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Environmental Assessment

Forest Plan Amendments

Caribbean National Forest
Rio Grande, Puerto Rico



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SUMMARY

The Caribbean National Forest proposes to amend the Revised Land and Resource Management Plan (Forest Plan). The project area is located in the rugged Sierra de Luquillo Mountains, 25 miles southeast of San Juan, Puerto Rico and is within the Caribbean National Forest, Puerto Rico. It is the only tropical forest administered by the USDA Forest Service. This action is needed, because we need to make minor adjustments to the proposed Wilderness boundary and we need to assign Management Areas to recently acquired land to be consistent with the Revised Land and Resource Management Plan. Management Direction is divided into general Forest-wide direction, and additional direction specific to the individual Management Areas. Management Direction is required by the National Forest Management Act Regulations, 36 CFR 219.

The proposed action may help achieve the goals and objectives of the Forest Plan by providing water for people's use, providing a means to control erosion, improve watershed health, improve aquatic habitat, and recreation. These were major issues during the revision of the Forest Plan and this amendment will help the Forest Service further address these issues. The proposed action may help achieve the goals and objectives of the Forest Plan by protecting the Wild and Scenic River (WSR) values and providing recreation opportunities for people. These were major issues during the revision of the Forest Plan and this amendment will help to further address these issues.

In addition to the proposed action, the Forest Service also evaluated the following alternatives:

- No-action alternative

The Forest Supervisor may amend the forest plan. Based on an analysis of the objectives, guidelines, and other contents of the forest plan, the Forest Supervisor shall determine whether proposed amendment would result in a significant change in the plan (36 CFR 219). Based upon the effects of the alternatives, the responsible official will decide if we amend the Land and Resource Management Plan.

INTRODUCTION

Document Structure

The Forest Service has prepared this Environmental Assessment in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This Environmental Assessment discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The document is organized into four parts:

- *Introduction:* The section includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.
- *Comparison of Alternatives, including the Proposed Action:* This section provides a more detailed description of the agency's proposed action as well as alternative methods for achieving the stated purpose. These alternatives were developed based on significant issues raised by the public and other agencies. This discussion also includes possible mitigation measures.
- *Environmental Consequences:* This section describes the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by alternatives. Alternative 1 is the no action alternative and alternative 2 is the proposed action. Within each section, the affected environment is described first, followed by the effects of the No Action Alternative that provides a baseline for evaluation and comparison of the other alternatives that follow.
- *Agencies and Persons Consulted:* This section provides a list of preparers and agencies consulted during the development of the environmental assessment.
- *Appendices:* The appendices provide more detailed information to support the analyses presented in the environmental assessment.

Additional documentation, including more detailed analyses of project-area resources, may be found in the project planning record located at the Catalina Service Center in Rio Grande, Puerto Rico.

Background

The USDA Forest Service acquired El Conde Estate through condemnation. The process of acquiring the land commenced in 1979. Normally the Forest Service (FS) does not use condemnation to acquire lands. However, if an owner refuses to sell an urgently needed property required for a specific purpose, we can initiate negotiations under the threat of condemnation. The applicable purposes in this case were watershed management and improvement of the recreational experience. El Conde tract is listed as Priority Objective I-1 in the Appendix C, Table C-1, *Tracts to be Acquired, Land Ownership Adjustment*

Program, Caribbean NF/Luquillo EF of the Revised Land and Resource Management Plan.

The Forest contains 27,890 acres, with elevation ranges from 100 to 3,533 feet above sea level. The Forest exhibits an abundant biodiversity. Puerto Rico's tropical moist forests are characterized by a great diversity of plants. More tree species occur on the Caribbean National Forest than in all the other 155 National Forests combined; and none of these species occur on any other National Forest. The vegetative diversity of this land area supports 134 species of wildlife and aquatic vertebrate, and 10 additional species of aquatic macro invertebrate. The Forest is also designated as the Luquillo Experimental Forest. Conservation of the El Conde tract facilities the USDA Forest Service's mission.

The Land and Resource Management Plan (LRMP) direction is to consolidate land ownership for improved management effectiveness and enhanced public benefits. The LRMP is the result of consultation between the public, agency, and Congress. At the project level, this condemnation supports two management objectives: healthy watershed management and improvement of the recreational experience.

There was a strong local support by the Resident Commission Office at Washington D.C., the Office of the Governor and the Mayor of the Municipality of Luquillo.

The land borders the Mameyes River. This 4.5 mile long river produces over 20 million gallons a day for Puerto Rico. Water quality from this river and watershed is optimum. This acquisition increases sustainable development and improves water supply management. In addition to biological values, this river was designated as a component of the National Wild and Scenic Rivers System by Congress due to its outstanding scenic, biological and recreational values. This became Public Law on December 19, 2002.

The Mameyes River at Puente Roto crossing is the most popular water play area on the Forest. FS ownership of this land will allow for site development of the area to enhance visitor's experience while ensuring soil protection and water quality.

The watershed is habitat for the Puerto Rican Parrot, Puerto Rican Boa, which are both federally endangered species. The endangered broad-winged and sharp-shinned hawk, and the threatened peregrine falcon are also known to occasionally use the area. This watershed is suitable habitat for the sensitive red fruit bat. The unique Pterocarpus forest occurs within the river corridor.

These tracts are located in the forest watershed with the highest natural aquatic diversity and species richness of any forest watershed. This particular forest watershed supports five native fish species, nine freshwater shrimp species, and Puerto Rico's only freshwater crab.

The Land and Resource Management Plan (LRMP) recommends a contiguous block of 10,363 acres (37% of the Forest) for Wilderness designation. This includes one of two inventoried Roadless Areas on the Caribbean National Forest, El Toro Roadless area. The LRMP recommends Congressional Wilderness designation of 10,363 acres or 82% of El Toro Roadless Area. The El Toro Roadless Area is in the western half of the Forest and this contiguous block encompasses most of the primary forest in the west half of the Forest. It is named for the highest peak on the Forest, situated near the south western portion of the Roadless Area. The Roadless Area is about 20 air miles southeast of San

Juan, Puerto Rico. It is bounded in the north by P.R. Highway 966, on the south by the Forest boundary, on the east by P.R. Highway 191, and on the west by highway 186 and the Forest boundary.

While working on the legislation bill with the Resident Commissioner during the year 2000, we recognized the need to make an adjustment in the originally proposed Wilderness boundary to move back from Highway 191. The area west of PR 191 lacks of Wilderness character due to the high use of PR 191. Due to the possibility of landslides, and in order to protect the watershed and public safety, the use of mechanized equipment is needed for road right-of-way and the adjacent area maintenance. We also recognized the need to make additional small boundary changes to eliminate any possible conflicts between Wilderness designation and existing municipal water facilities. The revised proposed Wilderness boundary map reflect these changes and the intent to continue to permit use of existing water extraction facilities.

The Forest currently has no designated Wilderness, however a bill to designate certain National Forest System land in the Commonwealth of Puerto Rico as components of the National Wilderness Preservation System, Senate Bill 2334 was introduced on April 22, 2004. The proposed Wilderness area provides an example of Puerto Rico's original forest. It is the largest, contiguous, unroaded tract of forest on the island. It is a biological reservoir providing protection for rare and endemic habitats, animals and plants. Designation of Wilderness on the Forest would be particularly significant because it would be the only tropical forest in the National Forest Wilderness System, and would contribute toward the national goal of a more diverse wilderness preservation system.

Purpose and Need for Action

The purpose and need for these Forest Plan amendments are as follows:

- 1) To more accurately define the proposed Wilderness boundary currently in the proposed legislation, before the U.S. Congress can officially designate the area as El Toro Wilderness. The technology used to create the original proposed Wilderness map (C-MOD) was such that the lines and acreages in the Forest Plan were approximations. The proposed action creates more accurate boundaries for MA 5 (Wilderness).
- 2) Water intakes and distribution line right-of-ways that are under permit by the Puerto Rico Water Authority are located within the proposed Wilderness boundary (MA 5). Manmade structures, and the maintenance of those structures are uses incompatible with Wilderness and the Goals of MA 5 (Wilderness). Water intakes and distribution lines would most likely have to be removed if the current proposed Wilderness is designated by law; therefore, for them to continue to operate, they must be excluded from the designated Wilderness.
- 3) The original proposed Wilderness area did not allow for a transition from a highly used roaded area along PR 191 to the unroaded Wilderness. Mechanized equipment is not allowed within a Wilderness and is incompatible with MA 5 (Wilderness). Due to the high use of PR 191 and the possibility for erosion and landslides, maintenance of the road right-of-way and the adjacent area needs to be

done with mechanized equipment in order to protect the watershed and public safety. Since this is the major recreation corridor on the CNF assigning it to MA 2 (Developed Recreation) will give the Forest Service options to manage the recreation and prevent resource damage.

- 4) The original Forest Plan goals for MA 4 (Integrated) did not include water intake maintenance even though this was an issue during the revision of the Forest Plan. Adding this goal to the Forest Plan will help the CNF to better manage the water intakes and water lines that local residents and businesses depend on.

Adjusting the proposed Wilderness boundary helps achieve the goals and objectives of the Forest Plan by providing water for people's use, providing a means to control erosion, improve watershed health, improve aquatic habitat, and recreation. These were major issues during the revision of the Forest Plan and this amendment will help the Forest Service further address these issues. Below is a list of Forest Plan Goals that will be achieved by this amendment. A complete list of Forest Plan Goals can be found in the Forest Plan (chapter 4).

- Permit consumptive use of water from Forest streams for sustainable community development, while ensuring in-stream flows sufficient to protect aquatic and riparian ecosystems (Forest Plan 4-5).
- Improve watershed conditions and water quality, where adversely affected by landslides, recreation activities, roads and other facilities (Forest Plan 4-5).
- Maintain the current high quality condition of riparian area habitats (Forest Plan 4-6).
- Promptly restore disturbed areas through natural or managed re-vegetation (Forest Plan 4-10).
- Maintain existing roads and facilities to a high standard to enhance public service, protect natural resources, and protect capital investments (Forest Plan 4-44).
- Provide a range of recreation opportunities, focusing on developed recreation along existing roads (Forest Plan 4-31).

The purpose and need for these Forest Plan amendments are as follows:

- 1) Code of Federal Regulations (CFR) requires that National Forest lands be given Management Direction. Newly acquired land, like the El Conde tract, needs to be assigned to a Management Area (or MAs) to comply with the Land and Resource Management Plan. Furthermore, by assigning newly acquired land to a MA, management direction is clearly outlined in the Forest Plan.
- 2) These changes help achieve the goals and objectives of the Forest Plan by Protecting the WSR corridor and the river's WSR values. It also helps achieve Forest Plan goals of watershed protection and recreation.
- 3) If the proposed areas are not assigned to MA 9 (Scenic and Recreation River Corridors), WSR values could suffer.

- 4) Public Law No. 107-365 designated the Río Mameyes as a component of the Wild and Scenic River (WSR) National System which states that the WSR designation goes to the Forest boundary. The El Conde land extends the Forest boundary along the river and therefore extends the WSR.
- 5) By adding the remainder of the El Conde area to MA 2 (Developed Recreation), people will have another recreation option and therefore possibly decrease recreation pressure on other parts of the forest. It will also allow more options for the Forest Service to control the high recreation use that is currently taking place along the side of PR 988 at the Puento Roto bridge.

Adding the El Conde tract to MA 9 (Scenic and Recreation River Corridors) and MA 2 (Developed Recreation) and changing MA 2 (Developed Recreation) along the WSR Río Mameyes to MA 9 (Scenic and Recreation River Corridors) helps achieve the goals and objectives of the Forest Plan by protecting the WSR values and providing recreation opportunities for people. These were major issues during the revision of the Forest Plan and this amendment will help to further address these issues. Below is a list of Forest Plan Goals that will be achieved by this amendment. A complete list of Forest Plan Goals can be found in the Forest Plan (chapter 4).

- Emphasize watershed improvement activities in areas with highly erosive soils, and in areas of concentrated recreation use (particularly the Río Mameyes Watershed) (Forest Plan 4-6).
- Maintain the current high quality condition of riparian area habitats (Forest Plan 4-6).
- Provide a range of recreation opportunities, focusing on developed recreation along existing roads (Forest Plan 4-31).
- Develop currently undeveloped road-sites where concentrated use indicates a demand for facilities, and lack of facilities is contributing to resource damage (Forest Plan 4-31).
- Manage recommended WSR river segments to preserve the outstanding characteristics that make them eligible (Forest Plan 4-47).
- Manage WSR river segments in such a manner as to protect and enhance the values for which they were found eligible for WSR designation (Forest Plan 4-47).
- WSR Recreation segments may be paralleled by roads, have some development along shorelines, and have low intensity impoundments or diversion works, provided the waterway and its surroundings are generally natural in appearance (Forest Plan 4-47).

The purpose of this initiative is to assign Management areas to newly acquired land and to adjust the proposed Wilderness boundary. This action is needed, because we need to be consistent with Forest Plan Management Direction, and Standards and Guidelines. This action responds to the goals and objectives outlined in Chapter 4, Management Direction of the Forest Plan, and helps move the project area towards desired conditions described in the plan.

Proposed Action

The action proposed by the Forest Service to meet the purpose and need is to:

A. Wilderness boundary adjustment and associated changes

- 1) Define more accurately the boundaries for the proposed Wilderness area (MA 5).
- 2) Change the MA for the following water intake areas and water line right-of-ways from MA 5 (Wilderness) to MA 4 (Integrated):
 - Quebrada Jimenez Intake .80 acres near PR 9966
 - Rio Grande (Guzman Arriba) Intake 1.03 acres near PR 186
 - El Aljibe .04 acres near PR 9948
 - Rio Gurabo .35 acres near PR 949
- 3) Change 149 acres of the area adjacent to the north section of PR 191 from MA 5 (Wilderness) to MA 2 (Developed Recreation).
- 4) Add the following new goal to MA 4 (Integrated): “Accommodate the management and maintenance of existing water intakes and water lines”.

B. Assign Management Areas to the newly acquired land “El Conde”

- 1) Assign 80 acres of newly acquired land to MA 9 (Scenic and Recreation River Corridors) along the Wild & Scenic River (WSR) corridor (Rio Mameyes).
- 2) Assign the remaining 91 acres of newly acquired land to MA 2 (Developed Recreation).
- 3) Change 50 acres currently designated as MA 2 (Developed Recreation) along the Wild & Scenic River Mameyes to MA 9 (Scenic and Recreation River Corridors).

Decision Framework

Given the purpose and need, the deciding official reviews the proposed action and the other alternatives in order to make the decision of amending the Revised Forest Plan or not.

Public Involvement

The proposal was provided to the public and other agencies for comment during scoping on January 27, 2004. In addition, as part of the public involvement process, the IDT leader contacted some of the respondents of the scoping letter sent out in order to clarify any concerns they responded to.

Using the comments from the public, other agencies, and Interdisciplinary team (see *Issues* section), the interdisciplinary team developed a list of issues to address.

Issues

The Forest Service separated the issues into two groups: significant and non-significant issues. Significant issues were defined as those directly or indirectly caused by implementing the proposed action. Non-significant issues were identified as those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. The Council on Environmental Quality (CEQ) NEPA regulations require this delineation in Sec. 1501.7, "...identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)..." A list of non-significant issues and reasons regarding their categorization as non-significant may be found at the Catalina Service Center in the project record.

Issue Development Process

Public comments were reviewed by the Interdisciplinary Team (IDT) to identify issues relative to the Proposed Action.

The public comments were separated into 2 categories, which are as follows:

1. Significant issues; and,
2. Issues not carried forward in this analysis, or non-significant issues.

An issue is a point of discussion, debate, or dispute (about environmental effects) regarding the proposed action.

Significant issues are used to formulate alternatives, prescribe mitigation measures, or analyze environmental effects. Issues were considered to be significant due to their extent of their geographic distribution, the duration of their effects, the intensity of interest or the potential for resource conflicts.

Significant Issues

The IDT identified the following issues as significant:

Issue #1: Providing and protecting the Forest's water quantity and quality.

Issue #2: Protection of wildlife while conducting other Forest management activities.

Issue #3: Providing recreation opportunities while protecting the ecological values of the Forest.

Issues Not Carried Forward

An issue that surfaced during scoping was the amount of acreage that was proposed to change from MA5 (Wilderness) to MA2 (Developed Recreation) while adjusting the proposed Wilderness boundary. The change from MA5 to MA2 occurs along PR Rd 191,

other Wilderness boundary adjustments change Management Areas from MA5 to MA4 (Integrated). This was discussed during the June 10th IDT meeting. Specialists discussed and agreed that the proposed Wilderness boundary was minimally adjusted to adequately address watershed protection, road and trail maintenance and water supply. It was also concluded that the recommendation given was randomly selected and was not supported by scientific evidence. In addition, less than one (1) percent of the total acreage is being change from MA5 to MA2 and MA4 within the proposed wilderness boundary line.

ALTERNATIVES, INCLUDING THE PROPOSED ACTION

This chapter describes and compares the alternatives considered for the Forest Plan Amendments. It includes a description and map of each alternative considered. This section sharply defines the differences between each alternative and providing a clear basis for choice among options by the decision maker and the public. Some of the information is based upon the environmental effects of implementing each alternative.

Alternatives

Alternative 1

No Action

Under the No Action alternative, current management plans would continue to guide management of the project area. No Forest Plan Amendments would be implemented. *See Appendix A, C-MOD map of the Revised Land and Resource Management Plan.*

Alternative 2

The Proposed Action

To adjust the proposed Wilderness boundary line and to assign Management Areas to newly acquired land. See Figure 1 and 2.

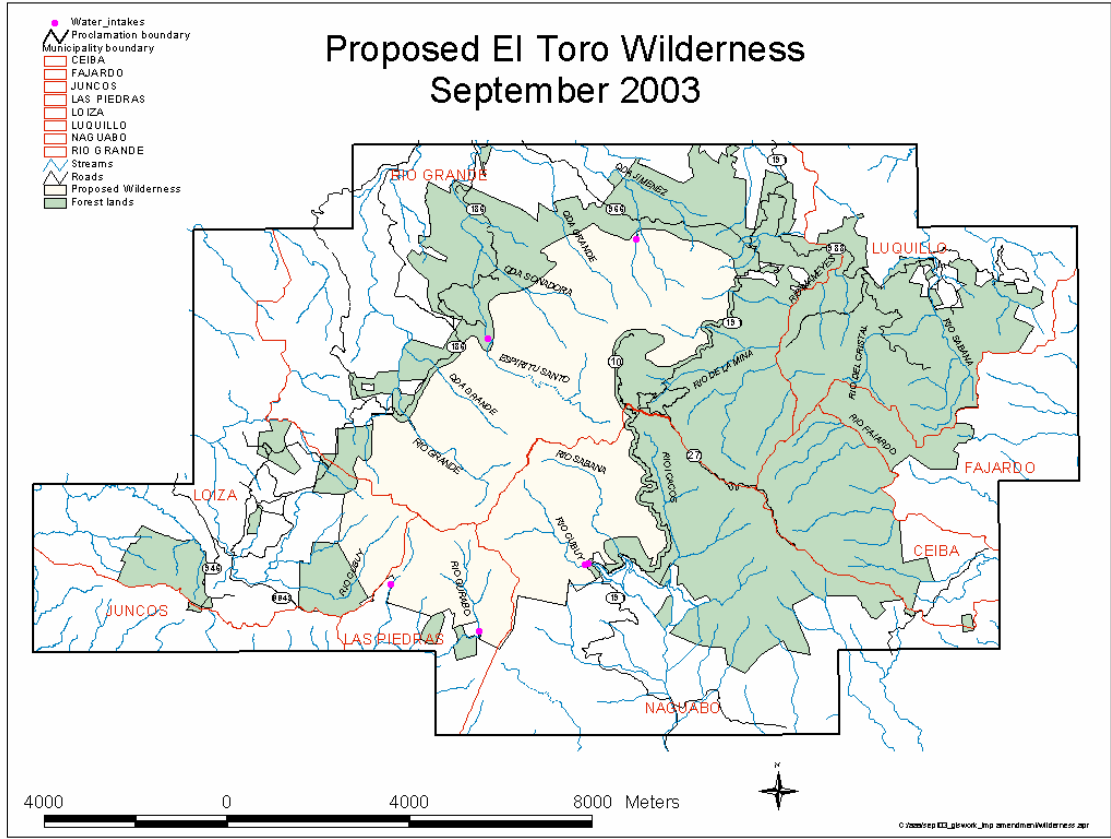


Figure 1. Proposed Wilderness boundary adjustments.

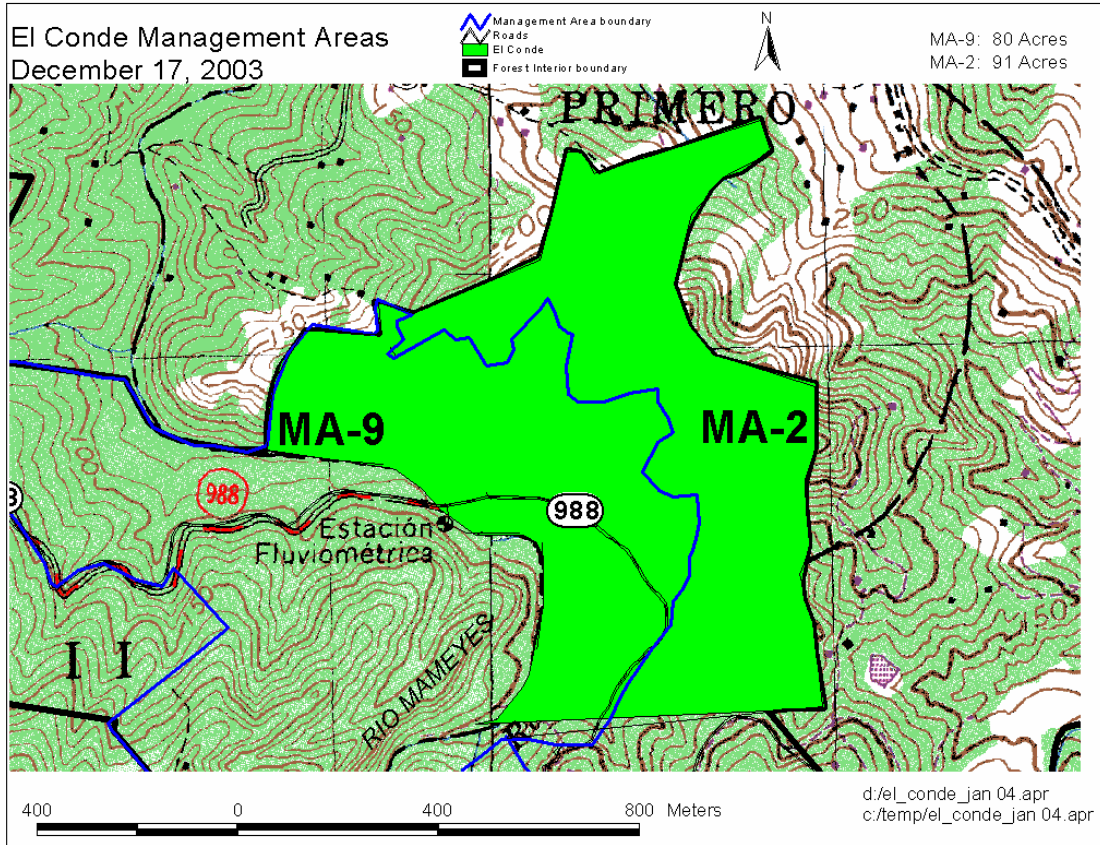


Figure 2. El Conde Management Areas.

ENVIRONMENTAL CONSEQUENCES

This section summarizes the physical, biological, social and economic environments of the affected project area and the potential changes to those environments due to implementation of the alternatives. It also presents the scientific and analytical basis for comparison of alternatives presented in the chart above.

Physical Setting

Soils and Water

Introduction and background

The El Conde Tract is a 171.8 parcel along the banks of Rio Mameyes. Rio Mameyes has been designated by Congress as a Wild and Scenic River. Environmental evaluation requires consideration of resource values and the effect of new management area allocation on sediment yields and water quality.

The Road PR-191 is the major artery to Forest recreation facilities. Currently, the boundary of the proposed wilderness area of El Toro extends to the road prism. The forest roads are characterized by a high landslide frequency. Landslide restoration requires use of mechanized equipment. Since use of mechanized equipment is not allowed on wilderness areas, an environmental evaluation is required to study the need for change. Landslides restoration reduces erosion and subsequent contamination to our waters.

El Conde Tract has been visited extensively by Forest Ecosystem Staff. A Litigation Report is in file. The file contains basic resource descriptions. Road PR-191 is constantly under field investigation. Landslides have been repaired after Hurricanes Hugo, Hortense, Marilyn and Georges. Other storms that have required repair include April 2003 Storm Activity.

The project activities are consistent with the Forest Plan standards and goals as follows:

- Maintaining water quality to meet or exceed Federal, Commonwealth and local water quality standards.
- Improve watershed condition and water quality where adversely affected by landslides.

Affected Environment

El Conde is located along the northern banks of Rio Mameyes. The tract is dominated by a hill top and forested southern facing slopes. A review of Caribbean Area Soil Survey, shows the Caguabo-Mucara-Naranjito soil association on the site (NRCS, 2002). The Caguabo soils make up about 42 percent of the association; Mucara soils, 19 percent; and Naranjito soils, 13 percent. The remaining 26 % consists of minor soils. The Caguabo soils are shallow, well drained; and moderately steep to very steep. Steep slopes, the

hazard of erosion, and depth to bedrock are the main limitations for farming and recreation uses. The Mucara Series consists of moderately deep soils that are well drained and moderately permeable. These soils formed in residuum derived from basic volcanic rocks. They are on side slopes and ridge tops of strongly dissected volcanic uplands. Slopes are 12 to 40 percent. These soils are fertile and have high available water capacity and moderate shrink-swell potential. Runoff is medium to rapid. These soils are somewhat difficult to work. The Naranjito Series consists of moderately deep soils that are well drained and moderately permeable. These soils have a high available water capacity, moderate shrink-swell potential, and medium fertility.

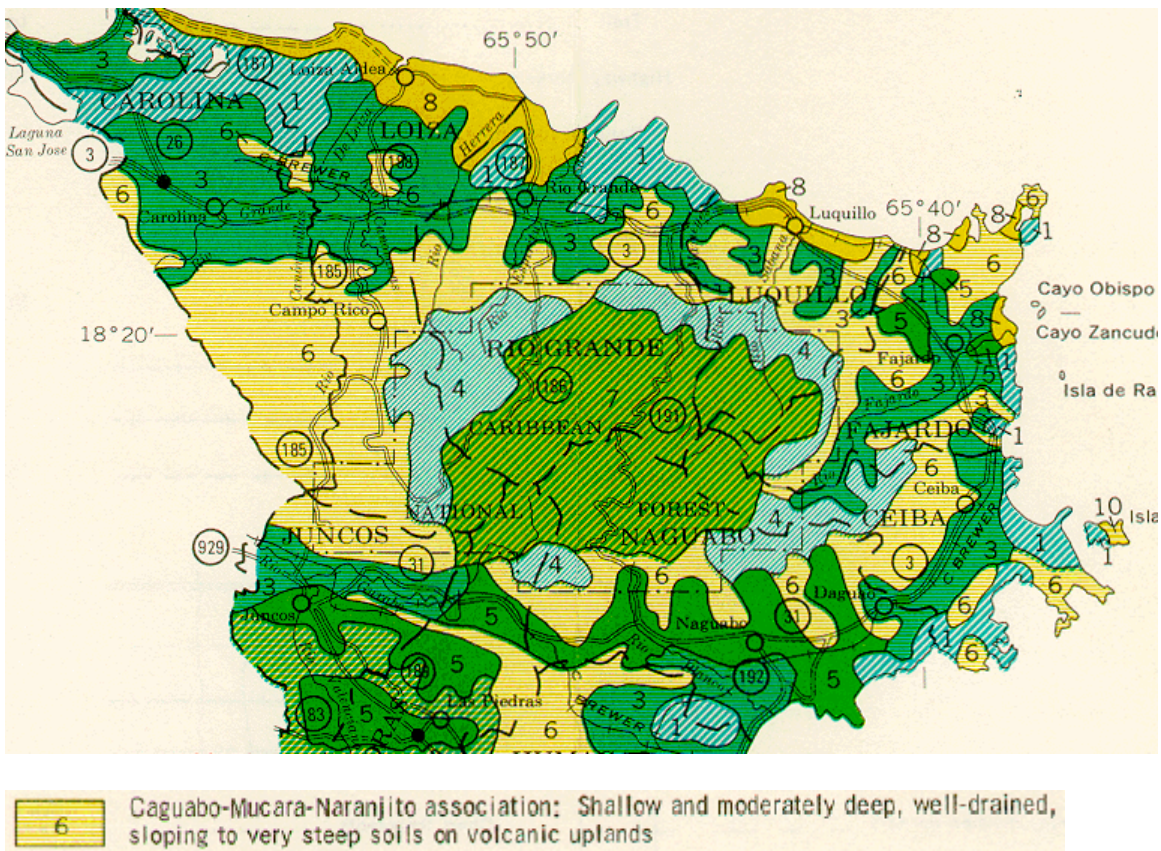


Figure 3. Shows Soils within El Conde Tract.

El Conde area is within the Mameyes watershed. The Mameyes Watershed covers 6.88 sq. miles within the forest, or 10.4% of the forest. The lower Mameyes corridor contains 625 acres, of which 75% is in national forest ownership, and 25% is privately owned. The tract is practically composed of secondary forest land. The range in elevation is from 100 meters above sea-level to 310 meters, moderate slopes. The average discharge at station 0655 is 55.8 cubic ft. /sec.

The Environmental Quality Board (EQB) establishes water quality standards for Puerto Rico. A review of Puerto Rico Water Quality Standards was conducted. The EQB 1990 policy states the “Where high quality waters constitute an outstanding National resource,

such waters as of El Yunque National Forest ...water quality shall be maintained and protected.” Water quality is good within the study area of the lower segment, affected to some degree by recreation use on the Rio de la Mina (a tributary of the Mameyes), and the heavy use near Puente Roto (LRMP, 1997).

The Mameyes is also unique among all Puerto Rican rivers in having no major permanent water extractions or impoundments.

The Road PR 191 is the main route into the Forest and has the heaviest traffic of any road in the system. This road crosses the Forest from Mameyes on the north to Naguabo on the south. In 1970, the road was closed by a major landslide during heavy rains associated with a tropical storm. The road remains closed between gates at Km. 13.3 and Km. 21.0. A review of CNF Soil Survey shows three types of soils in the north area and three types in the south area: Zarzal-Cristal complex, Yunque-Moteado complex and Guayabota-Yunque complex on the north part and Picacho-Utuado complex, Picacho-Ciales complex and Iacos loam on the south part (NRCS, 2002).

Table 1: Soils of Northern Segment:

Zarzal-Cristal complex 20 to 60 percent slopes		
Parameters	Zarzal Soil	Cristal Soil
Permeability	Moderately slow	Slow
Available water capacity	High	Medium
Content of organic matter	Medium	Medium
Natural Fertility	Medium	Medium
Shrink-swell potential	Moderate	Moderate
Flooding	None	None
Hydric	No	No
Seasonal high water table	No data	At a depth of 12 to 36 inches (30 to 91 cm) from January through December, perched.

Yunque-Moteado Complex 20 to 65 percent slopes		
Parameters	Yunque Soil	Moteado Soil
Permeability	Moderately	Slow
Available water capacity	High	High
Content of organic matter	Medium	High
Natural Fertility	Medium	Medium
Shrink-swell potential	Moderate	High
Flooding	None	None
Hydric	No	Yes
Seasonal high water table	At a depth of 30 to 48 inches (76 to 122 cm) from December to March, perched; at a depth of 24 to 30 inches (61 to 76 cm) from April to November, perched.	At the surface to a depth of 12 inches (30 cm) from December through March, perched; at the surface to a depth of 6 inches (15 cm) from April through November, perched.

Guayabota-Yunque Complex 30 to 60 percent slopes		
Parameters	Guayabota Soil	Yunque Soil
Permeability	Slow	Moderate
Available water capacity	High	High
Content of organic matter	Medium	High
Natural Fertility	Low	Medium
Shrink-swell potential	High	Moderate
Flooding	None	None
Hydric	Yes	No
Seasonal high water table	No data provided	At a depth of 30 to 48 inches (76 to 122 cm) from Dec through March, perched; a depth of 24 to 30 inches (61 to 76 cm) from April through November, perched.

Table 2: Soils of Road 191 Southern Segment:

Picacho-Utuado complex, 35 to 80 percent slopes		
Parameters	Picacho Soil	Utuado Soil
Permeability	Moderate	Moderately rapid
Available water capacity	High	High
Content of organic matter	Low	Medium
Natural Fertility	Low	Medium
Shrink-swell potential	Moderate	Low
Flooding	None	None
Hydric	No	No

Picacho-Ciales complex, 5 to 30 percent slopes		
Parameters	Picacho Soil	Ciales Soil
Permeability	Moderate	Slow
Available water capacity	High	High
Content of organic matter	Low	Medium
Natural Fertility	Low	Medium
Shrink-swell potential	Moderate	Low
Flooding	None	None
Hydric	No	Yes

Icacos Loam, occasionally flooded	
Parameters	Icacos Soil
Permeability	Moderate
Available water capacity	High
Content of organic matter	High
Natural Fertility	High
Shrink-swell potential	Low
Flooding	Occasional; brief; January through December
Hydric	No

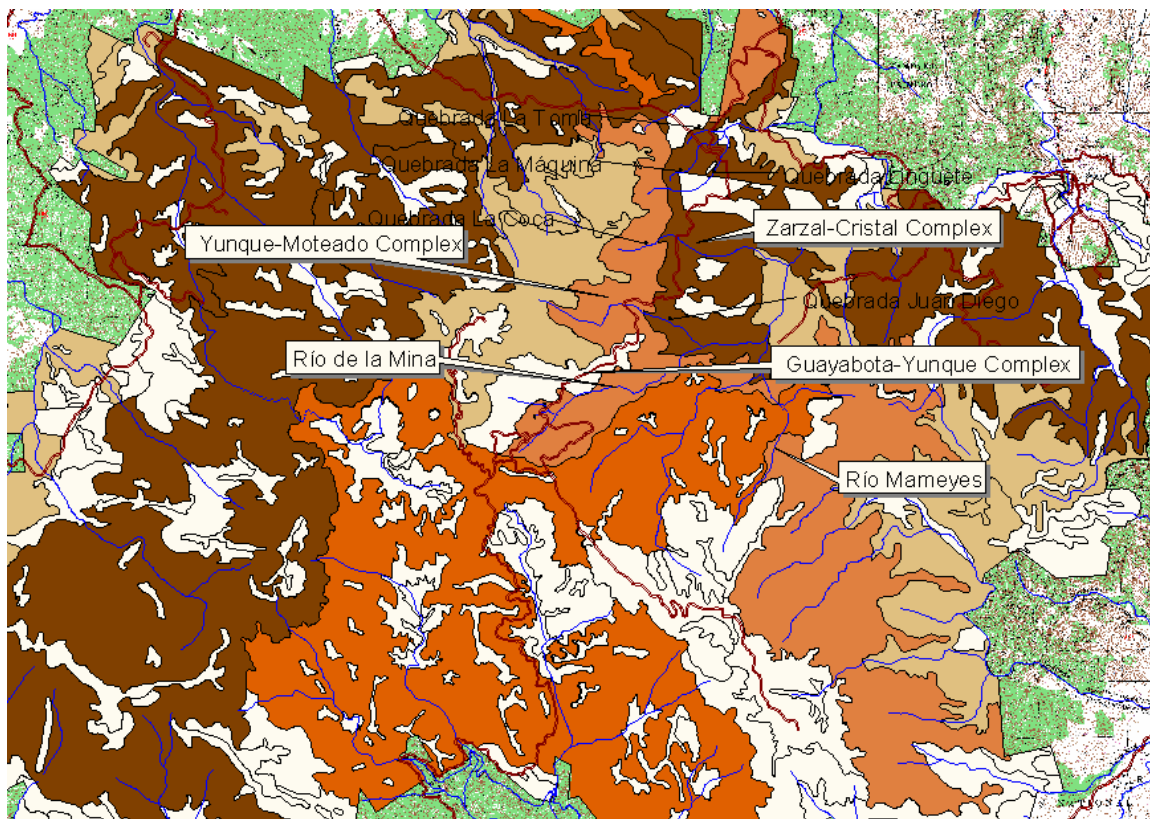


Figure 4. Shows soils and major streams within PR 191 North.

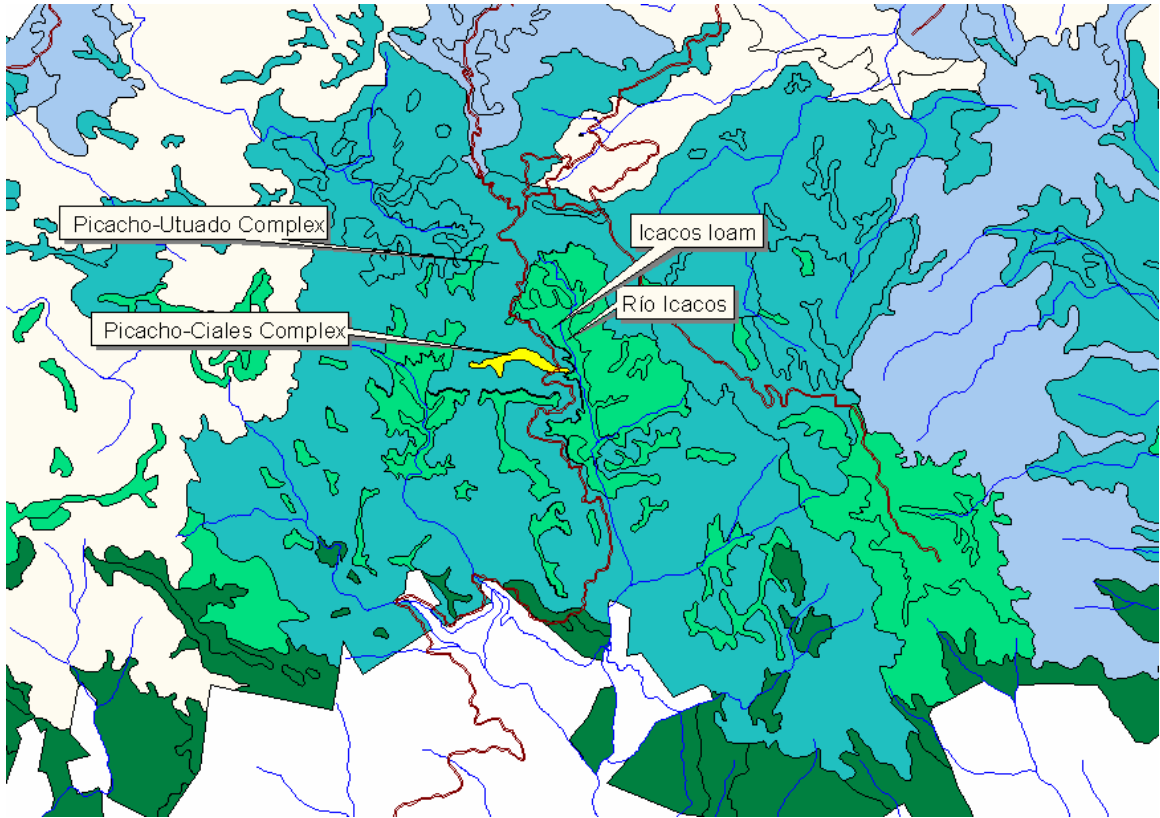


Figure 5. Shows 3 types of soil on PR 191 South part and a major stream within it.

PR 191 area is within the Mameyes watershed. The Mameyes Watershed covers 6.88 sq. miles within the forest, or 10.4% of the forest. The lower Mameyes corridor contains 625 acres, of which 75% is in national forest ownership, and 25% is privately owned. The tract is practically composed of secondary forest land. The range in elevation is from 210 meters above sea-level to 750 meters approximately on the North part and from 600 meters to 750 meters on the south, moderate slopes. The average discharge at station 0655 is 55.8 cubic ft. /sec.

The Environmental Quality Board (EQB) establishes water quality standards for Puerto Rico. A review of Puerto Rico Water Quality Standards was conducted. The EQB 1990 policy states the “Where high quality waters constitute an outstanding National resource, such waters as of El Yunque National Forest ...water quality shall be maintained and protected.” Water quality is good within the study area of the lower segment, affected to some degree by recreation use on the Rio de la Mina (a tributary of the Mameyes), and the heavy use near Puente Roto (LRMP, 1997).

Along PR 191 North, we have a possibility that part of the runoff drains into Río de la Mina and consequently into Río Mameyes, both major streams, but we have some crossings through 191 North segment like: Quebrada Juan Diego, Quebrada La Coca, Quebrada La Máquina, Quebrada Linguete and Quebrada La Toma that could contribute with runoff to Rio Mameyes.

The Mameyes is also unique among all Puerto Rican rivers in having no major permanent water extractions or impoundments. Otherwise, PR 191 south segment doesn't have stream crossings. All the runoff drains into Rio Icacos, a major stream.

Environmental Effects

Alternative 1: No Action

Under the Alternative 1 for the El Conde area, current management plans would continue to guide management of the project area. No activities would be implemented to accomplish soils and water conservation.

For the Wilderness boundary adjustments, water intake facilities and access roads maintenance will be limited by the use of non-motorized equipment. There will be no change in MA. Soils prone to erosion will treated at a slower pace. Sediment yields will continue for a longer period of time.

Alternative 2: The Proposed Action

For El Conde a review of the Land and Resource Management Plan (LRMP) was conducted to evaluate how 171 acres of El Conde Tract meet the Wild and Scenic River's eligibility, suitability, standard and guidelines, and Management Area designations. The area of Puente Roto is adjacent to El Conde tract. The steep topography, forested vegetation and high quality waters provide the opportunity to consider the effects of Alternative 2. Rio Mameyes was studied during 1996 using the Wild & Scenic designation model. The Final Environmental Impact Statement (FEIS) and its associated Land and Resource Management Plan (LRMP) Caribbean NF and Luquillo Experimental Forest (USDA FS, 1997) documented the analysis. A report summarizing the result of the field investigation and recommendation of Wild and Scenic Management Area designation is included in Appendix A.

Under the Proposed Action, there will be an increase of 130 acres in land allocated for soil and water protection through the use of Management Area 9. In addition, the Forest will increase its Management Area 2 Designation by 80 acres. Due to steep south facing slopes and forested vegetation, potential management activities such as developed recreation, road and trail construction are extremely limited to approximately 7 acres. The upper sections of EL Conde Tract contain an area of 2 acres with potential for developed recreation. The lower section contains an area of 5 acres commonly known as Puente Roto. Sediment yields were estimated for Alternative 1 and 2.

Table 3. Summary of Sediment Yield Estimate above Baseline Levels.

Acres with Development Potential	Alternative 1	Alternative 2
Developed Recreation MA9	0	5
Developed Recreation MA2	0	2

Estimated Sediment Yield (tons/year)	Alternative 1	Alternative 2
Developed Recreation MA9	2.6	6.4
Developed Recreation MA2	1.0	2.6
Total	3.6	9.0

The sediment yields in Table 3 are based on the same assumptions used in EIS for the Revised Forest Plan (FEIS-RFP, III-11 through 17, and Appendix B, pages 11-12). This would be largely due exposure of soil vegetation. This surely over-estimates sediment yields, but results should be roughly proportional and so useful for comparing alternatives. Alternative 1 shows baseline sediment yields of the no-action alternative and baseline sediment yields for potential recreation site development are shown in Alternative 2.

In Alternative 1, the current situation would continue. There would be no human disturbance activities to soils in the project area. Natural soil erosion patterns will occur.

Developed Recreation will be the activity that would contribute the most to sediment yield Alternative 2 (Table 3). Depending on assumptions used, total sediment yield over the entire Forest is estimated to be between 25,000 and 75,000 tons annually, or on the order of 8, 333 times the estimated amount of sediment produced by the proposed project.

For the Wilderness boundary adjustments, 2.2 acres of land allocated to Management Area 5 will be dedicated to Integrated Management. Re-designation to MA4 will allow use of mechanized equipment on water intake facilities. This will facilitate treatment on sites prone to erosion; thus, reducing potential yields to Forest’s streams.

Creating a spatial database of 1609 landslides, scientists from US Geological Service concluded that the zone of mass-wasting disturbance associated with highways is extensive. The average landslide frequency in a study area within CNF/LEF at distances of 85 m or less on either side of the highway was 30 landslides per square kilometer (Larsen and Parks, 1997). On areas at distances greater than 85 meters, the rate was 6 landslides per square kilometer. The hill slope instability zones are characterized by soil slips, slumps and failures associated with rainstorms. A review of Hurricane Georges and April 2003 Storm Watershed Improvement Database shows the number of landslides and mean square area within the 85 m zone:

Table 4: Number of landslides and Mean Area for Hurricane Georges and April 2003 Storm along Road PR 191.

Storm	n	Mean (Sq ft)
H. George Road 191-N	23	964

H. George Road 191-S	8	800
April 2003 Road 191-N	16	1476
April 2003 Road 191-S	37	1223

Under Alternative 1, similar situations will occur along PR 191. The 149 acres corridor of PR-191 which is vulnerable to landslides will be treated with non-motorized equipment. This will result in slower recovery rates and longer periods of erosion and sedimentation.

Under Alternative 2, the wilderness boundary on the western side of PR 191 is displaced to allow a management zone in which the landslide problem can be treated effectively. A displacement.

Biological Setting

Wildlife and Fish

Introduction and background

The Fauna of the Caribbean National Forest (CNF) is one of most distinguishable communities in the National Forest system. Species from this tropical U.S. National Forest exhibit traits unique only to tropical ecosystems. Both aquatic and terrestrial animal species on the Forest have many distinct characteristics that have evolved through interactions that promote specialization. Tropical rain forests have the greatest diversity of species of all communities (*Campbell, 1993*). Ranging from multiple species of terrestrial vertebrates, over 127 species, to an abundant array, 17 species of freshwater fish. The CNF boast a spectacular degree of biodiversity in comparison to other National Forests.

One of the most important ecological terms created to describe the environmental elements of a community is biodiversity. Biodiversity has been defined as “the variety of life in an area, including the variety of genes, species, plant and animal communities, ecosystems, and the interactions of these elements (*USDA Forest Service(b), 1997*). Complex ecological processes that enable multiple species to exist are supported by healthy terrestrial ecosystems and waterways.

Within this network of species and biotic interactions some species are classed together into meaningful management categories developed by land management agencies. Certain species that are in danger of extinction are categorized according to the severity of their status. Those classes are proposed, threatened, endangered and sensitive. In the National Environmental Policy Act (NEPA) process all fore mentioned categories are address in a Biological Evaluation (BE). In this project 3 fauna species were addressed to ensure no adverse affects are committed to them or a significant part of their habitat,

official determinations were sent to U.S. Fish and Wildlife Service (USFWS). Refer to the BE for the proposed amendment to the land and resource management plan.

A second tier of species management classification to convey potential affects is presented as Management Indicator Species (MIS). MIS are animal or plant species whose population changes are believed to indicate the effects of land management activities. The MIS concept was developed in response to Forest Planning requirements contained in the National Forest Management Act of 1976 (*16 USC 1600*). The concept is a planning tool to promote more effective management of habitats, both terrestrial and aquatic, on National Forest lands.

Affected Environment:

The Forest Plan establishes 12 animal MIS for the Forest: In table 5 there is a list of them with general locations where each species may be found.

Table 5

<u>Common Name</u>	Scientific Name	<u>Forest range</u>
Puerto Rican Parrot	<i>Amazona vittata</i>	Forest interior
Sharp-shinned Hawk	<i>Accipiter striatus venator</i>	Forest-wide
Broad-winged Hawk	<i>Buteo platypterus brunnescens</i>	Forest-wide
Elfin Woods Warbler	<i>Dendroica angelae</i>	Dwarf forest region
Black-throated Blue Warbler	<i>Dendroica caerulescens</i>	Forest-wide
Tree-hole coqui	<i>Eleutherodactylus hedricki</i>	Mid-elevation sites
Warty Coqui	<i>Eleutherodactylus locustus</i>	Low to Mid-elevation sites
Burrow Coqui	<i>Eleutherodactylus unicolor</i>	Mid to high elevation sites
Yellow-bearded Anole	<i>Anolis gundlachi</i>	Forest wide
<i>Sicydium plumieri</i>	<i>Sicydium plumieri</i>	All Forest rivers
<i>Agonostomus monticola</i>	<i>Agonostomus monticola</i>	Two major Forest rivers
Macrobrachium carcinus	<i>Macrobrachium carcinus</i>	All Forest rivers

In the Environmental Assessment, the MIS will be addressed in regards to the proposed project. Some species also are addressed in the BE because of their status. The MIS will be addressed on a forest level. In other words, how will this project affect the population of each species on the Forest? As mentioned in the proposed actions, this project will be insignificant to the entire forest ecosystem due to its administrative nature. The scope and type of activities of the project will determine most effects.

In the Forest Plan there is a desire to maintain the Forest’s biodiversity—including species, genetic diversity and ecosystem processes (*USDA Forest Service (a), 1997*). Viable populations of native flora and fauna including proposed, endangered, threatened,

and sensitive species are maintained or monitored. The ranges, distributions, population characteristics, habitat requirements and association of forest species are better understood through multiple year evaluations.

In the Forest Plan, MIS are decided through a definition process. To display them, Table 6 shows the requirements for each species to be in this category.

Table 6

Category	Definition
1. Endangered species	A plant or animal species listed as endangered on Commonwealth and Federal list; i.e., that is in danger of extinction throughout all or a significant portion of its range (<i>FSM 2670</i>).
2. Threatened species	A plant or animal species listed as threatened on Commonwealth and Federal lists; i.e., that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range (<i>FSM 2670.5</i>)
3. Sensitive species	A species for which population viability is a concern as evidenced by (a) significant current or predicted downward trends in population numbers or density; or (b) significant current or predicted downward trends in habitat capability that would further reduce a species' existing distribution (<i>FSM 2670.5</i>)
4. Rare species	A species for which population viability is a concern because the species exists at extremely low numbers over the Forest or is highly restricted in its distribution within the Forest.
5. Insular species	A species that occurs as one or more small, reproductively isolated populations on an island or group of islands.
6. Keystone species	A species whose presence and effect in an ecosystem are major factors affecting the structure, diversity, and function of the system (<i>FSH 2609.12</i>)
7. Emphasis species	A species for which there is high public demand (<i>FSM 2600</i>). Normally, these species are those commonly hunted, fished, or trapped, and are often of significant economic value.
8. Special interest	A species having high value for non-consumptive species recreational, cultural, educational, religious or scientific values (<i>FSH 2609.12</i>).
9. Species requiring special habitats	Habitats having productivity, rareness, or importance to a wildlife community such that the habitat itself is an important component of wildlife or fish diversity and may be used to focus planning and management (<i>FSH 2609.12</i>).
10. Ecological indicator	A species whose population dynamics reflect significant changes in the condition or productivity of an ecosystem (<i>FSM 2600</i>).

The following breaks down each species into each corresponding category.

<i>Species</i>	<i>MIS Category</i>
Puerto Rican parrot	1,5,7,8,9
Puerto Rican sharp-shinned hawk	5,8,10

Puerto Rican broad-winged hawk	5,8,10
Elfin Woods warbler	3,5,8,9
Black-throated blue warbler	8
Yellow-bearded Anole	10
Tree-hole Coqui	8,9
Warty Coqui	3,8,9
Burrow Coqui	5,8,9

<i>Species</i>	<i>MIS Category</i>
Goby	9,10
Mountain Mullet	9,10
River Shrimp	7,8,9

Table 7 helps indicate effects of management on some MIS elements of this framework.

Table 7

MIS species	Analyzed Further	Relevance to this project (Potential Effects of Concern)
Puerto Rican Parrot	No	Not found nearby to intended areas with administrative management code changes.
Sharp-shinned Hawk	Yes	No nests or individuals found in the vicinity, but potential habitat exists around the sites. (refer to Biological Evaluation for amendment)
Broad-winged Hawk	Yes	No nests or individuals found in the vicinity, but potential habitat exists around the sites. (refer to Biological Evaluation for amendment)
Elfin Woods Warbler	No	Due to the proposed site of the wilderness boundary changes & new lands designation, the birds preferred habitat only exists at high elevation around 1000 meters (dwarf forest).
Black-throated Blue Warbler	No	The type of administrative activity will not lead the species towards downward trends.
Tree-hole coqui	No	Preferred habitat is above 450 meters in elevation.
Warty Coqui	No	The type of administrative activity will not lead the species towards downward trends.
Burrow Coqui	No	Highly unlikely due to preferred habitat found above 670 meters above sea level.
Yellow-bearded Anole	No	The type of administrative activity will not lead the species towards downward trends.
Sicydium plumieri	No	The proposed action will not have any significance to aqua fauna.
Agonostomus monticola	No	The proposed action will not have any significance to aqua fauna.
Macrobrachium carcinus	No	The proposed action will not have any significance to aqua fauna.

Environmental Effects

Alternative 1: No Action

The effects are divided into two categories: 1) Direct and Indirect and 2) Cumulative

- 1) The no action would have no effects on the MIS of the Caribbean National Forest. Since there are no changes in the status quo wildlife would still be protected by the NEPA process and the intentions of Forest Service regulations. Although this is an alternative the CNF cannot leave acquired land without any designations. Without this important definitions future actions cannot be planned.
- 2) Over time there are no significant changes expected to the MIS that would potentially exist in the area. If in the future a project or a number of projects are proposed all PETS species would be addressed for each plan.

Alternative 2: The Proposed Action

The effects are divided into two categories: 1) Direct and Indirect and 2) Cumulative

- 1) The proposed wilderness boundary adjustment and management area assignment to the “El Conde” will have no significant direct or indirect effects. The nature of the proposed action is administrative descriptions, which will the only immediate effects are the movement of features on Forest maps. Allowing for other Forest management activities would consist of both the daily maintenance and emergency measures after an event. Wildlife and fish species would be protected during any of the types of activities by the procedures of the NEPA process and Forest Service regulations. The professionals of the agency are well versed in the best management actions for natural resources due to the national mandate of the Forest Service. This being only an administrative action there are no immediate on-the-ground propositions expected.
- 2) There is a potential cumulative effect depending what would occur in the long-term from this action. In the designation of the “El Conde” there are two management areas, MA 2 (developed recreation) and MA 9 (Scenic and Recreation River Corridors). With the naming of MA 2 there is a chance of an actual developed recreation site built and according to the Land and resources management plan (LRMP) for the Caribbean National Forest, one is intended to be built. Therefore from this administrative action cumulative effects would exist to certain species that are not able to temporary change their behavior or are not able to move quickly away. There are no MIS that fall under that category, but one endangered species has a remote possibility, the species is addressed in the Biological Evaluation. If in the future a project or a bevy of projects proposed all PETS species would be addressed for each plan.

Social and Economic Setting

Lands/Special Uses

Introduction and background

Currently approximately 100 special use permits are administered on the Caribbean National Forest. Electronic facilities, water systems, tour guide operators and research are some of the predominate uses.

The boundaries of the Caribbean National Forest have expanded over the last century from the original 12,433 acres of Spanish Crown Lands originally established in 1876 and which later became the Luquillo Forest Reserve in 1903. Land purchases in the 1930s and 1940s added an additional 11,000 acres to the Forest. In the 1970s and again in the 1990s more acres were acquired bringing the current total area to 28,002 acres. Land acquisition priorities for the Forest focus on reducing the in holdings in the Forest and irregular boundaries and to acquire critical wildlife habitats and recreation sites. The El Conde tract was acquired through a condemnation process as interest was in acquiring the property for water quality and key recreation management.

Affected Environment

The proposed wilderness boundary has been adjusted to provide access to four existing water impoundments or water line right of ways for management and maintenance. Approximately three of these affected existing water systems are under special use authority of the Puerto Rico Aqueducts and Sewer Authority (Quebrada Jimenez, Guzman Arriba and Rio Gurabo) and another water system is authorized for community or private water supplies (El Aljibe). Currently there are no special use permits issued for the area in or adjacent to the El Conde tract.

Environmental Effects

Alternative 1: No Action

Under the no action alternative current water intakes infrastructure can be maintained by mechanized equipment.

Alternative 2: The Proposed Action

Under alternative #2, existing special use permits for water systems would need to be monitored to ensure that maintenance activities are not extended inside the wilderness boundary. Unauthorized water impoundments or lines found within the wilderness area would be removed. The addition of new water systems will not be allowed within the wilderness boundaries unless under certain restrictive circumstances. Proposed projects for special use authorizations will be screened and issued only if they are compatible with the appropriate management area direction for wilderness (MA 5). Any proposal for special use authorizations (i.e. linear right of ways for utilities or water, research) within or near the El Conde tract would need to support compliance with the Forest Plan designation for water quality and support visual quality recommendations for management area designations for MA2 (Developed Recreation) and MA9 (Scenic and Recreation River Corridors).

Recreation

Introduction and background

The Caribbean National Forest is one of the most visited recreation areas in Puerto Rico. The Forest offers a diversity of recreational activities that range from visiting the El Portal Rain Forest Center, picnicking, bird watching, water play, primitive camping and hiking along its many trails. There is only one Developed Recreation Site near the El Toro Wilderness Area. The area is known as Quebrada Grande Recreation Area that is located at PR 186, Km.15.8. It is located west of the El Toro Wilderness Area. There are other undeveloped recreation areas at several river crossings along PR 186 outside the Wilderness Area.

There are two primitive hiking trails in the El Toro Wilderness Area, El Toro National Recreation Trail (Trail #34) and Tradewinds National Recreation Trail (Trail #35). It is the only Recreation Area on the western part of the Forest and closest to the proposed El Toro Wilderness Area. In the spring of 1994 the parking area improved and a Sweet Smelling Toilet was added to the site. This area and the undeveloped picnic areas near the rivers are mostly used during the summer weekends. During the year its use is much less but still mostly on weekends.

The Quebrada Grande Recreation Area is clearly identified on the Forest Quadrangle Map that was printed in 1981. In the *Environmental Impact Statement for the Revised Land and Resource Management Plan* dated 1997, the Quebrada Grande Recreation Area is identified as a *Dispersed Recreation Area* (page III-51). The Quebrada Grande Recreation Area was built in the early 1980's and consists of 6 picnic shelters, a Sweet Smelling Toilet (SST) and a parking lot. The isolated location of this recreation area in relation to the main Forest Recreation Corridor, which is located along PR 191, means that this area has very low visitation. The other recreation activity that occurs near the El Toro Wilderness area is along PR 186 where the road intersects with the Rio Espiritu Santos and Quebrada Sonadora. The main activities occurring at these locations are picnics and wading in the river. The El Toro Wilderness Area will not be affected adversely by recreation activities at this location or at the river crossing that occur along PR 186 because of the buffer area created by the Management Area (MA-6 Research) that exist between the road and the proposed Wilderness boundary.

The proposed adjustments to the El Toro Wilderness boundary will not affect the Recreation activities that occur along PR 186. The limited recreational use of this area is because of its isolated location and will not have an impact on the Recreation Resources that are located in this part of on the Forest. Trails #34 and #35 are classified as Challenging based on location, grade and surface. Recreation activities are limited to hiking use as stated in the Standards and Guidelines for MA-5 in the *Revised Land and Resource Management Plan*, page 4-86.

The El Conde Land Acquisition is adjacent to a non-developed recreation area known locally as Puente Roto. Family Picnics are very common among local visitors to the Forest. This area has been used as an undeveloped picnic area and a water play area by

the local residents that live near this area for many generations. Angelito Trail (Trail #7) is located southeast of Puente Roto at Km 3.5 on PR 988 and is used by people who visit Puente Roto.

The Puente Roto Area is currently in a MA-2, Developed Recreation. The proposed recreational development for this area calls for a parking area, picnic shelters, trash collection area and sanitary facilities. Primitive camping could be another recreation activity that could be developed in other areas of the newly acquired land assigned to MA2.

Puente Roto and Angelito Trail are clearly identified on the Forest Quadrangle Map that was printed in 1981. The area is used mostly by people from the surrounding communities of La Vega, Sabana, Palmer, Barcelona and Buena Vista Carrion. There are no recreational facilities in the area. There are some trash cans, signage and a large trash bin. People mostly visit Puente Roto on weekends and holidays. There is some use during the week but significantly less than on weekends. The main activity at this location is water play and picnicking. Parking is not organized and functions on a “first come, first serve” basis.

The *Revised Land and Resource Management Plan* dated 1997, places the Puente Roto in a MA-2, Developed Recreation. Its proximity to Angelito Trail (Trail #7) makes this area a favorite recreation area for the surrounding communities. The proposed change in Management Area from MA-2 to MA-9 will not affect the recreation activity at Puente Roto. The Rio Mameyes is designated as a Recreation River from Angelito Trail (Trail #7) to the north Forest boundary.

Affected Environment

The El Toro Wilderness Area has been managed as a wilderness area. Senate Bill 2334, dated April 22, 2004 is currently before Congress to officially designate El Toro as a Wilderness Area under the Wilderness Act (16 U.S.C. 1113 et seq.). The area has maintained its natural wilderness character. The two trails which connect with each other run east to west and are of primitive construction. Primitive camping is allowed but is rarely used because of its isolation and climatic conditions. These conditions range from heavy rains, low temperatures and high wind velocity.

The El Conde purchase will have a positive recreational and social impact on the Puente Roto Area. The designation of 171 additional acres in this area will improve the current recreation density that is found in this area. Of the 171 acres, 80 acres will be in MA-9 and 91 acres in MA-2. The new MA-2 is isolated and very difficult to get to from Puente Roto. The location of MA-2 is isolated and not accessible from PR 988. Access to the El Conde tract is best done through the Buena Vista Carrion Sector using PR 990. Its location and access challenge makes Primitive and Car Camping a possible recreation activity

Environmental Effects

Alternative 1: No Action

- No affect on the resource area.
- Consistent with the Forest Plan.
- No irreversible impacts.

Alternative 2: The Proposed Action

- The effects of this alternative will not impact the Quebrada Grande Recreation Area. The new wilderness boundary will not alter the current MA 2 - Dispersed Recreation Area as illustrated in the *Revised Land and Resource Management Plan*.
- The primitive hiking trails comply with wilderness standards.
- Is consistent with the Revised Forest Plan.
- The effects of this Alternative will have a positive impact to the current Puente Roto Area. The designated MA-2 and MA-9 will not affect future recreational development in this area as specified in the Standards and Guidelines of the Revised Land Management Plan.
- The additional acres at this location will make the planning of recreation facilities more viable and reduce recreation density.

Cumulative Effects

The proposed amendment to the *Revised Land and Resource Management Plan* would not have a cumulative effect on the Recreation resource. The proposed Wilderness boundary changes do not impact this recreation resource because of the distance from one another. The proposed MA-2 and MA-3 for El Conde would not impact the recreation resource. This area has been a non-developed recreation area for many generations and the resource has not been altered or changed.

Mitigation

No mitigation for the propose boundary adjustments of the wilderness area or for the Management Area assignment for El Conde on the Recreation Resource.

Monitoring

More monitoring will be required in the future when the planned recreation facilities are built.

Heritage

Introduction and background

Prior to any ground disturbing activity, it is necessary to determine if there are any heritage resources within the proposed project area. On the Caribbean National Forest (CNF) typical heritage resources that might be encountered include prehistoric petroglyphs, Spanish-era gold mines and coffee plantation sites, Civilian Conservation Corps (CCC) constructions, and historic farmsteads. Generally we begin by researching the site files, literature, and historic maps, documents and aerial photographs of the

project vicinity, and of the specifically proposed site. Then, a walk-over survey of the area is conducted to become better familiarized with the area, and in an preliminary effort to locate cultural resources. Based on signs of, or potential for cultural resources during this initial literature search and surface survey, a decision is made whether to proceed with more intensive sub-surface testing. If heritage resources are found, then they are evaluated to determine if they are significant and potentially eligible for inclusion on the National Register of Historic Places (NRHP). If they meet the necessary criteria, then, in consultation with the Puerto Rico State Historic Preservation Office (PR SHPO), measures are developed to protect, document, rehabilitate or in some way mitigate the impacts the project will have on these heritage resources.

However, because the proposed amendments to the Forest Plan and changes in management area designations are purely administrative actions, any future ground disturbing activities will follow the Section 106 process as individual projects, for the purposes of heritage resources there is no area considered as the Area of Potential Effect (APE) for the proposed project.

Heritage Resources field surveys of the newly acquired El Conde tract were conducted in 2004. The surface survey identified several historic buildings that are potential eligible for inclusion on the National Register of Historic Places. These resources have not been evaluated so far, but apparently are residences dating to the New Deal Era period.

In matters concerning cultural resource compliance, the Caribbean National Forest is the responsible federal agency for the proposed project. The Revised Land and Resource Management Plan, Caribbean National Forest/Luquillo Experimental Forest, Puerto Rico (1997:4-53 to 4-55) presents the Forest-wide Goals, Standards and Guidelines that must be followed for Heritage Resources. A Memorandum of Understanding between the CNF, the PR SHPO, accepted by the Advisory Council on Historic Preservation, further defines these responsibilities. Section 106 of the National Historic Preservation Act of 1966, as codified in 36 CFR Part 800, and other related legislation and regulations also apply to this type of federal undertaking.

Affected Environment

There is a wide variety of heritage resources on the Forest to consider before defining the affected environment, as evident by the ample account of these resources presented in the Final Environmental Impact Statement for the Revised LRMP/CNF-LEF (1997:III-75-77). However, because the proposed undertaking is limited to Forest Plan amendments and changes in management area designations, all exclusively administrative activities, there is no area of potential impact directly affected by the proposed action.

Environmental Effects

Alternative 1: No Action

This alternative will have no immediate or direct affect on cultural resources in current designated management areas because they would not change from their current status; but no action would leave the newly acquired El Conde tract, which is currently unclassified land, without a management area designation. It is consistent with the Forest

Plan for matters related to heritage resources. There are no irreversible/irretrievable impacts to heritage resources resulting from this action.

Alternative 2: Proposed Action

This alternative will have no immediate or direct affect on cultural resources because it only involves amendments to the Forest Plan which are exclusively management activities with no associated on-the-ground actions. It also benefits the resource by assigning management area designations to unclassified newly acquired land.

- The proposed non-significant Forest Plan amendment would change the management designation of four areas around water intakes (totaling 2.22 acres) from their current designation of Wilderness (MA 5) to Integrated (MA 4); and change 149 acres adjacent to the northern section of PR Road191 from Wilderness (MA 5) to Developed Recreation (MA 2). It also involves the addition of a non-significant new goal to the Integrated Management Area.

In the case of the recently purchased El Conde tract, because it was previously not part of the Forest, it had no management area designation. The proposal is to designation 80 acres of this newly acquired land along the Wild and Scenic Mameyes River to Scenic and Recreation River Corridor (MA 9)); as well as, to assign the remaining 91 acres of this newly-acquired undesignated land to Developed Recreation (MA 2). Nearby, in an already designated tract, it is proposed to change 50 acres from Developed Recreation (MA 2) to Scenic and Recreation River Corridor (MA 9).

- Cultural resources are protected in all management areas. Ground disturbing activities pose the greatest potential to impact cultural resources, so management areas where this potential is increased or decreased will have possible effects on the preservation of heritage resources. The proposed change and addition to the Forest Plan of management area designations for about 372 acres of land have a direct relationship on how heritage resources will be protected and managed in the future. The range and types of projects and facilities that are common in Developed Recreation and Integrated management areas have the most potential for disturbing cultural resources, therefore by increasing and designating new land to this management area, there is an increased potential to affect historic properties in this area. This is also true for the land that would change from Wilderness to Developed Recreation and to Integrated management areas. However, the land that was newly designated and that land reclassified from Developed Recreation to Scenic and Recreation River Corridors, will possible decrease the potential for impacts to its cultural resources. In general the pattern is towards management areas with greater potential for impacting cultural resources; but we reemphasize that, through the NEPA and Section 106 process, cultural resources are protected in all management areas.

- The proposed changes in and designations of management areas would apply to all future situations that have the potential to affect heritage resources, but only in the areas where the proposed designation is changed or newly designated, not across the entire planning area. As indicated above, there is the potential for either positive or negative effects.

Cumulative Effects

There are no known cumulative effects to heritage resources from this proposed project.

Mitigation

There are no direct effects to the land, nor any soil disturbing activities that require mitigation as a result of the proposed action. In the future, individual projects will be mitigated as necessary.

Monitoring

There are no direct effects to the land, nor any soil disturbing activities that require monitoring as a result of the proposed action. In the future, individual projects will be monitored as necessary.

Scenery

Introduction and background

The Caribbean National Forest is one of the most visited nature areas in Puerto Rico. The Forest offers a place where people can enjoy the tropical rain forest in its natural setting. Visitors to the Forest enjoy nature activities such as picnicking, bird watching, nature photography, water play, primitive camping and hiking. The area is currently known as the El Toro Roadless Area. The area has been considered three times previously for wilderness designation. It is currently under consideration under Senate Bill 2334, dated April 22, 2004. The bill, if finally approved, will designate approximately 10,000 acres as the El Toro Wilderness Area.

There are two primitive hiking trails in the El Toro Wilderness Area, the El Toro National Recreation Trail (Trail #34) and Tradewinds National Recreation Trail (Trail #35). People that hike these trails are true nature enthusiasts because of its isolation from other trails and the contact with nature it brings.

The scenery that is found in the El Toro Wilderness Area is indicative of the four forest types that are found in the Forest. These are the Tabonuco, Palo Colorado, Sierra Palm and Cloud Forest. Various rivers and streams originate in the El Toro Wilderness Area. The Flora and Fauna that is found in this area is unique to the Forest. The area has also become the nesting place for the Puerto Rican Parrot, which is an endangered species. For these reasons the El Toro Wilderness Area must be protected and managed as a Wilderness Area.

The El Toro Roadless Area is identified in the *Environmental Impact Statement for the Revised Land and Resource Management Plan* dated 1997, (page III-63) and in the

Revised Land and Resource Management Plan dated 1997 as MA-5 Wilderness (page 4-82 - 4-85). There are no defined access routes to the area with the exception of the El Toro and Tradewinds Trail that are found on the southern portion of the area. The trails run east to west and connect to each other at the El Toro Peak. These trails start at high elevations in the Sierra Palm Forest. Hiking these trails is very challenging but the rewards are abundant. El Toro Peak, which is over 3,500 feet above sea level, is an exceptional vista point. There is a Forest Service Road (Road #12, Palo Hueco) that has controlled access for Researchers and PR Parrot Field personnel. The rivers and streams that originate in the El Toro Wilderness Area are all pristine water resource that is used by the surrounding Municipalities. The vegetation is also pristine and in constant evolution. The isolated location of this wilderness area in relation to the rest of the Forest means that this area has limited visitation

The proposed adjustments to the El Toro Wilderness boundary will moderately alter the original wilderness acreage. The area has been managed as Management Area 5 - Wilderness. Wilderness characteristics are perpetuated in the Management Area with or without congressional action as stated in the *Revised Land and Resource Management Plan*, page 4-84.

The Caribbean National Forest has one of the most diverse ecosystems in Puerto Rico. The Forest offers a diversity of recreational activities that range from visiting the El Portal Rain Forest Center, picnicking, bird watching, nature photography, water play, primitive camping and hiking along its many trails. Family Picnics are very common among local visitors to the Forest. The El Conde Land Acquisition is adjacent to a non-developed recreation area known locally as Puente Roto. This area has been used as an improvised picnic and water play area by the local residents that live near this area for many generations. Angelito Trail (Trail #7) is located southeast of Puente Roto at Km.3.5 on PR 988 and is used by people who visit Puente Roto.

Scenery Management found along PR 988 is very unique to the lower elevations of the Forest. There are numerous creeks found along PR 988 but known more visible than the Rio Mameyes crossing at Puente Roto (Km 2.8). The Rio Mameyes meanders at this location as it runs north to the Atlantic Ocean. The river is very inviting to the local visitors because of its gentle flow and large boulders where people can sit and enjoy the river and the sun. The vegetation at this location is also spectacular because of the variety and size of the trees that are found there. At this lower elevation trees can grow to over 50 to 60 feet. There are also several areas along PR 988 that have views to the mountain peaks that are found in the Forest such as East Peak and El Yunque Peak.

The *Environmental Impact Statement for the Revised Land and Resource Management Plan* dated 1997, (page III-78&79) states that the Forest has some of the most scenic landscape in the National Forest System. *The Revised Land and Resource Management Plan* dated 1997, (page 4-56-57) indicate that for most Management Areas there is direction for Preservation, Retention and Partial Retention. In MA-2 there should be 50% Retention (for areas viewed from recreation areas and roads). There are no recreation structures at Puente Roto making this Scenery Management direction in total

compliance. The scenery resource that is prominent at Puente Roto and El Conde are views of the high peaks and the Rio Mameyes.

The *Revised Land and Resource Management Plan* dated 1997 (page 4-56) directs Management Area 2 Developed Recreation to have 50% Retention and Management Area 9 Scenic and Recreation River Corridors to have 50% Partial Retention. Both Management Areas comply with these Standards and Guidelines. The proposed changes in Management Areas at Puente Roto and El Conde comply with Forest Plan Direction. There is limited Scenery differences between the two Management Areas.

Affected Environment

The El Toro Wilderness Area has always been managed as a wilderness area. Senate Bill 2334, dated April 22, 2004 is currently before Congress to officially designate El Toro as a Wilderness Area under the Wilderness Act (16 U.S.C. 1113 et seq.). The area has maintained its natural wilderness character. The proposed changes to the El Toro Wilderness Area were requested so as to be able to maintain water intakes near roaded areas. The two trails, which connect with each other, run east to west and are of primitive construction. Primitive camping is allowed but is rarely used because of its isolation and climatic conditions. These conditions range from heavy rains, cool temperatures and high wind velocity. The Forest Road 12 will be maintained as a controlled access road for Forest Service personnel conduction field studies.

There will be little of any affect on the Puente Roto and El Conde Land Acquisition Scenery Management direction. Both areas have a retention factor. The Puente Roto are has scenery management to highlight view of the Rio Mameyes and of the Forest peaks. The El Conde Parcel which is at a much higher elevation has scenery management direction to Forest peaks and of the Atlantic Ocean shoreline of Puerto Rico.

Environmental Effects

Alternative 1: No Action

- No affect on the resource area.
- Is consistent with the Forest Plan.
- No irreversible impacts.

Alternative 2: Proposed Action

- The effects of this alternative will not impact the El Toro Wilderness Area. The new wilderness boundary will slightly alter the current MA 5 - Wilderness Area configuration as illustrated in the *Revised Land and Resource Management Plan*.
- The primitive hiking trails comply with wilderness standards.
- Is consistent with the Revised Forest Plan.
- The effects of the Proposed Action will not have a significant on the Scenery Management directions for the area.
- The Scenery Management direction is to allow for natural Flora process to continue its normal development. Any future recreation development at Puente Roto should be screened and materials used should simulate form, line, color and texture of the natural surrounding areas.

Cumulative Effects

The proposed amendment to the *Revised Land and Resource Management Plan* would not have a cumulative effect on wilderness resource. The proposed Wilderness boundary changes do not impact this recreation resource because of the distance from one another. The proposed Management Area changes will not have a cumulative effect on the scenery at Puente Roto. Any future recreation construction will need to follow Scenery Management directive found in the *Revised Land and Resource Management Plan*, (page 4-55 through 4-58)

Mitigation

Mitigation for the proposed boundary adjustments of the Wilderness Area is to monitor the water intake areas that originated this Forest Plan Amendment.

Monitoring

Monitoring required by Forest Specialist in the water, biological and forestry discipline. Periodic monitoring required to evaluate vegetation growth along PR 988 to ensure vehicular safety with proper sight lines.

Roadless Areas and Wilderness

Introduction and background

The Caribbean National Forest is one of the most visited nature areas in Puerto Rico. The Forest offers a place where people can enjoy the tropical rain forest in its natural setting. Visitors to the Forest enjoy nature activities such as picnicking, bird watching, nature photography, water play, primitive camping and hiking. The area is currently known as the El Toro Roadless Area. The area has been considered three times previously for wilderness designation. It is currently under consideration under Senate Bill 2334, dated April 22, 2004. The bill, if finally approved, will designate approximately 10,000 acres as the El Toro Wilderness Area.

There are two primitive hiking trails in the El Toro Wilderness Area, the El Toro National Recreation Trail (Trail #34) and Tradewinds National Recreation Trail (Trail #35). People that hike these trails are true nature enthusiast because of its isolation from other trails and the contact with nature it brings. The area has been managed as a wilderness area from the time the Forest was established in 1903 as the Luquillo Experimental Forest.

Various rivers and streams originate in the El Toro Wilderness Area. These rivers and streams are the water resources for the Municipalities that border the Forest. The Flora and Fauna that is found in this area is unique to the Forest. The area has also become the nesting place for the Puerto Rican Parrot which is an endangered species. For these reasons the El Toro Wilderness Area must be protected and managed as a Wilderness Area.

The El Toro Roadless Area is identified in the *Environmental Impact Statement for the Revised Land and Resource Management Plan* dated 1997, (page III-63) and in the

Revised Land and Resource Management Plan dated 1997 as MA-5 Wilderness (page 4-82 - 4-85). There are no defined access routes to the area with the exception of the El Toro and Tradewinds Trail that are found on the southern portion of the area. The trails run east to west and connect to each other at the El Toro Peak. There is a Forest Service Road (Road # 12, Palo Hueco) that has controlled access for Researchers and PR Parrot Field personnel. The rivers and streams that originate in the El Toro Wilderness Area are all pristine water resource that is used by the surrounding Municipalities. The vegetation is also pristine and in constant evolution. The isolated location of this wilderness area in relation to the rest of the Forest means that this area has limited visitation.

The proposed adjustments to the El Toro Wilderness boundary will moderately alter the original wilderness acreage. The area has been managed as Management Area 5 - Wilderness. Wilderness characteristics are perpetuated in the Management Area with or without congressional action as stated in the *Revised Land and Resource Management Plan*, page 4-84.

Affected Environment

The El Toro Wilderness Area has always been managed as a wilderness area. Senate Bill 2334, dated April 22, 2004 is currently before Congress to officially designate El Toro as a Wilderness Area under the Wilderness Act (16 U.S.C. 1113 et seq.). The area has maintained its natural wilderness character. The proposed changes to the El Toro Wilderness Area were requested so as to be able to maintain water intakes near roaded areas. The two trails, which connect with each other, run east to west and are of primitive construction. Primitive camping is allowed but is rarely used because of its isolation and climatic conditions. These conditions range from heavy rains, cool temperatures and high wind velocity. The Forest Road #12 will be maintained as a controlled access road for Forest Service personnel conduction field studies.

Environmental Effects

Alternative 1: No Action

- No affect on the resource area.
- Consistent with the Forest Plan.
- No irreversible impacts.

Alternative 2: Proposed Action

- The effects of this alternative will not impact the El Toro Wilderness Area. The new wilderness boundary will slightly alter the current MA 5 - Wilderness Area configuration as illustrated in the *Revised Land and Resource Management Plan*.
- The primitive hiking trails comply with wilderness standards.
- Is consistent with the Revised Forest Plan.

Cumulative Effects

The proposed amendment to the *Revised Land and Resource Management Plan* would not have a cumulative effect on wilderness resource. The proposed Wilderness boundary changes do not impact this recreation resource because of the distance from one another.

Mitigation

Mitigation for the proposed boundary adjustments of the Wilderness Area is to monitor the water intake areas that originated this Forest Plan Amendment.

Monitoring

Monitoring required by Resource Forest Specialist.

Wild and Scenic Rivers

Introduction and background

The Caribbean National Forest is one of the most visited recreation areas in Puerto Rico. The Forest offers a diversity of recreational activities that range from visiting the El Portal Rain Forest Center, picnicking, bird watching, water play, primitive camping and hiking along its many trails. Family Picnics are very common among local visitors to the Forest. The El Conde Land Acquisition is adjacent to a non-developed recreation area known locally as Puente Roto at Km 2.5 on PR 988. This area has been used as an undeveloped picnic and water play area by the local residents that live near this area for many decades. The Rio Mameyes is the river that intersects PR 988 at this location. The Rio Mameyes was designated a Wild and Scenic River by Public Law on December 19, 2002. The one (1) mile stretch of the river that runs North from Angelito Trail (Trail #7) to the Forest Boundary is designated as a Recreation River.

Puente Roto and Angelito Trail are identified on the *Forest Quadrangle Map* that was printed in 1981. In the *Environmental Impact Statement for the Revised Land and Resource Management Plan* dated 1997, the area of Puente Roto had two Management Areas, MA-2 and MA-9. The El Conde land purchase MA-9 will increase by 80 acres and the MA-2 will increase by 91 acres. Management Area 9 will be extend the Forest boundary along the river and therefore extends the Wild and Scenic River.

The area known as Puente Roto is in Management Area 9 – Scenic and Recreation River Corridors and is south of the El Conde Parcel. The *Revised Land and Resource Management Plan* establishes that the Guidelines (page 4-104) for the Rio Mameyes recreation segment to complete project design and NEPA analysis for a picnic area at Puente Roto, reduce water quality impacts and improve recreation experience by providing improved parking, trails, garbage collection and toilets, to the extent funding permits. The River Classification of the Rio Mameyes from Puente Roto to Angelito Trail is Recreational River Area. This classification states that this section of the river is readily accessible by road and that it may have some development along their shorelines.

Affected Environment

The El Conde purchase will have a positive recreational and social impact on the Puente Roto Area. The Recreation River segment will allow an MA-9 designation for both sides of the Rio Mameyes up to the Forest Boundary. The additional acres (80 acres) at this location will also mean that future recreational development will not have to be densely planned and designed. The designation of additional acres (91 acres) as MA2,

(Developed Recreation) will greatly improve the current recreation density that occurs in the Forest.

Environmental Effects

Alternative 1: No Action

- No affect on the resource area.
- Consistent with the Forest Plan.
- No irreversible impacts.

Alternative 2: The Proposed Action

- The effects of this Alternative will have a positive impact on the Puente Roto Area. The additional MA-9 acres will make management of the area more in step to what is currently occurring in this area.
- Is consistent with the Revised Forest Plan.
- The impact to the area will mean additional recreation river area. This additional area will contribute to better planning of any future recreational development for the area.

Cumulative Effects

The proposed amendment to the *Revised Land and Resource Management Plan* would not have a cumulative effect on the recreation resource. The proposed Developed Recreation (MA-2) and Wild and Scenic River (MA-9) boundary changes will not impact the recreation river resource and but will actually complement each other.

Mitigation

No mitigation required.

Monitoring

Periodic monitoring required to verify that recreation segment of the Rio Mameyes does not extend to the Scenery segment which is to the South of Puente Roto.

CONSULTATION AND COORDINATION

The Forest Service consulted the following individuals, Federal, State, and local agencies, and non-Forest Service persons during the development of this environmental assessment:

ID TEAM MEMBERS:

Felipe Cano, Carolyn Krupp, Jose Ortega, Manuel Ortiz, Carolyn Pabon, Fernando Perez, Pedro Rios, Luis Rivera, and Jeff Walker

FEDERAL, STATE, AND LOCAL AGENCIES:

The Commonwealth of Puerto Rico: Planning Board, PR Electric Power Authority, Highway and Transportation Authority, and Municipalities surrounding the Caribbean National Forest, USDI Fish and Wildlife Service, State Historic Preservation Office, the Society of Natural History of PR, and the East Ecological Coalition.

CITATIONS:

- Final Environmental Impact Statement for the Revised Land and Resource Management Plan, Caribbean National Forest, 1997.
- Revised Land and Resource management Plan, Caribbean National Forest, 1997, USDA Forest Service, Southern Region.
- 16 USC 1600. United States Code
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- Larsen, M.C., and Parks, J.E. 1997. How wide is a road? The association of roads and mass-wasting in a forested montane environment. Earth Surface Process and Landforms, John Wiley and Sons, Ltd., Vol. 22, 835-848
- Soil Survey Staff. 2001. Soil Survey of Caribbean National Forest and Luquillo Experimental Forest, Commonwealth of Puerto Rico. United States Department of Agriculture, National Resources Conservation Service.
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- USDA, FS-643. August 1999.

APPENDICES:

- Appendix A - Land and Resource Management Plan, C-MOD Map.
- Appendix B – Assignment of Newly Acquired Portions of Mameyes River to MA9.
- Appendix C – Landslides Statistics for Hurricane Georges and April 2003 Storm.

APPENDIX A
Final Environmental Impact Statement
For the
Revised Land and Resource
Management Plan
Alternative C-MOD Map

BOSQUE NACIONAL
DEL CARIBE
BOSQUE EXPERIMENTAL
DE LUQUILLO
PUERTO RICO
REVISIÓN DEL PLAN FORESTAL
ALTERNATIVA C-MOD
Declaración de Impactos Ambientales

LEYENDA

LEGEND

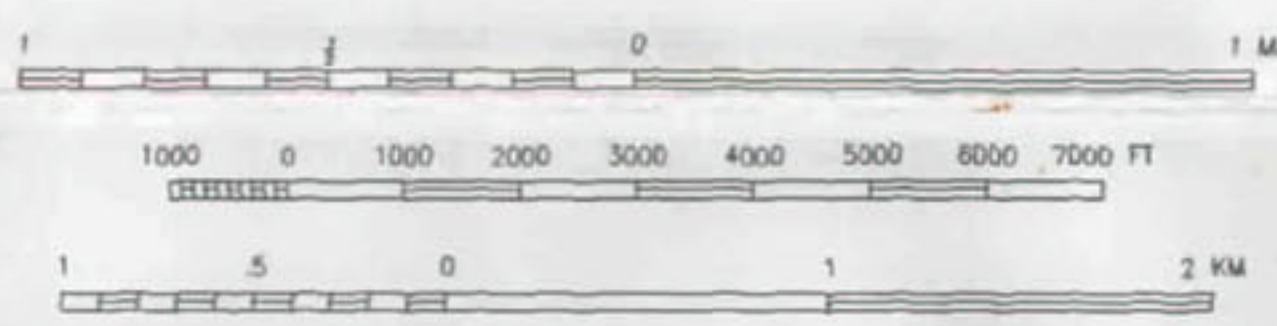
- | | | |
|--|--|--------------------------------|
| Terrenos Privados Dentro de los Límites del Bosque | | Private Land Inside Forest Bdy |
| Area de Manejo | | Management Area |
| Límite del Bosque Nacional | | National Forest Boundary |
| Camino Principal de Acceso al Bosque | | Major Forest Access Road |
| Camino de Uso Administrativo | | Administrative Road |
| Vereda Actual | | Existing Trail |

River Segments Recommended for Wild, Scenic, or Recreation Designation

Secciones de Ríos Recomendadas para la Designación del Río Silvestre, Panorámico, o Recreativo

- | | | |
|------------|--|------------|
| Silvestre | | Wild |
| Panorámico | | Scenic |
| Recreativo | | Recreation |

SCALE BAR



MANAGEMENT AREA DESCRIPTIONS

Management Area 1 - Administrative Sites

Areas totaling 204 acres occupied by El Portal Tropical Forest Center, Catalina Work Station, and other Forest Service administrative facilities.

Management Area 2 - Developed Recreation

Areas totaling 1,158 acres where emphasis is on developed recreation sites—picnic grounds, trailhead parking, de-centralized interpretive facilities.

Management Area 3 - Communication Sites

Areas totaling 196 acres on El Yunque Peak and East Peak used for communication facilities, associated access roads, and electrical transmission lines. Actual area under special use permits for communication sites is 31 acres.

Management Area 4 - Integrated

Areas totaling 6,216 acres where dispersed recreation and research are emphasized.

Management Area 5 - Wilderness

Area of 10,363 acres proposed for wilderness designation.

Management Area 6 - Research

Areas totaling 919 acres where research, including long-term watershed studies, and treatment/control studies, is emphasized.

Management Area 7 - Research Natural Area

Existing and proposed expansion of the Baño de Oro Research Natural Area totaling 6,372 acres; maintained in undisturbed condition for current and future non-manipulative research.

Management Area 8 - Timber Demonstration

Areas totaling 1,167 acres where sustainable production of timber is demonstrated.

Management Area 9 - Wild/Scenic/Recreation River Corridors

Areas totaling 1,295 acres which are managed to protect Wild, Scenic, and Recreation Rivers.

CARIBBEAN
NATIONAL FOREST
LUQUILLO EXPERIMENTAL FOREST
PUERTO RICO
REVISED FOREST PLAN
ALTERNATIVE C-MOD
Environmental Impact Statement

DESCRIPCIÓN de las AREAS de MANEJO

Area de Manejo 1 - Sitios Administrativos

Esta área consiste de 204 acres ocupados por El Portal Tropical Forest Center y la Estación de Trabajo Catalina, y otras instalaciones administrativas del Servicio Forestal.

Area de Manejo 2 - Recreación Desarrollada

Esta área consiste de un total de 1,158 acres, donde se da énfasis a los sitios de recreación desarrollada - sitios de picnic, estacionamientos en las cabeceras de las veredas, e instalaciones descentralizadas de interpretación.

Area de Manejo 3 - Sitios de Comunicación

Esta área consiste de un total de 196 acres en el Pico de El Yunque y el Pico del Este, que se usa para las instalaciones de comunicación, los caminos de acceso que les pertenecen, y las líneas de electricidad que les dan servicio. La área actual bajo permiso especial es de 31 acres.

Area de Manejo 4 - Integrada

Esta área consiste de 6,216 acres dedicados a la recreación, y a la investigación.

Area de Manejo 5 - Área Silvestre

Esta área consiste de 10,363 acres propuestos para la designación de área silvestre.

Area de Manejo 6 - Investigación

Esta área consiste de 919 acres, donde se da énfasis a la investigación, y a los estudios de largo plazo de la cuenca, además de los estudios de tratamiento y control.

Area de Manejo 7 - Área Natural de Investigación

Esta área abarca un total de 6,372 acres pertenecientes a la Área de Investigación Natural Baño de Oro, tanto actual como propuesta, que se mantienen en una condición prístina para los fines de la investigación actual y futura.

Area de Manejo 8 - Demostrada de Madera

Esta área abarca un total de 1,167 acres donde la producción sostenible de madera está demostrada.

Area de Manejo 9 - Corredores de Ríos Silvestres/Panorámicos/Recreacionales

Esta área abarca un total de 1,295 acres donde se da énfasis a la protección de Ríos Silvestres, Panorámicos y Recreacionales.

APPENDIX B

Assignment of Newly Acquired Portions of Mameyes River to Management Area 9

1. *Introduction and Purpose*

A review of CNF/LEF Land and Resource Management Plan was conducted to evaluate how 171.8 acres of El Conde Tract meet the Wild and Scenic River's eligibility, suitability, standard and guidelines, and Management Area designations. The area of Puente Roto is adjacent to El Conde tract. This report summarizes the result of the field investigation and recommends Management Area designation.

2. *Existing Criteria*

Rio Mameyes was studied during 1996 using the Wild & Scenic designation model. The Final Environmental Impact Statement (FEIS) and its associated Land and Resource Management Plan (LRMP) Caribbean NF and Luquillo Experimental Forest (USDA FS, 1997) documented the analysis. This report tiers to the LRMP and EIS using the same value analysis, determination of river section classification, and suitability criteria parameters.

3. **Value Analysis**

The area considered is Rio Mameyes from Puente Roto Road 988 Bridge north to the new Forest Boundary (Map). The total length of the river corridor is .69 miles. The river sections from Puente Roto to its Headwaters were determined to be eligible on its outstanding scenic, biological and recreation values (FEIS, 1997). The new river segment values are:

Value	Criteria Review for New Section
Scenic	Not remote or isolated. Enters a wide stream reach. Not outstanding.
Recreation	Similar previous analysis. Popular play area. Outstanding values remain.
Geological and Hydrological	Adds .27 sq. miles to of the watershed within NF land. Water quality optimum. Water quantity remains the same. No significant floodplain due to steep slopes. Outstanding values remain.
Biological	Similar previous analysis. Outstanding values remain.

In conclusion, the new river segment meets outstanding recreational, biological and hydrological values.

4. Potential Classification of Eligible River Section

The new river section is readily accessible by road; therefore, the section qualifies for classification (Photo 1.)



5. Suitability Determination

River suitability for designation was determined based on the following parameters:

Suitability Criteria	Assessment
Land Ownership	El Conde tract contains 148 acres. This increases national forest ownership from 469 acres (75%) to 617 acres (98%).
Compatibility with other uses	Fully compatible with current Recreation section.
Outstanding Remarkable Features	Fully compatible with the concept of highest recreation and biological values. The section is free of impoundment.

In conclusion, the 3 suitability criteria are met.

6. Compatibility of New River Section with Desired Future Condition, Goals, Standard & Guidelines for Wild and Scenic Rivers

A review of current Wild and Scenic River elements of LRMP follows:

LRMP Component	Description
Desired Future Condition	No need to change to accommodate the new river section.
Goals and Objectives	Extends Recreation segment by .69 miles
S&Gs	No need to change to accommodate new river section.

In conclusion, designation of the new river segment enhances compliance with LRMP.

7. Compatibility of New River Section with Management Area 9 Allocation

A review of current Wild and Scenic River elements of LRMP follows:

LRMP Component	Description
Desired Future Condition	No need to change to accommodate new river section. Fully compatible with increased protection desires.
Goals and Objectives	No need to change to accommodate new river section. Fully compatible with improvement of recreational opportunities.
S&Gs	No need to change to accommodate new river section. Fully compatible NEPA compliance for a picnic area.

In conclusion, designation of the new river segment as Management Area 9 enhances compliance with LRMP.

8. *Results and Recommendations*

The southern bank and slopes of El Conde tract should be allocated as Management Area 9.

APPENDIX C

Landslides Statistics for Hurricane Georges and April 2003 Storms

Prepared by: Fernando Perez, Hydrologist Trainee

Hurricane Georges

Tag #	Location	W-- ID	Area (ft ²)	Condition	Watershed	Slope	Altitude	Soils
1	PR R191	1	800	II	II AB	8%	1148ft	ZCC
2	PR R191	2	1200	I	I A	34%	1476ft	ZCC
3	PR R191	2	100	II	I B	30%	1197ft	ZCC
4	PR R191	2	1500	III	III	46%	1450ft	ZCC
5	PR R191	2	400	I	I B	32%	1509ft	ZCC
6	PR R191	2	150	I	I B	50%	1509ft	ZCC
Puente	PR R191	2	18	I	I B	60%	1509ft	ZCC
7	PR R191	2	300	I	I AB	42%	1520	ZCC
New	PR R191	2	63	I	I A	59%	1541ft	ZCC
8	PR R191	2	750	I	I A	34%	1738ft	ZCC
9	PR R191	2	450	I	I A	52%	1960ft	ZCC
10A	PR R191	2	2090	II	II A	44%	1610ft	ZCC
10B	PR R191	2	3200	II	II A/C	48%	2001ft	ZCC
11A	PR R191	2	2025	I	I B	42%	2014ft	YMC
11B	PR R191	2	3000	II	II C	44%	2011ft	YMC
12	PR R191	2	200	I	I A	61%	2050ft	YMC
13	PR R191	2	600	I	II A	50%	2080ft	YMC
14	PR	2	750	I	I A	36%	1935ft	GYC

	R191							
14-b	PR R191	2	550	I	I A	43%	1614ft	GYC
15	PR R191	2	3200	III	III	28%	2132ft	YMC
16	PR R191	2	200	I	I A	52%	2312ft	YMC
17	PR R191	2	525	I	II A / I A	20%	2378ft	PUC
18	PR R191	7	100	I	I A	38%	2460ft	PUC
19	PR R191S	7	600	I	I A	28%	2296ft	PUC
20	PR R191S	7	620	I	I B	32%	2132ft	PUC
21	PR R191S	7	1600	II	II A	36%	2099ft	PUC
22	PR R191S	7	875	I	I A	22%	2100ft	PUC
23	PR R191S	7	100	I	I	26%	2066ft	PUC
24	PR R191S	7	1750	II	II A/B	26%	2066ft	PUC
25	PR R191S	7	60	I	I A	60%	2034ft	PUC
Road	PR R191S	7	120ft ³	III	III	n/a	2034ft	n/a
26	PR R191S	7	800	III	II	32%	2066ft	PUC
Total			28576					

n = represent sample size (# of Landslides)

Σ = is the summation sign

x = represent the variable (in this case the “area”)

Including North and South landslides:

n = 31 landslides

< Area = 18 ft²

> Area = 3,200 ft²

Mean:

$$\mu = \sum xi/n$$

$$28576/31 = 921.8 \text{ ft}^2.$$

The mean area that a landslide could affect is 921.8 ft².

Median:

$$(n + 1)/2 = 600 \text{ ft}^2$$

Mode:

The most frequently occurring value in the data set is 100 ft².

Average slope: 39%

Average Altitude: 1876 ft.

Soil Types:

Soils	Average
ZCC	42%
YMC	19%
PUC	32%
GYC	7%

Dividing North and South Landslides:

191 North:

Tag #	Location	W-- ID	Area (ft ²)	Condition	Watershed	Slope	Altitude	Soils
1	PR R191	1	800	II	II AB	8%	1148ft	ZCC
2	PR R191	2	1200	I	I A	34%	1476ft	ZCC
3	PR R191	2	100	II	I B	30%	1197ft	ZCC
4	PR R191	2	1500	III	III	46%	1450ft	ZCC

5	PR R191	2	400	I	I B	32%	1509ft	ZCC
6	PR R191	2	150	I	I B	50%	1509ft	ZCC
Puente	PR R191	2	18	I	I B	60%	1509ft	ZCC
7	PR R191	2	300	I	I AB	42%	1520	ZCC
New	PR R191	2	63	I	I A	59%	1541ft	ZCC
8	PR R191	2	750	I	I A	34%	1738ft	ZCC
9	PR R191	2	450	I	I A	52%	1960ft	ZCC
10A	PR R191	2	2090	II	II A	44%	1610ft	ZCC
10B	PR R191	2	3200	II	II A/C	48%	2001ft	ZCC
11A	PR R191	2	2025	I	I B	42%	2014ft	YMC
11B	PR R191	2	3000	II	II C	44%	2011ft	YMC
12	PR R191	2	200	I	I A	61%	2050ft	YMC
13	PR R191	2	600	I	II A	50%	2080ft	YMC
14	PR R191	2	750	I	I A	36%	1935ft	GYC
14-b	PR R191	2	550	I	I A	43%	1614ft	GYC
15	PR R191	2	3200	III	III	28%	2132ft	YMC
16	PR R191	2	200	I	I A	52%	2312ft	YMC
17	PR R191	2	525	I	II A / I A	20%	2378ft	PUC
18	PR R191	7	100	I	I A	38%	2460ft	PUC

n = 23
 < Area = 18 ft²
 > Area = 3,200 ft²

Mean:

$$\mu = \sum x_i / n$$

$$22171/23 = 964 \text{ ft}^2.$$

The mean area that a landslide could affect is 964 ft².

Median:

$$(n + 1)/2 = 550 \text{ ft}^2$$

Mode: Multimode

The most frequently occurring values in the data set are 100, 200, 750 and 3,200 ft².

Average slope: 41.4%

Average Altitude: 1789ft.

Soil Types:

Soils	Average
ZCC	56%
YMC	26%
PUC	9%
GYC	9%

191 South:

19	PR R191S	7	600	I	I A	28%	2296ft	PUC
20	PR R191S	7	620	I	I B	32%	2132ft	PUC
21	PR R191S	7	1600	II	II A	36%	2099ft	PUC
22	PR R191S	7	875	I	I A	22%	2100ft	PUC
23	PR R191S	7	100	I	I	26%	2066ft	PUC
24	PR R191S	7	1750	II	II A/B	26%	2066ft	PUC
25	PR R191S	7	60	I	I A	60%	2034ft	PUC

26	PR R191S	7	800	III	II	32%	2066ft	PUC

n = 8

< Area = 60 ft²

> Area = 1750ft²

Mean:

$$\mu = \sum xi/n$$

$$6405/8 = 800.6 \text{ ft}^2.$$

The mean area that a landslide could affect is 800.6 ft².

Median:

$$(n + 1)/2 = 710 \text{ ft}^2$$

Mode: No mode

Average slope: 32.8%

Average Altitude: 2362ft.

Soil Types:

Soils	Average
ZCC	0%
YMC	0%
PUC	100%
GYC	0%

In conclusion, we can see that the biggest landslides occurred in the 191 north part, with the types of soils ZCC and YMC. Also we had more landslides in the north part than the south part.

April Rain Event 2003

			Altitude		area		
191North-1	0.2 miles North of Aviary Gate	Mameyes	690	100	55	5500	3
191North-2	0.2 miles North of Aviary Gate	Mameyes	690	30	20	600	2
191North-3	Caimitillo Trail Water Pump	Mameyes	620			0	3
191North-4	Palma Sierra Parking	Mameyes	610	25	20	500	3
191North-5	1.3 miles North of Aviary Gate	Mameyes	605	10	6	60	NT
191North-6	2.2 miles North of Aviary Gate	Mameyes	480	10	5	50	NT
191North-7	2.6 miles North of Aviary Gate	Mameyes	500	65	30	1950	2
191North-8	2.75 miles North of Aviary Gate	Mameyes	515	25	10	250	NT
191North-9	2.8 miles North of Aviary Gate	Mameyes	515	20	15	300	NT
191North-10	Private/Forest Land	Mameyes	460	100	30	3000	2
191North-11	4.0 miles North of Aviary Gate	Mameyes	425	45/45	120/20	6300	3
191North-12	4.2 miles North of Aviary Gate	Mameyes	400	75	30	2250	2
191North-13	4.25 miles North of Aviary Gate	Mameyes	395	60	30	1800	3 left side
191North-14	4.25 miles North of Aviary Gate	Mameyes	395	30	10	300	1
191North-15	.25 miles North of 9966	Mameyes	350	25	25	625	2
191North-16	0.9 miles North of 9966	Mameyes	270	3	10	30	NT
191North-17	1.0 miles North of 9966	Mameyes	250	7	15	105	1
191Icacos-1	0.3 miles south of Aviary Gate	Blanco	720	45	30	1350	2
191Icacos-2	0.35 miles South of Aviary Gate	Blanco	690	40	25	1000	2
191Icacos-	0.55 miles South of Aviary	Blanco	665	25	20	500	2

3	Gate							
191Icacos-4	0.6 miles South of Aviary Gate	Blanco	650	40	50	2000	2	
191Icacos-5	0.6 miles South of Aviary Gate	Blanco	650	40	40	1600	3	
191Icacos-6	0.68 miles South of Aviary Gate	Blanco	650	35	40	1400	3	
191Icacos-7	0.69 miles South of Aviary Gate	Blanco	650	12	20	240	1	
191Icacos-8	0.7 miles South of Aviary Gate	Blanco	640	30	25	750	2	
191Icacos-9	0.72 miles South of Aviary Gate	Blanco	640	30	5	150	NT	
191Icacos-10	1 mile south of Aviary Gate	Blanco	640	15	25	375	1	
191Icacos-11	1.3 miles south of Aviary Gate	Blanco	640	30	25	750	2	
191Icacos-12	1.3 miles south of Aviary Gate	Blanco	640	45	10	450	2	
191Icacos-13	1.5 miles south of Aviary Gate	Blanco	640	25	10	250	1	
191Icacos-14	1.6 miles south of Aviary Gate	Blanco	640	15	15	225	1	
191Icacos-15	1.69 miles south of Aviary Gate	Blanco	640	35	90	3150	2	
191Icacos-16	1.71 miles south of Aviary Gate	Blanco	640	45	35	1575	2	
191Icacos-17	1.72 miles south of Aviary Gate	Blanco	640	50	65	3250	3	
191Icacos-18	1.75 miles south of Aviary Gate	Blanco	640	4	12	48	NT	
191Icacos-19	1.79 miles south of Aviary Gate	Blanco	640	25	40	1000	2	
191Icacos-20	1.81 miles south of Aviary Gate	Blanco	660	30	25	750	2	
191Icacos-21	1.85 miles south of Aviary Gate	Blanco	660	35	40	1400	3	
191Icacos-22	1.88 miles south of Aviary Gate	Blanco	660	50	65	3250	2	
191Icacos-23	2 miles south of Aviary Gate	Blanco	660	15	15	225	1	
191Icacos-24	2 miles south of Aviary Gate	Blanco	630	60	16	960	3	
191Icacos-25	2 miles south of Aviary Gate	Blanco	630	45	42	1890	3	
191Icacos-	17 m past slide 25	Blanco	640	36	40	1440	3	

26								
191Icacos-								
27	38 m past slide 25	Blanco	640	40	65	2600	3	
191Icacos-								
28	83 m past slide 25	Blanco	640	40	12	480	2	
191Icacos-								
29	139 m past slide 25	Blanco	630	20	35	700	2	
191Icacos-								
30	292 m past slide 25	Blanco	628	30	35	1050	2	
191Icacos-								
31	547 m past slide 25	Blanco	628	20	25	500	2	
191Icacos-								
32	658 m past slide 25	Blanco	615	15	14	210	2	
191Icacos-								
33	687 m past slide 25	Blanco	605	60	70	4200	2	
191Icacos-								
34	747 m past slide 25	Blanco	600	20	55	1100	2	
191Icacos-								
35	787 m past slide 25	Blanco	600	20	40	800	3	
191Icacos-								
36	848 m past slide 25	Blanco	590	3	6	18	NT	
191Icacos-								
37	900 m past slide 25	Blanco	580	60	60	3600	3	

Including North and South landslides:

n = 53

< Area = 18 ft²

> Area = 6300ft²

Mean:

$$\mu = \sum xi/n$$

$$68856/53 = 1299 \text{ ft}^2.$$

The mean area that a landslide could affect is 1299 ft².

Median:

$$(n + 1)/2 = 750 \text{ ft}^2$$

Mode: Bimodal

The most frequently occurring values in the data set are 500 and 750 ft².

Average Altitude: 588.7ft.

Dividing North and South Landslides:

191 North:

			Altitude		area		
191North-1	0.2 miles North of Aviary Gate	Mameyes	690	100	55	5500	3
191North-2	0.2 miles North of Aviary Gate	Mameyes	690	30	20	600	2
191North-3	Caimitillo Trail Water Pump	Mameyes	620			0	3
191North-4	Palma Sierra Parking	Mameyes	610	25	20	500	3
191North-5	1.3 miles North of Aviary Gate	Mameyes	605	10	6	60	NT
191North-6	2.2 miles North of Aviary Gate	Mameyes	480	10	5	50	NT
191North-7	2.6 miles North of Aviary Gate	Mameyes	500	65	30	1950	2
191North-8	2.75 miles North of Aviary Gate	Mameyes	515	25	10	250	NT
191North-9	2.8 miles North of Aviary Gate	Mameyes	515	20	15	300	NT
191North-10	Private/Forest Land	Mameyes	460	100	30	3000	2
191North-11	4.0 miles North of Aviary Gate	Mameyes	425	45/45	120/20	6300	3
191North-12	4.2 miles North of Aviary Gate	Mameyes	400	75	30	2250	2
191North-13	4.25 miles North of Aviary Gate	Mameyes	395	60	30	1800	3 left side
191North-14	4.25 miles North of Aviary Gate	Mameyes	395	30	10	300	1
191North-15	.25 miles North of 9966	Mameyes	350	25	25	625	2
191North-16	0.9 miles North of 9966	Mameyes	270	3	10	30	NT

191North-
17 1.0 miles North of 9966 Mameyes 250 7 15 105 1

n = 16

< Area = 30 ft²

> Area = 6300ft²

Mean:

$$\mu = \sum xi/n$$

$$23620/16 = 1476.3 \text{ ft}^2.$$

The mean area that a landslide could affect is 1476.3 ft².

Median:

$$(n + 1)/2 = 550 \text{ ft}^2$$

Mode:

The most frequently occurring values in the data set are 300 ft².

Average Altitude: 472ft.

191 South:

			Altitude		area		
191Icacos- 1	0.3 miles south of Aviary Gate	Blanco	720	45	30	1350	2
191Icacos- 2	0.35 miles South of Aviary Gate	Blanco	690	40	25	1000	2
191Icacos- 3	0.55 miles South of Aviary Gate	Blanco	665	25	20	500	2
191Icacos- 4	0.6 miles South of Aviary Gate	Blanco	650	40	50	2000	2

191Icacos-5	0.6 miles South of Aviary Gate	Blanco	650	40	40	1600	3
191Icacos-6	0.68 miles South of Aviary Gate	Blanco	650	35	40	1400	3
191Icacos-7	0.69 miles South of Aviary Gate	Blanco	650	12	20	240	1
191Icacos-8	0.7 miles South of Aviary Gate	Blanco	640	30	25	750	2
191Icacos-9	0.72 miles South of Aviary Gate	Blanco	640	30	5	150	NT
191Icacos-10	1 mile south of Aviary Gate	Blanco	640	15	25	375	1
191Icacos-11	1.3 miles south of Aviary Gate	Blanco	640	30	25	750	2
191Icacos-12	1.3 miles south of Aviary Gate	Blanco	640	45	10	450	2
191Icacos-13	1.5 miles south of Aviary Gate	Blanco	640	25	10	250	1
191Icacos-14	1.6 miles south of Aviary Gate	Blanco	640	15	15	225	1
191Icacos-15	1.69 miles south of Aviary Gate	Blanco	640	35	90	3150	2
191Icacos-16	1.71 miles south of Aviary Gate	Blanco	640	45	35	1575	2
191Icacos-17	1.72 miles south of Aviary Gate	Blanco	640	50	65	3250	3
191Icacos-18	1.75 miles south of Aviary Gate	Blanco	640	4	12	48	NT
191Icacos-19	1.79 miles south of Aviary Gate	Blanco	640	25	40	1000	2
191Icacos-20	1.81 miles south of Aviary Gate	Blanco	660	30	25	750	2
191Icacos-21	1.85 miles south of Aviary Gate	Blanco	660	35	40	1400	3
191Icacos-22	1.88 miles south of Aviary Gate	Blanco	660	50	65	3250	2
191Icacos-23	2 miles south of Aviary Gate	Blanco	660	15	15	225	1
191Icacos-24	2 miles south of Aviary Gate	Blanco	630	60	16	960	3
191Icacos-25	2 miles south of Aviary Gate	Blanco	630	45	42	1890	3
191Icacos-26	17 m past slide 25	Blanco	640	36	40	1440	3
191Icacos-27	38 m past slide 25	Blanco	640	40	65	2600	3

191Icacos-28	83 m past slide 25	Blanco	640	40	12	480	2
191Icacos-29	139 m past slide 25	Blanco	630	20	35	700	2
191Icacos-30	292 m past slide 25	Blanco	628	30	35	1050	2
191Icacos-31	547 m past slide 25	Blanco	628	20	25	500	2
191Icacos-32	658 m past slide 25	Blanco	615	15	14	210	2
191Icacos-33	687 m past slide 25	Blanco	605	60	70	4200	2
191Icacos-34	747 m past slide 25	Blanco	600	20	55	1100	2
191Icacos-35	787 m past slide 25	Blanco	600	20	40	800	3
191Icacos-36	848 m past slide 25	Blanco	590	3	6	18	NT
191Icacos-37	900 m past slide 25	Blanco	580	60	60	3600	3

n = 37

< Area = 18 ft²

> Area = 4200ft²

Mean:

$$\mu = \sum xi/n$$

$$45236/37 = 1222.6 \text{ ft}^2.$$

The mean area that a landslide could affect is 1222.6 ft².

Median:

$$(n + 1)/2 = 960 \text{ ft}^2$$

Mode:

The most frequently occurring values in the data set are 750 ft².

Average Altitude: 639ft.

Conclusion:

Otherwise, with April Rain Event 2003 case we can see that the south part of road 191 suffered more landslides than the north part, but the average area that the landslide could affect, continue greater in the north part than the south.