Species of Concern
NOAA National Marine Fisheries Service

Opossum pipefish
Microphis brachyurus lineatus

KEY INFORMATION

Areas of Concern
Southeast Florida to the Rio Grande River (Rio Bravo), Texas.

Year Identified as "Species of Concern"
1991

Factors for Decline
- Habitat destruction
- Water control structures
- Degraded water quality
- Disease

Conservation Designations
IUCN: Not Evaluated
American Fisheries Society: Threatened
Species of Greatest Conservation Need:
FL, LA, and TX.

Drawing courtesy: R. Grant Gilmore.

Brief Species Description:
Opossum pipefish are a widespread species that spawn in low salinity areas of **estuaries**. The lineatus subspecies is known to range from New Jersey south through the Gulf of Mexico and Caribbean to Sao Paulo, Brazil. It also occurs on the Pacific Coast of Panama after having passed through the Panama Canal. The range of the species of concern is shown in Figure 1. It is a relatively large pipefish, reaching a standard length of 7.6 inches (194 mm). It is the only western Atlantic pipefish with a combination of confluent lateral trunk and inferior tail ridges, 17 to 23 pectoral-fin rays, and 9 caudal-fin rays. Fins are generally small and they are not strong swimmers. Opossum pipefish are the only North American pipefish in which the males bear the brood pouch on the trunk rather than the tail (Subfamily Doryrhamphinae). The snout is long (1.5 to 2.0 times in head length), there are 16 to 21 trunk rings and 20 to 26 tail rings. The color of the opossum pipefish is distinctive, especially in breeding adults: the upper snout and back half of the head and body is sienna brown with a series of dark red blotches on each lateral trunk ring forming a red stripe between the lateral and superior trunk ridges; there is a silver stripe on the mid-side between the lateral and inferior trunk ridges, a silver edge on the inferior trunk ridge; the lower half of the snout is bright red with a variable number of black vertical bars, and the caudal fin is also red with a central dark stripe. Juveniles are not as colorful as they are either nearly transparent or light brown with widely spaced dark vertical bars. Juveniles usually have well developed spines on each vertical ridge (scutellum) separating all body and trunk ridges. These scutellar spines are reduced in adults.

Opossum pipefish have not been known to over-winter or breed in the warm temperate (Carolinian) portion of their range. Year round captures indicating permanent populations only occur in southeastern Florida tributaries in the U.S., most notably in the Indian River Lagoon. The smallest juvenile opossum pipefish (< 3 inches or 70 mm TL) have only been captured in oceanic, *Sargassum* rafts, or coastal marine environments, while adults only occur in freshwater tributaries within 50 km (30 miles) of the coast (Gilmore and Hastings 1982; Gilmore 1992, 1999). In Florida, juveniles migrate into freshwater tributaries during the dry season of December to May, a period of minimum

freshwater flow. Maturation, mating and larval release occurs in freshwater during the wet season from June to November, under conditions of maximum water flow. Distribution in local stream systems appears to be very patchy and associated with clumps of emergent vegetation including *Panicum* spp. and *Polygonum* spp. (Gilmore and Hastings 1982, Gilmore 1999a, Gilmore and Frias-Torres 2000). Opossum pipefish are carnivorous, preying on crustaceans and small fish as ambush predators in dense vegetation (Teixeira and Perrone 1998, Frias-Torres 2002). Age at maturation and longevity are unknown, but eggs are rarely present in males less than 120 mm SL.

Adult in *Polygonum* vegetation.

Males incubate up to 953 eggs in the abdominal pouch, making *O. brachyurus lineatus* one of the most fecund pipefishes in North America (Dawson and Vari 1982). The range is from 35 to 734 eggs, with a mean of 383 eggs/male, in Florida (Gilmore 1999a), and 10 to 953 eggs, with a mean of 409 eggs/male in Mexico (Miranda-Marure et al. 2004). Eggs are incubated for 5 to 10 days before larvae hatch and are released by the male. Males can receive at least two different sequential egg batches from females (direct mating behavior and egg deposition observations in Frias-Torres 2002; Miranda-Marure, et al. 2004). Newly released larvae must have **brackish** conditions of near 18 ppt salinity within a day or so of birth in the lab (and for at least two weeks after birth) in order to survive (Gilmore 1999b), indicating a physiology adapted for downstream transport to estuarine and marine environments during the wet season (Frias-Torres 2002). Multiple spawnings per year are possible (Miranda-Marure et al. 2004). Long distance upstream migration has been documented in the St. Lucie River, Florida, and Panama Canal (Dawson and Vari 1982, Gilmore 1992). No more than a dozen or so breeding pairs have been captured at a single location.

Drawing courtesy R. Grant Gilmore

Rationale for "Species of Concern" Listing:

Demographic and Genetic Diversity Concerns:

Nothing is known about annual variation in population size, but the decline in habitat quantity and quality (described below) has likely led to a drastic decrease in population size. Genetic studies have not been conducted on populations of opossum pipefish anywhere within their range. There is evidence the western Atlantic populations have three isolated metapopulations, with the North Atlantic and Caribbean metapopulation including the U.S. distribution (Gilmore 1999b). It is also possible that the Florida populations represent a self recruiting disjunct metapopulation separated from the primary Caribbean gene pool, with extremely rare waifs from southern sources recruiting during exceptional recruitment periods. A maximum of 25 individuals have been captured at a single location. It is estimated that only a few hundred individuals still breed in tributaries to the Indian River Lagoon system of Florida. None have been collected in recent years from Mississippi (Poss 1999). Information on longevity and recruitment rates is lacking.

Factors for Decline:

The major threats to the opossum pipefish are habitat destruction, water control structures, declining water quality, and an increase in disease. These factors have been documented within the primary ecosystems occupied by opossum pipefish. The dependency of opossum pipefish breeding pairs on specific freshwater vegetation species targeted for herbicide treatment in Florida threatens their survival (Gilmore 1999b). Vegetation elimination destroys adult pipefish breeding and feeding habitat. Seawall, dock, and rip rap construction also destroy habitat. Water control structures prevent migration of fish and have altered the hydrologic regime of their habitat. Poor water quality, unnatural water flow rates, and significant atypical freshwater release from artificial water canals and systems (wrong season, exceptional water volume) are typical of the principal riverine system where the pipefish occurs in Florida (the Loxahatchee, St. Lucie, and St. Sebastian rivers). Opossum pipefish are poor swimmers so changes to water velocity can be problematic. Major fish disease outbreaks have occurred after St. Lucie River/Canal freshwater releases were made from Lake Okeechobee. Recent increases in destruction rates of important habitat and declines in water quality indicate that the remaining opossum pipefish populations are vulnerable.

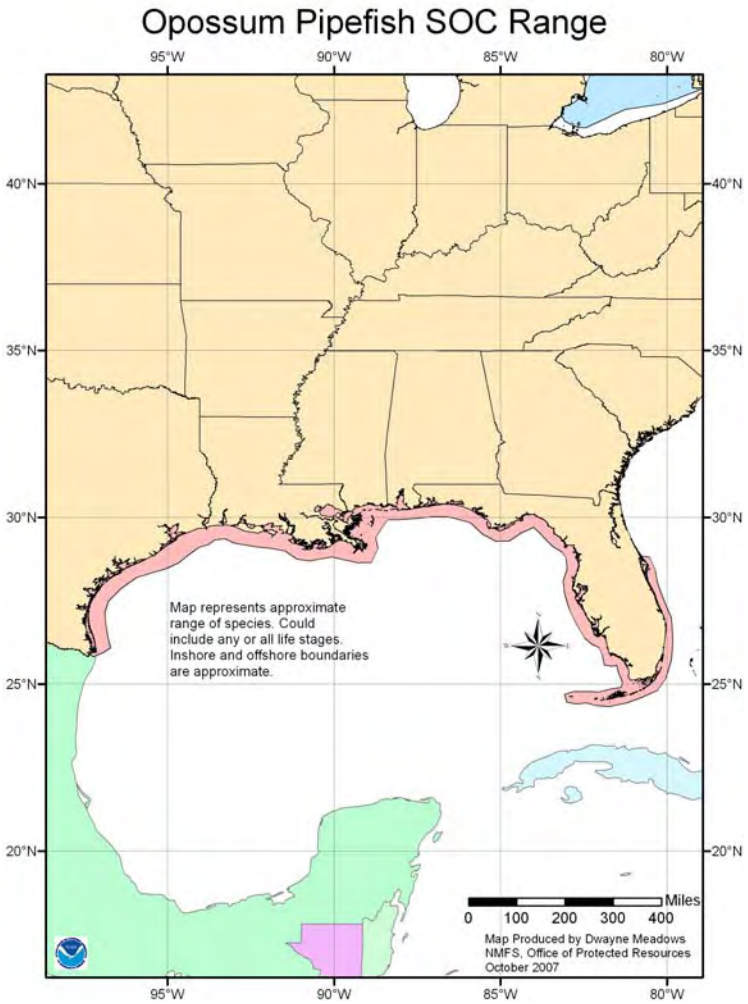

Figure 1. Range of the opossum pipefish species of concern.

Status Reviews/Research Underway: None.

Data Deficiencies:
Larval and juvenile habitat use and needs including freshwater vegetation distribution and abundance, migration dynamics are areas in need of better data.

Existing Protections and Conservation Actions:
Some of the existing spawning habitat is generally protected in parks (Jonathan Dickenson State park of the Loxahatchee River, the north fork of the St. Lucie and parts of the St. Sebastian are in the Florida Aquatic Reserve System), though there are no specific measures to conserve opossum pipefish and all three rivers are still influenced by water control systems.

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Point(s) of contact for questions or further information:

For further information on this Species of Concern, or on the Species of Concern Program in general, please contact NMFS, Office of Protected Resources, 1315 East West Highway, Silver Spring, MD 20910, (301) 713-1401, soc.list@noaa.gov; http://www.nmfs.noaa.gov/pr/species/concern/, or Jennifer Moore, NMFS, Southeast Region, Protected Resources Division, 263 13th Avenue S., St. Petersburg, FL 33701, (727)824-5312, Alex.Meyer@noaa.gov.