Roads Analysis

Francis Marion National Forest

September 19, 2003

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Introduction

Overview of National Forest Road Analysis

This document summarizes the key findings and results of the application of the forest-wide Roads Analysis Process (RAP) for the Francis Marion National Forest. The RAP analysis followed procedures in USDA publication FS-643, Roads Analysis: Informing Decisions About Managing the National Forest Transportation System. The RAP is **not a decision document** but is intended to be an assessment tool to provide the Forest Supervisor and District Ranger with information to develop and maintain road systems.

Land allocations, management strategies and the road maintenance budget have changed significantly during the past decade. It has been determined that road analyses are needed on all National Forests and Grasslands to better coordinate our road management programs. The analysis process provides land managers with a science-based analytical tool to help balance public needs, scientific information and funding levels when determining the size, purpose and extent of future forest road systems.

The Roads Rule and Policy became effective on January 12, 2001 (Federal Register/Volume 66, No. 9) and was issued as amendments to Forest Service Manual Title 7700-Engineering, Chapter 7700-Zero Code and in Chapter 7710-Transportation Atlas, Records, and Analysis.

Road analysis occurs at two levels, the forest scale and project scale. The forest scale addresses the existing forest road system (maintenance level 3, 4 and 5 roads) from a landscape perspective. It highlights problem areas and opportunities in the road system so that land managers can make better decisions regarding the transportation system. The project scale road analysis addresses road maintenance level 1 and 2 roads as well as unclassified roads. **Project level road analysis will not be addressed in this report.**

There is a need to identify and prioritize the minimum road system necessary for public access and management of the Forest due to critical shortfalls in funding. Road management objectives should be reviewed for existing roads and proposed new roads during planning area analysis and during site-specific environmental analysis.

This report uses existing information and recognizes that additional information will need to be gathered in the future. This report may periodically be updated or appended to as additional data is gathered and analyzed.

Scope of this Analysis

The Forest is located along the Atlantic Coast and is an extensive lowland where elevations range from 0 to 80 feet above sea level. The topography is characterized by a series of parallel ridges of sandy beach deposits with large areas of swamps, bays and upland flats between the ridges. Coastal marshes and river floodplains are also found on the Forest. Carolina bays and limestone sinks are two special geological features found

on the Forest. Two Ranger Districts comprise the Francis Marion National Forest, the Witherbee and Wambaw. Unlike other eastern Forests, much of the area is federally owned in large contiguous sections.

Roads managed by other federal, state, county and private entities are connected to many roads on the national forest. It is not obvious to the casual user where jurisdiction changes from one agency to another. Major state and county roads will be addressed where appropriate when considering roads managed by the Forest Service.

Chapter 1 - Setting Up the Analysis

Objectives of the Francis Marion Road Analysis

The objectives of transportation analysis are:

- To determine, given likely funding levels, the minimum transportation facilities needed for public and agency access to achieve forest land and resource management goals and to safeguard ecosystem health.

- To incorporate transportation system needs into the planning process.

- To direct the orderly improvement and management of the transportation system.

- To interact and involve the public, State, Local, and Tribal governments in transportation analysis.

Interdisciplinary Team Members (IDT) and Participants

The core interdisciplinary team and their specialties are:

Jim Knibbs	Team Leader
Ed Hedgecock	Engineering
Donna Alexander	Engineering

Other team members who participated and their specialties are:

Gary Peters	Wildlife
William Hansen	Hydrology
Jeanne Riley	Aquatics and Fisheries
Robin Roecker	Botany and Threatened, Endangered and Sensitive species
Joseph Robles	Recreation
Robbin Cooper	Scenery and Roadless Areas

District Involvement in the Process

The IDT met on the Forest in 2003 with employees to review maps of roads and to gather site-specific information. This information was used to help identify issues and concerns on management of the transportation system and to refine analysis maps. The information from those meetings is contained in the process records for this report. A roads atlas is being prepared and will be maintained at both the District and Supervisor's Office.

Information Sources

The IDT identified the following information sources to use in this analysis:

- Basic road information for Maintenance level 3, 4 and 5 roads
- Deferred maintenance costs from INFRA
- Public Forest Service Roads (PFSR) project submittals
- Forest Highway listing
- Road Management Objectives
- Forest Service Manual and Handbook directions
- Revised Land and Resource Management Plan and the Final environmental Impact Statement for the Revised Land and Resource Management Plan for the Francis Marion National Forest

Analysis

The IDT and other team members reviewed the 71 key questions and determined which ones were appropriate to apply to the Maintenance level 3, 4 and 5 roads for this analysis.

Public Involvement

A Public meeting was held in June 2003 to gather public input on issues, concerns and opportunities with management of the arterial and collector road system on the Forest. Public comments were incorporated into the discussion items in Chapter 4. Written comments are located in the analysis file for this report.

Chapter 2 - Describing the Situation

The National Forest Transportation System

The transportation system provides public access and facilitates forest management activities. The system is facing increased use with a declining road budget and a large backlog of "deferred maintenance" work. Deferred maintenance is defined as "scheduled maintenance work that is needed to keep roads at their current functional level and has not been accomplished" (usually as a result of a lack of funding). Examples of common types of maintenance work performed would be culvert and bridge replacement, road resurfacing and reestablishing ditchline drainage. Increasing urban development adjacent to and within the proclamation boundary on private land is creating new demands on the road system. Many of the roads were not designed to handle these new demands of traffic mix and volume. A majority of the roads have existed for a long time, pre-dating the existence of the national forest.

The total Forest road system includes approximately 1,009 miles of classified roads. This system includes State, county, and National Forest system roads. The National Forest roads have recently been divided into public and administrative road categories. The administrative roads are generally for administration of the national forest lands and resources and are not classified as public roads. However, the Secretary of Agriculture allows public use if the road is considered open to traffic. The designated public roads are generally drivable by automobile.

National Forest system roads currently total about 557 miles. Roads are divided into three functional classes: arterial, collector, and local. They are operated under road management objectives to minimize resource-use conflicts. These conflicts may include mixed vehicle use, wildlife considerations, and water quality concerns.

There are five maintenance levels for Forest Service roads and they are described in Forest Service Handbook, FSH 7709.58, *Transportation System Maintenance Handbook.* User comfort and driving ease are increasingly important considerations from maintenance level 3 to 5. Approximately 69 percent of the Forest roads are in the level 3 to 5 class and another 23 percent of forest roads are in the level 1 (closed) class. The following is a description of the five maintenance levels (FSH 7709.58, Section 12.3, Item 2).

a. Level 1. Assigned to intermittent service roads during the time they are closed to vehicular traffic. The closure period must exceed 1 year. Basic custodial maintenance is performed to keep damage to adjacent resources to an acceptable level and to perpetuate the road to facilitate future management activities. Emphasis is normally given to maintaining drainage facilities and runoff patterns. Planned road deterioration may occur at this level. Appropriate traffic management strategies are "prohibit" and "eliminate."

Roads receiving level 1 designation may be of any type, class, or construction standard, and may be managed at any other maintenance level during the time they are open for traffic. However, while being maintained at level 1, they are closed to vehicular traffic, but may be open and suitable for non-motorized uses.

b. Level 2. Assigned to roads open for use by high clearance vehicles. Passenger car traffic is not a consideration. Traffic is normally minor, usually consisting of one or a combination of administrative, permitted, dispersed recreation, or other specialized uses. Log haul may occur at this level. Appropriate traffic management strategies are either to (1) discourage or prohibit passenger cars or (2) accept or discourage high clearance vehicles.

c. Level 3. Assigned to roads open and maintained for travel by a prudent driver in a standard passenger car. User comfort and convenience are not considered priorities.

Roads in this maintenance level are typically low speed, single lane with turnouts and spot surfacing. Some roads may be fully surfaced with either native or processed material. Appropriate traffic management strategies are either "encourage" or “accept." "Discourage" or "prohibit" strategies may be employed for certain classes of vehicles or users.

d. Level 4. Assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds. Most roads are double lane and aggregate surfaced. However, some roads may be single lane. Some roads may be paved and/or dust abated. The most appropriate traffic management strategy is "encourage." However, the "prohibit" strategy may apply to specific classes of vehicles or users at certain times.

e. Level 5. Assigned to roads that provide a high degree of user comfort and convenience. These roads are normally double lane, paved facilities. Some may be aggregate surfaced and dust abated. The appropriate traffic management strategy is "encourage."

Nearly all maintenance activities are accomplished with service or construction contracts. The Francis Marion road maintenance contracts for the last few years have had to reduce the mileage maintained due to decreased funding and higher contract costs. The smaller timber sale program as a result of Hurricane Hugo in 1989 is the main reasons for the reduction in funding available for road maintenance. The forest road condition survey program has identified nearly 12.4 million dollars in deferred maintenance work.

Road management objectives will be reviewed for existing roads and proposed new roads during area analysis and for site-specific projects. Analysis will be aided by the use of a Road Analysis Process (RAP) to assist the line officer in making road decisions. Timber sales will generally use existing or temporary roads for access to harvest units. New road construction for timber sales will be less than in the past. Key roads identified in the public roads program will be upgraded as funds become available to improve public access and safety.

Mileage by maintenance level is summarized in Table 1.

Table 1. Miles of NFSRs by Maintenance Level

Maintenance Level	Miles
Level 1: Closed Road	126.4
Level 2: Maintained for High Clearance Vehicles	44.3
Level 3: Maintained for passenger car, low user comfort, aggregate surface	329.7
Level 4: Maintained for passenger car, moderate user comfort	55.6
Level 5: High standard passenger car road, double lane paved	1.0
Total	557.0

All maintenance levels are displayed here to show the mileage distribution of the various maintenance levels. The remainder of this report will focus on maintenance level (ML) 3, 4 and 5 roads as required by the forest scale analysis.

Past reconstruction of ML 3 and 4 roads was done for recreational, administrative and commercial timber sale access. Some of the roads were built prior to federal ownership of the land. Some roads continue to provide access to private lands (prescriptive rights roads) and may not have any formal rights-of-way agreements.

Roads are categorized by their functional classification. The three classifications defined in the Travel Routes National Data Dictionary ROADS are Arterial, Collector and Local. Most of the ML 3 and 4 roads are classified as local and collector roads. Table 2 summarizes all NFSRs by functional classification.

Table 2. Forest Functional Class

Functional Class Designation	Miles
Functional Class A: Primary (High standard through-routes, arterial linkages, Scenic Byways)	44.2
Functional Class C: Secondary (Key inter-forest connections to interior recreation, forest management, fire response)	111.0
Functional Class L: Local (Candidates for reduction of maintenance standards, decommissioning or obliteration)	401.8

Federally Designated Forest Highways

Forest highways are specially designated routes maintained by a public road agency and are of special importance to the Forest. These roads may be partially funded under the Federal Lands Highway program. The Forest Service cooperates with the State of South Carolina on the designation and management of these roads. There are currently about 111 miles (see Appendix B) of designated forest highways on the Francis Marion National Forest.

Economic Situation

The Forest budget allocation for maintenance, construction and reconstruction of roads has averaged $220,000 (contract dollars) per year for fiscal years 2000 through 2002. The annual cost needed to maintain the transportation system to standards as defined in the road management objectives is considerably higher than the funds allocated. The Forest is receiving only about 1.7 percent of its non-critical maintenance needs (deferred maintenance). Roadwork has typically been postponed indefinitely due to funding shortfalls.

In prior years, appropriated funding has been supplemented by road maintenance work performed by timber purchasers through the commercial timber sale program. This program has declined greatly and has offered very little recent funding.

Since 1998, the Forest has conducted road condition surveys to determine the costs of maintaining the road system to standard. Road improvements (annual and deferred costs) are identified and documented in a national database called INFRA.

Tables 3 and 4 summarize the costs for critical and deferred maintenance needs for implementing the Forest Service Mission, health and safety and resource protection. The Forest is being funded at about 51 percent of its need in annual maintenance. Funding allows only a small portion of deferred maintenance needs to be completed. If left uncorrected, this will result in roads on the Forest to continually decline over time.

Table 3. Estimated Annual Maintenance Costs

Maintenance Level	Total Miles	Average Cost/mile ($)	Total Funding Needs ($)	Total Funding to Districts ($)	Funding Shortfall ($)
1	126.4	116	14,662	-	-
2	44.3	536	23,745	-	-
3	329.7	649	213,975	-	-
4	55.6	430	23,908	-	-
5	1.0	241	241	-	-
Total	557.0	420	276,531	140,000	136,531

Based on 2003 dollars

Table 4. Estimated Deferred Maintenance Costs

Maintenance Level	Total Miles	Average Cost/mile ($)	Total Funding Needs ($)	Total Funding to Districts ($)	Funding Shortfall ($)
1	126.4	116	476,528	-	-
2	44.3	536	422,888	-	-
3	329.7	649	7,789.822	-	-
4	55.6	430	3,664,095	-	-
5	1.0	241	33,684	-	-
Total	557.0	420	12,387,017	80,000	12,307,017

Based on 2003 dollars

There is a need to identify and prioritize the minimum road system necessary for access and management of the Forest due to critical shortfalls in funding. This includes altering Road Management Objectives (RMOs) including maintenance levels that reflect long term funding. Site-specific project planning that either directly or indirectly involves roads should include analysis on access management.

After Hurricane Hugo in 1989, timber harvesting declined sharply as a new forest re-grew. Forest conditions are now to the point where thinnings are needed to reduce basal areas in order to keep stands healthy and vigorously growing. Generally speaking, these "first thinnings" have low economic value. The road system to support this program is in place, however, many of the roads need to be resurfaced and other improvements made in order to accomplishment forest management objectives.

There are many roads on the Forest that are opened for seasonal purposes such as hunting. These roads are opened during the time of September through December. These roads need to be considered for a lower maintenance standard although opening them during deer season is considered advantages to control the very productive deer herds. Some roads are closed for wildlife nesting, soil and water protection and could be considered for year-round closure.

Chapter 3 - Identifying Issues

The intent of this document is to help inform decisions on roads and access management. Eight Forest Goals are found in the Revised Land and Resource Management Plan, Francis Marion National Forest, page 1-2 through 1-3. These goals in conjunction with public input were used to develop roads related issues, concerns and opportunities.

Desired Future Condition for Transportation System: The construction of new roads is minimal and the amount of reconstruction has decreased. Road closure is emphasized in some areas of the Forest to enhance roadless area characteristics and to provide more primitive recreational experiences. The road system continues to provide adequate access for the public to enjoy the Forest.

System roads classified as maintenance level 3-5 are the primary means of access both for resource management and public access.

Issue Summary

The following issues were identified concerning arterial and collector roads on the Francis Marion National Forest.

A. Access for land management activities

Road access is needed for land management activities, law enforcement and for administrative uses. A balance is needed in allowing these uses while at the same time being responsible to protect and manage resources. There is a need to acquire formal rights-of-way to federal parcels of land where none or only prescriptive rights exist.

B. Inadequate road maintenance funding

Inadequate funding has created a backlog of maintenance work (deferred maintenance) and has led to deteriorating road conditions. This has had adverse impacts on natural resources, increased vehicle maintenance costs and safety hazards to the public.

C. Need for improvements on heavily use roads; downgrade maintenance levels on other roads; decommissioning/obliterating unneeded roads

There is a need to upgrade some roads that are receiving increased use by the public. These roads were originally designed for a lower use level than they are currently receiving and should be upgraded to reflect their use as multi-purpose roads. Arterial and collector roads are receiving increased use which could make prescribed burning more difficult. Prescribed burning on the Forest is essential to meeting desired vegetative conditions and maintaining/enhancing habitat for many threatened, endangered and sensitive species. In addition, other roads can

be downgraded to reflect lower use and to reduce maintenance costs. Some roads should be decommissioned/obliterated to reduce adverse environmental impacts or to achieve objectives stated in the Forest Plan for large blocks of land with a closed or unroaded character.

D. Impacts to terrestrial plants and animals and associated habitats including threatened, endangered and rare species

Roads have beneficial and adverse impacts on terrestrial plant and animal species. Road rights-of-ways provide permanent early successional habitat needed for many species of plants and animals. Road ditches and culverts provide pathways for introduction of predatory fish to ponds inhabited by amphibians, such as the federally threatened flatwoods salamander. Road maintenance activities can adversely impact these species, when soil is disturbed or roadsides are seeded with invasive exotic species.

E. Impact of roads to riparian areas, water quality and aquatic habitats

Roads can directly affect surface and subsurface water movement patterns and indirectly affect adjacent streams through surface runoff pollutants (sediment, petroleum and other chemicals) and may alter ecological functioning. Sediment can adversely affect wetlands. Culverts and other road drainage structures can block movement of fish and other aquatic organisms within stream systems.

F. Road access for recreation opportunities for the public (developed, dispersed, remote)

Roads provide access for a variety of developed and dispersed recreational activities. Hunting access is limited by road closures which are viewed both positively and negatively by hunters themselves. Recreation use is steadily increasing and is placing more emphasis on roads to meet these demands. Roads negatively impact remote recreation settings by increasing visitor numbers and increase noise and dust.

G. Impact of roads on wilderness areas

Roads adjacent to wilderness areas can detract from wilderness experiences and affect resources.

H. Private landowner access

Private landowner access is needed across the Forest when no other access routes exist.

I. Impact of roads on Forest health and providing wood products

Roads provide access for managing forest vegetation through prescribed burning, timber stand improvement and commercial timber sales. They are needed to suppress insect and disease (i.e. southern pine beetle) outbreaks, for salvage of damaged and fire killed timber as a result of natural disasters such as fire and blowdown.

J. Impact of roads on spread of invasive exotic plants

Motor vehicles provide a means to spread seed of invasive exotic plants from one area to another.

Chapter 4 - Assessing Benefits, Problems and Risks

This chapter is an assessment of the ecological, social and economic considerations of the current transportation system.

EF (1) – What ecological attributes, particularly those unique to the region, would be affected by roading of currently roadless areas?

The Francis Marion National Forest is well roaded. Roadless areas include designated wilderness such as Wambaw Swamp and Little Wambaw Swamp. These areas consist primarily of wetlands. Road construction on the perimeter could modify the hydrology of the area thereby negatively affecting the swamp hardwood communities.

EF (2) – To what degree do the presence, type, and location of roads increase the introduction and spread of exotic plant and animal species, insects, diseases, and parasites? What are the potential effects of such introduction to plant and animal species and ecosystem function in the area?

Ditchlines of some roads connect to swampy areas occupied by flatwoods salamander (endangered species) allowing the introduction of predatory fish that feed on the salamander.

Road corridors tend to promote the spread of invasive plant species, since invasive plant species readily invade the disturbed, high light environments provided along roads. This problem is exacerbated since often invasive plant species have been intentionally planted along road corridors primarily for soil stabilization purposes. Roads increase the risk of introduction and spread of exotic plant species throughout the Forest and are not limited to any particular geographic area. Potential adverse effects to native and desired non-native plant and animal species and ecosystem function are potentially high. Exotic invasive species are known to pose the second largest threat to endangered species after habitat destruction. For example, invasive exotic species such as cogongrass, if found on the Forest, could severely alter desired fire regimes. Invasive plants such as tall fescue along road corridors compete with native vegetation and alter native community composition.

EF (3) – To what degree do the presence, type and location of roads contribute to the control of insects, diseases and parasites?

Most of the 3-5 roads are historical in nature, being developed to originally access the area by settlers. The entire road system (including local roads, maintenance level 1 and 2) provides the means for early detection and control of insects and diseases and is essential for maintaining a healthy forest. The road system was the chief means for restoration and rehabilitation of natural resources following Hurricane Hugo in 1989. It also was used to salvage merchantable timber products. Currently, the roads provide access for intermediate silvicultural treatments and prescribed burning to keep the forest healthy and to develop certain vegetative conditions.

EF (4) – How does the road system affect ecological disturbance regimes in the area?

The road system provides control lines and allows more frequent low intensity burning that is in-line with historic fire regimes.

Past road construction activities have resulted in fragmentation of habitat for the federally threatened flatwoods salamander in the Cainhoy area of the Forest. Road ditches have created pathways for the migration of fish into ephemeral wetlands, thereby negatively impacting amphibian diversity.

Roads, while providing necessary fire breaks in some areas, inhibit landscape level burning patterns throughout the forest. State and federal highways decrease the Forest's ability to conduct prescribed burning and the amount completed on a yearly basis. Smoke along major roads can increase risk to motorists by reducing visibility. This in turn increases the complexity of prescribed burning and narrows the period when burning can be accomplished. Indirectly this can negatively affect native plant communities and associated rare species in the surrounding landscapes.

AQ (1) – How and where does the road system modify the surface and subsurface hydrology of the area?

Road systems typically alter both surface and subsurface hydrologic patterns to some extent. Subsurface water patterns are altered as road surfaces cut into hillslopes severing the normal subsurface flow path along the slope. Sometimes the cutting into slopes contacts groundwater or stormflow leading to perennial or ephemeral flows into ditches. Surface flow paths are also altered by the road surface, cutbank and fillslopes. Some hydrologic function is eventually reestablished as plants cover and develop roots systems within these areas. However, the effects from cutting into slopes in the relatively flat sandy terrain of the coastal plain and flatwoods are generally limited. Typically, road surfaces are maintained in a compacted and barren state and storm runoff may be many times higher in comparison to forested areas. Frequent road drainage structures such as dips, leadouts, culverts and reverse grades are needed to divide and disperse this excess flow into the adjacent forested filter zones. When this is not done effectively, road ditches carry more runoff, sediment and other pollutants into nearby stream systems. Changes in stream channels (downcutting and bank erosion) and ditches occur when they are overloaded with flow. Added flooding is probably increased in the relatively flat terrain. The degree of this effect can be very minor or a major departure from the natural conditions. Roads located on exceptionally flat terrain also may have drainage problems or contribute to offsite flooding. Usually the road surface is compacted relative to the surrounding terrain. This causes an obstruction in subsurface flow pathways and adds to water retention, rutting and drainage problems. Roads with extensive ditch lines may cause impacts to the surrounding terrain by altering the normal flow paths and transport water for long distances. For some roads, deferring needed maintenance means

escalating future costs to fix the problem. Recognizing and correcting problems early can save substantial costs in long term management of road systems.

AQ (2): How and where does the road system generate surface erosion?

Surface erosion is typically associated with construction, reconstruction and maintenance activities. Surface erosion is reduced by maintaining quality vegetated or armored soil cover. Cleaning and re-shaping ditches and grading surfaces often increase the amount of bare soil or loose aggregate surface material. This in turn increases the potential for erosion and runoff to ditches and other drainage structures. Road surfaces reduce rainfall infiltration and generate surface erosion in ditches during runoff. The severity of surface erosion may be related to a number of factors including road grade; condition of fill and cut slopes, drainage ditches and road surface; road and soil materials involved; and frequency of surface drainage. Surface erosion and off site effects from sediment are generally low since most of the roads on the Francis Marion National Forest are low gradient.

AQ (4): How and where do road-stream crossings influence local stream channels and water quality?

Essentially all road/stream crossings affect stream channels and water quality, but the extent and severity is quite variable. Crossings with properly sized and installed drainage structures limit hydrologic interference including the transfer of water and aquatic organisms. Maintaining quality surface erosion control and storm drainage structures adjacent to the crossing seldom contribute much effect in themselves to these problems. Road stream crossings may be areas were chemical drippage from vehicles and accidents involving spills may enter aquatic systems producing detrimental local and downstream effects to water quality and aquatic habitats. In some instances, road surfacing materials and treatments may contribute to adverse effects to streams and habitat.

AQ (5): How and where does the road system create potential for pollutants, such as chemical spills, oils, de-icing salts, or herbicides, to enter surface waters?

Most of the potential for the addition of pollutants is associated with road/stream crossings and areas where the road is located in close proximity to streams or adjacent wetlands. Pollutants enter streams through direct transmission, indirect erosion, runoff or in groundwater. Maintaining forested buffer zones and providing frequent road surface drainage into filter zones are often very effective in limiting pollutants. Road ditches have a high potential to transport pollutants to streams where the buffer is insufficient to absorb runoff and especially when they transfer captured groundwater or surface flow, road surface flow and stormflow directly into stream channels.

AQ (6): How and where is the road system "hydrologically connected" to the stream system? How do the connections affect water quality and quantity (such as, the delivery of sediments and chemicals, thermal increases, elevated peak flows)?

Road systems are hydrologically connected to the stream system typically at stream crossings, adjacent wetlands, lengthy ditch lines and areas where the road drainage frequency and stream buffer are insufficient to limit flow to streams during heavy storm events or floods. Areas where the water is absorbed into the surface, delayed or temporarily stored, but later reappears in flow are typically not considered connected to the stream system. Road ditches that lead to perennial, intermittent and ephemeral streams are connected. Road drainage from storm water runoff that is delivered to buffer areas or filter zones but remains concentrated (delivered directly to streams or tributary channels) are typically hydrologically connected. The locations of hydrologic connectivity generally require site specific evaluation. The likelihood of connectivity is greater for road/stream crossing areas and roads in close proximity to the stream, riparian and wetland network. Connectivity is much more extensive than is typically indicated by the blue line streams and wetland indicators on topographic maps.

How do the connections affect water quality and quantity (such as, the delivery of sediments and chemicals, thermal increases, elevated peak flows)?

Hydrologic connections with roads often extend the network of surface drainage and are likely to produce some level of effects to water quality and quantity including the delivery of sediments and elevating peak flows. Road surfaces often produce and channelize runoff above normal levels. Roads that are poorly designed or maintained are more apt to have more infrequent but a much higher severity of connections. These roads often concentrate road drainage into ditches for extended distances. Wheel tracks and erosion channels can develop on road surfaces reducing the effectiveness of designed surface drainage features. These poorly designed or maintained roads may carry road drainage for long distances, eventually delivering abnormal quantities of flow and pollutants to localized areas. Added erosion and channel adjustments (downcutting or stream bank erosion) are often the result to these downstream. When these flows are not drained to road ditches with filter zones, they may be retained on the road surface, creating increased potential for rutting or fill cracking and failure. The individual circumstances and specifics determine the frequency and extent of these effects. Thermal increases are more likely to be localized when surface or subsurface flow is captured into a road ditch and delivered at some distance to a small stream system. Roads in close proximity to streams may reduce riparian shading that may result in increased stream temperatures. Fine sediment and turbidity addition to streams from road surfaces also increase solar absorption of thermal energy, increasing stream temperatures.

AQ (7): What downstream beneficial uses of water exist in the area? What changes in uses and demand are expected over time? How are they affected or put at risk by road-derived pollutants?

South Carolina Department of Health and Environmental control direct that surface water resources be maintained to provide for a full array of water use that could occur within downstream areas. Freshwaters should have the ability to support downstream uses including municipal, domestic, irrigation, industry, swimming, and a balanced indigenous aquatic community of fauna and flora. Shellfish Gathering and Outstanding Resource Waters are not to be degraded, maintaining water quality for downstream uses. The actual type and proximity to specific downstream uses varies substantially, and should be evaluated on a more site-specific basis.

Growing communities typically place an increasing demand on drinking, industrial, recreational, fishing and scenic uses of water. Changes in use and demand might be put at risk resources that are sensitive to excessive road-derived pollutants. Typically the USFS is not the major contributor of these pollutants at larger scales. However, there may be individual circumstances to consider that would warrant change in road management strategies to reduce the risk of road-derived pollutants.

AQ (8): How and where does the road system affect wetlands?

Roads influence many wetlands across the Francis Marion National Forest, which has about 50% of the area in wetlands. Wetlands affected are well dispersed across the landscape, found in often linear features, isolated Carolina bays and connected to streams and river systems. Some streams and associated wetlands have a tidal influence. Typically the interface of the roads with wetlands will be associated with stream crossings that cannot be avoided. Wetlands are typically avoided as they are more costly to build and maintain, lack the topography that is desired for good road drainage and tend to accumulate and retain water.

AQ (9): How does the road system alter physical channel dynamics, including isolation of floodplains: constraints on channel migration; and the movement of large wood, fine organic matter and sediment?

Road systems can contribute to the alteration of channel dynamics. Many of the channels have been altered somewhat by road location and placement as structures have not always been designed to contain the flood flows. Aquatic habitats associated with these streams are often low quality due to the sandy substrate of the coastal plain. The amounts of debris from Hurricane Hugo and similar events have helped to form pools that have improved fishery and other aquatic habitats. Roads constructed across streams with floodplains can create some localized isolation from the floodplain with road fill. Roads built along the stream within the floodplain can restrict channel migration and function in instances of severe encroachment. The specifics of each instance must be evaluated to determine the extent of the impact.

AQ (10) – How and where does the road system restrict the migration and movement of aquatic organisms? What aquatic species are affected and to what extent?

Road crossings, such as culverts and fords, can act as barriers to aquatic organism movement within stream systems. Upstream and downstream migration obstacles can result in a decrease in population numbers and an increase in genetic isolation. Fish, mollusk, crayfish, amphibian and reptile populations may experience life cycle interruptions. Organisms may not have access to a large portion of good quality habitat within a stream system or watershed.

There has been no Forest wide assessment of road crossing barriers. Through general observation, there are a number of culverts and fords that appear to be barriers to aquatic organism movement within streams.

AQ (13) – How and where does the road system facilitate the introduction of non-native aquatic species?

There are no known problems associated with the introduction of non-native aquatic species on the Francis Marion at this time. Stream inventory is continuing on the Forest. All streams that are crossed by roads are susceptible to non-native introduction.

AQ (14) – To what extent does the road system overlap with areas of exceptionally high aquatic diversity or productivity, or areas containing rare or unique aquatic species or species of interest?

Most streams are accessible by road on the Forest. Stream inventory is an ongoing project. Populations of American eel will be monitored during the next two years. Crayfish specimens have been collected for identification. Mussel populations have been observed across the Forest and need to be inventoried. Recent pond surveys produced two salt water aquatic species. Isolated ponds and wet areas may serve as a refuge for the young of these species.

EC (1) – How does the road system affect the agency's direct costs and revenues? What, if any, changes in the road system will increase net revenue to the agency by reducing cost, increasing revenue, or both?

The arterial and collector roads are the backbone network for all activities on the Forest. Road management is geared toward identifying and being responsive to changes in road use by the public, private landowners within the proclamation boundary and other Federal and State Agencies. Adverse effects of roads on natural resources are being identified and priorities' set for correcting problems as funding permits.

Culvert replacement, drainage and surfacing are planned on Forest Service Road #204, Echaw in 2003. Road improvements are geared toward: reducing short-term maintenance

and monitoring costs; improving safety; and, improving recreation access. Maintaining and upgrading these roads increase direct and indirect revenues.

EC (2) – How does the road system affect the priced and non-priced consequences included in economic efficiency analysis used to assess net benefits to society?

Road improvements indirectly result in increased net revenues through increased stumpage values for both federal and private timber and extend the time periods for hauling timber during wet weather.

Commercial recreation use of roads on the Forest consists of kayak outfitters accessing Cape Romaine and rivers. Non-priced consequences of maintaining/improving the level 3 through 5 road network include meeting public demand for recreational activities such as hunting, fishing, hiking, boating, biking, OHV, horseback riding and access to recreational facilities.

EC (3) – How does the road system affect the distribution of benefits and costs among affected people?

The arterial and collector roads primarily benefit local residents, state and federal agencies that use the roads to fulfill management responsibilities. Commercial and recreational use of the arterial and collector roads is increasing. Potential for conflicts are increasing among these diverse groups in management of roads.

TM (1, 2 and 3) – How does road spacing and location affect logging systems feasibility? How does the road system affect managing the suitable timber base and other lands? How does the road system affect access to timber stands needing silvicultural treatment?

The arterial and collector roads are primarily in place. The road system accommodates ground-based logging systems (rubber-tired skidders, dozers and feller-bunchers). This system is adequate to meet present and future logging needs.

Additions to the road network would primarily occur at the 1 and 2 maintenance level. This would primarily be to access unroaded tracts, to reduce skidding costs and to improve management efficiency at the stand level.

MM (1) – How does the road system affect access to locatable, leasable and salable minerals?

Again, the arterial and collector roads are all primarily in place. Though the road system was developed to accommodate ground-based logging systems it will also adequately meet the needs of any mineral development activities since these are also ground based operations. This system is most likely adequate to meet future needs.

WP (1): How does the road system affect access, constructing, maintaining, monitoring, and operating water diversions, impoundments, and distribution canals or pipes?

The National Forest maintains several small impounded lakes and greentree reservoirs that are used for recreational purposes. Roads are critical for maintenance and use of these public facilities. Many of the water impoundment facilities owned by the USFS also are contributing to the non-road backlog maintenance need for the forest due to the past lack of funding to properly maintain them.

WP (2): How does road development and use affect water quality in municipal watersheds?

There are no municipal watersheds identified on the Francis Marion National Forest. In some instances, the road right of way or road prism has been used in the transmission of community or municipal water sources to the public through waterlines to service private lands and industries.

WP (3): How does the road system affect access to hydroelectric power generation?

Most hydroelectric power generation is on private lands, with private road access. A few National Forest roads provide access to power generation facilities, structures or impounded water. In most instances, road right-of-way agreements are already in place across the Forest for access to facilities. The FS will work with FERC and the generating entity to help maintain road or other conditions to ensure business and recreational access when appropriate. Mitigation measures needed should be addressed when lands managed by the National Forest are affected by these uses. Road systems may also become useful as corridors that are used to relay power.

SP (1) and SU (1) – How does the road system affect access for collecting special forest products? How does the road system affect managing special use permit sites?

A variety of special use permits exist across the Forest for powerline, gasline, cable optic lines and waterlines. All of these uses depend on maintenance level 3, 4 and 5 roads for primary access as well as their connection to the state, county and federal highway systems.

GT (1) (2) – What road systems connect to public roads and provide primary access to communities? What is the current condition of these roads? What maintenance standard should they be? How does the road system connect large blocks of land in other ownerships to public roads?

Appendix B identifies Forest highway routes that are important to communities and meet public demand for access into and through the Forest.

Key roads identified by the public and Forest Service personnel are I'on Swamp, Lethcoe, Willow, Brick Church, Hoover, Echaw, Halfway Creek and Yellowjacket roads. These roads as well as others (State road #98 and 654) are receiving increased use by a diverse public with different needs and desires for access management across the Forest.

Comments both internally and from the public have stressed the need to maintain roads to the standard they were designed for. Likewise, some roads may need to be upgraded because they serve community infrastructure (mail and bus routes or are major through roads). Not only are these roads used by local individuals and for commercial purposes but also by people enjoying recreational activities (such as hikers, bikers and bird watchers).

Public concerns identified the need for commodity users to pay their share of road maintenance fees. Improving certain roads will likely increase public use of them.

Recent large land purchases (IP Wando – 3,866 acres for instance) by the federal government and managed by the Forest Service will require and identification of roads for public access and any improvements needed to bring them up to a certain standard. Other roads in these purchase tracts may be eligible for decommissioning and obliteration.

South Carolina Department of Transportation reconstruction activities on Steed Creek road would temporarily divert traffic onto roads managed by the Forest Service for the short term. This may require some additional maintenance to be done on these roads.

GT (3) – How does the road system affect managing roads with shared ownership or with limited jurisdiction?

Many of the roads on the county network existed prior to any formal deeded rights-of-way. This makes it difficult to widen a road or to change alignment. Formal agreements need to be made. Similarly, historical access to private property exists across federal lands usually with no formal written agreement.

Cooperative reciprocal agreements with counties on road maintenance need to be investigated.

Evaluations and improvements may be needed from Forest Service roads to private lands.

Identify roads for appropriation by the Federal Highway Administration (FHWA) for long-term management purposes (following MOU between the two agencies) to improve management efficiency.

GT (4) – How does the road system address the safety of road users?

Decrease maintenance on roads has resulted in increasing safety concerns among the public and Forest Serve personnel. Roads identified under GT (1) (2) are in a

deteriorated state with numerous potholes and shoulders sloughing off. This is leading to increased vehicle maintenance and safety concerns. For example, maintenance on some roads is being done only once or twice a year. Some roads are bladed before hunting season and depending on weather conditions they can get severely rutted soon afterwards. They may stay in that condition for many months before they are graded again.

The public has asked that parking areas be developed along Halfway Creek and Steed Creek Roads and that I'on Swamp road be widened and include the development of primitive parking areas.

The Forest has a large annual prescribed burning program (up to 50,000 acres annually). This requires coordination with state and county road management agencies as well as roads managed by the Forest Service in identifying temporary road closures. This is needed to address safety concerns associated with smoke reducing visibility.

TW (1): What are the direct effects of the road system on terrestrial species habitat?

The assumption in the background statement that roads result in habitat loss and fragmentation is misleading and inaccurate. Habitat loss and fragmentation is the combination of landscape pattern, patch size (grain and texture) and of course, habitat types. In landscapes that are predominantly forested (>70%) issues related to habitat loss and fragmentation are reduced to minor or insignificant levels.

The Francis Marion is a contiguous land tract that is mostly forested. Hurricane Hugo in 1989 blew down vast acreages of older mature pine and resulted in the establishment of many young stands.

TW (2): How does the road system facilitate human activities that affect habitat?

The road system does provide public access along the length of open public roads on the Forest. Timber theft, dumping, arson, and illegal off-road traffic are some of the consequences of open access to public lands.

TW (3): How does the road system affect legal and illegal human activities (including trapping, hunting, poaching, harassment, road kill, or illegal kill levels)? What are the effects on wildlife species?

Open roads provide access to public lands in rural forested landscapes on the National Forest. These roads provide necessary access to the multitude of hunters, birders, anglers and outdoor enthusiasts that depend on our National Forests for a land base to pursue their chosen activity. People engaged in illegal activities likewise have access to these same lands. In South Carolina, the Francis Marion National Forests provide over 60% of the public hunting lands available in the State.

Legal threats to wildlife from roads are directly proportional to the traffic volume and speed limit of highways. Interstates are more lethal to wildlife than graveled forest roads for example.

UR (1): Is there now or will there be in the future excess supply or excess demand for unroaded recreation opportunities?

It is difficult to forecast demand for general unroaded recreation opportunities since they encompass a variety of activities. However, the demand for several recreation opportunities (including some opportunities that are done in unroaded recreation settings) is covered in the Final Environmental Impact Statement (December, 1995) for the Francis Marion National Forest.

As for supply of unroaded recreation opportunities, there is a supply of unroaded recreation settings (and therefore opportunities) on the Francis Marion including 4 designated wildernesses. There is an objective in the Revised Francis Marion Land and Resource Management Plan (December, 1995) to increase the amount of land that is greater than ½ mile from a road. As this objective is accomplished in the future, the supply of unroaded recreation settings will increase.

UR (2): Is developing new roads into unroaded areas, decommissioning of existing roads, or changing the maintenance of existing roads causing substantial changes in the quantity, quality, or type of unroaded recreation opportunities? And what effects might occur from these activities?

Developing new roads into unroaded areas does cause substantial change in the quantity and quality of unroaded recreation opportunities. In general, the quantity and quality of unroaded recreation opportunities decrease, depending on the location of the new road. Noise and other disturbances (such as dust and increased amounts of people) caused from the use of roads is a negative effect on the unroaded recreation users' feeling of solitude. Some effects from road construction, including noise, dust and increased numbers of people decreases the feeling for unroaded recreation users. Any road building in the "inventoried roadless areas" will negatively affect quantity and quality of the roadless recreation experience.

Decommissioning of existing roads can have a positive effect on unroaded recreation opportunities depending on the location of the road/roads to be decommissioned. By decommissioning several roads in the general vicinity, there is the potential to increase the quantity and quality of recreation opportunities in the area. The effects of decommissioning roads can include less dust and noise from vehicles and fewer numbers of visitors due to increased difficulty in access.

Changing the maintenance level of existing roads causes less change to unroaded recreation opportunities than developing new roads. By increasing the maintenance level, the speed of vehicles may increase and more people will be able to access the area.

By decreasing the maintenance level, the speed of vehicles may decrease and the numbers of people who access the area may decrease.

UR (3): Who participates in unroaded recreation in the areas affected by constructing, maintaining and decommissioning roads?

Forest specific knowledge about our visitors who participate in unroaded recreation is limited and is often antidotal. The Francis Marion National Forest completed a Forest Visitor Use survey in 2002. Some preliminary demographic results show that 80% of forest visitors are male and about 92% of them are white. In the wildernesses, over 99% of the visitors are white.

UR (4): What are these participants' attachments to the area, how strong are their feelings, and are alternative opportunities and locations available?

People often get attached to certain areas on National Forests. People can recreate for generations at the same areas on the Forest and this may lead to strong attachments.

There are not any other public lands with similar opportunities within the vicinity. In the coastal area around the National Forest, there will be fewer of these types of opportunities for unroaded recreation opportunities available as development continues.

RR (1): Is there now or will there be in the future excess supply or excess demand for roaded recreation opportunities?

It is difficult to forecast demand for general roaded recreation opportunities since they encompass a variety of activities. However, the demand for several recreation opportunities (including some opportunities that are done in roaded recreation settings) is covered in the Final Environmental Impact Statement (March, 1996) for the Francis Marion National Forest.

As for supply of these opportunities, the majority of the recreation settings on the Forest are roaded recreation.

RR (2): Is developing new roads, decommissioning of existing of existing roads, or changing the maintenance of existing roads causing substantial changes in the quantity, quality, or type of roaded recreation opportunities? And what effects might occur from these activities?

Most of the Francis Marion National Forest has a roaded natural recreation opportunity spectrum. Roaded recreation is more abundant compared to unroaded recreation.

Noise, dust and other disturbances caused from the use of roads is a negative effect on the road recreation users. However, road noise and/or disturbance are necessary if one is to enjoy the convenience of roads. Any additional road building near areas that enjoy high recreation use could negatively affect the quality of the recreation experience because of

the additional noise and disturbance. But road improvements could significantly improve the quality of the experience for those who prefer well-maintained roads. Road maintenance levels also affect the type of roaded recreation enjoyed. Adding roads to the low maintenance level classification would actually increase the opportunities for high clearance vehicle driving even though poorly maintained roads may limit access for many.

RR (3): Who participates in roaded recreation in the areas affected by constructing, maintaining and decommissioning roads?

Forest specific knowledge about our visitors who participate in unroaded recreation is limited and is often antidotal. The Francis Marion National Forest completed a Forest Visitor Use survey in 2002. Some preliminary demographic results show that 80% of forest visitors are male and about 92% of them are white. In the wildernesses, over 99% of the visitors are white.

Handicap hunter access is needed on some roads.

RR (4): What are these participants' attachments to the area, how strong are their feelings, and are alternative opportunities and locations available?

Roaded recreation attachments are strong enough to cause the creation of interest groups that advocate the protection of their preferred recreation opportunity and urge for the creation of new opportunities. Many recreationists benefit from roads, such as off-road enthusiasts, campers, day-users, and hunters. While the existing road system in South Carolina is very extensive, the demand for roaded recreation is increasing, just as demand for unroaded recreation is increasing.

Some of the roaded recreation activities, such as hunting, horseback riding, and OHV riding are all available on private land in South Carolina. The dilemma, however, is this, many can not afford to own, lease, or rent land of sufficient size to enjoy these activities, and even fewer can afford to own, lease, or rent land on a scale that provides the same or better setting as what one can find on National Forest.

AU (1) – How does the road system affect access needed for research, inventory, and monitoring?

The current road system provides good access for monitoring of resource management activities on the National Forest. Forest Inventory and Analysis (FIA) plots are located in the area as well as bird monitoring points. The Forest provides many opportunities for ongoing research with various universities because of its location and accessibility.

AU (2) – How does the road system affect investigative or enforcement activities?

The road system provides access for law enforcement and resource protection.

PT (1) – How does the road system affect fuels management?
Typically, roads are used as control lines for prescribed burning and for access to determine conditions before and after a fuels management treatment. Road access increases management efficiency, safety, reduces costs and resource impacts from repetitive fireline construction.

PT (2) – How does the road system affect the capacity of the Forest Service and cooperators to suppress wildfires?

The road system provides access and quick response for wildfire suppression and resource protection. Roads serve as control lines and emergency access points for firefighters, and they improve access for equipment such as dozers, fire engines, water tenders and fire crew transport vehicles.

PT (3) – How does the road system affect risk to firefighters and to public safety?

The topography is not very steep on the Forest and roads typically are wide and have sufficient sight distance for vehicular fire traffic including firefighter transport busses. County, state and Forest Service managed road systems provide the access. Generally, the road system is adequate to meet fire suppression needs and allows orderly egress by the public from the affected area.

PV (1) – Do areas planned for road construction, closure, or decommissioning have unique physical or biological characteristics, such as unique natural features and threatened or endangered species?

Steed Creek Road, planned for road improvements including widening and paving, crosses several unique fire-maintained communities including rare species populations on the Forest.

Chapter 5 – Describing Opportunities and Setting Priorities

This chapter describes management opportunities and sets priorities for road management on the Francis Marion National Forest

Management Opportunities

There are opportunities to:

1. improve roads that are public safety concerns.

2. protect habitat related to threatened, endangered and sensitive species.

3. close and decommission roads that are no longer needed for management or are having substantial resource impacts.

4. develop agreements with the State and County agencies on road maintenance.

5. develop formal rights-of-way agreements with private landowners and with State and County agencies.

6. improve handicap hunter access on a few closed roads.

7. close roads (permanently and with gates) to reduce maintenance costs and provide wildlife food and seclusion and meet Forest Plan objective O-3 (Increase the acres greater than ½ mile from an open road to 24,000 acres in the next ten years.)

8. identify ROWs that should be appropriated by the Federal Highway Administration.

9. develop a road management plan for new land acquisitions that protect resources and provide safe public access.

10. identify temporary road closures when conducting prescribed burning activities to provide safety for the public.

11. develop road use agreements and collect fees for commercial use of system roads.

12. update/improve GIS transportation layer and road atlas.

Priorities

Needs are identified in each category with specific references found in Chapter 4.

1. Public Health and Safety
[Reference: GT (1) - (4), PT (3), Appendices A and B]

- ✓ Identify high priority roads in need of maintenance or if road standards need to be changed to accommodate current and projected use levels.

- ✓ Identify roads for temporary closures during prescribed burning operations.

2. Resource Protection and Management

[Reference: EF (2) - (4), GT (1), GT (2)]

- ✓ Continue to manage for known populations of threatened, endangered and sensitive species (TES) that occur within road rights-of-way.

- ✓ Identify ditchlines that connect to swampy areas that allow predatory fish to feed on the endangered flatwoods salamander.

- ✓ Identify areas along rights-of-way where invasive exotic species could be reduced and/or eliminated especially where they impact TES species.

- ✓ Classify and implement decisions (road closures/decommissioning) on roads in new land acquisitions – especially IP Wando purchase.

- ✓ Identify road reconstruction needs and obtain funding to facilitate first thinning harvests to keep young stands healthy.

- ✓ Continue to identify roads where smoke management concerns exist and mitigate adverse impacts.

3. Public/Adjacent Landowners/Other State and Federal Agencies

[Reference: GT (1) – (3), EC (1), SP (1), SU (1)]

- ✓ Identify or begin road improvement projects.

- ✓ Identify roads where maintenance can be done by the State or County road agencies and vice versa.

- ✓ Continue to identify roads to be upgraded/downgraded based on traffic use level.

- ✓ Identify and work with utility companies in the placement of future utility lines within road rights-of-way.

- ✓ Identify ROW with State and County agencies that need to be formalized and/or improved.

- ✓ Identify roads for handicap hunter access.

- ✓ Identify roads to be appropriated by Federal Highways Administration.

- ✓ Collect road use fees from commercial users of roads.

4. Financial (Issue B)

[Reference: EC (1)]

- ✓ Identify roads for closing to reduce annual and/or deferred maintenance costs.

- ✓ Identify road improvements to reduce short-term maintenance costs.

- ✓ Identify roads to remove from the transportation system.

Chapter 6 - Reporting

This roads analysis supplements the Francis Marion National Forest Land and Resource Management Plan. The results and findings can be used to set Forest-wide priorities and also direct site-specific analysis/surveys at the project and area level.

Key Analysis Results and Findings

1. The forest road condition survey program has identified over 12 million dollars in deferred maintenance work on the road system that needs to be accomplished.

2. The Forest is receiving only about 1.7 percent of its non-critical maintenance needs at the present time.

3. The Forest is being funded at about 51 percent of its need in annual maintenance.

4. There is a need to establish reciprocal agreements for road maintenance with the State of South Carolina and the counties, especially for roads receiving heavy use by the public.

5. There is a need to maintain roads to designed standards for public safety.

6. Some closed roads need to be accessible for handicap hunters.

7. Roadside maintenance activities affect habitat for some threatened, endangered and sensitive plant and animal species.

8. Roads managed by the Forest Service are inextricably linked to other federal, state and local road systems providing access to homes, farms, local industries and community infrastructure.

9. Traffic has increased beyond the original design standards of some roads and they need to be upgraded.

10. Reduced maintenance has created washboard surfaces, potholes and erosion and breakup of shoulders on some roads.

Appendices

A - Potential Public Forest Service Road Projects
B – Francis Marion Forest Highways
C - ML 3-5 Roads on the Forest

Appendix A

Francis Marion NF Potential Public Forest Service Road Projects

Road Project Name	Road Number	Road Name	Total Miles	Total Estimated Cost (in Millions)
Willow Hall & I'on Swamp	202	Willow Hall	6.41	
	228	I'on Swamp	3.73	$1,070,000
Brick Church & Hoover	188	Brick Church	2.54	
	183	Hoover Road	4.21	$660,000
Echaw	204	Echaw	8.25	$ 740,000

FY 2003 Restoration Projects

Road #	Name	Mileage	Project Description
204	Echaw	0.2	Culvert replacement, Drainage and Surfacing
District		5.0	Aggregate Replacement in Campgrounds
District		0.5	Replacement of Culverts

Appendix B

Francis Marion National Forest
Forest Highway Routes

Route No.	County	Length (miles)	State Roads	County Roads
201	Berkeley	15.9	SC 402	
203	Berkeley	10.7	S 171, S 125	
204	Berkeley,Charleston	12.0	S 133, S 1032	
206	Berkeley	23.1	S 100, S98	
207	Berkeley	6.8	S 97	
208	Berkeley	8.8	S 126	
211	Berkeley	7.6	S 598	
212	Berkeley	6.2	S 599, S 166	
213	Berkeley	5.3	S 172, S 49	
216	Charleston	8.8		C 217, C 215
217	Charleston	5.8	S 1335	C 216
	Total	111.0		

Appendix C

ML 3-5 Roads on the Forest (attachment)