APÉNDICE C

ESTUDIO DE FLORA Y FAUNA CENTRAL GUÁNICA

TERRESTRIAL FLORA AND FAUNA STUDY

OLD GUÁNICA SUGAR MILL AND ADJACENT PARCELS

GUÁNICA, PUERTO RICO

Prepared for:

PUERTO ENSENADA DEVELOPMENT CORPORATION

PEDCO

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SAN JUAN, PR

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EXECUTIVE SUMMARY

The Puerto Ensenada Development Corporation (PEDCO) is proposing the development of a concept known as Pueblo Marino within the Old Guánica Sugar Mill and three neighboring parcels property of the Puerto Rico Land Authority, in the Municipality of Guánica, Puerto Rico (the Project). Pueblo Marino will integrate the Ensenada and Guánica communities. The Project will include the following components: a 250-room hotel, an educational facility (Ecorium), a dock, housing complexes, commercial establishments, a parking area and recreational areas.

The flora of the Guánica Sugar Mill and the adjacent parcels consists of 188 species, most of which are common throughout the southwestern portion of Puerto Rico. Many of these are exotic species; some are considered as ornamentals. Several remnants of the original dry forest still persist within the parcels such as the southern slope of the old abandoned house in Punta Pera, the southern portion of the southwest parcel (including the southern slope on top of Highway PR-325), the bank of Río Loco in the North parcel and the northern portion of the Northwest parcel, just south of Highway PR-116. These patches include some plant species considered as critical by DNER, none of which are classified as threatened or endangered. These species are two cacti: *Leptocereus quadricostatus* and *Opuntia moniliformis*.

Birds were the dominant faunal group observed at the site with 60 out of 73 vertebrates. Among the most common bird species were Turkey Vulture (*Cathartes aura*), Gray Kingbird (*Tyrannus dominicensis*), Northern Mockingbird (*Mimus poliglottos*), White-winged Dove (*Zenaida asiatica*), Greater Antillean Grackle (*Quiscalus niger*), and Bananaquit (*Coereba flaveola*). The Brown Pelican (*Pelecanus occidentalis*), an endangered species, and the Sandwich Tern (*Sterna sandvicensis*), are very common seabirds found along Guánica Bay and the Río Loco. Other vertebrates found within the parcel include rats, mice, Coquí frogs, toads, geckos and several

Anoline lizards, among them the Dry Forest Anole (*Anolis cooki*), considered as a critical species by DNER.

One endangered species, the Brown Pelican, previously reported by the DNER from the area, was observed during the field visits. Brown Pelicans were observed resting and feeding around Guánica Bay and Río Loco. The proposed project should not have any significant impact on this species, however.

The effects of the Project on the natural resources within the parcels will be minimal since most of the area has already been disturbed by human activities. The remnants of dry forest vegetation are populated by rather common species that can regenerate on undisturbed areas selected for such purposes as part of a possible mitigation action. The two critical cacti species can be replanted in those selected areas since they can be asexually reproduced rather easily from fragments placed on nutrient-rich soil. The Dry Forest Anole can do well if native vegetation is selected for the reforestation plan that will be needed according to Planning Board Regualtion #25 ("Reglamento de Siembra, Corte y Forestación para Puerto Rico"). Some sites are somewhat forested and for them a mitigation and reforestation plan will be necessary and recommended.

The proposed Project may affect some wetlands and coastal vegetation. For this reason a Joint Permit Application must be submitted and Wetland Jurisdictional Delineation of the parcels must be performed according to U. S. Corps of Engineers (USCoE) guidelines. A proper mitigation plan must be prepared in accordance with the USCoE regulations. If these recommendations are followed, the impact of the Project to the biological resources of the area should be minimal.

INTRODUCTION

The southwestern coast of Puerto Rico has a rich cultural and natural heritage with excellent marine and coastal resources. It has not experienced significant tourism development even though the zone has the potential for high scale tourism that considers the protection and conservation of the natural resources, some of which are unique to the area.

The Puerto Ensenada Development Corporation (PEDCO) is proposing the development of a concept known as Pueblo Marino within the Old Guánica Sugar Mill and three neighboring parcels property of the Puerto Rico Land Authority, in the Municipality of Guánica, Puerto Rico (the Project). Pueblo Marino will integrate the Ensenada and Guánica communities. The Project will include the following components: a 250-room hotel, an educational facility (Ecorium), a dock, housing complexes, commercial establishments, a parking area and recreational areas. Figures 1 and 2 show the Site Location Map.

Environmental regulations require the preparation of an Environmental Document in order to comply with the Puerto Rico Environmental Public Policy Act. CSA Group performed a Terrestrial Flora and Fauna Study (the Study) to describe sensitive ecosystems and the presence of species that could be potentially affected during the development of the proposed Project. In addition, this study serves to corroborate the presence of critical, threatened or endangered species inhabiting within the site of the proposed Project and nearby areas.

This report is divided into four sections: 1) general description of the Project's approach and components; 2) study methodology; 3) description of the representative flora and fauna; 4) conclusions and recommendations. Appendix 1 contains all figures. The complete list of species found is in appendix 2. The photographic documentation of the area is presented as Appendix 3.

CSA Biologists, Agustín Lizardi-Rodríguez and José A. Salguero-Faría conducted the field studies between June and July 2001. José Juan Terrasa (Senior Scientist) revised this report and provided technical support for the Study.

PROJECT AREA DESCRIPTION

The Project lies within the Barrio Ensenada located on the northwestern coast of the Guánica Bay, Municipality of Guánica, Puerto Rico (Figure 2). It consists of four parcels:

OLD GUÁNICA SUGAR MILL

It occupies approximately 52.4 acres and is limited on the North and West by Highway PR-116R, and to the South and East by the Guánica Bay. The Guánica Sugar Mill ceased operations in 1981. At the moment these facilities are in complete abandonment.

SOUTHWEST PARCEL

This parcel consists of 23.3 acres on a limestone hill. The Southwest parcel is bound by the Ensenada Community, Highway PR-325 and the Old Guánica Sugar Mill to the North; Highway PR-325 and the Old Guánica Sugar Mill to the East; the Ensenada Community to the West and Highway PR-325 to the South. On top of this hill there are three water tanks that provided service to the sugar mill. These tanks are not in use at the moment.

NORTH PARCEL

The North parcel is located west of the Rio Loco river mouth. The approximately 6.8 acres are also limited to the North by Highway PR-116R, East by a private parcel and South by the Guánica Bay. A portion of this parcel is being used as 7an illegal dump.

NORTHWEST PARCEL

This 8.7 acres parcel is located South of Cerro del Abra, across Highway PR-116. The southern limit of the parcel is an old municipal road, used by American employees of the Sugar Mill. The eastern and western limits are occupied by private properties. This area is used as pastureland for horses.

Guánica lies on the Southern Coastal Plain of Puerto Rico, whose climatic conditions include it within the Subtropical Dry Forest life zone (Ewel and Whitmore, 1973). Mean annual rainfall for this life zone ranges from 600 to 1,100 mm. The vegetation typical to this region is xerophytic (semidecidious), consisting of small trees and shrubs. Their leaves are usually small, coriaceous or succulent, and many present spines or thorns. Common species characteristic of the Subtropical Dry Forest life zone include: *Bursera simaruba* (Turpentine tree), *Prosopis juliflora* (Mesquite), *Guaiacum officinale* (Lignum vitae), *Leucaena leucocephala* (Wild tamarind), *Tamarindus indica* (Tamarind), and *Meliococcus bijugatus* (Genip) and various species within the Cactaceae.

In the vicinity of the Project there is a protected area under the jurisdiction of the DNER. The Guánica State Forest is located about 1 km away, to the southwest of the Project.

METHODOLOGY

This section describes the procedures used to carry out the Terrestrial Flora and Fauna Study and the selection criteria for the study areas. The research procedures used for the Study are in accordance with those accepted by the Department of Natural and Environmental Resources (DNER) and the U. S. Fish and Wildlife Service (USFWS).

CSA made a literature review regarding scientific studies within the Project area. This includes a consultation with the DNER's Natural Heritage Office regarding the presence of critical, threatened and endangered species within the area proposed for the Project.

Field teams conducted ground reconnaissances within the Project area in order to describe the existing plant and animal species and corroborate the presence of sensitive species. Samples of those plant species that were not easily identified in the field were collected for further identification. Taxonomic identifications were based on Vélez (1950), Little, Woodbury and Wadsworth (1974), Godfrey and Wooten (1979, 1981), Liogier (1985, 1988, 1991, 1995, 1997), Acevedo-Rodríguez and Woodbury (1985), Proctor (1989), Más and García-Molinari (1990), Raffaele et al. (1998), Rivero (1998), Tobe et al. (1998), Little and Wadsworth (1999), and specimens at the Department of Natural and Environmental Resources and the University of Puerto Rico-Río Piedras Herbaria. For the fauna, systematic searches were performed within the Project areas at different times of the day in order to describe the inhabiting species in the study area. Bird censuses were conducted during dawn and late afternoon, plus all species active between these periods were also annotatted (Wunderle 1994). Searches for mammals were limited to those species listed as rare or endangered (bat species). Reptile and amphibian searches were conducted according to Rivero (1998).

RESULTS

The study area can be characterized as presenting two different communities: coastal and mangrove forest, and coastal dry thicket. A total of 188 plant species were observed at the study site. Exotic trees, shrubs, vines, and various herbaceous species dominate most of the study area, of which only small pockets of the native dry forest remain. On coastal areas associated with the Guánica Bay and the Río Loco, native coastal species abound. The fauna consists of 73 species, dominated by the 60 bird species identified for the area. Tables 1 and 2 summarize the plant and animal species found during the Study.

FLORA

The flora of the Guánica Sugar Mill and the adjacent parcels consists mainly of successional species, most of which are common throughout the southwestern portion of Puerto Rico. Many of these are exotic species; some are considered as ornamentals. Several remnants of the original dry forest still persist within the parcels, such as the southern slope of the old abandoned house in Punta Pera, the southern portion of the southwest parcel (including the southern slope on top of Highway PR-325), the bank of Río Loco in the North parcel and the northern portion of the Northwest parcel just south of Highway PR-116. These patches include some plant species considered as critical by DNER, none of which are classified as threatened or endangered, however (Figure 4). These species are two cacti: *Leptocereus quadricostatus* and *Opuntia moniliformis*. Among the dominant species we found trees such as Genip (*Meliococcus bijugatus*), Wild tamarind (*Leucaena leucocephala*), Mesquite (*Prosopis juliflora*), Cat's claw (*Pithecelobium unquis-cati*) and the cacti *Pilosocereus royenii* and *Opuntia moniliformis*, this last one considered a critical species by DNER. Herbaceous species

were also common throughout all parcels, including Love-chain (*Antigonon leptopus*), *Cissus trifoliata*, Viscid mallow (*Bastardia viscosa*), *Jasminum fluminense*, Guinea grass (*Urochloa maxima*) and *Solanum persicifolium*.

A mangrove forest is found along the coast in the Old Sugar Mill premises and along the banks of the Río Loco in the North parcel (Figure 3). The species that dominate this area include Red mangrove (*Rhizophora mangle*), White mangrove (*Laguncularia racemosa*), Black mangrove (*Avicennia germinans*) and Cork tree (*Thespesia populnea*). Table 1 lists the plant species found within the Project area.

FAUNA

Birds were the dominant faunal species observed at the site. Among the most common bird species, we found: Turkey Vulture (*Cathartes aura*), Gray Kingbird (*Tyrannus dominicensis*), Northern Mockingbird (*Mimus poliglottos*), White-winged Dove (*Zenaida asiatica*), Greater Antillean Grackle (*Quiscalus niger*), and Bananaquit (*Coereba flaveola*). The Brown Pelican (*Pelecanus occidentalis*), an endangered species, and the Sandwich Tern (*Sterna sandvicensis*), are very common seabirds found along Guánica Bay and the Río Loco.

Other vertebrates found within the parcels include rats, mice, Coquí frogs, toads, geckos, and several Anoline lizards, among them the Dry Forest Anole (*Anolis cooki*). The Dry Forest Anole is considered as a critical species by DNER (Figure 4). Table 2 lists the animal species found within the Project areas.

CONCLUSIONS AND RECOMMENDATIONS

Most of the existing vegetation observed throughout the Project area is invasive, ornamental, escaped from cultivation, or related to human occupancy. Most of the dominant vegetation does not resemble the natural composition characteristic of the Subtropical Dry Forest life zone. Human activities have disturbed most of the parcels. Consequently, invasive and secondary species have colonized the area replacing the native plants.

One endangered species, the Brown Pelican, previously reported by the DNER from the area, was observed during the field visits. Brown Pelicans were observed resting and feeding near Guánica Bay and Río Loco. The proposed project should not have any significant impact on this species, however.

The effects of the Project on the biological resources within the parcels will be minimal since most of the area has already been disturbed by human activities. The remnants of the dry forest vegetation are populated by rather common species that can regenerate on undisturbed areas selected for such purposes as part of a possible mitigation action. The two critical cacti species can be replanted in those selected areas since they can be asexually reproduced rather easily from fragments placed on nutrient-rich soil. The Dry Forest Anole can do well if native vegetation is selected for the reforestation plan that will be needed according to Planning Board Regulation #25 ("Reglamento de Siembra, Corte y Forestación para Puerto Rico"). Some sites are somewhat forested and for them a mitigation and reforestation plan will be necessary and recommended.

The proposed Project may affect some wetlands and coastal vegetation. For this reason a Joint Permit Application must be submitted and a Wetland Jurisdictional Delineation of the parcels must be performed according to U. S. Corps of Engineers (USCoE) guidelines. A proper

mitigation plan must be performed in accordance with the USCoE regulations. If these recommendations are followed, the impact of the Project to the biological resources of the area should be minimal.

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APPENDIX 1. FIGURES

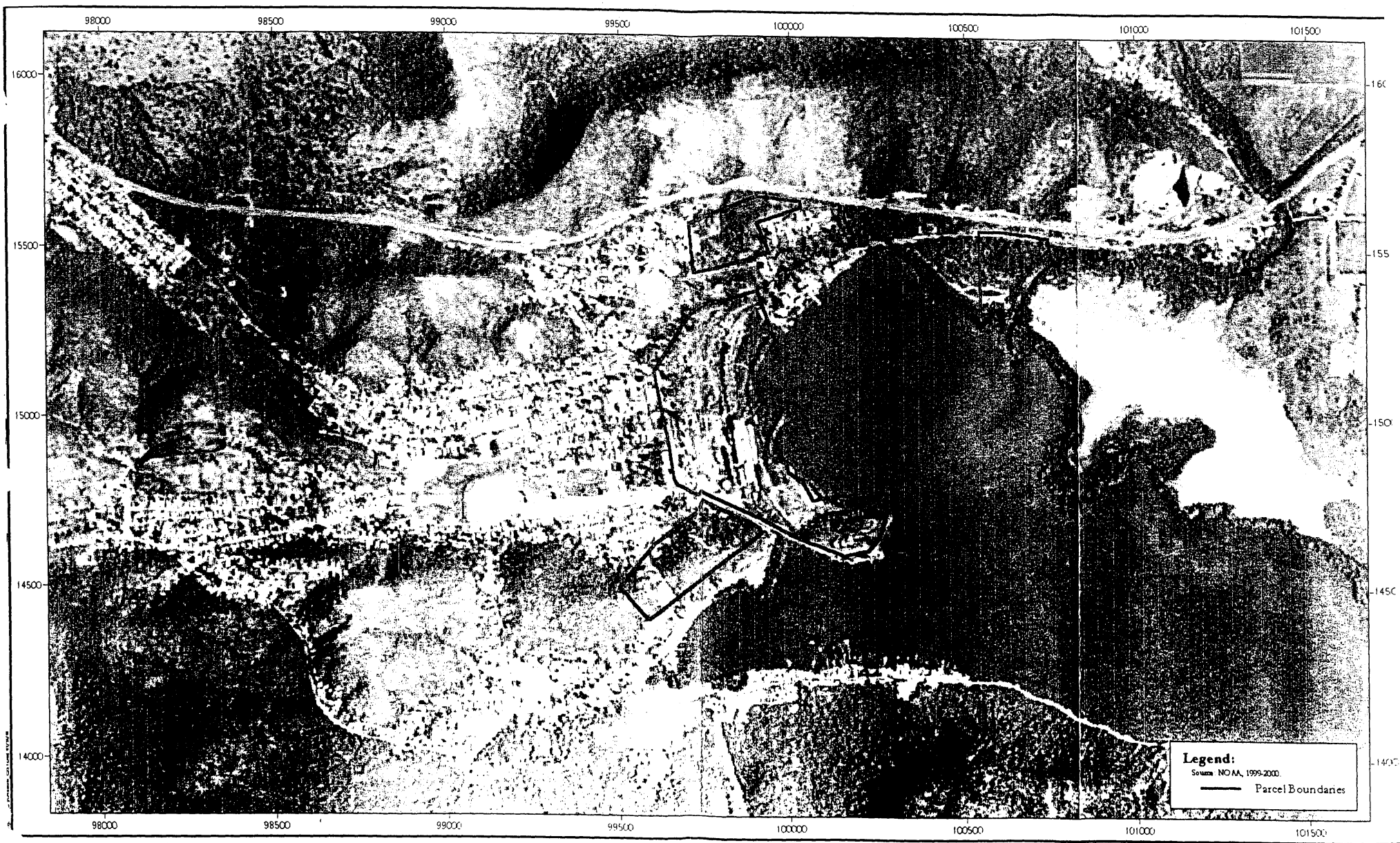

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Figure 1. Aerial Photograph

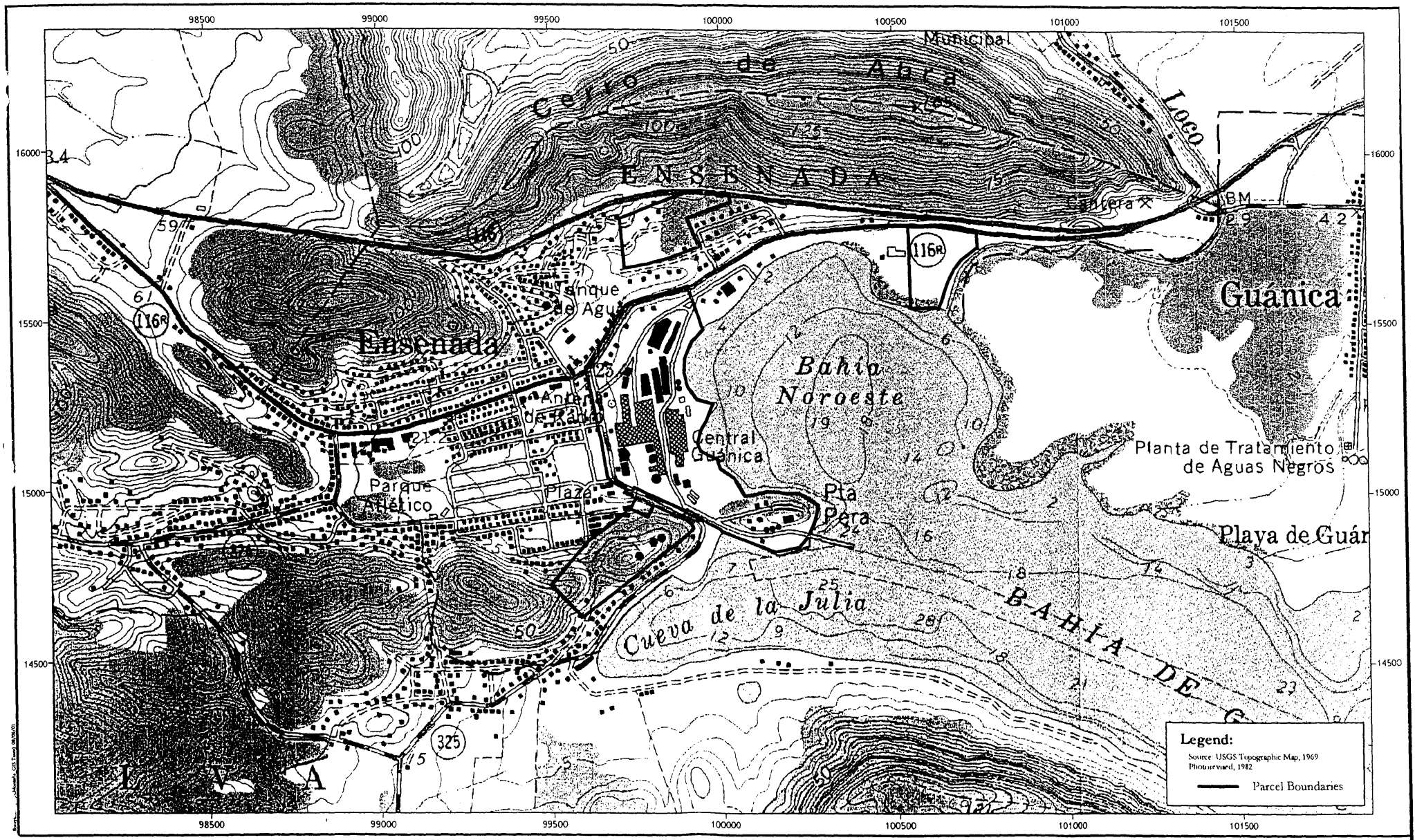

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Figure 2. USGS Topographic Map

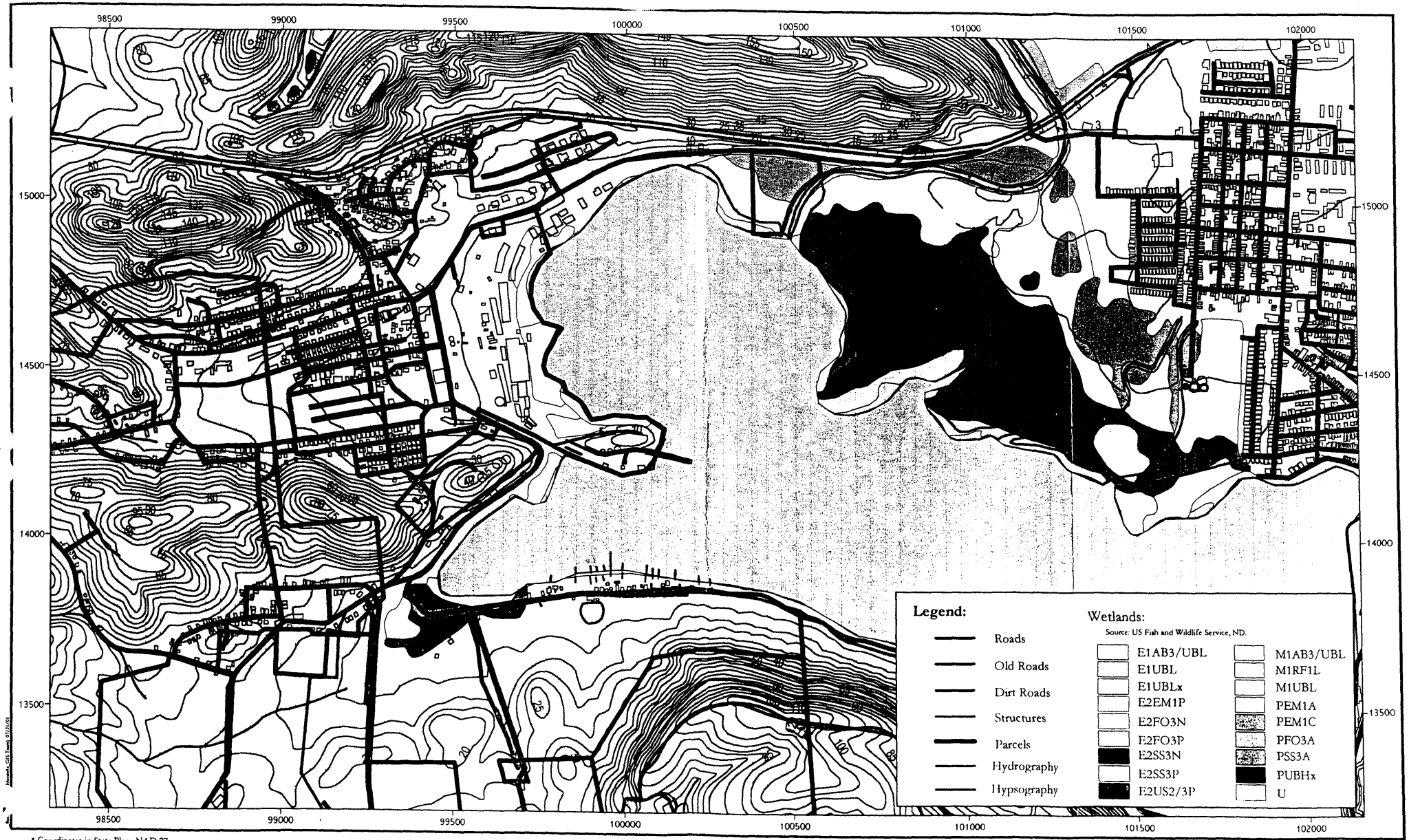

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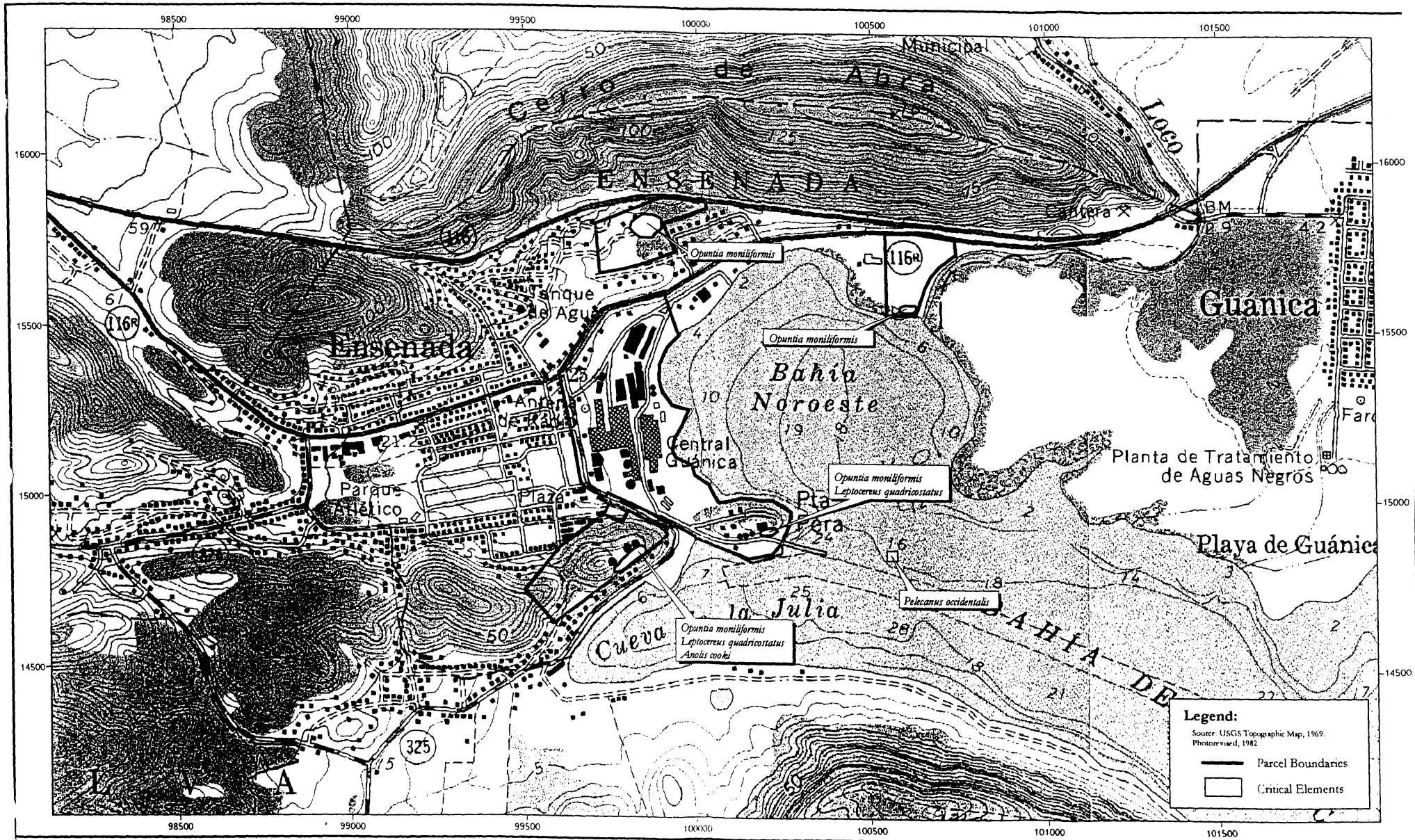
Figure 3. National Wetland Inventory Map



* Coordinates in State Plane NAD 27

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Figure 4. Critical Elements

APPENDIX 2. Flora and Fauna Complete Species List

Table 1: Complete list of the flora found within the Project area	Nombre común	Common name	Area			
			SM	NW	SW	N
Acanthaceae						
Ruellia tuberosa L.	-	Many-roots	x	x	x	x
Siphonoglossa sessilis (Jacq.) D. Gobson	-	-		x		
Thumbergia fragrans Roxb.	Susana blanca	-	x			
Aizoaceae						
Sesuvium portulacastrum (L.) L.	Verdolaga rosada	Sea purslane	x			x
Trianthema portulacastrum L.	Verdolaga de hoja ancha	-	x	x		x
Amaranthaceae						
Achyranthes aspera L. var. *aspera*	Rabo de gato	Man-better-man	x	x	x	x
Amaranthus crassipes Schlecht.	-	-		x		
Amaranthus dubius Mart.	Bledo	Amaranth		x		
Amaranthus spinosus L.	Blero espinoso	Spiny amaranth	x			
Anacardiaceae						
Comocladia glabra (Schultes) Spreng.	Carrasco	Poison ash			x	
Mangifera indica L.	Mangó	Mango	x			
Annonaceae						
Annona muricata L.	Guanábana	Soursop	x			
Apocynaceae						
Catharanthus roseus (L.) G. Don	Playera	Periwinkle	x			
Rauvolfia nitida Jacq.	Muñeco	Bitter ash			x	
Arecaceae						
Cocos nucifera L.	Palma de Coco	Coconut Palm	x			
Roystonea borinquena O. F. Cook.	Palma Real	Royal palm	x		x	
Asclepiadaceae						
Calotropis procera (Ait.) W. T. Aiton	Algodón de seda	Giant milkweed	x			

Table 1: Complete list of the flora found within the Project area	Nombre común	Common name	Area			
			SM	NW	SW	N
Asclepiadaceae (Cont.)						
Cryptostegia madagascariensis Boyer	Canario morado falso	Rubber vine	x		x	
Asteraceae						
Bidens alba (L.) DC. var. *radiata*	Margarita silvestre	Shepherd's needle	x			
Flaveria trinervia (Spremg.) C. Mohr.	-	-				x
Launaea intybacea (Jacq.) Beauverd	Achicoria azul	Wild lettuce	x			x
Mikania cordifolia (L. f.) Willd.	Guaco	-	x			
Parthenium hysterophorus L.	Yerba amarga	Feverfew	x	x		
Pluchea odorata (L.) Cass.	Salvia	-	x			
Tridax procumbens L.	Pancha	-	x			
Vernonia cinerea (L.) Lessing	Yerba socialista	-	x			
Wedelia lanceolata DC.	-	-			x	
Aviceniaceae						
Avicennia germinans (L.) L.	Mangle negro	Black Mangrove	x			x
Bataceae						
Batis maritima L.	Planta de sal	Saltwort	x			x
Bignoniaceae						
Distictis lactiflora (Vahl.) DC.	Pega palo	-	x		x	
Macfadyena unguis-cati (L.) A. Gentry	Bejuco de gato	Cat's claw			x	
Spathodea campanulata Beav.	Tulipán africano	African tulip	x			
Tabebuia heterophylla (DC.) Britt	Roble nativo	White cedar			x	
Bombacaceae						
Ceiba pentandra L.	Ceiba	Silk-cotton tree	x			
Boraginaceae						
Bourreria succulenta Jacq.	Capá	Pigeon berry	x			
Heliotropium curassavicum L.	Cotorrera de playa	Seaside heliotrope	x			x

Table 1: Complete list of the flora found within the Project area	Nombre común	Common name	Area			
			SM	NW	SW	N
Boraginaceae (Cont.)						
Heliotropium indicum L.	Cotorrera	Indian heliotrope				x
Tournefortia microphylla Bertero	-	-			x	
Bromeliaceae						
Bromelia pinguin L.	Maya	-		x		
Tillandsia recurvata (L.) L.	Nidos de gungulén	Bunch moss	x	x	x	x
Burseraceae						
Bursera simaruba (L.) Sarg.	Almácigo	Turpentine tree	x	x	x	x
Cactaceae						
Leptocereus quadricostatus (Bello) Britton & Rose*	Sebucán	-	x		x	
Opuntia antillana Britton & Rose	-	Bull suckers	x		x	x
Opuntia moniliformis (L.) Haw.*	Tuna	-	x	x	x	x
Pilosocereus royenii (L.) Byles & Rowley	Dildo	-	x	x	x	x
Stenocereus hystix (Haw.) Buxb.	Dildo español	Spanish dildo	x			
Capparaceae						
Capparis flexuosa (L.) L.	-	-	x			x
Capparis hastata Jacq.	Burro	Broad-leaved caper	x	x		
Capparis indica (L.) Fawe. & Rendle	Sapo prieto	Linguam	x	x		x
Cleome viscosa L.	-	-	x	x		
Caricaceae						
Carica papaya L.	Lechosa	Papaya	x			
Casuarinaceae						
Casuarina equisetifolia J. R. & G. Forst.	Pino Australiano	Australian Pine				
Combretaceae						
Bucida buceras L.	Úcar	Oxhorn bucida	x			

Table 1: Complete list of the flora found within the Project area	Nombre común	Common name	Area			
			SM	NW	SW	N
Combretaceae (Cont.)						
Laguncularia racemosa (L.) Gaertn.	Mangle blanco	White mangrove	x			x
Quiscalis indica L.	Corazón de hombre	Rangoon creeper	x			
Terminalia catappa L.	Almendro	Indian almond	x			
Commelinaceae						
Commelina diffusa Burm. f.	Cojitre	French weed	x	x	x	
Convolvulaceae						
Ipomoea nil (L.) Roth	Bejuco de vaca	-			x	
Ipomoea ochracea (Lindl.) G. Don	-	-	x			
Ipomoea tiliacea (Willd.) Choisy	Bejuco de puerco	-	x			
Merremia dissecta (Jacq.) Hall f.	-	Know-you	x	x	x	x
Costaceae						
Costus speciosus (Koenig) J. E. Smith	-	-	x			
Crassulaceae						
Bryophyllum pinnatum (Lam.) Oken	Yerba de bruja	Life plant	x			
Cucurbitaceae						
Cucumis anguria L.	Pepinillo silvestre	-	x			
Momordica charantia L.	Cundeamor	Wild balsam apple	x	x		
Cyperaceae						
Fimbristylis sp.	Junquito	-	x			
Elaeocarpaceae						
Mutingia calabura L.	Capulín	Panama berry	x			
Euphorbiaceae						
Adelia ricinella L.	Cotorro	Ricinella	x	x	x	

Table 1: Complete list of the flora found within the Project area	Nombre común	Common name	Area			
Euphorbiaceae (Cont.)			SM	NW	SW	N
Argythamnia candicans Sw.	-	-			x	
Chamaecyse hirta (L.) Millspaugh	Lechecillo	-	x	x		
Chamaecyse prostrata (Ait.) Small	Lechecillo	-				x
Chamaesyce hyssopifolia (L.) Small	Lechera	-	x	x		
Croton astriotes Dryand.	Marán	-			x	
Croton discolor Willd.	Lechecillo	-			x	
Croton betulinus Vahl	-	-		x	x	x
Croton lobatus L.	Croton lobulado	-	x	x	x	
Euphorbia heterophylla L.	Lechecilla	-		x	x	
Euphorbia lactea Haw.	Candelero	Mottled spurge			x	
Gymnanthes lucida Sw.	Yaití	Crabwood	x			
Jatropha gossypifolia L.	-	-	x	x	x	x
Phyllanthus niruri L.	Quinino del pobre	Gale of the wind	x			
Ricinus communis L.	Higuereta	Castor bean	x			
Tragia volubilis L.	Pringamoza	Poison ash		x	x	
Fabaceae						
Acacia farnesiana (L.) Willd.	Aroma	-	x		x	
Albizia lebbeck (L.) Benth.	Acacia amarilla	Siris tree	x			
Alysicarpus vaginalis (L.) DC.	Yerba de contrabando	False moneywort	x			
Caesalpinia pulcherrima (L.) Sw.	Clavellina	Barbados pride	x			
Coursetia caribaea (Jacq.) Lavin	Añil falso	-	x			
Crotalaria incana L.	Cascabelillo vacío	Shake-shake	x		x	
Delonix regia (Bojer ex Hook.) Raf.	Flamboyán	Flamboyant	x	x		
Desmanthus virgatus (L.) Willd.	Desmanto amarillo	-		x		
Galactia dubia DC.	-	-	x	x	x	
Galactia striata (Jacq.) Urb.	-	-		x		
Indigofera suffruticosa Miller	Añil	Indigo	x			
Leucaena leucocephala (Lam.) DeWit	Tamarindillo	Wild tamarind	x	x	x	x
Macroptilium lathyroides (L.) Urb.	Habichuela parada	Wild bush bean	x	x		
Mimosa pudica L.	Morivivi	Sensitive plant			x	

Table 1: Complete list of the flora found within the Project area	Nombre común	Common name	Area			
			SM	NW	SW	N
Fabaceae (Cont.)						
Neptunia plena (L.) Benth.	Desmanto amarillo	Water neptunia	x		x	
Parkinsonia aculeata L.	Palo de rayo	Jerusalem thorn				x
Piscidia carthagenensis Jacq.	Ventura	Fish poison		x	x	
Pithecelobium unguis-cati (L.) Mart.	Escambrón colorado	Cat's claw	x	x	x	x
Prosopis juliflora (Sw.) DC.	Bayahonda	Mesquite	x	x	x	x
Rhynchosia minima (L.) DC.	Frijolillo	-	x			
Sesbania cericea (Willd.) Link	Papagayo	-	x			
Senna obtusifolia (L.) Irwin & Barneby	Dormidera	-		x		
Senna occidentalis (L.) Link	Hedionda	Coffee senna	x			
Stilosanthes hamata (L.) Tabú.	Zarzabacoa enana	Pencil flower	x			
Tephrosia cinerea (L.) Pers.	Añil cenizo	-	x	x	x	
Lamiaceae						
Leonotis nepetifolia (L.) R. Br.	Botón de cadete	Lion's ear	x			
Lauraceae						
Persea americana Miller	Aguacate	Avocado	x			
Lemnaceae						
Lemna perpusilla Torrey	Lentejilla de agua	Duckweed	x			
Liliaceae						
Sansevieria hyacinthoides (L.) Druce	Lengua de vaca	Sweet sansevieria	x	x	x	x
Malpighiaceae						
Stigmayphyllon emarginatum (Cav.) A. Juss.	Bejuco de San Pedro	-	x	x	x	x
Malvaceae						
Bastardia viscosa (L.) HBK.	Escoba babosa	Viscid mallow	x	x	x	x
Gossypium hirsutum L.	Algodón	Wild cotton	x	x		x
Malachra capitata (L.) L.	Malvavisco	Mallow	x			

Table 1: Complete list of the flora found within the Project area	Nombre común	Common name	Area			
			SM	NW	SW	N
Malvaceae (Cont.)						
Malachra fasciata Jacq.	Malva blanca	-			x	
Malvastrum americanum (L.) Torrey	Malva silvestre	False Mallow		x		
Malvastrum corchorifolium (Desr.) Britt. *in* Small	-	-	x	x		x
Pavonia fruticosa (Miller) Fawcett & Rendle	Cadillo pequeque	-			x	
Pavonia spinifex (L.) Kuntze	Cadillo espinoso	-	x			
Sida abutifolia Mill.	Escoba tendida	-		x		
Sida acuta Burm f.	Escoba blanca	Wire weed	x			
Sida glabra Miller	Escobita dulce	-	x	x	x	
Sida glomerata Cav.	Escoba de paloma	-			x	
Sida glutinosa Commers *ex* Cav.	-	-		x		
Sida rhombifolia L.	Escoba colorada		x	x		
Sida stipularis Cav.	Escoba blanca	Wire weed	x			
Thespesia populnea (L.) Solander	Emajagüilla	Cork tree	x			
Melastomataceae						
Dissotis rotundifolia (Smith) Triana	-	-	x		x	
Meliaceae						
Swietenia mahogany (L.) Jacq.	Caoba dominicana	Mahogany	x	x		
Myrtaceae						
Eugenia axillaris Willd	Grajo	White stopper			x	
Nyctaginaceae						
Boerhavia scandens L.	Pegapollo	-	x	x	x	
Boerhavia coccinea Miller	Mata pavo	Hog-weed	x	x	x	
Boerhavia erecta L.	-	-	x	x	x	x
Bougainvillea spectabilis Willd.	Trinitaria	Bougainvillea	x			
Oleaceae						
Jasminum fluminense Vell.	Jazmín oloroso	-	x	x	x	x

Table 1: Complete list of the flora found within the Project area	Nombre común	Common name	Area			
			SM	NW	SW	N
Onagranaceae						
Ludwigia erecta (L.) H. Hara	Yerba de hicotea	-	x			
Ludwigia octovalvis (Jacq.) Raven	Yerba de clavo	Primerose willow	x			
Papaveraceae						
Argemone mexicana L.	Cardo santo	Mexican poppy	x			
Phytolaccaceae						
Petiveria alliacea L.	Anamú	Garlicweed	x	x	x	x
Rivina humilis L.	Carmín	Cat's blood	x	x		x
Trichostigma octandrum (L.) H. Walt.	Bejuco de palma	Basket wiss	x	x	x	x
Poaceae						
Arundo donax L.	Guajana	Giant reed	x			
Cenchrus ciliaris L.	Yerba salina	Buffel grass	x	x		x
Cenchrus echinatus L.	Abrojo	Bur grass			x	
Chloris inflata Link	Paragüita	Mexican blue grass	x	x		x
Cynodon dactylon (L.) Pers.	Bermuda común	Bermuda gras	x			
Dichanthium annulatum (Forsk.) Stapf.	Yerba de las traviesas	Railroad-track grass	x			
Eleusine indica (L.) Gaertn.	Pata de gallina	Goose grass		x		
Pennisetum purpureum Schum.	Yerba de elefante	-				x
Sporobolus jacquemontii Kunth	-	-				x
Sporobolus virginicus (L.) Kunth	Matojo de playa	Sea-shore rush grass				x
Urochloa maxima (Jacq.) R. D. Webster	Yerba de guinea	Guinea grass	x	x	x	x
Polygonaceae						
Antigonon leptopus Hook. & Arn.	Coral	Love-chain	x	x	x	x
Polypodiaceae						
Nephrolepis multiflora (Roxb.) Jarrett	Helecho común	Common fern			x	

Table 1: Complete list of the flora found within the Project area	Nombre común	Common name	Area			
			SM	NW	SW	N
Pontederiaceae						
Eichornia crassipes (Mart.) Solms	Jacinto de agua	Water hyacinth				x
Portulacaceae						
Portulaca oleracea L.	Verdolaga	Purslane	x		x	x
Portulaca pilosa L.	Don Diego	-	x			x
Talinum fruticosum (L.) Juss.	Verdolaga francesa	-		x		x
Rhamnaceae						
Gouania polygama (Jacq.) Urb.	Bejuco de indio	Soap-stick			x	
Ziziphus reticulata (Vahl) DC.	Cascarilla	-				x
Rhyzophoraceae						
Rhyzophora mangle L.	Mangle rojo	Red Mangrove	x			x
Rubiaceae						
Randia aculeata L.	Tintillo	Box brier	x	x		
Spermacoce confusa Rendle & Gillis	Yerba de garro	Button weed	x			
Rutaceae						
Murraya exotica L.	Café de la India	Orange jessamine	x			
Sapindaceae						
Meliococcus bijugatus Jacq.	Quenepa	Genip	x	x	x	x
Serjania polyphylla (L.) Radlkofer	Bejuco de canastas	Basket wood	x		x	
Thouinia striata var. *portoricensis* (Radlkofer) Votava & Alain	Serrasuela	-			x	
Sapotaceae						
Sideroxylon obovatum Lamark	Araña gato	Break hill			x	
Scrophulariaceae						
Capraria biflora L.	Té del país	Goat-weed		x		

Table 1: Complete list of the flora found within the Project area	Nombre común	Common name	Area			
			SM	NW	SW	N
Solanaceae						
Datura metel L.	Chamisco amarillo	Garden datura	x	x		
Physalis angulata L.	Sacabuche	Ground cherry	x	x		
Solanum elaeagnifolium Cav.	-	-			x	
Solanum persicifolium Dunal	Berenjena de playa	-	x	x	x	x
Sterculiaceae						
Melochia pyramidata L.	Bretónica piramidal	-		x		
Waltheria indica L.	Malvabisco	-	x	x	x	x
Urticaceae						
Ficus citrifolia P. Mill	Jagüey macho	-	x			
Verbenaceae						
Citharexylum fruticosum L.	Péndula	Florida fiddlewood			x	
Clerodendrum aculeatum (L.) Schlecht.	Escambrón blanco	-	x			
Lantana camara L. var. *camara*	Cariaquillo	Yellow sage			x	
Lantana exarata Urb. & Ekm.	-	-	x	x	x	x
Priva lappulacea (L.) Pers.	Abrojo	Bur vervain			x	
Stachytarpheta jamaicensis (L.) Vahl	Bretónica	-	x	x		
Vitaceae						
Cissus trifoliata L.	Bejuco de caro	-	x	x	x	x
Cissus verticillata (L.) Nicholson & Jarvis	Bejuco de caro	Pudding vine	x			
Zigophyllaceae						
Guaiacum officinale L.	Guayacán	Lignum vitae	x	x	x	x
Kallstroemia maxima (L.) Hook & Arn.	Abrojo	Caltrop	x	x		

*Critical element according to DNER

Species total = 188

SM: Sugar Mill; NW: Northwest parcel; SW: Southwest parcel; N: North parcel

Table 2. Complete list of the fauna found at the Project area	Nombre común	Common name	Status
Birds			
Accipitridae			
Buteo jamaicensis	Guaraguao Común	Red-tailed Hawk	R
Ardeidae			
Ardea alba	Garza Real	Great Egret	R
Bubulcus ibis	Garza Ganadera	Cattle Egret	R
Butorides virescens	Martinete	Green Heron	R
Egretta caerulea	Garza Azul	Little Blue Heron	R
Nyctanassa violacea	Yaboa Común	Yellow-crowned Night-heron	R
Caprimulgidae			
Chordeiles gundlachii	Querequequé	Antillean Nighthawk	R
Cathartidae			
Cathartes aura	Aura tiñosa	Turkey Vulture	R
Charadriidae			
Charadrius vociferus	Playero Sabanero	Killdeer	R
Columbidae			
Columbina passerima	Rolita	Common Ground-dove	R
Columba livia	Paloma Casera	Rock Dove	I
Columba squamosa	Paloma Turca	Scaly-naped Pigeon	R
Zenaida asiatica	Tórtola Aliblanca	White-winged Dove	R
Zenaida aurita	Tórtola Cardosantera	Zenaida Dove	R
Streptopelia risoria	Tórtola Collarina	Ringed Turtle-dove	I
Cuculidae			
Coccyzus minor	Pájaro Bobo Menor	Mangrove Cuckoo	R
Crotophaga ani	Judío	Smooth-billed Ani	R
Coerebidae			
Coereba flaveola	Reinita Común	Bananaquit	R
Emberezidae			
Loxigilla portoricensis	Comeñame	Puerto Rican Bullfinch	E
Tiaris bicolor	Gorrión Negro	Black-faced Grassquit	R
Tiaris olivacea	Gorrión Barba Amarilla	Yellow-faced Grassquit	R
Parulidae			
Dendroica adelaidae	Reinita Mariposera	Adelaide's Warbler	E
Dendroica discolor	Reinita Galana	Prairie Warbler	M

Table 2. Complete list of the fauna found at the Project area	Nombre común	Common name	Status
Dendroica petechia	Canario de Mangle	Yellow Warbler	R
Parula americana	Reinita Pechidorada	Northern Parula	M
Seiurus noveboracensis	Pizpita de Mangle	Northern Waterthrush	M
Setophaga ruticilla	Candelita	American Redstart	M
Icteridae			
Icterus icterus	Turpial	Troupial	I
Molothrus bonariensis	Tordo	Shiny Cowbird	R
Quiscalus niger	Chango	Greater Antillean Grackle	R
Thraupidae			
Spindalis portoricensis	Reina Mora de PR	Puerto Rican Spindalis	E
Estrildidae			
Estrilda melpoda	Veterano	Orange-cheeked Waxbill	I
Lonchura cucullata	Diablito	Bronze Mannikin	I
Lonchura malabarica	Gorrión Pico Plata	Silverbill Finch	I
Lonchura punctulata	Gorrión Canela	Nutmeg Mannikin	I
Falconidae			
Falco sparverius	Falcón Común	American Kestrel	R
Fregatidae			
Fregata magnificens	Tijereta	Magnificent Frigatebird	R
Pterochelidon fulva	Golondrina de Cuevas	Cave Swallow	R
Laridae			
Sterna hirundo	Gaviota Común	Common Tern	R
Sterna sandvicensis	Gaviota Piquiaguda	Sandwich Tern	R
Mimidae			
Margarops fuscatus	Zorzal Pardo	Pearly-eyed Thrasher	R
Mimus polyglottos	Ruiseñor	Northern Mockingbird	R
Passeridae			
Passer domesticus	Gorrión Inglés	House Sparrow	R
Pelecanidae			
Pelecanus occidentalis[1]	Pelicano Pardo	Brown Pelican	R
Picidae			
Melanerpes portoricensis	Carpintero	Puerto Rican Woodpecker	E
Ploceidae			

Table 2. Complete list of the fauna found at the Project area	Nombre común	Common name	Statu
Vidua macroura	Viuda Colicinta	Pin-tailed Whydah	I
Psittasidae			
Myopsitta monachus	Perico Monje	Monk Parakeet	I
Rallidae			
Gallinula chloropus	Gallareta Común	Common Moorhen	R
Recurvirostridae			
Himantopus mexicanus	Viudita	Black-necked Stilt	R
Scolopacidae			
Actitis macularia	Playero Coleador	Spotted Sandpiper	M
Arenaria interpres	Playero Turco	Ruddy Turnstone	M
Tringa flavipes	Playero Guineilla Menor	Lesser Yellowlegs	M
Tringa melanoleuca	Playero Guineilla Mayor	Greater Yellowlegs	M
Todidae			
Todus mexicanus	San Pedrito	Puerto Rican Tody	E
Trochilidae			
Anthracothorax dominicus	Zumbador dorado	Antillean Mango	R
Chlorostilbon maugaeus	Zumbadorcito de PR	Puerto Rican Emerald	E
Tyrannidae			
Elaenia martinica	Jui blanco	Caribbean Elaenia	R
Tyrannus dominicensis	Pitirre	Gray Kingbird	R
Vireonidae			
Vireo altiloquus	Julián Chivi	Black-wiskered Vireo	R
Vireo latimeri	Bienteveo	Puerto Rican Vireo	M
Mammals			
Rodentia			
Rattus norvegicus	Rata	Brown Rat	I
Mus musculus	Jarriero	House Mouse	I
Mustelidae			
Herpestes auropunctatus	Mangosta	Indian Mongoose	I
Anfibios			
Bufonidae			
Bufo marinus	Sapo Común	Cane Toad	I

Table 2. Complete list of the fauna found at the Project area	Nombre común	Common name	Status
Leptodactylidae			
Leptodactylus albilabris	Ranita de Labio Blanco	White-lipped Frog	E
Eleutherodactylus coqui	Coquí Común	-	E
Reptiles			
Iguanidae			
Anolis pulchellus	Lagartijo de Jardín	Grass Anole	E
Anolis cristatellus cristatellus	Lagartijo Común	Common Anole	R
Anolis cooki[2]	Lagartijo del Seco	Dry Forest Anole	E
Teiidae			
Ameiva exsul	Siguana Común	-	R
Geckonidae			
Hemidactylus brooki	Salamaquesa Casera	-	R
Phyllodactylus wirshingi	-	-	R
Sphaerodactylus macrolepis ateles	Salamanquita Común	-	E

[1] Endangered; [2] Critical element

Species total = 73

E = Endemic, I = Introduced, M = Migratory, R = Resident

APPENDIX 3. PHOTOGRAPHIC DOCUMENTATION

Photo 1: Access road within the Old Guánica Sugar Mill. The short stature vegetation in this photo, dominated by Wild tamarind (*Leucaena leucocephala*), is representative of this parcel.

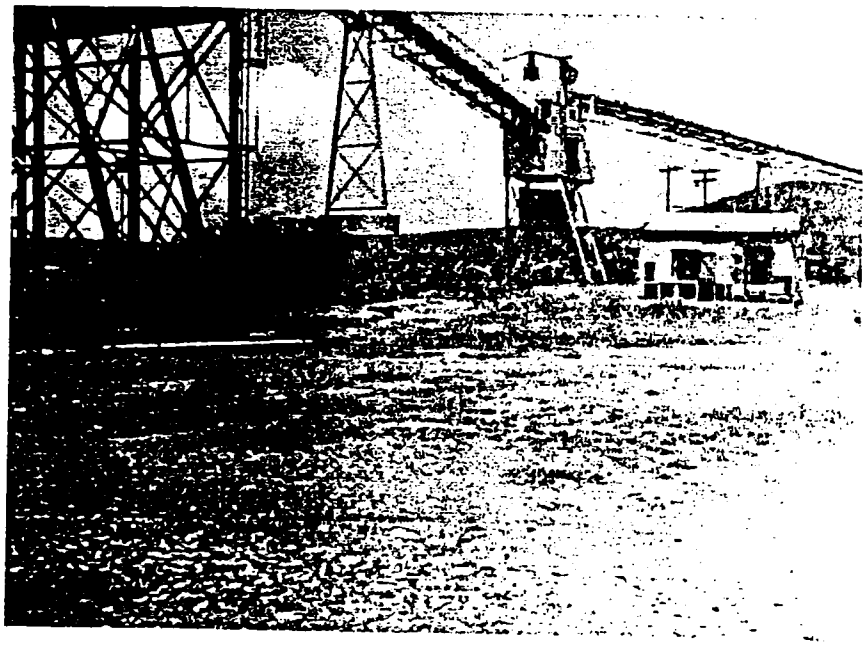

Photo 2: Old conveyor belt in Punta Pera demonstrating the impact on the vegetation caused by the operation of the Old Sugar Mill.

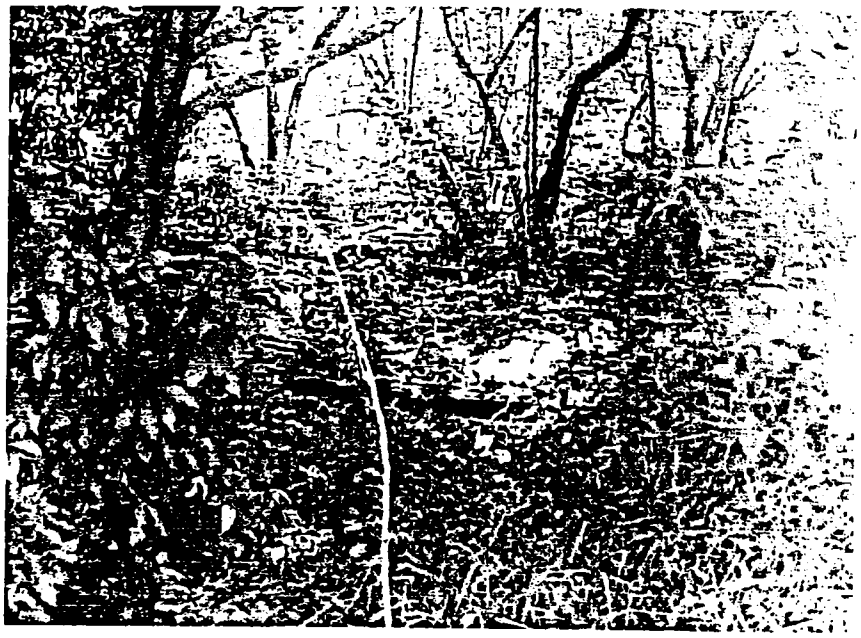

Photo 3: Forested patch south of the old mansion at Punta Pera. Patches of the original dry forest can be found in this area, including *Leptocereus quadricostatus* and *Opuntia moniliformis*

Photo 4: Ruins of the dock at Punta Pera. Mangrove forest and remnants of the dry forest are visible in the background.

Photo 5: Water tank on top of the Southwest parcel. Most of the vegetation in the area is low and shrubby, typical of disturbed sites.

Photo 6: Forest patch on the southern slope of the southwest parcel. This patch contains remnants of the original dry forest, including *Leptocereus quadricostatus* and *Opuntia moniliformis*.

Photo 7: View of the mangrove forest on the banks of Río Loco.

Photo 8: View of the vegetation within the North parcel, close to Highway PR-116R. It is dominated by *Acacia farnesiana*, *Prosopis juliflora*, *Opuntia antillana*, *Batis maritima* and grasses

Photo 9: View of the North parcel vegetation and abandoned tires, part of the illegal dump established in this area.

Photo 10: View of the Northwest parcel. This area has a mixture of exotic ornamentals, secondary species, and patches of dry forest species.

Photo 11: View of human impact on the Northwest parcel.

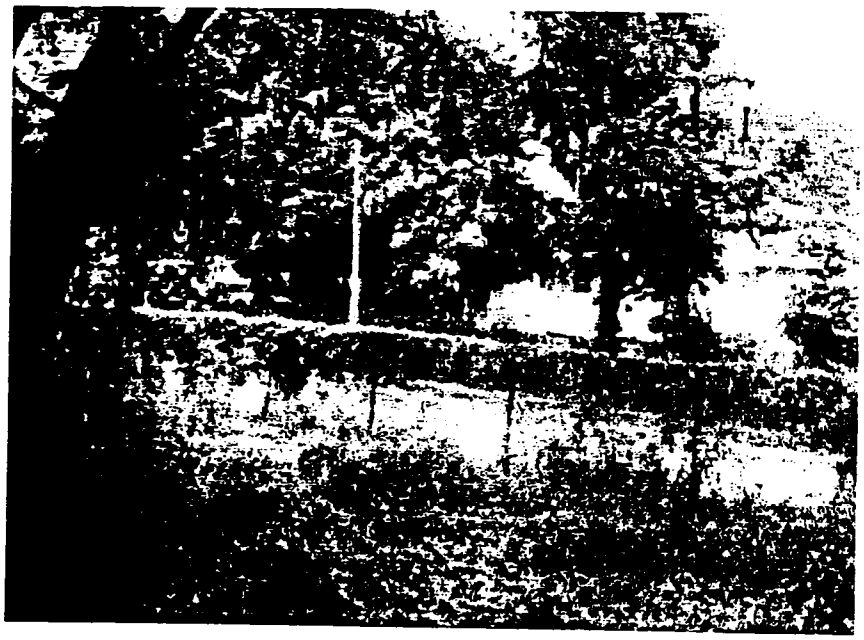

Photo 12: Housing complex on the eastern limit of the Northwest parcel.

Photo 13: *Opuntia moniliformis* (A) and *Leptocereus quadricostatus* (B) considered as critical elements by DNER.

Photo 14: *Anolis cristatelus* at the Northwest parcel.

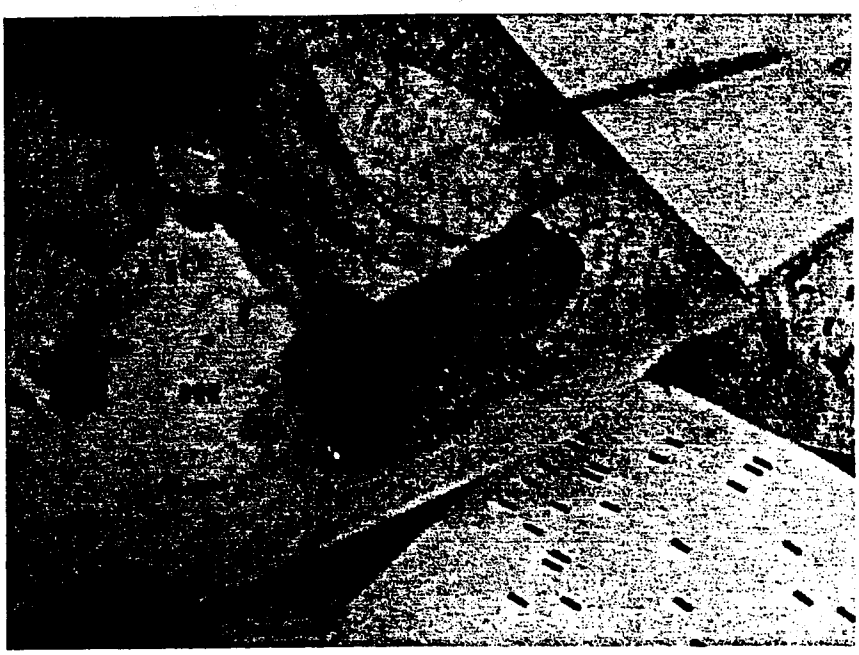

Photo 15: *Bufo marinus* juvenile inside one of the buildings at the Old Guánica Sugar Mill.

Photo 16: Killdeer chick hiding in the low vegetation near Punta Pera. It is one of the many bird species found in the Old Guánica Sugar Mill.