UPDATED RESEARCH DATA FOR SNAPPER IN SOUTH AUSTRALIA - JUNE 2019

Fish stocks are constantly changing and require continual monitoring and management. For the Marine Scalefish Fishery, the South Australian Research and Development Institute (SARDI) assesses the status of key fish stocks on an annual basis. The primary objective of the program is to provide scientific information to support the sustainable utilisation of South Australia's shared fisheries resources.

Research and monitoring shows Snapper in decline

The stock assessment and monitoring program for Snapper includes three levels of information to support the current proposed management scenarios, including:

- Fishery-independent estimates of regional spawning biomass determined from an egg survey (Daily Egg Production Method; DEPM) undertaken in Spencer Gulf and Gulf St. Vincent in December 2018;
- An analysis of fishery-dependent commercial fishery statistics from 1984 to 2018;
- An analysis of the population biology of Snapper, including their regional size/age composition, through an on-going biological monitoring program.

Each of these levels of information have indicated declines in the Snapper stocks in Spencer Gulf/West Coast and Gulf St Vincent.

Snapper egg survey (DEPM) results

SARDI has recently provided additional information on Snapper spawning biomass estimates. A DEPM survey conducted from 10 to 19 December 2018 in Gulf St Vincent and Spencer Gulf and reported in June 2019 suggests there has been a considerable decline in stock abundance in both gulfs. The following provides an overview of the DEPM conducted in December 2018:

- For the DEPM, the plankton sampling was undertaken from 10-19 December 2018 throughout Gulf St. Vincent and the northern part of Spencer Gulf (Figure 1). A total of 329 stations were sampled using plankton tows.
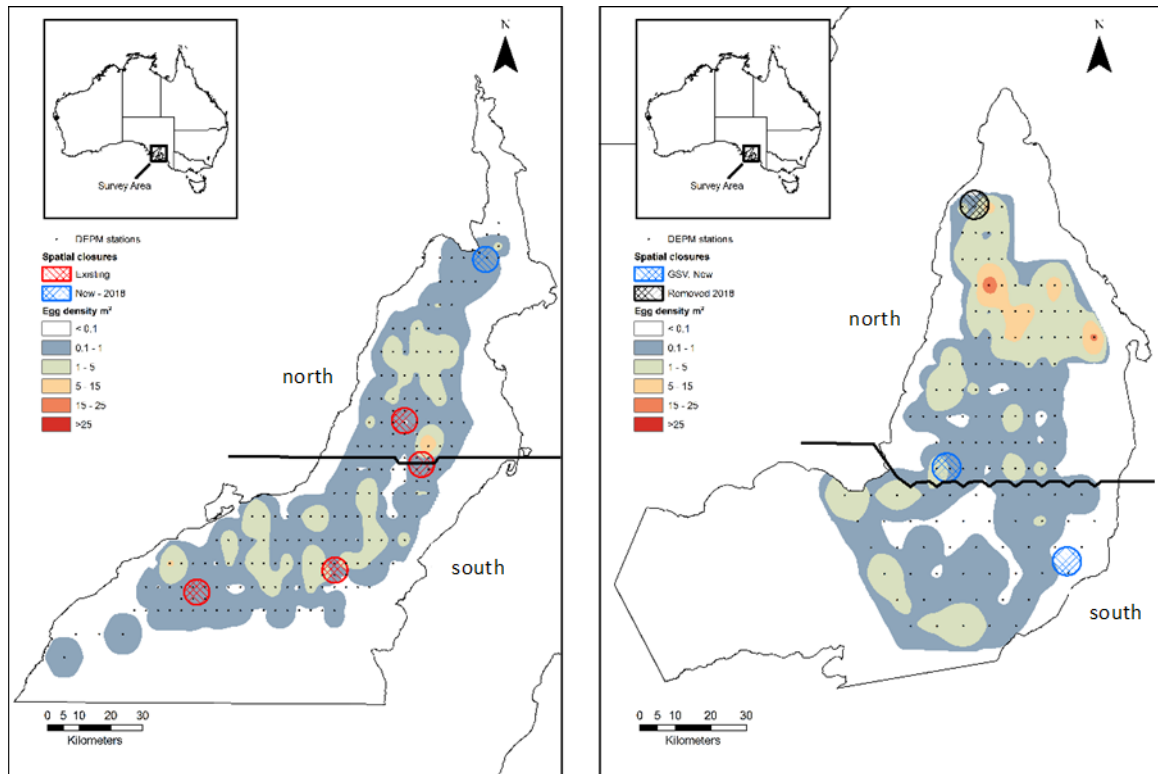
Figure 1. Maps of the northern part of Spencer Gulf and Gulf St. Vincent relating to the DEPM undertaken in December 2018. For each region the map shows: the division into the north and south areas; the locations of the sample stations; and the estimated densities of Snapper eggs.

- Plankton samples were sorted, and Snapper eggs identified and counted. To account for a reduced number of stations sampled in 2018 than what was planned (due to inclement weather), the analysis of the 2013 and 2014 DEPM surveys were recalculated at the same spatial scale (i.e. same number/location of stations) to ensure the surveys were comparable. Consequently, the recalculated estimates of biomass presented at the meeting for Spencer Gulf in 2013 and Gulf St Vincent in 2014 are marginally lower than those originally reported in Steer et al. (2017).

- For Spencer Gulf, Snapper eggs were broadly distributed throughout both areas, but were generally in low abundance. The highest density was recorded at one station adjacent to the Santa Anna spawning spatial closure at the boundary between the two areas. For Gulf St Vincent, the densities were consistently low throughout the southern gulf. Relatively higher densities were recorded across the northern gulf particularly at two hotspots, one each on the eastern and western sides of the gulf.

- For Spencer Gulf in 2018, the estimated spawning biomass was 192 t, which was 22.9% lower than the spatially-comparable (recalculated) estimate of 249 t in 2013 (Table 1). Declines were evident for both the northern and southern areas with a reduction of 30.3% for the latter region. The standard error associated with the 2018 biomass estimates for Spencer Gulf were 129 t to 255 t.

- The estimated spawning biomass for Gulf St Vincent in 2018 of 343 t was considerably lower than that of the spatially-comparable (recalculated) 2,590 t in 2014, representing a reduction of 86.8% (Table 1). There were considerable declines in the estimates of biomass in both the northern and southern areas. The standard error associated with the 2018 biomass estimates for Gulf St Vincent were 213 t to 473 t.

Region	Area	Re-estimated Spawning biomass (t) 2013/14 (± SE)	Spawning biomass (t) 2018 (± SE)	% reduction
SG	north	127 (74 – 180)	107 (49 – 165)	15.7
	south	122 (82 – 162)	85 (60 – 110)	30.3
	TOTAL	249 (182 – 316)	192 (129 – 255)	22.9
GSV	north	1,890 (851 – 2,930)	277 (152 – 402)	85.3
	south	700 (378 – 1,022)	66 (33 – 99)	90.6
	TOTAL	2,590 (1,502 – 3,678)	343 (213 – 473)	86.8

Table 1. Comparison of the estimates of spawning biomass between DEPM surveys undertaken in 2013 for Spencer Gulf, 2014 for Gulf St. Vincent and 2018 for both gulfs. Comparable sample areas were considered in the calculations for the two DEPMs undertaken in each gulf.

- The DEPM plankton survey area in Spencer Gulf in 2018 (Fig. 1), corresponded closely with the area enclosed in MFAs 11, 19, 20, 21, 22 and 23. The total commercial catches taken from these MFAs in 2013 and 2018 were compared with the respective estimates of spawning biomass (Fig. 2). Respectively, in 2013 and 2018, 18.6% and 19.4% of the estimated spawning biomass was taken by commercial fishers. For Gulf St. Vincent, the comparison between estimates of spawning biomass and the commercial catches was more challenging as the area considered in the plankton survey in 2018 poorly matched the boundaries of the MFAs. As such, the commercial catches from the area enclosed in MFAs 34, 35, 36 and 43 were considered as approximations of the total commercial catch. Using catches reported from these MFAs, a total of 15.0% of the estimated biomass was taken by commercial fishers in 2014, but in 2018 this increased to 45.8% (Fig. 2). This suggests that for GSV, between 2014 and 2018 there has been a substantial increase in the harvest fraction as spawning biomass has declined. These catches and harvest fractions are likely underestimated as recreational and Aboriginal/Traditional catches are not included.
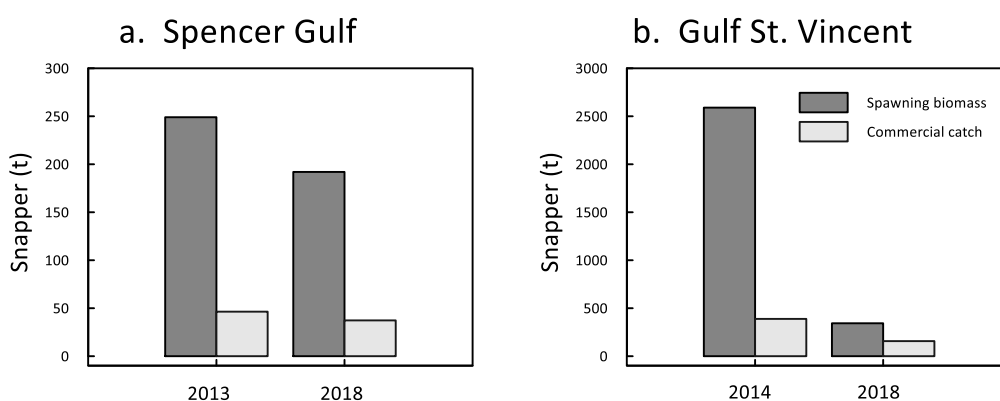

Figure 2. Comparisons of estimates of spawning biomass for Snapper from the two DEPM surveys and estimates of commercial catches. a. Commercial catches for Spencer Gulf involved MFAs 11, 19, 20, 21, 22, 23. b. Commercial catches for Gulf St. Vincent were for MFAs 34, 35, 36 and 43.

- Overall, the estimates of spawning biomass for 2018 are consistent with declines in commercial catch levels for the different regions. For this large, long-lived, relatively slow-growing, demersal species with current depressed biomass levels, a low harvest fraction (e.g. <10%, and potentially <5%) would likely be required to prevent further decline and begin stock recovery. If a harvest fraction of 10% were applied, this would translate to catches of 19 t across all sectors for northern Spencer Gulf, 28 t for northern Gulf St Vincent and 7 t for southern Gulf St Vincent.
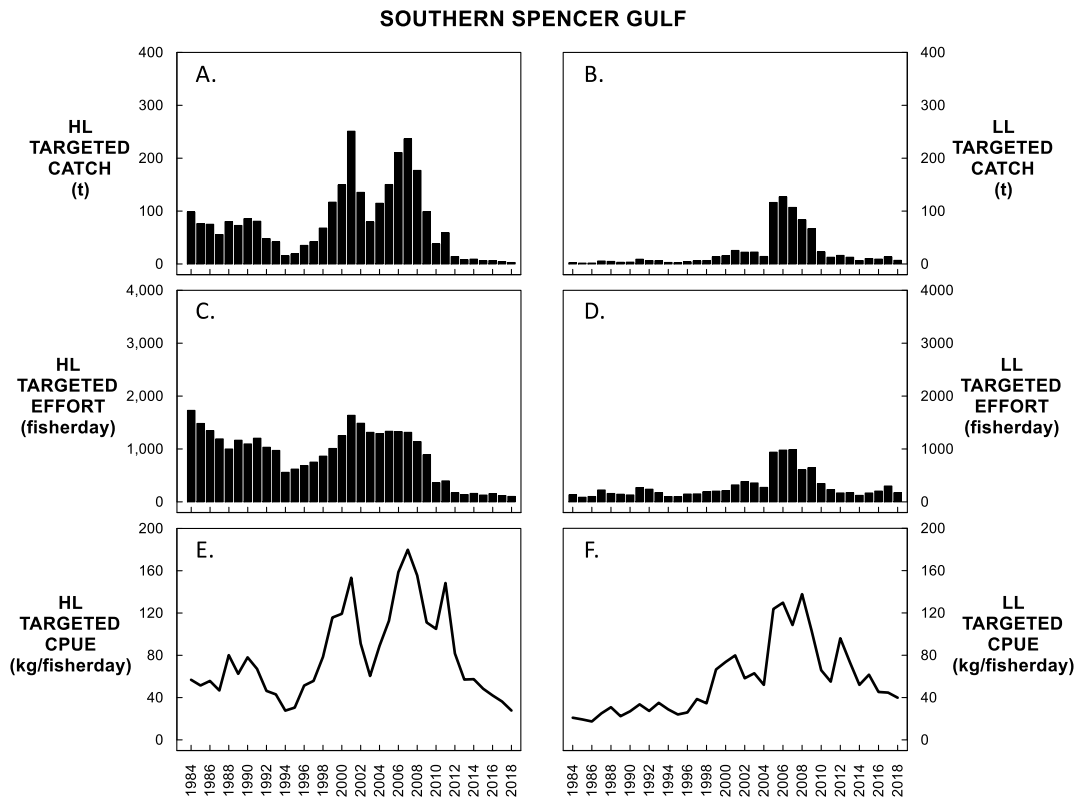
Commercial fishery statistics

The Commercial catch and effort information provides important data on which the status of the Snapper stocks are assessed and another line of evidence to support fisheries management decisions. The most up-to-date information on catch and effort information includes:

- In 2018, for Northern Spencer Gulf, targeted catches by gear type were low, particularly for handlines, which was the lowest yet recorded. For both gear types, they reflect declining trends since 2007. Targeted fishing effort and catch per unit effort (CPUE) for both gear types have declined over the same time period. Handline CPUE in 2018 was the lowest yet recorded (Fig 3).

- In 2018, for Southern Spencer Gulf, targeted catches by gear type were low, particularly for handlines, which was the lowest yet recorded. For both gear types, they reflect declining trends since 2007. Targeted fishing effort and CPUE for both gear types have declined over the same time period. Handline CPUE in 2018 was the lowest yet recorded (Fig 4).

- The fishery in Northern Gulf St Vincent has been dominated by the longline sector for the past decade. Since 2014, the annual commercial catch in Northern Gulf St Vincent has declined. Targeted longline catch peaked in 2014. By 2018, it had fallen to 31% of that in 2014, and to the lowest level in a decade (Fig 5). Targeted longline effort showed a similar decline. Despite these declines, targeted longline CPUE has remained relatively high, likely reflecting 'hyperstability' (i.e. the harvesting of Snapper that are aggregating) in this index as a consequence of targeted fishing on known Snapper schools.

- In Southern Gulf St Vincent the targeted catch, effort and CPUE in the past three years were relatively high. The dichotomy here may relate to the timing of the movement of some commercial fishers from the northern to the southern gulf regions, associated with the reduction in biomass in the northern gulf (Fig 6).
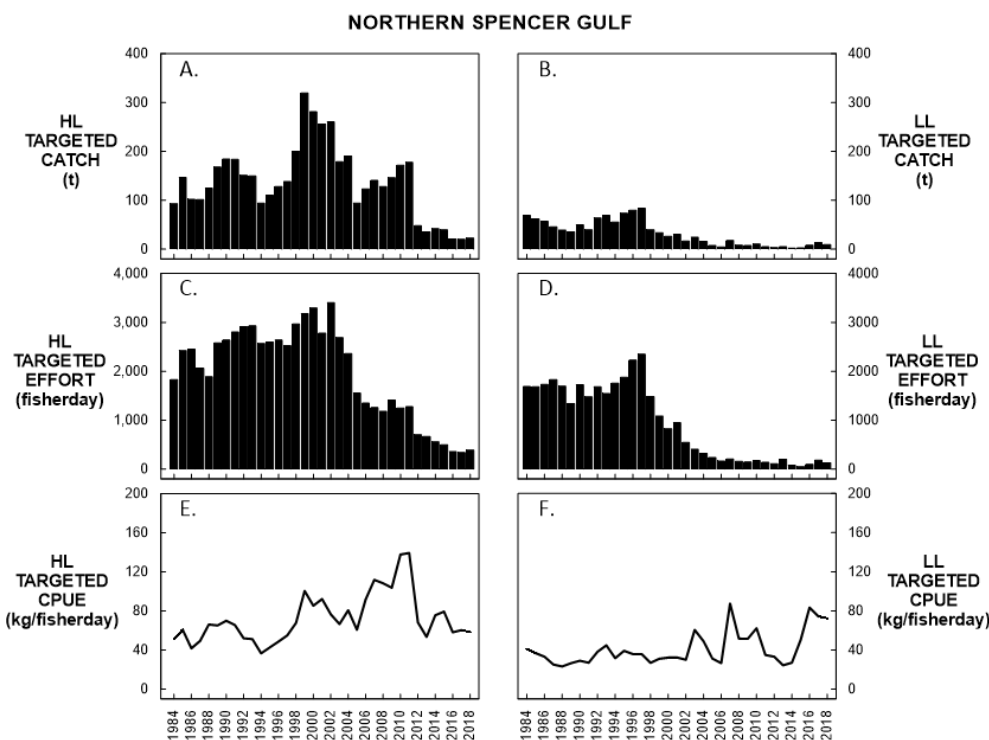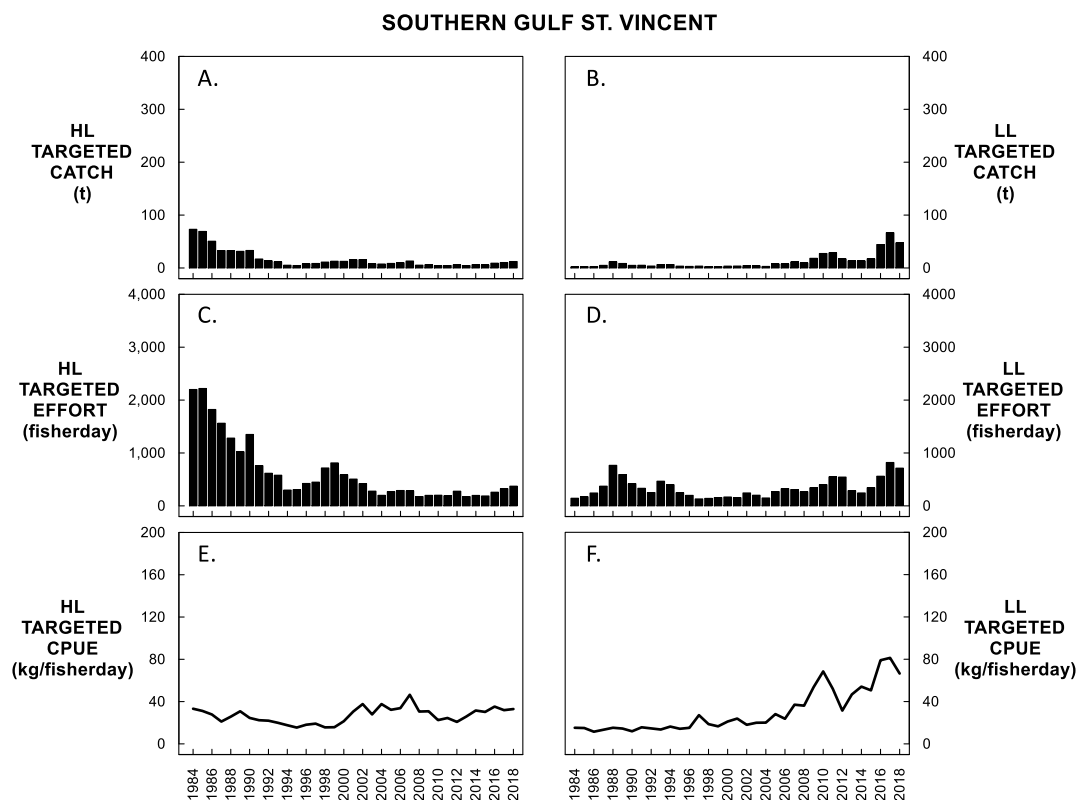

Figure 3. Time-series of commercial fishery statistics for Northern Spencer Gulf by gear type. A,B targeted catches. C,D targeted effort. E,F targeted CPUE.

Figure 4. Time-series of commercial fishery statistics for Southern Spencer Gulf by gear type. A,B targeted catches. C,D targeted effort. E,F targeted CPUE.
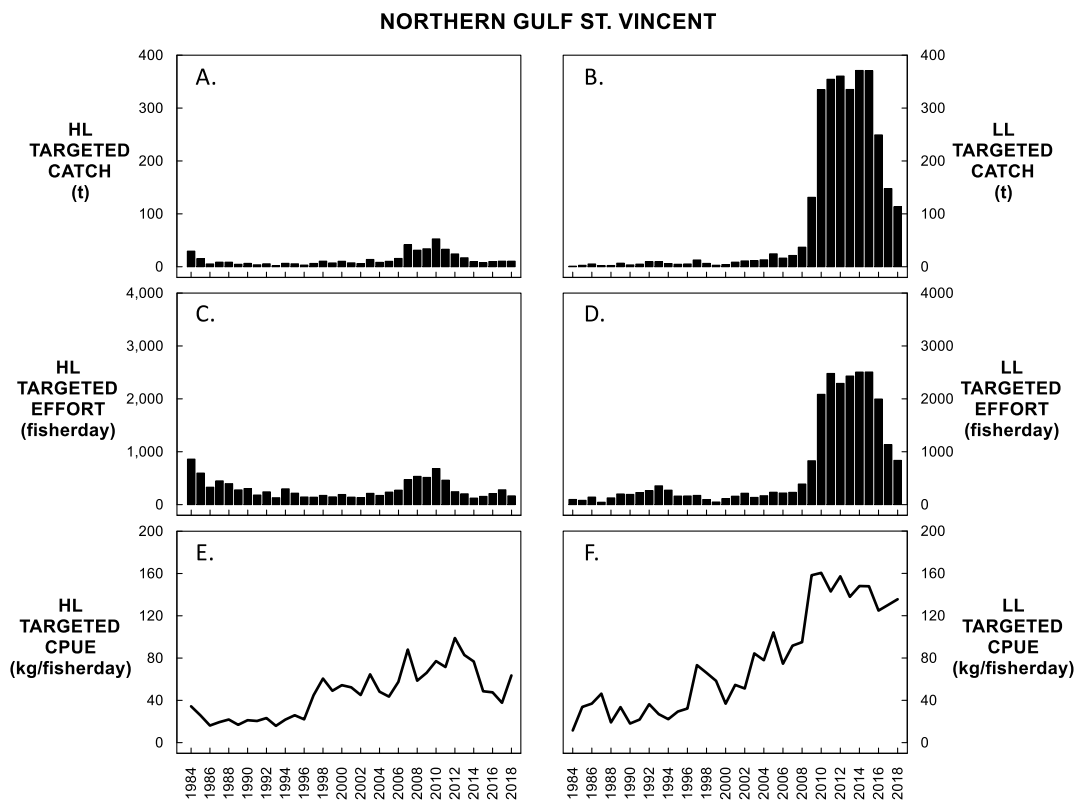
Figure 5. Time-series of commercial fishery statistics for Northern Gulf St. Vincent by gear type. A,B targeted catches. C,D targeted effort. E,F targeted CPUE.

SOUTHERN GULF ST. VINCENT

Figure 6. Time-series of commercial fishery statistics for Southern Gulf St. Vincent by gear type. A,B targeted catches. C,D targeted effort. E,F targeted CPUE.

Size Frequency Distributions of Snapper

SARDI through their on-going market based sampling collects biological information such as age and length data, which can provide information on recruitment and size structure of Snapper. The following provides information on recruitment and size structures for Snapper:

- The size structures in Northern Spencer Gulf from market sampling in 2016, 2017 and 2018 were dominated by relatively small fish 30 to 50 cm size classes. The relatively few fish sampled that were >50 cm contrasts considerably from the size structures during the peak catches in 2010/11, indicating considerable truncation.

- For Southern Spencer Gulf, the sample size was highest in 2017. In this year, the size structure demonstrated a mode of small fish of 30 – 40 cm, and a smaller mode for fish in the 60 – 80 cm size class (Fig 7).

- For the Northern Gulf St Vincent, there is no evidence of recruitment of any strong year class in recent years and the very large fish (>80 cm CFL) are now relatively rare, suggesting that truncation in the size structure has occurred as the biomass has declined (Fig 7).

- For Southern Gulf St Vincent, there were no apparent modes in the size structures.
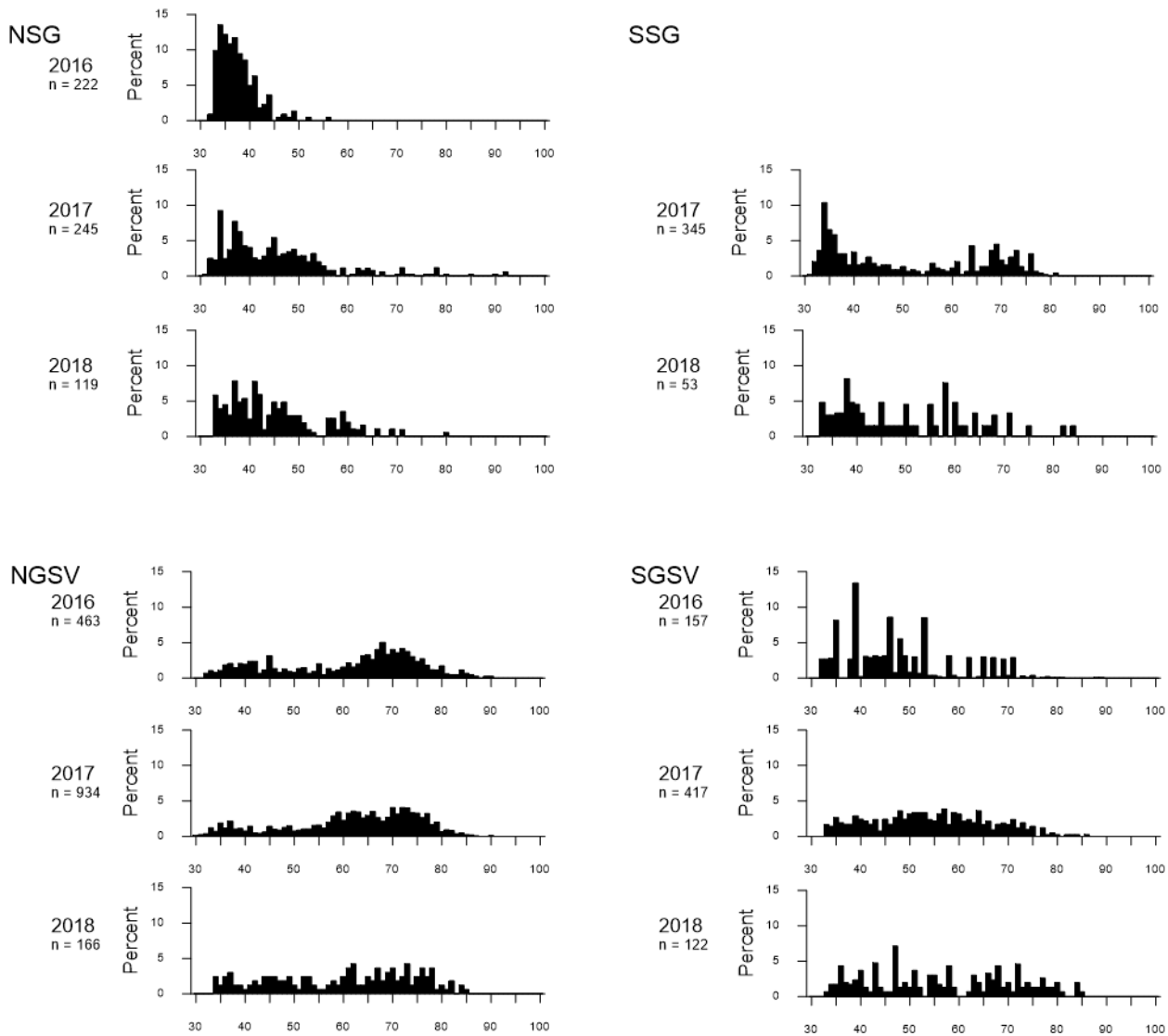
Figure 7. Size frequency distributions by region and year, developed from market sampling of the commercial catches at the SAFCOL wholesale fish market.

Conclusion

The assessment of Snapper stocks has considered the best-available science including; an analysis of fishery-dependent fishery statistics since 1984, integration of fishery-independent estimates of spawning biomass, and a 20-year biological monitoring program. These information sources have indicated that the Spencer Gulf / West Coast and the Gulf St. Vincent stocks have reduced biomasses and are under increasing fishing pressure. The concerning status of these stocks are supported by anecdotal reports from commercial and recreational fishers.