STATEMENT OF FINDINGS

FOR

EXECUTIVE ORDER 11990 (PROTECTION OF WETLANDS)

AND

EXECUTIVE ORDER 11988 (FLOODPLAIN MANAGEMENT)

Cane River Creole National Historical Park
Emergency Stabilization / Erosion Control on the Bank of Cane River Lake

Oakland Plantation
Natchitoches Parish, Louisiana

Recommended: Laura Gates — Superintendent, — 7/21/11 Date

Certification of Technical Adequacy and Servicewide Consistency: [signature] — Chief, Water Resources Division — 7/26/2011 Date

Approved: [signature] — Regional Director — 8-3-11 Date

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1. INTRODUCTION

1.1 Wetlands

Executive Order 11990: *Protection of Wetlands*, issued 24 May 1977, directs all federal agencies to avoid to the maximum extent possible the long- and short-term adverse impacts associated with the occupancy, destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative. In the absence of such alternatives, parks must modify actions to preserve and enhance wetland values and minimize degradation.

To comply with E.O. 11990 within the context of the agency's mission, the National Park Service (NPS) has developed a set of policies and procedures found in *Director's Order #77-1: Wetland Protection* and *Procedural Manual #77-1: Wetland Protection*. These policies and procedures emphasize: 1) exploring all practical alternatives to building on, or otherwise adversely affecting, wetlands; 2) reducing impacts to wetlands whenever possible; and 3) providing direct compensation for any unavoidable wetland impacts by restoring degraded or destroyed wetlands on other NPS properties. If a Preferred Alternative would have adverse impacts on wetlands, a Statement of Findings (SOF) must be prepared that documents the above steps and presents the rationale for choosing an alternative that would have adverse impacts on wetlands.

1.2 Floodplains

Pursuant to Executive Order 11988 (Floodplain Management), and the NPS Director's Order #77-2: Floodplain Management, the NPS has evaluated flooding hazards related to a proposed banks stabilization project along the shoreline of the Cane Rive Lake along the Oakland Plantation (the "plantation") at Cane River Creole National Historical Park (the "park"). This SOF describes the Preferred Alternative, project site, floodplain determination, use of floodplain, investigation of alternatives, flood risks, and mitigation for the continued use of facilities within the floodplain.

2. PREFERRED ALTERNATIVE

The Preferred Alternative is described as the stabilization of the bank of Cane River Lake along the plantation property. In addition to bank stabilization, proposed drainage improvements under the Preferred Alternative would include re-grading the drainage ditches on both sides of the roadway, installing culvert crossings, installing a catch basin, and constructing a drainage outfall chute into the lake at the north end of the project site. The Preferred Alternative includes the use of gabion retaining structures to stabilize soils along the proposed project area. Gabion retaining structures are rectangular, galvanized, wire mesh baskets filled with rocks to form flexible, permeable, monolithic structures used for erosion control and bank stabilization. For installation of the gabion baskets, a 3-foot deep by 3-foot wide trench would run the shoreline for approximately 1,200-linear feet. These gabion baskets would be placed in the trench and the bottom 2-feet would be filled with 6 inch to 8 inch rocks. The gabion baskets would then be filled with the excavated sediment that was previously removed from the trench and the top 1-foot would have intermittent rocks and sediment that would be filled to the top of the baskets leaving "no voids". This would allow for the plants to take root and not be impeded by the presence of rock below the surface and no settling should occur. The side of the basket closest to the water's edge would be smaller than the 3-foot to accommodate the natural slope downward to the water. The same ratio of rock would apply to the water side of the baskets. The baskets would be covered on the top of the embankment by a Macmat and a soil mat with previously excavated vegetation from the trenching process. The minimum thickness of the soil mat would be 3 inches and affixed to the Macmat with soil staples. This would be the preferred method fortified with the approved wetland seed mix and or seedlings. In the event that existing vegetation is not present, an approved pre-vegetated soil mat would be applied to the top of the Macmat and affixed with soil staples. The preferred alternative offers the best toe protection since the gabion baskets conform to ground movement, dissipate energy from flowing water, and drain freely.

The compacted clay fill would be placed at a slope of 1.8(H):1(V) on the face of the existing embankment. The embankment footprint would be extended approximately 5.0 feet into the lake. The roadway shoulder would be sloped at 10(H):1(V) and the area between it and the top of the new lake bank would be graded to gradually slope down at 8(H):1(V) into the lake to allow for natural water flow into the lake. This would allow for natural drainage, rather than drainage through a lakeside ditch.

The site would need to be cleared of vegetation in preparation for the fill and installment of the gabion baskets. After the installation is complete, the area would be re-vegetated with appropriate native plant species. Within the wetland areas, salvaged wetland plants removed prior to installation of the gabion baskets and fill material would be replanted on the Macmat. Additional wetland vegetation would be planted along the shoreline. Species would potentially include river cane (*Arundinaria gigantea*), giant cutgrass (*Zizaniopsis miliacea*), common sneezeweed (*Helenium autumnale*), deertongue (*Dichanthelium clandestinum*), fowl mannagrass (*Glyceria striata)*, fox sedge (*Carex vulpinoidea*), Louisiana iris (*Iris brevicaulis, I. fulva, I. hexagona, I. giganticaerulea,* and *I. nelsonii*), and sassafras (*Sassafras albidium*). In addition, river cane would also be planted surrounding the proposed drainage outfall chute and in an area adjacent to the abandoned steel truss bridge. A seed mix containing a slope stabilizing native grass mix would be sown into 12 inches of topsoil within the upland area. Species that would be used include switch

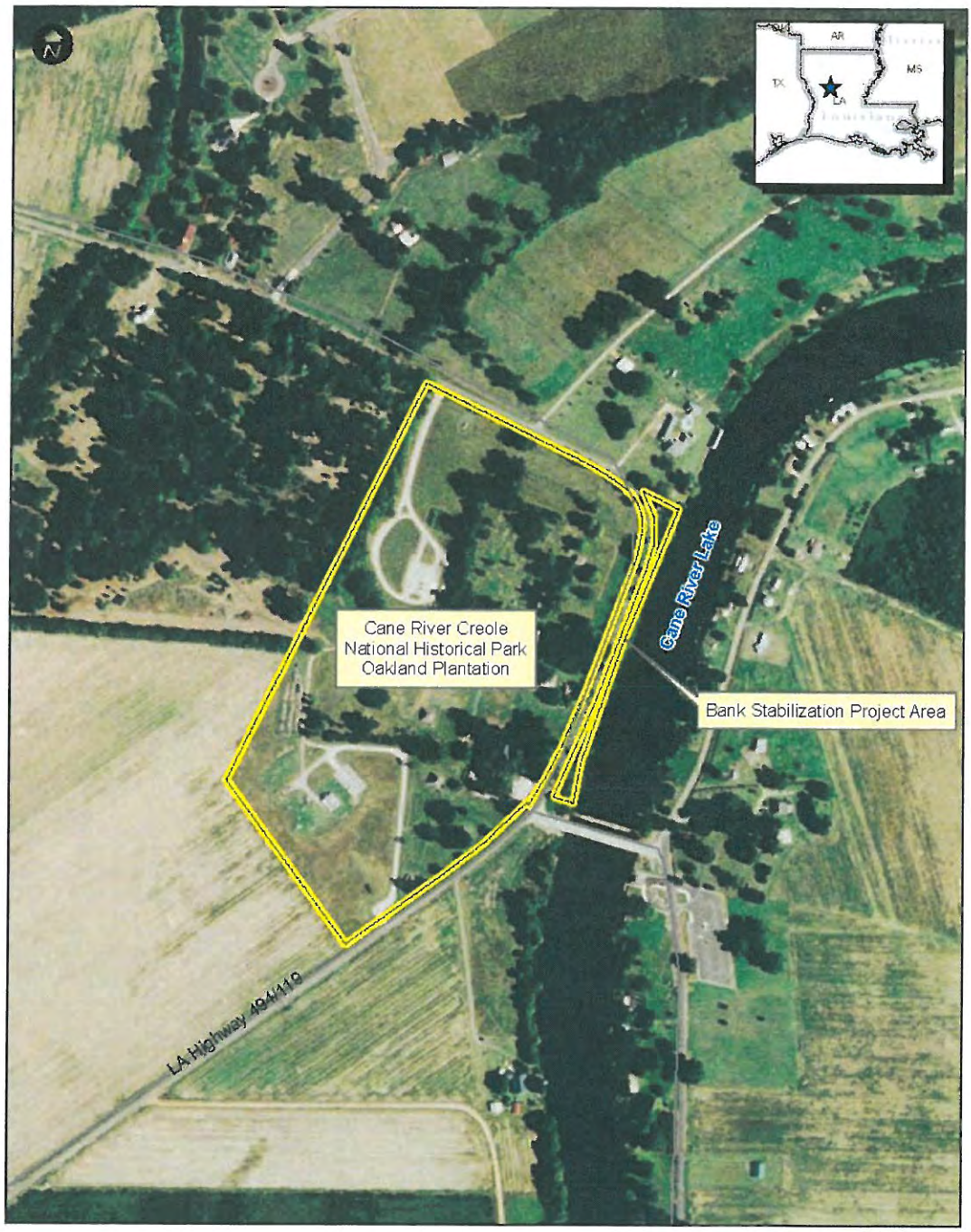
grass (*Panicum virgatum*), Indian grass (*Sorpghastrum nutans*), and little bluestem (*Schizachyrium scoparium*). Approximately 400 to 500 container plants which would include one to three gallon shrubs would be planted randomly throughout the site between the native grass mix and wetland edge mix. In addition approximately 30 to 40 15-gallon container trees/shrubs would be planted randomly throughout the site. Potential species include common buttonbush (*Cephalanthus occidentalis*), blackhaw viburnum (*Viburnum prunifolium*), swamp dogwood (*Cornus amomum*), American black elderberry (*Sambucus nigra spp. canadensis.*), fragrant sumac (*Rhus aromatica*), and spicebush (*Lindera* sp.). Proper establishment of the native plants is essential to help anchor the soil and stabilize the lake bank. It is estimated that full vegetative cover can be reestablished in two years.

An aggressive exotic species removal plan which would entail controlling invasive species such as Chinese privet and Chinese tallow or other like invasive species would be implemented to help establish a more natural wetland littoral zone in this previously disturbed area. While very few exotic invasive species are currently located on the site, the plan aims to ensure that no invasive species recruitment occurs following the shoreline stabilization activities. Visual inspections would take place on a monthly basis. Hand and/or chemical treatment removal techniques would be implemented for the eradication of undesirables and exotic species. Hand removal would be monitored by a qualified biologist/botanist/Arborist that is familiar with the local flora. Qualified personnel would mark all of the trees for removal prior to commencement. Chemical treatment would be applied by trained and licensed personnel so as to prevent the inadvertent over-spraying onto native plants and trees. Only approved herbicides may be used during eradication events, such as Garlon 3 or 4 or other U.S. Department of Agriculture approved herbicides for aquatic environments. A baseline inspection/monitoring report would be prepared prior to construction that would describe the current conditions and nuisance cover. Success would be determined by the natural recruitment of the native wetland groundcover species that are proposed for planting. The project site would be monitored monthly for one year to ensure that coverage of exotic or invasive plant species do not exceed 5 percent. If nuisance/exotic species are greater than 5 percent cover or coverage of native species falls below 80 percent, a Remedial Action Plan would be implemented, subject to National Park Service approval.

3. PROJECT SITE

The plantation includes 44 acres of land owned by NPS with an additional 144 acres within the park boundary under private ownership. The plantation borders the Cane River Lake, and is about 10 miles to the south of the Natchitoches Parish. The plantation is part of the Cane River Creole National Historical Park. The project area is a small strip of land along the bank of Cane River Lake on the property. The area of concern is approximately 1.01 (upland) acres, 1,190 feet long and varies in width (18 to 147 feet). It is bordered to the east by the Cane River Lake and to the west by a 50 feet wide right-of-way (ROW) of State Highway LA-494. LA-494 is a paved two-lane state highway and is classified as a rural-collector. The posted speed limit along this roadway is 55 MPH. The south end of the project area is bordered by two bridges. The vegetation along the project area is mostly shrubs, bushes, and trees. Figure 1 shows the project area.

Figure 1. Cane River Lake Project Area



4. DESCRIPTION OF WETLANDS AND FLOODPLAINS WITHIN PROJECT AREA

4.1 Wetlands

For the NPS, any area that is classified as a *wetland* according to the U.S. Fish and Wildlife Service's (USFWS) "Classification of Wetlands and Deepwater Habitats of the United States" (Report FWS/OBS-79/31); (Cowardin et al. 1979) is subject to NPS DO #77-1: *Wetland Protection.* (*Deepwater habitats* are not subject to DO #77-1.) Under the Cowardin definition, a wetland must have one or more of the following three attributes:

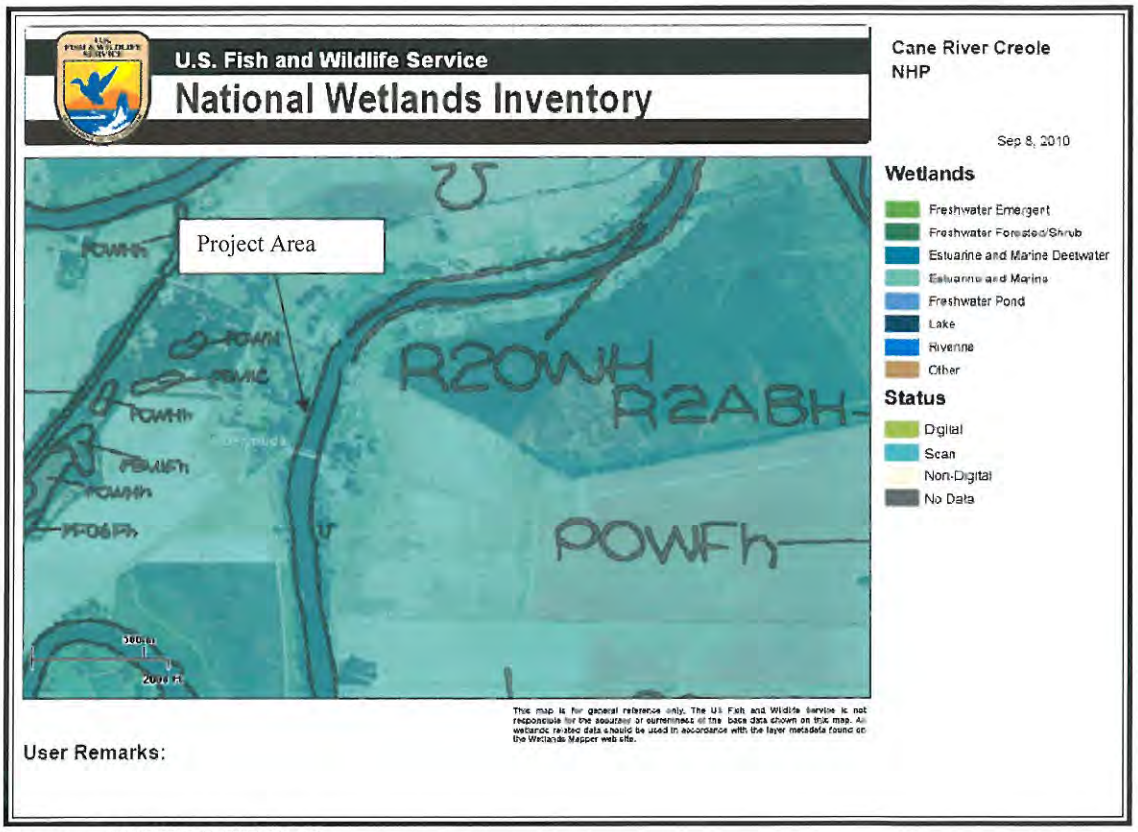
1. At least periodically, the land supports predominantly hydrophytes (wetland vegetation);
2. The substrate is predominantly undrained hydric soil; or
3. The substrate is non-soil and is saturated with water or covered by shallow water at some time during the growing season of each year.

The Cowardin wetland definition encompasses more aquatic habitat types than the definition and delineation manual used by the Corps of Engineers for identifying wetlands subject to Section 404 of the Clean Water Act. The 1987 "Corps of Engineers Wetlands Delineation Manual" requires that *all three* of the parameters listed above (hydrophytic vegetation, hydric soil, wetland hydrology) be present in order for an area to be considered a wetland. The Cowardin wetland definition includes such wetlands, but also adds some areas that, though lacking vegetation and/or soils *due to natural physical or chemical factors* such as wave action or high salinity, are still saturated or shallow inundated environments that support aquatic life (e.g., unvegetated stream shallows, mudflats, rocky shores).

The National Wetlands Inventory (NWI) of the USFWS produces information on the characteristics, extent, and status of the nation's wetlands and deepwater habitats. The wetlands on the maps are based upon the Cowardin wetland definition and classification system (Cowardin 1979), so (subject to ground-truthing) they are considered wetlands by the NPS. Based on the NWI maps for the site, only Cane River Lake is mapped as a riverine, lower perennial, open water, permanently flooded wetland (R2OWH). Figure 2 presents a map of wetlands and deepwater habitats as mapped by NWI. The NWI map of the project area was ground-truthed during a wetland delineation conducted from 11-12 May 2010 by a wetland delineator (Sarah T. Koser) who has received a certificate of training from a recognized wetland delineation training provider and has over eight years of experience in wetland delineation. The wetland delineation of the site was performed via boat (due to deep waters beyond the shoreline of the site) and by foot; Ms. Betty Fuller of the Cane River Waterway Commission acted as captain of the boat. During the wetland delineation, it was determined that the in addition to the riverine wetland mapped at Cane River Lake, the shoreline of Cane River Lake supports a narrow, palustrine wetland. The palustrine wetland is described as an emergent with both persistent and non-persistent vegetation that is permanently flooded wetland (PEM1/2H). The upland/wetland boundary of the palustrine wetland was located along the water's edge due to existing steep slopes beyond the shoreline. The palustrine/riverine wetland boundary was located at the extent of the rooted vascular plants observed at the site. The riverine wetland continues from the rooted vascular plant boundary until deepwater habitat is reached at approximately 2m (6.6 ft). In summary, there are two types of

wetlands that were mapped for this site: a riverine and a palustrine wetland. Appendix A presents the photographic log of the wetland delineation.

Figure 2. National Wetland Inventory Wetlands at the Park



Source: USFWS/NWI 2010.

Because the project area is located in the State of Louisiana, which is considered the *Atlantic and Gulf Coast Plain* region by the USACE, the Regional Supplement to the 1987 USACE Delineation Manual (USACE 2008) was used to record data for the wetland delineation. The project area is also considered within Region 2 (Southeast) by USFWS for determining hydrophytic plant status. Four datasheets were recorded within the wetland area (WL2, WL6, and WL12) two upland datasheets were recorded (UPL1, UPL2), and one datasheet was recorded within a disturbed upland area at the project site (UPL3). Appendix B presents the datasheets recorded during the wetland delineation.

Within the palustrine wetland located along the western shoreline of Cane River Lake, the primary indicators of wetland hydrology included surface water, drift deposits, saturation, and aquatic fauna (red-eared slider turtles [*Trachemys scripta elegans*] were observed). Surface water covered the entire emergent wetland and submerged woody debris was observed throughout the area.

Because Cane River Lake is a recreational waterway, wave action from the wakes generated by local boat traffic is an additional source of hydrology along the shoreline of the emergent wetland.

The vegetation observed within the palustrine wetland was dominated by hydrophytes (wetland vegetation). Dominant species included southern wild rice (*Zizaniopsis miliacea)* and taro (*Colocasia esculenta*) located nearest to the shoreline as well as yellow pond lily (*Nuphar lutea*) partially submerged in the water along the shoreline. Giant cutgrass is considered a persistent emergent wetland plant and characterized as an obligate (OBL) in Region 2 (occurs almost always, estimated probability 99%, under natural conditions in wetlands); taro is considered a non-persistent emergent wetland plant and characterized as obligate in Region 2 (usually occurs in wetlands, estimated probability of being found in wetlands under natural conditions is 99%). At this site, yellow pond lily was also classified as an emergent plant and is characterized as an obligate (OBL) in Region 2. Additionally, water hyacinth (*Eichhornia crassipes*), one non-dominant species that is classified as a floating vascular plant, was also observed within some portions of the palustrine wetland. Also along the shoreline but non-dominant within both the palustrine and riverine wetlands, algae was observed as well as two species of submerged aquatic vegetation (SAV) that were identified as coontail (*Ceratophyllum demersum*) and waternymph (*Najas* sp.). Because emergent plants were observed as dominant at the site, this wetland was characterized as a palustrine, emergent, persistent/non-persistent, permanently flooded wetland (PEM1/2H).

The USDA NRCS characterizes the soils along the shoreline of Cane River Lake as Roxana very fine sandy loam. This soil series is defined as a hydric soil due to criterion number 4, soils that are frequently flooded for long duration or very long duration during the growing season (NRCS 2010). During the wetland delineation, the soil samples collected along the shoreline of Cane River Lake were characterized as silty clay loam with very fine sand and considered problematic hydric soils due to red parent material. This observation is confirmed because Cane River Lake is an oxbow lake that was created when the main channel of the Red River was dammed; the Red River in the vicinity of the project area is described as a land resource region (LRR P) that supports red parent material as stated in the *Interim Regional Supplement to the Corps of Engineers Manual* (USACE 2008). Because the majority of the soils at the site were submerged, the soils were collected and dried before the soil profile was described to allow redox features to become visible. In all three soils, the following hydric soil indicators were recorded: iron manganese masses and either low chroma values or redoximorphic features. At WL2, the chroma value for soil at a depth of was 5YR4/4 (at 0-2 inches) and was 5YR3/4 (at 2-12 inches) with concentrated redox features in the pore lining described as 5YR2.5/1. At WL 6, the soil from depths of 0-12 inches had a chroma value of 5YR3/2 with concentrated redox features in the pore lining described as 5YR2.5/1. At WL12, the soil at a depth of 0-12 inches had a chroma value of 5YR3/2 with concentrated redox features in the pore lining described as 5YR2.5/1. Based upon the soil samples collected, hydric soils were recorded within the palustrine wetland.

Also a small area approximately 0.07 acres in size in the northeast corner of the site and inland from the shoreline was investigated during the wetland delineation downstream of a grassed swale. This area is a drainage depression fed by stormwater through a scoured channel that overflows to Cane River Lake. Debris (large trees and shrubs) have been dumped in area and channel is headcutting and moving upstream to culvert. Therefore, this area was considered disturbed and a

datasheet was recorded (UPL3-DST) to determine if the area qualified as a wetland. It was determined that although some hydrophytic plant species were observed, there were not greater than 50 percent and the vegetation as well as the soil was considered very borderline for a wetland area. Because no hydrology was observed at the site, the area only gets wet during storm events from overland/surface runoff from the culvert/swale, and because hydrophytic vegetation was not greater than 50 percent, this area was not considered a wetland.

Following the field activities, the wetland data points collected in the field via boat and by foot were mapped on an aerial photograph. Approximately 0.64 acres of PEM1/2H wetlands are located in the vicinity of the park and approximately 0.26 acres of R2OWH wetlands (6.6 ft and less) are located in the vicinity of the park. For a graphical depiction of the existing wetland site features at the park, see Figures 3 and 4.

Wetland Functions and Values

Wetlands serve a wide range of ecological functions. They are valuable as holding areas for rising floodwaters. Wetland vegetation reduces floodwater velocity and depletes its destructive energy, thereby protecting mainland and upland areas. Wetland vegetation also forms buffers against erosion by absorbing current and storm energy, stabilizing substrates, and trapping sediments. Filtration of sediments, nutrients, pollutants, and toxic substances has the added advantage of improving water quality.

The wetland area at the project site is associated with bank of the Cane River Lake along the plantation property, in-between the right-of-way for state highway LA-494 and the Cane River Lake. This wetland area is characterized as a *palustrine, emergent, persistent/non-persistent, permanently flooded wetland (PEM1/2H).* The primary functions provided by this wetland area are biotic (fish and wildlife habitat) as well as providing economic values through recreational fishing and tourism. This wetland provides fisheries and benthic habitat and provides wildlife habitat for reptilian/amphibian species (most notably turtles, water snakes, and the American alligator [*Alligator mississipiensis*]) as well as aquatic avian species (commonly egrets, herons, and kingfishers). Shoreline wetland areas like the palustrine wetland at the site provide both habitat and cover for fish species that can then support recreational fishing in Cane River Lake. Secondary values provided by the wetland include cultural values such as aesthetics because the shoreline wetland is vegetated and located within a historical park. In summary, there are two types of wetlands that were mapped for this site: a riverine and a palustrine wetland. Cane River Lake is mapped as a riverine, lower perennial, open water, permanently flooded wetland (R2OWH) and the shoreline wetland is mapped as a palustrine, emergent, persistent/non-persistent, permanently flooded wetland (PEM1/2H). The wetlands identified within the project area do not support habitat for any special status species.

The entire Cane River Lake is mapped as a R2OWH; therefore, this habitat is located outside of the project area. The dammed portion of Cane River Lake is approximately 34.5 miles in length; therefore, the habitat associated with the riverine wetland is similar throughout this stretch of the river. Cane River Lake supports a variety of finfish species including largemouth bass (*Micropterus salmoides*), white bass (*Morone chrysops*), yellow bass (*Morone mississippiensis*), striped bass (*Morone saxatilis*), white crappie (*Pomoxis annularis*), black crappie (*Pomoxis*

nigromaculatus), sunfish (*Lepomis* sp.), catfish (*Ictaluridae* sp.), bowfin (*Amia calva*), gar (Lepisosteidae), carp (Cyprinidae), shad (*Alosa* sp.), and pickerel (*Esox* sp.) (NPS 2000). Fish species use the riverine portion of Cane River Lake for breeding and foraging. Aquatic bird species including the pied-billed grebe (*Podilymbus podiceps*), wood duck (*Aix sponsa*), great blue heron (*Ardea herodias*), great egret (*Ardea alba*), double-crested cormorant (*Phalacrocorax auritus*), and white pelicans (*Pelecanus erythrorhynchos*) rely on this habitat for feeding. During construction, these fish and bird species may disperse to the similar riverine habitat adjacent to the project area.

The palustrine emergent wetland located along the shoreline is not considered a unique, rare, or unusual habitat within the immediate project area. Palustrine wetlands are common along the shorelines of the 34.5-mile Cane River Lake. Associated vegetation includes southern wild rice, taro, yellow pond lily, giant cutgrass, and water hyacinth. Many of the bird species mentioned above may use the emergent wetland for feeding. There is potential that some avian species may use the wetland areas or vegetation for nesting sites. Impacts to bird species from the bank stabilization would be minimal since it is likely that the birds would use the similar habitat adjacent to the project area and along the Cane River Lake for feeding and nesting. Other wildlife that are associated with the palustrine wetlands include amphibian and reptiles, including the southern leopard frog (*Lithobates sphenocephala*), American bullfrog (*Lithobates catesbeiana*) red-eared slider (*Trachemys scripta elegans*), Mississippi map turtle (*Graptemys pseudogeographica kohnii*), razorback musk turtle (*Sternotherus carinatus*), yellowbelly water snake (*Nerodia erythrogaster flavigaster*), broadbanded water snake (*Nerodia fasciata confluens*), cottonmouth (*Agkistrodon piscivorus*), and the American alligator (*Alligator mississippiensis*). In addition, mussels, clams, and crustaceans including crawfish are also commonly found within the palustrine wetland areas. Like the other fish and birds discussed above, it is likely that most of the reptile, amphibian, and crustaceans would disperse to other similar areas during construction activities.

4.2 Floodplains

The 100-year floodplain mapped on the boundary of Cane River Lake is Zone A, which means that no Base Flood Elevation (BFE) which is the height of the base flood, in feet, in relation to the National Geodetic Vertical Datum of 1929 has been determined for the area (Figure 5) (FEMA 1998). A large portion of the plantation is located within the 500-year floodplain. Approximately one-third of the plantation's structures, including the majority of the main house are outside of the floodplain. Cane River itself is within the 100-year floodplain (Figure 5). However, only the northeast corner of the proposed project area lies within the 100-year floodplain and this area is estimated to be less than 0.1 acres within the floodplain.

All agencies must avoid building within a 100-year floodplain, unless there is no other alternative. NPS policy dictates guidelines to restore and maintain natural floodplains. Guidelines also require avoidance of the environmental impacts of development within floodplains, or modification of floodplains. The guidelines also require that, where practicable alternatives exist, Class I action be avoided within a 100-year floodplain. Class I actions include the location or construction of administration, residential, warehouse, and maintenance buildings, non-excepted parking lots, or other man-made features that by their nature entice or require individuals to occupy the site.

Figure 3. Existing Conditions along West Bank of Cane River Lake at Proposed Bank Stabilization

Figure 4. Existing Wetlands along the West Bank of Cane River Lake

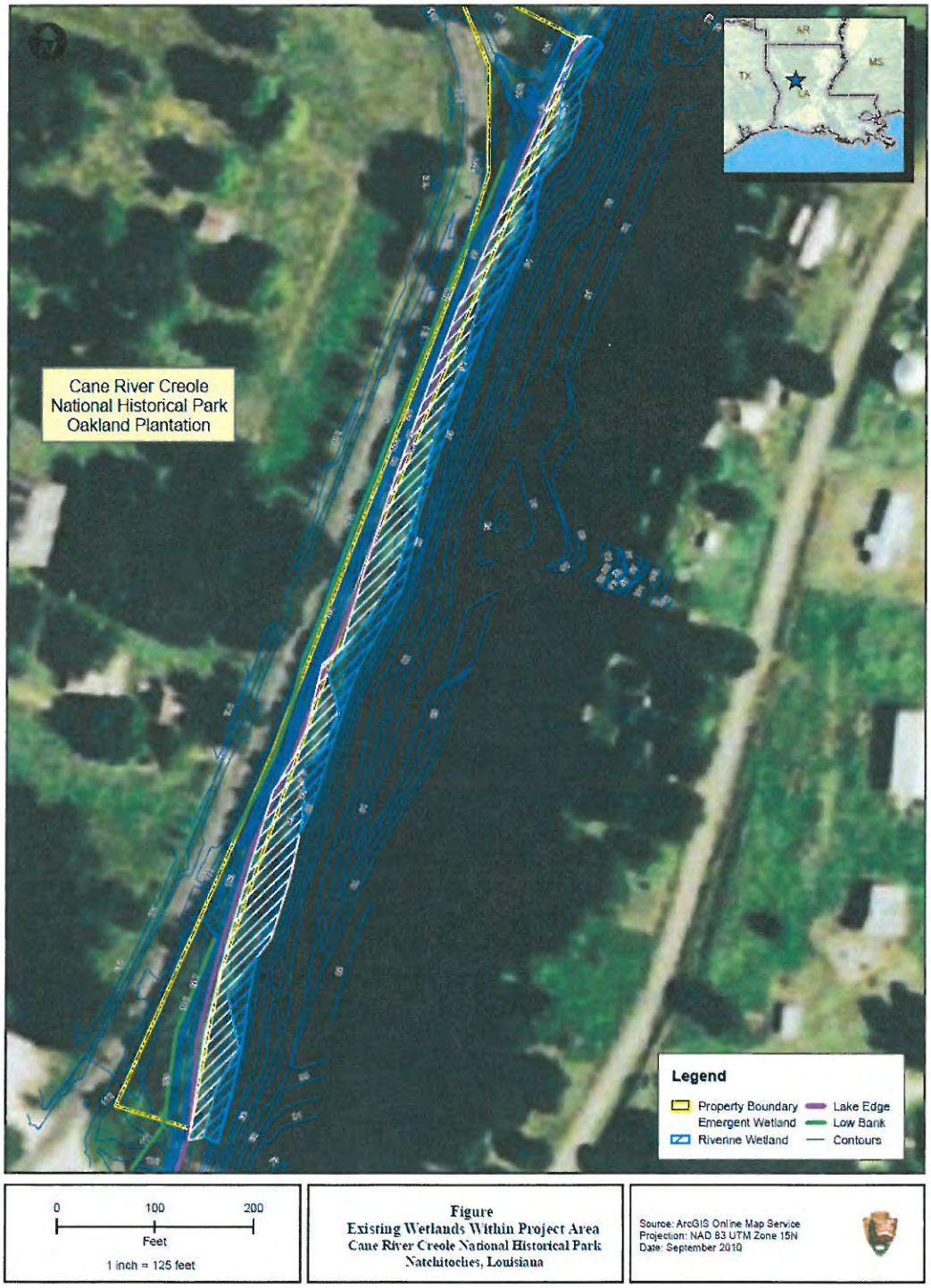


Figure 5. Mapped 100-Year and 500 year Floodplain at the Plantation

5. USE OF THE WETLANDS AND FLOODPLAINS

5.1 Historical Use of the Park

Oakland Plantation was established as a result of the division of the Bermuda Plantation. Bermuda Plantation originally included both sides of the Cane River or Red River as it was known historically. In keeping with major cultural changes following the Civil War, Bermuda Plantation was divided among two brothers of the Prud'homme Family. Subsequently "Atahoe" was established on the east side and "Oakland" was established on the west side of the Red River.

Originally, Oakland Plantation was over 3400 acres, most of which was devoted to growing cotton. This large cotton plantation was home to a vast workforce of enslaved workers. In 1840, there were nearly 150 enslaved workers sharing the plantation with the owner's families, and the families of the overseers. The Civil War brought changes to the Cane River area. The isolation of cotton markets by the Union forces cut off the connection of these plantations to their markets. In response, Southern Confederate troops burned the cotton in order to prevent its seizure by the Union troops. When the Union troops arrived in Cane River, they took grain stores and slaves. As they retreated, they burned many of the plantations. Many of the plantation's former workers and their descendants returned to Oakland as sharecroppers, often remaining the same houses as their ancestors. Although the Oakland plantation survived the war, pests and low cotton prices kept things meager at the plantation, and eventually mechanical equipment replaced human labor. In 1994, the park was designated by Congress.

The Red River originally maintained a braided network of channels and tributaries that encompassed much of contemporary Natchitoches Parish, Louisiana. The current course of the Red River lies northeast of the Oakland Plantation. Culturally-induced factors including the clearing of the "Great raft" logjam in the first half of the 19th century and subsequent damming operations, coupled with natural changes to the riverine system cause Cane River to become an oxbow channel. Consequently, the local desire for agricultural sustainability and recreation influenced the damming of Cane River via a spillway system in the 1930's to produce the 32-mile long Cane River Lake.

Today Cane River is enjoyed as a recreation site for boating, fishing, and swimming, as well as jet skiing, water skiing, and recreational barging. The narrowness of the river means that boat wakes have caused serious erosion damage. This erosion was exacerbated by two severe storms that occurred in late October, 2007. These two heavy storms occurred within 36 hours of each other, with rainfall reaching 17 inches between the two storms. This resulted in a major washout of this thin strip of land in the park. This strip of land is about 1 acre, 1,190 feet long, with width varying along the side from 18 to 147 feet.

5.2 Proposed Use of the Park

NPS is proposing to provide bank stabilization along the Cane River Lake on the plantation, thereby preserving the property and State Highway LA-494. The need for the Preferred Alternative includes reduction of bank erosion that threatens State Highway LA-494 and the

plantation property. Erosion conditions are currently exacerbated during storm events, when runoff becomes stronger and by wave action from passing boats in the Cane River Lake.

There are two principle issues affecting the proposed project area: erosion of the bank from runoff and from wave action from boats. The highly eroded areas are located at or near the existing storm water discharge points to the Cane River Lake. At the north end of the project site, severe erosion due to the high velocity of storm water discharge exiting the cross drain pipes caused a large portion of the lake bank to washout. Similarly, a small washout occurred south of the plantation store near a discharge area of an existing cross drain pipe. The erosion of the bank along Cane River Lake has reduced the top of the bank to as narrow as approximately 10 feet from the edge of the roadway pavement. In addition to the erosion caused by the storm water runoff, erosion problems are occurring near the top and side of the bank. Although the lake does not have a substantial current flow, local boat traffic that travels along the lake creates wake that contributes to the erosion of the toe of the lake bank. Wave action is also created from the newly constructed seawalls along portions of the Cane River Lake which has contributed to the erosion of the bank.

With the implementation of the Preferred Alternative, the use of the park would remain the same; however, a small portion of the 100-year floodplain is located within the project area and within wetlands as confirmed during the 2010 site visit. The proposed use of the park and the visitation are both expected to stay the same. Re-grading to create a more naturally functioning floodplain and planting of the site with native vegetation would provide a more aesthetically pleasing and historical landscape along the bank of the Cane River Lake.

6. INVESTIGATION OF ALTERNATIVES

For this project, a Preferred Alternative, a No Action Alternative, and four other alternatives were considered and investigated. The Preferred Alternative is described as bank stabilization of the bank of Cane River Lake along the plantation property. In addition to bank stabilization, proposed drainage improvements under the Preferred Alternative would include re-grading the drainage ditches on both sides of the roadway, installing culvert crossings, installing a catch basin, and constructing a drainage outfall chute into the lake at the north end of the project site. The Preferred Alternative includes the use of gabion retaining structures to stabilize soils along the proposed project area (Figure 6 and 7). For installation of the gabion baskets, a 3-foot deep by 3-foot wide trench would run the shoreline for approximately 1,200-linear feet. These gabion baskets would be placed in the trench and the bottom 2-feet would be filled with 6 inch to 8 inch rocks. The gabion baskets would then be filled with the excavated sediment that was previously removed from the trench and the top 1-foot would have intermittent rocks and sediment that would be filled to the top of the baskets leaving "no voids". This would allow for the plants to take root and not be impeded by the presence of rock below the surface and no settling should occur. The side of the basket closest to the water's edge would be smaller than the 3-foot to accommodate the natural slope downward to the water. The same ratio of rock would apply to the water side of the baskets (Figure 8). The baskets would be covered on the top of the embankment by a Macmat and a soil mat with previously excavated vegetation from the trenching process. The minimum thickness of the soil mat would be 3 inches and affixed to the Macmat with soil staples. This would be the preferred method fortified with the approved wetland seed mix and or seedlings. In the event that existing vegetation is not present, an approved pre-vegetated soil mat would be

applied to the top of the Macmat and affixed with soil staples. The compacted clay fill would be placed at a slope of 1.8(H):1(V) on the face of the existing embankment. The embankment footprint would be extended approximately 5.0 feet into the lake. The roadway shoulder would be sloped at 10(H):1(V) and the area between it and the top of the new lake bank would be graded to gradually slope down at 8(H):1(V) into the lake to allow for natural water flow into the lake.

Alternative 1includes the stabilization of the bank of the lake and toe in as well as drainage improvements within the project area would occur and would include re-grading the drainage ditches on both sides of the roadway, installing culvert crossings, installing a new culvert outfall into the lake, and constructing a drainage outfall chute into the lake at the north end of the project site would be undertaken. In order to maintain the natural aesthetic look of the project site and to provide adequate stabilization of the lake bank, a Turf Reinforcement Mat (TRM) system would be installed along the lake bank and along the channel of the chute. The TRM structure consists of three layers of polypropylene and a layer of coconut fibers. The mats along with the root reinforcement of seeded or planted vegetation, resist damage from wave energy and high velocity surface flows. The compacted clay fill would be placed at a slope of 1.7(H):1(V) on the face of the existing embankment. The embankment footprint would be extended approximately 5.0 feet into the lake. Beneath the water surface elevation level, the scour stop would be installed approximately from elevation 94.0 ft to 102 ft. The face of the compacted clay fill would be lined with a TRM to prevent erosion of the fill material. The roadway shoulder would be sloped at 8(H):1(V) and the area between it and the top of the new lake bank would be graded to gradually slope down into the lake to allow for natural water flow into the lake. This would allow for natural drainage, rather than drainage through a lakeside ditch. The TRM can withstand high scour from water flow, and would therefore prevent erosion of the bank. A geosynthetic scour mat would be placed at the toe of the embankment to prevent erosion at the toe.

Alternative 2 would restore the lake bank with a geogrid reinforced embankment system and protect the new ground surface with a TRM system. The geogrid reinforced retaining wall system would be composed of geogrid, geotextile, and wire form baskets. The geogrid protects the new lake bank from internal stability failure and erosion, while the wire form baskets give permanent facial stability in fill placement and compaction. The toe of the new lake bank would be protected with a Marine Mattress system. The Marine Mattress system would consist of 12 inches of 3-5 inch stones encapsulated in geogrid and geotextile layers. The marine mattress would protect the lower bank from erosion caused by water movement down the lake bank and drainage outfall chutes, as well as from wave impacts of boat wakes. The existing bank slope would be returned to a 1.65(H):1(V) and the toe of the embankment footprint would be extended approximately 14 feet into the lake. The backfill would consist of free draining common fill (stone) and granular fill. A drainage ditch would also be located at the top of the embankment with a 4(H): 1(V) slope near the edge of the existing roadway and a 3(H):1(V) slope near the edge of the existing embankment.

Alternative 3 would restore the lake bank by installing a cantilevered sheet pile wall and constructing an embankment slope of 2(H):1(V) behind the sheet pile wall that would be lined with a TRM to prevent erosion of the embankment material. A 12-inch thick marine mattress would be placed on the lake side of the sheet pile wall to prevent erosion. The sheet pile would be placed approximately 5 feet from the existing toe of the lake. The backfill would consist of free draining fill material. Drainage behind the sheet pile wall would be provided by a perforated pipe

that would be covered with geotextile fabric, preventing free draining backfill or other debris from entering and clogging the pipe.

Alternative 4 would restore the existing and eroded lake bank with compacted clay fill embankment above a riprap/stone base and protecting it with a TRM system. This alternative consists of excavating the existing slope and placing riprap at a slope of 1.6(H):1(V). The toe of the embankment footprint would extend approximately 8.5 feet into the lake. A longitudinal stone dike would be constructed along the lake bank toe and compacted clay fill would be placed on top of the riprap or stone base. The embankment would be lined with a TRM system to prevent erosion. A geotextile would be used as a separator at the clay/stone interface. A drainage ditch would also be located at the top of the embankment with a 4(H): 1(V) slope near the edge of the existing roadway and a 3(H):1(V) slope near the edge of the existing embankment.

Because the location of the bank along the Cane River Lake has emergent wetlands, alternative locations that entirely avoid wetlands and waters of the U.S., including floodplains as defined by the NPS, are not possible. The *Environmental Assessment: Cane River Creole National Historical Park Emergency Stabilization / Erosion Control on the Bank of Cane River Lake,* Oakland Plantation, Natchitoches Parish, Louisiana considers the No Action alternative along with the Preferred Alternative and four other alternatives, all of which involve projects within the wetlands and floodplains. For a graphical presentation of the Preferred Alternative, see Figures 6 and 7. Along with the No Action Alternative, the Preferred Alternative, and four other alternatives, additional alternatives were considered but dismissed in the EA. These additional alternatives were identified during the internal scoping process. These alternatives were dismissed from further analysis due to technical feasibility, potential for major environmental impacts to the park, and conflicts with the purpose and need of the project. Table 1 includes a description of the dismissed alternatives and justification for dismissal.

Table 1. Alternatives Considered But Dismissed

Alternative	Description	Reasons for Dismissal
Alternative A	Turf reinforcement mat protected embankment (with stone toe)	-May not meet USACE long term stability criteria -Exceeds Cane River Lake Waterway Commission (CRWC) criteria -Impact of shoreline changed -No medium/large tree growth
Alternative B	Turf reinforcement mat protected embankment (with scour stop toe)	-May not meet USACE long term stability criteria -Soil stabilization issues -Exceeds CRWC criteria -No medium/large tree growth
Alternative C	Vegetated reinforcement embankment (with stone toe)	-May not meet USACE long term stability criteria -Exceeds CRWC criteria -Concerns about boat damage from stone toe -Erosion issues not fully solved, may be future problems

Alternative	Description	Reasons for Dismissal
Alternative D	Vegetated reinforcement embankment (with scour stop toe)	-May not meet USACE long term stability criteria -Exceeds CRWC criteria -Impact of shoreline changed -Erosion issues not fully solved, may be future problems
Alternative E	Sheet pile retaining wall	-Cost of the alternative -Alternative causes concern over boater safety -Extent and appearance of the steel sheet pile
Alternative F	Turf reinforcement mat protected embankment (with riprap base)	-May not meet USACE long term stability criteria -Exceeds CRWC criteria -Visual impact of shoreline changed -Constructability issues (steepest solution) -Concerns over boat strike and safety of riprap
Alternative G	Use wood seawall / trees for protected embankment	-May not meet USACE long term stability criteria -Visual impact of shoreline changed -Erosion issues not fully solved, may be future problems -Concerns from CRWC
Alternative H	Use articulated concrete mat or gunnite surface stabilization	-Visual impact of shoreline changed -Erosion issues not fully solved, may be future problems -Slope too steep to install gunnite (need 1:1, have 1:4 slope)
Alternative I	Drop stone on embankment at washout areas (USCOE idea)	-Concerns from CRWC -Impact of shoreline changed -Erosion issues not fully solved, may be future problems -Riprap area cannot be re-vegetated
Alternative J	Use wood or composite retaining wall with fill behind (similar to Alt 3)	-Extent and appearance of the steel sheet pile -Poses many concerns over boater safety -Wood or composite retaining walls would require multiple replacements before useful life of project is met
Alternative K	Use turf reinforcement mat protected embankment with wood or composite wall to reduce riprap	-Constructability issues (steepest solution) -Wood or composite retaining walls would require multiple replacements before useful life of project is met -Visual impacts of shoreline changed -Exceeds CRWC criteria
Alternative L	Use soldier pile retaining wall with fill behind (similar to Alt 3)	-Poses maintenance issues along weak spots of retaining wall -Extent and appearance of retaining wall -Concerns over boater safety -Concerns over boat damage from stone toe

Alternative	Description	Reasons for Dismissal
Alternative M	Use stone columns along the edge of the road	-Existing areas not fully solved, may be future problems and added maintenance -Impact of shoreline changed -Cost of alternative -Concerns over boater safety
Alternative N	Use micropiles or jet grouting to reinforce embankment	-Constructability issues due to steepness -Cost of alternative -Concerns over boater safety -Existing areas not fully solved, may be future soil stabilization problems
Alternative O	Use sheet pile closer to road with no additional fill to restore the lake bank or removal of existing vegetation required & underground drainage system	-Existing areas not fully solved, may be future problems -Cost of alternative -Risk of future loss of additional historic landscape -Concerns from CRWC
Alternative P	Move the road to a new location	-Existing areas not fully solved, may be future problems -Cost and schedule requirements of alternative -Won't solve erosion and instability issues in timely manner -State's objective in resolving issue disregards the Park's mission to restore area to natural condition
Alternative Q	Give the land between the road and lake to the Natchitoches Police Jury and let them solve the problem	-Doesn't address purpose and need of project -Won't solve erosion and instability issues in timely manner -Parish's objective in resolving issue disregards the Park's mission to restore area to natural condition
Alternative R	Close the road and allow the erosion to naturally continue	-Doesn't address purpose and need of project -Would stop traffic flow on road, causing major disruptions -Probably would not be approved by LADOTD -Concerns from CRWC
Alternative S	Sell the land between the road and lake to concessionaire and let them develop it for their use	-Doesn't address purpose and need of project -Won't solve erosion and instability issues in timely manner -State's objective in resolving issue disregards the Park's mission to restore area to natural condition -Concerns from LADOTD, NPS, and CRWC

Alternative	Description	Reasons for Dismissal
Alternative T	Give the land between the road and lake to the Louisiana Department of Transportation and let them solve the problem	-Doesn't address purpose and need of the project -Won't solve erosion and instability issues in timely manner -State's objective in resolving issue disregards the Park's mission to restore area to natural condition -Concerns from LADOTD, NPS, and CRWC
Alternative U	Do partial sheet pile and solve road drainage areas	-Doesn't address purpose and need of the project -Impact of shoreline changed -Concerns from NPS and CRWC
Alternative V	Create earth retention system at road shoulder and re-grade at road shoulder only	-Cost of alternative -Impact of shoreline changed -Existing eroded lake bank is not mitigated -Concerns from NPS and CRWC

No Action Alternative. The No Action Alternative is required for the Park process to review and compare all feasible alternatives to the existing baseline conditions. Under the No Action Alternative, the bank of the Cane River Lake would continue to be susceptible to erosion from stormwater runoff and wave action from boating activities. This lack of action would continue to lead to erosion of the bank, and erosion could eventually threaten State Highway LA-494 by the continued deterioration of the bank.

Figure 6. Proposed Design Layout for Bank Stabilization at Cane River Lake

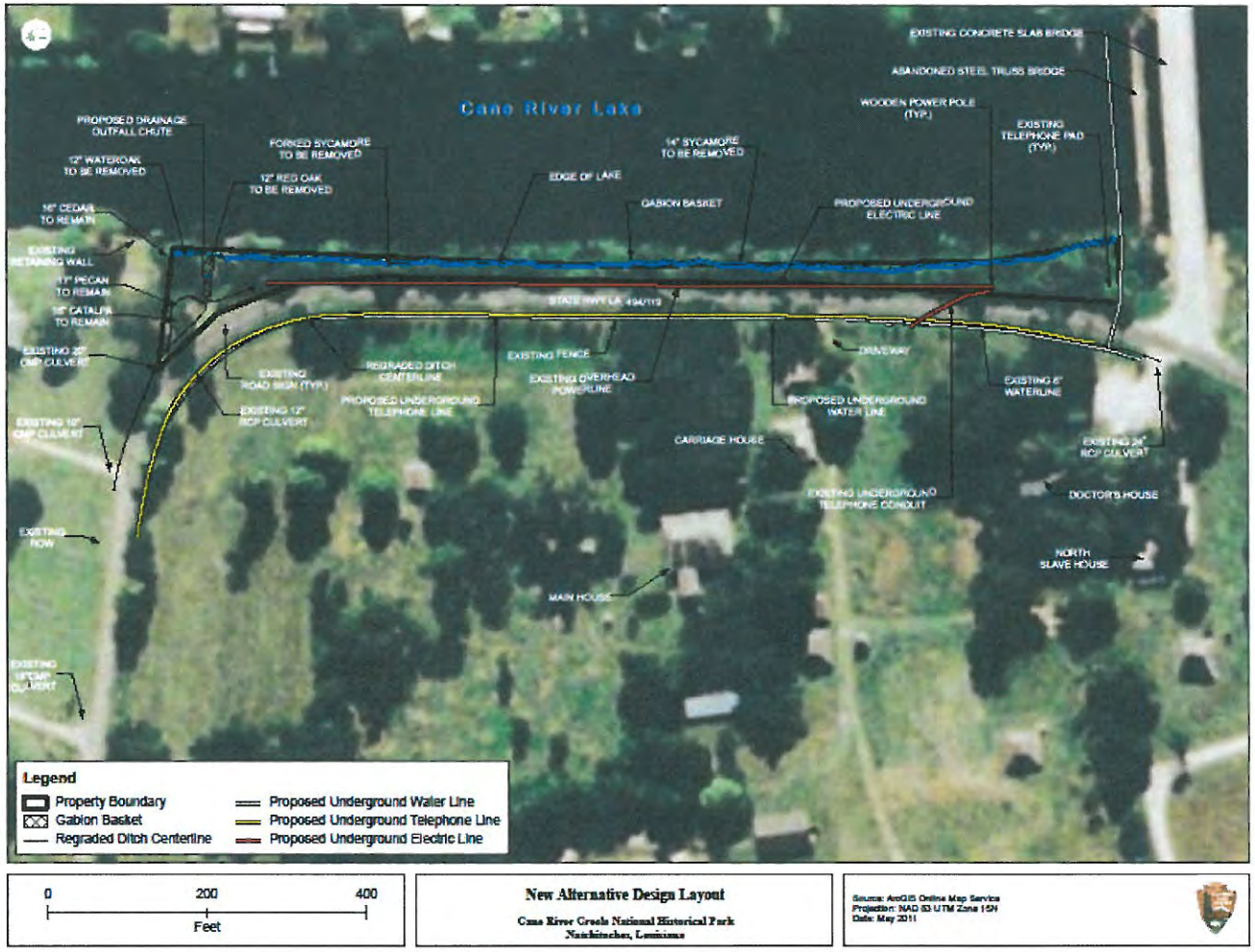
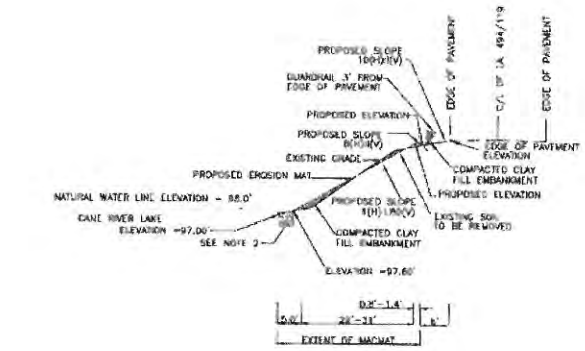
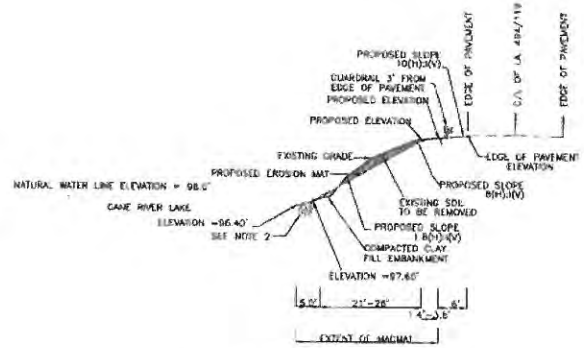
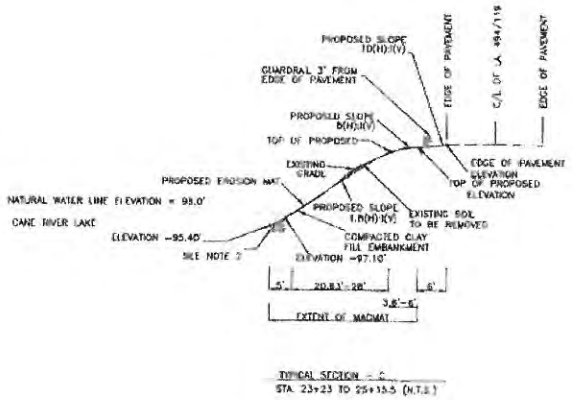


Figure 7. Details of Typical Cross-Sections for Proposed Bank Stabilization







NOTES:

1. DESIGN BASED UPON MINIMUM REQUIREMENTS OF LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT.
2. STANDARD SIZE OF GABION BOX IS 3' X 3' X 12' (REFERENCE- MACCAFERRI INC). DIMENSIONS AND SHAPE WILL BE ADJUSTED TO MATCH SLOPE AND THE NATURAL RIVER BOTTOM.
3. PROPOSED EROSION MAT BY MANUFACTURE IS MACMAT RMP. EXTENT OF MACMAT WILL BE AS SHOWN IN RESPECTIVE CROSS SECTION. TOP END OF MACMAT WILL BURIED INTO THE SOIL. MACMAT WILL COVER THE GABION BOX AND WILL PROVIDE BASE FOR TOPSOIL.
4. ALL PROPOSED SLOPES SHOWN IN CROSS SECTIONS ARE MAXIMUM SLOPES.
5. GUARD RAILS ARE PROPOSED AND WILL BE INSTALLED BY DRONIN CONSTRUCTION INC-FLORIDA.

90% DESIGN

TYPICAL SECTIONS
1 OF 2

Figure 8. Details of Gabion Baskets for Proposed Bank Stabilization

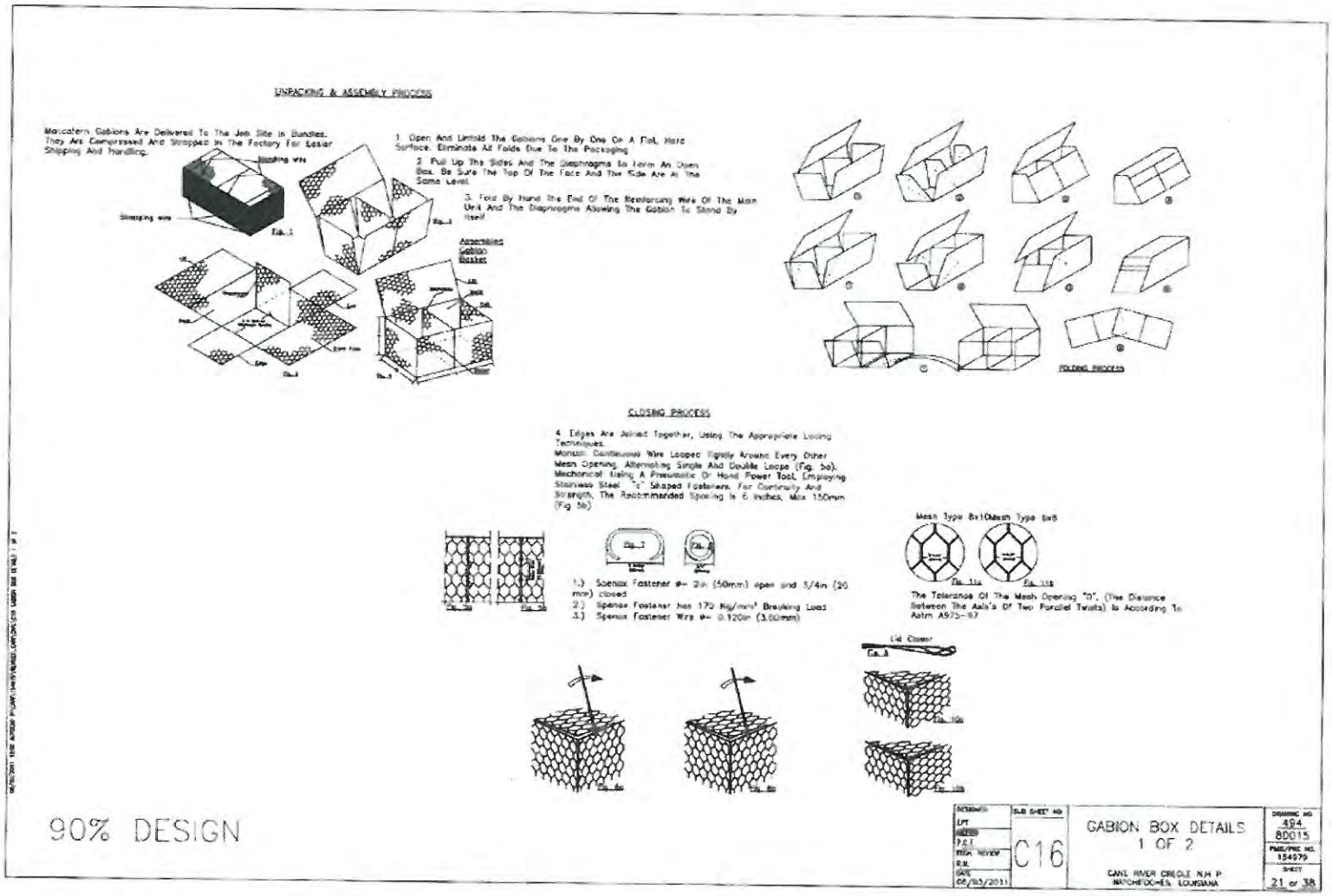
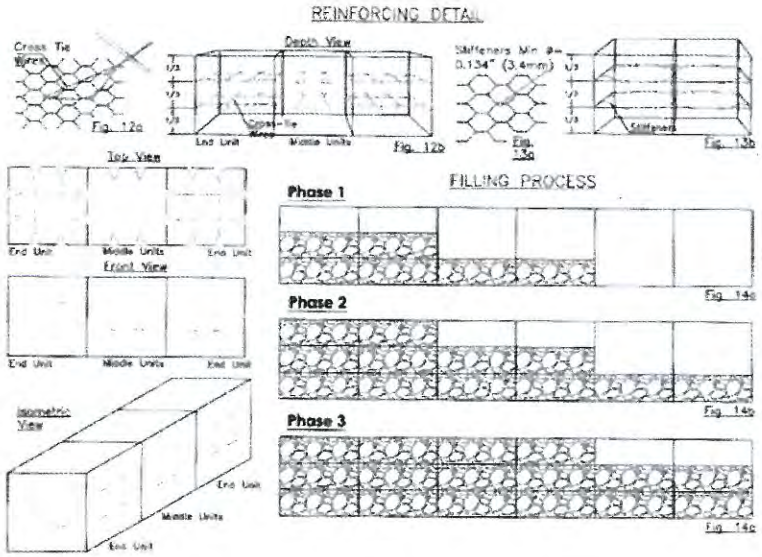
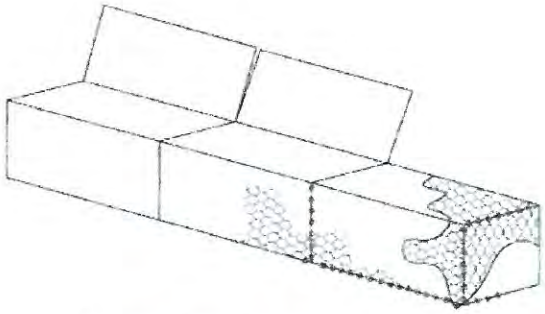


Figure 8 Continued. Details of Gabion Baskets for Proposed Bank Stabilization

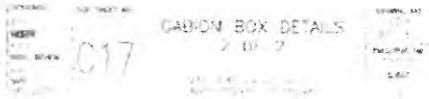




Gabion Placement

Fig. 15

90% DESIGN



7. WHY THE PREFERRED ACTION WAS CHOSEN

A Value Analysis Workshop was conducted on June 22 and 23, 2010 to analyze Alternatives 1 through 4. A Value Analysis is an organized, creative process, which focuses attention on the requirements of a project for the purposes of achieving essential functions and attendant benefits at the lowest, total costs for materials, equipment, staffing, energy usage, facilities, maintenance, etc. During the Value Analysis the team reviewed the design alternatives, considered cost estimates, and prepared a function-logic diagram. A function-logic diagram describes the essential functions of the project that would enhance the park's mission. Certain value analysis analytical tools and methods were used during the two day workshop to focus the team on the issues, problems, and opportunities presented by the proposed project.

The Value Analysis workshop focused on the following:

- Develop the Preferred Alternative for the proposed project by using Choosing by Advantages.
- Review options to maximize the projects useful life (50-100 years)
- Create options within the project budget.
- Identify opportunities to improve the value of the project.

The Preferred Alternative was selected by using the Choosing by Advantages process. In this process, decisions are based on the importance of the advantages between alternatives. The evaluation involves the identification of the attributes or characteristics of each alternative relative to the evaluation criteria, a determination of the advantages for each alternative within each evaluation factor, and the weighing of the importance of each advantage. The factors used to evaluate the proposed alternatives for the bank stabilization project included the following:

- Protect cultural and natural resources.
- Improve efficiency of park operations.
- Provide cost-effective, environmentally responsible, and otherwise beneficial development for the park.

Alternative 1, which includes drainage system improvements, the installation of compacted clay fill lined with a TRM system, the installation of a geosynthetic scour mat at to the tow of the bank, and the re-vegetation of the bank was selected as the Preferred Alternative. Alternative 1 was selected because this alternative would be better at preventing erosion from the local boat traffic and would meet the long-term needs of the project. Additionally, Alternative 1 would require the least amount of maintenance from park staff and it would best preserve the cultural landscape of the area.

In March 2011, a new alternative was developed that included a new design with a reduced footprint. The new design provides the greatest slope stability for the embankment by the use of gabion baskets at the toe of the bank. Advantages of the new design include the following:

- Best toe protection can be achieved
- Use of gabion basket conforms to ground movement, dissipates energy from flowing water, and drains freely

- Reduces velocity of surface runoff and diverts flow away from eroding cross sections
- Limits mass movement of disturbed slopes (soil movement) and offers effective erosion control
- Flexibility – gabion baskets tolerate movement
- Allows vegetation growth
- Greater than 75 year life span
- Rapid blending into the environment
- Easily vegetated
- Reduced footprint and impacts to wetlands

For the reasons listed above, the new design was selected as the new Preferred Alternative.

8. PROPOSED IMPACTS TO WETLANDS, FLOODPLAIN AND FLOOD RISK OF THE PROPOSED PROJECT AREA

8.1 Impacts to Wetlands

Figure 9 and the following table describe the permanent impacts to wetlands for the No Action Alternative and the Preferred Alternative:

Alternative	Impact (Acreage)	Wetland Type
No Action Alternative	0.0 acres	N/A
Preferred Alternative	0.10 acres	PEM1/2H
Preferred Alternative	None	R2OWH

No Action Alternative

Under the No Action Alternative, the proposed stabilization project would not be constructed and erosion of the bank of Cane River Lake would continue. Therefore, long-term, minor, adverse impacts associated with wetland loss from further erosion would occur as a result of the No Action Alternative.

Preferred Alternative

As stated previously, the Cane River Lake western bank along the plantation and portions of the immediately surrounding area is characterized as palustrine, emergent, persistent/non-persistent permanently flooded wetland (PEM1/2H), and beyond this wetland to a maximum of 6.6 ft in depth as riverine, lower perennial, open water, permanently flooded wetland (R2OWH) under the Cowardin classification system. These wetland areas are therefore regulated as wetland under DO #77-1. Portions of the site are also regulated as a wetland (vegetated portions) or a "water of the United States" (unvegetated portions) under Section 404 of the Clean Water Act. As a result of the Preferred Alternative, long-term, minor, adverse impacts to these wetlands are anticipated as a result of the addition of fill to the current bank. The Preferred Alternative consists of extending the embankment footprint approximately 5.0 feet into the lake (at water pool elevation of 98 feet) within the PEM1/2H wetland. A barge would be transported to and from the project site to be used as a staging area for four to six months during construction for bank stabilization. Therefore,

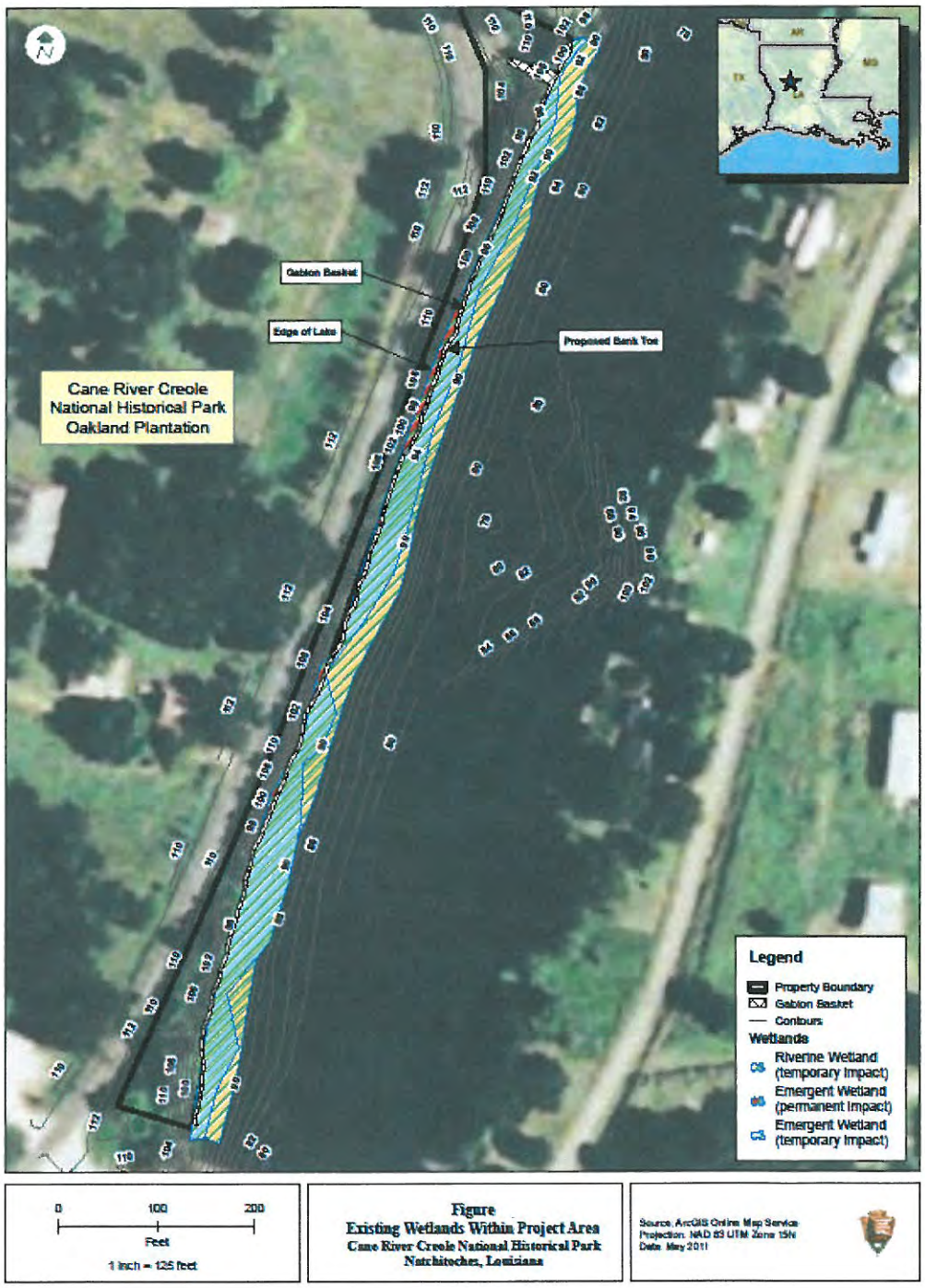
approximately 0.10 acres of fill material along the bank classified as palustrine, emergent, persistent/non-persistent permanently flooded wetland (PEM1/2H) would be required and would permanently impact this wetland. There would be no permanent impact to the riverine, lower perennial, open water, permanently flooded wetland (R2OWH). The PEM1/2H wetland beyond the 5.0 feet of bank stabilization would be temporarily and adversely affected during the construction period. As a result, a maximum of ***approximately 0.54 acres beyond the bank stabilization classified as palustrine, emergent, persistent/non-persistent permanently flooded wetland (PEM1/2H) and 0.32 acres of riverine, lower perennial, open water, permanently flooded wetland (R2OWH) would temporarily impacted*** during barge activities while the stabilization is being constructed and placed along the shoreline.

The yellow pond lily is the dominant plant species that would be temporarily impacted beyond the 5.0 ft of bank stabilization because it is the only emergent rooted vascular plant at the site at depths beyond 5.0 ft. Yellow pond-lily is an aquatic perennial plant with spongy rhizomes that anchor the plant into the muddy bottom of a waterbody (USDA/NRCS 2004). Although this plant is not considered invasive, it is very difficult to eradicate when not grown in containers because any section of rhizome left behind may sprout new growth; this plant may become weedy in some regions or habitats and may displace desirable vegetation if not properly managed (USDA/NRCS 2004). Due to the hardiness and resilience of yellow pond lily rhizomes, it is expected that this plant species would recover in many areas from temporary construction that occur beyond the areas of bank stabilization following the completion of water-based construction activities. Although long-term, minor, adverse impacts to wetlands would occur as a result of the Preferred Alternative, beneficial impacts are associated with stabilizing the bank and replanting with wetland vegetation to reduce future erosion and the ultimate loss of land would offset the adverse impacts to wetlands. Though wetlands would be impacted, the end result would be beneficial from not allowing the erosion to continue. In addition to impact along the bank of Cane River Lake, proposed drainage improvements would also occur in the vicinity of the disturbed area investigated during the wetland delineation in the northeast corner of the site. Specifically, a drainage outfall chute into Cane River Lake at the north end of the project site is proposed that would also be naturally re-vegetated with river cane following construction activities. The drainage chute design details include a smooth transition to the existing Cane River Lake bank slope. Therefore, the Preferred Alternative should reduce the secondary or offsite effects that currently occur at the site, including drainage and flooding that have exacerbated the bank erosion and have affected the existing wetlands along the shoreline of the site. Overall there would be no net loss of wetlands and stabilization of the Cane River Lake bank.

Other impacts associated with the Preferred Alternative are described in detail in Chapter 4 of the EA and include long-term impacts from the project and temporary impacts from bank stabilization construction activities. Figures 6 and 7 show current design details of the Preferred Alternative, Figure 8 shows the details of the gabion basket construction, and Figure 9 shows wetland impacts associated with the Preferred Alternative. Note that from the water's edge on bank of the Cane River Lake to the extent of the emergent, rooted vascular plants is classified as a palustrine, emergent, persistent/non-persistent permanently flooded wetland (PEM1/2H), with a riverine, lower perennial, open water, permanently flooded wetland (R2OWH) from the boundary of the rooted vascular plants to deepwater habitat. The bank stabilization of the western bank of Cane River Lake on the plantation would provide a long-term, beneficial impact to cultural landscape

resources and infrastructure by improving the aesthetics of the area, and preventing further erosion that could threaten State Highway LA-494. Long-term, beneficial impacts to soils, water quality, archeological resources, the floodplain, and aesthetics are also anticipated as a result of the Preferred Alternative. Adverse impacts to wetlands would result from the Preferred Alternative, but mitigation proposed and the long-term benefits of protecting resources through the bank stabilization are expected to outweigh the adverse affects. The bank stabilization period would cause short-term, minor adverse impacts to noise quality, water quality, air quality, soils, vegetation, wildlife, aquatic resources, historic resources, the cultural landscape, health and safety, energy requirements, a reduction in the quality of water-based recreational opportunities in the immediate area, and aesthetics due to construction equipment. These impacts would be temporary in nature and would only occur during the bank stabilization period of the project.

Figure 9. Wetland Impacts Associated with Preferred Alternative



Total Wetland Impacts

As stated above, a total of approximately 0.10 acres of PEM1/2H wetlands would be permanently affected by the proposed project along the bank of the Cane River Lake at the plantation. The wetland impacts are located within a ***palustrine, emergent, persistent/non-persistent permanently flooded wetland (PEM1/2H)*** on the bank of Cane River Lake along the plantation property. According to NPS DO #77-1, if impacts to wetlands cannot be avoided, compensation for wetland degradation or loss would be required at a minimum 1:1 ratio in a comparable alternate location, which is discussed in greater detail in Section 9.1. No compensation is required for this project as the wetland would be re-established and considered self-compensating. Overall, there would be no net loss to wetland and beneficial impacts would occur by reducing erosion which would protect additional wetlands from being lost in the future.

As a result of the wetlands affected by the Action Alternatives, a Section 10 Rivers and Harbors Appropriation Act of 1899 Permit and a Section 404 Permit may be required for the discharge of material into wetland areas, which would be completed and submitted to the USACE-Vicksburg District. Because the project area is outside of Louisiana's coastal zone, LADNR does not review the Joint Application Permit. The exact acreage of wetlands affected and a mitigation plan for the loss of wetlands would be included in the permit application as a requirement of the Section 404 Permit. The NPS uses a more conservative estimate of wetlands, which includes requiring only one of the three criteria that the USACE requires for the characterization of a wetland.

8.2 Flood Risk of the Proposed Project Area

Floodplain zones, as mapped by FEMA, are located within the site boundary. NPS has adopted guidelines pursuant to Executive Order 11998 stating that it is NPS policy to restore and preserve natural floodplain values and avoid environmental impacts associated with the occupation and modification of floodplains. As stated previously, a large portion of the Oakland Plantation lies within the 500-year floodplain. The 100-year floodplain includes the Cane River Lake, the lake banks, and a small portion of the northeast corner of the proposed project area. Since the banks within the project area are currently steep, the majority of the project area lies outside of the 100-year floodplain. The proposed project under the Preferred Alternative includes stabilizing the bank by extending the bank further into the lake and decreasing the steepness of the slope from the water's edge to the top of the bank. Reducing the slope of the bank would likely extend the floodplain into the proposed project area, which would be similar to the historic floodplain of the area.

The Preferred Alternative would cause minor alterations to less than 0.1 acres within the floodplain by providing bank stabilization along the bank of the plantation on Cane River Lake. A small portion of the northeast corner of the proposed project site lies within the 100-year floodplain. Since the banks within the project area are currently steep, the majority of the project area lies outside of the 100-year floodplain. The Preferred Alternative includes stabilizing the bank by extending the bank further into the lake and decreasing the steepness of the slope from the water's edge to the top of the bank. The gradual slope of the bank would reduce the water surface elevation and allow more volume of water into the lake. There is a potential that the floodplain would widen and extend into the proposed project location. Long-term, beneficial impacts to the

floodplain would result from the Preferred Alternative since the floodplain would function more naturally. As stated previously, a TRM system would be placed along the lake bank and along the channel of the drainage chute, and a geosynthetic scour mat would be placed at the toe of the embankment to prevent erosion at the toe. The addition of fill and placement of mats along with the root reinforcement of seeded or planted vegetation, would reduce damage from wave energy and high velocity surface flows. Further erosion of the bank would halt. Stopping this erosion would result in long-term, beneficial impacts to the floodplain from the Preferred Alternative, because lessening the steepness of the slope would allow for the restoration of natural floodplain function. In order to protect the bank, material revetment and fill material is required.

9. MITIGATION MEASURES

Implementation of the Preferred Alternative would involve impacting minimal areas of wetlands and the floodplain on the bank of the Cane River Lake. The majority of the bank stabilization activity would occur in the water and along the shoreline of the bank. During the entire bank stabilization process for the Preferred Alternative, best management practices would be employed to minimize impacts to hydrology, water quality, threatened and endangered species, and cultural resources as described in detail in Chapter 5 of the EA to comply with both *Procedural Manual #77-1: Wetland Protection* and *Procedural Manual #77-2: Floodplain Management*. If required, a sediment and erosion control plan would be prepared prior to construction and submitted to appropriate local and state agencies. Whenever possible, construction activities, including heavy equipment use and stockpiling of materials, would be conducted outside of wetland areas and a barge would be transported to and from the project site to be used as a staging area for four to six months during construction for bank stabilization.

9.1 Wetland Mitigation

For the purposes of implementing Executive Order 11990, the NPS has determined that any area classified as wetland habitat according to the USFWS *Classification of Wetlands and Deepwater Habitats of the United States* is subject to *Director's Order #77-1: Wetland Protection* and the implementation procedures outlined in the *Procedural Manual #77-1: Wetland Protection.* Director's Order #77-1 states that for new actions where impacts to wetlands cannot be avoided, proposals must include plans for compensatory mitigation that restores wetlands on NPS lands at a minimum acreage ratio of 1 to 1. For this project, the long-term impact to the palustrine wetlands is 0.10 acres. Wetland mitigation would be accomplished by re-planting salvaged wetlands plants along the restored lake bank and by re-vegetating the area with plant species native to the area, region 2. The plant species used would include only FAC, FAC+, FACW, and OBL wetland species native to the area. Obligate wetland (OBL) species that would be used include giant cutgrass, fowl mannagrass, fox sedge, Louisiana iris, and common buttonbush. Facultative wetland (FACW) species that would be used are river cane, common sneezeweed, deertongue, sassafras, and northern spicebush. Facultative wetland - (FACW-) used would be swamp dogwood, American black elderberry, and switch grass, which is a facultative (FAC+) species.

It is expected that once project construction is completed and the area has become fully re-vegetated, the site would once again function as an emergent palustrine wetland. Additional benefits include returning the upland and wetland area back to an accurate cultural landscape as

well as creating a more contiguous wetland area at the park. Mitigation efforts would restore these wetland areas after construction has concluded. The current wetland at the shoreline is characterized as Palustrine, emergent, persistent/non-persistent permanently flooded wetland (PEM1/2H). These palustrine wetlands would be restored through planting salvaged wetland vegetation and planting additional native species. This project is self-compensating; therefore, no change in wetland acreage or wetland function is expected. Overall, there would be no net loss to wetlands. The wetland functions gained through mitigation would be similar to wetland functions prior to implementation of the project.

Currently, the wetlands at the proposed project area provide biotic benefits through the creation of habitat for fish and wildlife, including several reptile and amphibian species. The wetlands also provide habitat for aquatic avian species, such as herons and egrets. Portions of this function would be temporarily lost during construction, but would be restored after mitigation efforts have been completed. The wetland mitigation work would be completed at the conclusion of the construction for bank stabilization. The anticipated time-frame for the full functioning of the restored wetland (from a soil stabilization function and shorebird/reptile/benthic habitat function) is estimated at approximately one year.

Monitoring of the restored wetland would be consistent with 33 CFR Part 332 (Compensatory Mitigation for Losses of Aquatic Resources), paragraph 6 (Monitoring). An aggressive exotic species removal plan which would entail controlling invasive species such as Chinese privet and Chinese tallow or other like invasive species would be implemented to help establish a more natural wetland littoral zone in this previously disturbed area. While very few exotic invasive species are currently located on the site, the plan aims to ensure that no invasive species recruitment occurs following the shoreline stabilization activities. Hand and/or chemical treatment removal techniques would be implemented for the eradication of undesirables and exotic species. A baseline inspection/monitoring report would be prepared prior to construction that would describe the current conditions and nuisance cover. Success would be determined by the natural recruitment of the native wetland groundcover species that are proposed for planting. The project site would be monitored monthly for one year to ensure that coverage of exotic or invasive plant species do not exceed 5 percent. If nuisance/exotic species are greater than 5 percent cover or coverage of native species falls below 80 percent, a Remedial Action Plan would be implemented, subject to National Park Service approval. Monitoring would be performed and funded by the construction project and would meet the requirements and restrictions of Section 5.2.3, paragraph 6 of *Procedural Manual* #77-1. A wetland mitigation plan and a wetlands permit may be required for wetlands impacted on the bank of the proposed study area and would be prepared when design and survey efforts are completed. Both the wetlands mitigation plan and wetlands permit application would be completed after design of the preferred action is completed and available for use in preparing these documents.

9.2 Floodplain Mitigation

The design of structures within the floodplain would incorporate methods for minimizing flood damage, as contained in the National Flood Insurance Program "*Floodplain Management Criteria for Flood-Prone Areas*" (CFR 44, 60.3) and in accordance with any state or county requirements for flood-prone areas.

Floodplain infiltration and conveyance would be beneficially impacted by the Preferred Alternative due to the fact that steepness of the bank would be reduced, returning the natural function of the floodplain. The prevention of further erosion would further benefit the floodplain. The majority of the construction activity associated with the Preferred Alternative would occur in the water and along shoreline areas within the floodplain. Because the Preferred Alternative is water-dependent, the project cannot completely avoid being situated in a floodplain due to its function relying on a close proximity to water. Impacts to the floodplain have been minimized to the greatest extent practicable. Short-term, minor impacts to floodplains would occur due to construction activities but long-term benefits would occur when the area is re-vegetated. Re-vegetation of the shoreline areas following construction would assist in improving biotic values through planting native plant vegetation.

10. SUMMARY

The bank stabilization of the Cane River Lake shoreline would protect infrastructure and improve the cultural landscape and aesthetics as well as prevent future erosion along the shorelines of bank on the plantation property. Long-term, beneficial impacts to soils, water quality, the floodplain, archeological sites, infrastructure, the cultural landscape, and aesthetics are anticipated as a result of the prevention of further erosion under the Preferred Alternative. The Preferred Alternative would occur within the Cane River Lake, within a ***palustrine, emergent, persistent/non-persistent permanently flooded*** wetland (PEM1/2H), and ***riverine, lower perennial, open water, permanently flooded*** wetland (R2OWH), and within the 100-year floodplain. Approximately 0.10 total acres of palustrine wetlands and 0.1 acres of the 100-year floodplain would be permanently affected by this project. However, no net loss of wetlands is expected since this project is self-compensating and palustrine emergent wetlands would be re-established using methods described previously. In the broader sense of the Cane River Lake, the undertakings proposed in this document would not significantly alter wetland systems but make improvements to the shoreline, would beneficially alter floodplain attributes, and decrease potential flooding risks to human safety or property damage. The overall hydrology of the river and its banks is not expected to change as a result of the Preferred Alternative, and the natural function of the floodplain is expected to be partially restored. The Preferred Alternative would, therefore, constitute a beneficial impact to the floodplain. The NPS finds the Preferred Alternative to be acceptable under Executive Order 11988 for the protection of floodplains.

The mitigation proposed in exchange for the wetland impacts would assure no net loss of wetlands acreage or wetland function. The Preferred Alternative would constitute a minor impact to wetlands that would be mitigated for by planting salvaged wetland vegetation within the palustrine emergent wetland and by re-vegetating the site with appropriate, native wetland plant species. The NPS therefore finds that the Preferred Alternative, as stipulated, is consistent with Executive Order 11990 and the policies and procedures found in Director's Order #77-1 and Procedural Manual #77-1.

11. REFERENCES

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U. S. Army Corps of Engineers. 2008. *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region,* ed. J. S. Wakeley, R. W. Lichvar, and C. V. Noble. ERDC/EL TR-08-30. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

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APPENDIX A: PHOTOGRAPHIC RECORD

PHOTOGRAPHIC RECORD

Cane River Creole National Historical Park
May 11-12, 2009

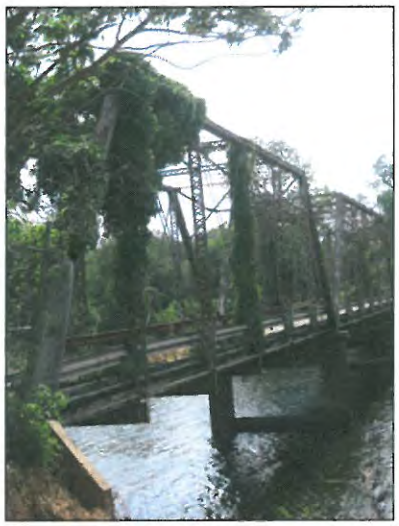

Photo 1 – Old Bridge

Photo 2 – Old bridge shoreline

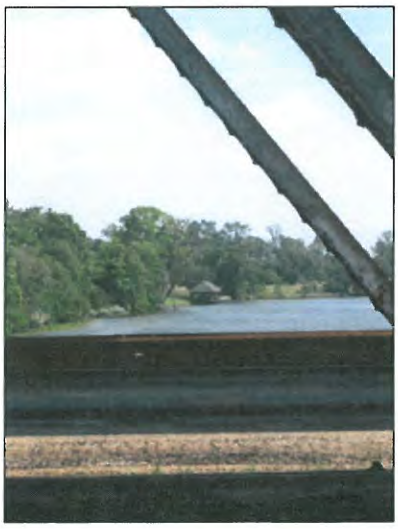

Photo 3 – View from Bridge

Photo 4 – Erosion scour hole

Photo 5 – Oakland plantation

Photo 6 – NPS property boundary

Photo 7 – Swale area

Photo 8 – Swale along road

Photo 9 – Old bridge looking North

Photo 10 – Shoreline near bridge

Photo 11 – EM 8: Yellow pond lily, taro, giant cutgrass

Photo 12 – EM 9: Yellow pond lily, taro, giant cutgrass

Photo 13 – EM 9: Yellow pond lily, taro, giant cutgrass

Photo 14 – EM 9: Yellow pond lily, taro, giant cutgrass

Photo 15 – EM 10: Yellow pond lily and red eared slider turtle

Photo 16 – Yellow pond lily, taro, giant cutgrass

Photo 17 - Taro along shoreline

Photo 18 – Barn swallow nests (under bridge)

Photo 19 - Recording data during wetland delineation

Photo 20 - Recording data during wetland delineation

Photo 21 - looking down at shoreline from high bank

Photo 22 - looking down at shoreline from high bank

APPENDIX B: DATASHEETS

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Cane River Creole NHP City/County: Natchitoches Parish Sampling Date: 5/11/2010

Applicant/Owner: NPS State: LA Sampling Point: WL2

Investigator(s): SK, JM Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____

Subregion (LRR or MLRA): _____ Lat: _____ Long: _____

Soil Map Unit Name: Roxana very fine sandy loam NWI classification: PEM1/2H; River = R2OWH

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	**Yes**	
Hydric Soil Present?	**Yes**	**Is the sampling area within a wetland? YES**
Wetland Hydrology Present?	**Yes**	

Remarks:

Thin emergent wetland along closed bridge. Photos #44 and #45

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

		Secondary Indicators (minimum of two required)
		Surface Soil Cracks (B6)
X Surface Water (A1)	Water-Stained Leaves (B9)	Sparsely Vegetated Concave Surface (B8)
High Water Table (A2)	X Aquatic Fauna (B13) **Red-eared slider**	Drainage Patterns (B10)
X Saturation (A3)	Marl Deposits (B15) **(LRR U)**	Moss Trim Lines (B16)
Water Marks (B1)	Hydrogen Sulfide Odor (C1)	Dry-Season Water Table (C2)
Sediment Deposits (B2)	Oxidized Rhizospheres on Living Roots (C3)	Crayfish Burrows (C8)
X Drift Deposits (B3)	Presence of Reduced Iron (C4)	Saturation Visible on Aerial Imagery (C9)
Algal Mat or Crust (B4)	Recent Iron Reduction in Tilled Soils (C6)	Geomorphic Position (D2)
Iron Deposits (B5)	Thin Muck Surface (C7)	Shallow Aquitard (D3)
Inundation Visible on Aerial Imagery (B7)	Other (Explain in Remarks)	FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	**Yes**	Depth (inches): 0	
Water Table Present?	**Yes**	Depth (inches): 0	
Saturation Present? (includes capillary fringe)	**Yes**	Depth (inches): 0	**Wetland Hydrology Present? Yes**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: WL2

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
	= Total Cover		

Sapling Stratum (Plot size:)			
1.			
4.			
5.			
	= Total Cover		

Shrub Stratum (Plot size:)			
1.			
2.			
3.			
	= Total Cover		

Herb Stratum (Plot size:)			
1. *Colocasia esculenta*	70	Y	OBL
2. *Zizaniopsis miliacea*	10	Y	OBL
3. *Eichhornia crassipes*	5	N	OBL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	= Total Cover		

Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size. Includes woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes X No

Remarks: (If observed, list morphological adaptations below)

Also algae and coontail SAV dispersed in some areas along shoreline; submerged woody debris in water along shoreline 5' and out.

SOIL

Sampling Point: WL2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
~~2-12~~	~~7.5YR 3/2~~	~~100~~					~~silt loam~~	~~submerged w/organic debris w/ fine sand~~

Let soil dry out and re-examined:

0-2	5YR 4/4	90	5YR 2.5/1	10	C	PL	Silty loam w/ very fine sand	
2-12	5YR 3/4	90	5YR 2.5/1	10	C	PL	Silty loam w/ very fine sand	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- Organic Bodies (A6) **(LRR P, T, U)**
- 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- Muck Presence (A8) **(LRR U)**
- 1 cm Muck (A9) **(LRR P, T)**
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Coast Prairie Redox (A16) **(MLRA 150A)**
- Sandy Mucky Mineral (S1) **(LRR O, S)**
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Dark Surface (S7) **(LRR P, S, T, U)**
- Polyvalue Below Surface (S8) **(LRR S, T, U)**
- Thin Dark Surface (S9) **(LRR S, T, U)**
- Loamy Mucky Mineral (F1) **(LRR O)**
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Marl (F10) **(LRR U)**
- Depleted Ochric (F11) **(MLRA 151)**
- X Iron-Manganese Masses (F12) **(LRR O, P, T)**
- Umbric Surface (F13) **(LRR P, T, U)**
- Delta Ochric (F17) **(MLRA 151)**
- Reduced Vertic (F18) **(MLRA 150A, 150B)**
- Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- 1 cm Muck (A9) **(LRR O)**
- 2 cm Muck (A10) **(LRR S)**
- Reduced Vertic (F18) **(outside MLRA 150A,B)**
- Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- X Red Parent Material (TF2)
- Very Shallow Dark Surface (TF1 2) **(LRR T, U)**
- Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric Soil Present? Yes X **No** ____

Remarks:
Low chroma soils with brighter redox features.

Region LRRP; red parent material originates from Red river/cane river

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Cane River Creole NHP City/County: Natchitoches Parish Sampling Date: 5/11/2010
Applicant/Owner: NPS State: LA Sampling Point: WL6, photo #47
Investigator(s): SK, JM Section, Township, Range: _____
Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____
Subregion (LRR or MLRA): _____ Lat: _____ Long: _____
Soil Map Unit Name: Roxana very fine sandy loam NWI classification: PEM1/2H; River = R2OWH
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)
Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	
Hydric Soil Present?	Yes	Is the sampling area within a wetland? YES
Wetland Hydrology Present?	Yes	

Remarks:

Thin emergent wetland along shoreline. Some overhanging trees rooted further inland of shoreline, but an emergent wetland. Photos #47, 48, 49

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

X Surface Water (A1)	Water-Stained Leaves (B9)	Secondary Indicators (minimum of two required): Surface Soil Cracks (B6)
X High Water Table (A2)	X Aquatic Fauna (B13) **Red-eared sliders**	Sparsely Vegetated Concave Surface (B8)
X Saturation (A3)	Marl Deposits (B15) **(LRR U)**	Drainage Patterns (B10)
Water Marks (B1)	Hydrogen Sulfide Odor (C1)	Moss Trim Lines (B16)
Sediment Deposits (B2)	Oxidized Rhizospheres on Living Roots (C3)	Dry-Season Water Table (C2)
X Drift Deposits (B3)	Presence of Reduced Iron (C4)	Crayfish Burrows (C8)
Algal Mat or Crust (B4)	Recent Iron Reduction in Tilled Soils (C6)	Saturation Visible on Aerial Imagery (C9)
Iron Deposits (B5)	Thin Muck Surface (C7)	Geomorphic Position (D2)
Inundation Visible on Aerial Imagery (B7)	Other (Explain in Remarks)	Shallow Aquitard (D3)
		FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes	Depth (inches): 0	
Water Table Present?	Yes	Depth (inches): 0	
Saturation Present? (includes capillary fringe)	Yes	Depth (inches): 0	Wetland Hydrology Present? Yes

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Also coontail and Najas species dispersed in some areas near shoreline

VEGETATION – Use scientific names of plants.

Sampling Point: WL6

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Robinia pseudo-acacia*	1	N	UPL
2.			
3.			
	= Total Cover		
Sapling Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		
Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size:)			
1. *Colocasia esculenta*	15	Y	OBL
2. *Zizaniopsis miliacea*	5	Y	OBL
3. *Nuphar lutea*	10	Y	OBL
4.			
5.			
6.			
7.			
8.			
9.			
	= Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 % (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

__ Dominance Test is >50%
__ Prevalence Index is ≤3.0[1]
__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size. Includes woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes X No

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WL6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
Let soil sample dry:								
0-12	5YR 3/2	90	5YR 2.5/1	10	C	PL		

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

Histosol (A1)
Histic Epipedon (A2)
Black Histic (A3)
Hydrogen Sulfide (A4)
Stratified Layers (A5)
Organic Bodies (A6) **(LRR P, T, U)**
5 cm Mucky Mineral (A7) **(LRR P, T, U)**
Muck Presence (A8) **(LRR U)**
1 cm Muck (A9) **(LRR P, T)**
Depleted Below Dark Surface (A11)
Thick Dark Surface (A12)
Coast Prairie Redox (A16) **(MLRA 150A)**
Sandy Mucky Mineral (S1) **(LRR O, S)**
Sandy Gleyed Matrix (S4)
Sandy Redox (S5)
Stripped Matrix (S6)
Dark Surface (S7) **(LRR P, S, T, U)**

Polyvalue Below Surface (S8) **(LRR S, T, U)**
Thin Dark Surface (S9) **(LRR S, T, U)**
Loamy Mucky Mineral (F1) **(LRR O)**
Loamy Gleyed Matrix (F2)
Depleted Matrix (F3)
Redox Dark Surface (F6)
Depleted Dark Surface (F7)
Redox Depressions (F8)
Marl (F10) **(LRR U)**
Depleted Ochric (F11) **(MLRA 151)**
X Iron-Manganese Masses (F12) **(LRR O, P, T)**
Umbric Surface (F13) **(LRR P, T, U)**
Delta Ochric (F17) **(MLRA 151)**
Reduced Vertic (F18) **(MLRA 150A, 150B)**
Piedmont Floodplain Soils (F19) **(MLRA 149A)**
Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

1 cm Muck (A9) **(LRR O)**
2 cm Muck (A10) **(LRR S)**
Reduced Vertic (F18) **(outside MLRA 150A,B)**
Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
X Red Parent Material (TF2)
Very Shallow Dark Surface (TF1 2) **(LRR T, U)**
Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric Soil Present? Yes X **No** ____

Remarks: **Bright reddish soil but completely submerged and supportive of emergent veg; red parent material originates from Red river/cane river**

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Cane River Creole NHP City/County: Natchitoches Parish Sampling Date: 5/11/2010
Applicant/Owner: NPS State: LA Sampling Point: WL12
Investigator(s): SK, JM Section, Township, Range: _____
Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____
Subregion (LRR or MLRA): _____ Lat: _____ Long: _____
Soil Map Unit Name: Roxana very fine sandy loam NWI classification: PEM1/2H; River = R2OWH
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)
Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	
Hydric Soil Present?	Yes	
Wetland Hydrology Present?	Yes	**Is the sampling area within a wetland? Yes**

Remarks:

Photos # 50, 51, 52. Shoreline with wave action

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

		Secondary Indicators (minimum of two required)
		Surface Soil Cracks (B6)
X Surface Water (A1)	Water-Stained Leaves (B9)	Sparsely Vegetated Concave Surface (B8)
X High Water Table (A2)	X Aquatic Fauna (B13)	Drainage Patterns (B10)
X Saturation (A3)	Marl Deposits (B15) **(LRR U)**	Moss Trim Lines (B16)
Water Marks (B1)	Hydrogen Sulfide Odor (C1)	Dry-Season Water Table (C2)
Sediment Deposits (B2)	Oxidized Rhizospheres on Living Roots (C3)	Crayfish Burrows (C8)
X Drift Deposits (B3)	Presence of Reduced Iron (C4)	Saturation Visible on Aerial Imagery (C9)
Algal Mat or Crust (B4)	Recent Iron Reduction in Tilled Soils (C6)	Geomorphic Position (D2)
Iron Deposits (B5)	Thin Muck Surface (C7)	Shallow Aquitard (D3)
Inundation Visible on Aerial Imagery (B7)	Other (Explain in Remarks)	FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes	Depth (inches): 0	
Water Table Present?	Yes	Depth (inches): 0	
Saturation Present? (includes capillary fringe)	Yes	Depth (inches): 0	**Wetland Hydrology Present? Yes**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Aquatic fauna included: red-eared sliders and dragonflies

VEGETATION – Use scientific names of plants.

Sampling Point: WL12

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		
Sapling Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		
Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
	= Total Cover		
Herb Stratum (Plot size: 30 ft radius)			
1. *Zizaniopsis miliacea*	10	Y	OBL
2. *Colocasia esculenta*	15	Y	OBL
3. *Eichhornia crassipes*	3	N	OBL
4. *Nuphar lutea*	40	Y	OBL
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	= Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 % (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

__ Dominance Test is >50%

__ Prevalence Index is ≤3.0[1]

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size. Includes woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes X No

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WL12

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
Let soil dry out:								
0 – 12	5YR 3/2	90	5YR 2.5/1		10	C	PL	silty clay loam with very fine sand

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- Organic Bodies (A6) **(LRR P, T, U)**
- 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- Muck Presence (A8) **(LRR U)**
- 1 cm Muck (A9) **(LRR P, T)**
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Coast Prairie Redox (A16) **(MLRA 150A)**
- Sandy Mucky Mineral (S1) **(LRR O, S)**
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Dark Surface (S7) **(LRR P, S, T, U)**
- Polyvalue Below Surface (S8) **(LRR S, T, U)**
- Thin Dark Surface (S9) **(LRR S, T, U)**
- Loamy Mucky Mineral (F1) **(LRR O)**
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Marl (F10) **(LRR U)**
- Depleted Ochric (F11) **(MLRA 151)**
- X Iron-Manganese Masses (F12) **(LRR O, P, T)**
- Umbric Surface (F13) **(LRR P, T, U)**
- Delta Ochric (F17) **(MLRA 151)**
- Reduced Vertic (F18) **(MLRA 150A, 150B)**
- Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- 1 cm Muck (A9) **(LRR O)**
- 2 cm Muck (A10) **(LRR S)**
- Reduced Vertic (F18) **(outside MLRA 150A,B)**
- Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- X Red Parent Material (TF2)
- Very Shallow Dark Surface (TF1 2) **(LRR T, U)**
- Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric Soil Present? Yes X **No** ____

Remarks:

Photo #53 wetland along shore; low chroma soils with brighter redox features; Region LRRP; red parent material originates from Red river/cane river

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Cane River Creole NHP City/County: Natchitoches Parish Sampling Date: 5/11/2010

Applicant/Owner: NPS State: LA Sampling Point: UPL1

Investigator(s): SK, JM Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____

Subregion (LRR or MLRA): _____ Lat: _____ Long: _____

Soil Map Unit Name: Roxana very fine sandy loam NWI classification: None -upland area

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	No	
Hydric Soil Present?	No	**Is the sampling area within a wetland?** **No**
Wetland Hydrology Present?	No	

Remarks:

Upland pt. by WL6

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

Secondary Indicators (minimum of two required)

Surface Soil Cracks (B6)

Surface Water (A1)	Water-Stained Leaves (B9)	Sparsely Vegetated Concave Surface (B8)
High Water Table (A2)	Aquatic Fauna (B13)	Drainage Patterns (B10)
Saturation (A3)	Marl Deposits (B15) **(LRR U)**	Moss Trim Lines (B16)
Water Marks (B1)	Hydrogen Sulfide Odor (C1)	Dry-Season Water Table (C2)
Sediment Deposits (B2)	Oxidized Rhizospheres on Living Roots (C3)	Crayfish Burrows (C8)
Drift Deposits (B3)	Presence of Reduced Iron (C4)	Saturation Visible on Aerial Imagery (C9)
Algal Mat or Crust (B4)	Recent Iron Reduction in Tilled Soils (C6)	Geomorphic Position (D2)
Iron Deposits (B5)	Thin Muck Surface (C7)	Shallow Aquitard (D3)
Inundation Visible on Aerial Imagery (B7)	Other (Explain in Remarks)	FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	**No**	Depth (inches):	
Water Table Present?	**No**	Depth (inches):	
Saturation Present? (includes capillary fringe)	**No**	Depth (inches):	**Wetland Hydrology Present?** **No**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: UPL1

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Broussonetia papyrifera*	5	Y	NI
2. *Robinia pseudo-acacia*	2	N	UPL
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Shrub Stratum (Plot size:)			
1. *Rubus spp.*	5	N	NA
2.			
3.			
4.			
5.			
6.			
	= Total Cover		

Herb Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	= Total Cover		

Woody Vine Stratum (Plot size:)			
1. *Toxicodendron radicans*	20	Y	FAC
2. *Vitis rotundifolia*	5	N	NA
3. *Lonicera japonica*	50	Y	FAC-
4. *Vitis labrusca*	5	N	NA
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33 % (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

__ Dominance Test is >50%

__ Prevalence Index is ≤3.0[1]

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size. Includes woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes____ No X

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: UPL1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 – 12	7.5YR 5/6	100					silty-dry (very orange)	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- Organic Bodies (A6) **(LRR P, T, U)**
- 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- Muck Presence (A8) **(LRR U)**
- 1 cm Muck (A9) **(LRR P, T)**
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Coast Prairie Redox (A16) **(MLRA 150A)**
- Sandy Mucky Mineral (S1) **(LRR O, S)**
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Dark Surface (S7) **(LRR P, S, T, U)**
- Polyvalue Below Surface (S8) **(LRR S, T, U)**
- Thin Dark Surface (S9) **(LRR S, T, U)**
- Loamy Mucky Mineral (F1) **(LRR O)**
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Marl (F10) **(LRR U)**
- Depleted Ochric (F11) **(MLRA 151)**
- Iron-Manganese Masses (F12) **(LRR O, P, T)**
- Umbric Surface (F13) **(LRR P, T, U)**
- Delta Ochric (F17) **(MLRA 151)**
- Reduced Vertic (F18) **(MLRA 150A, 150B)**
- Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- 1 cm Muck (A9) **(LRR O)**
- 2 cm Muck (A10) **(LRR S)**
- Reduced Vertic (F18) **(outside MLRA 150A,B)**
- Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- Red Parent Material (TF2)
- Very Shallow Dark Surface (TF1 2) **(LRR T, U)**
- Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ **No** X

Remarks:.

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Cane River Creole NHP City/County: Natchitoches Parish Sampling Date: 5/11/2010

Applicant/Owner: NPS State: LA Sampling Point: UPL2

Investigator(s): SK, JM Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____

Subregion (LRR or MLRA): _____ Lat: _____ Long: _____

Soil Map Unit Name: Roxana very fine sandy loam NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	No	
Hydric Soil Present?	No	**Is the sampling area within a wetland?** **No**
Wetland Hydrology Present?	No	

Remarks:

Upland pt. by WL6

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

Secondary Indicators (minimum of two required)

Surface Soil Cracks (B6)

Surface Water (A1)	Water-Stained Leaves (B9)	Sparsely Vegetated Concave Surface (B8)
High Water Table (A2)	Aquatic Fauna (B13)	Drainage Patterns (B10)
Saturation (A3)	Marl Deposits (B15) **(LRR U)**	Moss Trim Lines (B16)
Water Marks (B1)	Hydrogen Sulfide Odor (C1)	Dry-Season Water Table (C2)
Sediment Deposits (B2)	Oxidized Rhizospheres on Living Roots (C3)	Crayfish Burrows (C8)
Drift Deposits (B3)	Presence of Reduced Iron (C4)	Saturation Visible on Aerial Imagery (C9)
Algal Mat or Crust (B4)	Recent Iron Reduction in Tilled Soils (C6)	Geomorphic Position (D2)
Iron Deposits (B5)	Thin Muck Surface (C7)	Shallow Aquitard (D3)
Inundation Visible on Aerial Imagery (B7)	Other (Explain in Remarks)	FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	**No**	Depth (inches):	
Water Table Present?	**No**	Depth (inches):	
Saturation Present? (includes capillary fringe)	**No**	Depth (inches):	**Wetland Hydrology Present?** **No**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Dry terrestrial area b/n mowed grass and emergent wetland. Very steep topography, discarded debris

VEGETATION – Use scientific names of plants.

Sampling Point: UPL2

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Broussonetia papyrifera*	5	Y	NI (UPL)
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling Stratum (Plot size:)			
1. *Sambucus canadensis*	2	Y	FACW-
2. *Cornus* sp.	2	N	
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Shrub Stratum (Plot size:)			
1. *Toxicodendron radicans*	10	Y	FAC
2.			
3.			
4.			
5.			
6.			
	= Total Cover		

Herb Stratum (Plot size:)			
1. *Elymus virginicus*	10	Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	= Total Cover		

Woody Vine Stratum (Plot size:)			
1. *Toxicodendron radicans*	10	Y	FAC
2. *Vitis rotundifolia*	2	N	NA
3. *Lonicera japonica*	5	Y	FAC-
4. *Vitis labrusca*	2	N	NA
5.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 83 % (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 = 0
FACW species	2	x 2 = 4
FAC species	35	x 3 = 105
FACU species	0	x 4 = 0
UPL species	5	x 5 = 25
Column Totals:	42 (A)	134 (B)

Prevalence Index = B/A = 3.19

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

Prevalence Index is ≤3.0[1]

Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size. Includes woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes X No

Remarks: (If observed, list morphological adaptations below).