

Strongylura marina (Atlantic Needlefish)

Family: Belonidae (Needlefish)

Order: Beloniformes (Flyingfish and Needlefish)

Class: Actinopterygii (Ray-finned Fish)



Fig. 1. Atlantic needlefish, *Strongylura marina*.

[<http://www.thejump.net/id/atlantic-needlefish.htm>, downloaded 5 April 2015]

TRAITS. *Strongylura marina* is a moderately sized, very elongate fish typically about 60cm in length (Hoese and Moore, 1977). Maximum recorded size of 111cm and 2.34 kg (IGFA, 2001); body narrow, slender and cylindrical with hundreds of small thin, flexible, cycloid scales (Ross, 2001). Large eyes with black pigment behind eye extending from the top to mid-eye. Pointed beak-like jaw with hundreds of tiny, sharp teeth (Ross, 2001). Upper body surface green to blue green and lower body surface silvery in appearance (Fig. 1); has a silvery white mid-lateral band and dark predorsal band. Caudal fin truncate to slightly forked.

DISTRIBUTION. Found in the western Atlantic from Maine to the south of Brazil; Occurs in the western Caribbean Sea and coastal waters of the Gulf of Mexico; not present Antilles and Bahamas.

HABITAT AND ACTIVITY. Surface swimmer using eel-like body waves (Liao, 2002). Native to sea/bay/gulf areas; found commonly in estuarine and shallow coastal habitats but can sometimes move to freshwater areas such as coastal ponds. Characteristically euryhaline as evidences by populations present in brackish as well as freshwater environments. The maximum salinity inhabitable by an adult is 36.9 ppt (Hardy, 1978). It can be encountered during the day or night as activity seems to relate to tidal patterns rather than feeding pattern. Tends towards warmer environments and has been known to migrate with the onset of cold seasons (Holt and Holt, 1983). Spawning occurs in shallow inshore habitats but due to the presence of juvenile fish in freshwater environments it is likely that reproduction can also take place there.

FOOD AND FEEDING. *Strongylura marina* are carnivorous and the larger fish are mainly piscivorous. Common diet components are small fishes, mysids, copepods, insects, and shrimp (Hildebrand and Schroeder, 1928; Darnell, 1958; Springer and Woodburn, 1960; Carr and

Adams, 1973). Prey are pursued actively and consumed by ram-feeding. It charges at its target swiftly and clamps it between its jaws. Depending on the position of the prey when clamped, the jaws/teeth are used to alter its orientation so that it is lengthways within the jaw and facing headfirst towards the throat and then can be swallowed easily. Carr and Adams (1973) relate diet to ontogeny as food preferences change in relation to upper and lower jaw sizes. Juveniles' lower jaws are longer than its upper jaws and its diet consists mainly of planktonic invertebrates. At 35-50mm diet is approximately 70% amphipods, shrimp and mysids; 30% fish. Around 50mm diet begins an almost exclusive switch to fish (Boughton et al., 1991). Adult fish have fully developed/elongated upper jaws which are equivalent to the lower jaw in length and mainly feed on fish.

POPULATION ECOLOGY. *Strongylura marina* swim in schools at the surface of the water often alongside tuna. It swims near the surface and have been known to collectively leap out of the water when threatened or excited by artificial light and attack divers, inflicting injury. It can leap out of the water and attack at 50 km per hour. Populations are widespread but its density is such that its numbers do not dominate ichthyofaunas.

REPRODUCTION. As is typical of fish, *Strongylura marina* displays oviparity so embryonic development does not take place within the mother. It scatters eggs prior to fertilisation in open water and does not guard them. Reproductive maturity is noted to be attained in its second year. The left gonad of the female is not developed at maturity. Eggs are demersal, laid near submerged vegetation in shallow water, and adhesive so able to attach themselves to surfaces such as algal mats by means of filamentous tendrils present on the egg's surface. These tendrils, about the same as the egg's diameter, are abundant and consistently spaced (Breder and Rosen, 1966; Foster, 1974; Hardy, 1978). Fertilised eggs are of considerable size having a diameter of 3.5-3.6mm and spherical in shape and have no oil globules. Spawning season varies based on location. Upon hatching larvae are large with an average size of 9-14mm (Foster, 1974; Hardy, 1978). Jaw morphology changes with maturity as the upper jaw grows more slowly than the lower jaw. When just hatched both jaws are short and of equal length but the growth of the lower jaw bypasses the upper so that at a length of less than 35-50mm individuals possess what is referred to as a halfbeak. At this stage the upper jaw is shorter than the lower jaw. At full maturity both jaws are of about equal length giving the mouth a needle appearance.

ANTIPREDATOR BEHAVIOUR. The diet of large piscivorous fish such as *Megalops atlanticus* or tarpon commonly includes needlefish such as *S. marina*. The bottlenose dolphin of Texas and juvenile lemon sharks also feed on *S. marina* but is more of an occasional than a common component of their diets. Its surface swimming tendencies make them attractive prey to birds such as black skimmers (Gordon et al., 2000). *S. marina* remains have also been identified in the droppings of bald eagles. Its defense against predation involves rapid lunging at predators penetrating them with its needle-like nose. It leaps out of the water in a similar manner to flying fish at aerial predators such as birds. Its leaping, rapid, skittish movement in itself serves as a defence as it may make it difficult for a predator to catch them.

REFERENCES

- Boughton, D. A., B. B. Collette, and A. R. McCune. 1991. Heterochrony in jaw morphology of needlefishes (Telostei: Belontiidae). *Syst. Zool.* 40(3):329-354.
- Breder, C.M., Jr., and D.E. Rosen. 1966. *Modes of Reproduction in Fishes*. T.F.H. Publications, Jersey City, N.J. 941 pp.

- Carr, W. E. S., and C. A. Adams. 1973. Food habits of juvenile marine fishes occupying seagrass beds in the estuarine zone near Crystal River, Florida. *Trans. Amer. Fish. Soc.* 102(3):511-540.
- Darnell, R. M. 1958. Food habits of fishes and larger invertebrates of Lake Pontchartrain, Louisiana, an estuarine community. *Univ. Texas, Publ. Inst. Mar. Sci.* 5:353-416.
- FishBase. *Strongylura Marina, Atlantic Needlefish* : Fisheries, Gamefish. <http://www.fishbase.org/summary/974>, downloaded April 5, 2015.
- Foster, N. R. 1974. *Strongylura marina*-Atlantic Needlefish, pp. 125-126 In: *Manual for identification of early developmental stages of fishes of the Potomac River estuary*. A. J. Lippson and R. L. Moran, eds. Environmental Technology Center, Marietta Corp., Baltimore, Md.
- Gordon CA, Cristol DA, and RA Beck. 2000. Low reproductive success of black skimmers associated with low food availability. *Waterbirds: The International Journal of Waterbird Biology* 23:468-474.
- Hardy, J. D., Jr. 1978. Development of fishes of the mid-Atlantic bight. Vol. II. *Anguillidae through Syngnathidae*. FWS/OBS-78/12, U. S. Fish and Wildlife Service, Biological Service Program. 458 pp.
- Holt S.A. and G.J. Holt. (1983). Cold death of fishes at Port Aransas, Texas: January 1982. *The Southwestern Naturalist* 28:464-466.
- Hildebrand, S. F., and W. S. Schroeder. (1928). Fishes of Chesapeake Bay. *Bull. U.S. Bur. Fish.* 43(I):1-336.
- Hoese H.D. and R.H. Moore. (1977). *Fishes of the Gulf of Mexico. Texas, Louisiana, and Adjacent Waters*. College Station TX: Texas A&M University Press.
- IGFA. (2001). Database of IGFA angling records until 2001. International Game Fish Association, Fort Lauderdale FL.
- IUCN. (2014). Red List of Threatened Species. *Strongylura marina*. <http://www.iucnredlist.org/details/155259/0>, downloaded April 5, 2015.
- Liao J.C. (2002). Swimming in needlefish (Belonidae): anguilliform locomotion with fins. *Journal of Experimental Biology* 205:2875-2884.
- Ross, S. T. (2001). *The Inland Fishes of Mississippi*. Jackson, Mississippi: University Press of Mississippi.
- Smithsonian Marine Station. (2008). *Strongylura marina*. http://www.sms.si.edu/irlspec/Strongylura_marina.htm, downloaded April 5, 2015.
- Springer, V. G. and K. D. Woodburn. 1960. An ecological study of the fishes of the Tampa Bay area. *Prof. Pap., ser. no. I*, Florida State Board of Conservation, St. Petersburg. 104 pp.
- Strongylura marina* Atlantic Needlefish. <http://txstate.fishesoftexas.org/strongylura%20marina.htm>, downloaded April 5, 2015.

Author: Cheyenne Ramesar

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