

SUGGESTED BENEFICIAL USE OF SPOIL IN NORTHEAST FLORIDA



*Brunswick Harbor
spoil island*

FINAL REPORT TO US FISH AND WILDLIFE SERVICE GRANT AGREEMENT F12AC00817 AUDUBON FLORIDA AUGUST 2013

INTRODUCTION

For the past five years, Audubon Florida has had a staff presence in Northeast Florida focusing on the conservation of coastal birds, in particular, beach-dependent birds in Nassau, Duval, St. Johns and Flagler counties. The region has seen an improvement in protection and management of beach-dependent birds. Most of the region's beaches now use best management practices for beach-nesting birds: pre-posting historical nesting areas before the birds return to nest and posting new nesting areas annually, use predator control as needed, conduct regular surveys, limit public beach driving close to the nesting birds and have bird steward programs (volunteers or interns educating the public and preventing disturbances to the nesting birds). Despite this fact, the birds' reproductive success on natural beach habitat

remains poor and there is concern that current success rates will not assure long term sustainable populations (Florida Fish and Wildlife Conservation Commission 2011). Furthermore, with climate change, more impact to beach-nesting birds is expected: increased storms and sea level rise will result in more wash-over of nesting sites. Spoil sites, more elevated, can provide habitat safer from wash-over.

Complementing existing natural beach-nesting areas with artificial sites on dredged material management areas (DMMAs), also known as spoil sites or confined disposal facilities (CDFs), will be important to conserve these species long term, in the region and statewide. On Florida's Atlantic coast, the Southeast region offers very little suitable beach-nesting bird habitat; successful nesting in Northeast Florida is needed in a statewide conservation prospective to offset the impacts of catastrophic events on beach-nesting birds on the Gulf Coast (tropical storm surge, oil spills, etc...). Accordingly the creation of artificial habitat is identified as a conservation action in the Florida Fish and Wildlife Conservation Commission's (FWC) draft Imperiled Beach-Nesting Birds' (IBNBs) Species Action Plan.

In this report, we make a case for DMMAs as having the potential to provide needed bird habitat, we describe some examples used successfully in other places (in the Southeast US) that could serve as models, we review the different types of Northeast Florida DMMAs and we recommend improvements to be considered for future implementation. We do not discuss technical or financial aspects of recommended projects; we give examples of successful projects that could be used in the region.

We also provide recommendations to improve current management measures at active DMMAs. Current management measures appear to focus on precluding violation of the Migratory Bird Treaty Act (MBTA) – i.e., preventing take of nesting birds (or their eggs and chicks). However, such measures, while costly and manpower-intensive, do not result in the birds nesting productively --which is a key to the long term survival of the species. Therefore we provide suggestions that could lead to successful nesting. This would give meaning to the hard work of the people tasked with bird protection measures at DMMAs and would contribute to migratory bird conservation in a way more consistent with the 2001 Executive Order 13186 which gives Federal Agencies the responsibility to protect Migratory Birds.

With the proposed deepening of the Jacksonville Harbor shipping channel, the need for extra disposal sites for dredge material is anticipated and the examples and suggestions in this report can guide the beneficial use of spoil, and offer ideas for environmental damage mitigation projects. Note that while this report focuses on the potential for DMMAs to provide habitat for beach-dependent bird species, dredge disposal sites can also benefit bird species other than shorebirds and seabirds.

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1. AVIAN USE OF DMMAS

Since the 1890s, the U.S. Army Corps of Engineers (Corps) has created over 2,000 man-made islands in the United States by depositing dredged material in waterways (Guilfoyle et al. 2006). During the 1970s, the Corps' Dredged Material Research Program conducted extensive research on avian use of dredged material islands in seven regional studies (Soots and Landin 1978, Guilfoyle et al. 2006). Results were that nationally, 45 percent of all colonial ground-nesting birds and 30 percent of all colonial tree-nesting birds were utilizing man-made islands. For many beach-dependent birds, the importance of these islands was ranked as critical breeding habitat - for Gull-billed Tern, Common Tern, Least Tern, Sandwich Tern, and Royal Tern (Soots and Landin 1978, Guilfoyle et al. 2006).

2. MAKING A CASE FOR THE NEED TO CREATE OR IMPROVE NORTHEAST FLORIDA DMMAS

2.1 Species that would benefit:

- Nesting: Least Tern, Wilson's Plover, Black Skimmer, American Oystercatcher, crested terns (Royal, Sandwich, Caspian), Gull-billed Tern, Laughing Gull.
- Non-breeding: Piping Plover, Red Knot, many other shorebird and seabird species

2.2 Current state and regional (Nassau to Flagler counties) conservation status:

- Least Tern (currently state-listed as Threatened), Black Skimmer and American Oystercatcher (currently state-listed as Species of Special Concern) will all be listed as Threatened at the state level in 2014. These three species have been experiencing population declines that justified their listing (Florida Fish and Wildlife Conservation Commission 2011).

In Northeast Florida:

- *Least Tern: from 2009 to 2012, out of 18 nesting colonies of Least Terns in Northeast Florida with 10 or more pairs of birds, only two apparently had a productivity rate of over 0.5 chick per pair - 0.5 chick per pair is the productivity rate estimated as necessary to maintain a sustainable population for the Federally Endangered Interior Least Tern (Hill 1985, Smith and Renken 1993).*
- *Black Skimmer: in the 1970s, 900 pairs of nesting Black Skimmers were reported in Nassau Sound (Loftin 1978). Through the 1990s and 2000s, Audubon found reports of colonies with 50- 100 chicks (Nassau Sound or Huguenot). From 2008 to 2012, only 10 Black Skimmer chicks are known to have fledged in Northeast Florida (in 2010 in Nassau Sound) (FWC Beach-nesting Birds Database, FWC Florida Shorebird Database and Audubon staff observations).*
- *In Northeast Florida, American Oystercatchers mostly nest on oyster rakes along the region's rivers and sounds. These rakes are narrow and not very elevated. As they offer no upland for the habitat to migrate to, they are feared to be especially vulnerable to wash-over with sea level rise.*
- Wilson's Plover: not currently listed but USFWS considers it a Bird of Conservation Concern (US Fish and Wildlife Service 2008). The population trend is thought to be declining based on best available information (Andres and al. 2012).
- Royal, Sandwich and Caspian Terns: not listed but these species are confined to nesting on islands or island-like habitat - old causeways or small peninsulas. In the State of the Birds 2010 Report on Climate Change, climate change and associated sea level rise have been identified as particularly threatening to island-nesting species (North American Bird Conservation Initiative, U.S. Committee, 2010). Royal Tern and Sandwich Tern have a vulnerability ranking of 4 (high vulnerability). Florida harbors only five large colonies of Royal Terns (Huguenot Memorial Park, Egmont Key, Three Rooker Island, Fort George causeway and the Tampa Harbor spoil islands 2D and 3D). Although Caspian Terns do not currently nest in Northeast Florida the species is expanding its range (as for other species of larids, this may represent reoccupation of their former breeding range thanks to the protection afforded by the MBTA) and nesting on man-made sites is increasing (McNair 2000).

In Northeast Florida:

- *With only one small, undeveloped island (Nassau Sound Little Bird Island) and a peninsula connected to the mainland in Huguenot Memorial Park, which is functionally an island, Northeast Florida only offers two possible natural nesting sites for Royal and Sandwich Terns. With the recent erosion of Nassau Sound Little Bird Island, only Huguenot's peninsula remains as a suitable nesting site for colonial seabirds.*
- *There is no other current Royal and Sandwich Tern nesting site on the East Coast of Florida. As previously stated, from a statewide conservation perspective, nesting sites on the East Coast are important to compensate for catastrophic losses that occur on the Gulf Coast.*
- **Gull-billed Tern:** in the 1970s over 500 nests were reported in Florida (Molina and Ewin 2006, Smith and Lucas 2007, Molina and al. 2010), with between 150 and 325 nests regularly reported in Northeast Florida (Little Bird Island in Nassau Sound). In 1976, the island's productivity was estimated at 150 chicks (Smith and Lucas). In the FWC 1998-2000 statewide study, Gore found Gull-billed Terns nesting at only 4 sites in the state with an average of 18 nests each year (Gore and al. 2007). In 2012, Rogers also found Gull-billed Terns nesting at four sites with a total minimum of 123 nests statewide (Rogers 2012)

In Northeast Florida:

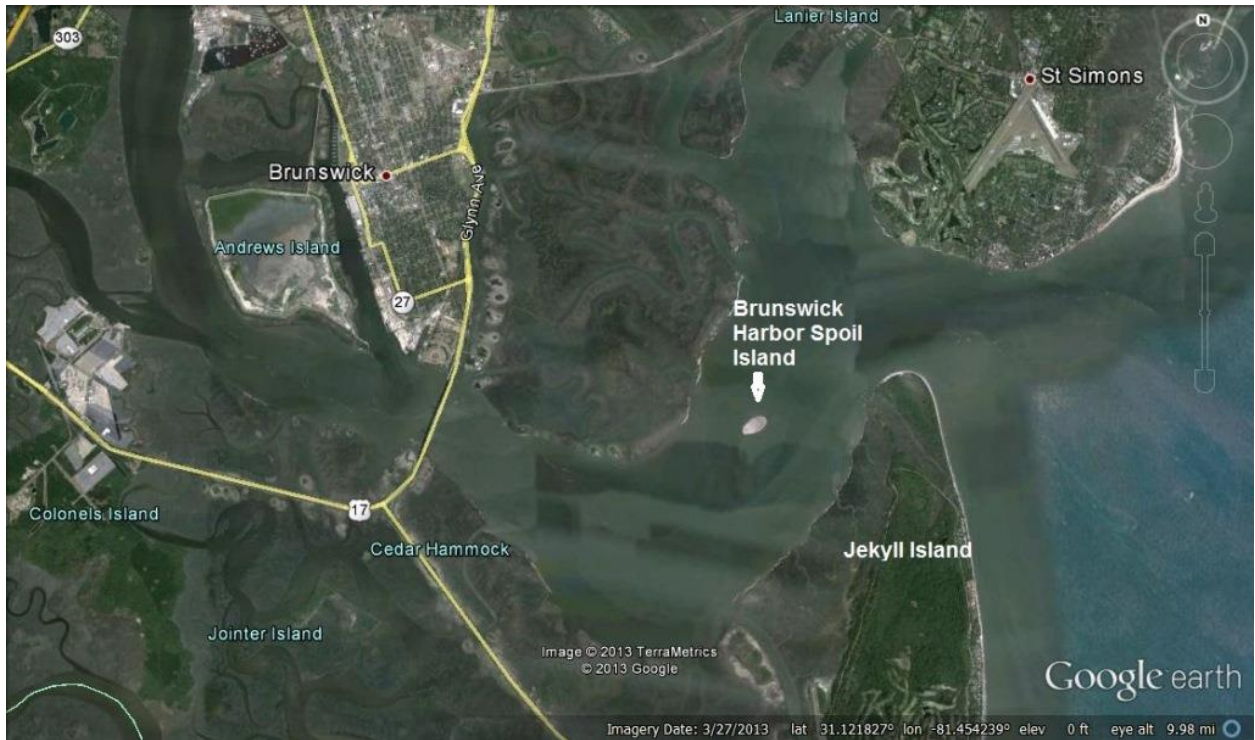
- *In the past four nesting seasons (2009-2012) in Northeast Florida, only one Gull-billed Tern chick is known to have fledged.*

3. EXAMPLES OF DMMA'S USED BY BIRDS

3.1 Creation of a spoil island during harbor deepening - Brunswick Harbor Dredge Spoil Island

The spoil island was created in 2007 in Brunswick Harbor, Georgia, to provide bird and fish habitat, part of a harbor deepening project. It was also hoped the island would attract the birds away from another active DMMA (Andrews Island) for two reasons: bird nesting interfering with dredging operations and the proximity of Andrews Island DMMA to a highly contaminated site (PCBs).

The 14-acre island was built on some existent shoals at the confluence of the Brunswick River and the Intracoastal Waterway (ICW). It is armored with rip-rap on most of its circumference – on the sides most likely to face erosion - while the side facing south southwest was left unarmored. The northeast part of the island forms a large plateau that stands about 10 feet above water. On the southeast side the island the plateau tapers down to a high beach then a low beach sloping down to the water's edge. Some shoals adjacent to the island offer feeding habitat.



Despite its relatively small size the island harbors seven species of beach-nesting birds (eight if counting the Brown Pelicans which nested on it in the past): Royal Tern, Sandwich Tern, Gull-billed Tern, Black Skimmer, Least Tern, Laughing Gull and Wilson's Plover. It not only harbors a diversity of species, but also a high number of each: over 5000 Royal Terns, 40 Sandwich Terns, between 50 and 60 nests each for Gull-billed Tern, Black Skimmer and Least Tern, and 3 Wilson's Plover pairs. It is the only colony of Royal Tern in the state of Georgia this year (Tim Keyes, GA DNR, personal comm.).

Georgia Department of Natural Resources (GA DNR) surveys have documented good nesting success on the island. The island is also used as a roosting site for seabirds and shorebirds, notably for wintering American Oystercatchers.



The island's high part, a plateau, tapers down to a beach toward the right (southeast)

The primary management strategy is to keep vegetation growth under control so the habitat remains suitable for beach-nesting birds. Methods used have included prescribed fire, tilling with a bulldozer, and annual use of herbicide. Vegetation management requires an estimated 3-4 days of work per year.

The island is posted as off limits to boat landings, with signs around the perimeter and signs and twine on the side where boaters are most likely to land. Enforcement is key to assuring nesting success; fortunately, a law enforcement base is located close by.

Terrestrial predators have not been documented on the spoil island. Distance from the mainland and tidal currents likely will continue to prevent access.

Being familiar with three large mixed seabird colonies in Florida, the sight of the Brunswick Harbor dredge spoil island was remarkable, due to the diversity and abundance of birds nesting successfully on a relatively small surface area with relatively low management needs. See additional photos of the island in Appendix B.

3.2 Enhancement by addition of dredged material to a spoil island created during shipping channel dredging in Tampa Bay - Port Manatee Spoil Island (Paul et al. 2004, Erwin K. 2004)

Originally created in 1969 as a byproduct of channel dredging to provide access to the port, this 59-acre man-made island lies west of Port Manatee in Tampa Bay, Florida. Originally barren, the island quickly became covered with native and non-native vegetation.

In 2001-2002, the Manatee County Port Authority secured authorization to dredge sensitive estuarine habitats in order to expand port facilities. As mitigation for dredging in sensitive habitats, the Port Authority made a long-term commitment to restore bird habitats on the Port Manatee "Spoil Island", including habitat for beach-nesting species. Work included creating a lagoon to provide foraging habitat for wading birds and shorebirds and using the excavated material to create a plateau for nesting by beach-dependent species. The plateau has been maintained free of vegetation by herbicide applications and by other mechanical measures.

Following restoration, Least Terns and Wilson's Plovers readily started nesting on the newly created habitat. In 2004, surveys estimated about 25-30 pairs of nesting Wilson's Plovers and about 50 pairs of Least Terns. American Oystercatchers also nested on the island, along the shoreline, but the number of nesting pairs remained the same as prior to the habitat enhancement. The central ridge also provided roosting habitat for migratory shorebirds, primarily Wilson's Plovers, Least Sandpipers and Dunlins.

Maintenance measures for the island's nesting habitat include: vegetation control, predator removal as needed, erosion control, and prevention of human access for security reasons. Vegetation management remains a challenge with twice per year herbicide applications. The plateau is harrowed regularly to reestablish the fine sand that has a tendency to wash off, leaving a substrate too silt-laden and hard for beach-nesting birds.

The Port Manatee spoil island example illustrates a restoration project that creates not only nesting habitat but also foraging habitat for beach-dependent birds and for wading birds. The shallow lagoons provide feeding habitat close to the nesting area which may improve nesting productivity, as parent birds don't have to go far to find food for their offspring. The proximity of feeding and roosting grounds, often found at inlets is also sought-after by migrating and wintering birds.

The island is not armored and erosion has been a problem along the island's perimeter and on the sides of the central plateau. Growth of wildflowers and other low vegetation is now promoted on the sides of the plateau to try to prevent erosion. The erosion of the island perimeter is affecting American Oystercatcher nesting habitat (A. Paul and M. Rachal, personal comm.).

Ground-nesting species that have nested on the island include: Least Tern, Wilson's Plover, Killdeer, Willet, and Common Nighthawk. In the restored mangroves, there is now a rookery of nesting wading birds, herons and egrets. Least Terns have had up to 100 nests on the island and Wilson's Plovers up to 50. In recent years, nest numbers were down, as the terns seem to have moved to other nearby nesting grounds (A. Paul and M. Rachal, personal comm.).

3.3 Enhancement by management of spoil islands created during the ICW construction - Indian River Lagoon Spoil Islands (Adams T. 1996)

This project was conducted in 1995-96 with a goal of creating Least Tern nesting habitat on three spoil islands in the Indian River Lagoon. The islands were created during the construction of the Intracoastal Waterway and, over time, became heavily vegetated with invasive trees, notably Brazilian peppers and Australian pines. Before the heavy vegetation covered the islands Least Terns were reported nesting on them.

The islands chosen for habitat enhancement were small, close to an inlet, covered with exotic, invasive vegetation and not categorized as having educational or conservation value in the 1989 Indian River Lagoon spoil islands management plan. Enhancement measures consisted in removing the trees and all vertical structures as much as possible, raking the islands' surfaces smooth, and preventing vegetation regrowth with herbicide application. Least Tern decoys were set in open areas on the islands and boat landing was discouraged by signage.

Least Terns began nesting on one of the islands, despite a significant human and pet disturbance event early in the nesting season. Furthermore, the restored islands acted as important roosting habitat for various species of birds when other nearby islands were receiving high visitation by boaters.

This project illustrates well how quickly species like Least Tern will settle onto new habitat provided for them. We believe that sites along the ICW or the Northeast Florida rivers are well-suited for habitat creation as we have observed many Least Terns on these bodies of water.

Vegetation management is key to creating suitable habitat: beach-nesting species require open vistas around their nesting sites to detect approaching terrestrial predators and will not nest close to trees and tall bushes. Trees are also not desirable as they provide perches for avian predators and cover for mammalian predators like raccoons. Often, it is invasive vegetation that colonizes these islands and removing vegetation to create nesting habitat has the added bonus of preventing the spread of invasive, exotic plant species (like Brazilian peppers, Australian pine, Tamarisk, etc.). However, vegetation management is manpower-intensive and when not consistently applied, the vegetative succession quickly renders the habitat unsuitable for nesting. Compared to central and south Florida, most of northeast Florida has the advantage that spoil islands and other nesting sites are not bordered by protected mangrove trees, and the vegetation needing removal is not of conservation concern.

The Indian River Lagoon project also points out the need to address the fact that vegetation removal renders islands more attractive to recreational boaters. While agencies have the authority to forbid boat landings to protect wildlife, they are often reluctant to do so, and without proper law enforcement to patrol, off-limit posting is ineffectual. One

potential solution is to remove vegetation on several nearby islands and to designate a couple for recreation and boat landing while closing off others to allow bird nesting.

Another important point that the Indian River Lagoon example illustrates is the erosion of spoil islands through time: two of the islands mentioned in the 1996 project are now submerged. Conservation measures on old spoil islands/sites should include the periodic addition of spoil to maintain the sites' height above sea level. Spoil addition also helps recess the vegetation and keeps the nesting substrate's adequate composition. While armoring renders beach habitat less suitable, it should be considered on a case by case basis on the sides of islands most prone to erosion. One area of the island should be left unarmored to provide beach habitat and water access.



Islands in 1994 above and 1999 below



By 2004:



3.4 Enhancement in an active DMMA and creation of a coastal island – Savannah Harbor (Calver S. 2007)

[Note: in his report, Steve Calver calls the DMMA confined disposal facilities (CDFs); we changed the term back to DMMA for the reading ease of our report.]

It was a need for additional dredged material disposal capacity in Savannah Harbor that led to this project; to compensate for wetland loss, a plan was developed (Long-Term Management Strategy) that included improvement and creation of bird habitat. As no practical site for the creation of a new DMMA could be identified, an existing DMMA was enhanced and an offshore island was created.

The Savannah Harbor Navigation Project is the entity that manages the Savannah Harbor navigation channel at Savannah, Georgia. Over the years, the seven DMMA used became known for supporting an abundance and diversity of birds including several state or federally listed species.

In his report on the project at the 2005 meeting in Long Island NY "Second Regional Workshop on Dredging, Beach Nourishment, and Birds on the North Atlantic Coast" (Guilfoyle and al. 2007), J. Steve Claver mentions that although

"the [DMMA]s were well known in the birding community as valuable areas for attracting birds, until relatively recently there has been little interest in the Savannah District in management for migratory birds. Past management focused on compliance with the Migratory Bird Treaty Act (MTBA). Furthermore, it was difficult to justify the use of navigation project funds to promote conservation of migratory birds. Even the recent Executive Order 13186 that directs federal agencies to conserve migratory bird populations has had little impact because guidelines for implementing the order have not been established. Because of these constraints, efforts were made to develop a management program to benefit migratory birds at a relatively low cost to the project. This program includes past restrictions to comply with the MBTA and adds additional features based on requirements in a wetland mitigation plan".

The plan focuses on two main measures:

- A rotation plan to increase bird foraging habitat by pairing DMMA, using one to receive material for three years while the other one is left to dry and management of the water level to maximize wildlife habitat while minimizing impact to dredge disposal
- The creation of nesting islands:
 - Two 1-acre nesting islands were built inside each approximately 1-sq-mile disposal area. These islands were seen as having two advantages: attract the birds in an area free of predators and in an area away from active disposal. If an area in the deposition cell is dry and sandy, birds will start to nest and only manpower-intensive deterrent efforts like installation and maintenance of stakes and flagging will prevent them to nest; attracting the birds to another site like the islands would help alleviate that problem.

- One 4-acre island was built in the near-shore waters north of the entrance channel to increase coastal bird nesting habitat.

In the report mentioned above, J. Steve Calver states that Wilson's Plovers, Least Terns, Gull-billed Terns, and Black Skimmers nested on the interior islands while Royal Terns, Sandwich Terns, Gull-billed Terns and American Oystercatchers nested on the near-shore island.

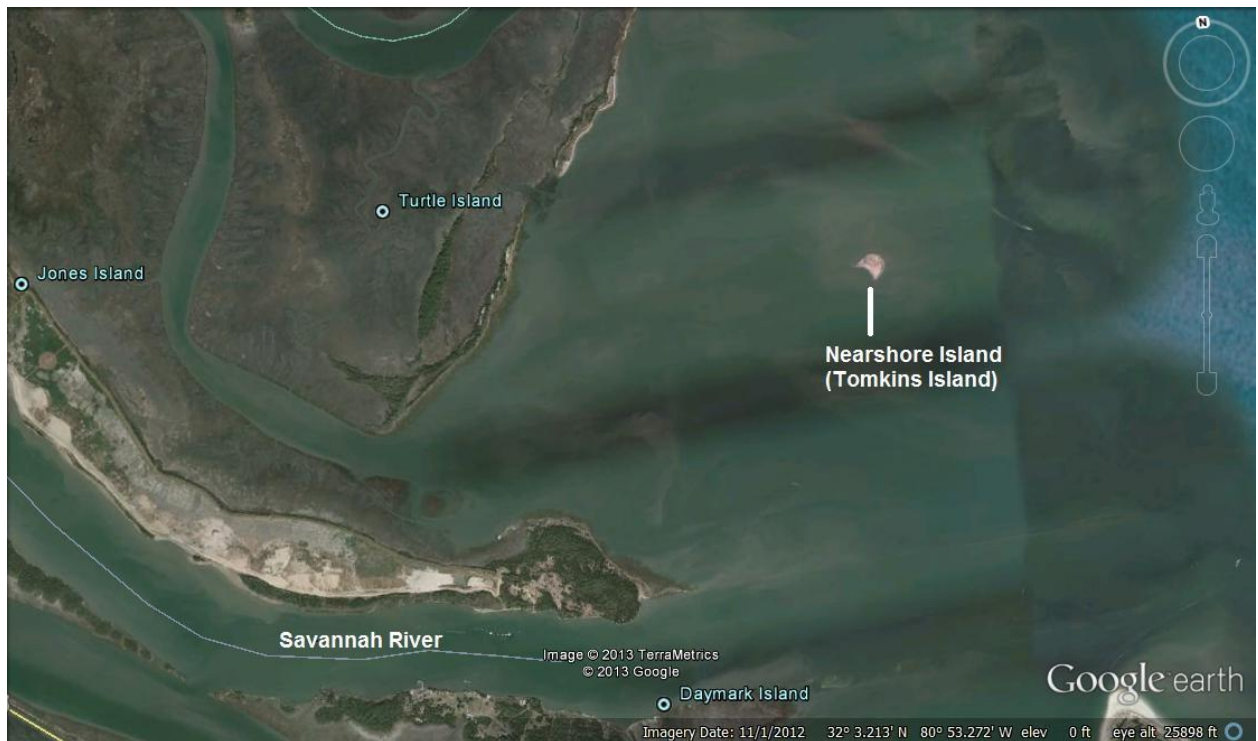


Bird nesting islands created in the Savannah Harbor DMMMA cells

This example was chosen to illustrate how bird nesting habitat – nesting islands inside the cells - can be created in active DMMAs in a way that prevents birds from interfering with dredging activities while providing successful nesting conditions.

The long term management measures described above are still working to provide the birds with successful nesting outcomes. Currently, the islands in the deposition cells harbor nesting Least Terns, Black Skimmers, Gull-billed Terns, Killdeer and Wilson's Plovers as well as Black-necked Stilts and wading birds species. The Least Terns nesting on the islands are successful while the ones that sometimes nest on the dry ground of a cell usually fail due to predation (E. Covington, personal comm.). The islands successfully attract the terns away from the cells where dredging activities occur. The nesting colonies are significant with Least Tern colonies of over 200 nests, Gull-billed Terns of over 100 nests, and Black Skimmers being more irregular but with over 90 nests one year and over 200 another year.

The near-shore created island (Tomkins Island), has nesting Royal, Sandwich and Gull-billed Terns, Black Skimmers, Laughing Gulls and Brown Pelicans. Royal and Sandwich Terns numbered over 9000 and 2500, respectively. Numbers were lower in recent years (signs of Great Horned Owl predation noted), but seemed to be rebounding in 2013. Management measures employed on the island include vegetation control, spraying for fire ants and more recently for ticks that were noted on Brown Pelican chicks and were the probable cause of this species' nesting failure. (F. Sanders, personal comm.).



Map showing the location of the near-shore Island, Tomkins Island, created out of spoil

4. STATUS OF NORTHEAST FLORIDA DMMA'S AND SITE SPECIFIC RECOMMENDATIONS

4.1 Active DMMA's on islands in the St. Johns River - Bartram Island, Florida

Bartram Island is a dredged material management area (DMMA) in the St. Johns River. The Dames Point bridge passes over the island, but provides no pedestrian or vehicle access to the island; all access is by boat. The island is over 11 miles from the mouth of the St. Johns River, and about 10 miles, as the crow flies, to the ocean.

The island encompasses five DMMA cells. Cells A, B and C are located west of the bridge, cell F and G on the east side of the bridge.



Bartram Island

Dredged material is regularly deposited on the island during maintenance of the navigation channels in the St. Johns River, part of the Jacksonville Harbor. Cell A is about 210 acres; work started in 2012 to increase the cell capacity which includes raising the cell's walls and construction of cross dikes.

Least Terns and Killdeer s regularly nest on the island. The nesting data is not being entered into the Florida Shorebird Database, a database created by the Florida Fish and Wildlife Conservation Commission to centralize beach-nesting bird data, but all the reports we received were consistent in saying the productivity is poor or nil due mostly to predation and sometimes to storm flooding.

When we visited in October 2012, we saw where the Least Terns attempt to nest. As it is in a location that interferes with dredge spoil deposits, posts and flags were installed to discourage nesting.



The Least Tern nesting area in cell A. Flagging is used to prevent the birds from nesting during dredge deposit operations.

Cell B contained standing water and harbored good numbers and a variety of wintering ducks and shorebird species.



Wintering shorebirds and seabirds in cell B.

Site-specific recommendations:

- **Create a suitable nesting site for the Least Terns that would not interfere with dredging operations.** Discouraging Least Terns from nesting in a suitable area is not easy and is manpower intensive. We suggest combining deterrent methods at the active dredge spoil deposition area with attracting the terns to another site, nearby but out of the way of the dredging work. During our visit, cell B had significant standing water and we were told that this cell usually remains wet. Audubon recommends providing the Least Terns with a floating raft for nesting, anchored in the middle of cell B, to attract them away from nesting on the ground in cell A which interferes with dredging operation. A floating raft would provide them with a nesting structure that could shift with changing water levels and could allow them to nest even if dredged sludge was pumped into cell B.
- **Make the nesting site safe from terrestrial predators.** Considerable effort and expenses are dedicated to monitoring these unsuccessful sites. Preventing nesting failure by investing in predator control would maximize the benefit and value of these monitoring efforts and contribute effectively in the species conservation. As so much time, effort and money are dedicated to monitoring the terns, preventing their nesting failure by doing predator control would render these efforts more effective for the species conservation. . Providing the terns with a nesting raft would help prevent nesting failure due to terrestrial predators.
- **Follow Savannah Harbor example.** The approach of attracting Least Terns away from nesting on the ground of an active cell by providing them with an elevated suitable nesting site was used successfully in the Savannah Harbor case, discussed previously in this report. At that location, instead of using rafts, islands were built in the middle of the cells using some extra dredged material.
- **Consider predator control on the whole island.** On a bigger picture, Bartram Island's large size, its location in the middle of the St. Johns River and its lack of public access would make it suitable for providing beach-nesting bird habitat with some enhanced management measures, notably with better control of the terrestrial predators - wild hogs and raccoons. These species could be eliminated from this island. This recommendation also applies to Buck Island where mammalian predators also regularly cause the failure of nesting Least Terns. The USDA regularly engages in contracts with third parties for mammalian and avian predator control.
- **Create additional nesting areas away from the cells or on cells not actively used.** Then Bartram Island should be assessed to see if beach-nesting habitat could be provided away from the DMMA cells by clearing an upper beach area of vegetation or by leveling spoil mounds not in use (i.e. cell C). Least Terns are a "pioneer" nesting species and readily nest on newly-created habitat. They can nest successfully within a 3-4 month period. If such a

window occurs during the dredging activities schedule, allowing them to nest will make a significant contribution to the species' conservation.

- **Assess "No Name Island" for beach-nesting bird habitat suitability.** *The closest island upriver from Bartram could also provide suitable beach-dependent bird habitat. It is currently used for military training. Clearing up vegetation in a small area and removing terrestrial predators, if present on the island, could provide habitat if military operations could be localized away from the cleared area during beach-nesting bird season.*

4.2 Active DMMA on the marsh – Dayson Island

Dayson Island is a DMMA located along Heckscher drive, on its north side, immediately east of Clapboard Creek. It is composed of one large cell; the dike around it has a perimeter of about 2 ½ miles. This site became a federal property in 2005. It is also sometimes called Little Marsh Island.

The DMMA is owned by the US Marine Corps. It is used to deposit the material dredged from the shipping channel to the Marine Corps Support Facility on Blount Island. Dredging is frequent, every one to two years, usually in the winter months but sometimes dredge deposit occurs during nesting season.

The DMMA is not on an island. It is surrounded on two sides by salt marsh. The dredge sludge is brought onto the site by a pipe; the DMMA's only cell has no water control mechanism.

The site is monitored for its bird use five times a year by an environmental consultant; one survey during breeding season, four during the non-breeding season. Nesting bird species include Canada Geese and Wilson's Plovers. When we visited the site in April 2009, the Wilson's Plover nests had been depredated. Canada Geese were on nest.

The water levels vary at the site depending on evaporation and rainfall but the site usually offers some area of open water. When we visited in April 2013, a large water body was present on the west end of the cell and a smaller one on the east end. The west end body of water hosted large numbers and a good variety of birds – shorebirds and ducks. The east end body of water hosted some Least Sandpipers.



View of the Dayson DMMA from west (top photo) to east (bottom photo).



Wintering shorebirds and ducks roosting and feeding in the wet area at the west end of the cell

The number of birds increased while we were surveying the site. Many birds came in as the tide rose and the surrounding mud flats became inundated. As the water level in the DMMA is not tide dependent, the birds were finding, at high tide, both feeding and roosting habitat in the DMMA, habitat that had been submerged in the surrounding marshes. Because of its accessibility to predators, the site is more suitable for providing habitat to roosting and feeding birds.

Site-specific recommendations:

- ***Consider the installation of a water level control mechanism to maintain optimum conditions for bird use.***
- ***Include predator control program when improvements are made to nesting habitat*** (electric fencing is probably necessary). *As the site is not on an island, it is easily accessible by terrestrial predators.*
- ***Document use of the site*** by wintering and migrating species by complementing the consultant surveys (five per year) ***with more regular surveys (at least one per month).***

4.3 Developed spoil island with old spoil mound – Blount Island (Marine Corps section).

Blount Island is a developed spoil island in the St. Johns River, including JaxPorts facilities on one side and a Marine Corps base on the other. The Marine Corps base has had nesting Least Terns nest on a gravel parking lot. In the 2013 nesting season Least Terns nested again in the same parking lot. There is a spoil mound on the site. Part of it was removed and a lake was created as part of a mitigation project. We have tried to arrange for a volunteer surveyor to supplement the surveys conducted by the professional consultant hired by the Marine Corps (one survey during nesting season) to better document the Least Tern nesting effort.



Site-specific recommendations:

- ***Conduct weekly surveys of the nesting Least Tern colony to capture nesting success and enter the data into the Florida Shorebird Database.***
- ***Consider the creation of beach-nesting bird habitat when restoring the spoil mound.*** As Least Terns are attracted to the area, when finishing the restoration of the spoil mound, consider the creation of beach-nesting bird habitat such as an island (bare of vegetation) in the middle of the adjacent lake. Or some of the spoil mound could be retained and cleaned of vegetation. For military security reasons and probably for sanitary reasons as well, the base does not have many predators like raccoons; its various ponds and other natural areas harbor a great variety of birds

including ducks, shorebirds, wading birds, and other species. Ground-nesting species like Black-necked Stilts and Canada Geese nest successfully. If habitat could be created for beach-nesting bird species there is a good chance they would also be successful. It would also attract the Least Terns away from the parking lot where they nest now and can be in the way of military operations.

4.4 Old spoil sites along the Atlantic Intracoastal Waterway (ICW)

These spoil deposit sites date back to the creation of the ICW and consist of dredged material deposited on the marsh bordering the ICW. Depending on their size and height, they have been more or less colonized by trees – some of the largest harbor maritime hammock, with pines and live oaks growing. Many of the smaller sites are populated mostly by red cedars and palmettos, with often the center of the spoil mounds covered only with very sparse vegetation. Ownership of the sites varies: Florida Department of Environmental Protection (DEP), North Florida Land Trust (NFLT), Nature Conservancy, CSX, and others.

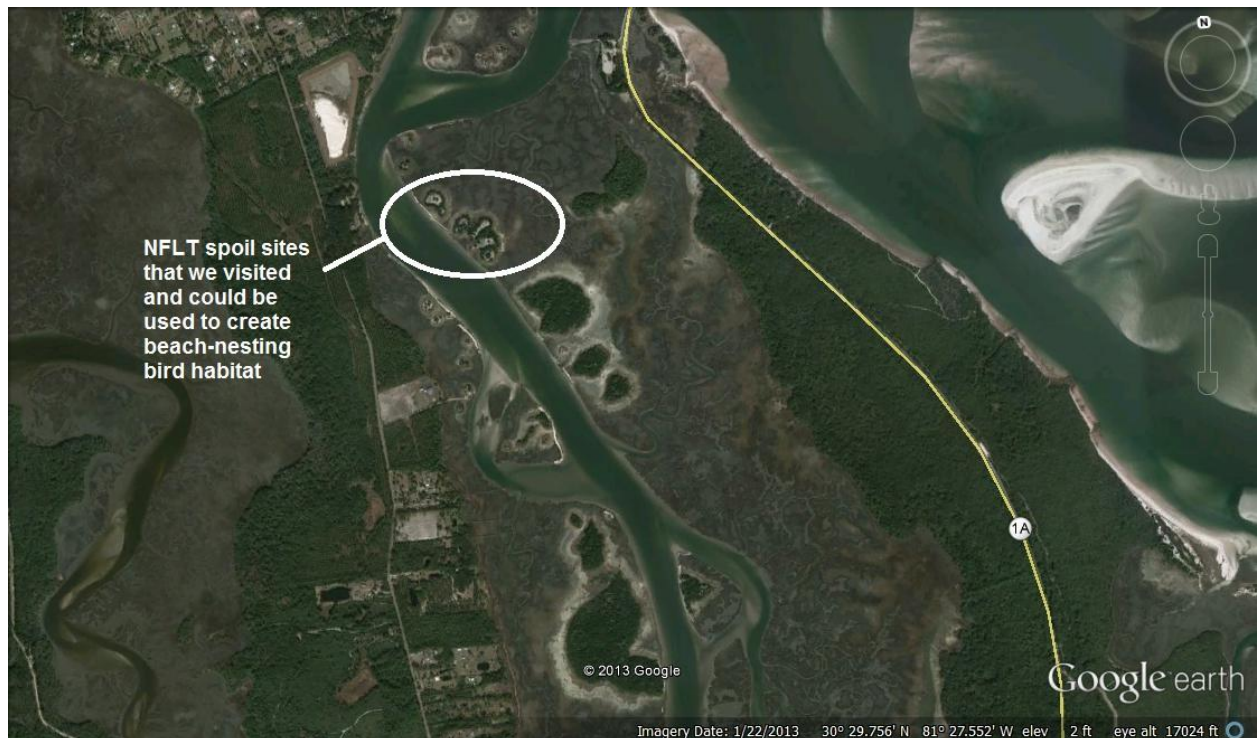
As far as beach-nesting birds, these sites could readily attract nesting Least Terns, Wilson's Plovers and American Oystercatchers and some of the other local beach-nesting bird species. Habitat could be created on the smaller sites by removing the existing trees and with some enhancement of the sparsely vegetated area in the center of the spoil sites. The main concern will be predator management as the sites are not islands, but rather stand at the edge of a vast expanse of marsh. Predators of most concern are raccoons and removal of the trees would be key as trees provide raccoons with resting places. Coyotes are also potential predators. The abundance of low-lying *Opuntia* (cactus) would need to be assessed as it might present a threat to the chicks.



The small spoil sites have a ring of red cedars and some palmettos with a center relatively bare of vegetation or covered with beach vegetation.



The opportunity for restoration is timely as a spoil island management plan is being developed by the North Florida Land Trust, DEP, and the St. Johns River Water Management District (SJRWMD). So far the plans are to create a mosaic of habitats: some of the spoil sites will be scraped and returned to marsh, some others will be enhanced to create a healthy maritime hammock habitat, and consideration is being given to create beach-dependent bird habitat on some of the sites.



Specific actions already planned include protection of the inlet-facing beach on Sawpit Island with armoring and restoration of the beach area by adding spoil to it, with a goal of restoring a nesting beach for diamondback terrapins, one of very few such nesting beaches in the region. The spoil used to restore the beach would come from old spoil piles on Sawpit that would be returned to marsh habitat. Siltation behind the armoring might create shorebird feeding habitat. The restored beach could provide American Oystercatcher nesting habitat, despite trees a bit too close, as predator control measures are planned. The measures, planned because terrapins have been heavily depredated, will also benefit beach-nesting bird species. On the sites where large trees already occur, plans are to help establish a healthy maritime hammock by thinning some of the red cedars to favor recruitment of live oaks and pines. Such hammock islands provide important migration stop-over habitat for neotropical migratory songbirds.

Site-specific recommendations:

- ***Monitor and document shorebird use of the restored shoreline on Sawpit as such information would be useful to inform other similar projects.***
- ***When creating beach-nesting bird habitat on old spoil sites, consider:***
 - ***Removing all trees*** that block the birds' detection of predators and that create predator perches
 - ***Create several sites:*** if sites are small, several adjacent sites can allow multiple species to nest in close proximity which helps the birds defend nesting sites from

predators. Also consider the creation of alternate sites at a certain distance: when nesting colonies are successful, they grow from year to year; when a Least Tern colony grows to be over 200 nests, it is more visible to large predators (mammals, wading birds or birds of prey) that target the colony. The terns will then move to an alternative site nearby for a few nesting seasons. Providing the birds with a choice of nesting sites is very helpful for long term productivity.

- ***Have a long term vegetation control plan and a predator control plan***
- ***Have law enforcement back-up*** to prevent the site from being used for human recreation and/or provide an alternate site for recreational use
- ***Plan on species specific management measures:*** early pre-posting for species which start nesting in March and early April – Wilson’s Plover and American Oystercatcher. Prevent human-related disturbances with patrols by bird stewards (volunteers or interns) for species especially sensitive to disturbances like Gull-billed Terns and Black Skimmers.

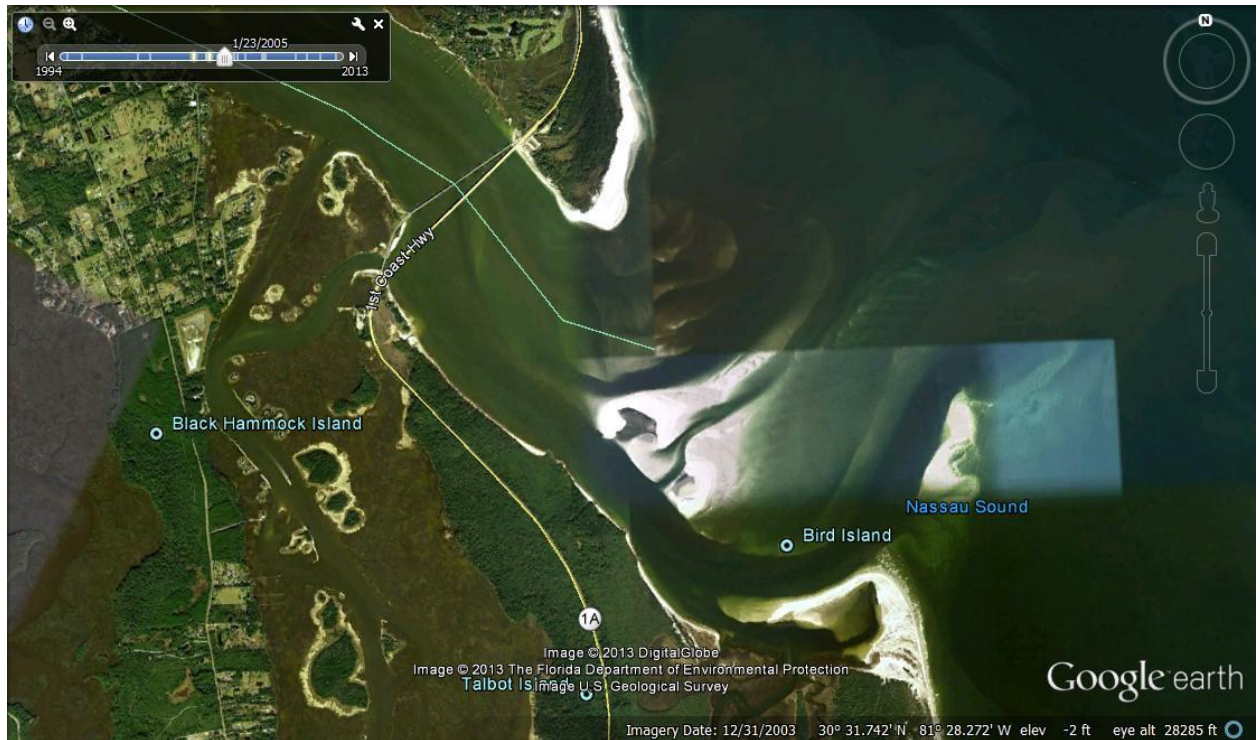
5. ENHANCEMENT OF A NATURAL ISLAND WITH SPOIL AND CREATION OF A NEW ISLAND

5.1 Nassau Sound Little Bird Island

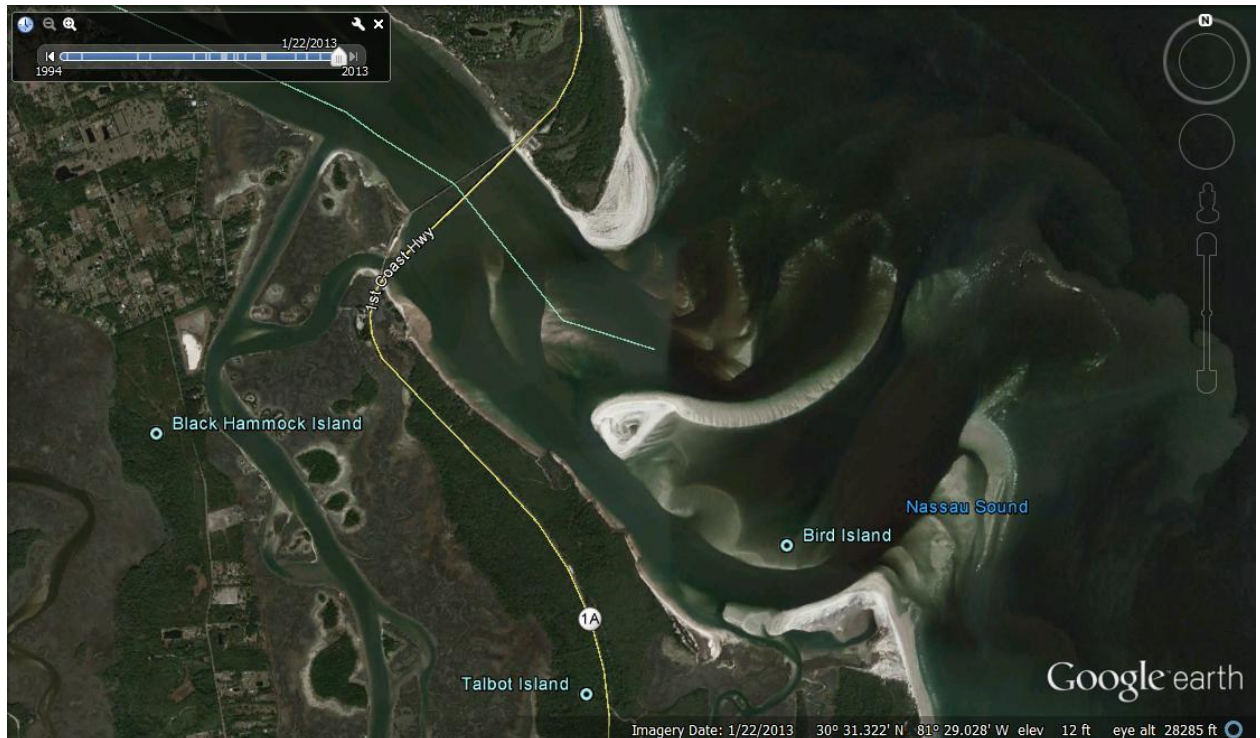
Preferred beach-nesting bird habitats are the tips of islands on inlets and small, undeveloped coastal islands. Nowadays, Northeast Florida has only one small undeveloped coastal island, in Nassau Sound, an island known as Little Bird Island. In the past, there have been up to three islands in the sound: one of them, known as Big Bird, is now merged with the tip of Little Talbot Island and Third Bird has merged with Little Bird.

While the island is now very low, it was a much larger island in the past, large enough to harbor, in the 1970s, a large mixed colony of nesting seabirds (Royal Terns, Black Skimmers, Gull-billed Terns, and other species). The island is constantly eroding and within the past four years, has lost most of its dunes. It is of much concern considering the variety of beach-dependent birds relying on this island: in the recent past, nesting species have included: American Oystercatchers, Wilson’s Plovers, Least Terns, Black Skimmers, and Gull-billed Terns. In a more distant past, the island offered nesting habitat to Royal and Sandwich Terns as well. This means that all the beach-nesting species of the Florida East Coast nest or have nested on this island. Furthermore, the island regularly harbors

migrating shorebird species of federal conservation concern – the Red Knot and the Piping Plover.



Nassau Sound in 2003 (above) and 2013 (below)



In the past five nesting seasons, the island was the only nesting site in Northeast Florida (from Flagler to Nassau counties) to fledge Black Skimmers and Gull-billed Tern. And, besides one skimmer chick in Volusia County, it is believed to be the only site to fledge beach-nesting skimmers and Gull-billed Terns on the entire east coast of Florida.



The low and eroding Little Bird Island in Nassau Sound. No nesting birds in 2012 and 2013

Although sea level rise and the dynamic of natural islands are surely playing a role in the island's erosion, coastal armoring has also influenced the inlet's dynamics. In fact, there was sufficient concern that a groin tightening on South Amelia Island would rob the inlet of sediment that a judge mandated a settlement agreement between DEP and Audubon, requiring management of the inlet islands. The State's MOU and plan requirements unfortunately remain uncompleted.

Site-specific recommendations:

- ***Build the island up with spoil.*** *Considering the recognized wildlife value of the island, its rapid erosion and the ground for intervention that the settlement provides, we encourage innovative thinking and consideration of building up the island surface area and height by deposition of solid dredged material. We think building up the northeast section of the island would preserve the existing lagoon while providing sand that the wind would redistribute around the island.*

- ***Partition the restored island to allow successful nesting or create an island for boaters.*** In exchange for restoring the island, the island should be partitioned to offer on one side (northeast section) bird habitat while offering recreational use on the other end of the island. This would get the support of the recreational users of the island as they are also losing their destination. Alternatively, one could consider building a second island as a boaters' destination while making Little Bird Island off-limits to boat landings.

5.2 Creating a New Island

Considering the lack of small natural islands in Northeast Florida and recognizing that manmade conditions are adding to the lack of emergent bars and islands by modifying the natural sand flow along the coast, consideration should be given to using spoil to create new islands. In the Brunswick Harbor and Savannah Harbor examples previously discussed, created islands successfully provide nesting habitat for several beach-nesting bird species.



Site-specific recommendation:

- ***Consider the creation of an island off-shore if conditions allow.***

- ***Consider the creation of an in-shore island.*** A good location may be at the confluence of the Nassau and South Amelia rivers, where there is an area of shallow shoals which forces the ICW into a wide curve. Addition of dredged material in that area could create an emergent island like the Brunswick Harbor spoil island as the location is similar, i.e., close to an inlet.

Although there are significant impacts to benthic habitats from deposition of dredged material, such a project could still be considered in a multispecies conservation approach.

6. RECOMMENDATIONS SUMMARY AND NEXT STEPS

At existing DMMA's in Northeast Florida:

- Regular monitoring and entry of the data into the Florida Shorebird Database (FSD) so species distribution and nesting success can be tracked and inform statewide conservation efforts. Minimum data entered should be for the six FSD survey windows (monthly surveys from March through August). If nesting is occurring, weekly data entry is recommended, as well as documentation of abrupt changes like the partial loss of a colony.
- Implement the Army Corps' Migratory Bird Protection Policy as it is done in Port of Tampa with pre-nesting and post-season meetings to discuss yearly dredging operations planned and bird conservation measures that could be attained while the dredging occurs. Such collaborative measures are being used in other Corps districts successfully, for example, in Virginia at Craney Island (Vogt 2010). Coordinate with the Tampa Harbor committee and discuss successes, challenges and lessons that could be successfully implemented in Northeast Florida. Such collaborative efforts between the Corps and the coastal bird research and conservation communities are recommended (Lott and al. 2011).
- Develop new working methods that could enhance Migratory Bird nesting success (in accordance with the 2001 Executive Order 13186 – protection of Migratory Birds) without impacting dredging activities as done in the Savannah Harbor project. In that project, nesting islands were created within the DMMA's.

Create new habitat:

- Include beach-dependent bird habitat creation, enhancement or restoration in estuaries and coastal restoration project planning.
- Inventory all historic spoil sites and convene their land owners and managers to discuss enhancement and management measures at a regional scale – Flagler to Nassau counties. There is an existing spoil islands working group in Southeast Florida that can be used as a model.
- Implement best management practices at restored or newly created sites, like predator control, regular bird surveys, limited human access to prevent disturbances and vegetation management. Creating habitat is a great first step but ongoing management measures are necessary to produce successful nesting.

Further considerations:

- “When there is a will, there is a way”: The innovative examples highlighted in this report were just that: innovations, successful in enhancing bird habitat on DMMAs. Modifying project planning and design processes will be key, to incentivize innovation, adaptive management, and experimentation.
- Keep spoil sites as complementary solutions: they do not remedy the fact that people who visit conservation lands and other beaches expect (on conservation lands) and really enjoy the spectacle of the birds. Spoil sites will remain out of reach and should be seen as species reservoirs. Best beach-dependent bird management measures should be encouraged and implemented at all sites.
- Document: when researching the literature for this report, we noticed that little has been published recently on the subject (Lott and al. 2011), and very little in the southeast US. We encourage anybody restoring or enhancing DMMAs to document and publish an account of their project’s success, its evolution, the challenges and the lessons learned.

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APPENDIX A. SUMMARY TABLE OF RECOMMENDED MEASURES

RECOMMENDED MEASURES	EXAMPLES WHERE MEASURES WERE USED				NE FL SITES WHERE MEASURES SHOULD BE USED
	Brunswick + Tomkins	Port Manatee	Indian River	Savannah DMMA	
Habitat creation and enhancement					
Shoreline completely unarmored		x	x		Nassau Sound Bird Island
Portion of shoreline left unarmored to provide gradual slope/littoral habitat	x				New Island
Management measures					
Active vegetation removal to create nesting habitat	x	x	x		Old spoil sites, Bartram, No Name Island
Strategic, recurring placement of spoil materials to discourage plant recruitment	x				Old spoil sites, Nassau Sound Is., New Island
DMMA sited far enough from land to be inaccessible to terrestrial predators	x		x		Nassau Sound Is., New Island
Create nesting islands in DMMA cells				x	Bartram and Buck, Dayson if water can be kept in
Collaborate with conservationists and improve management to attain bird successful nesting	x	x	x	x	Bartram and Buck
Report data in Florida Shorebird Database					Bartram and Buck, all sites
Conduct spoil deposition operations during non-breeding season					Bartram, Buck, and Dayson
Active predator control (trapping, etc...)		x			Bartram and Buck Is.
Passive predator control (electric fencing)				x	Old spoil sites
Declaring islands off limits to boat landings + law enforcement	x	x			New Island, Old Spoil sites, Nassau Sound Is.

APPENDIX B. ADDITIONAL PHOTOS OF BRUNSWICK HARBOR SPOIL ISLAND



East side of island with St Simmons Inlet in the back



Top of the mound



The Upper Beach habitat on the SW side of the island



The lower beach on the SW side



The Royal Tern chicks at the top of the mound heading toward the beach



View from the mound



The nesting Black Skimmers and Gull-billed Terns