SOUTHERN ENVIRONMENTAL LAW CENTER

Telephone 919-967-1450 | 601 WEST ROSEMARY STREET, SUITE 220 CHAPEL HILL, NC 27516-2356 | Facsimile 919-929-9421

July 27, 2012

Via U.S. and Electronic Mail
Mr. Mickey Sugg
U.S. Army Corps of Engineers
69 Darlington Ave.
Wilmington, NC 28403
Mickey.T.Sugg@usace.army.mil

RE: Figure Eight Island Shoreline Management Project – SAW-2006-41158

Dear Mr. Sugg:

Please accept these amended comments on the Figure Eight Island Shoreline Management Project Draft Environmental Impact Statement ("DEIS"). The Southern Environmental Law Center submits these comments on behalf of the North Carolina Coastal Federation, Audubon North Carolina, and the Environmental Defense Fund.[1] As described below, the NEPA process must be halted until the Figure Eight Homeowners' Association ("HOA") can demonstrate that it possesses the necessary property rights to construct its preferred alternatives. If the HOA acquires those rights and the project is reinitiated, certain alternatives violate the Endangered Species Act and/or the Clean Water Act and cannot be lawfully permitted. Further, even if the HOA acquires required property rights to build the groin, scoping of any proposed terminal groin must occur and the DEIS must be supplemented to account for significant, important changes to Rich Inlet that have occurred since data collection and aerial observations stopped in 2007 as well as changes in property values. In its current state, the DEIS does not provide a basis for the Corps to move forward with any alternative other than Alternative 2 – the actual no-action alternative which does not require a Corps permit.

I. THE CORPS MUST ISSUE A SUPPLEMENT BECAUSE THE DEIS WAS PUBLISHED THROUGH IMPROPER PROCEDURES, LACKS NECESSARY INFORMATION, AND RELIES ON OUT-OF-DATE INFORMATION.

A. The Corps Has Not Provided Scoping Notice of Terminal Groin Proposals.

Scoping is a necessary and important part of the NEPA process. As the regulations state, "[t]here shall be an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a **proposed action**." 40 C.F.R. § 1501.7 (emphasis added). At the time the scoping notice for this EIS was issued and the scoping meeting was held, the proposed action was inlet realignment. The Corps has not issued a

[1] These comments are amended to add Environmental Defense Fund. No other changes have been made to the comments submitted on July 20, 2012.

scoping notice or held a scoping meeting for proposed actions – a terminal groin – described in the DEIS and is, therefore, in violation of NEPA regulations. The Corps must withdraw the DEIS, issue a scoping notice for the proposed action, and reconsider the DEIS in light of comments received.

B. The HOA Has Not Demonstrated Property Rights Necessary to Construct the Applicant's Preferred Alternative Groin, in Violation of Corps Regulations.

The Corps's decision to issue this EIS without any demonstration that the Figure Eight HOA has the necessary property rights to construct the preferred alternative contradicts the agency's regulation and biases the resulting analysis. Moreover, it is a waste of the agency's resources as well as those of the state and federal commenting agencies and the public's time.

The preferred alternative, a terminal groin built on the northern end of the island, would be built across approximately 15 lots, none of which are owned by the HOA. See Figure 1 (superimposing proposed terminal groin from DEIS on New Hanover County 2012 GIS tax map depicting property boundaries). When a project is proposed to the Corps, the agency's regulations require the applicant to demonstrate "that the applicant possesses or will possess the requisite property interest to undertake the activity proposed in the application." 33 C.F.R. § 325.1(d)(8). Nothing in the DEIS indicates that the HOA owns, has easements or options on, or any other ability to acquire the properties where the terminal groin would be built.

The HOA does not have the authority to force property owners to grant an easement. The HOA, unlike a municipality lacks the power of eminent domain. Similarly, the Association's controlling documents do not give the HOA the authority to condemn an individual's property. The current Restrictive Covenants on Figure Eight Island properties grant the HOA the authority to access individual lots for certain specific, limited uses, but none of those uses grant the Association the authority to permanently take and transform an owner's lot. The reservation of "miscellaneous easements" in the restrictive covenants is limited to utilities including electricity, telephone, gas, sewer, or water, and for these, limited to the rear ten feet or ten feet on the side of a lot. Both directly, and by implication, easements for other structures or purposes are not reserved. In addition, the North Carolina Planned Community Act, N.C. Gen. Stat. § 47F-1-101 et seq., does not empower HOAs with authority to, in essence, condemn private property to construct a terminal groin.

The HOA has provided no evidence in the DEIS that it "possesses or will possess the requisite property interest to undertake the activity proposed in the application" as the "applicant's preferred alternative" as required by Corps's regulations. This is particularly important because construction of a terminal groin will likely substantially decrease the value of the impacted properties. Lacking this demonstrated property interest to construct its preferred terminal groin, the Corps should immediately cease all work on this project so as not to potentially waste even more resources and time of state and federal agencies and the public.

Figure 1. Proposed terminal groin and properties on north end of Figure Eight Island.

C. Data Relied on in the DEIS is Stale and Must be Updated in a Supplement.

The data relied on in the DEIS is stale and cannot serve the role given. The freshness of the data is particularly relevant here, where the focus of the DEIS is the management of a dynamic inlet system. As a federal appellate court recently stated, "[r]eliance on data that is too stale to carry the weight assigned to it may be arbitrary and capricious." N. Plains Res. Council v. Surface Transp. Bd., 668 F.3d 1067, 1086 (9th Cir. 2011). More pointedly, even if it could be assumed that the physical environment was static, that determination alone cannot show that "information regarding habitat and populations of numerous species remains the same as well." Id.

When that reliance on stale data causes important, relevant information to be omitted, the error is fatal to the DEIS. As the Fourth Circuit recently stated, "agencies violate NEPA when they fail to disclose that their analysis contains incomplete information." N.C. Wildlife Fed'n v. N.C. Dep't of Transp., 677 F.3d 596, 603 (4th Cir. 2012). Critically, "[w]hen relevant information 'is not available during the [impact statement] process and is not available to the public for comment[,] . . . the [impact statement] process cannot serve its larger informational role, and the public is deprived of [its] opportunity to play a role in the decision-making process.'" Id. Even more recently, the Fourth Circuit held that "material misapprehension of the

baseline conditions existing in advance of an agency action can lay the groundwork for an arbitrary and capricious decision." Friends of Back Bay v. U.S. Army Corps of Eng'rs, 681 F.3d 581, 588 (4th Cir. 2012). "'Without [accurate baseline] data, an agency cannot carefully consider information about significant environment impacts'" and therefore the analysis will "result[] in an arbitrary and capricious decision." N.C. Wildlife Fed'n, 677 F.3d at 603 (quoting N. Plains Res. Council, Inc. v. Surface Transp. Bd., 668 F.3d 1067, 1085 (9th Cir. 2011)).

In light of these cases, the importance of up-to-date, accurate baseline information is paramount. Here, the failure to update stale data is more pronounced due to the dynamic nature of Rich Inlet, and reliance on that data is clearly arbitrary and capricious. The nature of the inlet reveals the first instance in which the use of stale data fundamentally undercuts the EIS. The baseline assumptions regarding inlet location, shoal formations, erosion rates, and beach conditions rely on information most recently collected in 2007. Examples of the use of this outdated data include EIS statements like:

- "Given the shoreline recession rates observed between 1999 and 2007, Inlet Hood Road and Comber Road could be undermined within the next five (5) years . . . ;"
- "Continuation of the present rate of shoreline recession on the extreme north end of Figure Eight Island will imminently threaten an additional four (4) homes on Surf Court within the next 3 years and owners will likely pursue authorization for sandbag placement;" and (26)
- "If erosion rates continue at their current level, nine (9) homes on Beach Road North located immediately south of Surf Court are expected to become threatened within the next ten (10) years . . . ."

It is worth noting that none of these predictions based on the outdated information turned out to be accurate. It has been five years since 2007, and neither Inlet Hook Road nor Comber Road has been undermined. No homes on Surf Court are in jeopardy, and none have been sandbagged.

One prediction does appear to be coming true, but has not been considered in the EIS. The EIS states that "[s]hifts in the channel orientation toward Figure Eight Island would have a beneficial impact on the north end of the island." (39) Given the present accretion in front of the sandbagged houses, that projection appears to have validity, yet was not taken into account in the EIS. See Figure 5.3, p. 18.

Essential data regarding erosion rates is at least five years old and assumptions based on that data have proven to be false. Yet the EIS and the models it relies on depend on that dated information without any documentation to explain how the stale data represents current physical conditions and erosion rates, or, more accurately, why the apparent discrepancies between its assumptions and current conditions are not relevant.

Moreover, it is apparent that the data that is the foundation for the Delft3D model and the EIS does not reflect current conditions. These issues will be discussed in more detail below, but Figure 2. demonstrates that previously estimated erosion rates have not continued to the present and, in fact, current beach conditions suggest that the beach is accreting.

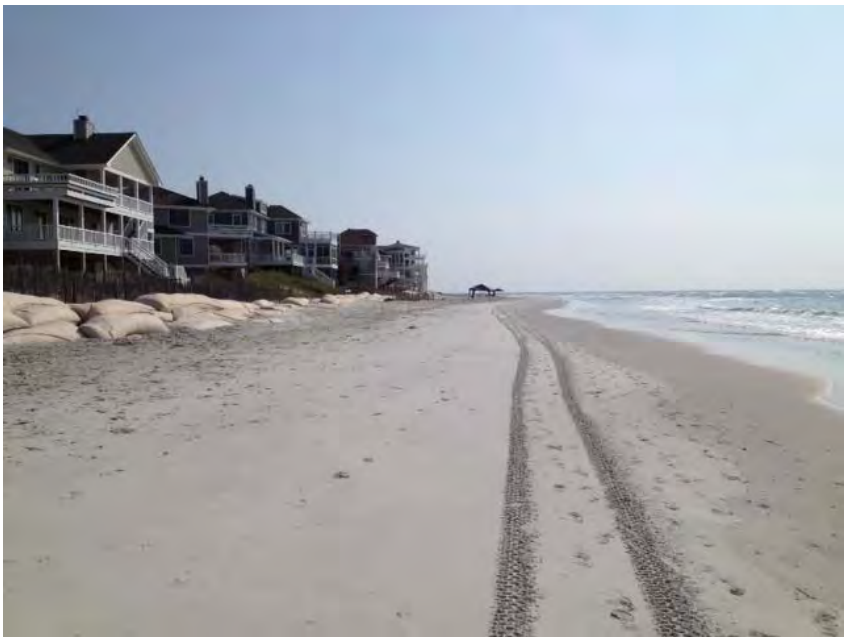


Figure 2. Beach at high tide in front of sandbagged properties in July 2012.

This accretion was not predicted in the models or the EIS and neither have been updated to explain it. The baseline data relied on by the models and the EIS are not only stale, the assumptions used appear to be incorrect, and the projections made are demonstrably wrong. Therefore, the EIS cannot be relied on to comply with NEPA or carry out the Corps's permitting process.

The staleness of the EIS is further demonstrated by the out-dated tax values for the properties on Inlet Hook and Comber roads. The tax assessments included in the economic analysis in the EIS rely on information compiled in 2009. That data is now three years old and fails to reflect current tax values. As will be further discussed below, the properties on Comber and Inlet Hook are worth approximately half of the amount included in the EIS, skewing the cost calculations and biasing the overall EIS. The data regarding lot availability appears to be similarly stale. As with the stale inlet data, reliance on this out-of-date, inaccurate economic data undermines the credibility of the EIS and its usefulness as a decision-making document.

A supplemental EIS is required when "[t]here are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts." 40 C.F.R. § 1502.9(c)(ii). The complete failure of the models used to accurately estimate environmental impacts constitutes new information "relevant to environmental concerns and bearing on the proposed action or its impacts." Similarly, the accretion observed in front of the sandbagged houses and updated property values qualify as "new circumstances" that have a direct bearing on the agency's analysis. Therefore, a supplement to this DEIS is required.

II. THE CORPS CANNOT ISSUE A PERMIT FOR EITHER TERMINAL GROIN OR SAND DREDGING ALTERNATIVES BECAUSE DOING SO WOULD VIOLATE THE ENDANGERED SPECIES ACT AND THE CLEAN WATER ACT.

A. Construction of a terminal groin destroys and adversely modifies critical habitat for the piping plover at Rich Inlet and can not be permitted.

The project area at Rich Inlet includes designated critical habitat for wintering populations of piping plover. The area is a key wintering site for piping plovers. A terminal groin as proposed in Alternatives 5A and 5B as well as extensive sand dredging in the inlet will destroy and adversely modify both habitats and inlet processes that constitute primary constituent elements of critical habitat and the Endangered Species Act ("ESA") prohibits issuance of a permit that would authorize these activities.

1. *The Corps may not permit an action that adversely modifies critical habitat by diminishing the value of the habitat for either the survival or recovery of a species.*

Under the ESA, "[e]ach Federal agency shall, in consultation with and with the assistance of the Secretary, insure that any action authorized, funded or carried out by such agency is not likely to . . . result in the destruction or adverse modification of [critical] habitat." 16 U.S.C. § 1536(a)(2). Section 7 of the ESA "requires federal agencies to ensure that none of their activities, including the granting of licenses and permits, will … adversely modify a species' critical habitat." Karuk Tribe of Cal. v. United States Forest Serv., 681 F.3d 1006, 1020 (9th Cir. June 1, 2012) (citing Babbitt v. Sweet Home Chapter, 515 U.S. 687, 692 (1995)). The Corps also has "an independent duty under section 7(a)(2) to ensure that its [action] … [is] not likely … to adversely modify [critical] habitat." Defenders of Wildlife v. United States EPA, 420 F.3d 946, 976 (9th Cir. 2005). (Agency reliance on a faulty Biological Opinion violates its duty under Section 7(a)2) of the ESA).[1]

The regulatory definition of "adverse modification" is found in 50 C.F.R. § 402.02, and states that an "adverse modification" is a "direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species." In Gifford

[1] Further, "it is unlawful for any person subject to the jurisdiction of the United States to . . . take any species," which is defined to include "significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering." 50 C.F.R. § 17.3. The prohibition on take includes agencies authorizing activities carried out by others that result in take of a listed species. Strahan v. Coxe, 127 F.3d 155, 163 (1st Cir. 1997). (State of Massachusetts was found to have exacted a taking of endangered Northern Right Whales through its licensing and permitting of certain fishing practices that exacted a taking of the species); Sierra Club v. Yuetter, 926 F.2d 429, 438-39 (5th Cir. 1991)(finding Forest Service caused take of endangered red-cockaded woodpecker by permitting logging practices near nesting colonies); Defenders of Wildlife v. Administrator, Envtl Protection Agency, 882 F.2d 1294, 1300-01 (8th Cir.1989)(finding EPA caused take of endangered species through its registration of pesticides for use by others); Loggerhead Turtle v. County Council of Volusia County, 896 F. Supp.1170, 1180-1181 (M.D. Fla. 1995)(holding Volusia County caused take of endangered sea turtles through its authorization of vehicular beach access during turtle mating season).

Pinchot Task Force v. U.S. Fish and Wildlife Service, 378 F.3d 1059, 1070-70 (9th Cir.), the 9th Circuit ruled that "the regulatory definition of 'adverse modification' contradicts Congress's express command," and therefore violates the ESA. The court explained that Congress enacted the ESA "not merely to forestall the extinction of [a] species (i.e., promote a species['] survival), but to allow a species to recover to the point where it may be delisted." Id. at 1070. Because a species needs more critical habitat for its recovery than is necessary for survival, the court found that the regulation was invalid because "[w]here Congress in its statutory language required 'or,' the agency in its regulatory definition substituted 'and.'" Id.

In response to the Gifford Pinchot decision, the U.S. Fish & Wildlife Service ("FWS") issued a directive on the use of the invalidated regulatory definition of "adverse modification" in a Memorandum on December 9, 2004.[2] The Memorandum directs FWS biologists "not cite to or use" the invalidated regulatory definition of adverse modification "at any point in the consultation process."[3] The Memorandum also directs FWS staff "to rely on an analytic framework based on the language of the ESA itself, which requires that critical habitat be designated to achieve the twin goals of survival and conservation (i.e., recovery) of listed species. Under current practice, the FWS "will find 'adverse modification' if the impacts of a proposed action on a species' designated critical habitat would appreciably diminish the value of the habitat for either the survival or the recovery of the species."[4]

The determination whether designated critical habitat would continue to serve its intended conservation role in recovery of a species is determined by whether the critical habitat retains its ability to provide and continue to establish the necessary primary constituent elements ("PCEs"). The FWS defines PCEs as "physical or biological feature[s] essential to the conservation of a species for which its designated or proposed critical habitat is based on."[5] The examples FWS give are "space for individual and population growth, and for normal behavior; … nutritional or physiological requirements; cover or shelter; sites for breeding, reproduction, rearing of offspring; … and habitats that are protected from disturbance or are representative of the species' historic geographic and ecological distribution."[6] In a recent revised designation of critical habitat for the Pacific coast population of the western snowy plover, FWS explains that activities that may constitute an "adverse modification" of critical habitat "are those that alter the physical and biological features to an extent that appreciably reduces the conservation value of critical habitat." 77 Fed. Reg. 36,728, 36,774 (June 19, 2012) (to be codified at 50 C.F.R. pt. 17). Agencies must use the "best scientific data" when conducting and relying on these Biological Opinions evaluating whether proposed actions result in adverse modification of critical habitat. Conservation Cong. v. United States Forest Serv., 2012 U.S. Dist. LEXIS 84943, 36 (D. Cal. 2012).

[2] Minn. Ctr. for Envtl. Advocacy v. United States Forest Serv., 2012 U.S. Dist. LEXIS 51853, 44-46 (D. Minn. Apr. 12, 2012) (citing FWS0004205).
[3] Id.
[4] Id. (emphasis added).
[5] FWS, Endangered Species Glossary, available at: www.fws.gov/nc-es/es/glossary.pdf.
[6] Id.

2. *The Rich Inlet area includes designated critical habitat for the recovery of the piping plover.*

FWS designated critical habitat for the wintering populations of piping plovers on July 10, 2001. 66 Fed. Reg. 36,038 (July 10, 2001). The habitat designated "is essential to the conservation of this species." 66 Fed. Reg. at 36,041. Areas containing primary constituent elements that constitute critical habitat were designated in eight states, including 18 units on the North Carolina coast. Unit NC-11: Topsail includes Rich Inlet and the project area:

> This unit extends southwest from 1.0 km (0.65 mi) northeast of MLLW of New Topsail Inlet on Topsail Island to 0.53 km (0.33 mi) southwest of MLLW of Rich Inlet on Figure Eight Island. It includes both Rich Inlet and New Topsail Inlet and the former Old Topsail Inlet. All land, including emergent sandbars, from MLLW on Atlantic Ocean and sound side to where densely vegetated habitat, not used by the piping plover, begins and where the constituent elements no longer occur. In Topsail Sound, the unit stops as the entrance to tidal creeks become narrow and channelized.

Id. at 36,087.

Designated critical habitat within critical habitat Unit NC-11: Topsail includes those primary constituent elements present in the area as described in the regulation:

> The primary constituent elements essential for the conservation of wintering piping plovers are those habitat components that support foraging, roosting, and sheltering and the physical features necessary for maintaining the natural processes that support these habitat components. The primary constituent elements include intertidal beaches and flats (between annual low tide and annual high tide) and associated dune systems and flats above annual high tide. Important components of intertidal flats include sand and/or mud flats with no or very sparse emergent vegetation. In some cases, these flats may be covered or partially covered by a mat of blue-green algae. Adjacent non-or sparsely vegetated sand, mud, or algal flats above high tide are also important, especially for roosting piping plovers, and are primary constituent elements of piping plover wintering habitat. Such sites may have debris, detritus (decaying organic matter), or micro-topographic relief (less than 50 cm above substrate surface) offering refuge from high winds and cold weather. Important components of the beach/dune ecosystem include surfcast algae, sparsely vegetated backbeach and salterns (beach area above mean high tide seaward of the permanent dune line, or in cases where no dunes exist, seaward of a delineating feature such as a vegetation line, structure, or road), spits, and washover areas. Washover areas are broad, unvegetated zones, with little or no topographic relief, that are formed and maintained by the action of hurricanes, storm surge, or other extreme wave action.

Id. at 36,086.

In designating critical habitat, FWS identified factors that may affect piping plover survival or use of the area:

> Overall winter habitat loss is difficult to document; however, a variety of human-caused disturbance factors have been noted that may affect plover survival or utilization of wintering habitat (Nicholls and Baldassarre 1990a, Haig and Plissner 1993). These factors include recreational activities (motorized and pedestrian), *inlet and shoreline stabilization, dredging of inlets that can affect spit (a small point of land, especially sand, running into water) formation, beach maintenance and renourishment (renourishing the beach with sand that has been lost to erosion),* and pollution (e.g., oil spills) (USFWS 1996). The peer-reviewed, revised recovery plan for the Atlantic piping plover population recognizes the need to protect wintering habitat from direct and indirect impacts of shoreline stabilization, navigation projects, and development. (emphasis added).

Id. at 36039.

The Recovery Plan for the critically endangered Great Lakes piping plover population states that "[i]nlet dredging and artificial structures, such as breakwalls and groins, can eliminate breeding and wintering areas and alter sedimentation patterns leading to the loss of nearby habitat."[7] The 5-year Status Review for Piping Plover states: "The three recovery plans state that shoreline development throughout the wintering range poses a threat to all populations of piping plovers. The plans further state that beach maintenance and nourishment, inlet dredging, and artificial structures, such as jetties and groins, can eliminate wintering areas and alter sedimentation patterns leading to the loss of nearby habitat."[8] The Status Review concludes: "Habitat loss and degradation on winter and migration grounds from shoreline and inlet stabilization efforts, both within and outside of designated critical habitat, remain a serious threat to all piping plover populations."[9]

As discussed in more detail below, Alternatives 5A and 5B propose a terminal groin and related activities to attempt to stabilize Rich Inlet that are specifically identified by FWS and other experts as factors leading to the decline of piping plovers. If authorized at Rich Inlet within critical habitat Unit NC-11, these alternatives would destroy and adversely modify primary constituent elements of plover habitat, permanently alter natural processes that maintain these essential components of plover habitat, and undermine and appreciably reduce the likelihood of recovery of the species.

3. *Alternatives 1, 3, 4, 5A, and 5B will result in the adverse modification of critical habitat and can not be permitted.*

A six year study by Audubon North Carolina[10] documents the use of the Rich Inlet area by piping plovers and other shorebirds.

---

[7] U.S. Fish & Wildlife Service, Recovery Plan for the Great Lakes Piping Plover (Charadrius melodus) (September 2003) at 23.

[8] U.S. Fish & Wildlife Service, Piping Plover (Charadrius melodus) 5-Year Status Review: Summary and Evaluation (2009) at 31.

[9] Id. at 39.

[10] The results of this study are presented in a letter of July 20, 2012 from Walker Golder, Audubon North Carolina, to Mickey Sugg, U.S. Army Corps of Engineers. The information in this letter is incorporated by reference into this assessment of project impacts on critical habitat.

> Piping Plovers were observed throughout the Rich Inlet system, using all areas of the inlet: the shoals in the main channel and Green Channel, beaches and spits on the northern and southern sides of the inlet mouth, and, much less frequently, beach or sandbar areas at the back of the inlet. Further, the same banded individuals were seen at the north and south sides of the inlet systems, as well as shoals in the inlet channels, and observed moving shifting to different foraging roosting sites as the tide changed. No wintering banded Piping Plover was observed on only one segment of the inlet. [11]

The Rich Inlet area and critical habitat Unit NC-11 annually supports a wintering population of piping plovers, including individuals from both the critically endangered Great Lakes population and the threatened Atlantic Coast population. Figure 3 depicts the distribution of piping plovers documented at Rich Inlet from 2008-2012. Audubon biologists documented banded and unbanded piping plovers during this period and have confirmed 12 individual piping plovers from the critically endangered Great Lakes population using the north end of Figure Eight Island, the Rich Inlet shoals, and southern Hutaff Island since 2008. In designating critical habitat, the FWS states that "areas of high plover concentrations indicate that the areas are important to wintering piping plovers," and goes on to emphasize that "[t]his is particularly true for the endangered Great Lakes population." 66 Fed.Reg. at 36,057.

[11] Id.

Figure 3. Locations of Individuals or Flocks of Piping Plovers at Rich Inlet, July 2008-May 2012.

Alternatives 5A and 5B include construction of a terminal groin that will directly destroy primary constituent elements of designated critical habitat for the piping plover and destroy and adversely modify the natural processes that support habitat components essential to the recovery of the species. Alternatives 1, 3, 4, 5A and 5B include extensive dredging and sand mining within the inlet system that will directly destroy primary constituent elements of designated critical habitat for the piping plover and adversely modify the natural processes that support habitat components essential to the recovery of the species. Section 7 of the ESA prohibits agencies from taking actions that result in destruction or adverse modification of critical habitat, and these alternatives can not be permitted.

Primary constituent elements of critical habitat in the project area that will be destroyed or adversely modified include areas that support foraging, roosting, and sheltering and features necessary to maintain the processes that support these habitat components. These areas include

intertidal beaches and flats and associated dune systems and flats above annual high tide; sparsely vegetated sand, mud, or algal flats above high tide; sparsely vegetated backbeach; and spits.

Alternatives 5A and 5B propose construction of a terminal groin on the north end of Figure Eight Island and dredging within the inlet area for initial fill along the ocean beach south of the groin, and periodic dredging for beach nourishment. As discussed previously (see discussion of no action alternative), the impacts of dredging within the existing permitted area must be considered as a part of these alternatives. This is particularly important to the required assessment of impacts to primary constituent elements of critical habitat because the permitted area initially comprised intertidal flats, and much of the area would return to intertidal flats if dredging is halted. Alternative 5B has additional channel dredging impacts resulting from construction of a new channel as an extension of the currently permitted area.

Primary constituent elements of critical habitat would be destroyed and adversely affected by construction of a terminal groin in the following ways:

a. Primary Constituent Element: Intertidal beaches and flats.

Intertidal flats are one of the most important habitats for foraging piping plovers. Figure 3 depicts the extensive use of these intertidal flat areas by piping plovers. Alternatives 1, 3, 4, 5A, and 5B involve extensive mining of sediment from the Rich Inlet area. This sediment is essential for maintaining the intertidal flats that constitute foraging areas and a primary constituent element of the critical habitat for wintering piping plovers. Alternatives 1, 4, and 5B involve extensive and periodic removal of sediment from a previously permitted area which, as discussed previously, must be assessed as a part of these alternatives. Alternatives 3 and 5A include additional channel dredging to remove sediment and reorient or relocate the inlet.

Sediment removal reduces sediment in the inlet system which in turn reduces the extent of intertidal flats. The piping plover status review summarizes these impacts:

> Sand mining, the practice of extracting (dredging) sand from sand bars, shoals, and inlets in the nearshore zone, is a less expensive source of sand than obtaining sand from offshore shoals for beach nourishment. Sand bars and shoals are sand sources that move onshore over time and act as natural breakwaters. Inlet dredging reduces the formation of exposed ebb and flood tidal shoals considered to be primary or optimal piping plover roosting and foraging habitat. Removing these sand sources can alter depth contours and change wave refraction as well as cause localized erosion (Hayes and Michel 2008).[12]

Alternative 1 Current Nourishment would periodically remove sediment from the 44.7 acre Nixon Channel dredge area. Six dredging projects since 1993 have removed between 274,000 and 350,000 cubic yards each. DEIS at 201. Alternative 3 Inlet Management with Beach Fill would initially remove 1.7M cubic yards of sediment to construct channels, dam the existing ebb tide channel, and nourish beaches. Maintenance dredging would remove 716,000

[12] U.S. Fish & Wildlife Service, Piping Plover (Charadrius melodus) 5-Year Status Review: Summary and Evaluation (2009)

cubic yards every five years. DEIS at 225. Alternative 4 Beach Nourishment without Inlet Management will initially remove 400,000 cubic yards of sediment from the Rich Inlet system by mining the Nixon Channel area and continuing to mine any shoals and reappear. DEIS at 256. Alternative 5A Groin with Channel will remove 994,000 cubic yards of sediment from Nixon Channel and also directly excavate 26.8 acres of intertidal shoals. DEIS at 263. Alternative 5B Groin with Beach Fill will initially remove 289,800 cubic yards of sediment from Nixon Channel and then 175,800 cubic yards every five years. DEIS at 281. All of these alternatives will mine sediment from the inlet system which will reduce the extent of shoals and intertidal flats and destroy or adversely modify this primary constituent element of critical habitat.

In contrast with these alternatives, the DEIS predicts Alternative 2 Abandon/Retreat with result in a net increase in sediment in the Rich Inlet system and an increase in intertidal flats. DEIS at 217. This will enhance this component of critical habitat.

b. Primary Constituent Element: Spits.

Construction of a terminal groin on the north end of Figure Eight Island will result in truncation and loss of the spit and associated shoreline and encroachment of vegetation in the now unvegetated or sparsely vegetated areas on the landward side of the groin. The piping plover status report discusses the impacts of groins and inlet stabilization:

> Inlet stabilization with rock jetties and associated channel dredging for navigation alter the dynamics of longshore sediment transport and affect the location and movement rate of barrier islands (Camfield and Holmes 1995), typically causing downdrift erosion. Sediment is then dredged and added back to islands which subsequently widen. Once the island becomes stabilized, vegetation encroaches on the bayside habitat, thereby diminishing and eventually destroying its value to piping plovers. Accelerated erosion may compound future habitat loss, depending on the degree of sea-level rise. Unstabilized inlets naturally migrate, re-forming important habitat components, whereas jetties often trap sand and cause significant erosion of the downdrift shoreline. These combined actions affect the availability of piping plover habitat (Cohen et al. 2008).[13]

The DEIS predicts that after construction of a groin, the area on the inlet side of the groin will become submerged and no longer habitat for plovers. DEIS at 282. While, as discussed previously, the models underlying this prediction are questioned, this outcome is consistent with other groins at other inlets. The DEIS states that any habitat losses from groin construction are "ephemeral," which is wrong. The loss of the spit and associated intertidal shoreline is permanent. As depicted in Figure 3, piping plovers extensively use the spit and shoreline. A groin will destroy and adversely modify this primary constituent element of the critical habitat.

[13] Id.

c. Primary Constituent Element: Sparsely vegetated flats above high tides.

As discussed above with respect to the impacts to the spit, a terminal groin will destroy and adversely modify the flats above high tide on the north end of Figure Eight Island by allowing encroachment of vegetation in the area on the landward side of the groin. The DEIS acknowledges these now open flats above the high tide line will be adversely modified by construction of groin and the resulting vegetative encroachment. DEIS at 282.

d. Primary Constituent Element: Sparsely vegetated backbeach.

Figure 4 is a photograph of piping plovers foraging on the sparsely vegetated backbeach along the outside of Nixon Channel on January 1, 2012. One of the plovers is from the critically endangered Great Lakes population. The photograph is taken in from the sandbagged house on North Beach Road. Figure 3 documents the extensive use of this sparsely vegetated backbeach area by piping plovers. The proposed terminal groin in Alternatives 5A and 5B would be constructed on this backbeach. As with the spit, the shoreline in this area will erode to submerged land after construction of a groin. The primary constituent element backbeach habitat will permanently disappear in this area. A terminal groin will thus destroy and adversely modify this primary constituent element of critical habitat.

Figure 4. Two piping plovers photographed January 1, 2010 on north end of Figure Eight Island (south shore of Rich Inlet). The terminal groin would destroy this vegetated backbeach habitat which is designated critical habitat under the Endangered Species Act. The color-banded Piping Plover (lower left and insert) is from the endangered Great Lakes population.

e. Primary Constituent Element: Inlet processes.

A terminal groin will fundamentally alter the natural inlet processes at Rich Inlet that form and maintain the other primary constituent elements of critical habitat discussed above. Massive removal of sediment from the inlet system will also alter these natural processes. The

purpose of a terminal groin is to modify these natural inlet processes. Construction of a groin will adversely modify these processes and the important role they play in the maintenance of the other primary constituent elements of critical habitat.

Construction of a terminal groin as proposed in Alternatives 5A and 5B will destroy and adversely modify primary constituent elements of critical habitat for the piping plover and can not be permitted.

E. The Terminal Groin Alternatives are the Most Environmentally Damaging Practicable Alternatives and Therefore Cannot Be Permitted.

Under the Clean Water Act, the Corps is only able to permit the least environmentally damaging practicable alternative ("LEDPA"). At the outset, it is clear that Alternative 2 is practicable. Practicable means "available and capable of being done after taking into consideration cost, existing technology, and logistics." 40 C.F.R. § 230.3(q). Therefore, the practicability analysis cannot consider potential benefits included in the DEIS's cost-benefit analysis (i.e. avoiding the loss of land and structures), but must be limited to the cost of carrying out the alternative – the "response/construction costs." See DEIS at 67. On that basis, each alternative is practicable and Alternative 2 is one third the cost of the preferred alternative. Based on the information provided in the DEIS, it is clear that the LEDPA is Alternative 2. Therefore, it is the only alternative that can be permitted.

Excluding Alternative 2, which is clearly the LEDPA because it does not require dredging or beach nourishment, the alternatives fall into two categories. The first includes the non-structural alternatives, whose environmental impacts – dredging, smothering benthic organisms, altered beach profile, etc. – vary by degree. The second category includes the terminal groin alternatives, whose unique environmental impacts – hardening of the shoreline, loss of overwash areas, etc. – are permanent.

In its application of the 404(b)(1) Guidelines, the Corps must evaluate "the nature and degree of effect that the proposed discharge will have, individually and cumulatively, on the characteristics at the proposed disposal sites." 40 C.F.R. § 230.11(a). That effect is measured by how the discharges change the "physical, chemical, and biological characteristics of the substrate" and affect "bottom-dwelling organisms at the site by smothering immobile forms or forcing mobile forms to migrate." 40 C.F.R. §230.20(b).

The analysis of these factors reveals a clear divide. The non-structural alternatives will have varying degrees of impact on infaunal communities in both the dredged areas and the nourished areas. Due to the scope of dredging and beach fill, Alternative 3 – as described in the EIS – appears to have the most severe impact of the non-structural alternatives on substrate and bottom dwelling organisms. Because it would involve no dredging or nourishment, Alternative 2 would have the least impact on substrate and benthic organisms. Unlike any of the non-structural alternatives, however, the terminal groin alternatives will permanently alter the characteristics of the site. The intertidal areas lost in the area that would be impacted by the terminal groin will not redevelop, eliminating the possibility that the benthic organisms buried or displaced could repopulate the area. The groin alternatives will fundamentally change the nature

of the northern end of the island, eliminating overwash areas and permanently altering substrate and eliminating habit for benthic organisms. Alternatives 5A and 5B are the most environmentally damaging alternatives when evaluated under the factors in 40 C.F.R. § 230.20.

The Corps must also evaluate "the nature and degree of effect that the proposed discharge will have individually and cumulatively on water, current patterns, circulation including downstream flows, and normal water fluctuation." 40 C.F.R. § 230.11(b). These effects are measured by the "adverse changes" that occur in "[l]ocation, structure, and dynamics of aquatic communities; shoreline and substrate erosion and deposition rates; [and] the deposition of suspended particulates." 40 C.F.R. § 230.23(b).

As with impacts to substrate, Alternative 2 clearly has the least environmental impact on the aquatic communities and deposition of suspended particles. It would not adversely affect aquatic communities and would continue to allow deposition of suspended particles on the overwash areas at the northern end of the island (as would the other non-structural alternatives). By comparison, the terminal groin alternatives would permanently displace aquatic communities at the northern end of the island and eliminate overwash, cementing the accompanying adverse environmental impacts.

The Corps's consideration of the fluctuation of normal water level must include consideration of "modifications [that] can alter or destroy communities and populations of aquatic animals and vegetation, . . . modify habitat, reduce food supply, restrict movement of aquatic fauna, destroy spawning areas, and change adjacent, upstream, and downstream areas." 40 C.F.R. § 230.24.

For the reasons described above and the impacts on the benthic communities, Alternative 2 has the least environmental impact. Alternative 2 would also have the least adverse environmental effect on wet beach habitat, adjacent dry beach habitat, and back beach habitat. Other non-structural alternatives would similarly have environmental impacts to these habitats. Alternatives 5A and 5B would have significant, permanent impacts to these areas. They would eliminate wet beach habitats and the associated benthic organisms, significantly modify dry beach habitats, and result in dense vegetation of what are now sparsely vegetated back beach habitats. They would therefore have the greatest adverse impacts of any of the alternatives.

In addition to the Corps's endangered and threatened species analysis under the ESA, it must also consider listed species under the 404(b)(1) Guidelines. The Corps must compare alternatives based on their potential impact on "nesting areas, protective cover, adequate and reliable food supply and resting areas for migratory species." 40 C.F.R. § 230.30(b)(2).

Alternative 2 and the other non-structural alternatives would allow critical habitat for piping plover to remain on the northern end of Figure Eight Island. As discussed above, Alternatives 5A and 5B would destroy that critical habitat, adversely affecting threatened and endangered species.

Finally, the Corps must consider "the loss or change of breeding and nesting areas, escape cover, travel corridors, and preferred food sources for resident and transient wildlife species associated with the aquatic system." 40 C.F.R. § 230.32(b).

Construction of either Alternative 5A or 5B would eliminate habitat for all shorebirds that rely on relatively unvegetated back beach, wet beach, and intertidal habitats. Therefore, the adverse effects described above for piping plover are likely to be felt by red knots and other shorebirds.

It is clear from the DEIS that under the 404(b)(1) Guidelines, the Corps cannot permit either Alternative 1, 3, 4, 5A, or 5B. All would have significantly greater environmental impact than Alternative 2. Alternative 2 is the LEDPA and is the only alternative that can be permitted by the Corps.

III. THE DEIS FAILS TO PROVIDE THE THOROUGH REVIEW REQUIRED UNDER NEPA AND MUST BE SUPPLEMENTED.

A. Environmental impact analysis based on the Delft3D model must be rejected entirely.

The DEIS relies extensively in analysis of environmental impacts on bathymetry and other predictions of the Delft3D model. As discussed below, the model has grossly miscalculated the bathymetry, movement, and orientation of the inlet and resulting effects on the barrier islands over the last five years. If the model has fundamentally miscalculated the bathymetry, movement, and orientation of the inlet and related effects on the islands without channel dredging, groins, or other alterations, adding these complexities will result in even more useless information.

Although the DEIS relies on the predictions of the Delft3D model, it states that "[t]he model results are by no means intended to represent predictions of what changes to expect in the future with certainty, as this would require an ability to predict future weather and oceanic conditions." DEIS at 165. Instead, the DEIS argues that the model is useful because it "impos[es] the same set of forcing conditions in the model for each alternative and identify[ies] relative differences in the response of the modeled system." DEIS at 165. Even if that were correct,[14] it does not save the DEIS's reliance on the model. Actual behavior of the inlet demonstrates that the "same set of forcing conditions" used to model alternatives has no relation to the actual conditions in the inlet. Using a model to evaluate a fictional set of conditions that have no bearing or connection to reality cannot serve as the basis for the agency's "hard look" and certainly does not reflect reasoned decision making.

NEPA requires that agencies ensure the professional and scientific integrity of environmental impact statements. 40 C.F.R. 1502.24. Any method of interpreting environmental impacts is only as good as its predictive abilities. "Without [accurate baseline] data, an agency cannot carefully consider information about significant environment impacts . . .

[14] Despite this statement that the Delft3D model has no predictive value, the DEIS relies nearly exclusively on the model results to predict performance of the alternatives, environmental impacts, and costs.

resulting in an arbitrary and capricious decision." N.C. Wildlife Fed'n, 677 F.3d at 603 (citing See N. Plains Res. Council v. Surface Transp. Bd., 668 F.3d 1067, 1085 (9th Cir. 2011). Reliance on data that has no credible predictive value "does not constitute the 'hard look' required under NEPA." N. Plains Res. Council, 668 F.3d at 1087 (9th Cir. 2011).

The key test of any model is its predictive capability. The following three figures in Figure 5 illustrate the fundamental failure of the Delft3D model to predict key components of even the baseline inlet's bathymetry, movement, and orientation and related effects over a five year period. Figure 5.1 (Figure 2, Appendix B DEIS) is the "initial bathymetry" for Alternative 2 Abandon/Retreat from 2007. Alternative 2 Abandon/Retreat includes no new channel dredging or terminal groin, and the model is used just to predict how the inlet will change over time.

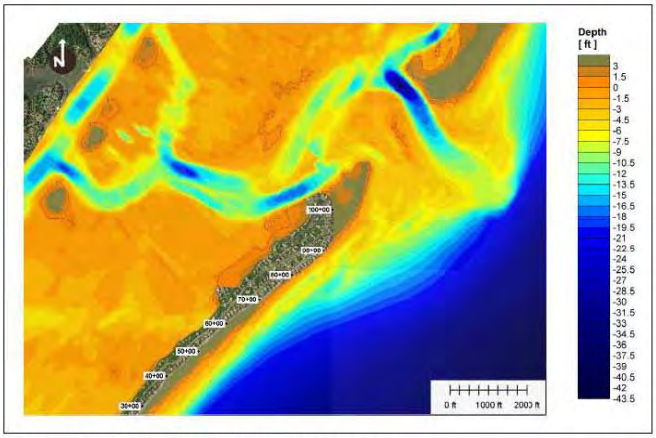


Figure 5.1. Alternative 2, initial bathymetry.

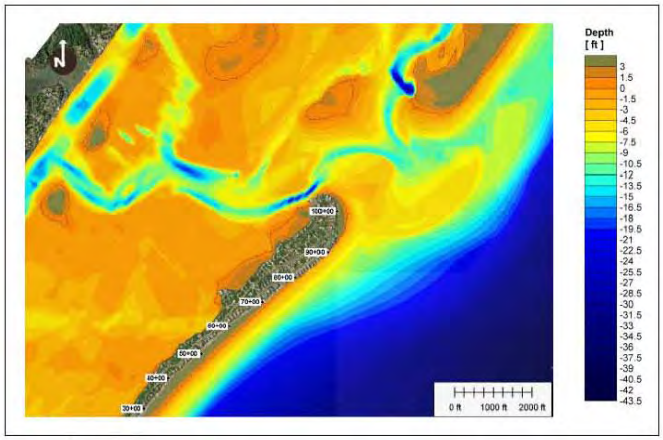


Figure 5.2. Alternative 2, bathymetry after 5 years simulation.

Figure 5.3. Google Earth satellite image of Rich Inlet area, 2012.

Figure 5. Comparison of initial (2007) bathymetry (Figure 5.1) and model predicted (2012) bathymetry (Figure 5.2) with actual 2012 satellite photograph (Figure 5.3).

Figure 5.2 (Figure 5, Appendix B DEIS) is the Alternative 2 bathymetry after five years simulation, or 2012. It predicts substantial movement of the ebb flow channel outlet to the northeast with final orientation to the east-northeast. It also predicts the main channel of Nixon Channel approaching the inlet will swing away from the interior marsh bank and that the higher elevation tip of the spit on Figure Eight Island will substantially erode away. Delft3D predictions of inlet movement, orientation, and related effects on the two islands underlie not only all the analysis of environmental impacts of the alternatives, but also the economic analysis (e.g., frequency of channel dredging or required nourishment).

Figure 5.3 is Google Earth imagery of the actual inlet area in 2012, to contrast with the model predictions in Figure A. The outlet of the ebb tide channel is oriented not to the northeast but nearly due south, Nixon Channel approaching the inlet has not swung away from the back side marsh but instead hugs the back side, and the Figure Eight Island spit is substantially intact. In short, a monkey with a crayon may have done a better job predicting inlet movement, orientation, and bathymetry. These faulty predictions do not even consider the compounding complexities of a terminal groin or channel dredging. Delft3D predictions underlie essentially all of the environmental analysis in the DEIS. Since the DEIS itself demonstrates no predictive capability for this model on essential assumptions underlying the environmental analysis, all the conclusions are open to question, and the entire environmental analysis must be re-done with defensible information and analysis that meets the standards for professional and scientific integrity that NEPA demands.

This gross disparity between the model's prediction and reality should come as no surprise – the model relies on a simplified set of parameters that does not and cannot predict the dynamic inlet area. Even Dr. Clearly, the HOA's expert, is described in meeting minutes included in Appendix A as making the point that "there is so much uncertainty and [that he] does not agree that you can put a lot of faith in the model over five (5) years."[15]

Perhaps the most obvious shortcoming is that the models do not take into account storm activity. It is well known that storms play a controlling role on coastal shorelines. Dr. Cleary, as reported in Appendix A, noted that "storm impacts and the relative location of Rich Inlet" are the primary drivers of erosion and accretion rates.[16] The only model identified as potentially evaluating storms was the Storm Induced Beach Change Model ("SBEACH"). It makes several assumptions that render the findings useless and was, unsurprisingly, inaccurate when compared to even a mild hurricane.

Without any support, the SBEACH relied on several assumptions. First, the model assumes that the median sediment grain diameter across the shoreline is uniform.[17] No data supports this assertion and, given the numerous beach nourishment events that have occurred on the island, there is no basis for assuming it is accurate. The model also assumes, without support, that the influence of structures blocking longshore transport, like the proposed terminal groin, is small. There is no documentation provided to defend that assumption generally or with respect to Figure Eight Island. Indeed, the very purpose of the preferred alternative is to control

[15] DEIS Appendix A, Meeting Minutes at (June 10, 2003).
[16] DEIS Appendix A, Meeting Minutes at 3 (May 3, 2007).
[17] DEIS Appendix B, Subpart B at 97.

longshore transport. Finally, the model assumes that "the existing sandbags along Comber Road and Inlet Hook Road . . . offer negligible protection against storm erosion."[18] No support for that conclusion is provided, and it is almost certainly inaccurate.

When "calibrated" to Hurricane Ophelia, SBEACH was shown to be inaccurate. Along "highly eroded beach," the model predicted erosion nearly four times greater than that actually observed, predicting a total loss of 17.2 cy/ft when only 4.7 cy/ft was actually lost.[19] On Figure Eight overall, the model predicted 9.5 cy/ft of erosion when the observed erosion was significantly less, 5.9 cy/ft.[20] On Lea-Hutaff the model was entirely incorrect, predicting erosion of 6.4 cy/ft when the island actually gained 4.7 cy/ft.[21] Given these results, there is no basis to conclude that SBEACH has any predictive value.

The Delft3D model relied on as the foundation for the EIS is no better. In addition to the shortcomings discussed above, the DEIS provides no explanation for the variation in the model results included in Appendix A. In 2008, when inlet realignment was the HOA's preferred alternative, Tom Jarrett emailed the following model results to the Corps.

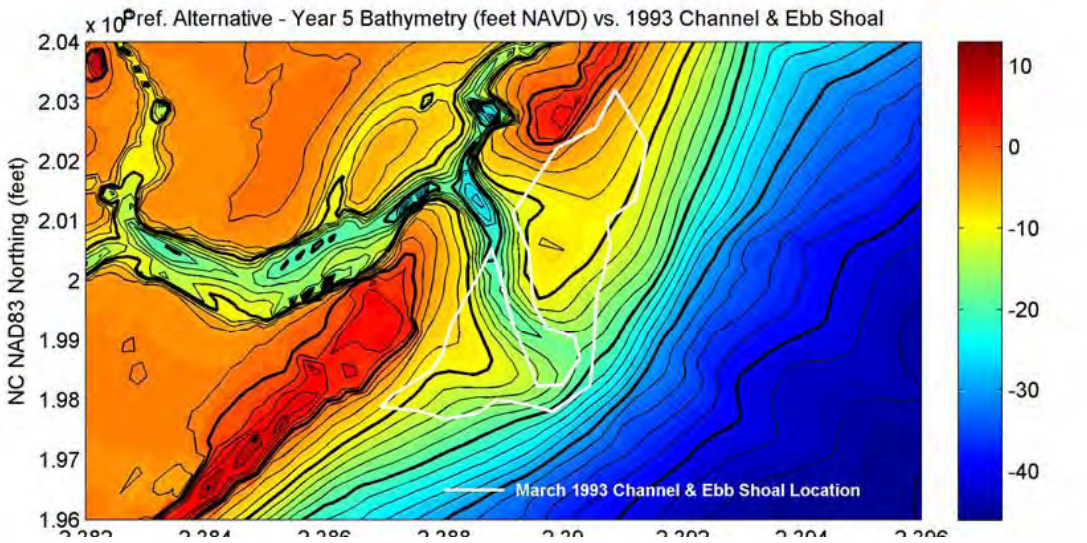


Figure 6. Inlet Realignment – Year 5 2008 Results

As described in Mr. Jarrett's email, the model showed the "predicted inlet reconfiguration after 5-years," which coincided almost perfectly with "[t]he white outline . . . which is basically the target configuration associated with the channel realignment."[22] If anything, the inlet was better positioned than the "target" with respect to promoting accretion on Figure Eight Island.

[18] Id.
[19] DEIS Appendix B, Subpart B at 98.
[20] Id.
[21] Id.
[22] Email from Tom Jarrett to Mickey Sugg (Sept. 9, 2008).

In the DEIS, which lists the HOA's preferred alternative as the terminal groin, the same model has significantly different results with respect to inlet realignment.

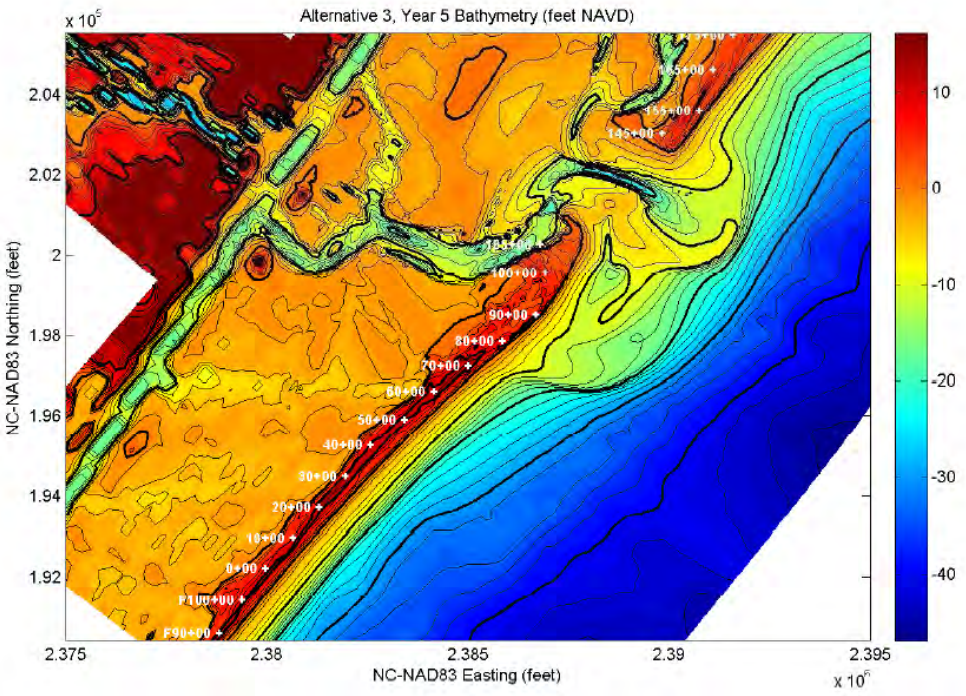


Figure 7. Inlet Realignment – Year 5 DEIS Results

No explanation for the significant variation in the model's results is given in the DEIS. Data collection to support the model appears to have ended 2007, however, and therefore the results should not have varied between 2008 and 2012. This suggests that model was manipulated and the discrepancy between these two model runs must be explained.

B. The DEIS Excludes Cumulative Impacts from Other Terminal Groin Projects.

The Corps has an obligation to evaluate cumulative impacts in addition to the direct and indirect impacts of the alternatives in the DEIS. Here, the agency failed to evaluate what may be the most important cumulative impact – the construction of other terminal groins in North Carolina. As Corps staff stated during one of the PDT meetings, "the biggest concern with the terminal groin alternative includes a hard structure on the beach and this could potentially open the door for other structures at other locations."[23] Despite this concern, the DEIS does not address the cumulative effects of "other structures at other locations."

NEPA requires that analysis. Regulations define cumulative impacts to include "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions . . . ." 40 C.F.R. § 1508.7. Courts have mandated that the analysis of those impacts and that "[c]onclusory statements that

[23] DEIS Appendix A, Meeting Minutes at 5 (May 20, 2009).

the indirect and cumulative effects will be minimal or that such effects are inevitable are insufficient under NEPA." N.C. Wildlife Fed'n, 677 F.3d at 602 (citing Ctr. for Biological Diversity v. United States DOI, 623 F.3d 633, 642-43 (9th Cir. 2010); Davis v. Mineta, 302 F.3d 1104, 1122-23 (10th Cir. 2002).)

In this circumstance, the cumulative impact of "other structures at other locations" is significant. As the piping plover recovery plan states, hardened structures were a primary contributor to the species current status. The DEIS acknowledges that the terminal groin would eliminate key piping plover habitat – destroying primary constituent elements. Loss of that crucial habitat has already been observed at Masonboro Inlet, where hardened structures have been in place for decades.

It is our understanding that at least three other beach communities have been in touch with federal or state agencies, including the Corps, about constructing terminal groins. The Corps must evaluate the cumulative impacts of these proposed groins as well as the potential for other groins at similar inlets in North Carolina.

C. The Economic Analysis is Fundamentally Flawed.

The assessment of economic impacts of the various alternatives in the DEIS is vague, inaccurate, and incomplete. The flaws are so numerous the DEIS must be supplemented to allow public review and comment on an economic analysis of alternatives that is based on accurate information and the full range of economic considerations necessary to evaluate the alternatives. In addition, the Corps must make clear that potential benefits or avoided costs cannot be the basis for the LEDPA determination, that only the cost of developing the alternative can be considered. The basic flaws in the economic analysis are outlined below.

The DEIS bases its assessments of economic impacts on tax value, but grossly and erroneously overstates the tax value of properties "threatened" by movements of Rich Inlet. The DEIS claims the value of the "27 oceanfront parcels located on Surf Court, Comber Road, and Inlet Hook Road – the area directly impacted by the changes in Rich Inlet – have a total tax value of $48.4 million." DEIS at 22. First, the properties on Surf Court should be excluded from this total. These properties are not located on the "bump" or imminently threatened as are the properties on Comber Road and Inlet Hook Road. The imminently threatened properties are the sandbagged properties on Comber Road and Inlet Hook Road identified in DEIS Figure 2.6.

Second, the DEIS erroneously states the tax value of the "threatened" structures. DEIS Table 2.2 presents a "total value" of the "threatened structures" of $23,760,425. The actual tax value based on New Hanover County tax records examined on July 9, 2012 is approximately one-half the claimed tax value in the DEIS or $12,402,700. The actual tax values of the "threatened properties" are presented in Table 1 below and the New Hanover County tax records are attached.

Address of Sandbagged Properties	Land Value	Structures Value	Total Value
5 Comber	$328,100	$379,400	$707,500
6 Comber	$322,900	$490,400	$813,300
7 Comber	$44,500	$0	$44,500
8 Comber	$287,000	$302,000	$589,000
9 Comber	$317,300	$269,800	$587,100
10 Comber	$334,500	$348,200	$682,700
11 Comber	$336,200	$402,100	$738,300
12 Comber	$346,400	$330,100	$676,500
14 Comber	$340,100	$315,400	$655,500
15 Comber	$336,100	$227,400	$563,500
16 Comber	$296,000	$349,500	$645,500
17 Comber	$323,000	$197,300	$520,300
3 Inlet Hook	$341,900	$240,100	$582,000
4 Inlet Hook	$340,200	$349,900	$690,100
5 Inlet Hook	$347,100	$353,800	$700,900
6 Inlet Hook	$362,100	$346,900	$709,000
7 Inlet Hook	$429,800	$289,000	$718,800
8 Inlet Hook	$488,400	$245,000	$733,400
544 Beach Road North	$701,600	$343,200	$1,044,800
TOTAL	**$6,623,200**	**$5,779,500**	**$12,402,700**

Table 1. July 2012 Tax Values of Imminently Threatened Properties.

Third, the DEIS fails to assess and include the decrease in value of at least 13"non-threatened" properties on the ocean-inlet side of the north end of Beach Road North that will result from construction of a terminal groin. A terminal groin in front of these properties will both take parts of these properties and fundamentally change the property from direct frontage and access to ocean-inlet beach to a walled frontage on a groin. Figure Eight Island tax values place a premium on beach or water frontage, with lots having such frontage valued substantially more than interior lots lacking direct frontage and access. The DEIS completely fails to consider the substantial decrease in tax value to the properties that would front a groin in assessing economic impact. The properties affected by construction of the groin are depicted in Figure 1. The current tax values of these properties are presented below in Table 2. As discussed by Dr. Wakeman in his comments submitted in a separate letter, an economic assessment of a proposed terminal groin must consider the decrease in value of the truncated properties.

Address of Properties Fronting Groin	Land Value	Structures Value	Total Value
542 Beach Road North	$46,200	$0	$46,200
540 Beach Road North	$721,800	$803,100	$1,524,900
538 Beach Road North	$696,800	$788,600	$1,485,400
536 Beach Road North	$661,600	$0	$661,600
534 Beach Road North	$662,400	$692,100	$1,354,500
532 Beach Road North	$673,800	$757,700	$1,431,500
530 Beach Road North	$683,800	$429,200	$1,113,000
528 Beach Road North	$700,800	$766,600	$1,467,400
526 Beach Road North	$685,500	$706,800	$1,392,300
524 Beach Road North	$697,800	$285,400	$983,200
522 Beach Road North	$688,900	$1,536,700	$2,225,600
520 Beach Road North	$705,700	$1,059,800	$1,765,500
518 Beach Road North	$766,100	$0	$766,100
TOTAL	**$8,391,200**	**$7,826,000**	**$16,217,200**

Table 2. July 2012 Tax Values of Properties Fronting Proposed Terminal Groin.

Fourth, in assessing economic impacts, the DEIS fails to consider the enhanced value of the interior lots that would become lots fronting the ocean if the existing " threatened" structures are removed or relocated. As noted above, tax values on the island place a premium on ocean or water frontage. If the current threatened structures are removed or relocated, this premium would be transferred to the "second row" properties. The July 9, 2012 assessed tax values and enhanced values are summarized in Table 3.

Address of "Second Row" Properties	Land Value	Structures Value	Total Value
1 Inlet Hook	$481,400	$263,200	$744,600
2 Inlet Hook	$458,300	$0	$458,300
9 Inlet Hook	$761,800	$529,300	$1,291,100
10 Inlet Hook	$801,400	$0	$801,400
1 Comber	$458,400	$338,300	$796,700
2 Comber	$460,700	$871,200	$1,331,900
3 Comber	$458,500	$1,451,900	$1,910,400
18 Comber	$458,700	$351,700	$810,400
19 Comber	$457,800	$313,800	$771,600
20 Comber	$454,000	$385,200	$839,200
21 Comber	$454,800	$1,044,600	$1,499,400
22 Comber	$455,400	$670,600	$1,126,000
23 Comber	$458,600	$909,000	$1,367,600
24 Comber	$454,700	$0	$454,700
25 Comber	$487,100	$743,000	$1,230,100
TOTAL	**$7,561,600**	**$7,871,800**	**$15,433,400**

Table 3. July 2012 Tax Values of "Second Row" Properties

Fifth, the economic analysis fails to consider the enhanced value to existing lots if "threatened" structures are moved to those lots. The DEIS states there are 93 vacant lots on Figure Eight Island. DEIS p. 223. It then understates the potential to relocate structures by stating only 16 lots are currently listed for sale (excluding those that may be for sale but not listed) and overstates the number of threatened structures that require relocation at 40 by unjustifiably adding "structures that may become imminently threatened over the next thirty years" to the 17 structures constructed on the "bump" and "imminently threatened." All but one of the 17 "imminently threatened" structures could be relocated to the 16 lots identified as listed for sale, and the remaining one structure could likely be relocated to one of the remaining 77 lots on the island. The enhanced value of the relocated properties must then be reflected in the assessment of the economic impacts of Alternative 2.

If accurate and complete economic information and analysis are used, Alternative 2 Retreat/Relocate is likely to emerge as the economically preferred alternative. Since it is also the least environmentally damaging practicable alternative it is the only alternative that can be permitted. Because the economic analysis in the DEIS is so fundamentally inaccurate and incomplete, a supplemental DEIS must be prepared to provide the public the opportunity to comment on an analysis of the economic impacts of alternatives based on accurate and complete information. "Agencies shall insure the professional integrity … of the discussion and analyses in environmental impact statements." 40 C.F.R. § 1502.24.

D. DEIS Fails to Account for Realistic Sea Level Rise Projections.

The effect of sea level rise is critical to evaluating the long-term viability and effects of each of the proposed alternatives. Inexplicably, the DEIS relies on a straight-line estimate that does not reflect current scientific understanding, Corps policy, or the best estimates by North Carolina scientists.

Based in large part on the Intergovernmental Panel on Climate Change, last year the Corps released a circular to provide guidance on how the agency should take into account the effects of sea level rise on coastal projects. As stated in the circular, "[p]otential relative sea-level change must be considered in every USACE coastal activity as far inland as the extent of estimated tidal influence."[24] In that consideration, the circular recommends preparing multiple scenarios to account for potential ranges in sea level rise.[25] A multi-pronged approach is necessary to "improve the overall life-cycle performance" of the selected alternative.[26] Among the specific effect of sea-level change that the Corps's supporting materials highlight are "changes in shoreline erosion, inundation or exposure of low-lying coastal areas, changes in storm and flood damage, [and] shifts in extent and distribution of wetlands and other coastal habitats."[27] The DEIS touches on each of these areas to some degree, but fails to do so in a way that meaningfully addresses the potential effect of sea level rise.

To perform a meaningful analysis, the Corps circular states that the agency's analysis "shall include, as a minimum, a low rate which shall be based on an extrapolation on the historical tide gauge rate, and intermediate and high rates, which include future acceleration of [global mean sea level."[28] But the DEIS failed to do anything more than state the "low rate" and move on.

The error in doing so is particularly clear on the North Carolina coast, an area particularly vulnerable to accelerated sea level rise. The Coastal Resources Commission's Science Panel estimated several scenarios of potential sea level rise, including a minimum of 15 inches by 2100.[29] The panel noted, however, that "various models and observations indicate that accelerated rates of [sea level rise] in the future are likely."[30] Based on their review of peer-reviewed literature, the Science Panel recommended using 1 meter of sea level rise for planning purposes in North Carolina after finding that accelerated sea level rise is "likely."[31]

But despite acknowledging this broad consensus that accelerated sea level rise is expected, the DEIS does nothing to evaluate the effect of sea level rise on each of the

---

[24] U.S. Army Corp of Engineers, Sea-Level Change Considerations for Civil Works Program, EC 1165-2-212, Circular No. 1165-2-212, 1 (October 1, 2011).
[25] Id. at 2.
[26] Id. at 3.
[27] Id. at B-1.
[28] Id. at B-10.
[29] N.C. Coastal Resources Commission Science Panel on Coastal Hazards, North Carolina Sea-Level Rise Assessment Report, 10 (March 2010).
[30] Id.
[31] Id. at 12.

alternatives. Instead, it summarily states that "[n]o direct or indirect impacts are expected to occur as a result of sea level rise for any of the projects." DEIS at 194. The DEIS then states that "unmanaged areas of the dry beach and dune communities may become more vulnerable to erosion" as a result of sea level rise, but cursorily dismisses that threat because the alternatives "may help protect" those area. Id. This unsupported conjecture cannot constitute the "hard look" required by NEPA. Moreover, the analysis cannot be saved by the DEIS's one-sentence "analysis" of the effect of historic rates of sea level rise on Wrightsville Beach and Carolina Beach nourishment projects.

In short, the DEIS's analysis of sea level rise and its effect on the alternatives is useless. It hardly constitutes a look, much less the "hard look" required by NEPA. It omits anything more than a canned summary of estimates of accelerated sea level rise and provides no analysis of how sea level rise of any degree would affect the project. An agency decision is arbitrary and capricious under NEPA if, as with accelerated sea level rise, the agency "entirely failed to consider an important aspect of the problem." Hughes River Watershed Conservancy v. Johnson, 165 F.3d 283, 287-288 (4th Cir. 1999)

E. The Purpose and Need Is Specific and Restrictive.

The purpose and need statement is an essential guide to the EIS. It "shall briefly specify the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action." 40 C.F.R. § 1502.13. The purpose and need in this EIS misses that mark.

The EIS fails to identify a single purpose and need, instead opting for eight. Those eight purpose and needs cover a broad range of issues with a degree of specificity that ensures confusion. As discussed below, the EIS's analysis of alternatives reveals that confusion, with several alternatives being dismissed without legitimate reasons. As a result, the purpose and need statement derails the alternatives analysis, which "must focus on the accomplishment of the underlying purpose and need," but cannot do so because of the unnecessary detail.

F. The Analysis of Each Alternative is Flawed.

1. The DEIS analysis of Alternative 1 fails to account for current conditions, overstates costs, and is incomplete.

a. Alternative 1 is not the No Action Alternative.

Alternative 1 is mislabeled as the No Action alternative. As stated in NEPA regulations, the No Action Alternative is one that "results in no construction requiring a Corps permit." 33 C.F.R. Part 235, Appendix B, Sec. 9.b(5)(b). Alternative 1 requires long-term dredging in Rich Inlet and requires a Corps Permit. Any future dredging requires either the existing modified permit, a new modified permit, or a new permit.

b. The analysis of Alternative 1 fails to account for current conditions.

The EIS's analysis of Alternative 1 is fundamentally undercut by its reliance on dated information and exclusion of up-to-date observations about the condition of the beach and the position of the inlet. The DEIS analysis directly depends on "[c]ontinuation of the present rate of shoreline recession on the extreme north end of Figure Eight Island" as the basis for its analysis. DEIS at 26. Moreover, it relies on the assumption that existing sandbag structures would "either fail or be removed" within five years. DEIS at 26.

Neither of those assumptions are valid. The inlet appears to be reorienting towards Figure Eight Island. As depicted in the photograph on page 18, the channel is no longer aligned in the northeasterly direction that contributed to the "present rate of shoreline recession" at Figure Eight, and therefore the pre-2007 erosion rate is not a legitimate basis for future predictions. As is expected, the natural reorientation has discontinued the pre-2007 erosion rate and has, in fact, caused accretion on the beach fronting the sandbagged houses on Inlet Hook Road and Combers Road. Not only have those sandbags held and remained, additional houses have not been threatened.

These changes in existing conditions are crucial for the evaluation of Alternative 1 and undermine the EIS's conclusion that "[u]nder Alternative 1, the shorelines on both islands would be expected to continue to behave as they have in the past." DEIS at 168. The change in erosion rates will fundamentally change the effect of beach nourishment projects, extending the longevity of the projects and reducing frequency and scope of the projects, thereby reducing costs. The supplement to the DEIS must reevaluate Alternative 1 in light of changed baseline conditions.

c. The Alternative 1 cost analysis dramatically overstates costs.

The cost analysis of Alternative 1 is drastically overstated. The inflated costs have multiple sources. First, the analysis expands the group of threatened structures far beyond those that are actually threatened or can reasonably be expected to be threatened. The DEIS ominously threatens that "present rate of shoreline recession" will result in erosion that threatens 21 houses not currently sandbagged. DEIS at 26. In addition to providing no evidence that the "present rate of shoreline recession" will continue, the DEIS provides no data to show that these properties are or have ever been threatened by erosion. The notion that these properties will be threatened is pure conjecture and is unsubstantiated by any historical or predictive analysis. Moreover, it is arbitrary and capricious because it "runs counter to the evidence before the agency." Hughes River Watershed Conservancy, 165 F.3d at 287-288.

Trimming the 21 houses that have no documented, foreseeable threat shrinks the cost of Alternative 1. Further, updating the value of actually threatened houses and adding in the lost value for those properties that would be bisected by the terminal groin, the overall change in property value under Alternative 1 is significantly reduced from the $25.7 million for lost structures and $57.9 million for lost land estimated in the DEIS. Based on the analysis above, the value of lost structures and land is approximately $12.4 million instead of $83.6 million. In

addition, the avoided property loss from those properties that would be fronted by the groin could be significant, and we should expect some increase in value for newly oceanfront lots, meaning the overall loss in property value under Alternative 1 would be much less than estimated. Further, with the current orientation of the inlet, the frequency of beach nourishment will be reduced, decreasing the projected $27.5 million estimated for beach nourishment.

Taking these factors into account, Alternative 1's actual estimated cost will be much lower than the inflated figure in the DEIS. And even that number is likely excessive because it assumes that owners of threatened houses would choose to destroy the houses rather than relocate them to interior or sound-side properties.

d. Failure to model Alternative 1 is arbitrary and capricious.

Although we do not believe the modeling that supports the EIS analysis is valid, the Corps relied on it for the purpose of comparing alternatives. Therefore, it is remarkable that Alternative 1 was not modeled. The DEIS states that "[t]he Delft3d model was not specifically run under Alternative 1 conditions" and that the Corps relied on "results derived from Alternative 2" instead. DEIS at 168. Given that Alternative 1 would include continuation of current beach management activities and Alternative 2 would completely abandon those activities, it is unclear how modeling for Alternative 2 could predict the effect of a fundamentally different Alternative 1. The DEIS does not provide any explanation why the results from Alternative 2 are an appropriate "proxy for Alternative 1." DEIS at 168.

e. Alternative 1 meets the purpose and need.

Alternative 1 meets the purpose and needs listed for this project and is practicable. Alternative 1 reduces erosion along the targeted area. It has provided protection over the last five years and will provide protection into the future – protection that is enhanced by the inlet's natural realignment. It provides compatible beach sand while maintaining navigation in Rich Inlet and allowing continued recreation on the northern spit. Finally, it provides better balance between human activities and natural resources than either of the groin alternatives by allowing the continued development of quality wildlife habitat on the northern spit.

2. The DEIS analysis of Alternative 2 fails to account for current conditions and overestimates costs.

The DEIS analysis of Alternative 2 suffers from the same flaws as the analysis of Alternative 1. It fails to account for existing conditions. That omission has been discussed in detail above, and we will not repeat it here. Similarly, making the same adjustments to the inflated economic analysis reveals that Alternative 2's actual cost would be much lower and clearly practicable.

Unlike Alternative 1, the Delft3D model was run for Alternative 2. The model results, however, are entirely inaccurate when compared with current conditions (which align with year 5 in the model). As discussed above, the model results for Alternative 2 demonstrate the futility in relying on the model to predict environmental impacts or geological changes.

3. The DEIS analysis of Alternative 3 fails to account for current conditions, overestimates costs, is contradicted by previous modeling, and excludes feasible alternatives that meet the purpose and need.

The DEIS's analysis of Alternative 3 is also flawed. Like each of the alternatives, it fails to consider the change in baseline conditions since 2007. As recent imagery has shown, the inlet has shifted in such a way that the erosion on Figure Eight Island has diminished and the beach is widening. For Alternative 3, the natural realignment has significant impacts.

First, it affects the costs associated with realignment and beach nourishment. As the inlet has shifted closer to the HOA's desired location, the amount of realignment necessary to further relocate the inlet and build a dike across the, now partially closed, 2007 inlet. Further, the accretion observed on the north end of Figure Eight means that less sand may be required under the alternative and it may last longer. Finally, because the inlet appears to be re-orienting towards Figure Eight naturally, there is no basis for concluding that it will relocate to its 2007 position every five years.

Even under the model, it is not clear that there is any legitimate basis for estimating that the inlet relocation would require repeat relocations every five years. In 2008, when inlet relocation was the HOA's preferred alternative, the model showed that the inlet would be in the "ideal" location after five years. The results of that modeling run, which are included in Appendix A of the DEIS, are shown below.

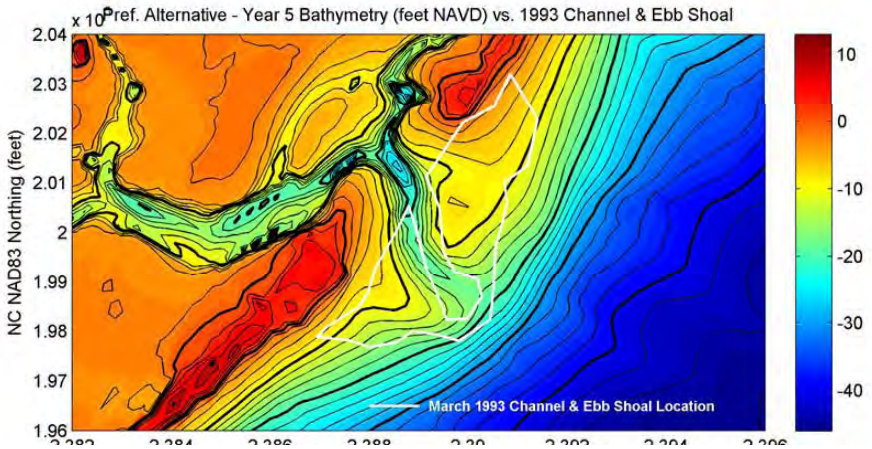


Figure 8. Inlet Realignment – Year 5 2008 Results

As explained by the email accompanying these results, the results show "the predicted inlet reconfiguration after 5-years [sic] following the channel realignment," in which the inlet almost exactly matches the "target configuration" noted by the white outline.[32] Under these results there does not appear to be any approaching need for a second realignment, reducing the overall cost of the project over a 30-year period.

[32] Email from Tom Jarrett to Mickey Sugg (Sept. 9, 2008).

These results conflict with the results included in the DEIS for Alternative 3. In the DEIS, the inlet takes a sudden shift in year 5, returning to the 2007 inlet position. Given the current position of the inlet and the previous modeling results, the estimate does not appear to have any validity.

Moreover, the thresholds relied upon to evaluate Alternative 3 are not supported in the DEIS. The DEIS identifies two thresholds – 60% shoaling of the initial construction volume and location of 50% of the thalweg outside of the initial construction corridor – but does not explain the process for selecting these thresholds or describe why they are appropriate. The DEIS does not identify which purpose and needs would not be fulfilled if one or both thresholds are exceeded and does not assess the effect of exceeding either threshold on erosion rates. In addition, the description of the action to be taken if a threshold is exceeded – namely evaluate maintenance needs – is not consistent with the assumption that the channel will be relocated every five years.

Relocating the channel every five years is also inconsistent with the inlet's history. Dr. Cleary analyzed the inlet's movement from 1938 to 2007. Although the inlet did move during that period, nothing in the record supports the repeated, rapid movement suggested by the model. Critically, neither did Dr. Cleary when preparing his report in support of the inlet realignment during the early stages of this project. At that time, Dr. Cleary determined that "[t]he relocation effort would ultimately lead to a reconfiguration of the barrier's planform along the northern end of F8I and an eventual cessation of the chronic erosion."[33] The report does not anticipate the need to consistently realign the channel, but rather suggests that relocation should provide permanent erosion control. Even more emphatically, the report states that relocation "will reverse the erosion trend that has characterized the oceanfront since the late 1990s."[34] Indeed, the report even notes that historical patterns suggest that erosion on Figure Eight is a less common inlet alignment, stating that "net progradation has characterized the past seven decades of oceanfront shoreline change."[35] In fact, Cleary suggests that mechanical realignment will only act to hasten natural realignment, stating that "[g]iven sufficient time natural progradation will again occur along the Figure Eight island oceanfront."[36]

Dr. Cleary's report obliterates any validity the Delft3D model had with respect to Alternative 3. He stated that natural relocation of the channel would cause accretion on Figure Eight. The channel appears to be moving and it is, in fact, causing accretion. Directly contradicting the model, he predicted that relocation would be a long-term corrective action for Figure Eight. And finally, nothing in his 59-page report suggests that the realigned inlet would relocate to the 2007 location within 5 years. Notably, his prediction is in line with the 5-year model results that Tom Jarrett forwarded to the Corps in 2008.

The Corps must reevaluate Alternative 3 based on the shortcomings described above. During that analysis, the Corps must consider options for Alternative 3 that were prematurely discarded in the DEIS. Specifically, the Corps must reevaluate options that were excluded for

[33] DEIS Appendix B, Subpart A at 2.
[34] Id. at 53.
[35] Id. at 56.
[36] Id. at 59.

reasons that do not appear to have anything to do with meeting the purpose and need. Alternative 3, Option 1 was excluded because of a potential loss of a connection to Green Channel.[37] Similarly, Alternative 3, Option 3 was excluded because it did not include a connection from the main channel to Green Channel. DEIS at 161. Notably, a direct connection to Green Channel is not included in any of the eight purpose and need statements. The purpose and need does include maintaining navigation to Nixon Channel, which both options 1 and 3 do. Therefore, the decision to eliminate these alternatives was arbitrary and capricious.

Options 4A and 4B for Alternative 3 were similarly eliminated based on the potential effect on the connection to Green Channel and a vague statement regarding potential erosion of salt marsh. Neither warrants dismissal of these options without detailed review. As already mentioned, no alternative can be eliminated based on the connection to Green Channel. As for the potential impact to salt marsh, the entire purpose of the EIS is to evaluate the environmental impacts of various alternatives. If only alternatives without environmental impacts were carried forward, only Alternative 2 would survive. Each of the others have environmental impacts that must be weighed in the EIS.

The Corps must also consider options to Alternative 3 that vary nourishment levels. The Engineering Report purported to do so, but ensured two of the options would fail. Of the three options considered in the Engineering Report, two excluded any fill on Nixon Channel[38] despite the Nixon Channel shoreline being one of the focal points of the overall project. See DEIS at 15. It is no surprise, therefore, that the Engineering Report – and as a result the DEIS – dismiss the options that omit Nixon Channel shoreline from the nourishment project.[39] They were designed to be dismissed, leaving only the most extensive and expensive option.

The third nourishment option included nourishment all the way from the inlet to the intersection of Beach Road and Beachbay Lane.[40] Requiring such extensive nourishment increases both costs and environmental impact and does so with no apparent purpose. Much of the area that would receive sand is not imminently threatened or projected to be threatened in the near future. Even the Engineering Report's modeling showed that such extensive beach nourishment was unnecessary and that the erosion between F90 and 30 was insignificant.[41] A smaller nourishment project could provide the same benefits, or greater than the projected benefit given current accretion, at much less cost and with much less environmental impact. The DEIS's failure to evaluate such an alternative is inexplicable given that it is exactly what was done with the preferred alternative. Alternative 5B is described as a version of 5A that involves less nourishment. It is, therefore, cheaper (though still carries the substantial environment effects due to the permanently hardened structure and lost habitat). The DEIS must evaluate a similar option for Alternative 3.

[37] We note that the loss was predicted by the Delft3D model, which appears, based on current conditions, to have no predictive value.
[38] DEIS Appendix B, Subpart B at 59.
[39] DEIS Appendix B, Subpart B at 65.
[40] DEIS Appendix B, Subpart B at 59.
[41] DEIS Appendix B, Subpart B at 162.

4. The DEIS analysis of Alternative 4 fails to account for current conditions.

Like each of the previous alternatives, the DEIS analysis of Alternative 4 fails is undercut by the DEIS's reliance on stale data and the Delft3D modeling. Alternative 4 should be reevaluated based on the current alignment of the inlet and current accretion rates.

5. The DEIS analysis of Alternative 5 demonstrates that both alternatives fail to meet the purpose and need and underestimates costs associated with the groins.

The terminal groin options are the only alternatives in the EIS that clearly violate the purpose and need statements. Both proposals eliminate the spit on the northern end of Figure Eight Island, causing significant damage to shorebird habitat and eliminating a popular recreational resource. Further, both terminal groin proposals would devalue the properties at the end of the island by replacing their beach with a rubble or sheet pile wall.

The environmental impacts of the terminal groin alternatives are discussed more fully above and will not be repeated here. We do, however, point out that one of the purpose and need statements for the shoreline protection project is to "[b]alance the needs of the human environment with the protection of existing natural resources." DEIS at 15. There is no balance in either terminal groin alternative. Each would eliminate the existing spit, destroying habitat and overwash areas. The environmental benefits of those areas would be entirely lost. Therefore, neither alternative meets the purpose and need to balance human needs and the protection of natural resources.

For the same reason – elimination of the spit – the terminal groin alternatives fail to meet the purpose and need of "[m]aintain[ing] existing recreational resources." DEIS at 15. As acknowledged in the DEIS, the spit that will be eliminated is a popular recreational resource. Even if sand covers the groin, the recreational resource will be permanently lost under either groin alternative.

Likewise, the groins fail to "[m]aintain the tax value of the homes and infrastructure on Figure Eight Island." DEIS at 15. As discussed in more detail above, both groin alternatives would require 15 properties to trade their beachfront for rock rubble or steel sheet pile. As a result, those properties are certain to decline in value.

In addition, the preferred alternative does not even appear to provide the erosion protection described in the purpose and need. One of the purpose and need statements documented that the project was to "[r]educe or mitigate erosion along 3.77km (2.34 mi) of Figure Eight Island oceanfront shoreline south of Rich Inlet . . . ." DEIS at 15. Yet the DEIS did not model Alternative 5B in the Delft3D model and does not provide any other means of evaluating its erosion control potential apart. The DEIS summarily states that "[t]he projected performance of the beach fill for Alternative 5B was based on the volume of initial beach fill retained . . . by the results of the Delft3D simulation for Alternative 5A." DEIS at 285. The document does not provide any explanation as to why reliance on 5A results is appropriate or

why the smaller beach fill would function similarly to that of 5A. Such unsupported conclusions cannot be considered a "hard look" at the alternative.

Finally, the cost estimates for both groin estimates are understated. First, the cost of acquiring the property rights to build the groin across the 15 oceanfront lots is entirely excluded. Given the expected loss of value of those lots, there may be significant costs associated with acquiring those rights if those rights can be acquired at all. Second, the estimates appear to be low, and no explanation is given for the discrepancy between costs estimated in the Coastal Resources Commission's Terminal Groin Study and the estimated costs. The Terminal Groin Study found that rubble mound costs ranged from $1,230-5,180 per linear foot in the studied groins and estimated that a 1,500 foot rock rubble groin would cost at least $3,090 per linear foot in North Carolina. Similarly, the study found that sheet pile cost from $4,000 to 4,800 per linear foot in studied cases and estimated that a 1,500 foot sheet pile would cost $4,300 per linear foot. Although the preferred alternative is a hybrid of these two approaches, the DEIS must explain why projected costs are significantly lower than other studied projects and the recently estimated cost.

In addition to underestimating construction costs, the DEIS appears to underestimate maintenance costs. The CRC Terminal Groin Study estimated that annual maintenance and monitoring for a 1,500 ft groin would total $2,250,000 per year. The Engineering Report does not include any estimates for maintenance of the groin and only estimates $1,821,000 in nourishment costs every 5 years.[42] These discrepancies must be explained.

III. THE DEIS DOES NOT MEET THE REQUIREMENTS OF STATE LAW REGARDING TERMINAL GROINS.

As the DEIS recognizes, the change in state law that allowed the HOA to tack on the terminal groin alternatives also imposed certain requirements for any terminal groin proposal. For the reasons stated below, the information in the DEIS fails to meet those requirements.

A. Non-structural Alternatives Are Practical.

Before the Corps can issue a permit for a terminal groin for Rich Inlet, the HOA must demonstrate that "nonstructural approaches to erosion control, including relocation of threatened structures, are impractical." N.C. Gen. Stat. § 113A-115.1(f)(2). Here, each of the non-structural approaches are practical. Therefore, the Corps cannot issue a permit for the preferred alternative or any groin alternative.

B. The Construction of the Groin Will Result in Significant Adverse Impacts to Public Recreational Beach.

The HOA must also demonstrate that its proposed terminal groin will not "result in significant impacts to private property or to the public recreational beach." N.C. Gen. Stat. § 113A-115.1(f)(4). The DEIS's terminal groin alternatives will do both. It will eliminate the beachfront access of properties on the northern end of the island, causing both a loss of private

[42] DEIS Appendix B, Subpart B at 206.

property and a decline in property value. Further, the groin will permanently eliminate the public recreational beach. These impacts to private property and public recreational beach are significant by any definition, and therefore preclude permitting the groin alternatives.

C. The Shoreline Management Plan is Outdated and Relies on Inaccurate Assumptions.

The HOA must provide a shoreline management plan before any permit can be issued for any terminal groin project (assuming it could be issued under the ESA or CWA). The Shoreline Management Plan proffered in the DEIS suffers from the same shortcomings as the remainder of the DEIS – it relies on erosion and shoreline information from 2007. That information is outdated and contradicted by current conditions. The Shoreline Management Plan heavily relies on the erosion caused by a channel orientation that is no longer representative of Rich Inlet. Truncating the analysis in 2007 gives greater weight to the time period from 1996 to 2007, an isolated segment of time during which there was erosion, but nothing in the DEIS suggests that that time period is typical for the inlet long term.

Indeed, the DEIS contradicts that position. As Dr. Cleary's report in Appendix B states, "net progradation has characterized the past seven decades of oceanfront shoreline change."[43] The analysis of shoreline changes in Table 6.2 demonstrates that even at transects 16-19, the long-term erosion rate is a mild -1.1 ft/yr. It is only by excluding the periods of accretion before 1974 that the analysis results in a more significant -16.8 ft/yr. The late 1990s and early 2000s were clearly a period of erosion for the island, but do not typify the long-term erosion patterns for the inlet and cannot be used as the basis for the Shoreline Management Plan. The purpose of emphasizing this time period is transparent, but short periods of erosion that do not reflect the long-term movement of the inlet should not be relied upon to justify permanently altering the inlet system.

The response trigger is inadequate because it relies on the artificially constrained time period of 1974-2007. The use of this time period is inappropriate because it fails to approximate the long-term nature of the island, instead emphasizing a period of greater erosion rates. Setting the threshold of harm caused by the groin based on this truncated time period fails to provide adequate protection or an effective baseline for monitoring.

The proposal for a two year monitoring plan is unreasonable. The terminal groin alternatives would fundamentally alter the nature of the inlet. There is no basis for assuming that the inlet would return to some level of stasis within two years of that dramatic alteration. The DEIS provides no support for the selection of a two year period.

Mitigation measures are ill-defined and unprotective. First, the mitigation plan is necessarily inadequate because it is based on response triggers that assume significant erosion. Second, the mitigation plan fails to describe the quantity of sand available in Nixon Channel, what metrics would be used to determine whether to access that sand or the dredge piles, or what the environmental impacts of those actions would be. In addition, the DEIS fails to describe what standards would be used to determine whether impacts cannot be mitigated.

[43] DEIS Appendix B, Subpart B at 56.

These failures in the Shoreline Management Plan described in the DEIS violate N.C. Gen. Stat. 113A-115.1 and provide an additional reason that the terminal groin alternatives cannot be lawfully permitted.

D. The DEIS Does Not Include Any Proof of Financial Assurance.

The HOA is required by state law to provide "[p]roof of financial assurance in the form of a bond, insurance policy, escrow account or other financial instrument" before any permit can be issued. N.C. Gen. Stat. § 113A-115.1(e)(6). The DEIS does not identify any financial assurance for the project or describe what proof the HOA intends to present.

IV. CONCLUSION

This DEIS cannot serve the purpose that it is intended to serve under NEPA. Before any further action on this project can take place, the HOA must demonstrate that they have the requisite property rights to carry their preferred alternative forward. That information is not only required by the Corps's regulations, it is essential to the analysis. Further, certain alternatives cannot be permitted and the focus of any future analysis should exclude those alternatives. Finally, if the HOA is able to demonstrate the necessary property rights required to move forward, the analysis in the DEIS must be updated, reassessed, and more clearly explained as described above.

We appreciate the opportunity to submit these comments and the extension of the comment deadline to allow a more-complete review of the DEIS. Please contact us at (919) 967-1450 if you have any questions regarding these comments.

Sincerely,

Derb S. Carter, Jr.
Senior Attorney/Director, Carolinas Office

Geoffrey R. Gisler
Staff Attorney

cc (via email):
Todd Miller, NCCF
Walker Golder, Audubon NC
Pete Benjamin, USFWS

Audubon NORTH CAROLINA
7741 Market Street, Unit D
Wilmington, North Carolina 20411
910-686-7527

July 20, 2012

Mr. Mickey Sugg
U.S. Army Corps of Engineers
69 Darlington Avenue
Wilmington, NC 28403

Re: Comments on the Draft Environmental Impact Statement for the project known as "Figure Eight Island Shoreline Management Project"

Dear Mr. Sugg:

These comments regarding the Draft Environmental Impact Statement (DEIS) for the project known as "Figure Eight Island Shoreline Management Project" are submitted by the National Audubon Society's North Carolina State Office.

The applicant has proposed as the preferred alternative to install a terminal groin on the northern end of Figure Eight Island at Rich Inlet and replenish approximately 2 miles of oceanfront beach and approximately 1,800 linear feet of back barrier shoreline with sand.

The National Audubon Society strongly opposes the preferred alternative and all other alternatives that include the construction of a terminal groin or similar hardened structures on the northern end of Figure Eight Island. In addition, we oppose the dredging or other removal of sand from Rich Inlet or the associated ebb and flood tidal deltas, and the channelization of the inlet. Such a project will have significant and lasting, direct negative impacts to birds and other wildlife that depend on the dynamism of mid-Atlantic coast inlets at critical points in their life cycles.

NEPA requires that agencies insure the professional and scientific integrity of environmental impact statements [40 C.F.R. 1502.24]. The DEIS fails to adequately describe the affected environment, fails to adequately assess the environmental consequences, fails to consider the scientific data that exists and is available, fails to consider the impacts to federal and state listed species and high-priority species, omits key state-listed species, fails to consider the impacts on habitats for shorebirds, waterbirds and other wildlife, ignores the pertinent recommendations of leading scientists, fails to objectively consider impacts and alternatives, inaccurately represents direct impacts, fails to consider indirect and cumulative impacts, presents dubious models based on old data that could not predict the present orientation of the inlet and are of questionable use in predicting the future orientation of the inlet in response to terminal groin construction and the proposed sand mining, and the DEIS contains an extraordinary number of factual errors and omissions.

Due to errors in statements of fact regarding the birds' use of Rich Inlet area and its failure to draw correct, logical conclusions from the data available, the DEIS does not adequately address the impacts to breeding, migrating, and wintering birds using Rich Inlet, Figure Eight Island and the project area. Some of these omissions are so systemic and egregious as to give the impression that the DEIS was drafted in

order to arrive at the conclusions desired by the applicant rather than to report the full and objective consideration of and impacts of reasonable alternatives. In its current state, the DEIS should not be accepted by the permitting agencies and returned for major corrections and revisions to address these crucial flaws.

Rich Inlet

Rich Inlet is one of the most stable inlets in North Carolina. The inlet has remained in the same general corridor of approximately 500 meters for the last century. It is one of the few stable inlets in North Carolina. This stability and the lack of perturbations of natural processes have resulted in Rich Inlet being very important to birds and other wildlife that depend on inlets.

In the southeastern United States, 54% of inlets have been significantly modified. The percentage of modified inlets in North Carolina is significantly higher, at 85%, which is one of the highest percentages of all southeastern states (Rice 2012a). The modification of inlets by sand mining, channelization, hardened structures, and dredging has a significant negative impact on species that require habitats associated with inlets, primarily shorebirds and waterbirds. The direct, indirect and cumulative impacts of inlet modifications in North Carolina and the southeastern United States are direct threats to populations of many species of shorebirds and waterbirds.

Alternatives

Six alternatives were presented in the DEIS. Two alternatives (5A and 5B) propose terminal groins that will permanently eliminate vital habitats for nesting, migrating and wintering birds, threatens state and federally-listed species, and jeopardizes fisheries. Two alternatives (1 and 3) propose sand mining in Rich Inlet that will directly and/or indirectly eliminate vital habitats for migrating and wintering birds, threatens nesting habitat for birds, and threatens state-and federally-listed species. One alternative (4) proposes mining sand from offshore and island sources without removing sand from the greater Rich Inlet area, Nixon Channel or Green Channel. The disposal of dredged sand as proposed by this alternative will eliminate vital foraging habitats for piping plovers, red knots and other shorebird species in the intertidal zone, the gently-sloping and low energy wet sand habitats, and the associated shoals on the northern end of Figure Eight Island and Nixon Channel. This alternative also eliminates important food and foraging habitat that supports shorebirds such as red knots and piping plovers (and others) at critical times in their life cycles. In addition, the turbidity associated with the disposal of dredged material on the north end Figure Eight Island will directly impact vital food resources for Piping Plovers, Red Knots, and other shorebirds.

Alternatives 1, 3, 4, 5A and 5B have significant negative and direct impacts on habitats that are important for federally-listed species, state-listed species and species proposed for federal listing under the Endangered Species Act. Of these, all alternatives that involve hardened structures, such as the construction of a terminal groin, the removal of sand from Rich Inlet by dredging or other means, or the disposal of sand on the northern end of Figure Eight Island (as proposed in Alternative 4) should be removed from consideration. Hardened structures, sand mining, channelization of inlets, and disposal of sand on vital foraging habitat for shorebirds are explicitly listed as threats to state and federally-listed species and designated critical habitats, and these actions will result in a significant loss of habitat for these species. These impacts cannot be mitigated for and will result in the permanent loss of vital habitats for birds and are direct threats to populations of shorebirds and waterbirds.

Alternative 2, the “Abandon/Retreat” alternative, is the only reasonable, lasting, and responsible alternative proposed in the DEIS.

Cost Estimates proposed in the Alternatives
The cost estimates proposed in the DEIS are questionable. For example, the implementation cost includes cost of land and structures when this is not an actual cost of the project. Additional and questionable cost estimates are also presented.

The cost estimates should be evaluated by an objective, third party expert with no past or present financial interest in Figure Eight Island, terminal groins, or hardened structures on barrier islands, dredging or sand mining, or any other financial relation to any proposed action included in this DEIS. It appears that no such evaluation has been completed.

Project Delivery Team
According to the US Army Corps of Engineers, the Project Delivery Team (PDT) is responsible for:

- Developing the project scope, while adhering to statutory, regulatory, and policy guidance
- Scoping, scheduling, and estimating their portions of the project accurately
- Discussing and committing to the quality and delivery expected for their respective products and services
- Discussing and committing to the key decision points included in the PMP
- Discussing and committing to a systematic approach to measure the progress, status, and quality of their respective products and services
- Committing to complete their portions of the work within the agreed to budget and schedule
- Performing quality work and meeting the public trust
- Providing all or some projects funds and certain products/services on some projects (Customer member of PDT)
- Sharing decision-making authority (Customer member of PDT)
- Providing input on project scope and schedule; may or may not have decision-making authority or provide funds and/or services (Stakeholder)

The PDT for this proposed action failed to involve stakeholders and/or selectively invited stakeholders to meetings of the PDT. Some were apparently excluded from meeting invitations. The PDT for this proposed project served little other purpose than to tolerate a repeated sales pitch for terminal groins from consultants and paid “experts.” This PDT did not constitute stakeholder participation and involvement in the process.

Impacts of Terminal Groins on Birds, Bird Habitats, other Wildlife and Fisheries
Throughout the southeastern U.S., the use of coastal areas by shorebirds, “is skewed towards use of inlet habitats versus other coastal habitats” (Harrington 2008). Species occurring in significantly higher numbers at inlets than other coastal areas include the Black-bellied Plover, Wilson’s Plover, Piping Plover, Snowy Plover, Red Knot, Ruddy Turnstone and Western Sandpiper; all but the Black-bellied Plover are species of high concern or highly imperiled (U.S. Shorebird Conservation Plan 2004), and all but the Snowy Plover are found at Rich Inlet.

Negative impacts to shorebirds would result from all of the proposed alternatives except Alternative 2. The alternatives that propose the installation of a terminal groin, dredging, sand mining, or the disposal of sand on intertidal habitats will result in the loss or significant degradation of intertidal flood shoals, emergent flood shoals, and sand-mud flats that have been designated part of the NC-11 Critical Habitat Unit for wintering Piping Plovers:

Unit NC–11: Topsail. 451 ha (1114 ac) in Pender County and Hanover County. The entire area is privately owned. This unit extends southwest from 1.0 km (0.65 mi) northeast of MLLW of New Topsail Inlet on Topsail Island to 0.53 m (0.33 mi) southwest of MLLW of Rich Inlet on Figure Eight Island. It includes both Rich Inlet and New Topsail Inlet and the former Old Topsail Inlet. All land, including emergent sandbars, from MLLW on Atlantic Ocean and sound side to where densely vegetated habitat, not used by the piping plover, begins and where the constituent elements no longer occur. In Topsail Sound, the unit stops as the entrance to tidal creeks become narrow and channelized (USFWS 2001).

According to the USFWS's wintering habitat assessment,

> *[t]he primary constituent elements essential for the conservation of wintering piping plovers are those habitat components that support foraging, roosting, and sheltering and the physical features necessary for maintaining the natural processes that support these habitat components. The primary constituent elements include intertidal beaches and flats (between annual low tide and annual high tide) and associated dune systems and flats above annual high tide. Important components of intertidal flats include sand and/or mud flats with no or very sparse emergent vegetation. In some cases, these flats may be covered or partially covered by a mat of blue-green algae. Adjacent non-or sparsely vegetated sand, mud, or algal flats above high tide are also important, especially for roosting piping plovers, and are primary constituent elements of piping plover wintering habitat* (USFWS 2001).

The stable beach created by the proposed terminal groin and fillet would vegetate rapidly, which would also impact additional important components of Piping Plover habitat:

> *sparsely vegetated backbeach and salterns (beach area above mean high tide seaward of the permanent dune line, or in cases where no dunes exist, seaward of a delineating feature such as a vegetation line, structure, or road), spits, and washover areas* (USFWS 2001).

The impacts of terminal groins and other actions associated with inlets are specifically addressed in the 5-year status review for Piping Plover, which was excluded from the DEIS. The other shorebird species found at Rich Inlet depend on the same habitats at critical times of their annual cycles and have similar energetic needs.

Piping Plover *(Charadrius melodus)* 5-Year Review: Summary and Evaluation:

Inlet stabilization/relocation

Many navigable mainland or barrier island tidal inlets along the Atlantic and Gulf of Mexico coasts are stabilized with jetties, groins, or by seawalls and/or adjacent industrial or residential development (see section WM 2.2.1.4 summary of studies documenting piping plover reliance on inlet habitats). Jetties are structures built perpendicular to the shoreline that extend through the entire nearshore zone and past the breaker zone (Hayes and Michel 2008) to prevent or decrease sand deposition in the channel. Inlet stabilization with rock jetties and associated channel dredging for navigation alter the dynamics of longshore sediment transport and affect the location and movement rate of barrier islands (Camfield and Holmes 1995), typically causing downdrift erosion. Sediment is then dredged and added back to islands which subsequently widen. Once the island becomes stabilized, vegetation encroaches on the bayside habitat, thereby diminishing and eventually destroying its value to piping plovers. Accelerated erosion may compound future habitat loss, depending on the

degree of sea-level rise. Unstabilized inlets naturally migrate, re-forming important habitat components, whereas jetties often trap sand and cause significant erosion of the downdrift shoreline. These combined actions affect the availability of piping plover habitat (Cohen et al. 2008).

Sand mining/dredging

Sand mining, the practice of extracting (dredging) sand from sand bars, shoals, and inlets in the nearshore zone, is a less expensive source of sand than obtaining sand from offshore shoals for beach nourishment. Sand bars and shoals are sand sources that move onshore over time and act as natural breakwaters. Inlet dredging reduces the formation of exposed ebb and flood tidal shoals considered to be primary or optimal piping plover roosting and foraging habitat. Removing these sand sources can alter depth contours and change wave refraction as well as cause localized erosion (Hayes and Michel 2008).

Exposed shoals and sandbars are also valuable to piping plovers, as they tend to receive less human recreational use (because they are only accessible by boat) and therefore provide relatively less disturbed habitats for birds. We do not have a good estimate of the amount of sand mining that occurs across the piping plover wintering range, nor do we have a good estimate of the number of inlet dredging projects that occur. This number is likely greater than the number of total jettied inlets shown in Table WM3, since most jettied inlets need maintenance dredging, but non-hardened inlets are often dredged as well.

Groins

Groins (structures made of concrete, rip rap, wood, or metal built perpendicular to the beach in order to trap sand) are typically found on developed beaches with severe erosion. Although groins can be individual structures, they are often clustered along the shoreline. Groins act as barriers to longshore sand transport and cause downdrift erosion, which prevents piping plover habitat creation by limiting sediment deposition and accretion (Hayes and Michel 2008). These structures are found throughout the southeastern Atlantic Coast, and although most were in place prior to the piping plover's1986 ESA listing, installation of new groins continues to occur. Table WM4 tallies recent groin installation projects in wintering and migration habitat, as estimated by USFWS biologists.

Terminal groins are significantly damaging to nesting habitat for shorebirds and waterbirds. Terminal groins stabilize the terminal ends of barrier islands. This stabilization results in the encroachment of vegetation which eliminates nesting habitat for shorebirds (except willet) and waterbirds. Numerous examples of loss of habitat due to terminal groin construction can be seen from New England to Florida.

The shorebirds and waterbird species that nest at Rich Inlet include Least Tern, Common Tern, Black Skimmer, Gull-billed Tern (historically), Wilson's Plover, Piping Plover, American Oystercatcher and Willet. Sustaining populations of these species depends on maintaining habitat within the entire inlet complex, not just one side of the inlet. A terminal groin at Rich Inlet will eliminate vital habitats that these birds require and will have a direct negative impact on populations of the species listed above.

The impact of projects such as proposed in this DEIS on Red Knots is addressed specifically in the "Status of the Red Knot in the Western Hemisphere (Niles et al. 2008):

"NC: Along the coast, threats to migrant and wintering Red Knot habitat include beach stabilization works (nourishment, channel relocation, and bulkhead construction), and housing development. Note: Terminal groins and hardened structures were illegal in NC at the time when this paper was published.

FL: Shoreline hardening, dredging, and deposition, including beach-nourishment activities, are significantly altering much of Florida's coastline. … Furthermore, the impacts on Red Knots and other shorebirds is [sic] not well known but is thought to be significant"

The North Carolina Coastal Habitat Protection Plan cites terminal groins and beach nourishment as a threat to fisheries (Deaton et al 2005): "*Obstacles such as jetties adjacent to inlets block the natural passage of larvae into inlets and reduce recruitment success*." "*In addition to causing erosion on downdrift beaches and accelerating the need for beach nourishment projects, jetties obstruct fish passage through adjacent inlets (Blanton et al. 1999).*" Impacted species include menhaden, spot, Atlantic croaker, shrimp, gag, black sea bass, flounder, and others.

Shorebird and waterbird use of Rich Inlet compared with Masonboro Inlet

In order to provide a complete and accurate picture of how Piping Plovers and other shorebirds use Rich Inlet and to assess bird use of a stabilized inlet with Rich Inlet, the following summary data from regular, year-round surveys of inlets in southeastern North Carolina is presented. The data were collected and analyzed by Audubon North Carolina.

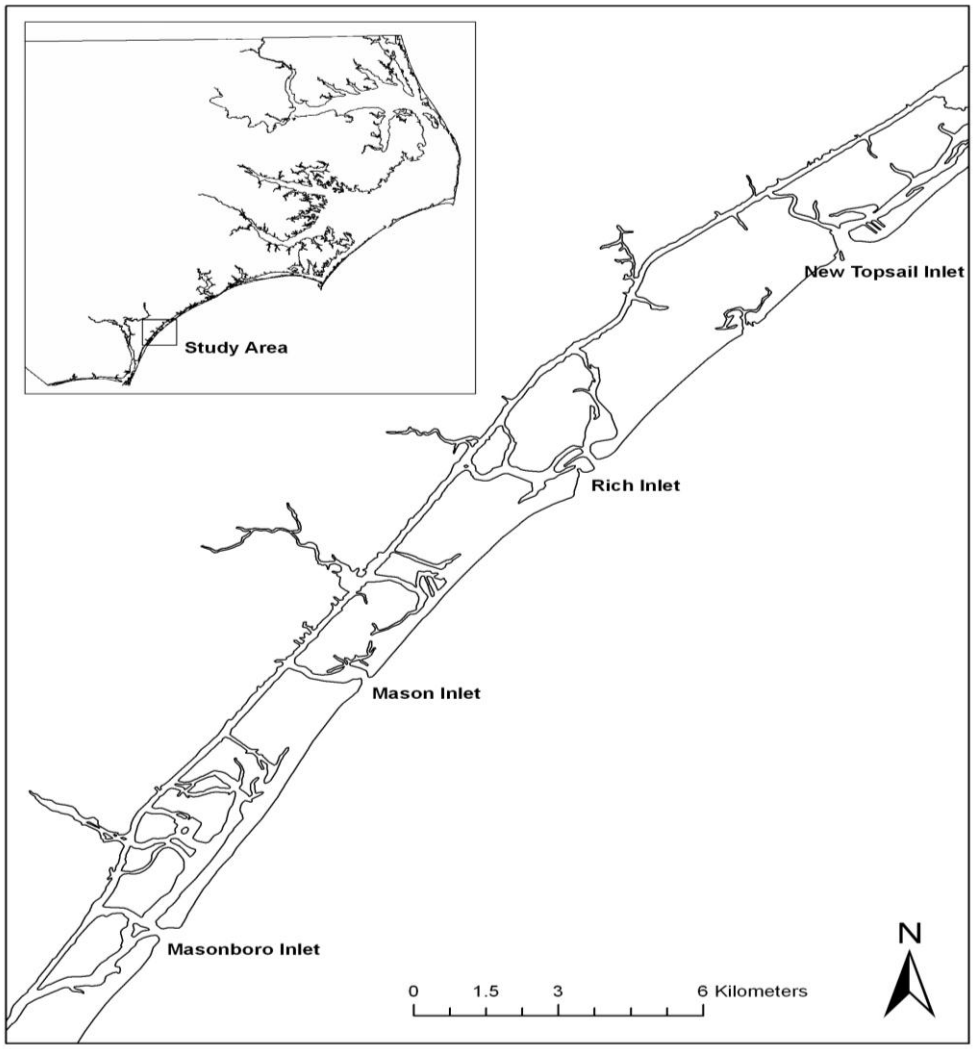
Prior to 2007, data quantifying the year-round use of inlets in southeastern North Carolina by breeding, migrating and wintering shorebirds did not exist. In order to fill this knowledge gap, in 2007 Audubon began conducting regular bird surveys at four area inlets, New Topsail Inlet, Rich Inlet, and Mason Inlet, adding Masonboro Inlet in 2009 (Figure 1). The intent of these surveys was to capture species composition, abundance, timing, and patterns of habitat use by shorebirds and other taxa. Data for Rich Inlet and Masonboro Inlet are presented here.

<u>Site Information</u>

Rich and Masonboro Inlets are two of about 20 inlets in North Carolina. They are located in southern North Carolina approximately 9.6 miles apart. Rich Inlet is located between Figure Eight Island to the south and Hutaff Island to the north. The inlet is part of the Lea-Hutaff Important Bird Area (Golder and Smalling 2010) and is designated as critical winter habitat for Piping Plover (Critical Habitat Unit NC-11), which includes Lea-Hutaff Island and the emergent shoals and sandbars within Rich Inlet (USFWS 2001). The inlet experiences periodic dredging in Nixon Channel behind Figure Eight Island (Rice 2012a).

Masonboro Inlet is located between Wrightsville Beach to the north and Masonboro Island to the south. Masonboro Inlet has been modified through relocation of the inlet in 1947, and a jetty on the north side of the inlet was completed in 1966 and terminal groin on the south side were subsequently installed in 1981 (Cleary and Marden 2001). The inlet is also maintained for navigation through dredging (Rice 2012a). As a result, the inlet has no ebb or flood shoal islands, and relatively few intertidal sandbars. Masonboro Island receives regular replenishment of sand along 2.5 miles of oceanfront beach (Rice 2012b) to mitigate for accelerated erosion caused by the construction of the terminal groin.

Figure 1. The inlet study area, showing Rich Inlet between New Topsail Inlet and Mason Inlet.



Methods

Rich Inlet was surveyed by boat and foot in three sections, Hutaff Island on the north side, Figure Eight Island on the south side, and the Rich Inlet, which encompasses the marsh and dredge island shoreline in Nixon and Green Channels, the large intertidal shoal in Green Channel (Green Shoal), the large intertidal shoal in the middle of the inlet mouth (Rich Shoal), and any other emergent shoals or sandbars in the inlet system (Figure 2). The Rich Inlet survey area encompasses about 2.9 km^2. The initial winter surveys only covered the Rich Inlet section of the inlet. Beginning in March, the south end of Hutaff Island was also surveyed. In September 2009, the survey was expanded to include northernmost Figure Eight Island.

Masonboro Inlet was surveyed exclusively on foot from the south end of Wrightsville Beach, which provided a view of about three-quarters of the inlet system, an area of about 2.3 km^2 (Figure 3). The south side of the sandbars on Masonboro Island, as well as the south channel of the inlet about 1,000 m of ocean beach adjacent to the inlet on Masonboro Island were not visible. Logistical limitations prevented the entire inlet system from being surveyed.

Surveys at Rich Inlet began in winter 2007 on a monthly basis and went to a weekly basis starting in March. Thereafter surveys were conducted on a weekly basis during shorebird migration (March-May

and July-November) and bi-weekly or monthly in winter (December-February). Data recorded included bird species, number of individuals/species, tide, weather, survey start and end times, and environmental conditions. Banded individuals were recorded and every effort was made to document all color combinations and codes. For piping plovers, we also documented latitude/longitude of individuals or flocks, behavior, habitat, substrate and landscape type.

Observations were made with 8x or 10x binoculars and a 20-60x spotting scope. In order to best assess abundance of shorebirds, preference was given to conducting surveys at high tide, but in order to assess the use of intertidal areas by species such as the Piping Plover and Red Knot, surveys were also performed at mid and low tide. All three sections of the survey area had to be surveyed on the same day in the same contiguous block of time in order for a survey to be considered complete. When no complete surveys are available for a given week, incomplete surveys were included for data analysis if available.

Figure 2. The Rich Inlet survey extent.

Figure 3. The Masonboro Inlet survey extent.

Results

A total of 84 species were recorded at Rich Inlet from 2007-2012. Sixteen species were recorded in one year only. Sixty-four species were recorded at Masonboro Inlet from 2009-2012. Fourteen species were recorded in one year only.

Peak species abundance by month shows patterns of seasonal use by key species (Tables 1-6). Migration—the seasonal movements between breeding and wintering grounds—is found in most shorebird species, as well as in other birds. Shorebirds typically breed in the far north in order to exploit the seasonal abundance of food resources and stop over during migration at key sites with suitable habitats in order to refuel before continuing (Colwell 2010).

Table 1. Peak monthly abundance of key species at Rich Inlet, 2007. "All species" is the total of all species seen, not only of the key species listed. Species ordered taxonomically.

	Month										
Species	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Black-bellied Plover	0	4	52	16	17	8	13	20	21	29	22
Semipalmated Plover	88	7	12	15	24	5	39	26	36	47	36
Piping Plover	5	6	8	17	7	10	15	13	10	8	8
American Oystercatcher	0	3	11	20	19	21	21	0	1	0	0
Willet	2	0	9	43	11	10	6	7	10	7	12
Whimbrel	0	0	0	1	5	1	5	0	0	0	0
Sanderling	49	54	115	102	106	116	170	143	136	83	90
Red Knot	0	0	0	0	258	2	4	0	0	4	0
Dunlin	1249	589	594	326	60	0	2	0	5	647	268
Semipalmated Sandpiper	0	0	0	0	4	4	2	4	5	3	0
Western Sandpiper	28	11	19	9	0	27	32	19	17	15	6
Least Sandpiper	0	0	0	5	0	13	21	8	0	0	0
Short-billed Dowitcher	194	80	111	38	5	45	44	82	90	195	105
Royal Tern	0	0	6	27	45	77	109	228	470	11	1
Sandwich Tern	0	0	0	8	4	12	17	50	14	160	0
Common Tern	0	0	0	16	39	10	58	661	670	40	0
Least Tern	0	0	6	61	100	17	12	0	2	0	0
Black Skimmer	0	0	0	0	81	3	30	156	330	1500	0
All Species	1617	1344	1157	1206	751	323	424	1269	1570	2815	1151

Table 2. Peak monthly abundance of key species at Rich Inlet, 2008. "All species" is the total of all species seen, not only of the key species listed. Species ordered taxonomically.

	Month										
Species	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Black-bellied Plover	21	49	37	27	18	10	10	30	12	20	9
Semipalmated Plover	14	91	201	22	11	20	35	68	29	9	70
Piping Plover	3	10	6	7	4	12	13	15	6	4	4
American Oystercatcher	0	20	18	8	5	16	7	8	0	0	0
Willet	50	14	18	18	8	18	14	27	5	23	34

Whimbrel	0	0	0	7	0	3	0	0	0	0	0
Sanderling	77	37	115	143	144	138	116	125	115	42	91
Red Knot	0	0	0	89	165	1	0	0	0	0	7
Dunlin	495	805	690	116	39	20	14	23	58	160	894
Semipalmated Sandpiper	1	0	0	0	0	0	4	2	0	0	0
Western Sandpiper	5	13	18	10	0	55	27	45	24	2	7
Least Sandpiper	0	0	16	1	0	34	10	3	0	1	0
Short-billed Dowitcher	130	91	225	81	20	72	42	16	72	81	80
Royal Tern	0	0	1	65	41	132	66	150	20	13	0
Sandwich Tern	0	0	0	63	14	39	40	59	40	103	0
Common Tern	0	0	21	125	8	6	42	48	30	13	0
Least Tern	0	0	0	114	51	18	14	4	0	0	0
Black Skimmer	0	0	1	50	31	30	103	115	400	300	0
All Species	1042	1732	1657	747	547	629	446	924	702	1408	1382

Table 3. Peak monthly abundance of key species at Rich Inlet, 2009. “All species” is the total of all species seen, not only of the key species listed. Species ordered taxonomically.

	Month										
Species	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Black-bellied Plover	5	6	44	25	15	5	12	21	69	36	2
Semipalmated Plover	0	0	11	53	45	12	41	74	57	38	36
Piping Plover	7	1	17	2	2	14	15	19	10	9	5
American Oystercatcher	0	11	28	20	27	5	10	8	0	0	0
Willet	24	30	37	19	38	23	19	7	10	9	20
Whimbrel	0	0	0	11	10	5	2	0	0	0	1
Sanderling	151	350	300	109	43	72	146	227	131	319	95
Red Knot	1	0	7	65	150	0	0	0	0	0	0
Dunlin	600	685	764	208	54	0	0	0	177	518	371
Semipalmated Sandpiper	0	0	0	0	13	0	2	1	0	0	0
Western Sandpiper	12	5	25	10	0	4	16	19	32	7	2
Least Sandpiper	0	0	0	2	0	4	13	8	1	0	0
Short-billed Dowitcher	65	76	114	129	67	31	80	46	42	59	77
Royal Tern	0	0	4	24	40	126	94	94	102	33	0
Sandwich Tern	0	0	0	4	0	11	23	65	149	186	0
Common Tern	0	0	4	6	13	6	7	39	6	0	0
Least Tern	0	0	0	75	154	18	16	0	0	0	0
Black Skimmer	0	0	0	100	50	2	29	620	260	0	0
All Species	1969	1467	1356	807	472	349	582	1216	1374	1466	1282

Table 4. Peak monthly abundance of key species at Rich Inlet, 2010. “All species” is the total of all species seen, not only of the key species listed. Species ordered taxonomically.

	Month										
Species	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**

Black-bellied Plover	23	9	31	18	60	5	38	36	41	11	3
Semipalmated Plover	12	0	54	30	159	22	164	131	39	9	0
Piping Plover	5	3	7	4	2	9	25	22	3	2	0
American Oystercatcher	0	0	20	16	18	24	22	9	16	0	0
Willet	10	3	20	13	6	39	29	15	4	8	0
Whimbrel	0	0	0	0	3	0	1	1	0	0	0
Sanderling	100	99	119	102	113	151	135	202	181	51	4
Red Knot	0	0	6	61	49	0	0	0	0	1	0
Dunlin	675	885	923	262	188	0	0	0	12	1199	508
Semipalmated Sandpiper	0	0	1	0	3	0	6	0	0	0	0
Western Sandpiper	8	20	15	12	9	60	28	65	17	12	0
Least Sandpiper	0	0	1	0	0	4	0	7	0	0	0
Short-billed Dowitcher	42	15	78	70	62	25	19	61	21	29	0
Royal Tern	1	0	3	60	85	241	219	78	214	7	0
Sandwich Tern	0	0	0	73	10	60	45	28	72	1	0
Common Tern	0	0	0	55	248	3	11	245	1	0	0
Least Tern	0	0	0	243	463	249	14	1	0	0	0
Black Skimmer	0	0	0	60	90	1	5	160	294	0	0
All Species	2121	1436	1742	1084	1346	846	721	991	1061	1589	608

Table 5. Peak monthly abundance of key species at Rich Inlet, 2011. "All species" is the total of all species seen, not only of the key species listed. Species ordered taxonomically.

	Month											
Species	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Black-bellied Plover	0	75	45	88	14	2	14	33	77	55	55	56
Semipalmated Plover	0	35	15	56	250	5	33	260	73	39	118	26
Piping Plover	1	3	15	19	0	0	5	10	5	11	5	0
American Oystercatcher	0	4	21	20	15	17	14	40	36	16	3	0
Willet	1	16	13	33	26	10	13	24	40	10	2	4
Whimbrel	0	0	0	0	11	0	0	11	1	0	0	0
Sanderling	13	136	74	72	74	0	3	67	220	246	74	142
Red Knot	0	3	43	26	93	0	0	0	1	0	18	7
Dunlin	75	936	981	413	280	0	0	0	0	28	781	1361
Semipalmated Sandpiper	0	0	0	0	0	0	0	0	5	0	0	0
Western Sandpiper	0	58	54	15	59	0	127	79	29	42	5	14
Least Sandpiper	0	0	0	0	8	0	4	25	6	0	0	0
Short-billed Dowitcher	0	35	134	166	77	0	70	35	149	60	61	120
Royal Tern	0	0	5	52	49	10	180	306	258	337	5	1
Sandwich Tern	0	0	0	27	88	0	15	7	110	237	11	0
Common Tern	0	0	13	4	69	7	6	9	253	19	1	0
Least Tern	0	0	0	215	586	42	99	10	0	0	0	0
Black Skimmer	0	0	0	132	33	6	8	83	290	60	5	0

All Species	92	1159	1397	1319	1612	157	532	833	1436	2086	2312	2684

Table 6. Peak monthly abundance of key species at Rich Inlet, 2012. "All species" is the total of all species seen, not only of the key species listed. Species ordered taxonomically.

	Month				
Species	**Jan**	**Feb**	**Mar**	**Apr**	**May**
Black-bellied Plover	48	16	122	107	58
Semipalmated Plover	29	57	63	84	382
Piping Plover	0	2	5	3	0
American Oystercatcher	0	12	22	22	16
Willet	35	57	102	130	24
Whimbrel	0	0	0	4	51
Sanderling	32	67	141	207	197
Red Knot	23	3	0	70	234
Dunlin	531	1362	1073	479	478
Semipalmated Sandpiper	0	0	0	0	220
Western Sandpiper	72	23	32	27	92
Least Sandpiper	0	0	0	6	3
Short-billed Dowitcher	136	228	140	253	194
Royal Tern	0	0	4	267	69
Sandwich Tern	0	0	0	28	28
Common Tern	0	0	0	3	32
Least Tern	0	0	0	160	209
Black Skimmer	0	0	0	120	6
All Species	2436	2060	3532	2405	1827

Shorebird species that both winter and stop over at Rich Inlet but do not breed locally show a general pattern of abundance in which numbers peak during spring migration, generally from March-May, and fall migration, generally from July-November. During the winter months, smaller numbers are observed. Species that showed this two-season peak in abundance and maintaining a smaller wintering population include Black-bellied Plover, Semipalmated Plover, Piping Plover, Western Sandpiper, and Short-billed Dowitcher.

Some species use different routes on spring and fall migration. The Whimbrel, which is not abundant in southeast North Carolina, was observed in greater numbers during spring migration than on fall migration. The Red Knot showed the same pattern, with migratory flocks arriving in the area in late spring, sometimes as early as March, but more typically in April and May. A flock of about 20 also winters in the area. Similarly, the Least Sandpiper was not seen, or seen in low numbers in the spring, but was more abundant during fall migration.

Dunlin winter at Rich Inlet, arriving late in the year (October or November) and remaining through April or May. In most years, they were completely absent from July-September. Conversely, despite being non-breeding in North Carolina, Sanderlings were seen year-round, though in greater numbers during spring and fall migration.

American Oystercatchers used Rich Inlet during spring and fall migration and remained present in the summer months when breeding pairs occupied territories around the inlet. However, they were generally absent from the inlet in the winter, though approximately 200 winter in Masonboro Sound to the south. Another local breeder that also appeared to use Rich Inlet on migration is the Willet. Unlike the oystercatchers, Willets also winter in Rich Inlet.

Royal and Sandwich Terns breed in in the Cape Fear region on the Lower Cape Fear River and farther north throughout North Carolina, but used Rich Inlet before and after breeding. Black Skimmers followed the same pattern, though they nest at local inlets and on barrier islands to the north and south. Upon initial arrival in the area, flocks occupied Rich Inlet in April and May. They were scarce in June and early July, but numbers began to build again in July and August. These flocks included young of the year could constitute birds that bred as far north as New England. These flocks stayed into October (the terns) and November (Black Skimmers), suggesting the inlet's significance to these species as a major staging site prior to and during migration.

Unlike the other terns, the Least Tern did not linger at Rich Inlet. After fledging young they moved out of the inlet quickly, probably moving south. Common Terns breed around Rich Inlet in small numbers, but they use the inlet habitats during spring and fall migration.

Masonboro Inlet supported fewer migrating and wintering shorebirds than Rich Inlet. (Tables 7-10).

Table 7. Peak monthly abundance of key species at Masonboro Inlet, 2009. "All species" is the total of all species seen, not only of the key species listed. Species ordered taxonomically.

	Month					
Species	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Black-bellied Plover	0	1	8	2	1	0
Semipalmated Plover	1	39	28	1	68	49
Piping Plover	0	0	2	0	4	1
American Oystercatcher	2	3	0	0	0	0
Willet	3	2	5	5	2	2
Whimbrel	0	0	0	0	0	0
Sanderling	8	15	20	29	22	24
Red Knot	0	0	0	0	0	0
Dunlin	0	0	0	10	400	180
Semipalmated Sandpiper	0	0	0	0	0	0
Western Sandpiper	0	4	3	0	1	0
Least Sandpiper	0	2	2	1	0	0
Short-billed Dowitcher	0	0	0	0	0	0
Royal Tern	100	32	22	22	0	0
Sandwich Tern	0	14	62	15	15	0
Common Tern	3	10	0	20	0	0
Least Tern	190	176	0	0	0	0
Black Skimmer	144	186	405	250	230	0
All Species	381	489	727	697	539	397

Table 8. Peak monthly abundance of key species at Masonboro Inlet, 2010. “All species” is the total of all species seen, not only of the key species listed. Species ordered taxonomically.

	Month											
Species	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Black-bellied Plover	12	0	0	0	0	0	0	0	0	0	0	0
Semipalmated Plover	0	2	25	0	0	0	1	0	1	1	64	5
Piping Plover	0	0	0	0	0	0	1	0	0	0	0	0
American Oystercatcher	0	0	3	0	3	3	1	0	0	0	0	0
Willet	0	2	3	1	1	5	1	4	3	1	3	1
Whimbrel	0	0	0	0	0	0	0	0	0	0	0	0
Sanderling	20	27	29	3	0	0	6	3	6	9	9	24
Red Knot	0	0	0	0	0	0	0	0	0	0	0	0
Dunlin	130	70	300	0	1	0	0	0	0	0	440	70
Semipalmated Sandpiper	0	0	0	0	0	0	0	0	0	0	0	0
Western Sandpiper	0	0	0	0	0	2	0	0	0	0	0	0
Least Sandpiper	0	0	0	0	0	0	0	0	0	0	2	0
Short-billed Dowitcher	0	0	0	2	0	0	0	0	0	0	0	0
Royal Tern	0	0	2	27	75	9	0	3	2	9	0	0
Sandwich Tern	0	0	0	15	7	2	0	0	0	1	0	1
Common Tern	0	0	0	6	1	2	4	2	2	0	0	0
Least Tern	0	0	0	33	17	240	300	137	0	12	0	0
Black Skimmer	0	4	0	100	64	112	100	204	54	0	0	0
All Species	287	233	371	163	173	368	410	345	75	45	518	199

Table 9. Peak monthly abundance of key species at Masonboro Inlet, 2011. “All species” is the total of all species seen, not only of the key species listed. Species ordered taxonomically.

	Month											
Species	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Black-bellied Plover	0	0	0	11	4	0	3	5	7	17	3	4
Semipalmated Plover	2	0	0	2	22	0	0	19	33	24	73	16
Piping Plover	0	0	7	0	0	0	0	0	0	0	2	0
American Oystercatcher	2	3	4	3	3	6	7	6	2	0	0	0
Willet	1	4	1	17	4	5	4	5	8	1	4	5
Whimbrel	0	0	0	2	0	0	0	0	0	0	0	0
Sanderling	17	26	13	21	5	0	1	36	22	42	12	32
Red Knot	0	0	0	0	0	0	0	0	2	0	0	0
Dunlin	125	124	52	32	0	0	0	0	0	3	343	12
Semipalmated Sandpiper	0	0	0	0	0	0	0	0	0	0	0	0
Western Sandpiper	0	15	0	0	27	0	0	1	4	11	0	0
Least Sandpiper	0	0	0	0	0	0	0	0	0	0	0	0
Short-billed Dowitcher	0	0	0	0	0	0	0	0	0	0	0	0
Royal Tern	0	0	7	49	65	42	42	92	331	95	6	0
Sandwich Tern	0	0	3	66	11	0	0	15	87	130	22	0

Common Tern	0	0	29	8	5	1	23	71	137	8	0	0
Least Tern	0	0	0	114	266	414	298	25	1	0	0	0
Black Skimmer	0	0	0	0	0	0	0	0	0	0	0	0
All Species	179	185	350	495	547	514	566	631	841	653	1036	307

Table 10. Peak monthly abundance of key species at Masonboro Inlet, 2012. "All species" is the total of all species seen, not only of the key species listed. Species ordered taxonomically.

	Month				
Species	**Jan**	**Feb**	**Mar**	**Apr**	**May**
Black-bellied Plover	0	2	8	12	3
Semipalmated Plover	18	40	150	2	16
Piping Plover	0	3	0	2	0
American Oystercatcher	2	6	9	6	6
Willet	2	1	1	1	4
Whimbrel	0	0	0	0	7
Sanderling	5	74	63	25	20
Red Knot	0	0	0	0	0
Dunlin	240	386	384	0	0
Semipalmated Sandpiper	0	0	0	0	0
Western Sandpiper	0	8	3	0	0
Least Sandpiper	0	0	0	0	0
Short-billed Dowitcher	0	0	0	0	8
Royal Tern	0	0	0	37	45
Sandwich Tern	0	0	0	2	5
Common Tern	0	0	0	3	10
Least Tern	0	0	0	186	481
Black Skimmer	0	0	0	133	205
All Species	511	781	775	455	541

The lower numbers of shorebirds are likely due to a lack of suitable habitat, particularly intertidal sand-mud flats, lack of accessible dry sand beach which is important for high tide rest and roost sites, and heavy human disturbance throughout the year. The lack of suitable habitat is directly attributable to the stabilization of the inlet with a jetty and terminal groin and regular inlet dredging.

Piping Plover

A total of 742 sightings were made of Piping Plovers at Rich Inlet from July 2008-May 2012. The total number of sightings was greater during fall migration than in the spring, but sightings were made in every month of the year. The only month in which little Piping Plover migration takes place is June. In some years Piping Plovers nest on Hutaff Island, but numbers are low (2 pairs 2008, 1 pair 2009, 2 pairs 2010, 0 pairs 2011 and 2012). These plovers may be detected in May and July surveys.

At Masonboro Inlet total of 33 sightings of Piping Plovers were made from July 2009-May 2012. In comparison, during the same period of time, 660 Piping Plover sightings were made at Rich Inlet. There are no records of Piping Plovers ever breeding at Masonboro Inlet.

Piping Plovers were observed regularly throughout the Rich Inlet complex (see Figure 4) including northern Figure Eight Island and southern Hutaff Island. The use of areas within the inlet complex varied depending on tidal cycle and level of human disturbances. These findings are similar to other studies that found Piping Plovers using different areas and habitats in the same inlet throughout the tidal cycle (Cohen et al. 2008 and Maddock et al. 2009). Sightings of Piping Plovers were regularly made in every month of the year, reflecting year-round use by breeding as well as migrating and wintering individuals.

Figure 4. Locations of individual or flocks of Piping Plovers at Rich Inlet, July 2008-May 2012.

At Masonboro Inlet, Piping Plovers were seen sporadically (none were seen in 2010). They were observed on the dredge island on the west side of the inlet, on the south end of Wrightsville Beach, and on the south side of Masonboro Island (Figure 5). Piping Plovers may use other areas of Masonboro Inlet, such as the small beaches and sandbars in the southern channel, but these areas lack key constituent elemets that are important for piping plovers. Some individuals could have been present on the ocean side of Masonboro Island, but these areas were not surveyed. Masonboro Inlet lacks extensive low-energy intertidal flats that are heavily used by piping plovers at Rich Inlet.

Figure 5. Locations of individual or flocks of Piping Plovers at Masonboro Inlet, July 2009-May 2012.

During migration and wintering, Piping Plovers engage in two essential behaviors, foraging and resting/roosting. A core wintering area or stopover site must provide habitat suitable for resting/roosting, typically backshore above the high-tide line, and foraging, typically wet sand in intertidal areas (Elliott-Smith and Haig 2004). Of the 742 Piping Plover sightings at Rich Inlet, 69.4% (515) were of foraging birds, 21.7% (161) were of roosting birds, and 8.9% (66) were of birds performing another activity such as preening or agonistic behavior towards conspecifics. Of the 515 sightings of foraging Piping Plovers at Rich Inlet, 51.3% (264) were on shoals or sandbars in Rich Inlet; 33.6% (173) were on Hutaff Island, typically in the swash zone at mid or low tide, and 15.1% (78) were on North Figure Eight Island, typically on the low-energy sound side (Figure 6).

Figure 6. Behavior or individual or flocks of Piping Plovers in Rich Inlet, July 2008-May 2012.

One of the 33 Piping Plover sightings at Masonboro Inlet was auditory only, and no location, habitat, landscape, or behavior was recorded. Of the remaining 32 for which data were available, 46.9% (15) were of foraging birds, 43.8% (14) were of roosting birds, and 9.3% (3) were of alert birds. At Masonboro Inlet, Piping Plovers have a limited choice of landscape types for foraging and roosting.

Figure 7. Behavior of individual or flocks of Piping Plovers at Masonboro Inlet, July 2009-May 2012.

At Rich Inlet, Piping Plovers foraged in several landscape types and favored ocean beaches or inlet spits for roosting (Table 11). Of the seven landscape types where Piping Plovers were observed foraging, ocean beach and flood shoal islands were used most frequently (36.5% and 43.7% of observations, respectively). However, when taken together, Piping Plovers most often utilized sheltered, low-energy shoals, bay beaches, inlet spits, and sandbars on the sound side of the inlets for foraging (62.5% of landscapes). Low-energy shoals and other intertidal sand or sand-mud habitats support marine invertebrates that make up the Piping Plover's diet, particularly polychaetes, which are favored throughout their winter range (Elliott-Smith and Haig 2004).

Table 11. Landscape use by activity for Piping Plovers at Rich Inlet, July 2008-May 2012.

	Ocean beach	Bay beach	Inlet spit	Ebb shoal island	Flood shoal island	Sandbar	Tidal creek/lagoon
Foraging	36.5 (188)	9.1 (47)	5.2 (27)	1.0 (5)	43.7 (225)	4.3 (22)	0.2 (1)
Roosting	65.8 (106)	5.0 (8)	19.2 (31)	5.0 (8)	5.0 (8)	0	0
Other Behavior*	67.7 (44)	12.3 (8)	7.7 (5)	10.8 (7)	0	1.5 (1)	0

* Includes preening, bathing, flying, aggression, walking, and alert.

Foraging at Masonboro Inlet took place on one small sandbar projecting from a dredge island and bay beach and ocean beach, while roosting was divided almost evenly between ocean beach and bay beach (Table 12). The Piping Plover's preferred winter foraging habitat is scarce in Masonboro Inlet. The terminal groin on Masonboro Island limits the formation of an inlet spit, which is important for Piping Plovers. Regular dredging eliminates intertidal sand-mud flats and sand bars that piping plovers require. Furthermore the level of human disturbance on Wrightsville Beach makes it less suitable for Piping Plovers and other shorebirds.

Table 12. Landscape use by activity for Piping Plovers at Masonboro Inlet, July 2009-May 2012.

	Ocean beach	Bay beach	Inlet spit	Ebb shoal island	Flood shoal island	Sandbar	Tidal creek/lagoon
Foraging	20.0 (3)	20.0 (3)	13.3 (2)	0	0	46.7 (7)	0
Roosting	57.1 (8)	42.9 (6)	0	0	0	0	0
Alert*	66.7 (2)	13.3 (1)	0	0	0	0	0

* No other behavior was recorded.

When foraging at Rich Inlet, Piping Plovers strongly favored the intertidal zone (90.1% of observations) and were less likely to use wrack or other habitat (Table 13). Roosting Piping Plovers were most often seen in on the backshore (44.1%) or old wrack (36.0%). A review also found preferences for sheltered shorelines and intertidal areas in foraging Piping Plovers in South Carolina and the Gulf Coast and for ocean beaches in roosting Piping Plovers (USFWS 2009). Similar preferences for inlets (Wilkinson and Spinks 1994, Rabon 2006) and for sheltered and/or intertidal habitats in and around inlets have been detected (Haig and Oring 1985, Johnson and Baldassarre 1988, Nicholls and Baldassarre 1990, Cohen 2008 et al.).

Table 13. Habitat use by activity for Piping Plovers at Rich Inlet, July 2008-May 2012.

	Intertidal zone	Fresh wrack	Old wrack	Backshore	Dune	Ephemeral pool

Foraging	90.1 (464)	4.9 (25)	1.2 (6)	2.5 (13)	0.2 (1)	1.1 (6)
Roosting	8.1 (13)	9.9 (16)	36.0 (58)	44.1 (71)	1.9 (3)	0
Other Behavior*	64.6 (42)	1.5 (1)	3.1 (2)	18.5 (12)	10.8 (7)	1.5 (1)

* Includes preening, bathing, flying, aggression, walking, and alert.

Piping Plovers at Masonboro Inlet also strongly favored the intertidal zone (93.3% of observations) and were less likely to use wrack or other habitat (Table 14). Roosting Piping Plovers were most often seen in on the backshore (92.9%). The ocean beach on Masonboro Island was not surveyed, and the ocean beach on Wrightsville Beach may have received more human foot traffic than the backshore that was available on the inlet spit of Wrightsville Beach.

Table 14. Habitat use by activity for Piping Plovers at Masonboro Inlet, July 2009-May 2012.

	Intertidal zone	Fresh wrack	Old wrack	Backshore	Dune	Ephemeral pool
Foraging	93.3 (14)	0	0	6.7 (1)	0	0
Roosting	0	7.1 (1)	0	92.9 (13)	0	0
Alert*	0	0	0	100.0 (3)	0	0

* No other behavior was recorded.

Of Piping Plovers that were observed foraging at Rich Inlet, 56.9% were found on sand substrate and 31.2% were found on mud/sand; 91.4% of roosting Piping Plovers were found on sand (Table 15). Piping Plovers strongly preferred to roost in habitat (backshore and old wrack) and in landscapes (ocean beach or inlet spit) that were most likely to have sandy substrate. For foraging, Piping Plovers overwhelmingly used the intertidal zone, which at Rich Inlet is often sand-based. The lower-energy portions of Green Shoal and Rich Shoal sometimes develop a mud/sand mixture, which is reflected in the portion of foraging observed on that substrate.

Table 15. Substrate by activity for Piping Plovers at Rich Inlet, July 2008-May 2012.

	Sand	Mud/sand	Mud	Algal mat	Peat outcrop	Unknown
Foraging	56.9 (293)	31.2 (161)	8.0 (41)	0.8 (4)	0	3.1 (16)
Roosting	91.4 (147)	4.3 (7)	0	0	0	4.3 (7)

At Masonboro Inlet, 53.3% of foraging Piping Plovers were found on sand substrate and 46.7.2% were found on mud/sand; 100% of roosting Piping Plovers were found on sand (Table 16). There is not a great deal of mud or mud/sand substrate available in the Masonboro Inlet system. The 7 sightings of Piping Plovers foraging on mud/sand were of a flock of 7 found on a single day.

Table 16. Substrate by activity for Piping Plovers at Masonboro Inlet, July 2009-May 2012.

	Sand	Mud/sand	Mud	Algal mat	Peat outcrop
Foraging	53.3 (8)	46.7 (7)	0	0	0
Roosting	100.0 (14)	0	0	0	0

Of the 742 total Piping Plover sightings at Rich Inlet, 283 (38.2%) were made at high tide, 194 (26.2%) were made at mid tide, 262 (35.3%) were made at low tide, and no tidal information was recorded for 2 (0.3%). Of the observations made of foraging Piping Plovers, 388 (75.3%) were at mid or low tide, and of the observations made of roosting Piping Plovers, 135 (83.9%) were at high tide (Table 17).

Table 17. Activity by tidal stage for Piping Plovers at Rich Inlet, July 2008-May 2012.

	High	Mid	Low	Unknown
Foraging	24.4 (126)	30.5 (157)	44.9 (231)	0.2 (1)
Roosting	83.9 (135)	15.5 (25)	1 (0.6)	0

The same preference was seen at Masonboro Inlet. Of the 32 Piping Plover sightings with such data available, 20 (62.5%) were made at high tide, 7 (21.9%) were made at mid tide, and 5 (15.6%) were made at low tide. Of the 15 observations made of foraging Piping Plovers, 12 (80.0%) were at mid or low tide, and of the observations made of roosting Piping Plovers, 14 (100.0%) were at high tide (Table 18).

Table 18. Activity by tidal stage for Piping Plovers at Masonboro Inlet, July 2009-May 2012.

	High	Mid	Low
Foraging	20.0 (3)	46.7 (7)	33.3 (5)
Roosting	100.0 (14)	0	0

Eighteen total individual banded Piping Plovers were sighted at Rich Inlet from 2008-2012. No banded Piping Plovers were seen at Masonboro Inlet. Eleven of the plovers sighted were too distant for their legs to be checked for bands. Atlantic population Piping Plovers winter along the southern Atlantic seaboard and in the Caribbean, including The Bahamas. Members of the Great Lakes population winter on the southern Atlantic seaboard and into the Gulf Coast of Florida. Great Plains individuals winter mostly on the Gulf Coast, but some also use the southern Atlantic seaboard (Gratto-Trevor et al. 2009). The Great Lakes population is extensively banded, and there are proportionally fewer banded Piping Plovers from the Great Plains and Atlantic populations. The majority of Piping Plovers at Rich and Masonboro Inlets are most likely Atlantic population birds (Gratto-Trevor et al. 2009), based on the population's known distribution and the absence of bands.

Banded Piping Plovers at Rich Inlet were from all three populations, with the greatest number of banded individuals from the Great Lakes population (Table 19). The population demographics among migrating and wintering Piping Plovers observed during this project were similar to those reported in Gratto-Trevor et al. (2009), but for the absence of band records from eastern Canada.

Table 19. Number of individual banded Piping Plovers from each population seen at Rich Inlet, July 2008-May 2012.

	Banded Individuals
Atlantic	3
Great Lakes	12
Great Plains	1
Unknown	2

Ten of the 18 banded individuals at Rich Inlet were apparently stopping over and did not winter in the region. One individual was seen on two different migrations. Of the remaining 8 individuals, one wintered at Mason Inlet to the south, four wintered at New Topsail Inlet to the north, and 3 wintered exclusively at Rich Inlet. One of those individuals has wintered at Rich Inlet for two consecutive years, and one has wintered there for three consecutive years.

Duration of stopovers cannot be determined with certainty, but it is of interest to attempt an estimate the total number of individual Piping Plovers using area site in a single season, which would more accurately reflect the significance the site to Piping Plovers. Peak monthly counts, such as are presented above, do not capture turnover rates, and thus do not distinguish between, for example, one group of 10 Piping Plovers using Rich Inlet throughout the fall and 10 groups of 10 Piping Plovers stopping over at Rich Inlet and moving on within a few days. Because only banded birds can be distinguished from one another, duration of stopovers was calculated for all banded birds sighted at Rich Inlet from July 2008-May 2012.

A total of 22 apparent spring and fall stopover events were recorded at Rich Inlet from July 2008-May 2012. In 7 of these instances, the bird went on to winter at Mason or New Topsail Inlet; in 14 the bird wintered at an unknown location; in one instance the bird wintered in the Bahamas. Though these 7 events may not reflect use by birds in the middle of their migration, they nevertheless add to the total number of individual Piping Plovers using the inlet and so were included. Because surveys were not done every day, and because even if they were, there was not a 100% probability of detecting the banded bird, a minimum and maximum duration had to be calculated for each sighting of a migrating Piping Plover. In order to estimate a maximum duration, we counted the number of days between the last survey before the bird was observed and the next survey on which the bird was not observed. In order to estimate a minimum duration, it was assumed that the bird arrived on the first day it was observed and departed on the last day it was observed, so the number of day from the first to the last sighting were counted. To arrive at a middle estimate of stopover duration, the number of days between the last survey before the bird was observed and the next survey on which the bird was not observed was divided by two and added to the number of days between sightings of the banded individual. This assumed that the bird arrived halfway between the last survey on which it was not seen and the first survey on which is was seen and departed halfway between the last survey on which it was seen and the first survey on which it was not seen.

Using this method, migration stopover ranged from 1-34 days. The majority (17) had a minimum of one day, and 13 stopovers had a maximum of 14 days or fewer. In five instances, a survey was not done in the week preceding the sighting, or only an incomplete survey was done, so the maximum duration for those sightings was possibly be increased by the lack of data. In two instances a bird with a non-unique band combination was seen on two dates over two months apart. These were generic brood-marker combinations, which are placed on hatch-year birds and replaced with unique combinations upon their return to breeding grounds. Based on repeated sightings of other banded Piping Plovers, it seemed unlikely that a bird would be at the inlet for two months without being sighted on any surveys, so the two brood marker combinations were treated as separate individuals.

The average minimum stopover duration was 3.4 days and the average maximum duration was 14.7 days. The average duration of the middle estimate of duration was 8.6 days. In order to arrive at rough estimates of the total number of Piping Plovers using the estimated range of stopover durations, we summed counts from one-week and two-week intervals (i.e. with at least six and 13 days between surveys) during spring and fall migration to approximate the middle and upper duration estimates.

Using this method, we found total number of individual Piping Plovers using Rich Inlet to be smaller in the spring and significantly greater in the fall (Table 20). As many as 164 individuals may use Rich Inlet during fall migration, and as many as 75 may use the inlet during spring migration.

Table 20. Estimated total individual Piping Plovers using Rich Inlet in spring and fall migration.

	Spring			Fall		
	4 days	**1 week**	**2 weeks**	**4 days**	**1 week**	**2 weeks**
2007	75	61	38	164	134	74
2008	37	23	18	107	93	38
2009	29	25	22	142	109	50
2010	36	26	18	125	113	65
2011	66	56	22	87	64	37
2012	12	12	10	-	-	-

The two populations that regularly use the southeastern Atlantic coast are the Great Lakes and Atlantic populations (Gratto-Trevor 2009). Relative to the total population of the Atlantic and Great Lakes populations, approximately 1,800 pairs and 50 pairs, respectively, use of Rich Inlet by piping plover is significant. We estimate that up to 2% in spring and 4.5% in fall of the entire combined Atlantic and Great Lakes populations of piping plovers depend on Rich Inlet at critical times during migration.

Because of the low number of sightings and the lack of banded individuals, turnover was not estimated for Masonboro Inlet.

Piping Plovers do not use large core winter ranges. They can be less than 3 km^2 (Drake et al. 2001), which is similar to the size of inlets, including Rich and Masonboro Inlets, in southeastern North Carolina. The Rich Inlet surveys, as well as other similar work (Maddock et al. 2009, Cohen et al. 2008), also demonstrate that Piping Plovers often use a single inlet or tend to rely heavily on a single inlet when migrating and wintering. Further, inlet systems are recognized as significant habitat for non-breeding Piping Plovers throughout the southeastern United States (USFWS 2009). Rich Inlet provides the variety of habitats that Piping Plovers require (Rabon 2006, Drake et al. 2001, Johnson and Baldassarre 1988), particularly mudflats associated with inlets (Nicholls and Baldassarre 1990). The Piping Plovers stopping over and wintering at Rich Inlet are therefore likely to be nearly or entirely dependent on the entire inlet complex for the mosaic of foraging and roosting habitats they require. In contrast, few Piping Plovers stop over at Masonboro Inlet and none seem to use it as part of their core wintering area.

Conclusion

While similar species nest at each inlet and numbers are dependent on quality of habitat available in a given year, year-round surveys at Rich Inlet and Masonboro Inlet found sharply contrasting patterns and amounts of use by wintering and migrating shorebirds. At Rich Inlet, large numbers of wintering and migrating shorebirds use the mosaic of habitats available throughout the system, while at Masonboro Inlet, habitat is less varied and much smaller in total area. This effect on shorebird usage rates is particularly pronounced in the Piping Plover and other shorebird species. The Piping Plover's typical reliance on a small core winter territory, usually the vicinity of a single inlet, and the use of the Rich Inlet system by a significant number of migrating and wintering individuals demonstrates the importance of this inlet. In contrast, Masonboro Inlet is used by orders of magnitude fewer Piping Plovers, although it is within their migration and winter range. Taken together, these facts demonstrate the importance of unstabilized inlets to Piping Plovers, and the importance of Rich Inlet in particular.

Factual Errors Regarding Impacts to Birds and Bird Habitats
Numerous factual errors persist throughout the DEIS. Some of these affect the substance and outcome of the analysis of impacts to shorebirds, while others suggest that the impacts of the project would be better assessed by personnel with experience with and knowledge of shorebirds and waterbirds.

These comments will identify 1. major and minor factual errors in the DEIS, 2. omissions from the DEIS, and 3. serious problems with sourcing and use of data.

Errors in Chapter 4, Section E: Birds
It is impossible to assess the impacts of any action without proceeding from facts and the proper application thereof. Therefore, a lack of apparent understanding of the available data, as well as the misreporting of the same is undesirable in an environmental impact statement and renders it worse than useless to the permitting agencies as a tool for assisting in the assessment of the proposed project.

The inconsistency and inaccuracy in sourcing data is confusing and sloppy. Data collected by Audubon North Carolina (Audubon), which is the state office of the National Audubon Society, is almost always cited as coming from the Cape Fear Audubon Society (CFAS), which is an all-volunteer chapter of the National Audubon Society that does not conduct bird surveys at Rich Inlet or elsewhere. Other attributions of Audubon data include "NCAS" and "North Carolina Audubon Society"; no such named entity exists. This is relevant because the North Carolina State Office of the National Audubon Society (Audubon) has professional staff with more than 40 years of collective experience with coastal shorebirds and waterbirds.

Data from Audubon surveys is incorrectly characterized the DEIS, in statements that are sometimes contradictory of proceeding or succeeding text. The main problems are:

1. Sums of counts of species, such as the Red Knot on p. 93, are used instead of maximum counts among all surveys. The correct way to utilize these numbers is explicated on p. 144, but this advice was apparently was not taken. No discussion is made of turnover, which, when quantified can be used to sum counts from different dates in order to estimate total usage of an area by a particular species.
2. The DEIS claims a "lack of regular monitoring during the non-breeding season" on p. 142, yet in the same paragraph it claims that 726 surveys were made of Rich Inlet from 2008-2011, which, if true, would result in a survey every 2 days, which would be very regular monitoring indeed. Clearly, no critical thought was applied in the production of that section.
3. On p. 142, the draft states that two breeding pairs of Piping Plovers were seen on Hutaff Island. The data is referenced to Sara Schweitzer, 2011. Similar data was provided by Audubon to NCWRC, but the EIS reports it incorrectly. In 2011, 2 pairs nested on Hutaff Island of Lea-Hutaff Island. Although Piping Plovers have bred on Hutaff Island in other years, most recently 2008-2010, none were there in 2011. The available Piping Plover breeding data from previous years is not included in the text of the Piping Plover portion of Chapter 4, Section E, but is in Table 4.8, which does not distinguish between Piping Plovers nesting on Figure Eight Island and Hutaff Island.
4. Every sentence in the following text found on p. 142 is incorrect:

   The Cape Fear Audubon Society has provided raw data from piping plover surveys conducted between 2008 and 2011. A total of 3,039 individuals were observed during the 726 surveys completed during this time resulting in an average of 4.2 individual piping plovers per survey.

The annual average number of piping plovers observed per survey ranged between 3.5 and 4.6 (Cape Fear Audubon Society, pers. comm., 2012). Based on the information provided, it is unknown how many individuals were observed foraging, resting, nesting, or flying over. Because the methodologies have not been provided at this time, additional results and analysis cannot be included herein.

The Cape Fear Audubon Society did not provide raw data; Audubon did. The figures 3,039 and 726 are wrong, and their derivation is difficult to discern by examining the data that was provided to the authors of the DEIS. A total of 726 sightings—not individuals—were made of Piping Plovers on 150 of shorebird surveys from July 2008-December 2011. Had the intent of DEIS been to faithfully assess impacts to wildlife, it should have taken pause at its erroneous figure "3,039 individuals," as that many Piping Plovers would mean that over 80% of the Atlantic Piping Plover population was using Rich Inlet. It would not be possible to determine the number of shorebird surveys from the raw data sent to the authors, but counting the unique dates of the Piping Plover sightings in the raw data would provide a close approximation (surveys on which no Piping Plovers were observed would be missing from the tally). The summary statistics (4.2 Piping Plovers per survey and annual average between 3.5 and 4.6) based on the incorrect figures are also incorrect. The number of individual Piping Plovers engaging in specific behaviors (foraging, roosting, etc.) could be determined from the data, provided the draft's authors had asked for a key to the column that was labeled "Behavior" and coded numerically. A brief description of survey methods was provided with the raw data as part of a map displaying the specific locations where individual or flocks of Piping Plovers were recorded. The authors of the report did not contact Audubon to ask any questions about the data provided.

As stated above, correct summary of the results of the 2007-2012 shorebird surveys at Rich Inlet is attached as an appendix. Data was collected and prepared by Audubon staff. Also included is the report from Masonboro Inlet, a stabilized inlet south of Rich Inlet.

In addition to the issues with its reporting of Audubon data, the DEIS has other problems with Piping Plover data. The authors again commit the error of summing counts—in this case, nests found from 2000-2007 on p. 142 and in Table 4.8 to indicate the number of pairs of nesting Piping Plovers using Rich Inlet. If 31 pairs of Piping Plovers used Rich Inlet, it would be extremely notable, as the state's total nesting population was 24 pairs in 2000 and 61 pairs in 2007 (USFWS 2011a). The same mistake is made in summing the Piping Plover counts in Table 4.8. The fact that these fantastical numbers, along with the 3,039 figure, go unremarked demonstrates the draft's disinterest in reporting impact to listed species. The fact that these numbers are incorrectly characterized indicates that the report would be better in the hands of someone with the appropriate background for interpreting the available data and assessing such impacts. An example of appropriately summing shorebird counts to arrive at an estimate of total individuals using an area in a given timeframe is provided in Audubon report (Audubon 2012a).

In the Wilson's Plover section on p. 144, the draft states "This is a peripheral species (North Carolina lies at the periphery of its species range) requiring monitoring by the NCNHP." This statement is incorrect. The current breeding range of the Wilson's Plover extends into northern Virginia, in the Delmarva Peninsula; its historic range reached New Jersey (Corbat and Bergstrom 2000). Breeding bird surveys of Lea-Hutaff are conducted every year by Audubon staff. Wilson's Plovers territories and nests are noted. In 2012, there were 25 defended territories, indicating 25 nesting pairs and 46 defended territories in 2011 (Audubon unpublished data).

The American Oystercatcher section (p. 145) does not mention the species' Partners in Flight Extremely High Priority status, nor does it mention its use of Rich Inlet during migration, particularly in the spring, when numbers increase as breeding and local birds' numbers are augmented by migrants (Audubon 2012a).

The Common Tern section contains an example of how to property report the number of nests found over a period of years. The data cited from David Webster's surveys of Figure Eight Island do not include the emergent shoals in the mouth of Rich Inlet. Common Terns, as well as Royal Terns, Sandwich Terns, and Black Skimmers, use area inlets as staging areas during spring and fall migration. In the spring as many as 463 Common Terns were counted on shorebird surveys, and in the fall as many as 670 were counted (Audubon 2012a). These flocks are often observed on the shoals in the mouth of Rich Inlet.

The DEIS does not contain data on the use of Rich Inlet by staging Black Skimmers. Like the Common Tern, Black Skimmers congregate at area inlets in the spring and fall. At Rich Inlet, the peak spring count is 132 the peak fall count is 1,500 (Audubon 2012a). Also like the Common Terns, Black Skimmers use the emergent shoal in the mouth of Rich Inlet, as well as the islands' spits to roost in these large groups.

Other Errors in Chapter 4

The DEIS imagines the dredge islands in the project area that are adjacent to the AIWW to be significant to nesting colonial waterbirds. It states

> *Colonial waterbirds utilize a variety of habitats for foraging, roosting, and nesting, which includes estuaries, oceanfronts, open dunes, inland areas, and intertidal shoal habitats. These birds also use a variety of habitats for nesting. Some colonial waterbirds such as brown pelicans, herons, and egrets utilize vegetated, upland environments. These three colonial waterbird groups prefer trees, shrubs, and grass lands for nesting and, as a result, may utilize the upland hammocks identified within the Permit Area* (p. 93).

Brown Pelicans and nearly all wading birds do not and have not ever nested on these islands. Green Herons and Yellow-crowned Night Herons may, in small numbers, nest on the islands. If the DEIS would like to create a scenario in which AIWW-adjacent dredge islands are spared from sand mining by turning to the shoals within Rich Inlet for material, its premise is invalid. Further, the infrequent deposits of spoil material on the AIWW dredge islands calls into question their sustainability as sand sources over a period of many years.

Of less concern, page 93 also suggests that brown pelicans, herons, and egrets are in three taxonomic groups. Herons and egrets do not comprise two separate taxonomic groups. Broadly herons and egrets are all in family Ardeidea, and at the genus level, the 12 species regularly occurring in North Carolina are in five genera. On a non-technical level, "heron" and "egret" are often used to denote long-legged wading birds that are blue (or another dark color) and white in color, respectively.

In the section entitled "Benefits of Inlet Dunes and Dry Beaches to Shorebirds, Colonial Waterbirds, and Other Waterbirds," inlet dunes and dry beaches are cited on pp. 93-94 as used by "herons and egrets, and ibises (*Threskiomis* spp.). In addition to intertidal shoal habitats, these birds can be found foraging, roosting, and nesting in estuaries, oceanfronts, open dunes located within the inlet complex." These species cannot typically be found in these habitats, except estuaries, which are not the subject of the section. Great Egrets, Snowy Egrets, and Great Blue Herons may occasionally be seen on beach fronts and very rarely in dunes.

The DEIS states that "*Some species of waterbirds, such as terns and black skimmers, nest on bare sand and shell with little or no vegetation. These species will change nesting areas in response to changing environmental conditions, such as increased vegetation or storm events*" (p. 94). On the same page, the importance of overwash habitat is stated. These statements are correct, but later in the DEIS, the authors state that "*These stabilization measures will allow for long term growth and development of dune vegetation and provide habitat for roosting, foraging and nesting shorebirds*" (p. 234). This is profoundly incorrect. The DEIS pointedly refuses to make the connection between stabilizing the north end of Figure Eight Island, vegetative succession, and the loss of nesting and roosting habitat for shorebirds during both the breeding and non-breeding season that will result from the construction of a terminal groin and other actions proposed in the DEIS.
Although p. 94 correctly identifies habitat scouring created by overwash as essential to shorebirds, it does not list all species that use such areas for nesting. In addition to the species it mentions (Willet, American Oystercatcher, Piping Plover, Wilson's Plover, and Killdeer), Common Terns, Least Terns, Gull-billed Terns, and Black Skimmers rely on overwash to create and maintain nesting habitat.

On p. 95, the paragraph titled "*Benefits of Tidal Flats and Shoals to Shorebirds, Colonial Birds and Other Waterbirds*" addresses the significance of these habitats in general terms. It does not specify the species that rely on them, nor does it provide citations to this effect. (It says "*Breeding and non-breeding federally endangered species and species of special concern also utilize intertidal flats and shoals. Therefore, Rich Inlet's habitats and the shorebirds that utilize them are a very important natural resource to the coast of North Carolina*.") Intertidal flats and shoals, particularly low-energy wet sand flats and shoals, are essential to many species of migrating and wintering shorebirds (Colwell 2010). These comments will address the reliance of Piping Plovers and other shorebirds on these features in the section called "*Impacts to Piping Plovers and Other Shorebirds*," but it is illogical and extraordinary that the DEIS would make more detailed statements regarding the use of dunes by egrets, herons, and ibis than about the use of intertidal features by Piping Plovers.

Also on p. 100, the DEIS states that "*Colonial waterbirds, such as gulls and black skimmers that utilize estuarine habitats, oceanfront shoreline, open dunes, and inland areas also utilize wet beach habitats for foraging, roosting, and nesting*." Gulls are not of conservation concern in North Carolina and do not typically nest on its beaches; mentioning them does not reflect a great deal of knowledge about beach-nesting birds in the state. The draft goes on to state "*These colonial waterbirds can rapidly populate and alter ranges in response to changes in environmental conditions.*" Again, this is inaccurate and misleading. Colonial waterbirds do not "*rapidly populate and alter ranges*." Most species produce on average fewer than 2 fledglings per pair and often less than 1 fledgling per pair (Nisbet 2002, Thompson at al. 1997, Gochfeld and Burger 1994). They also do not alter their range quickly. The draft is likely misapplying "range," the total geographic area in which a species is found, with terns' ability to colonize newly available habitat within its range, such as when Least Terns occupied the emergent shoal in the mouth of Rich Inlet in 2010 and 2011 after having nested in previous years on Hutaff Island.

Errors in Chapter 5

With regard to Alternative 3, the DEIS states:

> *These impacts will result in the conversion of intertidal flats and shoals to alternate habitat types; namely subtidal habitat and dry beach habitat. The removal of this habitat is expected to affect various foraging bird species who utilize the intertidal flats and shoals* (p. 232).

However, the affected species, including the Piping Plover and Red Knot, are not named and loss of foraging habitat is not described as a negative and ongoing impact. The authors of the DEIS either do not know or do not want to point out that availability foraging habitat is critical to shorebirds' survival and and that the proposed project will have a direct negative impact on these species.

With regard to Alternative 5A, the draft states:

> *Specifically, a net increase in shoaling is expected within the flood tide delta and along the western tip of Hutaff Island. This shoaling should help serve to maintain the integrity of the intertidal flats and shoals in this area, but at a reduced size…. (T)hese reformed intertidal and shoals may be less in size and extent from the pre-construction acreage. Because of the anticipated net reduction of the extent of intertidal flats and shoals relative to the without project condition, indirect negative impacts to the foraging and resting bird species utilizing the intertidal flats and shoals within the inlet complex are anticipated. Impacts to the intertidal flats and shoals within this area will cause the direct mortality ofmacroinfaunal species which is a prey source for foraging birds and fish populations* (p. 264).

And it reiterates:

> *Although intertidal flats and shoals are expected to be reduced within the permit area, the habitat should persist because the intertidal flats and shoals are considered to be ephemeral and dynamic* (p. 266).

Why they should persist is not explained, although to the south Masonboro Inlet's carrying capacity for shorebird species, including the Piping Plover, has been reduced by its relative lack of intertidal flats, shoals, and sandbars.

Although inlet systems are dynamic systems and the varied habitats they provide to birds and other wildlife are constantly undergoing change, Alternatives 1, 3, 4, 5A, and 5B are attempts to inhibit these natural processes and prevent the natural changes that maintain suitable foraging and nesting habitat. And, in all of its assessments of indirect impacts to shorebirds, the DEIS states that intertidal flats and shoals will be reduced, though it declines to state the obvious: that loss of this habitat will have a significant negative impact on wintering and migrating shorebirds like the Piping Plover and other shorebirds.

The DEIS repeatedly--and inaccurately-- asserts that direct impacts to shorebirds, including Piping Plovers, will be "minimal" because construction of the proposed terminal groin will take place between November 16th and March 31st:

> *The presence of construction activity in association with the groin and beach nourishment placement may stress shorebirds, including the endangered piping plover, from foraging along the intertidal flats along the northern portion of Figure Eight Island. With construction taking place between November 16th and March 31st, direct impacts to birds utilizing these habitats should be minimal. Also, the use of mechanical equipment will be restricted within a specific construction corridor for the construction of the terminal groin which should help in reducing any potential stresses on the birds that may be foraging and/or resting in the area. In addition, these birds would be expected to temporarily relocate to available nearby intertidal flats and shoals on the north side of the inlet* (p. 281).

This is entirely false. With these statements the DEIS does not demonstrate an understanding of patterns of inlet use by wintering shorebirds. Such activities will directly impact migrating and wintering shorebirds, including but not limited to the Piping Plover, whose spring migration numbers peak in March or April, and which overwinters at Rich Inlet. Other species that winter at Rich Inlet include Dunlin (peak November-March count: 1,362), Short-billed Dowitcher (peak November-March count: 228), Semipalmated Plover (peak November-March count: 201), and Black-bellied Plover (peak November-March count: 122) (Audubon 2012a). The presence of construction equipment will be time-limited and episodic (it won't be in motion continuously), but when machinery is active, the north end of Figure Eight Island, where these flocks often roost, will be unavailable. Further, the low-energy mudflat on the sound side of the north end of Figure Eight Island is an important feeding area for Piping Plovers as well as other shorebirds, and the shoal on the north side of the inlet (Green Shoal) is submerged for much of the tidal cycle.

Wider beaches are repeatedly presented as a beneficial effect of the installation of the terminal groin and beach renourishment, yet the DEIS does not address the effects of vegetative succession and the loss of nesting habitat and the loss of high tide rest/roost habitat. The report states, "*These stabilization measures will allow for long term growth and development of dune vegetation and provide habitat for roosting, foraging and nesting shorebirds*" (p. 234), but the opposite is true (USFWS 2009). Overwash fans and elevated inlet spits constitute the best habitat for beach-nesting birds, such as Least Terns, Common Terns, Black Skimmers, American Oystercatchers, and Wilson's Plovers, which are found on Figure Eight Island (Thompson et al. 1997). This is because they are sparsely vegetated or bare and maintained through natural processes. Within 3-5 years without overwash, dune vegetation will become too dense and eliminate or significantly degrade nesting habitat (Parnell and Shields 1990). Roosting shorebirds also prefer elevated but open areas that allow them to see the approach of predators. They do not roost within dune systems or seek vegetation. The DEIS makes similar statements earlier, in Chapter 4, on p. 94 and p. 97 (e.g. "*Terns and black skimmers nest on bare sand and shell with little or no vegetation. These species will change nesting areas in response to changing environmental conditions, such as increased vegetation*"), but that information is disregarded in assessing the consequences of the installation of a terminal groin.

Omissions

Chapter 4, section E of the draft purports to describe use of Rich Inlet by bird species with federal or state status in narrative form, but it omits the Least Tern entirely. This is extraordinary, because Figure Eight Island regularly posts the Least Tern colony on the north end of Figure Eight Island, there is a long history of nesting by Least Terns on Figure Eight Island, and there is easily and readily available data on Least Tern nesting within the project area.

Section E also omits the Red Knot, whose candidacy for listing under the Endangered Species Act is discussed elsewhere in the document. Table 4.5 of the DEIS also purports to enumerate all listed species found in the Rich Inlet system; however, it omits the Least Tern (again), Red Knot, Snowy Egret, Little Blue Heron, Tricolored Heron, and Bald Eagle (Table 28). Of these species, data showing the use of the system by Least Terns and Red Knots is readily available and even referenced multiple times elsewhere in the DEIS.

Table 28. Status and use type of listed bird species using Rich Inlet. Species at Rich Inlet from Audubon surveys (2012a), except Painted Bunting.

	Status	Inlet Use
Bald Eagle	ST	O

Snowy Egret	SSC	O
Little Blue Heron	SSC	O
Tricolored Heron	SSC	O
Piping Plover	FT	B, M, W
Wilson's Plover	SSC	B, M
American Oystercatcher	SSC	B, M, W
Red Knot	FT*	M, W
Gull-billed Tern	ST	B
Common Tern	SSC	B, M
Least Tern	SSC	B, M
Black Skimmer	SSC	B, M
Painted Bunting	SSC	B

FE = Federally Endangered, FT = Federally Threatened ST = State Threatened SSC = State Special Concern
B = Breeding M = Migrating W = Wintering O = Occasional
* Candidate for listing

Partners in Flight's Watch List includes several species of conservation concern that use Rich Inlet (Golder and Smalling 2011) (Table 29). This WatchList is not mentioned in the DEIS.

Table 29. Partners in Flight priority species. Species at Rich Inlet from Audubon surveys (2012a), except Painted Bunting.

Species	Status	Inlet Use	Species	Status	Inlet Use
Brown Pelican	HP	B*, M, W	Western Sandpiper	HP	M, W
White Ibis	HP	B*	Royal Tern	HP	B*, M
Clapper Rail	HP	B, W	Sandwich Tern	HP	B*, M
American Kestrel	EHP	O	Common Tern	HP	B, M
Peregrine Falcon	EHP	O	Least Tern	HP	B, M
American Oystercatcher	EHP	B, M, W	Gull-billed Tern	HP	B
Piping Plover	EHP	B, M, W	Black Skimmer	HP	B, M
Wilson's Plover	HP	B	Painted Bunting	HP	
Solitary Sandpiper	HP	O	Saltmarsh Sparrow	EHP	M, W
Whimbrel	HP	M	Nelson's Sparrow	HP	M, W
Red Knot	EHP	M, W	Seaside Sparrow	HP	M, W
Semipalmated Sandpiper	HP	M			

B = Breeding B* = present during breeding season but does not breed at Rich Inlet
M = Migrating W = Wintering O = Occasional

The U.S. Shorebird Conservation Plan (2004) also lists priority species, several of which use Rich Inlet (Table 30). Because the various conservation plans use different criteria for selecting species of concern, it is useful to consult multiple sources in order to determine which species are most sensitive to environmental impacts.

Table 30. U.S. Shorebird Conservation Plan priority species. Species at Rich Inlet from Audubon surveys (2012a).

Species	Status	Inlet Use
Piping Plover	HI	B, M, W
Red Knot	HI	M, W
Marbled Godwit	HC	M
Western Sandpiper	HC	M, W
Short-billed Dowitcher	HC	M, W
Wilson's Plover	HC	B, M
American Oystercatcher	HC	B, M, W

Whimbrel	HC	M
Ruddy Turnstone	HC	M, W
Sanderling	HC	M, W
Dunlin	HC	M, W

HI = Highly Imperiled HC = High Concern
B = Breeding M = Migrating W = Wintering

Red Knot

Red Knots are not mentioned in Chapter 4, Section E of the DEIS. The *Calidris canutus rufa* subspecies is a candidate species for protection under the Endangered Species Act. They migrate along the Atlantic seaboard, stopping over at Delaware Bay and other coastal sites. The threats to Red Knots include habitat destruction due to "beach erosion and various shoreline protection and stabilization projects," inadequate regulation, and human disturbance are also identified threats (USFWS 2011b). However, the DEIS does not cite the report evaluating their ESA candidacy.

Red Knots use Rich Inlet during migration, particularly in May, in flocks of up to 258, and a small flock winters in the Cape Fear region from New Topsail Inlet to Mason Inlet and has been observed at Rich Inlet (greatest count 23, January 2012) (Audubon2012a). Band sightings at Rich Inlet show that birds using Delaware Bay use Rich Inlet as a stopover site (Audubon unpubl. data). Flocks have been observed roosting and feeding on the entire Rich Inlet Shoals, both oceanfront and sound side beaches on Figure Eight Island, and Hutaff Island.

Piping Plover

The Piping Plover's extensive and year-round use of Rich Inlet has been thoroughly documented above. These key facts bear repeating:

1. Band data shows that Threatened and Endangered populations of Piping Plovers use Rich Inlet.
2. Best data indicate that well over 100 individuals use Rich Inlet annually during spring and fall migration. During spring migration, an estimated 75 individual Piping Plovers depend on Rich Inlet at this critical time of their annual cycle. This represents approximately 2% of the Atlantic coast and Great Lakes population (USFWS 2012) During fall migration, an estimated 164 Piping Plovers used the inlet, or up to 4.5% of the population (USFWS 2012).
3. Piping Plovers at Rich Inlet depend on low-energy, intertidal sand and mud-sand flats and shoals, and the oceanfront beach and intertidal zone for foraging. They also depend on the adjacent inlet shoulders as high tide rest/roost sites.
4. If a terminal groin wasinstalled at Rich Inlet, or were other projects undertaken that eliminated or reduced foraging habitat, the inlet would resemble Masonboro Inlet, at which 33 Piping Plover sightings were made from July 2009-May 2012. No sightings at all were made in 2010. In contrast, in the same period of time 660 Piping Plover sightings were made at Rich Inlet.

The DEIS fails to reference any of a number of other shorebird conservation plans, all of which reference the importance of winter and migration habitat. Examples of such references include the Dunlin conservation plan:

> *To safeguard Dunlin populations, we have to protect the interconnected chains of wetlands they depend upon from further deterioration and disappearance. Because adult survival is a critical variable in determining population size of [long-lived] migratory shorebirds, it is very important to maintain and secure high-quality habitats* (Fernández and Buchanan 2010),

Sanderling:

> *Habitat loss has particularly significant implications for Sanderlings during migration—a time when they must put on fat to fuel their long flights—and also in winter (stressful weather). The potential cost during migration is clear: without enough fuel (fat), Sanderlings may not be able to complete the next leg of their journey, may arrive on breeding grounds with too few resources to breed, or may not survive. On the wintering grounds (e.g., California, North Carolina, and Peru), many individuals exhibit strong site fidelity and spend most of their time (or return to) the same 5- to 10-kilometer stretch of beach year after year (Myers et al. 1979a, Connor et al. 1981, Myers et al. 1988, Dinsmore et al., 1998). Thus, the loss of even small stretches of coastline could alter social dynamics of local winter populations, with potentially harmful (although currently unknown) consequences.*
>
> *At many other beaches throughout the nonbreeding range, physical manipulation of the sand/beach surface reduces prey availability and may also reduce cover for night roosting (e.g., by removing wrack). For instance, beach "re-nourishment" projects (i.e., adding sand to a sandy beach for stabilization and aesthetic purposes), beach scraping (removal of the top ~12" of sand, for commercial construction projects), and mechanized beach raking (removal of seaweed and other debris for aesthetic purposes) all alter the sand composition, prey abundance, and other attributes of the habitat, and likely impact Sanderlings and other organisms as well (e.g., nesting sea turtles). These practices are common along U.S. coasts, although their impacts on invertebrate populations and their predators (i.e., shorebirds) are largely unstudied* (Payne 2010),

Whimbrel

> *On the Atlantic coast of the United States, encroaching human development, increasing recreational use of coastal areas, and beach stabilization projects all threaten the limited amount of suitable habitat remaining (Clark et al. 2000, Hunter et al. 2002, K. Forgues, pers. comm.).* (Wilke and Johnston-González 2010).

Little Blue Heron, Snowy Egret, Tricolored Heron

Little Blue Herons are occasionally observed in small numbers (<20) during shorebird surveys during the summer and fall (Audubon 2012a. Snowy Egrets are seen in small numbers from the spring-fall. Tricolored Herons are seen year-round (Audubon 2012a).

Bald Eagle

In the late summer and fall of 2011 and the winter and spring of 2012, a Bald Eagle was observed at Rich Inlet (Audubon 2012a). In all cases, it was an adult, but it is not possible to determine if it was the same individual. Bald Eagles nest along the AICWW and may hunt in the area's inlets.

Because none of the proposed alternatives except for Alternative 2 avoid or minimize significant, cumulative direct and indirect negative impacts to birds, Chapter 6, Avoidance and Minimization, omits almost any mention of shorebirds and offers only grossly inadequate monitoring (p. 298). The proposed bird monitoring as conducted by UNCW under the direction of David Webster is inadequate to the task of assessing impacts of alternatives 1, 3, 4, 5A, and 5B because it does not cover the entire inlet system. The statement "Opportunistic surveys for non-breeding piping plovers have been conducted in more recent years" is not correct. Systematic year-round surveys have taken place since 2007 (Audubon 2012a). The boat-based, year-round weekly/biweekly methodology used in these surveys is necessary for valid monitoring of Rich Inlet.

Problems with the Summary of Impacts Table

The Summary of Impacts Table does not fully list all negative impacts to birds. In fact, it elides over them, as is the case throughout the rest of the document. Throughout the table, the DEIS pushes the "positive" impact of additional dunes, but entirely fails to mention that the formation of such dunes destroys nesting habitat for shorebirds and waterbirds. Dunes are not the habitat that shorebirds or waterbirds require. Meanwhile, the DEIS neglects to mention the loss of foraging habitat.

Under Alternative 3, the table states with regard to inlet dunes and dry beaches :

> *Negative direct impacts of 40-50 acres if inlet dunes and dry beach habitat are expected. This will lead to the burial of infaunal species and disruption of nesting and foraging habitat as a result of the sporadic beach nourishment activities. The burial of infaunal organisms could negatively indirectly affect the birds that forage on these organisms. These impacts would be incurred along the inlet beaches of Figure Eight Island and Hutaff Island (in response to the constructed dike). Positive indirect impacts are anticipated to the birds and sea turtles which utilize this habitat for nesting and foraging as the habitat increases. Due to the relocation of the inlet channel, much of the ebb tide delta that currently provides protection to Hutaff Island's Inlet Dunes and Dry Beaches is expected to diminish as the ebb tide delta is expected to reorient southward. Therefore, as shown by Delft3D model results, portions of the inlet beaches along Hutaff Island are expected to erode within 5 years.*

The burial of infaunal organisms will directly and negatively impact the shorebirds that feed on them. Depending on conditions it can take more than a year to recover populations (Peterson et al. 2006). Nesting habitat may also be lost to new erosion patterns along Hutaff Island. The positive impacts cited are dubious, at best.

The impacts on intertidal flats and shoals are grossly understated by the table and throughout the DEIS. Alternative 3 would remove 15-20 acres of flats and anticipates additional losses to erosion. Alternative 5A would remove 26.8 acres of intertidal flats and shoals and impact an additional 0.7 acres. Both alternatives state "No cumulative impacts are anticipated." Instead, there will be direct, indirect and Cumulative impacts that result from the aforementioned alternatives. The intertidal flats and shoals are extremely important foraging areas for Piping Plovers and other shorebirds in Rich Inlet (Audubon 2012a), and such habitat has been found to be of particular importance to non-breeding Piping Plovers (Haig and Oring 1985, Johnson and Baldassarre 1988, Nicholls and Baldassarre 1990, Cohen 2008). The DEIS entirely omits to mention this impact, which would significantly reduce the amount of habitat available to Piping Plovers, Red Knots, and other shorebirds and will significantly diminish the quality of the NC-11 Critical Habitat Unit.

Another indirect impact to birds not mentioned by the DEIS is increased competition between birds and people for space. Without extensive shoals, boaters will be pushed into a smaller area, where they are more likely to flush flocks. This chronic disturbance will exclude Piping Plovers and other shorebirds and waterbirds from very important habitat that is otherwise suitable. Various shorebird conservation plans and resources (e.g. Colwell 2010, Brown et al. 2001) name disturbance from beachgoers and other recreationalists as a major threat to migrating and wintering shorebirds, whose energetic needs may not be met if they are flushed too frequently from feeding and roosting sites. This disturbance threatens their survival. Meanwhile, the increase in dry beach will be of minimal benefit to boaters in Rich Inlet, and access to anchorage on the sound side of Figure Eight Island would be the determining factor in access to the wider beach to be created on the island.

Finally, the DEIS does not address the potential long-term cumulative impacts to the addition of a terminal groin on the north end of Figure Eight Island. Thegroin will function as all groins do and trap sand, disrupting longshore transport of sediment, which will likely impact the beaches southward on Figure Eight Island, Mason Inlet and Wrightsville Beach. These beaches will require more frequent sand replenishment and dredging, which will have a significant impact on birds that depend on beaches and intertidal habitats. These long-term impacts would have negative effects on birds beyond the project area.

Sourcing and Use of Data

One of the most objectionable aspects of the DEIS is its deliberate distortion of impacts to shorebirds, particularly the Piping Plover, through its selective citation and sourcing of scientific literature and federal shorebird recovery plans and reports.

The DEIS cites major conservation planning documents, such as the U.S. Shorebird Conservation Plan and Atlantic population Piping Plover recovery plan; however, it uses these documents only to establish basic facts about the species' range and biology. The recommendations and conclusions within these documents are not cited. Citing the recovery plan, or other peer-reviewed literature, without mentioning conclusions and recommendations, is not useful in assessing impacts to Piping Plovers and other shorebirds.

All USFWS Piping Plover conservation documents plans cite the need to protect Piping Plover habitat from both the direct and indirect impacts of shoreline stabilization, inlet dredging, and beach maintenance. The Piping Plover Atlantic Coast Population Revised Recovery Plan (USFWS 1996) states "*Loss and degradation of habitat due to development and shoreline stabilization have been major contributors to the species' decline*." It cites the cumulative effects of structures that "cause significant habitat degradation by robbing sand from the downdrift shoreline" as well as more localized impacts at the sites of these structures. It recommends the discouragement of stabilization projects and suggests creation or enhancement of habitat in affected areas as mitigation. These conclusions are not referenced in the DEIS. Instead, it uses the recovery plan three times: to cite the Piping Plover's use of overwash habitats (p. 94), its listing status (p. 140), and its nest construction and clutch size (p. 141).

The Recovery Plan for the Great Lakes Piping Plover states :

> *Beach stabilization and 'nourishment' projects also degrade the quality of beach habitat for piping plovers and other coastal species. To ensure adequate habitat for survival, reproduction and recovery, natural processes within the ecosystems piping plovers utilize must be protected* (USFWS 2003).

The DEIS does not reference the Recovery Plan for the Great Lakes Piping Plover, although use of the southeast coast by Great Lakes plovers is documented in the literature it does cite and it does mention use of the Atlantic coast by Great Lakes birds.

The Piping Plover (*Charadrius melodus*) 5-Year Review: Summary and Evaluation identifies sand placement projects, inlet stabilization/relocation, sand mining/dredging, groins, and seawalls and revetments as threats to Piping Plovers and the 24 species of shorebirds that migrate along the Atlantic coast. See pages 4-5.

> *Habitat loss and degradation remains very serious threats to Atlantic Coast piping plovers, especially in the New York-New Jersey and Southern recovery units. Artificial shoreline*

stabilization projects perpetuate conditions that reduce carrying capacity and productivity and exacerbate conflicts between piping plovers and human beach recreation. As discussed in section AC 2.5.3.5, many activities that artificially stabilize barrier beaches will further exacerbate threats from projected sea-level rise (USFWS 2009).

The review also explains the importance of high-quality stopover and wintering habitat in the context of a small population that spends most of its annual cycle away from nesting grounds:

Two recent Atlantic Coast population viability analyses conducted by Calvert et al. (2006) and Brault (2007) have confirmed the consistent finding of earlier piping plover PVAs that extinction risk is highly sensitive to small declines in adult and/or juvenile survival rates (USFWS 2009).

and

Piping plover populations are highly vulnerable to even small declines in survival rates of adults and fledged juveniles. Population growth gained through high productivity on the breeding grounds will be quickly reversed if survival rates or breeding fitness decline due to stressors experienced during the two-thirds of the annual cycle spent in migration and wintering. Although management of threats in the nonbreeding range has begun to increase in recent years, considerably more attention and effort are required (USFWS 2009).

By providing foraging and roosting habitat within a single inlet system, comparable in size to a typical Piping Plover winter home range (Drake et al. 2001), Rich Inlet likely supports as many as 164 individual Piping Plovers during a single fall migration season. The projects proposed in Alternatives 1, 3, 4, 5A and 5B would diminish or eliminate habitat in Rich Inlet. So in the face of strong and specific opposition to the type of project proposed by the applicant, the DEIS fails to cite any of these recommendations or conclusions, nor in fact does it cite the 5-year review at all.

The U.S. Shorebird Conservation Plan is cited twice in the DEIS, on p. 74 to substantiate use of salt marsh habitat for foraging by shorebirds and on p. 144 in reference to the conservation status of the Wilson's Plover. Neither of these instances is appropriate use of the document. Worse, the draft omits to cite pertinent information within the plan that relates directly to the alternatives that would attempt shoreline stabilization:

The SCPCR [Southeastern Coastal Plains-Caribbean Regional Plan] is important for breeding shorebirds as well as for supporting transient species during both northbound and southbound migrations. Breeding species of highest regional priority include American Oystercatcher, Snowy Plover, Wilson's Plover, and Piping Plover. Shorebirds in the planning region face potential impacts primarily from: 1) chronic human-caused disturbance to roosting and nesting birds and possibly to foraging birds; 2) oil spills at strategic migration staging areas; 3) transfer of water rights that may directly or indirectly affect prey availability by reducing freshwater input into important estuarine habitats; 4) barrier beach stabilization; 5) contaminants; and 6) inadequate management capability on public lands. Also, there has been a well-documented loss of wetland habitats in the SCPCR during the last 200 years.

Three general habitat goals for the SCPCR are: 1) to provide optimal breeding habitat to maintain and increase populations of priority species; 2) to provide high quality managed habitat

> *to support species migrating through or wintering in the region; and 3) to restrain human disturbance to tolerable levels for shorebirds throughout the year* (Brown et al. 2001).

The plan includes dredging wetland areas that have been impaired by sedimentation as a potential but not preferred management activity, but only in the context of maintaining shorebird habitat in non-barrier systems, not engineering beachfront or inlet systems. It states instead that "Naturally self-maintaining systems should be preserved and are generally preferable to sites requiring ongoing management (Brown et al. 2001).

There is no conservation document that calls for the installation of terminal groins and fillets to create habitat for beach-nesting birds; no conservation document that calls for the installation of terminal groins and other hardened structures to impair natural coastal processes along barrier islands and at inlets; no conservation plan that claims these benefit shorebirds. Instead, every plan cites shoreline stabilization projects as a threat to shorebirds. Yet, the DEIS could find no room in 365 pages to cite these scientifically valid problems with terminal groins, dredging, and sand mining.

In general, the DEIS privileges breeding over non-breeding birds in its comments on impacts to birds. This is not in step with current conservation planning, which recognizes the need to protect species like the Piping Plover throughout their annual cycle (i.e. during migration and winter as well as nesting) (USFWS 2009, Brown et al. 2001).

The DEIS also mistreats peer-reviewed articles. When the Delt3D model predicts an increase in beach width, either on Hutaff or Figure Eight Island, the DEIS attempts to emphasize the importance of wide beaches to Piping Plovers. It does so in two places, citing the same journal articles:

> *Wintering plovers on the Atlantic coast prefer wide beaches in the vicinity of inlets (Nicholls and Baldassarre, 1990; Wilkinson and Spinks, 1994)* (p. 230).

> *As shown by research, wintering plovers on the Atlantic coast prefer wide beaches in the vicinity of inlets (Nicholls and Baldassarre, 1990; Wilkinson and Spinks, 1994)* (p. 262).

However, Baldassarre (1990) found that wide beaches were a significant predictor of Piping Plover presence on the Gulf Coast, not the Atlantic coast, and differentiated between the more important predictive factors for Piping Plover occupancy on the Atlantic coast—the number of large inlets and passes, the presence of mudflats, and the number of tidepools—and the Gulf coast—beach width, number of small inlets, and beach area). This information is presented in the abstract of the article, as well as the body, and is not obscure or difficult to discern. The inevitable conclusion is that the DEIS was more interested in arriving at a desired conclusion than faithfully and accurately describing the conclusions of a peer-reviewed article.

Similarly, Wilkinson and Spinks (1994) found Piping Plovers were on open sandy beaches near inlets. However, the DEIS does not look any farther at the factors that attract Piping Plovers to the vicinity of inlets. There is a growing body of peer-reviewed scientific literature showing the use of inlets and associated low-energy intertidal flats by Piping Plovers, particularly migrating or wintering Piping Plovers (Haig and Oring 1985, Johnson and Baldassarre 1988, Nicholls and Baldassarre 1990), and indicating that Piping Plovers use a variety of habitats throughout the tidal cycle within a small home range during the non-breeding season (Drake et al. 2001, Rabon 2006, Cohen 2008 et al., Maddock et al. 2009). Foraging activity is strongly associated with mud or sandflats on the Atlantic and Gulf coasts (Nicholls 1989), and

the same has been documented at Rich Inlet, where Piping Plovers foraged on low-energy shoals, bay beaches, inlet spits, and sandbars on the sound side of the inlets on 62.5% of observations (Audubon2012a). This preference for a mosaic of habitat types and their frequent reliance on intertidal flats and shoals should require comment in the DEIS, as two of the alternatives would result in the elimination of a large proportion of this habitat from Rich Inlet. However, the DEIS choose to elide over these findings while selectively citing its sources.

Conclusions

Best management practices for minimizing environmental impacts for shoreline stabilization projects first call for alternatives to hardened structures to be sought; except in extreme cases of urbanization, structures such as groins should not be employed, and when they are a high-quality EIS should be prepared (Rice 2009). In particular, inlets should not be stabilized and shoals should not be subjected to sand mining due to environmental impacts and a tendency for removal to accelerate erosion elsewhere (Rice 2009). The number of structures threatened by natural inlet processes and the state of the DEIS do not conform to these recommendations. As North Carolina's inlets are increasingly impacted by stabilization and other anthropogenic affects it becomes increasingly important to protect remaining natural inlet systems.

Alternatives 1, 3, 4, 5A, and 5B all would significantly and negatively impact the populations of Piping Plovers, Red Knots and other shorebirds, as well as Least Terns, Common Terns, Black Skimmers and other birds that have been shown to rely on Rich Inlet, Figure Eight Island and Hutaff Island.

Literature Cited

American Oystercatcher Working Group [AOWG], Erica Nol and Robert C. Humphrey. 2012. American Oystercatcher (*Haematopus palliatus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology.

Audubon North Carolina (Audubon). 2012a. Rich Inlet Shorebird Surveys, 2007-2012: Preliminary Summary of Results. Wilmington, NC. 21 pp.

Audubon North Carolina (Audubon). 2012b. Masonboro Inlet Shorebird Surveys, 2009-2012: Preliminary Summary of Results. Wilmington, NC. 14 pp.

Blanton, J.O., F.R. Werner, A. Kaoolnai, B.O. Blanton, D. Knott, and E.L. Werner. 1999. Wind-generated transport of fictitious passive larvae into shallow tidal estuaries. Fisheries Oceanography 8: 210-223.

Brown, S., C. Hickey, B. Harrington, and R. Gill, eds. 2001. The U.S. Shorebird Conservation Plan, 2nd ed. Manomet Center for Conservation Sciences, Manomet, MA.

Clark, K.E., L.J. Niles and Northern Atlantic Shorebird Habitat Working Group. 2000. Northern Atlantic Regional Shorebird Plan. Version 1.0. Woodbine, New Jersey.

Cleary, W.J. and T.P. Marden. 2001. A Pictorial Atlas of North Carolina Inlets. Raleigh, NC. North Carolina Sea Grant, NC State University, 1575 Varsity Drive, Flex Building Module 1, Campus Box 8605, Raleigh, NC 27695. 919-515-2454. http://www.ncseagrant.org/index.cfm.

Cohen, J.B., S.M. Karpanty, D.H. Catlin, J.D. Fraser, and R.A. Fischer. 2008. Winter ecology of Piping Plovers at Oregon Inlet, North Carolina. Waterbirds 31: 472-479.

Colwell, M.A. 2010. Shorebirds Ecology, Conservation and Management. University of California Press, Berkeley.

Connors, P.G., J.P. Myers, C.S.W. Connors, and F.A. Pitelka. 1981. Interhabitat movements by Sanderlings in relation to foraging profitability and the tidal cycle. Auk 98: 49–64.

Corbat, C.A. and P.W. Bergstrom. 2000. Wilson's Plover (*Charadrius wilsonia*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology.

Defeo, O., A. McLachlan, D.S. Schoeman, T. A. Schlacher, J. Dugan, A. Jones, M. Lastra, F. Scapini. 2009. Threats to sandy beach ecosystems: A review. Estuarine, Coastal and Shelf Science 81: 1-12.

Dinsmore, S.J., J.A. Collazo and J.R. Walters. 1998. Seasonal numbers and distribution of shorebirds on North Carolina's Outer Banks. Wilson Bulletin 110: 171–181.

Drake, K. R., J. E. Thompson, K. L. Drake, and C. Zonick. 2001. Movements, habitat use, and survival of nonbreeding Piping Plovers. Condor 103: 259-267.

Elliott-Smith, E. and S.M. Haig. 2004. Piping Plover (*Charadrius melodus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology.

Fernández, G., J.B. Buchanan, R.E. Gill, Jr., R. Lanctot, and N. Warnock. 2010. Conservation Plan for Dunlin with Breeding Populations in North America (*Calidris alpina arcticola, C. a. pacifica, and C. a. hudsonia*), Version 1.1. Manomet Center for Conservation Sciences, Manomet, Massachusetts.

Fernández, G., N. Warnock, D.B. Lank, and J.B. Buchanan. 2010. Conservation Plan for the Western Sandpiper (*Calidris mauri*). Version 1.1. Manomet Center for Conservation Sciences, Manomet, Massachusetts.

Gochfeld, M. and J. Burger. 1994. Black Skimmer (*Rynchops niger*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology.

Golder, W. and C. Smalling. 2011. Important Bird Areas of North Carolina 2010 Edition. Audubon North Carolina.

Gratto-Trevor, C., D. Amirault-Langlais, D. Catlin, F. Cuthbert, J. Fraser, S. Maddock, Roche, and F. Shaffer. 2009. Winter distribution of four different piping plover breeding populations. Report to U.S. Fish and Wildlife Service. 11 pp.

Haig, S. M. and L. W. Oring. 1985. The distribution and status of the Piping Plover throughout the annual

cycle. Journal of Field Ornithology 56: 334-345.

Harrington, B. R. 2008. Coastal inlets as strategic habitat for shorebirds in the southeastern United States. DOER Technical Notes Collection. ERDC TN-DOER-E25. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

Harrington, B.A. 2001. Red Knot (*Calidris canutus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology.

Hunter, W.C., J. Collazo, B. Noffsinger, B. Winn, D. Allen, B. Harrington, M. Epstein, and J. Saliva. 2002. Southeastern Coastal Plains-Caribbean Region Report. U.S. Shorebird Conservation Plan. Atlanta, Georgia.

Johnson, C.M. and G.A. Baldassarre. 1988. Aspects of the wintering ecology of Piping Plovers in coastal Alabama. Wilson Bulletin 100: 214-223.

Lowther, P.E., H.D. D. III, and C.L. Gratto-Trevor. 2001. Willet (Tringa semipalmata), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology.

Macwhirter, B., P. Austin-Smith, Jr., and D. Kroodsma. 2002. Sanderling (Calidris alba), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology.

Maddock, S., M. Bimbi, and W. Golder. 2009. South Carolina shorebird project, draft 2006-2008 piping plover summary report. Audubon North Carolina and U.S. Fish and Wildlife Service, Charleston, South Carolina. 135 pp.

Myers, J.P., P.G. Connors, and F.A. Pitelka. 1979b. Territoriality in non-breeding shorebirds. Studies in Avian Biology 2: 231–246.

Myers, J.P., C.T. Schick, and G. Castro. 1988. Structure in Sanderling (*Calidris alba*) populations: the magnitude of intra- and inter-year dispersal during the nonbreeding season. Acta XIX Congr. Int. Ornithology 19: 604–615.

Molina, K. C., J. F. Parnell and R. M. Erwin. 2009. Gull-billed Tern (Gelochelidon nilotica), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology.

Nicholls, J. L. and G. A. Baldassarre. 1990. Habitat selection and interspecific associations of Piping Plovers wintering in the United States. Wilson Bulletin. 102: 581-590.

Nicholls, J. L. 1989. Distribution and other ecological aspects of Piping Plovers wintering along the Atlantic and Gulf coasts. M. S. thesis. Auburn Univ. Auburn, AL.

Niles, J.N., H.P. Sitters, A.D. Dey, P.W. Atkinson, A.J. Baker, K.A. Bennerr, R. Carmona, K.E. Clark, N.A. Clark, C. Espoz, P.A. González, B.A. Harrington, D.E. Hernández, K.S. Kalasz, R.G. Lathrop, R.N. Matus, C.D.T. Minton, R.I.G. Morrison, M.K. Peck, W. Pitts, R.A. Robinson, and I.L. Serrano. Status of the Red Knot (Caladrius canutus rufa) in the Western Hemisphere. 2008. Studies in Avian Biology 36. 185 pp.

Nisbet, I.C. 2002. Common Tern (Sterna hirundo), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology.

Parnell, J. and M. Shields. 1990. Management of North Carolina's Colonial Waterbirds. North Carolina Sea Grant. UNC-SG-90-03. pp. 165.

Payne, L. X. 2010. Conservation Plan for the Sanderling (*Calidris alba*). Version 1.1. Manomet Center for Conservation Sciences, Manomet, Massachusetts.

Peterson, C.H., M.J. Bishop, G.A. Johnson, L.M. D'Anna, and L.M. Manning. 2006. Exploiting beach filling as an unaffordable experiment: Benthic intertidal impacts propagating upwards to shorebirds. Journal of Experimental Marine Biology and Ecology 338: 205-221.

Peterson, C.H. 1985. Patterns of lagoonal bivalve mortality after heavy sedimentation and their paleoecological significance. Paleobiology 11: 139-153.

Peterson, C.H. and R. Black. 1988. Density-dependent mortality caused by physical stress interacting with biotic history. American Naturalist 131: 257-270.

Rabon, D.R. (compiler). 2006. Proceedings of the Symposium on the Wintering Ecology and Conservation of Piping Plovers. U.S. Fish and Wildlife Service, Raleigh, NC.

Rice, T.M. 2012a. Inventory of habitat modifications to tidal inlets in the coastal migration and wintering range of the piping plover (*Charadrius melodus*). Prepared for the U.S. Fish and Wildlife Service, Terwilliger Consulting, Inc. 35 pp.

Rice, T.M. 2012b. The status of sandy, oceanfront beach habitat in the coastal migration and wintering range of the piping plover, (*Charadrius melodus*). Prepared for the U.S. Fish and Wildlife Service, Terwilliger Consulting, Inc. 40 pp.

Rice, T.M. 2009. Best management practices for shoreline stabilization to avoid and minimize environmental impacts. Prepared for the USFWS, Panama City Ecological Services Field Office, Terwilliger Consulting, Inc.. 22 pp.

Street, M.W., A.S. Deaton, W.S. Chappell, and P.D. Mooreside. 2005. North Carolina Coastal Habitat Protection Plan. North Carolina Department and Natural Resources Division of Marine Fisheries, Morehead City, NC. 656 pp.

Thompson, B.C., J.A. Jackson, J. Burger, L.A. Hill, E.M. Kirsch, and J.L. Atwood. 1997. Least Tern (Sternula antillarum), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology.

U.S. Fish and Wildlife Service. [USFWS] 2012. Preliminary 2011 Atlantic Coast Piping Plover Abundance and Productivity Estimates. 2012 Atlantic Coast Piping Plover and Least Tern Workshop. Shepherdstown, WV. 1 p.

U.S. Fish and Wildlife Service [USFWS]. 2011a. Abundance and productivity 2010 update: Atlantic Coast piping plover population. Sudbury, Massachusetts. 4 pp.

U.S. Fish and Wildlife Service [USFWS]. 2011b. Endangered and Threatened Wildlife and Plants; Review of Native Species That Are Candidates for Listing as Endangered or Threatened; Annual Notice of Findings on Resubmitted Petitions; Annual Description of Progress on Listing Actions. Federal Register 76 (207): 66370-66439.

U.S. Fish and Wildlife Service [USFWS]. 2009. Piping Plover (*Charadrius melodus*) 5-Year Review: Summary and Evaluation. Hadley, Massachusetts. vi + 206 pp.

U.S. Fish and Wildlife Service [USFWS]. 2003. Recovery Plan for the Great Lakes Piping Plover (*Charadrius melodus*). Ft. Snelling, Minnesota. viii + 141 pp.

U.S. Fish and Wildlife Service [USFWS]. 2001. Piping Plover (*Charadrius melodus*) Wintering Habitat. Federal Register 66 (132): 36086-36092.

U.S. Fish and Wildlife Service [USFWS]. 1996. Piping Plover (*Charadrius melodus*), Atlantic Coast Population, Revised Recovery Plan. Hadley, Massachusetts. 258 pp.

U.S. Shorebird Conservation Plan. 2004. High Priority Shorebirds - 2004. Unpublished Report, U. S. Fish and Wildlife Service, 4401 N. Fairfax Dr., MBSP 4107, Arlington, VA, 22203 U.S.A. 5 pp.

Wilke, A.L., and R. Johnston-González . 2010. Conservation Plan for the Whimbrel (*Numenius phaeopus*). Version 1.1. Manomet Center for Conservation Sciences, Manomet, Massachusetts.

Wilkinson, P. M. and M. Spinks. 1994. Winter distribution and habitat utilization of Piping Plovers in South Carolina. Chat 58: 33-37.

Thank you for the opportunity to submit comments on this important project.

Sincerely,

Walker Golder
Deputy State Director

North Carolina Coastal Federation
CITIZENS WORKING TOGETHER FOR A HEALTHY COAST
Celebrating 30 Years of Coastal Conservation
1982-2012

July 20, 2012

TO: Mickey Sugg
Project Manager
US Army Corps of Engineers
69 Darlington Avenue
Wilmington NC 28403-1343

FROM: Todd Miller, Executive Director
Ana Zivanovic-Nenadovic, Program and Policy Analyst

Dear Mickey,

Please accept these comments on behalf of the North Carolina Coastal Federation with regard to the draft Environmental Impact Statement (DEIS) prepared by the Figure Eight Homeowners' Association (HOA).

All work on this draft document should be placed on hold until the applicant demonstrates that it has secured the property rights necessary to construct its preferred alternative—a terminal groin. To date the HOA has not obtained the necessary easements to construct the proposed terminal groin and seawall on the private land where it is to be sited. Since the private HOA has no legal authority to condemn someone else's private property, without these easements or property rights this alternative is not reasonable or viable. Furthermore, neither your agency nor the N.C. Division of Coastal Management can even deem a permit application for this project to be complete without obtaining these private landowners' agreements.

Your regulations for processing a permit application state that an application for a permit is not complete until signed by the applicant, and the applicant cannot sign a complete permit application unless each property owner submits a statement designating the same agent for the project. Your rules states:

(8) Signature on application. The application must be signed by the person who desires to undertake the proposed activity (i.e., the applicant) or by a duly authorized agent. When the applicant is represented by an agent, that information will be included in the space provided on

the application or by a separate written statement. The signature of the applicant or the agent will be an affirmation that the applicant possesses or will possess the requisite property interest to undertake the activity proposed in the application, except where the lands are under the control of the Corps of Engineers, in which cases the district engineer will coordinate the transfer of the real estate and the permit action. An application may include the activity of more than one owner provided the character of the activity of each owner is similar and in the same general area and each owner submits a statement designating the same agent.

The same requirement for a complete application applies for the Major CAMA permit that will be required for this project. The following regulation applies for an application for a CAMA permit (i.e., the state development permit that will also be required for the project):

15A NCAC 07J .0204 PROCESSING THE APPLICATION
(a) On receipt of a CAMA major development and/or dredge and fill permit application by the Department, a letter shall be sent to the applicant acknowledging receipt.
(b) Application processing shall begin when an application is accepted as complete. Before an application will be accepted as complete, the following requirements must be met;
(4) a copy of a deed or other instrument under which the applicant claims title must accompany a CAMA major development and/or dredge and fill permit application;

Thus, neither your agency nor the state can even accept a permit application and begin processing it for review unless the HOA can show that it has legal authority over the land (in the form of a deed or "other instrument") for building the project. Lacking these landowner agreements, Alternatives 5a and 5b are not reasonable and realistic, and including them in the DEIS is simply a huge waste of time and financial resources, and interferes with the capacity of your agency to thoroughly analyze reasonable and practical alternatives for this project.

In addition, the Council on Environmental Quality (CEQ) has issued regulations for preparing Environmental Impact Statements, and our remaining comments are organized based upon those rules.

Sec. 1502.7 Page limits

The text of final environmental impact statements (e.g., paragraphs (d) through (g) of Sec. 1502.10) shall normally be less than 150 pages and for proposals of unusual scope or complexity shall normally be less than 300 pages.

This DEIS is more than 350 pages long. Furthermore, the additional information presented in the appendices adds a total of 495 pages for the engineering report appendix and 833 pages for the geotechnical appendix. The project is not of unusual scope or complexity, and therefore the DEIS needs to be rewritten to be 150 pages or less.

Sec. 1502.8 Writing

Environmental impact statements shall be written in plain language ... so that decision-makers and public can readily understand them.

The DEIS is not written in clear and easily comprehensible language. The overwhelming amount of engineering and technical jargon is not translated into plain language and is not readily understandable by general public. Some of the technical aspects of the DEIS document need to be simplified and its content made more transparent so that the public can make an informed decision.

Sec. 1502.9 Draft. Final, and Supplemental Statements

Draft environmental impact statements shall be prepared in accordance with the scope decided upon in the scoping process.

The initial purpose and need as advertised in the Federal Register is drastically different than the project proposal in the public notice and DEIS. The terminal groin was not added as an alternative until later in the process and therefore was never discussed by the project delivery team or in a public scoping meeting. The public was not properly informed of the change in intent of the project, which violates section 1501.7 of CEQ NEPA regulations, which states that "an agency shall revise the determinations made…if substantial changes are made later in the proposed action, or if significant new circumstances or information arise which bear on the proposal or its impacts."

Sec. 1502.13 Purpose and need

The statement shall briefly specify the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action.

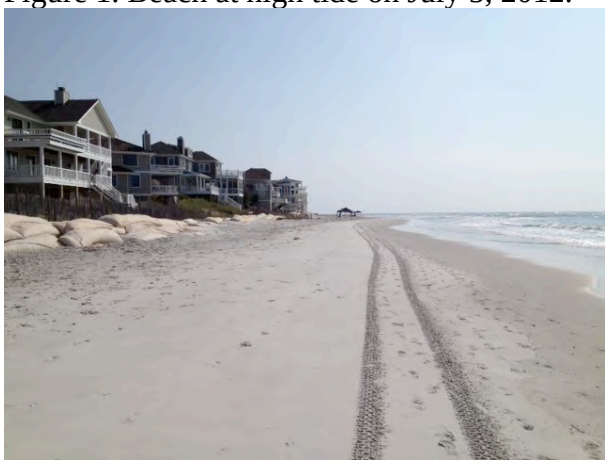
The DEIS identifies **eight *purpose and needs*** for the project. It then proposes six alternatives to respond to those identified needs. **None of the alternatives identified in the DEIS, including the proposed action, achieves all these project goals**. Following is an analysis of the degree to which the alternatives achieve the project's purpose and needs, as identified in the DEIS:

1. *Reduce erosion along 2.34 miles (**12,355 linear feet**) of Figure Eight Island oceanfront shoreline south of Rich Inlet and 0.34 mi of back barrier shoreline on Figure Eight Island along Nixon Channel.*

   Four of the alternatives could potentially reduce some erosion on 2.34 miles (or 12,355 linear feet) of beach south of Rich Inlet or on the backside of the barrier island. These are the non-structural alternatives that will allow the inlet to migrate naturally, or Alternative 4 that repositions the inlet main channel to the middle of the inlet. Historical data on shoreline changes indicate that when the channel migrates to the center of the inlet the beaches on the northern end of Figure Eight Island (where the sandbags are now located) will move seaward and the beach will accrete. Beach nourishment does not typically reduce erosion, but simply moves erosion that is occurring seaward until the sand placed on the beach is washed away.

The beach is currently building seaward (accreting) in front of the sand bags which may indicate that the inlet channel is migrating naturally, and allowing this part of the island to rebuild on its own.

Figure 1. Beach at high tide on July 5, 2012.



2. *Provide reasonable short-term protection to imminently threatened residential structures over the next five years.*

Nineteen houses are imminently threatened by erosion within about 3,000 feet of Rich Inlet. In the absence of storms, all non-structural beach fill management strategies provide some protection of these exposed houses. Allowing the inlet channel to move more to the center of the inlet (either naturally or by dredging) would provide significantly more short-term protection for these structures than building a terminal groin. A 700-foot terminal groin without beach renourishment provides less than 1,000 linear feet of naturally trapped sand according to modeling runs (5b-3) in the Engineering Report, and without beach renourishment this alternative offers no protection to the imminently threatened residential structures.

The models used in the DEIS predict that the inlet shoulder (sand spit) seaward of the terminal groin (Alternative 5b) will erode away and be under water after the terminal groin is built. This means that the sand spit situated between Nixon Channel (which is being deepened as it is used as a borrow pit for sand for beach renourishment) and the ocean will completely disappear. Figure 2 below shows what is projected to happen to the sand spit by year 5 of the project. There are no projections in the DEIS as to what will happen in this area from years six to 30 during the life of the project.

Figure 2. Five year projection after implementation of alternative 5b

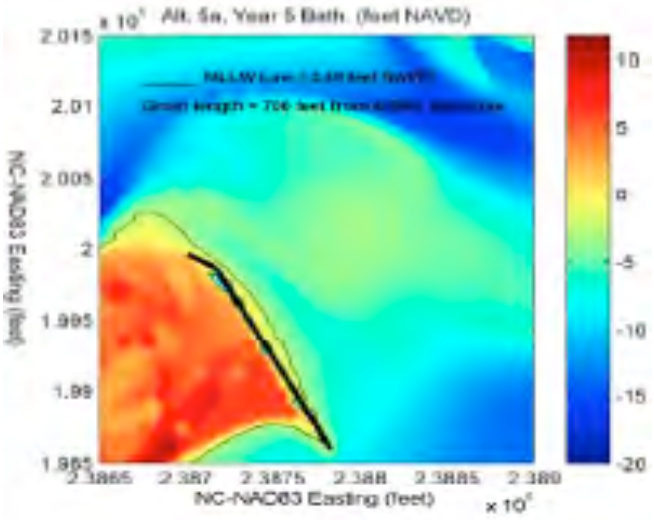


Figure 12 from Appendix B (Figure 3 below) depicts past shorelines from 1938 to 2007. Note that most of the endangered houses would have been gone if they had existed in 1945 when the shoreline was located about where the beach road is today.

Figure 3. Historical shorelines

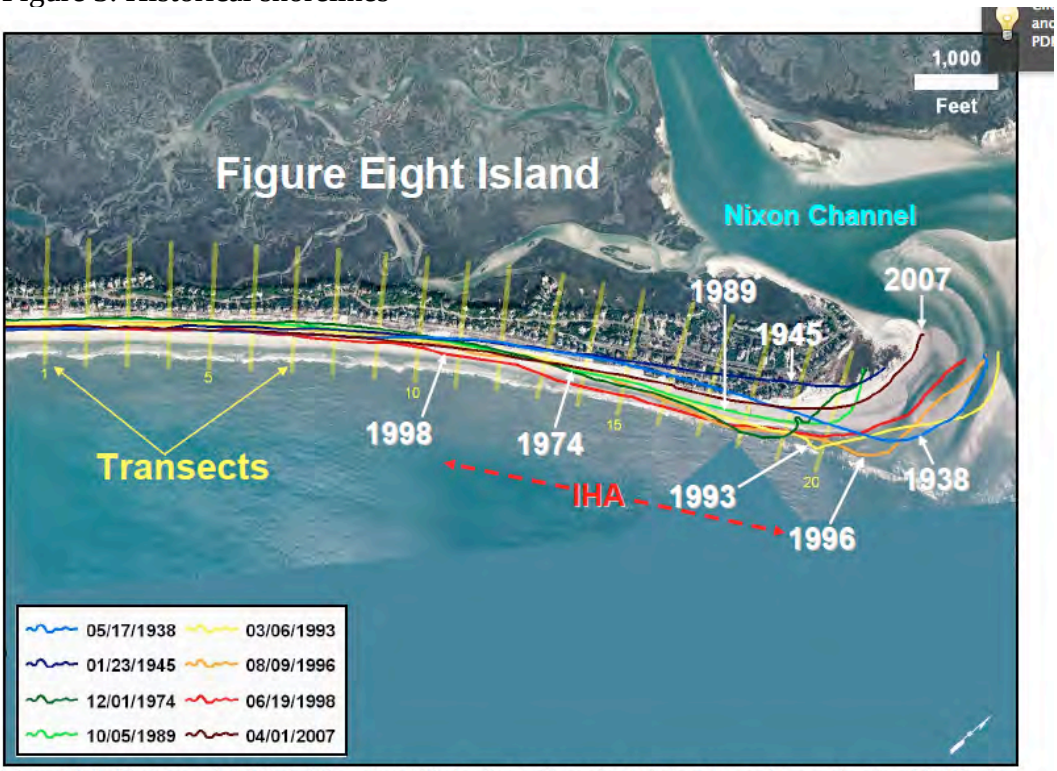


Figure 12. Aerial photograph (2007) depicting selected (8) shoreline positions along F8I since 1938 and transect locations (T1-20). The F8I Rich Inlet IHA includes the shoreline reach between Transects 11 and 20. Note that the 1945 shoreline position is the most landward positioned shoreline. Also note a significant number of homes lie seaward of the 1945 shoreline position

Of all the shorelines previously recorded at Rich Inlet, the 1945 shoreline has the closest configuration to what could potentially be the shoreline once the terminal groin is constructed. Losing the sand spit in combination with the artificially deepened borrow pit in Nixon Channel could result in the establishment of the main inlet ebb channel right up against the south side of the inlet. This would completely erode away the ebb tidal delta that is currently providing some wave protection for oceanfront properties near the inlet.

Figure 4. 1945 shoreline

If this shoreline configuration were to occur as a result of the sand spit eroding away and the main channel connecting to the Nixon Channel borrow area, all the houses on the north end of the island would be destroyed by Alternative 5b.

3. *Provide long-term protection to Figure Eight Island homes and infrastructure over the next 30 years.*

Over the past 30 years, numerous hurricanes and storms have at times caused significant erosion and structural damage on Figure Eight Island. Sixty-three houses on the oceanfront of Figure Eight experienced significant damage from severe erosion and storm surge caused by Hurricane Fran in 1996. Such extreme erosion events take place over a few days at most, and their dramatic effects are not reflected in the computer models that are used by the DEIS to predict shoreline change and sediment budgets. These models average out long-term impacts of such storms but do not predict short-term changes that can cause catastrophic property damage. Major hurricanes can cause major erosion under any alternative described in this DEIS. The engineering report in Appendix B states that the benefits of inlet channel relocation (Alternative 3) could be completely undone overnight by a major hurricane that reconfigures the inlet, but provides no similar caution regarding the impact of storms on alternatives 4, 5a or 5b.

The DEIS does not consider these significant, short-term events in its analysis or in comparison of alternatives. The prediction in the report that there will be **ZERO** property losses under Alternatives that relocate the inlet channel, increase beach nourishment, and/or construct a terminal groin are grossly misleading and wrong. Property damage will occur as a

result of major storm events over the next 30 years under any alternative described in this report, and the extent of damages will be many millions of dollars. Once these damage estimates are considered in Alternatives 3, 4, 5a, and 5b they may no longer be as cost-effective as Alternatives 1 or 2 (business as usual or no-action).

4. *Acquire compatible beach material in compliance with the North Carolina State Sediment Criteria for shore protection project.*

   All the management actions contained in the DEIS can achieve this purpose if current rules adopted by the Coastal Resources Commission that regulate the use of compatible sediment are enforced.

5. *Maintain navigation conditions within Rich Inlet and Nixon Channel.*

   Existing navigation conditions will only be maintained by not changing the existing level of dredging that is occurring for beach nourishment today. Relocating the inlet channel may temporarily enhance navigation for a short period. Thus, all the alternatives will maintain the status quo in terms of navigation.

   It should also be noted that navigation was not addressed in the initial scoping and project delivery team meetings as an intent of the project. Adding this component in the DEIS reflects a change in intent that was never discussed as required by CEQ regulation 1501.7 (referenced above).

6. *Balance the needs of the human environment with the protection of existing natural resources.*

   Existing levels of beach renourishment have been permitted based upon a public interest permit review that has attempted to balance the needs of human and natural environment. The DEIS outlines alternatives that could damage the critical nesting habitat for shorebirds in the inlet (including endangered species), and creates increasing uncertainty about the ability to balance human and natural resource needs.

   Rules adopted by the Coastal Resources Commission (CRC) attempt to balance the needs of the human environment with the protection of existing natural resources. One of those rules is 15A NCAC 07H .0310(a)(3) (Use Standards for Inlet Hazard Areas) which states: *Only residential structures of four units or* ***less or non-residential structures of less than 5,000 square feet total floor space shall be allowed within the inlet hazard area****, except that access roads to those areas and maintenance and replacement of existing bridges shall be allowed.* The 800-foot landward revetment attached to the seaward terminal groin has a floor area of 5,400 square feet, and violates this development standard.

7. *Maintain existing recreational resources.*

   Existing non-structural management strategies will maintain the current level of recreational resources. The terminal groin options will cause the sand spit and southern inlet shoulder to erode away, and this will eliminate from public use a major recreational area used by boaters for swimming and walking the beach. Boat access to Figure Eight Island along the landward side of Rich Inlet will become much more hazardous and dangerous, and public access to the ocean beach from the sound side to the ocean will be cut off once the sand spit seaward of the groin washes away. In essence, the revetment (a large wall) will obstruct the ability of the public to get to the beach. The residential properties landward of the proposed groin are private property, and there is no assurance that any public access will be maintained along this shoulder of the inlet once the beaches seaward of the terminal groin and revetment wash away.

8. *Maintain the tax value of the homes and infrastructure on Figure Eight Island.*

   The failure of the DEIS to account for property losses associated with major storms over the next 30 years makes a comparison between alternatives regarding preservation of tax value and infrastructure completely impossible. No reliable cost-benefit analysis can be conducted as long as the impact of storms over the next 30 years is ignored. In addition, the values for the oceanfront homes currently threatened by erosion are grossly inflated in the DEIS, and do not represent current tax values.

Scope of Analysis

The permit area is too narrowly defined

The DEIS delineates the permit area solely upon the potential sediment distribution as a result of Alternative 3. The applicant claims that the preferred alternative will result in "similar" sediment distribution and has therefore not updated the permit area for the terminal groin project. However, this seems highly unlikely given that a terminal groin and channel realignment are two entirely different management strategies. In reality, it seems as though the DEIS is neglecting any of the impacts that the terminal groin will have that are different from the channel realignment, particularly to the sound side. This is abundantly clear if one takes a look at the figures of the model results provided in this DEIS. Each one of these images shows a close up of the northern end of Figure 8 Island rather than a larger image of the impacts to surrounding areas. It is imperative that the DEIS address the impacts of a terminal groin to the larger region.

Sec. 1502.14 Alternatives including the proposed action

This section is the heart of the environmental impact statement. Based on the information and analysis presented in the sections on the Affected Environment (Sec. 1502.15) and the Environmental Consequences (Sec. 1502.16), it [the document] should present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decisionmaker and the public. In this section agencies shall:

(a) Rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated.
(b) Devote substantial treatment to each alternative considered in detail including the proposed action so that reviewers may evaluate their comparative merits.
(c) Include reasonable alternatives not within the jurisdiction of the lead agency.
(d) Include the alternative of no action.
(e) Identify the agency's preferred alternative or alternatives, if one or more exists, in the draft statement and identify such alternative in the final statement unless another law prohibits the expression of such a preference.
(f) Include appropriate mitigation measures not already included in the proposed action or alternatives.

The (DEIS) officially identifies **six alternatives** to achieve the "**purpose and needs**" that the Homeowners' Association set for the project. Below is a table that uses the array of information contained in the DEIS to provide a side-by-side (apples to apples) comparison of each alternative using consistent measures. "Alternative 5b" is identified as the Homeowners Association's **preferred alternative**. However, 5b is described **inconsistently** in the DEIS and the Engineering Report (Appendix B). For that reason, seven alternatives (which include the description of 5b in the Engineering Report) are listed in the table below. A table such as the one we present below (table 1) should have been provided in the DEIS to fulfill that part (b) of Sec. 1502.14 "so that reviewers may evaluate their comparative merits."

Table 1. Nourishment cost comparison

Alternatives	Total Nourishment: Cubic yards per year	Total Cost of Nourishment Per year ($)	Approximate Length of Ocean Beach Nourished (ft)	Cost of Nourishment Per Cubic Yard ($)
#1: Continue current beach management (as needed on northern half of island)	92,105	916,666	12,400	$9.95
#2: Abandon Beach Management	0	0	0	0
#3: Relocate Inlet Channel and Use Sand to Renourish Beach Every Five Years (northern half of island)	136,680	1,564,666	7,500	$11.45
#4: Renourish Beach Every Three Years (northern half of island)	225,000	3,006,666	7,500	$13.36
#5: 2,100 foot long Terminal Groin and Revetment, Renourish Beach Every Five Years (northern end of island)	91,500	1,084,800	12,400	$11.86
#5b: 1,600 foot long Terminal Groin and Sea Wall, Renourish north end of island every 5 years (4,000 feet)	35,160	364,200	4,000	$10.36
#5b*: 1,600 foot long Terminal Groin and Sea Wall, Renourish northern half of island every 4 years	91,500	1,084,200	12,400	$11.86

*** The descriptions of the 1,600 foot terminal groin and revetment alternative are not consistent in the DEIS. The engineering report states that renourishment will need to occur every four years, and is likely to be needed over the entire northern half of the island. That description significantly increases the cost of that alternative.**

The Homeowners' Association selected the 1,600-foot long terminal groin and revetment option as its preferred alternative. However, given the inconsistent description of this alternative in the draft report, it is not clear what this option really involves. The DEIS says this alternative requires construction of the terminal groin, 4,000 linear feet of beach renourishment, soundside renourishment at Nixon Channel, and that renourishment will need to be repeated every five years. On the other hand, the Engineering Report attached to the DEIS says that **most of the northern half of the island will need to be renourished every four years**.

From this, it is obvious that under Section 1502.14 the DEIS does not comply with the requirements: (a) all the alternatives are not objectively evaluated and more significance was put on structural alternatives; (b) there is no analysis that facilitates understanding of comparative merits of all the alternatives; (f) appropriate mitigation measures are not included for a variety of

issues including building on wetlands.

Sec. 1502.15 Affected environment

The environmental impact statement shall succinctly describe the environment of the area(s) to be affected or created by the alternatives under consideration. The descriptions shall be no longer than is necessary to understand the effects of the alternatives. Data and analyses in a statement shall be commensurate with the importance of the impact, with less important material summarized, consolidated, or simply referenced. Agencies shall avoid useless bulk in statements and shall concentrate effort and attention on important issues. Verbose descriptions of the affected environment are themselves no measure of the adequacy of an environmental impact statement.

The impacts to the permit area associated with the preferred alternative are likely to be many due to the diversity and dynamicity of the environment. Including extraneous information in the description of the affected environment makes it difficult to discern which of the impacts are most important. Additionally, lengthy descriptions discourage thorough review of the entire DEIS and may obscure impacts. To be in compliance with CEQ guideline 1502.15, the affected environments section in the Figure 8 Island DEIS should be amended to address the following concerns:

Many sections within the “Affected Environment” Chapter includes a “Benefits” portion to the specific area of affected environment they discuss. While understanding the importance of the specific affected environment is important, this is not in compliance with the CEQ regulations because many of these “Benefits” sections are too lengthy in their description, and may be unnecessary.

Oyster and shellfish surveys that were included are from the years 1986-1991. These surveys are outdated and a more recent survey should be included in the DEIS in order for the analysis to be considered “commensurate with the importance of the impact.”

These are some examples of verbose and unnecessary descriptions in the DEIS:

p. 73-76: The salt marsh communities section includes an overly verbose description of what salt marsh communities exist in North Carolina and the benefits these communities provide to various aquatic species.

p. 98-99: The Wet Beach Communities section provides too detailed and outdated description of the Coquina Clam and the Mole Crab from 1996.

p. 115-124 and 131-139 maps: When describing sea turtle and seabeach amaranth distribution, the authors chose to use a map for each of the years for which data are available. These maps add about 20 pages to the section. This added length is unnecessary and aggregating the data will make it easier to fully understand the annual variation in the distribution of these species. This information should be more effectively communicated by combining the data into one comprehensive map for each species.

p. 126: Within the manatee section, each manatee sighting is listed in paragraph form. These data could be more effectively and succinctly conveyed using a table or a map.

p. 126: The whale section states that blue, finback, humpback, north Atlantic right, sei, and sperm whales occur infrequently in the ocean off the coast of NC. However, the document also states that right whales and humpback whales routinely come close enough inshore to encounter the permit area. These two statements are contradictory and confusing.

p. 149: The public safety section includes statistics about accidents and boating safety in all of North Carolina, but does not mention which of these are relevant to the permit area.

p. 150: Also in the public safety section, it is stated that public access by land is restricted and therefore public safety is less of an issue. However, in the recreational resources section on the same page, it says the permit area offers a number of recreational activities and that the area is heavily utilized by boaters. These two statements are contradictory and should be addressed for clarity.

p. 153: The drinking water section is overly verbose regarding the county-wide well system. Figures are included enumerating the water demands of surrounding communities, not including Figure 8 Island. This information is irrelevant.

Removing superfluous, out-of-date, and contradictory information is necessary to comply with CEQ regulation 1502.15. Furthermore, addressing the above issues in this section will allow for greater transparency and permit the general public to comprehend the various issues at stake.

Sec. 1502.16 Environmental consequences

This section forms the scientific and analytic basis for the comparisons under Sec. 1502.14. It shall consolidate the discussions of those elements required by sections 102(2)(C)(i), (ii), (iv), and (v) of NEPA which are within the scope of the statement and as much of section 102(2)(C)(iii) as is necessary to support the comparisons. The discussion will include the environmental impacts of the alternatives including the proposed action, any adverse environmental effects which cannot be avoided should the proposal be implemented, the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and any irreversible or irretrievable commitments of resources which would be involved in the proposal should it be implemented. This section should not duplicate discussions in Sec. 1502.14. It shall include discussions of:

(a) Direct effects and their significance (Sec. 1508.8).
(b) Indirect effects and their significance (Sec. 1508.8).
(c) Possible conflicts between the proposed action and the objectives of Federal, regional, State, and local (and in the case of a reservation, Indian tribe) land use plans, policies and controls for the area concerned. (See Sec. 1506.2(d).)
(d) The environmental effects of alternatives including the proposed action. The comparisons under Sec. 1502.14 will be based on this discussion.
(e) Energy requirements and conservation potential of various alternatives and mitigation measures.

(f) Natural or depletable resource requirements and conservation potential of various alternatives and mitigation measures.
(g) Urban quality, historic and cultural resources, and the design of the built environment, including the reuse and conservation potential of various alternatives and mitigation measures.
(h) Means to mitigate adverse environmental impacts (if not fully covered under Sec. 1502.14(f)).
[43 FR 55994, Nov. 29, 1978; 44 FR 873, Jan. 3, 1979]

Impacts on endangered species and loss of critical habitat

Chapter 5 of DEIS states that the Project Area overlaps Piping Plover critical habitat and further comments that this area will be directly impacted by the construction of a terminal groin. Specifically, it acknowledges that the terminal groin construction '....may stress shore birds, including the endangered piping plover' (p.281). However, there is no mention of mitigation for the destruction of this endangered/threatened species' habitat in Chapter 6, which supposedly addresses avoidance and minimization. The DEIS should address mitigation measures, including the need for an Incidental Take permit. The Endangered Species Act (ESA) requires an Incidental Take Permit for the taking of an endangered or threatened species. A take is defined as any action that will 'harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct,' (Section 3(19)), which also includes habitat modification or degradation.

There are two populations of Piping Plover that utilize habitat within the project area: the critically endangered Great Lakes population and the threatened Atlantic Coast population. However, the only minimization action the DEIS describes is performing construction outside the breeding season of the Atlantic Coast population. This effectively ignores minimization of impacts to the Great Lakes population that winters along the North Carolina coast.

While the endangered Piping Plover will lose critical habitat, it will not be the only federally endangered species to experience adverse impacts. Manatees, Loggerhead Sea Turtles, and Atlantic and Shortnose Sturgeon all occur in the project area and may be affected by the terminal groin structure and subsequent habitat loss. The DEIS should address these endangered and or threatened species.

Wetlands Loss

The preferred alternative chosen in the DEIS shows that the revetment part of the terminal groin will be built in a wetland area. To be in compliance with the Clean Water Act, a Section 404 permit must be obtained and mitigation action taken when wetlands are destroyed. No minimization action is described to address the loss of salt marsh wetlands in the northern part of the island from the terminal groin construction/footprint, as described in the applicant's preferred Alternative, 5b. Furthermore, the Delft3D model projects that land northward of the terminal groin and on the sound side of the island, including wetlands, may disappear with the construction of a groin. This potential loss of additional wetlands should also be accounted for when addressing avoidance and minimization as well as mitigation. This clearly shows that the DEIS is not in compliance with parts (a), (b), (f) and (h) of section 1502.16.

The DEIS clearly fails to comply with parts: a) and b) of section 1502.15. It does not list all direct and indirect consequences of the proposed project; c) it fails to report the proposed project is in possible conflict with the Endangered Species Act due to piping plover habitat; and h) it fails to provide information on mitigation measures that will be taken for building on wetlands and for affecting habitat of an endangered species.

Sec. 1502.17 List of preparers.

The environmental impact statement shall list the names, together with their qualifications (expertise, experience, professional disciplines), of the persons who were primarily responsible for preparing the environmental impact statement or significant background papers, including basic components of the statement (Secs. 1502.6 and 1502.8). Where possible the persons who are responsible for a particular analysis, including analyses in background papers, shall be identified. Normally the list will not exceed two pages.

The DEIS fails to comply with this requirement. The only names listed are the names of the members of the PDT team, but there are no names of individuals who performed different analyses of the document. The DEIS needs to identify the authors and state their expertise, experience and professional disciplines so that the public can be properly informed. There should be a disclaimer about the role of the PDT team. It has not met since August 2010, and has never been convened to participate or review the draft EIS.

Sec. 1502.18 Appendix

If an agency prepares an appendix to an environmental impact statement the appendix shall:
(a) Consist of material prepared in connection with an environmental impact statement (as distinct from material which is not so prepared and which is incorporated by reference (Sec. 1502.21)).
(b) Normally consist of material which substantiates any analysis fundamental to the impact statement.
(c) Normally be analytic and relevant to the decision to be made.
(d) Be circulated with the environmental impact statement or be readily available on request.

In addition to being burdensome, long and complex, the Appendices are inconsistent with the main DEIS document. As mentioned above, the preferred alternative is described inconsistently in the DEIS and in the Appendix with the Engineering report. The costs as well as the timeline of nourishment are inconsistent.

Further, the Summary of Impacts Table presented as one of the appendices is incorrect and grossly repeated. For example on page one it is stated that the impact of Alternative 5b on salt marsh is “same as Alt 5B”. Further, it is stated that there are no direct, indirect or cumulative impacts of Alternative 5a on salt marsh. This is completely incorrect since it is shown in the maps throughout the DEIS that the proposed groin would be built in and across the salt marsh that is located on the northern tip of the island. In addition, it appears that the effect of Alternative 5a on Recreational Sources is just copied into the effect of Alternative 5b on the same resource. In addition, the claim that there will be no impacts to shoals washing away after

the groin is put in place is incorrect. According to maps in the DEIS it is visibly seen that after year 5 most of the shoals in the inlet will disappear.

Overall this Summary of Impacts Table is inaccurate, oversimplified and does not provide objective information about the impacts of the alternatives.

1502.22 Incomplete or unavailable information

When an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an environmental impact statement and there is incomplete or unavailable information, the agency shall always make clear that such information is lacking.

(a) If the incomplete information relevant to reasonably foreseeable significant adverse impacts is essential to a reasoned choice among alternatives and the overall costs of obtaining it are not exorbitant, the agency shall include the information in the environmental impact statement.

(b) If the information relevant to reasonably foreseeable significant adverse impacts cannot be obtained because the overall costs of obtaining it are exorbitant or the means to obtain it are not known, the agency shall include within the environmental impact statement:

1. *A statement that such information is incomplete or unavailable;*
2. *a statement of the relevance of the incomplete or unavailable information to evaluating reasonably foreseeable significant adverse impacts on the human environment;*
3. *a summary of existing credible scientific evidence which is relevant to evaluating the reasonably foreseeable significant adverse impacts on the human environment, and*
4. *the agency's evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community. For the purposes of this section, "reasonably foreseeable" includes impacts which have catastrophic consequences, even if their probability of occurrence is low, provided that the analysis of the impacts is supported by credible scientific evidence, is not based on pure conjecture, and is within the rule of reason.*

The DEIS fails to include essential information about potential storm impacts on not only the proposed structure, but also on residence structures and the natural environment of the island. Including the potential impact of storms in the DEIS is relevant to reasonably foreseeable significant adverse impacts, which are essential to the reasoned choice among proposed alternatives (in this case the choice of Alternative 5b).

North Carolina has been affected by 403 known tropical or subtropical cyclones. According to statistical hurricane research between 1886 and 1996 by the North Carolina State Climatology Office, a tropical cyclone makes landfall on the N.C. coastline about once every four years. In addition, according to National Atmospheric and Oceanic Administration and the U.S. Geological Service recent data show that the coast of North Carolina will likely be affected by more than 60 hurricanes in a 100-year period. It is, therefore, reasonable to assume that this

project and the surrounding area will be affected by at least one major storm with catastrophic consequences over its projected lifetime of 30 years.

With the section 1502.22 in mind and because the CEQ defines “reasonably foreseeable” impacts as those “impacts which have catastrophic consequences, even if their probability of occurrence is low” (CFR 40 § 1502.22(b)4), it is an imperative for the agency to consider the impacts of storms when drafting the EIS for this project.

More specifically, the DEIS needs to include:

1. In a highly dynamic system such as the one in barrier islands, erosion rates fluctuate over time and are unpredictable. This dynamicity and unpredictability increases with the occurrence of storms. In this DEIS the evaluations of damages due to long-term erosion and loss of tax revenues as shown in the alternatives 1 through 5 are hard to prove unless they account for the effects of storms.

2. Furthermore, it is unreasonable to claim no (zero) loss in both tax revenue and long-term erosion damages as the DEIS does. In addition, these values should be presented in a form of range or confidence intervals to correctly reflect the short-term storm-related uncertainties associated with performance of proposed alternatives.

In light of this evidence it is reasonable to assume that a major storm will impact the Rich Inlet area. Due to dynamicity of natural systems and storm-related uncertainties the effects of the storm can vary. As stated by the authors of DEIS, repetitive storm damage could lead to demolition of some of the structures. In this case the predictions for, including the benefit and cost analysis of, the preferred alternative 5b would no longer stand.

Including the uncertainties of storm-related effects must be paramount for the agency in order to have a complete and representative DEIS document because these data can show “significant adverse impacts essential to a reasoned choice among alternatives” as stated in the Section 1502.22. Reaching a decision without including this essential information would be arbitrary and capricious.

Modeling

Use of the SBEACH model, with inputs provided in the DEIS, is not sufficient to convey the possible effects of terminal groin construction. Delft3D relies on inputs of known waves, tides, currents, and winds. While it is not assumed that the model should predict future storm events, it should be calibrated to a variety of possible weather conditions, both weak and strong to obtain meaningful results. By calibrating SBEACH to Hurricane Ophelia, a relatively weak hurricane in North Carolina history, the engineering report fails to capture the breadth of possible storm impacts. Additionally, by only considering the long term impacts, the model does not reflect catastrophic short term impacts of storm events which cause the greatest damage and should be included in the study.

Moreover, use of data from 2007 does not accurately reflect current conditions. Using older data does not include shoreline changes from the last five years which may alter costs associated with inlet and beach management.

Lastly, sand spits within the project area, defined as 'ephemeral' in the DEIS, are not included in the modeling process. These areas are critical habitat for the threatened and endangered Piping Plover populations and are used daily by the public. Their fate should be carefully considered. Not including these sand spits in the modeling process marginalizes their value. While inlet shoals may change form often, labeling them as ephemeral suggests they are short-lived and disappear. Publicly available aerial imagery from 1993 until now shows the presence of sandy spits in Rich Inlet and therefore impacts to these areas need to be addressed more thoroughly.

Robust models are calibrated on a wide array of data and scenarios. As pointed out above, calibrating the model only with data provided from Hurricane Ophelia is misleading given that Ophelia was a relatively weak storm. The model should be tested by using data from a stronger storm such as for example Hurricane Fran. In addition, the models should predict short-term consequences, and not just the long-term ones. By calibrating Delft3D using only older data, and excluding variety of storm activities as well as leaving out sensitivity of critical habitat areas, the DEIS does not provide accurate information for the applicant to make an informed decision regarding shoreline management.

If models used in the DEIS are not suited for including a variety of storm events and for accounting for their potential short-term effects and/or if data for different storms are not available, according to the CEQ rules, the agency needs to follow four steps described in Sec. 1502.22 (b). In this manner the public will be aware of the fact that crucial information relevant to the reasonably foreseeable significant adverse impact is not included in the analysis and will be able to make an informed decision accordingly.

DEIS used three models to simulated changes in the project area.

For an open and transparent information exchange it is imperative that the models used in the DEIS are qualified in quantitative, rather than in qualitative terms. It is impossible for the public to know how reliable, accurate and representative these models are if the relevant information is not provided. For these reasons, a coefficient of determination (R) for every model needs to be explicitly stated and then translated to lay terms so that general public can understand the meaning of that information.

The uncertainty of models' representativeness is further shown in the Engineering Report Appendix: on page 100 Table 2 shows the calibration of SBEACH using data from Hurricane Ophelia. The table shows observed and simulated changes at different shoreline profiles. It is clear that on several profiles the model predicted the opposite outcome. That is, where the model simulated an erosion of 35 ft., the observed event was an accretion of 64 ft. (profile 170+00 – Lea Hutaff Island). Similar outcome occurs in profiles 70+00 and 80+00. On the average the model simulated an erosion of 17.7 ft. across all profiles whereas the observed average for all profiles was an accretion of 3.3 ft.

Sec. 1502.23 Cost-benefit analysis

If a cost-benefit analysis relevant to the choice among environmentally different alternatives is being considered for the proposed action, it shall be incorporated by reference or appended to the statement as an aid in evaluating the environmental consequences. To assess the adequacy of compliance with section 102(2)(B) of the Act the statement shall, when a cost-benefit analysis is prepared, discuss the relationship between that analysis and any analyses of unquantified environmental impacts, values, and amenities. For purposes of complying with the Act, the weighing of the merits and drawbacks of the various alternatives need not be displayed in a monetary cost-benefit analysis and should not be when there are important qualitative considerations. In any event, an environmental impact statement should at least indicate those considerations, including factors not related to environmental qualities, which are likely to be relevant and important to a decision.

The DEIS grossly underestimates the total cost of financial assurances compared to the cost estimates provided in the CRC Terminal Groin Study. The following table compares the costs outlined in the DEIS to the estimates provided in the CRC Report.

Table 2. Terminal groin cost comparison

	DEIS	**CRC Report**
Monitoring	$480,000 / 30 years	$100,000 - $500,000 / year
Maintenance	$0	10 - 15% of initial construction costs / year*
Mitigation	$1,821,000 / every 5 years	$1.2 million / year**
Removal	$1,000,000 – total for structure removal	$500-1500 / linear foot (depending on section)
TOTAL	$3,301,000	$57,140,000***

* Accounts for increased storminess and possibility of accelerated sea level rise.
** Average annual cost of beach nourishment for "long" terminal groins (~1500').
*** Total is based on the lower estimates for each category and is calculated for Alternative 5b.

Monitoring: The DEIS estimates that the cost of monitoring performance and assessing impacts to the adjacent shorelines and inlet environment will total $480,000. This claim is unreasonably low considering the CRC report estimates that monitoring costs would likely range from $100,000 (2 surveys/year) to $500,000 (multiple surveys and environmental monitoring) ***per year*** for a few years, depending on agency requirements.

Maintenance: The DEIS naively claims that maintenance costs will total $0 based on the documented performance of groins at Fort Macon and Pea Island. While the CRC report states that maintenance costs at Fort Macon have been negligible, it recommends that applicants plan for annualized maintenance expenditures between 10-15% of initial construction costs to account for increased storminess and the possibility of accelerated sea level rise.

Mitigation: The DEIS only accounts for one installment of beach fill and does not reflect the total cost of periodic nourishment every 5 years. If this number is calculated to reflect beach fill every five years (a total of 5 fill events over the 30 year project), the total cost for mitigation would be $9,105,000. In addition, it is unclear whether the cost estimate for mitigation includes measures to address changes in adjacent estuarine/inlet shorelines north of the groin, or if it only accounts for the nourishment of ocean shorelines. Furthermore, additional sources of sand (in addition to Nixon Channel or the islands along the AICWW) could be necessary, especially after storms or unexpected erosion events. The cost to obtain these additional sand supplies needs to be estimated, and included in the mitigation strategy.

Removal: The DEIS only accounts for the removal of the rubblemound portion of the structure, claiming that the landward shore anchoring section will not be built if observed negative impacts of the seaward structure cannot be mitigated. As a result, the proposed cost of removal ($1,000,000) does not account for the cost of removing the steel anchoring section ($500 / linear foot) should the groin fail after its construction.

Restoration: The estimated total amount of financial assurances proposed in the DEIS does not include costs associated with the restoration of adversely impacted public, private, or public trust environment or property as required by Section 1. G.S. 113A-115.1 (e)(6) d.

If the DEIS were to include periodic beach fill events in the mitigation category, the total cost of the financial assurance should be $10,585,000. This number is still far lower than what the CRC Study on Terminal Groins projects. At the very least, this DEIS should explain the reasons for this discrepancy.

Table 3. Terminal groin project costs

	Amelia	Fort Macon	Oregon Inlet	St. Johns Pass	Captiva Island	Figure 8
Length (ft)	1,500	1,530	3,125	460	350	1,600
Height (ft)	7.2 -15.2	Up to 14	14-25.5	Up to 15 (10 ft. ave.)	Up to 15 (10 ft ave.)	Up to 10
Cost/Ft ($)	2,260	1,900	8,410	1,925	1,925	1,800
Total Cost ($)	3.3 M	2.9 M	24.2 M	890K	670K	2.88 M

Table 3 above represents the costs of various terminal groins. It is unclear how the $1,800/LF was achieved for the Figure 8 Island, especially taking into account that the landward side of the proposed project contains sheet piles. From table 4 below it can be observed that the cost of sheet pile material is around $4,000/LF depending on the slope of the beach. It is imperative that this cost calculation is clearly and transparently represented in the DEIS document.

Table 4. Estimated costs for potential North Carolina groins

	Flat-Sloped Beach	Steep-Sloped Beach	Flat-Sloped Beach	Steep-Sloped Beach
Length	450 ft	450 ft	1500 ft	1500 ft
Average Height	8 ft	12 ft	12 ft	19 ft
Rubble Mound (small stone)				
Unit Cost	$1,230/LF	$1,930/LF	$2,640/LF	$4,460/LF
Total Cost	$554K	$869K	$4.0M	$6.7M
Rubble Mound (large stone)				
Unit Cost	$1,440/LF	$2,260/LF	$3,090/LF	$5,180/LF
Total Cost	$648K	$1.0M	$4.6M	$7.8M
Geotextile Tubes*				
Unit Cost	$350/LF	$660/LF	N/A	N/A
Total Cost	$160K	$300K	N/A	N/A
Steel Sheet Piles w/ concrete fascia & cap				
Unit Cost	$4,000/LF	$4,300/LF	$4,300/LF	$4,500/LF
Total Cost	$1.8M	$2.2M	$6.5M	$6.8M
Concrete sheet piles (tied back)**				
Unit Cost	$4,600/LF	$4,800/LF	$4,800/LF	N/A
Total Cost	$2.1M	$2.2M	$7.2M	N/A
Timber Piles*				
Unit Cost	$4,000/LF	N/A	N/A	N/A
Total Cost	$1.8M	N/A	N/A	N/A

*Should not be used for longer groins
**Likely not used for water depths greater than 15 feet

Table courtesy of CRC Terminal Groin Study Final Report, March 2010.

The cost of alternative three, Inlet Relocation is grossly exaggerated

The projected cost of Alternative Three is greatly exaggerated in comparison with two recent channel relocation projects: Mason Inlet (2002) and Bogue Inlet (2005).

In 2002 Mason Creek was dredged to relocate the channel 3000 feet north of the original location. The project involved the temporary construction of a sheet wall, the relocation of dredged material to close the original channel and rebuild northern Wrightsville Beach, and provide beach nourishment to southern Figure Eight Island. In 2005 Bogue Inlet was realigned to a more central location which included the construction of sand dike to close the previous channel using dredge material, and beach nourishment along 4.5 miles of western Emerald Isle. The dredged material from both projects was used for the beach nourishment.

As illustrated in the following table, the total projected dredge volume for Rich Inlet is over 1.7 million cubic yards (CY). This is significantly greater than the dredged volumes of Mason Inlet and Bogue Inlet projects. This greater dredging adds to the difference in total cost between all these projects, making the Rich Inlet project **48%** more than the total cost of relocating Mason Inlet and **36%** more than Bogue Inlet.

Alternative Three could be accomplished by relocating the existing channel with a small new channel that replicates the natural channel in a different inlet position. This would minimize the amount of dredging required significantly and still accomplish the project purposes. Some of the dredging for the Bogue Inlet project was used for beach renourishment, and that added to the cost of that project. The Terminal Groin Alternative (5b) demonstrates that there is an existing source of sand for beach renourishment already permitted, and the inlet does not need to be mined to provide sand for renourishment. Scaling back the scope of Alternative 3 would make this alternative much more cost-effective.

Table 5. Channel realignment cost comparison

	Rich Inlet	Mason Inlet	% difference between Mason & Rich Inlets	Bogue Inlet	% difference between Bogue & Rich Inlets
Total Cost* ($ million)	15.3	8	48%	9.8	36%
Total Volume Dredged (CY)	1,760,700**	790,000	55%	1,000,000	43%
Cost per CY dredged ($)	8.69	10.13	17%	9.8	13%
New Channel Dimensions (ft)(l x w) Depth	Green: 3800x240 Nixon: 1400x240 Entrance:***x450 all depths to -19 ft NAVD	4580x140 depth is -10 ft NGDV	-	7000x150-400**** depth is -15.5ft NGDV29	-
Closure Dike Volume (CY)	513,700	concrete sheet wall used	-	296,000	43%
Beach Nourishment Volume (CY)	Ocean shore: 1,152,300 Nixon shore: 65,000 Total: 1,217,300	500,000	59%	710,000	42%

* Total cost only includes the original relocation construction and excludes any future monitoring and maintenance ** Page 36 of the DEIS gives a summary of the amount of material dredged and where it will be deposited *[ocean shoreline fill = 1,152,300; Nixon Channel fill = 65,000 CY; closure dike = 513,700 CY; and upland disposal of clay = 29,700]*. This total, according to the DEIS is 1,773,300 CY. However, adding up the amounts ourselves, we find that the total is 1,760,700 CY.

*** According to the DEIS, the length of the entrance/bar channel will be "from the inlet throat to -19 ft NAVD depth contour" (pg 31 of DEIS)

**** Different sections of the Bogue Inlet channel were dredged to different widths: 150 ft at the Northern reach, 275 (avg.) in the 1st transition, 400 ft in the central reach, 300 ft (avg.) in the 2nd transition, and 200 ft in the southern reach

$0 cost for erosion damages and loss of tax revenue is misleading

When accounting for the economic impacts of each alternative, the DEIS predicts that there will be **zero costs** associated with "long-term erosion damages" and "loss of tax revenue" for alternatives 3-5. This is grossly misleading.

The calculation of zero costs for these areas is based on the premise that no property will be lost or damaged under Alternatives 3-5. However, damages will occur as the result of storm events over the next 30 years, and these damages could be on the order of millions of dollars. A correct estimate of these costs will change the cost-effectiveness of each alternative.

Positive Impacts are not explained

The DEIS states that "...the protection of these homes from erosion provided by the implementation of Alternative 3 will provide a positive direct, indirect, and cumulative economic benefit." If the report is going to laud the fact that there are benefits to be derived from a project, then these benefits need to be explained. Specifically, there needs to be an itemized description of what the exact positive economic impacts to the local economy of New Hanover County are within Alternative 3 (pg. 245). Moreover, positive impacts should be discussed for all alternatives, not just Alternative 3.

Loss of public trust resources is not accounted for

The Delft3D model projects that implementation of the applicant's preferred alternative will effectively destroy the sandy spits and shoals on the northern end of Figure 8 Island and impact Hutaff Island. While these areas are especially important for the wildlife mentioned above, they are also used daily by members of the public other than those residing on Figure 8 Island. In particular, as evidenced by the comments at the June 7, 2012 public hearing, these areas are used heavily by boaters and kayakers as a place to fish, sunbathe, and enjoy the beach. Rich Inlet provides a valuable area for recreation that is part of the public trust owned by all residents of North Carolina. This projected loss of public trust areas needs to be accounted for. It is unfair that the public should have to bear the burden of loss.

Additionally, it is troubling that impacts to Hutaff Island are marginalized solely because the island is undeveloped. Although there are no private properties in need of protection on Hutaff Island, impacts to its environment and the services it provides must be considered. Specifically, the Figure 8 HOA must take appropriate actions to mitigate any loss of this public trust resource.

Indirect socioeconomic effects are ignored

Furthermore, loss of the shoals or impediments to the navigation of Rich Inlet could have negative socioeconomic impacts on surrounding communities. Charter and recreational fishers use the inlet for access to the open ocean. These boaters frequent local businesses, including, but not limited to, restaurants, stores, and gas stations. Disrupting their ability to use Rich Inlet for recreation could have a significant negative impact on local economies. However, it appears that this cost to society was completely disregarded in the economic analysis in the DEIS.

Sec. 1502.24 Methodology and scientific accuracy

Agencies shall insure the professional integrity, including scientific integrity, of the discussions and analyses in environmental impact statements. They shall identify any methodologies used and shall make explicit reference by footnote to the scientific and other sources relied upon for conclusions in the statement. An agency may place discussion of methodology in an appendix.

The preferred option, Alternative 5b, was chosen based on a comparison of the costs associated with each alternative. It is imperative that there is complete transparency regarding the methodology used for calculating costs. This methodology needs to be expressed in a manner simple enough that every person who reads this document can understand it.

Overall, no clear description of how any costs were calculated exists within this DEIS. In particular, the DEIS lacks clarity regarding:

- which houses are going to be relocated and which are going to be demolished (for Alternatives 1 and 2) and why the costs of relocating only 10 houses are presented (when there are 16 vacant lots)

- how and when the periodic costs associated with the various alternatives are accrued, specifically nourishment and/or dredging events as well as periodic maintenance

- the different beach nourishment estimates among the alternatives, specifically, the timing between events and the amount of sand deposited

Compliance with Senate Bill 110

In addition to failing to comply with the CEQ's regulations, the DEIS fails to comply with the SB 110.

Following is the list of some of the S.B. 110 requirements rules:

1. § 113A-115.1(e)(6)(d) - *Restoration of public, private, or public trust property if the groin has an adverse impact on the environment or property;*
2. § 113A-115.1(e)(5)(b) - *Define the baseline for assessing any adverse impacts and the thresholds for when the adverse impact must be mitigated;*
3. § 113A-115.1(e)(5)(c) - *Provide for mitigation measures to be implemented if the adverse impacts cannot be mitigated;* and
4. § 113A-115.1(e)(5)(b) *Proof of financial assurance in the form of a bond, insurance policy, escrow account, or other financial instrument that is adequate to cover the cost of mitigation.*

Senate Bill 110 mandates that public, private, or public trust property should be restored if a terminal groin causes adverse impacts to them. To determine if this occurs, the permit applicant

is required to define baselines for assessing adverse impacts and the thresholds at which the impacts must be mitigated. Without formally adopted regulations that have been fully-vetted through a rule-making process, left to its own discretion, Figure 8 HOA has attempted to define **very limited** baselines, mitigation thresholds, mitigation triggers, and financial assurances. It has proposed to:

- The Figure 8 Island HOA proposes to use as a baseline the lower 90-percent confidence level of shoreline position based upon a linear regression estimate of where the beach would move under Alternative 2, a complete retreat scenario. If this threshold is used, the island could experience 800 feet of erosion over 30 years, an area equivalent to the entire northern end of the island where sandbags are present, without triggering a need for mitigation. All alternatives described in the DEIS can easily meet this proposed threshold, and will never trigger mitigation.

  Additionally, Figure 8 HOA states that any erosion must persist for 2 years in order for it to be attributed to the groin. This is an interesting clause to include in the DEIS considering that the HOA also claims that there will be no erosion and ZERO loss of property if the groin is built.

  Further, if ZERO future property damage is a supposed benefit of the terminal groin alternative, then any property losses that occur in the next 30 years should be compensated by the HOA through its bonding requirement, and property losses should trigger mitigation measures. This will occur since homeowners will likely insist on more beach nourishment if their properties become endangered.

- The DEIS does not establish any thresholds or triggers for mitigation if critical nesting habitat of the Piping Plover in the inlet is lost as a result of the terminal groin. It does not establish any triggers for mitigation if critical fishery areas or wildlife habitat in the inlet are lost as a result of the terminal groin. Baseline conditions for these sand flats and shoals need to be provided, so that any losses to this public trust area can be mitigated. In addition, financial assurances need to be provided to ensure this mitigation takes place.

- The DEIS ignores the cost and environmental effects of having to find additional sources of sand if increased beach nourishment is required: Additional sources of sand (in addition to Nixon Channel or the islands along the AICWW) could be necessary especially after storms or unexpected erosion events. The cost to obtain these additional sand supplies needs to be estimated, and included in the mitigation strategy.

- The terminal groin option does not include an inlet management plan as required by S.B.110.

- The DEIS does not address the potential for the groin to be flanked from the back side of the island during storm surges, thereby causing significant property damage as flood waters are reflected and channeled along the south side of the structure. Triggers to mitigate such damage need to be established.
- The DEIS does not address thresholds and triggers to protect public trust rights for access, swimming hazards that may be caused by the terminal groin, or navigational safety issues.

These rocks next to water in a popular boating and swimming area are likely to become an attractive and dangerous nuisance, and costly lawsuits may result. Private property owners that must sign easements to allow the terminal groin on their land are likely to insist on “hold harmless” agreements, and that will obligate the Figure 8 HOA to cover potential litigation costs. ".

- The DEIS does not include Financial Assurance Costs. Pursuant to Senate Bill 110, the applicant for a permit for a terminal groin is required to show proof of financial assurance to cover the costs of maintenance and monitoring of the terminal groin, implementation of mitigation measures, modification or removal of the terminal groin, and restoration of public, private, or public trust property if the groin has an adverse impact on the environment or property (see additional comment below relating to SB 110). However, these costs have not been included in the implementation costs for Alternative 5a and 5b on which the cost benefit analysis is based.

- The DEIS fails to identify what form of financial assurance will be used. Pursuant to Section 1. G.S. 113A-115.1 (e)(6), applicants for a permit to construct a terminal groin are required to submit proof of financial assurance in the form of a bond, insurance policy, escrow account, or other financial instrument that is adequate to cover the cost of (a) long-term maintenance and monitoring of the terminal groin; (b) implementation of mitigation measures as provided in the inlet management plan; (c) modification or removal of the terminal groin as provided in the inlet management plan; and (d) restoration of public, private, or public trust property if the groin has an adverse impact on the environment or property. The DEIS does not describe the type of financial assurance that will be used. It is essential that the HOA identifies what form of financial assurance they will provide as part of their application.

Conclusion

The Figure 8 HOA needs to take immediate action to rectify the deficiencies outlined above. The document, as stands, deliberately includes misleading information, obfuscates true financial costs, and fails to holistically address the impacts of a terminal groin in a dynamic inlet area. In addition to these shortcomings, the DEIS dismisses adverse impacts to critical habitat affecting endangered and threatened shorebirds, Manatees, Sea Turtles, and Sturgeon, does not mitigate for wetlands destruction, and disregards negative consequences shouldered by non-Figure 8 Island residents. Apart from these specific shortcomings, the document itself is confusing, lacks a logical sequence, and makes it difficult to discern which alternative is the least environmentally damaging and most practicable.

It is imperative that these concerns are addressed in the final revision.

Thank you for your consideration.

CC: Colonel Steven A. Baker, Wilmington District Commander USA COE

North Carolina Coastal Federation
CITIZENS WORKING TOGETHER FOR A HEALTHY COAST
Celebrating 30 Years of Coastal Conservation
1982-2012

June 14, 2012

MEMORANDUM

TO: Bob Emory, Chair, Coastal Resources Commission
FROM: Todd Miller, Executive Director
Ana Zivanovic-Nenadovic , Program and Policy Analyst
RE: Need for Rules for S.B. 110

The draft EIS on the proposed terminal groin for Rich Inlet prompts me to follow-up on the email that I sent on October 10, 2011 encouraging the Coastal Resources Commission (CRC) to adopt rules to implement the terminal groin law (S.B. 110).

The N.C. Coastal Federation expressed concerns about how the N.C. Division of Coastal Management would consistently enforce broadly described requirements in S.B. 110. Many of those same issues were presented by the DCM staff last fall to the CRC's science panel for its help, but were never resolved.

Without formally adopted regulations that have been fully vetted through the public rule-making process, the applicants for terminal groins are left to interpret the stipulations of S.B. 110 at their own discretion. This is exactly what has now occurred in the draft Environmental Impact Statement (DEIS) recently submitted by the Figure Eight Homeowners Association (F8 HOA) to the U.S. Army Corps of Engineers.

Following is the list of some of the S.B. 110 requirements that are now being implemented without administrative rules:

(1) § 113A-115.1(e)(6)(d) - *Restoration of public, private, or public trust property if the groin has an adverse impact on the environment or property;*
(2) § 113A-115.1(e)(5)(b) - *Define the baseline for assessing any adverse impacts and the thresholds for when the adverse impact must be mitigated;*
(3) § 113A-115.1(e)(5)(c) - *Provide for mitigation measures to be implemented if the adverse impacts cannot be mitigated;* and

(4) § 113A-115.1(e)(5)(b) *Proof of financial assurance in the form of a bond, insurance policy, escrow account, or other financial instrument that is adequate to cover the cost of mitigation.*

Left to its own discretion, F8 HOA has attempted to define **very limited** mitigation thresholds, mitigation triggers, and financial assurances. It has proposed to:

(a) Allow a huge amount of beach erosion before the terminal groin is blamed: It is asking to use the lower 90-percent confidence level of shoreline position along the oceanfront based upon a linear regression estimate of where the beach would move under a complete retreat scenario for island residents. Within this project area, if this threshold is adopted as adequate, almost the entire island near Rich Inlet (in the area of the sand bags) can wash away (approximately 800 feet of erosion over 30 years) without triggering a need for mitigation. In addition, the DEIS states that this erosion must persist for two years before the groin will be blamed for the erosion, and mitigation is required. This huge amount of leeway to allow significant erosion is sought by the permit applicant even though in its own DEIS it claims that there will be ZERO loss of property along the beach over the next 30 years if the groin is constructed. This is a classic example of a snake oil salesman claiming amazing results when you buy his tonic, and then providing no guarantee that it will perform as advertised. All alternatives described in the DEIS can easily meet this proposed threshold, and will never trigger mitigation.

(b) Exclude from consideration the potential for private property to be damaged along end and backside of the island: The DEIS does not address the potential for the groin to be flanked from the back side of the island during storm surges, and cause significant property damage to houses and lots on the end and backside of the island as flood waters are reflected and channeled along the south side of the structure. Triggers to mitigate such damage need to be established, and financial assurances to cover private property losses provided.

(c) Ignore the cost and environmental effects of having to find additional sources of sand if increased beach nourishment is required: Additional sources of sand (in addition to Nixon Channel or the islands along the AICWW) could be necessary especially after storms or unexpected erosion events. The cost to obtain these additional sand supplies needs to be estimated, and included in the mitigation strategy. The terminal groin option does not include an inlet management plan as required by S.B.110.

(d) Avoid any consideration of the need to mitigate the loss of public trust rights as well as increased dangers to public health and welfare: The DEIS does not address thresholds and triggers to protect public trust rights for access, swimming hazards that may be caused by the terminal groin, and navigational safety issues. These rocks next to water in a popular boating and swimming area are likely to become an attractive and dangerous nuisance, and costly lawsuits may result. Private property owners that must sign easements to allow the terminal groin on their land are likely to insist on "hold harmless" agreements, and that will obligate the F8 HOA to cover potential litigation costs.

(e) Obtain a positive cost-benefit analysis by stating that the groin provides for complete protection of property for the next 30 years: While the terminal groin

will not be blamed if a huge amount of erosion occurs, at the same time the applicant is claiming that there will be zero property damage over the next 30 years if the groin is allowed. This financial result of the project is then used to give the terminal groin option a highly beneficial cost-benefit ratio. As long as ZERO future property damage is a benefit that is being claimed for the terminal groin alternative, then any property losses that occur in the next 30 years should be compensated by F8 HOA through its bonding requirement. Property losses should also trigger mitigation measures. (This in reality will occur since homeowners are going to insist on expanded beach nourishment if their properties become endangered. Nearly 350,000 cubic yards of sand were placed on the island's beaches after Hurricane Fran because so many houses were endangered by beach erosion related to the hurricane.)

(f) Exclude the potential need for environmental mitigation from bonding requirements: The DEIS does not establish any thresholds or triggers for mitigation if critical fisheries or wildlife habitat in the inlet are lost as a result of the terminal groin. Baseline conditions for these habitats are need to be provided so that any losses to this public trust area can be mitigated, and financial assurances provided to make sure this mitigation takes place.

In calculating how much financial assurance it must provide, F8 HOA estimates that it will only need a little over $3 million in financial assurances to cover all the potential future mitigation needs of the project over the next 30 years. This figure includes the cost of removing the terminal groin if necessary. This absurdly low estimate underscores why the mitigation measures that are proposed are simply unrealistic and silly, and why a thoughtful, open, and deliberative rule-making process to address these key legal mandates is urgently needed.

Lacking administrative rules, the permitting process will be chaotic at best, and subject all parties to needless delays and expenses associated with permit appeals and litigation that are likely given the lack of clear policy guidance on these statutory requirements. It is important that the CRC engage all parties in addressing this policy and regulatory vacuum.

Cc:
Joan Weld
Braxton Davis

North Carolina
Wildlife Federation
Affiliated with the National Wildlife Federation

2155 McClintock Rd.
Charlotte, NC 28205
(704) 332-5696

1024 Washington St.
Raleigh, NC 27605
(919) 833-1923

July 11, 2012

US Army Corps of Engineers
Wilmington District Regulatory Division
69 Darlington Avenue
Wilmington, NC 28403

RE: Corps ID # SAW-2006-41158

The North Carolina Wildlife Federation offers the following comments on the DEIS for the Figure Eight Island Shoreline management Project. The Federation is a statewide, nonprofit conservation organization of hunters, anglers, and outdoor enthusiasts formed in 1945 with the sole mission to protect fish and wildlife resources and their habitats in North Carolina. Based on the analyses presented in the DEIS we recommend that either Alternative 2 – Abandon/Retreat or Alternative 1 – No Action be adopted.

The preferred action, Alternative 5B, which differs from Alternative 5A only in the source location of fill material, would involve the construction and installation of a 700-ft terminal groin at the extreme north end of the island. A 900-ft landward extension would anchor the groin and prevent flanking erosion. With the groin in place the estimated 5-year beach renourishment needs for the ocean shoreline and the Nixon Channel shoreline is in excess of 175,000 cubic yards.

The preferred alternative would affect numerous species of wildlife. According to the DEIS, the "Permit Area encompasses 4,282 acres and includes a wide diversity of estuarine and nearshore habitat types supporting diverse ecosystems typically associated with a developed and undeveloped barrier island system in southeastern North Carolina." and acknowledges that "During all months of the year, Rich Inlet provides important foraging, roosting and nesting habitats for shorebirds, colonial birds, and other waterbirds." And "Therefore, Rich Inlet's habitats and the shorebirds that utilize them are a very important natural resource to the coast of North Carolina."

The DEIS predicts that within five years of construction, portions of the inlet beach and dune system on Figure Eight Island at Rich Inlet would be converted to a subtidal and intertidal sand flat. The loss of the sand spit will result in negative indirect impacts to the birds and sea turtles thatuse this habitat for nesting and foraging. The U.S. Fish and Wildlife Service has designated the impacted area of Figure Eight Island and adjacent Hutaff Island as Critical Habitat for the endangered piping plover (*Charadrius melodus*). The DEIS notes that due to accretion the amount of habitat will increase on Hutaff Island, but not by an amount that will offset the loss on Figure Eight Island. Thus there will be a net, undetermined, loss of total habitat for the piping plover that will result in increased competition for resources on the remaining habitat. Also recreational users of the beach areas will be further concentrated on Hutaff Island, which will likely lead to more disturbance to the birds. We maintain that these impacts represent a taking of an endangered species and are unacceptable.

As previously stated the preferred alternative will decrease recreational opportunities on Figure Eight Islandand concentrate recreational users on Hutaff Island. Public recreational use of Figure Eight Island is limited to the beaches accessible by boat. The DEIS states beach loss at Rich Inlet will be offset by additional beach area along the ocean. Ocean front beaches typically are inaccessible to boaters due to the higher surf relative to the AICW or the inlets. The preferred alternative will effectively render more of the beach area inaccessible by the public, while the demand for such access is at a high level.

The potential impacts of sea level rise on structures the proposed groin is intended to protect were not adequately addressed in the DEIS. The preponderance of scientific data indicate that future rates of increase in average sea level will substantially exceed historic rates. Such increases are already being observed in the Hatteras area. If predicted increases approximate actual increases at Figure 8 Island, the groin could be rendered ineffective in protecting target structures.

The barrier islands of North Carolina have long been recognized as dynamic features of the landscape in that local areas are continually eroding or accreting. Thus any structures placed on these islands are in some jeopardy, particularly if those structures are located on the periphery of an island. While terminal groins may alleviate erosion in the target area, they typically accelerate erosion in unpredictable non-target areas, making the overall impacts difficult to estimate. The examples provided in the DEIS of reputed successes in the installation of terminal groins are not convincing. Data on specific environmental conditionsthat led to success are lacking, as are data that demonstrate those same conditions are present at Figure Eight Island.

The best alternative at Figure Eight Island is Alternative 2 – Abandon/Retreat and the second bestis Alternative 1 – No Action. Undeveloped lots are available for homes that need to be relocated. The major argument advanced against these alternatives in the DEIS appears to be the costs of relocation and the outright loss of structures. This argument is somewhat spurious in that the structures were intentionally located in areas lacking long-term stability. By knowingly building in such areas and then arguing that the economic costs to abandon or relocate the structures are excessive is disingenuous at best.

Thank you for the opportunity to express our concerns about this proposed project.

Sincerely,

T Gestwicki

Tim Gestwicki
Executive Director

RECEIVED
JUL 20 2012
REG. WILM. FLD. OFC.

July 20, 2012

Mr. Mickey Sugg
U.S. Army Corps of Engineers
Wilmington District Regulatory Division
69 Darlington Avenue
Wilmington, NC 28403

RE: Corps ID # SAW-2006-41158

Dear Mr. Sugg:

PenderWatch & Conservancy offers the following comments on the DEIS for the Figure Eight Island Shoreline Management Project. PenderWatch is a not-for-profit membership organization founded in 1986 that currently has more than 400 members. We focus on maintaining, restoring and educating the public about the environment of Pender County, NC. Many PenderWatch members live in Hampstead, Scotts Hill and Topsail Island, NC, near Rich Inlet, Hutaff Island and Figure Eight Island, and boat, swim, kayak, fish, canoe and view wildlife at Rich Inlet, Hutaff Island and public access areas of Figure Eight Island. Our members' activities would be significantly affected by construction of the proposed 1600' seawall and terminal groin at the northern end of Figure Eight Island.

As a preliminary matter, we strongly object to the extremely short time the Corps gave opponents of this proposal to comment. The application was filed with the Corps of Engineers on May 23, 2012 and the Corps required public comments to be filed by July 20, 2012 (extended from July 9, 2012.) The Figure Eight Island Homeowners' Association has spent years working on its plans; it is unreasonable and fundamentally unfair for the Corps to allow opponents less than two months to alert the public to the threat, solicit comments from the public and also to research and submit our opposing comments to this complex proposal.

Nonetheless, our members - in conjunction with the North Carolina Coastal Federation and the North Carolina Wildlife Federation -- spent several days (despite the extreme heat) obtaining 137 signatures on a petition opposing the Figure Eight Island Homeowners' Association's proposed terminal groin from folks who were literally fishing, swimming, sunbathing, kayaking and boating in Rich Inlet, the southern end of Hutaff Island and the public access area of northern Figure Eight Island at Rich Inlet. The petition states:

> We, the undersigned, spend time in Rich Inlet fishing, swimming, teaching our children how to swim, walking on the beach, sunbathing, picnicking and bird watching, among other activities. We oppose the proposal by the Figure Eight Island Homeowners' Association to build a seawall and terminal groin because they will destroy the beautiful sand spit on the Figure Eight Island side of Rich Inlet.

With apologies for smears from suntan lotion and salt water on the petition's pages, we submit the petition with their signatures. Each and every person who signed the petition would be directly and negatively affected by the proposed seawall and terminal groin at the northern end of Figure Eight Island.

Based on the analyses presented in the DEIS we recommend that either Alternative 2 - Abandon/Retreat or Alternative 1 - No Action be adopted. The petitioner's preferred action, Alternative 5B, which differs from Alternative 5A only in the source location of fill material, would involve the construction and installation of a 700-ft terminal groin at the extreme north end of the island combined with a 900-ft seawall stretching across the north end of the island from the sound to the groin.

We submit that the Figure Eight Homeowners' Association proposal is plainly deficient and non-compliant with Paragraphs 4, 5 & 6 of the North Carolina law governing terminal groins, S.L. 2011-387. Pursuant to S.L. 2011-387, an applicant for a permit for the construction of a terminal groin shall submit all of the following . . . .:

(1) Information to demonstrate that structures or infrastructure are imminently threatened by erosion, and nonstructural approaches to erosion control, including relocation of threatened structures, are impractical.
(2) An environmental impact statement that satisfies the requirements of G.S. 113A-4.
(3) A list of property owners and local governments that may be affected by the construction of the proposed terminal groin and its accompanying beach fill project and proof that the property owners and local governments have been notified of the application for construction of the terminal groin and its accompanying beach fill project.
(4) A plan for the construction and maintenance of the terminal groin and its accompanying beach fill project prepared by a professional engineer licensed to practice pursuant to Chapter 89C of the General Statutes.
(5) A plan for the management of the inlet and the estuarine and ocean shorelines immediately adjacent to and under the influence of the inlet. The inlet management plan shall do all of the following relative to the terminal groin and its accompanying beach fill project:
    a. Describe the post-construction activities that the applicant will undertake to monitor the impacts on coastal resources.
    b. Define the baseline for assessing any adverse impacts and the thresholds for when the adverse impacts must be mitigated.
    c. Provide for mitigation measures to be implemented if adverse impacts reach the thresholds defined in the plan.
    d. Provide for modification or removal of the terminal groin if the adverse impacts cannot be mitigated.
(6) Proof of financial assurance in the form of a bond, insurance policy, escrow account, or other financial instrument that is adequate to cover the cost of:
    a. Long-term maintenance and monitoring of the terminal groin.
    b. Implementation of mitigation measures as provided in the inlet management plan.
    c. Modification or removal of the terminal groin as provided in the inlet management plan.SL2011-0387 Session Law 2011-387
    d. Restoration of public, private, or public trust property if the groin has an adverse impact on the environment or property.

Our objections to the alternatives favored by the Homeowners' Association include but are not limited to the following:

- Sand mining;
- Continuing beach renourishment would be needed;
- Would disrupt most stable inlet in North Carolina - Rich Inlet;
- Threatens pristine Lea/Hutaff Island --
    - habitat for shorebirds, colonial birds and other birds,
    - migrating birds resting and feeding,
    - endangered nesting sea turtles,
    - threatened piping plovers;
- According to petitioner's DEIS, its preferred alternatives will destroy public trust beaches and sand islands that are extremely popular with PenderWatch members and the general public and are heavily used for public recreation;
- Figure Eight is a private island without public access;
- We object to use of public funds for a terminal groin on a private island --
    - indirect state and federal funds are already being spent on the project (i.e., in permitting process);
- Figure Eight Island homeowners whose homes are threatened should relocate the threatened houses, which were built in an area of the island that was well known to be fast-eroding and unstable;
- The seawall and terminal groin would have a potentially devastating impact on tidal creeks in the Rich Inlet tidal flow system;
- The groin extending 700' into the ocean will constitute a potential navigational hazard yet there is no provision in the DEIS for the Figure Eight Homeowners' Association to assume guaranteed financial liability for any navigational "accidents" caused by the terminal groin;
- There are grossly inadequate funds committed for monitoring the impact of the structure, for maintenance and repair of the structure and for removing it in violation of S.L. 2011-38.

Alternatives 5B and 5A, the petitioner's preferred alternatives, would negatively affect numerous species of wildlife. According to the DEIS, the "Permit Area encompasses 4,282 acres and includes a wide diversity of estuarine and near shore habitat types supporting diverse ecosystems typically associated with a developed and undeveloped barrier island system in southeastern North Carolina" and it acknowledges that "[d]uring all months of the year, Rich Inlet provides important foraging, roosting and nesting habitats for shorebirds, colonial birds, and other waterbirds." And "[t]herefore, Rich Inlet's habitats and the shorebirds that utilize them are a very important natural resource to the coast of North Carolina."

The DEIS predicts that within five years of construction, portions of the inlet beach and dune system on Figure Eight Island at Rich Inlet will be converted to a subtidal and intertidal sand flat. The loss of the sand spit will result in negative indirect impacts to the birds and sea turtles that use this habitat for nesting and foraging, including endangered and threatened species. The U.S. Fish and Wildlife Service has designated the impacted area of Figure Eight Island and adjacent Hutaff Island as Critical Habitat for the threatened piping plover. The DEIS notes that due to accretion the amount of habitat will increase on Hutaff Island. However, it will not accrete by an amount that will offset the loss on Figure Eight Island. Thus there will be a net loss of total habitat for the piping plover that will result in increased competition for resources in the remaining habitat. In addition, current recreational users of the public access areas of Figure Eight Island will be displaced and concentrated on Hutaff Island, which will inevitably lead to more disturbance to the birds.

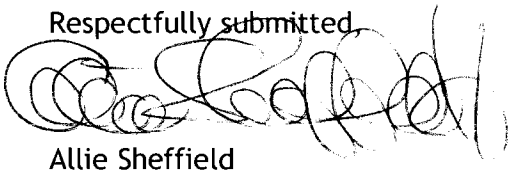
Public recreational use of Figure Eight Island is limited to the beaches accessible by boat, since the bridge to Figure Eight Island is closed to the public. The DEIS states that beach loss at the north end of Figure Eight Island (at Rich Inlet) will be offset by additional public access beach area along the ocean. But ocean front beaches are largely inaccessible to boaters coming from the Intracoastal Waterway and sound, because of the rough surf and dangerous currents in the inlet and the extreme difficulty -- if not impossibility -- of anchoring a motor boat in the ocean (i.e. breakers) in order to use the oceanfront beach. The Homeowners' Association's preferred alternative will destroy the currently accessible public access beach areas at the north end of Figure Eight Island but the so-called "offset" of more ocean front access touted by the proponents of the groin is illusory because it will be inaccessible to boaters. This clearly violates S.L. 2011-38's requirement that "construction and maintenance of the terminal groin will not result in significant adverse impacts to . . . the public recreational beach."

S.L. 2011-38 mandates in Paragraph 6 that the proponent of a terminal groin set aside "sufficient funds" in the form of a financial instrument (i.e., bond, insurance policy, escrow account, etc.) to fund long-term monitoring, maintenance and repair of the terminal groin and removal of the terminal groin if it does not work as predicted. However, the Figure Eight Homeowners' Association proposes to allot a paltry $480,000 (in 2012 dollars) to monitor the terminal groin over the next 30 years, which includes preparing 33 detailed studies of the environmental consequences of the groin. There is no allocation whatsoever for statutorily mandated maintenance and repair of the seawall and groin, or for mandated mitigation and repair to damage to Lea-Hutaff Island caused by the seawall and terminal groin. And the Homeowners' Association proposes to commit a laughable $1 million to remove the massive seawall and terminal groin if its adverse effects cannot be mitigated. These amounts manifestly do not constitute "sufficient funds" as required by the law.

To reiterate, our preferred alternative at Figure Eight Island is Alternative 2 - Abandon/Retreat and our second preferred alternative is Alternative 1 - No Action. Undeveloped lots are available on and off Figure Eight Island to move island homes that are threatened by erosion. The proposed seawall and terminal groin will cause inestimable environmental and recreational public access loss for many to benefit a few property owners on Figure Eight Island who foolishly built homes at the northern end of Figure Eight Island, an area that has always been well known to be unstable and rapidly eroding -- just like the northern end of all of North Carolina's barrier islands.

Finally, in addition to these comments, we adopt the comments submitted by the North Carolina Coastal Federation, the North Carolina Wildlife Federation and the North Carolina Audubon Society.

Respectfully submitted,



Allie Sheffield
President

SAVE RICH INLET

We, the undersigned, spend time in Rich Inlet fishing, swimming, teaching our children how to swim, walking on the beach, sunbathing, picnicking and bird watching, among other activities. We oppose the proposal by the Figure Eight Island Homeowners' Association to build a seawall and terminal groin because they will destroy the beautiful sand spit on the Figure Eight Island side of Rich Inlet.

Date	NAME (Please Print)	Mailing Address	Email Address	Telephone #
6/16/12	Dani Neathery	192 Holly Ridge House Ridge	Neneal[illegible]	[illegible]
6/16/12	Pearl Douglas	910 Wordsworth Dr, Wilm	Wspd[illegible]	—
6/16/12	Barbara Bell	152 George II Hwy SE		
6/16/12	Tynisia Bell	152 George II Hwy SE	D.tynisia[illegible]	
6/16/12	Erica Bohl	108 N McCullen St Burgaw		
6/16/12	Jon Bohl	108 N McCullen St Burgaw		
6/16/12	J Richard Tamisiea, MD	6309 Fox Run Rd Wilm	dtamisiea@[illegible]	
6/16	Tom Alusic	1621 St. Anne, Wilmington NC		
6/16	[illegible]	[illegible]		
6/16/12	Linda Reed	713 Ayd Dr. Surfside Beach		
6/16	V. Fowler	705 Macnair Shallotte		
6/16/12	Shawn Heid	6961 E Hwy 210, Sneads Ferry		

SAVE RICH INLET

We, the undersigned, spend time in Rich Inlet fishing, swimming, teaching our children how to swim, walking on the beach, sunbathing, picnicking and bird watching, among other activities. We oppose the proposal by the Figure Eight Island Homeowners' Association to build a seawall and terminal groin because they will destroy the beautiful sand spit on the Figure Eight Island side of Rich Inlet.

Date	NAME (Please Print)	Mailing Address	Email Address	Telephone #
6/16	Howard Chadwick	707 Gleneagles Dr. Myrtle Beach	[illegible]@aol.com	
6/16	Sam Wilson	2024 Creecy Ave. Wilmington 28403	saw6137@alum.uncw.edu	
	Jim Skiba	311 Friday Dr W. 28411	mkcmoon311@[illegible].com	
6-16	THOMAS PETREA	2248 2 NC HWY 210 RPNC 28457		910-259-2788
6/16	Lindsey Skiba	311 Friday Dr. Wilm. 28411		
6/16	Diane Skiba	311 Friday Dr Wilm 28411		
* 6/16	Christian Phillips	307 Bridgeton Ct. Wilm 28411	[illegible]	
6/16	HARRY BREEN	7513 S PROMONTORY CT WILMINGTON 28412	LDBREEN@GMAIL.COM	
6/16	DIANNE BREEN	7513 S. Promontory Ct. Wilmington 28412		
	Yvonne Bigby		[illegible]@[illegible]	
6/16	Robert Peacock		robert.peacock@[illegible]	
6/16	[illegible]	134 W. [illegible] Richlands 28547		910-346-[illegible]

SAVE RICH INLET

We, the undersigned, spend time in Rich Inlet fishing, swimming, teaching our children how to swim, walking on the beach, sunbathing, picnicking and bird watching, among other activities. We oppose the proposal by the Figure Eight Island Homeowners' Association to build a seawall and terminal groin because they will destroy the beautiful sand spit on the Figure Eight Island side of Rich Inlet.

Date	NAME (Please Print)	Mailing Address	Email Address	Telephone #
6-16-12	Claudia Lee Spiller	[illegible] E Creek Rd Rocky Point, NC		[illegible]
6/16/12	Geo Knox	55 Drake Ct. Rocky Pt. NC 28457	[illegible]	[illegible]
6/16/12	Tom Anderson	1147 Lakeview Ave Richlands NC		[illegible]
6/16/12	Faith Anderson	1147 Lakeview Ave. Richlands NC		910 [illegible]
"	Mike Boedeker	1040 Stonebridge Ln. Leland, NC	cboedeker@[illegible].com	910-3[illegible]
4-14-12	Cassandra Civils	7273 Herring Rd [illegible] NC		910 [illegible]
6-16-12	Richard H. Walker Jr	441 Maides Ave Wilm. NC		910 7636040
6 16 12	Raymond Civils	P.O. Box 207 Harrells NC 28444	nighthawk4[illegible]@yahoo.com	910 532 6379
6-16-12	Susan Leuck	5162 Minnesota Dr Southport NC 28461		910 454-1134
6-16-12	Lyle Leuck	5162 Minnesota Dr. Southport, NC 28461		910 454 1134
6/16/12	Tara Arnette	413 NC Hwy 53E Kelly NC		[illegible]
6/16/12	Tanya Novakowski	209 N Smith Str. [illegible] NC		[illegible]

SAVE RICH INLET

We, the undersigned, spend time in Rich Inlet fishing, swimming, teaching our children how to swim, walking on the beach, sunbathing, picnicking and bird watching, among other activities. We oppose the proposal by the Figure Eight Island Homeowners' Association to build a seawall and terminal groin because they will destroy the beautiful sand spit on the Figure Eight Island side of Rich Inlet.

Date	NAME (Please Print)	Mailing Address	Email Address	Telephone #
6/16/12	Sarah Gubitz	111 Double Eagle Rd.	sarahsuna@aol.com	910-256-4417
6/16/12	Wm Gubitz	111 Double Eagle Rd.	wgubitz@live.com	
6/16/12	Ted Avent	102 Pendula Way	Avent Tom@yahoo.com	
6/16/12	Dan English	4108 Indian Corn Trl	dan@glbtech.com	
6/16/12	HENRY OCHORACKI	1353 GRANDIFLORA, LELAND NC	HCIC4ORACKI@RC.RR.COM	
6/16/12	KENNETH SMILES	441 1/2 MARINES AVE	VETERANSOFWAR@[illegible].COM	[illegible]
6-16-12	Sheila Powell	9000 S. Dickerson Bungalow Rd		
6-16-12	Jim Hammond	2657 CAROLINA BEACH	SUNNYWHAMMOND@YAHOO.COM	910-202-7644
6-16-12	Deanna DeWeese	4908 Indian Corn Trl.	deanna-d@earthlink.net	910-494-3020
6-16-12	Tammy Clayton	4702 westgate rd	Twestgate@aol.com	
6-16-12	June Cradick	Box 1964 ILM 28402		910.233.5717
6-16-12	ALAN CRADICK	BOX 1564 ILM 28402		910-200-4494

SAVE RICH INLET

We, the undersigned, spend time in Rich Inlet fishing, swimming, teaching our children how to swim, walking on the beach, sunbathing, picnicking and bird watching, among other activities. We oppose the proposal by the Figure Eight Island Homeowners' Association to build a seawall and terminal groin because they will destroy the beautiful sand spit on the Figure Eight Island side of Rich Inlet.

Date	NAME (Please Print)	Mailing Address	Email Address	Telephone #
6/23/12	Jennifer Bluestone	1725 Futch Creek Rd Wilm 28411	jenbluestone@gmail.com	919-345-5475
6/23/12	Jonathan Bluestone	"	"	"
6/23/12	Sofia Bluestone	"	"	"
6/23/12	Eliana Bluestone	"	"	"
6/23/12	Stephen Henson	"	sbhenson@gmail.com	
6/23/12	Jennifer Henson	"	jenirnwb@gmail.com	
6/23/12	Peter DeBelli	"	pennpete@aol.com	
6/23/12	Jackie Barber	"	jbdeby@aol.com	

SAVE RICH INLET

We, the undersigned, spend time in Rich Inlet fishing, swimming, teaching our children how to swim, walking on the beach, sunbathing, picnicking and bird watching, among other activities. We oppose the proposal by the Figure Eight Island Homeowners' Association to build a seawall and terminal groin because they will destroy the beautiful sand spit on the Figure Eight Island side of Rich Inlet.

Date	NAME (Please Print)	Mailing Address		Email Address	Telephone #
6-23-12	Shannon Brown	22 Long Point Ln	Hampstead NC 28443		910-686-5558
6-23-12	Julie Lee	214 Queen St. WILMINGTON, NC 28401			(910) 254-2709
6-23-12	Jeff Brown	22 Long Point Lane	HAMPSTEAD NC 28443		(910) 686-5558
6-23-12	Brian Mitchell	462 Biscayne Dr 28411		bmitchell2147@gmail.com	(910) 686-7116
6-23-12	Andrea Mitchell	462 Biscayne Dr. 28411		wilmingtonrdh@gmail.com	(910) 686-7116
6-23-12	Rich Gustavson	520 Bay cove LN 28411			(910) 686-6914
6-23-12	Bob Gehrke	248 Pages Creek Dr			" 620-4[illegible]
6/23/12	Clarissa Woodward	7306 Cassimir Place 28412		clarissa[illegible]@live.com	(910) 679-[illegible]
6/23/12	Corey Ahouse	104 Prospect Ave		Haveahouse@gmail.com	(9[illegible] 5[illegible]
6/23/12	Dennis Eckhardt	320 Ann Andole Trace		EckhardtFire@yahoo.com	910-617-1340
6/23/12	Debra Elkins	242 W Bedford Dr			Wilmington 910 40[illegible]
6/23/12	Ken Fielding	152 Ludlow Dr		Wilm NC 28411	[illegible]

SAVE RICH INLET

We, the undersigned, spend time in Rich Inlet fishing, swimming, teaching our children how to swim, walking on the beach, sunbathing, picnicking and bird watching, among other activities. We oppose the proposal by the Figure Eight Island Homeowners' Association to build a seawall and terminal groin because they will destroy the beautiful sand spit on the Figure Eight Island side of Rich Inlet.

Date	NAME (Please Print)	Mailing Address	Email Address	Telephone #
		Hampstead 28443		
6/30/12	John R. Spruill	1836 Corcas Ferry Rd	Spruill544@gmail.com	910-599-5540
6/30	Rebecca Blake	3859 Sweetbriar Rd Wilmington NC 28403	Blakemanbs@hotmail.com	
6/30	Paul Staten	155 E. Brandywine Circle	pstaten@gmail.com	
6/30	Kayce Darrell	5008 Castle Lakes Rd Castle Hayne	kaycedarrell@ec.rr.com	
6/30	Saraiya Rashid	210 S. 6TH St. Wilmington 28401	SURAIYA.RASHID@gmail.com	
6/30	Merlie Baker	306 Poplar Grove Wilmington 28411	cbaker1948@charter.net	
6/30	Matt Colleghan	160 Arlington Drive Wilmington NC 28403	mcolleghan@yahoo.com	
6/30	DAVID SHUCAVAGE,	305 SOUTH 2nd Street, Wilmington NC 28401	RICHERoyalSTAMPS@4	
6-30	Emily Ullmer	402 Riviera Dr Wilm 28411	emullmer@yahoo	
6-30	Amanda Hellmann	2317 Oleander Drive Wilm 28403		910-399-7660
6-30	Chance Hellmann	2317 Oleander Drive Wilm. 28403		910-399-7660

SAVE RICH INLET

We, the undersigned, spend time in Rich Inlet fishing, swimming, teaching our children how to swim, walking on the beach, sunbathing, picnicking and bird watching, among other activities. We oppose the proposal by the Figure Eight Island Homeowners' Association to build a seawall and terminal groin because they will destroy the beautiful sand spit on the Figure Eight Island side of Rich Inlet.

Date	NAME (Please Print)	Mailing Address	Email Address	Telephone #
6/30/12	John R. Sprull	1836 Corcas Ferry Rd Hampstead 28443	Sprull544@gmail.com	910 599 5640
6/30	Rebecca Blake	3839 Sweetbriar Rd Wilmington NC 28403	Blakeamom68@hotmail.com	
6/30	Paul Staten	155 E. Brandywine Circle	gulfstaten@gmail.com	
6/30	Kayce Darrell	5008 Castle Lakes Rd Castle Hayne	Kaydee@ec.rr.com	910-617-9031
6/30	Sarariya Rashid	210 S. 6TH St. Wilmington 28401	SURAIYA.RASHID@gmail.com	
6/30	Charlie Baker	306 Poplar Grove Wilmington 28411	cbaker1948@charter.net	
6/30	Matt Collegan	160 Arlington Drive Wilmington NC 28403	mcollegan@yahoo.com	
6/30	DAVID SHUCAVAGE,	305 SOUTH 2nd Street, Wilmington NC 28401	RICH@RojosystemsNC.com	
6-30	Emily Ullmer	402 Riviera Dr Wilm 28411	emullmer@yahoo	
6-30	Amanda Hellmann	2317 Oleander Drive Wilm 28403		910-399-7660
6-30	Chance Hellmann	2317 Oleander Drive Wilm. 28403		910-399-7660

SAVE RICH INLET

We, the undersigned, spend time in Rich Inlet fishing, swimming, teaching our children how to swim, walking on the beach, sunbathing, picnicking and bird watching, among other activities. We oppose the proposal by the Figure Eight Island Homeowners' Association to build a seawall and terminal groin because they will destroy the beautiful sand spit on the Figure Eight Island side of Rich Inlet.

Date	NAME (Please Print)	Mailing Address	Email Address	Telephone #
		Hampstead 28443		
6/30/12	John R. Spruill	1836 Corcas Ferry Rd	Spruill544@gmail.com	910 599 5640
6/30	Rebecca Blake	3829 Sweetbriar Rd Wilmington NC 28403	Blakemom68@hotmail.com	
6/30	Paul Staten	155 E. Brandywine Circle	palfstaten@gmail.com	
6/30	Kaye Darrell	5008 Castle Lakes Rd Castle Hayne	Kaydee@ec.rr.com	910-617-9031
6/30	Saraiya Rashid	210 S. 6TH St. Wilmington 28401	SORAIYA.RASHID@gmail.com	
6/30	Charlie Baker	306 Poplar Grove Wilmington 28411	cbaker1948@ec.rr.net	
6/30	Matt Collegan	160 Arlington Drive Wilmington NC 28403	mcollegan@yahoo.com	
6/30	DAVID SHUCAVAGE,	305 SOUTH 2nd Street, Wilmington NC 28401	[redacted] RICH@ROJOSYSTEMS.COM	
6-30	Emily Ullmer	402 Riviera Dr Wilm 28411	emullmer@yahoo	
6-30	Amanda Hellmann	2317 Oleander Drive Wilm 28403		910-399-7660
6-30	Chance Hellmann	2317 Oleander Drive Wilm. 28403		910-399-7660

SAVE RICH INLET

We, the undersigned, spend time in Rich Inlet fishing, swimming, teaching our children how to swim, walking on the beach, sunbathing, picnicking and bird watching, among other activities. We oppose the proposal by the Figure Eight Island Homeowners' Association to build a seawall and terminal groin because they will destroy the beautiful sand spit on the Figure Eight Island side of Rich Inlet.

Date	NAME (Please Print)	Mailing Address	Email Address	Telephone #
	Kelly Shapiro	3708 Rockwood Dr	Kellyshapiro@gmail	
	J. Clark	513 Windstar Ln	HeyFromJ@gmail.com	
	Jill Sink	661 Hickory Point Rd	Hampstead, NC 28443	
	Joe McBee	661 Hickory Point Rd	[illegible] 28443	910-471-4[illegible]
	Bob Clark	513 Windstar Ln	BCLARKJR@BFPE.com	910-443-7620
	Lilie LaCourse	37 Grand Ave	Dixie_Cowgirl@hotmail.com	
	Jesse M Puskee	4101 Wrightsville Ave	Wilm., NC 28403	
	Sara N Puskee	4101 Wrightsville Ave	Wilm., NC 28403	
	Andee Woodcock	424 E Creekview Dr, Hampstead, NC 28443	andeewoodcock@gmail.com	910-279-4605
	Dennis Woodcock	424 E. Creekview Dr.	Hampstead, N.C. 28443	910-270-4405
	Luke Woodcock	424 E. Creekview Dr.	Hampstead, NC 28443	910-470-7005
	Candace Woodcock	424 E. Creekview Dr.	Hampstead, NC 28443	910-270-4405

SAVE RICH INLET

We, the undersigned, spend time in Rich Inlet fishing, swimming, teaching our children how to swim, walking on the beach, sunbathing, picnicking and bird watching, among other activities. We oppose the proposal by the Figure Eight Island Homeowners' Association to build a seawall and terminal groin because they will destroy the beautiful sand spit on the Figure Eight Island side of Rich Inlet.

Date	NAME (Please Print)	Mailing Address	Email Address	Telephone #
	Scott Sink	616 Trace Drive 28411	scott626@gmail.com	910-219-2[illegible]
	Justin Hobbs	2404 Graysail Ct 28411	Hobbsland[illegible]@[illegible].com	910-[illegible]
	Erik Francin	7212 Courtney Pines Rd 28411	efrancin@ec.rr.com	910-[illegible]
	Matt Warren	6108 Tidal Reach Ct		910-452-[illegible]
	Chris Slaydd	5128 Somerset LN		910-508-[illegible]
	Kim Barrington	512 Emerywood Dr 27615	Kimbarrington@nc.rr.com	
	Mike Sutton	10400 Ashland Gate Dr 27617	mksutton@[illegible].com	
	[illegible]	PO Box 10262 Wil. NC 28404		

SAVE RICH INLET

We, the undersigned, spend time in Rich Inlet fishing, swimming, teaching our children how to swim, walking on the beach, sunbathing, picnicking and bird watching, among other activities. We oppose the proposal by the Figure Eight Island Homeowners' Association to build a seawall and terminal groin because they will destroy the beautiful sand spit on the Figure Eight Island side of Rich Inlet.

Date	NAME (Please Print)	Mailing Address	Email Address	Telephone #
	~~Michael Migliaccio~~	168 middle point rd Hampstead NC	MikeMigliaccio@aol.com	910 270 4812
	JEFF WALDYKE	106 POONCE CT WLM NC	jwaldyke@gmail.com	910 795 3216
	ARTHUR NORZ	5653 PLANTATION LANDING DR. WILM NC		
	TED LANDERS	403 Foothill Ct, WILMINGTON NC		
	TROY JONES	221 KINGS GRANT DRIVE WILMINGTON NC		CELL 712 03 2
	Joyce Parker	1010 Kings Grant Rd Wilmington		
	CHERYL PARKER	715 JENNINGS Dr 28403		
	TODD PARKER	" "		
	RAMONA JACKSON	131 MYRTLE AVE 28403		9192911044
	TERESA TAYLOR	monajackson@nc.rr.com		
		send petition monajackson@nc.rr.com		
		& Stop Titan mtg		

SAVE RICH INLET

We, the undersigned, spend time in Rich Inlet fishing, swimming, teaching our children how to swim, walking on the beach, sunbathing, picnicking and bird watching, among other activities. We oppose the proposal by the Figure Eight Island Homeowners' Association to build a seawall and terminal groin because they will destroy the beautiful sand spit on the Figure Eight Island side of Rich Inlet.

Date	NAME (Please Print)	Mailing Address	Email Address	Telephone #
	~~Michael Migliarese~~	~~768 middle point rd Hampstead NC~~	~~[illegible]@[illegible].com~~	~~910 270 9781~~
	Mary Ann Milne	2176 Washington Acres Rd Hamp. NC	xhersizemmilne@bellsouth.net	910-350-7814
	Carolyn McCann	303 Hwy 210 West Hamp. NC		910 270 4547
	Karma Maples	PO Box 444 Hampstead NC		910 270 3121
	Michael Wainscott	8712 Bald Eagle Ln	mwainscott@[illegible]	
	Kelly Wainscott	8712 Bald Eagle Ln	Kelly@thewainscotts.[illegible]	

SAVE RICH INLET

We, the undersigned, spend time in Rich Inlet fishing, swimming, teaching our children how to swim, walking on the beach, sunbathing, picnicking and bird watching, among other activities. We oppose the proposal by the Figure Eight Island Homeowners' Association to build a seawall and terminal groin because they will destroy the beautiful sand spit on the Figure Eight Island side of Rich Inlet.

Date	NAME (Please Print)	Mailing Address	Email Address	Telephone #
	~~Richard Mylander~~	~~168 middle point ct Hampstead NC~~	~~Rmylander@aol.com~~	~~910 270 4852~~
	Brian Lentz	1423 Forest Hill Dr.	brianleelentz@gmail.com	910 254 [illegible]
	Lindsay Skinner	709 N 4th St #104	skinner.lj@gmail.com	[illegible]
	George Best	405 Blooming Meadows Rd	[illegible]	
	Jennifer Best			
	Beverly Healy	Wilmington, NC 28411 Holiday Drive		

SAVE RICH INLET

We, the undersigned, spend time in Rich Inlet fishing, swimming, teaching our children how to swim, walking on the beach, sunbathing, picnicking and bird watching, among other activities. We oppose the proposal by the Figure Eight Island Homeowners' Association to build a seawall and terminal groin because they will destroy the beautiful sand spit on the Figure Eight Island side of Rich Inlet.

Date	NAME (Please Print)	Mailing Address		Email Address	Telephone #
	Michael Migliaccio	168 middle point rd	Hampstead NC	MikeMigliaccio@aol.com	910 270 4812
	Sarah Meshaw	118 Coppers Tr.	Wilm. NC	SMeshaw@atmegov.com	622-1910
	Stephanie Robinson	118 Coppers Tr.	Wilm. NC	Stefietta.bell@southtel.net	232-0561
	Chris Robinson	118 Coppers Tr.	Wilm. NC	CRobinson240@ec.rr.com	274-5252
	Kathleen Bowles	210 Seminole Trail	Wilm. NC	bowles1994@gmail.com	431-1501
	KC Harmon	221 St. Luke Ct.	Wilm. NC	poshyleec@msn.com	232-4259
	Terry Tomb	4821 Milford Rd	Wilm, NC	tr.tytomb@yahoo.com	
	Richard Witherspoon	139 Dogwood Lane	Hampstead, NC	Wspam62@aol.com	547-4991
	Ivey English	139 Dogwood Lane	Hampstead, NC		547-4988
	Kelly Witherspoon	139 Dogwood Lane	Hampstead NC	Kbwitherspoon@AOL.com	547-9990
	Katie Witherspoon	139 Dogwood Lane	Hampstead, NC		347-1374
	Mary Mary Sheffield	36 North Oak Ct,	Surf City 28445	marsh36@yahoo.com	910-328-0915

SAVE RICH INLET

We, the undersigned, spend time in Rich Inlet fishing, swimming, teaching our children how to swim, walking on the beach, sunbathing, picnicking and bird watching, among other activities. We oppose the proposal by the Figure Eight Island Homeowners' Association to build a seawall and terminal groin because they will destroy the beautiful sand spit on the Figure Eight Island side of Rich Inlet.

Date	NAME (Please Print)	Mailing Address	Email Address	Telephone #
	[illegible]	[illegible]	[illegible]	[illegible]
	Diana DeSimone	1048 Candlelight Lane Leland NC		[illegible]
	James Cox	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]
	Warren L Smith	2431 Oakley Rd. Carolina Shores NC		910 [illegible]
	Gabriel Sheffield	1337 Colvos Ferry Rd Hampstead NC		

PenderWatch & Conservancy
Post Office Box 62
Hampstead, NC 28443

June 13, 2012

U.S. Army Corps of Engineers
Wilmington Regulatory Field Office
Attention: Mr. Mickey Sugg
69 Darlington Avenue
Wilmington, NC 28403

Dear Mickey,

Enclosed is a brief article posted online in January 2011 and written by Rob Young, Director of the Program for the Study of Developed Shorelines at Western Carolina University. It introduces and summarizes a longer paper which is also enclosed, entitled A Fiscal Analysis of Shifting Inlets and Terminal Groins in North Carolina, written by Andrew Coburn, Associate Director of the same Program.

We at PenderWatch believe this paper contains significant information and analysis that is relevant to the proposed Figure Eight Island Shoreline Management Project and the Draft EIS that was the subject of a Public Hearing in Wilmington on June 7. Please add these documents to the written comments that were solicited in connection with the Public Hearing.

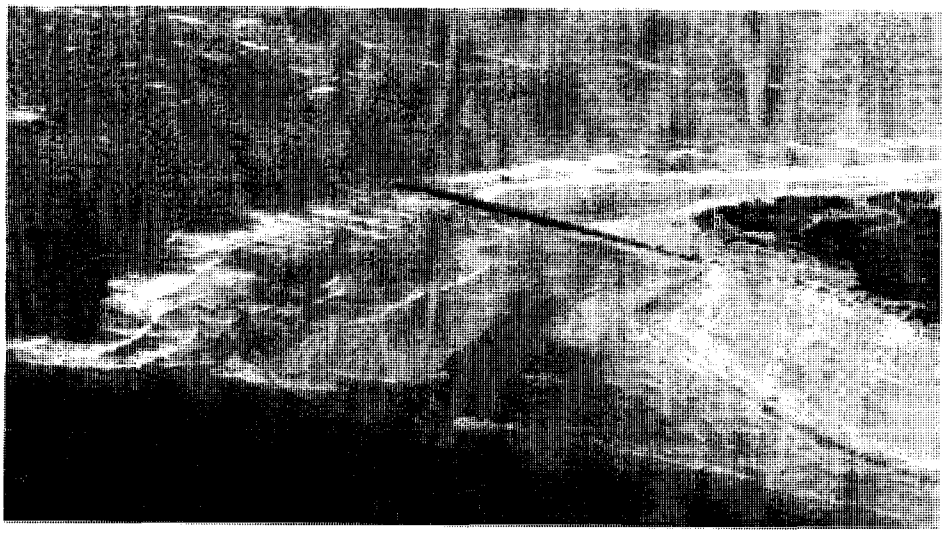
Best wishes,

Donald C. Ellson

Donald C. Ellson
Secretary

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

Posted In Articles & Dossiers, Shoreline Armoring
Jan
28



By Rob Young Director of the Program for the Study of Developed Shorelines at Western Carolina University

Amid all the other issues the legislature is likely to consider this session, terminal groins, shore-perpendicular structures built at inlets in attempt to slow erosion, might not catch the attention of most taxpayers. State law has banned these structures for more than two decades.

But the debate about terminal groins is worth keeping an eye on, whether you live in western North Carolina or in a coastal community, because it could cost you and our state a pretty penny.

A new study by Andrew Coburn of the Program for the Study of Developed Shorelines at Western Carolina University suggests that the benefits of groins in protecting beach homes from erosion are unlikely to outweigh the costs.

Coburn's report shows that using taxpayer funds to support the value of the relatively small number of threatened properties simply will not return enough tax dollars to make public funding worthwhile.

Of course, in a private community like Figure Eight Island, residents there may elect to cover the costs of building a terminal groin to protect their neighbors' investments out of their own pockets. This would be an altruistic gesture, but it would still be a bad investment for those who chose to live back from the beach.

And make no mistake: groins are a bad investment. Their initial cost will run into the millions of dollars and annual maintenance can top $2 million. A state-funded study completed last year demonstrated that property down the beach from the groin gets no clear benefits. Nor could the study guarantee that towns with groins will save money in their ongoing battle to protect investment property. All the terminal groins examined in the study still required massive beach re-nourishment.

These beach re-nourishment projects typically cost millions of dollars and must be repeated every few years. Beach communities often ask the legislature to help pay those costs with state dollars. SO, managing the shoreline around a privately built groin could continue to cost taxpayers money.

The bottom line is that, while it may hold the tip of an island in place, a terminal groin will do so for the benefit of only a very small number of property owners at the expense of other private property owners and/or taxpayers.

A wiser course would be to allow the free market to set property values for oceanfront homes that are located in chronic erosion areas. Constantly asking taxpayers (or neighbors) to protect a small number of poorly located homes through beach re-nourishment, sand bags and now terminal groins simply supports an artificially high value for those homes that does not reflect the risk involved in building in a very dangerous place.

Many oceanfront property owners feel that the entire community (or the entire state for that matter) should pay to maintain a beach in front of their investments because "everyone uses the beach". But, from a scientific perspective, it is not coastal erosion that has removed or narrowed the beach. The beach has narrowed because there is a building in the way of its natural, landward retreat. If there were no buildings, the beach would still be there. So, erosion doesn't remove beaches, poorly located infrastructure removes beaches.

Please don't think that I am suggesting that we move all homes 10 miles away from the sea. I am not even suggesting that we get rid of oceanfront property. I am simply suggesting that oceanfront investment property located in chronic erosion areas and near inlets produces constant headaches for taxpayers.

Sometimes, we all make a bad investment decision. Those individuals who purchased property in areas experiencing constant erosion and storm damage made a bad investment decision. I owned plenty of US Airways stock when they went bankrupt. I lost my shirt. I never expected my neighbors to bail me out.

The same is true with oceanfront investment property. We can all feel sympathy for those individuals whose property is threatened, but taxpayers have no responsibility to protect those particular investments. Nor should our public beaches, which are owned by all of us, after all, be compromised to protect a small number of property owners. Doing so only makes things worse, and more expensive in the long run.

So, if the state legislature decides to reverse state law and allow terminal groins along the North Carolina coast there should be no public funding available to aid in their construction or maintenance. And, private property owners who may then be asked to pay to protect their neighbor's homes should think twice.

Original Study by Andrew S. Coburn, PSDS

Rob Young, *in* NewsObserver

Related Posts

- Lost Villages, Pictures by Neil A White
- Stay or go? Some towns are eyeing retreat from sea
- Homeowners allowed to grow size of temporary retaining walls
- Hawaii's Beaches Are in Retreat, and Its Way of Life May Follow
- Another Dam Project Approved for Patagonia

Tags: Erosion, Rob Young

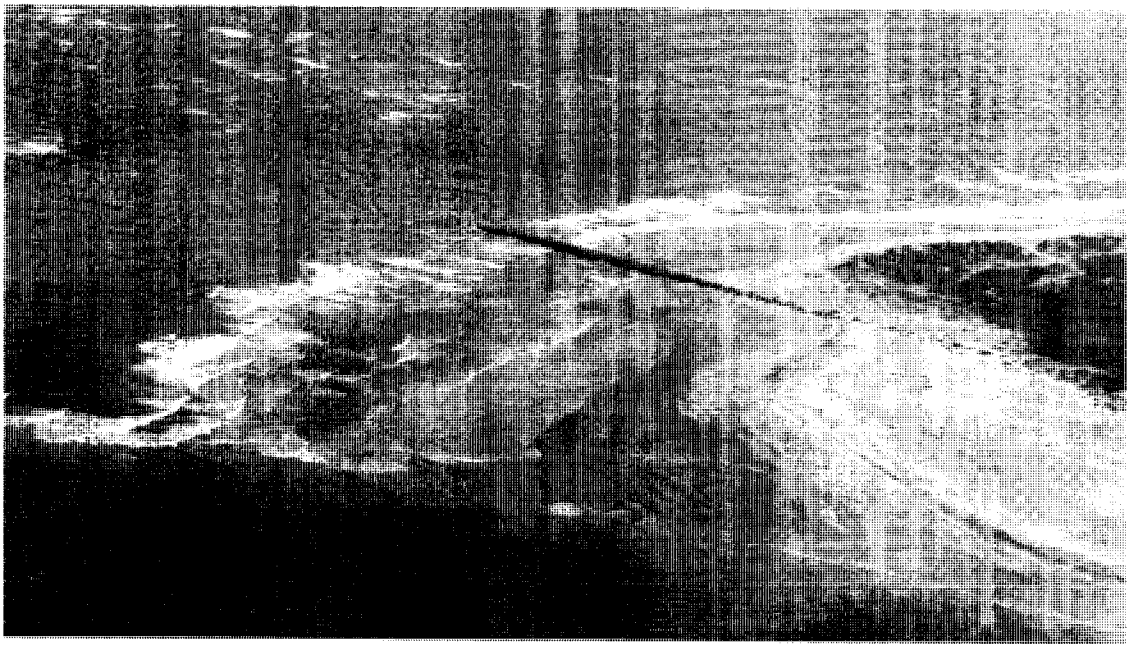
1 Comment to "A Fiscal Analysis of Shifting Inlets and Terminal Groins in North Carolina"

- March 4, 2011 at 8:06 pm
  Miranda Pearce says:

  I wholeheartedly agree! I am an ocean front property owner and am passionately against any legislation which would weaken our ban on hard structures of any kind. I've watched what the wind and the water and the currents will do for 57 years. The Atlantic Ocean does what it wants to do. All anyone has to do is stand there and look at it and they'd have to be idiots to think we could stop it from having its way. I added my own comments to EDF's email to my Senator Thom Goolsby, who responded that after much study and consideration, he was supporting the proposal to allow terminal groins, he and his family love the beach, and I could rest assured that he wouldn't support anything which would be detrimental to the beaches of North Carolina. I'm also against beach re-nourishment. The only gamble my father ever took in his life was the purchase of that beach house in 1965. He knew he was rolling the dice and he never expected anyone else to bail him out, if he lost it. Thanks for the nice article.

Post comment

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



Andrew S. Coburn, Associate Director

Program for the Study of Developed Shorelines
Western Carolina University
294 Belk
Cullowhee, NC 28723
psds.wcu.edu
828-227-7519

Western Carolina

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/Shallotte Inlet
6. Wrightsville Beach/Mason Inlet	13. Ocean Isle Beach/Shallotte 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
Bald Head Island	0.2700
Carolina Beach	0.1750
Caswell Beach	0.1300
Emerald Isle	0.0800
Holden Beach	0.0690
North Topsail Beach	0.2355
Oak Island	0.1400
Ocean Isle Beach	0.0900
Topsail Beach	0.3100
Wrightsville Beach	0.0800
AVERAGE	**0.1559**

County	FY 2010-11 Tax Rate
Brunswick County	0.3050
Carteret County	0.2300
New Hanover County	0.4525
Onslow County	0.5900
Pender County	0.6500
AVERAGE	**0.4455**

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	$1,531651
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	Shallotte	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	Shallotte	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 groins 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.

PARID: R03815-001-021-000
PLYBON ROBERT B MARY E **5 COMBER RD**

Values

Year	2012
Total Land	$328,100
Total Buildings	$379,400
Appraised Total	$707,500

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03815-001-022-000
HARAZIN WILLIAM D BECKY R **6 COMBER RD**

Values

Year	2012
Total Land	$322,900
Total Buildings	$490,400
Appraised Total	$813,300

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03815-001-023-000
POINEAU ANDREA MICHAEL ETAL **7 COMBER RD**

Values

Year	2012
Total Land	$44,500
Total Buildings	$0
Appraised Total	$44,500

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03815-001-024-000
MURPHY PHILIP M MARGARET **8 COMBER RD**

Values

Year	2012
Total Land	$287,000
Total Buildings	$302,000
Appraised Total	$589,000

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03815-001-025-000
NINE COMBER ROAD LLC **9 COMBER RD**

Values

Year	2012
Total Land	$317,300
Total Buildings	$269,800
Appraised Total	$587,100

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03815-001-026-000
VENO CHRISTOPHER MARGARET ETAL **10 COMBER RD**

Values

Year	2012
Total Land	$334,500
Total Buildings	$348,200
Appraised Total	$682,700

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03815-001-027-000
FARBOLIN RICHARD P CAROL J **11 COMBER RD**

Values

Year	2012
Total Land	$336,200
Total Buildings	$402,100
Appraised Total	$738,300

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03815-001-028-000
NELSON JAMES G NANCY DEYTON **12 COMBER RD**

Values

Year	2012
Total Land	$346,400
Total Buildings	$330,100
Appraised Total	$676,500

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03811-002-002-000
CAGNEY IRENE T TRUST **14 COMBER RD**

Values

Year	2012
Total Land	$340,100
Total Buildings	$315,400
Appraised Total	$655,500

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03811-002-003-000
COURTNEY WILLIAM **15 COMBER RD**

Values

Year	2012
Total Land	$336,100
Total Buildings	$227,400
Appraised Total	$563,500

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03811-002-004-000
FIGURE 8 POINTE LLC **16 COMBER RD**

Values

Year	2012
Total Land	$296,000
Total Buildings	$349,500
Appraised Total	$645,500

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03811-002-005-000
NC HOME CORPORATION INC **17 COMBER RD**

Values

Year	2012
Total Land	$323,000
Total Buildings	$197,300
Appraised Total	$520,300

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03811-002-006-000
INLET HOOK LLC **3 INLET HOOK RD**

Values

Year	2012
Total Land	$341,900
Total Buildings	$240,100
Appraised Total	$582,000

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03811-002-007-000
TAYLOR RALPH C JR NANCY HOOD **4 INLET HOOK RD**

Values

Year	2012
Total Land	$340,200
Total Buildings	$349,900
Appraised Total	$690,100

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03811-002-008-000
 # 5 INLET HOOK NCR LLC **5 INLET HOOK RD**

Values

Year	2012
Total Land	$347,100
Total Buildings	$353,800
Appraised Total	$700,900

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03811-002-009-000
FIGURE 8 POINTE LLC **6 INLET HOOK RD**

Values

Year	2012
Total Land	$362,100
Total Buildings	$346,900
Appraised Total	$709,000

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03811-002-010-000
SAND DOLLAR VENTURES LLC **7 INLET HOOK RD**

Values

Year	2012
Total Land	$429,800
Total Buildings	$289,000
Appraised Total	$718,800

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03811-002-011-000
CONN WILLIAM O JANE O **8 INLET HOOK RD**

Values

Year	2012
Total Land	$488,400
Total Buildings	$245,000
Appraised Total	$733,400

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03811-002-027-000
KENAN THOMAS S III **544 BEACH RD N**

Values

Year	2012
Total Land	$701,600
Total Buildings	$343,200
Appraised Total	$1,044,800

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03811-002-026-000
CARLSON ANNE D CARL I JR ETAL **542 BEACH RD N**

Values

Year	2012
Total Land	$46,200
Total Buildings	$0
Appraised Total	$46,200

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03811-002-025-000
DAVIS JEFFREY **540 BEACH RD N**

Values

Year	2012
Total Land	$721,800
Total Buildings	$803,100
Appraised Total	$1,524,900

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03811-002-024-000
HOWARD RICHARD T ELIZABETH H **538 BEACH RD N**

Values

Year	2012
Total Land	$696,800
Total Buildings	$788,600
Appraised Total	$1,485,400

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03811-002-023-000
SAMMONS BETTY K DAVID A **536 BEACH RD N**

Values

Year	2012
Total Land	$661,600
Total Buildings	$0
Appraised Total	$661,600

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03811-002-022-000
DENBY CARMEN Y ETAL **534 BEACH RD N**

Values

Year	2012
Total Land	$662,400
Total Buildings	$692,100
Appraised Total	$1,354,500

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03811-002-021-000
FERGUSON BARBARA L QUAL PER RES TR **532 BEACH RD N**

Values

Year	2012
Total Land	$673,800
Total Buildings	$757,700
Appraised Total	$1,431,500

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03811-002-020-000
MORRISETTE WILLIAM F NANCY P **530 BEACH RD N**

Values

Year	2012
Total Land	$683,800
Total Buildings	$429,200
Appraised Total	$1,113,000

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03811-002-019-000
GOLDENBERG ALAN D VICKI L **528 BEACH RD N**

Values

Year	2012
Total Land	$700,800
Total Buildings	$766,600
Appraised Total	$1,467,400

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03811-002-018-000
MAITRE VICKI B REV TRUST **526 BEACH RD N**

Values

Year	2012
Total Land	$685,500
Total Buildings	$706,800
Appraised Total	$1,392,300

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03811-002-017-000
ROGERS MARSHALL C **524 BEACH RD N**

Values

Year	2012
Total Land	$697,800
Total Buildings	$285,400
Appraised Total	$983,200

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03811-002-016-000
MCCOY R FREDERICK JR REVOCABLE TRUST **522 BEACH RD N**

Values

Year	2012
Total Land	$688,900
Total Buildings	$1,536,700
Appraised Total	$2,225,600

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03811-002-015-000
SCLAFANI PAUL J ELLEN M WATERS **520 BEACH RD N**

Values

Year	2012
Total Land	$705,700
Total Buildings	$1,059,800
Appraised Total	$1,765,500

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03811-002-014-000
TAYLOR RALPH CECIL JR NANCY H **518 BEACH RD N**

Values

Year	2012
Total Land	$766,100
Total Buildings	$0
Appraised Total	$766,100

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03811-001-010-000
STEPHENSON RUSSELL L JR SUSAN Y ETAL **1 INLET HOOK RD**

Values

Year	2012
Total Land	$481,400
Total Buildings	$263,200
Appraised Total	$744,600

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03811-001-009-000
RDA TRUST **2 INLET HOOK RD**

Values

Year	2012
Total Land	$458,300
Total Buildings	$0
Appraised Total	$458,300

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03811-002-012-000
OLEARY BRIAN A JUDITH M **9 INLET HOOK RD**

Values

Year	2012
Total Land	$761,800
Total Buildings	$529,300
Appraised Total	$1,291,100

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03811-002-013-000
TAYLOR RALPH CECIL JR NANCY H **10 INLET HOOK RD**

Values

Year	2012
Total Land	$801,400
Total Buildings	$0
Appraised Total	$801,400

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03815-001-031-000
SPENCER WILLIAM L CHRISTY ETAL **1 COMBER RD**

Values

Year	2012
Total Land	$458,400
Total Buildings	$338,300
Appraised Total	$796,700

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03815-001-030-000
FIELDS JORMAN WADE SUE BURGE **2 COMBER RD**

Values

Year	2012
Total Land	$460,700
Total Buildings	$871,200
Appraised Total	$1,331,900

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03815-001-029-000
MARSHALL JAMES M BETH ETAL **3 COMBER RD**

Values

Year	2012
Total Land	$458,500
Total Buildings	$1,451,900
Appraised Total	$1,910,400

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03811-001-008-000
JOHNSON WILLIAM D SALLY C **18 COMBER RD**

Values

Year	2012
Total Land	$458,700
Total Buildings	$351,700
Appraised Total	$810,400

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03811-001-007-000
CARTER PATRICIA KELLEY **19 COMBER RD**

Values

Year	2012
Total Land	$457,800
Total Buildings	$313,800
Appraised Total	$771,600

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03811-001-006-000
CAVANAUGH ALYCE IRREV TRUST ETAL **20 COMBER RD**

Values

Year	2012
Total Land	$454,000
Total Buildings	$385,200
Appraised Total	$839,200

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03811-001-005-000
OVERTON BECKY HARRIS VANCE P **21 COMBER RD**

Values

Year	2012
Total Land	$454,800
Total Buildings	$1,044,600
Appraised Total	$1,499,400

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03811-001-004-000
MINTON GENE W ETAL **22 COMBER RD**

Values

Year	2012
Total Land	$455,400
Total Buildings	$670,600
Appraised Total	$1,126,000

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03811-001-003-000
TAYLOR KAREN CUNNINGHAM **23 COMBER RD**

Values

Year	2012
Total Land	$458,600
Total Buildings	$909,000
Appraised Total	$1,367,600

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03811-001-002-000
24 CUMBER ROAD LLC **24 COMBER RD**

Values

Year	2012
Total Land	$454,700
Total Buildings	$0
Appraised Total	$454,700

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

PARID: R03811-001-001-000
GARROU LINDA D ETAL **25 COMBER RD**

Values

Year	2012
Total Land	$487,100
Total Buildings	$743,000
Appraised Total	$1,230,100

MARKET VALUE SHOWN - EXEMPTIONS TO BE REFLECTED IN AUG BILLS

THE DATA IS FROM 2012

SOUTHERN ENVIRONMENTAL LAW CENTER

Telephone 919-967-1450 | 601 WEST ROSEMARY STREET, SUITE 220 CHAPEL HILL, NC 27516-2356 | Facsimile 919-929-9421

July 20, 2012

Via U.S. and Electronic Mail
Mr. Mickey Sugg
U.S. Army Corps of Engineers
69 Darlington Ave.
Wilmington, NC 28403
Mickey.T.Sugg@usace.army.mil

RE: Figure Eight Island Shoreline Management Project – SAW-2006-41158

Dear Mr. Sugg:

Please accept these comments on the Figure Eight Island Shoreline Management Project Draft Environmental Impact Statement ("DEIS"). The Southern Environmental Law Center submits these comments on behalf of the North Carolina Coastal Federation and Audubon North Carolina. As described below, the NEPA process must be halted until the Figure Eight Homeowners' Association ("HOA") can demonstrate that it possesses the necessary property rights to construct its preferred alternatives. If the HOA acquires those rights and the project is reinitiated, certain alternatives violate the Endangered Species Act and/or the Clean Water Act and cannot be lawfully permitted. Further, even if the HOA acquires required property rights to build the groin, scoping of any proposed terminal groin must occur and the DEIS must be supplemented to account for significant, important changes to Rich Inlet that have occurred since data collection and aerial observations stopped in 2007 as well as changes in property values. In its current state, the DEIS does not provide a basis for the Corps to move forward with any alternative other than Alternative 2 – the actual no-action alternative which does not require a Corps permit.

I. THE CORPS MUST ISSUE A SUPPLEMENT BECAUSE THE DEIS WAS PUBLISHED THROUGH IMPROPER PROCEDURES, LACKS NECESSARY INFORMATION, AND RELIES ON OUT-OF-DATE INFORMATION.

A. The Corps Has Not Provided Scoping Notice of Terminal Groin Proposals.

Scoping is a necessary and important part of the NEPA process. As the regulations state, "[t]here shall be an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a **proposed action**." 40 C.F.R. § 1501.7 (emphasis added). At the time the scoping notice for this EIS was issued and the scoping meeting was held, the proposed action was inlet realignment. The Corps has not issued a

scoping notice or held a scoping meeting for proposed actions – a terminal groin – described in the DEIS and is, therefore, in violation of NEPA regulations. The Corps must withdraw the DEIS, issue a scoping notice for the proposed action, and reconsider the DEIS in light of comments received.

B. The HOA Has Not Demonstrated Property Rights Necessary to Construct the Applicant's Preferred Alternative Groin, in Violation of Corps Regulations.

The Corps's decision to issue this EIS without any demonstration that the Figure Eight HOA has the necessary property rights to construct the preferred alternative contradicts the agency's regulation and biases the resulting analysis. Moreover, it is a waste of the agency's resources as well as those of the state and federal commenting agencies and the public's time.

The preferred alternative, a terminal groin built on the northern end of the island, would be built across approximately 15 lots, none of which are owned by the HOA. See Figure 1 (superimposing proposed terminal groin from DEIS on New Hanover County 2012 GIS tax map depicting property boundaries). When a project is proposed to the Corps, the agency's regulations require the applicant to demonstrate "that the applicant possesses or will possess the requisite property interest to undertake the activity proposed in the application." 33 C.F.R. § 325.1(d)(8). Nothing in the DEIS indicates that the HOA owns, has easements or options on, or any other ability to acquire the properties where the terminal groin would be built.

The HOA does not have the authority to force property owners to grant an easement. The HOA, unlike a municipality lacks the power of eminent domain. Similarly, the Association's controlling documents do not give the HOA the authority to condemn an individual's property. The current Restrictive Covenants on Figure Eight Island properties grant the HOA the authority to access individual lots for certain specific, limited uses, but none of those uses grant the Association the authority to permanently take and transform an owner's lot. The reservation of "miscellaneous easements" in the restrictive covenants is limited to utilities including electricity, telephone, gas, sewer, or water, and for these, limited to the rear ten feet or ten feet on the side of a lot. Both directly, and by implication, easements for other structures or purposes are not reserved. In addition, the North Carolina Planned Community Act, N.C. Gen. Stat. § 47F-1-101 et seq., does not empower HOAs with authority to, in essence, condemn private property to construct a terminal groin.

The HOA has provided no evidence in the DEIS that it "possesses or will possess the requisite property interest to undertake the activity proposed in the application" as the "applicant's preferred alternative" as required by Corps's regulations. This is particularly important because construction of a terminal groin will likely substantially decrease the value of the impacted properties. Lacking this demonstrated property interest to construct its preferred terminal groin, the Corps should immediately cease all work on this project so as not to potentially waste even more resources and time of state and federal agencies and the public.

Figure 1. Proposed terminal groin and properties on north end of Figure Eight Island.

C. Data Relied on in the DEIS is Stale and Must be Updated in a Supplement.

The data relied on in the DEIS is stale and cannot serve the role given. The freshness of the data is particularly relevant here, where the focus of the DEIS is the management of a dynamic inlet system. As a federal appellate court recently stated, "[r]eliance on data that is too stale to carry the weight assigned to it may be arbitrary and capricious." N. Plains Res. Council v. Surface Transp. Bd., 668 F.3d 1067, 1086 (9th Cir. 2011). More pointedly, even if it could be assumed that the physical environment was static, that determination alone cannot show that "information regarding habitat and populations of numerous species remains the same as well." Id.

When that reliance on stale data causes important, relevant information to be omitted, the error is fatal to the DEIS. As the Fourth Circuit recently stated, "agencies violate NEPA when they fail to disclose that their analysis contains incomplete information." N.C. Wildlife Fed'n v. N.C. Dep't of Transp., 677 F.3d 596, 603 (4th Cir. 2012). Critically, "[w]hen relevant information 'is not available during the [impact statement] process and is not available to the public for comment[,] . . . the [impact statement] process cannot serve its larger informational role, and the public is deprived of [its] opportunity to play a role in the decision-making process.'" Id. Even more recently, the Fourth Circuit held that "material misapprehension of the

baseline conditions existing in advance of an agency action can lay the groundwork for an arbitrary and capricious decision." Friends of Back Bay v. U.S. Army Corps of Eng'rs, 681 F.3d 581, 588 (4th Cir. 2012). "'Without [accurate baseline] data, an agency cannot carefully consider information about significant environment impacts'" and therefore the analysis will "result[] in an arbitrary and capricious decision." N.C. Wildlife Fed'n, 677 F.3d at 603 (quoting N. Plains Res. Council, Inc. v. Surface Transp. Bd., 668 F.3d 1067, 1085 (9th Cir. 2011)).

In light of these cases, the importance of up-to-date, accurate baseline information is paramount. Here, the failure to update stale data is more pronounced due to the dynamic nature of Rich Inlet, and reliance on that data is clearly arbitrary and capricious. The nature of the inlet reveals the first instance in which the use of stale data fundamentally undercuts the EIS. The baseline assumptions regarding inlet location, shoal formations, erosion rates, and beach conditions rely on information most recently collected in 2007. Examples of the use of this outdated data include EIS statements like:

- "Given the shoreline recession rates observed between 1999 and 2007, Inlet Hood Road and Comber Road could be undermined within the next five (5) years . . . ;"
- "Continuation of the present rate of shoreline recession on the extreme north end of Figure Eight Island will imminently threaten an additional four (4) homes on Surf Court within the next 3 years and owners will likely pursue authorization for sandbag placement;" and (26)
- "If erosion rates continue at their current level, nine (9) homes on Beach Road North located immediately south of Surf Court are expected to become threatened within the next ten (10) years . . . ."

It is worth noting that none of these predictions based on the outdated information turned out to be accurate. It has been five years since 2007, and neither Inlet Hook Road nor Comber Road has been undermined. No homes on Surf Court are in jeopardy, and none have been sandbagged.

One prediction does appear to be coming true, but has not been considered in the EIS. The EIS states that "[s]hifts in the channel orientation toward Figure Eight Island would have a beneficial impact on the north end of the island." (39) Given the present accretion in front of the sandbagged houses, that projection appears to have validity, yet was not taken into account in the EIS. See Figure 5.3, p. 18.

Essential data regarding erosion rates is at least five years old and assumptions based on that data have proven to be false. Yet the EIS and the models it relies on depend on that dated information without any documentation to explain how the stale data represents current physical conditions and erosion rates, or, more accurately, why the apparent discrepancies between its assumptions and current conditions are not relevant.

Moreover, it is apparent that the data that is the foundation for the Delft3D model and the EIS does not reflect current conditions. These issues will be discussed in more detail below, but Figure 2. demonstrates that previously estimated erosion rates have not continued to the present and, in fact, current beach conditions suggest that the beach is accreting.

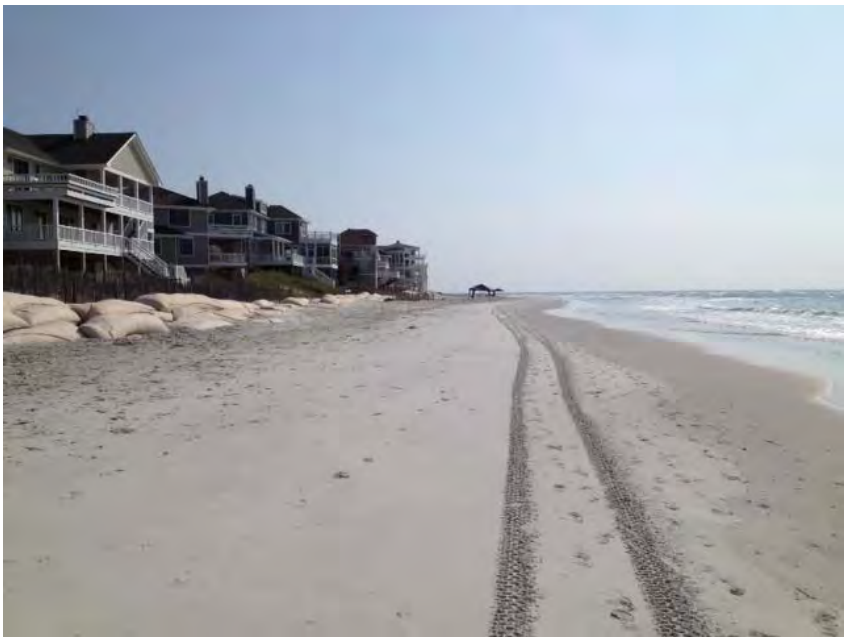


Figure 2. Beach at high tide in front of sandbagged properties in July 2012.

This accretion was not predicted in the models or the EIS and neither have been updated to explain it. The baseline data relied on by the models and the EIS are not only stale, the assumptions used appear to be incorrect, and the projections made are demonstrably wrong. Therefore, the EIS cannot be relied on to comply with NEPA or carry out the Corps's permitting process.

The staleness of the EIS is further demonstrated by the out-dated tax values for the properties on Inlet Hook and Comber roads. The tax assessments included in the economic analysis in the EIS rely on information compiled in 2009. That data is now three years old and fails to reflect current tax values. As will be further discussed below, the properties on Comber and Inlet Hook are worth approximately half of the amount included in the EIS, skewing the cost calculations and biasing the overall EIS. The data regarding lot availability appears to be similarly stale. As with the stale inlet data, reliance on this out-of-date, inaccurate economic data undermines the credibility of the EIS and its usefulness as a decision-making document.

A supplemental EIS is required when "[t]here are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts." 40 C.F.R. § 1502.9(c)(ii). The complete failure of the models used to accurately estimate environmental impacts constitutes new information "relevant to environmental concerns and bearing on the proposed action or its impacts." Similarly, the accretion observed in front of the sandbagged houses and updated property values qualify as "new circumstances" that have a direct bearing on the agency's analysis. Therefore, a supplement to this DEIS is required.

II. THE CORPS CANNOT ISSUE A PERMIT FOR EITHER TERMINAL GROIN OR SAND DREDGING ALTERNATIVES BECAUSE DOING SO WOULD VIOLATE THE ENDANGERED SPECIES ACT AND THE CLEAN WATER ACT.

A. Construction of a terminal groin destroys and adversely modifies critical habitat for the piping plover at Rich Inlet and can not be permitted.

The project area at Rich Inlet includes designated critical habitat for wintering populations of piping plover. The area is a key wintering site for piping plovers. A terminal groin as proposed in Alternatives 5A and 5B as well as extensive sand dredging in the inlet will destroy and adversely modify both habitats and inlet processes that constitute primary constituent elements of critical habitat and the Endangered Species Act ("ESA") prohibits issuance of a permit that would authorize these activities.

1. *The Corps may not permit an action that adversely modifies critical habitat by diminishing the value of the habitat for either the survival or recovery of a species.*

Under the ESA, "[e]ach Federal agency shall, in consultation with and with the assistance of the Secretary, insure that any action authorized, funded or carried out by such agency is not likely to . . . result in the destruction or adverse modification of [critical] habitat." 16 U.S.C. § 1536(a)(2). Section 7 of the ESA "requires federal agencies to ensure that none of their activities, including the granting of licenses and permits, will … adversely modify a species' critical habitat." Karuk Tribe of Cal. v. United States Forest Serv., 681 F.3d 1006, 1020 (9th Cir. June 1, 2012) (citing Babbitt v. Sweet Home Chapter, 515 U.S. 687, 692 (1995)). The Corps also has "an independent duty under section 7(a)(2) to ensure that its [action] … [is] not likely … to adversely modify [critical] habitat." Defenders of Wildlife v. United States EPA, 420 F.3d 946, 976 (9th Cir. 2005). (Agency reliance on a faulty Biological Opinion violates its duty under Section 7(a)2) of the ESA).[1]

The regulatory definition of "adverse modification" is found in 50 C.F.R. § 402.02, and states that an "adverse modification" is a "direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species." In Gifford

[1] Further, "it is unlawful for any person subject to the jurisdiction of the United States to . . . take any species," which is defined to include "significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering." 50 C.F.R. § 17.3. The prohibition on take includes agencies authorizing activities carried out by others that result in take of a listed species. Strahan v. Coxe, 127 F.3d 155, 163 (1st Cir. 1997). (State of Massachusetts was found to have exacted a taking of endangered Northern Right Whales through its licensing and permitting of certain fishing practices that exacted a taking of the species); Sierra Club v. Yuetter, 926 F.2d 429, 438-39 (5th Cir. 1991)(finding Forest Service caused take of endangered red-cockaded woodpecker by permitting logging practices near nesting colonies); Defenders of Wildlife v. Administrator, Envtl Protection Agency, 882 F.2d 1294, 1300-01 (8th Cir.1989)(finding EPA caused take of endangered species through its registration of pesticides for use by others); Loggerhead Turtle v. County Council of Volusia County, 896 F. Supp.1170, 1180-1181 (M.D. Fla. 1995)(holding Volusia County caused take of endangered sea turtles through its authorization of vehicular beach access during turtle mating season).

Pinchot Task Force v. U.S. Fish and Wildlife Service, 378 F.3d 1059, 1070-70 (9th Cir.), the 9th Circuit ruled that "the regulatory definition of 'adverse modification' contradicts Congress's express command," and therefore violates the ESA. The court explained that Congress enacted the ESA "not merely to forestall the extinction of [a] species (i.e., promote a species['] survival), but to allow a species to recover to the point where it may be delisted." Id. at 1070. Because a species needs more critical habitat for its recovery than is necessary for survival, the court found that the regulation was invalid because "[w]here Congress in its statutory language required 'or,' the agency in its regulatory definition substituted 'and.'" Id.

In response to the Gifford Pinchot decision, the U.S. Fish & Wildlife Service ("FWS") issued a directive on the use of the invalidated regulatory definition of "adverse modification" in a Memorandum on December 9, 2004.[2] The Memorandum directs FWS biologists "not cite to or use" the invalidated regulatory definition of adverse modification "at any point in the consultation process."[3] The Memorandum also directs FWS staff "to rely on an analytic framework based on the language of the ESA itself, which requires that critical habitat be designated to achieve the twin goals of survival and conservation (i.e., recovery) of listed species. Under current practice, the FWS "will find 'adverse modification' if the impacts of a proposed action on a species' designated critical habitat would appreciably diminish the value of the habitat for either the survival or the recovery of the species."[4]

The determination whether designated critical habitat would continue to serve its intended conservation role in recovery of a species is determined by whether the critical habitat retains its ability to provide and continue to establish the necessary primary constituent elements ("PCEs"). The FWS defines PCEs as "physical or biological feature[s] essential to the conservation of a species for which its designated or proposed critical habitat is based on."[5] The examples FWS give are "space for individual and population growth, and for normal behavior; … nutritional or physiological requirements; cover or shelter; sites for breeding, reproduction, rearing of offspring; … and habitats that are protected from disturbance or are representative of the species' historic geographic and ecological distribution."[6] In a recent revised designation of critical habitat for the Pacific coast population of the western snowy plover, FWS explains that activities that may constitute an "adverse modification" of critical habitat "are those that alter the physical and biological features to an extent that appreciably reduces the conservation value of critical habitat." 77 Fed. Reg. 36,728, 36,774 (June 19, 2012) (to be codified at 50 C.F.R. pt. 17). Agencies must use the "best scientific data" when conducting and relying on these Biological Opinions evaluating whether proposed actions result in adverse modification of critical habitat. Conservation Cong. v. United States Forest Serv., 2012 U.S. Dist. LEXIS 84943, 36 (D. Cal. 2012).

[2] Minn. Ctr. for Envtl. Advocacy v. United States Forest Serv., 2012 U.S. Dist. LEXIS 51853, 44-46 (D. Minn. Apr. 12, 2012) (citing FWS0004205).
[3] Id.
[4] Id. (emphasis added).
[5] FWS, Endangered Species Glossary, available at: www.fws.gov/nc-es/es/glossary.pdf.
[6] Id.

2. *The Rich Inlet area includes designated critical habitat for the recovery of the piping plover.*

FWS designated critical habitat for the wintering populations of piping plovers on July 10, 2001. 66 Fed. Reg. 36,038 (July 10, 2001). The habitat designated "is essential to the conservation of this species." 66 Fed. Reg. at 36,041. Areas containing primary constituent elements that constitute critical habitat were designated in eight states, including 18 units on the North Carolina coast. Unit NC-11: Topsail includes Rich Inlet and the project area:

> This unit extends southwest from 1.0 km (0.65 mi) northeast of MLLW of New Topsail Inlet on Topsail Island to 0.53 km (0.33 mi) southwest of MLLW of Rich Inlet on Figure Eight Island. It includes both Rich Inlet and New Topsail Inlet and the former Old Topsail Inlet. All land, including emergent sandbars, from MLLW on Atlantic Ocean and sound side to where densely vegetated habitat, not used by the piping plover, begins and where the constituent elements no longer occur. In Topsail Sound, the unit stops as the entrance to tidal creeks become narrow and channelized.

Id. at 36,087.

Designated critical habitat within critical habitat Unit NC-11: Topsail includes those primary constituent elements present in the area as described in the regulation:

> The primary constituent elements essential for the conservation of wintering piping plovers are those habitat components that support foraging, roosting, and sheltering and the physical features necessary for maintaining the natural processes that support these habitat components. The primary constituent elements include intertidal beaches and flats (between annual low tide and annual high tide) and associated dune systems and flats above annual high tide. Important components of intertidal flats include sand and/or mud flats with no or very sparse emergent vegetation. In some cases, these flats may be covered or partially covered by a mat of blue-green algae. Adjacent non-or sparsely vegetated sand, mud, or algal flats above high tide are also important, especially for roosting piping plovers, and are primary constituent elements of piping plover wintering habitat. Such sites may have debris, detritus (decaying organic matter), or micro-topographic relief (less than 50 cm above substrate surface) offering refuge from high winds and cold weather. Important components of the beach/dune ecosystem include surfcast algae, sparsely vegetated backbeach and salterns (beach area above mean high tide seaward of the permanent dune line, or in cases where no dunes exist, seaward of a delineating feature such as a vegetation line, structure, or road), spits, and washover areas. Washover areas are broad, unvegetated zones, with little or no topographic relief, that are formed and maintained by the action of hurricanes, storm surge, or other extreme wave action.

Id. at 36,086.

In designating critical habitat, FWS identified factors that may affect piping plover survival or use of the area:

> Overall winter habitat loss is difficult to document; however, a variety of human-caused disturbance factors have been noted that may affect plover survival or utilization of wintering habitat (Nicholls and Baldassarre 1990a, Haig and Plissner 1993). These factors include recreational activities (motorized and pedestrian), *inlet and shoreline stabilization, dredging of inlets that can affect spit (a small point of land, especially sand, running into water) formation, beach maintenance and renourishment (renourishing the beach with sand that has been lost to erosion),* and pollution (e.g., oil spills) (USFWS 1996). The peer-reviewed, revised recovery plan for the Atlantic piping plover population recognizes the need to protect wintering habitat from direct and indirect impacts of shoreline stabilization, navigation projects, and development. (emphasis added).

Id. at 36039.

The Recovery Plan for the critically endangered Great Lakes piping plover population states that "[i]nlet dredging and artificial structures, such as breakwalls and groins, can eliminate breeding and wintering areas and alter sedimentation patterns leading to the loss of nearby habitat."[7] The 5-year Status Review for Piping Plover states: "The three recovery plans state that shoreline development throughout the wintering range poses a threat to all populations of piping plovers. The plans further state that beach maintenance and nourishment, inlet dredging, and artificial structures, such as jetties and groins, can eliminate wintering areas and alter sedimentation patterns leading to the loss of nearby habitat."[8] The Status Review concludes: "Habitat loss and degradation on winter and migration grounds from shoreline and inlet stabilization efforts, both within and outside of designated critical habitat, remain a serious threat to all piping plover populations."[9]

As discussed in more detail below, Alternatives 5A and 5B propose a terminal groin and related activities to attempt to stabilize Rich Inlet that are specifically identified by FWS and other experts as factors leading to the decline of piping plovers. If authorized at Rich Inlet within critical habitat Unit NC-11, these alternatives would destroy and adversely modify primary constituent elements of plover habitat, permanently alter natural processes that maintain these essential components of plover habitat, and undermine and appreciably reduce the likelihood of recovery of the species.

3. *Alternatives 1, 3, 4, 5A, and 5B will result in the adverse modification of critical habitat and can not be permitted.*

A six year study by Audubon North Carolina[10] documents the use of the Rich Inlet area by piping plovers and other shorebirds.

---

[7] U.S. Fish & Wildlife Service, Recovery Plan for the Great Lakes Piping Plover (Charadrius melodus) (September 2003) at 23.

[8] U.S. Fish & Wildlife Service, Piping Plover (Charadrius melodus) 5-Year Status Review: Summary and Evaluation (2009) at 31.

[9] Id. at 39.

[10] The results of this study are presented in a letter of July 20, 2012 from Walker Golder, Audubon North Carolina, to Mickey Sugg, U.S. Army Corps of Engineers. The information in this letter is incorporated by reference into this assessment of project impacts on critical habitat.

> Piping Plovers were observed throughout the Rich Inlet system, using all areas of the inlet: the shoals in the main channel and Green Channel, beaches and spits on the northern and southern sides of the inlet mouth, and, much less frequently, beach or sandbar areas at the back of the inlet. Further, the same banded individuals were seen at the north and south sides of the inlet systems, as well as shoals in the inlet channels, and observed moving shifting to different foraging roosting sites as the tide changed. No wintering banded Piping Plover was observed on only one segment of the inlet. [11]

The Rich Inlet area and critical habitat Unit NC-11 annually supports a wintering population of piping plovers, including individuals from both the critically endangered Great Lakes population and the threatened Atlantic Coast population. Figure 3 depicts the distribution of piping plovers documented at Rich Inlet from 2008-2012. Audubon biologists documented banded and unbanded piping plovers during this period and have confirmed 12 individual piping plovers from the critically endangered Great Lakes population using the north end of Figure Eight Island, the Rich Inlet shoals, and southern Hutaff Island since 2008. In designating critical habitat, the FWS states that "areas of high plover concentrations indicate that the areas are important to wintering piping plovers," and goes on to emphasize that "[t]his is particularly true for the endangered Great Lakes population." 66 Fed.Reg. at 36,057.

[11] Id.

Figure 3. Locations of Individuals or Flocks of Piping Plovers at Rich Inlet, July 2008-May 2012.

Alternatives 5A and 5B include construction of a terminal groin that will directly destroy primary constituent elements of designated critical habitat for the piping plover and destroy and adversely modify the natural processes that support habitat components essential to the recovery of the species. Alternatives 1, 3, 4, 5A and 5B include extensive dredging and sand mining within the inlet system that will directly destroy primary constituent elements of designated critical habitat for the piping plover and adversely modify the natural processes that support habitat components essential to the recovery of the species. Section 7 of the ESA prohibits agencies from taking actions that result in destruction or adverse modification of critical habitat, and these alternatives can not be permitted.

Primary constituent elements of critical habitat in the project area that will be destroyed or adversely modified include areas that support foraging, roosting, and sheltering and features necessary to maintain the processes that support these habitat components. These areas include

intertidal beaches and flats and associated dune systems and flats above annual high tide; sparsely vegetated sand, mud, or algal flats above high tide; sparsely vegetated backbeach; and spits.

Alternatives 5A and 5B propose construction of a terminal groin on the north end of Figure Eight Island and dredging within the inlet area for initial fill along the ocean beach south of the groin, and periodic dredging for beach nourishment. As discussed previously (see discussion of no action alternative), the impacts of dredging within the existing permitted area must be considered as a part of these alternatives. This is particularly important to the required assessment of impacts to primary constituent elements of critical habitat because the permitted area initially comprised intertidal flats, and much of the area would return to intertidal flats if dredging is halted. Alternative 5B has additional channel dredging impacts resulting from construction of a new channel as an extension of the currently permitted area.

Primary constituent elements of critical habitat would be destroyed and adversely affected by construction of a terminal groin in the following ways:

a. Primary Constituent Element: Intertidal beaches and flats.

Intertidal flats are one of the most important habitats for foraging piping plovers. Figure 3 depicts the extensive use of these intertidal flat areas by piping plovers. Alternatives 1, 3, 4, 5A, and 5B involve extensive mining of sediment from the Rich Inlet area. This sediment is essential for maintaining the intertidal flats that constitute foraging areas and a primary constituent element of the critical habitat for wintering piping plovers. Alternatives 1, 4, and 5B involve extensive and periodic removal of sediment from a previously permitted area which, as discussed previously, must be assessed as a part of these alternatives. Alternatives 3 and 5A include additional channel dredging to remove sediment and reorient or relocate the inlet.

Sediment removal reduces sediment in the inlet system which in turn reduces the extent of intertidal flats. The piping plover status review summarizes these impacts:

> Sand mining, the practice of extracting (dredging) sand from sand bars, shoals, and inlets in the nearshore zone, is a less expensive source of sand than obtaining sand from offshore shoals for beach nourishment. Sand bars and shoals are sand sources that move onshore over time and act as natural breakwaters. Inlet dredging reduces the formation of exposed ebb and flood tidal shoals considered to be primary or optimal piping plover roosting and foraging habitat. Removing these sand sources can alter depth contours and change wave refraction as well as cause localized erosion (Hayes and Michel 2008).[12]

Alternative 1 Current Nourishment would periodically remove sediment from the 44.7 acre Nixon Channel dredge area. Six dredging projects since 1993 have removed between 274,000 and 350,000 cubic yards each. DEIS at 201. Alternative 3 Inlet Management with Beach Fill would initially remove 1.7M cubic yards of sediment to construct channels, dam the existing ebb tide channel, and nourish beaches. Maintenance dredging would remove 716,000

[12] U.S. Fish & Wildlife Service, Piping Plover (Charadrius melodus) 5-Year Status Review: Summary and Evaluation (2009)

cubic yards every five years. DEIS at 225. Alternative 4 Beach Nourishment without Inlet Management will initially remove 400,000 cubic yards of sediment from the Rich Inlet system by mining the Nixon Channel area and continuing to mine any shoals and reappear. DEIS at 256. Alternative 5A Groin with Channel will remove 994,000 cubic yards of sediment from Nixon Channel and also directly excavate 26.8 acres of intertidal shoals. DEIS at 263. Alternative 5B Groin with Beach Fill will initially remove 289,800 cubic yards of sediment from Nixon Channel and then 175,800 cubic yards every five years. DEIS at 281. All of these alternatives will mine sediment from the inlet system which will reduce the extent of shoals and intertidal flats and destroy or adversely modify this primary constituent element of critical habitat.

In contrast with these alternatives, the DEIS predicts Alternative 2 Abandon/Retreat with result in a net increase in sediment in the Rich Inlet system and an increase in intertidal flats. DEIS at 217. This will enhance this component of critical habitat.

b. Primary Constituent Element: Spits.

Construction of a terminal groin on the north end of Figure Eight Island will result in truncation and loss of the spit and associated shoreline and encroachment of vegetation in the now unvegetated or sparsely vegetated areas on the landward side of the groin. The piping plover status report discusses the impacts of groins and inlet stabilization:

> Inlet stabilization with rock jetties and associated channel dredging for navigation alter the dynamics of longshore sediment transport and affect the location and movement rate of barrier islands (Camfield and Holmes 1995), typically causing downdrift erosion. Sediment is then dredged and added back to islands which subsequently widen. Once the island becomes stabilized, vegetation encroaches on the bayside habitat, thereby diminishing and eventually destroying its value to piping plovers. Accelerated erosion may compound future habitat loss, depending on the degree of sea-level rise. Unstabilized inlets naturally migrate, re-forming important habitat components, whereas jetties often trap sand and cause significant erosion of the downdrift shoreline. These combined actions affect the availability of piping plover habitat (Cohen et al. 2008).[13]

The DEIS predicts that after construction of a groin, the area on the inlet side of the groin will become submerged and no longer habitat for plovers. DEIS at 282. While, as discussed previously, the models underlying this prediction are questioned, this outcome is consistent with other groins at other inlets. The DEIS states that any habitat losses from groin construction are "ephemeral," which is wrong. The loss of the spit and associated intertidal shoreline is permanent. As depicted in Figure 3, piping plovers extensively use the spit and shoreline. A groin will destroy and adversely modify this primary constituent element of the critical habitat.

[13] Id.

c. Primary Constituent Element: Sparsely vegetated flats above high tides.

As discussed above with respect to the impacts to the spit, a terminal groin will destroy and adversely modify the flats above high tide on the north end of Figure Eight Island by allowing encroachment of vegetation in the area on the landward side of the groin. The DEIS acknowledges these now open flats above the high tide line will be adversely modified by construction of groin and the resulting vegetative encroachment. DEIS at 282.

d. Primary Constituent Element: Sparsely vegetated backbeach.

Figure 4 is a photograph of piping plovers foraging on the sparsely vegetated backbeach along the outside of Nixon Channel on January 1, 2012. One of the plovers is from the critically endangered Great Lakes population. The photograph is taken in from the sandbagged house on North Beach Road. Figure 3 documents the extensive use of this sparsely vegetated backbeach area by piping plovers. The proposed terminal groin in Alternatives 5A and 5B would be constructed on this backbeach. As with the spit, the shoreline in this area will erode to submerged land after construction of a groin. The primary constituent element backbeach habitat will permanently disappear in this area. A terminal groin will thus destroy and adversely modify this primary constituent element of critical habitat.

Figure 4. Two piping plovers photographed January 1, 2010 on north end of Figure Eight Island (south shore of Rich Inlet). The terminal groin would destroy this vegetated backbeach habitat which is designated critical habitat under the Endangered Species Act. The color-banded Piping Plover (lower left and insert) is from the endangered Great Lakes population.

e. Primary Constituent Element: Inlet processes.

A terminal groin will fundamentally alter the natural inlet processes at Rich Inlet that form and maintain the other primary constituent elements of critical habitat discussed above. Massive removal of sediment from the inlet system will also alter these natural processes. The

purpose of a terminal groin is to modify these natural inlet processes. Construction of a groin will adversely modify these processes and the important role they play in the maintenance of the other primary constituent elements of critical habitat.

Construction of a terminal groin as proposed in Alternatives 5A and 5B will destroy and adversely modify primary constituent elements of critical habitat for the piping plover and can not be permitted.

E. The Terminal Groin Alternatives are the Most Environmentally Damaging Practicable Alternatives and Therefore Cannot Be Permitted.

Under the Clean Water Act, the Corps is only able to permit the least environmentally damaging practicable alternative ("LEDPA"). At the outset, it is clear that Alternative 2 is practicable. Practicable means "available and capable of being done after taking into consideration cost, existing technology, and logistics." 40 C.F.R. § 230.3(q). Therefore, the practicability analysis cannot consider potential benefits included in the DEIS's cost-benefit analysis (i.e. avoiding the loss of land and structures), but must be limited to the cost of carrying out the alternative – the "response/construction costs." See DEIS at 67. On that basis, each alternative is practicable and Alternative 2 is one third the cost of the preferred alternative. Based on the information provided in the DEIS, it is clear that the LEDPA is Alternative 2. Therefore, it is the only alternative that can be permitted.

Excluding Alternative 2, which is clearly the LEDPA because it does not require dredging or beach nourishment, the alternatives fall into two categories. The first includes the non-structural alternatives, whose environmental impacts – dredging, smothering benthic organisms, altered beach profile, etc. – vary by degree. The second category includes the terminal groin alternatives, whose unique environmental impacts – hardening of the shoreline, loss of overwash areas, etc. – are permanent.

In its application of the 404(b)(1) Guidelines, the Corps must evaluate "the nature and degree of effect that the proposed discharge will have, individually and cumulatively, on the characteristics at the proposed disposal sites." 40 C.F.R. § 230.11(a). That effect is measured by how the discharges change the "physical, chemical, and biological characteristics of the substrate" and affect "bottom-dwelling organisms at the site by smothering immobile forms or forcing mobile forms to migrate." 40 C.F.R. §230.20(b).

The analysis of these factors reveals a clear divide. The non-structural alternatives will have varying degrees of impact on infaunal communities in both the dredged areas and the nourished areas. Due to the scope of dredging and beach fill, Alternative 3 – as described in the EIS – appears to have the most severe impact of the non-structural alternatives on substrate and bottom dwelling organisms. Because it would involve no dredging or nourishment, Alternative 2 would have the least impact on substrate and benthic organisms. Unlike any of the non-structural alternatives, however, the terminal groin alternatives will permanently alter the characteristics of the site. The intertidal areas lost in the area that would be impacted by the terminal groin will not redevelop, eliminating the possibility that the benthic organisms buried or displaced could repopulate the area. The groin alternatives will fundamentally change the nature

of the northern end of the island, eliminating overwash areas and permanently altering substrate and eliminating habit for benthic organisms. Alternatives 5A and 5B are the most environmentally damaging alternatives when evaluated under the factors in 40 C.F.R. § 230.20.

The Corps must also evaluate "the nature and degree of effect that the proposed discharge will have individually and cumulatively on water, current patterns, circulation including downstream flows, and normal water fluctuation." 40 C.F.R. § 230.11(b). These effects are measured by the "adverse changes" that occur in "[l]ocation, structure, and dynamics of aquatic communities; shoreline and substrate erosion and deposition rates; [and] the deposition of suspended particulates." 40 C.F.R. § 230.23(b).

As with impacts to substrate, Alternative 2 clearly has the least environmental impact on the aquatic communities and deposition of suspended particles. It would not adversely affect aquatic communities and would continue to allow deposition of suspended particles on the overwash areas at the northern end of the island (as would the other non-structural alternatives). By comparison, the terminal groin alternatives would permanently displace aquatic communities at the northern end of the island and eliminate overwash, cementing the accompanying adverse environmental impacts.

The Corps's consideration of the fluctuation of normal water level must include consideration of "modifications [that] can alter or destroy communities and populations of aquatic animals and vegetation, . . . modify habitat, reduce food supply, restrict movement of aquatic fauna, destroy spawning areas, and change adjacent, upstream, and downstream areas." 40 C.F.R. § 230.24.

For the reasons described above and the impacts on the benthic communities, Alternative 2 has the least environmental impact. Alternative 2 would also have the least adverse environmental effect on wet beach habitat, adjacent dry beach habitat, and back beach habitat. Other non-structural alternatives would similarly have environmental impacts to these habitats. Alternatives 5A and 5B would have significant, permanent impacts to these areas. They would eliminate wet beach habitats and the associated benthic organisms, significantly modify dry beach habitats, and result in dense vegetation of what are now sparsely vegetated back beach habitats. They would therefore have the greatest adverse impacts of any of the alternatives.

In addition to the Corps's endangered and threatened species analysis under the ESA, it must also consider listed species under the 404(b)(1) Guidelines. The Corps must compare alternatives based on their potential impact on "nesting areas, protective cover, adequate and reliable food supply and resting areas for migratory species." 40 C.F.R. § 230.30(b)(2).

Alternative 2 and the other non-structural alternatives would allow critical habitat for piping plover to remain on the northern end of Figure Eight Island. As discussed above, Alternatives 5A and 5B would destroy that critical habitat, adversely affecting threatened and endangered species.

Finally, the Corps must consider "the loss or change of breeding and nesting areas, escape cover, travel corridors, and preferred food sources for resident and transient wildlife species associated with the aquatic system." 40 C.F.R. § 230.32(b).

Construction of either Alternative 5A or 5B would eliminate habitat for all shorebirds that rely on relatively unvegetated back beach, wet beach, and intertidal habitats. Therefore, the adverse effects described above for piping plover are likely to be felt by red knots and other shorebirds.

It is clear from the DEIS that under the 404(b)(1) Guidelines, the Corps cannot permit either Alternative 1, 3, 4, 5A, or 5B. All would have significantly greater environmental impact than Alternative 2. Alternative 2 is the LEDPA and is the only alternative that can be permitted by the Corps.

III. THE DEIS FAILS TO PROVIDE THE THOROUGH REVIEW REQUIRED UNDER NEPA AND MUST BE SUPPLEMENTED.

A. Environmental impact analysis based on the Delft3D model must be rejected entirely.

The DEIS relies extensively in analysis of environmental impacts on bathymetry and other predictions of the Delft3D model. As discussed below, the model has grossly miscalculated the bathymetry, movement, and orientation of the inlet and resulting effects on the barrier islands over the last five years. If the model has fundamentally miscalculated the bathymetry, movement, and orientation of the inlet and related effects on the islands without channel dredging, groins, or other alterations, adding these complexities will result in even more useless information.

Although the DEIS relies on the predictions of the Delft3D model, it states that "[t]he model results are by no means intended to represent predictions of what changes to expect in the future with certainty, as this would require an ability to predict future weather and oceanic conditions." DEIS at 165. Instead, the DEIS argues that the model is useful because it "impos[es] the same set of forcing conditions in the model for each alternative and identify[ies] relative differences in the response of the modeled system." DEIS at 165. Even if that were correct,[14] it does not save the DEIS's reliance on the model. Actual behavior of the inlet demonstrates that the "same set of forcing conditions" used to model alternatives has no relation to the actual conditions in the inlet. Using a model to evaluate a fictional set of conditions that have no bearing or connection to reality cannot serve as the basis for the agency's "hard look" and certainly does not reflect reasoned decision making.

NEPA requires that agencies ensure the professional and scientific integrity of environmental impact statements. 40 C.F.R. 1502.24. Any method of interpreting environmental impacts is only as good as its predictive abilities. "Without [accurate baseline] data, an agency cannot carefully consider information about significant environment impacts . . .

[14] Despite this statement that the Delft3D model has no predictive value, the DEIS relies nearly exclusively on the model results to predict performance of the alternatives, environmental impacts, and costs.

resulting in an arbitrary and capricious decision." N.C. Wildlife Fed'n, 677 F.3d at 603 (citing See N. Plains Res. Council v. Surface Transp. Bd., 668 F.3d 1067, 1085 (9th Cir. 2011). Reliance on data that has no credible predictive value "does not constitute the 'hard look' required under NEPA." N. Plains Res. Council, 668 F.3d at 1087 (9th Cir. 2011).

The key test of any model is its predictive capability. The following three figures in Figure 5 illustrate the fundamental failure of the Delft3D model to predict key components of even the baseline inlet's bathymetry, movement, and orientation and related effects over a five year period. Figure 5.1 (Figure 2, Appendix B DEIS) is the "initial bathymetry" for Alternative 2 Abandon/Retreat from 2007. Alternative 2 Abandon/Retreat includes no new channel dredging or terminal groin, and the model is used just to predict how the inlet will change over time.

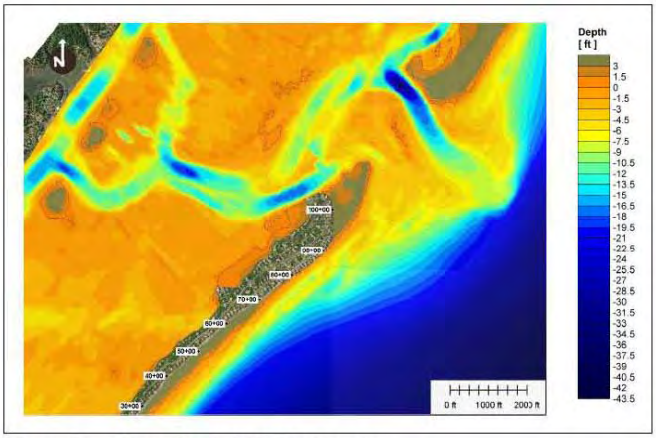


Figure 5.1. Alternative 2, initial bathymetry.

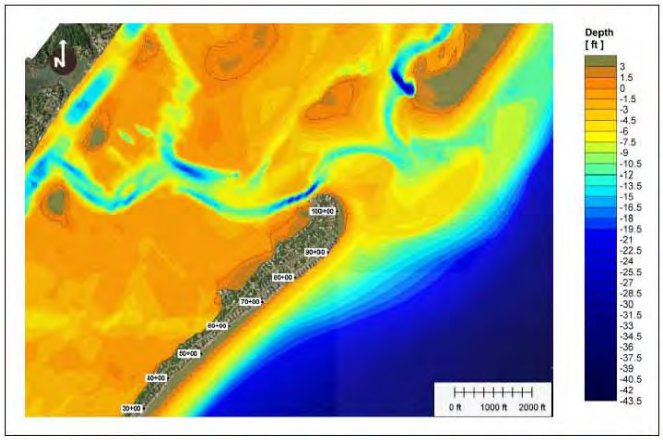


Figure 5.2. Alternative 2, bathymetry after 5 years simulation.

Figure 5.3. Google Earth satellite image of Rich Inlet area, 2012.

Figure 5. Comparison of initial (2007) bathymetry (Figure 5.1) and model predicted (2012) bathymetry (Figure 5.2) with actual 2012 satellite photograph (Figure 5.3).

Figure 5.2 (Figure 5, Appendix B DEIS) is the Alternative 2 bathymetry after five years simulation, or 2012. It predicts substantial movement of the ebb flow channel outlet to the northeast with final orientation to the east-northeast. It also predicts the main channel of Nixon Channel approaching the inlet will swing away from the interior marsh bank and that the higher elevation tip of the spit on Figure Eight Island will substantially erode away. Delft3D predictions of inlet movement, orientation, and related effects on the two islands underlie not only all the analysis of environmental impacts of the alternatives, but also the economic analysis (e.g., frequency of channel dredging or required nourishment).

Figure 5.3 is Google Earth imagery of the actual inlet area in 2012, to contrast with the model predictions in Figure A. The outlet of the ebb tide channel is oriented not to the northeast but nearly due south, Nixon Channel approaching the inlet has not swung away from the back side marsh but instead hugs the back side, and the Figure Eight Island spit is substantially intact. In short, a monkey with a crayon may have done a better job predicting inlet movement, orientation, and bathymetry. These faulty predictions do not even consider the compounding complexities of a terminal groin or channel dredging. Delft3D predictions underlie essentially all of the environmental analysis in the DEIS. Since the DEIS itself demonstrates no predictive capability for this model on essential assumptions underlying the environmental analysis, all the conclusions are open to question, and the entire environmental analysis must be re-done with defensible information and analysis that meets the standards for professional and scientific integrity that NEPA demands.

This gross disparity between the model's prediction and reality should come as no surprise – the model relies on a simplified set of parameters that does not and cannot predict the dynamic inlet area. Even Dr. Clearly, the HOA's expert, is described in meeting minutes included in Appendix A as making the point that "there is so much uncertainty and [that he] does not agree that you can put a lot of faith in the model over five (5) years."[15]

Perhaps the most obvious shortcoming is that the models do not take into account storm activity. It is well known that storms play a controlling role on coastal shorelines. Dr. Cleary, as reported in Appendix A, noted that "storm impacts and the relative location of Rich Inlet" are the primary drivers of erosion and accretion rates.[16] The only model identified as potentially evaluating storms was the Storm Induced Beach Change Model ("SBEACH"). It makes several assumptions that render the findings useless and was, unsurprisingly, inaccurate when compared to even a mild hurricane.

Without any support, the SBEACH relied on several assumptions. First, the model assumes that the median sediment grain diameter across the shoreline is uniform.[17] No data supports this assertion and, given the numerous beach nourishment events that have occurred on the island, there is no basis for assuming it is accurate. The model also assumes, without support, that the influence of structures blocking longshore transport, like the proposed terminal groin, is small. There is no documentation provided to defend that assumption generally or with respect to Figure Eight Island. Indeed, the very purpose of the preferred alternative is to control

[15] DEIS Appendix A, Meeting Minutes at (June 10, 2003).
[16] DEIS Appendix A, Meeting Minutes at 3 (May 3, 2007).
[17] DEIS Appendix B, Subpart B at 97.

longshore transport. Finally, the model assumes that "the existing sandbags along Comber Road and Inlet Hook Road . . . offer negligible protection against storm erosion."[18] No support for that conclusion is provided, and it is almost certainly inaccurate.

When "calibrated" to Hurricane Ophelia, SBEACH was shown to be inaccurate. Along "highly eroded beach," the model predicted erosion nearly four times greater than that actually observed, predicting a total loss of 17.2 cy/ft when only 4.7 cy/ft was actually lost.[19] On Figure Eight overall, the model predicted 9.5 cy/ft of erosion when the observed erosion was significantly less, 5.9 cy/ft.[20] On Lea-Hutaff the model was entirely incorrect, predicting erosion of 6.4 cy/ft when the island actually gained 4.7 cy/ft.[21] Given these results, there is no basis to conclude that SBEACH has any predictive value.

The Delft3D model relied on as the foundation for the EIS is no better. In addition to the shortcomings discussed above, the DEIS provides no explanation for the variation in the model results included in Appendix A. In 2008, when inlet realignment was the HOA's preferred alternative, Tom Jarrett emailed the following model results to the Corps.

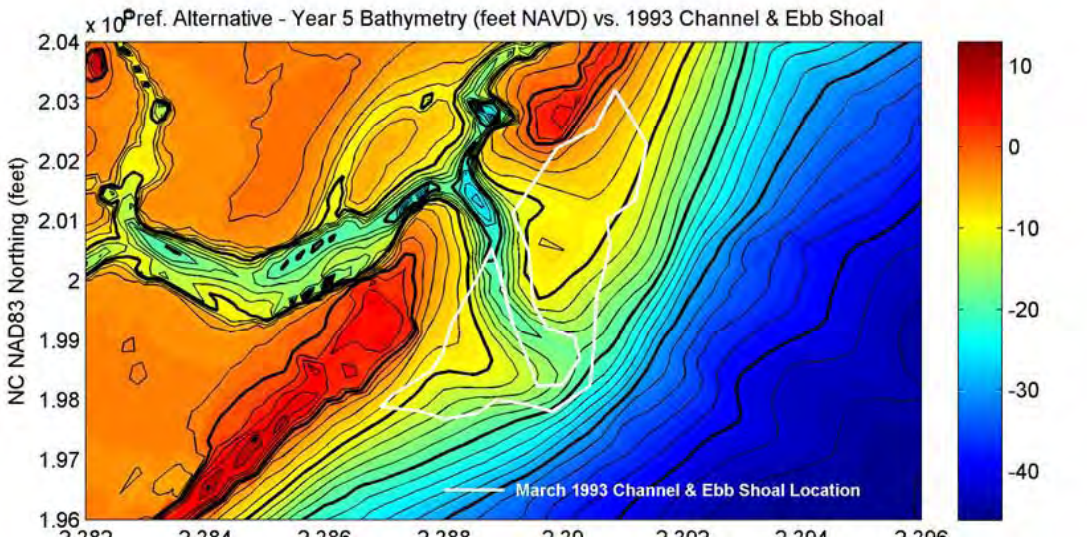


Figure 6. Inlet Realignment – Year 5 2008 Results

As described in Mr. Jarrett's email, the model showed the "predicted inlet reconfiguration after 5-years," which coincided almost perfectly with "[t]he white outline . . . which is basically the target configuration associated with the channel realignment."[22] If anything, the inlet was better positioned than the "target" with respect to promoting accretion on Figure Eight Island.

[18] Id.
[19] DEIS Appendix B, Subpart B at 98.
[20] Id.
[21] Id.
[22] Email from Tom Jarrett to Mickey Sugg (Sept. 9, 2008).

In the DEIS, which lists the HOA's preferred alternative as the terminal groin, the same model has significantly different results with respect to inlet realignment.

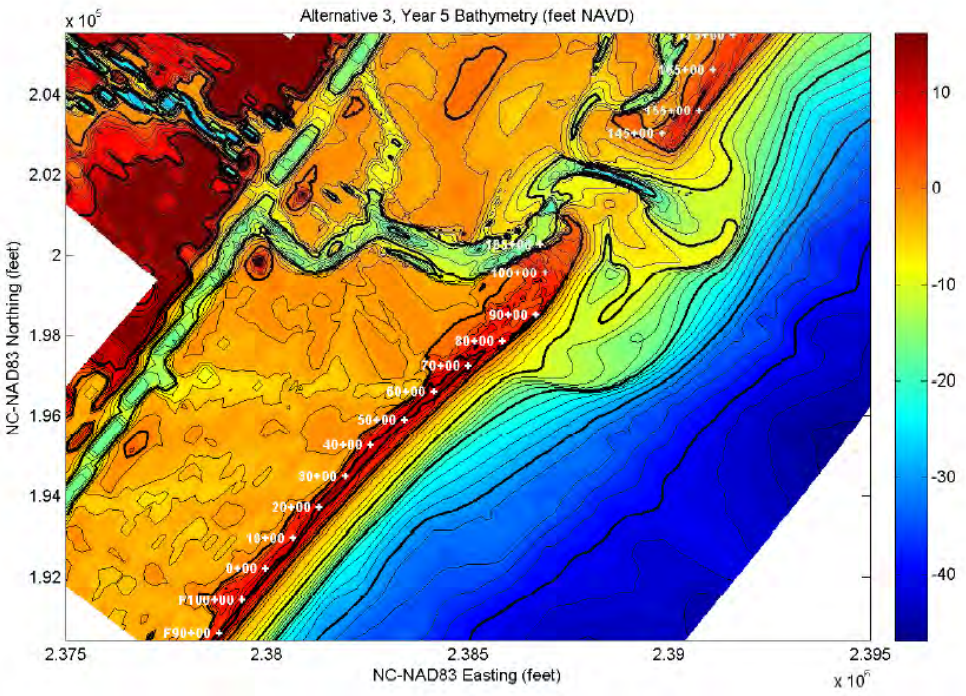


Figure 7. Inlet Realignment – Year 5 DEIS Results

No explanation for the significant variation in the model's results is given in the DEIS. Data collection to support the model appears to have ended 2007, however, and therefore the results should not have varied between 2008 and 2012. This suggests that model was manipulated and the discrepancy between these two model runs must be explained.

B. The DEIS Excludes Cumulative Impacts from Other Terminal Groin Projects.

The Corps has an obligation to evaluate cumulative impacts in addition to the direct and indirect impacts of the alternatives in the DEIS. Here, the agency failed to evaluate what may be the most important cumulative impact – the construction of other terminal groins in North Carolina. As Corps staff stated during one of the PDT meetings, "the biggest concern with the terminal groin alternative includes a hard structure on the beach and this could potentially open the door for other structures at other locations."[23] Despite this concern, the DEIS does not address the cumulative effects of "other structures at other locations."

NEPA requires that analysis. Regulations define cumulative impacts to include "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions . . . ." 40 C.F.R. § 1508.7. Courts have mandated that the analysis of those impacts and that "[c]onclusory statements that

[23] DEIS Appendix A, Meeting Minutes at 5 (May 20, 2009).

the indirect and cumulative effects will be minimal or that such effects are inevitable are insufficient under NEPA." N.C. Wildlife Fed'n, 677 F.3d at 602 (citing Ctr. for Biological Diversity v. United States DOI, 623 F.3d 633, 642-43 (9th Cir. 2010); Davis v. Mineta, 302 F.3d 1104, 1122-23 (10th Cir. 2002).)

In this circumstance, the cumulative impact of "other structures at other locations" is significant. As the piping plover recovery plan states, hardened structures were a primary contributor to the species current status. The DEIS acknowledges that the terminal groin would eliminate key piping plover habitat – destroying primary constituent elements. Loss of that crucial habitat has already been observed at Masonboro Inlet, where hardened structures have been in place for decades.

It is our understanding that at least three other beach communities have been in touch with federal or state agencies, including the Corps, about constructing terminal groins. The Corps must evaluate the cumulative impacts of these proposed groins as well as the potential for other groins at similar inlets in North Carolina.

C. The Economic Analysis is Fundamentally Flawed.

The assessment of economic impacts of the various alternatives in the DEIS is vague, inaccurate, and incomplete. The flaws are so numerous the DEIS must be supplemented to allow public review and comment on an economic analysis of alternatives that is based on accurate information and the full range of economic considerations necessary to evaluate the alternatives. In addition, the Corps must make clear that potential benefits or avoided costs cannot be the basis for the LEDPA determination, that only the cost of developing the alternative can be considered. The basic flaws in the economic analysis are outlined below.

The DEIS bases its assessments of economic impacts on tax value, but grossly and erroneously overstates the tax value of properties "threatened" by movements of Rich Inlet. The DEIS claims the value of the "27 oceanfront parcels located on Surf Court, Comber Road, and Inlet Hook Road – the area directly impacted by the changes in Rich Inlet – have a total tax value of $48.4 million." DEIS at 22. First, the properties on Surf Court should be excluded from this total. These properties are not located on the "bump" or imminently threatened as are the properties on Comber Road and Inlet Hook Road. The imminently threatened properties are the sandbagged properties on Comber Road and Inlet Hook Road identified in DEIS Figure 2.6.

Second, the DEIS erroneously states the tax value of the "threatened" structures. DEIS Table 2.2 presents a "total value" of the "threatened structures" of $23,760,425. The actual tax value based on New Hanover County tax records examined on July 9, 2012 is approximately one-half the claimed tax value in the DEIS or $12,402,700. The actual tax values of the "threatened properties" are presented in Table 1 below and the New Hanover County tax records are attached.

Address of Sandbagged Properties	Land Value	Structures Value	Total Value
5 Comber	$328,100	$379,400	$707,500
6 Comber	$322,900	$490,400	$813,300
7 Comber	$44,500	$0	$44,500
8 Comber	$287,000	$302,000	$589,000
9 Comber	$317,300	$269,800	$587,100
10 Comber	$334,500	$348,200	$682,700
11 Comber	$336,200	$402,100	$738,300
12 Comber	$346,400	$330,100	$676,500
14 Comber	$340,100	$315,400	$655,500
15 Comber	$336,100	$227,400	$563,500
16 Comber	$296,000	$349,500	$645,500
17 Comber	$323,000	$197,300	$520,300
3 Inlet Hook	$341,900	$240,100	$582,000
4 Inlet Hook	$340,200	$349,900	$690,100
5 Inlet Hook	$347,100	$353,800	$700,900
6 Inlet Hook	$362,100	$346,900	$709,000
7 Inlet Hook	$429,800	$289,000	$718,800
8 Inlet Hook	$488,400	$245,000	$733,400
544 Beach Road North	$701,600	$343,200	$1,044,800
TOTAL	**$6,623,200**	**$5,779,500**	**$12,402,700**

Table 1. July 2012 Tax Values of Imminently Threatened Properties.

Third, the DEIS fails to assess and include the decrease in value of at least 13"non-threatened" properties on the ocean-inlet side of the north end of Beach Road North that will result from construction of a terminal groin. A terminal groin in front of these properties will both take parts of these properties and fundamentally change the property from direct frontage and access to ocean-inlet beach to a walled frontage on a groin. Figure Eight Island tax values place a premium on beach or water frontage, with lots having such frontage valued substantially more than interior lots lacking direct frontage and access. The DEIS completely fails to consider the substantial decrease in tax value to the properties that would front a groin in assessing economic impact. The properties affected by construction of the groin are depicted in Figure 1. The current tax values of these properties are presented below in Table 2. As discussed by Dr. Wakeman in his comments submitted in a separate letter, an economic assessment of a proposed terminal groin must consider the decrease in value of the truncated properties.

Address of Properties Fronting Groin	Land Value	Structures Value	Total Value
542 Beach Road North	$46,200	$0	$46,200
540 Beach Road North	$721,800	$803,100	$1,524,900
538 Beach Road North	$696,800	$788,600	$1,485,400
536 Beach Road North	$661,600	$0	$661,600
534 Beach Road North	$662,400	$692,100	$1,354,500
532 Beach Road North	$673,800	$757,700	$1,431,500
530 Beach Road North	$683,800	$429,200	$1,113,000
528 Beach Road North	$700,800	$766,600	$1,467,400
526 Beach Road North	$685,500	$706,800	$1,392,300
524 Beach Road North	$697,800	$285,400	$983,200
522 Beach Road North	$688,900	$1,536,700	$2,225,600
520 Beach Road North	$705,700	$1,059,800	$1,765,500
518 Beach Road North	$766,100	$0	$766,100
TOTAL	**$8,391,200**	**$7,826,000**	**$16,217,200**

Table 2. July 2012 Tax Values of Properties Fronting Proposed Terminal Groin.

Fourth, in assessing economic impacts, the DEIS fails to consider the enhanced value of the interior lots that would become lots fronting the ocean if the existing " threatened" structures are removed or relocated. As noted above, tax values on the island place a premium on ocean or water frontage. If the current threatened structures are removed or relocated, this premium would be transferred to the "second row" properties. The July 9, 2012 assessed tax values and enhanced values are summarized in Table 3.

Address of "Second Row" Properties	Land Value	Structures Value	Total Value
1 Inlet Hook	$481,400	$263,200	$744,600
2 Inlet Hook	$458,300	$0	$458,300
9 Inlet Hook	$761,800	$529,300	$1,291,100
10 Inlet Hook	$801,400	$0	$801,400
1 Comber	$458,400	$338,300	$796,700
2 Comber	$460,700	$871,200	$1,331,900
3 Comber	$458,500	$1,451,900	$1,910,400
18 Comber	$458,700	$351,700	$810,400
19 Comber	$457,800	$313,800	$771,600
20 Comber	$454,000	$385,200	$839,200
21 Comber	$454,800	$1,044,600	$1,499,400
22 Comber	$455,400	$670,600	$1,126,000
23 Comber	$458,600	$909,000	$1,367,600
24 Comber	$454,700	$0	$454,700
25 Comber	$487,100	$743,000	$1,230,100
TOTAL	**$7,561,600**	**$7,871,800**	**$15,433,400**

Table 3. July 2012 Tax Values of "Second Row" Properties

Fifth, the economic analysis fails to consider the enhanced value to existing lots if "threatened" structures are moved to those lots. The DEIS states there are 93 vacant lots on Figure Eight Island. DEIS p. 223. It then understates the potential to relocate structures by stating only 16 lots are currently listed for sale (excluding those that may be for sale but not listed) and overstates the number of threatened structures that require relocation at 40 by unjustifiably adding "structures that may become imminently threatened over the next thirty years" to the 17 structures constructed on the "bump" and "imminently threatened." All but one of the 17 "imminently threatened" structures could be relocated to the 16 lots identified as listed for sale, and the remaining one structure could likely be relocated to one of the remaining 77 lots on the island. The enhanced value of the relocated properties must then be reflected in the assessment of the economic impacts of Alternative 2.

If accurate and complete economic information and analysis are used, Alternative 2 Retreat/Relocate is likely to emerge as the economically preferred alternative. Since it is also the least environmentally damaging practicable alternative it is the only alternative that can be permitted. Because the economic analysis in the DEIS is so fundamentally inaccurate and incomplete, a supplemental DEIS must be prepared to provide the public the opportunity to comment on an analysis of the economic impacts of alternatives based on accurate and complete information. "Agencies shall insure the professional integrity … of the discussion and analyses in environmental impact statements." 40 C.F.R. § 1502.24.

D. DEIS Fails to Account for Realistic Sea Level Rise Projections.

The effect of sea level rise is critical to evaluating the long-term viability and effects of each of the proposed alternatives. Inexplicably, the DEIS relies on a straight-line estimate that does not reflect current scientific understanding, Corps policy, or the best estimates by North Carolina scientists.

Based in large part on the Intergovernmental Panel on Climate Change, last year the Corps released a circular to provide guidance on how the agency should take into account the effects of sea level rise on coastal projects. As stated in the circular, "[p]otential relative sea-level change must be considered in every USACE coastal activity as far inland as the extent of estimated tidal influence."[24] In that consideration, the circular recommends preparing multiple scenarios to account for potential ranges in sea level rise.[25] A multi-pronged approach is necessary to "improve the overall life-cycle performance" of the selected alternative.[26] Among the specific effect of sea-level change that the Corps's supporting materials highlight are "changes in shoreline erosion, inundation or exposure of low-lying coastal areas, changes in storm and flood damage, [and] shifts in extent and distribution of wetlands and other coastal habitats."[27] The DEIS touches on each of these areas to some degree, but fails to do so in a way that meaningfully addresses the potential effect of sea level rise.

To perform a meaningful analysis, the Corps circular states that the agency's analysis "shall include, as a minimum, a low rate which shall be based on an extrapolation on the historical tide gauge rate, and intermediate and high rates, which include future acceleration of [global mean sea level."[28] But the DEIS failed to do anything more than state the "low rate" and move on.

The error in doing so is particularly clear on the North Carolina coast, an area particularly vulnerable to accelerated sea level rise. The Coastal Resources Commission's Science Panel estimated several scenarios of potential sea level rise, including a minimum of 15 inches by 2100.[29] The panel noted, however, that "various models and observations indicate that accelerated rates of [sea level rise] in the future are likely."[30] Based on their review of peer-reviewed literature, the Science Panel recommended using 1 meter of sea level rise for planning purposes in North Carolina after finding that accelerated sea level rise is "likely."[31]

But despite acknowledging this broad consensus that accelerated sea level rise is expected, the DEIS does nothing to evaluate the effect of sea level rise on each of the

---

[24] U.S. Army Corp of Engineers, Sea-Level Change Considerations for Civil Works Program, EC 1165-2-212, Circular No. 1165-2-212, 1 (October 1, 2011).
[25] Id. at 2.
[26] Id. at 3.
[27] Id. at B-1.
[28] Id. at B-10.
[29] N.C. Coastal Resources Commission Science Panel on Coastal Hazards, North Carolina Sea-Level Rise Assessment Report, 10 (March 2010).
[30] Id.
[31] Id. at 12.

alternatives. Instead, it summarily states that "[n]o direct or indirect impacts are expected to occur as a result of sea level rise for any of the projects." DEIS at 194. The DEIS then states that "unmanaged areas of the dry beach and dune communities may become more vulnerable to erosion" as a result of sea level rise, but cursorily dismisses that threat because the alternatives "may help protect" those area. Id. This unsupported conjecture cannot constitute the "hard look" required by NEPA. Moreover, the analysis cannot be saved by the DEIS's one-sentence "analysis" of the effect of historic rates of sea level rise on Wrightsville Beach and Carolina Beach nourishment projects.

In short, the DEIS's analysis of sea level rise and its effect on the alternatives is useless. It hardly constitutes a look, much less the "hard look" required by NEPA. It omits anything more than a canned summary of estimates of accelerated sea level rise and provides no analysis of how sea level rise of any degree would affect the project. An agency decision is arbitrary and capricious under NEPA if, as with accelerated sea level rise, the agency "entirely failed to consider an important aspect of the problem." Hughes River Watershed Conservancy v. Johnson, 165 F.3d 283, 287-288 (4th Cir. 1999)

E. The Purpose and Need Is Specific and Restrictive.

The purpose and need statement is an essential guide to the EIS. It "shall briefly specify the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action." 40 C.F.R. § 1502.13. The purpose and need in this EIS misses that mark.

The EIS fails to identify a single purpose and need, instead opting for eight. Those eight purpose and needs cover a broad range of issues with a degree of specificity that ensures confusion. As discussed below, the EIS's analysis of alternatives reveals that confusion, with several alternatives being dismissed without legitimate reasons. As a result, the purpose and need statement derails the alternatives analysis, which "must focus on the accomplishment of the underlying purpose and need," but cannot do so because of the unnecessary detail.

F. The Analysis of Each Alternative is Flawed.

1. The DEIS analysis of Alternative 1 fails to account for current conditions, overstates costs, and is incomplete.

a. Alternative 1 is not the No Action Alternative.

Alternative 1 is mislabeled as the No Action alternative. As stated in NEPA regulations, the No Action Alternative is one that "results in no construction requiring a Corps permit." 33 C.F.R. Part 235, Appendix B, Sec. 9.b(5)(b). Alternative 1 requires long-term dredging in Rich Inlet and requires a Corps Permit. Any future dredging requires either the existing modified permit, a new modified permit, or a new permit.

b. The analysis of Alternative 1 fails to account for current conditions.

The EIS's analysis of Alternative 1 is fundamentally undercut by its reliance on dated information and exclusion of up-to-date observations about the condition of the beach and the position of the inlet. The DEIS analysis directly depends on "[c]ontinuation of the present rate of shoreline recession on the extreme north end of Figure Eight Island" as the basis for its analysis. DEIS at 26. Moreover, it relies on the assumption that existing sandbag structures would "either fail or be removed" within five years. DEIS at 26.

Neither of those assumptions are valid. The inlet appears to be reorienting towards Figure Eight Island. As depicted in the photograph on page 18, the channel is no longer aligned in the northeasterly direction that contributed to the "present rate of shoreline recession" at Figure Eight, and therefore the pre-2007 erosion rate is not a legitimate basis for future predictions. As is expected, the natural reorientation has discontinued the pre-2007 erosion rate and has, in fact, caused accretion on the beach fronting the sandbagged houses on Inlet Hook Road and Combers Road. Not only have those sandbags held and remained, additional houses have not been threatened.

These changes in existing conditions are crucial for the evaluation of Alternative 1 and undermine the EIS's conclusion that "[u]nder Alternative 1, the shorelines on both islands would be expected to continue to behave as they have in the past." DEIS at 168. The change in erosion rates will fundamentally change the effect of beach nourishment projects, extending the longevity of the projects and reducing frequency and scope of the projects, thereby reducing costs. The supplement to the DEIS must reevaluate Alternative 1 in light of changed baseline conditions.

c. The Alternative 1 cost analysis dramatically overstates costs.

The cost analysis of Alternative 1 is drastically overstated. The inflated costs have multiple sources. First, the analysis expands the group of threatened structures far beyond those that are actually threatened or can reasonably be expected to be threatened. The DEIS ominously threatens that "present rate of shoreline recession" will result in erosion that threatens 21 houses not currently sandbagged. DEIS at 26. In addition to providing no evidence that the "present rate of shoreline recession" will continue, the DEIS provides no data to show that these properties are or have ever been threatened by erosion. The notion that these properties will be threatened is pure conjecture and is unsubstantiated by any historical or predictive analysis. Moreover, it is arbitrary and capricious because it "runs counter to the evidence before the agency." Hughes River Watershed Conservancy, 165 F.3d at 287-288.

Trimming the 21 houses that have no documented, foreseeable threat shrinks the cost of Alternative 1. Further, updating the value of actually threatened houses and adding in the lost value for those properties that would be bisected by the terminal groin, the overall change in property value under Alternative 1 is significantly reduced from the $25.7 million for lost structures and $57.9 million for lost land estimated in the DEIS. Based on the analysis above, the value of lost structures and land is approximately $12.4 million instead of $83.6 million. In

addition, the avoided property loss from those properties that would be fronted by the groin could be significant, and we should expect some increase in value for newly oceanfront lots, meaning the overall loss in property value under Alternative 1 would be much less than estimated. Further, with the current orientation of the inlet, the frequency of beach nourishment will be reduced, decreasing the projected $27.5 million estimated for beach nourishment.

Taking these factors into account, Alternative 1's actual estimated cost will be much lower than the inflated figure in the DEIS. And even that number is likely excessive because it assumes that owners of threatened houses would choose to destroy the houses rather than relocate them to interior or sound-side properties.

d. Failure to model Alternative 1 is arbitrary and capricious.

Although we do not believe the modeling that supports the EIS analysis is valid, the Corps relied on it for the purpose of comparing alternatives. Therefore, it is remarkable that Alternative 1 was not modeled. The DEIS states that "[t]he Delft3d model was not specifically run under Alternative 1 conditions" and that the Corps relied on "results derived from Alternative 2" instead. DEIS at 168. Given that Alternative 1 would include continuation of current beach management activities and Alternative 2 would completely abandon those activities, it is unclear how modeling for Alternative 2 could predict the effect of a fundamentally different Alternative 1. The DEIS does not provide any explanation why the results from Alternative 2 are an appropriate "proxy for Alternative 1." DEIS at 168.

e. Alternative 1 meets the purpose and need.

Alternative 1 meets the purpose and needs listed for this project and is practicable. Alternative 1 reduces erosion along the targeted area. It has provided protection over the last five years and will provide protection into the future – protection that is enhanced by the inlet's natural realignment. It provides compatible beach sand while maintaining navigation in Rich Inlet and allowing continued recreation on the northern spit. Finally, it provides better balance between human activities and natural resources than either of the groin alternatives by allowing the continued development of quality wildlife habitat on the northern spit.

2. The DEIS analysis of Alternative 2 fails to account for current conditions and overestimates costs.

The DEIS analysis of Alternative 2 suffers from the same flaws as the analysis of Alternative 1. It fails to account for existing conditions. That omission has been discussed in detail above, and we will not repeat it here. Similarly, making the same adjustments to the inflated economic analysis reveals that Alternative 2's actual cost would be much lower and clearly practicable.

Unlike Alternative 1, the Delft3D model was run for Alternative 2. The model results, however, are entirely inaccurate when compared with current conditions (which align with year 5 in the model). As discussed above, the model results for Alternative 2 demonstrate the futility in relying on the model to predict environmental impacts or geological changes.

3. The DEIS analysis of Alternative 3 fails to account for current conditions, overestimates costs, is contradicted by previous modeling, and excludes feasible alternatives that meet the purpose and need.

The DEIS's analysis of Alternative 3 is also flawed. Like each of the alternatives, it fails to consider the change in baseline conditions since 2007. As recent imagery has shown, the inlet has shifted in such a way that the erosion on Figure Eight Island has diminished and the beach is widening. For Alternative 3, the natural realignment has significant impacts.

First, it affects the costs associated with realignment and beach nourishment. As the inlet has shifted closer to the HOA's desired location, the amount of realignment necessary to further relocate the inlet and build a dike across the, now partially closed, 2007 inlet. Further, the accretion observed on the north end of Figure Eight means that less sand may be required under the alternative and it may last longer. Finally, because the inlet appears to be re-orienting towards Figure Eight naturally, there is no basis for concluding that it will relocate to its 2007 position every five years.

Even under the model, it is not clear that there is any legitimate basis for estimating that the inlet relocation would require repeat relocations every five years. In 2008, when inlet relocation was the HOA's preferred alternative, the model showed that the inlet would be in the "ideal" location after five years. The results of that modeling run, which are included in Appendix A of the DEIS, are shown below.

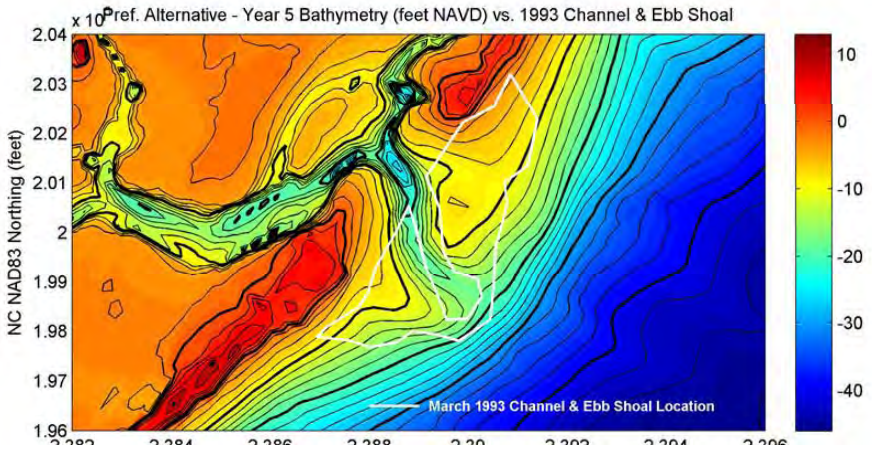


Figure 8. Inlet Realignment – Year 5 2008 Results

As explained by the email accompanying these results, the results show "the predicted inlet reconfiguration after 5-years [sic] following the channel realignment," in which the inlet almost exactly matches the "target configuration" noted by the white outline.[32] Under these results there does not appear to be any approaching need for a second realignment, reducing the overall cost of the project over a 30-year period.

[32] Email from Tom Jarrett to Mickey Sugg (Sept. 9, 2008).

These results conflict with the results included in the DEIS for Alternative 3. In the DEIS, the inlet takes a sudden shift in year 5, returning to the 2007 inlet position. Given the current position of the inlet and the previous modeling results, the estimate does not appear to have any validity.

Moreover, the thresholds relied upon to evaluate Alternative 3 are not supported in the DEIS. The DEIS identifies two thresholds – 60% shoaling of the initial construction volume and location of 50% of the thalweg outside of the initial construction corridor – but does not explain the process for selecting these thresholds or describe why they are appropriate. The DEIS does not identify which purpose and needs would not be fulfilled if one or both thresholds are exceeded and does not assess the effect of exceeding either threshold on erosion rates. In addition, the description of the action to be taken if a threshold is exceeded – namely evaluate maintenance needs – is not consistent with the assumption that the channel will be relocated every five years.

Relocating the channel every five years is also inconsistent with the inlet's history. Dr. Cleary analyzed the inlet's movement from 1938 to 2007. Although the inlet did move during that period, nothing in the record supports the repeated, rapid movement suggested by the model. Critically, neither did Dr. Cleary when preparing his report in support of the inlet realignment during the early stages of this project. At that time, Dr. Cleary determined that "[t]he relocation effort would ultimately lead to a reconfiguration of the barrier's planform along the northern end of F8I and an eventual cessation of the chronic erosion."[33] The report does not anticipate the need to consistently realign the channel, but rather suggests that relocation should provide permanent erosion control. Even more emphatically, the report states that relocation "will reverse the erosion trend that has characterized the oceanfront since the late 1990s."[34] Indeed, the report even notes that historical patterns suggest that erosion on Figure Eight is a less common inlet alignment, stating that "net progradation has characterized the past seven decades of oceanfront shoreline change."[35] In fact, Cleary suggests that mechanical realignment will only act to hasten natural realignment, stating that "[g]iven sufficient time natural progradation will again occur along the Figure Eight island oceanfront."[36]

Dr. Cleary's report obliterates any validity the Delft3D model had with respect to Alternative 3. He stated that natural relocation of the channel would cause accretion on Figure Eight. The channel appears to be moving and it is, in fact, causing accretion. Directly contradicting the model, he predicted that relocation would be a long-term corrective action for Figure Eight. And finally, nothing in his 59-page report suggests that the realigned inlet would relocate to the 2007 location within 5 years. Notably, his prediction is in line with the 5-year model results that Tom Jarrett forwarded to the Corps in 2008.

The Corps must reevaluate Alternative 3 based on the shortcomings described above. During that analysis, the Corps must consider options for Alternative 3 that were prematurely discarded in the DEIS. Specifically, the Corps must reevaluate options that were excluded for

[33] DEIS Appendix B, Subpart A at 2.
[34] Id. at 53.
[35] Id. at 56.
[36] Id. at 59.

reasons that do not appear to have anything to do with meeting the purpose and need. Alternative 3, Option 1 was excluded because of a potential loss of a connection to Green Channel.[37] Similarly, Alternative 3, Option 3 was excluded because it did not include a connection from the main channel to Green Channel. DEIS at 161. Notably, a direct connection to Green Channel is not included in any of the eight purpose and need statements. The purpose and need does include maintaining navigation to Nixon Channel, which both options 1 and 3 do. Therefore, the decision to eliminate these alternatives was arbitrary and capricious.

Options 4A and 4B for Alternative 3 were similarly eliminated based on the potential effect on the connection to Green Channel and a vague statement regarding potential erosion of salt marsh. Neither warrants dismissal of these options without detailed review. As already mentioned, no alternative can be eliminated based on the connection to Green Channel. As for the potential impact to salt marsh, the entire purpose of the EIS is to evaluate the environmental impacts of various alternatives. If only alternatives without environmental impacts were carried forward, only Alternative 2 would survive. Each of the others have environmental impacts that must be weighed in the EIS.

The Corps must also consider options to Alternative 3 that vary nourishment levels. The Engineering Report purported to do so, but ensured two of the options would fail. Of the three options considered in the Engineering Report, two excluded any fill on Nixon Channel[38] despite the Nixon Channel shoreline being one of the focal points of the overall project. See DEIS at 15. It is no surprise, therefore, that the Engineering Report – and as a result the DEIS – dismiss the options that omit Nixon Channel shoreline from the nourishment project.[39] They were designed to be dismissed, leaving only the most extensive and expensive option.

The third nourishment option included nourishment all the way from the inlet to the intersection of Beach Road and Beachbay Lane.[40] Requiring such extensive nourishment increases both costs and environmental impact and does so with no apparent purpose. Much of the area that would receive sand is not imminently threatened or projected to be threatened in the near future. Even the Engineering Report's modeling showed that such extensive beach nourishment was unnecessary and that the erosion between F90 and 30 was insignificant.[41] A smaller nourishment project could provide the same benefits, or greater than the projected benefit given current accretion, at much less cost and with much less environmental impact. The DEIS's failure to evaluate such an alternative is inexplicable given that it is exactly what was done with the preferred alternative. Alternative 5B is described as a version of 5A that involves less nourishment. It is, therefore, cheaper (though still carries the substantial environment effects due to the permanently hardened structure and lost habitat). The DEIS must evaluate a similar option for Alternative 3.

[37] We note that the loss was predicted by the Delft3D model, which appears, based on current conditions, to have no predictive value.
[38] DEIS Appendix B, Subpart B at 59.
[39] DEIS Appendix B, Subpart B at 65.
[40] DEIS Appendix B, Subpart B at 59.
[41] DEIS Appendix B, Subpart B at 162.

4. The DEIS analysis of Alternative 4 fails to account for current conditions.

Like each of the previous alternatives, the DEIS analysis of Alternative 4 fails is undercut by the DEIS's reliance on stale data and the Delft3D modeling. Alternative 4 should be reevaluated based on the current alignment of the inlet and current accretion rates.

5. The DEIS analysis of Alternative 5 demonstrates that both alternatives fail to meet the purpose and need and underestimates costs associated with the groins.

The terminal groin options are the only alternatives in the EIS that clearly violate the purpose and need statements. Both proposals eliminate the spit on the northern end of Figure Eight Island, causing significant damage to shorebird habitat and eliminating a popular recreational resource. Further, both terminal groin proposals would devalue the properties at the end of the island by replacing their beach with a rubble or sheet pile wall.

The environmental impacts of the terminal groin alternatives are discussed more fully above and will not be repeated here. We do, however, point out that one of the purpose and need statements for the shoreline protection project is to "[b]alance the needs of the human environment with the protection of existing natural resources." DEIS at 15. There is no balance in either terminal groin alternative. Each would eliminate the existing spit, destroying habitat and overwash areas. The environmental benefits of those areas would be entirely lost. Therefore, neither alternative meets the purpose and need to balance human needs and the protection of natural resources.

For the same reason – elimination of the spit – the terminal groin alternatives fail to meet the purpose and need of "[m]aintain[ing] existing recreational resources." DEIS at 15. As acknowledged in the DEIS, the spit that will be eliminated is a popular recreational resource. Even if sand covers the groin, the recreational resource will be permanently lost under either groin alternative.

Likewise, the groins fail to "[m]aintain the tax value of the homes and infrastructure on Figure Eight Island." DEIS at 15. As discussed in more detail above, both groin alternatives would require 15 properties to trade their beachfront for rock rubble or steel sheet pile. As a result, those properties are certain to decline in value.

In addition, the preferred alternative does not even appear to provide the erosion protection described in the purpose and need. One of the purpose and need statements documented that the project was to "[r]educe or mitigate erosion along 3.77km (2.34 mi) of Figure Eight Island oceanfront shoreline south of Rich Inlet . . . ." DEIS at 15. Yet the DEIS did not model Alternative 5B in the Delft3D model and does not provide any other means of evaluating its erosion control potential apart. The DEIS summarily states that "[t]he projected performance of the beach fill for Alternative 5B was based on the volume of initial beach fill retained . . . by the results of the Delft3D simulation for Alternative 5A." DEIS at 285. The document does not provide any explanation as to why reliance on 5A results is appropriate or

why the smaller beach fill would function similarly to that of 5A. Such unsupported conclusions cannot be considered a "hard look" at the alternative.

Finally, the cost estimates for both groin estimates are understated. First, the cost of acquiring the property rights to build the groin across the 15 oceanfront lots is entirely excluded. Given the expected loss of value of those lots, there may be significant costs associated with acquiring those rights if those rights can be acquired at all. Second, the estimates appear to be low, and no explanation is given for the discrepancy between costs estimated in the Coastal Resources Commission's Terminal Groin Study and the estimated costs. The Terminal Groin Study found that rubble mound costs ranged from $1,230-5,180 per linear foot in the studied groins and estimated that a 1,500 foot rock rubble groin would cost at least $3,090 per linear foot in North Carolina. Similarly, the study found that sheet pile cost from $4,000 to 4,800 per linear foot in studied cases and estimated that a 1,500 foot sheet pile would cost $4,300 per linear foot. Although the preferred alternative is a hybrid of these two approaches, the DEIS must explain why projected costs are significantly lower than other studied projects and the recently estimated cost.

In addition to underestimating construction costs, the DEIS appears to underestimate maintenance costs. The CRC Terminal Groin Study estimated that annual maintenance and monitoring for a 1,500 ft groin would total $2,250,000 per year. The Engineering Report does not include any estimates for maintenance of the groin and only estimates $1,821,000 in nourishment costs every 5 years.[42] These discrepancies must be explained.

III. THE DEIS DOES NOT MEET THE REQUIREMENTS OF STATE LAW REGARDING TERMINAL GROINS.

As the DEIS recognizes, the change in state law that allowed the HOA to tack on the terminal groin alternatives also imposed certain requirements for any terminal groin proposal. For the reasons stated below, the information in the DEIS fails to meet those requirements.

A. Non-structural Alternatives Are Practical.

Before the Corps can issue a permit for a terminal groin for Rich Inlet, the HOA must demonstrate that "nonstructural approaches to erosion control, including relocation of threatened structures, are impractical." N.C. Gen. Stat. § 113A-115.1(f)(2). Here, each of the non-structural approaches are practical. Therefore, the Corps cannot issue a permit for the preferred alternative or any groin alternative.

B. The Construction of the Groin Will Result in Significant Adverse Impacts to Public Recreational Beach.

The HOA must also demonstrate that its proposed terminal groin will not "result in significant impacts to private property or to the public recreational beach." N.C. Gen. Stat. § 113A-115.1(f)(4). The DEIS's terminal groin alternatives will do both. It will eliminate the beachfront access of properties on the northern end of the island, causing both a loss of private

[42] DEIS Appendix B, Subpart B at 206.

property and a decline in property value. Further, the groin will permanently eliminate the public recreational beach. These impacts to private property and public recreational beach are significant by any definition, and therefore preclude permitting the groin alternatives.

C. The Shoreline Management Plan is Outdated and Relies on Inaccurate Assumptions.

The HOA must provide a shoreline management plan before any permit can be issued for any terminal groin project (assuming it could be issued under the ESA or CWA). The Shoreline Management Plan proffered in the DEIS suffers from the same shortcomings as the remainder of the DEIS – it relies on erosion and shoreline information from 2007. That information is outdated and contradicted by current conditions. The Shoreline Management Plan heavily relies on the erosion caused by a channel orientation that is no longer representative of Rich Inlet. Truncating the analysis in 2007 gives greater weight to the time period from 1996 to 2007, an isolated segment of time during which there was erosion, but nothing in the DEIS suggests that that time period is typical for the inlet long term.

Indeed, the DEIS contradicts that position. As Dr. Cleary's report in Appendix B states, "net progradation has characterized the past seven decades of oceanfront shoreline change."[43] The analysis of shoreline changes in Table 6.2 demonstrates that even at transects 16-19, the long-term erosion rate is a mild -1.1 ft/yr. It is only by excluding the periods of accretion before 1974 that the analysis results in a more significant -16.8 ft/yr. The late 1990s and early 2000s were clearly a period of erosion for the island, but do not typify the long-term erosion patterns for the inlet and cannot be used as the basis for the Shoreline Management Plan. The purpose of emphasizing this time period is transparent, but short periods of erosion that do not reflect the long-term movement of the inlet should not be relied upon to justify permanently altering the inlet system.

The response trigger is inadequate because it relies on the artificially constrained time period of 1974-2007. The use of this time period is inappropriate because it fails to approximate the long-term nature of the island, instead emphasizing a period of greater erosion rates. Setting the threshold of harm caused by the groin based on this truncated time period fails to provide adequate protection or an effective baseline for monitoring.

The proposal for a two year monitoring plan is unreasonable. The terminal groin alternatives would fundamentally alter the nature of the inlet. There is no basis for assuming that the inlet would return to some level of stasis within two years of that dramatic alteration. The DEIS provides no support for the selection of a two year period.

Mitigation measures are ill-defined and unprotective. First, the mitigation plan is necessarily inadequate because it is based on response triggers that assume significant erosion. Second, the mitigation plan fails to describe the quantity of sand available in Nixon Channel, what metrics would be used to determine whether to access that sand or the dredge piles, or what the environmental impacts of those actions would be. In addition, the DEIS fails to describe what standards would be used to determine whether impacts cannot be mitigated.

[43] DEIS Appendix B, Subpart B at 56.

These failures in the Shoreline Management Plan described in the DEIS violate N.C. Gen. Stat. 113A-115.1 and provide an additional reason that the terminal groin alternatives cannot be lawfully permitted.

D. The DEIS Does Not Include Any Proof of Financial Assurance.

The HOA is required by state law to provide "[p]roof of financial assurance in the form of a bond, insurance policy, escrow account or other financial instrument" before any permit can be issued. N.C. Gen. Stat. § 113A-115.1(e)(6). The DEIS does not identify any financial assurance for the project or describe what proof the HOA intends to present.

IV. CONCLUSION

This DEIS cannot serve the purpose that it is intended to serve under NEPA. Before any further action on this project can take place, the HOA must demonstrate that they have the requisite property rights to carry their preferred alternative forward. That information is not only required by the Corps's regulations, it is essential to the analysis. Further, certain alternatives cannot be permitted and the focus of any future analysis should exclude those alternatives. Finally, if the HOA is able to demonstrate the necessary property rights required to move forward, the analysis in the DEIS must be updated, reassessed, and more clearly explained as described above.

We appreciate the opportunity to submit these comments and the extension of the comment deadline to allow a more-complete review of the DEIS. Please contact us at (919) 967-1450 if you have any questions regarding these comments.

Sincerely,

Derb S. Carter, Jr.
Senior Attorney/Director, Carolinas Office

Geoffrey R. Gisler
Staff Attorney

cc (via email):
Todd Miller, NCCF
Walker Golder, Audubon NC
Pete Benjamin, USFWS

Visit Our Website: http://ww2.surfrider.org/capefear

Like Us On Facebook:
https://www.facebook.com/Cape.Fear.Surfrider.Foundation

July 19, 2012

Mickey Sugg
Project Manager
US Army Corps of Engineers
69 Darlington Avenue
Wilmington NC 28403-1343

Re: Comments on Figure 8 Island Terminal Groin DEIS

Dear Mr. Sugg-

Thank you for the opportunity to comment on the Draft Environmental Impact Statement for the proposed Terminal Groin project at Figure 8 Island, NC. Surfrider Foundation is a non-profit grassroots organization dedicated to the protection and enjoyment of our world's oceans, waves and beaches.

Existing environment

We feel that the DEIS fails in numerous places to fully and accurately describe the local environment and the projects impacts. In particular the document does not account for the large and frequent public use of the Rich Inlet shoals and spit at the north end Figure 8 Island. This area is frequently utilized by fishers, boaters and surfers to access the public trust lands surrounding Rich Inlet, providing vital recreational opportunities at the otherwise private island. The DEIS fails to adequately describe this use, and fails completely to describe the recreational use by surfers. Surfing at Rich Inlet is undertaken year-round but most frequently during storm swells and relies on the natural formation of sand bars along the outer ebb delta. The DEIS needs to include full descriptions of this use and the natural resources that are utilized.

Impacts

Modeling within the DEIS predicts that this spit and shoals will disappear or be permanently submerged following construction of the terminal groin. This could result in the complete elimination of public access to this portion of the beach. Short and long term impacts of the loss of this access need to be included. Modeling only makes predictions for the first 5 years

following construction and offers no discussion of conditions further into the 30 year expected life of the project. If it assumed that conditions will remain the same after 5 years then long-term impacts due to loss of the north-end beach should reflect that, or be properly discussed.

Cost-Benefit

Discussion of property values and costs for moving structures are basic at best. No detail is provided as to how the calculations were made, or exactly which properties would be under threat in each alternative scenario. A clear and detailed analysis of options for home relocation is needed. Properties along the north-facing beaches will surely lose value under the preferred alternative as sand erodes seaward of the groin. In addition the benefits to the local economy by recreational use of the beaches and shoals surrounding Rich Inlet are not discussed at all. It is also unclear what impacts to navigation will occur under each scenario.

Thank you for the opportunity to comment.

Sean Ahlum
Chair, Cape Fear Chapter
Surfrider Foundation

[illegible] Sunset Boulevard North ● Sunset Beach, NC 28468
Telephone 910.579.6297 ● Fax 910.579.1848
Website www.sunsetbeachnc.gov ● Email sunsetbeachnc@atmc.net

Gary Parker, Administrator

July 3, 2012

Mr. Mickey Sugg
Regulatory Project Manager
U.S. Army Corps of Engineers
Wilmington District Regulatory Division
69 Darlington Ave
Wilmington, NC 28403

Re.: Figure 8 Island Draft EIS Comments

Dear Mr. Sugg:

The Town of Sunset Beach respectfully submits the following comments on the Figure 8 Island Draft Environmental Impact Statement.

In 2011, the Town of Sunset Beach opposed legislation allowing terminal groins. The Town's message to State Legislators stated that if the legislature approved terminal groins, eight recommendations from the North Carolina Coastal Resources Commission (CRC) about the permitting process should be included in the legislation.

Because terminal groins were approved by the legislature in Senate Bill 110 (SB110), which included the CRC recommendations, Sunset Beach now has a stake in monitoring and commenting on the permitting processes beginning with the Figure 8 Island Draft Environmental Impact Statement (DEIS).[1]

The DEIS has many flaws, all of which are of interest to Sunset Beach. Some require immediate comment.

- The DEIS does not adequately address the downdrift ocean-side environmental impact beyond about 2 miles from the proposed groin. This is a serious omission. Coastal scientists have long warned about downdrift effects, including effects on adjacent islands. In an open letter signed by 43 of the country's top coastal scientists, the scientists state, "there is no debate: A structure placed at the terminus of a barrier island, near an inlet, will interrupt the natural sand bypass system, deprive the ebb and flood tide deltas of sand and cause negative impacts to adjacent islands." [2] And, "Permitting the construction of terminal groins will harm the coast and place downdrift property at risk."[3]

- The DEIS does not propose adequate funding for monitoring the environmental effects of the groin, as the law requires, and it proposes nothing about monitoring or mitigation on adjacent islands and estuaries. The standards for monitoring are low and the triggers for mitigation are unreasonably high.[1] We note that the Town of Sunset Beach agrees with the comments submitted by Todd Miller and Ana Zivanovic-Nenadovic to Bob Emory, Chair, Coastal Resources Commission, in a June 14, 2012 memorandum enumerating in part the shortcomings of the DEIS in question.

- If the groin causes damage to nearby islands or estuaries, the DEIS does not propose any funding for mitigation, as the law requires. The total proposed financial assurance bond is $3,301,000.[1] The DEIS says,

  "In summary, the financial assurances will be based upon:

  - $480,000 for shoreline monitoring
  - $0 for maintenance [of the groin]
  - $1,821,000 for beach nourishment on Figure Eight Island
  - $1,000,000 for the removal of the terminal groin"[1]

- All of these estimates relate to Figure 8 itself, and are based on the presumption that the groin is not yet finished.

Sunset Beach is not close to Figure 8. Nevertheless, the Town must comment now and request changes in the DEIS because this DEIS, if approved, will surely be the template for other towns, including our near neighbor, Ocean Isle Beach. If Ocean Isle Beach installs a groin, Sunset Beach will suffer. [4,5]

For the sake of the entire coast of North Carolina, please address the accuracy and fairness of the Figure 8 Home Owners Association's DEIS and make appropriate changes.

Respectfully submitted,

Rich Cerrato, Mayor
Town of Sunset Beach

Attachment: Todd Miller, NC Coastal Federation Letter to Bob Emory, Coastal Resources Commission

[1] http://www.saw.usace.army.mil/WETLANDS/Projects/Figure8TerminalGroin/DEIS/index.html
[2] http://www.wcu.edu/WebFiles/PDFs/Coastal_Scientist_Groin_Statement.pdf
[3] http://www.wcu.edu/4402.asp
[4] Dr. L. J. Pietrafesa. Letter to the Brunswick Beacon. 4-16-12
[5] L.J. Pietrafesa. Personal Communication. "On the Continued Cost of Upkeep Related to Groins and Jetties" To be published in the Journal of Coastal Research, September 2012.

THE UNIVERSITY
of NORTH CAROLINA
at CHAPEL HILL

INSTITUTE OF
MARINE SCIENCES

3431 ARENDELL STREET
MOREHEAD CITY NC 28557

T 252 726.6841
F 252 726.2426

July 20, 2012

Mr. Mickey Sugg
Project Manager
US Army Corps of Engineers
69 Darlington Avenue
Wilmington NC 28403-1343

Dear Mr. Sugg:

After completing my review of the Figure Eight Homeowner's Association (HOA) Draft EIS (DEIS) for the Shoreline Management Project, I would like to express my concern regarding the absence of consideration for the shorebirds on Figure Eight Island.

The piping plover is federally listed as a threatened and endangered species. The two populations of plovers that inhabit the Project Area are the Great Lakes population, which is listed as endangered, and the Atlantic Coast population, which is listed as threatened. The Great Lakes population spends the winter months in North Carolina, whereas the Atlantic Coast population resides year round and relies on the northeast tip of Figure Eight Island, for breeding, foraging and nesting.

As illustrated in Chapter 4 (Figure 4.1), the proposed Project Area intersects federally designated piping plover critical habitat, which is essential for the species' recovery. In particular, the construction of a terminal groin on Figure Eight Island will result in 1) the loss of intertidal foraging habitat and 2) the loss of high ground nesting habitat. While the DEIS acknowledges that the terminal groin may adversely affect both populations of piping plover, the proposed mitigation is inadequate to maintain Figure Eight Island as federally designated critical habitat. In order to comply with the federal Endangered Species Act, I strongly recommend that the DEIS be revised to account for the following concerns.

Loss of Intertidal Foraging Habitat

The Delft3D Model five-year simulation shows that the northeastern tip of Figure Eight Island will erode due to the presence of a terminal groin (Appendix B, Figure 61). The disappearance of this land will result in the significant loss of intertidal foraging habitat, which provides vital food sources for nestlings, juveniles, and adult piping plovers. In particular, the modeled erosion threatens to destroy the salt marshes and inlet shoals that support several species of marine worms, mollusks, crustaceans, and insects. Such a loss in food resources will have a significant adverse effect on the ability of the piping plover to live on Figure Eight Island.

In addition, the presence of the terminal groin will likely interfere with the sand sharing dynamics of Rich Inlet to the north of Figure Eight Island, thereby reducing the availability, abundance, and location of intertidal shoals in Nixon Channel. These inlet shoals provide

additional foraging habitat as well as a resting site for the plovers as they fly back and forth across the inlet. The disruption of this system is a significant geomorphological consequence that is not accounted for in the DEIS.

Loss of High Ground Nesting Habitat

Should erosion flank the northern side of the terminal groin as predicted by the Delft3d Model, the structure will effectively function as a seawall, which is prohibited along the beaches and inlets of North Carolina. Aside from being illegal, the resulting seawall will interrupt barrier island overwash dynamics, allowing vegetation to grow thicker on the stabilized shoreline west of the groin. Piping plovers actively avoid predators that usually hide in heavily vegetated areas, and rely on overwash fans for nesting. Consequently, the construction of the proposed terminal groin will result in the loss of valuable nesting habitat within the piping plover's federally designated critical habitat.

Proposed Mitigation is Inadequate

While the DEIS acknowledges that the construction of the terminal groin may "stress shorebirds, which includes the piping plover" (p. 281), the only direct action proposed to mitigate any adverse impacts to the piping plover is to allow construction outside of the breeding season, which begins in late March/early April. The DEIS does not describe any additional actions to minimize adverse impacts to the wintering endangered Great Lakes plovers.

I fundamentally challenge the assumption that construction outside the breeding period is sufficient mitigation. The DEIS does not define what is meant by the breeding period and whether this includes courtship behavior, copulation, egg laying, and hatching. Furthermore, the DEIS does not acknowledge the phases of energy accumulation that are needed in preparation for breeding, or the time it takes for chicks to become independent of their parents. I would argue that the entire life cycle of the piping plover is dedicated to breeding, and to claim that performing construction outside the breeding season is adequate mitigation is inaccurate. These birds need to consume a large amount of resources in preparation for breeding and, as I mentioned above, construction will likely remove or damage the habitat that provides various sources of sustenance. In addition, construction will scare the piping plovers away from the area where they nest and ultimately destroy nesting habitat by interfering with island overwash dynamics. This disruption in life cycle will affect the success of the breeding season and the numbers of healthy chicks that are produced. This species is federally listed as endangered and I question whether this is the time to be experimenting with their population and critical habitat.

Compliance with the Endangered Species Act

The disruption and eventual loss of critical habitat and associated food resources due to the construction of the terminal groin and the lack of adequate mitigation qualifies as a take as defined under Section 3(19) of the Endangered Species Act (ESA): any action that will "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" of an endangered or threatened species. In order to comply with the ESA, the DEIS should acknowledge the need for an Incidental Take Permit and outline the application

process that is required by law

In addition to the piping plover, other state-listed threatened species and species of special concern utilize these Figure Eight Island shoals as habitat, including the gull billed tern, Wilson's plover, the black skimmer, the American oystercatcher, and the common tern. Wilson's plovers and American oystercatchers have been observed during their breeding seasons on the northern tip of Figure Eight Island. Like the piping plover, all of these species will likely suffer similar consequences should the proposed terminal groin be built.

It is imperative that the DEIS comply with the Endangered Species Act and address how the resulting permanent habitat loss will impact the federally protected piping plover as well as the other species of shorebirds mentioned above that utilize the Project Area.

Sincerely,

Charles H. Peterson

Charles H. "Pete" Peterson
Alumni Distinguished Professor

20 July, 2012

Attention: Mickey Sugg
69 Darlington Avenue
Wilmington, NC 28403

Dear Mr. Sugg,

Thank you for the opportunity to review the Figure Eight Island Terminal Groin - Shoreline Management Project Draft Environmental Impact Study (Corps ID # SAW-2006-41158) developed by the Figure Eight Island Homeowners Association (applicant).

General Comments

According to NC Session Law 2011-387 an entity applying for a permit to construct a terminal groin in North Carolina must demonstrate that nonstructural approaches to erosion control are impractical. The DEIS provides unequivocal evidence that nonstructural alternatives to reducing or mitigating erosion along 3.77 km (2.34 mi) of Figure Eight Island oceanfront shoreline south of Rich Inlet and 0.55 km (0.34 mi) of backbarrier shoreline on Figure Eight Island along Nixon Channel - the primary purpose of the stated project - are practical. Issuance of a 404 permit by the Corps may, therefore, be inconsistent with North Carolina's Coastal Area Management Act.

Inappropriate Use of Models

All the models used in the DEIS have trouble analyzing shoreline change, project performance, and project impacts near inlets. In fact, it is clearly stated in the original GENESIS manual that the model is not to be used in areas where shoreline change can be driven by anything other than gradients in longshore sediment transport. Inlet shorelines are specifically ruled out. The calibration and verification runs performed for Figure Eight Island are for very short periods of time. This is because calibrating the model over a longer period of time would be

difficult given the extreme fluctuations in the direction and magnitude of shoreline change near the inlet. We suggest that the modelers attempt to calibrate and verify the model using a period of time that is at least as long as the period for which they would like to project into the future.

SBEACH also assumes that storm impact will be simple profile readjustment during high water events and does not account for the multi-dimensional complexity of storm processes at inlets. SBEACH can shed no light whatsoever on the impacts that the proposed structure will have on storm processes within the project area. In fact, the DEIS gives us little verifiable information about the benefits/impacts that any of the options will have for storm protection of property or any increased project durability during storms. This is certainly true for the preferred option. The case is not made that there will be increased storm protection.

Even with the Delft3D calibration it is clear that the model performs poorly near the inlet and did not, and cannot take storm driven impacts and changes into consideration. In short, all of the model runs and analysis in the DEIS are simulations providing one possible outcome from millions of possibilities. The results are of indeterminable accuracy. Everyone must clearly understand that these model runs cannot be used to predict environmental impacts nor to quantify benefits versus costs. In particular, any possible benefit that a terminal groin may have for increasing beach nourishment durability cannot be gleaned from the modeling done here.

The DEIS frequently refers to the results of calibration and verification runs as looking "reasonable." But, this is for model runs when you are forcing the model to produce an answer you want. We have no way of knowing if any of the projections are producing results that are reasonable. All of these model shortcomings indicate that any suggested project benefits or examination of impacts based on these model runs is simply arm waiving.

Notice of Intent

The most significant problem with the DEIS is that it contains a preferred alternative (construction of a terminal groin) that is not even mentioned in the Notice of Intent published in the Federal Register on February 26, 2007. It is our contention that this represents not merely a change in project scope but an entirely new project that necessitates the issuance of an entirely new Notice of Intent.

This position is supported by Mickey Sugg, US Army Corps of Engineers Regulatory Project Manager, during the May 3, 2007 PDT meeting in which he states, "if a project modification is deemed necessary to extend the area for nourishment from the initial three mile area to the entire ocean beach, another Notice of Intent would have to be sent out."

If a change such as the length of beach to be nourished would necessitate a new NOI, construction of a terminal groin surely must, too. However, since an NOI that accurately and correctly describes the proposed/intended project has never been issued, we believe this effort is not only in violation of NEPA but also significantly compromises the public's ability to evaluate the project's environmental impacts as well as assess and compare potential alternatives.

Scoping

Because the applicant's preferred alternative (5B) was not mentioned in the Notice of Intent (and not even legal in NC until May 2011), it was not adequately assessed during the scoping process in violation of NEPA.

The EIS process begins with publication of a Notice of Intent (NOI), stating an applicant's intent to prepare an EIS for a particular proposal. The NOI is published in the Federal Register, and provides basic information on the proposed action in preparation for the scoping process. The NOI provides a brief description of the

proposed action and possible alternatives. It also describes the proposed scoping process, including any meetings and how the public can get involved.

According to the Council on Environmental Quality (CEQ), the scoping process is the best time to identify issues, determine points of contact, establish project schedules and provide recommendations. The overall goal is to define the scope of issues to be addressed in depth in the analyses that will be included in the EIS. Specifically, the scoping process is meant to:

- Identify people or organizations who are interested in the proposed action;
- Identify the significant issues to be analyzed in the EIS;
- Identify and eliminate from detailed review those issues that will not be significant or those that have been adequately covered in prior environmental review;
- Determine the roles and responsibilities of lead and cooperating agencies;
- Identify any related EAs or EISs;
- Identify gaps in data and informational needs;
- Set time limits for the process and page limits for the EIS;
- Identify other environmental review and consultation requirements so they can be integrated with the EIS; and
- Indicate the relationship between the development of the environmental analysis and the agency's tentative decision making schedule (CEQ NEPA Regulations, 40 C.F.R. § 1501.7.).

On February 26, 2007 a Notice of Intent entitled "*Intent To Prepare a Draft Environmental Impact Statement (DEIS) for the Development of an Inlet Management Plan That Includes the Repositioning and Realignment of the Main Ebb Channel of Rich Inlet and To Use the Material To Nourish Figure Eight Island, North of Wilmington, New Hanover County, NC*" was published in the Federal Register. <u>The NOI DOES NOT even mention a terminal groin.</u>

Although an initial scoping effort for the project described in the NOI was undertaken, it focused on non-structural erosion response alternatives. Structural erosion control alternatives - including terminal groins - have unique issues, concerns and potential impacts that are significantly different from non-structural erosion control alternatives.

40 CFR 1501.7(c) states "an agency shall revise the [scoping determinations] if substantial changes are made later in the proposed action." This substantial change should have triggered a supplementary scoping process. Because a terminal groin was never mentioned in the NOI, nor adequately assessed during the scoping process, the public's ability to make a thoughtful and rational presentation on the potential impacts of the applicant's preferred alternative AND identify and develop reasonable alternatives has been severely compromised.

Language

40 CFR 1502.8 states that an EIS must be "…written in plain language and may use appropriate graphics so that decision makers and the public can readily understand them." The DEIS contains a significant amount of technical jargon that is unintelligible to the public and other stakeholders.

Economic Calculations

Tables demonstrating the summary of average annual economic impacts of each alternative are unsubstantiated, poorly explained and inaccurate. For example, estimated long-term erosion damages and associated loss of tax revenue for Alternatives 3-5 are $0. This implies that these alternatives will result in no structural damage/loss over the next 30 years – an unproven scenario that is difficult to envision.

Environmental Impacts

We believe implementation of the applicant's preferred alternative (construction of a terminal groin) will result in significant, detrimental environmental impacts that the DEIS fails to accurately describe, assess, avoid or mitigate.

Submitted by:
Robert S. Young, PhD, PG
Andrew Coburn, MEM
Roxanna Farshchi
Program for the Study of Developed Shorelines
ryoung@email.wcu.edu