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Via U.S. and Electronic Mail

Mr. Mickey Sugg
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RE: Figure Eight Island Shoreline Management Project – SAW-2006-41158

Dear Mr. Sugg:

Please accept the following comments on the proposed terminal groin project on Figure Eight Island on behalf of the N.C. Coastal Federation (federation). For the past 33 years the federation has been taking an active role in the protection of North Carolina's coastal water quality, habitat and public beach access. The federation actively supports the preservation and public use of our state's beautiful and productive beaches and inlets as public trust resources for everyone in North Carolina.

The Supplemental Environmental Impact Statement (SEIS) document breaks the very basic tenets of the National Environmental Policy Act (NEPA): transparency, disclosure and clarity. This 2,200-page encyclopedia of information is convoluted, confusing, and obscure. The U.S. Corps of Engineers (Corps) fails to establish evidence that the selected preferred alternative is the least environmentally damaging practicable alternative (LEDPA) because the study is based on a number of unsupported assumptions. The available data are used only arbitrarily, and the presentation of the performed analysis is highly selective in its delivery. Further, The Corps does not provide the public and decision-makers with a thorough and comparable analysis of reasonable alternatives, thus confining the public information to narrow, selective and targeted information that supports only the preferred alternative.

Failure to comply with NEPA

In the SEIS the Corps fails to: (a) establish a realistic purpose and need for this project; (b) rigorously explore and objectively evaluate all alternatives; (c) provide clear and concise information; and (d) provide an objective analysis rather than justify already made decisions.



a. Failure to establish purpose and need for the project

40 CFR 1502.13 requires the agency to briefly specify the purpose and need for the proposed project. However, the need to “mitigate chronic erosion on the northern portion of Figure Eight Island to preserve the integrity of its infrastructure, provide protection to existing development, and ensure the continued use of the oceanfront beach along the northernmost three miles of its oceanfront shoreline”¹ is invalid given that the north end of the island has been accreting. Thus, the need to protect the structures, public resources and infrastructure from erosion identified in the rest of the section is unwarranted. The only potential reason to undertake a shoreline management project in Rich Inlet would be to manage the location of the inlet channel to prevent occasional movement of the shoreline on the north end of Figure Eight Island. The channel movement under rare instances may threaten about 18 oceanfront homes. This was the case in 2008.

In fact, the purpose of a terminal groin at the proposed location is not to control or influence the channel location in the inlet. Its purpose is rather to manage the oceanfront beach. Controlling the channel location is vital to the ultimate success of the groin. That is why the state law in North Carolina that allows consideration of terminal groins at inlets also requires the development of an inlet management plan.

As discussed later in this letter, a recently completed NEPA review of inlet management alternative for Bogue Inlet found that building a terminal groin there was not cost-effective because the groin could not be constructed in lieu of managing the inlet channel location. It was determined that “the terminal groin itself could not be counted on alone to provide adequate inlet stability.”² For that reason the terminal groin alternative was excluded from further considerations in Bogue Inlet. In many ways, the natural forces at work at Bogue Inlet are very similar to those at Rich Inlet. Thus, the Corps cannot justify drawing significantly different conclusions in the case of Rich Inlet .

The Corps must update the purpose and need to meet existing needs and exclude the non-existing ones. This would render the entire SEIS obsolete and the proposed project unnecessary, given current conditions at the north end of the Figure Eight Island.

b. Failure to rigorously explore and objectively evaluate all alternatives

In describing the treatment of project alternatives as the heart of the Environmental Impact Statement (EIS), 40 CFR 1502.14 requires the agencies to: (1) rigorously explore and objectively evaluate all alternatives; (2) dedicate substantial treatment to each alternative to allow evaluation of their comparative merits. The Corps fails to comply with both of these legal requirements.

¹ SEIS, p. 5

² Moffatt & Nichol, 2014 p. 213

To allow for the objective, equal and rigorous analysis of all the alternatives the Corps needs to establish objective and comparable set of baseline data, analyses and results for all alternatives. The Corps does none. With arbitrary and selective treatment of data and available information and by relying on a number of unsupported assumptions the Corps precludes any possibility of objective and comparative analysis of all the alternatives.

First, the Corps does not provide evidence for the stated reason underlying the entire study: that the inlet bar channel has started shifting toward Huttaff Island thus making the erosion at Figure Eight Island imminent. As evidence of this erosion the Corps references only an aerial image which is not included in the document. Hence this assumption is unsupported. If indeed the channel has started shifting, the Corps needs to provide ample evidence of the channel's imminent shift. Without this evidence this study has no merit.

In fact, the Corps states that predicting when the shifting of the channel would occur is "not possible due to variability and contingency on the weather and storm events."³ Further, in assessing Alternative 3 the Corps states that the bar channel is presently in a favorable position for Figure Eight Island and that no structures are imminently threatened.⁴

Moreover, according to the report by Dr. Cleary in Appendix B, despite the natural cyclical change in inlets surrounded by barrier islands, Rich Inlet has maintained a relatively stable position over the years. In addition, the overall trend in the past seven decades on the Figure Eight Island has been characterized by accretion.⁵ In particular, the report states that despite several erosion episodes at the northern portion of Figure Eight Island, the past seven decades of oceanfront shoreline change were characterized by a "net progradation."⁶ In particular, between 1938 and 2007 the shoreline within the Inlet Hazard Area, between T10 and T 20, prograded an average of 70 ft., while between 1938 and 1996, the same segment prograded an average of 239 ft. Since 1996, the net oceanfront change along the shoreline segment between T11 and T20, ranged from 5 ft. to 414 ft. Dr. Cleary concludes that "given sufficient time natural progradation will again occur along the Figure Eight Island oceanfront."⁷

Second, the Corps unreasonably assumes that even if the bar channel started moving and it caused erosion on Figure Eights Island, the rates of erosion would mimic those of 2006. Thus, the Corps arbitrarily choses the 2006 shoreline position as the worst case scenario and uses it as a baseline for the entire study. The Corps does not provide any data to support this claim. In fact, the Corps cannot provide evidence for this assumption because according to Dr. Clary's report 2006 was not when the island experienced the worst

³ SEIS, p. 18

⁴ *Id.*, p. 29

⁵ Appx. B p. 56

⁶ *Id.*

⁷ Appx. B, Sub-appx. A, p. 59

erosion rates.⁸

Third, the Corps determines that upon the imminent channel shift toward Huttaff Island, Figure Eight Island would experience erosion rates existent in 2006, and that these rates would be maintained throughout the lifetime of the project, for the next 30 years. These conclusions are arbitrary.

Finally, the Corps does not provide information on modeling of Alternative 1, instead stating that Alternative 2 will be used as its proxy.⁹ This is unacceptable given that the two alternatives are intrinsically different: Alternative 1 assumes the continuation of current inlet management practices such as dredging and nourishment, while Alternative 2 assumes taking no action at all. However, the economic assessment in Appendix G provides modeling results for Alternative 1. This shows that this alternative has been modeled, but the results have not been included in the main document for comparative study of alternatives.

For the purposes of NEPA the Corps needs to analyze alternatives in the same manner. Given that the chosen method for comparison of alternatives in the SEIS is based on modeling results, the Corps needs to provide evidence of imminent erosion; define and apply the current rates of shoreline change at Figure Eight Island, rather than rely on old erosion rates; and model and analyze Alternative 1 in a manner equivalent to other that of the other alternatives. Further, the Corps needs to completely exclude the consideration of 2006 shoreline as a worst case scenario and to consequently exclude all the modeling relating to that baseline period.

c. Failure to provide clear and concise information

40 CFR 1502.1. and 1502.2 (c) mandate that the EIS should be concise, clear and to the point, supported by evidence of analyses and no longer than necessary to comply with NEPA. The Corps fails to comply with this requirement.

The document is overwhelmingly confusing because it provides data and analyses for different sets of baseline data producing up to six different projections for each alternative:

- Application of past erosion rates to 2006 shoreline;
- Application of past erosion rates to 2012 shoreline;
- Modeled shoreline change based on 2006 shoreline using Delft3D model;
- Modeled shoreline change based on 2012 shoreline using Delft3D model;
- Modeled shoreline change based on 2007 shoreline using GENESIS model;
- and
- Modeled shoreline change based on 2012 shoreline using GENESIS model.

⁸ Appx. B, Sub-appx. A, p. 59, Fig. 52

⁹ SEIS, p. 203

To make things less transparent, the past erosion rates are never clearly disclosed so the rate used for each given outcome is never clear. For example, on page 30, the Corps states that if the inlet realigns toward Huttaff Island, “erosion rates along the north end of Figure Eight Island are expected to accelerate and attain rates comparable to those measured between 1993 and 2007.” On that same page, the Corps states that “the economic assessment assumed the shoreline would erode into the existing development at rates comparable to those measured between 1999 and 2007.” Similar statements are made on page 33, then followed with “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 with an additional eight (8) homes on Beach Road North threatened within the next 25 years.” Yet, on page 33, the Corps states “At the present time (2015), the shoreline along the north end of Figure Eight Island is responding positively to the orientation of the ocean bar channel at Rich Inlet”¹⁰ - i.e. accreting. Thus, the “current level” of shoreline change is accretion, not erosion.

The confusing use of erosion rates continues in Chapter 5. On page 203, the Corps describes shoreline change rates from 1974 to 2007 as ranging “from +1.1 feet/year just north of Bridge Road to -16.8 feet/year in the northern area fronting the sandbags” in its description of Alternative 1. In describing Alternative 2, the Corps uses a different time period and a different set of rates. It states that “for the northernmost area of Figure Eight Island, shoreline change rates have varied from -12.6 feet/year to -92.8 feet/year during the 1996 to 2007 time period.”¹¹ The same page references erosion and accretion rates from 1998 to 2007.

Further, the Corps uses disparate timelines in the SEIS. While the lifetime of the project is 30 years, the Delft 3D model runs for some alternatives are performed for 5 year, and for others for 7 years; the timeline for GENESIS runs is 10 years; and the impacts on habitat are only assessed for 5 years, and based on obsolete shoreline.

The lack of clarity pertaining to the erosion rates, combined with the disparate timelines referenced in analyses, prevents a meaningful comparison of the results and alternatives, rendering the entire exercise meaningless. These are only some of many contradictions in the SEIS that make it incapable of serving its purpose under NEPA.

The use of 2006 shoreline data is completely unwarranted, unnecessary and confusing. It misrepresents the current conditions and obfuscates the overall analysis. The Corps fails to prove the relevance of including this information and only contributes to an already confusing document. The Corps needs to standardize the erosion rates and timelines used, and remove extraneous data from the model runs in order to produce concise, clear, transparent results.

¹⁰ SEIS, p. 33

¹¹*Id.*, p. 206

d. Failure to objectively assess environmental impacts rather than to justify already made decisions

40 CFR 1502.2(g) requires the EIS to assess the environmental impact of proposed agency actions, rather than to justify decisions already made. The entire SEIS is a showcase of a document that is trying to justify a decision that has already been made. This is not surprising given that the Figure Eight Homeowners’ Association (HOA) and its consultants have been publicly open for years about their desire to build a terminal groin at Figure Eight Island.

The Corps needs to objectively assess the environmental impact of the project based on sound science. The desires of the HOA and residents of Figure Eight Island should not factor in to the environmental impact of the project.

Inadequate use of modeling tools and arbitrary interpretation of model results

The Corps has used Delft3D modeling tool, SWAN, and GENESIS as the second opinion tool. These are (a) inadequate; (b) have been shown to produce inaccurate results; and furthermore (c) acquired results have not been equally applied to all SEIS Alternatives.

a. Inadequate use of modeling tools

The modeling tools used by the Corps are inappropriate for determining the effects of engineered structures on future shoreline positions and sand volume changes. Basing decisions solely on the results of these tools is a dangerous exercise that puts at risk public trust belonging to the people of North Carolina.

The authors of the study acknowledge that the model results should be interpreted with caution because the models “indicate” rather than “predict” future events. One could argue that “an indicator” has higher certainty than “a prediction” in science. Regardless of the semantics, the mere statement the models are indicating rather than predicting does not make it so. In fact, the Corps predicts future shoreline changes and needed sand volumes throughout the entire document.

While it has been recognized that mathematical models based on oversimplified and obsolete assumptions can be useful theoretical tools when calibration factors and calibration-verification methods are added, their use in modeling shoreline changes as a basis for policy decisions has been questioned by scientists (Pilkey et.al 2013; Cooper and Pilkey 2004; Oreskes 1998; Oreskes et.al. 1994; Pilkey and Pilkey-Jarvis, 2007).

Moreover, the major limitation with the use of these models is the inability of the modeler to account for “unknown timing, intensity, direction and sequencing of coastal storms” (Pilkey et.al 2013 p. 143). A variety of complex variables affect coastal processes and only a handful of them are included in the modeling tools. In addition, ordering complexity, or the timing of these variables is impossible to predict and accurately include in the modeling

(Pilkey et.al 2013). The Corps indeed recognizes its inability to predict future weather.¹² However, by projecting future shoreline positions and sand volume changes based on the modeling the Corps still acts as if it knows future weather and oceanic conditions with certainty.

Another limitation of the models is that they usually rely on linear representations of non-linear processes affected by complex and interrelated variables of coastal processes. In the SEIS in the Corps attempts to determine future shoreline positions and mitigation thresholds, which results in unrealistic thresholds spreads. This subject is discussed later in this letter.

Specifically, GENESIS, one of the models used in the SEIS study, have been critically reviewed as relying on poor assumptions and widespread use of smoothing averages (Young et al. 1995; Thieler et al. 2000). The third model, Delft3D, while more sophisticated, is a hydrodynamic model designed to analyze water movement, not sand movement. Therefore applied to modeling of the impact of engineering activities on the beach it is inadequate (Pilkey et.al 2013).

Finally, even if the model run has a successful calibration and verification and agrees with the known event used to calibrate it, the model has certainly not predicted the future. In other words, the results obtained by that specific model run, calibrated and verified for certain conditions of a known period are only *one of hundreds of possible results*. One could obtain all possible results if one knew not only the intensity and timing of future weather events, but also the sequence of those events, among many other factors. The model results, as presented in the SEIS give users a false sense of confidence and are in fact unreliable in accurately assessing the risk of extraordinary events such as hurricanes.

The Corps recognizes the limitations of the models but concludes that the model results are best used for comparisons among various alternatives, rather than absolute predictions of future volume changes.¹³ This is counterintuitive. To obtain a significant relative comparison, the actual components of comparison need to be relevant and accurate. Given the models' inadequacy to project any future shoreline changes, or even replicate the observed ones, it is unreasonable to assume that using models for a relative comparison among alternatives will produce any accurate or significant results.

b. Inaccurate results from the models used in the SEIS

The SEIS is replete with evidence of models' inability to accurately indicate passed events. In addition, as stated by the Corps, modeling was based on 2006 parameters when the shoreline at Figure Eight Island was eroding, and applied to 2012 when the shoreline was

¹² SEIS, p.27

¹³ Appx. B, p.170

accreting.¹⁴ The calibration was also based on a period of erosion, between 1999 and 2007.¹⁵ Calibrated as such, the models are preconditioned to overestimate erosion. This is confirmed in the Appendix B: “under these [2006] inlet bar channel conditions, the north end of the Figure Eight Island normally experiences severe erosion.”¹⁶ Based on this set of conditions the models produce inaccurate, irrelevant and biased outputs.

The modeling results based on 2006 data indicate that the island would erode in the 5 years following the model year, from 2006 - 2011.¹⁷ However, by 2011 the north end of the island experienced a significant period of accretion, one that has continued to this day.

On page 206 of the SEIS, the 2012 modeling simulation for Alternative 2 shows that by year 3 of simulation the bar channel would have migrated to the center of the inlet between Figure Eight Island and Huttaff Island.¹⁸ The simulation results in the channel maintaining a stable position in years 4 and 5 with the outer end of the channel swinging toward the north end of Figure Eight Island at the end of year 5. Transposing this simulation to the actual events at Rich Inlet, it can be concluded that at present time, which is year 3 of the simulation, the channel is definitely not in the position indicated by the model, which casts doubt on the accuracy of the model simulation indication for the next two years.

In another example, the Engineering report states “the Delft3D model’s estimated erosion rates on the north end of Figure Eight Island...are high in comparison to the present trends.”¹⁹ The present trend, in fact, is accretion and not erosion. The Corps also recognizes this trend confirming that the north end of Figure Eight Island has accreted between 165 and 360 ft.²⁰ (up to 100 cy/ft./yr between s 80+00 to 110+00). The model predicted that the island would erode from 60+00 to 110+00, with substantial erosion (greater than 50 cy/ft./yr) between stations 90+00 to 105+00.

The glaring disparity between the model and reality points to the futility of using this modeling tool in the SEIS. The Corps needs to reject the use of these inadequate modeling tools and stop relying on their results for decision making in the case of the Figure Eight Island shoreline management plan.

¹⁴ SEIS, Appendix B p. 170: *It should be noted that the model was calibrated during a period of erosion along the majority of this segment (see Figure 11-38). For this reason, the model tends to estimate erosion along north of profile 77+50, rather than accretion. It should also be noted that the timing and quantity of the beach fills placed in 2009 and 2010 do not match the placement scenario of Alternative 4, in which all fill is placed at Year 0.*

¹⁵ Appx. B, p.135

¹⁶ *Id.*, p. 148

¹⁷ *Id.*, p. 173

¹⁸ SEIS, p. 205

¹⁹ Appx. B, p.170

²⁰ SEIS, p. 29

c. Application of modeling results not universal to all Alternatives

Despite the outlined modeling deficiencies, if the Corps still determines that the modeling tools used in this study comprise a good basis for decision-making then it should *apply* the results obtained by the modeling runs. Instead the Corps completely ignores the results obtained for the 2012 modeling. These modeling data show that Alternative 2 meets the needs of the applicant and is the LEDPA.

Further, on page 203 the Corps states that 2012 modeling shows the spit off the north end of Figure Eight Island would remain fairly stable over the entire 5-year simulation.²¹ In addition, in Appendix B, the Corps states that the Alternative 5D would reduce the surface area of the spit by roughly 25 percent compared to its area under Alternative 2.²²

Finally, even after ignoring the fact that the model is calibrated to over-estimate erosion, it is clear from the comparative analysis of the alternatives in table 5.15b that Alternative 2 is the preferred alternative.²³ This table summarizes the average annual rate of volume change at Figure Eight Island. The table indicates the same trends apply under both Alternative 2 and Alternative 5D. Further, the areas that the model shows will accrete will accrete more under Alternative 2 than under Alternative 5D. Similarly, those areas that will erode will erode less under Alternative 2 than under Alternative 5D. Hence, Alternative 2 is a better option than Alternative 5D since it achieves the HOA's purpose and need at no environmental cost.

Failure to include adequate data in Shoreline Management Plan

G.S. 113A - 115.1(e)(5) requires the applicant for a terminal groin to submit a plan for the management of the inlet and the estuarine and ocean shorelines immediately adjacent to and under the influence of the inlet, including (a) defining the baseline for assessing and mitigating any adverse impacts; and (b) providing mitigation measures that would be implemented should the adverse impacts meet the thresholds defined in the plan.

In its attempt to comply with this requirement, the Corps egregiously bases the entire analysis of this section on obsolete data that skew the results presented in the document. The Corps describes that it will use past shoreline changes to establish the basis for development of expected future shoreline trends.²⁴ In turn, these expected trends would form the basis for determining thresholds that, if surpassed would, after two a period of two-year long observation, trigger mitigation. The ensuing analysis is flawed.

²¹ SEIS, p. 205

²² Appx. B, p. 181

²³ SEIS, p. 254

²⁴ *Id.*, p. 456

a. Baseline data are applied arbitrarily in establishing past shoreline trends

The Corps cites Dr. Cleary's 2007 report²⁵ as the underlying source of data to establish past shoreline trends. However, the application of the report and the data in the SEIS is arbitrary for several reasons.

First, the data used in the report end in 2007 excluding the most recent period of accretion that the island has experienced. As stated in the SEIS, in recent years the shoreline accreted from 165 ft. – 360 ft. Including this most recent shoreline change would affect all figures and results of the study and in turn impact the expected future shoreline changes as presented in the SEIS.

Second, in the application of past shoreline change trends to the determination of future expected shoreline changes, the SEIS only uses data from 1974-2007 even though data for a period between 1938 and 2007 are available. As stated in the study, the reason for choosing this shorter time segment is "the recent tendency for the inlet's ocean bar channel to be situated near the south end of Huttaff Island."²⁶

This stated reasoning is invalid because: (1) the stated tendency of the bar channel is incorrect. The channel has recently been located near the Figure Eight Island causing the positive shoreline change; also, Figures 9 and 10 of Appendix B, Sub-appendix A do not support the stated reasoning; and (2) there is no logical explanation or support for the statement that the bar channel's tendency to be situated near the Huttaff Island, even if true, warrants the application of a shorter rather than longer time period.

Finally, in choosing to apply only the shorter time segment (1974-2007) to the projection of future shoreline changes the Corps contradicts its own statement that "the linear regression rates developed for each transect group *do not adequately represent* the highly variable nature of the behavior of the shorelines *over short time intervals* [emphasis added]."²⁷

b. Future expected shoreline trends are skewed by arbitrary calculation of past shoreline trends

The dataset (1938-2007) used in the calculation of past shoreline trends is limited and incomplete because it omits the recent accretion trend (165 ft. – 360 ft.)²⁸ on Figure Eight Island. In turn this skewed dataset produced a biased baseline used to project expected future shoreline trends, which in turn resulted in an invalid calculation of mitigation thresholds.

²⁵ Inlet-Related Shoreline Changes: Rich Inlet, North Carolina; Updated through 2007; SEIS, Appx. B, Sub-appx. A

²⁶ SEIS, p. 467-468

²⁷ *Id.*, p. 467

²⁸ *Id.*, p. 29

For example, at T20 if the more current shoreline data (i.e. through 2012 or present) had been included both historic long-term and short-term linear regression would have been positively impacted. The slope of these two regressions would tend toward zero (in this case the average observed shoreline change over time) or toward positive. This, in turn would impact the projection of expected future shoreline change by changing the slope of its regression line toward zero or positive.

Further, the Corps arbitrarily determines that if a threshold is met, a two-year period of observation is necessary before mitigation takes place. The Corps does not provide any evidence to support the two-year waiting period. In this case if the erosion rates reach 700 ft. per year compared to the past average shoreline change at the north end (T20) of the Figure Eight Island there would be a two year observation period before any mitigation would take place. Put into reality this means that the shoreline approximately between 60+00 and 105+00 (T16-19 in Dr. Cleary's study) would have to erode all the way between the Beach Road N and the Oyster Catcher Road and stay there for two years before any mitigation took place. In other words the new shoreline would be in the middle of the current island.

The Corps has to reject the use of the obsolete and selective data as a basis for the determination of future shoreline positions. Further, the Corps needs to find a different method to establish a baseline for mitigation triggers that would provide realistic and meaningful thresholds.

Effects on the Environment

The Corps completely fails in the analysis of the effects of the environment, because it does not even make an attempt to analyze the effects on existing habitat. Instead, the Corps (a) repeats the same flawed analysis presented in the DEIS using the obsolete 2007 aerial map (Figure 4.1)²⁹ for delineating habitat areas upon which it analyzes direct and indirect habitat impacts. The Corps admits it will update this map closer to the construction date.³⁰ This blatant omission of the current habitat map violates the essence of the NEPA.

Further, the Corps (b) fails to provide evidence of Section 7 Consultation required under the Endangered Species Act (ESA); (c) underestimates impact on wintering habitat for endangered and threatened species; and (d) underestimates the impact of delineated wetlands.

²⁹ SEIS, p. 100

³⁰ *Id.* p. 452

a. Use of obsolete shoreline for mapping habitat areas

The Corps uses a 2007 aerial map for delineating habitat and analyzing environmental impacts. Given that during this period Figure Eight Island experienced high rates of erosion and hence reduced habitat area, this baseline is inadequate. The Corps needs to use the current accreted shoreline to map habitat areas given that in the recent years approximately 60 acres of habitat area was added to the north end of the island.

In Chapter 6 the Corps states that “updated mapping of the habitat baseline conditions will be performed within a time period closer to the construction of Alternative 5D.”³¹ This is impermissible. The Corps needs to provide this information for public input at the time of the publication of this document. Without the assessment of the habitat impacts on the current shoreline it is impossible to understand and analyze the breadth and scope of the direct, indirect and cumulative impacts on the habitat.

Given the obsolete data the Corps presents it is futile to further discuss the Environmental Impacts analysis. However, several additional statements need to be addressed. The Corps states that results for indirect impacts should be “interpreted with caution as they are not intended to be precise prediction of habitat change considering they are, in part, based on modeling simulation and are therefore only intended to provide insight as to potential changes.”³² This, coupled with the fact that the impacts to habitat are modeled for 5 years whereas the project lifetime is 30 years renders the analysis of habitat impacts inaccurate and futile.

Finally, the indirect impacts are only evaluated for the beach habitats on the oceanfront, and upland habitats are omitted. In fact, the table of impacts³³ provided in the SEIS is completely useless given that it does not distinguish among positive, negative or both of these effects. In that sense it is for example unclear whether the 0-5 acres of inlet dunes and dry beaches that will be impacted under Alternative 5D will be a positive or negative impact, or both.

Overall, the assessment of habitat impacts is inadequate, obsolete and useless. The Corps needs to reject this habitat impacts assessment and produce one that: 1) is based on the current shoreline and current habitat area; 2) analyzes direct and indirect impacts on all habitats – beachfront and upland ones; and 3) provides a clear distinction among positive and negative impacts, or both.

³¹ SEIS, p. 452

³² *Id.*, p. 201

³³ *Id.*, p. 202

b. Failure to comply with the federally required Section 7 of the Endangered Species Act

The Corps fails to fulfill the basic legal requirements to provide a unilateral assessment of the effects on the environment. This proposed project would affect threatened species such as piping plover and proposed to be listed species such as red knots and their critical habitat, hence it requires the Corps to consult with expert agencies U.S. Fish and Wildlife Service and National Marine Fishery Service. This consultation is required early in the process so that the expert agencies can provide their Biological Opinion about the effects of the project on the listed species. The Endangered Species Act (ESA) requires this Biological Opinion. The SEIS fails to provide documents to show that the Consultation has occurred and to supply the Biological Opinion of expert agencies. Without the Biological Opinion the public is cannot know what the response of the expert agencies is on the Corps' assessment of the effects.

The Section 7 Consultation provision was put in place in the ESA so that opinions of all relevant parties are taken into consideration before the public can comment on the project. The Corps needs to comply with the ESA and consult with the U.S. Fish and Wildlife Service and the National Marine Fishery Service to receive their Biological Opinion on the effects of the project on the listed species of Rich Inlet. Without it, the SEIS is incomplete.

c. Impact on wintering habitat for endangered and threatened species has been underestimated

The Corps states that the construction period of the groin would occur during winter months, avoiding nesting periods for piping plovers and turtles, among others. However, the Corps fails to account for wintering grounds of threatened populations of piping plover, such as those from the Great Lakes. By building a groin during winter months wintering critical habitats that are crucial for the continued existence of this threatened species would be threatened, or "taken" under the ESA.

As shown earlier in this letter the doing nothing course of action would not only achieve the purpose and need of the HOA but would also provide a spit with an area 25 percent larger than that under the preferred alternative 5D. This area provides essential critical habitat.

The Corps needs to include an assessment of impacts to all species affected by the project. For that reason the Corps needs to complete the Section 7 Consultation with the expert agencies.

d. Impact on delineated wetland and lack of mitigation measures has been underestimated

Delineated wetlands (Fig 6.1)³⁴ are located in the upland areas of the north end of Figure Eight Island. According to the construction plans the land portion of the groin would cut across these wetlands, impacting them. Table 5.1 of the SEIS shows a direct “positive, negative or both”³⁵ impact of 0.4 acres to the salt marsh with a disclaimer that these impacts are associated with the construction of the groin sheet pile and anchorage and are considered temporary. This table is insufficient since it does not specify which area will experience which impacts. The Corps does not provide for any mitigation measures of the impacted wetlands.

The Corps needs to provide a detailed assessment of the proposed project on delineated wetlands and secure mitigation measures for the impacted areas.

Comparison to the Oregon Inlet groin project is overstated and irrelevant

In an attempt to demonstrate the success of groin structures the Corps refers to the example of the groin in Oregon Inlet. The Corps cites Overton’s 2011 report that claimed that the groin was successful in achieving its purpose without appearing to have “caused adverse impacts to the shoreline over the six-mile study.”³⁶ First, it is important to note that the geological circumstances of Oregon Inlet are vastly different than those of Rich Inlet, thus this comparison is inadequate. Second, other scientists have questioned Overton’s analysis. For example, Riggs and Aimes (2009) question the assumptions made in Overton’s monitoring study, the lack of accounting for some critical coastal processes (such as human modification) as well as express concern with the paucity of the data in it. Third, and most importantly, the number of variables at play at the Oregon Inlet is so large that granting the seemingly positive impacts to the area solely to the groin is unwarranted. One such variable is the placement of 18.7 million of cubic yards of sand in the project area. For these reasons the example of Oregon Inlet is completely inadequate and should be discarded from the SEIS.

A more comparable example in this case would be Bogue Inlet. This inlet has historically behaved similarly to Rich Inlet. The channel moves considerably along the inlet corridor from Bear Island to the Point at Emerald Isle. In its analysis of the best alternatives for the management of Bogue Inlet, the Moffatt & Nichol study concluded that “the terminal groin itself could not be counted on alone to provide adequate inlet stability.”³⁷ Further, the study concludes that “given the past behavior at the Point, it would be impossible to say that inlet management would never be required even if a terminal groin were built.”³⁸ For

³⁴ SEIS, p. 446

³⁵ *Id.*, p. 202

³⁶ *Id.*, p. 232

³⁷ Moffatt and Nichol, 2014 p. 213

³⁸ *Id.*

these reasons, the report rejected the terminal groin alternative stating that it would be too costly considering that channel relocation would be required sometime in the future.

Putting together the 30 year costs of building a groin and the 30 year cost for relocating the channel as stated in the SEIS brings the total potential cost of this project to \$86 million over a 30 year period.³⁹

Similarly in Rich Inlet, the Corps cannot reasonably conclude that a channel relocation will never be required should a groin be installed. The Corps needs to account for this and include it in the analysis.

Analysis of economic impact is preposterous

The economic assessment provided in Appendix G is utterly incorrect. The Corps states that the assessment is based on modeling results.⁴⁰ However, it appears that the study is based only on 2006 modeling given that it completely ignores the 2012 results presented throughout the SEIS.

Further, the assessment is unreliable because it is riddled with limitations such as “these values should not be considered definitive”⁴¹ and “monetary values that are provided herein should not be considered to be a representation of true economic cost associate with the alternatives”⁴² and “given the lack of formal valuation and the inherent uncertainties regarding specific performance of alternatives over a 30-year project horizon, providing an estimate of total costs, total benefits or net gains is not possible”⁴³. The assessment concludes “complicating the analysis of the available alternatives is the fact that many important outcomes are uncertain and inherently unpredictable”⁴⁴. Taking into consideration these qualifiers it is impossible to take this study as anything different than a speculation based on an inaccurate and selective set of data.

In fact, the entire study reads more like a fable based in the past than a credible economic assessment. The level of Dr. Schuhmann’s understanding of the proposed alternatives, the modeling results, and present conditions is questionable.

For example, in his assessment of Alternative 3 Dr. Shuhmann states that the channel is currently located near the Huttaff Island⁴⁵, whereas in reality the channel is presently located just next to the north end of Figure Eight Island. Further, Dr. Shuhmann bases the entire study on the premise that the project area is currently experiencing erosion. In fact,

³⁹ SEIS, p.97

⁴⁰ Appx. G, p. 2

⁴¹ Appx. G

⁴² *Id.*

⁴³ *Id.*

⁴⁴ *Id.*, p.29

⁴⁵ *Id.*, p. 15

he uses the term “erosion” 73 times throughout the study. Thus he refers to “impending property loss due to erosion”⁴⁶ in assessing houses to be demolished or removed; or predicts that “based on Delft3D model simulations and assuming current rates of erosion”⁴⁷ twenty-one houses would have to be demolished in the absence of a groin. More specifically, houses located at 5 Surf Court will be demolished or removed in year 5. However, the model predicts that after 5 years nearly 70,000 cubic yards of sand will have accreted on the 250-foot segment of beach in front of the house.

Finally, the Corps has already recognized that none of the houses at the north end of Figure Eight Island is threatened by erosion.⁴⁸ Therefore the Corps needs to reject this economic assessment.

a. Costs are grossly underestimated

Table 1 shows the direct comparison of financial assurance estimates provided in the SEIS and the assessment done by the Coastal Resources Commission’s (CRC) Science Panel’s study on terminal groins. From this comparison it stands that monitoring, maintenance and mitigation are grossly under estimated.

	SEIS	CRC Report
Monitoring	\$480,000 / 30 years	\$100,000 – \$500,000 / year (Applied to F8: \$3 -\$15 million/30 years)
Maintenance	\$25,000 / year	10-15% of initial constr. cost/year* (Applied to F8: \$745k – 1.1 mill/year)
Mitigation	\$2,718,000 / every 5 years	\$1.2 million / year**
Removal	\$3,200,000	\$500-\$1500 / linear foot (depending on section)
30 Year Total	\$18,738,000	\$53,430,000***

Table 1: Comparison of financial assurance estimates provided by the CRC study and the SEIS.
 * 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 5D.

⁴⁶ Appx. G, p.5
⁴⁷ *Id.*, p.12
⁴⁸ SEIS, p. 29

The Corps estimates that the cost of monitoring and assessing impacts to the adjacent shorelines and inlet will total \$480,000. This claim is unreasonably low considering the Coastal Resources Commission's 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.⁴⁹

Further, the corps determines the maintenance cost for the preferred alternative as averaging \$25,000/year.⁵⁰ On page 79 it notes that this cost, which is the same for Alternatives 5A and 5B, is based on "an assumption that an average of 1% of the armor stone would have to be replaced every year."⁵¹ The CRC recommends that applicants should 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.⁵² Applying this assessment to the initial construction cost of Alternative 5D results in a cost of \$745,000 - \$1.1 million/year. Similarly, mitigation costs assessed by the Corps are underestimated compared to the estimates provided by the CRC study.

Overall, taking into account lower estimates of the CRC study and applying them to the proposed alternative 5D over a 30 year period results in almost 3 times (or 285 percent) higher costs than estimated by the Corps.

The Corps needs to reassess the costs estimate and provide a realistic representation of monitoring, maintenance and mitigation costs.

b. Presentation of annualized present values costs of alternatives is biased

The Corps arbitrarily uses an interest rate of 6% to present annualized present values or the opportunity cost of funds, even though as recognized by the author of the economic assessment the discount rate at present time is 2%, whereas the most commonly used discount rate in civil works is 4.125%. This high rate skews the results showing lower present costs than if a lower rate were used.

The annualized cost presentation of the alternatives in the main SEIS document is biased because it shows the present values using only the highest discount rate of 6%. The difference between the low range of costs using a 6% discount rate and the high range of costs using a 2% discount rate is between 27% and 48%, depending on the alternative.

Also stated in the economic assessment is that the application of higher discount rates results in lower present values for future expenditures and is usually used for projects with uncertain outcomes. By using the 6% rate, Dr. Schuhmann: 1) acknowledges that this project has an uncertain future; and 2) skews the results by showing lower present annual

⁴⁹ NC DCM CRC – Terminal Groin Final Report

⁵⁰ SEIS, p. 93

⁵¹ *Id.*, p.79

⁵² NC DCM CRC – Terminal Groin Final Report

costs. The Corps needs to present the range of values based on all three discount rates and justify the selection of one discount rate over others.

c. Value of ecosystem services is not included

The economic assessment is insufficient because it does not include the value of the ecosystem services, including recreational value, provided by Rich Inlet and Figure Eight Island. The author of the assessment admits that these values are “substantial ... but remain unknown.”⁵³

Despite the difficulties associated with monetizing values of ecosystem services, frameworks for standardizing valuation of ecosystem services have been developed for a variety of conditions (Costanza et.al. 1997; de Groot et.al. 2002). Therefore, in order to present the true costs of the project the Corps needs to put a value on the ecosystem services affected by the proposed project.

Failure to secure property rights

The Corps has identified a new, more northerly position as the preferred alternative for this project. In particular, this new position includes a terminal groin located 420 feet north of the original preferred alternative shown in the draft Environmental Impact Statement. The reason for the newly positioned groin, as explained in the SEIS is the inability of the Figure Eight Homeowners Association to secure necessary property rights and easements from the property owners at the north end of the island⁵⁴. These easements are deemed necessary for the construction of the groin since the structure would be placed on the private properties. However, the recent accretion trend on the north end of the island has contributed to the addition of approximately 165 – 350 ft. of sand seaward of the 2006 shoreline position.⁵⁵ Overlaying the newly proposed groin to the current island shoreline shows that the groin would still be located on the private properties.

33 CFR 325.1(d)(8) mandates that the applicant’s signature is 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.”

Further, the same requirement applies under Major CAMA permit where 15A NCAC 07J.0204(b)(4) mandates that a dredge/fill permit application must present “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.”

⁵³ Appx. G

⁵⁴ SEIS p. 64

⁵⁵ *Id.*, p. 29

All alternatives proposing the installation of a terminal groin are required to have an accompanying beach fill plan. Specifically, under the preferred alternative 5D 55 property lots would be affected by the proposed beach fill plan.

The applicant has failed to comply with both the federal and state requirements of the permit application. Thus, neither the Corps nor the State agency can accept the permit application and begin processing it for review unless the applicant can show that it has the legal authority over the land upon which it will build the project and conduct the associated beach fill plan.

Conclusion

For the reasons described above, as well as those in our previous comment letters, the Corps cannot issue a Final Environmental Impact Statement for this project. The Corps has failed to comply with the requirements established by NEPA and with other federal and state laws. The SEIS is replete with deficiencies that must be addressed. These deficiencies must be fully explained in a second supplemental EIS and released for public review and comment.

Thank you for considering these comments. Please contact me at (252) 393-8185 or anaz@nccoast.org if you have any questions regarding their content.

Sincerely,



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