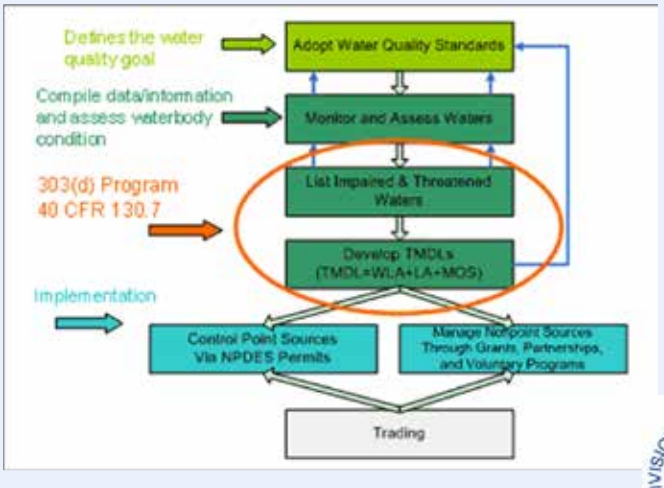
TMDLs

Water Quality-Based Approach of the Clean Water Act



Collaborative TMDLs

- **Lockwoods Folly River example**
- Pollutant: fecal coliform bacteria
- Shellfish areas closed
- Initiated at local level
- Partners
  - NC Coastal Federation
  - Brunswick County
  - NC DOT
  - Local citizens
- 86 % reduction needed

Lockwoods Folly River Fecal Coliform TMDL Implementation Plan

- **Measure 1: Reduce stormwater runoff from 94% of existing development**
- **Measure 2: Prevent stormwater runoff from all new development**
- **Measure 3: Control and reduce sources of fecal coliform bacteria**
- **Measure 4: Education/Outreach/Training**

HQW, ORW and Coastal Stormwater

HQW, ORW and Coastal Stormwater

Permit required for any development activities that require an Erosion and Sedimentation Control Plan (for disturbances of one or more acres) or a CAMA major permit and meet any of the following criteria:

• Located within the 20 coastal counties,
-OR-
• Drain to Outstanding Resource Waters (ORW),
-OR-
• Located within 1-mile and drain to High Quality Waters

Recent Changes: Coastal Stormwater

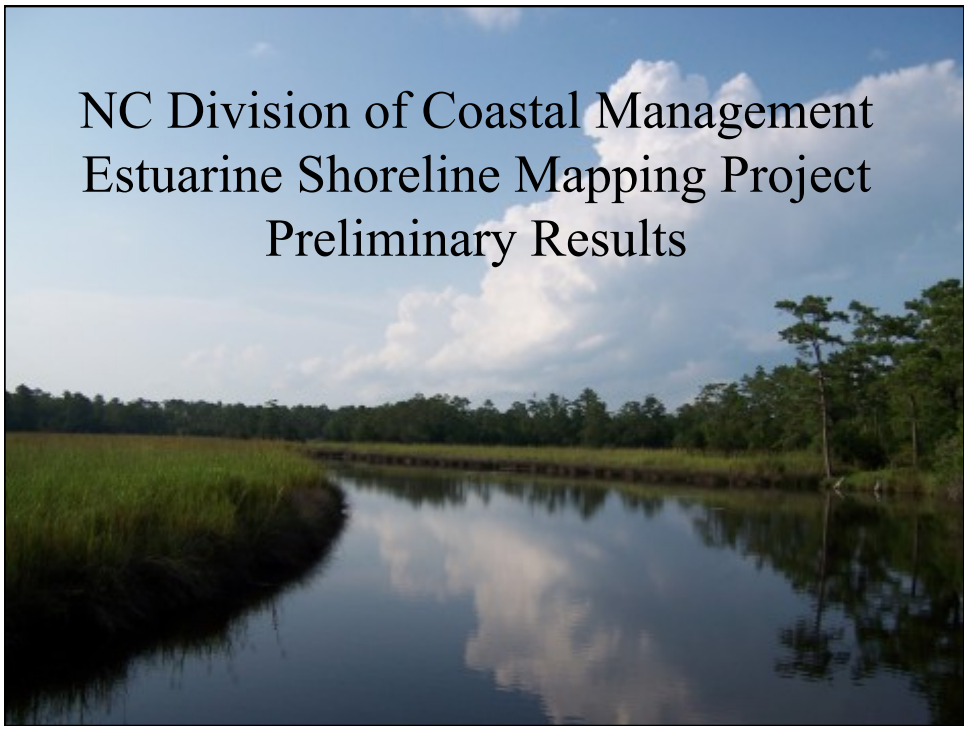
- Effective October 1, 2008 - New Requirements in Session Law 2008-211
- Non-residential development activities that disturb less than one acre but add more than 10,000 square feet of built upon area require a permit.
- Residential development activities within ½-mile of and draining to shellfishing waters that disturb less than one acre but add more than 10,000 square feet of built upon area, resulting in at least 12% total built upon area, also require a permit.

Recent Changes: Coastal Stormwater

- ORW – 12% BUA limit under the low density option
  25% BUA maximum under the high density option using any combination of BMP controls to treat first 1.5 inch rainfall event or difference in pre and post development conditions for one-year, 2 4 hour storm.
  50-foot-wide vegetated buffer

- SA – 12% BUA limit under the low density option
  No BUA limit under the high density option

- Non SA – 24% BUA limit under low density option
  No BUA limit under high density option and must treat first 1.5 inch rainfall event

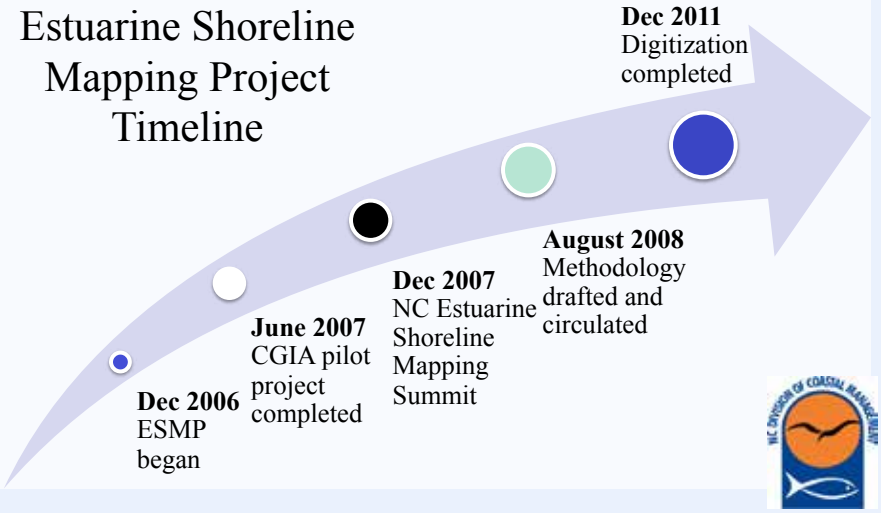


Background

- Goal:
  - To delineate an accurate estuarine shoreline and quantify the mileage of various shoreline types and the number of shoreline structures
- Objectives:
  - To begin to understand the cumulative effects of development along the estuarine shoreline (shading, ecosystem function loss, etc.)
  - To aid our understanding of how permitting activities affect coastal residents and the environment

Background

Estuarine Shoreline Mapping Project Timeline



Data and Methodology

- Aerial photography
- 3 GIS layers
  - Estuarine Shoreline (line)
  - Shoreline stabilization structures (line)
  - Structures over water (polygon)

Data and Methodology

- Estuarine Shoreline (line)
  - Swamp forest, marsh, sediment bank, modified, and miscellaneous

Data and Methodology

– Shoreline stabilization structures (line)
  - Boat ramp, breakwater, groin, sill, riprap revetment, unknown, and bulkhead

Data and Methodology

– Structures over water (polygon)
  - Bridge, pier/floating dock/wharf, and unknown

Preliminary Results

- Estuarine shoreline type breakdown by counties

County	Shoreline Type*									
	Swamp Forest		Marsh		Sediment Bank		Modified		Misc	
Pasquotank	129.4	(59.5%)	12.8	(5.9%)	45.7	(21.0%)	29.3	(13.5%)	0.2	(0.1%)
Perquimans	156.4	(65.2%)	4.3	(1.8%)	46.2	(19.2%)	32.8	(13.7%)	0.3	(0.1%)
Tyrrell	200.7	(65.8%)	63.2	(20.7%)	31.5	(10.3%)	8.9	(2.9%)	0.5	(0.2%)
Currituck	61.0	(5.3%)	916.4	(79.4%)	107.9	(9.3%)	62.1	(5.4%)	6.03	(0.5%)
Washington	65.0	(74.5%)	0.4	(0.4%)	12.7	(14.5%)	9.2	(10.5%)	<0.0	(0.1%)

*Shoreline type length is shown in miles (percent).
Highest percent shoreline type of each county is shown in red and lowest amount is shown in blue, excluding miscellaneous.

Preliminary Results

- Shoreline stabilization structures by county

County	Modification Type*						
	Boat Ramp	Breakwater	Groin	Sill	Riprap Revetment	Unknown	Bulkhead
Pasquotank	0.1	0.2	0.7	0.1	8.0	<0.1	22.5
Perquimans	0.2	0.1	0.2	<0.1	6.9	0.1	28.0
Tyrrell	0.1	0.2	0.5	0.0	5.3	<0.1	3.9
Currituck	0.6	0.4	1.3	0.7	7.6	0.6	55.8
Washington	0.1	0.0	0.3	0.1	2.3	0.2	7.6

* Shoreline type length is shown in miles.
Highest amount of modification type for each county is shown in red.

Preliminary Results

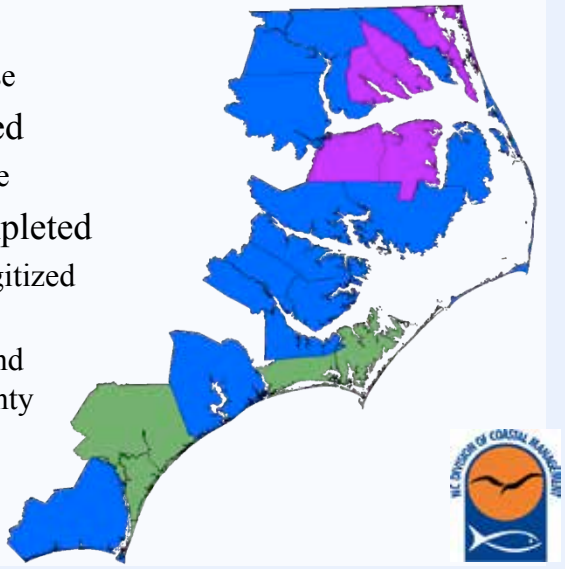
- Structures over the water by county

County	Modification Type*					
	Bridge		Pier/Floating Dock/ Wharf		Unknown	
Pasquotank	63,077	(23)	469,345	(482)	2,754	(9)
Perquimans	244,704	(8)	648,116	(806)	4,860	(20)
Tyrrell	21,219	(9)	43,751	(168)	3,669	(16)
Currituck	337,502	(31)	758,170	(1,505)	26,356	(69)
Washington	514,180	(14)	216,597	(259)	1,416	(3)

*Modification type total area is shown in feet ^{2} (count).
Highest modification type area of each county is shown in red.

Status Update

- Counties digitized
  - 17 counties in house
- Counties QA/QC'ed
  - 5 counties complete
- Counties to be completed
  - 3 counties to be digitized and QA/QC'ed
  - Carteret, Pender, and New Hanover County



What's Next?

- Perform additional analysis for remaining counties
- Collaborate with Shellfish Sanitation to field check data
- Other possibilities:
  - Spatial analysis of structure locations, i.e. are piers and docks clustered within a county?
  - Shoreline change analysis?