

Seventy-four Research Plan

Background

Seventy-four (*Polysteganus undulosus*), an endemic southern African reef dwelling sparid was once heavily exploited throughout its range. Although the stock had already collapsed by the 1960s, strict fishery regulations were only slowly put in place from 1985 and not rigorously enforced. As for other similar species, revision of the regulations did not yield stock recovery and a ten-year moratorium for *P. undulosus* was put in place in 1998. In 2007, a spawner-biomass-per-recruit assessment was conducted on *P. undulosus* which showed limited recovery of the adult stock. This work led to the moratorium being extended for a further 5 years, to 2013 (the original recommendation was 10 years based on the longevity and the slow growth and late maturation of this species), and subsequently rolled over on a year-by-year basis. According to reports of fishers, juveniles of this species have become increasingly abundant in the Eastern Cape (Kei Mouth to East London). Based on these reports, and associated catch positions for reef-associated fishes in that area, an attempt to collect specimens and size frequencies to conduct another assessment was made in 2016. However, the scarcity of mature fish in the catch during the two surveys (n=150) and in subsequent attempts to catch mature fish during a recreational fishing competition in KwaZulu Natal suggested that the spawning population had not recovered, and the moratorium was further extended.

A brief review of available data

Fisheries data:

Since the moratorium has been in place there has been no consistent fisheries or fisheries dependent (i.e., observer programme, landing monitoring, competitions etc.) dataset that can be used for abundance trends with any confidence. Fisheries data are available from commercial catches before the moratorium (NMLS). These can be used to provide an initial map of the spatiotemporal extent of the population, the size frequencies, and biologically and ecologically important areas (spawning sites etc.). There are also historical landings that, although limited, are useful in that these precede the NMLS.

Sampling:

Limited size frequency data and maturity information are available from Mann (2007) and Kerwath et al (2016) unpublished data. Historical otolith samples are available from previous age and growth studies and routine collections. Relevant biological data from all studies have been collated in the Southern African Marine Linefish Species Profiles. Population genetics information is available from a few historical studies, but no next generation techniques have been employed to date.

Underwater visual census:

As seventy-four is distributed mostly outside depths accessible to SCUBA divers, fisheries independent diving surveys for this species are not feasible. Underwater video systems such as ROV (Button et al. 2020; Geldenhuys 2015, Maquela et al 2016) and BRUV have been used across areas of seventy-four distribution and >7 500 hours of underwater footage (da Silva et al. submitted) is available. These data can be used to gain information on the relative abundance of seventy-four and potentially to provide a comprehensive size structure of this species where it has been surveyed.

Re-assessment strategy

To comprehensively assess the recovery of seventy-four and the risk associated with potential changes in its management and in the absence of a time series of fishery data, all other remaining data streams need to be considered and carefully integrated. The assessment will largely have to rely on “equilibrium” models, which assume constant fishing mortality and constant recruitment, which is a fair assumption given that fishing for this species has been disallowed for 25 years (Haupt et al. 2020). The combined underwater video camera (UVC) data is comprehensive and likely to cover all important areas of seventy-four abundance. Current strategies to use metrics derived from UVC data mostly revolve around using the frame with the largest number of individuals (i.e. MaxN), which is not feasible for rare species and introduces considerable bias towards smaller sizes. New metrics to gain unbiased size information from UVC are in development locally and internationally and will be available for use in the updated assessment.

UVC data alone will not be sufficient to conduct an assessment and samples must be collected to update important life history parameters related to growth and maturation. These samples have to be collected during dedicated surveys across the species’ distribution over the period of one biological cycle (i.e. one year). This can be done together with stakeholders, including organised recreational angling.

Work plan

1. Collate all historical data.
2. Collate and filter all underwater footage that contains seventy-four
3. Generate relative abundance metrics (i.e., MaxN or equivalent) for all areas.
4. Generate unbiased size frequencies, with up-to-date methodology from UVC.
5. Develop dedicated field sampling plan and carry out multi-area/institutional sampling for genetics and life history components of the study.
6. From samples, update life history parameters as model input (i.e., age length key, growth functions, maturity curves.
7. Determine genetic structure to confirm panmixia and therefore assessment units.
8. Select most appropriate model framework. A range of data-limited models have been developed over the last decade, but it is envisaged that the base-case is going to be an Age-Structured Equilibrium Model (ASEM).
9. Review of project results by the LNSWG and advise on the appropriate action to ensure recovery of this once important fishery resource.

A comprehensive project plan with responsibilities and deadlines, subject to approval and available funding, is going to be developed by the LNSWG.