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POLICIES FOR THE PROTECTION AND RESTORATION OF ESSENTIAL FISH HABITATS FROM BEACH RENOURISHMENT AND ASSOCIATED LARGE-SCALE COASTAL ENGINEERING

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Policy Context

This document establishes the policies of the South Atlantic Fishery Management Council (SAFMC) regarding protection of the essential fish habitats (EFH) and habitat areas of particular concern (EFH-HAPCs) impacted by beach renourishment (dredge-and-fill activities), and related large-scale coastal engineering projects (e.g., beach scraping). The policies are designed to be consistent with the overall habitat protection policies of the SAFMC as formulated and adopted in the Habitat Plan (SAFMC, 1998a), the Comprehensive EFH Amendment (SAFMC, 1998b) and Fishery Ecosystem Plan (SAFMC, 2009). This document is not intended to supersede any other applicable state or federal policy or regulation pertaining to beach dredge-and-fill projects, but intended to complement existing policies or regulations for the benefit of protecting essential fish habitat managed by the SAFMC.

The findings presented below assess the threats to EFH potentially posed by activities related to the large-scale dredging and disposal of sediments in the coastal ocean and adjacent habitats, and the processes whereby those resources are placed at risk. The policies established in this document are designed to avoid, minimize and offset damage caused by these activities, in accordance with the general habitat policies of the SAFMC as mandated by law.

EFH at Risk from Beach Renourishment

The SAFMC finds:

1) In general, frequent and widespread beach renourishment projects (dredge-and-fill) occurring in the United States southeast together constitute a real and significant threat to EFH under the jurisdiction of the SAFMC. Coastal communities are strongly encouraged to evaluate the full range alternatives to these types of projects when addressing erosion and sea level rise.

2) The cumulative adverse effects of these projects, especially in relation to increasing frequency of activity, change in season of activity, and recovery from these activities, have not been adequately assessed, including impacts on public trust marine and estuarine resources, state and federally protected species, and SAFMC-designated EFH and EFH-HAPCs. Long-term

geoengineering of the southeastern coastline is being conducted without review of the collective consequence of these activities (Armstrong and Lazarus, 2019; Staudt et al., 2021)

3) While some environmental research studies have been completed for select beach renourishment activities in the southeast, these have often been limited by small sample size, short duration or inconsistent sample design (Bergquist and Crowe, 2009). Historically, emphasis has been placed on the logistics of dredging and economics, with environmental considerations dominated by compliance with the Endangered Species Act for sea turtles, piping plovers and other listed organisms. Less emphasis has been placed on the hundreds of other species affected, many with direct and significant fishery value.

4) Although minimization strategies have been developed for beach renourishment activities, such as those listed below as Best Management Practices, increasing demand for more and frequent renourishment activities from a growing number of coastal communities have increased pressure to locate borrow areas in vulnerable habitats such as ebb-tide deltas, allow insufficient time for recovery (if recovery is even possible), and conduct activities during periods of high biological activity (Manning et al., 2014; Crowe et al., 2016; Woodbridge et al., 2016; Johnson et al., 2020ab; Staudt et al., 2021).

5) The majority (74%) of the U.S. Atlantic coastline is less than 16 km from a large-scale beach renourishment project that has the potential to impact a variety of habitats, including (Armstrong and Lazarus, 2019; Miselis et al, 2021):

a) waters and benthic habitats in and near the dredging sites
b) Waters between dredging and filling sites
c) waters and benthic habitats in and near the fill sites, and
d) waters and benthic habitats as sediments move subsequent to deposition in fill areas.

6) Large sections of South Atlantic waters potentially affected by these projects, both individually and collectively, have been identified as EFH or EFH-HAPC by the SAFMC**,** Mid-Atlantic Fishery Management Council (MAFMC), and National Marine Fisheries Service - Highly Migratory Species (HMS). Potentially Affected species and their EFH under federal management include (SAFMC, 1998b):

a) summer flounder (various nearshore waters, including the surf zone and inlets; certain offshore waters)
b) bluefish (various nearshore waters, including the surf zone and inlets)
c) many snapper and grouper species (live hardbottom from shore to 600 feet, and – for estuarine-dependent species [e.g., gag grouper and gray snapper] – unconsolidated bottoms and live hardbottoms to the 100 foot contour).
d) black sea bass (various nearshore waters, including unconsolidated bottom and live hardbottom to 100 feet, and hardbottoms to 600 feet)
e) penaeid shrimp (offshore habitats used for spawning and growth to maturity, and waters connecting to inshore nursery areas, including the surf zone and inlets)

f) coastal migratory pelagics [e.g., king mackerel, Spanish mackerel] (sandy shoals of capes and bars, barrier island ocean-side waters from the surf zone to the shelf break inshore of the Gulf Stream; all coastal inlets)
g) corals of various types (hard substrates and muddy, silt bottoms from the subtidal to the shelf break)
h) areas identified as EFH for Highly Migratory Species (HMS) managed by the Secretary of Commerce (e.g., sharks: inlets and nearshore waters, including pupping and nursery grounds)

In addition, numerous species of crustaceans, mollusks, and annelids that are not directly managed, but form the critical prey base for most managed species, are killed or otherwise directly or indirectly affected by large dredge-and-fill projects (Greene, 2002).

7) Beach renourishment projects also potentially threaten important habitats for anadromous species under federal, interstate and state management (in particular, inlets and offshore overwintering grounds), as well as essential overwintering grounds and other critical habitats for weakfish and other species managed by the Atlantic States Marine Fisheries Commission (ASMFC) and the states.

8) Many of the habitats potentially affected by these projects have been identified as EFH-HAPCs by the SAFMC. The specific fishery management plan is provided in parentheses:

a) all nearshore hardbottom areas (SAFMC, snapper grouper).
b) all coastal inlets (SAFMC, penaeid shrimps, and snapper grouper).
c) near-shore spawning sites (SAFMC, penaeid shrimp).
d) benthic *Sargassum* (SAFMC, snapper grouper).
e) from shore to the ends of the sandy shoals of Cape Lookout, Cape Fear, and Cape Hatteras, North Carolina; Hurl Rocks, South Carolina; *Phragmatopora* (worm reefs) reefs off the central coast of Florida and nearshore hardbottom south of Cape Canaveral (SAFMC, coastal migratory pelagics).
f) Florida Bay, Biscayne Bay, Card Sound, and coral hardbottom habitat from Jupiter Inlet through the Dry Tortugas, Florida (SAFMC, Spiny Lobster)
g) Hurl Rocks (South Carolina), The *Phragmatopoma* (worm reefs) off central east coast of Florida, nearshore (0-4 meters; 0-12 feet) hardbottom off the east coast of Florida from Cape Canaveral to Broward County; offshore (5-30 meters; 15-90 feet) hardbottom off the east coast of Florida from Palm Beach County to Fowey Rocks; Biscayne Bay, Florida; Biscayne National Park, Florida; and the Florida Keys National Marine Sanctuary (SAFMC, Coral, Coral Reefs and Live Hardbottom Habitat).
h) EFH-HAPCs designated for HMS species (e.g., sharks) in the South Atlantic region (NMFS, Highly Migratory Species).

9) Habitats likely to be affected by beach renourishment projects include many recognized in state-level natural resource management plans. Examples of these habitats include Critical Habitat Areas (CHAs) established by the North Carolina Marine Fisheries Commission, either in

species-specific Fishery Management Plans (FMPs) or in the North Carolina Coastal Habitat Protection Plan (Deaton *et al.*, 2010).

Threats to Marine and Estuarine Resources from Beach Renourishment Activities and Related Large Coastal Engineering Projects

The SAFMC finds that beach renourishment activities and related large-scale coastal engineering projects (including inlet alteration projects) and disposal of material for navigational maintenance, threaten or potentially threaten EFH through the following mechanisms:

1) Direct mortality, displacement, and altered community structure of benthic organisms at and near sediment dredging sites (Van Dolah *et al.*, 1992; Wilber and Stern, 1992; Van Dolah *et al.*, 1994; Jutte *et al.*, 1999a and b; Greene, 2002; Byrnes *et al.*, 2004a and b; Diaz *et al.*, 2004; Bergquist *et al.*, 2009)

2) Direct mortality of fish larvae, as well as other planktonic and nektonic organisms at and near sediment dredging sites due to entrainment and decreased water quality. (Olney and Bilkovic, 1998; Wilber and Clarke, 2001, Greene, 2002).

3) Direct mortality, displacement, and altered community structure of organisms, including nekton, at initial sediment fill sites (Rakocinski *et al.*, 1996; Peterson *et al.*, 2000a; Greene, 2002; Posey and Alphin, 2002; Peterson *et al.* 2000b; Peterson *et al.* 2006; Colosio *et al.*, 2007; Lewis *et al.*, 2012; Schlacher *et al.* 2012; Speybroeck *et al.*, 2006; Van Tomme *et al.*, 2013; Johnson et al., 2020ab)

4) Elevated turbidity and deposition of fine sediments down-current from dredging sites (Dodge *et al.*, 1974; Jordan *et al.*, 2010)

5) Alteration of seafloor topography and associated current and waves patterns and magnitudes at dredging areas (Greene, 2002; Blake *et al.*, 1996; Byrnes *et al.* 2004a and b; Maa *et al.*, 2004; Finkl and Hobbs, 2009)

6) Alteration of seafloor sediment size-frequency distributions at dredging sites, with secondary effects on benthos at those sites (Van Dolah *et al.*, 1992; Van Dolah *et al.*, 1994; Van Dolah *et al.*, 1998; Jutte and Van Dolah, 1999 and 2001; Jutte *et al.*, 2001; Greene, 2002; Jutte *et al.*, 199a and b; Diaz *et al.*, 2004; Nairn *et al.*, 2004; Bergquist *et al.*, 2009; Xu *et al.*, 2014)

7) Decreased primary productivity at dredged sites due to greater depths and increased turbidity (Greene, 2002)

8) Increased deposition of fine-grained sediments and organic matter in dredged areas, potentially resulting in decreased dissolved oxygen and increased hydrogen sulphide levels (Greene, 2002; Byrnes *et al.*, 2004a and b; Bergquist *et al.*, 2009)

9) Elevated turbidity in and near initial fill sites, especially in the surf zone, and deposition of fine sediment down-current from initial fill sites (Peterson *et al.*, 2000a and b; Greene, 2002; Speybroeck *et al.*, 2006)

10) Alteration of nearshore topography and current and wave patterns and magnitudes associated with fill (Greene, 2002; Benedet *et al.* 2004; Speybroeck *et al.*, 2006; Hartog *et al.*, 2008)

11) Movement of deposited sediment away from initial fill sites, especially onto hardbottoms (Greene, 2002; Speybroeck *et al.*, 2006; Jordan *et al.*, 2010)

12) Alteration of large-scale sediment budgets, sediment movement patterns and feeding and other ecological relationships, including the potential for cascading disturbance effects (Peterson *et al.*, 2000a; Greene, 2002; Benedet *et al.*, 2004; Nairn *et al.*, 2004; Speybroeck *et al.*, 2006)

13) Alteration of large-scale movement patterns of water, with secondary effects on water quality and biota (Greene, 2002; Nairn *et al.*, 2004; Hartog *et al.*, 2008)

14) Alteration of movement patterns and successful inlet passage for larvae, post-larvae, juveniles and adults of marine and estuarine organisms (Greene, 2002)

15) Alteration of long-term shoreline migration patterns (inducing further ecological cascades with consequences that are difficult to predict) (Greene, 2002)

16) Exacerbation of transport and/or biological uptake of toxicants and other pollutants released at either dredge or fill sites (Greene, 2002)

In addition, the interactions between cumulative and direct (sub-lethal) effects among the above factors likely trigger non-linear impacts that are completely unstudied.

SAFMC Best Management Practices for Beach Renourishment Projects and Related Large Coastal Engineering Projects

The SAFMC establishes the following best management practices for unavoidable beach renourishment and related large-scale coastal engineering projects, to clarify and augment the general policies already adopted in the Habitat Plan and Comprehensive Habitat Amendment (SAFMC 1998a; SAFMC 1998b):

1) For each project, a comprehensive environmental document should be prepared based on the best available information, and should include:

> a) Defined areas of direct and indirect impact, using guidance provided in 40 CFR Section 1508.8 Effects. Areas of direct impact should at a minimum include the borrow sites (dredged or mined areas), the beach/nearshore sites (fill areas), and the Equilibrated Toe of Fill. Areas of indirect impact should at a

minimum include the areas adjacent to direct impact areas that would be affected by indirect project impacts.

b) Baseline surveys designed with appropriate methodology to adequately document pre-project conditions for biological, physical and water resources in both direct and indirect impact areas. Baseline surveys should follow the BACI (Before- After, Control-Impact) sampling framework (Stewart-Oaten 1986). Biological resources at a minimum include benthic infauna and epifauna, SAV, hard bottom habitat, hard bottom-dependent species, coral reef habitat, and coral reef- dependent species (e.g., corals, octocorals). Physical and water resources at a minimum include topography, bathymetry, water quality (turbidity, sedimentation, total suspended solids and dissolved oxygen) and sediment characteristics (grain size, sorting, and mineralogy).

c) An analysis of alternatives, including alternatives that may minimize future need for additional nourishment activities (e.g., sand bypass), to include the following components:

i. Identification of avoidance and minimization efforts.

Ii. Identification of the direct and indirect project impacts that cannot be avoided or minimized, using appropriately designed baseline surveys identified in c) above.

iii. Identification of cumulative impacts that at a minimum includes impacts associated with other beach dredge-and-fill projects, as well as any other large-scale coastal engineering projects that are both geographically and ecologically related.

d) A during-construction monitoring plan as deemed necessary for a specific project, designed with appropriate methodology to adequately detect and document both direct and indirect project impacts. Monitoring plans should follow the BACI sampling framework.

e) A post-construction monitoring plan for biological, physical and water resources designed with appropriate methodology to adequately detect and document both direct and indirect project impacts. Monitoring plans should follow the BACI sampling framework. Post-construction monitoring should include quantitative comparisons of abundance, biomass, species diversity, and community composition in direct and indirect impact area and reference (control) areas before and after dredge-and-fill operations.

2) Fill material should match the sediment characteristics of the recipient beach as closely as possible.

3) Dredging should be limited to bathymetric peaks (rather than depressions or level sea bottom) in areas characterized by strong currents and sand movement, in order to increase sediment infilling rates and decrease the duration of impacts to benthic habitats.

4) Dredging should be limited to the shallowest depths possible to minimize changes in wave energy and currents, thus reducing the likelihood of infilling with fine-grained sediments.

5) In areas with seasonal benthic recruitment periods, beach renourishment and large-scale coastal engineering activities should be conducted during periods of low biological activity ahead of spring/summer benthic recruitment periods to allow maximum recovery of adversely impacted communities.

6) Habitats designated as EFH-HAPC or recognized in state-level natural resource management plans should not be used as borrow areas.

Research Needs

(input from panel)

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