

Summary of the Biology and Taxonomy of Seahorses

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Life history and conservation

A dearth of knowledge on the biology of seahorses, particularly life history parameters, makes it difficult to manage effectively a population, let alone a species. However, existing information on life history does indicate that many species may be susceptible to high levels of exploitation: low population densities mean that seahorses may have trouble finding a new partner; low mobility and small home range sizes mean that adult seahorses will be slow to recolonize over-exploited areas; possible low rates of natural adult mortality means that heavy fishing will place new pressures on the population; male brooding means that survival to birth of the young depends on the survival of the male; monogamy in most species means that a widowed partner stops reproducing, at least temporarily; and a small brood size limits the potential reproductive rate (although this may be offset by higher juvenile survival).

Taxonomy

All seahorses are members of the family Syngnathidae, along with the pipefishes, pipehorses, and seadragons. These fishes are found in the same order (Gasterosteiformes) as the trumpetfishes, snipefishes, cornetfishes, and pegasids (sea moths). About 33 species of seahorse (genus *Hippocampus*) are currently recognized from morphometric and genetic analysis, although a few more species may emerge from further taxonomic research. The vast majority of seahorse species have not been studied adequately in the wild.

Distribution and movement

Seahorses occupy both temperate and tropical coastal waters, with a distribution from about 50 degrees north to 50 degrees south. Most seahorses are generally found among seagrasses, macroalgae, mangrove roots, and corals, while others live on open sand or muddy bottoms. Some species are also found in estuaries or lagoons. Seahorses tend to be patchily distributed at low densities, and are highly influenced by anthropogenic activities, especially habitat degradation.

Seahorses swim using the propulsive force of the quickly oscillating dorsal fin, and employ the pectoral fins on either side of the body for steering and stability. More adapted to maneuverability than speed, seahorses apparently rely on camouflage to avoid detection from predators, rather than on speed for escape. Most seahorse species studied to date exhibit high site-fidelity and small home range sizes, at least during the breeding season.

Morphology

Seahorses have a head at right angles to the body and a fully prehensile tail that wraps around any suitable holdfast, including human made objects (e.g. fish cages, shark nets). Their thin skin is stretched over a series of bony plates that are visible as rings around the trunk and tail. The number of rings is useful in identifying species, as are the cheek spines, fin rays, and coronet on top of the head. Some species also have bony bumps or skin filaments protruding from these bony rings. Seahorses are masters of camouflage, changing colour and growing skin filaments to blend in with their surroundings. Short-term colour changes may also occur during courtship displays and daily greetings.

Seahorses are either measured in height (coronet to tip of uncurled tail) or in standard length. Adult seahorse heights vary among species, ranging from the large Australian big-bellied seahorse (*H. abdominalis*, > 30 cm) to the tiny pygmy seahorse (*H. denise*, < 2 cm). Sexual maturity in males can be recognized by the presence of a fully developed brood pouch. Seahorse weights vary with reproductive stage, increasing a great deal when they have ripe eggs (females) or are pregnant (males). Young seahorses look like miniature adult seahorses, are fully independent after birth, and receive no further parental care. Newborns of most species measure 7-12 mm.

Survival

Lifespans for seahorses are estimated (generally from laboratory observations) to range from about one year in the very small species to about 3-5 years for the larger species. Mortality from predation is probably greatest in juveniles, which are eaten by many fish and invertebrates. Adult seahorses are presumed to have few predators as a result of excellent camouflage, and unappetizing bony plates and spines. Crabs may be among the most threatening predators. Seahorses have also been found in the stomachs of large pelagic fishes such as tuna and dorado and are eaten by skates and rays, penguins, other water birds, and the occasional sea turtle.

Feeding

Seahorses are voracious feeders, typically relying entirely on live, moving food. They are primarily ambush predators, sucking passing prey quickly out of the water with their long snouts. Their eyes move independently of each other, allowing the seahorse to maximize its search area. They will ingest prey small enough to fit into their mouth, mostly small crustacea such as amphipods, but also fish fry and other invertebrates. Seahorses have neither teeth nor stomach, and pass food through an undifferentiated digestive system.

Reproduction

The male seahorse, rather than the female, becomes pregnant, although it is still the female that produces the eggs, and the male the sperm. The female deposits eggs into the male's brood pouch, where he fertilizes them. The pouch acts like the uterus of a mammal, complete with a placental fluid that bathes the eggs, and provides nutrients and oxygen to the developing embryos while removing waste products. The pouch fluid is altered during pregnancy from being similar to body fluids to being more like the surrounding seawater. Pregnancy lasts about 2 to 6 weeks, the length decreasing with increasing temperature. At the end of gestation the male goes into labour, pumping and thrusting for hours to release his brood.

Males of most species release about 100-200 young per pregnancy, but the total ranges from 5 for the smaller species, to well over 1000 young. The low number of young produced may be somewhat offset by their more advanced stage of development at release, such that each young should have a higher chance of survival than in most fish, in the absence of other pressures.

The breeding season varies according to species, and is most likely dependant on water temperature, monsoon patterns, and the lunar cycle. Most (but perhaps not all) species of seahorses studied to date appear to be monogamous, forming pair bonds that last the entire breeding season. Pair bonds in monogamous species are commonly reinforced by daily greetings that are extended into courtships once the male gives birth.

REFERENCES

Foster, S.J. and A.C.J. Vincent. (2004). *The life history and ecology of seahorses, Hippocampus spp.: Implications for conservation and management*. Journal of Fish Biology 65:1-61.