Marine Catfishes Guild

Hardhead Catfish *Ariopsis felis*
Gafftopsail Catfish *Bagre marina*

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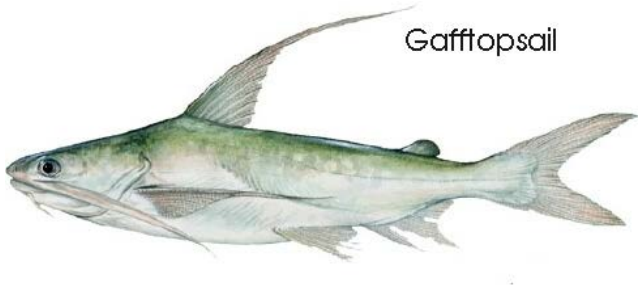

DESCRIPTION

Taxonomy and Basic Description

The marine catfishes, *Ariopsis felis* and *Bagre marina*, belong to the family Ariidae. They lack scales but possess a forked caudal fin (tail), have an adipose fin anterior of the caudal peduncle, and have large, serrated spines on the three forward-most fins (two pectoral and the first dorsal). The spines can induce a painful injury and are covered in a slime that is mildly venomous (Halstead et al. 1990).

The common name for hardhead catfish is derived from the presence of a hard, bony plate extending rearward toward the dorsal fin from a line between the Catfish's eyes. The head is moderately flattened with the upper jaw forming a broad arc. One thread-like barbel is located on either side of the mouth just above the rear corners, and two pairs of white barbels are located on the chin. The rear dorsal (adipose) fin is fleshy and black, unlike the other fins which are membranous and translucent. The back of the fish is generally silvery with blue, green, or brownish tones, while the belly is generally white. The Hardhead Catfish has been reported at sizes up to 70 cm (27 in.) (Acero 2002) but is more commonly found at sizes up to 36 cm (14 in.) in South Carolina's coastal waters (P. Webster, pers. obs.).

The gafftopsail catfish, *Bagre marina*, is readily distinguished from the hardhead by long, thread-like extensions from its dorsal and pectoral fins and more strap-like, rather than rounded, barbels extending from the upper jaw. It has 22-28 anal fin rays and 11-14 pectoral fin rays, compared with 18-20 and 6-10, respectively, in the hardhead catfish.

Status

On occasion, mass mortalities of marine catfish have been observed along the Gulf Coast. There have been no known directed fisheries for marine catfish in South Carolina, but both species

have undergone a dramatic decline in numbers since the mid-1990s, and state regulations stipulate that any caught fish must be released alive immediately.

POPULATION SIZE AND DISTRIBUTION

South Carolina is well within the northern limits for the hardhead catfish and the gafftopsail catfish. *A. felis* has a coastal range from North Carolina to Florida and throughout the Gulf of Mexico to the Yucatán Peninsula (Acero, 2002); other sources indicate that the species may range as far north as Cape Cod at times (Jones et al. 1978). *B. marinus* ranges from Cape Cod, Massachusetts south through coastal Florida and the Gulf of Mexico to Panama (Muncy and Wingo, 1983). Population genetics have not been investigated, so population structures remain unclear.

Hardhead catfish have been prominent in a number of mass mortality incidents in the Gulf of Mexico and appear to be in decline along the Southeastern Atlantic Coast (Wardle et al. 1998; SEAMAP unpub. data). As suggested by trawl surveys, abundance of the Hardhead Catfish in South Carolina experienced two drastic drops during the 1990s. Additional sampling along the Atlantic Coast of the Southeastern United States indicates that abundance remains depressed from North Carolina to Florida (SEAMAP unpub. data). However, since the decline occurred, sampling of coastal waters from Cape Hatteras, North Carolina, to Cape Canaveral, Florida, indicates that the decline in abundance is most pronounced in the northern portion of this range. Gafftopsail catfish are generally less abundant than hardhead catfish, but they too have experienced a sharp and persistent decline in abundance. (See graphs below, Figures 1-3.)

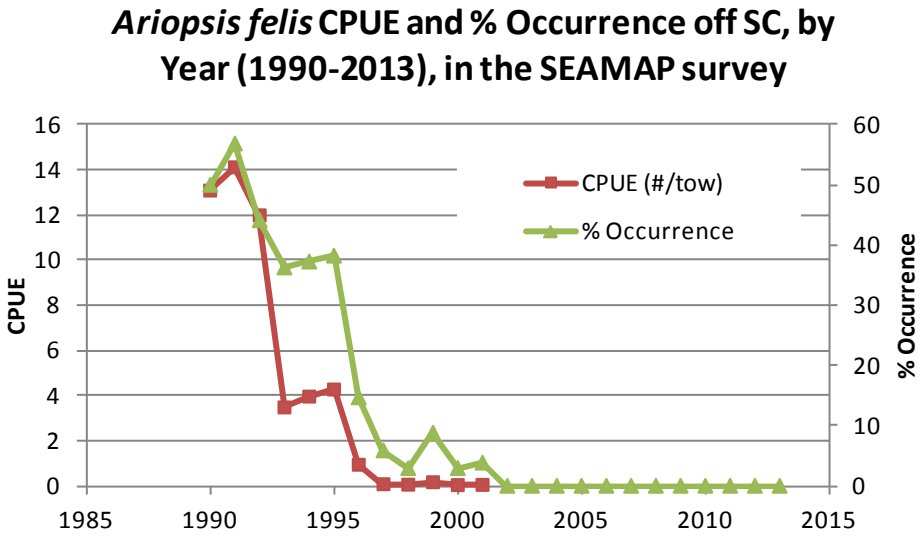

Figure 1: Hardhead catfish declines.

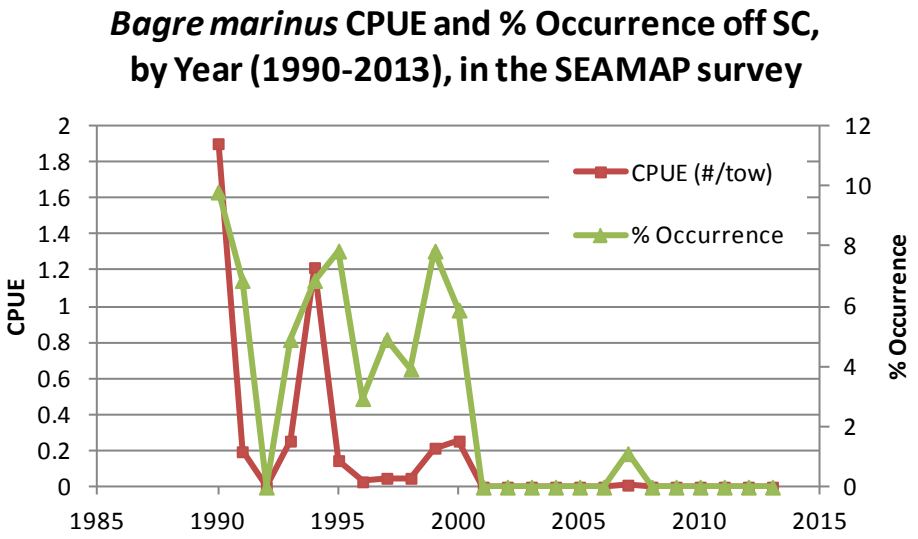

Figure 2: Gafftopsail catfish declines

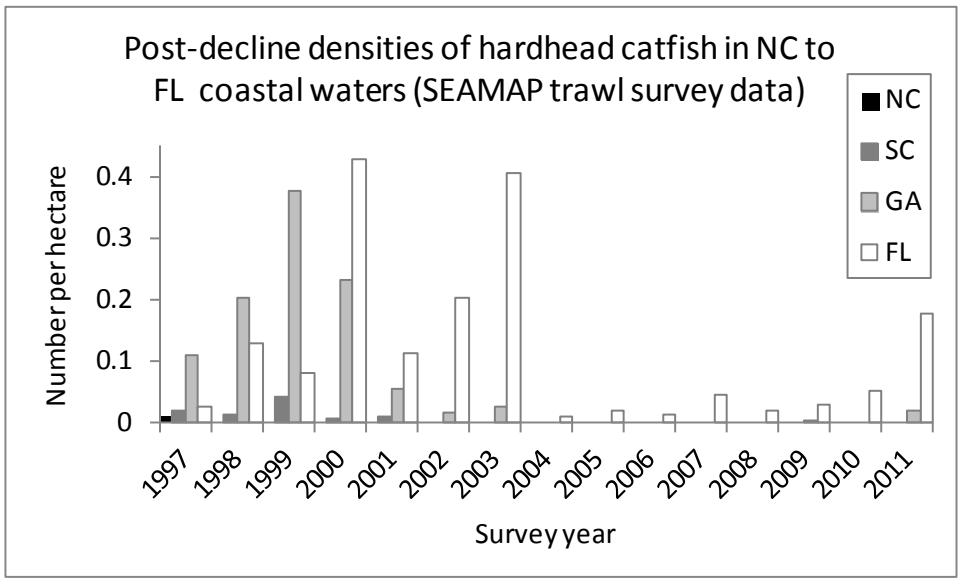

Figure 3: Hardhead catfish SEAMAP trawl survey

Despite reduced abundance over the shallow coastal shelf, marine catfish may be encountered by anglers in estuaries, through the surf zone, and into near-coastal waters of the shelf. A true estimate of population size, considering abundance through all of these habitats, has not been calculated.

HABITAT AND NATURAL COMMUNITY REQUIREMENTS

Marine catfish are generalists, tolerating a wide range of salinities from open ocean to fresh water; however, their occurrence in fresh waters is less common. They are generally found over muddy bottoms, or at least in murky waters (Acero 2002).

Marine catfish are mouth-brooders. Once spawning has occurred, the male will carry the eggs in his mouth until they hatch into larvae in about a month. He may then carry the young for a few more weeks until they are larger and stronger (Jones et al. 1978).

CHALLENGES

Mass mortalities of marine catfish have generally been ascribed to one of three causes: disease (R. Overstreet, USM, pers. comm., June 7, 2005), harmful algal blooms, and/or extremely low levels of dissolved oxygen (hypoxia) (Wardle et al. 1998). It is unclear which, if any, of these agents is the cause of the recent declines of hardhead and gafftopsail catfish observed in South Carolina. A simple decline in abundance, as generally seen for these species in the Atlantic, does not tend to garner the immediate attention elicited by the mass mortalities witnessed along the Gulf Coast and in Indian River Lagoon, Florida.

Chemical contamination in the catfishes' environment provides two very different possible threats. Non-point source pollution may contribute to the occurrence of algal blooms, which, depending on the algal variety, may simply cause hypoxic events (Wardle et al. 1998) or may result in the release of deadly toxins (Steidinger et al. 1998). The second threat comes from contaminants accumulated in the muddy sediments with which this fish is associated. Metals, polycyclic aromatic hydrocarbons (PAHs), and pesticides all accumulate in muddy sediments (Sanger et al. 1999a,b) and have been shown to have detrimental effects on benthic creatures exposed to them. While limited studies have been conducted on the effects of certain compounds on hardhead catfish (Steele 1983a,b), the effects of other pollutants and combination effects are not known. Catfish both live and feed primarily along the bottom, which increases their exposure to contaminants since much of the lower end of their food chain is anchored in benthic organisms. This challenge is not unique to catfish. Bioaccumulation is a threat to the entire food chain, including humans.

CONSERVATION ACCOMPLISHMENTS

There are no known conservation accomplishments specifically for the hardhead or gafftopsail Catfish.

CONSERVATION RECOMMENDATIONS

- Identify whether single or multiple Atlantic and Gulf of Mexico populations exist for each species.
- Examine long-term trends in marine catfish population size and distribution and relate, where possible, to environmental variation.
- Identify causative factors in future marine catfish mortality events.
- Determine if latent pathogens exist in the marine catfish populations. Monitor the population to determine pathogen temporal prevalence, and determine whether mortality events are triggered by pathogens themselves or by some other stressor.
- Investigate whether wild saltwater catfish are plagued by similar diseases to their captive freshwater relatives such as: visceral toxicosis, proliferative gill disease and enteric

septicemia. If so, determine if effluent from aquaculture operations is a significant threat to the marine catfish.
- Develop the capacity to properly investigate possible harmful algal blooms and monitor for such blooms.
- Determine effects of pollutants on marine catfish reproduction, growth, and longevity.
- Determine marine catfish spawning seasons, spawning locations, and recruitment mechanism for the Atlantic Coast.
- Determine marine catfish predator/prey relationships and examine contaminant loads across these relationships.
- Monitor the effectiveness of existing Best Management Practices (BMPs) such as setbacks, retention ponds, and vegetated buffers for preventing nutrient and contaminant runoff into coastal waters.
- Apply and enforce BMPs, such as those utilized by proactive communities.
- Educate the public about the importance of the marine catfish in terms of ecological value. While these species are not commonly utilized as a food fish and it is generally maligned due to its pain-inducing spines, it does have a role to play in coastal ecosystems.

MEASURES OF SUCCESS

If stressors depressing abundance of marine catfish are identified, it may be possible to halt and reverse the downward trend. One indication of this would be a move toward abundance or density values at least approaching those seen in 1993 through 1995 by the SEAMAP trawl survey off of South Carolina. Future actions proposed to remove stresses on marine catfish will likely benefit other benthic organisms as well and thus could be quite valuable from an ecological and even a human health perspective.

LITERATURE CITED

Acero, A. 2002. Ariidae: sea catfishes. Pages 831-852. *In:* The living marine resources of the western central Atlantic. Volume 2. Bony fishes part 1 (Ascipenseridae to Grammatidae), K.E. Carpenter, editor. FAO Species Identification Guide for Fishery Purposes, American Society of Ichthyologists and Herpetologist Special Publication 5. Rome.

Halstead, B.W., P.S. Auerbach and D.R. Campbell, 1990. A colour atlas of dangerous marine animals. Wolfe Medical Publications Ltd, W.S. Cowell Ltd, Ipswich, England. 192 p.

Jones, P.W., F.D. Martin and J.D. Hardy, Jr. 1978. Development of fishes of the mid-Atlantic Bight: an atlas of egg, larval, and juvenile stages. Volume I: Acipenseridae through Ictaluridae. U.S. Fish and Wildlife Service, Office of Biological Programs. FSW/OBS-78/12. Ft. Collins, CO. 366 pp.

Muncy, R .J., and W.M. Wingo. 1983. Species profiles: life histories and environmental requirements of coastal invertebrates (Gulf of Mexico) – sea catfish and gafftopsail . U.S. Fish and Wildlife Service, Division of Biological Services, FWS/OBS-82/11.5. U.S. Army Corps of Engineers, TR EL-82-4. 17 pp.

Sanger, D.M., A.F. Holland, and G.I. Scott. November 1999a. Tidal Creek and Salt Marsh Sediments in South Carolina Coastal Estuaries: I. Distribution of Trace Metals. Archives of Environmental Contamination and Toxicology; 37 (4):445-457.

Sanger, D.M., A.F. Holland, and G.I. Scott. November 1999b. Tidal Creek and Salt Marsh Sediments in South Carolina Coastal Estuaries: II. Distribution of Organic Contaminants. Archives of Environmental Contamination and Toxicology. 37(4):458-471.

Southeast Area Monitoring and Assessment Program – South Atlantic Shallow Water Trawl Survey. Unpublished data 1989-2004.

Steele, C.W. 1983a. Acute Toxicity of Copper to Sea Catfish. Marine Pollution Bulletin. 14(5):168-170.

Steele, Craig W. 1983b. Effects of exposure to sublethal copper on the locomotor behavior of the sea catfish, Arius felis. Aquatic Toxicology. 4:83-93.

Steidinger, K.A., J.H. Landsberg, E.W. Truby and B.S. Roberts. 1998. First report of *Gymnodinium pulchellum* (Dinophyceae) in North America and associated fish kills in the Indian River, Florida. J. Phycol. 34:431-437.

Wardle, W.J., W.G. Denton and D.E. Harper, Jr. 1998. An Account of the 1994 Phytoplankton Blooms and Mass Mortalities of Marine Animals along the Western Louisiana and Northern Texas Coast, with Comparison to Similar Events of 1984. Pp 33-38. *In*: Characteristics and causes of Texas marine strandings. U.S. Department of Commerce, R. Zimmerman (ed.). NOAA Tech. Rep. NMFS 143. 85 pp.