



Mapping & Evaluating Wetlands in Coastal NC: Project Overview

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Outline: NC DCM Wetlands Mapping

1

Background

2

Methodology & Output

3

GIS Products

4

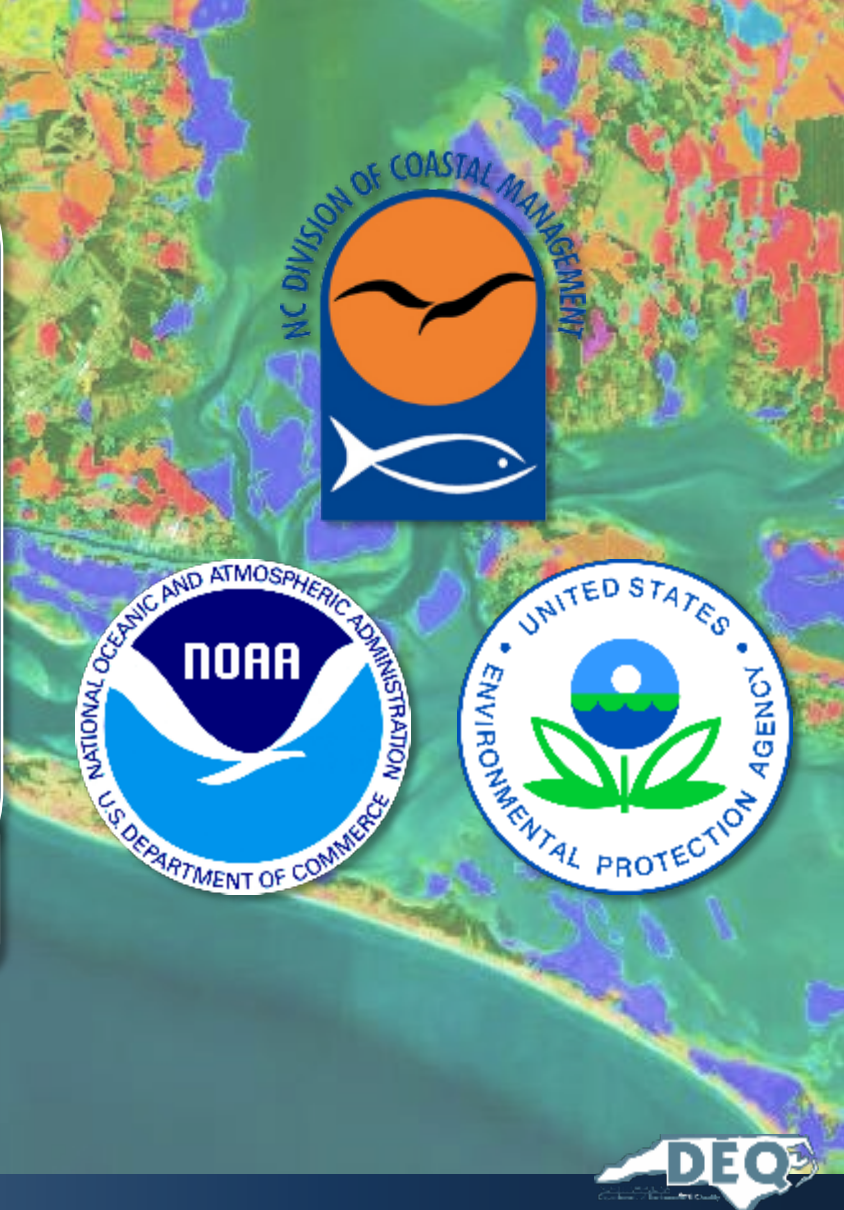
Where are we in 2020?

1

Background: Acknowledgments

- **James (Jim) Stanfill**
- Kelly Williams
- Chase Barnard
- Lori Sutter
- Mac Haupt
- Mike Wood
- Jim Wuenscher
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- Chris Bruce
- Lonnie Shull
- Sheila Balsdon
- Sean McGuire
- Greg Meyer
- Cherri Smith
- Steven Stichter
- ...and many others

jim.stanfill@ncdenr.gov



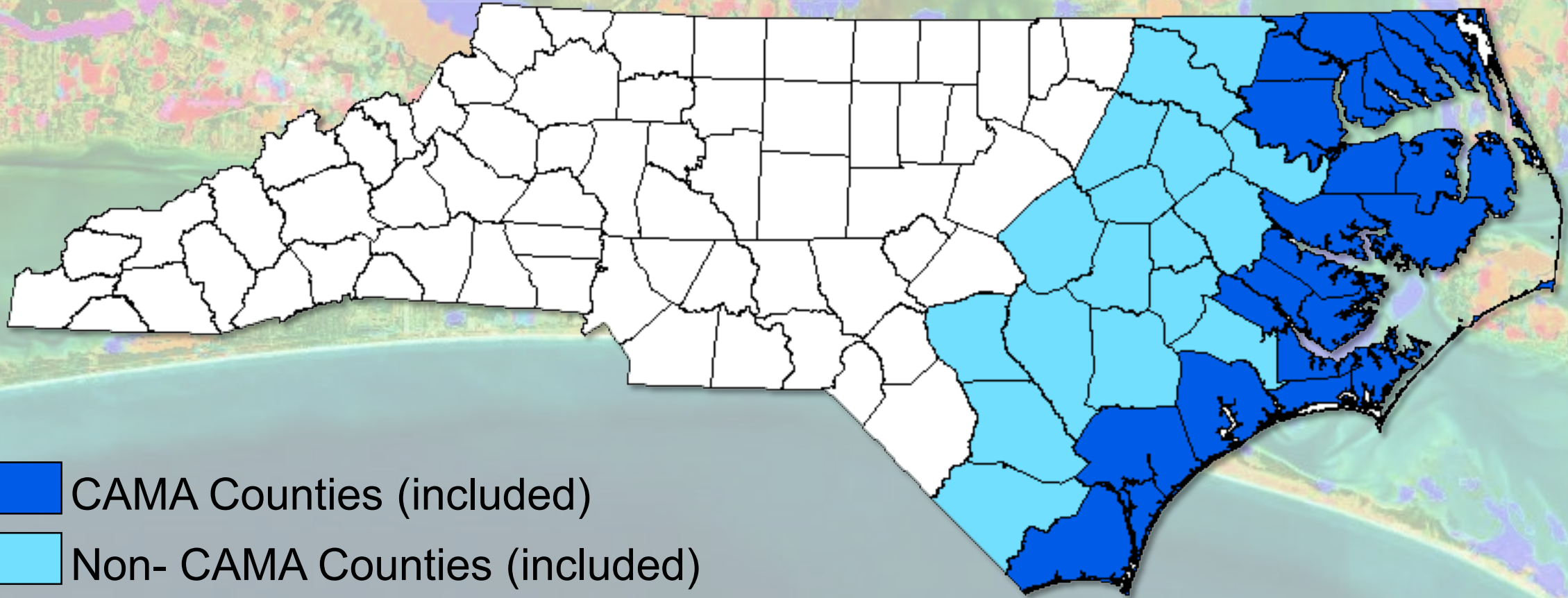
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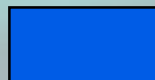
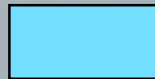

Background: Conception and Components

1991 to 1999

1. Wetlands Mapping & Inventory
2. Functional Assessment of Wetlands (NC-CREWS)
3. Wetland Restoration Identification & Prioritization
4. Coordination with Wetland Regulatory Agencies
5. Potential Coastal Area Wetlands Policies
6. Local Land Use Planning

2 Methodology & Output: Geographic Extent



-  CAMA Counties (included)
-  Non- CAMA Counties (included)
-  No Data (not included)

2

Methodology & Output: Initial Considerations

1. **Limited Resources**
2. **Limited Time Frame**
3. **Large Geographic Area**
(over 2.5 million acres of wetlands)

- **Wide range of users**
- **Planning Tool**
- **Basis of Functional Assessment and Potential Restoration Efforts**

Accurate, Comprehensive, Understandable GIS Method

2 Methodology: Wetland Inventory

Goal #1: Identify

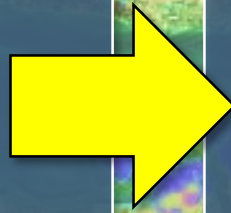
location, type, amount of wetlands in coastal NC starting with GIS data

- **National Wetland Inventory Maps**
 - Most comprehensive inventory of wetlands
- **NRCS Digital Soils Maps**
 - Particularly useful in marginal areas
 - Identify omitted areas
- **Landsat 30M TM Imagery - 1988, 1994**
 - Most recent data source
 - Identify omitted areas
 - Identify cut-over and cleared wetlands
- **Hydrography**
 - Utilized in HGM Classification

2 Methodology & Output: **Wetland Classification**

Data Inputs:

- Cowardin Classifications
- Water Regime
- Soil Type
- Satellite Imagery
- Landscape Position
- Hydrography
- Over 400 Field Site Evaluations



DCM Wetland Types:

- Bottomland Hardwood
- Pocosin
- Pine Flat
- Hardwood Flat
- Managed Pine
- Freshwater Marsh
- Salt/Brackish Marsh
- Estuarine Scrub Shrub
- Estuarine Forest
- Maritime Forest
- Headwater Swamp
- Human Impacted

2

Methodology & Output: Wetland Classification

Each wetland polygon generated by the overlay analysis contains the following information:

- All attributes from the source data layers
- DCM wetland type
- Hydrogeomorphology (HGM) Class (used in later analysis)

Some wetlands are given a “**modifier**”

- Drained or Ditched
- Cut-over
- Cleared



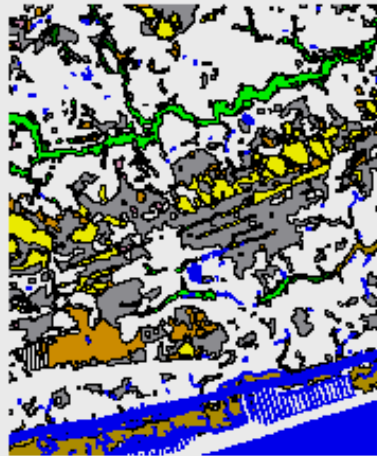
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GIS Data Layers for DCM Wetland Mapping

NWI Data

NWI Data

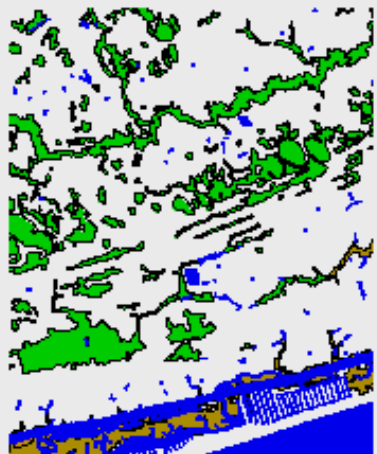
- Water
- Hydric Soils
- BO
- CA
- CT
- DO
- Gt
- LA
- Lo
- Li
- Ma
- Mk
- Mt
- Pi
- Ra
- To
- Wo



Soils Data

Soils Data

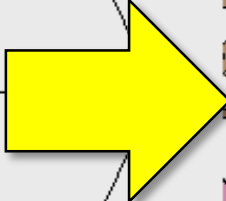
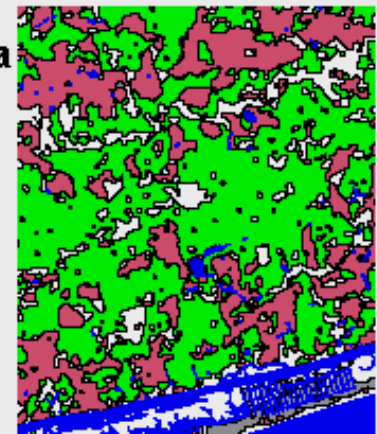
- Water
- Freshwater For.
- Freshwater Em.
- Estuarine For.
- Estuarine Em.



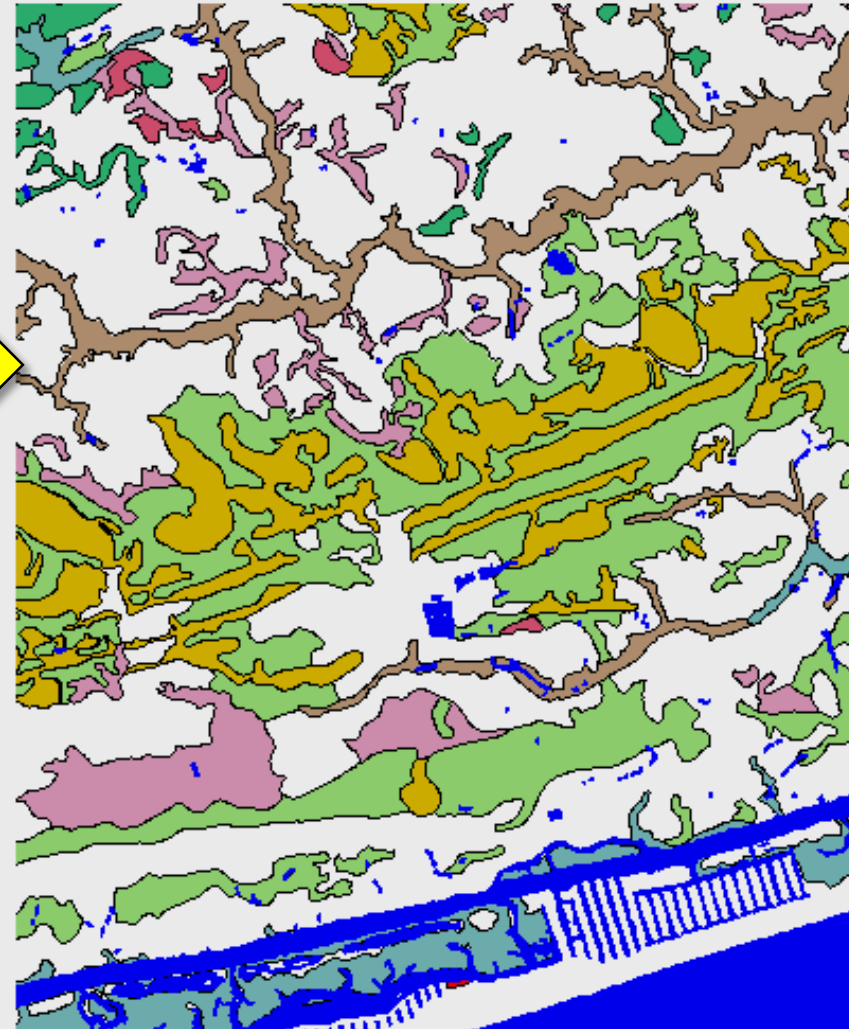
Landsat Data

Landsat Data

- Water
- Landsat
- Dev.
- Ag/Grass
- Pine Forest
- Dist. Land



Wetland Type Map



- Water
- Wetlands
- S/B Marsh
- FW Marsh
- Est SS
- Pocosin
- BLH
- Swamp
- HW Flat
- Pine Flat
- Mgd Pine
- Headwater
- Cleared

2 Methodology & Output: Accuracy Assessment

- Over 600 field sites visited
- Accuracy
 - 89% for wetlands overall
 - 97% (marsh, bottomland hardwoods, swamps & pocosin)
 - 65%-75% headwater forest, hardwood flats & managed pines.



2 Methodology & Output: **Limitations of Wetlands Maps**

Limitations

- Minimum Mapping Size: 1 acre
- Source data is not perfect
- Maps show only the probability of finding a wetland in a particular area

Implications

- Small wetlands not included
- Data are an **Underestimation** of wetlands
- Maps **Cannot** be used for on-site wetland determinations

Simple

- Simplification of a complex system
- Easily understood wetland types

Comprehensive

- Includes wetlands not found on NWI

Accurate

- 89% wetland probability rate
- Includes 1988 and 1994 data

Ability to Manipulate and Query

- Can generate statistics on range/extent or loss/gain

2 Methodology & Output: NC-CREWS

Goal #2: North Carolina Coastal Region Evaluation of Wetland Significance

48 Separate Parameters Analyzed

Water Quality

- Nonpoint Source Removal
- Floodwater Cleansing

Hydrology

- Surface Runoff Storage
- Floodwater Storage
- Shoreline Stabilization

Wildlife Habitat

- Terrestrial Wildlife
- Aquatic Life

Potential Risk

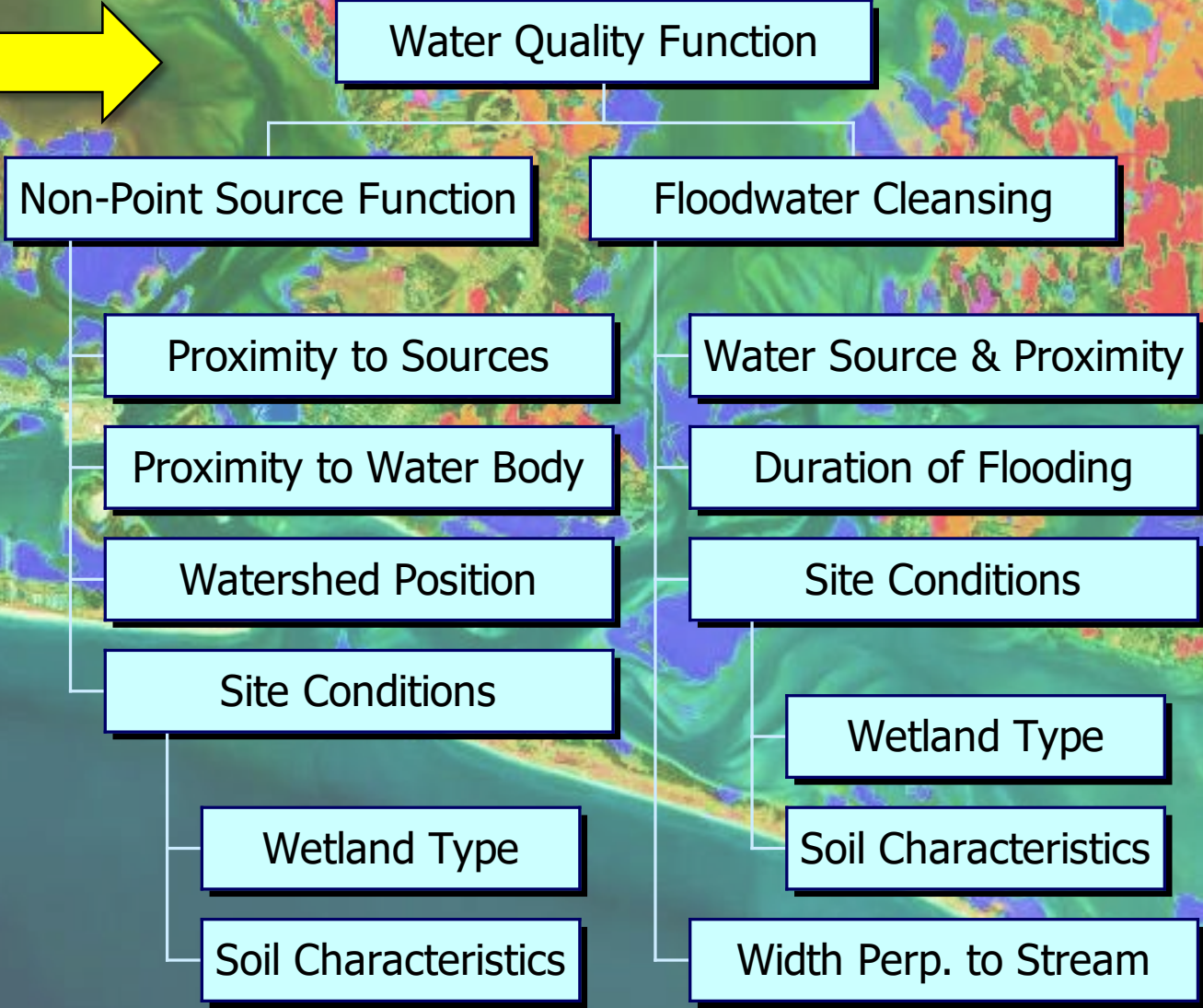
- Wetland Extent and Rarity
- Replacement Difficulty
- Land Use Characteristics

2 Methodology & Output: NC-CREWS

Example: Water Quality Function



Considerations of both the **capability** and the **opportunity** to perform a specific function.



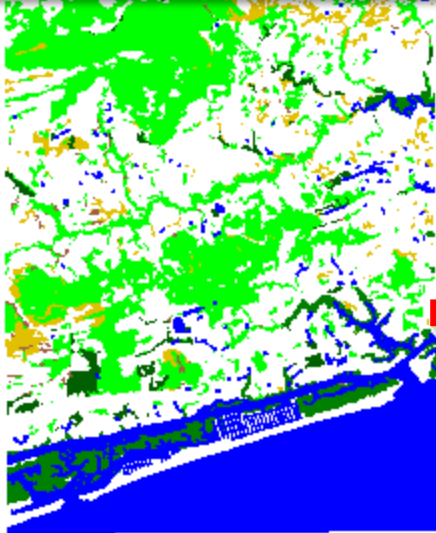
2 Methodology & Output: **NC-CREWS**

The model produces ratings for each wetland polygon:

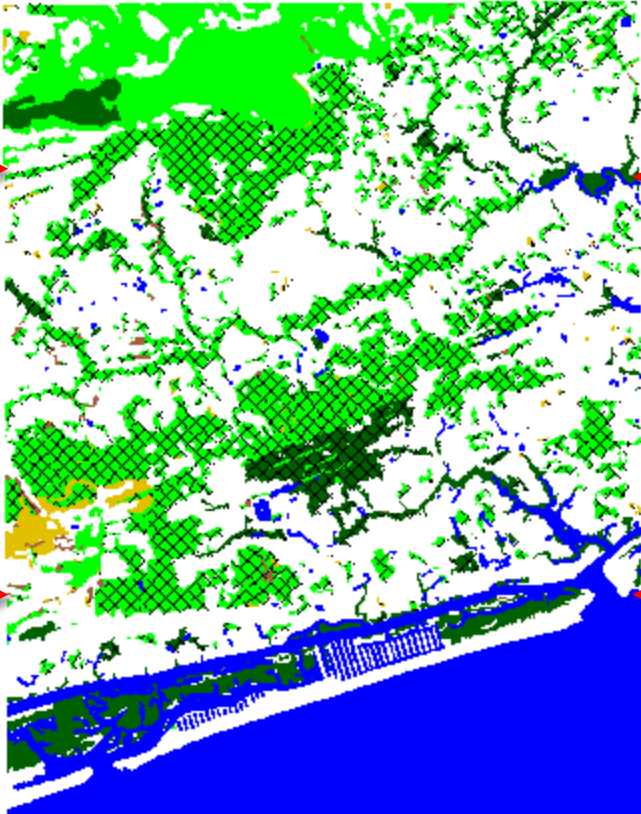
- **Beneficial** Functional Significance
- **Substantial** Functional Significance
- **Exceptional** Functional Significance

Wetlands can be evaluated on the basis of an overall rating or in terms of individual functions.

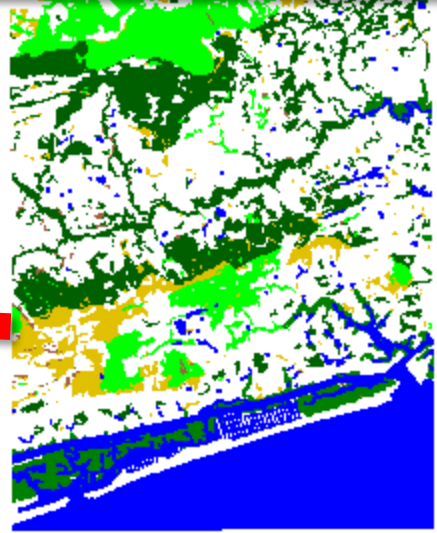
Water Quality Functions



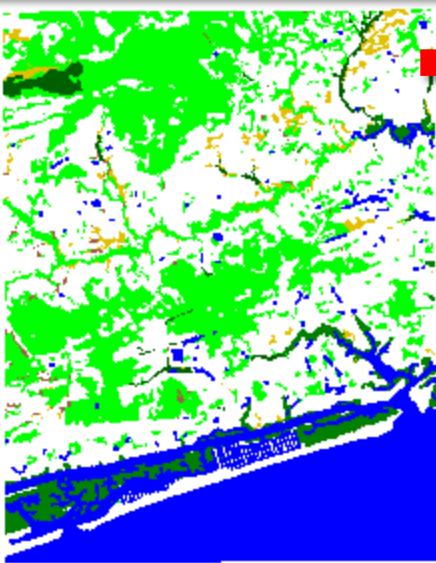
Overall Wetland Functional Significance



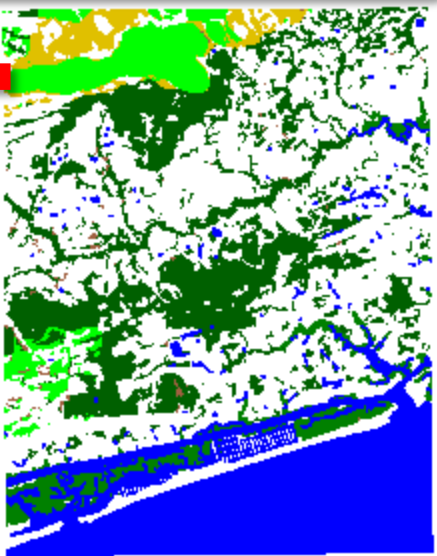
Habitat Functions



Hydrologic Functions



Potential Risks



- Water
- High Potential Risk
- Wetland Functional Significance
- Unable to Evaluate
- Beneficial Functional Significance
- Substantial Functional Significance
- Exceptional Functional Significance

Development and Transportation Planning

- Wetland Identification of Most Significant Wetlands
- Wetland Avoidance of Most Significant Wetlands
- Identification of Functional Impacts

CAMA Land Use Planning

- Identification of Fragile Areas
- Development of Conservation Classification and Land Use Classification Maps

Acquisition of Ecologically Significant Wetlands

2 Methodology & Output: Enhancement, Restoration, & Creation

Goal #3: Wetland Enhancement, Restoration & Creation Potential

- **Wetland Creation** is the process of creating a wetland where none has existed before.
- **Restoration** refers to creating a wetland on a site which was at one time a wetland but currently is not.
- **Enhancement** is the process of enhancing an existing wetland to a higher level of functioning.

2 Step Process:

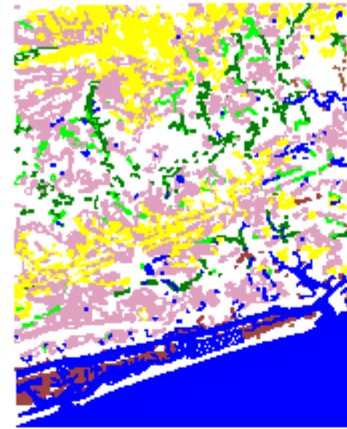
Step 1: Classification of restoration type

Step 2: Identification of Sites

Soils by Potential Restoration Type

Soils by Potential Restoration Type

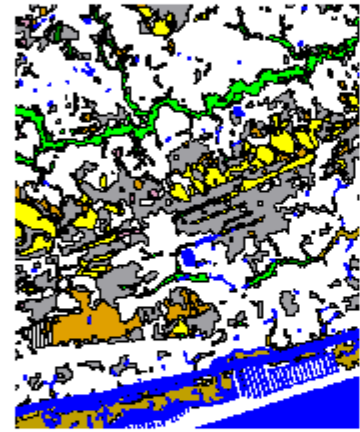
- Water
- Restoration Types
- N/A
- Marsh
- Est S/S, Fo, Mrt Fo
- Swamp/BLH
- BLH/Headwater
- Flat
- Pocosin



Wetland Data

Wetland Data

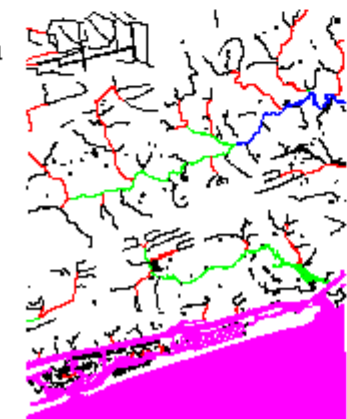
- Water
- Wetlands
- S/B Marsh
- FW Marsh
- Est SS
- Pocosin
- BLH
- Swamp
- HW Flat
- Pine Flat
- Mgd Pine
- Headwater
- Cleared



Hydrography Data

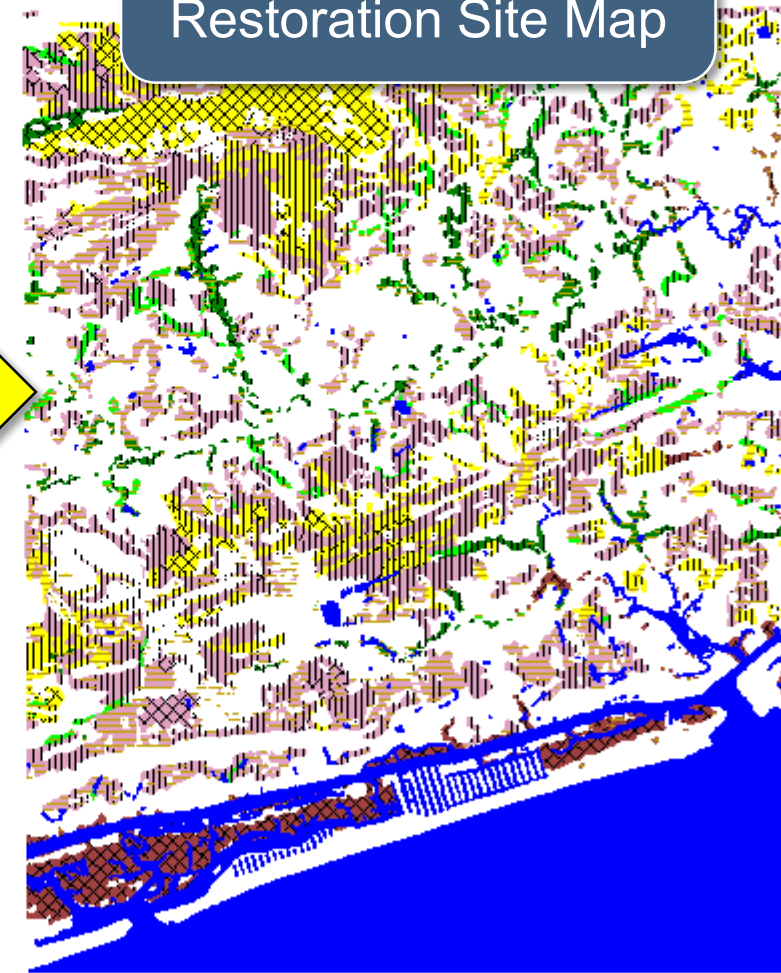
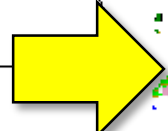
Hydrography Data

- Stream Order
- 0
- 1
- 2
- 3
- 4
- 20
- Stream Order
- 1
- 2
- 3
- 4
- 20



GIS Data Layers for Potential Wetland Restoration Site Map

Potential Wetlands Restoration Site Map



- Water
- Restoration Modifications
- N/A
- Ditched & Cleared
- Mgd. Pine Lands
- NWI Impound.
- NWI Excau.
- Enhancement
- Restoration Types
- N/A
- Marsh
- Est S/S, Fo, Mrt Fo
- Swamp/BLH
- BLH/Headwater
- Flat
- Pocosin



2

Methodology & Output: **Benefits of Restoration Potential Data**

- Quick identification or scan of potential restoration sites.
- Better management of sites over a large geographic area.
- Landscape level/Ecological approach vs. “For Sale” Sign.
- Further analysis can be used to prioritize sites based upon potential to perform specific functions.

GIS Products: ArcGIS Online (AGOL) & Downloads

GIS Data Layers

1. Wetlands Data
2. NC-CREWS Data
3. Restoration Potential Data

Layer List

- Wetlands
- Wetlands
- Other
- Managed Pineland
- Cutover
- Clearcut
- Depositional Sand
- Pine
- Bottomland Hardwood
- Hardwood Flat
- Drained
- Freshwater Marsh
- Salt/Brackish Marsh
- Wetland Restoration Potential
- NC-CREWS (wetlands)
- Post-Hurricane Isaias Imagery (2020/08/04)

AGOL keyword search: "NC DCM"

ArcGIS online nc dcm

Search: nc dcm Arranged by Relevance 46 Results

- Territories.** approved by the NC Coastal Resources Commission (CRC), this line establishes the... Feature Service by raloja_adrick_ncdenr 3/25/2020 Details Add
- NERR** Information regarding NC DCM's NC Coastal Reserve and National Estuarine Research Reserves. Feature Service by bpuckett2_ncdenr 3/12/2019 Details Add
- Wetlands** These data were created to assist local, state, and federal government agencies and others in making resource management decisions and in land use planning. Feature Service by mwstanw1_ncdenr 5/18/2018 Details Add
- DCM North Carolina Measurement Line (Unve** This line represents the Measurement Line within the Unvegetated Beach AEC at Surf City and North Topsail Beach, NC. The Measurement Line is temporarily used as the... Feature Service by kmrichardson_ncdenr 4/8/2020 Details Add
- DCM North Carolina Coastal Region Evaluation** The North Carolina Coastal Region Evaluation of Wetlands Significance (NC-CREWS). These data were created to assist local, state, and federal government agencies and... Feature Service by kmrichardson_ncdenr 3/25/2020 Details Add
- DCM_Beach_and_Waterfront_Access** GDB depicts public water and beach access sites in North Carolina that were completely... Feature Service by kmrichardson_ncdenr 3/25/2020 Details Add
- DCM Coastal Reserve Trails** North Carolina's Coastal Reserve and National Estuarine Research Reserve Trails. Feature Service by kmrichardson_ncdenr 3/25/2020 Details Add

4 Where are we in 2020?

- **1999** – project completed
- **2005** – No dedicated Wetlands DCM Staff
- **2020**
 - NC DOT & others continue to use data
 - NC DCM continues to make the data available
 - NC DCM has no planned updates

NC Division of Coastal Management

DCM Contact:

Ken.Richardson@ncdenr.gov

DCM Website:

<https://deq.nc.gov/about/divisions/coastal-management>

or

NCCoastalManagement.net

ArcGIS Online (keyword search):

“NC DCM”