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2022 TASMANIAN SCALLOP FISHERY PRESEASON SURVEY REPORT

Jayson Semmens, Davis Hinton, Graeme Ewing, Samantha Twiname, David Moreno and
Ryan Day

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Institute for Marine and Antarctic Studies, University of Tasmania, Private Bag 49,
Hobart TAS 7001

Enquires should be directed to:

Dr Jayson Semmens

Institute for Marine and Antarctic Studies
University of Tasmania
Private Bag 49, Hobart, Tasmania 7001, Australia

Jayson.Semmens@utas.edu.au

Ph. (03) 6226 8275

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INTRODUCTION

The 2022 Tasmanian Scallop Fishery (TSF) pre-season assessment was comprised of targeted and exploratory commercial dredge surveys and an IMAS video survey yielding density and size structure in the TSF areas. In contrast to previous years, White Rock (Area 5; Table 1, Appendix 1) was divided into four equal-sized sub-areas to ensure a more even sampling design and was subject to a video survey prior to a targeted dredge survey, allowing for comparative results.

SURVEY METHODS

Dredge surveys

Dredge surveys consisted of exploratory and targeted tows in the 2022 TSF preseason survey. Two targeted surveys were conducted Area 5: one in White Rock consisting of 52 sites, and one in Marion Bay consisting of 30 sites. IMAS developed a random survey design for the targeted component of the dredge survey to better reflect the variation in density of scallops across the defined area of interest. Fishers participating in targeted dredge surveys were chartered by NRE to sample in accordance with the IMAS random survey design and did not retain scallops. Tows were ~ 500 m in length for both targeted and exploratory surveys (calculated from the start and finish coordinates). The sites towed were randomly assigned within the boundaries of polygons defined by NRE managers as the regions of commercial interest (Table 1, Appendix 1). An IMAS or department observer was onboard for targeted surveys and catch weights (kg) of legal-sized scallops (≥ 90 mm) were recorded for each tow. The observer recorded the size structure of each tow by measuring the shell length (width at the widest point of the shell) of up to 100 scallops randomly sampled from the ungraded catch. The density of legal-sized scallops was reported as the ratio of the landed weight of legal sized scallops over the product of dredge width and tow length (calculated from start and finish coordinates).

Video Surveys

The video component of the survey was conducted in White Rock (Area 5) in April 2022 (Table 1, Appendix 1). Fifty-two sites within this region were randomly assigned for the 2022 survey using the 'Create Random Points' tool in the software package ArcGIS 10.4. Assignment of random points was constrained within a 200 km² polygon (perimeter 72 km) provided by NRE that defined the area of interest to management, and with a minimum allowable separation of 500m. The 2022 pre-season survey deployed the IMAS towed video system at the same 52 sites prior to the targeted dredge surveys in the White Rock region to provide a comparison between the survey methods. The video survey consisted of a towed video from the site position in a straight line transect for at least 500m, approximately 1m above the seafloor, at towing speed 1.5 knots. Each transect was recorded as a track on the vessel's GPS unit.

Video footage from each site (in a randomised order) is currently being viewed and analysed using video analysis software Transect Measure (SeaGIS) which allows frame-by-frame analysis of the video footage. Within any frame a pixel-to-millimetre calibration was made using a known distance (e.g., the separation of scaling lasers) allowing objects within that frame to be measured in mm. The software also incorporated annotation of the position and

time sequence of objects and measurements within any frame. By matching the frame time sequence with vessel GPS track time sequence data, the geographic position of objects in a frame was determined. These features of the software were used to ascertain the number of commercial scallops, their size, and their geographic position within the analysed segment of each video transect.

Table 1. Tasmanian Scallop Fishery 2022 pre-season survey sites by area, region, vessel, and survey method. Areas refer to Appendix 2.

Area	Region	Vessel	Targeted Dredge	Exploratory Dredge	Video
3	Babel Island	Odete C	-	30	-
3	Cape Barren Island	Odete C	-	35	-
3	Eddystone Point	Odete C	-	15	-
4	The Gardens	Odete C, Karmin		64 18	-
4	Bicheno	Odete C	-	13	-
5	White Rock	Odete C	52	-	52
5	Marion Bay	Odete C	30	-	-
5	South White Rock	Odete C	-	16	-
1	North West	Shandara Odete C	52	150 152	
Total Sites			134	493	52

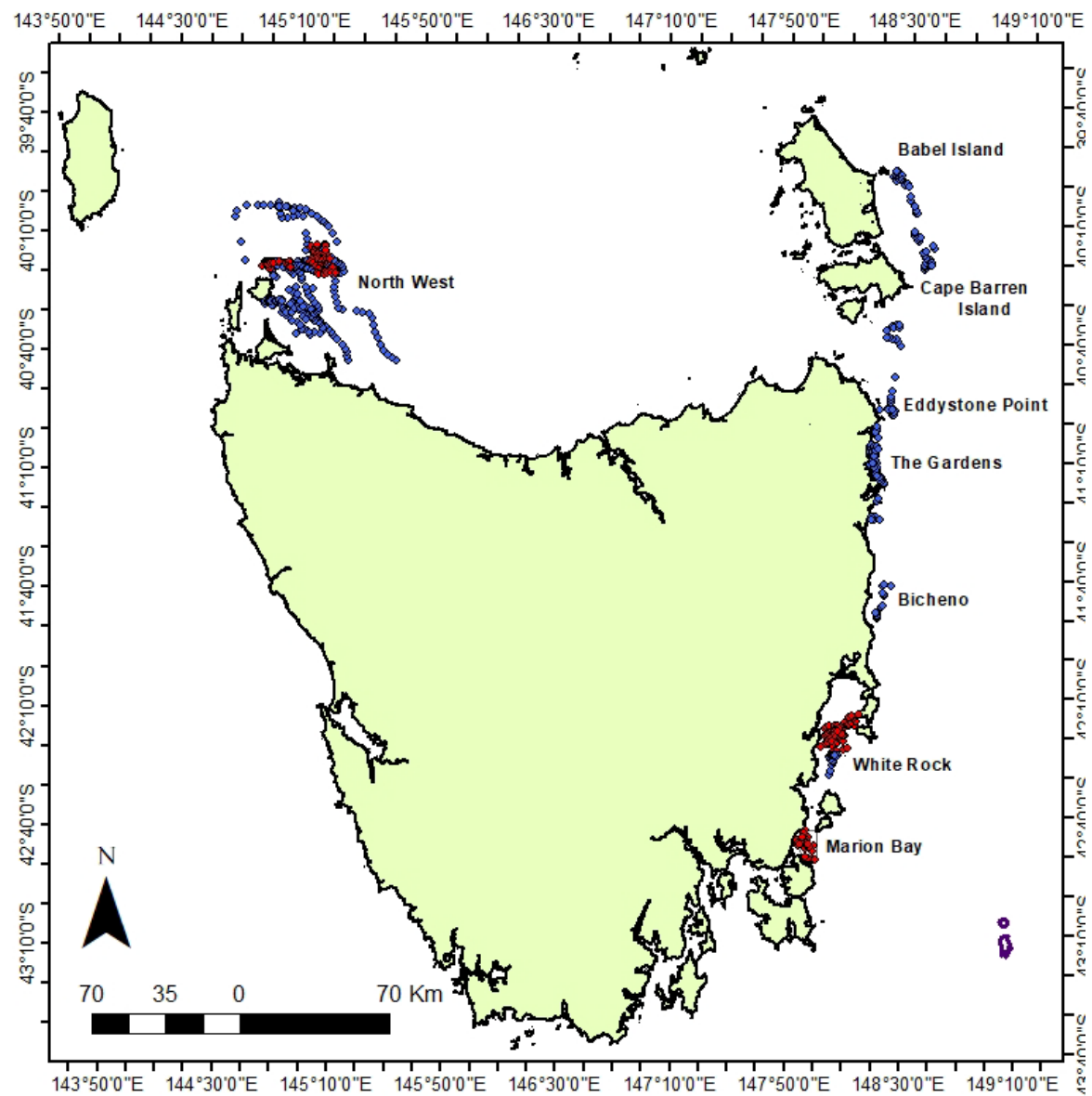


Figure 1. Map of the 2022 TSF pre-season dredge survey sites. Red dots indicate targeted survey sites and blue dots indicate exploratory survey sites.

SURVEYS RESULTS BY AREA

White Rock (Area 5) – Targeted dredge and video surveys

The White Rock targeted dredge survey consisted of 52 targeted dredge survey tows in four sub-areas (13 in each sub-area) deployed from FV Odete C in April 2022 (Table 1, Figures 1, 2 and 3). The targeted dredge sites were a random subset of 13 of 20 sites randomly allocated in each of the sub-areas in the White Rock NRE-defined polygon. The 2022 White Rock video survey consisted of 52 tows using the IMAS towed video unit which were conducted prior to the dredge surveys. Video tows were each of approximately 500m in length.

The White Rock targeted dredge survey tows yielded an average density of legal-sized scallops of 22.3 kg/1000m² (median 8.3kg/1000m²), with a discard rate of 3.1% (Table 2; Figures 2-5). Sub-area yields are provided in Table 3.

The White Rock targeted video survey tows yielded an average density of legal-sized scallops of 30.0 kg/1000m² (median 23.7 kg/1000m²), with a discard rate of 5.0% (Table 2; Figures 2-5). Sub-area yields are provided in Table 3.

Table 2. Current and historical legal-sized scallop density, average size, and discard rate for White Rock (Area 5) from recent dredge and video pre-season surveys.

Season	Method	Density (kg/1000m ²)		Average scallop size (mm ± SE)	Discard % < 90 mm
		Average	Median		
2022	Dredge	22.3	8.3	106.4±0.2	3.1
	Video	39.0	23.7	106.8±0.3	5.0
2021	Dredge	15.6	14.2	102.2 ± 0.2	5.7
	Video	30.4	27.2	96.0 ± 0.4	30.5
2020	Dredge	20.9	16.6	97.9 ± 0.2	7.5
	Video	21.9	8.5	85.6 ± 0.4	58.9
2017	Dredge	4.7	3.9	100.5 ± 0.1	2.2
2016	Dredge	4.4	3.5	96.8 ± 0.2	22.5
2015	Dredge	19.7	15.8	99.1 ± 7.7	3.9
2014	Dredge	8.6	7.2	98.2 ± 8.2	7.3
2013	Dredge	6.2	-	93.9 ± 11.1	18.2
2011	Dredge	>30	-	-	7.5

Table 3. Legal-sized scallop density, average size, and discard rate for the four sub-areas of White Rock (Area 5) from the 2022 dredge and video pre-season surveys.

Method	Sub-area	Density (kg/1000m ²)		Average scallop size (mm ± SE)	Discard % <90 mm
		Average	Median		
Dredge	Sub-area 1	29.4	6.6	102.3±2.4	4.7
	Sub-area 2	36.4	36.3	101.6±1.7	2.0
	Sub-area 3	10.2	1.8	105.5±2.3	7.0
	Sub-area 4	13.4	8.5	116.5±2.9	0.5
Video	Sub-area 1	47.5	34.0	104.9±0.5	5.8
	Sub-area 2	63.5	51.6	104.8±0.4	5.5
	Sub-area 3	22.5	16.9	108.3±0.8	0.9
	Sub-area 4	22.0	14.3	114.9±1.0	1.7

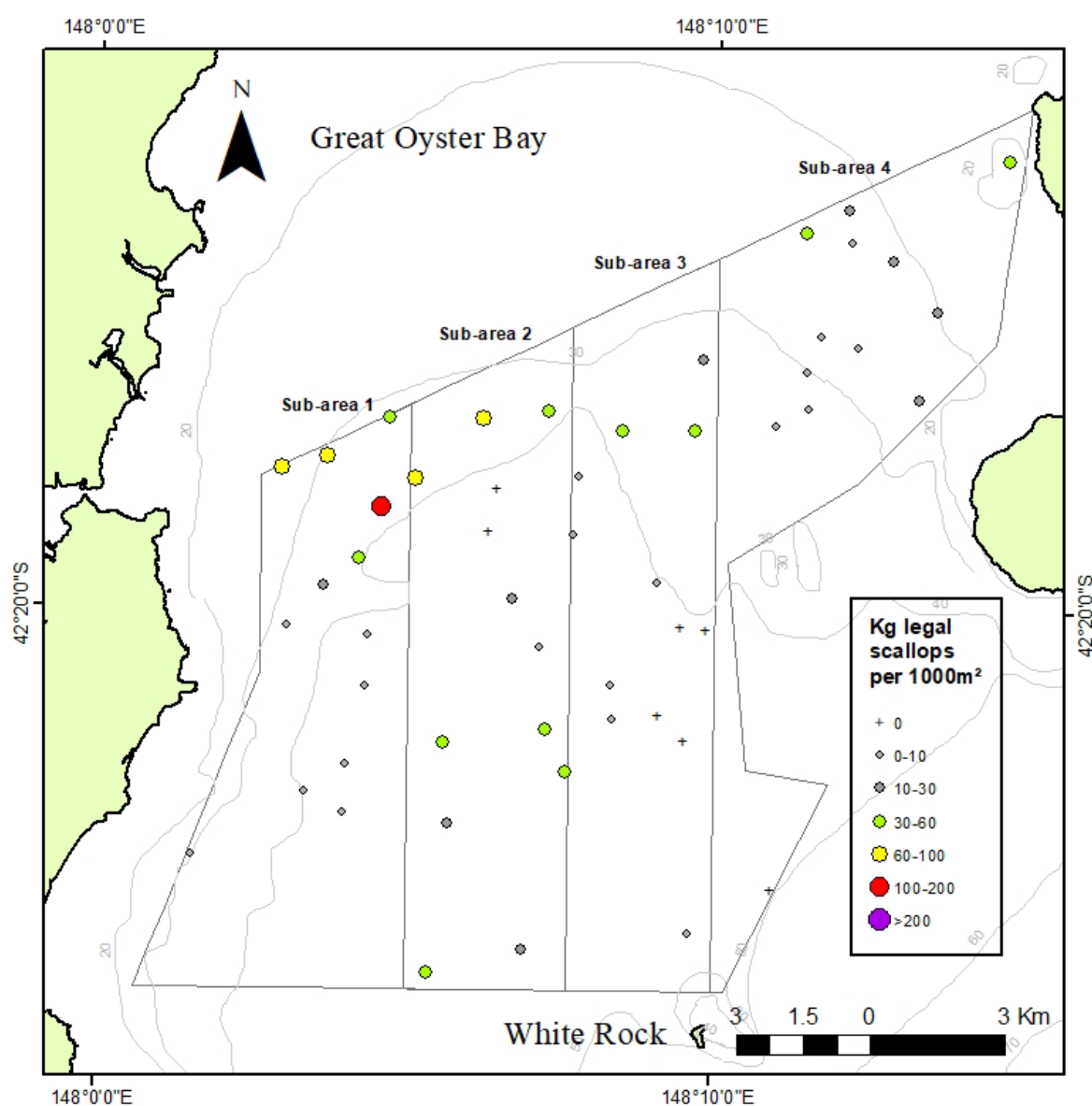


Figure 2. Legal-sized scallop density per tow for the White Rock (Area 5) targeted dredge survey. Density is displayed as kg of legal scallops (>90mm) per 1000m².

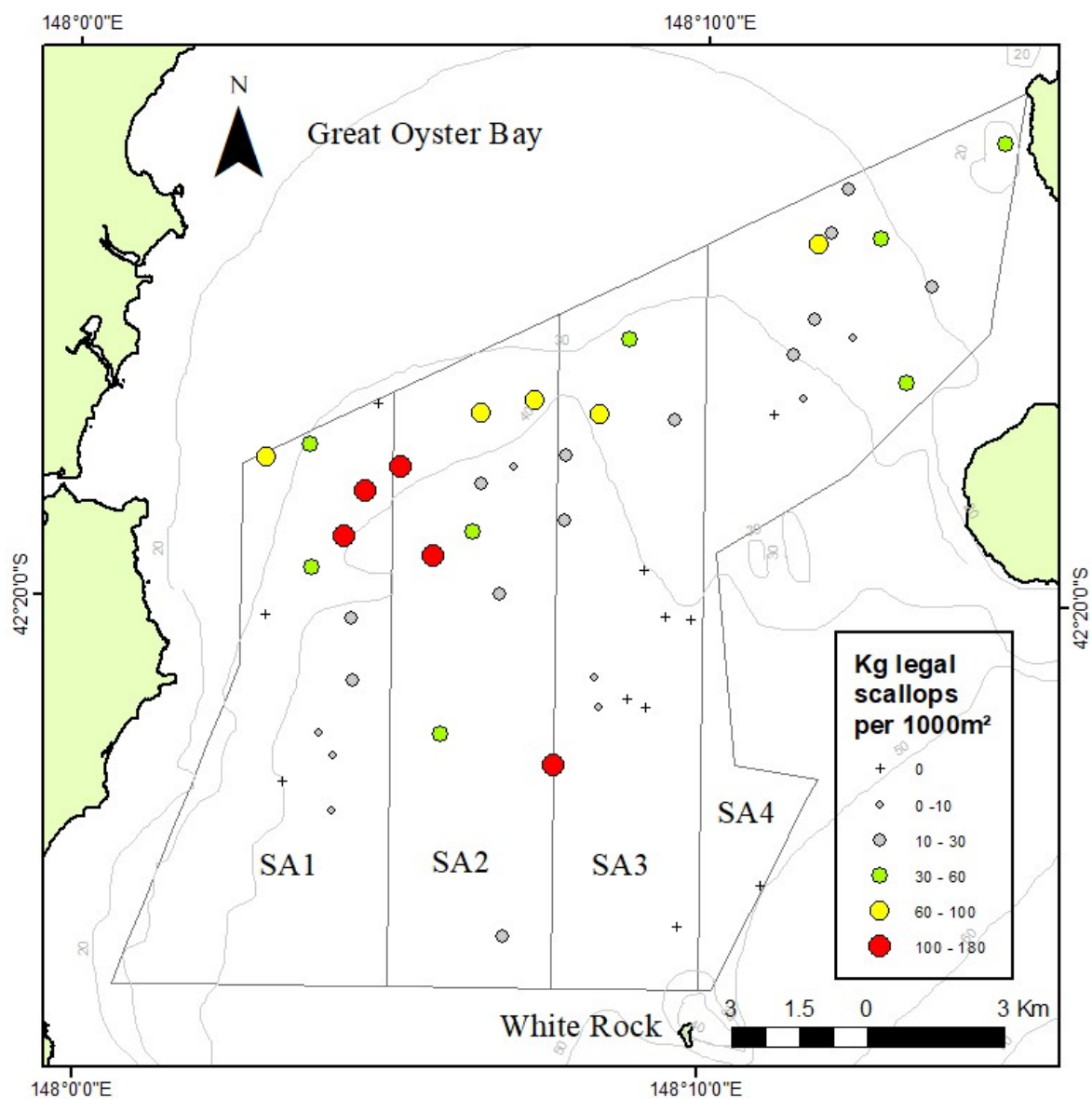


Figure 3. Legal-sized scallop density per tow for the White Rock (Area 5) targeted video survey. Density is displayed as kg of legal scallops (>90mm) per 1000m².

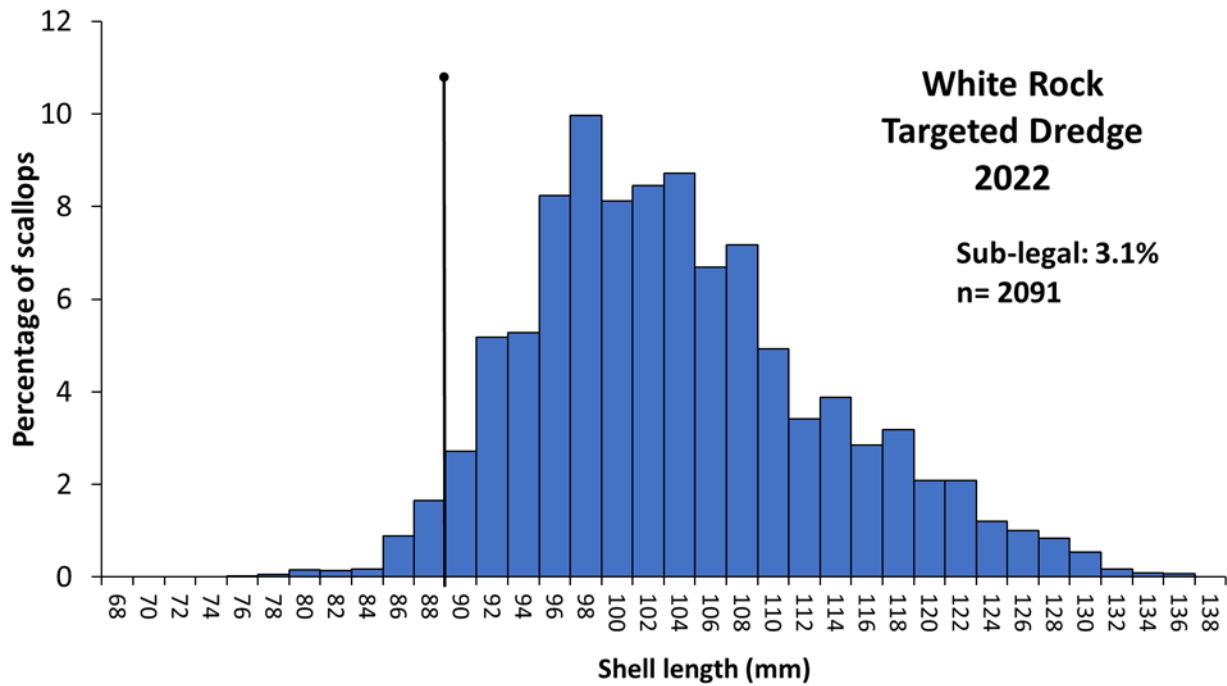


Figure 4. Standardised length frequency distribution for the 52 dredge tows in the White Rock (Area 5) targeted dredge survey. The dredge discard rate was 3.1% from 2091 scallops measured at 90 mm minimum length with a mean size $\pm$ se: 106.4 ± 0.23 mm. The vertical line shows the 90 mm minimum length.

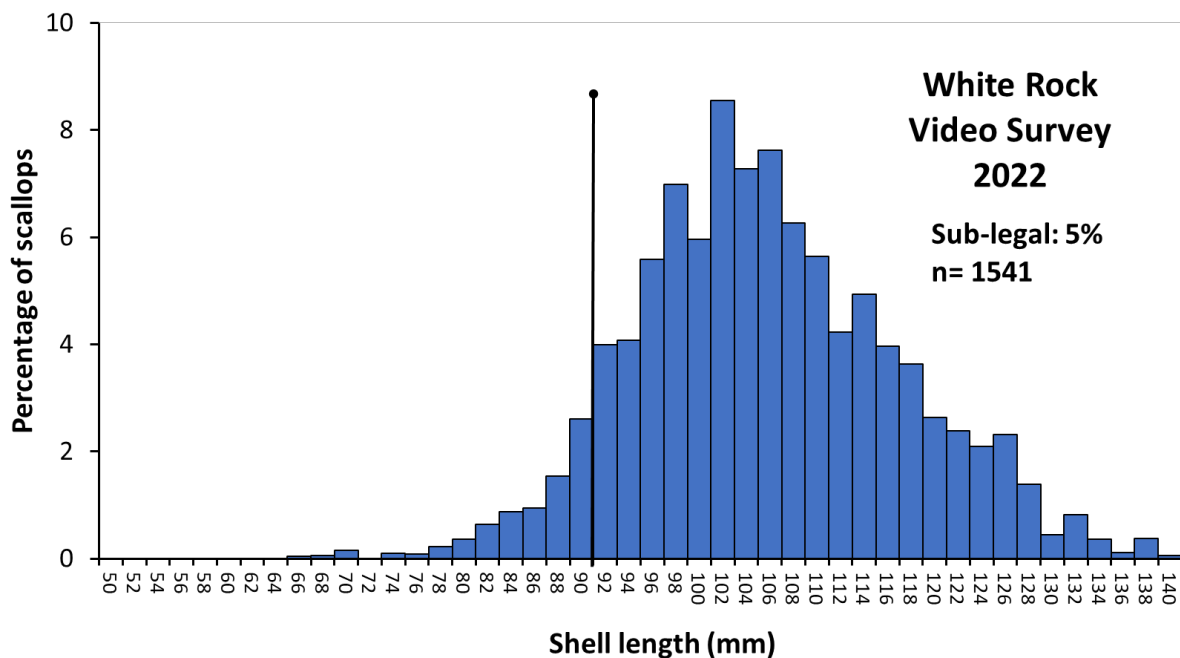


Figure 5. Standardised length frequency distribution for the video tows in the White Rock (Area 5) targeted video survey. The video discard rate was 5.0% from 1541 scallops measured at 90 mm minimum length with a mean size $\pm$ se: 106.78 ± 0.29 mm. The vertical line shows the 90 mm minimum length.

Marion Bay (Area 5) – Targeted dredge survey

The Marion Bay targeted dredge survey consisted of 30 survey dredge tows deployed from FV Odete C in April 2022 (Table 1; Figures 1, 6 and 7).

The Marion Bay targeted dredge survey tows yielded an average density of legal-sized scallops of 10.1kg/1000m² (median 5.6 kg/1000m²), with a discard rate of 4.47% (Figures 6 and 7).

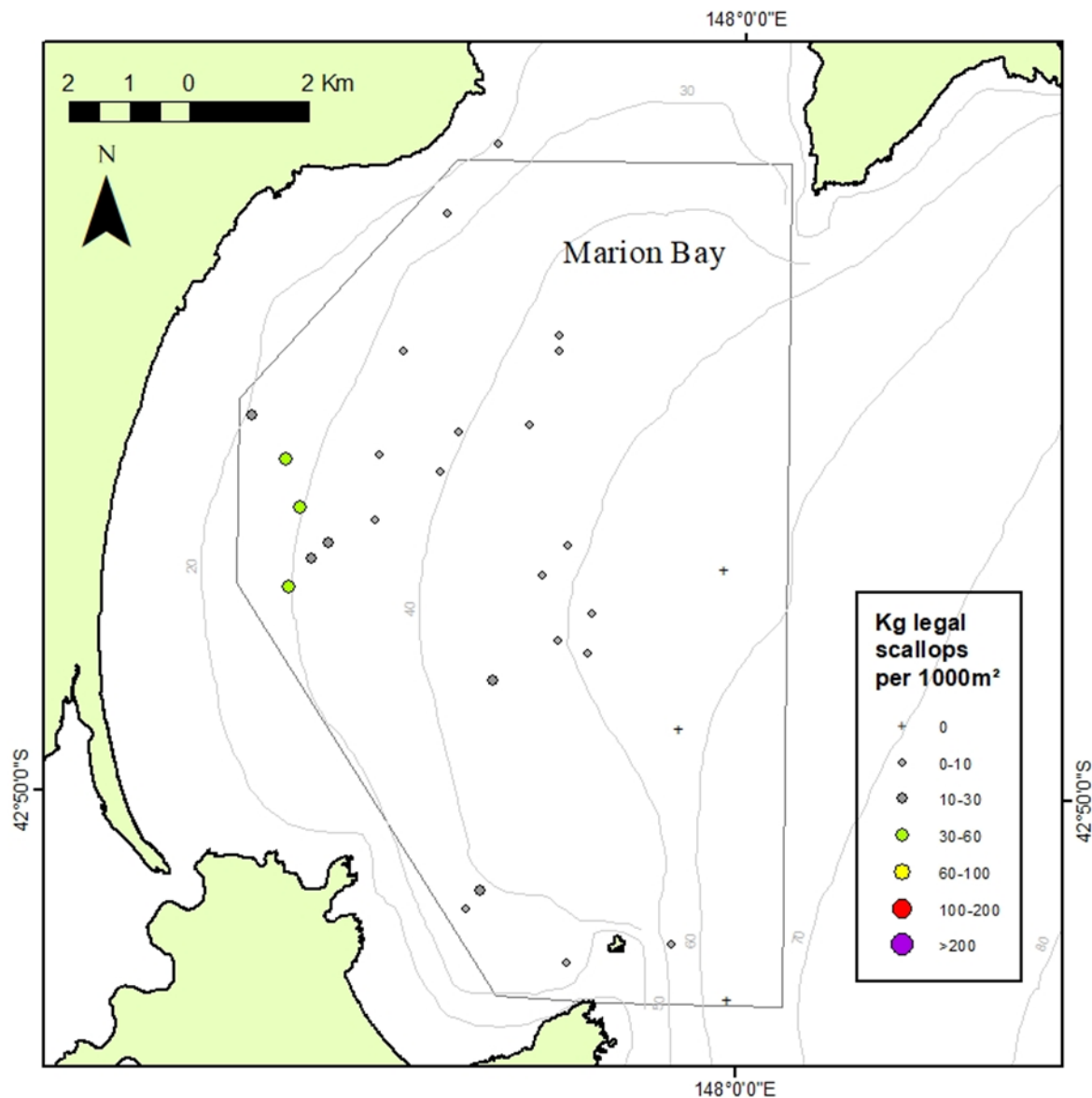


Figure 6. Legal-sized scallop density per tow for the Marion Bay (Area 5) targeted dredge survey. Density is displayed as kg of legal scallops (>90mm) per 1000m².

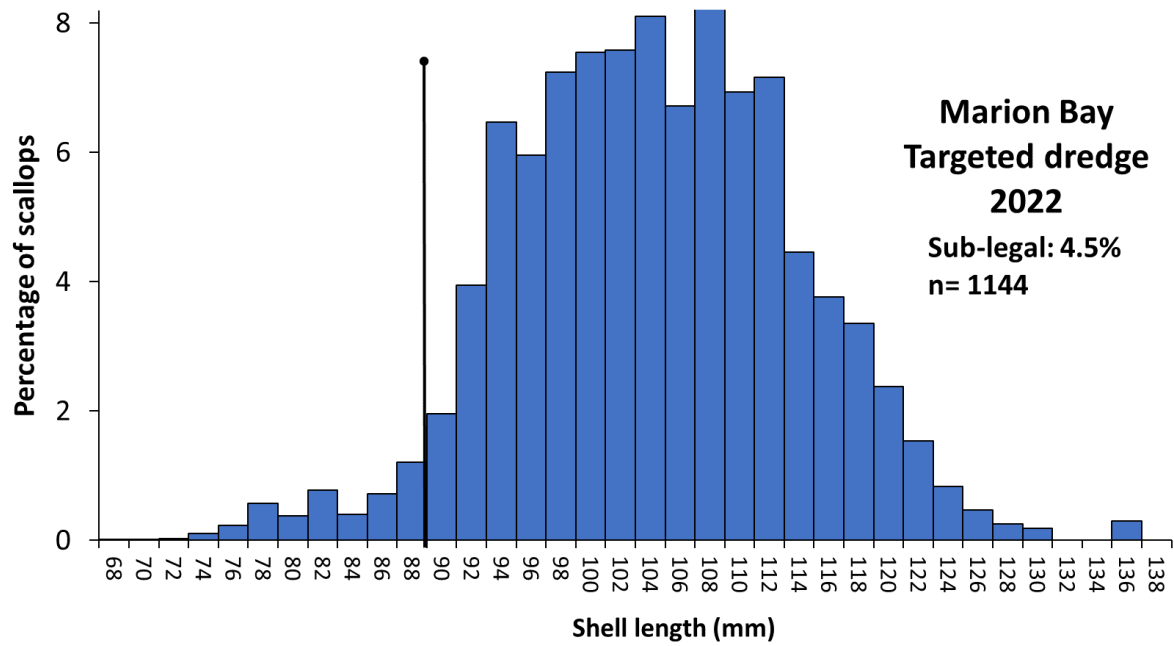


Figure 7. Standardised length frequency distribution for the 30 dredge tows in Marion Bay (Area 5) targeted dredge survey. The dredge discard rate was 4.47% from 1144 scallops measured at 90 mm minimum length with a mean size $\pm$ se: 104.6 ± 0.3 mm. The vertical line shows the 90 mm minimum length.

South White Rock (Area 5) – Exploratory dredge survey

The South White Rock exploratory dredge survey consisted of 16 survey dredge tows deployed from FV Odete C in April 2022 (Table 1; Figures 1, 8 and 9).

The South White Rock exploratory dredge survey tows yielded an average density of legal-sized scallops of 2.5 kg/1000m² (median 0.05 kg/1000m²), with a low discard rate of 1% (Figures 8 and 9).

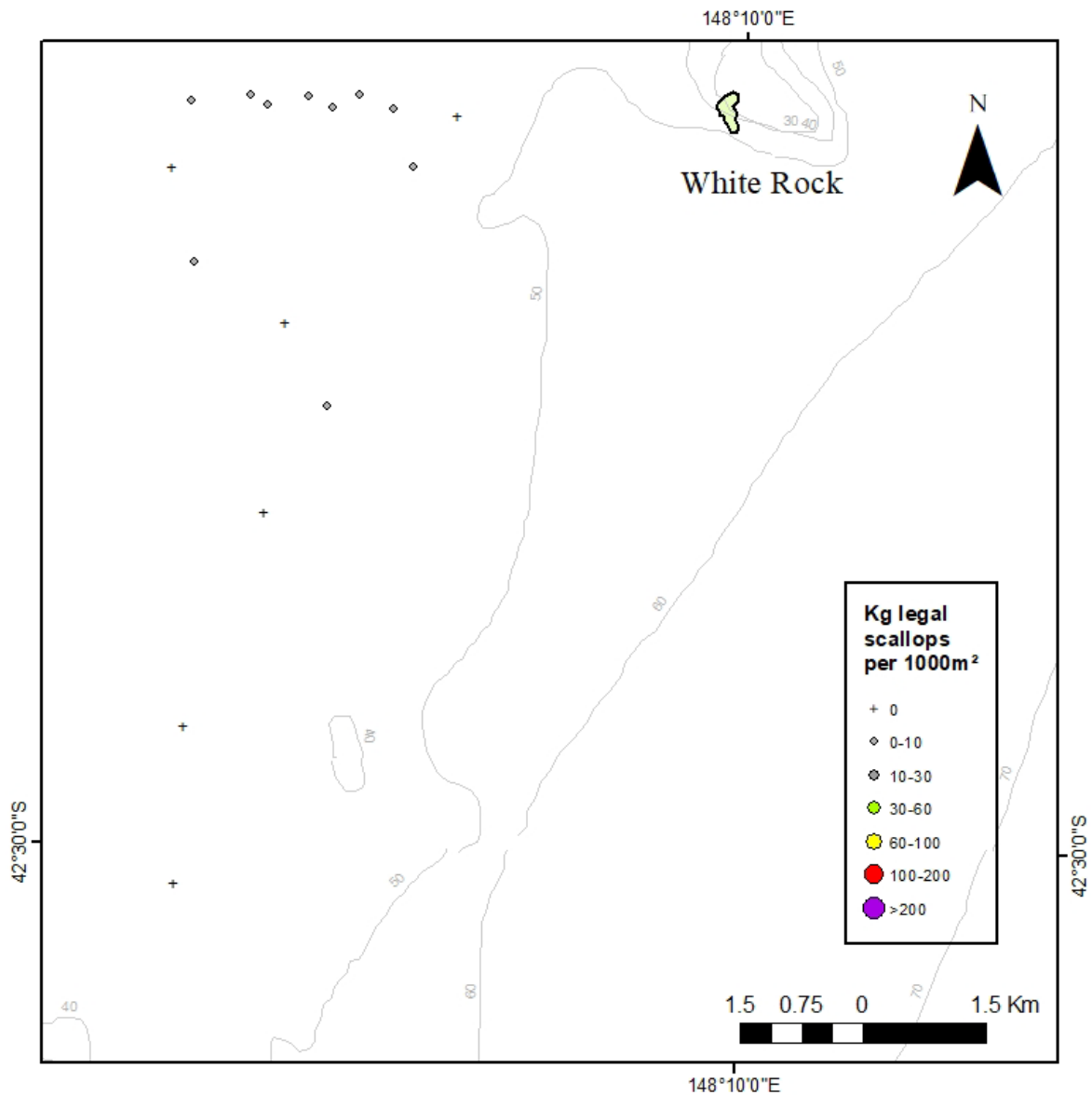


Figure 8. Legal-sized scallop density per tow for the South White Rock (Area 5) exploratory dredge survey. Density is displayed as kg of legal scallops (>90mm) per 1000m².

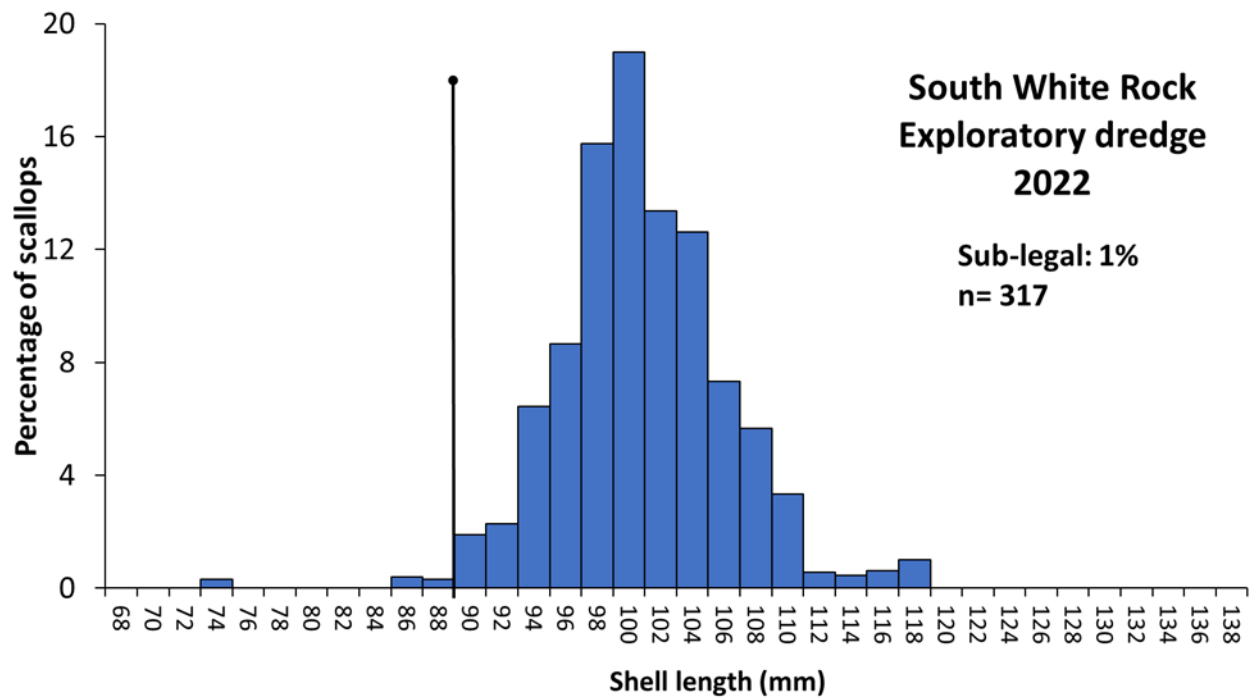


Figure 9. Standardised length frequency distribution for the 16 exploratory dredge tows in South White Rock (Area 5). The dredge discard rate was 1% from 317 scallops measured at 90 mm minimum length with a mean size $\pm$ se: 102.4 ± 0.3 mm. The vertical line shows the 90 mm minimum length.

Bicheno (Area 4) – Exploratory dredge survey

The Bicheno exploratory dredge survey consisted of 13 survey dredge tows deployed from FV Odete C in April 2022 (Table 1; Figures 1 and 10).

The Bicheno exploratory dredge survey tows yielded an average density of legal-sized scallops of 0.65 kg/1000m² (median 0.4 kg/1000m², Figure 10). Note that no length data was provided for Bicheno survey dredge tows.

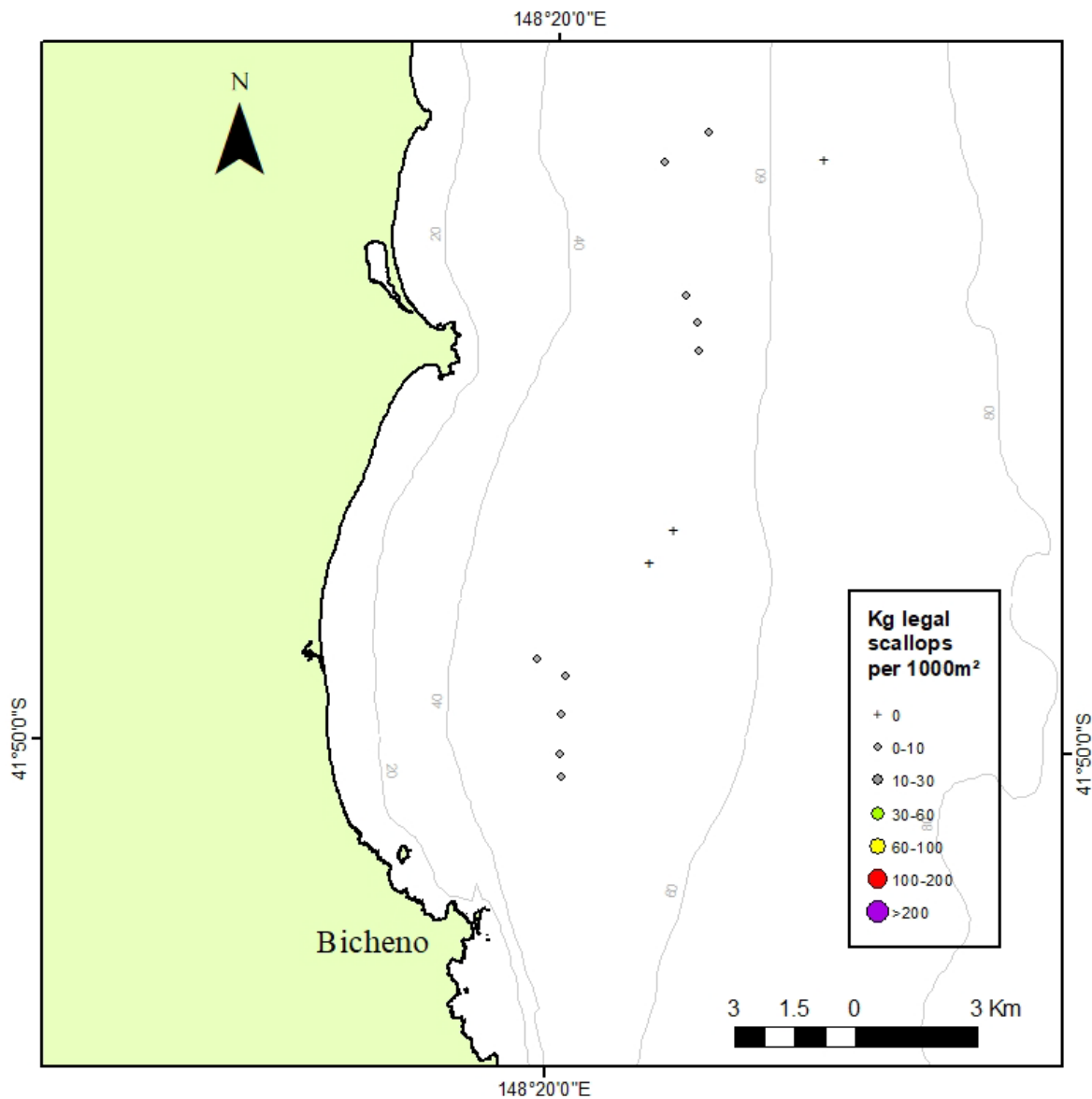


Figure 10. Legal-sized scallop density per tow for Bicheno (Area 4) exploratory dredge survey. Density is displayed as kg of legal scallops (>90mm) per 1000m².

Eddystone Point (Area 3)– Exploratory dredge survey

The Eddystone Point exploratory dredge survey consisted of 15 survey dredge tows deployed from FV Odete C in April 2022 (Table 1, Figures 1 and 11).

The Eddystone Point exploratory dredge survey tows yielded an average density of legal-sized scallops of 8.12 kg/1000m² (median 4.8 kg/1000m²), with a discard rate of 32.4% (Figures 11 and 12).

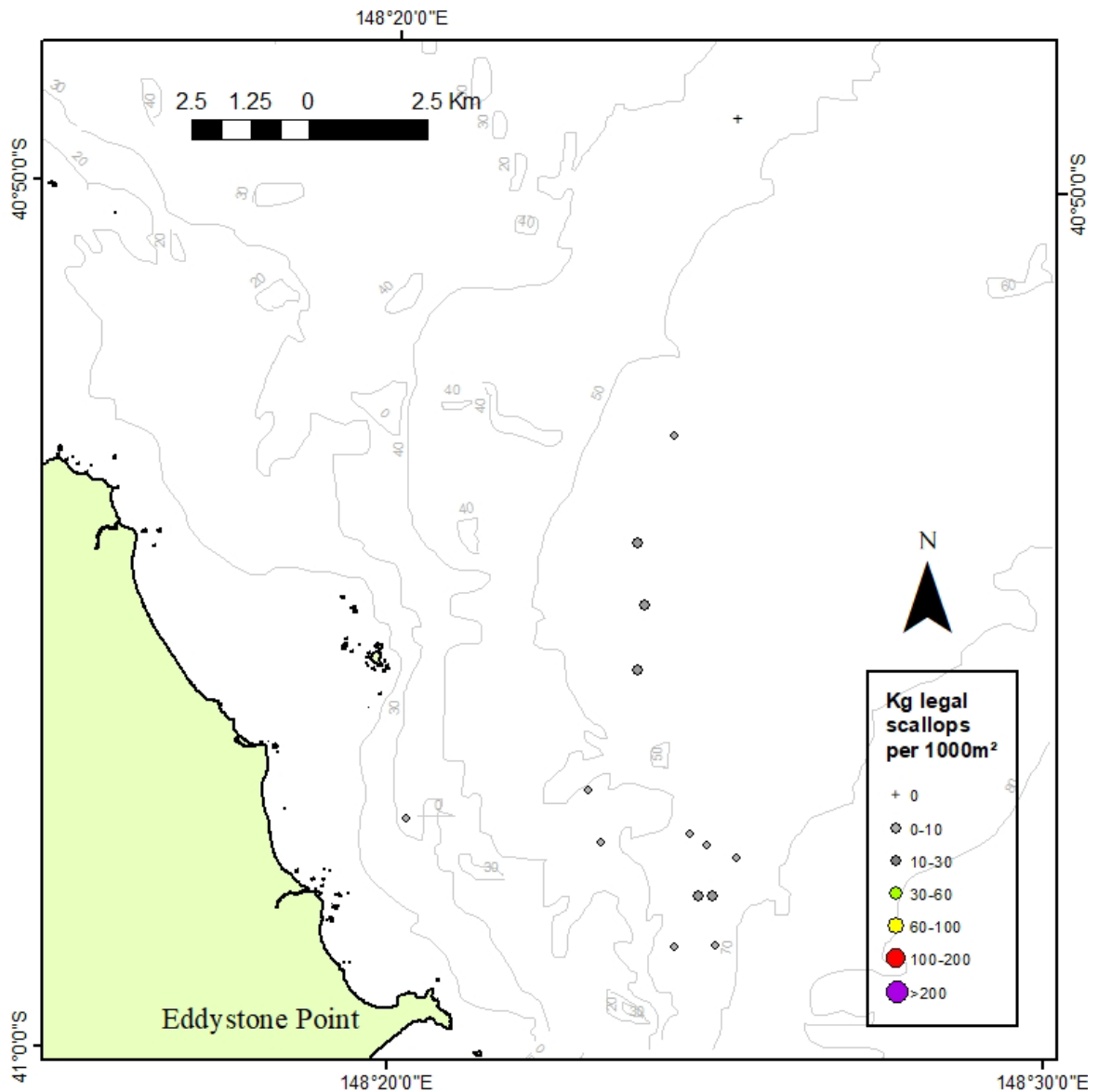


Figure 11. Legal-sized scallop density per tow for Eddystone Point (Area 3) exploratory dredge survey. Density is displayed as kg of legal scallops (>90mm) per 1000m².

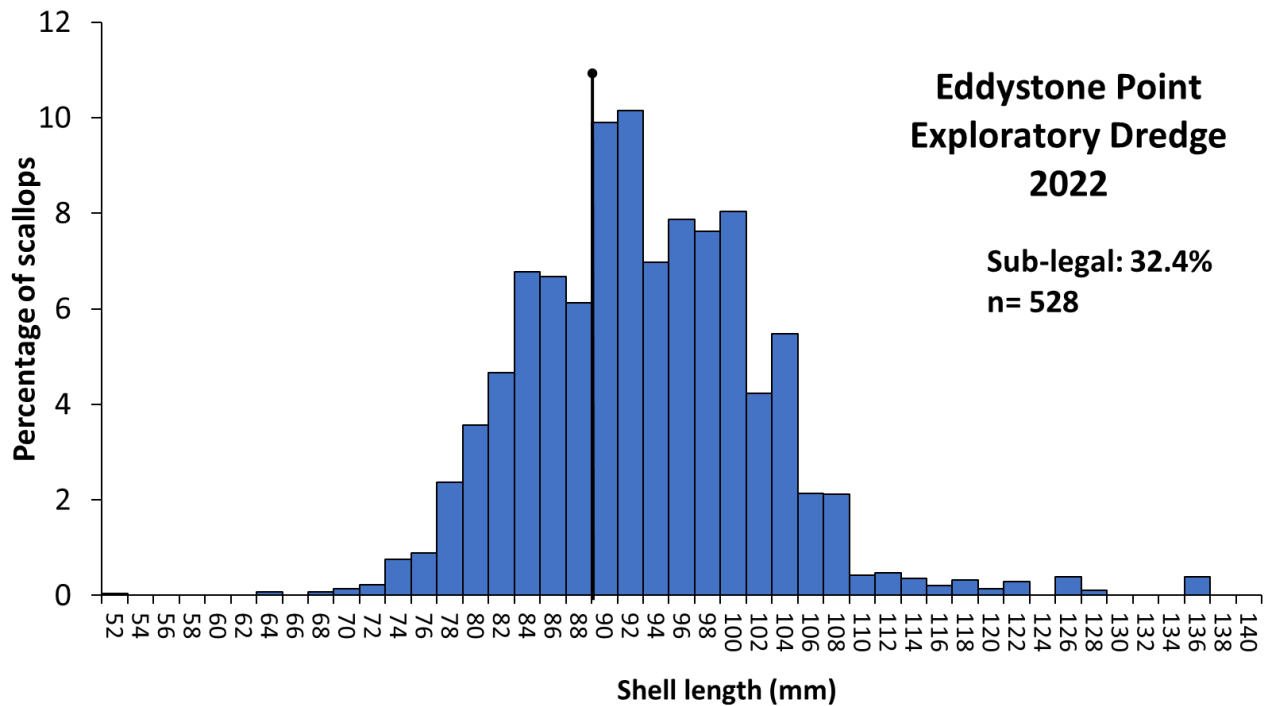


Figure 12. Standardised length frequency distribution for the 15 exploratory dredge tows in the Eddystone Point region. The dredge discard rate was 32.4% from 528 scallops measured at 90 mm minimum length with a mean size $\pm$ se: 93.97 ± 0.42 mm. The vertical line shows the 90 mm minimum length.

The Gardens (Area 4)– Exploratory dredge survey

The Gardens exploratory dredge survey consisted of 82 survey dredge tows. 64 deployed from FV Odete C in April 2022, and 18 tows deployed from FV Karmin in May 2022 (Table 1, Figure 1 and 13).

The Gardens exploratory dredge survey tows yielded an average density of legal-sized scallops of 9.95 kg/1000m² (median 1.85 kg/1000m²), with a discard rate of 11.1% (Figures 13 and 14).

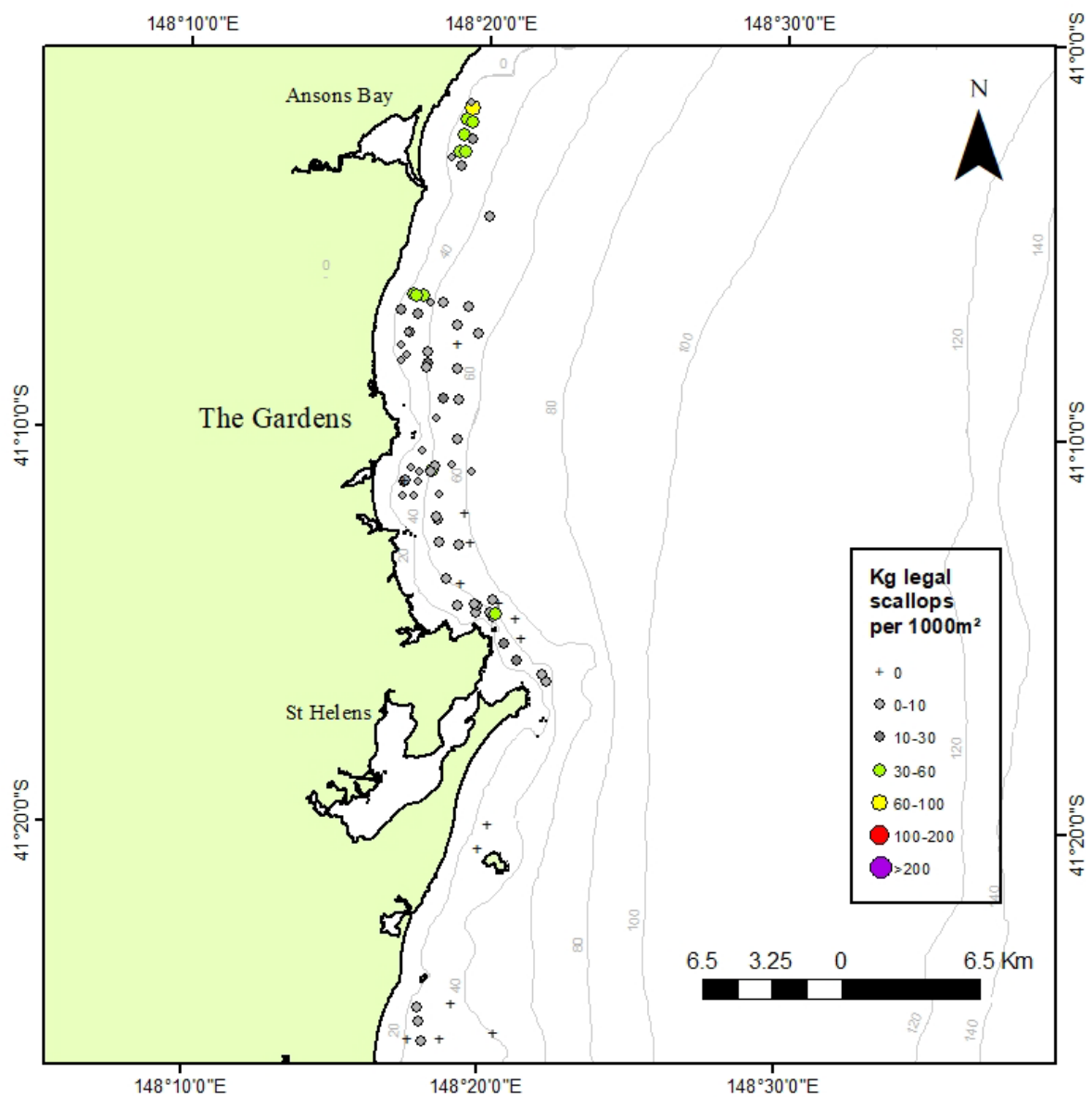


Figure 13. Legal-sized scallop density per tow for The Gardens (Area 4) exploratory dredge survey. Density is displayed as kg of legal scallops (>90mm) per 1000m².

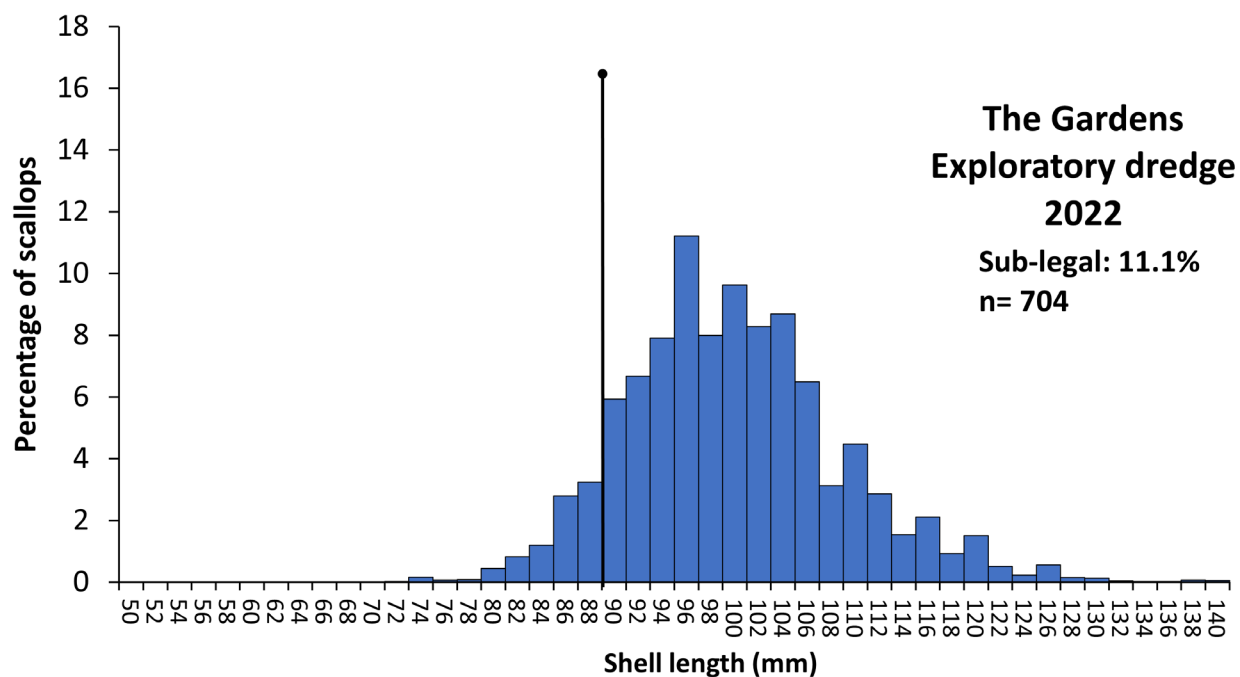


Figure 14. Standardised length frequency distribution for the 82 exploratory dredge tows in The Gardens region. The dredge discard rate was 11.1% from 1767 scallops measured at 90 mm minimum length with a mean size $\pm$ se: 101.03 ± 0.22 mm. The vertical line shows the 90 mm minimum length.

Cape Barren Island (Area 3) - Exploratory dredge survey

The Cape Barren Island exploratory dredge survey consisted of 35 survey dredge tows deployed from FV Odete C in April 2022 (Table 1, Figures 1 and 15). Yielding an average density of legal-sized scallops of 15.1 kg/1000m² (median 8.8 kg/1000m²), with a discard rate of 33.9% (Figures 15 and 16).

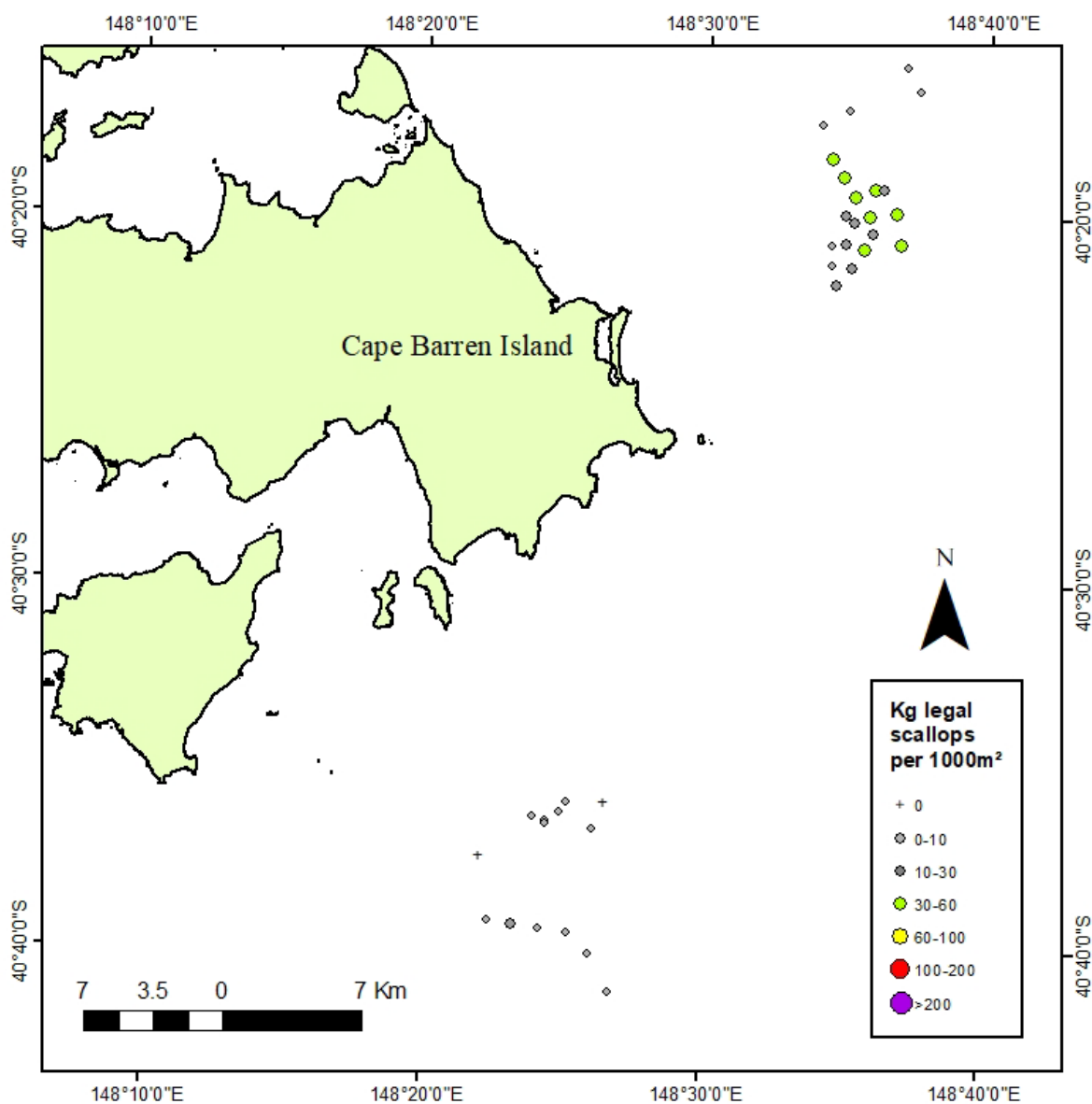


Figure 15. Legal-sized scallop density per tow for Cape Barren Island (Area 3) exploratory dredge survey. Density is displayed as kg of legal scallops (>90mm) per 1000m².

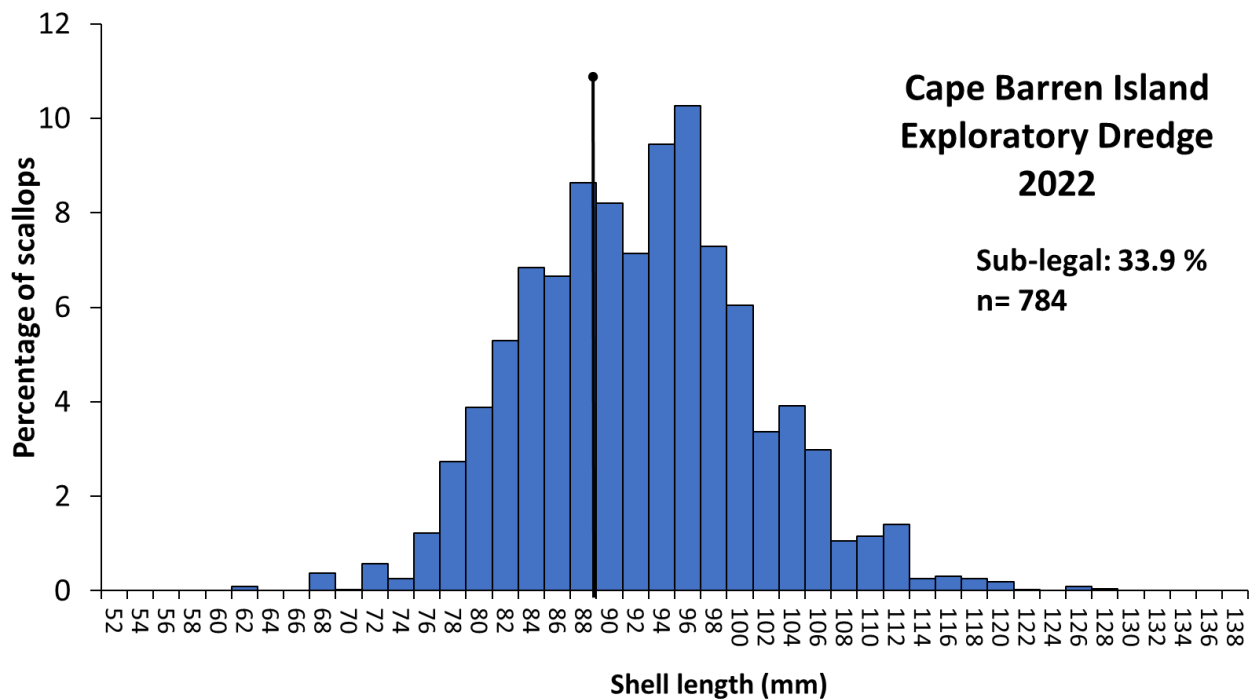


Figure 16. Standardised length frequency distribution for the 35 exploratory dredge tows in the Cape Barren Island region. The dredge discard rate was 33.9% from 784 scallops measured at 90 mm minimum length with a mean size $\pm$ se: 96.27 ± 0.35 mm. The vertical line shows the 90 mm minimum length. Note a total of 35 tows were conducted for this region, only 21 of those sites yielded length data.

Babel Island (Area 3) - Exploratory dredge survey

The Babel Island exploratory dredge survey consisted of 30 survey dredge tows deployed from FV Odete C in April 2022 (Table 1, Figures 1 and 17).

The Babel Island exploratory dredge survey tows yielded an average density of legal-sized scallops of 12.5 kg/1000m² (median 9.32 kg/1000m²), with a discard rate of 9.34% (Figures 17 and 18).

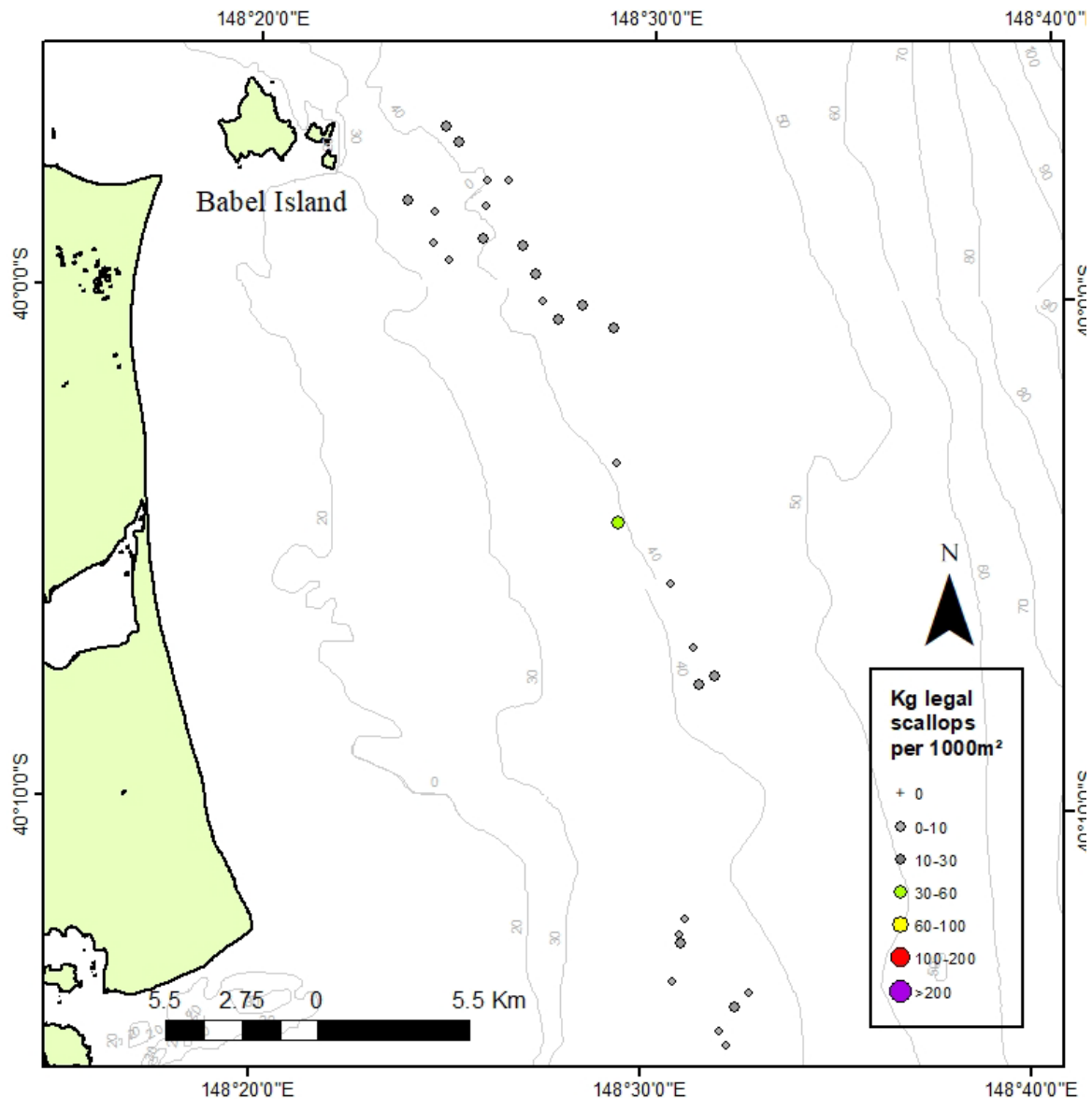


Figure 17. Legal-sized scallop density per tow for Babel Island (Area 3) exploratory dredge survey. Density is displayed as kg of legal scallops (>90mm) per 1000m².

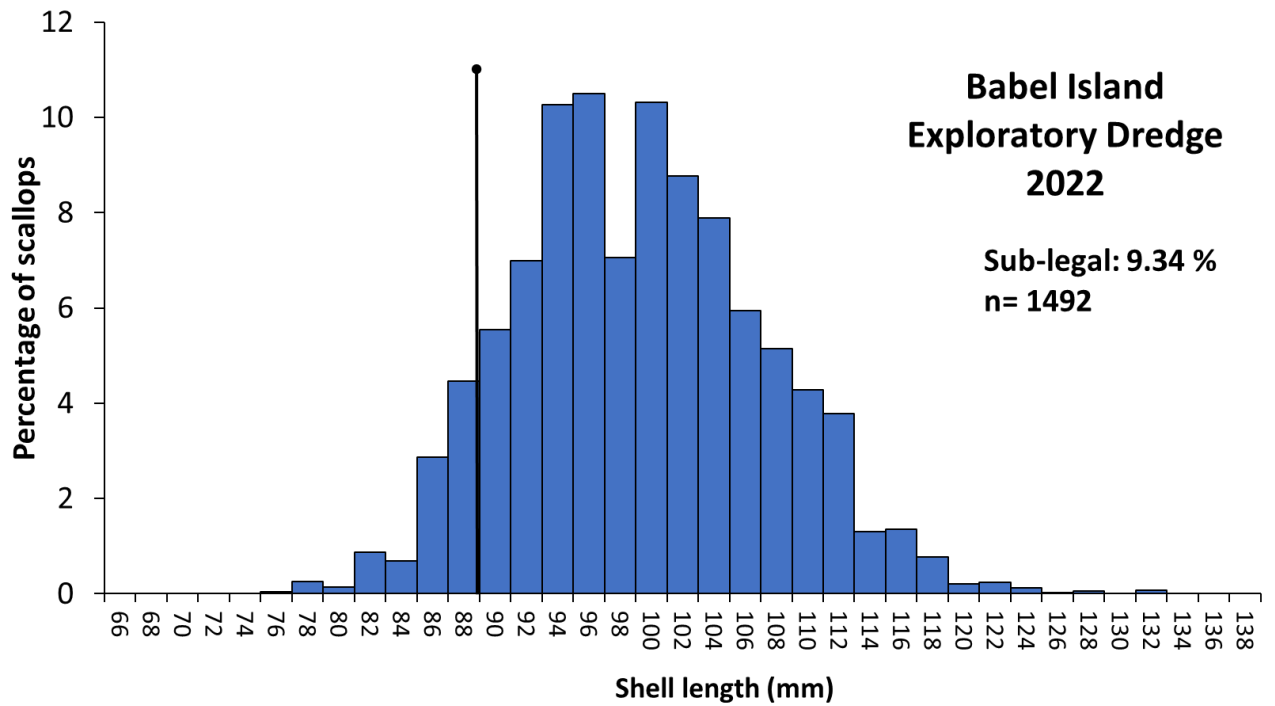


Figure 18. Standardised length frequency distribution for the 30 exploratory dredge tows in the Babel Island region. The dredge discard rate was 9.34% from 1492 scallops measured at 90 mm minimum length with a mean size $\pm$ se: 100.40 ± 0.21 mm. The vertical line shows the 90 mm minimum length.

North West (Area 1) – Targeted dredge survey

The North West targeted dredge survey consisted of 52 survey dredge tows deployed from FV Shandara in June 2022 (Table 1 and 4; Figures 1, 19 and 20).

The North West targeted dredge survey tows yielded an average density of legal-sized scallops of 36.61 kg/1000m² (median 6.6 kg/1000m²), with a discard rate of 38.7% (Figures 17 and 18).

Sub-area yields are provided in Table 4.

Table 4. Legal-sized scallop density, average size, and discard rate for the four sub-areas of North West (Area 1) from the 2022 dredge survey.

Method	Sub-area	Density (kg/1000m ²)		Average scallop size (mm ± SE)	Discard % <90 mm
		Average	Median		
Dredge	Sub-area 1	65.5	30.6	91.8±0.2	38.7
	Sub-area 2	52.5	18.6	91.0±0.2	38.2
	Sub-area 3	5.6	0	90.6±0.3	51.2
	Sub-area 4	22.7	5.5	96.0±0.4	27.3

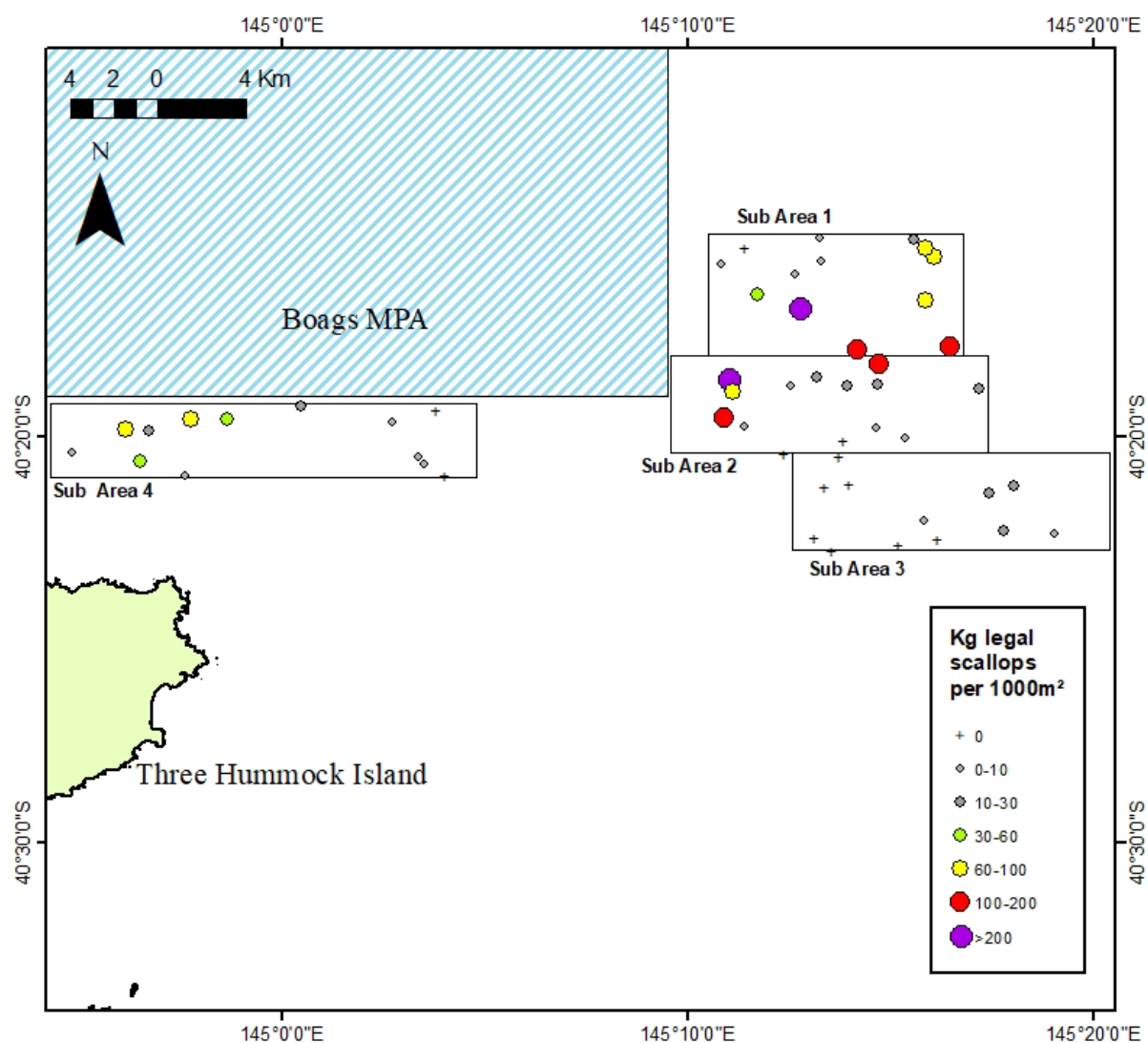


Figure 19. Legal-sized scallop density per tow for the North West (Area 1) targeted dredge survey. Density is displayed as kg of legal scallops (>90mm) per 1000m².

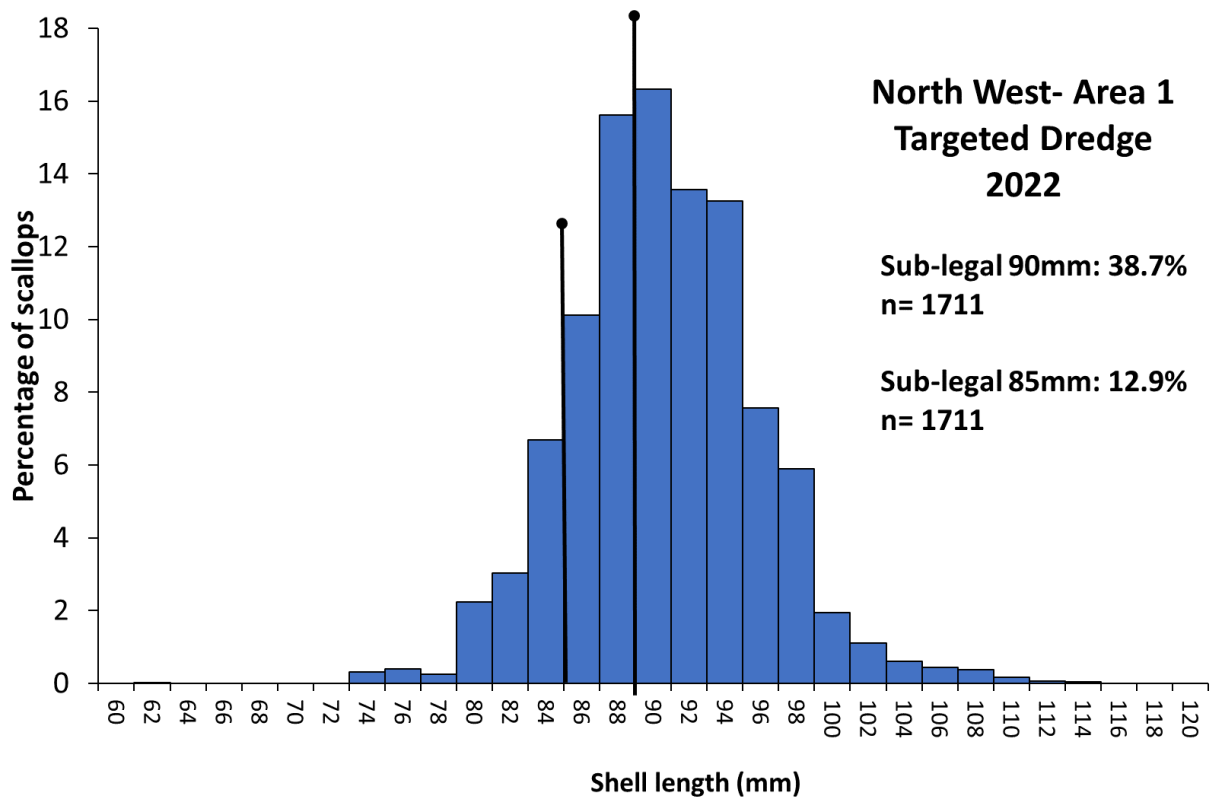


Figure 20. Standardised length frequency distribution for the 52 dredge tows in the North West (Area 1) targeted dredge survey. The dredge discard rate was 38.7% from 1711 scallops measured at 90 mm minimum length with a mean size $\pm$ se: 92.4 ± 0.1 mm. The first and second vertical lines from left show the 85 and 90 mm minimum length, respectively.

North West (Area 1) – Exploratory Dredge Survey

The North West exploratory dredge survey consisted of 302 survey dredge tows. 152 deployed from FV Odete C and 150 deployed from FV Shandara (Table 1, Figures 1 and 21).

The North West exploratory dredge survey tows yielded an average density of legal-sized scallops of 22.2 kg/1000m² (median 0.27 kg/1000m²), with a discard rate of 29.1% (Figures 21 and 22)

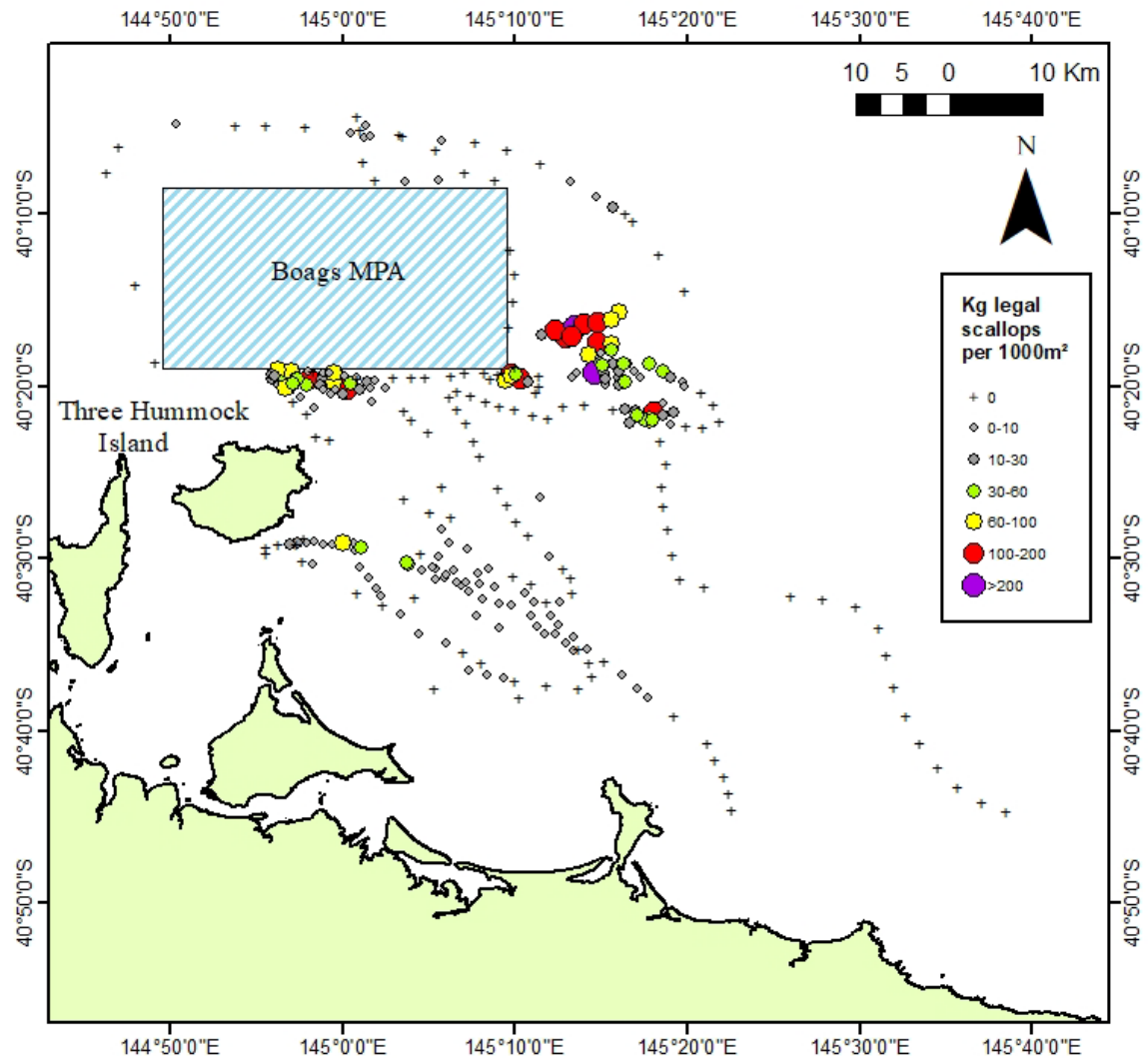


Figure 21. Legal-sized scallop density per tow for the North West (Area 1) targeted dredge survey. Density is displayed as kg of legal scallops (>90mm) per 1000m².

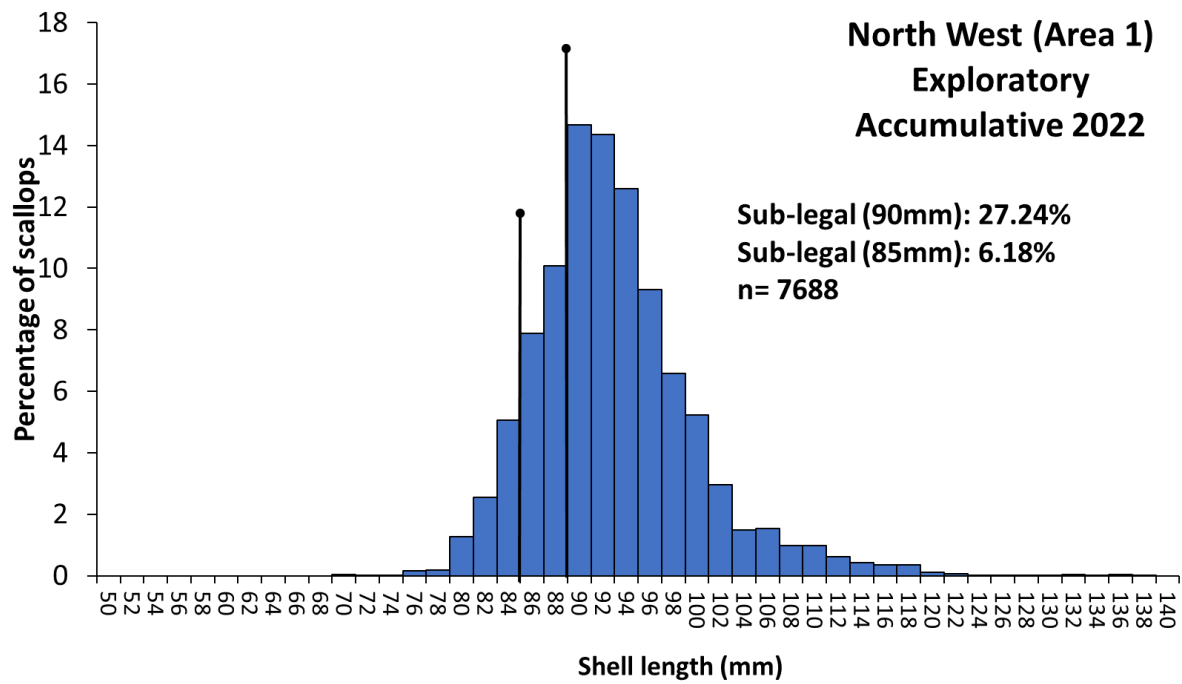


Figure 22. Standardised length frequency distribution for the 302 exploratory dredge tows in the North West region. The dredge discard rate was 27.24% from 7688 scallops measured at 90 mm minimum length with a mean size $\pm$ se: 94.18 ± 0.078 mm. The vertical line shows the 90 mm minimum length.

BIOMASS ESTIMATES

An estimated biomass of scallops within each of the polygons defined by NRE managers as the regions of commercial interest was calculated using the standard method of scaling-up the mean density across the survey area for both the dredge and video surveys (Table 5).

An adjustment for dredge efficiency of 33% (Harrington et al. 2008) has been applied to the dredge biomass estimates and is also presented in Table 5, 6 and 7. It should, however, be noted that the comparison between the dredge and video biomass estimates in the White Rock region in the 2021, and 2022 surveys raises questions around the validity of the adjustment applied for dredge efficiency. The dredge estimates of the mean and lower and upper 95% confidence intervals for biomass were 61.3, 63.4 and 60.3% of those for video in 2021, respectively. Similarly, the dredge estimates of the mean and lower and upper 95% confidence intervals for biomass were 58.1, 54.3 and 60.2% of those for video in 2022. This suggests that dredge efficiency, at least in the White Rock region, is significantly higher than 33% and closer to 60%. Consequently, dredge biomass values provided here should only be used as a relative value for comparison between the regions surveyed.

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Harrington, J.J., Semmens, J.M., Haddon, M., 2008. 2008 Commonwealth Bass Strait Central Zone Scallop Fishery Survey. Survey Final Report. Tasmanian Aquaculture and Fisheries Institute. University of Tasmania.

Table 5. Density and estimated biomass of legal-sized commercial scallops (*Pecten fumatus*) within each of the sub-areas of the White Rock survey area (Area 5), based on dredge and video survey methods for 2022. Dredge-derived biomass estimates adjusted for dredge efficiency should be interpreted with caution as recent White Rock video surveys raise questions about their validity. Biomass confidence intervals are 95%.

Method	Sub-area	n	Mean legal (kg/1000 m ²)	SD (kg/1000 m ²)	Area (km ²)	Biomass (t)			Adjusted biomass (t)		
						Lower CI	Mean	Higher CI	Lower CI	Mean	Higher CI
Dredge	Sub-area 1	13	29.4	35.8	50	388	1469	2549	1164	4407	7647
	Sub-area 2	13	36.4	29.9	50	914	1817	2721	2742	5451	8163
	Sub-area 3	13	10.2	16.5	50	9	509	1008	27	1527	3024
	Sub-area 4	13	13.4	12.8	50	284	671	1058	852	2013	3174
Video	Sub-area 1	9	34.9	35.6	50	668	1743	2817	-	-	-
	Sub-area 2	7	66.6	57.8	50	1582	3328	5074	-	-	-
	Sub-area 3	4	28.2	31.2	50	470	1412	2353	-	-	-
	Sub-area 4	9	24.7	23.2	50	533	1233	1933	-	-	-

Table 6. Density and estimated biomass of legal-sized commercial scallops (*Pecten fumatus*) within the White Rock and Marion Bay sampling areas (Areas 5) defined by NRE managers as the regions of commercial interest, based on dredge and video survey methods for 2022 and previous years. Dredge-derived biomass estimates adjusted for dredge efficiency should be interpreted with caution as recent White Rock video surveys raise questions about their validity. Biomass confidence intervals are 95%.

Area	Method	n	Sub-legal (%)	Mean legal (kg/m ²)	SD (kg/m ²)	Area (km ²)	Biomass (t)			Adjusted biomass (t)		
							Lower CI	Mean	Higher CI	Lower CI	Mean	Higher CI
White Rock	Dredge 2022	52	3.1	0.0223	0.0271	200	2960	4471	5982	8880	13413	17946
	Dredge 2021	29	3.9	0.0156	0.0144	200	2024	2133	4220	6072	9366	12660
	Video 2022	52	5.1	0.0384	0.0402	200	5456	7694	9932	-	-	-
	Video 2021	14	28.2	0.0254	0.0230	200	3191	5093	6995	-	-	-
	Video 2020	48	58.9	0.0219	0.0280	200	2077	3161	4246	-	-	-
Marion Bay	Dredge	30	4.5	0.0101	0.0134	106	537	1065	1593	1611	3195	4779
North West	Dredge	52	38.7	0.0366	0.0563	133	4089	7208	10327	12267	21624	30981

Table 7. Density and estimated biomass of legal-sized commercial scallops (*Pecten fumatus*) within each of the sub-areas of the North West survey area (Area 1), based on dredge survey methods for 2022. Dredge-derived biomass estimates adjusted for dredge efficiency should be interpreted with caution as recent White Rock video surveys raise questions about their validity. Biomass confidence intervals are 95%.

Method	Sub-area	n	Mean legal (kg/1000 m ²)	SD (kg/1000 m ²)	Area (km ²)	Biomass (t)			Adjusted biomass (t)		
						Lower CI	Mean	Higher CI	Lower CI	Mean	Higher CI
Dredge	Sub-area 1	13	65.5	70.0	34.5	1064	3243	5422	3192	9729	16266
	Sub-area 2	13	52.5	68.5	34.1	462	2573	4684	1386	7719	14052
	Sub-area 3	13	5.6	9.6	34.3	-21	276	573	-7	828	1719
	Sub-area 4	13	22.7	27.9	30.8	258	1125	1993	774	3375	5979

Appendix 1:

Targeted Survey Sites

White Rock preseason targeted dredge survey 2022

In a different manner to previous years, the White Rock sampling area has been divided into four equal-sized sub-areas (Fig. 1). Twenty random sites have been selected per sub-area, of which 13 are to be sampled, with seven alternate sites in case of unsuitable sampling conditions. These sites will be surveyed by both video and commercial dredge tows in the 2022 survey. To qualify as a valid survey tow, the dredge must pass within 100 m of the site mark at some point during the tow. Survey tows will be 500 m in length. **Please note this is a random survey, non-random shots must not be undertaken.** The observer will provide the details around sampling each tow for density and size frequency.

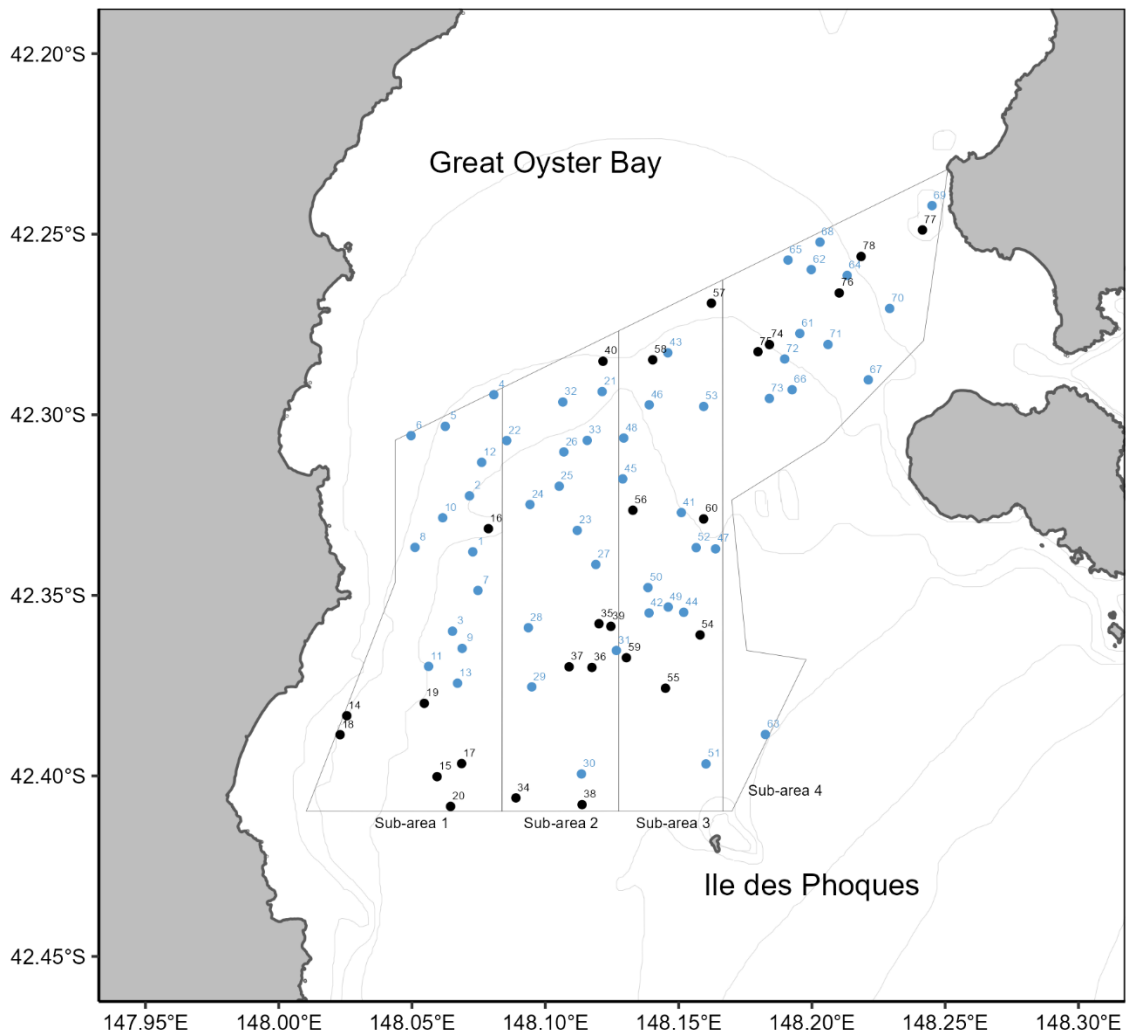


Figure A1. Commercial Scallop (*Pecten fumatus*) survey sites (with site numbers) for the four sub-areas of sampling site White Rock (Area 5).

Table A1. White Rock survey sites listed in randomised order per sub-area.

Dredge Shot Number	Sub-area	Decimal Degrees Latitude	Decimal Degrees Longitude	Degrees Latitude	Decimal Minutes Latitude	Degrees Longitude	Decimal Minutes Longitude
1	1	-42.337956	148.072797	-42	20.277	148	4.368
2	1	-42.322459	148.071551	-42	19.348	148	4.293
3	1	-42.359941	148.065172	-42	21.596	148	3.910
4	1	-42.294438	148.080699	-42	17.666	148	4.842
5	1	-42.303201	148.062466	-42	18.192	148	3.748
6	1	-42.305771	148.049647	-42	18.346	148	2.979
7	1	-42.348657	148.074729	-42	20.919	148	4.484
8	1	-42.336718	148.051118	-42	20.203	148	3.067
9	1	-42.364703	148.068807	-42	21.882	148	4.128
10	1	-42.328524	148.061503	-42	19.711	148	3.690
11	1	-42.369684	148.056211	-42	22.181	148	3.373
12	1	-42.313175	148.076135	-42	18.790	148	4.568
13	1	-42.374343	148.067063	-42	22.461	148	4.024
14	1	-42.383357	148.025540	-42	23.001	148	1.532
15	1	-42.400219	148.059403	-42	24.013	148	3.564
16	1	-42.331538	148.078649	-42	19.892	148	4.719
17	1	-42.396602	148.068605	-42	23.796	148	4.116
18	1	-42.388594	148.023028	-42	23.316	148	1.382
19	1	-42.379917	148.054594	-42	22.795	148	3.276
20	1	-42.408471	148.064462	-42	24.508	148	3.868
21	2	-42.293588	148.121307	-42	17.615	148	7.278
22	2	-42.307140	148.085521	-42	18.428	148	5.131
23	2	-42.332024	148.111987	-42	19.921	148	6.719
24	2	-42.324848	148.094252	-42	19.491	148	5.655
25	2	-42.319786	148.105213	-42	19.187	148	6.313
26	2	-42.310288	148.106943	-42	18.617	148	6.417
27	2	-42.341467	148.118952	-42	20.488	148	7.137
28	2	-42.358967	148.093638	-42	21.538	148	5.618
29	2	-42.375346	148.094922	-42	22.521	148	5.695
30	2	-42.399469	148.113561	-42	23.968	148	6.814
31	2	-42.365278	148.126657	-42	21.917	148	7.599
32	2	-42.296461	148.106571	-42	17.788	148	6.394
33	2	-42.307099	148.115709	-42	18.426	148	6.943
34	2	-42.406099	148.088975	-42	24.366	148	5.339
35	2	-42.357867	148.120128	-42	21.472	148	7.208
36	2	-42.369977	148.117486	-42	22.199	148	7.049
37	2	-42.369809	148.108922	-42	22.189	148	6.535
38	2	-42.407969	148.113788	-42	24.478	148	6.827
39	2	-42.358603	148.124589	-42	21.516	148	7.475
40	2	-42.285176	148.121635	-42	17.111	148	7.298
41	3	-42.327083	148.151042	-42	19.625	148	9.063
42	3	-42.354890	148.138903	-42	21.293	148	8.334
43	3	-42.282824	148.145939	-42	16.969	148	8.756
44	3	-42.354712	148.151915	-42	21.283	148	9.115
45	3	-42.317752	148.129045	-42	19.065	148	7.743

46	3	-42.297242	148.138967	-42	17.835	148	8.338
47	3	-42.337130	148.163843	-42	20.228	148	9.831
48	3	-42.306438	148.129409	-42	18.386	148	7.765
49	3	-42.353246	148.146092	-42	21.195	148	8.766
50	3	-42.347854	148.138508	-42	20.871	148	8.310
51	3	-42.396702	148.160264	-42	23.802	148	9.616
52	3	-42.336789	148.156588	-42	20.207	148	9.395
53	3	-42.297703	148.159399	-42	17.862	148	9.564
54	3	-42.360968	148.158063	-42	21.658	148	9.484
55	3	-42.375730	148.145076	-42	22.544	148	8.705
56	3	-42.326446	148.132835	-42	19.587	148	7.970
57	3	-42.269100	148.162297	-42	16.146	148	9.738
58	3	-42.284767	148.140290	-42	17.086	148	8.417
59	3	-42.367276	148.130416	-42	22.037	148	7.825
60	3	-42.328842	148.159373	-42	19.731	148	9.562
61	4	-42.277478	148.195472	-42	16.649	148	11.728
62	4	-42.259787	148.199760	-42	15.587	148	11.986
63	4	-42.388529	148.182536	-42	23.312	148	10.952
64	4	-42.261422	148.213232	-42	15.685	148	12.794
65	4	-42.257145	148.191044	-42	15.429	148	11.463
66	4	-42.293061	148.192580	-42	17.584	148	11.555
67	4	-42.290325	148.221160	-42	17.420	148	13.270
68	4	-42.252183	148.203021	-42	15.131	148	12.181
69	4	-42.242068	148.245065	-42	14.524	148	14.704
70	4	-42.270569	148.229168	-42	16.234	148	13.750
71	4	-42.280546	148.206038	-42	16.833	148	12.362
72	4	-42.284552	148.189776	-42	17.073	148	11.387
73	4	-42.295494	148.184048	-42	17.730	148	11.043
74	4	-42.280572	148.184082	-42	16.834	148	11.045
75	4	-42.282540	148.179761	-42	16.952	148	10.786
76	4	-42.266259	148.210249	-42	15.976	148	12.615
77	4	-42.248812	148.241470	-42	14.929	148	14.488
78	4	-42.256165	148.218455	-42	15.370	148	13.107

Marion Bay (Area5) preseason dredge survey 2022

Fifty random sites have been selected for the Marion Bay sampling area, of which at least 30 are to be sampled, with 20 alternate sites if more can be undertaken and in case of unsuitable bottom for dredging. These sites will be surveyed by commercial dredge tows in the 2022 survey. To qualify as a valid survey tow, the commercial dredge must pass within 100 m of the site mark at some point during the tow. Survey tows will be approximately 500 m in length. **Please note this is a random survey, non-random shots must not be undertaken.** The observer will provide the details around sampling each tow for density and size frequency.

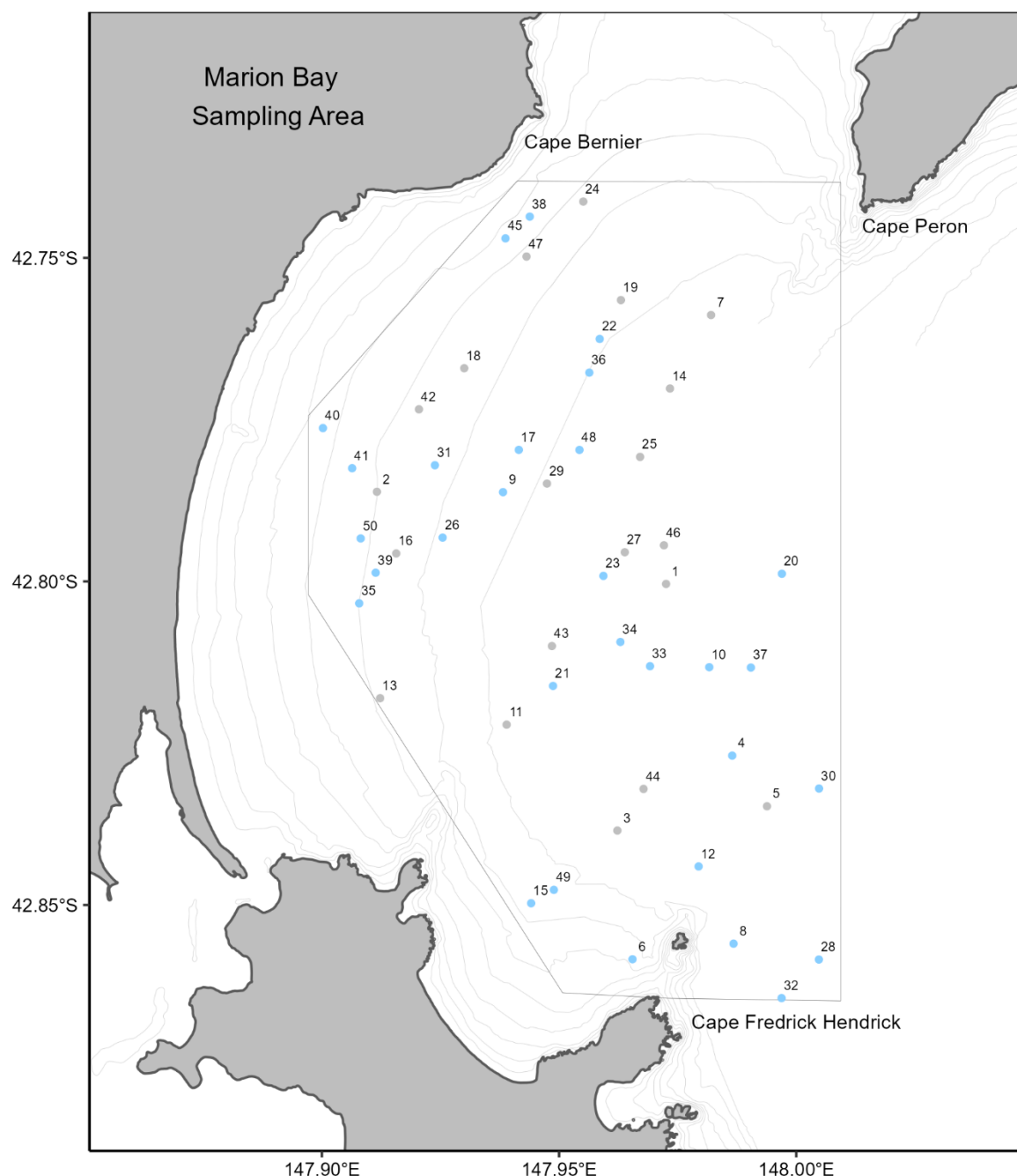


Figure A2. Commercial Scallop (*Pecten fumatus*) dredge survey sites (with site numbers) in the Marion Bay (Area 5) sampling area. Light blue sites are the primary tow sites and grey sites are the alternate tow sites (see Table 1). Contours lines indicate depth in 5 m intervals.

Table A2. Marion Bay survey sites listed in randomised order. Primary tow sites are shaded in blue (random order numbers 1-30) and alternate tow sites are shaded in grey (random order numbers 31-50).

Random order	Dredge Site Number	Decimal Degrees Latitude	Decimal Degrees Longitude	Degrees Latitude	Decimal Minutes Latitude	Degrees Longitude	Decimal Minutes Longitude
1	20	-42.798807	147.996960	-42	47.928	147	59.818
2	50	-42.793351	147.908184	-42	47.601	147	54.491
3	37	-42.813306	147.990424	-42	48.798	147	59.425
4	17	-42.779670	147.941511	-42	46.780	147	56.491
5	48	-42.779677	147.954290	-42	46.781	147	57.257
6	26	-42.793221	147.925452	-42	47.593	147	55.527
7	39	-42.798651	147.911337	-42	47.919	147	54.680
8	40	-42.776301	147.900221	-42	46.578	147	54.013
9	33	-42.813098	147.969165	-42	48.786	147	58.150
10	32	-42.864384	147.996896	-42	51.863	147	59.814
11	8	-42.855974	147.986770	-42	51.358	147	59.206
12	35	-42.803381	147.907869	-42	48.203	147	54.472
13	34	-42.809352	147.962924	-42	48.561	147	57.775
14	12	-42.844040	147.979404	-42	50.642	147	58.764
15	6	-42.858374	147.965470	-42	51.502	147	57.928
16	36	-42.767734	147.956370	-42	46.064	147	57.382
17	30	-42.831998	148.004789	-42	49.920	148	0.287
18	10	-42.813250	147.981653	-42	48.795	147	58.899
19	22	-42.762525	147.958561	-42	45.752	147	57.514
20	9	-42.786204	147.938184	-42	47.172	147	56.291
21	23	-42.799143	147.959335	-42	47.949	147	57.560
22	28	-42.858416	148.004759	-42	51.505	148	0.286
23	45	-42.746992	147.938699	-42	44.819	147	56.322
24	21	-42.816144	147.948722	-42	48.969	147	56.923
25	49	-42.847658	147.948897	-42	50.860	147	56.934
26	31	-42.782040	147.923822	-42	46.922	147	55.429
27	41	-42.782510	147.906376	-42	46.951	147	54.383
28	38	-42.743628	147.943816	-42	44.618	147	56.629
29	15	-42.849722	147.944106	-42	50.983	147	56.646
30	4	-42.826913	147.986492	-42	49.615	147	59.189
31	1	-42.800385	147.972555	-42	48.023	147	58.353
32	16	-42.795675	147.915672	-42	47.740	147	54.940
33	27	-42.795489	147.963848	-42	47.729	147	57.831
34	18	-42.767052	147.930006	-42	46.023	147	55.800
35	14	-42.770190	147.973373	-42	46.211	147	58.402
36	11	-42.822126	147.938943	-42	49.328	147	56.337
37	29	-42.784876	147.947448	-42	47.093	147	56.847
38	42	-42.773400	147.920460	-42	46.404	147	55.228
39	7	-42.758831	147.982028	-42	45.530	147	58.922
40	43	-42.809980	147.948490	-42	48.599	147	56.909
41	24	-42.741305	147.955097	-42	44.478	147	57.306

42	44	-42.832058	147.967797	-42	49.923	147	58.068
43	3	-42.838493	147.962281	-42	50.310	147	57.737
44	2	-42.786148	147.911604	-42	47.169	147	54.696
45	5	-42.834743	147.993818	-42	50.085	147	59.629
46	47	-42.749799	147.943134	-42	44.988	147	56.588
47	46	-42.794415	147.972099	-42	47.665	147	58.326
48	19	-42.756525	147.963032	-42	45.391	147	57.782
49	13	-42.818040	147.912280	-42	49.082	147	54.737
50	25	-42.780755	147.967069	-42	46.845	147	58.024

North West (Area 1) preseason targeted dredge survey 2022

In 2022 a targeted dredge survey has been designed following exploratory dredge surveys in the North West of Area 1. The area contains four sub-area sample sites of approximately the same size. Twenty random sites have been selected per sub-area, of which 13 are to be sampled (blue sites), with seven alternate sites (black sites) in case of unsuitable sampling conditions. To qualify as a valid survey tow, the dredge must pass within 100 m of the site mark at some point during the tow. Survey tows must be 500 m in length.

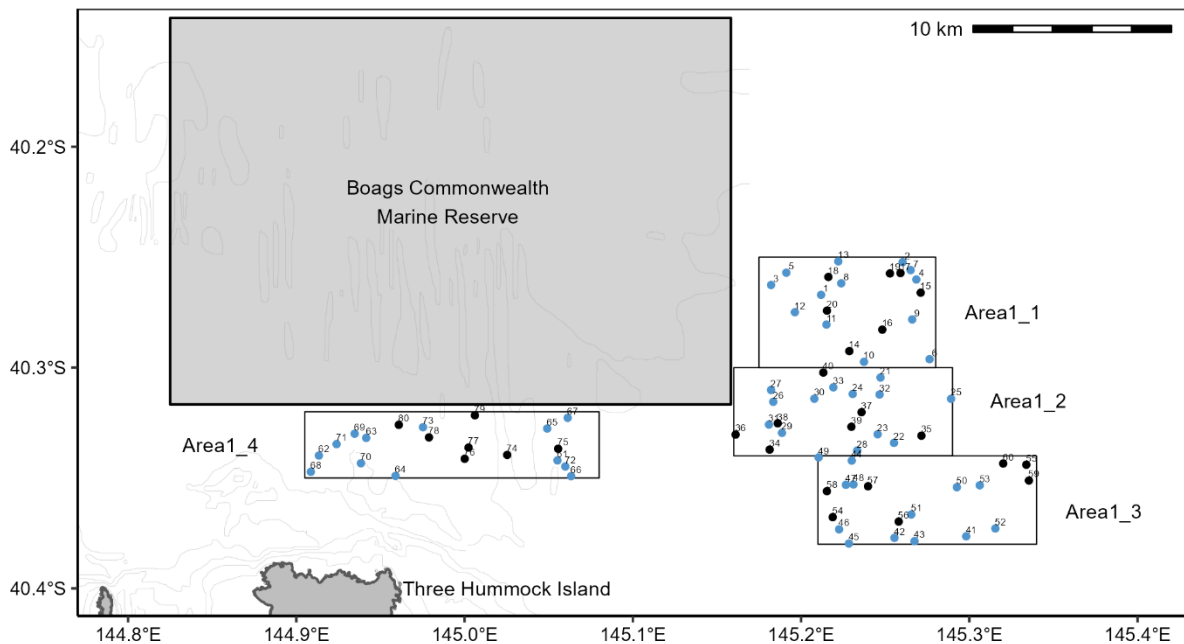


Figure 1. Commercial Scallop (*Pecten fumatus*) survey sites (with site numbers) for the four sub-areas of Area 1, North West Tasmania. Blue sites indicate the primary sampling sites and black sites indicate the alternate sites in case of unsuitable sampling conditions. See Figures 2-5 for each subarea in closer detail.

Table 1. Survey sites listed in randomised order per sub-area.

Dredge shot number	Sub- area	Decimal Degrees Latitude	Decimal Degrees Longitude	Degrees Latitude	Decimal Minutes Latitude	Degrees Longitude	Decimal Minutes Longitude
1	A1_1	-40.267049	145.211903	-40	16.023	145	12.714
2	A1_1	-40.252269	145.260371	-40	15.136	145	15.622
3	A1_1	-40.262609	145.182164	-40	15.757	145	10.930
4	A1_1	-40.260104	145.268503	-40	15.606	145	16.110
5	A1_1	-40.257016	145.191229	-40	15.421	145	11.474
6	A1_1	-40.296198	145.276356	-40	17.772	145	16.581
7	A1_1	-40.255873	145.265120	-40	15.352	145	15.907
8	A1_1	-40.261842	145.223857	-40	15.711	145	13.431
9	A1_1	-40.278203	145.266053	-40	16.692	145	15.963
10	A1_1	-40.297394	145.237406	-40	17.844	145	14.244
11	A1_1	-40.280533	145.215085	-40	16.832	145	12.905
12	A1_1	-40.274933	145.196326	-40	16.496	145	11.780
13	A1_1	-40.251902	145.222124	-40	15.114	145	13.327
14	A1_1	-40.292545	145.228681	-40	17.553	145	13.721
15	A1_1	-40.266093	145.271097	-40	15.966	145	16.266
16	A1_1	-40.282822	145.248275	-40	16.969	145	14.897
17	A1_1	-40.257202	145.259059	-40	15.432	145	15.544
18	A1_1	-40.258967	145.216225	-40	15.538	145	12.973
19	A1_1	-40.257365	145.252832	-40	15.442	145	15.170
20	A1_1	-40.274228	145.215405	-40	16.454	145	12.924
21	A1_2	-40.304494	145.247210	-40	18.270	145	14.833
22	A1_2	-40.334124	145.255206	-40	20.047	145	15.312
23	A1_2	-40.330190	145.245507	-40	19.811	145	14.730
24	A1_2	-40.311963	145.230689	-40	18.718	145	13.841
25	A1_2	-40.314144	145.289166	-40	18.849	145	17.350
26	A1_2	-40.315491	145.183470	-40	18.929	145	11.008
27	A1_2	-40.310157	145.182134	-40	18.609	145	10.928
28	A1_2	-40.337600	145.233386	-40	20.256	145	14.003
29	A1_2	-40.329557	145.188652	-40	19.773	145	11.319
30	A1_2	-40.314093	145.207884	-40	18.846	145	12.473
31	A1_2	-40.325812	145.180907	-40	19.549	145	10.854
32	A1_2	-40.312209	145.246641	-40	18.733	145	14.798
33	A1_2	-40.308950	145.219188	-40	18.537	145	13.151
34	A1_2	-40.337151	145.181299	-40	20.229	145	10.878
35	A1_2	-40.330861	145.271512	-40	19.852	145	16.291
36	A1_2	-40.330345	145.161061	-40	19.821	145	9.664
37	A1_2	-40.320225	145.235921	-40	19.214	145	14.155
38	A1_2	-40.325244	145.186117	-40	19.515	145	11.167
39	A1_2	-40.326808	145.229908	-40	19.609	145	13.794
40	A1_2	-40.302255	145.213218	-40	18.135	145	12.793
41	A1_3	-40.376418	145.298130	-40	22.585	145	17.888
42	A1_3	-40.377120	145.255489	-40	22.627	145	15.329

43	A1_3	-40.378625	145.267418	-40	22.717	145	16.045
44	A1_3	-40.342138	145.230106	-40	20.528	145	13.806
45	A1_3	-40.379681	145.228410	-40	22.781	145	13.705
46	A1_3	-40.373242	145.222573	-40	22.395	145	13.354
47	A1_3	-40.353116	145.226633	-40	21.187	145	13.598
48	A1_3	-40.352936	145.231131	-40	21.176	145	13.868
49	A1_3	-40.340692	145.210417	-40	20.442	145	12.625
50	A1_3	-40.354173	145.292594	-40	21.250	145	17.556
51	A1_3	-40.366540	145.265512	-40	21.992	145	15.931
52	A1_3	-40.372879	145.315448	-40	22.373	145	18.927
53	A1_3	-40.353318	145.306193	-40	21.199	145	18.372
54	A1_3	-40.367752	145.218778	-40	22.065	145	13.127
55	A1_3	-40.343991	145.333866	-40	20.639	145	20.032
56	A1_3	-40.369751	145.258007	-40	22.185	145	15.480
57	A1_3	-40.353772	145.239783	-40	21.226	145	14.387
58	A1_3	-40.355982	145.215364	-40	21.359	145	12.922
59	A1_3	-40.351157	145.335418	-40	21.069	145	20.125
60	A1_3	-40.343460	145.320111	-40	20.608	145	19.207
61	A1_4	-40.342049	145.055215	-40	20.523	145	3.313
62	A1_4	-40.339831	144.913441	-40	20.390	144	54.806
63	A1_4	-40.331865	144.941532	-40	19.912	144	56.492
64	A1_4	-40.349043	144.958942	-40	20.943	144	57.537
65	A1_4	-40.327618	145.049104	-40	19.657	145	2.946
66	A1_4	-40.349174	145.063298	-40	20.950	145	3.798
67	A1_4	-40.322762	145.061283	-40	19.366	145	3.677
68	A1_4	-40.347212	144.908646	-40	20.833	144	54.519
69	A1_4	-40.329949	144.934665	-40	19.797	144	56.080
70	A1_4	-40.343339	144.938411	-40	20.600	144	56.305
71	A1_4	-40.334668	144.923934	-40	20.080	144	55.436
72	A1_4	-40.344793	145.059881	-40	20.688	145	3.593
73	A1_4	-40.327002	144.975293	-40	19.620	144	58.518
74	A1_4	-40.339544	145.025332	-40	20.373	145	1.520
75	A1_4	-40.336760	145.055600	-40	20.206	145	3.336
76	A1_4	-40.341314	145.000055	-40	20.479	145	0.003
77	A1_4	-40.336222	145.002369	-40	20.173	145	0.142
78	A1_4	-40.331623	144.978849	-40	19.897	144	58.731
79	A1_4	-40.321633	145.006139	-40	19.298	145	0.368
80	A1_4	-40.325935	144.960901	-40	19.556	144	57.654

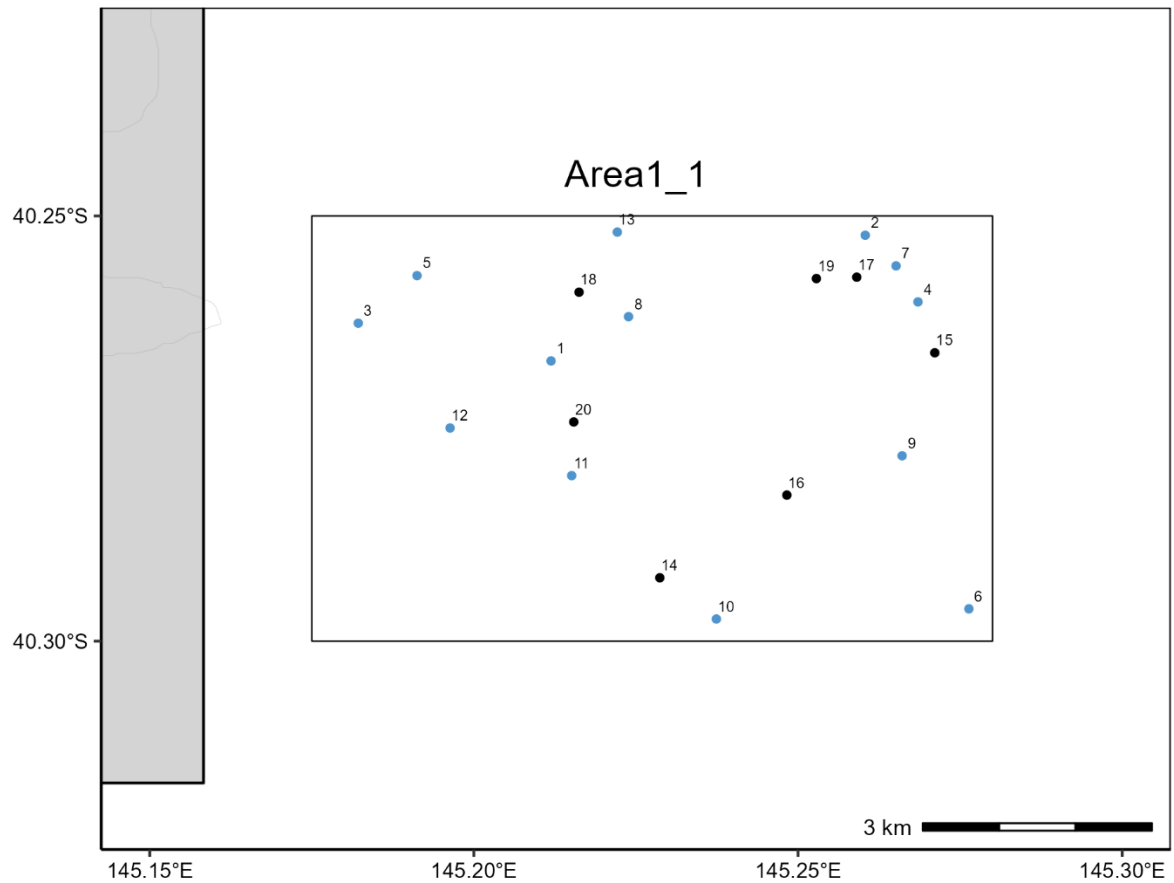


Figure 2. Commercial Scallop (*Pecten fumatus*) survey sites (with site numbers) for sub-area 1 of Area 1 (Area1_1), North West Tasmania. Blue sites indicate the primary sampling sites and black sites indicate the alternate sites in case of unsuitable sampling conditions.

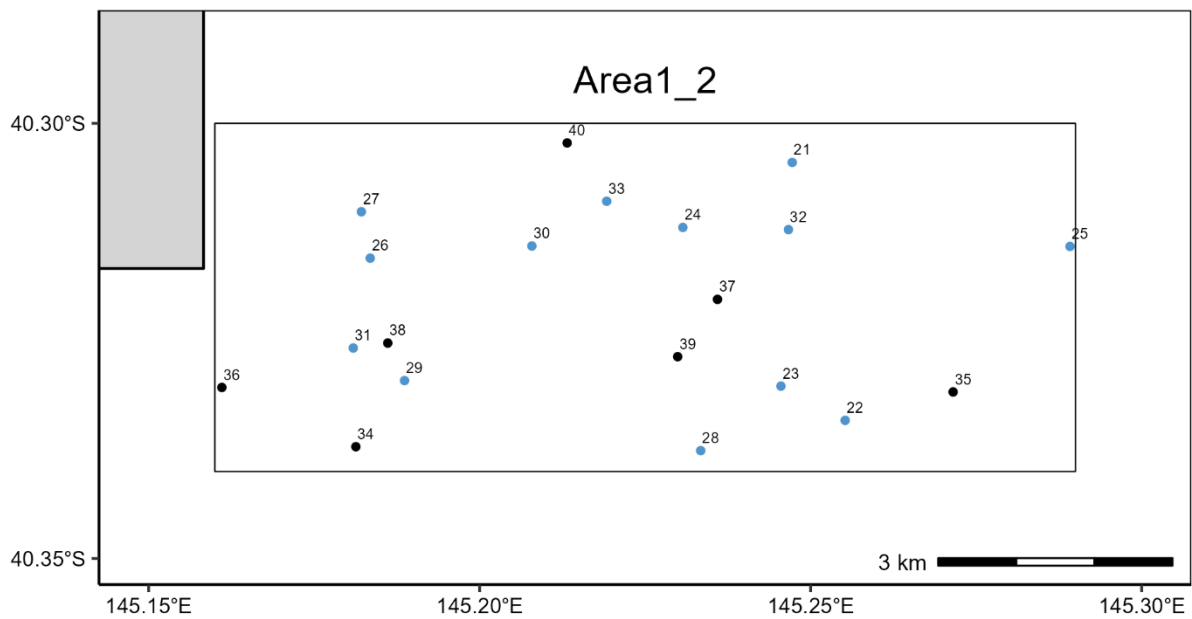


Figure 3. Commercial Scallop (*Pecten fumatus*) survey sites (with site numbers) for sub-area 2 of Area 1 (Area1_2), North West Tasmania. Blue sites indicate the primary sampling sites and black sites indicate the alternate sites in case of unsuitable sampling conditions.

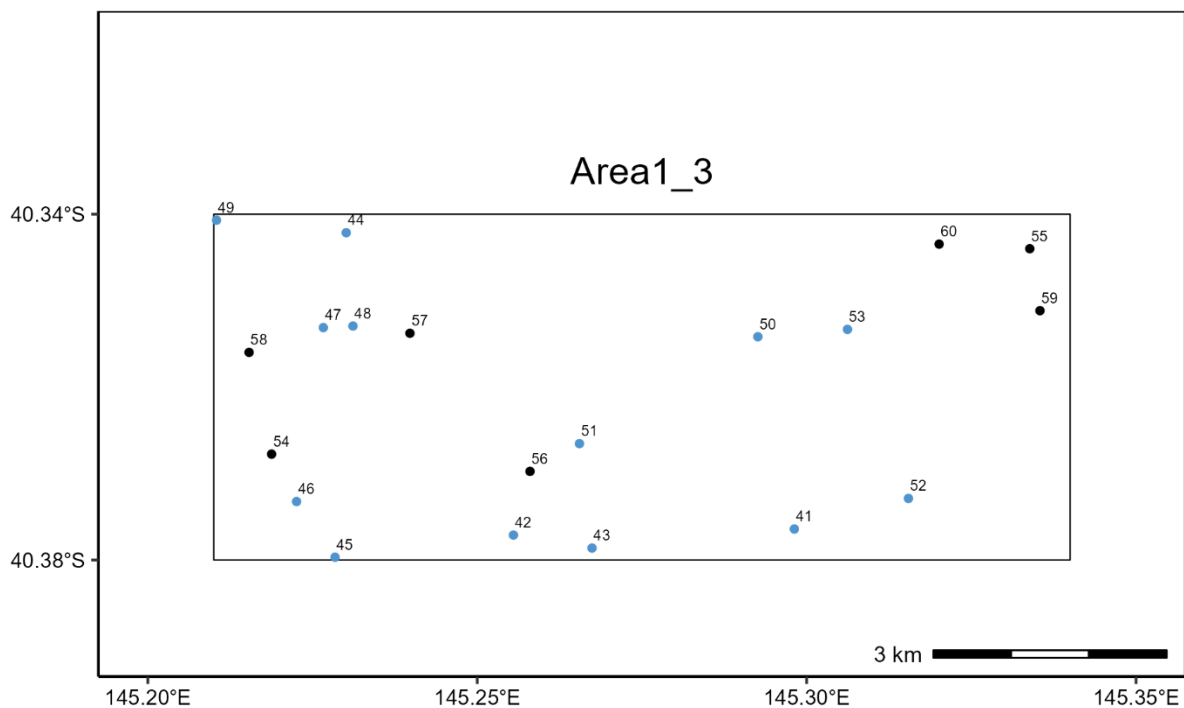


Figure 4. Commercial Scallop (*Pecten fumatus*) survey sites (with site numbers) for sub-area 3 of Area 1 (Area1_3), North West Tasmania. Blue sites indicate the primary sampling sites and black sites indicate the alternate sites in case of unsuitable sampling conditions.

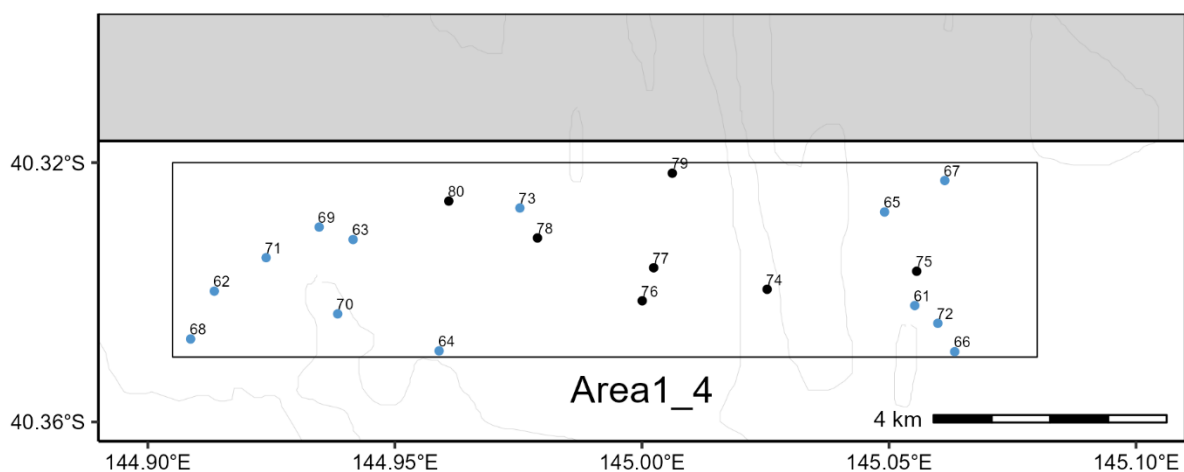


Figure 5. Commercial Scallop (*Pecten fumatus*) survey sites (with site numbers) for sub-area 3 of Area 1 (Area1_3), North West Tasmania. Blue sites indicate the primary sampling sites and black sites indicate the alternate sites in case of unsuitable sampling conditions.

Appendix 2:

Tasmanian Scallop Fishery Survey Areas

