

A Fiscal Analysis of Shifting Inlets and Terminal Groins in North Carolina



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Executive Summary

North Carolina contains some of the most unique and biologically rich coastal ecosystems in the United States, providing immeasurable aesthetic, habitat, recreational and economic benefits. In order to successfully - and equitably - balance long-term environmental and sustainability needs with short-term economic development concerns, state and local coastal management policies, rules and laws must be both technically and fiscally-sound.

Nowhere is this more evident than at North Carolina's tidal inlets where these dynamic natural features, once used to lure economic development, are now considered the primary threat to the very development they were used to attract.

In response to the risk shifting inlets pose to static economic development, NC coastal communities and property owners typically rely on three mechanisms to protect vulnerable coastal property: 1) Beach restoration 2) Inlet channel realignment and 3) Sandbags.

Beach restoration involves the import and emplacement of sand on an eroding beach in order to artificially stabilize inlet and ocean shorelines. Inlet channel realignment modifies the position and orientation of an inlet's main ebb channel in an effort to reduce impacts and erosion rates along adjacent shorelines. Sandbags are a temporary measure intended to provide short-term protection to imminently threatened structures until a more "permanent" solution can be implemented.

A fourth approach, now being actively promoted by some in North Carolina, is the use of terminal groins: shore-perpendicular erosion control structures made of rock or steel placed at the ends of islands near dynamic coastal inlets.

Session Law 2009-479 in 2009 instructed the NC Coastal Resources Commission (CRC) to study the feasibility and advisability of terminal groins as erosion control devices. The study, completed in April 2010 at a cost of \$280,000, included an assessment of the potential economic impacts of shifting inlets to the state, local governments and the private sector from erosion due to shifting inlets, but failed to provide compelling evidence regarding the economic or fiscal benefits of terminal groins.

As a follow-up to that study, the Program for the Study of Developed Shorelines (PSDS) at Western Carolina University examined the economic role of coastal property at ten North Carolina tidal inlets (Bogue, New River, New Topsail, Rich, Mason, Carolina Beach, Cape Fear, Lockwood Folly, Shallotte and Tubbs) to evaluate the potential fiscal costs of property loss as well as fiscal benefits of terminal groins in ten coastal municipalities (Emerald Isle, North Topsail Beach, Topsail Beach, Wrightsville Beach, Carolina Beach, Bald Head Island, Caswell Beach, Oak Island, Holden Beach and Ocean Isle Beach), five coastal counties (Carteret, Onslow, Pender, New Hanover and Brunswick) and one private island (Figure 8 Island).

Based on this study, PSDS has determined that:

- 1) Assessed value does not reflect the potential fiscal impacts of shifting inlets to the state or local governments from erosion due to shifting inlets,
- 2) The fiscal benefits of protecting property at-risk to shifting inlets are small compared to the costs of protection,
- 3) The use of terminal groins would provide limited fiscal and economic benefits to state taxpayers and local communities and
- 4) Long-term costs of a terminal groin exceed potential long-term benefits at every developed NC inlet.

This analysis indicates that, even ignoring environmental concerns, terminal groins are not a fiscally-sound strategy for dealing with coastal property at-risk to shifting inlets and, due to their limited fiscal benefits, the expenditure of state funds for groin construction/maintenance is bad public policy.

1) Assessed value does not accurately reflect the fiscal contribution investment property at-risk to shifting inlets makes to North Carolina’s coastal municipal and county economies

According to the CRC terminal groin study, the purpose of the economic assessment component of the study was to assess economic value within areas around developed inlets called 30-year risk areas (30 YRAs) that contain a level of risk approximately equal to the risk indicated by setbacks in adjacent oceanfront areas, as well as the economic value of properties in 30 YRAs having temporary sandbag protection (Table 1).

Table 1: North Carolina 30-Year Risk Areas

1. Emerald Isle/Bogue Inlet	8. Bald Head Island/Cape Fear Inlet
2. North Topsail Beach/New River Inlet	9. Caswell Beach/Cape Fear Inlet
3. Topsail Beach/New Topsail Inlet	10. Oak Island/Lockwood Folly Inlet
4. Figure 8 Island/Rich Inlet	11. Holden Beach/Lockwood Folly Inlet
5. Figure 8 Island/Mason Inlet	12. Holden Beach/Shalotte Inlet
6. Wrightsville Beach/Mason Inlet	13. Ocean Isle Beach/Shalotte Inlet
7. Carolina Beach/Carolina Beach Inlet	14. Ocean Isle Beach/Tubbs Inlet

A number of components of economic value within these 30 YRAs were considered including residential property, commercial property, government property, road infrastructure, waterline infrastructure, sewer infrastructure, property tax base and revenues and recreation and environmental value. The greatest potential economic impact of shifting inlets, according to the CRC study, is to residential property, which the study quantifies in terms of assessed value.

But an economic assessment that focuses almost exclusively on assessed coastal property value - the dollar value of an asset assigned by a public tax assessor for the purposes of taxation - is misleading because changes in value do not accurately reflect actual fiscal impacts coastal counties, municipalities and the state may experience as a result of shifting inlets.

Taxation or, more specifically, ad valorem tax revenue based on assessed value and generated by residential property, does, however, reflect the potential fiscal impacts various levels of government may experience due to shifting inlets along the North Carolina coast.

Ad valorem taxes comprise an average of about 57% of all revenue collected by North Carolina coastal county and municipal governments (Table 2). From the perspective of a public entity such as a coastal municipality or county, the potential loss of ad valorem (and to a similar extent occupancy and sales) tax revenue generated by at-risk residential coastal property represents an accurate and meaningful way to quantify the tangible costs of shifting inlets.

Table 2: NC Coastal Municipal and County Ad Valorem Tax Revenue

Jurisdiction	Budget Year	General Fund (GF) Revenue	Ad Valorem Tax Revenue	Ad Valorem Tax Revenue as a % of GF Revenue
Bald Head Island	FY 2010/11	\$8,246,160	\$6,815,618	83%
Carolina Beach	FY 2009/10	\$8,203,250	\$4,125,000	50%
Caswell Beach	FY 2010/11	\$1,011,618	\$547,000	54%
Emerald Isle	FY 2010/11	\$7,016,691	\$3,437,423	49%
Holden Beach	FY 2009/10	\$2,417,773	\$1,507,023	62%
Kill Devil Hills	FY 2009/10	\$12,035,612	\$5,278,985	44%
Kitty Hawk	FY 2009/10	\$5,721,795	\$2,476,750	43%
Kure Beach	FY 2010/11	\$2,891,452	\$1,538,914	53%
Nags Head	FY 2009/10	\$11,292,993	\$4,490,743	40%
North Topsail Beach	FY 2010/11	\$3,339,166	\$1,903,186	57%
Oak Island	FY 2010/11	\$11,341,185	\$6,472,902	57%
Ocean Isle Beach	FY 2010/11	\$4,156,762	\$2,349,000	57%
Sunset Beach	FY 2009/10	\$4,748,773	\$2,213,468	47%
Surf City	FY 2010/11	\$5,887,153	\$3,120,586	53%
Topsail Beach	FY 2010/11	\$2,092,670	\$1,314,690	63%
Wrightsville Beach	FY 2008/09	\$7,722,822	\$2,644,346	34%
Brunswick County	FY 2010/11	\$136,232,066	\$100,331,000	74%
Carteret County	FY 2010/11	\$74,918,385	\$43,290,000	58%
Currituck County	FY 2010/11	\$44,028,000	\$24,936,000	57%
Dare County	FY 2010/11	\$99,244,631	\$49,309,278	50%
New Hanover County	FY 2010/11	\$253,919,849	\$158,778,525	63%
Onslow County	FY 2010/11	\$163,799,539	\$70,261,500	43%
Pender County	FY 2009/10	\$49,261,230	\$30,238,766	61%
Municipal and County Combined Total		\$919,529,575	\$527,380,703	57%

Ad valorem tax rates for coastal municipalities and counties adjacent to a developed coastal inlet in North Carolina are \$.1559/\$100 and \$.4455/\$100 respectively (Table 3). The loss of a residential coastal property assessed at \$1 million, therefore, would result in an annual loss of \$6,014 in ad valorem tax revenue [$\$1,000,000/100 * (.1559 + .4455)$] - or just 0.6% of the property's \$1 million assessed value.

Table 3: NC Coastal Municipal and County Ad Valorem Tax Rates

Municipality	FY 2010-11 Tax Rate	County	FY 2010-11 Tax Rate
Bald Head Island	0.2700	Brunswick County	0.3050
Carolina Beach	0.1750	Carteret County	0.2300
Caswell Beach	0.1300	New Hanover County	0.4525
Emerald Isle	0.0800	Onslow County	0.5900
Holden Beach	0.0690	Pender County	0.6500
North Topsail Beach	0.2355	AVERAGE	0.4455
Oak Island	0.1400		
Ocean Isle Beach	0.0900		
Topsail Beach	0.3100		
Wrightsville Beach	0.0800		
AVERAGE	0.1559		

According to the CRC study, 1,983 residential properties with an assessed value of about \$1.4 billion are within the state’s fourteen 30 YRAs. While losing all at-risk properties is unlikely, the potential fiscal impact to North Carolina’s coastal municipalities and counties would be \$7,127,087 - the combined local and county ad valorem tax revenue these properties currently generate but would not in the future (Table 4). Over 30 years, using a discount rate of 3% and price appreciation rate of 5%, the loss of 1,983 at-risk coastal properties would result in a loss of ad valorem tax revenue totaling about \$292 million - or about 25% of assessed value.

Table 4: Properties “At-Risk” to Shifting Inlets

Municipality	Year	Total Ad Valorem Tax Revenue Collected	“At-Risk” Properties	Ad Valorem Tax Revenue Generated by At-Risk Properties
Bald Head Island	FY 2010/2011	\$6,815,618	323	\$1,017,647
Carolina Beach	FY 2009/2010	\$4,125,000	39	\$60,776
Caswell Beach	FY 2010/2011	\$547,000	100	\$135,483
Emerald Isle	FY 2010/2011	\$3,437,423	96	\$71,560
Figure 8 Island	N/A	N/A	114	N/A
Holden Beach	FY 2009/2010	\$1,507,023	343	\$207,756
North Topsail Beach	FY 2010/2011	\$1,903,186	376	\$157,356
Oak Island	FY 2010/2011	\$6,472,902	102	\$181,335
Ocean Isle Beach	FY 2009/2010	\$2,349,000	124	\$54,931
Topsail Beach	FY 2010/2011	\$1,314,690	184	\$103,165
Wrightsville Beach	FY 2008/2009	\$2,644,346	182	\$83,863
		\$31,116,188	1983	\$2,073,872
County				
Brunswick County	FY 2010/2011	\$100,331,000	992	\$2,705,286
Carteret County	FY 2010/2011	\$43,290,000	96	\$205,735
New Hanover County	FY 2010/2011	\$158,778,525	335	\$1,531,651
Onslow County	FY 2010/2011	\$70,261,500	376	\$394,224
Pender County	FY 2009/2010	\$30,238,766	184	\$216,313
		\$402,899,791	1983	\$5,053,209
Total Ad Valorem Tax Revenue generated by properties in 30 YRA				\$7,127,087

The use of assessed value grossly overstates the value of coastal property at risk to, and the potential fiscal impacts of, shifting inlets, thereby resulting in the misperception that much more is at risk than actually is.

Using ad valorem tax revenue rather than assessed value provides a pragmatic approach for evaluating the true value of “at-risk” properties as well as estimating the potential fiscal impact state, county and municipal economies could experience as a result of shifting inlets.

An issue that should be considered when evaluating the value of coastal property at risk to shifting inlets, but not discussed in the CRC report or this white paper, is the contribution public policies and actions such as state and federally-subsidized insurance and shore protection projects make to assessed values and, ultimately, ad valorem tax revenue.

2) The fiscal benefits of protecting investment property at-risk to shifting inlets are small compared to the costs of protection

While ad valorem, sales and occupancy tax revenue is critical for maintaining the economic viability of coastal North Carolina, an analysis of 30 YRAs at ten NC tidal inlets shows that the contribution residential properties at-risk to shifting inlets make to North Carolina’s coastal municipal and county economies is insignificant.

Table 5 shows the contribution residential property at risk to shifting inlets makes at the municipal and county level. While coastal counties have more than twice the amount of ad valorem tax revenue at risk than coastal municipalities (\$5,053,216 vs. \$2,073,872), the relative importance of ad valorem tax revenue generated by at-risk property is greater for municipalities than counties. For example, the total loss of all at-risk residential properties in the Caswell Beach/Cape Fear 30 YRA would eliminate \$135,483 - nearly 25% of the municipal ad valorem tax revenue collected by Caswell Beach. Brunswick County’s loss of \$317,865 in county ad valorem tax revenue - 2.3 times more than Caswell Beach – represents only 0.32% of its ad valorem tax revenue.

Table 5: Assessed Value of, and Ad Valorem Tax Revenue Generated by, At-Risk Coastal Properties by 30 YRA

Community	County	Inlet	Assessed Value of At-Risk Property	2010 Municipal Ad Valorem Tax Revenue Generated by At-Risk Properties	2010 County Ad Valorem Tax Revenue Generated by At-Risk Properties
Bald Head Island	Brunswick	Cape Fear	\$310,732,000	\$1,017,647	\$947,733
Carolina Beach	New Hanover	Carolina Beach	\$34,729,000	\$60,776	\$161,664
Caswell Beach	Brunswick	Cape Fear	\$104,218,000	\$135,483	\$317,865
Emerald Isle	Carteret	Bogue	\$89,450,000	\$71,560	\$205,735
Figure 8	New Hanover	Rich	\$163,186,000	N/A	\$759,631
Figure 8	New Hanover	Mason	\$46,408,941	N/A	\$216,034
Holden Beach	Brunswick	Lockwood Folly	\$27,240,000	\$18,796	\$83,082
Holden Beach	Brunswick	Shallotte	\$273,855,000	\$188,960	\$835,258
North Topsail Beach	Onslow	New River	\$66,817,693	\$157,356	\$394,224
Oak Island	Brunswick	Lockwood Folly	\$109,900,000	\$181,335	\$335,195
Ocean Isle Beach	Brunswick	Shallotte	\$25,069,000	\$22,562	\$76,460
Ocean Isle Beach	Brunswick	Tubbs	\$35,966,000	\$32,369	\$109,696
Topsail Beach	Pender	New Topsail	\$33,279,000	\$103,165	\$216,314
Wrightsville Beach	New Hanover	Mason	\$84,710,027	\$83,863	\$394,325
			\$1,405,560,661	\$2,073,872	\$5,053,216

Of the ten municipalities with a 30 YRA, only three have more than 10% of their ad valorem tax base in a 30 YRA: Caswell Beach: 24.8%, Bald Head Island: 14.9% and Holden Beach: 12.5%. The remaining municipalities have an average of 3.2% of their ad valorem tax base in a 30 YRA. No coastal county has more than 1% of its ad valorem tax base in a 30 YRA (Table 6).

Table 6: The Contribution of At-Risk Coastal Properties to Ad Valorem Tax Revenue by 30 Year Risk Area

Community	Inlet	County	2010 Municipal Ad Valorem Tax Revenue Generated by At-Risk Properties	% of Municipal Ad Valorem Tax Revenue At-Risk	2010 County Ad Valorem Tax Revenue Generated by At-Risk Properties	% of County Ad Valorem Tax Revenue At-Risk
Bald Head Island	Cape Fear	Brunswick	\$1,017,647	14.9%	\$947,733	0.96%
Carolina Beach	Carolina Beach	New Hanover	\$60,776	1.5%	\$161,664	0.10%
Caswell Beach	Cape Fear	Brunswick	\$135,483	24.8%	\$317,865	0.32%
Emerald Isle	Bogue	Carteret	\$71,560	2.1%	\$205,735	0.46%
Figure 8	Rich	New Hanover	N/A	N/A	\$759,631	0.48%
Figure 8	Mason	New Hanover	N/A	N/A	\$216,034	0.14%
Holden Beach	Lockwood Folly	Brunswick	\$18,796	1.2%	\$83,082	0.08%
Holden Beach	Shallotte	Brunswick	\$188,960	12.5%	\$835,258	0.85%
North Topsail Beach	New River	Onslow	\$157,356	8.3%	\$394,224	0.54%
Oak Island	Lockwood Folly	Brunswick	\$181,335	2.8%	\$335,195	0.34%
Ocean Isle Beach	Shallotte	Brunswick	\$22,562	1.0%	\$76,460	0.08%
Ocean Isle Beach	Tubbs	Brunswick	\$32,369	1.3%	\$109,696	0.11%
Topsail Beach	New Topsail	Pender	\$103,165	7.8%	\$216,314	0.70%
Wrightsville Beach	Mason	New Hanover	\$83,863	3.2%	\$394,325	0.25%
			\$2,073,872		\$5,053,216	

In order to provide an assessment of the current or imminently at-risk property due to potential erosion from shifting inlets, the CRC study identified properties having temporary sandbag protection. These properties are considered at imminent risk, rather than at risk over a 30-year period. Properties located immediately adjacent to erosion control sandbag locations, or between two nearby sandbag locations, were considered to be Imminent Risk Properties (IRPs). Sandbag locations on ocean facing or inlet-facing beaches within the 30 YRAs were considered to be inlet IRPs.

Of the state's 1,983 properties within a 30 YRA, 204 (10.3%) are classified as an inlet IRP (Table 7). These properties have an assessed value of \$89.6 million and generate \$445,767/year in municipal (\$102,244) and county (\$343,523) ad valorem tax revenue (Table 8).

Table 7: Imminent Risk Properties Within 30-Year Risk Areas

Community	Inlet	County	At-Risk Properties	Imminent Risk Properties (IRP)	IRPs as a % of At-Risk Properties
Bald Head Island	Cape Fear	Brunswick	323	22	6.8%
Carolina Beach	Carolina Beach	New Hanover	39	0	0.0%
Caswell Beach	Cape Fear	Brunswick	100	0	0.0%
Emerald Isle	Bogue	Carteret	96	13	13.6%
Figure 8 Island	Rich	New Hanover	89	16	18.0%
Figure 8 Island	Mason	New Hanover	25	0	0.0%
Holden Beach	Lockwood Folly	Brunswick	150	32	21.3%
Holden Beach	Shallotte	Brunswick	193	0	0.0%
North Topsail Beach	New River	Onslow	376	37	9.8%
Oak Island	Lockwood Folly	Brunswick	102	0	0.0%
Ocean Isle Beach	Shallotte	Brunswick	85	24	28.2%
Ocean Isle Beach	Tubbs	Brunswick	39	3	7.7%
Topsail Beach	New Topsail	Pender	184	57	31.0%
Wrightsville Beach	Mason	New Hanover	182	0	0.0%
TOTAL			1983	204	10.3%

Table 8: Summary of Imminent Risk Properties (IRP)

# Imminent Risk Properties (IRP)	204
% of all Properties in 30 YRA that are IRP	10.3%
Assessed Value of IRPs	\$89,610,211
2010 Municipal Tax Revenue generated by IRPs	\$102,244
2010 County Tax Revenue generated by IRPs	\$343,523
Total 2010 Tax Revenue generated by IRPs	\$445,767

As table 9 shows, the loss of all imminent risk properties, a more plausible scenario than the loss of all at-risk properties, would result in an insignificant loss of municipal and county ad valorem tax revenue in every 30 YRA:

- Bald Head Island has \$35,920 in municipal ad valorem tax revenue at imminent risk in the Bald Head Island/Cape Fear 30 YRA – the most of any NC coastal municipality. This amount, however, represents only 0.55% of the town’s total ad valorem tax revenue.
- New Hanover County has \$120,881 in county ad valorem tax revenue considered in imminent risk in the Figure 8/Rich 30 YRA – the most of any NC coastal county. This amount represents only 0.08% of the ad valorem tax revenue collected by the county in 2010.
- Topsail Beach is the only municipality with more than 1% of its ad valorem revenue classified as being in imminent risk. Pender County is the only county with even 0.1% of its ad valorem tax revenue in imminent risk.

Table 9: Contribution of IRPs to Ad Valorem Tax Revenue by 30 Year Risk Area

Community	Inlet	County	2010 Municipal Ad Valorem Tax Revenue Generated by IRPs	% of Municipal Ad Valorem Tax Revenue in Imminent Risk	2010 County Ad Valorem Tax Revenue Generated by IRPs	% of County Ad Valorem Tax Revenue in Imminent Risk
Bald Head Island	Cape Fear	Brunswick	\$35,920	0.55%	\$33,452	0.03%
Carolina Beach	Carolina Beach	New Hanover	\$0	0.00%	\$0	0.00%
Caswell Beach	Cape Fear	Brunswick	\$0	0.00%	\$0	0.00%
Emerald Isle	Bogue	Carteret	\$11,500	0.34%	\$33,062	0.07%
Figure 8	Rich	New Hanover	\$0	0.00%	\$120,881	0.08%
Figure 8	Mason	New Hanover	\$0	0.00%	\$0	0.00%
Holden Beach	Lockwood Folly	Brunswick	\$12,024	0.79%	\$53,152	0.05%
Holden Beach	Shallotte	Brunswick	\$0	0.00%	\$0	0.00%
North Topsail Beach	New River	Onslow	\$6,863	0.35%	\$17,193	0.02%
Oak Island	Lockwood Folly	Brunswick	\$0	0.00%	\$0	0.00%
Ocean Isle Beach	Shallotte	Brunswick	\$2,312	0.10%	\$7,835	0.01%
Ocean Isle Beach	Tubbs	Brunswick	\$5,760	0.24%	\$19,520	0.02%
Topsail Beach	New Topsail	Pender	\$27,865	2.11%	\$58,428	0.19%
Wrightsville Beach	Mason	New Hanover	\$0	0.00%	\$0	0.00%
			\$102,244		\$343,523	

3) The use of terminal groins would provide limited fiscal and economic benefits to state taxpayers and local coastal communities

Because the CRC study leaves the efficacy of constructing terminal groins at developed North Carolina inlets unresolved, it is difficult to accurately quantify the long-term fiscal benefits terminal groins may or may not produce over a period of 30 years.

It is possible, however, to make two assumptions about terminal groins based on the study:

1. All IRPs in North Carolina will be lost over the next 30 years without terminal groins and
2. If they work intended, terminal groins may protect IRPs for the next 30 years.

Because the effectiveness of terminal groins beyond IRPs is highly uncertain, IRPs represent at-risk coastal properties most likely to benefit from terminal groins and the continued generation of municipal and county ad valorem tax revenue by IRPs within 30 YRAs is the primary fiscal benefit of constructing a terminal groin in a 30 YRA.

In the Ocean Isle Beach/Shallotte Inlet 30 YRA, for example, the primary annual benefit of constructing a terminal groin is \$10,147 - the combined municipal and county ad valorem tax revenue currently generated by 24 IRPs in this 30 YRA. Over 30 years, using a discount rate of 3% and price appreciation rate of 5%, the primary fiscal benefit of constructing a terminal groin in Ocean Isle Beach at Shallotte Inlet is \$415,633 (Table 10).

Table 10 shows that the estimated annual primary fiscal benefit of constructing a terminal groin in each of the state’s 30 YRAs is \$445,767. Over 30 years, using a discount rate of 3% and price appreciation rate of 5%, the primary fiscal benefit of constructing terminal groins in all 30 YRAs (even though six have no IRPs) is \$18,259,148. Note that this table includes only municipal and county ad valorem tax revenue due to the small number of impacted properties (204) and limited contribution of other revenue sources.

Table 10: Primary Fiscal Benefit of a Terminal Groin by 30 Year Risk Area

Community	Inlet	County	2010 Municipal Ad Valorem Tax Revenue Generated by IRPs	2010 County Ad Valorem Tax Revenue Generated by IRPs	2010 Combined Ad Valorem Tax Revenue Generated by IRPs	NPV of Ad Valorem Tax Revenue Generated by IRPs Over 30 Years
Bald Head Island	Cape Fear	Brunswick	\$35,920	\$33,452	\$69,372	\$2,841,560
Carolina Beach	Carolina Beach	New Hanover	\$0	\$0	\$0	\$0
Caswell Beach	Cape Fear	Brunswick	\$0	\$0	\$0	\$0
Emerald Isle	Bogue	Carteret	\$11,500	\$33,062	\$44,562	\$1,825,313
Figure 8	Rich	New Hanover	\$0	\$120,881	\$120,881	\$4,951,430
Figure 8	Mason	New Hanover	\$0	\$0	\$0	\$0
Holden Beach	Lockwood Folly	Brunswick	\$12,024	\$53,152	\$65,176	\$2,669,687
Holden Beach	Shalotte	Brunswick	\$0	\$0	\$0	\$0
North Topsail Beach	New River	Onslow	\$6,863	\$17,193	\$24,056	\$985,362
Oak Island	Lockwood Folly	Brunswick	\$0	\$0	\$0	\$0
Ocean Isle Beach	Shalotte	Brunswick	\$2,312	\$7,835	\$10,147	\$415,633
Ocean Isle Beach	Tubbs	Brunswick	\$5,760	\$19,520	\$25,280	\$1,035,499
Topsail Beach	New Topsail	Pender	\$27,865	\$58,428	\$86,293	\$3,534,664
Wrightsville Beach	Mason	New Hanover	\$0	\$0	\$0	\$0
			\$102,244	\$343,523	\$445,767	\$18,259,148

4) Long-term costs of a terminal groin exceed potential long-term benefits at every developed NC inlet

The CRC study estimates the initial cost of constructing a 1,500-foot terminal groin, similar in size to the structure currently at Fort Macon, to be \$10,850,000 with total annual maintenance costs of about \$2,250,000. Using a 3% discount rate and price appreciation rate of 5%, the estimated total cost of constructing and maintaining one terminal groin in North Carolina over 30 years is approximately \$54,950,993.

This amount is more than ten times greater than the potential long-term fiscal benefit of constructing a groin at Figure 8/Rich Inlet (\$4,951,430) and about three times greater than the combined long-term benefit of constructing terminal groins at all fourteen 30 YRAs (\$18,259,148).

Given the CRC study and an evaluation of other terminal structures, a scenario in which terminal groins protect only IRPs over a 30-year period is rational. However, due to uncertainty in the efficacy of terminal groins, PSDS also assessed a “best-case” scenario in which the benefits of terminal groins extend to every at-risk property within every 30 YRA for 30 years.

In this scenario, long-term costs are projected to exceed potential long-term benefits (measured by the continued generation of ad valorem tax revenue) in every 30 YRA except Bald Head Island/Cape Fear (Table 11). It should be noted that the potential fiscal benefits of constructing and maintaining a terminal groin at Bald Head Island over a period of 30 years are split almost equally between Bald Head Island (\$41,684,034) and Brunswick County (\$38,820,273).

Table 11: Estimated “Best-Case” Fiscal Benefit of a Terminal Groin by 30 Year Risk Area

Community	Inlet	County	2010 Municipal Ad Valorem Tax Revenue Generated by all At-Risk Properties	2010 County Ad Valorem Tax Revenue Generated by all At-Risk Properties	2010 Total Ad Valorem Tax Revenue Generated by all At-Risk Properties	NPV of Ad Valorem Tax Revenue Generated by all At-Risk Properties Over 30 Years
Bald Head Island	Cape Fear	Brunswick	\$1,017,647	\$947,733	\$1,965,380	\$80,504,307
Carolina Beach	Carolina Beach	New Hanover	\$60,776	\$161,664	\$222,440	\$9,111,408
Caswell Beach	Cape Fear	Brunswick	\$135,483	\$317,865	\$453,348	\$18,569,674
Emerald Isle	Bogue	Carteret	\$71,560	\$205,735	\$277,295	\$11,358,334
Figure 8	Rich	New Hanover	N/A	\$759,631	\$759,631	\$31,115,391
Figure 8	Mason	New Hanover	N/A	\$216,034	\$216,034	\$8,849,010
Holden Beach	Lockwood Folly	Brunswick	\$18,796	\$83,082	\$101,878	\$4,173,044
Holden Beach	Shallotte	Brunswick	\$188,960	\$835,258	\$1,024,218	\$41,953,190
North Topsail Beach	New River	Onslow	\$157,356	\$394,224	\$551,580	\$22,593,374
Oak Island	Lockwood Folly	Brunswick	\$181,335	\$335,195	\$516,530	\$21,157,684
Ocean Isle Beach	Shallotte	Brunswick	\$22,562	\$76,460	\$99,022	\$4,056,059
Ocean Isle Beach	Tubbs	Brunswick	\$32,369	\$109,696	\$142,065	\$5,819,152
Topsail Beach	New Topsail	Pender	\$103,165	\$216,314	\$319,479	\$13,086,241
Wrightsville Beach	Mason	New Hanover	\$83,863	\$394,325	\$478,188	\$19,587,150

Discussion

Assessed property values do not reflect the potential costs of shifting inlets to coastal municipalities, counties or the state. Ad valorem tax revenue generated by at-risk coastal property represents a more realistic and accurate way to quantify the potential fiscal impacts a North Carolina coastal county or municipality might expect as a result of shifting inlets.

The assessed value of 1,983 properties at-risk to shifting inlets in North Carolina is approximately \$1.4 billion. Losing every at-risk property, however, would translate into an annual loss of \$7,127,087 in county and municipal ad valorem tax revenue – a figure that is 0.5% of assessed value. Over 30 years, using a discount rate of 3% and price appreciation rate of 5%, the NPV of this statewide loss is \$292 million.

While \$7,127,087 in annual lost ad valorem tax revenue seems significant, it represents less than 5% of municipal ad valorem tax revenue and 0.37% of county ad valorem tax revenue collected by NC coastal communities and counties containing a developed in 2010.

Of the state’s 1,983 at-risk properties, 204 are classified as Imminent Risk Properties (IRPs). These properties represent 0.45% of coastal municipal ad valorem tax revenue and 0.04% of coastal county ad valorem tax revenue collected in 2010.

IRPs also represent the primary beneficiaries of terminal groins, and the continued generation of ad valorem tax revenue by IRPs resulting from the emplacement of terminal groins can be used to quantify the potential fiscal benefits of terminal groins.

Using IRPs as a proxy to estimate the impacts of terminal groins, annual municipal benefits range from \$0 in seven locations (Carolina Beach/Carolina Beach Inlet, Caswell Beach/Cape Fear Inlet, Figure 8/Rich Inlet, Figure 8/Mason Inlet, Holden Beach/Shallotte Inlet, Oak Island/Lockwood Folly Inlet and Wrightsville Beach/Mason Inlet) to \$35,920 in Bald Head Island.

Annual County benefits using IPRs as a proxy range from \$0 in six locations (Carolina Beach/Carolina Beach Inlet, Caswell Beach/Cape Fear Inlet, Figure 8/Mason Inlet, Holden Beach/Shallotte Inlet, Oak Island/Lockwood Folly Inlet and Wrightsville Beach/Mason Inlet) to \$120,881 in Figure Eight Island.

The NPV of ad valorem tax revenue generated by IRPs and assumed to be protected by a terminal groin over 30 years, using a discount rate of 3% and price appreciation rate of 5%, ranges from \$0 in six locations (Carolina Beach/Carolina Beach Inlet, Caswell Beach/Cape Fear Inlet, Figure 8/Mason Inlet, Holden Beach/Shallotte Inlet, Oak Island/Lockwood Folly Inlet and Wrightsville Beach/Mason Inlet) to \$4,951,430 at Figure Eight Island/Rich Inlet.

The annual fiscal benefit of constructing and maintaining a terminal groin at every developed NC inlet, in terms of protecting municipal and county ad valorem tax revenue generated by IRPs, is \$445,767. The NPV of this ad valorem tax revenue over 30 years, using a discount rate of 3% and price appreciation rate of 5%, is \$18,259,148.

When the protective benefits of terminal groins are extended to all 1,983 at-risk properties, the NPV potential fiscal benefits (over the next 30 years) range from about \$4 million at Ocean Isle Beach/Shallotte Inlet to about \$80.5 million at Bald Head Island/Cape Fear.

The cost of constructing and maintaining one terminal groin in North Carolina over 30 years, using a discount rate of 3% and price appreciation rate of 5%, is estimated by the NC CRC to be \$54,900,993. When put in proper context, the cost of constructing and maintaining a terminal groin exceeds potential fiscal benefits at every North Carolina inlet.

Summary of Findings

- Assessed property value is not an accurate metric for quantifying the fiscal impacts of chronic erosion and coastal storm impacts and should not be used to justify the expenditure of public funds for erosion control measures.
- A fiscal analysis of tax revenue impacts to NC coastal municipalities, counties and the state is a sound methodology by which to evaluate the potential impacts of shifting inlets as well as potential costs and benefits of constructing and maintaining terminal groins.
- The average annual fiscal impact, in terms of property tax revenue, of losing a \$1 million coastal property in NC is \$6,014.
- The combined impact of losing a coastal property at-risk to shifting inlets in NC is about 0.6% of the property's assessed value.
- 1,983 residential coastal properties are considered at-risk to shifting inlets in NC.
- Properties at-risk to shifting inlets represent about 9% of all municipal and county ad valorem tax revenue collected coast-wide in 2010.
- Of the ten NC municipalities adjacent to a shifting inlet only Caswell Beach, Bald Head Island and Holden Beach have more than 10% of their ad valorem tax base at risk to shifting inlets. The remaining coastal municipalities have an average of 3.2% of their ad valorem tax base at-risk to shifting inlets.

- Of the 1,983 coastal properties at risk to shifting inlets, 204 (10.3%) are classified as being in imminent risk.
- Properties in imminent risk to shifting inlets represent about 0.08% of all municipal and county ad valorem tax revenue collected coast-wide in 2010.
- The CRC study estimates the cost of constructing and maintaining one terminal groin in North Carolina over 30 years to be approximately \$54,950,993.
- Using IRPs as a proxy for estimating the impacts of terminal groins, annual fiscal benefits of constructing a terminal groin at every developed NC inlet is \$445,767. Over 30 years, the primary fiscal benefit of constructing a terminal groin at every developed inlet is \$18,259,148.
- Terminal groins are not a fiscally-sound strategy for dealing with coastal property at-risk to shifting inlets
- The limited fiscal benefits produced by terminal groins do not justify the expenditure of state funds.