Communiqué

Snapper Science Stakeholder Group (SSSG) Communiqué

Meeting #7 – Tuesday 1 October 2024

The seventh Snapper Science Stakeholder Group meeting primarily focused on project updates for Research Theme 2 – Estimates of Biomass. This included experimental studies to refine the daily egg production method (DEPM) and hydroacoustic surveys to estimate Snapper biomass, the results of which will inform future applications of each method.

HIGHLIGHTS

- **DEPM Refinement Study – Three sampling methods (vertical, oblique, and neuston tows) were compared at three sampling intensities in summer 2023/24. The results showed that either vertical or oblique tows can be used to estimate biomass using the DEPM, and that in general, the precision of biomass estimates were improved when the spatial intensity of plankton sampling was increased. These results will inform the design of future surveys.**
- **Hydroacoustic Surveys – Snapper were generally (78%) identified in mixed species assemblages that included Yellowtail Scad, Silver Trevally, and Blue Mackerel. Snapper were strongly correlated with benthic structure, which is an important consideration for future surveys. Acoustic (sound) and optical (underwater video) methods confidently identified Snapper and are suitable to estimate biomass in Gulf St Vincent.**
- **Advancing App-Based Reporting – Reporting by recreational fishers through the SA fishing app trialled during 2021/2022 as part of FRDC Project No. 2020-056. Over 2,500 events were recorded across 1,500 devices, although users generally disengaged quickly. Bias correction and expansion methods were used to correct for differences between app users and overall population.**
- **Recreational Catch Reporting Tool – Proposed methods to validate reporting data include on-site surveys, traffic cameras and counters, whilst attitudinal surveys can be used to investigate biases and understand participation barriers.**
- **Communication and Extension – Numerous webpage updates were published in September 2024 including a Snapper Science program timeline, media section, and updates for projects in Research Themes 1 and 2. Video pre-production is ongoing.**

Next meeting

The next SSSG meeting is planned for late January 2025, with the date to be confirmed. The meeting will include milestone updates for projects in Research Theme 1 – Biology and Ecology and an update on fieldwork completed in summer 2024/25.

Webpage: Snapper science program - PIRSA

FRDC FISHERIES RESEARCH AND DEVELOPMENT CORPORATION

Government of South Australia
Department of Primary Industries and Regions

SARDI SOUTH AUSTRALIAN RESEARCH AND DEVELOPMENT INSTITUTE

DEPM Refinement Study

The Daily Egg Production Method (DEPM) has been used to estimate spawning biomass for various stocks of Snapper in Australia and New Zealand since the early 1990s. This project involves a series of objectives to validate and improve estimates of spawning biomass for Snapper including the technique used to sample Snapper eggs from the water column and the spatial scale of sampling.

Two surveys were completed in December 2023 and January 2024 in Gulf St Vincent. In each survey, three gear types to sample plankton were compared – vertical, oblique, and neuston (surface) tows (see Figure 1). Each method was used to sample plankton at 61 stations which were arranged in a grid composed of three sampling intensities – 4 × 2 nm, 2 × 2 nm, and 1.4 × 1.4 nm.

The three net types sampled vastly different volumes of water. The vertical tow sampled the least, the oblique tow sampled ~3 times the water compared to a vertical tow, and the neuston tow sampled ~12-15 times the water of a vertical tow. Despite the large differences in the volume of water filtered, the overall concentration of Snapper eggs sampled using each gear type was very similar.

Across the two surveys, just over 1% of the eggs sampled were identified as Snapper eggs, and there were significantly more eggs sampled in January 2024 than in December 2023. Comparison of the different spatial scales of sampling showed that a higher sampling intensity refined the estimate of spawning area and provided a higher estimates of egg production.

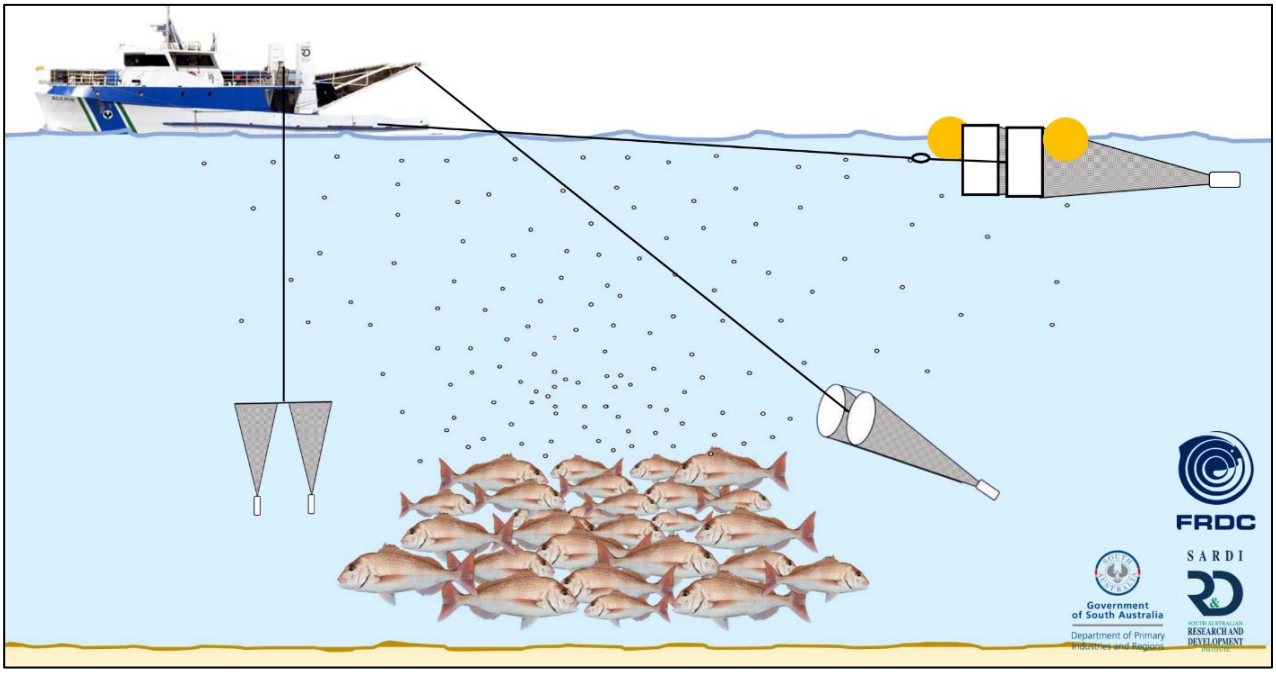

Figure 1. Schematic of the three methods used to sample Snapper eggs - vertical (left), oblique (middle), and neuston plankton tows (right).

Based on the results of the study, a series of recommendations were developed for future applications of the DEPM for Snapper. They included:

- Both vertical and oblique plankton tows are suitable to sample Snapper eggs and estimate mean daily egg production for the DEPM.
- Plankton sampling at a high spatial intensity appears most appropriate for future surveys.

- The distribution of plankton stations should prioritise areas where spawning aggregations of Snapper are most likely to be located. This can be informed by several data sources including previous egg surveys, historic spawning aggregation sites, fishery catch records, and engagement with industry.
- Reducing the survey area through intensive plankton sampling and prioritising key spawning areas is likely to reduce variance in adult parameters (i.e., spawning fraction).

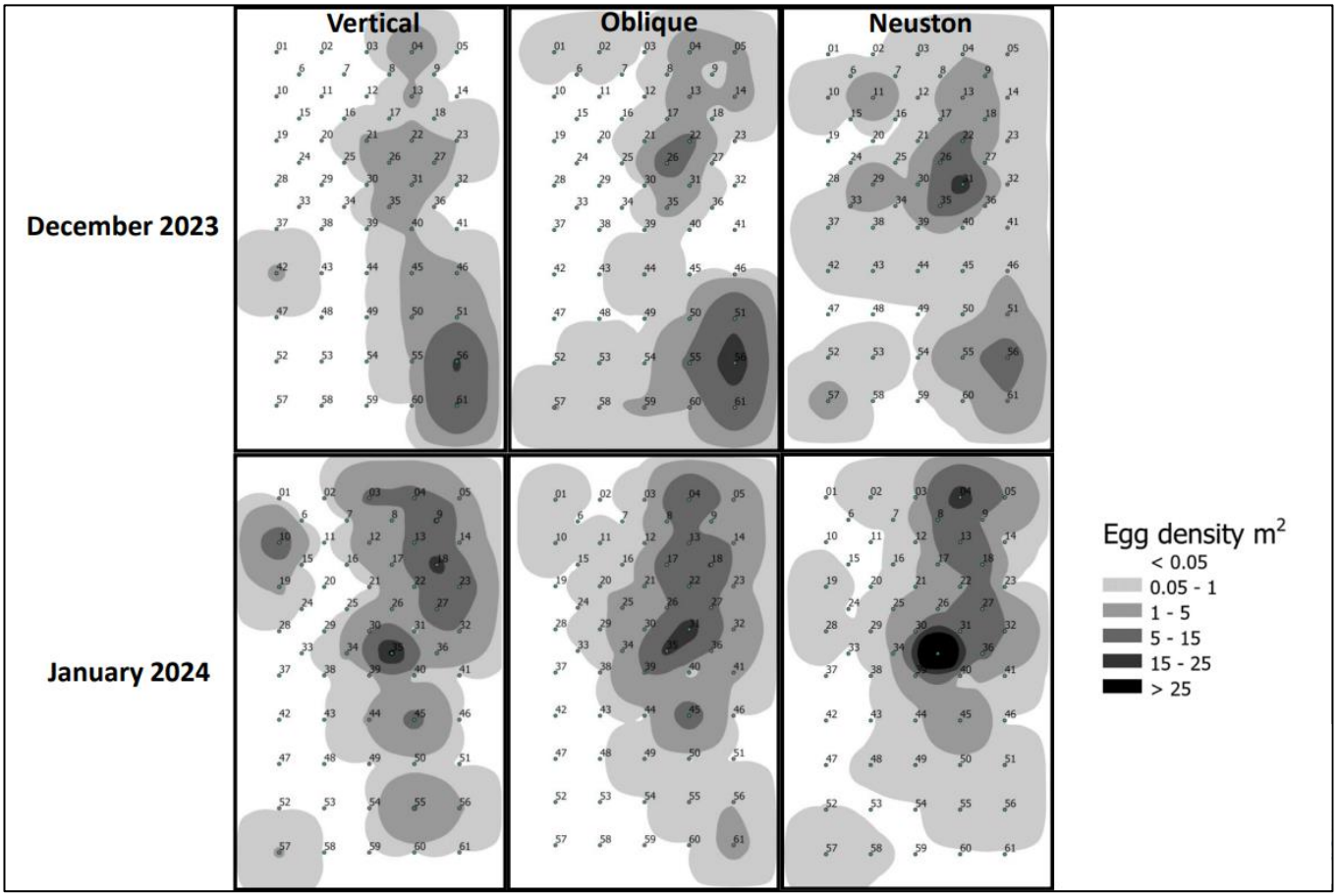

Figure 2. Distributions of Snapper eggs using the three sampling methods (vertical, oblique, and neuston tows) over the same area in December 2023 and January 2024.

Hydroacoustic Surveys

Hydroacoustic surveys were completed in December 2023 and January 2024 in Gulf St Vincent over the same area as the DEPM surveys. The survey in December characterised the broad acoustic environment and provided a snapshot of fish schools throughout the area. Snapper aggregations were strongly correlated with benthic structure, with 95% of Snapper aggregations within 100 m of structure. Also, Snapper were generally (78%) found in mixed species aggregations that included Yellowtail Scad, Blue Mackerel, and Silver Trevally.

The objective of the survey in January 2024 was to estimate the biomass of individual Snapper aggregations. A total of 22 aggregations were surveyed at high intensity, with acoustic signatures categorised into five groups.

1. Snapper – signatures dominated by Snapper (>90%).
2. Individual Snapper – single tracks with clear arches close to Snapper schools, or groups of single tracks close to structure.
3. Mixed – Likely Snapper and small pelagic fish mix with unknown proportions.
4. Small pelagic fish (SPF) – signatures dominated by small pelagic fish (<90%).
5. Individual unknown – Single tracks with clear arches away from a school or structure.

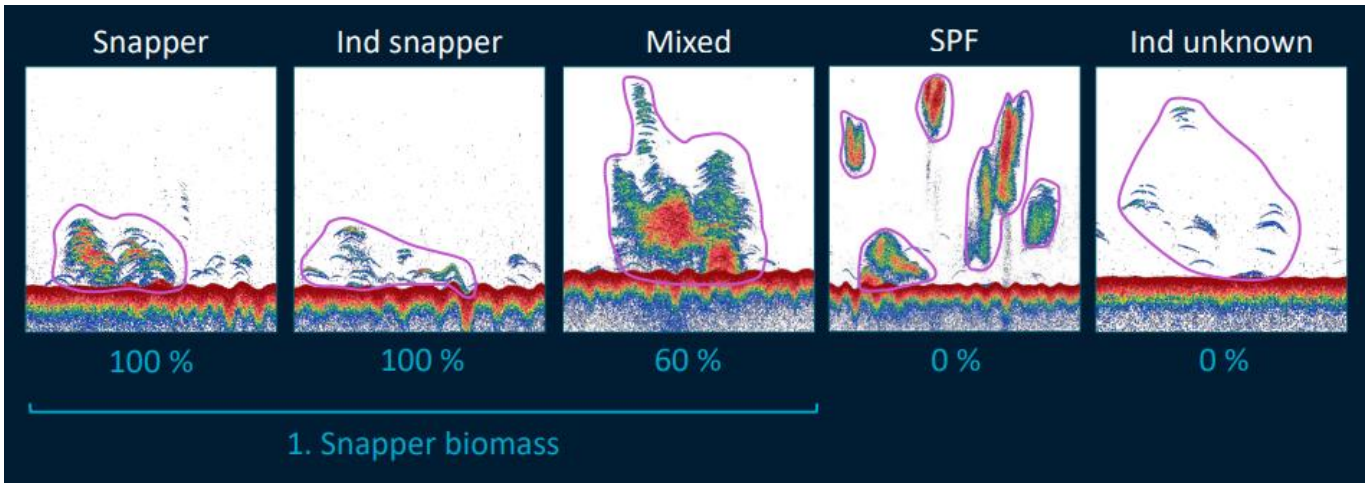

Figure 3. The five groups of acoustic signatures and their relative contribution to Snapper biomass. SPF – small pelagic fishes.

When a fish aggregation was identified, a drop camera was deployed to identify the species of fish in the aggregation and estimate the size of individual fish. The footage showed three dominant groups that aggregated around structure – Snapper, small pelagic fish (Yellowtail Scad and Blue Mackerel) and Trevally. This information was used to estimate the proportion of each species in the aggregation.

Data from the acoustic and optical components were integrated to estimate the biomass of Snapper in each aggregation, which were combined to provide an estimate of total biomass. Two estimates were produced: (1) a conservative estimate of the absolute minimum biomass of Snapper, which was 31 t; and (2) a maximum estimate, which was 90 t.

This study demonstrated that acoustic-optical methods can estimate the biomass of Snapper aggregations in GSV. Vessel avoidance, Snapper movement, and scaling estimates were identified as challenges associated with the method.

Advancing app-based reporting for recreational fisheries

App-based reporting for recreational fisheries allows real-time data collection, is user friendly and flexible. Although, barriers include missing or incomplete data, participation bias and therefore challenges in expanding the data to the population. Additionally, current stakeholder confidence in the quality of app-based data is low.

To better understand the advantages, disadvantages, and applicability of app-based reporting for recreational fisheries, Dr Crystal Beckmann (SARDI) led a voluntary app-based reporting trial across South Australia between 2021 and 2022 through the SA Fishing App. This project was part of a national FRDC project (2020-056) in collaboration with the University of Tasmania Institute of Marine and Antarctic Sciences (IMAS) and results were compared to the 2021/22 State-wide recreational fishing survey. During the app-based trial, approximately 2,200 fishing events were logged from 1,500 devices across the state. Of the users, 80% submitted a single event and most users disengaged quickly, with average retention of approximately 47 days. Follow-up surveys with participants revealed that most users did not report data every time they went fishing, with many forgetting to report, and most not reporting when they didn't catch any fish. More avid fishers (10+ days fishing in the past 12 months) were over-represented in the app-based survey in comparison to the State-wide survey. However, reporting did not increase with the avidity of the fisher as seen in the State-wide survey.

To fill in gaps and correct biases in the data, adjustments were made to address discrepancies, such as fewer reports of trips with little or no catch and lower participation in the app-based data. These changes improved the accuracy of app-based estimates of catch and fishing effort. The data were then expanded to better represent the entire fishing population, ensuring all types of fishers were included. Different methods were compared for each species to identify the most suitable approach for generating accurate catch and effort estimates, with benchmarks from the State-wide survey used to interpret the results.

Based on the app-based reporting trial, several recommendations were developed. Enhancing the app design to boost participation, retention, and data accuracy is essential. Incorporating alternative methods like remote monitoring and complementary approaches such as on-site and attitudinal surveys, will support the app-based data. On-site surveys are particularly valuable for gathering species-specific catch rate data, as they allow for direct observation and more accurate reporting of catch events. Attitudinal surveys provide insights into fisher behaviour, helping to understand motivations and factors influencing catch rates. Continuous validation and comparison between app data and probability-based benchmarks are also crucial to ensure the reliability and effectiveness of the data for assessment and fishery management.

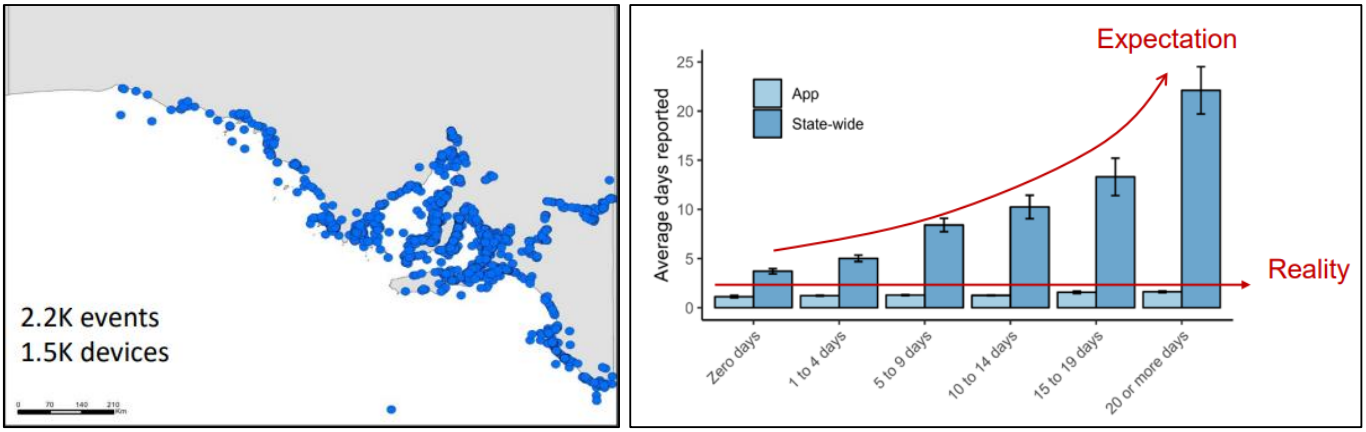

Figure 4. A - Reported fishing events across the app-based trial. B – Reporting was expected to increase with avidity as seen in the state-wide data, though this trend was not reflected in app-based data.

Recreational Catch Reporting Tool

Currently, the SA fishing app is used to provide up-to-date information on fishing limits, closures, and restrictions, and enables submission of mandatory reports for South-East (SE) recreational Snapper catches. PIRSA Fisheries and Aquaculture is developing a new app to replace the current one, with continued capability of reporting recreational catch.

To improve data accuracy and increase fisher participation in reporting of catches, the following research and development objectives have been identified.

1. Use on-site surveys and remote monitoring to validate app-based catch and effort.
2. Identify and address biases in app-based reporting through attitudinal surveys.
3. Validating spatial and temporal trends by comparing app data with independent benchmarks.

Accurate stock assessments depend on comprehensive recreational fishing data. Next steps in the research and development process will include collaborating with stakeholders to identify appropriate locations and periods for on-site surveys and remote monitoring, as well as designing attitudinal surveys to understand barriers to participation and biases.

Figure 5. Accurate stock assessments depend on comprehensive recreational fishing data. A recreational catch reporting tool will aid in producing such a dataset.

Communication and Extension

A key communication strategy of the Snapper Science Program is the Snapper Recovery Hub microsite. In September 2024, the site went through extensive updates, showcasing the various advancements in projects across the program, namely across Research Theme 1 and 2. Additionally, a new timeline of key project milestones was added to allow community members to visualise key milestones. Finally, a new 'In the News' scrollable media bar has been added to the Snapper Recovery Hub homepage showcasing the various coverage of the Snapper Science Program across TV, radio and partner newsletters. Updates to the webpage will continue into 2025.

New photography and video footage has been procured to further showcase the diversity of scientific processes within the Snapper Science Program. The new footage has been employed across the webpage and social media and will be used in upcoming video content.

Figure 6. New footage of Snapper Science Program – Snapper egg identification.

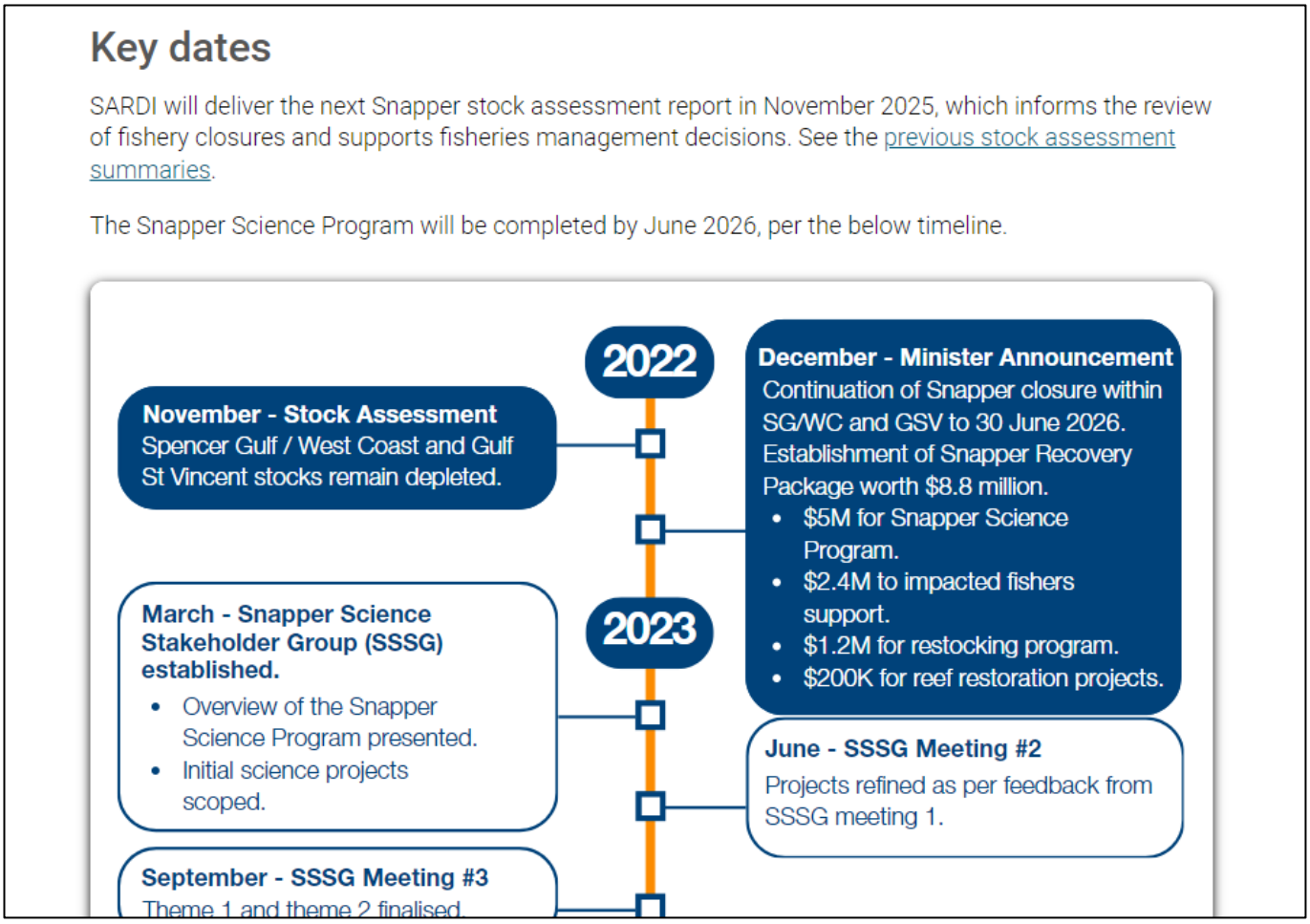

Figure 7. Snapper Science Program timeline now available on the Snapper Recovery Hub webpage.