WHITE PAPER

NEW INLET DAM REMOVAL

The following facts or coastal engineering opinions relate to a recent N.C. Legislative proposal (SB160) to remove the historical New Inlet Dam so as to allow for or encourage the reopening of New Inlet which has been closed since 1879. A potential purpose of the reestablishment of New Inlet is to foster a new major navigational channel between the Ocean and various locations within the Cape Fear River.

BACKGROUND

- In 1857, federal nautical charts clearly indicate that New Inlet was a relatively robust tidal inlet having a major influence on the environs of the lower Cape Fear River (see **Figure 1**). At the time, sailing lines existed through *both* New Inlet and the natural primary entrance to the Cape Fear River which is located to the south between Oak Island and Smith Island (known today as Bald Head Island). As an unstabilized inlet, New Inlet's mapped location has varied significantly throughout the years.

- Anecdotally, New Inlet opened in about 1761 during a storm event at a "haulover" location across the barrier island that had been physically lowered by fishermen dragging their boats over the narrow beach which lay between the river and the ocean. It is reported that the haulover was utilized by small craft desiring to avoid transit around or across Frying Pan Shoals located seaward of Cape Fear.

- Various levels of attempted engineered improvements by State interests intended to foster a reliable navigation channel between New Inlet and the City of Wilmington met with little success. Accordingly, portions of the Cape Fear River in the vicinity of the inlet suffered extensive problematic shoaling throughout the 19th Century. In the 1820's, the

State of N.C. formally requested the assistance of the U.S. Army Corps of Engineers via the newly established Rivers and Harbors Act.

- Before 1853, no work had been performed with the goal of improving navigation at the southerly natural entrance to the Cape Fear River. At or about that time however, the historical premise of needing to improve navigation between New Inlet and Wilmington was eventually abandoned. For example, a Commission appointed by the then Secretary of War, Jefferson Davis concluded that prior engineering improvements "attempted" at New Inlet had *not* been sound and had actually impacted or reduced navigability to the City of Wilmington. Not unexpectedly, the Commission similarly deduced that as depths throughout New Inlet increased over time, corresponding depths at the Cape Fear River mouth had decreased. As a result, the Commission subsequently recommended that New Inlet be *closed* in order to attempt to restore naturally occurring navigable depths over the ocean bar at the River entrance back to their pre-1761 conditions. No major navigation works on the Cape Fear were accomplished however until after the Civil War.

- Records show that the Corps of Engineers resumed work on the lower Cape Fear River in 1870. Although New Inlet had been invaluable to the City of Wilmington during the Civil War, it was recognized to be a "liability" after the war due to its propensity for shoaling and lack of reliable depth over its ocean bar. Accordingly, in 1869, Congress authorized a reexamination of the river's navigation system. In 1870, work on the Cape Fear River proceeded in three phrases with the first point of order being the *closure of New Inlet and nearby swashes to the south.* On 14 June 1879, after several years of implementation of various levels of engineered works, New Inlet was physically closed – via the "New Inlet Dam". However, the initial closure of the inlet increased tidal flows through various swashes through the island requiring an extensive second structure extending to the south entitled the "Swash Defense Dam". With the entire tidal prism of the Cape Fear River finally confined to the River mouth, the Wilmington District, USACOE was ultimately able to successfully dredge, expand and maintain a federally

authorized navigation project channel from the Atlantic Ocean to the Port of Wilmington over the subsequent decades.

- In 1913, the Ocean Entrance Channel was dredged to a depth of -26 feet. Since 2000, it has been authorized at a depth of -44 ft. (MLW). As a direct result of channel improvements to the Cape Fear River's hydraulic efficiency, the tidal range at the Port of Wilmington has increased from 2.7 ft. in 1911 to over 4.15 ft. today – due to continuing deepening and widening of the federally authorized navigation channel. Corresponding increases in tidal flow, as well as riverine salinity have likewise occurred.

PREDICTIONS

Based upon historical data, recent numerical DELFT3D modeling (using software licensed from Delft University of Technology in the Netherlands) of the Cape Fear River Entrance by the Village of Bald Head Island and fundamental coastal engineering principles associated with tidal inlet hydromechanics, the following opinions or predictions are rendered for consideration regarding any proposal intended to reopen New Inlet:

- The New Inlet and Swash Dam structures were both authorized by Congress and constructed by the U.S. Army Corps of Engineers. Their removal would therefore necessitate deauthorization by Congress. Such actions would be subject to NEPA and would necessitate appropriate physical and fiscal justification, an Environmental Impact Study and significant federal, state and public coordination. The physical and environmental consequences of reintroducing a second tidal inlet to the Cape Fear River would be significant.

- Similarly, both the nature and the age of the subject dam structures constitute "engineered features" that would qualify for their inclusion in the National Register of Historic Places. Hence, considerations regarding cultural resource impact because of structure removal or modification would be significant. Any associated change in channel alignment could likewise impact the documented site of the CSS Raleigh sunk immediately west of the

inlet dam "Rocks". Any inlet related erosion – after inlet opening – could likewise threaten certain portions of the historical Ft. Fisher complex.

- The entire geomorphology of the entrance to the Cape Fear River as it currently exists – with its Congressionally authorized and routinely maintained federal navigation channel, is dependent upon a *no-flow* condition at New Inlet. Prior to its closure, New Inlet was a relatively robust flowing tidal inlet. With dam removal, the driving forces which influence tidal inlet creation and stability would be expected again to foster a large flowing inlet at its historical location near Fort Fisher. Major alterations to the Cape Fear River's salinity regime, essential fish habitat and entire eco-system – as they exist today – would be *inevitable* with the introduction of a second tidal inlet.

- Moreover, reopening of New Inlet would immediately serve to decrease tidal flow through the Cape Fear River mouth. Subsequently, shoal configurations conducive to today's hydraulic conditions at that location would be subject to significant change. The latter would substantially, influence littoral processes and sediment transport on both Oak Island and Bald Head Island. Federal navigation channel shoaling would be expected to increase significantly thereby requiring more frequent and larger contract dredging operations. Without same, commercial traffic to the Port of Wilmington would be impeded or reduced. To the West of New Inlet in the River, significant transport of sediment from the reopened inlet would result in major maintenance requirements because of shoaling at a location where large scale sediment deposition does not presently occur. Any effort to fix New Inlet at one location in order to meet modern day navigational depth requirements would in all probability necessitate the construction of jetties on the inlet's seaward side.

- The creation (or reintroduction) of *any* tidal inlet along *any* oceanfront shoreline immediately disrupts existing littoral transport rates. As a result, a newly formed tidal inlet becomes an immediate and significant sediment "sink" as ebb and flood tidal shoals at the inlet are formed over time. The net result is large scale erosion and recession of the

adjacent barrier island shorelines which suffer the consequences of the newly established sediment budget. At Bald Head Island, the downdrift shoreline of East Beach (facing Onslow Bay) would suffer long-term and large scale accelerated erosion and shoreline recession due to a highly predictable sediment deficit caused by the reopened (and structurally stabilized) inlet to the north. East Beach presently is relatively stable and is among the most picturesque shorelines in North Carolina, with wide beaches, dune complexes and stately homes. A weakened barrier island upland would again be subject to frequent swash formation during storm events – further exacerbating beach erosion and sediment deficits southward thereof.

- A reduction in tidal flows through the mouth of the Cape Fear River would affect Caswell Beach, Fort Caswell and the two inlet/ocean facing shorelines at Bald Head Island. Changes in tidal flows within the AIWW and in the vicinity of Southport could occur. Associated water quality changes would be expected because of reductions in water exchange at these locations and in particular within the canalized (manmade) segment of the Intracoastal Waterway.

- The reintroduction of a new major inlet connecting the Cape Fear River with the Atlantic Ocean, and in particular one maintained for navigation, would allow for an increase in flooding due to storm surges associated with major storm events. As a result, flood insurance elevations at Southport and other locales within the influence of New Inlet may increase. Existing habitable structures built to today's 100-year storm elevations as established by FEMA, may be deemed non-compliant and subject to higher flooding risks and insurance rates. Increases in tidal range throughout the upper reaches of the Cape Fear River could be realized. If such occurred, corresponding vulnerability to flooding would increase proportionally.

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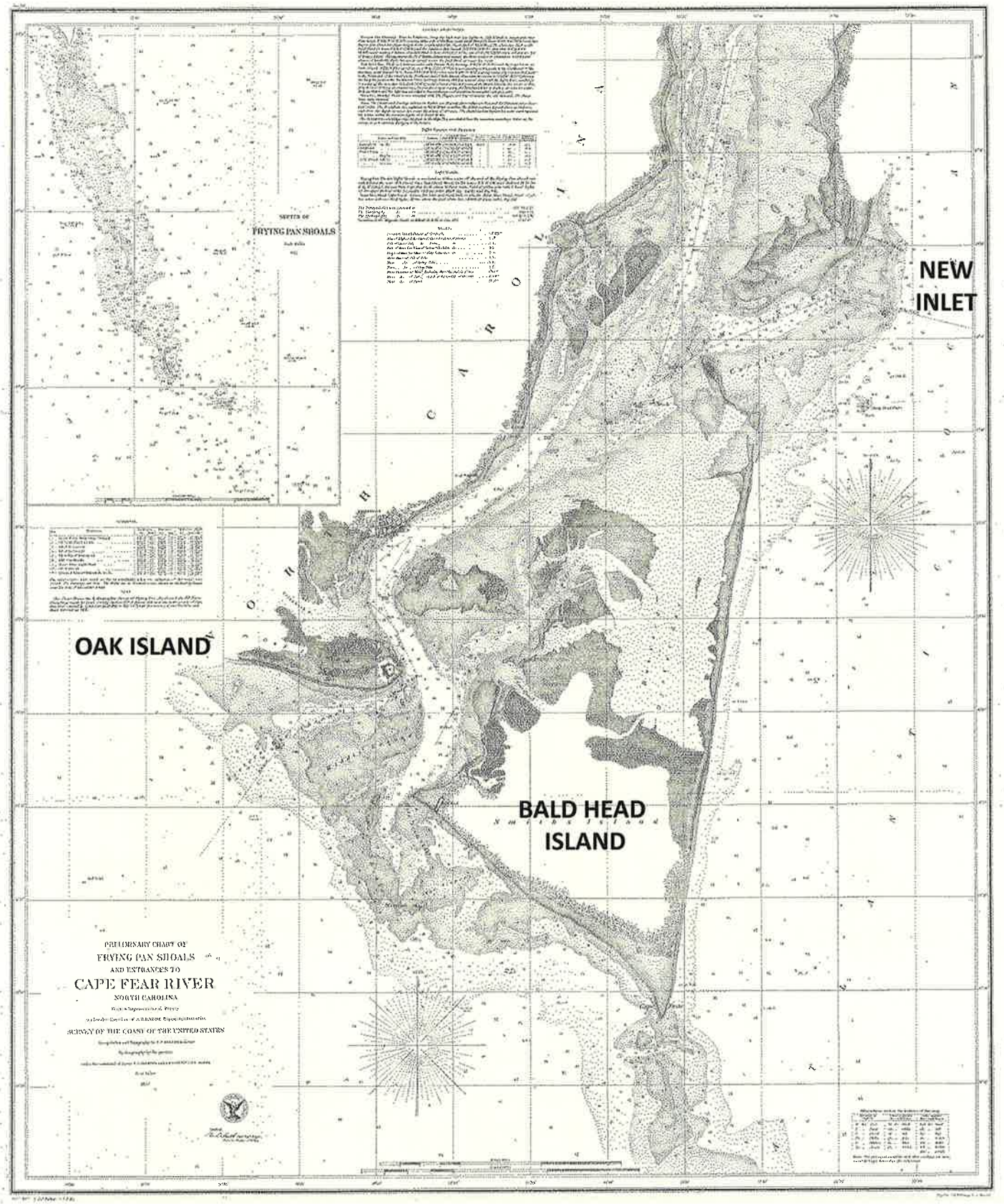
ATTACH – Figure 1



1857 Navigation Chart – Lower Cape Fear River

Figure 1