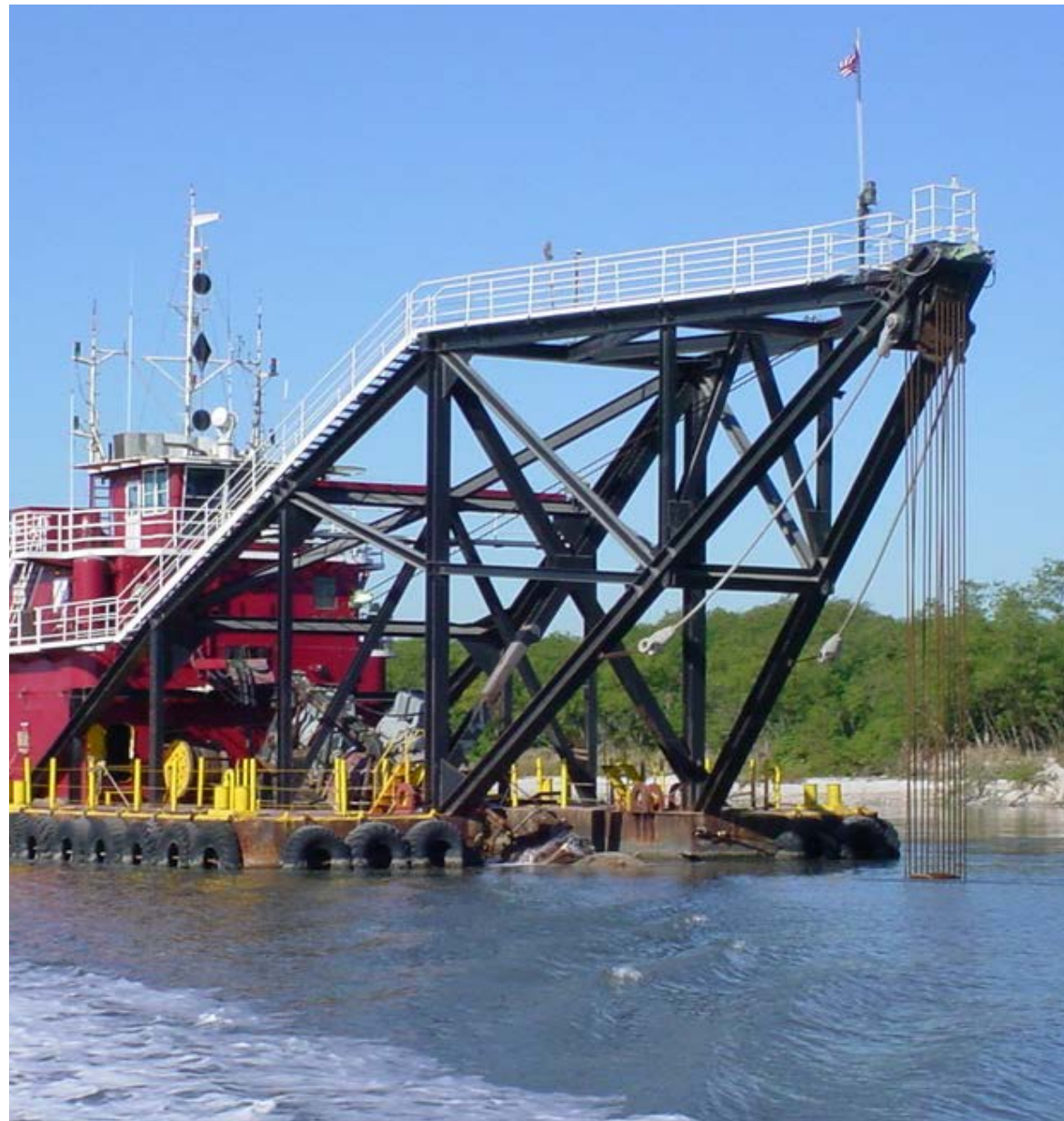


DREDGING AND DREDGE MATERIAL MANAGEMENT

Develop a plan for beneficial uses of dredged material in Tampa Bay



OBJECTIVES:

Coordinate projects that generate dredged material with those that could use the material for beneficial uses. Complete the Tampa Bay Regional Sediment Management Plan to develop and prioritize locations for utilization of sediment generated through dredging activities. Continue to encourage and implement environmentally beneficial uses of dredged material.

STATUS:

Ongoing. Long-term Dredged Material Management Plan (DMMP) was adopted in 2002 and updated in 2011. High priority projects are: Continued research, dredging and restoration activities included in the Dredged Hole Habitat Assessment; longshore bar creation; McKay Bay dredged hole restoration; and Egmont Key shoreline stabilization. Focus of this action shifted to implementation of beneficial use projects.

RELATED ACTIONS:

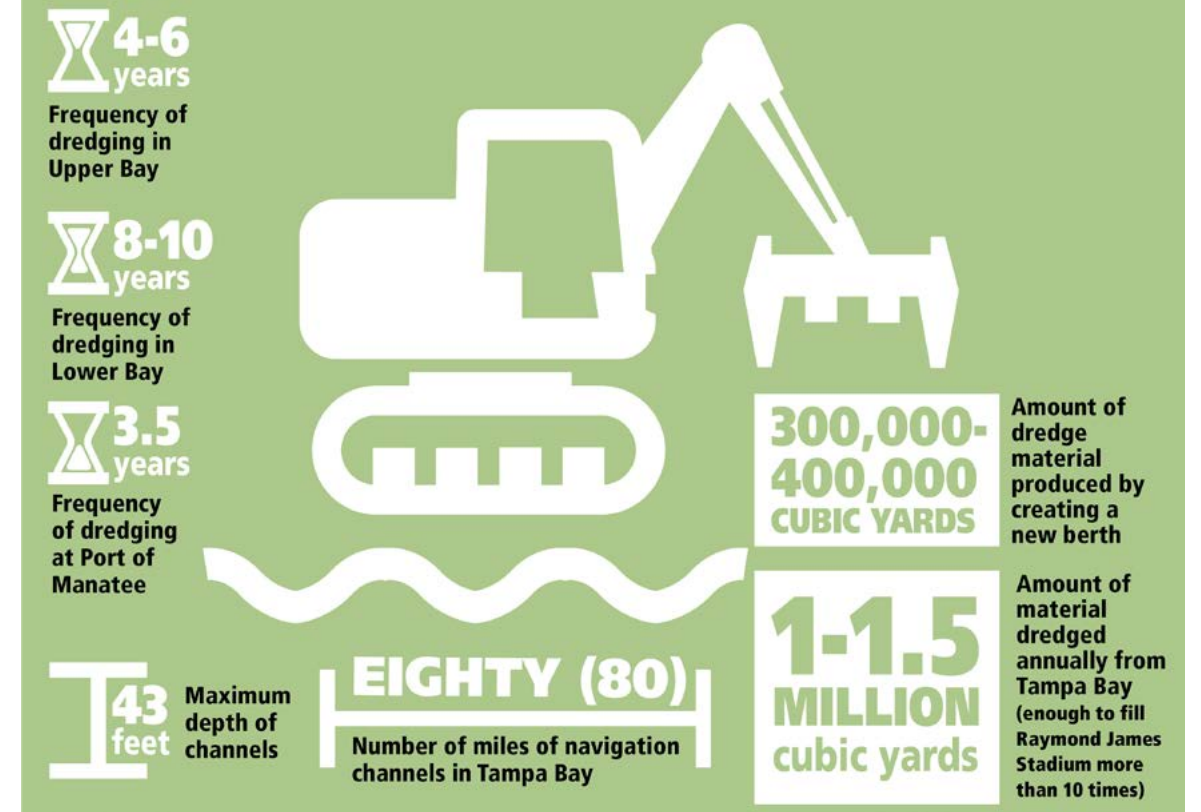
- BH-4 Identify hard bottom communities and avoid impacts*
- PA-1 Provide for and manage human uses of the bay*

BACKGROUND:

Tampa Bay has three major ports or deep-draft harbors: Port Tampa Bay, Port Manatee and the Port of St. Petersburg. Port Tampa Bay (formerly

At left: bay managers are working with area ports and the U.S. Army Corps of Engineers to beneficially use material that must be scooped from shipping channels and berths to maintain safe navigation. Photo by Nanette O'Hara.

DREDGING BY THE NUMBERS



DATA SOURCE: US Army Corps of Engineers

the Port of Tampa) is among the nation's busiest, handling one-third of the cargo moving in and out of Florida and some 900,000 cruise ship passengers yearly. Port Manatee is the closest U.S. deepwater seaport to the expanded Panama Canal — important exports include citrus juices, phosphate products and construction equipment.

Dredging to maintain the bay's approximately 80 miles of nautical highways, which can be 43 feet deep in places, generates from 1 to 1.5 million cubic yards of material annually. Dredging is conducted primarily by the United States Army Corps of Engineers (USACE), which maintains all federal channels. Port Tampa Bay and Port Manatee maintain regional channels and port facilities.¹



A deep dredge hole at Port Tampa Bay has been partially filled to improve water quality. Photo by Dennis Crnolatas.

to create new channels, port berths or port-related development occurs on an intermittent, less frequent basis. New berths may generate from 300,000 to 400,000 cubic yards of material, while expanding or deepening existing channels could generate several million cubic yards of material.

Sediments dredged from the upper bay, where most dredging historically occurred, has traditionally been piped onto two man-made islands in Hillsborough Bay (Dredged Material Management Areas 2D and 3D). Dikes on these islands have been raised over time to increase their total capacity. Material dredged from the lower bay is generally placed on the shoreline of Egmont Key, an island at the mouth of Tampa Bay. Material dredged from Manatee Harbor is typically placed at upland locations on Port Manatee property. Dredged materials are occasionally placed at other upland locations to facilitate habitat restoration projects.²

An Ocean Dredged Material Disposal Site, approximately 18 miles offshore of Egmont Key, is still available, but has not been used since the late 1990s.

USACE is required to develop a Dredged Material Management Plan (DMMP) for each of its federal navigation projects to demonstrate sufficient disposal capacity for a minimum of 20 years. DMMPs describe how much new material will be dredged during any proposed deepening and widening work; the volumes to be dredged to maintain the federal channels; and how dredged materials will be managed in an economically and environmentally sound manner. The Tampa Harbor DMMP was originally approved in 2002 and updated in 2011.³ Input to Plan updates is provided by the Tampa Bay Dredging Advisory Group, a sub-committee of the Tampa Bay Estuary Program (TBEP) Technical Advisory Committee.



Two manmade islands in Tampa Bay are important disposal sites for dredged material. Photo courtesy Port Tampa Bay.

The USACE recently began working with Tampa Bay stakeholders to identify the most viable opportunities for beneficial use of dredged materials. This new effort is referred to as Regional Sediment Management (RSM), a systems approach to managing sediments to maximize environmental and economic benefits. RSM actions implemented in other regions of the country include mitigating for sea-level rise impacts to marsh habitat through the use of thin-layer placement of material, creating bird habitat through the creation of islands, filling dredged holes and stabilizing shorelines. Initial meetings to develop a beneficial use “wish list” were convened in 2016; the formal RSM Plan will be completed in 2017.

Implementing beneficial uses of dredge material can be challenging because USACE must identify the “least-cost, environmentally acceptable” placement option. Transportation costs associated with beneficial uses may be high. A complicating factor is that most dredged material from Tampa Bay is silty material that is not ideal for some beneficial uses, including beach nourishment.

Despite these constraints, USACE can often conduct beneficial use projects at low or no additional cost, if regional consensus about desired projects is proactive and projects are aligned with maintenance dredging schedules. Under USACE’s Continuing Authorities Program small-scale beneficial use projects may be implemented in shorter timeframes.

Filling holes in the bay left from decades-old dredging projects (such as creation of residential finger-fill canals) offers one potential beneficial use, where filling or partially filling the holes will improve habitat value and foster seagrass recovery. TBEP led a research project from 2003–2005 to determine the ecological value of 11 dredged holes in the bay based on water and sediment quality and importance as fish habitat.⁴

In 2012, Port Tampa Bay and the Southwest Florida Water Management District partnered on a project to partially fill the McKay Bay dredge hole to improve water quality. The project utilized dredge material from port expansion and mitigation activities. Two other holes, MacDill Runway and Big Island, have been partially filled since the 2005 study.

TBEP is now coordinating a study of eight dredge holes not previously assessed, as well as three that have been altered since the original study (including the partially filled McKay Bay dredge hole). Results and recommendations from this new initiative are

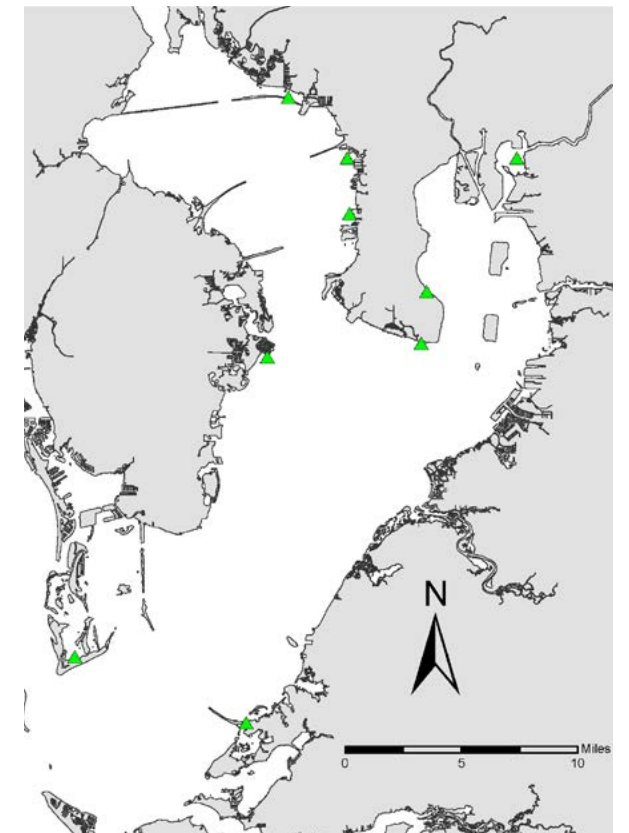
expected in 2017. This information will also be incorporated into USACE’s Tampa Bay RSM study.

Dredged material also could be used to fill old mosquito control ditches, or to re-create shallow-water sandbars in the bay. The longshore bar concept was tested in a pilot project adjacent to MacDill Air Force Base as a strategy for restoring seagrass. The project evaluated the wave-dampening effectiveness of four different materials: riprap, rubble, reef balls and a sandbar covered with small riprap.⁵

Project results to date have been inconclusive regarding seagrass expansion. However, the bars have maintained their structural integrity, provide fish habitat and appear to dampen wave energy. Similar projects in other coastal areas, such as North Carolina, have documented success in improving seagrass habitat. Although not a cost-effective, long-term strategy for seagrass recovery in Tampa Bay, it may be viable when appropriate fill material is available and historic longshore bars can be restored. Another possibility is to create sandbars that will gradually erode, allowing seagrasses to migrate inland as sea level rises.

Use of rocky dredged material to create additional hard bottom habitat in Tampa Bay will be examined in the hard bottom mapping project (see *Action BH-4*).

Other potential beneficial uses for dredged material include creation of habitat for nesting shorebirds, construction of nearshore bars for coastal storm protection, filling of borrow pits and artificial “lakes” close to the bay and thin-layer placement of sediment within coastal wetlands to prevent erosion as sea level rises.



Dredge holes being evaluated for potential restoration or enhancement as fisheries habitat. SOURCE: TBEP.

STRATEGY:**Activity 1**

Complete the Tampa Bay RSM Plan to develop and prioritize locations for utilization of sediment generated through dredging activities. Ensure that environmental impacts of beneficial use projects (including impacts from pipeline placement or varying sediment quality, for example) are adequately addressed. Streamline permitting for beneficial uses by identifying and resolving permitting uses associated with project sites before permit applications are submitted. Consider allowing mitigation credits for beneficial use projects, such as habitat restoration that utilizes dredge material.

Responsible parties: USACE (lead) with input from Tampa Bay Dredging Advisory Group, Florida Department of Environmental Protection

Timeframe: The sediment management plan will be completed in 2017

Cost and potential funding sources: \$\$-\$\$\$
USACE

Location: Baywide

Benefit/Performance measure: Identification of best locations and most effective techniques for beneficial uses of dredge material.

Results: Ecologically beneficial uses of dredge material will improve habitat for fish and wildlife (for example, through creation of additional nesting, nursery and foraging areas and expansion of seagrasses).

Deliverables: Tampa Bay RSM document. Map of potential sediment disposal locations and management options. Expedited permits for appropriate beneficial use projects.



A TBEP-sponsored study of dredge holes in Tampa Bay is documenting their use by fish and other marine life, including this juvenile loggerhead sea turtle.

Activity 2

Complete the Tampa Bay Dredged Hole Habitat Assessment to develop restoration and protection strategies for additional dredged holes in Tampa Bay. As part of the assessment, ensure that access to holes for filling (by equipment or pipeline) is feasible, and ensure that quality of dredge material is suitable for intended purpose.

Responsible parties: TBEP (coordinator), Dredged Hole Project Team, Input from TAC and Tampa Bay Dredging Advisory Group

Timeframe: The dredged hole assessment, data analyses and management recommendations will be completed in 2017

Cost and potential funding sources: \$\$ SWFWMD Cooperative Funding, TBERF, Hillsborough County Pollution Recovery Fund, TBEP staff time (CWA Section 320)

Location: Baywide

Benefit/Performance measure: Evaluation of 11 dredged holes in Tampa Bay for overall bay water quality and habitat benefits.

Results: Site-specific restoration or protection recommendations for dredged holes in Tampa Bay, if implemented, will result in improved ecological habitat values for these areas.

Deliverables: Tampa Bay Dredged Hole Habitat Assessment Report. Map of studied holes and management recommendations.

Activity 3

Maintain the Tampa Bay Dredging Advisory Group to provide technical input on proposed dredging projects and beneficial uses. Seek opportunities to expand outreach and coordinate funding and/or cost-sharing for beneficial use projects. Integrate beneficial use projects with larger, Gulfwide efforts.

Responsible parties: TBEP (coordinator), Tampa Bay Dredging Advisory Group, USACE, other Gulf NEPs

Timeframe: Advisory Group meets as needed, generally annually

Cost and potential funding sources: \$ CWA Section 320 funds for TBEP staff time. Advisory Group may seek funding opportunities for future projects

Location: Baywide

Benefit/Performance measure: Improved coordination of dredging and material management projects. Enhanced outreach and leveraging of resources for beneficial projects.

Results: Protection and improvement of habitat and water quality through review of projects involving dredging and dredged material management by bay managers.

Deliverables: Minutes from Dredging Advisory Group meetings

- ¹ Physical Impacts to Habitats in Tampa Bay. 1993. Technical Publication #03-93 of the Tampa Bay National Estuary Program. Prepared by Coastal Environmental, Inc. (D.L. Wade and A.J. Janicki).
- ² Dredged Material Management Strategy: Tampa Bay, Florida. 2000. Technical Report #01-00 of the Tampa Bay Estuary Program. Prepared by the U.S. Army Corps of Engineers, Jacksonville District.
- ³ Tampa Harbor, Florida: Dredged Material Management Plan Update. 2011. Prepared by the U.S. Army Corps of Engineers, Jacksonville District.
- ⁴ Tampa Bay Dredged Hole Habitat Assessment Project. 2005. Technical Report #04-05 of the Tampa Bay Estuary Program. Prepared by the Tampa Bay Dredged Hole Habitat Assessment Advisory Team (L. Griffen and H. Greening).
- ⁵ Experimental Restoration of Longshore Bars Associated with Seagrass Recovery in Tampa Bay, Florida, USA. 2014. Technical Report #06-13 of the Tampa Bay Estuary Program. Final Report submitted to the Gulf of Mexico Program (L. Cross).



DREDGING AND DREDGE MATERIAL MANAGEMENT

Continue to minimize impacts to bay wildlife and their habitats from dredging activities



OBJECTIVES:

Improve dredging and dredged material disposal practices to minimize impacts to wildlife and their habitats. Support research to better understand and quantify the effects of dredging on wildlife. Develop recommendations for Best Management Practices (BMPs) for regional beach and shoreline renourishment projects to better safeguard key species. Track development of new technologies to better protect wildlife during dredging.

STATUS:

New Action

RELATED ACTIONS:

- BH-2 Establish and implement mitigation criteria*
- BH-4 Identify hard bottom communities and avoid impacts*
- BH-6 Encourage habitat enhancement along altered waterfront properties*
- DR-1 Develop a plan for beneficial uses of dredged material in Tampa Bay*

BACKGROUND:

Dredging operations, including removal and disposal of dredged materials, can kill, injure, impact reproduction or alter the behavior of bay wildlife — including shorebirds, sea turtles and manatees. The type of dredging equipment used,

At left: Two manmade islands in Hillsborough Bay are used for disposal of dredged material from port-related projects. These islands are important nesting areas for a variety of birds, such as this American Oystercatcher. Port officials work closely with local Audubon managers to balance dredging and wildlife needs. Photo courtesy Audubon Florida.

as well as the location, timing and duration of the project, influence which wildlife species may be affected.

Potential dredging impacts to Tampa Bay wildlife include:

- Disturbance or destruction of nesting habitats for turtles or shorebirds during placement of dredged material on beaches or spoil islands.
- Smothering of shoreline bivalve and crab populations during placement of dredged materials on beaches, destroying feeding grounds for shorebirds and important recreational fish.
- Reduction of sea turtle nesting success due to incompatible sediment types placed on nesting beaches.
- Physical impacts to manatees and sea turtles during active dredging operations, such as hopper dredge buckets.
- Collisions with wildlife during movement of vessels associated with dredging operations.
- Higher turbidity levels caused by resuspension of sediment during dredging.
- Increased light levels associated with dredging operations at night. Nighttime dredging also poses inherent risks to manatees and other animals, as they are less likely to be visible.
- Displacement, smothering or death of benthic organisms such as worms or snails or small, bottom-dwelling fishes during dredging and transport activities.

Precautions to minimize impacts of dredging activities exist. For example, federal regulations require the United States Army Corps of Engineers (USACE) to consult with the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA NMFS) on all federally authorized dredging projects. Prudent scheduling of projects can avoid or minimize disruption to shorebird or sea turtle nesting. Trained observers may alert project personnel to the presence of sea turtles or manatees, and temporarily halt dredging to avoid conflicts. Moreover, gear modifications, such as drag deflectors that prevent sea turtles from being drawn into hopper dredges, can prevent deaths and injuries.

Strategies for protecting wildlife during and after dredging have been developed by agencies such as the Florida Department of Environmental Protection (FDEP), the Florida Fish and Wildlife Conservation Commission (FWC), NMFS and the United States Fish and Wildlife Service (USFWS).

FWC's standard manatee protection conditions are required protocols during active dredging and include: trained observers who can halt in-water operations when manatees are observed within a 50-foot radius; idle speed/no wake operation of vessels at all times when draft is less than four-feet clearance; use of siltation or turbidity barriers that do not entangle or entrap manatees; immediate reporting of collisions or injuries; and erecting speed zone signs prior to all in-water project activities. Manatee observers were extensively used during excavation and installation of the

Gulfstream natural gas pipeline that runs underneath Tampa Bay. No standardized training or certification is required for observers; they are approved on a case-by-case basis. Additionally, there is no outright prohibition on nighttime dredging with clamshell buckets, although no manatee injuries have been reported from clamshell dredging at night in Tampa Bay.

USFWS has taken the lead on measures to protect nesting sea turtles, while NOAA has led efforts to reduce dredging-related mortality of sea turtles and sawfish. An annual “incidental take” allowance of sea turtles applies to all federal dredging projects using hopper dredges in the Gulf of Mexico.

Audubon Florida’s Coastal Islands Sanctuaries staff plays a critical role in providing guidance to reduce impacts to birds that nest on two large manmade islands in Hillsborough Bay, 2D and 3D, by identifying nesting times and providing observers during dredge disposal operations. These Dredge Material Management Areas (DMMA) are important disposal sites for ongoing maintenance dredging of shipping channels and port facilities conducted by the USACE and Port Tampa Bay.

Together, islands 2D and 3D annually host nesting pairs of 14 species, including imperiled American Oystercatchers, Least Terns, and Black Skimmers, and one of the most important Laughing Gull colonies in the United States.

Local Audubon managers have worked cooperatively with USACE and Port Tampa Bay to develop a Migratory Bird Protection Policy and detailed Site-Specific Bird Protection Plan for dredging activities on DMMA 2D and 3D. This Plan is reviewed by the multi-stakeholder Migratory Bird Protection Committee coordinated by Port Tampa Bay. Guidelines in the Plan are incorporated in dredging contracts as requirements or recommended practices.



Dredging offers opportunities to enhance wildlife protection, through beneficial use of dredge

material to create or restore habitat. For example, material from the dredging of the turning basin at the mouth of the Alafia River was placed on the shoreline of the Richard T. Paul Alafia Bank Bird Sanctuary to slow erosion of this extremely valuable colonial waterbird nesting colony (see *Action BH-6*).

NESTING COLONIES ON DREDGE MATERIAL MANAGEMENT AREAS 2D AND 3D, 1998-2016

Dredge Material Management Area 2D

SPECIES	LISTING	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Black-crowned Night-Heron												5								
Common Gallinule												1								
Wilson’s Plover				3							8									
American Oystercatcher	T	35	36	33	32	37	34	37	32	35	37	32	34	36	29	32	33	27	26	18
Black-necked Stilt							45		4	12	70	60	50	40	30	20	25			
Willet			10	36	3	9	6			5	10	15	5	5	5	5				
Laughing Gull											100	5,850	1,810	1,250	5,000	1,250	1,500			
Gull-billed Tern										4	7	4	7	10	30	65	12			
Caspian Tern												15	64	95	60	100	56			
Royal Tern													25	130	90	60	110			
Least Tern	T										60	38	50	100	0	68	0			
Sandwich Tern																	25			
Black Skimmer	T											22	107	150	175	200	100			
Total		35	46	72	36	46	89	37	36	56	292	6,042	2,152	1,816	5,419	1,800	1,866	27	26	18

Dredge Material Management Area 3D

SPECIES	LISTING	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
American Oystercatcher	T	18	18	15	17	16	13	15	16	15	15	15	18	18	9	9	12	9	7	8
Black-necked Stilt		20																15		12
Willet			5	1	9	10	6	5	2	6	1	1	5	3				5		2
Laughing Gull		6,500	8,200	5,600	5,200	4,100	5,255	3,475	4,700	4,700	2,765	450					50	250	250	7,950
Gull-billed Tern				1	7	8	16		8									0	25	35
Caspian Tern		75	92	77	82	88	80	80	80	88	71	76						55	75	57
Royal Tern		107	765	303	93	278	156	107	175	420	153	72						10	60	125
Least Tern	T																			23
Sandwich Tern		99	180	74	50	286	210	155	250	125	82	3						0	40	46
Black Skimmer	T	360	320	195	160	250	180	0	205	210	110	0						35	55	100
Total		7,179	9,560	6,266	5,610	5,036	5,916	3,837	5,431	5,564	3,167	617	23	21	9	9	62	379	512	8,358

T = Threatened species

SOURCE: Audubon Florida

beneficial use projects, including those to improve wildlife habitat (see *Action DR-1*).

Renourishment of area beaches with dredged material from Tampa Bay is generally avoided because the material is typically not of sufficient quality to meet state requirements for use on sandy beaches. These rules offer some protection to nesting turtles and shorebirds; however, concerns about the impact of renourishment on sea turtles and beach-nesting birds remain. Use of coarse

In 2015, USACE began development of a Regional Sediment Management Plan for Tampa Bay, offering an unprecedented opportunity for bay managers to suggest and prioritize appropriate

material, along with compaction from heavy equipment, may prevent turtles or beach-nesting birds from successfully excavating nests; and the slope and elevation of the completed projects may inhibit nesting, or lead to flooding of nests. Placing fill on beaches during nesting periods may remove important nursery areas for all or a significant portion of that nesting season. Relocation, when necessary, may not be as successful.

In 2015, Egmont Key received dredged material that did not meet state criteria as an emergency measure to reduce erosion threatening historic structures on the island. USACE funded a study by Eckerd College researchers in summer 2016 to assess whether, and to what extent, turtle nesting was affected. Egmont Key also is an important and vulnerable nursery for beach-nesting birds, particularly Laughing Gulls and Royal and Sandwich Terns.

USACE is investigating improvements to operating procedures to better protect wildlife. Current initiatives include more advanced sighting techniques for marine mammals (such as thermal or infrared technology) that can be performed by human observers.

Improved coordination and communication about dredging activities, standardized training of on-water observers, and technological advances can enhance protection of bay wildlife during dredging and disposal activities in the future.

STRATEGY:

Activity 1 Encourage continued use and compliance with shorebird protection measures specified in the Site-



The type of material used for beach renourishment, as well as timing and placement, may reduce the nesting success of sea turtles on barrier island beaches. Photo by Blair Witherington.



Clamshell dredging in Tampa Bay. This technique uses a “clamshell” bucket with hinged jaws, suspended from a crane aboard a barge. Photo by Nanette O’Hara.

Specific Bird Protection Plan for dredging activities on Dredge Material Management Areas 2D and 3D. Review and update Plan as needed to improve or modify guidelines to avoid, minimize or mitigate impacts to nesting birds.

Responsible parties: Port Tampa Bay Migratory Bird Protection Committee and partners

Timeframe: Dredging schedule reviewed annually by Migratory Bird Protection Committee, with opportunity to amend plan prior to and following dredging

Cost and potential funding sources: \$ Responsible parties

Location: Baywide

Benefit/Performance measure: Improved coordination of dredging activities and collaboration among Committee members.

Results: Reduced impact to nesting shorebirds due to scheduled dredging and disposal activities.

Deliverables: Updated Site-Specific Bird Protection Plan.

Activity 2

Support research to better understand, quantify and minimize or avoid impacts of dredging on wildlife, including impacts from use of dredge material to renourish beaches where sea turtles nest. Support development of alternative dredge techniques that reduce the potential impact on wildlife at the dredge location, such as: improved turtle-exclusion devices; advanced dewatering to make cutter heads more economical than clamshells for small dredging projects; and directional drilling or precision “plowing” of trenches for cables or submerged pipelines to avoid disturbance of live-bottom habitats.

Responsible parties: USACE, USFWS, FWC

Timeframe: 2016–2017 for Egmont Key sea turtle beach nesting assessment; other studies may be initiated by 2020

Cost and potential funding sources: \$\$ USACE research funds or external grants to researchers

Location: Baywide

Benefit/Performance measure: Improved understanding of current dredging practices and impacts to wildlife.

Results: Reduced death or injury of wildlife due to dredging and renourishment practices.

Deliverables: Research reports summarizing and comparing techniques to avoid or mitigate impacts.

Activity 3

Encourage dredging practices that avoid secondary impacts, promote the long-term viability of adjacent habitats or optimize the potential for habitats to form within the project area.

Responsible parties: USACE, USFWS, FWC, local port authorities

Timeframe: Ongoing

Cost and potential funding sources: \$–\$\$\$\$ Funding from existing budgets for dredge projects

Location: Baywide

Benefit/Performance measure: Protection or creation or enhancement of underwater habitats

such as seagrasses and hard bottom.

Results: Increased populations of fish and other marine organisms (including benthic communities).

Deliverables: Post-project monitoring reports assessing habitat health and utilization.

Activity 4

Encourage and support development of statewide recommendations for Best Management Practices (BMPs) for beach and shoreline renourishment projects to improve protection of key species during and after renourishment. BMPs could include: timing and location of projects to avoid placement during peak nesting seasons; design considerations, including quality of material used for placement and profile or elevation of renourished shoreline; and monitoring and relocation protocols.

Responsible parties: USACE, NMFS, FWC and FWS (potential leads) with input from Tampa Bay Dredging Advisory Group and Tampa Bay Estuary Program Technical Advisory Committee

Timeframe: Begin in 2017 following results of Eckerd College sea turtle nesting study

Cost and potential funding sources: \$-\$\$ External grants; staff time for responsible parties

Location: Baywide

Benefit/Performance measure: Identification or adoption of BMPs to reduce impacts to wildlife.

Results: Reduced impacts to wildlife associated with dredging operations.

Deliverables: BMPs guidance document.

Activity 5

Track development of new technologies and improvements for training of official observers to better protect wildlife during dredging. Encourage use of new technologies, such as sonar, thermal or infrared imaging, to detect sea turtles, sawfish and marine mammals near active dredging operations, to supplement human spotters. Support improvements to FWC’s manatee observer program and the USFWS

Marine Mammal Observer program, including a standardized training program. Consider incorporation of recommendations from NOAA’s Protected Species Observer program for geological and geophysical surveys regarding experience, qualifications and standardized data collection and reporting protocols.

Responsible parties: USACE Research and Development Center (lead), with input from NMFS, FWC, USFWS, Tampa Bay Dredging Advisory Group and Manatee Awareness Coalition

Timeframe: Research and testing of imaging technology is ongoing

Cost and potential funding sources: \$\$ USACE

Location: Baywide

Benefit/Performance measure: Widespread adoption of supplemental imaging tools and enhanced training of trained observers.

Results: Reduced impact to wildlife during in-water dredging operations.

Deliverables: Guidelines for and implementation of supplemental imaging tools. Standard training, performance and reporting requirements for marine mammal observers.

Activity 6

Continue to avoid and minimize dredging impacts to seagrasses, mangroves and hard bottom communities in the bay. Develop and implement recommendations to mitigate or offset unavoidable impacts from dredging (see *Actions BH-2* and *BH-4*).

Responsible parties: USACE, local port authorities (leads for operational dredging practices); TBEP and local government and agency partners (for mitigation recommendations)

Timeframe: TBEP Habitat Master Plan incorporating mitigation guidance initiated in 2017, complete in 2019. Habitat Master Plan is updated every 5-8 years.

Cost and potential funding sources: \$\$-\$\$\$ TBEP funding through CWA Section 320 funds

Location: Baywide

Benefit/Performance measure: Protection and restoration of habitats from dredging impacts will support the goals of TBEP’s Habitat Master Plan.

Results: Measurable goals adopted by the TBEP Policy Board for hard bottom habitat.

Deliverables: Tampa Bay Habitat Master Plan with recommendations for avoiding or minimizing impacts of dredging on underwater habitats. TBEP adoption of measurable goals for hard bottom habitats.