MARINE MAMMAL COMMISSION

28 September 2015

The Honorable Penny Pritzker
Chair, Gulf Coast Ecosystem Restoration Council
Hale Boggs Federal Building
500 Poydras Street, Suite 1117
New Orleans, LA 70130

RE: Comments on Draft Funded Priorities List

Dear Secretary Pritzker:

The Gulf Coast Ecosystem Restoration Council's (Council) draft initial Funded Priorities List (FPL) has identified restoration activities in ten key watersheds across the Gulf of Mexico. The draft FPL represents the first phase of Council-funded restoration activities under the Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States (RESTORE) Act of 2012.

The planning and on-the-ground activities identified in the draft FPL are designed to restore, conserve, and protect key marsh habitat and other coastal, estuarine, and marine habitats. The Council's focus on habitat and water quality improvements in inshore waters of each Gulf state has the potential to address restoration goals for many aquatic species adversely affected by the spill. Although not a stated target of restoration, habitat and water quality enhancements could benefit certain marine mammals that inhabit the inshore and coastal waters of the northern Gulf, particularly bottlenose dolphins and manatees. However, several of the proposed restoration activities also have the potential to adversely affect these species, which, as discussed below, may have implications under the Marine Mammal Protection Act (MMPA) and, for manatees, under the Endangered Species Act (ESA).

The MMPA established the Marine Mammal Commission (Commission) to oversee and advise federal agencies regarding activities that may affect marine mammals and the ecosystems upon which they depend. The Commission, in consultation with its Committee of Scientific Advisors on Marine Mammals, has reviewed the Council's draft FPL and commends the Council for making funds available in a timely manner to address restoration needs across the Gulf. The Commission appreciates this opportunity to provide input and recommendations on the draft FPL.

Marine mammals in the watersheds targeted for restoration

Bottlenose dolphins occur in each of the ten watersheds[1] targeted by the Council for restoration activities. Of the 31 stocks of bottlenose dolphins that occur in the inshore bays, sounds, and estuaries of the northern Gulf, 18 occur within these watersheds and 4 are adjacent (Waring et al. 2015; Figure 1). Three additional stocks occur in coastal waters adjacent to these watersheds,

[1] Laguna Madre, Matagorda Bay, Galveston Bay, Mississippi River Delta, Mississippi Sound, Mobile Bay, Pensacola Bay, Apalachicola Bay, Suwanee Watershed, and Tampa Bay.

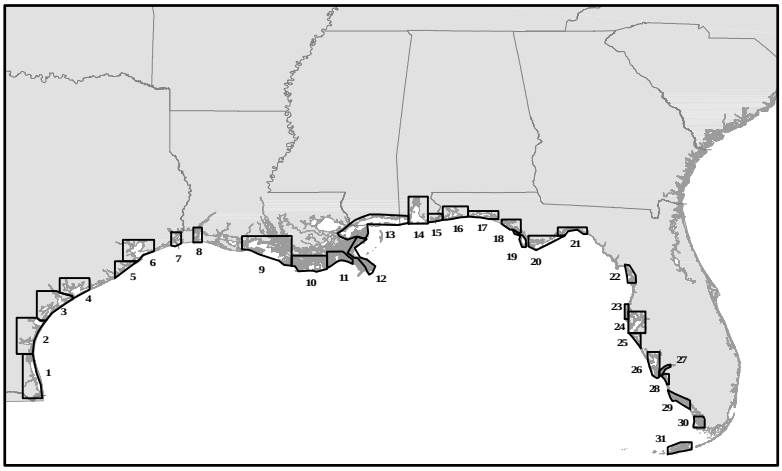


Figure 1. Map of northern Gulf of Mexico depicting the approximate boundaries of the 31 currently recognized bay, sound, and estuary (inshore) stocks of bottlenose dolphins. Stocks that occur within or adjacent(*) to watersheds that have proposed restoration activities include: (1) Laguna Madre; (2) Corpus Christi Bay and surrounding bays; (3) Espiritu Santo Bay to Redfish Bay; (4) Matagorda Bay and surrounding bays; (5) West Bay*; (6) Galveston Bay and surrounding bays; (9) Vermilion Bay to Atchafalaya Bay; (10) Terrebonne and Timbalier Bays; (11) Barataria Bay; (12) Mississippi River Delta; (13) Mississippi Sound, Lake Borgne, and Bay Boudreau; (14) Mobile and Bonsecour Bays; (15) Perdido Bay; (16) Pensacola and East Bays; (17) Choctawhatchee Bay*; (18) St. Andrew Bay*; (19) St. Joseph Bay; (20) St. Vincent Sound, Apalachicola Bay, and St. George Sound; (21) Apalachee Bay*; (22) Waccasassa Bay to Crystal Bay; (23) St. Joseph Sound and Clearwater Harbor; and (24) Tampa Bay. (Adapted from Vollmer and Rosel 2013)

between the shoreline or barrier islands and the 20-m isobath (Waring et al. 2015).[2] Inshore and coastal dolphin stocks have received more research attention than offshore cetacean stocks due to their proximity to shore and greater tendency to strand when sick or injured, but there are still many data gaps regarding their abundance, stock structure, prey preferences and habitat requirements (Vollmer and Rosel 2013). Photographic-identification (photo-ID) and tagging studies indicate that many dolphins in inshore waters are year-round, long-term residents with strong site fidelity (Waring et al. 2015). Some stocks exhibit seasonal movements within stock boundaries, presumably linked to prey availability (Irvine et al. 1981). While population abundance estimates are available for only six of the stocks, all are believed to be small (Waring et al. 2015). Bottlenose dolphins prey on a large variety of bony fishes[3] and, to a lesser degree, invertebrates (Barros and Odell 1990, Berens McCabe et al. 2010, Dunshea et al. 2013). Inshore dolphins often feed very close to land and in some cases drive fish out of shallow marsh waters and onto shore in a technique called "strand feeding" (Leatherwood 1975). Dolphins have been shown to respond to environmental changes; for example, dolphins in Sarasota Bay, Florida, alter their activity budgets, sociality, and ranging patterns in response to harmful algal blooms and associated changes in prey availability and distribution (McHugh et al. 2011).

Florida manatees occur year-round in two of the ten watersheds targeted by the Council for restoration activities (Tampa Bay and the Suwannee Watershed) and at least seasonally in five others (Mississippi River Delta, Mississippi Sound, Mobile Bay, Pensacola Bay, and Apalachicola Bay). Manatees use inland and coastal waters of the northern Gulf ranging from Florida to eastern Texas (U.S. Fish and Wildlife Service (FWS) 2014), although their winter distribution is generally restricted to Florida. Much research and monitoring has been focused on manatees due to their endangered status and vulnerability to human activities. The Florida Fish and Wildlife Conservation Commission

[2] There are two other dolphin stocks (bottlenose dolphins and Atlantic spotted dolphins) that occur on the continental shelf (20-200 m) and 20 species or stocks of cetaceans in oceanic waters (>200 m) of the northern Gulf (Waring et al. 2015). Because of the watershed focus of the proposed projects, effects on marine mammals that occur in waters more than 20 m deep are not discussed in this letter.

[3] Commonly from the families Sparidae, Mugilidae, Scombridae, and Sciaenidae.

(FWCC) recently estimated their total abundance in Florida at 6,350 animals (95% confidence interval: 5,310–7,390; Martin et al. 2014). Manatee habitat includes freshwater rivers, estuarine bays, and marine coastlines (FWCC 2007). They are herbivorous, foraging on a variety of marine and freshwater vegetation (Smith 1993). In winter manatees are dependent on natural warm-water refuges (e.g., warm-water springs) as well as artificial sources of warm water such as effluents from power plants and dredged basins that retain warm water during cold periods (Laist et al. 2013).

Inshore and coastal waters of the northern Gulf are heavily affected by human activities as well as environmental stressors. The bottlenose dolphins and manatees that reside in the Gulf are exposed to a wide variety of potential threats, including pollution (oil and gas, chemical, heavy metal, run-off and wastewater, and marine debris), fisheries (recreational, commercial, and aquaculture), industrial activities (dredging, construction, energy development, coastal engineering), tourism, recreational boating, environmental stressors (algal blooms, storms, hypoxia, climate change, freshwater inflow/salinity changes, invasive species, and disease), and habitat loss or alteration (Phillips and Rosel 2014; FWCC 2007). Some large-scale mortality events involving bottlenose dolphins and manatees have been linked to known factors (such as biotoxins, disease, or cold weather) while the etiology of other such events has not been determined (Litz et al. 2014, National Marine Fisheries Service (NMFS)[4], FWCC[5]).

Potential effects of restoration activities on marine mammals

The Council has proposed a wide variety of on-the-ground restoration activities for its initial round of funding, including—

- restoring the natural hydrology of marshes and wetlands (Texas, Louisiana, Alabama, Florida);
- acquiring coastal land parcels (Texas, Mississippi);
- plugging abandoned oil and gas wells (Texas);
- backfilling remnant oil and gas canals and reclaiming associated spoil banks (Louisiana) ;
- renourishing and stabilizing beaches and barrier islands (Louisiana, Mississippi, Alabama);
- developing living shoreline and restoring oyster reefs (Louisiana, Alabama, Florida);
- restoring seasonal Mississippi River inflow (Louisiana);
- restoring submerged aquatic vegetation (Alabama);
- restoring streams and creating tidal marshes (Alabama);
- improving stormwater treatment and wastewater infrastructure (Florida);
- dredging and removing contaminated sediments (Florida); and
- reducing pollution from agricultural operations (Florida).

Several of the proposed restoration activities have the potential to benefit marine mammals through habitat and water quality enhancements and the restoration of submerged aquatic vegetation. Others have the potential to affect marine mammals adversely, either directly or indirectly. For example, dredging of contaminated sediments can temporarily re-suspend pollutants

[4] http://www.nmfs.noaa.gov/pr/health/mmume/events.html
[5] http://myfwc.com/research/manatee/rescue-mortality-response/mortality-statistics/

into the water column where they may be ingested by marine mammal prey (Martins et al. 2012); re-suspended nutrients can help to develop or exacerbate harmful algal blooms (Van Dolah 2000). Renourishment (e.g., shoreline and barrier island stabilization projects) can alter benthic communities and affect the prey of marine mammals (Peterson and Bishop 2005). Backfilling of canals and reclamation of spoil banks can trap marine mammals and block access to their natural habitat, requiring rescue and relocation of the "stranded" animals (P.E. Rosel, NMFS, personal communication). River diversions can increase freshwater input into marsh habitat, exposing dolphins to low-salinity waters. Such exposure can compromise epidermal integrity (as evidenced by skin lesions), cause physiological stress, and contribute to secondary infections (Wilson et al. 1999; Mullin et al. 2015; Holyoake et al. 2010). Low-salinity conditions can also affect the distribution of dolphin prey (Barros and Odell 1990). Disturbance from construction/demolition activities and associated vessel traffic can increase sound levels and disrupt foraging, habitat use, daily or migratory movements, and behavior (Nowacek et al. 2001, 2004). Increased vessel traffic can also increase the risk of vessel strikes (FWS 2001, Wells et al. 2008, Bechdel et al. 2009).

As the Council is aware, all marine mammals are protected under the MMPA. The MMPA sets forth a national policy to prevent marine mammal species and stocks from diminishing, as a result of human activities, beyond the point at which they cease to be significant functioning elements of the ecosystems of which they are a part. Manatees are listed as endangered and receive additional protection under the ESA. Activities that may result in the taking of marine mammals or endangered species, or in alteration of designated critical habitat, are subject to the taking provisions of each Act and, for listed species, the section 7 consultation requirements of the ESA. Critical habitat for manatees has been designated in portions of two of the watersheds for which restoration activities have been proposed—the Suwanee watershed and Tampa Bay (see enclosed map). The following is a summary of the taking/consultation provisions of each Act.

- Section 101(a)(5)(A-D) of the MMPA (16 U.S.C. 1371(a)(5)), provides mechanisms for authorizing the "incidental," but not intentional, take[6] of small numbers of marine mammals resulting from a specified activity (other than commercial fishing) within a specified geographic region provided the taking would have no more than a "negligible impact" on marine mammal species and stocks. Requests for marine mammal incidental take authorizations are reviewed and processed by NMFS and/or FWS.
- Section 7(a)(2) of the ESA (16 U.S.C. 1536(a)(2)) mandates that all Federal agencies consult with the Secretary of Commerce or Interior (via NMFS or FWS) to ensure that any agency action is not likely to (1) jeopardize the continued existence of any endangered or threatened species or (2) result in the destruction or adverse modification of an endangered or threatened species' critical habitat. The incidental take[7] of listed species can be authorized under section 7(b)(4).

As a federal agency, the Council must ensure that restoration activities are in compliance with the taking provisions of the MMPA and ESA and also the consultation provisions of the ESA. The ESA was listed in the draft FPL as one of the federal laws with which the Council must comply,

[6] "Take" under the MMPA means to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal.
[7] "Take" under the ESA means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.

but there was no mention of the MMPA. As there is the potential for Council-funded activities to have both beneficial and negative effects on marine mammals, the Commission recommends that the Council consult with NMFS regarding the potential for incidental taking of bottlenose dolphins associated with inshore and nearshore proposed restoration activities, and with the FWS regarding potential effects on manatees (and other endangered species under FWS's jurisdiction) and designated critical habitat.

The importance of comprehensive monitoring

The draft FPL states that the goal of the proposed activities is to restore and enhance the health, diversity, and resilience of key marsh habitat and other coastal, estuarine, and marine habitat. As noted in the draft FPL, monitoring is a critical component to (1) assess the overall effectiveness of the proposed projects and (2) inform the selection of future projects. This would be achieved at a local scale by site-specific monitoring and at a broader scale by building on existing monitoring programs and establishing protocols and standards to enable data aggregation and synthesis. Site-specific monitoring plans were not available for review as part of the draft FPL, but independent science reviews were conducted and a summary of comments and Council responses was included in the draft FPL. The broader-scale monitoring program has yet to be developed but would be based on foundational components identified under the proposed Council Monitoring & Assessment Program Development project (DOC_RESTORE_002_001_Cat1).

In several cases, reviewers indicated that site-specific monitoring plans may not be adequate to evaluate the success of the project. A comprehensive and well-designed monitoring program is critical to gauge the effectiveness of restoration activities. A recent workshop convened by the National Academy of Sciences Gulf Research Program (2015) noted that—

> "Environmental monitoring information can be used to increase basic understanding, identify emerging problems and long-term trends, inform restoration projects, prioritize use of resources, and provide information to guide policy and management. For rapidly changing regions like the Gulf of Mexico, monitoring efforts also can yield reference data that flag emerging environmental and health concerns."

Both site-specific and broad-scale monitoring plans should be part of an adaptive management system used by the Council and its restoration partners[8] to gain an understanding of the Gulf ecosystem and to inform future decision-making (see, for example, Goetz et al. 2004). In general, restoration monitoring plans should be interdisciplinary and inter-institutional, with long-term stable funding identified at the outset. Plans should include monitoring of key physical, biological, and ecological parameters before, during, and after restoration activities. Biological and ecological monitoring should include regular, systematic, long-term surveys of a broad range of representative marine species, including plants, invertebrates, fish, birds, sea turtles, and marine mammals. Such surveys should be designed to occur at sufficient levels of effort and frequency to allow detection of changes, with a high level of confidence.

[8] Including, but not limited to, the Deepwater Horizon Natural Resource Damage Assessment Trustee Council, the National Fish and Wildlife Foundation Gulf Environmental Benefit Fund, the National Academy of Sciences Gulf Research Program, and the NOAA RESTORE Act Science Program.

Given sufficient planning and stakeholder input, the Council's Gulf-wide Monitoring & Assessment Program, once implemented, would have the potential of becoming a strong foundation for assessing the effectiveness of proposed and future restoration activities across the Gulf. The Commission agrees that the Council should build on existing monitoring programs where they exist, but as demonstrated by the lack of baseline environmental information prior to the Deepwater Horizon oil spill, such programs are not sufficient to characterize environmental conditions and detect changes that may result from restoration and other human activities.

Marine mammal monitoring programs in the Gulf have been inconsistent and inadequate (Marine Mammal Commission 2011). The Commission believes that the Council and its partners should consider expanding some of the following existing marine mammal monitoring programs[9] as part of its site-specific and broad-scale restoration monitoring efforts.

- The NMFS Marine Mammal Health and Stranding Response Program oversees a national volunteer network of trained responders and veterinarians who are authorized under the MMPA to respond to, rescue, and rehabilitate live-stranded marine mammals and investigate dead-stranded marine mammals. The information collected from stranded marine mammals is used to assess marine mammal health and health trends; correlate health and trend data with biological, physical, and chemical environmental parameters; and coordinate responses to unusual mortality events. Stranding network members are located in each of the five Gulf states[10] and are typically associated with non-governmental organizations, academic institutions, and state agencies. NMFS provides administration, coordination, and data management for the program.
- The Manatee Salvage and Necropsy Program at the Florida Fish and Wildlife Research Institute (FWRI, part of the FWCC) supports efforts to salvage and necropsy Florida manatees throughout their range, including animals that strand outside the state of Florida, and to identify and track trends in manatee mortality.
- The FWS and FWCC respond to calls about injured and distressed manatees throughout the southeastern United States. As necessary, they engage in or coordinate capture and transport to three authorized zoo and aquarium hospitals in Florida for rehabilitation and eventual release back into the wild through the Manatee Rescue and Rehabilitation Partnership.
- Photo-identification, mark-recapture (tagging/tracking), and remote biopsy sampling programs for bottlenose dolphins and manatees can provide information on abundance, distribution, movements, stock structure, and vital rates. Long-term studies allow detection of population-level changes in response to environmental and human-caused perturbations. Such studies are typically conducted by non-governmental organizations, academic institutions, state resource agencies, NMFS (for bottlenose dolphins), and the U.S. Geological Survey (for manatees). Centralized large-scale, collaborative identification catalogs have been established and are managed for bottlenose dolphins and manatees, providing a basis for tracking movements of individuals beyond individual project study sites, and detecting range shifts in response to environmental changes.

[9] Monitoring activities identified here generally involve the taking of marine mammals and therefore require permits or other authorizations under the MMPA (for bottlenose dolphins and manatees) and the ESA (for manatees).
[10] http://sero.nmfs.noaa.gov/protected_resources/marine_mammal_health_and_stranding_response_program/mmstranding_organizations/index.html

- Periodic aerial surveys of inshore and coastal waters are used to generate data for abundance estimates and to track seasonal movements of bottlenose dolphins and manatees. Aerial surveys for bottlenose dolphins are conducted by NMFS; manatee surveys are conducted by FWRI, the U.S. Geological Survey, and other entities.
- Live-capture/release health assessments of dolphins and manatees are used to investigate unusual mortality events and the effects of environmental stressors. Health assessments of bottlenose dolphins have been conducted at two oil-impacted sites in the Gulf (Barataria Bay and Mississippi Sound) and a long-term reference site in Sarasota Bay to investigate sub-lethal effects from the Deepwater Horizon oil spill. Similar health assessments of manatees have been conducted in Florida waters. Health assessments are personnel- and resource-intensive and typically involve collaborators from a large number of federal and state agencies and private institutions in the Gulf and elsewhere.

As noted previously, site-specific monitoring plans were not made available as part of the draft FPL. As such, the Commission is unable to determine whether they are adequate for monitoring potential effects on marine mammals, their habitat, and their prey. The Commission therefore recommends that the Council make both site-specific and broad-scale monitoring plans available for public review and comment. The Commission further recommends that the Council provide long-term support for existing marine mammal monitoring programs in inshore and coastal waters to track the short- and long-term effects of restoration activities by the Council and its restoration partners.

I hope these comments and recommendations are helpful to the Council. Please let me know if you have any questions.

Sincerely,

Rebecca J. Lent, Ph.D.
Executive Director

Enclosure

References

Barros, N.B., and D.K. Odell. 1990. Food habits of bottlenose dolphins in the southeastern United States. Pages 309–328 *in* S. Leatherwood and R. Reeves (eds.). The Bottlenose Dolphin. Academic Press, San Diego, California, 653 pages.

Bechdel, S.E., M.S. Mazzoil, M.E. Murdoch, E.M. Howells, J.S. Reif, and S.D. McCulloch. 2009. Prevalence and impacts of motorized vessels on bottlenose dolphins (*Tursiops truncatus*) in the Indian River Lagoon, Florida. Aquatic Mammals 35(3):367-377.

Berens McCabe, E., D.P. Gannon, N.B. Barros, and R.S. Wells. 2010. Prey selection in a resident common bottlenose dolphin (*Tursiops truncatus*) community in Sarasota Bay, Florida. Marine Biology 157(5):931-942. doi:10.1007/s00227-009-1371-2

Dunshea, G., N.B. Barros, E.J. Berens McCabe, N.J. Gales, M.A. Hindell, S.N. Jarman, and R.S. Wells. 2013. Stranded dolphin stomach contents represent the free-ranging population's diet. Biology Letters 9:20121036. doi:10.1098/rsbl.2012.1036

FWS. 2001. Florida manatee recovery plan (*Trichechus manatus latirostris*), Third Revision. Atlanta, Georgia, 144 pages plus appendices. At http://www.fws.gov/northflorida/Manatee/Recovery%20Plan/2001_FWS_Florida_Manatee_Recovery_Plan.pdf.

FWS. 2014. West Indian Manatee (*Trichechus manatus*), Florida stock (Florida subspecies, *Trichechus manatus latirostris*). U.S. Fish and Wildlife Service, Jacksonville, Florida, 17 pages. At http://www.fws.gov/northflorida/manatee/SARS/FR00001606_Final_SAR_WIM_FL_Stock.pdf.

FWCC. 2007. Florida manatee management plan *Trichechus manatus latirostris*, 267 pages. At http://myfwc.com/media/214332/manatee_mgmt_plan.pdf.

Holyoake, C., H. Finn, N. Stephens, P. Duignan, C. Salgado, H. Smith, L. Bejder, T. Linke, C. Daniel, and H. Lo. 2010. Technical report on the bottlenose dolphin (*Tursiops aduncus*) unusual mortality event within the Swan Canning Riverpark, June-October 2009. Report to the Swan River Trust, 234 pages. At http://www.swanrivertrust.wa.gov.au/docs/technical-reports/technical-report-on-the-bottlenose-dolphin-unusual-mortality-event-within-the-swan-canning-riverpark-june-october-2009.pdf.

Irvine, A.B., M.D. Scott, R.S. Wells, and J.H. Kaufmann. 1981. Movements and activities of the Atlantic bottlenose dolphin, *Tursiops truncatus*, near Sarasota, Florida. Fishery Bulletin 79(4):671-688.

Laist, D.W., C. Taylor, and J.E. Reynolds, III. 2013. Winter habitat preferences for Florida manatees and vulnerability to cold. PLoS One 8(3):e58978. doi:10.1371/journal.pone.005897

Litz, J.A., M.A. Baran, S.R. Bowen-Stevens, R.H. Carmichael, K.M. Colegrove, L.P. Garrison, S.E. Fire, E.M. Fougeres, R. Hardy, S. Holmes, W. Jones, B.E. Mase-Guthrie, D.K. Odell, P.E. Rosel, J.T. Saliki, D.K. Shannon, S.F. Shippee, S.M. Smith, E.M. Stratton, M.C. Tumlin, H.R. Whitehead, G.A.J. Worthy, and T.K. Rowles. 2014. Review of historical unusual mortality events (UMEs) in the Gulf of Mexico (1990−2009): Providing context for the multi-year northern Gulf of Mexico cetacean UME declared in 2010. Diseases of Aquatic Organisms 112:161-175.

Leatherwood, S. 1975. Some observations of feeding behavior of bottle-nosed dolphins (*Tursiops truncatus*) in the northern Gulf of Mexico and (*Tursiops* cf *T. gilli*) off southern California, Baja California, and Nayarit, Mexico. Marine Fisheries Review 37:10–16.

Marine Mammal Commission. 2011. Assessing the long-term effects of the BP Deepwater Horizon oil spill on marine mammals in the Gulf of Mexico: a statement of research needs. Marine Mammal Commission, Bethesda, Maryland, 38 pages. At http://www.mmc.gov/reports/workshop/pdf/longterm_effects_bp_oilspil.pdf.

Martin, J., H.H. Edwards, C.J. Fonnesbeck, S.M. Koslovsky, C.W. Harmak, and T.M. Dane. 2014. Combining information for monitoring at large spatial scales: First statewide abundance estimate of the Florida manatee. Biological Conservation 186:44-51.

Martins, M., P.M. Costa, J. Raimundo, C. Vale, A.M. Ferreira, and M.H. Costa. 2012. Impact of remobilized contaminants in *Mytilus edulis* during dredging operations in a harbour area: Bioaccumulation and biomarker responses. Ecotoxicology and Environmental Safety 85:96-103.

McHugh, K.A., J.B. Allen, A.A. Barleycorn, and R.S. Wells. 2011. Severe *Karenia brevis* red tides influence juvenile bottlenose dolphin (*Tursiops truncatus*) behavior in Sarasota Bay, Florida. Marine Mammal Science 27(3):622-643.

Mullin, K.D., K. Barry, C. Sinclair, J. Litz, K. Maze-Foley, E. Fougeres, B. Mase-Guthrie, R. Ewing, A. Gorgone, J. Adams, and M. Tumlin. 2015. Common bottlenose dolphins (*Tursiops truncatus*) in Lake Pontchartrain, Louisiana: 2007 to mid-2014. NOAA Technical Memorandum NMFS-SEFSC-673, 43 pages. doi:10.7289/V51C1TT8 At: http://docs.lib.noaa.gov/noaa_documents/NMFS/SEFSC/TM_NMFS_SEFSC/NMFS_SEFSC_TM_673.pdf.

Nowacek, S.M., R.S. Wells, and A.R. Solow. 2001. Short-term effects of boat traffic on bottlenose dolphins, *Tursiops truncatus*, in Sarasota Bay, Florida. Marine Mammal Science 17(4):673-688.

Nowacek, S.M., R.S. Wells, D.P. Nowacek, E.C.G. Owen, T.R. Speakman, and R.O. Flamm. 2004. Florida manatees, *Trichechus manatus latirostris*, respond to approaching vessels. Biological Conservation 119:517-523.

National Academy of Sciences. 2015. Opportunities for the Gulf Research Program: Monitoring ecosystem restoration and deep water environments: A workshop summary. The National Academies Press, Washington, D.C., 52 pages. At http://www.nap.edu/catalog.php?record_id=21673.

Peterson, C.H., and M. Bishop. 2005. Assessing the environmental impacts of beach renourishment. BioScience 55(10):887-896.

Phillips, N.M., and P.E. Rosel. 2014. A Method for Prioritizing Research on Common Bottlenose Dolphin Stocks Through Evaluating Threats and Data Availability: Development and Application to Bay, Sound and Estuary Stocks in Texas. NOAA Technical Memorandum NMFS-SEFSC-665, Miami, Florida, 146 pages. At http://docs.lib.noaa.gov/noaa_documents/NMFS/SEFSC/TM_NMFS_SEFSC/NMFS_SEFSC_TM_665.pdf.

Goetz, F., C. Tanner, C.S. Simenstad, K. Fresh, T. Mumford, and M. Logsdon. 2004. Guiding restoration principles. Puget Sound Nearshore Partnership, Report Number 2004-03. Washington Sea Grant Program, University of Washington, Seattle, Washington, 16 pages. Available at http://pugetsoundnearshore.org/technical_papers/nearshore_guiding_principles.pdf.

Smith, K.N. 1993. Manatee habitat and human-related threats to seagrass in Florida: A review. Unpublished report. Florida Department of Environmental Protection, Tallahassee, Florida, 38 pages.

Van Dolah, F.M. 2000. Marine algal toxins: Origins, health effects, and their increased occurrence. Environmental Health Perspectives 108(Supplement 1):133-141.

Vollmer, N.L., and P.E. Rosel. 2013. A review of common bottlenose dolphins (*Tursiops truncatus*) in the northern Gulf of Mexico: Population biology, potential threats, and management. Southeastern Naturalist 12(Monograph 6):1-43.

Waring, G.T., E. Josephson, K. Maze-Foley, and P.E. Rosel (eds). 2015. U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments - 2014, 361 pages. At http://www.nmfs.noaa.gov/pr/sars/region.htm.

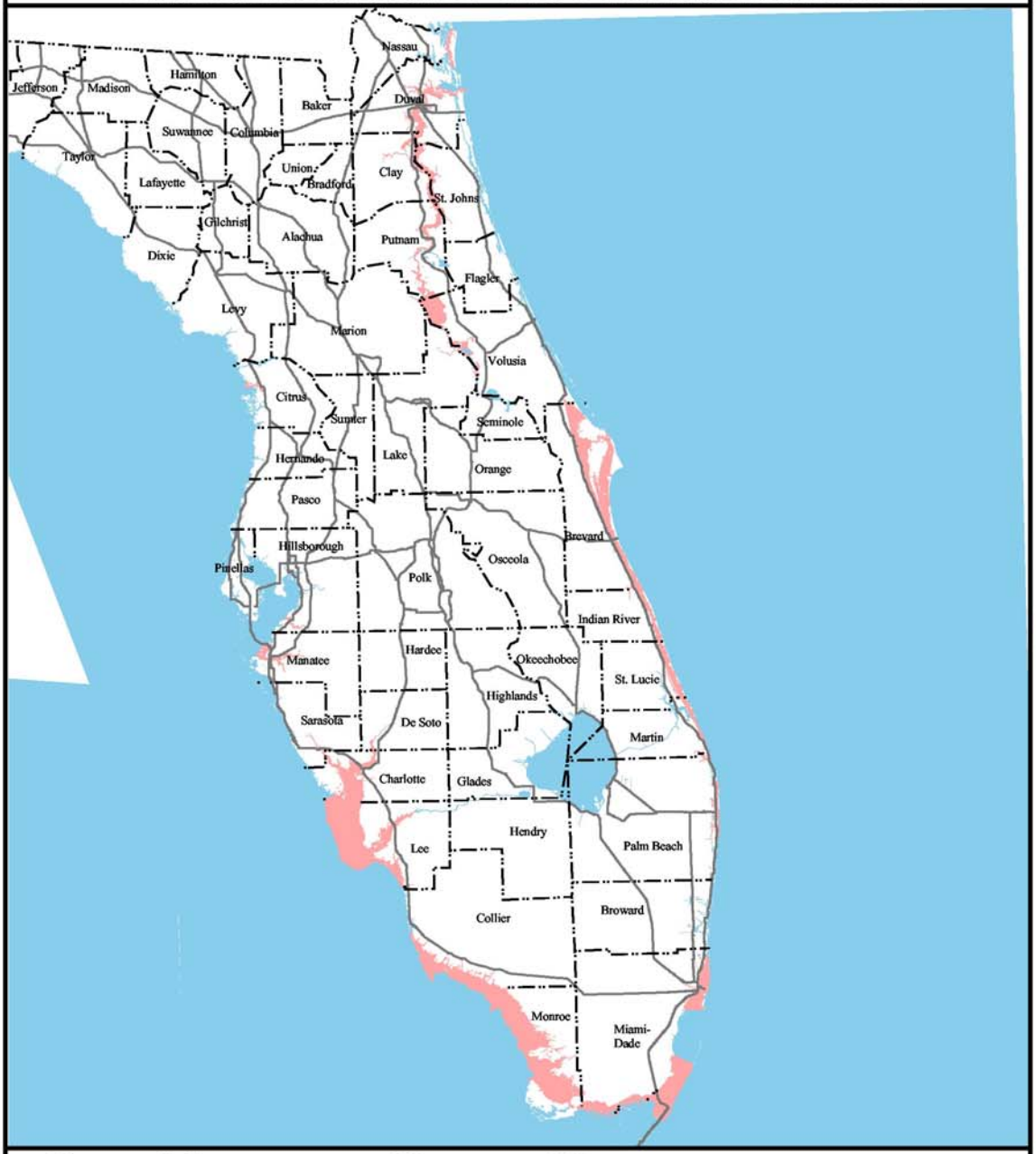
Wells, R.S., J.B. Allen, S. Hofmann, K. Bassos-Hull, D.A. Fauquier, N.B. Barros, R.E. DeLynn, G. Sutton, V. Socha, and M.D. Scott. 2008. Consequences of injuries on survival and reproduction of common bottlenose dolphins (*Tursiops truncatus*) along the west coast of Florida. Marine Mammal Science 24:774-794.

Wilson, B., H. Arnold, G. Bearzi, C.M. Fortuna, R. Gaspar, S. Ingram, C. Liret, S. Pribanic, A.J. Read, V. Ridoux, K. Schneider, K.W. Urian, R.S. Wells, C. Wood, P.M. Thompson, and P.S. Hammond. 1999. Epidermal disease in bottlenose dolphins: Impacts of natural and anthropogenic factors. Proceedings of the Royal Society of London: B 256:1077-1083.

Critical Habitat for the **Florida manatee** (*Trichechus manatus*) as defined in the Code of Federal Regulations 50 Parts 1 to 199, revised as of October 1, 2000.

Crystal River and its headwaters known as King's Bay, Citrus County; the Little Manatee River downstream from the U.S. Highway 301 bridge, Hillsborough County; the Manatee River downstream from the Lake Manatee Dam, Manatee County; the Myakka River downstream from Myakka River State Park, Sarasota and Charlotte Counties; the Peace River downstream from the Florida State Highway 760 bridge, De Soto and Charlotte Counties; Charlotte Harbor north of the Charlotte-Lee County line, Charlotte County; Caloosahatchee River downstream from the Florida State Highway 31 bridge, Lee County; all U.S. territorial waters adjoining the coast and islands of Lee County; all U.S. territorial waters adjoining the coast and islands and all connected bays, estuaries , and rivers from Gordon's Pass, near Naples, Collier County, southward to and including Whitewater Bay, Monroe County; all waters of Card, Barnes, Blackwater, Little Blackwater, Manatee, and Buttonwood Sounds between Key Largo, Monroe County, and the mainland of Dade County; Biscayne Bay, and all adjoining and connected lakes, rivers, canals, and waterways from the southern tip of Key Biscayne northward to and including Maule Lake, Dade County; all of Lake Worth, from its northernmost point immediately south of the intersection of U.S. Highway 1 and Florida State Highway A1A southward to its southernmost point immediately north of the town of Boynton Beach, Palm Beach County; the Loxahatchee River and its headwaters, Martin and West Palm Beach Counties; that section of the intracoastal waterway from the town of Seawalls Point, Martin County to Jupiter Inlet, Palm Beach County; the entire inland section of water known as the Indian River, from its northernmost point immediately south of the intersection of U.S. Highway I and Florida State Highway 3, Volusia County, southward to its southernmost point near the town of Sewalls Point, Martin County, and the entire inland section of water known as the Banana River and all waterways between Indian and Banana Rivers, Brevard County; the St. Johns River including Lake George, and including Blue Springs and Silver Glen Springs from their points of origin to their confluences with the St. Johns River; that section of the Intracoastal Waterway from its confluences with the St. Marys River on the Georgia-Florida border to the Florida State Highway A1A bridge south of Coastal City, Nassau and Duval Counties.

General locations of the designated critical habitat for the Florida manatee.



General Area

Distance: Miles

0 30 60 90 120 Miles

N

Legend

Highways

Critical habitat

Use Constraints: This map is intended to be used as a guide to identify the general areas where Florida Manatee critical habitat has been designated. Refer to the narrative description published in the Code of Federal Regulations (CFR) 50 Parts 1 to 199 (a copy of this text is printed on the reverse of this map).