

THE BEHAVIOUR OF REEF-DWELLING SPARID FISHES

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ABSTRACT

Notes on the behaviour of six species of sparid fish, all rock reef dwelling, and forming an important section of the inshore line fish industry in the southern Cape, are given. It is shown that these fishes, although closely related, show very different feeding patterns. Notes on the breeding of *Spondylisoma emarginatum* are given, and the male behaviour in nature is shown to differ from that observed in an aquarium.

The line fish industry of the southern Cape coast is a primitive yet at times productive fishery. The fishing is all done by hand line; traditionally cotton lines stiffened with ox blood were used, but heavy monofilament lines have become universal in the last twenty years. The line ends with a round lead sinker and two traces, each with a single hook. An estimated catch of 20 000 short tons a year (not including snoek, *Thyrsites atun*) is landed in the Republic and South West Africa (Division of Sea Fisheries Annual Reports) with this simple gear.

In the area studied, Cape Point to the Tsitsikama coast, the major catch comprises kabeljou (*Johnius hololepidotus*), geelbek (*Atractoscion aequidens*), yellowtail (*Seriola lalandii*) and snoek (*Thyrsites atun*). These, however, are all seasonal species, and between seasons a subsistence level fishery is undertaken with sparid fishes comprising the major portion of the catch. The sparid fishes are important because they tide the crews over between seasons rather than as a profitable fishery, and it was for this reason that a study of their biology was undertaken as a joint project between the Division of Sea Fisheries and the Institute of Oceanography, University of Cape Town.

The species discussed here are:—

Roman	<i>Chrysolephus laticeps</i>	(Cuvier & Valenciennes)
Dageraad	<i>Chrysolephus cristiceps</i>	(Cuvier & Valenciennes)
Red stumpnose	<i>Chrysolephus gibbiceps</i>	(Cuvier & Valenciennes)
Red steenbras	<i>Petrus rupestris</i>	(Cuvier & Valenciennes)
Frans Madame	<i>Boopsoidea inornata</i>	Castelnau
Steentjie	<i>Spondylisoma emarginatum</i>	(Cuvier & Valenciennes)

All are species found on rocky reefs in water from five to 30 metres deep, and are common from Cape Point to southern Natal. Only three other sparid fishes are of importance in this fishery in the southern Cape. These are the white stumpnose (*Rhabdosargus globiceps*), found in sandy areas, the silver fish or doppie (*Argyrozona argyrozona*), a wide-ranging midwater predator, and the hottentot (*Pachymetopon blochii*), which is abundant only west of Cape Point.

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The observations recorded here were made on the reefs in the natural habitat of the species, using normal S.C.U.B.A. diving equipment. The observations are not detailed, as they were made in the course of other work, and time for detailed observations under water is necessarily limited. Reference is made under the various species to their normal method of taking bait. The method of taking or reacting to bait is very characteristic for the various sparids, and with experience a fisherman can tell with a high degree of accuracy what species of fish is at the bait. It is not easy to describe these "bites", but an attempt is made in Fig. 1. The patterns exhibited are generalized for the various species; they can of course not take into account such variables as type of bait, size of sinker, water depth, and plain intuition, but should help the inexperienced to visualize to some extent the feel of the different fish.

Dageraad

The dageraad is rare west of Cape Agulhas, but young fishes are common inshore on the Tsitsikama coast. In this area, various banks are referred to as dageraad banks, areas where this species may be caught in large numbers and other sparid species are rare. Many reasons have been advanced for this, but it has been seen that all these banks are areas of flat rock, and the other sparid fishes are common only on high reefs or areas of broken rock. The bite of dageraad (Fig. 1) is at all times very soft, usually only an increase in the weight of the line. The dageraad is caught in large numbers early in the day, but later becomes scarce. Two reasons for this are advanced by fishermen, either that the fish have ceased feeding, or that they have left the area. Direct observation has shown that they are present on the banks all day. In the early morning, however, they are found moving slowly across a bank, the whole school in the same direction. The fish are swimming in a head down position and gently pulling at the holdfasts of algae searching for food. When food is found it is taken very deliberately. There is little or no attempt by other nearby fishes to snatch at the food before it is swallowed, and the fish finding the food swallows it where it is found, rather than rushing away with it.

Observations made later in the day showed the fishes swimming 1–3 metres off the bottom, in a horizontal position, and the orderly progression of earlier has changed to an apparently aimless milling around.

Roman

Within False Bay the roman is economically the most important of the winter bottom fishes. Fishermen consider the small roman of up to about 1 kg to be easily caught by drifting over the reef with the bait suspended about 50 cm off the bottom. Larger fishes are not commonly caught in this way, however, and it is usually necessary to allow the bait to lie on the bottom, fishing with a slack line. Larger fishes are said to be timid and are frightened by the up-and-down movement of the bait caused by swells. It is also believed that dropping anchor will frighten off the fish, and it is a fact that catches usually show a reduction after anchoring. The bite of the two size groups is also different, the younger fish giving sharp tugs, and the large fish either a strong, steady pull (Fig. 1), or alternatively no reaction at all is felt until an attempt is made to haul up the line. Under these circumstances the hook is invariably found buried in the throat or stomach. In common with most other sparid fishes, roman are seldom caught inshore when offshore winds are blowing, and are said to desert shallow water at this time.

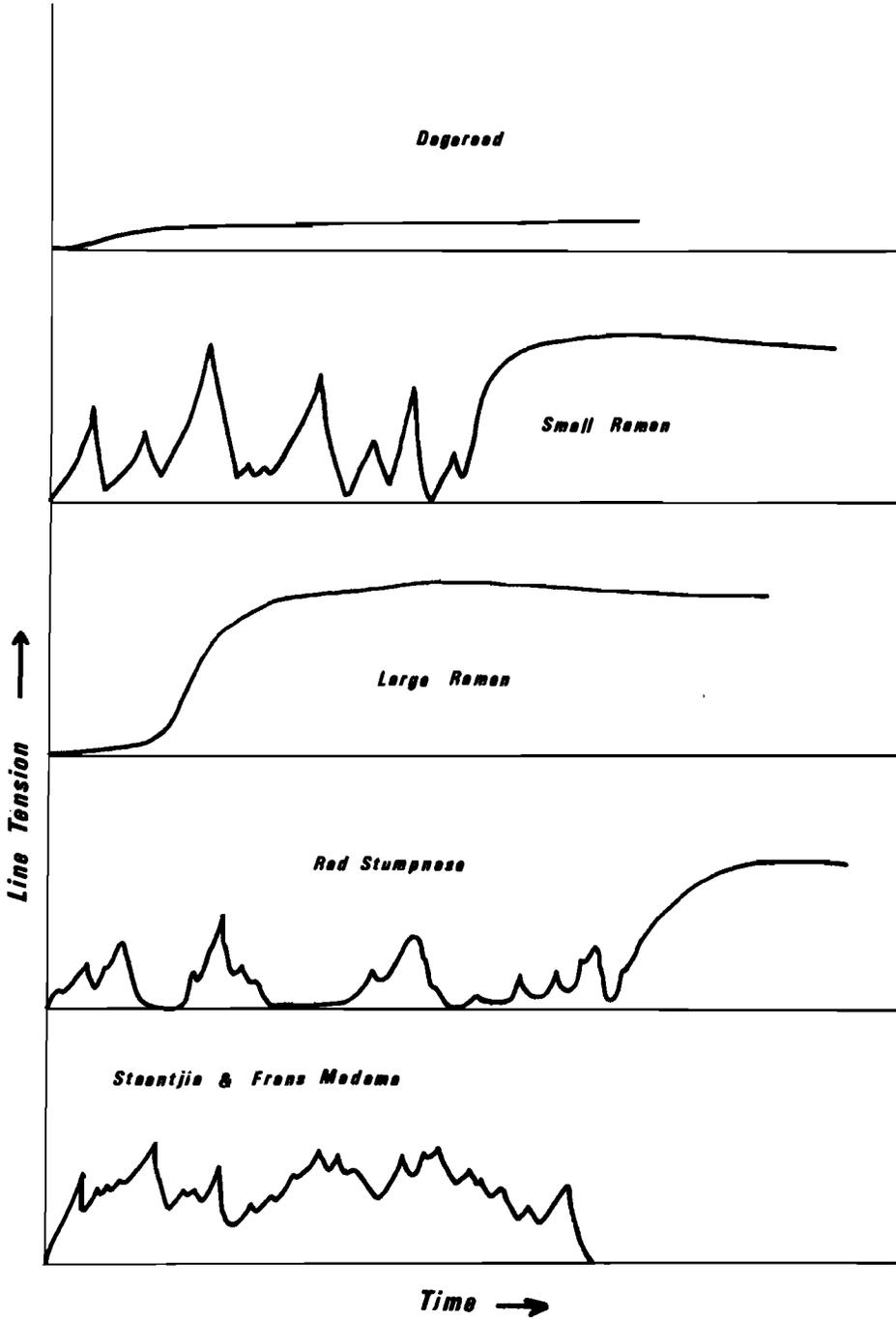


FIGURE 1

Diagrammatic representation of the feel of the different sparid fish species when fishing with a handline. Both axes are variable.

Direct observations have shown three distinct phases in the roman. Up to a length of approximately 50 mm the fishes are found in weed at the base of the reef, in False Bay mainly in *Caulerpa* beds, and feeding on minute organisms. At this stage their behaviour is typically that of a weed-dwelling fish, hiding motionless in the weed when threatened. Above this size the fishes move on to the reefs. The reefs preferred by this species are normally very rugged, with many cracks, or boulder-strewn. Up to a size of 250 mm the roman are found swimming over the reef in groups of 3 - 6 fishes. They normally swim 0,5 - 1 metres from the reef, darting in occasionally to feed. Food is taken in an impetuous manner, the fish attempting to swim away with the food before swallowing it. This usually results in the fish being mobbed by the others in the group. The group is fast-moving most of the time, but it appears that each group has a limited range over the reef, seldom more than 15 metres square. Even the threat of danger will not cause a group to desert its area; the fishes will merely dart behind rocks or over a ridge.

The larger roman are sluggish by comparison; each has a crack or cave which it will defend and which it shows a marked reluctance to leave. Most of the time the fish will wait, with only the head protruding, for food (small fishes, cephalopods, and crustaceans) to come within striking range, and at the least sign of danger will move back deep into the shelter. Large roman, which are always males (Penrith, in press), will remain in the same area for a long period. One case is known of a roman with a characteristic scar that inhabited the same deep cave for a minimum of 25 months before it was shot. One or more large fishes may have their territories within the range of a young group. The latter will be threatened only if they approach very closely the large fish's cave.

These findings are in agreement with the results obtained from surface fishing. They explain why small roman can easily be caught with lines just off the bottom, whereas for large specimens the bait has to be completely still before the fish will come out of its cave. The lack of any bite often experienced with large roman can be attributed to the bait lying very close to the fish's shelter, coupled with the slack line. The reduction in catches while anchored is the result of the territoriality of the fishes, both the group territory of the younger fishes and the individual territories of the older males, as while drifting new territories will continually be sampled, whereas only a limited number will be sampled while at anchor.

Wind conditions do not drive territorial fishes away, but offshore winds cause a rapid reduction in the temperature of shallow water (Stander & Neppen 1969), and this results in a poor catch, due possibly to a sudden lowering of the metabolic rate of the fishes and a consequent loss of the feeding urge.

Red stumpnose

The red stumpnose has a reputation for very delicate feeding; it is considered a difficult fish to hook, as it will play with the bait for a long time before taking it (Fig. 1).

Diving has shown that the red stumpnose is not a permanent inhabitant of a reef. Although stragglers are present in False Bay throughout the year, the main population appears only during March to September. However, the species is never present in large numbers in any one area, and may be found on rugged and smooth reefs.

Feeding is a very delicate operation in red stumpnose. When feeding on small black mussels they approach the reef in a head down position, grip one or a few mussels in their teeth, and then

worry this until the byssus threads of the mussels break. Often the fish will release its hold and take a new grip. Like dageraad, red stumpnose will often root at the bases of algae searching for polychaetes e.g. *Eunice*. If a worm is found the fish will gently pull it out with slow shakes of the body, often releasing its hold, sucking in that portion of the worm already removed and then taking a fresh hold and extracting a further length of worm. It is likely that the edge of the bait is gripped in the fish's jaws and then the resistance of the trace is felt. Only after tugging gently for a while will the fish swallow the bait. Biden (1930) suggested that the red stumpnose uses its high forehead as a lever to tear red-bait (*Pyura*) pods open. This has never been observed and is unlikely, as the forehead bone is rather delicate, and one would expect to find large fishes to have scarred foreheads, which is not the case.

Red steenbras

Very few observations were made on this species (the only sparid in the area to grow to a large size), and these only on juveniles. Their behaviour appears to be much like that of young roman, a small group patrolling over a reef with sudden darts into crevices to search for food. It does not appear as if they remain on one reef only as do the young roman. This is probably due in part to their very restricted diet compared with the roman.

Frans Madame and Steentjie

These species are not very important as food fish. They have, however, an importance as bait fish. They also have a negative importance, as at times they are present in such numbers that no bait can get through to the larger fishes below. This is not as unlikely as it seems. The fish, when present, are seldom present in anything but large numbers. They usually congregate above a reef with a high crest or a very broken reef where the ground swell causes a current. At any one time a small number are feeding on algae and any animal food they can find along the ridge, while the rest hang a metre or so above the reef. As the swells sweep over the reef they bring in a quantity of broken weed and other food, and this is grabbed by the waiting fishes. Any piece too large to be swallowed immediately is attacked by as many fishes as can get a grip. Bait is treated in the same way; often a single hook will have eight to ten fishes around it for a few seconds until it is bare.

Breeding behaviour of steentjie

Breeding behaviour was observed in the steentjie and in none of the other species. The breeding behaviour has previously been described by van Bruggen (1965) on the basis of observations made by him and Dr. Liversidge in the large community tank at the Port Elizabeth aquarium.

Breeding behaviour in the natural environment was observed during January 1969 near the reefs at Roman Rock lighthouse, False Bay, in depths of 18 - 30 metres, on a bottom composed of coarse shell grit mixed with fine sand. A large number of nests were observed, each a shallow saucer-shaped depression of about 0,5 m diameter and 20 cm deep. Unlike the Port Elizabeth nests, they were not close together but were separated by 3 - 10 metres. The males, in nuptial dress as figured by van Bruggen, spent part of the time clearing the nest, but the major activity during the period of observation was pursuing the females. The aquarium observations suggested that the males waited for females to enter the nest area, but this did not appear to be the case in False Bay. Males swam relatively far from the nests, up to 10 m horizontally and 5 - 8 m vertically in pursuit

of females, which they attempted to chase towards the nest. No spawning activity was observed, but a few nests had pairs of fish circling the nest, the female in front. No vigorous defence of nests by males was observed; it presumably occurs, but in an area where there is plenty of space for the nests, as compared with the close confines of a display tank, where the nest defence was the major male activity, it is unlikely that defence of the nest need ever be as dominant an activity.

SUMMARY

The reef-dwelling sparid line fish in Cape waters may be divided into two groups, those with a delicate and deliberate manner of feeding (red stumpnose and dageraad), and those with an aggressive feeding behaviour. The latter group may be further divided into those where one fish will pounce on a food item (roman, red steenbras), and those where one fish finding food releases an aggressive sympathetic induction in a large portion of the group (Frans Madame and steentjie). This type of behaviour is not universal in the social species, however, as it was not observed in the dageraad.

Breeding behaviour in the steentjie is discussed, and the difference between the behaviour observed in a natural population and a population in the artificial environment of an aquarium is shown.

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