



ECONOMIC ANALYSIS OF  
CRITICAL HABITAT  
DESIGNATION FOR THE  
GUAJÓN

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## EXECUTIVE SUMMARY

1. The purpose of this report is to assess the potential economic impacts associated with the proposed critical habitat designation for the guajón (*Eleutherodactylus cooki*), one of 16 "coquí" frog species native to Puerto Rico. The guajón was listed as a threatened species in 1997. On October 5, 2006, the U.S. Fish and Wildlife Service (Service) published a Proposed Rule to designate approximately 217.2 acres of critical habitat for the species.<sup>1</sup> The Service is currently proposing an additional 43.4 acres for critical habitat designation. Thus, in total, the Service proposes 17 critical habitat units encompassing 260.6 acres in southeastern Puerto Rico as critical habitat for the guajón (hereafter, this area is referred to as the proposed critical habitat designation).<sup>2</sup> The proposed designation falls in seven municipalities: Humacao, Las Piedras, Maunabo, Patillas, Juncos, San Lorenzo, and Yabucoa. All of the land within the proposed critical habitat units is privately owned.
2. The area of southeastern Puerto Rico in which the proposed units are located is mountainous and rural. Consequently, the proposed critical habitat areas are only accessible via winding two-lane roads. Due to the rugged topography and poor soil at these elevations, economic activity in the vicinity of the proposed units is limited to subsistence farming and minor commercial establishments often attached to residents' homes. Three of the 17 units are zoned for small-scale farming, which also permits limited home construction for single families. A fourth unit is owned by the Puerto Rico Conservation Trust. The remaining units are unzoned due to the limited economic activity in the area.
3. This analysis examines potential economic impacts associated with mitigating threats from road construction, agriculture, development, human refuse, and fishing with chemicals. Exhibit ES-1 summarizes the potential future costs that are quantified over the 20 year period between 2007 and 2026. Potential future costs associated with the proposed designation are estimated at \$4.34 million in undiscounted dollars, \$4.28 million when discounted at three percent, and \$4.23 million when discounted at seven percent. Annualized future costs are \$288,000 using a three percent discount rate and \$399,000 using a seven percent discount rate. Potential future costs are dominated by the

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<sup>1</sup>Note that this analysis presents only approximate estimates of land acreage included in critical habitat. Please refer to the Proposed Rule for legal descriptions of proposed critical habitat designation.

<sup>2</sup>U.S. Fish and Wildlife Service, Designation of Critical Habitat for the Guajón, Proposed Rule, 71 FR 58953, October 5, 2006, as amended by Briefing statement for the Director, Southeast Region, Service, April 3, 2007.

expected costs of guajón conservation efforts during road construction, specifically the extension of Puerto Rico Highway 53. Exhibit ES-2 details other impacts likely to be incurred to mitigate threats from agriculture, development, human refuse, and fishing. These impacts are not quantified.

**EXHIBIT ES-1 FUTURE ECONOMIC IMPACTS BY ACTIVITY, 2007-2026**

ACTIVITY	UNDISCOUNTED	PRESENT VALUE 3%	PRESENT VALUE 7%	ANNUALIZED 3%	ANNUALIZED 7%
Road construction	\$4,110,000	\$4,108,000	\$4,106,000	\$276,000	\$388,000
Administrative effort	\$230,000	\$171,000	\$122,000	\$12,000	\$11,000
<b>Total</b>	<b>\$4,340,000</b>	<b>\$4,279,000</b>	<b>\$4,228,000</b>	<b>\$288,000</b>	<b>\$399,000</b>

Note: Totals may not sum due to rounding.

**EXHIBIT ES-2 UNQUANTIFIED IMPACTS, 2007-2026**

ACTIVITY	POTENTIAL ECONOMIC IMPACTS
Agriculture	Reduced herbicide, fertilizer, and insecticide use; impact on crop yield is uncertain
Development	Avoidance of riparian areas; limited development anticipated
Refuse	Clean-up of illegal garbage dumping and signage
Fishing with Chemicals	Signage

**ES.1 RESULTS OF THE ANALYSIS**

4. **ES 1.1 ROAD CONSTRUCTION** Future costs to road construction of \$4.1 million in undiscounted dollars are all associated with the extension of Puerto Rico Highway 53 between Maunabo and Yabucoa. In 2004, the Puerto Rico Highway and Transportation Authority (PRHTA) began construction of the 9.1-km extension, which intersects the Emajagua Unit. The project is slated for completion in the summer of 2008. Anticipated guajón conservation efforts during the highway extension include species monitoring, acquiring land for conservation, constructing an additional bridge to permit stream flow, and installing rocky streambeds in box culverts. The PRHTA does not anticipate additional road projects in the future in or near proposed critical habitat.
5. **ES 1.2 AGRICULTURE** The Service lists agriculture as a threat to 12 of the 17 guajón critical habitat units: the Mariana, Montones, Jacaboa, Calabazas, Guayanés, Guayabota, Talante, Cielito, Verraco, Cueva Marcela, Ceiba Sur, and Playita units. Farming in these areas consists entirely of small-scale household plots farmed without machinery. To avoid impacts to the guajón from agricultural activities, fertilizers and pesticide use by agricultural users may need to be curtailed. However, due to the dispersed nature and small scale of farming activities near critical habitat, the Service does not plan to require residents in or adjacent to the proposed units to alter their agricultural activities.<sup>3</sup> In

<sup>3</sup> Written communication with Service, Southeast Region Office, March 30, 2007.

addition, the level of current fertilizer and pesticide use as well as the impacts of curtailing their use on crop yield are uncertain. Thus, potential impacts are not included in the overall calculated economic impacts of critical habitat (CH) designation.

6. To provide context for understanding potential impacts on agricultural activities, should they occur, this analysis estimates the value of crop production potentially at risk if the Service were to seek changes to agricultural practices, particularly reductions in fertilizer and pesticide use. The analysis estimates the value of crop production within a quarter mile of the proposed units. This production is valued at \$473,000 annually, or \$9.6 million over the twenty year period of analysis (undiscounted). When discounted at seven percent, twenty-year crop production is valued at \$5.0 million. However, this estimate represents an absolute upper bound value of agricultural activity potentially at risk if the Service were to recommend changes to local agricultural practices. This estimate is likely to overstate potential impacts on agriculture for several reasons: (1) average crop sales per acre is likely to be overstated because the average sales per acre is skewed upward by sales from farms at lower elevations with better soil, and because critical habitat areas are selected because they currently contain ideal habitat for the guajón (i.e., they are unlikely to be harvested as cropland); (2) chemical fertilizers and/or pesticides are not necessarily applied to all cropland; thus, not all cropland near critical habitat would need conservation measures for the guajón that halt use of these chemicals; and (3) even if farmers are currently using fertilizer or pesticides on lands near critical habitat and these farmers cease or curtail the application of these to conserve guajón, crop harvest on these lands would not be reduced to zero.
7. **ES 1.3 DEVELOPMENT** The Plan de Uso de Terrenos de Puerto Rico (Puerto Rico Land Use Plan) from the Puerto Rico Planning Board (PRPB) defines all proposed critical habitat areas as "lands not foreseen for development due to their special location, topography, aesthetic, archeological, ecological, and agricultural value, and natural resources. These lands should never be used for urban purposes."<sup>4</sup> Thus, all of the proposed critical habitat units are encompassed in areas that the Land Use Plan expressly programs for protection from development or for continued agricultural uses. Moreover, the Panduras Unit is entirely owned by the Puerto Rico Conservation Trust, and thus will not be developed.<sup>5</sup>
8. Aside from the Puerto Rico Land Use Plan, current zoning and topography also limit construction throughout the areas proposed for critical habitat. Three of the 17 proposed critical habitat units are located in areas zoned for light agriculture and the construction of single-family homes. The remaining units are unzoned due to the limited economic activity in the area.<sup>6</sup> In past technical assistance efforts, slight modifications in construction have been sufficient to avoid adversely affecting the guajón and its habitat.

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<sup>4</sup> Plan de Uso de Terrenos de Puerto Rico, Borrador Preliminar Para Vistas Públicas (Puerto Rico Land Use Plan). Preliminary Draft for Public Hearings. February 2006. Puerto Rico Planning Board. Office of the Puerto Rico Land Use Plan. As viewed at <http://www.gobierno.pr/OPUT/Documentos/DocumentosAnejos.htm> on February 13, 2007.

<sup>5</sup> Personal communication with Service biologist, Puerto Rico Field Office, on January 22, 2007.

<sup>6</sup> Zoning for five units is estimated based on the proximity of those units to nearby units with known zoning.

The Service's recommended modifications have included: maintaining forest habitat along stream drainages, preserving an additional ten-meter buffer beyond the forested riparian area, and piling soil and fill away from stream drainages. Given the low expected cost of these practices, future impacts to development are not quantified.

9. **ES.4 REFUSE AND FISHING WITH CHEMICALS** The Proposed Rule identifies refuse from nearby communities and fishing with chemical substances as threats to the guajón and its habitat. The threat from refuse could be mitigated by installing signage indicating that dumping trash in or near critical habitat is illegal, or by contracting individuals to remove any observed waste. Signage announcing that fishing with chemicals is prohibited could also be installed. The costs of these actions are anticipated to be minor.
10. **ES.5 SMALL BUSINESS AND ENERGY IMPACTS** As impacts to agriculture and development activities are expected to be minimal, little impact to small businesses is expected as a result of the proposed critical habitat designation. All impacts to road construction will be borne by the government of the Commonwealth of Puerto Rico, which is not defined as a small entity by the Small Business Administration (SBA). Impacts to the energy industry are also not expected. These conclusions are explained in Appendices A and B.

## SECTION 1 | INTRODUCTION AND FRAMEWORK FOR ANALYSIS

### 1.1 PURPOSE OF THE ECONOMIC ANALYSIS

11. The purpose of this report is to estimate the economic impact of actions taken to protect the guajón and its habitat. The report attempts to quantify the costs of conservation efforts associated with economic activities that may adversely affect proposed critical habitat. The analysis looks retrospectively at costs incurred since the guajón was listed as threatened in 1997, and it attempts to estimate future costs likely to occur after the 2007 proposed critical habitat designation is finalized.
12. This information is intended to assist the Secretary in determining whether the benefits of excluding particular areas from the designation outweigh the benefits of including those areas in the designation.<sup>7</sup> In addition, this information allows the U.S. Fish and Wildlife Service (the Service) to address the requirements of Executive Orders 12866 and 13211, and the Regulatory Flexibility Act (RFA), as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA).<sup>8</sup> This report also complies with direction from the U.S. Court of Appeals for the 10th Circuit that “co-extensive” effects should be included in the economic analysis to inform decision-makers regarding which areas to designate as critical habitat.<sup>9</sup>
13. This chapter provides background information on the species and the proposed designation. Next, it describes the regulatory alternatives considered by the Service. Then, it describes the approach to estimating impacts and lays out the scope of the analysis. Information sources relied upon are summarized in the next section. The chapter concludes with a description of the organization of the remainder of the report.

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<sup>7</sup> 16 U.S.C. §1533(b)(2).

<sup>8</sup> Executive Order 12866, *Regulatory Planning and Review*, September 30, 1993; Executive Order 13211, *Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use*, May 18, 2001; 5. U.S.C. §§601 *et seq.*; and Pub Law No. 104-121.

<sup>9</sup> In 2001, the U.S. Court of Appeals for the 10th Circuit instructed the Service to conduct a full analysis of all of the economic impacts of proposed critical habitat designation, regardless of whether those impacts are attributable co-extensively to other causes (*New Mexico Cattle Growers Ass'n v. U.S.F.W.S.*, 248 F.3d 1277 (10<sup>th</sup> Cir. 2001)).

## 1.2 BACKGROUND<sup>10</sup>

### 1.2.1 REGULATORY HISTORY

14. In 1997, the guajón was listed as a threatened species. On October 5, 2006, the Service published a Proposed Rule to designate critical habitat for the species. For a description of the species and the primary constituent elements essential to its conservation, refer to the Proposed Rule.

### 1.2.2 PROPOSED CRITICAL HABITAT

15. The Service proposes 17 critical habitat units encompassing 260.6 acres in southeastern Puerto Rico.<sup>11</sup> The proposed designation falls entirely within privately owned lands in seven municipalities: Humacao, Las Piedras, Maunabo, Patillas, Juncos, San Lorenzo, and Yabucoa. Each unit consists of a stream segment and the area extending laterally 30 meters from the stream banks. Water flow in these streams is typically very low and sometimes intermittent throughout the year. The streams are fed from underground sources and mountain runoff, and some units are connected as part of larger river systems.<sup>12</sup> They are extremely rocky and contain boulders and other rock formations that are several meters in height. The guajón has not been found in streams with high water flow that lack these rock features. Exhibit 1 provides a map of southeastern Puerto Rico, showing the location of each proposed critical habitat unit.

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<sup>10</sup> U.S. Fish and Wildlife Service, Designation of Critical Habitat for the Guajón, Proposed Rule, 71 FR 58953, October 5, 2006.

<sup>11</sup> U.S. Fish and Wildlife Service, Designation of Critical Habitat for the Guajón, Proposed Rule, 71 FR 58953, October 5, 2006, as amended by Briefing statement for the Director, Southeast Region, Service, April 3, 2007.

<sup>12</sup> Written communication with Service, Southeast Region Office, March 30, 2007.



EXHIBIT 1 MAP OF PROPOSED GUAJÓN CRITICAL HABITAT



Source: Critical habitat GIS layer from Service Biologist, Puerto Rico Field Office, received November 15, 2006, amended April 11, 2007.

1.3 REGULATORY ALTERNATIVES

16. Executive Order 12866 directs Federal Agencies to evaluate regulatory alternatives. The Service identifies 17 units of proposed critical habitat for the guajón. Alternatives to the Proposed Rule are possible through section 4(b)(2) of the Act. Section 4(b)(2) allows the Service to exclude areas proposed for designation based on economic impact and other relevant impact.

#### 1.4 THREATS TO THE SPECIES AND HABITAT

17. The primary threats to the guajón are contamination of its stream habitat as a result of road projects, small-scale agriculture, development, illegal trash dumping, and fishing with chemicals. The Proposed Rule states:
- "deforestation and earth movement near streams for road construction and ... urban and rural development may result in changes in the composition and abundance of vegetation surrounding guajón habitat... Any stream modification (e.g., embankment, channelization) or development (e.g., tourist, urban) within the watershed where the guajón exists could result in an increase of chemical laden sediments and alteration of the streams' quality."<sup>13</sup>
18. The Proposed Rule also notes that development and the expansion of paved surfaces increase the risk of flash floods, which can wash away guajón eggs and adult individuals. Threats from agriculture include: "the use of pesticides, herbicides, and fertilizers, [which] could have detrimental effects on survival of the guajón from runoff into waterways adjacent to guajón habitat." Refuse from nearby communities and fishing with chemical substances are also identified as threats to the species. Exhibit 2 summarizes the threats affecting each proposed unit.

#### EXHIBIT 2 THREATS TO PROPOSED GUAJÓN CRITICAL HABITAT

UNIT	UNIT NAME	THREATS
1	Mariana	Road construction, development, agriculture, human refuse
2	Montones	Road construction, development, agriculture, human refuse
3	Tejas	Road construction and development
4	Emajagua	Road construction, development, human refuse
5	Jacaboa	Road construction, development, agriculture, human refuse
6	Calabazas	Road construction, development, agriculture, human refuse
7	Guayanés	Road construction, development, agriculture, human refuse
8	Panduras	Road construction and human refuse
9	Talante	Road construction, development, agriculture, human refuse
10	Guayabota	Road construction, development, agriculture, human refuse
11	Guayabito	Road construction
12	Guayabo	Road construction
13	El Cielito	Reduced abundance of vegetation, agriculture, human refuse
14	Verraco	Reduced abundance of vegetation, agriculture, human refuse
15	Cueva Marcela	Reduced abundance of vegetation, agriculture, human refuse
16	Ceiba Sur	Reduced abundance of vegetation, agriculture, human refuse
17	Playita	Reduced abundance of vegetation, agriculture, human refuse

Sources: U.S. Fish and Wildlife Service, Designation of Critical Habitat for the Guajón, Proposed Rule, 71 FR 58953, October 5, 2006; U.S. Fish and Wildlife Service, Briefing statement for the Director, Southeast Region, April 3, 2007.

<sup>13</sup> Ibid.

## 1.5 APPROACH TO ESTIMATING ECONOMIC EFFECTS

19. This economic analysis considers both the economic efficiency and distributional effects that may result from efforts to protect the guajón and its habitat. Economic efficiency effects generally reflect “opportunity costs” associated with the commitment of resources required to accomplish species and habitat conservation. For example, if activities that can take place on a parcel of land are limited as a result of the designation or the presence of the species, and thus the market value of the land is reduced, this reduction in value represents one measure of opportunity cost or change in economic efficiency. Similarly, the costs incurred by a Federal action agency to consult with the Service under section 7 represent opportunity costs of guajón conservation efforts.
20. This analysis also considers the distribution of impacts associated with the designation, including an assessment of any local or regional impacts of habitat conservation and the potential effects of conservation efforts on small entities and the energy industry. This information may be used by decision-makers to assess whether the effects of guajón conservation efforts unduly burden a particular group or economic sector. For example, while conservation efforts may have a small impact relative to Puerto Rico's economy, individuals employed in a particular sector of the island's economy may experience relatively greater impacts. However, with the proposed designation for the guajón, estimated future impacts to agriculture, development, and road construction are too small to produce regional economic effects. Also, as explained in Appendices A and B, the impacts are not expected to affect small businesses or the energy industry.

### 1.5.1 EFFICIENCY EFFECTS

21. At the guidance of the Office of Management and Budget (OMB) and in compliance with Executive Order 12866 "Regulatory Planning and Review," Federal agencies measure changes in economic efficiency in order to understand how society, as a whole, will be affected by a regulatory action. In the context of regulations that protect guajón habitat, these efficiency effects represent the opportunity cost of resources used or benefits forgone by society as a result of the regulations. Economists generally characterize opportunity costs in terms of changes in producer and consumer surpluses in affected markets.<sup>14</sup>
22. In some instances, compliance costs may provide a reasonable approximation for the efficiency effects associated with a regulatory action. For example, a Federal landowner or manager may enter into a consultation with the Service to ensure that a particular activity will not adversely modify critical habitat. The effort required for the consultation is an economic opportunity cost because the landowner or manager's time and effort would have been spent in an alternative activity had the parcel not been species' habitat. When compliance activity is not expected to significantly affect markets -- that is, not

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<sup>14</sup> For additional information on the definition of "surplus" and an explanation of consumer and producer surplus in the context of regulatory analysis, see: Gramlich, Edward M., *A Guide to Benefit-Cost Analysis (2<sup>nd</sup> Ed.)*, Prospect Heights, Illinois: Waveland Press, Inc., 1990; and U.S. Environmental Protection Agency, *Guidelines for Preparing Economic Analyses*, EPA 240-R-00-003, September 2000, available at <http://yosemite.epa.gov/ee/epa/eed.nsf/webpages/Guidelines.html>.

result in a shift in the quantity of a good or service provided at a given price, or in the quantity of a good or service demanded given a change in price -- the measurement of compliance costs can provide a reasonable estimate of the change in economic efficiency.

23. Where habitat protection measures are expected to significantly impact a market, it may be necessary to estimate changes in producer and consumer surpluses. For example, a designation that precludes the development of large areas of land may shift the price and quantity of housing supplied in a region. Changes in economic efficiency (i.e., social welfare) can then be measured by considering changes in producer and consumer surplus in the market. However, in the case of the proposed guajón designation, the impacts on agriculture and development are too small to impact markets for agricultural commodities and land.

#### 1.6 SCOPE OF THE ANALYSIS

24. This analysis identifies those economic activities believed to most likely threaten the listed species and its habitat and, where possible, quantifies the economic impact to avoid, mitigate, or compensate for such threats within the boundaries of the proposed critical habitat designation. In instances where critical habitat is being proposed after a species is listed, some future impacts may be unavoidable, regardless of the final designation and exclusions under 4(b)(2). However, due to the difficulty in making a credible distinction between listing and critical habitat effects within critical habitat boundaries, this analysis considers all future conservation-related impacts to be co-extensive with the designation.<sup>15,16</sup>
25. Coextensive effects may also include impacts associated with overlapping protective measures of other Federal, State, and local laws that aid habitat conservation in the areas proposed for designation. In past instances, some of these measures have been precipitated by the listing of the species and impending designation of critical habitat. Because habitat conservation efforts affording protection to a listed species likely contribute to the efficacy of the critical habitat designation efforts, the impacts of these actions are considered relevant for understanding the full effect of the proposed critical habitat designation. Enforcement actions taken in response to violations of the Act, however, are not included.

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<sup>15</sup> In 2001, the U.S. Court of Appeals for the 10th Circuit instructed the Service to conduct a full analysis of all of the economic impacts of proposed critical habitat designation, regardless of whether those impacts are attributable co-extensively to other causes (*New Mexico Cattle Growers Assn v. U.S.F.W.S.*, 248 F.3d 1277 (10th Cir. 2001)).

<sup>16</sup> In 2004, the U.S. Ninth Circuit invalidated the Service's regulation defining destruction or adverse modification of critical habitat (*Gifford Pinchot Task Force v. United States Fish and Wildlife Service*). The Service is currently reviewing the decision to determine what effect it (and to a limited extent *Center for Biological Diversity v. Bureau of Land Management* (422F.Supp.2d 1115 (N.D. Cal. 2006))) may have on the outcome of consultations pursuant to section 7 of the Act.

### CALCULATING PRESENT VALUE AND ANNUALIZED IMPACTS

For each land use activity, this analysis compares economic impacts incurred in different time periods in present value terms. The present value presents the value of a payment or stream of payments in common dollar terms. That is, it is the sum of a series of past or future cash flows expressed in today's dollars. Translation of economic impacts of past or future costs to present value terms requires the following: a) past or projected future costs of guajón conservation efforts; and b) the specific years in which these impacts have or are expected to be incurred. With these data, the present value of the past or future stream of impacts ( $PV_c$ ) of guajón conservation efforts from year  $t$  to  $T$  is measured in 2007 dollars according to the following standard formula:<sup>a</sup>

$$PV_c = \sum_t^T \frac{C_t}{(1+r)^{t-2007}}$$

$C_t$  = forecast cost of guajón conservation efforts in year  $t$

$r$  = discount rate<sup>b</sup>

Impacts of conservation efforts for each activity in each unit are also expressed as annualized values. Annualized values are calculated to provide comparison of impacts across activities with varying forecast periods ( $T$ ). For this analysis, however, all activities employ a forecast period of 20 years, 2007 through 2026. Annualized impacts of future guajón conservation efforts ( $APV_c$ ) are calculated by the following standard formula:

$$APV_c = PV_c \left[ \frac{r}{1 - (1+r)^{-N}} \right]$$

$N$  = number of years in the forecast period (in this analysis, 20 years)

<sup>a</sup> To derive the present value of past conservation efforts for this analysis,  $t$  is 1998 and  $T$  is 2007; to derive the present value of future conservation efforts,  $t$  is 2007 and  $T$  is 2026.

<sup>b</sup> To discount and annualize costs, guidance provided by the OMB specifies the use of a real rate of seven percent. In addition, OMB recommends sensitivity analysis using other discount rates such as three percent, which some economists believe better reflects the social rate of time preference. (U.S. Office of Management and Budget, Circular A-4, September 17, 2003 and U.S. Office of Management and Budget, "Draft 2003 Report to Congress on the Costs and Benefits of Federal Regulations; Notice," 68 *Federal Register* 5492, Feb. 3, 2003.)

#### 1.6.1 SECTIONS OF THE ACT RELEVANT TO THE ANALYSIS

26. This analysis focuses on activities that are influenced by the Service through sections 4, 7, 9, and 10 of the Act. Section 4 of the Act focuses on the listing and recovery of endangered and threatened species, as well as the critical habitat designation. In this section, the Secretary is required to list species as endangered or threatened "solely on the basis of the best available scientific and commercial data."<sup>17</sup> Section 4 also requires the Secretary to designate critical habitat "on the basis of the best scientific data available and after taking into consideration the economic impact, and any other relevant impact, of specifying any particular area as critical habitat."<sup>18</sup> In addition, under section 4, the Service is required to develop a recovery plan that recommends actions necessary to satisfy the biological needs and assure the recovery of the species. The plan serves as guidance for interested parties, including Federal, State, and local agencies, private landowners, and the general public.
27. The protections afforded to threatened and endangered species and their habitat are described in sections 7, 9, and 10 of the Act, and economic impacts resulting from these protections are the focus of this analysis:
- Section 7 of the Act requires Federal agencies to consult with the Service to ensure that any action authorized, funded, or carried out will not likely jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat. The administrative costs of these consultations, along with the costs of project modifications resulting from these consultations, represent compliance costs associated with the listing of the species and critical habitat designation.
  - Section 9 defines the actions that are prohibited by the Act. In particular, it prohibits the "take" of endangered wildlife, where "take" means to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."<sup>19</sup> The economic impacts associated with this section manifest themselves in sections 7 and 10.
  - Under section 10(a)(1)(B) of the Act, an entity (i.e., a landowner or local government) may develop a Habitat Conservation Plan (HCP) for an endangered animal species in order to meet the conditions for issuance of an incidental take permit in connection with the development and management of a property.<sup>20</sup> The requirements posed by the HCP may have economic impacts associated with the goal of ensuring that the effects of incidental take are adequately minimized and mitigated. The designation of critical habitat does not require

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<sup>17</sup> 16 U.S.C. 1533.

<sup>18</sup> 16 U.S.C. 1533.

<sup>19</sup> 16 U.S.C. 1532.

<sup>20</sup> U.S. Fish and Wildlife Service, "Endangered Species and Habitat Conservation Planning," August 6, 2002, accessed at <http://endangered.fws.gov/hcp/>.

completion of an HCP; however, the designation may influence conservation measures provided under HCPs.

#### 1.6.2 OTHER RELEVANT PROTECTION EFFORTS

28. The protection of listed species and habitat is not limited to the Act. Other Federal agencies, as well as State and local governments, may also seek to protect the natural resources under their jurisdiction. For the purpose of this analysis, such protective efforts are considered to be co-extensive with the protection offered by CH, and costs associated with these efforts are included in this report. In addition, under certain circumstances, the critical habitat designation may provide new information to a community about the sensitive ecological nature of a geographic region, potentially triggering additional economic impacts under other State or local laws. In cases where these costs would not have arisen absent the designation of CH, they are included in the economic analysis.

#### 1.6.3 BENEFITS

29. Under Executive Order 12866, OMB directs Federal agencies to provide an assessment of both the social costs and benefits of proposed regulatory actions.<sup>21</sup> OMB's Circular A-4 distinguishes two types of economic benefits: direct *benefits and ancillary benefits*. Ancillary benefits are defined as favorable impacts of a rulemaking that are typically unrelated, or secondary, to the statutory purpose of the rulemaking.<sup>22</sup>
30. In the context of critical habitat designation, the primary purpose of the rulemaking (i.e., the direct benefit) is the potential to enhance conservation of the species. The published economics literature has documented that social welfare benefits can result from the conservation and recovery of endangered and threatened species. In its guidance for implementing Executive Order 12866, OMB acknowledges that it may not be feasible to monetize, or even quantify, the benefits of environmental regulations due to either an absence of defensible, relevant studies or a lack of resources on the implementing agency's part to conduct new research.<sup>23</sup> *Rather than rely on economic measures, the Service believes that the direct benefits of the Proposed Rule are best expressed in biological terms that can be weighed against the expected cost impacts of the rulemaking.*
31. Critical habitat designation may also generate ancillary benefits. Critical habitat aids in the conservation of species specifically by protecting the primary constituent elements on which the species depends. To this end, critical habitat designation can result in maintenance of particular environmental conditions that may generate other social benefits aside from the preservation of the species. That is, management actions undertaken to conserve a species or habitat may have coincident, positive social welfare implications. For example, conservation of guajón habitat may reduce erosion in stream

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<sup>21</sup> Executive Order 12866, *Regulatory Planning and Review*, September 30, 1993.

<sup>22</sup> U.S. Office of Management and Budget, "Circular A-4," September 17, 2003, available at <http://www.whitehouse.gov/omb/circulars/a004/a-4.pdf>.

<sup>23</sup> U.S. Office of Management and Budget, "Circular A-4," September 17, 2003, available at <http://www.whitehouse.gov/omb/circulars/a004/a-4.pdf>.

watersheds, improving water quality in downstream reservoirs. While ancillary benefits are not the primary purpose of critical habitat, they may result in gains in employment, output, or income that may offset the direct, negative impacts to a region's economy resulting from actions to conserve a species or its habitat. *The proposed guajón critical habitat is not expected to produce any significant ancillary benefits.*

#### 1.7 ANALYTIC TIME FRAME

32. The analysis estimates impacts based on activities that are "reasonably foreseeable," including, but not limited to, activities that are currently authorized, permitted, or funded, or for which proposed plans are currently available to the public. This analysis will summarize costs associated with past guajón conservation efforts since 1997 (the year the species was listed as threatened) and then forecast projected future impacts for the 20 year period from 2007 (the year of the final critical habitat designation) to 2026. Forecasts of economic conditions and other factors beyond the next 20 years would be speculative.

#### 1.8 INFORMATION SOURCES

33. The primary source of information presented in this report was communication with the Service and government agencies in Puerto Rico. Specifically, the analysis relies on data collected through communication with staff at the following agencies:

- U.S. Fish and Wildlife Service (Service);
- Puerto Rico Planning Board; and
- Puerto Rico Highway and Transportation Authority.

34. In addition, this analysis relies upon the Service's administrative records and publicly available land use planning documents. The reference section at the end of this document provides a full list of information sources.

#### 1.9 STRUCTURE OF REPORT

35. The remainder of this report is organized as follows:

- Section 2: Potential Economic Impacts;
- References;
- Appendix A: Administrative Costs; and,
- Appendix B: Small Business Impacts and Energy Impacts Analysis.



## SECTION 2 | POTENTIAL ECONOMIC IMPACTS OF PROPOSED CRITICAL HABITAT

36. This section assesses the past and future economic impacts associated with proposed critical habitat for the guajón. Specifically, the section considers economic impacts associated with mitigating the following threats: road construction, agriculture, development, refuse, and fishing with chemical substances.

### 2.1 ROAD CONSTRUCTION

#### 2.1.1 PUERTO RICO HIGHWAY 53: PAST AND FUTURE COSTS

37. In 2004, the Puerto Rico Highway and Transportation Authority (PRHTA) began construction of a 9.1-km extension of Puerto Rico Highway 53 between Maunabo and Yabucoa. The extension traverses the proposed Emajagua critical habitat unit. In 2004 the PRHTA initiated an informal consultation with the Service regarding the project.<sup>24</sup> This consultation resulted in a Protection, Mitigation, and Preservation Plan, intended to reduce the project's impact on the guajón. The plan includes four components: species monitoring, acquiring land for conservation, constructing an additional bridge to permit stream flow, and habitat restoration efforts (installing rocky streambed in box culverts to recreate natural streambed conditions).
38. PRHTA contracted a team of biologists to relocate any guajón individuals in the construction area upstream. The biological team was also contracted to monitor the species throughout the duration of the project. These actions, which cost approximately \$10,000 per month, have been ongoing since construction began in August 2004, and will continue until the project's anticipated completion in the summer of 2008.<sup>25</sup> Additionally, PRHTA has agreed to purchase 26 acres of land in the Panduras Mountains in order to compensate for guajón habitat permanently degraded during construction. The land will be placed under permanent conservation easement and transferred to the Puerto Rico Department of Natural and Environmental Resources (DNER). PRHTA intends to purchase this parcel in the near future for an estimated \$250,000.<sup>26</sup>

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<sup>24</sup> Informal consultation between Department of Army, Jacksonville District Corps of Engineers, Antilles Office, and Fish and Wildlife Service, Puerto Rico Field Office. Correspondence dated August 19, 2004.

<sup>25</sup> Personal communication with Carmen Morales, Puerto Rico Highway and Transportation Authority, on January 18, 2007.

<sup>26</sup> Ibid. Note that the \$250,000 purchase price reflects a land value of \$9,600 per acre. MLS listings for vacant land in this area of Puerto Rico show similar per acre land values. Puerto Rico Real Estate Services. MLS Listings, as viewed at [http://www.lamrealtypr.com/Search\\_MLS\\_Listings/page\\_976185.html](http://www.lamrealtypr.com/Search_MLS_Listings/page_976185.html) on March 20, 2007.

39. The Protection, Mitigation, and Preservation Plan for the highway project also includes design changes intended to protect the guajón and its habitat. An additional bridge will be built at a cost of \$3.5 million in order to protect guajón habitat that would otherwise be paved over with roadway. Also, rocky streambed habitat will be installed in the box culverts where the guajón is located. These installations are intended to recreate the natural streambed habitat. PRHTA estimates the streambed installation will cost \$180,000.<sup>27</sup>
40. Exhibit 3 summarizes past and future costs of guajón conservation efforts during the extension of Puerto Rico Highway 53. Past costs total \$290,000 in undiscounted dollars and only consist of spending on the biological team. Discounted at three and seven percent, past costs are \$306,000 and \$327,000, respectively. Future costs include spending for the biological team, acquiring the property for conservation, constructing the additional bridge, and installing rocky streambed habitat in the box culverts. These future costs of guajón conservation efforts total \$4,110,000 in undiscounted dollars. Discounted at three and seven percent, future costs total \$4,108,000 and \$4,106,000, respectively.

**EXHIBIT 3 PAST AND FUTURE COSTS OF GUAJÓN CONSERVATION EFFORTS DURING CONSTRUCTION OF PR-53**

COST CATEGORY	YEAR	PAST COSTS (2004-2006)			FUTURE COSTS (2007-2008)		
		UNDISCOUNTED	PRESENT VALUE (3%)	PRESENT VALUE (7%)	UNDISCOUNTED	PRESENT VALUE (3%)	PRESENT VALUE (7%)
Biological team	2004-2008	\$290,000	\$306,000	\$327,000	\$180,000	\$178,000	\$176,000
Property acquisition	2007	\$0	\$0	\$0	\$250,000	\$250,000	\$250,000
Additional bridge	2007	\$0	\$0	\$0	\$3,500,000	\$3,500,000	\$3,500,000
Installation of rock surface in box culvert	2007	\$0	\$0	\$0	\$180,000	\$180,000	\$180,000
<b>TOTAL</b>		<b>\$290,000</b>	<b>\$306,000</b>	<b>\$327,000</b>	<b>\$4,110,000</b>	<b>\$4,108,000</b>	<b>\$4,106,000</b>

Source: Personal communication with Javier Ramos and Carmen Morales, Puerto Rico Highway and Transportation Authority, on February 2, 2007.

Note: The costs of the property acquisition, additional bridge, and rock surface for the box culvert will be incurred in 2007, thus there is no need to discount these costs.

**2.1.2 OTHER FUTURE IMPACTS TO ROAD CONSTRUCTION**

41. Each year the PRHTA produces a five-year plan describing future road construction and maintenance projects. The current planning document includes anticipated projects between 2007 and 2011. This current plan indicates there are no road projects anticipated for any of the areas in or near proposed critical habitat, aside from the PR-53 extension. Staff at the PRHTA confirmed the absence of future projects in the vicinity of proposed

<sup>27</sup> Personal communication with Javier Ramos, Puerto Rico Highway and Transportation Authority, on February 2, 2007.

critical habitat.<sup>28</sup> Exhibit 4 provides a map showing where existing roads intersect the proposed CH units.

**EXHIBIT 4 ROADS IN THE VICINITY OF PROPOSED CRITICAL HABITAT**



Source: Critical habitat and road GIS layers from Service Biologist, Puerto Rico Field Office. Received on November 15, 2006; April 11, 2007.

42. Aside from Puerto Rico Highway 53, which intersects the Emajagua Unit, a few roads intersect other proposed critical habitat units. Road 182 passes through the Guayabota Unit, Road 900 through the Guayabo and Guayabito Units, Highway 3 through the

<sup>28</sup> Personal Communication with G. Ortega, Puerto Rico Highway and Transportation Authority, Programming Office, on February 2, 2006.

Talante Unit, and Road 758 through the Jacoboa Unit. These roads are paved two lane roads with little or no shoulder space. Due to the remote location of the units, PRHTA does not anticipate additional road maintenance or expansion projects beyond the five-year planning horizon over the 20 year timeframe of this analysis.<sup>29</sup> Therefore, future costs to road construction are limited to those associated with Puerto Rico Highway 53.

## 2.2 AGRICULTURE

43. The Service lists agriculture as a threat to 12 of the 17 guajón critical habitat units: the Mariana, Montones, Jacoboa, Calabazas, Guayanés, Guayabota, Talante, Cielito, Verraco, Cueva Marcela, Ceiba Sur, and Playita units. The Proposed Rule states that runoff of sediment, fertilizer, insecticides, and herbicides can harm guajón stream habitat. To identify areas where agricultural activity is occurring or may occur that could affect proposed critical habitat areas, soil data and aerial imagery were examined in combination with on-the-ground site observation. Then, to understand the magnitude of potential economic impacts on agricultural practices, an estimate was made of the agricultural production value in proposed critical habitat areas.
44. The Montones unit consists of class V, VI, and VII soils, as defined by the Natural Resources Conservation Service (NRCS) of the U.S. Department of Agriculture.<sup>30</sup> None of these soil classes are well suited for crop agriculture. The NRCS defines Class V soils as suited for pasture and forests, Class VI soils for "moderately limited" pasture and forests, and Class VII for "very limited" pasture and forests. The Mariana unit consists of the poorest Class VII soils.<sup>31</sup> Soil quality near the remaining units could not be determined; however, it is likely poor given their elevation and proximity to the Montones and Mariana units.
45. Due to the overall poor soil quality and rugged topography, agriculture near the proposed units is limited to small-scale family plots. Aerial imagery confirms the dispersed and small-scale nature of nearby agricultural activity.<sup>32</sup> Agricultural production in the vicinity of the proposed units is primarily for household consumption, although families sometimes sell in local markets what they do not consume. The agricultural plots are typically small groves of banana and plantain trees or small rows of crops planted on hillsides.<sup>33</sup> Given the small scale of production and the topography of the landscape, the farming is done largely by hand. There may be a few cattle that graze near critical

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<sup>29</sup> Ibid.

<sup>30</sup> Reglamento de Planificación No.4, Reglamento de Zonificación de Puerto Rico, November 5, 2000, available at <http://www.jp.gobierno.pr/>

<sup>31</sup> Ibid.

<sup>32</sup> Critical habitat GIS layer from Service Biologist, Puerto Rico Field Office, received April 11, 2006; Photography provided by Google Earth aerial imagery, March-April 2007.

<sup>33</sup> Personal communication with Service biologist, Puerto Rico Field Office, January 22, 2007.

habitat. However, the guajón lives among large boulders, often one to three meters in height, which prevent the cattle from disturbing the species.<sup>34</sup>

46. To avoid impacts to the guajón from agricultural activities, fertilizers and pesticide use by agricultural users may need to be curtailed. However, due to the dispersed nature and small scale of farming activities near critical habitat, the Service does not plan to require residents in or adjacent to the proposed units to alter their agricultural activities.<sup>35</sup> In addition, the level of current fertilizer and pesticide use as well as the impacts of curtailing their use on crop yield are uncertain. To provide context for understanding potential impacts on agricultural activities, should they occur, this analysis estimates the value of crop production potentially at risk if the Service were to seek changes to agricultural practices, particularly reductions in fertilizer and pesticide use. This estimate provides a measure of the extent of agricultural activity in the vicinity of critical habitat, but is not included in the overall calculated economic impacts of critical habitat designation.
47. The estimate of crop value potentially at risk is developed using data from the Department of Agriculture's most recent census of Puerto Rican agriculture, which was completed in 2002. First, quarter-mile buffers were drawn around the 12 proposed units where agriculture was identified as a threat. Quarter-mile buffers were chosen in order to encompass the catch basins that drain into the proposed units. Catch basin boundaries were estimated by examining elevation data. Using the elevation data, it was possible to determine that runoff outside of the quarter-mile buffers largely drains into streams outside of proposed critical habitat. For the purposes of this analysis, the percent of a municipality's harvested cropland within a buffer is assumed to be the same as the percent of the municipality's total area in the buffer. For example, 2.6 percent of the total land area of the municipality of Las Piedras falls within the Montones unit buffer. Therefore, 2.6 percent of Las Piedras' harvested cropland is assumed to lie within the Montones unit buffer. Given the topography and poor soil quality around these units, this assumption is likely to overstate the area of harvested cropland in each buffer. Exhibit 5 summarizes the calculations for each of the units with adjacent cropland, and presents the amount of harvested cropland in each buffer.

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<sup>34</sup> Personal communication with Service biologist, Puerto Rico Field Office, January 31, 2007.

<sup>35</sup> While ideally the Service could limit or cease the use of chemical fertilizers and pesticides on these garden plots, the Service believes that monitoring pesticide and fertilizer use by a large, dispersed group of individuals would be infeasible. Personal communication with Service biologist, Puerto Rico Field Office, on January 31, 2007 and February 13, 2007; Written communication with Service, Southeast Region Office, March 30, 2007.

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## EXHIBIT 5 CALCULATION OF HARVESTED CROPLAND WITHIN CH BUFFERS (ACRES)

UNIT	MUNICIPALITY	AREA OF MUNICIPALITY [A]	AREA OF CH BUFFER [B]	% [B/A]	AREA OF HARVESTED CROPLAND IN MUNICIPALITY [C]	ESTIMATED AREA OF HARVESTED CROPLAND IN CH BUFFER [B/A]*[C]
Montones	Las Piedras	21,683	563	2.6%	1,247	32
Mariana	Humacao	28,653	448	1.6%	1,419	22
Guayabota	Yabucoa	35,360	253	0.7%	3,078	22
Calabazas	Yabucoa	35,360	225	0.6%	3,078	20
Guayanés	Yabucoa	35,360	249	0.7%	3,078	22
Jacaboia	Patillas	29,888	283	0.9%	1,288	12
Talante	Maunabo	13,466	365	2.7%	605	16
El Cielito	Maunabo	13,472	247	1.8%	605	11
Verraco	San Lorenzo	34,036	209	0.6%	6,455	40
Cueva Marcela	San Lorenzo	34,036	378	1.1%	6,455	72
Ceiba Sur	Juncos	17,032	334	2.0%	1,682	33
Playita	Maunabo	13,472	210	1.6%	605	9
<b>Total</b>						<b>269</b>

Note: All areas are measured in acres. GIS was used to identify quarter-mile buffer areas around critical habitat designation units to approximate drainage areas.

Sources: National Agricultural Statistics Service, 2002 Census of Agriculture; IEC analysis of GIS data.

48. The 2002 Puerto Rico Agricultural Census also provides total crop sales by municipality. Thus, sales per acre of harvested cropland can be calculated for each municipality. In Exhibit 6, sales per acre are multiplied by harvested cropland within each buffer in order to derive an estimate of crop sales within each buffer. Across the buffers, annual crop sales are estimated to total \$473,000 in 2006 dollars. The potential crop sales within the buffers are expected to total \$9.6 million in undiscounted dollars, or \$7.0 million when discounted at three percent, and \$5.0 million when discounted at seven percent, over the twenty year timeframe of this analysis.

## EXHIBIT 6 CALCULATION OF CROP SALES WITHIN BUFFERS

UNIT	MUNICIPALITY	2002 CROP SALES PER ACRE (\$2006) [A]	ESTIMATED AREA OF HARVESTED CROPLAND IN CH BUFFER [B]	MAXIMUM POTENTIAL CROP SALES FROM LANDS WITHIN CH BUFFER (ANNUAL) [A]*[B]
Montones	Las Piedras	\$1,836	32	\$59,000
Mariana	Humacao	\$2,165	22	\$48,000
Guayabota	Yabucoa	\$1,906	22	\$42,000
Calabazas	Yabucoa	\$1,906	20	\$37,000
Guayanés	Yabucoa	\$1,906	22	\$99,000
Jacaboia	Patillas	\$4,271	12	\$52,000
Talante	Maunabo	\$2,873	16	\$47,000
El Cielito	Maunabo	\$2,873	11	\$32,000
Verraco	San Lorenzo	\$623	40	\$25,000
Cueva Marcela	San Lorenzo	\$623	72	\$45,000
Ceiba Sur	Juncos	\$548	33	\$18,000
Playita	Maunabo	\$2,873	9	\$27,000
<b>TOTAL</b>			<b>269</b>	<b>\$473,000</b>

Note: Totals may not sum due to rounding.

Source: Puerto Rico Agricultural Census 2002-2003 as viewed at <http://www.gobierno.pr/Censo/CensoAgricultura/> on March 15, 2007.

49. The crop sales within the critical habitat buffers represent an upper bound estimate of the value of crop production at risk as a result of the proposed critical habitat designation. First, average crop sales per acre for a municipality is likely to be higher than sales per acre in the vicinity of proposed critical habitat. This is because the average sales per acre is skewed upward by sales from farms at lower elevations with better soil, and because critical habitat areas are selected because they currently contain ideal habitat for the guajón (i.e., they are unlikely to be harvested as cropland.) Second, chemical fertilizers and/or pesticides are not necessarily applied to all cropland; thus, not all cropland near critical habitat would need conservation measures for the guajón that halt use of these chemicals. Third, even if farmers are currently using fertilizer or pesticides on lands near critical habitat and these farmers cease or curtail the application of these to conserve guajón, crop harvest on these lands would not be reduced to zero. Consequently, actual annual impacts of guajón conservation on agriculture are anticipated to be less than \$473,000.

### 2.3 DEVELOPMENT

50. Development activity is listed as a threat in nine of the 17 proposed CH units: Mariana, Montones, Tejas, Emajagua, Jacaboa, Calabazas, Guayanés, Talante, and Guayabota.<sup>36</sup> Only three of the proposed critical habitat units are located in areas zoned by the Puerto Rico Planning Board, the island's land use planning agency. The remaining proposed critical habitat units are located in rural, mountainous areas with limited agriculture and development potential. Consequently, the Puerto Rico Planning Board has not zoned them. Note that development in the Panduras Unit is not possible, because it is entirely owned by the Puerto Rico Conservation Trust.<sup>37</sup>
51. The three zoned units are Mariana, Montones, and Tejas. The Montones and Tejas units are zoned as "A3"; the Mariana unit is zoned as "A4." The A3 zone permits light agriculture and grazing as well as the construction of single-family homes. Similarly, the A4 zone permits light agriculture and construction of homes for one or two families. However, pressure for development in these areas is not strong for three main reasons:
- First, current zoning does not permit multiple homes per lot, and permitted development is not dense. In both the A3 and A4 zones, if a lot is under an acre in size, the construction footprint may *not* exceed 50 percent of the lot's area. If a lot is larger than an acre, the construction footprint may not exceed 20 percent of the lot area.<sup>38</sup>
  - Second, the steep topography limits home construction potential. Most homes in the vicinity of proposed critical habitat are basic, single-story cement structures, often constructed on stilts on hillsides. On a site visit to proposed critical habitat in January 2007, the lack of flat land on which to build a large multi-residence housing development, for example, was immediately obvious.<sup>39</sup>
  - Third, overall economic activity in affected municipalities, particularly high in the mountains near the proposed units, is very limited. The proposed units are located along winding, fairly inaccessible mountain roads far from beaches and tourist destinations or other factors that would drive development. A site visit confirmed the absence of luxury and tourist construction in the area.<sup>40</sup> Median household income in the municipalities containing proposed critical habitat is relatively low, ranging from \$12,000 to \$14,600 in 2000. The poverty rate was also relatively high in 2000, ranging from 47.2 to 59.1 percent of the population in affected municipalities.<sup>41</sup>

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<sup>36</sup> In addition, five units list "changes in the composition and abundance of vegetation surrounding guajón habitat" as a threat that may require special management "due to these units being located on private farms." These are: El Cielito, Verraco, Cueva Marcela, Ceiba Sur, and Playita.

<sup>37</sup> Personal communication with Service biologist, Puerto Rico Field Office on January 22, 2007.

<sup>38</sup> Reglamento de Planificación No. 4.

<sup>39</sup> Site visit to proposed critical habitat on January 31, 2007.

<sup>40</sup> Site visit to proposed critical habitat on January 31, 2007.

<sup>41</sup> U.S. Census Bureau, American Community Survey, as viewed at <http://www.census.gov/acs/www/> on February 13, 2007.



52. In addition to these factors that mitigate against large-scale development, the Puerto Rico Planning Board recently completed an island-wide land use plan that seeks to limit development pressure throughout large portions of the island's southeastern mountain ranges.<sup>42</sup> The land use plan is intended to guide permitting and future zoning decisions by Puerto Rico's executive agencies and municipal governments. Detailed land use planning maps for each municipality indicate that the proposed critical habitat units are located in sizable swaths of land designated for two types of rural uses: "Common Rural" and "Specially Protected Rural."<sup>43</sup> The Puerto Rico Land Use Plan generally defines "Rural Land" areas as:

*"lands that should be expressly protected from the urbanization process due to their agricultural value and potential, their natural resources, potential or actual recreational value, or safety and public health concerns, or because they are not foreseen to be developed within the ten year period from the [land use plan] adoption date."<sup>44</sup>*

53. Because all critical habitat units are classified as Rural Lands, all of the proposed CH units are encompassed in areas that the Land Use Plan expressly programs for protection from development or for continued agricultural uses.
54. Exhibit 7 shows the specific Rural Land use designation for the areas in which each proposed unit is located. Of the nine proposed units where development is listed as a threat, six are categorized as Specially Protected Rural. The Puerto Rico Land Use Plan defines Specially Protected Rural areas as:

*"Lands not foreseen for development due to their special location, topography, aesthetic, archeological, ecological, and agricultural value, and natural resources. These lands should never be used for urban purposes."<sup>45</sup>*

55. Three units where development is listed as a threat include land categorized as "Common Rural:" Emajagua, Tejas, and Mariana. While the majority of the lands included in the Emajagua and Tejas units are designated as Specially Protected Rural areas, these units encompass Common Rural areas as well. The Mariana unit is predominantly comprised of lands designated as Common Rural. The Common Rural categorization is defined as:

*"Land not foreseen for development due to the fact that the urban and urbanizable areas have sufficient land allocated for future development."<sup>46</sup>*

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<sup>42</sup> Puerto Rico Land Use Plan. Preliminary Draft for Public Hearings. February 2006. Puerto Rico Planning Board. Office of the Puerto Rico Land Use Plan. As viewed at <http://www.gobierno.pr/OPUT/Documentos/DocumentosAnejos.htm> on February 13, 2007.

<sup>43</sup> Puerto Rico Land Use Plan. Land Use Classification Maps by Municipality for the First Round of Public Hearings. Puerto Rico Planning Board. Office of the Puerto Rico Land Use Plan. As viewed at <http://www.gobierno.pr/OPUT/Mapas/> on February 13, 2007.

<sup>44</sup> Puerto Rico Land Use Plan. Preliminary Draft for Public Hearings. February 2006. Puerto Rico Planning Board. Office of the Puerto Rico Land Use Plan. As viewed at <http://www.gobierno.pr/OPUT/Documentos/DocumentosAnejos.htm> on February 13, 2007.

<sup>45</sup> Ibid.

## EXHIBIT 7 DEVELOPMENT POTENTIAL IN PROPOSED CRITICAL HABITAT

UNIT	UNIT NAME	DEVELOPMENT LISTED AS THREAT?	ZONING	PLANNED LAND USE CATEGORY
1	Calabazas	Yes	Unzoned	Specially protected rural area, borders Common rural area
2	Emajagua	Yes	Unzoned	Specially protected rural area and Common rural area, borders Developed urban area
3	Guayabito	No	Unzoned	Specially protected rural area
4	Guayabo	No	Unzoned	Specially protected rural area
5	Guayabota	Yes	Unzoned	Specially protected rural area
6	Guayanes	Yes	Unzoned	Specially protected rural area, borders Common rural area
7	Jacaboa	Yes	Unzoned	Specially protected rural area
8	Mariana	Yes	A4	Common rural area
9	Montones	Yes	A3	Specially protected rural area
10	Panduras	No	Unzoned	Specially protected rural area
11	Talante	Yes	Unzoned	Specially protected rural area
12	Tejas	Yes	A4	Specially protected rural area and Common rural area
13	El Cielito	No <sup>1</sup>	Unzoned <sup>2</sup>	Specially protected rural area
14	Verraco	No <sup>1</sup>	Unzoned <sup>2</sup>	Specially protected rural area
15	Cueva Marcela	No <sup>1</sup>	Unzoned <sup>2</sup>	Specially protected rural area
16	Ceiba Sur	No <sup>1</sup>	Unzoned <sup>2</sup>	Specially protected rural area
17	Playita	No <sup>1</sup>	Unzoned <sup>2</sup>	Specially protected rural area, borders Common rural area

Source: Puerto Rico Land Use Plan. Land Use Classification Maps by Municipality for the First Round of Public Hearings. Puerto Rico Planning Board. Office of the Puerto Rico Land Use Plan. As viewed at <http://www.gobierno.pr/OPUT/Mapas/> on February 13, 2007.

<sup>1</sup>Threats are described by the Service as including "changes to the composition and abundance of vegetation surrounding guajón habitat." U.S. Fish and Wildlife Service, Briefing statement for the Director, Southeast Region, April 3, 2007.

<sup>2</sup>Zoning for these units is estimated based on the proximity of these units to nearby units with known zoning.

56. It should be noted that the Emajagua unit borders a developed urban area at the edge of the town of Emajagua. Aerial photographs show that the lots along this street block are already densely developed with single family homes.<sup>47</sup> However, the existing development is located downstream from the Emajagua unit and at a lower elevation. Therefore, runoff from this block of homes is unlikely to affect the water quality within the Emajagua unit.

<sup>46</sup> Ibid.

<sup>47</sup> Critical habitat GIS layer from Service Biologist, Puerto Rico Field Office, received April 11, 2006; Photography provided by GoogleEarth technology, March-April 2007.

57. In sum, the Puerto Rico Land Use Plan anticipates limited development near the proposed units over the next ten years. Beyond these ten-year urban growth expectations, significant development remains unlikely considering the three factors outlined above: the low density zoning requirements, steep topography, and limited economic activity. Nonetheless, construction of scattered single family homes may still occur over the twenty year period of this analysis.
58. The Service has engaged in no consultations and very few development-related technical assistance efforts since the guajón's listing in 1997. However, two previous technical assistance efforts related to home construction help to understand anticipated impacts of guajón conservation efforts on small-scale residential projects, should they occur. In these technical assistance efforts, the Service did not recommend halting construction, but recommended that best management practices related to project siting and the moving of soil be followed.<sup>48</sup> Due to the low density A3 and A4 zoning requirements, slight modifications in construction plans, such as moving the project footprint by a few meters, were deemed sufficient to avoid adversely affecting the guajón and its habitat. As a result, expected impacts to home construction are anticipated to be limited to the added cost of undertaking the following best management practices, as recommended in two previous technical assistance efforts:<sup>49</sup>
- Maintain forest habitat along stream drainages;
  - Preserve an additional ten-meter buffer beyond the forested riparian area; and
  - Pile soil and fill away from stream drainages.
59. Given the low expected cost of these practices, future impacts to development are not quantified.

#### 2.4 REFUSE AND FISHING WITH CHEMICALS

60. The Proposed Rule identifies refuse from nearby communities and fishing with chemical substances as two additional threats to the guajón and its habitat. The threat from refuse could be mitigated by contracting individuals to remove any waste or by installing signage indicating that dumping trash in or near critical habitat is illegal. Fishing with chemicals does not occur within the proposed units because water flow in guajón habitat is too low and often too sporadic to support fish populations.<sup>50</sup> However, chemical fishing in nearby tributaries could impact water quality in proposed critical habitat. Signage prohibiting fishing with chemicals could be installed to mitigate this threat. The costs of trash clean-up and signage are anticipated to be minor.

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<sup>48</sup> Personal communication with Service biologist, Puerto Rico Field Office on January 31, 2007.

<sup>49</sup> Technical assistance to Puerto Rico Department of Housing from Fish and Wildlife Service, Puerto Rico Field Office. Correspondence dated June 29, 2005.

<sup>50</sup> Personal communication with Service biologist, Puerto Rico Field Office, on January 31, 2007.

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- U.S. Department of Agriculture, Puerto Rico Census of Agriculture, as viewed at <http://www.nass.usda.gov/census/census97/puertorico/centext1.htm> on February 13, 2007.
- U.S. Fish and Wildlife Service, Briefing statement for the Director, Southeast Region, April 3, 2007.
- Written communication with Service, Southeast Region Office, March 30, 2007.

## APPENDIX A | ADMINISTRATIVE COSTS

61. This Appendix presents the administrative cost of actions taken under section 7 of the Endangered Species Act. These section 7 actions include technical assistance efforts, informal consultations, and formal consultations, which are defined below. In this appendix, the frequency and cost of each type of administrative action are estimated. Using this information, past and future costs of administrative actions for the guajón are calculated. All past administrative costs are due exclusively to the guajón's status as an endangered species. Although the frequency of past administrative actions is used to project the number of future administrative actions, future actions may be associated with either the guajón's listing or its critical habitat.

### A.1 CATEGORIES OF ADMINISTRATIVE COSTS

62. The following section summarizes the types of section 7 administrative actions.

#### TECHNICAL ASSISTANCE

63. The Service frequently responds to requests for technical assistance from State agencies, local municipalities, and private landowners and developers who may have questions about whether specific activities will affect critical habitat. Technical assistance costs represent the estimated economic cost of informational conversations between these entities and the Service. Most likely, such conversations will occur between municipal or private property owners and the Service regarding lands in or adjacent to critical habitat or other lands where the guajón may be present. The Service's technical assistance activities are voluntary and generally occur in instances where a Federal nexus does not exist.

#### SECTION 7 CONSULTATIONS

64. Section 7(a)(2) of the Act requires Federal agencies (Action agencies) to consult with the Service whenever activities they undertake, authorize, permit, or fund may affect a listed species or its critical habitat. There are two scenarios under which the designation of critical habitat can result in section 7 consultations that are otherwise not required by the species' listing. These are:
- New consultations, which can occur when activities involving a Federal nexus are proposed in critical habitat believed to be unoccupied by the species; and
  - Re-initiations of consultations, which result when consultations that previously occurred under the listing are re-initiated due to new information or circumstances generated by the designation.

In some cases, consultations will involve the Service and another Federal agency only, such as the U.S. Forest Service. More often, they will also include a third party involved in projects on non-Federal lands with a Federal nexus, such as state agencies and private landowners.

65. During a consultation, the Service, the Action agency, and the landowner applying for Federal funding or permitting (if applicable) communicate in an effort to minimize potential adverse effects to the species and/or to the proposed critical habitat. Communication between these parties may occur via written letters, phone calls, in-person meetings, or any combination of these. The duration and complexity of these interactions depend on a number of variables, including the type of consultation, the species, the activity of concern, the activity's potential effects to the species and its critical habitat, the Federal agency, and whether there is a private applicant involved.
66. Section 7 consultations with the Service may be either informal or formal. *Informal consultations* consist of discussion between the Service, the Action agency, and the applicant concerning an action that may affect a listed species or its designated critical habitat. The process is designed to identify and resolve potential concerns at an early stage in the planning process. By contrast, a *formal consultation* is required if the Action agency determines that its proposed action may or will adversely affect the listed species or designated critical habitat in ways that cannot be resolved through informal consultation. The formal consultation process results in a Biological Opinion from the Service on whether the action is likely to jeopardize a species or adversely modify critical habitat. The Biological Opinion also includes recommendations for minimizing the expected impacts to the species and its critical habitat. Regardless of the type of consultation or proposed project, section 7 consultations can require substantial administrative effort on the part of all participants.

#### A.2 ESTIMATED COSTS OF CONSULTATIONS AND TECHNICAL ASSISTANCE

67. After analyzing in 2002 the historical section 7 files from Service Field Offices around the country, cost estimates for formal and informal consultations and technical assistance requests were developed. The files examined included consultations and technical assistance efforts associated with species listings as well as critical habitat designations. The cost estimates are based on an average level of effort (low, medium, or high) multiplied by the appropriate labor rates for staff from the Service and other Federal agencies.
68. The cost estimates presented in this section capture the administrative effort associated with activities, such as meetings, phone calls, preparing letters, and issuing final biological opinions. Exhibit A-1 provides a summary of the estimated costs to the Service, Action agencies, and third party applicants for each type of administrative action.

**EXHIBIT A-1 ESTIMATED ADMINISTRATIVE COSTS OF CONSULTATION AND TECHNICAL ASSISTANCE EFFORTS (PER EFFORT)**

CONSULTATION TYPE	SERVICE	ACTION AGENCY	THIRD PARTY	TOTAL
Technical Assistance	\$520	n/a	\$1,050	\$1,500
Informal Consultation	\$2,250	\$2,900	\$2,050	\$7,500
Formal Consultation	\$5,050	\$5,750	\$3,500	\$14,500

Source: IEC analysis based on data from the Federal Government Schedule Rates, Office of Personnel Management, 2002, a review of consultation records from several Service Field Offices across the country. Confirmed by local Action agencies. Note: Low and high estimates primarily reflect variations in staff wages and time involvement by staff.

**A.3 SUMMARY OF PAST ADMINISTRATIVE COSTS FOR THE GUAJÓN**

69. Although the guajón was listed as threatened in 1997, Service administrative records are only readily available for the period between 2004 and 2006. Over this three year period, there were 23 technical assistance efforts, one informal section 7 consultation, and no formal section 7 consultations. The technical assistance efforts are not all associated with areas in or near the proposed critical habitat designation. In fact, some of the technical assistance efforts involve basic inquiries to determine whether or not the guajón occupies sites far from the proposed critical habitat units. The informal consultation, which occurred in 2004, concerned the extension of Puerto Rico Highway 53 through the Emajagua Unit. These past administrative efforts are not linked to particular critical habitat units; thus, in Exhibit A-2 they are organized by municipality. Exhibit A-3 provides the undiscounted value of past administrative costs as well as the present and annualized values at discount rates of three and seven percent. Between 2004 and 2006 past administrative costs totaled \$42,000. Using a seven percent discount, the present value of past administrative costs is \$48,000.

**A.4 SUMMARY OF FUTURE ADMINISTRATIVE COSTS FOR THE GUAJÓN**

70. The Service's administrative action between 2004 and 2006 of 23 technical assistance efforts and one informal consultation represent an average of 7.67 technical assistance efforts per year and 0.33 informal consultations per year. At these rates the Service is projected to conduct 153 technical assistance efforts and seven informal consultations for the guajón over the next 20 years. The single past informal consultation was for the extension of Puerto Rico Highway 53. However, as no future road construction projects of that scale are anticipated to occur in or near proposed critical habitat, no further informal consultations are expected to occur over the next 20 years. Exhibit A-4 summarizes future administrative actions by municipality, while Exhibit A-5 provides the undiscounted value of future administrative costs as well as the present and annualized values at discount rates of three and seven percent. Total future administrative costs are estimated at \$230,000. Using a seven percent discount, the present value of future administrative costs is \$122,000, while the annualized value is \$11,000.

## EXHIBIT A-2 PAST ADMINISTRATIVE COSTS BY UNIT AND ACTIVITY, 2004-2006, \$2007

UNIT	TYPE OF CONSULTATION	AGRICULTURE	DEVELOPMENT	ROAD CONSTRUCTION	TOTAL NUMBER	TOTAL COSTS
Humacao	Formals					
	Informals					
	Technical Assistance					
	<b>Subtotal</b>	0	0	0	0	\$0
Las Piedras	Formals					
	Informals					
	Technical Assistance	6	1	1	8	\$12,000
	<b>Subtotal</b>	6	1	1	8	\$12,000
Maunabo	Formals					
	Informals			1	1	\$7,500
	Technical Assistance			1	1	\$1,500
	<b>Subtotal</b>	0	0	2	2	\$9,000
Patillas	Formals					
	Informals					
	Technical Assistance			3	3	\$4,500
	<b>Subtotal</b>	0	0	3	3	\$4,500
San Lorenzo	Formals					
	Informals					
	Technical Assistance		3	1	4	\$6,000
	<b>Subtotal</b>	0	3	1	4	\$6,000
Yabucoa	Formals					
	Informals					
	Technical Assistance	6		1	7	\$10,500
	<b>Subtotal</b>	6	0	1	7	\$10,500
Total	Formals					
	Informals			1	1	\$7,500
	Technical Assistance	12	4	7	23	\$34,500
<b>Total Costs</b>		<b>\$18,000</b>	<b>\$6,000</b>	<b>\$18,000</b>		<b>\$42,000</b>

Note: Total costs may not sum due to rounding.



## EXHIBIT A-3 TOTAL AND ANNUALIZED PAST ADMINISTRATIVE COSTS, 2004-2006, \$2007

MUNICIPALITY	TOTAL UNDISCOUNTED	PRESENT VALUE (3%)	PRESENT VALUE (7%)
Humacao	\$0	\$0	\$0
Las Piedras	\$12,000	\$13,000	\$14,000
Maunabo	\$9,000	\$10,000	\$10,000
Patillas	\$5,000	\$5,000	\$5,000
San Lorenzo	\$6,000	\$6,000	\$7,000
Yabucoa	\$11,000	\$11,000	\$12,000
<b>Total</b>	<b>\$42,000</b>	<b>\$45,000</b>	<b>\$48,000</b>

Note: Totals may not sum due to rounding.

## EXHIBIT A-4 FUTURE ADMINISTRATIVE COSTS BY UNIT AND ACTIVITY, 2007-2026, \$2007

UNIT	TYPE OF CONSULTATION	AGRICULTURE	DEVELOPMENT	ROAD CONSTRUCTION	TOTAL NUMBER	TOTAL COSTS
Humacao	Formals					
	Informals					
	Technical Assistance					
	<b>Subtotal</b>	0	0	0	0	\$0
Las Piedras	Formals					
	Informals					
	Technical Assistance	40	7	7	53	\$80,000
	<b>Subtotal</b>	40	7	7	53	\$80,000
Maunabo	Formals					
	Informals					
	Technical Assistance			7	7	\$10,000
	<b>Subtotal</b>	0	0	7	7	\$10,000
Patillas	Formals					
	Informals					
	Technical Assistance			20	\$30,000	\$30,000
	<b>Subtotal</b>	0	0	20	\$30,000	\$30,000
San Lorenzo	Formals					
	Informals					
	Technical Assistance		20	7	27	\$40,000
	<b>Subtotal</b>	0	20	7	27	\$40,000
Yabucoa	Formals					
	Informals					

UNIT	TYPE OF CONSULTATION	AGRICULTURE	DEVELOPMENT	ROAD CONSTRUCTION	TOTAL NUMBER	TOTAL COSTS
	Technical Assistance	40	0	7	47	\$70,000
	<b>Subtotal</b>	40	0	7	47	\$70,000
Total	Formals					
	Informals					
	Technical Assistance	80	27	48	153	\$230,000
<b>Total Costs</b>		<b>\$120,000</b>	<b>\$40,000</b>	<b>\$70,000</b>		<b>\$230,000</b>

Note: Total costs may not sum due to rounding.

**EXHIBIT A-5 TOTAL AND ANNUALIZED FUTURE ADMINISTRATIVE COSTS, 2007-2026, \$2007**

MUNICIPALITY	TOTAL UNDISCOUNTED	PRESENT VALUE (3%)	PRESENT VALUE (7%)
Humacao	\$0	\$0	\$0
Las Piedras	\$80,000	\$60,000	\$42,000
Maunabo	\$10,000	\$7,000	\$5,000
Patillas	\$30,000	\$22,000	\$16,000
San Lorenzo	\$40,000	\$30,000	\$21,000
Yabucoa	\$70,000	\$52,000	\$37,000
<b>Total</b>	<b>\$230,000</b>	<b>\$171,000</b>	<b>\$122,000</b>
<b>Annualized</b>		<b>\$12,000</b>	<b>\$11,000</b>

Note: Totals may not sum due to rounding.

**APPENDIX B | SMALL ENTITY AND ENERGY IMPACTS ANALYSIS**

71. This appendix considers the extent to which the results presented in the economic analysis reflect potential future impacts to small entities and the energy industry. The small business analysis is conducted pursuant to the Regulatory Flexibility Act (RFA) as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) in 1996. The energy analysis in Section B.2 is conducted pursuant to Executive Order No. 13211.
- B.1 SBREFA ANALYSIS**
72. In accordance with SBREFA, when a Federal agency publishes a notice of rulemaking for any proposed or final rule, it must make available for public comments a regulatory flexibility analysis that describes the effect of the rule on small entities (i.e., small businesses, small organizations, and small government jurisdictions). No regulatory flexibility analysis is required, however, if the head of an agency certifies that the rule will not have a significant economic impact on a substantial number of small entities. SBREFA amended the RFA to require Federal agencies to provide a statement of the factual basis for certifying that a rule will not have significant economic impact on a substantial number of small entities.
73. As detailed in Section 2 of this analysis, minimal impacts to agriculture and development are expected to result from the designation of guajón critical habitat. The economic impacts of the designation are expected to be borne primarily by the Puerto Rico Highway and Transportation Authority during construction of PR Highway 53. The government of the Commonwealth of Puerto Rico is not defined as a small entity by the Small Business Administration (SBA). Consequently, the designation of critical habitat for the guajón is not expected to impact small entities.
- B.2 POTENTIAL IMPACTS TO THE ENERGY INDUSTRY**
74. Pursuant to Executive Order No. 13211, “Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use,” issued May 18, 2001, Federal agencies must prepare and submit a “Statement of Energy Effects” for all “significant energy actions.” The purpose of this requirement is to ensure that all Federal agencies

“appropriately weigh and consider the effects of the Federal Government’s regulations on the supply, distribution, and use of energy.”<sup>51</sup>

75. The Office of Management and Budget has provided guidance for implementing this Executive Order that outlines nine outcomes that may constitute “a significant adverse effect” when compared without the regulatory action under consideration:
- Reductions in crude oil supply in excess of 10,000 barrels per day (bbls);
  - Reductions in fuel production in excess of 4,000 barrels per day;
  - Reductions in coal production in excess of 5 million tons per year;
  - Reductions in natural gas production in excess of 25 million Mcf per year;
  - Reductions in electricity production in excess of 1 billion kilowatts-hours per year or in excess of 500 megawatts of installed capacity;
  - Increases in energy use required by the regulatory action that exceed the thresholds above;
  - Increases in the cost of energy production in excess of one percent;
  - Increases in the cost of energy distribution in excess of one percent; or
  - Other similarly adverse outcomes.<sup>52</sup>
76. As none of these criteria are relevant to this analysis, energy-related impacts associated with guajón conservation efforts within the proposed critical habitat are not expected.

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<sup>51</sup> Memorandum For Heads of Executive Department Agencies, and Independent Regulatory Agencies, Guidance For Implementing E.O. 13211, M-01-27, Office of Management and Budget, July 13, 2001, <http://www.whitehouse.gov/omb/memoranda/m01-27.html>.

<sup>52</sup> Ibid.