

**ASSESSMENT AND STRATEGY
OF THE
NORTH CAROLINA
COASTAL MANAGEMENT PROGRAM**

FY 2016-2020

**PERFORMED UNDER THE
COASTAL ZONE ENHANCEMENT GRANTS PROGRAM**

**SECTION 309
COASTAL ZONE MANAGEMENT ACT**



June 1, 2015

This document consists of six major sections: (I) Introduction, (II) Summary of recent Section 309 achievements, (III) Program Assessment, (IV) Program Enhancement Strategy (FY 2016-2020), (V) Budget summary, (VI) Summary of Stakeholder and Public Involvement. It was prepared by the NC Division of Coastal Management based on guidance provided by the federal Office of Ocean and Coastal Resource Management (OCRM).

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ASSESSMENT AND STRATEGY
of the
NORTH CAROLINA COASTAL MANAGEMENT PROGRAM
FY 2016-2020

I. INTRODUCTION

North Carolina's Coastal Zone Management Program

North Carolina's Coastal Zone Management Program was federally approved in 1978 in response to passage of the federal Coastal Zone Management Act in 1972, which provides funds to coastal states to develop and administer coastal zone management programs. The Division of Coastal Management (DCM) works to protect, conserve and manage North Carolina's coastal resources through an integrated program of planning, permitting, education and research.

DCM carries out the State's Coastal Area Management Act (CAMA), the Dredge and Fill Law and the federal Coastal Zone Management Act in 20 coastal counties, using rules and policies developed by the NC Coastal Resources Commission (CRC). The division serves as staff to the CRC. DCM is an agency within the NC Department of Environment and Natural Resources, which is responsible for managing and protecting the State's natural resources.

DCM is responsible for several programs, including:

- Permitting and enforcement
- CAMA land-use planning
- Public beach and waterfront access
- North Carolina Coastal Reserves
- Clean Marinas

Section 309 Coastal Zone Enhancement Grant Program in North Carolina

Section 309 of the Coastal Zone Management Act (CZMA), as amended in 1990, provides for a voluntary Coastal Zone Enhancement Grants Program to encourage states to develop program changes in one or more of nine specified enhancement areas: public access, coastal hazards, ocean resources, wetlands, cumulative and secondary impacts, marine debris, special area management planning, energy and government facility siting, and aquaculture. Under this program, every five years coastal states conduct a detailed program assessment of these nine enhancement areas and, as a result, identify high-priority areas for inclusion in a five-year strategic plan.

North Carolina's Section 309 Program was established in FY 1991-92 when DCM performed an initial assessment of North Carolina's Coastal Management Program pursuant to the CZMA. Since then, North Carolina has developed program assessments and strategies in 1997, 2001, 2006, and 2010.

For FY 2016-2020, DCM has completed its assessment of the State's coastal program and has developed its five-year strategic plan. Utilizing the CZMA Section 309 Program Guidance document finalized by OCRM in June 2014, the Program Assessment and Strategy document was developed by DCM staff with stakeholder review and input. An initial draft Program Assessment was developed in February 2015.

DCM then formed an internal Program Assessment and Strategy Review Team and this team met to review the results of the Assessment, determine final program ratings, agree which programs should be

included in the Strategy and identify specific program changes and/or outcomes. From that point, staff worked mainly to develop the Strategy document and provided several other draft iterations of the Assessment and Strategy that were reviewed by the Review Team. DCM submitted its first draft document to OCRM on February 2, 2015. This draft was revised according to OCRM comments received on April 1, 2015 and was re-submitted on June 1, 2015.

To solicit stakeholder input in the development of the FY2016-2020 Program Assessment and Strategy, DCM invited input on prioritizing among the nine program enhancement areas, and asked stakeholders what actions the DCM should take to make program improvements. This survey was by invitation and was distributed electronically through DCM's Interested Parties List. This distribution includes the majority of relevant stakeholders and private citizens with an interest in coastal management in the State (i.e., state, federal and local government agencies, academia, environmental groups, Coastal Resources Commission and Coastal Resources Advisory Council members, and citizens). The stakeholder input period was from December 8, 2014 through December 19, 2014. Stakeholder input is summarized in Section VI.

In addition to stakeholder input, DCM solicited public input on the draft FY2016-2020 Program Assessment and Strategy. DCM invited public review/comment and provided a link to its February 2, 2015 draft document through DCM's Interested Parties List and DCM's website located at <http://www.nccoastalmanagement.net/>. The public comment period was from March 2, 2015 through April 1, 2015, and no public comments were received.

As a result of this process, DCM has identified **Coastal Hazards** as the high priority enhancement area that will drive the program enhancement strategy for FY 2016-2020.

II. SUMMARY OF RECENT SECTION 309 ACHIEVEMENTS

North Carolina's 2010-2015 309 Strategy implements three program changes under the Coastal Hazards and enhancement area: 1) Implementation of a Statewide, Regional-based Beach and Inlet Management Plan for North Carolina, 2) Development of New and Revised Estuarine Shoreline Management Rules, and 3) Development of a Sea Level Rise Policy, Land Use Planning Guidelines, and Updated Assessment Report; and one program change under the Ocean Resources enhancement area: Development of a NC Coastal Atlas and Memorandum of Agreement. The following is a summary of these program changes and related accomplishments.

Coastal Hazards Strategy

1) Implementation of a Statewide, Regional-based Beach and Inlet Management Plan for North Carolina

This 309 strategy is leading towards program changes that help to implement the North Carolina Beach & Inlet Management Plan through the completion of two primary tasks. The Division proposed to initiate revisions to the CRC's Shoreline Erosion policies (15A NCAC 07M .0202) that would allow regional approaches to beach management. The CMP intends to propose the rule amendments to the CRC in 2015 and complete this program change by the end of the current Strategy period.

The second primary task is the preparation and adoption of a Guidance Document for Local Governments on Regional Planning and Permitting of Beach & Inlet Projects. The guidance

document is intended to encourage and facilitate beach communities working together to achieve economies of scale and reduce conflicts, and is intended to create a framework for regional permitting of beach & inlet projects. The CMP worked with local government and industry partners to draft the guidance document, and is in the process of finalizing the draft for adoption in 2015.

2) Development of New and Revised Estuarine Shoreline Management Rules

This 309 strategy is leading towards program changes that improve estuarine shoreline management in North Carolina. The primary tasks associated with this strategy are an amended General Permit for Marsh Sills (15A NCAC 07H .2700), Estuarine Shoreline Mapping (ESM) and data analysis, and public education and outreach in support of more resilient practices.

The CMP coordinated an inter-agency review of marsh sill structures for the purposes of simplifying the marsh sills GP. Despite a lower permit application fee, the GP is not often used by property owners for a variety of reasons, including relative complexity in permitting compared to bulkheads and lack of public awareness of marsh sills as an erosion control option. The CMP has secured review agency approval of a more streamlined permitting process, and continues to work with the Army Corps of Engineers to streamline permit review on the federal side. The CMP has made significant progress and expects to propose rule amendments to the CRC in the first half of 2015. The CMP is also utilizing NC NERR staff to assist with public education and outreach, and marine contractor education about marsh sills.

The CMP has completed two rounds of Estuarine Shoreline Mapping and data analysis. The first round was completed from a composite set of aerial photography taken over a number of years, while the second round used exclusively 2012 aerial photography. The CMP now has two digitized estuarine shoreline maps, including shore-adjacent structures and shoreline types, and related analyses. The digitized maps and data are available on DCM's website and through the NC Coastal Atlas, and are already being used by researchers on a variety of projects. Digitizing additional shorelines in the future will help the CMP be more informed about habitat and development trends along the state's estuarine shorelines.

3) Development of a Sea-Level Rise Policy, Land Use Planning Guidelines, and Updated Assessment Report

This 309 strategy was developed to result in program changes that improved understanding of long-term coastal hazards through research, education, and planning. The CMP worked with a myriad of agency and local government officials to develop a draft sea-level rise policy that built upon information contained within the CRC Science Panel's 2010 Sea-Level Rise Assessment Report. The CRC approved the policy for rulemaking to have it entered into the N.C. Administrative Code (NCAC), but the action was terminated for reasons outside of the CMP's control. The policy is not expected to be entered into the NCAC during this Strategy period. In addition to the policy not moving forward, consideration of land use planning amendments were also abandoned.

The CRC's Science Panel recommended that their 2010 Sea-Level Rise Assessment Report be updated in 2015. Subsequently, N.C. Session Law 2012-202 directed that the update be drafted by March 2015, and finalized by March 2016. The Science Panel has met regularly since July 2014 and is prepared to complete the draft in March 2015 as directed. The final version is expected to be complete by March 2016, in accordance with the session law and 309 Strategy.

Ocean Resources Strategy

1) Development of a NC Coastal Atlas and Memorandum of Agreement

This 309 strategy was developed to produce program changes that improve access to coastal data for research, planning and permitting. The strategy began with the development and execution of a Memorandum of Understanding among seven state and regional organizations with data or expertise that would be beneficial to the project. The MOA was executed in June 2014. The CMP is providing 309 funding to East Carolina University to do the technical development of the Atlas. The Atlas is live and has gone through beta testing and revision. Development is ongoing with new data being brought online and training workshops for likely users among agency partners.

III. ASSESSMENT

PHASE I (HIGH-LEVEL) ASSESSMENT:

Purpose: To quickly determine whether the enhancement area is a high priority enhancement objective for the CMP that warrants a more in-depth assessment. The more in-depth assessments of Phase II will help the CMP understand key problems and opportunities that exist for program enhancement and determine the effectiveness of existing management efforts to address those problems.

Wetlands

Section 309 Enhancement Objective: Protection, restoration, or enhancement of the existing coastal wetlands base, or creation of new coastal wetlands. §309(a)(1)

Note: For the purposes of the Wetlands Assessment, wetlands are “those areas that are inundated or saturated at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.” [33 CFR 328.3(b)]. See also pg. 17 of the CZMA Performance Measurement Guidance¹ for a more in-depth discussion of what should be considered a wetland.

Resource Characterization:

- Using provided reports from NOAA’s Land Cover Atlas² or high-resolution C-CAP data³ (Pacific and Caribbean Islands only), please indicate the extent, status, and trends of wetlands in the state’s coastal counties. You can provide additional or alternative information or use graphs or other visuals to help illustrate or replace the table entirely if better data are available. Note that the data available for the islands may be for a different time frame than the time periods reflected below. In that case, please specify the time period the data represents. Also note that Puerto Rico and the Commonwealth of the Northern Mariana Islands (CNMI) currently only have data for one time point so will not be able to report trend data. Instead, Puerto Rico and CNMI should just report current land use cover for all wetlands and each wetlands type.

Coastal Wetlands Status and Trends		
Current state of wetlands in 2011 (acres)	2,563,408.4 (28.6% of coastal area)	
Percent net change in total wetlands (% gained or lost)*	from 1996-2011	from 2006-2011
	-1.07	-0.11
Percent net change in freshwater (palustrine wetlands) (% gained or lost)*	from 1996-2011	from 2006-2011
	-1.0	-0.10
Percent net change in saltwater (estuarine) wetlands (% gained or lost)*	from 1996-2011	from 2006-2011
	0.07	-0.014

¹ <http://coastalmanagement.noaa.gov/backmatter/media/czmmapsguide11.pdf>

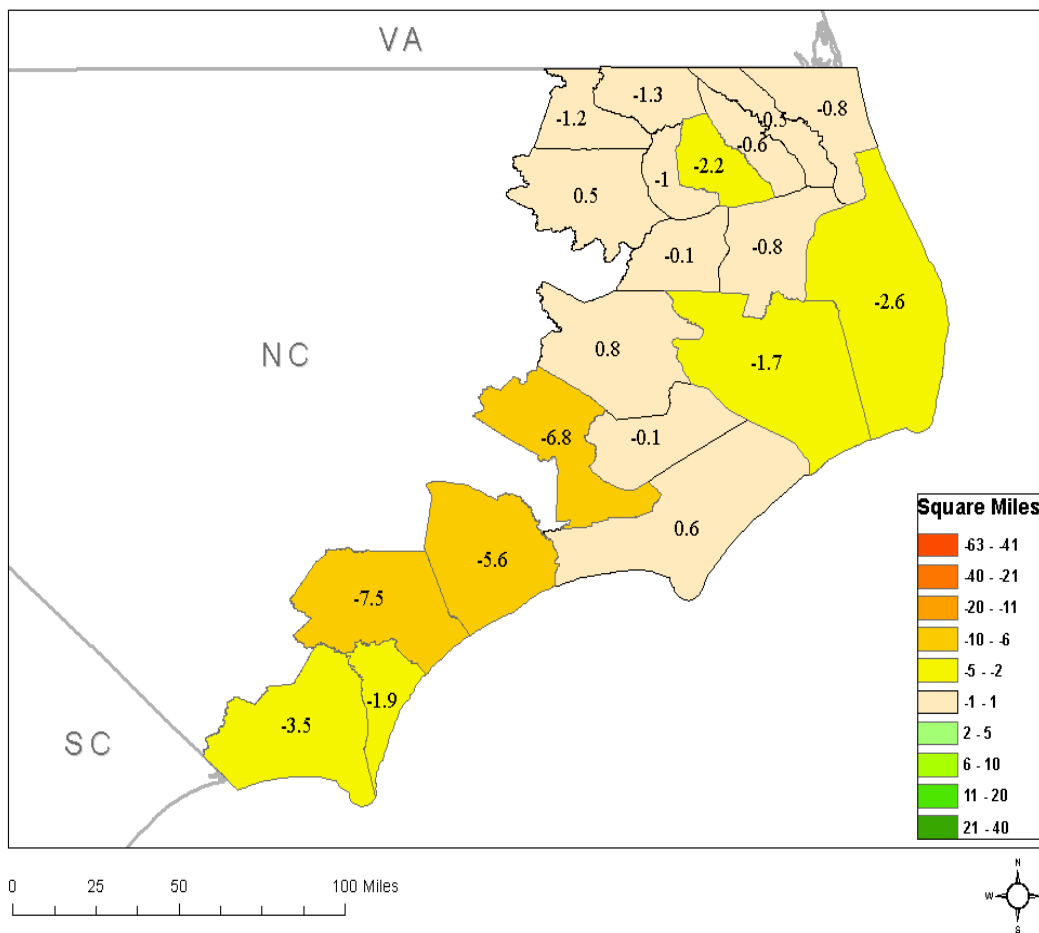
² <http://www.csc.noaa.gov/ccapatlas/>. Summary reports compiling each state’s coastal county data are provided on the ftp site.

³ <http://www.csc.noaa.gov/digitalcoast/data/ccaphighres>

How Wetlands Are Changing*		
Land Cover Type	Area of Wetlands Transformed to Another Type of Land Cover between 1996-2011 (Sq. Miles)	Area of Wetlands Transformed to Another Type of Land Cover between 2006-2011 (Sq. Miles)
Development	-6,332.0	-2,115.9
Agriculture	-5,581.2	1,619.9
Barren Land	-2,912.7	-1,383.7
Water	-3,247.2	62.7

* Note: Islands likely have data for another time period and may only have one time interval to report. If so, only report the change in wetlands for the time period for which high-resolution C-CAP data are available. Puerto Rico and CNMI do not report.

Net Wetland Change by County 1996-2010



2. If available, briefly list and summarize the results of any additional state- or territory-specific data or reports on the status and trends of coastal wetlands since the last assessment to augment the national data sets.

Distribution of Land Cover Types in Coastal Counties		
Land Cover Type	Land Area Coverage in 2011 (Acres)	Gain/Loss Since 2006 (Acres)
Developed, High Intensity	44,328.2	4,230.4
Developed, Low Intensity	151,155.4	6,661.8
Developed, Open Space	115,175.0	11,277.0
Grassland	221,262.5	-30,740.3
Scrub/Shrub	627,480.7	143,767.8
Barren Land	116,311.9	436.1
Open Water	2,929,214.7	892.7
Agriculture	1,313,493.8	-23,573.2
Forested	938,641.6	-109,948.7
Wetlands	2,503,868.2	-2,849.5

Note: area within the state mapped by C-CAP is 8960931.8 acres.

Development Status and Trends for Coastal Counties			
	2006	2011	Total (Percent) Net Change
Percent land area developed	288,489.3 (3.2%)	310,658.5 (3.5%)	22,169.2 (7.7%)
Percent impervious surface area	77,916.6 (0.9%)	83,608.3 (0.9%)	5,691.7 (7.3%)

How Land Use is Changing in Coastal Counties	
Land Cover Type	Areas Lost to Development Between 2006-2011 (Acres)
Barren Land	3,733.1
Wetland	2,171.7
Open Water	91.4
Agriculture	7,386.4
Scrub/Shrub	3,089.5
Grassland	5,733.1
Forested	2,096.7

Management Characterization:

1. Indicate if there have been any significant changes at the state or territory level (positive or negative) that could impact the future protection, restoration, enhancement, or creation of coastal wetlands since the last assessment.

Management Category	Significant Changes Since Last Assessment (Y or N)
Statutes, regulations, policies, or case law interpreting these	Y
Wetlands programs (e.g., regulatory, mitigation, restoration, acquisition)	N

2. For any management categories with significant changes, briefly provide the information below. If this information is provided under another enhancement area or section of the document, please provide a reference to the other section rather than duplicate the information:
 - a. Describe the significance of the changes;
 - b. Specify if they were 309 or other CZM-driven changes; and
 - c. Characterize the outcomes or likely future outcomes of the changes.

N.C. Session Law 2014-120 raised the permitting threshold for impacting isolated wetlands from 1/3 acre to 1 acre, and lowered the mitigation ratio from 2:1 to 1:1. Although isolated wetlands are not within the CZM permitting jurisdiction, there could be a cumulative reduction in wetlands through the combination of the less restrictive permitting threshold plus the lowered mitigation ratio. The changes were made by the General Assembly, not driven by the CZM program.

Enhancement Area Prioritization:

1. What level of priority is the enhancement area for the coastal management program?

High	
Medium	X
Low	

2. Briefly explain the reason for this level of priority. Include input from stakeholder engagement, including the types of stakeholders engaged.

No legislative or regulatory changes were made to the management scheme for wetlands under the CMP’s permitting jurisdiction, but a regulatory change is anticipated within the next year to help with the field delineation of jurisdictional wetlands. Since this is the only change currently anticipated, this enhancement area is considered and medium priority. Most of the stakeholder input was outside of CAMA jurisdiction, or recommended actions that are already complete or underway. Stakeholder input did not justify making this enhancement area a high priority.

Coastal Hazards

Section 309 Enhancement Objective: Prevent or significantly reduce threats to life and property by eliminating development and redevelopment in high-hazard areas, managing development in other hazard areas, and anticipating and managing the effects of potential sea level rise and Great Lakes level change. §309(a)(2)

Note: For purposes of the Hazards Assessment, coastal hazards include the following traditional hazards and those identified in the CZMA: flooding; coastal storms (including associated storm surge); geological hazards (e.g., tsunamis, earthquakes); shoreline erosion (including bluff and dune erosion); sea level rise; Great Lake level change; land subsidence; and saltwater intrusion.

Resource Characterization:

- Flooding:** Using data from NOAA’s *State of the Coast* “Population in the Floodplain” viewer⁴ and summarized by coastal county through NOAA’s Coastal County Snapshots for Flood Exposure,⁵ indicate how many people were located within the state’s coastal floodplain as of 2010 and how that has changed since 2000. You may use other information or graphs or other visuals to help illustrate.

Population in the Coastal Floodplain			
	2000	2010	Percent Change from 2000-2010
No. of people in coastal floodplain ⁶	209,254	325,797	56%
No. of people in coastal counties ⁷	792,620	1,149,661	45%
Percentage of people in coastal counties in coastal floodplain	26%	28%	-----

- Shoreline Erosion** (for all states other than Great Lakes and islands; for Great Lakes and islands, see Question 5): Using data from NOAA’s *State of the Coast* “Coastal Vulnerability Index,”⁸ indicate the vulnerability of the state’s shoreline to erosion. You may use other information or graphs or other visuals to help illustrate or replace the table entirely if better data is available. *Note: For New York and Pennsylvania that have both Atlantic and Great Lakes shorelines, fill out the table below for the Atlantic shoreline only.*

Vulnerability to Shoreline Erosion		
Vulnerability Ranking	Miles of Shoreline Vulnerable ¹¹	Percent of Coastline ⁹
Very low (>2.0m/yr) accretion	94	3%
Low (1.0-2.0 m/yr) accretion	113	4%
Moderate (-1.0 to 1.0 m/yr) stable	1,667	62%
High (-1.1 to -2.0 m/yr) erosion	296	11%
Very high (<-2.0 m/yr) erosion	496	18%

- Sea Level Rise** (for all states other than Great Lakes and islands; for Great Lakes and islands, see Question 5): Using data from NOAA’s *State of the Coast* “Coastal Vulnerability Index,”¹⁰ indicate the vulnerability of the state’s shoreline to sea level rise. You may provide other information or use graphs or other visuals to help illustrate or replace table entirely if better data is available. *Note: For New York and Pennsylvania that have both Atlantic and Great Lakes shorelines, fill out the table below for your Atlantic shoreline only.*

⁴ <http://stateofthecoast.noaa.gov/pop100yr/welcome.html>. Note FEMA is in the process of updating the floodplain data. This viewer reflects floodplains as of 2010. If you know the floodplain for your state has been revised since 2010, you can either use data for your new boundary, if available, or include a short narrative acknowledging the floodplain has changed and generally characterizing how it has changed.

⁵ www.csc.noaa.gov/digitalcoast/tools/snapshots

⁶ To obtain exact population numbers for the coastal floodplain, download the Excel data file on the State of the Coast “Population in the Floodplain” viewer: <http://stateofthecoast.noaa.gov/pop100yr/welcome.html>. Summary population data for each coastal state is available on the ftp site.

⁷ To obtain population numbers for coastal counties, see spreadsheet of coastal population and critical facilities data provided or download directly from <http://www.csc.noaa.gov/digitalcoast/data/stics>. Summary population data for each coastal state is available on the ftp site.

⁸ <http://stateofthecoast.noaa.gov/vulnerability/welcome.html> (see specifically “Erosion Rate” drop-down on map). The State of the Coast visually displays the data from USGS’s Coastal Vulnerability Index.

⁹ To obtain exact shoreline miles and percent of coastline, mouse over the colored bar for each level of risk or download the Excel data file.

¹⁰ <http://stateofthecoast.noaa.gov/vulnerability/welcome.html> (see “Vulnerability Index Rating” drop-down on map). The State of the Coast visually displays the data from USGS’s Coastal Vulnerability Index.

Coastal Vulnerability to Historic Sea Level Rise		
Vulnerability Ranking	Miles of Shoreline Vulnerable ¹¹	Percent of Coastline
Very low	0	0%
Low	0	0%
Moderate	504	19%
High	1,050	39%
Very high	1,114	42%

4. **Other Coastal Hazards:** In the table below, indicate the general level of risk in the coastal zone for each of the coastal hazards. The state’s multi-hazard mitigation plan is a good additional resource to support these responses.

Type of Hazard	General Level of Risk ¹¹ (H, M, L)
Flooding (riverine, stormwater)	H
Coastal storms (including storm surge) ¹²	H
Geological hazards (e.g., tsunamis, earthquakes)	L
Shoreline erosion ¹³	H
Sea level rise ^{13,14,15}	H
Great Lake level change ¹⁴	NA
Land subsidence	L/M
Saltwater intrusion	L/M
Other (please specify)	

5. If available, briefly list and summarize the results of any additional data or reports on the level of risk and vulnerability to coastal hazards within your state since the last assessment. The state’s multi-hazard mitigation plan or climate change risk assessment or plan may be a good resource to help respond to this question.

Management Characterization:

1. Indicate if the approach is employed by the state or territory and if significant state- or territory-level changes (positive or negative) have occurred that could impact the CMP’s ability to prevent or significantly reduce coastal hazards risk since the last assessment.

Management Category	Employed by State or Territory (Y or N)	CMP Provides Assistance to Locals that Employ (Y or N)	Significant Changes Since Last Assessment (Y or N)
Statutes, regulations, policies, or case law interpreting these that address:			

¹¹ Risk is defined as “the estimated impact that a hazard would have on people, services, facilities and structures in a community; the likelihood of a hazard event resulting in an adverse condition that causes injury or damage.” *Understanding Your Risks: Identifying Hazards and Estimating Losses. FEMA 386-2. August 2001*

¹² In addition to any state- or territory-specific information that may help respond to this question, the U.S. Global Change Research Program has an interactive website that provides key findings from the 2014 National Climate Assessment for each region of the country, including regions for the coasts and oceans, and various sectors. The report includes findings related to coastal storms and sea level rise that may be helpful in determining the general level of risk. See <http://nca2014.globalchange.gov/>.

¹³ See NOAA State of the Coastal Vulnerability to Sea Level Rise Tool (select “Erosion Rate” from drop-down box) <http://stateofthecoast.noaa.gov/vulnerability/welcome.html>. The State of the Coast visually displays the data from USGS’s Coastal Vulnerability Index.

<i>elimination of development/redevelopment in high-hazard areas¹⁴</i>	N	N	N
<i>management of development/redevelopment in other hazard areas</i>	Y	Y	N
<i>climate change impacts, including sea level rise or Great Lake level change</i>	N	Y	N
Hazards planning programs or initiatives that address:			
<i>hazard mitigation</i>	Y	Y	N
<i>climate change impacts, including sea level rise or Great Lake level change</i>	N	Y	N
Hazards mapping or modeling programs or initiatives for:			
<i>sea level rise or Great Lake level change</i>	N	N	N
<i>other hazards</i>	Y	Y	N

2. Briefly state how “high-hazard areas” are defined in your coastal zone.
 The NCCMP defines a High Hazard Flood area of environmental concern as “the area subject to high velocity waters (including hurricane wave wash) in a storm having a one percent chance of being equaled or exceeded in any given year, as identified as zone V1-30 on the flood insurance rate maps of the Federal Insurance Administration, U.S. Department of Housing and Urban Development.”

3. For any management categories with significant changes, briefly provide the information below. If this information is provided under another enhancement area or section of the document, please provide a reference to the other section rather than duplicate the information:
 - a. Describe the significance of the changes;
 - b. Specify if they were 309 or other CZM-driven changes; and
 - c. Characterize the outcomes or likely future outcomes of the changes.

Enhancement Area Prioritization:

1. What level of priority is the enhancement area for the coastal management program?

High X
Medium
Low

Briefly explain the reason for this level of priority. Include input from stakeholder engagement, including the types of stakeholders engaged.

Due to geography and topography, North Carolina’s natural vulnerability to coastal hazards is very high. The state’s large and rapidly growing coastal population means that a tremendous amount of property, infrastructure, economic wellbeing and lives are also directly within harm’s way. The CMP has consistently worked to mitigate these risks, and will continue to do so as the stakes grow higher. Most of the stakeholder input for this enhancement area related directly or indirectly to current priorities of the CRC and DCM, and supported making this enhancement area a high priority.

¹⁴ Use state’s definition of high-hazard areas.

Public Access

Section 309 Enhancement Objective: Attain increased opportunities for public access, taking into account current and future public access needs, to coastal areas of recreational, historical, aesthetic, ecological, or cultural value. §309(a)(3)

Resource Characterization:

1. Use the table below to provide data on public access availability within the coastal zone.

Public Access Status and Trends			
Type of Access	Current number ¹⁵	Changes or Trends Since Last Assessment ¹⁶ (↑, ↓, -, unkwn)	Cite data source
Beach access sites	More than 425	↑ 64	DCM access contracts, NC WRC, local government input
Shoreline (other than beach) access sites	Unknown	↑ 39	DCM access contracts, NC WRC, local government input
Recreational boat (power or nonmotorized) access sites	More than 100	↑ 21	DCM access contracts, NC WRC, local government input
Number of designated scenic vistas or overlook points	Unknown	↑ 7	DCM access contracts, NC WRC, local government input
Number of fishing access points (i.e. piers, jetties)	Unknown	↑ 10	DCM access contracts, NC WRC, local government input
Coastal trails/ boardwalks	No. of Trails/ boardwalks Unknown	Unknown	
	Miles of Trails/boardwalks Unknown		
	Unknown		
Number of acres parkland/open	Total sites Unknown		

¹⁵ Be as specific as possible. For example, if you have data on many access sites but know it is not an exhaustive list, note “more than” before the number. If information is unknown, note that and use the narrative section below to provide a brief qualitative description based on the best information available.

¹⁶ If you know specific numbers, please provide. However, if specific numbers are unknown but you know that the general trend was increasing or decreasing or relatively stable or unchanged since the last assessment, note that with a ↑ (increased), ↓ (decreased), - (unchanged). If the trend is completely unknown, simply put “unkwn.”

Public Access Status and Trends			
Type of Access	Current number ¹⁵	Changes or Trends Since Last Assessment ¹⁶ (↑, ↓, -, unkwn)	Cite data source
space	Sites per miles of shoreline Unknown	Unknown	
Other (please specify)			

- Briefly characterize the demand for coastal public access and the process for periodically assessing demand. Include a statement on the projected population increase for your coastal counties.¹⁷ There are several additional sources of statewide information that may help inform this response, such as the Statewide Comprehensive Outdoor Recreation Plan,¹⁸ the National Survey on Fishing, Hunting, and Wildlife Associated Recreation,¹⁹ and your state’s tourism office.

The only assessment that occurs is the annual Coastal Area Management Act Public Beach and Water Access Grant Program request for funding. Local governments from the 20 coastal counties have the opportunity to request grant funds for public access projects. In the last five years, requests have increased in both number of applications and dollar amount. It is anticipated that with the projected population increase the demand for coastal water access will also increase. The population within the state’s coastal shoreline counties is projected to increase by 9.9 percent between 2010 and 2020.

- If available, briefly list and summarize the results of any additional data or reports on the status or trends for coastal public access since the last assessment.

N/A

Management Characterization:

- Indicate if the approach is employed by the state or territory and if there have been any significant state- or territory-level management changes (positive or negative) that could impact the future provision of public access to coastal areas of recreational, historical, aesthetic, ecological, or cultural value.

Management Category	Employed by State or Territory (Y or N)	CMP Provides Assistance to Locals that Employ (Y or N)	Significant Changes Since Last Assessment (Y or N)

¹⁷ See NOAA’s Coastal Population Report: 1970-2020 (Table 5, pg. 9): <http://stateofthecoast.noaa.gov/coastal-population-report.pdf>

¹⁸ Most states routinely develop “Statewide Comprehensive Outdoor Recreation Plans”, or SCROPs, that include an assessment of demand for public recreational opportunities. Although not focused on coastal public access, SCROPs could be useful to get some sense of public outdoor recreation preferences and demand. Download state SCROPs at www.recpro.org/scorps.

¹⁹ The National Survey on Fishing, Hunting, and Wildlife Associated Recreation produces state-specific reports on fishing, hunting, and wildlife associated recreational use for each state. While not focused on coastal areas, the reports do include information on saltwater and Great Lakes fishing, and some coastal wildlife viewing that may be informative and compares 2011 data to 2006 and 2001 information to understand how usage has changed. See www.census.gov/prod/www/fishing.html.

Statutes, regulations, policies, or case law interpreting these	Y	Y	N
Operation/maintenance of existing facilities	N	N	N
Acquisition/enhancement programs	Y	Y	N

2. For any management categories with significant changes, briefly provide the information below. If this information is provided under another enhancement area or section of the document, please provide a reference to the other section rather than duplicate the information: N/A
 - a. Describe the significance of the changes;
 - b. Specify if they were 309 or other CZM-driven changes; and
 - c. Characterize the outcomes or likely future outcomes of the changes.

3. Indicate if your state or territory has a publically available public access guide. How current is the publication and how frequently it is updated?²⁰

Public Access Guide	Printed	Online	Mobile App
State or territory has? (Y or N)	N	Y	N
Web address (if applicable)		http://www.nccoastalmanagement.net/web/cm/accessmaps	
Date of last update		Spring 2014	
Frequency of update		Annual	

Enhancement Area Prioritization:

1. What level of priority is the enhancement area for the coastal management program?

High _____
Medium X
Low _____

2. Briefly explain the reason for this level of priority. Include input from stakeholder engagement, including the types of stakeholders engaged.

Public access to coastal waters impacts not only the state and local government's economies, but also the cultural and historical character of the region. There has been an increased demand for estuarine access for both recreational and commercial uses, as indicated through access grant requests. The projected population forecasts further emphasize the need to provide public access and associated amenities to meet future demands. Stakeholder input selected public access as the highest priority enhancement area. Despite the increasing demand and projected population

²⁰ Note some states may have regional or local guides in addition to state public access guides. Unless you want to list all local guides as well, there is no need to list additional guides beyond the state access guide. However, you may choose to note that the local guides do exist and may provide additional information that expands upon the state guides.

increase, the CMP is not well positioned to secure a meaningful program change for this enhancement area. At present, the CMP’s primary responsibility is in conducting an annual grant competition for funds that are appropriated by the General Assembly for the access program. Funding had been averaging at least \$1,000,000 per year until the real estate downturn, and now average a little over \$500,000 per year.

Marine Debris

Section 309 Enhancement Objective: Reducing marine debris entering the nation’s coastal and ocean environment by managing uses and activities that contribute to the entry of such debris. §309(a)(4)

Resource Characterization:

1. In the table below, characterize the existing status and trends of marine debris in the state’s coastal zone based on the best available data.

Source of Marine Debris	Existing Status and Trends of Marine Debris in Coastal Zone		
	Significance of Source (H, M, L, unknwn)	Type of Impact ²¹ (aesthetic, resource damage, user conflicts, other)	Change Since Last Assessment (↑, ↓, -, unknwn)
<i>Land-based</i>			
Beach/shore litter	H	aesthetic, resource damage, economic	-
Dumping	H	aesthetic, resource damage	-
Storm drains and runoff	H	aesthetic, resource damage	-
Fishing (e.g., fishing line, gear)	L	aesthetic, resource damage	-
Other (please specify)			
<i>Ocean or Great Lake-based</i>			
Fishing (e.g., derelict fishing gear)	L	aesthetic, resource damage	-
Derelict vessels	L	aesthetic, resource damage, economic	-
Vessel-based (e.g., cruise ship, cargo ship, general vessel)	L	aesthetic, resource damage	-
Hurricane/Storm	L	aesthetic, resource damage, economic	-
Tsunami	L	NA	-
Other (please specify)			

²¹ You can select more than one, if applicable.

2. If available, briefly list and summarize the results of any additional state- or territory-specific data or reports on the status and trends or potential impacts from marine debris in the coastal zone since the last assessment.

Management Characterization:

1. Indicate if the approach is employed by the state or territory and if there have been any significant state- or territory-level management changes (positive or negative) for how marine debris is managed in the coastal zone.

Management Category	Employed by State/Territory (Y or N)	CMP Provides Assistance to Locals that Employ (Y or N)	Significant Changes Since Last Assessment (Y or N)
Marine debris statutes, regulations, policies, or case law interpreting these	Y	Y	N
Marine debris removal programs	Y	Y	N

2. For any management categories with significant changes, briefly provide the information below. If this information is provided under another enhancement area or section of the document, please provide a reference to the other section rather than duplicate the information:
 - a. Describe the significance of the changes;
 - b. Specify if they were 309 or other CZM-driven changes; and
 - c. Characterize the outcomes and likely future outcomes of the changes.

Enhancement Area Prioritization:

1. What level of priority is the enhancement area for the coastal management program?

High _____
Medium X
Low _____

2. Briefly explain the reason for this level of priority. Include input from stakeholder engagement, including the types of stakeholders engaged.

The NCCMP continues to be concerned about marine debris, but has no regulatory authority to address it. The NCCMP is involved with marine debris through coordinating the NC Clean Marina Program, Clean Boater Program, and Marina Pumpout Program. The majority of the stakeholder input included suggestions that are outside of CAMA jurisdiction, or are already complete or underway. Recommendations do not justify making this enhancement area a high priority.

Cumulative and Secondary Impacts

Section 309 Enhancement Objective: Development and adoption of procedures to assess, consider, and control cumulative and secondary impacts of coastal growth and development, including the collective effect on various individual uses or activities on coastal resources, such as coastal wetlands and fishery resources. §309(a)(5)

Resource Characterization:

- Using National Ocean Economics Program Data on population and housing,²² please indicate the change in population and housing units in the state’s coastal counties between 2012 and 2007. You may wish to add additional trend comparisons to look at longer time horizons as well (data available back to 1970), but at a minimum, please show change over the most recent five year period (2012-2007) to approximate current assessment period.

Trends in Coastal Population and Housing Units				
Year	Population		Housing	
	Total (# of people)	% Change (compared to 2002)	Total (# of housing units)	% Change (compared to 2002)
2007	931,242	19.39%	497,641	20.66%
2012	1,009,491		528,916	

- Using provided reports from NOAA’s Land Cover Atlas²³ or high-resolution C-CAP data²⁴ (Pacific and Caribbean Islands only), please indicate the status and trends for various land uses in the state’s coastal counties between 2006 and 2011. You may use other information and include graphs and figures, as appropriate, to help illustrate the information. Note that the data available for the islands may be for a different time frame than the time periods reflected below. In that case, please specify the time period the data represents. Also note that Puerto Rico and the Commonwealth of the Northern Mariana Islands (CNMI) currently only have data for one time point so will not be able to report trend data. Instead, Puerto Rico and CNMI should just report current land use cover for developed areas and impervious surfaces.

Distribution of Land Cover Types in Coastal Counties		
Land Cover Type	Land Area Coverage in 2010 (Square miles)	Gain/Loss Since 2006 (Square miles)
Developed, High Intensity	69.25	6.6
Developed, Low Intensity	236.15	10.41
Developed, Open Space	178.64	48.62
Grassland	334.57	-49.48
Scrub/Shrub	959.74	216.32
Barren Land	181.84	0.76
Open Water	4573.44	0.69
Agriculture	2050.5	-35.17
Forested	1450.39	-176.09

²² www.oceaneconomics.org/. Enter “Population and Housing” section. From drop-down boxes, select your state, and “all counties.” Select the year (2012) and the year to compare it to (2007). Then select “coastal zone counties.” Finally, be sure to check the “include density” box under the “Other Options” section.

²³ www.csc.noaa.gov/ccapAtlas/. Summary data on land use trends for each coastal state is available on the ftp site.

²⁴ www.csc.noaa.gov/digitalcoast/data/ccaphighres. Summary data on land use trends for each coastal state is available on the ftp site.

Distribution of Land Cover Types in Coastal Counties		
Land Cover Type	Land Area Coverage in 2010 (Square miles)	Gain/Loss Since 2006 (Square miles)
Woody Wetland	3282.14	-54.28
Emergent Wetland	677.34	51.06

3. Using provided reports from NOAA's Land Cover Atlas²⁵ or high-resolution C-CAP data²⁶ (Pacific and Caribbean Islands only), please indicate the status and trends for developed areas in the state's coastal counties between 2006 and 2011 in the two tables below. You may use other information and include graphs and figures, as appropriate, to help illustrate the information. Note that the data available for the islands may be for a different time frame than the time periods reflected below. In that case, please specify the time period the data represents. Also note that Puerto Rico and CNMI currently only have data for one time point so will not be able to report trend data. Unless Puerto Rico and CNMI have similar trend data to report on changes in land use type, they should just report current land use cover for developed areas and impervious surfaces.

Development Status and Trends for Coastal Counties (square miles)			
	2006	2010	Net Change
Land area developed	448.41	484.04	35.63
Impervious surface area	Not available	Not available	8.97

* Note: Islands likely have data for another time period and may only have one time interval to report. If so, only report the change in development and impervious surface area for the time period for which high-resolution C-CAP data are available. Puerto Rico and CNMI do not need to report trend data.

How Land Use Is Changing in Coastal Counties	
Land Cover Type	Areas Lost to Development Between 2006-2011 (Square miles)
Barren Land	0.76 gained
Emergent Wetland	51.06 gained
Woody Wetland	54.28 lost
Open Water	0.69 gained
Agriculture	35.17 lost
Scrub/Shrub	216.32 gained
Grassland	49.48 lost
Forested	176.09 lost

* Note: Islands likely have data for another time period and may only have one time interval to report. If so, only report the change in land use for the time period for which high-resolution C-CAP data are available. Puerto Rico and CNMI do not report.

4. Using data from NOAA's State of the Coast "Shoreline Type" viewer,²⁷ indicate the percent of shoreline that falls into each shoreline type.²⁸ You may provide other information or use graphs or other visuals to help illustrate.

Shoreline Types	
Surveyed Shoreline Type	Percent of Shoreline

²⁵ www.csc.noaa.gov/ccapatlas/. Summary data on land use trends for each coastal state is available on the ftp site.

²⁶ www.csc.noaa.gov/digitalcoast/data/ccaphighres. Summary data on land use trends for each coastal state is available on the ftp site.

²⁷ <http://stateofthecoast.noaa.gov/shoreline/welcome.html>

²⁸ Note: Data are from NOAA's Environmental Sensitivity Index (ESI) Maps. Data from each state was collected in different years and some data may be over ten years old now. However, it can still provide a useful reference point absent more recent statewide data. Feel free to use more recent state data, if available, in place of ESI map data. Use a footnote to convey data's age and source (if other than ESI maps).

Armored	8
Beaches	7
Flats	3
Rocky	1
Vegetated	81

5. If available, briefly list and summarize the results of any additional state- or territory-specific data or reports on the cumulative and secondary impacts of coastal growth and development, such as water quality and habitat fragmentation, since the last assessment to augment the national data sets.

The NCCMP completed its first estuarine shoreline mapping project in 2012 (http://www.nccoastalmanagement.net/c/document_library/get_file?uuid=06cebd24-de74-4ffd-8cd3-378b85f97672&groupId=38319), and the second estuarine shoreline map will be complete in early 2015. The digital shorelines that were produced include categorization by type (e.g. sediment bank, marsh, mud, vegetated), as well as structures (e.g. bulkheads, piers, groins, boat ramps). Digitizing additional shorelines over time will allow the state to improve its ability to improve its ability to perform cumulative and secondary impact analysis.

Management Characterization:

1. Indicate if the approach is employed by the state or territory and if there have been any significant state-level changes (positive or negative) in the development and adoption of procedures to assess, consider, and control cumulative and secondary impacts of coastal growth and development, including the collective effect on various individual uses or activities on coastal resources, such as coastal wetlands and fishery resources, since the last assessment.

Management Category	Employed by State or Territory (Y or N)	CMP Provides Assistance to Locals that Employ (Y or N)	Significant Changes Since Last Assessment (Y or N)
Statutes, regulations, policies, or case law interpreting these	Y	N	N
Guidance documents	Y	N	N
Management plans (including SAMPs)	Y	N	N

2. For any management categories with significant changes, briefly provide the information below. If this information is provided under another enhancement area or section of the document, please provide a reference to the other section rather than duplicate the information:
 - a. Describe the significance of the changes;
 - b. Specify if they were 309 or other CZM-driven changes; and
 - c. Characterize the outcomes or likely future outcomes of the changes.

Pursuant to the N.C. Fisheries Reform Act of 1997 (G.S. 143B-279.8) NCDENR updated the N.C. Coastal Habitat Protection Plan (CHPP) effective December 2010. The goal of the CHPP is long-term protection and enhancement of coastal fisheries associated with various types of marine fishery

habitat. The CHPP, however, is non-regulatory. The CHPP document was updated by NCDENR staff and signed by the Coastal Resources, Environmental Management, Marine Fisheries, and Wildlife Resources Commissions.

Enhancement Area Prioritization:

1. What level of priority is the enhancement area for the coastal management program?

High _____
 Medium X
 Low _____

2. Briefly explain the reason for this level of priority. Include input from stakeholder engagement, including the types of stakeholders engaged.

The CMP and our partner agencies have an increasing number of indicators of cumulative and secondary impacts, and continue to gather data. The CMP and others have also begun mapping these data and performing initial analyses. Indicators so far appear to support ongoing monitoring, data collection and analysis, and no program change seems to be immediately necessary. Stakeholder input did not recommend making this enhancement area a high priority.

Special Area Management Planning

Section 309 Enhancement Objective: Preparing and implementing special area management plans for important coastal areas. §309(a)(6)

The Coastal Zone Management Act defines a Special Area Management Plan (SAMP) as “a comprehensive plan providing for natural resource protection and reasonable coastal-dependent economic growth containing a detailed and comprehensive statement of policies; standards and criteria to guide public and private uses of lands and waters; and mechanisms for timely implementation in specific geographic areas within the coastal zone. In addition, SAMPs provide for increased specificity in protecting natural resources, reasonable coastal-dependent economic growth, improved protection of life and property in hazardous areas, including those areas likely to be affected by land subsidence, sea level rise, or fluctuating water levels of the Great Lakes, and improved predictability in governmental decision making.”

Resource Characterization:

1. In the table below, identify geographic areas in the coastal zone subject to use conflicts that may be able to be addressed through a special area management plan (SAMP). This can include areas that are already covered by a SAMP but where new issues or conflicts have emerged that are not addressed through the current SAMP.

Geographic Area	Opportunities for New or Updated Special Area Management Plans
	Major conflicts/issues
Ocean Hazard & Inlet	Coastal development, storm hazards; sudden and chronic shoreline

Areas	changes; land alteration affecting the barrier island system
Coastal & Freshwater Wetlands	Coastal development, physical alteration; nonpoint source pollution, effects of shoreline hardening
Estuarine Waters	Coastal development, point & nonpoint pollution
Public Trust Waters	Competition from residential, industrial, commercial interests for access to and use of public trust resources
Estuarine Shorelines	Damage to their functions as natural barriers to shoreline erosion and capacity to buffer adjacent waters from runoff
Closed, highly productive shellfish waters	Uncontrolled development or development with high densities/intensities resulting in major or irreversible damage
Public Water Supplies	Uncontrolled development within watershed or well field boundaries. Salt water intrusion due to overdraft.
State Ports & Surrounding Areas	Multiple jurisdictions affecting natural resources and the use of public trust areas absent coordinated land use planning

2. If available, briefly list and summarize the results of any additional state- or territory-specific data or reports on the status and trends of SAMPs since the last assessment.

The NCCMP does not utilize SAMPs, but has recent and ongoing tasks related to statutory and regulatory Areas of Environmental Concern (AECs) that are similar in effect.

(a) Inlet Management Study

The NCCMP in 2013, as required under S.L. 2012-202, conducted a study of the feasibility of eliminating overlapping AECs for the lands adjacent to the mouth of the Cape Fear River and incorporating appropriate development standards into a new AEC. Also as required under S.L. 2012-202 the NCCMP subsequently began to study the feasibility of eliminating the Inlet Hazard AEC category and incorporating appropriate development standards into the Ocean Erodible AEC category. The Cape Fear River AEC study and the Inlet Hazard Area AEC study were combined for delivery to the state legislature by January 31, 2015.

(b) Living Shorelines Strategy

Over the past several years, the NCCMP has been undertaking substantial efforts to advance marsh sills and other living shoreline alternatives to vertical estuarine shoreline stabilization methods. These efforts have included coordinating the development of a General Permit, hosting workshops for property owners and marine contractors, developing an Estuarine Shoreline Stabilization Guide for property owners, and conducting a multi-agency assessment of installed structures. The NCCMP also coordinated a joint state-federal effort that led to the creation of a Living Shorelines Strategy document that has now been approved by DENR. The Strategy includes six short-term and four long-term actions that the NCCMP is now working to implement.

Management Characterization:

1. Indicate if the approach is employed by the state or territory and if there have been any significant state- or territory-level management changes (positive or negative) that could help prepare and implement SAMPs in the coastal zone.

Management Category	Employed by State or Territory (Y or N)	CMP Provides Assistance to Locals that Employ (Y or N)	Significant Changes Since Last Assessment (Y or N)
SAMP policies, or case law interpreting these	N	NA	NA
SAMP plans	N	NA	NA

2. For any management categories with significant changes, briefly provide the information below. If this information is provided under another enhancement area or section of the document, please provide a reference to the other section rather than duplicate the information:
- Describe the significance of the changes;
 - Specify if they were 309 or other CZM-driven changes; and
 - Characterize the outcomes or likely future outcomes of the changes.

Enhancement Area Prioritization:

1. What level of priority is the enhancement area for the coastal management program?

High _____
 Medium X
 Low _____

2. Briefly explain the reason for this level of priority. Include input from stakeholder engagement, including the types of stakeholders engaged.

Given the existing use of the similar and statutorily-created AEC framework in North Carolina, the CMP does not believe that employing the SAMP process is necessary or a high priority. The SAMP process overlaps with many of the other objectives and tasks that are currently part our CMP. Stakeholder input did not recommend making this enhancement area a high priority.

Ocean Resources

Section 309 Enhancement Objective: Planning for the use of ocean resources. §309(a)(7)

Resource Characterization:

1. Understanding the ocean economy can help improve management of the resources it depends on. Using Economics: National Ocean Watch (ENOW),²⁹ indicate the status of the ocean economy as of 2011, as well as the change since 2006, in the tables below. Include graphs and figures, as appropriate, to help illustrate the information. Note ENOW data are not available for the territories.

²⁹ www.csc.noaa.gov/enow/explorer/. If you select any coastal county for your state, you receive a table comparing county data to state coastal county, regional, and national information. Use the state column for your responses.

The territories can provide alternative data, if available, or a general narrative, to capture the value of their ocean economy.

Status of Ocean Economy for Coastal Counties (2011)				
	Establishments (# of Establishments)	Employment (# of Jobs)	Wages (Millions of Dollars)	GDP (Millions of Dollars)
Living Resources	170	3,358	\$26.5	\$151.3
Marine Construction	101	540	\$18.1	\$36.5
Marine Transportation	95	2,336	\$145.3	\$352
Offshore Mineral Extraction	21	121	\$3	\$5.3
Tourism & Recreation	2,331	34,925	\$507.9	\$1,100
All Ocean Sectors	2,788	42,688	\$760.5	\$1,800

Change in Ocean Economy for Coastal Counties (2006-2011)				
	Establishments (% change)	Employment (% change)	Wages (% change)	GDP (% change)
Living Resources	4.9	-4.3	12.3	5.3
Marine Construction	7.4	-49.8	-44	-44.7
Marine Transportation	6.7	-25.7	13.4	8.4
Offshore Mineral Extraction	16.7	-16.1	-29.1	-26.1
Tourism & Recreation	22	6.8	19.2	20.9
All Ocean Sectors	18.3	-5.2	-2	0.5

2. In the table below, characterize how the threats to and use conflicts over ocean resources in the state's or territory's coastal zone have changed since the last assessment.

Significant Changes to Ocean Resources and Uses	
Resource/Use	Change in the Threat to the Resource or Use Conflict Since Last Assessment (↑, ↓, -, unkwn)
Resource	
<i>Benthic habitat (including coral reefs)</i>	-
<i>Living marine resources (fish, shellfish, marine mammals, birds, etc.)</i>	↑
<i>Sand/gravel</i>	-
<i>Cultural/historic</i>	unkwn
<i>Other (please specify)</i>	
Use	
<i>Transportation/navigation</i>	↑

<i>Offshore development</i> ³⁰	↑
<i>Energy production</i>	↑
<i>Fishing (commercial and recreational)</i>	-
<i>Recreation/tourism</i>	-
<i>Sand/gravel extraction</i>	-
<i>Dredge disposal</i>	-
<i>Aquaculture</i>	-
<i>Other (please specify)</i>	

- For the ocean resources and uses in Table 2 (above) that had an increase in threat to the resource or increased use conflict in the state's or territory's coastal zone since the last assessment, characterize the major contributors to that increase.

Major Contributors to an Increase in Threat or Use Conflict to Ocean Resources												
Resource	Major Reasons Contributing to Increased Resource Threat or Use Conflict											
	(Note All that Apply with "X")											
	Land-based development	Offshore development	Polluted runoff	Invasive species	Fishing (Comm & Rec)	Aquaculture	Recreation	Marine Transportation	Dredging	Sand/Mineral Extraction	Ocean Acidification	Offshore Energy
<i>Living marine resources (fish, shellfish, marine mammals, birds, etc.)</i>												X
<i>Transportation/navigation</i>												X
<i>Offshore development</i>												X
<i>Energy production</i>												X

- If available, briefly list and summarize the results of any additional state- or territory-specific data or reports on the status and trends of ocean resources or threats to those resources since the last assessment to augment the national data sets.

While no official reports have been prepared, the NCCMP has recently seen applications from at least 10 private companies to conduct seismic testing and aerial surveys for petroleum deposits. There is also ongoing interest in wind energy development off the state's coast. These proposed activities have the potential to lead to increased threats to resources and use conflicts with existing marine activities.

Management Characterization:

- Indicate if the approach is employed by the state or territory and if any significant state- or territory-level changes (positive or negative) in the management of ocean resources have occurred since the last assessment?

³⁰ Offshore development includes underwater cables and pipelines, although any infrastructure specifically associated with the energy industry should be captured under the "energy production" category.

Management Category	Employed by State or Territory (Y or N)	CMP Provides Assistance to Locals that Employ (Y or N)	Significant Changes Since Last Assessment (Y or N)
Statutes, regulations, policies, or case law interpreting these	Y	Y	N
Regional comprehensive ocean management plans	N	-	-
State comprehensive ocean management plans	N	-	-
Single-sector management plans	Y	N	N

2. For any management categories with significant changes, briefly provide the information below. If this information is provided under another enhancement area or section of the document, please provide a reference to the other section rather than duplicate the information:
 - a. Describe the significance of the changes;
 - b. Specify if they were 309 or other CZM-driven changes; and
 - c. Characterize the outcomes or likely future outcomes of the changes.

3. Indicate if your state or territory has a comprehensive ocean or Great Lakes management plan.

Comprehensive Ocean Management Plan	State Plan	Regional Plan
Completed plan (Y/N) (If yes, specify year completed)	N	N
Under development (Y/N)	N	N
Web address (if available)	-	-
Area covered by plan	-	-

Enhancement Area Prioritization:

1. What level of priority is the enhancement area for the coastal management program?

High _____
Medium _____ X
Low _____

2. Briefly explain the reason for this level of priority. Include input from stakeholder engagement, including the types of stakeholders engaged.

The CMP does not anticipate any new challenges to ocean resources within the upcoming strategy period that require making this enhancement area a high priority. The CMP contributed to the development of the NC Coastal Atlas in the previous strategy period, and intends to continue to support this tool for use in ocean and coastal resource management. Stakeholder input includes recommendations that are mostly outside of CAMA jurisdiction, or are already underway, and does not justify making this enhancement area a high priority.

Energy and Government Facility Siting

Section 309 Enhancement Objective: Adoption of procedures and enforceable policies to help facilitate the siting of energy facilities and Government facilities and energy-related activities and Government activities which may be of greater than local significance. §309(a)(8)31

Resource Characterization:

1. In the table below, characterize the status and trends of different types of energy facilities and activities in the state’s or territory’s coastal zone based on best available data. If available, identify the approximate number of facilities by type. The MarineCadastre.gov may be helpful in locating many types of energy facilities in the coastal zone.

Status and Trends in Energy Facilities and Activities in the Coastal Zone				
Type of Energy Facility/Activity	Exists in CZ		Proposed in CZ	
	(# or Y/N)	Change Since Last Assessment (↑, ↓, -, unkwn)	(# or Y/N)	Change Since Last Assessment (↑, ↓, -, unkwn)
<i>Energy Transport</i>				
Pipelines ³²	N	-	N	unkwn
Electrical grid (transmission cables)	Y	Unkwn	N	unkwn
Ports	Y	-	N	-
Liquid natural gas (LNG) ³³	N	-	N	-
Other (please specify)				
<i>Energy Facilities</i>				
Oil and gas	N	-	Y	-
Coal	N	-	N	-
Nuclear ³⁴	Y	-	N	-
Wind	N	-	N	-
Wave ³⁵	N	-	N	-
Tidal ³⁶	N	-	N	-
Current (ocean, lake, river) ³⁶	N	-	N	-
Hydropower	N	-	N	-

³¹ CZMA § 309(a)(8) is derived from program approval requirements in CZMA § 306(d)(8), which states:

“The management program provides for adequate consideration of the national interest involved in planning for, and managing the coastal zone, including the siting of facilities such as energy facilities which are of greater than local significance. In the case of energy facilities, the Secretary shall find that the State has given consideration to any applicable national or interstate energy plan or program.”

NOAA regulations at 15 C.F.R. § 923.52 further describe what states need to do regarding national interest and consideration of interests that are greater than local interests.

³² For approved pipelines (1997-present): www.ferc.gov/industries/gas/indus-act/pipelines/approved-projects.asp

³³ For approved FERC jurisdictional LNG import/export terminals: www.ferc.gov/industries/gas/indus-act/lng/exist-term.asp

³⁴ The Nuclear Regulatory Commission provides a coarse national map of where nuclear power reactors are located as well as a list that reflects their general locations: www.nrc.gov/reactors/operating/map-power-reactors.html

³⁵ For FERC hydrokinetic projects: www.ferc.gov/industries/hydropower/gen-info/licensing/hydrokinetics.asp

Status and Trends in Energy Facilities and Activities in the Coastal Zone				
Type of Energy Facility/Activity	Exists in CZ		Proposed in CZ	
	(# or Y/N)	Change Since Last Assessment (↑, ↓, -, unkwn)	(# or Y/N)	Change Since Last Assessment (↑, ↓, -, unkwn)
Ocean thermal energy conversion	N	-	N	-
Solar	N	-	N	-
Biomass	N	-	N	-
Other (please specify)				

- If available, briefly list and summarize the results of any additional state- or territory-specific information, data, or reports on the status and trends for energy facilities and activities of greater than local significance in the coastal zone since the last assessment.

North Carolina saw significant interest in seismic testing for oil and gas in 2014. Several companies have applied for federal permits, and are engaged with the CMP for federal consistency review. Seismic testing and other exploration activity could occur within the 2016-2020 Strategy period, but the CMP does not envision the need for a program change for this enhancement area. Stakeholder input recommended actions that are mostly out of CAMA jurisdiction or already complete.

- Briefly characterize the existing status and trends for federal government facilities and activities of greater than local significance³⁶ in the state’s coastal zone since the last assessment.

The state’s coastal zone continues to be a significant military use area with five active military installations located along the coast. There has not been any significant change in the status or trends of these facilities or activities over the past five years.

Management Characterization:

- Indicate if the approach is employed by the state or territory and if significant state- or territory-level changes (positive or negative) that could facilitate or impede energy and government facility siting and activities have occurred since the last assessment.

Management Category	Employed by State or Territory (Y or N)	CMP Provides Assistance to Locals that Employ (Y or N)	Significant Changes Since Last Assessment (Y or N)
Statutes, regulations, policies, or case law interpreting these	Y	N	Y
State comprehensive siting plans or procedures	N	N	N

³⁶ The CMP should make its own assessment of what Government facilities may be considered “greater than local significance” in its coastal zone, but these facilities could include military installations or a significant federal government complex. An individual federal building may not rise to a level worthy of discussion here beyond a very cursory (if any at all) mention).

2. For any management categories with significant changes, briefly provide the information below. If this information is provided under another enhancement area or section of the document, please provide a reference to the other section rather than duplicate the information:
 - a. Describe the significance of the changes;
 - b. Specify if they were 309 or other CZM-driven changes; and
 - c. Characterize the outcomes or likely future outcomes of the changes.

Session law 2012-143, the Clean Energy and Economic Security Act, remade the state Mining Commission into the Mining and Energy Commission, and granted the new commission the power and duty to adopt rules necessary to regulate the development of the oil, gas, and mining resources of the state. The law also renamed the DENR’s Division of Land Resources the Division of Energy, Mineral, and Land Resources (DEMLR). The DEMLR provides staff support to the commission, and is responsible for program administration. The law significantly limits the CMPs jurisdiction over energy activities in the coastal zone.

Enhancement Area Prioritization:

1. What level of priority is the enhancement area for the coastal management program?

High	
Medium	X
Low	

2. Briefly explain the reason for this level of priority. Include input from stakeholder engagement, including the types of stakeholders engaged.

Pursuant to recent state law, the CMP has a limited role in government and energy facility siting and does not anticipate a need for additional program changes in this enhancement area. Most of the stakeholder input included recommendations that are either outside of CAMA jurisdiction or for program changes have already been completed, and do not justify making this enhancement area a high priority.

Aquaculture

Section 309 Enhancement Objective: Adoption of procedures and policies to evaluate and facilitate the siting of public and private aquaculture facilities in the coastal zone, which will enable states to formulate, administer, and implement strategic plans for marine aquaculture. §309(a)(9)

Resource Characterization:

1. In the table below, characterize the existing status and trends of aquaculture facilities in the state’s coastal zone based on the best available data. Your state Sea Grant Program may have information to help with this assessment.³⁷

³⁷ While focused on statewide aquaculture data rather than just within the coastal zone, the *Census of Aquaculture* (www.agcensus.usda.gov/Publications/2002/Aquaculture/) may help in developing your aquaculture assessment. The 2002 report, updated in 2005, provides a variety of state-specific aquaculture data for 2005 and 1998 to understand current status and recent trends. The next census is scheduled to come out late 2014 and will provide 2013 data.

Type of Facility/Activity	Status and Trends of Aquaculture Facilities and Activities		
	# of Facilities ³⁸	Approximate Economic Value	Change Since Last Assessment (↑, ↓, -, unkwn)
Terrestrial facility	Approx. 60	Unkwn	-
Shellfish leases	173	Unkwn	-
Franchises	51	Unkwn	-
Shellfish Leases with Water Columns	25	Unkwn	↑ (3 existed in 2010; increase of 733%)
Under dock oysters	10	Unkwn	↓ (-50% possibly due to enacted fees)

2. If available, briefly list and summarize the results of any additional state- or territory-specific data or reports on the status and trends or potential impacts from aquaculture activities in the coastal zone since the last assessment.

Management Characterization:

1. Indicate if the approach is employed by the state or territory and if there have been any state- or territory-level changes (positive or negative) that could facilitate or impede the siting of public or private aquaculture facilities in the coastal zone.

Management Category	Employed by State or Territory (Y or N)	CMP Provides Assistance to Locals that Employ (Y or N)	Significant Changes Since Last Assessment (Y or N)
Aquaculture comprehensive siting plans or procedures	N	-	-
Other aquaculture statutes, regulations, policies, or case law interpreting these	Y	N	unkwn

2. For any management categories with significant changes, briefly provide the information below. If this information is provided under another enhancement area or section of the document, please provide a reference to the other section rather than duplicate the information:
 - a. Describe the significance of the changes;
 - b. Specify if they were 309 or other CZM-driven changes; and
 - c. Characterize the outcomes or likely future outcomes of the changes.

Enhancement Area Prioritization:

1. What level of priority is the enhancement area for the coastal management program?

³⁸ Be as specific as possible. For example, if you have specific information of the number of each type of facility or activity, note that. If you only have approximate figures, note “more than” or “approximately” before the number. If information is unknown, note that and use the narrative section below to provide a brief qualitative description based on the best information available.

High _____
Medium _____
Low X

2. Briefly explain the reason for this level of priority. Include input from stakeholder engagement, including the types of stakeholders engaged.

The NC Division of Marine Fisheries, Wildlife Resources Commission, and Department of Agriculture and Consumer Services have primary regulatory oversight and responsibility related to aquaculture activities in the State, therefore, DCM will not be developing a strategy for aquaculture at this time..

Phase II (In-Depth) Assessment

Coastal Hazards

In-Depth Resource Characterization:

Purpose: To determine key problems and opportunities to improve the CMP's ability to prevent or significantly reduce coastal hazard risks by eliminating development and redevelopment in high-hazard areas and managing the effects of potential sea level rise and Great Lakes level change.

- 1a. **Flooding In-depth** (for all states besides territories): Using data from NOAA's *State of the Coast* "Population in the Floodplain" viewer³⁹ and summarized by coastal county through NOAA's Coastal County Snapshots for Flood Exposure,⁴⁰ indicate how many people at potentially elevated risk were located within the state's coastal floodplain as of 2010. These data only reflect two types of vulnerable populations. You can provide additional or alternative information or use graphs or other visuals to help illustrate or replace the table entirely if better data are available. *Note: National data are not available for territories. Territories can omit this question unless they have similar alternative data or include a brief qualitative narrative description as a substitute.*

2010 Populations in Coastal Counties at Potentially Elevated Risk to Coastal Flooding ⁴¹				
	Under 5 and Over 65 years old		In Poverty	
	# of people	% Under 5/Over 65	# of people	% in Poverty
Inside Floodplain	69,189	21.2%	69,141	21.2%
Outside Floodplain	721,589	87.6%	119,198	14.5%

- 1b. **Flooding In-depth** (for all states besides territories): Using summary data provided for critical facilities, derived from FEMA's HAZUS⁴² and displayed by coastal county through NOAA's Coastal County Snapshots for Flood Exposure,⁴³ indicate how many different establishments (businesses or employers) and critical facilities are located in the FEMA floodplain. You can provide more information or use graphs or other visuals to help illustrate or replace the table entirely if better information is available.

Critical Facilities in the FEMA Floodplain ⁴⁴						
	Schools	Police Stations	Fire Stations	Emergency Centers	Medical Facilities	Communication Towers
Inside Floodplain	1034	704	1056	unkwn	44	572
Coastal Counties	307	94	171	unkwn	18+	92

2. Based on the characterization of coastal hazard risk, what are the three most significant coastal hazards⁴⁴ within the coastal zone? Also indicate the geographic scope of the hazard, i.e., is it prevalent throughout the coastal zone or are specific areas most at risk?

³⁹ <http://stateofthecoast.noaa.gov/pop100yr/welcome.html>

⁴⁰ <http://www.csc.noaa.gov/digitalcoast/tools/snapshots>

⁴¹ To obtain exact population numbers for the coastal floodplain, download the excel data file from the State of the Coast's "Population in Floodplain" viewer.

⁴² <http://www.fema.gov/hazus>; can also download data from NOAA STICS <http://www.csc.noaa.gov/digitalcoast/data/stics>. Summary data on critical facilities for each coastal state is available on the ftp site.

⁴³ <http://www.csc.noaa.gov/digitalcoast/tools/snapshots>

⁴⁴ See list of coastal hazards at the beginning of this assessment template.

	Type of Hazard	Geographic Scope (throughout coastal zone or specific areas most threatened)
Hazard 1	Flooding	Throughout coastal zone
Hazard 2	Storms & storm surge	Throughout coastal zone, especially in FEMA V zones
Hazard 3	Shoreline erosion	Throughout coastal zone, especially near inlets

- Briefly explain why these are currently the most significant coastal hazards within the coastal zone. Cite stakeholder input and/or existing reports or studies to support this assessment.

North Carolina experiences frequent storm activity, including nor-Easters, tropical storms and hurricanes. Over the past few decades the state has experienced some of the highest damage in the country as a result of coastal storms. Additionally, as a result of its location in the hurricane belt and low-profile topography, North Carolina is ranked as one of the most vulnerable states to storm surge and inundation. On the oceanfront, local, state and federal government funds are used for beach nourishment and coastal storm damage reduction projects to temporarily mitigate the impacts of storm surge and shoreline erosion. Most of the stakeholder input related directly or indirectly to current priorities of the NCCMP, and justify making this enhancement area a high priority. The state's Floodplain Mapping Program reports that over 4,000 coastal zone structures with an aggregate value of nearly \$800 million sit only eight inches above current sea level, making them highly vulnerable to flooding from stormwater, storm surge, and sea-level rise.

- Are there emerging issues of concern, but which lack sufficient information to evaluate the level of the potential threat? If so, please list. Include additional lines if needed.

Emerging Issue	Information Needed
Securing sand supplies for increasing storm damage reduction projects	Inventory of beach-quality sand reserves (location and quantity)
Offshore energy development	Potential resource and use impacts , and appropriate mitigation measures

In-Depth Management Characterization:

Purpose: To determine the effectiveness of management efforts to address identified problems related to the coastal hazards enhancement objective.

- For each coastal hazard management category below, indicate if the approach is employed by the state or territory and if there has been a significant change since the last assessment.

Management Category	Employed by State/Territory (Y or N)	CMP Provides Assistance to Locals that Employ (Y or N)	Significant Change Since the Last Assessment (Y or N)
Statutes, Regulations, and Policies:			
<i>Shorefront setbacks/no build areas</i>	Y	Y	Y
<i>Rolling easements</i>	N	N	N
<i>Repair/rebuilding restrictions</i>	Y	Y	N

<i>Hard shoreline protection structure restrictions</i>	Y	Y	Y
<i>Promotion of alternative shoreline stabilization methodologies (i.e., living shorelines/green infrastructure)</i>	Y	Y	Y
<i>Repair/replacement of shore protection structure restrictions</i>	Y	Y	Y
<i>Inlet management</i>	Y	Y	Y
<i>Protection of important natural resources for hazard mitigation benefits (e.g., dunes, wetlands, barrier islands, coral reefs) (other than setbacks/no build areas)</i>	Y	Y	N
<i>Repetitive flood loss policies (e.g., relocation, buyouts)</i>	N	N	N
<i>Freeboard requirements</i>	Y	N	Y
<i>Real estate sales disclosure requirements</i>	N	N	N
<i>Restrictions on publicly funded infrastructure</i>	N	N	N
<i>Infrastructure protection (e.g., considering hazards in siting and design)</i>	N	N	N
<i>Other (please specify)</i>			
Management Planning Programs or Initiatives:			
<i>Hazard mitigation plans</i>	Y	N	N
<i>Sea level rise or climate change adaptation plans</i>	N	N	N
<i>Statewide requirement for local post-disaster recovery planning</i>	N	N	N
<i>Sediment management plans</i>	Y	Y	Y
<i>Beach nourishment plans</i>	Y	N	N
<i>Special Area Management Plans (that address hazards issues)</i>	N	N	N
<i>Managed retreat plans</i>	N	N	N
<i>Other (please specify)</i>			
Research, Mapping, and Education Programs or Initiatives:			
<i>General hazards mapping or modeling</i>	Y	Y	Y
<i>Sea level rise mapping or modeling</i>	N	N	N
<i>Hazards monitoring (e.g., erosion rate, shoreline change, high-water marks)</i>	Y	Y	Y
<i>Hazards education and outreach</i>	Y	Y	N
<i>Other (please specify)</i>			

2. Identify and describe the conclusions of any studies that have been done that illustrate the effectiveness of the state’s management efforts in addressing coastal hazards since the last assessment. If none, is there any information that you are lacking to assess the effectiveness of the state’s management efforts?

No known studies have been completed since the last assessment that illustrate the effectiveness of the state’s management efforts in addressing coastal hazards.

Identification of Priorities:

1. Considering changes in coastal hazard risk and coastal hazard management since the last assessment and stakeholder input, identify and briefly describe the top one to three management

priorities where there is the greatest opportunity for the CMP to improve its ability to more effectively address the most significant hazard risks. (Approximately 1-3 sentences per management priority.)

Management Priority 1: Improved delineation of hazards adjacent to inlets

Description: North Carolina’s existing Inlet Hazard Area (IHA) boundaries were adopted by the Coastal Resources Commission (CRC) in 1979 based on a study of inlet shoreline changes over time. However, the CRC has recognized a need to update the IHA boundaries and change the methodology for defining IHAs and managing development within these areas. The CRC’s Science Panel has recommended that the delineation of IHAs be revised after a review of site-specific studies of each inlet and the CRC has approved this approach.

Management Priority 2: Improve calculation of long-term average oceanfront erosion rates

Description: The CMP has used the “end-point method” to calculate long-term average annual shoreline change rates since its first study in 1979. While the method has remained consistent, techniques used to map shorelines and calculate shoreline change rates have continually evolved with data accessibility and advances in mapping technology. The CMP will evaluate alternate methodologies for calculating erosion rates; specifically the CMP will use AMBUR (Analyzing Moving Boundaries Using R) and ESRI’s ArcGIS to evaluate using linear regression as an alternative to the end-point method for calculating oceanfront erosion rates.

Management Priority 3: Support improved community resiliency to coastal hazards

Description: The CMP sees a need to develop a comprehensive and centralized approach to encouraging and supporting coastal communities in becoming more resilient to present and future coastal hazards. The CMP has increasingly been combining its regulatory program with non-regulatory strategies for encouraging more sustainable and resilient practices. The CMP will work with the NC National Estuarine Research Reserve/NC Coastal Reserve staff, NC Sea Grant, local governments, and other partners to create a community resilience guide that will help local communities to improve their hazards resiliency.

2. Identify and briefly explain priority needs and information gaps the CMP has for addressing the management priorities identified above. The needs and gaps identified here should not be limited to those items that will be addressed through a Section 309 strategy but should include any items that will be part of a strategy.

Priority Needs	Need? (Y or N)	Brief Explanation of Need/Gap
Research	Y	Risk & long-term effects of sea-level rise. Identification of recommended erosion control methods by location.
Mapping/GIS/modeling	Y	Comparison of methodologies for calculating shoreline erosion rates.
Data and information management	Y	Interlinked, user-friendly portal for GIS and permit data.
Training/Capacity building	Y	Resiliency training/capacity building for state & local government, and navigating state & federal mandates and regulations.

Decision-support tools	Y	Tools to: improve decision-making for development type and location in support of enhanced resilience; determine community vulnerability and risk exposure; and perform cost-benefit analyses.
Communication and outreach	Y	Resiliency outreach and education for coastal residents and marine contractors and engineers.
Other (Specify)		

Enhancement Area Strategy Development:

1. Will the CMP develop one or more strategies for this enhancement area?

Yes Y
 No

2. Briefly explain why a strategy will or will not be developed for this enhancement area.

The CMP has been making steady progress on coastal hazards program improvements the last several years and has strong momentum going forward. Despite this progress, more development plus shoreline erosion and sea-level rise continues to put more people and property at risk, and underscores the need to improve our understanding of the hazards and our vulnerability, and strengthen our resiliency.

IV. PROGRAM ENHANCEMENT STRATEGY (FY 2016-2020)

Introduction. This strategy represents the North Carolina CMP's proposed efforts for enhancing resilience to coastal hazards along three major themes: (1) oceanfront shorelines, (2) inlet shorelines, and (3) improving coastal community resilience. Three program changes and a number of contributing tasks are proposed to achieve this strategy. Through this strategy, DCM will develop the information and tools necessary to achieve or lead towards meaningful improvements to the coastal program.

Strategy Title: COASTAL HAZARDS

Program Change 1: *Delineation of Areas of Inlet Influence.*

I. Issue Area

The proposed strategy or implementation activities will support the following priority (high or medium) enhancement area(s) (check all that apply):

- | | |
|--|---|
| <input type="checkbox"/> Aquaculture | <input type="checkbox"/> Cumulative and Secondary Impacts |
| <input type="checkbox"/> Energy & Government Facility Siting | <input type="checkbox"/> Wetlands |
| <input checked="" type="checkbox"/> Coastal Hazards | <input type="checkbox"/> Marine Debris |
| <input type="checkbox"/> Ocean/Great Lakes Resources | <input type="checkbox"/> Public Access |
| <input type="checkbox"/> Special Area Management Planning | |

II. Program Change Description

A. The proposed strategy will result in, or implement, the following type(s) of program changes (*check all that apply*):

- A change to coastal zone boundaries;
- New or revised authorities, including statutes, regulations, enforceable policies, administrative decisions, executive orders, and memoranda of agreement/understanding;
- New or revised local coastal programs and implementing ordinances;
- New or revised coastal land acquisition, management, and restoration programs;
- New or revised Special Area Management Plans (SAMP) or plans for Areas of Particular Concern (APC) including enforceable policies and other necessary implementation mechanisms or criteria and procedures for designating and managing APCs; and,
- New or revised guidelines, procedures and policy documents which are formally adopted by a state or territory and provide specific interpretations of enforceable CZM program policies to applicants, local government and other agencies that will result in meaningful improvements in coastal resource management.

B. Description:

During this Strategy period DCM will work with the CRC to adopt new Inlet Hazard Area (IHA) maps by rule, including potential revisions to the development standards within the IHAs.

Inlet Hazard Areas of Environmental Concern (AECs) are coastal areas that are especially vulnerable to migration, erosion, flooding, and other adverse effects of sand, wind, and water because of their proximity to dynamic tidal inlets. Each of North Carolina's inlets is unique, with distinct geomorphological differences and history of behavior in the various coastal compartments of the state. North Carolina's existing IHA boundaries were adopted by the Coastal Resources Commission (CRC) in 1979 based on a study that used spatial gridding and statistical methods to compare and project inlet shoreline changes across multiple aerial photographs. The results of the 1978 study projected the

landward-most shoreline position (99% confidence interval) that would likely occur between 1978 and 1988. Therefore, 1988 represented the point in time where the statistical significance of the inlet shoreline trend predictions decreased. In 1998, the CRC's Science Panel recognized a need to update existing IHA boundaries and change the methodology for defining IHAs. The Panel recommended that the delineation of IHAs be revised after a review of site-specific studies of each inlet by a group of experts. Revision of the hazard zone delineations should consider such factors as previous inlet location, structurally weak areas along migration pathways, unusually low and narrow sections of barrier islands prone to breaching, external influences such as jetties and channelization, and increased erosion extending along adjacent shorelines. Additionally, the Division of Coastal Management (DCM) has never calculated erosion rates at inlets for purposes of supporting development standards. Instead, oceanfront erosion rates adjacent to the outside boundary of the IHAs are applied throughout the entire IHA. This has historically been due to a lack of data and techniques to accurately calculate erosion rates along curved inlet shorelines.

To facilitate the initial work to revise the IHA boundaries, the DCM collaborated extensively with the CRC's Science Panel from 2007 to 2010 in developing methodologies for updating the IHA boundaries. Lockwood Folly inlet was chosen as a test case by the Science Panel in order to establish an accurate method for hazard delineation, and included two major variables: 1) the spatial and temporal variability of the shoreline positions adjacent to the inlet, and 2) the application of simple statistical methods based on shoreline variability to determine the extent of oceanfront shorelines that were dominated more by inlet processes than by oceanfront processes. Usage of the inlet (e.g. recreational vs. commercial, or deep vs. shallow draft) was not a consideration when delineating the areas under inlet-dominated influence. However, usage or other such characteristics may become an additional element to consider should new inlet management strategies be required based on the primary use of an inlet, and its economic value to local communities and the State.

In 2010, the Science Panel proposed revisions to the Inlet Hazard Area boundaries for the state's 12 developed inlets based on new shoreline data and GIS capabilities to more accurately delineate shoreline areas that are directly influenced by inlets. These draft updated Inlet Hazard Area boundaries were not adopted by the Commission, but were deferred until the state's long-term annual erosion rates could be updated by DCM. The updated erosion rates have since been calculated and were adopted in early 2013.

Following the release of the 2010 report, coastal communities expressed their concern with the potential increased size of the IHA boundaries based on the assumption that existing IHA regulatory standards (square footage limitations, density, etc.) would be applied to larger sections of the coast, and be labeled as "*hazard areas*." Some believed that the size of the proposed IHA over-exaggerated the "*hazard*," and thought a more accurate term should be "Areas of Inlet Influence," since not all portions of the land inside each boundary are equally threatened by immediate erosion potential. Given concerns over the size of the proposed IHAs and use of the term "*hazard*" to describe them, the Panel also developed a "30-year risk line" within each developed inlet area to show the areas that were considered at risk over a 30-year timeframe due to inlet proximity and historic inlet location. Panel

members believed that this could serve as one option to better reflect “high-hazard” within their proposed IHA boundaries. Because the IHA discussion was deferred, the 30-Year Risk line concept was never fully considered by the CRC.

In 2012, Session Law 2012-202 (HB819) was passed and included a provision requiring the CRC to study the feasibility of eliminating the state’s Inlet Hazard Area of Environmental Concern. Section 5 of the Act specifically states:

“The Coastal Resources Commission shall study the feasibility of eliminating the Inlet Hazard Area of Environmental Concern and incorporating appropriate development standards adjacent to the State's developed inlets into the Ocean Erodible Area of Environmental Concern. If the Commission deems action is necessary to preserve, protect, and balance the economic and natural resources adjacent to inlets, the Commission shall consider the elimination of the inlet hazard boxes; the development of shoreline management strategies that take into account short- and long-term inlet shoreline oscillation and variation, including erosion rates and setback factors; the development of standards that account for the lateral movement of inlets and their impact on adjacent development and habitat; and consideration of how new and existing development standards, as well as existing and proposed development, are impacted by historical and ongoing beach and inlet management techniques, including dredging, beach fill, and engineered structures such as groins and jetties. As part of this study, the Commission shall collaborate with local governments and landowners affected by the Commission's Inlet Hazard Areas to identify regulatory concerns and develop strategies for creating a more efficient regulatory framework. The Commission shall report its findings, including any proposed actions the Commission deems appropriate, to the Secretary of Environment and Natural Resources, the Governor, the President Pro Tempore of the Senate, the Speaker of the House of Representatives, and the Environmental Review Commission on or before January 31, 2015.”

The CRC has the authority to designate and eliminate state jurisdictional areas defined as ‘Areas of Environmental Concern’ (AECs) in accordance with the NC Coastal Area Management Act (CAMA; NCGS 113A-113 et seq). Along North Carolina’s beachfront, the CRC has designed four types of AECs for permitting purposes, all of which make up a category referred to as the “Ocean Hazard AECs”: Ocean Erodible Areas, Inlet Hazard Areas, High Hazard Flood Areas, and Unvegetated Beach Areas.

In accordance with Session Law 2012-202 (HB819), the CRC tasked its Science Panel to address specific questions related to the study:

1. How are hazards different in inlet areas compared to other beach areas?
2. What is the best method to delineate the areas at greatest risk in inlet areas?
3. How should dredging, beach fill projects, and groins or jetties be accounted for in the delineation of risk areas near inlets?
4. Inlet Erosion Rate Methodology
5. Feasibility of Eliminating Inlet Hazard Areas

The Panel was asked to focus discussions on the delineation of risk areas adjacent to developed inlets and whether there is a viable alternative to the inlet hazard "boxes." At the December 17, 2014 CRC meeting, the CRC voted in favor of supporting the Science Panel's recommendation to delineate "Areas of Inlet Influence" based on their 2010 proposed Inlet Hazard Area Study; to develop an inlet erosion rate methodology; and to zone Areas of Inlet Influence based on shorter-term hazards (erosion).

III. Need(s) and Gap(s) Addressed

The overall goal of this program change is to improve continued management of North Carolina's active inlet areas. This program change addresses identified needs and gaps in the areas of GIS mapping and modeling, data & information management, and decision-support tools. The CMP will complete a number of tasks in support of this program change:

- Define Areas of Inlet Influence adjacent to active inlets which have been historically influenced, or potentially could be influenced by inlet related processes.
- Develop high-hazard zone(s) within each Area of Inlet Influence that directly reflect the short-term hazard (erosion).
- Develop a methodology for calculating inlet erosion rates that can be used for construction setback determinations.
- Calculate setback factors to be used to site development construction lines.

IV. Benefit(s) to Coastal Management

North Carolina's oceanfront beaches and inlets are a vital part of the heritage, economy, environment, and culture of the people of the state. However, without effective planning and management, the future of the state's coastal communities could be adversely affected by storms, migrating inlets, eroding inlet shorelines, or changing channel orientation.

Potential benefits for inlet management:

- Delineation and adoption of new IHAs or Areas of Inlet Influence will replace the outdated IHAs, and will update the CRC's jurisdictional boundaries of regulatory oversight.
- Delineation of barrier island areas that have been, or could be influenced by inlet-related processes will serve as a tool to educate and generate awareness of the historic and potential geomorphic changes at inlets.
- Within areas designated as "Areas of Inlet Influence" a high-hazard zone will be established in order to develop management strategies in support of policies that serve to protect life and property based on hazards and usage.

- Encourage more resilient inlet-beachfront development standards and construction practices based on inlet erosion rates.

V. Likelihood of Success

Much of the initial work to delineate Areas of Inlet Influence was completed during the Science Panel’s 2010 Inlet Hazard Area (IHA) Update Study. These boundaries were delineated based on multiple factors and represented a composite reflecting where inlet processes have had historical influences, or are likely to influence geomorphic changes in the short-term. While the end result of this effort was inlet boundaries where not all areas are subject to the same risks, or degree of risk, the CRC did not adopt them as the new IHA boundaries.

In 2012, Session Law 2012-202 (HB819) was passed requiring the CRC to study the feasibility of eliminating the state’s Inlet Hazard Area of Environmental Concern, and incorporating appropriate development standards adjacent to the State’s developed inlets into the Ocean Erodible Area of Environmental Concern. If the Commission deems action is necessary to preserve, protect, and balance the economic and natural resources adjacent to inlets, the Commission shall consider the elimination of the inlet hazard boxes; the development of shoreline management strategies that take into account short- and long-term inlet shoreline oscillation and variation, including erosion rates and setback factors. At the December 17, 2014 CRC meeting, the Commission voted to in favor of supporting the Science Panel’s recommendation to delineate “Areas of Inlet Influence” based on their 2010 proposed Inlet Hazard Area Study; develop inlet erosion rate methodology; and zone Areas of Inlet Influence based on shorter term hazards (erosion). It was believed that the 2010 Proposed IHA boundaries could better serve as inlet management areas based on existing and historic inlet dynamics, therefore the likelihood of success is very high.

VI. Strategy Work Plan

Total Years: 5

Total Budget: \$660,750

Final Outcome(s) and Products: Delineation of Areas of Inlet Influence to replace the State’s current, but in some cases outdated, Inlet Hazard Areas; define high-hazard areas within each Area of Inlet Influence and develop new and/or revise current CRC policies to address inlet management which could include construction setbacks based on inlet erosion rates; and develop methodology for calculating inlet erosion rates.

Year: 1 (July 2015 – June 2016)

Description of activities:

- Digitize new inlet shoreline(s) using imagery collected between 2009 and/or most recent.
- Develop inlet erosion rate methodology, and calculate shoreline change rates to compute development setbacks.

Outcome(s):

- Updated inlet shoreline database
- DCM data download webpage updated
- Inlet erosion rate methodology defined
- Inlet shoreline change rates calculated

Budget: \$156,150

Year: 2 (July 2016 - June 2017)

Description of activities:

- Calculate Slope of relative shoreline change rate (defining average rate of change) and Standard Deviation of shoreline position (quantifying the extent of shoreline variation) to define the point along the oceanfront shoreline where inlet related processes no longer dominate shoreline movement.
- Delineate landward extent (or zone) within each Area of Inlet Influence that corresponds to high-hazard threat (erosion) considering the uniqueness of each inlet and the affects that inlet processes have on adjacent barrier islands.
- Adjust the oceanfront shoreline extent of the Area of Inlet Influence (formerly the 2010 Science Panel's Proposed IHA) as new data (2009 to present) indicates.
- Re-evaluate landward boundaries of the Science Panel's 2010 Proposed IHA to ensure that they are appropriately delineated, and could potentially serve as geographic regions subject to a more comprehensive inlet management plan.
- Explore most effective strategies to communicate information to stakeholders.

Outcome(s):

- Define Areas of Inlet Influence.
- Define high-risk area(s) within each Area of Inlet Influence.
- Report to CRC documenting results and present maps illustrating results (Areas of Inlet Influence, high-risk areas, inlet erosion rates, inlet construction setback factors).

Budget: \$116,150

Year: 3 (July 2017 – June 2018)

Description of activities:

- Continue open dialog with the CRC regarding spatial data analyses and maps.
- Begin discussions with the CRC on potential amendments to their rules governing construction setbacks at inlets to include an inlet specific management approach.
- Conduct stakeholder outreach meetings with beach communities to gauge their understanding of the Areas of Inlet Influence, and to solicit additional inlet management strategies and priorities.

Outcome(s):

- Report to CRC documenting results and present maps as needed.
- Presentation of project to interest groups (NC Beach, Inlet and Waterway Association, Brunswick Beaches Consortium, New Hanover County Port, Waterways and Beach Commission, etc).
- Document additional local government goals for incorporation into programmatic guidelines.
- Report to CRC results of stakeholder meetings.
- Presentation of results to interest groups (NC Beach, Inlet and Waterway Association,

Brunswick Beaches Consortium, New Hanover County Port, Waterways and Beach Commission, etc), and solicitation of additional public input.

Budget: \$116,150

Year: 4 (July 2018 – June 2019)

Description of activities:

- Summarize comments from all stakeholder meetings and incorporate into discussion for developing inlet management strategies and policies.
- Begin drafting inlet shoreline erosion policies and/or new rule language specific to inlet management.

Outcome(s):

- Report to CRC summarizing Year 3 activities.
- Draft amendments to CRC Inlet Hazard Area rules and any new inlet management strategies and policies.

Budget: \$136,150

Year: 5 (July 2019 – June 2020)

Description of activities:

- Finalize Area of Inlet Influence Maps.
- Finalize inlet erosion rate and setback maps similar those created for oceanfront erosion rate update studies.
- Present draft amendments to CRC Inlet Hazard Area rules and any new inlet management strategies and policies.

Outcome(s):

- Update DCM data download webpage
- CRC adoption of amendments Inlet Hazard Area rules and any new inlet management policies specific to inlet management.
- Make maps and data available for download via the Division's website

Budget: \$136,150

VII. Fiscal and Technical Needs

A. Fiscal Needs: CZM Section 309 funds will be sufficient to carry out the proposed program changes. Funds will cover staff salary, travel, meetings, and maintenance fees for software and hardware.

B. Technical Needs: The state does possess the technical knowledge, skills, and/or equipment to carry out the proposed program changes related to the development of Areas of Inlet Influence.

VIII. Projects of Special Merit (Optional)

To be determined.

Program Change 2: Evaluate Alternate Methodologies and Improve Calculation of Oceanfront Shoreline Change Rates.

I. Issue Area

The proposed strategy or implementation activities will support the following priority (high or medium) enhancement area(s) (*check all that apply*):

- | | |
|--|---|
| <input type="checkbox"/> Aquaculture | <input type="checkbox"/> Cumulative and Secondary Impacts |
| <input type="checkbox"/> Energy & Government Facility Siting | <input type="checkbox"/> Wetlands |
| <input checked="" type="checkbox"/> Coastal Hazards | <input type="checkbox"/> Marine Debris |
| <input type="checkbox"/> Ocean/Great Lakes Resources | <input type="checkbox"/> Public Access |
| <input type="checkbox"/> Special Area Management Planning | |

II. Program Change Description

A. The proposed strategy will result in, or implement, the following type(s) of program changes (*check all that apply*):

- A change to coastal zone boundaries;
- New or revised authorities, including statutes, regulations, enforceable policies, administrative decisions, executive orders, and memoranda of agreement/understanding;
- New or revised local coastal programs and implementing ordinances;
- New or revised coastal land acquisition, management, and restoration programs;
- New or revised Special Area Management Plans (SAMP) or plans for Areas of Particular Concern (APC) including enforceable policies and other necessary implementation mechanisms or criteria and procedures for designating and managing APCs; and,
- New or revised guidelines, procedures and policy documents which are formally adopted by a state or territory and provide specific interpretations of enforceable CZM program policies to applicants, local government and other agencies that will result in meaningful improvements in coastal resource management.

B. Description:

The Division of Coastal Management will review the best available methodologies for calculating ocean shoreline change rates, and will use the most appropriate methodology to update the state's long-term annual oceanfront shoreline change rates. The updated rates will be incorporated into the CRC's rules by reference to the final report.

DCM has used the "end-point method" to calculate long-term average annual shoreline change rates since its first study in 1979. While the method has remained consistent, techniques used to map shorelines and calculate shoreline change rates have continually evolved with data accessibility and advances in mapping technology. Rates of change are measured in units of feet per year by dividing the distance between two shorelines on evenly spaced shore-perpendicular transects, by the time interval between them. This method was initially chosen because it was simple, inexpensive, recommended by the National Academy of Sciences, and because there were no other techniques at that time which did not have serious computational flaws. The NCCMP uses oceanfront shoreline change rates to site construction setback lines and calculate the landward boundary of the Ocean Erodible Area of Environmental Concern (AEC).

Measuring short-term change rates can be difficult given the constant influences that wind and tide have on a shoreline's position. Without attention given to the variability a shoreline's position at any

given hour or day, the potential exists for introducing a large degree of error. For this reason, a long-term method is used on the oceanfront to reduce measurement error by averaging it over the total time interval of the study. The longer the time interval between the early dates and most recent dates, the less error there is in the erosion rate. A fifty-year time interval was initially chosen as optimum because it is long enough to provide an acceptable level of data accuracy (+/-1 foot), and short enough to reflect significant changes both regional and local. To further reduce error, raw change rates are smoothed to reduce the effects of localized anomalies such as cusps. For oceanfront shorelines, this process uses a "17-point running average;" meaning that each transect's smoothed rate is averaged with eight transects on either side. For management purposes, smoothed rates are then "blocked" by grouping contiguous transects of similar values.

Recognizing a need for further improvements, the CRC's Science Panel recommended in 1999 that the DCM should invest in acquiring more shoreline data and evaluate alternative, or complementary, methods to analyze both short and long-term erosion. As a result of this recommendation, and with advances in GIS technology, the Division started an ongoing effort in 2002 to build a more robust oceanfront shoreline database.

In 2010, the DCM compared two technologies AMBUR (Analyzing Moving Boundaries Using R) and USGS's DSAS (Digital Shoreline Analysis System) in preliminary inlet erosion rate studies. Given the same shorelines and transects, both DSAS and AMBUR will generate the same basic statistical output. Like DSAS, AMBUR uses a "baseline and transect" method as the fundamental technique for quantifying distances and rates of shoreline movement to detect classification changes across time. This means that transects are cast from a baseline, or reference line, that generally follow the trend of all shorelines. Baseline orientation is important because it serves as the basis for the analysis by casting transects within defined parameters to best capture accurate shoreline movement. Unlike DSAS, AMBUR uses two baselines, an inner (landward of shorelines or onshore) and an outer (seaward of shorelines or offshore) from which to cast and orient transects based on user preferences, and to remove extraneous arcuate features which can cause transects to be cast in unfavorable orientations.

The Division will use AMBUR and ESRI's ArcGIS to evaluate using linear regression as an alternative to the end-point method for calculating oceanfront erosion rates. Some advantages of using linear regression over end-point are that (1) all data points are used in the rate calculation, thereby reducing the influence of spurious data points; (2) linear regression is an easily understood statistical analysis; and (3) summary and related statistical techniques are available to test and measure the quality of the straight-line fit, and to estimate the variance of the data.

III. Need(s) and Gap(s) Addressed

The overall goal of this program change is to improve continued management of North Carolina's oceanfront by evaluating an alternative method for calculating shoreline change rates, and to use the best available method to update the State's long-term average shoreline change rates. This program change addresses needs and gaps related to GIS mapping and modeling, decision-support tools, and data & information management. Tasks that will be performed in pursuance of this program change include:

- Evaluate linear regression as an alternative methodology to end-point for calculating oceanfront erosion rates.

- Calculate new shoreline change rates and setback factors to be used to site oceanfront development construction lines.
- Update Erosion Rate rules (15A NCAC 7H .0304(1)(a)). This will result in a change in the CRC’s jurisdictional boundaries for development permitting.

IV. Benefit(s) to Coastal Management

The primary reasons for calculating long-term erosion rates are to establish regulatory construction setbacks for oceanfront construction that account for the erosion hazard, and to provide information to property owners about the potential risk associated with shoreline change. With new data, alternative statistical methodologies, and advances in mapping technology, comes a better understanding of hazards along the oceanfront, more effective science-based policy, and more resilient development.

Additionally, by updating the oceanfront erosion rates every five years, North Carolina will remain compliant with FEMA (Federal Emergency Management Administration) guidelines for the Community Rating System (CRS). Updating rates will ensure that property owners in coastal communities that participate in the National Flood Insurance Program are given fifty CRS points to maintain insurance rates at their current level. The loss of these points may increase insurance rates by up to five percent for some policyholders.

V. Likelihood of Success

The CRC has traditionally updated oceanfront erosion rates approximately every five years since 1980, and the last update was adopted in February 2013. Erosion rates are used to establish construction setbacks and delineate the Ocean Erodible Area of Environmental Concern, the area in which there is a substantial possibility of excessive shoreline erosion. Calculation of erosion rates is in the public interest because it helps to communicate some of the risk associated with erosion, and it allows communities to retain the applicable CRS credits that contribute to lower flood insurance premiums.

VI. Strategy Work Plan

Total Years: 5

Total Budget: \$300,000

Final Outcome(s) and Products: The CMP will update the state’s long-term annual oceanfront shoreline change rates and incorporate them into the CRC’s rules.

Year: 1 (July 2016 – June 2017)

Description of activities:

- Evaluate current shoreline database to determine if all are suitable for use in a linear regression analysis. Considerations such as shoreline date (summer vs. winter and temporal span), historic storm data (avoid post-storm shorelines), data source and completeness, will be used collectively to define “suitable.”
- Digitize new shorelines (wet/dry) using available post-2009 imagery.
- Document the shoreline evaluation process and update metadata as necessary

Outcome(s):

- Updated oceanfront and inlet shoreline spatial database

- Updated shoreline metadata
- Shorelines identified for use in linear regression analysis
- Update DCM GIS data download page

Budget: \$60,000

Year: 2 (July 2017 – June 2018)

Description of activities:

- Digitize new shorelines (wet/dry) using post-2009 imagery as needed or when available
- Update metadata associated with creation of any new spatial data as needed.
- Meet with the CRC's Science Panel to discuss transect spacing to determine if current spacing (50-meters) is still appropriate.
- Digitize new baselines should new transects need to be cast.
- Select a minimum of three locations in different geographic regions with varying erosion rates (low, medium, high) that will serve as case studies to evaluate linear regression compared to end-point shoreline change rates methodologies. Since the Division believes that AMBUR (Analyzing Moving Boundaries Using R) is a better tool for analyzing shoreline change on curved shorelines (inlets and estuarine), the Division will also use it for analyzing oceanfront shorelines.

Outcome(s):

- Updated oceanfront and inlet shoreline database
- Updated shoreline metadata
- Defined oceanfront transects (continue using existing, or cast new transects)
- Document method and findings associated with case study
- Present case study results to Science Panel and CRC
- CRC adopt linear regression as an alternative methodology to end-point for calculating oceanfront shoreline change rates.

Budget: \$60,000

Year: 3 (July 2018-June 2019)

Description of activities:

- Digitize new shorelines (wet/dry) using post-2009 imagery as needed or when available.
- Update metadata associated with creation of any new spatial data as needed.
- Calculate oceanfront shoreline change rates for all NC barrier islands
- Calculate oceanfront construction Setback Factors using new erosion rates.
- Document methodology and results (draft report)
- Document fiscal analysis associated with update of CRC Rule 15A NCAC 07H .0304

Outcome(s):

- Updated oceanfront and inlet shoreline database
- Updated shoreline metadata
- DCM data download page updated
- DCM interactive mapping website updated

- Draft oceanfront erosion rates calculated for all NC barrier islands presented to, and adopted by CRC
- Draft oceanfront erosion Setback Factors presented to, and adopted by CRC.

Budget: \$60,000

Year(s): 4-5 (July 2019 – June 2020)

Description of activities:

- Present updated oceanfront erosion rate maps, construction Setback Factors, report, and fiscal analysis in each of NC’s eight oceanfront counties (Brunswick, New Hanover, Pender, Onslow, Carteret, Hyde, Dare, and Currituck).
- Compile comments from all public hearings.
- Begin rulemaking, including fiscal analysis, to incorporate updated shoreline change rates into CRC’s rules by reference.

Outcome(s):

- Present public comments to CRC.
- CRC adopt new oceanfront shoreline erosion rates and construction Setback Factors.

Budget: \$120,000

VII. Fiscal and Technical Needs

A. Fiscal Needs: Federal Section 309 funds provided to support this program change will be sufficient for the efforts and projects proposed. Other DCM staff, as well as those from the NCNERR, will also help to accomplish this program change. No additional fiscal needs outside 309 funds are foreseen at this time.

B. Technical Needs: DCM possesses the technical knowledge, skills, and equipment to carry out the proposed program change. No technical needs outside usual partners and stakeholders are foreseen at this time.

VIII. Projects of Special Merit (Optional)

To be determined.

Program Change 3: *Develop a North Carolina Coastal Community Resilience Guide.*

I. Issue Area

The proposed strategy or implementation activities will support the following priority (high or medium) enhancement area(s) (*check all that apply*):

- | | |
|--|---|
| <input type="checkbox"/> Aquaculture | <input type="checkbox"/> Cumulative and Secondary Impacts |
| <input type="checkbox"/> Energy & Government Facility Siting | <input type="checkbox"/> Wetlands |
| <input checked="" type="checkbox"/> Coastal Hazards | <input type="checkbox"/> Marine Debris |
| <input type="checkbox"/> Ocean/Great Lakes Resources | <input type="checkbox"/> Public Access |
| <input type="checkbox"/> Special Area Management Planning | |

II. Program Change Description

A. The proposed strategy will result in, or implement, the following type(s) of program changes (*check all that apply*):

- A change to coastal zone boundaries;
- New or revised authorities, including statutes, regulations, enforceable policies, administrative decisions, executive orders, and memoranda of agreement/understanding;
- New or revised local coastal programs and implementing ordinances;
- New or revised coastal land acquisition, management, and restoration programs;
- New or revised Special Area Management Plans (SAMP) or plans for Areas of Particular Concern (APC) including enforceable policies and other necessary implementation mechanisms or criteria and procedures for designating and managing APCs; and,
- New or revised guidelines, procedures and policy documents which are formally adopted by a state or territory and provide specific interpretations of enforceable CZM program policies to applicants, local government and other agencies that will result in meaningful improvements in coastal resource management.

B. Description:

The CMP will solicit two volunteer communities for pilot community resilience projects, and use their experiences as case studies within a Coastal Community Resilience guide. The pilot projects will likely focus on risk assessment and planning, and could include possible amendments to their hazard mitigation plans, disaster recovery plans, comprehensive plans, or local ordinances. The CMP will contract will appropriate providers to implement the pilot projects, which will include demonstration projects if funding allows.

Like many states, North Carolina has a wealth of data, information, tools and resources at the state and local levels that can help coastal communities plan for and implement measures that will increase their resilience to coastal hazards. In addition, several federal agencies have tools and resources that can be very helpful at the state and local levels. Local governments must constantly navigate a changing number of mandates for hazard mitigation and disaster recovery planning, and may not have the capacity to stay abreast of the range of tools and resources that are available to assist them. Along with planning mandates, local governments must keep up with state and federal standards and regulations that may need to be incorporated into local ordinances and permitting programs.

A number of large, costly storm events over the past decade have again reminded coastal communities of the need to become more resilient to episodic events, and continually-improving information about the nature and magnitude of chronic coastal hazards highlight the necessity of building in long-term resilience. The state has been working diligently on creating programmatic approaches to building resilience along oceanfront and inlet shorelines, and along estuarine shorelines as well. The CMP has been finding ways to improve permitting efficiency, identify sand resources, increase the amount of beach-quality dredged material that is used for beach nourishment, and increase the use of living shorelines for estuarine erosion control. These efforts have a direct benefit on increasing community resiliency and the CMP will continue to refine them in order to provide the best possible tools to local governments.

The NCCMP is ideally positioned to assist local communities in discovering, accessing and understanding the tools and resources that are available to help them build short- and long-term resilience to coastal hazards into their operational and regulatory frameworks.

The NCCMP will create, with the assistance of federal, state, local, and private sector partners, a guide to building community resilience to short-term and long-term coastal hazards. The guide will also help communities to interpret the enforceable policies of the CMP that are designed to help build resilience. The guide will be targeted towards local governments, and will provide information on building resilience within their planning and operations functions. The guide will be published primarily online for ease of update, but limited hardcopies may also be printed.

The guide will draw from existing tools and resources, such as Sea Grant's Coastal Community Resilience Index and Hazard Mitigation Guidebook, FEMA's National Disaster Recovery Framework, and the Office for Coastal Management's numerous Digital Coast resources, and put them into a North Carolina context. This effort will also build upon lessons learned in the development of resilience guides in other states and regions, such as Florida's Community Resiliency Initiative and the Great Lakes Coastal Resilience Planning Guide.

The N.C. Coastal Reserve and National Estuarine Research Reserve, N.C. Sea Grant, and regional planning organizations will be key partners in outreach to communities while preparing the guide, working with pilot communities, and training local communities in using the guide after it is released.

III. Need(s) and Gap(s) Addressed

The CMP's Assessment identifies improved community resiliency as a management priority during this strategy period, and developing the guide will address several needs and gaps.

- Research on regional vulnerability and impacts of relative sea-level rise, as well as adaptation strategies such as living shorelines and are needed to help local communities plan and withstand this long-term hazard.
- Improved methods of calculating shoreline change rates will provide communities with more accurate information for assessing risk and planning mitigation activities
- Sound information management is a valuable asset for a topic prone to information overload. This program change, by design, will involve the end users in developing the guide, thereby investing them in ensuring its usefulness and usability.
- Decision-support tools are at the heart of this program change. Coastal communities are often managing hazard mitigation and disaster recovery as related but separate functions. Communities can benefit from the synergies available by uniting these functions into a comprehensive resiliency approach.
- Creating a resilience guide will be ineffective without a strategic plan for training and capacity building among local communities. NCNERR Coastal Training Program staff and Sea Grant Extension will be essential partners in training and capacity-building efforts.
- Coastal residents are increasingly hearing and using the term "resilience" and may have conceptual understanding of what the term means; however, whether most residents understand how to build resilience and how they can collectively contribute to it is unknown. Coastal residents often look to marine contractors and engineers for guidance on techniques for erosion control and other hazard responses. The CMP sees this dynamic as an opportunity to

reach out to contractors and engineers to familiarize them with techniques that promote resiliency of private property without sacrificing public trust resources.

IV. Benefit(s) to Coastal Management

Resilience is a characteristic that is desired in all coastal investments. The benefits of resilience accrue to individual property owners, communities, residents, taxpayers, community managers, coastal managers, and many others—as all have a stake in improving community resilience. Benefits are realized in the form of, for example, decreased loss of life and property, minimized displacement, shorter disruptions to normal routines, faster recovery times, and less human suffering. Resilient communities are better prepared for short-term and long-term hazards, fare better during events, and recover faster. The NCCMP can facilitate resilience improvements through providing technical assistance and training on assessing vulnerability, planning, project implementation, and interpretation of state and federal enforceable policies. The CMP is in the process of revising its land use planning guidelines, which contain a number of enforceable policies that are subject to being amended. The resilience guide can help local communities interpret and apply changes to those enforceable policies.

V. Likelihood of Success

Coastal resilience is a concept that should have wide appeal, even if opinions on hazards, vulnerability and prudent actions may differ. A consistent theme on the coast is that local communities should have multiple options at their disposal for protecting life and property. During the last strategy period the CMP observed many communities becoming increasingly aware of their vulnerability to various coastal hazards, and seeking help in finding ways to strengthen their resilience. The coastal resilience guide is responsive to that sentiment, but will be itself non-regulatory.

Many resources and tools for building resilience are already in existence, and new ones are being created all the time. As one example, the CMP has been working on decreasing the regulatory burden that property owners have encountered in constructing living shorelines and other alternatives to vertical erosion control structures, including outreach and training for property owners, real estate professionals, and marine contractors. The CMP will consider innovative approaches and draw from existing tools and put them into a state-local context for North Carolina, including guidance for complying with the CMP's enforceable policies. In addition, the CMP already has strong established relationships with many of the partners that would be invited to contribute to creating the guide.

CMP staff will coordinate the development of the guide, and has the internal capacity to perform the majority of the required tasks. Where internal and partner capacity is lacking the CMP will need to retain the services of external contractors.

Importantly, achieving this program change is within the CMP's existing authority, and no new authorization will be required.

VI. Strategy Work Plan

Total Years: 5

Total Budget: \$670,000

Final Outcome(s) and Products: A N.C. Coastal Community Resilience Guide will be produced and provided to coastal communities along with training for using the guide.

Year: 1 (July 2016 – June 2017)

Description of activities:

- Identify prospective members and form a steering committee
- Steering committee meet to develop a work plan
- Hold a series of scoping meetings with stakeholders to identify needs and gaps
- Develop a draft outline for the guide

Outcome(s):

- Steering committee formed
- Work plan developed
- Outline drafted

Budget: \$110,000

Year: 2 (July 2017 – June 2018)

Description of activities:

- Identify representative pilot communities for planning assistance and (contingent upon funding availability) potential demonstration projects
- Identify and contract with vendor to implement pilot projects
- Scope out activities with pilot communities and prepare contracts
- Work with steering committee and partners to draft the guide

Outcome(s):

- Pilot communities identified
- Pilot projects identified and administrative requirements complete
- Initial draft guide complete

Budget: \$150,000

Year: 3 (July 2018-June 2019)

Description of activities:

- Conduct pilot projects, including draft amendments to relevant local plans and/or ordinances
- Solicit feedback on the draft guide and make revisions

Outcome(s):

- Pilot projects complete and documented
- Draft revised

Budget: \$150,000

Year(s): 4-5 (July 2019 – June 2020)

Description of activities:

- Finalize the guide
- Contract with graphic design vendor to prepare and publish the guide in online and hardcopy versions
- Conduct a series of training workshops for local governments, marine contractors and engineers

Outcome(s):

- Published Coastal Community Resilience Guide
- Completed series of training/capacity building workshops on community resilience and using the guide

Budget: \$260,000

VII. Fiscal and Technical Needs

A. Fiscal Needs: Federal Section 309 funds provided to support the NCCMP will be sufficient to complete the projects and program changes as proposed. Other DCM staff, as well as those from the NCNERR, will also help to accomplish the program changes.

B. Technical Needs: With two exceptions plus the addition of a new Senior Environmental Specialist in 2015, DCM anticipates that we will possess the technical knowledge, skills, and equipment to carry out the proposed program changes. DCM will engage with an external contractor for design and publishing of the Coastal Communities Resource Guide, and with appropriate contractors to implement the pilot projects. No other technical needs outside usual partners and stakeholders are foreseen at this time.

VIII. Projects of Special Merit (Optional)

To be determined.

V. 5-YEAR BUDGET SUMMARY

Strategy Title	Year 1 Funding	Year 2 Funding	Year 3 Funding	Year 4 Funding	Year 5 Funding	Total Funding
Coastal Hazards	\$326,150	\$326,150	\$326,150	\$326,150	\$326,150	\$1,630,750
<i>CH Task 1 - IHA</i>	<i>\$156,150</i>	<i>\$116,150</i>	<i>\$116,150</i>	<i>\$136,150</i>	<i>\$136,150</i>	<i>\$660,750</i>
<i>CH Task 2 - OEA</i>	<i>\$60,000</i>	<i>\$60,000</i>	<i>\$60,000</i>	<i>\$60,000</i>	<i>\$60,000</i>	<i>\$300,000</i>
<i>CH Task 3 - CCRG</i>	<i>\$110,000</i>	<i>\$150,000</i>	<i>\$150,000</i>	<i>\$130,000</i>	<i>\$130,000</i>	<i>\$670,000</i>
Administration	\$96,850	\$96,850	\$96,850	\$96,850	\$96,850	\$484,250
TOTAL 309	\$423,000	\$423,000	\$423,000	\$423,000	\$423,000	\$2,115,000

OCRM funded NC's 309 strategy at \$423,000 total in FY2014. The CMP is taking the approach of projecting level funding over this Strategy period. Figures will be revised in the respective grant applications based upon actual appropriations.

VI. SUMMARY OF STAKEHOLDER AND PUBLIC COMMENT

The NCCMP conducted an online survey in December 2014 to invite stakeholder input on potential 2016-2020 enhancement areas. The survey asked which enhancement area(s) the stakeholders thought should be high priorities for program changes, and what types of program changes they would recommend. Completed surveys were received from individuals affiliated with the following groups:

- Attorney, private practice
- Brunswick County Association of REALTORS
- Cape Lookout National Seashore
- Carolina Designs Realty
- City of Wilmington
- Coastal Review Online
- Coldwell Banker Seaside Realty
- First Flight Insurance Group, Inc.
- LMG Inc.
- NC Assn. of REALTORS
- NC Chapter Sierra Club
- NC Coastal Federation
- NC Dept. Ag& Consumer Services
- NOAA
- Pasquotank County Planning Department
- Private citizen/unaffiliated
- Realtor
- Retired Clemson University Faculty
- Surfrider Foundation
- Town of Emerald Isle
- Town of Pine Knoll Shores
- Town of Surf City, NC
- Village of Bald Head Island
- Ward and Smith, PA

From highest to lowest, the list below shows the percentage of stakeholders who ranked the nine enhancement areas as high priority:

- | | |
|--|-----|
| 1. Public Access | 73% |
| 2. Wetlands | 70% |
| 3. Marine Debris | 60% |
| 4. Ocean Resources | 58% |
| 5. Government & Energy Facility Siting | 55% |
| 6. Hazards | 52% |
| 7. Aquaculture | 49% |
| 8. Cumulative & Secondary Impacts | 47% |
| 9. Special Area Management Plans | 46% |

For reasons explained in the Assessment, the CMP views Coastal Hazards as the only enhancement area with opportunities for meaningful program changes within the 2016-2020 strategy period. For enhancement areas that ranked higher among stakeholders than Coastal Hazards, there are factors such as authority, jurisdiction and influence that make meaningful program changes unlikely.