

Exciting finds in Knysna Estuary

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First evidence of spotted grunter spawning in Knysna Estuary



The dark “cloud” in the water is an aggregation of spotted grunter. These fish come together in shallow water over a large sandflat in Knysna Estuary in order to spawn. Until recently, it was believed that this species only reproduces in the warm water off Kwa-Zulu Natal.

Many southern African linefishes, which are those species caught on hook and line, have been thought to reproduce in the coastal waters off Kwa-Zulu Natal (KZN). The warm Agulhas Current then facilitates the subsequent south-westward distribution of eggs and larvae onto the Agulhas banks and inshore coastal waters off the Eastern and Western Cape. While it has been assumed that this migratory life history strategy is ubiquitous among individuals of each species, there is growing evidence that partial migration takes place in many fish species. We recently published work that provides strong evidence of spotted grunter *Pomadasys commersonnii*, a marine estuarine-dependent coastal fish species, spawning within the Knysna Estuary. This was accomplished through observations of aggregation behaviour accompanied with macroscopic and histological examination of fish

gonads taken from individuals captured within one of these large aggregations.

Due to the wide, deep and permanently open mouth of the Knysna Estuary, the lower reaches closer to the mouth typify a sheltered marine embayment. These lower reaches are well flushed by tidal flows and exhibit temperature and salinity profiles similar to the adjacent ocean. It was in this area, specifically the shallow sand banks on the southern and western side of Leisure Island, where large shoals of spotted grunter were observed aggregating during February 2017. The aggregations formed during the incoming and high tide period over a number of days. The extent of the shoals varied but mainly consisted of a large main aggregation, comprising large individuals, with smaller individuals forming smaller shoals around the main shoal. Reports and observations from fishermen indicate that within the main shoal, individual fish would accelerate, accompanied by a silver flash (turning on their sides) and small plumes of discoloured water, suggesting gametes were being released, i.e. that spawning was taking place. Similar aggregations, although smaller in nature and occurring along the lower portion of Leisure Island around an area known as the Green Hole were noted again in December 2019, January and November 2020 and January 2021.

A single male and female specimen were collected from the aggregation in 2017, measured and dissected. The gonads were visually staged (i.e. showed obvious signs of gonad development and readiness to spawn) and histologically prepared sections from each fish were also examined by microscope. Macroscopically, both the female and male gonads were large and well vascularised. Histological examination was used to confirm the macroscopic staging, and further indicated that the fish were in spawning condition. The male gonad had

Rare fish finds



In February 2022, whilst doing some seine netting to look at littoral fish communities, a strange fish caught the attention of some tired students and made them very excited. The fish turned out to be a juvenile Indian mirrorfish, *Alectis indicus*. It is a tropical to sub-tropical species whose juveniles have been found as far as Algoa Bay. From available and published literature this is a new species record for Knysna Estuary.

Two weeks later, we caught another unusual specimen. This time it turned out to be a juvenile Crescent-tail bigeye, *Pricanthus hamrur*, a sub-tropical species that has been known to occur occasionally as far south as Knysna. Not a new record but an unusual sighting for Knysna Estuary.



well-developed sperm ducts with late-stage spermatids and spermatozoa found throughout the testicular region. Large concentrations of hydrated oocytes and tertiary yolk vesicle oocytes indicated that the female was in spawning condition, whilst post-ovulatory follicles were indicative of recent spawning.

Taking all the lines of evidence together, our work provides empirical evidence for the spawning of spotted grunter in an estuarine system outside of KZN. This finding contributes towards mounting evidence that suggests that South African spotted grunter likely harbour alternative spawning strategies. For example, spotted grunter is known to display year-round residency in and around the Breede Estuary and it is thought that spawning may occur in the adjacent marine environment. Such localised spawning may be playing a role in the reported south-westward range shift for this species.

With the current spawner biomass of large breeding adults estimated at being less than 25% of pre-exploitation levels, population analysis indicates that spotted grunter are over-fished and the population is currently in a state of collapse. However, in contrast to this, catch rates on the Breede Estuary have increased, indicating populations are yet to stabilise, and leading to a theory of possible stock separation.

However, genetic studies have indicated no differentiation between fish from across its distributional range, suggesting that the population is well mixed and highly connected.

We do not know whether individual fish stick to one of the two distinct spawning strategies (i.e. migrate to KZN or not) or whether the species may display conditional spawning strategies in which prevailing circumstances may influence the spawning strategy adopted. Either way, employing alternative life history tactics and strategies contribute towards population diversity and buffers against environmental change and poor recruitment years.

Further work is required to better understand the frequency, timing and drivers behind this non-migratory spawning behaviour and whether the frequent upwelling events that occur on the south coast have an impact on the survival and development of early life-stages. Understanding the role that non-migratory spawning plays in stock recruitment, particularly in the south-western extent of the species distribution will be important for future fishery management.

Butler EC, Childs AR, Smith MKS, Foster RM & Potts WM. 2022. Spawning observations of *Pomadasy commersonnii* in the marine section of the Knysna estuarine bay, Western Cape, South Africa, African Journal of Marine Science 44: 101-106.