# Snapper Science Stakeholder Group (SSSG) Communiqué

## Meeting #3 – Friday 4 August 2023

The third Snapper Science Stakeholder Group (SSSG) meeting largely focused on Research Theme 2 – Estimates of Biomass and presentations on the four proposed projects in this theme;

- Project 2.1 – Refinement of Daily Egg Production Method (DEPM) for Snapper
- Project 2.2 – Development and application of hydroacoustic surveys for Snapper
- Project 2.3 – Scoping study for close-kin mark-recapture (CKMR)
- Project 2.4 – Enhancement of the stock assessment model ('SnapEst')

## Refinements to the program structure and projects in Research Theme 1

The meeting provided an overview of the modifications to the proposed program structure and projects within Research Theme 1 – Biology. These changes were collated by feedback from stakeholders and research partners following Meeting #2. Dr Troy Rogers (SARDI) delivered a presentation outlining the significant updates, including:

- Sampling for the proposed genomics work in Project 1.2 'Contemporary demographics and stock structure for the West Coast population' has been expanded to advance our understanding of stock structure throughout South Australia.
- Project 4.2 'Fishery ecosystem model' is an existing project funded by the FRDC and will not be listed under the Snapper Science Program. The project will be revised to align with the objectives of the program and will occur concurrently.
- Research themes have been consolidated to bring projects with clear linkages together. Project 4.1 'Habitat survey and utilisation by Snapper at early life stages' has been moved into Research Theme 1, which has now been broadened to 'Biology and Ecology'. As a result, the number of research themes has been reduced from four to three.

## Endorsement of projects in Research Theme 1

The SSSG endorsed advancing the proposed projects for Research Theme 1 – Biology and Ecology into scoping document. Theme 1 project scope will be refined and circulated to the SSSG out-of-session.



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# Research Theme 2 – Estimates of Biomass

One of the highest research priorities for Snapper is the development of reliable fishery-independent indices to monitor population trends and inform stock status. Dr Troy Rogers presented an overview of the Research Theme 2 – Estimates of Biomass, with an emphasis on some of the reasons why fishery-independent indices are required. These were:

- The influence of changes to fishery management on commercial fishery statistics
- Confounding effects of hyperstability
- Absence of reliable fishery-dependent data

Dr Rogers explained how commercial catches and catch rates (i.e., catch per unit effort) have traditionally been used as a relative index of abundance for many fisheries. This assumes that an increasing catch rate reflects a higher abundance of fish, and vice versa. Hyperstability occurs when the relationships between catch rates and abundance become uncoupled, such that high catches and catch rates can persist although the population is declining. That is, hyperstability 'masks' the decline of the population. A variety of factors contribute to hyperstability, such as improved fishing efficiency through technological development (i.e., sonar, GPS, radar, communications) and aggregating behaviour linked to spawning and/or migration.

Dr Mick Drew (SARDI) was introduced as the leader for Research Theme 2 – Estimates of Biomass.

## 2.1 Refinement of the daily egg production method (DEPM) for Snapper

Over the last 30 years, the daily egg production method (DEPM) has been used to estimate the spawning biomass of Snapper in New Zealand, Western Australia, and South Australia. The underlying principle of the DEPM is that spawning biomass can be estimated from the relative abundance of eggs in the water column and the number of eggs produced by spawning fish.

Dr Mick Drew (SARDI) provided a summary of how the DEPM has evolved for Snapper in South Australia and identified areas for potential refinement to improve estimates of biomass. These included:

- Evaluate methods to sample Snapper eggs in the water column
- Approaches to determine total daily egg production (i.e., spawning area × egg production)
- Comparison of results with a concurrent hydroacoustic survey

Fieldwork for the study will be completed in December 2023 and January 2024 in Gulf St Vincent, with aggregations of Snapper identified prior to the study. The results will contribute to determining the method used to estimate biomass that will be included in the next stock assessment.

## 2.2 Development and application of hydroacoustic surveys

Hydroacoustic techniques use underwater sound signals to identify fish and are commonly used to survey for pelagic fish species (e.g., sardines and anchovies). Acoustic surveys have the capacity to cover large areas relatively quickly and gather data over a wide range. More recently, hydroacoustic techniques have been developed to survey for demersal fish species (i.e., species that generally occupy the bottom third of the water column), although this is associated with several challenges.

Dr Ben Scoulding (CSIRO) presented an overview of the hydroacoustic technique recently developed and applied by his team to estimate biomass for Snapper in Shark Bay, Western Australia. This involved traditional acoustic methods coupled with underwater video to determine the size and composition of fish assemblages. Dr Scoulding showed examples of how different species appear through acoustics and

the process involved in estimating biomass from the survey. Dr Scoulding then demonstrated how the technique can be adapted and improved for application in South Australia's gulfs. Hydroacoustic surveys will be done at the same time and over the same area in Gulf St Vincent as the DEPM surveys in December 2023 and January 2024.

## 2.3 Evaluation of close-kin mark-recapture (CKMR)

Dr Robin Thomson (CSIRO) provided a presentation about close-kin mark-recapture (CKMR) and how it could be applied for Snapper. CKMR is a form of mark-recapture experiment developed by CSIRO in which the size of a spawning population can be estimated based on the number of closely related individuals in a sample (i.e., parent-offspring pairs or half-sibling pairs).

For example, given a random sample of fish from a population, more closely related pairs would be expected in a smaller population, whilst less related pairs are expected in a larger population. CKMR can be used to estimate abundance, natural mortality, and fecundity with high precision and is independent of fishery data. This is a reasonably new fisheries assessment tool that is increasing in popularity and has been successfully applied to several commercial species including Southern Bluefin Tuna and School Shark.

Dr Thomson described how the proposed project will assess the feasibility of CKMR for Snapper in South Australia by identifying the number of samples required and developing an appropriate sampling design. Based on this study, a cost-benefit analysis will be used to determine if CKMR is an appropriate technique to estimate the biomass of Snapper in the future.

## 2.4 Enhancement of the stock assessment model ('SnapEst')

The Snapper stock assessment model ('SnapEst') uses numerous biological and fishery datasets to provide annual estimates of biomass, exploitation rate, and recruitment for each stock of Snapper in South Australia. The model was initially developed in the early 2000s and has evolved to incorporate new datasets through time (e.g., estimates of spawning biomass from the DEPM). A/Prof Rick McGarvey (SARDI) presented an overview of the proposed 'SnapEst model enhancement' project, which includes three parts:

- An external review of the existing model by an independent expert
- Integration of new data inputs developed through the science program (e.g., enhanced DEPM, hydroacoustic surveys, CKMR) and
- Development of a project model to evaluate potential future trends in the population.

The external review is currently being finalised and will be distributed when available. The recommendations of the review will guide the structure of the project. The projection model will use the estimates of recruitment from 0+ juvenile surveys to forecast future trends in biomass.

# Communications framework

A draft communications framework for the Snapper Science Program was developed by PIRSA, SARDI and FRDC and is open to feedback from the stakeholder group until Friday 11 August 2023. The communications framework also mentioned a proposal from RecFish SA for the 'SnappBack' program.

Proposed communications activities include a dedicated Snapper Recovery section on the PIRSA website (the 'Snapper Hub') that will be the central repository for all approved content relating to the

broader Snapper Recovery Package, which will showcase the Snapper Science Program. The Snapper Hub will be updated regularly with project developments, summaries from stakeholder group meetings (‘communiqués) and educational material. All of the information published on the Snapper Hub will be made available to support complementary extension activities led by stakeholders (e.g., RecFish SA).

## Stakeholder involvement/feedback

Stakeholder feedback on the communications framework and proposed projects in Research Theme 2 is requested by the 11th and 18th of August, respectively.

## Next meeting

The next SSSG meeting will be held mid to late October.