

Snapper Science Stakeholder Group (SSSG) Communiqué

Meeting #6 – Wednesday 12 June 2024

The sixth Snapper Science Stakeholder meeting focused on project updates for Research Theme 1 – Biology and Ecology. This included surveys to monitor the abundance of juvenile Snapper, sampling of Snapper on the West Coast of Eyre Peninsula, and time series analysis to investigate relationships between environmental parameters and juvenile recruitment.

HIGHLIGHTS

- **West Coast Stock Structure** – sampling of adult, egg, larvae, and juvenile Snapper was completed on the West Coast in summer 2023/24. A total of 342 adults, 26 juveniles, and 25 plankton samples have been collected and are currently being processed.
- **Environmental Variables and Recruitment** – time series of 51 environmental parameters were sourced and compared to annual recruitment in northern Spencer Gulf (NSG) and Gulf St Vincent (GSV) between 1984 and 2020. Preliminary analyses indicated that the number of days within the temperature threshold for Snapper spawning and larval survival has decreased since the 2000s.
- **Juvenile Recruitment Surveys** – targeted surveys for age-0 juvenile Snapper were completed in NSG and GSV in March and April 2024. The number of age-0 juveniles sampled in 2024 was much lower than in 2023. Juvenile Snapper were also recorded and retained from prawn surveys in SG and GSV in 2023/24.
- **Communication and Extension** – Snapper Restocking community event held on 22 April at Black Point, Yorke Peninsula, which was attended by Minister Scriven and ~60 community members. Project updates on the Snapper microsite will be released in July and a suite of videos are in production.

Next meeting

The next SSSG meeting is planned for September 2024, with the date to be confirmed. The meeting will include milestone updates for projects in Research Theme 2 – Estimates of Biomass, particularly the daily egg production method (DEPM) refinement study and hydroacoustic surveys.

West Coast Stock Structure

Currently, there are three recognised stocks of Snapper in South Australia: the Spencer Gulf/West Coast stock, the Gulf St Vincent stock, and the Western Victoria stock that extends into the South-East of SA. The aim of this study is to understand the processes that maintain the Snapper population on the West Coast of Eyre Peninsula. That is, either local spawning and recruitment on the West Coast, or emigration of fish from elsewhere.

The project involves two main components. The first is to sample the various life stages of Snapper on the West Coast (i.e., adults, eggs and larvae, and juveniles), and the second is to compare the characteristics of these fish (i.e., age, genetics, otolith chemistry) to those from other regions to determine the connectivity between them.

Adult Snapper were collected during three week-long trips to the West Coast in December 2023, February 2024, and May 2024. A total of 342 fish were collected in collaboration with commercial MSF fishers from numerous sites near Ceduna, Haslam, and Nuyts Archipelago. The fish ranged in size from 18 to 91 cm fork length and weighed up to 12.7 kg, with the oldest fish estimated at 28 years.

Plankton tows for Snapper eggs and larvae were done in February 2024. The locations for sampling were determined by the presence of spawning females in the adult samples collected the previous evening. The mixed plankton samples will be processed to identify Snapper eggs and larvae.

Juvenile Snapper were sampled using small fish traps and handlines in May 2024. Areas of soft, muddy bottom that are preferred by age-0 Snapper were located with commercial fishers and 26 Juvenile Snapper were sampled. The otoliths of these fish will be processed to estimate their age.

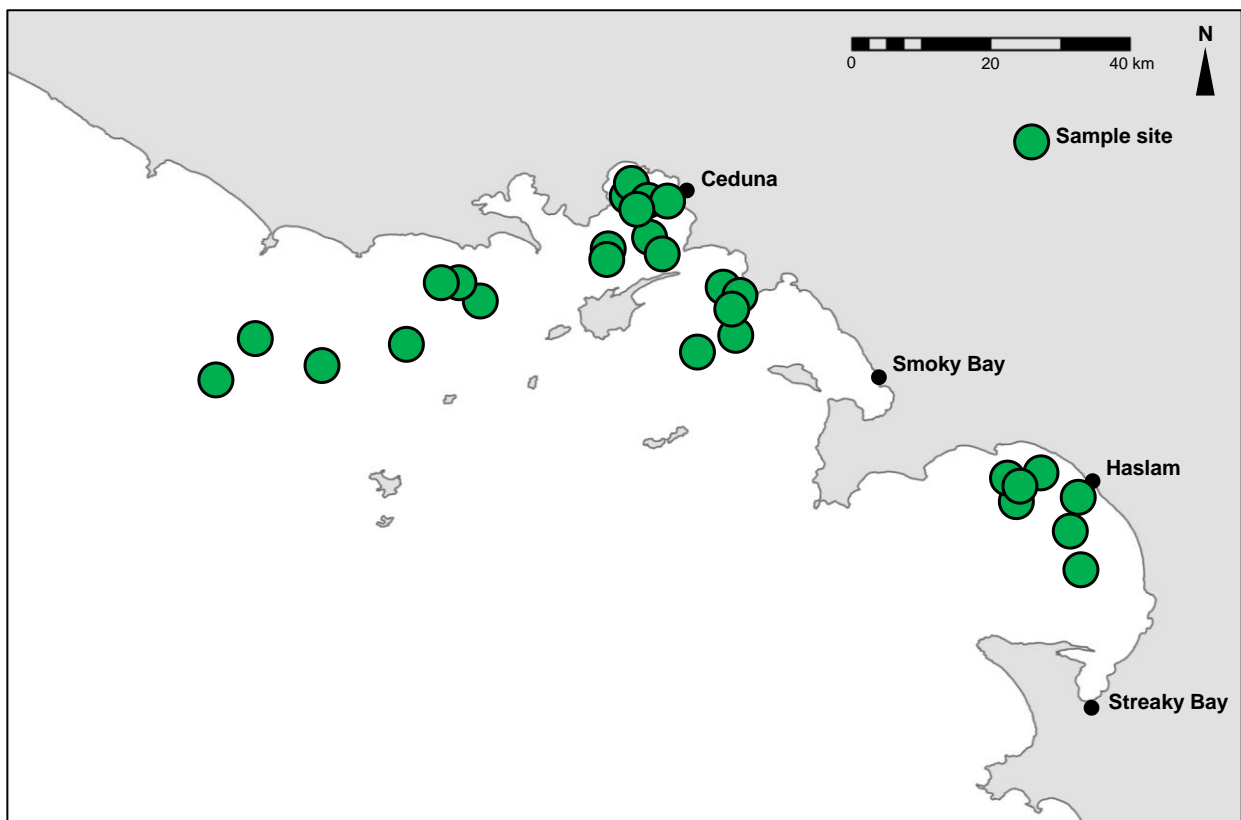


Figure 1. Locations of adult sampling along the West Coast of Eyre Peninsula, South Australia.

Environmental Variables and Recruitment

There are considerable knowledge gaps regarding the underlying factors that drive variation in juvenile recruitment, i.e., the number of juveniles that enter the population each year. The aim of this study is to retrospectively investigate the relationships between environmental parameters and juvenile recruitment and use this information to evaluate the potential effects of climate variation for Snapper in SA.

Estimates of annual recruitment for Snapper in Spencer Gulf and Gulf St Vincent from 1983 to 2019 were developed from the estimated ages of over 20,000 Snapper sampled since 2000. The time series of recruitment for each gulf was then compared to time series of over 50 environmental parameters including sea surface temperature, wind, rainfall, primary productivity, and climate indices. The time series for each parameter was normalised and detrended to remove seasonal effects and correlation analysis was used to identify the parameters to be considered for further analysis.

The optimal temperature range for Snapper spawning and egg and larval survival is between 18 and 22°C. For northern Spencer Gulf, preliminary analyses indicated that there had been an increase in the mean sea surface temperature (SST) during the summer months over the past 40 years, which resulted in fewer days within the optimal temperature range during the 2000s and 2010s. In addition, there has been a progressive increase in the frequency and intensity of marine heatwaves since the mid-2000s, which have the potential to significantly affect the survival of developing Snapper eggs and larvae.

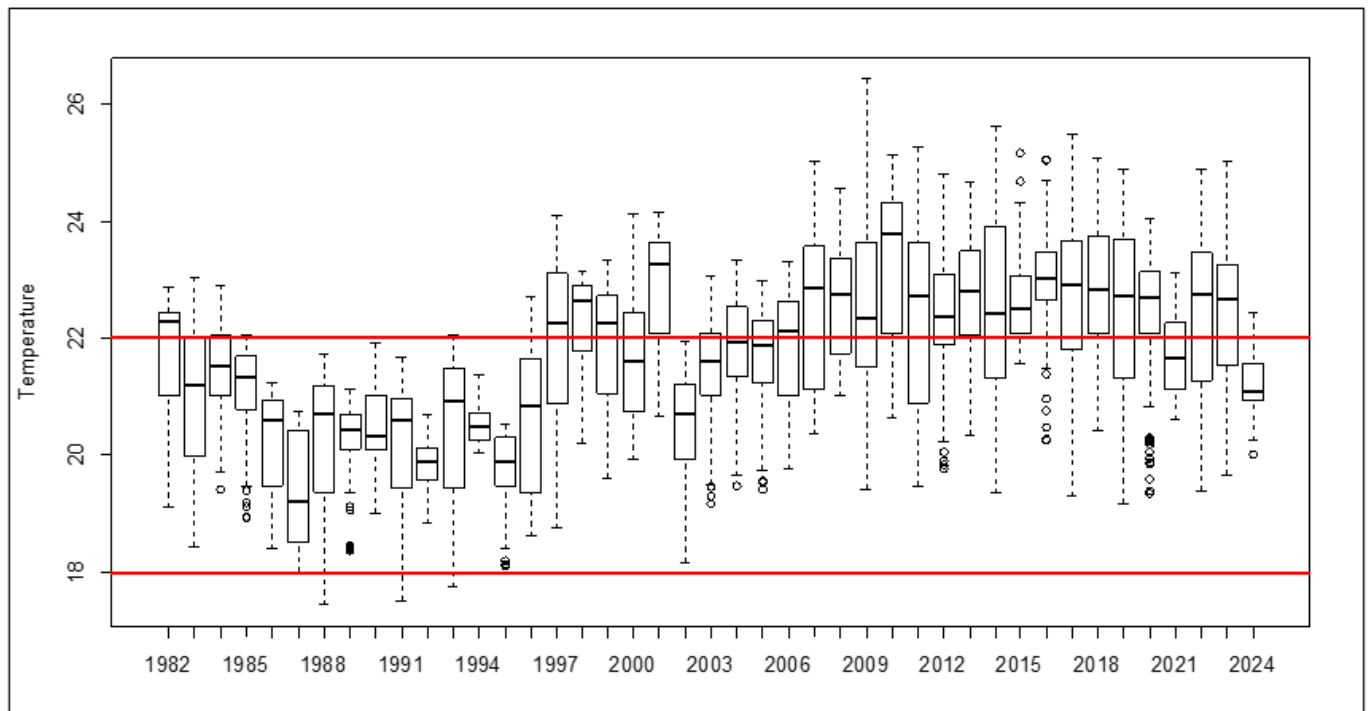


Figure 2. Boxplot showing the median and range of sea surface temperature (SST) during summer in Northern Spencer Gulf between 1982 and 2024. Red lines indicate the optimum temperature range for Snapper spawning and egg and larval survival (i.e., 18 to 22°C).

Juvenile Recruitment Surveys

The population dynamics and fishery productivity of Snapper populations are driven by inter-annual recruitment variability, i.e., the number of juveniles that enter the population each year. As such, annual surveys to monitor the abundance of age-0 juvenile Snapper in key nursery areas provide a relative index of recruitment that can be used to predict changes in the population.

The key nursery areas in each gulf are localised areas of fine, muddy bottom that are the preferred habitat of age-0 juvenile Snapper. In Spencer Gulf, the key nursery areas are in the northern part of the gulf near Western Shoal, False Bay, Fitzgerald Bay, and Ward Spit. Similarly, the key nursery areas for Gulf St Vincent are located near Ardrossan and Long Spit. Sampling is done with a small beam trawl that is towed behind a trailer boat at night, with each 5-minute trawl covering approximately 1,000 m².

The 2024 juvenile recruitment surveys were completed in Gulf St Vincent from 13 to 25 March and in Spencer Gulf from 26 March to 8 April. The number of age-0 Snapper sampled from each gulf in 2024 was lower than in previous surveys in 2022 and 2023. For Spencer Gulf, a total of three age-0 Snapper were sampled from one site at Western Shoal, which has been the most consistent site for juvenile Snapper in all previous surveys (i.e., 2000-2010, 2021-2023).

For Gulf St Vincent, there were no age-0 juveniles sampled from the 71 trawls across ten sites. There are two hypotheses to account for the consistent low number of recruits sampled in 2022, 2023, and 2024. Either (1) poor juvenile recruitment in each year, and/or (2) that key nursery areas were not adequately sampled. The latter hypothesis will be investigated through an extensive habitat survey in October 2024 to identify the preferred habitats of juvenile Snapper to inform future survey design.

Juvenile Snapper were recorded as bycatch on Prawn surveys in Spencer Gulf and Gulf St Vincent in 2023/24. The abundance of fish between 15 and 25 cm fork length suggests that some level of recruitment has occurred in recent years, which is consistent with age-0 juvenile surveys conducted in northern Spencer Gulf in 2022 and 2023.

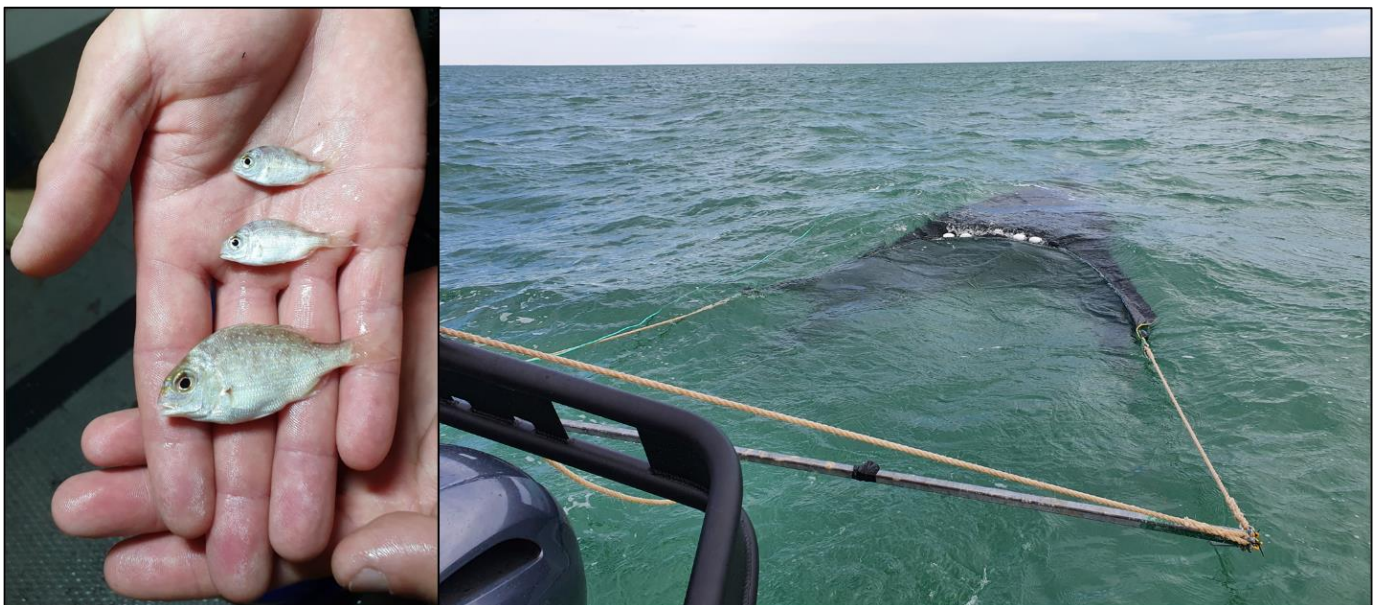


Figure 3. Juvenile Snapper collected in Spencer Gulf (left) and plumb-staff beam trawl used to sample age-0 juvenile Snapper (right).

Communication and Extension

A key component of the Snapper Science Program is communication and extension of the science being conducted to broader audiences. The Snapper microsite was launched in October 2023 and contains key information about the Snapper Recovery Package and the different components of the Snapper Science Program. A suite of videos regarding barotrauma and fish handling practices was released in December 2023 with weekly promotion through social media until February 2024.

The Snapper restocking community event was held on 22 April at Black Point, Yorke Peninsula. In addition to approximately 60 community members, the event was attended by Minister Scriven, the Mayor and CEO of the Yorke Peninsula Council, and representatives from the Narrunga Aboriginal Corporation. The event was pre-promoted through Ned McHenry's 'Catch of the Day' on Channel 7 News, local radio, newspapers, and via social media. The event was also covered on Channel 7 News on Saturday 27 April. A short video of the event has been produced and will be published across PIRSA channels imminently.

Updates to the Snapper microsite will be published in July, including updates for key projects in Research Themes 1 and 2. An article is also being produced for the Fisheries Research and Development Corporation (FRDC) newsletter and will be published in June.



Figure 4. Community members participating in the Snapper fingerling release at Black Point on the Yorke Peninsula on 22 April 2024.