V. Economic Assessment

A. Overview of Economic Considerations

The potential economic impact to State and local governments, and the private sector from erosion due to shifting inlets was assessed. Using the best available information, properties at risk within the State's Proposed Inlet Hazard Areas were identified. Given 30 years is a typical mortgage duration and other coastal risks are often calculated over this time period, a 30-year risk time period was used in the economic assessment. Additionally, as a means to assess the immediate and current property imminently at risk the value of properties and infrastructure with sandbags in place for temporary protection was evaluated.

1. Inlets Considered

The purpose of the economic assessment component of the study was to assess the economic value located within the proposed 30-year risk areas (30YRAs) and the imminent risk properties (IRPs) adjacent to the following North Carolina inlets that are defined by Inlet Hazard Areas:

* Beaufort Inlet
* Bogue Inlet
* New River Inlet
* New Topsail Inlet
* Rich Inlet
* Mason Inlet
* Masonboro Inlet
* Carolina Beach Inlet
* Cape Fear Inlet
* Lockwood Folly Inlet
* Shallotte Inlet
* Tubbs Inlet

In addition, Oregon Inlet is considered as a special case. While not defined as an Inlet Hazard Area (due to not having development immediately on either side), Oregon Inlet is traversed by a major bridge that is at risk from erosion and inlet migration.

2. 30-Year Risk Areas (30YRAs)

The 30YRAs were defined by lines on aerial photo maps provided by the North Carolina Division of Coastal Management. The maps are based on aerial photos from 2003-2009. Any land existing seaward of the lines is assumed to be at risk in the next 30 years. The current location of the line at each inlet can be seen in Section V-B. It should be noted that the proposed 30-year risk areas (30YRAs) are based on proposed 30-year risk lines that are still in draft form and being developed by DCM and a Science Panel subcommittee. The 30-yr risk line shown on Bald Head Island at the Cape Fear River Inlet still requires adjustment, however, most of the suspect region encompassed is part

of a golf course and should not adversely impact the economic assessment performed in this study. The risk lines are a result of examining the historic shorelines around the inlets to determine a designation of risk that is approximately equal to the level of risk indicated by the setbacks in adjacent oceanfront areas. These lines were agreed upon by the Science Panel for use in this assessment since they represent the best currently available data.

3. Imminent Risk Properties (IRPs)

In order to provide some assessment of the current or imminently at risk property and infrastructure due to potential erosion from shifting inlets, the DCM sandbag database (2008) was used to identify properties and infrastructure that have temporary sandbag protection. The database is not all inclusive and may have some sandbags in its records that are presently buried or removed, but it provides a means to select properties at more imminent or current risk rather than over a 30-year period. Properties and infrastructure located immediately adjacent to erosion control sandbags locations or between two nearby sandbag locations were considered to be IRPs. Sandbag locations on ocean-facing or inlet-facing beaches within the 30YRAs were considered to be inlet IRPs. The economic value associated with these properties and infrastructure is tabulated for each side of the inlets in Section V-B.

4. Types of Economic Value Considered

The 30YRAs support several types of economic value, including property and infrastructure value, recreation value, and environmental (wildlife preserve, scenic view, etc.) value. Given the time constraints of this study, it was decided to focus on the following components of economic value:

* Residential property
* Commercial property
* Government property
* Road infrastructure
* Waterline infrastructure
* Sewer infrastructure
* Property tax base and revenues
* Recreation and environmental value

Detailed assessment of environmental value is beyond the scope of this study. However, a brief review of studies that attempt to assess these values is provided in a separate section (Section V-C) to give some indication of their potential magnitude.

a) Property Value

County online Geographic Information System (GIS) property parcel databases were consulted to determine the property parcel numbers, types (residential, commercial, or government) and locations within the 30YRAs.

* GIS Brunswick County, NC. http://gis.brunsco.net/

* New Hanover County, NC -- GIS Maps.
http://www.nhcgov.com/AgnAndDpt/INFO/GIS/Pages/GISMaps.aspx

* Pender County, NC -- GIS maps.
http://www.pendercountync.gov/Government/Departments/InformationTechnologyServices/GISServices/OnLineGISDisclaimer.aspx

* Onslow County, NC -- GIS Maps.
http://maps.onslowcountync.gov/gomaps/map/Index.cfm

* GIS Carteret County, NC. http://carteret.connectgis.com/

Property parcel information was available for each side of each inlet, enabling disaggregation of results by inlet side. Some inlets face east, producing "north side" and "south side" results; other inlets face south, producing "east side" and "west side" results.

Some county GIS systems provided property value data as well as geographic data, while some did not. For those systems that did not, online county property tax records were used to determine property values via property parcel identification numbers. The property values obtained were the assessed property values as of the most recent assessment as made available through the county online GIS systems or from online property tax systems when the GIS systems contained no value information. For properties last assessed prior to 2009, some adjustments would customarily be made to account for the effects of inflation on property values; this adjustment typically increases property values. However, the economic crisis of 2008-2009 resulted in some reduction in most property values in the study region since the last assessment. As a detailed parcel-by-parcel accounting for these factors is beyond the scope of this study, the most recent assessed value was simply used as the measure of property value.

The property values provided by the county GIS systems were usually divided into three components: land value, structure/building value, and "other" value (e.g., outbuildings, common areas, etc.). Where possible, the values of these components are reported separately and then totaled. Some counties did not list "other" value.

For parcels with multiple residential units (e.g., duplexes and condos), property values were obtained for each residential unit in the parcel.

Many of the parcels in the 30YRAs and IRPs were residential beach houses/cottages. In many locations, these houses are arrayed in rows parallel to the shore. If a house is lost to inlet migration, some or all of the value of the inlet/oceanfront location would be expected to transfer to houses located on the next row away from the inlet/ocean, increasing their market value. On the other hand, loss of the intervening row of houses may increase the perception of erosion risk for the remaining houses, decreasing their market values. A detailed assessment of these "value transfer effects" is beyond the

scope of this study; instead, the existing values of the structures in their current locations are simply presented. However, a brief review of studies that attempt to assess these effects is provided in a separate section below to give some indication of their potential magnitude.

b) Road Infrastructure Value

The length (feet) of road infrastructure within each 30YRA and IRPs was determined using the county online GIS measuring tools. There are many types of road construction. For the purposes of this study, it is assumed that roads are typical 2-lane roads with 2-foot paved shoulders but without curbs, gutters, parking or sidewalks. This may not be accurate for all locations (for example, the road on the north end of Wrightsville beach has a bike lane on each side; however, this road was not in the 30YRA), but is typical for beach island roads in the study area. Road infrastructure was valued at current replacement cost. North Carolina Department of Transportation Construction Cost Estimates for 2008 were used to determine the typical cost of constructing such roads: $3 million per mile, or $568 per foot. The length of road within each 30YRA and IRPs was multiplied by $568 per foot to obtain the replacement cost value of road infrastructure.

c) Water Line Infrastructure Value

Coastal municipality Coastal Area Management (CAMA) plans were consulted to determine the locations and types of water line infrastructure within the 30YRAs and IRPs. These plans typically contain maps of water and sewer infrastructure locations. In general, water lines run along all streets in the 30YRAs and IRPs. As a result, the length (feet) of road infrastructure within each 30YRA or IRP was multiplied by an average per-foot cost of constructing typical, terminal water lines in coastal areas of $55/foot, based on discussions with engineers in the Cape Fear Public Utility Authority and Wrightsville Beach public works department.

d) Sewer Infrastructure Value

Coastal municipality Coastal Area Management (CAMA) plans were consulted to determine the locations and types of sewer line infrastructure within the 30YRAs and IRPs. In general, sewer lines run along all streets in the 30YRAs and IRPs. As a result, the length (feet) of road infrastructure within each 30YRA or IRP was multiplied by an average per-foot cost of constructing typical, terminal sewer lines in coastal areas. Discussions with engineers in the Cape Fear Public Utility Authority and Wrightsville Beach planning department produced an estimate of $150/foot.

e) Tax Values

The property tax base and property tax revenues originating from within each 30YRA and IRPs were determined based on the residential and commercial property values located within each 30YRA or for each IRP and the property tax rates applicable within in the respective county or municipality. Applicable property tax rates were obtained from the North Carolina Department of Revenue, Policy Analysis and Statistics Division, as given in the document "Property Tax Rates and Latest Year of Revaluation for North Carolina, Counties and Municipalities, Fiscal Year 2007-2008, Final Report," dated June

2008 (NCDR 2009a). The property tax rates used in this analysis are the rates that were in effect during the 2007-2008 fiscal tax year. Rates include county, city, and school district tax rates, but not fire district, or some special district tax rates. The rates are expressed in units of dollars of tax per $100 of assessed property value. The assessed residential and commercial property values identified in this study were summed to obtain estimates of property tax base. State and federal properties are exempt from property tax. Some undeveloped parcels have very low assessed property tax valuations. Assessed property tax base values were divided by $100 and then multiplied by the applicable tax rate to estimate property tax revenues originating from within each 30YRA or for the IRPs. To help put these values into perspective, the total assessed tax value (tax base) of all properties within each county and municipality containing 30YRAs and IRPs is presented for the fiscal 2007-2008 tax year. These values are presented in the tables in Section V-B.

B. Economic Impact of Shifting Inlets

1. Economic Value At Inlets

The economic impact of a particular inlet shifting within the 30YRAs was tabulated for each North Carolina inlet included in this economic study (excluding Oregon Inlet). Also the economic value of property and infrastructure imminently at risk is presented in a separate table.

Table V-1 through Table V-24 present components of economic value within the 30YRAs and for the IRPs for each side of each inlet (excluding Oregon Inlet). Figure V-1 through Figure V-12 shows the 30 year risk line used for the economic evaluation at each inlet (excluding Oregon Inlet) and the location of sandbags given in the DCM database.

Following the figures and tables is a special discussion of economic value at risk to shifting of Oregon Inlet.

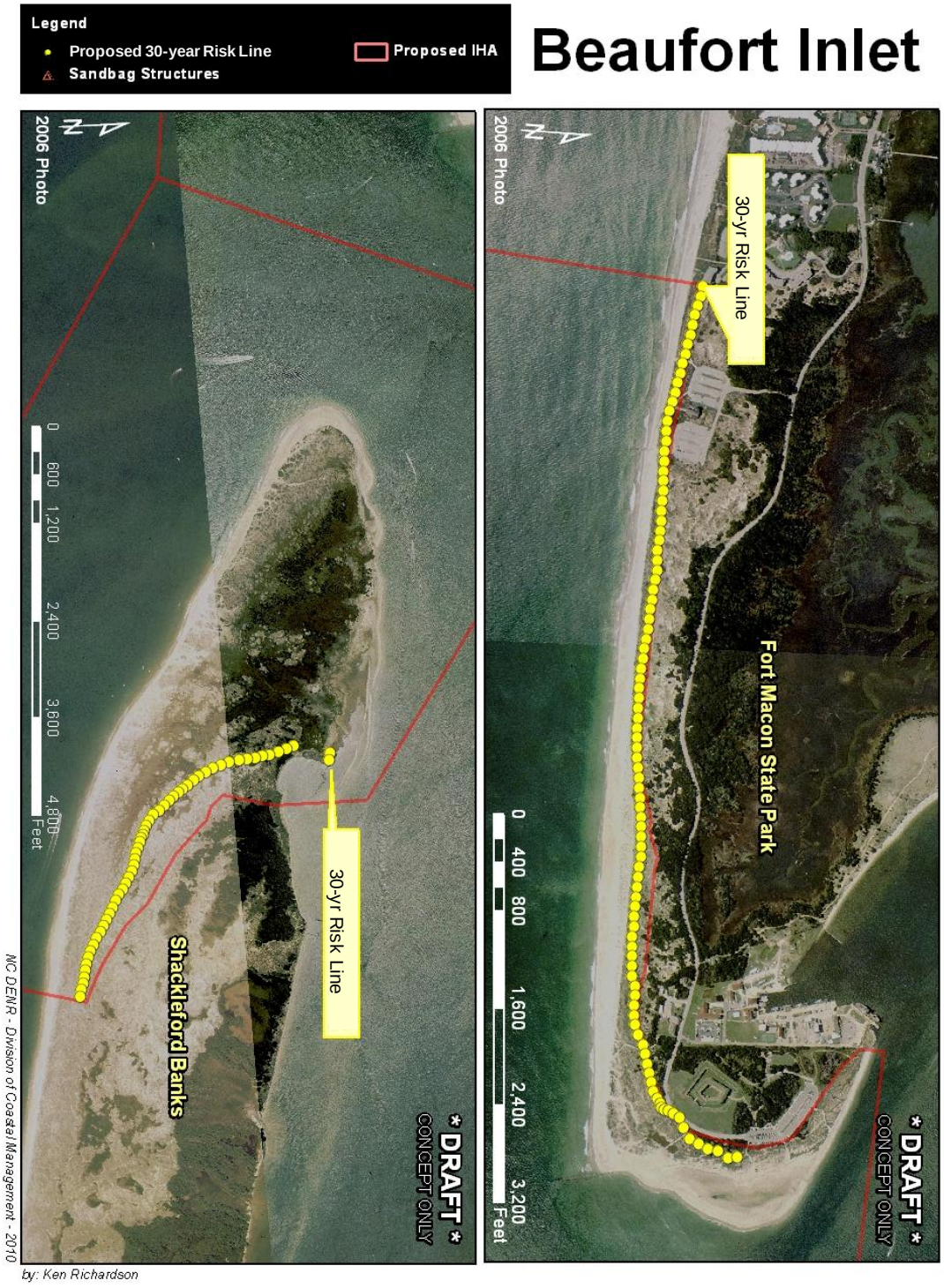

Figure V-1. 30-yr Risk Line and Sandbags at Beaufort Inlet

Table V-1. Economic Value at Risk Within 30-yr Risk Lines at Beaufort Inlet

Value Type	West Side of Inlet (Ft Macon State Park side)	East Side of Inlet (Shackleford Banks side)
Residential Property Value		
Number of Parcels	None w/n 30-yr Risk Lines.	None (undeveloped island)
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Commercial Property Value		
Number of Parcels	None w/n 30-yr Risk Lines.	None (undeveloped island)
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Government Property Value		
Number of Parcels	~90% public beach area (~9000ft in length) in Ft. Macon State Park	None (undeveloped island)
Land Value	-----	-----
Structure Value	5% loss of paved parking at Ft. Macon State Park	-----
Other Value	-----	-----
Total Value	-----	-----
Road Infrastructure Value		
Type	2-lane road w. 2' paved shoulders (no curb, gutter, parking or sidewalk)	None (undeveloped island)
Length (ft)	300	-----
Replacement Cost / ft	$568	-----
Total Value	$170,000	-----
Waterline Infrastructure Value		
Type	Typical	None (undeveloped island)
Length (ft)	300	-----
Replacement Cost / ft	$55	-----
Total Value	$17,000	-----
Sewer Infrastructure Value		
Type	None known. (Park on package system outside 30-yr risk line.)	None (undeveloped island)
Length (ft)	-----	-----
Replacement Cost / ft	-----	-----
Total Value	-----	-----
GRAND TOTAL VALUE	**$187,000**	**None (undeveloped island)**

Property Tax Base within 30-yr Risk Lines	Zero (exempt, state property)	Zero (exempt, fed. property)
Property Tax Revenue within 30-yr Risk Lines	Zero (exempt, state property)	Zero (exempt, fed. property)
Municipal Property Tax Base	Tax Exempt (Fort Macon State Park)	Tax Exempt (National Seashore)
County Property Tax Base	$17.5 billion (entire Carteret County)	

Table V-2. Economic Value at Imminent Risk (Sandbags) – Beaufort Inlet

Value Type	West Side of Inlet (Ft Macon State Park side)	East Side of Inlet (Shackleford Banks side)
Residential Property Value		
Number of Parcels	None.	None (undeveloped island)
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Commercial Property Value		
Number of Parcels	None.	None (undeveloped island)
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Government Property Value		
Number of Parcels	None.	None (undeveloped island)
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Road Infrastructure Value		
Type	None.	None (undeveloped island)
Length (ft)	-----	-----
Replacement Cost / ft	-----	-----
Total Value	-----	-----
Waterline Infrastructure Value		
Type	None.	None (undeveloped island)
Length (ft)	-----	-----
Replacement Cost / ft	-----	-----
Total Value	-----	-----
Sewer Infrastructure Value		
Type	None.	None (undeveloped island)
Length (ft)	-----	-----
Replacement Cost / ft	-----	-----
Total Value	-----	-----
GRAND TOTAL VALUE	**None.**	**None (undeveloped island)**

Property Tax Base of IRPs	Zero (exempt, state property)	Zero (exempt, fed. property)
Property Tax Revenue of IRPs	Zero (exempt, state property)	Zero (exempt, fed. property)
Municipal Property Tax Base	Tax Exempt (Fort Macon State Park)	Tax Exempt (National Seashore)
County Property Tax Base	$17.5 billion (entire Carteret County)	

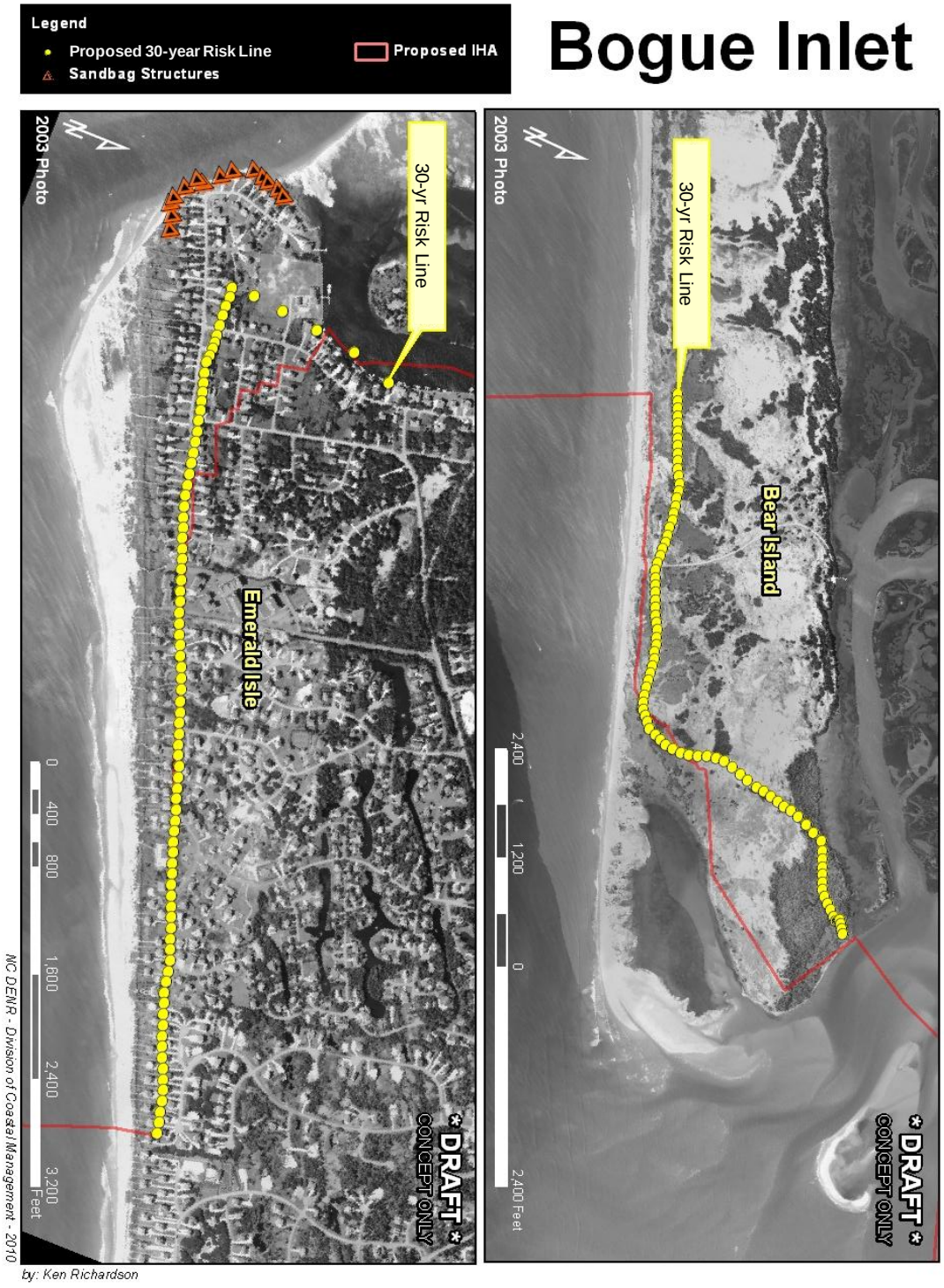

Figure V-2. 30-yr Risk Line and Sandbags at Bogue Inlet

Table V-3. Economic Value at Risk Within 30-yr Risk Lines at Bogue Inlet

Value Type	West Side of Inlet (Bear Island side)	East Side of Inlet (Emerald Island side)
Residential Property Value		
Number of Parcels	None (undeveloped island)	63 single family 33 condo units
Land Value	-----	$54,920,000
Structure Value	-----	$33,460,000
Other Value	-----	$1,070,000
Total Value	-----	$89,450,000
Commercial Property Value		
Number of Parcels	None (undeveloped island)	None known.
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Government Property Value		
Number of Parcels	None (undeveloped island)	None known.
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Road Infrastructure Value		
Type	None (undeveloped island)	2-lane road w. 2' paved shoulders (no curb, gutter, parking or sidewalk)
Length (ft)	-----	5818
Replacement Cost / ft	-----	$568
Total Value	-----	$3,304,624
Waterline Infrastructure Value		
Type	None (undeveloped island)	Typical
Length (ft)	-----	5818
Replacement Cost / ft	-----	$55
Total Value	-----	$319,990
Sewer Infrastructure Value		
Type	None (undeveloped island)	Typical
Length (ft)	-----	5818
Replacement Cost / ft	-----	$150
Total Value	-----	$872,700
GRAND TOTAL VALUE	**None (undeveloped island)**	**$93,947,314**

Property Tax Base within 30-yr Risk Lines	Zero (exempt, state property)	$89,450,000
Property Tax Revenue within 30-yr Risk Lines	Zero (exempt, state property)	$265,667 annually
Municipal Property Tax Base	Tax Exempt (Hammocks Beach State Park)	$4.23 billion (Emerald Isle)
County Property Tax Base	$9.7 billion (entire Onslow County)	$17.5 billion (entire Carteret County)

Table V-4. Economic Value at Imminent Risk (Sandbags) – Bogue Inlet

Value Type	West Side of Inlet (Bear Island side)	East Side of Inlet (Emerald Island side)
Residential Property Value		
Number of Parcels	None (undeveloped island)	13 SFR
Land Value	-----	$10,676,000
Structure Value	-----	$3,523,000
Other Value	-----	$176,000
Total Value	-----	$14,375,000
Commercial Property Value		
Number of Parcels	None (undeveloped island)	None.
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Government Property Value		
Number of Parcels	None (undeveloped island)	None.
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Road Infrastructure Value		
Type	None (undeveloped island)	None.
Length (ft)	-----	-----
Replacement Cost / ft	-----	-----
Total Value	-----	-----
Waterline Infrastructure Value		
Type	None (undeveloped island)	None.
Length (ft)	-----	-----
Replacement Cost / ft	-----	-----
Total Value	-----	-----
Sewer Infrastructure Value		
Type	None (undeveloped island)	None.
Length (ft)	-----	-----
Replacement Cost / ft	-----	-----
Total Value	-----	-----
GRAND TOTAL VALUE	**None (undeveloped island)**	**$14,375,000**

Property Tax Base of IRPs	Zero (exempt, state property)	$14,375,000
Property Tax Revenue of IRPs	Zero (exempt, state property)	$42,694 annually
Municipal Property Tax Base	Tax Exempt (Hammocks Beach State Park)	$4.23 billion (Emerald Isle)
County Property Tax Base	$9.7 billion (entire Onslow County)	$17.5 billion (entire Carteret County)

SFR = Single family residences.

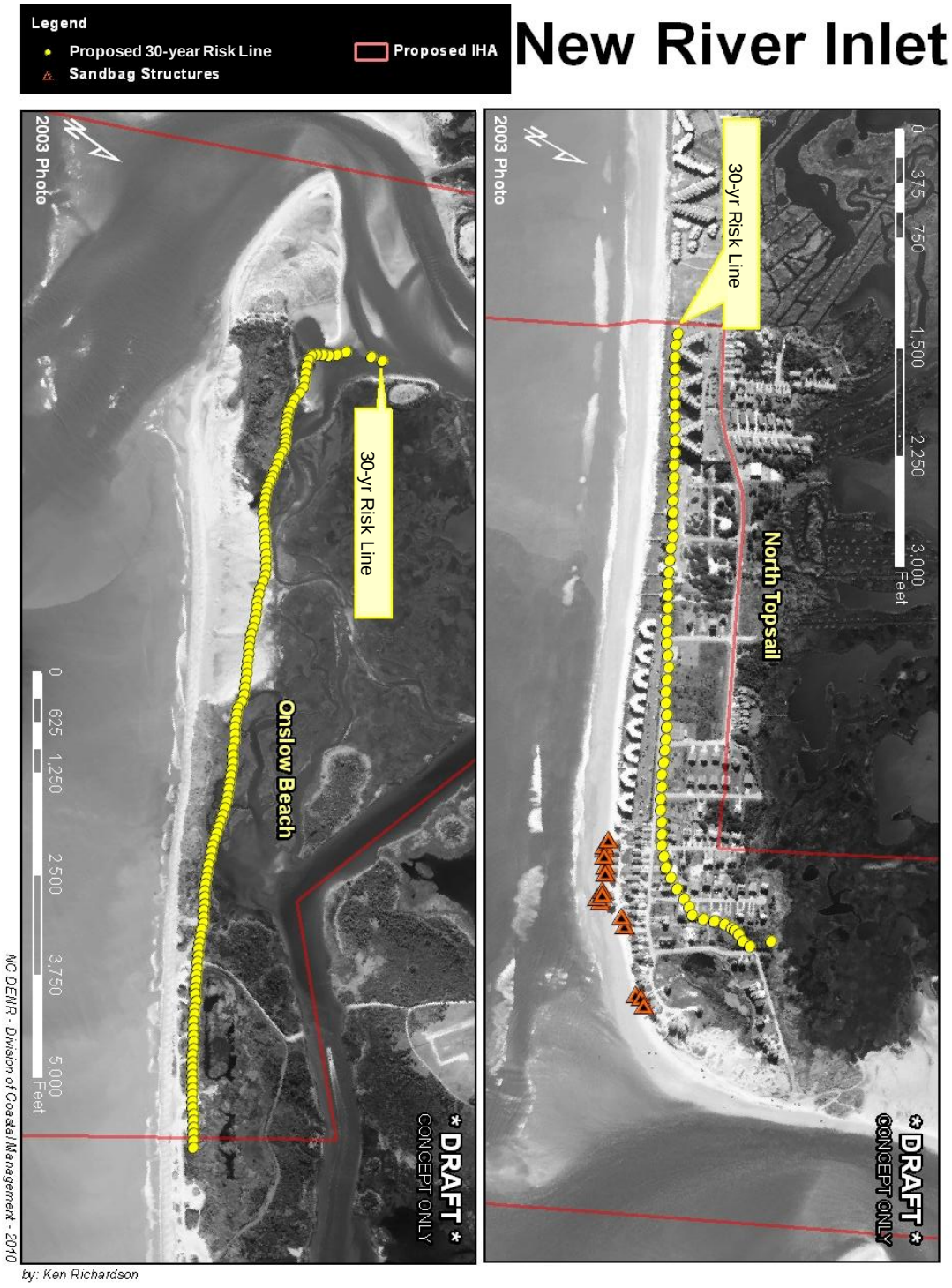

Figure V-3. 30-yr Risk Line and Sandbags at New River Inlet

Table V-5. Economic Value at Risk Within 30-yr Risk Lines at New River Inlet

Value Type	North Side of Inlet (Onslow Beach side)	South Side of Inlet (North Topsail Beach side)
Residential Property Value		
Number of Parcels	None (undev. military land)	136 residential single fam. 240 condo units
Land Value	-----	$24,773,765
Structure Value	-----	$41,666,597
Other Value	-----	$377,331
Total Value	-----	$66,817,693
Commercial Property Value		
Number of Parcels	None (undev. military land)	None known.
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Government Property Value		
Number of Parcels	None (undev. military land)	None known.
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Road Infrastructure Value		
Type	None (undev. military land)	2-lane road w. 2' paved shoulders (no curb, gutter, parking or sidewalk)
Length (ft)	-----	4480
Replacement Cost / ft	-----	$568
Total Value	-----	$2,545,455
Waterline Infrastructure Value		
Type	None (undev. military land)	Typical
Length (ft)	-----	4480
Replacement Cost / ft	-----	$55
Total Value	-----	$246,400
Sewer Infrastructure Value		
Type	None (undev. military land)	Typical
Length (ft)	-----	4480
Replacement Cost / ft	-----	$150
Total Value	-----	$672,000
GRAND TOTAL VALUE	**None (undev. military land)**	**$70,281,548**

Property Tax Base within 30-yr Risk Lines	None (undev. military land)	$66,817,693
Property Tax Revenue within 30-yr Risk Lines	None (undev. military land)	$443,001 annually
Municipal Property Tax Base	Tax Exempt (military)	$1.50 billion (North Topsail Beach)
County Property Tax Base	$9.7 billion (entire Onslow County)	

Table V-6. Economic Value at Imminent Risk (Sandbags) – New River Inlet

Value Type	North Side of Inlet (Onslow Beach side)	South Side of Inlet (North Topsail Beach side)
Residential Property Value		
Number of Parcels	None (undev. military land)	37 parcels (of which 15 have structures)
Land Value	-----	$1,328,850
Structure Value	-----	$1,556,901
Other Value	-----	$28,460
Total Value	-----	$2,914,211
Commercial Property Value		
Number of Parcels	None (undev. military land)	None.
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Government Property Value		
Number of Parcels	None (undev. military land)	None.
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Road Infrastructure Value		
Type	None (undev. military land)	None.
Length (ft)	-----	-----
Replacement Cost / ft	-----	-----
Total Value	-----	-----
Waterline Infrastructure Value		
Type	None (undev. military land)	None.
Length (ft)	-----	-----
Replacement Cost / ft	-----	-----
Total Value	-----	-----
Sewer Infrastructure Value		
Type	None (undev. military land)	None.
Length (ft)	-----	-----
Replacement Cost / ft	-----	-----
Total Value	-----	-----
GRAND TOTAL VALUE	**None (undev. military land)**	**$2,914,211**

Property Tax Base of IRPs	Exempt	$2,914,211
Property Tax Revenue of IRPs	Exempt	$19,322 annually
Municipal Property Tax Base	Tax Exempt (military)	$1.50 billion (North Topsail Beach)
County Property Tax Base	$9.7 billion (entire Onslow County)	

Figure V-4. 30-yr Risk Line and Sandbags at New Topsail Inlet

Table V-7. Economic Value at Risk Within 30-yr Risk Lines at New Topsail Inlet

Value Type	North Side of Inlet (Topsail Beach side)	South Side of Inlet (Lea Hutaff Island side)
Residential Property Value		
Number of Parcels	148 single-family residences 36 condo units	None (undeveloped island)
Land Value	$19,122,000	-----
Structure Value	$14,157,000	-----
Other Value	-----	-----
Total Value	$33,279,000	-----
Commercial Property Value		
Number of Parcels	None known.	None (undeveloped island)
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Government Property Value		
Number of Parcels	None known.	None (undeveloped island)
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Road Infrastructure Value		
Type	2-lane road w. 2' paved shoulders (no curb, gutter, parking or sidewalk)	None (undeveloped island)
Length (ft)	4575	-----
Replacement Cost / ft	$568	-----
Total Value	$2,599,000	-----
Waterline Infrastructure Value		
Type	Typical	None (undeveloped island)
Length (ft)	4575	-----
Replacement Cost / ft	$55	-----
Total Value	$252,000	-----
Sewer Infrastructure Value		
Type	Typical	None (undeveloped island)
Length (ft)	4575	-----
Replacement Cost / ft	$150	-----
Total Value	$686,000	-----
GRAND TOTAL VALUE	**$36,816,000**	**None (undeveloped island)**

Property Tax Base within 30-yr Risk Lines	$33,279,000	None (undeveloped island)
Property Tax Revenue within 30-yr Risk Lines	$342,774 annually	None (undeveloped island)
Municipal Property Tax Base	$0.42 billion (Topsail Beach)	$608,000 (Lea-Hutaff Island)
County Property Tax Base	$3.8 billion (entire Pender County)	

Table V-8. Economic Value at Imminent Risk (Sandbags) – New Topsail Inlet

Value Type	North Side of Inlet (Topsail Beach side)	South Side of Inlet (Lea Hutaff Island side)
Residential Property Value		
Number of Parcels	21 SFR & duplexes plus 36 condo units	None (undeveloped island)
Land Value	$5,735,000	-----
Structure Value	$3,213,000	-----
Other Value	$0	-----
Total Value	$8,949,000	-----
Commercial Property Value		
Number of Parcels	None.	None (undeveloped island)
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Government Property Value		
Number of Parcels	None.	None (undeveloped island)
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Road Infrastructure Value		
Type	2-lane road w. 2' paved shoulders (no curb, gutter, parking or sidewalk)	None (undeveloped island)
Length (ft)	755	-----
Replacement Cost / ft	$568	-----
Total Value	$429,000	-----
Waterline Infrastructure Value		
Type	Typical.	None (undeveloped island)
Length (ft)	755	-----
Replacement Cost / ft	$55	-----
Total Value	$42,000	-----
Sewer Infrastructure Value		
Type	Typical.	None (undeveloped island)
Length (ft)	755	-----
Replacement Cost / ft	$150	-----
Total Value	$113,000	-----
GRAND TOTAL VALUE	**$9,533,000**	**None (undeveloped island)**

Property Tax Base of IRPs	$8,949,000	None (undeveloped island)
Property Tax Revenue of IRPs	$92,175 annually	None (undeveloped island
Municipal Property Tax Base	$0.42 billion (Topsail Beach)	$608,000 (Lea-Hutaff Island)
County Property Tax Base	$3.8 billion (entire Pender County)	

SFR = Single Family Residences.

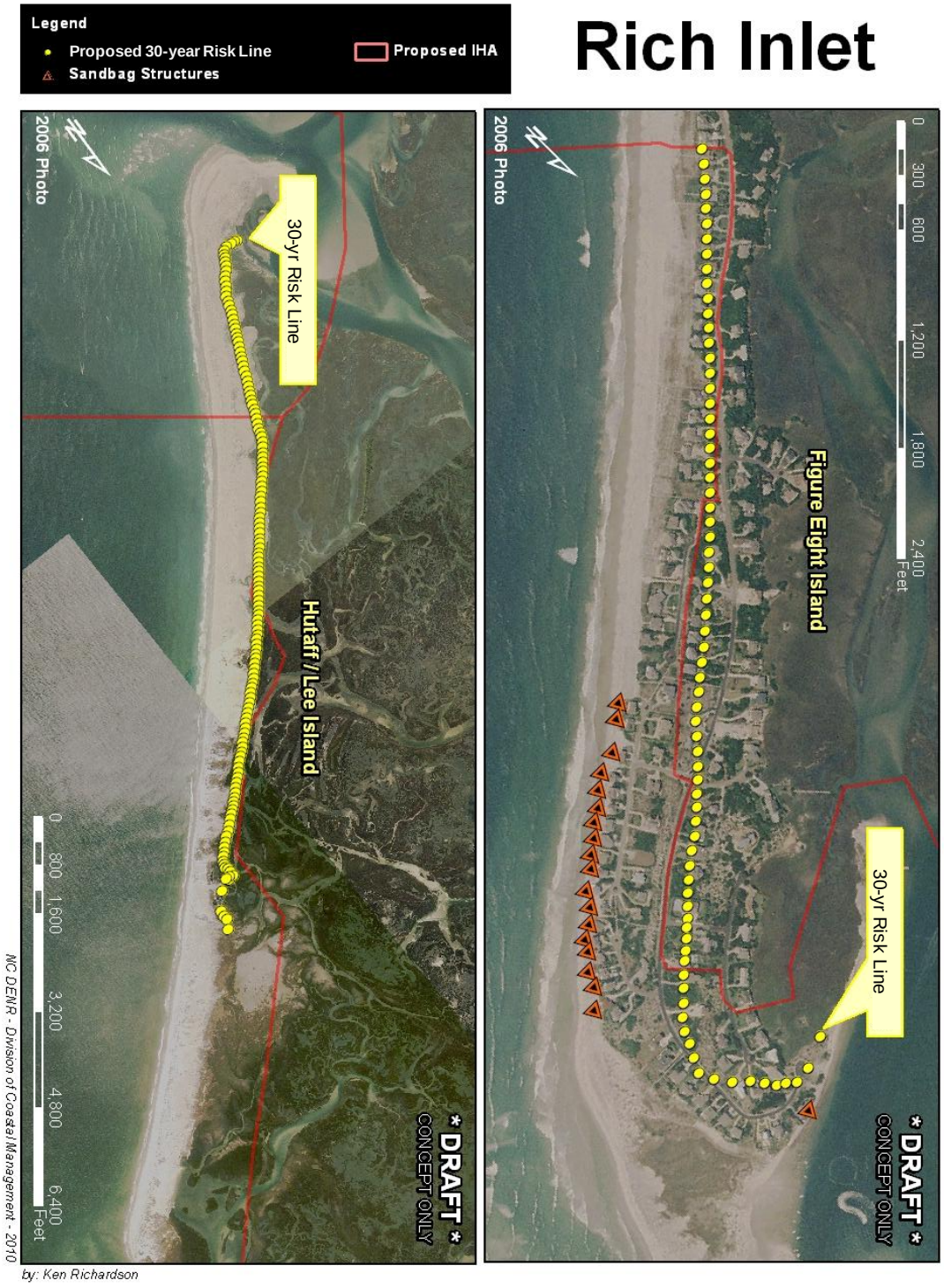

Figure V-5. 30-yr Risk Line and Sandbags at Rich Inlet

Table V-9. Economic Value at Risk Within 30-yr Risk Lines at Rich Inlet

Value Type	North Side of Inlet (Lea Hutaff Island side)	South Side of Inlet (Figure Eight Island side)
Residential Property Value		
Number of Parcels	None (undeveloped island)	89 single-family residences
Land Value	-----	$99,043,000
Structure Value	-----	$64,143,000
Other Value	-----	-----
Total Value	-----	$163,186,000
Commercial Property Value		
Number of Parcels	None (undeveloped island)	None known.
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Government Property Value		
Number of Parcels	None (undeveloped island)	None known.
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Road Infrastructure Value		
Type	None (undeveloped island)	2-lane road w. 2' paved shoulders (no curb, gutter, parking or sidewalk)
Length (ft)	-----	5149
Replacement Cost / ft	-----	$568
Total Value	-----	$2,926,000
Waterline Infrastructure Value		
Type	None (undeveloped island)	Typical
Length (ft)	-----	5149
Replacement Cost / ft	-----	$55
Total Value	-----	$283,000
Sewer Infrastructure Value		
Type	None (undeveloped island)	Typical
Length (ft)	-----	5149
Replacement Cost / ft	-----	$150
Total Value	-----	$772,000
GRAND TOTAL VALUE	**None (undeveloped island)**	**$167,168,000**

Property Tax Base within 30-yr Risk Lines	None (undeveloped island)	$163,186,000
Property Tax Revenue within 30-yr Risk Lines	None (undeveloped island)	$685,381 annually
Municipal Property Tax Base	$608,000 (Lea-Hutaff Island)	$1.20 billion (Figure Eight Island)
County Property Tax Base	$3.8 billion (entire Pender County)	$29.1 billion (entire New Hanover County)

Table V-10. Economic Value at Imminent Risk (Sandbags) – Rich Inlet

Value Type	North Side of Inlet (Lea Hutaff Island side)	South Side of Inlet (Figure Eight Island side)
Residential Property Value		
Number of Parcels	None (undeveloped island)	21 SFR
Land Value	-----	$14,854,000
Structure Value	-----	$11,114,000
Other Value	-----	$0
Total Value	-----	$25,968,000
Commercial Property Value		
Number of Parcels	None (undeveloped island)	None in EHA.
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Government Property Value		
Number of Parcels	None (undeveloped island)	None in EHA.
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Road Infrastructure Value		
Type	None (undeveloped island)	None in EHA.
Length (ft)	-----	-----
Replacement Cost / ft	-----	-----
Total Value	-----	-----
Waterline Infrastructure Value		
Type	None (undeveloped island)	None in EHA.
Length (ft)	-----	-----
Replacement Cost / ft	-----	-----
Total Value	-----	-----
Sewer Infrastructure Value		
Type	None (undeveloped island)	None in EHA.
Length (ft)	-----	-----
Replacement Cost / ft	-----	-----
Total Value	-----	-----
GRAND TOTAL VALUE	**None (undeveloped island)**	**$25,968,000**

Property Tax Base of IRPs	None (undeveloped island)	$25,968,000
Property Tax Revenue of IRPs	None (undeveloped island)	$109,066 annually
Municipal Property Tax Base	$608,000 (Lea-Hutaff Island)	$1.20 billion (Figure Eight Island)
County Property Tax Base	$3.8 billion (entire Pender County)	$29.1 billion (entire New Hanover County)

SFR = Single Family Residences.

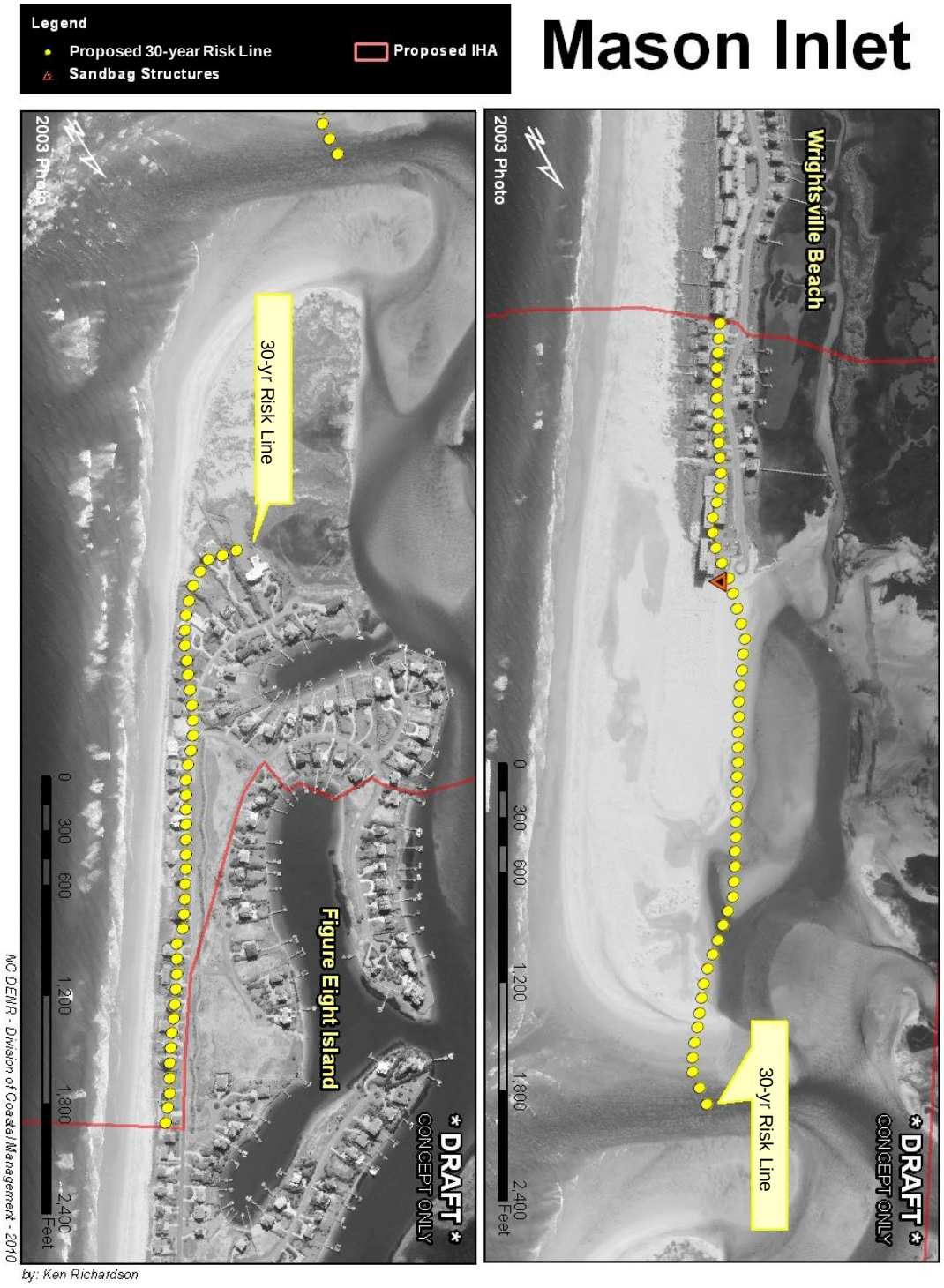

Figure V-6. 30-yr Risk Line and Sandbags at Mason Inlet

Table V-11. Economic Value at Risk Within 30-yr Risk Lines at Mason Inlet

Value Type	North Side of Inlet (Figure Eight Island side)	South Side of Inlet (Wrightsville Beach side)
Residential Property Value		
Number of Parcels	25	14 single-family 1 condo resort w. 168 resid. units
Land Value	$30,364,488	$30,869,445
Structure Value	$16,044,453	$53,840,582
Other Value	-----	-----
Total Value	$46,408,941	$84,710,027
Commercial Property Value		
Number of Parcels	None known.	2 units in condo resort
Land Value	-----	(value included under residential)
Structure Value	-----	(value included under residential)
Other Value	-----	-----
Total Value	-----	(value included under residential)
Government Property Value		
Number of Parcels	None known.	None known.
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Road Infrastructure Value		
Type	2-lane road w. 2' paved shoulders (no curb, gutter, parking or sidewalk)	2-lane road w. bike lanes each side (no curb, gutter, parking or sidewalk)
Length (ft)	250	0
Replacement Cost / ft	$568	$568
Total Value	$142,000	-----
Waterline Infrastructure Value		
Type	Typical	Typical
Length (ft)	250	0
Replacement Cost / ft	$55	$55
Total Value	$14,000	-----
Sewer Infrastructure Value		
Type	Typical	Typical
Length (ft)	250	0
Replacement Cost / ft	$150	$150
Total Value	$38,000	-----
GRAND TOTAL VALUE	**$46,602,941**	**$84,710,027**

Property Tax Base within 30-yr Risk Lines	$46,408,941	$84,710,027
Property Tax Revenue within 30-yr Risk Lines	$194,918 annually	$409,488 annually
Municipal Property Tax Base	$1.20 billion (Figure Eight Island)	$3.22 billion (Wrightsville Beach)
County Property Tax Base	$29.1 billion (entire New Hanover County)	

Table V-12. Economic Value at Imminent Risk (Sandbags) – Mason Inlet

Value Type	North Side of Inlet (Figure Eight Island side)	South Side of Inlet (Wrightsville Beach Side)
Residential Property Value		
Number of Parcels	None.	None. (Sandbag shown is remnant from before inlet relocation)
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Commercial Property Value		
Number of Parcels	None.	None.
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Government Property Value		
Number of Parcels	None.	None.
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Road Infrastructure Value		
Type	None.	None.
Length (ft)	-----	-----
Replacement Cost / ft	-----	-----
Total Value	-----	-----
Waterline Infrastructure Value		
Type	None.	None.
Length (ft)	-----	-----
Replacement Cost / ft	-----	-----
Total Value	-----	-----
Sewer Infrastructure Value		
Type	None.	None.
Length (ft)	-----	-----
Replacement Cost / ft	-----	-----
Total Value	-----	-----
GRAND TOTAL VALUE	**None.**	**None.**

Property Tax Base of IRPs	None.	None.
Property Tax Revenue of IRPs	None.	None.
Municipal Property Tax Base	$1.20 billion (Figure Eight Island)	$3.22 billion (Wrightsville Beach)
County Property Tax Base	$29.1 billion (entire New Hanover County)	

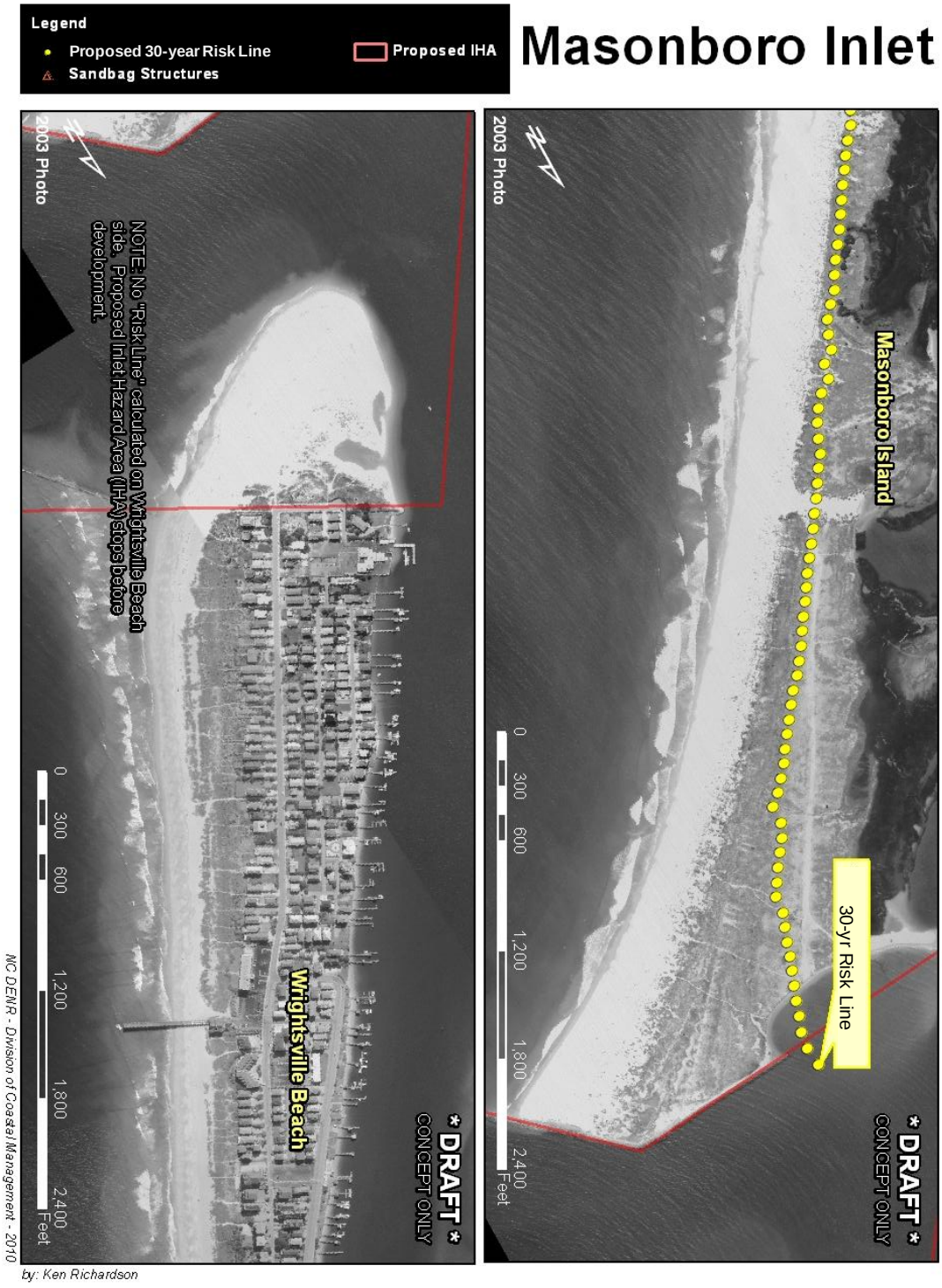

Figure V-7. 30-yr Risk Line and Sandbags at Masonboro Inlet

Table V-13. Economic Value at Risk Within 30-yr Risk Lines at Masonboro Inlet

Value Type	North Side of Inlet (Wrightsville Beach side)	South Side of Inlet (Masonboro Island side)
Residential Property Value		
Number of Parcels	None w/n 30-yr Risk Lines.	None (undeveloped island)
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Commercial Property Value		
Number of Parcels	None w/n 30-yr Risk Lines.	None (undeveloped island)
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Government Property Value		
Number of Parcels	None w/n 30-yr Risk Lines.	None (undeveloped island)
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Road Infrastructure Value		
Type	None w/n 30-yr Risk Lines.	None (undeveloped island)
Length (ft)	-----	-----
Replacement Cost / ft	-----	-----
Total Value	-----	-----
Waterline Infrastructure Value		
Type	None w/n 30-yr Risk Lines.	None (undeveloped island)
Length (ft)	-----	-----
Replacement Cost / ft	-----	-----
Total Value	-----	-----
Sewer Infrastructure Value		
Type	None w/n 30-yr Risk Lines.	None (undeveloped island)
Length (ft)	-----	-----
Replacement Cost / ft	-----	-----
Total Value	-----	-----
GRAND TOTAL VALUE	**None w/n 30-yr Risk Lines.**	**None (undeveloped island)**

Property Tax Base within 30-yr Risk Lines	None w/n 30-yr Risk Lines.	None (undeveloped island)
Property Tax Revenue within 30-yr Risk Lines	None w/n 30-yr Risk Lines.	None (undeveloped island)
Municipal Property Tax Base	$3.22 billion (Wrightsville Beach)	Tax Exempt (Nature Preserve)
County Property Tax Base	$29.1 billion (entire New Hanover County)	

Table V-14. Economic Value at Imminent Risk (Sandbags) – Masonboro Inlet

Value Type	North Side of Inlet (Wrightsville Beach side)	South Side of Inlet (Masonboro Island side)
Residential Property Value		
Number of Parcels	None.	None (undeveloped island)
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Commercial Property Value		
Number of Parcels	None.	None (undeveloped island)
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Government Property Value		
Number of Parcels	None.	None (undeveloped island)
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Road Infrastructure Value		
Type	None.	None (undeveloped island)
Length (ft)	-----	-----
Replacement Cost / ft	-----	-----
Total Value	-----	-----
Waterline Infrastructure Value		
Type	None.	None (undeveloped island)
Length (ft)	-----	-----
Replacement Cost / ft	-----	-----
Total Value	-----	-----
Sewer Infrastructure Value		
Type	None.	None (undeveloped island)
Length (ft)	-----	-----
Replacement Cost / ft	-----	-----
Total Value	-----	-----
GRAND TOTAL VALUE	**None.**	**None (undeveloped island)**

Property Tax Base of IRPs	None.	None (undeveloped island)
Property Tax Revenue of IRPs	None.	None (undeveloped island)
Municipal Property Tax Base	$3.22 billion (Wrightsville Beach)	Tax Exempt (Nature Preserve)
County Property Tax Base	$29.1 billion (entire New Hanover County)	

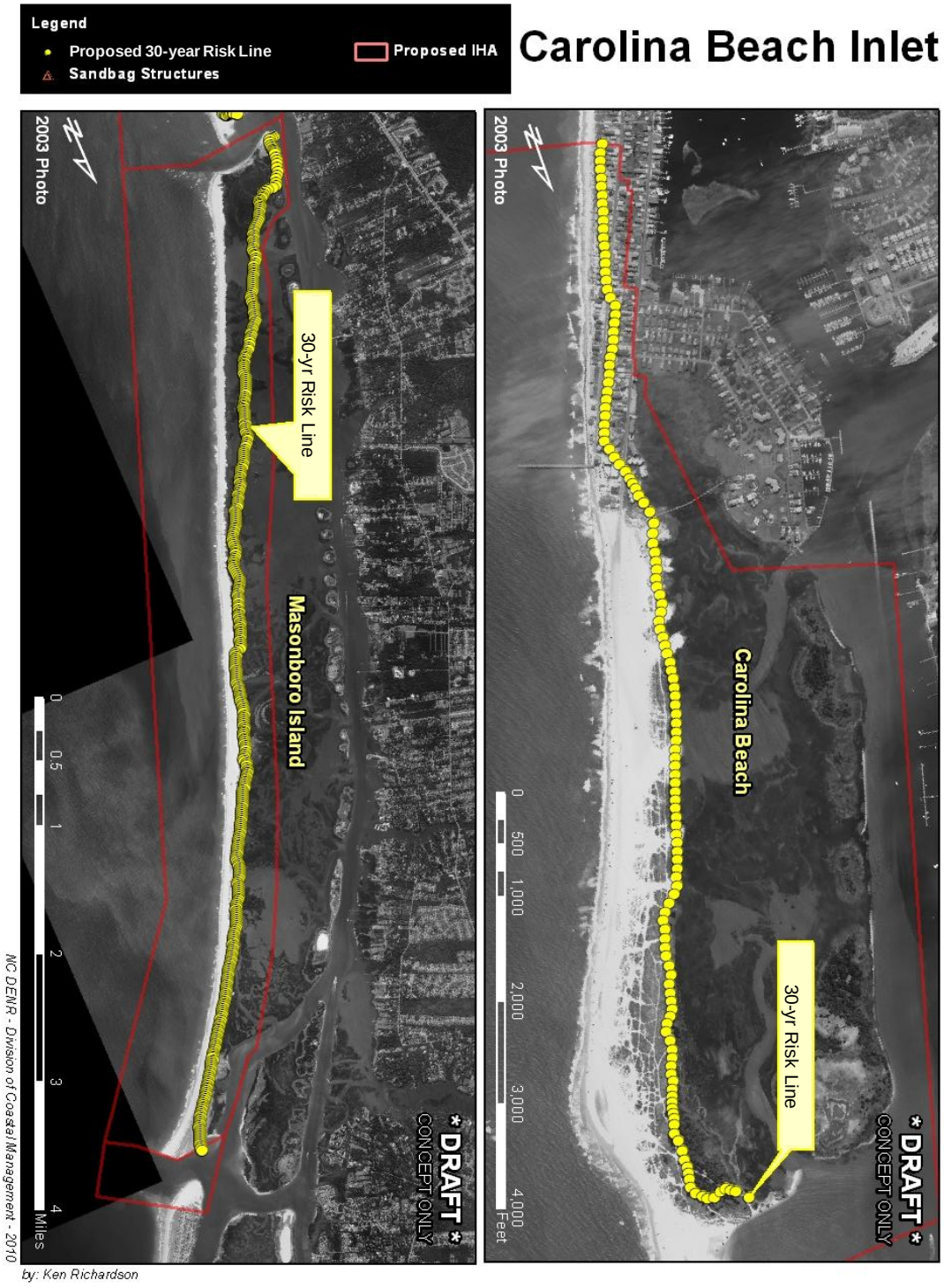

Figure V-8. 30-yr Risk Line and Sandbags at Carolina Beach Inlet

Table V-15. Economic Value at Risk Within 30-yr Risk Lines at Carolina Beach Inlet

Value Type	North Side of Inlet (Masonboro Island side)	South Side of Inlet (Carolina Beach side)
Residential Property Value		
Number of Parcels	None (undeveloped island)	39
Land Value	-----	$28,753,000
Structure Value	-----	$5,976,000
Other Value	-----	$0
Total Value	-----	$34,729,000
Commercial Property Value		
Number of Parcels	None (undeveloped island)	1 (Carolina Beach Fishing Pier)
Land Value	-----	(included in residential totals)
Structure Value	-----	(included in residential totals)
Other Value	-----	-----
Total Value	-----	(included in residential totals)
Government Property Value		
Number of Parcels	None (undeveloped island)	None known.
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Road Infrastructure Value		
Type	None (undeveloped island)	2-lane road w. 2' paved shoulders (no curb, gutter, parking or sidewalk)
Length (ft)	-----	2076
Replacement Cost / ft	-----	$568
Total Value	-----	$1,180,000
Waterline Infrastructure Value		
Type	None (undeveloped island)	Typical
Length (ft)	-----	2076
Replacement Cost / ft	-----	$55
Total Value	-----	$114,000
Sewer Infrastructure Value		
Type	None (undeveloped island)	Typical
Length (ft)	-----	2076
Replacement Cost / ft	-----	$150
Total Value	-----	$311,000
GRAND TOTAL VALUE	**None (undeveloped island)**	**$36,334,000**

Property Tax Base within 30-yr Risk Lines	None (undeveloped island)	$34,729,000
Property Tax Revenue within 30-yr Risk Lines	None (undeveloped island)	$206,638 annually
Municipal Property Tax Base	Tax Exempt (Nature Preserve)	$2.38 billion (Carolina Beach)
County Property Tax Base	$29.1 billion (entire New Hanover County)	

Table V-16. Economic Value at Imminent Risk (Sandbags) – Carolina Beach Inlet

Value Type	North Side of Inlet (Masonboro Island side)	South Side of Inlet (Carolina Beach side)
Residential Property Value		
Number of Parcels	None (undeveloped island)	None.
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Commercial Property Value		
Number of Parcels	None (undeveloped island)	None.
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Government Property Value		
Number of Parcels	None (undeveloped island)	None.
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Road Infrastructure Value		
Type	None (undeveloped island)	None.
Length (ft)	-----	-----
Replacement Cost / ft	-----	-----
Total Value	-----	-----
Waterline Infrastructure Value		
Type	None (undeveloped island)	None.
Length (ft)	-----	-----
Replacement Cost / ft	-----	-----
Total Value	-----	-----
Sewer Infrastructure Value		
Type	None (undeveloped island)	None.
Length (ft)	-----	-----
Replacement Cost / ft	-----	-----
Total Value	-----	-----
GRAND TOTAL VALUE	**None (undeveloped island)**	**None.**

Property Tax Base of IRPs	None (undeveloped island)	None.
Property Tax Revenue of IRPs	None (undeveloped island)	None.
Municipal Property Tax Base	Tax Exempt (Nature Preserve)	$2.38 billion (Carolina Beach)
County Property Tax Base	$29.1 billion (entire New Hanover County)	

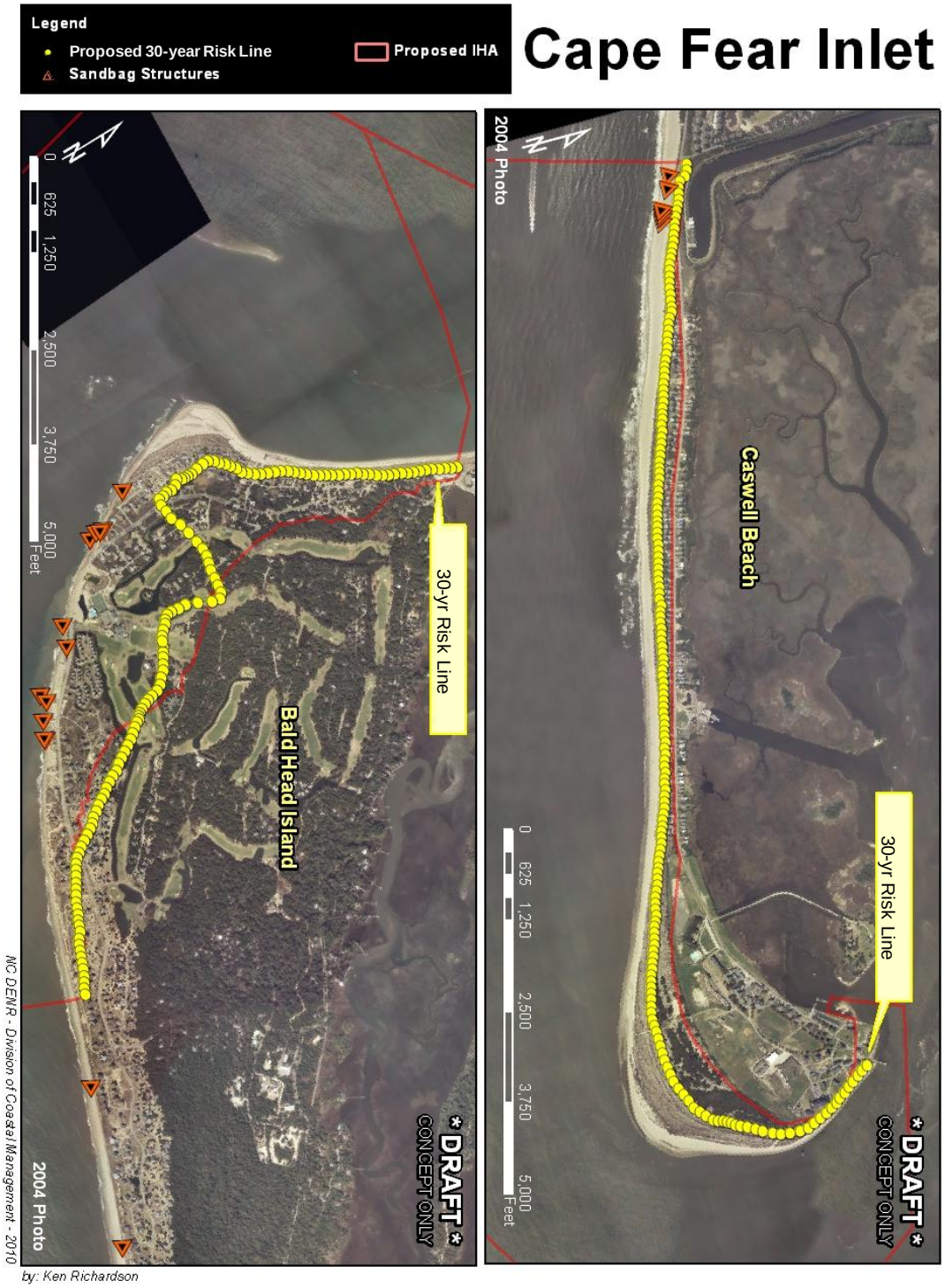

Figure V-9. 30-yr Risk Line and Sandbags at Cape Fear Inlet
(Note: Draft 30-year risk line subject to revision)

Table V-17. Economic Value at Risk Within 30-yr Risk Lines at Cape Fear Inlet

Value Type	West Side of Inlet (Caswell Beach side)	East Side of Inlet (Bald Head Island side)
Residential Property Value		
Number of Parcels	100 residential	323 residential
Land Value	$84,014,000	$195,274,000
Structure Value	$19,327,000	$114,625,000
Other Value	$877,000	$833,000
Total Value	$104,218,000	$310,732,000
Commercial Property Value		
Number of Parcels	1 (Progress Energy)	2 (Bald Head Island Club)
Land Value	$4,650,000	$963,000
Structure Value	$0	-----
Other Value	$5000	$525,000
Total Value	$4,655,000	$1,488,000
Government Property Value		
Number of Parcels	1 (Town of Caswell Beach) 1100 Caswell Beach Rd.	None known.
Land Value	$8,280,000	-----
Structure Value	$0	-----
Other Value	$0	-----
Total Value	$8,280,000	-----
Road Infrastructure Value		
Type	2-lane road w. 2' paved shoulders (no curb, gutter, parking or sidewalk)	2-lane road w. 2' paved shoulders (no curb, gutter, parking or sidewalk)
Length (ft)	1032	11990
Replacement Cost / ft	$568	$568
Total Value	$586,000	$6,813,000
Waterline Infrastructure Value		
Type	Typical	Typical
Length (ft)	1032	3750
Replacement Cost / ft	$55	$55
Total Value	$57,000	$659,000
Sewer Infrastructure Value		
Type	Typical	Typical
Length (ft)	1032	3750
Replacement Cost / ft	$150	$150
Total Value	$155,000	$1,799,000
GRAND TOTAL VALUE	**$117,951,000**	**$321,491,000**

Property Tax Base within 30-yr Risk Lines	$108,873,000	$312,220,000
Property Tax Revenue within 30-yr Risk Lines	$495,372 annually	$1,826,487 annually
Municipal Property Tax Base	$0.41 billion (Caswell Beach)	$1.96 billion (Bald Head Island)
County Property Tax Base	$28.6 billion (entire Brunswick County)	

Table V-18. Economic Value at Imminent Risk (Sandbags) – Cape Fear River Inlet

Value Type	West Side of Inlet (Caswell Beach side)	East Side of Inlet (Bald Head Island side)
Residential Property Value		
Number of Parcels	None.	22 SFR
Land Value	-----	$7,228,000
Structure Value	-----	$3,713,000
Other Value	-----	$27,000
Total Value	-----	$10,968,000
Commercial Property Value		
Number of Parcels	None.	None.
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Government Property Value		
Number of Parcels	None.	None.
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Road Infrastructure Value		
Type	None.	2-lane road w. 2' paved shoulders (no curb, gutter, parking or sidewalk)
Length (ft)	-----	1845
Replacement Cost / ft	-----	$568
Total Value	-----	$1,048,000
Waterline Infrastructure Value		
Type	None.	Typical
Length (ft)	-----	1845
Replacement Cost / ft	-----	$55
Total Value	-----	$101,000
Sewer Infrastructure Value		
Type	None.	Typical
Length (ft)	-----	1845
Replacement Cost / ft	-----	$150
Total Value	-----	$277,000
GRAND TOTAL VALUE	**None.**	**$12,394,000**

Property Tax Base of IRPs	None.	$10,968,000
Property Tax Revenue of IRPs	None.	$64,163 annually
Municipal Property Tax Base	$0.41 billion (Caswell Beach)	$1.96 billion (Bald Head Island)
County Property Tax Base	$28.6 billion (entire Brunswick County)	

SFR = Single family residences.

Figure V-10. 30-yr Risk Line and Sandbags at Lockwood Folly Inlet

Table V-19. Economic Value at Risk Within 30-yr Risk Lines at Lockwood Folly Inlet

Value Type	West Side of Inlet (Holden Beach side)	East Side of Inlet (Oak Island side)
Residential Property Value		
Number of Parcels	150	102
Land Value	$21,080,000	$93,700,000
Structure Value	$5,640,000	$15,470,000
Other Value	$511,000	$730,000
Total Value	$27,240,000	$109,900,000
Commercial Property Value		
Number of Parcels	None known.	None known.
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Government Property Value		
Number of Parcels	2 (Town of Holden Bch.)	2 (Town of Long Beach) 2 (Town of Oak Island)
Land Value	-----	$5.22 million (Long Beach) $237,000 (Oak Island)
Structure Value	-----	-----
Other Value	-----	-----
Total Value	No assessed value.	$5,460,000
Road Infrastructure Value		
Type	2-lane road w. 2' paved shoulders (no curb, gutter, parking or sidewalk)	2-lane road w. 2' paved shoulders (no curb, gutter, parking or sidewalk)
Length (ft)	8908	3750
Replacement Cost / ft	$568	$568
Total Value	$5,060,000	$2,130,000
Waterline Infrastructure Value		
Type	Typical	Typical
Length (ft)	8908	3750
Replacement Cost / ft	$55	$55
Total Value	$490,000	$206,000
Sewer Infrastructure Value		
Type	Typical	Typical
Length (ft)	8908	3750
Replacement Cost / ft	$150	$150
Total Value	$1,340,000	$563,000
GRAND TOTAL VALUE	**$34,130,000**	**$118,259,000**

Property Tax Base within 30-yr Risk Lines	$27,240,000	$109,900,000
Property Tax Revenue within 30-yr Risk Lines	$101,878 annually	$515,981 annually
Municipal Property Tax Base	$2.21 billion (Holden Beach)	$4.14 billion (Oak Island)
County Property Tax Base	$28.6 billion (entire Brunswick County)	

Table V-20. Economic Value at Imminent Risk (Sandbags) – Lockwood Folly Inlet

Value Type	West Side of Inlet (Holden Beach side)	East Side of Inlet (Oak Island side)
Residential Property Value		
Number of Parcels	32 SFR	None.
Land Value	$14,280,000	-----
Structure Value	$2,925,000	-----
Other Value	$221,000	-----
Total Value	$17,427,000	-----
Commercial Property Value		
Number of Parcels	None.	None.
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Government Property Value		
Number of Parcels	None.	None.
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Road Infrastructure Value		
Type	2-lane road w. 2' paved shoulders (no curb, gutter, parking or sidewalk)	None.
Length (ft)	1911	-----
Replacement Cost / ft	$568	-----
Total Value	$1,085,000	-----
Waterline Infrastructure Value		
Type	Typical	None.
Length (ft)	1911	-----
Replacement Cost / ft	$55	-----
Total Value	$105,000	-----
Sewer Infrastructure Value		
Type	Typical	None.
Length (ft)	1911	-----
Replacement Cost / ft	$150	-----
Total Value	$287,000	-----
GRAND TOTAL VALUE	**$18,904,000**	**None.**

Property Tax Base of IRPs	$17,427,000	None.
Property Tax Revenue of IRPs	$65,177 annually	None.
Municipal Property Tax Base	$2.21 billion (Holden Beach)	$4.14 billion (Oak Island)
County Property Tax Base	$28.6 billion (entire Brunswick County)	

SFR = Single family residences.

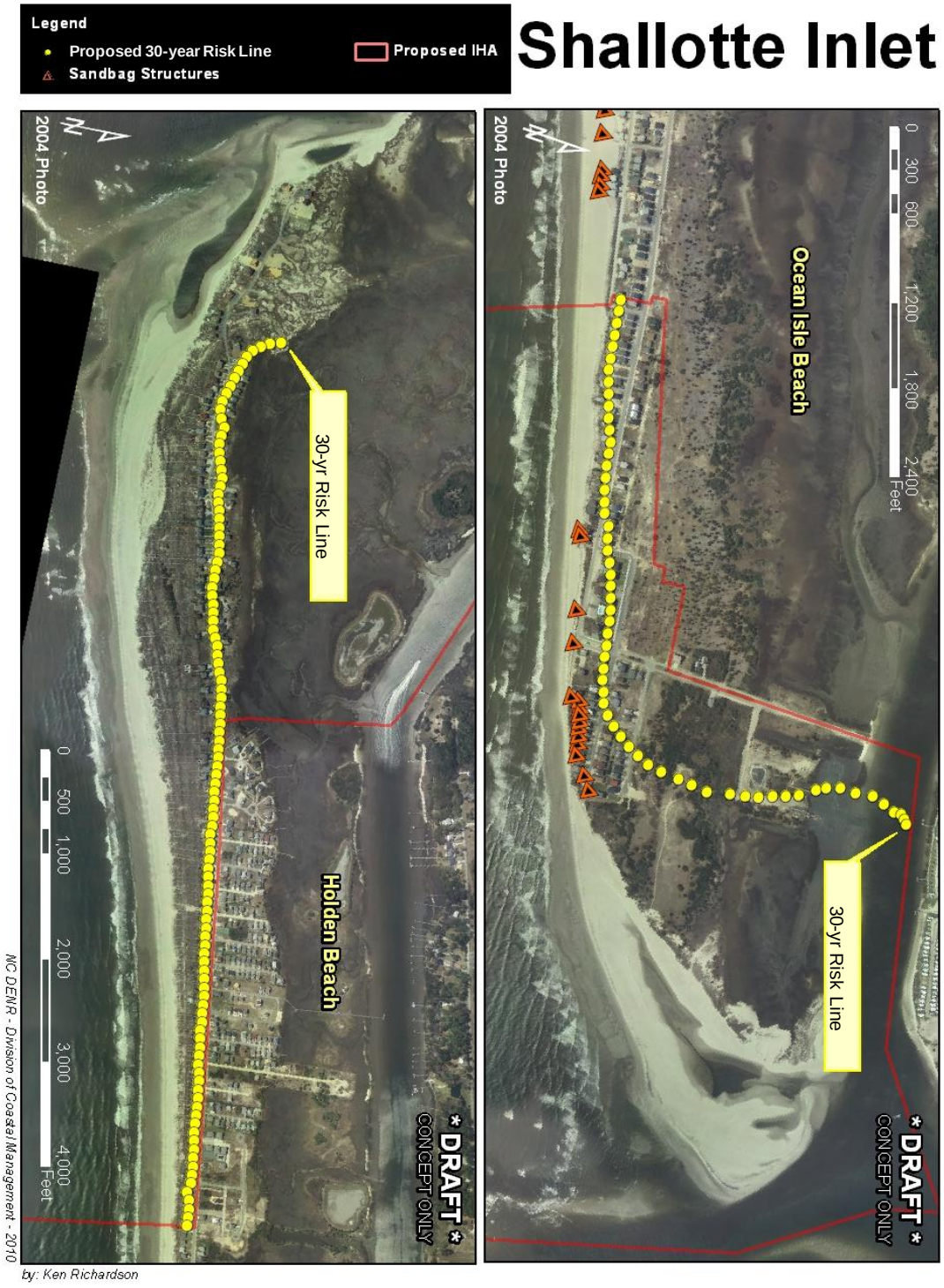

Figure V-11. 30-yr Risk Line and Sandbags at Shallotte Inlet

Table V-21. Economic Value at Risk Within 30-yr Risk Lines at Shallotte Inlet

Value Type	West Side of Inlet (Ocean Isle side)	East Side of Inlet (Holden Beach side)
Residential Property Value		
Number of Parcels	85	193
Land Value	$16,934,000	$229,097,000
Structure Value	$7,866,000	$41,912,000
Other Value	$269,000	$2,846,000
Total Value	$25,069,000	$273,855,000
Commercial Property Value		
Number of Parcels	None known.	None known.
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Government Property Value		
Number of Parcels	None known.	None known.
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Road Infrastructure Value		
Type	2-lane road w. 2' paved shoulders (no curb, gutter, parking or sidewalk)	2-lane road w. 2' paved shoulders (no curb, gutter, parking or sidewalk)
Length (ft)	2818	5685
Replacement Cost / ft	$568	$568
Total Value	$1,601,000	$3,230,000
Waterline Infrastructure Value		
Type	Typical	Typical
Length (ft)	2818	5685
Replacement Cost / ft	$55	$55
Total Value	$155,000	$313,000
Sewer Infrastructure Value		
Type	Typical	Typical
Length (ft)	2818	5685
Replacement Cost / ft	$150	$150
Total Value	$423,000	$853,000
GRAND TOTAL VALUE	**$27,248,000**	**$278,251,000**

Property Tax Base within 30-yr Risk lines	$25,069,000	$273,855,000
Property Tax Revenue within 30-yr Risk lines	$96,516 annually	$1,024,218 annually
Municipal Property Tax Base	$2.61 billion (Ocean Isle Beach)	$2.21 billion (Holden Beach)
County Property Tax Base	$28.6 billion (entire Brunswick County)	

Table V-22. Economic Value at Imminent Risk (Sandbags) – Shallotte Inlet

Value Type	West Side of Inlet (Ocean Isle side)	East Side of Inlet (Holden Beach side)
Residential Property Value		
Number of Parcels	24 SFR	None.
Land Value	$1,546,000	-----
Structure Value	$1,002,000	-----
Other Value	$20,000	-----
Total Value	$2,569,000	-----
Commercial Property Value		
Number of Parcels	None.	None.
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Government Property Value		
Number of Parcels	None.	None.
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Road Infrastructure Value		
Type	2-lane road w. 2' paved shoulders (no curb, gutter, parking or sidewalk)	None.
Length (ft)	2055	-----
Replacement Cost / ft	$568	-----
Total Value	$1,167,000	-----
Waterline Infrastructure Value		
Type	Typical	None.
Length (ft)	2055	-----
Replacement Cost / ft	$55	-----
Total Value	$113,000	-----
Sewer Infrastructure Value		
Type	Typical	None.
Length (ft)	2055	-----
Replacement Cost / ft	$150	-----
Total Value	$308,000	-----
GRAND TOTAL VALUE	**$4,157,000**	**None.**

Property Tax Base of IRPs	$2,569,000	None.
Property Tax Revenue of IRPs	$9,891 annually	None.
Municipal Property Tax Base	$2.61 billion (Ocean Isle Beach)	$2.21 billion (Holden Beach)
County Property Tax Base	$28.6 billion (entire Brunswick County)	

SFR = Single family residences.

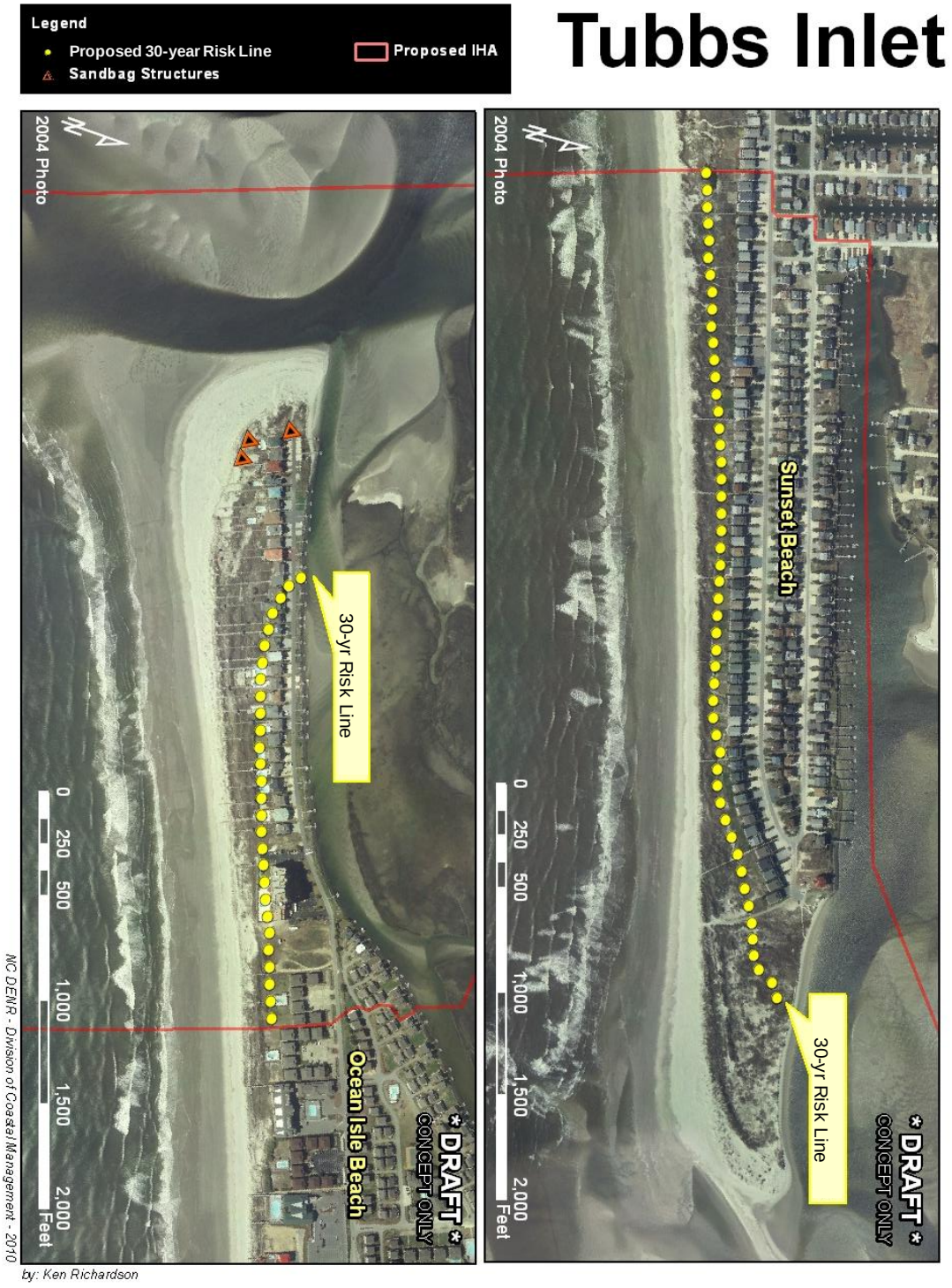

Figure V-12. 30-yr Risk Line and Sandbags at Tubbs Inlet

Table V-23. Economic Value at Risk Within 30-yr Risk Lines at Tubbs Inlet

Value Type	West Side of Inlet (Sunset Beach side)	East Side of Inlet (Ocean Isle side)
Residential Property Value		
Number of Parcels	None w/n 30-yr Risk Lines.	15 single family, 24 condo units
Land Value	-----	$26,290,000
Structure Value	-----	$9,113,000
Other Value	-----	$564,000
Total Value	-----	$35,966,000
Commercial Property Value		
Number of Parcels	None w/n 30-yr Risk Lines.	None known.
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Government Property Value		
Number of Parcels	None w/n 30-yr Risk Lines.	None known.
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Road Infrastructure Value		
Type	None w/n 30-yr Risk Lines.	2-lane road w. 2' paved shoulders (no curb, gutter, parking or sidewalk)
Length (ft)	-----	740
Replacement Cost / ft	-----	$568
Total Value	-----	$420,000
Waterline Infrastructure Value		
Type	None w/n 30-yr Risk Lines.	Typical
Length (ft)	-----	740
Replacement Cost / ft	-----	$55
Total Value	-----	$41,000
Sewer Infrastructure Value		
Type	None w/n 30-yr Risk Lines.	Typical
Length (ft)	-----	740
Replacement Cost / ft	-----	$150
Total Value	-----	$111,000
GRAND TOTAL VALUE	**None w/n 30-yr Risk Lines.**	**$36,538,000**

Property Tax Base within 30-yr Risk Lines	None w/n 30-yr Risk Lines.	$35,966,000
Property Tax Revenue within 30-yr Risk Lines	None w/n 30-yr Risk Lines.	$138,469 annually
Municipal Property Tax Base	$2.05 billion (Sunset Beach)	$2.61 billion (Ocean Isle Beach)
County Property Tax Base	$28.6 billion (entire Brunswick County)	

Table V-24. Economic Value at Imminent Risk (Sandbags) – Tubbs Inlet

Value Type	West Side of Inlet (Sunset Beach side)	East Side of Inlet (Ocean Isle side)
Residential Property Value		
Number of Parcels	None.	3 SFR
Land Value	-----	$4,464,000
Structure Value	-----	$1,752,000
Other Value	-----	$184,000
Total Value	-----	$6,400,000
Commercial Property Value		
Number of Parcels	None.	None.
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Government Property Value		
Number of Parcels	None.	None.
Land Value	-----	-----
Structure Value	-----	-----
Other Value	-----	-----
Total Value	-----	-----
Road Infrastructure Value		
Type	None.	2-lane road w. 2' paved shoulders (no curb, gutter, parking or sidewalk)
Length (ft)	-----	192
Replacement Cost / ft	-----	$568
Total Value	-----	$109,000
Waterline Infrastructure Value	-----	
Type	None.	Typical
Length (ft)	-----	192
Replacement Cost / ft	-----	$55
Total Value	-----	$11,000
Sewer Infrastructure Value		
Type	None.	Typical
Length (ft)	-----	192
Replacement Cost / ft	-----	$150
Total Value	-----	$29,000
GRAND TOTAL VALUE	**None.**	**$6,549,000**

Property Tax Base of IRPs	None.	$6,400,000.
Property Tax Revenue of IRPs	None.	$24,640 annually
Municipal Property Tax Base	$2.05 billion (Sunset Beach)	$2.61 billion (Ocean Isle Beach)
County Property Tax Base	$28.6 billion (entire Brunswick County)	

SFR = Single family residences.

Oregon Inlet

The issues involved in assessing the economic value at risk due to shifting of Oregon Inlet are different from those associated with the other North Carolina inlet, and so Oregon Inlet is considered here as a special case. In the case of Oregon Inlet, the benefits of a terminal groin depend on the scenario assumed for Bonner Bridge, which spans the inlet and connects Bodie Island in the north with Hatteras Island in the south. Bonner Bridge is near the end of its service life. Several alternatives for Bonner Bridge repair, relocation, or extension have been considered by highway planners (NCDOT 2008b). The current Preferred Alternative consists of a new bridge over Oregon Inlet (west of the existing Bonner Bridge) and the construction of additional bridges within the highway NC 12 easement from Oregon Inlet to the town of Rodanthe as needed to retain NC 12 in light of both ongoing shoreline erosion and the potential for island breaches in the area. The Preferred Alternative is designated as the "Parallel Bridge Phased Approach/Rodanthe Bridge Alternative." It is assumed here that the current Preferred Alternative is implemented, and economic value is assessed with and without a terminal groin under this assumption.

Currently, a terminal groin is in position. The terminal groin must remain in position to protect the Hatteras Island end of the new Parallel bridge that will replace Bonner Bridge until a smaller bridge is built to the south, connecting the new Parallel bridge with NC 12 farther south. The smaller bridge is the northern-most (closest to Oregon Inlet, within the Canal Zone area) Phase II bridge of the Preferred Alternative Plan. Once the smaller bridge is constructed, the terminal groin could be removed. The cost of constructing the smaller bridge is estimated to be between $131 and 194 million (2006 dollars). In effect, maintaining the terminal groin for one year allows delay of the construction of the smaller bridge for one year. If it is assumed that:

(1) constructing the smaller bridge costs $162.5 million (the midpoint of the cost estimate range) in 2009 (assuming that any inflation in construction costs that occurred between 2006 and 2008 was offset by deflation in construction costs during the recession of 2008-2009), and

(2) discount rate of 5% (the discount rate used by NCDOT in the Bonner Bridge alternatives study) is appropriate, then the costs savings arising from delaying construction of the smaller bridge by t years is:

$$(\$162.5 \text{ million}) - [(\$162.5 \text{ million})/(1+0.05)^t].$$

For example, if the terminal groin is maintained for 5 years, the costs savings arising from delayed construction of the smaller bridge for 5 years is $35.18 million. If the terminal groin is maintained for 30 years, the cost savings is $124.90 million. These are not annual cost savings but rather the total cost savings of delaying bridge construction for the indicated number of years. The cost savings arise from being able to invest and

earn interest on the money that otherwise would have been spent on constructing the smaller bridge. For every year that bridge construction is delayed, interest can be earned.

Interest rates and corresponding discount rates have been unusually low since the financial crisis of 2008-2009. If these lower rates persist, then the 5% discount rate may be inappropriately large. If a 2% discount rate is used instead, then the costs savings arising from delayed construction of the smaller bridge are smaller. For example, delaying bridge construction for 5 years results in a savings of $15.32 million. If the terminal groin is maintained for 30 years, the cost savings is $72.79 million with a 2% discount rate.

Against these savings must be netted the costs of maintaining the existing terminal groin.

C. Discussion of Other Factors That Influence Economics

1. Recreation and Environmental Value

Beach and wetland areas located within the 30 YRAs considered in this study support recreation and environmental values.

Beach areas provide locations for walking, shell collecting, sunbathing, swimming, surfing, birdwatching and fishing. Wetland areas provide kayaking, canoeing, and birdwatching opportunities as well as important habitat for juvenile fish and shellfish that support recreational and commercial fishing. Wetland areas may also improve coastal water quality through uptake of excess nutrients in the water and reduce the magnitude and severity of coastal erosion processes by absorbing wave energy.

The types and relative importance of supported values typically depend on whether the area is located on the ocean-facing, inlet-facing, or mainland-facing shore of the barrier island and on whether the area is adjacent to substantial residential and commercial development or is located on an undeveloped island or adjacent to a nature preserve.

A brief review of the economic values of beach and wetland areas is provided below, followed by a brief discussions of the undeveloped and nature preserve areas located within the 30 YRAs.

a) Beach Recreation Value

Recently, Bin et al. (2005) provided estimates of consumer surplus value for beach recreation in North Carolina. Consumer surplus is the value to the recreationist of the recreation experience itself, value beyond the expenditures made in order to gain access to the experience. The authors estimated consumer surplus per visitor for a day of beach recreation using the single-site multiple regression travel cost method. Onsite visitation data for seven North Carolina beaches were collected between July and November of 2003. One model pertained to beach visitors that make single day trips to the beach,

while the other was for visitors that stay onsite overnight. Depending upon the site, the estimated net benefits of a day at a beach in North Carolina ranged between $11 and $80 for those users making day trips and between $11 and $41 for those users staying overnight. In a separate study, Bin et al. (2007) estimated consumer surplus values per trip for day trips and overnight trips to Carteret, Pender, Onslow, New Hanover and Brunswick County beaches based on data provided in Herstine et al. (2005). The average estimates of consumer surplus value are $55 per day trip and $65 per overnight trip. These values are similar to other estimates of consumer surplus per beach trip for North Carolina beach trips (e.g., Bin et al. 2005, Whitehead et al. 2008).

b) Shore/Surf/Beach Fishing

Beaches also support consumer surplus value arising from pier and shore/surf/beach fishing. Whitehead et al. (2009) examine the impacts of eroding beaches on shore fishing value in North Carolina based on survey data from 2005-2006. The frequency of trips, average respondent travel cost to each site and the three-year historic average catch at each site were developed for 22 manmade fishing sites (piers and jetties) and the 28 beach and inlet fishing sites in North Carolina. Sixty-two percent of the anglers fish from manmade structures (piers and jetties), with thirty-eight percent fishing directly on the beach. In addition to surf fishing sites on ocean-facing beaches, the north shore of Oregon Inlet, the south shore of Beaufort inlet at Ft. Macon State Park, and the north shore of New River Inlet on Topsail Island were found to be very popular shore fishing locations. The most popular target species were: spot, flounder, kingfish, seatrout, bluefish, striped bass, Spanish mackerel, red drum and king mackerel. A large number of consumer surplus estimates were developed from the model including the potential lost economic value from loss of access to fishing sites, changes in catch rates, and changes in beach width. For example, the change in consumer surplus per trip from a change in the catch rate of one fish per hour at each site is $4.04. The change in consumer surplus per trip from an increase in beach width of 10 meters is $2.97. These estimates of consumer surplus loss assume that pier fishing locations are still available; that is, these estimates measure reduction in value from losing access to favorite fishing sites, under the assumption that other, substitute fishing sites are still available.

c) Primitive Area Hiking/Camping Value

Bowker, J.M. (2006) explores the economic value of recreation activities in primative/wilderness areas using data from the National Survey on Recreation and the Environment and GIS databases. These areas would be similar to undeveloped barrier islands such as Masonboro, Lea-Hutaff, and perhaps Hammocks Beach/Bear islands. Results indicate that although U.S. per-capita participation in such recreation is projected to decrease, based on changing demographics, total visitation will increase, driven by increases in population and household income.

d) Wetland Recreation Value

In a review article of the wetlands valuation literature, Brander et al. (2006) find that wetlands are highly productive ecosystems, providing a number of goods and services that are of value to people. The open-access nature and the public-good characteristics of

wetlands often result in these regions being undervalued in decisions relating to their use and conservation. The authors examined over 190 wetland valuation studies worldwide, providing 215 value observations, in order to present a more comprehensive meta-analysis of the valuation literature. In North America, saltwater/brackish water wetlands had a mean value of around $2000/hectare/year and a median value of $200/hectare/year (1995 dollars), with values varying depending on location and functions. In another review article of 39 wetland valuation studies, Woodward and Wui (2001) conclude that the variation in value estimates across locations is large, and site-specific studies are often needed to determine value. In the Woodward and Wui study, the component values of wetlands as nursery areas supporting recreational and commercial fisheries and as locations for birdwatching recreation were large relative to other components of value.

Bergstrom, et al. (1990) studied the recreation value of 3.25 million acres of wetlands along the south-eastern coast of Louisiana in 1985-1986, including values arising from waterfowl hunting and recreational fishing, shrimping and crabbing. An estimated 1.81 million recreation person-days per year supported an estimated $27.36 million in consumer surplus per year, or $360/year per wetland recreationist (1986 dollars).

In a recent study of the willingness of Mississippi state taxpayers to pay for restoration of barrier islands adversely affected by hurricanes, Petrolia and Kim (2009) found that average willingness to pay was $35 per taxpaying household, based on conservative assumptions and a random sample survey of 3000 Mississippi households.

e) Value of Non-Game Wildlife in Beach and Coastal Wetland Areas

There is evidence that North Carolina households place value on the non-game wildlife residing in coastal beach and wetland areas. Whitehead (1993) evaluated the value of coastal and marine non-game wildlife based on data from a 1991 survey of North Carolina households and found mean willingness to pay of $10.98 (1991 dollars) per household to support a "Loggerhead Sea Turtle Preservation Fund" and $14.74 per household to support a "Coastal Nongame Wildlife Preservation Fund."

f) Value of Coastal Wetlands in Supporting Recreational Fishing

In a study of the economic value on the contribution of saltwater marsh in supporting recreational fishing in Florida, Bell (1997) estimated that an acre of wetlands supported between $80-$526/year in consumer surplus for saltwater recreational anglers. This study only considered recreational fishing for species that depend on saltwater marsh habitat for part of their life cycle. The study used the relationship between acres of saltwater marsh in southern states from Virginia to Texas and recreational saltwater fishing trips, catch, and value to produce the marsh value estimates.

g) Value of Wetlands in Protecting Property from Hurricane Wind Damage

Farber (1987) examined the value on wetlands in reducing wind damage to property. The study estimated a storm wind damage function for the Louisiana gulf coast, where inland distance of a location and wetlands traversed by a hurricane were among the factors considered. Estimates were made of the increase in expected wind damage to property from the loss of intervening wetlands. The discounted value of the loss of a one mile strip of wetlands along Louisiana's gulf coast was estimated to be between $1.1 million and $3.7 million in 1980 dollars, using discount rates of 8% and 3%, respectively.

h) Bodie Island – Cape Hatteras National Seashore

The National Park Service administers the Cape Hatteras National Seashore (CAHA), our nation's first National Seashore, which includes and is adjacent to Oregon Inlet (National Park Service 2010a, 2010b). Hiking, bird watching, swimming and camping are allowed on Bodie Island. Fishing is also allowed, subject to fishing regulations including seasons, size limits and licensing requirements set by the North Carolina Division of Marine Fisheries. Off-road vehicles may be driven on designated portions of the beach. This site contains nationally significant natural and cultural resources and values that play a vital role in the state's ecosystem and local economies, and they are also home to many of the federally protected species that depend upon inlet shoreline habitat. For example, at CAHA, the inlet shorelines are among the few remaining areas where natural barrier island processes occur relatively unimpeded within the Seashore. As a result, the inlets within the Seashore have become even more important as protected wildlife habitat. See the environmental resources sections of this report for additional detail on ecological resources found within CAHA. See Whitehead (1993), for example, for estimates of economic value arising from non-game wildlife in beach and coastal wetland areas of North Carolina. National Park Service data show that in 2008 CAHA experienced 2.24 million visitors, supporting 2,243 local jobs and $211 million in regional economic output (National Park Service 2010b). If portions of CAHA were lost due to shifting inlets, some of this value might be lost. However, the inlet hazard areas are small relative to the total size of CAHA. On the other hand, if inlet habitat-dependent species were adversely affected by shifting inlets, CAHA might experience somewhat fewer visitors and provide less economic value supported by inlet-dependent non-game wildlife.

i) Pea Island National Wildlife Refuge – Cape Hatteras National Seashore

Pea Island National Wildlife Refuge (PINWR) is located in Dare County on the north end of Hatteras Island, adjacent to Oregon Inlet (http://www.fws.gov/peaisland/). PINWR is part of CAHA, but is administered by the U.S. Fish and Wildlife Service. PINWR supports a portion of the visitation and economic value reported in the Bodie Island -- Cape Hatteras National Seashore section of this report. Portions of PINWR would be at risk of loss should the existing terminal groin be removed. The 5,834 acre refuge is approximately 13 miles long (north to south) and ranges from a quarter mile to 1 mile wide (from east to west). The refuge is comprised of ocean beach, dunes, upland, fresh and brackish water ponds, salt flats, and salt marsh. The refuge is home more than 365

species; wildlife list has 25 species of mammals, 24 species of reptiles, and 5 species of amphibians. Concentrations of ducks, geese, swans, wading birds, shore birds, raptors, neotropical migrants are seasonally abundant on refuge. Endangered and threatened species include: peregrine falcons, loggerhead sea turtles, and piping plovers. Shelling, beachcombing, and walking along the shoreline are popular activities. Eco-tourists include canoeists and kayakers, beachcombers, surf and sound anglers, and nature photographers. The refuge has 790 acres of manageable waterfowl and waterbird impoundments. Pea Island National Wildlife Refuge is known as a "Bird Watchers Paradise." Two wildlife trails that are open year round. Hunting is not allowed on the refuge, but it offers access to both the Atlantic Ocean and Pamlico Sound for saltwater fishing. The Coastal Wildlife Refuge Society (the refuge support group) operates a gift shop in the Visitor Center. If Oregon Inlet were to erode southward, some beach area of PINWR could be lost, reducing the recreation value supported by PINWR; however, the lost area would likely be a small proportion of the entire PINWR.

j) Shackleford Banks - Cape Lookout National Seashore

Cape Lookout National Seashore (CALO) consists of 56 miles of undeveloped beach located on 4 barrier islands in North Carolina from Ocracoke Inlet on the northeast to Beaufort Inlet on the southeast (National Park Service 2010c). Shackleford Banks, one of the 4 CALO islands, is located on the north side of Beaufort Inlet. The undeveloped island is reachable only by boat. Passenger ferries depart from Morehead City, Beaufort, and Harkers Island. In 2008, CALO had 491,000 total visitors (National Park Service 2010c), of which some undetermined number visited Shackleford Banks. Wild horses live on Shackleford Banks, and viewing them is a common reason for visiting the island (National Park Service 2010d). Available by advance reservation, half-day and day-long horse watching trips are popular among wild-horse enthusiasts. Groups (usually organizations or classes) travel by charter ferry to Shackleford Banks where they are met by park rangers. Hiking, bird watching, swimming and camping are allowed on Shackleford Banks. Fishing is also allowed, subject to fishing regulations including seasons, size limits and licensing requirements set by the North Carolina Division of Marine Fisheries. Driving is not allowed on Shackleford Banks. No food, beverages, changing rooms, showers, trash cans or trash pickup service are available on Shackleford Banks. Composting-style toilets are located near the dock on the west end of the island. If Beaufort Inlet were to erode eastward, some beach area of Shackleford Banks could be lost; however, the lost area would likely be a small proportion of the entire island.

k) Fort Macon State Park

Fort Macon State Park is located in Carteret County on the eastern end of Bogue Banks, on the west side of Beaufort Inlet (http://www.ncparks.gov/Visit/parks/foma/main.php) (NCDPR 2009). A Civil War fort situated at the eastern end of the 424-acre has been restored and is a major regional tourist attraction. Picnic facilities in the park include outdoor grills, drinking water, picnic tables, shelters and restrooms. Although the fort area itself is not in the 30 YRAs, large portions of the beach recreation area are at risk.

Large beaches line the inlet and ocean-facing sides of the park. A seaside bathhouse and refreshment stand are open Memorial Day through Labor Day. The bathhouse facility has showers, changing rooms, concession stand and toilets. Lifeguards are on duty from Memorial Day through Labor Day. Because of strong water currents, wading, swimming and surfing are not allowed on the inlet beaches. Fish are abundant in the inlet and the ocean, and fishing is allowed year-round. Common species include flounder, bluefish, spot, croaker, sheepshead and whiting. In addition, Fort Macon is a great place for bird watching in all seasons.

A recent economic impact study of the NC State Park system (Greenwood and Vick 2008) found that in 2004, Fort Macon State Park had about 1.3 million visitors, of which over 300,000 (24 percent) resided outside the county and had visiting the park as the primary purpose of their trip to the area. These "primary purpose" visitors spent an estimated $12 million while visiting the region. If Beaufort Inlet were to erode westward toward the Fort, potentially large portions of the Park's beach recreation area could be lost, creating significant losses in recreation value.

I) Hammocks Beach State Park/ Bear Island

Hammocks Beach State Park is located on undeveloped Bear Island and Huggins Island, on the south side of Bogue Inlet (http://www.ncparks.gov/Visit/parks/habe/main.php) (NCDPR 2009). Bear Island is an 892-acre barrier island, roughly 3.5 miles long by .5 mile wide. Shrub thickets, maritime forests, large dunes and sand ridges dominate the landscape.

Between mid-May and late August, loggerhead sea turtles, a threatened/endangered species, come ashore at night to nest above the high-tide line. Hammocks Beach is also a haven for migratory shore birds, such as herons and egrets, who feed in tidal marshes and rest on the beach in the spring and fall. Bottlenose dolphins are often seen swimming offshore.

Some recreational infrastructure has been established, including a Bathhouse, Restrooms, Picnic Area, Outdoor Showers, and a small Concession Canteen with large covered porch. These facilities are open from Memorial Day through Labor Day. A portion of the beach is a designated swimming area. There are lifeguards on duty in the designated swimming area most days from Memorial Day through Labor Day. Fishing at Hammocks Beach is a favorite pastime in all seasons but is particularly good in the fall. Puppy drum, flounder, trout and blue fish are frequent catches on Bear Island.

Primitive campsites are located near the beach and the inlet. Fourteen family campsites accommodate six people and two tents each. Three group campsites, available to affiliated groups only, accommodate up to 12 persons each. Campsites are open year round.

A passenger ferry provides transportation to Bear Island for a modest fee. The island is also accessible by private boat or marine taxi service. Canoeists and kayakers may reach

Bear Island and explore the marsh by way of a designated canoe trail. Markers placed along the route indicate points of interest along the way.

A recent economic impact study of the NC State Park system (Greenwood and Vick 2008) found that in 2004, Hammocks Beach State Park had over 133,000 visitors, of which over 69,000 (52 percent) resided outside the county and had visiting the park as the primary purpose of their trip to the area. These "primary purpose" visitors spent an estimated $1.6 million while visiting the region. If Bogue Inlet were to erode south/westward, some portion of the beach area could be lost, reducing the recreation and wildlife habitat values supported by the island.

m) Lea Hutaff Island

Located north of Wilmington between Figure Eight Island and Topsail Island, Lea-Hutaff Island is a 5,641-acre undeveloped barrier island that provides primitive recreation opportunities (http://iba.audubon.org/iba/viewSiteProfile.do?siteId=346&navSite=state). One of North Carolina's few remaining relatively pristine barrier islands, Lea-Hutaff is an important sanctuary for wildlife and a peaceful recreation area for people.

In the spring and summer loggerhead sea turtles nest here, and thousands of shorebirds stop off during long migrations. This narrow strip of sand has been designated a state-significant Important Bird Area by Audubon North Carolina. More than 4,000 acres of tidal marsh and creeks serve as primary nursery areas for fish, shrimp and crabs, and support thousands of birds throughout the year.

Both Lea and Hutaff islands are privately owned. National Audubon Society and the NC Coastal Land Trust are currently negotiating with landowners to acquire Lea Island. Audubon North Carolina has a cooperative agreement to protect and manage Hutaff Island and Audubon staff posts and patrols tern and skimmer colonies on both islands and monitors birds throughout the year.

The Deputy Director of the North Carolina Audubon Society reports that recreational visitation information is unavailable for Lea-Hutaff Islands (Golder 2010). If New Topsail Inlet were to erode southward, or if Rich Inlet were to erode northward, then portions of the recreation and wildlife habitat values supported by the island could be lost.

n) Masonboro Island

Masonboro Island is the largest undisturbed barrier island along the southern part of the North Carolina coast and is located between Masoboro Inlet and Carolina Beach Inlet (http://www.nccoastalreserve.net/About-The-Reserve/Reserve-Sites/Masonboro-Island/59.aspx). The Masonboro Island component is the largest site within the North Carolina National Estuarine Research Reserve System. The 8.4 mile long island encompasses approximately 5,046 acres, 87 percent of which are covered with marsh and tidal flats. The remaining 619 acres are composed of beach uplands and dredge material islands. Masonboro Island is an essentially pristine barrier island and estuarine system

and supports important biological research as well as primitive beach recreation, fishing, and kayaking/canoe activities. The Masonboro Island site can only be reached by boat. There are public and private boat ramps in and near Wrightsville Beach and Carolina Beach. Boats usually land on the beaches along the north and south sound side of the island. Trails allow visitors to walk across the island to access the beach. Visitors may also walk down the undisturbed ocean beach for miles, a rare, unique, and therefore valuable experience. Camping is allowed on the island. Reserve managers estimate that approximately 9,300 recreationists visited the island in 2009, with an additional 12 visits by a local ecotour business (Sutton 2010). If Masonboro Inlet were to erode southward, or if Carolina Beach inlet were to erode northward, then portions of the recreation and wildlife habitat values supported by the island could be lost.

2. Transfer of Property Values to Remaining Structures Following Erosion Losses

The full value of residential property located within the 30YRAs as presented in the tables of this study may not be lost in the event that the properties themselves are lost to shifting inlets, as some of the property value associated with oceanfront or sound front location may transfer to nearby properties. While detailed assessment of this potential effect is beyond the scope of this study, a recent study of the components of coastal North Carolina property values provides some information on the possible size of the effect.

Bin et al. (2007) estimated the potential impacts of sea level rise on coastal North Carolina property values using a hedonic multiple regression model framework. Since the pioneering work by Rosen (1974), hedonic property models have been used extensively to study real estate values. Palmquist (2004) provides a useful summary of the hedonic property models. These models assume that a unit (parcel) of real property is a bundle of attributes (location, number of bedrooms, ocean view, etc.). The market price of property, which is observable, represents the total value of the combination of attributes. Residential homes are composite goods that contain different types and quantities of attributes. By observing how property values change as the levels of various attributes change, the incremental contribution of each attribute to total parcel value can be estimated.

Numerous studies have applied hedonic property value models to estimate the impacts on property values of hazard risks such as flood hazards (MacDonald, Murdoch, and White 1987; MacDonald, et al. 1990; Bin and Polasky 2004), erosion hazards (Kriesel, Randall, and Lichtkoppler 1993; Landry, Keeler, and Kriesel 2003), and wind hazards (Simmons, Kruse, and Smith 2000). As would be expected, prior studies have found that proximity to shoreline has a strong positive effect on property values. Milon, Gressel, and Mulkey (1984) estimated a large positive value from being close to the shore. They found that property values declined 36% in moving 500 feet from the Gulf of Mexico. Other studies have also found positive values for water proximity (Shabman and Bertelson 1979; Earnhart 2001).

Bin et al. used assessed values as the dependent variable in their hedonic regression study of North Carolina coastal property values. Property values were regressed on structural, location, and environmental attributes of properties within one mile of the coastline in Dare, Carteret and New Hanover Counties, NC. The hedonic regression results provide estimates of the relative importance of each property attribute in determining overall property values. Separate hedonic regression models were estimated for residential and non-residential properties. The primary results were robust across several alternative model specifications, and the results reported below are from the specification that provided the best overall model fit.

The Bin et al. study results related to the value of the water frontage component of property value provide information on the portion of overall property value that might be transferred to properties farther back from shore in the event a shorefront property is lost. In the Bin et al. study, water frontage raises property values by about 55% for ocean frontage and 35% for sound frontage for New Hanover county residential parcels (n=39,546 real estate transactions, $R^2 = 0.86$). That is, for every $1 million in ocean front residential property value, $354,840 of the $1 million is due to ocean front location, and $645,160 is due to other characteristics of the property. In the event that the property were lost to shifting inlets, the $645,160 would be lost, but some of the $354,840 of water frontage value would transfer to other property parcels on the "next row back" from the ocean (if a next row were present). The full $354,840 amount might not transfer to parcels on the "next row back" because (1) the "next row" parcels might be different from the lost parcels in acreage, structure characteristics, etc., and (2) loss of the first row parcels might indicate increased future risk of loss for the "next row" parcels, decreasing the market value of the "next row" parcels.

Results were similar for the other two NC counties in the Bin et al. study. For Dare County residential parcels, water frontage raises property values by about 73% for ocean frontage and 32% for sound frontage (n=25,870 real estate transactions, $R^2 = 0.71$). For Carteret County residential parcels, water frontage raises property values by about 67% for ocean frontage and 50% for sound frontage (n=27,789 real estate transactions, $R^2 = 0.69$).

In their investigation of erosion risk, Landry, Keeler, and Kriesel (2003) find a substantial discount for those properties in close proximity to high erosion hazard areas. The market value of homes in high erosion areas were reduced by $9,269. Dorfman, Keeler, and Kriesel (1996) examine shoreline protection schemes along the Lake Erie coast, focusing on the impact of hardened structures placed offshore to prevent bluff erosion. They find that housing values capitalize the value of erosion protection; erosion protection structures increase average property value by $16,261 by decreasing probability of erosion loss to a low level (0.05%).

Estimation of willingness to pay from hedonic property price models can be complicated by correlation of housing characteristics. Correlation is found in housing data when two or more characteristics tend to move in the same or opposite directions. For example,

houses with large square footage will tend to have more bedrooms and vice-versa—a positive correlation. If too much correlation exists in housing characteristic data, the separate effect of characteristics on housing value cannot be identified. Correlation can be a problem in coastal housing data. Bin and Kruse (2006) find that houses in flood zones on the coast tend to sell for more than other houses. However, these homes tend to be oceanfront and/or have superior ocean view (a confounding positive correlation between flood risk and amenities). As such, it can be difficult to separate the effect of flood zone and view amenities in coastal housing markets. Bin, Crawford, Kruse, and Landry (2006) use a novel approach to solve this identification problem. Many previous papers have used ocean frontage as a property attribute. They argue that ocean frontage primarily conveys benefits in terms of access and amenities. Instead of controlling for ocean-frontage, they use distance from the water to account for benefits of access, and use a GIS-derived viewscape measure to account for benefits associated with coastal ocean view. Viewscape is a three-dimensional measure of ocean view that is designed to capture the view amenities associated with a property, taking into account man-made and natural obstructions to view and how these obstructions change over time (i.e. from year-to-year). Importantly, the viewscape measure varies independently of risk, allowing researchers to disentangle spatially integrated attributes. The authors find that increasing ocean view by one degree increases housing value by $995. For their access measure, they find that a 10 foot decrease in distance to the beach increases housing value by $853. Location in a flood zone decreases housing value, on average, by $36,000.

To summarize the main point of this section, the full property values located within the 30 year risk line areas identified in this study likely would not be lost should the properties themselves be lost to shifting inlets, as a portion of the property value would likely transfer to nearby properties. Even if only half of the oceanfront amenity value as estimated in the Bin et al. study were to transfer to nearby properties, this would represent a transfer on the order of 17-21% of current values. That is, on the order of 17-21% of current property values in the 30 year risk line areas may transfer to nearby properties in the event the current properties are lost to shifting inlets.

D. Overall Findings and Summary

The economic impact of erosion due to shifting inlets ranges widely by inlet and even side of inlet. Some inlets have higher development, with property and infrastructure values in excess of $100 Million within the 30YRAs (30 years) and in excess of $10 Million in IRPs (current), while others are undeveloped within the areas at risk. While this assessment provides a means to estimate the economic impact to the State from erosion due to shifting inlets it is important to remember that not all property and infrastructure within the 30-year risk lines could necessarily be protected by a terminal groin. Additional factors such as recreation and environmental economic values and the potential transfer of value as properties are lost and others become oceanfront can be important in assessing the full economic impacts of erosion near inlets.

Beach and wetland areas adjacent to inlets can support significant recreation and environmental values. Recreation values include walking, shell collecting, sunbathing, swimming, surfing, birdwatching, hiking, camping, education, fishing, kayaking, and canoeing. Environmental values include juvenile fish and shellfish habitat (supporting recreational and commercial fishing industries), protected species habitat, rest and feeding areas for migrating birds, and water quality improvement and wave energy dissipation (wetland areas). In general, areas that are more unique in terms of recreational opportunities or environmental conditions or wildlife, relative to other barrier island locations in the region or nation, would be expected to have higher recreation and environmental values per unit of land area. Although studies have documented some recreation values for some North Carolina inlet areas (primarily beach recreation and shore fishing), other inlets are missing recreation value information, and some environmental values have not been assessed for N.C. inlet areas. As many environmental values are very site-specific, site-specific studies would be required to assess these values on a "for each side of each inlet" basis. Where available, results from studies of other barrier island areas in the southeastern United States have been provided to give a rough indication of the potential order of magnitude of some of these environmental values. If shifting inlets were to erode beach and wetland areas, some recreation and environmental value would be lost.

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