

Stegastes planifrons (Threespot Damsel fish)

Family: Pomacentridae (Damsel fish)

Order: Perciformes (Perch-like fish)

Class: Actinopterygii (Ray-finned fish)



Fig 1: Threespot damselfish, *Stegastes planifrons*

<https://www.inaturalist.org/taxa/49304-Stegastes-planifrons>

TRAITS. *Stegastes planifrons* is distinguished by two large blackish spots on its body, one on the base of the pectoral fin and the other on the caudal peduncle saddle. Its body profile is oval and laterally flattened and has a uniform bright yellow cast that progressively turns greyish brown with maturity (Figure 2). There is a yellow gold crescent above the eyes, a straight snout and a trail of dark vertical lines that precedes the scale rows on the body (Wellington and Robertson 2001). The black spot on the pectoral fin is absent in early juvenile stages however it is found on the last three dorsal spines and dorsal fin. The new recruits are also characterised by a single blue spot on the upper iris and a few on the head and upper body. They reach a total length of 13cm and have a straight head profile. There are twelve dorsal spines, fifteen to seventeen dorsal rays, two anal spines and approximately 14 anal soft rays (Froese and Pauly 2017).

ECOLOGY. The threespot damselfish is found in the Western Atlantic through the Caribbean Sea, Bahamas and Florida (Figure 3). They are typically a shallow water species and are very prominent in offshore and inshore coral reefs and they are one of the most abundant species in West Atlantic and Caribbean reefs. They primarily base their territory on hard corals like *Acropora cervicornis* (Figure 4) and *Orbicella annularis*, mainly occupying live corals (Axxline-Minotti 2003). The new recruits may subsist on external parasites of

other fishes. Other territories have been distinctly identified as dense turf algal patches, where they mostly forage. This herbivorous fish's main food source is algae but in its absence, they may feed on harpacticoid copepods, sponges, hydroids, minute gastropods and eggs of molluscs (Froese and Pauly 2017). Green and red algae as well as diatoms are its preference. Non-selective feeding is exhibited when there is a sudden disturbance in their territorial lawns which is beneficial in maintaining algal diversity. All their dietary needs are acquired directly from their territory which have been seen to change the boundaries in benthic communities, promoting algal growth. This fish can maintain algal lawns through weeding where these mats have been found to contribute to 70-80% of the productivity in reefs in St. Croix (Axxline-Minotti 2003).

SOCIAL ORGANISATION. *Stegastes planifrons* is a territorial fish. Damselfish are widespread and diverse in the Caribbean reef communities, with nine species present; they are also very abundant on sheltered reefs. On the Flower Garden bank in Mexico, the number of *S. planifrons* found within one transect ranged from 0-25 individuals, mostly seen in the water column and near brain corals. They forage individually on algal patches (Precht et al. 2010). The abundance in the adult population is seen to decrease when there is a decline in the *Acropora* genus. Juveniles recruit mainly on *Orbicella* corals in the absence of live corals. They overlap in their distribution on the reef slope with *Stegastes dorsopunicans* (Chaves et al. 2012).

ACTIVITY. *Stegastes planifrons* are strictly diurnal and at night they are found within caves crevices hiding from predators. During the day they mainly cultivate thick algal lawns within their territories hence controlling algal growth making them of high ecological importance. They also feed on these algal lawns and support various populations of herbivores. They promote growth on these algal mats by weeding, preparing substratum, fertilisation and herbivore exclusion from executing a 'farming behaviour'. They weed the algal lawns to encourage growth of their preferred algal species and suppress the growth of their less favoured algae (Gutiérrez 1998). These three-spot damselfishes may kill live corals by repeatedly biting on it, to provide a substratum for the algal lawn which can have negative impacts on the benthic algal and coral colonies. However, this activity can aid in the rapid recovery of injured *Acropora cervicornis*. They vacate early in the morning to be cleaned by gobies where this is the only time their territory is left unprotected (San Antonio 2008).

FORAGING BEHAVIOUR. The three-spot damselfish forage within its territory where all its dietary needs are derived. Corals were the most visited, then rocks in their territory where an average of 120 bites per 30 minutes were seen on algal mats of *Acropora cervicornis*. They exhibit highly significant foraging patterns where in the morning their rates are low, at noon rates are strikingly higher with a slight increase in the afternoon period. *Stegastes planifrons* that forage outside their territories forage at about 75% of the rate of the current residents. The larger ones that inhabit different territories tend to forage and feed at a higher rate in the afternoon when compared to the smaller ones (McDougall and Kramer 2006).

COMMUNICATION. *Stegastes planifrons* produces acoustical signals. It makes a pop to signal aggression during hostile antagonistic encounters. It is seen that the longer the aggression exercised the more pops heard and the increase in the intensity of the pulse. Each

pop ranges from 10-20 milliseconds. These pops are produced by both sexes and may be used in courtship to attract distant females. The frequency of the sound may vary by competitive males. In the territorial residents the frequency of the pops was low but when an intruder came near their territory the frequency increased. They may also produce grunts in the peak of their spawning dance (Ladich and Myrberg 1990). The bright yellow colour in juveniles is used to avoid predators and both juveniles and adults have ultraviolet patterns on their bodies which they use as a covert communication, also to avoid predators (Axxline-Minotti 2003).

SEXUAL BEHAVIOUR. Their sexual behaviour begins when the males develop a more colourful and brighter body colour to attract the female. Males keep their algal lawns to the highest quality to increase their courting chances. Females are oviparous and visit male territories and lay eggs in the algal nest where they can stick to any substrate, usually the algal lawn. The males immediately fertilise them and defend and guard this area until hatching. Males also aerate the eggs (McDougall and Kramer 2006). Their spawning season varies with the tidal cycle but fall in the months of June to September. Spawning occurs in a single day where males and females spawn with various mates, however only one female is accepted into the nest in that given time. This restriction is placed to prevent sneaking into the nest from other males and disturbance of the spawning female (Karino and Nakazono 1993).

JUVENILE BEHAVIOUR. Most juveniles in the same territory remain close together. They also cultivate algae creating algal lawns but not as actively as adults. Their aggression towards predators are as seen in the adults. They passively patrol, hiding less than adults (Precht et al. 2010).

ANTI PREDATOR BEHAVIOUR. *Stegastes planifrons* are the most aggressive in the Caribbean damselfish community. They fiercely guard and defend their territories and chase and nip predators, even divers (Fig 5). This allows them to exclude other herbivores from feeding in their territory controlling algal growth (Gutiérrez 1998). They show different levels of aggression to grazer species with these levels varying seasonally. A competitive relationship is developed among other species in the *Stegastes* genus in that the same aggression is shown upon entry to their territory. *S. planifrons* contribute to the exclusion of several species of sea urchins as they viciously attack them excluding them from their territory. They also avoid large predators by moving quickly away from them (Thresher 2010).

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Fig 2: Adult *Stegastes planifrons* (Greyish- brown colour)

<http://oceana.org/marine-life/ocean-fishes/threespot-damselfish>

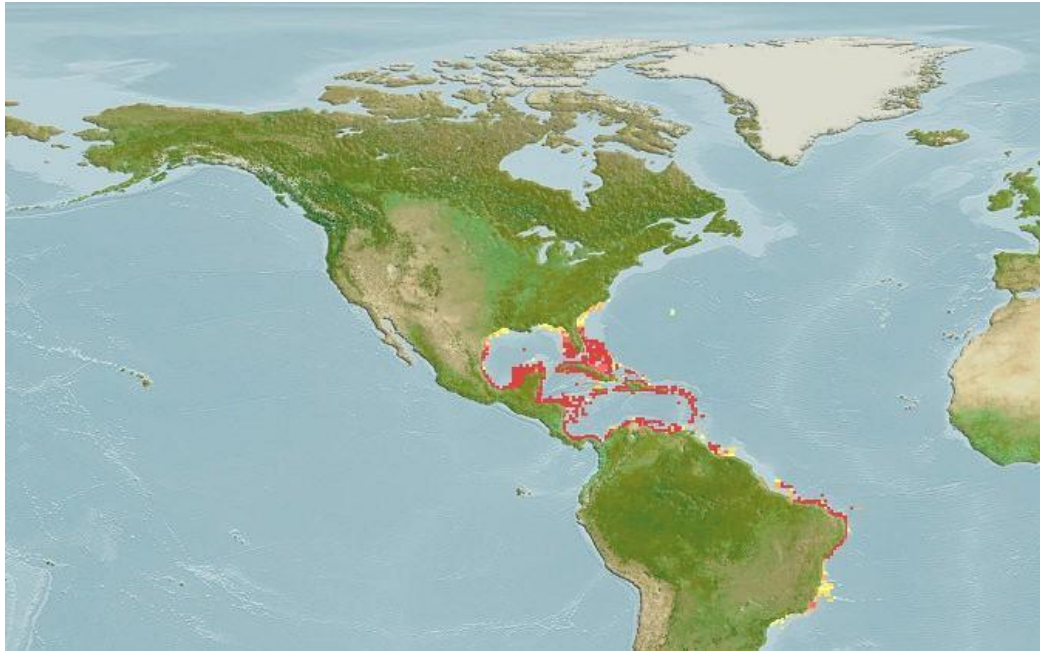


Fig 3: Geographic distribution of *Stegastes planifrons* throughout the Western Atlantic
http://www.aquamaps.org/receive.php?type_of_map=regular



Fig 4: An adult *Stegastes planifrons* basing its territory on the branching coral *Acropora cervicornis*
<https://ore.exeter.ac.uk/repository/bitstream/handle/10871/13790/HusainE.pdf?sequence=1&isAllowed=y>



Fig 5: *Stegastes planifrons* nipping a competitor/intruder

[https://commons.wikimedia.org/wiki/File:Stoplight_parrotfish_Sparisoma_viride_and_threespot_damselfish_Stegastes_planifrons_\(4657096921\).jpg](https://commons.wikimedia.org/wiki/File:Stoplight_parrotfish_Sparisoma_viride_and_threespot_damselfish_Stegastes_planifrons_(4657096921).jpg)

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