Acanthurus bahianus (Ocean Surgeonfish)

Family: Acanthuridae (Tangs and Surgeonfish)
Order: Perciformes (Perch and Allied Fish)
Class: Actinopterygii (Ray-finned Fish)

Fig. 1. Ocean surgeonfish, *Acanthurus bahianus.*

[http://www.anguilla-diving.com/1ocean_sfish.html, downloaded 5 February 2015]

TRAITS. Ocean surgeonfish are recognized immediately by their oval-shaped bodies of light yellow to blue-grey or dark brown colour variations (Fig. 1). Vertical lines of light yellow and blue colours are also found on their bodies. The ocean surgeonfish's dorsal fin has alternating orange and green-blue bands as well as a blue margin (Randall, 1967). The caudal fin is mostly an olive or brown hue with a faded or white base and a bluish-white posterior margin with a tiny violet or blue area at the socket of the caudal spine (Randall, 1967). Many possess blue or white markings on their dorsal, anal, and tail fins. Pale bands can sometimes be seen at the base of their tails. Short yellow lines span from the posterior margin of the eye, surrounded by a narrow blue region. During spawning, intraspecific competition and other communication methods, colour changes may occur. Ocean surgeonfish can span up to 38cm in length. They have 3 spines on their anal fins, up to 9 spines on their dorsal fins and 23-26 soft rays (Smith, 1997). Their dorsal fin is moderately long, unnotched and continuous. Their caudal fins are moderately to strongly emarginated (Wolf, 1987). Their bodies are relatively deep and compressed. Their mouth is small and positioned low on the head, making it suitable for extracting algae from rocks and coral. There is a piercing scalpel-like spine positioned on the side of its caudal peduncle (tail base) which fits into a horizontal groove. They have small and ctenoid (tiny projection-like) scales. The stomach is gizzard-like. In the small mouths of ocean surgeonfish, there is a close-set, spatulate (broad, rounded-end), denticulate-edged teeth. Their upper jaw contains 14 teeth, while the lower jaw has 16 teeth, but this can vary according to individual length. Their dentition is specifically suitable for feeding on filamentous benthic algae.

DISTRIBUTION. Ocean surgeonfish reside mainly in coral reefs. They are commonly found in the warm, coastal waters of the Gulf of Mexico, Bahamas, Florida, and the Caribbean Sea (Deloach, 1999). These locations are famous for their coral reefs and hence are suitable habitats for ocean surgeonfishes (Fig. 2). They can also be found north to Bermuda and Massachusetts as well as south of Brazil (Deloach, 1999). Ocean surgeonfishes are not commonly found in Trinidad and Tobago.

HABITAT AND ACTIVITY. Ocean surgeonfish resides within coral reefs, especially in shallow benthic locations inside coral or rocky formations (Fig. 2). A study was done to determine the relationship between several factors and temperature (Robertson et al., 2005). These factors included adult survivorship, maximum age, absolute growth rate and terminal size. It was observed that all these aforementioned factors are inversely related to temperature (Robertson et al., 2005). Results from this study showed that differences in lifespan are linked to temperature but these differences are independent of size. Differences in temperature and habitat attribute to variations in growth and size of observed ocean surgeonfishes. The terminal size of these fishes appears to be determined by the rate of growth. Prolonged life of fishes observed at three different islands seemed to be attributed to the effect of temperature instead of an island effect (Robertson et al., 2005).

FOOD AND FEEDING. Ocean surgeonfish are day-time (diurnal) feeders. They are herbivores who feed on fleshy and filamentous algae, as well as the microorganisms found on these algae. They also feed on green and brown algae, along with a small amount of tiny invertebrates. *Dictyota*, *Cladophora*, *Chaetomorpha*, *Ceramium*, and *Thalassia* are some common types of algae that belong in the diet of ocean surgeonfishes (Hogan, 2011). Inorganic material is accidentally ingested and makes up 40% of their stomach volume (Hogan, 2011). Foraging usually occurs away from the reef, in seagrass beds or over sandy areas. They possess small mouths and teeth specialized for picking up large quantities of coral and sand while feeding on algal mats along the bottom substrate. Their intestines are thin-walled and are usually filled with sand and various flora and fauna which can aid in the digestion of its algal diet (Deloach, 1999).

POPULATION ECOLOGY. Ocean surgeonfish are social fishes and usually forage in groups equal to or greater than five fishes. They may even form schools with other species of fishes such as doctorfish and the Atlantic blue tang surgeonfish (Fig. 3). A study was performed and the results demonstrated that schooling was advantageous for foraging, that is, it increases foraging time (Wolf, 1987). This study showed that fish which spent more time within schools had a greater foraging benefit and that smaller fish spent more time in schools than larger fish. It can therefore be deduced that time spent within a school and the magnitude of foraging benefit are positively correlated while there is a negative correlation between time spent within a school and fish size. Results also showed that there was a positive relation between non-schooling time and fish size. This means that larger fish spent more time as individuals than smaller fishes. The concluding result of this study showed that fishes with more benefit as part of a school, spent a higher percentage of time in schools (Wolf, 1987).

REPRODUCTION. As previously mentioned, Ocean surgeonfishes are social organisms and hence, spawning can occur in pairs or aggregation of pairs in groups greater than 15,000 individuals. Ocean surgeonfishes spawn in the water column. Very small eggs of size 0.67 mm and with an oil globule of diameter 0.17mm hatch approximately 28 hours after being laid (Robertson et al., 2005). Larvae emerge from the hatched eggs. The larvae then enter the pelagic stage and settle during the new moon (Robertson et al., 2005). Settling at this time is ideal because the darkness allows a lower risk of predation amongst sea grass or coral. Chemical cues determine where settling occurs. Metamorphosis of the larvae into juveniles occurs when the larvae approaches the reef. Transformation to the juvenile stage occurs at approximately 23-33mm in length corresponding to following a 42-68 day pelagic larval phase (Hogan, 2011). Sexual maturity is achieved after approximately two years and they exhibit a life span of approximately ten years. Ocean surgeonfishes show the fastest growth known for any acanthurid (Hogan, 2011). The spawning season occurs between November and April with the peak season between December and March (Heumann and Deloach, 1994). Ocean surgeonfish may experience changes in pigments during spawning (also seen with intraspecific competition and other forms of communication). Their eggs are spherically shaped and contain a single oil globule. Their larvae are ‘kite-shaped’ and possess a small mouth at the end of an elongated snout (Hogan, 2011). Ocean surgeonfish’s larvae are often found in the stomach contents of larger fishes. When the larvae settle out of the water column and grow into juveniles, they obtain and utilize protection and resources of the seagrass and reef habitats (Heumann and Deloach, 1994).

BEHAVIOUR. Ocean surgeonfish fall victim to predation by larger fishes and marine organisms. The main juvenile predator observed is the French angelfish but other predators include the tiger grouper, mutton snapper, yellowfin grouper, the great barracuda and trumpetfish (Baensch and Debelius, 1997). Ocean surgeonfish contain some physical features which serve purposes of defence against these predators including a scalpel-like spine located on each side of the caudal peduncle. The defence mechanism includes moving these spines in a slashing motion to inflict damage on the opposing organism (Baensch and Debelius, 1997). The larval stages of ocean surgeonfish have the highest risk of predation. Parasites of the ocean surgeon include the isopods *Anilocra acanthuri* and *Gnathia puertoricensis* and the digenic trematode *Macradena acanthuri*, as observed from the stomach of a specimen (Baensch and Debelius, 1997).

APPLIED ECOLOGY. The ocean surgeonfish have several importances to humans. It plays only a minor role in commercial fisheries, but is quite important in subsistence fisheries (Hogan, 2011). In subsistence fisheries it is caught in gill nets or traps and by spear fishing. They must be handled carefully, especially their spines on the sides of the caudal peduncle (Hogan, 2011). They can be then sold as fresh fish in locally markets. Ocean surgeonfishes as well as other members of this family are small and have spectacular colours, making them popular fish used in aquariums.

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Author: Shantal Samaroo
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Fig. 2. Ocean surgeonfish within coral reef in Florida.

[http://www.shutterstock.com/video/clip-4250819-stock-footage-shool-of-ocean-surgeonfish-over-a-coral-reef.html, downloaded 5 February 2015]

Fig. 3. School of ocean surgeonfish integrated with a school of blue tangs.

[http://www.coralreefphotos.com/ocean-surgeonfish-aggregations-acanthuridae/, downloaded 5 February 2015]