JOSH STEIN
Governor
D. REID WILSON
Secretary
TANCRED MILLER
Director

NORTH CAROLINA
Environmental Quality

CRC-25-43

November 5, 2025

MEMORANDUM

TO: Coastal Resources Commission

FROM: Ken Richardson, *Shoreline Management Specialist*

SUBJECT: Inlet Hazard Areas (IHA) Boundary Update:

The establishment of Areas of Environmental Concern (AEC) is authorized under the NC Coastal Area Management Act (CAMA) of 1974 (NCGS 113A-100 et seq.) and forms the foundation of the North Carolina Coastal Resources Commission's (CRC) permitting program for regulating coastal development. Rules defining three specific ocean hazard AECs appear in 15A NCAC 07H.0300: 1) Ocean Erodible, 2) Inlet Hazard, and 3) Unvegetated Beach AECs. The inlet hazard area (IHA) AEC is defined in 15A NCAC 07H.0304(2) as locations that "are especially vulnerable to erosion, flooding and other adverse effects of sand, wind, and water because of their proximity to dynamic ocean inlets."

Unlike other CRC jurisdictional areas, IHA boundaries are defined in a report referenced in the CRC's rules at 7H.0304(2). The current IHA boundaries correspond to maps originally developed by Priddy and Carraway (1978) for all of the State's then-active inlets. The report designating the IHA boundaries was adopted by the CRC in 1979, with minor amendments since that time.

The original IHA boundaries were based on statistical analysis (and to a lesser extent previous inlet location) of historical shoreline movement identified on multiple aerial photosets. In most cases, the statistical methods used in the 1978 study identified the landward-most shoreline position (99% confidence interval) projected to occur between 1978 and 1988. Originally, the CRC anticipated that these boundaries were to be updated at the end of the 1980s. However, due to a combination of factors, that update did not occur.

It was not until the late 1990s, after the CRC's Science Panel on Coastal Hazards was formed, that the need to update IHAs became more of a focal point of discussion. The following is a summarized timeline from 1998 to 2025:

- **1998-1999**: The newly-formed Science Panel recommended to the CRC that the IHAs were outdated and should be updated. The Science Panel recommended that DCM hire staff to work on inlet hazards data collection and analysis.

- **November 2002**: DCM hired a Coastal Hazards GIS Specialist to support all oceanfront and inlet data collection, mapping, and analysis efforts.

- **2004-2008**: Data collection and mapping in preparation for updating IHAs. DCM worked extensively with the Science Panel to develop inlet delineation methodologies.

- **2009**: DCM synthesized data and study results into a report.

- **May & July 2010**: DCM presented a proposed IHA boundary update to the CRC.

- **2010-2012**: Due to concerns about the increased size of the proposed Inlet Hazard Areas (IHAs), there were numerous questions regarding the applicable IHA rules, and particularly whether "risk" was consistent across all areas within the proposed boundaries. With several of these questions about IHA development standards remaining unresolved, and with other major issues demanding the attention of both the CRC and the Science Panel, such as studies on terminal groins and updates to oceanfront erosion rates, the IHA boundary update was temporarily paused.

- **2012**: The General Assembly directed the CRC to study the feasibility of creating a new AEC for the lands adjacent to the mouth of the Cape Fear River. Session Law 2012-202 required the CRC to consider the unique coastal morphologies and hydrographic conditions of the Cape Fear River region, and to determine if action is necessary to preserve, protect, and balance the economic and natural resources of this region through the elimination of current overlapping AECs by incorporating appropriate development standards into one single AEC unique to this location. During this study, the CRC found that while the Cape Fear River inlet did present a unique set of challenges, other inlets may have similar issues. The CRC therefore decided to undertake a comprehensive review of inlet-related issues, with the expectation of developing additional management tools that would allow the CRC to more proactively address the issues confronted by local governments in these dynamic areas.

- **February 2014**: The CRC asked the Science Panel to review a recommendation to remove IHA status from Mad Inlet, which had been naturally closed for some time. From this effort, the Panel made two recommendations that were presented to the CRC: 1) Mad Inlet was not at risk of reopening so IHA status should be removed; and 2) current IHAs were severely out of date and needed to be updated.

- **September 2014**: DCM presented a report to the CRC that was prepared following a series of stakeholder meetings, entitled, "NC Coastal Resources Commission Inlet Management Study Findings and Policy Options." Stakeholders made several recommendations to the CRC that pertained specifically to IHAs: 1) The CRC should task the Science Panel to

complete the development of methods to define revised IHAs and potential inlet and near-inlet setback lines for CRC review; and, 2) The IHAs should be eliminated and incorporated into the Ocean Erodible Area (OEA) while applying the same development standards currently utilized in the OEA.

- **May 2016**: Staff proposed to the CRC to continue discussing the IHAs, and to update inlet shoreline change rates that were presented in 2010 – CRC unanimously approved.

- **July 2016**: At the CRC meeting in Beaufort, the Commission issued the following scope of work to the Science Panel:

    - Develop a methodology for calculating inlet shoreline change rates.
      The Science Panel chose the linear regression method to measure shoreline change at inlets. This method incorporates multiple shorelines, versus the end-point method currently used on the oceanfront which only uses two shorelines (early and current). Inlet shoreline changes rates have not historically been used for determining construction setbacks at inlets.
    - Re-evaluate points along the oceanfront shoreline where inlet processes no longer influence shoreline position.
      When the Science Panel first started working on updating IHA boundaries in 2005, the Panel evaluated changes in shoreline position over time to determine the location along the shoreline where inlet-related processes no longer have a dominant influence on the shoreline's position.
    - Present results at a CRC Meeting.

- **November 2018**: At the CRC meeting in Ocean Isle, the Science Panel Co-Chair, Mr. Bill Birkemeier, presented the Panel's updated proposed IHA boundaries, and described the methods utilized by the Panel to map them.

- **February 2019**: The Science Panel's IHA report titled, "Inlet Hazard Area Boundary 2019 Update: Science Panel Recommendations to the North Carolina Coastal Resources Commission" was approved by the CRC, in addition to rule amendments 07H.0304, and 07H.0310. This started the rule making process.

    - ***September 2019***: The CRC approved the fiscal analysis
    - ***December 2019***- January 2019: Seven Public Hearings held in each of the affected counties (Brunswick, New Hanover, Onslow, Pender, Carteret, Hyde and Dare)
    - ***December 2019- January 2019***: Five public workshops held in North Topsail, Ocean Isle, Holden Beach, Carolina Beach and Topsail Beach
    - ***January 2020***: Public comment period closed, but then was later extended to March 2020 to allow more time for submitting comments
    - ***COVID-19***: delayed rule making until the CRC was able to meet in-person.

- **April 2023**: One of the recommendations in the Science Panel's 2019 report was to re-evaluate Inlet Hazard Area (IHA) boundaries and associated erosion rates in coordination with future oceanfront erosion rate update studies. However, delays in rulemaking, caused by an extended public comment period and the onset of COVID-19, meant that the next

scheduled oceanfront erosion rate update (2025) was approaching. In response, and at the request of both stakeholders and Division staff, the Coastal Resources Commission (CRC) re-issued a scope of work to its Science Panel.

  - Perform 5-year re-evaluation of IHA methods and boundaries incorporating data collected since the 2019 study.
  - Evaluate end-point and linear regression methods, and consider alternative methods for calculating oceanfront shoreline change rates.
  - Present draft report(s), including proposed IHA boundaries and erosion rates.

- **August 2025**: The CRC's Science Panel on Coastal Hazards and DCM Staff presented results for the updated IHA boundaries and OEA & IHA erosion rate studies detailed in the following reports:

  - *Inlet Hazard Area Boundaries, 2025 Update: Science Panel Recommendations to the North Carolina Coastal Resources Commission (download)*
  - *North Carolina 2025 Inlet Hazard Area (IHA) Erosion Rate & Setback Factors: Update Study (download)*
  - *North Carolina 2025 Oceanfront Setback Factors & Long-Term Average Annual Erosion Rate Update Study: Methods Report (download)*

At the August CRC meeting, Dr. Laura Moore, Chair of the CRC's Science Panel, presented the 2025 updated Inlet Hazard Area (IHA) boundaries and the methodologies used to define them. Specific details for each IHA boundary can be found in Chapter 3 (starting on page 30) of the report entitled *"Inlet Hazard Area Boundaries, 2025 Update: Science Panel Recommendations to the North Carolina Coastal Resources Commission."*

As Dr. Moore demonstrated at the August meeting, the spatial extent of the updated 2025 IHAs varies by inlet, with some areas decreasing in size compared to the current (1979) boundaries, while others have expanded. Table 1 provides a general comparison of the number of structures located within the current and proposed updated IHAs. Based on recent imagery and county GIS tax data, 783 structures are located within the current IHAs, compared to 866 within the proposed 2025 IHAs, a net increase of 83 structures that would be included within IHA boundaries.

Table 1. This table illustrates the number of structures inside the current IHA and the proposed 2025 IHA. The last column illustrates the difference in number of structures transitioning from the current IHA to the udpated IHA. (-) Indicates decrease.

Location	Total Structures (Current IHA)	Total Structures (2025 IHA)	Total Structures (Increase/Decrease)
Tubbs Inlet - Sunset Beach	206	17	-189
Tubbs Inlet - Ocean Isle	41	30	-11
Shallotte Inlet - Ocean Isle	0	200	200
Shallotte Inlet - Holden Beach	59	144	85
Lockwood Folly Inlet - Holden Beach	4	42	38
Lockwood Folly Inlet - Oak Island	43	105	62
Carolina Beach Inlet – Carolina Bch.	0	18	18
Masonboro Inlet - Wrightsville Beach	0	3	3
Mason Inlet - Wrightsville Beach	1	16	15
Mason Inlet - Figure Eight	36	10	-26
Rich Inlet - Figure Eight	36	62	26
New Topsail Inlet – Topsail Beach	177	17	-160
New River Inlet - N. Topsail Beach	84	125	41
Bogue Inlet - Emerald Isle	96	77	-19
Total:	**783**	**866**	**83**

Consistent with previous update studies, IHA boundaries at undeveloped inlets were not analyzed. DCM staff will recommend removing IHA designations from the following inlet locations: Little River Inlet (SC/NC), New River and Brown's Inlets (Camp Lejeune), Bogue Inlet (Hammocks Beach State Park), Barden Inlet, Ocracoke Inlet, and Hatteras Inlet. It is important to note that while inlet hazards are present at these sites, the areas remain undeveloped.

Rule Amendments

In 1981, the Commission recognized that inlet areas posed greater erosion hazards compared to oceanfront zones, noting at the time that 60 of the 70 structures affected by erosion were located near inlets. To address these risks, the Commission established additional regulations, including setbacks from the first line of stable, natural vegetation; limits on density, lot size, and structure size; requirements for public access; and prohibitions on beach bulldozing, artificial dune creation, and permanent erosion control structures (except for public projects). Because shoreline change rates have not historically been calculated for inlet areas, the setback factor used in the adjacent Ocean Erodible Area (OEA) is applied throughout each Inlet Hazard Area (IHA).

Current IHA rules have remained relatively unchanged since adoption in 1981. The following are current rules specific to IHAs:

1. **15A NCAC 07H .0304(2)** (Defines Inlet Hazard Areas):

   Inlet Hazard Area. The inlet hazard areas are natural-hazard areas that are especially vulnerable to erosion, flooding, and other adverse effects of sand, wind, and water because of their proximity to dynamic ocean inlets. This area extends landward from the mean low water line a distance encompassing that area within which the inlet migrates, based on statistical analysis, and shall consider such factors as previous inlet territory, structurally weak areas near the inlet, and external influences such as jetties, terminal groins, and channelization. The areas on the maps identified as Inlet Hazard Areas included in the report entitled INLET HAZARD AREAS, The Final Report and Recommendations to the Coastal Resources Commission, 1978, as amended in 1981, by Loie J. Priddy and Rick Carraway are incorporated by reference and are hereby designated as Inlet Hazard Areas, except for:

   (a) the location of a former inlet which has been closed for at least 15 years;
   (b) inlets that due to shoreline migration, no longer include the current location of the inlet; and
   (c) inlets providing access to a State Port via a channel maintained by the United States Army Corps of Engineers.

   In all cases, the Inlet Hazard Area shall be an extension of the adjacent ocean erodible areas and in no case shall the width of the inlet hazard area be less than the width of the adjacent ocean erodible area.

2. **15A NCAC 07H .0310** (Use Standards for Inlet Hazard Areas):

   (a) Inlet Hazard Areas of Environmental Concern as defined by Rule .0304 of this Section are subject to inlet migration, rapid and severe changes in watercourses, flooding and strong tides. Due to the extremely hazardous nature of the Inlet Hazard Areas, all development within these areas shall be permitted in accordance with the following standards:

   (1) All development in the inlet hazard area shall be set back from the vegetation line a distance equal to the setback required in the adjacent ocean hazard area;
   (2) Permanent structures shall be permitted at a density of no more than one commercial or residential unit per 15,000 square feet of land area on lots subdivided or created after July 23, 1981;
   (3) Only residential structures of four units or less or non-residential structures of less than 5,000 square feet total floor area shall be allowed within the inlet hazard area, except that access roads to those areas and maintenance and replacement of existing bridges shall be allowed;
   (4) Established common-law and statutory public rights of access to the public trust lands and waters in Inlet Hazard Areas shall not be eliminated or restricted. Development shall not encroach upon public accessways nor shall it limit the intended use of the accessways; and
   (5) All other rules in this Subchapter pertaining to development in the ocean hazard areas shall be applied to development within the Inlet Hazard Areas.

3. **15A NCAC 07H .0308(c)(6)** (Specific Use Standards for Ocean Hazard Areas):

No new dunes shall be created in inlet hazard areas. Reconstruction or repair of existing dune systems as defined in Rule .0305 of this Section and within the Inlet Hazard Area may be permitted.

Updating IHA boundaries will also require rule amendments. At the very least, amendments to 15A NCAC 07H .0304 will be needed, where AECs within the Ocean Hazard Area are defined. Inlet Hazard Areas defined in 15A NCAC 07H .0304(2):

- 07H .0304(2) Amendment: change reference to the report from "*Inlet Hazard Areas, The Final Report and Recommendations to the Coastal Resources Commission, 1978, as amended in 1981, by Loie J. Priddy and Rick Carraway*" to "*Inlet Hazard Area Boundaries, 2025 Update: Science Panel Recommendations to the North Carolina Coastal Resources Commission*."
    - This single amendment once effective would make the updated IHAs effective.

However, since the IHA setback factors are now calculated using inlet-specific erosion rates rather than being carried over from the adjacent OEA, additional rule amendments will be necessary. These will be discussed in greater detail following this IHA boundary discussion and during the OEA and IHA erosion rate update presentation. While there are other amendments being proposed by DCM staff for the purpose of clarification and cleaning up the rules, the following will need to be considered:

- 07H .0310 Use Standards for Inlet Hazard Areas
    - Current version of 07H. 0310(1) requires use of adjacent OEA erosion rate inside IHA. This would need to be amended to reference IHA erosion rate setback factors instead of the oceanfront erosion rates.

Staff's Recommendation to the Commission

Following the presentation of the updated IHA boundaries and OEA and IHA erosion rate and setback factors, staff will request that the Commission consider approving each report to initiate the rulemaking process.

Attachment A: Rules Pertaining to Inlet Hazard Areas & Staff's Proposed Rule Amendments.
Attachment B: 2025 Proposed Inlet Hazard Area Update Maps
Attachment C: CRC – Commissioner Comments/Questions and DCM Responses
Attachment D: Inlet Hazard Area Boundary 2025 Update: Science Panel Recommendations to the North Carolina Coastal Resources Commission (final report).

Attachment A: Rules Pertaining to Inlet Hazard Areas & Staff's Proposed Rule Amendments

15A NCAC 07H .0304 AECS WITHIN OCEAN HAZARD AREAS

The ocean hazard AECs contain all of the following areas:

(1) Ocean Erodible Area. ~~This is the area where there exists a substantial possibility of excessive erosion and significant shoreline fluctuation. The oceanward boundary of this area is the mean low water line. The landward extent of this area is the distance landward from the vegetation line as defined in 15A NCAC 07H .0305(a)(5) to the recession line established by multiplying the long-term annual erosion rate times 90; provided that, where there has been no long-term erosion or the rate is less than two feet per year, this distance shall be set at 180 feet landward from the vegetation line. For the purposes of this Rule, the erosion rates are the long-term average based on available historical data. The current long-term average erosion rate data for each segment of the North Carolina coast is depicted on maps entitled "North Carolina 2019 Oceanfront Setback Factors & Long Term Average Annual Erosion Rate Update Study" and approved by the Coastal Resources Commission on February 28, 2019 (except as such rates may be varied in individual contested cases or in declaratory or interpretive rulings). In all cases, the rate of shoreline change shall be no less than two feet of erosion per year. The maps are available without cost from any Local Permit Officer or the Division of Coastal Management on the internet at http://www.nccoastalmanagement.net.~~ These are oceanfront areas vulnerable to chronic or rapid erosion resulting from the combined effects of wind, ocean waves, current, tides, dredging activities, nearshore bathymetry, and erosion control structures.

(a) The oceanward boundary of this area is the mean low water line;

(b) The landward extent of this area is 180 feet or 90 times the erosion rate, whichever is greater, and is measured landward from the first line of stable and natural vegetation as definition as defined in 15A NCAC 07H .0305(5), the pre-project vegetation line as defined in 15A NCAC 07H .0305(6) or the measurement line as defined in 15A NCAC 07H .0305(9);

(c) For the purposes of this Rule, erosion rates are long-term averages based on historical shoreline data. The current erosion rate data for each segment of the North Carolina coast is depicted on maps entitled "North Carolina 2025 Oceanfront Setback Factors & Long-Term Average Annual Erosion Rate Update Study" and approved by the Coastal Resources Commission on **<<DATE>>**;

(d) For the purpose of siting development, the minimum erosion rate shall be two feet per year;

(e) Data and maps are available from the Division of Coastal Management online at https://www.deq.nc.gov/coastal-management/north-carolina-2025-oceanfront-setback-factors-long-term-average-annual-erosion-rate-update-study/open

(2) Inlet Hazard Area. ~~The inlet hazard areas are natural hazard areas that are especially vulnerable to erosion, flooding, and other adverse effects of sand, wind, and water because of their proximity to dynamic ocean inlets. This area extends landward from the mean low water line a distance encompassing that area within which the inlet migrates, based on statistical analysis, and shall consider such factors as previous inlet territory, structurally weak areas near the inlet, and external influences such as jetties, terminal groins, and channelization. The areas on the maps identified as Inlet Hazard Areas included in the report entitled INLET HAZARD AREAS, The Final Report and Recommendations to the Coastal Resources Commission, 1978, as amended in 1981, by Loie J. Priddy and Rick Carraway are incorporated by reference and are hereby designated as Inlet Hazard Areas, except for:~~

~~(a) the location of a former inlet which has been closed for at least 15 years;~~

~~(b) inlets that due to shoreline migration, no longer include the current location of the inlet; and~~

~~(c) inlets providing access to a State Port via a channel maintained by the United States Army Corps of Engineers.~~

~~In all cases, the Inlet Hazard Area shall be an extension of the adjacent ocean erodible areas and in no case shall the width of the inlet hazard area be less than the width of the adjacent ocean erodible area. This report is available for inspection at the Department of Environmental Quality, Division of Coastal Management, 400 Commerce Avenue, Morehead City, North Carolina or at the website referenced in Item (1) of this Rule.~~ These are areas vulnerable to severe erosion driven by the

dynamic nature of ocean inlets where natural processes and can undergo rapid shoreline change as inlet movement redistributes sand along adjacent beaches through the combined effects of wind, waves, current, dredging activities, nearshore bathymetry, and erosion control structures.

(a) The Inlet Hazard Area erosion rates are the long-term average erosion rates for each inlet hazard area and depicted in the report entitled "Inlet Hazard Area Boundaries, 2025 Update: Science Panel Recommendations to the North Carolina Coastal Resources Commission" and approved by the Coastal Resources Commission on **<<DATE>>**, except for inlets providing access to a State Port via a channel maintained by the United States Army Corps of Engineers.

(b) For the purposes of this Rule, the areas on the maps identified as inlet hazard areas are included in the report entitled, "Inlet Hazard Area Boundaries, 2025 Update: Science Panel Recommendations to the North Carolina Coastal Resources Commission" which were approved by the Coastal Resources Commission on **<<DATE>>** and are incorporated by reference and hereby designated as Inlet Hazard Areas.

(c) For the purpose of siting development, the minimum erosion rate shall be two feet per year.

(d) Data and maps are available from the Division of Coastal Management online at:

(i) Inlet hazard area boundaries: https://www.deq.nc.gov/coastal-management/documents/north-carolina-2025-inlet-hazard-area-iha-boundary-update/open

(ii) Inlet hazard area erosion rates and setback factors: https://www.deq.nc.gov/coastal-management/north-carolina-2025-inlet-hazard-area-iha-erosion-rate-setback-factors-update-study/open

(3) Unvegetated Beach Area. Beach areas within the Ocean Hazard Area of Environmental Concern where no stable and natural vegetation is present may be designated as Unvegetated Beach Areas on either a permanent or temporary basis as follows:

(a) ~~The areas in this category shall be designated following studies by the Division of Coastal Management to determine if the area is subject to rapid unpredictable landform change due to wind and wave action.~~ Areas in this category shall be designated based on studies conducted by the Division of Coastal Management to determine whether the area is subject to rapid and unpredictable landform change, characterized by significant shoreline or inlet movement occurring over short-time periods and high variability in erosion patterns caused by wind, waves, and tidal processes. These areas shall be designated on maps approved by the Coastal Resources Commission and available without cost from any Local Permit Officer or the Division of Coastal Management on the internet at the website referenced in Item (1) of this Rule.

(b) An area that is unvegetated as a result of a hurricane or other major storm event may be designated by the Coastal Resources Commission as an Unvegetated Beach Area for a specific period of time, or until the Division has determined the vegetation has re-established in accordance with 15A NCAC 07H .0305(a)(5). At the expiration of the time specified or the re-establishment of the vegetation, the area shall return to its pre-storm designation.

~~(c) The Commission designates as temporary unvegetated beach areas those oceanfront areas of:~~

~~(i) Surf City and North Topsail Beach in which the vegetation line as shown on the United States National Oceanic and Atmospheric Administration imagery dated September 17, 2018 was destroyed as a result of Hurricane Florence in September 2018; and~~

~~(ii) Oak Island in which the vegetation line as shown on the United States National Oceanic and Atmospheric Administration and Geological Survey imagery dated August 4, 2020 was destroyed as a result of Hurricane Isaias in August 2020.~~

~~The designation AEC boundaries can be found on the Division's website at https://files.nc.gov/ncdeq/Coastal%20Management/GIS/unvegetated_beach_aec.pdf and https://files.nc.gov/ncdeq/Coastal%20Management/GIS/unveg_beachAEC_Oak_Island.zip.~~

(4) State Ports Inlet Management Area. These are areas adjacent to and within Beaufort Inlet and the mouth of the Cape Fear River, providing access to a State Port via a channel maintained by the Unites States Army Corps of Engineers. These areas are unique due to the influence of federally-maintained channels, and the critical nature of maintaining shipping access to North Carolina's State Ports. These areas may require specific management strategies not warranted at other inlets to address erosion and shoreline stabilization. State Ports Inlet Management Areas shall extend from the mean low water line landward as designated on maps approved by the Coastal Resources Commission and available without cost from the Division of Coastal Management, and on the internet at the website at https://files.nc.gov/ncdeq/Coastal%20Management/GIS/state_port_aec.pdf.

History Note: *Authority G.S. 113A-107; 113A-107.1; 113A-113; 113A-124;*
Eff. September 9, 1977;
Amended Eff. December 1, 1993; November 1, 1988; September 1, 1986; December 1, 1985;
Temporary Amendment Eff. October 10, 1996;
Amended Eff. April 1, 1997;
Temporary Amendment Eff. October 10, 1996 Expired on July 29, 1997;
Temporary Amendment Eff. October 22, 1997;
Amended Eff. April 1, 2020; July 1, 2016; September 1, 2015; May 1, 2014; February 1, 2013; January 1, 2010; February 1, 2006; October 1, 2004; April 1, 2004; August 1, 1998;
Readopted Eff. December 1, 2020;
Amended Eff. August 1, 2022; September 1, 2021.

15A NCAC 07H .0310 USE STANDARDS FOR INLET HAZARD AREAS

(a) Inlet Hazard Areas of Environmental Concern as defined by Rule ~~.0304 of this Section are subject to~~ 15A NCAC 07H .0304(2) may experience rapid inlet migration, ~~changes in watercourses, flooding~~ high rates of shoreline erosion, flooding, and strong tides. Due to the hazardous nature of the Inlet Hazard Areas, all development within these areas shall be permitted in accordance with the following standards:

(1) ~~All development in the inlet hazard area shall be set back from the vegetation line a distance equal to the setback required in the adjacent ocean hazard area;~~ Development setbacks within Inlet Hazard Areas shall be measured in a landward direction from the first line of stable and natural vegetation, pre-project vegetation line, hybrid-vegetation line, or measurement line as defined in 15A NCAC 07H .0305, whichever is applicable;

(2) Permanent structures shall be permitted at a density of no more than one ~~commercial or residential~~ unit per 15,000 square feet of land area on lots subdivided or created after July 23, 1981;

(3) Only ~~residential~~ structures ~~of four units or less or non-residential structures of~~ with less than 5,000 square feet total floor area shall be allowed within the ~~inlet hazard area,~~ Inlet Hazard Area, except that access roads to those areas and maintenance and replacement of existing bridges shall be allowed;

~~(4) Established common law and statutory public rights of access to the public trust lands and waters in Inlet Hazard Areas shall not be eliminated or restricted. Development shall not encroach upon public accessways nor shall it limit the intended use of the accessways; and~~

(4) Notwithstanding any other setback requirement in Rule 15A NCAC 07H .0306(a)(5), replacement of a structure within the Inlet Hazard Area greater than 5,000 square feet, or more than one unit per 15,000 square feet of land area, shall be allowed provided the structure meets criteria defined in Rule 15A NCAC 07H 0306(a)(3)(L); and

(5) All other rules in this Subchapter pertaining to development in ~~the ocean hazard areas~~ Ocean Hazard Areas shall be applied to development within the Inlet Hazard Areas.

(b) The ~~inlet hazard area~~ Inlet Hazard Area setback requirements shall not apply to the types of development exempted from the ocean setback rules in 15A NCAC 07H .0309(a), or to the types of development listed in 15A NCAC 07H .0309(c).

(c) In addition to the types of development excepted under Rule .0309 of this Section, small scale development that does not induce further growth in the Inlet Hazard Area, such as the construction of single-family piers and small scale erosion control measures that do not interfere with natural inlet movement, may be permitted on those portions of shoreline within a designated Inlet Hazard Area that exhibit features characteristic of Estuarine Shoreline. Such features include the presence of wetland vegetation, lower wave energy, and lower erosion rates than in the adjoining Ocean Erodible Area. Such development shall be permitted under the standards set out in Rule .0208 of this Subchapter. For the purpose of this Rule, small scale is defined as those projects which are eligible for authorization under 15A NCAC 07H .1100, .1200, and 07K .0203.

History Note: *Authority G.S. 113A-107; 113A-113(b); 113A-124;*
Eff. December 1, 1981;
Emergency Rule Eff. September 11, 1981, for a period of 120 days to expire on January 8, 1982;
Temporary Amendment Eff. October 30, 1981, for a period of 70 days to expire on January 8, 1982;
Amended Eff. April 1, 1999; April 1, 1996; December 1, 1992; December 1, 1991; March 1, 1988;
Readopted Eff. December 1, 2020;
Amended Eff. August 1, 2022.

Attachment B: 2025 Proposed Inlet Hazard Area Update Maps

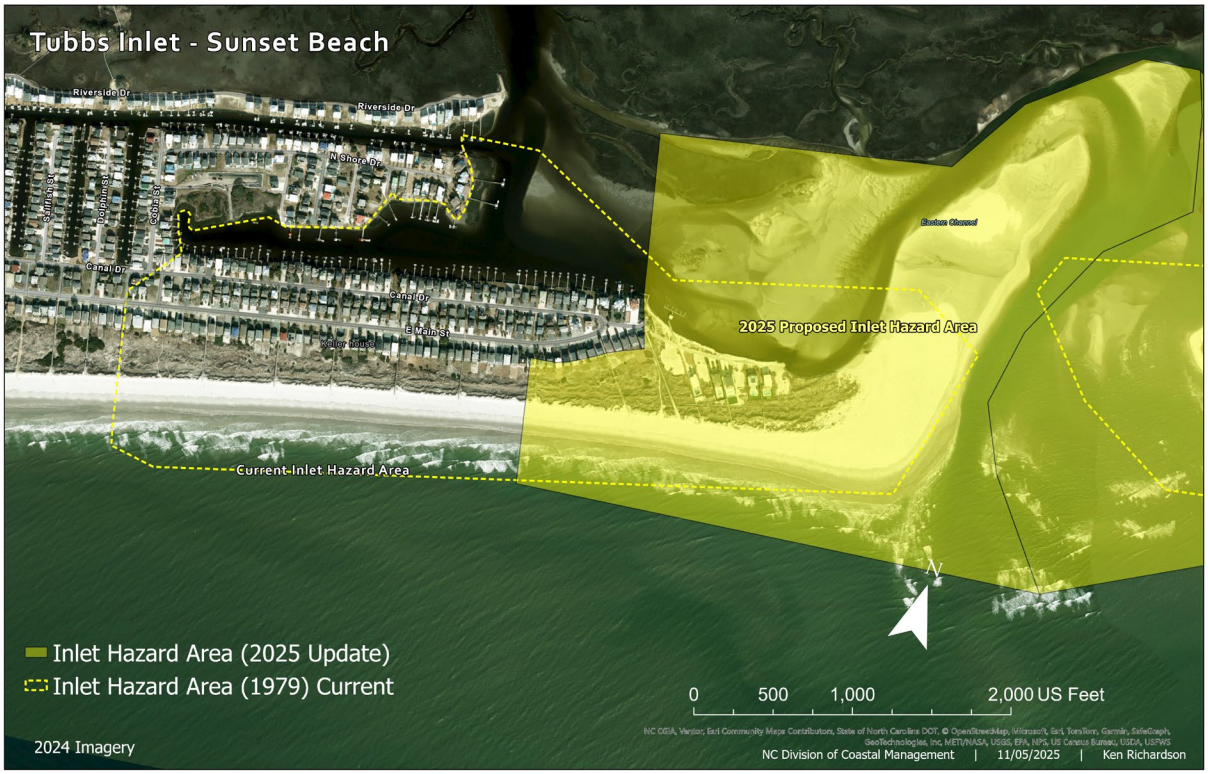

Figure 1. Current and 2025 Proposed Inlet Hazard Area boundaries at Tubbs Inlet – Sunset Beach.

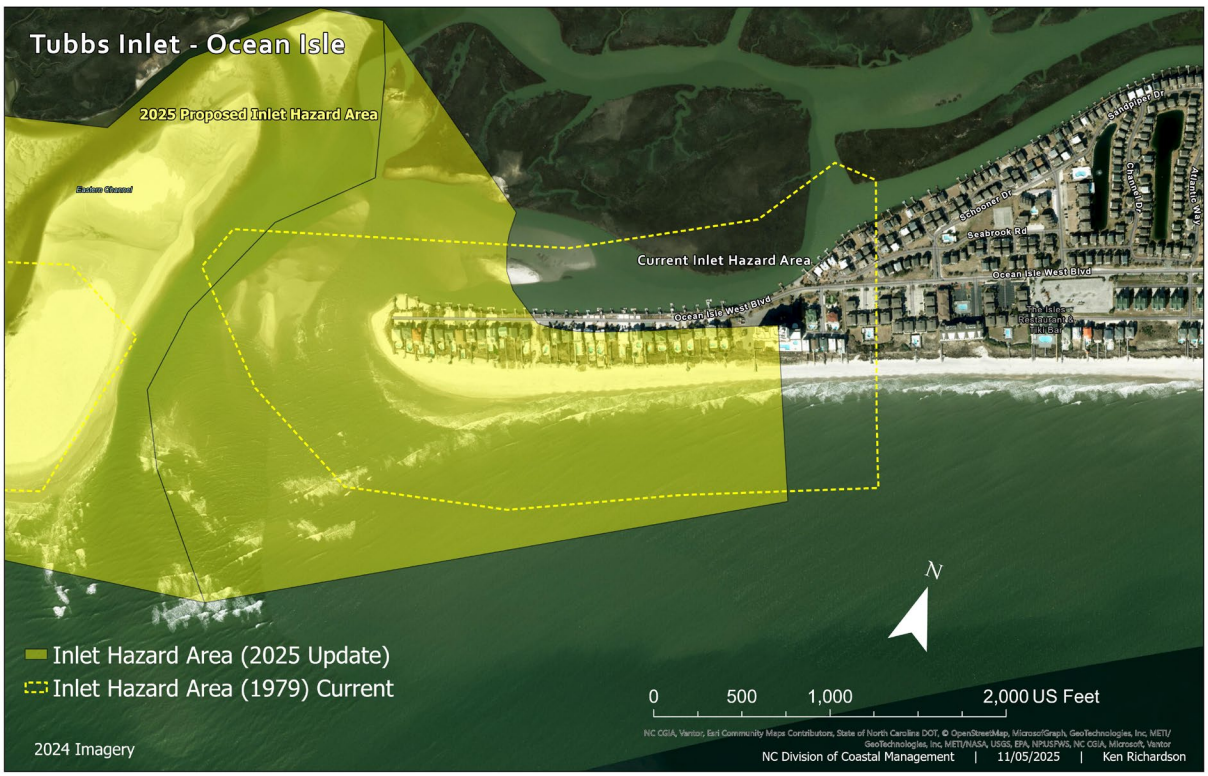

Figure 2. Current and 2025 Proposed Inlet Hazard Area boundaries at Tubbs Inlet – Ocean Isle.

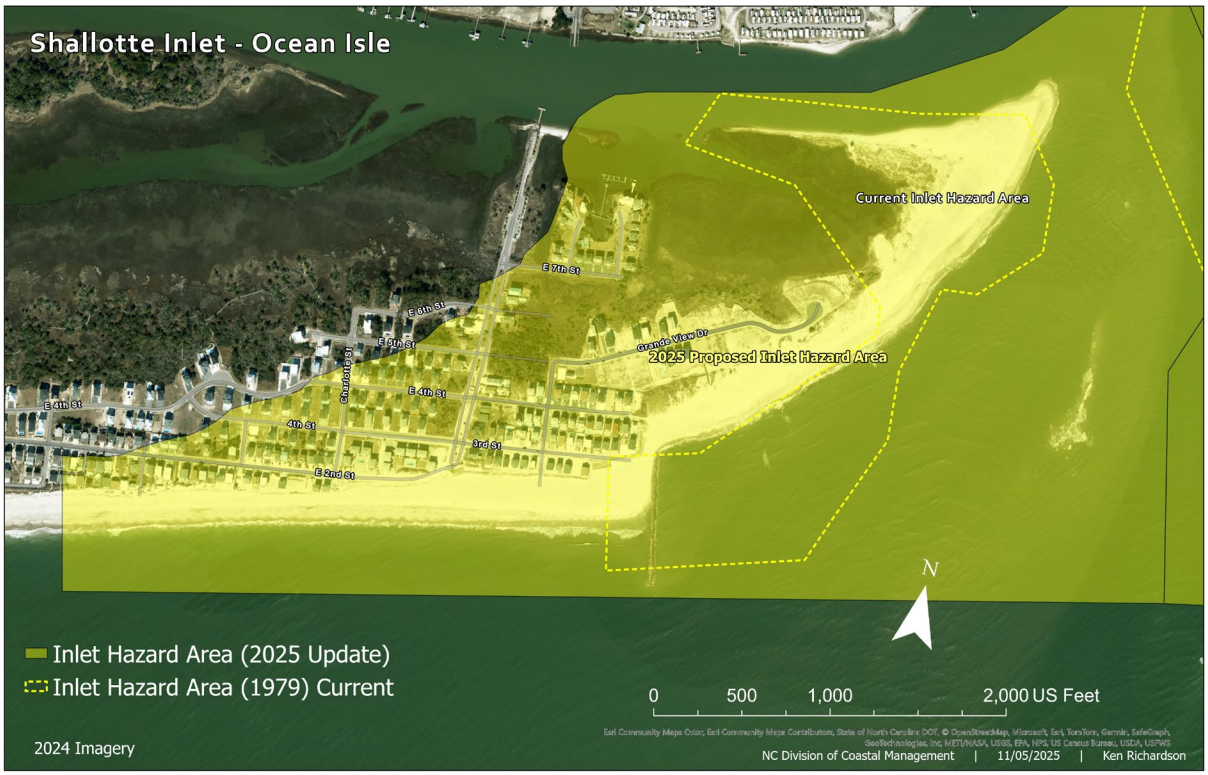

Figure 3. Current and 2025 Proposed Inlet Hazard Area boundaries at Shallotte Inlet – Ocean Isle.

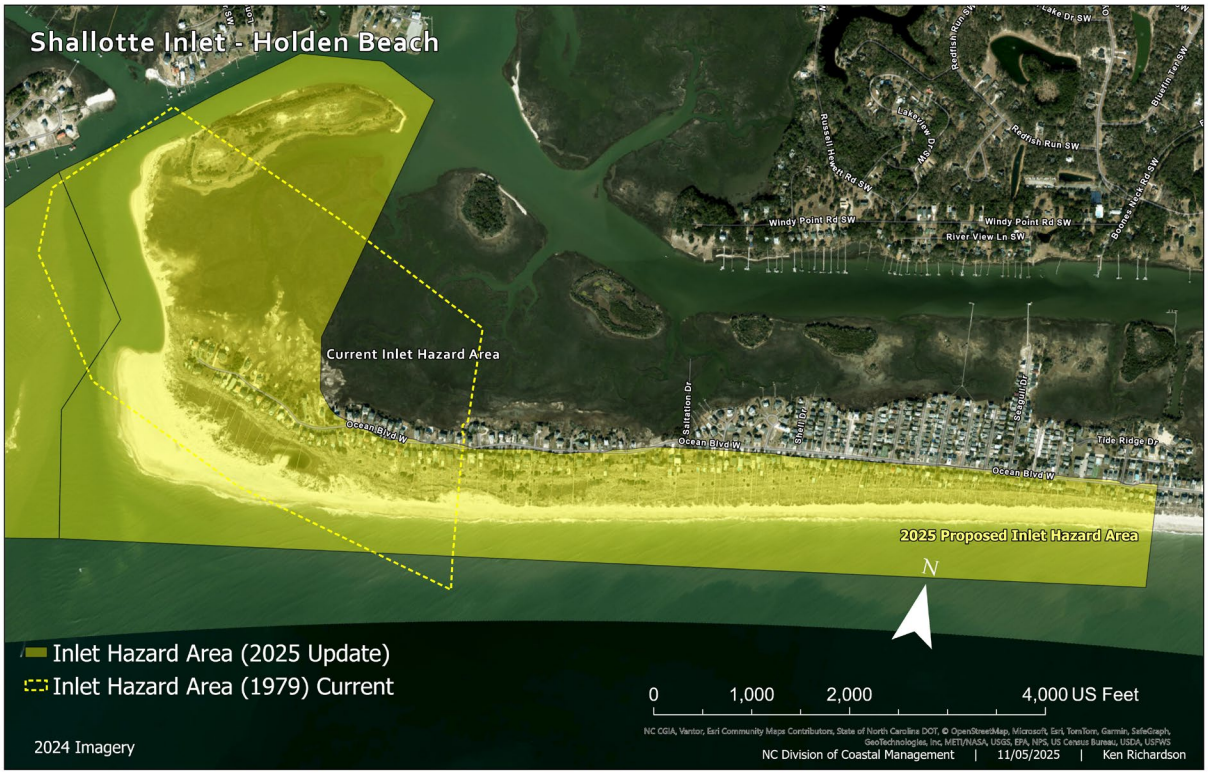

Figure 4. Current and 2025 Proposed Inlet Hazard Area boundaries at Shallotte Inlet – Holden Beach.

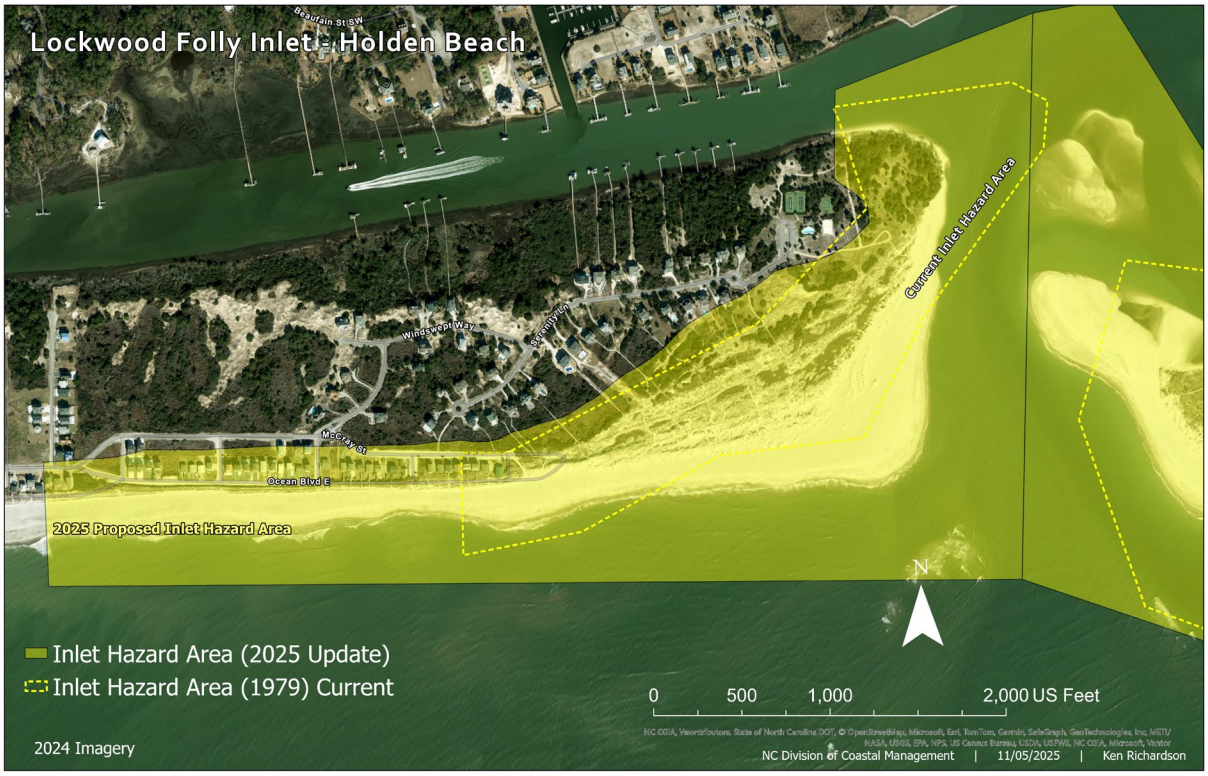

Figure 5. Current and 2025 Proposed Inlet Hazard Area boundaries at Lockwood Folly Inlet – Holden Beach.

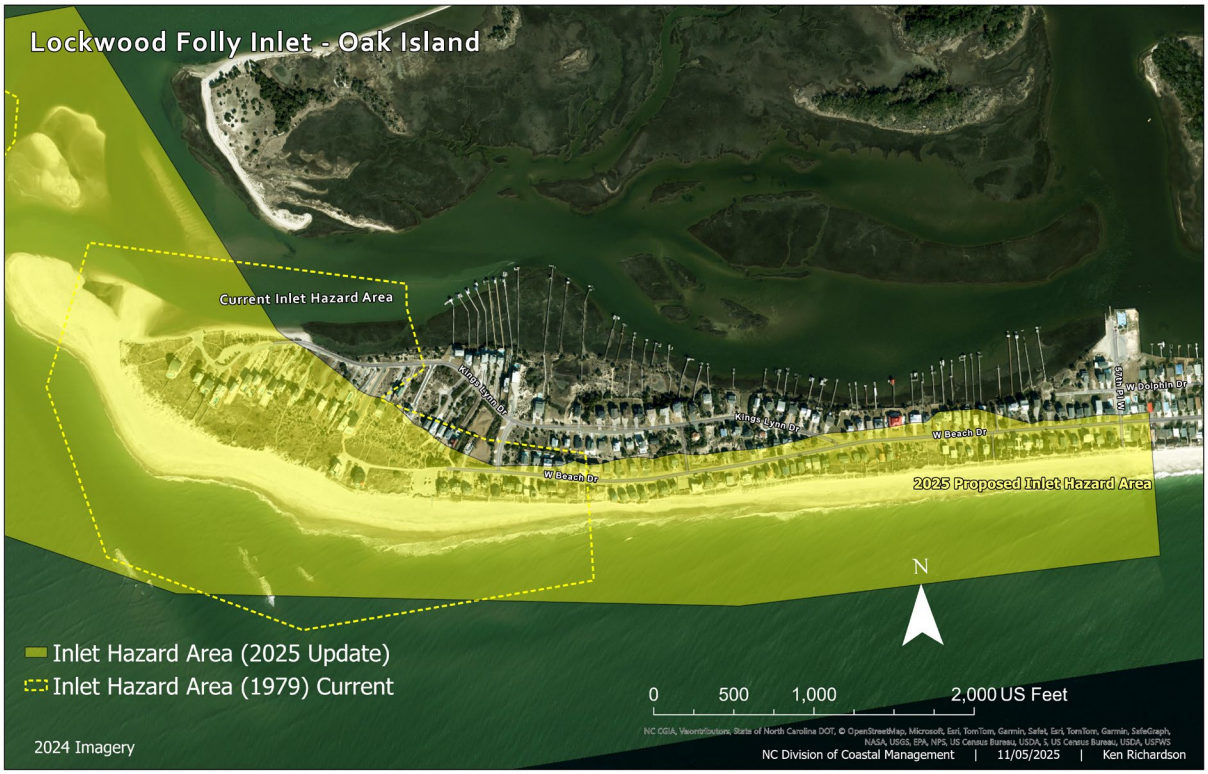

Figure 6. Current and 2025 Proposed Inlet Hazard Area boundaries at Lockwood Folly Inlet – Oak Island.

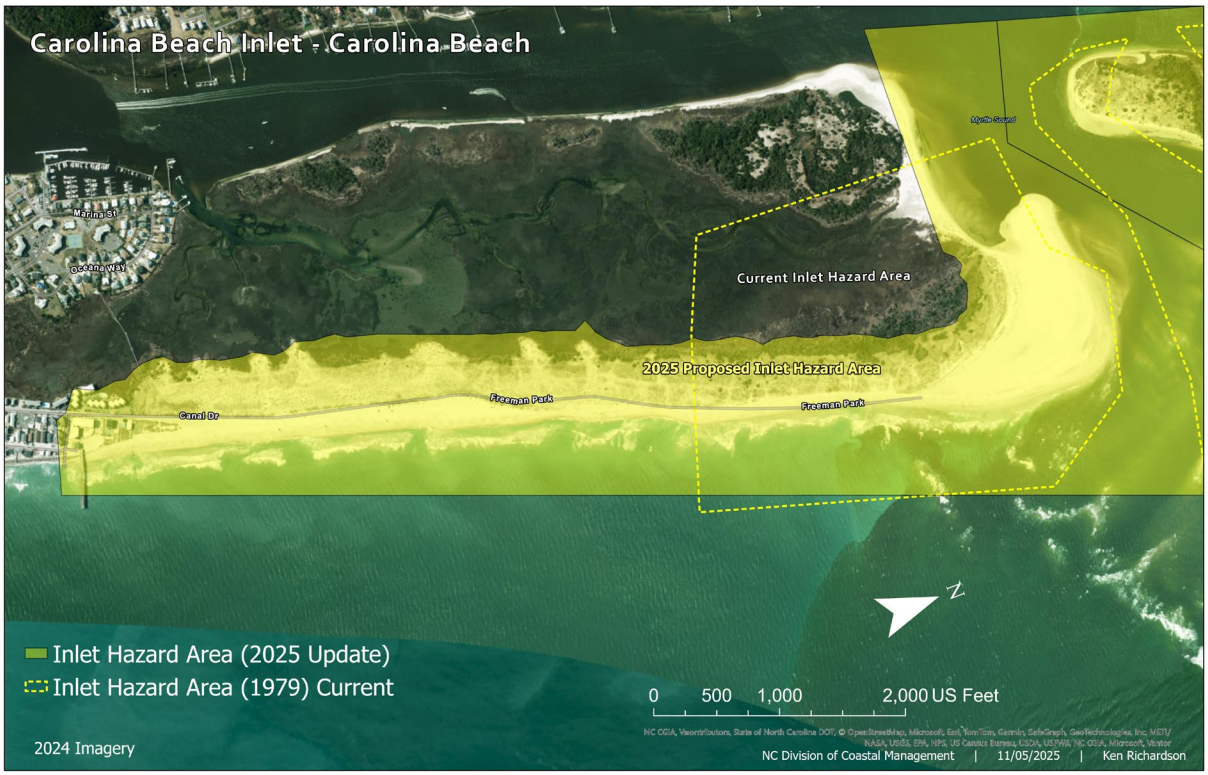

Figure 7. Current and 2025 Proposed Inlet Hazard Area boundaries at Carolina Beach Inlet – C.B.

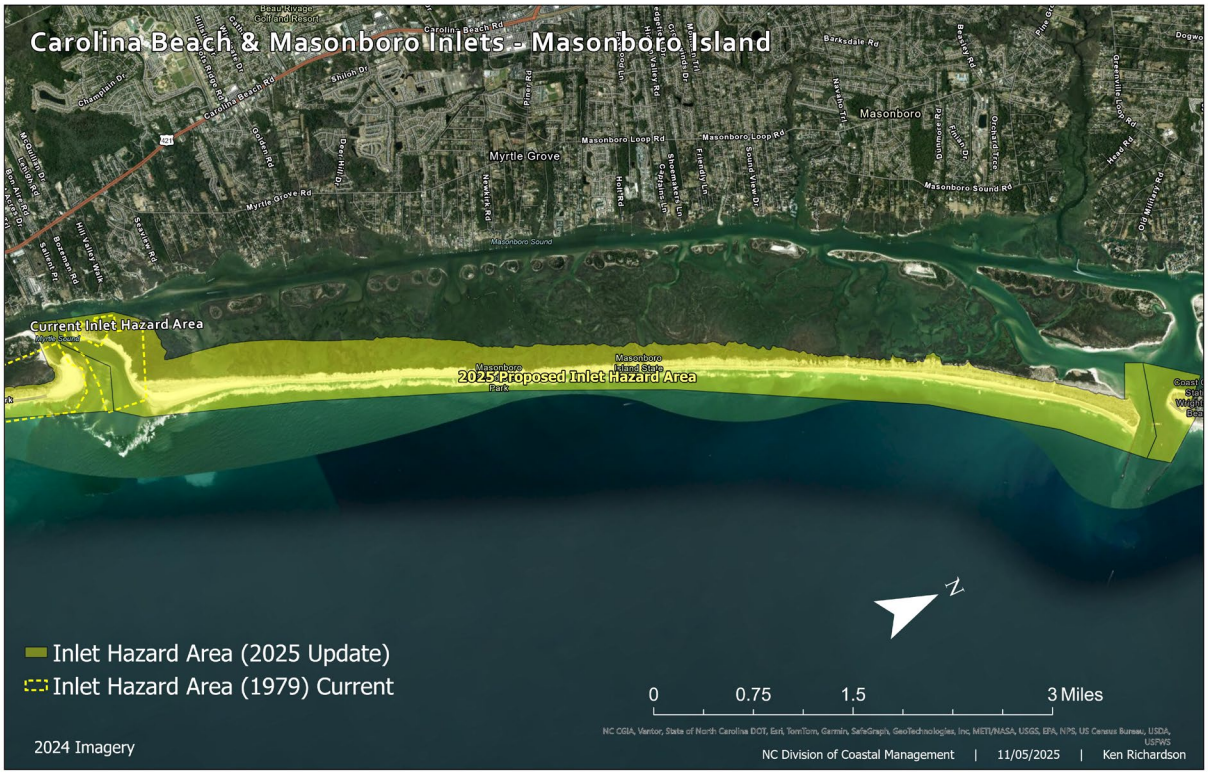

Figure 8. Current and 2025 Proposed Inlet Hazard Area boundaries at Carolina Beach & Masonboro Inlets – Masonboro Island.

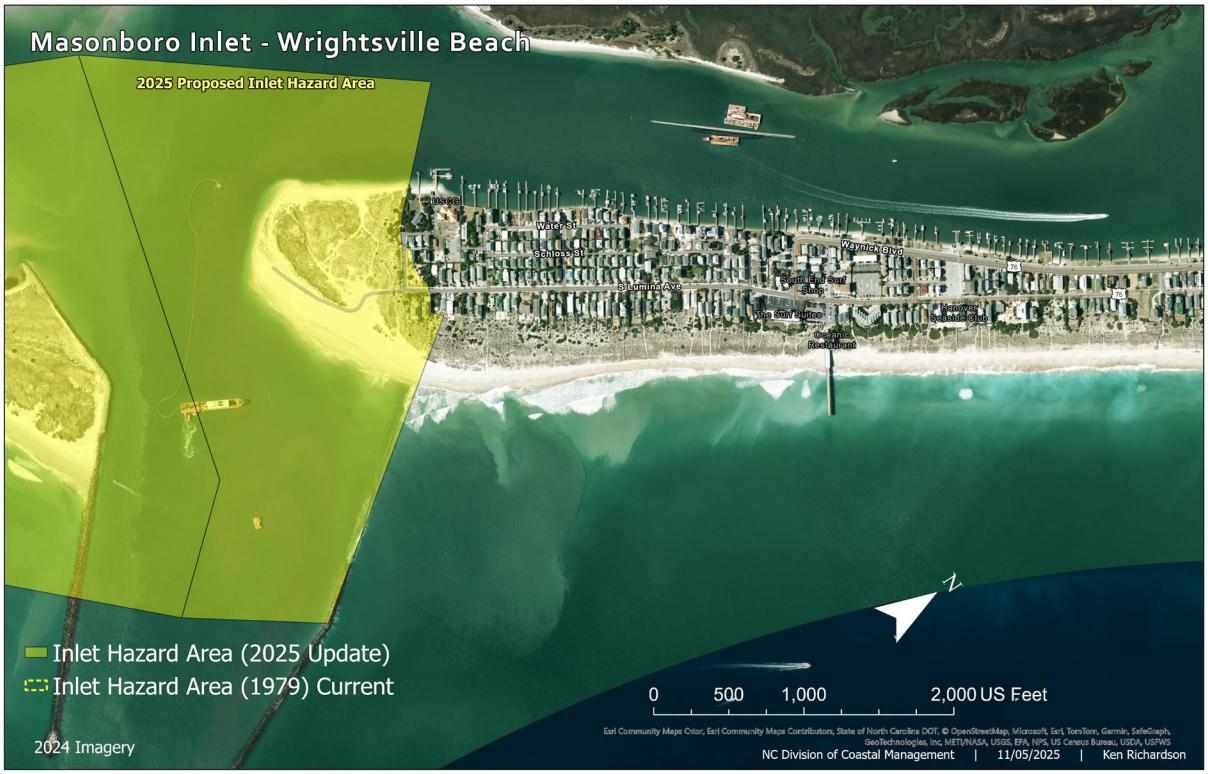

Figure 9. Current and 2025 Proposed Inlet Hazard Area boundaries at Masonboro Inlet – Wrightsville Beach.

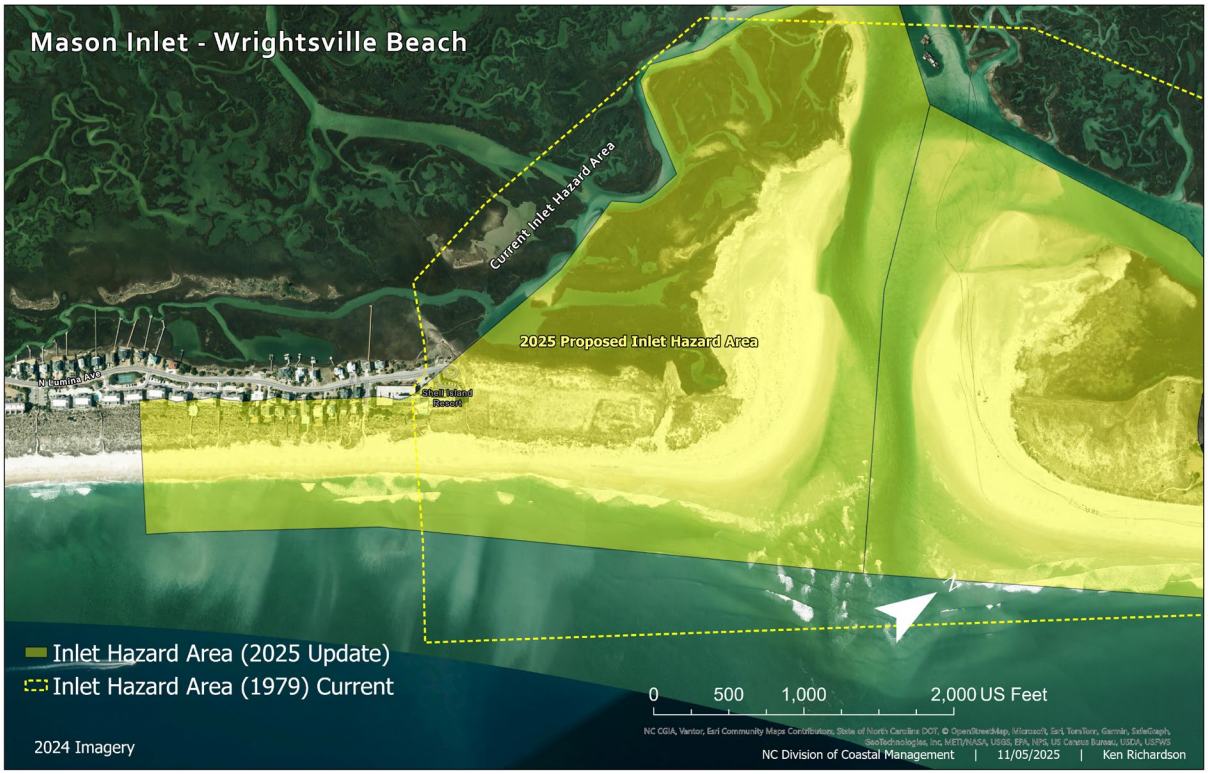

Figure 10. Current and 2025 Proposed Inlet Hazard Area boundaries at Mason Inlet – Wrightsville Beach.

Figure 11. Current and 2025 Proposed Inlet Hazard Area boundaries at Mason Inlet – Figure Eight.

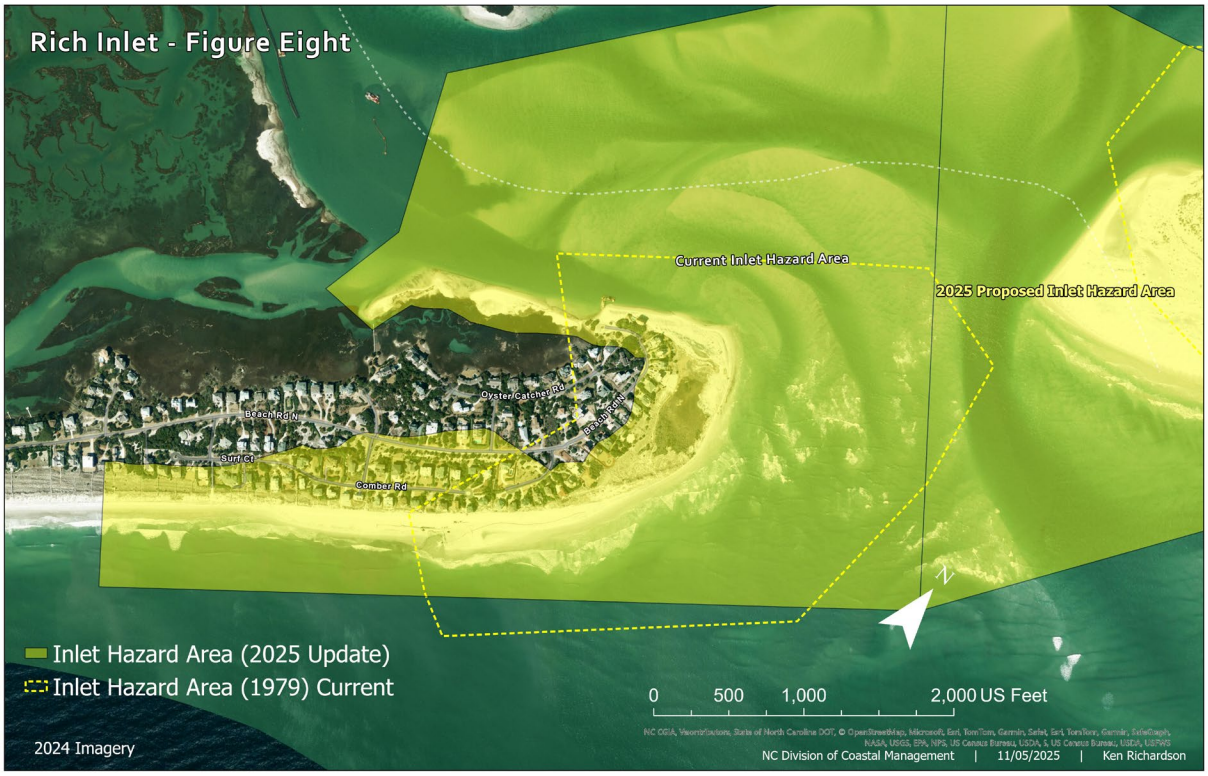

Figure 12. Current and 2025 Proposed Inlet Hazard Area boundaries at Rich Inlet – Figure Eight.

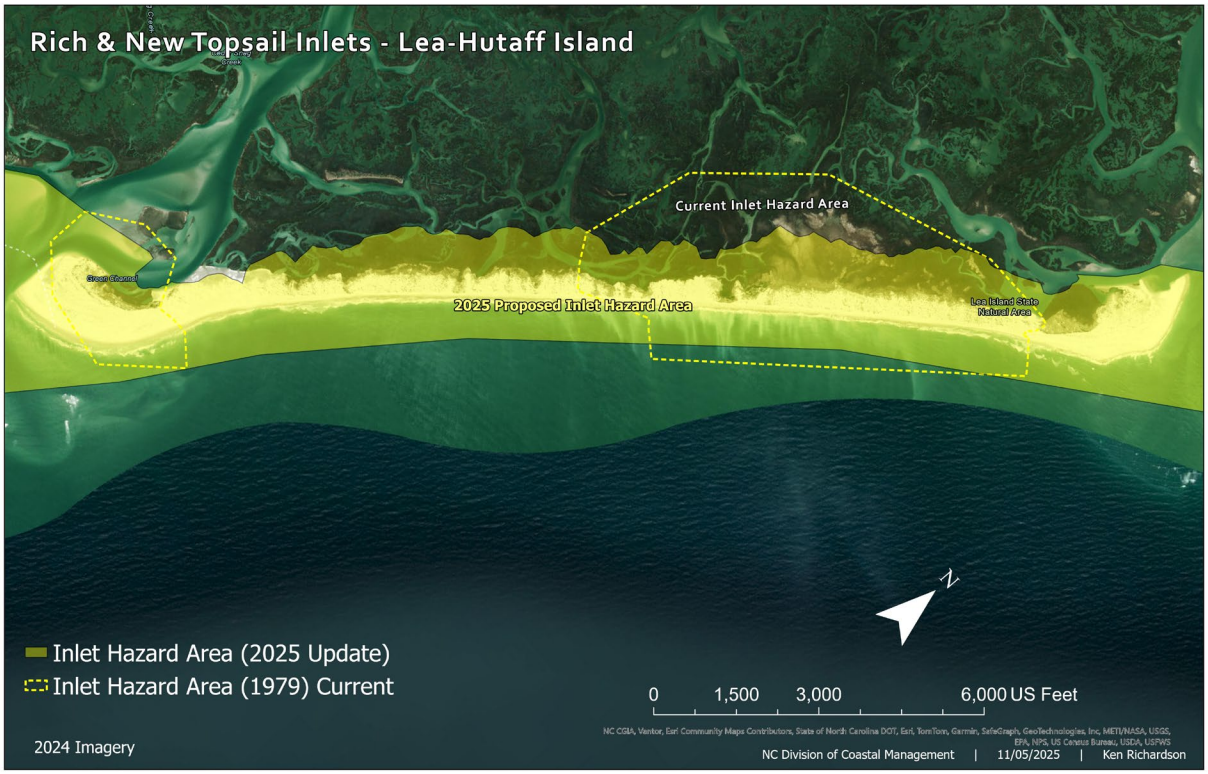

Figure 13. Current and 2025 Proposed Inlet Hazard Area boundaries at Rich & New Topsail Inlets – Lea-Hutaff Island.

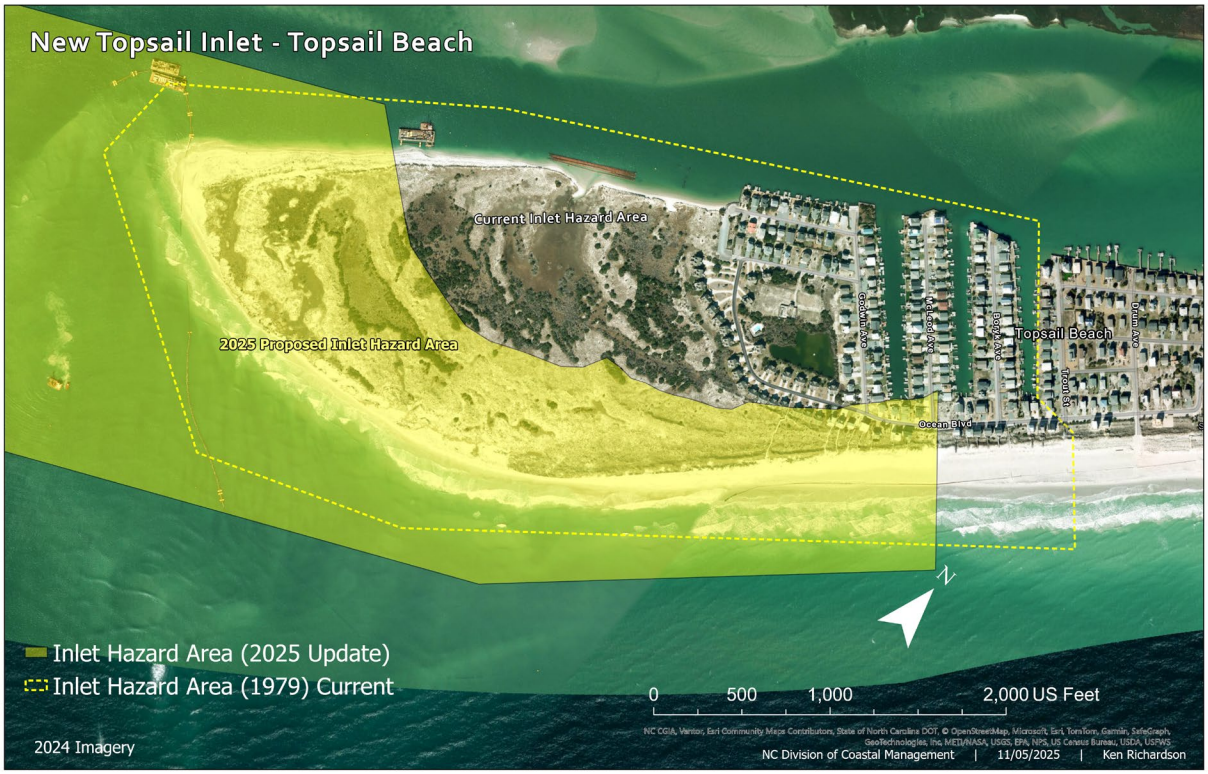

Figure 14. Current and 2025 Proposed Inlet Hazard Area boundaries at New Topsail Inlet – Topsail Beach.

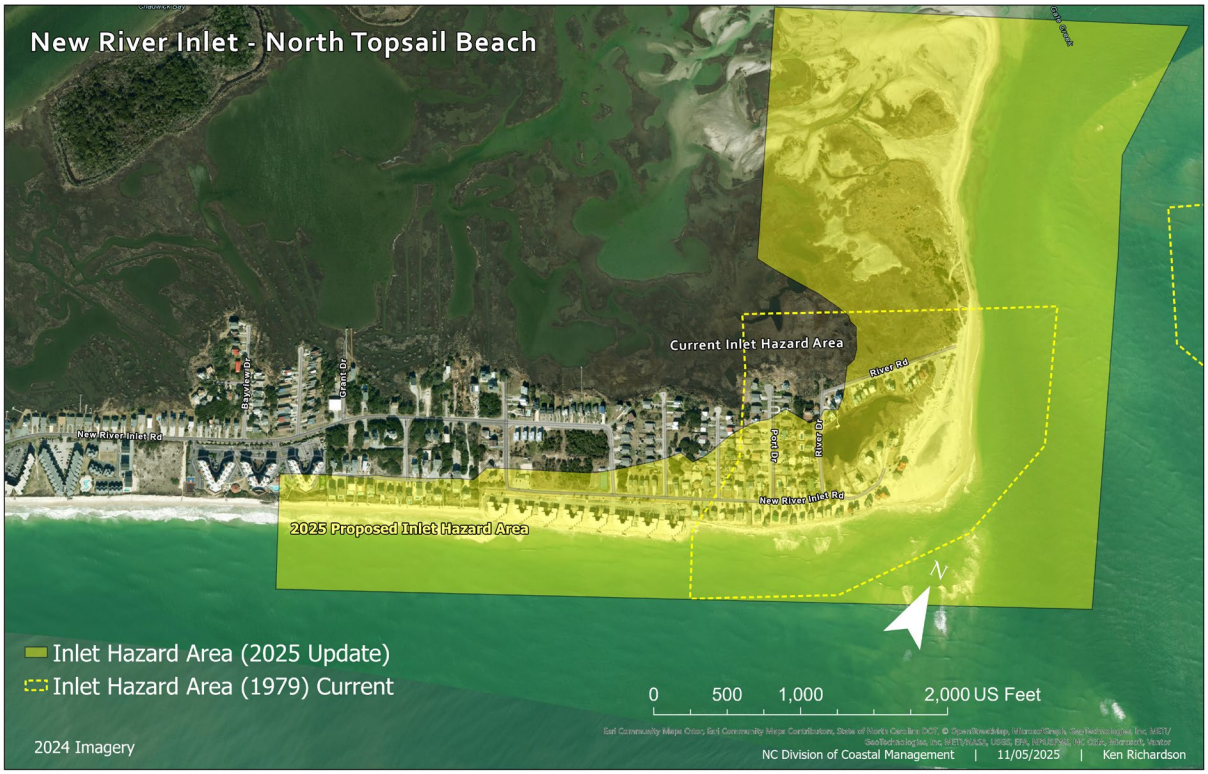

Figure 15. Current and 2025 Proposed Inlet Hazard Area boundaries at New River Inlet – N. Topsail.

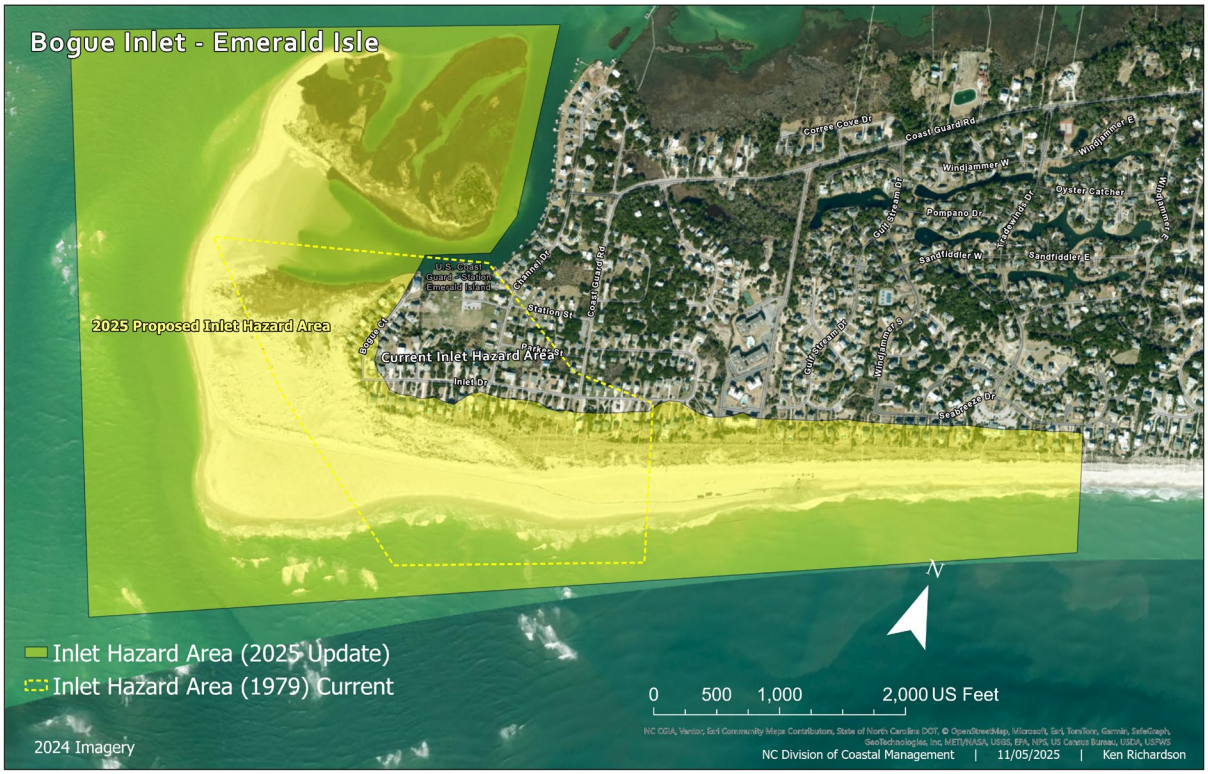

Figure 16. Current and 2025 Proposed Inlet Hazard Area boundaries at Bogue Inlet – Emerald Isle.

Commissioner: Earl Smith

Question/Comment #1: The recommendation from staff that sent the IHA Recommendations back to the Science Panel for the 5-year update was amended by Commissioner Holeman requiring that the Science Panel consider a list of issues that they cited in the earlier recommendation that needed more work. I forwarded that list to Ken Richardson and included additional items that arose during the public comments in our meetings. That email is attached. What I suggest is that staff provide a summary of the actions taken with regard to each of these for us to see. It appears that item 1 has been addressed with changes to the way standard deviation is used to determine alongshore boundaries. I would still like to know the number of instances where this new approach was overridden by 'professional knowledge and experience'.

Responses (NC DCM) #1:

1. A comparison of 2016 and 2023 Scopes of Work issued by the CRC can be found on page iii of the 2025 report (*Inlet Hazard Area Boundaries, 2025 Update: Science Panel Recommendations to the North Carolina Coastal Resources Commission*)

2. 2023 CRC Memo 23-08 (Science Panel SOW): https://www.deq.nc.gov/coastal-management/crc-23-08-science-panel-scope-work/download?attachment

3. April 2023 CRC Meeting Minutes: https://www.deq.nc.gov/coastal-management/documents/crc-minutes-april-2023/download?attachment

   Science Panel Charge (Scope of Work attached)**:**
   - Perform 5-year re-evaluation of IHA methods and boundaries incorporating data collected since the 2019 study.
   - Evaluate end-point and linear regression methods, and consider alternative methods, for calculating oceanfront shoreline change rates.
   - Present draft report(s), including proposed IHA boundaries and erosion rates, in summer 2024.

4. In the 2025 Inlet Hazard Area Boundary Update Report, a summary of methods for each side of each inlet can be found in Methodology Section, Table 1, Page 10. More details are then included in each inlet section in the report.

Question/Comment #2: Item 2 in the previously cited email is somewhat akin to the following comment that I would like to provide. We talked in our meeting about the use of the Hybrid Vegetation Line. That line is the most landward incursion of any vegetation line at each transect for all shorelines. Essentially, this is the farthest inland that any property has seen flooding. This would account for all of the shoreline movement for all of the years leading up to the establishment of that marker, irrespective of where the shoreline currently resides. Since HVL has not progressed

past that point, the instantaneous HVL change rate that exists there has to be <= 0. So, why are we not using the default minimum of 2 ft/year to compute the 30 year and 90 year hazard lines from the HVL? If we are going to use something else, we have to be tracking the HVL annual movement and that is not what is being done.

Responses (NC DCM) #2: The hybrid-vegetation is a composite of the most landward position of vegetation lines for the period of study only - starting in the early 1970s to current. For the reasons mentioned in the 2025 report, where pre-1970 shoreline data were excluded from the analyses, corresponding vegetation lines were too. DCM's database does include vegetation lines much farther landward of the HVL. The HVL should not be interpreted as the most landward limit of erosion.
As stated in the report, when measured erosion is less than -2 ft/yr or accretion is measured, the default minimum is 2. So the 30- and 90-Year Risk Lines are 2 x 30 and 2 x 90 measured from the HVL.
If the HVL is used for measuring setbacks in an IHA, it would conceivably be applied as the pre-project vegetation line is currently applied. Setbacks are measured from it, unless the actual vegetation line is farther landward. So, the HVL wouldn't necessarily need continual updating but would be with each IHA study (every 5 years).

Question/Comment #3: Another question that I have about the HVL is should it ever reset. For instance, there is a section of beach at Ocean Isle where houses are no longer present. A few years ago, the ocean beach eroded to the point that the frontal dunes were gone and high tides flooded beneath the structures. Long story short, the structures were all removed, the beach renourished, sand fence was installed and sea oats were planted. Soon frontal dunes on the empty lots returned and the beach began accreting sand. Removal of the structures allowed the beach to become viable again. Unlike erosion rates which sort of self adjust over time, the HVL looks like a forever thing. Has anyone considered the longer term for the HVL?

Responses (NC DCM) #3: This is a good policy discussion for the CRC to have. As you know, the pre-project vegetation line never expires, but with a CRC beach management plan, at least setbacks can be measured from the actual vegetation line, but still held to its landward-most adjacent neighbor. I could imagine that the HVL could be treated the same, but its position updated if needed with each IHA study.

Question/Comment #4: The Science Panel seems to have removed the language from the latest recommendation that generated the initial question and left that question unanswered. There are other problems with this non-answer that we may need to discuss.

Responses (NC DCM) #4: Should be addressed in other responses listed here if referring to application of methods. This report provides details pertaining to this study. The goal was to define areas potentially vulnerable to long-term influences of inlet dynamics should past trends prevail.

Question/Comment #5: With reference to item 3 in the previous email, Mr. Steve Johnson raised this issue at the public comments in our meeting at Ocean Isle Beach. He provided at least 2 references to support his comments in the context of how extrapolation using linear regression

models is poor practice. Here, the request was for supporting documentation from the Science Panel or staff.

Responses (NC DCM) #5: Linear regression is used professionally and academically for calculating shoreline erosion rates because it provides a simple, statistically sound way to describe long-term trends in shoreline movement over time. Another example where linear regression is used to calculate shoreline change rates can be found in the *2023 Ocean Isle Beach and Inlet Annual Monitoring Report prepared by Coastal Protection Engineering, April 2024*. It is a widely used method.

Here's why it's the preferred method:

1. Fits a trend line through shoreline position data

- Shoreline positions are measured at different times (for example, from aerial photos, surveys, or LiDAR).
- These positions are plotted against time, and linear regression finds the "best-fit" straight line through the data points.
- The slope of that line represents the *average annual erosion (or accretion) rate*. This should not be interpreted as a future prediction.

2. Reduces noise from natural variability

- Shorelines naturally shift back and forth seasonally, from storms, inlet changes, or beach nourishment. Depending on how much "shifting" is occurring over time will show in the confidence interval, standard deviation and standard error.
- A simple "end-point rate" (distance between two dates divided by years) can be misleading if one of those dates captured an unusual event.
- Regression uses *all available data points* over decades, which helps filter out short-term fluctuations and highlight the long-term trend.

3. Provides statistical confidence

- Regression not only gives the erosion rate (the slope), but also measures how well the line fits the data (R^2) and the uncertainty (standard error).
- This allows scientists and managers to understand whether the trend is strong and consistent or more variable.

4. Straightforward and replicable

- Linear regression is widely used, easy to calculate, and transparent.
- Different users applying the same dataset and method should reach the same result, which is important for regulatory and policy applications.

5. Appropriate for long-term planning

- Shoreline management and setback rules rely on decades-long averages, not short-term shifts.

- A linear trend, while not capturing every wiggle of the shoreline, offers a reasonable and defendable estimate of long-term behavior.

In summary, Linear regression is used because it gives a statistically reliable, long-term average erosion (or accretion) rate by minimizing the effects of short-term variability in shoreline position data.

Question/Comment #6: It is going to be very difficult to prove that the Science Panel Recommendations are effective in mitigating the hazards posed by the inlets. The focus seems to be only on erosion and loss of property. To that extent, it should be possible to compute shoreline positions based on the Linear Regression Transect equations then determine the standard deviation of each new shoreline to the computed shoreline. That can help us gauge the extent of the disconnect between the models and reality. There's a whole realm of things we might need to look at. I am thinking along the lines of accelerating erosion rates, for one. Another is the standard deviation of the errors between the measured source data and the computed shoreline position data. Least error regression is supposed to minimize this but it has at least 2 valid uses. This was Item 4 in the earlier email.

Responses (NC DCM) #6: Same as mentioned. Linear regression is used because it gives a statistically reliable, long-term average erosion (or accretion) rates by minimizing the effects of short-term variability in shoreline position data. The linear regression rate is not a prediction and should not be interpreted in that way. If the standard deviation of relative shoreline position, standard error, or 90%-95% confidence interval is high, that means the trend may not be strong and/or consistent, but it does mean there's a lot of shoreline variability, which is expected at inlets.

1. Provides statistical confidence

- Regression not only gives the erosion rate (the slope), but also measures how well the line fits the data (R^2) and the uncertainty (standard error).
- This allows scientists and managers to understand whether the trend is strong and consistent or more variable.

4. Straightforward and replicable

- Linear regression is widely used, easy to calculate, and transparent.
- Different users applying the same dataset and method should reach the same result, which is important for regulatory and policy applications.

5. Appropriate for long-term planning

- Shoreline management and setback rules rely on decades-long averages, not short-term shifts.
- A linear trend, while not capturing every wiggle of the shoreline, offers a reasonable and defendable estimate of long-term behavior.

Question/Comment #7: Ken Richardson provided me a good bit of information regarding the referenced documents in the earlier IHA Recommendations. One that I found extremely useful was the handbook for the tool that Ken uses to process shoreline data. I plan to send specific

comments with regard to the outputs that the tool offers directly to Ken. Item 5 in the prior email requested that the references be made available to the Commission and to the public via the DEQ website. What we are doing is a scientific endeavor so these papers need to be easy to obtain. We do need to not violate copyrights!

Responses (NC DCM) #7: It may be more accurate to label the section "Bibliography" rather than "References" in the 2025 IHA Boundary Update Report. Many of the works included are provided for the reader's benefit and are not directly cited in the report. In addition, several of the earlier studies were originally cited in past DCM oceanfront reports.

Question/Comment #8: One final thought. I was impressed by the presentation that Jamie Heath made to the Commission regarding the Resilient Coastal Communities Program during the 50th Anniversary Celebration Program. On the surface, the inlet communities face the same coastal hazards that other communities face. Is there something more than just regulating development that we can do, perhaps in the spirit of RCCP in the inlet areas? (Have the same thoughts about Buxton and the Outer Banks but that's a topic for another day.)

Responses (NC DCM) #8: Phase 1 of the RCCP is the "Risk and Vulnerability Assessment." The first step is simply to identify vulnerable areas and who and what are at risk (i.e., Inlet Hazard Areas). Identification does not mean these areas are destined to be lost, only that they are subject to potential impacts from inlet-related long-term erosion or shoreline fluctuations. Once areas are identified, regulation becomes just one component of a broader management approach. The key distinction between an IHA and an Ocean Erodible Area (OEA) is that within an IHA, new construction is limited in size and density, but all must meet setbacks; however, setbacks are not always a long-term solution since most oceanfront communities have installed at least one beach nourishment project and many have been doing it regularly for decades in order to "reset the erosion clock." It's worth noting that new dune creation is generally not allowed in an IHA, but existing dunes can be repaired or restored if damaged (within IHAs too).
In summary, recognizing the risk is the first step then management options have to be sorted out.

The following is PDF attached to Commissioner Smith's email:
NC DCM Note: it appears that this content was copied from the 2019 Science Panel report, CRC Memos related to the 2019 report, or public comments. Not related to the current Inlet Hazard Area Boundary Update Report (2025).

From Smith, W Earl <Earl.Smith@deq.nc.gov>
Date Fri 6/9/2023 5:28 PM
To Richardson, Ken <ken.richardson@deq.nc.gov>
Cc Davis, Braxton C <Braxton.Davis@deq.nc.gov>; Cahoon, Renee M <Renee.Cahoon@deq.nc.gov>; Andrew, Neal W <N.Andrew.CRC@deq.nc.gov>; Larry.Baldwin@ncdenr.gov <Larry.Baldwin@ncdenr.gov>; Emory, Robert R <Robert.Emory@deq.nc.gov>; holman4245@att.net <holman4245@att.net>; robert@roberthighdevelopment.com <robert@roberthighdevelopment.com>; Doug.Medlin@ncdenr.gov <Doug.Medlin@ncdenr.gov>; Phil.Norris@ncdenr.gov <Phil.Norris@ncdenr.gov>; Salter, Lauren N <Lauren.Salter@deq.nc.gov>; adtunnel@coastalnet.com <adtunnel@coastalnet.com>; monica1023@yahoo.com <monica1023@yahoo.com>

Issues cited in Science Panel Recommendation document for more work…

Everything to which I was referring at the April CRC meeting flows from Page 96 of the Science Panel Recommendation document, Section 4.0 copied below.

==========

4.0 Recommendations

The Inlet Hazard Area Method (IHAM) outlined and applied here is an objective methodology for calculating inlet shoreline change rates and for delineating the Inlet Hazard Areas (IHA) and areas within the IHA at greatest risk of experiencing inlet related erosion. Given the uniqueness of each inlet, it is important that the IHAM combines both accurate shoreline change data with variability statistics with detailed, professional knowledge of the underlying inlet geology and hydrodynamics. IHA boundaries have been proposed for the 10 developed North Carolina Inlets.

Given the potential for conditions at inlets to rapidly fluctuate over both the short- and long-term, the Science Panel on Coastal Hazards also recommends that the CRC consider updating the IHA every five years, coinciding with the oceanfront erosion rate and Ocean Erodible Area updates**. Recommended issues to evaluate in the next update include:**

- **a more detailed analysis of the effect of including dates after construction of the AIWW but prior to 1970;**
- **the effect of various running averages in smoothing transect points alongshore;**
- **evaluate more effective ways to establish inlet transects;**
- **continue to evaluate the effectiveness of the IHA in managing near-inlet development.**

Other issues may arise to consider in future updates as the Inlet Hazard Areas are implemented.

The following is my list of those Other issues. The first two are distressing because each of those represents data based methods that are stated in the methodology section of the recommendation and put out there for the public to believe that those methods are the science behind the proposed maps. But then, the fact that those data based methods are not followed by the Science Panel in the actual placement of some IHA boundaries discredits that portion of the methodology as valid science.

1. Page 28…CRC-20-33-Inlet-Hazard-Area-Public-Comments response from the Science Panel regarding the abandonment of the standard deviation calculation to identify the alongshore boundary at 1/3 of the inlet locations. The response to public comments states "We recommend exploring additional metrics at a later date that may be used in concert with shoreline variability to make establishing IHA boundaries less arbitrary and repeatable across the state."

   Given that there are a significant number of inlets where professional knowledge and experience of the Science Panel is playing an overriding role in this boundary determination, the Science Panel should state, for each inlet, where the calculations in the IHAM would locate this boundary, then the reasoning for not adopting that location if it is not used.

   It was interesting that when the specifics of the placement of the boundary found in the Methodology section 2.4 was made to the CRC, it was mentioned how the location of that boundary had moved in a relatively short period of time. This would indicate that the alongshore boundaries are not long term fixed locations but rather, those boundaries change locations based on a number of factors, some of which could be inlet movement in migrating or oscillating inlets, storm induced changes to the inlets and shorelines, management activities like dredging, beach nourishment and terminal groins, and probably other things. But alongshore movement can be measured and tracked and should be factored into recommendations for the regulations pertaining to the IHA's.

   One metric that might be of interest could be the standard deviation of the residuals at each transect from the linear regression analysis. On page 17 of the recommendation, it states "Linear regression minimizes the distance between the known values (actual shoreline positions) and a best-fit regression line ". These distances are known as the residuals. The standard deviation of the residuals is a measure of how well the regression equation reproduces the known, measured values. The basic assumption is that inlet forces create non-linear movement causing an increase in these residuals and looking at the standard deviation of these residuals on transects in the proximity of the

NORTH CAROLINA Department of Environmental Quality
North Carolina Department of Environmental Quality | Division of Coastal Management
Morehead City Office | 400 Commerce Avenue | Morehead City, North Carolina 28557
252.515.5400

inlets relative to the standard deviation of the residuals of ocean transects and relative to each other could help to quantify the inlet influence. Noticeable changes in this metric should begin to occur near the alongshore boundary, much like the standard deviation of shoreline positions indication in the methodology section of the report. Standard deviation of the residuals should continue to increase in the transects approaching the inlet. This calculation could simply give the same result as the current standard deviation calculation or it might provide new insights into placement and movement of that boundary.

2. Page 30…Recommendation document…There are pending questions to the Science Panel regarding effects to the Alongshore Boundary location and to the Setback Factors relative to the following statement in Science Panel recommendations:

   "Because of the high erosion rates near the inlet (upwards of ~15 ft/yr), the Panel decided, based on the underlying geology and surface dune topography, that the 90-yr Risk Line mapped using the IHAM fell too far inland, into an area where an increased inlet threat is unlikely. The Panel recommends moving the 90-Year Risk Line and establishing the landward limit of the recommended IHA closer to the 30-Year Risk Line."

   This represents abandonment of the Linear Regression based erosion rates to set the landward boundary and raises other questions regarding the validity of using those abandoned LRR's to establish setbacks and also whether the same logic applied by the Science Panel to adjust the landward limit of the IHA should cause adjustment to the alongshore boundary location.

3. From Page 7… Recommendations document…Executive Summary "…linear regression, a statistical method that takes advantage of the growing database of North Carolina shorelines and **that better reflects the dynamic nature of inlets** (rather than the endpoint method used in the OEA)." This claim seems to flow from Section 2.3 and to be related to the statement found there that says "Because inlet shorelines are constantly moving and fluctuating in position, the end-point method is less effective in capturing the dynamics of an inlet or for quantifying its long-term trends. " These statements and claims are counterintuitive. Linear regression creates a linear equation that plots the shoreline as changing at a constant rate from an initial position. This type of characterization is going to smooth out dynamics and mask them. So, it is not obvious how linear regression accomplishes what is claimed (i.e., reflecting the dynamic nature of inlets). Specifically, looking for a scientific reference demonstrating proof of this claim where details and examples can be studied. More generally, questions have been raised about the appropriateness of the use of linear regression in this context. In particular, public comments provided by Mr. Steve Johnson regarding "**Extrapolation**" beyond the "**scope of the model**" which occurs when one uses an estimated regression equation to estimate a mean or to predict a new response for *time* values not in the range of the sample data used to determine the estimated regression equation. This is not considered sound scientific use of Linear Regression. Would help to have a citation to a scientific study that demonstrates that linear regression is an appropriate method as used to develop the proposed maps and that supports the above claim made in the recommendation document. Alternatively, provide those details in an appendix.

NORTH CAROLINA Department of Environmental Quality
North Carolina Department of Environmental Quality | Division of Coastal Management
Morehead City Office | 400 Commerce Avenue | Morehead City, North Carolina 28557
252.515.5400

4. On page 17, the recommendation document tells us that "At each transect, there are a series of shoreline-transect intersections that represent the shoreline's position through time." No matter what method (end-point, Linear Regression, or other) is used to determine erosion rates for the shorelines, the standard deviation of the location of the shorelines at each 5 year update should be computed comparing the anticipated transect intersection locations using the projected erosion rates to the actual locations determined from field data. The goal here is to determine how well the information that the CRC is using to regulate the IHA's is tracking to the reality of what is happening on the shorelines and this should be reported to the CRC for each inlet as part of each update.

5. Facilitate public access to referenced documents

   In the spirit of providing science based recommendations, citations by author and year to scientific references such as Roger(2015) on page 7 and Priddy and Carraway (1978) on page 9 should to be replaced by numeric citations to those reference documents by converting the references section to a bibliography as would be found in any scientific publication. Since many of these references do not appear to be easily accessible or available to the general public or to the commissioners, copies of the referenced publications or weblinks should be made available on the DCM website and those weblinks should also be provided in the bibliography. The CRC should have and should provide ready public access to those materials as they are part of the IHA recommendations by reference.

Earl Smith, Commissioner
NC Dept of Environmental Quality
Coastal Resources Commission
earl.smith@deq.nc.gov
(919) 225-1396

DEQ is updating its email addresses to @deq.nc.gov in phases from May 1st to June 9th.

Email addresses may look different, but email performance will not be impacted.

Commissioner: Bob Emory

From: Emory, Robert R <Robert.Emory@deq.nc.gov>
Sent: Tuesday, September 30, 2025 4:11 PM
To: Cahoon, Renee M <Renee.Cahoon@deq.nc.gov>; Miller, Tancred <tancred.miller@deq.nc.gov>
Subject: IHA Questions

Question/Comment #1: Understand the logic of the Hybrid Vegetation Line being used as the setback measurement line. Do we know how many existing houses would be non-compliant if we adopt the HVL and the use of actual erosion rates within the proposed IHAs?

Responses (NC DCM) #1: The table below summarizes the total number of structures inside the 2025 updated IHA and: 1) number of structures that may not meet the current setback requirement, 2) number of structures that may not meet setback from the current vegetation line using updated 2025 setback, and 3) number of structures that may not meet setback from hybrid-vegetation (HVL) using updated 2025 setback requirements.

Location	Total Structures (Inside 2025 IHA)	May not meet current (2020) effective setback	May not meet updated 2025 setback	May not meet 2025 setback from HVL
Sunset Beach - Tubbs Inlet	17	0	0	5
Ocean Isle - Tubbs Inlet	30	1	12	13
Ocean Isle - Shallotte Inlet	200	66	113	122
Holden Beach - Shallotte Inlet	144	0	0	97
Holden Beach - Lockwood Folly Inlet	42	34	2	20
Oak Island - Lockwood Folly Inlet	105	24	24	76
Carolina Beach - CB Inlet	18	2	1	15
Wrightsville Beach - Masonboro Inlet	3	0	0	1
Wrightsville Beach - Mason Inlet	16	0	0	3
Figure Eight - Mason Inlet	10	9	9	10
Figure Eight - Rich Inlet	62	14	22	33
Topsail Beach - New Topsail Inlet	17	2	2	7
N. Topsail Beach - New River Inlet	123	41	58	68
Emerald Isle - Bogue Inlet	77	0	0	36
Total:	**866**	**193**	**243**	**506**

Question/Comment #2: I need to refresh my memory on development standards that would apply in the new IHAs, assuming adoption of the proposed IHAs, the HVL and actual erosion rates. Would they be any different from the adjacent OEA. Do we anticipate grandfathering? We may have addressed development standards I just don't remember.

Responses (NC DCM) #2: The only development standards that are different from the oceanfront (OEA) are:

- In and IHA, new construction is limited to 5,000 sqft. However, existing grandfather rules for structures no greater than 10,000 sqft currently apply to IHAs too.
- In an IHA, new construction is limited to no more than 1 commercial or residential unit per 15,000 sqft of land area on a lot inside an IHA.
- No new dunes can be constructed inside an IHA. However existing dunes damaged or destroyed can be repair.

With regards to erosion rates applied along the inlet shoreline, 3 locations will have higher erosion rates as a result of not applying the adjacent OEA rate: Tubbs Inlet at Ocean Isle, Shallotte Inlet at Ocean Isle, and New River Inlet at North Topsail Beach. At all locations, the adjacent OEA rate is 2 ft/yr, and where the 2025 IHA and the OEA meet, the IHA erosion rate starts at 2 ft/yr and goes up from there if erosion is measured. No place where the OEA rate is higher than the adjacent IHA.
If the HVL line is used for measuring setbacks, a grandfathering date may be necessary to avoid automatically making structures non-conforming.

Question/Comment #3: Seems to me there are four key parts to the IHA discussion.

- The boundaries.
- The setback measurement line.
- The use of actual erosion rates.
- The development standards.

The first three are covered in the SP report. I have trouble thinking about the boundaries and the impact of using the HVL in the absence of development standards.

Responses (NC DCM) #3: Correct. DCM will be prepared at the November meeting to show the minimum rule amendments required to move updated erosion rates and IHA boundaries forward. DCM will also be prepared to discuss use of the HVL should the Commission decide to support this Science Panel recommendation. If the CRC is supportive of the HVL, then additional rule language would need to be discussed to include grandfathering. However, if the CRC does not support its use, then size and density of new development would continue to be primary use standards (see DCM response #2 above).

Attachment (1): 2023 CRC Science Panel Scope of Work

North Carolina
Coastal Resources Commission

March 28, 2023

TO: Laura Moore, Ph.D., Chair, CRC Science Panel

FROM: Renee Cahoon, Chair, NC Coastal Resources Commission

SUBJECT: Scope of Work: Erosion Rate Methodology & Inlet Hazard Areas

When the NC Coastal Resources Commission's Science Panel presented updated Inlet Hazard Area (IHA) boundaries to the Commission in late 2019, the Panel recommended that boundaries be re-evaluated every five years to coincide with the Division of Coastal Management's routine oceanfront erosion rate updates.

The next update to the oceanfront erosion rates is planned for the 2024-25 timeframe. Because the updated studies of oceanfront and inlet shoreline changes would occur simultaneously, the CRC is asking the Science Panel to evaluate oceanfront erosion rates using the current method (end-point) and the method utilized in the recent IHA update (linear regression), to consider alternative methods; to evaluate IHA boundaries, and to provide the Commission with results listed under the following scope of work:

Science Panel Charge:

1) Perform 5-year re-evaluation of IHA methods and boundaries incorporating data collected since the 2019 study.
2) Evaluate end-point and linear regression methods, and consider alternative methods, for calculating oceanfront shoreline change rates.
3) Present draft report(s), including proposed IHA boundaries and erosion rates, in summer 2024.

The CRC is very appreciative of your dedication to helping decision-makers and the general public better understand coastal processes in North Carolina.

Attachment (2): 2016 Science Panel Scope of Work

North Carolina Department of Environmental Quality | Division of Coastal Management
Morehead City Office | 400 Commerce Avenue | Morehead City, North Carolina 28557
252.515.5400

July 12, 2016

TO: Margery Overton, Chair, CRC Science Panel

FROM: Frank Gorham, Chairman, Coastal Resources Commission

SUBJECT: Scope of Work: Inlet Erosion Rate Calculation Methodology

At the Coastal Resources Commission meeting on May 14, 2014 in Atlantic Beach, the Commission noted that just as every inlet is different, so are shoreline change rates along their beaches. During that meeting, the Commission identified erosion rate calculations for Inlet Hazard Areas as the second-highest priority on the Commission's short-term inlet management priority list, and asked the Panel to develop a methodology for calculating shoreline erosion rates adjacent to inlets for the purpose of better understanding changes over time.

At that time, priority was placed on finalizing the 2015 Sea-Level Rise Assessment Report, and the CRC did not issue a formal scope of work to the Panel. Now that the Sea-Level Rise Update report has been completed, the CRC is asking the Science Panel to finalize your proposed inlet shoreline change rate methodology and provide the Commission with results listed under the following scope of work:

Scope of Work:

1) Develop inlet shoreline change rate calculation methodology;
2) Re-evaluate points along the oceanfront shoreline where inlet processes are no longer the dominant influence over shoreline position; and
3) Present results at late spring/early summer 2017 CRC meeting

The CRC is very appreciative of your dedication to helping decision-makers and the general public better understand coastal processes in North Carolina.

North Carolina Department of Environmental Quality | Division of Coastal Management
Morehead City Office | 400 Commerce Avenue | Morehead City, North Carolina 28557
252.515.5400

North Carolina Department of Environmental Quality | Division of Coastal Management
Morehead City Office | 400 Commerce Avenue | Morehead City, North Carolina 28557
252.515.5400