

# **South Carolina Coastal Zone Management Program**

## **Section 309 Assessment and Strategy 2021-2025**

Prepared by the South Carolina Department of Health and  
Environmental Control, Office of Ocean and Coastal  
Resource Management



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## Introduction

The South Carolina Department of Health and Environmental Control, Office of Ocean and Coastal Resource Management (DHEC OCRM) is responsible for implementing the approved South Carolina Coastal Zone Management Program (SC CZMP) through the authorities specified in the Coastal Tidelands and Wetlands Act (SC Code ann. §48-39-110 *et seq.*), the DHEC Coastal Division Regulations, and the enforceable policies of the South Carolina Coastal Program Document. DHEC OCRM has direct permitting authority for proposed activities within the critical areas of the coast, which are defined as coastal waters, tidelands, beach/dune systems and beaches (R. 30-1.D). DHEC OCRM also has broader management authority over activities within the eight-county Coastal Zone through consistency certification of both federal and state permits, federal licenses, Outer Continental Shelf activities, and requests for federal funding assistance.

In order to effectively implement the SC CZMP, DHEC OCRM develops strategies and associated annual workplans under Section 309 of the Coastal Zone Management Act that address priority issues within the coastal zone and result in positive changes to relevant program policies. The following is a summary of the current Section 309 strategy (2016-2020 cycle) with anticipated outcomes, as well as the assessment and strategy for the upcoming 2021-2025 cycle.

## Summary of Current Section 309 Efforts

### Living Shorelines

DHEC OCRM's current Section 309 wetlands strategy for living shorelines was developed to accomplish two main outcomes: 1) establish a regulatory definition for living shorelines and 2) develop specific regulatory project standards for the permitting of living shoreline projects in South Carolina. The current lack of a regulatory definition and specific project standards to guide the permitting and construction of living shorelines has resulted in longer permit review times, loose design requirements, and the potential for construction of ineffective projects. The final outcomes associated with this five-year strategy are expected to create a streamlined pathway for the permitting process and result in the construction of effective living shoreline installations along the South Carolina coast.

DHEC OCRM is currently in Year 4 of the living shorelines 309 strategy. In early fall 2019, the South Carolina Department of Natural Resources (SCDNR) submitted the results from the National Estuarine Research Reserve System (NERRS) Science Collaborative project, *Summary of Living Shoreline Research to Inform Regulatory Decision-Making in South Carolina*.<sup>1</sup>

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<sup>1</sup> [http://www.nerrssciencecollaborative.org/media/files/SCDNLivingShorelinesSummaryDocument\\_20190731.pdf](http://www.nerrssciencecollaborative.org/media/files/SCDNLivingShorelinesSummaryDocument_20190731.pdf)

DHEC OCRM's project standards for living shorelines will be based, in part, on the results of the NERRS study, as well as continued monitoring of living shoreline installations by SCDNR which will extend through 2020.

In summer 2019, DHEC OCRM contracted with AECOM to model the potential for oyster-based living shoreline installations to reduce flood depths associated with two types of simulated storms on adjacent properties. The simulated storms included a Category 1 hurricane and a low-surge event. Three study areas along the South Carolina coast were modeled with and without living shoreline installations for each storm type and results were compared. Although there were not significant differences in water depth between scenarios, the results did show wave attenuation, as well as a decrease in the duration of wave action for storm simulations with the living shoreline scenarios. There were fewer effects of the living shoreline further landward of the installation.

A Living Shorelines Working Group was also convened at the start of this strategy. The group includes members of federal, state, and local governments, as well as non-government organizations (NGOs). These stakeholders are involved in various aspects of living shorelines including regulatory and permitting, installation and research, and education and outreach. To date, the Working Group has met four times, and a fifth meeting is planned for spring 2020. Additional details and information on past meetings can be found on the Living Shorelines Working Group webpage on the DHEC website.<sup>2</sup> DHEC OCRM will continue to engage and request feedback from the Working Group, as well as the general public, as regulations and project standards are being developed. A subgroup of the Living Shorelines Working Group met in May 2019 to begin discussing outreach and education opportunities specific to living shorelines. This subgroup prioritized two projects to start investigating and/or developing including 1) a South Carolina-specific cost comparison table describing the costs associated with various types of living shoreline installations and 2) a statewide website to share living shoreline information (e.g. how to navigate the permitting process, who to contact for help, etc.). This group has also discussed longer-term education and outreach opportunities including living shorelines training for marine contractors.

In early 2020, DHEC OCRM plans to host an inter-agency coordination meeting with key agencies that may be involved in the living shorelines process from permitting through the installation phase. Specifically, DHEC OCRM has reached out to the U.S. Army Corps of Engineers, U.S. Coast Guard, U.S. Fish and Wildlife Service, NOAA National Marine Fisheries Service, SCDNR, DHEC Shellfish Program, and DHEC Bureau of Water. A small group representing local governments and NGOs will also be invited to participate in the discussion. The goal of this meeting is to determine where each of these agencies is

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<sup>2</sup> <https://www.scdhec.gov/environment/your-water-coast/ocean-coastal-management/living-shorelines-working-group>

involved in the process. Furthermore, early coordination will allow DHEC OCRM to anticipate any issues or concerns these agencies may have with the overall process.

In summer 2020, DHEC OCRM will begin drafting living shoreline regulations to present to the DHEC Board. These regulations are anticipated to go before the South Carolina General Assembly in January 2021.

## Community Rating System

The current Section 309 strategy for coastal hazards involves the Community Rating System (CRS). DHEC OCRM is leveraging its existing relationships with coastal municipal governments through its Local Comprehensive Beach Management Plan (LCBMP) planning process to integrate CRS-based principles into the guidance and procedures for updating LCBMPs. LCBMPs are a statutory and regulatory requirement for all beachfront municipalities to inventory natural and physical features and analyze shoreline dynamics, coastal hazards and disaster preparedness (S.C. Code §48-39-350), and serve as an opportunity to improve strategic planning to mitigate threats to public and private property.

As part of this strategy, DHEC OCRM established the Coastal South Carolina CRS Users Group to provide a forum for coastal communities to share lessons learned, identify best practices, and gain efficiencies in planning processes that result in hazard mitigation and realized cost savings. To date, the CRS Users Group has met three times, and a fourth meeting is planned for early spring 2020. Additional details and information on past meetings can be found on the South Carolina Coastal CRS Users Group webpage on the DHEC website.<sup>3</sup>

In 2018, DHEC OCRM contracted with The Nature Conservancy (TNC) to develop the Community Rating System Explorer App<sup>4</sup> for coastal communities in South Carolina. The app identifies 1) land that currently qualifies for open space preservation (OSP) credit under Activity 420 and 2) land that, with the appropriate protections, could qualify for OSP credit in the future. A user of the app is able to view these parcels on a map as well as get summary data including the community's current class, current NFIP discount, impact adjusted special flood hazard area in acres, and acres and points available in the Open Space Preservation (422a) activity. In coordination with DHEC OCRM, TNC presented the app to interested coastal communities through two webinars in 2019, and the app was successfully developed for 20 communities through this effort.

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<sup>3</sup> <https://www.scdhec.gov/environment/your-water-coast/ocean-coastal-management/coastal-south-carolina-community-ratings-crs>

<sup>4</sup> <https://coastalresilience.org/project/community-rating-system-explorer/>

# Section 309 Assessment and Strategy Development (2021-2025)

## Stakeholder Engagement

### External Survey

DHEC OCRM developed an electronic, web-based survey in the fall of 2019 to engage stakeholders and gather feedback on priority focus areas for the SC CZMP. The survey was distributed to 73 external stakeholders, and 29 responses were received (39.7% response rate). Respondents represented federal, state, and local/county government agencies; NGOs; the real estate community; and one community association. One respondent did not provide their name or affiliation. The greatest response rates were from local and county government officials (7 respondents) and NGO representatives (7 respondents), with roughly half of all responses coming from these two groups.

Stakeholders were presented with the nine enhancement areas and asked to choose the four areas they felt were the highest priority for the SC CZMP. They were also asked to rank these four high-priority areas from most important (Priority #1) to least important (Priority #4). Table 1 includes the survey ranking results for each of the nine enhancement areas. The *Respondents* column represents the number of stakeholders that ranked each enhancement area as a top-four priority. *Priority* columns (1-4) identify the number (and percentage) of *Respondents* that ranked the enhancement area at each priority level. Table 1 also includes a *Score*, a weighted average calculated as follows, where:

$x$  = response count for each priority ranking  
 $w$  = weight of ranked position\*  
 $y$  = total response count (29)

$$\frac{X_1W_1 + X_2W_2 + X_3W_3 + X_4W_4}{y}$$

\* Priority #1 was given a weight of 4  
Priority #2 was given a weight of 3  
Priority #3 was given a weight of 2  
Priority #4 was given a weight of 1

**Table 1:** Ranking results from external stakeholder survey indicating priority enhancement areas.

Enhancement Area	Respondents (out of 29)	Priority #1	Priority #2	Priority #3	Priority #4	Score
Wetlands	25	14 (56.0%)	7 (28.0%)	3 (12.0%)	1 (4.0%)	2.90
Coastal Hazards	20	7 (35.0%)	10 (50.0%)	3 (15.0%)	0 (0.0%)	2.21
Marine Debris	14	4 (28.6%)	5 (35.7%)	3 (21.4%)	2 (14.3%)	1.34
Ocean Resources	17	2 (11.8%)	0 (0.0%)	7 (41.2%)	8 (47.1%)	1.03
Public Access	15	1 (6.7%)	2 (13.3%)	4 (26.7%)	8 (53.3%)	0.90
SAMP	7	1 (14.3%)	1 (14.3%)	3 (42.9%)	2 (28.6%)	0.52
Cumulative & Secondary Impacts	8	0 (0.0%)	1 (12.5%)	4 (50.0%)	3 (37.5%)	0.48
Energy & Gov't Facility Siting	5	0 (0.0%)	2 (40.0%)	1 (20.0%)	2 (40.0%)	0.34
Aquaculture	5	0 (0.0%)	1 (20.0%)	1 (20.0%)	3 (60.0%)	0.28

Survey results were analyzed and show that stakeholders viewed Wetlands as the highest priority enhancement area, followed by Coastal Hazards, and Marine Debris. A detailed breakdown of the results is provided below.

A total of 25 respondents (86%) ranked Wetlands as one of their top-four priority enhancement areas, with 14 of these respondents (56%) identifying this area as their highest priority and seven respondents (28%) identifying it as their second highest priority. Twenty respondents (69%) ranked Coastal Hazards as one of their top-four priority enhancement areas, with seven of these respondents (35%) identifying this area as their highest priority and 10 respondents (50%) identifying it as their second highest priority. Fourteen respondents (48%) ranked Marine Debris as one of their top-four priority enhancement areas, with four of these respondents (28.6%) identifying this area as their highest priority and five (35.7%) identifying it as their second highest priority. More respondents ranked Ocean Resources (17 respondents) and Public Access (15 respondents) in their top-four priority areas when compared to respondents who ranked Marine Debris (14 respondents) in their top-four areas. However, of the respondents who included Ocean Resources and Public Access in their top-four areas, most ranked these areas as third or fourth in priority.

Stakeholders who ranked Wetlands as one of their top-four priority enhancement areas identified the greatest needs or opportunities for this area as being improved coastal management efforts, research/assessment/monitoring, and education/outreach. Specific comments highlighted the need to protect, preserve, enhance, and restore wetlands as a resiliency effort in light of a changing climate and associated flooding and sea level rise. Suggested actions included better management and regulatory protection of wetlands (e.g.

consideration of setbacks/buffers from wetland areas and development of a framework or standard for Marsh Management Plans), improved research (e.g. wetland response to sea level rise and migration potential, as well as wetland ability to function as a buffer against storm surge), and enhanced education and outreach efforts related to the ecosystem services provided by wetlands.

Stakeholders who ranked Coastal Hazards as one of their top-four priority enhancement areas identified the greatest needs or opportunities for this area as being research/assessment/monitoring, mapping/GIS/modeling, education/outreach, and improved coastal management efforts. Flooding was the most commonly mentioned coastal hazard. Specific comments identified the need for additional research, mapping, and modeling to identify vulnerable areas and populations and how they will be affected by coastal hazards (while building on and/or bolstering existing research and information). One specific suggestion was related to the need for additional tidal gauges along the coast that monitor water levels. Sharing information and assisting local governments with prioritizing management projects was an identified need. Public outreach and education, specifically resilience awareness (e.g. risk communication and strategies for mitigating risk), were indicated as a high priority - including reaching out to diverse and highly vulnerable communities. Suggestions also included increased partnerships and moving beyond identification and planning of strategies into actual implementation of resiliency projects. Improved management suggestions included reducing development in high-risk areas.

Stakeholders who ranked Marine Debris as one of their top-four priority enhancement areas identified the greatest needs or opportunities for this area as being research/assessment/monitoring, education/outreach, improved coastal management efforts, and mapping/GIS/modeling. Plastics and abandoned and derelict vessels were specific types of marine debris mentioned by stakeholders. A variety of marine debris needs were identified including the need to: better understand the impacts of marine debris, educate the public on the impacts of marine debris and viable options for vessel disposal, incentivize debris collection and decisions to use plastic alternatives, better coordinate with NGOs and state and local entities (including sharing resources, capacity, and information), and improve mapping of areas with high marine debris needs.

## **Internal Survey**

The same survey was distributed to DHEC OCRM staff to gauge input on high priority areas for the SC CZMP. Roughly 30% of staff responded to the survey. Results indicate that internal staff viewed Coastal Hazards as the highest priority enhancement area, followed by Cumulative and Secondary Impacts, and Marine Debris.

Specific to Coastal Hazards, staff identified the need to better manage data and the need to develop a proactive plan for shoreline data collection (frequency, schedule, technology, etc.). Education and outreach were described as priorities, specifically targeting state-level decision-makers and the public. Better planning for hazards was also an identified need.

The primary needs and opportunities identified under Cumulative and Secondary Impacts included examining the effects of hardened structures on beachfront and estuarine shorelines, as well as the effects associated with coastal docks and marinas. A better understanding of the impacts associated with regional development was also mentioned.

Abandoned and derelict vessels (ADV) were identified by staff as a major Marine Debris issue. Identified needs associated with ADV included streamlining the process for identifying and removing vessels before they become submerged and appropriation of funds via congress and/or establishing fees for removal efforts. Continued education and outreach targeting common pollutants (e.g. cigarette butts) was an identified priority, as well as better understanding pollutant pathways from source to coastal waters. Research, monitoring, and mapping to better understand the extent of derelict vessels and fishing gear were also identified as opportunities to better manage these issues. One specific comment suggested development of a guidance document to share with stakeholders indicating what parties are responsible for removing storm-related debris and what resources are available.

## **Public Participation**

A 30-day public comment period will be established in the spring of 2020 to give the general public an opportunity to provide feedback on DHEC OCRM's proposed Section 309 Assessment and Strategy for 2021 to 2025. A summary of public comments will be included in the final version of the assessment and strategy.

# Phase I Assessment

## Wetlands

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

### Resource Characterization:

1. The following tables characterize the extent, status, and trends of wetlands in the South Carolina coastal zone. This information was obtained from NOAA's Land Cover Atlas and represents available data through 2010.<sup>5</sup>

**Current state of wetlands in 2010:** 1,981,183 acres (3,096 square miles)

The overall trend shown in Table 2 is a net loss of wetlands (-19.66%) in coastal South Carolina between 1996 and 2010. The greatest cumulative loss was to freshwater wetlands (-23.25%). There was also a net loss in wetlands from 2006 to 2010 (-4.27%), with an almost equal cumulative loss to both freshwater (-5.18%) and saltwater wetlands (-5.22%). Table 3 identifies development as the primary land cover type that has replaced the area previously categorized as wetland during both time periods.

**Table 2:** Coastal wetlands status and trends

Change in Wetlands	from 1996-2010	from 2006-2010
Percent net change in total wetlands (% gained or lost)*	-19.66	-4.27
Percent net change in freshwater (palustrine wetlands) (% gained or lost)	-23.25	-5.18
Percent net change in saltwater (estuarine) wetlands (% gained or lost)	-3.72	-5.21

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<sup>5</sup> <https://coast.noaa.gov/digitalcoast/tools/lca.html>

**Table 3:** Coastal wetlands change

Land Cover Type	Area of Wetlands Transformed to Another Type of Land Cover between 1996-2010 (Sq. Miles)	Area of Wetlands Transformed to Another Type of Land Cover between 2006-2010 (Sq. Miles)
Development	33.8322	11.79
Agriculture	5.99	.33
Barren Land	8.11	5.33
Water	9.74	2.13

2. **Additional Information on Status and Trends:** South Carolina land cover data for 2016 was not available through the Land Cover Atlas at the time of this assessment. DHEC OCRM reached out to external partners to determine if newer land cover data was available in the coastal zone. The Nature Conservancy, as part of their North Coast Resilience Project, developed 2017/2018 land cover data in select areas in Horry and Georgetown Counties including the cities of Conway, Andrews, and Georgetown.<sup>6</sup> DHEC OCRM reviewed this data, however, due to the limited spatial extent and difference in land cover classifications, this data was not incorporated into the status and trends provided in the tables above.

**Management Characterization:**

1. Table 4 identifies if there have been any significant changes at the state-level that could impact the future protection, restoration, enhancement, or creation of coastal wetlands since the last assessment.

**Table 4:** Wetland management

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

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<sup>6</sup> <https://maps.coastalresilience.org/southcarolina/>

2. For any management categories with significant changes, briefly provide the information below.
  - 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.

DHEC OCRM's current Section 309 living shorelines strategy will result in a significant change in wetland management in coastal South Carolina. The effort will result in the development of a regulatory definition and project standards for living shorelines. A summary of the need for this effort, the anticipated outcomes, and the current status of the strategy is provided in the section [Summary of Current Section 309 Efforts](#) above.

**Enhancement Area Prioritization:**

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

<b>High</b>	<u>  X  </u>
<b>Medium</b>	_____
<b>Low</b>	_____

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

DHEC OCRM identified wetlands as a high-priority enhancement area during the previous Section 309 assessment and strategy development for 2016-2020. As a result, a strategy was developed around living shorelines. While this five-year strategy will officially end in 2020, wetlands (including living shorelines) will continue to be a high-priority for the SC CZMP. As described above in the [Stakeholder Engagement](#) section, external stakeholders ranked wetlands as the highest priority enhancement area. Stakeholders highlighted the need to protect, preserve, enhance, and restore wetlands as a resiliency effort in light of a changing climate and associated flooding and sea level rise.

## 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)

### Resource Characterization:

1. Table 5 characterizes the general level of risk to the South Carolina coastal zone associated with various hazards. These general risk levels were determined based on the data and information presented in the following sections.

**Table 5:** General level of hazard risk in the coastal zone

Type of Hazard	General Level of Risk (H, M, L)
Flooding (riverine, stormwater)	H
Coastal storms (including storm surge)	H
Geological hazards (e.g., tsunamis, earthquakes)	Earthquake Risk: H Tsunami Risk: L
Shoreline erosion	H
Sea level rise	H
Land subsidence	M
Saltwater intrusion	M / H

2. **Flooding:** Data on the number of people and critical infrastructure facilities located within the South Carolina coastal floodplain was gathered from NOAA's Coastal County Snapshots tool on Digital Coast.<sup>7</sup> This data is summarized in Table 6. In addition to nearly one-third of the South Carolina coastal zone population residing in the floodplain, high tide flooding (HTF) is being observed at an increasing rate along the South Carolina coast. According to NOAA, annual HTF frequencies are rising fastest along the Southeast coast.<sup>8</sup> In early 2014, DHEC OCRM launched the MyCoast South Carolina King Tides reporting tool and established a King Tide threshold of 6.6 feet

<sup>7</sup> <https://coast.noaa.gov/digitalcoast/tools/snapshots.html>

<sup>8</sup> [https://tidesandcurrents.noaa.gov/publications/Techrpt\\_090\\_2018\\_State\\_of\\_US\\_HighTideFlooding\\_with\\_a\\_2019\\_Outlook\\_Final.pdf](https://tidesandcurrents.noaa.gov/publications/Techrpt_090_2018_State_of_US_HighTideFlooding_with_a_2019_Outlook_Final.pdf)

above Mean Lower Low Water for the Charleston area. Annually between 2015 and 2019, high tides at the Charleston Harbor Tide Station (NOAA Station ID 8665530) reached or exceeded that threshold on average about 3.5 times more frequently than predicted. In 2019, there were 180 King Tides observed at this station, nearly five times more than the predicted 37 King Tides. To date, over 880 King Tide reports documenting HTF in coastal South Carolina have been submitted through MyCoast.<sup>9</sup>

**Table 6:** Population and critical infrastructure located in the coastal floodplain

<b>Number of people and critical infrastructure facilities in the SC coastal floodplain</b>	
Total Population in Coastal Counties	1,249,086
Population in Coastal Floodplain	383,736
Percentage of Population in Coastal Floodplain	31%
Number of Schools in Coastal Floodplain	53
Number of Police Stations in Coastal Floodplain	16
Number of Fire Stations in Coastal Floodplain	51
Medical Facilities in Coastal Floodplain	12
Total Number of Critical Facilities in Coastal Floodplain	132

- Coastal Storms:** Since the previous Section 309 assessment, the South Carolina coast has been impacted by a number of coastal storms (Figure 1).<sup>10</sup> Over a four-day period in October 2015, a stalled mid-latitude weather system resulted in historic rain and wide-spread flooding in South Carolina. This event coincided with the passing of Hurricane Joaquin off the southeastern coast, which added additional tropical moisture to the system. Mt. Pleasant, South Carolina saw the highest recorded four-day rainfall total at nearly 27 inches, which exceeded the 1,000-year recurrence interval for the area.<sup>11</sup> In October 2016, Hurricane Matthew caused severe beach erosion as it skirted the South Carolina coast, eventually making landfall in the state as a Category 1 storm at Cape Romain National Wildlife Refuge, near the Town of McClellanville.<sup>12</sup> The following September (2017), Hurricane Irma made landfall near Marco Island in southwest Florida as a major hurricane. Irma moved quickly northward, eventually

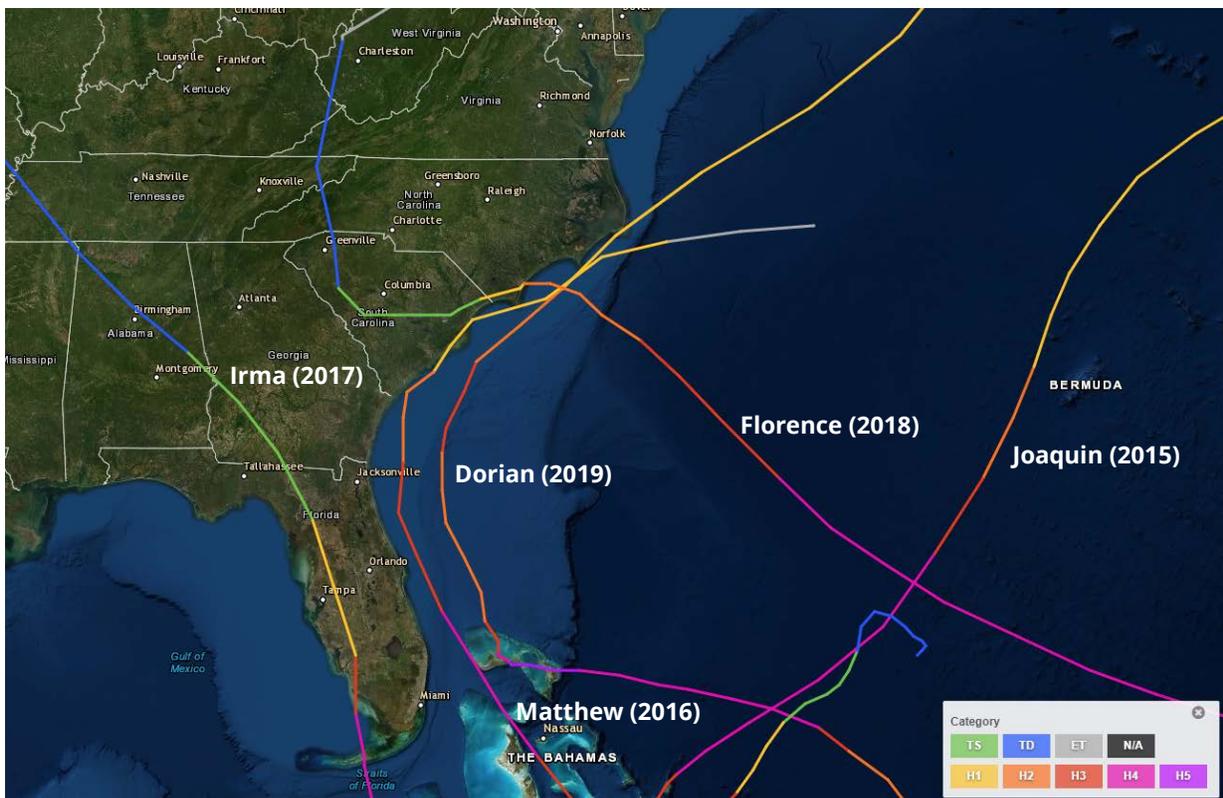
<sup>9</sup> <https://mycoast.org/sc/king-tides>

<sup>10</sup> <https://coast.noaa.gov/hurricanes/>

<sup>11</sup> <https://www.cisa.sc.edu/atlas/events-2015.html>

<sup>12</sup> <https://www.weather.gov/ilm/Matthew>

impacting South Carolina as a tropical storm.<sup>13</sup> Elevated water levels associated with Tropical Storm Irma reached 9.9 feet above MLLW at NOAA's tide gauge in the Charleston Harbor - the third highest water level recorded at this station since data collection began in 1899.<sup>14</sup> In September 2018, Hurricane Florence made landfall at Wrightsville Beach, North Carolina. The storm produced record breaking rainfall across eastern North Carolina and northeastern South Carolina. Rainfall exceeding 23 inches was recorded in Loris, South Carolina (Horry County), which set a new tropical cyclone rainfall record for the state.<sup>15</sup> Hurricane Dorian impacted coastal South Carolina as it passed offshore in early September 2019. The greatest effects - including flooding, power outages, and beach erosion - were seen along the northern portion of the coast in Georgetown and Horry counties. Three tornadoes touched down in Horry County during the passage of Dorian.<sup>16</sup>



**Figure 1:** Tracks of coastal storms that have impacted South Carolina since 2015, obtained from NOAA Historical Hurricane Tracks.

<sup>13</sup> <https://www.weather.gov/chs/TropicalStormIrma-Sep2017>

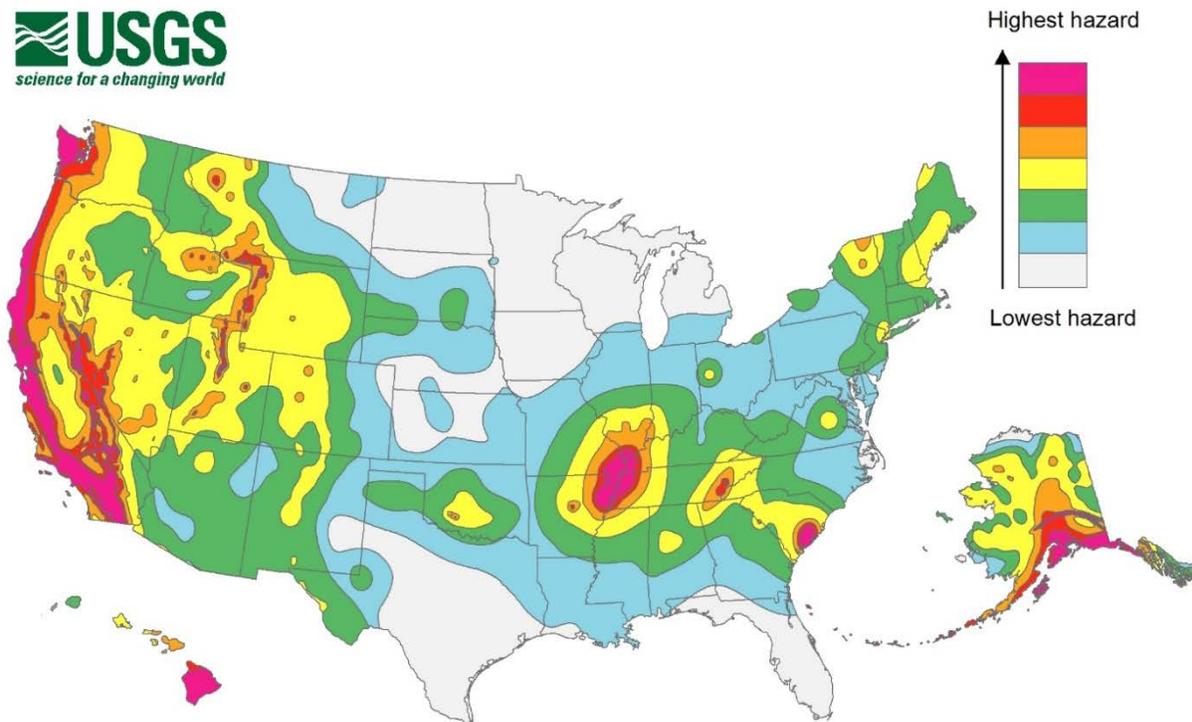
<sup>14</sup> <https://mycoast.org/reports/blogpost/sc-king-tide-recap-september-2017>

<sup>15</sup> <https://www.weather.gov/ilm/HurricaneFlorence>

<sup>16</sup> <https://www.weather.gov/ilm/Dorian>

#### 4. Geological Hazards

**Earthquakes:** The U.S. Geological Survey (USGS) updated the U.S. National Seismic Hazard Maps in 2014. The probabilistic maps represent an assessment of the best available science in earthquake hazards and incorporate new findings on earthquake ground shaking, faults, seismicity, and geodesy. As illustrated in Figure 2, a high-risk zone occurs in coastal South Carolina, with the greatest risk being in the central part of the coast near the Charleston area.<sup>17</sup> South Carolina is one of 16 states in the country with the highest risk of earthquakes.<sup>18</sup>



**Figure 2:** Simplified hazard map (peak ground acceleration that has a 2% chance of being exceeded in 50 years) from the 2014 USGS National Seismic Hazard Mapping Project.

**Tsunamis:** According to South Carolina Emergency Management Division’s (SCEMD) South Carolina Tsunami Response Plan, though the potential impact is high, the tsunami threat for South Carolina is extremely low, and any tsunamis would likely be small and inundate mostly the beaches.<sup>19</sup>

<sup>17</sup> <https://earthquake.usgs.gov/hazards/hazmaps/conterminous/index.php#2014>

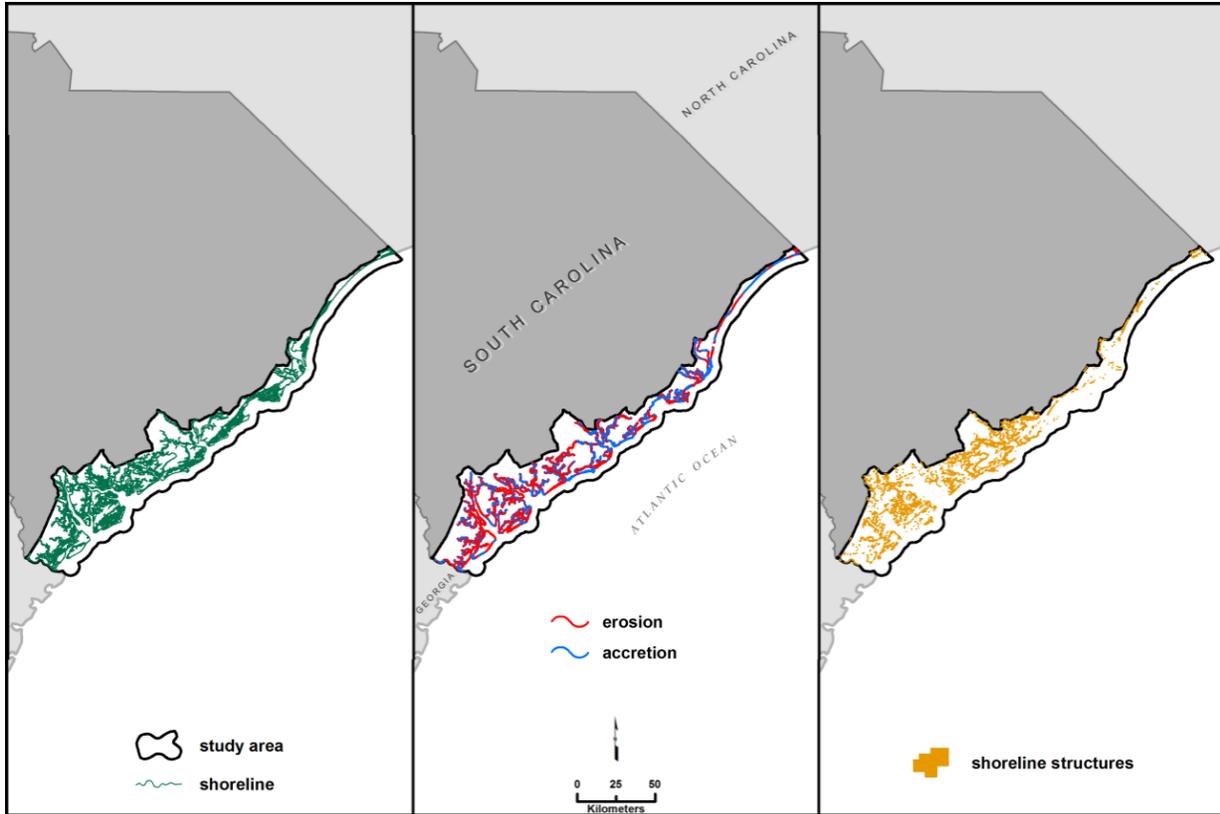
<sup>18</sup> <https://earthquake.usgs.gov/hazards/learn/>

<sup>19</sup> <https://www.scmd.org/media/1236/appendix-11-tsunami-plan.pdf>

- 5. Shoreline Erosion:** In 2014, DHEC OCRM contracted with the Applied Coastal Research Lab at Georgia Southern University to finish a long-term mapping project characterizing coastal erosion hazards in South Carolina. Historical shorelines were assembled and changes analyzed using Analyzing Moving Boundaries Using R (AMBUR) for shorelines from the 1800s, 1930s, and 2000s. The 2000s high-resolution shoreline was created by digitizing from highly controlled aerial and LiDAR imagery, and contains 14,103 kilometers (8,763 miles) of shore along the marsh-water, upland-water boundary, and approximate high-water line on beaches. This project also involved digitizing all anthropogenic shoreline structures (e.g. docks, seawalls, bulkheads) within the study area. Findings summarized in the 2017 final report suggest that some areas within coastal South Carolina are experiencing considerable amounts of shoreline erosion, which ultimately poses a threat to natural and cultural resources, as well as anthropogenic structures along portions of the shore. Prominent erosional scarps exist along portions of estuarine shorelines as cutbanks of tidal streams have migrated into tidal marsh and upland landscapes. Current adverse conditions along a considerable length of the shoreline include exposed upland bluffs slumping into adjacent tidal streams, undermined trees/vegetation, and loss of marsh shoreline. The average long-term erosion rate for the study area was found to be -0.55 meters/year ( $\pm 0.11$  m/yr). Unsheltered areas including oceanfront and inlet-facing shorelines had some of the highest shoreline change rates and erosion. The highest shoreline changes rates along estuarine shorelines were near bays/sounds/inlets and stream confluences. Based solely on long-term shoreline change rates and projecting or extrapolating where the shoreline might be located over the next 50 years, it was estimated that 1,412 structures could be threatened or impacted by shoreline erosion.<sup>20</sup> Figure 3 illustrates analyzed shorelines, erosional and accretional shorelines, and digitized shoreline structures associated with the South Carolina coastal erosion hazard mapping study.

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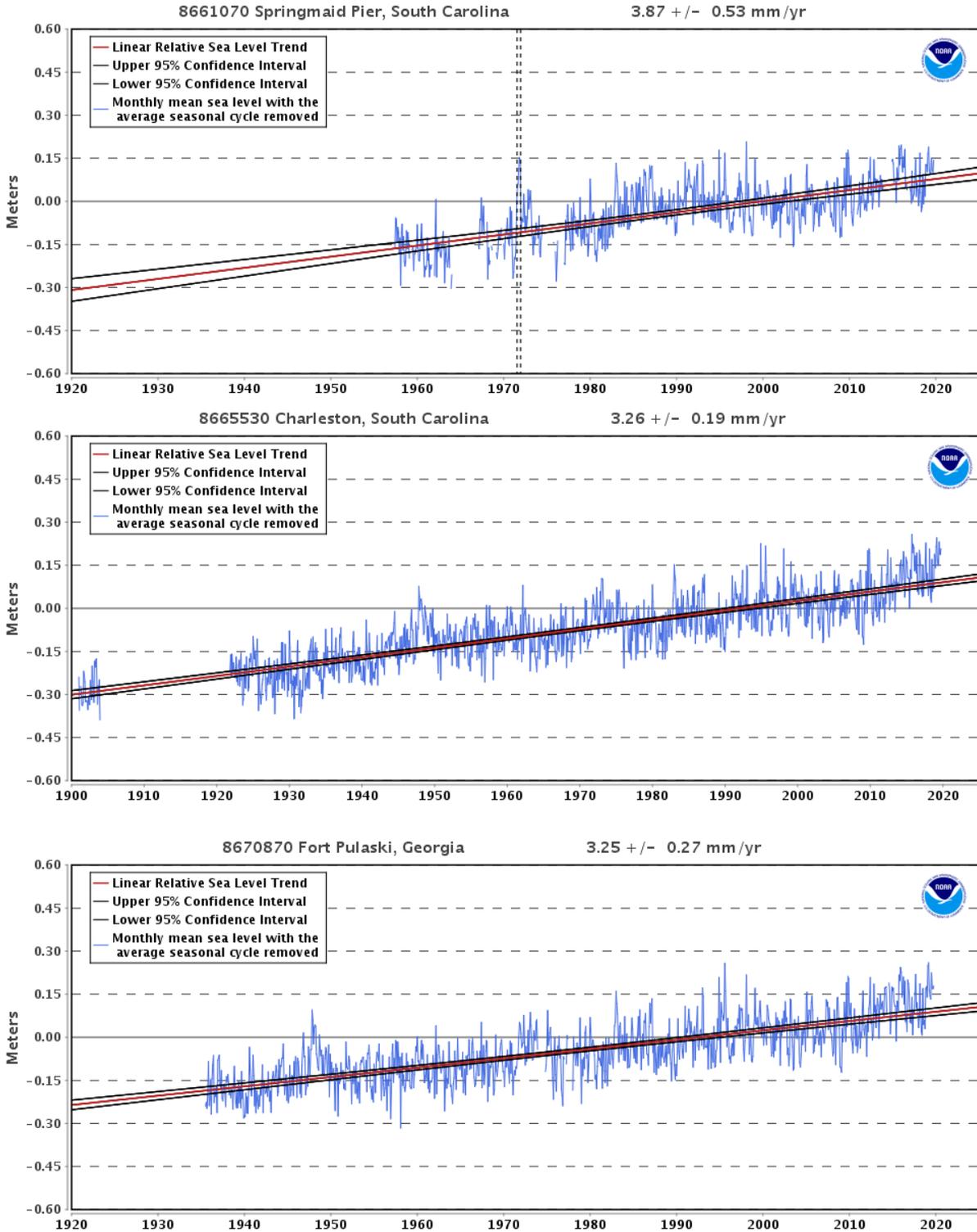
<sup>20</sup> [https://www.scdhec.gov/sites/default/files/docs/HomeAndEnvironment/Docs/Jackson\\_SCShorelineReport122017.pdf](https://www.scdhec.gov/sites/default/files/docs/HomeAndEnvironment/Docs/Jackson_SCShorelineReport122017.pdf)



**Figure 3:** Analyzed shorelines (left), erosional and accretional shorelines (middle), and digitized shoreline structures (right) associated with South Carolina coastal erosion hazard mapping study.

- Sea Level Rise:** Of the 141 stations where NOAA monitors and calculates mean sea level trends, the three stations closest to the South Carolina coast are all within the upper third of stations with the fastest rates of sea level rise.<sup>21</sup> These stations include 8661070 at Springmaid Pier, 866530 in Charleston Harbor, and 8670870 at Fort Pulaski, which are experiencing relative sea level rise rates of 3.87, 3.26, and 3.25 millimeters/year, respectively (Figure 4).

<sup>21</sup> <https://tidesandcurrents.noaa.gov/sltrends/mslUSTrendsTable.html>



**Figure 4:** Relative sea level trends in millimeters/year with a 95% confidence interval based on monthly mean sea level data from 1935 to 2018 for Springmaid Pier (top), Charleston Harbor (middle), and Fort Pulaski (bottom).

The South Carolina Emergency Management Division’s (SCEMD) 2018 state hazard mitigation plan includes an analysis of sea level rise based on a range of projections provided in a 2007 report by the Intergovernmental Panel on Climate Change (IPCC). SCEMD used the estimates to assess three scenarios including a 0.6, 1.0, and 2.0 meter rise in sea levels. The analysis included an estimated total land area inundated, and land area inundated greater than two feet, associated with six coastal counties under each sea level rise scenario. Results of the analysis are included in Table 7.<sup>22</sup>

**Table 7:** SCEMD projected inundation from modeled sea level rise scenarios

County	0.6 meter sea level rise (area in square miles)		1 meter sea level rise (area in square miles)		2 meter sea level rise (area in square miles)	
	Land Area Inundated	Land Area Inundated > 2 feet	Land Area Inundated	Land Area Inundated > 2 feet	Land Area Inundated	Land Area Inundated > 2 feet
Beaufort	117	7	191	35	265	200
Charleston	40	5	58	17	93	66
Colleton	37	5	104	11	172	129
Georgetown	62	0	147	25	207	159
Horry	0	0	38	4	59	47
Jasper	12	4	53	5	99	73
<b>Total</b>	<b>268</b>	<b>21</b>	<b>591</b>	<b>97</b>	<b>895</b>	<b>674</b>

- Land Subsidence:** Along the middle to southern stretch of the South Carolina coast, beginning around Charleston, land is subsiding due to natural geological pressures on the region’s continental shelf. At both the Fort Pulaski and Charleston Harbor tide stations, the subsidence rate is roughly five inches per century.<sup>23,24</sup> Human alterations, particularly groundwater extraction, can also result in land subsidence. A 2017 study found that coastal latitudes, including Virginia, North Carolina, and South Carolina (regions that extract groundwater faster than nature replenishes it), are sinking significantly faster than the geologic average.<sup>25,26</sup>

<sup>22</sup> <https://www.scmd.org/media/1391/sc-hazard-mitigation-plan-2018-update.pdf>

<sup>23</sup> <https://www.scseagrant.org/water-cities-climate-proof-the-coast/>

<sup>24</sup> <https://www.scseagrant.org/wp-content/uploads/Beaufort-Co-SLR-Adaptation-Report-Digital.pdf>

<sup>25</sup> <https://eos.org/articles/playing-with-water-humans-are-altering-risk-of-nuisance-floods>

<sup>26</sup> <https://www.nature.com/articles/s41598-017-11544-y>

8. **Saltwater Intrusion:** South Carolina’s 2019 Water Resources Report notes saltwater intrusion is an ongoing concern at coastal wells having water levels at or below sea level; some Upper and Middle Floridan wells on Hilton Head Island have already become saline. In the coastal areas of Charleston and Colleton counties, some Gordon wells are experiencing saltwater intrusion, as well.<sup>27</sup> A 2012 study by the Carolinas Integrated Sciences and Assessments (CISA) evaluated the variability of freshwater discharge and resulting salinity intrusion at the northern South Carolina coast (Yadkin-Pee Dee River basin) under future climatic conditions and sea level rise scenarios. Results at the Pawleys Island stream gauge to adding a 1.0 foot and a 2.0 foot sea level rise (on top of levels for the period July 1995 to August 2009) show that a 1.0 foot rise doubled the frequency of occurrence of specific conductance above 2,000  $\mu\text{S}/\text{cm}$  to 8% of the day. A 2.0 ft rise quadrupled the frequency to 14% of the time. For the 14-year simulation period, the number of days of specific conductance level at or above 2,000  $\mu\text{S}/\text{cm}$  was 191 days for the observed sea level conditions. A 1.0 foot rise increased the number of days to 399, and a 2.0 foot rise resulted in 697 days. When the specific conductance values for raw source water are greater than 1,000 to 2,000  $\mu\text{S}/\text{cm}$ , it becomes problematic for the operations of municipal water treatment plants.<sup>28</sup>

**Management Characterization:**

1. The following tables indicate if identified management approaches are employed by the state and if significant changes have occurred that could impact the SC CZMP’s ability to prevent or significantly reduce coastal hazards risk since the last assessment.

**Table 8:** Coastal hazards management

Topic Addressed	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)
Elimination of development/redevelopment in high-hazard areas	Y	Y	Y
Management of development/redevelopment in other hazard areas	Y	Y	Y
Climate change impacts, including sea level rise	N	Y	Y

<sup>27</sup> [http://hydrology.dnr.sc.gov/pdfs/reports/Report\\_61\\_Floridan\\_Gordon\\_2018.pdf](http://hydrology.dnr.sc.gov/pdfs/reports/Report_61_Floridan_Gordon_2018.pdf)

<sup>28</sup> [https://www.cisa.sc.edu/Pubs\\_Presentations\\_Posters/Reports/2012\\_CISA%20and%20SC%20Sea%20Grant\\_Salinity%20SARP%20Report.pdf](https://www.cisa.sc.edu/Pubs_Presentations_Posters/Reports/2012_CISA%20and%20SC%20Sea%20Grant_Salinity%20SARP%20Report.pdf)

**Table 9:** Coastal hazards planning programs or initiatives

<b>Topic Addressed</b>	<b>Employed by State or Territory (Y or N)</b>	<b>CMP Provides Assistance to Locals that Employ (Y or N)</b>	<b>Significant Changes Since Last Assessment (Y or N)</b>
Hazard mitigation	Y	Y	Y
Climate change impacts, including sea level rise	Y	Y	Y

**Table 10:** Coastal hazards mapping or modeling programs or initiatives

<b>Topic Addressed</b>	<b>Employed by State or Territory (Y or N)</b>	<b>CMP Provides Assistance to Locals that Employ (Y or N)</b>	<b>Significant Changes Since Last Assessment (Y or N)</b>
Sea level rise change	N	N	N
Shoreline change <ul style="list-style-type: none"> <li>• Shoreline change mapping study</li> <li>• Inlet dynamics study</li> <li>• Hazard vulnerability assessment</li> <li>• Beach profile monitoring</li> <li>• Beach renourishment database</li> </ul>	Y	Y	Y

2. Although the SC CZMP does not specifically define high-hazard areas, the Coastal Division Regulations (R. 30-1 *et seq.*) define the Coastal Zone as “all coastal waters and submerged lands seaward to the State’s jurisdictional limits and all lands and waters in the counties of the State which contain any one or more of the critical areas. These counties are Beaufort, Berkeley, Charleston, Colleton, Dorchester, Horry, Jasper, and Georgetown.” Critical Areas are defined as “any of the following: (1) coastal waters, (2) tidelands, (3) beach/dune systems and (4) beaches.” The SC CZMP has direct permitting authority for activities within the critical areas of the coastal zone and broader management authority for activities within the eight-county coastal zone outside of the critical area.

Within the beach/dune system, DHEC OCRM classifies beaches as either standard or inlet erosion zones, based on the following definitions:

Standard Erosion Zone: a segment of shoreline which is subject to essentially the same set of coastal processes, has a fairly constant range of profiles and sediment characteristics, and is not directly influenced by tidal inlets or associated inlet shoals.

Inlet Erosion Zone: a segment of shoreline along or adjacent to tidal inlets which is directly influenced by the inlet and its associated shoals.

(a) Unstabilized Inlets - inlets that have not been stabilized by jetties, terminal groins, or other structures.

(b) Stabilized Inlets - inlets which are stabilized by jetties, terminal groins, or other structures.

3. For any management categories with significant changes, briefly provide the information below.
  - 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.

**Coastal Hazards Management:** Since the previous assessment, major legislation was passed by the South Carolina General Assembly impacting DHEC OCRM's beachfront jurisdictional area. In 2016, Act 197 (Coastal Zone Critical Areas) established statutory changes prohibiting seaward movement of the state's baseline (the more seaward beachfront jurisdictional line) after December 31, 2017. In 2018, Act 173 (Beachfront Management Reform Act) established the position of the state's beachfront jurisdictional baselines and setback lines for the 2018 establishment cycle. Act 173 also included a section requiring DHEC to promulgate regulations to implement provisions of the act, including regulations that DHEC will use to locate a primary oceanfront sand dune. This regulatory promulgation process is currently underway. The Notice of Proposed Regulations can be found in the South Carolina State Register (Vol. 43, Issue 9, September 27, 2019, Document No. 4897).<sup>29</sup>

**Coastal Hazards Planning:** Significant state- and local-level coastal hazards planning initiatives have occurred in coastal South Carolina since the previous assessment. Examples are provided below.

DHEC OCRM is currently leveraging its existing relationships with coastal municipal governments through its Local Comprehensive Beach Management Plan (LCBMP) planning process to integrate CRS-based principles into the guidance and procedures for updating LCBMPs. Details on DHEC OCRM's current Section 309 CRS coastal hazards strategy can be found in the [Summary of Current Section 309 Efforts](#) section above.

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<sup>29</sup> [https://www.scstatehouse.gov/state\\_register.php?first=FILE&pdf=1&file=Sr26-9.pdf](https://www.scstatehouse.gov/state_register.php?first=FILE&pdf=1&file=Sr26-9.pdf)

In October 2018, to address challenges associated with flooding and extreme weather systems, the governor of South Carolina created the South Carolina Floodwater Commission by Executive Order 2018-50. The commission was charged with developing short- and long-term recommendations to alleviate and mitigate flood impacts to the state, with special emphasis on cities, communities and enterprises located on or near the coast and rivers across South Carolina. DHEC OCRM participated on the Living Shorelines Task force associated with the Commission. This task force was charged with identifying strategies and recommendations to improve the resilience of South Carolina to flooding, erosion, and other impacts associated with land use change. The Commission released a final report in 2019.<sup>30</sup>

In December 2015, the City of Charleston released its first Sea Level Rise Strategy, which included a comprehensive inventory of initiatives to improve the City's ability to withstand the effects of sea level rise. Within this strategy, the City planned on a 1.5 to 2.5 foot rise in sea level over the next 50 years. A 1.5 foot increase was used for short-term, less vulnerable investments (e.g. parking lots). A 2.5 foot increase was used for more critical, longer-term investments (e.g. emergency routes and public buildings).<sup>31</sup> In February 2019, an updated strategy was developed and adopted by City Council. Considering the latest sea level rise projections, the City increased the rate of sea level rise for planning purposes to 2.0 to 3.0 feet over the next 50 years.<sup>32</sup>

**Coastal Hazards Mapping or Modeling:** Significant changes in coastal hazards mapping or modeling efforts identified in Table 10 include the long-term mapping project characterizing coastal erosion hazards in South Carolina (identified above in Shoreline Erosion section).<sup>33</sup> A summary report of DHEC OCRM's study, *Evaluating Tidal Inlet Dynamics and Erosion in South Carolina*, was released in 2015. This inlet dynamics study was a project of special merit associated with a previous Section 309 coastal hazards strategy. In the spring of 2018, DHEC OCRM performed a hazard vulnerability assessment within the South Carolina Critical Area.<sup>34</sup> In 2019, enhancements (including the addition of a sand volume calculation tool) were made to DHEC OCRM's Beach Erosion Research and Monitoring (BERM) Profile Viewer.<sup>35</sup> Since the previous assessment, DHEC OCRM also developed a Beach Renourishment web application which provides an overview of completed renourishment projects along the South Carolina coast.<sup>36</sup>

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<sup>30</sup> <https://itgov.sc.gov/sites/default/files/Documents/Floodwater%20Commission/SCFWC%20Report.pdf>

<sup>31</sup> [https://www.charleston-sc.gov/DocumentCenter/View/10089/12\\_21\\_15\\_Sea-Level-Strategy\\_v2\\_reduce?bidId=](https://www.charleston-sc.gov/DocumentCenter/View/10089/12_21_15_Sea-Level-Strategy_v2_reduce?bidId=)

<sup>32</sup> <https://www.charleston-sc.gov/DocumentCenter/View/20521/Flooding-and-Sea-Level-Rise-Strategy-2019-printer-friendly?bidId=>

<sup>33</sup> [https://www.scdhec.gov/sites/default/files/docs/HomeAndEnvironment/Docs/Jackson\\_SCShorelineReport122017.pdf](https://www.scdhec.gov/sites/default/files/docs/HomeAndEnvironment/Docs/Jackson_SCShorelineReport122017.pdf)

<sup>34</sup> <https://gis.dhec.sc.gov/hva/>

<sup>35</sup> <https://gis.dhec.sc.gov/bermexplorer/>

<sup>36</sup> <https://gis.dhec.sc.gov/renourishment/>

**Enhancement Area Prioritization:**

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

<b>High</b>	<u>  X  </u>
<b>Medium</b>	<u>      </u>
<b>Low</b>	<u>      </u>

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

Coastal hazards was identified as a high-priority enhancement area during the previous 309 assessment and strategy development for 2016-2020. As a result, DHEC OCRM developed a strategy around the Community Rating System (CRS). While this five-year strategy will officially end in 2020, coastal hazards will continue to be a high-priority for the SC CZMP. Several of the coastal hazards identified in Table 5 including flooding, coastal storms, shoreline erosion, and sea level rise were classified as high-risk hazards for coastal South Carolina. External stakeholders ranked coastal hazards as the second highest priority enhancement area. As described above in the [Stakeholder Engagement](#) section, flooding was the most commonly mentioned coastal hazard by this group. Internally, DHEC OCRM staff ranked coastal hazards as the highest priority enhancement area. Staff identified data collection and management, planning, and education and outreach and as priority needs.

## 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. Table 11 provides data on public access availability in the South Carolina coastal zone.

**Table 11:** Public access status and trends

Type of Access	Current number	Changes or Trends Since Last Assessment (↑, ↓, -, unkwn)	Cite data source
Beach access sites	620	– however, this dataset has not been updated since the previous assessment	S.C. DHEC OCRM Beach Guide <sup>37</sup>
Shoreline (other than beach) access sites	Unknown	Unknown	N/A
Recreational boat (power or non-motorized) access sites	165	–	S.C. Department of Natural Resources <sup>38</sup>  County Government Websites
Number of designated scenic vistas or overlook points	4 designated Scenic Rivers	– Ashley River (Charleston and Dorchester Counties), Black River (Georgetown County), Great Pee Dee River (Georgetown County), and Little Pee Dee River (Horry County)	S.C. Department of Natural Resources <sup>39</sup>

<sup>37</sup> <https://gis.dhec.sc.gov/beachaccess/>

<sup>38</sup> <https://www.arcgis.com/home/webmap/viewer.html?useExisting=1&layers=a5527ce823504c1a904d117ec1a23cc1>

<sup>39</sup> <http://myscmap.sc.gov/water/river/index.html>

Type of Access	Current number	Changes or Trends Since Last Assessment (↑, ↓, -, unkwn)	Cite data source
Number of fishing access points (i.e. piers, jetties)	52	↑	S.C. Department of Natural Resources <sup>40</sup>  County Government Websites  Other <sup>41</sup>
Coastal trails/ boardwalks	No. of trails: 174 Total mileage: 1,268	↑	S.C. Department of Parks, Recreation, and Tourism <sup>42</sup>  Personal Communication w/ State Trails Coordinator
Number of acres parkland/open space	9 State Parks in the coastal zone (11,353 acres) 43 S.C. DNR Managed Properties (> 416,737 acres) Over 37,274 acres of County, Regional, and Community Parks	– in State Parks ↑ in state managed lands and county parks  (state managed properties include heritage preserves, wildlife management areas, seabird sanctuaries, and the Francis Marion National Forest, which alone is 258,816 acres)	S.C. State Parks <sup>43</sup>  S.C. Department of Natural Resources <sup>44</sup>

<sup>40</sup> <http://saltwaterfishing.sc.gov/piersbridges.html>

<sup>41</sup> [https://www.saltchef.com/catch\\_fish/SC/where\\_to\\_catch\\_fish\\_south\\_carolina.html](https://www.saltchef.com/catch_fish/SC/where_to_catch_fish_south_carolina.html)

<sup>42</sup> <https://www.sctrails.net/trails>

<sup>43</sup> <https://southcarolinaparks.com/>

<sup>44</sup> <https://www2.dnr.sc.gov/ManagedLands/>

Type of Access	Current number	Changes or Trends Since Last Assessment (↑, ↓, -, unkwn)	Cite data source
Access sites that are Americans with Disabilities Act (ADA) compliant	82 ADA compliant beach access sites	Unknown not reported under last assessment	S.C. DHEC OCRM Beach Guide <sup>45</sup>

2. **Demand for Coastal Public Access:** In late 2014, DHEC OCRM launched the South Carolina Beach Guide web application, which was designed to assist residents and visitors with locating public beach access points and the specific amenities provided at each location. Additionally, the Beach Guide provides information on water quality associated with monitoring stations along the coast.<sup>46</sup> Google Analytics data on the usage of this application suggests the tool was heavily utilized the first year after its release (Table 12). More recent data suggests usage of the application is declining. DHEC OCRM aims to increase the public usage of the Beach Guide by improving functionality of the application, as well as periodic promotion on DHEC social media platforms.

**Table 12:** Usage data associated with DHEC OCRM’s South Carolina Beach Guide web application

Date Range	No. of Users	No. of New Users	No. of Sessions
July 1, 2014 - June 30, 2015	3,041	3,033	3,448
July 1, 2015 - June 30, 2016	127,838	127,795	146,566
July 1, 2016 - June 30, 2017	58,908	57,018	76,032
July 1, 2017 - June 30, 2018	46,949	46,046	61,118
July 1, 2018 - June 30, 2019	23,846	23,049	33,847

3. **Additional Information on Status and Trends:** National Ocean Economics Program Data indicates the 2012 population in the South Carolina coastal zone was 1,269,511 and the 2017 population was 1,422,065, which represents a 12% increase over this time

<sup>45</sup> <https://gis.dhec.sc.gov/beachaccess/>

<sup>46</sup> <https://gis.dhec.sc.gov/beachaccess/>

period.<sup>47</sup> South Carolina state and county population projections for 2030 and 2035 estimate a coastal zone population of 1,506,090 (July 1, 2030) and 1,584,440 (July 1, 2035). These projections represent a 5.9% increase from 2017-2030 and an 11.4% increase from 2017-2035.<sup>48</sup>

Tourism is a \$22.6 billion industry in South Carolina and supports one in every 10 jobs in the state.<sup>49</sup> According to a 2016 analysis by Clemson University, tourism in the coastal zone accounted for 64% of the state's overall tourism revenue.<sup>50</sup>

The projected population increase for the South Carolina coastal zone, along with the major role coastal tourism plays in the overall state tourism industry, suggests the likelihood of an increased demand for coastal public access. This highlights the need to maintain, enhance, and expand access to coastal resources.

**Management Characterization:**

1. Table 13 indicates if identified management approaches are employed by the state and if significant changes have occurred that could impact the future provision of public access to coastal areas of recreational, historical, aesthetic, ecological, or cultural value.

**Table 13:** Public access management

<b>Management Category</b>	<b>Employed by State or Territory (Y or N)</b>	<b>CMP Provides Assistance to Locals that Employ (Y or N)</b>	<b>Significant Changes Since Last Assessment (Y or N)</b>
Statutes, regulations, policies, or case law interpreting these	Y	Y	N
Operation/maintenance of existing facilities	Y	Y	N
Acquisition/enhancement programs	Y	Y	N

<sup>47</sup> <https://www.oceaneconomics.org/>

<sup>48</sup> <http://sccommunityprofiles.org/census/proj2035.html>

<sup>49</sup> <https://www.scprt.com/tourism>

<sup>50</sup> <https://www.clemson.edu/cafls/departments/fec/news/files/quick-facts-fw-13-economic-contributions-of-natural-resources.pdf>

2. For any management categories with significant changes, briefly provide the information below.
  - 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.

No significant management changes have occurred since the previous assessment.

3. **Publicly Available Access Guide:** South Carolina has a publicly available Beach Guide web application, which is mobile compliant. The application was released publicly in 2014 and is currently undergoing an update (Table 14). DHEC OCRM also partners with local municipalities through a Keep Off the Dunes cost-share program. Participating communities provide annual reports on local efforts to create, maintain, and enhance public access and in exchange receive Keep Off the Dunes signs at a significantly reduced cost.

**Table 14:** Publicly available access guide

Public Access Guide	Printed	Online	Mobile App
State or territory has? (Y or N)	N	Y	
Web address	N/A	<a href="https://gis.dhec.sc.gov/beachaccess/">https://gis.dhec.sc.gov/beachaccess/</a>	Mobile compliant
Date of last update	N/A	Currently updating	
Frequency of update	N/A	Periodic	

**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.

External stakeholders did not rank Public Access among the highest priority enhancement areas; however, preservation and enhancement of public access to coastal resources is an important component of the SC CZMP. DHEC OCRM will continue to work with local governments to improve coastal access through various programmatic initiatives.

## 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. Table 15 characterize the existing status and trends of marine debris in the South Carolina coastal zone. This assessment is based on the data and information presented in the following sections.

**Table 15:** Existing status and trends of marine debris

Source of Marine Debris	Significance of Source (H, M, L, unkwn)	Type of Impact (aesthetic, resource damage, user conflicts, other)	Change Since Last Assessment (↑, ↓, -, unkwn)
Beach/shore litter	M / H	All of the above	- / ↓
Land-based dumping	Unknown	All of the above	Unknown
Storm drains and runoff	Unknown	All of the above	Unknown
Land-based fishing (e.g., fishing line, gear)	L / M	All of the above	Unknown
Ocean-based fishing (e.g., derelict fishing gear)	Unknown	All of the above	Unknown
Derelict vessels	H	All of the above	↑
Vessel-based (e.g., cruise ship, cargo ship, general vessel)	Unknown	All of the above	Unknown
Hurricane/Storm	M / H	All of the above	↑
Tsunami	L	All of the above	-

2. **Beach/shore litter:** In April 2016, DHEC OCRM migrated the South Carolina Adopt-A-Beach (AAB) program onto the MyCoast South Carolina platform. The previously paper-based AAB program is now entirely electronic. Members register, adopt a beach, and report their beach cleanup data to DHEC OCRM using the MyCoast application. Table 16 includes estimated volunteer hours and estimated weight of debris removed from South Carolina beaches over the past few years. The data shows a significant increase in AAB participation one year after the launch of the MyCoast Beach Cleanup reporting

tool.<sup>51</sup> While beach/shore litter continues to be a source of marine debris in South Carolina, DHEC OCRM and AAB partners are actively working to address the problem.

**Table 16:** Estimated volunteer hours and weight of debris removed from South Carolina beaches through the Adopt-A-Beach program

Date Range	Est. Volunteer Hours	Est. Weight of Debris Removed (pounds)
July 1, 2016 - June 30, 2017	506	711
July 1, 2017 - June 30, 2018	1,652	2,499
July 1, 2018 - June 30, 2019	1,450	1,176

3. **Land-based dumping:** It has been suggested that 80% of ocean plastic worldwide comes from land-based sources.<sup>52</sup> Data on the significance of land-based dumping and its contribution to marine debris in South Carolina could not be found, however.
  
4. **Storm drains and runoff:** Data on the significance of storm drains and runoff to the overall marine debris problem in South Carolina could not be found. Though it is well known that cigarette butts (the most common type of marine debris found on South Carolina beaches, and worldwide) are easily transported from land to ocean by storm drains, streams, and rivers. In 2015/2016, DHEC OCRM, in collaboration with the Charleston Chapter of the Surfrider Foundation and Folly Green, implemented a Cigarette Litter Reduction Pilot Study on Folly Beach in Charleston County, South Carolina. The project, funded by the National Marine Sanctuary Foundation and the NOAA Marine Debris Program (MDP), was designed to enhance awareness and promote proper disposal of cigarette litter on the beach.<sup>53</sup> In 2017/2018 this project was replicated by the Coastal Waccamaw Stormwater Education Consortium in the Grand Strand region of the South Carolina coast.<sup>54</sup>
  
5. **Land-based fishing gear:** Data from the AAB program shows hooks, lines, and lures (as a single category) to be one of the least commonly found types of marine debris on the South Carolina coast (roughly 0.5%). More robust data on the significance of specific types of land-based fishing gear in South Carolina could not be found. State-based efforts to reduce, reuse, or recycle used fishing gear in South Carolina include the Monofilament Recycling Program, which is operated by SCDNR and Palmetto Pride in an effort to keep this particular material out of local waterways and landfills.<sup>55</sup> In addition,

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<sup>51</sup> <https://mycoast.org/sc/beach-cleanup>

<sup>52</sup> <https://oceanconservancy.org/wp-content/uploads/2017/04/full-report-stemming-the.pdf>

<sup>53</sup> <https://www.scdhec.gov/cigarettelitter>

<sup>54</sup> <http://cwsec-sc.org/cigarettelitter/>

<sup>55</sup> <https://www.palmettopride.org/get-involved/pickup-programs/monofilament-recycling/>

DHEC OCRM partnered with the SC Sea Grant Consortium to sponsor Clean Marine Disposal events where people could drop off marine debris, such as coolers, monofilament fishing line, and buoys, at boat landings and other specified locations along the coast.

6. **Ocean-based fishing gear:** While ocean-based fishing gear is a known, problematic form of marine debris along the coast, quantifiable data on the significance in South Carolina could not be found. State-based efforts to reduce, reuse, or recycle used fishing gear in South Carolina include SCDNR’s reuse of abandoned crab traps. The agency has found that discarded or lost crab traps can be recovered from the environment and modified to support the development of oyster reefs in the area. Crab traps that are suspected to be abandoned can be reported to the agency by the public.<sup>56</sup>
  
7. **Derelict vessels:** In the fall of 2015, DHEC OCRM launched the Abandoned Boat reporting tool in MyCoast South Carolina. The annual number of derelict vessels being reported in South Carolina through the MyCoast application has been steadily increasing since the release of this reporting tool, as shown in Table 17.<sup>57</sup> As identified in the [Stakeholder Engagement](#) section above, external and internal survey results ranked Marine Debris as the third highest priority enhancement area for the SC CZMP. Both groups specified abandoned and derelict vessels (ADV) as a significant marine debris concern.

**Table 17:** Annual number of derelict vessel reports received through MyCoast South Carolina

Date Range	No. of Derelict Vessel Reports Received
July 1, 2015 - June 30, 2016	13
July 1, 2016 - June 30, 2017	15
July 1, 2017 - June 30, 2018	21
July 1, 2018 - June 30, 2019	30

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<sup>56</sup> <http://www.dnr.sc.gov/marine/crabtraps/>

<sup>57</sup> <https://mycoast.org/sc/boat>

In 2016, DHEC OCRM convened the ADV Working Group to examine inter-governmental challenges associated with ADV removal and prevention in South Carolina. Details on the findings of the Working Group, including identified challenges and needs, will be discussed under the [Phase II Assessment of Marine Debris](#).

8. **Vessel-based:** Robust data on the significance of vessel-based marine debris could not be found for South Carolina. However, in July 2019, local news outlets reported that plastic pellets (nurdles) were washing up on Sullivan’s Island in Charleston County, South Carolina. The nurdle spill was ultimately traced back to a shipping company operating in the Port of Charleston.<sup>58</sup> Additionally, in October 2019, the Post and Courier reported that a company which transports plastic pellets from Gulf Coast refineries to the East Coast for export to foreign markets would be opening a new \$60 million distribution center in Berkeley County in 2020. Nurdles will be packaged for export at the new facility. Trucks will then haul cargo containers full of the plastics to the Port of Charleston.<sup>59</sup> The risk of future nurdle spills within the South Carolina coastal zone, similar to the one on Sullivan’s Island, may increase as packaging and shipping activities increase in the area. Furthermore, an increase in cruise ship activity in the Charleston area<sup>60</sup> may result in the generation of more vessel-based marine debris than what has been observed in the past.
9. **Hurricane / Storm:** Since 2015, the South Carolina coast has been impacted by five storm events of relative significance, as described in the [Coastal Hazards Phase I Assessment](#) section above. These events have resulted in storm-generated marine debris (e.g. ADV and dock debris) in the coastal zone. In the fall of 2018, DHEC OCRM was awarded funding from NOAA for Post-Irma Marine Debris Assessment, Removal and Disposal in South Carolina. In 2019, as part of this project, a total of 14 vessels and one storm-debris pile associated with Hurricane Irma were removed from two project locations within the cities of Charleston and Folly Beach.
10. **Tsunami:** As identified above in the [Coastal Hazards Phase I Assessment](#) section, though the potential impact is high, the tsunami threat for South Carolina is extremely low, and any tsunamis would likely be small and inundate mostly the beaches.<sup>61</sup> As a result, the significance associated with this source is also low.

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<sup>58</sup> [https://www.postandcourier.com/news/charleston-plastic-company-cited-for-pollution-after-nurdle-spill-on/article\\_8479e74a-b467-11e9-a589-fbf9673347a0.html](https://www.postandcourier.com/news/charleston-plastic-company-cited-for-pollution-after-nurdle-spill-on/article_8479e74a-b467-11e9-a589-fbf9673347a0.html)

<sup>59</sup> [https://www.postandcourier.com/business/plastics-distributor-to-build-m-facility-to-serve-port-of/article\\_13f704e0-e9d6-11e9-b5c0-bb16f1dd5f2f.html](https://www.postandcourier.com/business/plastics-distributor-to-build-m-facility-to-serve-port-of/article_13f704e0-e9d6-11e9-b5c0-bb16f1dd5f2f.html)

<sup>60</sup> <https://abcnews4.com/news/local/carnival-sunshines-arrival-in-charleston-raises-environmental-congestion-concerns>

<sup>61</sup> <https://www.scecmd.org/media/1236/appendix-11-tsunami-plan.pdf>

**Management Characterization:**

1. Table 18 indicates if the identified management approach is employed by the state and if there have been any significant state-level marine debris management changes in the coastal zone.

**Table 18:** Marine debris management

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

2. For any management categories with significant changes, briefly provide the information below.
  - 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.

As identified above, DHEC OCRM migrated the statewide Adopt-A-Beach Program onto the MyCoast South Carolina platform in the spring of 2016. The primary goal of this effort was to provide program volunteers with a paper-free, streamlined process for submitting data. Additionally, the new system has served as an outreach, education, and data sharing tool. DHEC OCRM is now able to more efficiently share data with various partners including local governments, the Ocean Conservancy, and the general public.

DHEC OCRM has also been involved in various marine debris planning initiatives since the previous assessment. In the summer of 2016, DHEC OCRM and members of the ADV Working Group participated in a two-day planning workshop with the NOAA MDP to provide feedback on the development of an emergency marine debris response guide for South Carolina. In the fall of 2016, NOAA MDP published the *South Carolina Marine Debris Emergency Response Guide: Comprehensive Guidance Document*.<sup>62</sup> DHEC

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<sup>62</sup> <https://marinedebris.noaa.gov/emergency-response-guide/south-carolina-marine-debris-emergency-response-guide>

OCRM and the ADV Working Group provided initial feedback after publication of the document and assisted with subsequent revisions. While this guide does not establish a removal program, it provides guidance for how to proceed with removal operations after an emergency event. DHEC OCRM staff also participated in the development of the *Southeast Marine Debris Action Plan*, which was published by the NOAA MDP in June 2019.<sup>63</sup> DHEC OCRM participated in a series of planning workshops hosted by the NOAA MDP between 2014 and 2018, which culminated in development of the action plan.

**Enhancement Area Prioritization:**

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

<b>High</b>	<u>  X  </u>
<b>Medium</b>	<u>      </u>
<b>Low</b>	<u>      </u>

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

As described in the [Stakeholder Engagement](#) section, Marine Debris was ranked as the third highest priority enhancement area both externally and internally. Plastics, cigarette butts, and ADV were specific, problematic types of marine debris identified by these groups. ADV were determined to be a significant source of marine debris in South Carolina, as indicated in Table 15, which makes this particular type of marine debris a high priority for the SC CZMP.

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<sup>63</sup> <https://marinedebris.noaa.gov/regional-action-plan/southeast-marine-debris-action-plan>

## 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:

1. Table 19 indicates the change in population and housing units in the South Carolina coastal zone between 2012 and 2017. During this time period, the population has increased by 12% and the number of housing units has increased by roughly 8%. This data is based on National Ocean Economics Program Data.<sup>64</sup>

**Table 19:** Trends in coastal population and housing units

	2012	2017	Percent Change (2012-2017)
Number of people	1,269,511	1,422,065	12.02%
Number of housing units	652,656	704,483	7.94%

2. Table 20 indicates the status and trends for various land uses in the South Carolina coastal zone between 1996 and 2010. Data was retrieved from NOAA's Land Cover Atlas.<sup>65</sup> Data for 2016 was not available through the Land Cover Atlas at the time of this assessment. The greatest gain in area between 1996 and 2010 was the scrub/shrub land cover type (+228 acres). The greatest losses in area for this time period were forested and woody wetland land cover types with -353 acres and -140 acres in loss, respectively.

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<sup>64</sup> <https://www.oceaneconomics.org/>

<sup>65</sup> <https://www.coast.noaa.gov/digitalcoast/tools/lca.html>

**Table 20:** Status and trends for various land uses in the coastal zone between 1996 and 2010

Land Cover Type	Land Area Coverage in 2010 (Acres)	Gain/Loss Since 1996 (Acres)
Developed, High Intensity	86.55	32.08
Developed, Low Intensity	225.35	53.34
Developed, Open Space	175.92	48.54
Grassland	208.50	39.70
Scrub/Shrub	767.61	228.28
Barren Land	75.97	13.80
Open Water	1,391.40	12.67
Agriculture	601.76	-0.61
Forested	1,609.86	-353.40
Woody Wetland	2,221.74	-140.59
Emergent Wetland	842.51	67.99

3. Table 21 indicates the status and trends in development in the South Carolina coastal zone between 1996 and 2010. Data was retrieved from NOAA’s Land Cover Atlas.<sup>66</sup> Data for 2016 was not available through the Land Cover Atlas at the time of this assessment. Between 1996 and 2010, developed land area and impervious surface area increased within the coastal zone by nearly 13% and 4%, respectively (Table 21). Table 22 identifies area lost to development for various land cover types between 1996 and 2010. The land cover types with the greatest area lost to development include forested area (64.4-acre loss), followed by woody wetland area (29.5-acre loss) and scrub/shrub area (16.6-acre loss).

**Table 21:** Status and trends in development in the coastal zone between 1996 and 2010

	1996	2010	Percent Net Change
Percent land area developed	33.17	45.88	12.71
Percent impervious surface area	9.11	12.87	3.76

<sup>66</sup> <https://www.coast.noaa.gov/digitalcoast/tools/lca.html>

**Table 22:** Area lost to development for various land cover types between 1996 and 2010

<b>Land Cover Type</b>	<b>Areas Lost to Development Between 1996-2010 (Acres)</b>
Barren Land	1.48
Emergent Wetland	2.18
Woody Wetland	29.54
Open Water	3.82
Agriculture	8.83
Scrub/Shrub	16.64
Grassland	5.05
Forested	64.35

4. The following characterizes how the South Carolina coastal shoreline has changed in the past five years due to development, including changes to shoreline structures.

From 2016 to 2018, the DHEC OCRM Critical Area Permitting program processed over 5,600 requests to alter the Critical Area, including direct critical area permit applications, direct critical area permit amendments, permit transfers and extensions, general permits, emergency general permits (EGP), maintenance and repair notifications, beachfront notifications and critical area line delineations. The majority of the direct permit applications were associated with private, recreational use docks associated with upland development.

Along the beachfront, two DHEC OCRM Critical Area Permits have been issued in the last five years which resulted in substantial changes to groin structures. At Edisto Beach, 26 existing groins were lengthened in conjunction with a beach renourishment project. The groins were lengthened a cumulative distance of 1,765 feet. The length of each groin varied based on the engineered design of the project, but the maximum extension was 100 feet. At Folly Beach, nine existing derelict groins were replaced with rubble mound groin structures in conjunction with a beach renourishment project. In addition to the Critical Area Permits above, many Maintenance & Repair (M&R) authorizations have been granted for repairs to groins and shore-parallel erosion control structures on the beachfront. These M&Rs required the work to occur within the footprint and dimensions of the pre-existing structures, and therefore do not represent significant changes over the last five years.

5. The following summarizes the results of additional state-specific information on the cumulative and secondary impacts of coastal growth and development, such as water quality, shoreline hardening, and habitat fragmentation, since the last assessment.

From 2016 to 2018, the DHEC OCRM Coastal Zone Consistency (CZC) section issued 3,945 individual state CZC certifications and 1,839 general state CZC certifications. The majority of these were NPDES Stormwater permits, including wastewater and water supply, associated with various land development activities.

Impervious surfaces and other forms of development reduce water infiltration into the ground and often contribute to increased storm water runoff, sedimentation, and pollutant loading, all of which can degrade water quality.<sup>67</sup> According to Clemson Extension, more than 1,150 South Carolina waterways have been classified as "impaired," which means they are too polluted or degraded to meet accepted water quality standards.<sup>68</sup> Clemson Extension's Carolina Clear program and affiliated regional stormwater education consortiums including the Coastal Waccamaw and Ashley Cooper Stormwater Education Consortiums and Lowcountry Stormwater Partners provide education, outreach, and public involvement opportunities related to stormwater in coastal South Carolina.<sup>69</sup> The South Carolina Sea Grant Consortium supports research, education, communication, and training specific to a number of focus areas including healthy coastal ecosystems and sustainable coastal development and economy.<sup>70</sup> DHEC OCRM has held long-term partnerships with both Clemson Extension and the South Carolina Sea Grant Consortium through the South Carolina Coastal Information Network and statewide programs including the South Carolina Clean Marina Program.<sup>71,72</sup>

### **Management Characterization:**

1. Table 23 indicates if the identified approach is employed by the state and if there have been any significant state-level changes 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.

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<sup>67</sup> <https://coast.noaa.gov/howto/water-quality.html>

<sup>68</sup> <https://www.clemson.edu/extension/carolinaclear/stormwater101.html>

<sup>69</sup> <https://www.clemson.edu/extension/carolinaclear/regional-consortiums/index.html>

<sup>70</sup> <https://www.scseagrant.org/program-focus-areas/>

<sup>71</sup> <https://www.sccoastalinfo.org/>

<sup>72</sup> <https://www.scdhec.gov/environment/your-water-coast/ocean-coastal-management/clean-marinas>

**Table 23:** Management of cumulative and secondary impacts associated with development

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

2. For any management categories with significant changes, briefly provide the information below.
  - 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.

No significant management changes have occurred since the previous assessment.

**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.

While Cumulative and Secondary Impacts was not a top priority enhancement area for external stakeholders, internally, DHEC OCRM staff ranked this as the second highest priority area. The primary needs and opportunities identified by staff under Cumulative and Secondary Impacts included examining the effects of hardened structures on beachfront and estuarine shorelines, as well as the effects associated with coastal docks and marinas. A better understanding of the impacts associated with regional development was also mentioned.

## 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. Table 24 identifies geographic areas in the coastal zone subject to use conflicts that may be able to be addressed through a 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.

**Table 24:** Geographic areas in the coastal zone subject to use conflicts that could potentially be addressed through a SAMP

Geographic Area	Opportunities for New or Updated Special Area Management Plans Major conflicts/issues
Dorchester County	Potential to identify industrial/commercial corridors and areas with significant natural/cultural resources
Shem Creek	Potential to revisit with regards to working waterfront and public access

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

No additional information since previous assessment.

**Management Characterization:**

1. Table 25 indicates if the identified approach is employed by the state and if there have been any significant state-level management changes that could help prepare and implement SAMPs in the coastal zone.

**Table 25:** Management associated with special area management planning

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	Y	Y	N
SAMP plans	Y	Y	N

2. For any management categories with significant changes, briefly provide the information below.
  - 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.

No significant management changes have occurred since the previous assessment.

**Enhancement Area Prioritization:**

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

**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.

In order to engage in the SAMP process, a local government must formally request that a SAMP be authorized by the S.C. General Assembly. At this time, the SAMP process has not been identified as a priority by either a local government or by stakeholders. DHEC OCRM will continue to implement coastal planning efforts, primarily through the development of Local Comprehensive Beach Management Plans and technical assistance for local ordinance development.

## Ocean Resources

**Section 309 Enhancement Objective:** Planning for the use of ocean [and Great Lakes] resources. §309(a)(7)

### Resource Characterization:

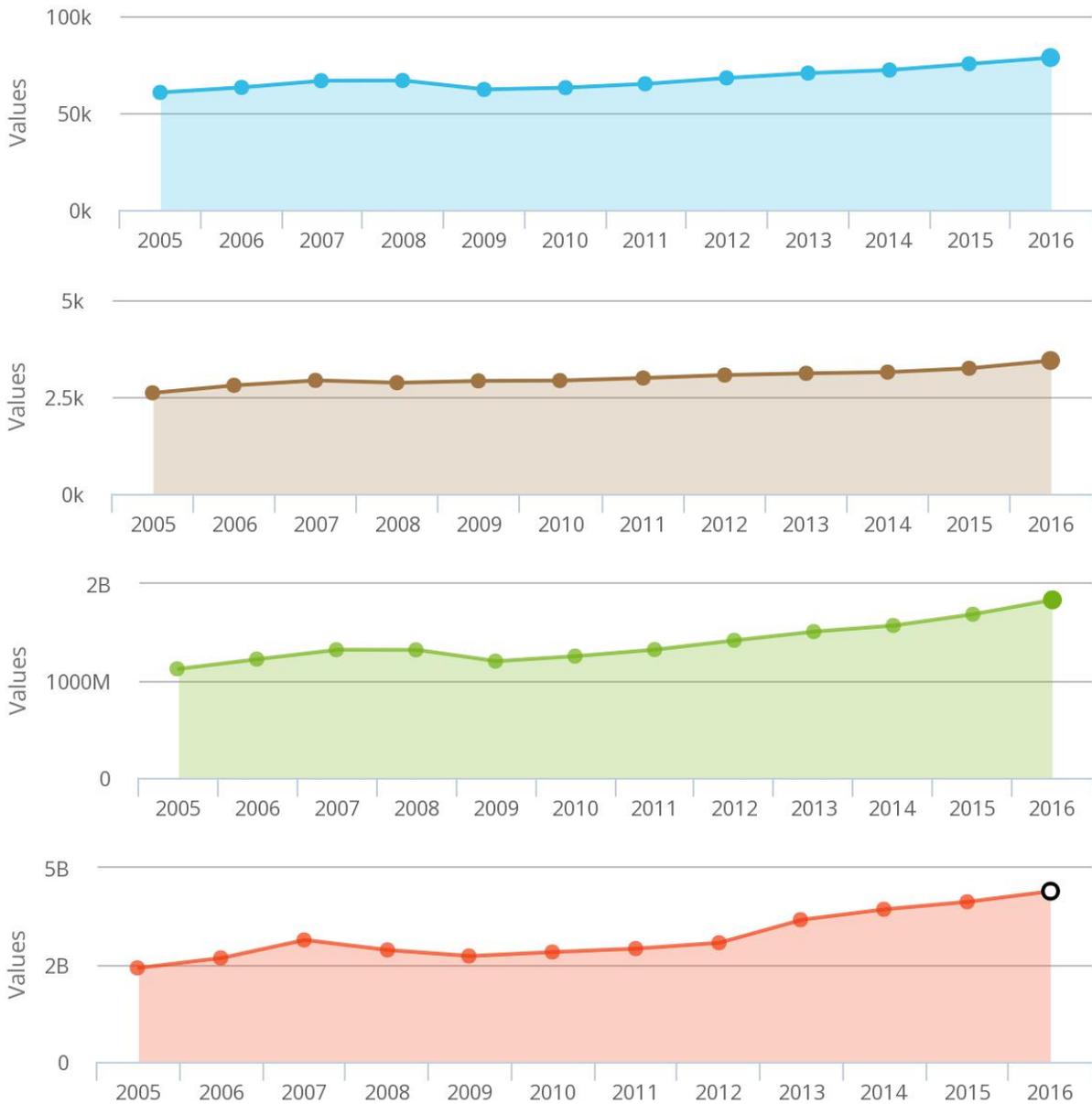
1. Table 26 indicates the status of the ocean economy as of 2015 and the change in economy from 2005-2015. Data was retrieved from NOAA's Economics: National Ocean Watch (ENOW).<sup>73</sup> Out of 30 U.S. coastal states and territories, South Carolina's total ocean economy ranks 13<sup>th</sup> both in number of jobs and number of establishments across all ocean economic sectors. The state ranks 16<sup>th</sup> and 15<sup>th</sup> in wages and GDP, respectively, across all ocean economic sectors. Tourism and recreation play a major role in the South Carolina ocean economy. This particular sector represents 90% of employment, 89% of establishments, 76% of wages, and 85% of GDP.

**Table 26:** Status (2015) and change (2005-2015) of South Carolina ocean economy

<b>2015 Status</b>	<b>All Ocean Sect.</b>	<b>Living Res.</b>	<b>Marine Constr.</b>	<b>Ship &amp; Boat Building</b>	<b>Marine Transp.</b>	<b>Offshore Mineral Extract.</b>	<b>Tourism &amp; Rec.</b>
Employment (# of Jobs)	75,344	331	458	2,410	4,449	148	67,544
Establishments (#)	3,238	68	58	38	160	23	2,891
Wages (Millions \$)	\$1.7 B	\$7.8 M	\$28.3 M	\$105.4 M	\$201.1 M	\$7.2 M	\$1.3 B
GDP (Millions \$)	\$4.1 B	\$18.2 M	\$66.2 M	\$134.4 M	\$430.4 M	\$20.2 M	\$3.5 B
<b>2005-2015 Change</b>	<b>All Ocean Sect.</b>	<b>Living Res.</b>	<b>Marine Constr.</b>	<b>Ship &amp; Boat Building</b>	<b>Marine Transp.</b>	<b>Offshore Mineral Extract.</b>	<b>Tourism &amp; Rec.</b>
Employment (# of Jobs)	14,790	28	-3	-255	595	28	14,396
Establishments (#)	634	-10	-16	-17	35	2	640
Wages (Millions \$)	\$563.5 M	\$2.52 M	\$10.9 M	\$9.8 M	\$63.8 M	\$2.65 M	\$473.7 M
GDP (Millions \$)	\$1.71 B	\$4.94 M	\$27.3 M	-\$84.3 M	\$184.9 M	\$6.34 M	\$1.57 B

<sup>73</sup> <https://www.coast.noaa.gov/digitalcoast/tools/enow.html>.

Figure 5 illustrates the overall increasing trends for each metric identified in the table above for South Carolina’s total ocean economy including jobs (blue), establishments (brown), wages (green), and GDP (orange). The inclusion of 2016 data in these figures further illustrates a continued increasing trend.



**Figure 5:** Trends in South Carolina’s total ocean economy as measured in number of jobs (blue), number of establishments (brown), wages (green), and GDP (orange) from 2005-2016.

2. Table 27 indicates the number of sites associated with various ocean uses off the coast of South Carolina.<sup>74</sup> Table 28 characterizes how the threats to and use conflicts over ocean resources have changed since the last assessment.

**Table 27:** Uses within ocean waters

Type of Use	Number of Sites
Federal sand and gravel leases ( <i>Completed</i> )	5
Federal sand and gravel leases ( <i>Active</i> )	2
Federal sand and gravel leases ( <i>Expired</i> )	0
Federal sand and gravel leases ( <i>Proposed</i> )	1
Beach Nourishment Projects	24
Ocean Disposal Sites	54
Principle Ports ( <i>Number and Total Tonnage</i> )	2 (Charleston: 23,015,503 / Savannah: 36,443,795)
Coastal Maintained Channels	49
Designated Anchorage Areas	5
Danger Zones and Restricted Areas	4

**Table 28:** Significant changes to ocean resources and uses

Resource/Use	Change in the Threat to the Resource or Use Conflict Since Last Assessment (↑, ↓, -, unkwn)
Benthic habitat	↑
Living marine resources	↑
Sand/gravel	↑
Cultural/historic	↑
Transportation/navigation	↑
Offshore development	-
Energy production	↑
Fishing (commercial and recreational)	↑
Recreation/tourism	↑
Sand/gravel extraction	↑
Dredge disposal	↑
Aquaculture	↑

<sup>74</sup> <https://www.coast.noaa.gov/digitalcoast/tools/ort.html>.

3. Table 29 identifies major contributing factors influencing the increase in threats and/or use conflicts to ocean resources identified in Table 28.

**Table 29:** Major contributors to an increase in threat or use conflict to ocean resources

Resource	Land-based dev.	Offshore dev.	Polluted runoff	Invasive species	Fishing (Comm. + Rec.)	Aquaculture	Recreation	Marine Transp.	Dredging	Sand/Mineral Extract.	Ocean Acid.
Benthic habitat (including coral reefs)										x	
Living marine resources (fish, shellfish, marine mammals, birds, etc.)	x		x		x			x			x
Sand/gravel		x			x				x	x	
Cultural/historic	x	x									
Other (please specify)											
Transportation/navigation		x									
Offshore development											
Energy production	x	x			x			x		x	
Fishing (commercial/recreational)	x	x	x	x	x	x	x	x	x	x	x
Recreation/tourism	x		x	x							
Sand/gravel extraction		x									
Dredge disposal			x								
Aquaculture					x		x				

3. The following summarizes additional state-specific information on the status and trends of ocean resources or threats to those resources since the last assessment.

In 2017 and 2018, DHEC OCRM staff developed standard operating procedures for certain projects permitted on the beachfront, such as renourishment that require monitoring for impacts to borrow sites, benthic habitats, sand resources, and living marine resources. These procedures are being implemented through the DHEC ePermitting platform to ensure appropriate monitoring schedules and timely report submission for the management of ocean resources.

In March 2019, DHEC received a federal permit application from WesternGeco, LLC (BOEM Federal Permit Number E14-004) for a federal consistency review of proposed seismic activities in federal waters off the South Carolina coast. Additional details are included in the following [Energy and Government Facility Siting Phase I Assessment](#) section.

**Management Characterization:**

1. Table 30 indicates if the identified approach is employed by the state and if any significant state-level changes in the management of ocean and Great Lakes resources have occurred since the last assessment.

**Table 30:** Management of ocean resources

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

2. For any management categories with significant changes, briefly provide the information below.
  - 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.

No significant management changes have occurred since the previous assessment.

3. **Comprehensive Ocean Management Plan:** Building on the SC Ocean Report from 2012, DHEC OCRM completed Ocean Action Plan documents in 2015 related to offshore energy development and regional sediment management, as well as Internal Regulatory Guidelines for offshore energy development. In 2017, DHEC OCRM initiated a coastal effects analysis for offshore wind energy activities to identify potential impacts to coastal resources significant to South Carolina.

**Table 31:** Comprehensive ocean management plans

Comprehensive Ocean Management Plan	State Plan	Regional Plan
Completed plan (Y/N) (If yes, specify year completed)	Y Ocean Action Plan for offshore energy development and RSM, 2015 (Revised 2017 and 2018)	N
Under development (Y/N)	N	N
Web address (if available)	N/A	N/A
Area covered by plan	State Jurisdictional Waters and Certain Activities in Federal Water	N/A

**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.

External stakeholders did not rank Ocean Resources among the highest priorities; however, DHEC OCRM will continue to update the Action Plan for offshore energy development and regional sediment management, as needed. Staff will also continue to participate in the Intergovernmental Renewable Energy Task Force.

## 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)

### Resource Characterization:

1. Table 32 characterizes the status and trends of energy facilities and activities near the coast of South Carolina based on data from NOAA's Ocean Reports tool.<sup>75</sup>

**Table 32:** Status and trends in energy facilities and activities

Type of Energy Facility/Activity	Exists in Coastal Zone (# or Y/N)	Change in Existing Facilities/Activities Since Last Assessment (↑, ↓, -, unkwn)	Proposed in Coastal Zone (# or Y/N)	Change in Proposed Facilities/Activities Since Last Assessment (↑, ↓, -, unkwn)
Pipelines	10	-	N	-
Electrical grid (transmission cables)	0	-	Y	↑
Ports	2	-	N	-
Liquid natural gas (LNG)	9	-	N	-
Oil and gas	6	-	Y	-
Coal	7	-	N	-
Nuclear	1	-	N	↓
Wind	0	-	Y	↑
Wave	0	-	N	-
Tidal	0	-	N	-
Current (ocean, lake, river)	0	-	N	-
Hydropower	2	-	N	-
Ocean thermal energy conversion	0	-	N	-
Solar	8	↑	Y	↑
Biomass	10	-	N	-

<sup>75</sup> <https://www.coast.noaa.gov/digitalcoast/tools/ort.html>

2. The following summarizes the results of additional state-specific information on the status and trends for energy facilities and activities of greater than local significance since the last assessment.

In 2015, BOEM released a Call for Information and Nominations to determine the interest in commercial wind leases in four areas off the South Carolina coast. In addition to coordinating planning efforts with the South Carolina Intergovernmental Renewable Energy Task Force, BOEM has also worked with NOAA to develop an interactive map<sup>76</sup> showing the Call areas with state-specific data layers for South Carolina.

3. The following characterizes the existing status and trends for federal government facilities and activities of greater than local significance since the last assessment.

In March 2019, DHEC received a federal permit application from WesternGeco, LLC (BOEM Federal Permit Number E14-004) for a federal consistency review of proposed seismic activities in federal waters off the South Carolina coast. This federal permit application was subject to a consistency review by DHEC to determine whether the proposed activities are consistent with the applicable enforceable policies of the SC CZMP.

WesternGeco's federal permit application proposed to conduct 2D seismic exploration activities in federal waters on the Mid- and South-Atlantic Outer Continental Shelf. WesternGeco's proposed seismic survey area extends from approximately 19 miles offshore of the southeast coast of Maryland south to approximately 50 miles offshore of St. Augustine, Florida. The proposed 2D survey area that was within the scope of the South Carolina consistency review is geographically located from approximately 32°N to 33.5°N and from 74°W to 79.5°W. WesternGeco estimated seismic operations to occur during 208 days over a period of about one year (allowing for contingencies).

Based on review of information provided by WesternGeco and the body of scientific literature available, DHEC determined that the seismic survey activities proposed by WesternGeco are not consistent with the applicable enforceable policies of the SC CZMP. DHEC provided formal notice of the determination to WesternGeco in a letter dated July 8, 2019.

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<sup>76</sup> <https://coast.noaa.gov/digitalcoast/tools/mmc.html>

WesternGeco filed a Notice of Appeal with the U.S. Department of Commerce on September 20, 2019 requesting that the Secretary of Commerce override DHEC’s objection to the coastal zone consistency certification for the proposed activities. WesternGeco’s Principal Brief was filed on October 21, 2019. DHEC filed its response with the Department of Commerce on December 3, 2019.

DHEC has also requested supplemental coordination with three companies that submitted federal permit applications in 2015 for seismic activities off the South Carolina coast: CGG Services Inc., GX Technology Corporation, and Spectrum Geo Inc. Based on the new and additional information and studies evaluated during WesternGeco’s 2019 consistency review, DHEC believes that the foreseeable coastal effects of seismic activities proposed by the three companies under the 2015 federal applications are substantially different than those initially described in their original consistency certifications.

DHEC provided letters to CGG Services Inc., GX Technology Corporation, and Spectrum Geo Inc. to request additional information under the federal Coastal Zone Management Act’s supplemental consistency certification process to determine if the seismic activities proposed under the 2015 federal applications are consistent with the state’s enforceable policies.

**Management Characterization:**

1. Table 33 indicates if the identified approach is employed by the state and if significant state-level changes that could facilitate or impede energy and government facility siting and activities have occurred since the last assessment.

**Table 33:** Management associated with energy and government facility siting

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

2. For any management categories with significant changes, briefly provide the information below.
  - 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.

No significant management changes have occurred since the previous assessment.

**Enhancement Area Prioritization:**

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

<b>High</b>	<input type="checkbox"/>
<b>Medium</b>	<input checked="" type="checkbox"/>
<b>Low</b>	<input type="checkbox"/>

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

During this assessment period, DHEC was granted limited authority to review five of the federal permit applications for seismic surveying for two specific elements including impacts to sea turtles and commercial and recreational fisheries. Additional information on the status of these federal consistency reviews can be found on the DHEC website.<sup>77</sup> While external stakeholders did not rank Energy and Government Facility Siting among the highest priorities, DHEC OCRM will continue to coordinate with BOEM and other state and federal partners on these and any future activities.

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<sup>77</sup> <https://www.scdhec.gov/environment/your-water-coast/ocean-coastal-management/federal-permit-request-conduct-seismic>

## 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. Table 34 characterizes the existing status and trends of aquaculture facilities in the South Carolina coastal zone based on the best-available data. All available data indicate an increase in activity and estimated economic value since the last assessment.

**Table 34:** Status and trends of aquaculture facilities and activities

Type of Facility/Activity	Number of Facilities	Approximate Economic Value	Change Since Last Assessment (↑, ↓, -, unkwn)
Mariculture Farms (Bottom Gear)	30	Unknown, see below	↑
Mariculture Farms (Floating Gear)	5	Unknown, see below	↑
Oyster Mariculture (combined)	--	Economic value of oyster harvests in SC: <sup>78</sup>  2014: \$105.5K 2015: \$106.0K 2016: \$135.5K 2017: \$272.4K 2018: \$647.5K	↑
Aquaculture in the Coastal Zone (total) <sup>79</sup>	28 (2017) 19 (2012)	Market value of Aquaculture Products (2017):* Charleston: \$1.79 M Horry: \$132 K  <i>*Data for most counties withheld to avoid disclosing data for individual farms.</i>	↑

<sup>78</sup> Data from SCDNR received via SC Sea Grant Consortium

<sup>79</sup> <https://www.nass.usda.gov/Publications/AgCensus/2017/>

2. The following summarizes additional state-specific information on the status and trends or potential impacts from aquaculture activities since the last assessment.

DHEC OCRM currently has 30 active/operating general permits for mariculture activities within the state's critical area permitting jurisdiction. These general permits authorize the installation and operation of bottom gear for the purposes of growing shellfish for commercial sale.

Since 2012, DHEC OCRM has been reviewing and subsequently authorizing individual critical area permits for floating mariculture operations within the state's critical area permitting jurisdiction. The permit process for these types of operations has developed into a highly coordinated effort between DHEC OCRM, SCDNR, and the U.S. Army Corps of Engineers. The installation and utilization of floating mariculture operations have become a hot topic with the shellfish industry, the state legislature, and the general public over the last five years. With the attention that has been focused on these operations from the aforementioned groups, it is important to include this type of operation in a separate category when discussed under the overall status and trends of Aquaculture Facilities and Activities. DHEC OCRM is currently developing a guidance document in coordination with the agencies above to better inform applicants regarding appropriate siting and applicable regulations for mariculture facilities.

A social carrying capacity study<sup>80</sup> is being completed by Clemson University to analyze the siting of mariculture facilities, specifically, floating facilities. The study will take place over two years and has just entered into the second year. As a stakeholder, DHEC OCRM has been participating in the study. This study will provide data to regulatory agencies which will reflect the general public's thoughts and views on mariculture, and more specifically, floating mariculture operations. The data and information generated through this study may assist with future siting of mariculture facilities. This research project is being supported by the South Carolina Sea Grant Consortium with funding provided by NOAA through the National Sea Grant College Program. The South Carolina Sea Grant Consortium supports research and outreach specific to a number of focus areas including sustainable fisheries and aquaculture.<sup>81</sup> The South Carolina Sea Grant Consortium has also begun updating its guide to mariculture permitting in which they are coordinating with DHEC OCRM, SCDNR, and the U.S. Army Corps of Engineers.

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<sup>80</sup> <https://www.scseagrant.org/project-a-36/>

<sup>81</sup> <https://www.scseagrant.org/program-focus-areas/>

**Management Characterization:**

1. Table 35 indicates if the identified approach is employed by the state and if there have been any state-level changes that could facilitate or impede the siting of public or private aquaculture facilities in the coastal zone.

**Table 35:** Aquaculture management

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

2. For any management categories with significant changes, briefly provide the information below.
  - 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.

No significant management changes have occurred since the previous assessment.

**Enhancement Area Prioritization:**

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

**High**       X    
**Medium**           
**Low**              

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

Permit applications for mariculture within the estuarine system are administered in accordance with existing statutes and regulations including the Coastal Tidelands and Wetlands Act and the Critical Area Permitting Regulations, as amended. Permit applications for offshore aquaculture will be administered with guidance from federal

agencies and informed by the regulatory guidance document for ocean activities. DHEC does not frequently receive permit applications for mariculture activities compared to applications for dock or erosion control permits; however, there has been an increase in the number of permit applications for mariculture activities within the estuarine system over the last five years. There has also been greater attention on floating mariculture projects and increased involvement by the shellfish industry, the state legislature, and the general public. There are knowledge gaps centered around Best Management Practices (BMPs) associated with floating mariculture operations and the operations' effects on the use of the critical area and the environment itself. A greater understanding of BMPs, as well as the effect of these operations on the use of the critical area and the natural environment, are needed. For the reasons mentioned above, DHEC OCRM has identified aquaculture as a high priority for the SC CZMP.

# Phase II Assessment

## Wetlands

### In-Depth Resource Characterization:

1. The three most significant existing or emerging physical stressors or threats to wetlands within the South Carolina coastal zone are included in Table 36.

**Table 36:** Three significant existing or emerging physical stressors or threats to wetlands

	<b>Stressor/Threat</b>	<b>Geographic Scope</b> (throughout coastal zone or specific areas most threatened)
Stressor 1	Development/Fill	Freshwater wetlands throughout the coastal zone
Stressor 2	Runoff (both salt and fresh)	Rural and urban areas throughout the coastal zone
Stressor 3	Lack of ability for marsh migration	Throughout most of the coastal zone

2. As identified in the [Wetlands Phase I Assessment](#), there has been an overall net loss of wetlands (-19.66%) in coastal South Carolina between 1996 and 2010. The greatest cumulative loss was to freshwater wetlands (-23.25%). Development is the top land cover type that has replaced the area previously categorized as wetland. As identified in the [Cumulative and Secondary Impacts Phase I Assessment](#), between 1996 and 2010, developed land area and impervious surface area increased within the coastal zone by nearly 13% and 4%, respectively. According to Clemson Extension, more than 1,150 South Carolina waterways have been classified as "impaired," which means they are too polluted or degraded to meet accepted water quality standards.<sup>82</sup> Impaired waters and polluted runoff reaching fresh and saltwater marshes can threaten the health of these ecosystems. The development trends identified above may also inhibit saltwater marshes from migrating inland in response to rising sea levels.

External stakeholders highlighted the need to protect, preserve, enhance, and restore wetlands as a resiliency effort in light of a changing climate and associated flooding and sea level rise. Suggested actions included better management and regulatory protection of wetlands (e.g. consideration of setbacks/ buffers from wetland areas and development of a framework or standard for Marsh Management Plans. Also identified

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<sup>82</sup> <https://www.clemson.edu/extension/carolinaclear/stormwater101.html>

was the need for improved research regarding wetland response to sea level rise, wetland migration potential, and wetland ability to function as a buffer against storm surge.

3. Table 37 identifies emerging issues of concern which lack sufficient information to evaluate the level of the potential threat.

**Table 37:** Emerging issues of concern which lack sufficient information to evaluate the level of potential threat

Emerging Issue	Information Needed
Comprehensive assessment of permit-estimated loss of estuarine and freshwater wetlands	Comprehensive data entry in ePermitting system to document acres of wetlands impacted/mitigated through regulatory programs

**In-Depth Management Characterization:**

1. Table 38 indicates if the identified management approach is employed by the state and if significant state-level changes have occurred since the last assessment.

**Table 38:** Wetland management

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)
Wetland assessment methodologies	Y	N	Y
Wetland mapping and GIS	Y	Y	N
Watershed or special area management plans addressing wetlands	Y	Y	N
Wetland technical assistance, education, and outreach	Y	Y	Y

2. For management categories with significant changes since the last assessment, briefly provide the information below.
  - a. Describe significant changes since the last assessment;
  - b. Specify if they were 309 or other CZM-driven changes; and
  - c. Characterize the outcomes or likely future outcomes of the changes.

In May 2017, DHEC OCRM migrated all Critical Area Permitting activities to the ePermitting platform. Subsequently, all Coastal Zone Consistency activities were also migrated over to this new online system. Site records within ePermitting can capture acres of wetland impacts requested and allowed for both jurisdictional and non-jurisdictional wetlands. In addition, mitigation acres can be captured for on-site and off-site mitigation, as well as mitigation bank credits. DHEC OCRM is refining internal processes to ensure that all wetland impacts and mitigation are accurately captured, which will assist with the assessment of trends across regulatory programs.

As identified in the [Summary of Current Section 309 Efforts](#), DHEC OCRM convened the Living Shorelines Working Group as part of the 309 wetlands strategy. The group includes members of federal, state, and local governments, as well as non-government organizations (NGOs). Technical information and updates associated with SCDNR's NERRS Science Collaborative living shorelines research project were periodically shared with the Working Group throughout the study. A subgroup comprised of Working Group members has also been established to focus specifically on outreach and education.

3. Identify and describe the conclusions of any studies that have been done that illustrate the effectiveness of the state's management efforts in protecting, restoring, and enhancing coastal wetlands since the last assessment.

As noted in the [Summary of Current Section 309 Efforts](#), the results of SCDNR's NERRS Science Collaborative living shorelines research project<sup>83</sup> were submitted in 2019. DHEC OCRM's project standards for living shorelines will be based, in part, on the results of this study, as well as continued monitoring of living shoreline installations by SCDNR which will extend through 2020.

### **Identification of Priorities:**

1. Considering changes in wetlands and wetland management since the last assessment and stakeholder input, below are the top management priorities where there is the greatest opportunity for the SC CZMP to improve its ability to more effectively respond to significant wetlands stressors.

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<sup>83</sup> [http://www.nerrsciencecollaborative.org/media/files/SCDNLivingShorelinesSummaryDocument\\_20190731.pdf](http://www.nerrsciencecollaborative.org/media/files/SCDNLivingShorelinesSummaryDocument_20190731.pdf)

*Management Priority 1: Ensuring comprehensive and accurate tracking of all wetland impacts and mitigation through SC CZMP regulatory program*

*Description: As described above, refine internal processes to ensure that all wetland impacts and mitigation resulting from SC CZMP regulatory programs are captured in the ePermitting system.*

*Management Priority 2: Model Marsh Management Plan*

*Description: In July 2019, the City of Folly Beach released a Marshfront Management Plan as an adaptive management effort to guide planning efforts along the City's vulnerable marshfront.<sup>84</sup> To date, the City of Folly Beach is the only municipality in South Carolina to develop such a plan. Development of a framework or model Marshfront Management Plan, and assisting local governments with development of local plans, was a suggestion received through the external stakeholder survey and is a wetland management opportunity for the SC CZMP.*

2. Table 39 identifies priority needs and information gaps the SC CZMP has to help it address the management priorities identified above.

**Table 39:** Priority needs and information gaps

<b>Priority Needs</b>	<b>Need? (Y or N)</b>	<b>Brief Explanation of Need/Gap</b>
Research	Y	Effects of sea level rise, changes in coastal hydrology and other stressors on freshwater and estuarine wetlands
Mapping/GIS	Y	Accurate assessment of current wetland coverage, losses over time and projected losses due to sea level rise
Data and information management	Y	ePermitting tracking (consistent entering of information for accurate representation in database)
Training/capacity building	Y	Marine contractor training associated with current Section 309 Living Shorelines strategy
Decision-support tools	N	
Communication and outreach	Y	More effective outreach and education on the importance of wetlands as essential habitat, and for flood mitigation and non-point source pollution reduction

<sup>84</sup> <https://www.cityoffollybeach.com/wp-content/uploads/2019/11/Marshfront-Management-Plan-July-19-FINAL.pdf>

**Enhancement Area Strategy Development:**

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

**Yes**      \_\_\_\_\_  
**No**            **X**    

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

While the wetlands enhancement area is a high priority for stakeholders and the SC CZMP, DHEC OCRM will not be developing a Section 309 wetlands strategy for the 2021 to 2025 enhancement cycle. DHEC OCRM will continue to address priority issues, particularly data and information management, through ongoing Section 306 efforts to fully utilize ePermitting for regulatory tracking.

## Coastal Hazards

### In-Depth Resource Characterization:

1. Table 40 identifies the three most significant coastal hazards within the South Carolina coastal zone, based on the characterization of coastal hazard risk presented in the [Coastal Hazards Phase I Assessment](#).

**Table 40:** Most significant types of coastal hazards

	Type of Hazard	Geographic Scope (throughout coastal zone or specific areas most threatened)
Hazard 1	Flooding	throughout the coastal zone, with greatest impacts in low-lying areas and poorly draining areas
Hazard 2	Shoreline Erosion	throughout the coastal zone, but highest erosion rates were found along oceanfront and inlet facing shorelines, as identified in the shoreline erosion section of the <a href="#">Coastal Hazards Phase I Assessment</a>
Hazard 3	Coastal Storms	throughout the coastal zone, with greatest impacts immediately adjacent to the coastline

2. In the [Phase I Assessment for Coastal Hazards](#), the highest ranking hazards included flooding, coastal storms, shoreline erosion, geological hazards (earthquakes), and sea level rise. The following sections explain why flooding, shoreline erosion, and coastal storms were identified as the most significant coastal hazards within the South Carolina coastal zone.
3. **Flooding:** As described above in the [Stakeholder Engagement](#) section, flooding was the most commonly mentioned coastal hazard by external stakeholders. Flooding was also mentioned by external stakeholders who ranked Wetlands as a high priority enhancement area. While conducting the [Coastal Hazards Phase I Assessment](#) for flooding, it was found that nearly one-third of the South Carolina coastal zone population resides in the floodplain. Additionally, high tide flooding (HTF) is being observed at an increasing rate along the South Carolina coast. According to NOAA, annual HTF frequencies are rising fastest along the Southeast coast.<sup>85</sup> The frequency and duration of HTF has further been documented in coastal South Carolina through DHEC OCRM's MyCoast South Carolina King Tide Reporting Tool.<sup>86</sup>

<sup>85</sup> [https://tidesandcurrents.noaa.gov/publications/Techrpt\\_090\\_2018\\_State\\_of\\_US\\_HighTideFlooding\\_with\\_a\\_2019\\_Outlook\\_Final.pdf](https://tidesandcurrents.noaa.gov/publications/Techrpt_090_2018_State_of_US_HighTideFlooding_with_a_2019_Outlook_Final.pdf)

<sup>86</sup> <https://mycoast.org/sc/king-tides>

4. **Shoreline Erosion:** Findings summarized in a 2017 final report on coastal erosion in South Carolina suggest that some areas within the state are experiencing considerable amounts of shoreline erosion, which ultimately poses a threat to natural and cultural resources, as well as anthropogenic structures along portions of the shore. Based solely on long-term shoreline change rates and projecting or extrapolating where the shoreline might be located over the next 50 years, it was estimated that 1,412 structures could be threatened or impacted by shoreline erosion.<sup>87</sup> In the internal survey of priority enhancement areas (see [Stakeholder Engagement](#) section) DHEC OCRM staff identified the need to develop a proactive plan for shoreline data collection.
5. **Coastal Storms:** As documented in the [Coastal Hazards Phase I Assessment](#), the South Carolina coast has been impacted by coastal storms every year since 2015. Impacts to public and private property were caused by associated riverine flooding, estuarine and beachfront flooding and erosion, and storm-generated marine debris. For each of these five storms, the DHEC OCRM Emergency Operations Plan was activated and post-disaster damage assessment activities were conducted to assess damage to structures located within the state's beachfront jurisdiction. The Governor of South Carolina issued evacuation orders in 2016 (Hurricane Matthew), 2017 (Hurricane Irma), 2018 (Hurricane Florence), and 2019 (Hurricane Dorian). These storms have resulted in significant impacts to South Carolina's tourism industry, as well. The South Carolina Department of Parks, Recreation and Tourism estimated that hurricanes and flooding have set the state's tourism industry back by about \$438 million over the last five years.<sup>88</sup>
6. Table 41 on the following page identifies emerging issues of concern which lack sufficient information to evaluate the level of the potential threat.

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<sup>87</sup> [https://www.scdhec.gov/sites/default/files/docs/HomeAndEnvironment/Docs/Jackson\\_SCShorelineReport122017.pdf](https://www.scdhec.gov/sites/default/files/docs/HomeAndEnvironment/Docs/Jackson_SCShorelineReport122017.pdf)

<sup>88</sup> [https://www.postandcourier.com/hurricanewire/south-carolina-tourism-dip-during-dorian-tied-for-largest-storm/article\\_568da798-e394-11e9-bff0-a3f825d9f328.html](https://www.postandcourier.com/hurricanewire/south-carolina-tourism-dip-during-dorian-tied-for-largest-storm/article_568da798-e394-11e9-bff0-a3f825d9f328.html)

**Table 41:** Emerging issues and information required to evaluate the level of potential threat

Emerging Issue	Information Needed
New beachfront jurisdictional lines and requirement for publicly available data established under the Beachfront Management Reform Act	Identification of all habitable structures, pools, and erosion control structures within DHEC OCRM's beachfront jurisdiction  Ensure data is publicly available
Potential inclusion of Recommendation 3* <sup>89</sup> provided by the Beachfront Jurisdictional Line Stakeholder Workgroup in the required process for establishing the beachfront jurisdictional lines	Identification of which beachfront structures within DHEC OCRM jurisdiction apply to Scenario 3, data collection effort related to the seaward edge of habitable structures

\* Recommendation 3 pertains to setting the baseline in standard and stabilized inlet zones when no primary oceanfront sand dune exists. This recommendation is further described in the Background and Strategy Narrative section of the [Coastal Hazards](#) strategy.

**In-Depth Management Characterization:**

1. Tables 42-44 indicate if the identified approach is employed by the state and if there has been a significant change since the last assessment.

**Table 42:** Coastal hazards management

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)
Shorefront setbacks/no build areas	Y	Y	Y
Rolling easements	Y	Y	Y
Repair/rebuilding restrictions	Y	Y	N
Hard shoreline protection structure restrictions	Y	Y	N
Promotion of alternative shoreline stabilization methodologies (i.e., living shorelines/green infrastructure)	Y (in-progress)	Y (in-progress)	Y (in-progress)
Repair/replacement of shore protection structure restrictions	Y	Y	N
Inlet management	Y	Y	N
Protection of important natural resources for hazard mitigation	Y	Y	N

<sup>89</sup> <https://www.scdhec.gov/environment/your-water-coast/ocean-coastal-management-ocrm/beach-management/beachfront-jurisdictional>

<b>Management Category</b>	<b>Employed by State/Territory (Y or N)</b>	<b>CMP Provides Assistance to Locals that Employ (Y or N)</b>	<b>Significant Change Since the Last Assessment (Y or N)</b>
benefits (e.g., dunes, wetlands, barrier islands, coral reefs) (other than setbacks/no build areas)			
Repetitive flood loss policies (e.g., relocation, buyouts)	N	Y	N
Freeboard requirements	N	N	N
Real estate sales disclosure requirements	Y	Y	N
Restrictions on publicly funded infrastructure	Y	N	N
Infrastructure protection (e.g., considering hazards in siting and design)	Y	Y	N

**Table 43:** Coastal hazards planning programs or initiatives

<b>Management Category</b>	<b>Employed by State/Territory (Y or N)</b>	<b>CMP Provides Assistance to Locals that Employ (Y or N)</b>	<b>Significant Change Since the Last Assessment (Y or N)</b>
Hazard mitigation plans	Y	Y	N
Sea level rise/Great Lake level change or climate change adaptation plans	N	Y	N
Statewide requirement for local post-disaster recovery planning	N	Y	N
Sediment management plans	N	Y	N
Beach nourishment plans	Y	Y	N
Special Area Management Plans (that address hazards issues)	N	Y	N
Managed retreat plans	N	N	Y

**Table 44:** Coastal hazards research, mapping, and education programs or initiatives

<b>Management Category</b>	<b>Employed by State/Territory (Y or N)</b>	<b>CMP Provides Assistance to Locals that Employ (Y or N)</b>	<b>Significant Change Since the Last Assessment (Y or N)</b>
General hazards mapping or modeling	Y	Y	Y
Sea level rise mapping or modeling	N	N	N
Hazards monitoring (e.g., erosion rate, shoreline change, high-water marks)	Y	Y	Y
Hazards education and outreach	Y	Y	Y

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.

Refer to studies summarized under [Coastal Hazards Phase I Assessment](#) section.

**Identification of Priorities:**

1. Considering changes in coastal hazard risk and coastal hazard management since the last assessment and stakeholder input, below are the top management priorities where there is the greatest opportunity for the SC CZMP to improve its ability to more effectively address the most significant hazard risks.

*Management Priority 1: Emergency operations data collection improvements and enhanced communication with local governments*

*Description: In recent years, DHEC OCRM has recognized the need to streamline emergency operations data collection procedures and improve communication with local governments. Following a disaster that has impacted the South Carolina coast, per R.30-14(D)(4)(e), OCRM must provide information to local building officials regarding the assessed damage to beachfront structures (specifically minor damage) so that authorizations to issue repairs can be made promptly. OCRM’s ability to communicate with local governments in a timely manner after a disaster, depends on the ability of field staff to accurately and efficiently collect damage assessment data on beachfront structures. A digital data collection application would help address this need. Upon preliminary examination of digital data collection tools including ESRI’s Collector Application and Survey123, there appears to be a significant opportunity to improve OCRM emergency operations data collection efforts and data sharing procedures. A subset of data exported from the associated, newly established*

*database could be used to populate a tool specifically designed for local governments. Because the information to be shared with local entities is spatial, a GIS-based web application is likely the most appropriate type of tool to meet OCRM's regulatory requirements and the needs of local government officials. However, development of such a tool would require close coordination and regular communication with end users to ensure it meets required needs. Due to the efficiencies that would be gained by pursuing a digital data collection system and a data sharing platform for local governments, these are high-priority goals for DHEC OCRM.*

*Management Priority 2: Respond to Act 173*

*Description: As identified above, Act 173 established a new set of beachfront jurisdictional lines. In response, DHEC OCRM must identify which beachfront structures are located within the state's jurisdiction. Act 173 also provided instructions to DHEC OCRM on aspects of public outreach associated with the jurisdictional line establishment process. One such requirement includes making available all information and raw data used to determine the location of the proposed lines. Developing an inventory of structures within the state's beachfront jurisdiction and establishing a data platform to comply with Act 173 are high priorities for DHEC OCRM.*

2. Table 45 identifies priority needs and information gaps the SC CZMP has for addressing the management priorities identified above.

**Table 45:** Priority needs and information gaps

<b>Priority Needs</b>	<b>Need? (Y or N)</b>	<b>Brief Explanation of Need/Gap</b>
Research	N	
Mapping/GIS/modeling	Y	Data overlay with aerial imagery to determine structures in close proximity to jurisdictional boundaries
Data and information management	Y	Opportunities to improve data collection efficiency and data management associated with emergency operations activities
Training/Capacity building	Y	All DHEC OCRM staff will require training on newly developed data collection process
Decision-support tools	Y	Need a tool to improve communication with local governments regarding structures located within the state's beachfront jurisdiction
Communication and outreach	Y	Better communication with local governments on structures located within the state's beachfront jurisdiction

**Enhancement Area Strategy Development:**

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

**Yes**        **X**    
**No**              

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

DHEC OCRM will be developing a coastal hazards strategy for the 2021 to 2025 enhancement cycle. Coastal hazards was identified as a high-priority enhancement area by both external stakeholders and DHEC OCRM staff. Based on feedback received through the stakeholder engagement process, and in light of the emerging issues identified in Table 36, there are a number of opportunities for the SC CZMP to improve current processes in order to better communicate risk and respond to coastal hazards in the future.

## Marine Debris

### In-Depth Resource Characterization:

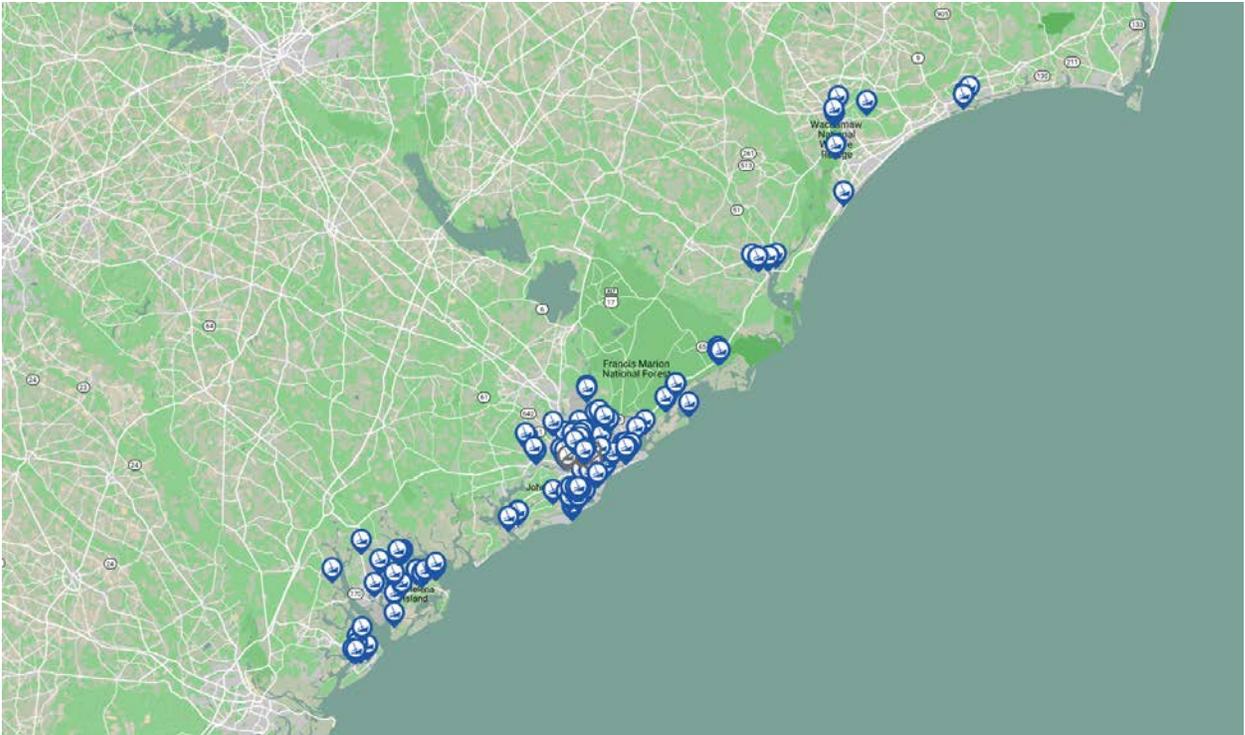
1. Table 46 identifies three significant challenges related to marine debris within the South Carolina coastal zone.

**Table 46:** Most significant or emerging challenges related to marine debris

	<b>Challenges</b>	<b>Geographic Scope</b> (throughout coastal zone or specific areas most threatened)
Challenge 1	ADV	Throughout waterways and marsh areas within the coastal zone
Challenge 2	Cigarette Litter	Throughout the coastal zone, concentrations along the beachfront, particularly in more populated/developed areas
Challenge 3	Plastics / microplastics	Throughout the coastal zone, beaches, marshes, and open water areas

2. **Abandoned and Derelict Vessels (ADV):** As identified in the [Stakeholder Engagement](#) section and [Phase I Assessment of Marine Debris](#), ADV are a recognized and significant part of the overall marine debris problem in coastal South Carolina. The annual number of derelict vessels being reported in South Carolina through the MyCoast application has been steadily increasing over the last four to five years (Table 17). ADV are located throughout coastal waterways and habitats in South Carolina (Figure 6). ADV damage fragile natural resources including salt marsh, benthic habitat, and oyster reefs. ADV can also become navigational hazards, compromise water quality, and impact public and private property (e.g. bridges, docks, etc.). Climate change and an increased frequency of storms may exacerbate the ADV problem along the South Carolina coast in the future.

In 2016, DHEC OCRM convened the ADV Working Group to examine inter-governmental challenges associated with ADV removal and prevention in South Carolina. The Working Group consisted of participants from local, state, and federal government agencies, as well as NGOs. Through a series of meetings and discussion, the Working Group identified a number of challenges and needs. Specific challenges identified include the difficulty in tracking vessels, limited funding for removal efforts, and challenges associated with vessel ownership identification. Recognized needs include improved inter-agency coordination and a transition from a focus on removal to a focus on prevention of ADV.



**Figure 6:** Blue pins represent ADV reports submitted through DHEC OCRM's MyCoast South Carolina Abandoned Boat Reporting Tool

- Cigarette Litter:** Cigarette litter tops the list as the most commonly found marine debris item on South Carolina beaches. Since the launch of the Beach Cleanup reporting tool on the MyCoast South Carolina platform in April 2016, Adopt-A-Beach partners have removed over 55,000 cigarettes from the state's beaches. Cigarette butts are a toxic form of marine debris. Composed primarily of cellulose acetate, cigarette butts degrade very slowly. Leaching of toxic materials (including heavy metals) from cigarette butts can degrade water quality, which may increase the risk of acute harm to local marine life. Birds, fish, sea turtles, and other wildlife may ingest cigarette butts, which can lead to choking, poisoning, or blockage of the gut. As mentioned in the [Phase I Assessment of Marine Debris](#), DHEC OCRM has actively worked to reduce and remove cigarette litter from South Carolina beaches since the previous assessment through various projects and programmatic initiatives. Continued, targeted education and outreach focusing on behavioral changes are still needed along the South Carolina coast.
- Plastics / microplastics:** Plastics were another major concern identified in the [Stakeholder Engagement](#) survey. Plastic and foam pieces are the second most commonly found marine debris item on South Carolina beaches. Since the launch of the Beach Cleanup reporting tool on the MyCoast South Carolina platform in April 2016, Adopt-A-Beach partners have removed nearly 21,000 plastic and foam pieces from the state's beaches. In addition to small plastic pieces, nearly 6,000 straws and stirrers,

5,000 plastic bottles, 3,400 plastics bags, and 2,000 beach toys have been removed from South Carolina beaches during this time. Research on microplastics in South Carolina waters has emerged as a focus area. Recently, the South Carolina Sea Grant Consortium supported a survey of microplastic abundance in Charleston Harbor, South Carolina and Winyah Bay, South Carolina.<sup>90</sup> This study was conducted by researchers at Clemson University and The Citadel. Results, published in 2018, indicate that microplastics are ubiquitous in these estuaries. Microplastics were found in the intertidal sediment and sea surface microlayer of each estuary. Black fragments were the most abundant microplastic particle in both estuaries. Charleston Harbor contained a high abundance of black microplastic fragments, which the researchers believed to be tire wear particles.<sup>91,92</sup> Additional research on microplastics in wastewater is being conducted by researchers at the College of Charleston.<sup>93</sup>

5. Table 47 identifies emerging issues of concern which lack sufficient information to evaluate the level of the potential threat.

**Table 47:** Emerging issues of concern which lack sufficient information to evaluate the level of the potential threat

Emerging Issue	Information Needed
Microplastics	Significance of threat to wildlife and human health

**In-Depth Management Characterization:**

1. Table 48 indicates if the approach is employed by the state and if significant state-level changes have occurred since the last assessment.

**Table 48:** Management of marine debris

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)
Marine debris research, assessment, monitoring	Y	Y	Y

<sup>90</sup> <https://www.scseagrant.org/2016-2018-research-coastal-development-and-economy/>

<sup>91</sup> <https://www.sciencedirect.com/science/article/abs/pii/S0025326X19305077>

<sup>92</sup> <https://www.sciencedirect.com/science/article/abs/pii/S0025326X18300419?via%3Dihub>

<sup>93</sup> <https://today.cofc.edu/2019/07/10/cofc-researcher-targets-household-microplastics/>

<b>Management Category</b>	<b>Employed by State or Territory (Y or N)</b>	<b>CMP Provides Assistance to Locals that Employ (Y or N)</b>	<b>Significant Changes Since Last Assessment (Y or N)</b>
Marine debris GIS mapping/database	Y	Y	Y
Marine debris technical assistance, education, and outreach	Y	Y	Y
Marine debris reduction programs (litter control, recycling, etc.)	Y	Y	Y

2. For management categories with significant changes since the last assessment, briefly provide the information below.
  - a) Describe significant changes since the last assessment;
  - b) Specify if they were 309 or other CZM-driven changes; and
  - c) Characterize the outcomes or likely future outcomes of the changes.

As identified in the [Phase I Assessment of Marine Debris](#), DHEC OCRM launched the Abandoned Boat reporting tool on MyCoast South Carolina in fall 2015. DHEC OCRM encourages citizens to report abandoned boats through this tool. Approved information reported through the tool is shared publicly on the MyCoast website. DHEC OCRM also shares this information with state and local partners involved in addressing ADV along the South Carolina coast. In April 2016, DHEC OCRM migrated the South Carolina Adopt-A-Beach (AAB) program onto MyCoast South Carolina. The previously paper-based AAB program is now entirely electronic. Members register, adopt a beach, and report their beach cleanup data to DHEC OCRM using the MyCoast application. This information is publicly available on the MyCoast website. In 2017, DHEC OCRM began providing beach litter summary reports to local beachfront municipal partners. These reports highlight recent AAB program activity in localized areas across the coast. Report details include number of cleanups, volunteer hours, quantity of items removed from the beach, estimated weight of debris removed from the beach, and a heat-map to spatially highlight debris concentration areas. As noted above, DHEC OCRM has also been actively involved in an effort to reduce and remove cigarette litter on South Carolina beaches since the last assessment.

3. Identify and describe the conclusions of any studies that have been done that illustrate the effectiveness of the state’s or management efforts to reduce marine debris since the last assessment. If none, is there any information that you are lacking to assess the effectiveness of the state’s or territory’s management efforts?

As noted above, the MyCoast Adopt-A-Beach Cleanup tool was activated in April 2016. Since that time 20 South Carolina beaches have been adopted, 107 organizations have registered in the system, and 261 unique individuals have participated in at least one cleanup. A breakdown of items collected by Adopt-A-Beach partners from April 2016 through January 2020 is provided in Table 49 below. Nearly 140,000 items, estimated at over 5,000 pounds, have been removed from South Carolina beaches during this time. Over 970 beach cleanups, consisting of over 4,500 volunteer hours, occurred during this time period.

**Table 49:** Quantity of items collected and removed from SC beaches from April 2016 - January 2020

<b>Item Type</b>	<b>Quantity Collected / Removed from SC Beaches Since April 2016</b>
Cigarettes	55,105
Plastic and Foam Pieces	20,813
Food Wrappers	13,103
Bottle Caps	9,601
Fireworks	6,266
Straws, Stirrers	5,866
Plastic Bottles	4,969
Utensils, Cups, Plates	3,662
Plastic Bags	3,348
Metal Cans	2,335
Misc Bottles/Cans	2,074
Clothing and Shoes	2,007
Beach Toys	1,807
Personal Hygiene	1,782
Food Containers	1,661
Glass Bottles	1,502
Balloons	1,427
Pet Waste	791
Other Trash	769
Hooks, Lines, Lures	704
Tent Stakes	265
<b>Total</b>	<b>139,857</b>

**Identification of Priorities:**

1. Considering changes in marine debris and marine debris management since the last assessment, as well as stakeholder input, below is the top management priority where there is the greatest opportunity for the SC CZMP to improve the effectiveness of its management effort to better respond to the most significant marine debris challenges.

*Management Priority 1: Addressing Abandoned and Derelict Vessels*

*Description: According to survey results discussed above, ADV were identified as a major marine debris problem by both external stakeholders and DHEC OCRM staff. Through a series of meetings and discussion, the ADV Working Group identified a number of challenges and needs specific to addressing ADV. Based on feedback received from these stakeholders, the greatest opportunities for the SC CZMP to improve the effectiveness of ADV management efforts include: improving inter-agency coordination, improving ADV tracking, and pursuing strategies that aim to prevent ADV.*

2. Table 50 identifies priority needs and information gaps the SC CZMP has to help it address the management priorities identified above.

**Table 50:** Priority needs to help address management priorities

<b>Priority Needs</b>	<b>Need? (Y or N)</b>	<b>Brief Explanation of Need/Gap</b>
Research	N	
Mapping/GIS	Y	A statewide ADV tracking database would allow for an accurate spatial representation of the ADV problem across the coast at any given point in time
Data and information management	Y	Coordinated statewide management of ADV data and information
Training/Capacity building	N	
Decision-support tools	Y	Coordinated statewide ADV tracking database would help target vessels for specific removal activities
Communication and outreach	Y	Continued, enhanced, and coordinated communication and outreach associated with ADV prevention

**Enhancement Area Strategy Development:**

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

Yes        X    
No

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

DHEC OCRM will be developing a marine debris strategy for the 2021 to 2025 enhancement cycle. Marine debris was identified as a high-priority enhancement area by both external stakeholders and DHEC OCRM staff. Based on feedback received through the stakeholder engagement process, and the ADV Working Group, there are a number of opportunities for the SC CZMP to pursue ADV prevention strategies and improve communication between agencies that address ADV in the coastal zone.

## Aquaculture

### In-Depth Resource Characterization:

1. The most significant existing or emerging challenges to facilitating the siting of aquaculture facilities within the coastal zone are included in Table 51 below.

**Table 51:** Significant existing or emerging challenges to facilitating the siting of aquaculture facilities

	<b>Challenges</b>	<b>Geographic Scope</b> (throughout coastal zone or specific areas most threatened)
Challenge 1	Conflicting Uses	Throughout coastal zone
Challenge 2	Insufficient Information/Data	Throughout coastal zone

2. **Conflicting Uses:** DHEC OCRM relies heavily on public input during the permitting process for mariculture facilities. In recent years, the resounding comments from the public have been related to the historic uses of various areas where mariculture facilities have been sited. Applicants have utilized SCDNR’s GIS mariculture siting tool<sup>94</sup> and have coordinated with DHEC OCRM, SCDNR, and the U.S. Army Corps of Engineers when attempting to preliminarily site a future facility. At the time of preliminary coordination regarding siting of mariculture facilities, information pertaining to the historic or current uses of the area is unknown. As the permit application moves through the public notice process, DHEC OCRM is made aware of historic and current uses of the area by the public. DHEC OCRM is charged with finding the balance between new uses of the coastal zone resources and maintaining the historic/current uses of those same resources. Members of the general public have stated that historic/current uses would be removed from the areas in which mariculture facilities are proposed. Determining the balance between new and historic uses of the coastal resources is a challenge that DHEC OCRM is working to address through the siting of mariculture facilities in less traversed or utilized waterways, but whether or not an area is heavily utilized by the public is sometimes information that is not presented until after a site has been chosen and a significant financial contribution has been undertaken by the applicant. The siting of mariculture facilities relies heavily on the water quality throughout the coastal zone. This challenge is prevalent throughout, and will persist, in any areas of the coastal zone that have high enough water quality to support the cultivation of shellfish within a confined mariculture facility.

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<sup>94</sup> <https://scdnr.maps.arcgis.com/apps/webappviewer/index.html?id=d7cce8c8272b4a36a8324fb5cc1833a7>

3. **Insufficient Information/Data:** Between 2015 and 2019, DHEC OCRM permitted 16 mariculture facilities including nine bottom gear operations and seven floating gear operations. Currently, five of the permitted floating facilities are in operation. With regard to floating facilities, there is insufficient data to analyze regarding possible cage movement due to tidal and wind conditions. There is also insufficient information pertaining to the most successful forms of anchoring or modifications to the anchoring system that eliminate cage movement and create a more static arrangement of the cages. There is insufficient information regarding the cages' impact to natural wildlife, including marine mammals and various species of fish. New or additional data and information would allow DHEC OCRM staff to make more informed permitting decisions on future applications for floating mariculture facilities.
4. Table 52 identifies emerging issues of concern which lack sufficient information to evaluate the level of the potential threat.

**Table 52:** Emerging issues of concern which lack sufficient information to evaluate the level of potential threat

Emerging Issue	Information Needed
Coordinating regulatory processes or review	Information related to how other states handle the coordination between state agencies and federal regulatory and resource agencies would be beneficial. Modifications to the current regulations are needed. The current regulations are outdated and need to be reviewed and modified to guide staff in making defensible permitting decisions.

**In-Depth Management Characterization:**

1. Table 53 indicates if the identified management approach is employed by the state and if significant state-level changes have occurred since the last assessment.

**Table 53:** Aquaculture management

Management Category	Employed by the State (Y or N)	CMP Provides Assistance to Locals that Employ (Y or N)	Significant Changes Since Last Assessment (Y or N)
Aquaculture research, assessment, monitoring	N	N	Y
Aquaculture GIS mapping/database	N	N	N

<b>Management Category</b>	<b>Employed by the State (Y or N)</b>	<b>CMP Provides Assistance to Locals that Employ (Y or N)</b>	<b>Significant Changes Since Last Assessment (Y or N)</b>
Aquaculture technical assistance, education, and outreach	Y	Y	Y

2. For management categories with significant changes since the last assessment, 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 significant changes since the last assessment;
  - b. Specify if they were 309 or other CZM-driven changes; and
  - c. Characterize the outcomes or likely future outcomes of the changes.

DHEC OCRM has provided technical assistance to agency partners through coordination meetings with the U.S. Army Corps of Engineers and SCDNR. These inter-agency meetings occur monthly and are open to the aquaculture industry. DHEC OCRM has also conducted outreach and education related to the permitting process at meetings open to the public. Additionally, a siting tool and guidance document are being developed in conjunction with the U.S. Army Corps of Engineers and the SCDNR.

As mentioned in the [Aquaculture Phase I Assessment](#), a social carrying capacity study is being conducted by Clemson University to analyze the siting of mariculture facilities, specifically, floating facilities. DHEC OCRM has been participating in the study as a stakeholder. While not yet completed, the outcomes of this study may assist with future siting of mariculture facilities.<sup>95</sup>

3. Identify and describe the conclusions of any studies that have been done that illustrate the effectiveness of the state’s or territory’s management efforts to facilitate the siting of aquaculture facilities since the last assessment.

See item 2 above.

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<sup>95</sup> <https://www.scseagrant.org/project-a-36/>

**Identification of Priorities:**

1. Considering changes in aquaculture activities, the management of these activities since the last assessment, and stakeholder input, below is the top management priority where there is the greatest opportunity for the SC CZMP to improve the effectiveness of its management effort to better respond to the most significant aquaculture challenges.

*Management Priority 1: Decision support tools for regulatory staff*

*Description: A GIS-based decision support tool is needed that incorporates water quality data, carrying capacity information from the Clemson University study, locations of shellfish leasing areas, species of concern for SC, historic resources and other factors used in consideration of mariculture permitting decisions.*

2. Table 54 identifies priority needs and information gaps the SC CZMP has to help it address the management priorities identified above.

**Table 54:** Priority needs and information gaps

<b>Priority Needs</b>	<b>Need? (Y or N)</b>	<b>Brief Explanation of Need/Gap</b>
Research	Y	More research is needed on gear types and their impacts to the critical area and to various species. More research is needed to understand the public’s opinion on mariculture facilities, especially floating facilities.
Mapping/GIS	Y	Additional mapping/GIS tools would be useful to assist with proper siting of mariculture facilities.
Data and information management	Y	Data on gear movement and appropriate anchoring systems would be useful to better assist with permitting these facilities.
Training/Capacity building	N	
Decision-support tools	Y	Research, Mapping, Data, etc. from the other needs would be beneficial and provide decision-support tools.
Communication and outreach	Y	Education for the public and members of the legislature as well as education for the industry could lead to a mutual agreement on siting and acceptance of mariculture facilities within the coastal waters of SC.

**Enhancement Area Strategy Development:**

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

**Yes**      \_\_\_\_\_  
**No**          **X**  

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

While mariculture remains a high-priority enhancement area for the SC CZMP, DHEC OCRM will not be developing a Section 309 aquaculture strategy for the 2021 to 2025 enhancement cycle. DHEC OCRM will continue to work in conjunction with federal and state partners to develop needed resources that will support regulatory decision making.

## **Section 309 Strategy for 2021-2025**

## Marine Debris: Abandoned and Derelict Vessels

### I. Issue Area(s)

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

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

### II. Strategy Description

**A.** The proposed strategy will lead to, or implement, the following types 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. Strategy Goal

The goals of this strategy are to 1) pilot a vessel turn-in program within the South Carolina coastal zone and develop a model framework for the program that can be replicated in other areas and 2) enhance DHEC OCRM's MyCoast South Carolina Abandoned Boat tool to improve statewide coordination and tracking of abandoned and derelict vessels.

### C. Background and Strategy Narrative

As identified in the [Phase I Assessment of Marine Debris](#), abandoned and derelict vessels (ADV) are a significant part of the overall marine debris problem in coastal South Carolina. The annual number of derelict vessels reported in the state through DHEC OCRM's MyCoast application has been steadily increasing over the last four to five years (Table 17). ADV in coastal South Carolina damage fragile natural resources including salt marsh, benthic habitat, and oyster reefs. ADV can also become navigational hazards, compromise water quality, and impact public and private property (e.g. bridges, docks, etc.).

Since 2004, DHEC OCRM has worked with federal, state, and local partners to leverage the removal of over 100 abandoned vessels from coastal waterways stretching from Horry County to Hilton Head Island. Despite these efforts, ADV remain a chronic problem along the coast of South Carolina. In 2016, DHEC OCRM convened the ADV Working Group to examine inter-governmental challenges associated with ADV removal and prevention in South Carolina. The Working Group consisted of participants from local, state, and federal government agencies, as well as non-government organizations (NGOs). Through a series of meetings and discussion, the Working Group identified a number of challenges and needs. Specific challenges identified include the difficulty in tracking vessels, limited funding for removal efforts, and challenges associated with vessel ownership identification. Recognized needs include improved inter-agency coordination and a transition from a focus on *removal* to a focus on *prevention* of ADV.

As identified above in the [Stakeholder Engagement](#) section, external stakeholders ranked Marine Debris as the third highest priority enhancement area. Specific to ADV, stakeholders mentioned the need to educate the public on viable options for vessel disposal and the need to better coordinate with NGOs and state and local entities, including sharing resources, capacity, and information. Internally, DHEC OCRM also ranked Marine Debris as the third highest priority enhancement area. ADV were identified by staff as a major Marine Debris issue, particularly the need to streamline the process for identifying and removing vessels before they become submerged, and the appropriation of recurring funds via congress and/or establishing fees for removal efforts.

Based on the current Section 309 assessment findings for marine debris, feedback from the ADV Working Group, and results from the stakeholder engagement survey, DHEC OCRM has developed a marine debris strategy to help address ADV in South Carolina. The proposed strategy will accomplish two primary goals. The first goal is to pilot a vessel turn-program within the South Carolina coastal zone and to develop a model framework for the program that can be adopted in other areas. A vessel turn-in program would provide an opportunity for boat owners to surrender and dispose of at-risk vessels before they become abandoned in coastal waters. This strategy component will begin with an investigation of planned and operational vessel turn-in programs in other areas, including a program that was planned in the Florida Keys (with Monroe County)<sup>96</sup> and the program that is currently being implemented by the Texas General Land Office.<sup>97</sup> This information will be used to develop detailed criteria for a local pilot program. This pilot program will then be pursued within one of South

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<sup>96</sup> <https://monroecounty-fl.gov/DocumentCenter/View/12030/VTIP-Overview-Presentation?bidId=>

<sup>97</sup> <http://www.glo.texas.gov/coast/oil-spill/programs/index.html>

Carolina's eight coastal counties. An outreach and education plan will be developed to promote the program. Findings associated with the pilot program, including lessons learned and future recommendations, will be summarized, and a model framework will be developed. This information will be shared with local governments and counties to encourage replication, and ideally permanent adoption of a program, within other areas of the South Carolina coast. Efforts associated with the pilot program are anticipated to wrap-up at the end of Year 3.

The second goal of the proposed strategy is to enhance DHEC OCRM's MyCoast South Carolina Abandoned Boat tool to improve statewide coordination and tracking of abandoned and derelict vessels. While the MyCoast Abandoned Boat tool has gained popularity since its launch in 2015, the system does not currently have the capability to track vessels over time. ADV reports submitted through MyCoast are static representations of vessels at a single point in time. Therefore, the database may not reflect the current state or location of vessels. The proposed strategy includes a QA/QC of existing records in the MyCoast database to ensure vessel reports are accurate and to remove or consolidate any duplicate records. DHEC OCRM will also research public-facing databases used in other states (e.g. Florida Fish and Wildlife Conservation Commission's Derelict Vessel Map Viewer<sup>98</sup>) and re-engage the ADV Working Group to gather input on MyCoast enhancements. DHEC OCRM will work with MyCoast application developers to execute key enhancements. A beta version of the enhanced MyCoast system will be tested internally with DHEC staff and agency partners. Suggested modifications will be noted during the test launch and incorporated into the system, as needed. A public launch of the enhanced system will be planned for the final year of the strategy. Following the public launch, DHEC OCRM will present and demo the enhanced application with local governments across the coastal zone. To further promote its use, the enhanced application will be featured on DHEC social media platforms and presented at regional workshops and conferences, such as Social Coast and the NOAA Southeast and Caribbean Regional Meeting.

### **III. Needs and Gaps Addressed**

The proposed marine debris strategy addresses a number of high-priority needs and gaps that have been identified by DHEC OCRM, the ADV Working Group, and other external stakeholders. The pilot vessel turn-in program and model framework aim to address at-risk vessels before they become abandoned in coastal waters. This proactive approach is aligned with the ADV Working Group's recommendation for the state to focus on ADV prevention. Development of an associated outreach plan will target marine debris needs identified by external stakeholders, specifically public education on viable options for vessel disposal.

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<sup>98</sup> <https://public.myfwc.com/LE/ArrestNet/DerelictVessel/VesselMap.aspx>

As indicated above, the ADV Working Group identified the challenge associated with tracking derelict vessels and the need to improve ADV coordination between federal, state, and local entities. The proposed marine debris strategy aims to fill this identified gap by pursuing key enhancements to DHEC OCRM's MyCoast system.

#### **IV. Benefits to Coastal Management**

Having completed a number of grant-based ADV removal projects over the past decade and a half, DHEC OCRM is well aware of the costs associated with removing abandoned vessels. That cost increases dramatically when vessels sink. By piloting a vessel turn-in program and setting the stage for program replication across the coastal zone, DHEC OCRM is pursuing an ADV prevention strategy which aims to address at-risk vessels before they become problematic and expensive to remove. In turn, this effort helps DHEC OCRM fulfill its responsibility of protecting coastal resources. In addition to improving statewide coordination and tracking of ADV, enhancements to the MyCoast system will help DHEC OCRM prioritize vessels for grant-based removal activities. The updated inventory of abandoned vessels will also better characterize the ADV problem within various jurisdictions and along the entire South Carolina coast. This information could be used to pursue other forms of funding for removal efforts. Furthermore, enhancements will improve identification of hotspots for vessel abandonment, which may be useful for developing management strategies at the local level.

This strategy will result in new guidelines and procedures that are formally adopted by the SC CZMP. The proposed efforts will better position local governments to address ADV within their respective jurisdictions. OCRM plans to pilot a vessel turn-in program and establish and promote a framework for project replication in other areas across the coast. OCRM will serve as a resource and partner to assist local governments in the establishment of similar vessel turn-in programs, which aim to prevent ADV. The proposed MyCoast enhancements will improve inter-governmental communication and better position state and local governments to target problematic vessels and pursue funding for removal of these vessels.

#### **V. Likelihood of Success**

There is a high likelihood of attaining the proposed strategy goal and program change during the five-year assessment cycle. ADV are a highly visible problem along the South Carolina coast. Issues associated with ADV, from aesthetics to public safety hazards, have been recognized by the media, the general public, local governments, and state

legislators.<sup>99</sup> The SC CZMP has existing support from the ADV Working Group, and the goals of this strategy build on this group's previous recommendations. Furthermore, the outcomes of this strategy have been tested in other parts of the country, allowing DHEC OCRM to learn from similar projects that have been pursued by other state and local governments.

## VI. Strategy Work Plan

**Strategy Goal:** Establish a model framework for a vessel turn-in program (VTIP) and pilot a program within one of South Carolina's eight coastal counties; Enhance DHEC OCRM's MyCoast South Carolina Abandoned Boat tool to improve statewide coordination and tracking of ADV.

**Total Years:** 5

**Total Budget:** \$662,500

**Year 1:** July 2021 - June 2022

**Description of activities:**

- Reconvene ADV Working Group to share 309 strategy and solicit feedback on strategy goals
- Research vessel turn-in programs in other states and examine locations within the South Carolina coastal zone to conduct pilot program
- Research existing ADV tracking databases and compile a list of proposed MyCoast enhancements in conjunction with ADV Working Group
- Begin drafting criteria for pilot vessel turn-in program
- Begin QA/QC of MyCoast abandoned vessel database (desktop analysis)
- Work with MyCoast application developers to begin updating baseline dataset

**Major Milestone(s):**

- Select a pilot area for vessel turn-in program
- Draft criteria for pilot vessel turn-in program
- Develop a list of proposed MyCoast enhancements
- Complete desktop analysis component of MyCoast database QA/QC effort and develop a list of vessels that require field verification

**Budget:** \$115,500

**Year 2:** July 2022 - June 2023

**Description of activities:**

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<sup>99</sup> [https://www.postandcourier.com/opinion/editorials/we-ve-got-to-do-something-about-abandoned-boats-in/article\\_22001f8e-20ad-11e8-83c1-af87fc7f4a97.html](https://www.postandcourier.com/opinion/editorials/we-ve-got-to-do-something-about-abandoned-boats-in/article_22001f8e-20ad-11e8-83c1-af87fc7f4a97.html)

- Work with pilot area to finalize criteria for vessel turn-in program
- In conjunction with partners (e.g. SC Sea Grant Consortium), develop an outreach plan for promoting pilot vessel turn-in program
- Continue QA/QC of MyCoast abandoned vessel database (field verification)
- Work with MyCoast application developers to continue updating baseline dataset and develop a strategy to incorporate proposed enhancements

**Major Milestone(s):**

- Finalize criteria for pilot vessel turn-in program
- Develop outreach plan for promotion of pilot program
- Complete field verification component of MyCoast database QA/QC effort
- Develop strategy to incorporate proposed enhancements

**Budget:** \$130,500

**Year 3:** July 2023 - June 2024

**Description of activities:**

- Execute outreach plan to promote pilot program
- Conduct a vessel turn-in event(s) in pilot location
- Evaluate the results of the pilot program, summarize process, lessons learned, and provide recommendations for future implementation
- Continue QA/QC and verification of new MyCoast abandoned boat reports
- Work with MyCoast application developers to begin executing enhancements

**Major Milestone(s):**

- Summary report and model framework for a vessel turn-in program
- Present pilot project results (with local governments, at select conferences and meetings)

**Budget:** \$155,500

**Year 4:** July 2024 - June 2025

**Description of activities:**

- Launch beta version of enhanced MyCoast system with test group consisting of internal DHEC staff and agency partners and request feedback on additional required modifications
- Begin incorporating additional modifications identified by test group

**Major Milestone(s):**

- Launch beta version of enhanced MyCoast system

**Budget:** \$130,500

**Year 5:** July 2025 - June 2026

**Description of activities:**

- Launch public version of enhanced MyCoast system

- Promote enhanced MyCoast system at targeted meetings
- Evaluate changes in MyCoast usage

**Major Milestone(s):**

- Public launch of enhanced MyCoast system

**Budget:** \$130,500

**VII. Fiscal and Technical Needs**

**A. Fiscal Needs:** CZMA Section 309 funds should be sufficient to carry out the proposed program change. Funding associated with the pilot vessel turn-in program is expected to primarily cover vessel disposal costs. It is not anticipated that funds would be offered as an incentive for boat turn-in, at least within the pilot stage of the program. Long-term, continuation of efforts proposed under this strategy will become programmatic initiatives established under Section 306.

**B. Technical Needs:** DHEC OCRM will work with MyCoast South Carolina application developers on tool enhancements.

**VIII. Projects of Special Merit (Optional):** Development of a South Carolina Marine Debris Action Plan would further DHEC OCRM's marine debris prevention efforts. This plan could be modeled off the recently released *North Carolina Marina Debris Action Plan*,<sup>100</sup> which was developed to compliment NOAA's *Southeast Marine Debris Action Plan*.<sup>101</sup> As noted in the [Phase I Assessment for Marine Debris](#), DHEC OCRM staff participated in the development of the *Southeast Marine Debris Action Plan*, which was published by the NOAA MDP in June 2019. Since its release, staff have continued to participate in regional working group calls aimed at achieving the identified objectives by putting into action the strategies outlined in the regional plan.

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<sup>100</sup> <http://nccoast.org/wp-content/uploads/2020/03/N.C.-Marine-Debris-Action-Plan-FINAL.pdf>

<sup>101</sup> <https://marinedebris.noaa.gov/regional-action-plan/southeast-marine-debris-action-plan>

## Coastal Hazards

### I. Issue Area(s)

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

- |  |   |
|--|---|
| <input type="checkbox"/> Aquaculture                           | <input type="checkbox"/> Cumulative and Secondary Impacts |
| <input type="checkbox"/> Energy and 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. Strategy Description

#### A. The proposed strategy will lead to, or implement, the following types 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. Strategy Goal

The goals of this strategy are to 1) improve the data collection process associated with DHEC OCRM's emergency operations responsibilities and better communicate this information with local governments, and 2) update and expand the use of DHEC OCRM's Beach Atlas tool to comply with requirements of the Beachfront Management Reform Act.

#### C. Background and Strategy Narrative

South Carolina's Code of Laws (S.C. Code Ann. Sections 48-39-10 *et seq.*, *as amended*) establishes DHEC OCRM's authorities for permitting activities in the state's critical areas. The state's beachfront jurisdictional lines delineate the extent of DHEC OCRM's direct permitting authority for activities within the defined beaches and beach/dune system critical areas. DHEC OCRM has specific conditions for construction and reconstruction of structures within this area. Each year, DHEC OCRM conducts a field-based structural inventory assessment to maintain a current list and status of all

habitable structures, pools, and erosion control structures within the state's beachfront jurisdiction. Following an emergency that impacts the South Carolina coastal zone, DHEC OCRM is responsible for conducting initial damage assessment of structures located within the state's beachfront jurisdiction. Annual structural inventory data serves as a baseline for post-disaster damage assessment activities.

By law, DHEC OCRM is required to establish and review the position of the state's beachfront jurisdictional lines every seven to ten years. In 2018, Act 173, the Beachfront Management Reform Act,<sup>102</sup> was signed by South Carolina Governor Henry McMaster. The Act established the position of the jurisdictional baselines and setback lines for the 2018 establishment cycle. Act 173 also provided instructions to DHEC OCRM on aspects of public outreach associated with the jurisdictional line establishment process. One such requirement includes making available all information and raw data used to determine the location of the proposed lines.

DHEC OCRM's proposed coastal hazards strategy will accomplish two high-priority goals over a four-year period. The first goal is to improve DHEC OCRM's process for emergency operations data collection, and to better communicate this information with local governments. To date, DHEC OCRM has used a paper-based system for recording data associated with annual beachfront structural inventory activities. The process involves printing data collection forms, which inventory teams populate in the field. Staff then update the tabular inventory dataset by digitally transcribing hand-written data and field notes. Staff subsequently update the spatial inventory dataset with the same information. In early 2020, DHEC OCRM will begin developing a digital data collection system for annual beachfront structural inventory activities using ESRI's Collector application.<sup>103</sup> Current plans involve beta testing the system in summer 2020, developing new standard operating procedures and staff training materials in fall 2020, and officially implementing the new system for structural inventory data collection in early 2021. Applying lessons learned from the implementation of ESRI's Collector application for structural inventory activities, the proposed strategy involves replicating this process for DHEC OCRM's post-disaster damage assessment activities.

This strategy also aims to better communicate with local governments regarding information on the structures located within the state's beachfront jurisdiction. DHEC OCRM's Emergency Operations Plan calls for communicating this information with local beachfront communities annually prior to the start of hurricane season. In order to meet post-disaster regulatory requirements, the Department must provide information to local building officials regarding the assessed damage to beachfront

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<sup>102</sup> [https://www.scstatehouse.gov/sess122\\_2017-2018/bills/4683.htm](https://www.scstatehouse.gov/sess122_2017-2018/bills/4683.htm)

<sup>103</sup> <https://www.esri.com/en-us/arcgis/products/collector-for-arcgis/overview>

structures (specifically minor damage) so that authorizations to issue repairs can be made promptly (R. 30-14(D)(4)(e)). DHEC OCRM's proposed coastal hazards strategy involves developing a tool, specifically for local beachfront community officials, to streamline the communication process. Because the information to be shared with local entities is spatial, a GIS-based web application is expected to be the most appropriate type of tool to meet OCRM's regulatory requirements. However, OCRM will engage local governments prior to the start of the new strategy to gather feedback on the development of a tool that allows OCRM to meet regulatory requirements while also serving to provide local officials with information they need in order to aid local recovery efforts. This proposed tool may also be used to share information with local officials on specific repair/rebuilding requirements within the state's beachfront jurisdiction. In spring 2020, DHEC OCRM will begin a cursory evaluation of the structures located seaward of the setback line as established by Act 173. This desktop analysis will be followed by a field-based effort to verify the list of structures within the state's beachfront jurisdiction. The final list of structures will be used to populate the proposed tool for local government officials.

The second high-priority goal associated with the proposed strategy is to update and expand the use of DHEC OCRM's Beach Atlas tool to comply with the public outreach requirements of Act 173. The Beach Atlas was initially developed in an effort to consolidate relevant SC CZMP data and information in an easily accessible format. The Beach Atlas provides direct links to a number of DHEC OCRM public web applications including the Beachfront Jurisdictional Lines,<sup>104</sup> Beach Renourishment,<sup>105</sup> Beach Erosion Research and Monitoring,<sup>106</sup> and Beach Guide<sup>107</sup> apps. The Beach Atlas is an ideal location to house public information to meet the requirements of Act 173, due to its comprehensive nature. This would require updates to the Atlas itself, as well as some of the web applications linked within, including the Beachfront Jurisdictional Lines and Beach Renourishment apps. Updating the Beach Atlas is an anticipated three-year effort, proposed to begin with content review in Year 2 of the upcoming strategy.

In addition to the requirements identified above, Act 173 included a section that requires DHEC OCRM to promulgate regulations to implement provisions of the Act. This includes regulations the Department will use to locate a primary oceanfront sand dune, which is used to set the baseline (the more seaward jurisdictional line) in certain locations along the coast (S.C. Code of Laws § 48-39-280(A)(1)). To initiate input into the regulatory development process, a Beachfront Jurisdictional Line Stakeholder Workgroup was convened by DHEC OCRM between October 2018 and February 2019.

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<sup>104</sup> <https://gis.dhec.sc.gov/shoreline/>

<sup>105</sup> <https://gis.dhec.sc.gov/renourishment/>

<sup>106</sup> <https://gis.dhec.sc.gov/bermexplorer/>

<sup>107</sup> <https://gis.dhec.sc.gov/beachaccess/>

The Workgroup was charged with developing recommendations to help formulate regulations for implementing future jurisdictional line review processes. One recommendation (Recommendation 3) provided by the Workgroup identified how the baseline should be set in the absence of a primary oceanfront sand dune. Specifically, the recommendation states:

*In standard and stabilized inlet zones on developed beachfronts, if no primary oceanfront sand dune exists, the upland location of the crest of the primary dune should be located by using the ideal dune analysis, a process outlined in regulation (S.C. Code Ann. Regs. 30-21(H)(2)), of a volumetric calculation for a 3-foot-high reference dune. After this analysis is completed, the baseline should be established at the crest of the ideal dune. If the ideal dune analysis establishes the baseline landward of a habitable structure, then the baseline should be placed at either the seaward edge of the habitable structure or the landward edge of the active beach, whichever is further landward. The baseline should not be set seaward of its position established by Act 173.*

Senate Bill 868,<sup>108</sup> which was introduced in the 2019-2020 Legislative Session of the South Carolina General Assembly, would amend Section 48-39-280, S.C. Code of Laws, to incorporate this recommendation. If passed, this statutory requirement will be incorporated into the final jurisdictional line establishment process for DHEC OCRM. In preparation, DHEC OCRM must determine which structures within its beachfront jurisdiction would apply under this scenario. Within Year 1 of the proposed strategy, DHEC OCRM will review the current list of structures within the state's beachfront jurisdiction and develop a secondary list of structures that apply to the scenario described in Recommendation 3.

### **III. Needs and Gaps Addressed**

The proposed coastal hazards strategy addresses a number of high-priority needs and gaps. As described in the [Stakeholder Engagement](#) section, internal staff identified improved data management as a priority need. By transitioning to a digital data collection system for post-disaster damage assessment activities, DHEC OCRM is improving the efficiency of data collection and data processing efforts. Furthermore, the digital system should result in improved quality and consistency of data collected by field staff. A high-priority need identified by external stakeholders was information sharing with local governments. DHEC OCRM has also recognized the need to improve communication with local governments related to structures within the state's beachfront jurisdiction. Development of a communication tool, as described above, will allow for enhanced communication with local municipalities.

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<sup>108</sup> [https://www.scstatehouse.gov/sess123\\_2019-2020/bills/868.htm](https://www.scstatehouse.gov/sess123_2019-2020/bills/868.htm)

The Beachfront Management Reform Act requires DHEC OCRM to publicly share all data and information used in the process to establish the state's beachfront jurisdictional lines. By updating and enhancing the Beach Atlas tool, DHEC OCRM will be able to comply with this requirement. The utility of improvements to the Beach Atlas tool, however, extend beyond the requirements of Act 173. Both internal and external survey respondents identified the need for coastal hazards outreach and education, specifically risk communication with state-level decision makers and the public. The enhanced Beach Atlas described above will serve as a single, comprehensive, and versatile tool for sharing beachfront data and information with a variety of stakeholders.

#### **IV. Benefits to Coastal Management**

A key element of the Coastal Zone Management Program is managing development in high-hazard areas. Proposed improvement to the beachfront data collection process enables DHEC OCRM to better implement state laws and regulations which support the state's beachfront management goals and protect vulnerable shorelines and natural ecosystems. Further, DHEC OCRM is committed to involving local governments in long-range comprehensive planning and management of the beach/dune system. The proposed strategy will equip local governments with data and information needed for long-term beachfront planning initiatives and management of this critical resource.

Regular maintenance and updates to the Beach Atlas will become a new procedure for OCRM. This tool will serve as OCRM's primary public-facing resource to convey the state's beachfront jurisdictional area, as well as beachfront hazard-related information including long-term erosion rates and beach renourishment information.

#### **V. Likelihood of Success**

There is a high likelihood of attaining the proposed strategy goal and program change during the five-year assessment cycle. Before the start of the upcoming strategy cycle, DHEC OCRM will have developed, tested, and launched ESRI's Collector application for structural inventory purposes. The Department will have the advantage of applying lessons learned from this process to a similar development plan for post-disaster damage assessment activities. Prior to the start of the upcoming strategy, DHEC OCRM also plans to gather input from local governments on the development of the proposed communication tool. This feedback will be incorporated into the development plan for the tool. Lastly, DHEC OCRM has extensive experience developing web applications for sharing information, which also increases the likelihood of success associated with proposed enhancements to the Beach Atlas tool.

## VI. Strategy Work Plan

**Strategy Goal:** Improve the process for data collection associated with DHEC OCRM's emergency operations responsibilities and better communicate this information with local governments; Update and expand the use of DHEC OCRM's Beach Atlas tool to comply with requirements of the Beachfront Management Reform Act.

**Total Years:** 4

**Total Budget:** \$

**Year 1:** July 2021 - June 2022

**Description of activities:**

- Begin the process for replicating the use of ESRI's Collector application for DHEC OCRM's post-disaster damage assessment activities
- Beta test the new data collection process for damage assessment
- Develop standard operating procedures and staff training for the new process
- Train staff on new data collection procedures for damage assessment
- Review updated list of structures within the state's beachfront jurisdiction to determine which structures apply to Recommendation 3 provided by the Beachfront Jurisdictional Line Workgroup
- Summarize information on structures within the state's beachfront jurisdiction and engage local governments to request input on tool to enhance communication between DHEC OCRM and local communities

**Major Milestone(s):**

- Newly developed standard operating procedures and staff training for damage assessment data collection
- Train staff and launch new digital data collection process for damage assessment
- Newly developed list of structures that apply to Recommendation 3
- Targeted feedback received from local communities on development of a communication tool

**Budget:** \$217,500

**Year 2:** July 2022 - June 2023

**Description of activities:**

- Develop tool to enhance communication with local governments
- Launch communication tool with external test group, request feedback and incorporate as needed
- Launch communication tool with full group of local government contacts
- Begin updating and enhancing content within Beach Atlas

**Major Milestone(s):**

- Newly launched communication tool
- Initial, priority enhancements made to Beach Atlas

**Budget:** \$202,500

**Year 3:** July 2023 - June 2024

**Description of activities:**

- Present and demo communication tool with local governments at targeted meetings
- Begin updating Beachfront Jurisdictional Line web application as a component of Beach Atlas enhancement effort

**Major Milestone(s):**

- Presentation and demo of communication tool with local governments
- Updated Beachfront Jurisdictional Line web application

**Budget:** \$177,500

**Year 4:** July 2024 - June 2025

**Description of activities:**

- Begin updating Beachfront Renourishment web application as a component of Beach Atlas enhancement effort

**Major Milestone(s):**

- Updated Beach Renourishment web application

**Budget:** \$202,500

**VII. Fiscal and Technical Needs**

**A. Fiscal Needs:** CZMA Section 309 funds should be sufficient to carry out the proposed program changes.

**B. Technical Needs:** DHEC OCRM will work with GIS Manager on application developments and enhancements.

**VIII. Projects of Special Merit (Optional):** As indicated in the [Phase II Assessment for Wetlands](#), the City of Folly Beach released a *Marshfront Management Plan* in July 2019 as an adaptive management effort to guide planning along the City's vulnerable marshfront.<sup>109</sup> To date, the City of Folly Beach is the only municipality in South Carolina to develop such a plan. Development of a framework or model Marshfront Management Plan at the state-level, and assisting local governments with development of local plans, was a suggestion received through the external stakeholder survey and is a wetland management opportunity for the SC CZMP.

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<sup>109</sup> <https://www.cityoffollybeach.com/wp-content/uploads/2019/11/Marshfront-Management-Plan-July-19-FINAL.pdf>

**5-Year Budget Summary by Strategy**

At the end of the strategy section, please include the following budget table summarizing your anticipated Section 309 expenses by strategy for each year. Generally, CMPs should only develop strategies for activities that the state intends to fund and work on given their anticipated level of Section 309 funding. However, in some circumstances, CMPs may wish to use the assessment and strategy development process as a broader strategic planning effort for the CMP. In that case, the CMP may elect to include additional strategies that exceed the state’s anticipated Section 309 funding over the five-year period. If the CMP chooses this approach, it should still clearly indicate which strategies it anticipates supporting with Section 309 funding and which strategies it anticipates supporting through other funding sources.

<b>Strategy Title</b>	<b>Anticipated Funding Source (309 or Other)</b>	<b>Year 1 Funding</b>	<b>Year 2 Funding</b>	<b>Year 3 Funding</b>	<b>Year 4 Funding</b>	<b>Year 5 Funding</b>	<b>Total Funding</b>
Marine Debris	309	\$115,500	\$130,500	\$155,500	\$130,500	\$130,500	<b>\$662,500</b>
Coastal Hazards	309	\$217,500	\$202,500	\$177,500	\$202,500	---	<b>\$800,000</b>
<b>Total Funding</b>		<b>\$333,000</b>	<b>\$333,000</b>	<b>\$333,000</b>	<b>\$333,000</b>	<b>\$130,500</b>	<b>\$1,462,500</b>