms as invasive. Based on this definition, the labeling of a species as “invasive” requires closely examining both the origin and effects of the species. The key is that the species must cause, or be likely to cause, harm and be exotic to the ecosystem it has infested before we can consider labeling it as “invasive”. Thus, native pests are not considered “invasive”, even though they may cause harm. Invasive species infest both aquatic and terrestrial areas and can be identified within any of the following four taxonomic categories: Plants, Vertebrates, Invertebrates, and Pathogens. Additional information on this definition can be found in Executive Order 13112.

inventoried roadless area (IRA) – Areas identified in a set of inventoried roadless area maps, contained in the Forest Service Roadless Area Conservation, Final Environmental Impact Statement, Volume 2, dated November 2000, and any subsequent update or revision of those maps through the land management planning process (36 CFR 294.11).

irreversible or irretrievable commitment of resources – Any commitment of resources that has the effect of foreclosing any reasonable or prudent alternatives that would not result in jeopardy to a federally listed species.

K

key ecosystem characteristics –

- a. Are important specific elements of an ecosystem that sustain the long-term integrity of the ecosystems (FSH 1909, Chapter 10, Assessment sec. 12.14).
- 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.

key ecosystem services – Ecosystem services provided by the plan area that are important in the broader landscape outside the plan area and are likely to be influenced by the land management plan.

L

land exchange – The conveyance of non-federal land or interests in the land in exchange for National Forest System land or interests in land.

landing – A cleared area in the forest to which logs are yarded or skidded for loading onto trucks for transport.

landline location – Legal identification and accurate location of national forest property boundaries.

land management planning – A formal process of management planning involving three interactive phases: monitoring, assessment, and revision, as described in the Federal Code of Regulations.

lands not suited for timber production – The responsible official shall identify lands within the plan area as not suited for timber production if any one of the following factors applies: (i) Statute, Executive order, or regulation prohibits timber production on the land; (ii) The Secretary of Agriculture or the Chief has withdrawn the land from timber production; (iii) Timber

production would not be compatible with the achievement of desired conditions and objectives established by the plan for those lands; (iv) The technology is not currently available for conducting timber harvest without causing irreversible damage to soil, slope, or other watershed conditions; (v) There is no reasonable assurance that such lands can be adequately restocked within 5 years after final regeneration harvest; or (vi) The land is not forest land.

lands that may be suitable for timber production – A preliminary classification in the process of determining lands that are suited for timber production. This preliminary classification excludes National Forest System lands that are not suitable for timber production based on the factors identified in 36 CFR 219.11(a)(1)(i), (ii), (iv), (v), and (vi), and is made prior to the consideration of the factor at 36 CFR 219.11(a)(iii), which identifies suitability based on objectives and desired conditions established by the plan for those lands.

landscape – A defined area irrespective of ownership or other artificial boundaries, such as a spatial mosaic of terrestrial and aquatic ecosystems, landforms, and plant communities, repeated in similar form throughout such a defined area. (36 CFR 219.19)

landscape character – Particular attributes, qualities, and traits of landscape that give it an image and make it identifiable or unique.

landtype – An intermediate level in the ecological classification system hierarchy that addresses land areas ranging in size from hundreds of acres up to ten thousands of acres. These units typically have similarities in landform, natural vegetative communities, and soils.

landtype association – A group of landtypes. The landtypes in the association are sufficiently homogeneous to be considered as a whole for modeling the future outputs and effects of planned management activities. Landtype associations may not follow watershed boundaries, and are defined on the basis of general similarities in climate, geology, landform, and vegetation.

landtype phase – The most detailed level in the ecological classification system hierarchy that addresses local geology, soils, streams, and vegetation types. Land areas are generally less than 100 acres in size.

large wood (LW) - Any piece(s) of dead woody material, e.g., dead boles, limbs, and large root masses, on the ground in forest stands or in streams —synonym coarse woody debris (CWD), large woody debris (LWD), large organic debris (LOD), down woody debris (DWD) —note the type and size of material designated as coarse woody debris varies among classification systems. For systems on the Francis Marion, large wood is >10 cm in diameter and >1 m in length.

large woody debris (LWD) – Logs, sticks, branches, and other wood that falls into streams and rivers. This debris can influence the flow and the shape of the stream channel.

late- seral (successional) stage – The stage of forest development at which overstory trees have attained most of expected height growth and have reached ecological maturity. As used in the environmental impact statement and the forest plan, this successional stage is generally defined by stand ages greater than 80 years for most hardwood types, and by stand ages greater than 60 years for most pine types. Old-growth forests occur during the later periods of this seral stage at ages that vary by forest type and in response to a variety of environmental conditions. See successional stage.

lead objector – For an objection submitted with multiple individuals, multiple entities, or combination of individuals and entities listed, the individual or entity identified to represent all

other objectors for the purposes of communication, written or otherwise, regarding the objection. (36 CFR 219.62)

lease – A contract between the landowner and another granting the latter the right to search for and produce oil, gas, or other mineral substances (as specified in the document) on payment of an agreed rental, bonus, or royalty. This right is subject to the terms, conditions, and limitations specified in the document.

leave tree – A tree (marked to be) left standing for wildlife, seed production, etc., in an area where it might otherwise be felled.

limits of acceptable change (LAC) – A planning process used to establish acceptable wilderness resource and social conditions and prescribe appropriate management actions.

line officer – A Forest Service official who serves in a direct line of command from the Chief. (36 CFR 219.62)

listed species – Any species of fish, wildlife, or plant officially designated as endangered or threatened by the Secretary of the Interior or Commerce. Listed species are documented in 50 CFR 17.11 and 17.12.

local road – Roads that connect terminal facilities with forest collector or forest arterial roads, or public highways. Forest local roads may be developed and operated for either long- or short-term service. These roads are generally single lane.

logging – The felling, skidding, on-site processing, and loading of trees or logs onto trucks.

long-term facilities – Facilities that are developed and operated for long-term land management and resource utilization needs. They may be operated for constant or intermittent service.

1. constant service – Facilities developed and operated for continuous or annual recurrent service.

2. intermittent service – Facilities developed and operated for periodic service and closed for more than one year between periods of use. Closure is by means other than a gate.

long-term sustained-yield capacity – The highest uniform wood yield from lands being managed for timber production that may be sustained under a specified management intensity, consistent with multiple-use objectives.

low PSI skidder – A term used to identify any one of several types of vehicles used to move logs from stump to log loading area. Low PSI (pounds per square inch) identifies those vehicles that, because of design of tracks, wheels, or suspension system, exert much lower pressure on ground surface than other types of ground-based skidding vehicles.

M

machine planting – A method by which tree seedlings are planted by mechanical means rather than by hand.

maintain – In reference to an ecological condition: To keep in existence or continuance of the desired ecological condition in terms of its desired composition, structure, and processes.

Depending upon the circumstance, ecological conditions may be maintained by active or passive management or both. (36 CFR 219.19)

management action – A set of management activities applied to a land area to produce a desired output.

management area – A land area identified within the planning area that has the same set of applicable plan components. A management area does not have to be spatially contiguous. (36 CFR 219.19)

management attainment report (MAR) – A process used in determining whether work is progressing as planned. It provides the manager with information for measuring progress against objectives, information for measuring self and subordinates' performance, and an indication of a reporting unit's performance.

management concern – An issue, problem, or condition which constrains the range of management practices identified by the Forest Service in the planning process.

management intensities – The set and schedule of management practices typically used for certain forest or timber types to achieve desired conditions that may include timber production.

management practices (vegetation management practices) – Silvicultural practices such as reforestation, prescribed fire, thinning to reduce stand density, and other practices designed to facilitate growth and development of trees.

mean annual increment of growth and culmination of mean annual increment of growth – The mean annual increment of growth is the total increment of increase of volume of a stand (standing crop plus thinnings) up to a given age divided by that age. The culmination of mean annual increment of growth is the age in the growth cycle of an even-aged stand at which the average annual rate of increase of volume is at a maximum. In land management plans, the mean annual increment of growth is expressed in cubic measure and is based on the expected growth of stands according to intensities and utilization guidelines in the plan (36 CFR 219.19).

management emphasis – The multiple-use values to be featured or enhanced.

management practice – A specific action, measure, course of action, or treatment undertaken on a forest.

management system – From FSH, a timber management system including even aged management and uneven-aged management (36 CFR 219.19).

management team – A decision-making group consisting of the forest supervisor, staff officers, and district rangers.

management type – The tree species or species group that should be grown on a specific site, whether or not it presently occupies the site that best suits the particular site soil, aspect, elevation, and moisture provided by the area and the forest plan's objectives.

mast tree – Generally hardwood trees of the heavy seeded variety including oaks, hickories, walnut, beech—25 years and older capable of producing frequent seed crops to feed a variety of wildlife species.

mature timber – The stage at which a crop or stand of trees best fulfills the main purpose for which it was grown.

mean annual increment of growth – The total increase in girth, diameter, basal area, height, or volume of individual trees or a stand up to a given age divided by that age.

mechanical site preparation – Soil disturbance by mechanical chopping, furrowing, dozing, or disking to prepare areas for reforestation. Objective is to reduce plant competition for trees to be planted.

mesic – Sites or habitats characterized by intermediate moisture conditions, i.e., neither decidedly wet or dry.

middle ground – The space between the foreground and the background in a picture or landscape; generally ½ mile to 4 miles distance from the viewer.

mid-seral (successional) stage – The stage of forest development during which distinct overstory, midstory, and understory canopies are developed. As used in the environmental impact statement and the forest plan, this successional stage is generally defined as stand ages of 41-80 years for most hardwood types, and as stand ages of 21-60 ages for most pine types. See successional stage.

mineral exploration – The search for valuable minerals on lands open to mineral entry.

mineral soil – Weathered rock materials without any vegetative cover.

mineral resource – A known or undiscovered concentration of naturally occurring solid, liquid, or gaseous material in or on the earth's crust in such form and amount that economic extraction of a commodity from the concentration is currently or potentially feasible.

minerals (leasable) – Coal, oil, gas, phosphate, sodium, potassium, oil shale, sulphur, and geothermal steam. All hard-rock minerals that occur on acquired lands, as opposed to public domain lands, are leasable.

minerals (salable) – Common variety deposits that—although they may have value or use in trade, manufacture, the sciences, or in the mechanical or ornamental arts—do not possess a distinct, special economic value for such use over and above the normal uses of the general sum of such deposits. These may include sand, stone, gravel, pumicite, cinders, pumice (except that occurring in pieces more than two inches on a side), clay, and petrified wood.

mitigation – Actions to avoid, minimize, reduce, eliminate, or rectify the impact of a management practice.

monitoring – A systematic process of collecting information to evaluate effects of actions or changes in conditions or relationships. (36 CFR 219.19)

mortality – Dead or dying trees resulting from forest fire, insect, diseases, or climatic factors.

motorized equipment – Machines that use a motor, engine, or other non-living power source. This includes, but is not limited to such machines as chain saws, aircraft, snowmobiles, generators, motor boats, and motor vehicles. It does not include small battery or gas powered hand carried devices that include+ shavers, wristwatches, flashlights, cameras, stoves, or other similar small equipment.

motor vehicle use map (MVUM) – The Motor Vehicle Use Map (MVUM) is a requirement of the Travel Management Final Rule and reflects travel management decisions on each National Forest and National Grassland. The MVUM is a black and white map with no topographic features. It is not a stand-alone map and is best used along with a Forest Visitor Map or other topographic map. The MVUM displays National Forest System (NFS) routes (roads and trails) or areas designated open to motorized travel. The MVUM also displays allowed uses by vehicle class (highway-legal vehicles, vehicles less than 50 inches wide and motorcycles); seasonal allowances; and other travel rule and regulation information. Routes not shown on the MVUM are not open to public motor vehicle travel. Routes designated for motorized use may not always be signed on the ground but will be identified on the MVUM. The public is responsible for referencing the MVUM to determine designated routes for motor vehicle use. MVUMs will be updated annually to correct mapping errors or discrepancies and update travel decisions.

multiple use – The management of all the various renewable surface resources of the NFS so that they are utilized in the combination that will best meet the needs of the American people; making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; that some land will be used for less than all of the resources; and harmonious and coordinated management of the various resources, each with the other, without impairment of the productivity of the land, with consideration being given to the relative values of the various resources, and not necessarily the combination of uses that will give the greatest dollar return or the greatest unit output, consistent with the Multiple-Use Sustained-Yield Act of 1960 (16 U.S.C. 528–531). (36 CFR 219.19)

multipliers – The ratio of a total impact to a component of the impact in input/output analysis. An example would be the ratio of the sum of direct, indirect, and induced impacts to direct impacts.

N

National Environmental Policy Act (NEPA) of 1969 – An act to declare a national policy that will encourage productive and enjoyable harmony between humankind and the environment. It was created to promote efforts that will prevent or eliminate damage to the environment, biosphere, and stimulate the health and welfare of humanity. In addition, the act was crafted to enrich the understanding of the ecological systems and natural resources important to the nation, and establish a Council of Environmental Quality.

National Forest Land Management Plan (forest plan) – A plan developed to meet the requirements of the Forest and Rangeland Renewable Resources Planning Act of 1974, as amended, that guides all natural resource management activities and establishes management standards and guidelines for the National Forest System lands of a given national forest.

National Forest Management Act (NFMA) of 1976 – Act passed as an amendment to the Forest and Rangeland Renewable Resources Planning Act, requiring the preparation of regional guides and forest plans, and the preparation of regulations to guide them.

national forest system (NFS) – All National Forest lands reserved or withdrawn from the public domain of the United States; all National Forest lands acquired through purchase, exchange, donation, or other means; the National Grasslands and land utilization projects administered under Title III of the Bankhead-Jones Farm Tenant Act (50 Stat. 525, 7 U.S.C. 1010-1012); the Midewin Tallgrass Prairie; and other lands, waters, or interests therein which are administered by

the Forest Service or are designated for administration through the Forest Service as a part of the system (16 U.S.C. 1608).

national forest system land – Federal land that has been legally designated as national forests or purchase units, and other land under the administration of the Forest Service, including experimental areas and Bankhead-Jones Title III land.

national forest system road – A forest road other than a road which has been authorized by a legally documented right-of-way held by a state, county, or local public road authority (36 CFR 212.1).

national forest system trail – A forest trail other than a trail which has been authorized by a legally documented right-of-way held by a state, county, or local public road authority (36 CFR 212.1).

national recreation trails – Trails designated by the Secretary of the Interior or the Secretary of Agriculture as part of the national system of trails authorized by the National Trails System Act. National recreation trails provide a variety of outdoor recreation uses, in or reasonably accessible, to urban areas.

National Register of Historic Places – The National Register of Historic Places is the Nation's official list of cultural resources worthy of preservation. Authorized under the National Historic Preservation Act of 1966, the National Register is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect our historic and archeological resources. Properties listed in the Register include districts, sites, buildings, structures, and objects that are significant in American history, architecture, archeology, engineering, and culture. The National Register is administered by the National Park Service, which is part of the U.S. Department of the Interior.

national visitor use monitoring (NVUM) – A systematic process to estimate annual recreation and other uses of National Forest lands through user surveys.

National Wild and Scenic Rivers System – Rivers with scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values designated by Congress under the Wild and Scenic Rivers Act of Oct. 2, 1968, for preservation of their free-flowing condition.

National Wilderness Preservation System – All lands covered by the Wilderness Act and subsequent wilderness designations, irrespective of the department or agency having jurisdiction.

native knowledge – A way of knowing or understanding the world, including traditional ecological and social knowledge of the environment derived from multiple generations of indigenous peoples' interactions, observations, and experiences with their ecological systems. Native knowledge is place based and culture-based knowledge in which people learn to live in and adapt to their own environment through interactions, observations, and experiences with their ecological system. This knowledge is generally not solely gained, developed by, or retained by individuals, but is rather accumulated over successive generations and is expressed through oral traditions, ceremonies, stories, dances, songs, art, and other means within a cultural context. (36 CFR 219.19)

native species – An organism that was historically or is present in a particular ecosystem as a result of natural migratory or evolutionary processes; and not as a result of an accidental or

deliberate introduction into that ecosystem. An organism's presence and evolution (adaptation) in an area are determined by climate, soil, and other biotic and abiotic factors. (36 CFR 219.19)

natural range of variation (NRV) – Spatial and temporal variation in ecosystem characteristics under historic disturbance regimes during a reference period. The reference period considered should be sufficiently long to include the full range of variation produced by dominant natural disturbance regimes, often several centuries, for such disturbances as fire and flooding and should also include short-term variation and cycles in climate. “Natural range of variation” (NRV) is a term used synonymously with historic range of variation or range of natural variation. The NRV is a tool for assessing ecological integrity, and does not necessarily constitute a management target or desired condition. The NRV can help identify key structural, functional, compositional, and connectivity characteristics, for which plan components may be important for either maintenance or restoration of such ecological conditions.

natural regeneration – An age class created from natural seeding, sprouting, suckering, or layering.

net annual growth – The net change in merchantable volume expressed as an annual average between surveys in the absence of cutting (gross growth minus mortality).

net public benefits – An expression used to signify the overall long-term value to the nation of all outputs and positive effects (benefits) less all associated inputs and negative effects (costs) whether they can be quantitatively valued. Net public benefits are measured by quantitative and qualitative criteria rather than a single measure or index. The maximization of net public benefits to be derived from management of units of the National Forest System is consistent with the principles of multiple use and sustained yield.

no-action alternative – The most likely condition expected to exist in the future if current management direction would continue unchanged.

non-commodity output – A resource output that cannot be bought and sold.

non-declining yield – A level of timber production planned so that the planned sale and harvest for any future decade is equal to, or greater than the planned sale and harvest for the preceding decade.

non-forest land – Land that has never supported forests and lands formerly forested where use for timber utilization is precluded by development for other use. Lands that never have had, or that are incapable of having 10 percent or more of the area occupied by forest trees; or lands previously having such cover and currently developed for non-forest use.

non-game species – Any species of wildlife or fish which is ordinarily not managed or otherwise controlled by hunting, fishing, or trapping regulations. The designation may vary by state.

non-point source pollution – A diffuse source of pollution not regulated as a point source. May include atmospheric, deposition, agricultural runoff, and sediment from land-distributing activities.

non-stocked stands – Stands less than 16.7 percent stocked with growing stock trees.

non-timber forest products – All forest products except timber, including resins, oils, leaves, bark, plants other than trees, fungi, and animals or animal products.

no surface occupancy (NSO) – Use or occupancy of the land surface for mineral development is prohibited to protect identified resource values

O

objection – The written document filed with a reviewing officer by an individual or entity seeking pre-decisional administrative review of a plan, plan amendment, or plan revision. (36 CFR 219.62)

objection period – The allotted filing period following publication of a public notice in the applicable newspaper of record (or the Federal Register, if the responsible official is the Chief) of the availability of the appropriate environmental documents and draft decision document, including a plan, plan amendment, or plan revision during which an objection may be filed with the reviewing officer. (36 CFR 219.62)

objection process – Those procedures established for pre-decisional administrative review of a plan, plan amendment, or plan revision. (36 CFR 219.62).

objective – An objective is a concise, measurable, and time-specific statement of a desired rate of progress toward a desired condition or conditions. Objectives should be based on reasonably foreseeable budgets.

objector – An individual or entity who meets the requirements of section 219.53, and files an objection that meets the requirements of sections 219.54 and 219.56. (36 CFR 219.62)

off-highway vehicle – Any motor vehicle designed for or capable of cross-country travel on or immediately over land, water, sand, snow, ice, marsh, swampland, or other natural terrain (36 CFR 212.1).

off-site species – Species growing or occurring on a site with conditions under which they would not occur naturally. This term is often used to refer to native plants and animals that humans have introduced outside of their normal habitats or ecosystems.

off-stream use – Water withdrawn or diverted from a ground or surface-water source for public water supply, industry, irrigation, livestock, thermoelectric power generation, and other uses.

old growth forests – An ecosystem distinguished by old trees and related structural attributes. Old growth encompasses the later stages of stand development that typically differ from earlier stages in a variety of characteristics including tree size, accumulation of large dead woody material, number of canopy layers, species composition, and ecosystem function. Old growth is not necessarily virgin or primeval. It can develop over time following human disturbances, just as it does following natural disturbances. Old growth encompasses older forests dominated by early seral species, and forests in later successional stages dominated by shade tolerant species.

online – Refers to the appropriate Forest Service website or future electronic equivalent. (36 CFR 219.62)

on-site – A term referring to species normally found on a site under natural conditions. The same or contiguous property that may be divided by a public or private right-of-way, provided that the entrance and exit between the properties is at a crossroads intersection, and that access is by crossing, as opposed to going along the right-of-way.

open water wetland - Deeper, normally perennial pools within wetlands and shallow portions of lakes and rivers. Typically home to submerged macrophytes.

operating plan – A written plan, prepared by those engaged in mining activity on the forests, and approved by a forest officer for prospecting, exploration, or extraction activities that are slated to take place on National Forest System land.

optional plan component – A plan may include goals as plan components. Goals are broad statements of intent, other than desired conditions, usually related to process or interaction with the public. Goals are expressed in broad, general terms, but do not include completion dates.

ordinary high water mark – The line on the shore established by the fluctuation of water, and is indicated by physical characteristics including a clear, natural line impressed on the bank; shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter, debris, or other appropriate means that consider the characteristics of the surrounding area.

output – The goods, end products, or services that are purchased, consumed, or used directly by people. Goods, services, products, and concerns produced by activities that are measurable and capable of being used to determine the effectiveness of programs and activities in meeting objectives. A broad term for describing any result, product, or service that a process or activity actually produces.

output, minimum level – The amount of an output that will occur regardless of management activity.

outstanding mineral rights – Instances in which the minerals in federally- owned lands were severed prior to the transaction in which government acquired the land. Such rights are not subject to the Secretary of Agriculture's rules and regulations. Removal or extraction of these minerals must be allowed in accordance with the instrument severing the minerals from the surface and under applicable state and local laws and regulations.

outstandingly remarkable value (ORV) – A scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar river-related value that is unique, rare, or exemplary feature and is significant when compared with similar values from other rivers at a regional or national scale.

overstory – That portion of trees in a two- or multi-layered forest stand that provides the upper crown cover.

overstory removal – The cutting of trees comprising an upper canopy layer in order to release trees or other vegetation in an understory.

P

persons-at-one-time (PAOT) –; a measure of recreation carrying capacity, especially for developed sites. National conventions include 5 persons per family picnic/camp unit, 3.5 persons per parking lot stall at a trailhead or visitor center, 1.5 persons per motorcycle parking stall and 40 persons per tour bus parking stall.

participation – Activities that include a wide range of public involvement tools and processes, such as collaboration, public meetings, open houses, workshops, and comment periods. (36 CFR 219.19)

partnership – Voluntary, mutually beneficial and desired arrangement between the Forest Service and another or others to accomplish mutually agreed-on objectives consistent with the agency’s mission and serving the public’s interest.

payments in lieu of taxes (PILT) – Payments to local or state governments based on ownership of federal land, and not directly dependent on production of outputs or receipt sharing.

per capita use – The average amount of water used person during a standard time period, generally per day.

perennial stream – Any watercourse that generally flows most of the year in a well-defined channel and is below the water table. Droughts and other precipitation patterns may influence the actual duration of flow. It contains fish or aquatic insects that have larvae with multi-year life cycles. Water-dependent vegetation is typically associated with perennial streams.

person-year – About 2,000 working hours that may be filled by one person working during the course of one year or several people working a total of 2,000 hours.

perennial stream – A stream or reach of a channel that flows continuously or nearly so throughout the year and whose upper surface is generally lower than the top of the zone of saturation in areas adjacent to the stream. These streams are identified as solid blue on the USGS 7 1/2-inch quadrangle maps.

persistence – Continued existence (36 CFR 219.19).

petrographic – The description and systematic classification of rocks.

physiographic region – A region of similar geologic structure and climate that has had a unified geomorphic history.

plan area – The NFS lands covered by a plan. (36 CFR 219.19)

plan components – Guide future project and activity decisionmaking. The plan must indicate whether specific plan components apply to the entire plan area, to specific management areas or geographic areas, or to other areas as identified in the plan. Every plan must include the following plan components:

1. Desired conditions. A description of specific social, economic, and/or ecological characteristics of the plan area, or a portion of the plan area, toward which management of the land and resources should be directed. Desired conditions must be described in terms that are specific enough to allow progress toward their achievement to be determined, but do not include completion dates.
2. Objectives. A concise, measurable, and time-specific statement of a desired rate of progress toward a desired condition or conditions. Objectives should be based on reasonably foreseeable budgets.
3. Standards. A mandatory constraint on project and activity decisionmaking, established to help achieve or maintain the desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.
4. Guidelines. A constraint on project and activity decisionmaking that allows for departure from its terms, so long as the purpose of the guideline is met. (§ 219.15(d)(3)). Guidelines are

established to help achieve or maintain a desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.

5. Suitability of lands. Specific lands within a plan area will be identified as suitable for various multiple uses or activities based on the desired conditions applicable to those lands. The plan will also identify lands within the plan area as not suitable for uses that are not compatible with desired conditions for those lands. The suitability of lands need not be identified for every use or activity. Suitability identifications may be made after consideration of historic uses and of issues that have arisen in the planning process. Every plan must identify those lands that are not suitable for timber production (§ 219.11).

plan or land management plan – A document or set of documents that provide management direction for an administrative unit of the NFS developed under the requirements of this part or a prior planning rule. (36 CFR 219.19)

plan monitoring program – The plan monitoring program sets out the plan monitoring questions and associated indicators, based on plan components. The plan monitoring program informs management of resources on the plan area and enables the responsible official to determine if a change in plan components or other plan content that guide management of resources on the plan area may be needed.

planning criteria – Standards, tests, rules, and guidelines by which the planning process is conducted, and upon which judgments and decisions are based.

planning horizon – The overall time period considered in the planning process that spans all activities covered in the analysis or plan. All future conditions and effects of proposed actions which would influence the planning decisions.

planning period – One decade. The time interval within the planning horizon that is used to show incremental changes in yields, costs, effects, and benefits.

planning record – Includes documents that support analytical conclusions made and alternatives considered throughout the planning process. (36 CFR 219.14)(b)(2))

plant and animal community – A naturally occurring assemblage of plant and animal species living within a defined area or habitat. (36 CFR 219.19)

plasticity- The degree to which “puddled” or reworked soil can be permanently deformed without rupturing. The evaluation is made by forming a roll (wire) of soil at a water content where the maximum plasticity is expressed.

Plasticity Class	Soil Science Conventional (Conv)	National Soil Information System (NASIS)	Criteria: make a roll of soil 4 cm long
Nonplastic	(w) po	PO	Will not form a roll 6 mm in diameter, or if a roll is formed, it can't support itself if held on end.
Slightly Plastic	(w) ps	SP	6 mm diameter roll supports itself; 4 mm diameter roll does not.
Moderately Plastic	(w)p	MP	4 mm diameter roll supports itself; 2 mm diameter roll does not
Very Plastic	(w) vp	VP	2 mm diameter roll supports its weight.

possible old growth – areas with the highest probability of being existing or future old growth based on the preliminary inventory criteria as described in the "Guidance for Conserving and Restoring Old-Growth Forest Communities on National Forests in the Southern Region".

pre-commercial thinning – The selective felling, deadening, or removal of tree in a young stand not for immediate financial return, but primarily to accelerate diameter increment on the remaining stems. To maintain a specific stocking or stand density range, or to improve the vigor and quality of the remaining trees.

prescribed burning – Application of prescribed fire.

prescribed fire – Any fire intentionally ignited by management actions in accordance with applicable laws, policies, and regulations to meet specific objectives.

present net value – The difference between the discounted value (benefits) of all outputs to which monetary values or established market prices are assigned and the total discounted costs of managing the planning area.

presuppression – Activities required in advance of fire occurrence to ensure effective suppression action, including: (1) recruiting and training fire forces, (2) planning and organizing attack methods, (3) procuring and maintaining fire equipment, and (4) maintaining structural improvements necessary for the fire program.

primitive road – Roads constructed with no regard for grade control or designed drainage, sometimes by merely repeated driving over an area. These roads are single lane, usually with native surfacing and sometimes passable with four-wheel drive vehicles only, especially in wet weather.

priority heritage assets – Heritage assets of distinct public value that are or should be actively maintained and meet one or more of the following criteria:

1. The significance and management priority of the property is recognized through an official designation such as listing on the National Register of Historic Places or on a State register.
2. The significance and management priority of the property is recognized through prior investment in preservation, interpretation, and use.
3. The significance and management priority of the property is recognized in an agency–approved management plan.
4. The property exhibits critical deferred maintenance needs and those needs have been documented. Critical deferred maintenance is defined as a potential health or safety risk or imminent threat of loss of significant resource values.

proclamation boundary – The boundary contained within the presidential proclamation that established the national forest.

productivity – The capacity of NFS lands and their ecological systems to provide the various renewable resources in certain amounts in perpetuity. For the purposes of this Handbook, productivity is an ecological term, not an economic term (36 CFR 219.19).

productive deferred – Productive (capable) forest land which has been legislatively designated or administratively designated by the Secretary of Agriculture or Chief of the Forest Service for

wilderness study or possible additions to the Wilderness System. This classification includes RARE II area designated as wilderness, but does not include RARE II areas designated as “further planning.”

productivity class – A classification of the capacity of a given piece of land for timber growth is expressed in cubic feet per acre a year.

Class I - Lands capable of producing 120 cubic feet or more per acre a year.

Class II - Lands capable of producing 85 to 119 cubic feet per acre a year.

Class III - Lands capable of producing 50 to 84 cubic feet per acre a year.

Class IV - Lands capable of producing 20 to 49 cubic feet per acre a year.

program – Sets of activities or projects with specific objectives, defined in terms of specific results and responsibilities for accomplishments.

program budget – The schedule of projects and activities to be carried out on the forest for a year for which funds have been appropriated.

program development and budgeting – The process by which activities for the forest are proposed and funded.

project – An organized effort to achieve an outcome on NFS lands identified by location, tasks, outputs, effects, times, and responsibilities for execution. (36 CFR 219.19)

projected timber sale quantity (PTSQ) – The estimated quantity of timber meeting applicable utilization standards that is expected to be sold during the plan period. As a subset of the projected wood sale quantity (PWSQ), the projected timber sale quantity includes volume from timber harvest for any purpose from all lands in the plan area based on expected harvests that would be consistent with the plan components. The PTSQ is also based on the planning unit’s fiscal capability and organizational capacity. PTSQ is not a target nor a limitation on harvest, and is not an objective unless the responsible official chooses to make it an objective in the plan.

projected wood sale quantity (PWSQ) – The estimated quantity of timber and all other wood products that is expected to be sold from the plan area for the plan period. The PWSQ consists of the projected timber sale quantity as well as other woody material such as fuelwood, firewood, or biomass that is also expected to be available for sale. The PWSQ includes volume from timber harvest for any purpose based on expected harvests that would be consistent with the plan components. The PWSQ is also based on the planning unit’s fiscal capability and organizational capacity. PWSQ is not a target nor a limitation on harvest, and is not an objective unless the responsible official chooses to make it an objective in the plan.

proposed action – In terms of the National Environmental Policy Act, the project, activity, or decision that a federal agency intends to implement or undertake. The proposed action described in the environmental impact statement is the forest plan.

proposed species – Any species of fish, wildlife, or plant that is proposed by the U. S. Fish and Wildlife Service or the National Marine Fisheries Service in the Federal Register to be listed under Section 4 of the Endangered Species Act. (36 CFR 219.19)

proposed wilderness – Areas recommended for wilderness by the Forest Service as a result of the RARE II study, but which have yet to be acted on by Congress.

prospecting permit – A written instrument or contract between the landowner and another conveying to the latter the right to enter the former's property and search for mineral materials. Two types of permits are used: (1) a BLM Prospecting Permit is issued by the Bureau of Land Management upon recommendation of the Forest Service. In most cases, these are preference right permits in which the prospector has the first opportunity, to the exclusion of all others, to lease any minerals discovered, and (2) a Forest Service Prospecting Permit issued by the Forest Service. No preference rights are conveyed under Forest Service permits, except in some cases of common varieties on acquired lands.

public domain land – Original holdings of the United States that were never granted or conveyed to other jurisdictions or reacquired by exchange for other public domain lands.

public issue – A subject or question of widespread public interest relating to management of the National Forest System.

public and governmental participation – Phrase used as shorthand for participation by all Tribes and Alaska Native Corporations, other Federal agencies, State and local governments, public and private organizations and interested individuals. This can include people and government and non-governmental entities in other countries, for example, where plan areas are adjacent or proximate to international borders.

public participation activities – Meetings, conferences, seminars, workshops, tours, written comments, survey questionnaires, and similar activities designed or held to obtain comments from the general public and specific publics.

public roads – Roads across national forest land which were in place as public ways when these lands were acquired. These roads may be a part of the forest, state, or county system, and may be maintained by any of these agencies.

public supply – Water withdrawn by public and private water suppliers and delivered to users.

pulpwood – Wood cut and prepared primarily for manufacture into wood pulp.

pure stand – A stand composed of essentially a single tree species, conventionally at least 85 percent based on numbers, basal areas, or volumes.

Q

qualifiers – Measurable characteristics of outputs and activities. They characterize properties or attributes of activities or outputs.

R

raking – A term used in land clearing whereby crawler tractors, or other types of similar heavy equipment, with a large rake device attached to the front end, are used to push clearing debris into piles or windrows.

ranger district – Administrative subdivisions of the forest supervised by a District Ranger who reports to the Forest Supervisor.

rare species – Any native or once-native species of wild animal which exists in small numbers, and has been determined to need monitoring. May include peripheral species.

real dollar value – A monetary value, which compensates for the effects of inflation.

reasonable assurance – A judgment made by the Responsible Official based on best available scientific information and local professional experience that practices based on existing technology and knowledge are likely to deliver the intended results. Reasonable assurance applies to average and foreseeable conditions for the area and does not constitute a guarantee to achieve the intended results.

receipt shares – The portion of receipts derived from Forest Service resource management that is distributed to state and county governments, including the Forest Service, 25 percent fund payments.

reconstruction – Work that includes, but is not limited to, widening of roads, improving alignment, providing additional turnouts, and improving sight distance that improve the standard to which the road was originally constructed. Also undertaken to increase the capacity of the road or to provide greater traffic safety.

record of decision – A document separate from, but associated with an environmental impact statement that publicly and officially discloses the responsible official's decision on the alternative assessed in the environmental impact statement chosen to implement.

recovery – For the purposes of this Handbook and with respect to threatened or endangered species: The improvement in the status of a listed species to the point at which listing as federally endangered or threatened is no longer appropriate (36 CFR 219.19).

recreation – Leisure time activity including swimming, picnicking, camping, boating, hiking, hunting, and fishing.

recreation alignment – To align or allocate the recreation resources (activities and opportunities) of an area with the niche and markets of the that area.

recreation capacity – A measure of the number of people a site can reasonably accommodate at one time; sometimes measured as PAOTs.

recreation opportunity – An opportunity to participate in a specific recreation activity in a particular recreation setting to enjoy desired recreation experiences and other benefits that accrue. Recreation opportunities include non-motorized, motorized, developed, and dispersed recreation on land, water, and in the air (36 CFR 219.19).

recreation opportunity spectrum – A method for classifying types of recreation experiences available, or for specifying recreation experience objectives desired in certain areas. Classes are: Primitive, Semi-Primitive Non-Motorized, Semi-Primitive Motorized, Roaded Natural, Rural, and Urban.

- **Primitive ROS** An area characterized by having essentially unmodified natural environment of fairly large size. Interaction between users is very low and evidence of other users is minimal. The area is managed to be essentially free from evidence of human-induced restrictions and controls. Motorized use within the area is not permitted.

The recreation experience opportunity level provided would be characterized by the extremely high probability of experiencing isolation from the sights and sounds of humans, independence, closeness to nature, tranquility, and self-reliance through the application of woodsmen and outdoor skills in an environment that offers a high degree of challenge and risk.

- **Semi-Primitive Non-Motorized (ROS)** An area characterized by a predominantly natural or natural-appearing environment of moderate-to-large size. Interaction between users (or concentration of users) is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present but are subtle.

The recreation experience opportunity level provided would be characterized by the high, but not extremely high (or moderate) probability of experiencing isolation from the sights and sounds of humans, independence, closeness to nature, tranquility, and self-reliance through the application of woodsmen and outdoor skills in an environment that offers challenge and risk. (The opportunity to have a high degree of interaction with the natural environment.) Motorized use is not permitted.

- **Semi-Primitive Motorized (ROS)** An area characterized by a predominantly natural or natural-appearing environment of moderate-to-large size. Interaction between users (or concentration of users) is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present but are subtle.

The recreation experience opportunity level provided would be characterized by the high, but not extremely high (or moderate) probability of experiencing isolation from the sights and sounds of humans, independence, closeness to nature, tranquility, and self-reliance through the application of woodsmen and outdoor skills in an environment that offers challenge and risk. (The opportunity to have a high degree of interaction with the natural environment.) Motorized use is permitted.

- **Roaded Natural (ROS)** An area characterized by predominantly natural-appearing environments with moderate evidences of the sights and sounds of man. Such evidences usually harmonize with the natural environment. Interaction between users may be low to moderate, but with evidence of other users prevalent. Resource modification and utilization practices are evident, but harmonize with the natural environment. Conventional motorized use is provided for in construction standards and design of facilities.

The recreation opportunity experience level provided would be characterized by the probability for equal experiencing of affiliation with individuals and groups and for isolation from sights and sounds of humans. Opportunities for both motorized and non-motorized forms of recreation may be provided.

- **Rural (ROS)** A classification for areas characterized by a substantially modified natural environment. Resource modification and utilization practices are to enhance specific recreation activities and to maintain vegetative cover and soil, but harmonize with the natural environment. A considerable number of facilities are designed for use by a large number of people. Moderate densities are provided away from developed sites. Facilities for intensified motorized use and parking are provided.

The recreation opportunity experience level provided would be characterized by the probability for experiencing affiliation with individuals and groups is prevalent, as is the

convenience of sites and opportunities. These factors are generally more important than the setting. Opportunities for wildland challenge, risk taking, and testing of outdoor skills are generally unimportant.

- **Urban (ROS)** An area characterized by a substantially urbanized environment, although the background may have natural-appearing elements. Renewable resources modification and utilization practices are to enhance specific recreation activities. Vegetative cover is often exotic and manicured. Sights and sound of humans, on-site, are predominant. Large numbers of users can be expected, both on-site and in nearby areas. Facilities for highly intensified motor use and parking are available with forms of mass transit often available to carry people throughout the site.

The recreation opportunity experience level provided would be characterized by the probability for experiencing affiliation with individuals and groups is prevalent, as is the convenience of sites and opportunities. Experiencing natural environments, having challenges and risk afforded by the natural environment, and the use of outdoor skills are relatively unimportant. Opportunities for competitive and spectator sports and for passive uses of highly human-influenced parks and open spaces are common.

recreation setting – The social, managerial, and physical attributes of a place that, when combined, provides a distinct set of recreation opportunities. The Forest Service uses the recreation opportunity spectrum to define recreation settings and categorize them into six distinct classes: primitive, semi-primitive non-motorized, semi-primitive motorized, roaded natural, rural, and urban. (36 CFR 219.19)

recreation visit – The entry of one person upon a National Forest to participate in recreation activities for an unspecified period of time. A NF visit can be composed of multiple site visits.

red-cockaded woodpecker (RCW) cluster - A cluster is at minimum 10 acres and includes all cavity trees used by a group of red-cockaded woodpeckers and a 200-foot wide buffer of continuous forest.

redundancy – The presence of multiple occurrences of ecological conditions such that not all occurrences may be eliminated by a catastrophic event.

reforestation – The re-establishment of forest cover by seeding, planting, and natural means.

regeneration – The act of renewing of a tree crop by establishing young trees by naturally or artificially. The young crop itself.

regeneration harvest – Any removal of trees intended to assist in the regeneration of a new age class or to make regeneration of a new age class possible. Regeneration harvest may be through even-aged or uneven-aged methods.

regeneration (reproduction) method – A cutting procedure by which a new age class is created. The major methods are clearcutting, seed-tree, shelterwood, selection, and coppice.

regeneration (reproduction) period – The time between the initial regeneration cutting and the successful re-establishment of a new age class by natural means, planting, or direct seeding.

Region 8 – The states that make up the Southern Region of the USDA Forest Service.

regional forester – The official responsible for management of National Forest land within a USDA Forest Service region.

removal cut – The cut which removes the last seed bearers of a seed tree or shelterwood regeneration method after the new seedling stand is considered to be established.

representativeness – The presence of a full array of ecosystem types and successional states, based on the physical environment and characteristic disturbance processes.

research natural area – An area set aside by the Forest Service specifically to preserve a representative sample of an ecological community, primarily for scientific and educational purposes. Commercial exploitation is not allowed and general public use is discouraged.

reserve trees – Trees, pole-sized or larger, retained after the regeneration period under the clearcutting, seed-tree, shelterwood, or coppice methods.

reserved mineral rights – Refers to those cases wherein the minerals were severed from the surface during the transaction whereby the government acquired the land. These rights are subject to the Secretary of Agriculture's rules and regulations that were applicable at the time of the transaction.

resilience – The ability of an ecosystem and its component parts to absorb, or recover from the effects of disturbances through preservation, restoration, or improvement of its essential structures and functions and redundancy of ecological patterns across the landscape.

resource – An aspect of human environment which renders possible, or facilitates the satisfaction of, human wants, and the attainment of social objectives.

responsible official – The official with the authority and responsibility to oversee the planning process and to approve a plan, plan amendment, and plan revision. (36 CFR 219.62)

restoration, ecological – The process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed. Ecological restoration focuses on reestablishing the composition, structure, pattern, and ecological processes necessary to facilitate terrestrial and aquatic ecosystems sustainability, resilience, and health under current and future conditions (36 CFR 219.19).

restoration, functional – Restoration of abiotic and biotic processes in degraded ecosystems. Functional restoration focuses on the underlying processes that may be degraded, regardless of the structural condition of the ecosystem. Functionally restored ecosystem may have a different structure and composition than the historical reference condition. As contrasted with ecological restoration that tends to seek historical reference condition, the functional restoration focuses on the dynamic processes that drive structural and compositional patterns. Functional restoration is the manipulation of interactions among process, structure, and composition in a degraded ecosystem to improve its operations. Functional restoration aims to restore functions and improve structures with a long-term goal of restoring interactions between function and structure. It may be, however, that a functionally restored system will look quite different than the reference condition in terms of structure and composition and these disparities cannot be easily corrected because some threshold of degradation has been crossed or the environmental drivers, such as climate, that influenced structural and (especially) compositional development have changed.

restore – To renew by the process of restoration. See restoration (36 CFR 219.19).

retention – A visual quality objective in which man’s activities are not evident to the casual forest visitor.

revegetation – The re-establishment and development of a plant cover. This may take place naturally through the reproductive processes of the existing flora or artificially through the direct action of humans (e.g.: afforestation and range reseeding).

reviewing officer – The USDA or Forest Service official having the delegated authority and responsibility to review an objection filed under this subpart. (36 CFR 219.62)

revision – To make the plan new or up-to-date. Plan revision must be considered and approved in accordance with the requirements for the development and approval of a forest plan. Revisions take place every 10-15 years, but may occur more frequently if conditions or public demands change significantly.

right-of-way (ROW) – Public or National Forest System lands authorized to be used or occupied pursuant to a ROW grant or special use authorization.

riparian areas – Three-dimensional ecotones [the transition zone between two adjoining communities] of interaction that include terrestrial and aquatic ecosystems that extend down into the groundwater, up above the canopy, outward across the floodplain, up the near-slopes that drain to the water, laterally into the terrestrial ecosystem, and along the water course at variable widths (36 CFR 219.19).

riparian-dependent resources – Resources that owe their existence to the riparian area.

riparian ecosystems – A transition area between the aquatic ecosystem and the adjacent terrestrial ecosystem; identified by soil characteristics or distinctive vegetation communities that require free or unbound water.

riparian functions – Activities that occur in a riparian area without the influence of management activities. Functions include erosion and deposition by the streams, nutrient cycling, movement and storage of water, vegetative succession, etc.

riparian management zone – Portions of a watershed where riparian-dependent resources receive primary emphasis, and for which plans include plan components to maintain or restore riparian functions and ecological functions. (36 CFR 219.19)

ripping – A process where the soil is mechanically sliced or broken to improve tilth, aeration, and permeability.

risk – A combination of the likelihood that a negative outcome will occur and the severity of the subsequent negative consequences. (36 CFR 219.19)

river classifications (Wild and Scenic Rivers) –

(1) wild – Rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America.

(2) scenic – Rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.

(3) Recreational – Rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.

road – A motor vehicle travelway over 50 inches wide, unless designated and managed as a trail. A road may be classified, unclassified or temporary. (1) Classified roads. Roads wholly or partially within or adjacent to National Forest System lands that are determined to be needed for long-term motor vehicle access, including State roads, county roads, privately owned roads, National Forest System roads, and other road authorized by the Forest Service. (2) Temporary Roads. Roads authorized by contract, lease, other written authorization, or emergency operation not intended to be part of the forest transportation system and not necessary for long-term resource management. (3) Unclassified Roads. Roads on National Forest System lands that are not managed as part of the forest transportation system, such as unplanned roads, abandoned travelways, and off-road vehicle tracks that have not been designated and managed as a trail; and those roads that were once under permit or other authorization and were not decommissioned upon the termination of the authorization.

road, constant service – A facility on the transportation system developed and operated for long-term land management and resource utilization needs. It is also operated for continuous or annual recurrent service. System-open roads generally remain open for public use except for seasonal closures to prevent road damage due to bad weather conditions.

road, intermittent service – A facility on the transportation system that is developed and operated for long-term land management and resource utilization needs. It is operated for periodic service and closed for more than one year between periods of use. System-closed roads are generally built to access logging sites and are closed once logging activities are completed. They can be re-opened several years later, however, when access is once again needed to the site.

road closure – A technique used by management to regulate and control the use of facilities to achieve transportation economy, user safety, protection of the public investment, and accomplishment of forest resource objectives. It may be intermittent or long term.

road density – A measure of the total length of road in any given unit of area (e.g.: 4 miles/square mile.)

road maintenance levels – A formally established set of objectives that describes the conditions necessary to achieve the planned operation of a road. The levels vary from Level I, basic custodial care, to Level V, which is assigned high use roads in which user safety and comfort are important considerations.

roadless area – Undeveloped federal land within which there are no improved roads or roads maintained for travel by means of motorized vehicles intended for highway use.

Roadless Area Review and Evaluation (RARE) II – The assessment of “primitive” areas within the national forests as potential wilderness areas as required by the Wilderness Act documented in the final environmental impact statement of the Roadless Area Review and Evaluation, January 1979.

RARE II area – An area of land identified during the RARE II and the re-evaluation process as having potential for inclusion in the National Wilderness Preservation System.

RARE II inventory boundary – A boundary established with public input surrounding large areas of primarily Forest Service lands for the purpose of evaluation during the RARE II process. These lands meet minimum Forest Service criteria for potential wilderness.

rotation – The number of years required to establish, including the regeneration period and grow timber crops, to a specified condition or maturity for harvest.

roundwood – Timber and fuelwood prepared in the round state - from felled trees to material trimmed, barked, and crosscut (e.g.: logs and transmission poles).

RPA Program – The recommended direction for long-range management of renewable resources of National Forest System lands. This direction serves as the basis for the regional targets assigned to the forest. The development of this direction is required by the Forest and Rangeland Renewable Resources Planning Act.

runoff – The total stream discharge of water from a watershed including surface and subsurface flow, but not groundwater. Usually expressed in acre-feet.

rural – A recreation opportunity spectrum classification for areas characterized by a substantially modified natural environment. Sights and sounds of man are evident. Renewable resource modification and utilization practices enhance specific recreation activities or provide soil and vegetative cover protection.

rural water use – Term used in previous water-use circulars to describe water used in suburban or farm areas for domestic and livestock needs. The water is generally self-supplied.

S

sacred site (Executive Order 13007) – Indian Sacred Sites, defines an Indian Sacred Site as “any specific, discrete, narrowly delineated location on Federal land that is identified by an Indian tribe, or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion; provided that the Indian tribe or appropriately authoritative representative of an Indian religion has informed the agency of the existence of such a site.”

sale schedule – The quantity of timber planned for sale by time period from an area of suitable land covered by a forest plan. The first period (usually a decade) of the selected sale schedule provides the allowable sale quantity. Future periods are shown to establish that long-term sustained yield will be achieved and maintained.

salt-water influx - The movement of saline water into freshwater surface waters (rivers, streams, lakes, ponds and wetlands) resulting in salinity levels higher than current conditions.

salt-water intrusion – The movement of saline water into freshwater aquifers resulting in salinity levels higher than current conditions.

salvage harvest – The removal of dead trees or trees damaged or dying because of injurious agents, other than competition, that recovers economic value that would otherwise be lost, or because the removal of the dead or damaged trees contributes to achieving plan desired conditions or objectives.

sanitation cutting – The removal of trees to improve stand health and to reduce actual or anticipated spread of insects and disease.

sapling – A usually young tree that is larger than a seedling, but smaller than a pole. Size varies by region.

savannas – An open area with trees covering less than 25 percent and with herbaceous species dominating.

sawtimber – Trees suitable in size and quality for producing logs that can be processed into dimension lumber.

scenery management system (SMS) – An overall framework for the orderly inventory, analysis, and management of scenery (FSM 2382).

scenic character – A combination of the physical, biological, and cultural images that gives an area its scenic identity and contributes to its sense of place. Scenic character provides a frame of reference from which to determine scenic attractiveness and to measure scenic integrity. (36 CFR 219.19)

scenic attractiveness – The scenic importance of a landscape based on human perceptions of the intrinsic beauty of landform, rockform, waterform, and vegetation pattern. Classified as A (Distinctive), B (Typical or Common), or C (Undistinguished).

scenic class – A system of classification describing the importance or value of a particular landscape or portions of that landscape. Values range from 1 (highest value) to 7 (lowest value).

scenic integrity objectives (SIOs) – These are developed for forest plans. Scenic integrity objectives are Very High-unaltered, High-appears unaltered, Moderate-slightly altered, and Low-moderately altered. A desired level of excellence based on physical and sociological characteristics of an area. Refers to the degree of acceptable alterations of the characteristic landscape. Objectives include Very High, High, Moderate, and Low.

- Very High (VH) - Generally provides for only ecological changes in natural landscapes and complete intactness of landscape character in cultural landscapes.
- High (H) - Human activities are not visually evident to the casual observer. Activities may only repeat attributes of form, line, color, and texture found in the existing landscape character.
- Moderate (M) - Landscapes appear slightly altered. Noticeable human created deviations must remain visually subordinate to the landscape character being viewed.
- Low (L) - Landscapes appear moderately altered. Human created deviations begin to dominate the valued landscape character being viewed but borrow from valued attributes such as size, shape, edge effect, and pattern of natural openings, vegetative type changes, or architectural styles outside the landscape being viewed.

scoured channel – A definable channel of flow where surface water converges with enough energy to remove soil, organic matter, and leaf litter.

secondary processor – A mill that processes partially manufactured wood (a wood product such as chips or lumber), into a finished product. Examples include paper and furniture.

sediment – Solid mineral and organic material that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice.

seedling/sapling stands – Stands at least 16.7 percent stocked with growing stock trees, of which more than one-half of total stocking is seedlings and saplings.

seed tree – An even-aged regeneration method where in a single cut, the removal of all merchantable trees in a stand, except for a small number of widely dispersed trees retained for seed production, and to produce a new age class in a fully-exposed microenvironment.

seed-tree with reserves method – A two-aged regeneration method in which some or all of the seed trees are retained after regeneration has become established to attain goals other than regeneration.

seep – A wet area where a seasonal high water table intersects with the ground surface. Seeps that meet the definition of a wetland are included in the Riparian Corridor.

selection cutting – The removal of selected trees, particularly mature trees at planned intervals (cutting cycle), individually or in small groups, from an uneven-aged forest to realize the yield, and establish a new crop of desired tree species. Additionally, the tending of immature stand components are accomplished at each cutting cycle.

sensitivity analysis – A determination of the consequences of varying the level of one or several factors while holding other factors constant.

sensitivity level – A particular degree or measure of viewer interest in the scenic qualities of the landscape.

shearing – A method used in land clearing whereby tree stems are severed at ground line by large bladed mechanisms mounted on crawler tractors (e.g.: serrated tooth V-blade or KG blade).

shelterwood – A regeneration method of regenerating an even-aged stand in which a new age class develops beneath the partially shaped microenvironment provided by the residual trees. The sequence of treatments can include three distinct types of cuttings: (1) an optional preparatory harvest to enhance conditions for seed production; (2) an establishment harvest to prepare the seed bed, and to create a new age class; and 3) a removal harvest to release established regeneration from competition with the overwood.

shelterwood with reserves – A two-aged regeneration method in which some or all of the shelter trees are retained, well beyond the normal period of retention, to attain goals other than regeneration.

silvicultural system – A management process whereby forests are tended, harvested, and replaced, resulting in a forest of distinctive form. Systems are classified according to the method of carrying out the fellings that remove the mature crop, and provide for regeneration and according to the type of forest thereby produced.

silviculture – The art and science of controlling the establishment, growth, composition, health, and quality of forests and woodlands. Silviculture entails the manipulation of forest and woodland vegetation in stands and on landscapes to meet the diverse needs and values of landowners and society on a sustainable basis.

silvics – The study of the life history and general characteristics of forest trees and stands, with particular reference to environmental factors, as a basis for the practice of silviculture.

single-tree selection – A regeneration method of creating new age classes in uneven-aged stands in which individual trees of all size classes are removed uniformly throughout the stand to achieve desired stand structural characteristics.

site – An area in which a plant or stand grows, considered in terms of its environment, particularly as this determines the type and quality of the vegetation the area can carry.

site class – A classification of site quality, usually expressed in terms of ranges of dominant tree height at a given age or potential mean annual increment at culmination.

site preparation – The preparation of the ground surface prior to reforestation. Various treatments are applied as needed to control vegetation that will interfere with the establishment of the new crop of trees or to expose the mineral soil sufficiently for the establishment of the species to be reproduced.

site index – A series-specific measure of actual or potential forest productivity (site quality, usually for even-aged stands), expressed in terms of the average height of trees included in a specified stand component (defined as a certain number of dominants, codominants, or the largest and tallest trees per unit area) at a specified index or base age.

site productivity class – A species-specific classification of forest land in terms of inherent capacity to grow crops of industrial, commercial wood. Usually derived from the site index.

site quality (productivity) – The productive capacity of a site, usually expressed as volume production of a given species.

skid trails – A travel way through the woods formed by loggers dragging (skidding) logs from the stump to a log landing without dropping a blade and without purposefully changing the geometric configuration of the ground over which they travel.

skidding – A term for moving logs by dragging from stump to roadside, deck, or other landing.

slash – The residue left on the ground after felling, silvicultural operations, or as a result of storm, fire, girdling, or poisoning. All vegetative debris resulting from the purchaser's operations. Slash associated with construction of roads is subject to treatment according to construction specifications, all other is subject to the terms of contract provision B/BT6.7.

snag – A dead or partially dead (more than 50 percent) hardwood or pine tree which is used by many bird species for perching, feeding, or nesting.

social analysis – An analysis of the social (as distinct from the economic and environmental) effects of a given plan or proposal for action. It includes identification and evaluation of all pertinent desirable and undesirable consequences to all segments of society, stated in some comparable quantitative terms, including persons or percent of population in each affected social segment. In addition, social analysis also includes a subjective analysis of social factors not expressible in quantitative terms.

social sustainability – See sustainability.

soil enhancement – Application of methods or materials to the soil to increase its productivity and stimulate growth of vegetation.

soil productivity – The inherent capacity of a soil to support the growth of specified plants, plant communities, or a sequence of plant communities. Soil productivity may be expressed in terms of volume or weight/unit area/year, percent plant cover, or other measures of biomass accumulation.

soil survey – A term for the systematic examination of soils in the field and in laboratories; their description and classification; the mapping of kinds of soil; the interpretation of soils according to their adaptability for various crops, grasses, and trees; their behavior under use of treatment for plant production or for other purposes; and their productivity under different management systems.

soil and water resource improvement – The application of preplanned treatment measures designed to favorably change conditions of water flow, water quality, rates of soil erosion, and enhancement of soil productivity.

sole source aquifer – Underground water supply designated by the Environmental Protection Agency (EPA) as the “sole or principle” source of drinking water for an area as established under section 1424(e) of the Safe Drinking Water Act (42 U.S.C. 300h–3(e)). (36 CFR 219.19)

source water protection areas – The area delineated by a State or Tribe for a public water system (PWS) or including numerous PWSs, whether the source is ground water or surface water or both, as part of a State or tribal source water assessment and protection program (SWAP) approved by Environmental Protection Agency under section 1453 of the Safe Drinking Water Act (42 U.S.C. 300h–3(e)). (36 CFR 219.19)

southern pine beetle (SPB) – One of the many species of pine bark beetles that are present in the forest at all times. When environmental and forest conditions become favorable, the beetle populations can increase and cause substantial timber losses over extensive areas in a relatively short period of time.

special-use authorization – A permit, term permit, or easement that allows occupancy, use, rights, or privileges of National Forest System land.

special use permit – A permit issued under established laws and regulations to an individual, organization, or company for occupancy or use of National Forest land for some special purpose.

species groups – a group of species that are associated with the same habitat conditions. Groupings are made based on the ecological conditions necessary to maintain or, in the case of federally listed threatened or endangered species, recover each group member.

species of conservation concern (SCC) – 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(c))

spring – A water source located where water begins to flow from the ground due to the intersection of the water table with the ground surface. Generally flows throughout the year. Springs that are the source of perennial or intermittent streams are included in the Riparian Corridor.

stand – A contiguous group of trees sufficiently uniform in age class distribution, composition, and structure, and growing on a site of sufficiently uniform quality, to be a distinguishable unit, such as mixed, pure, even-aged, and uneven-aged stands.

stand density – A quantitative measure of stocking expressed either absolutely per unit of land in terms of number of trees, basal area, volume per unit area, or relative to some standard condition.

stand improvement – A term comprising all intermediate cuttings made to improve the composition, structure, condition, health, and growth of even-aged, two-aged, or uneven-aged stands.

standards – A standard is a mandatory constraint on project and activity decisionmaking, established to help achieve or maintain the desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.

state, county, and municipal land – Land owned by states, counties, and local public agencies or municipalities, or land leased to these governmental units for 50 years or more.

stocking – An indication of growing space occupancy of trees relative to plan-defined desired conditions for the stand or area. Common indices of stocking include the number of trees by size and spacing, percent occupancy, basal area, relative density or crown completion factor.

stratified mixture – A stand in which different tree species occupy different strata of the total crown canopy.

stratigraphic – Pertaining to strata or layers, as in a description of layers of rock types.

stratum (canopy layer) – A distinct layer of vegetation within a forest community.

streamside management zones – Land areas adjacent to natural streams, lakes, ponds, and seeps. These zones are typically designed to reduce, minimize or prevent non-point source pollution from entering a stream system (e.g.: sediment from a road or timber harvesting activity). Specific SMZ buffer widths are often defined in State Best Management Practice handbooks.

stressors – For the purposes of this Handbook, actors that may directly or indirectly degrade or impair ecosystem composition, structure, or ecological process in a manner that may impair its ecological integrity, such as an invasive species, loss of connectivity, or the disruption of a natural disturbance regime (36 CFR 219.19).

substantive formal comments – Written comments submitted to, or oral comments recorded by, the responsible official or his designee during an opportunity for public participation provided during the planning process (secs. 219.4 and 219.16), and attributed to the individual or entity providing them. Comments are considered substantive when they are within the scope of the proposal, are specific to the proposal, have a direct relationship to the proposal, and include supporting reasons for the responsible official to consider. (36 CFR 219.62)

successional stage – A period, marked by distinctiveness of structure, in the development of a forest community from establishment of tree regeneration to advanced age. In general, successional stages used in the environmental impact statement and the forest plan are defined in terms of forest age as a surrogate measure of the distinct structure at each stage generally as follows:

	Stage Pine Types	Hardwood Types
Early	0 – 10 years old	0 – 10 years old
Sapling/Pole	11 – 20 years old	11 – 40 years old
Mid	21 – 60 years old	41 – 80 years old
Late	61+ years old	81+ years old

supply – The amount of a good or service that producers are willing to provide at a specified price, time period, and conditions of sale.

surficial water – Water on or at the ground surface. Does not include ditches, canals, spillways, or other human-created flow channels.

suitability of lands – A determination that specific lands within a plan area may be used, or not, for various multiple uses or activities, based on the desired conditions applicable to those lands. The suitability of lands determinations need not be made for every use or activity, but every plan must identify those lands that are not suitable for timber production.

sustainability – The capability to meet the needs of the present generation without compromising the ability of future generations to meet their needs. For the purposes of this Handbook “ecological sustainability” refers to the capability of ecosystems to maintain ecological integrity; “economic sustainability” refers to the capability of society to produce and consume or otherwise benefit from goods and services including contributions to jobs and market and nonmarket benefits; and “social sustainability” refers to the capability of society to support the network of relationships, traditions, culture, and activities that connect people to the land and to one another, and support vibrant communities (36 CFR 219.19).

sustainable recreation – The set of recreation settings and opportunities on the National Forest System that is ecologically, economically, and socially sustainable for present and future generations. (36 CFR 219.19)

sustained yield limit (SYL) – The amount of timber, meeting applicable utilization standards, “which can be removed from [a] forest annually in perpetuity on a sustained-yield basis” (NFMA at section 11, 16 USC 1611; 36 CFR 219.11(d)(6)). It is the volume that could be produced in perpetuity on lands that may be suitable for timber production. Calculation of the limit includes volume from lands that may be deemed not suitable for timber production after further analysis during the planning process. The calculation of the SYL is not limited by land management plan desired condition, other plan components, or the planning unit’s fiscal capability and organizational capacity. The SYL is not a target but is a limitation on harvest, except when the plan allows for a departure.

sympatric – Condition where two or more closely related species live together in the same section of stream. The species have overlapping distributions. Opposite of allopatric.

T

take – To harass, harm, pursue, hunt, shoot, wound, trap, or collect, or to attempt to engage in any such conduct. (For plants, see the following paragraph c.)

- a. Harass. An intentional or negligent act or omission that creates the likelihood of injury to wildlife by annoying it to an extent that significantly disrupts normal behavioral patterns, including, but not limited to, breeding, feeding, or sheltering.
- b. Harm. An act or omission that actually injures or kills wildlife, including acts that annoy it to an extent that significantly disrupts essential behavioral patterns, including, but not limited to, breeding, feeding, or sheltering. Harm includes significant environmental modification or degradation that results in direct death or injury.
- c. Collect. Used in the Forest Service to mean the same as "remove and reduce to possession", referring to the taking of plants. "Collect" means to remove a plant from the substrate in which it grows and to hold it as a person's own. Habitat alterations that might result in adverse effects on listed plants are covered under the requirements, governing consultation in section 7 of the Endangered Species Act of 1973.

targets – Objectives assigned to the forest by the Regional Plan.

taxonomic – Classification of organisms into categories according to their natural relationships.

temporary roads – These are low standard, generally single use facilities to access an area with no permanent road access. The road is authorized by contract, permit, lease, or other written authorization, or for emergency operations. The road is not part of the forest transportation system and is not necessary for long-term resource management. The road is for non-recurrent use and the location will be restored to near original condition after use by seeding or tree planting. Any cutting, filling or culverts should be removed as part of restoration. The road location should be sufficiently blocked to not allow any continued use by vehicular traffic.

term permit – A special-use authorization to occupy and use National Forest System land, other than rights-of-way, for a specified period. It is revocable and compensable according to its terms.

thermoelectric power water use – Water used in the process of the generation of thermoelectric power.

thinning – A cutting made to reduce stand density of trees primarily to improve growth, enhance forest health, or to recover potential mortality.

thinning interval – The period of time between successive thinning entries, usually used in connection with even-aged stands.

threatened species – Any species that the Secretary of the Interior or the Secretary of Commerce has determined is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. Threatened species are listed at 50 CFR sections 17.11, 17.12, and 223.102.

tiering – A National Environmental Policy Act term used to reference the coverage of general matters in broader environmental impact statements (including national program or policy statements), with subsequent narrower statements or environmental analyses (including regional

or basinwide program statements or ultimately site-specific statements), incorporating by reference the general discussions and concentrating solely on the issues specific to the statement subsequently prepared.

timber – Wood retaining many of the recognizable characteristics of a tree: round, bark covered, and tapering, but without the limbs and leaves. In wood-industry usage, it may be “standing timber”- that portion of living trees with characteristics of value to the wood-using industry, or cut trees not yet processed beyond removing limbs and tops.

timber demand – A relationship between stumpage or delivered log price and the quantity of timber produced.

timber harvest – The removal of trees for wood fiber use and other multiple-use purposes (36 CFR 219.19).

timber production – The purposeful growing, tending, harvesting, and regeneration of regulated crops of trees to be cut into logs, bolts, or other round sections for industrial or consumer use (36 CFR 219.19).

timber removals (drain) – The merchantable volume of trees removed from the inventory by harvesting, cultural operations including stand improvement, land clearing, or changes in land use expressed as an annual average between surveys. Within national forests, removals are almost all timber harvest except that the inventory on lands withdrawn by legislative action is also normally accounted for as “removals.”

timber stand improvement – A term comprising all intermediate cuttings made to improve the composition, constitution, condition, and increment of a timber stand.

timber supply – The amount of wood raw material available to be harvested within specified parameters of time and geographic area.

timberland – Forest land that is producing or capable of producing in excess of 20 cubic feet per acre per year of industrial wood crops under natural conditions. Not withdrawn from timber utilization, and not associated with urban or rural development. Currently, inaccessible and inoperable areas are included.

tolerance – The ability of a tree to grow satisfactorily in the shade of, and in competition with, other trees.

topography – The configuration of a land surface including its relief, elevation, and the position of its natural and human-made features.

trail type – A category that reflects the predominant trail surface and general modes of travel accommodated by a trail.

- a. Standard Terra Trail. A trail that has a surface consisting predominantly of the ground and that is designed and managed to accommodate use on that surface.
- b. Snow Trail. A trail that has a surface consisting predominantly of snow or ice and that is designed and managed to accommodate use on that surface.
- c. Water Trail. A trail that has a surface consisting predominantly of water (but may include land-based portages) and that is designed and managed to accommodate use on that surface.

trailhead – The transfer point between a trail and a road, water body, or airfield, which may have developments that facilitate transfer from one mode of transportation to another. For purposes of the FSTAG (FSM 2353.27), a trailhead is a site designed and developed to provide staging for trail use and does not include:

- a. Junctions between trails where there is no other access.
- b. Intersections where a trail crosses a road or users have developed an access point, but no improvements have been provided beyond minimal signage for public safety.

traffic service levels – Describe a road’s significant traffic characteristics and operating conditions.

tribal consultation – A formal government-to-government process that enables Indian Tribes and Alaska Native Corporations to provide meaningful timely input and, as appropriate, exchange views, information, and recommendations on Forest Service proposed policies or actions that may affect their rights or interests prior to a decision. Consultation is a unique form of communication characterized by trust and respect. (See FSM 1509.05)

two-aged system – A planned sequence of treatments designed to regenerate or maintain a timber stand with two age classes. A two-aged system is a form of even-aged management.

type conversion – A change from tree species or species group to another. An example is a change from hardwoods to pine.

U

unauthorized trail – A trail that is not a forest trail or a temporary trail and that is not included in a forest transportation atlas (36 CFR 212.1).

understory – The trees and other vegetation growing under a more or less continuous cover of branches and foliage formed collectively by the upper portion (overstory) of adjacent trees and other woody growth.

uneven-aged stand – A stand of trees of three or more distinct age classes, either intimately mixed or in groups.

uneven-aged system – A planned sequence of treatments designed to regenerate or maintain a timber stand with three or more age classes. Treatments include single-tree selection, and group selection regeneration methods.

universal soil loss equation – An equation used to estimate soil erosion rates and for the design of water erosion control systems. $A = RKLSPC$ wherein A = average annual soil loss in tons per acre per year; R = rainfall factor; K = soil erodibility factor, L = length of slope; S = percent of slope; P = conservation practice factor; and C = cropping and management factor.

urban – An area characterized by a substantially urbanized environment. The background may have natural-appearing elements.

utilization standards – Utilization standards are specifications for merchantable forest products offered in a timber sale.

V

values, market – Prices of market goods and services measured in real dollars in terms of what people are willing to pay as evidenced by market transactions.

values, non-market – Prices of non-market goods and services imputed from other economic values.

vector – A matrix composed of only one row or column.

viable population – A population of a species that continues to persist over the long term with sufficient distribution to be resilient and adaptable to stressors and likely future environments. (36 CFR 219.19)

viewshed – The total landscape seen, or potentially seen from all or a logical part of a travel route, use area, or water body.

visual resource – The composite of basic terrain, geological features, water features, vegetative patterns, and land-use effects that typify a land unit and influence the visual appeal the unit may have for visitors.

W

warm water fishery – Aquatic habitats that support fish species which have their best reproductive success and summer water temperature tolerance between 75 and 85 degrees Fahrenheit (23-29 C), or about 80 degrees Fahrenheit. Examples include sunfish species, and largemouth bass.

water supply area – Areas that serve present and future municipal water supply and trout hatching or rearing operations.

water yield – The measured output of the forest's streams expressed in acre-feet. The amount or volume of water that flows in a given period of time from a watershed.

waterbars – A change in the grade of a roadbed, trail surface, or fire line used to divert water off the surface to prevent it from eroding ruts and possibly carrying sediment to a stream.

watershed – A region or land area drained by a single stream, river, or drainage network; a drainage basin. (36 CFR 219.19)

watershed condition – The state of a watershed based on physical and biogeochemical characteristics and processes. (36 CFR 219.19)

Weeks Act – Implemented in 1911, it authorized the acquisition of lands on the watershed of navigable streams for the purposes of conserving their navigability, or for the purpose of timber.

wetlands – Those areas that are inundated by surface or ground water with a frequency sufficient to support and that, under normal circumstances, do or would support a prevalence of vegetation or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mud flats, and natural ponds.

wild and scenic river – A river designated by Congress as part of the National Wild and Scenic Rivers System that was established in the Wild and Scenic Rivers Act of 1968 (16 U.S.C. 1271 (note), 1271–1287). (36 CFR 219.19) for possessing outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural or other similar values.

wilderness – Any area of land designated by Congress as part of the National Wilderness Preservation System that was established in the Wilderness Act of 1964 (16 U.S.C. 1131–1136). (36 CFR 219.19) These areas include undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which:

1. Generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable;
2. Has outstanding opportunities for solitude or a primitive and unconfined type of recreation;
3. Has at least 5,000 acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and
4. May also contain ecological, geological, or other features of scientific, educational, scenic or historical value. (16 USC 1131(c))

Wilderness Act of 1964 – Act which gave Congress authority to designate certain areas of public land as wilderness. It established the National Wilderness Preservation System to secure an enduring resource of wilderness.

wilderness study area – One of the areas selected by the Chief of the Forest Service from an inventory of undeveloped National Forest System lands as having apparent high qualities for wilderness. Lands possessing the basic characteristics of wilderness and designated by Congress for further wilderness study. A study can determine whether they should be recommended for addition to the National Wilderness Preservation System.

wildfire – An unplanned, unwanted wildland fire including unauthorized human-caused fires, escaped wildland fire use events, escaped prescribed fire projects, and all other wildland fires where the objective is to put the fire out.

wildland fire – Any non-structure fire that occurs in vegetation or natural fuels. Wildland fire includes prescribed fire and wildfire.

wildland urban interface (WUI) – The line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels. Describes an area within or adjacent to private and public property where mitigation actions can prevent damage or loss from wildfire.

wildlife – All non-domesticated mammals, birds, reptiles, and amphibians living in a natural environment, including game species and non-game species. Animals, or their progeny (i.e., feral animals - including horses, burros, and hogs), that once were domesticated, but escaped captivity, are not considered wildlife.

wildlife and fish user-day – A 12-hour participation in the use of wildlife and fish primarily for consumptive or non-consumptive use including hunting, fishing, or wildlife viewing. Such use is the result of habitat management, and the populations supported by that habitat. A WFUD is

counted as one day or any part of a day that the user participated in these activities. Does not include sport or commercial uses of anadromous fish.

wildlife habitat diversity – The distribution and abundance of different plant and animal communities and species within a specific area.

wildlife habitat improvement – The manipulation or maintenance of vegetation to yield desired results in terms of habitat suitable for designated wildlife species or groups of species.

wildlife tree – A den tree, snag, or mast or food tree.

withdrawal – Water removed from the ground or diverted from a surface water source for use.

withdrawal of land – An order removing specific land areas from availability for certain uses.

withdrawn national forest lands – National Forest System lands segregated or otherwise withheld from settlement, sale, location, or entry under some or all of the general land laws.

woodlands – An open stand of trees with crowns not usually touching (generally forming a 25 to 60 percent cover).

woodland grazing – Grazing livestock on the grass-forbs existing under forested stands, mainly southern yellow pine types.

wrenching – The disturbance of seedling roots in a nursery bed (e.g.: with a tractor-drawn blade), with the objective of stimulating the development of a fibrous root system.

X

xeric – Pertaining to sites or habitats characterized by decidedly dry conditions.

Y

yarding – A term used to describe operations used to move logs from stump to point where logs are loaded for transport to mill. Most commonly used in cable logging operations.

yield table – A tabular statement of outputs expected to be produced under a specific set of conditions.

Appendix H: Description of the Resource Integration Zones

H.1 Coastal Resource Integration Zone

Just miles away from the city of Charleston and easily accessed by US Highway 17, this unique area features isolated forested lands and coastal marshes interspersed with small rural communities along a portion of the 3,000 -mile Atlantic Intracoastal Waterway. The identity of this zone is closely tied to the sights, sounds, and smells of the coastal environment, but with much considerable evidence of people, as well. The Waterway which includes numerous natural inlets, salt-water rivers, and bays provides ideal habitat for resident and migratory birds, as well as, an idyllic setting for viewing scenery and water-based recreational activities.

The Coastal Resource Integration Zone (RIZ) has a complex ecosystem which produces valuable goods and services that contribute to the health and well-being of its surrounding communities. (See Tables H-1 and H-2). This zone is bounded by S.C. Hwy. 17 to the north and the Intracoastal Waterway to the south.

Table H-1. Communities within the Coastal Resource Integration Zone

Incorporated Communities¹	Awendaw	McClellanville	Mount Pleasant
Population	1,294	499	67,843
Households	505	225	27,742
Families	371	150	18,045
2000-2010 Population Growth	8.3 percent	8.7 percent	42.5 percent
Unincorporated Communities within the Coastal Resource Integration Zone			
Brown Hill			
Buck Hall			
Collins Creek			
Laurel Hill			
Pinefield			
Tibwin			

¹ 2010 Census Data

Communities most influenced by activities in the Coastal Zone include the small towns within the forest boundary—Awendaw and McClellanville—and portions of the larger neighboring community of Mount Pleasant. These communities have experienced steady population growth over the last decade and are expected to continue to grow as more people are attracted to the beautiful scenery and mild climate of coastal South Carolina. To enhance the historic and natural character of these communities, Awendaw and McClellanville have embraced the principles of SmartGrowth and sustainable development to safeguard the open spaces, wetlands, riparian buffers and cultural resources they highly value.

Awendaw and McClellanville are gateway communities that provide a vital link to the legacy of the Coastal Zone's natural and cultural resources. Both communities have significant cultural resources; the proposed historic districts on the Francis Marion would complement and enhance

the historical context of these communities. Existing popular attractions in the Coastal Zone of the Francis Marion include the Sewee Shell Rings, the Sewee Visitor and Environmental Education Center, the South Carolina Palmetto Trail and the East Coast Greenway. These attractions provide opportunities for learning and eco- and historical tourism, and are attributed with attracting visitors and stimulating economic activity in these rural communities. In addition to supporting local outdoor recreation and tourism, management of intact ecosystems in the Francis Marion's Coastal Zone helps support the region's timber and seafood industries by enhancing local water quality and providing merchantable by-products from restoration activities.

Of the 29,600 acres bounded by this zone, only 9,000 acres are managed as part of the Francis Marion NF (See Table H-2). The other 70 percent of the Coastal Zone is private and other publicly owned lands. Approximately 15,100 acres of this zone are held in private ownership, with 2,400 privately owned acres held in conservation easements. Other publicly owned land is about 5,500 acres, but includes significant areas such as the Cape Romain National Wildlife Refuge and the Santee Coastal Reserve.

Table H-2. Land ownership in the Coastal Resource Integration Zone

Land Ownership	Acres
National Forest System lands	9,000
Other publicly owned lands	5,500
Private land	12,700
Private land with conservation easements	2,400
Total land area	29,600

Highway 17 serves as the Coastal Zone's main artery, providing local residents and forest visitors with access to rural communities and attractions on the Francis Marion. The natural settings, processes and historical attractions characteristic of the Coastal Zone contribute to the area's distinct sense of place and continue to be an integral part of the social and economic fabric of communities of place and of interest¹. People, or beneficiaries, derive a wide array of tangible (ecosystem goods) and non-tangible (ecosystem services) from ecological processes of the Coastal Zone. Forests provide a full suite of goods and services that are vital to human health and livelihood, natural assets we call ecosystem services. Residential property owners; timber harvesters; recreational experiencers and viewers; hunters; seafood extractors; spiritual and ceremonial users; artists; researchers and other educators and students; and people who benefit from the presence of the environment, open spaces, viewscapes, flora, fauna, natural materials and the sounds and scents of the Coastal Zone.

¹ Patterson et al., 2003 characterizes the difference between communities of place (i.e., people who are bound together because of where they reside, work, visit or otherwise spend a continuous portion of their time) and communities of interest (i.e., people who share a common interest or passion, regardless of their location or degree of interaction). The distinction between place and interest is not mutually exclusive; many communities share location and values, beliefs and attitudes because community members choose to live near like-minded people.

H.2. Wando Resource Integration Zone

The Wando RIZ, which borders the Coastal RIZ to the Southwest, is the second smallest zone on the forest and includes 38,320 acres of National Forest System lands, zero acres of other publicly owned lands, and approximately 31,500 acres of land in private ownerships (see Tables H-3 and H-4). Relatively few private lands are protected by conservation easements in the Wando area. This zone encompasses the southernmost area of the Francis Marion, which along with the Coastal Zone, are the closest National Forest lands to Charleston and Mount Pleasant.

Table H-3. Land ownership in the Wando Resource Integration Zone

Ownership	Acres
National Forest land	38,300
Other publicly owned land	0
Private land	31,500
Private land with conservation easements	1,200
Total land area	69,700

Although most of this zone can still be characterized as very rural, urban sprawl extending from the Charleston metropolitan area has slowly begun to transform its rural landscape. Continued population growth around Charleston and Mount Pleasant has given way to new exurban² areas, where outer suburbia encroaches on historically rural communities. These emerging exurban areas enable more residents to enjoy living in the green spaces of Wando, while continuing to maintain strong social and economic ties to Awendaw, Charleston, and Mount Pleasant.

Table H-4. Communities within the Wando Resource Integration Zone

No Incorporated Communities
Local Unincorporated Communities
Wando
Cainhoy aka The Village
Charity Church Road
French Quarter Creek
Pinefield
Greenbay
St. Thomas Island aka The Ferry
Old Joe aka Duffy's Corner

² Exurban areas are communities located in urban fringes where housing density is low, commercial development is minimal to nonexistent, population growth is high, and residents have the tendency to be heavily connected to cities. Exurbanites generally prefer the tranquility of more remotes locations with lots of open space, but continue to commute to urban centers to work.

South Carolina Hwy. 41 serves as the main artery of the Wando Zone, while S.C. Hwy. 17 runs along the zone's southern boundary. These roads enable the movement of people and commerce between southern Cainhoy peninsula and larger regional centers. The Cainhoy peninsula is located outside Charleston at the confluence of Charleston and Berkeley Counties and includes the contiguous communities of Cainhoy, Wando and Huger. Although there are nearly 2 dozen small, evocatively named communities scattered across the peninsula, they are primarily heirs' property communities where land that was purchased by former slaves after emancipation has been passed down from generation to generation without formal wills. In the absence of official documentation, these lands have been held in communal ownership outside the jurisdiction of any one entity. Today, the rural communities of Cainhoy are considered to be unincorporated neighborhoods under the jurisdiction of Berkeley County; although their transportation and development planning is largely influenced by the City of Charleston. Since census data for specific unincorporated areas is not readily available, it is difficult to determine exactly how many people live in unincorporated communities within the Wando RIZ. However, this region has been identified as one of the most rapidly growing areas within the Charleston/Lowcountry area.

The area known as Cainhoy lies within the Gullah-Geechee Cultural Heritage Corridor, a congressionally designated National Heritage Area created to preserve the unique African-based heritage and culture of slave descendants who continue to live along the Southern Atlantic Seaboard. Communities within this corridor share a common history rooted in farming (truck and subsistence) and logging; they take great pride in their culture, sense of place and strong devotion to family. Residents of Cainhoy are primarily African Americans, identify themselves as "Gullah" and continue to carry on the language, arts, crafts, religious beliefs, folklore, rituals and food preferences of their African and African American ancestors. Although many historic Gullah communities have transitioned from agriculture and bartering to a more cash and services based economy, many people living within the Wando Zone maintain strong ties to the land and rely on subsistence farming, fishing, hunting, bartering and small-scale marketing of subsistence and artisan products for a portion of their income.

Visitors are attracted to areas of the Francis Marion in the Wando RIZ because Hwy. 41 provides easy access and its natural landscapes support diverse recreational experiences which enable a growing number of urbanites to reconnect with the natural world and escape the stresses of everyday life. Highly visited areas of the forest include a Wildlife Management Area that supports hunting opportunities; a network of trails for hiking, horseback riding and mountain biking; and areas with rare plant and animal communities regarded by nature viewers. Berkeley County and adjacent residential developments have expressed growing interest in further developing recreational opportunities in the Wando RIZ by connecting Forest Service trails with those on adjacent lands. To ensure these lands continue to support the needs of both human and natural communities, local governments, communities, adjacent businesses and residents must maintain an ongoing dialogue to communicate the needs for mitigation.

The natural landscapes of the Wando RIZ contribute to the social, cultural and economic health and well-being of communities of place and of interest. Compared to other parts of the Francis Marion, management of National Forest System lands in the Wando RIZ present unique management challenges. Although this area is still considered a sea of green that provides quiet rejuvenation, private lands adjacent to the forest are zoned primarily for growth. Rapid commercial and residential development is expected to transition the Francis Marion into a more urban forest. Increased development along the forest's wildland-urban interface (WUI) means that publicly owned land managers must consider how demand for tangible (ecosystem goods) and non-tangible (ecosystem services) benefits from ecological processes on the forest are likely to

increase, while environmental stressors are likely to have an adverse effect on the quality and quantity of goods and services it provides. In addition to the benefits people receive from the natural environment, forest management must consider how increased development along the WUI will affect the demand for infrastructure and fire management on the Francis Marion. Developing creative strategies will be necessary to meet these growing needs in the face of competing budget priorities.

H.3 Wambaw Resource Integration Zone

The Wambaw RIZ encompasses a large coastal floodplain bordered by the Santee River to the North, the Wando RIZ to the South, U.S. Hwy 17 to the East, and S.C. Hwy. 41 to the West. This highly diverse and productive ecoregion includes 171,655 acre of scenic bottomland hardwood forests, depression ponds, Carolina bays and longleaf pine savannas (see Table H-5). Nearly 86 percent of the Wambaw RIZ is held under public ownership or protected through conservation easements, with the majority of lands administered by the Forest Service. The 138,255 acres of national forest lands within the Wambaw RIZ are attributed with being the Francis Marion's most remote and natural settings and include 4 congressionally designated wilderness areas.

Table H-5. Landownership patterns within the Wambaw Resource Integration Zone

Wambaw Zone	Acres		
National Forest System lands	138,255		
Other publicly owned lands	300		
Private land	24,500		
Private land with conservation easements	8,600		
Total land area	171,655		
Local Unincorporated Communities			
Honey Hill			
Steed Creek			
Fort Corner			
Huger			
Germantown			
Shulerville			
South Santee			
Local Incorporated Communities ¹			
	Awendaw	Jamestown	McClellanville
Population	1,294	72	499
Households	505	30	225
Families	371	18	150
2000-2010 Population Growth	8.3%	-27.2%	5.5%

¹ 2010 Census Data.

This zone is largely uninhabited and shows minimal signs of modern human occupation. The zone's few, highly traveled roads are located on its outskirts, enabling the integrity of the forest's interior to remain largely intact. Like the Wando, the Wambaw Zone is considered part of the Cainhoy peninsula and is located within the National Gullah-Geechee Cultural Heritage Corridor. The small heir's property communities of Honey Hill, Shulerville and Steed Creek are located here and are considered part of the unincorporated Huger area within Berkeley County. Residents living in these remote villages are primarily Gullah-Geechee families who have maintained a strong kinship to the people and lands of their African American ancestors. Since these communities are relatively secluded, families living in these historic villages continue to be partially subsistent and rely on the natural abundance of this zone to meet a portion of their household needs. Their continued reliance on natural goods and services from these forested wetlands increases their likelihood of being affected by Forest Service management decisions. Though they're not located within the Wambaw Zone; the communities of Jamestown, Huger, McClellanville and Awendaw are located in adjacent zones and may be also be affected by future forest management.

Although terrain within the Wambaw RIZ can be unforgiving and lives up to the legend of "The Swamp Fox"³ himself, this area of the forest has some of the most diverse species composition and community structure. Dense swamps and large tracts of wilderness in this zone create the largest contiguous area of the Francis Marion and serves as the forest interior. This core forest area is heavily influenced by dynamic physical and biological processes driven by climate, the hydrologic cycle, erosion, deposition and extreme natural events. Ecological processes which result from the constant interactions between the forest's terrestrial and aquatic ecosystems support fertile soils, rare and endangered plants and animals communities, and sites of archaeological and historical significance. The federally endangered American chaffseed occurs on upland longleaf and high-functioning loblolly woodlands and is found only within this zone

Water, biological and societal resources⁴ are abundant in this part of the Francis Marion. Its many streams, wetlands and bottomland hardwood forests are an integral part of the watershed. In addition to serving as a floodplain that reduces the risk and severity of flooding to downstream communities, these wetlands improve water quality by filtering and flushing nutrients, processing organic wastes and reducing sediment before waters reach the Coastal Zone. Improved water quality also contributes to the sustainability of the local fishery and seafood industry, and to local residents' ability to be subsistent.

The numerous streams and extensive wetlands of the Wambaw RIZ also serve as a trail system which supports high quality recreational experiences. Many forest visitors are attracted to this part of the forest because it supports outstanding opportunities for solitude and primitive recreation, including canoeing, kayaking, hunting and wildlife and nature viewing. These black

³ The Francis Marion National Forest is named after General Francis Marion who was known as "The Swamp Fox" for leading a band of irregular fighters in the back- and low-country swamps of South Carolina against British troops under Lord Cornwallis during the Revolutionary War.

⁴ "Water resources" include those resources and functions of the Wambaw that are part of or provide a benefit to the hydrologic cycles on the earth's surface and sub-surface, including natural moderation of floods, water quality maintenance, and groundwater recharge. "Biologic resources" are resources and functions that benefit large and diverse populations of plants and animals. "Societal resources" are those that directly benefit human society, including historical, archeological, scientific, recreational, and esthetic sites, in addition to sites generally highly productive for agriculture, aquaculture, and forestry where these uses are compatible with natural systems.

waters also provide a unique opportunity for visitors to retrace the steps of The Swamp Fox and connect with early American history.

Although there is little economic activity within the Wambaw RIZ, the recreational experiences on these lands are attributed with supporting local employment and income in gateway communities which offer outfitter and guide services. They also impact food, lodging, gas and other retailers which support the outdoor recreation and tourism industry in this area.

H.4 Santee Resource Integration Zone

The farthest northwest zone is the Santee, which encompasses 145,600 acres of public and private lands, and includes 29% of all lands administered as the Francis Marion. Much of Santee's private lands are forested or held in agricultural use. The Santee RIZ includes 73,900 acres of national forest lands, 6,000 acres of experimental forest and 71,600 acres of privately owned lands. While large tracts of private lands exist within the Santee RIZ, approximately 7,300 of these privately owned acres are protected under conservation easements (see Tables H-6 and H-7).

Table H-6. Land ownership in the Santee Resource Integration Zone

Land Ownership	Acres
National Forest System lands	73,900
Other publicly owned lands	100
Private land	64,300
Private land with conservation easements	7,300
Total land area	145,600

Like other zones, communities within the Santee are small and rural. Private land ownership within the zone is characterized as a mixture of small towns and heir's property villages which have preserved Gullah-Geechee culture. See Table H-6. The communities most influenced by this zone and its management are Jamestown, Macedonia, Alvin, St. Stephens, Bonneau, Cordesville, Witherbee, Bethera and Huger. Adjacent to the Santee is Moncks Corner, a rapidly expanding residential and commercial center. Since development plans for private forest and agricultural lands in Moncks Corner are still being developed, publicly owned land managers, local governments and private developers need to create a dialogue to ensure adverse impacts of increased development along the wildland-urban interface are mitigated.

The Santee Zone is bordered by S.C. Hwy. 41 to the east and dissected by U.S. Hwy 17A, 52 and S.C. Hwy. 45 and 402. These roads are well maintained and offer easy access to the outstanding opportunities for hunting, fishing, scenic driving and paddling which contribute to the high quality of life which is attributed with attracting and helping to retain local residents.

The zone's primary focus is access to recreational areas in the northern portion of the Santee River, the Wadboo Creek canoe/kayak trail, the land-based Palmetto Trail and to the Santee and Hellhole wildlife management areas. Hunting and fishing is very popular in this zone; the Forest Service works in partnership with SCDNR to maintain and restore habitat important to native species popular with local hunters and anglers.

The accessibility and abundance of outdoor experiences on the Francis Marion contribute to the area's distinct sense of place, and continue to be an integral part of the social and economic fabric of communities of place and of interest. People, or beneficiaries, derive a wide array of tangible (ecosystem goods) and non-tangible (ecosystem services) from ecological processes supported by natural settings within the Santee Zone. Forests provide a full suite of goods and services that are vital to human health and livelihood, natural assets we call ecosystem services.

Table H-7. Communities within the Santee Resource Integration Zone

Local Unincorporated Communities				
Alvin				
Gumville				
Old Cordesville				
Providence				
Bethera				
Macedonia				
Harristown				
Cordesville				
Witherbee				
New Hope				
Local Incorporated Communities¹				
	Bonneau	Jamestown	Monks Corner	St. Stephens
Population	487	72	7,885	1,697
Households	190	30	7,411	655
Families	132	18	1,999	424
2000-2010 Population Growth	22.0%	-27.2%	27.3%	-4.5%

¹ 2010 Census Data.

The following groups not only benefit from the presence of the environment, open spaces, viewsapes, flora, fauna and natural materials but also have been identified as receiving personal benefits from the Francis Marion in the Santee:

- Residential property owners;
- Timber harvesters;
- Recreational experiencers and viewers;
- Hunters;
- Spiritual and ceremonial users;
- Artists;
- Researchers, other educators and students; and
- People who care.

Though the ecological function of this area is still relatively intact, increased development in the rural communities surrounding the Francis Marion means that national forest land managers must

consider how demand for ecosystem goods and services benefits from ecological processes on the forest are likely to increase, while environmental stressors are likely to have an adverse effect on the quality and quantity of goods and services it provides. In addition to the benefits people receive from the natural environment, forest management must consider how increased development along the WUI will affect the demand for infrastructure and fire management on the Francis Marion, while identifying creative strategies to meet these growing needs in the face of shrinking appropriated budgets.

Appendix J: Reasonable and Prudent Measures from the Biological Opinion

J.1 Frosted flatwoods salamander

Reasonable and Prudent Measures

The United States Department of Interior, Fish and Wildlife Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take.

- The Forest Service will engage in habitat restoration and maintenance for the frosted flatwoods salamander within designated critical habitat. This measure also applies to other parts of the forest if or when frosted flatwoods salamander are found.

Terms and Conditions

To implement the reasonable and prudent measures, the following terms and conditions are required.

1. Every effort should be made to first maintain suitable wetland breeding and upland habitat where it occurs and expand /restore such habitat to suitable and preferred condition as soon as possible.
2. Frequent 1-3 year fire return interval, growing season burn, should be utilized.
3. Maintenance of hydrological function should be incorporated for restoring habitat.
4. Restoration and management for flatwoods salamanders should be effectively focused on the need for demographic connectivity and recolonization.

J.2 Red-cockaded woodpecker

Reasonable and Prudent Measures

The United States Department of Interior, Fish and Wildlife Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take.

- The Forest Service will develop a plan and system to implement and regulate future projects assuring that a RCW population of at least 400 active clusters and more than 350 PBGs is sustained.

Terms and Conditions

To implement the reasonable and prudent measure, the following terms and conditions are required.

1. With Service approval of the following methods and procedures, the Service will develop and implement an annual RCW survey based on a random sample of all managed clusters, with a statistically rigorous annual estimate of the population size in terms of number of active clusters and PBGs. To ensure the amount and extent of incidental take does not reduce the population to less than 400 active clusters and sustains more than 350

PBGs, the annual sample will be used as a statistical hypothesis and test that the proportion of observed active clusters and PBGs is equal to or greater than the proportion required to minimally sustain the population objective.

2. Foraging habitat analysis will be conducted to assess impacts of timber harvests in 0.5-mile foraging partitions according to MSS and GQFH criteria, based on guidelines in the 2003 RCW Recovery Plan and the Service's 2005 memorandum from the Assistant Regional Director, and guidance from the Service's South Carolina Ecological Services Field Office and RCW Recovery Coordinator. The RCW foraging habitat matrix program is not required to conduct FHA, although it may be used if desired. Where adverse effects (e.g. harm) are predicted in response to a reduction of foraging habitat, FHA will include direct and indirect effects at the RCW group and neighborhood level.

3. Cluster polygons will be identified where timber will be harvested during the breeding season. A cluster polygon is the minimum convex polygon of all cavities used by RCWs.