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TASMANIAN RECREATIONAL SCALLOP FISHERY: SURVEY AND STOCK STATUS UPDATE: 2022

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Table of Contents

Background

Sixty-two sites throughout the D'Entrecasteaux Channel were surveyed annually for scallop density and size structure between 2006 and 2012. Low stock levels and poor recruitment lead to the 2011 closure of the D'Entrecasteaux Channel recreational scallop fishery. A subgroup of 23 historically high scallop density sites were selected for sampling in 2017 and 2020 to determine whether sufficient evidence of recovery was present to justify a more extensive survey and consideration of re-opening the area to fishing. Densities of commercial scallops were very low throughout the channel. Small patches of queen scallops in higher densities were deemed insufficient to warrant consideration of a recreational fishery.

Despite the closure of the D'Entrecasteaux Channel scallop fishery, the remainder of the Tasmanian coast (except for Marine Protected Areas, Fisheries Research Areas and marine farms) has been exposed to recreational effort annually since 1995, when scallop dredge and dive licenses became available (Morton and Lyle 2004).

This report summarises the findings of a video survey conducted in 2022 to check for signs of recovery of scallop stocks in the D'Entrecasteaux Channel, and to initiate sampling in other areas exposed to recreational effort in south-east Tasmania (White Beach and Bull Bay).

Methods

The IMAS towed video camera was deployed at the 23 sites in the D'Entrecasteaux Channel that were sampled in the 2017 and 2020 surveys (Fig. 1A), at 4 sites in the Bull Bay area, on the north-east of Bruny Island (Fig. 1B), and at 8 sites in the White Beach area, located on the south-west side of the South Arm (Fig.1C).

The camera unit incorporates a standard-definition IP video camera for navigation, a high-definition GoPro Hero 8 video camera, LED lighting and 2 parallel scaling lasers at a separation of 150 mm (whose beams contact the seafloor in the centre of the video field) (Fig. 2). Tows were accomplished with the GoPro approximately one metre above the seafloor and at a speed-over-ground of around 1.2 knots. Tows were approximately 100 m in length, with each tow recorded as a track on the vessel GPS.

Video footage was viewed to determine the abundance of Commercial Scallops (*Pecten fumatus*), Queen Scallops (*Equichlamys bifrons*), Doughboy Scallops (*Mimachlamys asperrimus*) and other benthic taxa using video analysis software Transect Measure (SeaGIS). The start and end time of the benthic footage analysed for each site was recorded from the video time code and was used to truncate the site GPS track to determine the actual length of each transect.

Scallops and other taxa were counted only if:

1. they crossed the centre line of the video frame (i.e. a horizontal line passing through both laser points) and within 500 mm of either side of the centre point between the two scaling laser points (i.e. representing 1 m transect width) (Fig. 3)
2. they crossed the centre line from beyond the laser points (i.e. mobile species swimming across the line from behind the camera were not counted).

The density of scallops from the video survey was calculated as the ratio of the abundance of counted scallops and the transect area (i.e. 1 m × transect length).

Each scallop encountered in the video footage was assessed for its suitability for size determination. A scallop was sized if it met the following criteria:

1. clearly visible margins
2. orientated such that the length measurement length (widest point of the shell, parallel to the hinge) was within 30° of the horizontal axis (to minimise undersize bias from the oblique camera angle)
3. within 250mm of the centre of the transect (to minimise biases from camera lens distortion).

Every video frame in which a scallop was measured, a pixel to millimetre calibration was applied using the scaling lasers (150 mm) and the length (widest point of the shell, parallel to the hinge) of the scallop was measured in millimetres (Fig. 3). Overall size structure was standardised by the number of scallops in the site samples.

Segments in transects where the video field was less than 1 m wide or where the video left the seafloor sufficiently to preclude recognition of scallops were excluded from the analysis to minimise bias. These segments were excised based on their video timecodes cross referenced to the GPS track to ensure transect areas reflected valid video segments.

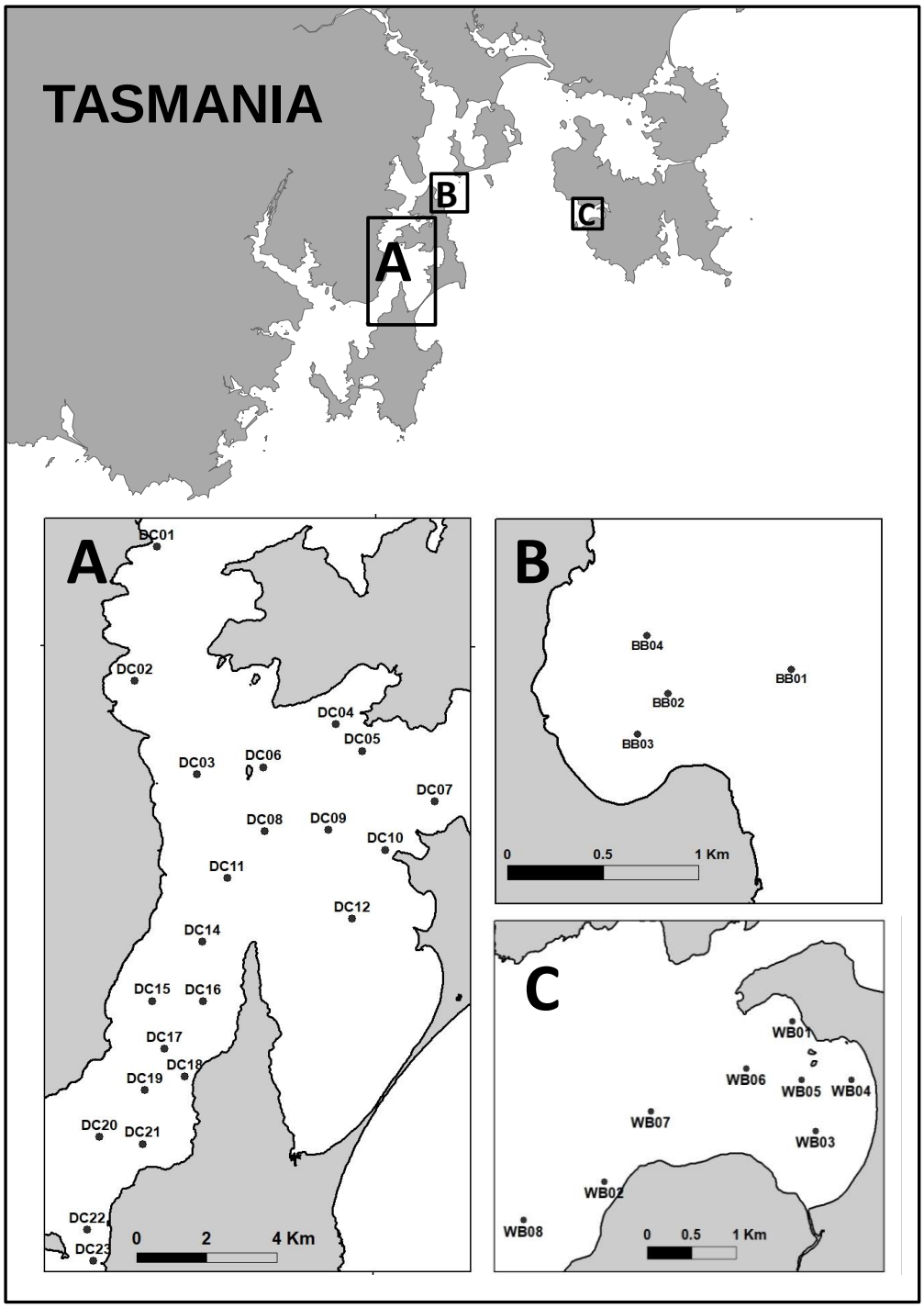

Fig. 1: Survey sites: D'Entrecasteaux Channel (A), Bull Bay (B) and White Beach (C).

Fig. 2: IMAS towed video camera unit.

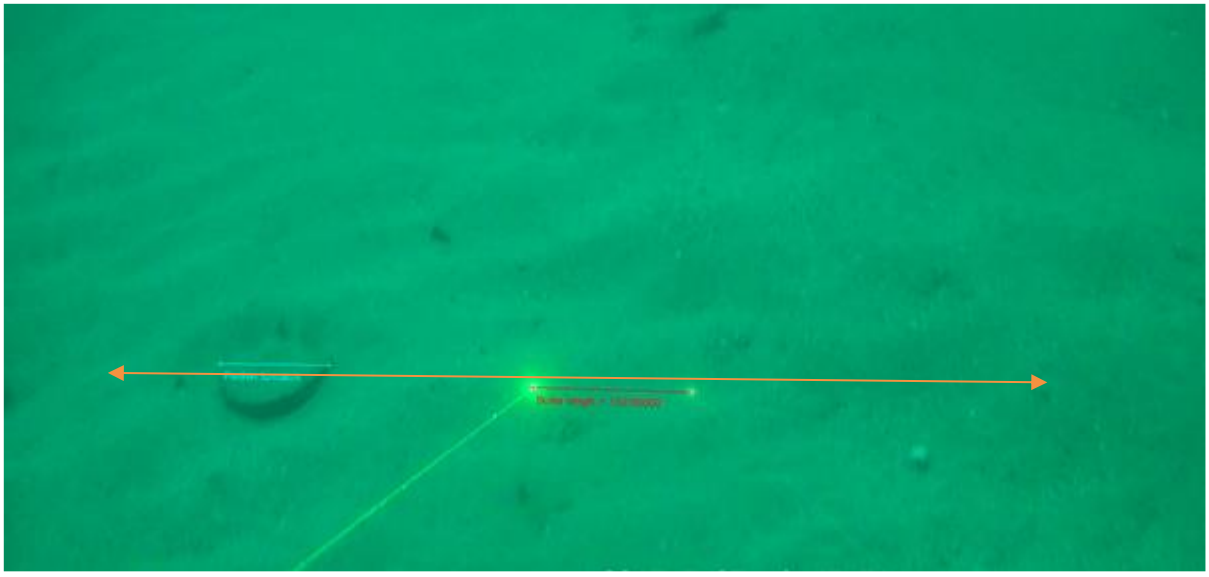

Fig. 3: Frame from video footage showing scaling lasers (green dots), pixel to millimetre calibration (red line), video centre line (orange line), transect length (orange line is 1000mm long and centred at the centroid of the scaling lasers), and a scallop width measurement (blue line) orientated at 10˚ to the centre line.

Results/Discussion

The towed video method provided footage of sufficient resolution to allow species identification and size measurements of scallops for all sites except for DC13 (due to corrupted video data). The average transect area was 92 m^2.

Scallop densities

Commercial Scallop densities were generally low throughout the Channel, except for three sites where medium densities (> 0.5 scallops m^{-2}) were observed (Table 1, Fig. 4). Commercial scallops were present in very low densities at Bull Bay (Fig. 5), and in medium densities at shallower sites at White Beach (Fig. 6).

The densities of Queen Scallops were very low at the mid-Channel sites (sites 1 to 12, Fig. 1), with a mean density of 0.01 Queen Scallops m^{-2} (Fig. 7). The density of Queen Scallops in areas of higher current flows (Middleton to Satellite Island, sites 13 to 23) were moderate with a mean density of 0.4 queen scallops m^{-2}.

The density of Doughboy Scallops was very low at all sites.

Table 1: Scallop densities (scallops per m^2) by site. Note that calculating legal sized density is only possible on transects with measured scallops.

Site	Transect Area (m^2)	Total density (abundance/m^2)		Legal sized density (abundance > 100mm/m^2)	
		Commercial	Queen	Commercial	Queen
DC01	118	0.00	0.00	0.00	0.00
DC02	92	0.00	0.00	0.00	0.00
DC03	105	0.25	0.06	-	0.04
DC04	111	0.27	0.00	0.14	0.00
DC05	127	0.02	0.00	-	0.00
DC06	124	0.47	0.00	0.44	0.00
DC07	84	0.25	0.00	0.06	0.00
DC08	79	0.04	0.00	0.04	0.00
DC09	50	0.02	0.00	-	0.00
DC10	89	0.90	0.00	0.90	0.00
DC11	88	0.11	0.07	0.11	-
DC12	92	0.37	0.00	0.37	0.00
DC14	69	0.49	0.57	0.35	0.06
DC15	89	0.48	0.02	0.48	-
DC16	101	0.71	1.40	0.52	0.47
DC17	87	0.14	0.61	0.14	0.37
DC18	67	0.12	0.03	0.09	-
DC19	87	0.05	0.03	0.05	-
DC20	95	0.13	0.00	0.13	0.00
DC21	93	0.30	0.02	0.30	-
DC22	69	0.49	0.77	0.49	0.70
DC23	107	1.44	0.79	1.44	0.63
BB01	102	0.00	0.00	0.00	0.00
BB02	168	0.00	0.00	0.00	0.00
BB03	94	0.02	0.00	-	0.00
BB04	117	0.02	0.00	-	0.00
WB01	109	0.07	0.01	0.07	-
WB02	93	0.02	0.00	0.02	0.00
WB03	93	0.06	0.00	-	0.00
WB04	104	0.00	0.01	0.00	-
WB05	95	0.43	0.00	0.43	0.00
WB06	91	0.29	0.00	0.16	0.00
WB07	90	0.22	0.00	0.19	0.00
WB08	127	0.00	0.00	0.00	0.00

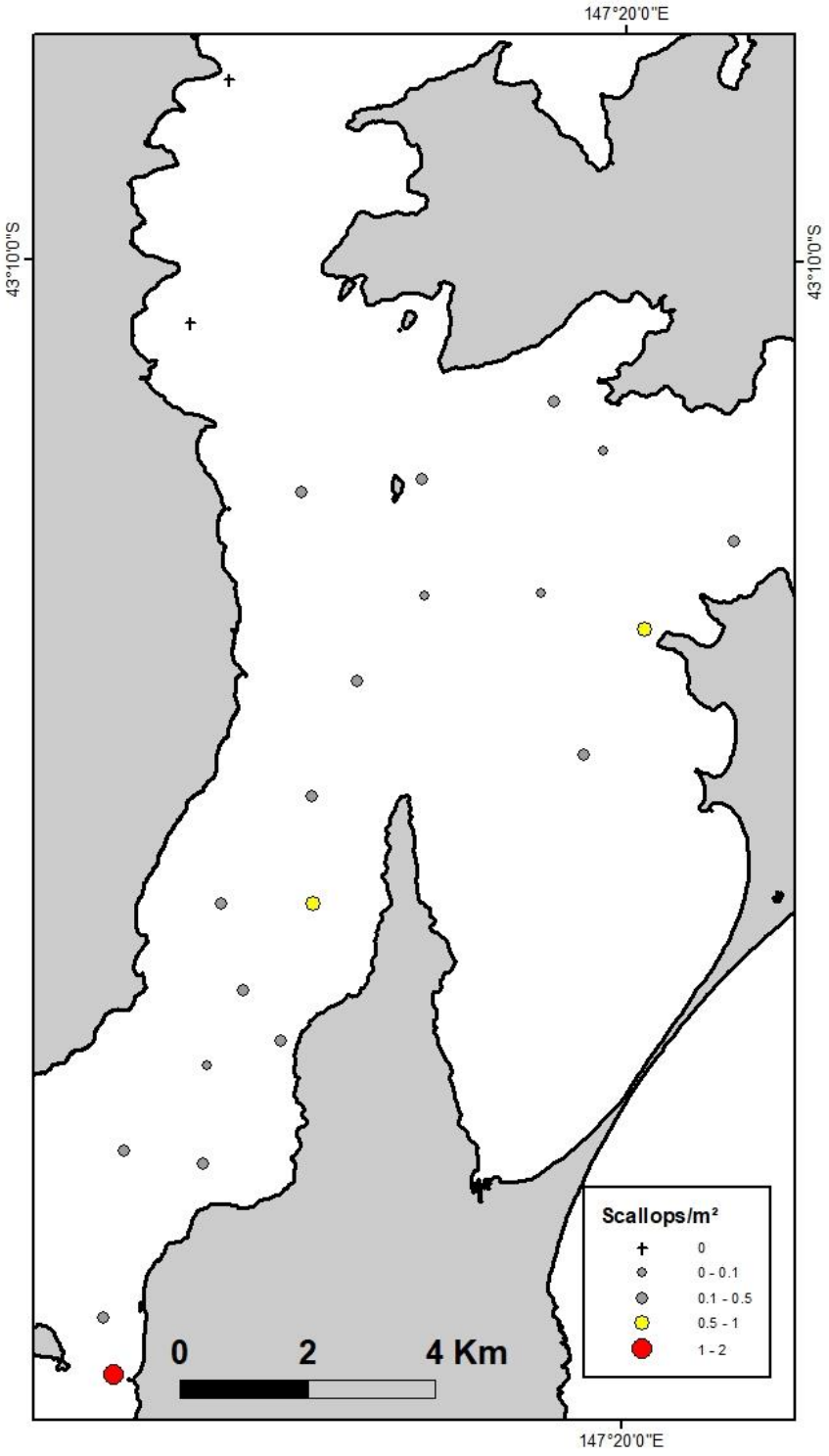

Fig. 4: Commercial Scallop densities (abundance m^{-2}) at D'Entrecasteaux Channel sites.

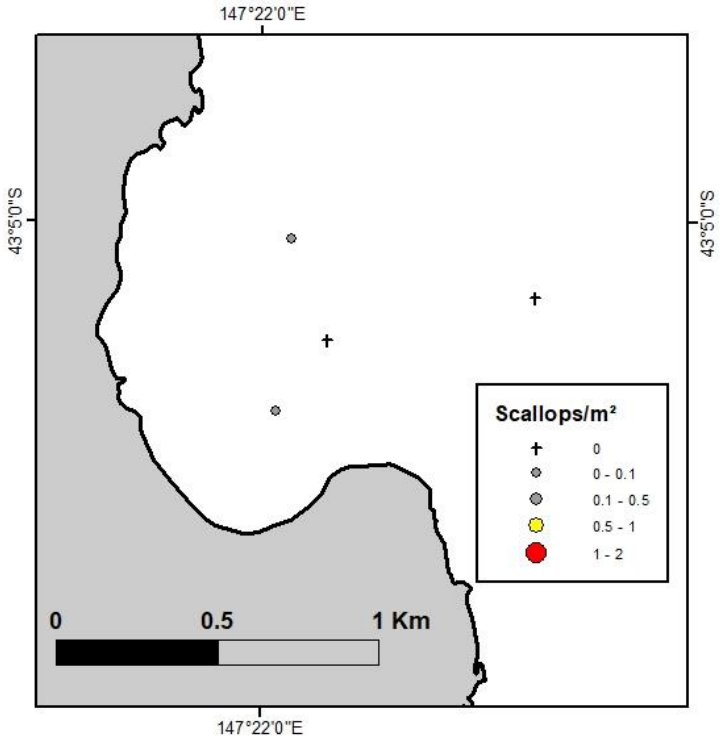

Fig. 5: Commercial scallop densities (abundance per m^2) at Bull Bay sites.

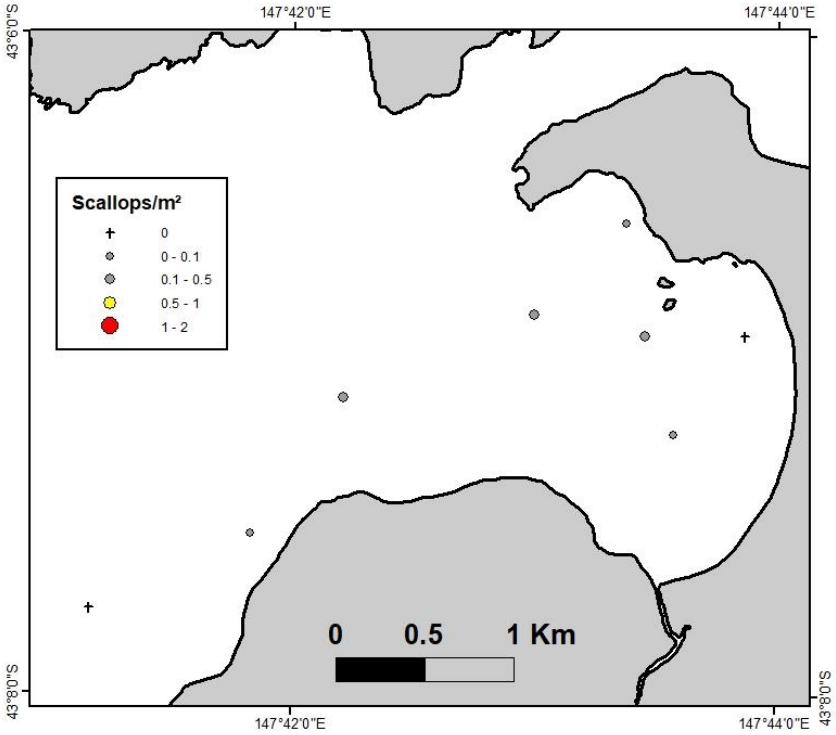

Fig. 6: Commercial scallop densities (abundance m^{-2}) at White Beach sites.

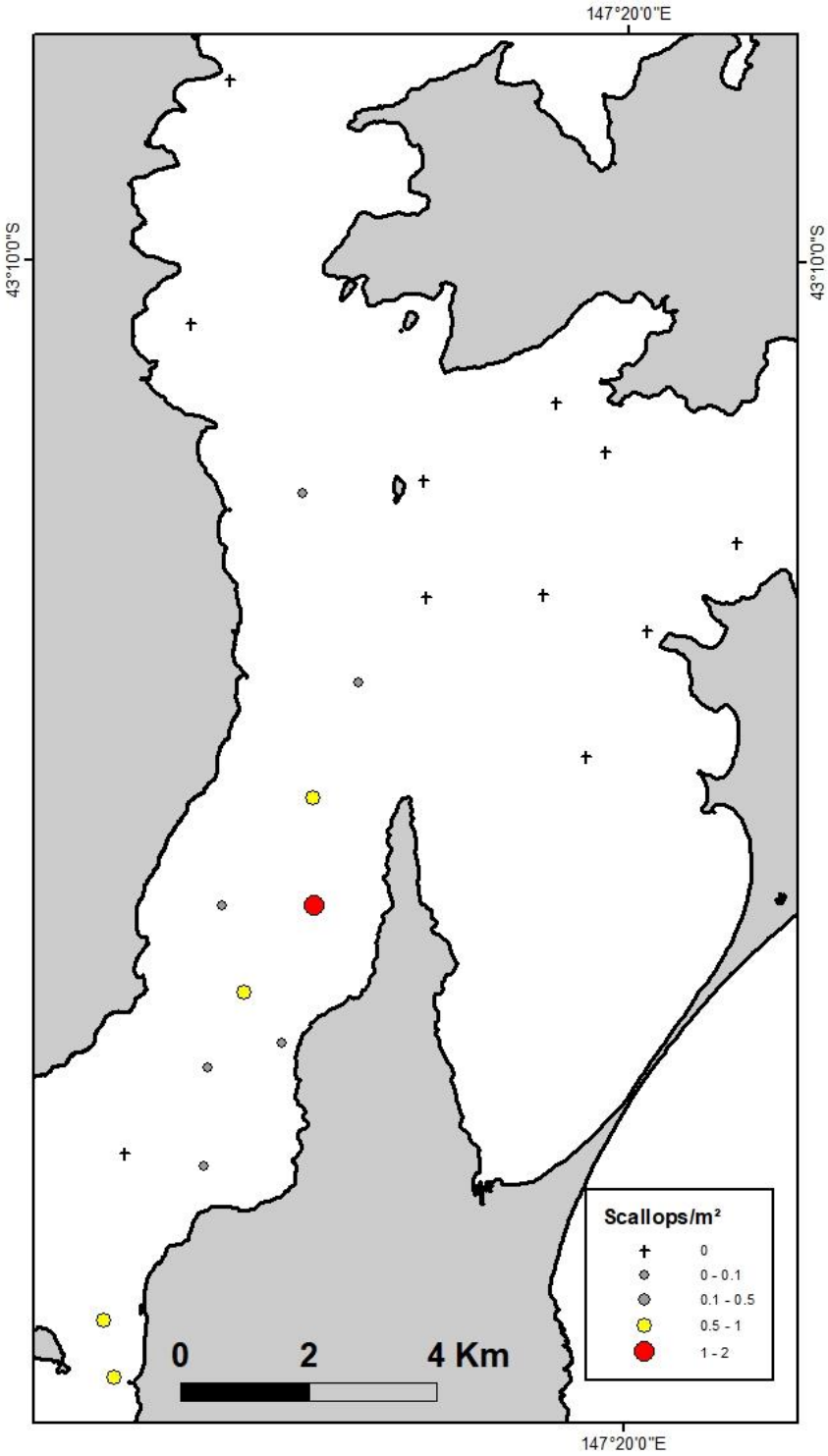

Fig. 7: Queen scallop densities (abundance m^{-2}) at D'Entrecasteaux Channel sites.

Size structure

Of the commercial scallops that were encountered in the survey (774), 201 were measured, and 157 were legal sized (> 100mm). The D'Entrecasteaux Channel size structure was dominated by legal-sized scallops (84%) and very few small scallops were encountered (Fig. 8). The White Beach area size structure was also dominated by legal-sized scallops (75%) and very few small scallops were encountered (Fig. 9). Very few scallops were encountered at Bull Bay sites and no scallops were measured.

Queen Scallops were relatively abundant in the areas of the D'Entrecasteaux Channel that experience higher current flows and 44% exceeded the minimum legal-size (Fig. 10). Small queen scallops were evident in medium densities at these sites. Queen scallops were not observed at Bull Bay and White Beach sites.

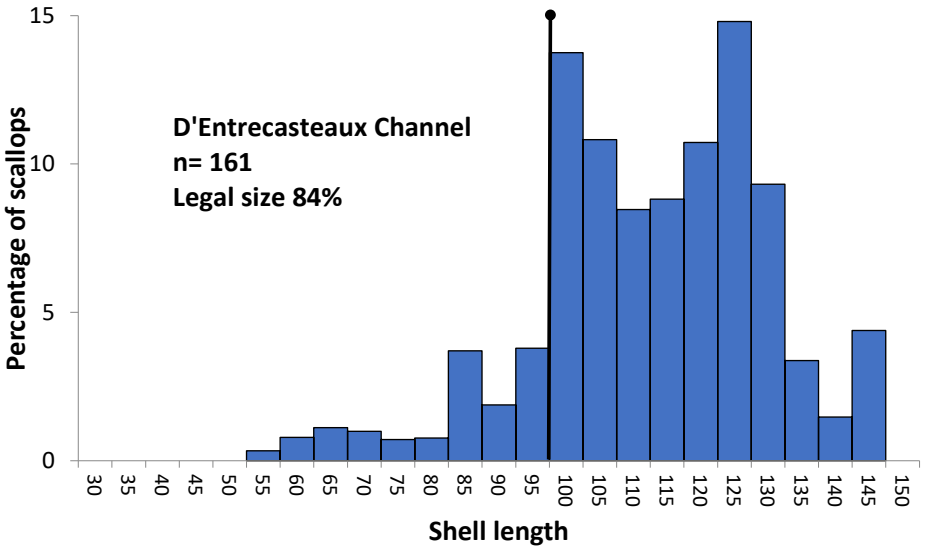

Fig. 8: Commercial Scallop standardised size distribution (mm) for the D'Entrecasteaux Channel. The vertical black line indicates the minimum legal size limit (MSL=100 mm).

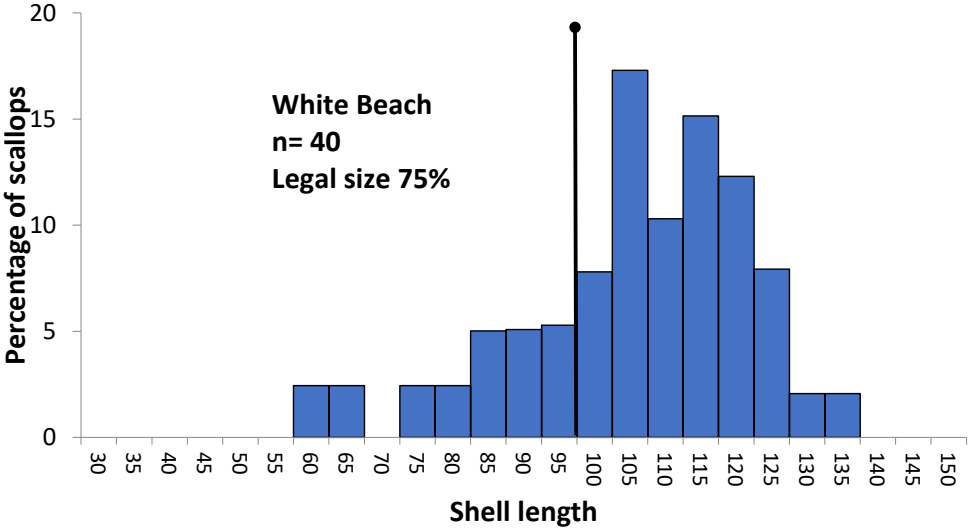

Fig. 9: Commercial Scallop standardised size distribution (mm) for the White Beach area. The vertical black line indicates the minimum legal size limit (MSL=100 mm).

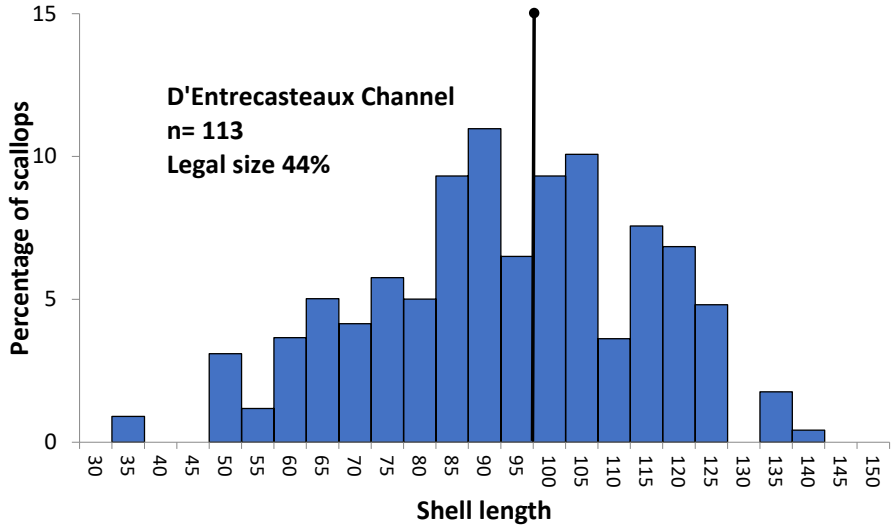

Fig. 10: Queen scallop standardised size distribution (mm) for the D'Entrecasteaux Channel. The vertical black line indicates the minimum legal size limit (MSL=100 mm).

Trends in recent D'Entrecasteaux Channel surveys

Densities of commercial scallops in the D'Entrecasteaux Channel have increased consistently over the three surveys conducted in 2017, 2020 and 2022 (Fig. 11). Increases are most apparent in the current survey and particularly in the lower channel sites. Likewise, the density of commercial scallops above the minimum legal-size has also increased (Fig. 12).

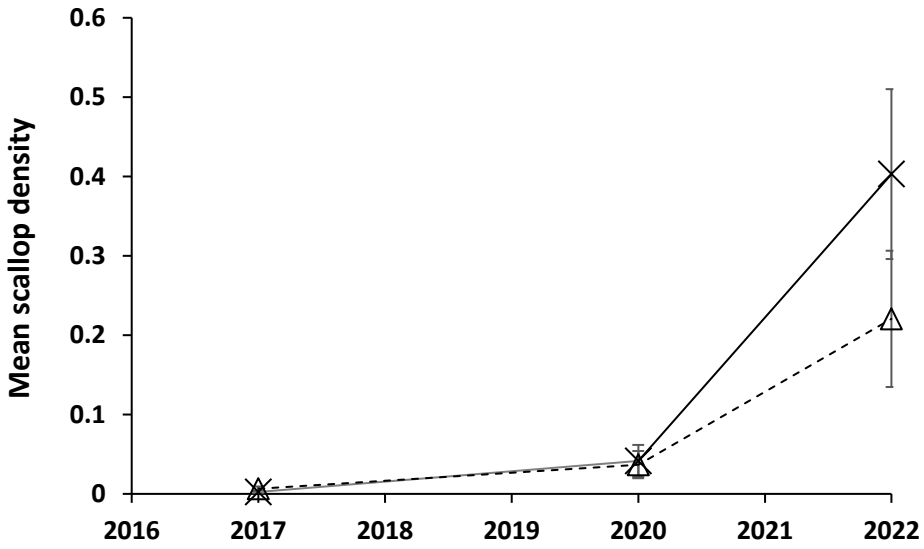

Fig. 11: Mean Commercial Scallop densities (individuals m^{-2}) by survey year for the D'Entrecasteaux mid channel sites (DC01 to DC10; triangles and dotted line) and the lower channel sites (DC11-23, crosses and solid line). Error bars are standard error.

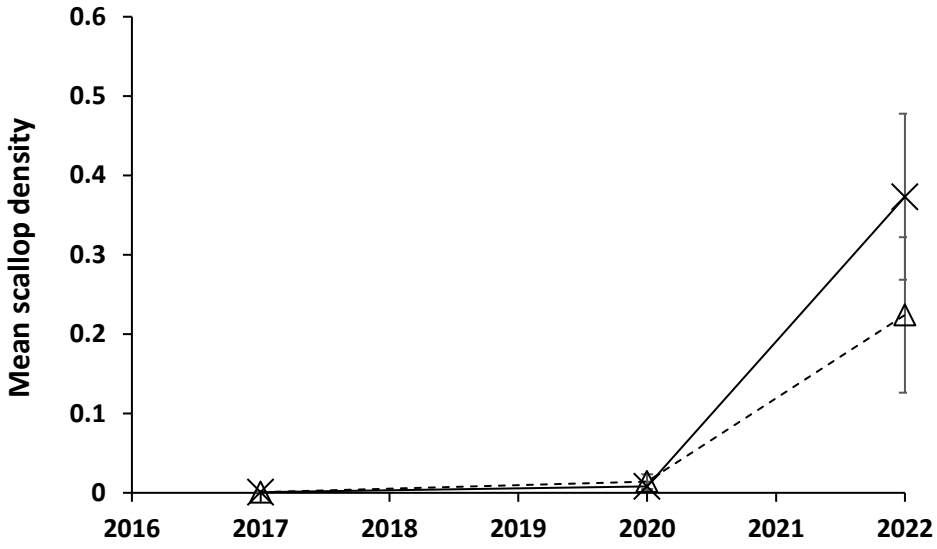

Fig. 11: Mean Commercial Scallop densities above the minimum legal-size (abundance per m^2) by survey year for the D'Entrecasteaux mid channel sites (DC01 to DC10; triangles and dotted line) and the lower channel sites (DC11-23, crosses and solid line). Error bars are standard error.

Conclusions

Commercial Scallops have increased in density in the D'Entrecasteaux channel, particularly in the high current areas around Middleton and Gordon, and Satellite Island. While this is a positive sign that the stock is re-building, overall densities are still low, and the predominance of legal-sized scallops suggest that recruitment continues at low levels. Genetic studies suggest that the Commercial Scallop population in the Channel is heavily reliant on self-recruitment and as such further rebuilding the adult stocks are necessary before any fishery for this species could be justified.

While medium densities of Queen Scallops persist, they appear to be restricted to small and isolated beds in the central Channel region and are primarily undersized.

While it is promising that densities are increasing in the channel, to put into perspective—historically the highest density at a given site for Queen Scallops was observed at 2.46 scallops m^{-2} in 2006 (Tracey and Lyle 2011), and maximum density of 3.8 scallops m^{-2} observed in 2016 (Forbes and Lyle 2016). For commercial scallops, high densities peaked in 2006 at 2 scallops m^{-2} (Tracey and Lyle 2008), and densities in 1955 were as high as 5.5 scallops m^{-2} (Olsen 1955)—orders of magnitude greater than the majority of densities observed in this study.

References

Olsen, A.M. (1955) Underwater studies on the Tasmanian Commercial scallop. *Notovola meridionalis* (Tate) (Lamellibrachiata: Pectinidae). *Australian Journal of Marine and Freshwater Research*, 6: 392–409.

Morton, A., Lyle, J.M. (2004) Summary of Tasmanian scallop fisheries, biology and research: Report prepared for the Recreational Fishery Advisory Committee. Tasmanian Aquaculture and Fisheries Institute.

Tracey, S., Lyle, J.M. (2008) Tasmanian recreational scallop fishery: 2005–2008. Tasmanian Aquaculture and Fisheries Institute. Hobart.

Tracey, S.R., Lyle, J.M. (2011) Stock assessment of scallops in the D'Entrecasteaux Channel. 2006-2011. Institute for Marine and Antarctic Studies, University of Tasmania, Hobart.

Forbes, E., Lyle, J.M. (2016) D'Entrecasteaux channel scallop survey and stock status update: 2016. Institute for Marine and Antarctic Studies, University of Tasmania, Hobart.