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draft

POLICY CONSIDERATIONS FOR DEVELOPMENT OF ARTIFICIAL REEFS IN THE SOUTH ATLANTIC REGION AND PROTECTION OF ESSENTIAL FISH HABITAT

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Introduction

This document provides the South Atlantic Fishery Management Council (SAFMC) guidance regarding protection and mitigation (avoidance, minimization, and compensatory mitigation) of Essential Fish Habitat (EFH) and Habitat Areas of Particular Concern (EFH-HAPCs) related to artificial reef development, placement, and maintenance. Artificial reefs, sometimes called "manmade reefs", " fish havens", or "constructed reefs", are broadly defined as any structure placed on the seabed, either deliberately or accidentally (e.g., shipwrecks), that acts similar to natural hard-bottom reefs and enhances fish habitat (Seaman 2000; Seaman and Sprague 1991). Properly sited artificial reefs can provide habitat for a wide variety of invertebrates and finfish, improve survival for species that are hard-bottom limited (Broughton 2012), serve as memorials, or stabilize coastlines (Harris,L 2006). They can also enhance existing ecosystems or create new ones to fill in gaps where EFH has been damaged or lost (Ambrose 1994; Koenig 2001; Dupont 2008). The effectiveness of an artificial reef in the enhancement of fishing varies and is dictated by geographical location, species targeted, stock health, and design and construction of the reef (Bohnsack 1989; Seaman 2000; Baine 2001). Artificial reefs may provide essential habitat while simultaneously acting to deflect pressure from surrounding natural hard bottom (e.g., Streich et al., 2017), including specially managed areas (e.g., Harmelin 2000); however, increased productivity may be offset by increased fishing pressure (Seaman 2000, Powers et al. 2003). For these reasons, permitted artificial reef sites are considered EFH by the SAFMC.

In addition to serving as EFH, this policy highlights that the Council has designated artificial reefs Special Management Zones (SMZs) as EFH-HAPCs. As a whole, 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, the findings assess potential threats and impacts to managed species EFH and EFH-HAPCs and the South Atlantic ecosystem associated with artificial reefs and processes that could improve those resources or place them at risk. The policies and

recommendations established in this document are designed to address such impacts in accordance with the habitat policies of the SAFMC as mandated by law. The SAFMC may revise this guidance in response to 1) changes in conditions in the South Atlantic region, 2) applicable laws and regulatory guidelines, 3) new knowledge about the impacts or 4) as deemed as appropriate by the Council.

Policy Considerations

Artificial reefs have the effect of changing habitats from a soft substrate to a hard substrate system or of adding higher relief to low relief (< 1m) hard substrate systems. Historically, fishermen created artificial reefs as fish attractants (Lindberg and Seaman 2011). An ongoing debate within the scientific community exists as to whether artificial reefs simply aggregate current individuals or actually enhance production (e.g., Bohnsack 1989, Pickering and Whitmarsh 1997; Lindberg 1997, Osenberg et al. 2002; Powers et al. 2003; Brickhill et al. 2005). The answer to that question can only be determined by viewing individual artificial reefs in a broader ecological context. For example, are fisheries habitat-limited (production) or recruitment-limited (aggregation) (Lindberg and Seaman 2001)? When well sited, the augmentation of species composition and local abundance of important species in a specific area are often seen as the primary benefits of reef deployment activities. Demersal reef-dwelling finfish, pelagic planktivores, and pelagic predators can use natural and artificial hard substrates in similar ways and often interchangeably (Arena et al 2007). In addition to location, temporal variation exists: elevated fish densities occur quickly after deployment (Bohnsack 1989), but substantial uncertainty remains about estimating overall fish production long-term (Powers et al. 2003, Lindberg et al. 2006). Finally, artificial reefs may affect species and life history stages differently: many reef-associated species occur on both natural and artificial reef habitats, with significant differences in the fish communities (Patterson et al. 2014; Streich et al. 2017).

As long noted by researchers, the physical characteristics of artificial reef habitat may result in differences in the observed behavior of fish species on or around such structures in contrast to behavior observed on equivalent areas of natural hard-bottoms (Bohnsack 1989; Lindberg et al 2006). Some reef structures, particularly those of higher relief, seem to yield generally higher densities of managed and non-managed pelagic and demersal species than a more widely spread lower relief, natural hard-bottom or reef (Rountree 1989; Collins et al 2016, Streich et al. 2017). However, many fishes in Gulf of Mexico studies have been documented as older and more fecund on natural reefs (Glenn et al. 2017; Karnauskas et al. 2017). The fishery management implications of these differences must be recognized and taken into consideration when planning, developing, and managing artificial reefs as EFH (Lindberg and Seaman 2011).

The proper placement of artificial materials in the marine environment can provide for the development of a healthy reef ecosystem, including intensive invertebrate communities and fish assemblages of value to both recreational and commercial fishermen. The effectiveness of an artificial reef in the enhancement of fishing varies and is dictated by geographical location, species targeted, stock health, and design and construction of the reef (Bohnsack 1989; Strelcheck et al. 2007). Artificial reefs have developed an impressive track record of providing beneficial results, as estimated in recent models and measured by fishing success for a wide range of finfish species (e.g., Pitcher et al. 2002, Gallaway et al. 2009). To date, artificial reefs have been chiefly employed to create specific, reliable, and more accessible opportunities for

recreational anglers. They have been used to a lesser extent to enhance commercial fishing probably because artificial reef total area is small compared to much larger, traditionally relied-upon, natural commercial fishing grounds.

Threats to EFH and EFH-HAPCs in Regards to Artificial Reefs

The SAFMC finds that properly-sited artificial reefs in the South Atlantic can enhance EFH for managed species, but can also negatively impact EFH and EFH-HAPCs and managed fisheries if not deployed properly (e.g. Osborne Reef Project[1]). Table 1 presents a summary of fisheries and habitat designations potentially affected by artificial reef development in the South Atlantic as presented in the SAFMC EFH User Guide (http://safmc.net/download/SAFMCEFHUsersGuideFinalRevAug17.pdf).

SAFMC Policies Addressing South Atlantic Artificial Reefs

The SAFMC establishes the following policies to address development of South Atlantic artificial reefs, and to clarify and augment the general policies already adopted in the Habitat Plan and Comprehensive Habitat Amendment and Fishery Ecosystem Plan (SAFMC 1998a; SAFMC 1998b; SAFMC 2009a).

***General Policies*:**

Uses

1. Artificial reefs can serve a variety of purposes beyond recreational and commercial activities. These potential purposes include areas for spawning, breeding, feeding, and refuge for growth to maturity of numerous marine organisms including Council-managed species.

2. The Council supports state requests to designate specific artificial reefs as SMZs for research and production in an effort to prevent overexploitation of specific artificial reef sites.

3. Artificial reefs can be used to support fisheries management by providing a more standardized comparison for scientific investigations.

Siting

4. Artificial reef managers should consult with all stakeholders (e.g., commercial trawlers, seismic surveyors) prior to siting in order to reduce user conflict and maximize the value of artificial reefs as EFH (Paxton et al. 2017).

5. Artificial reefs should be sited in a manner that connects the various life history stages of the target species (i.e., reduces habitat bottlenecks at specific life stages) or enhances a bottlenecked life history stage.

[1] http://www.dep.state.fl.us/waste/categories/tires/pages/osborneproject.htm

6. Properly sited artificial reefs are EFH and are not detrimental to migratory species such as right whales or Atlantic sturgeon.

7. Properly sited artificial reefs are not hazards to navigation; they are charted and deployed with navigation as part of the design.

Construction

8. The SAFMC requires the use of environmentally-safe, long-lasting materials for reef construction, which are stable in their location and avoid any potential danger to other species (e.g., sea turtles) and habitats (Lindberg & Seaman 2011; Barnette 2017).

9. Managers should use proper design and placement (e.g., relief, distance from shore, proximity to other habitats) to target specific life stages and species.

10. The impacts of decommissioning structures such as oil or gas platforms, offshore wind foundations, tactical aircrew combat training system (TACTS) towers, or navigational aids, should be considered on a case-by-case basis.

Mitigation

11. There should be mitigation measures specified if the function of an artificial reef is lost. Artificial reefs can be used to mitigate for damage to natural reefs and for damage to artificial reefs. However, natural (and to an extent artificial) reef habitat is not perfectly replaceable, so caution should be taken to reduce damage to natural and artificial reefs when possible.

12. Investigation on the potential of artificial reef construction to compensate fishers (as in "buy-back") for any future expansion of those SMZ areas designated as ‘no harvest’ should be conducted.

Habitat and Species Research Associated with Artificial Reef Development

The SAFMC encourages the funding of scientific research on the following topics:

Biological

1. Long-term ‘no take’ experiments on artificial reefs to statistically demonstrate any potential production of snapper and grouper through strict protection of spawning and juvenile growth.

2. Site selection and spatial habitat utilization by life stages and species life histories (e.g., nursery, spawning, etc.).

3. Community dynamics on artificial reefs and how they interact with communities on adjacent habitats.

4. Understanding the application of small scale scientific results to large scale regional fisheries management. E.g., how to apply results from local or specific individual artificial reef sites to a state or regional basis.

5. The feasibility of incorporating artificial reef habitat into ecosystem management and understanding the potential role of artificial reefs in fisheries management.

6. The role of artificial reefs in the recruitment and expansion of invasive species.

7. The connectivity of the designated reef areas regionally, relative to migration between and residence time on, specific sites (e.g., acoustic tagging studies).

Socioeconomics

8. The socioeconomic impacts of artificial reefs relative to the fishing and diving communities, in addition to the economic impact to local coastal municipalities.

Physical

9. The stability, durability, sedimentation, and subsidence of various reef structure metrics and placement in order to maximize ecological benefits and reduce entrapment or secondary effects and debris.

The SAFMC also encourages:

10. Long-term, multi-year standardized monitoring of artificial reefs and their communities, with the necessary long-term funding, to provide multi-year trends in reef fish productivity and allow valid future comparisons of temporal and spatial data.

11. Inter-state and/or national collaboration by developing similar data collections with regional or national data access.

12. Development and application of new innovations and techniques to ensure that regulations established for artificial reefs, especially no harvest areas, are enforced and violators are apprehended and prosecuted for illegal use of gears and/or poaching to the fullest extent of the law.

13. Conducting regional public education and outreach regarding the benefits of artificial and human made reefs for special purposes, including no harvest production (MPA and SMZ) areas and disposing of mono-filament fishing lines on shore, away from reefs.

14. Increasing public awareness and collaboration with regional recreational divers to remove debris, document fish species and maintain healthy reef function.

Many habitats in the South Atlantic Region susceptible to the effects of artificial reef development have been designated as EFH and EFH-HAPCs by the SAFMC (Table 1).

Table 1. Habitats designated as Essential Fish Habitat (EFH), their associated managed fisheries/species, and EFH-HAPCs (Source: SAFMC EFH Users Guide 2016).

Essential Fish Habitat	**Fisheries/Species**	**EFH- Habitat Areas of Particular Concern**
Wetlands		
Estuarine and marine emergent wetlands	Shrimp, Snapper Grouper	Shrimp: State designated nursery habitats Mangrove wetlands
Tidal palustrine forested wetlands	Shrimp	
Submerged Aquatic Vegetation		
Estuarine and marine submerged aquatic vegetation	Shrimp, Snapper Grouper, Spiny lobster	Snapper Grouper, Shrimp
Shell bottom		
Oyster reefs and shell banks	Snapper Grouper	Snapper Grouper
Coral and Hardbottom		
Coral reefs, live/hardbottom, medium to high rock outcroppings from shore to at least 600 ft where the annual water temperature range is sufficient for a particular species.	Snapper Grouper, Spiny lobster, Coral, Coral Reefs and Live Hard/bottom Habitat	The Point, Ten Fathom Ledge, Big Rock, MPAs; The *Phragmatopoma* (worm reefs) off central east coast of Florida and nearshore hardbottom; coral and hardbottom habitat from Jupiter through the Dry Tortugas, FL; Deepwater CHAPCs

rock overhangs, rock outcrops, manganese-phosphorite rock slab formations, and rocky reefs		Snapper Grouper [blueline tilefish]
Artificial reefs	Snapper Grouper	Special Management Zones
Soft bottom		
Subtidal, intertidal non-vegetated flats	Shrimp	
Offshore marine habitats used for spawning and growth to maturity	Shrimp	
Sandy shoals of capes and offshore bars	Coastal Migratory Pelagics	Sandy shoals; Capes Lookout, Fear, Hatteras, NC; Hurl Rocks, SC;
troughs and terraces intermingled with sand, mud, or shell hash at depths of 150 to 300 meters		Snapper Grouper [golden tilefish]
Water column		
Ocean-side waters, from the surf to the shelf break zone, including Sargassum	Coastal Migratory Pelagics	
All coastal inlets	Coastal Migratory Pelagics	Shrimp, Snapper Grouper
All state-designated nursery habitats of particular importance (e.g., PNA, SNA)	Coastal Migratory Pelagics	Shrimp, Snapper Grouper
High salinity bays, estuaries	Cobia in Coastal Migratory Pelagics	Spanish mackerel: Bogue Sound, New River, NC; Broad River, SC
Pelagic Sargassum	Dolphin	

Gulf Stream	Shrimp, Snapper Grouper, Coastal Migratory Pelagics, Spiny lobster, DolphinWahoo	
Spawning area in the water column above the adult habitat and the additional pelagic environment	Snapper Grouper	

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