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CHENIERS AND NATURAL RIDGES STUDY

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1.0 INTRODUCTION

Southwest Louisiana is characterized by extensive coastal marshland interrupted by numerous forests atop relict beach ridges, or chenier ridges, and natural ridges or levees. The cheniers of southwest Louisiana and the natural ridges of southeast Louisiana are unique geological features that are critical components of the ecology of these areas. They support a diversity of wildlife and, because of their location along important migration pathways, are especially significant for migrating birds, as well as providing natural protection against storm surge and flooding.

Cheniers and natural ridges were formed over thousands of years by the deltaic processes of the Mississippi River and other streams. The chenier ridges of southwestern Louisiana run laterally to the modern shoreline and rise above the surrounding marshes by as little as a few inches or as much as 10 feet (Byrne et al 1959). These ridges can range from two to 15 feet thick and from 100 to 1,500 feet wide with some ridges extending along the coast for a distance of up to 30 miles. Cheniers were created during the Pleistocene by river sediments being pushed westward by shoreline currents in the Gulf of Mexico (Gould and McFarlan 1959). Natural ridges were formed by the repeated overbank flood sedimentation of rivers in southeast Louisiana (Fisk 1944). Principally, the rivers involved in creating these natural levees are past distributaries of the Mississippi River.

Historically, the Louisiana Department of Natural Resources, Coastal Management Division (LDNR/CMD) has, primarily for non-oil and gas projects, deferred the regulation of proposed activities on these features to Local Coastal Parish Programs in Cameron and St. Tammany Parishes. Based on the potential inherent value of these features, and in light of the damages resulting from Hurricanes Katrina and Rita, it is the CMD's intent to evaluate the necessity to consider legislative or rule changes to identify uses on these features as State Concerns.

The Cheniers and Natural Ridges Study was conducted on multiple fronts. Professional biologists assessed historic and current wildlife usage and vegetative composition of cheniers and ridges by on-site field evaluations and review of available literature. A hydrological study was implemented to determine the efficacy of cheniers and natural ridges in storm surge protection and a geological study, which evaluated how structural changes in these features may affect their integrity, was completed. CMD permit records relevant to authorized activities on cheniers and natural ridges were reviewed and the extent of direct and indirect impacts associated with individual activities were evaluated. Additionally, historical and current aerial photography assessment was undertaken to quantify and qualify feature impacts. The objective of this report is to address anthropogenic changes that have affected the functions and values of cheniers and natural ridges in coastal Louisiana.

The study areas for cheniers were determined by soil type (Mermentau-Hackberry) while the study areas for the natural ridges in St. Tammany Parish were assigned by LDNR/CMD personnel. The study sites are shown on **Figures 1 – 5c.**

2.0 REGULATORY FRAMEWORK

It is imperative to understand the statutory mechanisms by which proposed coastal uses are evaluated and regulated in the Louisiana Coastal Zone. The Louisiana Coastal Resources Program (LCRP) has established specific guidelines for coastal uses that must be considered in the evaluation of coastal use permit applications. Ultimately, it is how those guidelines are interpreted and implemented that determines whether or not a proposed action is in compliance with the LCRP. In terms of regulatory authority, there is also a distinction between uses of state and local concerns.

2.1 The Coastal Use Guidelines.

The **Louisiana Administrative Code (LAC), Title 43, Chapter 7, Coastal Management** establishes the framework for regulation of proposed coastal uses in the Louisiana Coastal Zone. The biological and physiographical importance of cheniers and natural features is recognized in the LAC and regulatory guidance for proposed activities on these features appears in select sections. For example, in **Guidelines Applicable to All Uses (§701 F.)**. *Information regarding the following general factors shall be utilized by the permitting authority in evaluating whether the proposed use is in compliance with the guidelines.*

> **(§701 F.12)**. *Proximity to and extent of impacts on important natural features such as beaches, barrier islands, tidal passes, wildlife and aquatic habitats and forest lands.*
>
> And in **Section §701. G**. *It is the policy of the coastal resource program to avoid the following adverse impacts. To this end, all uses and activities shall be planned, sited, designed, constructed, operated, and maintained to avoid to the maximum extent practicable significant:*
>
> **(§701. G *5*.)** *Destruction or adverse alterations of streams, wetlands, tidal passes, inshore waters and waterbottoms, beaches, dunes, barrier islands, and other natural biologically valuable areas or protective coastal features.*

Subsequent sections of this report describe wildlife functions and values as well as protective qualities inherent in cheniers and natural ridges. Though not named specifically in the guidelines referenced above, it is implicit that cheniers and natural ridges should be considered important

natural features, biologically valuable areas and/or protective coastal features.

Isolated cheniers and isolated natural ridges are however, mentioned specifically in the guidelines relevant to proposed surface alterations. Surface alterations are defined in **§700. Definitions** as *those uses and activities which change the surface or usability of a land area or water bottom. Examples include fill deposition, land reclamation, beach nourishment, dredging (primarily aerial), clearing, draining, surface mining, construction and operation of transportation, mineral, energy and industrial facilities, and industrial, commercial and urban developments.* In **§711. I. Guidelines for Surface Alterations,** it is stated that: *Surface alterations that have high adverse impacts on natural functions shall not occur,* ***to the*** *maximum extent practicable, on barrier islands and beaches, isolated cheniers, isolated natural ridges or levees, or in wildlife and aquatic species breeding or spawning areas in important migratory routes*.

It is important to understand the *maximum extent practicable* modifier's role in the evaluation process of a proposed coastal use. At **§701.H.1 (Guidelines Applicable to All Uses)** it states: *In those guidelines in which the modifier "maximum extent practicable" is used, the proposed use is in compliance with the guideline if the standard modified by the term is complied with. If the modified standard is not complied with, the use will be in compliance with the guideline if the permitting authority finds, after a systematic consideration of all pertinent information regarding the use, the site and the impacts of the use as set forth is Subsection F. above, and a balancing of their relative significance, that the benefits resulting from the proposed use would clearly outweigh the adverse impacts resulting from noncompliance with the modified standard and there are no feasible and practical alternative locations, methods, and practices for the use that in compliance with the modified standard and:*

a. *Significant public benefits will result from the use; or*
b. *The use would serve important regional, state, or national interests, including the national interest in resources and the siting of facilities in the coastal zone identified in the coastal resources program, or;*
c. *The use is coastal water dependent.*

To put this in perspective the following example is posed. A sand mining operation is proposed on a chenier in Cameron Parish which would clearly result in a significant surface alteration. Since the action *may* be interpreted as counter to the surface alterations guidelines as outlined in the preceding sections, the maximum extent practicable modifier is invoked and the permitting entity must then determine if the proposed action would comply with at least one of the three criteria listed above (a-c) before a permit could be issued or denied.

2.2 State vs. Local Concerns.

Approved Local Coastal Programs, of which there are ten in the Louisiana Coastal Zone, may, in some cases, be the lead regulatory entity for various types of proposed coastal uses. According to the Louisiana Department of Natural Resources, CMD website, the 1978 Louisiana State and Local Coastal Resources Management Act, La. RS. 49:214.21 et seq, authorized the CMD's program and the development, at the parish level, of local coastal management programs (LCPs). Determination of whether or not an activity is of state or local concern is codified in the **LAC §723. F.3. iii:** *If a use is not predominately classified as either state or local by the act or the use overlaps the two classifications, it shall be of local concern unless it:*

a. *Is being carried out with state or federal funds;*
b. *Involves the use or has significant impacts on state or federal lands, water bottoms, or works;*
c. *Is mineral or energy development, production or transportation related;*
d. *Involves the use of, or has significant impacts, on barrier islands or beaches or any other shoreline which forms part of the baseline for Louisiana's offshore jurisdiction;*
e. *Will result in major changes in the quantity or quality of water flow and circulation or in the salinity or sediment transport regimes; or*
f. *Has significant interparish or interstate impacts.*

3.0 WILDLIFE DIVERSITY

3.1 Typical Habitat of Cheniers and Ridges

Cheniers, named from the French world *chene* meaning oak, and natural ridges can be described as a live oak-hackberry forest with live oak (*Quercus virginiana*) and hackberry (*Celtis laevigata*) as the dominant canopy species. Although this forest type is the typical habitat, some areas may be woodland (canopy not closed), shrub thicket, or grassland (Cocks 1907). According to Lester et al (2005), other characteristic species are honeylocust (*Gleditsia triacanthos*), swamp red maple (*Acer rubrum* var. *drummondii*), toothache tree (*Zanthoxylum clava-herculis*), water oak (*Quercus nigra*), green ash (*Fraxinus pennsylvanica*), and American elm (*Ulmus americana*). Subcanopy species include green hawthorn (*Crataegus viridis*), persimmon (*Diospyros virginiana*), and deciduous holly (*Ilex decidua*). Dwarf palmetto (*Sabal minor*) and prickly pear cactus (*Opuntia* spp.) are also common in the understory (NatureServe 2009, Neyland and Meyer 1997). Chinese tallow tree (*Sapium sebiferum*) has become a serious invader of chenier forests, and

can have major impacts on community structure and composition (Neyland and Meyer 1997).

The natural ridges of St. Tammany Parish are dominated by mixed hardwood-loblolly pine forest, managed upland pine forest, and managed pine flatwoods (Lester et al 2005). Mixed hardwood-loblolly pine forests are dominated by loblolly pine (*Pinus taeda*), cherrybark oak (*Quercus pagoda*), American elm (*Ulmus americana*), sweetgum (*Liquidambar styraciflua*), and water oak (*Quercus nigra*). Common understory and herbaceous species include deciduous holly (*Ilex decidua*), yellow jessamine (*Gelsemium sempervirens*), wax myrtle (*Morella cerifera*), yaupon (*Ilex vomitoria*), Chinese privet (*Ligustrum sinense*), and Louisiana blackberry (*Rubus spp.*).

3.2 Importance to Wildlife

Surrounded by lowland marshes, cheniers and natural ridges create a mosaic of diverse habitats in close proximity to one another with evergreen, upland forests adjacent to open freshwater and saltwater marshes. The cheniers and natural ridges of southern Louisiana are unique features that provide critical habitat to many species of wildlife. These forested areas provide habitat, cover, and food sources not available in adjacent marshes.

3.2.1 Listed Species

At least 14 federally or state monitored species, species guilds, or significant communities are known to exist on or adjacent to cheniers and/or natural ridges (G. Lester letter to Providence, January 21, 2009; USFWS 2003; **Table 3-1**). Included in this list of species are two federally protected species. Piping plover (*Charadrius melodus*), along with its critical habitat, and red-cockaded woodpecker (*Picoides borealis*) are protected by the Endangered Species Act (ESA). Although no recorded nests are present on cheniers or natural ridges at this time, bald eagles (*Halieaeetus leucocephalus*) are known to inhabit these areas. Bald eagles have been delisted from the ESA but are still protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. Nine of these sensitive biological elements are considered imperiled to critically imperiled in Louisiana. The remaining elements of concern are comprised of various species of plants, birds, sensitive habitats, and a single species of fish. In addition to those elements described above, there are 11 species known to inhabit cheniers and/or natural levees not listed on state, federal, or global lists but are being monitored for potential listing (**Table 3-2**).

It is clear that these listed species not only inhabit chenier and natural levee forests but depend on them for survival (**Table 3-1; Figures 6a – 6d**). Bald eagle nests and waterbird nesting colonies are present within or rely upon chenier and natural ridge forests. Vertical structure, such as trees or shrubs, is required for bird nests for these species. This type of vertical structure is only found in or adjacent to forests and not in the nearby marshes. Bald eagles, in particular, require trees of substantial size to support nests which may weigh several thousand pounds (del Hoyo et al 1994). Waterbird nesting colonies include a number of species of herons, egrets, ibises, and terns as well as anhingas, olivaceous cormorants, roseate spoonbills, laughing gulls, and black skimmers (Martin and Lester 1990; **Table 3-3**). Many of these species, particularly herons, egrets, ibises, and roseate spoonbills prefer to nest in large shrubs or trees (Martin and Lester 1990). Primarily because of habitat degradation, many of these species are in decline and are listed as birds of conservation concern (USFWS 2002a; Sauer et al 2008).

The red-cockaded woodpecker (RCW; *Picoides borealis*) is a bird of old-growth pine forests and, within the study area, is found only in federally protected lands in St. Tammany Parish. Its preferred habitat is stands of pines of at least ten acres, between 60-150 years old (Hovis and Labisky 1985). Mature pine forests have declined in Louisiana as a result of timbering, housing developments, and other land-clearing activities; consequently RCWs have been reduced to small isolated colonies (USFWS 2002b). The U.S. Fish and Wildlife Service manages natural ridge features in Big Branch National Wildlife Refuge specifically for RCW habitat. In this refuge there are at least 15 active colonies (USFWS 2003).

Table 3-1
Federally or state protected species, species guilds, or significant communities known to exist on or adjacent to cheniers and natural ridges (G. Lester letter to Providence, January 21, 2009; USFWS 2003).

Species	Scientific Name	Federal Rank	Global Rank	State Rank	State Status	No. Occurrences
Birds						
Piping Plover	*Charadrius melodus*	LT	G3	S2N	Threatened/Endangered	1
Red-Cockaded Woodpecker	*Picoides borealis*	LE	G3	S2	Endangered	15
Snowy Plover	*Charadrius alexandrinus*	N/A	G4	S1B,S2N	N/A	2
Wilson's Plover	*Charadrius wilsonia*	N/A	G5	S1S3B,S3N	N/A	1
Plants						
Big Sandbur	*Cenchrus myosuroides*	N/A	G4	S1	N/A	1
Blue Water Lily	*Nymphaea elegans*	N/A	G4?	S2S4	N/A	2
Golden Canna	*Canna flaccida*	N/A	G4?	S4?	N/A	2
Gregg's Amaranth	*Amaranthus greggii*	N/A	G4?	S3	N/A	2
Mexican Hat	*Ratibida peduncularis*	N/A	G4G5	S2S3	N/A	2
Roundleaf Scarf-pea	*Pediomelum rhombifolium*	N/A	G5	S2S3	N/A	1
Wedge-leaf Prairie-clover	*Dalea emarginata*	N/A	G5	S2	N/A	1
Fish						
Paddlefish	*Polyodon spathula*	N/A	G4	S3	Prohibited	1
Sensitive Habitats						
Migratory Bird Staging/stopover Site	N/A	N/A	GNR	SNR	N/A	1
Waterbird Nesting Colony	N/A	N/A	GNR	SNR	N/A	1

Explanation of ranking categories employed by the Louisiana Natural Heritage Programs worldwide in Appendix A.

Table 3-2
Species of concern known to occur within cheniers of southwest Louisiana.
These species are not listed on state, federal, or global lists but are being monitored for potential listing.
This table was adapted from Lester et al (2005).

Species	Scientific Name	Global Rank	State Rank
Birds			
American Woodcock	*Scolopax minor*	G5	S1B, S3S5N
Field Sparrow	*Spizella pusilla*	G5	S4B, S5N
Northern Parula	*Parula americana*	G5	S5B
Orchard Oriole	*Icterus spurius*	G5	S5B
Painted Bunting	*Passerina ciris*	G5	S5B
Prothonotary Warbler	*Protonotaria citrea*	G5	S5B
Yellow-billed Cuckoo	*Coccyzus americanus*	G5	S5B
Mammals			
Southeastern Myotis	*Myotis austroriparius*	G3G4	S4
Reptiles			
Ornate Box Turtle	*Terrapene ornata*	G5T5	S1
Butterflies			
Celia's Roadside Skipper	*Amblyscirtes celia*	G4	N/A
Falcate Orangetip	*Anthocharis midea*	G4G5	S4?

N/A = not applicable. See attached explanation of ranking categories employed by natural heritage programs worldwide.

Explanation of ranking categories employed by the Louisiana Natural Heritage Programs worldwide in Appendix A.

Table 3-3
Colonial wading bird species with conservation status.
Data are from Martin and Lester (1990).

Common Name	Scientific Name	Conservation Status
Anhinga	*Anhinga anhinga*	G5, S5B
Black-crowned night heron*	*Nycticorax nycticorax*	G5, S5B, S3N
Black skimmer	*Rynchops niger*	G5, S5, BCC
Brown pelican*	*Pelecanus occidentalis*	G4, S2
Caspian tern*	*Sterna caspia*	G5, S1S2B, S3N
Cattle egret	*Bubulcus ibis*	G5, S5B, S4N
Common tern*	*Sterna hirundo*	G5, S1B, S2N
Forster's tern	*Sterna forsteri*	G5, S5
Great blue heron	*Ardea herodias*	G5, S5B, S5N
Great egret	*Ardea alba*	G5, S5B, S4N
Gull-billed tern*	*Sterna nilotica*	G5, S2B, S2S3N, BCC
Laughing gull	*Larus atricilla*	G5, S5
Least tern	*Sterna antillarum*	G4, S4B, BCC
Little blue heron*	*Egretta caerulea*	G5, S5B, S3N, BCC
Olivaceous cormorant	*Phalacrocorax brasilianus*	G5, S4
Reddish egret	*Egretta rufescens*	G4, S2B, S4N, BCC
Roseate spoonbill*	*Platalea ajaja*	G5, S3
Royal tern	*Sterna maxima*	G5, S5
Sandwich tern	*Sterna sandvicensis*	G5, S4B
Snowy egret	*Egretta thula*	G5, S4B, S5N
Sooty tern*	*Sterna fuscata*	G5, S1B
Tricolored heron	*Egretta tricolor*	G5, S5B
White ibis	*Eudocimus albus*	G5, S5, BCC
White-faced or glossy ibis	*Plegadis chihi*	G5, S4

* indicates a species of concern

BCC = bird of conservation concern (USFWS 2002a).

Explanation of ranking categories employed by the Louisiana Natural Heritage Programs worldwide in Appendix A.

3.2.2 Neotropical Migrant Songbirds

Although many species of concern are known to occur along cheniers and natural ridges, the greatest wildlife value is to the many neotropical migrant songbirds that rely on these forests during migration. The chenier ridges of southwest Louisiana are uniquely situated to provide a final feeding site for those species beginning a trans-gulf migratory flight during fall migration or an initial resting ground for those species returning from a trans-gulf flight during spring migration (Barrow and Fontenot 2006). Cheniers

are the closest forested areas available to migrants for refueling and resting before beginning or after ending a journey that may span a distance less than a few hundred miles or as much as almost 10,000 miles and with durations of over twenty hours (Berthold 1993; Barrow and Fontenot 2006). Of the 160 species of neotropical migrant songbirds in the Western Hemisphere, more than half utilize Louisiana cheniers at some point during the year (Barrow and Fontenot 2006). Of those, only a few remain to breed and the rest are present only during migration.

Many species of neotropical migrant songbirds have experienced a dramatic decline over the past few decades (Robbins et al 1989; Sauer et al 2008). Especially at risk are those species in the eastern United States that use forested habitat in either wintering or breeding areas (Robbins et al 1989). The North American Breeding Bird Survey states that 43% of neotropical migrant songbirds show a significant negative trend in population from 1980 to 2007 (Sauer et al 2008). In Louisiana, 18% of neotropical migrant songbirds show a significant negative trend over the period from 1966 to 2007 while only 5% show a significant positive trend during that same time (**Table 3-4**).

Table 3-4
Summary data for neotropical migrant songbirds in Louisiana for the period of 1966 through 2007. Data are from Sauer et al (2008).

Summary Data for Neotropical Migrants in Louisiana	1966 - 1979	1980 - 2007	1966 - 2007
Number of species encountered on more than 14 routes	23	38	39
Proportion of species with significant negative trends	0.22	0.21	0.18
Proportion of species with significant positive trends	0.13	0.03	0.05
Prior mean trend	-1.01	-1.00	-0.85
Prior variance	66.879	3.662	1.144

The decline of neotropical migrant songbirds has prompted much research that has focused on the causes of these declines and whether the limiting factors affecting populations are at breeding grounds or wintering grounds. A relatively new area of research is focusing on those areas songbirds use along migratory routes. These areas that are used by songbirds for refueling and rest during migration are often referred to as stopover sites.

Although stopover sites are only used for a brief time during migration, they have proven to be critical to the survivorship and perpetuation of a population (Finch 1991; Sillett and Holmes 2002;

Yong and Finch 2002). In fact, a recent study indicates that 85% of annual mortality of a long-distance migrant species occurs during migration rather than at breeding or wintering grounds (Sillett and Holmes 2002). This same study also found that mortality rates are fifteen times higher for songbirds during migration than at other times during their annual life cycle. At the beginning of their journey, migrants do not have all of the fat reserves needed to fuel the entire flight; therefore, they must periodically interrupt migration to forage and rebuild depleted fat stores. Suitable stopover sites must provide adequate protection from predators as well as an ample food supply to allow migrants to replenish fat reserves rapidly. The availability of suitable stopover sites may pose a serious constraint to the conservation of migratory species, especially those that have shown declining populations.

Two specific examples of neotropical migrant songbirds that are dependent upon cheniers and natural ridges are the Eastern wood-pewee (*Contopus virens*) and the common yellowthroat (*Geothlypis trichas*). The Eastern wood-pewee is a conspicuous inhabitant of eastern deciduous forests and the common yellowthroat prefers dense thickets adjacent to water (Alsop 2001). Both are indicator species of the current status of neotropical migrant songbirds. Bird count data from Louisiana show that these species, like other migrant species of Louisiana, are on the decline (**Figures 3-1 and 3-2**). These data show that Eastern wood-pewees and common yellowthroats are declining in Louisiana at rates of greater than 5% and 16% per year, respectively. Further, these two species are declining throughout their range and not just within localized areas (**Figures 3-3 and 3-4**). Likely causes for decline in these species are habitat degradation and loss, disturbance, and cowbird parasitism (Alsop 2001). In contrast, total bird counts at Little Chenier (including both migratory and non-migratory) have remained relatively stable over the last two decades (**Figure 3-5**). This suggests that while migratory bird numbers are declining, non-migratory bird numbers may be on the rise.

Figure 3-1
Eastern wood-pewee, a forest-dwelling and neotropical migrant species, population data for Louisiana. "Count" is number of birds per survey route. Sauer et al (2008).

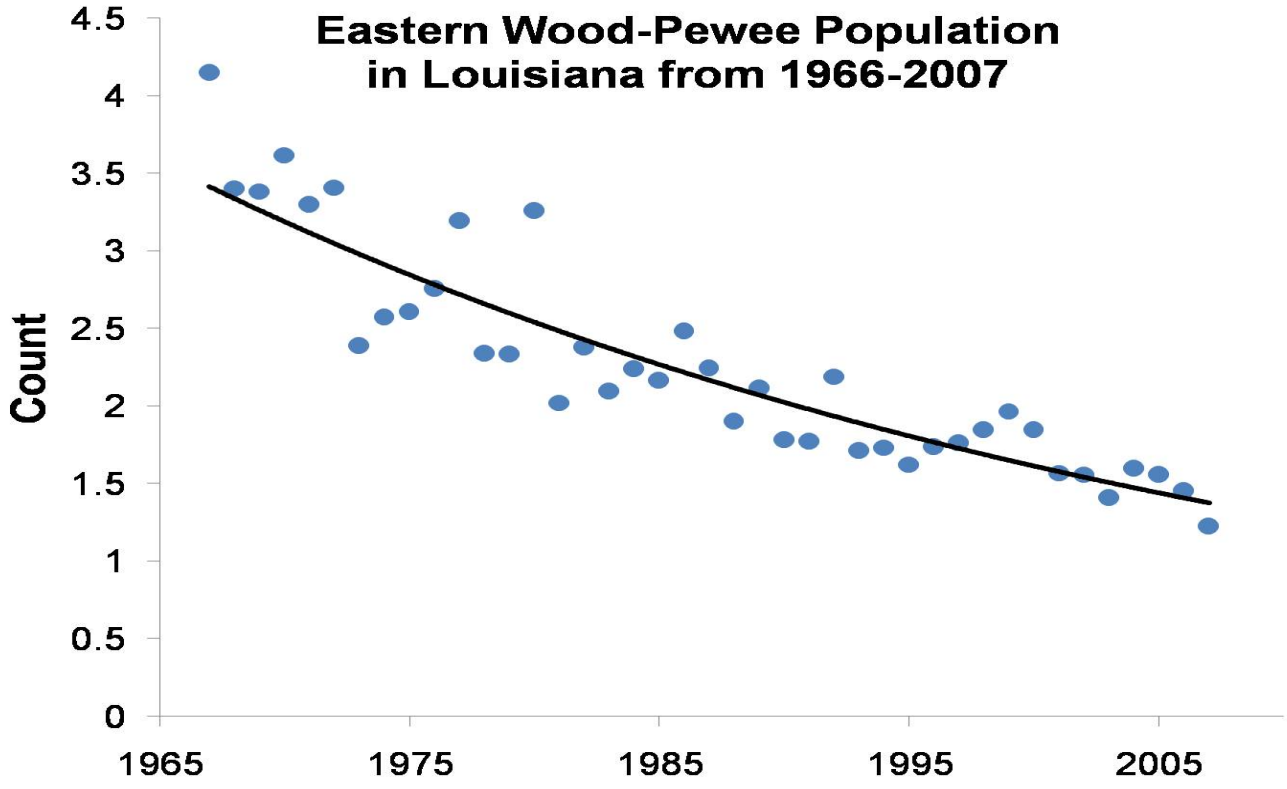


Figure 3-2
Common yellowthroat, a forest-dwelling and neotropical migrant species, population data for Louisiana.
"Count" is number of birds per survey route. Data are from Sauer et al (2008).

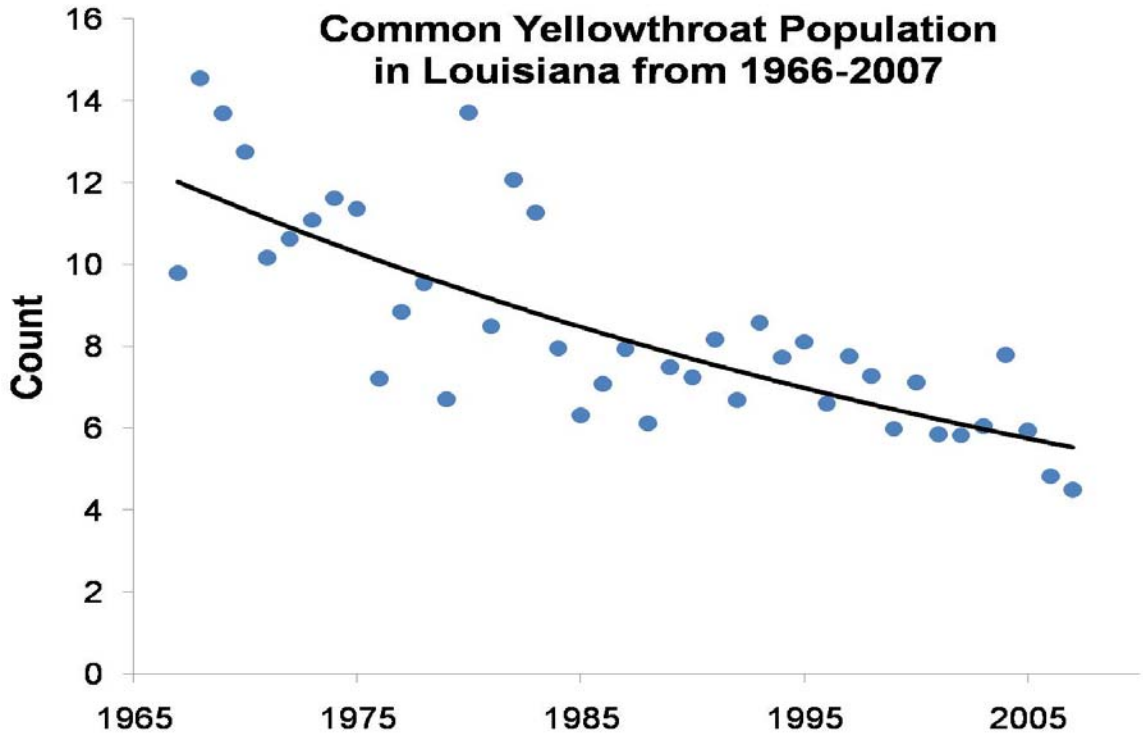


Figure 3-3
Eastern Wood-Pewee (*Contopus virens)*
Breeding Bird Survey trend map, 1966 – 2003 (Sauer et al 2008).

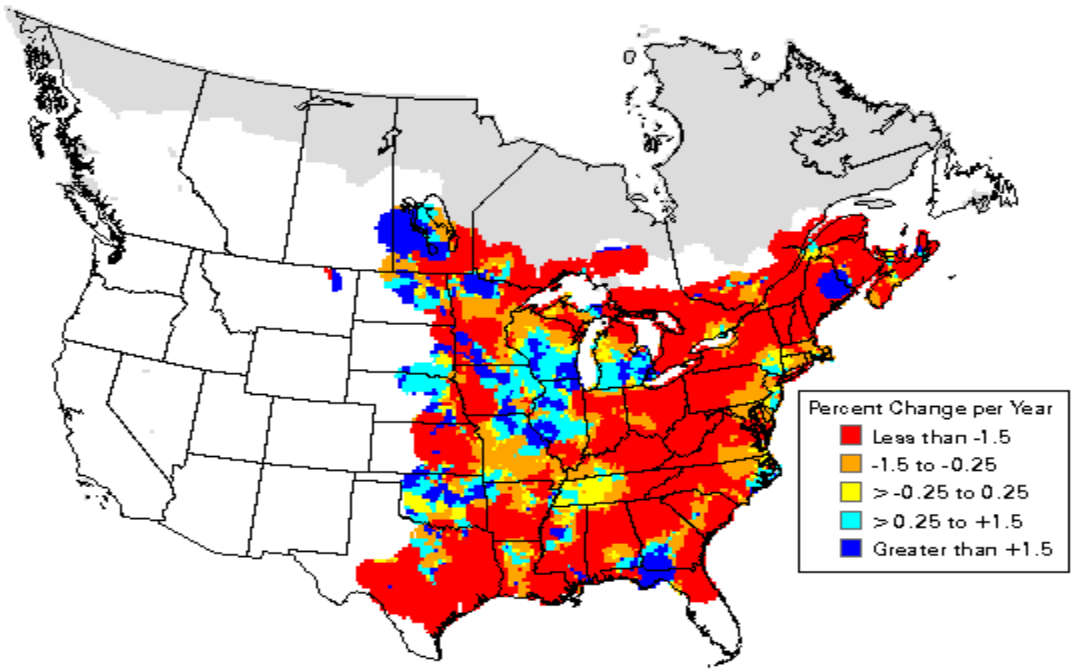


Figure 3-4
Common yellowthroat (*Geothlypis trichas)*
Breeding Bird Survey trend map, 1966 – 2003 (Sauer et al 2008).

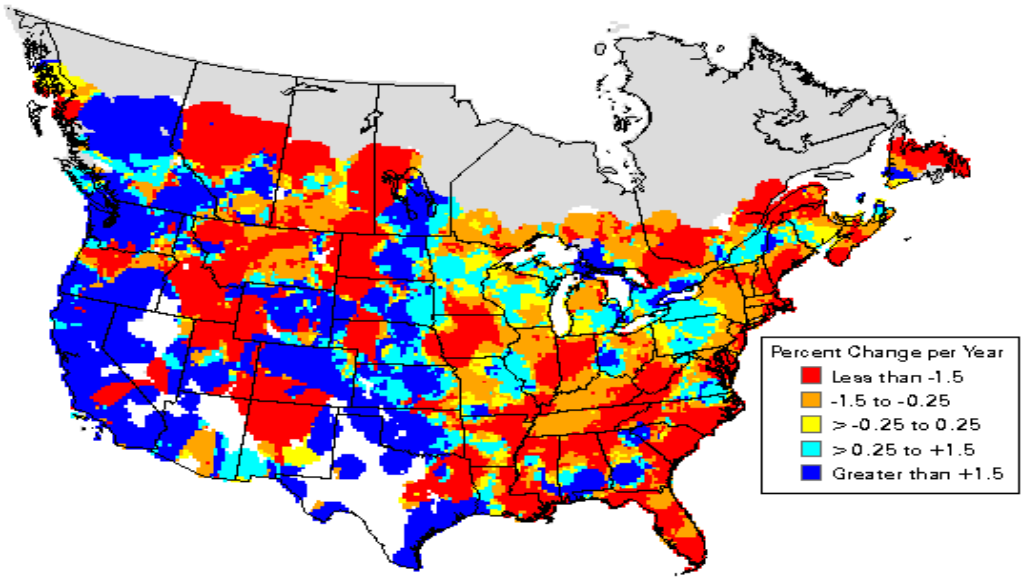
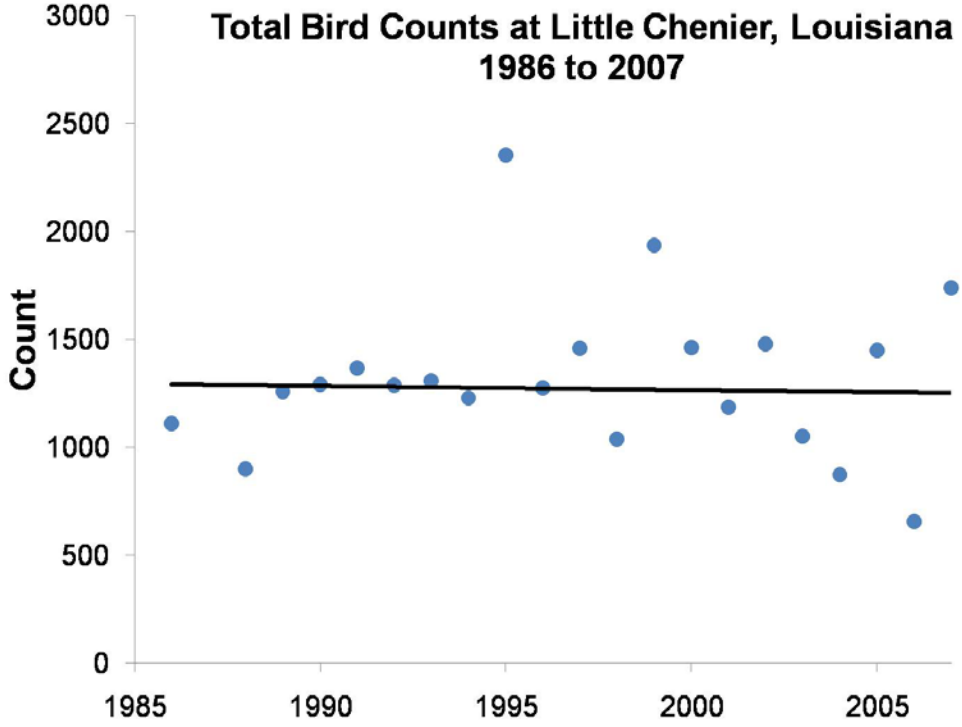


Figure 3-5
Total bird counts (migratory and non-migratory) observed along Breeding Bird Survey route #106 "Little Chenier, Louisiana." "Count" is number of birds per survey route. Data are from Sauer et al (2008).



3.2.3 Diversity Indices

Although little research has been conducted specifically on cheniers and ridges, these areas have been shown to be relatively diverse. Studies have shown that basal area (m^2/ha) ranges from 29.0 to 41.0 and overstory density (stems/ha) from 358.5 to 459.0 (**Table 3-5**). For reference, bald cypress-water tupelo swamps have densities at or near 1,235 stems/ha and basal area at 56.2 m^2/ha (Conner and Day 1976).

Table 3-5
Summary data for remnant forests on cheniers and ridges in southern Louisiana.

Basal Area (m^2/ha)	Overstory Density (stems/ha)	Species Diversity (Simpson's Index)	Species Richness (#/plot)
30.5[a]	358.5[a]	0.587-1.173[a]	8-14[a]
36.8[c]	415.5[c]	0.274-0.824[b]	7-11[b]
29.0[d]	423.0[f]	-	-
30.0[e]	459.0[f]	-	-
32.1[f]	-	-	-
41.1[f]	-	-	-

Studies: [a]White & Skojac 2002, [b]Neyland & Meyer 1997, [c]Robertson et al 1978, [d]Marks and Harcombe 1981, [e]Held and Winstead 1975, [f]Brown and Peterson 1983.

Chenier forests may be lower in species richness and diversity than natural ridge forests (Neyland and Meyer 1997; White and Skojac 2002). However, Neyland and Meyer attributed the low species diversity at several plots on chenier ridges to the high number of the invasive Chinese tallow tree. In this study, 85% of individuals at some plots were Chinese tallow tree.

4.0 ALTERATIONS IN HABITAT DIVERSITY

The remnant forests present on cheniers – coastal live oak-hackberry forest – are ranked by the Louisiana Natural Heritage Program as imperiled or critically imperiled because of the factors making them vulnerable to extirpation (LNHP letter to Providence, January 21). Cheniers have been greatly impacted because these features are slightly above the level of the surrounding marsh and are the only inhabitable land for the people of these areas. As a result, many of the cheniers have been cleared of vegetation for home sites, linear transportation projects, and commercial properties or have been drastically altered by livestock grazing or commercial mining operations (**Table 4-1**; Waldo 1963; Barrow and Fontenot 2006). Specific alterations are discussed more fully in Section 8.0. Additionally, these forests are at risk from colonization by invasive species and shoreline erosion.

Table 4-1
Threats affecting cheniers of southwest Louisiana.
This table was adapted from Lester et al 2005.

	Threat			
Source of Threat	**Altered Composition/ Structure**	**Habitat Destruction**	**Habitat Disturbance**	**Habitat Fragmentation**
Linear utilities				X
Livestock grazing	X		X	
Invasive species	X			
Mining practices		X		
Residential development		X	X	X
Shoreline erosion		X		

4.1 Anthropogenic Alterations

It appears that the greatest modifications to cheniers and ridges have come from anthropogenic influences. Estimates of the historical extent of chenier forests range from 100,000 to 500,000 acres with only 2,000 to 10,000 acres, or 2 to 10%, remaining (Smith 1993 as cited in Lester et al 2005). But this is difficult to approximate because the chenier ridges have likely experienced anthropogenic modification throughout their existence. The oldest of the cheniers is 3,300 years old (Gould and McFarlan 1959) but prehistoric Native Americans first inhabited Louisiana some 12,000 years ago (Kniffen 1968) with European settlement occurring around 1825 (Midkiff et al 1995). Considering this, it is probable that chenier forests may have never existed in a pristine state because they may have always been subject to the effects of human activity.

Because of their elevation, many cheniers and ridges have been converted to roadways, home sites, or commercial properties. Although no estimate is available, an assessment of topographic maps and aerial photographs show that almost all roads in these areas have been constructed atop cheniers or ridges. Home sites and other developments are subsequently constructed adjacent to roads. These activities have fragmented, disturbed, and destroyed large portions of remnant forests (Lester et al 2005).

Livestock grazing is a primary land use for cheniers and ridges. As much as 95% of all remnant forests are used for livestock grazing (Barrow and Fontenot 2006). This land use may not destroy habitat but, through disturbance of native vegetation, does alter the species composition and structure (Lester et al 2005). Disturbance of vegetation by cattle promotes

semi-open canopies in forests and inhibits colonization of open areas by woody species. Disturbances of this nature also allow for invasion by exotic species (Neyland and Meyer 1997).

4.2 Exotic Species Influence

Several exotic species have colonized cheniers and ridges including osage orange (*Maclura pomifera*), trifoliate orange (*poncirus trifoliata*), and others. But none have been as successful as Chinese tallow tree (*Sapium sebiferum*; Neyland and Meyer 1997). Chinese tallow tree has been shown to quickly establish recently disturbed areas (Neyland and Meyer 1997) and outgrow native bottomland species once established (Jones and McLeod 1989). Invasion by this species on cheniers has been shown to significantly reduce species diversity and alter community structure and species composition (Neyland and Meyer 1997). However, citing the ability of Chinese tallow tree to displace native grasslands and create new habitat for native woody species, Neyland and Meyer (1997) suggest Chinese tallow tree may actually increase the extent of chenier forests into the surrounding marshes.

4.3 Commercial Sand Mining

One of the most striking alterations to cheniers, in terms of habitat, has been the excavation of open pit sand and silt mining operations. The two types of soils that occur on cheniers, Hackberry and Mermentau, have much higher sand and silt content than the clayey soils of the surrounding marshes (Midkiff et al 1995). It has become profitable to excavate these soils to sell for fill material and, as a result, there are multiple open pit mining operations on existing cheniers. Open pit mining operations involve excavation of existing cheniers to a depth deeper than the surrounding marshes. After completion of operations, mining sites are essentially converted to open water (**Photographs 4.3.1 – 4.3.6**). All forested habitat is cleared and, once underwater, has little potential for regeneration. The original wildlife habitat for neotropical songbirds, colonial wading birds, and other forest-dependent wildlife is converted to aquatic habitat that is typically disconnected from other waterbodies. Further, the loss in elevation may allow a conduit for storm and tidal surges.

Photograph 4.3.1
Northerly aerial view of a sand pit in Cameron Parish taken after Hurricane Ike. Note section of washed-out highway. (*Photograph courtesy of CMD Permits and Mitigation Section*).

Photograph 4.3.2
Northerly aerial view of sand mining pit on Grand Chenier taken after Hurricane Ike (*Photograph courtesy of CMD Permits and Mitigation Section*).

Photograph 4.3.3
Ground level view of sand pit adjacent to LA Highway 82 in Cameron Parish following Hurricane Ike.
(*Photograph courtesy of CMD Permits and Mitigation Section*).

Photograph 4.3.4
Easterly ground level view of Trosclair Road sand pits in Cameron Parish following Hurricane Ike.
(*Photograph courtesy of CMD Permits and Mitigation Section*).

Photograph 4.3.5
Aerial view of sand mining pit on Grand Chenier taken after Hurricane Ike.
(*Photograph courtesy of CMD Permits and Mitigation Section*).

Photograph 4.3.6
Southerly ground level view of Trosclair Road sand pits
in Cameron Parish following Hurricane Ike.
(*Photograph courtesy of CMD Permits and Mitigation Section*).

5.0 HYDROLOGICAL STUDY

5.1 Introduction

A chenier is a beach ridge, usually composed of sand-sized material resting on clay or mud. These are the former beaches that, through the activities of nature, have become isolated from the mainland by strips of marshes (**Figure 5-1**). A chenier plain is characterized by shallow-based, perched sandy ridges, which rest on clay along a marshy or swampy, seaward facing tidal shore, with other beach ridges stranded in the marsh behind (Augustinus 1980). They are formed when the fine sand, eroded from the up-shore, is deposited. These land features are believed to attenuate storm surge and wave heights by providing the first line of defense for protection from storm surges during hurricanes and tropical storms. The degree that storm surges and wind waves are attenuated over these land forms is critical to flood protection for coastal areas, as well as to problems associated with erosion and development of coastal wetlands.

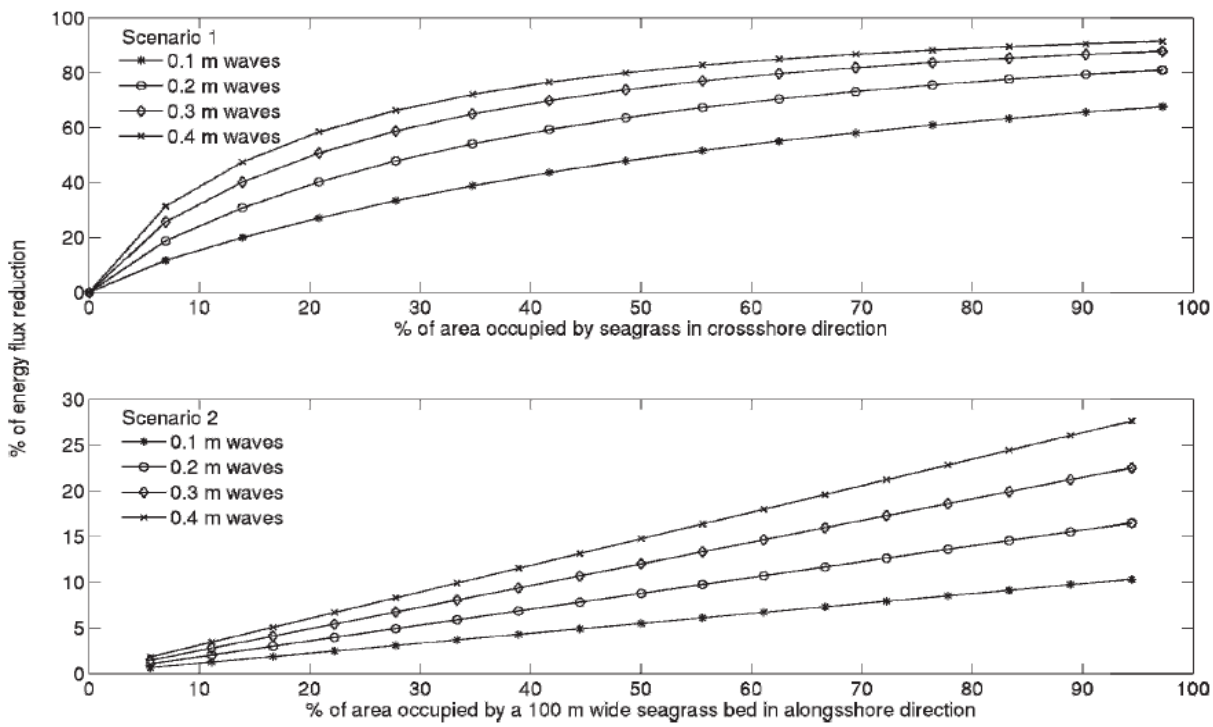
Figure 5-1
Typical aerial view of chenier plain

A considerable amount of work has been conducted regarding the role of natural structures for mitigating wave fields for coastal Louisiana. This report is based on a comprehensive search of existing literature and modeling efforts. The results and findings of these efforts are summarized

and documented to demonstrate the sea-defense value of such land features. The examples of some experiments conducted are explained below.

Shih-Nan et al (2007) ran the model NearCoM to study the effect of sea grass bed geometry in wave attenuation and sediment transportation. Their model scenarios included three, flat bottom cases with three different bed geometries. The first scenario included cross-shore bed widths from 0 to 700m with intervals of 50m, and the second used a cross-shore bed width of 100m. The along-shore bed length of the first scenario is full, while in the second it is 300 m to full, with 300m intervals. These cases examined the effect of bed width and alongshore extents on reduction of the wave energy. **Figure 5-2** shows a graphical result of the experiment.

Figure 5-2
Changes in wave energy flux reduction on the shoreline when cross shore and alongshore sea grass bed width increase.



From the results, it can be seen that larger sea grass bed width in the direction of wave propagation resulted in higher wave attenuation, and relative wave attenuation increased as the incoming wave height increased. The wave energy dissipation rate is proportional to the product of stress and wave orbital velocity for rough turbulent flow. They found that increasing the length of sea grass bed alongshore results in a linear reduction of wave energy flux at the shoreline. It is seen that the total

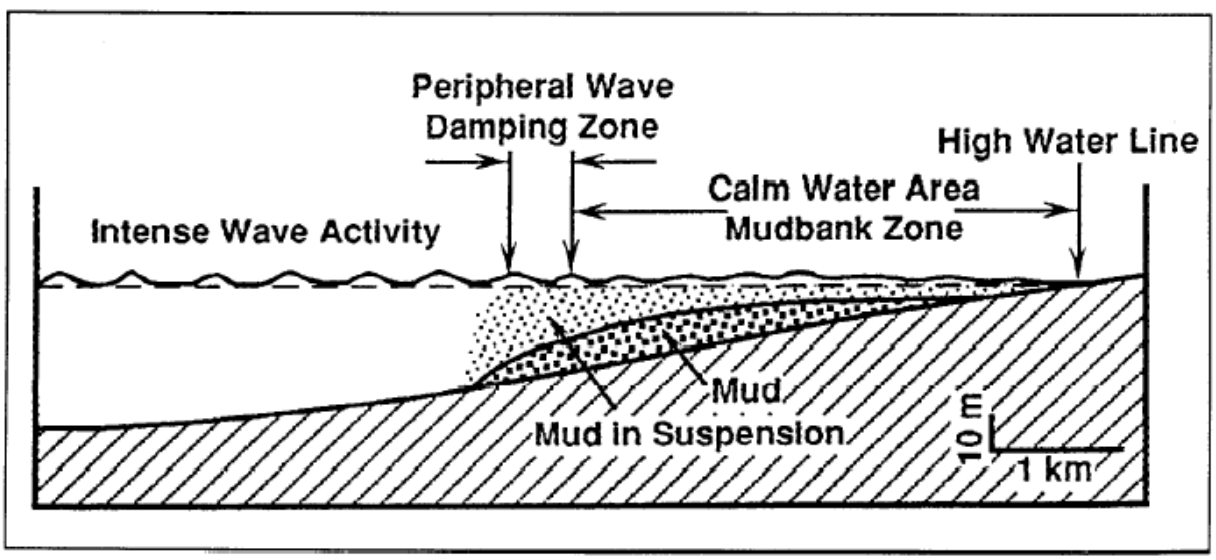
bottom stress reduction increased linearly with the offshore distance of the bed.

5.2 Wave Attenuation due to Cheniers

A chenier is formed when the mud or sand particles transported by wave currents are deposited near coastal areas. The particles that are carried by the water current are deposited according to the particle weight; i.e. the heavy particles such as sand and debris settle much faster and near the coastal areas while fine particles move farther and take more time to settle. Cheniers are composed primarily of sand and debris but sometimes contain shells and shell fragments. These materials are carried by the sea current towards the coastal area and are deposited.

Several studies have been done to show how energy dissipates when waves move over a muddy surface. A study done by U.S Army Corps of Engineers Waterway Experiment Station (1994) observed that when water moves over a muddy surface bottom, mud responds by oscillating at the frequency of the forcing wave. Due to higher viscosity, the oscillations attenuate much more rapidly with depth (**Figure 5-3**). A high rate of energy dissipation within the mud causes the surface wave height to decrease rapidly with onshore distance. Mud oscillation occurs primarily as a result of wave-induced pressure within the body of the material.

Figure 5-3
Schematic profile of mudbank region off the coast of Kerala, India (Nair 1988)



The study performed by Sheremet et al (2004) supports the theory that energy dissipates when a wave moves through a muddy surface. This experiment supports the hypothesis that sediment reworking is strongly related to wave dissipation in all the frequency bands. According to their

observation, the re-suspension and settling of sediment suggests that dissipation is strongly correlated to the formation of a high-density layer, likely due to sediment settling during the waning phase of a storm. As a storm approaches, near-shore currents and long waves traveling ahead of the approaching storm create the bottom turbulence necessary to resuspend and advect bed sediment. During the storm, sediment is mixed throughout the water column. In the waning phase, sediment settling increases flow viscosity near the bottom, which in turn accelerates settling by suppressing turbulence and therefore resuspension. As the water becomes viscous, mud layers act as a mediator of energy transfer from surface waves to the soft muddy bottom, modifying the spectral energy balance and wave propagation processes in nontrivial ways.

5.3 Results and Discussion

Cheniers and natural ridges, combined with reefs and marshes, appear to reduce the wave and surge fields and provide protection via attenuation of storm surge and wave heights. Loss of such land forms due to increased erosion in Louisiana's coasts has resulted in transformation from low to higher energy marine environments, which significantly impact the future coastal restoration efforts in Louisiana.

The attenuation of storm surges and waves are significantly greater over vegetated surfaces. The reduction in the wave height and velocity resulting from the presence of cheniers and natural ridges and vegetated surfaces will also induce deposition of sediments in marshes. Deposition of such sediments will largely depend on synergistic interactions of hydrodynamics and the marsh morphology.

There is a significant impact from land forms and vegetated surfaces on waves and storm surge attenuation, which can result in flood protection in coastal areas. A comprehensive coastal management plan will depend highly on proper management of hydrodynamics, vegetation surfaces, sedimentation, etc. in coastal zones.

Studies have been done regarding the deposition and the formation of the chenier, but few studies have addressed the wave attenuation over cheniers and natural ridges. Experimental models are needed to explain the extent of the impact by the cheniers and natural ridges during storm surges.

6.0 GEOLOGICAL STUDY

6.1 Introduction

As part of the overall study, a literature review was conducted to compare geological changes due to permitted activities and to compare how structural changes (due to permitted activities) may affect chenier

and natural ridge feature integrity. Though a thorough review of the literature was conducted, there are few geological studies *specific to* cheniers and natural ridge features. Therefore, a system-wide review, which included evaluation of anthropogenic actions and land loss data across the chenier plain was initiated, in a holistic approach, in an attempt to gauge anthropogenic alterations of natural features.

The Louisiana Chenier Plain has been formed over the past 7,000 years as a result of the shifting of the Mississippi River delta lobes. Cheniers are wave-built ridges deposited on an alluvial plain. A chenier has alternating mudflats, marsh, and long, narrow, coast-parallel, sandy ridges with oak dominated forest. The cheniers were formed as sediments were transported down the Mississippi and Atchafalaya delta lobes and into the Gulf of Mexico. Upon entering the gulf, currents carried the sediments through longshore drift and deposited the coarse sediments along the coasts. Through erosive cycles associated with delta shifting, the sediment eventually became isolated ridges along the shoreline. These barriers have served as a natural defense to episodes of high tidal influx, mostly associated with major storm events.

This portion of the study is intended to document changes to the cheniers as a result of anthropogenic influences in the study region. Specifically, the focus is on whether or not permitted activities have impacted or accelerated the degradation of the cheniers and natural ridges, or are observed land loss rates a result of natural erosion and subsidence within the study area.

6.2 Historical Events to Consider

To understand the effects of permitted activities on cheniers and natural ridges, it is important to understand the major historical events within and around the Mississippi River Delta over the last century where accurate measurements and land loss estimates are available. With the passage of the 1928 Flood Control Act by the United States Congress, the federal government assumed responsibility for managing the entire Mississippi River system. Starting in the 1930's, modernized levees along the Mississippi River were constructed for navigation and flood control. Prior to the 1950's, deforestation and farming practices resulted in a twofold increase in sediment load to coastal systems prior to dam and reservoir construction on the Arkansas and Missouri Rivers. However, as levees were completed, suspended sediments in the Mississippi River were deposited on the river floor and additional sediment was not available from the previously unimpeded natural processes of a meandering river system. Thus, starting around 1952, the Mississippi River started to show significant decline of suspended sediment concentrations along the Mississippi Delta Lobe.

Beginning around the same time (1952) and up until around 1973, significant canal dredging for oil and gas exploration was prevalent in the Louisiana Coastal Zone. The result of canal construction was an immediate impact to wetlands and nearshore habitats. In 1980, the Coastal Use Permit program was implemented and the LDNR/CMD began keeping records of dredging within the coastal zone.

The result of dredged canals and a decline in sediment load being delivered to the Mississippi Delta Lobe started showing its effects along the coastal zone. Scientific studies were undertaken to understand these impacts along with naturally occurring geological processes such as subsidence.

Over the past four decades, land loss has been well documented. A number of naturally occurring geological processes such as subsidence, erosion, as well as delta progradation and retrogradation are responsible for certain types of land loss. In addition, anthropogenic effects must also be evaluated to determine if man-made effects are contributing to the land loss and deterioration of cheniers and natural ridges.

6.3 Types of Permitted Activities

Permitted activities associated with dredging, canal construction, the installation of levees, dikes and impoundments as well as subsurface fluid withdrawal were evaluated. Permitting agencies such as the United States Army Corps of Engineers (USACE), the LDNR, Louisiana Department of Environmental Quality (LDEQ), as well as local parish coastal entities and levee boards have overseen permitted activities in coastal Louisiana.

6.3.1 Dredging

According to the Louisiana State University Center for Wetland Research, approximately 50% of the USACE permits for dredging in Louisiana are within the coastal zone. This dredging has placed significant stress on the wetlands in Louisiana. Dredging of canals for oil recovery, navigation, and other activities densely interlace the Louisiana coastal zone. As a result of the dredging activities, a 50% reduction of suspended sediment load in the Mississippi River has been measured. The significant decrease in suspended sediment has resulted in a decrease of available sediment for deposition in the nearshore marshes, wetlands, and delta lobes.

6.3.2 Levees

In addition to permitted dredging activities, levees have also played a substantial role in land loss along the coastal zone. Since passage of the 1928 Flood Control Act, modernized levees were built by the United States Army Corps of Engineers along the

Mississippi River. In many areas, the levees are made of concrete placed along the river to minimize erosion. Significant development of population centers and ports along the Mississippi River led to the need to control the rivers and impede their natural meandering tendencies. Although these efforts have been successful to this point in keeping the rivers paths in control, unintended consequences such as land loss downstream and the need for upstream dredging have resulted.

6.3.3 Dikes and Impoundments

Dikes and impoundments are another type of permitted activity to be studied when observing deterioration of the wetlands and chenier plains. Dikes have been utilized for tidal control to manipulate salt marsh habitats. Habitats behind the constructed dikes have shown rapid degradation over time due to the elimination or reduction in tidal flushing. As a result, sediment accretion rates are decreased behind the constructed dikes. Marsh impoundments were constructed for wildlife management as well as saltwater intrusion control. According to Kennish (2001), approximately 10% of Louisiana's coastal wetlands consists of impoundments. Levees are typically constructed along the perimeters of the marsh impoundments, thus isolating the impoundment from the natural habitat and hydrologic processes.

6.3.4 Subsurface Fluid Withdraw

The Louisiana coast has an abundance of oil and natural gas. As previously discussed, oil and gas exploration has impacted land loss rates through the dredging of navigational canals. However, another impact from oil and gas exploration is the subsidence caused by the withdrawal of subsurface fluids. As a result of the subsurface fluid withdrawal, voids are formed in the geological formations. Naturally, re-compaction of the formation occurs and leads to subsidence of the surface soils within the regions.

6.4 Effects of Permitted Activities

Numerous scientific studies have been conducted to determine the effects of permitted activities on land loss in the coastal zone. In this review, studies by the U.S. Geological Service (2004), U.S. Army Corps of Engineers (1990; 1992), M.J. Kennish (2001), R.A. McBride (2006), R.E. Turner (1997), and N.J. Craig et al (1979) are discussed. These reports studied land loss causes, coastal morphodynamics, anthropogenic effects, and land loss rates. Kennish (2001) suggested that 30%-59% of observed wetland losses occurred from 1955-1978 due to direct and indirect human impacts.

6.4.1 Dredging

Dredging has caused a substantial amount of land loss in Louisiana. Dredging directly converts wetland to open water or upland habitats. In addition, indirect wetland loss from spoil deposition is well documented as these areas now have a change in water levels, elevations, and species composition. Spoil banks lessen overbank flooding and sediment deposits to the marshes. While dredging causes direct land loss, unintended consequences have also been observed. For example, the series of canals has allowed a direct migration pathway for saltwater intrusion into the wetlands. As a result, indirect loss has been prevalent through changes in hydrology, saltwater intrusion, and acceleration of marsh deterioration. Changes in habitat have also made the remaining land extremely susceptible to accelerated erosion as vegetation has become sparse, making the granular soils more easily placed into suspension during high water episodes.

As a result of natural erosion along the man-made canals, widening over time from usage has been observed. Evident canal widening is affecting the Chenier Plain and is well documented through aerial photographs, surveys, and scientific studies. Annual increase of canal width ranges from 2 to 14% per year for a doubling time of 5-60 years.

6.4.2 Levees

Since the building of the levee systems starting in the 1930's, the effects of the levees have been observed. Levees alter the hydrology of wetland systems. In addition, the levees interfere with normal tidal flooding and drainage. The major impact from levees is the decreased sediment supply to the marsh surface. The decrease in sediment supply has resulted in accretion deficits of 0.41 to 0.81 centimeters per year in many areas of Mississippi River Delta (Kennish 2001). Thus, sediment that does travel to the delta regions get directly deposited into deep waters on the continental shelf edge.

Studies have been conducted to measure suspended sediment loads in the lower Mississippi River. Estimates from the early 1900's (prior to significant man-made structures and impacts) show suspended sediment at approximately 380 x 10^6 tons (Kennish 2001). By 1950 to early 1960 (post levee construction), the load had decreased to approximately 240 x 10^6 tons. Then, between 1963 and 1982 (canalization of coastal Louisiana), a 50% reduction in sediment load was measured (Kennish 2001).

6.4.3 Dikes and Impoundments

As previously discussed dikes and impoundments have been constructed for tidal/saltwater intrusion control and wildlife management. Although these structures in many cases have performed the intended job, they have also adversely impacted the ecosystem. These structures have, in some cases, lowered salinity. The reduced salinity is a result of a reduction in tidal flushing due to the berms and levees constructed. The result in changes in salinity has other effects such as changes in water quality, changes in floral/faunal communities to brackish and marsh flora and fauna. As a result, organic matter production is shown to vary, causing a change in sediment accretion rates.

6.4.4 Subsurface Fluid Withdrawal

Subsurface fluid withdrawal whether oil, gas, or groundwater, has resulted in rapid subsidence. This effect has been documented along many coastal zones from the southeastern Atlantic Coast, upper Texas Coast, the west coast along California, as well as coastal Louisiana. According to Kennish (2001), oil and gas withdrawal along the Louisiana coast has been shown to result in subsidence between 2 to 80 centimeters per year. The withdrawal and subsequent subsidence can also trigger faults and compound subsidence in areas.

6.5 Studies

A significant number of scientific studies have been documented for land loss along the Louisiana Coastal Zone. The USACE has a series of reports on land loss rates within the Louisiana Coastal Plain and Louisiana Chenier Plain. In addition, studies from the Louisiana State University Coastal Ecology Institute (Turner, 1997), Louisiana State University Center for Wetlands Resources (Craig, 1979), Rutgers University Institute of Marine and Coastal Sciences (Kennish, 2001), the United States Geological Survey (Morton et al 2004), and George Mason University Applied Coastal Research and Engineering Department (McBride, 2006) were reviewed for information on the Louisiana Chenier Plain and coastal ridges. The USACE (1990) Louisiana Chenier Plain study focused on mapping from four vintage aerial photographs. The study measured and calculated land loss areas from base maps. This allowed the USACE to determine land loss and classification.

Results of the USACE study determined land loss rates along the Louisiana Chenier Plain for four distinct time periods: 1930-1958, 1956-1974, 1974-1983, and 1983-1990 (**Tables 6-1 and 6-2**). In general, land loss rates were the highest in Time Period 2 (1956-1974) and the lowest in Time Period 1 (1932-1958). The USACE was able to produce a Chenier

Plain composite land loss rate curve. This curve showed the highest land loss rates in approximately 1966 at a rate of 13.86 square miles per year. Subsequently, the curve shows a decreasing land loss rate until 1983 with a Chenier Plain land loss rate 7.74 square miles per year.

Additionally, the USACE evaluated land loss rates within 12 U.S.G.S. 7.5-Minute Quadrangles of the Chenier Plain. The study showed variable land loss rates. Of the twelve quadrangles, two showed an increase (>10% change from the prior period) in land loss rates, three showed constant (<10% change) land loss rates, and seven showed decreasing land loss rate. The USACE also concluded that a significant portion of land loss was due to man-made factors.

A 1998 study by Bryant and Chabreck investigated vertical accretion of impounded salt marsh. The study involved four sites in the Chenier Plain and assessed the effects of impoundment levees on sediment delivery. The study found lower marsh surface elevation in the impoundment marsh habitat than in surrounding natural marshes. In fact, in 1994 impounded marsh elevations were 20-30 centimeters lower than natural marsh elevations. This change in elevation was determined to be a result of vertical marsh accretion rates. The study concluded that along Louisiana Coast, accretion rates were approximately 0.6 to 0.8 centimeters per year versus submergence rates 1-3 cm/yr.

Table 6-1
Chenier Plain Land Loss by U.S.G.S. 7.5-Minute Quadrangle
(Square Miles/Year)

Quadrangle	Average Loss mi^2/Year			
	Time period 1	Time period 2	Time period 3	Time period 4
	1930's - 1956-58	1956-58 - 1974	1974 - 1983	1983 - 1990
Johnnsons Bayou	0.09	3.12	1.02	0.3
Sulphur	0.05	1.82	0.4	0.28
Cameron	0.08	2.47	0.6	0.25
Sweet Lake	0.13	1.8	0.84	0.68
Grand Lake West	0.05	1.12	1.3	0.44
Hog Bayou	0.54	0.72	0.15	0.56
Grand Lake East	0.29	0.41	1.54	0.62
Constance Bayou	0.64	0.82	0.5	0.59
Forked Island	0.01	0.15	0.14	0.27
Pecan Island	0.06	0.79	0.75	0.62
Abbeville	0.07	0.23	0.24	0.43
Cheniere Au Tigre	0.08	0.36	0.13	0.32
Time Period Average	0.17	1.15	0.63	0.45

Table 6-2
Chenier Plain Land Loss by U.S.G.S. 7.5-Minute Quadrangle
(Percent/Year)

Quadrangle	Average % Loss/Year			
	Time period 1	Time period 2	Time period 3	Time period 4
	1930's - 1956-58	1956-58 - 1974	1974 - 1983	1983 - 1990
Johnnsons Bayou	0.04	1.23	0.53	0.16
Sulphur	0.02	0.78	0.2	0.14
Cameron	0.05	1.55	0.53	0.23
Sweet Lake	0.05	0.77	0.42	0.35
Grand Lake West	0.02	0.53	0.68	0.23
Hog Bayou	0.66	1.04	0.27	1.04
Grand Lake East	0.16	0.24	0.95	0.41
Constance Bayou	0.43	0.62	0.43	0.52
Forked Island	0.01	0.12	0.11	0.22
Pecan Island	0.03	0.44	0.47	0.4
Abbeville	0.08	0.25	0.27	0.5
Cheniere Au Tigre	0.08	0.38	0.15	0.37
Time Period Average	0.14	0.66	0.42	0.38

The tables above illustrate the changes in land loss rates over time periods that can be tied to anthropogenic activities. For instance, in Time Period 1, major construction efforts for the levee systems were underway. Time Period 1 showed the least amount of land loss rates within the study. Within this time period, sediment load within the Mississippi River was increased twofold due to deforestation and farming practices. Time Period 2 showed the most significant land loss rates over the study period. During this time period, activities such as dredging, canal construction for oil and gas exploration as well as building structures for tidal control were unpermitted and major factors in the coastal zone of Louisiana. At the end of Time Period 3, the Coastal Use Permit program was implemented. In most of the quadrangles studied, significant reductions in land loss were observed during this time period, even though the Coastal Use Permit program was only in effect for a small portion of the time period. During Time Period 4, further reduction in land loss rates was observed. These land loss rate declines can be credited to better management and decision making processes for permitted activities. Although land loss rates are still higher in Time Period 4 than Time Period 1, loss of sediment load accounts for approximately half of the difference observed between the two time periods. The remaining increase between the two time periods is a direct result of subsidence, inertia developed in the deterioration of the chenier plains, and man-made impacts.

6.6 Results/Discussion

The Louisiana coastal zone is a complex environment with a number of factors affecting its geomorphology. Regional subsidence of the area has caused significant land loss in the coastal zone. Clearly, man has also impacted the region in a number of ways including dredging, building of control structures such as levees and dikes, and building of navigational canals. These man-made structures have escalated land loss rates due to a number of unintended consequences. These consequences include a reduction in suspended load being carried to the coastal zone, saltwater intrusion into previous freshwater environments, changes in habitat, reduction in flora that has led to an increase in erosion during high-tide events, and isolation of areas from tidal flushing that has led to a decrease in sediment accretion rates. These impacts have built upon each other and have accelerated the land loss rates more significantly than originally anticipated.

The impacts of man in conjunction with natural geological processes have been well documented. However, as has been shown through the studies, proper permitting appears to have had a substantial positive impact and slowed land loss rates as compared to pre-permitted periods. Indeed, as shown during the hurricane season of 2005, the chenier plain and natural ridges are a vital barrier required for the protection of the coastal zone.

Through the use of proper permitting and an understanding of impacts not only to the local but regional environment as well, the degradation of the cheniers and natural ridges can be managed. In fact, given enough emphasis, the cheniers and natural ridges could perhaps be revitalized if permitting decisions and the potential impacts were studied through a central clearinghouse.

7.0 PERMITTED ACTIVITIES REVIEW

7.1 Methodology

Permitting records relevant to activities on cheniers and selected natural ridges in Cameron, Vermilion, and St. Tammany Parishes from the LDNR Strategic Online Natural Resources Information Service (SONRIS) database were reviewed. Coastal Use Permits (CUPs) that were on, or immediately adjacent to cheniers (Cameron and Vermilion Parishes) or natural ridges (St. Tammany Parish, as identified by LDNR personnel,) were identified and the information entered on spreadsheets. It should be noted that two of these ridges are within Fountainbleau State Park and the Big Branch National Wildlife Refuge and therefore, have few permit records for these areas.

The SONRIS database is a dynamic system that changes continuously as new permit applications are received. Data records captured for this report

are from the inception of the Louisiana Coastal Resources Program in 1980 through the week of October 6, 2008. The dataset from permitting records research includes the following parameters:

- **CUP#.** Coastal Use Permit Number. Sequential numbers, beginning in 1980, that are assigned permit applications upon receipt by LDNR/CMD.

- **Concern.** Whether or not a project was considered a state or local concern. Cameron Parish's Local Program was approved June 22, 1987, as per identified in the *Local Coastal Resources Management Act (SLCRMA) of 1978, Act 361 of 1978 as amended. R.S. 49:214.21-49:214.42*. Therefore, all projects prior to 1988 were considered state concerns. St. Tammany Parish's Local Coastal Program was approved on June 18, 1992. Vermilion Parish does not currently have an approved local coastal program and therefore all data collected for Vermilion Parish reflect uses of state concern.

- **Coordinates in Latitude/Longitude**. The coordinates of the project center(s), or for linear features, points-of-beginning and points-of-ending.

- **Permit applicant**. The entity applying for a Coastal Use Permit. This entity is ultimately responsible for the terms and conditions of the issued permit.

- **Project description.** Short statement describing the permitted action e.g., cattle walk, drilling rig. Note that some of the early CUPs do not have descriptions in the SONRIS database and some of the descriptions entered in the early years are incomplete.

- **Impacts**. Extent of surface impacts, expressed in acres, resulting from the project. Up until around 1997, impacts documented in acreage were not captured in the database. In these instances, cubic yardage of material, either excavation or fill, are noted. Volumetric rather than area measurements make quantifying ground disturbance on cheniers difficult.

- **Habitat type (Cowardin Classification).** Classification habitat as per Cowardin, L. M. et al (1979). *Classification of Deepwater Habitats in the Unites States*. U.S. Fish and Wildlife Service. This is the standard habitat classification used by LDNR/CMD. Please note that habitat classification was not documented in Cameron Parish until 1995 and not until 1997 for projects in Vermilion Parish. St. Tammany Parish habitat classification data entries began in 1999.

- **Ridge.** Chenier name as mapped on U.S. Geological Service 7.5-minute quadrangle maps. (Vermilion and Cameron Parishes only).

7.2 Results and Discussion

Data regarding the above-described parameters are included as **Appendix B.** The quality of the data for permitted coastal activities on the SONRIS database has evolved over the life of the LCRP and is, most notably in the early years, incomplete. For example, impact descriptions were, until around 1997, limited to volume of excavated and/or fill material instead of acreage. Habitat classifications do not appear in the database for Cameron Parish until around 1997. Habitat classifications documented in the database for Vermilion Parish are limited as well. Limited information on the aerial extent of impacts makes it difficult to quantify direct impacts to cheniers and adjacent areas. Lack of habitat data also makes quantifying and qualifying direct impacts to these features difficult. The advent of on-line permit application submittal through SONRIS has, however greatly improved the quality of permitting data.

7.2.1 Impacted Cheniers

Twenty-two mapped ridge systems whereupon permitted activities have occurred are identified on 2007 aerial photographs (**Figures 3a – 3d).** There has also been permitted activity on unnamed ridges as well. These named ridge features, along with the total number of permitted activities in parentheses include:

Cameron Parish

Blue Buck (62)
Little Chenier (20)
Eugene Island (4)
Mesquite Ridge (48)
Back Ridge (27)
Grand Chenier Ridge (44)
Oak Grove Ridge (13)
Garner Ridge (1)
Hackberry Ridge (14)
Pumpkin Ridge (2)
Smith Ridge (5)
Chenier Perdue Ridge (9)
Front Ridge (8)
High Island (4)
Indian Point Island (6)
Unnamed (28)

Vermilion Parish

Bill Ridge (1)
Sand Ridge (1)
Koch's Ridge (1)
Lost Island (1)
Unnamed (1)
Cheniere Au Tigre (1)
Front Ridge (12)
Buck Ridge (4)
Pecan Island (10)

7.2.2 Project Classifications.

Based on data obtained from SONRIS, from LCRP inception through October of 2008, total Coastal Use Permits and/or other authorizations on or immediately adjacent to the cheniers in Cameron and Vermilion Parishes numbered 328. Permitted activities in Cameron Parish outnumbered those in Vermilion Parish by nine-to-one. This is of course a function of the broad extent of cheniers in Cameron Parish as opposed to those in Vermilion Parish.

Three distinct classes of Coastal Use Permits were identified on the cheniers – oil and gas, private/commercial, and public. Of the total number of permitted activities, 185 (56%) are oil and gas related, 101 (31%) are private/commercial development, and 42 (13%) were initiated by public entities, such as Cameron Parish Gravity Drainage District and Cameron Waterworks. Permit totals of project types by parish are shown in **Table 7-1**.

On the St. Tammany Parish ridges evaluated there were thirteen private/commercial permit issued and three public permits issued (LA Department of Transportation, Louisiana Department of Culture, Recreation and Tourism, and the St. Tammany Parish School Board). There were no oil and gas permits issued for the study areas.

Table 7-1
Number of Permitted Activities
by Project Classification on Cheniers (1980 – 2008).

Parish	Oil & Gas	Private/Commercial	Public	Totals
Vermilion	16	14	3	33
Cameron	169	87	39	295
Totals	185 (56%)	101 (31%)	42 (13%)	328

7.2.3 State/Local Concerns

State and local concern data was compared for the target review period. The Cameron Parish Local Program was approved by the National Oceanic and Atmospheric Administration (NOAA) on June 22, 1987. Therefore all permit actions taken prior to 1988 in Cameron Parish were documented as state concerns. Of the total permit actions on Cameron Parish cheniers, (188) documented from 1988 through October of 2008, there were 81 permit actions

(43% of total) considered local concerns and 107 permit actions (57% of total) deemed state concerns. Vermilion Parish does not have an approved local coastal program therefore all uses were considered state concerns.

On the target St. Tammany Parish ridges, there were 31 total permits issued. Twelve of those permit actions (39%) were issued by the local program while 19 permits (61%) were issued as state concerns.

7.2.4 Permitted Activities

Based on the Descriptions Field in the SONRIS database, oil and gas was the dominant permitted activity in Cameron Parish. Because each individual permitted site was not evaluated by aerial photography and the habitat data was not, in most cases, listed consistently until around 1996 it is difficult to determine whether or not woody vegetation was cleared to implement the activity or if permanent impacts occurred as a result of the project. As stated in previous earlier sections, most of the chenier features have already be impacted to some degree, (*e.g.* cleared for pasture, agriculture, home sites).

In general, oil and gas exploration and production on the cheniers includes installation of pipelines/flowlines, well locations and board roads, heater platform installation, miscellaneous access roads, and other supporting infrastructure. In terms of direct impacts, pipelines/flowlines require clearing with construction (temporary) and permanent rights-of-way. When pipelines/flowlines are installed the impacts are most often temporary unless woody vegetation must be permanently maintained post-construction which may in turn impact wildlife resting/foraging areas as vegetation is removed. It is reasonable to assume however that most of the pipelines/flowline impacts are therefore temporary in nature and do not necessarily affect the integrity of the chenier. Well locations and associated access roads, from an impact standpoint, are similar to flowlines/pipelines in impact in that the surface of the chenier is affected. As mentioned previously, all oil and gas related actions are uses of state concerns and are therefore processed by the CMD and not the local coastal program.

Private/public coastal use permits in Cameron and Vermilion Parishes include activities such as installation of cattle walks, homesites, borrow sites for fill material, excavation of fish ponds, and drainage improvements. Of those listed actions, it seems clear that borrow pits for fill and excavation of fish ponds result in the highest degree of impact to the cheniers. Data base review showed that there are twenty-seven permitted borrow pit/fish pond

excavation projects in Cameron and Vermilion Parishes. Of those, twenty-six are in Cameron Parish. Thirteen of these areas were permitted as state concerns and thirteen were permitted as local concerns. The first local coastal program borrow pit permit was issued in 1996. Up until that point, all borrow pits were permitted as state concerns. Since 1996, all borrow pit permit applications, submitted by private/commercial entities, have been processed by the local coastal program. It must be noted however that review of historic aerial photography shows that a portion of the aerial extent of borrow pits along the cheniers may have occurred prior to inception of the LCRP.

As noted in **Section 4.0,** open pit mining operations involve excavation of existing cheniers to a depth deeper than the surrounding marshes with resultant conversion to open water aquatic habitat. Open water areas then have little potential for recovery as wildlife habitat. In **Section 5.0**, it was stated that attenuation of storm surges and waves are significantly greater over vegetated surfaces. When vegetation is removed from cheniers as a result of open pit construction, it lessens the capacity of these features to reduce wave height and velocity during storm surges.

Permitted activities on targeted St. Tammany Parish ridges are primarily those associated with home site and residential development. There were no permits associated with oil and gas exploration and production during the period of available data. This is not surprising as most of these areas are managed by state and federal entities which preclude most types of development on these properties. However, oil and gas facilities on these ridges may have been installed prior to the inception of the LCRP.

8.0 FIELD SURVEYS

8.1 Methodology

In mid-October 2008 and February 2009, Providence biologists established 64 individual sample locations on and immediately adjacent to cheniers in Cameron and Vermilion Parishes and within select natural ridges in St. Tammany Parish. Data forms, based on CMD Field Investigation reporting criteria, were developed and used to characterize various ecological and physiographical features at each sample location. Data collected at each of the sample locations included:

- Feature name
- Accessibility
- Site alterations

- Current/Adjacent land uses
- History of land use
- Wildlife species observed
- Invasive plant and animal species
- Mapped soil type(s)
- Vegetation

Sample locations were established by review of CMD permitting data, USDA Soil Conservation Service maps, aerial photography, and U.S.G.S. 7.5-minute topographic maps. The objective of the field effort was to identify and assess areas of cheniers that have been developed by private or commercial entities as well as those areas that are, at present, relatively undisturbed. Individual sample location coordinates were documented with GPS and those locations are plotted on 2007 aerial photographs (**Figures 3a – 3d and 5a – 5c)**. Data forms and photographs of each sample location, taken in the four cardinal directions, are included as **Appendix C.**

8.2 Results and Discussion

8.2.1 Accessibility

All sample locations on the cheniers were accessed either by state or private (primarily gravel or shell) roads. Time and resource constraints prohibited access to the more isolated cheniers. Access to the natural ridge sample locations in St. Tammany Parish were also via state highways and parish roads.

8.2.2 Site Alterations

As mentioned, areas of high ground are scarce in Cameron and Vermilion Parishes. Therefore historically, the ridges are utilized for habitation, transportation, livestock usage, agriculture and various other forms of infrastructure. Surface alterations observed at the sample locations include highways and access roads, drainage ditches, residences/outbuildings, power line rights-of-way, oil and gas production facilities, fencing, borrow pits, canals, lands cleared for pasture/agriculture, and miscellaneous fills for access and other infrastructure. No alterations, at least in terms of clearing and/or filling were observed on six of the 55 sample locations.

Along the St. Tammany ridges, these features have been manipulated for varying uses. A dominant land use for the ridges is residential housing with other uses including oil and natural gas wells, utility rights-of-way, some commercial development, and roadways. All ridge features are easily accessible from public roads

along US Highway 190 and from maintained roads throughout the public parks.

8.2.3 Wildlife Species Observed

Wildlife species observed on or adjacent to the chenier sample locations were noted on the data forms. These data are a snapshot of those species occurrences during the October field effort. No specific wildlife survey protocol was used to assess current wildlife populations at the sample locations. **Table 8-1** shows those species that were indentified.

Table 8-1
Wildlife species observed on or adjacent to chenier sample locations during the fieldwork of October 2008.

Common Name	Scientific Name
Birds	
Belted kingfisher	*Megaceryle alcyon*
Black-winged stilt	*Himantopus himantopus*
Cattle egret	*Bubulcus ibis*
Common grackle	*Quiscalus quiscula*
Double-crested cormorant	*Phalacrocorax auritas*
Great blue heron	*Ardea herodias*
Great egret	*Ardea alba*
Killdeer	*Charadrius vociferous*
Marsh wren	*Cistothorus palustris*
Common moorhen	*Gallinula chloropus*
Mourning dove	*Zenaida macroura*
Northern bobwhite	*Colinus virginianus*
Purple gallinule	*Porphyrio martinica*
Red-winged blackbird	*Agelaius phoeniceus*
Roseate spoonbill	*Ajaia ajaja*
Snowy egret	*Egretta thula*
Reptiles	
American alligator	*Alligator mississippiensis*
Banded water snake	*Nerodia fasciata*
Musk turtle	*Sternotherus odoratus*
Plain-bellied water snake	*Nerodia erythrogaster*
Pond slider	*Trachemys scripta*
Red-eared slider	*Trachemys scripta elegans*
Mammals	
Eastern cottontail	*Sylvilagus floridanus*
Raccoon	*Procyon lotor*

8.2.4 Invasive Plant and Animal Species

On the cheniers, as expected, Chinese tallow tree (*Sapium sebiferum*) is the dominant invasive plant species observed on the cheniers. Chinese tallow tree was observed at 19 of the 55 sample locations (35%) established to document current conditions. Only

one other invasive species, Chinese privet (*Ligustrum sinense*) was observed and this was limited to only one sample location.

On St. Tammany Parish ridges, the invasive species yaupon (*Illex vomitoria*) and Chinese privet were observed during the field evaluation in all forest types.

8.2.5 Mapped Soil Types

8.2.5.1 Cameron and Vermilion Parishes

Field data confirm that mapped soil series Mermentau-Hackberry are present at all sample locations. According to the Soil Survey of Cameron Parish (USDA Soil Conservation Service 1986), these level and gently undulating, somewhat poorly drained and poorly drained soils are near the coast of the Gulf of Mexico. The Hackberry soil is on low ridges, and the Mermentau soil is in depressions between the ridges. The ridges are 1 to 3 feet high and 50 to 300 feet wide. The depressions are about 50 to 300 feet wide. The soils are subject to flooding during hurricanes and tropical storms. Most areas are about 60 percent Hackberry and similar soils and 30 percent Mermentau soil. The two soils occur in areas so closely intermingled that they are difficult to map separately at an appropriate scale. Areas are long and narrow and range from 50 to 1,000 acres in size. Slope is 0 to 1 percent in the depressions and 1 to 3 percent on the ridges.

The Hackberry and Mermentau soils are used mainly as pasture. A small acreage is used for rangeland, homesite development, gardens, or industrial development. The primary management concerns for both soils are wetness and salinity, however, Hackberry soil is better suited for pasture as Mermentau soil is prone to experience frequent flooding. The natural vegetation on Hackberry soil includes: common bermudagrass (*Cynodon dactylon*), common carpetgrass (*Axonopus affinis*), rattail smutgrass (*Sporobolus indicus*), eastern falsewillow (*Baccharis halimifolia*), cabbage-palm (*Sabal palmetto*), pricklypear (*Opuntia stricta*), and, in certain areas, sugarberry (*Celtis laevigata*) and live oak (*Quercus virginiana*). The natural vegetation on Mermentau soil includes: coastal waterhyssop (*Bacopa monnieri*), saltmarsh morning glory (*Ipomoea sagittata*), longtom (*Paspalum lividum*), marsh hay cordgrass (*Spartina patens*), big cordgrass (*Spartina cynosuroides*), gulf cordgrass (*Spartina spartinae*), common reed (*Phragmites australis*), seashore saltgrass (*Distichlis spicata*), seashore paspalum (*Paspalum vaginatum*), Olney bulrush (*Scirpus americanus*), and dwarf spikerush (*Eleocharis parvula*).

8.2.5.2 St. Tammany Parish

Field data confirm that Guyton-Abita-Brimstone are present at all sample locations in the northwestern ridge. Guyton-Abita-Brimstone and Myatt-Stough-Prentiss are present at sample locations in the two southeastern ridges of St. Tammany Parish. According to the Soil Survey of St. Tammany Parish (USDA Soil Conservation Service 1990), Guyton-Abita-Brimstone are level to gently sloping, poorly drained and somewhat poorly drained soils found on the Eastern Gulf Coast Flatwoods, a broad stream, or marine terrace. The Guyton soil is in the drainage ways and depressions between the ridges. The Abita soil is on slightly convex ridges and side slopes, and the Brimstone soil is on the broad flats. Most areas are about 55 percent Guyton soils, 32 percent Abita soils, 8 percent Brimstone soils, and 5 percent soils of minor extent. Slope is 0 to 1 percent in the depressions and 1 to 5 percent on the ridges. These soils are used mainly as woodland. A small acreage is used for crops, pasture, or residential and commercial area. Wetness limits the use of equipment and the sodium levels of Brimstone can limit tree growth.

The Myatt-Stough-Prentiss are level to very gently sloping, poorly drained to moderately well drained soils found on broad terraces in the southern part of St. Tammany Parish. The Myatt soil is on low flats and in depressions between the ridges. The Stough soil is on flats that are slightly higher than those of the Myatt soils, and the Prentiss soil is found on low ridges. Most areas are about 42 percent Myatt soils, 39 percent Stough soils, 13 percent Prentiss soils, and 6 percent soils of minor extent. Slope is 0 to 1 percent in the depressions and 1 to 3 percent on the ridges. Used mainly as woodland. A small acreage is used for crops, pasture, or urban uses. The primary limitation for these soils is wetness. Flooding is a hazard associated with some areas of the Myatt soils.

The natural vegetation found within these soil types, for these natural ridge plant communities of the ridges of St. Tammany Parish, include: live oak (*Quercus Virginiana*), sweet gum (*Liquidambar syraciflua*), water oak (*Quercus nigra*), swamp dogwood (*Cornus foemina*), dwarf palmetto (*Sabal minor*), wax myrtle (*Morella cerifera*), seaside goldenrod (*Solidago sempervirens*), smartweeds (*Polygonum* spp.), panic grasses (*Panicum* spp.), and basket grass (*Oplismenus hirtellus*).

8.2.6 Vegetation

8.2.6.1 Cheniers

Chenier vegetative communities are not, in total, diverse. Dominant vegetative species and frequency (observations as a percentage of total sample locations) are shown in **Table 8-2.** As expected, the dominant forest tree species present on the sampled cheneirs are live oak, hackberry and the invasive Chinese tallow tree. Dominant woody shrub species include eastern falsewillow, annual sumpweed (*Iva frutescens*), Carolina wolfberry (*Lycium carolinianum*), needle bush (*Acacia farnesiana*), and hemp sesbania (*Sesbania exalata*). The herbaceous layer appears to be dominated by common bermudagrass, marsh hay cordgrass, and common reed. Dominant woody vine species include Louisiana blackberry (*Rubus louisianus*), and grape muscadine (*Vitis rotundifolia*).

Table 8-2
Vegetative Species and Frequency by Tree, Shrub, Herb, and Woody Vine Stratums in the chenier sample locations.

TREES

Common Name	Scientific Name	Occurrence by Sample Location	Frequency
Live oak	*Quercus virginiana*	32	33.7%
Sugarberry	*Celtis laevigata*	24	25.3%
Chinese tallow tree	*Sapium sebiferum*	18	18.9%
Honeylocust	*Gleditsia triacanthos*	8	8.4%
Pecan	*Carya illinoinensis*	7	7.4%
Black willow	*Salix nigra*	2	2.1%
American sycamore	*Platanus occidentalis*	2	2.1%
Water locust	*Gleditsia aquatica*	1	1.1%
Bald cypress	*Taxodium distichum*	1	1.1%
American elm	*Ulmus americana*	1	1.1%

SHRUBS

Common Name	Scientific Name	Occurrence by Sample Location	Frequency
Eastern baccharis	*Baccharis halimifolia*	21	20.4%
Jesuit's bark	*Iva frutescens*	19	18.4%
Carolina desert-thorn	*Lycium carolinianum*	14	13.6%
Sweet acacia	*Acacia farnesiana*	12	11.7%
Bigpod sesbania	*Sesbania exaltata*	12	11.7%
Dwarf palmetto	*Sabal minor*	8	7.8%
Erect pricklypear	*Opuntia stricta*	4	3.9%
Bushy seaside tansy	*Borrichia frutescens*	3	2.9%
Multiflora rose	*Rosa multiflora*	2	1.9%
Southern amaranth	*Amaranthus australis*	1	1.0%
Goatweed	*Capraria biflora*	1	1.0%
Yaupon	*Ilex vomitoria*	1	1.0%
Annual marsh elder	*Iva annua*	1	1.0%
Lantana	*Lantana camara*	1	1.0%
Chinese privet	*Ligustrum sinense*	1	1.0%
Virginia creeper	*Parthenocissus quinquefolia*	1	1.0%
Hercules' club	*Zanthoxylum clava-herculis*	1	1.0%

HERBS

Common Name	Scientific Name	Occurrence by Sample Location	Frequency
Bermudagrass	*Cynodon dactylon*	31	23.8%
Saltmeadow cordgrass	*Spartina patens*	16	12.3%
Common reed	*Phragmites australis*	11	8.5%
Great ragweed	*Ambrosia trifida*	7	5.4%
Saltgrass	*Distichlis spicata*	7	5.4%
Smooth cordgrass	*Spartina alterniflora*	7	5.4%
Common rush	*Juncus effusus*	4	3.1%
Torpedo grass	*Panicum repens*	4	3.1%
Bahiagrass	*Paspalum notatum*	4	3.1%
Annual ragweed	*Ambrosia artemisiifolia*	3	2.3%
Bardyardgrass	*Echinochloa crus-galli*	3	2.3%
Dogfennel	*Eupatorium capillifolium*	3	2.3%
Maidencane	*Panicum hemitomon*	3	2.3%
Switchgrass	*Panicum virgatum*	3	2.3%
Chairmaker's bulrush	*Schoenoplectus americanus*	3	2.3%
Cattail grass	*Setaria glauca*	3	2.3%
Seaside goldenrod	*Solidago sempervirens*	3	2.3%
Perennial saltmarsh aster	*Symphyotrichum tenuifolium*	3	2.3%
Narrowleaf cattail	*Typha angustifolia*	3	2.3%
White edge sedge	*Carex debilis*	2	1.5%
Tall morning-glory	*Ipomoea purpurea*	2	1.5%
Alligatorweed	*Alternanthera philoxeroides*	1	0.8%
Wand lythrum	*Lythrum lineare*	1	0.8%
Florida paspalum	*Paspalum floridanum*	1	0.8%
Curly dock	*Rumex crispus*	1	0.8%
Swamp verbena	*Verbena hastata*	1	0.8%

WOODY VINES

Common Name	Scientific Name	Occurrence by Sample Location	Frequency
Sawtooth blackberry	*Rubus louisianus*	4	40.0%
Muscadine	*Vitis rotundifolia*	2	20.0%
Spanish moss	*Tillandsia usneoides*	2	20.0%
Saw greenbrier	*Smilax bona-nox*	1	10.0%
Eastern poison ivy	*Toxicodendron radicans*	1	10.0%

8.2.6.2 St. Tammany Ridges

The natural ridges of St. Tammany Parish are dominated by mixed hardwood-loblolly pine forest, managed upland pine forest, and managed pine flatwoods. Mixed hardwood-loblolly pine forests are dominated by loblolly pine (*Pinus taeda*), cherrybark oak (*Quercus pagoda*), American elm (*Ulmus americana*), sweetgum (*Liquidambar styraciflua*), and water oak (*Quercus nigra*). Common understory and herbaceous species include deciduous holly (*Ilex decidua*), yellow jessamine (*Gelsemium sempervirens*), wax myrtle (*Morella cerifera*), yaupon (*Ilex vomitoria*), Chinese privet (*Ligustrum sinense*), and Louisiana blackberry (*Rubus spp.*).

The managed upland pine forests and managed pine flatwoods are present on state and federal conservation areas (Fontainebleau State Park and Big Branch National Wildlife Refuge). These areas are managed for red-cockaded woodpecker (*Picoides borealis*) habitat. Upland pine forests are dominated by longleaf pine (*Pinus palustris*), loblolly pine, water oak, and blackjack oak (*Quercus marilandica*). Common understory and herbaceous species include flowering dogwood (*Cornus florida*), wax myrtle, yaupon, yellow jessamine, blackberries, greenbriers (*Smilax spp.*), broomsedges (*Andropogon spp.*), and panic grasses (*Panicum spp.*). The managed pine flatwoods are dominated by longleaf pine, slash pine (*Pinus elliottii*), sweetbay (*Magnolia virginiana*), live oak (*Quercus virginiana*), wax myrtle, and blackjack oak. Common understory and herbaceous species include broomsedges, yellow-eyed grasses (*Xyris spp.*), panic grasses, beak-rushes (*Rhynchospora spp.*), and white edge sedge (*Carex debilis*).

9.0 AERIAL PHOTOGRAPHY ANALYSIS

Historic aerial photography for the study areas for the years 1950, 1953, 1957, 1968, 1998, and 2007 were secured from Louisiana State University, Department of Geography and Anthropology, Cartographic Information Center. The photographs are photomosaics taken by the United States Department of Agriculture or the Louisiana Department of Transportation. The historic aerial photography has been made available to the LDNR under separate cover.

As noted in **Section 4.3**, the most obvious impacts to cheniers in Cameron and Vermilion Parishes are the construction of open pits. GIS specialists assessed the aerial extent of the pits from 1950 through 2007. Existing pits, as of 2007 were digitized and the available years were subsequently evaluated to determine the approximate years that the pits were constructed as well as the acreage directly impacted. **Table 9-1** shows sand pit acreage by historical aerial photograph groupings.

Table 9-1 Sand pit acreage identified on historic aerial photographs from 1950 through 2007.

Years	Acreage (Cumulative)
1950s	54.7
1960s	184.0
1990s	354.9
2000 - 2005	502.1
2007	487*

*Based on 2007 data, it appears that approximately 15.1 acres of pits may have been reclaimed.

Exhibit 1 shows two mapped ridge features, Hackberry Ridge and Buck Ridge, in Sections 7, 8, 17, and 18 T15S-R13W where sand mining has been pervasive. It appears that significant mining activity occurred during the 1960s through the 1990s. **Exhibit 2** shows similar information for an area of Front Ridge, also in Cameron Parish in Sections 21-27, T15S-R9W.

Review of aerial photography on the selected ridges shows that activity on the central and eastern ridges (**Figures 5b and 5c**) is minimal due to these areas being part of Fountainbleau State Park and the Big Branch National Wildlife Refuge. The western most ridge (**Figure 5a and Exhibit 3**) shows that the dominant surface alterations have been primarily residential and commercial development as well as road infrastructure.

10.0 CONCLUSIONS AND RECOMMENDATIONS

10.1 General

The focus of this report is to address anthropogenic changes that may have affected functions and values of cheniers and natural ridge features in south Louisiana by assessing a variety of structural, regulatory, and ecological factors. Of particular importance are those anthropogenic alterations that have been authorized by the LCRP. The geologic structure and hydrologic function of cheniers were explored as was historic and current usage by wildlife species and the composition of current vegetative communities. Permitting records were reviewed to determine types and impacts of permitted actions and whether or not these actions were state or local concerns. Available aerial photography was evaluated in an attempt to quantify certain types of changes in landform and habitat.

In an historical context it is reasonable to assume that cheniers have, since pre-historic times and certainly since the post-European settlement era, experienced anthropogenic modification throughout their existence. As mentioned in **Section 3.0** it is probable that chenier forests may have

never existed in a pristine state because they may have always been subject to the effects of human activity. As stated, the oldest of the cheniers is 3,300 years while human activity dates back some 12,000 years.

It is obvious, especially in the cheniers of southwest Louisiana, that due to position in the landscape, these features have been especially vulnerable to development. Simply put, it's the only high ground in portions of expansive coastal parishes available where citizens can live and make a living. Field data show that the following surface alterations are present on chenier features: highways and access roads, drainage ditches, residences/outbuildings, power line rights-of-way, oil and gas production facilities, fencing, borrow pits, canals, lands cleared for pasture/agriculture, and miscellaneous fills for access and other infrastructure. It should be noted that only approximately 11 percent of the sample locations established to characterize cheniers during the fieldwork component of the study were undeveloped. This however is certainly not conclusive as to the overall development pressure on cheniers because accessibility and resource limitations prevented data collection on some of the more isolated ridges.

It would appear that most permitted coastal uses along the cheniers are fairly innocuous and have not resulted in significant degradation of these features. However, certain types of activities that involve significant clearing and excavation warrant critical review.

10.2 Biological Factors

From a biological perspective, certain data suggest that there is a significant decline in certain species of neotropical migrant songbirds over the past few decades (Robbins et al 1989; Sauer et al 2008). Whether or not this is directly attributable to degradation of chenier habitat is not fully understood. Therefore new research, focusing on stopover sites along migratory routes, is being implemented by university researchers and governmental agencies. Although stopover sites are only used for a brief time during migration, they have proven to be critical to the survivorship and perpetuation of a population. This new area of research should ultimately provide more conclusive information regarding the importance of cheniers to migratory bird populations. It is clear that chenier habitat has been altered by permitted actions that may be contributing to wildlife habitat degradation.

According to published data, the primary threats to bird populations along the cheniers are linear utilities, livestock grazing, invasive species, mining practices, residential development, and shoreline erosion (Lester et al 2005; Barrow and Fontenot 2006). With the exceptions of livestock grazing, invasive species, and shoreline erosion, these threats are all

regulated activities, whether by the state or local coastal program, and require some level of coastal use permitting.

The rise of invasive species populating cheniers has also, in the view of some researchers, led to the decline in habitat diversity along the cheniers (Jones and McLeod 1989; Neyland and Meyer 1997). Field data from this study indicate that Chinese tallow tree is present on a significant portion (35%) of the sample locations established to characterize the vegetative communities of the cheniers. Invasive species, specifically Chinese tallow tree, may occur when surface disturbances are authorized on cheniers.

10.3 Physical Factors

It is clear that cheniers and natural ridges function to reduce the wave and surge fields and provide protection via attenuation of storm surge and wave heights during storms. There is a significant impact from land forms and vegetated surfaces on waves and storm surge attenuation, which can result in flood protection in coastal areas (U.S Army Corps of Engineers Waterway Experiment Station 1994; Shih-Nan et al 2007). Further, loss of such land forms due to increased erosion in Louisiana's coasts has resulted in transformation from low to higher energy marine environments. Therefore it is reasonable to assume that permitted activities which impact chenier and natural ridge vegetation and the structural integrity of the cheniers and natural ridges themselves have adverse impacts on the cheniers' capacity to afford such storm protection.

There are documented activities that have physically impacted cheniers. Open pit mining, which was discussed in **Section 4.1,** is perhaps the most significant impact to cheniers, both from biological (habitat removal/conversion) and physical perspectives. Permit records indicate that since the LCRP's inception, twenty-six pits (borrow for fill, fish ponds, etc) have been authorized in Cameron and Vermilion Parishes. Of the twenty-six, there was an even split of those authorizations between state and local regulatory permitting. Additionally, based on GIS analyses, there appears to be approximately 487 acres of open pits throughout the cheniers of Cameron and Vermilion Parishes. It is important to note that many of the pits were excavated prior to the inception of the LCRP. It is clear that excavation of cheniers not only removes forest habitat but also significantly alters the very structure of the landform. Open pits, which are dug to depths lower than the surrounding cheniers and marshes, ultimately convert to open water. Unless the pits are reclaimed by re-deposition of fill and returned to pre-project contours, there is a permanent conversion from chenier to open water habitat. What remains is essentially a large hole in a ridge through which storm surges can pass unimpeded.

10.4 Recommendations

Based on evaluation of the referenced factors relevant to chenier and natural ridges and the inherent biological and physical value of these features, the following general recommendations are made:

1. The LDNR should consider formally designating cheniers as natural biologically valuable areas or protective coastal features in the Louisiana Coastal Zone and adapt more specific guidelines for their protection.

2. Commercial sand mining operations and large-scale excavations on cheniers and natural ridges should be discouraged.

3. Because CMD has the resources to provide the personnel and biological expertise more effectively than local coastal programs, Coastal Use Permit applications that involve large scale excavation (open pits for fill material, fish ponds, etc.) whereby the structural integrity of the chenier is threatened should be processed as state concerns.

4. Proposed coastal uses involving significant excavation on cheniers should be subjected to a higher level of review by the permitting authority. Specifically, a comprehensive justification and needs/alternatives analysis that clearly demonstrate the proposed action is the least-damaging, feasible practical alternative should be required as part of the permitting process for these proposed coastal uses.

5. Limit clearing of woody vegetation on cheniers through the permit review process. Require a critical review of alternatives to clearing and/or excavation to reach project goals.

6. Additional research is needed to better understand the role cheniers and natural ridges play in migratory bird success.

7. Landowner incentives to reclaim open pits along chenier features should be considered by the LDNR.

8. Additional modeling efforts, specific to cheiners and natural ridges in Cameron, Vermilion, and St. Tammany Parishes should be initiated to document those features' capacities for storm surge protection.

9. Continue to monitor remnant chenier forests as designated by the Louisiana Natural Heritage Program.

10. Develop outreach programs outlining the importance of cheniers and, more importantly, the rationale for their preservation and protection.

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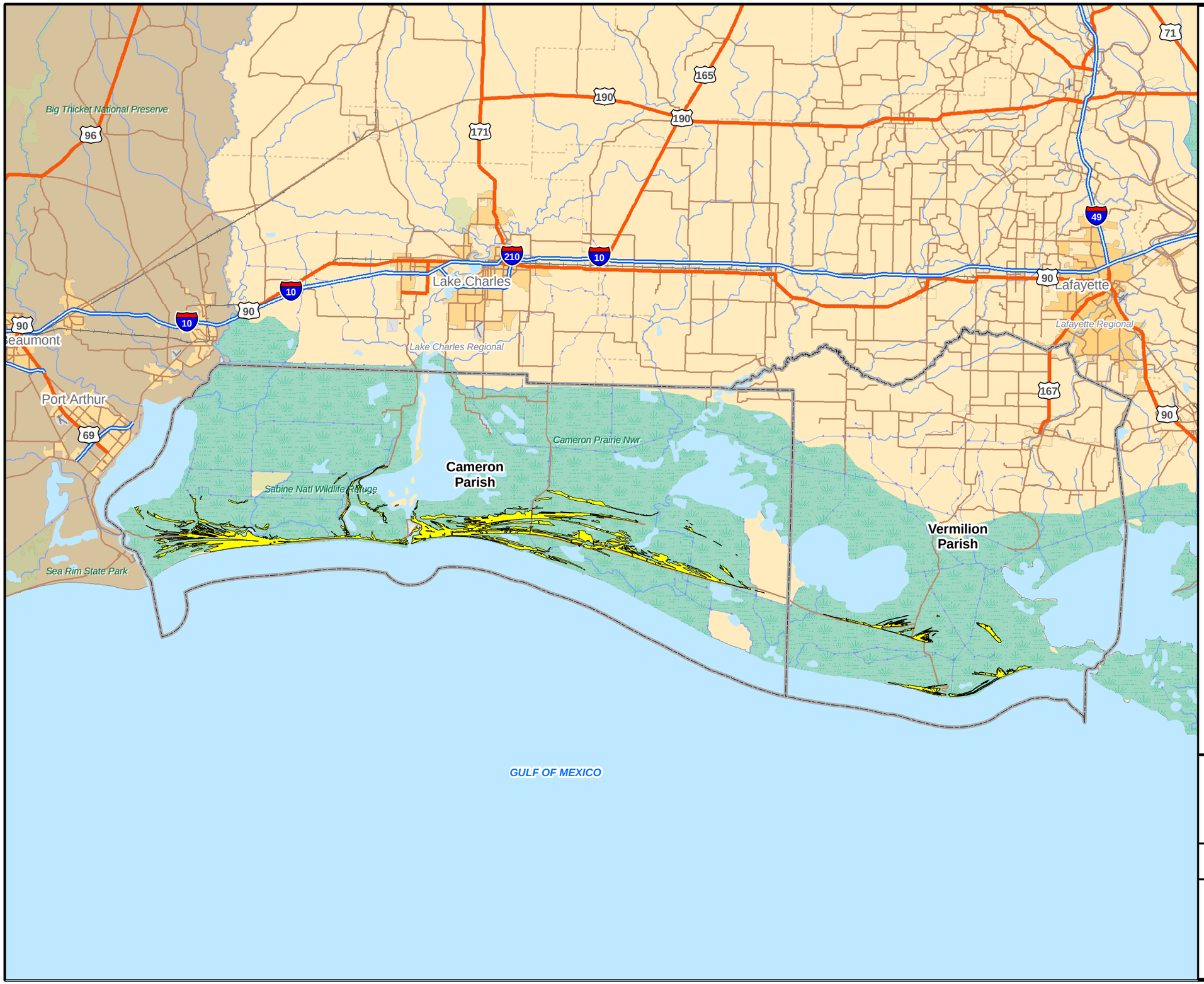
FIGURE 1

VICINITY MAP – CHENIERS OF SOUTHWEST LOUISIANA



N

Legend

Cheniers and Natural Ridges Study Areas

Reference

Base map comprised of ESRI StreetMap USA dataset.

11 5.5 0 11 Miles

Vicinity Map

Cheniers of Southwest Louisiana
Cameron and Vermilion Parishes

Louisiana Department of Natural Resources
Coastal Management Division

PROVIDENCE

Drawn By	DRA	02/11/09
Checked By	JBA	02/25/08
Approved By	RPC	02/25/08

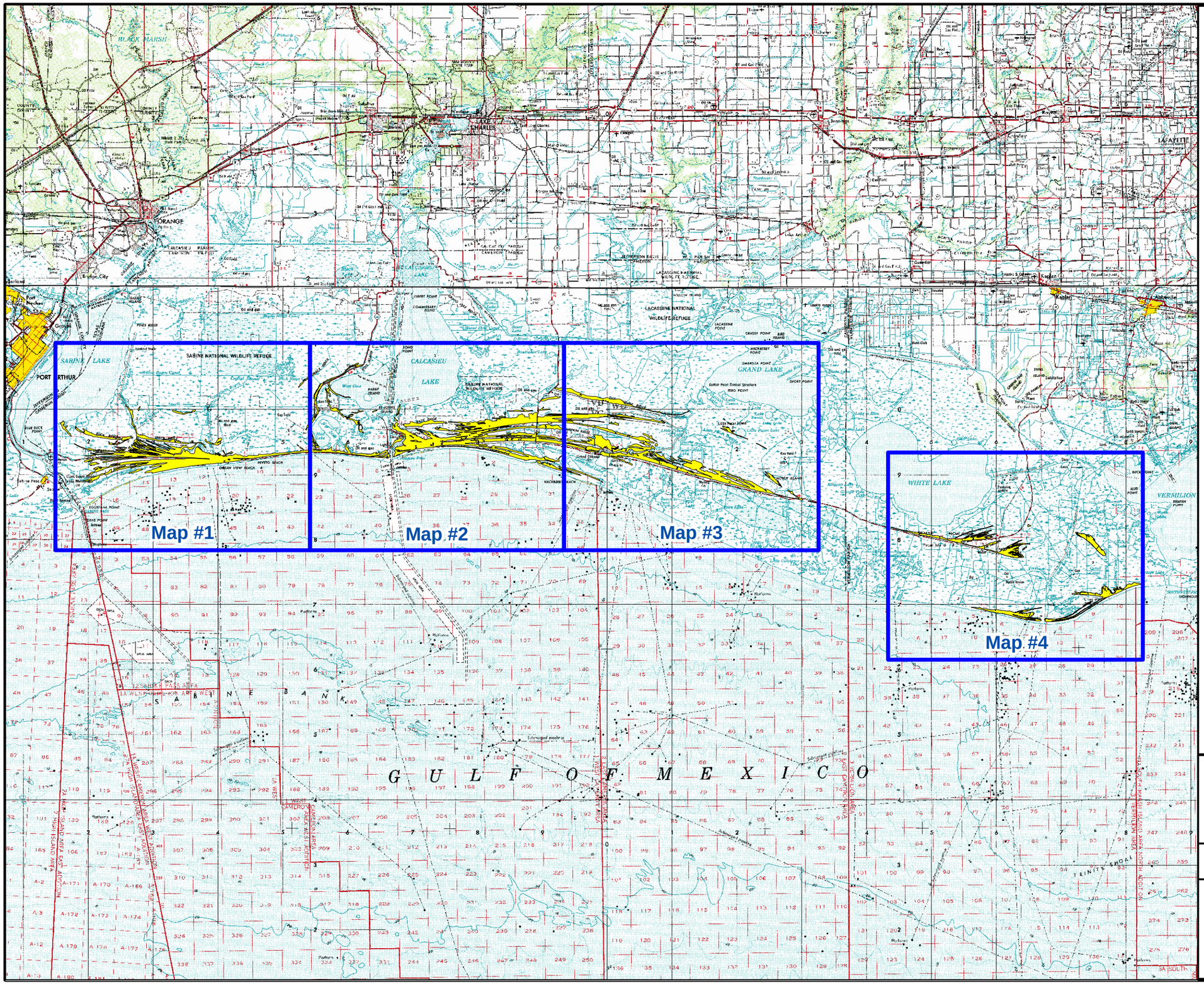
Project Number 227-009

Drawing Number 227-009-B005

1
Figure

FIGURE 2

LOCATION MAP – CHENIERS OF SOUTHWEST LOUISIANA



Legend

Cheniers and Natural Ridges Study Areas

Reference

Base map comprised of 1:250,000 USGS topographic maps, "Lake Charles" and "Port Arthur".

9 4.5 0 9 Miles

Location Map

Cheniers of Southwest Louisiana
Cameron and Vermilion Parishes

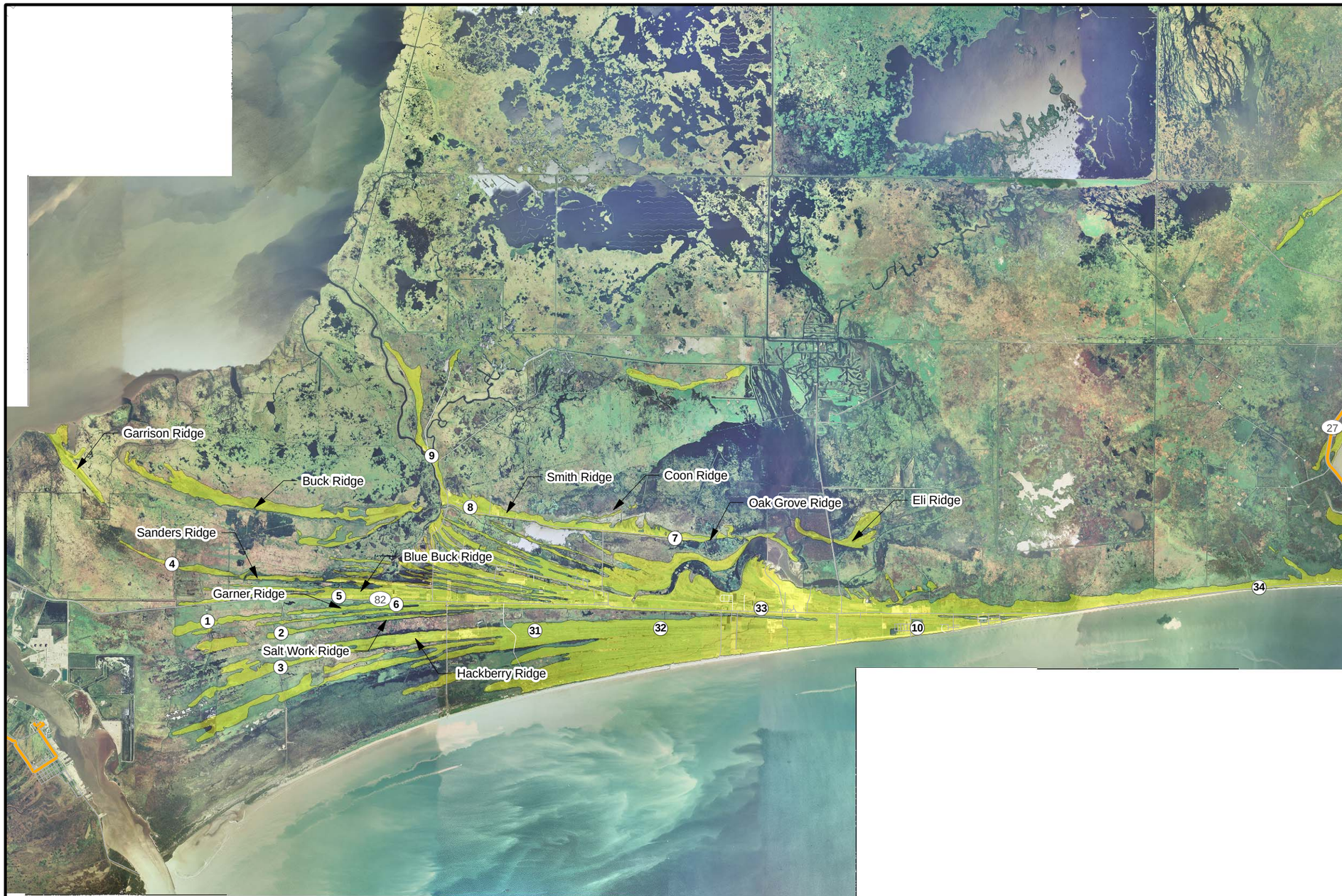
Louisiana Department of Natural Resources
Coastal Management Division

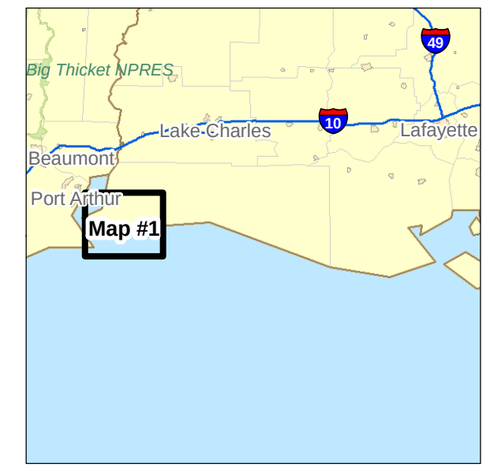
PROVIDENCE

Drawn By	DRA	02/11/09
Checked By	JBA	02/25/08
Approved By	RPC	02/25/08
Project Number 227-009		2 Figure
Drawing Number 227-009-B006		

FIGURES 3A – 3D

LOCATION MAPS WITH FIELD SAMPLE LOCATIONS





N

Legend

Cheniers and Natural Ridges Study Areas

Sample Locations

Reference

Base map comprised of 2007 aerial photograph.

2 1 0 2 Miles

Location Map #1

Cheniers of Southwest Louisiana
Cameron Parish

Louisiana Department of Natural Resources
Coastal Management Division

PROVIDENCE

Drawn By	DRA	02/11/09
Checked By	JBA	02/25/08
Approved By	RPC	02/25/08

Project Number 227-009

Drawing Number 227-009-B007

3a
Figure

Legend

- Cheniers and Natural Ridges Study Areas
- Sample Locations

Reference

Base map comprised of 2007 aerial photograph.

2 1 0 2 Miles

Location Map #2

Cheniers of Southwest Louisiana
Cameron Parish

Louisiana Department of Natural Resources
Coastal Management Division

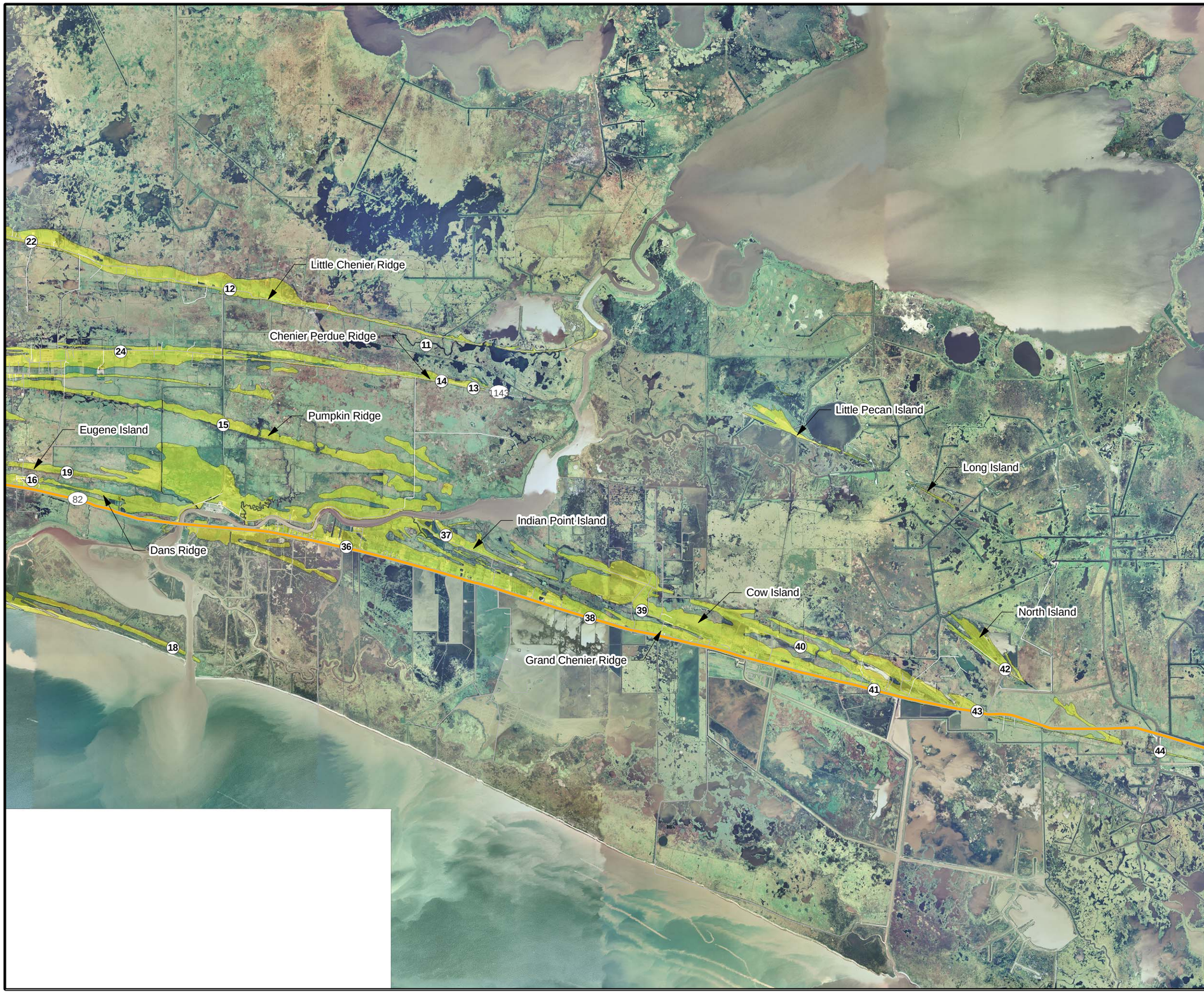
PROVIDENCE

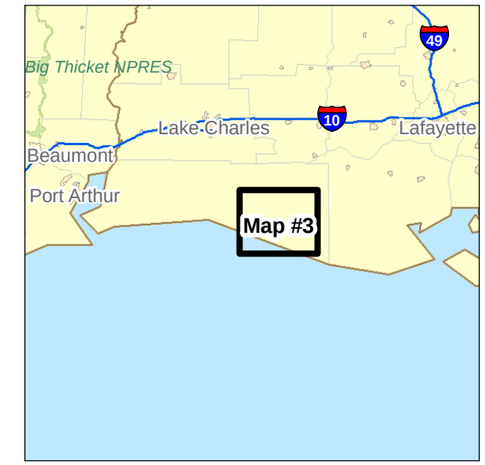
Drawn By	DRA	02/11/09
Checked By	JBA	02/25/08
Approved By	RPC	02/25/08

Project Number 227-009

Drawing Number 227-009-B008

3b
Figure





Legend

Cheniers and Natural Ridges Study Areas

Sample Locations

Reference

Base map comprised of 2007 aerial photograph.

2 1 0 2 Miles

Location Map #3

Cheniers of Southwest Louisiana
Cameron Parish

Louisiana Department of Natural Resources
Coastal Management Division

PROVIDENCE

Drawn By	DRA	02/11/09
Checked By	JBA	02/25/08
Approved By	RPC	02/25/08

Project Number 227-009

Drawing Number 227-009-B009

3c
Figure

Legend

- Cheniers and Natural Ridges Study Areas
- Sample Locations

Reference

Base map comprised of 2007 aerial photograph.

2 1 0 2 Miles

Location Map #4

Cheniers of Southwest Louisiana
Vermilion Parish

Louisiana Department of Natural Resources
Coastal Management Division

PROVIDENCE

Drawn By	DRA	02/11/09
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Approved By	RPC	02/25/08

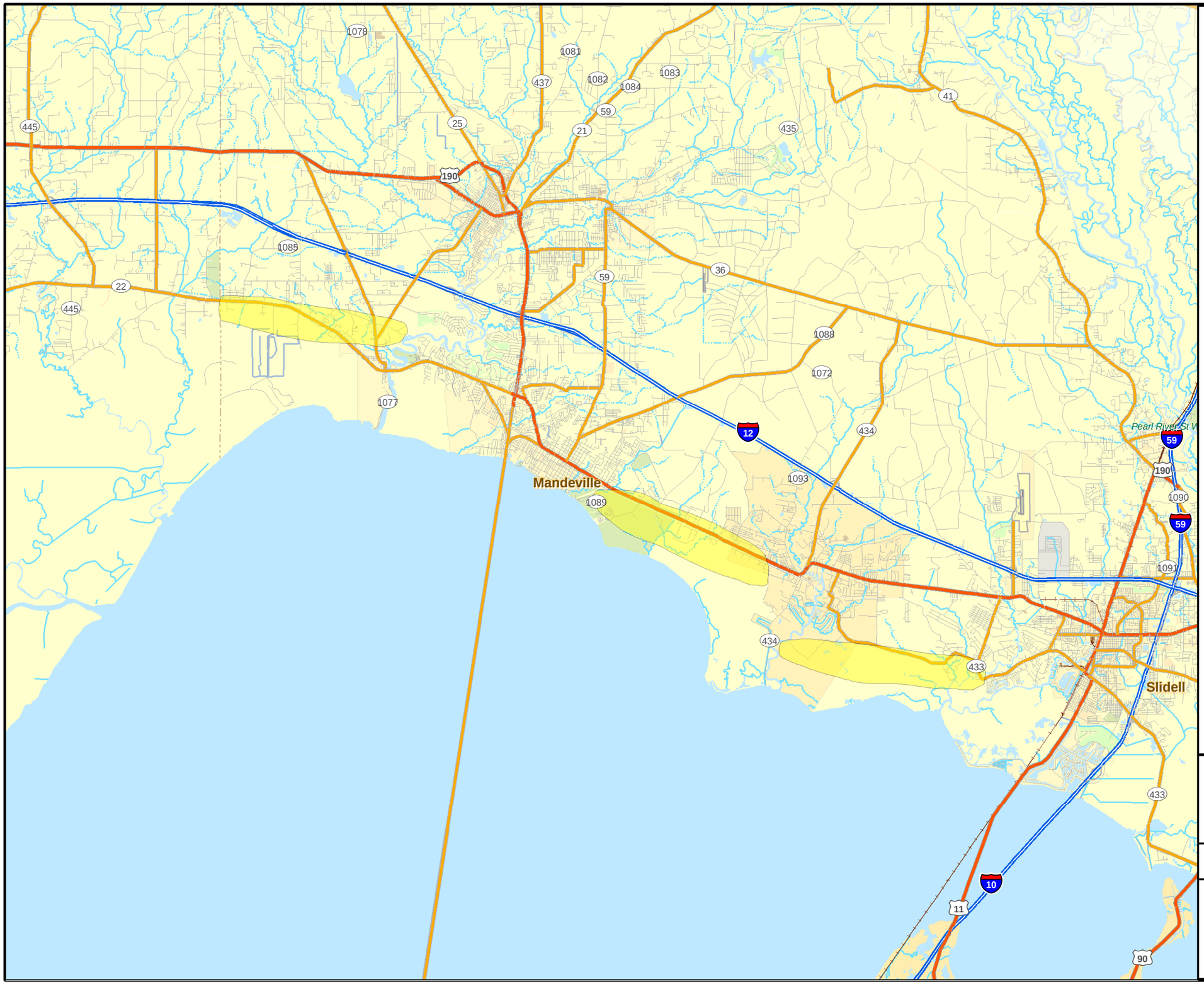
Project Number 227-009

Drawing Number 227-009-B010

3d
Figure

FIGURE 4

VICINITY MAP
SELECT NATURAL RIDGES IN ST. TAMMANY PARISH



Legend

Cheniers and Natural Ridges Study Areas

Reference

Base map comprised of ESRI StreetMap USA dataset.

3 1.5 0 3 Miles

Vicinity Map

Select Natural Ridges in St. Tammany Parish
St. Tammany Parish

Louisiana Department of Natural Resources
Coastal Management Division

PROVIDENCE

Drawn By	DRA	02/11/09
Checked By	JBA	02/25/08
Approved By	RPC	02/25/08

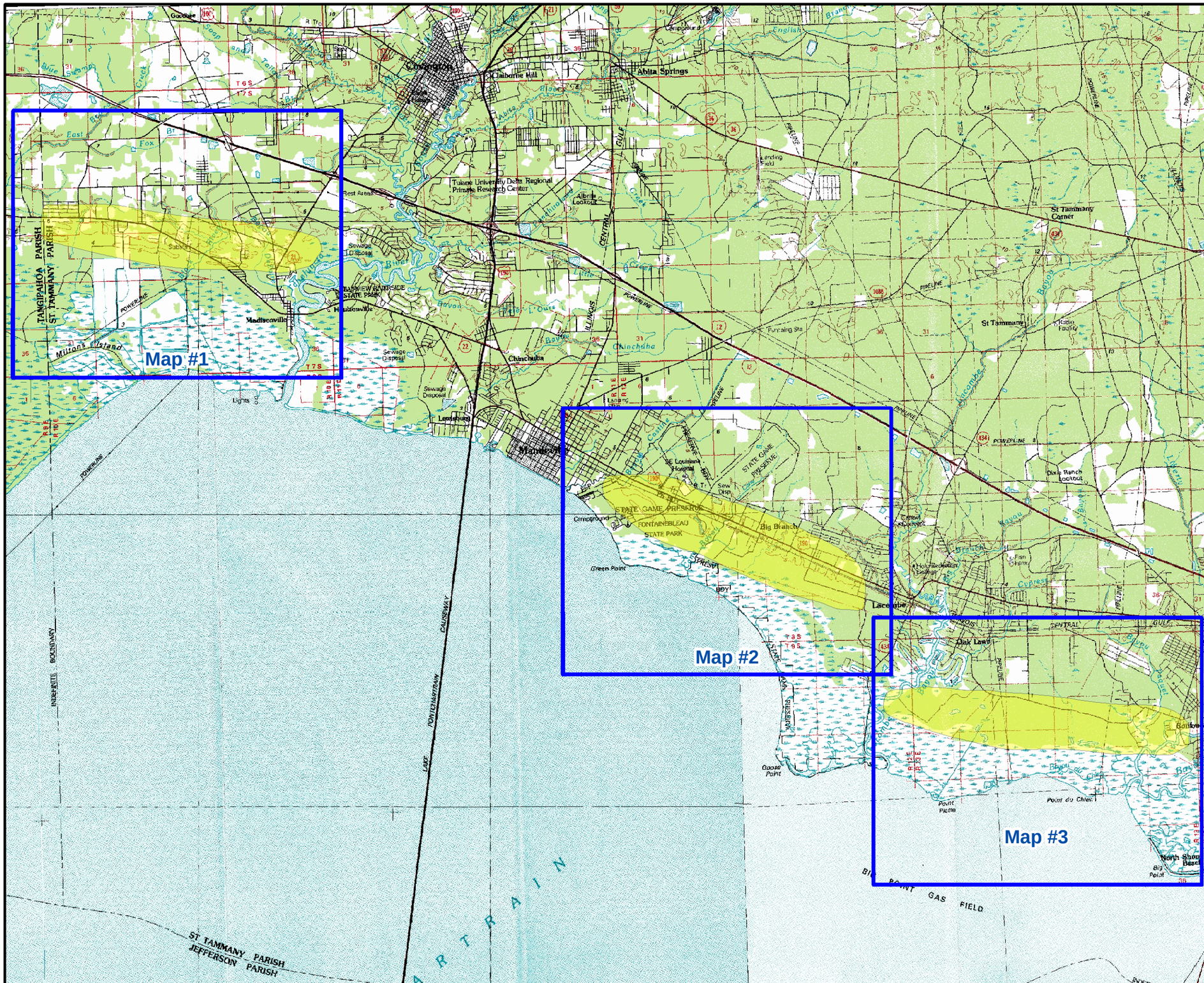
Project Number 227-009

Drawing Number 227-009-B011

4
Figure

FIGURE 5

LOCATION MAP
SELECT NATURAL RIDGES IN ST. TAMMANY PARISH



Legend

Cheniers and Natural Ridges Study Areas

Reference

Base map comprised of 1:100,000 USGS topographic maps, "Ponchatrain" and "Gulfport".

2 1 0 2 Miles

Location Map

Select Natural Ridges in St. Tammany Parish
St. Tammany Parish

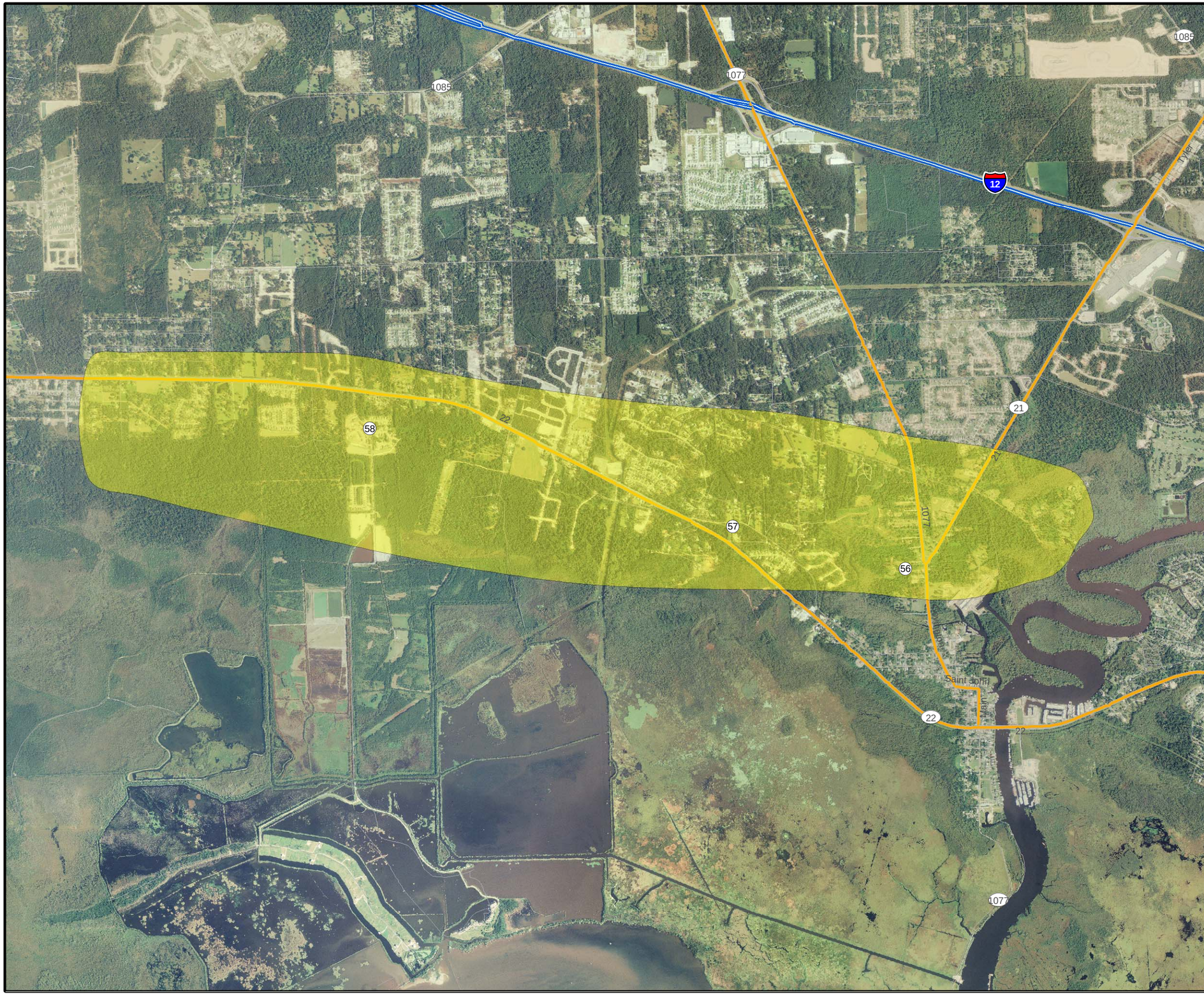
Louisiana Department of Natural Resources
Coastal Management Division

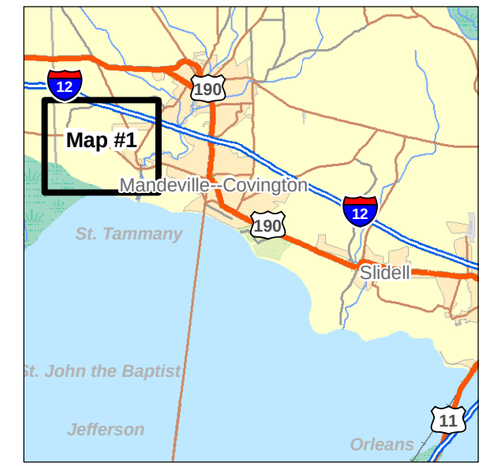
PROVIDENCE

Drawn By	DRA	02/11/09
Checked By	JBA	02/25/08
Approved By	RPC	02/25/08
Project Number 227-009		5
Drawing Number 227-009-B012		Figure

FIGURES 5A – 5C

LOCATION MAPS WITH FIELD SAMPLE LOCATIONS





Legend

Cheniers and Natural Ridges Study Areas

Sample Locations

Reference

Base map comprised of 2007 aerial photograph.

3,000 1,500 0 3,000 Feet

Location Map #1

Select Natural Ridges in St. Tammany Parish
St. Tammany Parish

Louisiana Department of Natural Resources
Coastal Management Division

PROVIDENCE

Drawn By	DRA	02/11/09
Checked By	JBA	02/25/08
Approved By	RPC	02/25/08

Project Number 227-009

Drawing Number 227-009-B013

5a
Figure

Legend

- Cheniers and Natural Ridges Study Areas
- Sample Locations

Reference

Base map comprised of 2007 aerial photograph.

3,000 1,500 0 3,000 Feet

Location Map #2

Select Natural Ridges in St. Tammany Parish
St. Tammany Parish

Louisiana Department of Natural Resources
Coastal Management Division

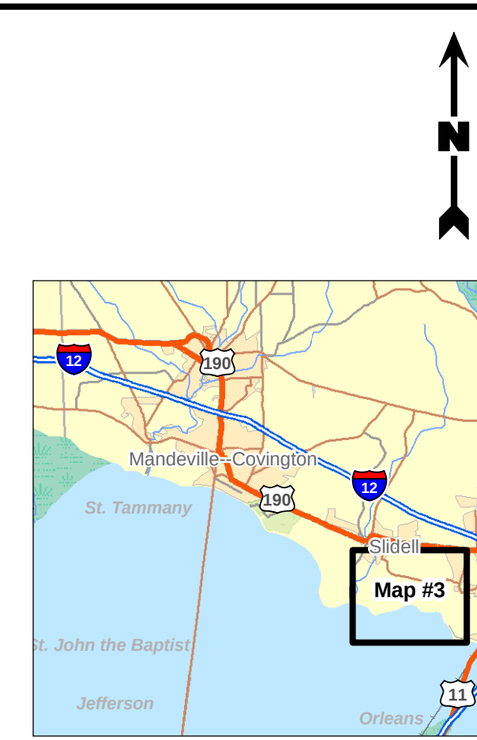
PROVIDENCE

Drawn By	DRA	02/11/09
Checked By	JBA	02/25/08
Approved By	RPC	02/25/08

Project Number 227-009

Drawing Number 227-009-B014

5b
Figure



Legend

Cheniers and Natural Ridges Study Areas

Sample Locations

Reference

Base map comprised of 2007 aerial photograph.

3,000 1,500 0 3,000 Feet

Location Map #3

Select Natural Ridges in St. Tammany Parish
St. Tammany Parish

Louisiana Department of Natural Resources
Coastal Management Division

PROVIDENCE

Drawn By	DRA	02/11/09
Checked By	JBA	02/25/08
Approved By	RPC	02/25/08

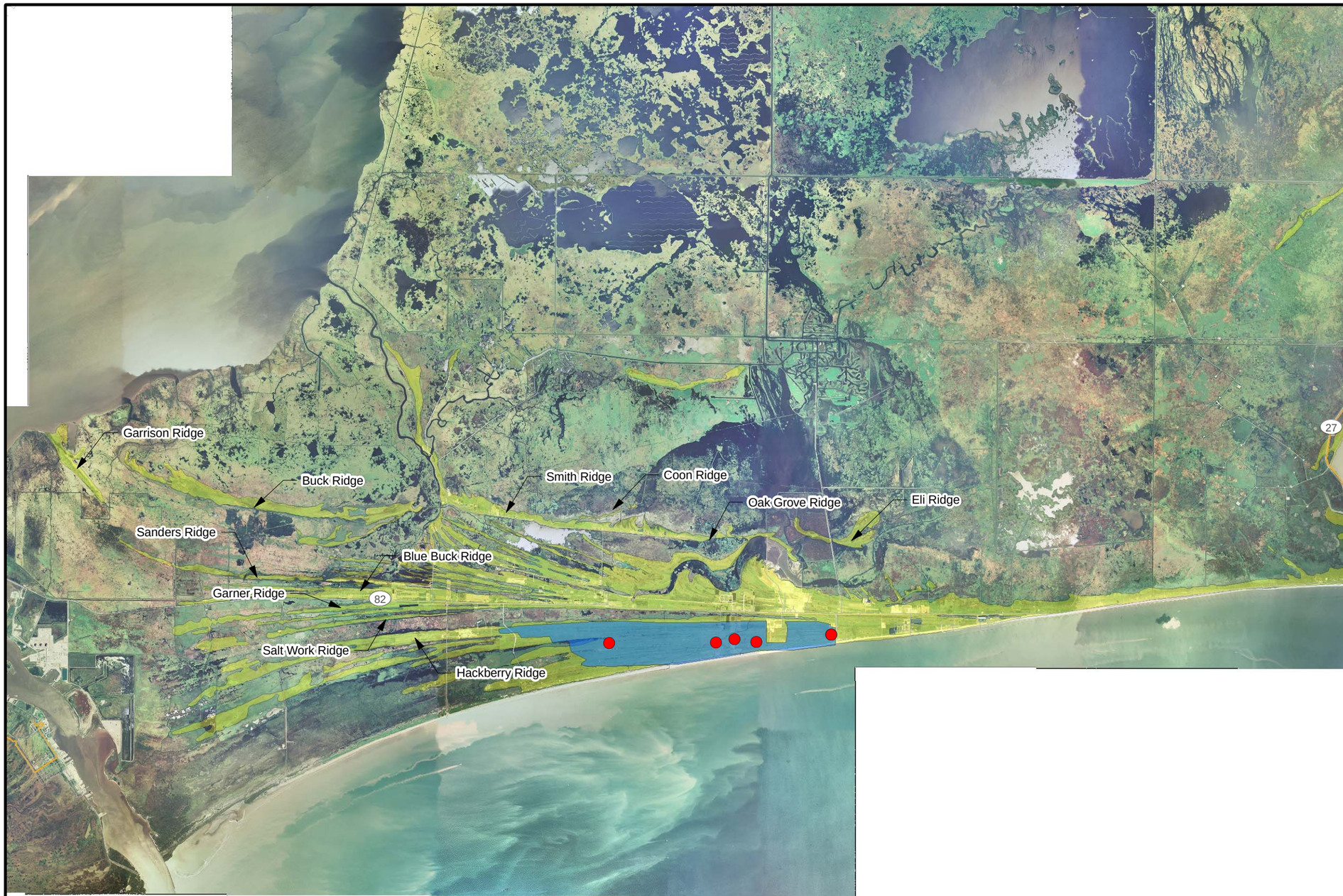
Project Number 227-009

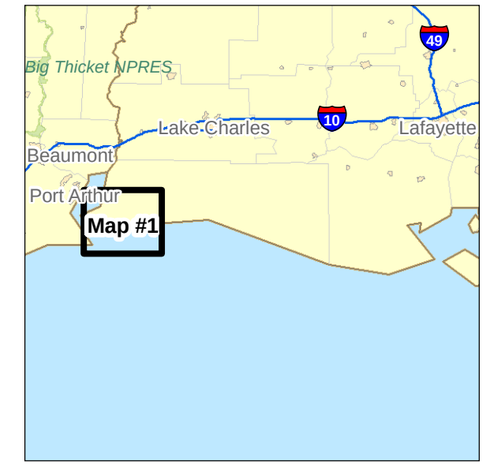
Drawing Number 227-009-B015

5c
Figure

FIGURES 6A – 6D

LOUISIANA NATURAL HERITAGE DATA MAPS





Legend

- Cheniers and Natural Ridges Study Areas
- Remnant Chenier Forest
- Sensitive Biological Elements

Reference

Base map comprised of 2007 aerial photograph.
Forest and Element data was obtained from the Louisiana Natural Heritage Program (LNHP), dated 2008.

2 1 0 2 Miles

Louisiana Natural Heritage Data Map #1

Cheniers of Southwest Louisiana
Cameron Parish

Louisiana Department of Natural Resources
Coastal Management Division

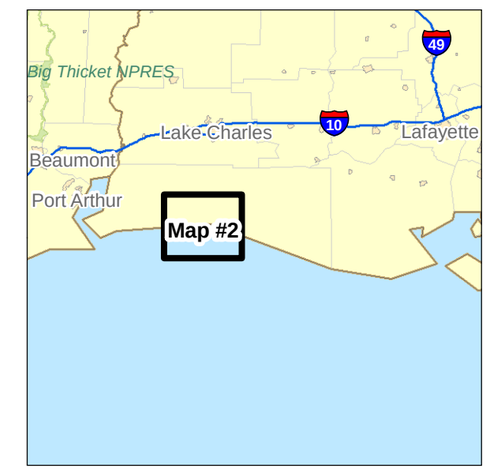
PROVIDENCE

Drawn By	DRA	02/11/09
Checked By	JBA	02/25/08
Approved By	RPC	02/25/08

Project Number 227-009

Drawing Number 227-009-B017

6a
Figure



Legend

- Cheniers and Natural Ridges Study Areas
- Remnant Chenier Forest
- Sensitive Biological Elements

Reference

Base map comprised of 2007 aerial photograph.
Forest and Element data was obtained from the Louisiana Natural Heritage Program (LNHP), dated 2008.

2 1 0 2 Miles

Louisiana Natural Heritage Data Map #2

Cheniers of Southwest Louisiana
Cameron Parish

Louisiana Department of Natural Resources
Coastal Management Division

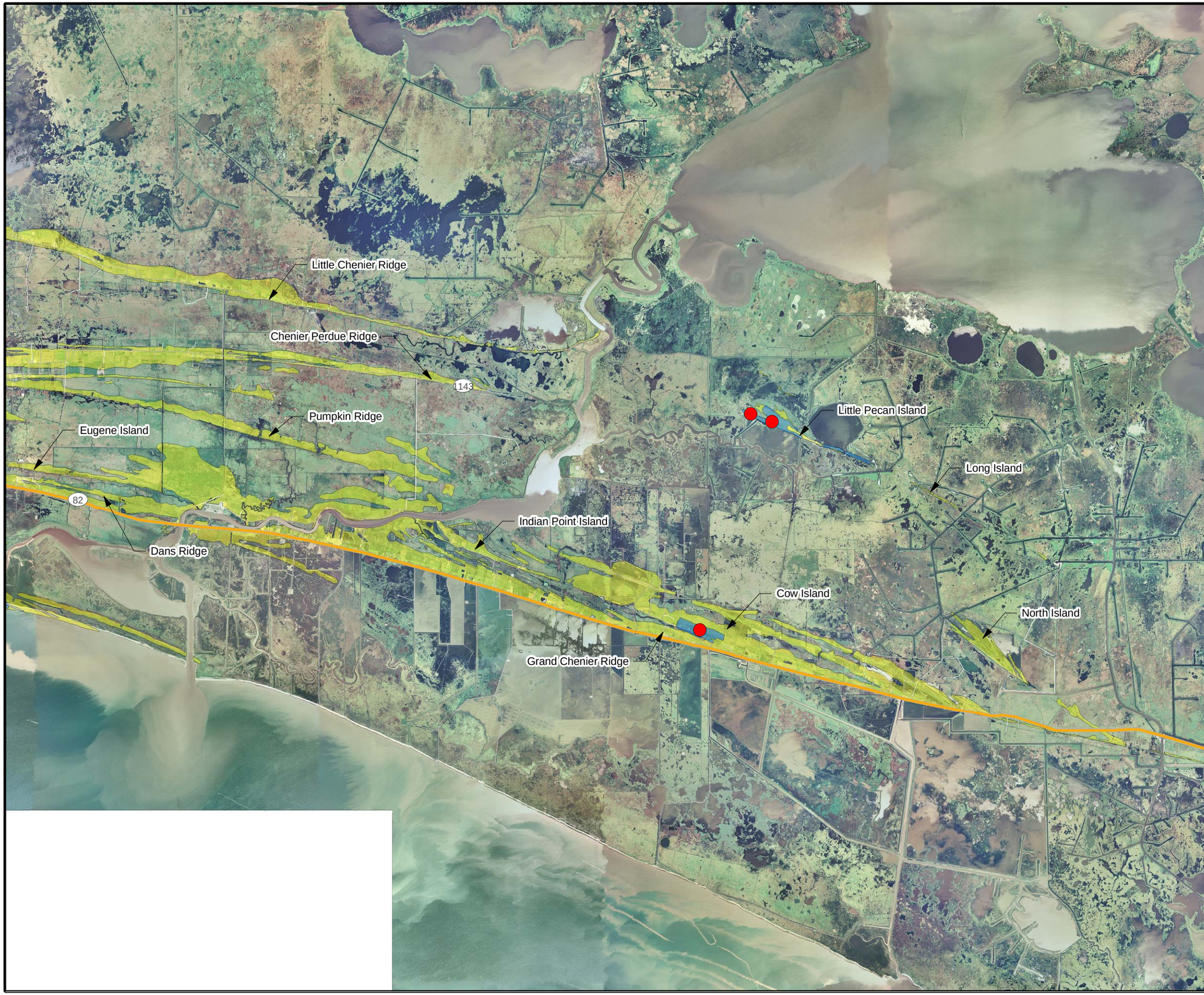
PROVIDENCE

Drawn By	DRA	02/11/09
Checked By	JBA	02/25/08
Approved By	RPC	02/25/08

Project Number 227-009

Drawing Number 227-009-B018

6b
Figure



Legend

- Cheniers and Natural Ridges Study Areas
- Remnant Chenier Forest
- Sensitive Biological Elements

Reference

Base map comprised of 2007 aerial photograph.
Forest and Element data was obtained from the Louisiana Natural Heritage Program (LNHP), dated 2008.

2 1 0 2 Miles

Louisiana Natural Heritage Data
Map #3

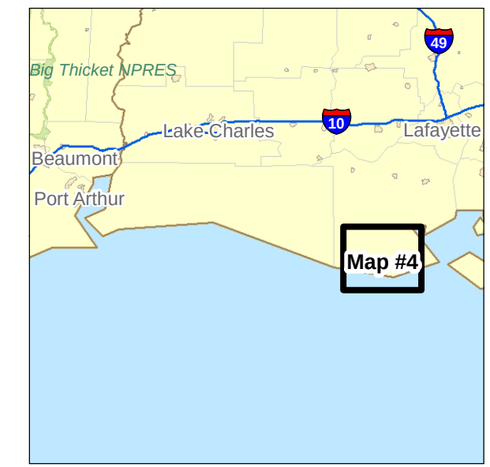
Cheniers of Southwest Louisiana
Cameron Parish

Louisiana Department of Natural Resources
Coastal Management Division

PROVIDENCE

Drawn By	DRA	02/11/09
Checked By	JBA	02/25/08
Approved By	RPC	02/25/08
Project Number 227-009		
Drawing Number 227-009-B019		

6c
Figure



N

Legend

- Cheniers and Natural Ridges Study Areas
- Remnant Chenier Forest
- Sensitive Biological Elements

Reference

Base map comprised of 2007 aerial photograph.
Forest and Element data was obtained from the Louisiana Natural Heritage Program (LNHP), dated 2008.

2 1 0 2 Miles

Louisiana Natural Heritage Data Map #4

Cheniers of Southwest Louisiana
Vermilion Parish

Louisiana Department of Natural Resources
Coastal Management Division

PROVIDENCE

Drawn By	DRA	02/11/09
Checked By	JBA	02/25/08
Approved By	RPC	02/25/08

Project Number 227-009

Drawing Number 227-009-B020

6d
Figure

APPENDIX A

AN EXPLANATION OF RANKING CATEGORIES EMPLOYED BY NATURAL HERITAGE PROGRAMS NATIONWIDE

EXPLANATION OF RANKING CATEGORIES EMPLOYED BY NATURAL HERITAGE PROGRAMS NATIONWIDE

Each element is assigned a single global rank as well as a state rank for each state in which it occurs. Global ranking is done under the guidance of NatureServe, Arlington, VA. State ranks are assigned by each state's Natural Heritage Program, thus a rank for a particular element may vary considerably from state to state. Federal ranks are designated by the U.S. Fish & Wildlife Service under the provisions of the Endangered Species Act of 1973. **DISCLAIMER:** This document is not an official copy of the laws in effect and should not be utilized or relied upon as such. For this reason, the accuracy of the information contained within this document cannot be guaranteed and the reader is cautioned that it is his/her responsibility to be apprised of the laws in effect at any given time. These laws include those contained within the Louisiana Revised Statutes, particularly Title 56, the official regulations of the Louisiana Wildlife and Fisheries Commission, federal laws, and any local or parish ordinances.

FEDERAL RANKS (USESA FIELD):

LE = Listed Endangered
LT = Listed Threatened
PE = Proposed endangered
PT = Proposed Threatened
C = Candidate
PDL = Proposed for delisting
E (S/A) or T (S/A) = Listed endangered or threatened because of similarity of appearance
XE = Essential experimental population
XN = Nonessential experimental population
No Rank = Usually indicates that the taxon does not have any federal status. However, because of potential lag time between publication in the Federal Register and entry in the central databases and state databases, some taxa may have a status which does not yet appear.
(Rank, Rank) = Combination values in parenthesis = The taxon itself is not named in the Federal Register as having U.S. ESA status; however, all of its infraspecific taxa (worldwide) do have official status. The statuses shown in parentheses indicate the statuses that apply to infraspecific taxa or populations within this taxon. *THE SPECIES IS CONSIDERED TO HAVE A COMBINATION STATUS IN LOUISIANA*
(PS) = partial status= Status in only a portion of the species' range. Typically indicated in a "full" species record where an infraspecific taxon or population has U.S. ESA status, but the entire species does not. *THE SPECIES DOES NOT HAVE A STATUS IN LOUISIANA*
(PS: Rank) = partial status= Status in only a portion of the species' range. The value of that status appears because the entity with status does not have an individual entry in Natureserve. *THE SPECIES MAY HAVE A STATUS IN LOUISIANA*

GLOBAL ELEMENT RANKS:

G1 = critically imperiled globally because of extreme rarity (5 or fewer known extant populations) or because of some factor(s) making it especially vulnerable to extinction
G2 = imperiled globally because of rarity (6 to 20 known extant populations) or because of some factor(s) making it very vulnerable to extinction throughout its range
G3 = either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range (e.g., a single physiographic region) or because of other factors making it vulnerable to extinction throughout its range (21 to 100 known extant populations)
G4 = apparently secure globally, though it may be quite rare in parts of its range, especially at the periphery (100 to 1000 known extant populations)
G5 = demonstrably secure globally, although it may be quite rare in parts of its range, especially at the periphery (1000+ known extant populations)
GH = of historical occurrence throughout its range; i.e., formerly part of the established biota, with the possibility that it may be rediscovered (e.g., Bachman's Warbler)
GU = possibly in peril range-wide, but status uncertain; need more information
G? = rank uncertain. Or a range (e.g., G3G5) delineates the limits of uncertainty
GQ = uncertain taxonomic status
GX = believed to be extinct throughout its range (e.g., Passenger Pigeon) with virtually no likelihood that it will be rediscovered
T = subspecies or variety rank (e.g., G5T4 applies to a subspecies with a global species rank of G5, but with a subspecies rank of G4)

STATE ELEMENT RANKS:

S1 = critically imperiled in Louisiana because of extreme rarity (5 or fewer known extant populations) or because of some factor(s) making it especially vulnerable to extirpation
S2 = imperiled in Louisiana because of rarity (6 to 20 known extant populations) or because of some factor(s) making it very vulnerable to extirpation
S3 = rare and local throughout the state or found locally (even abundantly at some of its locations) in a restricted region of the state, or because of other factors making it vulnerable to extirpation (21 to 100 known extant populations)
S4 = apparently secure in Louisiana with many occurrences (100 to 1000 known extant populations)
S5 = demonstrably secure in Louisiana (1000+ known extant populations)
(B or N may be used as qualifier of numeric ranks and indicating whether the occurrence is breeding or nonbreeding)
SA = accidental in Louisiana, including species (usually birds or butterflies) recorded once or twice or only at great intervals hundreds or even thousands of miles outside their usual range
SH = of historical occurrence in Louisiana, but no recent records verified within the last 20 years; formerly part of the established biota, possibly still persisting
SR = reported from Louisiana, but without conclusive evidence to accept or reject the report
SU = possibly in peril in Louisiana, but status uncertain; need more information
SX = believed to be extirpated from Louisiana
SZ = transient species in which no specific consistent area of occurrence is identifiable

STATE PROTECTION STATUS:

State status are contained in Title 56 of the Louisiana Revised Statutes as well as relevant rules and regulations adopted by the Louisiana Wildlife and Fisheries Commission and the Secretary of the Department of Wildlife and Fisheries. The Secretary of the Department of Wildlife and Fisheries is authorized to implement additional restrictions in emergency situations in order to protect fish and wildlife resources.

Endangered = Taking or harassment of these species is a violation of state and federal laws.
Threatened = Taking or harassment of these species is a violation of state and federal laws.
Threatened/Endangered = Taking or harassment of these species is a violation of state and federal laws.
Prohibited = Possession of these species is prohibited. No legal harvest or possession.
Restricted Harvest = There are restrictions regarding the taking and possession of these species.

APPENDIX B

COASTAL USE PERMITTING DATASETS

VERMILION PARISH

CUP #	LATITUDE	LONGITUDE	APPLICANT	DESCRIPTION	IMPACTS cubic yards (cy) acre (ac)	HABITAT TYPE	RIDGE
P19981809	29 34 39.7808076	-92 12 11.4681276	Sagrera Estates	Cattlewalk - General dredge and/or fill (eg. Flowlines) - Marsh management plan - Industrial/commercial development - H20 block: Levee	2.9ac (6000cy)	E2EM1P5	None Listed
P19810517	29 34 15.7876536	-92 12 45.468306	Sagrera, Lloyd	General dredge and/or fill (eg. Flowlines) - No development	None Listed	None Listed	Cheniere au Tigre
P20020507	29 33 16	-92 16 43	E.A. McIlhenny Enterprises	Refurbish 13,400 linear feet of existing levee, install nine 24-inch culverts, and install rip-rap - H20 block: Lock/culvert flapgate - Marsh management plan	2.05ac, 3.14ac, 9.17ac	E1UBLx5, E2EM1P5, USSs	Bill Ridge
P20050795	29 32 22	-92 19 44	Trunkline Gas Company	Levee Construction - install rip rap to restore an existing levee and spoil bank near Pecan Island	0.23ac	UBs	Sand Ridge
P19951523	29 37 38.7841008	-92 21 51.4832508	Columbia Gulf Transmission	General dredge and/or fill (eg. Flowlines)	4040cy	none listed	Front Ridge
P19951287	29 37 40.7849916	-92 21 55.4840388	Columbia Gulf Transmission	Submerged or buried pipeline - General dredge and/or fill (eg. Flowlines)	132cy	none listed	Front Ridge
P19950081	29 37 42.7874448	-92 22 1.4849148	Columbia Gulf Transmission	Submerged or buried pipeline - General dredge and/or fill (eg. Flowlines)	1005cy	none listed	Front Ridge
P19901056	29 37 40.7846676	-92 22 .4840752	Columbia Gulf Transmission	None listed	0cy	None Listed	Front Ridge
P19920559	29 37 37.7886072	-92 22 7.4843328	Columbia Gulf Transmission	Industrial/commercial development	54cy	None Listed	Front Ridge
P20080601	29 37 37.72	-92 22 7.78	Columbia Gulf Transmission	Abandonment of a 36" natural gas pipeline- approx. 25.18 miles long-approx. 9.3 miles on land or in state waters. The remainder of the length to be abandoned is in federal waters. The above-ground structures at the on-shore valve setting will be removed, temporarily displacing approx. 356 cubic yards of native material.	0.04ac	UUo	Front Ridge
P19950629	29 37 26.7864888	-92 21 9.4829328	Columbia Gulf Transmission	Boat ramp	69cy	None Listed	Front Ridge

VERMILION PARISH

CUP #	LATITUDE	LONGITUDE	APPLICANT	DESCRIPTION	IMPACTS cubic yards (cy) acre (ac)	HABITAT TYPE	RIDGE
P20071300	29 38 34.52	-92 23 10.54	Cochrane Technologies	Proposed installation of a 98' micronet tower with 5 guy lines at 20' intervals and electronics building for broadcasts of GPS differential corrections to support offshore navigation. Approximately 0.52 cubic yards of soil will be dispersed naturally around bore as a result of installation of the posts (4" x 4") for the electronics building. An additional 0.45 cubic yards of concrete will be used to secure the posts (4" x 4"). No additional dredge or fill required.	0.02ac (1cy)	UR	Koch's Ridge
P19990424	29 38 37	-92 20 59	Broussard, N.R.	General dredge and/or fill (eg. Flowlines) - Agricultural, forestry, aquaculture activities	600cy	None Listed	Lost Island
P19910868	29 37 52.7874636	-92 22 51.483936	Columbia Gulf Transmission	General dredge and/or fill (eg. Flowlines)	24cy	None Listed	Front Ridge
P20010251	29 38 8	-92 24 37	Petro-Hunt, LLC	Install board road, drillsite & structures to serve Corwin Broussard #1-H2O Block: Lock/Culvert Flapgate	4.48ac (1254cy)	UR	Front Ridge
P19980976	29 37 12.7840908	-92 23 40.4873232	Exxon	Both above ground and buried pipelines -Ring levee new oil and gas only-H2O Block: levee	0.03ac	UR	Front Ridge
P19940472	29 37 59.7883548	-92 23 40.4865276	Broussard, Larry, J.	General dredge and/or fill (eg. Flowlines)	44cy	None Listed	Front Ridge
P19970688	29 35 42.7927812	-92 21 52.483554	Exxon	General dredge and/or fill (eg. Flowlines)	0.2ac (900cy)	UR	Front Ridge
P19911115	29 38 48.7827996	-92 25 18.4881	Vermillion Parish PO	None listed	0cy	None Listed	Back Ridge
P20051578	29 39 2.62	-92 23 28.74	Choate, Acey	The project will include excavation and fill. Hurricane Rita destroyed the existing home on the site. In order to rebuild their home above the flood level, the house pad will have to be elevated to elevation 10.0. Approximately 1400 cubic yards will be excavated from an existing pond and used as fill to build the house pad.	0.4ac (1400cy)	UU	Back Ridge

VERMILION PARISH

CUP #	LATITUDE	LONGITUDE	APPLICANT	DESCRIPTION	IMPACTS cubic yards (cy) acre (ac)	HABITAT TYPE	RIDGE
P19871216	29 39 5.779998	-92 23 20.4850284	Bertrand, Wiley	Rig present - H20 Block: pilings or dolphins (eg.Walkway)	0cy	None Listed	Back Ridge
P20030802	29 39 5	-92 23 53	Reynolds, John M.	Build a road to improve access to a 110-acre waterfowl project and deepen existing borrow pit to use as a fish pond at Pecan Island	0.29ac, 0.09ac, 0.11ac (1450cy)	PEM1C, PFO1A, UR	Back Ridge
P19811171	29 38 49.7849568	-92 26 46.4914608	Vermillion Parish School Board	Development: sewerage/treatment plant - Dredge: borrow pit for fill	0cy	None Listed	Pecan Island
P19900778	29 38 59.7853968	-92 27 2.4915096	Woodbine Petroleum	Well #1 named LB Broussard- Dredge: ring levee new oil and gas only	0cy	None Listed	Pecan Island
P20070985	29 38 59.78	-92 27 2.49	Oracle Oil, LLC	Proposed re-entry into an existing well site for drilling operations. A ring levee will be constructed around the existing well site using 99 cubic yards of excavated native material. Additionally a pad site at the ring levee will be installed inside the ring levee using 1950 cubic yards of topsoil, 649 cubic yards of crushed stone or gravel and 1300 cubic yards of truck mats. An approximately 531' x 231' additional work area (maintained) will be utilized on an upland area south of the ring levee. No excavation or filling of the upland work area will be necessary.	0.81ac, 0ac (3998cy)	PEM1C, UU	Pecan Island
P19831435	29 38 51.7910856	-92 27 35.491518	Broussard, Errol	General dredge and/or fill (eg. Flowlines)	7662cy	None Listed	Pecan Island
P19951297	29 38 43	-92 27 16	Exxon Exploration	General dredge and/or fill (eg. Flowlines)	10125cy	None Listed	Pecan Island

VERMILION PARISH

CUP #	LATITUDE	LONGITUDE	APPLICANT	DESCRIPTION	IMPACTS cubic yards (cy) acre (ac)	HABITAT TYPE	RIDGE
P20071643	29 39 1.65	-92 27 4.13	Oracle Oil, LLC	Proposed construction of a metering station and re-capturing use of an existing 4-inch flowline to serve the LB Broussard No. 1 Well. The 4-inch flowline is currently present above the marsh surface. Also, proposed 4-inch flowline (1,455.54') to be placed above ground. Approximately 245 cubic yards of topsoil/dirt material will be hauled in to construct the containment berm. All access will be through existing pads or roads. The metering station and use of flowlines will be to tie into the well that was recently permitted under CUP P20070985. No additional dredge or fill are required for this project.	0ac (245cy)	UU	Pecan Island
P20061508	29 38 48	-92 27 5	Vermillion Parish Police Jury	Reconstruct the Pecan Island Fire Station. Approx. 600 cu. yds. of fill material will be hauled in.	0.59ac (600cy)	UU	Pecan Island
P20030778	29 39 7	-92 28 59	Guillory, Jimmie J.	Dredge 60' from embankment and use discharge or building up land to be used as a campsite and construct a bulkhead on tract B12	0.08ac (900cy)	E2EM1P5	Pecan Island
P20020402	29 39 8	-92 29 4	Duhon, Autry L.	Dredge for a new boat slip and construct a boat shed on a private lake on Pecan Island	0.08ac (33cy)	UU	Pecan Island
P19900892	29 38 .7862604	-92 28 .4936656	Vermillion Corporation	Marsh Management plan-General dredge and/or fill (eg. Flowlines) H20 Block: Lock/Culvert flapgate	35942cy	None Listed	Pecan Island

VERMILION PARISH

CUP #	LATITUDE	LONGITUDE	APPLICANT	DESCRIPTION	IMPACTS cubic yards (cy) acre (ac)	HABITAT TYPE	RIDGE
P20080813	29 38 53.8	-92 28 9.4	Vermillion Corporation	Proposed restoration of the bank for the freshwater diversion outfall channel as part of the Pecan Island Bank Restoration (ME-01) project in Pecan Island. Approximately 256.8 cubic yards of native material will be excavated from a borrow area and used as fill behind a proposed +/-550' pvc sheet piling. Approximately 700 cubic yards of riprap (rock material) and 646.1 cubic yards of clay (special fill from an offsite borrow area) will be used as fill along the banks of the existing diversion canal.	0.17ac (1602.9cy)	UF8	Pecan Island

CUP #	CONCERN	LATITUDE	LONGITUDE	APPLICANT	DESCRIPTION	IMPACTS cubic yards (cy) acre (ac)	HABITAT TYPE	RIDGE
P19800322	State	29 45 26.7984828	-93 38 55.5699192	Tenneco	None listed	0cy	None listed	Blue Buck
P19810212	State	29 50 27.7807056	-93 0 5.5384992	LIG	Submerged or buried pipeline	0cy	None listed	Little Chenier Ridge
P19810459	State	29 47 14.7930216	-93 4 1.5367008	Chevron Pipeline	Submerged or buried pipeline-Rig present	0cy	None listed	Eugene Island
P19810494	State	29 48 26.7939468	-93 13 33.546522	Williams	Board road	0cy	None listed	Mesquite Ridge
P19810512	State	29 47 25.7976528	-93 19 15.5524008	Conoco	Industrial/Commercial Development - Dredge: borrow pit for fill	0cy	None listed	Back Ridge
P19810682	State	29 45 41.7954384	-93 38 51.5697144	Tennessee Gas Pipeline	None listed	0cy	None listed	Blue Buck
P19810828	State	29 45 28.796976	-92 55 50.524608	Watson	Board road-Rig: Directional hole-No dredging	0cy	None listed	Grand Chenier Ridge
P19810833	State	29 45 52.7976396	-93 38 10.5692136	Shell	Industrial/commercial development	0cy	None listed	Blue Buck
P19810868	State	29 45 26.7984828	-93 38 55.5699192	Tenneco	Above ground pipeline	0cy	None listed	Blue Buck
P19810916	State	29 45 49.794894	-93 42 23.5741644	Trahan, Robert	Dredge: Borrow pit for fill	0cy	None listed	Blue Buck
P19811025	State	29 45 56.7960156	-92 57 28.5279084	Conoco	Dredge: Borrow pit for fill-Pipeline: Submerged or buried	0cy	None listed	Grand Chenier Ridge
P19811158	State	29 47 18.7968012	-93 19 18.553062	Superior Supply	Dredge: Borrow pit for fill	31cy	None listed	Not named
P19811683	State	29 45 23.7967992	-93 38 51.5697432	Tenneco	Backfill and/or plug for mitigation-submerged or buried pipelines	4500cy	None listed	Blue Buck
P19811727	State	29 45 47.7956376	-93 37 29.5693716	Shell	Above ground and buried pipeline	0cy	None listed	Blue Buck
P19811863	State	29 45 35.7936156	-92 55 41.5248924	MCOR	Board road - Rig present	1000cy	None listed	Grand Chenier Ridge
P19820020	State	29 50 29.7786768	-92 59 45.53916	Despot	Board road - Rig present	3800cy	None listed	Little Chenier Ridge
P19820185	State	29 45 31.7939076	-93 38 50.5691556	United Gas	Submerged or buried pipeline	0cy	None listed	Blue Buck
P19820277	State	29 49 21.787194	-93 2 9.5394948	Goldking	Board road	10500cy	None listed	Pumpkin Ridge
P19820386	State	29 45 38.796084	-93 37 41.5679592	Gulf	Submerged or buried pipeline - Dredge: backfill and/or plug for mitigation	6000cy	None listed	Blue Buck

CAMERON PARISH

CUP #	CONCERN	LATITUDE	LONGITUDE	APPLICANT	DESCRIPTION	IMPACTS cubic yards (cy) acre (ac)	HABITAT TYPE	RIDGE
P19820429	State	29 45 55.7953128	-93 38 30.5696688	Transcontinental Gas	Submerged or buried pipeline	0cy	None listed	Blue Buck
P19820497	State	29 49 45.7818492	-92 52 9.5254788	Faulk, Carl	Dredge: Canal maintenance	2500cy	None listed	Little Chenier Ridge
P19820511	State	29 47 26.7837468	-93 44 57.5790864	Cameron Parish Police Jury	Boat Ramp	4960cy	None listed	Smith
P19820534	State	29 45 22.793508	-93 39 57.570804	Crain Brothers	Cattlewalk - Dredge Borrow pit for fill	3750cy	None listed	Blue Buck
P19820684	State	29 46 6.801006	-93 21 31.5532044	C&K	Dredge: Backfill and/or plug for mitigation- Pipeline: buried and above ground	11105cy	None listed	Not named
P19820859	State	29 46 53.7918996	-93 40 31.5735204	Namias-Crownover	Dredge: Ring levee new oil and gas only	0cy	None listed	Smith
P19821095	State	29 43 31.7927676	-92 47 56.5144692	Davis Oil	Rig present	1900cy	None listed	Grand Chenier Ridge
P19821205	State	29 43 28.7978628	-92 47 16.5125292	LA Resources Pipeline	Submerged or buried pipeline - Dredge: backfill and/or plug for mitigation	4400cy	None listed	Grand Chenier Ridge
P19821763	State	29 48 42.790752	-93 14 44.5481952	Williams	Board road- rig present	3333cy	None listed	Back Ridge
P19821801	State	29 45 34.802334	-93 36 54.567396	Gulf	Buried pipeline - Dredge: backfill and/or plug for mitigation	12852cy	None listed	Blue Buck
P19830111	State	29 47 .797838	-93 13 50.5473132	Cameron Parish Recreation	Borrow pit for fill	18354cy	None listed	Mesquite Ridge
P19830586	State	29 48 33.7979988	-93 18 51.5537064	Amoco Production	Rig/well present	2446cy	None listed	Back Ridge
P19830819	State	29 48 25.7954832	-93 13 23.5470936	Williams	Industrial/Commercial Development	0cy	None listed	Mesquite Ridge
P19830965	State	29 49 5.7867852	-92 57 30.5331948	Theriot, Martin	General dredge and/or fill	1220cy	None listed	Chenier Perdue Ridge
P19830986	State	29 48 24.7931856	-93 19 .5525544	Amoco Production	Rig/well present	670cy	None listed	Back Ridge
P19831002	State	29 46 3.8056656	-93 21 6.5541024	Forman	Rig/well present	0cy	None listed	Not named

CUP #	CONCERN	LATITUDE	LONGITUDE	APPLICANT	DESCRIPTION	IMPACTS cubic yards (cy) acre (ac)	HABITAT TYPE	RIDGE
P19831216	State	29 47 11.7963168	-93 14 35.548026	Cockerell	Submerged or buried pipeline - general dredge and/or fill	6930cy	None listed	Mesquite Ridge
P19831239	State	29 43 40.791396	-92 47 9.5121636	Tricentrol	Rig/well present	8595cy	None listed	Grand Chenier Ridge
P19831244	State	29 46 48.7981452	-93 19 26.552226	LLOG	Rig/well present	3900cy	None listed	Not named
P19831451	State	29 48 28.7909676	-93 13 24.547476	Williams	Submerged or buried pipeline- general dredge and/or fill	1670cy	None listed	Mesquite Ridge
P19831590	State	29 50 32.7759	-92 59 51.5399892	Despot	Rig/well present	4290cy	None listed	Little Chenier Ridge
P19831623	State	29 48 29.7949968	-93 13 26.5475568	LA Resources Pipeline	Submerged or buried pipeline- general dredge and/or fill	700cy	None listed	Mesquite Ridge
P19831651	State	29 47 21.7893408	-93 44 54.5791236	Cameron Parish Police Jury	Canal maintenance	5200cy	None listed	Smith
P19831679	State	29 45 .7951284	-92 54 3.521178	Cameron Parish Waterworks	Buried pipeline - general dredge and/or fill	120000cy	None listed	Grand Chenier Ridge
P19831688	State	29 47 7	-93 17 52	Cameron Gravity Drainage District	General dredge and/or fill	3200cy	None listed	Mesquite Ridge
P19831761	State	29 48 56.7815184	-92 56 32.5320396	Forman	Rig/well present	3500cy	None listed	Chenier Perdue Ridge
P19840158	State	29 44 33.7970112	-92 52 29.5201848	Technadril-Fenix	Submerged or buried pipeline - general dredge and/or fill	4032cy	None listed	Grand Chenier Ridge
P19840270	State	29 49 49.784736	-93 8 6.5444604	Stone	Rig/well present	4604cy	None listed	High Island
P19840554	State	29 43 57.7933248	-92 47 15.5129712	Callon Petroleum Operating	Rig present - board road	8067cy	None listed	Grand Chenier Ridge
P19840662	State	29 44 1.790232	-92 48 58.5142884	Evans, Mhire	Borrow pit for fill	1500cy	None listed	Hackberry Ridge
P19840666	State	29 49 29.7786792	-92 52 32.5258212	LA Waterfowl Unlimited	Boatslip - dredge - H20 Block: Pilings or dolphins (eg.Walkway)	800cy	None listed	Little Chenier Ridge
P19840699	State	29 43 46.7922828	-92 47 13.5127104	Texaco Exploration and	Production/heater platform - Dredge: shell pad	300cy	None listed	Grand Chenier Ridge
P19840774	State	29 50 25.7826624	-93 0 2.53827	Despot	Rig/well present	0cy	None listed	Little Chenier Ridge

CAMERON PARISH

CUP #	CONCERN	LATITUDE	LONGITUDE	APPLICANT	DESCRIPTION	IMPACTS cubic yards (cy) acre (ac)	HABITAT TYPE	RIDGE
P19840882	State	29 47 37.789422	-93 10 38.5440672	Dimas, Gary	Cattlewalk - H20 Block: lock/culvert flapgate	1700cy	None listed	Front Ridge
P19840923	State	29 50 38.7822948	-93 1 8.5401624	Arco	Rig/well present	3183cy	None listed	Little Chenier Ridge
P19841091	State	29 43 33.7947204	-92 47 7.5135372	Wintershall	Board road-rig/well present	2400cy	None listed	Grand Chenier Ridge
P19841442	State	29 48 27.7907616	-93 18 53.5533372	Amoco Production	Well present	0cy	None listed	Back Ridge
P19841542	State	29 44 58.7891436	-93 43 36.5727	TXO	Rig/well present	11666cy	None listed	Hackberry Ridge
P19841730	State	29 49 36.7848516	-93 8 18.5446464	Stone	Rig/well present	12500cy	None listed	High Island
P19841749	State	29 45 28.8002196	-93 38 46.5691524	Tennessee Gas Pipeline	buried pipeline - dredge or fill	10600cy	None listed	Blue Buck
P19841769	State	29 46 24.7898496	-93 43 53.5748736	Davis, Raymond C.	Dredge: Borrow pit for fill, Rig present- Well name: Raymond Davis Fee	3000 cy	None listed	Blue Buck
P19850279	State	29 49 53.7839184	-92 56 52.5327864	TX Gas	Above ground and buried pipeline - general dredge and/or fill	18500cy	None listed	Little Chenier Ridge
P19850471	State	29 47 35.793744	-93 14 24.547668	Great South	Rig/well present	0cy	None listed	Mesquite Ridge
P19850503	State	29 47 22.7882472	-93 6 46.5401376	Cameron Parish Gravity Drainage	Drainage/flood program development	7460cy	None listed	Oak Grove Ridge
P19850504	State	29 47 25.7888076	-93 7 28.540254	Cameron Parish Gravity Drainage	Drainage/flood program development	4030cy	None listed	Front Ridge
P19850673	State	29 48 33.7972392	-93 19 5.5521876	Amoco Production	Backfill and/or plug for mitigation	200cy	None listed	Back Ridge
P19850746	State	29 45 15.7898412	-93 43 21.572706	TXO	Rig/well present	5856cy	None listed	Hackberry Ridge
P19850803	State	29 44 21.7906152	-92 50 48.5169936	Linder	Well present	0cy	None listed	Grand Chenier Ridge
P19850843	State	29 48 21.7912464	-93 18 45.5526432	Amoco Production	Rig/well present	0cy	None listed	Back Ridge
P19850984	State	29 43 57.7933248	-92 47 15.5129712	Cameron Development	Rig/well present	8067cy	None listed	Grand Chenier Ridge
P19851123	State	29 50 37.7763216	-93 0 56.5405488	Vincent, Amos	Agricultural/Crayfish Pond - General dredge and/or fill	3407cy	None listed	Little Chenier Ridge
P19851158	State	29 48 24.7974228	-93 18 48.5526096	Amoco Production	None listed	0cy	None listed	Back Ridge

CUP #	CONCERN	LATITUDE	LONGITUDE	APPLICANT	DESCRIPTION	IMPACTS cubic yards (cy) acre (ac)	HABITAT TYPE	RIDGE
P19851280	State	29 48 23.791806	-93 12 52.5475296	Williams	Well present	0cy	None listed	Mesquite Ridge
P19851384	State	29 48 21.788226	-93 12 35.54613	Williams	Well present	0cy	None listed	Mesquite Ridge
P19851489	State	29 47 21.7901688	-93 7 39.5410476	Rutherford, John	Cattlewalk - Dredge Borrow pit for fill	3300cy	None listed	Front Ridge
P19860111	State	29 49 23.7853056	-92 59 52.5374556	Denovo Oil and Gas	Rig/well present	0cy	None listed	Chenier Perdue Ridge
P19860312	State	29 47 25.7870004	-93 4 38.5378716	Mosbach Production	Well present	0cy	None listed	Eugene Island
P19860353	State	29 44 39.7944816	-92 50 45.5175348	Linder	Rig/well present	11670cy	None listed	Grand Chenier Ridge
P19860399	State	29 48 32.7922164	-93 19 4.5530076	Amoco Production Company	Rig/well present	1540cy	None listed	Back Ridge
P19860401	State	29 43 55.7953104	-92 47 15.5123088	Cameron Development	Submerged or buried pipeline - general dredge and/or fill	1880cy	None listed	Grand Chenier Ridge
P19860439	State	29 50 32.7757488	-93 0 12.5395344	Conner, Kermit	Pumping station	3300cy	None listed	Little Chenier Ridge
P19860580	State	29 44 34.7960256	-93 42 44.5725756	Canlan Oil	Rig/well present-maintenance and repair	0cy	None listed	Not named
P19860614	State	29 46 3.7937028	-93 38 47.569596	CSX	Submerged or buried pipeline - general dredge and/or fill	8901cy	None listed	Blue Buck
P19860734	State	29 46 16.7889756	-92 55 30.5252688	Miller, Watkin	H20 Block: Bulkhead and/or warf	0cy	None listed	Indian Pt. Island
P19860752	State	29 44 37.792788	-92 51 25.5171276	Roberts, James	General dredge and/or fill - H20 Block: Lock/Culvert flapgate	35cy	None listed	Grand Chenier Ridge
P19860774	State	29 45 35.798814	-93 36 16.5668832	Bailey, John	None listed	0cy	None listed	Blue Buck
P19860884	State	29 48 26.7972768	-93 19 1.5530916	Amoco Production	Backfill and/or plug for mitigation	829cy	None listed	Back Ridge
P19860952	State	29 44 41.7913476	-92 50 44.5167096	Linder	Buried pipeline - general dredge and/or fill	1360cy	None listed	Grand Chenier Ridge
P19870044	State	29 45 59.8007952	-93 38 18.5699508	LA Resources Pipeline	None listed	0cy	None listed	Blue Buck
P19870088	State	29 44 33.7942284	-93 42 40.5732744	Canlan Oil	None listed	0cy	None listed	not named

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CUP #	CONCERN	LATITUDE	LONGITUDE	APPLICANT	DESCRIPTION	IMPACTS cubic yards (cy) acre (ac)	HABITAT TYPE	RIDGE
P19870131	State	29 45 40.8034476	-93 35 .5665884	Cameron Parish Gravity Drainage	Drainage/flood program development - Buried pipeline-General dredge and/or fill	4471cy	None listed	Blue Buck
P19870162	State	29 44 40.7931864	-93 42 1.5726996	ANR Pipeline Company	None listed	0cy	None listed	Not named
P19870203	State	29 45 .7946892	-92 50 48.516756	Standard Oil	General dredge and/or fill	1053cy	None listed	Hackberry Ridge
P19870349	State	29 46 .796116	-92 57 40.5281772	Conoco	Canal maintenance dredge	20000cy	None listed	Grand Chenier Ridge
P19870352	State	29 43 18.7918788	-92 46 42.51252	Theriot, Valian	General dredge and/or fill - Board road	3000cy	None listed	Grand Chenier Ridge
P19870448	State	29 45 .7955496	-92 50 49.5166236	Linder	Rig present	8921cy	None listed	Hackberry Ridge
P19870468	State	29 45 .7955496	-92 50 49.5166236	Linder	None listed	0cy	None listed	Hackberry Ridge
P19870548	State	29 45 52.7942412	-92 56 50.5262076	Boudreaux, Larry	Agricultural/Crayfish Pond	2725cy	None listed	Grand Chenier Ridge
P19870555	State	29 49 4.7816112	-92 57 36.5328792	Hoin, Ernest	None listed	0cy	None listed	Chenier Perdue Ridge
P19870568	State	29 47 13.79742	-93 18 25.5509352	Cameron Parish Police Jury	General dredge and/or fill	340cy	None listed	Not named
P19870594	State	29 50 40.7841108	-93 1 35.5404324	Rutherford, John	Agricultural/Crayfish pond	1000cy	None listed	Little Chenier Ridge
P19870612	State	29 47 21.7938372	-93 9 36.5435784	Cameron Construction	General dredge and/or fill - Industrial/commercial development	163000cy	None listed	Front Ridge
P19870894	State	29 46 6.8104488	-93 30 .5622048	LaDOTD	Highway work	0cy	None listed	Blue Buck
P19870929	State	29 45 59.797638	-93 38 17.569752	LA Resources Pipeline	Above ground and buried pipeline	25cy	None listed	Blue Buck
P19870980	State	29 50 54.7819908	-93 2 28.541922	Trahan, Gene	Residence or camp	900cy	None listed	Little Chenier Ridge
P19871016	State	29 48 38.7924156	-93 13 32.5477236	Graham	Dredge: shell pad	4500cy	None listed	Mesquite Ridge
P19871024	State	29 48 33.7940064	-93 18 25.5519828	Amoco Production	Rig/well present	0cy	None listed	Back Ridge
P19871040	State	29 48 28.792692	-93 19 2.5534668	Amoco Production	Well present	1300cy	None listed	Back Ridge
P19880012	Local	29 45 54.7968204	-93 39 34.572258	Roy Bailey Construction	None listed	0cy	None listed	Not named

CUP #	CONCERN	LATITUDE	LONGITUDE	APPLICANT	DESCRIPTION	IMPACTS cubic yards (cy) acre (ac)	HABITAT TYPE	RIDGE
P19880017	Local	29 45 20.8034568	-93 36 34.5680064	Cameron Construction	None listed	0cy	None listed	Blue Buck
P19880018	Local	29 45 19.7947872	-92 54 51.5217636	Roy Bailey Construction	None listed	0cy	None listed	Grand Chenier Ridge
P19880080	State	29 48 27.7931592	-93 18 52.5529008	Amoco Production	Well present	660cy	None listed	Back Ridge
P19880102	State	29 45 1.7925408	-92 50 47.5164276	Linder	Buried pipeline-general dredge and/or fill-well present	925cy	None listed	Hackberry Ridge
P19880123	Local	29 45 22.7885328	-92 54 46.5227676	Welch's Alligator Farm	None listed	0cy	None listed	Grand Chenier Ridge
P19880166	State	29 44 34.7959428	-92 52 12.5194044	Exxon	Rig/well present	0cy	None listed	Grand Chenier Ridge
P19880254	Local	29 44 3.7915332	-92 49 12.5154912	Richard, Lester	None listed	0cy	None listed	Hackberry Ridge
P19880307	State	29 48 33.7890636	-93 13 32.5480188	Graham	Above ground pipeline	0cy	None listed	Mesquite Ridge
P19880321	State	29 48 33.7936896	-93 13 34.5476568	Graham	General dredge and/or fill	1700cy	None listed	Mesquite Ridge
P19880413	State	29 45 .789444	-92 50 30.5150892	LL&E	Rig/well present	0cy	None listed	Hackberry Ridge
P19880421	State	29 48 35.7919956	-93 17 31.5514824	Camex	Submerged or buried pipeline - general dredge and/or fill	200cy	None listed	Back Ridge
P19880448	State	29 48 33.7890636	-93 13 32.5480188	Graham	Submerged or buried pipeline - general dredge and/or fill	4584cy	None listed	Mesquite Ridge
P19880565	State	29 48 23.7970152	-93 17 45.551346	Camex	Rig/well present	278cy	None listed	Back Ridge
P19880757	Local	29 48 40.79322	-93 12 41.5471752	Cameron Parish Gravity Drainage	None listed	0cy	None listed	Mesquite Ridge
P19880758	Local	29 45 28.799514	-93 39 45.5715432	Equipment Rentals	None listed	0cy	None listed	Blue Buck
P19880765	Local	29 47 42.792684	-93 13 58.5473664	Cameron Parish Gravity Drainage	None listed	0cy	None listed	Mesquite Ridge
P19880771	Local	29 48 6.7959468	-93 13 19.5478536	Cameron Parish Gravity Drainage	None listed	0cy	None listed	Mesquite Ridge
P19880784	State	29 48 44.7873624	-92 54 52.528176	Dynamic	Rig/well present	175cy	None listed	Chenier Perdue Ridge
P19880818	Local	29 48 4.7896272	-93 14 20.5488888	Cameron Parish Gravity Drainage	None listed	0cy	None listed	Mesquite Ridge

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CUP #	CONCERN	LATITUDE	LONGITUDE	APPLICANT	DESCRIPTION	IMPACTS cubic yards (cy) acre (ac)	HABITAT TYPE	RIDGE
P19880825	State	29 47 .7885104	-93 4 20.5371624	LA Resources Pipeline	Industrial/commercial development	760cy	None listed	Oak Grove Ridge
P19880974	State	29 45 32.7886128	-92 54 2.521584	Statex Petroleum	Rig/well present	1580cy	None listed	Indian Pt. Island
P19881037	State	29 48 28.7981496	-93 17 46.552164	Rosewood	Rig/well present	0cy	None listed	Back Ridge
P19890246	Local	29 47 1.7899944	-93 4 58.5385392	Roy Bailey Construction	None listed	0cy	None listed	Oak Grove Ridge
P19890319	State	29 43 58.7922744	-92 47 10.513518	Energy Properties	Buried pipeline - general dredge and/or fill	60cy	None listed	Grand Chenier Ridge
P19890361	State	29 44 26.7952704	-92 50 56.5169784	Nasser Oil & Gas, Inc.	Rig/well present	5986cy	None listed	Grand Chenier Ridge
P19890388	Local	29 47 12.7961268	-93 6 48.53988	Hebert, Richard	None listed	0cy	None listed	Oak Grove Ridge
P19890422	State	29 48 26.7983496	-93 18 19.5527988	Amoco Production	Well present - pipeline above ground	0cy	None listed	Back Ridge
P19890525	Local	29 45 10.7913852	-92 54 .5210712	Cameron Parish Recreation	None listed	0cy	None listed	Grand Chenier Ridge
P19890570	Local	29 46 16.7928132	-93 43 20.5752072	Trahan, Alton	None listed	0cy	None listed	Blue Buck
P19890697	State	29 48 22.7921472	-93 17 44.5510032	Camex	Well present	0cy	None listed	Back Ridge
P19890722	State	29 48 29.7917388	-93 12 28.547028	Graham	Rig (directional hole) and well present	533cy	None listed	Mesquite Ridge
P19890751	State	29 46 6.8104488	-93 30 .5622048	LaDOTD	None listed	50000cy	None listed	Blue Buck
P19891086	State	29 49 24.7875636	-93 2 27.5390592	Theriot, Willard	None listed	0cy	None listed	Pumpkin Ridge
P19891108	State	29 44 58.7957208	-92 51 54.51903	Natural Gas Pipeline	General dredge and/or fill	180cy	None listed	Grand Chenier Ridge
P19900154	Local	29 43 35.7972492	-92 47 30.5137464	Brasseaux, D.L.	None listed	0cy	None listed	Grand Chenier Ridge
P19900207	State	29 46 5.7996768	-93 38 47.570658	Scurlock Oil	None listed	3110cy	None listed	Blue Buck
P19900215	State	29 45 .789444	-92 50 30.5150892	Linder	Buried pipeline - Well present - general dredge and/or fill	1945cy	None listed	Hackberry Ridge
P19900254	Local	29 48 20.7942372	-93 11 27.5453772	Cameron Parish Gravity Drainage	None listed	0cy	None listed	Mesquite Ridge

CUP #	CONCERN	LATITUDE	LONGITUDE	APPLICANT	DESCRIPTION	IMPACTS cubic yards (cy) acre (ac)	HABITAT TYPE	RIDGE
P19900546	Local	29 45 59.792058	-92 57 2.5262568	Cameron Parish Recreation	None listed	0cy	None listed	Grand Chenier Ridge
P19900910	State	29 46 8.7976416	-93 20 58.5533904	Linder	Rig/well present	4580cy	None listed	Not named
P19901161	State	29 48 39.7878156	-93 13 .5477052	Graham	Buried pipeline - general dredge and/or fill	1334cy	None listed	Mesquite Ridge
P19910165	Local	29 45 48.7986804	-93 39 12.5708616	Young, Elden	None listed	0cy	None listed	Blue Buck
P19910180	Local	29 45 42.78789	-92 54 37.5231672	Conner, John	None listed	0cy	None listed	Indian Pt. Island
P19910218	State	29 45 10.797966	-93 38 10.568364	Natural Gas Pipeline	None listed	0cy	None listed	Blue Buck
P19910385	State	29 46 8.7976416	-93 20 58.5533904	Linder	Buried pipeline - Well present - general dredge and/or fill	2250cy	None listed	Not named
P19910493	Local	29 47 .7880352	-93 3 49.5363888	Reina, J.C.	None listed	0cy	None listed	Oak Grove Ridge
P19910523	Local	29 43 30.7940052	-92 45 40.5110268	Miller, Donald	None listed	0cy	None listed	Grand Chenier Ridge
P19910597	Local	29 49 22.7840736	-93 0 52.5378276	Giroir, Joseph	None listed	0cy	None listed	Chenier Perdue Ridge
P19910708	State	29 45 44.7919704	-93 41 54.5717076	Cameron Telephone	none listed	0cy	None listed	Blue Buck
P19910737	Local	29 46 45.7983696	-93 14 56.5474452	Cameron Parish	None listed	0cy	None listed	Mesquite Ridge
P19910741	State	29 44 36.7948176	-92 52 47.51859	Natural Gas Pipeline	General dredge and/or fill	340cy	None listed	Grand Chenier Ridge
P19910816	Local	29 49 .7899852	-93 11 26.5465896	Richard, P.D.	None listed	0cy	None listed	Mesquite Ridge
P19910963	Local	29 46 30	-93 44 0	Trahan, Allen	None listed	0cy	None listed	Blue Buck
P19911072	State	29 47 20.7919932	-93 4 8.5363356	Shell Western E&P	Buried pipeline - general dredge and/or fill	2283cy	None listed	Eugene Island
P19920612	State	29 46 .796116	-92 57 40.5281772	Vastar Resources, Inc.	Canal maintenance dredge	24250cy	None listed	Grand Chenier Ridge
P19920794	Local	29 48 20.791386	-93 13 4.5474852	Valette, Calvin	None listed	0cy	None listed	Mesquite Ridge
P19920823	State	29 47 22.7895288	-93 4 9.5372904	LA Resources Pipeline	Buried pipeline - general dredge and/or fill	208cy	None listed	Eugene Island

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CUP #	CONCERN	LATITUDE	LONGITUDE	APPLICANT	DESCRIPTION	IMPACTS cubic yards (cy) acre (ac)	HABITAT TYPE	RIDGE
P19920853	Local	29 45 16.7963904	-92 55 15.5230572	Fawvor, James E.	None listed	0cy	None listed	Grand Chenier Ridge
P19920898	Local	29 46 57.7894116	-93 41 10.573782	Garber, Nickolaus	None listed	0cy	None listed	Smith
P19921061	Local	29 46 26.7944952	-93 10 48.542772	Theriot, F.O.	None listed	0cy	None listed	Mesquite Ridge
P19921107	State	29 45 14.7930264	-93 44 38.5756044	Phillips Petroleum	Buried pipeline	0cy	None listed	Hackberry Ridge
P19921303	State	29 47 .8011428	-93 19 20.5529628	Smith, Victor P.	Borrow pit for fill - Industrial/commercial construction	5120cy	None listed	Not named
P19921315	State	29 46 14.7948132	-93 43 20.5756428	LeBouef, Eric	None listed	0cy	None listed	Blue Buck
P19930065	State	29 46 59.7955908	-93 3 52.5368232	Shell Western E&P	Rig/well present	1000cy	None listed	Oak Grove Ridge
P19930111	Local	29 45 41.796702	-93 37 30.5694264	Cameron Telephone	None listed	0cy	None listed	Blue Buck
P19930235	State	29 45 51.7940172	-93 38 21.5698956	Columbia Gulf Transmission	Pumping station, pipelines buried and above ground, general dredge and/or fill	0cy	None listed	Blue Buck
P19930410	Local	29 47 15.7922952	-93 15 10.547442	Cameron Parish Gravity Drainage	None listed	0cy	None listed	Mesquite Ridge
P19930579	State	29 48 24.7987764	-93 19 18.5527236	MW Petroleum	Rig/well present	1045cy	None listed	Back Ridge
P19930628	Local	29 45 18.7924536	-92 54 46.5233544	Roy Bailey Construction	None listed	0cy	None listed	Grand Chenier Ridge
P19930632	Local	29 47 28.795506	-93 8 .5425584	Cameron Parish Gravity Drainage	None listed	0cy	None listed	Front Ridge
P19930873	State	29 46 5.7937296	-93 38 30.570936	Transcontinental Gas	General dredge and/or fill	1517cy	None listed	Blue Buck
P19930945	Local	29 45 40.80258	-93 33 55.565478	Lacoste, Donald D.	None listed	0cy	None listed	Blue Buck
P19930987	Local	29 49 36.7832676	-92 55 .5300364	Trahan, Hillary	None listed	0cy	None listed	Little Chenier Ridge
P19931086	Local	29 48 40.7916288	-93 13 2.5477752	Quinn, George C.	None listed	0cy	None listed	Mesquite Ridge
P19931292	State	29 44 30.79176	-93 42 53.5728132	Riceland Petroleum	Rig/well present	1945cy	None listed	Not named
P19940035	State	29 46 18.8013792	-93 20 53.5531344	Smith Production Company	Rig/well present	3895cy	None listed	Not named

CUP #	CONCERN	LATITUDE	LONGITUDE	APPLICANT	DESCRIPTION	IMPACTS cubic yards (cy) acre (ac)	HABITAT TYPE	RIDGE
P19940036	State	29 46 33	-93 19 51	Smith Production Company	Rig/well present	1945cy	None listed	Not named
P19940119	Local	29 45 59.7922164	-93 39 34.5708612	Roy Bailey Construction	None listed	0cy	None listed	Not named
P19940380	Local	29 47 18.7924812	-93 16 38.550648	Theriot, Roman	None listed	0cy	None listed	Mesquite Ridge
P19940452	Local	29 46 50.7969264	-93 15 20.5474536	Miller, Layton	None listed	0cy	None listed	Mesquite Ridge
P19940997	Local	29 46 30.7933032	-93 10 58.5443388	Savoie, John C.	None listed	0cy	None listed	Mesquite Ridge
P19941213	Local	29 45 24.79014	-93 44 2.5741824	Cameron Parish School	None listed	0cy	None listed	Hackberry Ridge
P19950044	State	29 44 26.7922284	-93 43 16.5726984	Riceland Petroleum	Well present	0cy	None listed	Not named
P19950060	Local	29 48 45.7932708	-93 11 28.5454284	Cameron Parish Gravity Drainage	None listed	0cy	None listed	Mesquite Ridge
P19950153	Local	29 47 12.7966164	-93 15 55.54872	Cameron Parish Gravity Drainage	None listed	0cy	None listed	Mesquite Ridge
P19950468	State	29 47 1.7902392	-93 4 15.537954	Shell Western E&P	Rig/well present	1296cy	None listed	Oak Grove Ridge
P19950496	Local	29 48 14.79078	-93 11 39.5452788	Boudreaux, Glenda	None listed	0cy	None listed	Mesquite Ridge
P19951049	Local	29 48 10.7886492	-93 11 43.5461676	Boudreaux, Glenda	None listed	0cy	None listed	Mesquite Ridge
P19951055	State	29 47 .7890504	-93 4 19.5369636	Shell Western E&P	General dredge and/or fill	802cy	None listed	Oak Grove Ridge
P19951344	State	29 47 1.794624	-93 3 50.5370268	Shell Western E&P	Rig/well present	1425cy	None listed	Oak Grove Ridge
P19951369	State	29 48 42.7912704	-93 16 43.5501732	Texas Meridian Resources	Pumping station - buried pipeline and well present	0.6ac (2076cy)	E2EM1P6	Back Ridge
P19951409	Local	29 47 1.7906244	-93 4 57.5383404	Roy Bailey Construction	None listed	0cy	None listed	Oak Grove Ridge
P19951418	Local	29 50 53.7777672	-93 2 17.5423992	Cameron Waterworks	None listed	0cy	None listed	Little Chenier Ridge
P19960777	State	29 48 .7945128	-93 11 .544596	ANR Pipeline Company	Buried pipeline - general dredge and/or fill	120cy	None listed	Mesquite Ridge
P19960905	State	29 48 46.7896932	-93 17 1.5510408	Texas Meridian Resources	Buried pipeline - well present	0cy	None listed	Back Ridge

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CUP #	CONCERN	LATITUDE	LONGITUDE	APPLICANT	DESCRIPTION	IMPACTS cubic yards (cy) acre (ac)	HABITAT TYPE	RIDGE
P19961386	Local	29 45 15.8107572	-93 27 20.5597368	Cameron Parish Gravity Drainage	None listed	0cy	None listed	Blue Buck
P19961876	Local	29 45 30.7980756	-93 37 20.5677588	Sandpiper Estate	None listed	0cy	None listed	Blue Buck
P19970534	State	29 48 47.7915408	-93 18 48.5528508	Texas Meridian Resources	Buried pipeline - general dredge and/or fill	3.9ac (6196cy)	E2EM1P6	Back Ridge
P19970796	Local	29 46 25.79187	-93 7 42.5410464	Labove, Kent	None listed	0cy	None listed	Front Ridge
P19971050	Local	29 45 10.8026136	-93 35 25.5655788	Erbelding, George	None listed	0cy	None listed	Blue Buck
P19971363	State	29 48 24	-93 16 59	LA Resources Pipeline	Buried pipeline - general dredge and/or fill	0.03ac, 0.03ac (114cy)	E2EM1P6, UR	Back Ridge
P19971512	Local	29 51 8.7780744	-93 3 10.5434676	Little Chenier Hunting	None listed	0cy	None listed	Little Chenier Ridge
P19971670	State	29 44 33.791442	-93 42 51.5735028	Riceland Petroleum	Rig/well present	1ac, 1.1ac (1904cy)	E2EM1P5, UU	Not named
P19980188	Local	29 45 55.7874072	-93 44 42.5756436	Protech Oil Field SE	None listed	0cy	None Listed	Garner
P19980318	State	29 45 26	-93 37 42	Basin Exploration	Borrow pit for fill	1ac (200cy)	UU	Blue Buck
P19980445	State	29 48 39.7935936	-93 12 10.5455412	RME Petroleum Company	Buried pipeline - general dredge and/or fill	0.22ac (620cy)	PEM1C	Mesquite Ridge
P19981006	State	29 44 34.7960616	-93 42 47.5722792	Riceland Petroleum	Well present	0.69ac	E2EM1P4	Not named
P19981183	State	29 45 54	-93 38 32	ANR Pipeline Company	None listed	0cy	None listed	Blue Buck
P19981257	Local	29 47 24.7950168	-93 7 56.5416696	Rutherford, Olive B.	None listed	0cy	None listed	Front Ridge
P19981673	State	29 43 21.791424	-93 47 54.5841384	Zydeco Exploration	Well Name: SL 16508- General dredge and/or fill (eg. Flowlines)	2.5ac	E2EM1N4	Not named
P19981723	State	29 44 20.7949632	-92 50 17.5170732	Fancor Oil, Inc.	Well present	2.07ac (267cy)	UF8	Grand Chenier Ridge
P19990323	state	29 46 .17	-93 39 49.92	Roy Bailey Construction	None listed	0cy	None listed	Blue Buck
P19990401	Local	29 47 42.1959	-93 13 57.0521	Cameron Parish Gravity Drainage	Normal maintenance and repair - general dredge and/or fill	660cy	None listed	Mesquite Ridge
P19990563	State	29 45 55.2767	-93 39 45.2497	Cheniere Energy Inc	Rig/well present	3.1ac (730cy)	UR	Blue Buck

CUP #	CONCERN	LATITUDE	LONGITUDE	APPLICANT	DESCRIPTION	IMPACTS cubic yards (cy) acre (ac)	HABITAT TYPE	RIDGE
P19990734	Local	29 46 7.03	-93 7 55	Bertrand, Charles Lynn	Residential development - borrow pit for fill	8450cy	None listed	Mesquite Ridge
P19990738	Local	29 47 4.2714	-93 18 21.7378	Cameron Parish Gravity Drainage	Normal maintenance and repair - general dredge and/or fill	0cy	None listed	Mesquite Ridge
P19991060	Local	29 49 42.62	-93 7 7.23	Wicke, Greg	None listed	0cy	None listed	High Island
P19991289	State	29 44 14.04	-92 50 13.41	Panaco, Inc.	General dredge and/or fill	.35ac/.23ac (466cy)	PEM1C/UF8	Grand Chenier Ridge
P19991330	Local	29 51 26.04899	-93 4 19.6401	Oak Grove Hunting Club	None listed	0.04ac (266cy)	E2EM1P6	Little Chenier Ridge
P19991400	State	29 47 .79149	-93 3 48.53665	The Meridian Resources and Exploration	Rig/well present	1.74ac (1452cy)	UU	Oak Grove Ridge
P20000355	State	29 44 10	-93 44 25	Cameron Parish Gravity Drainage	Perform maintenance dredging on Smith, Mays & Trahan Bayous	0.01ac	E1UBL4	Blue Buck
P20000623	State	29 50 31.273	-92 59 49.17	Indian Exploration, Inc.	Access, re-enter, complete and produce the Camelia Nunez Well #2	0.55ac	UR	Little Chenier Ridge
P20000658	State	29 43 13	-92 46 17	Hilliard Petroleum	Install structures to serve Mhire Well #1	2.4ac (655cy)	UR	Grand Chenier Ridge
P20001124	State	29 42 0	-92 59 0	DNR Office of Conservation-	Underwater Obstructions Removal	0cy	None listed	Indian Pt. Island
P20001254	State	29 42 0	-92 59 0	DNR Office of Conservation-	Underwater Obstructions Removal	0cy	PEM1Fh	Indian Pt. Island
P20001274	State	29 44 34	-93 42 48	Riceland Petroleum	Structures to serve SL16037 #2	0.68ac (622cy)	E2EM1P4	Not named
P20001537	State	29 49 48.2	-93 8 2.5	Southwestern Energy	Structures to serve Joyce Sturlese et al #1	2.8ac, 3.14ac (760cy)	PEM1T, UU	High Island
P20001630	State	29 45 44.1	-93 42 5.9	Dore Energy Corporation	Ring levee structures to serve Gray Estate #1	0.61ac, 1.26ac	PEM, UR	Blue Buck
P20001661	Local	29 48 15	-93 13 25	Constance, Katrina	Excavate for fish pond and fill	0cy	None listed	Mesquite Ridge
P20001882	State	29 48 42	-92 54 43.5	Petroquest Energy, Inc.	Drill barge structures to serve Mermentau Minerals #1	2.07 ac, 2.06ac (297cy)	E2EM1P6, UR	Chenier Perdue Ridge
P20010045	Local	29 49 24.5	-92 52 45.85	Cameron Parish Gravity Drainage	Restore levee & remove water control structure	0cy	None listed	Little Chenier Ridge
P20010264	State	29 47 9	-93 6 55	Department of Transportation	Bridge Replacement for Parish Road 357 over Creole Canal	0cy	None listed	Oak Grove Ridge

CAMERON PARISH

CUP #	CONCERN	LATITUDE	LONGITUDE	APPLICANT	DESCRIPTION	IMPACTS cubic yards (cy) acre (ac)	HABITAT TYPE	RIDGE
P20010314	State	29 45 21.18	-93 37 46.9	Basin Exploration	Repair 16" gas pipeline	0.01ac (333cy)	USSs	Blue Buck
P20010340	State	29 45 11	-93 42 53	Riceland Petroleum	Install structures to serve Matilda Gray Streams #1	4.2ac	E2EM1N5	Hackberry Ridge
P20010413	State	29 45 20	-92 55 11	Tepco Resources, Inc.	Install drill board road, drillsite & structures to serve Fawvor Estates #1	2.2ac (4033cy)	UA	Grand Chenier Ridge
P20010529	State	29 47 21.4795	-93 18 17.2166	Cameron Parish Gravity Drainage	Perform lateral maintenance in Cameron area	0cy	None listed	Back Ridge
P20010810	Local	29 45 59.92	-93 42 50.68	American Tower Corporation	Construct Johnson Bayou Communication Tower	0.01ac	UR	Blue Buck
P20010992	State	29 42 53.808	-93 50 24.463	Williams Field Services	Pipeline/Flowline - Maintenance on a 24" pipeline	16.5ac	PEM1F	Blue Buck
P20011125	State	29 44 23	-92 50 20	Fancor Oil, Inc.	Drill Site - Ring levee to drill the Evariste Nunez Heirs Well #3.	2.06ac, 1.42ac (355cy)	PFO1A	Grand Chenier Ridge
P20011231	Local	29 46 31.9728	-93 44. 11924	Cameron Parish Gravity Drainage	Replace culvert in the Johnson Bayou Area	32cy	None listed	Blue Buck
P20011511	State	29 48 46.251	-93 17 .371	Mission Resources	Install structures to serve ER & CF Henry Est. et al SWD #2	0.42ac	UR	Back Ridge
P20011812	Local	29 47 48.48	-93 11 28.21	Cameron Parish Gravity Drainage	Maintenance dredge existing W-1 east drainage lateral	0.55ac (1926cy)	PEM1C	
P20020216	Local	29 46 7.03	-93 7 54.73	Bertrand, Charles Lynn	Fill for development	638cy	None listed	Mesquite Ridge
P20020217	Local	29 47 25	-93 12 32	Wilkerson, Wendell	Excavate sand and clay for commercial use	0.86ac (16000cy)	UR	Mesquite Ridge
P20020564	Local	29 47 11	-93 8 18	Boudreaux, Dorothy	Excavate to enlarge an existing boat slip and boat house	0.01ac (50cy)	UA	Front Ridge
P20020581	Local	29 45 55	-93 45 53	Harrington, Richard	Home site/driveway - excavate a pond and use fill for landscape improvements to and	1.6ac	UR	Blue Buck
P20021171	Local	29 46 0	-92 55 13	Boudreaux, Larry	Excavate a fish pond to obtain fill for commercial use	1.72ac (38000cy)	UA	Indian Pt. Island
P20021530	State	29 49 2	-92 57 0	Ballard Exploration	Install two 6" flowlines and structures to serve the Theriot Heirs Well No. 001 ST	0.06ac (343cy)	E2EM1P6	Chenier Perdue Ridge
P20030001	State	29 48 32	-93 17 37	Reef Exploration, Inc.	Install structures and ring levee to drill Henry 28 Well No. 2	2.45ac	E2EM1P5	Back Ridge
P20030470	State	29 45 49	-93 43 10	Badon, Stacey	Excavate a fish pond and deposit fill around homesite at 6648 Golf Beach Hwy.	2.27ac (38223cy)	UR	Blue Buck
P20030629	Local	29 47 46	-93 13 52	Trahan, Alfred	Excavate a fish/turtle pond, deposit fill, and stockpile fill for future use	1000cy	None listed	Mesquite Ridge

CUP #	CONCERN	LATITUDE	LONGITUDE	APPLICANT	DESCRIPTION	IMPACTS cubic yards (cy) acre (ac)	HABITAT TYPE	RIDGE
P20030636	State	29 46 17.007	-92 50 24.833	Hilliard Petroleum	install a board road, ring levee, and structures to drill the Millrich Properties,	2.5ac (750cy)	USSs	Hackberry Ridge
P20030737	State	29 46 33.692	-93 19 51.58	Smith Production Company	Construct a well pad and ring levee to drill the Vua J.A. Davis No. 3 Well	2.07ac (1082cy)	None listed	Not named
P20031174	Local	29 48 29.938	-93 9 52.1221	Cameron Parish Water Works	Replace an existing water well and construct an elevated storage tank to	500cy	None listed	Mesquite Ridge
P20031495	Local	29 44 16	-92 51 2	Baker, Lynn	Dig a fish pond and use excavated material as fill for a house pad located in Grand	2000cy	None listed	Grand Chenier Ridge
P20031651	State	29 45 53	-93 48 15	Noble Energy, Inc.	Drill Site - install structures to drill the Sanders Ridge No. 2 Prospect Well located	0.03 ac	UR	Blue Buck
P20040680	State	29 48 42	-92 54 45	Reef Exploration, LLC	Construct a ring levee for drilling the Mermentau Minerals Well No. 1 in the Little	1.96ac, 0.45ac (286cy)	E2EM1P6, UR	Chenier Perdue Ridge
P20040708	State	29 45 15	-93 52 34	Cheniere Energy, Inc.	Install the Sabine Pass LNG Terminal (P20033120) and the Sabine Pass Pipeline	6.56ac (4569000cy)	E2EM1P5	Blue Buck
P20041202	State	29 46 25	-93 19 20	Sandalwood Oil and Gas, Inc.	Construct a board road to set up a drilling rig and structures necessary to drill the SL	3.65ac (933cy)	UR	Not named
P20041292	Local	29 45 29	-93 36 22	Romero, Jerry	excavate a pond in the Ocean View Subdivision	0.86ac	USS	Blue Buck
P20041337	State	29 48 40.0861	-93 23 51.6766	Cameron Parish Gravity Drainage	introduce fresh water into the Oyster Lake Area	0cy	None listed	Not named
P20041608	State	29 45 54	-93 20 48	Han-Padron Associates	Place four "bottom-mounted" meters in various locations to provide navigational	0cy	M1UBL4	Not named
P20041765	state	29 48 44	-93 14 44	Sandalwood Oil and Gas, Inc.	install a drillsite and structures to drill the Calcasieu Lake South Prospect	1.51ac (2294cy)	UUo	Back Ridge
P20051133	State	29 44 49	-93 15 53	Clayton Williams Energy, Inc.	Install a 4" flowline to serve SL 17636 Well No. 1	3474cy	None listed	Mesquite Ridge
P20051228	Local	29 47 18	-93 16 10	Cameron Parish Gravity Drainage	maintenance of drainage lateral in Sections 24-26	0.77ac (1850cy)	UR	Mesquite Ridge
P20051334	State	29 48 47	-92 55 16	PEL-TEX Oil Company, LLC	Install a board road, driveway, and drill site to drill the Millrich Properties, L.L.C. Well	2.51ac (7002cy)	UR	Chenier Perdue Ridge
P20051668	State	29 46 .14	-93 38 17.32	Chevron Pipeline	After-the-fact permit for repair of an existing valve site damaged by Hurricane Rita.	0.01ac	UUo	Blue Buck
P20060778	State	29 47 8	-93 11 52	Callon Petroleum Operating	Construct an oil and gas production facility in an area that was a former homesite	636cy	None listed	Mesquite Ridge
P20061120	State	29 48 47.31	-92 55 16.03	PEL-TEX Oil Company, LLC	Install 2 pipelines, install 2 valve sites and 2 driveways, directional drill a 2,660-foot	0.84ac, 4.28ac, (12427cy)	E1UBL6, E2EM1P6	Little Chenier Ridge
P20061131	Local	29 45	-93 44	Trahan, Gregory	Water hole/fish pond to get dirt for property improvements and possibly sell excess	0cy	None listed	Blue Buck

CAMERON PARISH

CUP #	CONCERN	LATITUDE	LONGITUDE	APPLICANT	DESCRIPTION	IMPACTS cubic yards (cy) acre (ac)	HABITAT TYPE	RIDGE
P20061497	Local	29 45 21	-93 36 21	Hannen, Paul	Install a sand fence on Beach Blvd. in the Oceanview Subdivision in Johnson Bayou	0ac, 0cy	URd	Blue Buck
P20061498	Local	29 46 13	-93 42 22	Snyder, James	Fill and grade for house pad and fish pond at 115 Eddie Lane in Johnson Bayou	0.24 ac	UU	Blue Buck
P20061764	Local	29 47 59	-93 12 33	Vincent, Michelle	Excavation and fill to raise house foundation to the required base flood	0.05ac (1388cy)	UU	Mesquite Ridge
P20061816	Local	29 43 46.32	-92 48 15.57	Quality Oilfield, LLC	Digging for sand to use for house pads to elevate homes to FEMA requirements at	1.38ac (26000cy)	PUBHx	Grand Chenier Ridge
P20070057	Local	29 45 59.92	-93 42 50.68	Cheniere Energy, Inc.	Proposed construction of Johnson Bayou	0.5ac (1010cy)	UR	Blue Buck
P20070115	State	29 45 56	-93 38 44	Cheniere Sabine Pass Pipeline,	Construction of the Johnson Bayou Metering & Regulatory (M&R) Facility to	3.03ac, 13.92ac	E2EM1P6, Uuo	Blue Buck
P20070206	State	29 49 3	-92 57 0	Ballard Exploration	Proposed well location to produce the Baccigalopi well no 2 on an existing shell	0.01ac	USS	Chenier Perdue Ridge
P20070358	State	29 47 35.6	-93 44 52.3	Natural Gas Pipeline	The proposed project will include the construction and operation of an	0.1ac (190cy)	UUo	Smith Ridge
P20070445	State	29 49 24.12	-92 53 56.69	PEL-TEX Oil Company, LLC	Installation of a ring levee drill site, with a board road, to drill and produce the	1.95ac (4600cy)	UR	Little Chenier Ridge
P20070662	State	29 45 59.4	-93 38 22.1	Williams Gas Pipeline	Proposed interconnect on the 30" SWLA Lateral at the SWLA, M.P. 20.3	0.1ac (246cy)	UUo	Blue Buck
P20071608	Local	29 46 6	-93 21 35	Allaire, John C.	Excavate and deposit fill for a new home site at 621 Gulf Beach Hwy. in Holly Beach	3111cy	None listed	Not named
P20071709	State	29 46 20	-93 20 49	M & C Oilfield Services, Inc.	construction of bulkhead, access road, two crane pads, and mooring dolphins	7ac, 0.67ac (326660cy)	E1UBL4, UR	Not named
P20080092	State	29 45 43	-93 34 47	Energy XXI Gulf Coast, Inc.	Proposed limestone road, drillsite (285' x 315') & structures for drilling Venus	2.47ac	UR	Blue Buck
P20080177	State	29 45 10.7	-93 37 46.1	Stone Energy Company	Placement of board mats and plastic barriers around an existing exposed	0.1ac	Urd	Blue Buck
P20080204	State	29 45 59.99	-93 38 27.5	Natural Gas Pipeline	Proposed installation of two 12" and one 16" pipelines (total length approx. 920') to	0.86ac	UUo	Blue Buck
P20080504	State	29 45 10.98	-92 53 58.32	Gulf South Pipeline	Proposed installation of a temporary trap and a temporary workspace (50' x 100') on	0.03ac (250cy)	UU	Grand Chenier Ridge
P20081087	State	29 47 8.4	-93 4 13.2	Pioneer Exploration, LLC	approximately 43 soil borings were sampled from various locations on the site	0cy	None listed	Oak Grove Ridge and

ST. TAMMANY PARISH

CUP #	CONCERN	LATITUDE	LONGITUDE	APPLICANT	DESCRIPTION	IMPACTS cubic yards (cy) acre (ac)	HABITAT TYPE
P20000573	State	30 4 54.98	-90 24 42.45	Entergy	Perform geotechnical soil borings for tower footing locations (Gypsy to Madisonville)	0.01ac	E1UBL5
P19820961	State	30 12 54.703422	-89 41 16.2111444	Mullen, Edward C. Jr.	General dredge and/or fill (flowlines)	2,010cy	Not listed
P19870462	State	30 11 50.705488	-89 42 31.2134472	Wall, V.G.	Borrow Pit For Fill	217,000 cy	Not listed
P19821400	State	30 16 5.7017964	-89 51 1.2404952	St. Tammany Parish Council	None listed	0cy	Not listed
P19821442	State	30 16 .7028472	-89 51 .2371896	St. Tammany Parish Council	PERMIT NUMBER CANCELLED	0cy	Not listed
P19840544	State	30 25 9.6993192	-90 10 44.2862364	Dufor, Elliot, Centine	None listed	0cy	Not listed
P19850231	State	30 15 51.7058496	-89 50 46.2379668	Bouliville Corporation	Residential development	0cy	Not listed
P19860242	State	30 20 9.7047852	-89 59 46.2631164	Tree Timber Service	None listed	0cy	Not listed
P19870247	State	30 16 5.6993448	-89 50 38.2392204	Tullier, Norris J. Mrs.	None listed	0cy	Not listed
P19870741	State	30 20 .7005444	-90 0 .2616732	Allkirk Corporation	Industrial/commercial development	0cy	Not listed
P19880954	State	30 16 18.7003812	-89 51 39.241152	Mossler, E.K.	Dredging for fill behind bulkhead	300cy	Not listed
P19910269	State	30 20 6.7033896	-90 0 14.2642008	Wilson, Justin	None listed	0cy	Not listed
P19920644	State	30 25 17.6996964	-90 9 44.286498	Madisonville Wood	Residential development	0cy	Not listed
P19931181	Local	30 16 5.7018864	-89 52 49.2440736	DiCarlo, Vincent and Mary	None listed	0cy	Not listed
P19940145	State	30 25 37.698834	-90 12 20.2899168	Revere, Richard	None listed	1926cy	Not listed
P19950540	Local	30 25 35.6943288	-90 10 57.2889504	Black River Land Development	None listed	0cy	Not listed
P19950801	State	30 25 30.7003044	-90 10 25.286268	Duncan, Janice	None listed	170cy	Not listed

ST. TAMMANY PARISH

CUP #	CONCERN	LATITUDE	LONGITUDE	APPLICANT	DESCRIPTION	IMPACTS cubic yards (cy) acre (ac)	HABITAT TYPE
P19951310	Local	30 26 .6937584	-90 11 55.2883056	Frobea, Michael	None listed	0cy	Not listed
P19951421	State	30 20 52.701036	-90 2 38.26941	LA Department of Culture	General dredge and/or fill	18055cy	Not listed
P19960363	Local	30 22 45.7020552	-90 10 45.2846928	Materne, Gerald M.	None listed	0cy	Not listed
P19961100	Local	30 26 10.699908	-90 14 .294198	Indian Trace Development	None listed	0cy	Not listed
P19971391	State	None listed	None listed	LaDOTD	Hurricane evacuation study to connect US90 to LA3127	0cy	Not listed
P19980883	State	30 16 4.700388	-89 50 40.2386532	LaDOTD	None listed	0cy	Not listed
P20001114	Local	30 20 13	-89 59 30	Simms, Dustin	Construction of single family residence	0cy	Not listed
P20071007	State	30 26 18	-90 7 47	Delta Land Holding, LLC	Proposed construction of the River Club residential development in Covington, which contains 149 lots.	0cy	Not listed
P19990501	Local	30 16 3.31	-89 50 58.11	DiMarco, Elizabeth P.BETH P	None listed	0.1ac	PEM1T
P20030318	Local	30 20 27.09	-90 0 27.3	ST. Tammany Parish School Board	Soil borings-preliminary geotechnical information for construction of a new junior high school on Hwy 190 east of Mandeville	0.09ac	UF7
P20030412	Local	30 26 0	-90 13 32	Coate, Buddy	Construct a planned unit development (Lakewood Estates)	0.07ac	UF7
P20040921	Local	30 26 11	-90 14 35	Baham Construction, LLC	construct a homesite on Lot 30 at 1966 Hwy. 22 in Madisonville	0.08ac	UF7
P20050873	Local	30 25 22	-90 8 56	Post Corporation of LA, LLC	construct a homesite on Lot 16 of River Cypress Lane of Brady Island subdivision in Madisonville	0.1ac	UF7
P20070962	Local	30 25 9	-90 11 11	Sjunnesen, Eric	Construct a homesite on a vacant lot in an established subdivision on Mattingly Lane in Madisonville	0.13 ac (262cy)	UF8
P19811583				Jackson Cable	PERMIT WITHDRAWN		
P19841754				Kopfler, Edwin L.	PERMIT WITHDRAWN		

ST. TAMMANY PARISH

CUP #	CONCERN	LATITUDE	LONGITUDE	APPLICANT	DESCRIPTION	IMPACTS cubic yards (cy) acre (ac)	HABITAT TYPE
P19850752				Second Development	PERMIT CANCELLED		
P19921196				St. Tammany Parish Gr	PERMIT WITHDRAWN		
P19930835				V&B International	APPLICATION WITHDRAWN		

APPENDIX C

DATA FORMS AND COPIES OF SAMPLE LOCATION PHOTOGRAPHS

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/7/08*** ***Field Analysts:*** ***Ryan Coleman/Lee Womack***

Sample Location ID Number: ***001*** ***Coordinates:*** ***29.75823, 93.82230***

Feature Name: ***Garner Ridge***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) Gravel road/private/raised

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Access road, gravel with drainage ditches

Current/Adjacent land uses Current – marsh; Adjacent - none

History of land use (if known) N/A

Wildlife Species observed Marsh wren (*Cistothorus palustris*) (2)

Invasive plant and animal species N/A

Mapped soil type(s) Mermentau-Hackberry

Comments Chenier feature not recognizable

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Spartina patens*	H	FACW	6.			
2.	*Iva frutescens*	S	FACW+	7.			
3.	*Sesbania exaltata*	S	FACW-	8.			
4.	*Distichlis spicata*	H	FACW+	9.			
5.	*Rumex crispus*	H	FAC	10.			

Remarks: Dieback as a result of Hurricanes Ike and Gustav

	N W E S	

Photographs of Sample 001 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/7/08*** ***Field Analysts:*** ***Ryan Coleman/Lee Womack***

Sample Location ID Number: ***002*** ***Coordinates:*** ***29.75530, 93.79948***

Feature Name: ***Saltwork Ridge***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) Gravel road/private/raised

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Well pad, trailers, fill, gravel, drainage ditches along access road

Current/Adjacent land uses Current – oil/gas pad, trailers

History of land use (if known) N/A

Wildlife Species observed Stilt (*Himantopus himantopus*) (2); grackle (*Quiscalus quiscula*)(15); marsh wren (*Cistothorus palustris*) (2)

Invasive plant and animal species N/A

Mapped soil type(s) Mermentau-Hackberry

Comments Ridge feature not visible

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Spartina patens*	H	FACW	6.			
2.	*Iva frutescens*	S	FACW+	7.			
3.	*Sesbania exaltata*	S	FACW-	8.			
4.	*Distichlis spicata*	H	FACW+	9.			
5.	*Phragmites australis*	H	FACW	10.			

Remarks: Dieback due to salt intrusion from Hurricanes Ike and Gustav

	N W E S	

Photographs of Sample 002 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/7/08*** ***Field Analysts:*** ***Ryan Coleman/Lee Womack***

Sample Location ID Number: ***003*** ***Coordinates:*** ***29.74593, 93.79964***

Feature Name: ***Hackberry Ridge***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) Gravel road/private/raised

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Ditches along access road

Current/Adjacent land uses Current – gravel turn around, drainage alterations; Adjacent – marsh

History of land use (if known) N/A

Wildlife Species observed Cormorant (*Phalacrocorax auritas*) (1); grackle (*Quiscalus quiscula*) (7); common moorhen (*Gallinula chloropus*) (1)

Invasive plant and animal species N/A

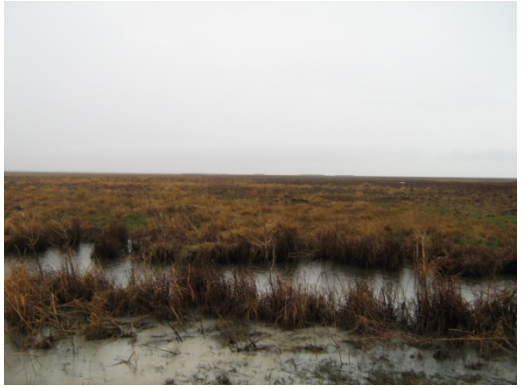
Mapped soil type(s) Mermentau-Hackberry

Comments Ridge feature not visible

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Spartina patens*	H	FACW	5.			
2.	*Distichlis spicata*	H	FACW+	6.			
3.	*Phragmites australis*	H	FACW	7.			
4.	*Sesbania exaltata*	S	FACW-	8.			

Remarks:

	N W E S	

Photographs of Sample 003 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/7/08*** ***Field Analysts:*** ***Ryan Coleman/Lee Womack***

Sample Location ID Number: ***004*** ***Coordinates:*** ***29.77360, 93.83342***

Feature Name: ***Sanders Ridge***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) Gravel road private

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Tank, well pad, gravel – fill for pad

Current/Adjacent land uses Current – oil/gas; Adjacent – marsh

History of land use (if known) N/A

Wildlife Species observed Plain-billed water snake (*Nerodia erythrogaster;* red-eared slider (*Trachemys scripta elegans*); alligator (*Alligator mississippiensis*)

Invasive plant and animal species N/A

Mapped soil type(s) Mermentau-Hackberry

Comments Ridge feature not visible

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Amaranthus australis*	S	OBL	7.	*Baccharis halimifolia*	S	FAC
2.	*Sesbania exaltata*	S	FACW-	8.	*Phragmites australis*	H	FACW
3.	*Iva frutescens*	S	FACW+	9.	*Schoenoplectus americanus*	H	OBL
4.	*Typha angustifolia*	H	OBL	10.	*Lycium carolinianum*	S	FACW
5.	*Spartina patens*	H	FACW	11.			
6.	*Ipomea purpurea*	H	FACU	12.			

Remarks:

	N W E S	

Photographs of Sample 004 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/7/08*** ***Field Analysts:*** ***Ryan Coleman/Lee Womack***

Sample Location ID Number: ***005*** ***Coordinates:*** ***29.76525, 93.78178***

Feature Name: ***Blue Buck Ridge***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) Gravel driveway private

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Camp, storm damage, gravel fill, power line right-of-way (ROW) fence, concrete pad

Current/Adjacent land uses Current – camp; Adjacent – marsh

History of land use (if known) N/A

Wildlife Species observed Killdeer (*Charadrius vociferous*) (4); Grackle (*Quiscalus quiscula*) (1)

Invasive plant and animal species *Sapium sebiferum*

Mapped soil type(s) Mermentau-Hackberry

Comments Ridge feature visible

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Celtis laevigata*	T	FACW	7.			
2.	*Sapium sebiferum*	T	FAC	8.			
3.	*Lycium carolinianum*	S	FACW	9.			
4.	*Iva frutescens*	S	FACW+	10.			
5.	*Acacia farnesiana*	S	FACU	11.			
6.	*Cynodon dactylon*	H	FACU	12.			

Remarks: *Celtis laevigata* stunted

BOTTOMLAND HARDWOOD* PARAMETERS FOR MITIGATION CALCULATIONS (WVA)

100 – all sugarberry PERCENT OF OVERSTORY CANOPY CONSISTING OF MAST OR OTHER EDIBLE SEED PRODUCERS (RED MAPLE, SUGARBERRY, GREEN ASH, BOXELDER, COMMON PERSIMMON SWEETGUM, HONEYLOCUST, RED MULBERRY, BALDCYPRESS, TUPELO GUM, AMERICAN ELM, CEDAR ELM, ETC.)

0 PERCENT OF OVERSTORY CANOPY CONSISTING OF HARD MAST PRODUCING TREES (OAKS, SWEET PECAN, OTHER HICKORIES)

AVERAGE AGE OF CANOPY-DOMINANT AND CANOPY-CODOMINANT TREES

OR

AVERAGE DIAMETER AT BREAST HEIGHT (DBH) OF CANOPY-DOMINANT OR CANOPY-CODOMINANT TREES

SPECIES	AGE	OR	DBH (inches)
Celtis laevigata	overstory/midstory		8-10
Sapium sebiferum	midstory		3-4
Acacia farnesiana	understory		<2

10 PERCENT UNDERSTORY COVER

20 PERCENT MIDSTORY COVER

50 PERCENT OVERSTORY COVER

IS THE AREA PART OF A FORCED DRAINAGE SYSTEM? No

WHAT IS THE RELATIVE POSITION OF THE WATER TABLE?
(NEAR THE SURFACE, DEEP) N/A

IS THE NATURAL HYDROLOGY ESSENTIALLY UNALTERED ALLOWING FOR NATURAL WETTING AND DRYING CYCLES? No

DOCUMENT ANY TREE REGENERATION None

*An area supporting or capable of supporting a canopy of woody vegetation of which greater than 40% consists of tree species such as oaks, hickories, American elm, cedar elm, green ash, sweetgum, sugarberry, boxelder, common persimmon, honeylocust, red mulberry, eastern cottonwood, American sycamore, etc.

	N W E S	

Photographs of Sample 005 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/7/08*** ***Field Analysts:*** ***Ryan Coleman/Lee Womack***

Sample Location ID Number: ***006*** ***Coordinates:*** ***29.76315, 93.76405***

Feature Name: ***Garner Ridge***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) Gravel access road

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Gravel access road – leading to well pad/tanks/trailers; Power line right-of-way (ROW) – gas - cleared

Current/Adjacent land uses Current – ROW and access road gravel "Sabine Lake Central Gathering Facility" Rosetta Resources, LP.OP; Adjacent – marsh

History of land use (if known) N/A

Wildlife Species observed N/A

Invasive plant and animal species N/A

Mapped soil type(s) Mermentau-Hackberry

Comments Power line ROW – running directly through ridge feature, ridge feature not visible

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Symphyotrichum tenuifolium*	H	OBL	8.	*Spartina patens*	H	FACW
2.	*Juncus effusus*	H	FACW+	9.			
3.	*Borrichia frutescens*	S	OBL	10.			
4.	*Phragmites australis*	H	FACW	11.			
5.	*Cynodon dactylon*	H	FACU	12.			
6.	*Iva frutescens*	S	FACW+	13.			
7.	*Acacia farnesiana*	S	FACU	14.			

Remarks:

	N W E S	

Photographs of Sample 006 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/7/08*** ***Field Analysts:*** ***Ryan Coleman/Lee Womack***

Sample Location ID Number: ***007*** ***Coordinates:*** ***29.78141, 93.67793***

Feature Name: ***Smith Ridge***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) Blacktop road (PR 548)

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) House, gravel fill/road, blacktop road, fence, drainage ditch

Current/Adjacent land uses Current – home site; Adjacent – marsh/pasture

History of land use (if known) N/A

Wildlife Species observed Alligator (*Alligator mississippiensis*), killdeer (*Charadrius vociferous*), snowy egret (*Egretta thula*), grackle (*Quiscalus quiscula*), stilt (*Himantopus himantopus*), blue heron (*Ardea herodias*), marsh wren (*Cistothorus palustris*), common moorhen (*Gallinula chloropus*), kingfisher (*Megaceryle alcyon*), roseate spoonbill (*Ajaia ajaja*)

Invasive plant and animal species N/A

Mapped soil type(s) Mermentau-Hackberry

Comments ridge feature visible

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Cynodon dactylon*	H	FACU	5.	*Quercus virginiana*	T	FACU+
2.	*Phragmites australis*	H	FACW	6.	*Platanus occidentalis*	T	FACW-
3.	*Ipomea purpurea*	H	FACU	7.			
4.	*Schoenoplectus americanus*	H	OBL	8.			
Remarks:							

	N W E S	

Photographs of Sample 007 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/7/08*** ***Field Analysts:*** ***Ryan Coleman/Lee Womack***

Sample Location ID Number: ***008*** ***Coordinates:*** ***29.78946, 93.74130***

Feature Name: ***Smith Ridge***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) Unnamed road, ½ blacktop/½ gravel off PR 548

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Fence, house (lost in storm), shed, roads, pasture

Current/Adjacent land uses Current – fallow pasture; Adjacent - residential

History of land use (if known) N/A

Wildlife Species observed N/A

Invasive plant and animal species N/A

Mapped soil type(s) Mermentau-Hackberry

Comments ridge feature visible

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Carya illinoiensis*	T	FAC+	8.			
2.	*Quercus virginiana*	T	FACU+	9.			
3.	*Cynodon dactylon*	H	FACU	10.			
4.	*Sesbania exaltata*	S	FACW-	11.			
5.	*Baccharis halimifolia*	S	FAC	12.			
6.	*Typha angustifolia*	H	OBL	13.			
7.	*Spartina alterniflora*	H	OBL	14.			

Remarks:

	N W E S	

Photographs of Sample 008 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/7/08*** ***Field Analysts:*** ***Ryan Coleman/Lee Womack***

Sample Location ID Number: ***009*** ***Coordinates:*** ***29.80319, 93.75333***

Feature Name: ***Smith Ridge – Northern Finger***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) Blacktop – Leads to warehouse/oil production

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Fill/oil production, power line ROW, road, cranes/equipment

Current/Adjacent land uses Current – oil facility; Adjacent – marsh/bayou

History of land use (if known) N/A

Wildlife Species observed Killdeer (*Charadrius vociferous*), alligator (*Alligator mississippiensis*)

Invasive plant and animal species *Sapium sebiferum*

Mapped soil type(s) Mermentau-Hackberry

Comments ridge visible

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Phragmites australis*	H	FACW	8.	*Sapium sebiferum*	T	FAC
2.	*Spartina alterniflora*	H	OBL	9.			
3.	*Spartina patens*	H	FACW	10.			
4.	*Sesbania exaltata*	S	FACW-	11.			
5.	*Baccharis halimifolia*	S	FAC	12.			
6.	*Cynodon dactylon*	H	FACU	13.			
7.	*Lycium carolinianum*	S	FACW	14.			

Remarks:

	N W E S	

Photographs of Sample 009 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/7/08*** ***Field Analysts:*** ***Ryan Coleman/Lee Womack***

Sample Location ID Number: ***010*** ***Coordinates:*** ***29.75766, 93.60281***

Feature Name: ***Peveto Woods – bird sanctuary***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) Blacktop – Gulfview Avenue; Gravel – Little Florida Beach PR-556

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Preserve – no alterations

Current/Adjacent land uses Current - bird sanctuary – BR Audubon; Adjacent - camps

History of land use (if known) N/A

Wildlife Species observed N/A

Invasive plant and animal species *Sapium sebiferum*

Mapped soil type(s) Mermentau-Hackberry

Comments Most trees/shrubs – salt bit; prevalent hurricane/storm damage probably the most "cheneir-like" observed before storm damage

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Quercus virginiana*	T	FACU+	7.	*Lycium carolinianum*	S	FACW
2.	*Sapium sebiferum*	T	FAC	8.			
3.	*Ilex vomitoria*	S	FAC	9.			
4.	*Vitis rotundifolia*	WV	FAC	10.			
5.	*Gleditsia aquatica*	T	OBL	11.			
6.	*Celtis laevigata*	T	FACW	12.			

Remarks:

BOTTOMLAND HARDWOOD* PARAMETERS FOR MITIGATION CALCULATIONS (WVA)

15 PERCENT OF OVERSTORY CANOPY CONSISTING OF MAST OR OTHER EDIBLE SEED PRODUCERS (RED MAPLE, SUGARBERRY, GREEN ASH, BOXELDER, COMMON PERSIMMON SWEETGUM, HONEYLOCUST, RED MULBERRY, BALDCYPRESS, TUPELO GUM, AMERICAN ELM, CEDAR ELM, ETC.)

85 PERCENT OF OVERSTORY CANOPY CONSISTING OF HARD MAST PRODUCING TREES (OAKS, SWEET PECAN, OTHER HICKORIES)

AVERAGE AGE OF CANOPY-DOMINANT AND CANOPY-CODOMINANT TREES

OR

AVERAGE DIAMETER AT BREAST HEIGHT (DBH) OF CANOPY-DOMINANT OR CANOPY-CODOMINANT TREES

SPECIES	AGE	OR	DBH (inches)
Quercus virginiana			50/25/10
Celtis laevigata			8-12
Gleditsia aquatica			2-8
Sapium sebiferum			6

5 (marginal due to storm) PERCENT UNDERSTORY COVER

50 PERCENT MIDSTORY COVER

IS THE AREA PART OF A FORCED DRAINAGE SYSTEM? No

WHAT IS THE RELATIVE POSITION OF THE WATER TABLE?
(NEAR THE SURFACE, DEEP) N/A

IS THE NATURAL HYDROLOGY ESSENTIALLY UNALTERED ALLOWING FOR NATURAL WETTING AND DRYING CYCLES? No

DOCUMENT ANY TREE REGENERATION None

*An area supporting or capable of supporting a canopy of woody vegetation of which greater than 40% consists of tree species such as oaks, hickories, American elm, cedar elm, green ash, sweetgum, sugarberry, boxelder, common persimmon, honeylocust, red mulberry, eastern cottonwood, American sycamore, etc.

	N W E S	

Photographs of Sample 010 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/8/08*** ***Field Analysts:*** ***Ryan Coleman/Lee Womack***

Sample Location ID Number: ***011*** ***Coordinates:*** ***29.82424, 92.92832***

Feature Name: ***Little Chenier***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) Little Chenier Road (PR 201)

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Old homesite

Current/Adjacent land uses Current – abandoned homesite; Adjacent – Chenier Communications and homesite

History of land use (if known) N/A

Wildlife Species observed Gallinule (*Porphyrio martinica*), cattle egrets (*Bubulcus ibis*), grackles (*Quiscalus quiscula*), slider (*Trachemys scripta*), cottontail (*Sylvilagus floridanus*), dove (*Zenaida macroura*)

Invasive plant and animal species N/A

Mapped soil type(s) Mermentau-Hackberry

Comments Entire chenier appears to be subsiding – dominated by marsh and > 50% developed, not sandy

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Sabal minor*	S	FACW	5.			
2.	*Quercus virginiana*	T	FACU+	6.			
3.	*Cynodon dactylon*	H	FACU	7.			
4.	*Baccharis halimifolia*	S	FAC	8.			
Remarks:							

BOTTOMLAND HARDWOOD* PARAMETERS FOR MITIGATION CALCULATIONS (WVA)

0 PERCENT OF OVERSTORY CANOPY CONSISTING OF MAST OR OTHER EDIBLE SEED PRODUCERS (RED MAPLE, SUGARBERRY, GREEN ASH, BOXELDER, COMMON PERSIMMON SWEETGUM, HONEYLOCUST, RED MULBERRY, BALDCYPRESS, TUPELO GUM, AMERICAN ELM, CEDAR ELM, ETC.)

100 PERCENT OF OVERSTORY CANOPY CONSISTING OF HARD MAST PRODUCING TREES (OAKS, SWEET PECAN, OTHER HICKORIES)

AVERAGE AGE OF CANOPY-DOMINANT AND CANOPY-CODOMINANT TREES

OR

AVERAGE DIAMETER AT BREAST HEIGHT (DBH) OF CANOPY-DOMINANT OR CANOPY-CODOMINANT TREES

SPECIES	AGE	OR	DBH (inches)
Quercus virginiana – approximately 10 trees			20

20 PERCENT UNDERSTORY COVER – impacted by salt water intrusion – mostly dead

0 PERCENT MIDSTORY COVER

IS THE AREA PART OF A FORCED DRAINAGE SYSTEM? No

WHAT IS THE RELATIVE POSITION OF THE WATER TABLE?
(NEAR THE SURFACE, DEEP) N/A

IS THE NATURAL HYDROLOGY ESSENTIALLY UNALTERED ALLOWING FOR NATURAL WETTING AND DRYING CYCLES? No

DOCUMENT ANY TREE REGENERATION None

*An area supporting or capable of supporting a canopy of woody vegetation of which greater than 40% consists of tree species such as oaks, hickories, American elm, cedar elm, green ash, sweetgum, sugarberry, boxelder, common persimmon, honeylocust, red mulberry, eastern cottonwood, American sycamore, etc.

	N W E S	

Photographs of Sample 011 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/8/08*** ***Field Analysts:*** ***Ryan Coleman/Lee Womack***

Sample Location ID Number: ***012*** ***Coordinates:*** ***29.84115, 92.99623***

Feature Name: ***Little Chenier***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) Little Chenier Road (PR 201)

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Oil/gas, holding tanks, gravel fill, clearing

Current/Adjacent land uses Current – oil/gas pad; Adjacent – pond/marsh

History of land use (if known) N/A

Wildlife Species observed Raccoon (*Procyon lotor*), kingfisher (*Megaceryle alcyon*), rabbits (*Sylvilagus floridanus*), musk turtles (*Sternotherus odoratus*), gallinule (*Porphyrio martinica*), cattle egrets (*Bubulcus ibis*), grackles (*Quiscalus quiscula*), white egret (*Ardea alba*)

Invasive plant and animal species *Sapium sebiferum*

Mapped soil type(s) Mermentau-Hackberry

Comments All vegetation adjacent to site -dominated by marsh and > 50% developed – soils not sandy - chenier appears to be subsiding; Western end of chenier dominated entirely by marsh and raised homesites – no chenier feature visible

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Spartina alterniflora*	H	OBL	6.			
2.	*Panicum hemitomon*	H	OBL	7.			
3.	*Salix nigra*	T	OBL	8.			
4.	*Sapium sebiferum*	T	FAC	9.			
5.	*Baccharis halimifolia*	S	FAC	10.			

Remarks: *Baccharis* showed signs of being salt bitten

	N W E S	

Photographs of Sample 012 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/8/08*** ***Field Analysts:*** ***Ryan Coleman/Lee Womack***

Sample Location ID Number: ***013*** ***Coordinates:*** ***29.81130, 92.91190***

Feature Name: ***Chenier Perdue***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads E. Creole Road (LA 1143) to PR 216

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Well pad for oil/gas, gravel fill, holding tanks

Current/Adjacent land uses Current - well pad; Adjacent – marsh/pasture

History of land use (if known) N/A

Wildlife Species observed Raccoon (*Procyon lotor*), grackle (*Quiscalus quiscula*), kingfisher (*Megaceryle alcyon*), redwing blackbird (*Agelaius phoeniceus*), killdeer (*Charadrius vociferous*), cottontail (*Sylvilagus floridanus*), roseate spoonbill (*Ajaia ajaja*), gallinule (*Porphyrio martinica*)

Invasive plant and animal species N/A

Mapped soil type(s) Mermentau-Hackberry

Comments Chenier somewhat visible on western portion

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	***On site:***			7.	*Typha angustifolia*	H	OBL
2.	*Quercus virginiana*	T	FACU+	8.			
3.	*Cynodon dactylon*	H	FACU	9.			
4.	*Sapium sebiferum*	T	FAC	10.			
5.	*Baccharis halimfolia*	S	FAC	11.			
6.	*Phragmites australis*	H	FACW	12.			

Remarks:

	N W E S	

Photographs of Sample 013 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/8/08*** ***Field Analysts:*** ***Ryan Coleman/Lee Womack***

Sample Location ID Number: ***014*** ***Coordinates:*** ***29.81344, 92.92302***

Feature Name: ***Chenier Perdue***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) PR 216

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Cleared for pasture - now fallow – scrub shrub

Current/Adjacent land uses Current and adjacent – fallow pasture

History of land use (if known) N/A

Wildlife Species observed Banded water snake (*Nerodia fasciata)*

Invasive plant and animal species N/A

Mapped soil type(s) Mermentau-Hackberry

Comments Site appears to be historically used for grazing; soil is loamy with shale fragments

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Baccharis halimifolia*	S	FAC	8.	*Lythrum lineare*	H	OBL
2.	*Acacia farnesiana*	S	FACU	9.			
3.	*Quercus virginiana*	T	FACU+	10.			
4.	*Rubus louisianus*	WV	FAC	11.			
5.	*Iva frutescens*	S	FACW+	12.			
6.	*Ambrosia trifida*	H	FAC	13.			
7.	*Verbena hastata*	H	FAC	14.			

Remarks: *Baccharis* and *Iva* dominant

	N W E S	

Photographs of Sample 014 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
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LDNR Contract No. 2533-08-02

Date: ***10/8/08*** ***Field Analysts:*** ***Ryan Coleman/Lee Womack***

Sample Location ID Number: ***015*** ***Coordinates:*** ***29.80023, 92.99853***

Feature Name: ***Pumpkin Ridge***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) Pumpkin Ridge Road – point taken from road

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Road running perpendicular through

Current/Adjacent land uses Marsh

History of land use (if known) Marsh

Wildlife Species observed White egret (*Ardea alba*)

Invasive plant and animal species *Sapium sebiferum*

Mapped soil type(s) Mermentau-Hackberry

Comments All marsh – ridge does not exist

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Spartina alterniflora*	H	OBL	5.			
2.	*Baccharis halimifolia*	S	FAC	6.			
3.	*Iva frutescens*	S	FACW+	7.			
4.	*Sapium sebiferum*	T	FAC	8.			
Remarks:							

	NE NW SW SE	

Photographs of Sample 015 in four directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/8/08*** ***Field Analysts:*** ***Ryan Coleman/Blake Amos***

Sample Location ID Number: ***016*** ***Coordinates:*** ***29.78356, 93.06466***

Feature Name: ***Dan's Ridge***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) Unnamed gravel road, Pioneer Exploration LTD sign

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Well pad, gravel/limestone fill

Current/Adjacent land uses Current – well pad

History of land use (if known) N/A

Wildlife Species observed Killdeer (*Charadrius vociferous*), white egret (*Ardea alba*), snowy egret (*Egretta thula*)

Invasive plant and animal species N/A

Mapped soil type(s) Mermentau-Hackberry

Comments Ridge seems to be dominated by marsh; from sample location "Eugene Island" appears to have a large stand of live oaks

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Iva frutescens*	S	FACW+	7.	*Ambrosia trifida*	H	FAC
2.	*Panicum repens*	H	FACW	8.	*Baccharis halimifolia*	S	FAC
3.	*Spartina patens*	H	OBL	9.			
4.	*Lythrum lineare*	H	OBL	10.			
5.	*Acacia farnesiana*	S	FACU	11.			
6.	*Cynodon dactylon*	H	FACU	12.			

Remarks: *Cynodon dactylon* killed by salt

	N W E S	

Photographs of Sample 016 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/8/08*** ***Field Analysts:*** ***Ryan Coleman/Blake Amos***

Sample Location ID Number: ***017*** ***Coordinates:*** ***29.78474, 93.09640***

Feature Name: ***Oak Grove Ridge***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) LA82

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Cleared homesite

Current/Adjacent land uses Current – fallow, homesite; Adjacent – shrub/scrub, baseball field

History of land use (if known) N/A

Wildlife Species observed N/A

Invasive plant and animal species *Sapium sebiferum*

Mapped soil type(s) Mermentau-Hackberry

Comments N/A

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Iva frutescens*	S	FACW+	9.	*Solidago sempervirens*	H	FACW
2.	*Panicum repens*	H	FACW-	10.			
3.	*Sapium sebiferum*	T	FAC	11.			
4.	*Sesbania exaltata*	S	FACW-	12.			
5.	*Acacia farnesiana*	S	FACU	13.			
6.	*Cynodon dactylon*	H	FACU	14.			
7.	*Carya illinoiensis*	T	FAC+	15.			
8.	*Quercus virginiana*	T	FACU+	16.			

Remarks:

	N W E S	

Photographs of Sample 017 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/8/08*** ***Field Analysts:*** ***Ryan Coleman/Blake Amos***

Sample Location ID Number: ***018*** ***Coordinates:*** ***29.7090, 93.01643***

Feature Name: ***Oak Grove Ridge***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) LA1143/Muria Road

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Previous on ramp to Hwy 82

Current/Adjacent land uses Current – none; Adjacent – marsh

History of land use (if known) N/A

Wildlife Species observed N/A

Invasive plant and animal species *Sapium sebiferum*

Mapped soil type(s) Mermentau-Hackberry

Comments N/A

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Gleditsia triacanthos*	T	FAC-	9.			
2.	*Sapium sebiferum*	T	FAC	10.			
3.	*Celtis laevigata*	T	FACW	11.			
4.	*Lycium carolinianum*	S	FACW	12.			
5.	*Acacia farnesiana*	S	FACU	13.			
6.	*Cynodon dactylon*	H	FACU	14.			
7.	*Baccharis halimifolia*	S	FAC	15.			
8.	*Quercus virginiana*	T	FACU+	16.			

Remarks:

BOTTOMLAND HARDWOOD* PARAMETERS FOR MITIGATION CALCULATIONS (WVA)

2% PERCENT OF OVERSTORY CANOPY CONSISTING OF MAST OR OTHER EDIBLE SEED PRODUCERS (RED MAPLE, SUGARBERRY, GREEN ASH, BOXELDER, COMMON PERSIMMON SWEETGUM, HONEYLOCUST, RED MULBERRY, BALDCYPRESS, TUPELO GUM, AMERICAN ELM, CEDAR ELM, ETC.)

98% PERCENT OF OVERSTORY CANOPY CONSISTING OF HARD MAST PRODUCING TREES (OAKS, SWEET PECAN, OTHER HICKORIES)

AVERAGE AGE OF CANOPY-DOMINANT AND CANOPY-CODOMINANT TREES

OR

AVERAGE DIAMETER AT BREAST HEIGHT (DBH) OF CANOPY-DOMINANT OR CANOPY-CODOMINANT TREES

SPECIES	AGE	OR	DBH (inches)
Quercus virginiana	+/- 80		40
Celtis laevigata	+/-20		12

100% PERCENT UNDERSTORY COVER

5% PERCENT MIDSTORY COVER

IS THE AREA PART OF A FORCED DRAINAGE SYSTEM? NO

WHAT IS THE RELATIVE POSITION OF THE WATER TABLE?
(NEAR THE SURFACE, DEEP) N/A

IS THE NATURAL HYDROLOGY ESSENTIALLY UNALTERED ALLOWING FOR NATURAL WETTING AND DRYING CYCLES? YES

DOCUMENT ANY TREE REGENERATION not within plot

*An area supporting or capable of supporting a canopy of woody vegetation of which greater than 40% consists of tree species such as oaks, hickories, American elm, cedar elm, green ash, sweetgum, sugarberry, boxelder, common persimmon, honeylocust, red mulberry, eastern cottonwood, American sycamore, etc.

	N W E S	

Photographs of Sample 018 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: *10/8/08* ***Field Analysts:*** *Ryan Coleman/Blake Amos*

Sample Location ID Number: *019* ***Coordinates:*** *29.78586, 93.0526*

Feature Name: *Eugene Island (live oak stand)*

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) Gravel road using a 4-wheeler

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) N/A

Current/Adjacent land uses Current – N/A; Adjacent – marsh

History of land use (if known) N/A

Wildlife Species observed N/A

Invasive plant and animal species N/A

Mapped soil type(s) Mermentau-Hackberry

Comments N/A

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Spartina patens*	H	FACW	9.	*Quercus virginiana*	T	FACU+
2.	*Iva frutescens*	S	FACW+	10.	*Ambrosia artemisiifolia*	H	FACU
3.	*Celtis laevigata*	T	FACW	11.	*Cynodon dactylon*	H	FACU
4.	*Lycium carolinianum*	S	FACW	12.			
5.	*Acacia farnesiana*	S	FACU	13.			
6.	*Sabal minor*	S	FACW	14.			
7.	*Sesbania exaltata*	S	FACW-	15.			
8.	*Baccharis halimifolia*	S	FAC	16.			

Remarks:

BOTTOMLAND HARDWOOD* PARAMETERS FOR MITIGATION CALCULATIONS (WVA)

2% PERCENT OF OVERSTORY CANOPY CONSISTING OF MAST OR OTHER EDIBLE SEED PRODUCERS (RED MAPLE, SUGARBERRY, GREEN ASH, BOXELDER, COMMON PERSIMMON SWEETGUM, HONEYLOCUST, RED MULBERRY, BALDCYPRESS, TUPELO GUM, AMERICAN ELM, CEDAR ELM, ETC.)

98% PERCENT OF OVERSTORY CANOPY CONSISTING OF HARD MAST PRODUCING TREES (OAKS, SWEET PECAN, OTHER HICKORIES)

AVERAGE AGE OF CANOPY-DOMINANT AND CANOPY-CODOMINANT TREES

OR

AVERAGE DIAMETER AT BREAST HEIGHT (DBH) OF CANOPY-DOMINANT OR CANOPY-CODOMINANT TREES

SPECIES	AGE	OR	DBH (inches)
Quercus virginiana	+/- 80		40
Celtis laevigata	+/-20		12

100% PERCENT UNDERSTORY COVER

5% PERCENT MIDSTORY COVER

IS THE AREA PART OF A FORCED DRAINAGE SYSTEM? NO

WHAT IS THE RELATIVE POSITION OF THE WATER TABLE?
(NEAR THE SURFACE, DEEP) N/A

IS THE NATURAL HYDROLOGY ESSENTIALLY UNALTERED ALLOWING FOR NATURAL WETTING AND DRYING CYCLES? YES

DOCUMENT ANY TREE REGENERATION not within plot

*An area supporting or capable of supporting a canopy of woody vegetation of which greater than 40% consists of tree species such as oaks, hickories, American elm, cedar elm, green ash, sweetgum, sugarberry, boxelder, common persimmon, honeylocust, red mulberry, eastern cottonwood, American sycamore, etc.

	N W E S	

Photographs of Sample 019 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/8/08*** ***Field Analysts:*** ***Ryan Coleman/Blake Amos***

Sample Location ID Number: ***020*** ***Coordinates:*** ***29.76498, 93.12414***

Feature Name: ***Mesquite Ridge (not visible)***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) Rutherford Beach Rd.

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Roads, roadside ditches

Current/Adjacent land uses Current – fallow pasture; Adjacent – marsh

History of land use (if known) N/A

Wildlife Species observed N/A

Invasive plant and animal species N/A

Mapped soil type(s) Mermentau-Hackberry

Comments Chenier not visible

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Spartina patens*	H	FACW	6.			
2.	*Iva frutescens*	S	FACW+	7.			
3.	*Celtis laevigata*	T	FACW	8.			
4.	*Lycium carolinianum*	S	FACW	9.			
5.	*Acacia farnesiana*	S	FACU	10.			
Remarks:							

	N W E S	

Photographs of Sample 020 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: *10/8/08* ***Field Analysts:*** *Ryan Coleman/Blake Amos*

Sample Location ID Number: *021* ***Coordinates:*** *29.78683, 93.16061*

Feature Name: *Front Ridge*

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) LA82

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Borrow pits, roadside ditches along LA82

Current/Adjacent land uses Current – N/A; Adjacent – marsh

History of land use (if known) N/A

Wildlife Species observed N/A

Invasive plant and animal species N/A

Mapped soil type(s) Mermentau-Hackberry

Comments N /A

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Cynodon dactylon*	H	FACU	9.			
2.	*Quercus virginiana*	T	FACU+	10.			
3.	*Celtis laevigata*	T	FACW	11.			
4.	*Lycium carolinianum*	S	FACW	12.			
5.	*Distichlis spicata*	H	FACW+	13.			
6.	*Iva annua*	S	FAC	14.			
7.	*Ambrosia trifida*	H	FAC	15.			
8.	*Rubus louisianus*	WV	FAC	16.			

Remarks:

	N W E S	

Photographs of Sample 021 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: *10/9/08* ***Field Analysts:*** *Ryan Coleman/Blake Amos*

Sample Location ID Number: *022* ***Coordinates:*** *29.85535, 93.06498*

Feature Name: *Little Chenier Ridge*

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) Parish Rd. (Little Chenier Rd.)

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Residential housing, roadside ditches, borrow areas for road

Current/Adjacent land uses Current – residential and pasture; Adjacent – marsh

History of land use (if known) N/A

Wildlife Species observed N/A

Invasive plant and animal species N/A

Mapped soil type(s) Mermentau-Hackberry

Comments N/A

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Cynodon dactylon*	H	FACU	5.			
2.	*Quercus virginiana*	T	FACU+	6.			
3.	*Sesbania exaltata*	S	FACW-	7.			
4.	*Typha angustifolia*	H	OBL	8.			

Remarks:

	N W E S	

Photographs of Sample 022 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/9/08*** ***Field Analysts:*** ***Ryan Coleman/Blake Amos***

Sample Location ID Number: ***023*** ***Coordinates:*** ***29.81547, 93.10203***

Feature Name: ***High Island***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) LA1143 (E. Creole Hwy.)

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Residential housing, LA1143, roadside ditches, ballpark, maintained pasture

Current/Adjacent land uses Current – residential and commercial; Adjacent – pasture/ marsh

History of land use (if known) N/A

Wildlife Species observed N/A

Invasive plant and animal species N/A

Mapped soil type(s) Mermentau-Hackberry

Comments N/A

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Cynodon dactylon*	H	FACU	7.			
2.	*Setaria glauca*	H	FAC	8.			
3.	*Rubus louisianus*	WV	FAC	9.			
4.	*Panicum virgatum*	H	FAC+	10.			
5.	*Borrichia frutescens*	S	OBL	11.			
6.	*Quercus virginiana*	T	FACU+	12.			
Remarks:							

	N W E S	

Photographs of Sample 023 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/9/08*** ***Field Analysts:*** ***Ryan Coleman/Blake Amos***

Sample Location ID Number: ***024*** ***Coordinates:*** ***29.82226, 93.03405***

Feature Name: ***High Island***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) LA1143 (E. Creole Hwy.)

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Old homesite, LA1143, roadside ditches

Current/Adjacent land uses Current – fallow; Adjacent – pasture/ marsh

History of land use (if known) N/A

Wildlife Species observed N/A

Invasive plant and animal species *Sapium sebiferum*

Mapped soil type(s) Mermentau-Hackberry

Comments N/A

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Cynodon dactylon*	H	FACU	9.	*Quercus virginiana*	T	FACU+
2.	*Celtis laevigata*	T	FACW	10.	*Borrichia frutescens*	S	OBL
3.	*Eupatorium capillifolium*	H	FACU	11.			
4.	*Ambrosia artemisiifolia*	H	FACU	12.			
5.	*Iva frutescens*	S	FACW+	13.			
6.	*Sapium sebiferum*	T	FAC	14.			
7.	*Carya illinoiensis*	T	FAC+	15.			
8.	*Acacia farnesiana*	S	FACU	16.			

Remarks:

BOTTOMLAND HARDWOOD* PARAMETERS FOR MITIGATION CALCULATIONS (WVA)

5% PERCENT OF OVERSTORY CANOPY CONSISTING OF MAST OR OTHER EDIBLE SEED PRODUCERS (RED MAPLE, SUGARBERRY, GREEN ASH, BOXELDER, COMMON PERSIMMON SWEETGUM, HONEYLOCUST, RED MULBERRY, BALDCYPRESS, TUPELO GUM, AMERICAN ELM, CEDAR ELM, ETC.)

30% PERCENT OF OVERSTORY CANOPY CONSISTING OF HARD MAST PRODUCING TREES (OAKS, SWEET PECAN, OTHER HICKORIES)

AVERAGE AGE OF CANOPY-DOMINANT AND CANOPY-CODOMINANT TREES

OR

AVERAGE DIAMETER AT BREAST HEIGHT (DBH) OF CANOPY-DOMINANT OR CANOPY-CODOMINANT TREES

SPECIES	AGE	OR	DBH (inches)
Celtis laevigata	+/-30		26
Sapium sebiferum	+/-10		8
Quercus virginiana	+/-30		24
Carya illinoiensis	+/-40		20

95% PERCENT UNDERSTORY COVER

20% PERCENT MIDSTORY COVER

IS THE AREA PART OF A FORCED DRAINAGE SYSTEM? NO

WHAT IS THE RELATIVE POSITION OF THE WATER TABLE?
(NEAR THE SURFACE, DEEP) N/A

IS THE NATURAL HYDROLOGY ESSENTIALLY UNALTERED ALLOWING FOR NATURAL WETTING AND DRYING CYCLES? NO

DOCUMENT ANY TREE REGENERATION YES

*An area supporting or capable of supporting a canopy of woody vegetation of which greater than 40% consists of tree species such as oaks, hickories, American elm, cedar elm, green ash, sweetgum, sugarberry, boxelder, common persimmon, honeylocust, red mulberry, eastern cottonwood, American sycamore, etc.

	N W E S	

Photographs of Sample 024 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERES AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/9/08*** ***Field Analysts:*** ***Ryan Coleman/Blake Amos***

Sample Location ID Number: ***025*** ***Coordinates:*** ***29.82757, 93.13764***

Feature Name: ***High Island***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) Parish Rd. 313 via 312 via Raymond Richard Rd.

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Parish road, borrow pit for road, residential houses, cemetery

Current/Adjacent land uses Current – residential/pasture; Adjacent – pasture/ marsh

History of land use (if known) N/A

Wildlife Species observed N/A

Invasive plant and animal species *Sapium sebiferum*

Mapped soil type(s) Mermentau-Hackberry

Comments N/A

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Cynodon dactylon*	H	FACU	9.			
2.	*Celtis laevigata*	T	FACW	10.			
3.	*Baccharis halimifolia*	S	FAC	11.			
4.	*Sesbania exaltata*	S	FACW-	12.			
5.	*Iva frutescens*	S	FACW+	13.			
6.	*Sapium sebiferum*	T	FAC	14.			
7.	*Distichlis spicata*	H	FACW+	15.			
8.	*Panicum hemitomon*	H	OBL	16.			

Remarks:

BOTTOMLAND HARDWOOD* PARAMETERS FOR MITIGATION CALCULATIONS (WVA)

10% PERCENT OF OVERSTORY CANOPY CONSISTING OF MAST OR OTHER EDIBLE SEED PRODUCERS (RED MAPLE, SUGARBERRY, GREEN ASH, BOXELDER, COMMON PERSIMMON SWEETGUM, HONEYLOCUST, RED MULBERRY, BALDCYPRESS, TUPELO GUM, AMERICAN ELM, CEDAR ELM, ETC.)

0% PERCENT OF OVERSTORY CANOPY CONSISTING OF HARD MAST PRODUCING TREES (OAKS, SWEET PECAN, OTHER HICKORIES)

AVERAGE AGE OF CANOPY-DOMINANT AND CANOPY-CODOMINANT TREES

OR

AVERAGE DIAMETER AT BREAST HEIGHT (DBH) OF CANOPY-DOMINANT OR CANOPY-CODOMINANT TREES

SPECIES	AGE	OR	DBH (inches)
Celtis laevigata	+/-15		14
Sapium sebiferum	+/-10		8

80% PERCENT UNDERSTORY COVER

30% PERCENT MIDSTORY COVER

IS THE AREA PART OF A FORCED DRAINAGE SYSTEM? NO

WHAT IS THE RELATIVE POSITION OF THE WATER TABLE?
(NEAR THE SURFACE, DEEP) N/A

IS THE NATURAL HYDROLOGY ESSENTIALLY UNALTERED ALLOWING FOR NATURAL WETTING AND DRYING CYCLES? NO

DOCUMENT ANY TREE REGENERATION *Sapium sebiferum*

*An area supporting or capable of supporting a canopy of woody vegetation of which greater than 40% consists of tree species such as oaks, hickories, American elm, cedar elm, green ash, sweetgum, sugarberry, boxelder, common persimmon, honeylocust, red mulberry, eastern cottonwood, American sycamore, etc.

	N W E S	

Photographs of Sample 025 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERES AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/9/08*** ***Field Analysts:*** ***Ryan Coleman/Blake Amos***

Sample Location ID Number: ***026*** ***Coordinates:*** ***29.80854, 93.15769***

Feature Name: ***High Island***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) E. Creole Hwy (LA27)

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Roadside ditches, LA 27

Current/Adjacent land uses Current – church, Entergy substation, residential. Cemetery; Adjacent – pasture/ marsh

History of land use (if known) N/A

Wildlife Species observed N/A

Invasive plant and animal species N/A

Mapped soil type(s) Mermentau-Hackberry

Comments N/A

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Cynodon dactylon*	H	FACU	6.			
2.	*Quercus virginiana*	T	FACU+	7.			
3.	*Setaria glauca*	H	FAC	8.			
4.	*Panicum virgatum*	H	FAC+	9.			
5.	*Echinochloa crus-galli*	H	FACW-	10.			

Remarks:

	N W E S	

Photographs of Sample 026 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERES AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/9/08*** ***Field Analysts:*** ***Ryan Coleman/Blake Amos***

Sample Location ID Number: ***027*** ***Coordinates:*** ***29.80211, 93.21554***

Feature Name: ***See map***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) E. Creole Hwy (LA 27)

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Old homesites, roads, ditches

Current/Adjacent land uses Current – fallow; Adjacent – marsh/pasture/residential

History of land use (if known) N/A

Wildlife Species observed N/A

Invasive plant and animal species N/A

Mapped soil type(s) Mermentau-Hackberry

Comments N/A

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Cynodon dactylon*	H	FACU	9.			
2.	*Quercus virginiana*	T	FACU+	10.			
3.	*Spartina patens*	H	FACW	11.			
4.	*Panicum virgatum*	H	FAC+	12.			
5.	*Iva frutescens*	S	FACW+	13.			
6.	*Celtis laevigata*	T	FACW	14.			
7.	*Carya illinoiensis*	T	FAC+	15.			
8.				16.			

Remarks:

	N W E S	

Photographs of Sample 027 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERES AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/9/08*** ***Field Analysts:*** ***Ryan Coleman/Blake Amos***

Sample Location ID Number: ***028*** ***Coordinates:*** ***29.78710, 93.29274***

Feature Name: ***See map***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) E. Creole Hwy (LA27)

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Roads, ditches, pond, old home site, Entergy substation

Current/Adjacent land uses Adjacent – fallow pasture/ marsh; Current – fallow/substation

History of land use (if known) N/A

Wildlife Species observed N/A

Invasive plant and animal species *Sapium sebiferum*

Mapped soil type(s) Mermentau-Hackberry

Comments N/A

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Taxodium distichum* (Planted)	T	OBL	8.	*Sapium sebiferum*	T	FAC
2.	*Quercus virginiana* (Planted)	T	FACU+	9.	*Baccharis halimifolia*	S	FAC
3.	*Carya illinoiensis* (Planted)	T	FAC+	10.	*Eupatorium capillifolium*	H	FACU
4.	*Solidago sempervirens*	H	FACW	11.			
5.	*Sesbania exaltata*	S	FACW-	12.			
6.	*Cynodon dactylon*	H	FACU	13.			
7.	*Iva frutescens*	S	FACW+	14.			

Remarks:

BOTTOMLAND HARDWOOD* PARAMETERS FOR MITIGATION CALCULATIONS (WVA)

2% PERCENT OF OVERSTORY CANOPY CONSISTING OF MAST OR OTHER EDIBLE SEED PRODUCERS (RED MAPLE, SUGARBERRY, GREEN ASH, BOXELDER, COMMON PERSIMMON SWEETGUM, HONEYLOCUST, RED MULBERRY, BALDCYPRESS, TUPELO GUM, AMERICAN ELM, CEDAR ELM, ETC.)

40% PERCENT OF OVERSTORY CANOPY CONSISTING OF HARD MAST PRODUCING TREES (OAKS, SWEET PECAN, OTHER HICKORIES)

AVERAGE AGE OF CANOPY-DOMINANT AND CANOPY-CODOMINANT TREES

OR

AVERAGE DIAMETER AT BREAST HEIGHT (DBH) OF CANOPY-DOMINANT OR CANOPY-CODOMINANT TREES

SPECIES	AGE	OR	DBH (inches)
Quercus virginiana	+/-40		30
Carya illinoiensis	+/-20		16
Taxodium distichum	+/-40		30

85% PERCENT UNDERSTORY COVER

0% PERCENT MIDSTORY COVER

IS THE AREA PART OF A FORCED DRAINAGE SYSTEM? NO

WHAT IS THE RELATIVE POSITION OF THE WATER TABLE?
(NEAR THE SURFACE, DEEP) N/A

IS THE NATURAL HYDROLOGY ESSENTIALLY UNALTERED ALLOWING FOR NATURAL WETTING AND DRYING CYCLES? NO

DOCUMENT ANY TREE REGENERATION minimal

*An area supporting or capable of supporting a canopy of woody vegetation of which greater than 40% consists of tree species such as oaks, hickories, American elm, cedar elm, green ash, sweetgum, sugarberry, boxelder, common persimmon, honeylocust, red mulberry, eastern cottonwood, American sycamore, etc.

	N W E S	

Photographs of Sample 028 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERES AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/9/08*** ***Field Analysts:*** ***Ryan Coleman/Blake Amos***

Sample Location ID Number: ***029*** ***Coordinates:*** ***29.77399, 93.32600***

Feature Name: ***See map***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) Gravel Road via Davis Road

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Old well pad; cleared/fallow pasture

Current/Adjacent land uses Adjacent – fallow pasture/ marsh; Current – none

History of land use (if known) N/A

Wildlife Species observed Bobwhite (*Colinus virginianus*)

Invasive plant and animal species N/A

Mapped soil type(s) Mermentau-Hackberry

Comments N/A

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Juncus effusus*	H	FACW+	9.	*Iva frutescens*	S	FACW+
2.	*Quercus virginiana*	T	FACU+	10.	*Capraria biflora*	S	FACW
3.	*Spartina patens*	H	FACW	11.	*Setaria glauca*	H	FAC
4.	*Opuntia stricta*	S	FACU-	12.	*Celtis laevigata*	T	FACW
5.	*Lycium carolinianum*	S	FACW	13.	*Distichlis spicata*	H	FACW+
6.	*Cynodon dactylon*	H	FACU	14.			
7.	*Acacia farnesiana*	S	FACU	15.			
8.	*Symphyotrichum tenuifolium*	H	OBL	16.			

Remarks:

BOTTOMLAND HARDWOOD* PARAMETERS FOR MITIGATION CALCULATIONS (WVA)

10% PERCENT OF OVERSTORY CANOPY CONSISTING OF MAST OR OTHER EDIBLE SEED PRODUCERS (RED MAPLE, SUGARBERRY, GREEN ASH, BOXELDER, COMMON PERSIMMON SWEETGUM, HONEYLOCUST, RED MULBERRY, BALDCYPRESS, TUPELO GUM, AMERICAN ELM, CEDAR ELM, ETC.)

10% PERCENT OF OVERSTORY CANOPY CONSISTING OF HARD MAST PRODUCING TREES (OAKS, SWEET PECAN, OTHER HICKORIES)

AVERAGE AGE OF CANOPY-DOMINANT AND CANOPY-CODOMINANT TREES

OR

AVERAGE DIAMETER AT BREAST HEIGHT (DBH) OF CANOPY-DOMINANT OR CANOPY-CODOMINANT TREES

SPECIES	AGE	OR	DBH (inches)
Quercus virginiana	20		20
Celtis laevigata	+/- 15		12

80% PERCENT UNDERSTORY COVER

35% PERCENT MIDSTORY COVER

IS THE AREA PART OF A FORCED DRAINAGE SYSTEM? NO

WHAT IS THE RELATIVE POSITION OF THE WATER TABLE?
(NEAR THE SURFACE, DEEP) N/A

IS THE NATURAL HYDROLOGY ESSENTIALLY UNALTERED ALLOWING FOR NATURAL WETTING AND DRYING CYCLES? YES

DOCUMENT ANY TREE REGENERATION minimal

*An area supporting or capable of supporting a canopy of woody vegetation of which greater than 40% consists of tree species such as oaks, hickories, American elm, cedar elm, green ash, sweetgum, sugarberry, boxelder, common persimmon, honeylocust, red mulberry, eastern cottonwood, American sycamore, etc.

	N W E S	

Photographs of Sample 029 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERES AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: *10/9/08* ***Field Analysts:*** *Ryan Coleman/Blake Amos*

Sample Location ID Number: *030* ***Coordinates:*** *29.78365, 93.22633*

Feature Name: *Front Ridge*

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) LA 27, Pasture Rd.

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Some clearing

Current/Adjacent land uses Adjacent – marsh; Current - pasture

History of land use (if known) N/A

Wildlife Species observed N/A

Invasive plant and animal species N/A

Mapped soil type(s) Mermentau-Hackberry

Comments N/A

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Cynodon dactylon*	H	FACU	8.			
2.	*Quercus virginiana*	T	FACU+	9.			
3.	*Spartina patens*	H	FACW	10.			
4.	*Opuntia stricta*	S	FACU-	11.			
5.	*Lycium carolinianum*	S	FACW	12.			
6.	*Gleditsia triacanthos*	T	FAC-	13.			
7.	*Acacia farnesiana*	S	FACU	14.			

Remarks:

BOTTOMLAND HARDWOOD* PARAMETERS FOR MITIGATION CALCULATIONS (WVA)

2% PERCENT OF OVERSTORY CANOPY CONSISTING OF MAST OR OTHER EDIBLE SEED PRODUCERS (RED MAPLE, SUGARBERRY, GREEN ASH, BOXELDER, COMMON PERSIMMON SWEETGUM, HONEYLOCUST, RED MULBERRY, BALDCYPRESS, TUPELO GUM, AMERICAN ELM, CEDAR ELM, ETC.)

100% PERCENT OF OVERSTORY CANOPY CONSISTING OF HARD MAST PRODUCING TREES (OAKS, SWEET PECAN, OTHER HICKORIES)

AVERAGE AGE OF CANOPY-DOMINANT AND CANOPY-CODOMINANT TREES

OR

AVERAGE DIAMETER AT BREAST HEIGHT (DBH) OF CANOPY-DOMINANT OR CANOPY-CODOMINANT TREES

SPECIES	AGE	OR	DBH (inches)
Quercus virginiana	60		40
Gleditsia triacanthos	10		6

70% PERCENT UNDERSTORY COVER

10% PERCENT MIDSTORY COVER

IS THE AREA PART OF A FORCED DRAINAGE SYSTEM? NO

WHAT IS THE RELATIVE POSITION OF THE WATER TABLE? (NEAR THE SURFACE, DEEP) N/A

IS THE NATURAL HYDROLOGY ESSENTIALLY UNALTERED ALLOWING FOR NATURAL WETTING AND DRYING CYCLES? YES

DOCUMENT ANY TREE REGENERATION *Quercus virginiana, Gleditsia triacanthos*

*An area supporting or capable of supporting a canopy of woody vegetation of which greater than 40% consists of tree species such as oaks, hickories, American elm, cedar elm, green ash, sweetgum, sugarberry, boxelder, common persimmon, honeylocust, red mulberry, eastern cottonwood, American sycamore, etc.

	N W E S	

Photographs of Sample 030 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/15/08*** ***Field Analysts:*** ***Blake Amos/John Price***

Sample Location ID Number: ***031*** ***Coordinates:*** ***29.75625, 93.72105***

Feature Name: ***Hackberry Ridge***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) Access along private farm road, Stream Properties site

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Minimal

Current/Adjacent land uses Current and adjacent – minimal cattle grazing, largely undisturbed

History of land use (if known) Same as current for several decades

Wildlife Species observed N/A

Invasive plant and animal species *Sapium sebiferum*

Mapped soil type(s) Mermentau-Hackberry

Comments N/A

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Celtis laevigata*	T	FACW	9.	*Solidago sempervirens*	H	FACW
2.	*Acacia farnesiana*	S	FACU	10.	*Sesbania exaltata*	S	FACW-
3.	*Gleditsia triacanthos*	T	FAC-	11.			
4.	*Sapium sebiferum*	T	FAC	12.			
5.	*Iva frutescens*	S	FACW+	13.			
6.	*Ambrosia artemisifolia*	H	FACU	14.			
7.	*Spartina alternifolia*	H	OBL	15.			
8.	*Spartina patens*	H	FACW	16.			

Remarks:

BOTTOMLAND HARDWOOD* PARAMETERS FOR MITIGATION CALCULATIONS (WVA)

70 PERCENT OF OVERSTORY CANOPY CONSISTING OF MAST OR OTHER EDIBLE SEED PRODUCERS (RED MAPLE, SUGARBERRY, GREEN ASH, BOXELDER, COMMON PERSIMMON SWEETGUM, HONEYLOCUST, RED MULBERRY, BALDCYPRESS, TUPELO GUM, AMERICAN ELM, CEDAR ELM, ETC.)

0 PERCENT OF OVERSTORY CANOPY CONSISTING OF HARD MAST PRODUCING TREES (OAKS, SWEET PECAN, OTHER HICKORIES)

AVERAGE AGE OF CANOPY-DOMINANT AND CANOPY-CODOMINANT TREES

OR

AVERAGE DIAMETER AT BREAST HEIGHT (DBH) OF CANOPY-DOMINANT OR CANOPY-CODOMINANT TREES

SPECIES	AGE	OR	DBH (inches)
Celtis laevigata	30		24
Acacia farnesiana	10		4
Gleditsia triacanthos	10		5
Sapium sebiferum	10		6

85 PERCENT UNDERSTORY COVER

15 PERCENT MIDSTORY COVER

IS THE AREA PART OF A FORCED DRAINAGE SYSTEM? No

WHAT IS THE RELATIVE POSITION OF THE WATER TABLE?
(NEAR THE SURFACE, DEEP) N/A

IS THE NATURAL HYDROLOGY ESSENTIALLY UNALTERED ALLOWING FOR NATURAL WETTING AND DRYING CYCLES? Yes

DOCUMENT ANY TREE REGENERATION *Celtis laevigata, Acacia farnesiana*

*An area supporting or capable of supporting a canopy of woody vegetation of which greater than 40% consists of tree species such as oaks, hickories, American elm, cedar elm, green ash, sweetgum, sugarberry, boxelder, common persimmon, honeylocust, red mulberry, eastern cottonwood, American sycamore, etc.

	N W E S	

Photographs of Sample 031 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/15/08*** ***Field Analysts:*** ***Blake Amos/John Price***

Sample Location ID Number: ***032*** ***Coordinates:*** ***29.75718, 93.68218***

Feature Name: ***Hackberry Ridge***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) Via private road off Hwy 82, Stream Properties site

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) N/A

Current/Adjacent land uses Current and adjacent – forest land, undisturbed

History of land use (if known) N/A

Wildlife Species observed N/A

Invasive plant and animal species *Sapium sebiferum*

Mapped soil type(s) Mermentau-Hackberry

Comments N/A

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Celtis laevigata*	T	FACW	7.			
2.	*Lycium carolinianum*	S	FACW	8.			
3.	*Gleditsia triacanthos*	T	FAC-	9.			
4.	*Sapium sebiferum*	T	FAC	10.			
5.	*Ambrosia trifida*	H	FAC	11.			
6.	*Rosa multiflora*	S	UPL	12.			

Remarks:

BOTTOMLAND HARDWOOD* PARAMETERS FOR MITIGATION CALCULATIONS (WVA)

80 PERCENT OF OVERSTORY CANOPY CONSISTING OF MAST OR OTHER EDIBLE SEED PRODUCERS (RED MAPLE, SUGARBERRY, GREEN ASH, BOXELDER, COMMON PERSIMMON SWEETGUM, HONEYLOCUST, RED MULBERRY, BALDCYPRESS, TUPELO GUM, AMERICAN ELM, CEDAR ELM, ETC.)

0 PERCENT OF OVERSTORY CANOPY CONSISTING OF HARD MAST PRODUCING TREES (OAKS, SWEET PECAN, OTHER HICKORIES)

AVERAGE AGE OF CANOPY-DOMINANT AND CANOPY-CODOMINANT TREES

OR

AVERAGE DIAMETER AT BREAST HEIGHT (DBH) OF CANOPY-DOMINANT OR CANOPY-CODOMINANT TREES

SPECIES	AGE	OR	DBH (inches)
Celtis laevigata	40		26
Gleditsia triacanthos	10		8
Sapium sebiferum	10		12

95 PERCENT UNDERSTORY COVER

10 PERCENT MIDSTORY COVER

IS THE AREA PART OF A FORCED DRAINAGE SYSTEM? No

WHAT IS THE RELATIVE POSITION OF THE WATER TABLE?
(NEAR THE SURFACE, DEEP) N/A

IS THE NATURAL HYDROLOGY ESSENTIALLY UNALTERED ALLOWING FOR NATURAL WETTING AND DRYING CYCLES? Yes

DOCUMENT ANY TREE REGENERATION *Celtis laevigata, Sapium sebiferum*

*An area supporting or capable of supporting a canopy of woody vegetation of which greater than 40% consists of tree species such as oaks, hickories, American elm, cedar elm, green ash, sweetgum, sugarberry, boxelder, common persimmon, honeylocust, red mulberry, eastern cottonwood, American sycamore, etc.

	N W E S	

Photographs of Sample 032 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/15/08*** ***Field Analysts:*** ***Blake Amos/John Price***

Sample Location ID Number: ***033*** ***Coordinates:*** ***29.76267, 93.65113***

Feature Name: ***See map***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) Private farm road; Stream Properties site

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) N/A

Current/Adjacent land uses Current – undisturbed forest land; Adjacent – cattle grazing

History of land use (if known) N/A

Wildlife Species observed N/A

Invasive plant and animal species *Sapium sebiferum*

Mapped soil type(s) Mermentau-Hackberry

Comments N/A

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Quercus virginiana*	T	FACU+	9.			
2.	*Baccharis halimifolia*	S	FAC	10.			
3.	*Spartina patens*	H	FACW	11.			
4.	*Rosa multiflora*	S	UPL	12.			
5.	*Opuntia stricta*	S	FACU-	13.			
6.	*Cynodon dactylon*	H	FACU	14.			
7.	*Sapium sebiferum*	T	FAC	15.			
8.				16.			

Remarks:

BOTTOMLAND HARDWOOD* PARAMETERS FOR MITIGATION CALCULATIONS (WVA)

0 PERCENT OF OVERSTORY CANOPY CONSISTING OF MAST OR OTHER EDIBLE SEED PRODUCERS (RED MAPLE, SUGARBERRY, GREEN ASH, BOXELDER, COMMON PERSIMMON SWEETGUM, HONEYLOCUST, RED MULBERRY, BALDCYPRESS, TUPELO GUM, AMERICAN ELM, CEDAR ELM, ETC.)

100 PERCENT OF OVERSTORY CANOPY CONSISTING OF HARD MAST PRODUCING TREES (OAKS, SWEET PECAN, OTHER HICKORIES)

AVERAGE AGE OF CANOPY-DOMINANT AND CANOPY-CODOMINANT TREES

OR

AVERAGE DIAMETER AT BREAST HEIGHT (DBH) OF CANOPY-DOMINANT OR CANOPY-CODOMINANT TREES

SPECIES	AGE	OR	DBH (inches)
Quercus virginiana	60		36
Sapium sebiferum	2		1

95 PERCENT UNDERSTORY COVER

5 PERCENT MIDSTORY COVER

IS THE AREA PART OF A FORCED DRAINAGE SYSTEM? No

WHAT IS THE RELATIVE POSITION OF THE WATER TABLE?
(NEAR THE SURFACE, DEEP) N/A

IS THE NATURAL HYDROLOGY ESSENTIALLY UNALTERED ALLOWING FOR NATURAL WETTING AND DRYING CYCLES? Yes

DOCUMENT ANY TREE REGENERATION *Quercus virginiana*

*An area supporting or capable of supporting a canopy of woody vegetation of which greater than 40% consists of tree species such as oaks, hickories, American elm, cedar elm, green ash, sweetgum, sugarberry, boxelder, common persimmon, honeylocust, red mulberry, eastern cottonwood, American sycamore, etc.

	N W E S	

Photographs of Sample 033 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/15/08*** ***Field Analysts:*** ***Blake Amos/John Price***

Sample Location ID Number: ***034*** ***Coordinates:*** ***29.76904, 93.49717***

Feature Name: ***See map***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) Off LA Hwy 82

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Natural gas pipeline, road

Current/Adjacent land uses Current and adjacent – pipeline, cattle grazing, road

History of land use (if known) N/A

Wildlife Species observed Shorebirds, terns

Invasive plant and animal species N/A

Mapped soil type(s) Mermentau-Hackberry

Comments N/A

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Spartina alternifolia*	H	OBL	3.			
2.	*Spartina patens*	H	FACW	4.			
Remarks:							

	N W E S	

Photographs of Sample 034 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/15/08*** ***Field Analysts:*** ***Blake Amos/John Price***

Sample Location ID Number: ***035*** ***Coordinates:*** ***29.77018, 93.34919***

Feature Name: ***See map***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) Private Road off LA Hwy 82

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Dock facility adjacent

Current/Adjacent land uses Current and adjacent – forest, dock facility

History of land use (if known) N/A

Wildlife Species observed N/A

Invasive plant and animal species N/A

Mapped soil type(s) Mermentau-Hackberry

Comments N/A

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Celtis laevigata*	T	FACW	5.			
2.	*Iva frutescens*	S	FACW+	6.			
3.	*Solidago sempervirens*	H	FACW	7.			
4.	*Spartina patens*	H	FACW	8.			

Remarks:

BOTTOMLAND HARDWOOD* PARAMETERS FOR MITIGATION CALCULATIONS (WVA)

100 PERCENT OF OVERSTORY CANOPY CONSISTING OF MAST OR OTHER EDIBLE SEED PRODUCERS (RED MAPLE, SUGARBERRY, GREEN ASH, BOXELDER, COMMON PERSIMMON SWEETGUM, HONEYLOCUST, RED MULBERRY, BALDCYPRESS, TUPELO GUM, AMERICAN ELM, CEDAR ELM, ETC.)

0 PERCENT OF OVERSTORY CANOPY CONSISTING OF HARD MAST PRODUCING TREES (OAKS, SWEET PECAN, OTHER HICKORIES)

AVERAGE AGE OF CANOPY-DOMINANT AND CANOPY-CODOMINANT TREES

OR

AVERAGE DIAMETER AT BREAST HEIGHT (DBH) OF CANOPY-DOMINANT OR CANOPY-CODOMINANT TREES

SPECIES	AGE	OR	DBH (inches)
Celtis laevigata	20		12

90 PERCENT UNDERSTORY COVER

5 PERCENT MIDSTORY COVER

IS THE AREA PART OF A FORCED DRAINAGE SYSTEM? No

WHAT IS THE RELATIVE POSITION OF THE WATER TABLE?
(NEAR THE SURFACE, DEEP) N/A

IS THE NATURAL HYDROLOGY ESSENTIALLY UNALTERED ALLOWING FOR NATURAL WETTING AND DRYING CYCLES? Hydrology altered - adjacent lot recently cleared and graded

DOCUMENT ANY TREE REGENERATION *Celtis laevigata*

*An area supporting or capable of supporting a canopy of woody vegetation of which greater than 40% consists of tree species such as oaks, hickories, American elm, cedar elm, green ash, sweetgum, sugarberry, boxelder, common persimmon, honeylocust, red mulberry, eastern cottonwood, American sycamore, etc.

	N W E S	

Photographs of Sample 035 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/16/08*** ***Field Analysts:*** ***Blake Amos/John Price***

Sample Location ID Number: ***036*** ***Coordinates:*** ***29.76356, 92.95604***

Feature Name: ***Grand Chenier***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) Off LA Hwy 82

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Old homesite, pasture, LA Hwy 82

Current/Adjacent land uses Current and adjacent – fallow pasture, abandoned homesite, oil/gas facility to E

History of land use (if known) N/A

Wildlife Species observed N/A

Invasive plant and animal species *Sapium sebiferum*

Mapped soil type(s) Mermentau-Hackberry

Comments N/A

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Quercus virginiana*	T	FACU+	7.			
2.	*Celtis laevigata*	T	FACW	8.			
3.	*Sapium sebiferum*	T	FAC	9.			
4.	*Opuntia stricta*	S	FACU-	10.			
5.	*Rubus louisianus*	WV	FAC	11.			
6.	*Zanthoxylum clava-herculis*	S	FAC	12.			

Remarks:

BOTTOMLAND HARDWOOD* PARAMETERS FOR MITIGATION CALCULATIONS (WVA)

30 PERCENT OF OVERSTORY CANOPY CONSISTING OF MAST OR OTHER EDIBLE SEED PRODUCERS (RED MAPLE, SUGARBERRY, GREEN ASH, BOXELDER, COMMON PERSIMMON SWEETGUM, HONEYLOCUST, RED MULBERRY, BALDCYPRESS, TUPELO GUM, AMERICAN ELM, CEDAR ELM, ETC.)

50 PERCENT OF OVERSTORY CANOPY CONSISTING OF HARD MAST PRODUCING TREES (OAKS, SWEET PECAN, OTHER HICKORIES)

AVERAGE AGE OF CANOPY-DOMINANT AND CANOPY-CODOMINANT TREES

OR

AVERAGE DIAMETER AT BREAST HEIGHT (DBH) OF CANOPY-DOMINANT OR CANOPY-CODOMINANT TREES

SPECIES	AGE	OR	DBH (inches)
Quercus virginiana	20		24
Celtis laevigata	12		14
Sapium sebiferum	8		4

30 PERCENT UNDERSTORY COVER

20 PERCENT MIDSTORY COVER

IS THE AREA PART OF A FORCED DRAINAGE SYSTEM? No

WHAT IS THE RELATIVE POSITION OF THE WATER TABLE?
(NEAR THE SURFACE, DEEP) N/A

IS THE NATURAL HYDROLOGY ESSENTIALLY UNALTERED ALLOWING FOR NATURAL WETTING AND DRYING CYCLES? No – road adjacent

DOCUMENT ANY TREE REGENERATION *Celtis laevigata*

*An area supporting or capable of supporting a canopy of woody vegetation of which greater than 40% consists of tree species such as oaks, hickories, American elm, cedar elm, green ash, sweetgum, sugarberry, boxelder, common persimmon, honeylocust, red mulberry, eastern cottonwood, American sycamore, etc.

	N W E S	

Photographs of Sample 036 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/16/08*** ***Field Analysts:*** ***Blake Amos/John Price***

Sample Location ID Number: ***037*** ***Coordinates:*** ***29.76697, 92.92157***

Feature Name: ***Indian Point Island***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) Off Indian Point Road

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Borrow pit, agricultural field, pasture

Current/Adjacent land uses Current - borrow pit, agricultural field, pasture; Adjacent - to the south is typical chenier habitat

History of land use (if known) N/A

Wildlife Species observed N/A

Invasive plant and animal species N/A

Mapped soil type(s) Mermentau-Hackberry

Comments N/A

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Cynodon dactylon*	H	FACU	4.			
2.				5.			
3.				6.			
Remarks:							

	N W E S	

Photographs of Sample 037 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/16/08*** ***Field Analysts:*** ***Blake Amos/John Price***

Sample Location ID Number: ***038*** ***Coordinates:*** ***29.74206, 92.87174***

Feature Name: ***Grand Chenier***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) LA Hwy 82

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Borrow pit, highway

Current/Adjacent land uses Current and adjacent – borrow pit, highway

History of land use (if known) N/A

Species observed N/A

Invasive plant and animal species N/A

Mapped soil type(s) Mermentau-Hackberry

Comments N/A

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Quercus virginiana*	T	FACU+	5.			
2.	*Sabal minor*	S	FACW	6.			
3.	*Phragmites australis*	H	FACW	7.			
4.				8.			

Remarks:

	N W E S	

Photographs of Sample 038 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/16/08*** ***Field Analysts:*** ***Blake Amos/John Price***

Sample Location ID Number: ***039*** ***Coordinates:*** ***29.74432, 92.85383***

Feature Name: ***Cow Island***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) Montie Road

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Pasture, road, homesite, infrequently mowed

Current/Adjacent land uses Current and adjacent – pasture, road homesite

History of land use (if known) N/A

Wildlife Species observed N/A

Invasive plant and animal species *Sapium sebiferum*

Mapped soil type(s) Mermentau-Hackberry

Comments N/A

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Quercus virginiana*	T	FACU+	7.			
2.	*Baccharis halimifolia*	S	FAC	8.			
3.	*Juncus effusus*	H	FACW+	9.			
4.	*Lycium carolinianum*	S	FACW	10.			
5.	*Cynodon dactylon*	H	FACU	11.			
6.				12.			

Remarks:

BOTTOMLAND HARDWOOD* PARAMETERS FOR MITIGATION CALCULATIONS (WVA)

0 PERCENT OF OVERSTORY CANOPY CONSISTING OF MAST OR OTHER EDIBLE SEED PRODUCERS (RED MAPLE, SUGARBERRY, GREEN ASH, BOXELDER, COMMON PERSIMMON SWEETGUM, HONEYLOCUST, RED MULBERRY, BALDCYPRESS, TUPELO GUM, AMERICAN ELM, CEDAR ELM, ETC.)

100 PERCENT OF OVERSTORY CANOPY CONSISTING OF HARD MAST PRODUCING TREES (OAKS, SWEET PECAN, OTHER HICKORIES)

AVERAGE AGE OF CANOPY-DOMINANT AND CANOPY-CODOMINANT TREES

OR

AVERAGE DIAMETER AT BREAST HEIGHT (DBH) OF CANOPY-DOMINANT OR CANOPY-CODOMINANT TREES

SPECIES	AGE	OR	DBH (inches)
Quercus virginiana	30		18

90 PERCENT UNDERSTORY COVER

5 PERCENT MIDSTORY COVER

IS THE AREA PART OF A FORCED DRAINAGE SYSTEM? No

WHAT IS THE RELATIVE POSITION OF THE WATER TABLE?
(NEAR THE SURFACE, DEEP) N/A

IS THE NATURAL HYDROLOGY ESSENTIALLY UNALTERED ALLOWING FOR NATURAL WETTING AND DRYING CYCLES? Yes

DOCUMENT ANY TREE REGENERATION Quercus Virginiana

*An area supporting or capable of supporting a canopy of woody vegetation of which greater than 40% consists of tree species such as oaks, hickories, American elm, cedar elm, green ash, sweetgum, sugarberry, boxelder, common persimmon, honeylocust, red mulberry, eastern cottonwood, American sycamore, etc.

	N W E S	

Photographs of Sample 039 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Field Analysts:

Date: ***10/16/08*** ***Blake Amos/John Price***

Sample Location ID Number: ***040*** ***Coordinates:*** ***29.73340, 92.79901***

Feature Name: ***See map***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) Parish Road 136

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Open pasture, road, homesite

Current/Adjacent land uses Current – pasture; Adjacent – marsh, homesite

History of land use (if known) N/A

Wildlife Species observed N/A

Invasive plant and animal species *Sapium sebiferum*

Mapped soil type(s) Mermentau-Hackberry

Comments N/A

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Sapium sebiferum*	T	FAC	8.	*Vitis rotundifolia*	WV	FAC
2.	*Celtis laevigata*	T	FACW	9.			
3.	*Gleditsia triacanthos*	T	FAC-	10.			
4.	*Eupatorium capillifolium*	H	FACU	11.			
5.	*Symphyotrichum tenuifolium*	H	OBL	12.			
6.	*Baccharis halimifolia*	S	FAC	13.			
7.	*Sabal minor*	S	FACW	14.			

Remarks:

BOTTOMLAND HARDWOOD* PARAMETERS FOR MITIGATION CALCULATIONS (WVA)

50 PERCENT OF OVERSTORY CANOPY CONSISTING OF MAST OR OTHER EDIBLE SEED PRODUCERS (RED MAPLE, SUGARBERRY, GREEN ASH, BOXELDER, COMMON PERSIMMON SWEETGUM, HONEYLOCUST, RED MULBERRY, BALDCYPRESS, TUPELO GUM, AMERICAN ELM, CEDAR ELM, ETC.)

0 PERCENT OF OVERSTORY CANOPY CONSISTING OF HARD MAST PRODUCING TREES (OAKS, SWEET PECAN, OTHER HICKORIES)

AVERAGE AGE OF CANOPY-DOMINANT AND CANOPY-CODOMINANT TREES

OR

AVERAGE DIAMETER AT BREAST HEIGHT (DBH) OF CANOPY-DOMINANT OR CANOPY-CODOMINANT TREES

SPECIES	AGE	OR	DBH (inches)
Sapium sebiferum	10		12
Celtis laevigata	30		28
Gleditsia triacanthos	10		6

90 PERCENT UNDERSTORY COVER

10 PERCENT MIDSTORY COVER

IS THE AREA PART OF A FORCED DRAINAGE SYSTEM? No

WHAT IS THE RELATIVE POSITION OF THE WATER TABLE?
(NEAR THE SURFACE, DEEP) N/A

IS THE NATURAL HYDROLOGY ESSENTIALLY UNALTERED ALLOWING FOR NATURAL WETTING AND DRYING CYCLES? No, roadside drainage

DOCUMENT ANY TREE REGENERATION *Sapium sebiferum*

*An area supporting or capable of supporting a canopy of woody vegetation of which greater than 40% consists of tree species such as oaks, hickories, American elm, cedar elm, green ash, sweetgum, sugarberry, boxelder, common persimmon, honeylocust, red mulberry, eastern cottonwood, American sycamore, etc.

	N W E S	

Photographs of Sample 040 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/16/08*** ***Field Analysts:*** ***Blake Amos/John Price***

Sample Location ID Number: ***041*** ***Coordinates:*** ***29.72031, 92.77363***

Feature Name: ***Grand Chenier***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) Grand Chenier Hwy (LA Hwy 87)

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Open pasture, road, homesite

Current/Adjacent land uses Current and adjacent – pasture, road, homesite

History of land use (if known) N/A

Wildlife Species observed N/A

Invasive plant and animal species N/A

Mapped soil type(s) Mermentau-Hackberry

Comments N/A

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Quercus virginiana*	T	FACU+	5.			
2.	*Echinochloa crus-galli*	H	FACW-	6.			
3.	*Ambrosia trifida*	H	FAC	7.			
4.	*Sabal minor*	S	FACW	8.			

Remarks:

	N W E S	

Photographs of Sample 041 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/16/08*** ***Field Analysts:*** ***Blake Amos/John Price***

Sample Location ID Number: ***042*** ***Coordinates:*** ***29.72634, 92.72829***

Feature Name: ***North Island***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) Parish Road 147

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Road, homesite

Current/Adjacent land uses Current and adjacent – marsh, pasture, road, homesite

History of land use (if known) N/A

Wildlife Species observed N/A

Invasive plant and animal species *Sapium sebiferum*

Mapped soil type(s) Mermentau-Hackberry

Comments N/A

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Quercus virginiana*	T	FACU+	9.			
2.	*Celtis laevigata*	T	FACW	10.			
3.	*Gleditsia triacanthos*	T	FAC	11.			
4.	*Baccharis halimifolia*	S	FAC	12.			
5.	*Sabal minor*	S	FACW	13.			
6.	*Juncus effusus*	H	FACW+	14.			
7.	*Cynodon dactylon*	H	FACU	15.			

Remarks:

BOTTOMLAND HARDWOOD* PARAMETERS FOR MITIGATION CALCULATIONS (WVA)

40 PERCENT OF OVERSTORY CANOPY CONSISTING OF MAST OR OTHER EDIBLE SEED PRODUCERS (RED MAPLE, SUGARBERRY, GREEN ASH, BOXELDER, COMMON PERSIMMON SWEETGUM, HONEYLOCUST, RED MULBERRY, BALDCYPRESS, TUPELO GUM, AMERICAN ELM, CEDAR ELM, ETC.)

60 PERCENT OF OVERSTORY CANOPY CONSISTING OF HARD MAST PRODUCING TREES (OAKS, SWEET PECAN, OTHER HICKORIES)

AVERAGE AGE OF CANOPY-DOMINANT AND CANOPY-CODOMINANT TREES

OR

AVERAGE DIAMETER AT BREAST HEIGHT (DBH) OF CANOPY-DOMINANT OR CANOPY-CODOMINANT TREES

SPECIES	AGE	OR	DBH (inches)
Quercus virginiana	100+		48
Celtis laevigata	30		20
Gleditsia triancanthos	10		5
Sapium sebiferum	5		5

95 PERCENT UNDERSTORY COVER

10 PERCENT MIDSTORY COVER

IS THE AREA PART OF A FORCED DRAINAGE SYSTEM? No

WHAT IS THE RELATIVE POSITION OF THE WATER TABLE?
(NEAR THE SURFACE, DEEP) N/A

IS THE NATURAL HYDROLOGY ESSENTIALLY UNALTERED ALLOWING FOR NATURAL WETTING AND DRYING CYCLES? Yes

DOCUMENT ANY TREE REGENERATION *Quercus virginiana,Celtis laevigata*

*An area supporting or capable of supporting a canopy of woody vegetation of which greater than 40% consists of tree species such as oaks, hickories, American elm, cedar elm, green ash, sweetgum, sugarberry, boxelder, common persimmon, honeylocust, red mulberry, eastern cottonwood, American sycamore, etc.

	N W E S	

Photographs of Sample 042 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/16/08*** ***Field Analysts:*** ***Blake Amos/John Price***

Sample Location ID Number: ***043*** ***Coordinates:*** ***29.71370, 92.73796***

Feature Name: ***Grand Chenier***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) LA Hwy 82

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Road

Current/Adjacent land uses Current – forest land; Adjacent – road

History of land use (if known) N/A

Wildlife Species observed N/A

Invasive plant and animal species N/A

Mapped soil type(s) Mermentau-Hackberry

Comments N/A

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Quercus virginiana*	T	FACU+	7.			
2.	*Celtis laevigata*	T	FACW	8.			
3.	*Iva frutescens*	S	FACW+	9.			
4.	*Sabal minor*	S	FACW	10.			
5.	*Ambrosia trifida*	H	FAC	11.			
6.	*Panicum hemitomon*	H	OBL	12.			

Remarks:

BOTTOMLAND HARDWOOD* PARAMETERS FOR MITIGATION CALCULATIONS (WVA)

45 PERCENT OF OVERSTORY CANOPY CONSISTING OF MAST OR OTHER EDIBLE SEED PRODUCERS (RED MAPLE, SUGARBERRY, GREEN ASH, BOXELDER, COMMON PERSIMMON SWEETGUM, HONEYLOCUST, RED MULBERRY, BALDCYPRESS, TUPELO GUM, AMERICAN ELM, CEDAR ELM, ETC.)

55 PERCENT OF OVERSTORY CANOPY CONSISTING OF HARD MAST PRODUCING TREES (OAKS, SWEET PECAN, OTHER HICKORIES)

AVERAGE AGE OF CANOPY-DOMINANT AND CANOPY-CODOMINANT TREES

OR

AVERAGE DIAMETER AT BREAST HEIGHT (DBH) OF CANOPY-DOMINANT OR CANOPY-CODOMINANT TREES

SPECIES	AGE	OR	DBH (inches)
Quercus virginiana	60		36
Celtis laevigata	20		12

90 PERCENT UNDERSTORY COVER

15 PERCENT MIDSTORY COVER

IS THE AREA PART OF A FORCED DRAINAGE SYSTEM? No

WHAT IS THE RELATIVE POSITION OF THE WATER TABLE?
(NEAR THE SURFACE, DEEP) N/A

IS THE NATURAL HYDROLOGY ESSENTIALLY UNALTERED ALLOWING FOR NATURAL WETTING AND DRYING CYCLES? Yes

DOCUMENT ANY TREE REGENERATION *Celtis laevigata*

*An area supporting or capable of supporting a canopy of woody vegetation of which greater than 40% consists of tree species such as oaks, hickories, American elm, cedar elm, green ash, sweetgum, sugarberry, boxelder, common persimmon, honeylocust, red mulberry, eastern cottonwood, American sycamore, etc.

	No photographs available for this site.	
	N **W** **E** **S**	

Photographs of Sample 043 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/16/08*** ***Field Analysts:*** ***Blake Amos/John Price***

Sample Location ID Number: ***044*** ***Coordinates:*** ***29.70161, 92.67475***

Feature Name: ***See map***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) LA Hwy 82

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Oil/gas facility, road, canal constructed perpendicularly through ridge

Current/Adjacent land uses Current – oil/gas facility, road; Adjacent – marsh

History of land use (if known) N/A

Wildlife Species observed N/A

Invasive plant and animal species *Sapium sebiferum*

Mapped soil type(s) Mermentau-Hackberry

Comments N/A

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Sapium sebiferum*	T	FAC	7.			
2.	*Celtis laevigata*	T	FACW	8.			
3.	*Salix nigra*	T	OBL	9.			
4.	*Phragmites australis*	H	FACW	10.			

Remarks:

	N W E S	

Photographs of Sample 044 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/16/08*** ***Field Analysts:*** ***Blake Amos/John Price***

Sample Location ID Number: ***045*** ***Coordinates:*** ***29.65559, 92.50493***

Feature Name: ***See map***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) W LA Hwy 82

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Road, homesteads

Current/Adjacent land uses Current – road, homesteads; Adjacent – marsh

History of land use (if known) N/A

Wildlife Species observed N/A

Invasive plant and animal species *Ligustrum sinense*

Mapped soil type(s) Mermentau-Hackberry

Comments N/A

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Celtis laevigata*	T	FACW	7.			
2.	*Ligustrum sinense*	S	FAC	8.			
3.	*Quercus virginiana*	T	FACU+	9.			
4.	*Parthenocissus quinquefolia*	S	FAC	10.			
5.	*Phragmites australis*	H	FACW	11.			
6.	*Lantana camara*	S	FACU	12.			

Remarks:

	N W E S	

Photographs of Sample 045 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/16/08*** ***Field Analysts:*** ***Blake Amos/John Price***

Sample Location ID Number: ***046*** ***Coordinates:*** ***29.65156, 92.47521***

Feature Name: ***See map***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) LA Hwy 82

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Road, homestead, agricultural field, pasture

Current/Adjacent land uses Current –pasture; Adjacent – road, homestead, marshy, open water

History of land use (if known) N/A

Wildlife Species observed N/A

Invasive plant and animal species N/A

Mapped soil type(s) Mermentau-Hackberry

Comments N/A

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Cynodon dactylon*	H	FACU	7.			
2.	*Paspalum notatum*	H	FACU+	8.			
3.	*Quercus virginiana*	T	FACU+	9.			
4.				10.			

Remarks:

	N W E S	

Photographs of Sample 046 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/16/08*** ***Field Analysts:*** ***Blake Amos/John Price***

Sample Location ID Number: ***047*** ***Coordinates:*** ***29.65049, 92.46974***

Feature Name: ***See map***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) LA Hwy 82

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Canal continued directly through chenier (N to S), road, agricultural, pasture

Current/Adjacent land uses Current – road, agricultural, pasture

History of land use (if known) N/A

Wildlife Species observed N/A

Invasive plant and animal species N/A

Mapped soil type(s) Mermentau-Hackberry

Comments N/A

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Cynodon dactylon*	H	FACU	5.			
2.	*Paspalum notatum*	H	FACU+	6.			
3.	*Phragmites australis*	H	FACW	7.			
4.				8.			

Remarks:

	N W E S	

Photographs of Sample 047 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/16/08*** ***Field Analysts:*** ***Blake Amos/John Price***

Sample Location ID Number: ***048*** ***Coordinates:*** ***29.64877, 92.43079***

Feature Name: ***Cane Ridge***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) Via private road (Astor Road) off LA Hwy 82

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Road, homestead

Current/Adjacent land uses Current and adjacent – forest, road, homestead

History of land use (if known) N/A

Wildlife Species observed N/A

Invasive plant and animal species *Sapium sebiferum*

Mapped soil type(s) Mermentau-Hackberry

Comments N/A

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Quercus virginiana*	T	FACU+	9.			
2.	*Carya illinoiensis*	T	FAC+	10.			
3.	*Ulmus americana*	T	FACW	11.			
4.	*Tillandsia usneoides*	WV	N/A	12.			
5.	*Baccharis halimifolia*	S	FAC	13.			
6.	*Sapium sebiferum*	T	FAC	14.			
7.	*Toxicodendron radicans*	WV	FAC	15.			
8.	*Ambrosia trifida*	H	FAC	16.			

Remarks:

BOTTOMLAND HARDWOOD* PARAMETERS FOR MITIGATION CALCULATIONS (WVA)

10 PERCENT OF OVERSTORY CANOPY CONSISTING OF MAST OR OTHER EDIBLE SEED PRODUCERS (RED MAPLE, SUGARBERRY, GREEN ASH, BOXELDER, COMMON PERSIMMON SWEETGUM, HONEYLOCUST, RED MULBERRY, BALDCYPRESS, TUPELO GUM, AMERICAN ELM, CEDAR ELM, ETC.)

90 PERCENT OF OVERSTORY CANOPY CONSISTING OF HARD MAST PRODUCING TREES (OAKS, SWEET PECAN, OTHER HICKORIES)

AVERAGE AGE OF CANOPY-DOMINANT AND CANOPY-CODOMINANT TREES

OR

AVERAGE DIAMETER AT BREAST HEIGHT (DBH) OF CANOPY-DOMINANT OR CANOPY-CODOMINANT TREES

SPECIES	AGE	OR	DBH (inches)
Quercus virginiana	40		28
Carya illinoiensis	15		16
Ulmus americana	6		4

30 PERCENT UNDERSTORY COVER

10 PERCENT MIDSTORY COVER

IS THE AREA PART OF A FORCED DRAINAGE SYSTEM? No

WHAT IS THE RELATIVE POSITION OF THE WATER TABLE?
(NEAR THE SURFACE, DEEP) N/A

IS THE NATURAL HYDROLOGY ESSENTIALLY UNALTERED ALLOWING FOR NATURAL WETTING AND DRYING CYCLES? Yes

DOCUMENT ANY TREE REGENERATION *Sapium sebiferum*

*An area supporting or capable of supporting a canopy of woody vegetation of which greater than 40% consists of tree species such as oaks, hickories, American elm, cedar elm, green ash, sweetgum, sugarberry, boxelder, common persimmon, honeylocust, red mulberry, eastern cottonwood, American sycamore, etc.

	N W E S	

Photographs of Sample 048 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/16/08*** ***Field Analysts:*** ***Blake Amos/John Price***

Sample Location ID Number: ***049*** ***Coordinates:*** ***29.64783, 92.41714***

Feature Name: ***Back Ridge***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) LAHwy 82

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Borrow pit, road, homestead

Current/Adjacent land uses Current and adjacent – borrow pit, road, homestead

History of land use (if known) N/A

Wildlife Species observed N/A

Invasive plant and animal species N/A

Mapped soil type(s) Mermentau-Hackberry

Comments N/A

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Quercus virginiana*	T	FACU+	9.			
2.	*Celtis laevigata*	T	FACW	10.			
3.	*Platanus occidentalis* (Planted)	T	FACW-	11.			
4.	*Cynodon dactylon*	H	FACU	12.			
5.	*Paspalum notatum*	H	FACU+	13.			
6.				14.			

Remarks:

	N W E S	

Photographs of Sample 049 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/16/08*** ***Field Analysts:*** ***Blake Amos/John Price***

Sample Location ID Number: ***050*** ***Coordinates:*** ***29.65002, 92.39406***

Feature Name: ***Front Ridge***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) LA Hwy 82

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Borrow pit, road, residence

Current/Adjacent land uses Current and adjacent – borrow pit, road, residence

History of land use (if known) N/A

Wildlife Species observed N/A

Invasive plant and animal species N/A

Mapped soil type(s) Mermentau-Hackberry

Comments N/A

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Quercus virginiana*	T	FACU+	9.			
2.	*Cynodon dactylon*	H	FACU	10.			
3.	*Panicum repens*	H	FACW-	11.			
4.	*Carex debilis*	H	FACW	12.			
5.	*Gleditsia triacanthos*	T	FAC	13.			
6.				14.			

Remarks:

	N W E S	

Photographs of Sample 050 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/16/08*** ***Field Analysts:*** ***Blake Amos/John Price***

Sample Location ID Number: ***051*** ***Coordinates:*** ***29.64452, 92.38134***

Feature Name: ***Kochs Ridge***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) Veasley Road

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Pasture, roads, residence

Current/Adjacent land uses Current and adjacent – pasture, roads, residence, marsh

History of land use (if known) N/A

Wildlife Species observed N/A

Invasive plant and animal species N/A

Mapped soil type(s) Mermentau-Hackberry

Comments N/A

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Paspalum notatum*	H	FACU+	9.			
2.	*Cynodon dactylon*	H	FACU	10.			
3.	*Panicum repens*	H	FACW-	11.			
4.				12.			

Remarks:

	N W E S	

Photographs of Sample 051 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/16/08*** ***Field Analysts:*** ***Blake Amos/John Price***

Sample Location ID Number: ***052*** ***Coordinates:*** ***29.63738, 92.40290***

Feature Name: ***Pecan Island***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) Beach front road then private farm road

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Agricultural pasture land, road

Current/Adjacent land uses Current and adjacent – agricultural pasture land, road

History of land use (if known) N/A

Wildlife Species observed N/A

Invasive plant and animal species N/A

Mapped soil type(s) Mermentau-Hackberry

Comments N/A

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Quercus virginiana*	T	FACU+	9.			
2.	*Celtis laevigata*	T	FACW	10.			
3.	*Panicum repens*	H	FACW-	11.			
4.	*Carya illinoiensis*	T	FAC+	12.			
5.	*Paspalum floridanum*	H	FACW	13.			
6.				14.			

Remarks:

	N W E S	

Photographs of Sample 052 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/16/08*** ***Field Analysts:*** ***Blake Amos/John Price***

Sample Location ID Number: ***053*** ***Coordinates:*** ***29.62453, 92.35255***

Feature Name: ***Pecan Island***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) LA 3147 then boat dock road

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Minimal

Current/Adjacent land uses Current and adjacent – undisturbed forestland

History of land use (if known) N/A

Wildlife Species observed N/A

Invasive plant and animal species N/A

Mapped soil type(s) Mermentau-Hackberry

Comments N/A

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Quercus virginiana*	T	FACU+	9.	*Ambrosia trifida*	H	FAC
2.	*Celtis laevigata*	T	FACW	10.			
3.	*Gleditsia triacanthos*	T	FAC	11.			
4.	*Baccharis halimifolia*	S	FAC	12.			
5.	*Sabal minor*	S	FACW	13.			
6.	*Smilax bona-nox*	WV	FAC	14.			
7.	*Tillandsia usneoides*	WV	N/A	15.			
8.	*Lycium carolinianum*	S	FACW	16.			

Remarks:

BOTTOMLAND HARDWOOD* PARAMETERS FOR MITIGATION CALCULATIONS (WVA)

20 PERCENT OF OVERSTORY CANOPY CONSISTING OF MAST OR OTHER EDIBLE SEED PRODUCERS (RED MAPLE, SUGARBERRY, GREEN ASH, BOXELDER, COMMON PERSIMMON SWEETGUM, HONEYLOCUST, RED MULBERRY, BALDCYPRESS, TUPELO GUM, AMERICAN ELM, CEDAR ELM, ETC.)

80 PERCENT OF OVERSTORY CANOPY CONSISTING OF HARD MAST PRODUCING TREES (OAKS, SWEET PECAN, OTHER HICKORIES)

AVERAGE AGE OF CANOPY-DOMINANT AND CANOPY-CODOMINANT TREES

OR

AVERAGE DIAMETER AT BREAST HEIGHT (DBH) OF CANOPY-DOMINANT OR CANOPY-CODOMINANT TREES

SPECIES	AGE	OR	DBH (inches)
Quercus virginiana	60		36
Celtis laevigata	30		20
Gleditsia triacanthos	8		4

10 PERCENT UNDERSTORY COVER

30 PERCENT MIDSTORY COVER

IS THE AREA PART OF A FORCED DRAINAGE SYSTEM? No

WHAT IS THE RELATIVE POSITION OF THE WATER TABLE?
(NEAR THE SURFACE, DEEP) N/A

IS THE NATURAL HYDROLOGY ESSENTIALLY UNALTERED ALLOWING FOR NATURAL WETTING AND DRYING CYCLES? Yes

DOCUMENT ANY TREE REGENERATION None

*An area supporting or capable of supporting a canopy of woody vegetation of which greater than 40% consists of tree species such as oaks, hickories, American elm, cedar elm, green ash, sweetgum, sugarberry, boxelder, common persimmon, honeylocust, red mulberry, eastern cottonwood, American sycamore, etc.

	N W E S	

Photographs of Sample 053 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/16/08*** ***Field Analysts:*** ***Blake Amos/John Price***

Sample Location ID Number: ***054*** ***Coordinates:*** ***29.55158, 93.32109***

Feature Name: ***Pecan Island***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) LA 3147

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Borrow pits and road

Current/Adjacent land uses Current and adjacent – borrow pits and road

History of land use (if known) N/A

Wildlife Species observed N/A

Invasive plant and animal species N/A

Mapped soil type(s) Mermentau-Hackberry

Comments N/A

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Celtis laevigata*	T	FACW	9.			
2.	*Baccharis halimifolia*	S	FAC	10.			
3.	*Schoenoplectus americanus*	H	OBL	11.			
4.	*Spartina alternifolia*	H	OBL	12.			
5.	*Cynodon dactylon*	H	FACU	13.			
6.				14.			

Remarks:

	N W E S	

Photographs of Sample 054 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***10/16/08*** ***Field Analysts:*** ***Blake Amos/John Price***

Sample Location ID Number: ***055*** ***Coordinates:*** ***29.62728, 92.36895***

Feature Name: ***See map***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) LA 3147

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Oil/gas facility – Columbia Gulf

Current/Adjacent land uses Current and adjacent – oil/gas facility, road

History of land use (if known) N/A

Wildlife Species observed N/A

Invasive plant and animal species N/A

Mapped soil type(s) Mermentau-Hackberry

Comments N/A

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Lycium carolinianum*	S	FACW	9.			
2.	*Spartina patens*	H	FACW	10.			
3.	*Baccharis halimifolia*	S	FAC	11.			
4.	*Alternanthera philoxeroides*	H	OBL	12.			
5.	*Eleocharis crus-galli*	H	FACW-	13.			
6.	*Carex debilis*	H	FACW	14.			
7.	*Distichlis spicata*	H	FACW+	15.			

Remarks:

	N W E S	

Photographs of Sample 055 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***2/16/09*** ***Field Analysts:*** ***Blake Amos/Lee Womack***

Sample Location ID Number: ***056*** ***Coordinates:*** ***30.41806, 90.16377***

Feature Name: ***See map***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) Moticheck Rd

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) home site, road, industrial

Current/Adjacent land uses Current and adjacent – home site, road, industrial

History of land use (if known) N/A

Wildlife Species observed N/A

Invasive plant and animal species Chinese privet (*Ligustrum sinense*), giant switchcane (*Arundinaria gigantea*)

Mapped soil type(s) Abita silt loam

Comments N/A

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Quercus nigra*	T	FAC	8.	*Ligustrum sinense*	S	FAC
2.	*Quercus falcata*	T	FACU-	9.	*Arundinaria gigantea*	S	FACW
3.	*Pinus taeda*	T	FAC	10.			
4.	*Lygodium japonicum*	WV	FAC	11.			
5.	*Gelsemium sempervirens*	WV	FAC	12.			
6.	*Smilax glauca*	WV	FAC	13.			
7.	*Carex debilis*	H	FACW	14.			

Remarks:

BOTTOMLAND HARDWOOD* PARAMETERS FOR MITIGATION CALCULATIONS (WVA)

0% PERCENT OF OVERSTORY CANOPY CONSISTING OF MAST OR OTHER EDIBLE SEED PRODUCERS (RED MAPLE, SUGARBERRY, GREEN ASH, BOXELDER, COMMON PERSIMMON SWEETGUM, HONEYLOCUST, RED MULBERRY, BALDCYPRESS, TUPELO GUM, AMERICAN ELM, CEDAR ELM, ETC.)

20% PERCENT OF OVERSTORY CANOPY CONSISTING OF HARD MAST PRODUCING TREES (OAKS, SWEET PECAN, OTHER HICKORIES)

AVERAGE AGE OF CANOPY-DOMINANT AND CANOPY-CODOMINANT TREES

OR

AVERAGE DIAMETER AT BREAST HEIGHT (DBH) OF CANOPY-DOMINANT OR CANOPY-CODOMINANT TREES

SPECIES	AGE	OR	DBH (inches)
Quercus nigra	12		6-10
Quercus falcata	12		6-10
Pinus taeda	20		12

5% PERCENT UNDERSTORY COVER

60% PERCENT MIDSTORY COVER

IS THE AREA PART OF A FORCED DRAINAGE SYSTEM? NO

WHAT IS THE RELATIVE POSITION OF THE WATER TABLE?
(NEAR THE SURFACE, DEEP) DEEP

IS THE NATURAL HYDROLOGY ESSENTIALLY UNALTERED ALLOWING FOR NATURAL WETTING AND DRYING CYCLES? YES

DOCUMENT ANY TREE REGENERATION NONE, DENSE MIDSTORY

*An area supporting or capable of supporting a canopy of woody vegetation of which greater than 40% consists of tree species such as oaks, hickories, American elm, cedar elm, green ash, sweetgum, sugarberry, boxelder, common persimmon, honeylocust, red mulberry, eastern cottonwood, American sycamore, etc.

	N W E S	

Photographs of Sample 056 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***2/16/09*** ***Field Analysts:*** ***Blake Amos/Lee Womack***

Sample Location ID Number: ***057*** ***Coordinates:*** ***30.42204, 90.18066***

Feature Name: ***See map***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) Dutch Road near LA 22

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) home site, road, utility right-of-way

Current/Adjacent land uses Current and adjacent – home site, road, utility right-of-way

History of land use (if known) N/A

Wildlife Species observed N/A

Invasive plant and animal species Chinese privet (*Ligustrum sinense*), yaupon (*Ilex vomitoria*)

Mapped soil type(s) Guyton silt loam

Comments N/A

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Pinus taeda*	T	FAC	8.	*Ligustrum sinense*	S	FAC
2.	*Quercus nigra*	T	FAC	9.			
3.	*Cornus drummondii*	T	FAC	10.			
4.	*Sabal minor*	S	FACW	11.			
5.	*Ilex vomitoria*	S	FAC	12.			
6.	*Smilax glauca*	WV	FAC	13.			
7.	*Carex debilis*	H	FACW	14.			

Remarks:

BOTTOMLAND HARDWOOD* PARAMETERS FOR MITIGATION CALCULATIONS (WVA)

0% PERCENT OF OVERSTORY CANOPY CONSISTING OF MAST OR OTHER EDIBLE SEED PRODUCERS (RED MAPLE, SUGARBERRY, GREEN ASH, BOXELDER, COMMON PERSIMMON SWEETGUM, HONEYLOCUST, RED MULBERRY, BALDCYPRESS, TUPELO GUM, AMERICAN ELM, CEDAR ELM, ETC.)

25% PERCENT OF OVERSTORY CANOPY CONSISTING OF HARD MAST PRODUCING TREES (OAKS, SWEET PECAN, OTHER HICKORIES)

AVERAGE AGE OF CANOPY-DOMINANT AND CANOPY-CODOMINANT TREES

OR

AVERAGE DIAMETER AT BREAST HEIGHT (DBH) OF CANOPY-DOMINANT OR CANOPY-CODOMINANT TREES

SPECIES	AGE	OR	DBH (inches)
Quercus nigra	12		8-12
Pinus taeda	30		24

80% PERCENT UNDERSTORY COVER

10% PERCENT MIDSTORY COVER

IS THE AREA PART OF A FORCED DRAINAGE SYSTEM? NO

WHAT IS THE RELATIVE POSITION OF THE WATER TABLE? (NEAR THE SURFACE, DEEP) NEAR SURFACE

IS THE NATURAL HYDROLOGY ESSENTIALLY UNALTERED ALLOWING FOR NATURAL WETTING AND DRYING CYCLES? NO

DOCUMENT ANY TREE REGENERATION *Quercus* sp.

*An area supporting or capable of supporting a canopy of woody vegetation of which greater than 40% consists of tree species such as oaks, hickories, American elm, cedar elm, green ash, sweetgum, sugarberry, boxelder, common persimmon, honeylocust, red mulberry, eastern cottonwood, American sycamore, etc.

	N W E S	

Photographs of Sample 057 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***2/16/09*** ***Field Analysts:*** ***Blake Amos/Lee Womack***

Sample Location ID Number: ***058*** ***Coordinates:*** ***30.43115, 90.21617***

Feature Name: ***See map***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) Guste Island Road

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) recently developed home site/subdivision, utility right-of-way, drainage improvement retention pond

Current/Adjacent land uses Current and adjacent – home site/subdivision, utility right-of-way, drainage improvement retention pond

History of land use (if known) N/A

Wildlife Species observed N/A

Invasive plant and animal species Chinese privet (*Ligustrum sinense*)

Mapped soil type(s) Abita silt loam

Comments N/A

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Pinus taeda*	T	FAC	8.			
2.	*Andropogon glomeratus*	H	FACW+	9.			
3.	*Ligustrum sinense*	S	FAC	10.			
4.	*Gelsemium sempervirens*	WV	FAC	11.			
5.	*Trifolium repens*	H	FACU	12.			
6.	*Eupatorium capillifolium*	H	FACU	13.			
7.	*Panicum dichotomiflorum*	H	FACW	14.			

Remarks:

	N W E S	

Photographs of Sample 058 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***2/16/09*** ***Field Analysts:*** ***Blake Amos/Lee Womack***

Sample Location ID Number: ***059*** ***Coordinates:*** ***30.33541, 90.03693***

Feature Name: ***See map***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) Hiking trail in state park

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) hiking trail, hurricane damage

Current/Adjacent land uses Current and adjacent – Fountainebleu State Park

History of land use (if known) N/A

Wildlife Species observed N/A

Invasive plant and animal species yaupon (*Ilex vomitoria*)

Mapped soil type(s) Myatt fine sandy loam

Comments N/A

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Pinus taeda*	T	FAC	8.	*Rubus trivialis*	S	FAC
2.	*Quercus nigra*	T	FAC	9.	*Ilex vomitoria*	S	FAC
3.	*Sapium sebiferum*	T	FAC	10.	*Eleocharis palustris*	H	OBL
4.	*Quercus falcata*	T	FACU-	11.	*Juncus effusus*	H	FACW+
5.	*Quercus virginiana*	T	FACU+	12.	*Sabal minor*	S	FACW
6.	*Liquidambar styraciflua*	T	FAC+	13.			
7.	*Eupatorium capillifolium*	S	FACU	14.			

Remarks:

BOTTOMLAND HARDWOOD* PARAMETERS FOR MITIGATION CALCULATIONS (WVA)

0% PERCENT OF OVERSTORY CANOPY CONSISTING OF MAST OR OTHER EDIBLE SEED PRODUCERS (RED MAPLE, SUGARBERRY, GREEN ASH, BOXELDER, COMMON PERSIMMON SWEETGUM, HONEYLOCUST, RED MULBERRY, BALDCYPRESS, TUPELO GUM, AMERICAN ELM, CEDAR ELM, ETC.)

30% PERCENT OF OVERSTORY CANOPY CONSISTING OF HARD MAST PRODUCING TREES (OAKS, SWEET PECAN, OTHER HICKORIES)

AVERAGE AGE OF CANOPY-DOMINANT AND CANOPY-CODOMINANT TREES

OR

AVERAGE DIAMETER AT BREAST HEIGHT (DBH) OF CANOPY-DOMINANT OR CANOPY-CODOMINANT TREES

SPECIES	AGE	OR	DBH (inches)
Quercus nigra	6		5-6
Quercus virginiana	80+		30
Quercus falcata	25		18

50% PERCENT UNDERSTORY COVER

50% PERCENT MIDSTORY COVER

IS THE AREA PART OF A FORCED DRAINAGE SYSTEM? NO

WHAT IS THE RELATIVE POSITION OF THE WATER TABLE?
(NEAR THE SURFACE, DEEP) DEEP

IS THE NATURAL HYDROLOGY ESSENTIALLY UNALTERED ALLOWING FOR NATURAL WETTING AND DRYING CYCLES? YES

DOCUMENT ANY TREE REGENERATION *Quercus nigra, Liquidambar styraciflua*

*An area supporting or capable of supporting a canopy of woody vegetation of which greater than 40% consists of tree species such as oaks, hickories, American elm, cedar elm, green ash, sweetgum, sugarberry, boxelder, common persimmon, honeylocust, red mulberry, eastern cottonwood, American sycamore, etc.

	N W E S	

Photographs of Sample 059 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***2/16/09*** ***Field Analysts:*** ***Blake Amos/Lee Womack***

Sample Location ID Number: ***060*** ***Coordinates:*** ***30.32783, 90.00594***

Feature Name: ***See map***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) Lemieux Blvd

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) unimproved road

Current/Adjacent land uses Current and adjacent – Big Branch National Wildlife Refuge

History of land use (if known) Appears to have been logged within the last 30 years

Wildlife Species observed marsh wren (*Cistothorus palustris*), leopard frog (*Rana sphenocephala*), chickadee (*Poecile carolinensis*), northern cardinal (*Cardinalis cardinalis*), blue jay (*Cyanocitta cristata*), mourning dove (*Zenaida macroura*), pine warbler (*Dendroica pinus*), great egret (*Ardea alba*), great blue heron (*Ardea herodias*), gray squirrel (*Sciurus carolinensis*)

Invasive plant and animal species yaupon (*Ilex vomitoria*)

Mapped soil type(s) Guyton silt loam

Comments red-cockaded woodpecker (*Picoides borealis*) present on refuge

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Pinus taeda*	T	FAC	8.			
2.	*Quercus nigra*	T	FAC	9.			
3.	*Pinus elliottii*	T	FACW	10.			
4.	*Ilex vomitoria*	S	FAC	11.			
5.	*Panicum dichotomiflorum*	H	FACW	12.			
6.	*Carex debilis*	H	FACW	13.			
7.	*Sabal minor*	S	FACW	14.			

Remarks:

BOTTOMLAND HARDWOOD* PARAMETERS FOR MITIGATION CALCULATIONS (WVA)

0% PERCENT OF OVERSTORY CANOPY CONSISTING OF MAST OR OTHER EDIBLE SEED PRODUCERS (RED MAPLE, SUGARBERRY, GREEN ASH, BOXELDER, COMMON PERSIMMON SWEETGUM, HONEYLOCUST, RED MULBERRY, BALDCYPRESS, TUPELO GUM, AMERICAN ELM, CEDAR ELM, ETC.)

0% PERCENT OF OVERSTORY CANOPY CONSISTING OF HARD MAST PRODUCING TREES (OAKS, SWEET PECAN, OTHER HICKORIES)

AVERAGE AGE OF CANOPY-DOMINANT AND CANOPY-CODOMINANT TREES

OR

AVERAGE DIAMETER AT BREAST HEIGHT (DBH) OF CANOPY-DOMINANT OR CANOPY-CODOMINANT TREES

SPECIES	AGE	OR	DBH (inches)
Pinus elliottii	25		20
Pinus taeda	25		24

5% PERCENT UNDERSTORY COVER

80% PERCENT MIDSTORY COVER

IS THE AREA PART OF A FORCED DRAINAGE SYSTEM? NO

WHAT IS THE RELATIVE POSITION OF THE WATER TABLE?
(NEAR THE SURFACE, DEEP) NEAR THE SURFACE

IS THE NATURAL HYDROLOGY ESSENTIALLY UNALTERED ALLOWING FOR NATURAL WETTING AND DRYING CYCLES? YES

DOCUMENT ANY TREE REGENERATION *Quercus nigra*

*An area supporting or capable of supporting a canopy of woody vegetation of which greater than 40% consists of tree species such as oaks, hickories, American elm, cedar elm, green ash, sweetgum, sugarberry, boxelder, common persimmon, honeylocust, red mulberry, eastern cottonwood, American sycamore, etc.

	N W E S	

Photographs of Sample 060 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***2/16/09*** ***Field Analysts:*** ***Blake Amos/Lee Womack***

Sample Location ID Number: ***061*** ***Coordinates:*** ***30.30913, 89.95543***

Feature Name: ***See map***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) Barringer Rd

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Road, home sites

Current/Adjacent land uses Current and adjacent – road, home sites

History of land use (if known) N/A

Wildlife Species observed marsh wren (*Cistothorus palustris*), leopard frog (*Rana sphenocephala*), chickadee (*Poecile carolinensis*), northern cardinal (*Cardinalis cardinalis*), blue jay (*Cyanocitta cristata*), mourning dove (*Zenaida macroura*), pine warbler (*Dendroica pinus*), great egret (*Ardea alba*), great blue heron (*Ardea herodias*), gray squirrel (*Sciurus carolinensis*)

Invasive plant and animal species yaupon (*Ilex vomitoria*)

Mapped soil type(s) Prentiss fine sandy loam

Comments red-cockaded woodpecker (*Picoides borealis*) present on refuge

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Pinus taeda*	T	FAC	8.	*Andropogon glomeratus*	H	FACW+
2.	*Quercus marilandica*	T	NI	9.			
3.	*Pinus elliottii*	T	FACW	10.			
4.	*Quercus virginiana*	T	FACU+	11.			
5.	*Ilex vomitoria*	S	FAC	12.			
6.	*Ilex decidua*	S	FACW-	13.			
7.	*Morella cerifera*	S	FAC+	14.			

Remarks:

BOTTOMLAND HARDWOOD* PARAMETERS FOR MITIGATION CALCULATIONS (WVA)

0% PERCENT OF OVERSTORY CANOPY CONSISTING OF MAST OR OTHER EDIBLE SEED PRODUCERS (RED MAPLE, SUGARBERRY, GREEN ASH, BOXELDER, COMMON PERSIMMON SWEETGUM, HONEYLOCUST, RED MULBERRY, BALDCYPRESS, TUPELO GUM, AMERICAN ELM, CEDAR ELM, ETC.)

5% PERCENT OF OVERSTORY CANOPY CONSISTING OF HARD MAST PRODUCING TREES (OAKS, SWEET PECAN, OTHER HICKORIES)

AVERAGE AGE OF CANOPY-DOMINANT AND CANOPY-CODOMINANT TREES

OR

AVERAGE DIAMETER AT BREAST HEIGHT (DBH) OF CANOPY-DOMINANT OR CANOPY-CODOMINANT TREES

SPECIES	AGE	OR	DBH (inches)
Pinus elliottii	25		20
Pinus taeda	30		24
Quercus virginiana	60		30

5% PERCENT UNDERSTORY COVER

80% PERCENT MIDSTORY COVER

IS THE AREA PART OF A FORCED DRAINAGE SYSTEM? NO

WHAT IS THE RELATIVE POSITION OF THE WATER TABLE?
(NEAR THE SURFACE, DEEP) NEAR THE SURFACE

IS THE NATURAL HYDROLOGY ESSENTIALLY UNALTERED ALLOWING FOR NATURAL WETTING AND DRYING CYCLES? YES

DOCUMENT ANY TREE REGENERATION *Quercus marilandica*

*An area supporting or capable of supporting a canopy of woody vegetation of which greater than 40% consists of tree species such as oaks, hickories, American elm, cedar elm, green ash, sweetgum, sugarberry, boxelder, common persimmon, honeylocust, red mulberry, eastern cottonwood, American sycamore, etc.

	N W E S	

Photographs of Sample 061 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***2/16/09*** ***Field Analysts:*** ***Blake Amos/Lee Womack***

Sample Location ID Number: ***062*** ***Coordinates:*** ***30.28457, 89.91827***

Feature Name: ***See map***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) Boy Scout Rd

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Nature board walk, managed pine stands for red-cockaded woodpecker (RCW, *Picoides borealis*) habitat

Current/Adjacent land uses Current and adjacent – nature walk, RCW habitat

History of land use (if known) N/A

Wildlife Species observed marsh wren (*Cistothorus palustris*), leopard frog (*Rana sphenocephala*), chickadee (*Poecile carolinensis*), northern cardinal (*Cardinalis cardinalis*), blue jay (*Cyanocitta cristata*), mourning dove (*Zenaida macroura*), pine warbler (*Dendroica pinus*), great egret (*Ardea alba*), great blue heron (*Ardea herodias*), gray squirrel (*Sciurus carolinensis*)

Invasive plant and animal species yaupon (*Ilex vomitoria*)

Mapped soil type(s) Stough fine sandy loam

Comments Managed for RCW by selective harvests, midstory clearing, and fire regime. West Indian manatees (*Trichechus manatus*) present on refuge.

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Pinus elliottii*	T	FACW	8.	*Ilex vomitoria*	S	FAC
2.	*Pinus palustris*	T	FACU+	9.			
3.	*Andropogon glomeratus*	H	FACW+	10.			
4.	*Spartina patens*	H	FACW	11.			
5.	*Panicum dichotomiflorum*	H	FACW	12.			
6.	*Leersia virginica*	H	FACW	13.			
7.	*Juncus effusus*	H	FACW+	14.			

Remarks:

BOTTOMLAND HARDWOOD* PARAMETERS FOR MITIGATION CALCULATIONS (WVA)

0% PERCENT OF OVERSTORY CANOPY CONSISTING OF MAST OR OTHER EDIBLE SEED PRODUCERS (RED MAPLE, SUGARBERRY, GREEN ASH, BOXELDER, COMMON PERSIMMON SWEETGUM, HONEYLOCUST, RED MULBERRY, BALDCYPRESS, TUPELO GUM, AMERICAN ELM, CEDAR ELM, ETC.)

0% PERCENT OF OVERSTORY CANOPY CONSISTING OF HARD MAST PRODUCING TREES (OAKS, SWEET PECAN, OTHER HICKORIES)

AVERAGE AGE OF CANOPY-DOMINANT AND CANOPY-CODOMINANT TREES

OR

AVERAGE DIAMETER AT BREAST HEIGHT (DBH) OF CANOPY-DOMINANT OR CANOPY-CODOMINANT TREES

SPECIES	AGE	OR	DBH (inches)
Pinus palustris	25		12
Pinus elliottii	25		12

90% PERCENT UNDERSTORY COVER

5% PERCENT MIDSTORY COVER

IS THE AREA PART OF A FORCED DRAINAGE SYSTEM? NO

WHAT IS THE RELATIVE POSITION OF THE WATER TABLE?
(NEAR THE SURFACE, DEEP) NEAR THE SURFACE

IS THE NATURAL HYDROLOGY ESSENTIALLY UNALTERED ALLOWING FOR NATURAL WETTING AND DRYING CYCLES? YES

DOCUMENT ANY TREE REGENERATION *Pinus* sp.

*An area supporting or capable of supporting a canopy of woody vegetation of which greater than 40% consists of tree species such as oaks, hickories, American elm, cedar elm, green ash, sweetgum, sugarberry, boxelder, common persimmon, honeylocust, red mulberry, eastern cottonwood, American sycamore, etc.

	N W E S	

Photographs of Sample 062 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***2/16/09*** ***Field Analysts:*** ***Blake Amos/Lee Womack***

Sample Location ID Number: ***063*** ***Coordinates:*** ***30.28058, 89.90796***

Feature Name: ***See map***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) Bayou Paquet Rd

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Oil/gas well pad, pipeline right-of-way, road

Current/Adjacent land uses Current - oil/gas well pad, pipeline right-of-way, road; Adjacent – land managed for red-cockaded woodpecker (RCW, *Picoides borealis*) habitat

History of land use (if known) N/A

Wildlife Species observed N/A

Invasive plant and animal species yaupon (*Ilex vomitoria*)

Mapped soil type(s) Myatt fine sandy loam

Comments RCW and West Indian manatees (*Trichechus manatus*) present on adjacent refuge

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Pinus elliottii*	T	FACW	8.			
2.	*Quercus virginiana*	T	FACU+	9.			
3.	*Andropogon glomeratus*	H	FACW+	10.			
4.	*Cornus drummondii*	T	FAC	11.			
5.	*Ilex vomitoria*	S	FAC	12.			
6.	*Sabal minor*	S	FACW	13.			
7.				14.			

Remarks:

	N W E S	

Photographs of Sample 063 in the four cardinal directions

BIOLOGICAL INVESTIGATION REPORT
CHENIERS AND NATURAL RIDGES STUDY
LDNR Contract No. 2533-08-02

Date: ***2/16/09*** ***Field Analysts:*** ***Blake Amos/Lee Womack***

Sample Location ID Number: ***064*** ***Coordinates:*** ***30.26935, 89.84625***

Feature Name: ***See map***

SITE INFORMATION

Accessibility (e.g., State, Parish Roads) Dave Pichon Rd

Site Alterations (e.g., borrow pits, structures, oil and gas infrastructure) Home sites, road, utility right-of-way

Current/Adjacent land uses Current and adjacent – home sites, road, utility right-of-way

History of land use (if known) N/A

Wildlife Species observed N/A

Invasive plant and animal species yaupon (*Ilex vomitoria*), Chinese privet (*Ligustrum sinense*)

Mapped soil type(s) Stough fine sandy loam

Comments N/A

VEGETATION

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
1.	*Quercus virginiana*	T	FACU+	8.			
2.	*Quercus nigra*	T	FAC	9.			
3.	*Pinus taeda*	T	FAC	10.			
4.	*Ilex vomitoria*	S	FAC	11.			
5.	*Ligustrum sinense*	S	FAC	12.			
6.	*Morella cerifera*	S	FAC+	13.			
7.				14.			

Remarks:

BOTTOMLAND HARDWOOD* PARAMETERS FOR MITIGATION CALCULATIONS (WVA)

0% PERCENT OF OVERSTORY CANOPY CONSISTING OF MAST OR OTHER EDIBLE SEED PRODUCERS (RED MAPLE, SUGARBERRY, GREEN ASH, BOXELDER, COMMON PERSIMMON SWEETGUM, HONEYLOCUST, RED MULBERRY, BALDCYPRESS, TUPELO GUM, AMERICAN ELM, CEDAR ELM, ETC.)

30% PERCENT OF OVERSTORY CANOPY CONSISTING OF HARD MAST PRODUCING TREES (OAKS, SWEET PECAN, OTHER HICKORIES)

AVERAGE AGE OF CANOPY-DOMINANT AND CANOPY-CODOMINANT TREES

OR

AVERAGE DIAMETER AT BREAST HEIGHT (DBH) OF CANOPY-DOMINANT OR CANOPY-CODOMINANT TREES

SPECIES	AGE	OR	DBH (inches)
Quercus nigra	10		6
Pinus taeda	30		24
Quercus virginiana	100+		36

20% PERCENT UNDERSTORY COVER

50% PERCENT MIDSTORY COVER

IS THE AREA PART OF A FORCED DRAINAGE SYSTEM? NO

WHAT IS THE RELATIVE POSITION OF THE WATER TABLE?
(NEAR THE SURFACE, DEEP) DEEP

IS THE NATURAL HYDROLOGY ESSENTIALLY UNALTERED ALLOWING FOR NATURAL WETTING AND DRYING CYCLES? YES

DOCUMENT ANY TREE REGENERATION NONE

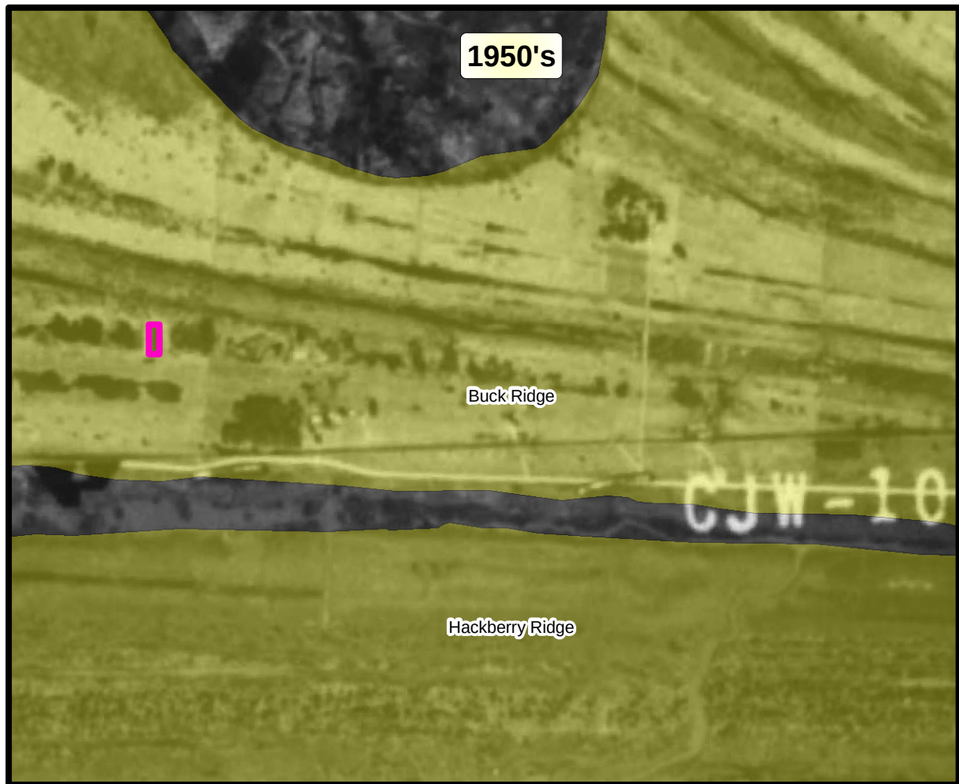
*An area supporting or capable of supporting a canopy of woody vegetation of which greater than 40% consists of tree species such as oaks, hickories, American elm, cedar elm, green ash, sweetgum, sugarberry, boxelder, common persimmon, honeylocust, red mulberry, eastern cottonwood, American sycamore, etc.

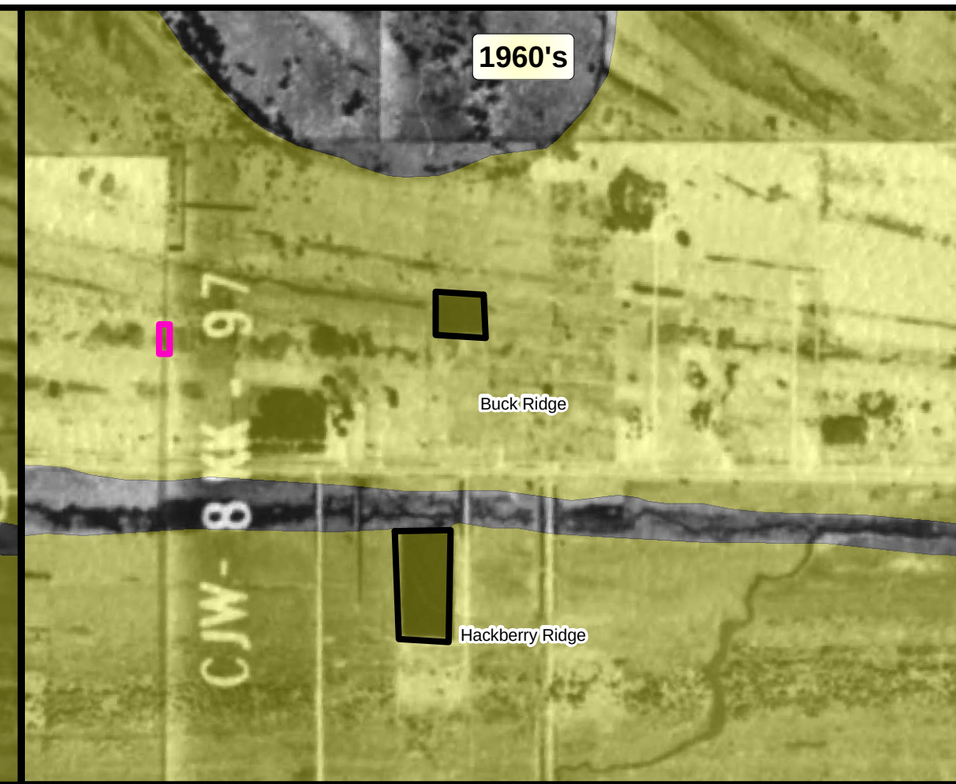
	N W E S	

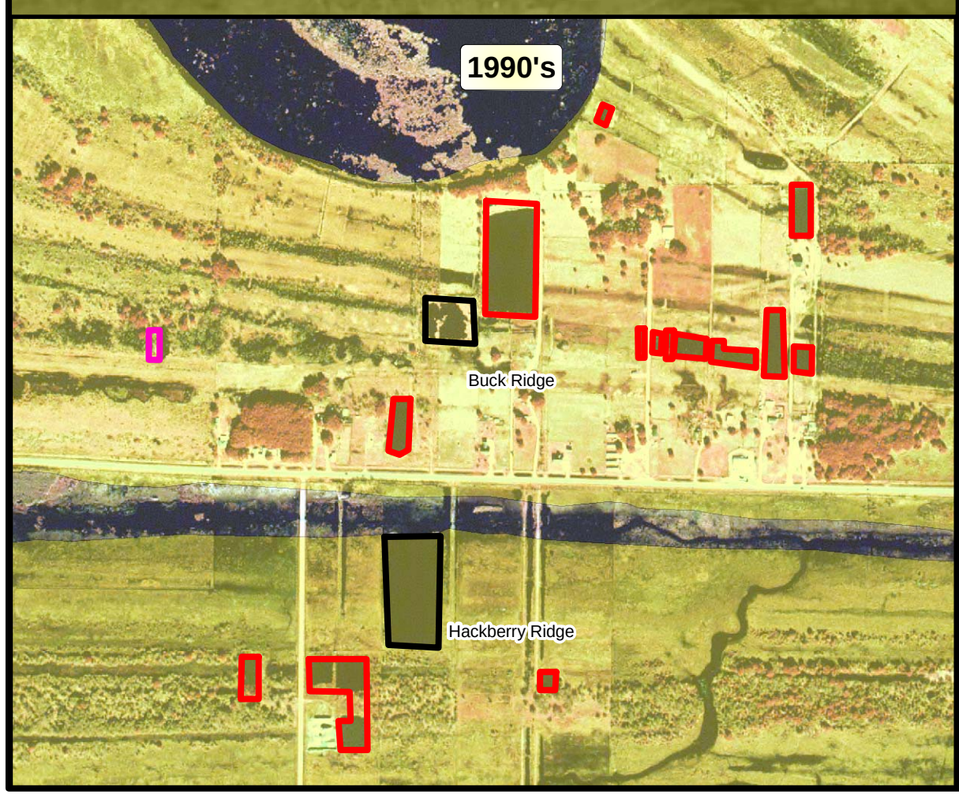
Photographs of Sample 064 in the four cardinal directions

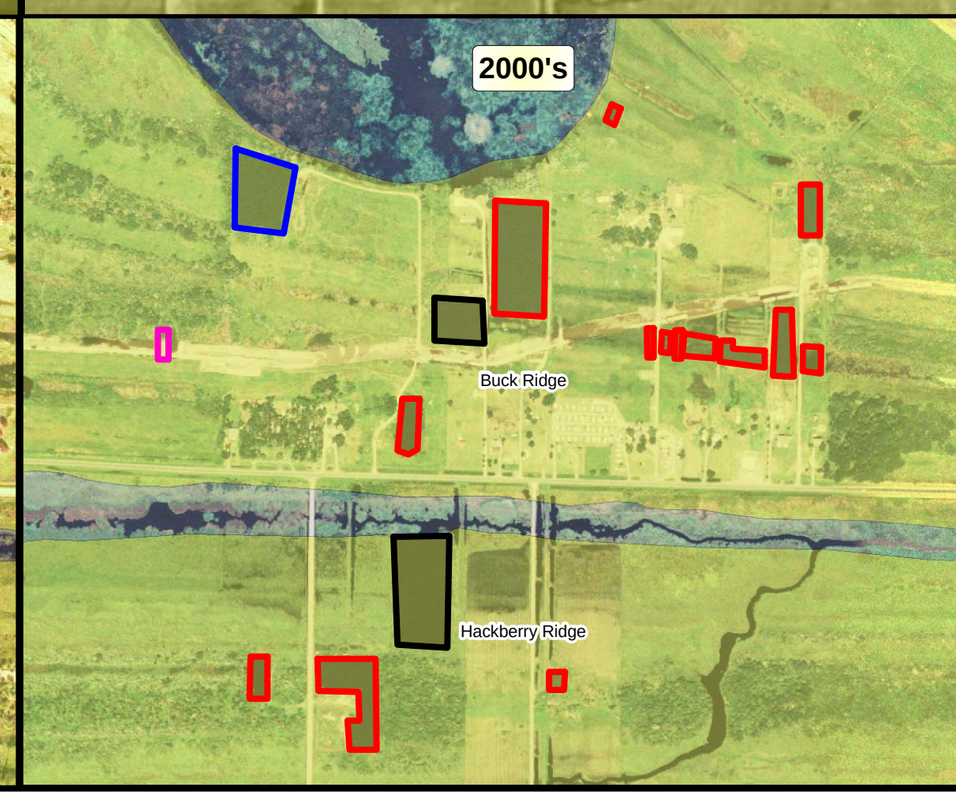
EXHIBIT 1

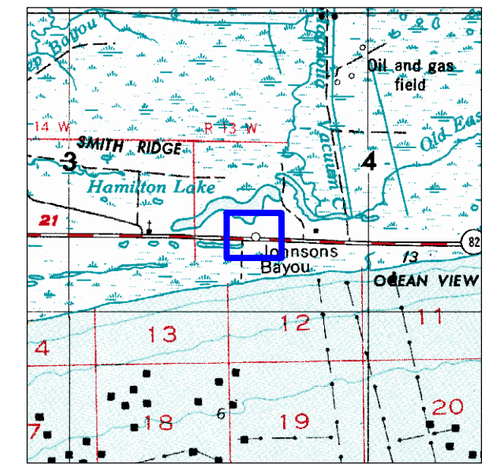
HISTORICAL AERIAL PHOTOGRAPHS – BUCK AND HACKBERRY RIDGES











N

Legend

- Cheniers and Natural Ridges Study Areas
- 1950's Pits
- 1960's Pits
- 1990's Pits
- 2000's Pits

Reference

Base map comprised of 1953, 1967, 1998, and 2007 aerial photographs.

1,000 500 0 1,000 Feet

Historic Aerial Photographs
Buck and Hackberry Ridges

Cheniers of Southwest Louisiana
Cameron Parish

Louisiana Department of Natural Resources
Coastal Management Division

PROVIDENCE

Drawn By	DRA	02/17/09
Checked By	JBA	02/25/08
Approved By	RPC	02/25/08

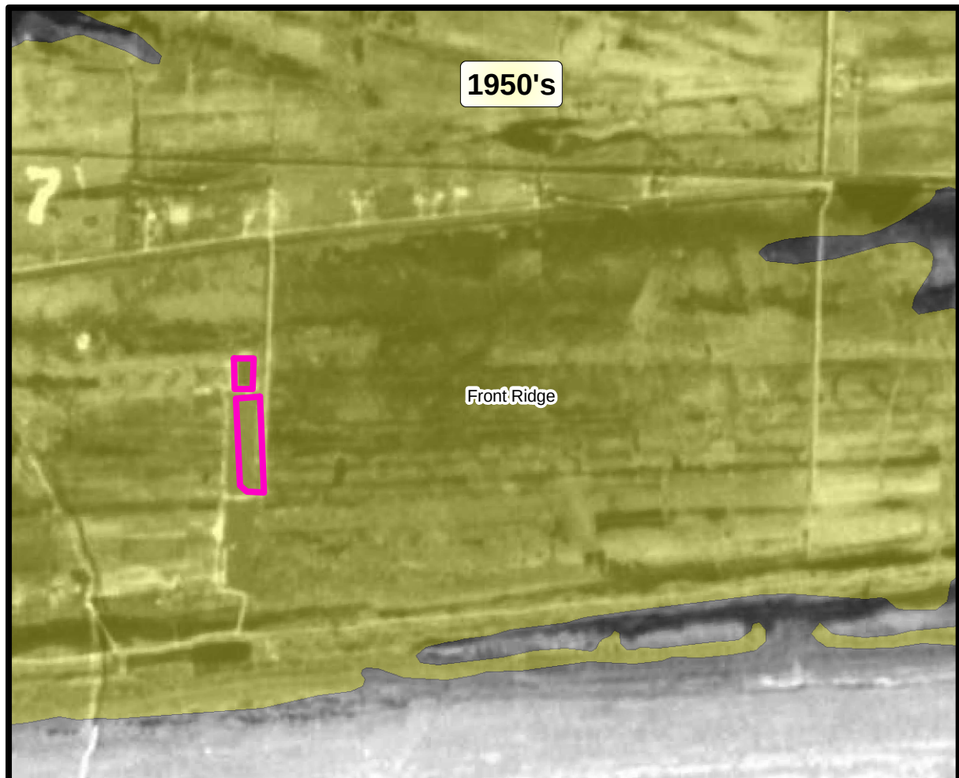
Project Number 227-009

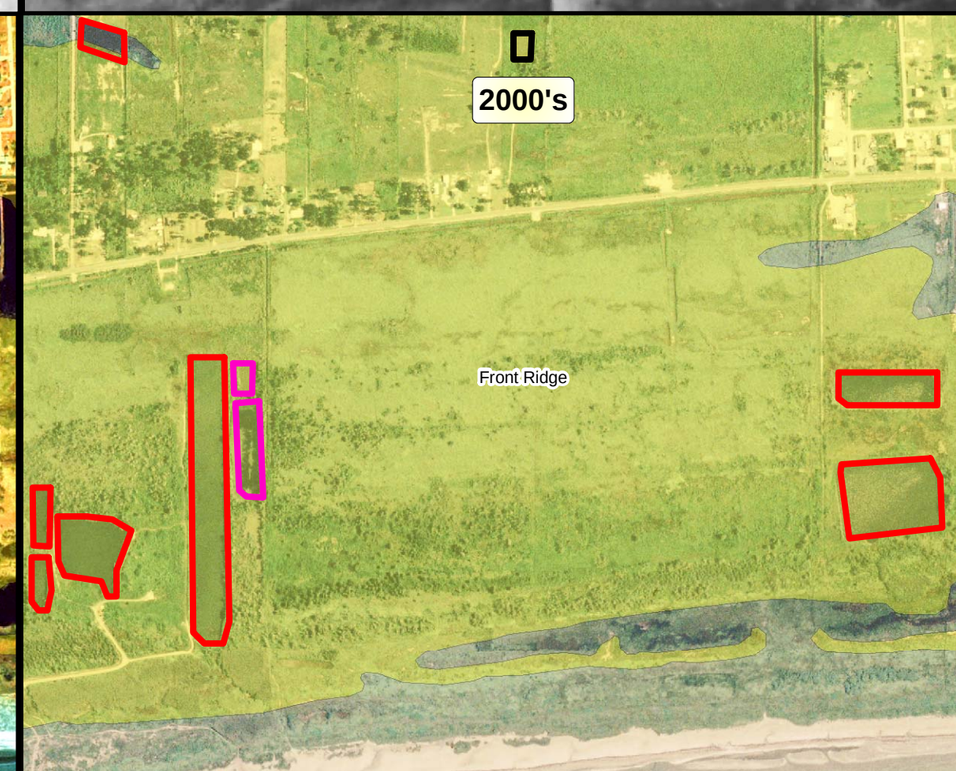
Drawing Number 227-009-B016

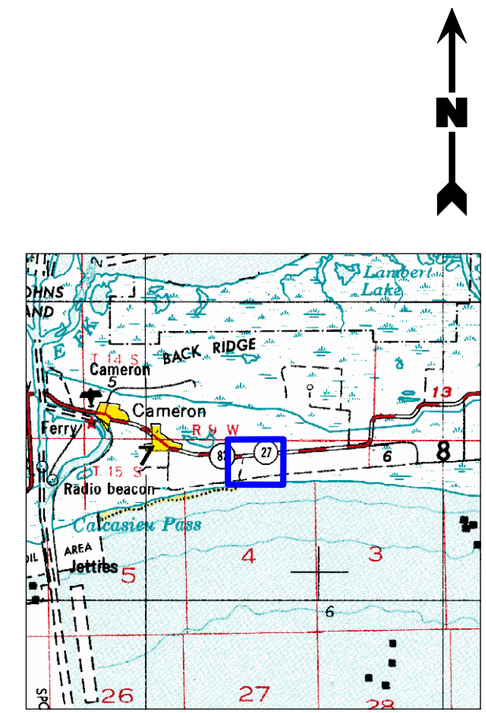
1
Exhibit

EXHIBIT 2

HISTORICAL AERIAL PHOTOGRAPHS – FRONT RIDGE







Legend

- Cheniers and Natural Ridges Study Areas
- 1950's Pits
- 1960's Pits
- 1990's Pits

Reference

Base map comprised of 1953, 1967, 1998, and 2007 aerial photographs.

1,000 500 0 1,000 Feet

Historic Aerial Photographs
Front Ridge

Cheniers of Southwest Louisiana
Cameron Parish

Louisiana Department of Natural Resources
Coastal Management Division

PROVIDENCE

Drawn By	DRA	02/17/09
Checked By	JBA	02/25/08
Approved By	RPC	02/25/08

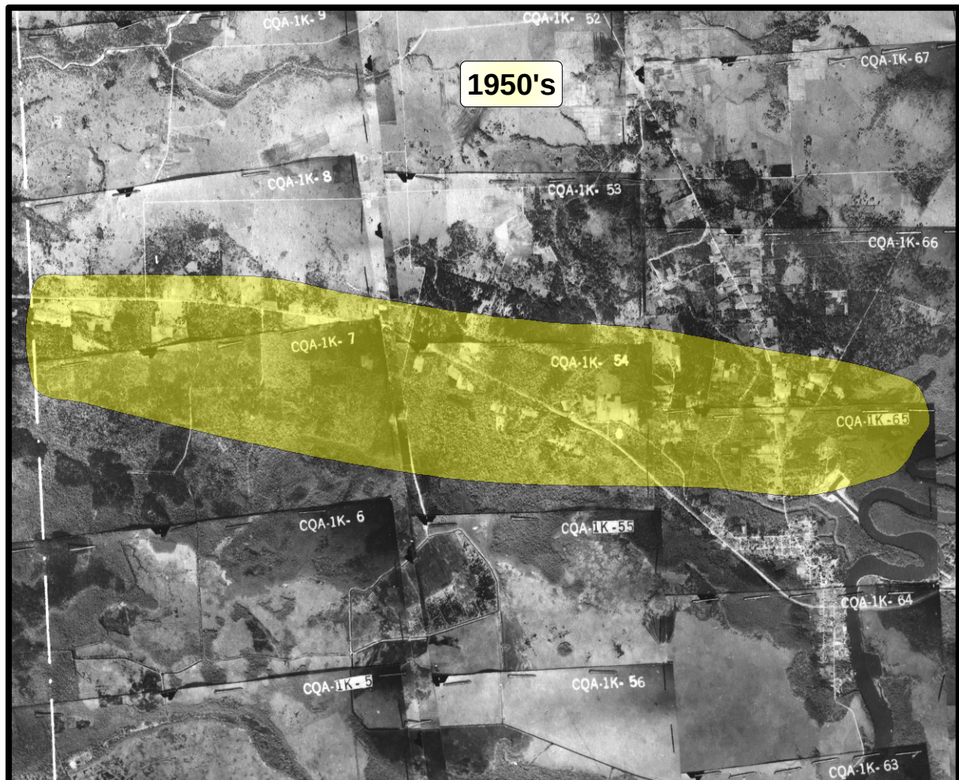
Project Number 227-009

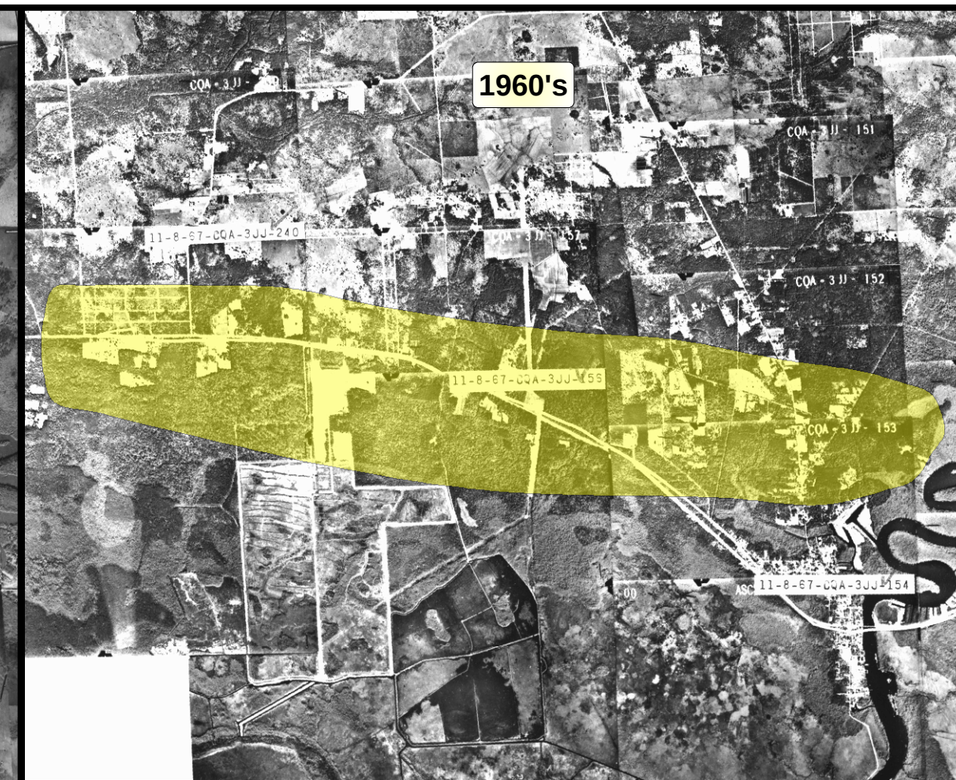
Drawing Number 227-009-B021

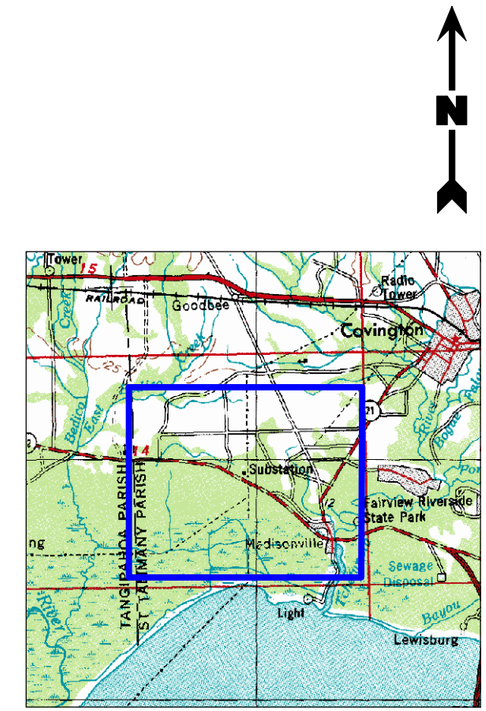
2
Exhibit

EXHIBIT 3

HISTORICAL AERIAL PHOTOGRAPHS – SELECT RIDGES OF ST. TAMMANY PARISH







Legend

Cheniers and Natural Ridges Study Areas

Reference

Base map comprised of 1954, 1967, 1985, and 2007 aerial photographs.

1 0.5 0 1 Miles

Historic Aerial Photographs

Cheniers of Southeast Louisiana
St. Tammany Parish

Louisiana Department of Natural Resources
Coastal Management Division

PROVIDENCE

Drawn By	DRA	02/17/09
Checked By	JBA	02/25/08
Approved By	RPC	02/25/08

Project Number 227-009

Drawing Number 227-009-B022

3
Exhibit