



GOVERNMENT OF PUERTO RICO
Puerto Rico Electric Power Authority

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April 14, 2011

Hon. Daniel Galán Kercadó
Secretary
Department of Natural and Environmental Resources
San Juan, Puerto Rico

Dear Secretary Galán Kercadó:

**Re: Vía Verde Project
Voluntary Coquí Llanero Avoidance Guideline**

On November 30, 2010 the Puerto Rico Electric Power Authority (PREPA) secured compliance with the Puerto Rico Environmental Policy Act, Law 416 of September 22, 2004 for the construction of a 92 miles, 24 inches diameter Natural Gas Pipeline Project. Said project is geared to improve the operational flexibility of PREPA's power generating system, as well as provide natural gas to the power generating facilities located in the northern part of Puerto Rico.

The development of a study aimed to determine the presence of the Puerto Rican crested toad (*Peltophryne lemur*) and *coquí llanero* (*Eleutherodactylus juanariveroi*) in specific sections within the proposed project alignment was deemed necessary, as part of a supplemental biological assessment required for the construction of the project. For that purpose, PREPA commissioned the studies to Mrs. Sondra Vega. These studies would evaluate the potential habitats for said federally listed species (crested toad), and the state listed species (*coquí llanero*). Mrs. Vega is one of the most qualified professionals available in Puerto Rico, who is fully familiar with these species and their relative habitats.

In particular, the *Coquí Llanero* Habitat Study was performed from November 2010 to February 2011, covering the potential species habitat located within the Toa Baja Municipality and the selected alignment developed for the Vía Verde Natural Gas Pipeline Project. As a result of this effort, a detailed report was written, which summarized the methodology utilized, as well as the data gathered and findings associated with said field study. A copy of Mrs. Vega's report is included herein for needed reference. (See Attachment # 1)

The report written by Mrs. Vega establishes that "the section that runs from road PR-867 and ends in PR-165 to the north is mostly comprised by areas of improved pastures, interrupted by canals and lagoons populated by *Panicum aquaticum*, *Cyperus giganteus*, *Eichhornia crassipes*, *Alternanthera philoxeroides* and *Pistia stratiotes*, among others. Closer to the coast, in addition to areas covered by grass, there are groups of trees and shrubs that include almond, coconut palms and mangroves, among others. During visits to this portion of the section, the presence of at least six individuals of the *coquí llanero* was detected (See Figure 6 of the Report). The species was heard in the grassy vegetation along the sides of the water channel. *This site represents the first location for the coquí*

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llanero outside of the habitat originally described for the species" as defined by the Department of Natural and Environmental Resources (DNER). As a result of these observations, Mrs. Vega concluded that "In terms of the coqui llanero, the species was detected in December and January along the side of one of the channels that runs through the study area in the municipality of Toa Baja".

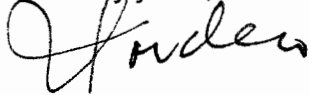
This letter is intended to voluntarily present a series of actions and efforts aimed to avoid any impact to this state listed species and at the same time guarantee the commitment of PREPA to work together with the DNER to preserve this state listed species. The recommended actions are as follows:

1. Develop a **Relocation Protocol** aimed to relocate any individual that is identified by a Resident Biologist, as requested by the DNER in the endorsement of the Vía Verde project Environmental Impact Statement,
2. **Hire a second Biologist expert** in the species to evaluate the area where the pipeline will be buried two days before the actual construction schedule and before the actual construction begins,
3. Not later than 30 days after the completion of the field work under consideration, **a report must be filed before the DNER, as well as the U.S. Fish & Wildlife Service**, summarizing all field findings.

Please have the DNER experts evaluate these voluntary recommendations aimed to protect this state listed species. At the same time we request DNER to approve the actions listed above and endorse, in writing, the action plan presented herein.

In the event additional information related with the subject is needed, please do not hesitate to contact us or engineer Daniel Pagán, PREPA's Environmental Consultant, at your earliest convenience at 787-382-7330.

Cordially yours,



Attachments

- c Mr. Miguel A. García Bermúdez, PHD (DNER)
Eng. Daniel Pagán (PREPA)

**Search of the Puerto Rican crested toad (*Peltophryne lemur*)
and coquí llanero (*Eleutherodactylus juanariveroi*) in areas proposed for the
construction of *Via Verde***

For:

Sr. Yousev García, Director
Asesores Ambientales y Educativos, Inc.
130 Winston Churchill Ave. PMB 145
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By:

Sondra I. Vega-Castillo, MS
Wildlife Biologist

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SUMMARY

The government of Puerto Rico, through the Puerto Rico Electric Power Authority, proposes the construction of a pipeline that would run from the Eco-Electric plant in Guayanilla, southwestern Puerto Rico, to Central Palo Seco in the municipality of Cataño. The project is known as *Vía Verde* and will have a total length of 92 miles. As part of environmental assessment required for the construction of the project, it was necessary to conduct a study to determine the presence of the Puerto Rican crested toad (*Peltophryne lemur*) and coquí llanero (*Eleutherodactylus juanariveroi*) in specific sections within the proposed alignment of the pipeline. Both species are considered endangered. Although the study areas meet many of the habitat requirements for the crested toad, during the search period no individuals of this species were found. However, this study documents the presence of a new location for the coquí llanero.

INTRODUCTION

The government of Puerto Rico, through the Puerto Rico Electric Power Authority, proposes the construction of a 24-inch diameter steel pipe to transport natural gas from the Eco-Electric plant in Guayanilla, southwestern Puerto Rico to Central Palo Seco in the municipality of Cataño. This project is known as *Vía Verde* and will have a total length of 92 miles, running through the municipalities of Peñuelas, Adjuntas, Utuado, Arecibo, Barceloneta, Manatí, Vega Baja, Vega Alta, Dorado, Toa Baja, Cataño, Bayamón and Guaynabo.

Construction of the project includes cleaning of right of way, digging trenches, installing pipe and testing the pipe installed. The right of way to be established during construction will be 150 feet wide along the entire alignment and include areas of maintenance and operation. Within this right of way, 50 feet will be for permanent operational maintenance of the pipeline. This 50-foot transect will be kept free of deep-rooted vegetation and any construction. According to the environmental impact statement (EIS), the remainder of the maintenance right of way will be reforested. On the other hand, the trenches will have a depth of five to six feet and a width of four to five feet. The same excavated material will be used to cover the installed pipe.

As indicated in the EIS, the proposed project will cross roads and water bodies. To minimize the impact in both cases, boring will be used under roads and water bodies (Section 1.2, pages 10 and 11). In these areas, the right of way will be greater than 150 feet and less than 300 feet. The areas affected by the construction of *Vía Verde* will be restored. In the case of wetlands, vegetation to be impacted or removed will be mitigated once finished the construction. However, in forested areas the right of way will be kept free of vegetation.

As part of the environmental requirements for the proposed project, an inventory of the flora and fauna elements was conducted along the proposed alignment. However, due to the magnitude of the project and the diversity of habitats through which it crosses, it becomes necessary to supplement the information related to specific wildlife species previously identified by regulatory agencies. Among the species of interest are the Puerto Rican crested toad (*Peltophryne lemur*) and coquí llanero (*Eleutherodactylus juanariveroi*). In regard to the crested toad, the project would impact an area in the municipality of Peñuelas that has been identified as potential habitat for the species. In addition, *Vía Verde* is proposed to cross historical crested toad sites, in northern Puerto Rico, specifically in the municipalities of Manatí and Vega Baja.

Some of these areas are also listed as potential habitat for the species (USFWS 1992). In the case of coquí llanero, the pipeline would traverse wetland areas in the municipality of Toa Baja, that has been identified as potential habitat for the species. The purpose of this report is to present the findings on efforts to document the presence of crested toad and coquí llanero in three areas within the proposed alignment for the *Vía Verde* project.

Description of target species

Crested toad

Individuals of crested toad are medium-sized (64-120 mm, SVL), characterized by supraorbital crests and a long upturned snout (Figure 1). Its dorsal color is brown-blackish with white or yellow marbling; females are off-white in the ventral area, while males are yellowish. The species exhibits sexual dimorphism, females being larger than males (120 mm females, 85 mm males), in addition females have prominent cephalic crests and lack nuptial pads on the first fingers (Rivero 1998).

The crested toad is the only species of toad endemic to Puerto Rico and Virgin Gorda. On Virgin Gorda, the species has not been observed in the last three decades and is now considered extinct (Díaz-Lameiro et al. 2010). In Puerto Rico, the historical distribution of the species is associated with lowland limestone forest in both the north and south parts of the Island. Historical records in the north include locations in the municipalities of Isabela, Quebradillas, Arecibo, Barceloneta, Bayamón, and Vega Baja, whereas in the south the species is known for the municipalities of Guánica and Coamo (USFWS 1992, Díaz-Lameiro et al. 2010). The species was considered extinct in Puerto Rico until it was rediscovered in Isabela in 1966 (García Díaz 1967), and in Quebradillas in 1974 (Rivero 1980). In southern Puerto Rico the crested toad was rediscovered in 1984 in the Guánica National Forest (Moreno 1985). Currently, the only known wild populations of this species are located in Guánica, Guayanilla and Yauco. In 2006 the species was reintroduced at El Tallonal Private Reserve in Arecibo, and 2007 tadpoles were released in the municipality of Coamo. At present, *P. lemur* is listed as an endangered species by the U.S. Fish and Wildlife Service and the Puerto Rico Department of Environment and Natural Resources. In addition, the species is on the red list of threatened species of the International Union for the Conservation of Nature (IUCN 2009).

The habitat of *P. lemur* is associated with humid, arid or semiarid limestone forests, characterized by a high content of cavities and cracks in soil with good drainage and diverse vegetation (USFWS 1992). Areas of runoff accumulation or permanent ponds that serve for breeding are essential components of habitat for the species. The period of greatest activity of the species is during the rainy season, specifically after heavy rain, when both males and females leave their refuges and travel long distances to get to the permanent or temporary pools where

individuals congregate to breed (USFW 1992, Rivero 1998). The crested toad has the ability to travel about two miles from cavities and crevices used as retreat sites in the wooded hills (Moreno 1985, Lentini 1992, Johnson 2001).

Coquí Llanero

The coquí llanero (*Eleutherodactylus juanariveroi*) was discovered in 2004 in seasonally flooded herbaceous wetland in the municipality of Toa Baja. This species is the smallest of the genus *Eleutherodactylus* on the Island. Adults are 15 mm in body length on average (Ríos-López and Thomas 2007). Its color ranges from yellow to yellowish brown with a light, longitudinal, reversed comma mark on each side; its mid-dorsal zone is broadly bifurcated and has two conspicuous post-tympanic glands (Figure 2). The call consists of a series of short high pitched notes with call duration varying from 4 to 21 seconds. The calling activity starts at sunset and decreases before midnight.

The coquí llanero is characterized by the smallest geographical distribution of all frogs in Puerto Rico. The only known population, is located in the Sabana Seca, Ingenio Ward within the Sabana Seca U.S. Naval Security Group Activity property and the Caribbean Primate Research Center in the municipality of Toa Baja. The species is considered a habitat specialist, limited to a 180 hectares of seasonally flooded palustrine wetland at 17 m (55.8 ft) above sea level on limestone formation (Ríos-López and Thomas 2007). The 25% of the wetland vegetation consists of two rare species of ferns, *Blechnum serrulatum* (Blechnaceae), *Thelypteris interrupta* (Thelypteridaceae) and *Sagittaria lancifolia* (Alismataceae), a plant where the coquí llanero lays its eggs. This species has been designated as critically endangered (DRNA 2007) and its habitat has been designated as Essential Critical Habitat (DNER 2007).

METHODOLOGY

Crested toad

The search was focused in three sections within the *Via Verde* project alignment that are considered part of the historical distribution of the species. One of these locations is in the municipality of Peñuelas and the other two are located in the municipalities of Manatí and Vega Baja. Prior to the field visits, a simple water flow accumulation model was developed using geographic information system (GIS). For the development of the model, digital elevation maps for Puerto Rico were used, each built with 30-meter cells. Using the spatial analysis hydrology tool, a flow management tool was applied to create a grid using the elevation information. The numerical model uses this information to calculate what flow would follow the raindrops falling on each plot. As a result of this analysis, maps that identified the areas where the accumulation of water will occur were created (Figures 3, 4 and 5). This tool is frequently used to identify watersheds, streams and rivers, among others. All water accumulation areas indicated by the model that were located in the proposed alignment of *Via Verde* were identified. Then, all those areas were visited and the search was narrowed to 100 feet to each side of the proposed alignment. All areas identified were visited during the day, which allowed identifying the landscape and its associated habitat. In addition, visits were carried out at night to detect the species. During the visits, substrates such as small caves and rock shelters were searched actively. The presence of cavities and cracks in the limestone are of vital importance for this species, as it provides hydrated places where the crested toad can hide during the day (Matos-Torres 2003). Moreover, tadpoles were searched and identified in all areas where pools were identified. All visits were conducted between the months of November and December 2010.

Coquí Llanero

For the coquí llanero, habitat assessment and search for the species was conducted along the proposed alignment of the project in the municipality of Toa Baja. Prior to the field visits, equidistant points on the aerial photo were set along the proposed alignment and were used as search reference (Figure 6). Visits were conducted during daylight in December 2010 and day and night during the month of January and February 2011. In addition, playback calls were used during night to encourage males to vocalize.

RESULTS AND DISCUSSION

Crested toad

No individuals of crested toad were either observed or heard during the visits conducted to determine the presence of the species in the study areas (Table 1). Tadpoles of the species were not observed on any of the temporary and permanent ponds found throughout the areas studied. However, the presence of the toad in those areas cannot be categorically discarded because the search coincided with the period of low activity for the species and therefore, the probability of detection was significantly reduced. The active period for the species coincides with the rainy season, when males and females leave their places of refuge to breed in permanent or temporary ponds (USFW 1992, Rivero 1998). Furthermore, amphibians are ectotherms and their nocturnal activity is determined by air temperature, where activity increases with higher temperatures (Lampo and Bayliss 1996, Duellman and Trueb 1994).

As part of efforts to increase the chances of finding the species, a flow accumulation model was used. The model identified a total of 27 sites within a range of approximately 200 feet along the search sections in the pipeline alignment. Of these, 5 accumulation areas were in the south (Figure 7), 9 on Vega Baja (Figure 8) and 14 in the path of Manatí (Figure 11). All areas were visited and evaluated according to the habitat requirements of the species. Many of the habitat requirements of the species such as continuous limestone forest areas, caves and crevices between rocks and temporary ponds were present in the visited areas (USFW 1992). In addition, the sites visited are within the historical distribution range of the species in both north and south of the Island (USFWS 1992). Below is a description of the sites identified as potential for the presence of the species.

South Section

Of the five areas identified by the model in the south, three have the potential to be habitat for the species (Figure 7). Area 1 and 5 hold water intermittently and both are surrounded by dry forest. Area 2 consists of two permanent ponds surrounded by dry forest. The areas have a separation of thirty feet among them but lies within the same channel. The ponds are being used by the common toad (*Rhynella marina*) and white-lip frog (*Leptodactylus albilabris*). During the visits, adult and tadpoles of both species were observed.

Vega Baja Section

The flow accumulation model identified 9 areas within the proposed route along the Vega Baja section (Figure 8). Within the visited areas a permanent artificial pond was identified as potential breeding place for the species, the pond is near the accumulation area number two. This pond is located in a flat area about 75 m away from the nearest haystack hill and is surrounded by pastures (Figure 9). In this pond, tadpoles of the common toad were observed. However, in this section, the area with the greatest potential for occurrence of the species is located between points 5 and 6 (see Figure 8). This area consists of a sinkhole that flows into an intermittent streambed which forms small temporary ponds during rain periods (Figure 10). This site is within part of a limestone forest that is in good condition, and is characterized by a large number of cavities and leaf litter (see Figure 10). The sinkhole runs between the haystack hills, connecting with other streambeds until reaches a residence backyard. These forests are part of the limestone area where individuals of crested toad had been observed in the past (Bird-Picó and Binet, personal communication).

Manatí Section

In this section the model of flow accumulation identified a total of 14 areas (Figure 11). Of these, the areas 6, 7 and 12 contain potential habitat for the crested toad. Area 6 consists of a sinkhole that collects runoff water. It is surrounded by limestone forest and contains cavities that can serve as retreat sites for the species. Area 7 is a sinkhole with a small permanent pond in which tadpoles of white-lipped frog were observed. This area is surrounded by both limestone forest and open areas. Finally, the area 12 is a sinkhole that collects runoff water forming small intermittent ponds. This area is adjacent on one side to a haystack hill and to an abandoned agricultural field on the other side. All ponds contained tadpoles of the white-lipped frog.

During visits to this section, the presence of the Puerto Rico boa (*Epicrates inornatus*) was documented in two locations (Figure 12). In one of the places, a dead juvenile individual, probably attacked by a predator, was found (Figure 13). In addition, at least one individual of *Ottoschulzia rhodoxylon* was observed on the top of one of the haystack hills (Figure 12).

Coquí llanero

The studied section can be described as heterogeneous in terms of its vegetation. The area extends from road PR-165 to the south of road PR- 867, and comprises a mosaic of herbaceous wetland and upland. The dominant vegetation in these areas was improved pastures, cattail (*Typha domingensis*) and black mimosa (*Mimosa pigra*). In terms of the amphibian community, the common coquí (*Eleutherodactylus coqui*), the Antillean coquí (*Eleutherodactylus antillensis*), whistling coquí (*Eleutherodactylus cochranæ*), white-lip frog (*Leptodactylus albilabris*) and common Scinax (*Scinax rubra*; introduced to the Island in 1988), were the most commonly observed and/or heard. The coquí llanero was neither heard nor observed in this area during the study. The area near point three was not visited for safety reasons. An illegal drug dealer was operating in this site.

The section that runs from road PR-867 and ends in road PR-165 to the north is mostly comprised by areas of improved pastures, interrupted by canals and lagoons populated by *Panicum aquaticum*, *Cyperus giganteus*, *Eichhornia crassipes*, *Alternanthera philoxeroides* and *Pistia stratiotes*, among others. Closer to the coast, in addition to areas covered by grass, there are groups of trees and shrubs that include almond, coconut palms and mangroves, among others. During visits to this portion of the section, the presence of at least six individuals of the coquí llanero was detected (Figure 6). The species was heard in the grassy vegetation along the sides of the water channel. This site represents the first location for the coquí llanero outside of the habitat originally described for the species.

CONCLUSION

Study areas were monitored between November and December 2010 for the detection of the Puerto Rican crested toad, and extended until February for the presence of the coquí llanero. The crested toad was not detected during that period neither in the north nor in the south of the Island. However, the presence of the toad in those areas cannot be categorically discarded since the habitat is suitable for the species. Moreover, the areas that were monitored are within the historical range of this species. In terms of the coquí llanero, the species was detected in December and January along the side of one of the channels that runs through the study area in the municipality of Toa Baja.

LITERATURE CITED

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Appendix

Figure 1. Photo of a male of crested toad (*Peltophryne lemur*). Photo: Alberto R. Puente-Rolón



Figure 2. Photo of a male of the coquí llanero (*Eleutherodactylus juanariveroi*).
Source: Ríos López, 2007.

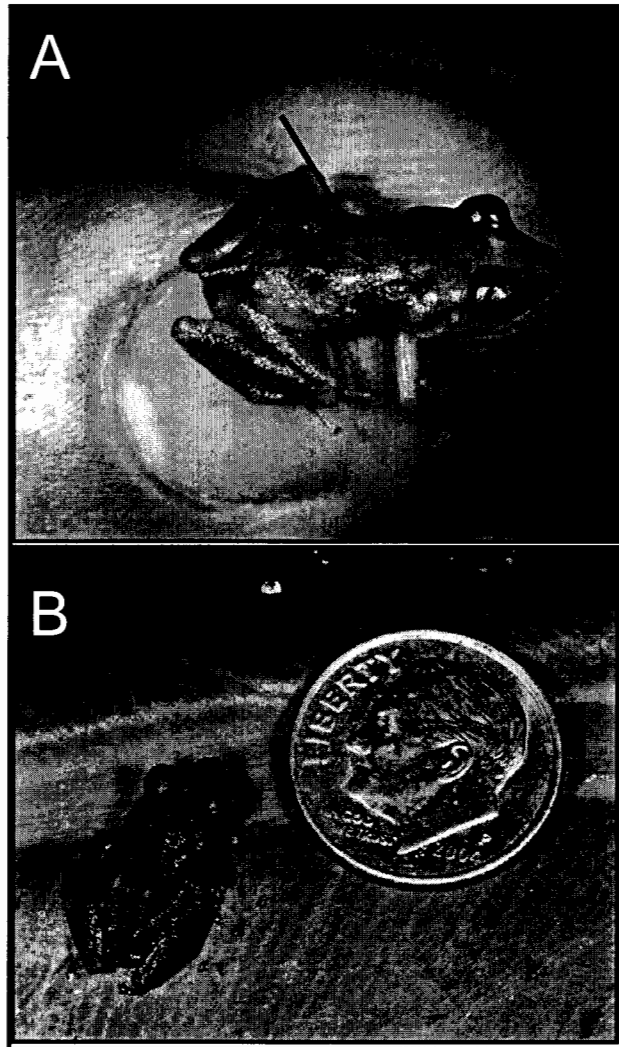


Figura 3. Aerial photo showing the water flow accumulation model for Peñuelas section.

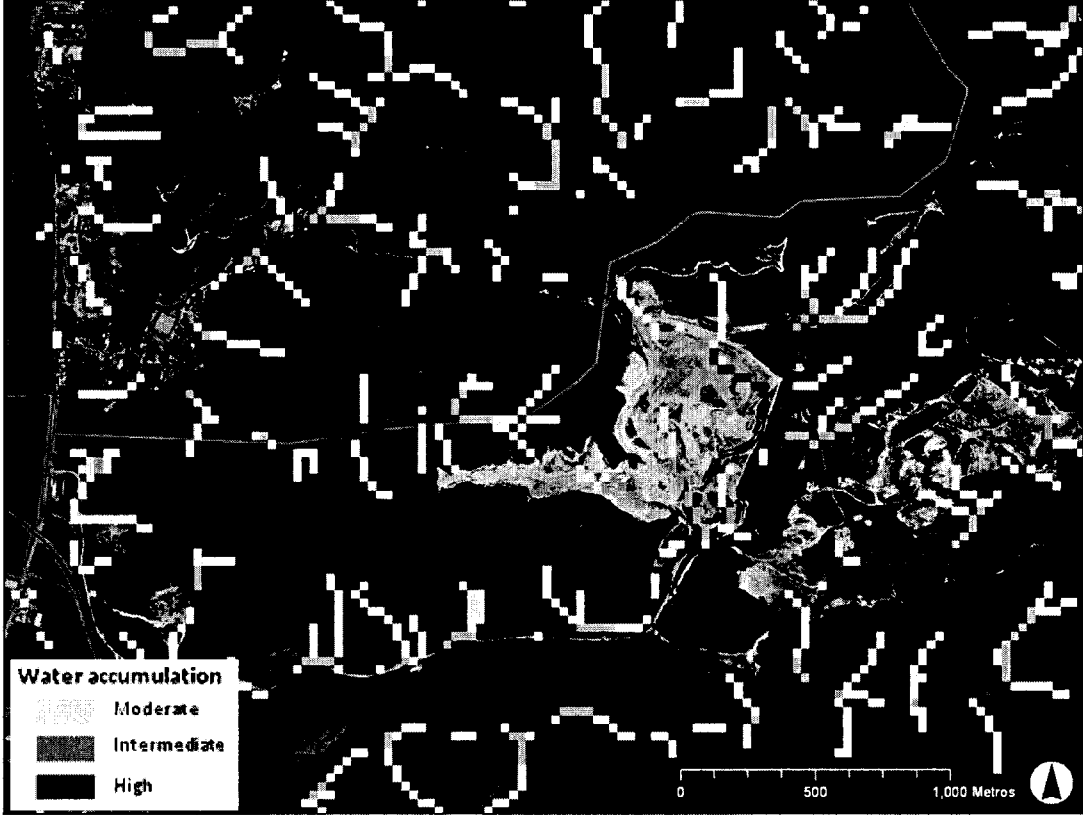


Figure 4. Aerial photo showing the water flow accumulation model for Vega Baja section.

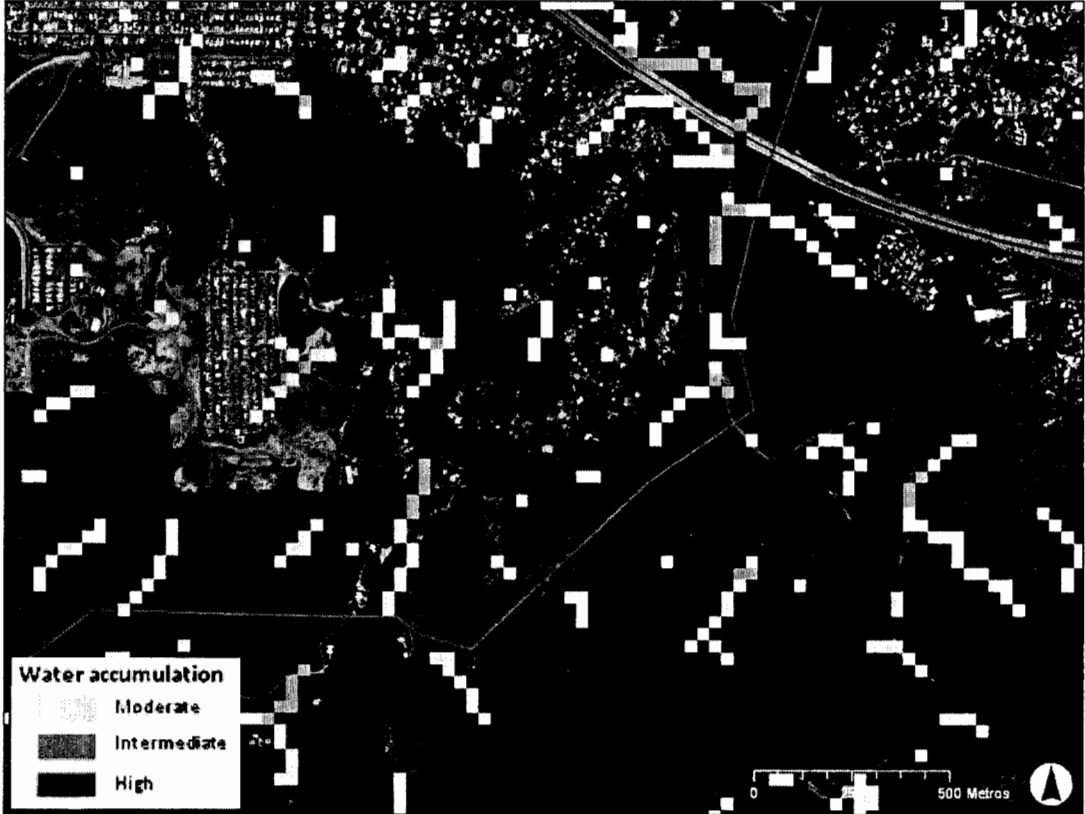


Figure 5. Aerial photo showing the water flow accumulation model for Manatí section.

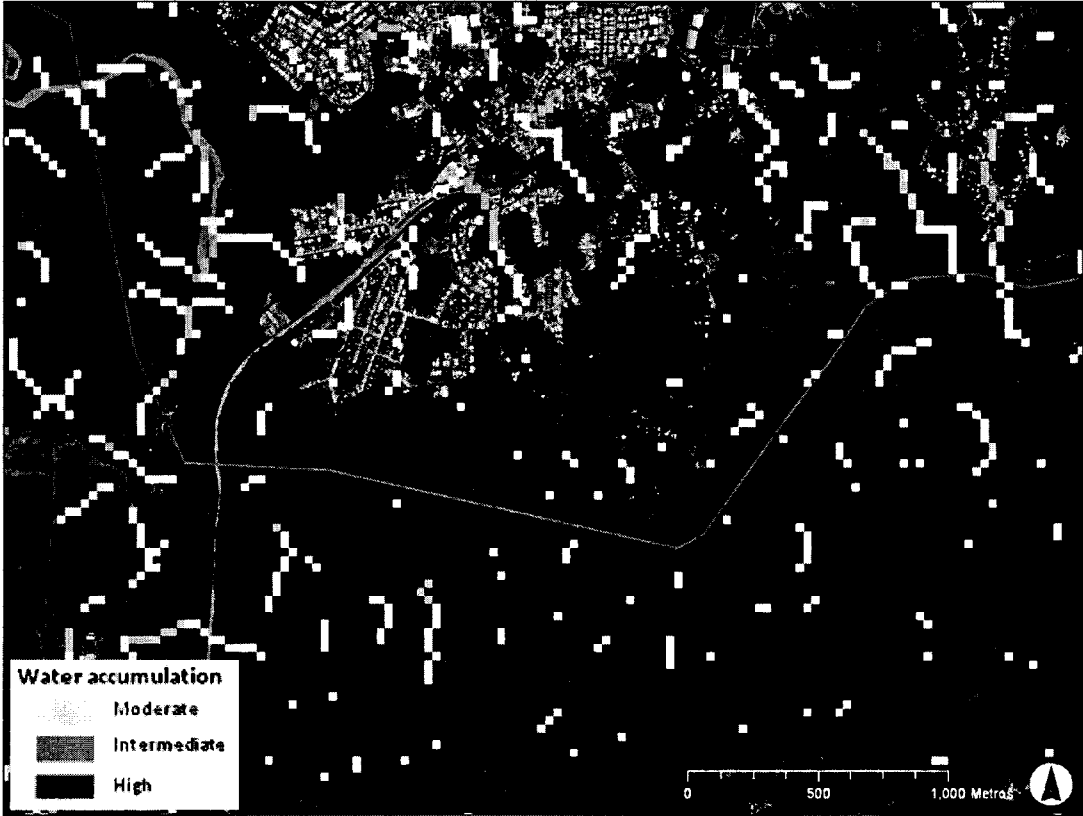


Figure 6. Aerial photo of the section studied at the municipality of Toa Baja. Points 1-9 were used as reference points within the alignment. The blue dot in the figure point out the locality where the species was heard.

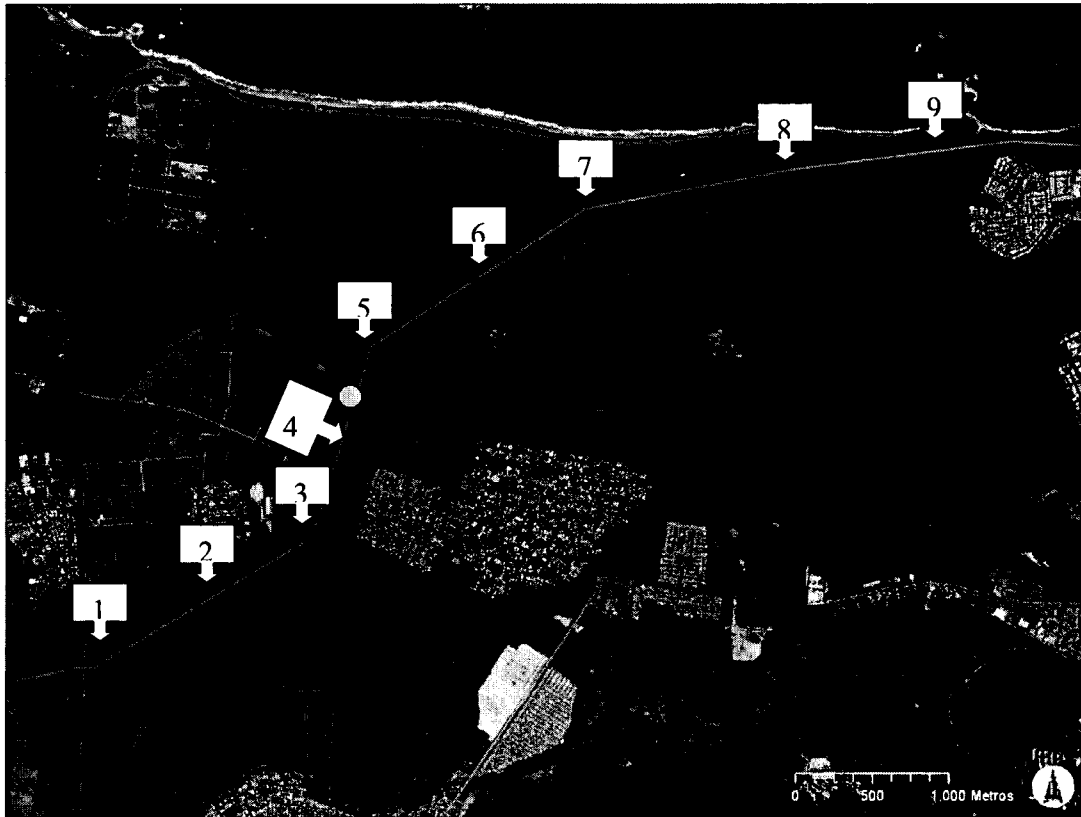


Figure 7. Aerial photo of Peñuelas section showing the areas of accumulation that were identified for the search of the crested toad and the permanent ponds identified as potential reproduction areas for the species (ponds are represented by blue points).

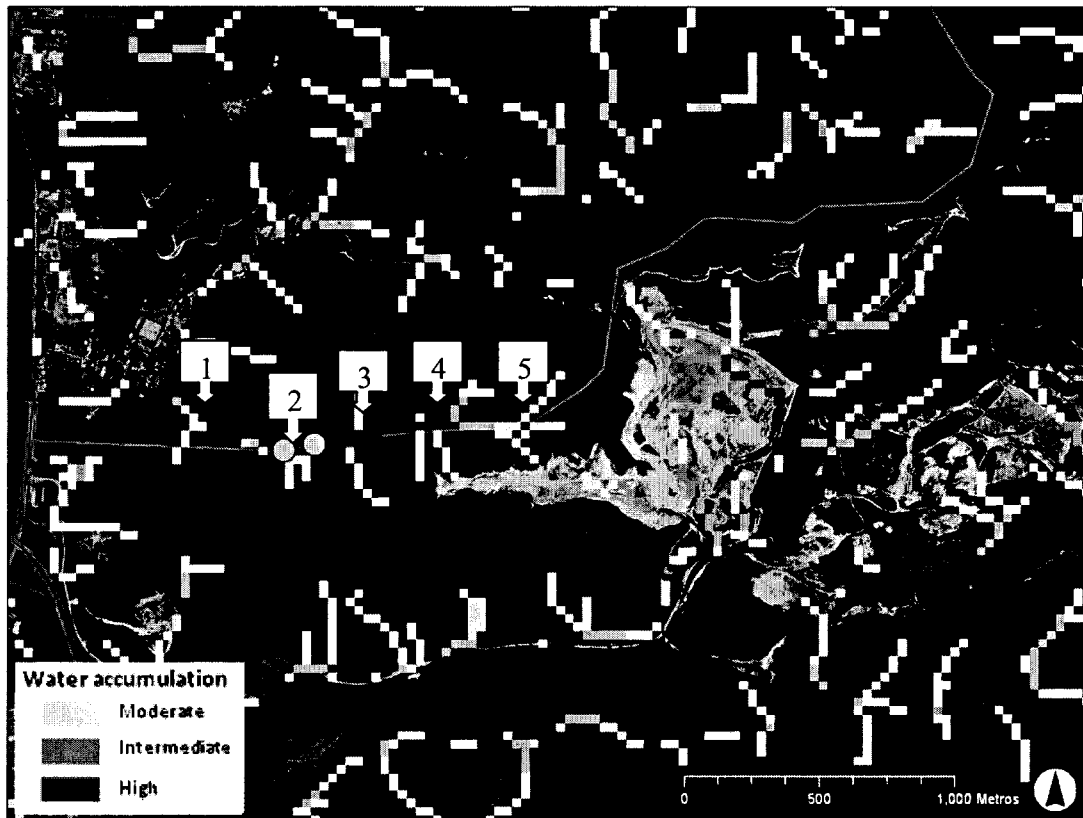


Figure 8. Aerial photo of Vega Baja section showing the areas of accumulation that were identified for the search of the crested toad.

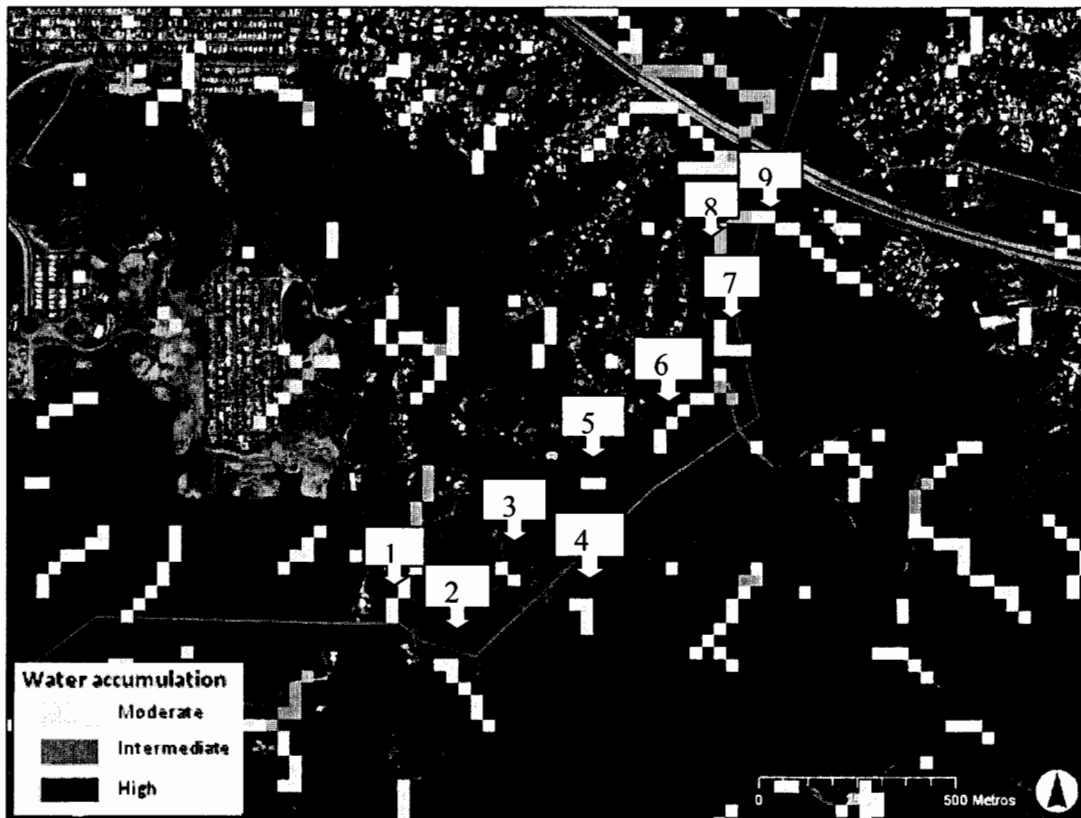


Figure 9. Photo of the artificial pond found near the second water accumulation area.



Figure 10. Photos showing the area between point 5 and 6, these areas were identified as potential habitat for the crested toad.



Figure 11. Aerial photo of Vega Baja section showing the areas of accumulation that were identified for the search of the crested toad.

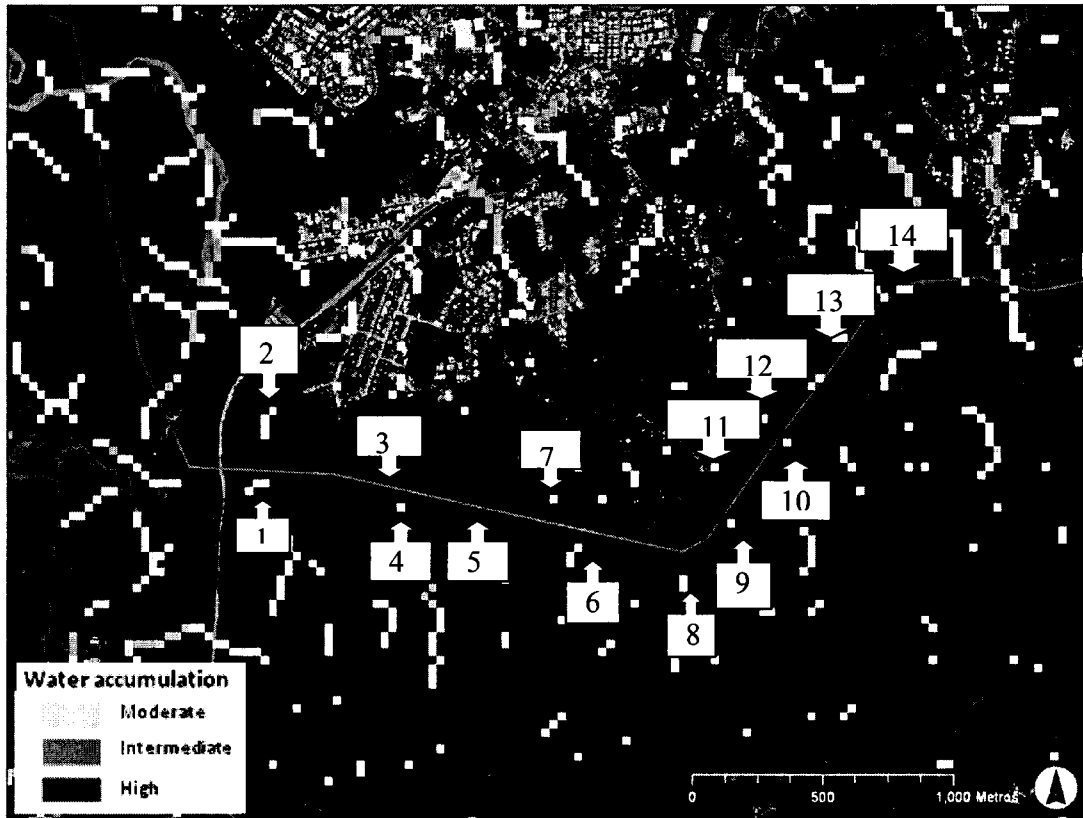


Figure 12. Aerial photo showing the localities of the Puerto Rican boa (blue points) and *Ottoschulzia rhodoxylon* (blue triangle).

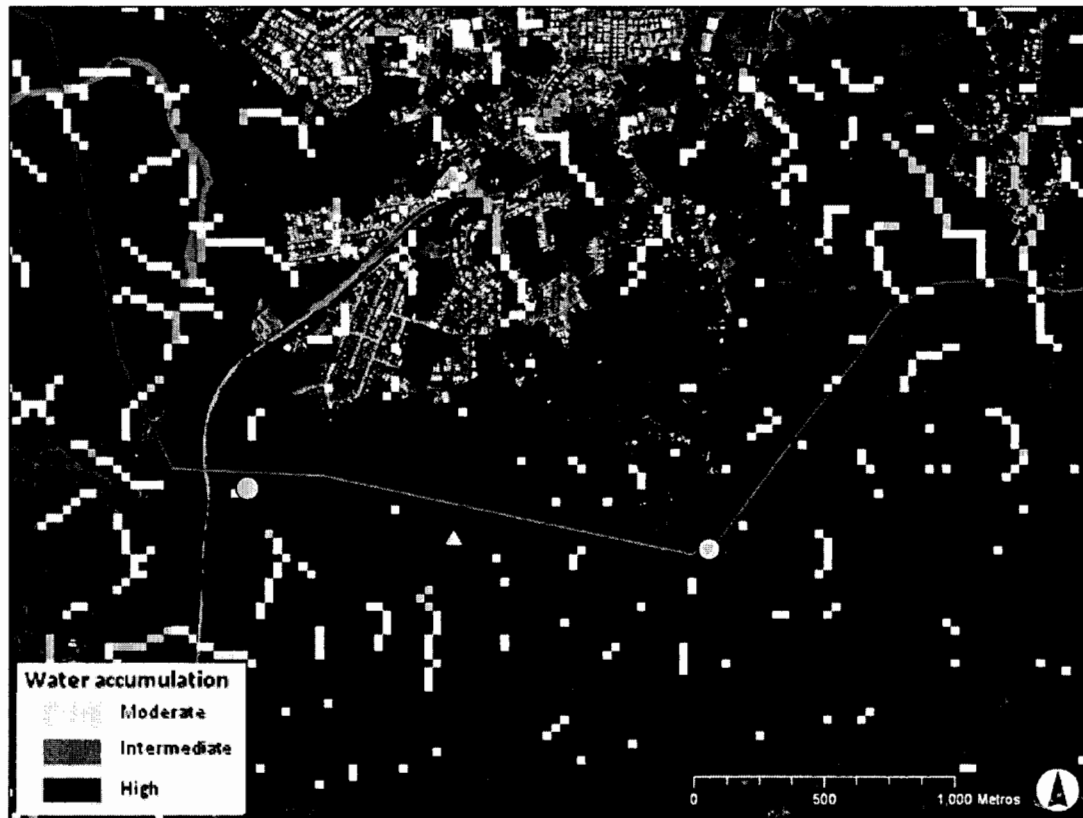


Figure 13. Photo of the dead individual of the Puerto Rican boa that was found at the Manatí section.



Table 1. Dates of visits.

Section	Date
Crested toad	
South	November 19, 2010
	November 20, 2010
	December 4, 2010
	December 11, 2010
	December 13, 2010
Vega Baja	December 1, 2010
	December 20, 2010
	December 27, 2010
Manatí	December 2, 2010
	December 15, 2010
	December 28, 2010
Coquí llanero	
Toa Baja	December 30, 2010
	January 10, 2011
	January 31, 2011
	February 16, 2011

Precipitation:

Through the [31st of December, 2010](#), precipitation across Puerto Rico was 132% of normal for the year (170% of normal across the U.S. Virgin Islands). A plot of the weekly precipitation across Puerto Rico (along with labels identifying some of the major weather events) as well as accumulative precipitation and its deviation from normal is displayed below in Figure 2.

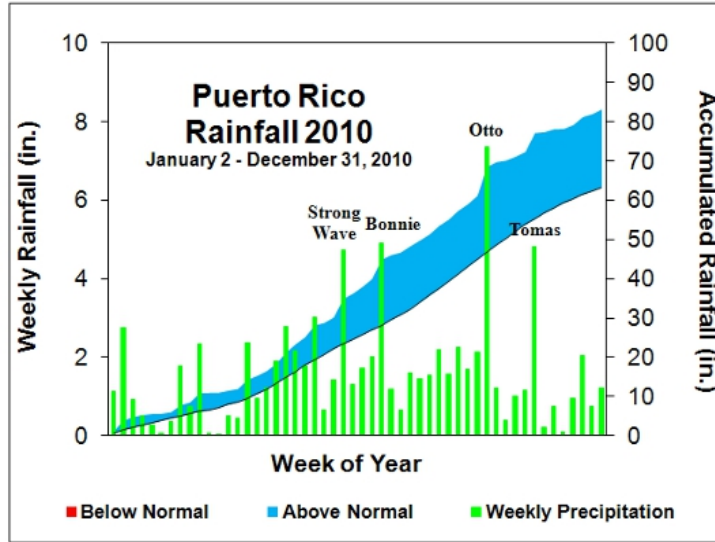


Figure 2 - Island wide precipitation through December 31st, 2010 for the more than 50 cooperative stations