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Results of the 2024–25 Pāua Catch Sampling project

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J.P. Cooper

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PLAIN LANGUAGE SUMMARY

This report summarises pāua shell length information collected by sampling the commercial catch from areas PAU 2, PAU 3A, PAU 3B, PAU 4, PAU 5A, PAU 5B, PAU 5D and PAU 7 during the 2024–25 fishing year.

Over the 2024–25 season the length frequency distributions from PAU 3A, PAU 4, PAU 5A, PAU 5B, PAU 5D showed that there has been a decrease in the overall length of pāua measured live on the SciElex boards while PAU 3B and PAU 7 showed an increase.

At the start of the following season, 2025–26, the Minister imposed a TACC reduction of 10% in PAU 2 and a 40% reduction in PAU 5A.

EXECUTIVE SUMMARY

Cooper, J.P. (2026). Results of the 2024–25 Pāua Catch Sampling project.

***New Zealand Fisheries Assessment Report** 2026/17.* 31 p.

The measurement of landed pāua shells from the commercial catch began in June 1990 and continued until 1994. Pāua market sampling was reinstated in PAU 5B, PAU 5D, and PAU 7 in 1997 to contribute data to the 1998–1999 length-based population model stock assessments in those areas. From the 1999–2000 fishing year the programme was expanded to include sampling from all major Quota Management Areas (QMAs) where commercial landings of pāua were made.

This report summarises the shell length information collected from areas PAU 2, PAU 3A, PAU 3B, PAU 4, PAU 5A, PAU 5B, PAU 5D and PAU 7 during the 2024–25 fishing year.

Over the 2024–25 season the length frequency distributions from PAU 3A, PAU 4, PAU 5A, PAU 5B, PAU 5D showed that there has been a decrease in the overall length of pāua measured live on the SciElex boards while PAU 3B and PAU 7 showed an increase.

1. INTRODUCTION

A stock monitoring programme to sample the landed commercial fish catch in New Zealand was established by MAF Fisheries in 1989. The programme primarily involved the collection of data on hoki and orange roughy, but in June 1990 it was expanded to include a number of other species, including pāua (Fisher & Banks 1991). Market sampling of pāua was done on a monthly basis in PAU 5A, PAU 5B, PAU 5D and PAU 7. This programme was suspended in July 1994 (Fisher & Banks 1995).

In December 1997, market sampling of landed pāua shell was re-established in PAU 5A, PAU 5B, PAU 5D and PAU 7 to contribute data to the 1998–1999 length-based stock assessment model (Andrew et al. 2000). From the 1999–2000 fishing year onwards, the programme was expanded to include sampling from all commercially important QMAs (i.e. PAU 2, PAU 3, PAU 4, PAU 5A, PAU 5B, PAU 5D and PAU 7) - Andrew et al. (2001), Naylor & Notman (2003), Notman (2004, 2005, 2006, 2007), Cooper (2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023), Cooper & McCowan (2025a, 2025b).

2. METHOD

To ensure the greatest geographic and temporal spread, catches are sampled across the season within each QMA. Because pāua fishing activity is largely dictated by weather conditions and market demand, sampling at regular intervals during the season is not possible.

A combination of measuring pāua using the "red sack" system (measuring shells from shucked pāua on land post processing) and the "SciElex" measuring boards (measuring live pāua at sea) has been used.

2.1 The red sack system using the Zebratech measuring boards to measure the shell post shucking

A target of about 150 shells from 40 diver days (from each QMA) was set as this was expected to provide a CV in the order of 20%. The "red sack - catch sampling kit" that has been used since the 2006–07 season was again used for this project. These kits are self-contained and include all the paraphernalia needed. During a dive event the harvester randomly chooses a bin which normally contains 60 to 100 pāua (this depends on size of the pāua i.e., a typical 30 kilo bin will hold one hundred 125 mm pāua but only sixty 150 mm pāua). They tag their randomly chosen bin and fill in the data sheet which records the required information. When the Licensed Fish Receiver (LFR) receives this tagged bin, they separately shuck it and put the shells into the distinctive red sack which is included with each catch sampling kit. These shells are then measured by one of our independently contracted field technicians either at premises of the LFR, shell buyer or shell owners' property.

The pāua are measured using one of five Zebratech (Nelson, NZ) units which measure overall length plus the technician determines any tele-conch measurement (i.e. the hump) using a calibrated gauge and enters this into the unit. The overall length and where applicable the tele-conch measurement is stored by the unit. When the Zebratech data files are downloaded the tele-conch measurement is subtracted from the overall length to give the basal length.

2.2 In-boat system using the SciElex measuring boards to measure pāua

During the 2019–20 season the industry started to utilise SciElex (Tasmania) measuring boards which are used on deck to measure live pāua as they are unloaded from the diver's catch bag. The SciElex instruments utilise a spring-loaded bookend system that the pāua are swiped through. This allows pāua to be measured at a very fast rate however only the overall length can be measured (there is no time or ability to enter the hump measurement so therefore no tele-conch measurement can be recorded).

The Zebratech and SciElex units are calibrated periodically and are accurate to within 1 mm. The use of both units and methods has been approved by the Shellfish Working Group and meet Fisheries New Zealand Science and Research Information standards.

2.3 Sampling Effort

2.3 1 The red sack system using the Zebratech measuring boards to measure basal length of the shell post shucking

1. Catch sampling kits are delivered to each regional organisation, called PauaMACs, at the beginning of the season. The PauaMACs then distribute these haphazardly to harvest crews operating within their QMAs.
2. Harvest crews haphazardly select what days and which dive events they will use a catch sampling kit.
3. On the dive events where a catch sampling kit is employed the crew haphazardly select which bin or bins they tag. At the LFR these tagged bins are shucked separately and the shells are placed into a red sack. At a later time one of our technicians then measure these shells (overall and tele-conch), the data is logged and the file downloaded and entered into the MPI *Market* database (which is managed by NIWA).

2.3 2 The in-boat system using the SciElex measuring boards to measure overall length of live pāua

1. The SciElex boards are mounted in the harvesting vessel.
2. The diver's catch bag is brought onto the boat, the pāua are tipped out on to a sorting table, the pāua are separated and individually swiped through the unit to measure and record the overall length.
3. The unit produces a loud beep if any pāua are shorter than the pre-entered minimum harvest size/length (MHS) required. Those shorter than the MHS are a very small minority as the pāua are measured by the diver as the pāua are removed from the reef. Any undersized pāua are returned to the reef.
4. As each pāua is measured the length, GPS location, time and date are recorded which increases the spatial resolution of the catch to the scale of the reef or pāua bed. This provides data on the numbers and length distribution of animals taken from different habitats within a Pāua Statistical Area.
5. When the boat returns to land the data are automatically uploaded to an intermediate catch sampling platform managed by Dragonfly Science who then upload data to the *Market* database once all data has been collected and processed.

The red sack (Zebratech unit) measurements are referenced at the scale of Pāua Statistical Areas (which can be tens of kilometres of coastline) whereas with the utilisation of the in-boat SciElex unit pāua are measured (with the latitude/longitude recorded) within a few hundred metres of where the pāua were caught.

The length data is standardised for use in stock assessment modelling using a multivariate poisson Generalised Linear Mixed Model with effects for area, year, fisher, region etc, with statistical-area specific effects for the measurement method (either overall or basal length). The fisher and statistical area effects in the model help to adjust for any differences in selectivity between the fish selected for the live trade (measured using SciElex) and those that are shelled (measured using the Red Sacks system) (Philipp Neubauer Pers. Comm.).

The area-specific measurement method effect is effectively a time-invariant conversion factor that is estimated within the model to convert from overall to basal lengths. The model is then used to predict the length compositions for all catch as if it had been observed as a basal length.

Overall measures are only different from basal if there is a hump (overhang) on the shell which mostly

happens in stunted areas and in PAU 4; with particular statistical areas having higher proportions of "humped" fish. The minor impact of humped fish in most areas means that having the much larger number of samples with better coverage from the SciElex boards outweighs the benefit of having the direct basal measure (rather than the model-scaled measure). (Philipp Neubauer Pers. Comm.).

3. RESULTS

The history of pāua catch sampling is shown in Table 1 and Table 2. Table 3 shows the separation of pāua measured by the red sack method and the SciElex boards during the 2024–25 fishing season.

Because of the use of the SciElex boards the number of pāua measured over the last few seasons has been steadily increasing (Table 1). This has resulted in the number of measurements increasing from an average of 80 000 pāua measurements to just over 245 500 measurements in the 2024–25 season. The Pāua Industry Council is now measuring approximately ten times the number of pāua /shells compared to the first year of the contract (2006–07).

Prior to 2006 the Pāua Catch Sampling project was operated by NIWA, and only basal shell lengths were measured. Post-2006 when the project has been operated by the Pāua Industry Council, both basal and overall lengths have been measured. With the advent of the SciElex units (which can only measure the overall length) a new graph series has been developed, showing the overall lengths measured using the SciElex board data. Moving forward and as the time series increases this overall length graph will begin to replace the previous basal length graphs.

Table 1: Summary of pāua data recorded over the history of the catch sampling project. The Samples column shows the number of individual sampling events that were conducted each fishing year. A sampling event relates to the Pāua Statistical Area pāua were taken from so if, during a daily fishing event, the harvest crew changes the Statistical Area they are harvesting in then that sampling event is closed off and a new one is started.

Fishing Year	Samples	Basal length ("red sack")	Overall length only (SciElex)	Shells	QMAs sampled
1989–90	8	4 726		4 726	PAU 7
1990–91	31	12 678		12 678	PAU 7
1991–92	111	39 278		39 278	PAU 5A,5B,5D,7
1992–93	106	35 748		35 748	PAU 5A,5B,5D,7
1993–94	90	29 364		29 364	PAU 5A,5B,5D,7
1997–98	39	4 913		4 913	PAU 5A,5B,5D,7
1998–99	86	10 430		10 430	PAU 2,4,5A,5B,5D,7
1999–00	261	31 911		31 911	PAU 2,3,4,5A,5B,5D,7
2000–01	274	38 400		38 400	PAU 2,3,4,5A,5B,5D,7
2001–02	268	38 285		38 285	PAU 2,3,4,5A,5B,5D,7
2002–03	303	42 251		42 251	PAU 2,3,4,5A,5B,5D,7
2003–04	295	33 995		33 995	PAU 2,3,4,5A,5B,5D,7
2004–05	251	27 543		27 543	PAU 2,3,4,5A,5B,5D,7
2005–06	224	24 051		24 051	PAU 2,3,4,5A,5B,5D,7
2006–07	185	26 235		26 235	PAU 2,3,4,5A,5B,5D,7
2007–08	258	31 572		31 572	PAU 2,3,4,5A,5B,5D,6,7

Fishing Year	Samples	Basal length ("red sack")	Overall length only (SciElex)	Shells	QMAs sampled
2008–09	314	31 064		31 064	PAU 2,3,4,5A,5B,5D,7
2009–10	604	58 754		58 754	PAU 2,3,4,5A,5B,5D,6,7
2010–11	675	63 248		63 248	PAU 2,3,4,5A,5B,5D,6,7
2011–12	843	78 264		78 264	PAU 2,3,4,5A,5B,5D,6,7
2012–13	921	84 814		84 814	PAU 2,3,4,5A,5B,5D,6,7
2013–14	874	81 935		81 935	PAU 2,3,4,5A,5B,5D,6,7
2014–15	904	82 743		82 743	PAU 2,3,4,5A,5B,5D,6,7
2015–16	969	82 319		82 319	PAU 2,3,4,5A,5B,5D,6,7
2016–17	942	81 226		81 226	PAU 2,3,4,5A,5B,5D,7
2017–18	822	68 564		68 564	PAU 2,3,4,5A,5B,5D,6,7
2018–19	678	55 966		55 966	PAU 2,3,4,5A,5B,5D,7
2019–20	765	49 154	44 756	93 910	PAU 2,3,4,5A,5B,5D,6,7
2020–21	720	43 273	110 515	153 788	PAU 2,3,4,5A,5B,5D,6,7
2021–22	634	31 938	183 725	215 663	PAU 2,3A,3B,4,5A,5B,5D,7
2022–23	764	28 100	277 339	305 439	PAU 2,3A,3B,4,5A,5B,5D,7
2023–24	614	28 289	190 195	218 484	PAU 2,3A,3B,4,5A,5B,5D,7
2024–25	567	19 333	226 185	245 518	PAU 2,3A,3B,4,5A,5B,5D,6,7

Table 2: Summary of data recorded per fishing year since 2006-07. The Shells rows show the number of measurements (either overall or basal length or both from each shell) that were taken from each QMA during the season. The measurements taken could be from either the shell (measured post shucking) or by measuring the shell when the animal was still alive. The Samples rows show the number of individual sampling events that were conducted from each QMA during the season. A sampling event relates to the Pāua Statistical Area they were taken from so if, during a daily fishing event, the harvest crew changes the Statistical Area they are harvesting in then that sampling event is closed off and a new one is started. [continue over next page].

Fishing year		PAU 2	PAU 3	PAU 3A	PAU 3B	PAU 4	PAU 5A	PAU 5B	PAU 5D	PAU 6	PAU 7	Total
2006–07	Shells	4 721	2 164			4 891	3 490	3 443	2 060	0	5 466	26 235
2006–07	Samples	36	17			33	20	26	18	0	35	185
2007–08	Shells	2 723	5 429			5 709	2 548	4 278	1 378	152	9 355	31 572
2007–08	Samples	25	47			42	22	38	12	1	71	258
2008–09	Shells	2 908	6 368			5 999	1 653	5 016	3 270	0	5 850	31 064
2008–09	Samples	27	65			60	25	49	34	0	54	314
2009–10	Shells	11 800	8 021			11 067	5 166	7 097	3 618	184	11 801	58 754
2009–10	Samples	118	78			119	64	73	40	2	110	604
2010–11	Shells	12 561	8 469			13 365	2 353	5 829	1 707	101	18 863	63 248
2010–11	Samples	124	91			150	32	79	24	1	174	675
2011–12	Shells	14 000	8 636			20 287	2 396	5 472	2 549	97	24 827	78 264
2011–12	Samples	140	97			240	31	65	32	1	237	843
2012–13	Shells	18 160	8 144			19 290	3 696	7 331	4 128	290	23 856	84 814
2012–13	Samples	181	82			241	52	88	56	2	219	921
2013–14	Shells	13 913	6 032			21 188	5 159	8 974	5 254	134	21 281	81 935
2013–14	Samples	139	56			260	61	106	61	1	190	874
2014–15	Shells	17 243	10 196			17 454	3 851	7 094	3 898	105	22 902	82 743
2014–15	Samples	173	96			215	51	94	54	1	213	904
2015–16	Shells	20 920	7 996			16 607	3 855	6 848	1 700	76	24 317	82 319
2015–16	Samples	210	76			225	65	116	28	1	247	969

Table 2: Continued.

Fishing year		PAU 2	PAU 3	PAU 3A	PAU 3B	PAU 4	PAU 5A	PAU 5B	PAU 5D	PAU 6	PAU 7	Total
2016–17	Shells	22 786	4 475			18 751	5 203	7 709	3 994	0	18 308	81 226
2016–17	Samples	228	43			264	66	102	54	0	185	942
2017–18	Shells	18 362	2 347			13 507	5 105	3 029	1 835	165	24 214	68 564
2017–18	Samples	190	30			212	71	46	25	2	246	822
2018–19	Shells	21 000	5 997			10 748	756	1 510	67	0	15 888	55 966
2018–19	Samples	223	80			167	12	25	1	0	170	678
2019–20	Shells	22 348	10 673			10 687	2 752	1 119	2 256	99	43 976	93 910
2019–20	Samples	168	110			183	47	18	34	1	204	765
2020–21	Shells	46 618	19 950			14 547	6 110	5 492	3 539	2 175	55 357	153 788
2020–21	Samples	183	95			126	41	33	61	2	179	720
2021–22	Shells	29 771		11 434	41 590	34 137	1 235	5 000	4 796	73	89 700	215 663
2021–22	Samples	140		20	84	115	23	5	43	1	203	634
2022–23	Shells	38 115		7 337	36 862	73 786	9 115	17 742	13 871	0	108 611	305 439
2022–23	Samples	121		14	62	207	62	23	49	0	226	764
2023–24	Shells	37 951		7 727	20 266	35 388	12 481	8 881	5 779	887	89 124	218 484
2023–24	Samples	142		11	27	147	63	12	61	2	149	614
2024–25	Shells	33 481		21 873	39 417	25 513	20 473	15 646	10 962	2064	76 089	245 518
2024–25	Samples	125		29	47	108	52	39	35	2	130	567

Table 3: Summary of data recorded in 2024–25. The rows show the number of measurements that were taken from each QMA during the season. The shells from the red sacks had the overall and basal lengths recorded while those pāua measured live on the SciElex boards only had their Overall length recorded.

	Red Sacks (empty pāua shells)		SciElex units (live pāua)		Total	
	Measurements	Samples	Measurements	Samples	Measurements	Samples
PAU 2	11 209	98	22 272	27	33 481	125
PAU 3A	0	0	21 873	29	21 873	29
PAU 3B	0	0	39 417	47	39 417	47
PAU 4	4 543	74	20 970	34	25 513	108
PAU 5A	553	4	19 920	48	20 473	52
PAU 5B	112	2	15 534	37	15 646	39
PAU 5D	1 292	17	9 670	18	10 962	35
PAU 6	0	0	2 064	2	2 064	2
PAU 7	1 624	16	74 465	114	76 089	130
TOTAL	19 333	211	226 185	356	245 518	567

3.1 PAU 2

In 2024–25 a total of 33 481 pāua were measured in PAU 2 (Table 2 and Table 3) from 125 samples. Figure 1 shows that these were mainly from Pāua Statistical Area 216 (hereafter denoted as ‘P’ e.g., P216) and southwards with P236 yielding twice the tonnage of any other Statistical Area. Figure 2 shows the cumulative frequency distributions of the basal length, which suggests that in 2024–25 the pāua were smaller than in the previous three seasons. Figure 3 shows the cumulative frequency distributions of overall length from pāua measured live on the SciElex boards. This graph reflects a similar trend to Figure 2 in that in 2024–25 the pāua in PAU 2 were smaller than during the previous three seasons. Figure 4 shows that in PAU 2 the lengths of shells (basal lengths and overall lengths) and the overall lengths of live pāua were very similar.

The reduction in shell length was one of the factors that led to the Minister reducing the PAU 2 TACC by 10% at the start of the 2025–26 season (Oct 2025).

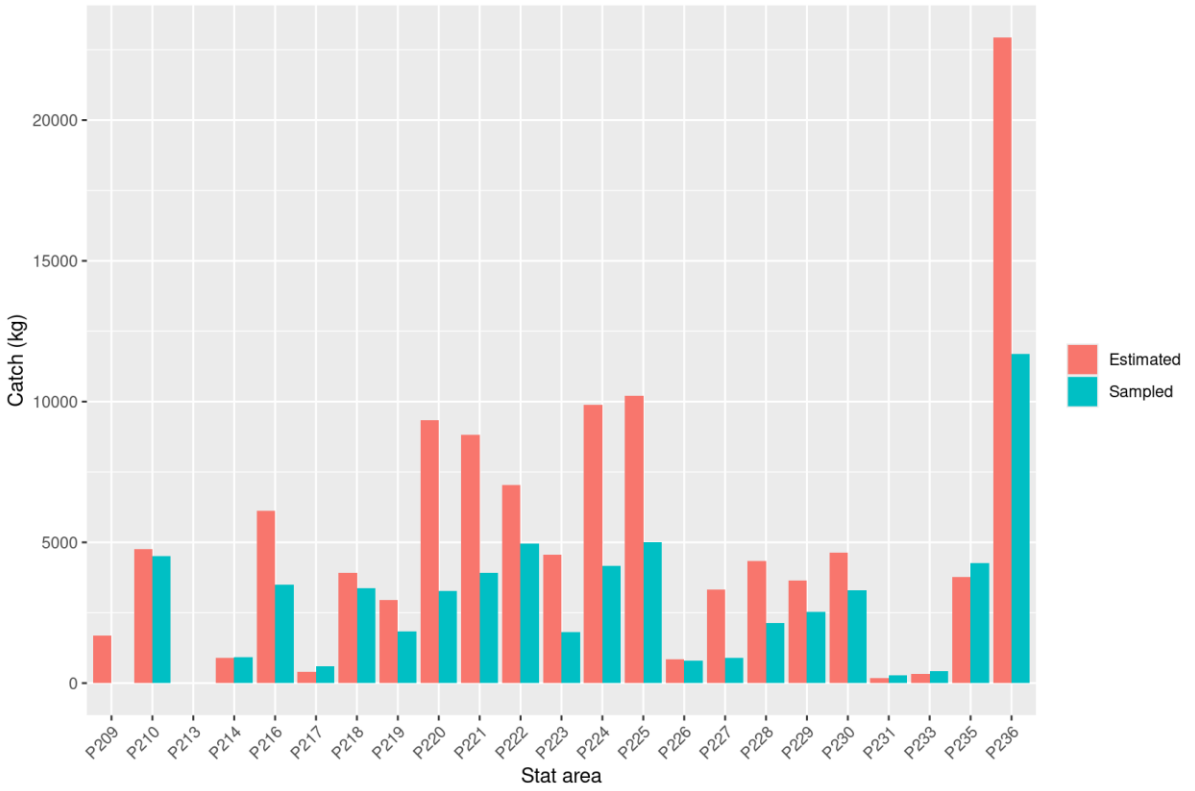

Figure 1: **Total estimated catch and sampled catch in PAU 2 in 2024–25. The estimated catch is the estimated catch reported on the ERS. The Sampled catch is the total of the estimated catch from any harvesting event from which a sample was taken.**

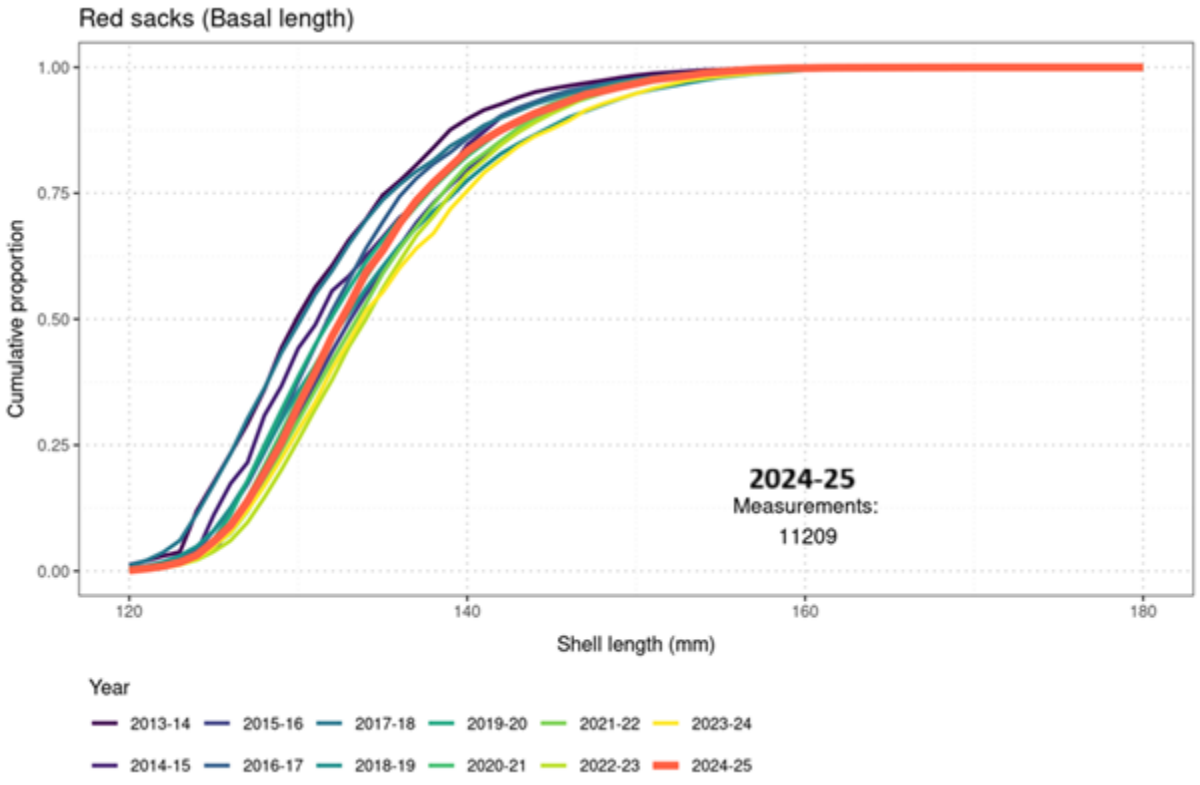

Figure 2: **Cumulative frequency distributions of length (basal length only) from the red sacks for PAU 2 between 2013–14 and 2024–25.**

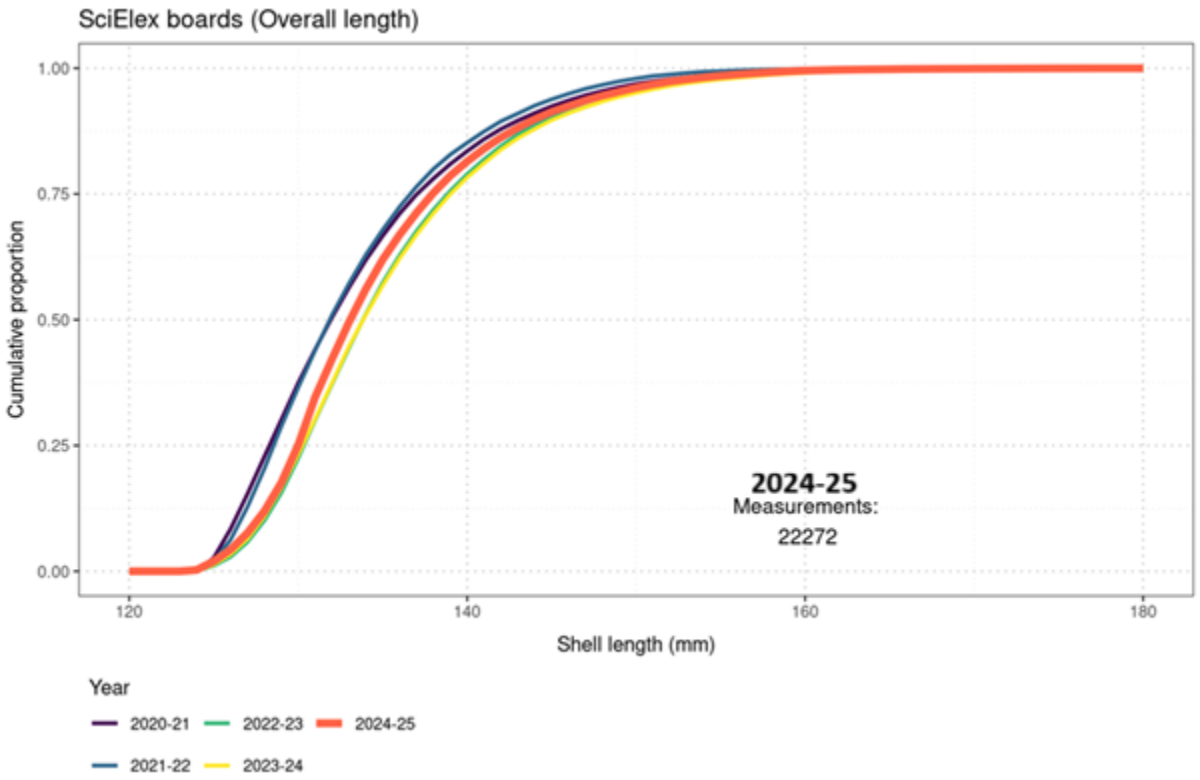

Figure 3: Cumulative frequency distributions of length (overall lengths of live pāua only) from the SciElex boards for PAU 2 between 2020–21 and 2024–25.

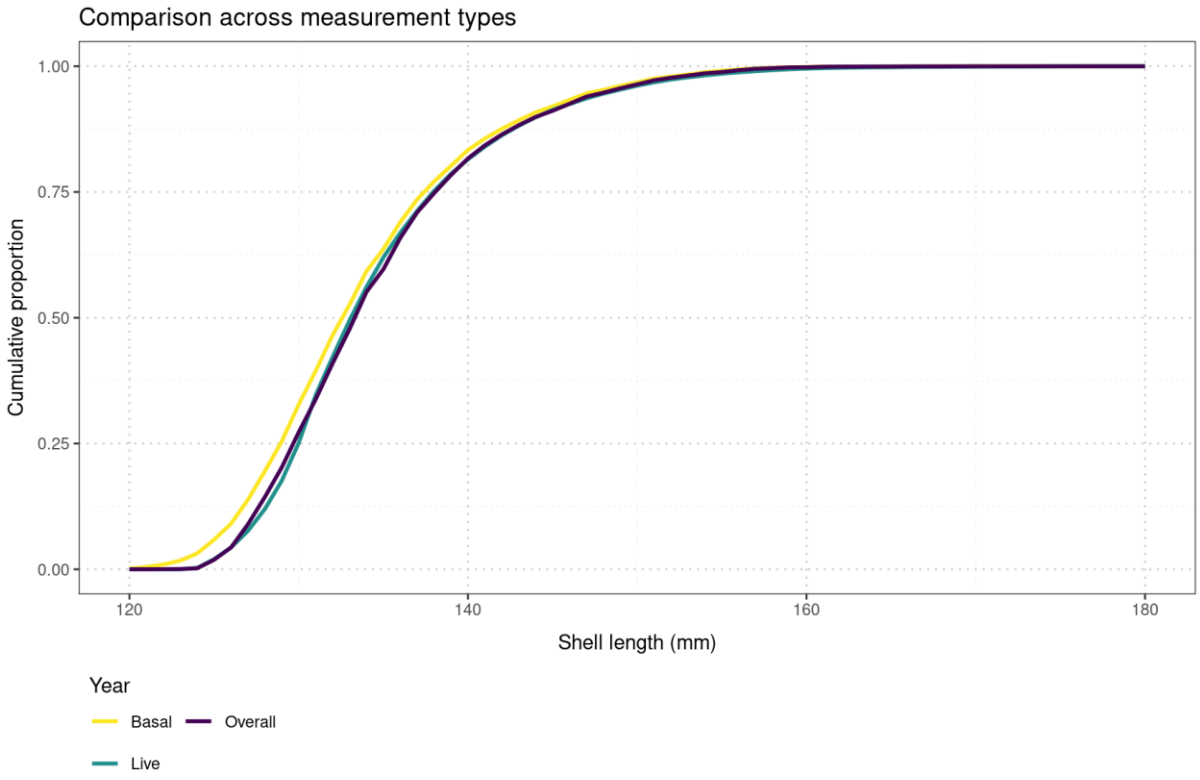

Figure 4: Cumulative length frequency distributions of PAU 2 in 2024–25. The yellow (basal) and black (overall) lines come from empty shells measured from the red sacks. The green line (live) is the overall shell length measured using a SciElex unit while the pāua were still alive.

3.2 PAU 3A

The PAU 3 Quota Management Area (QMA) was subdivided into PAU 3A and PAU 3B after the Kaikōura earthquake. The 2022–23 fishing year is the first year that data is presented separately for PAU 3A and PAU 3B, however data from 2017–18 to 2022–23 for PAU 3 only came from the PAU 3B part of the fishery, due to the emergency fishery closure of what is now PAU 3A.

In 2024–25 a total of 21 873 pāua from 29 sample events were measured in PAU 3A (Table 3). Figure 5 shows the estimated catch from each Statistical Area and the amount of this catch that was sampled. Figure 6 shows the cumulative length distribution (overall length) for the PAU 3A area for the period from 2020–21 through to 2024–25. The fishery in PAU 3A comprises mainly large pāua which are destined for the live trade however the pāua were smaller in 2024–25 compared to the previous three seasons.

No samples were measured as empty shell through the red sack system in the 2024–25 season.

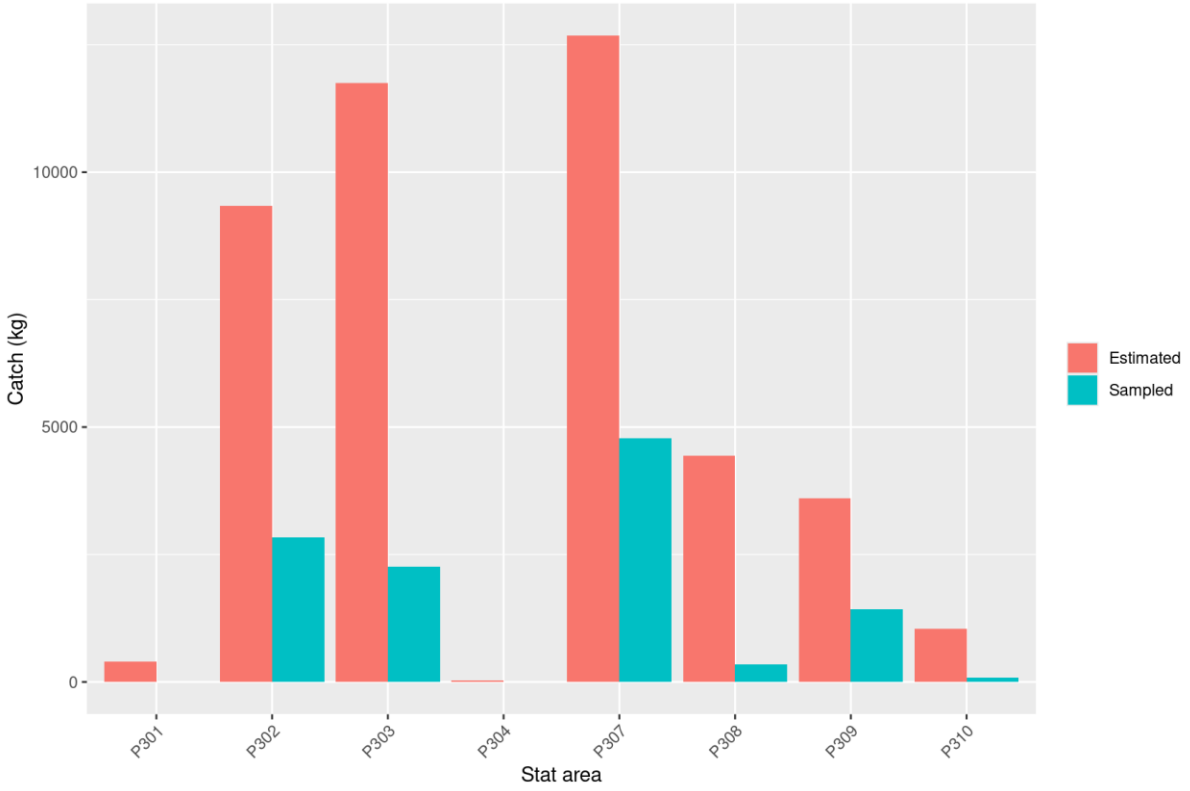

Figure 5: Total estimated catch and sampled catch in PAU 3A area 2024–25. The estimated catch is the estimated catch reported on the ERS. The Sampled catch is the total of the estimated catch from any harvesting event from which a sample was taken.

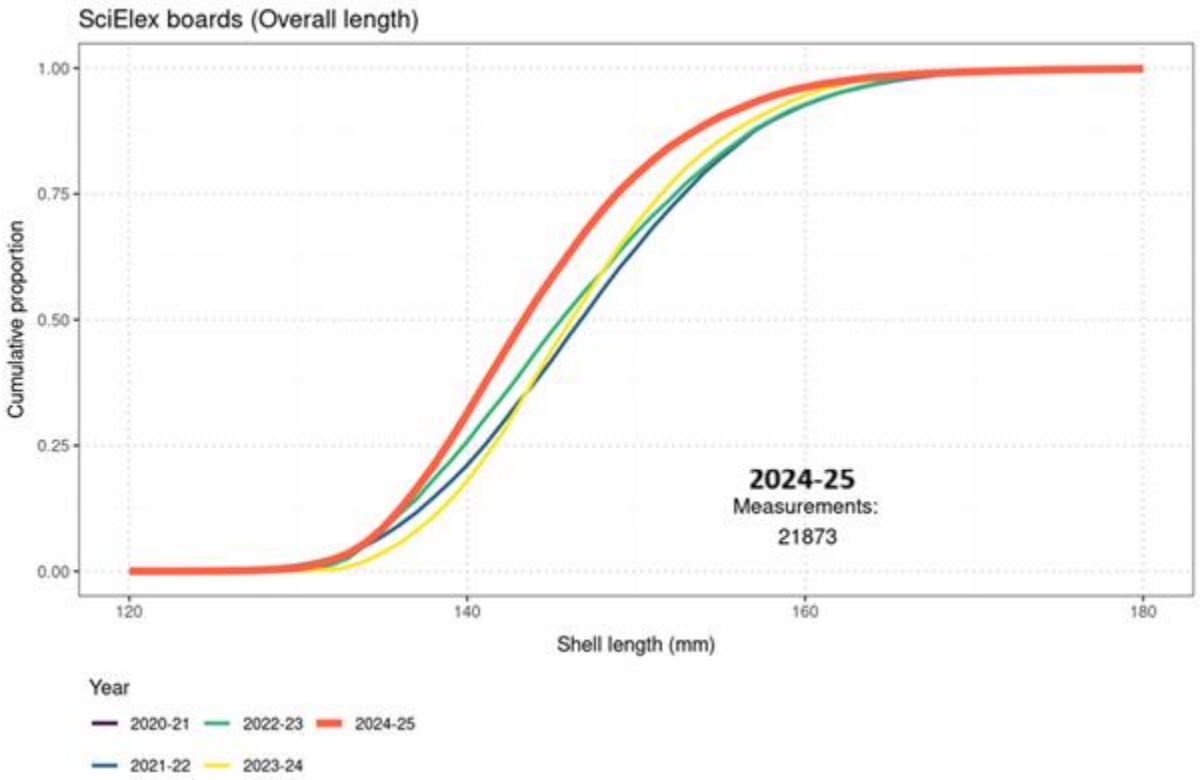

Figure 6: Cumulative frequencies of length (overall length only) from the SciElex boards for PAU 3A between 2020–21 and 2024–25. There are no red sacks measurements in 2024–25

3.3 PAU 3B

After the Kaikōura earthquake, the PAU 3 Quota Management Area (QMA) was subdivided into PAU 3A and PAU 3B. In 2024–25 a total of 39 417 pāua from 47 sampling events were measured in PAU 3A (Table 2 and Table 3). Figure 7 shows the estimated catch from each Statistical Area and the amount of this catch that was sampled. There were no red sacks measurements in 2024–25. Figure 8 shows the overall lengths of live pāua measured on the SciElex boards in the PAU 3B area from 2020–21 through to 2024–25 which shows that in 2024–25 the pāua were larger than the previous four seasons.

The pāua in PAU 3B are typically smaller than those from PAU 3A, especially when a large proportion of the catch is taken from around Banks Peninsula (P323 to P336) where pāua grow more slowly.

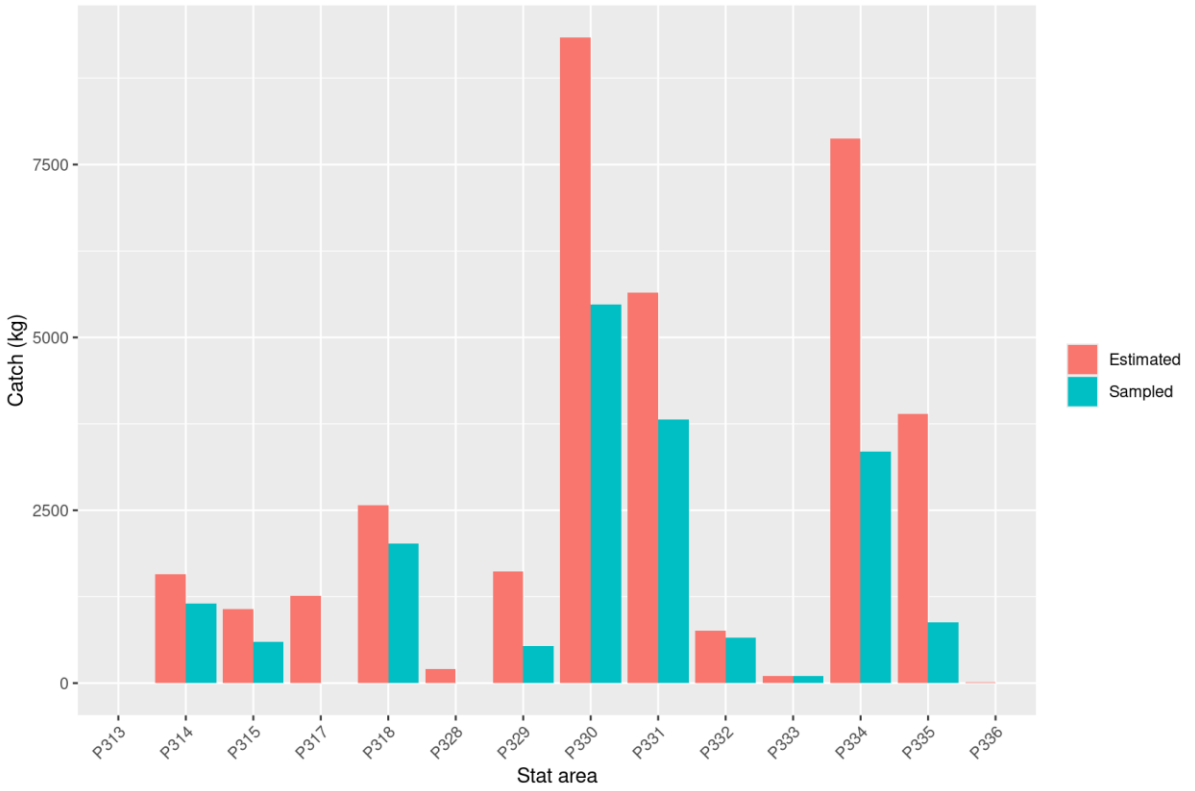

Figure 7: **Total estimated catch and sampled catch in PAU 3B area 2024–25. The estimated catch is the estimated catch reported on the ERS. The Sampled catch is the total of the estimated catch from any harvesting event from which a sample was taken.**

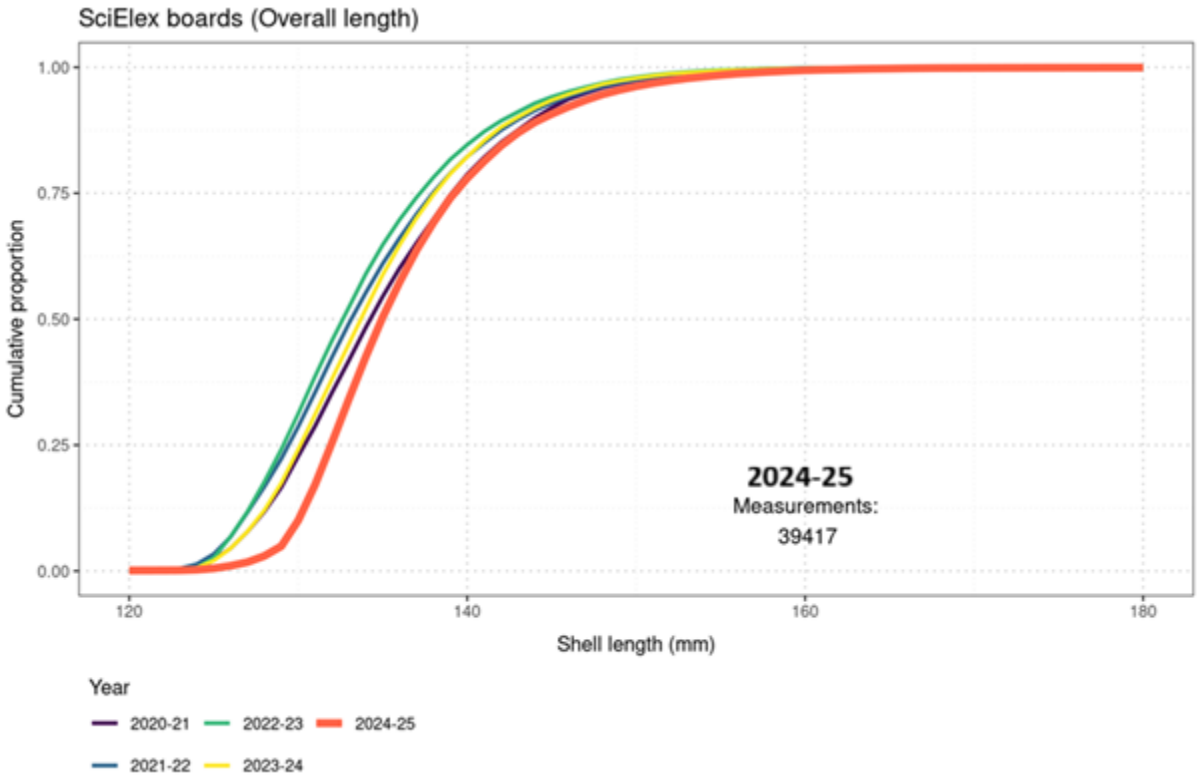

Figure 8: **Cumulative frequencies of length (overall length of live pāua only) from the SciElex boards for PAU 3B between 2020–21 and 2024–25. There are no red sacks measurements for PAU 3B in 2024–25.**

3.4 PAU 4

In 2024–25 a total of 25 513 pāua were measured in PAU 4 (Table 2 and Table 3) from 108 samples. Figure 9 shows which Pāua Statistical Areas the catch and samples were taken from. Figure 10 shows the cumulative frequencies of the basal length from the red sacks for PAU 4 between 2013–14 and 2023–24. The hump was not measured in 2024–25 therefore no basal length was recorded. The reason for this is that in PAU 4, due to the poor quality of fishing data collected prior to the implementation of the Electronic Reporting System (ERS), it was decided to utilise only ERS data (i.e., data from the past five years) for stock assessment modelling. Consequently, the traditional basal length measurement has been discontinued, with only overall length data to be recorded and used in the future. As a result, during the 2024–25 season, only overall length measurements were taken using both the red sacks (Zebratech boards) and SciElex boards.

Figure 11 shows the cumulative frequencies of the overall length from live pāua measured on the SciElex boards for PAU 4 between 2020–21 and 2024–25 which suggests that in 2024–25 the pāua were smaller than in the previous three seasons.

Figure 12 shows a comparison of measurement types with the overall lengths of pāua measured using the red sack system being larger than the overall lengths of the pāua measured live on the SciElex boards.

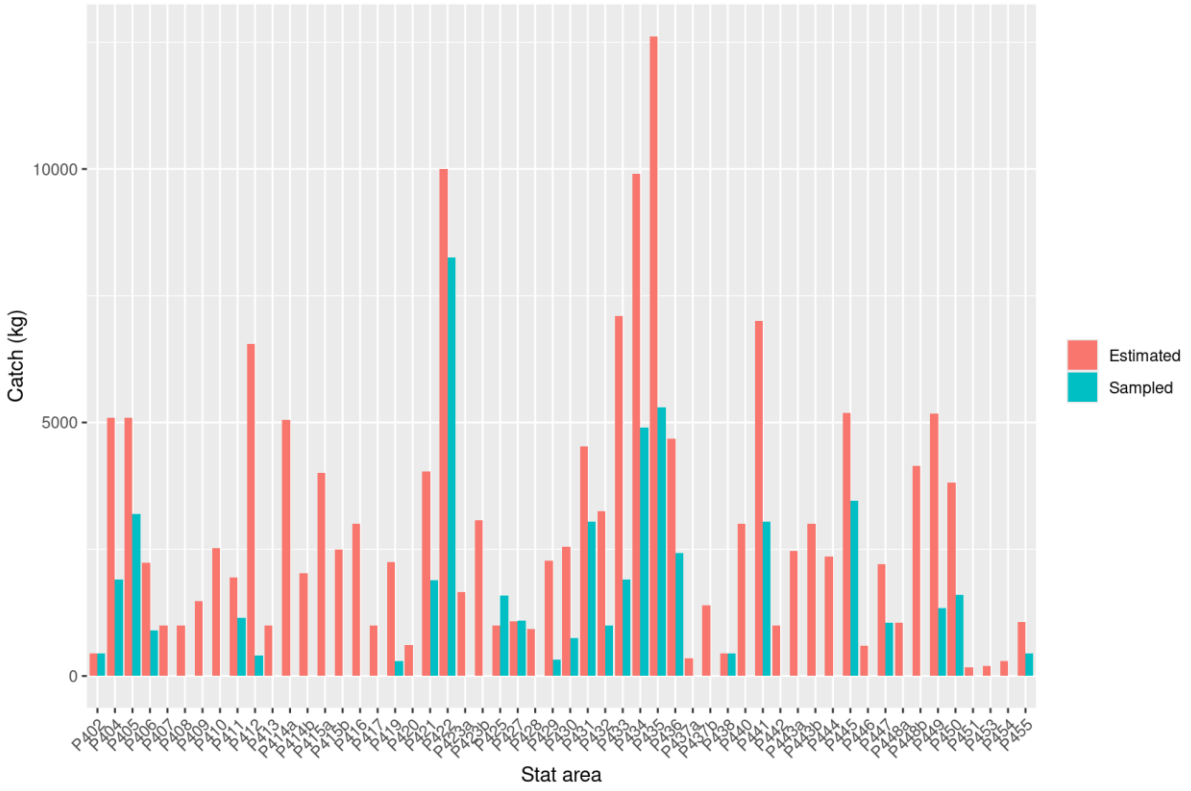

Figure 9: Total estimated catch and sampled catch in PAU 4 in 2024–25. The estimated catch is the estimated catch reported on the ERS. The Sampled catch is the total of the estimated catch from any harvesting event from which a sample was taken.

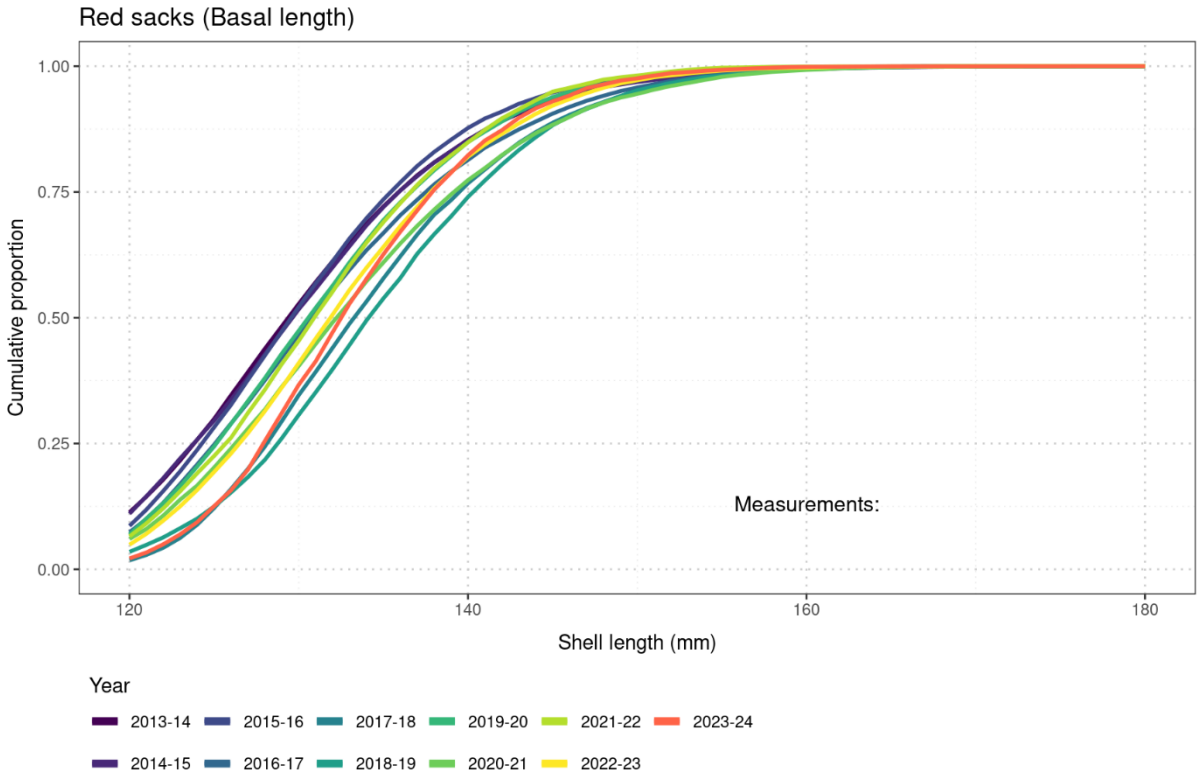

Figure 10: Cumulative frequencies of length from the red sacks for PAU 4. The seasons between 2013–14 and 2023–24 – there were no basal lengths measurements recorded in 2024–25.

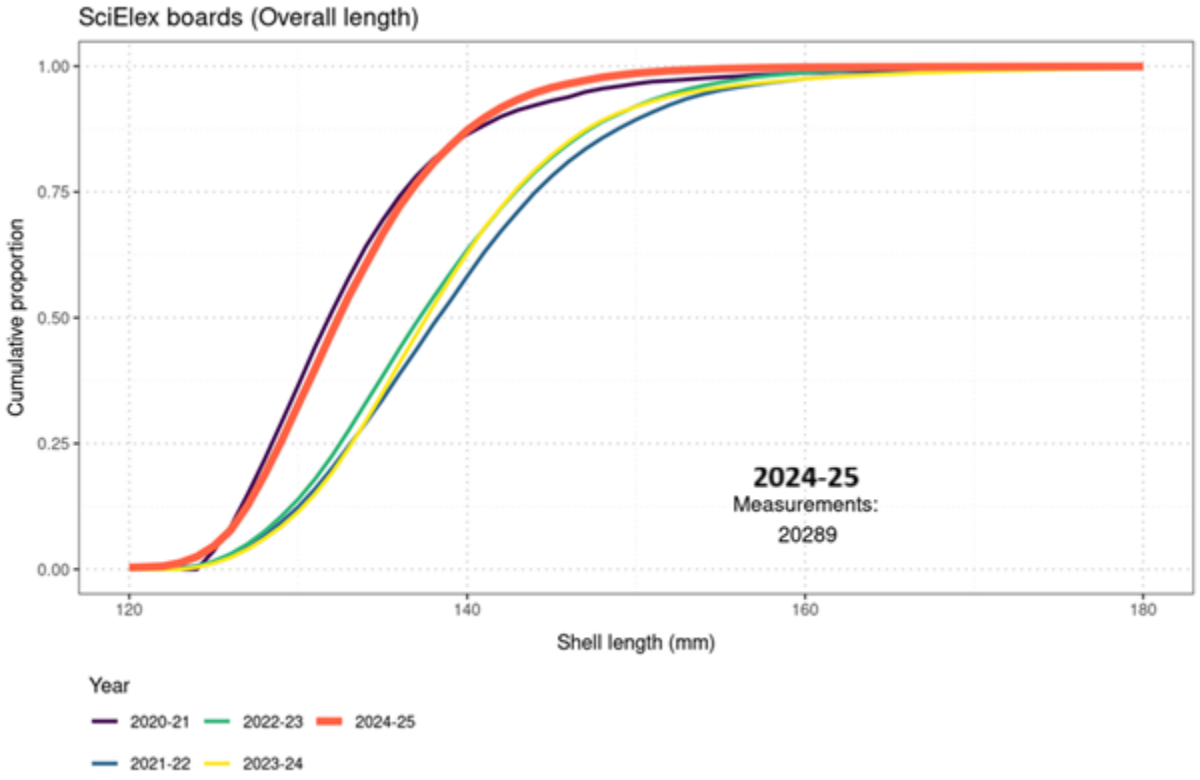

Figure 11: Cumulative frequencies of length (overall length of live pāua only) from the SciElex boards for PAU 4 between 2020–21 and 2024–25.

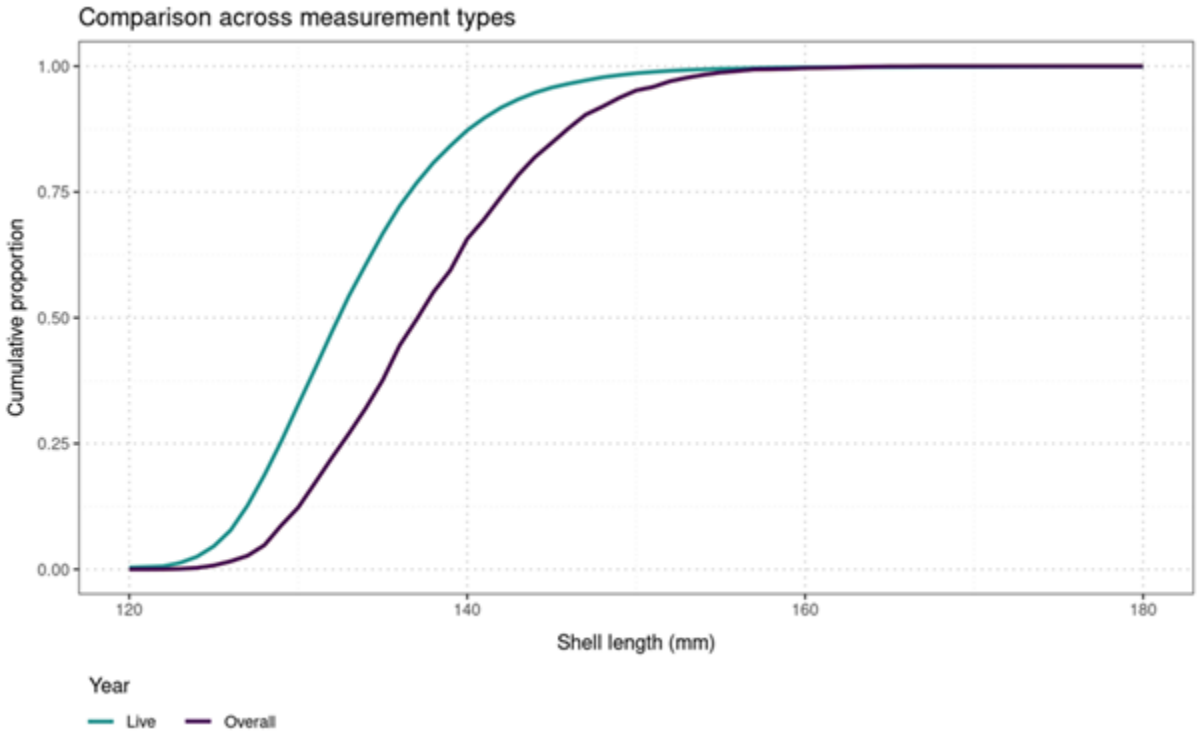

Figure 12: Cumulative frequencies of length of PAU 4 in 2024–25. The purple line is the overall shell length from empty shells measured from the red sacks (there were no measurements of the basal lengths in 2024–25). The green line (live) is the overall shell length measured using a SciElex unit while the pāua were still alive.

3.5 PAU 5A

In 2024–25 a total of 20 473 pāua were measured in PAU 5A (Table 2 and Table 3) from 52 samples. Figure 13 shows that the catch and samples were mainly taken in the south of the area. Figure 14 shows the cumulative frequency distributions of the basal lengths from the red sacks for PAU 5A between 2013–14 and 2024–25.

Figure 15 illustrates that the overall length of live pāua is comparable to the previous season; however, the two most recent seasons were noticeably smaller than the previous three seasons.

Figure 16 shows the similarity in overall lengths between the red sack and SciElex measurements.

The reduction in shell length was one of the factors that led to the Minister reducing the PAU 5A TACC by 40% at the start of the 2025–26 season (Oct 2025).

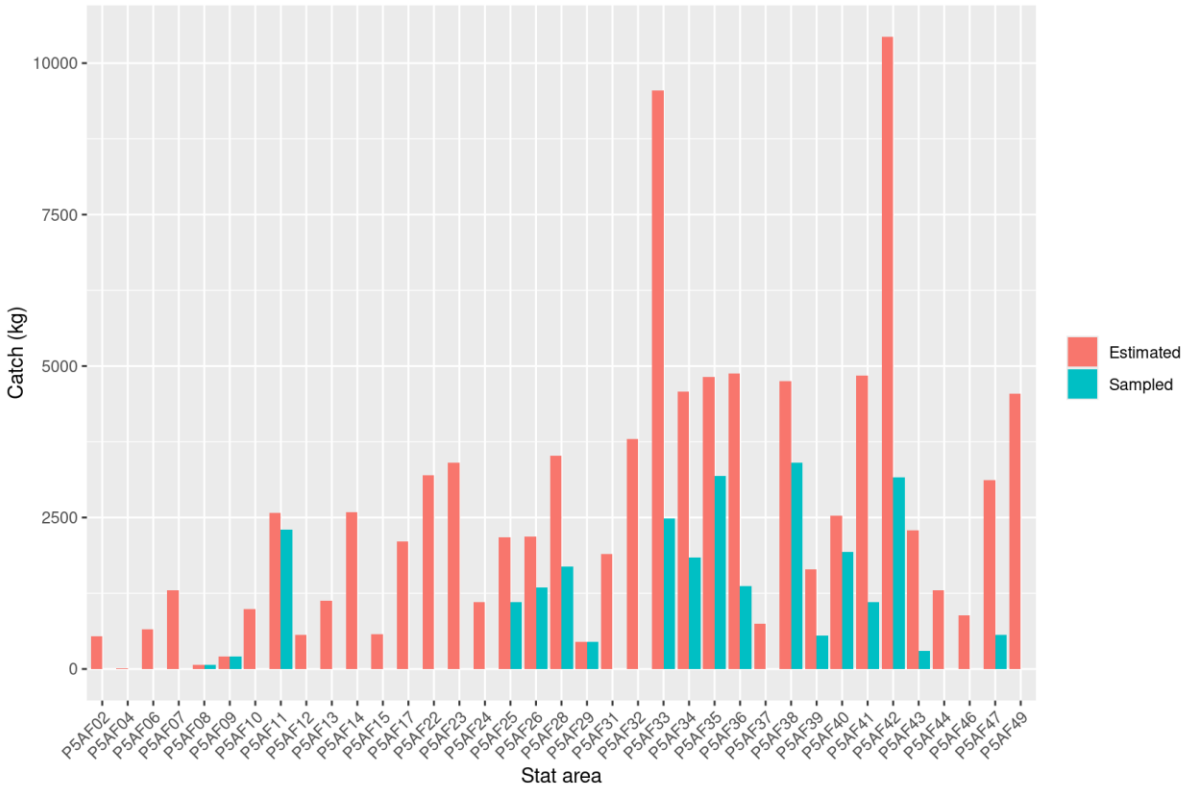

Figure 13: Total estimated catch and sampled catch for PAU 5A in 2024–25. The estimated catch is the estimated catch reported on the ERS. The Sampled catch is the total of the estimated catch from any harvesting event from which a sample was taken.

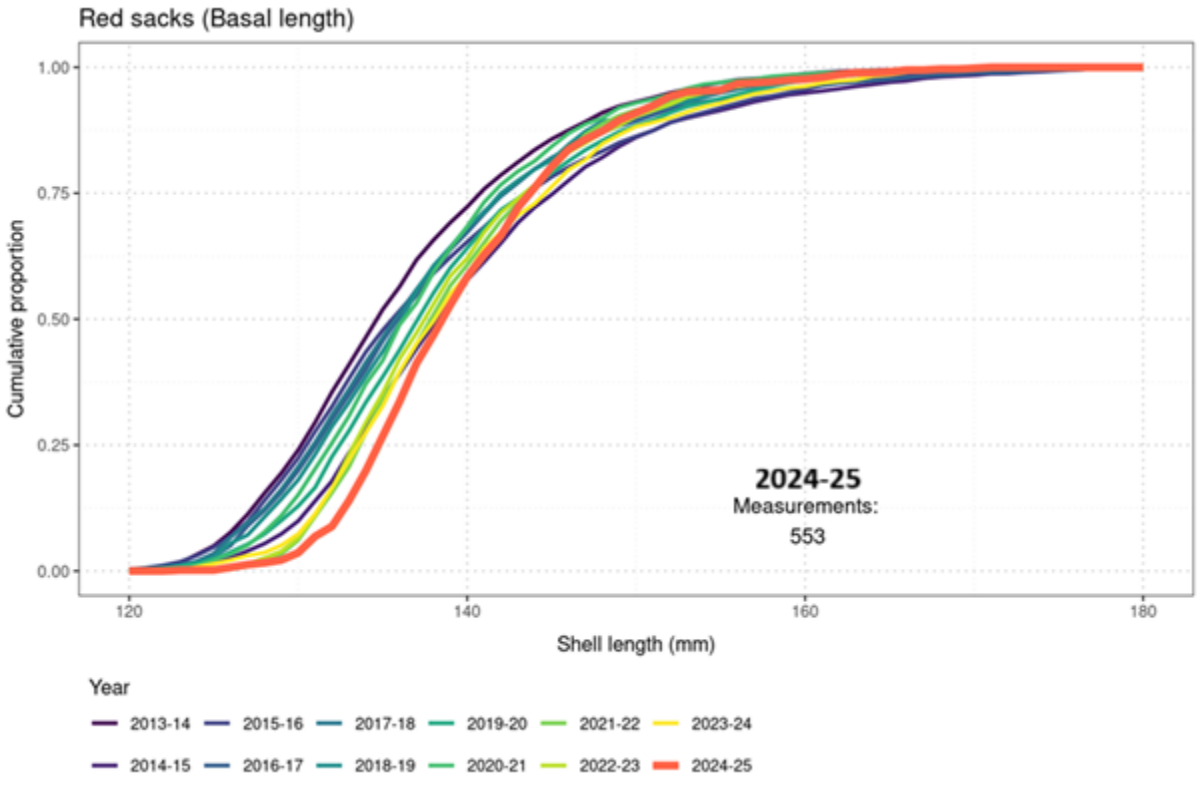

Figure 14: Cumulative frequencies of length (basal length only) from the red sacks for PAU 5A between 2013–14 and 2024–25.

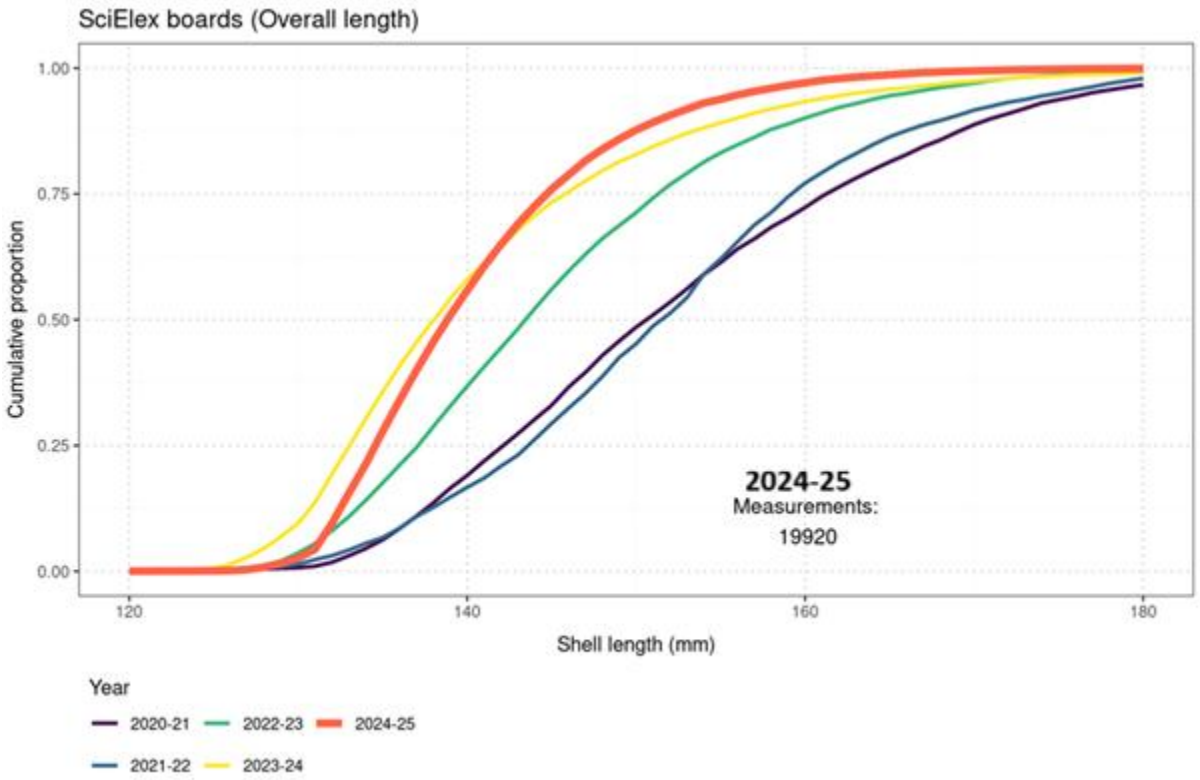

Figure 15: Cumulative frequencies of length (overall length of live pāua only) from the SciElex boards for PAU 5A between 2020–21 and 2024–25.

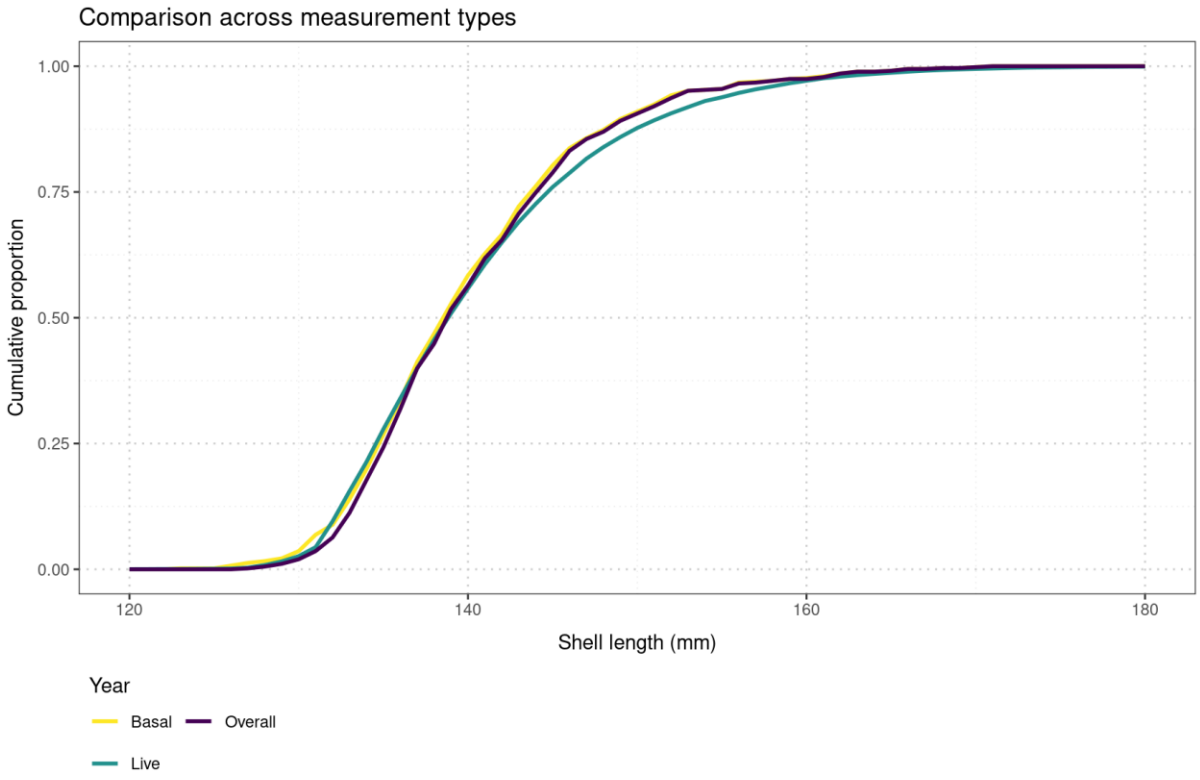

Figure 16: Cumulative frequencies of length of PAU 5A in 2024–25. The yellow (basal) and black (overall) lines come from empty shells measured from the red sacks. The green line (live) is the overall shell length measured using a SciElex unit while the pāua were still alive.

3.6 PAU 5B

In 2024–25 a total of 15 646 pāua were measured in PAU 5B (Table 2 and Table 3) in 39 samples. Figure 17 shows how this catch and sampling was distributed over the PAU 5B Statistical Areas. This shows that there are still statistical areas, and some with very high catches, that have little or no catch sampled. This is a potential source of sampling bias if these under-represented parts of the fishery have pāua of certain characteristics (e.g. are larger on average).

In the 2022–23 season there were no pāua measured using the red sack system. In the 2023–24 and 2024–25 seasons there were only a small number (96 and 112 pāua respectively) measured from red sacks. These low numbers explain the 'jagged' looking cumulative length frequency distributions in Figure 18. Compared to the previous season, Figure 19 shows an increase in the overall length measured with the SciElex boards between 2023–24 and 2024–25, However pāua in 2024–25 were still smaller than in 2020–21, 2021–22 and 2022–23. Figure 20 shows the difference in overall length measured from the red sack compared to the SciElex samples. This difference can be explained by the fact that larger pāua are targeted for the live export market and therefore are not available for the red sacks method (i.e. pāua going in the red sacks are measured after being shucked).

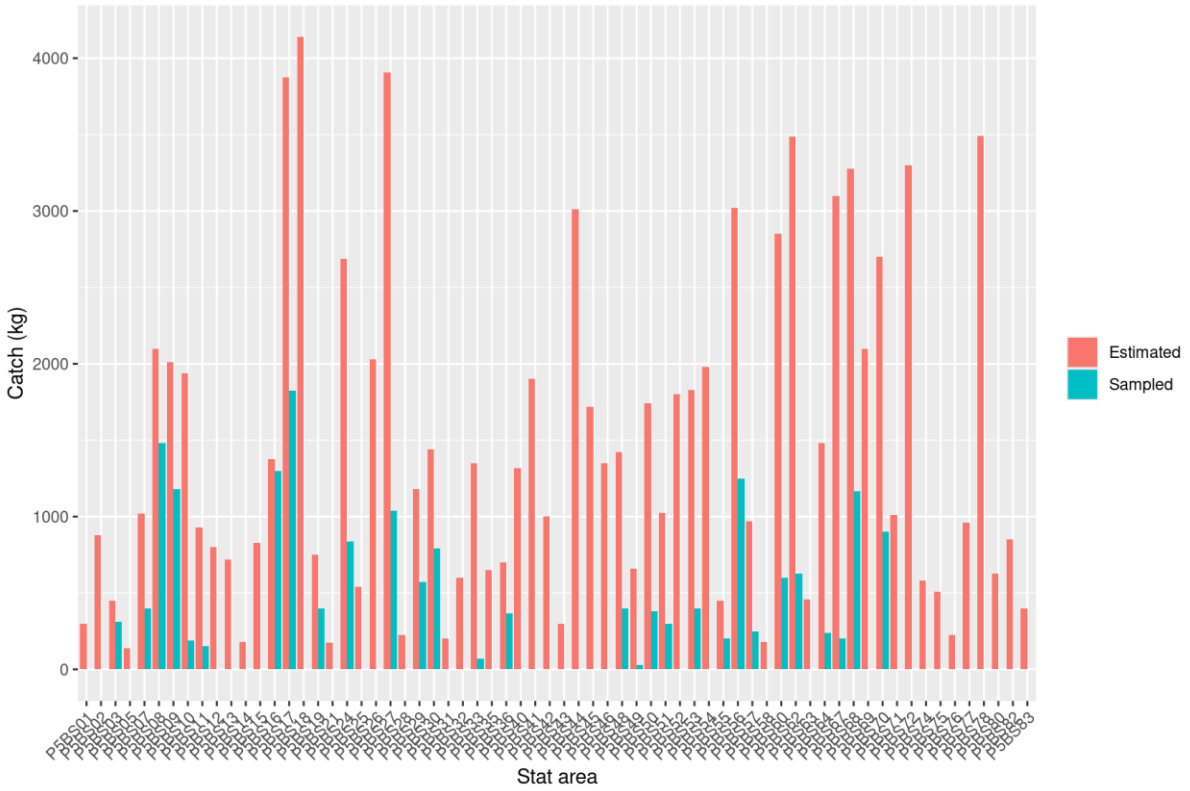

Figure 17: Total estimated catch and sampled catch for PAU 5B in 2024–25. The estimated catch is the estimated catch reported on the ERS. The Sampled catch is the total of the estimated catch from any harvesting event from which a sample was taken.

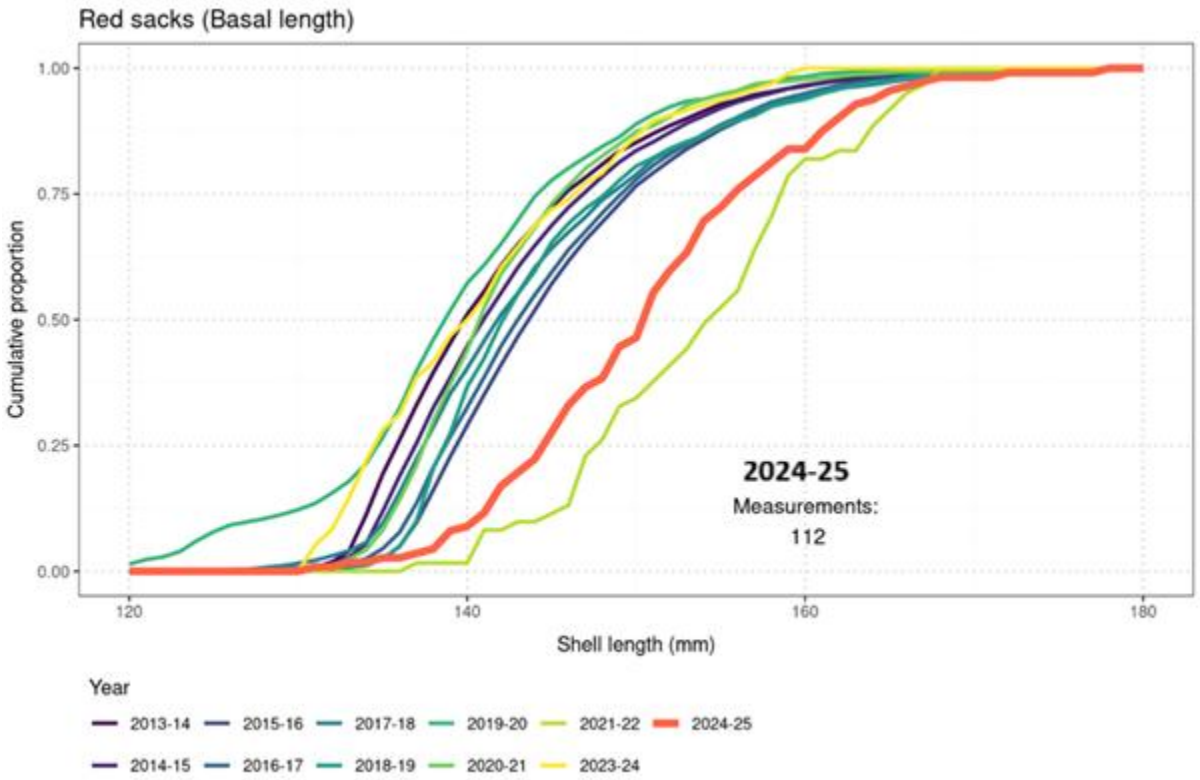

Figure 18: Cumulative frequencies of length (basal length only) from the red sacks for PAU 5B between 2013–14 and 2024–25. No shells were measured in 2022–23 through the Red Sacks method.

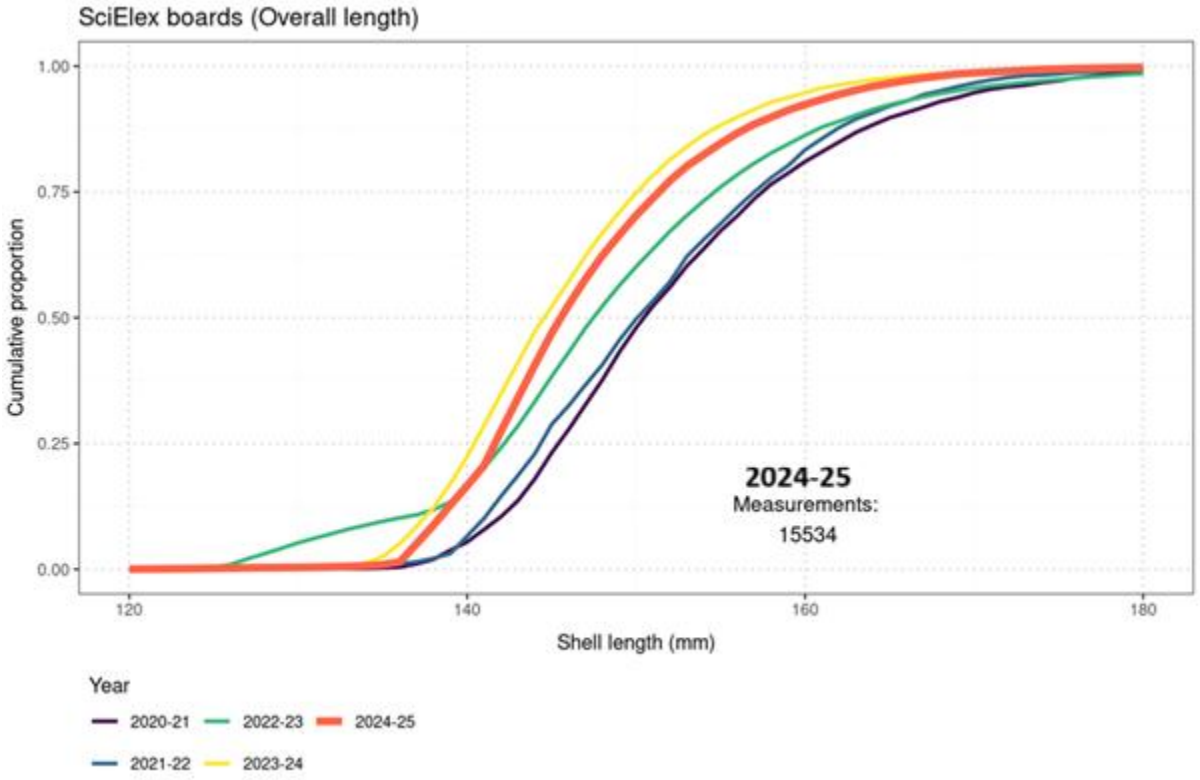

Figure 19: Cumulative frequencies of length (overall length of live pāua only) from the SciElex boards for PAU 5B between 2020–21 and 2024–25.

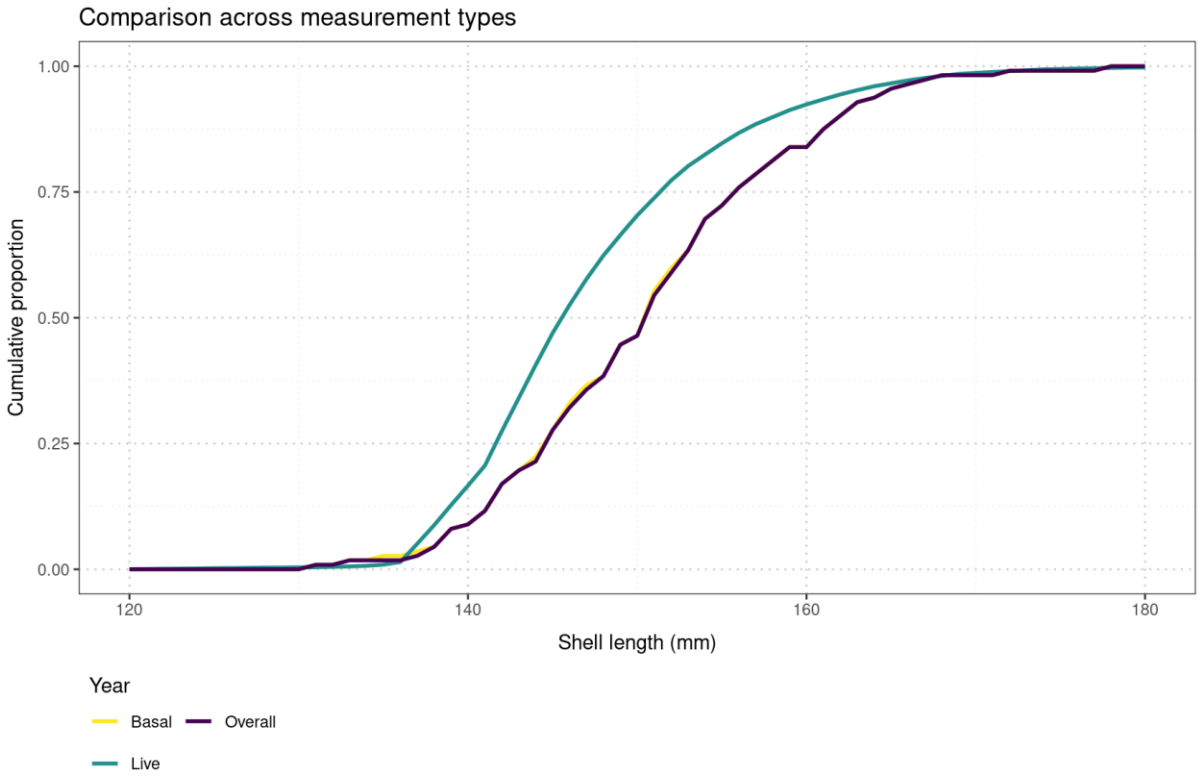

Figure 20: Cumulative frequencies of length of PAU 5B in 2024–25. The yellow (basal) and black (overall) lines come from empty shells measured from the red sacks. The green line (live) is the overall shell length measured using a SciElex unit while the pāua were still alive.

3.7 PAU 5D

In 2024–25 a total of 10 962 pāua were measured in PAU 5D (Table 2 and Table 3) in 35 samples. Figure 21 shows how this catch and sampling was distributed across the Pāua Statistical Areas. Figure 22 shows the cumulative frequencies of basal length from the red sacks for PAU 5D between 2013–14 and 2024–25.

Figure 23 shows the cumulative frequencies of overall length of live pāua measured on the SciElex boards for PAU 5D over the 2022–23, 2023–24 and 2024–25 seasons. There was a slight decrease in the cumulative length frequencies in 2024–25.

Figure 24 shows that the overall length of live pāua measured on the SciElex boards was smaller than the overall length of pāua measured from the red sacks.

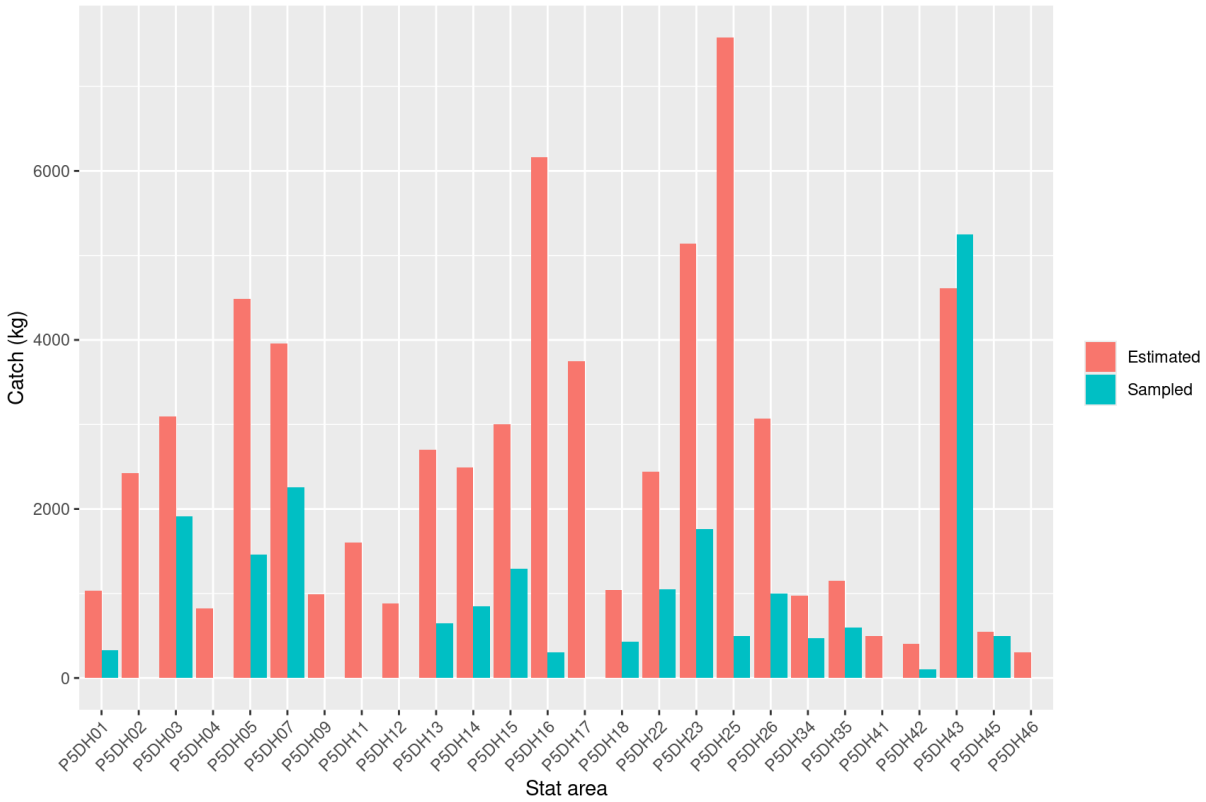

Figure 21: Total estimated catch and sampled catch for PAU 5D in 2024–25. The estimated catch is the estimated catch reported on the ERS. The Sampled catch is the total of the estimated catch from any harvesting event from which a sample was taken.

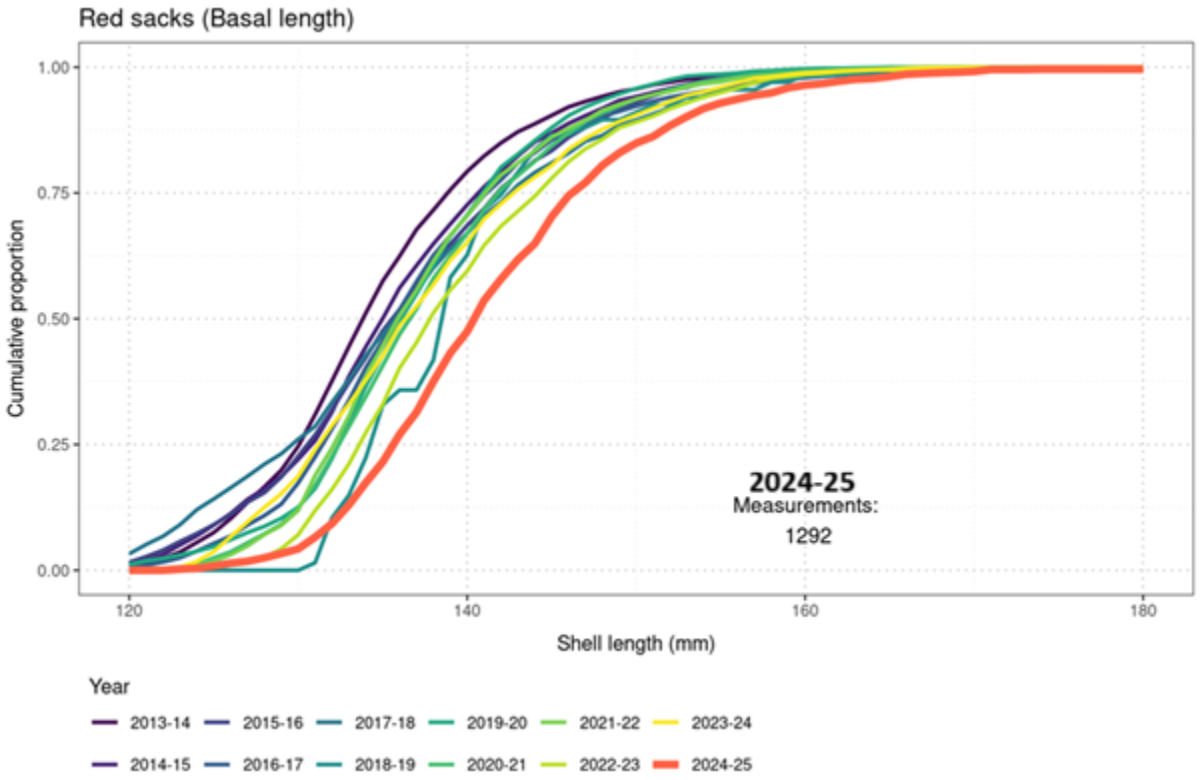

Figure 22: Cumulative frequencies of length (basal length only) from the red sacks for PAU 5D between 2013–14 and 2024–25.

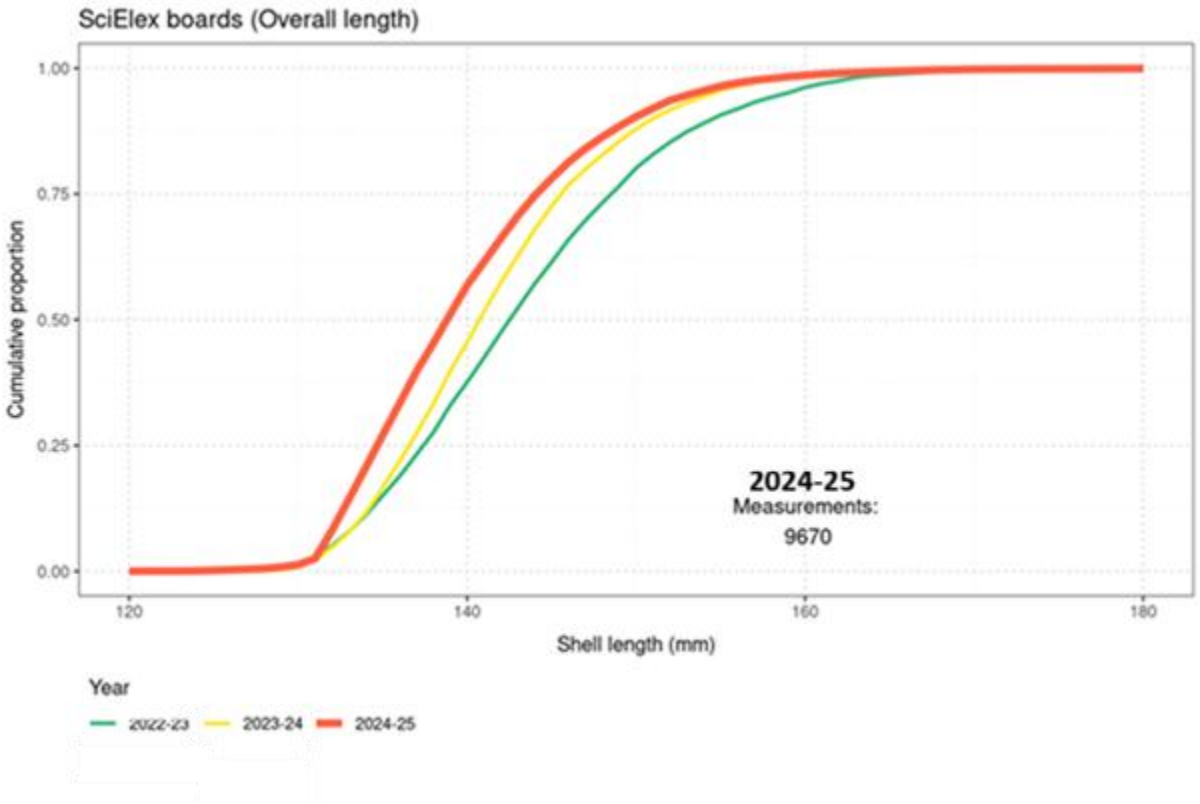

Figure 23: Cumulative frequencies of length (overall length of live pāua only) from the SciElex boards for PAU 5D between 2022–23 and 2024–25.

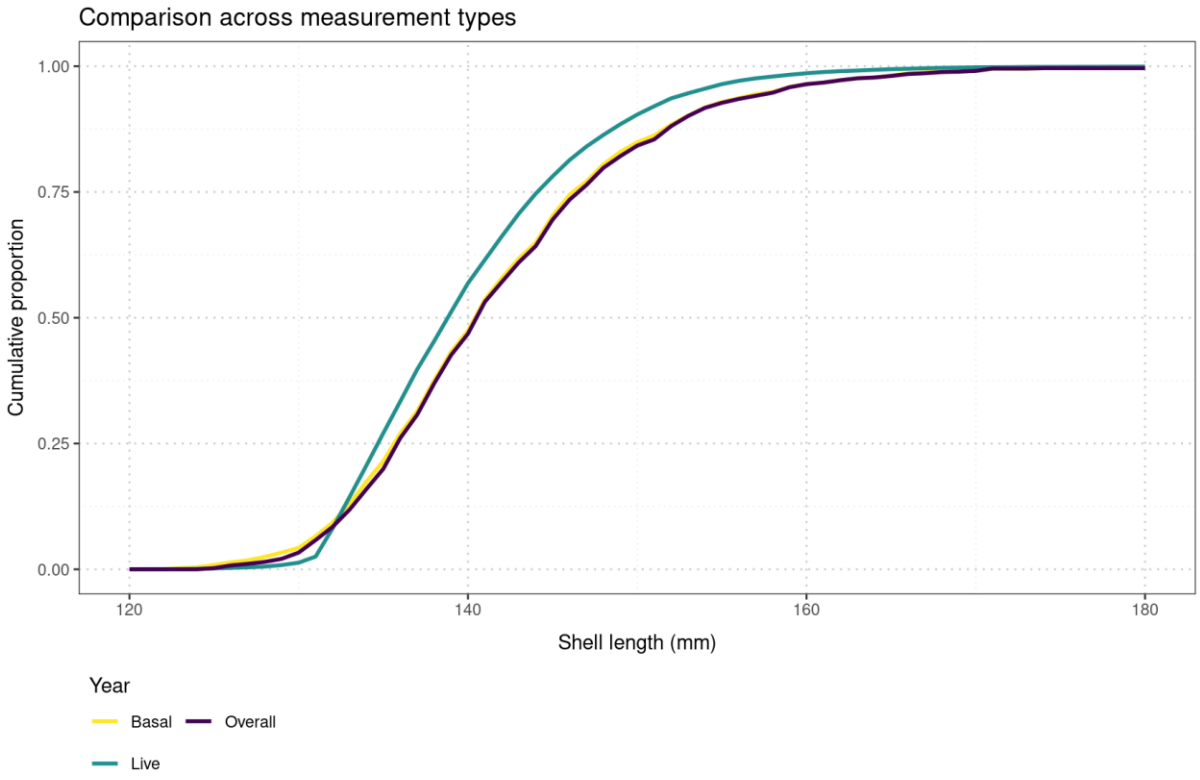

Figure 24: Cumulative frequencies of length of PAU 5D in 2024–25. The yellow (basal) and black (overall) lines come from empty shells measured from the red sacks. The green line (live) is the overall shell length measured using a SciElex unit while the pāua were still alive.

3.8 PAU 7

In 2024–25 a total of 76 089 pāua were measured in PAU 7 (Table 2 and Table 3) in 130 samples. Figure 25 shows that most of the PAU 7 catch was taken in P704 to P728 and a high proportion of this was sampled. Figure 26 shows the cumulative frequencies of basal length from the red sacks for PAU 7 between 2013–14 and 2024–25. Figure 27 shows that the pāua overall length in 2024–25 was very similar to the previous two seasons. This reflects the incrementally increased MHS, which is now up to 131 mm, in the Cook Strait part of the fishery (where approximately 75% of the catch comes from).

Figure 28 shows that the overall lengths of the 74 465 pāua measured live (SciElex boards) were larger than the 1624 pāua shells measured after shucking (from the red sacks).

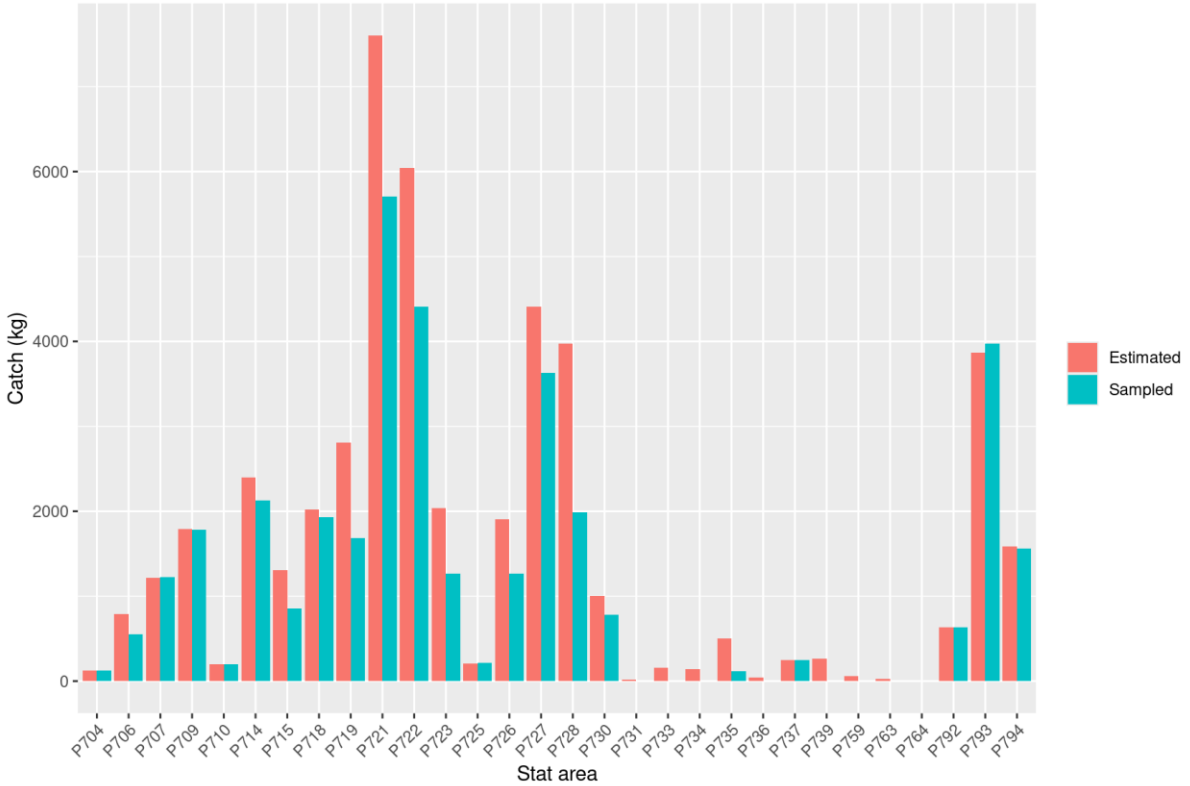

Figure 25: Total estimated catch and sampled catch for PAU 7 in 2024–25. The estimated catch is the estimated catch reported on the ERS. The Sampled catch is the total of the estimated catch from any harvesting event from which a sample was taken.

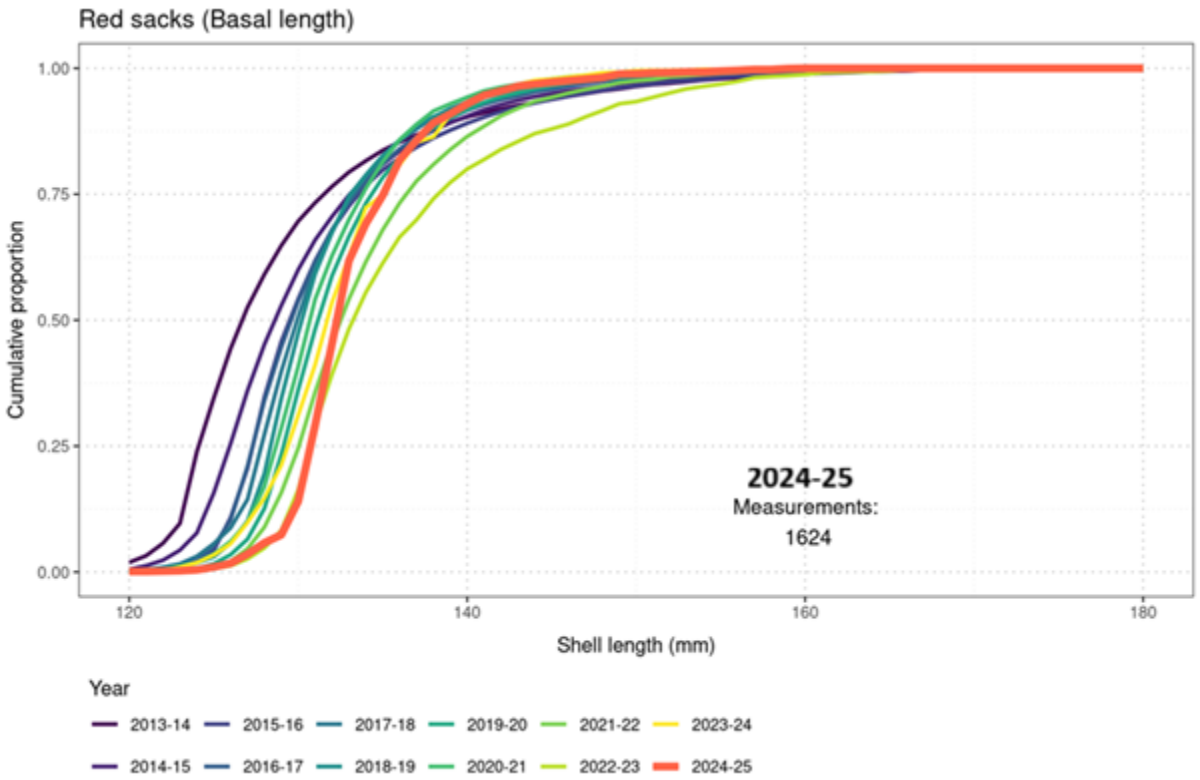

Figure 26: Cumulative frequencies of length (basal length only) from the red sacks for PAU 7 between 2013–14 and 2024–25.

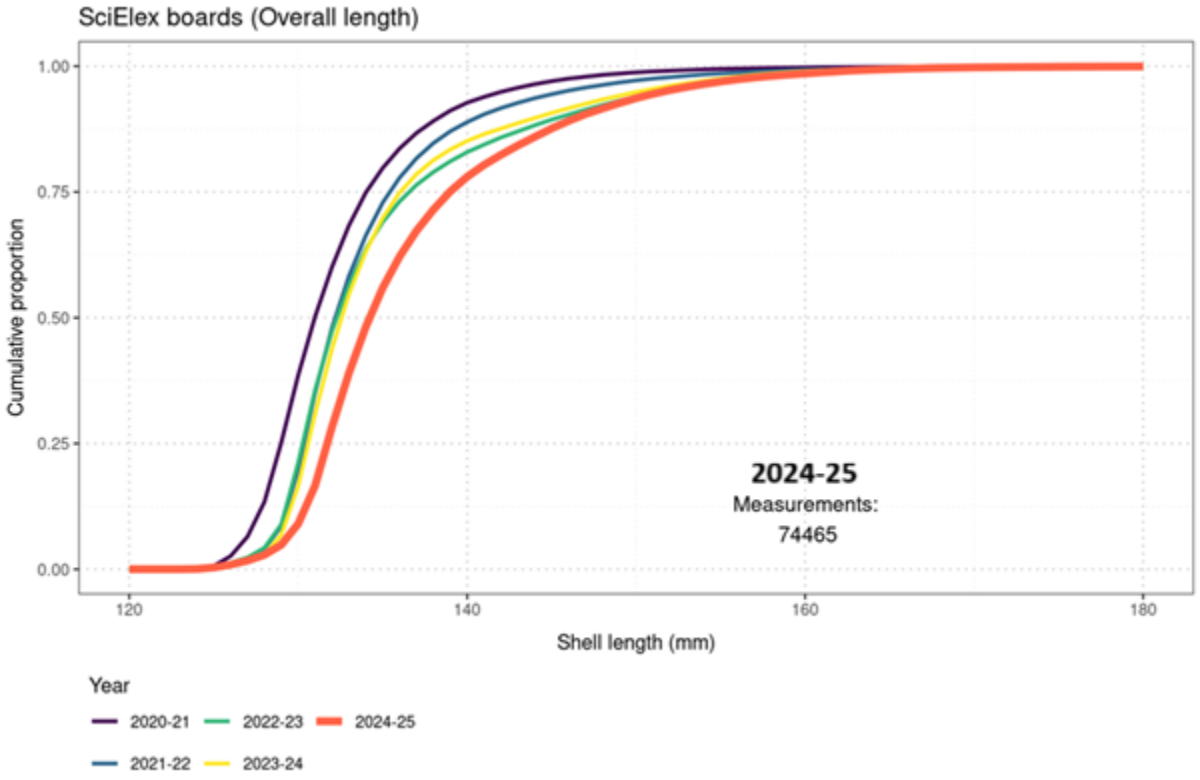

Figure 27: Cumulative frequencies of length (overall length of live pāua only) from the SciElex boards for PAU 7 between 2020–21 and 2024–25.

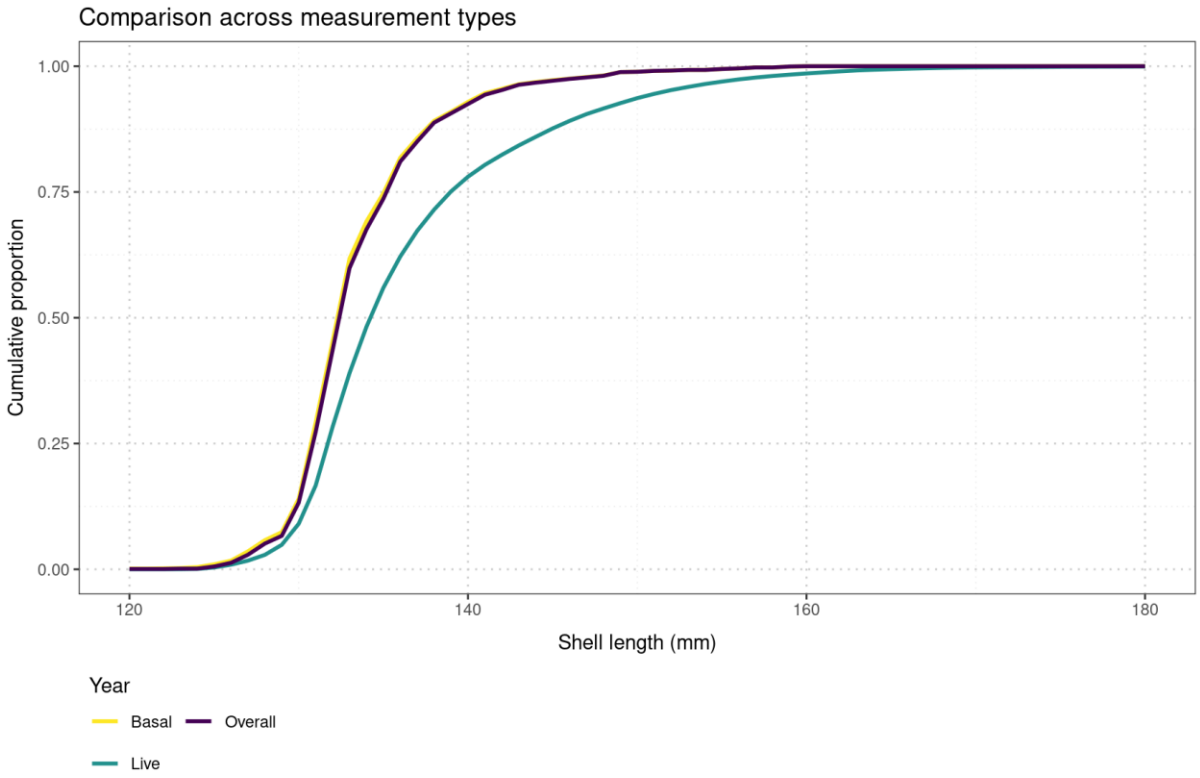

Figure 28: Cumulative length frequencies of PAU 7 in 2024–25. The yellow (basal) and black (overall) lines come from empty shells measured from the red sacks. The green line (live) is the overall shell length measured using a SciElex unit while the pāua were still alive.

3.9 All QMA length frequency distributions – 2024–25

In 2024–25 a total of 245 518 pāua were measured across all QMAs (Table 2, Table 3) in a total of 567 samples. Figure 29 shows that PAU 7 followed by PAU 2 had the smallest basal lengths while PAU 5B followed by PAU 5D had the largest basal lengths. Figure 30 shows that PAU 4 followed by PAU 2 had the smallest overall lengths of pāua (measured live) on average while PAU 5B followed by PAU 3A had the largest overall lengths.

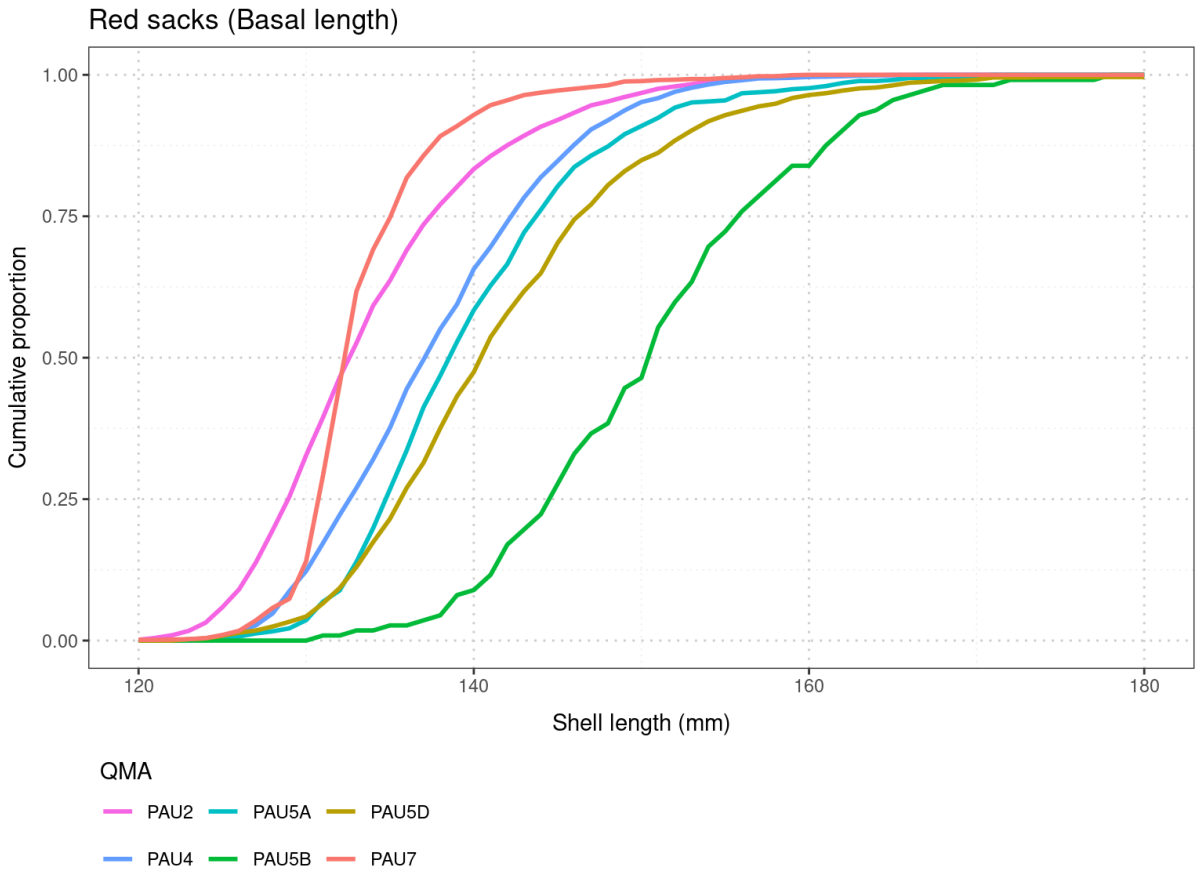

Figure 29: Cumulative frequencies of basal length from the red sacks for all QMAs during 2024–25.

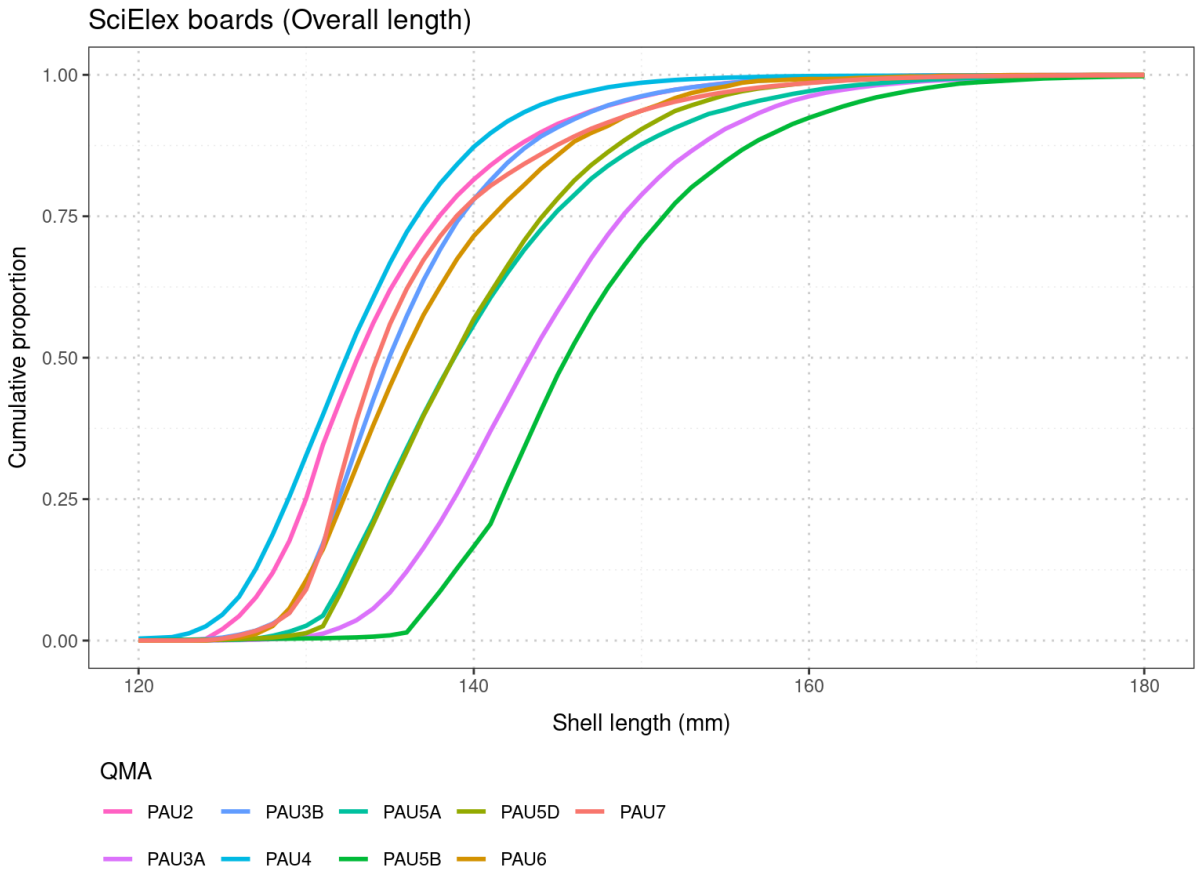

Figure 30: Cumulative frequencies of overall length (live pāua only) from the SciElex Boards from all QMAs in 2024–25.

4. POTENTIAL RESEARCH

1. The automation of uploading from the SciElex measuring boards, the verification of this data and archiving is now happening with the v2 and v3 wifi enabled SciElex boards. The v1 SciElex boards, some of the v2 and also the Zebratech boards (used to measure the red sacks) still require a manual download and this data is then uploaded into the database housed at Dragonfly where verification and archiving takes place. Automation of the uploading for the v1, some of the v2 and Zebratech boards would be desirable.
2. Utilising the lat/long/time/date of each pāua that is measured on the SciElex boards. This data provides high resolution spatial information as to where the pāua were harvested, effectively to within a few hundred metres, however there is currently no provision within the *Market* database to store this (Fisher & MacKay 2020). Future work could include the expansion of the Market database so that it had new fields to record this geographical data. This location data could then be used in Stock Assessments and Management Procedures.

5. FULFILMENT OF BROADER OUTCOMES

As required under Government Procurement rules[1], Fisheries New Zealand considered broader outcomes (secondary benefits such as environmental, social, economic or cultural benefits) that would be generated by this project. The following broader outcomes were delivered:

[1] https://www.procurement.govt.nz/procurement/principles-charter-and-rules/government-procurement-rules/planning-your-procurement/broader-outcomes/

1. Increased use of the SciElex boards is resulting in increased employment opportunities as PIC is paying the daily cost of an additional crewperson to operate these measuring boards on harvesting vessels. Much of this happens at the regional level, for example in more remote areas such as the Chathams.
2. The use of the SciElex boards is also increasing the environmental knowledge as the lat/long/time/date location of each pāua that is measured is recorded. This location data, at a scale of a few hundred metres (which is far higher resolution than the traditional Statistical Area scale) allows individual reefs and pāua beds to be mapped which will add significantly to the habitat and environmental understanding.
3. We are now archiving a baseline record of pāua size trends across much of the country that is available to all researchers, including for customary and recreational fishing. We believe this will prove a valuable resource for monitoring future effects of climate change on pāua fisheries.

6. ACKNOWLEDGEMENTS

Acknowledgements to the PIC technicians who measure the shells from the red sacks, the crews who are using the SciElex boards, Dr Phil Neubauer for his work on the automation of the uploading, verification and archiving of data plus the automated production of graphs etc, Helen Regan for overseeing the management of the project. We also acknowledge Fisheries New Zealand for the funding of this project (this work was completed under Objective 2 of Fisheries New Zealand project PAU2022-05C) and in particular thanks to Dr Marine Pomarède (Fisheries New Zealand) for guiding the project.

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