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Institute for Marine and Antarctic Studies

TASMANIAN RECREATIONAL SCALLOP FISHERY: SURVEY AND STOCK STATUS UPDATE: 2024

Peter Coulson, Alyssa Marshell, Robert Kilpatrick, Graeme Ewing and Sean Tracey

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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 Peter Coulson
Institute for Marine and Antarctic Studies
University of Tasmania
Private Bag 49, Hobart, Tasmania 7001, Australia
peter.coulson@utas.edu.au
Mobile: +61 4 0773 0652

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Executive Summary

Despite the closure of the D'Entrecasteaux Channel scallop fishery since 2011, there continues to be a lack of recovery in the Channel's scallop population. Relatively low densities of scallops were observed at 76 sites surveyed across the northern, middle, and southern regions of the Channel in March 2024, with a greater than two-fold decline in total scallop density between 2022 and 2024 at sample sites assessed in both years. Furthermore, the dominance of legal-sized scallops (> 100 mm) suggests that recruitment continues to be limited. The Commercial scallop population in the D'Entrecasteaux Channel is heavily reliant on self-recruitment. Therefore, further rebuilding of adult stocks is important before considering reopening the fishery.

In the northern region of the Channel, the total density of Commercial scallops was very low, ranging between 0.1 and 0.3 scallops m^{-2} and with scallops only present at a few sites. In the middle region of the Channel, Commercial scallop densities were a maximum of 0.46 scallops m^{-2}. Sites in the southern region of the Channel reached a maximum of 0.61 scallops m^{-2}, while the density of legal-sized scallops was a maximum of 0.52 scallops m^{-2}.

Queen scallops were present at only a few sites in the northern and middle Channel regions and were at very low densities. The highest total densities of Queen scallops and densities of legal-size individuals were found in the southern region of the Channel (1.72 and 1.51 scallops m^{-2}, respectively) and Kingfisher Beach in Great Taylors Bay (2.54 and 2.12 scallops m^{-2}, respectively). While medium densities of Queen scallops persist, they are restricted to small and isolated beds and are primarily undersized.

Doughboy scallop abundance continued to be very low at all sites and Channel regions, with a total of 36 counted at only 14 of the 76 sites sampled during the current survey.

Opening the D'Entrecasteaux Channel for recreational scallop fishing would risk further depletion of adult stocks. Even if favourable settlement and recruitment occurs, it will take several years for the cohort to reach legal size and maturity. Therefore, recreational scallop fishing closures in the Channel should remain in place to protect the remaining population.

Background

Sixty-four 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 led to the closure of the D'Entrecasteaux Channel recreational scallop fishery in 2011. Following the closure, 62 sites were surveyed in 2011, and 52 of those sites surveyed in 2012. A subgroup of 22 historically high scallop density sites were selected for sampling in 2016, 2017, 2020 and 2022 to determine whether there was sufficient evidence of recovery to justify a more extensive survey and consideration of re-opening the area to fishing. Since the closure, densities of Commercial scallops (*Pecten fumatus*) have remained very low throughout the D'Entrecasteaux Channel, and small patches of Queen scallops (*Equichlamys bifrons*) in higher densities were deemed insufficient to warrant consideration of reopening a recreational fishery.

There were increased densities of Commercial scallops in the D'Entrecasteaux Channel in 2022, particularly in the high current areas around Middleton and Gordon, and Satellite Island (Ewing et al. 2022). While this was a positive sign that the stock could be re-building, total densities were

still low, and the dominance of legal-sized scallops suggested that recruitment was still limited and at low levels. In recent years, the highest density of Commercial scallops was 2 scallops m^{-2} observed in 2006 (Tracey and Lyle 2008), which is still orders of magnitude lower than densities as high as 5.5 scallops m^{-2} recorded in 1955 (Olsen 1955). Genetic studies indicate that the Commercial scallop population in the D'Entrecasteaux Channel mostly rely on self-recruitment, with very little immigration of recruits from outside Channel populations (Ovenden et al. 2016; Mendo et al. 2014). As such, rebuilding adult stocks are necessary to maximise the potential of successful spawning and recruitment events.

This report summarises the findings of video surveys conducted in March 2024 to quantify estimates of scallop stocks in the D'Entrecasteaux Channel by extending the time-series of sites sampled in recent surveys, and by sampling additional historically surveyed sites in regions of the northern and southern Channel areas.

Methods

A towed video camera was deployed by IMAS at 76 sites in the D'Entrecasteaux Channel in March 2024 (Table 1, Fig. 1). Twenty-two of these sites have been consistently surveyed since 2017, hereafter referred to as "Original" sites, and 44 sites were sampled in previous diver and/or video surveys over the past two decades, hereafter referred to as "Historical" sites ("S" prefix in Figs 2,3 and 4). An additional 10 sites ("A" prefix in Figs 2, 3 and 4), identified by recreational fishers and NRE as sites of potential importance for recreational scallop fishing, hereafter referred to as "Recreational" sites, were also surveyed during the 2024 survey. The depth of the survey sites covers the range of depths at which scallops have been encountered in prior surveys and from anecdotal accounts (Table 1).

The camera unit incorporates a standard-definition Internet Protocol (IP) video camera for navigation, a high-definition GoPro Hero 11 video camera, LED lighting and two parallel scaling lasers at a separation of 180 mm (whose beams contact the seafloor in the centre of the video field) (Figs 5, 6). At each site, video footage of the seafloor along a transect of ~ 200m was captured with the GoPro approximately one metre above the seafloor. During each transect, tow speeds were ~ 1.2 knots, and each transect was recorded as a track on the vessel GPS.

Video footage was analysed using Transect Measure software (SeaGIS Pty Ltd) to determine the abundance of Commercial scallops (*Pecten fumatus*), Queen scallops (*Equichlamys bifrons*), Doughboy scallops (*Mimachlamys asperrimus*) and other benthic taxa along ~ 100 m of the 200 m transect. 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.

The three scallop species 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. 6)
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 measured 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 250 mm 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 (180 mm) and the length (widest point of the shell, parallel to the hinge) of the scallop was measured in millimetres (Fig. 6). The 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.

To investigate whether the total mean densities of commercial scallops and the mean densities of legal-size commercial scallops at corresponding site groups (i.e. All sites, “Original”, “Historical”, “Recreational”) between the middle and southern regions of D’Entrecasteaux Channel were significantly different, t-tests were carried out on corresponding pairs of density data.

To determine whether the total mean densities of commercial scallops and the mean densities of legal-size commercial scallops at sites within each site group (i.e. “Original”, “Historical” and “Recreational”) within each region (i.e. middle and southern) were significantly different, an analysis of variance (ANOVA) test, with site group as the independent variable, was undertaken.

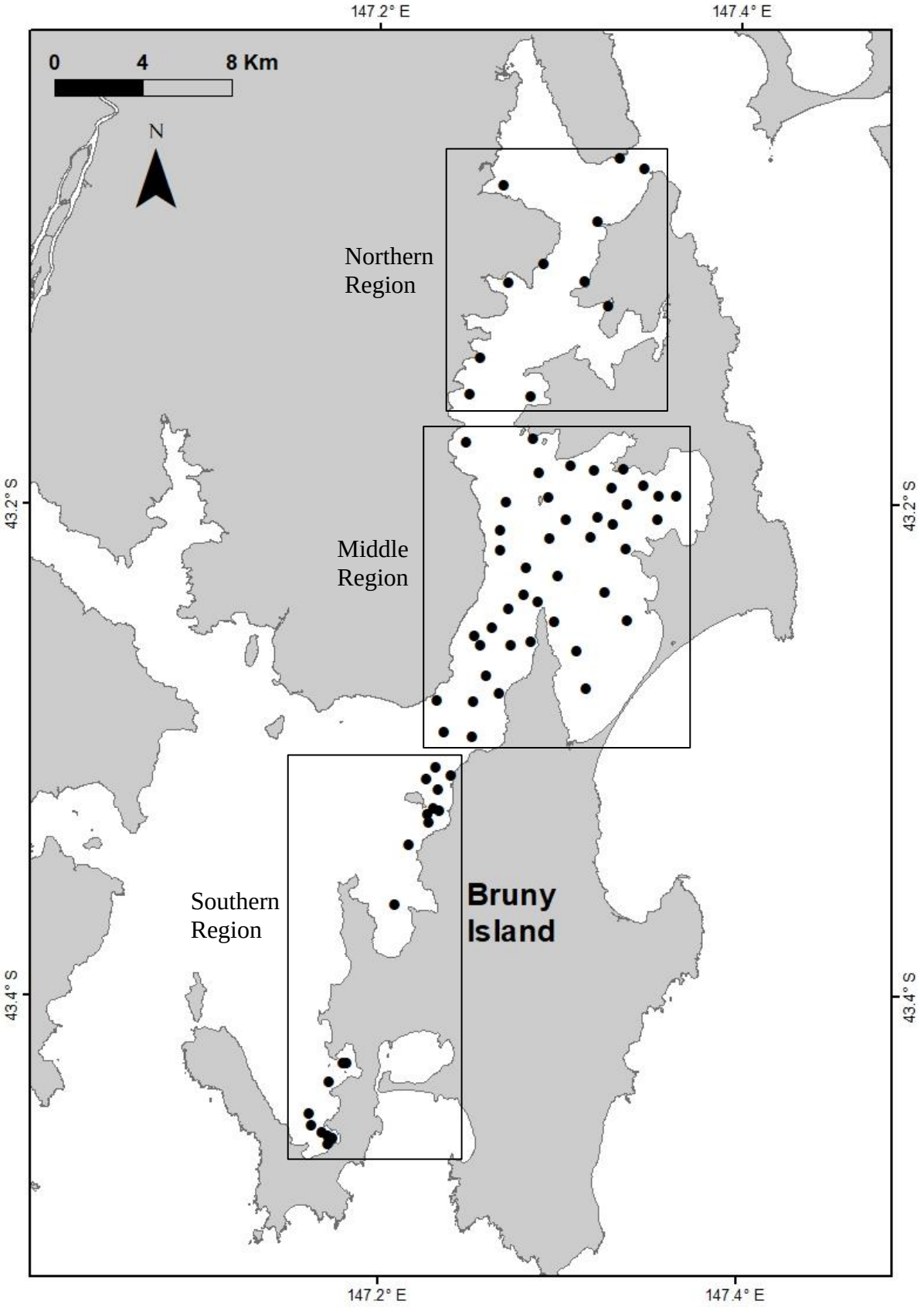

Figure 1. Map showing the location of the 76 sites in the northern, middle, and southern regions of the D'Entrecasteaux Channel surveyed in March 2024.

Table 1. The name, region and depth of sites sampled during the 2024 survey of scallops in the D'Entrecasteaux Channel. Sites with an "S" prefix have been sampled in prior surveys and sites with an "A" prefix were added to the 2024 survey. No shading indicates those "Historical" sites previous sampled by diver and/or video surveys over the past two decades, dark grey shading indicate the 22 "Original" sites sampled regularly since 2017, light grey shading are those "Recreational" sites identified by recreational fishers and NRE as important fishing sites.

Site	Region	Depth (m)	Site	Region	Depth (m)
S01	Northern	11	S34	Middle	12
S02	Northern	12	S35	Middle	10
S06	Northern	16	S36	Middle	12.4
S08	Northern	13	S37	Middle	7
S09	Northern	10	S38	Middle	13
S10	Northern	15	S39	Middle	13
S11	Northern	14	S40	Middle	12
S12	Northern	16	S41	Middle	11
S13	Northern	16	S42	Middle	10
S14	Northern	13	S43	Middle	8
S15	Northern	16	S44	Middle	12
A07	Middle	8	S45	Middle	12.7
A08	Middle	10.5	S46	Middle	13
A09	Middle	5.5	S47	Middle	14
A10	Middle	17	S52	Middle	13
S03	Middle	9	S63	Middle	11.5
S04	Middle	11	S64	Middle	13
S05	Middle	10	A01	Southern	1.5
S05R	Middle	14	A02	Southern	0.5
S07	Middle	9	A03	Southern	2
S16	Middle	11	A04	Southern	3.5
S17	Middle	12	A05	Southern	7
S18	Middle	10	A06	Southern	7.5
S19	Middle	10	S48	Southern	10
S20	Middle	12	S49	Southern	10
S21	Middle	7	S50	Southern	10
S22	Middle	6.5	S51	Southern	8.6
S23	Middle	14	S53	Southern	13
S24	Middle	8.8	S54	Southern	9
S25	Middle	14	S54R	Southern	5
S26	Middle	9	S55	Southern	7
S27	Middle	13	S56	Southern	6
S28	Middle	11	S57	Southern	12
S29	Middle	10	S58	Southern	20
S30	Middle	7	S59	Southern	11
S31	Middle	5	S60	Southern	11
S32	Middle	11.5	S61	Southern	15
S33	Middle	7.5	S62	Southern	6

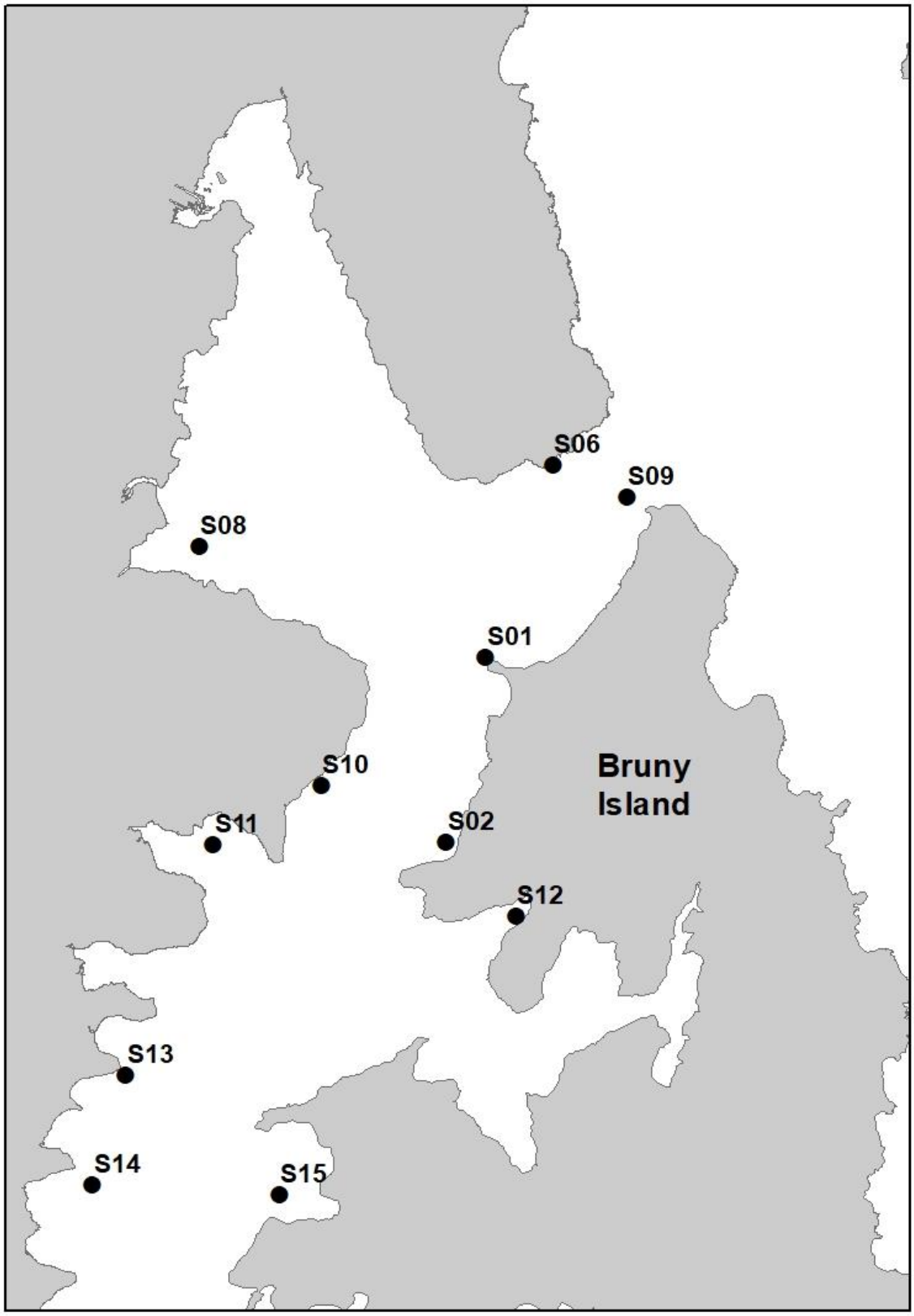

Figure 2. Map of northern region of the D'Entrecasteaux Channel showing the location of the sites surveyed in March 2024. Sites with an "S" prefix have been sampled in prior surveys.

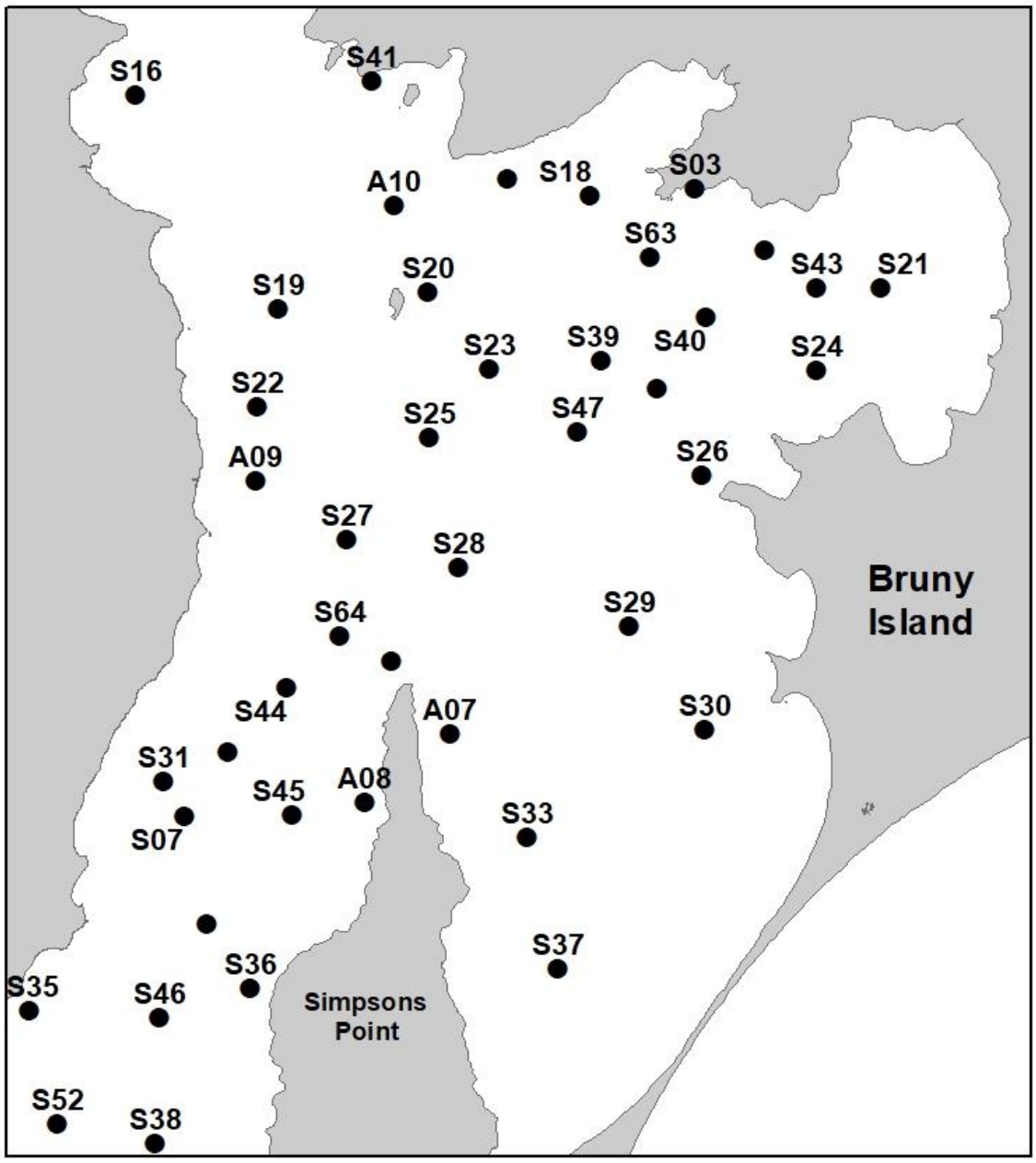

Figure 3. Map of middle region of the D'Entrecasteaux Channel showing the location of the sites surveyed in March 2024. Sites with an "S" prefix have been sampled in prior surveys and sites with an "A" prefix were added to the 2024 survey.

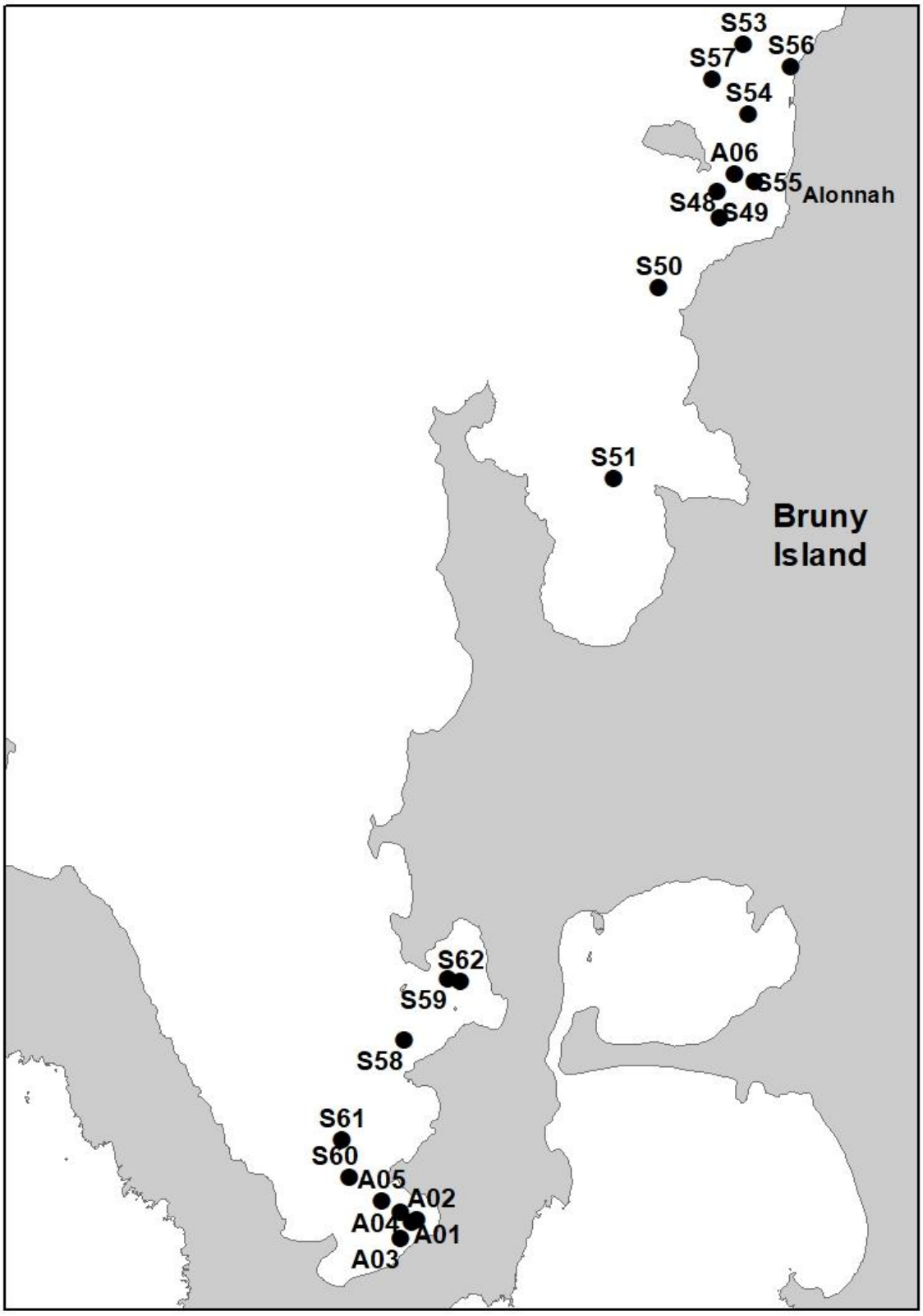

Figure 4. Map of southern region of the D'Entrecasteaux Channel showing the location of the sites surveyed in March 2024. Sites with an "S" prefix have been sampled in prior surveys and sites with an "A" prefix were added to the 2024 survey.

Figure 5. IMAS towed video camera unit.

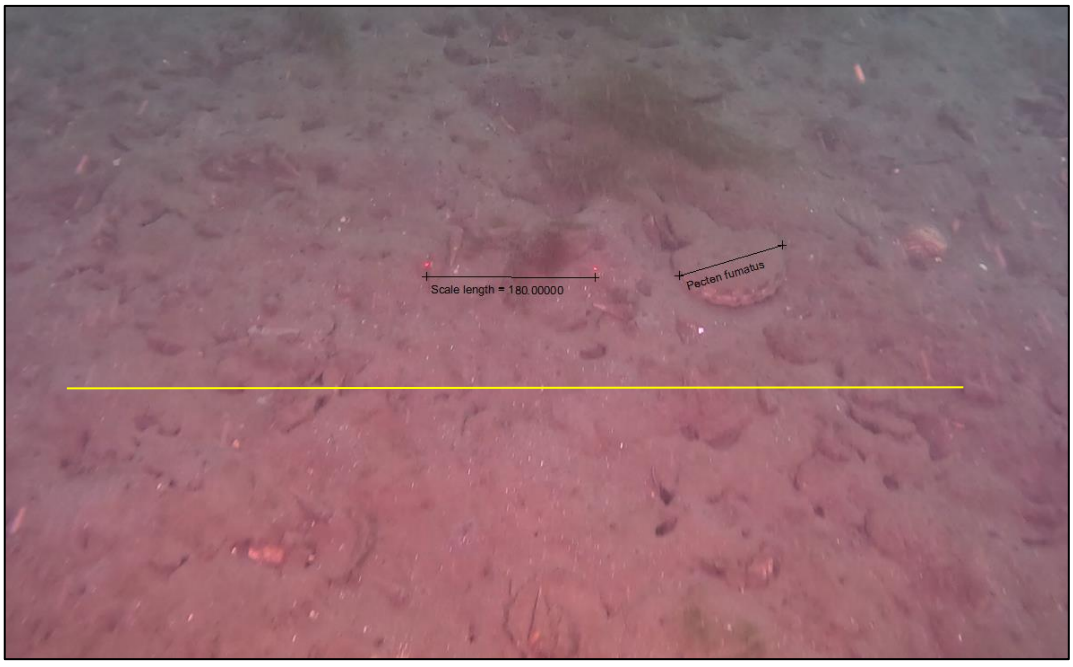

Figure 6. Frame from video footage showing pixel to millimetre calibration scale directly below scaling lasers (red dots), Commercial scallop (*Pecten fumatus*) width measurement and transect width (yellow line is 1000 mm long and centred at the centroid of the scaling lasers).

Results/Discussion

The towed video method provided footage of sufficient resolution to allow species identification and size measurements of scallops for all sites. The average transect area was 105 m^2.

Scallop densities

Commercial scallops were found at only three of the 11 sites in the northern region of the Channel, and at those three sites, their total density was very low, ranging between 0.1 and 0.3 scallops m^{-2} (Table 2, Fig. 7a). In the middle region of the Channel, Commercial scallops were found at 27 of the 44 sites sampled, with densities ranging between 0.1 - 0.46 scallops m^{-2} (Table 2, Fig. 7b). Sites in the southern region of the Channel that possessed higher abundances of Commercial scallops were all located off Alonnah. At the 13 of 21 sites where Commercial scallops were present, their total densities ranged from 0.01 - 0.61 scallops m^{-2} (Table 2, Fig. 8). Although, one site in the northern region of the Channel contained legal-size Commercial scallops, their density was very low at that site (Table 2, Fig. 9a). At the 27 sites in the middle region where Commercial scallops were present, the density of legal-size scallops ranged from 0.02 -0.35 scallops m^{-2} (Table 2, Fig. 9b). The density of legal-size scallops in the southern region of the Channel ranged from 0.01 - 0.52 scallops m^{-2} (Table 2, Fig. 10).

Queen scallops were present at only two sites in the northern Channel region and were at very low densities (Table 3). The density of Queen scallops in the middle region were ≥ 0.2 scallops m^{-2} at seven of 44 sites, with the density of legal-size scallops ≥ 0.2 scallops m^{-2} at five of those sites. The highest total densities of Queen scallops and densities of legal-size individuals were found in the southern region of the Channel, in waters off Alonnah (1.72 and 1.51 scallops m^{-2}, respectively) and Kingfisher Beach in Great Taylors Bay (2.54 and 2.12 scallops m^{-2}, respectively). While the highest density of Queen scallops observed during the current survey is similar to the 2.46 scallops m^{-2} that were observed in 2006 (Tracey and Lyle 2011), this is still lower than the maximum density of 3.8 scallops m^{-2} observed in 2016 (Forbes and Lyle 2016). While medium densities of Queen scallops persist, they are restricted to small and isolated beds and are primarily undersized.

A total of 36 Doughboy scallops were counted and observed only at 14 of the 76 sites sampled during the current survey.

Size structure

Of the 716 Commercial scallops counted during the 2024 survey, 310 were measured. While the lengths of Commercial scallops ranged from 47 - 179 mm, those individuals > minimum legal-size (i.e. 100 mm) dominated the size structure of Commercial scallops in the D'Entrecasteaux Channel (Fig. 11).

There were a large number of Queen scallops counted during this year's survey (1416), with high abundances encountered at some of the "Historical" sites. The lengths of the 368 Queen scallops that could be accurately measured ranged between 46 and 167 mm, with only 47% of these being > minimum legal-size (i.e. 100 mm). The length structure data indicated that there has been a recent successful recruitment event with numerous individuals between 70 and 75 mm (Fig. 12).

Table 2. The total density and density (abundance m^{-2}) of legal-size (i.e. > 100 mm) Commercial scallops (*Pecten fumatus*) at each site sampled during the 2024 survey. Note that calculating legal sized density is only possible on transects with measured scallops. Sites with an "S" prefix have been sampled in prior surveys and sites with an "A" prefix were added to the 2024 survey. No shading indicates those "Historical" sites previous sampled diver and/or video surveys over the past two decades, dark grey shading indicate those 22 "Original" sites sampled regularly since 2017, light grey shading are those "Recreational" sites identified by recreational fishers and DNRET as important fishing sites.

Site	Region	Transect Area (m^2)	Total density	Legal-size density	Site	Region	Transect Area (m^2)	Total density	Legal-size density
S01	North	136	0	0	S34	Middle	112	0.13	0.12
S02	North	102	0	0	S35	Middle	103	0.04	0.03
S06	North	102	0.02	-	S36	Middle	104	0.04	0.02
S08	North	107	0	0	S37	Middle	105	0	0
S09	North	103	0	0	S38	Middle	94	0.03	-
S10	North	103	0	0	S39	Middle	110	0	0
S11	North	106	0	0	S40	Middle	101	0	0
S12	North	100	0	0	S41	Middle	108	0.01	0
S13	North	104	0.01	0.01	S42	Middle	101	0.03	0
S14	North	102	0.03	0	S43	Middle	107	0	0
S15	North	101	0	0	S44	Middle	90	0.43	0.25
A09	Middle	100	0	0	S45	Middle	103	0.17	0.08
A07	Middle	106	0	0	S46	Middle	120	0.01	-
A08	Middle	106	0.27	0.08	S47	Middle	103	0	0
A10	Middle	100	0.23	0.14	S52	Middle	103	0.07	0.05
S03	Middle	104	0	0	S63	Middle	100	0.02	-
S04	Middle	103	0.05	0.05	S64	Middle	102	0.46	0.02
S05	Middle	108	0	0	A01	South	106	0	0
S05R	Middle	127	0.06	-	A02	South	86	0.03	-
S07	Middle	102	0.43	0.35	A03	South	102	0	0
S16	Middle	113	0	0	A04	South	106	0	0
S17	Middle	100	0	0	A05	South	104	0	0
S18	Middle	109	0	0	A06	South	112	0.42	0.42
S19	Middle	108	0.21	0.15	S48	South	105	0.28	0.12
S20	Middle	105	0.13	0.09	S49	South	103	0.15	0.15
S21	Middle	108	0.01	0.01	S50	South	100	0	0
S22	Middle	103	0	0	S51	South	102	0.02	0.02
S23	Middle	101	0	0	S53	South	103	0.02	0.02
S24	Middle	109	0.05	0.03	S54	South	101	0.44	0.44
S25	Middle	101	0	0	S54R	South	103	0.50	0.45
S26	Middle	101	0.33	0.20	S55	South	56	0.61	0.52
S27	Middle	109	0.04	-	S56	South	103	0.06	0.04
S28	Middle	105	0.11	0	S57	South	105	0.04	0.02
S29	Middle	104	0.20	0.12	S58	South	103	0	0
S30	Middle	105	0	0	S59	South	106	0	0
S31	Middle	103	0	0	S60	South	107	0.01	0.01
S32	Middle	100	0.31	0.21	S61	South	108	0.08	0.06
S33	Middle	107	0.02	-	S62	South	105	0	0

Table 3. The total density and density (abundance m^{-2}) of legal-size (i.e. > 100 mm) Queen scallops (*Equichlamys bifrons*) at each site sampled during the 2024 survey. Note that calculating legal sized density is only possible on transects with measured scallops. Sites with an "S" prefix have been sampled in prior surveys and sites with an "A" prefix were added to the 2024 survey. No shading indicates those "Historical" sites previous sampled diver and/or video surveys over the past two decades, dark grey shading indicate those 22 "Original" sites sampled regularly since 2017, light grey shading are those "Recreational" sites identified by recreational fishers and DNRET as important fishing sites.

Site	Region	Transect Area (m^2)	Total density	Legal-size density	Site	Region	Transect Area (m^2)	Total density	Legal-size density
S01	North	136	0	0	S34	Middle	112	0.35	0.28
S02	North	102	0	0	S35	Middle	103	0.93	0.56
S06	North	102	0.02	-	S36	Middle	104	0.07	0.05
S08	North	107	0	0	S37	Middle	105	0	0
S09	North	103	0.02	0	S38	Middle	94	0.27	0.21
S10	North	103	0	0	S39	Middle	110	0	0
S11	North	106	0	0	S40	Middle	101	0.01	-
S12	North	100	0	0	S41	Middle	108	0	0
S13	North	104	0	0	S42	Middle	101	0	0
S14	North	102	0	0	S43	Middle	107	0	0.00
S15	North	101	0	0	S44	Middle	90	0.42	0.21
A09	Middle	100	0	0	S45	Middle	103	0.17	0
A07	Middle	106	0	0	S46	Middle	120	0.32	0.16
A08	Middle	106	0.14	0.14	S47	Middle	103	0.00	0
A10	Middle	100	0	0	S52	Middle	103	0.17	0.09
S03	Middle	104	0	0	S63	Middle	100	0	0
S04	Middle	103	0	0	S64	Middle	102	0.16	0
S05	Middle	108	0	0	A01	South	106	0.83	0.32
S05R	Middle	127	0.14	-	A02	South	86	0.74	-
S07	Middle	102	0.27	0.20	A03	South	102	0.59	0.20
S16	Middle	113	0	0	A04	South	106	0	0
S17	Middle	100	0	0	A05	South	104	0.01	0.01
S18	Middle	109	0	0	A06	South	112	1.72	1.51
S19	Middle	108	0	0	S48	South	105	0	0
S20	Middle	105	0	0	S49	South	103	0.59	0.20
S21	Middle	108	0	0	S50	South	100	0	0
S22	Middle	103	0	0	S51	South	102	0	0
S23	Middle	101	0	0	S53	South	103	0	0
S24	Middle	109	0.04	-	S54	South	101	0.11	0.11
S25	Middle	101	0	0	S54R	South	103	1.81	1.44
S26	Middle	101	0.01	0	S55	South	56	2.05	1.20
S27	Middle	109	0.05	-	S56	South	103	0.12	0
S28	Middle	105	0	0	S57	South	105	0	0
S29	Middle	104	0.01	0	S58	South	103	0	0
S30	Middle	105	0	0	S59	South	106	0	0
S31	Middle	103	0.11	0.05	S60	South	107	0.09	0.08
S32	Middle	100	0.24	0.16	S61	South	108	0	0
S33	Middle	107	0	0	S62	South	105	0	0

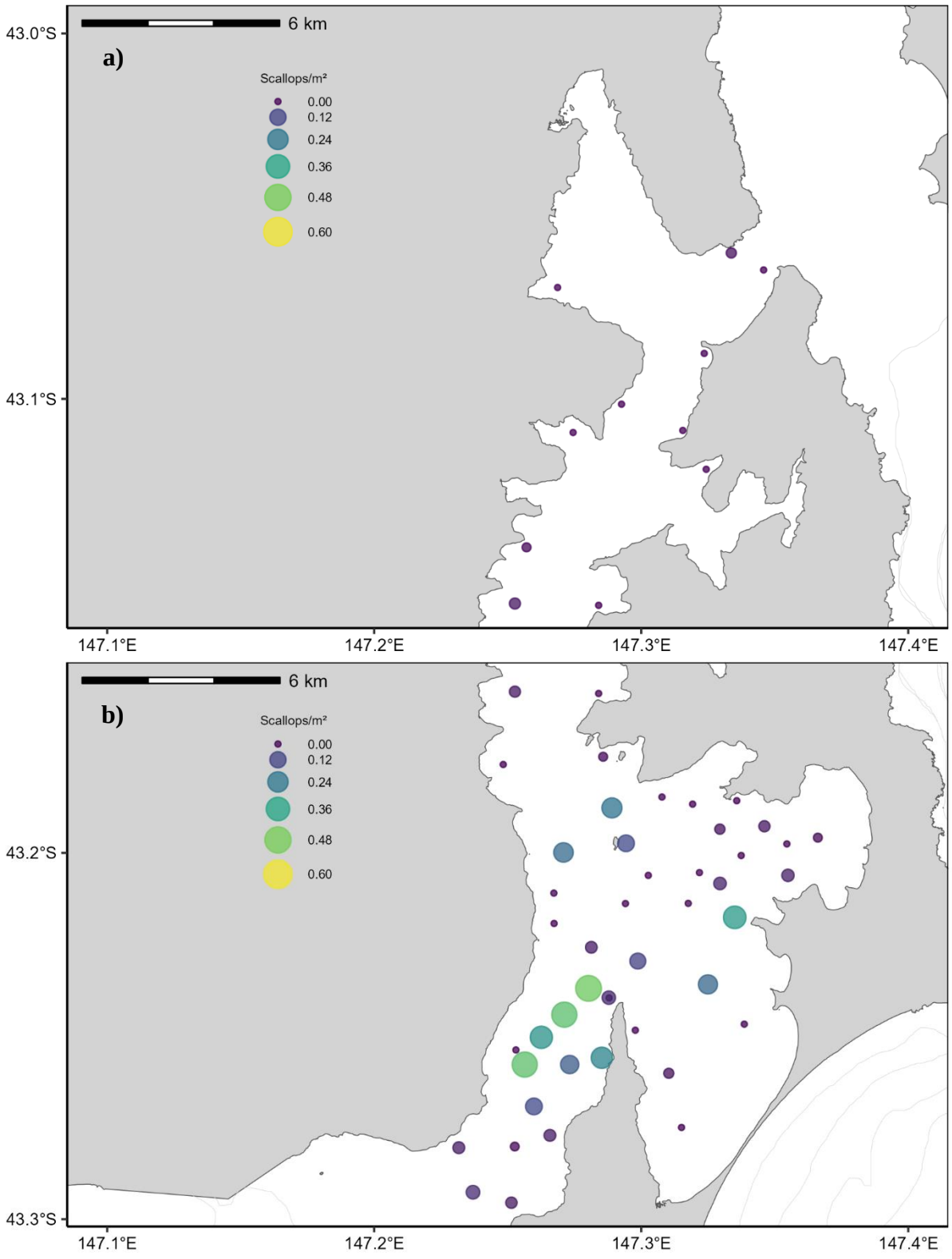

Figure 7. The total density (abundance m^{-2}) of Commercial scallops (*Pecten fumatus*) at each site in the a) northern and b) middle regions of the D'Entrecasteaux Channel surveyed in March 2024.

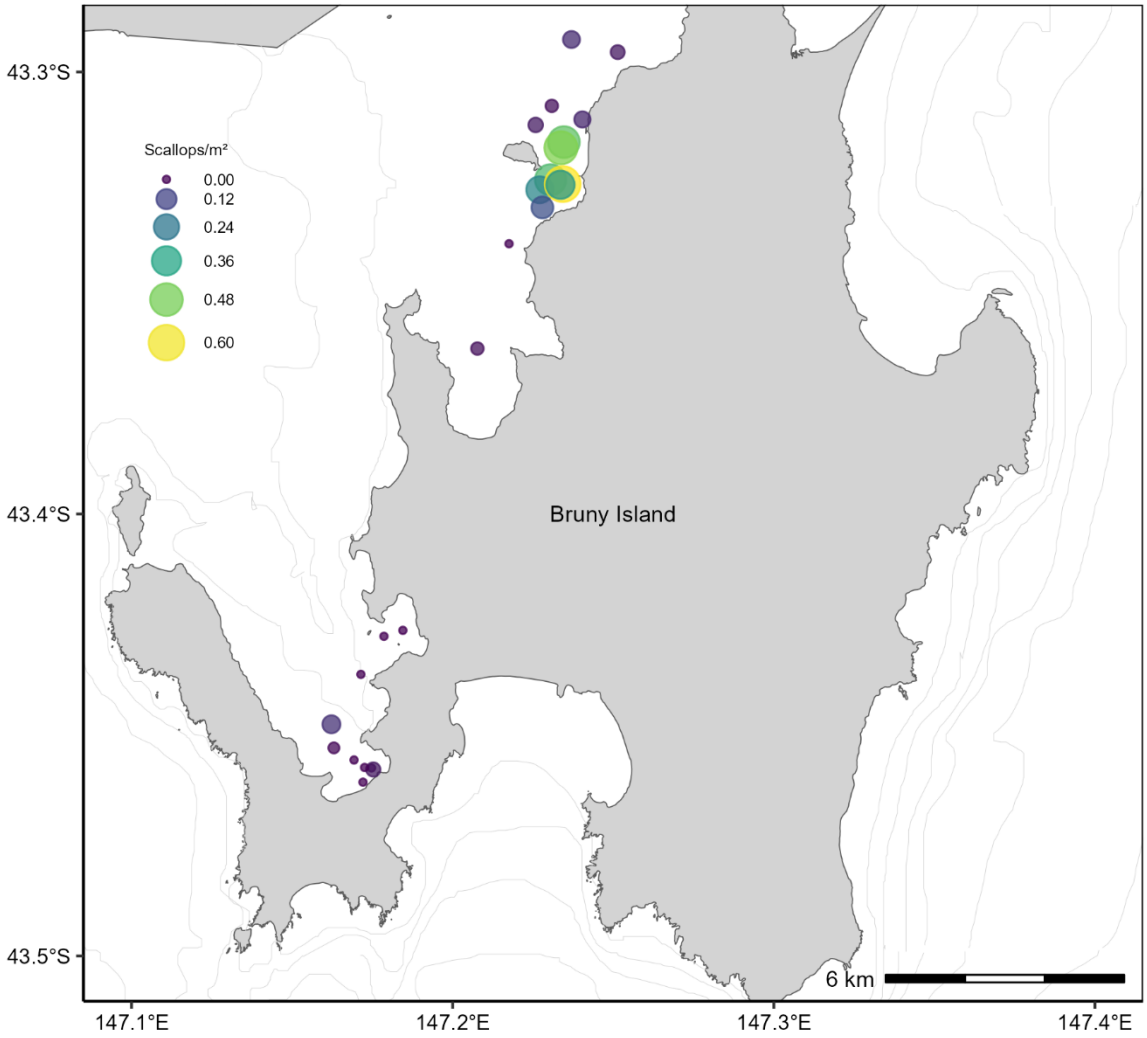

Figure 8. The total density (abundance m^{-2}) of Commercial scallops (*Pecten fumatus*) at each site in the southern region of the D'Entrecasteaux Channel surveyed in March 2024.

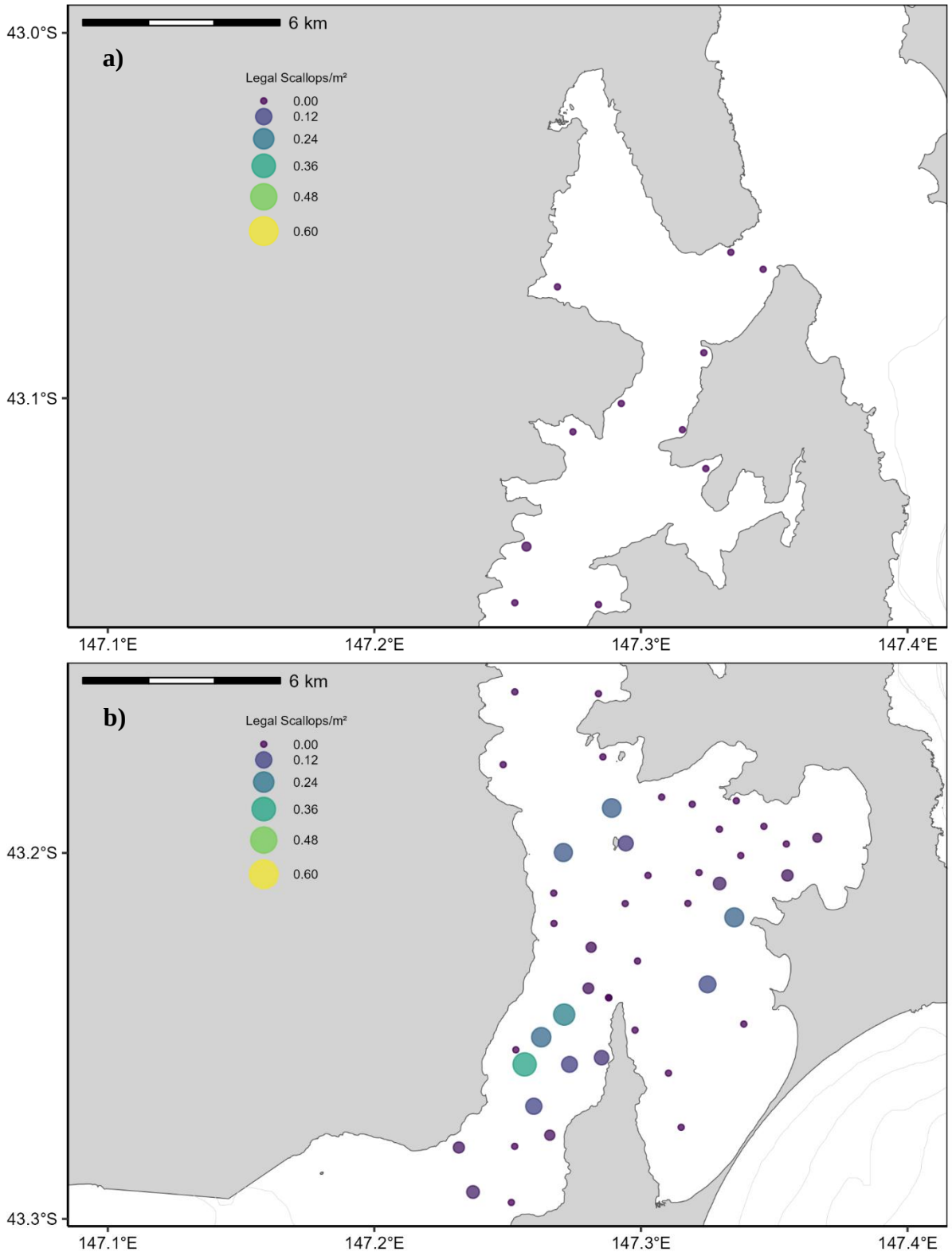

Figure 9. The density of legal-size (i.e. > 100 mm) Commercial scallops (*Pecten fumatus*) at each site in the a) northern and b) middle regions region of the D'Entrecasteaux Channel surveyed in March 2024.

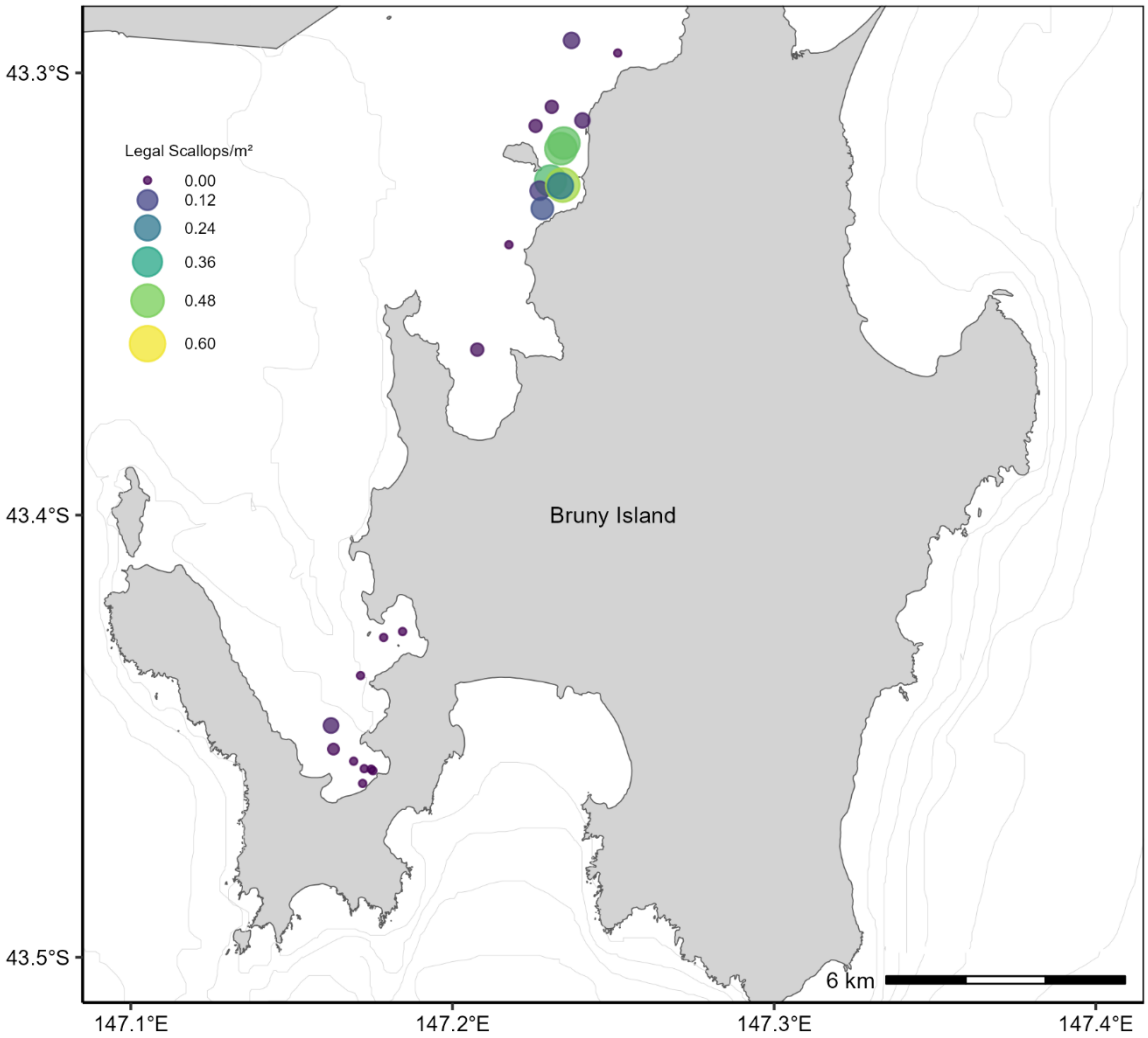

Figure 10. The density of legal-size (i.e. > 100 mm) Commercial scallops (*Pecten fumatus*) at each site in the southern region of the D'Entrecasteaux Channel surveyed in March 2024.

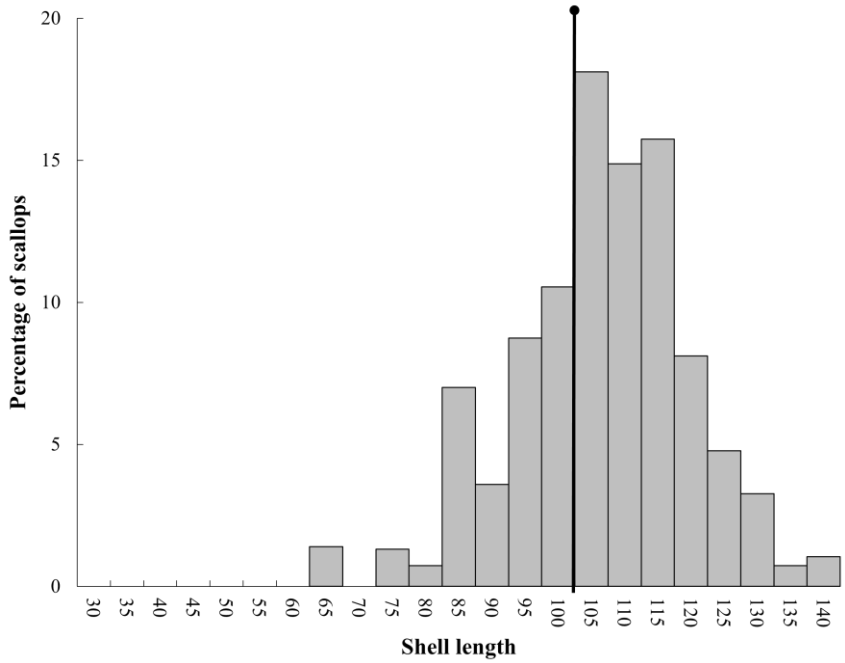

Figure 11. Standardised size distribution (mm) of Commercial scallops from the D'Entrecasteaux Channel. The vertical black line indicates the minimum legal-size limit (MSL = 100 mm).

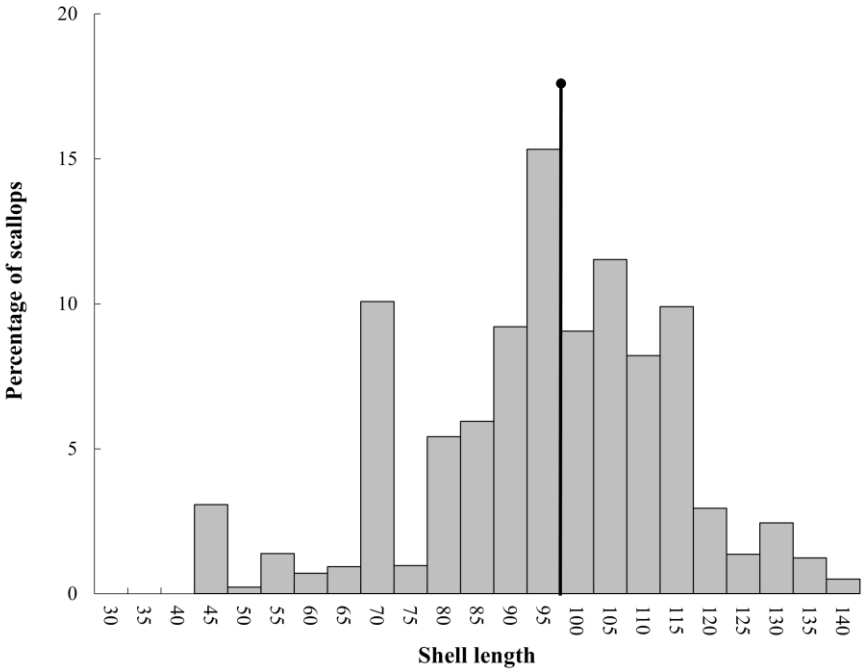

Figure 12. Standardised size distribution (mm) of Queen scallops from the D'Entrecasteaux Channel. The vertical black line indicates the minimum legal-size limit (MSL = 100 mm).

Year and region comparisons

The mean total densities of Commercial scallops, as well as the mean densities of legal-size Commercial scallops, at the "Original" sites surveyed in the middle and lower regions of the D'Entrecasteaux Channel increased between surveys conducted in 2017 and 2020 and more so between 2020 and 2022 (Fig 13a,b). However, surveys of those same sites in 2024 indicate that scallop densities have declined (Fig. 13a,b).

The mean total density of Commercial scallops at All sites and the "Original" and "Historical" sites in the middle region were significantly lower ($p < 0.05$) than those for the corresponding site groups in the southern region, noting that in all regions, scallop density was very low (Fig. 14a, Table 4). While the reverse was true for mean total commercial scallop density at "Recreational" sites in the middle and southern regions, the difference in scallop density in this case was not significant. While the mean density of legal-size commercial scallops at All sites and the "Original" and "Historical" sites in the middle region were also lower than those for the corresponding site groups in the southern region, the difference in scallop densities was only significant at All and "Historical" site groups (Fig. 14b, Table 4). Although the mean density of legal-size Commercial scallops at the "Original" sites was lower than those for the corresponding site group the Southern region of the D'Entrecasteaux Channel, the difference in scallop density was not significant. The mean density of legal-size Commercial scallops at recreational sites in both regions of the D'Entrecasteaux Channel were identical (Fig. 14b, Table 4).

While the mean total density and mean density of legal-size Commercial scallops at sites within each of the three site groups (i.e. "Original", "Historical" and "Recreational") in the middle and southern regions varied, these differences were not significant (Table 5). This comparison also indicates that those 22 sites (i.e., "Original" sites) consistently surveyed since 2017 provide a reliable representation of density of Commercial scallops in the D'Entrecasteaux Channel and can form the basis for future surveys.

Table 4. The mean total density and density of legal-size Commercial scallops (individuals m^{-2}) at All sites and the "Original", "Historical" and "Recreational" sites surveyed in the middle and southern regions of the D'Entrecasteaux Channel in 2024 and *p* values for the t-tests comparing the mean total densities of Commercial scallops and the mean densities of legal-size Commercial scallops at corresponding site groups (i.e. All sites, "Original", "Historical" and "Recreational" sites) between the middle and southern regions. Those significant values (i.e. < 0.05) are in bold text.

	Middle	**Southern**	
Total density	Mean	Mean	*p*
All	0.06	0.15	**0.01**
Original	0.07	0.24	**0.02**
Historical	0.03	0.11	**0.03**
Recreational	0.13	0.07	0.32
Legal-size density	Mean	Mean	*p*
All	0.04	0.12	**0.01**
Original	0.05	0.16	0.05
Historical	0.01	0.08	**0.03**
Recreational	0.07	0.07	0.49

Table 5. *p* values from the ANOVA used to determine whether the mean total densities of commercial scallops and the mean densities of legal-size Commercial scallops at sites within each site group (i.e. "Original", "Historical" and "Recreational") within each region (i.e. middle and southern) were significantly different.

	Total density	**Legal-size density**
Middle	0.16	0.17
Southern	0.11	0.36

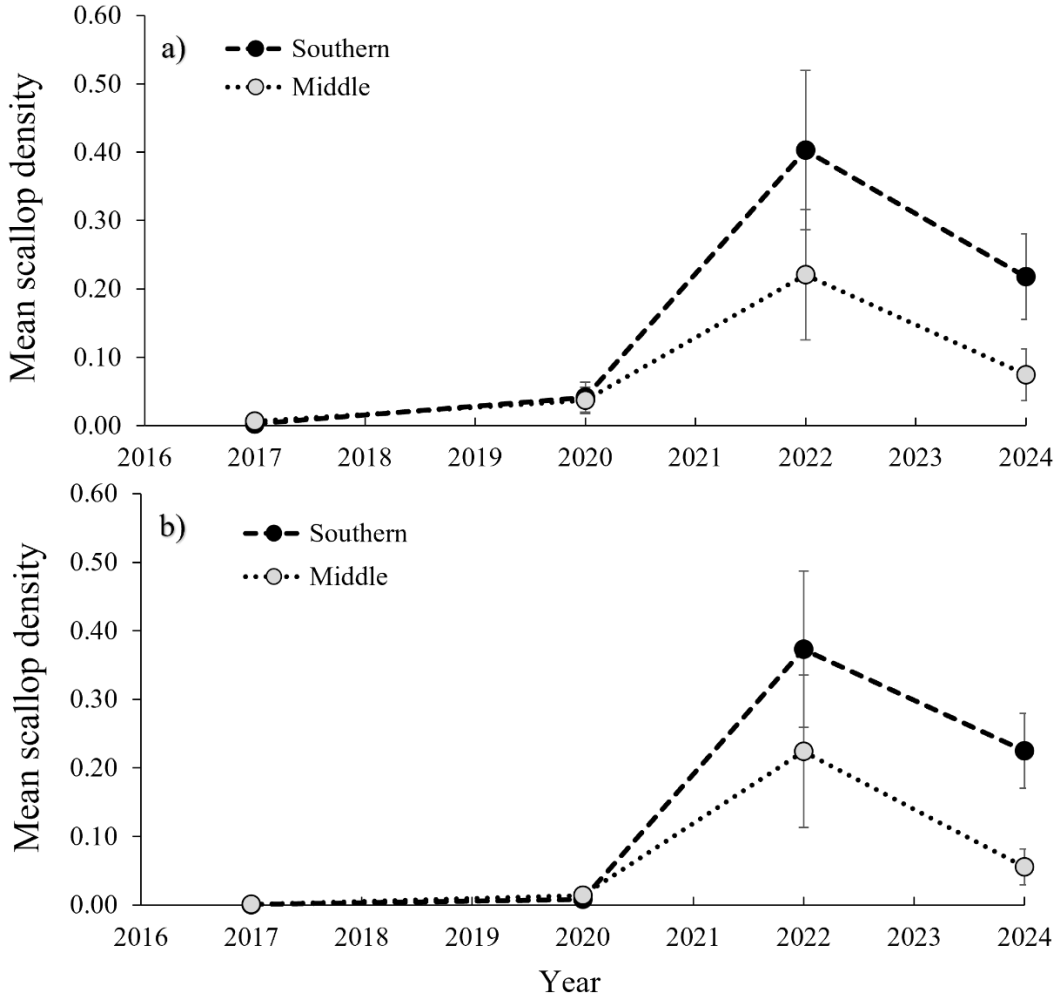

Figure 13. a) Mean total densities (individuals m^{-2}) of Commercial scallops (± 1 SE), and b) mean densities (individuals m^{-2}) of legal-size Commercial scallops (± 1 SE) at the "Original" sites in the southern and middle regions of the D'Entrecasteaux Channel between 2017 and 2024.

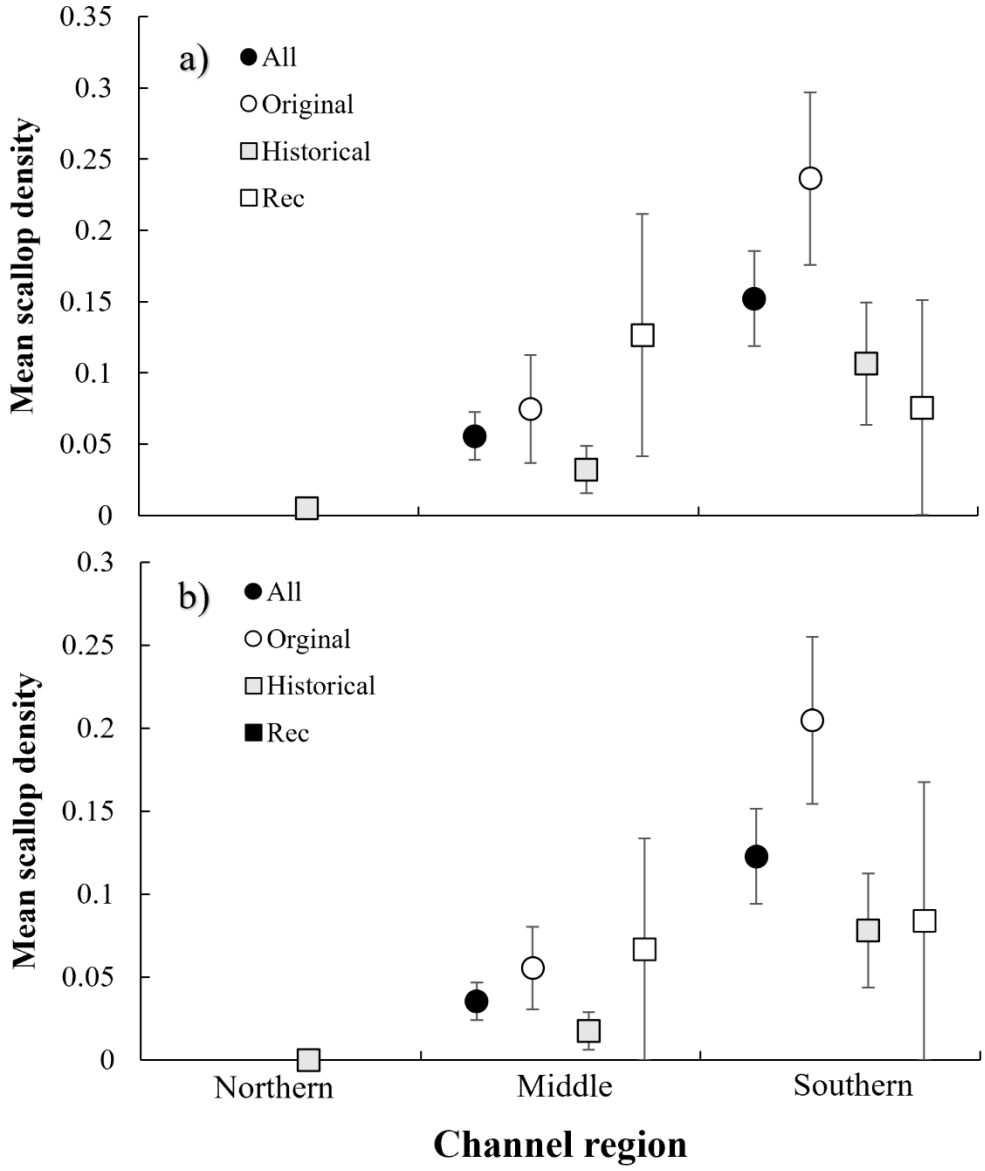

Figure 14. Comparison of the a) mean total densities (individuals m^{-2}) of Commercial scallops (± 1 SE), and b) mean densities (individuals m^{-2}) of legal-size Commercial scallops (± 1 SE) at All sites combined (black circle) and the "Original" (white circle), "Historical" (grey squares), "Recreational" sites (white squares) in the northern, middle, and southern regions of the D'Entrecasteaux Channel.

Conclusions

The 2024 surveys provide evidence that the density of scallops in the D'Entrecasteaux Channel remains at historical lows. Despite a slight increase in Commercial scallop density in 2022, their densities have since declined at the "Original" sites, some of which have been surveyed regularly since 2006. Furthermore, the dominance of legal-sized scallops (> 100 mm) suggests that recruitment continues to be limited. Commercial scallop population in the D'Entrecasteaux Channel is heavily reliant on self-recruitment. Therefore, further rebuilding of adult stocks is necessary before reopening the fishery.

While medium densities of Queen scallops persist, they appear to be restricted to small and isolated beds in the middle and southern regions of the D'Entrecasteaux Channel and are primarily undersized.

Although it was promising that densities were increasing in the D'Entrecasteaux Channel in recent surveys, historically the highest density of Queen scallops observed was 2.5 scallops m^{-2} in 2006 (Tracey and Lyle 2011), with a maximum density of 3.8 scallops m^{-2} observed in 2016 (Forbes and Lyle 2016). For Commercial scallops, high densities peaked in 2006, nearly 20 years ago, at 2 scallops m^{-2} (Tracey and Lyle 2008), and densities were as high as 5.5 scallops m^{-2} in 1955 (Olsen 1955), over five times greater than most densities observed in 2024.

In addition, these scallop beds are restricted to relatively localised areas, which makes them particularly vulnerable to fishing pressure. Therefore, to increase the likelihood of sustaining future fisheries, it is recommended to continue applying the management strategy using information about population structure to determine whether areas should be opened to fishing each year (Tracey and Lyle 2008). Dependence upon a single cohort of adult stock without evidence of additional settlement to replenish the stock, as is the current situation for Commercial scallops, would be a high-risk strategy. A management approach that continues to protect the adult stock until there is evidence of adequate recruitment is a necessary precautionary approach. This helps to insure against fishing stocks down to a point where the adult biomass no longer represents a viable spawning population, with resultant dependence on limited settlement derived from populations outside of the area (Tracey and Lyle 2008). This is particularly important in a semi-enclosed area such as the D'Entrecasteaux Channel where populations are more likely to be self-recruiting as opposed to more open coastal waters, where there is evidence that recruits can be derived from adjacent scallop beds.

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