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POLICY FOR THE PROTECTION AND RESTORATION OF ESSENTIAL FISH HABITATS FROM ENERGY EXPLORATION AND DEVELOPMENT ACTIVITIES
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Introduction

This document provides guidance from the South Atlantic Fishery Management Council (SAFMC) regarding the protection of Essential Fish Habitat (EFH) and Habitat Areas of Particular Concern (EFH-HAPCs) from impacts associated with energy exploration and development activities as described in the "Threats to Marine and Estuarine Resources" section of this policy. This document also provides guidance regarding mitigation of those impacts, including avoidance, minimization and compensatory mitigation. The guidance is 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), the Fishery Ecosystem Plan of the South Atlantic Region (SAFMC 2009a), Comprehensive Ecosystem-Based Amendment 1 (SAFMC 2009b), Comprehensive Ecosystem-Based Amendment 2 (SAFMC 2011), and the various Fishery Management Plans (FMPs) of the Council.

For the purposes of policy development, the types of activities within the scope of this document include wind; oil and gas; methane hydrate mining; estuarine and marine hydrokinetic; liquefied natural gas (LNG) regasification, pipelines, and offshore and on-shore facilities; and onshore power plants. The findings assess potential impacts to EFH and EFH-HAPCs posed by activities related to energy exploration and development in offshore and coastal waters, riverine systems and adjacent wetland habitats, and the processes that could improve those resources or place them at risk. The policies and recommendations established in this document are designed to avoid and minimize impacts and optimize benefits from these activities, in accordance with the general habitat policies of the SAFMC as mandated by law. The SAMFC may revise this guidance in response to changes in the types and location of energy exploration and development activities in the South Atlantic region, applicable laws and regulatory guidelines, and knowledge about the impacts of energy exploration and development on habitat.

EFH At Risk from Energy Exploration and Development Activities

The SAFMC finds that:

1. Energy exploration or development has the potential to occur within or in proximity to EFH including – but not limited to – coral, coral reefs, and live/hardbottom habitat at all depths in the Exclusive Economic Zone (EEZ); EFH-HAPCs; or other special biological resources essential to commercial and recreational fisheries under SAFMC jurisdiction.

2. Energy development activities have the potential to cause impacts to a variety of habitats across the shelf and to nearshore, estuarine, and riverine systems and wetlands, including:
   a) waters and benthic habitats in or near drilling and disposal sites, including those potentially affected by sediment movement and by physical disturbance associated with drilling activities and site development;
   b) waters and benthic habitats in or near LNG processing facilities or other energy development sites,
   c) exposed hardbottom (e.g. reefs, live bottom, deepwater *Lophelia* mounds) in shallow and deep waters,
   d) coastal wetlands
   e) coastal inlets and
   f) riverine systems and associated wetlands; and
   g) Intertidal oyster reefs

3. Certain offshore, nearshore, and riverine habitats are particularly important to the long-term viability of commercial and recreational fisheries under SAFMC management, and potentially threatened by oil, gas, wind and other energy exploration and development activities:
   a) coral, coral reef and live/hardbottom habitat, including deepwater coral communities,
   b) marine and estuarine water column habitat,
   c) estuarine wetlands, including mangroves and marshes,
   d) submerged aquatic vegetation (including seagrass),
   e) waters that support diadromous fishes, and their spawning habitats
   f) waters hydrologically and ecologically connected to waters that support EFH.

4. Siting and design of onshore receiving, holding, and transport facilities could have impacts on wetlands, shallow habitats such as oyster reefs and submerged aquatic vegetation, and endangered species' habitats if they are not properly located.

5. 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. 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 such as gag grouper and gray snapper – unconsolidated bottoms and live/hardbottoms in the estuaries,
d) Black Sea Bass (various nearshore waters, including unconsolidated bottom and live/hardbottom to 600 feet),
e) penaeid shrimp (estuarine emergent habitat, offshore habitats used for spawning and growth to maturity, and waters connecting to inshore nursery areas, including the surf zone and inlets, live/hardbottom),
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 and associated organisms (on hard substrates in shallow, mid-shelf, and deepwater),
h) royal red shrimp (upper regions of the continental slope from 180 meters (590 feet) to about 730 meters (2,395 feet), with concentrations found at depths of between 250 meters (820 feet) and 475 meters (1,558 feet) over blue/black mud, sand, muddy sand, or white calcareous mud),
i) rock shrimp (offshore terrigenous and biogenic sand bottom habitats from 18 to 182 meters in depth with highest concentrations occurring between 34 and 55 meters. This applies for all areas from North Carolina through the Florida Keys. Essential fish habitat includes the shelf current systems near Cape Canaveral, Florida which provide major transport mechanisms affecting planktonic larval rock shrimp),
j) golden crab (a flat foraminferan ooze habitat; distinct mounds, primarily of dead coral; ripple habitat; dunes; black pebble habitat; low outcrop; and soft-bioturbated habitat),
k) Pennatulacea (sea pens and sea pansies) muddy, silt bottoms from the subtidal to the shelf break, and deepwater corals and associated communities,
l) Highly Migratory Species (areas identified as EFH for managed by the Secretary of Commerce (e.g., inlets and nearshore waters, including shark pupping and nursery grounds), and
m) Diadromous species (riverine and offshore areas that support, including important prey species such as shad, herring and other alosines in addition to Shortnose and Atlantic sturgeon).

6. Many of the habitats potentially affected by these activities have been identified as EFH-HAPCs by the SAFMC. Each EFH-HAPC, type of activity posing a potential threat and FMP is provided as follows:

EFH-HAPC	Activity	FMP
Nearshore hardbottom	LNG regasification, pipelines and power plants	Snapper Grouper
Coastal inlets	estuarine hydrokinetic; LNG regasification, pipelines,	Shrimp, Snapper Grouper

EFH-HAPC	Activity	FMP
Spawning sites	estuarine hydrokinetic; LNG regasification and pipelines; and power plants	Shrimp, Snapper Grouper
Manganese outcroppings on the Blake Plateau	oil and gas; methane hydrate mining; marine hydrokinetic; LNG regasification and pipelines	Snapper Grouper, Golden Crab
Pelagic and benthic *Sargassum*	wind; oil and gas; marine hydrokinetic; LNG regasification and pipelines	Snapper Grouper, Dolphin Wahoo
Inshore and nearshore areas to the ends of the sandy shoals of Cape Lookout, Cape Fear, and Cape Hatteras, North Carolina; Hurl Rocks, South Carolina; and *Phragmatopoma* (worm reefs) reefs off the central coast of Florida and near shore hardbottom south of Cape Canaveral	wind; oil and gas; marine hydrokinetic; LNG regasification and pipelines	Coastal Migratory Pelagics
Atlantic coast estuaries with high numbers of Spanish mackerel and cobia from ELMR, to include Bogue Sound, New River, North Carolina; Broad River, South Carolina	estuarine hydrokinetic; LNG on-shore facilities; and power plants	Coastal Migratory Pelagics
Florida Bay, Biscayne Bay, Card Sound, and coral hardbottom habitat from Jupiter Inlet through the Dry Tortugas, Florida	wind; oil and gas; marine hydrokinetic; LNG regasification and pipelines	Spiny Lobster
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	wind; oil and gas; marine hydrokinetic; LNG regasification and pipelines	Coral, Coral Reef, and Live Hard/bottom
Council-designated Artificial Reef Special Management Zones (SMZs)	wind; oil and gas; methane hydrate mining; marine hydrokinetic; LNG regasification and pipelines	Snapper Grouper, Coastal Migratory Pelagics, Coral, Coral Reef, and Live Hard/bottom Habitat
Troughs and terraces intermingled with sand, mud, or shell hash at depths of 150 to 300 meters	wind; oil and gas; marine hydrokinetic; LNG regasification and pipelines	Snapper-grouper [golden tilefish]
Rock overhangs, rock outcrops, manganese-phosphorite rock slab formations, and rocky reefs	wind; oil and gas; marine hydrokinetic; LNG regasification and pipelines	Snapper-grouper [blueline tilefish]
HAPCs designated for HMS species (e.g., sharks) in the South Atlantic region – exploration and development	wind; oil and gas; marine hydrokinetic; LNG regasification and pipelines	Highly Migratory Species (NMFS FMP)

EFH-HAPC	Activity	FMP
Deepwater Coral HAPCs are designated as Snapper Grouper EFH-HAPCs: Cape Lookout Coral HAPC, Cape Fear Coral HAPC, Blake Ridge Diapir Coral HAPC, Stetson-Miami Terrace Coral HAPC, and Pourtalés Terrace Coral HAPC	wind; oil and gas; marine hydrokinetic; methane hydrate mining, LNG regasification and pipelines	Coral, Coral Reef, and Live Hard/bottom Habitat
Estuarine emergent and mangrove wetlands	estuarine hydrokinetic; LNG on-shore facilities; and power plants	Shrimp, Snapper Grouper
Seagrass	estuarine hydrokinetic; LNG on-shore facilities; and power plants	Shrimp, Snapper Grouper
State-designated nursery habitats (e.g., Florida Aquatic Preserves)	estuarine hydrokinetic; LNG on-shore facilities; and power plants	Shrimp, Snapper Grouper

7. Habitats likely to be affected by energy activities include many recognized in state level fishery management plans. Examples of these habitats include Strategic Habitat Areas (SHAs) such as those established by the State Marine Fisheries Commissions via FMPs, coastal habitat protection plans, or other management provisions. North Carolina SHAs, are a "subset of the overall system that includes a representative portion of each unique habitat so that overall biodiversity and ecological functions are maintained." NCMFC has established 20 units for Region 1; 67 units for Region 2; and 48 units for Region 3.

Threats to Marine and Estuarine Resources from Energy Exploration and Development Activities

The SAFMC finds that energy exploration and development activities threaten or potentially threaten EFH through the following mechanisms:

1. Direct mortality and displacement of organisms at and near dredging (Clarke et al. 2000), drilling or trenching sites , in addition to the installation of facilities and operation of such facilities .

2. Deposition of fine sediments (sedimentation) and drilling muds down-current from drilling, dredging, trenching, and/or backfilling sites. In a review of over 77 published studies that examine the effects of sedimentation and turbidity with 89 coral species, Erftemeijer et al. (2012) concluded increased sedimentation cause smothering and burial of coral polyps, shading, tissue necrosis, and unhealthy high concentrations of bacteria in coral mucus. Turbidity and sedimentation also reduce the recruitment, survival, and settlement of coral larvae.

3. Chronic elevated turbidity in and near drilling, dredging, trenching, and/or backfilling sites, which can interfere with foraging by fish and shrimp and abrade their gills and other soft tissues (Lindeman and Snyder 1999).

4. Direct mortality of eggs and larvae of marine organisms from water intake (Gallaway et al. 2007); post-larvae, juveniles and adults of marine and estuarine organisms due to spills from pipelines, or from vessels in transit near or close to inlet areas.

5. Alteration of long-term shoreline migration patterns with complex ecological consequences due to the placement of facilities (nearshore/offshore.)

6. One of the risks associated with horizontal directional drilling (HDD) is the escape of drilling mud into the environment as a result of a spill, collapse of the drill hole or the rupture of mud to the surface, which is commonly known as a "frac-out". A frac-out is caused when excessive drilling pressure results in drilling mud leaching vertically toward the surface. Because HDD activities occur in proximity to sensitive habitats (e.g., seagrass, coral), burial of habitat could result from "frac-outs" associated with HDD.

7. Permanent conversion of soft bottom habitat to artificial hardbottom habitat through installing a hard linear structure (i.e., a pipe covered in articulated concrete mats) can occur and the ecological effects of this habitat conversion are not well-understood.

8. Impacts to benthic resources from placement and shifting of anchors (Rogers and Garrison 2001), cables (Messing 2011; Gilliam and Walker 2012), pipelines, and other types of direct mechanical damage such as damage from deployment of instrumentation (e.g., Acoustic Doppler Current Profiles).

9. Alterations in amount and timing of riverflow and significant blockage or reduction in area of critical spawning habitat resulting from damming or diverting rivers

10. Alteration of community diversity, composition, food webs and energy flow due to addition of structure (Sammarco, Paul W. 2014; Claisse et al. 2014).

11. Fish behaviour and health may be negatively impacted by anthropogenic sound depending on sound pressure levels and the duration of the sound producing activity (Popper et al 2014).

12. Operation of power plants can alter water quality The greatest risk to aquatic and estuarine ecosystems posed by power plant cooling systems is continuous exposure to sublethal stressors, such as changes in water quality, rather than the abrupt mortality of large numbers of organisms due to impingement and entrainment (Clark and Brownell 1973; Laws 2000; Kulkarni et al. 2011). Water quality (inclusive of temperature and salinity) is known to be a driver of fine scale spatial variation in nearshore fish communities, e.g., in Biscayne Bay (Serafy et al. 1997; 2003; 2005; Faunce and Serafy 2007).

13. The interactions among all effects (including lethal and sub-lethal; direct and indirect; short-term, long-term, and cumulative) affect the magnitude of the overall impacts. Such interactions may result in a scale of effect that is multiplicative rather than additive. The effects of those interactions are largely unstudied and almost completely unknown.

SAFMC Policies for Energy Exploration and Development Activities

The SAFMC establishes the following policies and best management practices (BMPs) related to energy exploration and development activities and related projects, to clarify and augment the general policies already adopted in the Habitat Plan and Comprehensive Habitat Amendment (SAFMC 1998a; SAFMC 1998b; SAFMC 2009a). The following is intended to include existing relevant guidance documents (e.g., *Alternative Energy Environmental Information Needs* (USDOI, MMS 2007a):

General Policies:

1. Projects should avoid, minimize, and – where possible – offset damage to EFH, EFH-HAPCs, and SHAs. This should be accomplished, in part, by integrating the best available and least damaging technologies into the project design.

2. Projects should avoid intersection or overlap with Allowable Fishing Areas within the Deepwater Coral HAPCs.

3. All facilities associated with energy exploration and development, should be designed to avoid or minimize to the maximum extent practicable impacts on coastal ecosystems and sand sharing systems.

4. Projects should comply with existing standards and requirements regulating domestic and international transportation of energy products including regulated waste disposal and emissions which are intended to minimize negative impacts on and preserve the quality of the marine environment.

5. Open-loop LNG processing facilities should be avoided in favor of closed-loop systems. Water intake associated with closed-loop should be minimized and the effects to fishery resources should be determined through baseline studies and project monitoring.

6. Pilot scale projects should not occur in areas where full-scale efforts are predicted to be environmentally unacceptable (e.g., MPAs, CHAPCs, and Spawning SMZs).

EFH Review, Administrative Policies, Licensing Policies and Best Management Practices:

1. EFH Assessments prepared for energy-related projects include the mandatory components set forth in 50 CFR Part 600, Subpart K:
    - A description of the proposed action;
    - An analysis of the effects, including cumulative effects, of the action on EFH, the managed species, and associated species by life history stage;
    - The Federal agency's views regarding the effects of the action on EFH; and
    - Proposed mitigation

2. Projects requiring expanded EFH consultation should provide a full range of alternatives, along with assessments of the relative impacts of each on each type of EFH, EFH-HAPC, and SHAs. Expanded EFH consultations allow NMFS and a Federal action agency the maximum opportunity to work together in the review of an activity's impact on EFH and the development of EFH conservation recommendations. Expanded consultation procedures must be used for Federal actions that would result in substantial adverse effects to EFH. Federal action agencies are encouraged to contact NMFS at the earliest opportunity to discuss whether the adverse effect of a proposed action makes expanded consultation appropriate.

3. Impact evaluations should include quantitative assessments for each habitat based on recent scientific studies, habitat characterizations, and the best available information. All EFH assessments should be based upon the best available science, be conservative, and follow precautionary principles as developed for various Federal and State policies. EFH Assessments are produced with information gathered from the best available technologies to map and characterize project sites (e.g., see Vinick et al. 2012). The methods used for habitat mapping and characterization work should reflect input from resource trustees and be performed with experienced personnel.

4. Existing transportation infrastructure (e.g., existing cables or pipelines) should be utilized wherever practicable in order to avoid or minimize environmental impacts.

5. The effects of sound from proposed projects on fish behaviour and health should be considered in EFH Assessments.

6. Compensatory mitigation should not be considered until avoidance and minimization measures have been duly demonstrated. Compensatory mitigation should be required to offset losses to EFH, including losses associated with temporary impacts, and should take into account uncertainty and the risk of the chosen mitigation measures inadequately offsetting the impacts. Mitigation

should be local, "up-front," and "in-kind," and include long-term monitoring to assess and ensure the efficacy of the mitigation program selected.

7. Modelling efforts should fully characterize assumptions applied and disclose any potential biases that may affect results

8. Determination of the physical and chemical oceanographic and meteorological characteristics of the area should be done through field studies by lead action agencies, cooperating agencies, academics, or the applicant. These characteristics include but are not limited to, on-site direction and velocity of currents and tides, sea states, temperature, salinity, water quality, wind storms frequencies, and intensities and icing conditions. Studies should also include a detailed characterization of seasonal surface currents and likely spill trajectories. Such studies must be conducted prior to approval of any Exploration Plan or Development and Production Plan in order to have adequate information upon which to base decisions related to site-specific proposed activities.

9. The Environmental Impact Statement (EIS), Environmental Assessment (EA) or EFH Assessment for any outer continental shelf oil and gas lease sale should address impacts, if any, from activities specifically related to natural gas production, safety precautions required in the event of the discovery of "sour gas" or hydrogen sulfide reserves and the potential for cross-shelf transport of hydrocarbons to nearshore and inshore estuarine habitats by Gulf Stream spin-off eddies. The EIS, EA, or EFH Assessment should also address the development of contingency plans to be implemented if problems arise due to oceanographic conditions or bottom topography, the need for and availability of onshore support facilities in coastal areas, and an analysis of existing facilities and community services in light of existing major coastal developments.

10. License or permit decisions for construction projects that penetrate or attach to the seabed should be based on geotechnical studies completed to ensure that the geology of the area is appropriate for the construction method and that geological risks are appropriately mitigated.

11. Adequate spill containment and clean-up equipment should be maintained for all development facilities, and, the equipment shall be available on-site or located so as to be on-site within the landing time trajectory.

12. Bonds must be required and must be adequate to assure that resources will be available for unanticipated environmental impacts, spill response, clean-up and environmental impact assessment.

13. Exploration and development activities should not disrupt or impede known migratory patterns of endangered and threated species, nor shall they disrupt or impede the breeding or nesting seasons of endangered and threatened species.

This may necessitate the imposition of seasonal, spatial, or other constraints on exploration and development activities.

14. Licenses and permits clearly should describe required monitoring before, during and after the project in sufficient detail to document pre-project conditions and the initial, long-term, and cumulative impacts of the project on EFH. Monitoring and, if necessary, for adaptive management shall be required for the life of the project. The monitoring methods should reflect input from resource trustees and be conducted by experienced personnel.

15. Third party environmental inspectors shall be required on all projects to provide for independent monitoring and permit compliance.

16. Hydrotest chemicals that may be harmful to fish and wildlife resources should not be discharged into waters of the United States.

17. Licenses or permits should require all project-related work vessels that traverse any reef system or sensitive habitat to be equipped with standard navigation aids, safety lighting and communication equipment. Equipment, such as tow lines, that could drag along the bottom and impact benthic habitat should be secured during transit. U.S. Coast Guard automated identification system (AIS) requirements must be followed.

18. Any anchor placement should completely avoid corals and be visually verified by diver or remote camera. In addition, measures to avoid anchor sweep should be developed and implemented.

19. Appropriate buffers should be designated around sensitive marine habitats.

20. A contingency plan should be required to address catastrophic blowouts or more chronic material losses from LNG facilities, including trajectory and other impact analyses and remediation measures and responsibilities.

21. Licenses and permits should require the development of resource sensitivity training modules specific to each project, construction procedures, and habitat types found within the project impact area. This training should be provided to all contractors and sub-contractors that are anticipated to work in or adjacent to areas that support sensitive habitats.

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