

**METHODS AND APPROACH FOR
THREATENED AND ENDANGERED SPECIES AND HABITAT SURVEYS
WITHIN THE SIA AND EMA ON VIEQUES, PUERTO RICO**

prepared for



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METHODS AND APPROACH FOR THREATENED AND ENDANGERED SPECIES AND HABITAT SURVEYS WITHIN THE SIA AND EMA ON VIEQUES, PUERTO RICO

Geo-Marine, Inc. (GMI) biologists have been tasked to conduct listed biological species (flora and fauna) and critical habitats surveys within the Surface Impact Area (SIA) and portions of the Eastern Maneuver Area (EMA) on Vieques, Puerto Rico. Data obtained from these surveys will be used to produce a Biological Assessment (BA) that is an amendment to the May 2006 Live Impact Area (LIA) BA that will identify areas of concern and mitigation measures for anticipated future impacts.

SURVEY STRATEGY

The U.S. Fish and Wildlife Service (USFWS) lists 10 threatened and endangered (T&E) bird and 49 plant species as occurring or possibly occurring in Puerto Rico (Appendix I). The list was narrowed down to four bird and 17 plant species for Vieques based on their specific habitat requirements and available habitat within the SIA and EMA (Table 1). Although the possibility of occurrence exists for all of the plant species listed in Table 1 to be present on Vieques, it is more probable that only a select few will be found based on data from prior surveys and precise “fits” to specific habitat requirements. Vieques also has habitat that may support five avian species listed as vulnerable and of concern (Appendix I).

Table 1. Federally threatened or endangered avian or plant species potentially occurring on Vieques, Puerto Rico

Scientific Name	Common Name
Birds	
<i>Agelaius xanthomus</i>	Yellow-shouldered blackbird
<i>Charadrius melodus</i>	Piping plover
<i>Sterna dougallii gougallii</i>	Roseate tern
<i>Pelecanus occidentalis</i>	Brown pelican
Plants	
<i>Aristida chaseae</i>	Chase's threeawn
<i>Buxus vahlii</i>	Vahl's boxwood
<i>Calyptanthus thomasiana</i>	none
<i>Calyptronoma rivalis</i>	Palma de manaca
<i>Chamaecrista glandulosa var. mirabilis</i>	none
<i>Cornutia obovata</i>	Palo de nigua
<i>Daphnopsis hellerana</i>	none
<i>Eugenia woodburyana</i>	none
<i>Gesneria pauciflora</i>	Yerba maricao de cueva

<i>Goetzea elegans</i>	Beautiful goetzea
<i>Leptocereus grantianus</i>	none
<i>Myrcia paganii</i>	Ausu
<i>Ottoschulzia rhodoxylon</i>	Palo de rosa
<i>Psychilis macconnelliae</i>	none
<i>Schoepfia arenaria</i>	Arana
<i>Stahlia monosperma</i>	Cobana negra
<i>Zanthoxylum thomasianum</i>	St. Thomas prickly-ash

Determining Survey Areas

To determine locations for surveys, extensive review of the ecological requirements for each T&E plant species was completed. This information, in conjunction with findings from previous surveys and existing data of Vieques vegetation, soil, and elevation data was mapped using ArcGIS to determine where the specific required parameters for each species overlap. Polygons or shapefiles were then created for areas of overlap to indicate locations of high probability for the existence of each T&E species. Of those listed in Table 1, only four species show a high probability of occurring on Vieques, these include *Stahlia monosperma*, *Psychilis macconnelliae*, *Goetzea elegans*, and *Chaemacrista glandulosa* var. *mirabilis* (Figures 1-4, respectfully).



Stahlia monosperma found on Vieques, Puerto Rico.

Two species that were thought to potentially occur on Vieques, *Eugenia woodburyana* and *Calypttranthes thomasiana* could not be “matched” to any areas within the SIA or EMA based information from previous surveys or their elevation, soil, and associated vegetation requirements.



Flower of *Psychilis macconnelliae*



Flower and fruit of *Goetzea elegans*.

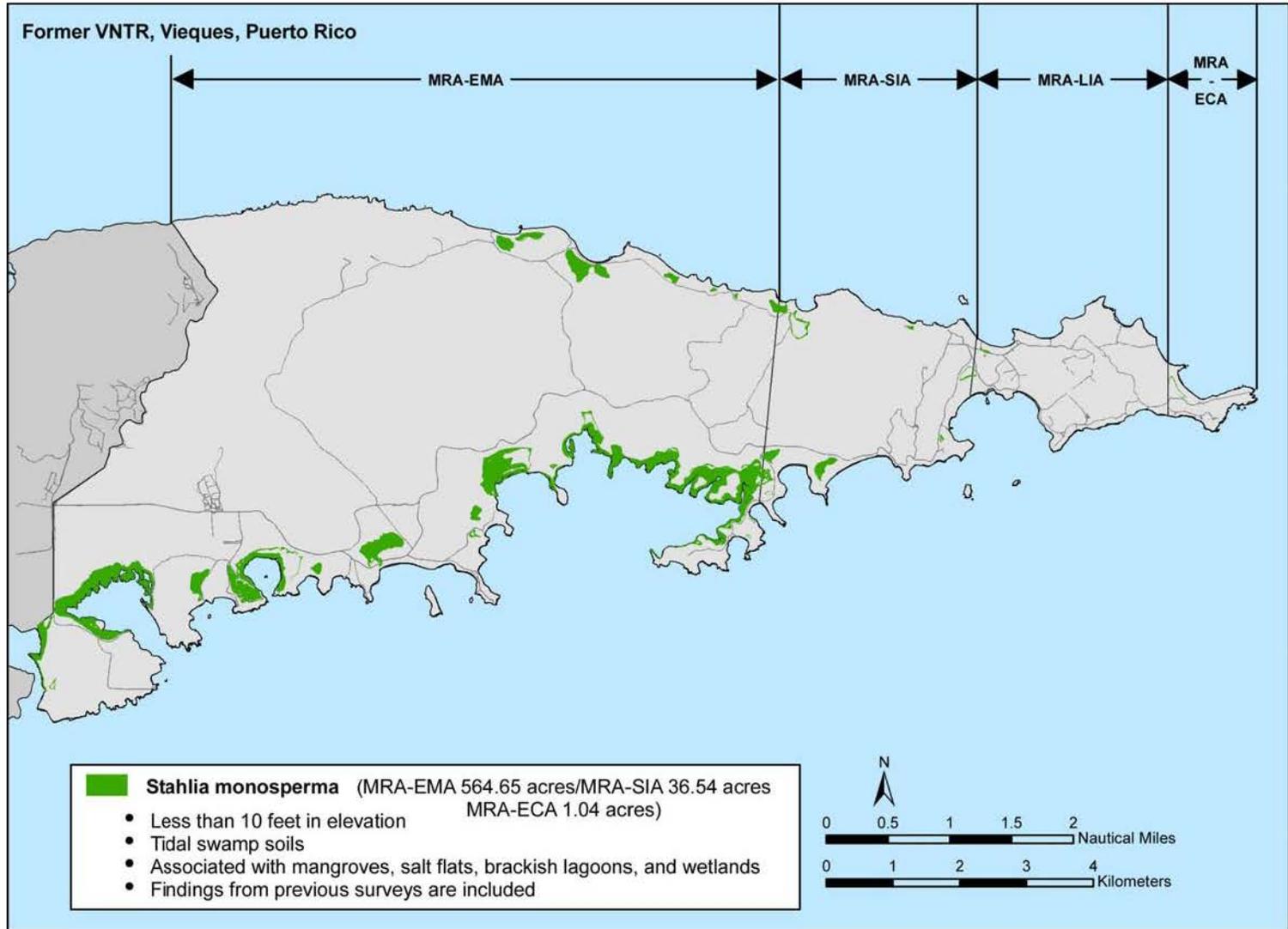


Figure 1. Map showing areas of high probability for the presence of *Stahlia monosperma* on Vieques, Puerto Rico.

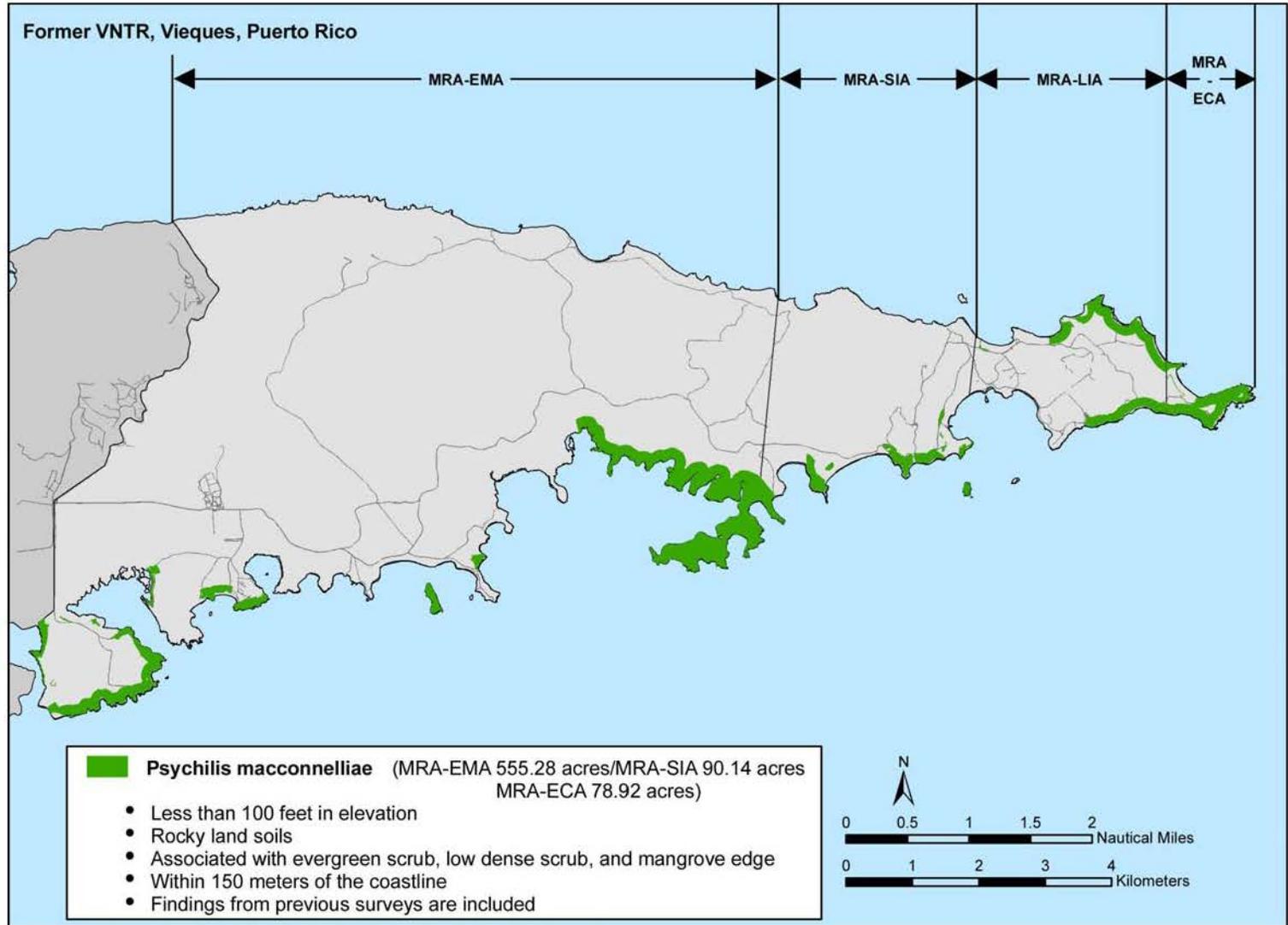


Figure 2. Map showing areas of high probability for the presence of *Psychilis macconnelliae* on Vieques, Puerto Rico.

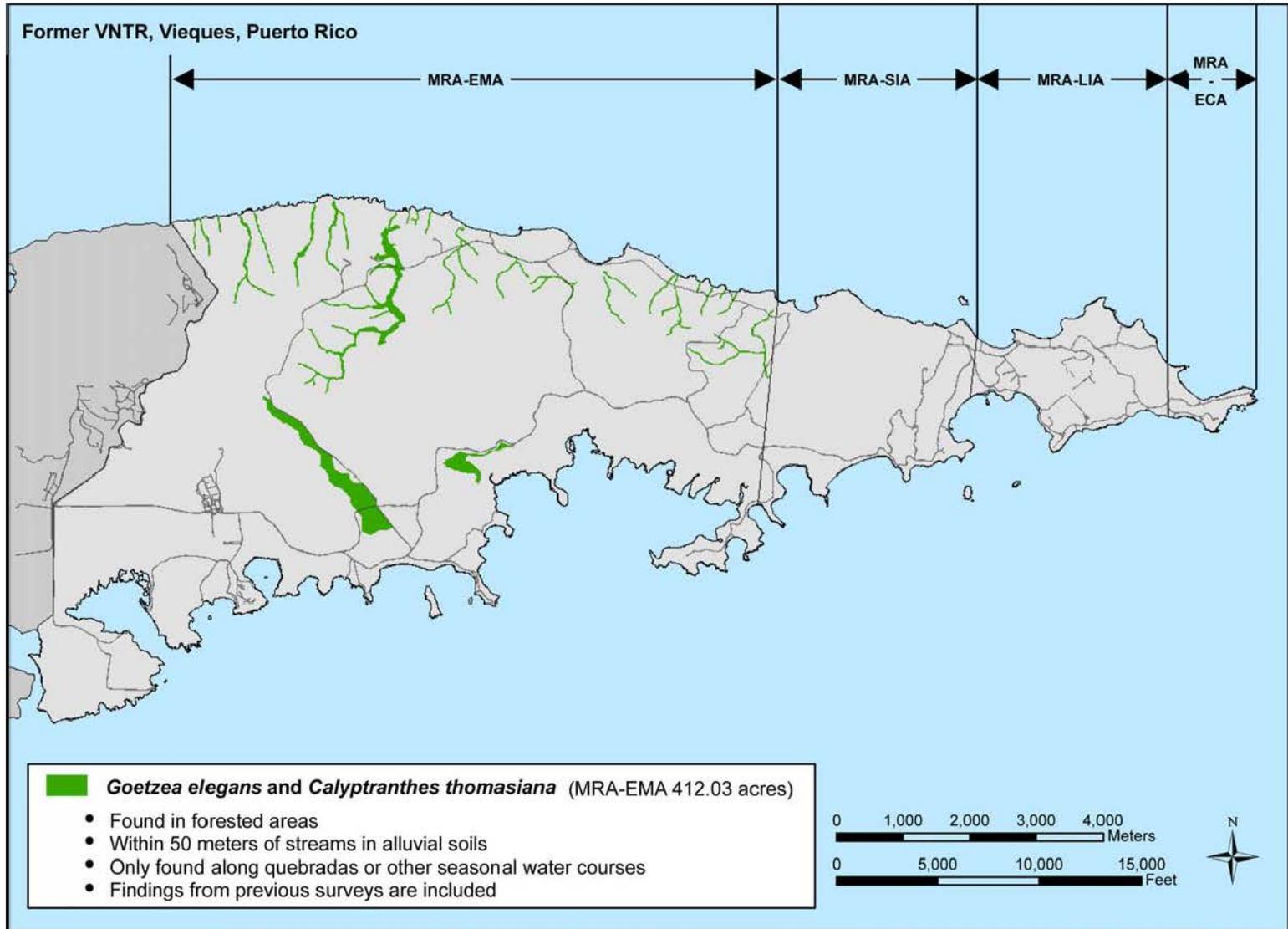


Figure 3. Map showing areas of high probability for the presence of *Goetzea elegans* on Vieques, Puerto Rico.

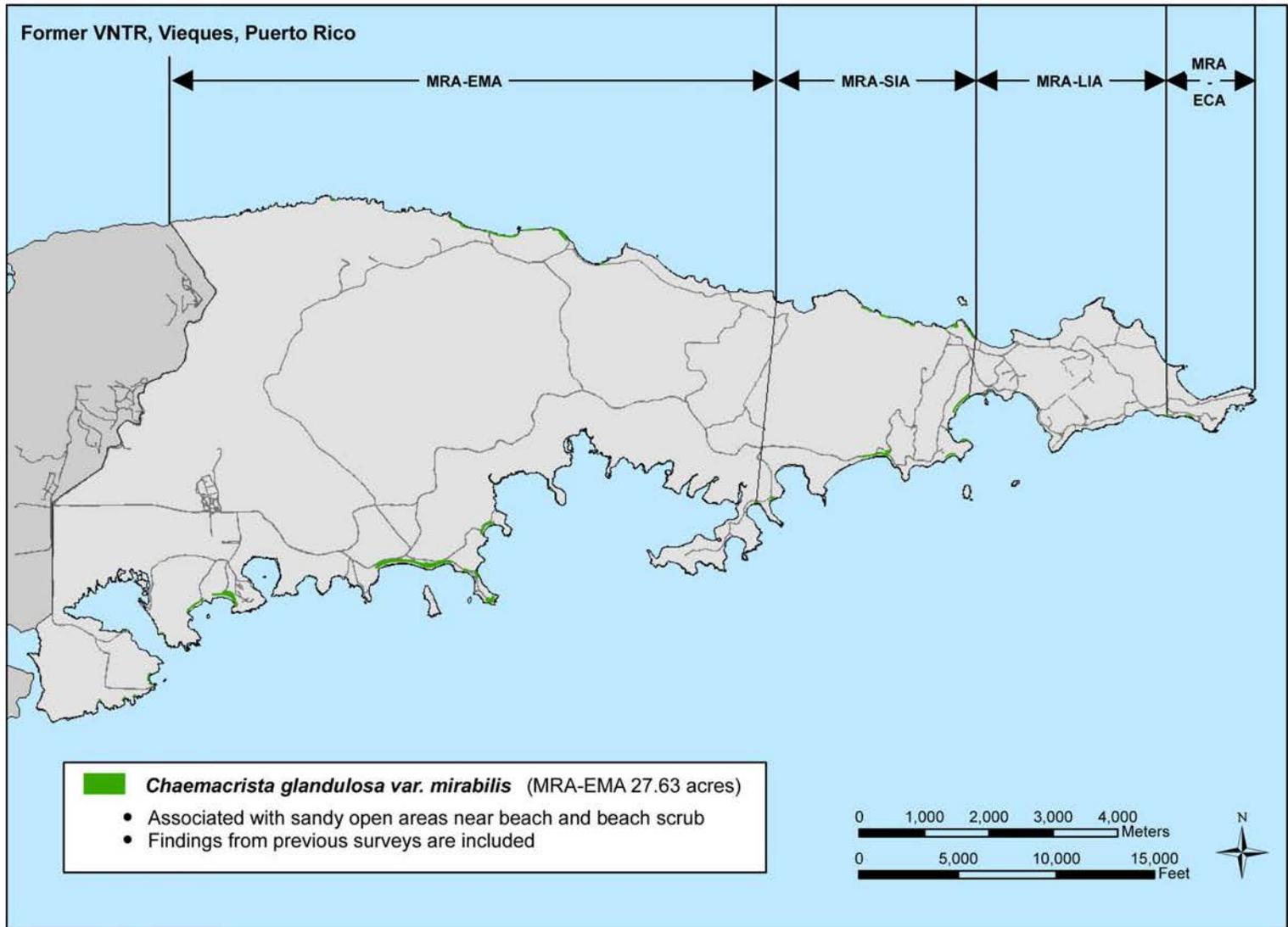


Figure 4. Map showing areas of high probability for the presence of *Chaemacrista glandulosa var. mirabilis* on Vieques, Puerto Rico.

The survey areas within the SIA and EMA that have been selected due to their high probability of occurrence of *S. monosperma*, *C. thomasi*, and *G. elegans*, and *C. glandulosa* include the majority of the mangroves, wetlands, salt flats, brackish lagoons, quebradas, and forested areas, which are also target locations for T&E bird species. Additionally, all roads and trails within the SIA and EMA will be surveyed either by vehicle or on foot to determine if suitable habitat, elevation, and soil requirements exist for any of the T&E species. The location of areas that are potentially suitable for T&E species will be marked with a GPS unit during the onsite survey and the points will be depicted on maps displaying the survey findings. Although the survey areas target the four specific plant species listed above, GMI biologists will be surveying for all threatened, endangered, or rare species listed.

Remaining Areas Not Surveyed

Portions of land within the SIA and EMA will not be included in the T&E surveys. The rationale for this decision is based on the habitat of these locations and the associated probability of finding T&E species. The majority of the area not being surveyed is covered in either thick thorn scrub or grassland vegetation. Of the T&E plant and bird species listed as potentially occurring on Vieques, none are known to occur in dense thorn scrub or grassland habitat, therefore, the focus for these surveys has been limited to areas that have a high probability of containing T&E species.

SURVEY METHODOLOGY

The roads and trails within the SIA and EMA that provide suitable habitat for T&E species will be surveyed, 25 feet on either side of the road at 100% effort, for T&E plants and birds and their habitat. In areas where roads and trails are within 100 feet of any beach, surveys will be conducted at 100% effort throughout the 100 foot area (Figure 5). The high probability areas for plant T&E species will also be surveyed 100%. Figure 6 shows all areas to be surveyed in the SIA and EMA. Random surveys within specialized habitats, such as forests, will also be conducted in areas of interest; however, the locations of these areas will be determined by field biologists during the onsite surveys on an “as needed” basis. This approach will allow the biologists to further evaluate areas they determine to not have been adequately surveyed.

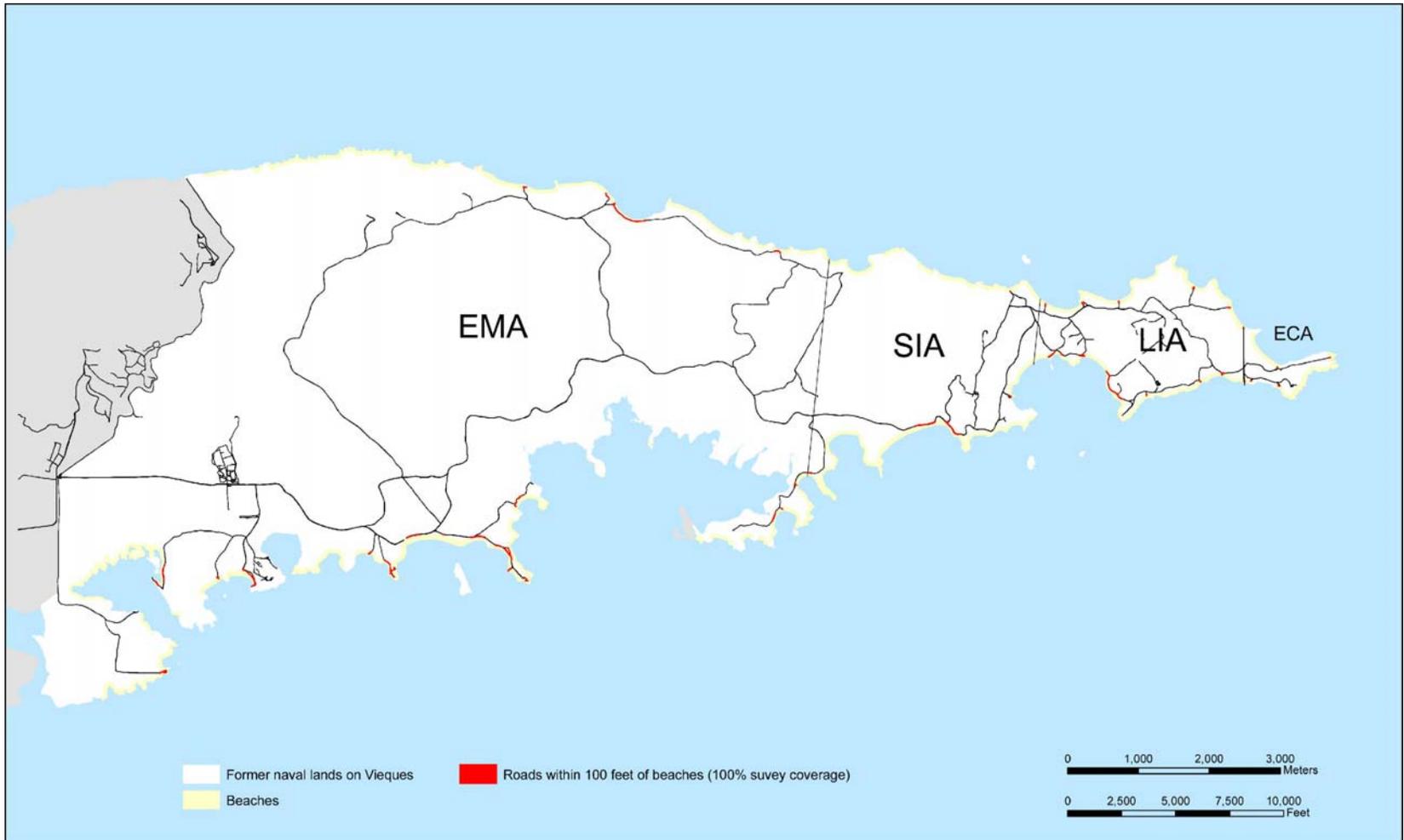


Figure 5. Map showing areas of roads or trails within 100 feet of beaches that require 100% surveys within the entire 100 foot area on Vieques, Puerto Rico.

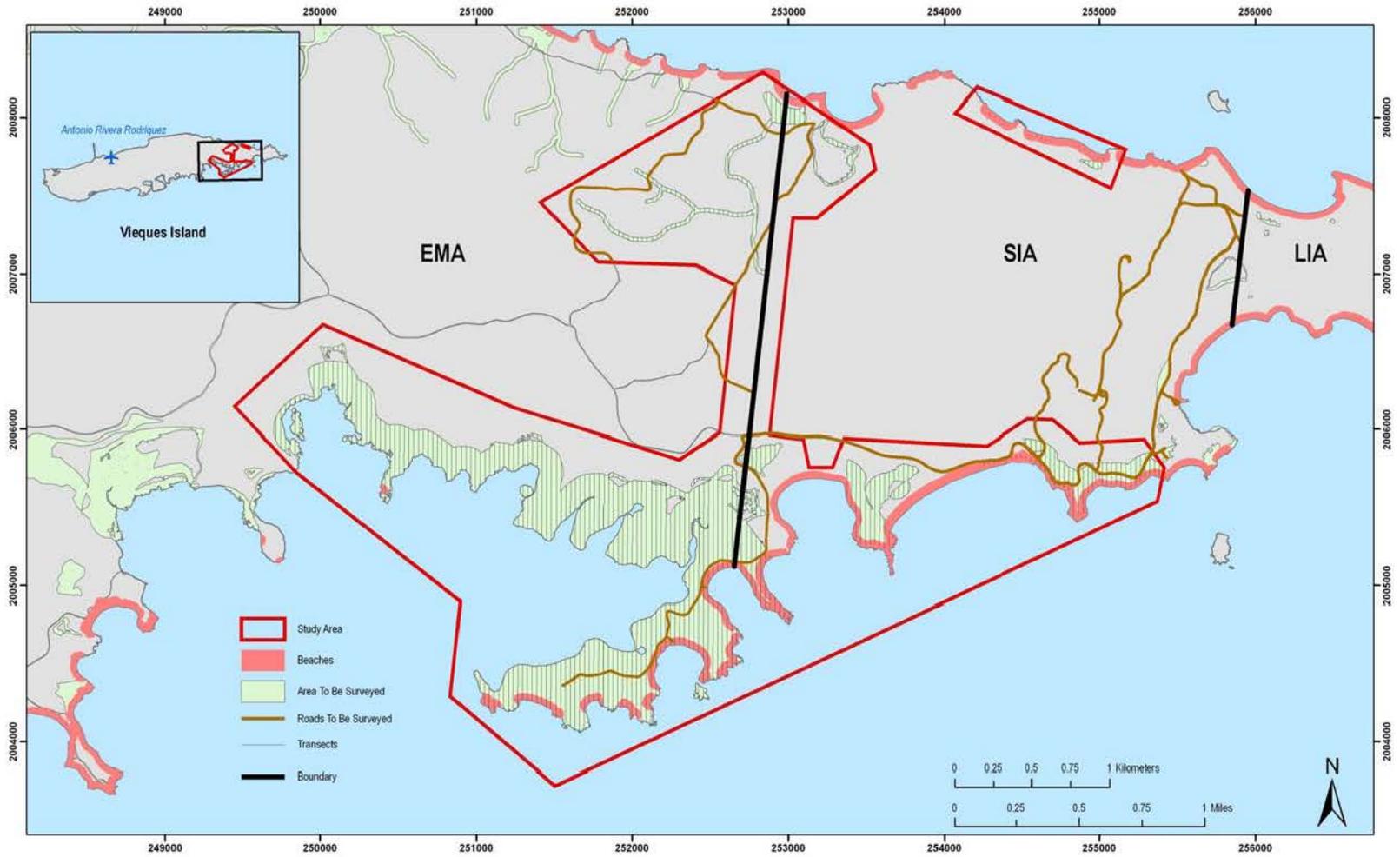


Figure 6. Map showing the listed species survey areas within the SIA and EMA on Vieques, Puerto Rico.

Roads and Trails

At a minimum, two teams of two biologists (which will be accompanied by UXO EOD personnel) will work simultaneously in each area. A “leap-frog” approach will be used for vehicle accessible roads. This approach will allow one team of surveyors to start at a particular point on a road, while the other team takes the vehicle a designated distance down the road and begins a second survey. When the first team arrives at the vehicle, they will in turn drive the vehicle a designated distance, passing the second team, and begin a third survey, etc. This will allow for faster surveys, as biologists will not have to retrace their steps to return to the vehicle. For roads or trails that cannot be accessed by vehicle, survey teams will conduct all investigations on foot. It is possible that field crews will have to spend several days clearing roads and trails due to plant overgrowth, therefore, all roads and trails will be investigated and cleared as necessary before surveys begin.

High Probability Areas

Field surveys within the SIA and EMA will be conducted by both teams simultaneously to expedite sampling. Linear transects spaced 50 to 100 feet apart, depending on terrain and vegetation, will be used to conduct surveys and ensure 100% coverage. Teams of two biologists will walk each transect surveying 25 to 50 feet on either side of the centerline depending on visibility and terrain. Field maps will be prepared for all surveyors that indicate areas to be investigated, transect locations, and GPS coordinates at the end and mid points of each transect to assist with on the ground location and navigation.

If threatened, endangered, or rare species plant species (includes all species listed by USFWS) are encountered in any area during surveys, the location point will be marked with a hand held GPS unit and individual plants or area of the populations will be marked with flagging tape. Time, date, habitat and vegetation descriptions will also be taken, as well as photographs. GIS maps will be generated using ArcGIS showing the location of all T&E species encountered and incorporated into the BA. All listed avian species encountered will be identified, counted, and their location recorded with a GPS unit and maps will be generated using ArcGIS showing location(s) by species. Behavior (i.e., transitioning, feeding, loafing, nesting, roosting) for each species will also be documented.

Surface Impact Area (SIA)

The SIA has the least amount of designated survey area due to the widespread thorn scrub and grassland habitats in the area. Once in the field, if GMI biologists will determine if other habitats of interest occur within the SIA and, if found, randomized surveys in those locations will be conducted.

Overall, a total of 7.23 miles of roads and 0.27 miles of trails lie within the SIA. If all are able to be surveyed for T&E species, it will total approximately 45 acres. Target survey areas for T&E plants encompass another 109 acres, for a total of 154 acres surveyed or 10% of the total SIA.

Eastern Maneuver Area (EMA)

The EMA has the highest diversity of habitats of any survey zone, with the majority of forests and large quebradas found here. Many areas within the northernmost portions of the EMA have never been thoroughly surveyed. These areas, as well as the quebradas, are a high priority and will be carefully surveyed. During these surveys, only the eastern portions of the EMA will be surveyed (see Figure 6). The remaining areas will be surveyed at a later date. Once in the field, if biologists discover additional areas of interest, random surveys will be conducted in those areas to ensure T&E habitats are investigated adequately.

Aerial photography of the EMA shows that several areas along the southeastern portions of the survey area are inundated (Figure 7). Transects through the wettest areas may prove to be difficult and, depending upon water depth and clarity, some areas may have to be avoided due to the inability to see UXO below the surface of the water. If field crews determine that transects surveys are not feasible in some areas for safety reasons, as much vegetation surrounding those wet areas will be surveyed as possible as these are high areas of probability for species occurrence. All survey decisions will be made in the field in conjunction with the UXO EOD support staff based on current conditions of the wetland areas and site specific information regarding amount and types of ordnance being found or known to occur in the survey area.



Figure 7. Aerial image showing inundated wetland areas along the southeastern portions of the EMA.

Overall, a total of 1.23 miles of roads and trails lie within the survey area of the EMA, totaling approximately 15 acres. If all portions of the target survey areas for T&E plants and birds can be surveyed, this will encompass another 430 acres, for a total of 445 acres surveyed.

HEALTH AND SAFETY PLAN

GMI will prepare an Activity Hazard Analysis prior to conducting any field surveys, as well as follow the Health and Safety Plan set forth by CH2M Hill. In addition, all GMI field staff will participate in the daily UXO safety briefings and hold “tailgate” meetings to discuss safety issues of concern.

GMI is aware of the hazards that exist on Vieques, including heat, dehydration, bees and wasps, plant thorns/spines, and rough terrain. All staff will be well equipped with water and first aid essentials during all field work. All members of the field crew are Red Cross CPR/AED and First Aid certified.

SCHEDULE

A tentative schedule for all field surveys, interim reports, and the final BA is included in Appendix II. The schedule is contingent upon the approval of the methods and approach from USFWS. Field surveys can be easily adjusted to accommodate on-site demolition, area closures, and weather.

APPENDIX I.

U.S. Fish and Wildlife Service and Puerto Rico Department of Natural and Environmental Resources list of threatened and endangered bird and plant species occurring or potentially occurring on Puerto Rico.

Species	Status*	Range & Habitat	Found on Vieques
BIRDS			
<i>Agelaius xanthomus</i>	E	<ul style="list-style-type: none"> mangrove zone or the arid coastal fringe. Nesting occurs in mangroves along the coast and on small off-shore islands 	Possible
<i>Buteo platypterus brunnescens</i>	E	<ul style="list-style-type: none"> more often seen in the eastern side of the Caribbean National Forest, and the tabonuco and palo colorado forest types were reported to be the preferred habitats for the species (Wiley and Bauer 1985). Delannoy (1992) reported broad-winged hawks clustered in the north-central part of the Caribbean National Forest within the subtropical wet forest and subtropical rain forest life zones, where the tabonuco is the dominant forest type. In the Carite forest the species has been reported from the elfin, caimitillo, granadillo, tabonuco, and slope forest types (Hernandez 1980, Delannoy 1992). 	NO
<i>Accipiter striatus venator</i>	E	<ul style="list-style-type: none"> located in the north-central and eastern parts of the Maricao forest, within the subtropical lower montane wet forest and subtropical wet forest life zones 	NO
<i>Caprimulgus noctitherus</i>	E	<ul style="list-style-type: none"> presently found only in the dry limestone forests of the southwestern coast. In the Susua area nightjars occur primarily on the southern slopes, but could be found in the mature lower cordillera forest at somewhat higher elevations. In the Guánica Forest, where the nightjars are most common, elevations range from sea level to 230 meters. 	NO
<i>Amazona vittata</i>	E	<ul style="list-style-type: none"> Puerto Rican parrot is presently found only in Puerto Rico, but up until 1899 it was also found on nearby Culebra Island, and earlier on Vieques and Mona Islands. The present habitat consists of mature rain forest located between about 1,300 and 2,700 feet in elevation. 	Possible
<i>Anas bahamensis</i>	V	<ul style="list-style-type: none"> Prefers mangrove islets and forages in low-lying evergreen and semi-deciduous forests. 	Possible
<i>Columba inornata wetmorei</i>	E	<ul style="list-style-type: none"> The plain pigeon historically was widespread in the western foothills and valleys of Puerto Rico General habitat types used in the past include lowland swamps and woodland, open woodland and cultivated land in the mountains, limestone karst, and coffee plantations in upland hills. The presently occupied habitat is located in the lower montane rainforest zone. 	NO

Species	Status*	Range & Habitat	Found on Vieques
<i>Charadrius melodus</i>	T	<ul style="list-style-type: none"> populations inhabit beaches, mudflats, and sandflats 	YES
<i>Dendrocygna arborea</i>	V	<ul style="list-style-type: none"> Prefer mangroves, reeds and swampy areas and will often nest on offshore cays. 	Possible
<i>Fulica caribaea</i>	V	<ul style="list-style-type: none"> Prefers brackish and saline lagoons and nests in marshes and swamps. 	Possible
<i>Oxyura jamaicensis</i>	V	<ul style="list-style-type: none"> Preferred habitat is coastal embayments, swamps, and marshes. 	Possible
<i>Patagioenas leucocephala</i>	V	<ul style="list-style-type: none"> Prefers isolated offshore mangroves and nearshore hardwood and evergreen forests. 	Possible
<i>Sterna dougallii dougallii</i>	T	<ul style="list-style-type: none"> Roseate terns breed in colonies almost exclusively on small offshore islands, rarely on large islands. The northeastern colonies are on rocky offshore islands, barrier beaches, or salt marsh islands. Most colonies are close to shallow water fishing sites with sandy bottoms, bars, or shoals. The Caribbean birds nest in relatively open areas, often with no cover nearby. They breed on a variety of small cays or islands with rocky, grassy, coral rubble, or sand substrate. There is little information on the habitat of the wintering range. Some birds have been found roosting on sandbars or beaches at river mouths, estuaries, or ocean front. 	YES
<i>Corvus leucognaphalus</i>	T	<ul style="list-style-type: none"> Does not occur in Puerto Rico or vicinity 	NO
<i>Pelecanus occidentalis</i>	E	<ul style="list-style-type: none"> Habitat of the brown pelican is mainly coastal; these birds are rarely seen inland or far out at sea. They feed mostly in shallow estuarine waters, less often up to 40 miles from shore. Pelicans make extensive use of sand spits, offshore sand bars, and islets for nocturnal roosting and daily loafing, especially by nonbreeders and during the non-nesting season. Dry roosting sites are essential. Some roosting sites eventually may become nesting areas. 	YES
PLANTS			
<i>Adiantum vivesii</i>	E	<ul style="list-style-type: none"> found only on privately owned land located on the north side of Puerto Rico Hwy found in the limestone or karst region up to 198 m in elevation 	NO
<i>Aristida chaseae</i>	E	<ul style="list-style-type: none"> endemic to Puerto Rico and currently known from only two sites in the southwestern portion of the island located within the subtropical dry forest life zone 	Possible
<i>Aristida portoricensis</i>	E	<ul style="list-style-type: none"> Pelos del <input type="checkbox"/>olora is found on serpentine slopes and red clay soils of southwestern Puerto Rico. In the Sierra Bermeja this 	NO

Species	Status*	Range & Habitat	Found on Vieques
		grass is found growing on exposed rock crevices, frequently in association with <i>Aristida chasae</i> , a candidate species, and <i>Digitaria eggersii</i> , at elevations between 180 and 301 meters.	
<i>Auerodendron pauciflorum</i>	E	<ul style="list-style-type: none"> only known to exist in the limestone hills of Isabela in northwestern Puerto Rico restricted to semi-evergreen forests 	NO
<i>Banara vanderbiltii</i>	E	<ul style="list-style-type: none"> plant is currently known from two privately-owned sites: in northern Puerto Rico, between Vega Baja and Bayamon, and in the Tetras de Cayey in the municipality of Salinas found in the semi-evergreen forests of the karst region of northern Puerto Rico and in one area in the central mountains 	NO
<i>Buxus vahlii</i>	E	<ul style="list-style-type: none"> This plant is known from two locations in Puerto Rico Vahl's boxwood is found in semi-evergreen seasonal forests on limestone at elevations between 80 and 650 feet, where it is restricted to ravines and ledges. It grows as an understory shrub in semi-shaded conditions. 	Possible
<i>Callicarpa ampla</i>	E	<ul style="list-style-type: none"> At present capa rosa is known only from the palo Colorado forest of the Luquillo Mountains in northeastern Puerto Rico. All known sites occur within the Caribbean National Forest, managed by the U.S. Forest Service. The palo Colorado forest is found at elevations greater than 650 meters. 	NO
<i>Calyptanthes thomasiana</i>	E	<ul style="list-style-type: none"> 300 – 800 feet in elevation in upland moist forest or semi-evergreen forests 	Possible
<i>Calyptronoma rivalis</i>	T	<ul style="list-style-type: none"> located in the semi-evergreen, limestone forests of northwestern Puerto Rico. These forests are at elevations of 100 to 150 meters. The habitat areas are wet and humid, and the natural populations are found in level or almost level areas around stream banks. 	Possible
<i>Catesbaea melanocarpa</i>	E	<ul style="list-style-type: none"> subtropical dry forest of southwest PR 	NO
<i>Chamaecrista glandulosa</i> var. <i>mirabilis</i>	E	<ul style="list-style-type: none"> endemic to the silica sands of the northern coast of Puerto Rico previously found associated with mangroves in the southwest portion of former navy lands, Vieques 	YES
<i>Cordia bellonis</i>	E	<ul style="list-style-type: none"> elevation 441 to 820 meters along river margins and on steep slopes 	NO
<i>Cornutia obovata</i>	E	<ul style="list-style-type: none"> Only seven trees are known to exist in three areas: five individuals from five different locations in the limestone hills of the Rjo Abajo Commonwealth Forest; one from the limestone hills near the Arecibo Observatory; and one from 	Possible

Species	Status*	Range & Habitat	Found on Vieques
		<ul style="list-style-type: none"> Barranquitas in the central mountains found in the semi-evergreen or evergreen seasonal forest of the subtropical moist forest life zone on limestone hills at elevations from 150 to 350 meters. 	
<i>Cranichis ricartii</i>	E	<ul style="list-style-type: none"> reported from three locations in the moist serpentine scrub forests of the Maricao Commonwealth Forest found growing in the humus of moist serpentine scrub forests of montane ridges at elevations above 680 meters. 	NO
<i>Crescentia portoricensis</i>	E	<ul style="list-style-type: none"> found on only 12 sites in two areas of southwestern Puerto Rico inhabits montane, lower montane, mixed evergreen, semievergreen, and deciduous forests, which are underlain by serpentine. Within the two forests where it occurs, the species is restricted to sites along permanent or intermittent watercourses. 	NO
<i>Cyathea dryopteroides</i>	E	<ul style="list-style-type: none"> endemic to elfin forests of the Central Cordillera of Puerto Rico at elevations above 1,000 meters (3,280 feet). 	NO
<i>Daphnopsis hellerana</i>	E	<ul style="list-style-type: none"> endemic to Puerto Rico and restricted to the limestone hills of the northwestern coast of the island. found in the semi-evergreen or evergreen seasonal forest of the subtropical moist forest life zone on limestone hills at elevations from 150 to 350 meters. 	Possible
<i>Elaphoglossum serpens</i>	E	<ul style="list-style-type: none"> found at a single site in the montane dwarf forest of the summit of Cerro Punta 	NO
<i>Eugenia haematocarpa</i>	E	<ul style="list-style-type: none"> occurs within the Caribbean National Forest within the palo Colorado forest found at elevations greater than 650 meters 	NO
<i>Eugenia woodburyana</i>	E	<ul style="list-style-type: none"> currently known only from the Sierra Bermeja in the municipalities of Cabo Rojo and Lajas and from the Gunica Commonwealth Forest in Gunica, all in southwestern Puerto Rico. subtropical dry forest life zone 	Possible
<i>Gesneria pauciflora</i>	T	<ul style="list-style-type: none"> found growing in rocky stream beds on wet serpentine rock, where water is constantly seeping 	Possible
<i>Goetzea elegans</i>	E	<ul style="list-style-type: none"> Forested area, within 50m of streams in alluvial soils Along quebradas or seasonal water courses 	YES
<i>Harrisia portoricensis</i>	T	<ul style="list-style-type: none"> Once occurring on mainland Puerto Rico, the species has not been collected there since 1913, and is considered extirpated. The plant currently is restricted to three islands west of Puerto Rico Mona, 	NO

Species	Status*	Range & Habitat	Found on Vieques
		Monito, and Desecheo.	
<i>Ilex cookii</i>	E	<ul style="list-style-type: none"> endemic to elfin forests of the Central Cordillera of Puerto Rico at elevations above 1,000 meters (3,280 feet). 	NO
<i>Ilex sintenisii</i>	E	<ul style="list-style-type: none"> found only in the Luquillo Mountains where it is restricted to the dwarf or elfin forest. found at elevations above 750 meters on windward, ridge and leeward areas of the mountain tops 	NO
<i>Juglans jamaicensis</i>	E	<ul style="list-style-type: none"> found on lands adjacent to the Monte Guilarte Commonwealth Forest in the central mountains of Puerto Rico 	NO
<i>Lepanthes eltoroensis</i>	E	<ul style="list-style-type: none"> found only in the sierra Palm, palo Colorado, and dwarf forest associations of the Luquillo Mountains, all at elevations greater than 850 meters. 	NO
<i>Leptocereus grantianus</i>	E	<ul style="list-style-type: none"> endemic to the island of Culebra which is located just off the northeastern corner of Puerto Rico. subtropical dry forest life zone. 	Possible
<i>Lyonia truncata var. proctorii</i>	E	<ul style="list-style-type: none"> very steep slopes of Cerro Mariquita in the range of hills known as the Sierra Bermeja 	NO
<i>Mitracarpus maxwelliae</i>	E	<ul style="list-style-type: none"> known from only one location in the municipality of Guánica, in the southwestern part of the island subtropical dry forest life zone 	NO
<i>Mitracarpus polycladus</i>	E	<ul style="list-style-type: none"> known from the island of Saba in the Lesser Antilles and from one locality in southwestern Puerto Rico within the subtropical dry forest life zone 	NO
<i>Myrcia paganii</i>	E	<ul style="list-style-type: none"> found in the semi-evergreen or evergreen seasonal forest of the subtropical moist forest life zone on limestone hills at elevations from 150 to 350 meters 	Possible
<i>Ottoschulzia rhodoxylon</i>	E	<ul style="list-style-type: none"> Found in three locations Different types of habitat exist at each of the three locations. The north coast, Bayamon site is situated in a semi-evergreen, seasonal forest at an elevation of 325 feet or 100 meters. In the southwestern coast Guanica Forest, the species occurs in a low elevation, semi-deciduous, dry forest on limestone. One tree in this population is located alongside a dry stream bed which carries water only during torrential rains. The individual in the Maricao Forest survives in a lower montane, semi-evergreen forest on serpentine outcrops. This location is at an elevation of about 1,960 feet or 600 meters. 	Possible

Species	Status*	Range & Habitat	Found on Vieques
<i>Peperomia wheeleri</i>	E	<ul style="list-style-type: none"> Wheeler's peperomia is only known from Culebra Andesitic lava underlies most of Culebra Island, and on the north coast it is overlain by andesitic tuff. In north central Culebra this tuff and lava has been intruded by diorite. This diorite has weathered to round boulders which may reach several feet in diameter. Between these boulders the soil is shallow and mixed with loose stones. 	NO
<i>Psychilis macconnelliae</i>	R	<ul style="list-style-type: none"> Within 150 meters of the coastline associated with evergreen scrub, low dense scrub, and mangrove edge 	YES
<i>Pleodendron macranthum</i>	E	<ul style="list-style-type: none"> subtropical wet and the subtropical montane wet forests of northern and eastern Puerto Rico elevations greater than 650 meters 	NO
<i>Polystichum calderonense</i>	E	<ul style="list-style-type: none"> found on moist, shaded, non-calcareous ledges on mountain tops at elevations of 1,000 to 1150 meters 	NO
<i>Schoepfia arenaria</i>	T	<ul style="list-style-type: none"> known from four locations: Isabela, Piñones, Fajardo, and Río Abajo Commonwealth Forest found in low elevation evergreen and semi-evergreen forests of the limestone hills of northern Puerto Rico at elevations which vary from 150 to 350 meters 	Possible
<i>Solanum drymophilum</i>	E	<ul style="list-style-type: none"> Only 100 to 150 plants still exist on a single, 2-acre site in the Sierra de Cayey in central Puerto Rico. Although Erubia is native to evergreen forests on volcanic soils from 1,000 to 3,000 feet, most of the shrub's remaining population is in a pasture on the area's southern hill. 	NO
<i>Stahlia monosperma</i>	T	<ul style="list-style-type: none"> Scattered populations survive in Puerto Rico, the island of Vieques, and in the eastern portion of the Dominican Republic. Cobana Negra is found on the edge of salt flats in brackish, seasonally flooded wetlands. Its associates are black mangrove and buttonwood mangrove. 	YES
<i>Styrax portoricensis</i>	E	<ul style="list-style-type: none"> only one immature tree is presently known and occurs in the palo Colorado forest the palo Colorado forest is found at elevations greater than 650 meters 	NO
<i>Tectaria estremerana</i>	E	<ul style="list-style-type: none"> found in moist, shaded humus on and among the limestone boulders at 250 to 300 meters 	NO

Species	Status*	Range & Habitat	Found on Vieques
<i>Ternstroemia luquillensis</i>	E	<ul style="list-style-type: none"> known only from the palo Colorado and dwarf forests of the Luquillo Mountains in northeastern Puerto Rico 	NO
<i>Ternstroemia subsessilis</i>	E	<ul style="list-style-type: none"> restricted to the palo Colorado and dwarf forests of the Luquillo Mountains 	NO
<i>Thelypteris inabonensis</i>	E	<ul style="list-style-type: none"> is rare and localized in wet, montane forests at elevations of 1,120 to 1,250 meters 	NO
<i>Thelypteris verecunda</i>	E	<ul style="list-style-type: none"> is found at moist shaded limestone ledges at middle elevations of 200 meters 	NO
<i>Thelypteris yaucoensis</i>	E	<ul style="list-style-type: none"> found in humus on steep, shaded rocky banks and ledges at high elevations of 850 to 1,200 meters. 	NO
<i>Trichilia triacantha</i>	E	<ul style="list-style-type: none"> Bariaco is endemic to Puerto Rico and is restricted to dry limestone forests of the southwestern portion of the island. Bariaco is found in the deciduous and the semi-evergreen seasonal forests of the subtropical dry forest life zone of southwestern Puerto Rico at elevations of less than 100 meters. 	NO
<i>Vernonia proctorii</i>	E	<ul style="list-style-type: none"> endemic to Puerto Rico and known only from the summit area of Cerro Mariquita in the range of hills known as the Sierra Bermeja located within the subtropical dry forest life zone 	NO
<i>Zanthoxylum thomasianum</i>	E	<ul style="list-style-type: none"> The species grows in rugged hilly areas in soils of volcanic origin, as well as in areas of limestone. These areas are distinguished by the low stature of the vegetation and by having more than 50 percent of the species losing their leaves during the dry season. Two strata of trees are usually present. The uppermost continuous stratum is located about 15 to 30 feet high and is mostly composed of deciduous species. The lower stratum, at or below 15 feet, is composed of evergreen species. An herbaceous layer is lacking for the most part. 	Possible

* E = endangered

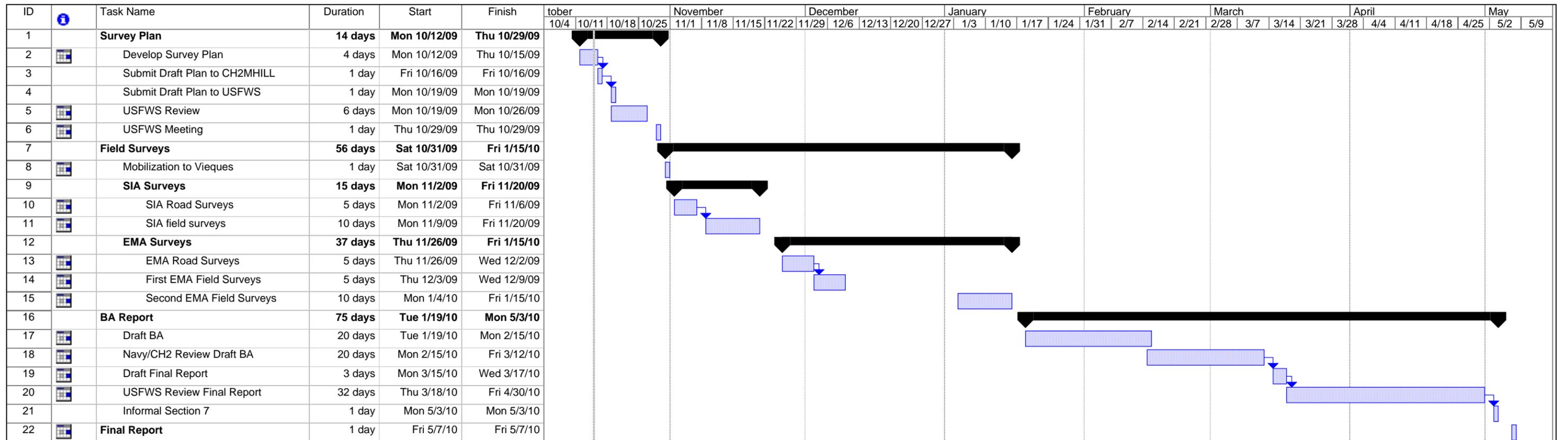
T = Threatened

R = Rare

V = Vulnerable; considered threatened by Dept of Natural and Environmental Resources (DNER)

APPENDIX II.

Tentative schedule for all field surveys, interim reports,
and the final Biological Assessment.



Project: survey schedule
Date: Thu 10/15/09

Task		Progress		Summary		External Tasks		Deadline	
Split		Milestone		Project Summary		External Milestone			