SOUTH ATLANTIC FISHERY MANAGEMENT COUNCIL

4055 FABER PLACE DRIVE, SUITE 201

NORTH CHARLESTON, SOUTH CAROLINA 29405

TEL 843/571-4366 FAX 843/769-4520

Toll Free: 1-866-SAFMC-10

E-mail: safmc@safmc.net Web site: www.safmc.net

Duane Harris, Chairman
David Cupka, Vice-Chairman

Robert K. Mahood, Executive Director
Gregg Waugh, Deputy Executive Director

POLICIES FOR THE PROTECTION OF SOUTH ATLANTIC ECOSYSTEMS FROM INVASIVE SPECIES

(January 2010)

Policy Context

This document establishes the policies of the South Atlantic Fishery Management Council (SAFMC) regarding protection of South Atlantic ecosystems from potential impacts associated with invasive species. The policies are designed to be consistent with the overall habitat protection policies of the SAFMC as formulated in the Habitat Plan (SAFMC 1998a) and adopted in the Comprehensive EFH Amendment (SAFMC 1998b) and the various Fishery Management Plans (FMPs) of the Council.

The findings presented below assess potential impacts to the South Atlantic's ecosystems posed by invasion of non-native species in offshore and coastal waters and the processes which could place those resources at risk. In adhering to a precautionary approach to management, the SAFMC establishes in this document policies and recommendations designed to avoid, minimize, and offset potential impacts to South Atlantic ecosystems.

According to Pimentel et al. (2000, 2005), the United States spends $137 billion annually on issues related to invasive species, including development of control strategies and removal as well as loss of revenue. Research indicates that non-native organisms may compete with native organisms, alter habitats (Mack et al. 2000; Kolar and Lodge 2001; Rahel 2002; Olden et al. 2004) and reduce biodiversity (Olden et al. 2004).

While the number of introduced non-native marine organisms is small compared to that of terrestrial and freshwater species, introductions have accelerated in recent decades mainly due to increase in coastal development and shipping (Morris & Whitfield 2009). According to the United States Geological Survey (2009), more than 68 marine species have been introduced in Florida, the Caribbean and the Gulf of Mexico. Of these, the majority comprises marine fishes. Invasion by marine fishes is considered highly significant, with the potential to displace native species and impact community structure and biodiversity (e.g., Grozholz et al. 2000; Streftaris et al. 2005; Goren & Galil 2005; Dierking 2007; Albins & Hixon 2008).

The SAFMC finds that:

1. Invasive marine organisms have the potential to cause adverse impacts to a variety of habitats across the shelf and to nearshore systems including:

    a) exposed hardbottom (e.g. reefs and live bottom) in shallow and deep waters,
    b) submerged aquatic vegetation beds, and
    c) spawning and nursery areas.

2. Certain offshore and nearshore ecosystems are particularly important to the long-term viability of commercial and recreational fisheries under SAFMC management, and are potentially threatened by invasive species, including:

    a) coral, coral reef and live/hardbottom habitat;
    b) marine and estuarine waters;
    c) estuarine wetlands, including mangroves and marshes; and
    d) submerged aquatic vegetation.

3. Portions of the South Atlantic ecosystem potentially affected by invasive species, 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) 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);
    b) black sea bass (various nearshore waters, including unconsolidated bottom and live/hardbottom to 100 feet, and hardbottoms to 600 feet);
    c) penaeid shrimp (offshore habitats used for spawning and growth to maturity, and waters connecting to inshore nursery areas);
    d) 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);
    e) corals of various types and associated organisms (on hard substrates in shallow, midshelf, and deep water);
    f) muddy, silt bottoms from the subtidal to the shelf break, deepwater corals and associated communities; and
    g) areas identified as EFH for Highly Migratory Species managed by the Secretary of Commerce (e.g., sharks: inlets and nearshore waters, including pupping and nursery grounds).

4. Scientists have documented important habitat values for East coast Florida nearshore hardbottom used by over 500 species of fishes and invertebrates, including juveniles of many reef fishes. Equivalent scientific work is just beginning in other South Atlantic states, but life histories suggest that similar habitat use patterns will be found.

5. Invasive marine species present an unacceptable risk to the biological integrity of South Atlantic ecosystems and must be addressed. Moreover, South Atlantic ecosystems, particularly those in Florida, have been shown to be vulnerable to the establishment of nonindigenous species.

6. The addition of invasive lionfish (*Pterois volitans* and *P. miles*) and the nonindigenous orange cup coral (*Tubastraea coccinea*), along with existing coral reef stressors, could cause negative changes in coral reef ecosystems of the South Atlantic region.

SAFMC Policies Addressing Invasive Species

The SAFMC establishes the following general policies related to invasive marine organisms:

1. In instances where an invasive species belongs to a group of organisms included in the Fishery Management Unit (*i.e.*, stony corals), the Council does not consider the invasive species to be included in the Fishery Management Unit (FMU) since such an organism threatens the conservation and management of the FMU.

2. The Council encourages NOAA Fisheries Habitat Conservation Division (HCD) to consider recommending removal of invasive species as a compensatory mitigation measure. When removal of an invasive species occurs in designated EFH, EFH-HAPCs or CHAPCs, the Council would defer to HCD to recommend an appropriate removal method(s) that will avoid or minimize environmental damage.

3. The Council supports the availability of grant funding to promote research targeting invasive species -- including prevention of introductions, evaluation of impacts, expansion control and removal -- through existing partnerships (*i.e.*, SARP) and in cooperation with state and federal agencies including NOAA's Invasive Species Program, the National Invasive Species Council and the Gulf and South Atlantic Aquatic Nuisance Species Panel.

4. The Council will recommend to the National Aquatic Species Task Force, as appropriate, that management plans be developed for potentially invasive species in South Atlantic waters.

5. The Council encourages the development of novel gears to effectively remove invasive species and do not compromise the integrity of South Atlantic ecosystems.

6. The Council strongly supports integrating monitoring of invasive species into existing fishery-independent and dependent programs.

7. The Council supports programs to control invasive species' populations (*e.g.* lionfish) in areas of high ecological/economic importance. The Council supports local harvest strategies that do not impact populations of managed species or their habitats.

Threats from Invasive Marine Organisms

The SAFMC finds the following to constitute potential threats to South Atlantic ecosystems:

1. Potential impacts of the invasion of Indo-Pacific lionfish (*Pterois volitans* and *P. miles*) in South Atlantic waters include reduction of forage fish biomass, increase in algal growth due to herbivore removal by lionfish, and competition with native reef fish.

2. Lionfish have been shown to impact community structure and biodiversity potentially causing cascading trophic impacts on economically important species under SAFMC management.

3. Lionfish competition with native species could hamper stock rebuilding efforts for the Snapper Grouper Complex.

4. Socio-economic impacts of the lionfish invasion could include impacts on commercial and recreational fisheries, the aquarium trade, and coastal tourism industry.

5. Lionfish interactions with humans will continue to increase as lionfish densities increase. The number of envenomations of recreational swimmers, fishermen, and divers is likely to increase.

6. The orange cup coral, *Tubastraea coccinea*, is a stony coral not native to the South Atlantic region. Artificial structures are the preferred habitat and *T. coccinea* is prolific on some artificial structures in the Caribbean, Gulf of Mexico, and off Florida.

7. While there have been no reports of orange cup coral on natural substrate in Florida, it has been observed in the northern Bahamas reefs and it may eventually colonize natural reef/hardbottom in the region.

8. Over 30 species of non-native marine fish have been documented in South Florida waters in the last decade. These species represent a "watchlist" of potential future invaders. It is thought that these species are also aquarium trade releases, similar to lionfish.

References

Albins, M. A., M. A. Hixon. 2008. Invasive Indo-Pacific lionfish *Pterois volitans* reduce recruitment of Atlantic coral-reef fishes. Marine Ecology Progress Series 367: 233–238.

Dierking, J. 2007. Effects of the introduced predatory fish *Cephalopholis argus* on native reef fish populations in Hawaii. Ph.D. Dissertation. University of Hawaii at Manoa. 115 p.

Goren, M., and B. S. Galil. 2005. A review of changes in fish assemblages of Levantine inland and marine ecosystems following the introduction of non-native fishes. Journal of Applied Ichthyology 21: 364-370.

Grozholz, E. D., M. R. Gregory, C. A. Dean, K. A. Shirley, J. L. Maron, and P. G. Conners. 2000. The impacts of a nonindigenous marine predator in California Bay. Ecology 81:1206-1224.

Kolar,C. S. and D. M. Lodge. 2001. Progress in invasion biology: predicting invaders. Trends in Ecology and Evolution 16: 199-204.

Mack, R.N., D. Simberloff, W. M., Lonsdale, H. Evans, M. Clout, and F. A. Bazzaz. 2000. Biotic invasions: Causes, epidemiology, global consequences, and control. Ecological Applications 16:2035-2054.

Morris, J. A., Jr., J. L. Akins, A. Barse, D. Cerino, D. W. Freshwater, S. J. Green, R. C. Munoz, C. Paris and P. E. Whitfield. 2009. Biology and ecology of the invasive lionfishes, *Pterois miles* and *P. volitans*. Proceedings of the Gulf and Caribbean Fisheries Institute 29: 409-414.

Morris, J. A., Jr., and J. L. Akins. 2009. Feeding ecology of invasive lionfish (*Pterois volitans*) in the Bahamian archipelago. Environmental Biology of Fishes 86: 389-398.

Morris, J. A., Jr., and P. E. Whitfield. 2009. Biology, Ecology, Control and Management of the Invasive Indo-Pacific Lionfish: An Updated Integrated Assessment. NOAA Technical Memorandum NOS NCCOS 99. 57 pp.

Olden, J. D., N. L. Poff, M. R. Douglas, M. E. Douglas, and K. D. Fausch. 2004. Ecological and evolutionary consequences of biotic homogenization. Trends in Ecology and Evolution 19: 18-24.

Pimentel, D., L. Lach, R. Zuniga, and D. Morrison. 2000. Environmental and economic costs associated with nonindigenous species in the United States. Bioscience 50: 53-65.

Pimentel, D., R. Zuniga, and D. Morrison. 2005. Update on the environmental and economic costs associated with alien-invasive species in the United States. Ecological Economics 52: 273-288.

Rahel, F. J. 2002. Homogenization of freshwater faunas. Annual Reviews of Ecological Systems 33: 291-315.

Schofield, P. J., J. A. Morris, Jr. and L. Akins. 2009. Field guide to nonindigenous marine fishes of Florida. NOAA Technical Memorandum NOS NCCOS 92. 210 pp.

South Atlantic Fishery Management Council (SAFMC). 1998a. Final Habitat Plan for the South Atlantic region: Essential Fish Habitat Requirements for Fishery Management Plans of the

South Atlantic Fishery Management Council. South Atlantic Fishery Management Council, 1 Southpark Circle, Suite 306, Charleston, SC 29407-4699. 457 pp. plus appendices.

South Atlantic Fishery Management Council (SAFMC). 1998b. Final Comprehensive Amendment Addressing Essential Fish Habitat in Fishery Management Plans of the South Atlantic Region. Including a Final Environmental Impact Statement /Supplemental Environmental Impact Statement, Initial Regulatory Flexibility Analysis, Regulatory Impact Review, and Social Impact Assessment /Fishery Impact Statement. South Atlantic Fishery Management Council, 1 Southpark Circle, Suite 306, Charleston, SC 29407-4699. 136pp.

Streftaris, N., A. Zenetos, and E. Papathanassiou. 2005. Globalisation in marine ecosystems: the story of nonindigenous marine species across European seas. Oceanography and Marine Biology, An Annual Review 43: 319-453.

United States Geological Survey Nonindigenous Aquatic Invasive Species Database (USGS-NAS). 2009. Gainesville, FL. http://nas.er.usgs.gov