

MITIGATION BANK PROSPECTUS

JEAT TRACT NORTHEAST CAPE FEAR UMBRELLA MITIGATION BANK

Pender County, North Carolina

Sponsor:

*Shaw Highway Properties, LLC
(attn. Cal Miller, Member/Manager)*

Prepared by:

*Land Management Group, Inc.
Wilmington, NC*

October 6, 2016

TABLE OF CONTENTS

I.	EXECUTIVE SUMMARY	1
II.	INTRODUCTION	2
	A. Project Overview	2
	B. Site Location	2
	C. Watershed Characterization	3
	D. Mitigation Goals	4
	E. Geographic Service Area	5
III.	BASELINE CONDITIONS	5
	A. Community Types	5
	B. Vegetation	6
	C. Soil Characteristics	6
	D. Hydrology/Hydraulic Characteristics	7
IV.	CONCEPTUAL PLAN	7
	A. Wetland Preservation	7
	B. Stream Preservation	8
	C. Habitat Corridor	9
V.	BANK OPERATION	9
VI.	CONCLUSION	12
VII.	SOURCES OF INFORMATION	14

LIST OF FIGURES, TABLES, AND APPENDICES

Figure 1	Vicinity Map
Figure 2	Topographic Map
Figure 3	LiDAR Map
Figure 4	Soils Map
Figure 5	Aerial Photograph
Figure 6	Geographic Service Area (GSA)
Figure 7	Composite Map of Contiguous Protected Lands

Table 1..... Preliminary Mitigation Type and Quantity
Table 2.....Summary Table of Contiguous Protected Lands
Table 3..... Proposed Project Timetable
Table 4..... Sample Credit Release Schedule (Wetlands)
Table 5..... Sample Credit Release Schedule (Streams)

Appendix A..... Preliminary Wetland Map
Appendix B..... Ecoregion Map
Appendix C.....NC WAM Forms
Appendix D..... Site Photographs
Appendix E Historical Aerial Photographs
Appendix F NC SAM Assessment

I. EXECUTIVE SUMMARY

On behalf of Shaw Highway Properties, LLC (Bank Sponsor), Land Management Group, Inc. (LMG) is submitting the following prospectus for the addition of the Jeat Tract (an approximate 168-acre project area) to the existing Northeast Cape Fear Umbrella Mitigation Bank (Bank). The existing Bank has been implemented to provide compensatory mitigation for authorized stream and wetland impacts with the Northeast Cape Fear River Basin (USGS 8-digit hydrologic unit 03030007). The initial phase of the Bank consists of one 1,153-acre tract (Holly Shelter Bay site) located adjacent to Holly Shelter Game Lands in Pender County, North Carolina. The Jeat site consists of approximately 160 acres of high-quality tidal freshwater riverine swamp forest, 4,000 linear feet (lf) of first-order streams, and 8 acres of upland habitat corridor that extends from Shaw Highway (across from the existing Holly Shelter Bay site of the Bank) to the riverine swamp wetlands along the Northeast Cape Fear River. Additional stream and riparian sites in the Northeast Cape Fear cataloging unit are also currently being evaluated for potential inclusion in the existing Bank. The following Prospectus provides more specific information on the Jeat Tract. The information provided is intended to serve as the basis for the modification of the existing MBI.

The Jeat site provides an opportunity to preserve high-quality tidal riverine swamp forest and streams and to provide an important link in protected lands from U.S. Highway 17 near Holly Ridge to the Northeast Cape Fear River (west of Shaw Highway). In addition, the Jeat property abuts approximately 895 acres of protected lands (located immediately north on the Northeast Cape Fear River).

The following prospectus provides general information regarding the existing conditions as well as preliminary acreage totals for the proposed preservation of riparian wetlands on the Jeat Tract. Upon receipt of the IRT Evaluation Letter, the Sponsor intends to modify the existing umbrella instrument to incorporate the Jeat site into the existing Northeast Cape Fear Umbrella Mitigation Bank.

II. INTRODUCTION

A. Project Overview

The Jeat preservation site (approximately 168 acres) consists predominantly of tidal freshwater riverine swamp forest abutting the Northeast Cape Fear River. The preservation area is part of a larger tract that is approximately 400 acres total. The remaining portion of the site not included in the proposed project consists entirely of non-jurisdictional uplands. Future land use includes conceptual plans for residential development on the uplands. Protection of the mature riverine wetlands is considered particularly important due to planned upland development and potential threats to the adjacent high quality wetlands and waters. The riparian (riverine) wetlands appear to have been maintained in their current natural state since at least the 1930s. The site includes approximately 160 acres of wetlands and an 8 acre upland habitat corridor. The site is proposed to be included in the existing Northeast Cape Fear Umbrella Mitigation Bank.

Given the landscape position, hydrology, vegetation, and soil types occurring on the tract, the entire 160-acre wetland preservation area consists of riparian riverine swamp forest habitat (NCWFAT 2010). The site consists predominantly of organic and mucky mineral hydric soils characteristic of bottomland swamps of the outer Coastal Plain. Representative mapped soil units include Dorovan muck and Pactolus fine sand. These series are very poorly drained to moderately well drained soils characteristic of bottomlands and stream terraces. A preliminary wetland mapping performed by LMG indicates that approximately 160 acres of high quality riparian wetlands exist on the site (refer to attached preliminary wetland map – Appendix A). LMG will soon conduct a comprehensive wetland delineation. An approved jurisdictional determination will be obtained.

B. Site Location

The tract is located just northwest of the intersection of NC Hwy 210 and Shaw Highway (east of Interstate 40), near Rocky Point (Pender County), NC. The site abuts the Northeast Cape Fear River and is directly across Shaw Highway from the Holly Shelter Bay Tract of the existing Northeast Cape Fear Umbrella Mitigation Bank. The tract is bounded by the Cape Fear River Wetlands Game Land to the north (an approximate 895-acre protected game land owned by the North Carolina Wildlife Resources Commission). The Northeast Cape Fear River abutting the site and the wetlands on-site are designated as a North Carolina Significant Natural Heritage Area

(SNHA) by the North Carolina Natural Heritage Program (LeBlond 2000). The Northeast Cape Fear River Floodplain SNHA possesses outstanding scenic values and is one of the largest and most important landscape connections in the southeastern part of the state. In addition, it is classified as vulnerable to extinction (due to its limited range of occurrence and threat to degradation). Refer to the enclosed site location map (Figure 1), USGS topographic quadrangle (Figure 2), LiDAR topographic map (Figure 3), and the Pender County Soil Survey map (Figure 4) for additional site information. A 2012 aerial photograph of the site (Figure 5) is also enclosed for reference.

C. Watershed Characterization

The Jeat Tract is located within the Northeast Cape Fear River watershed (DWQ Subbasin 03-06-23). The subbasin consists of managed forestry tracts, low-density residential and high density commercial/industrial developments along the Highway 210 and Interstate 40 corridors. Increased development and population growth is expanding in the areas north of Wilmington, NC. According to the State Data Center, New Hanover and Pender Counties are among the highest projected growth counties in the state (with projected population increases of over 13% from 2020-2030). Increased development pressures in the northern part of New Hanover County and southern Pender County (within the Northeast Cape Fear River Basin) are anticipated with the completion of the Wilmington Bypass (I-140) and the construction of the Hampstead Bypass (US Highway 17). The completion of these roads will provide for improved transportation routes from the northeastern portion of the region to the southwestern portion of the region (inclusive of the I-40 corridor and the watershed of the Jeat and Holly Shelter Bay Bank sites).

The North Carolina Division of Water Resources (NCDWR) surface water body classification for the Northeast Cape Fear River is C-Sw and applies to the section of river abutting the project site. The classification “C” denotes waters protected for secondary uses such as secondary recreation, fishing, wildlife, fish consumption, aquatic life including propagation, survival and maintenance of biological integrity, and agriculture. “Secondary recreation includes wading, boating, and other uses involving human body contact with water where such activities take place in an infrequent, unorganized, or incidental manner.” The classification “Sw” denotes swamp waters. The Northeast Cape Fear River is habitat for anadromous fish such as hickory shad, striped bass, and Atlantic sturgeon. Wetlands within the project area drain directly to the

Jeat Tract Prospectus

Northeast Cape Fear River (with mapped primary nursery area located one mile downstream from the Jeat property).

Streams and waterbodies within the watershed are susceptible to impairment from nutrient loading, low ambient dissolved oxygen (DO) concentrations, and fecal bacteria contamination. Lillington Creek (located immediately upstream of the Jeat property) is listed as a 303(d) impaired waters for exceeding criteria suitable for the “Sw” classification. Overall, the Northeast Cape Fear River and its tributaries are susceptible to water quality impairments associated with low DO, high total nitrogen, and high total phosphorous. High nutrient concentrations originate from non-point source loading. Sediment loading (associated with intensive silvicultural and agricultural drainage practices) is prevalent throughout the watershed. These impairments tend to be exacerbated by upland development, logging practices, and other direct disturbances to streams and wetlands (such as prior channelization of streams and ditching of adjacent wetlands). The cumulative effects of such practices result in diminished nutrient uptake and nutrient/sediment loading to down-gradient waters.

D. Mitigation Goals

The goal of the existing Northeast Cape Fear Umbrella Mitigation Bank is to provide high-quality compensatory mitigation for permitted impacts within the Northeast Cape Fear River Basin via the restoration, enhancement, and preservation of wetlands and streams. The addition of the Jeat site to the umbrella mitigation bank will result in the preservation of high quality riparian wetlands abutting the Northeast Cape Fear River and a direct connection between the existing bank and the river via a protected habitat corridor. Refer to Table 1 for the type and quantity of mitigation proposed at this time.

Table 1. Preliminary Mitigation Type and Quantity

Community Type	Mitigation Type	Quantity (ac/lf)	Credit Ratio	Potential Credits
Riparian Wetlands (Riverine Swamp Forest)	Preservation	160	5:1	32
First-Order Stream	Preservation	4,000	2.5:1	1,600
Upland Habitat Corridor	Preservation	8	1:0	0
	Total Wetlands (Riparian, Riverine)			32
	Total Stream			1,600

E. Geographic Service Area

The Jeat Tract is located within the Middle Atlantic Coastal Plain (Ecoregion 63) as defined by Griffith et al. (2002) "Ecoregions of North Carolina" (Appendix B). This ecoregion encompasses the area defined as the 'Carolina Flatwoods' – a subregion occurring along nearly level, poorly drained areas in the outer Coastal Plain including the Cape Fear River Basin.

The "Ecoregions of North Carolina" is a collaborative effort between the NRCS, EPA, NCDENR, U.S. Geological Service (USGS), U.S. Forestry Service (USFS), and the University of North Carolina (UNC). The Ecoregions Project has identified areas of North Carolina consisting of ecosystems that are similar in type, quantity, and quality of environmental resources. Characteristics of ecoregions include similar geology, physiography, vegetation, climate, soils, land use, wildlife, and hydrology.

The Geographic Service Area (GSA) is the designated area wherein a bank can reasonably be expected to provide appropriate compensation for impacts to similar wetland and/or other stream or aquatic functions. The site is located within the Northeast Cape Fear Hydrologic Unit (Hydrologic Unit Code 03030007); therefore, no changes to the current GSA boundary are proposed. Refer to Figure 6 for the location and extent of the GSA (HUC 03030007). The umbrella mitigation banking instrument identifies the specific GSA approved by the IRT.

III. BASELINE CONDITIONS

A. Community Type

The proposed wetland preservation areas consist of riparian (riverine) swamp forest communities. Based upon the Cowardin classification for wetland and deepwater habitats (Cowardin et al. 1979), the wetland community type to be preserved is Palustrine Forested Wetland (broad-leaved deciduous and needle-leaved deciduous; semi permanently flooded).

The wetlands have been evaluated using the North Carolina Wetland Assessment Method (NC WAM). The purpose of NC WAM is to provide the public and private sectors with an accurate, consistent, rapid, observational, and scientifically based field method to determine the level of function of a wetland relative to reference condition (when appropriate) for each general

wetland type in North Carolina (NCWFAT 2010). NC WAM generates two wetland functional ratings: the first is a reflection of wetland condition as represented by on-site indicators of function, and the second is wetland condition as modified by wetland opportunity (determined by the condition of the watershed draining to a specific wetland) (NCWFAT 2010). For this site, NC WAM has been used to consider the chemical, physical, and biological functions for each wetland polygon and assess the general performance of each function relative to the wetland type. The functional ratings of both of these wetland polygons was High. Refer to Appendix C for a compilation of the functional ratings for each wetland. The enclosed site photographs depict existing conditions of the wetlands proposed for preservation (Appendix D).

B. Vegetation

Dominant canopy species in the proposed wetland preservation area include swamp black gum (*Nyssa biflora*), bald cypress (*Taxodium distichum*), water tupelo (*Nyssa aquatica*), and red maple (*Acer rubrum*). The wetlands do not appear to have been clear-cut since at least the 1930s (refer to attached historic aerial photographs in Appendix E). However, evidence of older cypress stumps suggest that some thinning may have occurred approximately 40-50 years ago. Common shrubs include American holly (*Ilex opaca*), titi (*Cyrilla racemiflora*), and tag alder (*Alnus serrulata*). The herbaceous stratum is generally sparse due to prolonged inundation. Hummocks and higher portions of the wetlands include species such as cinnamon fern (*Osmundastrum cinnamomeum*) and various sedges (*Carex* spp.). Cape Fear spatterdock (*Nuphar saggitifolia*) is prevalent along the riverfront. Pennywort (*Hydrocotyle* spp.) and alligator weed (*Alternanthera philoxeroides*) are dense in some old oxbows of the river. The most common woody vine is laurel-leaf greenbrier (*Smilax laurifolia*).

C. Soil Characteristics

The wetlands proposed for preservation (bordering the Northeast Cape Fear River) exhibit nearly level topography. The site is mapped in the Goldsboro-Norfolk-Exum and Foreston-Autryville-Baymeade general soil units. The Goldsboro-Norfolk-Exum assemblage is characterized by “nearly level to gently sloping, moderately well drained and well drained soils that have a sandy or loamy surface layer and a loamy subsoil” (USDA 1990). The Foreston-Autryville-Baymeade general soil unit consists of “nearly level to gently sloping, moderately well drained and well drained soils that have a sandy surface layer and a loamy or sandy subsoil” (USDA 1990). The predominant wetland soil unit occurring on the tract is the Dorovan muck soil

series (Figure 4). This soil occurs on low floodplains along streams and is very poorly drained. This soil unit is characterized by low chroma (black and very dark brown) muck about 60 inches thick underlain by very dark gray loamy sand.

D. Hydrology/Hydraulic Characteristics

The site consists of relatively unaltered tidal freshwater riverine swamp forest. According to NC WAM, undisturbed riverine swamp forests exhibit seasonal to semi-permanent inundation (NCWFAT 2010). Sources of hydrologic input include overbank and/or tidal flooding, groundwater, and overland runoff.

IV. CONCEPTUAL PLAN

A. Wetland Preservation

Approximately 160 acres of existing, high quality riparian (riverine) wetlands have been identified for preservation within the site (Appendix A). Wetland hydrology in these areas is unaltered by any drainage features. The canopy of the riverine swamp forest is dominated by mature swamp black gum (*Nyssa biflora*), bald cypress (*Taxodium distichum*), water tupelo (*Nyssa aquatica*), and red maple (*Acer rubrum*). Based upon the functional assessment performed (NC WAM), the functional ratings for the wetland polygons to be protected under a conservation easement are “High”. Preservation of the wetlands on the Jeat property is considered particularly beneficial due to the anticipated development of the uplands that could result in the construction of individual piers for each lot of the pending subdivision (along the entire length of the property’s riverfront). Additional threats include the logging of mature hardwoods to establish viewsheds and/or for sale of timber. Preservation of riverine wetlands (particularly those designated as a Significant Natural Heritage Area in a rapidly growing region of the state) is in keeping with goals of NC DEQ’s Cape Fear River Basin Restoration Priorities (RBRP) as well as the Coastal Habitat Protection Plan (CHPP). Further, the preservation of the site will provide habitat connectivity between thousands of acres of protected lands and connect regionally important wetland complexes.

Due to the existence of an intact, mature canopy, no earthwork or planting activities are proposed for the preservation areas. All of the existing wetlands and the designated upland habitat corridor will be protected through appropriate legal covenants. These covenants will

assure that the wetlands will be preserved in their natural state in perpetuity. A comprehensive wetland delineation will be performed prior to the production of a conservation easement plat and prior to execution of an amended banking instrument.

B. Stream Preservation

The Jeat Tract abuts the Northeast Cape Fear River. A number of federally-listed species have been identified as occurring within the river. A majority of these species are associated with wetland and aquatic habitats. Listed rare species include the American alligator (*Alligator mississippiensis*) and Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*). Other species of anadromous fish including hickory shad (*Alosa mediocris*) and striped bass (*Morone saxatilis*) are also known to occur within this section of the Northeast Cape Fear River. Preservation of stream corridors provides functional benefits to the habitats that support these species.

Approximately 4,000 lf of Coastal Plain stream will be preserved as part of the larger Bank project (Appendix F). The six stream reaches targeted for preservation are all relatively large, perennial, single-thread first order streams that originate within the river floodplain. Stream channels within these areas retain the characteristic dimension, plan, and profile relative to their watershed. As a result, the stream/floodplain interaction remains intact and functional. In addition, sufficient canopy coverage also exists to regulate stream temperatures during summer months.

The streams were assessed utilizing the methods described in the 2014 North Carolina Stream Assessment Methodology (NC SAM) (NC Stream Functional Assessment Team 2014). The NC SAM forms determine stream quality and function. One NC SAM field assessment form was completed for each stream reach in September 2016. All of the stream reaches scored High on the NC SAM rating calculator (Appendix F).

The majority of the stream reaches are accessible from the river by boat during high water conditions. Streams 4 and 6 are not accessible by motorboat due to a high concentration of aquatic macrophytes at the downstream confluences of the streams with the river. The streams range in width from approximately 15 feet to 100 feet. Depth ranges from approximately 4 feet to >8 feet (limit of sampling equipment used during the stream assessment). A relatively large, stable beaver dam was observed at Stream 4 approximately 200 feet below the stream origin.

Jeat Tract Prospectus

Northeast Cape Fear Umbrella Mitigation Bank
Northeast Cape Fear River Basin (HUC 03030007)

The riverine floodplain abutting the streams contain several large specimens of bald cypress (*Taxodium distichum*) and swamp black gum (*Nyssa biflora*). At the time of the stream assessment (September 2016), the floodplain exhibited several feet of inundation. The floodplain canopy abutting Stream 6 is less mature than at the other streams but is still adequate for stream shading. Refer to Appendix F for site photographs of existing conditions at the streams and associated floodplain.

C. Habitat Corridor

As indicate above, approximately 8 acres of upland will be included within the recorded conservation easement. The upland area is designated as a protected habitat corridor between the Holly Shelter Bay Bank site and the riverine wetlands of the Northeast Cape Fear River. The inclusion of the Jeat property will provide protected habitat connectivity between Holly Shelter Game Lands (from US Highway 17 in Holly Ridge) to the Northeast Cape Fear River (by way of the existing Holly Shelter Bay Bank site). In addition, the Jeat site will provide an important, protected link to the existing NE Cape Fear Game Lands (an approximate 895-acre protected site owned by the NC Wildlife Resources Commission) and expand the area of contiguous protected corridor along this section of the river. The following table (Table 2) lists the contiguous lands currently under conservation or planned for conservation within the vicinity of the NECFUMB. Figure 7 depicts the location and extent of the contiguous properties under conservation in the area.

V. BANK OPERATION

The Bank Sponsor (Shaw Highway Properties, LLC) has an option to purchase the portion of the Jeat Tract that includes the wetlands proposed for preservation and the upland habitat corridor. Prior to the modification of the existing banking instrument, the Sponsor will own fee simple title to the property. The Sponsor has implemented and successfully completed several mitigation projects (including permittee-responsible, in-lieu fee, and mitigation bank projects) in Ohio and North Carolina. Staff members working on the project for the Sponsor have advanced degrees in Forestry/Natural Resources and Engineering. As a result, the Sponsor is well-versed in site management. The Sponsor has also contracted with LMG for environmental services associated with the design and implementation of the bank site. Over the last decade, LMG has designed and implemented numerous wetland restoration projects for full-delivery (NC Division

Jeat Tract Prospectus

of Mitigation Services and NC DOT), private wetland and stream mitigation bank sites, and permittee-responsible mitigation (PRM).

Table 2. Contiguous Protected Lands in Vicinity of the NECFUMB

Name of Tract	Size (acres)	Location	Owner
Holly Shelter Game Lands	54, 232	Highway 17 Pender County	NC WRC
Holly Shelter Bay Site	1,153	Shaw Highway	Shaw Highway Properties LLC
Jeat Tract	168	Shaw Highway – NE Cape Fear River	JEAT LLC (under option by Shaw Highway Properties LLC)
Cape Fear River Wetlands	895	Shaw Highway – NE Cape Fear River	NC WRC
Greentree	162	Shaw Highway – NE Cape Fear River	NC WRC
Pender-4	802	Stag Park Road – NE Cape Fear River	NC WRC
Bear Garden	7,985	Shaw Highway and Old Maple Hill Rd	NC WRC
Wells Tract	107	Old Bannermans Bridge Road NE Cape Fear River	NC WRC
Angola Bay	24,483	Wallace Area Pender/Duplin Counties	NC WRC

Many of the site evaluations (e.g. soil profile descriptions, hydrologic evaluations, and vegetative surveys) have been completed for the site. More detailed habitat assessment and survey work will be necessary for the inclusion of the Jeat site into the Northeast Cape Fear Umbrella Mitigation Bank. A comprehensive wetland delineation will be performed and an approved jurisdictional determination will be acquired from the USACE prior to the final modified banking instrument. Upon execution of the MBI modification by the Interagency Review Team (IRT), the bank Sponsor (WRC) will initiate the inclusion of the Jeat site into the existing Northeast Cape Fear Umbrella Mitigation Bank.

Mitigation bank credits will be calculated using the following standard:

<u>Mitigation Type</u>	<u>Ratio</u>
Wetland Preservation (Riparian, Riverine)	5:1
Stream Preservation	2.5:1

Use of credits from the Bank to offset wetland impacts authorized by federal permits or state water quality certifications must be in compliance with the Clean Water Act, Section 404 (b)(1) guidelines and other applicable federal and state legislation, regulations, and policies. Prior to release of bank credits, the following requirements will be met: (1) modification of the MBI; (2) recordation of the conservation easement; and (3) establishment of appropriate financial assurances. Given the identified ratio for wetland preservation it is estimated that 32 riparian wetland credits will be derived from the Jeat site. Additional sites may be added in the future under the Northeast Cape Fear Umbrella Mitigation Bank.

The tentative schedule for establishment of the bank site is outlined in Table 3. The corresponding credit release schedules are outlined in Table 4 and Table 5. Note that the final, approved credit release schedule will be identified in the modification of the existing banking instrument prior to execution by IRT members and the Sponsor.

Table 3. Proposed Project Timetable.

Task	Project Milestone	Projected Completion
1.0	Execution of modified MBI	December 2016
2.0	Recordation of Conservation Easement Deed	February 2017

Table 4. Sample Credit Release Schedule (Wetland Preservation)

Task	Projected Completion Date	Percentage of Wetland Credits Released (% Cumulative)	Percentage of Credits Released (% Cumulative)
1.0. Execution of modified MBI; Recordation of Conservation Easement	2/2017	15 (15)	4.8
2.0 Completion of Physical and Biological Improvements	2/2018	85 (100)	27.2
Total		100%	32.0

Table 5. Sample Credit Release Schedule (Stream Preservation)

Task	Projected Completion Date	Percentage of Stream Credits Released (% Cumulative)	Percentage of Credits Released (% Cumulative)
1.0. Execution of modified MBI; Recordation of Conservation Easement	2/2017	15 (15)	240
2.0 Completion of Physical and Biological Improvements	2/2018	85 (100)	1,360
Total		100%	1,600

Ownership of the site will reside with the Bank Sponsor who intends to transfer a perpetual conservation easement to an appropriate 501(c)3 non-profit organization (as approved by the IRT) for long-term protection of the site. The most likely easement holder will be the Land Trust for America which currently holds the easement for the existing Northeast Cape Fear Umbrella Mitigation Bank. Other potential easement holders may include the North Carolina Coastal Land Trust or the Cape Fear River Watch. The conservation easement will be recorded upon IRT approval and execution of the modified MBI. The transferee will be responsible for maintaining the Bank in accordance with a Conservation Easement placed on the Bank Site for perpetual protection as described in the existing Mitigation Plan.

The Sponsor has accounting procedures in place for maintaining accurate records of debits made from the bank that is acceptable to the IRT. Such procedures include the generation of a debit report by the Sponsor documenting all credits used at the time they are debited from the bank. Notification to the IRT is typically provided within 30 days of the date of credit sale. In addition, the Sponsor prepares an Annual Report (i.e. ledger) to be provided to the IRT every calendar year. The ledger documents all credits used and the balance of credits remaining. The Sponsor's reporting obligations hereunder shall end upon the sale of all credits or termination of the MBI, whichever event first occurs.

VI. CONCLUSION

Site evaluations completed to date indicate that the Jeat Tract is well-suited for high-quality riparian (riverine) swamp forest and stream preservation. Approximately 160 acres of wetland preservation has been identified for inclusion within a conservation easement. Preservation of the riverine wetlands along this portion of the Northeast Cape Fear River is viewed as particularly beneficial in light of the functional benefits these wetlands provide and the potential for degradation threats (via upland development and logging). Furthermore, the proposed project will ensure increased habitat connectivity between regionally significant preservation lands (including Holy Shelter Game Lands and the NE Cape Fear River Wetland sites that are under ownership of the State of North Carolina). By providing wetland and stream credits (in combination with the existing Holly Shelter Bay Bank site) prior to authorized impacts, loss of wetland and stream functions within the watershed are

minimized. Overall, the inclusion of the Jeat site into the existing Northeast Cape Fear Umbrella Mitigation Bank has the potential to result in discernable ecological benefits within a watershed currently experiencing rapid growth and development pressure.

VII. SOURCES OF INFORMATION

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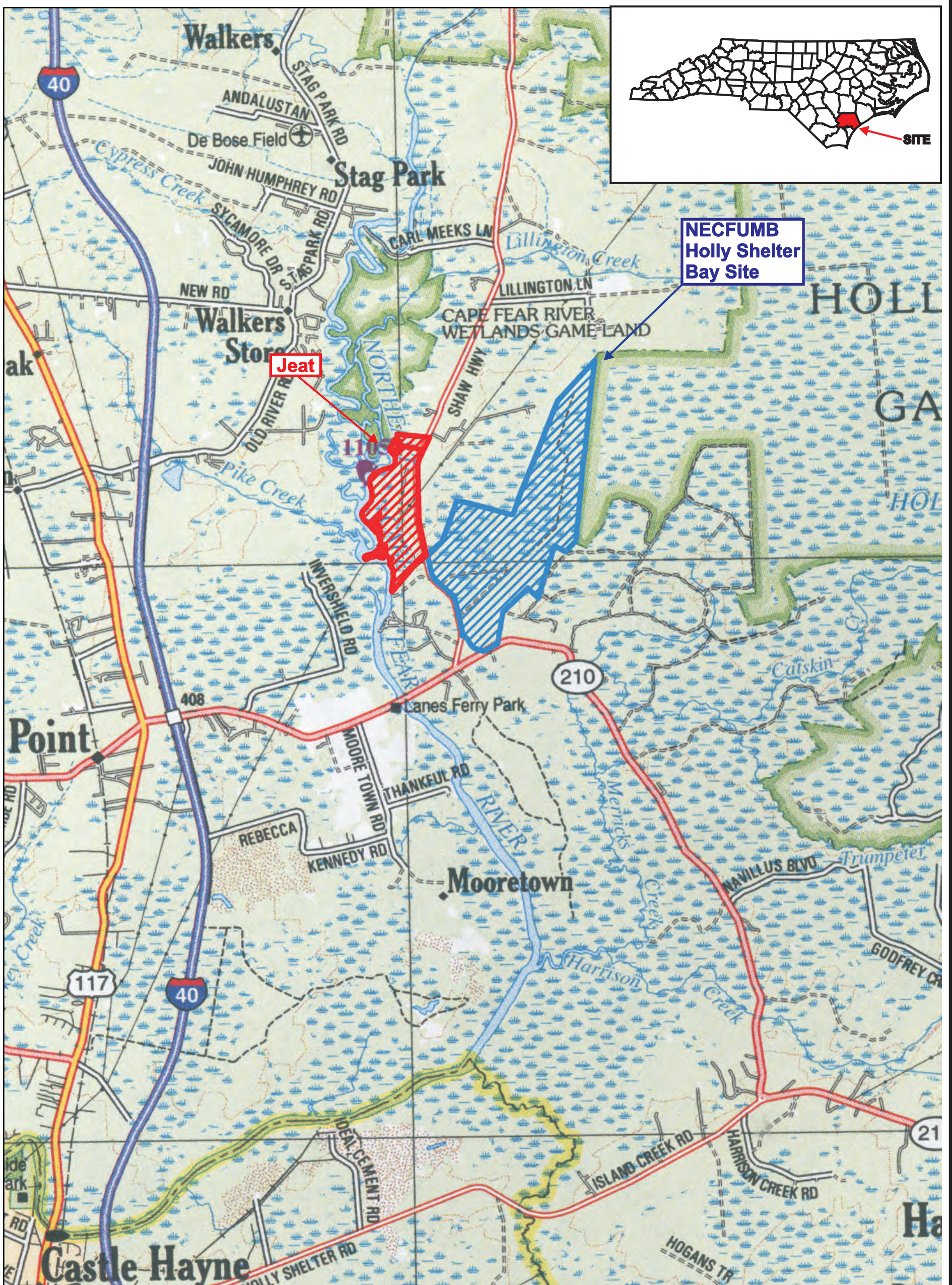
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FIGURES

Jeat Mitigation Site (Shaw Highway - Pender County, North Carolina)
Northeast Cape Fear Umbrella Mitigation Bank
Northeast Cape Fear River Basin (HUC 03030007)



Legend

- Jeat Tract
- NECFUMB - Holly Shelter Bay Site

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*Boundaries are approximate and are not meant to be absolute.

Map Source: DeLorme Atlas & Gazetteer, Pg 85 (2010)



SCALE 1" = 1 mile
(when printed at 11"x17")

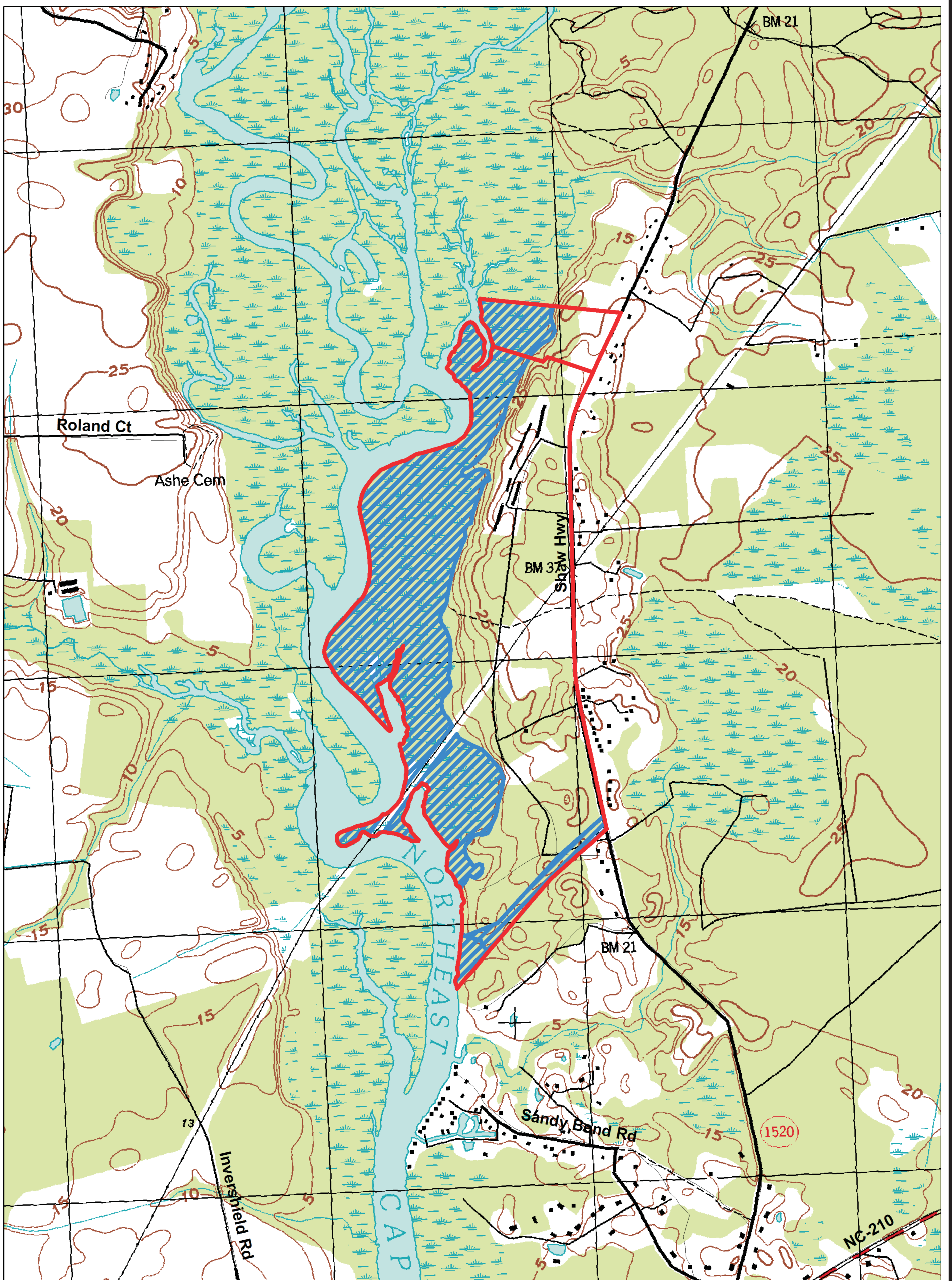
Jeat Tract
NECFUMB
Pender County, NC

October 2016
LMG # 40-16-094



www.lmggroup.net
3805 Wrightsville Avenue
Wilmington, NC 28403
Phone: 910.452.0001 Fax: 910.452.0060

Figure 1
Vicinity Map



Legend

- Jeat Tract
- Proposed Conservation Easement

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*Boundaries are approximate and are not meant to be absolute.

Map Source: USGS Mooretown Quadrangle 7.5 minute



SCALE 1" = 1,200'
(when printed at 11"x17")

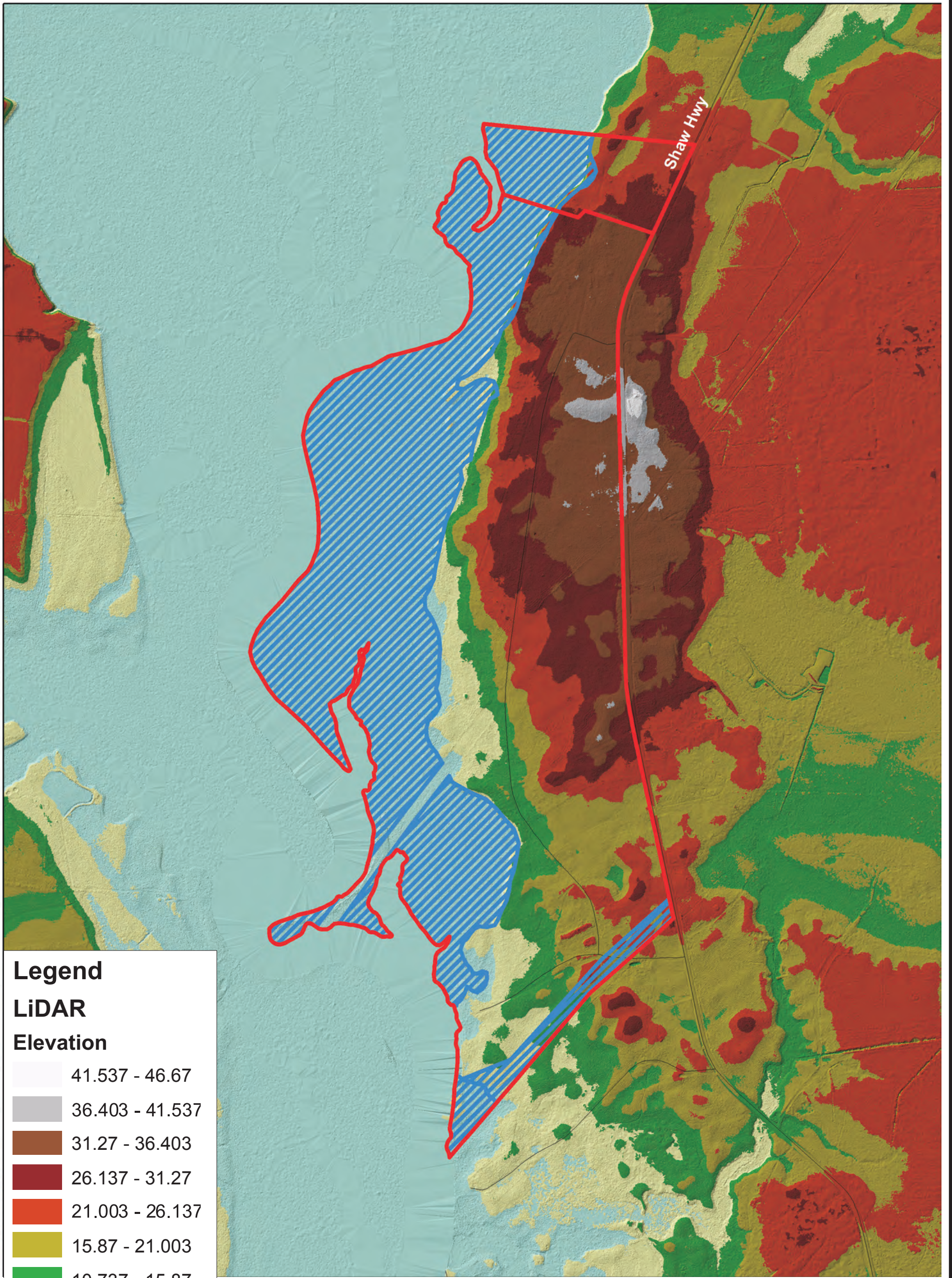
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www.lmggroup.net
3805 Wrightsville Avenue
Wilmington, NC 28403
Phone: 910.452.0001 Fax: 910.452.0060

Figure 2
Topographic Map



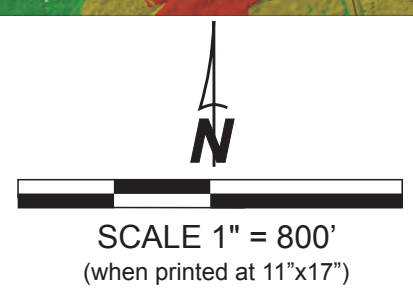
Legend

LiDAR Elevation

	41.537 - 46.67
	36.403 - 41.537
	31.27 - 36.403
	26.137 - 31.27
	21.003 - 26.137
	15.87 - 21.003
	10.737 - 15.87
	5.603 - 10.737
	0.47 - 5.603

Legend

	Jeat Tract
	Proposed Conservation Easement



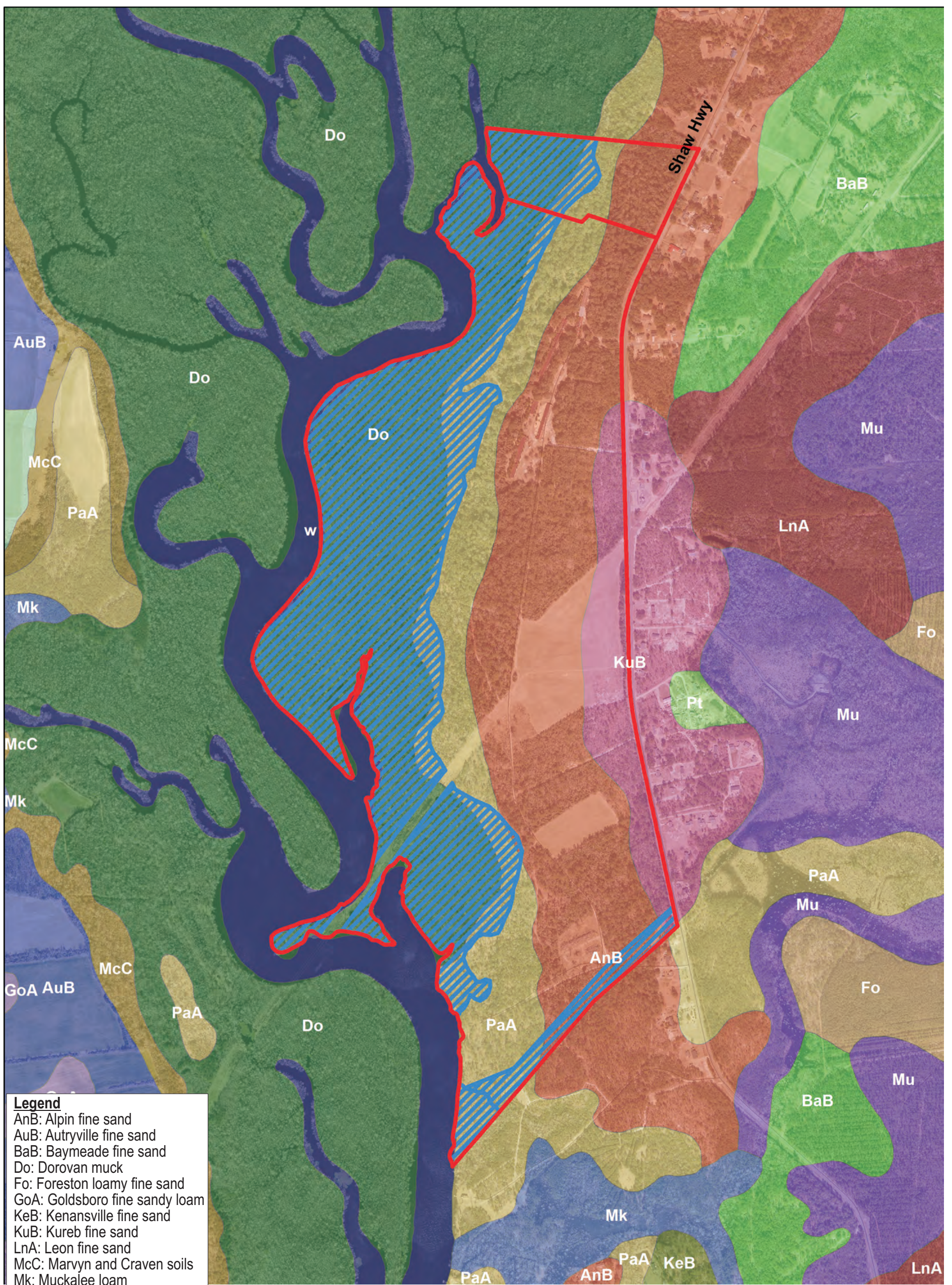
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 *Boundaries are approximate and are not meant to be absolute.
 Map Source: NC Flood Mapping Program QL2 LiDAR data

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www.lmggroup.net
 3805 Wrightsville Avenue
 Wilmington, NC 28403
 Phone: 910.452.0001 Fax: 910.452.0060

Figure 3
LiDAR map



Legend
 AnB: Alpin fine sand
 AuB: Autryville fine sand
 BaB: Baymeade fine sand
 Do: Dorovan muck
 Fo: Foreston loamy fine sand
 GoA: Goldsboro fine sandy loam
 KeB: Kenansville fine sand
 KuB: Kureb fine sand
 LnA: Leon fine sand
 McC: Marvyn and Craven soils
 Mk: Muckalee loam
 Mu: Murville muck
 NoA: Norfolk loamy fine sand
 PaA: Pactolus fine sand
 Pt: Pits
 w: water

Legend
 Jeat Tract
 Proposed Conservation Easement


 SCALE 1" = 800'
 (when printed at 11"x17")

L:\WETLANDS\2016\40-16-094\Prospectus\Figures\Figures.cdr
 *Boundaries are approximate and are not meant to be absolute.
 Map Source: NRCS Soil Survey

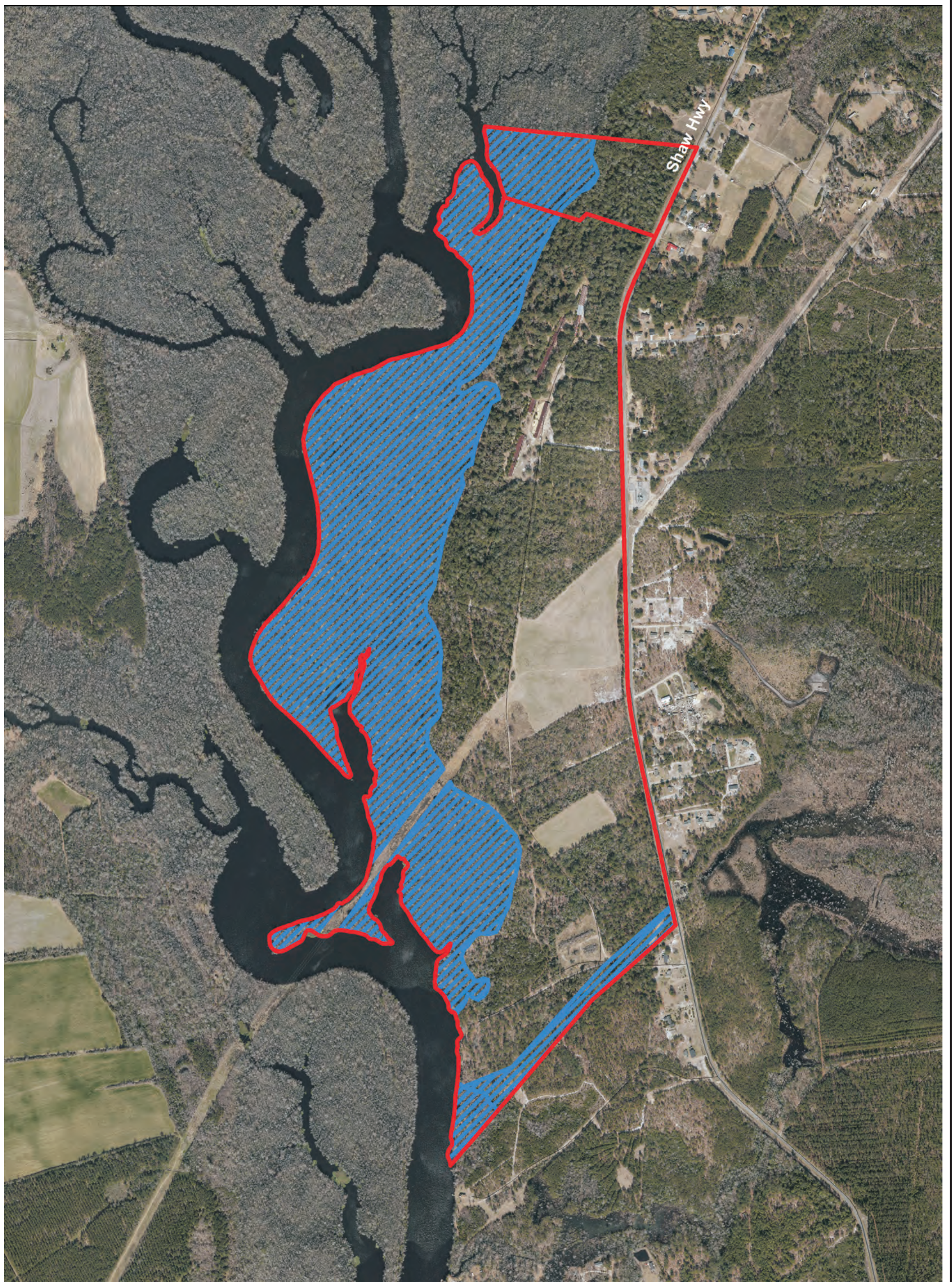
Jeat Tract
 NECFUMB
 Pender County, NC

October 2016
 LMG # 40-16-094





www.lmggroup.net
 3805 Wrightsville Avenue
 Wilmington, NC 28403
 Phone: 910.452.0001 Fax: 910.452.0060

Figure 4
Soils Map



Legend

-  Jeat Tract
-  Proposed Conservation Easement

L:\WETLANDS\2016\40-16-094\Prospectus\Figures\Figures.cdr

*Boundaries are approximate and are not meant to be absolute.

Map Source: 2012 NC OneMap Aerial Photography



SCALE 1" = 800'
(when printed at 11"x17")

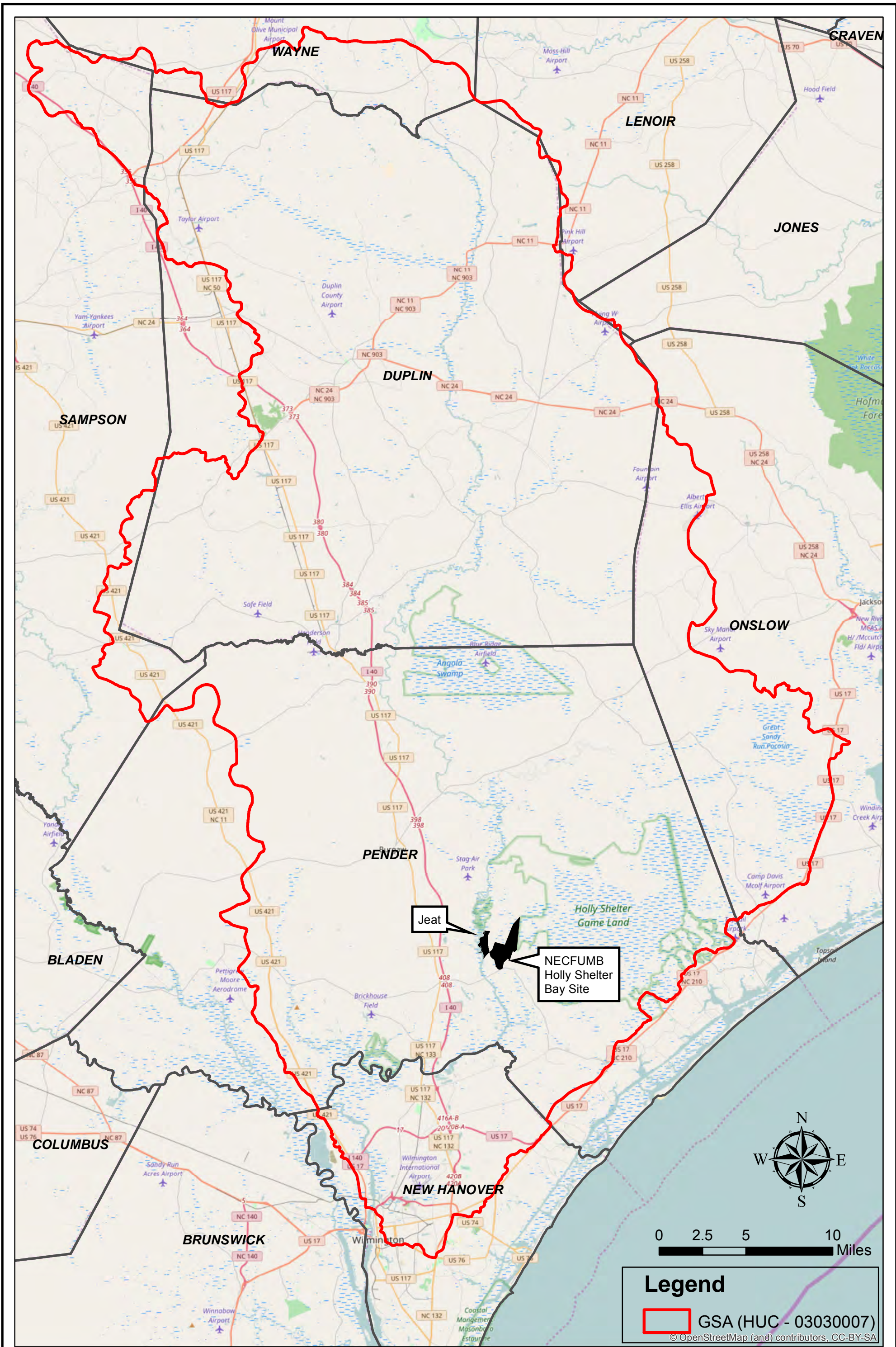
Jeat Tract
NECFUMB
Pender County, NC

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Figure 5
Aerial Photograph





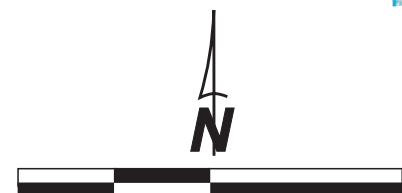
LEGEND

- Jeat Tract
- NECFUMB - Holly Shelter Bay Site
- State Owned Protected Lands

L:\WETLANDS\2016WETLANDSFILES\40-16-094--NECFUMB-Jeat, Cal Miller\CompositeMap

*Boundaries are approximate and are not meant to be absolute.

Map Source: DeLorme Atlas & Gazetteer, Pgs. 77;78;85;86



SCALE 1" = 2 MILES
(when printed at 11"x17")

Jeat Tract
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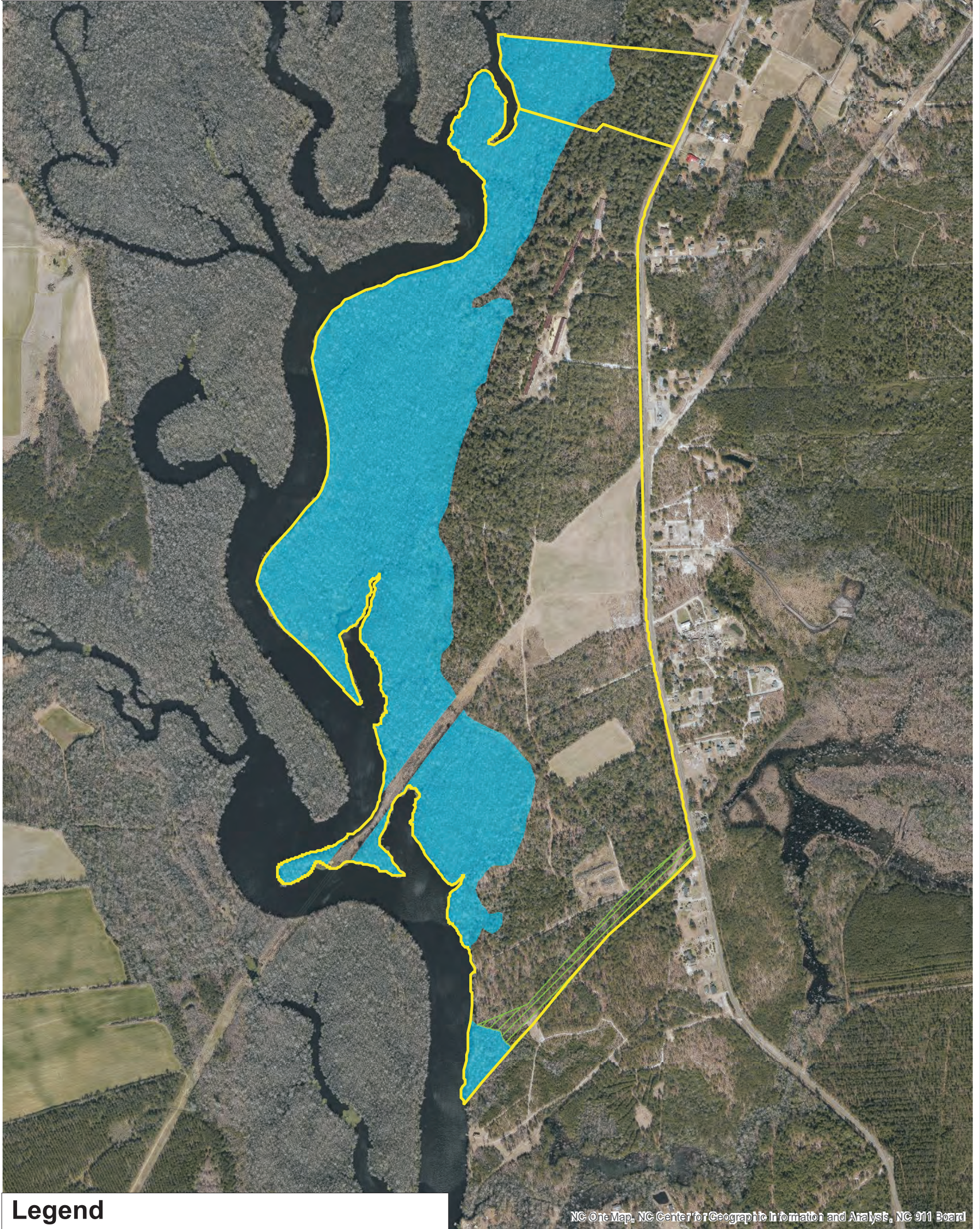
Figure 7
Composite Map of
Contiguous Protected Lands

APPENDIX A

PRELIMINARY WETLAND MAP




Jeat Mitigation Site (Shaw Highway - Pender County, North Carolina)
Northeast Cape Fear Umbrella Mitigation Bank
Northeast Cape Fear River Basin (HUC 03030007)

NOTE: This is not a survey. This map is for preliminary planning purposes only. Findings are based upon a review of available aerial photography and limited ground-truthing. Lines depicted on the map are approximate based upon preliminary field sketches and do not represent distinct boundaries. A formal delineation with US Army Corps of Engineers review and approval is recommended prior to specific site planning. Property boundaries are based upon available tax parcel information.

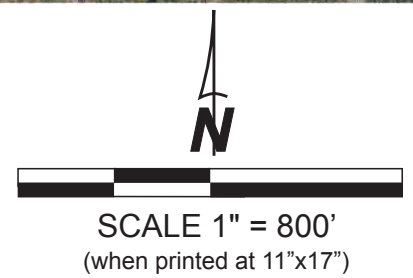


NC One Map, NC Center for Geographic Information and Analysis, NC 911 Board

Legend

-  Parcel Boundaries ~385.3 ac
-  Wetland Preservation Area ~160.1 ac
-  Upland Habitat Corridor ~7.5 ac

*Boundaries are approximate and are not meant to be absolute.
Map Source: 2012 NC OneMap Aerial Photography



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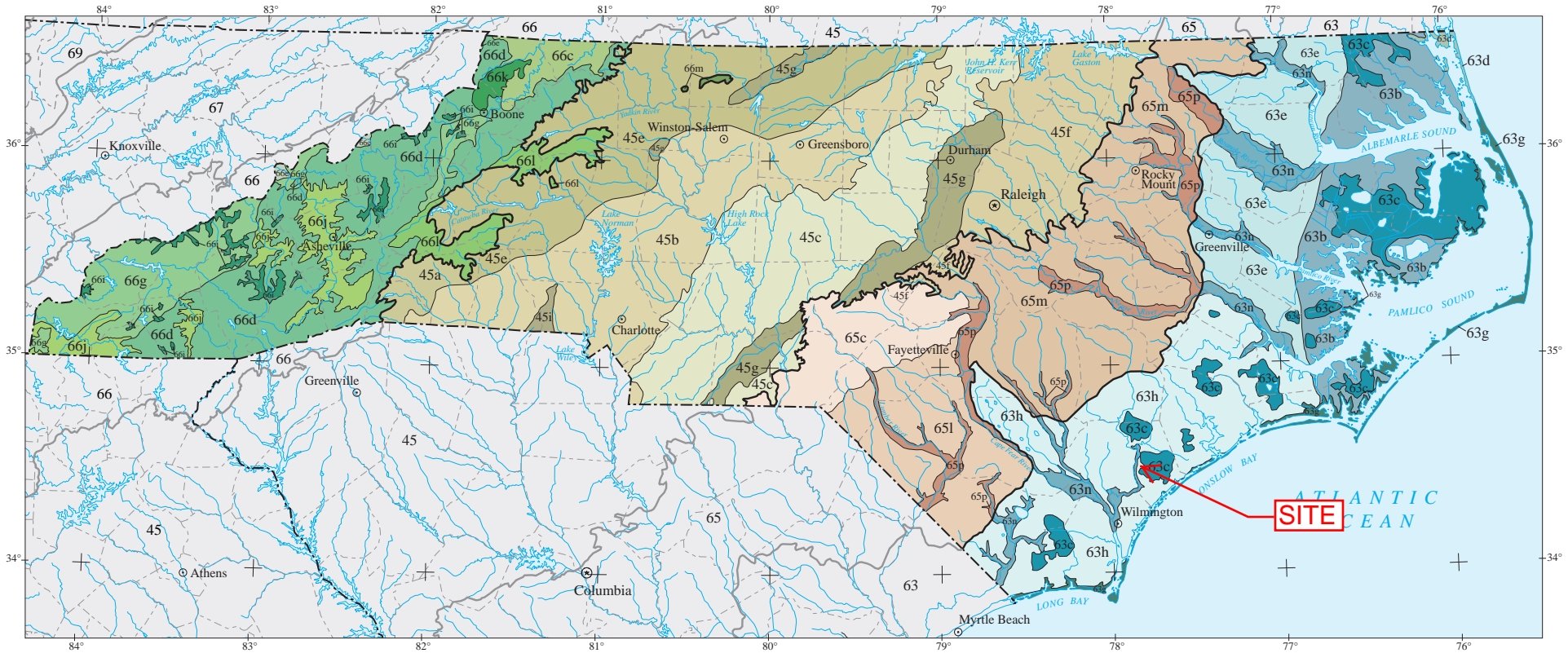
Appendix A
Preliminary Wetland Map

APPENDIX B

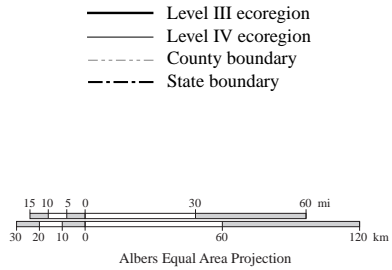
ECOREGION MAP

Jeat Mitigation Site (Shaw Highway - Pender County, North Carolina)
Northeast Cape Fear Umbrella Mitigation Bank
Northeast Cape Fear River Basin (HUC 03030007)

Ecoregions of North Carolina



- | | |
|--|---|
| 45 Piedmont | 65 Southeastern Plains |
| 45a Southern Inner Piedmont | 65c Sand Hills |
| 45b Southern Outer Piedmont | 65l Atlantic Southern Loam Plains |
| 45c Carolina Slate Belt | 65m Rolling Coastal Plain |
| 45e Northern Inner Piedmont | 65p Southeastern Floodplains and Low Terraces |
| 45f Northern Outer Piedmont | |
| 45g Triassic Basins | 66 Blue Ridge |
| 45i Kings Mountain | 66c New River Plateau |
| | 66d Southern Crystalline Ridges and Mountains |
| 63 Middle Atlantic Coastal Plain | 66e Southern Sedimentary Ridges |
| 63b Chesapeake-Pamlico Lowlands and Tidal Marshes | 66g Southern Metasedimentary Mountains |
| 63c Nonriverine Swamps and Peatlands | 66i High Mountains |
| 63d Virginian Barrier Islands and Coastal Marshes | 66j Broad Basins |
| 63e Mid-Atlantic Flatwoods | 66k Amphibolite Mountains |
| 63g Carolinian Barrier Islands and Coastal Marshes | 66l Eastern Blue Ridge Foothills |
| 63h Carolina Flatwoods | 66m Sauratown Mountains |
| 63n Mid-Atlantic Floodplains and Low Terraces | |



Ecoregions denote areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources. They are designed to serve as a spatial framework for the research, assessment, management, and monitoring of ecosystems and ecosystem components. The approach used to compile this map is based on the premise that ecological regions can be identified through the analysis of the patterns of biotic and abiotic phenomena that reflect differences in ecosystem quality and integrity. These phenomena include geology, physiography, vegetation, climate, soils, land use, wildlife, and hydrology. The relative importance of each characteristic varies from one ecological region to another regardless of the hierarchical level. The Ecoregions of North Carolina map was compiled at a scale of 1:250,000. Compilation of this map is part of a collaborative project primarily between the US EPA, USDA-NRCS, NC DENR, as well as with other state and federal agencies. Comments and suggestions regarding this map should be addressed to Glenn Griffith, USDA-NRCS, 200 SW 35th Street, Corvallis, OR 97333, (541) 754-4465, email: griffith.glenn@epa.gov, or to James Omernik, U.S. EPA - NHEERL, 200 SW 35th Street, Corvallis, OR 97333, (541) 754-4458, email: omernik.james@epa.gov.

APPENDIX C

NC WAM FORMS

Jeat Mitigation Site (Shaw Highway - Pender County, North Carolina)
Northeast Cape Fear Umbrella Mitigation Bank
Northeast Cape Fear River Basin (HUC 03030007)

NC WAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name	Jeat Property - AA1 - South Wetland	Date	3/22/16
Wetland Type	Riverine Swamp Forest	Assessor Name/Organization	Corey Novak / LMG
Level III Ecoregion	Middle Atlantic Coastal Plain	Nearest Named Water Body	Northeast Cape Fear River
River Basin	Cape Fear	USGS 8-Digit Catalogue Unit	03030007
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	34.461178 / -77.834882

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on the last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area.)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

- | | | |
|---------------------------------------|---------------------------------------|--|
| GS | VS | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Not severely altered |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

- | | | |
|---------------------------------------|---------------------------------------|--|
| Surf | Sub | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | | | |
|-----|---------------------------------------|---------------------------------------|---|
| | AA | WT | |
| 3a. | <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 deep |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input type="checkbox"/> D | <input type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input checked="" type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |
| | <input type="checkbox"/> C | | Evidence that maximum depth of inundation is less than 1 foot |

4. Soil Texture/Structure – assessment area condition metric

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the top 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
C Loamy or clayey soils not exhibiting redoximorphic features
D Loamy or clayey gleyed soil
E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence
B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | | | |
|---------------------------------------|---------------------------------------|---|
| Surf | Sub | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. Land Use – opportunity metric

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

- | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| WS | 5M | 2M | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 10% impervious surfaces |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥ 20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥ 20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥ 20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥ 20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric

- 7a. Is assessment area within 50 feet of a tributary or other open water?
Yes No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.
A ≥ 50 feet
B From 30 to < 50 feet
C From 15 to < 30 feet
D From 5 to < 15 feet
E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
≤ 15-feet wide > 15-feet wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
Yes No
- 7e. Is stream or other open water sheltered or exposed?
Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate for riparian wetlands only)

Check a box in each column for riverine wetlands only. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

- | | | |
|---------------------------------------|---------------------------------------|-----------------------|
| WT | WC | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | ≥ 100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A ≥ 500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D From 25 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E From 10 to < 25 acres
<input checked="" type="checkbox"/> F	<input checked="" type="checkbox"/> F	<input checked="" type="checkbox"/> F From 5 to < 10 acres
<input type="checkbox"/> G	<input type="checkbox"/> G	<input type="checkbox"/> G From 1 to < 5 acres
<input type="checkbox"/> H	<input type="checkbox"/> H	<input type="checkbox"/> H From 0.5 to < 1 acre
<input type="checkbox"/> I	<input type="checkbox"/> I	<input type="checkbox"/> I From 0.1 to < 0.5 acre
<input type="checkbox"/> J	<input type="checkbox"/> J	<input type="checkbox"/> J From 0.01 to < 0.1 acre
<input type="checkbox"/> K	<input type="checkbox"/> K	<input type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥ 90%) of its natural landscape size.
- B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

Well	Loosely	
<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	≥ 500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	< 10 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	Wetland type has a poor or no connection to other natural habitats

13b. **Evaluate for marshes only.**

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C

Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. **Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)**

- A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

A ≥ 25% coverage of vegetation
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum.** Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

A Large snags (more than one) are visible (> 12 inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric

A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12 inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes
 The NE Cape Fear River in this area is tidal freshwater. It is habitat for anadromous fish including hickory shad, striped bass, and sturgeon. The river is also habitat for federally protected species including the American alligator and sturgeon. The assessment area is designated as a Significant Natural Heritage Area. The entire upstream watershed draining to the assessment area is within 2 miles. The river is considered to be exposed due to regular boat traffic. The river is approximately 275 ft. wide adjacent to the assessment area (just under the 300 ft. threshold for connectivity). The canopy is nearly closed with natural gaps associated with natural processes.

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name Jeat Property - AA1 - South Wetland Date of Assessment 3/22/16
 Wetland Type Riverine Swamp Forest Assessor Name/Organization Corey Novak / LMG

Notes on Field Assessment Form (Y/N) YES
 Presence of regulatory considerations (Y/N) YES
 Wetland is intensively managed (Y/N) NO
 Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES
 Assessment area is substantially altered by beaver (Y/N) NO
 Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) YES
 Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	HIGH
	Sub-surface Storage and Retention	Condition	MEDIUM
Water Quality	Pathogen Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence (Y/N)	NO
	Particulate Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence (Y/N)	NO
	Soluble Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence (Y/N)	NO
	Physical Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence (Y/N)	NO
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence (Y/N)	NA	
Habitat	Physical Structure	Condition	HIGH
	Landscape Patch Structure	Condition	MEDIUM
	Vegetation Composition	Condition	HIGH

Function Rating Summary

Function	Metrics	Rating
Hydrology	Condition	HIGH
Water Quality	Condition	HIGH
	Condition/Opportunity	HIGH
	Opportunity Presence (Y/N)	NO
Habitat	Condition	HIGH

Overall Wetland Rating **HIGH**

NC WAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name	Jeat Property - AA2 - North Wetland	Date	3/22/16
Wetland Type	Riverine Swamp Forest	Assessor Name/Organization	Corey Novak / LMG
Level III Ecoregion	Middle Atlantic Coastal Plain	Nearest Named Water Body	Northeast Cape Fear River
River Basin	Cape Fear	USGS 8-Digit Catalogue Unit	03030007
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	34.472631 / -77.836108

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on the last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area.)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

- | | | |
|---------------------------------------|---------------------------------------|--|
| GS | VS | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Not severely altered |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

- | | | |
|---------------------------------------|---------------------------------------|--|
| Surf | Sub | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | | | |
|-----|---------------------------------------|---------------------------------------|---|
| | AA | WT | |
| 3a. | <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 deep |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input type="checkbox"/> D | <input type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input checked="" type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |
| | <input type="checkbox"/> C | | Evidence that maximum depth of inundation is less than 1 foot |

4. Soil Texture/Structure – assessment area condition metric

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the top 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. []A Sandy soil
[]B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
[]C Loamy or clayey soils not exhibiting redoximorphic features
[]D Loamy or clayey gleyed soil
[X]E Histosol or histic epipedon
4b. [X]A Soil ribbon < 1 inch
[]B Soil ribbon ≥ 1 inch
4c. []A No peat or muck presence
[X]B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- Surf Sub
[X]A [X]A Little or no evidence of pollutants or discharges entering the assessment area
[]B []B Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area
[]C []C Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor)

6. Land Use – opportunity metric

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

- WS 5M 2M
[]A []A []A ≥ 10% impervious surfaces
[X]B [X]B [X]B < 10% impervious surfaces
[]C []C []C Confined animal operations (or other local, concentrated source of pollutants)
[]D []D []D ≥ 20% coverage of pasture
[]E []E []E ≥ 20% coverage of agricultural land (regularly plowed land)
[]F []F []F ≥ 20% coverage of maintained grass/herb
[X]G [X]G [X]G ≥ 20% coverage of clear-cut land
[]H []H []H Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area.

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric

- 7a. Is assessment area within 50 feet of a tributary or other open water?
[X]Yes []No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.
7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.
[X]A ≥ 50 feet
[]B From 30 to < 50 feet
[]C From 15 to < 30 feet
[]D From 5 to < 15 feet
[]E < 5 feet or buffer bypassed by ditches
7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
[]≤ 15-feet wide [X]> 15-feet wide [] Other open water (no tributary present)
7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
[X]Yes []No
7e. Is stream or other open water sheltered or exposed?
[]Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
[X]Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate for riparian wetlands only)

Check a box in each column for riverine wetlands only. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

- WT WC
[X]A [X]A ≥ 100 feet
[]B []B From 80 to < 100 feet
[]C []C From 50 to < 80 feet
[]D []D From 40 to < 50 feet
[]E []E From 30 to < 40 feet
[]F []F From 15 to < 30 feet
[]G []G From 5 to < 15 feet
[]H []H < 5 feet

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A ≥ 500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D From 25 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E From 10 to < 25 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F From 5 to < 10 acres
<input type="checkbox"/> G	<input type="checkbox"/> G	<input type="checkbox"/> G From 1 to < 5 acres
<input type="checkbox"/> H	<input type="checkbox"/> H	<input type="checkbox"/> H From 0.5 to < 1 acre
<input type="checkbox"/> I	<input type="checkbox"/> I	<input type="checkbox"/> I From 0.1 to < 0.5 acre
<input type="checkbox"/> J	<input type="checkbox"/> J	<input type="checkbox"/> J From 0.01 to < 0.1 acre
<input type="checkbox"/> K	<input type="checkbox"/> K	<input type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥ 90%) of its natural landscape size.
- B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

Well	Loosely	
<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	≥ 500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	< 10 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	Wetland type has a poor or no connection to other natural habitats

13b. **Evaluate for marshes only.**

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C

Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. **Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)**

- A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

A ≥ 25% coverage of vegetation
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum.** Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

A Large snags (more than one) are visible (> 12 inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric

A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12 inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

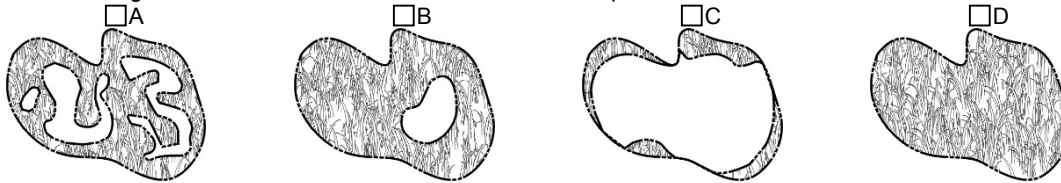
20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

The NE Cape Fear River in this area is tidal freshwater. It is habitat for anadromous fish including hickory shad, striped bass, and sturgeon. The river is also habitat for federally protected species including the American alligator and sturgeon. The assessment area is designated as a Significant Natural Heritage Area. The entire upstream watershed draining to the assessment area is within 2 miles. The river is considered to be exposed due to regular boat traffic. The river is approximately 275 ft. wide adjacent to the assessment area (just under the 300 ft. threshold for connectivity). The canopy is closed.

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name Jeat Property - AA2 - North Wetland Date of Assessment 3/22/16
Wetland Type Riverine Swamp Forest Assessor Name/Organization Corey Novak / LMG

Notes on Field Assessment Form (Y/N) YES
Presence of regulatory considerations (Y/N) YES
Wetland is intensively managed (Y/N) NO
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES
Assessment area is substantially altered by beaver (Y/N) NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) YES
Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	HIGH
	Sub-surface Storage and Retention	Condition	MEDIUM
Water Quality	Pathogen Change	Condition	LOW
		Condition/Opportunity	LOW
		Opportunity Presence (Y/N)	NO
	Particulate Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence (Y/N)	YES
	Soluble Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence (Y/N)	NO
	Physical Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence (Y/N)	NO
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence (Y/N)	NA	
Habitat	Physical Structure	Condition	HIGH
	Landscape Patch Structure	Condition	HIGH
	Vegetation Composition	Condition	HIGH

Function Rating Summary

Function	Metrics	Rating
Hydrology	Condition	HIGH
Water Quality	Condition	HIGH
	Condition/Opportunity	HIGH
	Opportunity Presence (Y/N)	YES
Habitat	Condition	HIGH

Overall Wetland Rating **HIGH**

APPENDIX D

SITE PHOTOGRAPHS

Jeat Mitigation Site (Shaw Highway - Pender County, North Carolina)
Northeast Cape Fear Umbrella Mitigation Bank
Northeast Cape Fear River Basin (HUC 03030007)



(1) View of wetlands from river



(2) View of Cape Fear spatterdock

**Jeat Tract
NECFUMB
Pender County, NC**



**Appendix D:
Site Photographs**



(3) View of southern wetland where NC WAM form AA1 was completed



(4) View of northern wetland where NC WAM form AA2 was completed



(5) View of wetlands from uplands



(6) View of wetlands from river

**Jeat Tract
NECFUMB
Pender County, NC**



Appendix D:
Site Photographs



(7) View of wetlands from uplands



(8) View of wetlands from river

**Jeat Tract
NECFUMB
Pender County, NC**



Appendix D:
Site Photographs



(9) View of wetlands from river



(10) View of wetlands from river

**Jeat Tract
NECFUMB
Pender County, NC**



Appendix D:
Site Photographs

APPENDIX E

HISTORICAL AERIAL PHOTOGRAPHS

Jeat Mitigation Site (Shaw Highway - Pender County, North Carolina)
Northeast Cape Fear Umbrella Mitigation Bank
Northeast Cape Fear River Basin (HUC 03030007)



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Geomatics, Aergrid, CN, CF, swisstopo, and the GIS User Community



SCALE 1" = 800'
(when printed at 11"x17")

*Boundaries are approximate and are not meant to be absolute.

Jeat Tract
NECFUMB
Pender County, NC

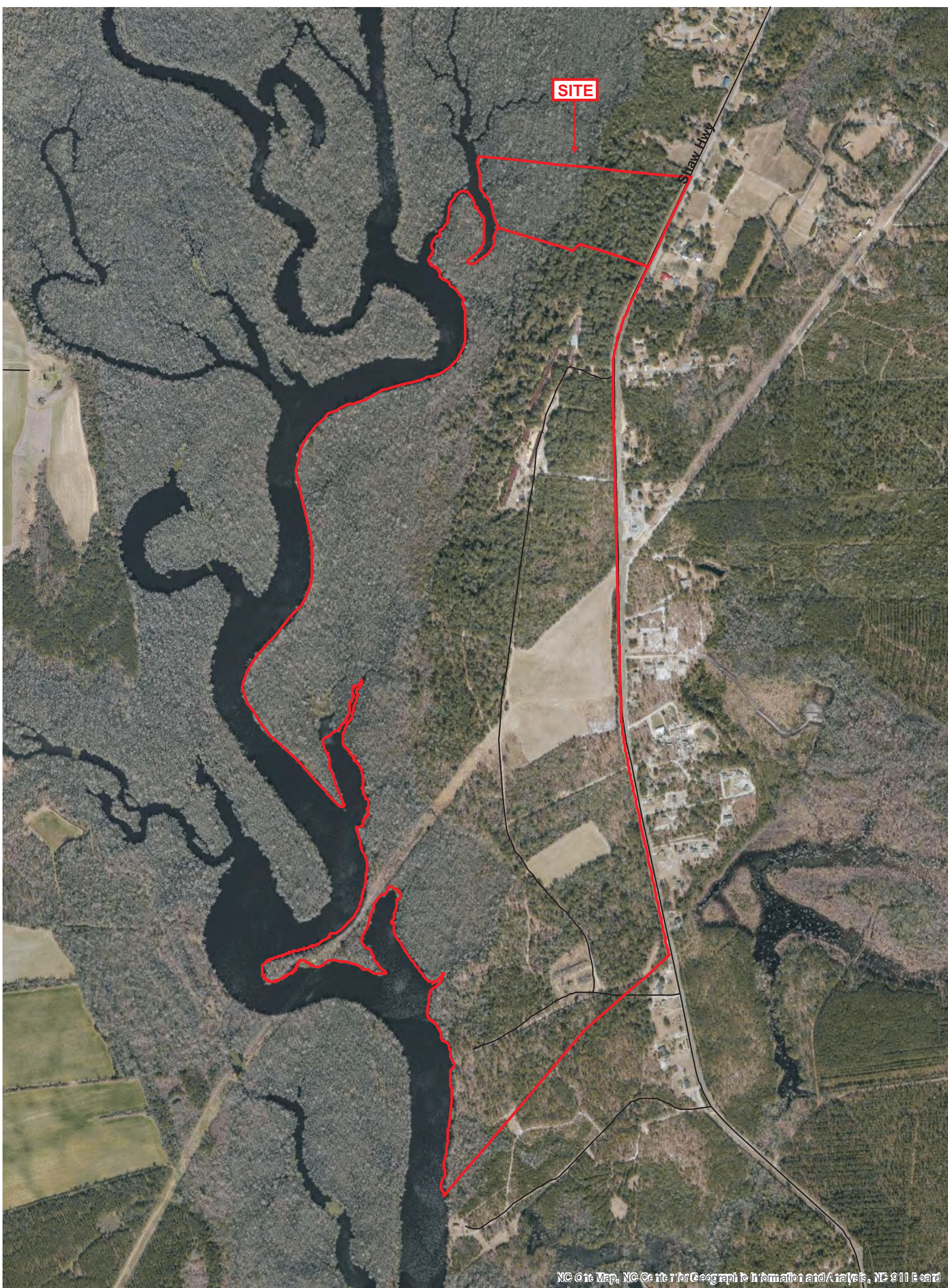
October 2016
LMG # 40-16-094



www.lmggroup.net
3805 Wrightsville Avenue
Wilmington, NC 28403
Phone: 910.452.0001 Fax: 910.452.0060

2014 GIS World Imagery
Color
Aerial Photograph

Appendix E



NC One Map, NC Center for Geographic Information and Analysis, NC 911 Board



SCALE 1" = 800'
(when printed at 11"x17")

*Boundaries are approximate and are not meant to be absolute.

Jeat Tract
NECFUMB
Pender County, NC

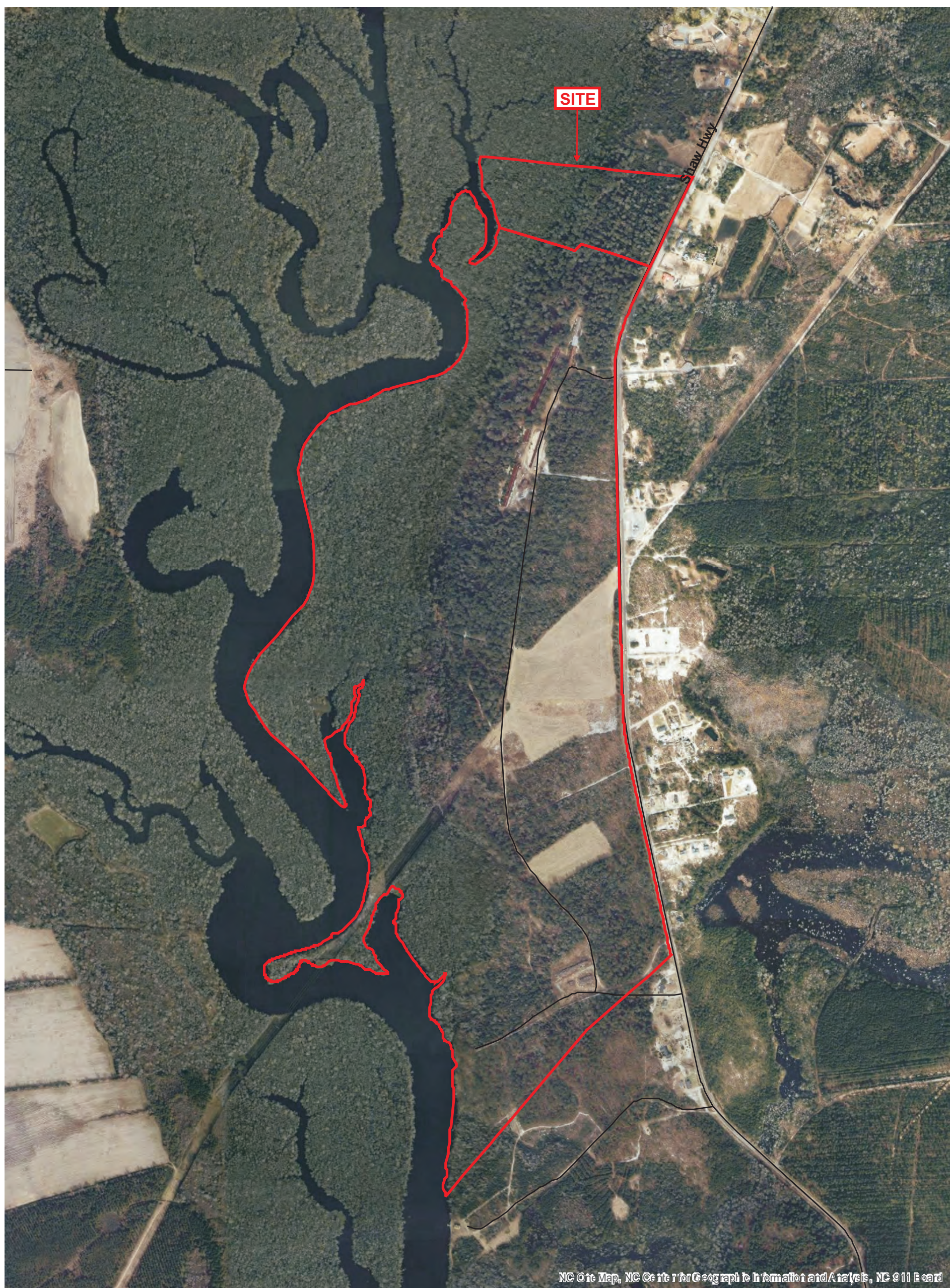
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2012 NC OneMap
Color
Aerial Photograph

Appendix E



NC OneMap, NC Center for Geographic Information and Analysis, NC 911 Board



SCALE 1" = 800'
(when printed at 11"x17")

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Jeat Tract
NECFUMB
Pender County, NC

October 2016
LMG # 40-16-094



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2010 NC OneMap
Color
Aerial Photograph

Appendix E



SCALE 1" = 800'
(when printed at 11"x17")

*Boundaries are approximate and are not meant to be absolute.

Jeat Tract
NECFUMB
Pender County, NC

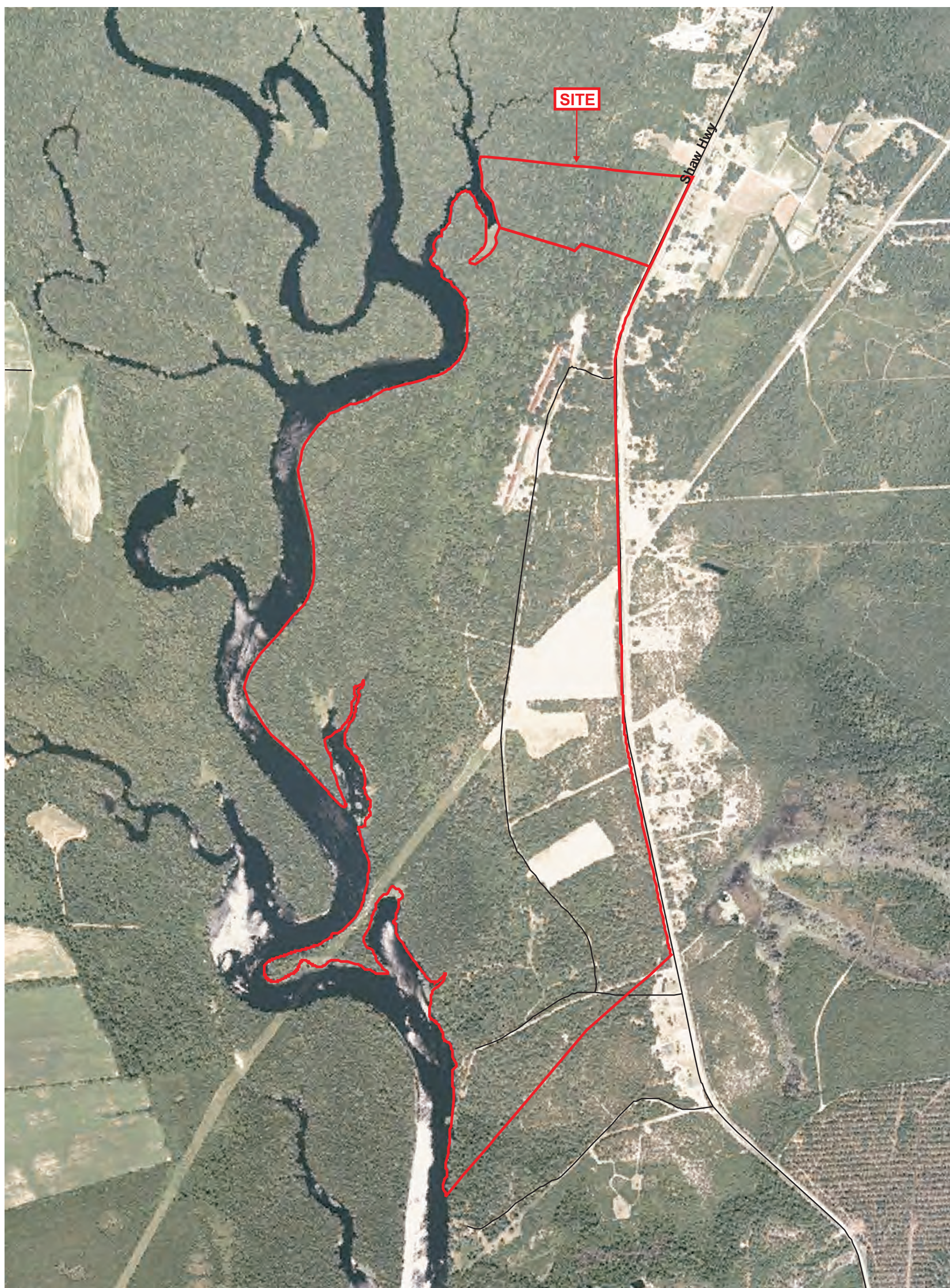
October 2016
LMG # 40-16-094



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2008 NC OneMap
Color
Aerial Photograph

Appendix E



SCALE 1" = 800'
(when printed at 11"x17")

*Boundaries are approximate and are not meant to be absolute.

Jeat Tract
NECFUMB
Pender County, NC

October 2016
LMG # 40-16-094



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Phone: 910.452.0001 Fax: 910.452.0060

2004 GIS
Color
Aerial Photograph

Appendix E



NC OneMap



SCALE 1" = 800'
(when printed at 11"x17")

*Boundaries are approximate and are not meant to be absolute.

Jeat Tract
NECFUMB
Pender County, NC

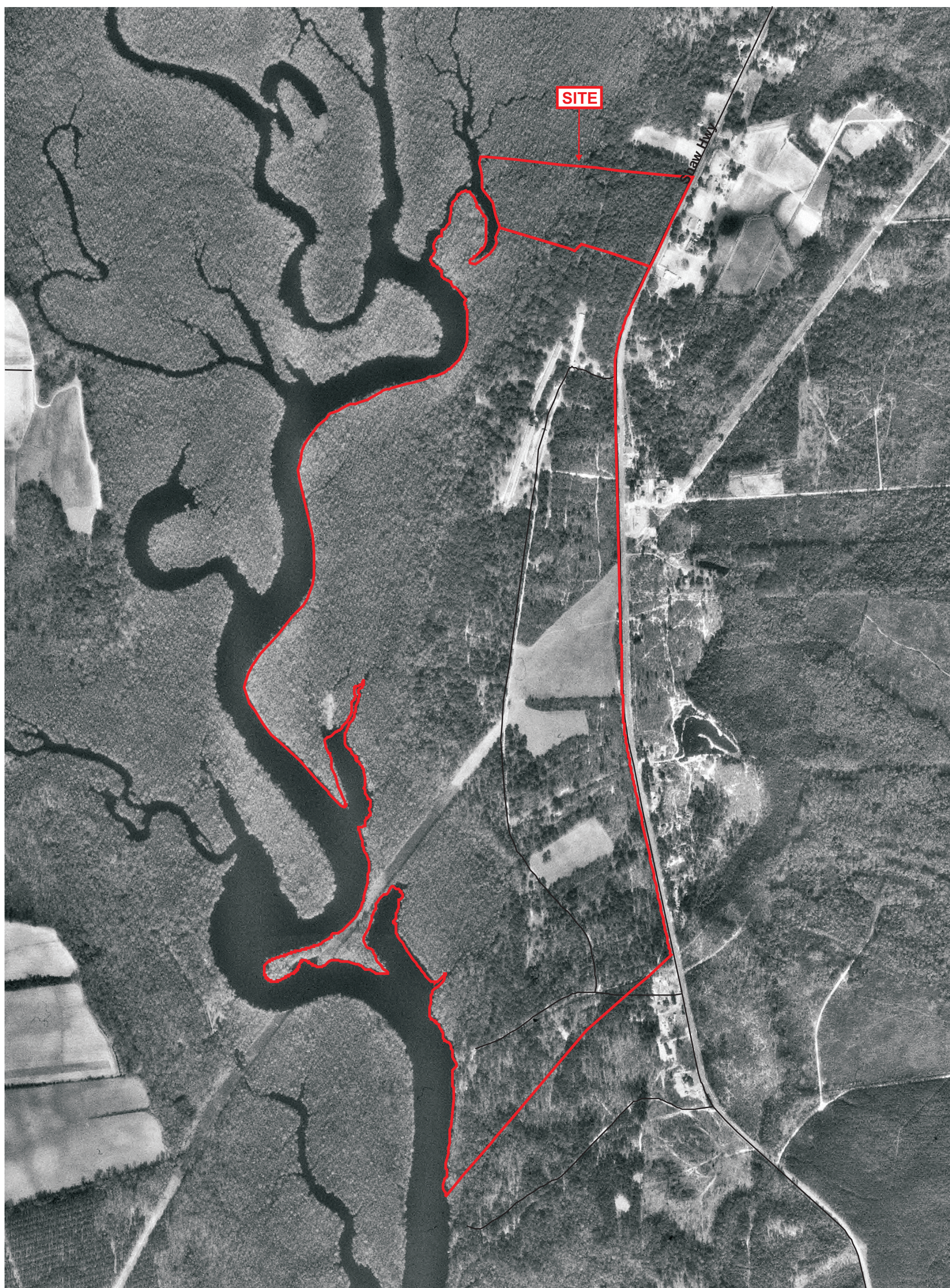
October 2016
LMG # 40-16-094



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Wilmington, NC 28403
Phone: 910.452.0001 Fax: 910.452.0060

1998 NAPP
Infrared
Aerial Photograph

Appendix E



SCALE 1" = 800'
(when printed at 11"x17")

*Boundaries are approximate and are not meant to be absolute.

Jeat Tract
NECFUMB
Pender County, NC

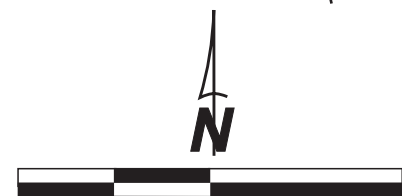
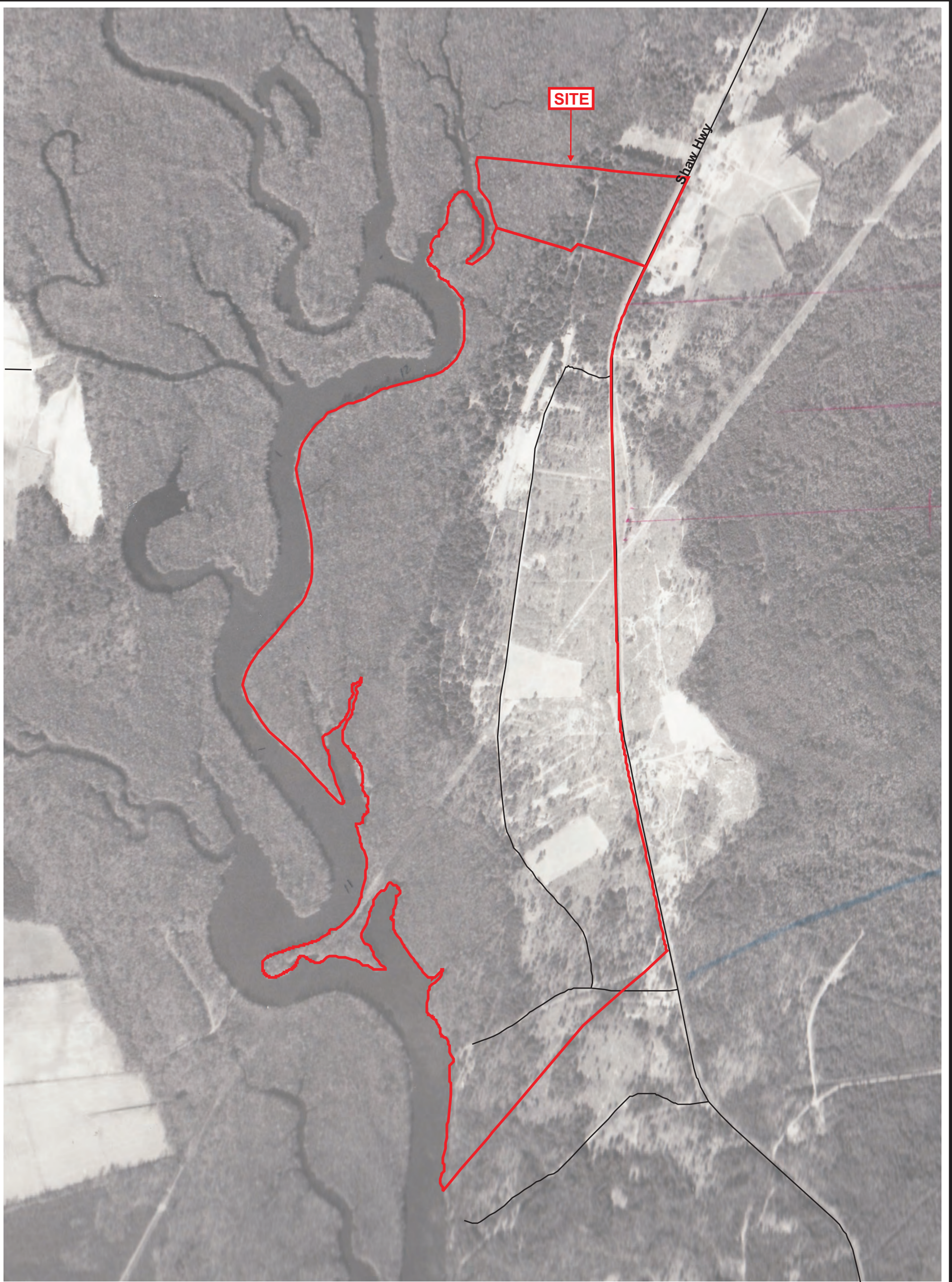
October 2016
LMG # 40-16-094



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Wilmington, NC 28403
Phone: 910.452.0001 Fax: 910.452.0060

1993 NAPP
Black & White
Aerial Photograph

Appendix E



SCALE 1" = 800'
(when printed at 11"x17")

*Boundaries are approximate and are not meant to be absolute.

Jeat Tract
NECFUMB
Pender County, NC

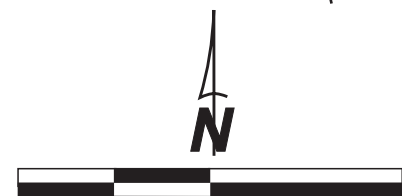
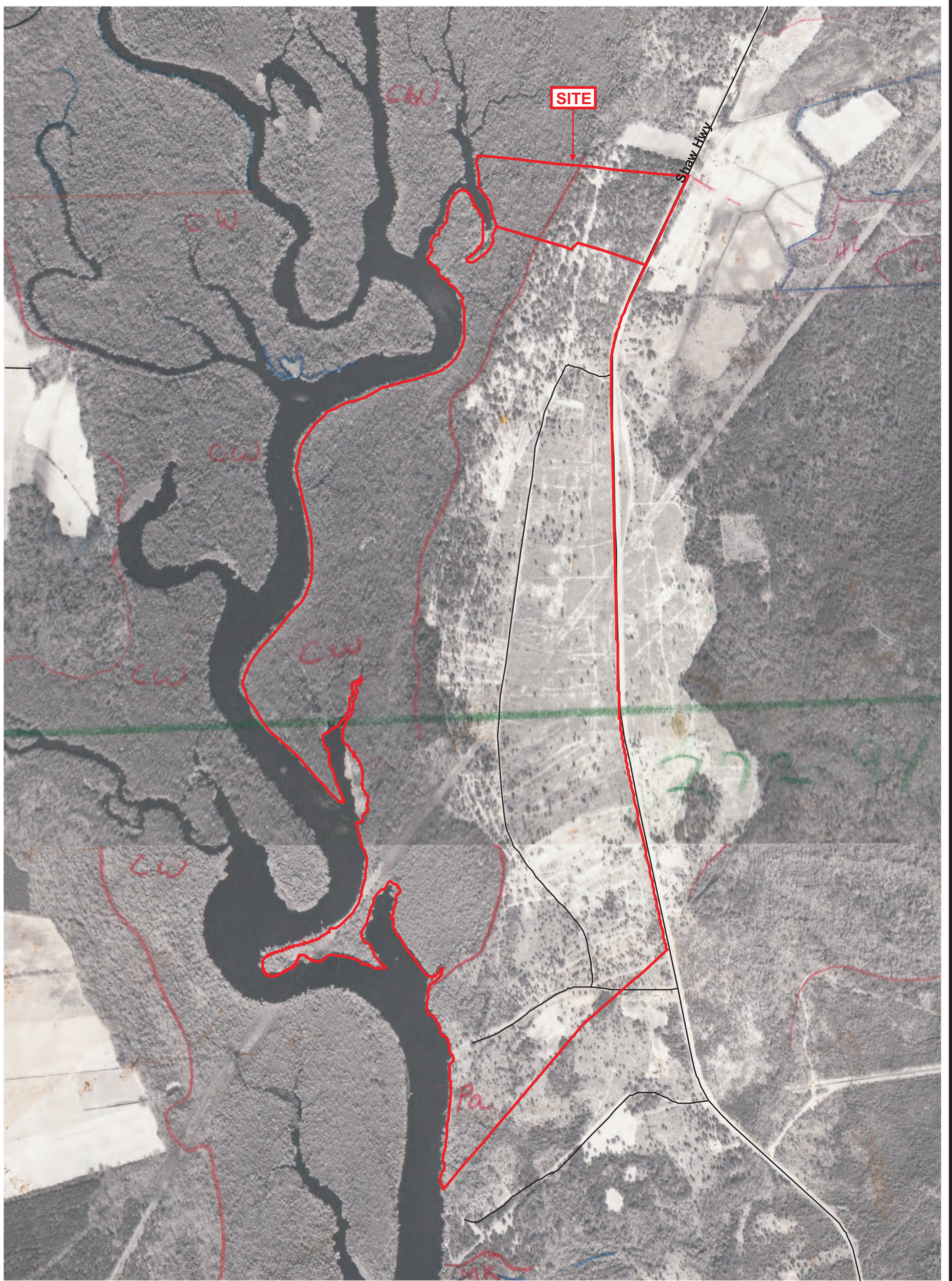
October 2016
LMG # 40-16-094



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Wilmington, NC 28403
Phone: 910.452.0001 Fax: 910.452.0060

1981 NRCS
Black & White
Aerial Photograph

Appendix E



SCALE 1" = 800'
(when printed at 11"x17")

*Boundaries are approximate and are not meant to be absolute.

Jeat Tract
NECFUMB
Pender County, NC

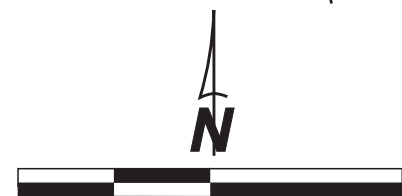
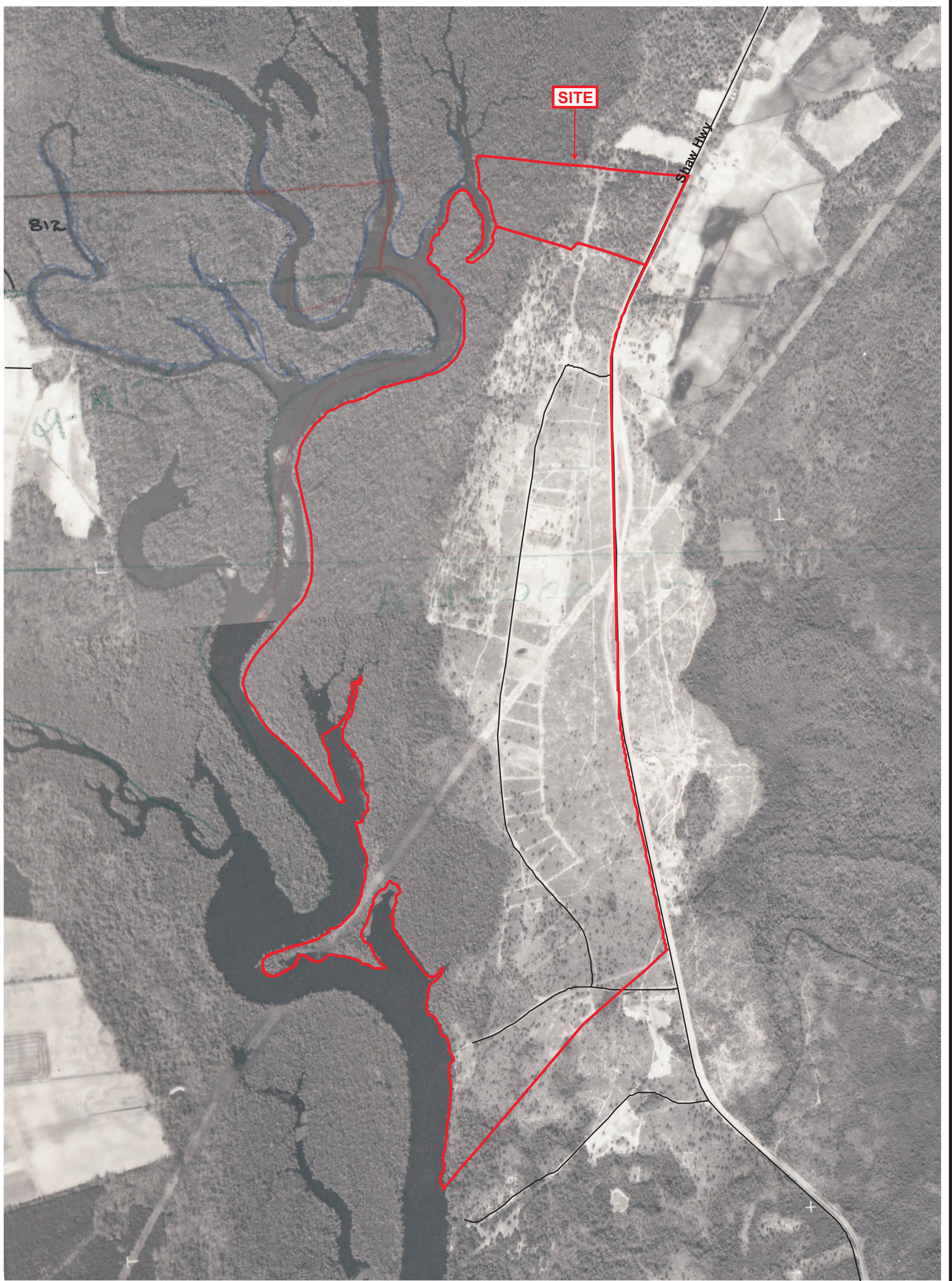
October 2016
LMG # 40-16-094



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3805 Wrightsville Avenue
Wilmington, NC 28403
Phone: 910.452.0001 Fax: 910.452.0060

1972 NRCS
Black & White
Aerial Photograph

Appendix E



SCALE 1" = 800'
(when printed at 11"x17")

*Boundaries are approximate and are not meant to be absolute.

Jeat Tract
NECFUMB
Pender County, NC

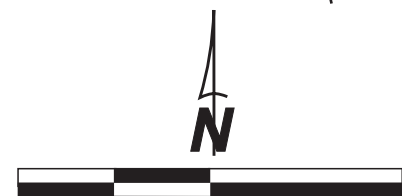
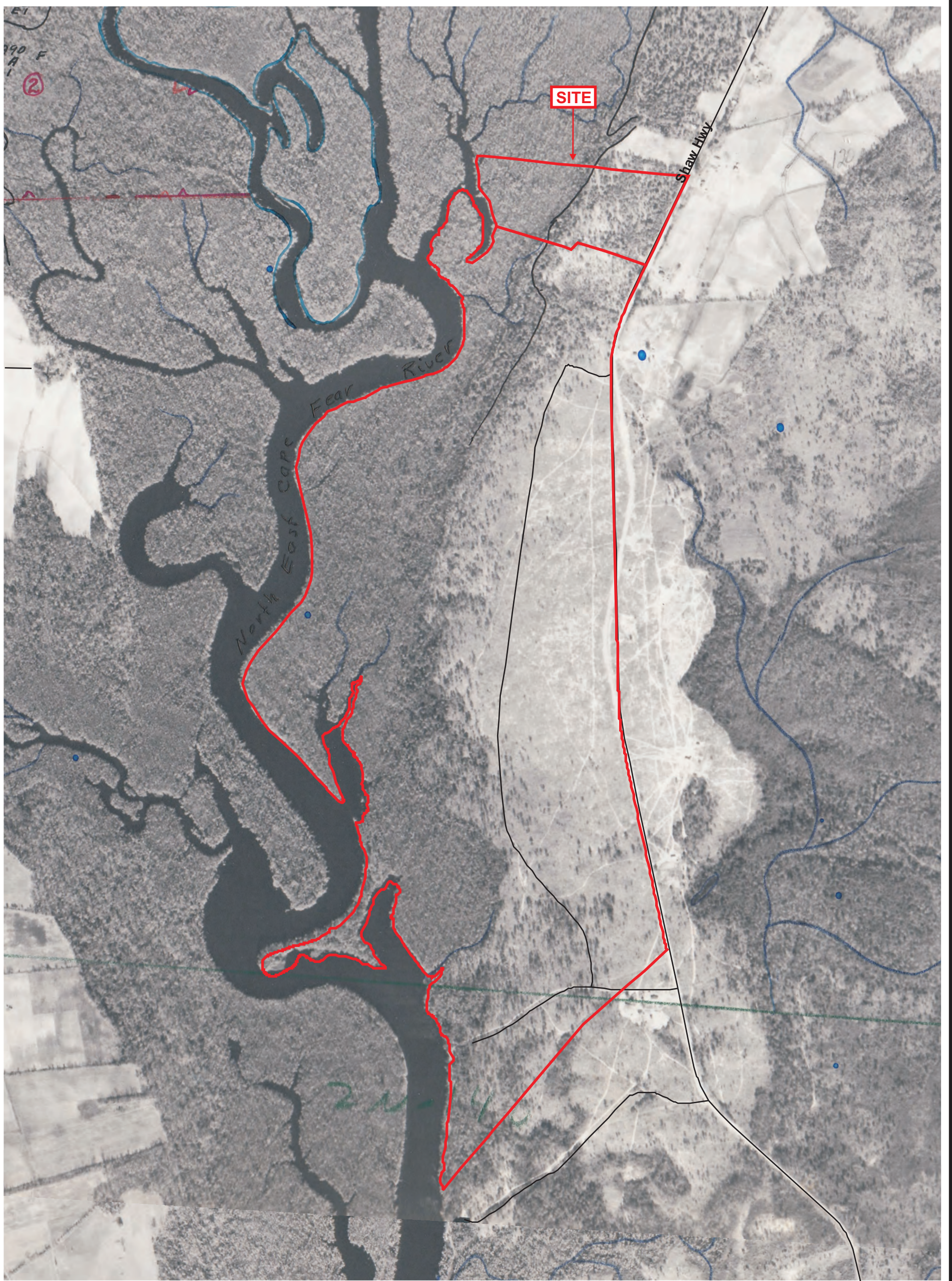
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1966 NRCS
Black & White
Aerial Photograph

Appendix E



SCALE 1" = 800'
(when printed at 11"x17")

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Jeat Tract
NECFUMB
Pender County, NC

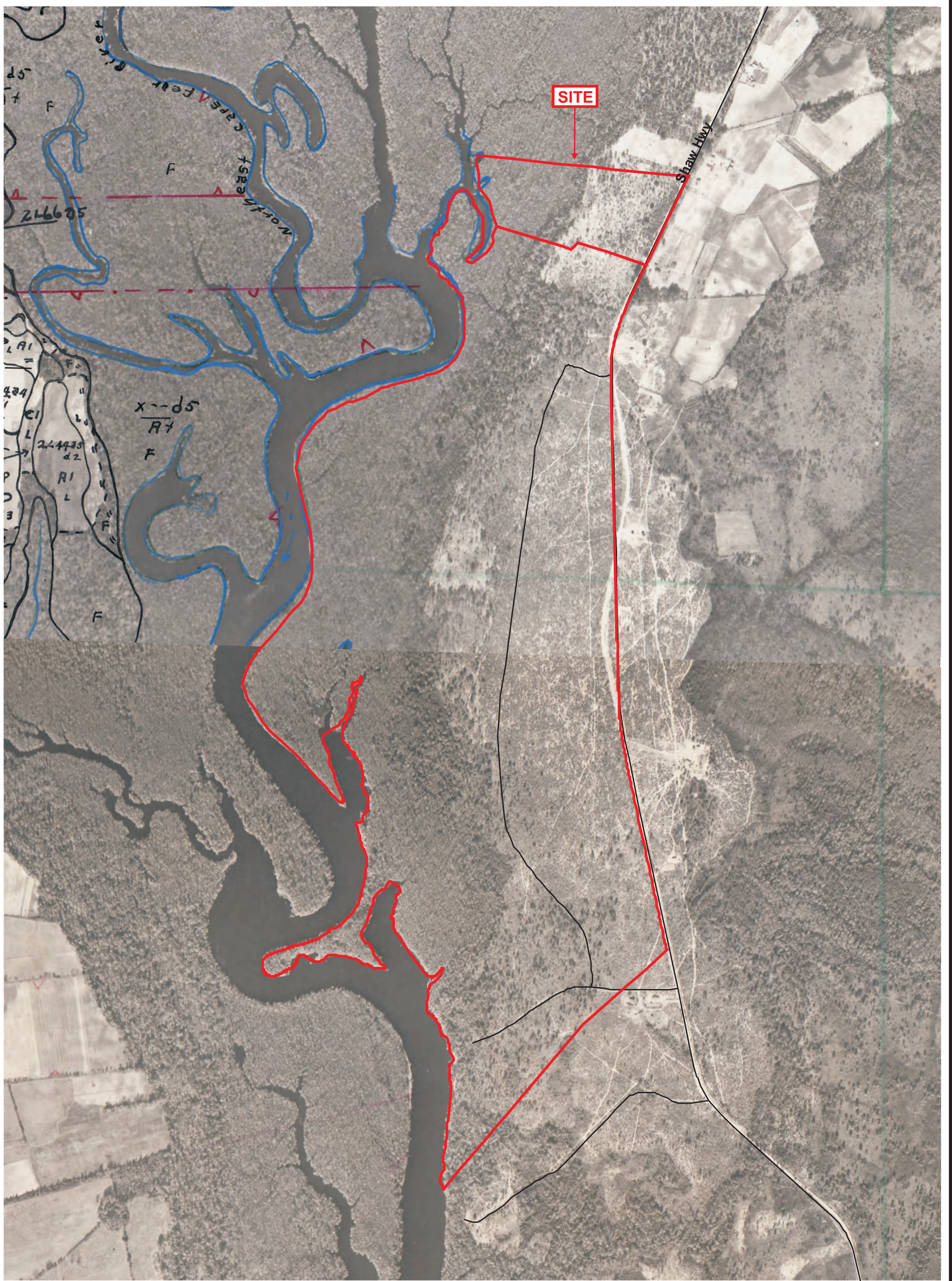
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1956 NRCS
Black & White
Aerial Photograph

Appendix E



SCALE 1" = 800'
(when printed at 11"x17")

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Jeat Tract
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Pender County, NC

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1949 NRCS
Black & White
Aerial Photograph

Appendix E



SCALE 1" = 800'
(when printed at 11"x17")

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Jeat Tract
NECFUMB
Pender County, NC

October 2016
LMG # 40-16-094



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1938 NRCS
Black & White
Aerial Photograph

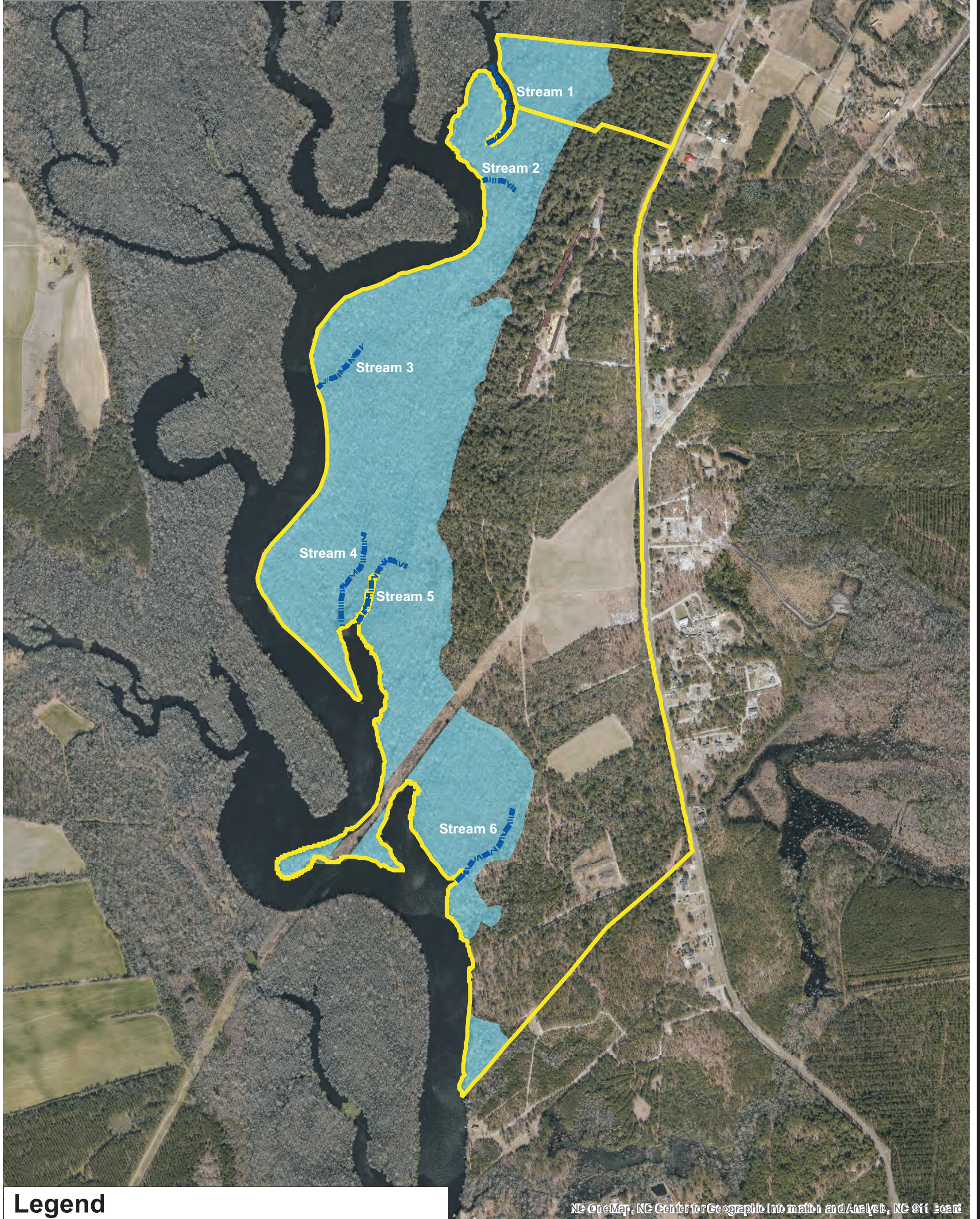
Appendix E

APPENDIX F

NC SAM ASSESSMENT




Jeat Mitigation Site (Shaw Highway - Pender County, North Carolina)
Northeast Cape Fear Umbrella Mitigation Bank
Northeast Cape Fear River Basin (HUC 03030007)

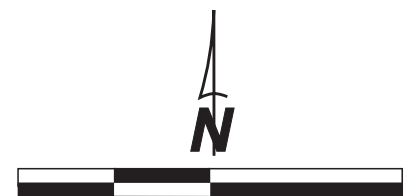
NOTE: This is not a survey. This map is for preliminary planning purposes only. Findings are based upon a review of available aerial photography and limited ground-truthing. Lines depicted on the map are approximate based upon preliminary field sketches and do not represent distinct boundaries. A formal delineation with US Army Corps of Engineers review and approval is recommended prior to specific site planning. Property boundaries are based upon available tax parcel information.



NC OneMap, NC Center for Geographic Information and Analysis, NC Off Board

Legend

-  Parcel Boundaries ~385.3 ac
-  Wetland Preservation Area ~160.1 ac
-  Perennial Streams ~4,000 linear ft.



SCALE 1" = 800'
(when printed at 11"x17")

*Boundaries are approximate and are not meant to be absolute.
Map Source: 2012 NC OneMap Aerial Photography

Jeat Tract
NECFUMB
Pender County, NC



October 2016
LMG # 40-16-094



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3805 Wrightsville Avenue
Wilmington, NC 28403
Phone: 910.452.0001 Fax: 910.452.0060

Appendix F
NC SAM Assessment Areas

NC SAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 2
Rating Calculator Version 2

USACE AID #:	NCDWR #:																														
<p>INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.</p> <p>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</p> <p>PROJECT/SITE INFORMATION:</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%;">1. Project name (if any): <u>Jeat Property</u></td> <td style="width:50%;">2. Date of evaluation: <u>9/9/16</u></td> </tr> <tr> <td>3. Applicant/owner name: <u>Wetlands Resource Center</u></td> <td>4. Assessor name/organization: <u>Corey Novak / LMG, Inc.</u></td> </tr> <tr> <td>5. County: <u>Pender</u></td> <td>6. Nearest named water body on USGS 7.5-minute quad: <u>Northeast Cape Fear River</u></td> </tr> <tr> <td>7. River basin: <u>Cape Fear</u></td> <td></td> </tr> <tr> <td colspan="2">8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>34.482465, -77.834633</u></td> </tr> </table> <p>STREAM INFORMATION: (depth and width can be approximations)</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%;">9. Site number (show on attached map): <u>Stream 1</u></td> <td style="width:50%;">10. Length of assessment reach evaluated (feet): <u>750</u></td> </tr> <tr> <td colspan="2">11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>>8</u> <input type="checkbox"/> Unable to assess channel depth.</td> </tr> <tr> <td colspan="2">12. Channel width at top of bank (feet): <u>100</u> 13. Is assessment reach a swamp steam? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</td> </tr> <tr> <td colspan="2">14. Feature type: <input checked="" type="checkbox"/> Perennial flow <input type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream</td> </tr> </table> <p>STREAM CATEGORY INFORMATION:</p> <p>15. NC SAM Zone: <input type="checkbox"/> Mountains (M) <input type="checkbox"/> Piedmont (P) <input checked="" type="checkbox"/> Inner Coastal Plain (I) <input type="checkbox"/> Outer Coastal Plain (O)</p> <p>16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream): <input checked="" type="checkbox"/>  <input type="checkbox"/>  (more sinuous stream, flatter valley slope) (less sinuous stream, steeper valley slope)</p> <p>17. Watershed size: (skip for Tidal Marsh Stream) <input checked="" type="checkbox"/> Size 1 (< 0.1 mi²) <input type="checkbox"/> Size 2 (0.1 to < 0.5 mi²) <input type="checkbox"/> Size 3 (0.5 to < 5 mi²) <input type="checkbox"/> Size 4 (≥ 5 mi²)</p> <p>ADDITIONAL INFORMATION:</p> <p>18. Were regulatory considerations evaluated? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, check all that apply to the assessment area.</p> <table style="width:100%; border: none;"> <tr> <td><input checked="" type="checkbox"/> Section 10 water</td> <td><input type="checkbox"/> Classified Trout Waters</td> <td><input type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/> IV <input type="checkbox"/> V)</td> </tr> <tr> <td><input type="checkbox"/> Essential Fish Habitat</td> <td><input type="checkbox"/> Primary Nursery Area</td> <td><input type="checkbox"/> High Quality Waters/Outstanding Resource Waters</td> </tr> <tr> <td><input checked="" type="checkbox"/> Publicly owned property</td> <td><input type="checkbox"/> NCDWR Riparian buffer rule in effect</td> <td><input type="checkbox"/> Nutrient Sensitive Waters</td> </tr> <tr> <td><input checked="" type="checkbox"/> Anadromous fish</td> <td><input type="checkbox"/> 303(d) List</td> <td><input checked="" type="checkbox"/> CAMA Area of Environmental Concern (AEC)</td> </tr> </table> <p><input checked="" type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area. List species: <u>American alligator, Atlantic sturgeon</u></p> <p><input type="checkbox"/> Designated Critical Habitat (list species) _____</p> <p>19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p>		1. Project name (if any): <u>Jeat Property</u>	2. Date of evaluation: <u>9/9/16</u>	3. Applicant/owner name: <u>Wetlands Resource Center</u>	4. Assessor name/organization: <u>Corey Novak / LMG, Inc.</u>	5. County: <u>Pender</u>	6. Nearest named water body on USGS 7.5-minute quad: <u>Northeast Cape Fear River</u>	7. River basin: <u>Cape Fear</u>		8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>34.482465, -77.834633</u>		9. Site number (show on attached map): <u>Stream 1</u>	10. Length of assessment reach evaluated (feet): <u>750</u>	11. 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1. **Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)**
 - A Water throughout assessment reach.
 - B No flow, water in pools only.
 - C No water in assessment reach.
2. **Evidence of Flow Restriction – assessment reach metric**
 - A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
 - B Not A
3. **Feature Pattern – assessment reach metric**
 - A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
 - B Not A
4. **Feature Longitudinal Profile – assessment reach metric**
 - A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
 - B Not A
5. **Signs of Active Instability – assessment reach metric**

Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

 - A < 10% of channel unstable
 - B 10 to 25% of channel unstable
 - C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric

Consider for the Left Bank (LB) and the Right Bank (RB).

- LB RB
[X]A [X]A Little or no evidence of conditions that adversely affect reference interaction
[B] [B] Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])
[C] [C] Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

7. Water Quality Stressors – assessment reach/intertidal zone metric

Check all that apply.

- [A] Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
[B] Excessive sedimentation (burying of stream features or intertidal zone)
[C] Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
[D] Odor (not including natural sulfide odors)
[E] Current published or collected data indicating degraded water quality in the assessment reach. Cite source in "Notes/Sketch" section.
[F] Livestock with access to stream or intertidal zone
[G] Excessive algae in stream or intertidal zone
[H] Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
[I] Other: (explain in "Notes/Sketch" section)
[X]J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- [A] Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
[B] Drought conditions and rainfall exceeding 1 inch within the last 48 hours
[X]C No drought conditions

9. Large or Dangerous Stream – assessment reach metric

[X]Yes []No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric

10a. []Yes []No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- [A] Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
[B] Multiple sticks and/or leaf packs and/or emergent vegetation
[C] Multiple snags and logs (including lap trees)
[D] 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
[E] Little or no habitat
[F] 5% oysters or other natural hard bottoms
[G] Submerged aquatic vegetation
[H] Low-tide refugia (pools)
[I] Sand bottom
[J] 5% vertical bank along the marsh
[K] Little or no habitat

*****REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS*****

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. []Yes []No Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- [A] Riffle-run section (evaluate 11c)
[B] Pool-glide section (evaluate 11d)
[C] Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but <= 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

Table with 5 columns: NP, R, C, A, P and rows for Bedrock/saprolite, Boulder (256 – 4096 mm), Cobble (64 – 256 mm), Gravel (2 – 64 mm), Sand (.062 – 2 mm), Silt/clay (< 0.062 mm), Detritus, Artificial (rip-rap, concrete, etc.)

11d. []Yes []No Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

12a. Yes No Was an in-stream aquatic life assessment performed as described in the User Manual?

If No, select one of the following reasons and skip to Metric 13. No Water Other: _____

12b. Yes No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

1 >1 Numbers over columns refer to “individuals” for Size 1 and 2 streams and “taxa” for Size 3 and 4 streams.

- Adult frogs
- Aquatic reptiles
- Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- Beetles
- Caddisfly larvae (T)
- Asian clam (*Corbicula*)
- Crustacean (isopod/amphipod/crayfish/shrimp)
- Damselfly and dragonfly larvae
- Dipterans
- Mayfly larvae (E)
- Megaloptera (alderfly, fishfly, dobsonfly larvae)
- Midges/mosquito larvae
- Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
- Mussels/Clams (not *Corbicula*)
- Other fish
- Salamanders/tadpoles
- Snails
- Stonefly larvae (P)
- Tipulid larvae
- Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

LB RB

- A A Little or no alteration to water storage capacity over a majority of the streamside area
- B B Moderate alteration to water storage capacity over a majority of the streamside area
- C C Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes)

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

LB RB

- A A Majority of streamside area with depressions able to pond water \geq 6 inches deep
- B B Majority of streamside area with depressions able to pond water 3 to 6 inches deep
- C C Majority of streamside area with depressions able to pond water < 3 inches deep

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)

Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

LB RB

- Y Y Are wetlands present in the streamside area?
- N N

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- D Evidence of bank seepage or sweating (iron in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)

Check all that apply.

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream (\geq 24% impervious surface for watershed)
- D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)

Consider aspect. Consider “leaf-on” condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)

Consider “vegetated buffer” and “wooded buffer” separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated		Wooded		
LB	RB	LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 30 feet wide
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	< 10 feet wide <u>or</u> no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Vegetated” Buffer Width).

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Mature forest
<input type="checkbox"/> B	<input type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input type="checkbox"/> C	<input type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input type="checkbox"/> E	<input type="checkbox"/> E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	Row crops
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	Maintained turf
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	Pasture (no livestock)/commercial horticulture
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Wooded” Buffer Width).

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Medium to high stem density
<input type="checkbox"/> B	<input type="checkbox"/> B	Low stem density
<input type="checkbox"/> C	<input type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input type="checkbox"/> B	<input type="checkbox"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input type="checkbox"/> C	<input type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. Yes No Was conductivity measurement recorded?

If No, select one of the following reasons. No Water Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).

<input type="checkbox"/> A	< 46	<input type="checkbox"/> B	46 to < 67	<input type="checkbox"/> C	67 to < 79	<input type="checkbox"/> D	79 to < 230	<input type="checkbox"/> E	≥ 230
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Notes/Sketch:



Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 1
Rating Calculator Version 2

Stream Site Name Jeat Property Date of Assessment 9/9/16
 Stream Category la1 Assessor Name/Organization Corey Novak / LMG, Inc.

Notes of Field Assessment Form (Y/N) NO
 Presence of regulatory considerations (Y/N) YES
 Additional stream information/supplementary measurements included (Y/N) NO
 NC SAM feature type (perennial, intermittent, Tidal Marsh Stream) Perennial

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	HIGH	
(2) Baseflow	HIGH	
(2) Flood Flow	HIGH	
(3) Streamside Area Attenuation	HIGH	
(4) Floodplain Access	HIGH	
(4) Wooded Riparian Buffer	HIGH	
(4) Microtopography	HIGH	
(3) Stream Stability	HIGH	
(4) Channel Stability	HIGH	
(4) Sediment Transport	HIGH	
(4) Stream Geomorphology	HIGH	
(2) Stream/Intertidal Zone Interaction	NA	
(2) Longitudinal Tidal Flow	NA	
(2) Tidal Marsh Stream Stability	NA	
(3) Tidal Marsh Channel Stability	NA	
(3) Tidal Marsh Stream Geomorphology	NA	
(1) Water Quality	HIGH	
(2) Baseflow	HIGH	
(2) Streamside Area Vegetation	HIGH	
(3) Upland Pollutant Filtration	HIGH	
(3) Thermoregulation	HIGH	
(2) Indicators of Stressors	NO	
(2) Aquatic Life Tolerance	HIGH	
(2) Intertidal Zone Filtration	NA	
(1) Habitat	HIGH	
(2) In-stream Habitat	HIGH	
(3) Baseflow	HIGH	
(3) Substrate	HIGH	
(3) Stream Stability	HIGH	
(3) In-stream Habitat	HIGH	
(2) Stream-side Habitat	HIGH	
(3) Stream-side Habitat	HIGH	
(3) Thermoregulation	HIGH	
(2) Tidal Marsh In-stream Habitat	NA	
(3) Flow Restriction	NA	
(3) Tidal Marsh Stream Stability	NA	
(4) Tidal Marsh Channel Stability	NA	
(4) Tidal Marsh Stream Geomorphology	NA	
(3) Tidal Marsh In-stream Habitat	NA	
(2) Intertidal Zone	NA	
Overall	HIGH	

NC SAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 2
Rating Calculator Version 2

USACE AID #:	NCDWR #:																														
<p>INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.</p> <p>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</p> <p>PROJECT/SITE INFORMATION:</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%;">1. Project name (if any): <u>Jeat Property</u></td> <td style="width:50%;">2. Date of evaluation: <u>9/9/16</u></td> </tr> <tr> <td>3. Applicant/owner name: <u>Wetlands Resource Center</u></td> <td>4. Assessor name/organization: <u>Corey Novak / LMG, Inc.</u></td> </tr> <tr> <td>5. County: <u>Pender</u></td> <td>6. Nearest named water body on USGS 7.5-minute quad: <u>Northeast Cape Fear River</u></td> </tr> <tr> <td>7. River basin: <u>Cape Fear</u></td> <td></td> </tr> <tr> <td colspan="2">8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>34.479920, -77.834859</u></td> </tr> </table> <p>STREAM INFORMATION: (depth and width can be approximations)</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%;">9. Site number (show on attached map): <u>Stream 2</u></td> <td style="width:50%;">10. Length of assessment reach evaluated (feet): <u>300</u></td> </tr> <tr> <td colspan="2">11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>>8</u> <input type="checkbox"/> Unable to assess channel depth.</td> </tr> <tr> <td colspan="2">12. Channel width at top of bank (feet): <u>30</u> 13. Is assessment reach a swamp steam? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</td> </tr> <tr> <td colspan="2">14. Feature type: <input checked="" type="checkbox"/> Perennial flow <input type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream</td> </tr> </table> <p>STREAM CATEGORY INFORMATION:</p> <p>15. NC SAM Zone: <input type="checkbox"/> Mountains (M) <input type="checkbox"/> Piedmont (P) <input checked="" type="checkbox"/> Inner Coastal Plain (I) <input type="checkbox"/> Outer Coastal Plain (O)</p> <p>16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream): <input checked="" type="checkbox"/> A  (more sinuous stream, flatter valley slope) <input type="checkbox"/> B  (less sinuous stream, steeper valley slope)</p> <p>17. Watershed size: (skip for Tidal Marsh Stream) <input checked="" type="checkbox"/> Size 1 (< 0.1 mi²) <input type="checkbox"/> Size 2 (0.1 to < 0.5 mi²) <input type="checkbox"/> Size 3 (0.5 to < 5 mi²) <input type="checkbox"/> Size 4 (≥ 5 mi²)</p> <p>ADDITIONAL INFORMATION:</p> <p>18. Were regulatory considerations evaluated? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, check all that apply to the assessment area.</p> <table style="width:100%; border: none;"> <tr> <td><input checked="" type="checkbox"/> Section 10 water</td> <td><input type="checkbox"/> Classified Trout Waters</td> <td><input type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/> IV <input type="checkbox"/> V)</td> </tr> <tr> <td><input type="checkbox"/> Essential Fish Habitat</td> <td><input type="checkbox"/> Primary Nursery Area</td> <td><input type="checkbox"/> High Quality Waters/Outstanding Resource Waters</td> </tr> <tr> <td><input type="checkbox"/> Publicly owned property</td> <td><input type="checkbox"/> NCDWR Riparian buffer rule in effect</td> <td><input type="checkbox"/> Nutrient Sensitive Waters</td> </tr> <tr> <td><input checked="" type="checkbox"/> Anadromous fish</td> <td><input type="checkbox"/> 303(d) List</td> <td><input checked="" type="checkbox"/> CAMA Area of Environmental Concern (AEC)</td> </tr> </table> <p><input checked="" type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area. List species: <u>American alligator, Atlantic sturgeon</u></p> <p><input type="checkbox"/> Designated Critical Habitat (list species) _____</p> <p>19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p>		1. Project name (if any): <u>Jeat Property</u>	2. Date of evaluation: <u>9/9/16</u>	3. Applicant/owner name: <u>Wetlands Resource Center</u>	4. Assessor name/organization: <u>Corey Novak / LMG, Inc.</u>	5. County: <u>Pender</u>	6. Nearest named water body on USGS 7.5-minute quad: <u>Northeast Cape Fear River</u>	7. River basin: <u>Cape Fear</u>		8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>34.479920, -77.834859</u>		9. Site number (show on attached map): <u>Stream 2</u>	10. Length of assessment reach evaluated (feet): <u>300</u>	11. 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1. **Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)**
 - A Water throughout assessment reach.
 - B No flow, water in pools only.
 - C No water in assessment reach.
2. **Evidence of Flow Restriction – assessment reach metric**
 - A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
 - B Not A
3. **Feature Pattern – assessment reach metric**
 - A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
 - B Not A
4. **Feature Longitudinal Profile – assessment reach metric**
 - A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
 - B Not A
5. **Signs of Active Instability – assessment reach metric**

Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

 - A < 10% of channel unstable
 - B 10 to 25% of channel unstable
 - C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric

Consider for the Left Bank (LB) and the Right Bank (RB).

- LB RB
[X]A [X]A Little or no evidence of conditions that adversely affect reference interaction
[B] [B] Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])
[C] [C] Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

7. Water Quality Stressors – assessment reach/intertidal zone metric

Check all that apply.

- [A] Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
[B] Excessive sedimentation (burying of stream features or intertidal zone)
[C] Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
[D] Odor (not including natural sulfide odors)
[E] Current published or collected data indicating degraded water quality in the assessment reach. Cite source in "Notes/Sketch" section.
[F] Livestock with access to stream or intertidal zone
[G] Excessive algae in stream or intertidal zone
[H] Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
[I] Other: (explain in "Notes/Sketch" section)
[X]J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- [A] Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
[B] Drought conditions and rainfall exceeding 1 inch within the last 48 hours
[X]C No drought conditions

9. Large or Dangerous Stream – assessment reach metric

[X]Yes []No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric

10a. []Yes []No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- [A] Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
[B] Multiple sticks and/or leaf packs and/or emergent vegetation
[C] Multiple snags and logs (including lap trees)
[D] 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
[E] Little or no habitat
[F] 5% oysters or other natural hard bottoms
[G] Submerged aquatic vegetation
[H] Low-tide refugia (pools)
[I] Sand bottom
[J] 5% vertical bank along the marsh
[K] Little or no habitat

*****REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS*****

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. []Yes []No Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- [A] Riffle-run section (evaluate 11c)
[B] Pool-glide section (evaluate 11d)
[C] Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but <= 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

Table with 5 columns: NP, R, C, A, P and rows for Bedrock/saprolite, Boulder (256 – 4096 mm), Cobble (64 – 256 mm), Gravel (2 – 64 mm), Sand (.062 – 2 mm), Silt/clay (< 0.062 mm), Detritus, Artificial (rip-rap, concrete, etc.)

11d. []Yes []No Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

12a. Yes No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. No Water Other: _____

12b. Yes No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

1 >1 Numbers over columns refer to “individuals” for Size 1 and 2 streams and “taxa” for Size 3 and 4 streams.

- Adult frogs
- Aquatic reptiles
- Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- Beetles
- Caddisfly larvae (T)
- Asian clam (*Corbicula*)
- Crustacean (isopod/amphipod/crayfish/shrimp)
- Damselfly and dragonfly larvae
- Dipterans
- Mayfly larvae (E)
- Megaloptera (alderfly, fishfly, dobsonfly larvae)
- Midges/mosquito larvae
- Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
- Mussels/Clams (not *Corbicula*)
- Other fish
- Salamanders/tadpoles
- Snails
- Stonefly larvae (P)
- Tipulid larvae
- Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Moderate alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Majority of streamside area with depressions able to pond water \geq 6 inches deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of streamside area with depressions able to pond water < 3 inches deep |

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)

Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input checked="" type="checkbox"/> Y | <input checked="" type="checkbox"/> Y | Are wetlands present in the streamside area? |
| <input type="checkbox"/> N | <input type="checkbox"/> N | |

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- D Evidence of bank seepage or sweating (iron in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)

Check all that apply.

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream (\geq 24% impervious surface for watershed)
- D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)

Consider aspect. Consider “leaf-on” condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)

Consider “vegetated buffer” and “wooded buffer” separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated		Wooded		
LB	RB	LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 30 feet wide
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	< 10 feet wide <u>or</u> no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Vegetated” Buffer Width).

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Mature forest
<input type="checkbox"/> B	<input type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input type="checkbox"/> C	<input type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input type="checkbox"/> E	<input type="checkbox"/> E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	Row crops
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	Maintained turf
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	Pasture (no livestock)/commercial horticulture
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Wooded” Buffer Width).

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Medium to high stem density
<input type="checkbox"/> B	<input type="checkbox"/> B	Low stem density
<input type="checkbox"/> C	<input type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input type="checkbox"/> B	<input type="checkbox"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input type="checkbox"/> C	<input type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. Yes No Was conductivity measurement recorded?
If No, select one of the following reasons. No Water Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).
A < 46 B 46 to < 67 C 67 to < 79 D 79 to < 230 E ≥ 230

Notes/Sketch:



Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 1
Rating Calculator Version 2

Stream Site Name Jeat Property Date of Assessment 9/9/16
 Stream Category la1 Assessor Name/Organization Corey Novak / LMG, Inc.

Notes of Field Assessment Form (Y/N) NO
 Presence of regulatory considerations (Y/N) NO
 Additional stream information/supplementary measurements included (Y/N) NO
 NC SAM feature type (perennial, intermittent, Tidal Marsh Stream) Perennial

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	HIGH	
(2) Baseflow	HIGH	
(2) Flood Flow	HIGH	
(3) Streamside Area Attenuation	HIGH	
(4) Floodplain Access	HIGH	
(4) Wooded Riparian Buffer	HIGH	
(4) Microtopography	HIGH	
(3) Stream Stability	HIGH	
(4) Channel Stability	HIGH	
(4) Sediment Transport	HIGH	
(4) Stream Geomorphology	HIGH	
(2) Stream/Intertidal Zone Interaction	NA	
(2) Longitudinal Tidal Flow	NA	
(2) Tidal Marsh Stream Stability	NA	
(3) Tidal Marsh Channel Stability	NA	
(3) Tidal Marsh Stream Geomorphology	NA	
(1) Water Quality	HIGH	
(2) Baseflow	HIGH	
(2) Streamside Area Vegetation	HIGH	
(3) Upland Pollutant Filtration	HIGH	
(3) Thermoregulation	HIGH	
(2) Indicators of Stressors	NO	
(2) Aquatic Life Tolerance	HIGH	
(2) Intertidal Zone Filtration	NA	
(1) Habitat	HIGH	
(2) In-stream Habitat	HIGH	
(3) Baseflow	HIGH	
(3) Substrate	HIGH	
(3) Stream Stability	HIGH	
(3) In-stream Habitat	HIGH	
(2) Stream-side Habitat	HIGH	
(3) Stream-side Habitat	HIGH	
(3) Thermoregulation	HIGH	
(2) Tidal Marsh In-stream Habitat	NA	
(3) Flow Restriction	NA	
(3) Tidal Marsh Stream Stability	NA	
(4) Tidal Marsh Channel Stability	NA	
(4) Tidal Marsh Stream Geomorphology	NA	
(3) Tidal Marsh In-stream Habitat	NA	
(2) Intertidal Zone	NA	
Overall	HIGH	

NC SAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 2
Rating Calculator Version 2

USACE AID #:	NCDWR #:
<p>INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.</p> <p>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</p>	
PROJECT/SITE INFORMATION:	
1. Project name (if any): <u>Jeat Property</u>	2. Date of evaluation: <u>9/9/16</u>
3. Applicant/owner name: <u>Wetlands Resource Center</u>	4. Assessor name/organization: <u>Corey Novak / LMG, Inc.</u>
5. County: <u>Pender</u>	6. Nearest named water body on USGS 7.5-minute quad: <u>Northeast Cape Fear River</u>
7. River basin: <u>Cape Fear</u>	
8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>34.475326, -77.839362</u>	
STREAM INFORMATION: (depth and width can be approximations)	
9. Site number (show on attached map): <u>Stream 3</u>	10. Length of assessment reach evaluated (feet): <u>530</u>
11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>6</u>	<input type="checkbox"/> Unable to assess channel depth.
12. Channel width at top of bank (feet): <u>40</u>	13. Is assessment reach a swamp steam? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
14. Feature type: <input checked="" type="checkbox"/> Perennial flow <input type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream	
STREAM CATEGORY INFORMATION:	
15. NC SAM Zone: <input type="checkbox"/> Mountains (M) <input type="checkbox"/> Piedmont (P) <input checked="" type="checkbox"/> Inner Coastal Plain (I) <input type="checkbox"/> Outer Coastal Plain (O)	
16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream):	<input checked="" type="checkbox"/> A  (more sinuous stream, flatter valley slope) <input type="checkbox"/> B  (less sinuous stream, steeper valley slope)
17. Watershed size: (skip for Tidal Marsh Stream)	<input checked="" type="checkbox"/> Size 1 (< 0.1 mi ²) <input type="checkbox"/> Size 2 (0.1 to < 0.5 mi ²) <input type="checkbox"/> Size 3 (0.5 to < 5 mi ²) <input type="checkbox"/> Size 4 (≥ 5 mi ²)
ADDITIONAL INFORMATION:	
18. Were regulatory considerations evaluated? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, check all that apply to the assessment area.	
<input checked="" type="checkbox"/> Section 10 water <input type="checkbox"/> Classified Trout Waters <input type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/> IV <input type="checkbox"/> V) <input type="checkbox"/> Essential Fish Habitat <input type="checkbox"/> Primary Nursery Area <input type="checkbox"/> High Quality Waters/Outstanding Resource Waters <input type="checkbox"/> Publicly owned property <input type="checkbox"/> NCDWR Riparian buffer rule in effect <input type="checkbox"/> Nutrient Sensitive Waters <input checked="" type="checkbox"/> Anadromous fish <input type="checkbox"/> 303(d) List <input checked="" type="checkbox"/> CAMA Area of Environmental Concern (AEC) <input checked="" type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area. List species: <u>American alligator, Atlantic sturgeon</u> <input type="checkbox"/> Designated Critical Habitat (list species) _____	
19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

1. **Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)**
 - A Water throughout assessment reach.
 - B No flow, water in pools only.
 - C No water in assessment reach.

2. **Evidence of Flow Restriction – assessment reach metric**
 - A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
 - B Not A

3. **Feature Pattern – assessment reach metric**
 - A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
 - B Not A

4. **Feature Longitudinal Profile – assessment reach metric**
 - A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
 - B Not A

5. **Signs of Active Instability – assessment reach metric**

Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

 - A < 10% of channel unstable
 - B 10 to 25% of channel unstable
 - C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric

Consider for the Left Bank (LB) and the Right Bank (RB).

- LB RB
[X]A [X]A Little or no evidence of conditions that adversely affect reference interaction
[B] [B] Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])
[C] [C] Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

7. Water Quality Stressors – assessment reach/intertidal zone metric

Check all that apply.

- [A] Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
[B] Excessive sedimentation (burying of stream features or intertidal zone)
[C] Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
[D] Odor (not including natural sulfide odors)
[E] Current published or collected data indicating degraded water quality in the assessment reach. Cite source in "Notes/Sketch" section.
[F] Livestock with access to stream or intertidal zone
[G] Excessive algae in stream or intertidal zone
[H] Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
[I] Other: (explain in "Notes/Sketch" section)
[X]J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- [A] Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
[B] Drought conditions and rainfall exceeding 1 inch within the last 48 hours
[X]C No drought conditions

9. Large or Dangerous Stream – assessment reach metric

[X]Yes []No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric

10a. []Yes []No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- [A] Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
[B] Multiple sticks and/or leaf packs and/or emergent vegetation
[C] Multiple snags and logs (including lap trees)
[D] 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
[E] Little or no habitat
[F] 5% oysters or other natural hard bottoms
[G] Submerged aquatic vegetation
[H] Low-tide refugia (pools)
[I] Sand bottom
[J] 5% vertical bank along the marsh
[K] Little or no habitat

*****REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS*****

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. []Yes []No Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- [A] Riffle-run section (evaluate 11c)
[B] Pool-glide section (evaluate 11d)
[C] Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but <= 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

Table with 5 columns: NP, R, C, A, P and rows for Bedrock/saprolite, Boulder (256 – 4096 mm), Cobble (64 – 256 mm), Gravel (2 – 64 mm), Sand (.062 – 2 mm), Silt/clay (< 0.062 mm), Detritus, Artificial (rip-rap, concrete, etc.)

11d. []Yes []No Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

- 12a. Yes No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. No Water Other: _____
- 12b. Yes No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

- 1 >1 Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.
- Adult frogs
 - Aquatic reptiles
 - Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
 - Beetles
 - Caddisfly larvae (T)
 - Asian clam (*Corbicula*)
 - Crustacean (isopod/amphipod/crayfish/shrimp)
 - Damselfly and dragonfly larvae
 - Dipterans
 - Mayfly larvae (E)
 - Megaloptera (alderfly, fishfly, dobsonfly larvae)
 - Midges/mosquito larvae
 - Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
 - Mussels/Clams (not *Corbicula*)
 - Other fish
 - Salamanders/tadpoles
 - Snails
 - Stonefly larvae (P)
 - Tipulid larvae
 - Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Moderate alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Majority of streamside area with depressions able to pond water \geq 6 inches deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of streamside area with depressions able to pond water < 3 inches deep |

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)

Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input checked="" type="checkbox"/> Y | <input checked="" type="checkbox"/> Y | Are wetlands present in the streamside area? |
| <input type="checkbox"/> N | <input type="checkbox"/> N | |

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- D Evidence of bank seepage or sweating (iron in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)

Check all that apply.

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream (\geq 24% impervious surface for watershed)
- D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)

Consider aspect. Consider "leaf-on" condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)

Consider “vegetated buffer” and “wooded buffer” separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated		Wooded		
LB	RB	LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 30 feet wide
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	< 10 feet wide <u>or</u> no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Vegetated” Buffer Width).

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Mature forest
<input type="checkbox"/> B	<input type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input type="checkbox"/> C	<input type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input type="checkbox"/> E	<input type="checkbox"/> E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	Row crops
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	Maintained turf
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	Pasture (no livestock)/commercial horticulture
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Wooded” Buffer Width).

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Medium to high stem density
<input type="checkbox"/> B	<input type="checkbox"/> B	Low stem density
<input type="checkbox"/> C	<input type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input type="checkbox"/> B	<input type="checkbox"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input type="checkbox"/> C	<input type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. Yes No Was conductivity measurement recorded?

If No, select one of the following reasons. No Water Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).

<input type="checkbox"/> A	< 46	<input type="checkbox"/> B	46 to < 67	<input type="checkbox"/> C	67 to < 79	<input type="checkbox"/> D	79 to < 230	<input type="checkbox"/> E	≥ 230
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Notes/Sketch:



Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 1
Rating Calculator Version 2

Stream Site Name Jeat Property Date of Assessment 9/9/16
 Stream Category la1 Assessor Name/Organization Corey Novak / LMG, Inc.

Notes of Field Assessment Form (Y/N) NO
 Presence of regulatory considerations (Y/N) NO
 Additional stream information/supplementary measurements included (Y/N) NO
 NC SAM feature type (perennial, intermittent, Tidal Marsh Stream) Perennial

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	HIGH	
(2) Baseflow	HIGH	
(2) Flood Flow	HIGH	
(3) Streamside Area Attenuation	HIGH	
(4) Floodplain Access	HIGH	
(4) Wooded Riparian Buffer	HIGH	
(4) Microtopography	HIGH	
(3) Stream Stability	HIGH	
(4) Channel Stability	HIGH	
(4) Sediment Transport	HIGH	
(4) Stream Geomorphology	HIGH	
(2) Stream/Intertidal Zone Interaction	NA	
(2) Longitudinal Tidal Flow	NA	
(2) Tidal Marsh Stream Stability	NA	
(3) Tidal Marsh Channel Stability	NA	
(3) Tidal Marsh Stream Geomorphology	NA	
(1) Water Quality	HIGH	
(2) Baseflow	HIGH	
(2) Streamside Area Vegetation	HIGH	
(3) Upland Pollutant Filtration	HIGH	
(3) Thermoregulation	HIGH	
(2) Indicators of Stressors	NO	
(2) Aquatic Life Tolerance	HIGH	
(2) Intertidal Zone Filtration	NA	
(1) Habitat	HIGH	
(2) In-stream Habitat	HIGH	
(3) Baseflow	HIGH	
(3) Substrate	HIGH	
(3) Stream Stability	HIGH	
(3) In-stream Habitat	HIGH	
(2) Stream-side Habitat	HIGH	
(3) Stream-side Habitat	HIGH	
(3) Thermoregulation	HIGH	
(2) Tidal Marsh In-stream Habitat	NA	
(3) Flow Restriction	NA	
(3) Tidal Marsh Stream Stability	NA	
(4) Tidal Marsh Channel Stability	NA	
(4) Tidal Marsh Stream Geomorphology	NA	
(3) Tidal Marsh In-stream Habitat	NA	
(2) Intertidal Zone	NA	
Overall	HIGH	

NC SAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 2
Rating Calculator Version 2

USACE AID #:	NCDWR #:																														
<p>INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.</p> <p>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</p> <p>PROJECT/SITE INFORMATION:</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%;">1. Project name (if any): <u>Jeat Property</u></td> <td style="width:50%;">2. Date of evaluation: <u>9/9/16</u></td> </tr> <tr> <td>3. Applicant/owner name: <u>Wetlands Resource Center</u></td> <td>4. Assessor name/organization: <u>Corey Novak / LMG, Inc.</u></td> </tr> <tr> <td>5. County: <u>Pender</u></td> <td>6. Nearest named water body on USGS 7.5-minute quad: <u>Northeast Cape Fear River</u></td> </tr> <tr> <td>7. River basin: <u>Cape Fear</u></td> <td></td> </tr> <tr> <td colspan="2">8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>34.470019, -77.838766</u></td> </tr> </table> <p>STREAM INFORMATION: (depth and width can be approximations)</p> <table style="width:100%; border: none;"> <tr> <td style="width:50%;">9. Site number (show on attached map): <u>Stream 4</u></td> <td style="width:50%;">10. Length of assessment reach evaluated (feet): <u>840</u></td> </tr> <tr> <td colspan="2">11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>>8</u> <input type="checkbox"/> Unable to assess channel depth.</td> </tr> <tr> <td colspan="2">12. 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List species: <u>American alligator, Atlantic sturgeon</u></p> <p><input type="checkbox"/> Designated Critical Habitat (list species) _____</p> <p>19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p>		1. Project name (if any): <u>Jeat Property</u>	2. Date of evaluation: <u>9/9/16</u>	3. Applicant/owner name: <u>Wetlands Resource Center</u>	4. Assessor name/organization: <u>Corey Novak / LMG, Inc.</u>	5. County: <u>Pender</u>	6. Nearest named water body on USGS 7.5-minute quad: <u>Northeast Cape Fear River</u>	7. River basin: <u>Cape Fear</u>		8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>34.470019, -77.838766</u>		9. Site number (show on attached map): <u>Stream 4</u>	10. Length of assessment reach evaluated (feet): <u>840</u>	11. 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1. **Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)**
 A Water throughout assessment reach.
 B No flow, water in pools only.
 C No water in assessment reach.
2. **Evidence of Flow Restriction – assessment reach metric**
 A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
 B Not A
3. **Feature Pattern – assessment reach metric**
 A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
 B Not A
4. **Feature Longitudinal Profile – assessment reach metric**
 A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
 B Not A
5. **Signs of Active Instability – assessment reach metric**
Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).
 A < 10% of channel unstable
 B 10 to 25% of channel unstable
 C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric

Consider for the Left Bank (LB) and the Right Bank (RB).

- LB RB
[X]A [X]A Little or no evidence of conditions that adversely affect reference interaction
[B] [B] Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])
[C] [C] Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

7. Water Quality Stressors – assessment reach/intertidal zone metric

Check all that apply.

- [A] Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
[B] Excessive sedimentation (burying of stream features or intertidal zone)
[C] Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
[D] Odor (not including natural sulfide odors)
[E] Current published or collected data indicating degraded water quality in the assessment reach. Cite source in "Notes/Sketch" section.
[F] Livestock with access to stream or intertidal zone
[G] Excessive algae in stream or intertidal zone
[H] Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
[I] Other: (explain in "Notes/Sketch" section)
[X]J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- [A] Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
[B] Drought conditions and rainfall exceeding 1 inch within the last 48 hours
[X]C No drought conditions

9. Large or Dangerous Stream – assessment reach metric

[X]Yes []No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric

10a. []Yes []No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- [A] Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
[B] Multiple sticks and/or leaf packs and/or emergent vegetation
[C] Multiple snags and logs (including lap trees)
[D] 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
[E] Little or no habitat
[F] 5% oysters or other natural hard bottoms
[G] Submerged aquatic vegetation
[H] Low-tide refugia (pools)
[I] Sand bottom
[J] 5% vertical bank along the marsh
[K] Little or no habitat

*****REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS*****

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. []Yes []No Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- [A] Riffle-run section (evaluate 11c)
[B] Pool-glide section (evaluate 11d)
[C] Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but <= 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

Table with 5 columns: NP, R, C, A, P and rows for Bedrock/saprolite, Boulder (256 – 4096 mm), Cobble (64 – 256 mm), Gravel (2 – 64 mm), Sand (.062 – 2 mm), Silt/clay (< 0.062 mm), Detritus, Artificial (rip-rap, concrete, etc.)

11d. []Yes []No Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

12a. Yes No Was an in-stream aquatic life assessment performed as described in the User Manual?

If No, select one of the following reasons and skip to Metric 13. No Water Other: _____

12b. Yes No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

1 >1 Numbers over columns refer to "individuals" for Size 1 and 2 streams and "taxa" for Size 3 and 4 streams.

- Adult frogs
- Aquatic reptiles
- Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- Beetles
- Caddisfly larvae (T)
- Asian clam (*Corbicula*)
- Crustacean (isopod/amphipod/crayfish/shrimp)
- Damselfly and dragonfly larvae
- Dipterans
- Mayfly larvae (E)
- Megaloptera (alderfly, fishfly, dobsonfly larvae)
- Midges/mosquito larvae
- Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
- Mussels/Clams (not *Corbicula*)
- Other fish
- Salamanders/tadpoles
- Snails
- Stonefly larvae (P)
- Tipulid larvae
- Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Moderate alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Majority of streamside area with depressions able to pond water \geq 6 inches deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of streamside area with depressions able to pond water < 3 inches deep |

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)

Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input checked="" type="checkbox"/> Y | <input checked="" type="checkbox"/> Y | Are wetlands present in the streamside area? |
| <input type="checkbox"/> N | <input type="checkbox"/> N | |

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- D Evidence of bank seepage or sweating (iron in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)

Check all that apply.

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream (\geq 24% impervious surface for watershed)
- D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)

Consider aspect. Consider "leaf-on" condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)

Consider “vegetated buffer” and “wooded buffer” separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated		Wooded		
LB	RB	LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 30 feet wide
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	< 10 feet wide <u>or</u> no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Vegetated” Buffer Width).

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Mature forest
<input type="checkbox"/> B	<input type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input type="checkbox"/> C	<input type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input type="checkbox"/> E	<input type="checkbox"/> E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	Row crops
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	Maintained turf
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	Pasture (no livestock)/commercial horticulture
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Wooded” Buffer Width).

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Medium to high stem density
<input type="checkbox"/> B	<input type="checkbox"/> B	Low stem density
<input type="checkbox"/> C	<input type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input type="checkbox"/> B	<input type="checkbox"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input type="checkbox"/> C	<input type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. Yes No Was conductivity measurement recorded?

If No, select one of the following reasons. No Water Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).

<input type="checkbox"/> A	< 46	<input type="checkbox"/> B	46 to < 67	<input type="checkbox"/> C	67 to < 79	<input type="checkbox"/> D	79 to < 230	<input type="checkbox"/> E	≥ 230
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Notes/Sketch:

There is a large beaver dam ~200 ft. below the stream origin. Stream is not accessible by boat due to aquatic macrophytes at lower end.



Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 1
Rating Calculator Version 2

Stream Site Name Jeat Property Date of Assessment 9/9/16
 Stream Category la1 Assessor Name/Organization Corey Novak / LMG, Inc.

Notes of Field Assessment Form (Y/N) YES
 Presence of regulatory considerations (Y/N) NO
 Additional stream information/supplementary measurements included (Y/N) NO
 NC SAM feature type (perennial, intermittent, Tidal Marsh Stream) Perennial

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	HIGH	
(2) Baseflow	HIGH	
(2) Flood Flow	HIGH	
(3) Streamside Area Attenuation	HIGH	
(4) Floodplain Access	HIGH	
(4) Wooded Riparian Buffer	HIGH	
(4) Microtopography	HIGH	
(3) Stream Stability	HIGH	
(4) Channel Stability	HIGH	
(4) Sediment Transport	HIGH	
(4) Stream Geomorphology	HIGH	
(2) Stream/Intertidal Zone Interaction	NA	
(2) Longitudinal Tidal Flow	NA	
(2) Tidal Marsh Stream Stability	NA	
(3) Tidal Marsh Channel Stability	NA	
(3) Tidal Marsh Stream Geomorphology	NA	
(1) Water Quality	HIGH	
(2) Baseflow	HIGH	
(2) Streamside Area Vegetation	HIGH	
(3) Upland Pollutant Filtration	HIGH	
(3) Thermoregulation	HIGH	
(2) Indicators of Stressors	NO	
(2) Aquatic Life Tolerance	HIGH	
(2) Intertidal Zone Filtration	NA	
(1) Habitat	HIGH	
(2) In-stream Habitat	HIGH	
(3) Baseflow	HIGH	
(3) Substrate	HIGH	
(3) Stream Stability	HIGH	
(3) In-stream Habitat	HIGH	
(2) Stream-side Habitat	HIGH	
(3) Stream-side Habitat	HIGH	
(3) Thermoregulation	HIGH	
(2) Tidal Marsh In-stream Habitat	NA	
(3) Flow Restriction	NA	
(3) Tidal Marsh Stream Stability	NA	
(4) Tidal Marsh Channel Stability	NA	
(4) Tidal Marsh Stream Geomorphology	NA	
(3) Tidal Marsh In-stream Habitat	NA	
(2) Intertidal Zone	NA	
Overall	HIGH	

NC SAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 2
Rating Calculator Version 2

USACE AID #:	NCDWR #:		
<p>INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.</p> <p>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</p>			
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1. Project name (if any):	Jeat Property	2. Date of evaluation:	9/9/16
3. Applicant/owner name:	Wetlands Resource Center	4. Assessor name/organization:	Corey Novak / LMG, Inc.
5. County:	Pender	6. Nearest named water body on USGS 7.5-minute quad:	Northeast Cape Fear River
7. River basin:	Cape Fear		
8. Site coordinates (decimal degrees, at lower end of assessment reach):	34.470106, -77.838384		
STREAM INFORMATION: (depth and width can be approximations)			
9. Site number (show on attached map):	Stream 5	10. Length of assessment reach evaluated (feet):	770
11. Channel depth from bed (in riffle, if present) to top of bank (feet):	4	<input type="checkbox"/> Unable to assess channel depth.	
12. Channel width at top of bank (feet):	30	13. Is assessment reach a swamp stream?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
14. Feature type:	<input checked="" type="checkbox"/> Perennial flow <input type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream		
STREAM CATEGORY INFORMATION:			
15. NC SAM Zone:	<input type="checkbox"/> Mountains (M) <input type="checkbox"/> Piedmont (P) <input checked="" type="checkbox"/> Inner Coastal Plain (I) <input type="checkbox"/> Outer Coastal Plain (O)		
16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream):	<input checked="" type="checkbox"/> A  (more sinuous stream, flatter valley slope) <input type="checkbox"/> B  (less sinuous stream, steeper valley slope)		
17. Watershed size: (skip for Tidal Marsh Stream)	<input checked="" type="checkbox"/> Size 1 (< 0.1 mi ²) <input type="checkbox"/> Size 2 (0.1 to < 0.5 mi ²) <input type="checkbox"/> Size 3 (0.5 to < 5 mi ²) <input type="checkbox"/> Size 4 (≥ 5 mi ²)		
ADDITIONAL INFORMATION:			
18. Were regulatory considerations evaluated? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, check all that apply to the assessment area.			
<input checked="" type="checkbox"/> Section 10 water <input type="checkbox"/> Classified Trout Waters <input type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/> IV <input type="checkbox"/> V)			
<input type="checkbox"/> Essential Fish Habitat <input type="checkbox"/> Primary Nursery Area <input type="checkbox"/> High Quality Waters/Outstanding Resource Waters			
<input type="checkbox"/> Publicly owned property <input type="checkbox"/> NCDWR Riparian buffer rule in effect <input type="checkbox"/> Nutrient Sensitive Waters			
<input checked="" type="checkbox"/> Anadromous fish <input type="checkbox"/> 303(d) List <input checked="" type="checkbox"/> CAMA Area of Environmental Concern (AEC)			
<input checked="" type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area. List species: <u>American alligator, Atlantic sturgeon</u>			
<input type="checkbox"/> Designated Critical Habitat (list species) _____			
19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			

1. **Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)**
 - A Water throughout assessment reach.
 - B No flow, water in pools only.
 - C No water in assessment reach.

2. **Evidence of Flow Restriction – assessment reach metric**
 - A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
 - B Not A

3. **Feature Pattern – assessment reach metric**
 - A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
 - B Not A

4. **Feature Longitudinal Profile – assessment reach metric**
 - A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
 - B Not A

5. **Signs of Active Instability – assessment reach metric**

Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

 - A < 10% of channel unstable
 - B 10 to 25% of channel unstable
 - C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric

Consider for the Left Bank (LB) and the Right Bank (RB).

- LB RB
[X]A [X]A Little or no evidence of conditions that adversely affect reference interaction
[B] [B] Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])
[C] [C] Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

7. Water Quality Stressors – assessment reach/intertidal zone metric

Check all that apply.

- [A] Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
[B] Excessive sedimentation (burying of stream features or intertidal zone)
[C] Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
[D] Odor (not including natural sulfide odors)
[E] Current published or collected data indicating degraded water quality in the assessment reach. Cite source in "Notes/Sketch" section.
[F] Livestock with access to stream or intertidal zone
[G] Excessive algae in stream or intertidal zone
[H] Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
[I] Other: (explain in "Notes/Sketch" section)
[X]J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- [A] Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
[B] Drought conditions and rainfall exceeding 1 inch within the last 48 hours
[X]C No drought conditions

9. Large or Dangerous Stream – assessment reach metric

[X]Yes []No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric

10a. []Yes []No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- [A] Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
[B] Multiple sticks and/or leaf packs and/or emergent vegetation
[C] Multiple snags and logs (including lap trees)
[D] 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
[E] Little or no habitat
[F] 5% oysters or other natural hard bottoms
[G] Submerged aquatic vegetation
[H] Low-tide refugia (pools)
[I] Sand bottom
[J] 5% vertical bank along the marsh
[K] Little or no habitat

*****REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS*****

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. []Yes []No Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- [A] Riffle-run section (evaluate 11c)
[B] Pool-glide section (evaluate 11d)
[C] Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but <= 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

Table with 5 columns: NP, R, C, A, P and rows for Bedrock/saprolite, Boulder (256 – 4096 mm), Cobble (64 – 256 mm), Gravel (2 – 64 mm), Sand (.062 – 2 mm), Silt/clay (< 0.062 mm), Detritus, Artificial (rip-rap, concrete, etc.)

11d. []Yes []No Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

12a. Yes No Was an in-stream aquatic life assessment performed as described in the User Manual?
If No, select one of the following reasons and skip to Metric 13. No Water Other: _____

12b. Yes No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

1 >1 Numbers over columns refer to “individuals” for Size 1 and 2 streams and “taxa” for Size 3 and 4 streams.

- Adult frogs
- Aquatic reptiles
- Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- Beetles
- Caddisfly larvae (T)
- Asian clam (*Corbicula*)
- Crustacean (isopod/amphipod/crayfish/shrimp)
- Damselfly and dragonfly larvae
- Dipterans
- Mayfly larvae (E)
- Megaloptera (alderfly, fishfly, dobsonfly larvae)
- Midges/mosquito larvae
- Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
- Mussels/Clams (not *Corbicula*)
- Other fish
- Salamanders/tadpoles
- Snails
- Stonefly larvae (P)
- Tipulid larvae
- Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Moderate alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Majority of streamside area with depressions able to pond water ≥ 6 inches deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of streamside area with depressions able to pond water < 3 inches deep |

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)

Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input checked="" type="checkbox"/> Y | <input checked="" type="checkbox"/> Y | Are wetlands present in the streamside area? |
| <input type="checkbox"/> N | <input type="checkbox"/> N | |

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- D Evidence of bank seepage or sweating (iron in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)

Check all that apply.

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream (≥ 24% impervious surface for watershed)
- D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)

Consider aspect. Consider “leaf-on” condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)

Consider “vegetated buffer” and “wooded buffer” separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated		Wooded		
LB	RB	LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 30 feet wide
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	< 10 feet wide <u>or</u> no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Vegetated” Buffer Width).

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Mature forest
<input type="checkbox"/> B	<input type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input type="checkbox"/> C	<input type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input type="checkbox"/> E	<input type="checkbox"/> E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	Row crops
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	Maintained turf
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	Pasture (no livestock)/commercial horticulture
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Wooded” Buffer Width).

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Medium to high stem density
<input type="checkbox"/> B	<input type="checkbox"/> B	Low stem density
<input type="checkbox"/> C	<input type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input type="checkbox"/> B	<input type="checkbox"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input type="checkbox"/> C	<input type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. Yes No Was conductivity measurement recorded?
If No, select one of the following reasons. No Water Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).
A < 46 B 46 to < 67 C 67 to < 79 D 79 to < 230 E ≥ 230

Notes/Sketch:



Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 1
Rating Calculator Version 2

Stream Site Name Jeat Property Date of Assessment 9/9/16
 Stream Category la1 Assessor Name/Organization Corey Novak / LMG, Inc.

Notes of Field Assessment Form (Y/N) NO
 Presence of regulatory considerations (Y/N) NO
 Additional stream information/supplementary measurements included (Y/N) NO
 NC SAM feature type (perennial, intermittent, Tidal Marsh Stream) Perennial

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	HIGH	
(2) Baseflow	HIGH	
(2) Flood Flow	HIGH	
(3) Streamside Area Attenuation	HIGH	
(4) Floodplain Access	HIGH	
(4) Wooded Riparian Buffer	HIGH	
(4) Microtopography	HIGH	
(3) Stream Stability	HIGH	
(4) Channel Stability	HIGH	
(4) Sediment Transport	HIGH	
(4) Stream Geomorphology	HIGH	
(2) Stream/Intertidal Zone Interaction	NA	
(2) Longitudinal Tidal Flow	NA	
(2) Tidal Marsh Stream Stability	NA	
(3) Tidal Marsh Channel Stability	NA	
(3) Tidal Marsh Stream Geomorphology	NA	
(1) Water Quality	HIGH	
(2) Baseflow	HIGH	
(2) Streamside Area Vegetation	HIGH	
(3) Upland Pollutant Filtration	HIGH	
(3) Thermoregulation	HIGH	
(2) Indicators of Stressors	NO	
(2) Aquatic Life Tolerance	HIGH	
(2) Intertidal Zone Filtration	NA	
(1) Habitat	HIGH	
(2) In-stream Habitat	HIGH	
(3) Baseflow	HIGH	
(3) Substrate	HIGH	
(3) Stream Stability	HIGH	
(3) In-stream Habitat	HIGH	
(2) Stream-side Habitat	HIGH	
(3) Stream-side Habitat	HIGH	
(3) Thermoregulation	HIGH	
(2) Tidal Marsh In-stream Habitat	NA	
(3) Flow Restriction	NA	
(3) Tidal Marsh Stream Stability	NA	
(4) Tidal Marsh Channel Stability	NA	
(4) Tidal Marsh Stream Geomorphology	NA	
(3) Tidal Marsh In-stream Habitat	NA	
(2) Intertidal Zone	NA	
Overall	HIGH	

NC SAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 2
Rating Calculator Version 2

USACE AID #:	NCDWR #:
<p>INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.</p> <p>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</p>	
PROJECT/SITE INFORMATION:	
1. Project name (if any): <u>Jeat Property</u>	2. Date of evaluation: <u>9/9/16</u>
3. Applicant/owner name: <u>Wetlands Resource Center</u>	4. Assessor name/organization: <u>Corey Novak / LMG, Inc.</u>
5. County: <u>Pender</u>	6. Nearest named water body on USGS 7.5-minute quad: <u>Northeast Cape Fear River</u>
7. River basin: <u>Cape Fear</u>	
8. Site coordinates (decimal degrees, at lower end of assessment reach): <u>34.470019, -77.838766</u>	
STREAM INFORMATION: (depth and width can be approximations)	
9. Site number (show on attached map): <u>Stream 6</u>	10. Length of assessment reach evaluated (feet): <u>780</u>
11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>>8</u>	<input type="checkbox"/> Unable to assess channel depth.
12. Channel width at top of bank (feet): <u>15</u>	13. Is assessment reach a swamp steam? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
14. Feature type: <input checked="" type="checkbox"/> Perennial flow <input type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream	
STREAM CATEGORY INFORMATION:	
15. NC SAM Zone: <input type="checkbox"/> Mountains (M) <input type="checkbox"/> Piedmont (P) <input checked="" type="checkbox"/> Inner Coastal Plain (I) <input type="checkbox"/> Outer Coastal Plain (O)	
16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream):	<input checked="" type="checkbox"/>  <input type="checkbox"/>  (more sinuous stream, flatter valley slope) (less sinuous stream, steeper valley slope)
17. Watershed size: (skip for Tidal Marsh Stream)	<input checked="" type="checkbox"/> Size 1 (< 0.1 mi ²) <input type="checkbox"/> Size 2 (0.1 to < 0.5 mi ²) <input type="checkbox"/> Size 3 (0.5 to < 5 mi ²) <input type="checkbox"/> Size 4 (≥ 5 mi ²)
ADDITIONAL INFORMATION:	
18. Were regulatory considerations evaluated? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, check all that apply to the assessment area.	
<input checked="" type="checkbox"/> Section 10 water <input type="checkbox"/> Classified Trout Waters <input type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/> IV <input type="checkbox"/> V) <input type="checkbox"/> Essential Fish Habitat <input type="checkbox"/> Primary Nursery Area <input type="checkbox"/> High Quality Waters/Outstanding Resource Waters <input type="checkbox"/> Publicly owned property <input type="checkbox"/> NCDWR Riparian buffer rule in effect <input type="checkbox"/> Nutrient Sensitive Waters <input checked="" type="checkbox"/> Anadromous fish <input type="checkbox"/> 303(d) List <input checked="" type="checkbox"/> CAMA Area of Environmental Concern (AEC) <input checked="" type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area. List species: <u>American alligator, Atlantic sturgeon</u> <input type="checkbox"/> Designated Critical Habitat (list species) _____	
19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

1. **Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)**
 - A Water throughout assessment reach.
 - B No flow, water in pools only.
 - C No water in assessment reach.

2. **Evidence of Flow Restriction – assessment reach metric**
 - A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is severely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impoundment on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates, debris jams, beaver dams).
 - B Not A

3. **Feature Pattern – assessment reach metric**
 - A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
 - B Not A

4. **Feature Longitudinal Profile – assessment reach metric**
 - A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
 - B Not A

5. **Signs of Active Instability – assessment reach metric**

Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

 - A < 10% of channel unstable
 - B 10 to 25% of channel unstable
 - C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric

Consider for the Left Bank (LB) and the Right Bank (RB).

- LB RB
[X]A [X]A Little or no evidence of conditions that adversely affect reference interaction
[B] [B] Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])
[C] [C] Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

7. Water Quality Stressors – assessment reach/intertidal zone metric

Check all that apply.

- [A] Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
[B] Excessive sedimentation (burying of stream features or intertidal zone)
[C] Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
[D] Odor (not including natural sulfide odors)
[E] Current published or collected data indicating degraded water quality in the assessment reach. Cite source in "Notes/Sketch" section.
[F] Livestock with access to stream or intertidal zone
[G] Excessive algae in stream or intertidal zone
[H] Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc)
[I] Other: (explain in "Notes/Sketch" section)
[X]J Little to no stressors

8. Recent Weather – watershed metric (skip for Tidal Marsh Streams)

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- [A] Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
[B] Drought conditions and rainfall exceeding 1 inch within the last 48 hours
[X]C No drought conditions

9. Large or Dangerous Stream – assessment reach metric

[X]Yes []No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric

10a. []Yes []No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for Size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- [A] Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
[B] Multiple sticks and/or leaf packs and/or emergent vegetation
[C] Multiple snags and logs (including lap trees)
[D] 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
[E] Little or no habitat
[F] 5% oysters or other natural hard bottoms
[G] Submerged aquatic vegetation
[H] Low-tide refugia (pools)
[I] Sand bottom
[J] 5% vertical bank along the marsh
[K] Little or no habitat

*****REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS*****

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. []Yes []No Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- [A] Riffle-run section (evaluate 11c)
[B] Pool-glide section (evaluate 11d)
[C] Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffle sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but <= 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

Table with 5 columns: NP, R, C, A, P and rows for Bedrock/saprolite, Boulder (256 – 4096 mm), Cobble (64 – 256 mm), Gravel (2 – 64 mm), Sand (.062 – 2 mm), Silt/clay (< 0.062 mm), Detritus, Artificial (rip-rap, concrete, etc.)

11d. []Yes []No Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

12. Aquatic Life – assessment reach metric (skip for Tidal Marsh Streams)

12a. Yes No Was an in-stream aquatic life assessment performed as described in the User Manual?

If No, select one of the following reasons and skip to Metric 13. No Water Other: _____

12b. Yes No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

1 >1 Numbers over columns refer to “individuals” for Size 1 and 2 streams and “taxa” for Size 3 and 4 streams.

- Adult frogs
- Aquatic reptiles
- Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- Beetles
- Caddisfly larvae (T)
- Asian clam (*Corbicula*)
- Crustacean (isopod/amphipod/crayfish/shrimp)
- Damselfly and dragonfly larvae
- Dipterans
- Mayfly larvae (E)
- Megaloptera (alderfly, fishfly, dobsonfly larvae)
- Midge/mosquito larvae
- Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
- Mussels/Clams (not *Corbicula*)
- Other fish
- Salamanders/tadpoles
- Snails
- Stonefly larvae (P)
- Tipulid larvae
- Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Moderate alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Severe alteration to water storage capacity over a majority of the streamside area (examples: ditches, fill, soil compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Majority of streamside area with depressions able to pond water \geq 6 inches deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of streamside area with depressions able to pond water < 3 inches deep |

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)

Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

- | | | |
|---------------------------------------|---------------------------------------|--|
| LB | RB | |
| <input checked="" type="checkbox"/> Y | <input checked="" type="checkbox"/> Y | Are wetlands present in the streamside area? |
| <input type="checkbox"/> N | <input type="checkbox"/> N | |

16. Baseflow Contributors – assessment reach metric (skip for Size 4 streams and Tidal Marsh Streams)

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction passing flow during low-flow periods within the assessment area (beaver dam, leaky dam, bottom-release dam, weir)
- D Evidence of bank seepage or sweating (iron in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)

Check all that apply.

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low-flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream (\geq 24% impervious surface for watershed)
- D Evidence that the streamside area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)

Consider aspect. Consider “leaf-on” condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)

Consider “vegetated buffer” and “wooded buffer” separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated		Wooded		
LB	RB	LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	<input checked="" type="checkbox"/> A	≥ 100 feet wide <u>or</u> extends to the edge of the watershed
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 50 to < 100 feet wide
<input type="checkbox"/> C	<input type="checkbox"/> C	<input checked="" type="checkbox"/> C	<input type="checkbox"/> C	From 30 to < 50 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 30 feet wide
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	< 10 feet wide <u>or</u> no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Vegetated” Buffer Width).

LB	RB	
<input type="checkbox"/> A	<input checked="" type="checkbox"/> A	Mature forest
<input checked="" type="checkbox"/> B	<input type="checkbox"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input type="checkbox"/> C	<input type="checkbox"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="checkbox"/> D	<input type="checkbox"/> D	Maintained shrubs
<input type="checkbox"/> E	<input type="checkbox"/> E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	Row crops
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	Maintained turf
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	Pasture (no livestock)/commercial horticulture
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Wooded” Buffer Width).

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Medium to high stem density
<input type="checkbox"/> B	<input type="checkbox"/> B	Low stem density
<input type="checkbox"/> C	<input type="checkbox"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10 feet wide.

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	The total length of buffer breaks is < 25 percent.
<input type="checkbox"/> B	<input type="checkbox"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="checkbox"/> C	<input type="checkbox"/> C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input type="checkbox"/> B	<input type="checkbox"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input type="checkbox"/> C	<input type="checkbox"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. Yes No Was conductivity measurement recorded?

If No, select one of the following reasons. No Water Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).

A < 46 B 46 to < 67 C 67 to < 79 D 79 to < 230 E ≥ 230

Notes/Sketch:

Stream is not accessible by boat due to aquatic macrophytes at the base of the stream. This small area may restrict flow but not severely.

Draft NC SAM Stream Rating Sheet
Accompanies User Manual Version 1
Rating Calculator Version 2

Stream Site Name Jeat Property Date of Assessment 9/9/16
 Stream Category la1 Assessor Name/Organization Corey Novak / LMG, Inc.

Notes of Field Assessment Form (Y/N) YES
 Presence of regulatory considerations (Y/N) NO
 Additional stream information/supplementary measurements included (Y/N) NO
 NC SAM feature type (perennial, intermittent, Tidal Marsh Stream) Perennial

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	HIGH	
(2) Baseflow	HIGH	
(2) Flood Flow	HIGH	
(3) Streamside Area Attenuation	HIGH	
(4) Floodplain Access	HIGH	
(4) Wooded Riparian Buffer	HIGH	
(4) Microtopography	HIGH	
(3) Stream Stability	HIGH	
(4) Channel Stability	HIGH	
(4) Sediment Transport	HIGH	
(4) Stream Geomorphology	HIGH	
(2) Stream/Intertidal Zone Interaction	NA	
(2) Longitudinal Tidal Flow	NA	
(2) Tidal Marsh Stream Stability	NA	
(3) Tidal Marsh Channel Stability	NA	
(3) Tidal Marsh Stream Geomorphology	NA	
(1) Water Quality	HIGH	
(2) Baseflow	HIGH	
(2) Streamside Area Vegetation	HIGH	
(3) Upland Pollutant Filtration	HIGH	
(3) Thermoregulation	HIGH	
(2) Indicators of Stressors	NO	
(2) Aquatic Life Tolerance	HIGH	
(2) Intertidal Zone Filtration	NA	
(1) Habitat	HIGH	
(2) In-stream Habitat	HIGH	
(3) Baseflow	HIGH	
(3) Substrate	HIGH	
(3) Stream Stability	HIGH	
(3) In-stream Habitat	HIGH	
(2) Stream-side Habitat	HIGH	
(3) Stream-side Habitat	HIGH	
(3) Thermoregulation	HIGH	
(2) Tidal Marsh In-stream Habitat	NA	
(3) Flow Restriction	NA	
(3) Tidal Marsh Stream Stability	NA	
(4) Tidal Marsh Channel Stability	NA	
(4) Tidal Marsh Stream Geomorphology	NA	
(3) Tidal Marsh In-stream Habitat	NA	
(2) Intertidal Zone	NA	
Overall	HIGH	



(1) View of bald cypress trunk near Stream 1



(2) View of Stream 1

**Jeat Tract
NECFUMB
Pender County, NC**



**Appendix F:
NC SAM
Site Photographs**



(3) View of floodplain abutting Stream 1



(4) View of Stream 3

**Jeat Tract
NECFUMB
Pender County, NC**



Appendix F:
NC SAM
Site Photographs



(5) View of swamp black gum near Stream 4



(6) View of floodplain near origin of Stream 5

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**Appendix F:
NC SAM
Site Photographs**



(7) View of Stream 5



(8) View of Stream 6 near origin

**Jeat Tract
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Pender County, NC**



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NC SAM
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