

**CROATAN MITIGATION BANK
ADDENDUM TO THE NCDOT UMBI**

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Prepared for
North Carolina Department of Transportation



Prepared by



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DATE: 1/27/2009

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CROATAN MITIGATION SITE
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1.0 BASELINE INFORMATION

The Croatan Mitigation Bank (CMB) wetland and stream restoration site is located in U.S. Geological Survey (USGS) Hydrologic Unit (HU) 03020204 and N.C. Division of Water Quality (NCDWQ) Neuse River sub-basin 03-04-10 along the outer bend in the Neuse River between New Bern and the Pamlico Sound. The project is located in the Middle Atlantic Coastal Plain Level III Ecoregion (Nonriverine Swamps and Peatlands and Carolina Flatwoods Level IV ecoregions), and occurs within Craven County in the vicinity of the western boundary of HU 03020204 and HU 03020106 (see Figure 1, Appendix A). The CMB is located approximately 3.6 miles northwest of Havelock and is situated west of US Highway 70 and south of Catfish Lake Road (SR 1100). The CMB is bounded to the west, north, and east by lands associated with the Croatan National Forest.

The CMB encompasses 4,034.6 acres under the ownership of the N.C. Department of Transportation (NCDOT). In general, the site slopes gently downward from a high of approximately 43 feet above mean sea level (AMSL) along the shoreline of Long Lake towards the south, across the expanse of Gum Swamp, to the headwaters of the East Prong of Brices Creek to the north and the headwaters of Tucker Creek to the east. The elevation change across the site from south to north is approximately 30 feet. The East Prong of Brices Creek is classified as Class C, Sw, NSW waters. Class C waters are suitable for aquatic life propagation and survival, fishing, wildlife, secondary recreation, and agriculture. The supplemental classification "Sw" refers to "swamp waters" which are characterized by low velocities and other natural characteristics which make them different from adjacent streams. The supplemental classification "NSW" refers to "nutrient sensitive waters" which are characterized by excessive growth of microscopic and macroscopic vegetation which impair the best use of the water. Tucker Creek is classified as Class SC, Sw, NSW waters. Class SC waters are tidal salt waters suitable for aquatic life propagation and maintenance of biological integrity, wildlife, and secondary recreation.

The CMB contains both non-riverine and riverine mitigation areas. Prior to mitigation activities, non-riverine and riverine functions on the site had been severely impacted as a result of silvicultural practices (road construction, ditching, and logging). Water tables were maintained at lower elevations, and plant species composition had adapted to drier conditions. The location of ditches and roads changed the lateral flow paths of surface and groundwater through the site, reduced water retention times within the site, and increased flows in associated drainages following rainfall events.

The site was designed and implemented in two phases, Phase I (1469.3 acres) and Phase II (2565.3 acres). Phase I construction was completed in the winter of 2001, and Phase II

construction was completed in the spring of 2002. Five years of hydrologic and vegetative monitoring were completed for Phase I in 2006 and for Phase II in 2007.

2.0 BANK SITE SELECTION

The CMB Site was first evaluated as part of a feasibility evaluation by NCDOT in 1997. Subsequent detailed Site investigations occurred between 1998 and 2000, and the CMB was formed in 2000. Further details regarding the process ultimately resulting in the selection of the Site for development of the CMB can be found in the Croatan Wetland Mitigation Bank Mitigation Plan (NCDOT 2000).

3.0 BANK SITE PROTECTION INSTRUMENT

The CMB Mitigation Banking Instrument, hereafter referred to as “MBI”, is titled “Agreement to Establish the Croatan Wetland Mitigation Bank in Craven County, North Carolina, 2002”. The MBI states that the NCDOT will manage the property through completion of the monitoring period and approved closeout of the mitigation components. Beyond that, the NCDOT has developed a Memorandum of Understanding (MOU) with the U.S. Army Corps of Engineers (USACE) and the U.S. Forest Service (USFS). The MOU (Agreement No. 02-MU-11081100-034) requires that the USFS preserve all natural areas, and prohibit all use of the property inconsistent with its use as mitigation property, including any activity that would materially alter the biological integrity or functional and educational value of wetlands within the Bank site, consistent with the mitigation plan. The purpose of the MOU will be to assure that future use of the Bank site will result in the protection, maintenance and enhancement of wetland functions described in the mitigation plan.

4.0 OBJECTIVES

The goal of the project was to restore functional riverine and non-riverine wetland systems to the Site. The functional restoration of the CMB has occurred through a mixture of various treatments of hydrologic and vegetative restoration, enhancement, and/or preservation. Each treatment for a specific area of the CMB was specifically designed to generate the best wetland functional improvement with the least disturbance practicable.

5.0 MITIGATION WORK PLAN

Mitigation construction activities involved various treatments of hydrologic restoration, which included ditch removal and/or modifications, installation of ditch plugs, installation of surface water diversions, scarification of consolidated soils, removal of existing conveyance structures, modifications or removal of the Site road network, improved roadway drainage, and installation of subsurface aggregate drains.

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Vegetation planting activities were dependent on the relative wetness of areas to be planted. Planting zones were determined based on these assessments, and planted species were matched according to their wetness tolerance and the anticipated wetness of the planting area. Site preparation for the Phase I area began in fall 2000, with appropriate areas replanted prior to the beginning of the 2002 growing season. Hydrologic modifications to Phase I began in 2001 and were completed prior to the beginning of the 2002 growing season. The 5-year monitoring period for Phase I began with the 2002 growing season. Site preparation for the Phase II area began in summer 2001. Unavailability of adequate planting stock in late 2001 prevented replanting prior to hydrologic modifications; however, appropriate areas were planted in February 2003. Hydrologic modifications began as Phase I implementation was nearing completion, and Phase II modifications were implemented by February 2003. The 5-year monitoring period for Phase II began with the 2003 growing season.

6.0 PERFORMANCE STANDARDS

According to the MBI and annual monitoring plans, the CMB Mitigation Bank Review Team (MBRT) established specific goals for vegetative and hydrologic success.

Vegetation success criteria established by the MBRT state:

- 1) That there must be a minimum of 320 trees per acre surviving for three consecutive years.
- 2) The required survival criterion will decrease by 10-percent per year after the third year of vegetation monitoring (i.e., for an expected 288 trees/acre for Year 4, and 260 trees/acre for Year 5), such that at the end of Year 5, there are at least 260 5-year old trees per acre.

Hydrologic success criteria established by the MBRT include both of the following:

- 1) Inundation or saturation within 12 inches of the surface for at least 12.5-percent of the growing season for mineral soils and 25-percent of the growing season for organic soils and riverine restoration/enhancement areas (**Success Criterion 1**); and
- 2) The hydroperiod for restoration/enhancement areas shall be within 50-percent of reference saturation or inundation depth, duration and frequency for the first three years and shall be within 20-percent for years four and five (**Success Criterion 2**).
 - If the 50-percent and 20-percent reference goals are not attained, the MBRT requested that a site visit be conducted to determine the viability of the site.

As of 2007, the project has been subject to five years of monitoring. Monitoring data for the Site are summarized below.

7.0 MONITORING REQUIREMENTS

Vegetation Monitoring

Based on vegetation monitoring, it appears that all of the Site wetlands are on a trajectory to meet mitigation goals. Of the 4034.6-acre CMB Site, approximately 224.5 acres were involved in tree planting for Phase I and 466.0 acres were involved in tree planting for Phase II. Twenty-five vegetation monitoring plots were established throughout the Phase I planting areas, and 23 vegetation monitoring plots were established throughout the Phase II planting areas. Final vegetation monitoring of Phase I (Year 5, 2006) revealed an average tree density of 352 trees/acre, which exceeds the MBRT defined vegetation success criteria of 260 trees/acre for Year 5. Vegetation monitoring of Phase II revealed an average tree density of 330 trees/acre, which exceeds the MBRT success criteria of 288 trees/acre for Year 4.

Photographic Monitoring

Photographs have been taken annually during monitoring at nine photo points. Photographs taken in areas cleared and replanted as part of restoration depict dense and lush herbs and shrubs. Photographic monitoring indicates that the Site is on a trajectory to meet restoration goals.

Wetland Hydrology Monitoring

Phase I - Overall 2002-2006. Overall, mitigation measures have been successful at restoring jurisdictional hydrology in 91.0-percent of gauges for at least one of the hydrologic success criteria. Mitigation measures in Phase I also succeeded at restoring both hydrologic success criteria in 76.4-percent of gauge sites. In most areas jurisdictional hydrology has been restored, including those located adjacent to point plugged ditches that maintain the access roads. However, there were 17 gauge sites where a successful restoration of wetland conditions was recorded, but the data demonstrated that the mitigation was unsuccessful at returning these gauge sites to within 20-percent of reference hydrology conditions under the normal rainfall conditions. Additionally, there were seven gauges that did not meet minimum jurisdictional hydrology for 12.5-percent of the growing season, although all exhibited a hydroperiod between 5 and 12.5-percent of the growing season. Of the seven gauges with recorded hydrology below 12.5-percent of the growing season, four are located adjacent to point plugged ditches and the other three gauges are located on topographic highs.

Phase II – 2006. Overall, mitigation measures have been successful at restoring jurisdictional hydrology in 94.0-percent of gauges for at least one of the hydrologic success criteria. Mitigation measures in Phase II also succeeded at restoring both hydrologic success criteria in 82.1-percent of gauge sites. At 20 gauge sites within Phase II, jurisdictional hydrology has been restored, but not to within 20-percent of reference conditions under normal rainfall conditions. In most areas jurisdictional hydrology has been restored, including those located adjacent to point plugged ditches that maintain the access roads. However, there were six gauge sites where a successful restoration of wetland conditions was recorded, but the data demonstrated that the mitigation was unsuccessful at returning these gauge sites to within 20-percent of reference hydrology

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conditions under the normal rainfall conditions. Ten gauges are not meeting minimum jurisdictional hydrology for 12.5-percent of the growing season, although all exhibited a hydroperiod between 5 and 12.5-percent of the growing season.

8.0 OTHER INFORMATION

8.1 NCWAM WETLAND TYPE DETERMINATION

As of early 2008, North Carolina natural resources agencies have begun to utilize North Carolina Wetland Assessment Method (NC WAM) general wetland types (WFAT 2008) for wetlands classification. The NC WAM wetland type key utilizes landscape setting, vegetation, and hydrology in the identification of wetland types.

The NC WAM wetland type key uses the description “in a geomorphic floodplain or associated with a natural linear conveyance (such as a topographic crenulation) or along shorelines of natural waterbodies greater than 20 acres or artificial impoundments” to separate riparian (riverine) wetlands from non-riparian (non-riverine) wetlands. A crenulation is a linear, topographic feature that is less defined than a stream channel or valley and may be characterized by “v”-shaped contour lines on topographic mapping. The best available information should be used in the determination of the presence or absence of a geomorphic floodplain or a natural linear conveyance.

The classification of CMB wetlands NC WAM wetland types was performed using a combined desktop and field approach in accordance with methods prescribed in the NC WAM User Manual (WFAT 2008). Subsequent to a field visit in May 2008 the entire CMB was classified into appropriate NC WAM wetland types. After the preliminary field visit, the collected data from representative sites (completed NCWAM data forms, site photographs, and Global Positioning System [GPS] data) were used to facilitate a desktop key exercise of NCWAM wetland types. The NCWAM wetland types at 12 distinct locations visited in the field were evaluated in Geographical Information Systems (GIS), and compared against GIS datasets in order to identify similar conditions throughout the CMB to the conditions of the visited area. After the preliminary desktop evaluation, an additional four-person days of field effort were undertaken to field verify specific signatures that had been perceived during the desktop analyses. The resulting draft NC WAM wetland type map was created and presented to the Inter-agency Review Team (IRT) for the NCDOT UMBI in October 2008. Following IRT review, a final NC WAM wetland type map was prepared in accordance with the guidance of the IRT and is presented as Figure 2 (Appendix A).

8.1.1 Data Sources

GIS datasets utilized include SSURGO soils data, aerial photography from multiple years (1998 color infra-red [USGS], 2004-2006 natural color [USDA], and 2006 high-resolution [Google Earth]), Light Distance and Ranging (LiDAR) high-resolution elevation data (N.C. Floodplain Mapping Program), USGS 7.5 minute topographic quadrangles, vegetation communities for the CMB (Environmental Services, Inc[ESI]),

National Wetlands Inventory (U.S. Fish and Wildlife Service), N.C. Division of Coastal Management wetland maps, and NCGAP vegetation community mapping.

8.1.2 Wetland Type Identification

The desktop analyses relied heavily on multiple GIS data sources. Non-riverine wetland types were classified by interpretation of landscape position, soils, and vegetation data. The re-classification of non-riverine wetland types into riverine wetland types was based upon NC WAM and agency guidance (USACE/NCDWQ 2007) regarding the presence of riverine wetlands that occur in natural “topographic crenulations” within the Outer Coastal Plain physiographic province. Using this guidance, LiDAR data and Google Earth imagery facilitated a digitization of topographic and vegetation community patterns.

During the field evaluation, field reconnaissance verified the wetland type identification from the desktop analyses in all instances. Additional field data, including photographs and GPS points were taken at new locations to support the desktop identification.

In addition to hand digitization of riverine wetlands associated with natural topographic crenulations, LiDAR data were post-processed using the ArcHydro model through ESRI’s Spatial Analyst and ArcGIS 9.2. The ArcHydro model analyzed flow direction and accumulation and made a prediction of flow paths through the CMB. Additional data predicted by the model include stream generation and micro-catchment delineation throughout the CMB. Riverine wetlands that were delineated by hand were compared to flow paths that were predicted using Arc Hydro. All areas where flow has been observed in the field matched areas of predicted flow from the model. Additionally, other areas of predicted flow are characterized by appropriate LiDAR and vegetation communities to be reclassified into riverine wetland areas.

8.1.3 Stream Identification

Arc Hydro data were reviewed for quality assurance through field observations and other GIS desktop identification methods, and most modeled flow paths were used for generation of stream credits. A 100-foot buffer was placed on flow path/stream lines, and reviewed to ensure that the 100-foot buffer area remained within riverine wetland areas. Areas reclassified as Riparian Headwater Stream have been removed from the acreage of available riverine wetland credits (see Table 2). The stream length and acreage of the riverine headwater stream calculations are available in Table 3.

8.1.4 Credit Calculations

Original MBI credit calculations were revisited after completing NC WAM wetland type identification. This involved a GIS analysis of the original mitigation treatment and the NC WAM wetland type coverage. The mitigation treatment files were obtained from ESI. The areas of NC WAM wetland types in each mitigation treatment were calculated, and compared against the original MBI credit estimate. While credits shifted between riverine and non-riverine wetland landscape positions, no credits shifted between restoration, enhancement, or preservation mitigation treatments. A revised accounting of the conversion has been prepared and is available in Tables 1 and 2.

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Based upon field investigations and limited sampling, it is expected that the majority of the CMB will support an overall NC WAM functional rating of High. The only areas that will score less than high are former roadway areas that support marsh vegetation. Some areas of both Riverine and Non-Riverine Swamp Forests will rate as Low for the habitat function, but will still rate an overall High based upon successful hydrology function and water quality function restoration. Low habitat ratings reflect the lack of mature trees and expected strata in forested wetland types. However, habitat ratings are expected to improve over time as the vegetation trends toward the expected structure and diversity.

9.0 DETERMINATION OF CREDITS

Based on the various mitigation treatments depicted in Table 1, the original MBI totals have been separated into NC WAM wetland types for each treatment. The resulting wetland credits are provided in Table 2. Riparian Headwater Stream credits, generated pursuant to agency guidance (USACE and NCDWQ 2007), are provided in Table 3.

Table 1. Updated Wetland Mitigation Components for the CMB.

CMB Component		Total (acres)
Non-riverine Wetlands	Restoration	1308.52
	Enhancement	1514.37
	Preservation	264.02
Riverine Wetlands	Restoration	176.28
	Enhancement	561.03
	Preservation	134.78
Non-credit Areas	Non-restorable	46.00
	Non-hydric Soil	29.60
Total		4034.60

Table 2. Wetland Credits Generated at the CMB.

	Non-riverine Wetland Credits			Riverine Wetland Credits			Total Credits
	R	E	P	R	E	P	
Bank Total	1308.52	757.19	52.80	143.71	195.25	4.8	2462.27*

*The wetland credit estimate excludes 140.00 acres of riverine wetlands (85.27 acres enhancement, 22.16 acres of preservation, and 32.57 acres of restoration) that have been classified as Riparian Headwater System stream mitigation resulting in 60,984 linear feet of stream.

Table 3. Riparian Headwater Stream Credits

	Riparian Headwater Stream (Linear Feet)			Riparian Headwater Stream (Credits)			Total Credits
	R	E	P	R	E	P	
Bank Total	14,187.49	37,143.61	9,652.90	14,187.49	18,571.81	1,930.58	34,689.88

*Approximately 140.00 acres of riverine wetlands (85.27 acres enhancement, 22.16 acres of preservation, and 32.57 acres of restoration) have been classified as Riparian Headwater System stream mitigation resulting in 60,984 linear feet of stream.

9.1 CREDIT RELEASE SCHEDULE

The original MBI credit release is presented herein. While available mitigation has been updated to present NC WAM wetland types, the credit release schedule should not be affected. No credit release for the riparian headwater stream credits was provided in the original MBI; however, it is proposed that the same release schedule be used. The original MBI indicated 15-percent of the Site’s total mitigation credits shall be available for sale immediately upon completion of all of the following:

1. Execution of the MBI by the Sponsor, the USACE, and other agencies eligible for membership in the IRT who choose to execute the agreement;
2. Approval of the final mitigation plan;
3. Delivery of the financial assurances;
4. Recordation of the preservation mechanism, as well as a title opinion acceptable to the USACE covering the property;

Additionally, no later than the first full growing season following initial debiting of the bank, the Sponsor was required to complete the initial physical and biological improvements to the Site as defined in the mitigation plan. Subject to NCDOT’s continued satisfactory completion of all required success criteria and monitoring, additional mitigation credits were proposed to be available for sale by NCDOT on the following schedule:

- 10-percent after first year, if interim success measures are met (total 25-percent);
- 10-percent after second year; if interim success measures are met (total 35-percent);
- 10-percent after third year; if interim success measures are met (total 45-percent);
- 15-percent after fourth year; if interim success measures are met (total 60-percent);
- 15-percent after fifth year, if Success Criteria are met (total 75-percent); and
- 25-percent after fifth year, if the bank site meets the overall objectives and Success Criteria set forth in the mitigation plan (total 100-percent).

The above schedule applies only to the extent that the NCDOT documents acceptable survival and growth of planted vegetation, and attainment of acceptable wetland hydrology as described under the mitigation plan success criteria. The final 25-percent of credits will be available for sale only upon a determination by the IRT of functional success as defined in the mitigation plan.

A current debit ledger for all projects that have already used available credits from the CMB is provided in Appendix B.

The NCDOT has completed all required monitoring and found that the CMB has met all monitoring objectives; therefore, the NCDOT proposes that the entire amount of available mitigation credits be released upon subsequent execution of this addendum to the NCDOT UMBI. Available credits at the CMB will be used primarily for NCDOT projects, but may also be used for non-NCDOT projects.

10.0 PROPOSED GEOGRAPHIC SERVICE AREA

According to the original MBI, the Geographic Service Area (GSA) for the CMB was composed of Hydrologic Cataloging Unit (HUC) 03020204 (corresponding to DWQ sub-basins 03-04-10 and 03-04-11). Use of the Site to compensate for impacts beyond the geographic service area may be considered by the Corps or the permitting agency on a case-by-case basis.

However, since the development of the MBI, additional information related to appropriate Service Areas and ecoregions has been made available, which suggest that the GSA as defined in the MBI may no longer accurately reflect the relevant federal and state resource management agencies' goal to integrated ecosystem management. Therefore, separate GSAs for riverine and non-riverine wetland credits are proposed.

10.1 RIVERINE GEOGRAPHIC SERVICE AREA

For riparian/riverine wetland types, the proposed GSA is depicted in Figure 3 (Appendix A). The proposed riverine GSA includes the entire 03020204 HUC, but also includes sub-watersheds (Table 4) from the 03020106 HUC that have a hydrologic connection to the Croatan National Forest.)

As shown on Figure 3, the proposed riverine GSA includes inset areas that demonstrate that the boundary between the 03020204 and 03020106 HUCs is not well drawn to accurately reflect drainage patterns that can be perceived using higher resolution data in GIS. Based on the same data sources utilized for determining NC WAM types, it is proposed that all of the lakes in the Croatan National Forest support a hydrologic connection to each other on at least an occasional or seasonal basis. The distribution of hydrology among the individual lakes, as well as the headwater riverine wetlands associated with the lakes were presented to the IRT during an October 2008 GIS presentation to justify the NC WAM reclassification.

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Table 4. The proposed riverine GSA includes all of 03010104 and the following 14-digit hydrologic units from 03020106:

14-Digit Hydrologic Unit Code							
Prefix	Suffix	Prefix	Suffix	Prefix	Suffix	Prefix	Suffix
030201060	10040	030201060	20030	030201060	30040	030201060	20040
030201060	10020	030201060	30070	030201060	30020	030201060	30080
030201060	10060	030201060	20060	030201060	30030	030201060	20050
030201060	10050	030201060	30060	030201060	30010	030201060	20080
030201060	10031	030201060	30050	030201060	10070	030201060	20052
030201060	20010	030201060	20020	030201060	20070		

Through GIS evaluation of the fringes of the lakes using both LiDAR and available aerial photography, multiple areas of outflow from the lakes can be perceived. Each outflow acts as a landscape-scale headwater riverine system for the respective watershed into which it drains. When considered on a landscape scale, the watersheds receiving water from the interconnected lakes ultimately drain into the Neuse River in 03020204 and to the Newport River in 03020106. The proposed riverine PSA includes all associated watersheds that may receive water from the lakes within the Croatan National Forest.

10.2 NON-RIVERINE GEOGRAPHIC SERVICE AREA

For non-riparian/non-riverine wetland types, the proposed GSA is depicted in Figure 4. The Site occurs along a boundary between the 63h and 63c Level IV ecoregions, and river basin or other hydrologic boundaries are not proposed as being reasonable for non-riverine wetland credits. The proposed non-riverine GSA includes all of the 03020204 HUC, as well as the Mid-Atlantic/Carolina Flatwoods (63e and 63h) and Swamps and Peatlands (63c) Level IV ecoregion portions of the 03020106, 03020202, and 03030001 HUCs occurring within the Neuse and White Oak River basins. Since riverine wetland function is not associated with the available credits involved with the non-riverine GSA, it is proposed to be based upon ecoregion boundaries that were developed to denote areas of similarity in ecosystems and habitat. The non-riverine wetland resources that may be impacted within the region are expected to very similar to the non-riverine wetland credits available at the CMB. The Level IV ecoregions are characterized by a similarity of type, quality, and quantity of non-riverine wetland resources that occur within a geographic area much larger than proposed herein. In an effort to be consistent with the original MBI, watershed boundaries have been used to restrict the Level IV ecoregion areas that occur outside of either the Neuse or White Oak River basins. However, the similarity in non-riverine function across a wide geographic area suggests that a GSA larger than the 03020204 HUC is appropriate. The function-based and ecoregion approach to wetland mitigation is consistent with relevant federal and state resource management agencies' goal to integrated ecosystem management. Additional justification for a larger than typical GSA for non-riverine wetland credits include the following:

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- The Site has already been constructed and is a known entity.
- The Site is an NCDOT legacy mitigation site, and NCDOT has been involved with the Site for over 12 years.
- The Site has completed five years of monitoring.
- The Site has mostly met success criteria.
- The Site is a large, high-quality mitigation site, and is showing trends toward a mature forested wetland and riverine system over much of the mitigation area.
- The Site occurs in the same Level IV ecoregions as the proposed non-riverine GSA.

11.0 MAINTENANCE PLAN

Maintenance of the CMB will be assumed by the USFS after the Site is transferred from the NCDOT to the USFS. Maintenance of roadways, culverts, habitat, and forest stands for fire risk will occur as prescribed in the MOU between the USFS and the NCDOT, as well as the Forest Plan for Management Area 7. The Site is expected to be transferred to the USFS after the release of the available credits and final certification of the Site by the IRT.

12.0 MANAGEMENT PLANS

12.1 LONG TERM MANAGEMENT PLAN

The Site is proposed to be managed by the USFS under the terms of the MOU between the USFS and the NCDOT, as well as the Forest Plan for Management Area 7. The Forest Plan has been developed in accordance with the National Forest Management Act of 1976.

12.2 ADAPTIVE MANAGEMENT PLAN

The Site is proposed to be managed by the USFS under the terms of the MOU between the USFS and the NCDOT, as well as the Forest Plan for Management Area 7. In the event that unforeseen, stochastic circumstances occur that affect the management of the Site, the USFS management strategies will address the issues that arise.

13.0 FINANCIAL ASSURANCES

The Site is proposed to be managed as part of an umbrella mitigation bank, which will have its own distinct cost center number within the NCDOT budgeting and financial tracking system. Therefore, all accounting for revenues, contract encumbrances, fund transfers, and expenses, will be performed and reported independent from other capital budget or operating budget accounting.

References

- N.C. Department of Transportation (NCDOT), 2000. Wetland Mitigation Plan For Croatan Wetland Mitigation Bank in Craven County, North Carolina (T.I.P. Number R-1015WM). 83pp.
- U.S. Army Corps of Engineers (USACE) and N.C. Division of Water Quality (NCDWQ), 2007. Information regarding stream restoration in the Outer Coastal Plain of NC. 10pp.
- N.C. Ecosystem Enhancement Program (NCEEP), 2007. Annual Report for 2006, Croatan Wetland Mitigation Bank. EEP Project 103. 87pp.
- N.C. Ecosystem Enhancement Program (NCEEP), 2006. Annual Report for 2005, Croatan Wetland Mitigation Bank. EEP Project 103. 87pp.
- U.S. Army Corps of Engineers (USACE), N.C. Department of Transportation (NCDOT), and U.S. Forest Service (USFS). 2003. Memorandum of Understanding between the U.S. Army Corps of Engineers, State of North Carolina Department of Transportation, and the United States Forest Service for the Disposition and Management of the Croatan Wetland Mitigation Bank in Craven County, North Carolina. Agreement No. 02-MU-11081100-034. 5pp.
- Wetland Functional Assessment Team (2008). N.C. Wetland Assessment User Manual, Version 1.0. 213pp.

Appendix A

Figures 1-4

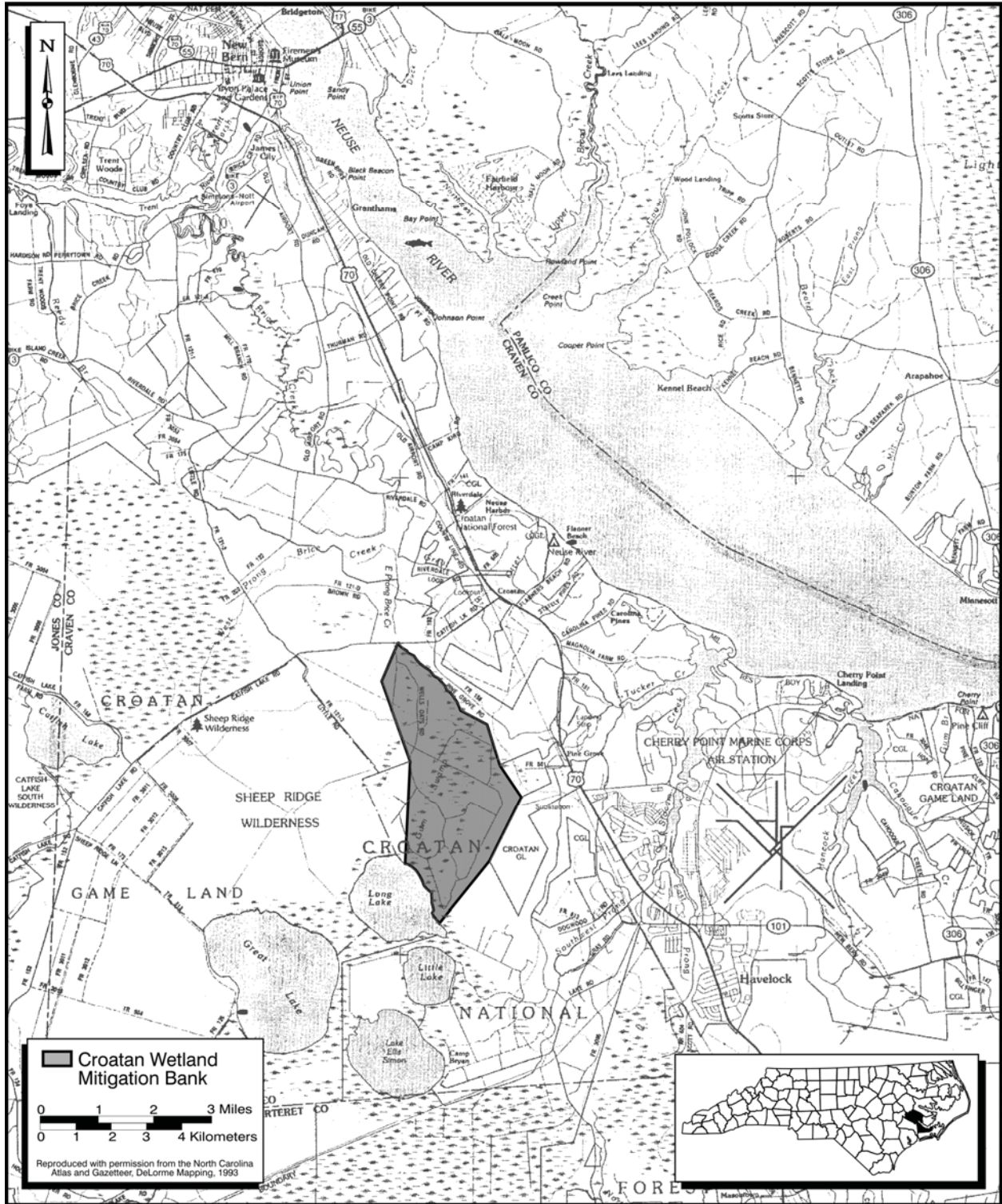
Figure 1. Site Location

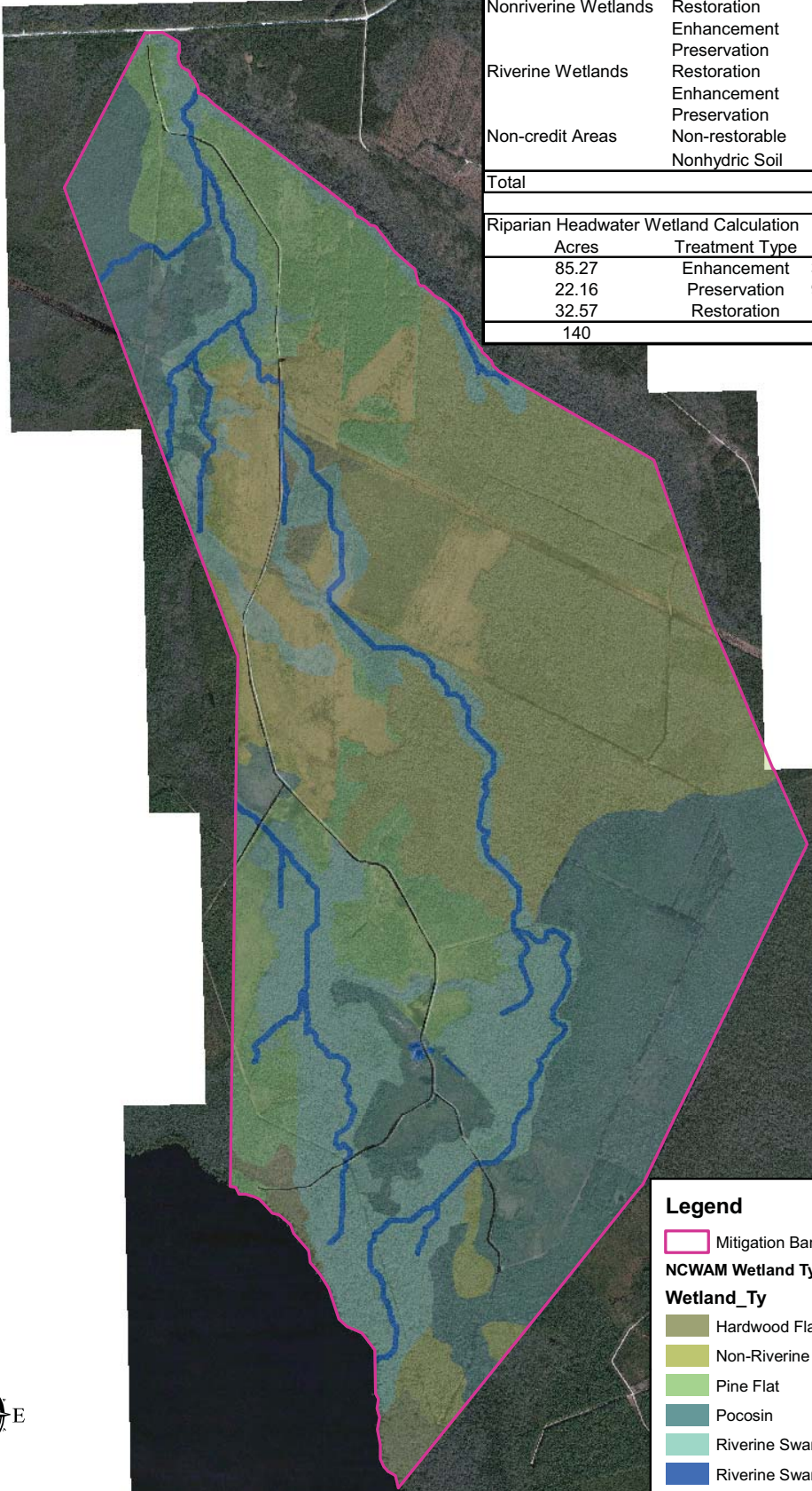
Figure 2. NCWAM Wetland Types

Figure 3. Geographic Service Area for Riparian (Riverine) wetland and stream credits

Figure 4. Geographic Service Area for Non-Riparian (Non-Riverine) wetland types

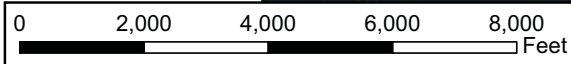
Figure 1. Site Location Map





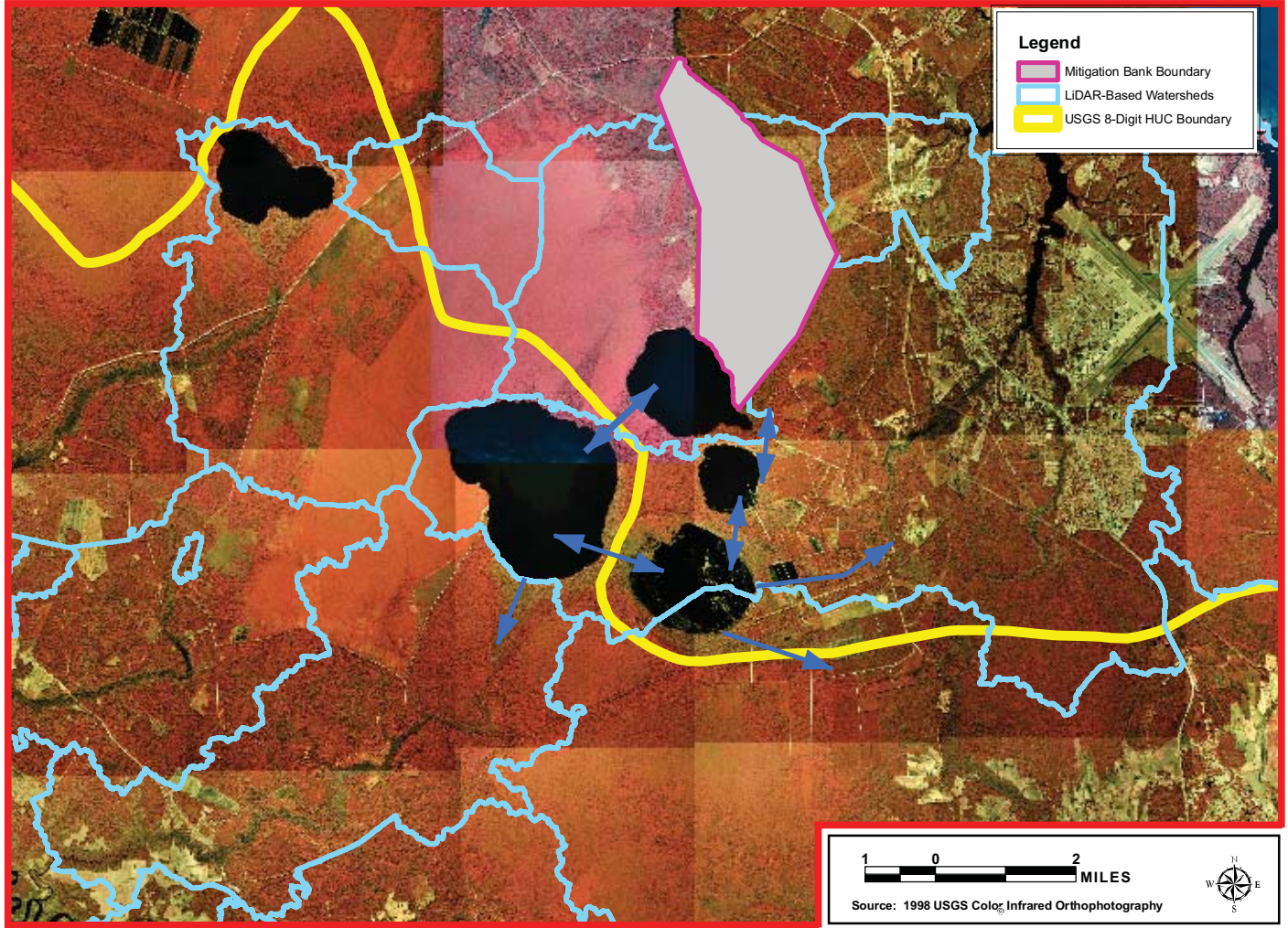
CWMB Component		Total (acres)
Nonriverine Wetlands	Restoration	1308.52
	Enhancement	1514.37
	Preservation	264.02
Riverine Wetlands	Restoration	176.28
	Enhancement	561.03
	Preservation	134.78
Non-credit Areas	Non-restorable	46.00
	Nonhydic Soil	29.60
Total		4034.60

Riparian Headwater Wetland Calculation			
Acres	Treatment Type	Linear Ft	Credits
85.27	Enhancement	37143.61	18571.81
22.16	Preservation	9652.896	1930.579
32.57	Restoration	14187.49	14187.49
140		60984	34689.88

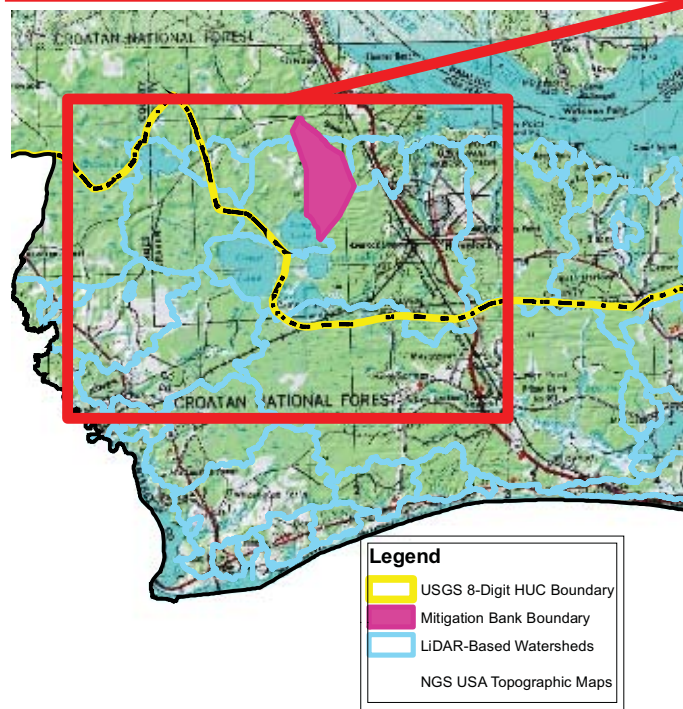


Legend

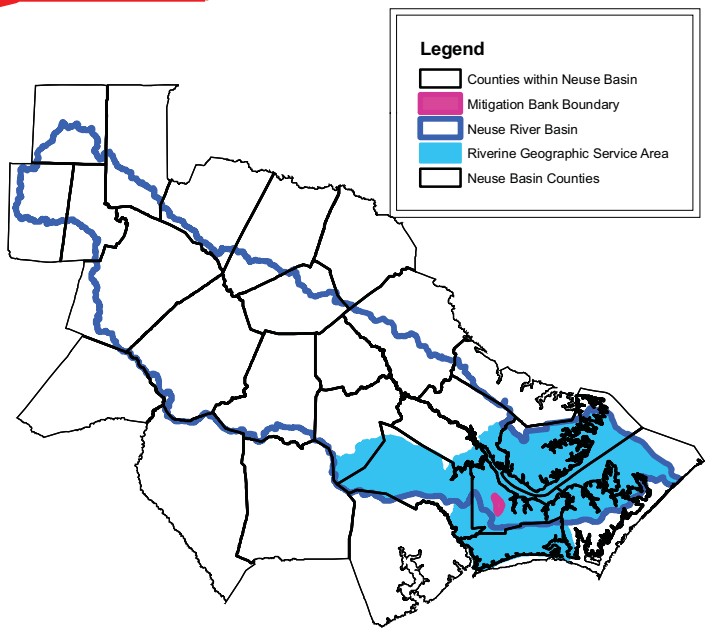
- Mitigation Bank Boundary
- NCWAM Wetland Types**
- Wetland_Ty**
- Hardwood Flat
- Non-Riverine Swamp Forest
- Pine Flat
- Pocosin
- Riverine Swamp Forest
- Riverine Swamp Forest - Stream
- Road
- Water



1 0 2 MILES
 Source: 1998 USGS Color Infrared Orthophotography



Legend
 USGS 8-Digit HUC Boundary
 Mitigation Bank Boundary
 LiDAR-Based Watersheds
 NGS USA Topographic Maps



Legend
 Counties within Neuse Basin
 Mitigation Bank Boundary
 Neuse River Basin
 Riverine Geographic Service Area
 Neuse Basin Counties

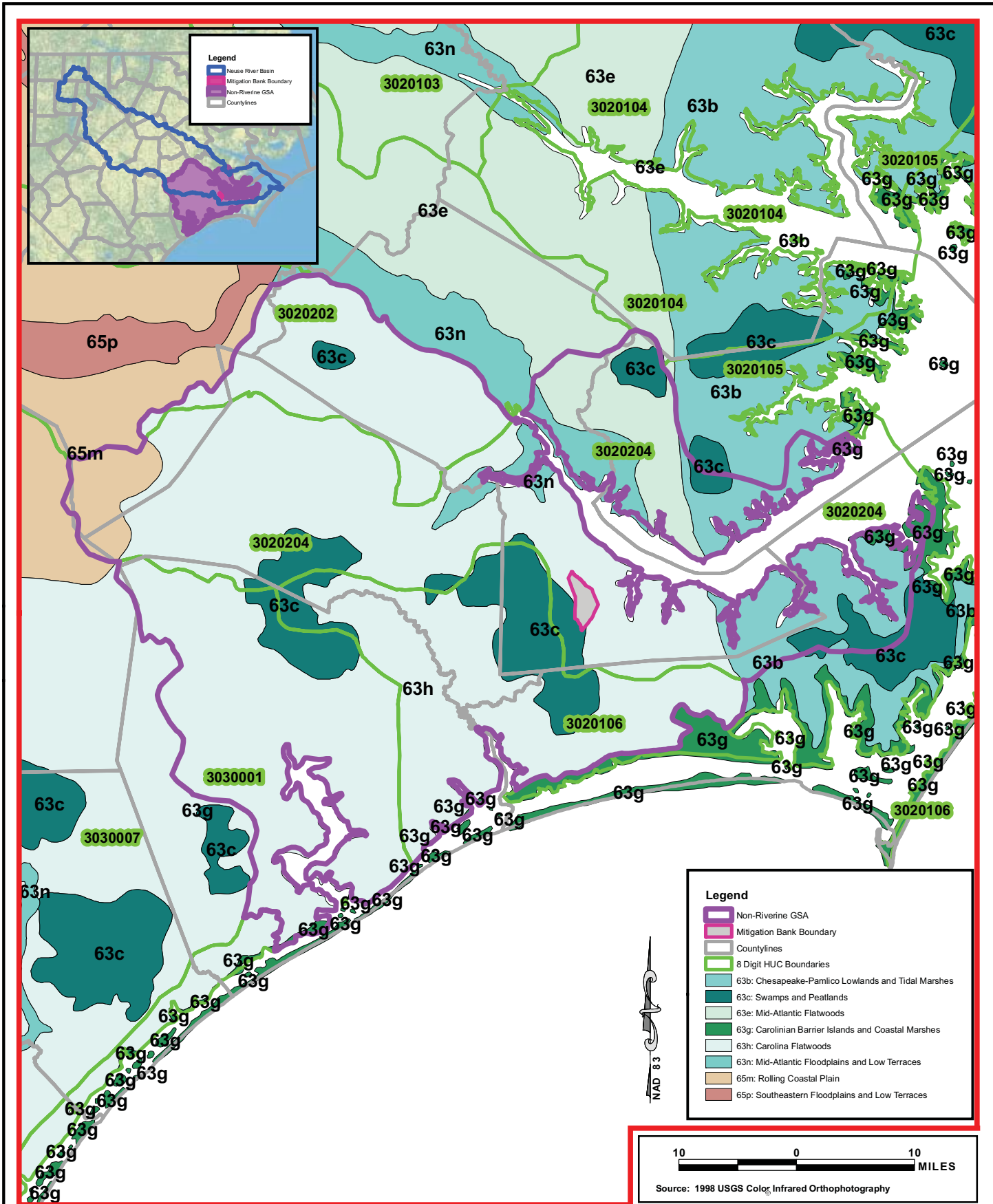
Proposed Riverine GSA



Prepared By: _____
 Prepared For: _____
**Geographic Service Area for
 Riverine Wetland and Stream Credits
 Croatan Mitigation Bank
 CRAVEN COUNTY, NORTH CAROLINA**

Dwn By: _____
 MTC
 Ckd By: _____
 Date: _____
 DEC 2008
 Project No.: _____
 100004922

FIGURE
3



Prepared By:



**Geographic Service Area for
Non-Riverine Wetland Credits
Croatan Mitigation Bank
CRAVEN COUNTY, NORTH CAROLINA**

Dwn By: MTC
 Ckd By:
 Date: JAN 2009
 Project No.: 100004922

FIGURE
4

