

Snapper Science Stakeholder Group (SSSG) Communiqué

Meeting #8 – Tuesday 4 February 2025

The eighth Snapper Science Stakeholder Group meeting focused on project updates for Research Theme 1 – Biology and Ecology and Research Theme 3 – Monitoring and Assessment. This included a suite of field work completed during summer 2024/25, the review biological data for Snapper in South Australia, and the habitat survey in Gulf St Vincent to identify potential nursery areas for juvenile Snapper.

HIGHLIGHTS

- **DEPM surveys 2024/25** – A total of over 1,000 plankton samples were collected from Spencer Gulf and Gulf St Vincent in December 2024 and January 2025, respectively. These samples will be processed over the coming months to identify Snapper eggs. Representative samples of adult Snapper were collected at the same time as the plankton surveys to calculate key adult parameters including spawning fraction and batch fecundity.
- **Acoustic-optical survey** – 35 Snapper aggregation sites were surveyed in Gulf St Vincent in January 2025. Snapper were observed at most sites (85-90%) and were generally within 100 m of structure on the seabed. The survey also involved a comparison of acoustic data collection between a trailer boat and an uncrewed electric vessel. The work was led by researchers from the CSIRO.
- **Review of Biological Parameters** – Spatial and temporal trends in biological parameters for Snapper were compared at various scales. Examples of analyses for northern Spencer Gulf showed temporal shifts in growth parameters and the onset of maturity over the past 25 years.
- **Juvenile Snapper** – Otolith microstructure analysis of juvenile Snapper was used to estimate the age of fish in days, which was used to calculate the spawn and settlement dates of each fish. The back-calculated spawn dates of juveniles sampled in recent years were generally between mid-December and mid-January, which is consistent with historic datasets (i.e., 2000 to 2010).
- **Habitat survey in Gulf St Vincent** – Habitat surveys of Gulf St Vincent using towed underwater cameras and sediment analysis were completed in late 2024. A total of 167 camera tows and 207 sediment grabs were completed. Ongoing analysis will compare these findings with existing datasets to improve the understanding of juvenile Snapper habitat distribution in GSV.

Next meeting

The next SSSG meeting is scheduled for 8 May 2025 and will involve project updates for Research Theme 2 – Estimates of Biomass.

Webpage: [Snapper science program - PIRSA](#)



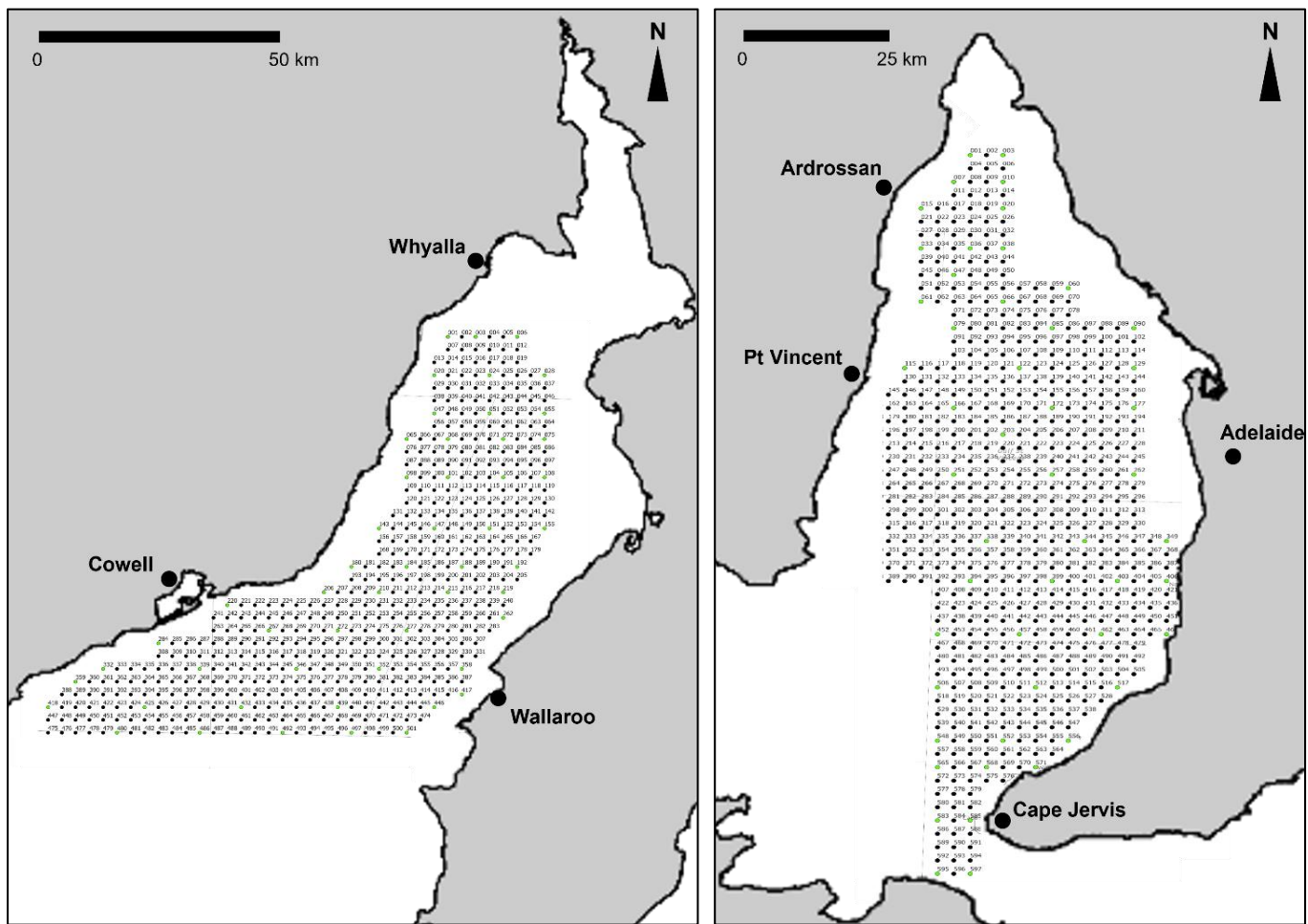
DEPM Surveys 2024/25

As presented at SSSG Meeting No. 7 in October 2024, the design of the daily egg production method (DEPM) surveys for 2024/25 was informed by the recommendations from the refinement study completed in 2023/24. The recommendations for plankton sampling included:

- Use a vertical tow to sample for Snapper eggs at each plankton station,
- Collect plankton samples at a higher spatial resolution (i.e., 1.5 × 1.5 nm) and,
- Increase the number of plankton samples collected.

The survey in Spencer Gulf was completed from 9 to 20 December 2024. Plankton samples were collected at 501 stations throughout the northern and central regions of the gulf, with environmental information collected using a CTD cast at 55 stations. The survey in Gulf St Vincent was completed from 8 to 18 January 2025. Plankton samples were collected at 560 stations throughout the gulf, with environmental data collected at 60 stations. All plankton sampling was done from *MRV Ngerin*, with a team of six research staff that operated 24 hours a day.

The mixed plankton samples are sorted following a multi-stage process to identify the Snapper eggs, which includes morphological and molecular techniques. With over 1,000 plankton samples collected across the two gulfs, laboratory processing and analysis will require several months to complete.



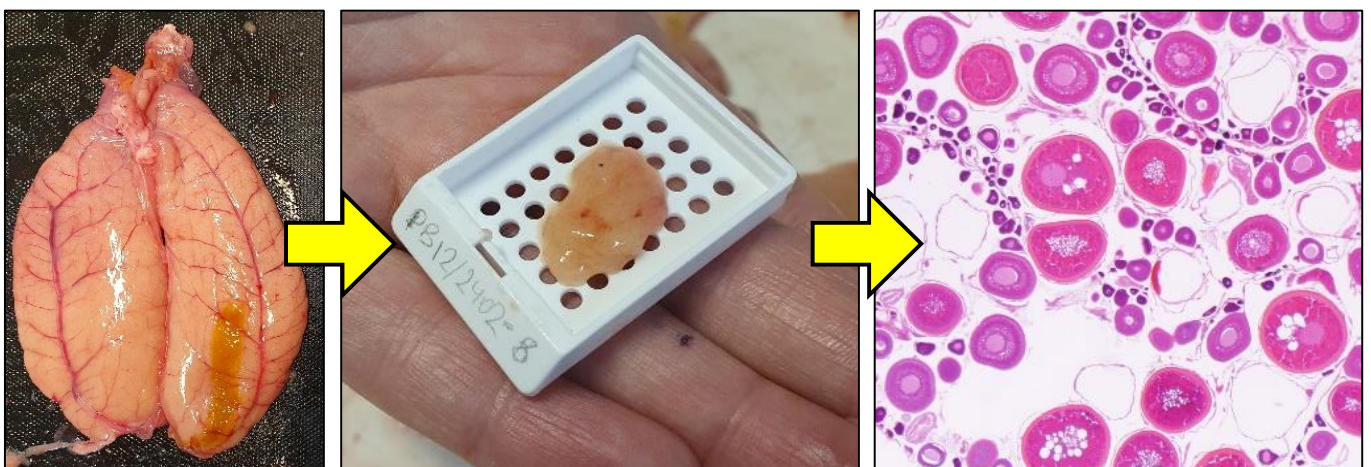
Spatial distribution of plankton sampling stations in Spencer Gulf (left) and Gulf St Vincent (right).



Plankton samples were collected using a vertical tow, which were preserved in ethanol for subsequent laboratory analysis.

The second component of the DEPM surveys is the collection of representative samples of adult fish to calculate reproductive parameters. Adult samples were collected by seven contracted Marine Scalefish Fishery (MSF) fishers under the direction of a SARDI observer. For Spencer Gulf, a total of 295 fish were collected from 17 samples throughout the survey area. For Gulf St Vincent, 331 fish were collected from 27 samples. When possible, adult sampling was done in the afternoon and evening to align with the daily spawning cycle and increase the probability of sampling fish about to spawn.

To determine if a female Snapper had spawned recently or would have spawned in the next few hours, a section of the ovary is sampled and processed for histological analysis. This process enables microscopic analysis of the ovary and is essential to determine reproductive condition.



Preparation of an ovary sample for histology to determine reproductive condition.

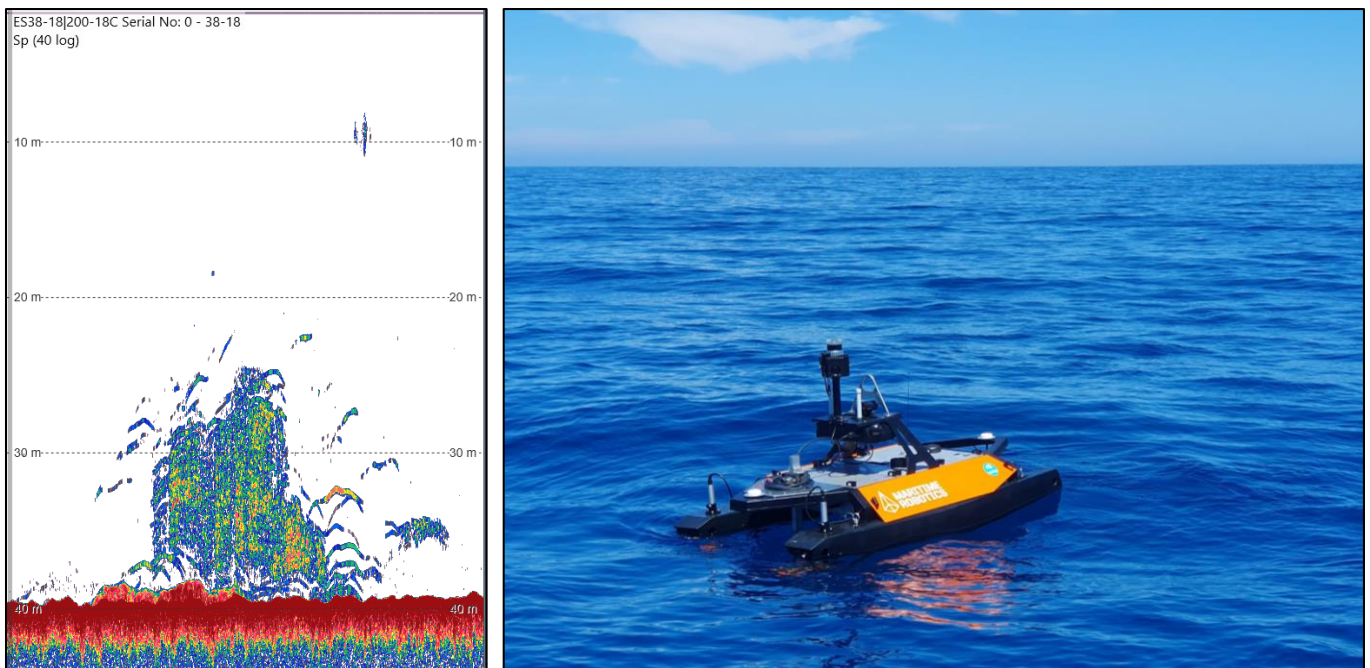
Acoustic-optical Survey

As for the DEPM surveys, the design of the acoustic-optical survey was informed by the results of the experimental study in summer 2023/24. These included:

- Aggregations of Snapper were strong associated with structure on the seafloor.
- Almost all Snapper aggregations were within 100 m of the structure.
- Snapper were generally identified in mixed species aggregations that also included Silver Trevally, Yellowtail Scad, and Blue Mackerel.
- Snapper demonstrated avoidance behaviour associated with vessel noise.

An acoustic-optical survey was completed in Gulf St Vincent from 8 to 18 January 2025, i.e., at the same time as the DEPM survey. The survey involved high intensity sampling at 35 recognised aggregation sites throughout the gulf. At each site, a series of linear transects arranged in a star pattern were completed, with each transect extending 250 m from the centre point. The acoustic equipment included a 38/200 kHz Airmar transducer connected to a laptop through a Simrad WBT Mini, and a Lowrance HDS Pro was used for navigation and side imaging.

Snapper were identified at 85-90% of the sites surveyed. Aggregations that contained Snapper were generally within 100 m of structure and contained other species including Silver Trevally and Yellowtail Scad. Underwater video provided essential data to identify the species composition of the aggregation and estimate the relative proportions of those species.



An example of an echogram of a Snapper aggregation (left) and the uncrewed electric vessel (right).

To investigate the hypothesis that vessel noise influenced Snapper behaviour and acoustic observations, a trial was conducted between the trailer boat and an uncrewed electric vessel. The same acoustic equipment was attached to both vessels. Six aggregation sites were surveyed for comparison, with the electric vessel completing the transects first, followed by the trailer boat. Potential benefits of automation in hydroacoustic surveys include enhanced efficiency and reduced costs, with increased data quality and higher confidence in biomass estimates.

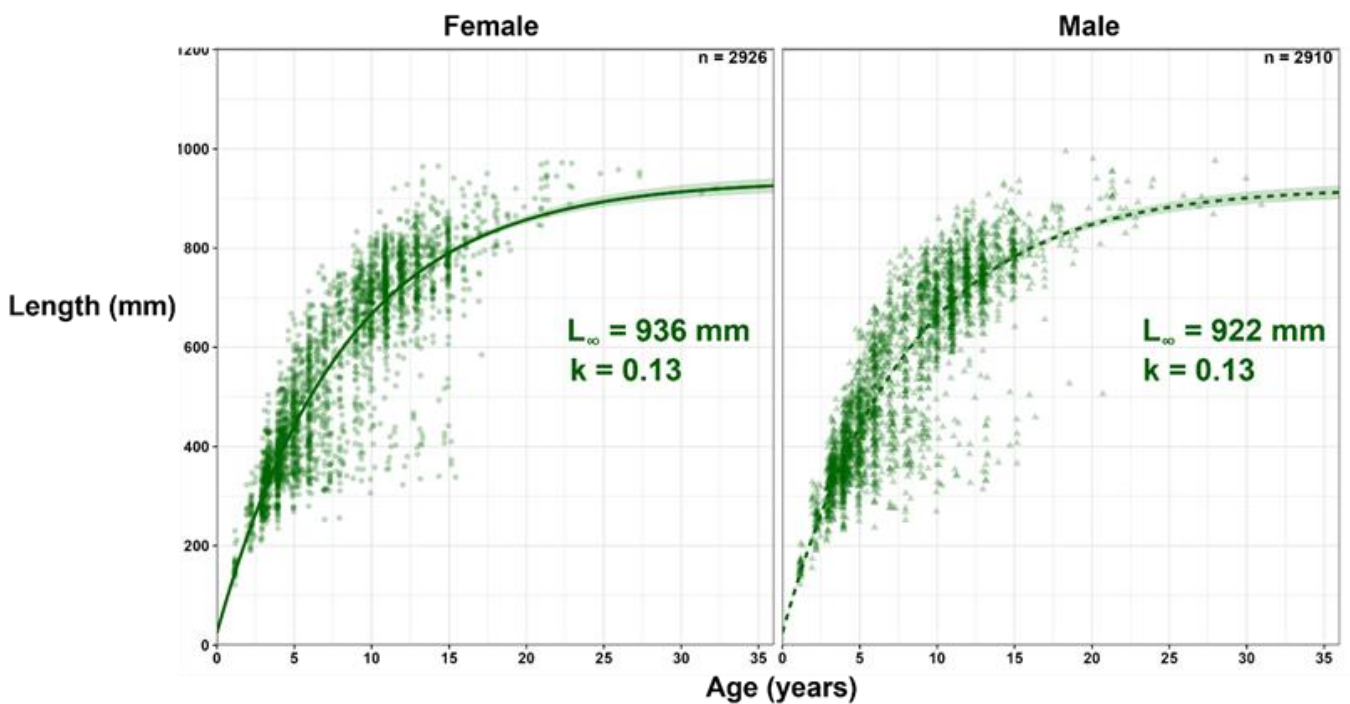
Review of Biological Parameters

Over the past 40 years, SARDI researchers have collected biological and fisheries data for Snapper in South Australia. In other jurisdictions across Australia, long-term datasets such as this have been used to identify temporal shifts in biological parameters such as growth and maturity. The aim of this project was to assess variability in the biological characteristics of Snapper over the last 40 years, which may have been influenced by changes in environmental conditions and stock abundance.

The first step was to synthesise the available datasets. State-wide sampling of Snapper has occurred since 2000, primarily through the commercial market sampling program and regional catch sampling. Other datasets that were incorporated included targeted research projects, trawl surveys for juvenile Snapper, and post-graduate studies. This has resulted in an extensive dataset with biological information for almost 30,000 Snapper, and lengths for over 75,000 individuals.

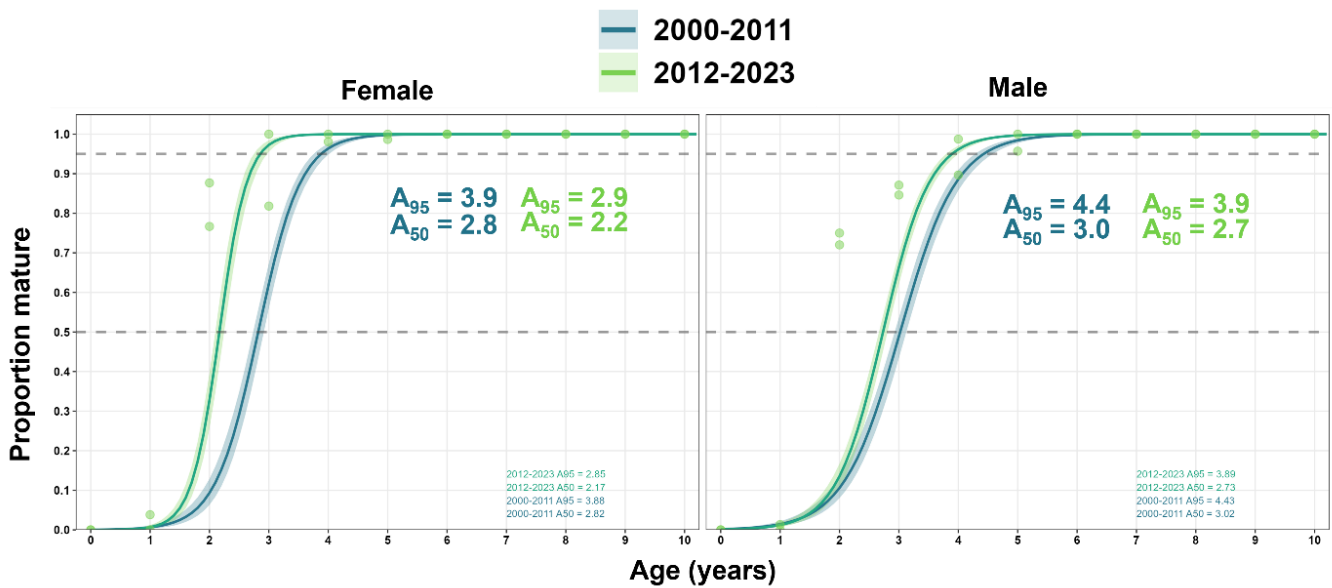
This project has included cross-jurisdiction collaboration with the Western Australia Department of Primary Industries and Regional Development (WA DPIRD) who completed a similar analysis in a recent FRDC project ‘Where did the Snapper go?’ (FRDC Project No. 2018-050, Jackson et al. 2023). The project identified several spatial and temporal shifts in growth and maturity, and produced two data analysis packages that have been utilised for Snapper in SA.

Data analyses have been completed at several spatial and temporal scales. Spatially, the data were analysed at the regional population level, i.e., the West Coast of Eyre Peninsula, northern Spencer Gulf, southern Spencer Gulf, northern Gulf St Vincent, southern Gulf St Vincent, and the South-East Region. Temporally, the data were analysed for the entire time series of data available, then by 12-year and 5-year blocks when sufficient data were available. Data were separated by sex. Examples of these analyses are provided for one region, i.e., northern Spencer Gulf.



Von Bertalanffy growth curves for Snapper sampled from Northern Spencer Gulf between 2000 and 2023.

The age when 50% and 95% of fish were sexually mature was estimated for males and females. The data were separated into two time periods with different population structures for northern Spencer Gulf: 2000 to 2011 when the estimated biomass was high, and 2012 to 2023 when the estimated biomass was much lower. The analysis identified that the age of 50% and 95% maturity for each sex was lower in the latter time period, which is a common characteristic of depleted populations.



Age-at-maturity curve for Snapper in Northern Spencer Gulf split into two time periods: 2000-2011 and 2012-2023.

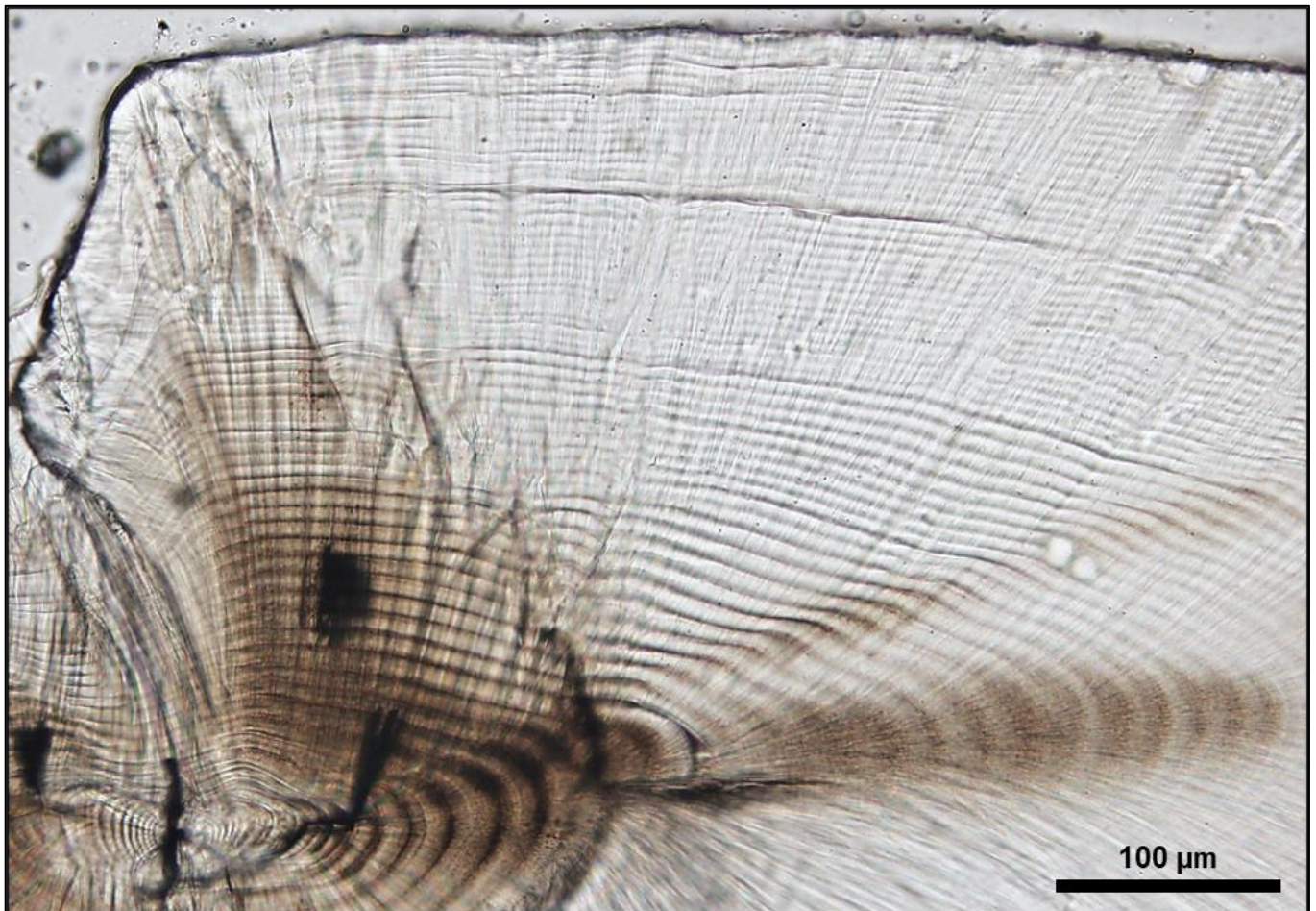
The next stage of the study will use the individual biological characteristics to calculate population-level parameters such as natural mortality.

Snapper Early Life History

The otoliths of a juvenile Snapper provide a unique insight into its early life history. The otoliths form increments daily that can be interpreted to estimate age (in days) and calculate other characteristics including growth rate, spawn date, and settlement date. When this process is repeated for numerous individuals in a cohort, and for multiple cohorts over several years, it builds a comprehensive description of early life history characteristics. The preparation of an otolith for microstructure examination is a tedious and time-consuming task, as each tiny otolith is polished by hand to progressively reveal the daily growth increments.

The age-0 juvenile Snapper sampled from northern Spencer Gulf over the last few years have ranged in size from 25 to 80 mm fork length and were estimated to range in age from 49 to 128 days. By subtracting the estimate age from the date of capture, it is possible to calculate the date each fish was spawned. The estimate spawn dates ranged from early December to early February. However, the majority of fish were spawned in a much shorter period between mid-December and early January.

The early life history characteristics of age-0 Snapper sampled between 2021 and 2024 were very similar to those sampled in annual surveys between 2000 and 2010.

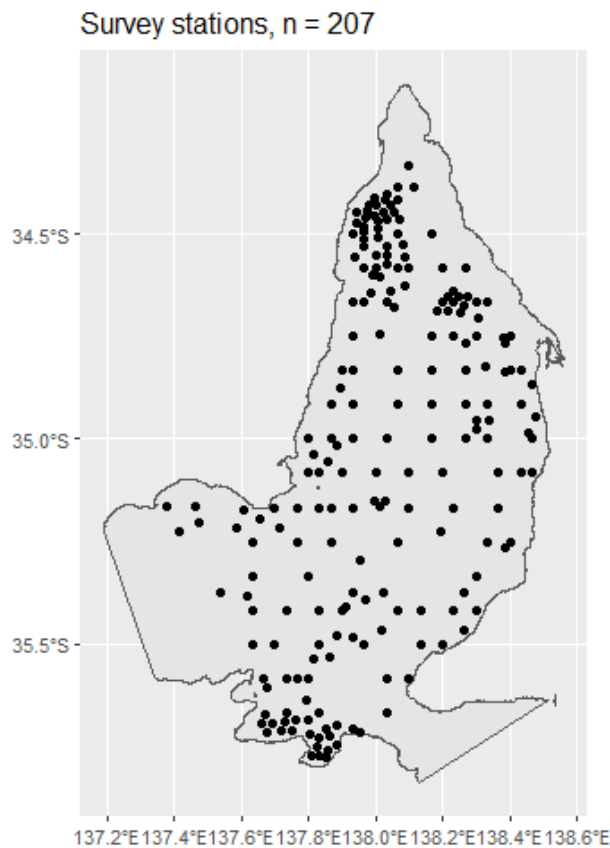


The microstructure of an otolith from a juvenile Snapper showing the continuous sequence of daily increments.

Benthic Habitat Survey in Gulf St Vincent

Snapper occupy a variety of different habitats throughout their life history. The preferred habitat for juveniles is soft, muddy areas as identified through annual surveys in northern Spencer Gulf from 2000 to 2010. Whilst these areas have been identified throughout Spencer Gulf, the distribution of appropriate benthic habitat for juvenile Snapper in Gulf St Vincent is poorly understood.

The aim of this project is to understand the spatial distribution of benthic (seafloor) habitats in Gulf St Vincent, with particular focus on the soft sediments preferred by age-0 Snapper. The survey was completed across two cruises in September and October 2024. Over the 2 weeks at sea, a total of 167 camera tows (totalling 83.5 km) and 207 sediment samples were collected. Formal analysis of camera footage and sediment samples is ongoing, with comparisons between this survey and existing datasets to be undertaken in coming months.



Top – locations for towed underwater camera and sediment sample collection in GSV. Bottom – a variety of benthic substrates were sampled, as evidenced by the array of sediments collected.