Beach Renourishment in Jacksonville

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The beaches of Duval County, along Florida's "First Coast", enjoy a long and rich history that has been heavily influenced by coastal construction. There are about 16 miles of ocean beaches in Duval County, divided by the St. Johns River Entrance (**Figure A**). The six miles of beach north of the river are part of a large expanse of public parks and remain mostly undeveloped. In contrast, the ten miles of beach south of the river are mostly developed and urban in nature. These include the 1.0- and 1.5-mile shorelines of the Mayport Naval Station and City of Jacksonville's Hanna Park, closest to the river entrance, and 7.5-miles of urban shoreline referred to collectively as "The Beaches". From north to south, this includes the Cities of Atlantic Beach, Neptune Beach, and Jacksonville Beach. These three local governments maintain separate budgets and governance but each share common services with the City of Jacksonville via an intra-local agreement. For more than 100 years, the beach cities have been an important and heavily utilized recreational amenity for the citizens of Duval County (**Figure B)**.

The Duval County coastline has been profoundly changed by navigation improvements built at the St. Johns River Entrance. These include construction of two rock jetties by the U.S. Army Corps of Engineers beginning in 1879 which were subsequently sand-tightened in the early twentieth century (**Figure C**). The length of the north and south jetties is about 3 miles and 2.5 miles, respectively. As a result of sand impounded against the north jetty, the natural inlets north of the River Entrance have shifted north and one has nearly closed, and new islands have formed and overlapped old ocean shorelines. On the other hand, the jetties -- combined with persistently deeper channel dredging and the resulting changes to the ebb tidal shoal -- act as a littoral barrier that deprive the southern beaches of their natural sediment supply and have caused The Beaches to erode. This erosion, probably combined with imprudent development upon the natural dunes, prompted coastal residents and businesses to construct timber bulkheads as early as the 1910's and 1920's during the Florida land-boom. After storms in 1925 and 1932, most of these bulkheads were replaced by concrete seawalls (**Figure D**). Widespread coastal armoring combined with a chronic sediment deficit resulted in a gradual deflation and narrowing of the beach profiles throughout southern Duval County, from the 1920's through the 60's and 70's (**Figure E**). The nor'easter of 1962 -- followed by the passage of Hurricane Dora in 1964 -- extensively damaged the beaches and coastal communities (**Figure F**). The Corps began placement of sand dredged from the River Entrance to the 1-mile shoreline of Mayport Naval Station, just south of the inlet, in 1963. But the coastal damage was severe enough to warrant congressional authorization of the Federal Shore Protection Project along the entire southern 10 miles of the Duval shoreline, south of the St. Johns River Entrance.

The authorized project consists of a 60-foot wide construction berm at an elevation of +11 ft, MLW. The original 1965 authorization included federal fiscal participation for 10 years, which was later extended to 50 years. The Corps' authorizing design document was adopted in 1975. Initial project construction placed about 3.7 million cubic yards (cy) of sand on the beaches between 1978 and 1980, including sand from maintenance dredging. Since then, there have been four principal renourishment events along portions of the southern, urban shoreline (in 1985-87, 1991, 1995, and 2005) along with periodic placement of maintenance dredged sand along the northern project shorelines of Mayport Naval Station and Hanna Park, just south of the inlet (about every 3 to 5 years). The total volume of sand placed along the 10-mile project area from 1978 through the present is about 10.45 million cubic yards, of which about 41% is from navigation dredging at the River Entrance and 59% is from an offshore borrow source about 8 miles seaward of the project area. This equates to about 316,000 cubic yards per year – which compares well with the 1975 pre-project prediction of 260,000 cy/yr – especially when it is recognized that much of this placement volume includes maintenance-dredged sand that is placed beyond the requirements of the shore protection project. These efforts combined with a dune fencing & vegetation program by the City of Jacksonville have resulted in a remarkable transformation of Duval's beaches.

Figures G through I visually compare beach conditions in Atlantic Beach and Jacksonville Beach in the early 1970's prior to project construction with those observed in 2010 and 2011. Project performance both visually and technically is outstanding.

With more than three decades of successful periodic renourishment, the Duval SPP is one of the three oldest federal beach nourishment projects in the state. A natural byproduct of highly successful long-term beach projects can be waning of public awareness regarding the original (and continued) need for beach nourishment. In Duval County, for example, one might be hard pressed to find an average beachgoer who is aware that the remnants of a rip-rap armored seawall are directly buried by the overwhelmingly healthy dune system. With continued renourishment of the Federal Project hopefully a history lesson is the only education they'll receive on the subject.

Photo Credit -- Many of the photographs included in this article are from the Beaches Area Historical Society, Jacksonville Beach, FL.

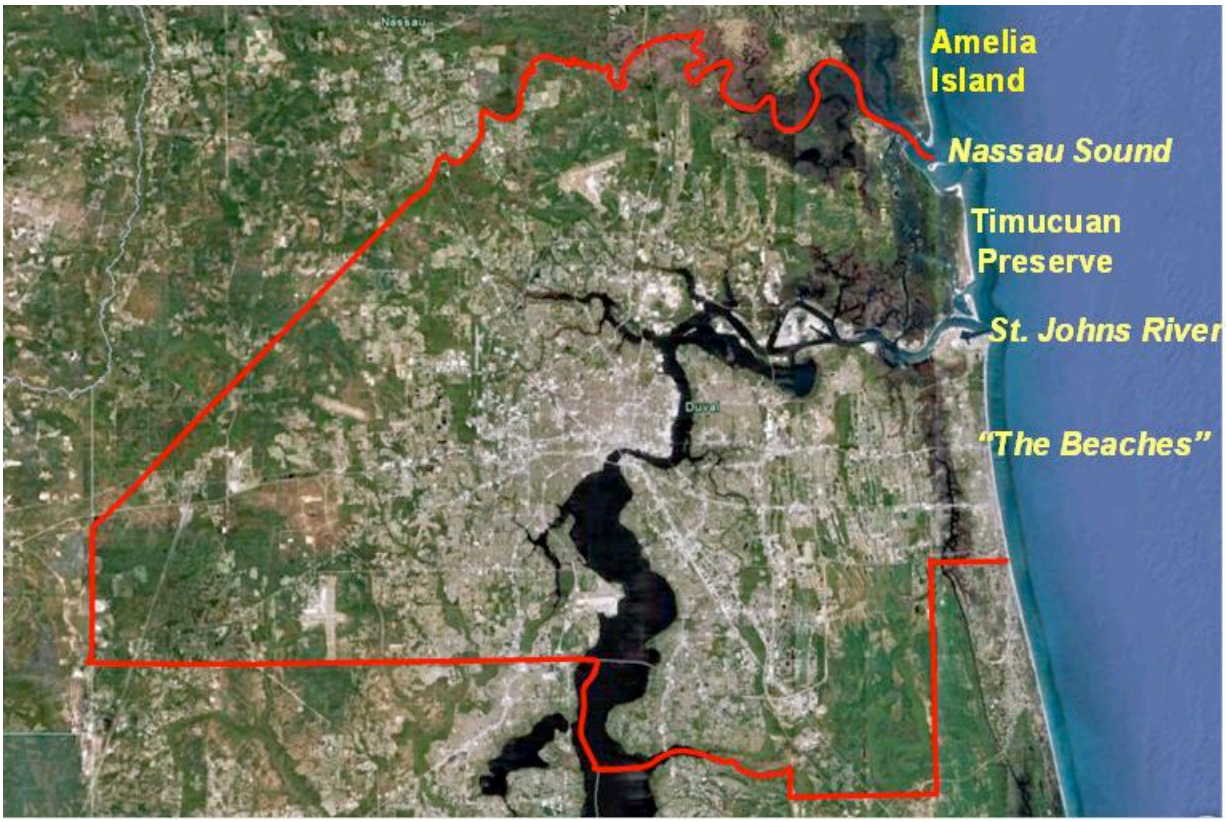

Figure A: 2010 aerial photograph of Duval County, Florida.

Figure B: Shortly after the expansion of the railroad into Jacksonville Beach and the construction of Atlantic Blvd. (Florida's first paved highway) the beaches became a major recreational destination. <*upper left*> c. 1910. <*upper right*> The boardwalk along Jacksonville Beach, c.1920-30. <*lower left*> Easy road access to the beaches made auto racing a popular activity. <*lower right*> The Blue Angels at a 1950 air show in Jacksonville Beach. Note the seawall/bulkhead fronting the first row of buildings in the 1910, and subsequent, photographs.

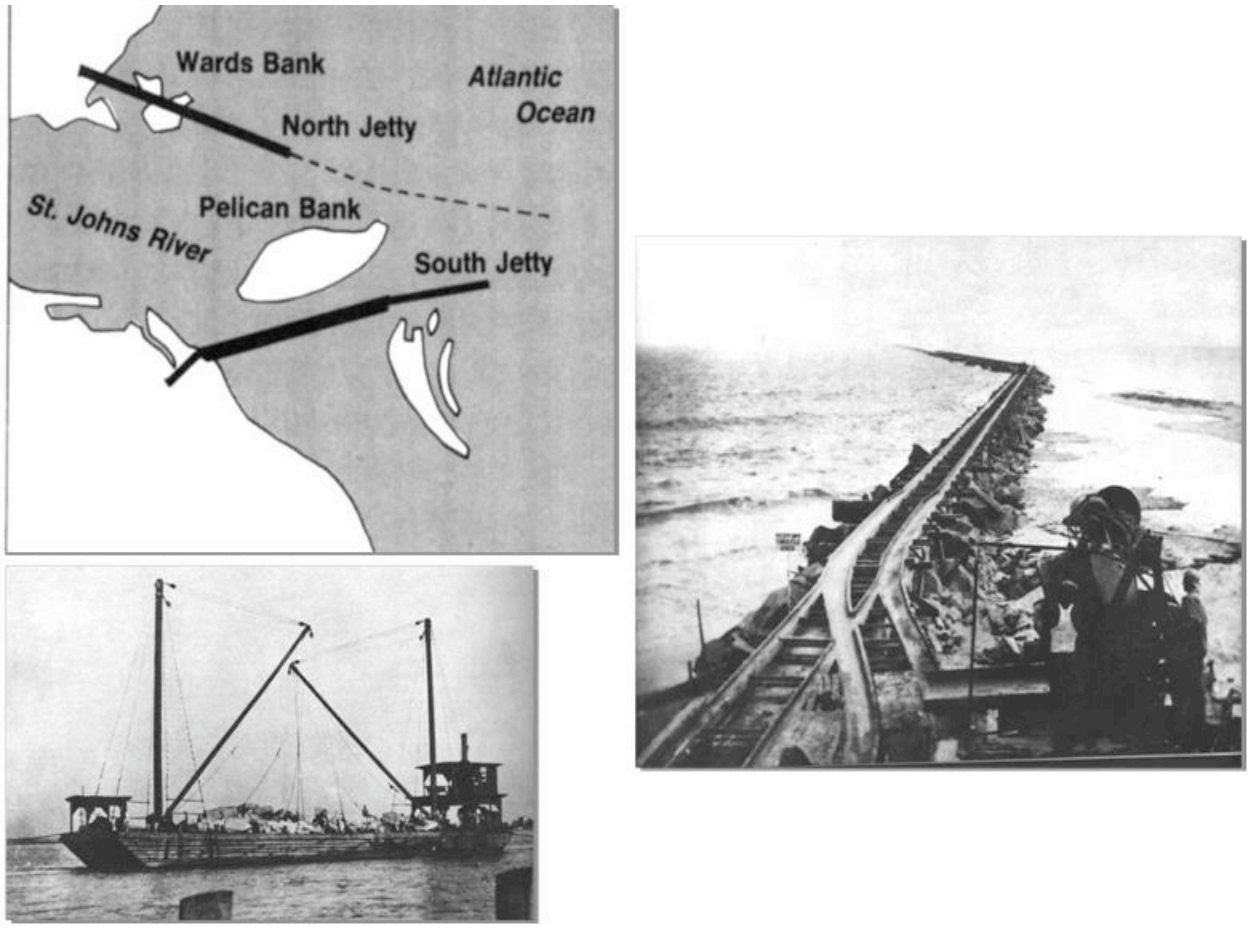

Figure C: Construction of the jetties at the entrance to the St. Johns River, 1880 through 1895. Foundation boulders were placed by barge and the jetty construction was completed by rail.

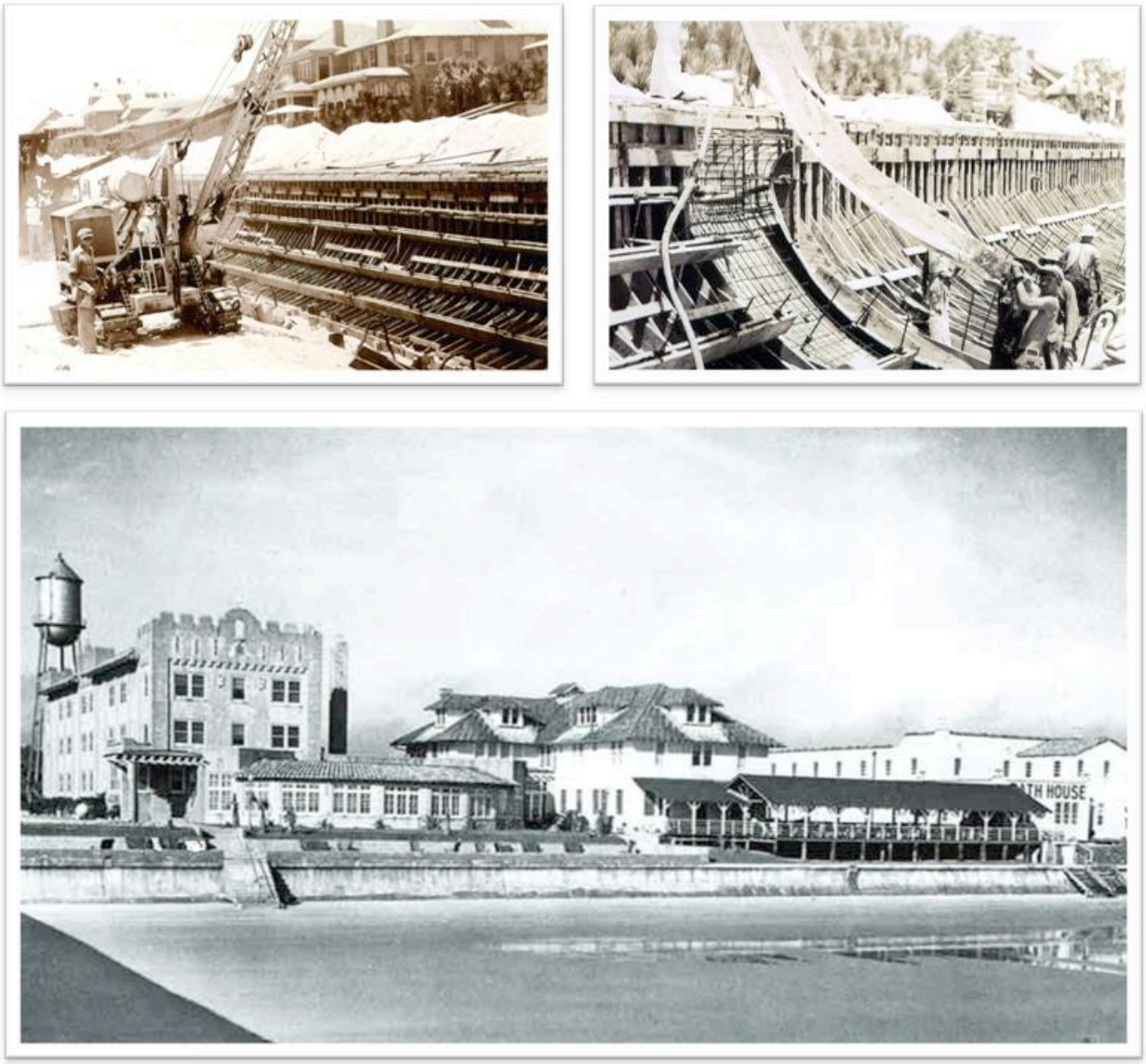

Figure D: Seawall construction along Atlantic Beach in the 1930's.

Figure E: Construction of the jetties at Mayport contributed to a lack of sediment supply for the downdrift (south) beach leading to a gradual lowering and contracting recreational beach. The problem was readily apparent by the early 1960's and continued until the initial nourishment project in 1978.

Figure F: Typical storm damage from the 1962 nor'easter and Hurricane Dora, 1964.

Figure G: Atlantic Beach, Florida prior to initial construction of the Federal Shore Protection Project <*upper right and left*> and in March 2010 <*lower* photo>. All photos illustrate conditions in Atlantic Beach.

Figure H: Jacksonville Beach, Florida in 1962 prior to initial construction (and Hurricane Dora) <*upper photo*> and in February 2011 <*lower photo*>. Photos illustrate conditions in the vicinity of Beach Blvd. facing north.

Figure I: Jacksonville Beach, Florida 1973, prior to initial construction <*upper photo*> and in February 2011 <*lower photo*>. Both photos illustrate conditions from atop the Lifesaving Corps Tower in Jacksonville Beach, facing south.