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Tini a Tangaroa

Observer sampling of deepwater fisheries, 1989–90 to 2024–25. Part 1: BAR to LIN

New Zealand Fisheries Assessment Report 2026/42

D.A.J. Middleton

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TABLE OF CONTENTS

EXECUTIVE SUMMARY 1

1 INTRODUCTION 2

2 SAMPLING REPRESENTATIVENESS REPORTS 3

2.1 BAR stocks . . . 3
2.1.1 BAR 4: Trawl fishery . . . 7
2.1.2 BAR 5: Trawl fishery . . . 25
2.1.3 BAR 7: Trawl fishery . . . 49
2.2 BOE stocks . . . 73
2.2.1 BOE 1: Trawl fishery . . . 77
2.2.2 BOE 3A: Trawl fishery . . . 94
2.2.3 BOE 4: Trawl fishery . . . 112
2.2.4 BOE 6: Trawl fishery . . . 130
2.3 BYX stocks . . . 148
2.3.1 BYX 2: Trawl fishery . . . 152
2.3.2 BYX 3: Trawl fishery . . . 171
2.4 CDL stocks . . . 196
2.4.1 CDL 1: Trawl fishery . . . 201
2.4.2 CDL 2: Trawl fishery . . . 218
2.4.3 CDL 3: Trawl fishery . . . 236
2.5 EMA stocks . . . 248
2.5.1 EMA 7: Trawl fishery . . . 252
2.5.2 EMA 7: PS fishery . . . 276
2.6 FRO stocks . . . 283
2.6.1 FRO 5: Trawl fishery . . . 288
2.6.2 FRO 7: Trawl fishery . . . 306
2.6.3 FRO 8: Trawl fishery . . . 324
2.6.4 FRO 9: Trawl fishery . . . 342
2.7 GSH stocks . . . 360
2.7.1 GSH 4: Trawl fishery . . . 364
2.7.2 GSH 5: Trawl fishery . . . 380
2.7.3 GSH 6: Trawl fishery . . . 396
2.8 GSP stocks . . . 412
2.8.1 GSP 1: Trawl fishery . . . 416
2.8.2 GSP 5: Trawl fishery . . . 432
2.9 HAK stocks . . . 448
2.9.1 HAK 1: Trawl fishery . . . 452
2.9.2 HAK 4: Trawl fishery . . . 476
2.9.3 HAK 7: Trawl fishery . . . 500
2.10 HOK stocks . . . 524
2.10.1 HOK 1CR: Trawl fishery . . . 529
2.10.2 HOK 1CS: Trawl fishery . . . 553
2.10.3 HOK 1NE: Trawl fishery . . . 577
2.10.4 HOK 1PU: Trawl fishery . . . 601
2.10.5 HOK 1SA: Trawl fishery . . . 625
2.10.6 HOK 1WC: Trawl fishery . . . 649
2.11 JMA stocks . . . 673
2.11.1 JMA 3: Trawl fishery . . . 676
2.11.2 JMA 7: Trawl fishery . . . 702
2.12 LDO stocks . . . 728
2.12.1 LDO 1: Trawl fishery . . . 731

2.12.2 LDO 3: Trawl fishery 747
2.13 LIN stocks 764
2.13.1 LIN 1: Line fishery 770
2.13.2 LIN 1: Trawl fishery 780
2.13.3 LIN 2: Line fishery 797
2.13.4 LIN 2: Trawl fishery 807
2.13.5 LIN 3&4: Line fishery 824
2.13.6 LIN 3&4: Trawl fishery 847
2.13.7 LIN 3&4: Pot fishery 871
2.13.8 LIN 5&6: Trawl fishery 879
2.13.9 LIN 5&6: Line fishery 903
2.13.10 LIN 6B: Trawl fishery 920
2.13.11 LIN 6B: Line fishery 944
2.13.12 LIN 6B: Pot fishery 961
2.13.13 LIN 7CK: Trawl fishery 968
2.13.14 LIN 7CK: Line fishery 992
2.13.15 LIN 7WC: Trawl fishery 1002
2.13.16 LIN 7WC: Line fishery 1026
2.13.17 LIN 7WC: Pot fishery 1037

3 ACKNOWLEDGEMENTS 1042

4 REFERENCES 1042

PLAIN LANGUAGE SUMMARY

Standardised reports of the quantity and representativeness of observer sampling are provided for BAR to LIN from 1989–90 to 2024–25.

EXECUTIVE SUMMARY

Middleton, D.A.J.[1] **(2026). Observer sampling of deepwater fisheries, 1989–90 to 2024–25. Part 1: BAR to LIN.**

***New Zealand Fisheries Assessment Report 2026/42*. 1042 p.**

Observer sampling data are a key input for many assessments of the status of deepwater stocks. However, the quantity and quality of observer sampling has previously only been established when an assessment is attempted. Project OBS2025-01 has addressed this problem by implementing templates for routine reporting of observer sampling coverage, in a largely automated manner.

One of the key outputs of the project is annual sampling reports that examine observer coverage on a stock and fishery basis. This report provides the first iteration of these annual reports, for 1989–90 to 2024–25 and BAR to LIN stocks.

[1]Pisces Research, Wellington, New Zealand

1. INTRODUCTION

A format for providing a comprehensive summary of the observer sampling undertaken for all deepwater stocks, and the representativeness of that sampling, was developed by Middleton (2026). This document provides these reports for BAR to LIN stocks for the fishing years 1989–90 to 2024–25.

The process for identifying key fisheries and sampling thresholds, and an explanation of the graphical presentation and representativeness statistics used in this report, is provided by Middleton (2026).

2. SAMPLING REPRESENTATIVENESS REPORTS

2.1 BAR stocks

Observer sampling of barracouta is considered with respect to the barracouta Quota Management Areas.

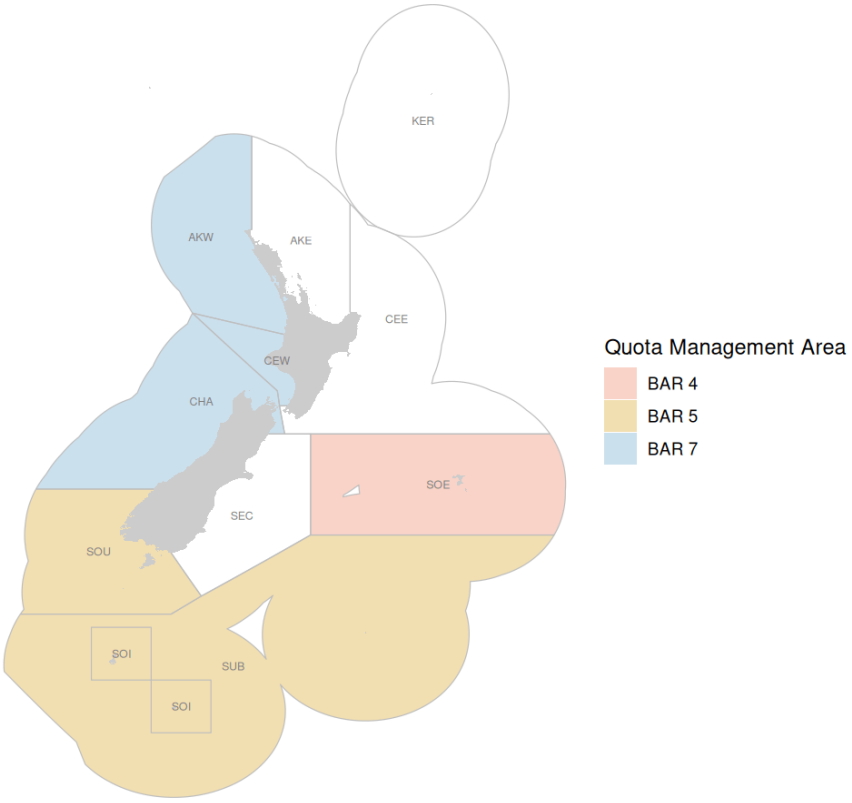


Figure 1: Observer Fisheries Management Areas (black borders, labels on plot) in relation to the Quota Management Area for barracouta (coloured areas, per legend).

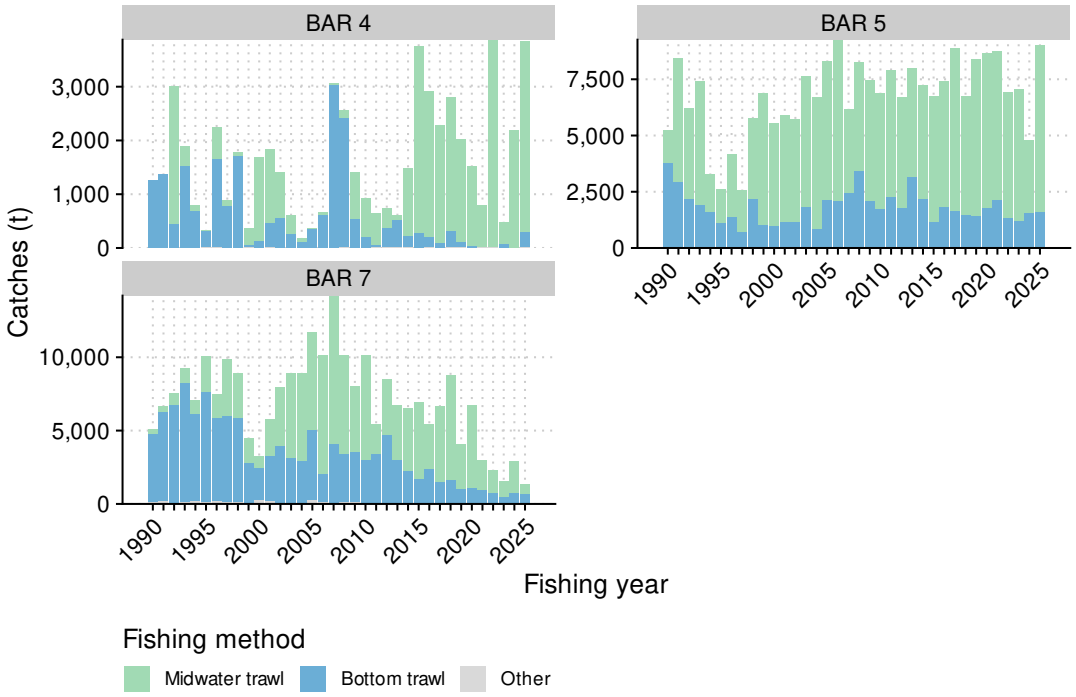


Figure 2: **Catches of barracouta by fishing method, for events within the barracouta Quota Management Areas. Methods grouped as Other include: BLL, BPT, BS, CP, D, DL, DS, DV, FN, FP, HL, L, MPT, PL, POT, PRB, PRM, PS, PSH, RLP, RN, SJ, SLL, SN, T, TL.**

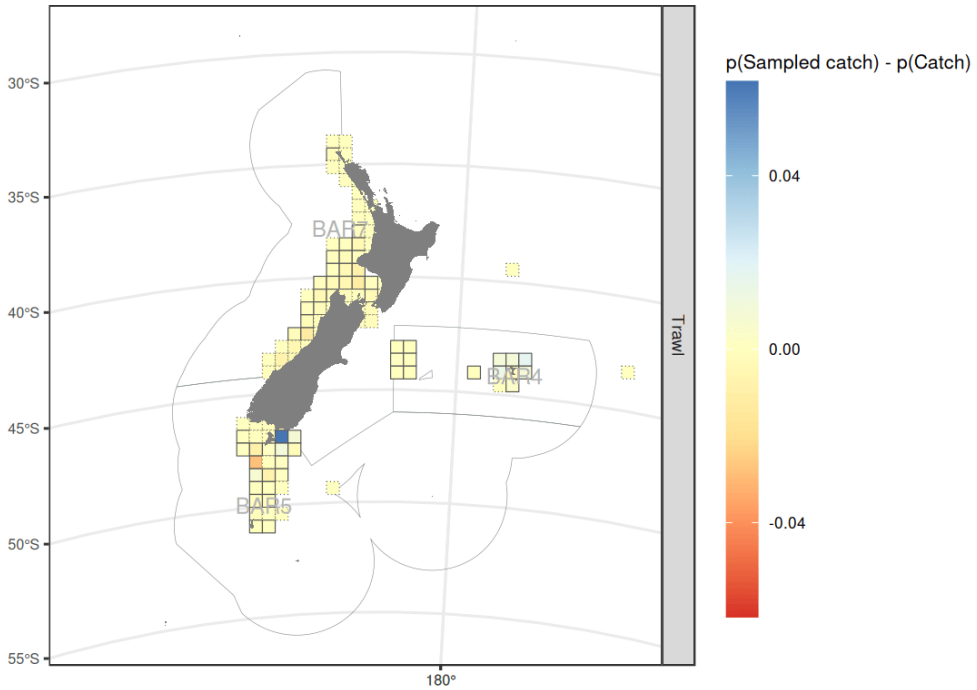


Figure 3: **Differences in the relative proportions of catch and sampled catch for barracouta during 2021–2025. Cells with a dotted border had no sampling.**

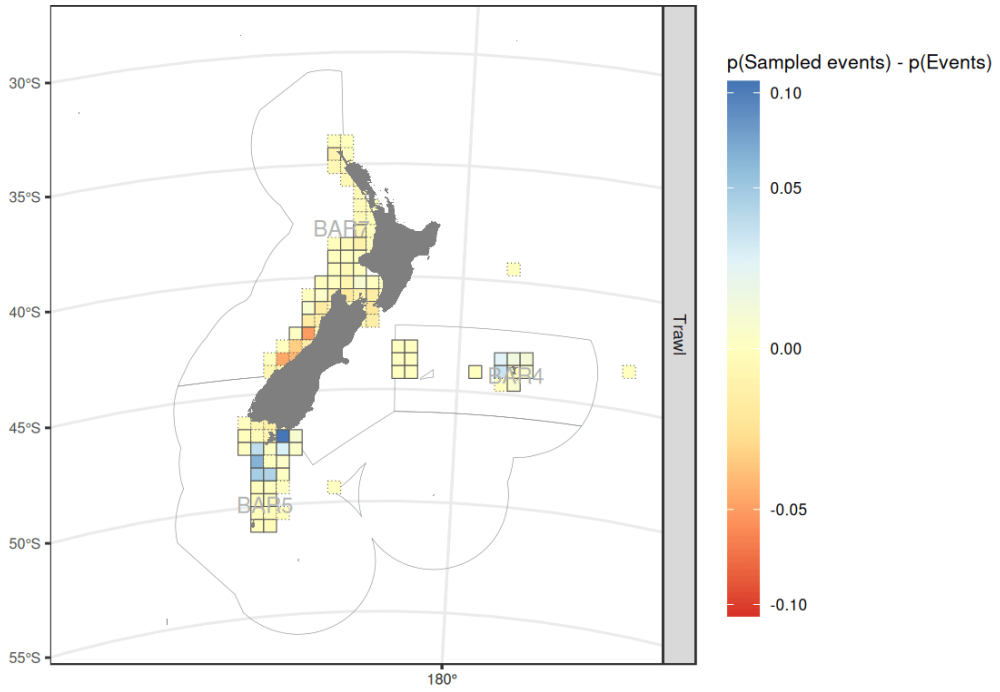


Figure 4: **Differences in the relative proportions of events meeting the sampling threshold and sampled events for barracouta during 2021–2025. Cells with a dotted border had no sampling.**

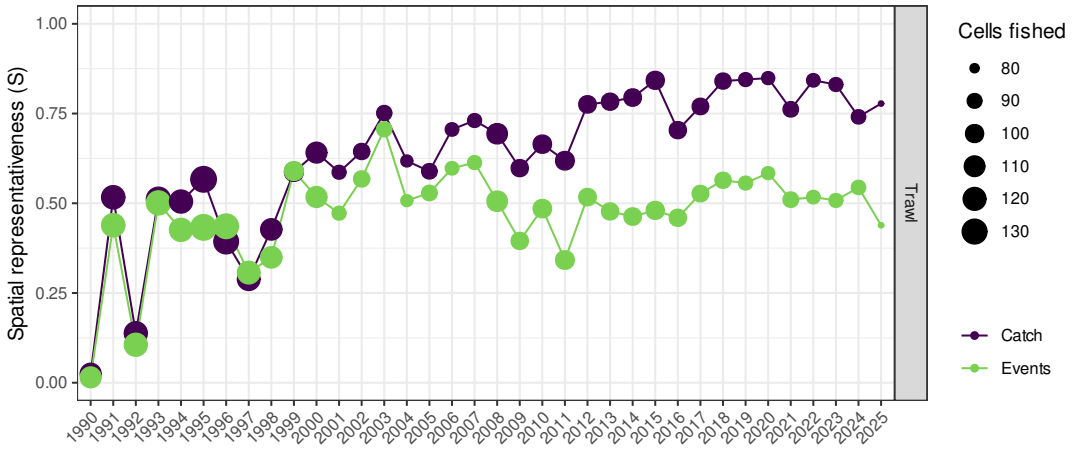


Figure 5: **Spatial representativeness of observer sampling of barracouta by fishing year. Representativeness is assessed using the Manhattan distance metric (*S*) applied to 64 km grid cells, for both the proportion of catch sampled and the proportion of positive events sampled.**

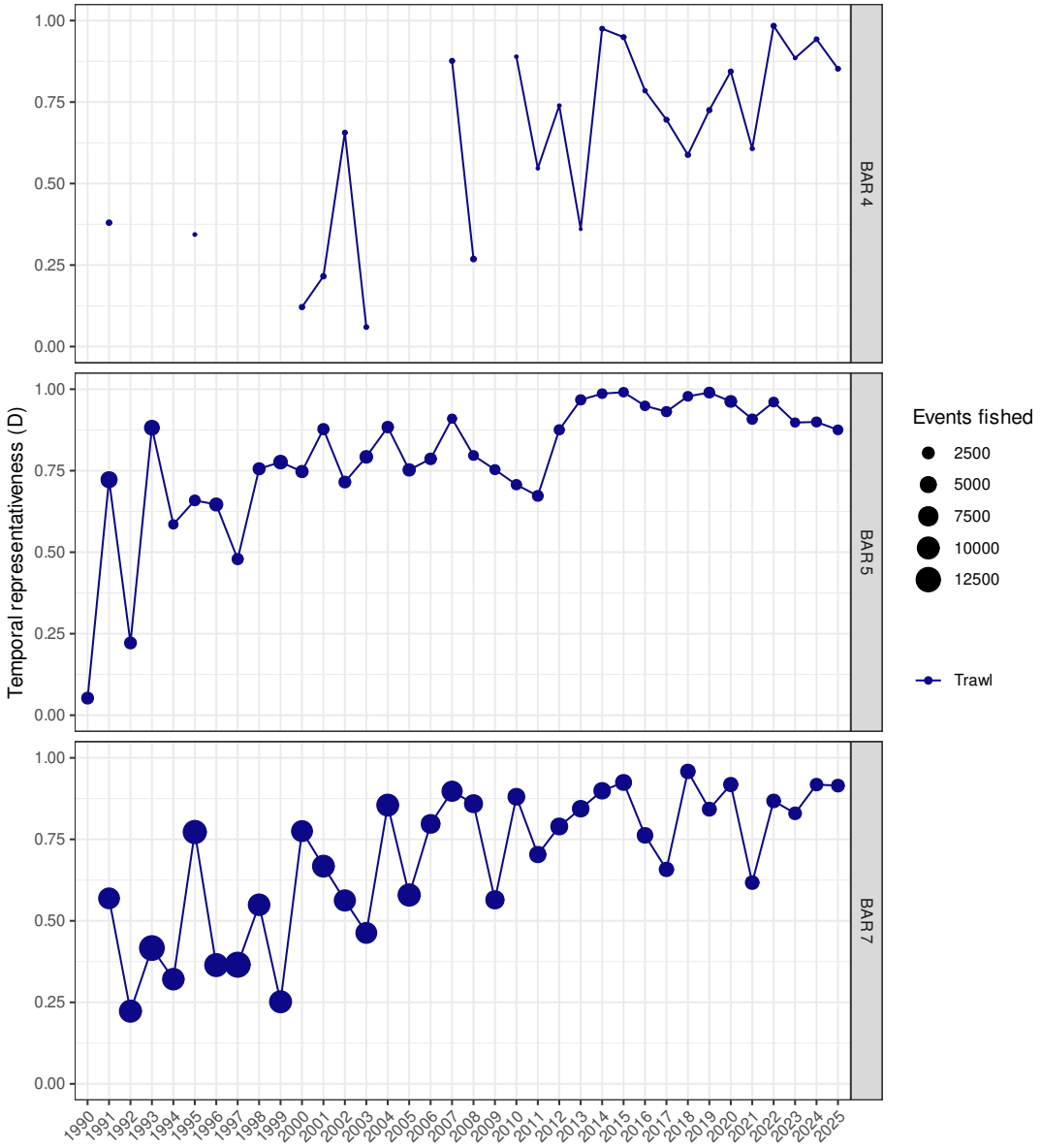


Figure 6: Temporal representativeness of observer sanpling of barracouta by fishing year and area. Temporal representativeness is assessed using the KS statistic (*D*) applied to the start date-times of all fishing events and all sampled fishing events, weighted by catch weight.

2.1.1 BAR 4: Trawl fishery

2.1.1.1 Length-frequency samples

Table 1: Length-frequency samples of barracouta from the BAR 4 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of barracouta exceeded a potential sampling threshold of 50 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	322	0	0	0.00
1991	370	17	1 820	4.59
1992	260	0	0	0.00
1993	293	0	0	0.00
1994	169	0	0	0.00
1995	115	1	104	0.87
1996	478	0	0	0.00
1997	286	0	0	0.00
1998	284	0	0	0.00
1999	62	0	0	0.00
2000	341	10	528	2.93
2001	358	10	1 027	2.79
2002	263	23	1 008	8.75
2003	208	1	20	0.48
2004	144	0	0	0.00
2005	92	0	0	0.00
2006	268	0	0	0.00
2007	279	26	2 647	9.32
2008	417	26	2 034	6.24
2009	127	0	0	0.00
2010	102	26	2 211	25.49
2011	89	12	1 166	13.48
2012	105	35	3 120	33.33
2013	39	25	2 056	64.10
2014	247	50	3 442	20.24
2015	283	102	8 245	36.04
2016	186	32	2 907	17.20
2017	297	61	4 713	20.54
2018	169	42	3 064	24.85
2019	324	44	2 815	13.58
2020	273	74	4 813	27.11
2021	156	19	1 303	12.18
2022	310	103	8 693	33.23
2023	93	32	1 881	34.41
2024	236	95	6 830	40.25
2025	258	58	4 631	22.48

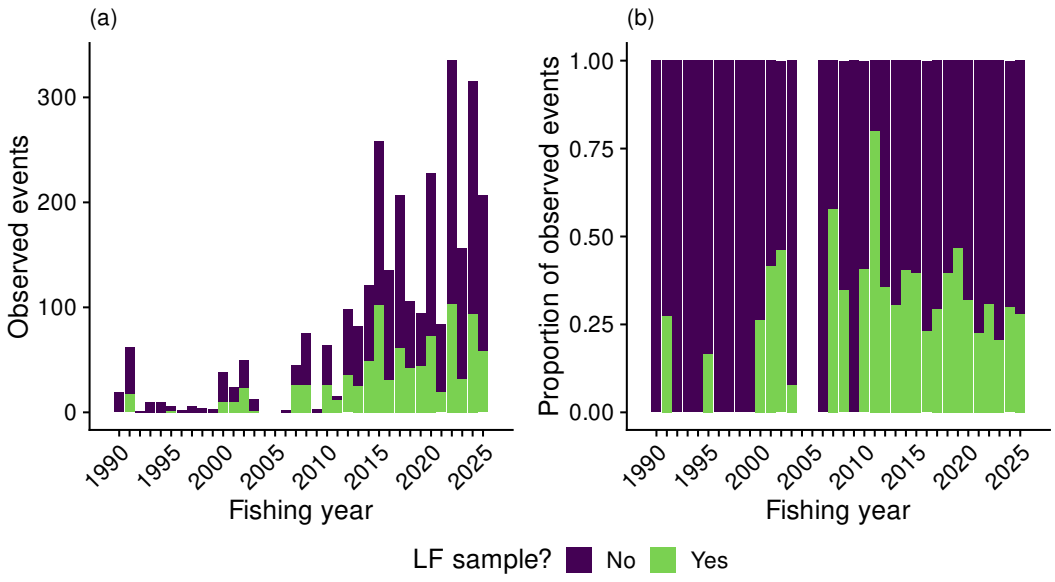


Figure 7: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in BAR 4 where the barracouta catch exceeded the 50 kg threshold, with and without length-frequency sampling.**

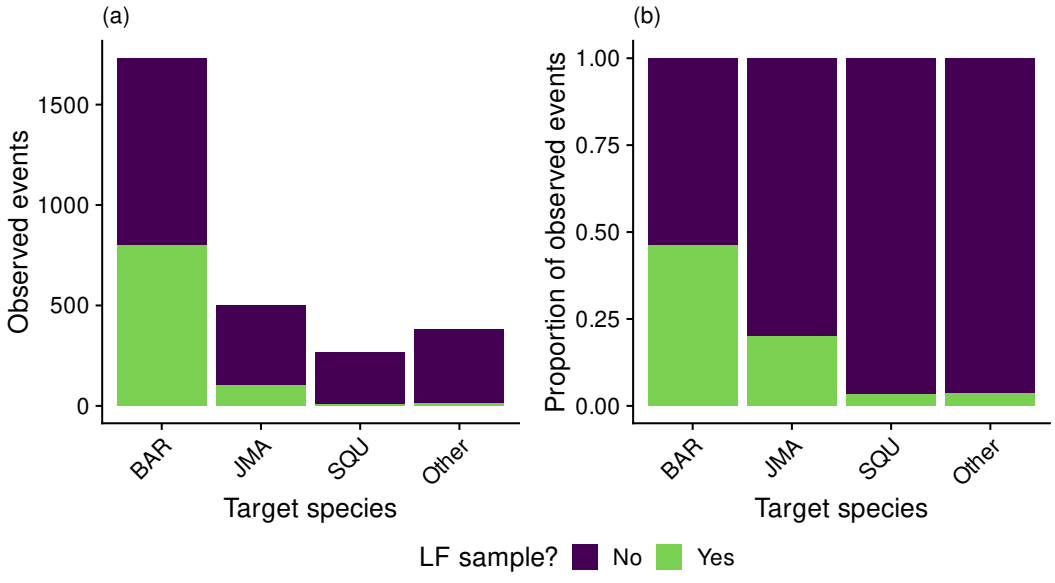


Figure 8: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in BAR 4 where the barracouta catch exceeded the 50 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

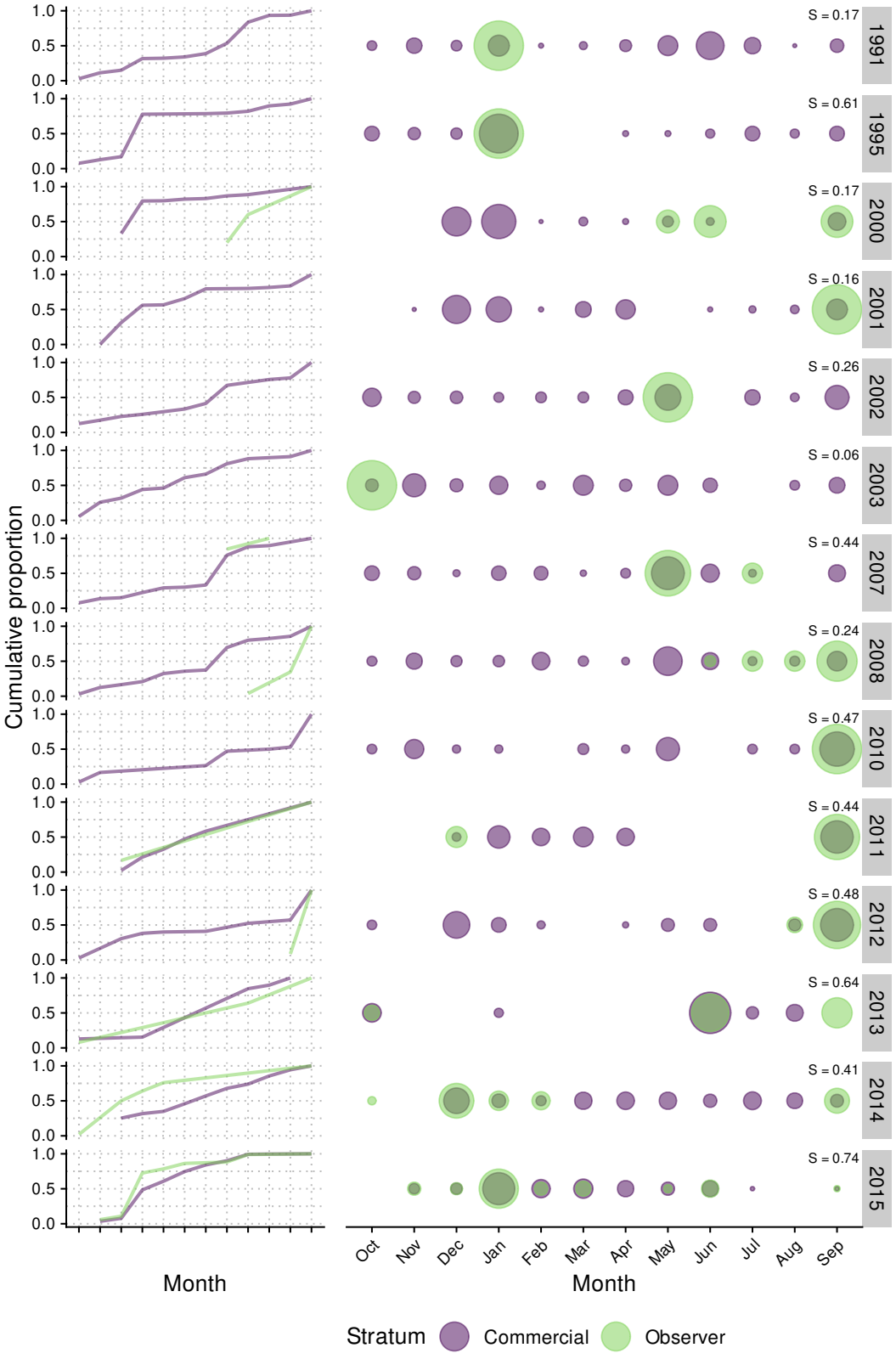


Figure 9: **Monthly representativeness of observer sampling coverage of Trawl fishing events in BAR 4, where the barracouta catch exceeded the 50kg threshold, in 1991 to 2015. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

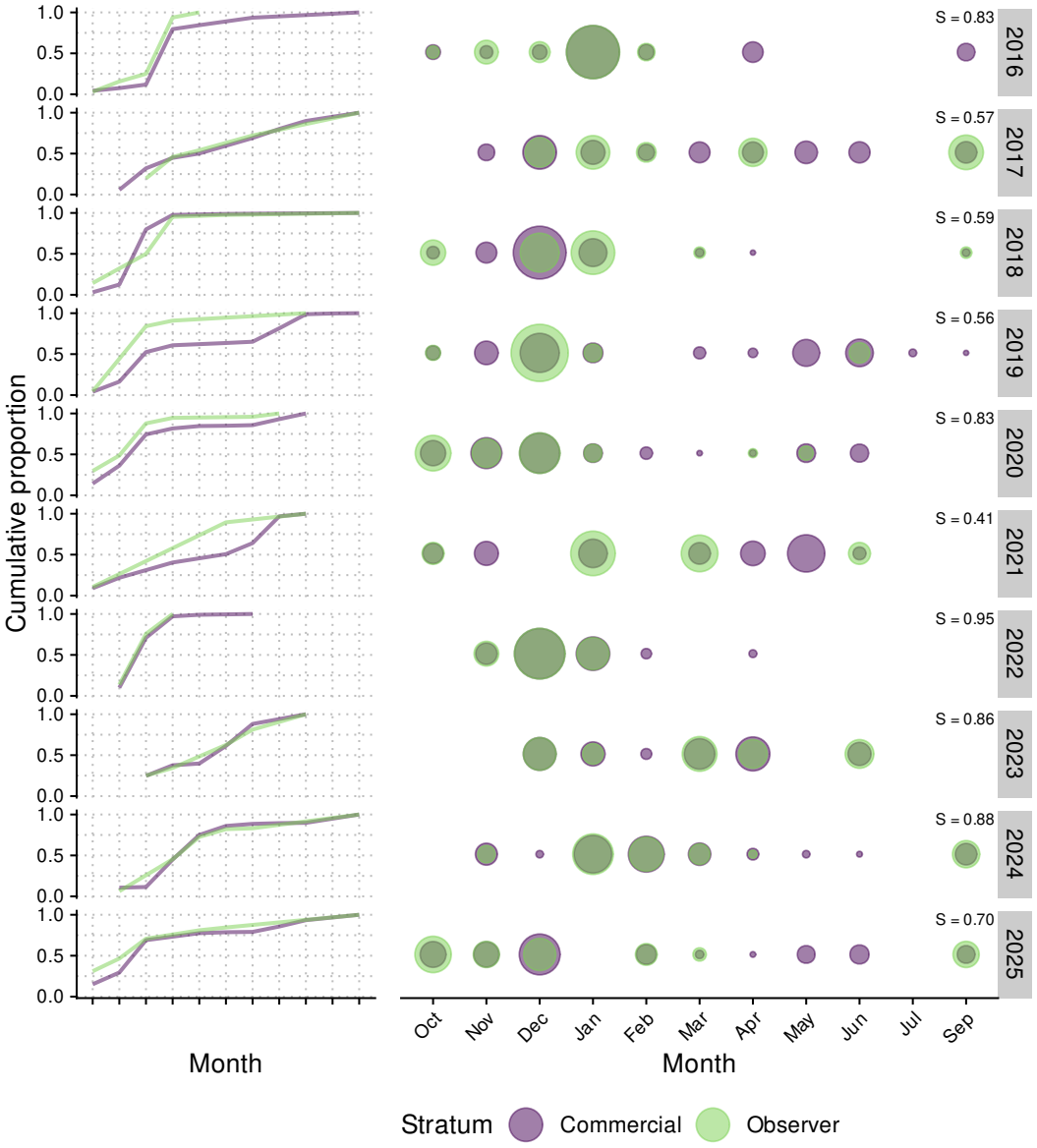


Figure 10: Monthly representativeness of observer sampling coverage of Trawl fishing events in BAR 4, where the barracouta catch exceeded the 50kg threshold, in 2016 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

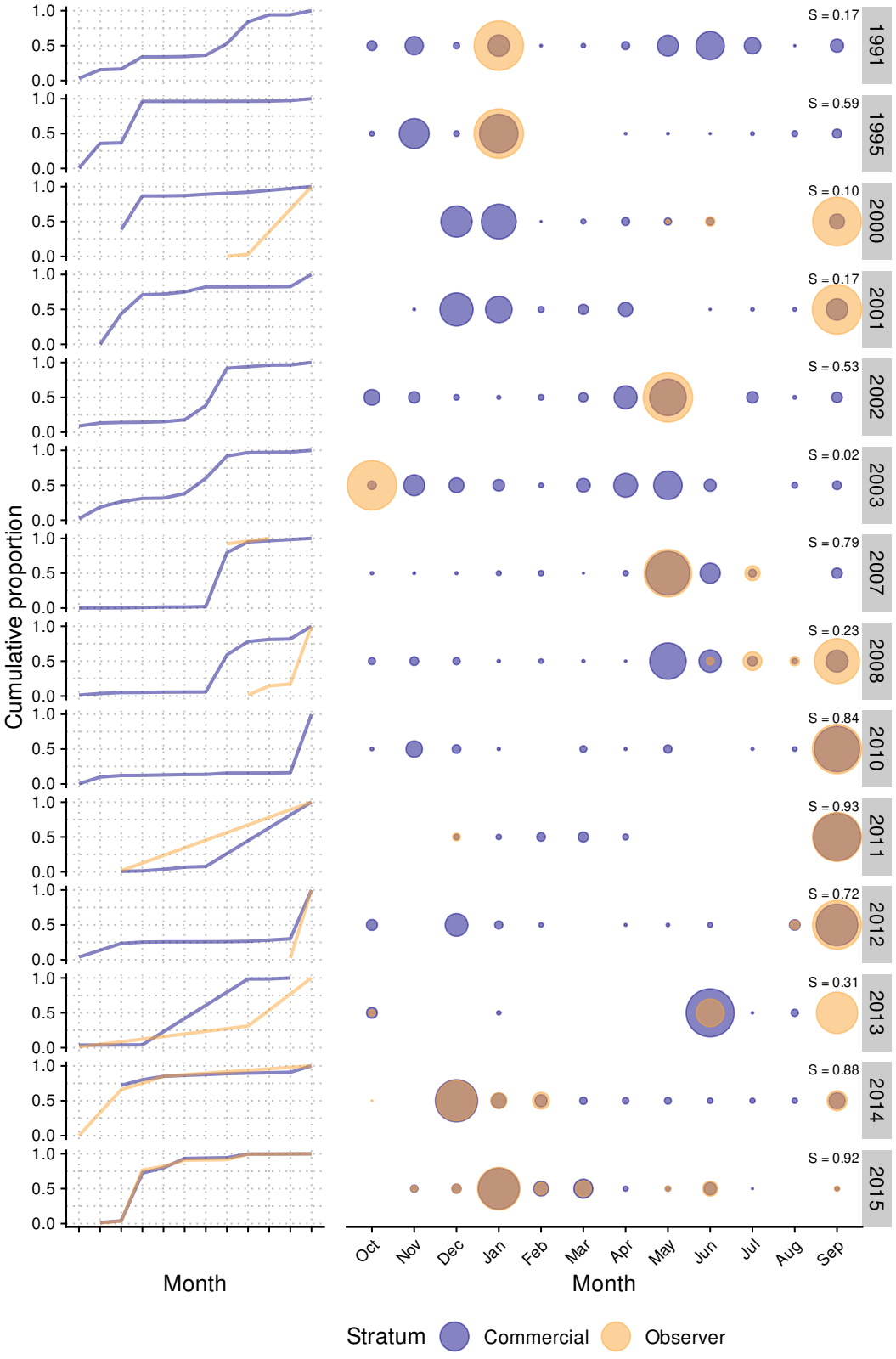


Figure 11: **Monthly representativeness of observer sampling coverage of Trawl catch in BAR 4, from events where the barracouta catch exceeded the 50kg threshold, in 1991 to 2015. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

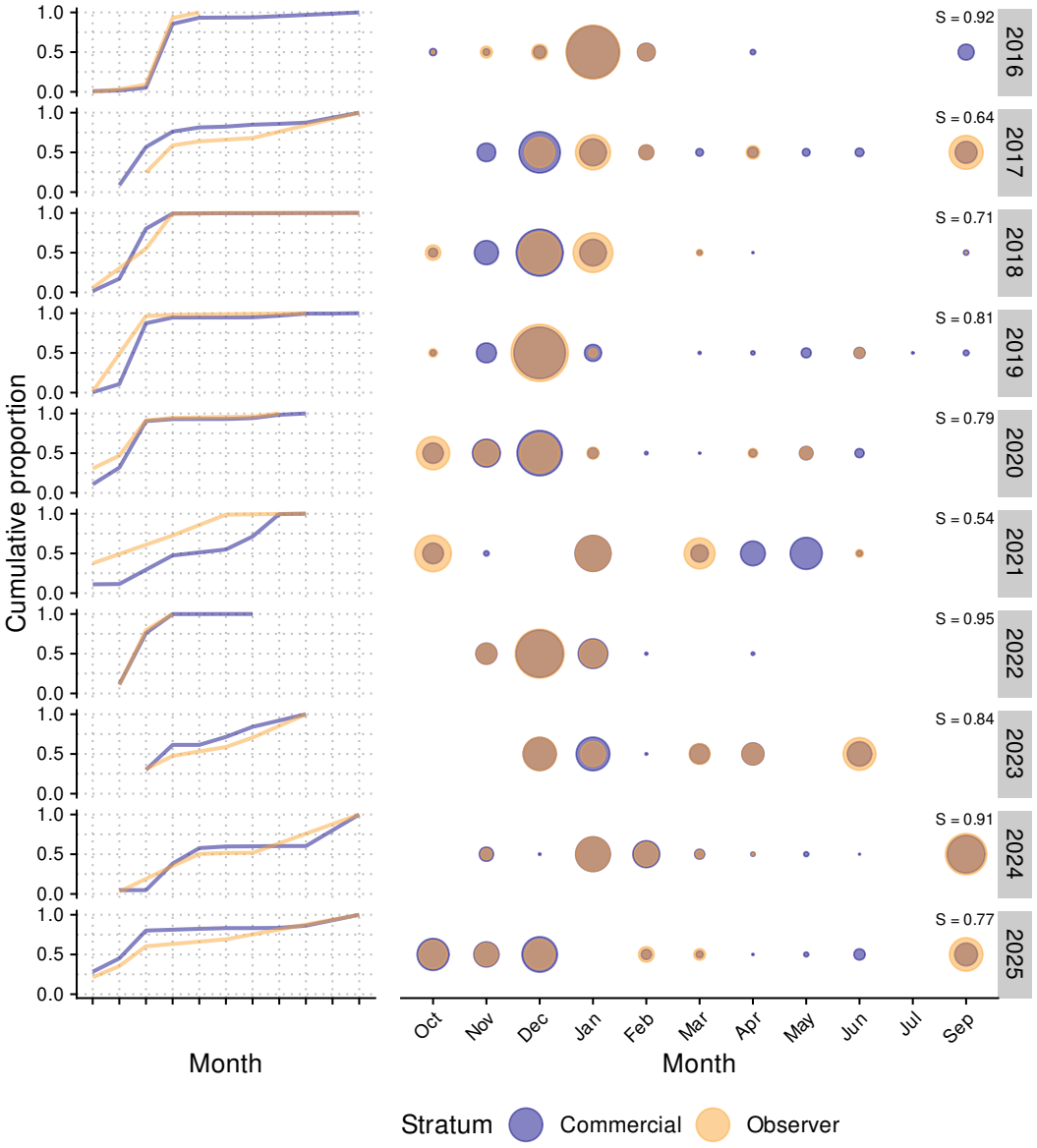


Figure 12: Monthly representativeness of observer sampling coverage of Trawl catch in BAR 4, from events where the barracouta catch exceeded the 50kg threshold, in 2016 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

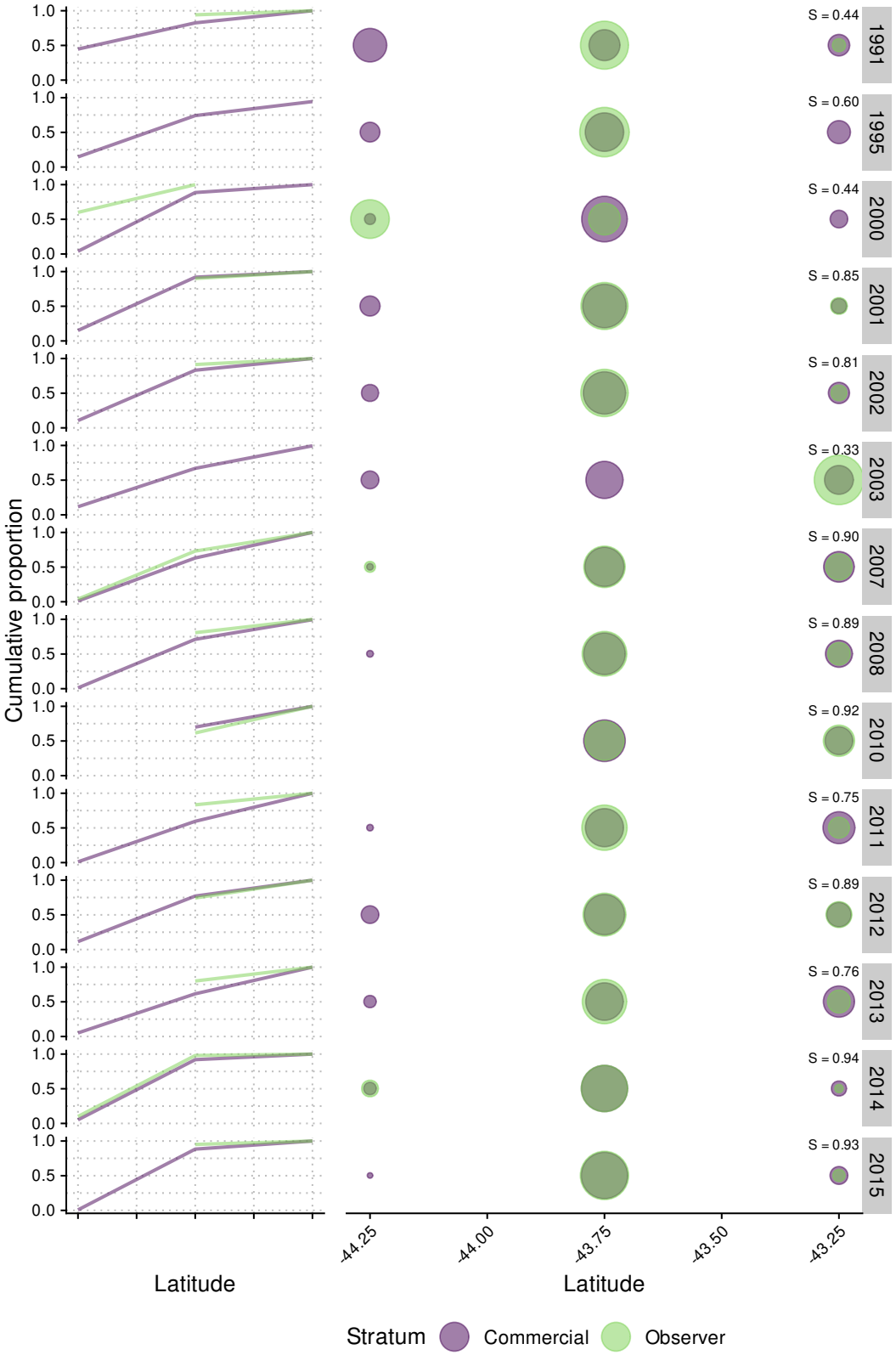


Figure 13: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in BAR 4, where the barracouta catch exceeded the 50kg threshold, in 1991 to 2015. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

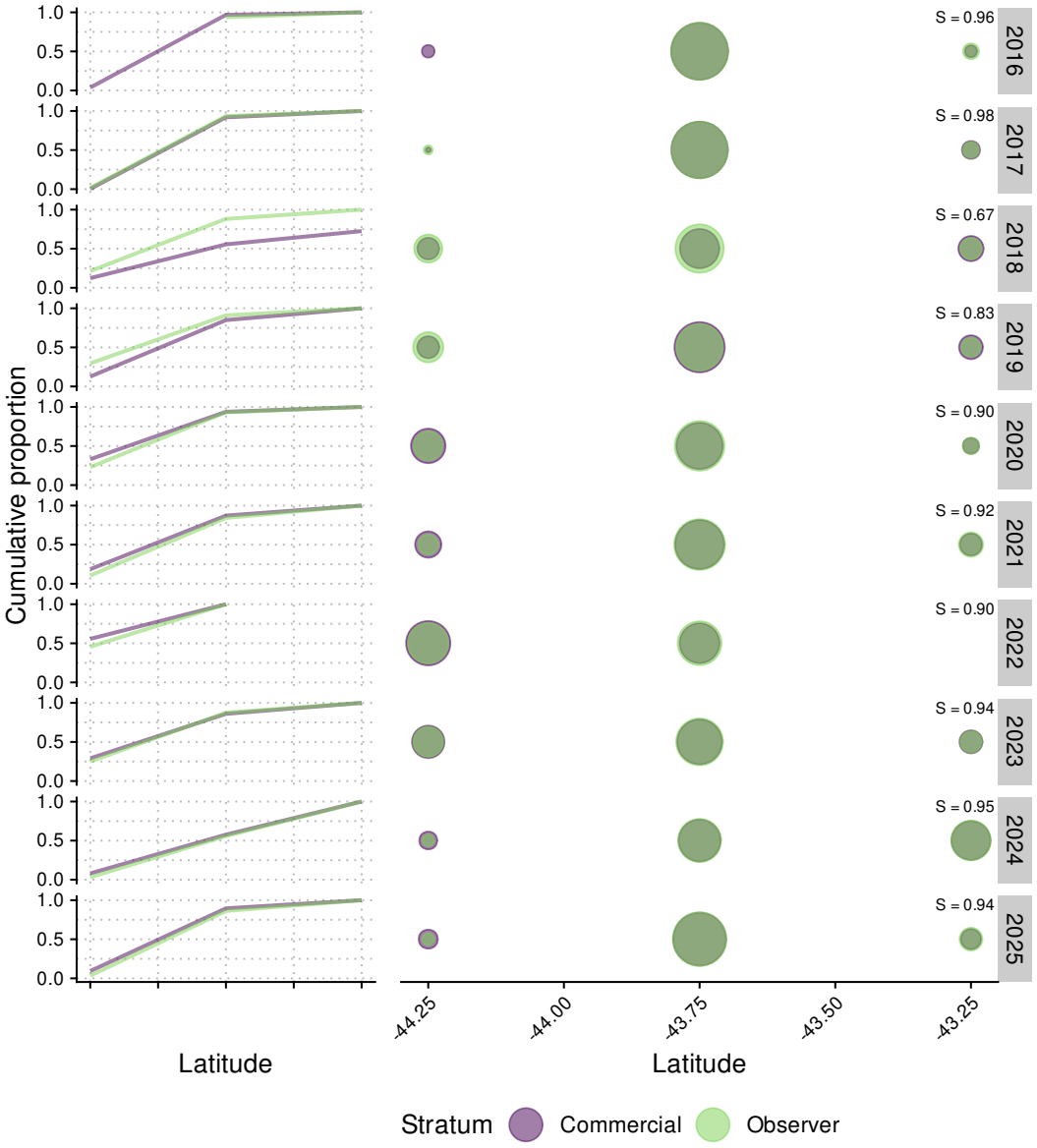


Figure 14: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in BAR 4, where the barracouta catch exceeded the 50kg threshold, in 2016 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

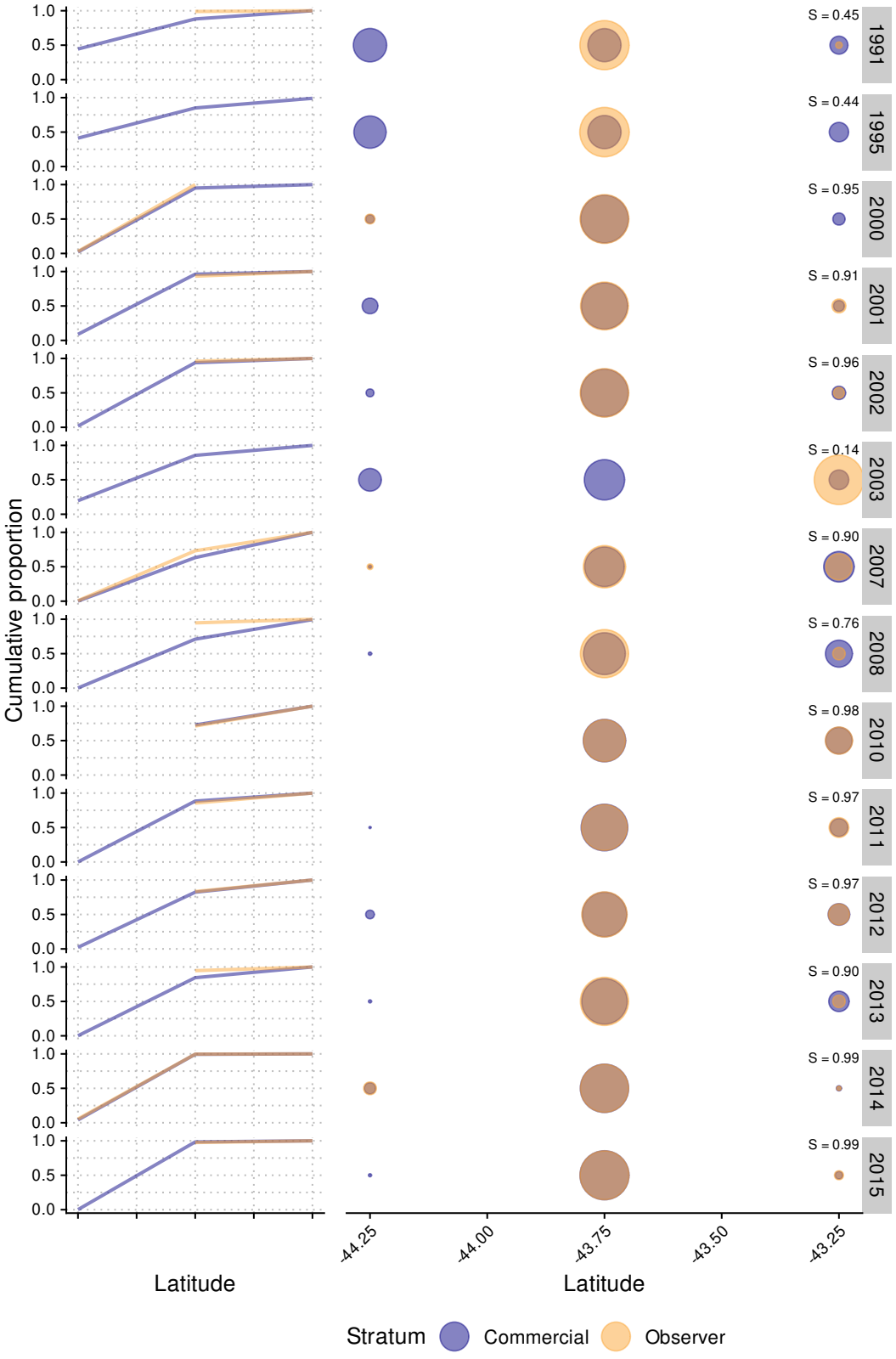


Figure 15: Latitudinal representativeness of observer sampling coverage of Trawl catch in BAR 4, from events where the barracouta catch exceeded the 50kg threshold, in 1991 to 2015. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

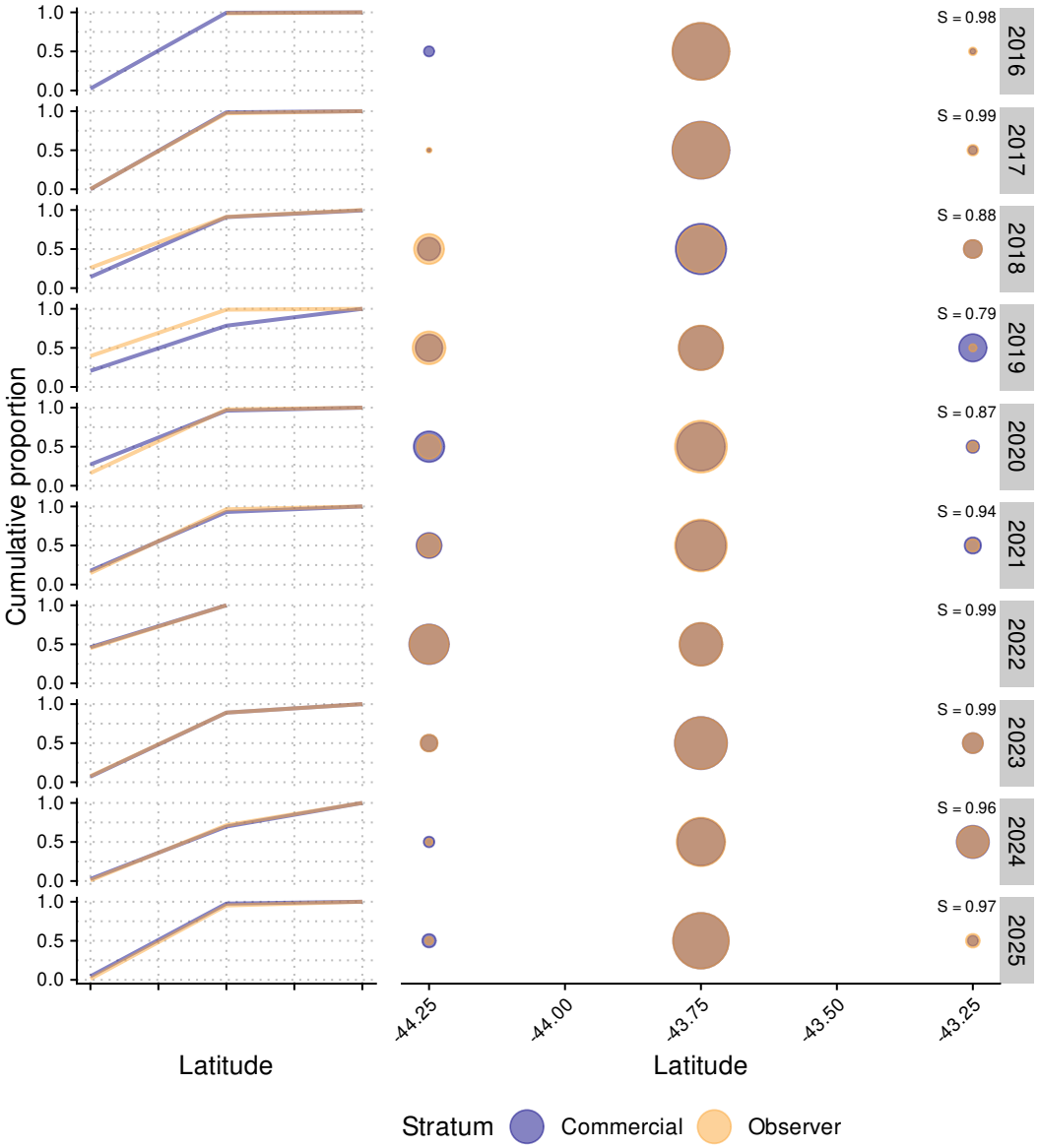


Figure 16: Latitudinal representativeness of observer sampling coverage of Trawl catch in BAR 4, from events where the barracouta catch exceeded the 50kg threshold, in 2016 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

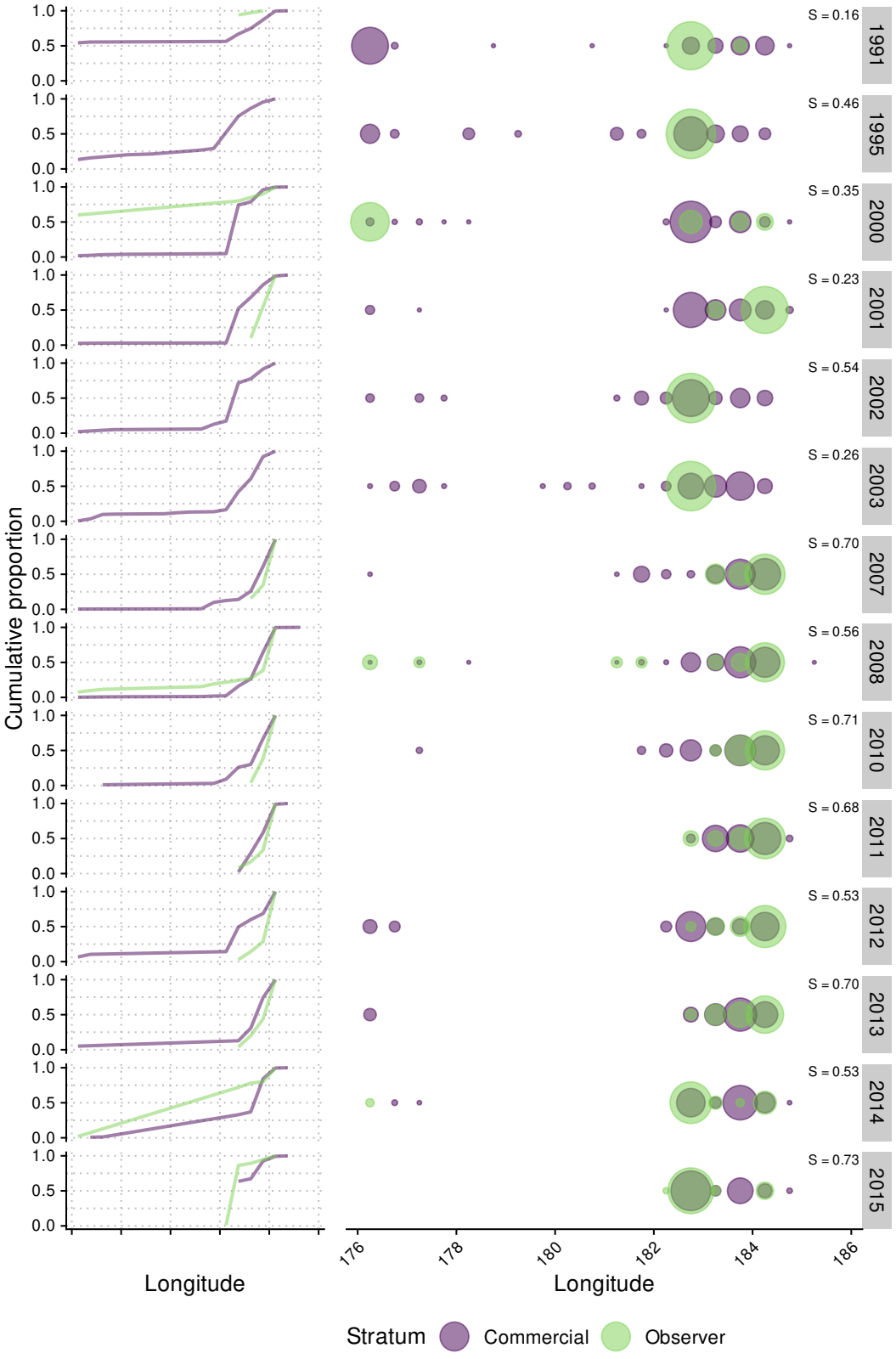


Figure 17: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in BAR 4, where the barracouta catch exceeded the 50kg threshold, in 1991 to 2015. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

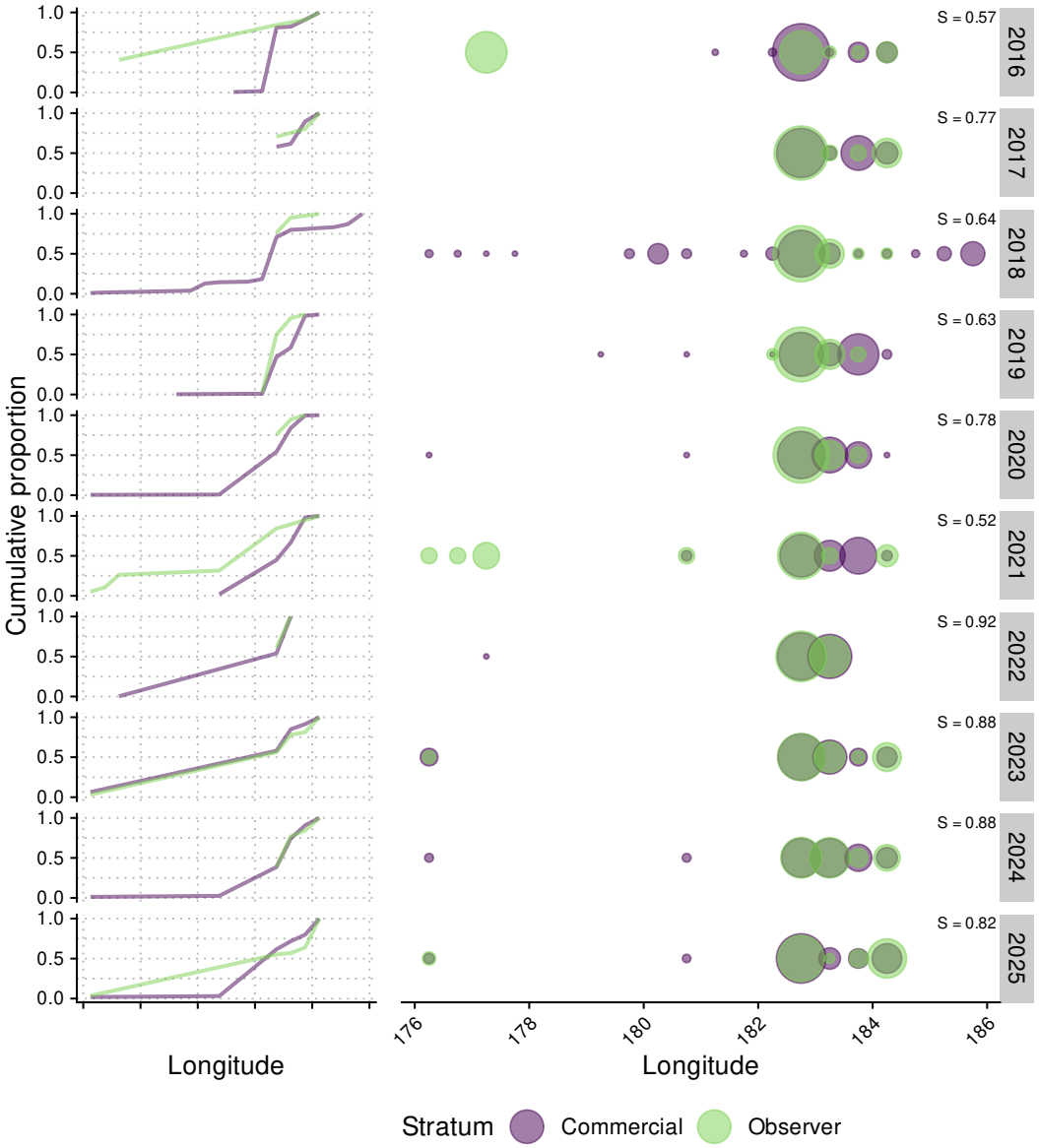


Figure 18: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in BAR 4, where the barracouta catch exceeded the 50kg threshold, in 2016 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

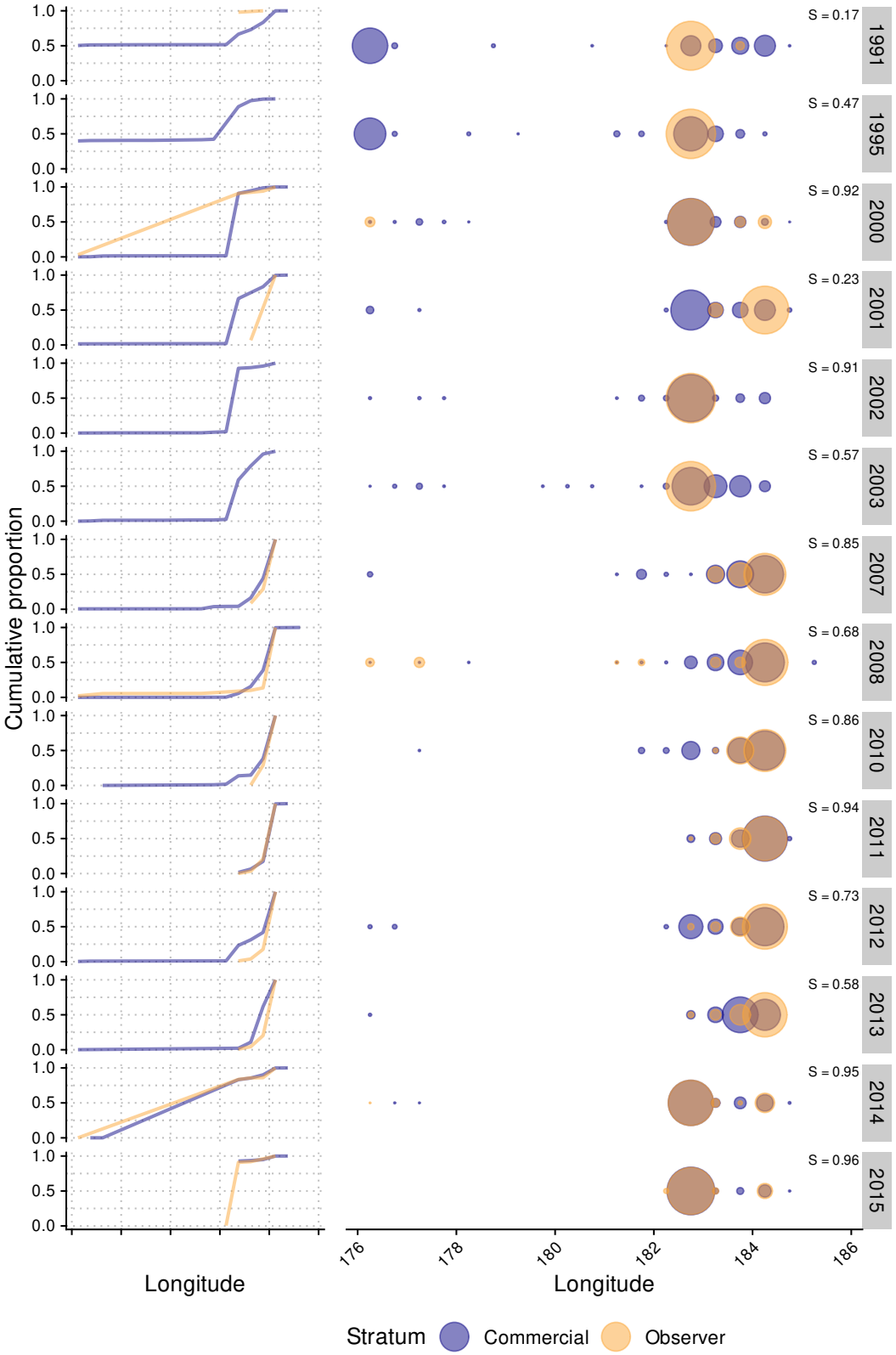


Figure 19: Longitudinal representativeness of observer sampling coverage of Trawl catch in BAR 4, from events where the barracouta catch exceeded the 50kg threshold, in 1991 to 2015. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

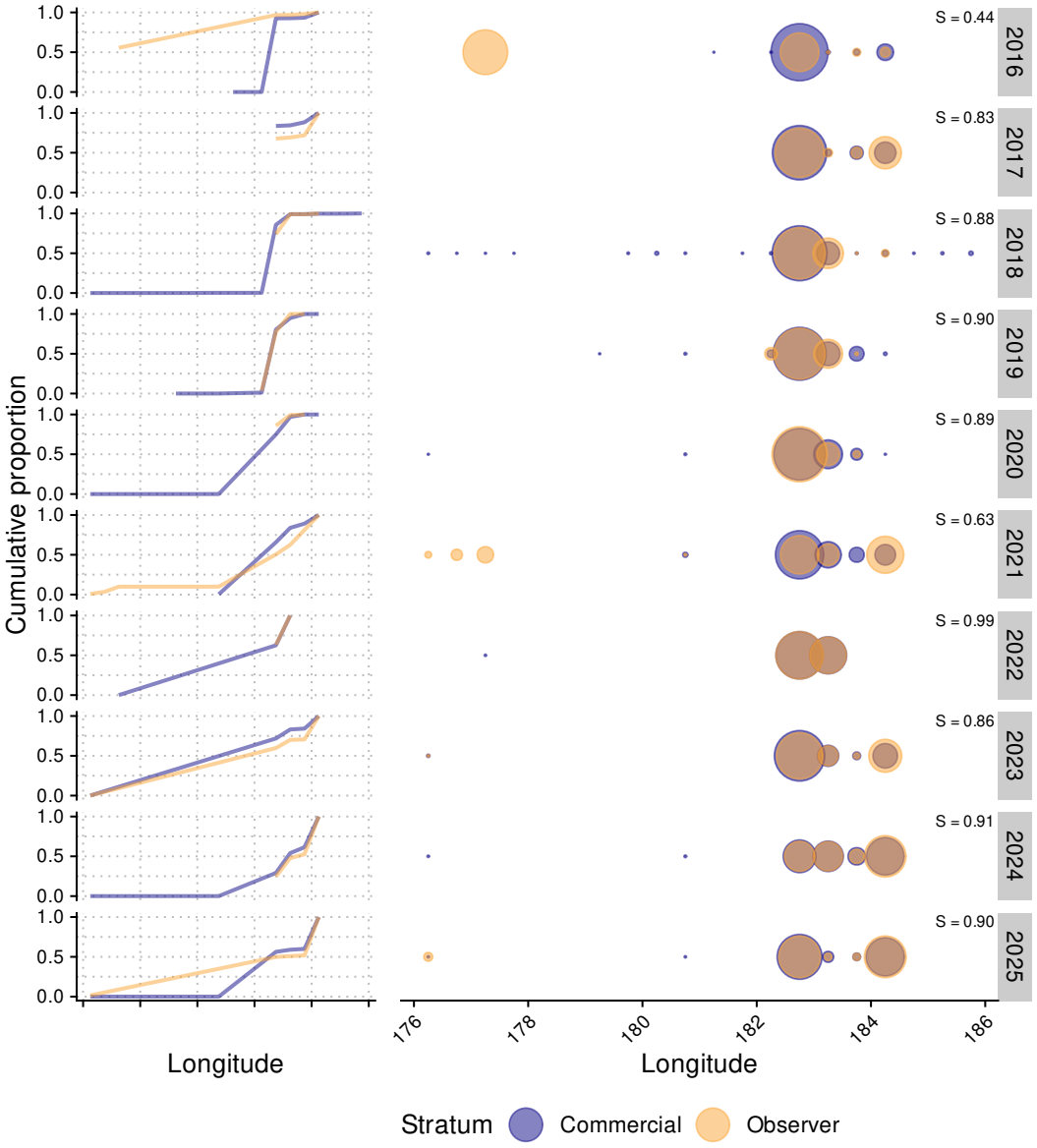


Figure 20: **Longitudinal representativeness of observer sampling coverage of Trawl catch in BAR 4, from events where the barracouta catch exceeded the 50kg threshold, in 2016 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

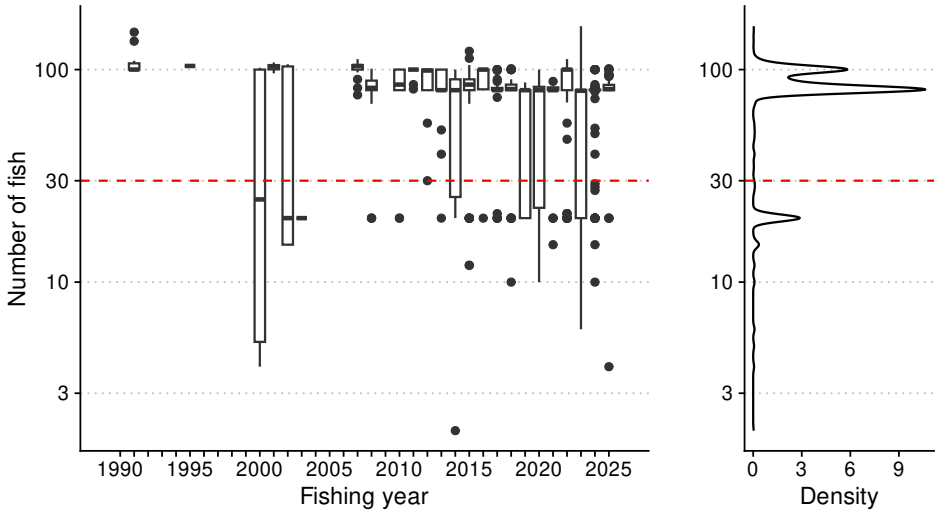


Figure 21: Length-frequency sample sizes for observed fishing events in BAR 4 where barracouta were sampled. The red dashed line indicates a sample size of 30 fish.

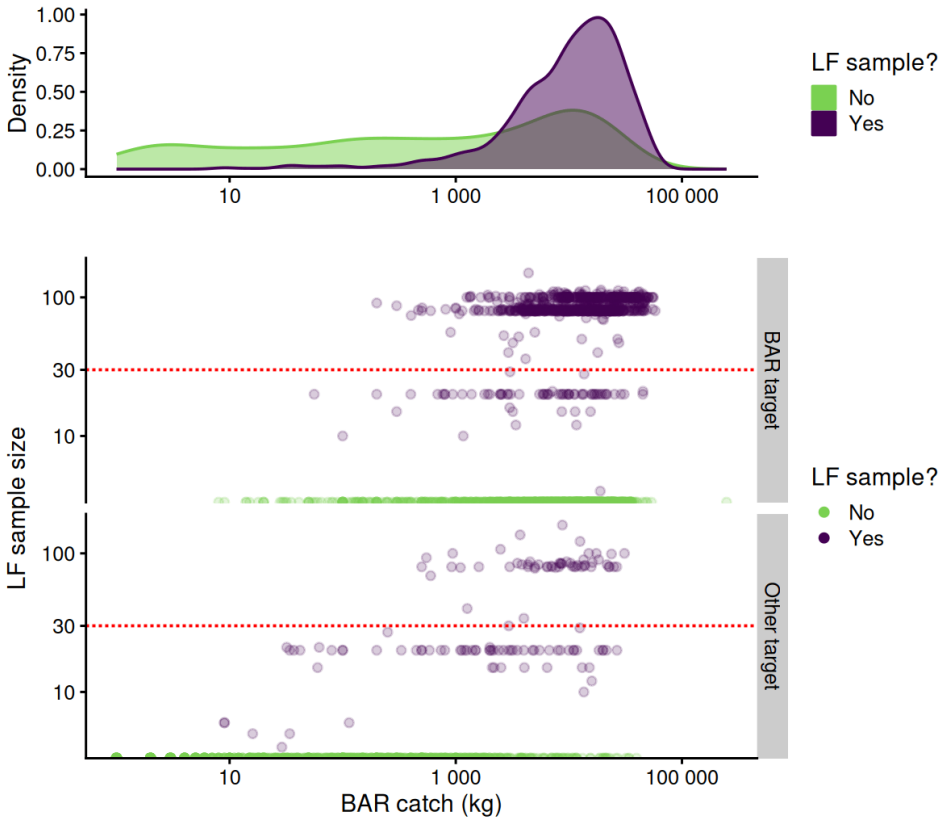


Figure 22: Length-frequency sample sizes (number of fish sampled) for observed fishing events in BAR 4 in relation to the total barracouta catch from an event, separately for barracouta target events and other target species. The red dashed line indicates a sample size of 30 fish.

2.1.1.2 Otolith samples

Table 2: Otolith samples of barracouta from the BAR 4 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of barracouta exceeded a potential sampling threshold of 50 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	322	0	0	0.00
1991	370	0	0	0.00
1992	260	0	0	0.00
1993	293	0	0	0.00
1994	169	0	0	0.00
1995	115	0	0	0.00
1996	478	0	0	0.00
1997	286	0	0	0.00
1998	284	0	0	0.00
1999	62	0	0	0.00
2000	341	0	0	0.00
2001	358	0	0	0.00
2002	263	0	0	0.00
2003	208	0	0	0.00
2004	144	0	0	0.00
2005	92	0	0	0.00
2006	268	0	0	0.00
2007	279	0	0	0.00
2008	417	0	0	0.00
2009	127	0	0	0.00
2010	102	1	4	0.98
2011	89	10	107	11.24
2012	105	26	185	24.76
2013	39	24	200	61.54
2014	247	38	231	15.38
2015	283	0	0	0.00
2016	186	0	0	0.00
2017	297	61	306	20.54
2018	169	40	217	23.67
2019	324	44	358	13.58
2020	273	70	371	25.64
2021	156	19	107	12.18
2022	310	86	556	27.74
2023	93	32	232	34.41
2024	236	93	789	39.41
2025	258	58	558	22.48

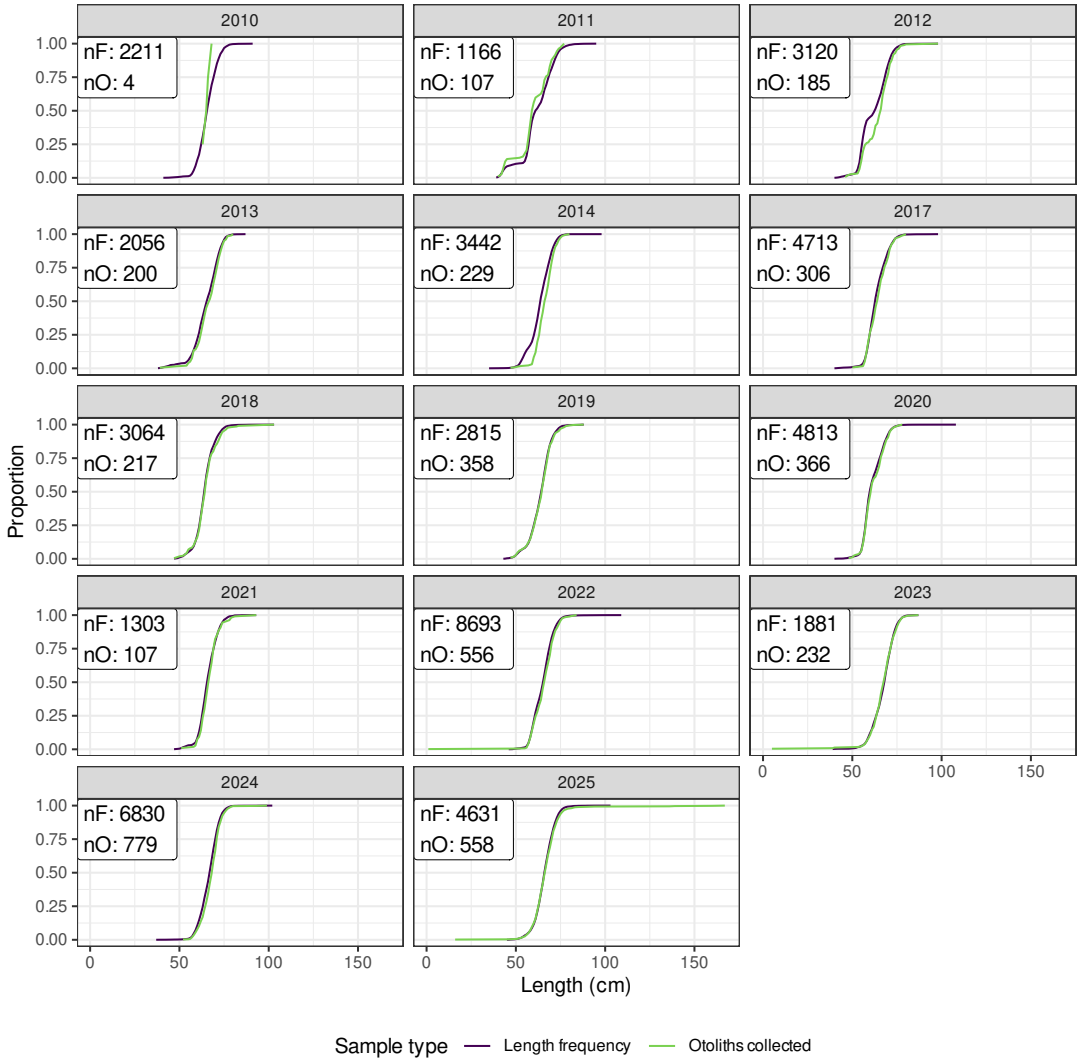


Figure 23: Cumulative distributions of the length of fish in the length frequency and otolith samples of barracouta in the BAR 4 Trawl fishery for the 2010 to 2025 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

2.1.1.3 Catch quantification

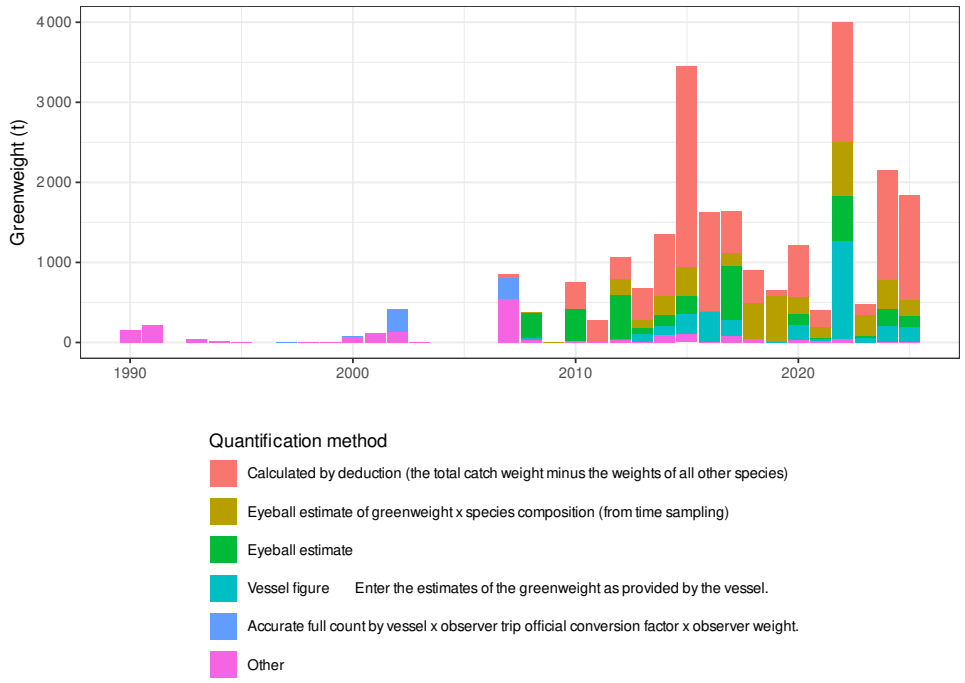


Figure 24: Methods used by observers to quantify the catch of barracouta in the BAR 4 Trawl fishery. The legend lists the methods used in descending order of total catch.

2.1.2 BAR 5: Trawl fishery

2.1.2.1 Length-frequency samples

Table 3: Length-frequency samples of barracouta from the BAR 5 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of barracouta exceeded a potential sampling threshold of 50 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	2 209	1	102	0.05
1991	4 797	23	2 203	0.48
1992	2 320	22	1 897	0.95
1993	4 119	101	3 626	2.45
1994	1 303	155	5 394	11.90
1995	1 889	106	1 791	5.61
1996	3 144	70	3 271	2.23
1997	2 057	31	1 177	1.51
1998	2 606	40	1 583	1.53
1999	3 335	114	4 864	3.42
2000	2 686	184	8 340	6.85
2001	2 191	484	17 094	22.09
2002	2 476	264	9 547	10.66
2003	2 932	264	9 392	9.00
2004	2 251	259	6 847	11.51
2005	2 673	353	8 892	13.21
2006	2 316	318	10 466	13.73
2007	1 370	169	4 833	12.34
2008	1 566	119	2 750	7.60
2009	1 647	131	3 998	7.95
2010	1 815	169	5 708	9.31
2011	2 045	188	6 641	9.19
2012	1 768	228	8 721	12.90
2013	1 796	485	22 472	27.00
2014	1 545	340	13 821	22.01
2015	1 492	274	10 660	18.36
2016	1 506	437	20 169	29.02
2017	1 745	387	21 683	22.18
2018	1 545	339	16 353	21.94
2019	2 031	358	14 527	17.63
2020	2 497	451	17 734	18.06
2021	1 818	313	13 066	17.22
2022	1 575	339	14 576	21.52
2023	1 360	237	14 065	17.43
2024	1 700	318	16 681	18.71
2025	1 587	236	14 955	14.87

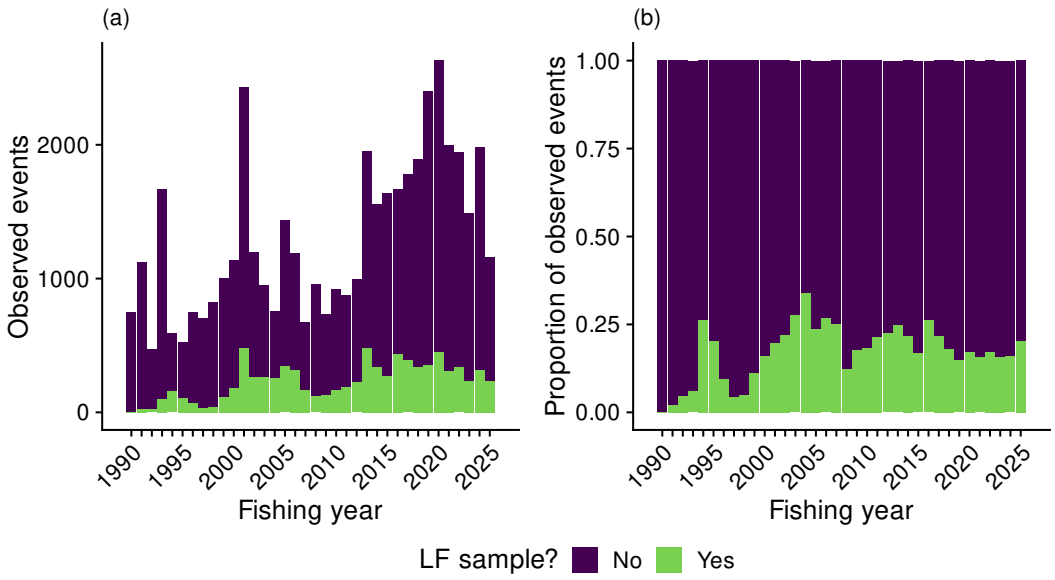


Figure 25: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in BAR 5 where the barracouta catch exceeded the 50 kg threshold, with and without length-frequency sampling.**

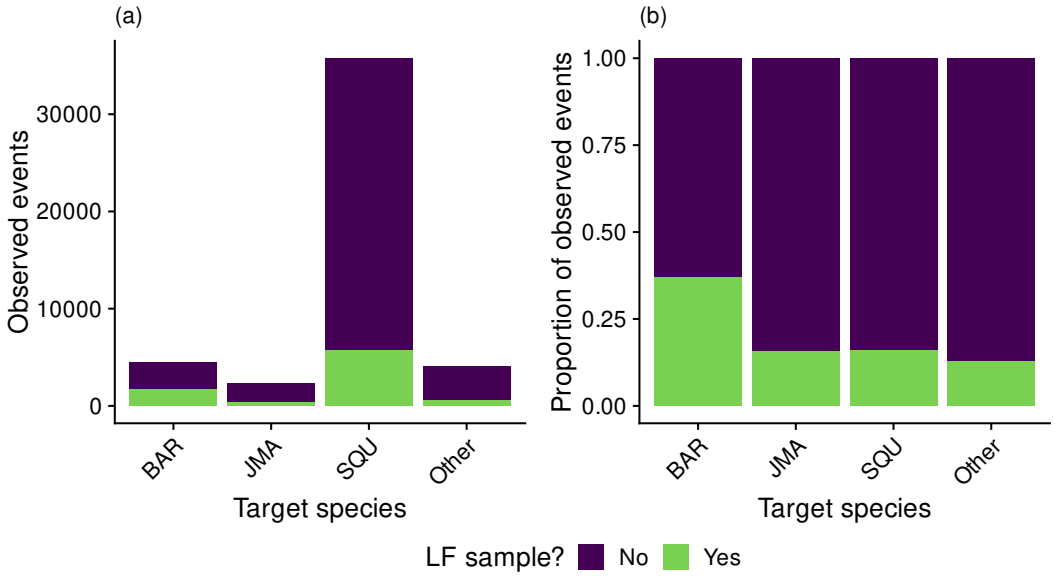


Figure 26: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in BAR 5 where the barracouta catch exceeded the 50 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

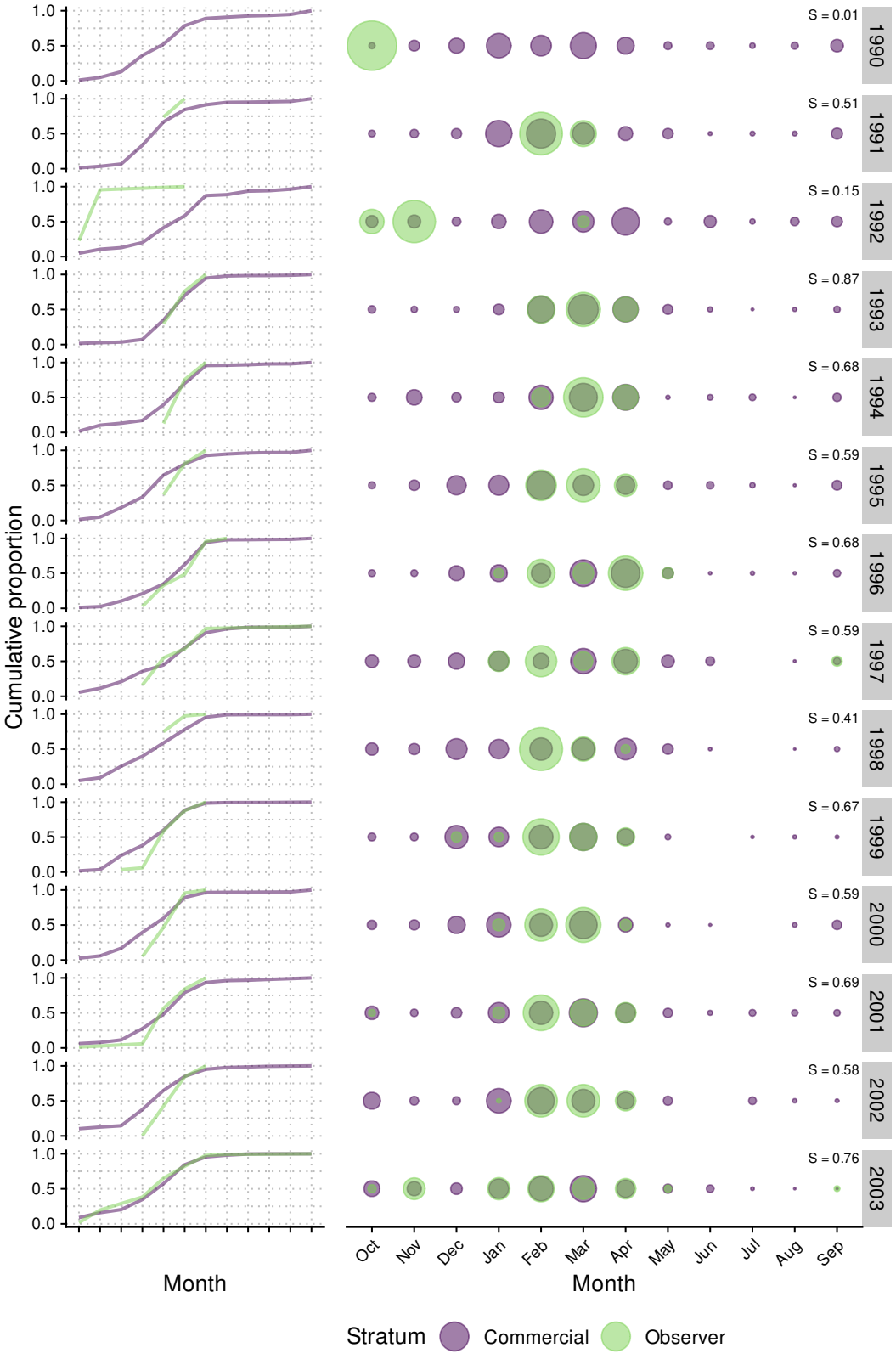


Figure 27: Monthly representativeness of observer sampling coverage of Trawl fishing events in BAR 5, where the barracouta catch exceeded the 50kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

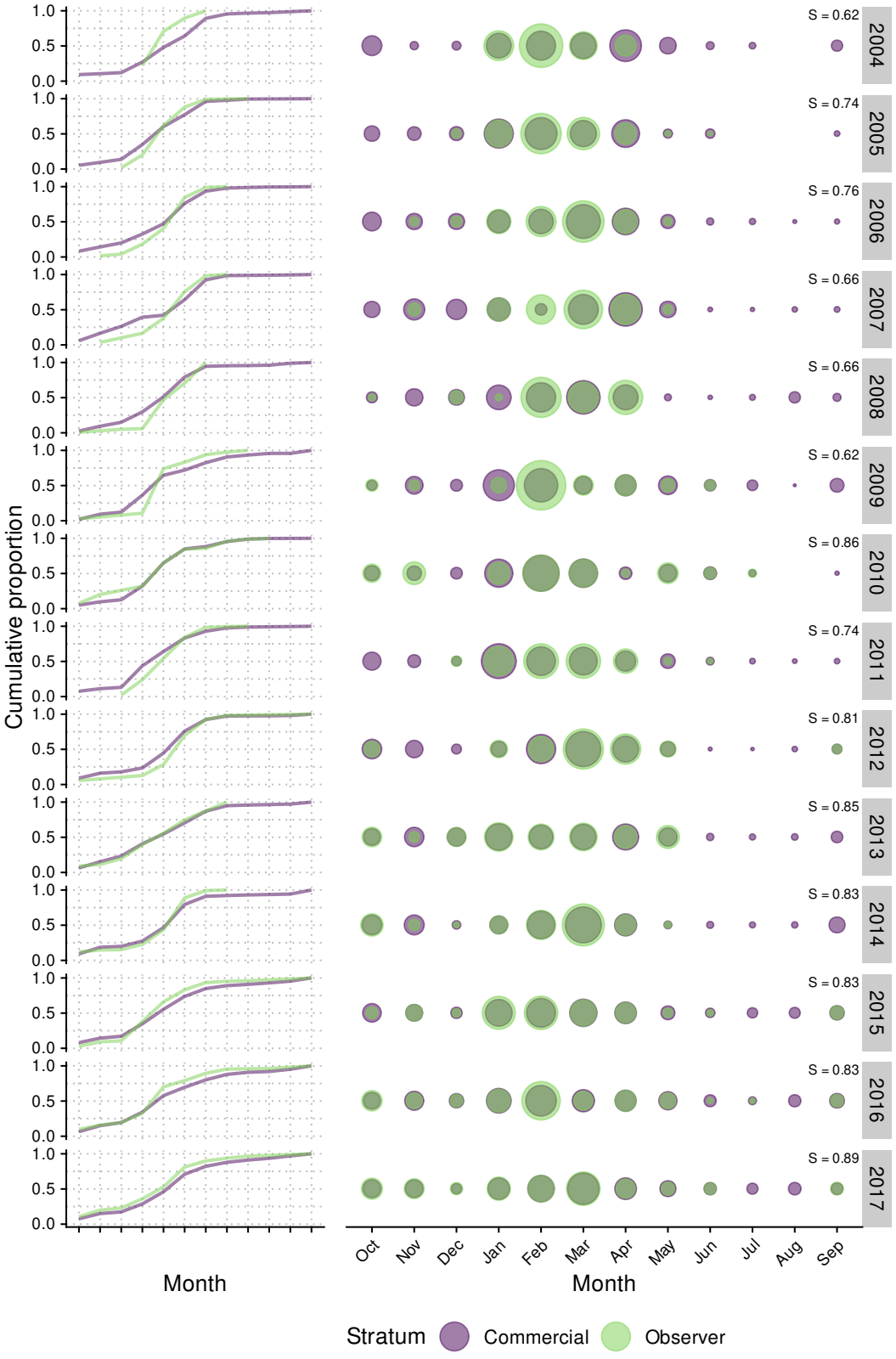


Figure 28: Monthly representativeness of observer sampling coverage of Trawl fishing events in BAR 5, where the barracouta catch exceeded the 50kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

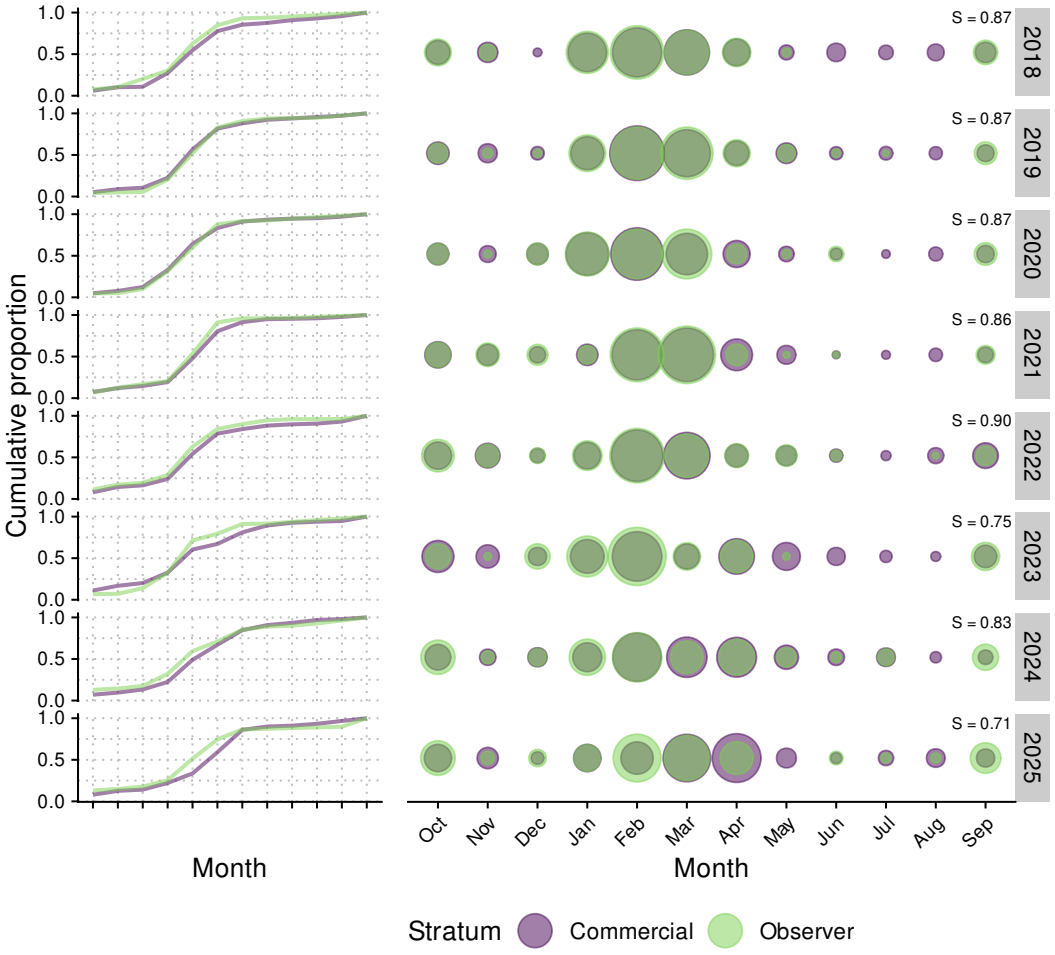


Figure 29: Monthly representativeness of observer sampling coverage of Trawl fishing events in BAR 5, where the barracouta catch exceeded the 50kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

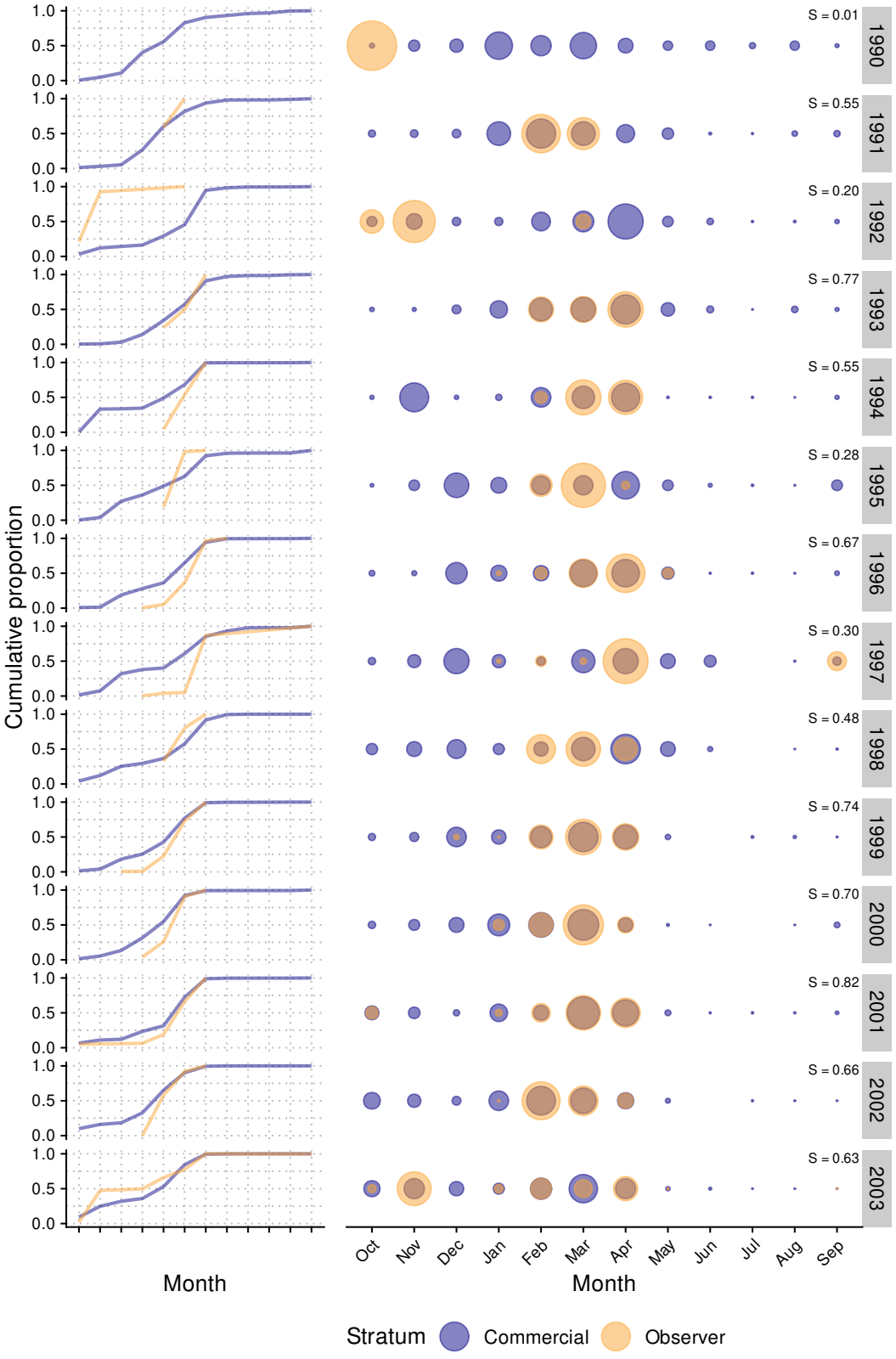


Figure 30: Monthly representativeness of observer sampling coverage of Trawl catch in BAR 5, from events where the barracouta catch exceeded the 50kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

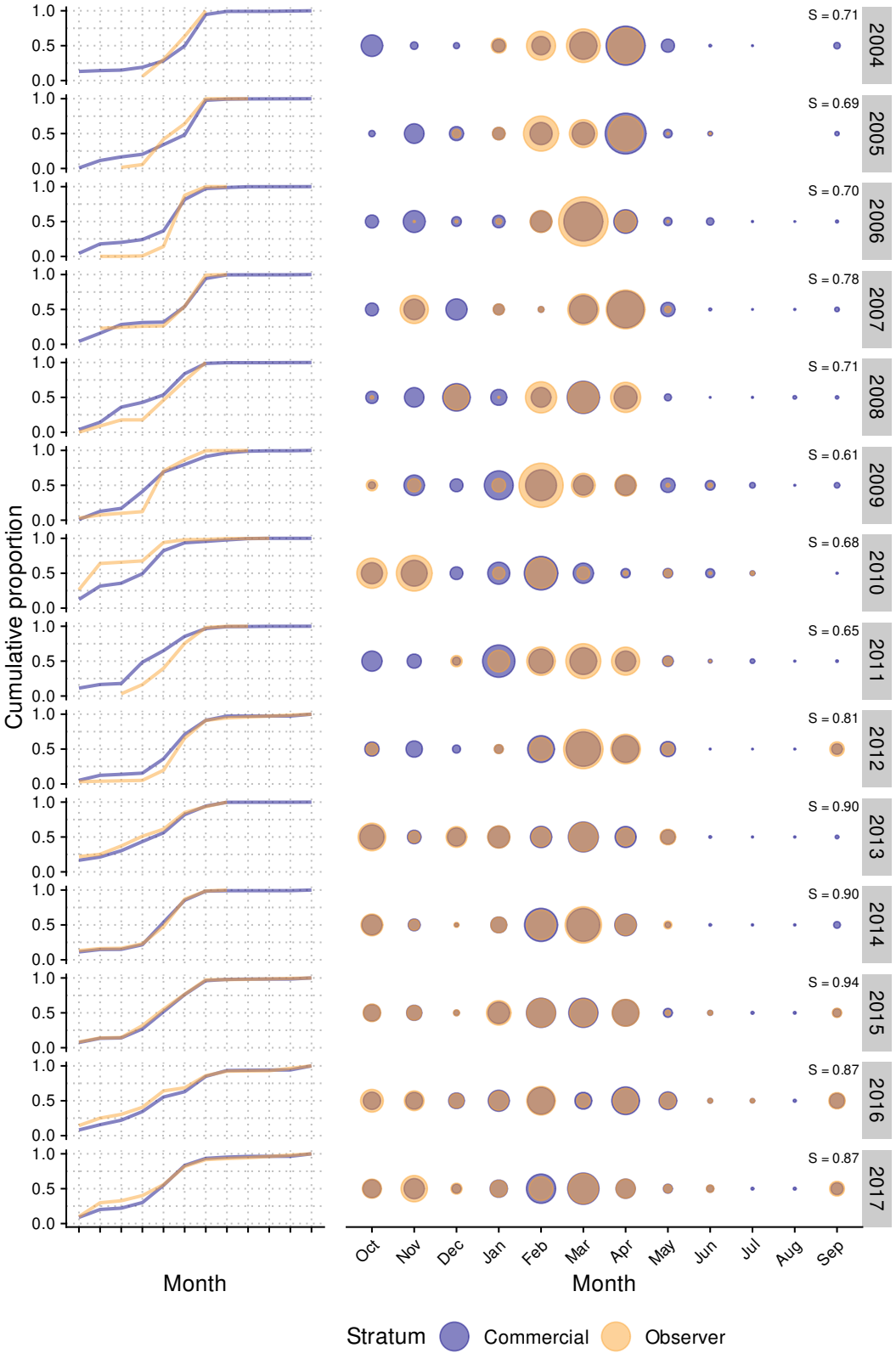


Figure 31: Monthly representativeness of observer sampling coverage of Trawl catch in BAR 5, from events where the barracouta catch exceeded the 50kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

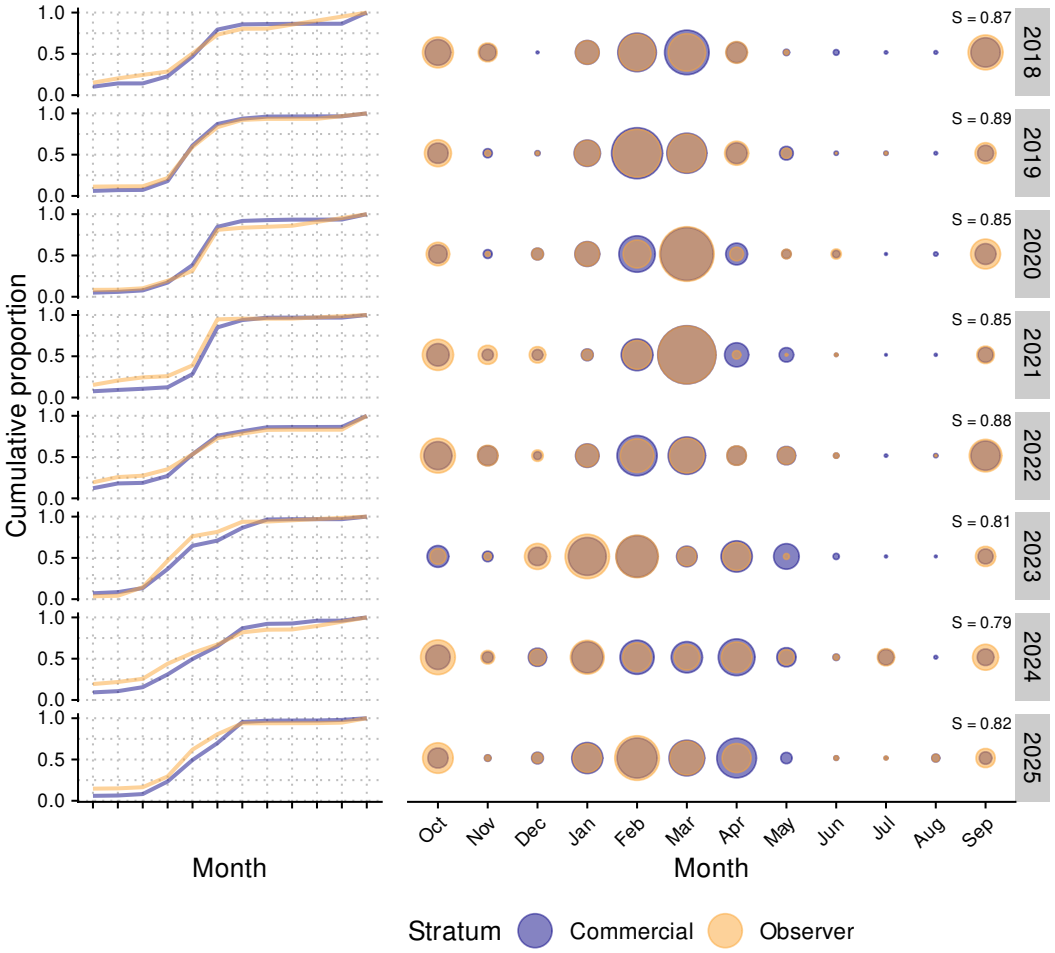


Figure 32: Monthly representativeness of observer sampling coverage of Trawl catch in BAR 5, from events where the barracouta catch exceeded the 50kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

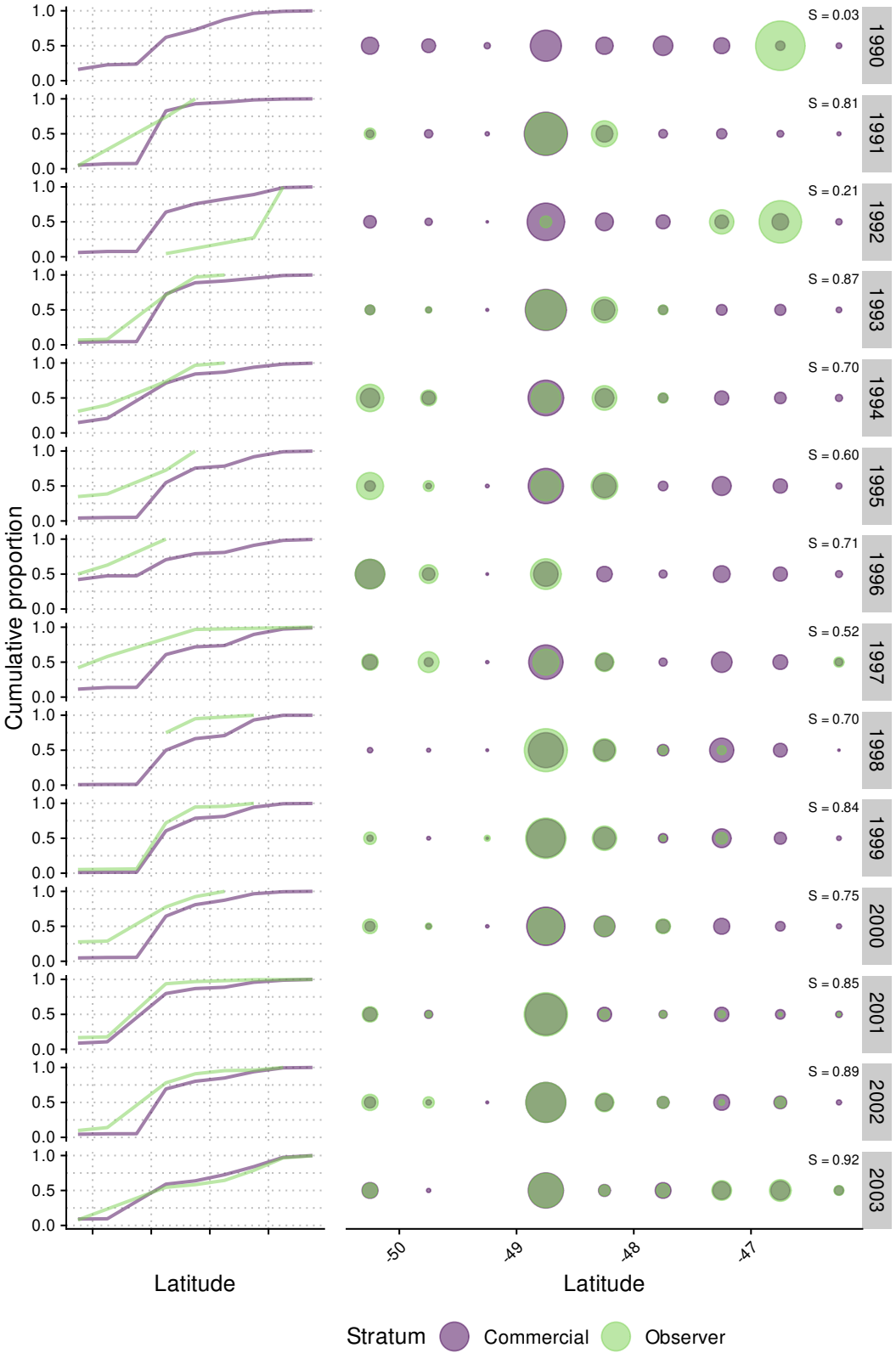


Figure 33: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in BAR 5, where the barracouta catch exceeded the 50kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

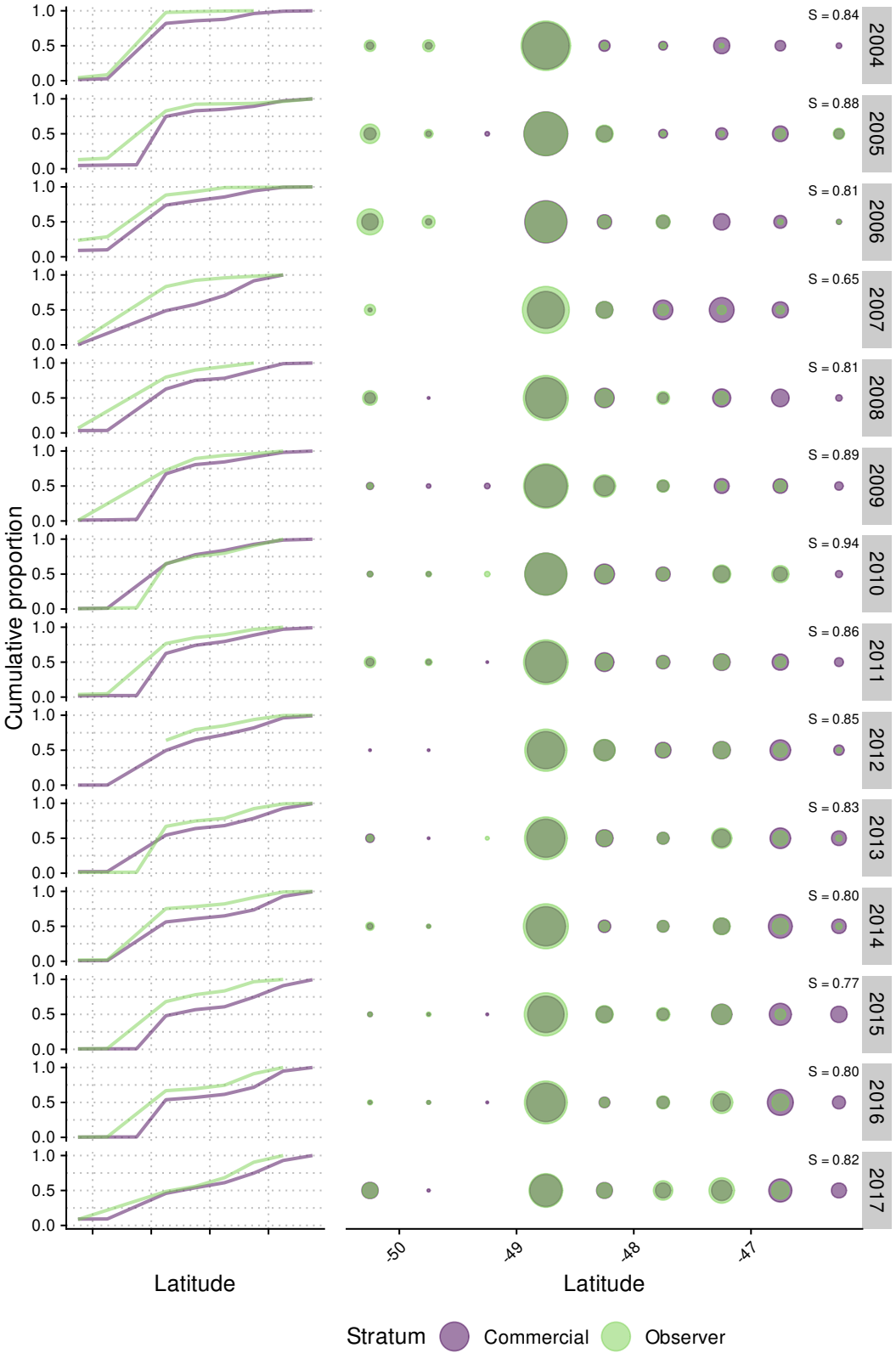


Figure 34: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in BAR 5, where the barracouta catch exceeded the 50kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

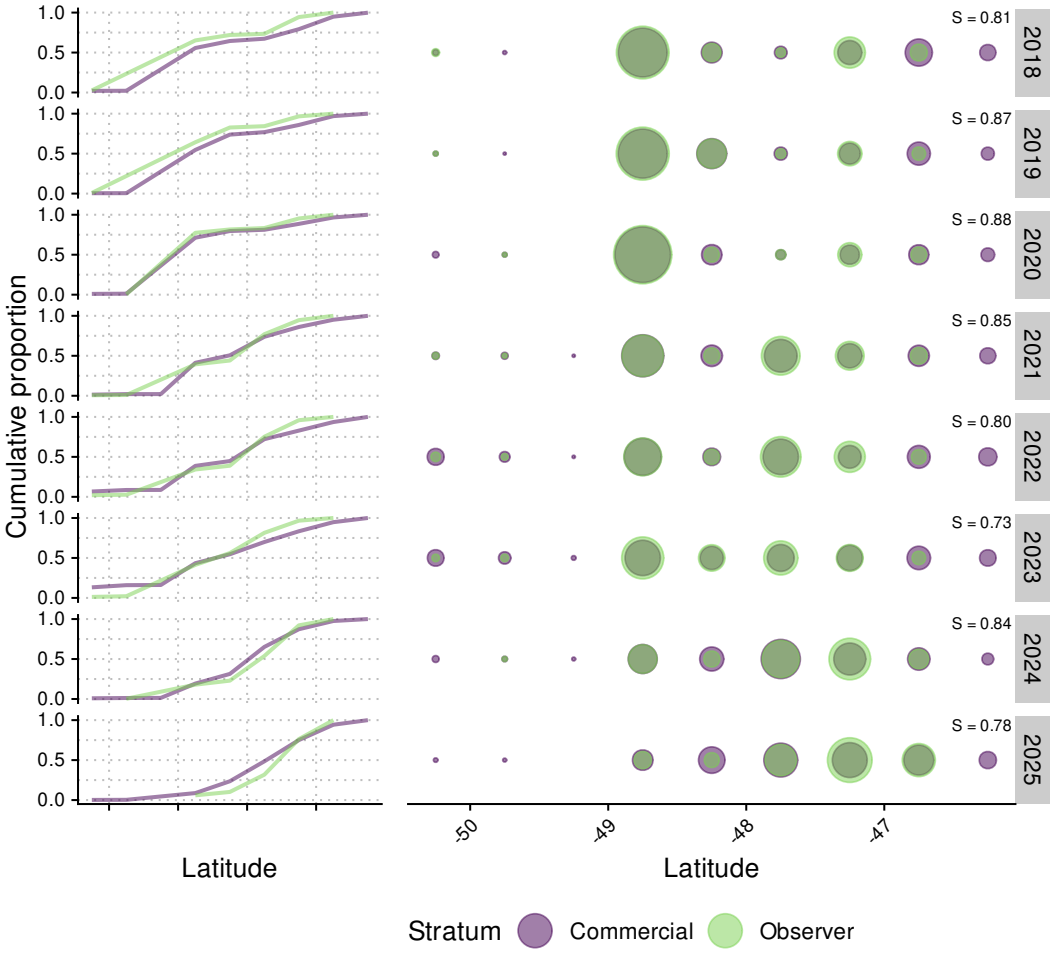


Figure 35: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in BAR 5, where the barracouta catch exceeded the 50kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

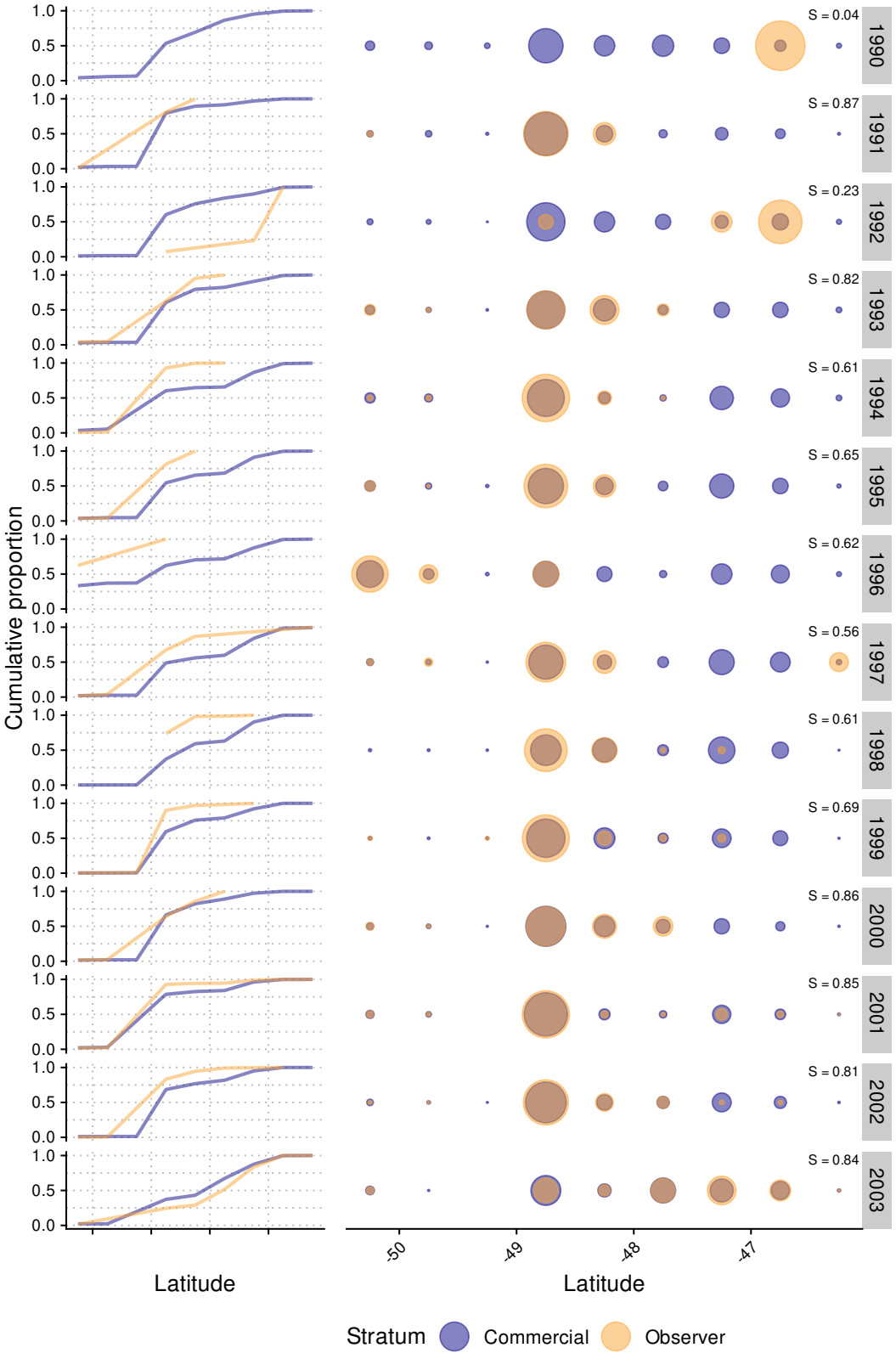


Figure 36: Latitudinal representativeness of observer sampling coverage of Trawl catch in BAR 5, from events where the barracouta catch exceeded the 50kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

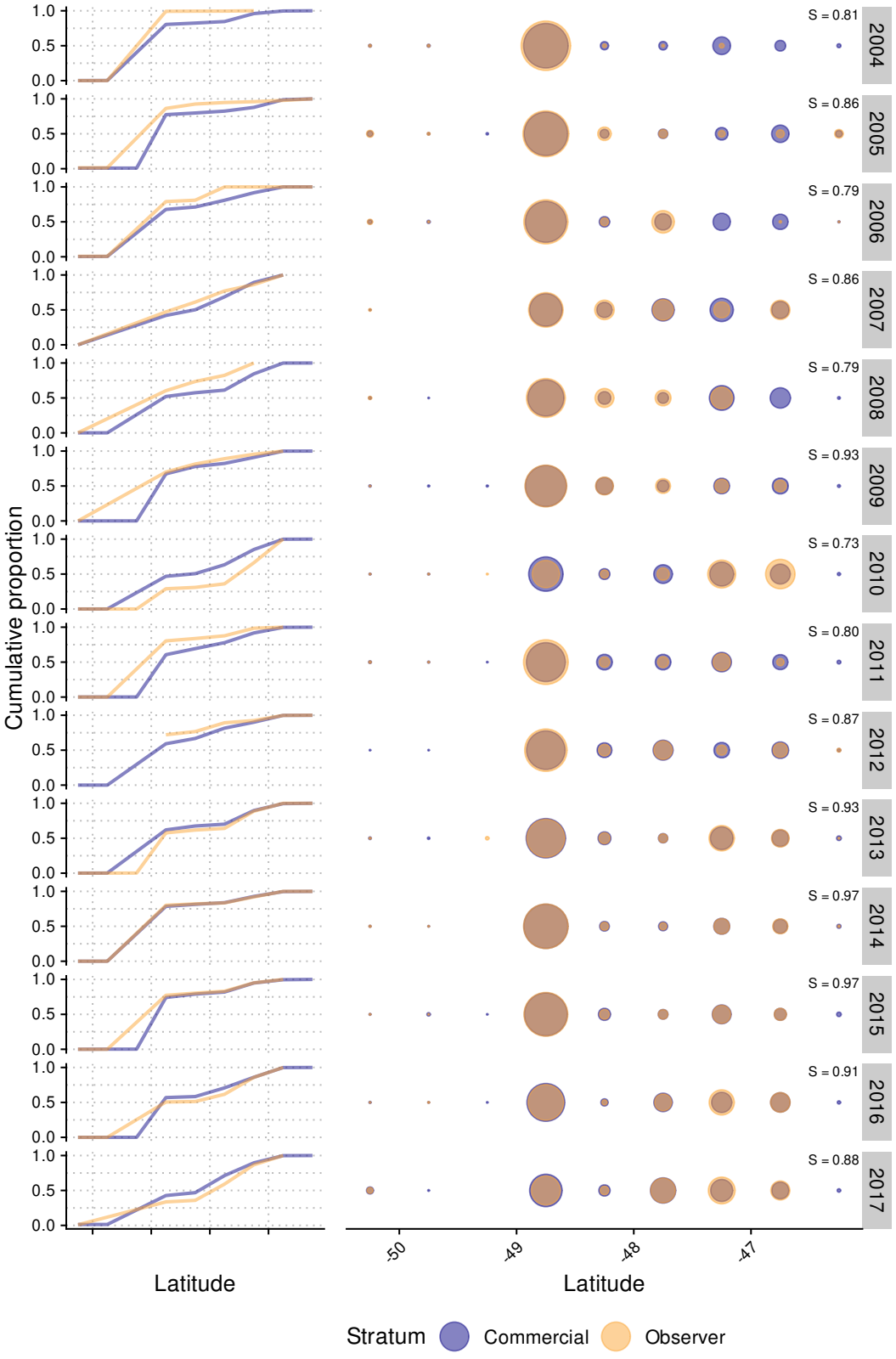


Figure 37: Latitudinal representativeness of observer sampling coverage of Trawl catch in BAR 5, from events where the barracouta catch exceeded the 50kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

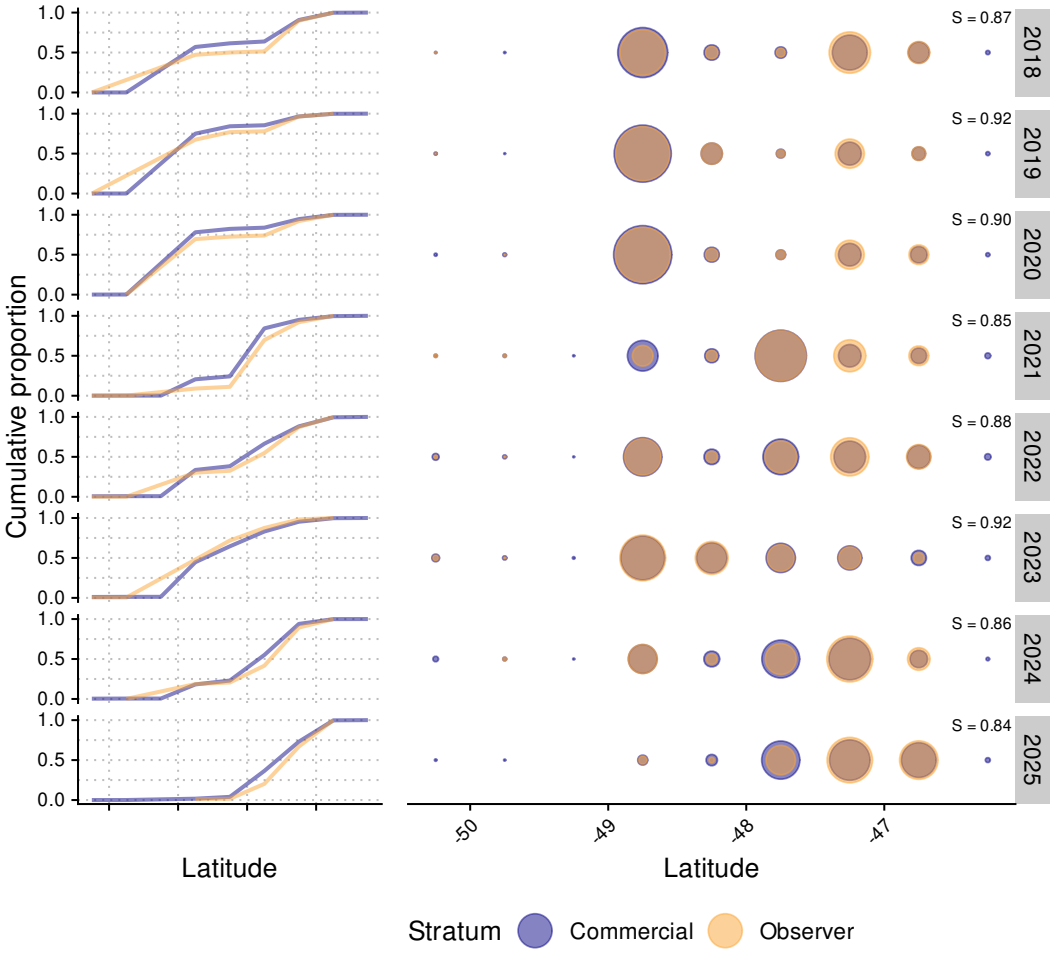


Figure 38: Latitudinal representativeness of observer sampling coverage of Trawl catch in BAR 5, from events where the barracouta catch exceeded the 50kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

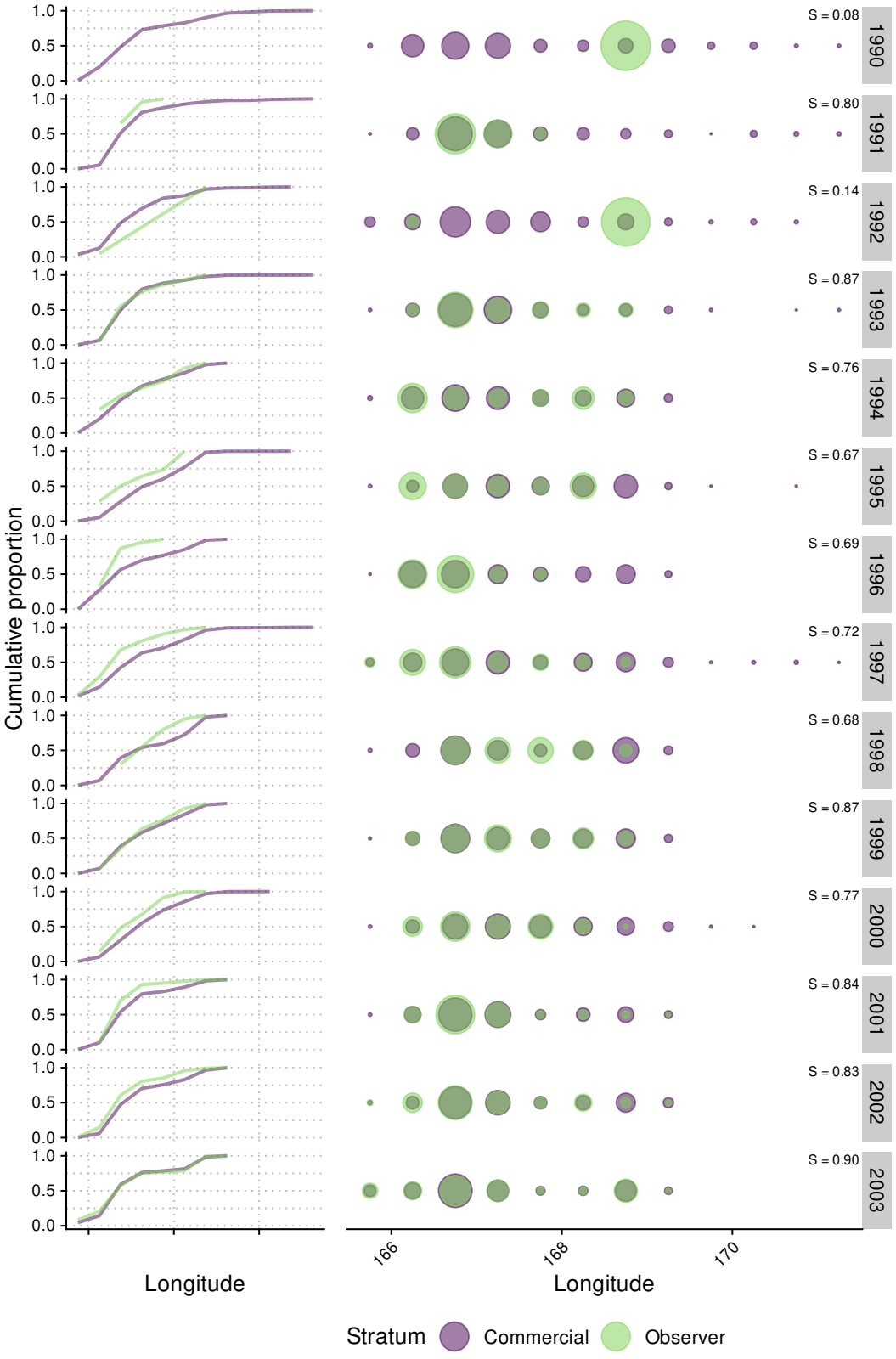


Figure 39: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in BAR 5, where the barracouta catch exceeded the 50kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

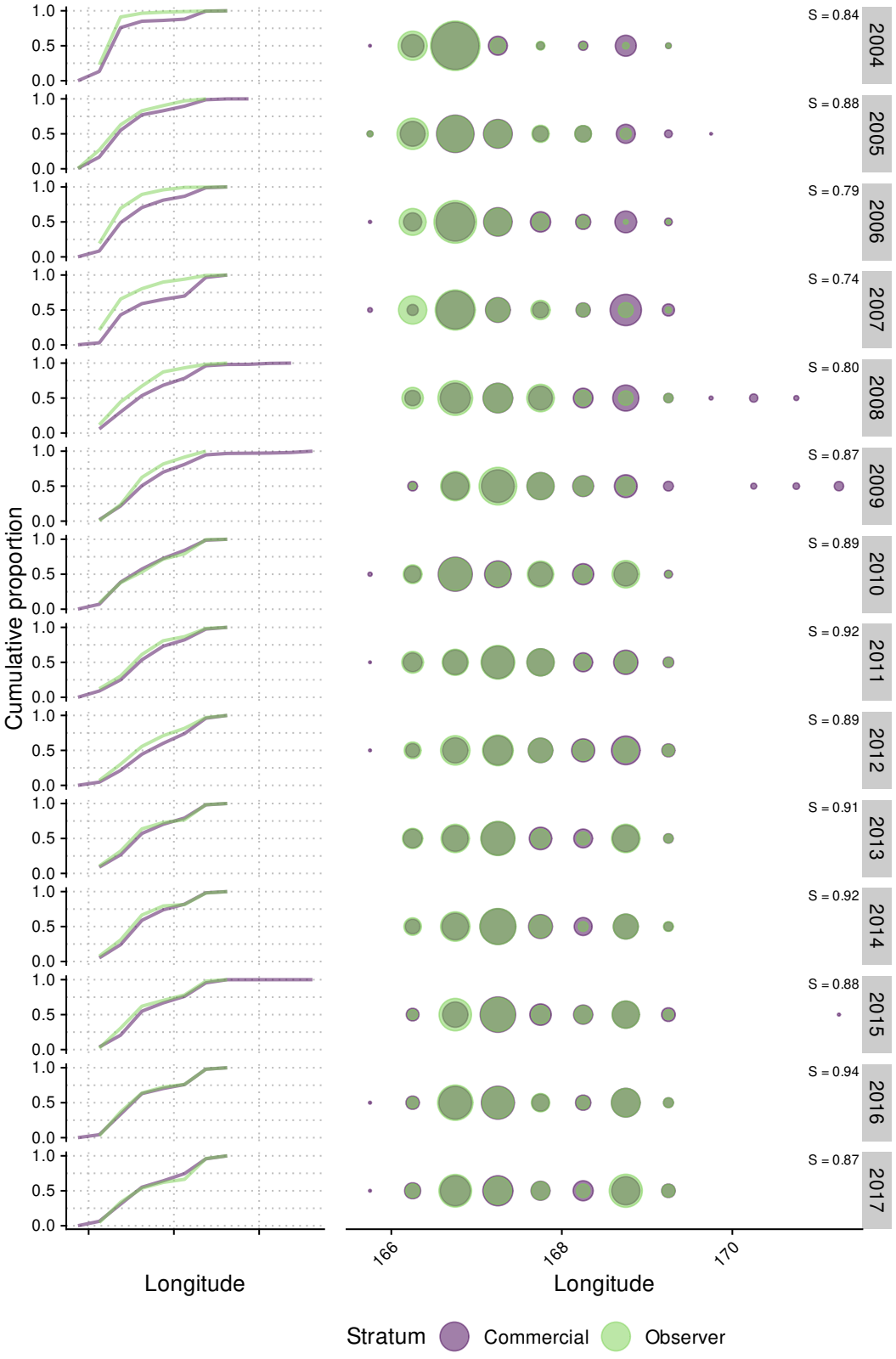


Figure 40: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in BAR 5, where the barracouta catch exceeded the 50kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

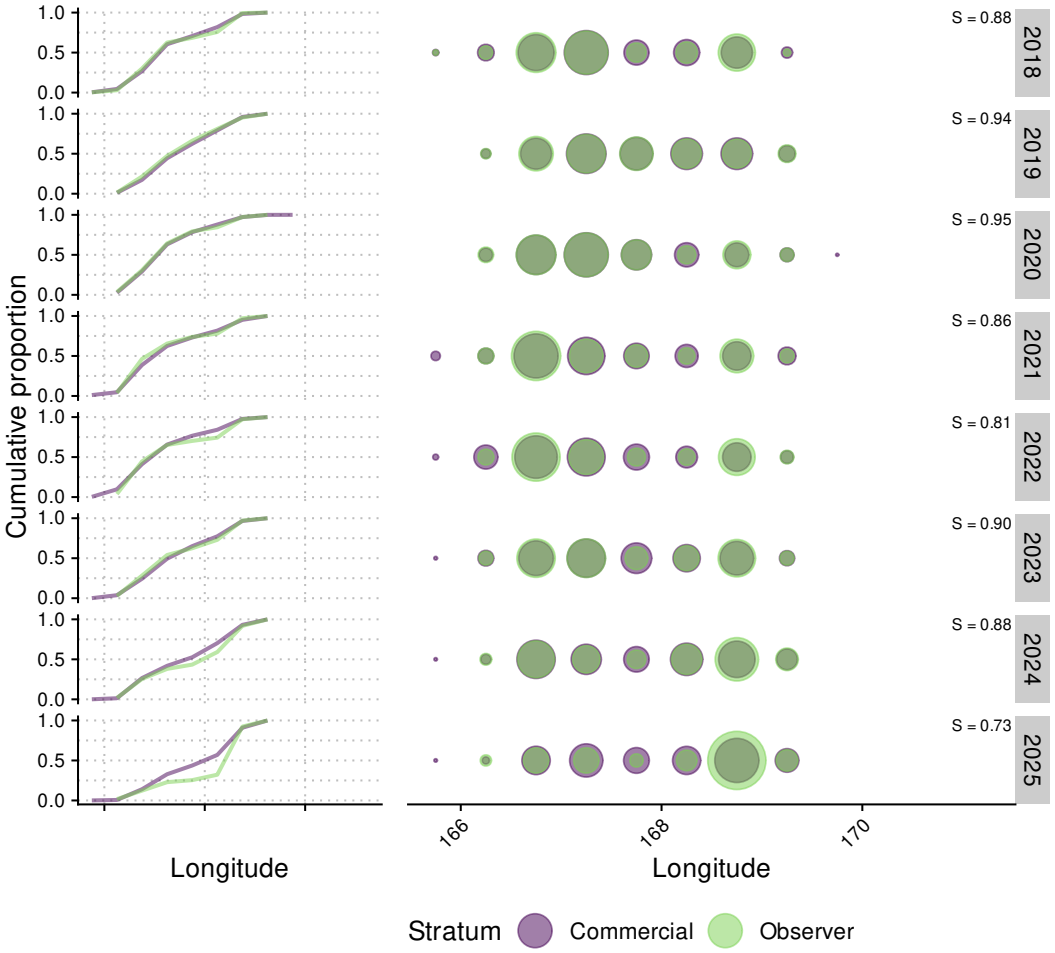


Figure 41: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in BAR 5, where the barracouta catch exceeded the 50kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

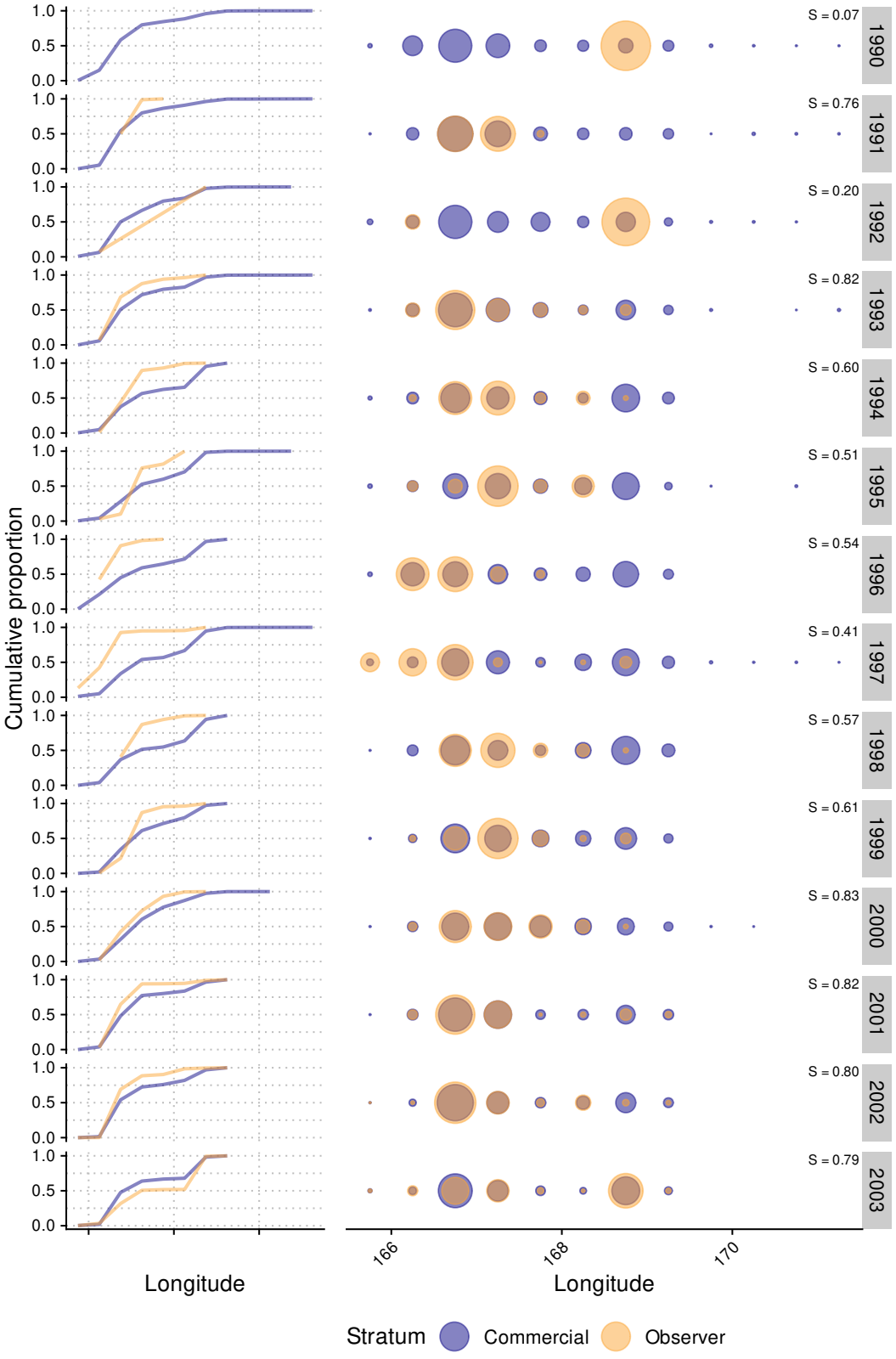


Figure 42: Longitudinal representativeness of observer sampling coverage of Trawl catch in BAR 5, from events where the barracouta catch exceeded the 50kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

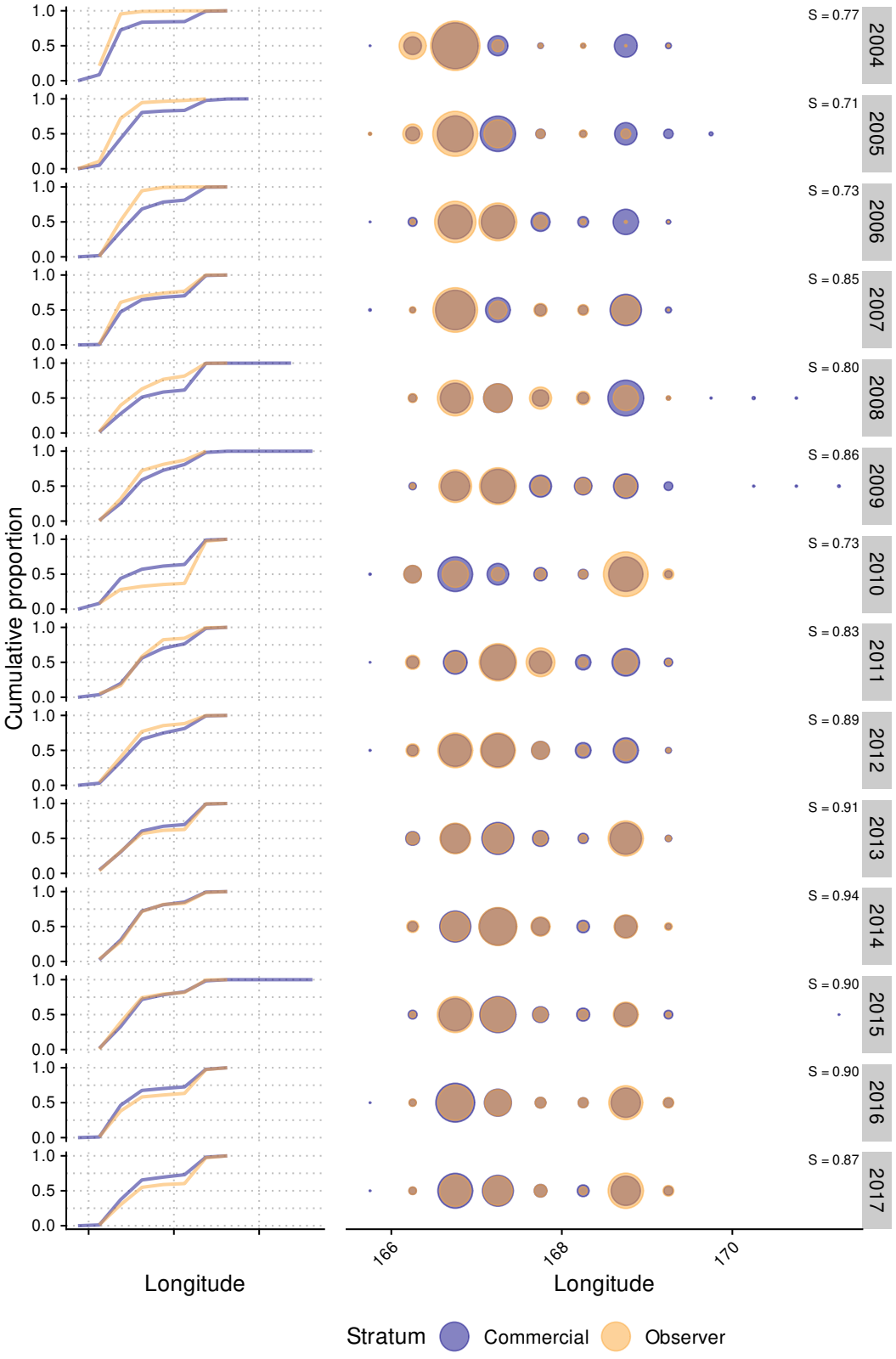


Figure 43: Longitudinal representativeness of observer sampling coverage of Trawl catch in BAR 5, from events where the barracouta catch exceeded the 50kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

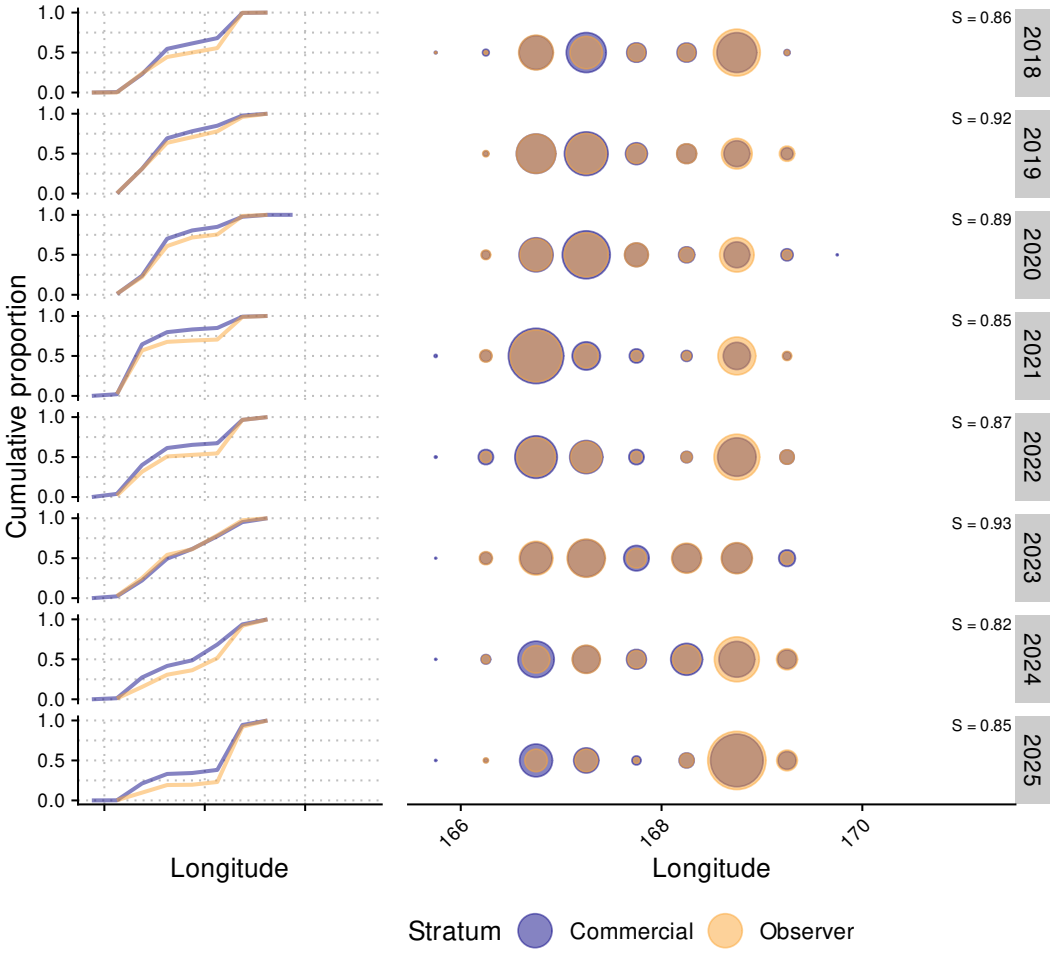


Figure 44: **Longitudinal representativeness of observer sampling coverage of Trawl catch in BAR 5, from events where the barracouta catch exceeded the 50kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

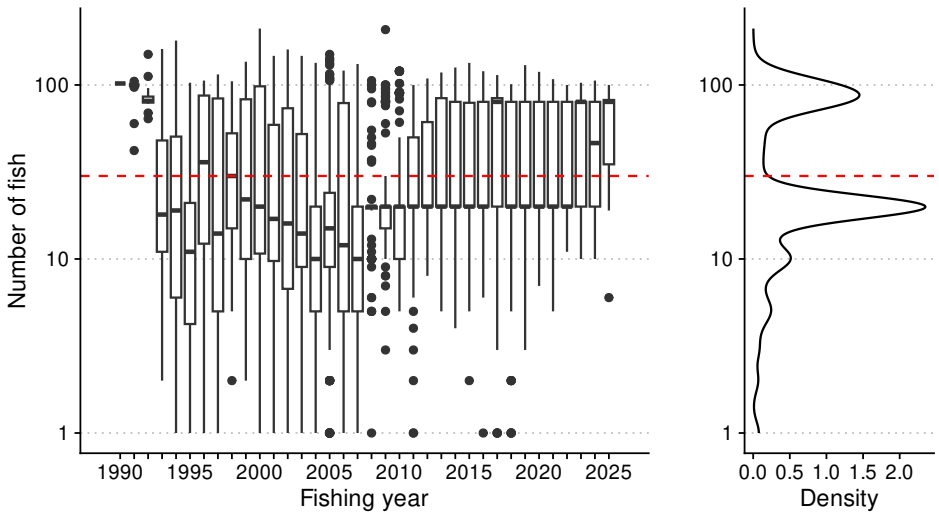


Figure 45: **Length-frequency sample sizes for observed fishing events in BAR 5 where barracouta were sampled. The red dashed line indicates a sample size of 30 fish.**

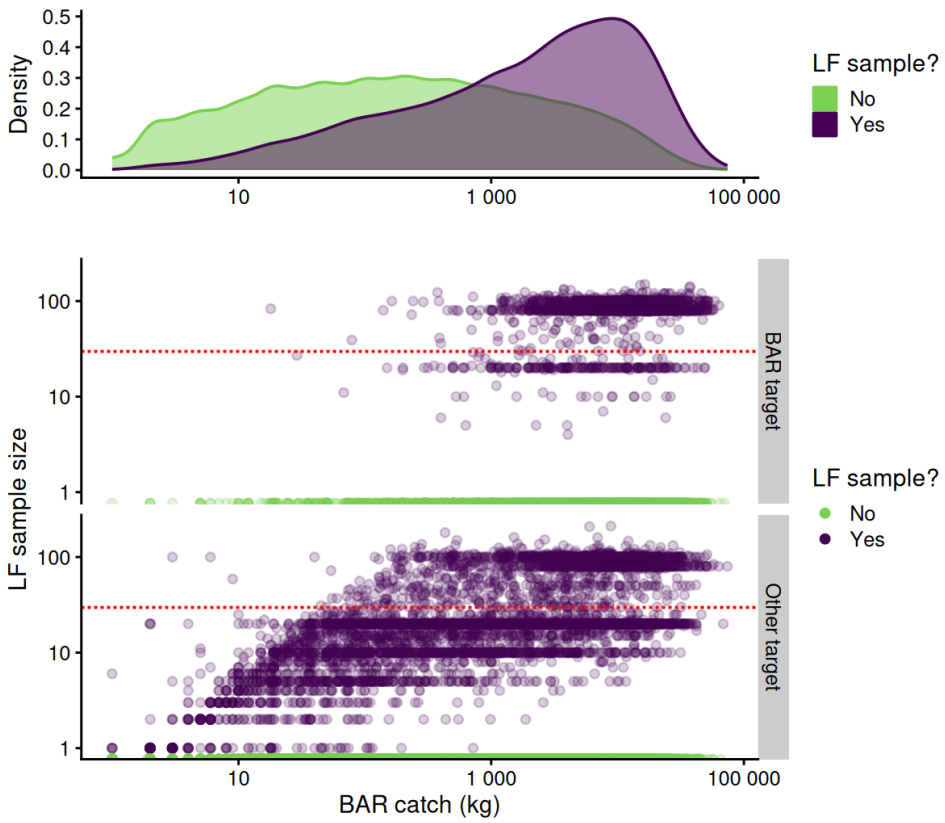


Figure 46: Length-frequency sample sizes (number of fish sampled) for observed fishing events in BAR 5 in relation to the total barracouta catch from an event, separately for barracouta target events and other target species. The red dashed line indicates a sample size of 30 fish.

2.1.2.2 Otolith samples

Table 4: Otolith samples of barracouta from the BAR 5 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of barracouta exceeded a potential sampling threshold of 50 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	2 209	0	0	0.00
1991	4 797	0	0	0.00
1992	2 320	0	0	0.00
1993	4 119	0	0	0.00
1994	1 303	0	0	0.00
1995	1 889	0	0	0.00
1996	3 144	0	0	0.00
1997	2 057	0	0	0.00
1998	2 606	0	0	0.00
1999	3 335	0	0	0.00
2000	2 686	0	0	0.00
2001	2 191	0	0	0.00
2002	2 476	0	0	0.00
2003	2 932	0	0	0.00
2004	2 251	0	0	0.00
2005	2 673	0	0	0.00
2006	2 316	0	0	0.00
2007	1 370	0	0	0.00
2008	1 566	0	0	0.00
2009	1 647	14	92	0.85
2010	1 815	129	715	7.11
2011	2 045	124	679	6.06
2012	1 768	175	968	9.90
2013	1 796	328	1 926	18.26
2014	1 545	307	1 547	19.87
2015	1 492	62	315	4.16
2016	1 506	121	608	8.03
2017	1 745	294	1 708	16.85
2018	1 545	328	1 899	21.23
2019	2 031	335	1 857	16.49
2020	2 497	421	2 204	16.86
2021	1 818	241	1 277	13.26
2022	1 575	334	2 056	21.21
2023	1 360	234	1 934	17.21
2024	1 700	307	2 412	18.06
2025	1 587	212	1 673	13.36

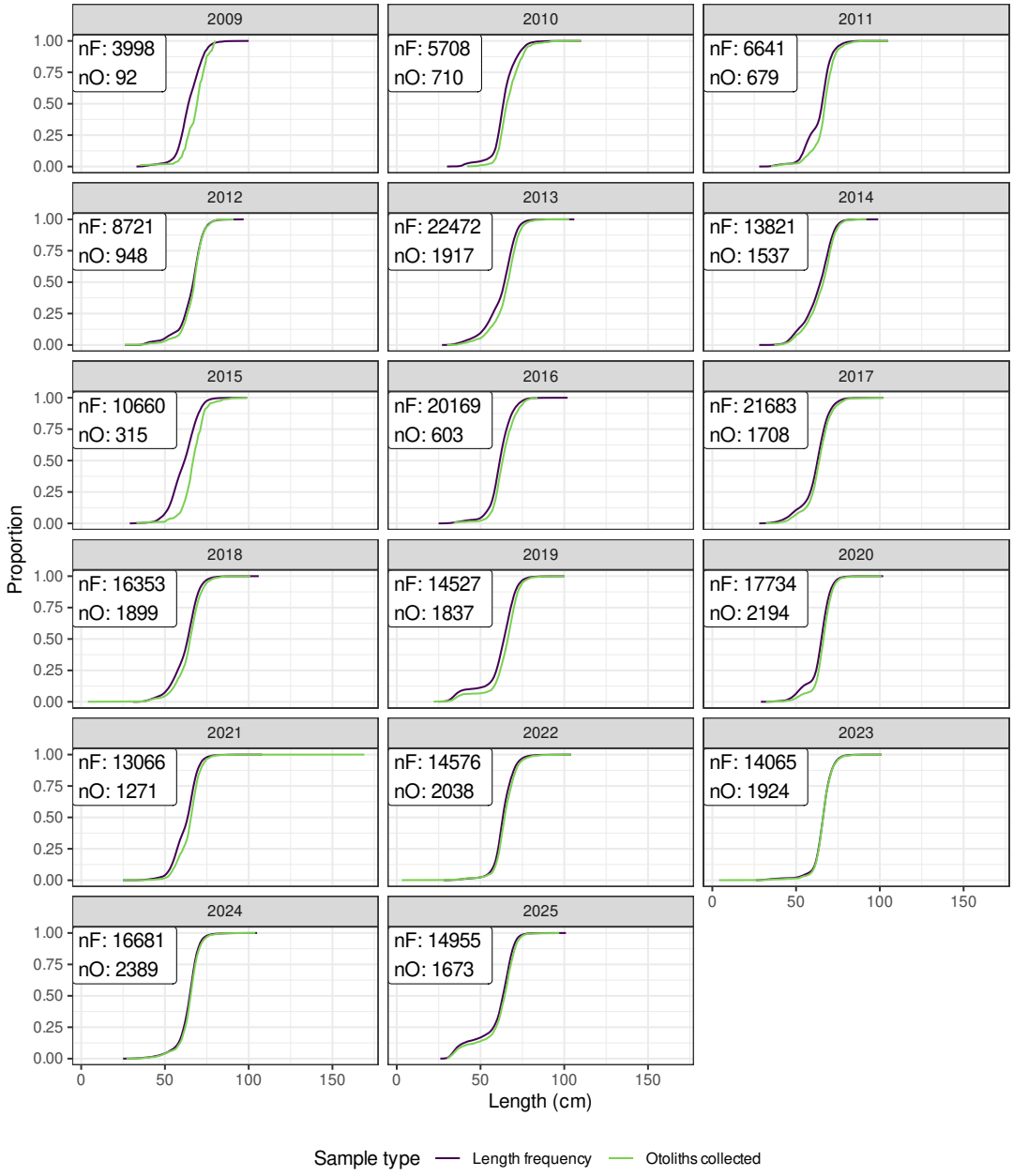


Figure 47: Cumulative distributions of the length of fish in the length frequency and otolith samples of barracouta in the BAR 5 Trawl fishery for the 2009 to 2025 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

2.1.2.3 Catch quantification

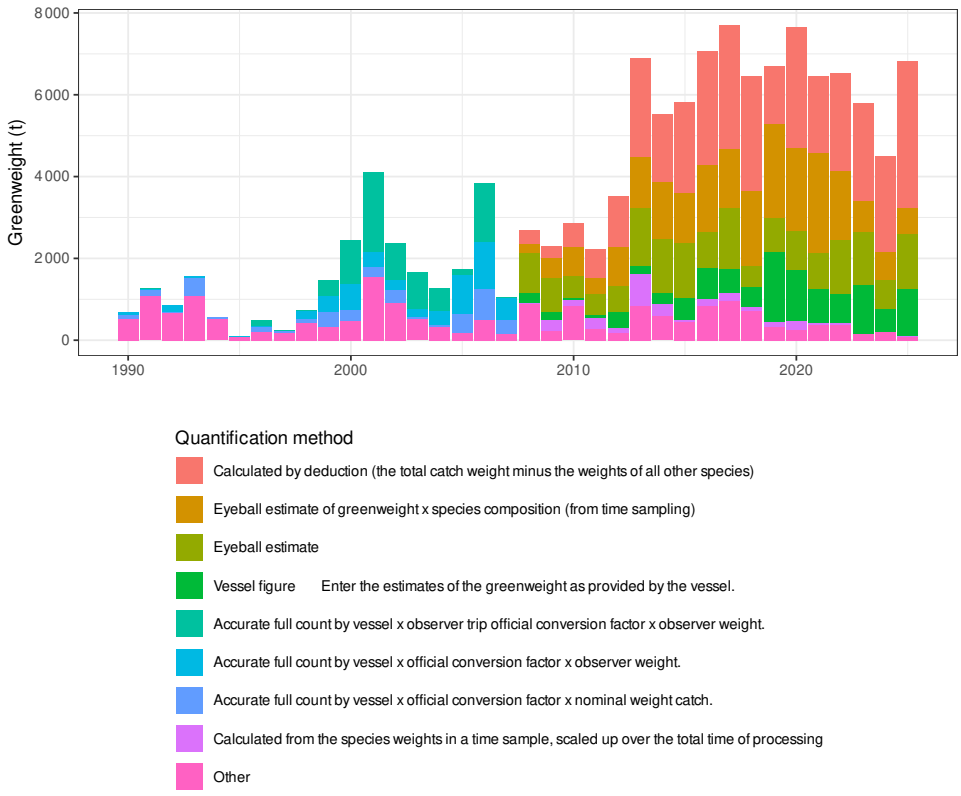


Figure 48: Methods used by observers to quantify the catch of barracouta in the BAR 5 Trawl fishery. The legend lists the methods used in descending order of total catch.

2.1.3 BAR 7: Trawl fishery

2.1.3.1 Length-frequency samples

Table 5: Length-frequency samples of barracouta from the BAR 7 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of barracouta exceeded a potential sampling threshold of 50 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	6 877	0	0	0.00
1991	8 057	27	2 650	0.34
1992	9 525	1	49	0.01
1993	12 057	9	547	0.07
1994	8 819	42	892	0.48
1995	10 666	47	1 560	0.44
1996	10 531	40	1 776	0.38
1997	12 223	24	1 068	0.20
1998	9 152	6	170	0.07
1999	9 547	27	1 541	0.28
2000	8 583	45	843	0.52
2001	9 448	101	2 791	1.07
2002	8 876	77	2 298	0.87
2003	8 610	130	1 759	1.51
2004	9 698	75	2 513	0.77
2005	10 016	120	6 437	1.20
2006	6 859	127	4 088	1.85
2007	8 035	169	6 266	2.10
2008	6 336	143	5 582	2.26
2009	6 578	97	3 030	1.47
2010	5 482	128	4 983	2.33
2011	5 054	25	1 144	0.49
2012	5 497	221	8 543	4.02
2013	5 316	285	10 035	5.36
2014	5 235	280	8 498	5.35
2015	4 930	436	18 141	8.84
2016	4 578	195	5 808	4.26
2017	3 867	183	7 902	4.73
2018	3 957	304	11 623	7.68
2019	3 609	237	8 097	6.57
2020	3 808	265	10 089	6.96
2021	3 476	100	3 676	2.88
2022	3 490	175	4 418	5.01
2023	2 934	114	3 555	3.89
2024	2 854	111	3 975	3.89
2025	2 982	42	1 428	1.41

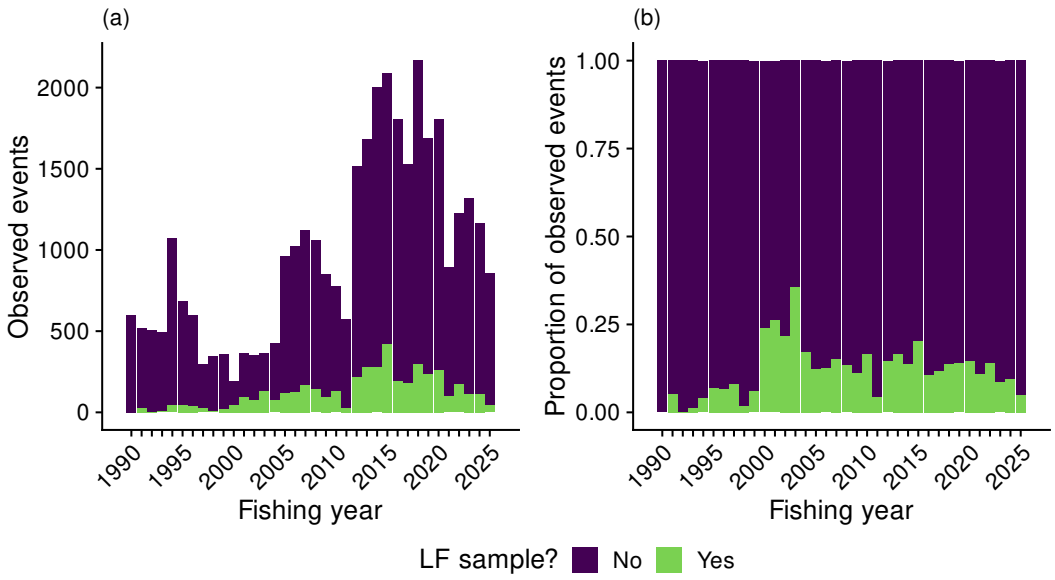


Figure 49: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in BAR 7 where the barracouta catch exceeded the 50 kg threshold, with and without length-frequency sampling.**

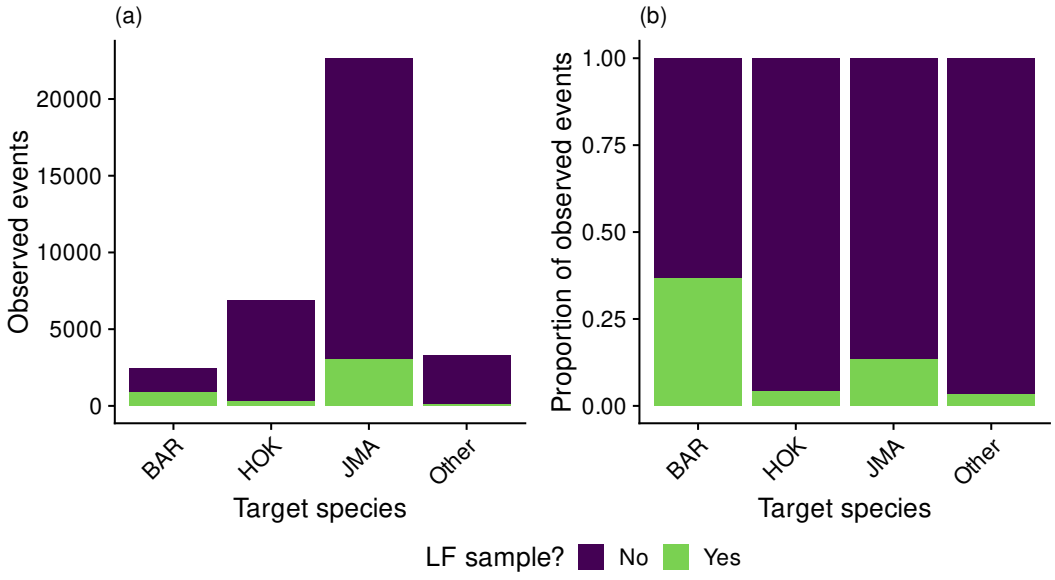


Figure 50: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in BAR 7 where the barracouta catch exceeded the 50 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

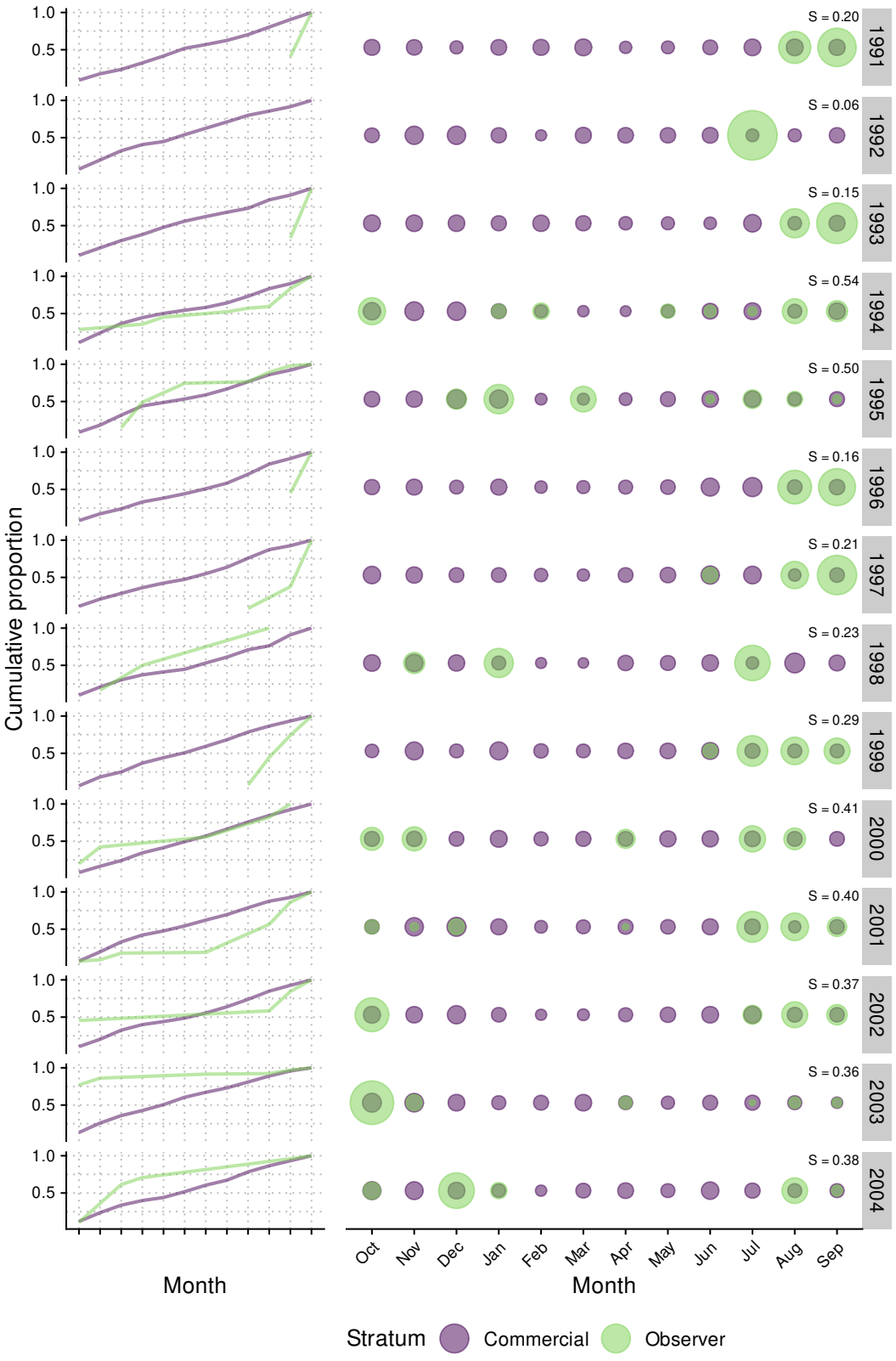


Figure 51: Monthly representativeness of observer sampling coverage of Trawl fishing events in BAR 7, where the barracouta catch exceeded the 50kg threshold, in 1991 to 2004. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

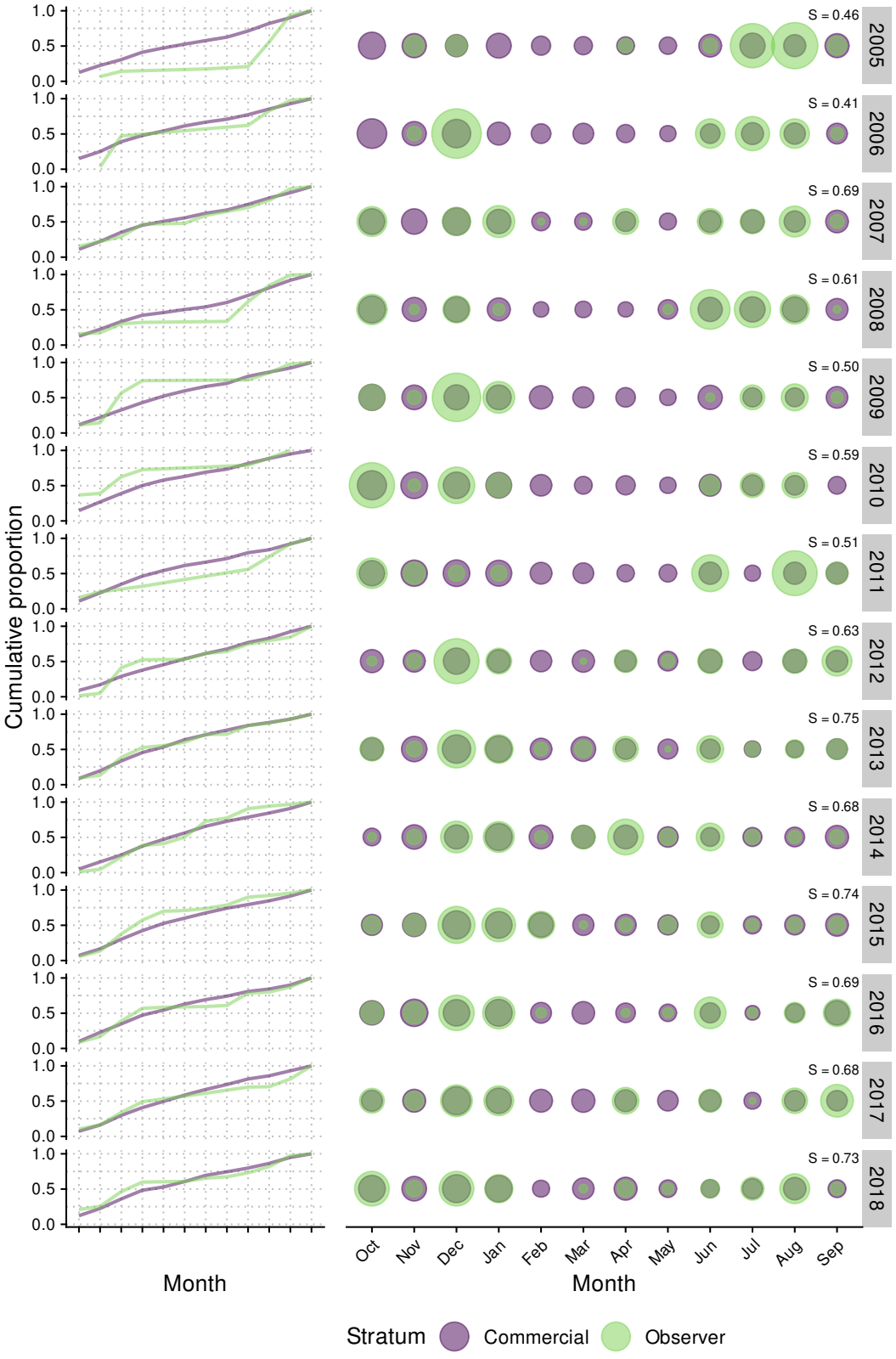


Figure 52: Monthly representativeness of observer sampling coverage of Trawl fishing events in BAR 7, where the barracouta catch exceeded the 50kg threshold, in 2005 to 2018. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

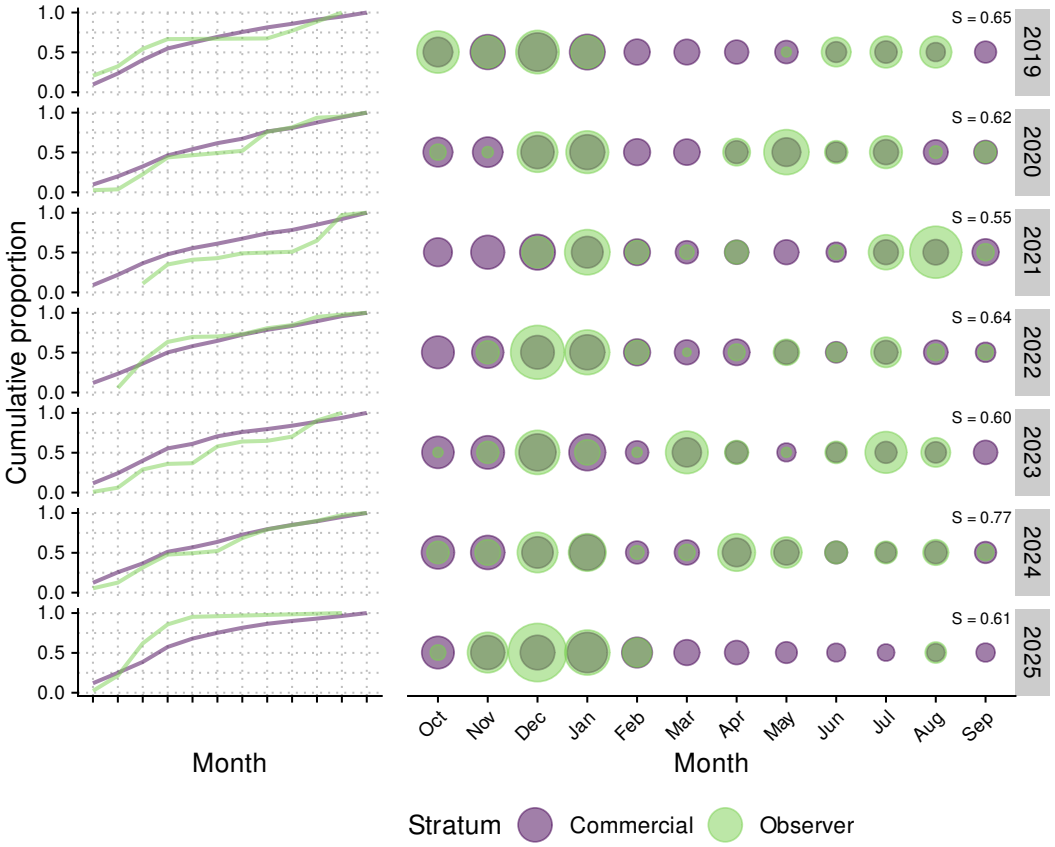


Figure 53: Monthly representativeness of observer sampling coverage of Trawl fishing events in BAR 7, where the barracouta catch exceeded the 50kg threshold, in 2019 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

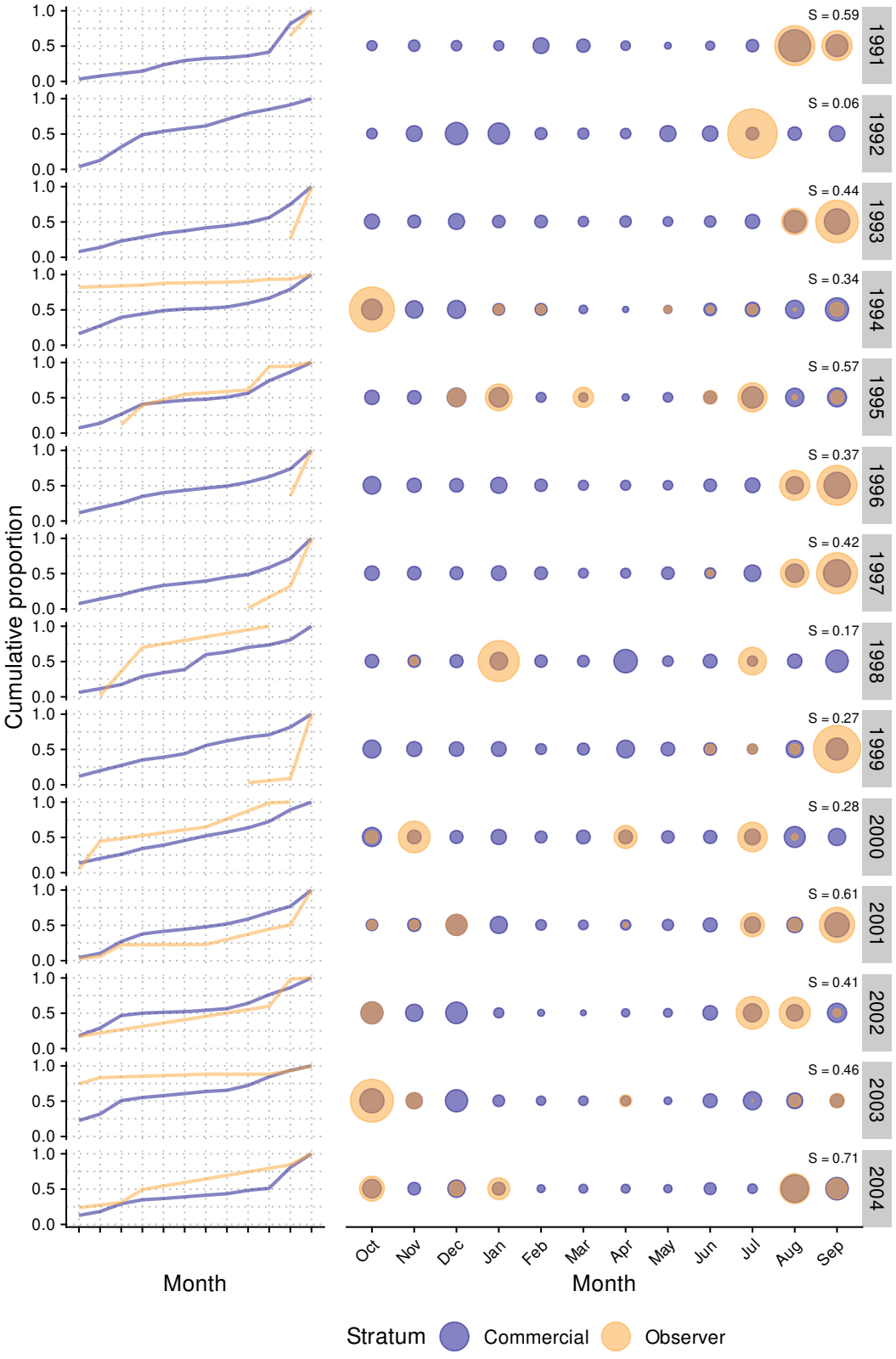


Figure 54: **Monthly representativeness of observer sampling coverage of Trawl catch in BAR 7, from events where the barracouta catch exceeded the 50kg threshold, in 1991 to 2004. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

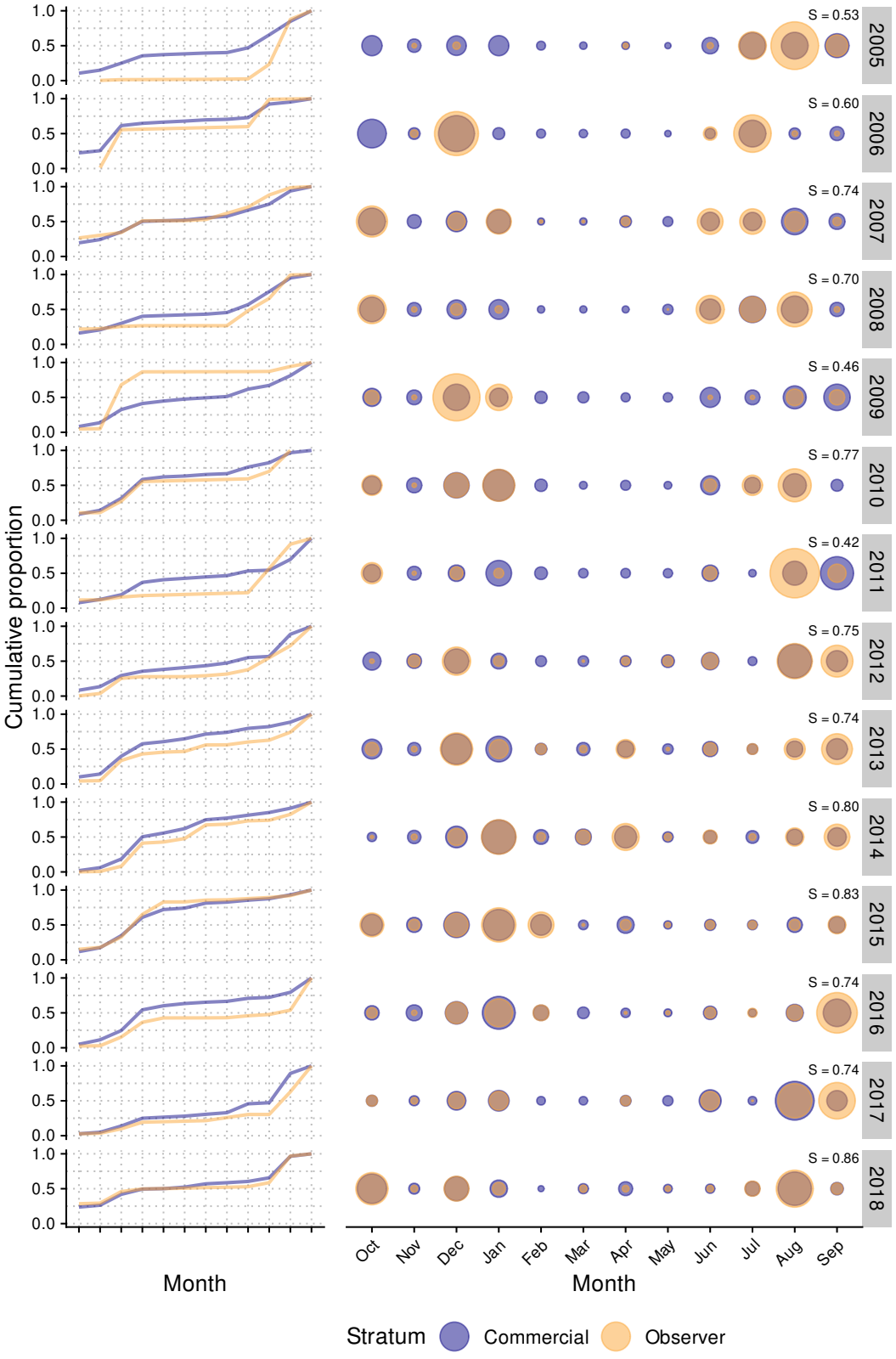


Figure 55: Monthly representativeness of observer sampling coverage of Trawl catch in BAR 7, from events where the barracouta catch exceeded the 50kg threshold, in 2005 to 2018. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

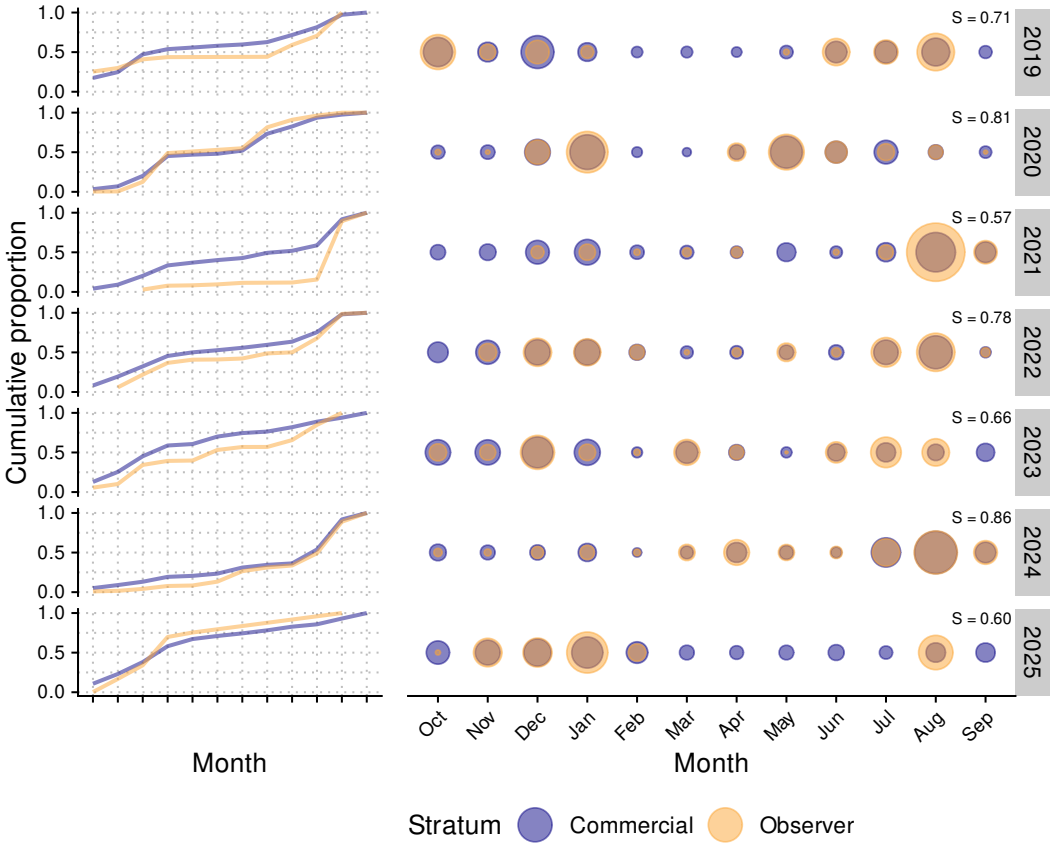


Figure 56: Monthly representativeness of observer sampling coverage of Trawl catch in BAR 7, from events where the barracouta catch exceeded the 50kg threshold, in 2019 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

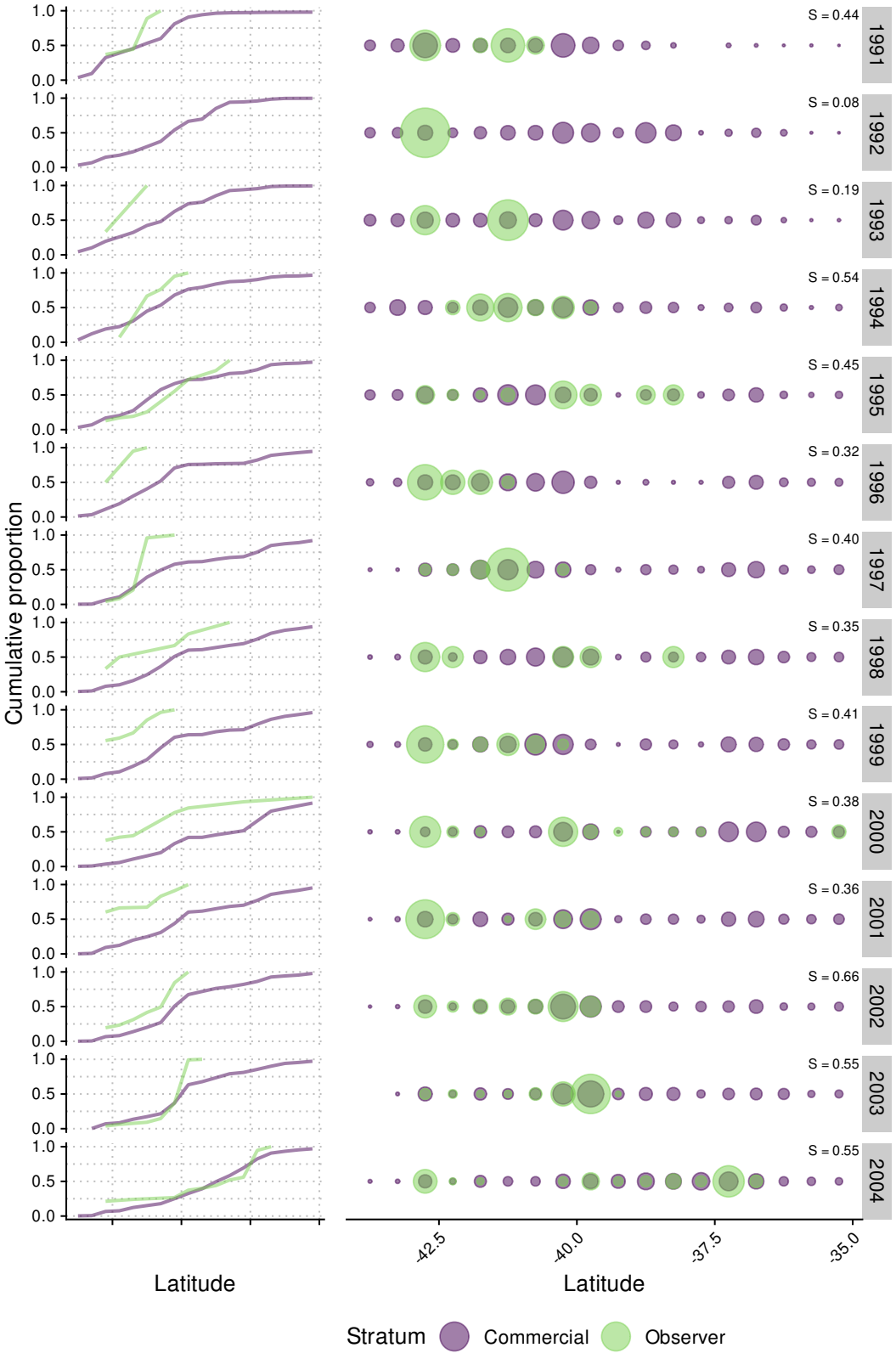


Figure 57: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in BAR 7, where the barracouta catch exceeded the 50kg threshold, in 1991 to 2004. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

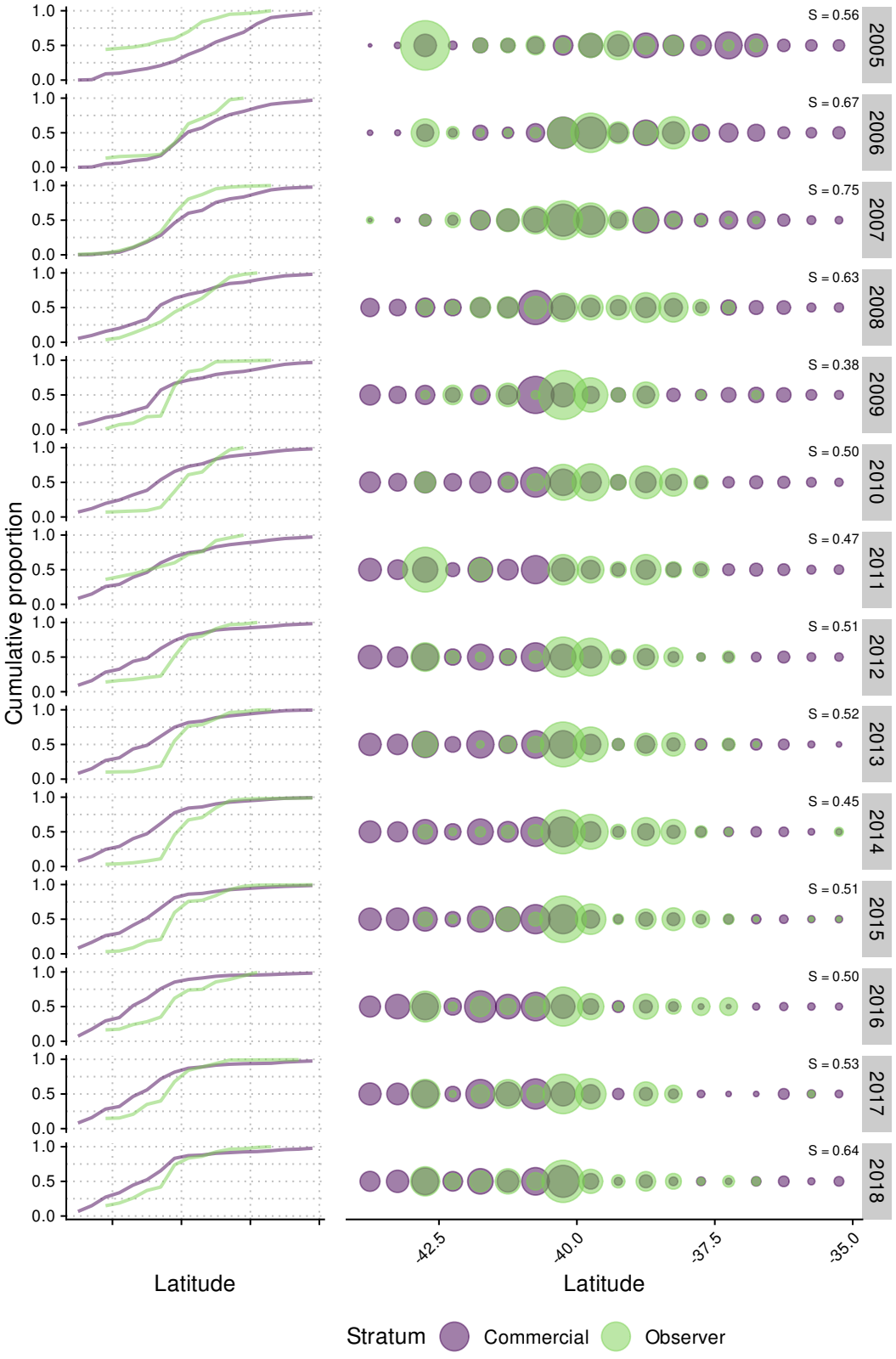


Figure 58: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in BAR 7, where the barracouta catch exceeded the 50kg threshold, in 2005 to 2018. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

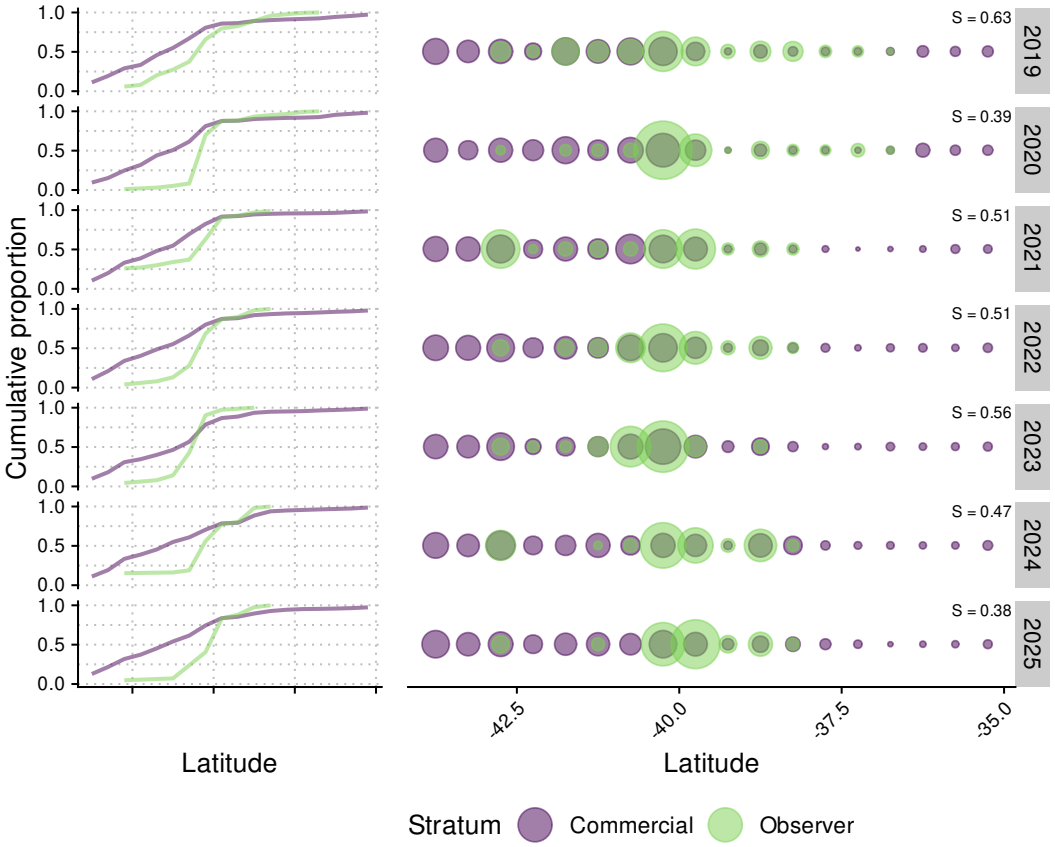


Figure 59: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in BAR 7, where the barracouta catch exceeded the 50kg threshold, in 2019 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

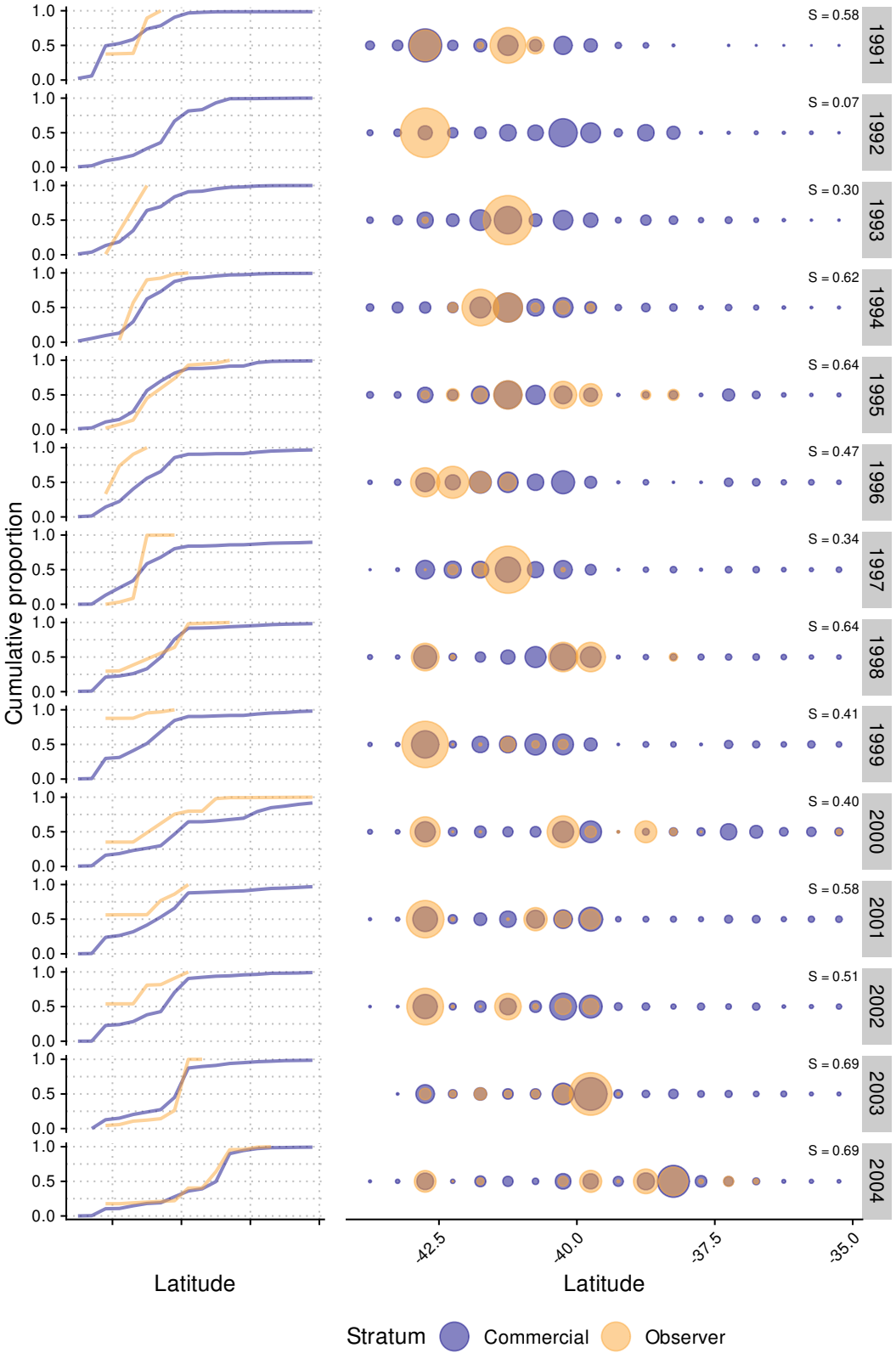


Figure 60: **Latitudinal representativeness of observer sampling coverage of Trawl catch in BAR 7, from events where the barracouta catch exceeded the 50kg threshold, in 1991 to 2004. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

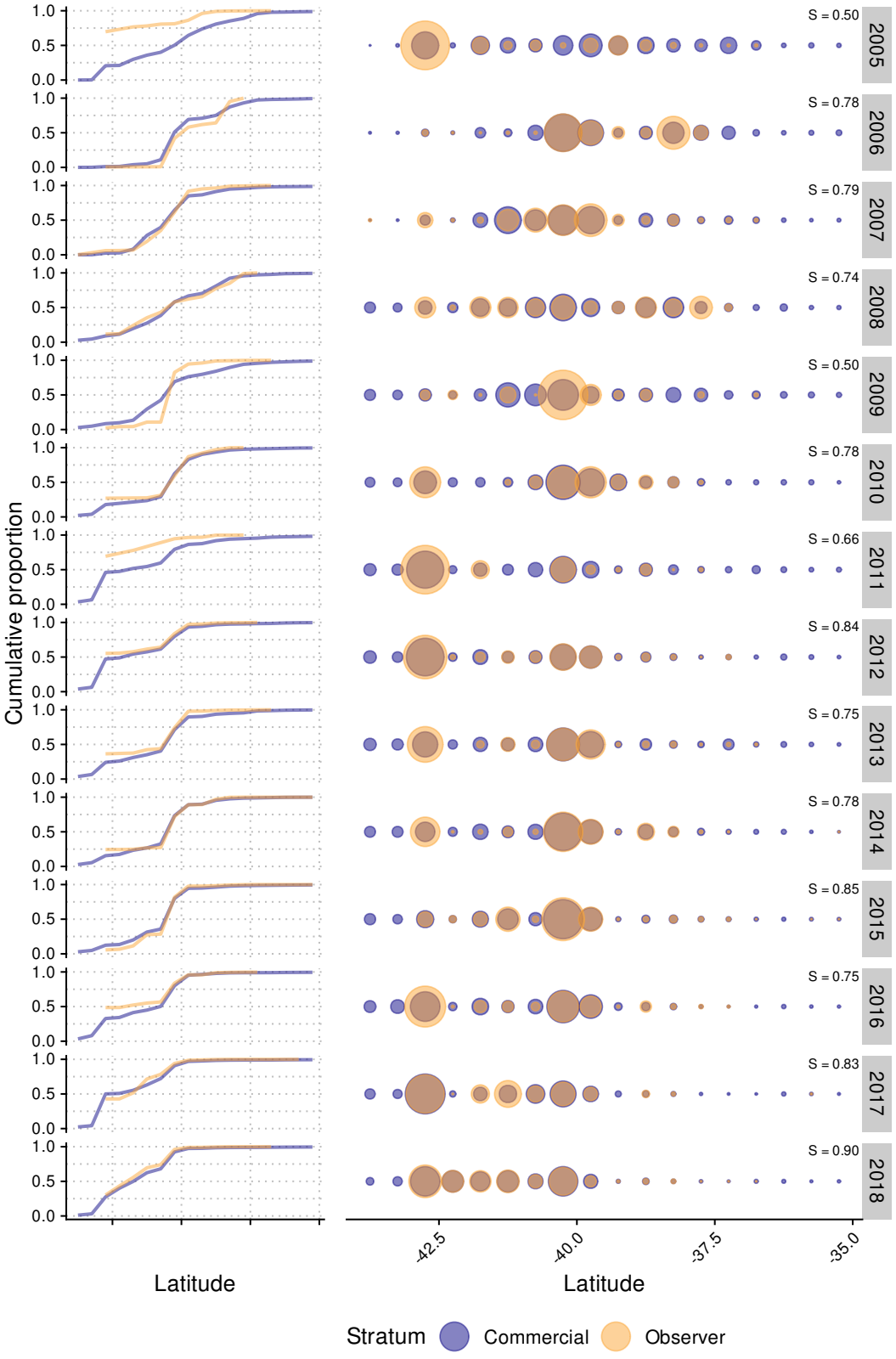


Figure 61: Latitudinal representativeness of observer sampling coverage of Trawl catch in BAR 7, from events where the barracouta catch exceeded the 50kg threshold, in 2005 to 2018. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

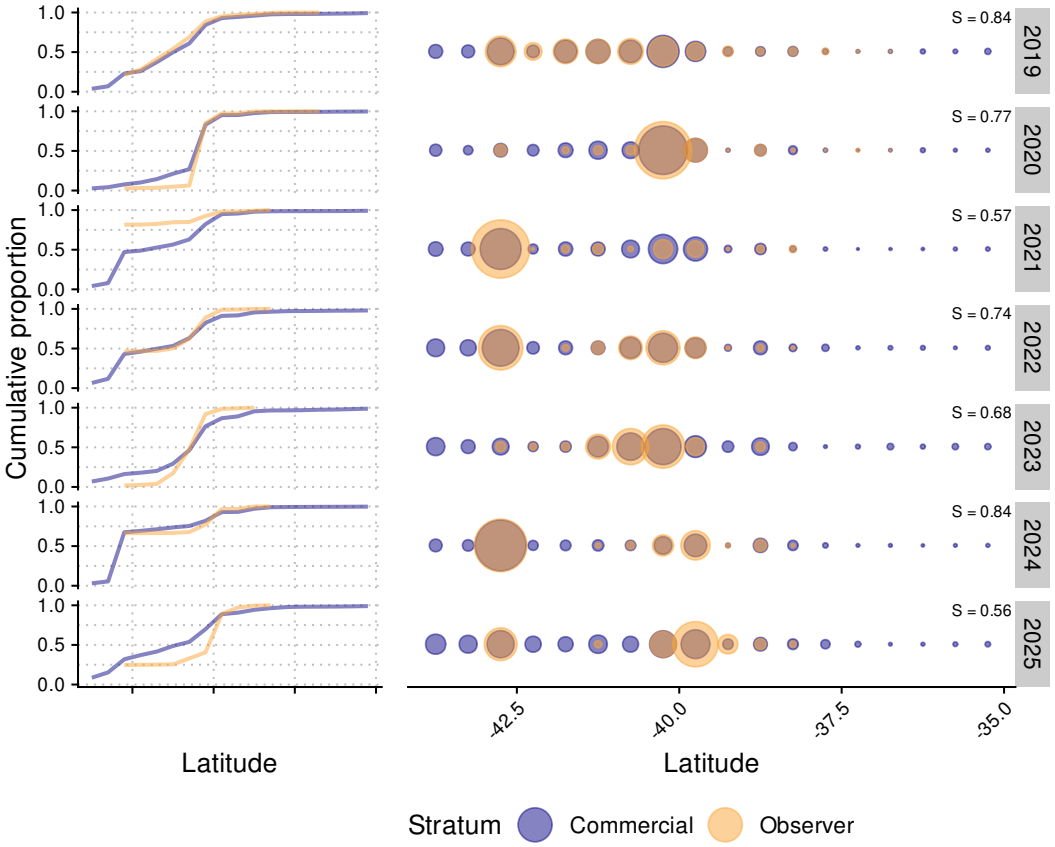


Figure 62: Latitudinal representativeness of observer sampling coverage of Trawl catch in BAR 7, from events where the barracouta catch exceeded the 50kg threshold, in 2019 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

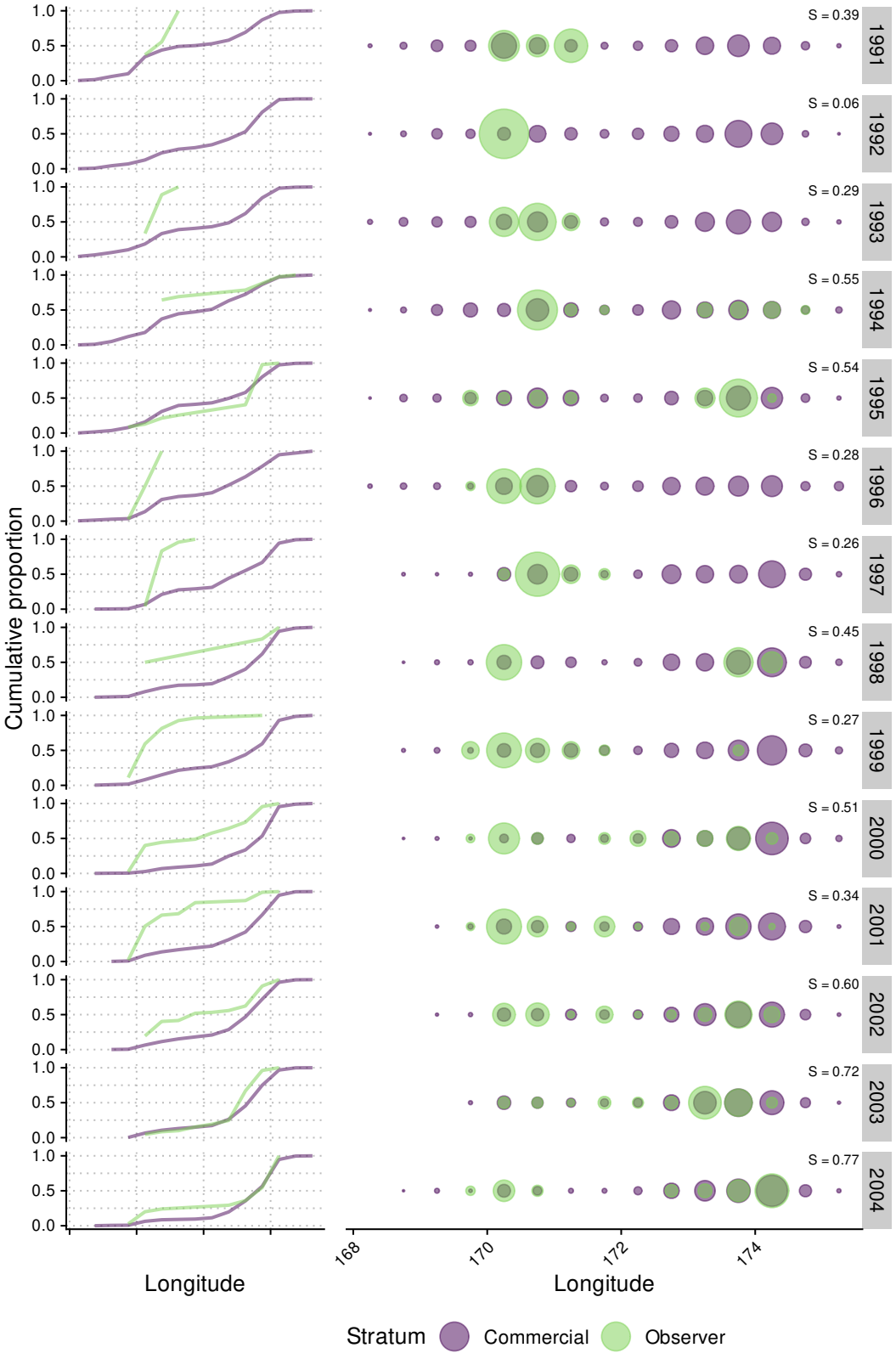


Figure 63: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in BAR 7, where the barracouta catch exceeded the 50kg threshold, in 1991 to 2004. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

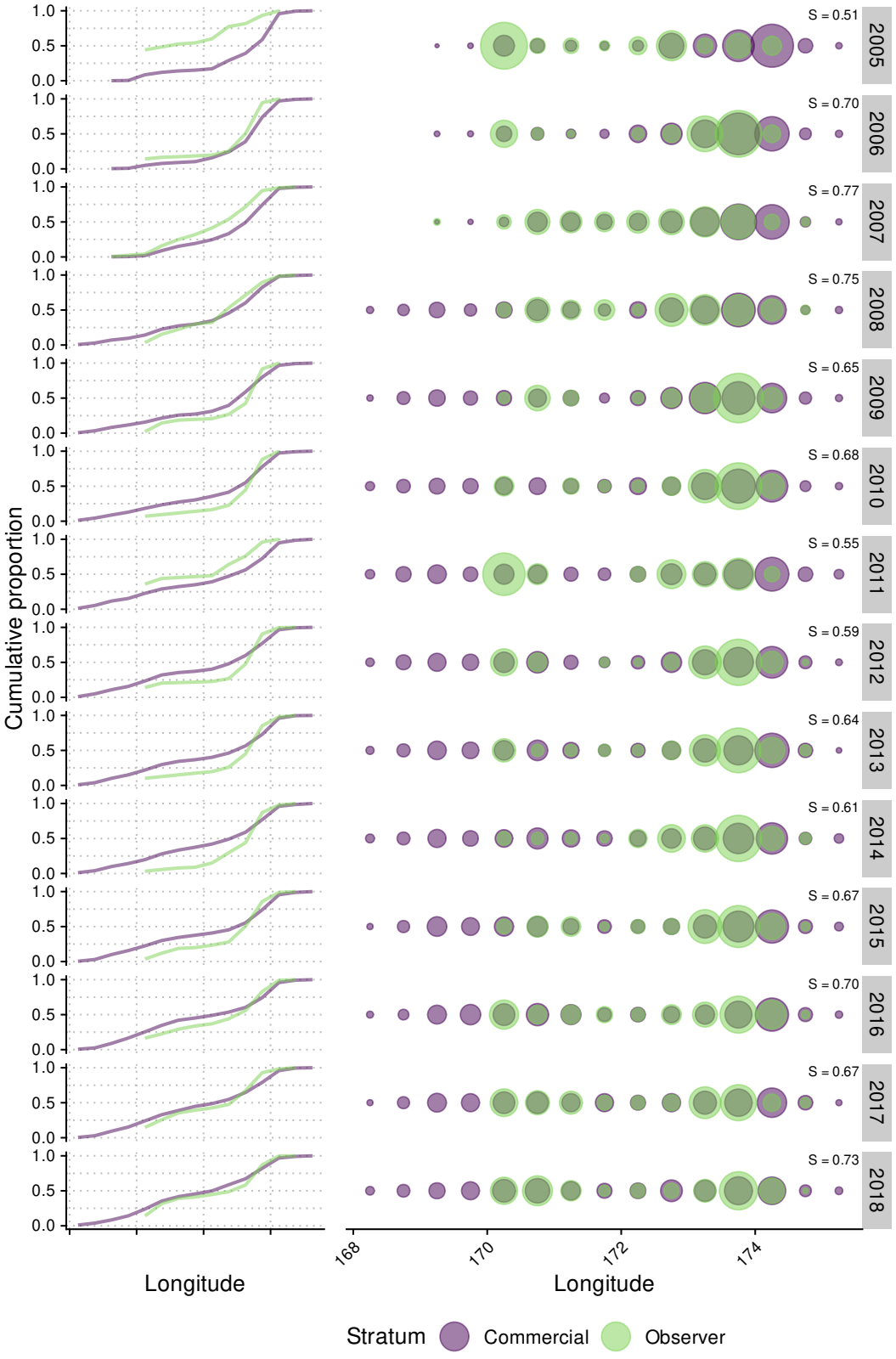


Figure 64: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in BAR 7, where the barracouta catch exceeded the 50kg threshold, in 2005 to 2018. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

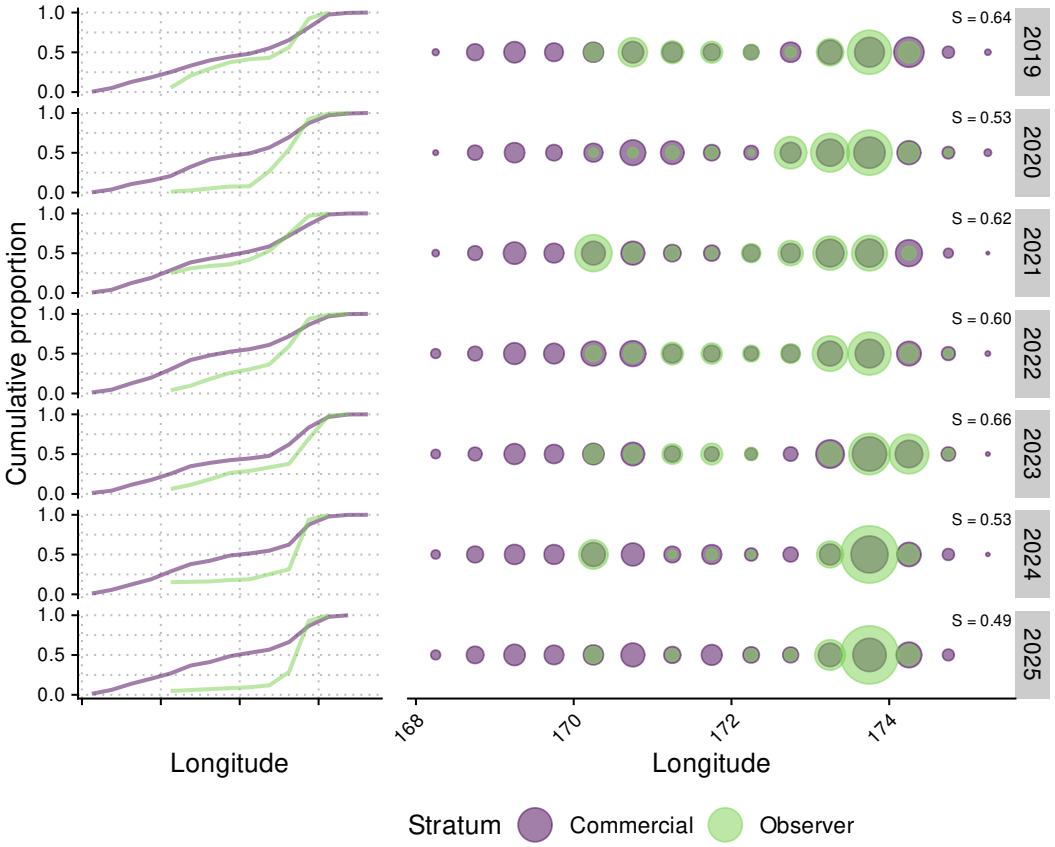


Figure 65: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in BAR 7, where the barracouta catch exceeded the 50kg threshold, in 2019 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

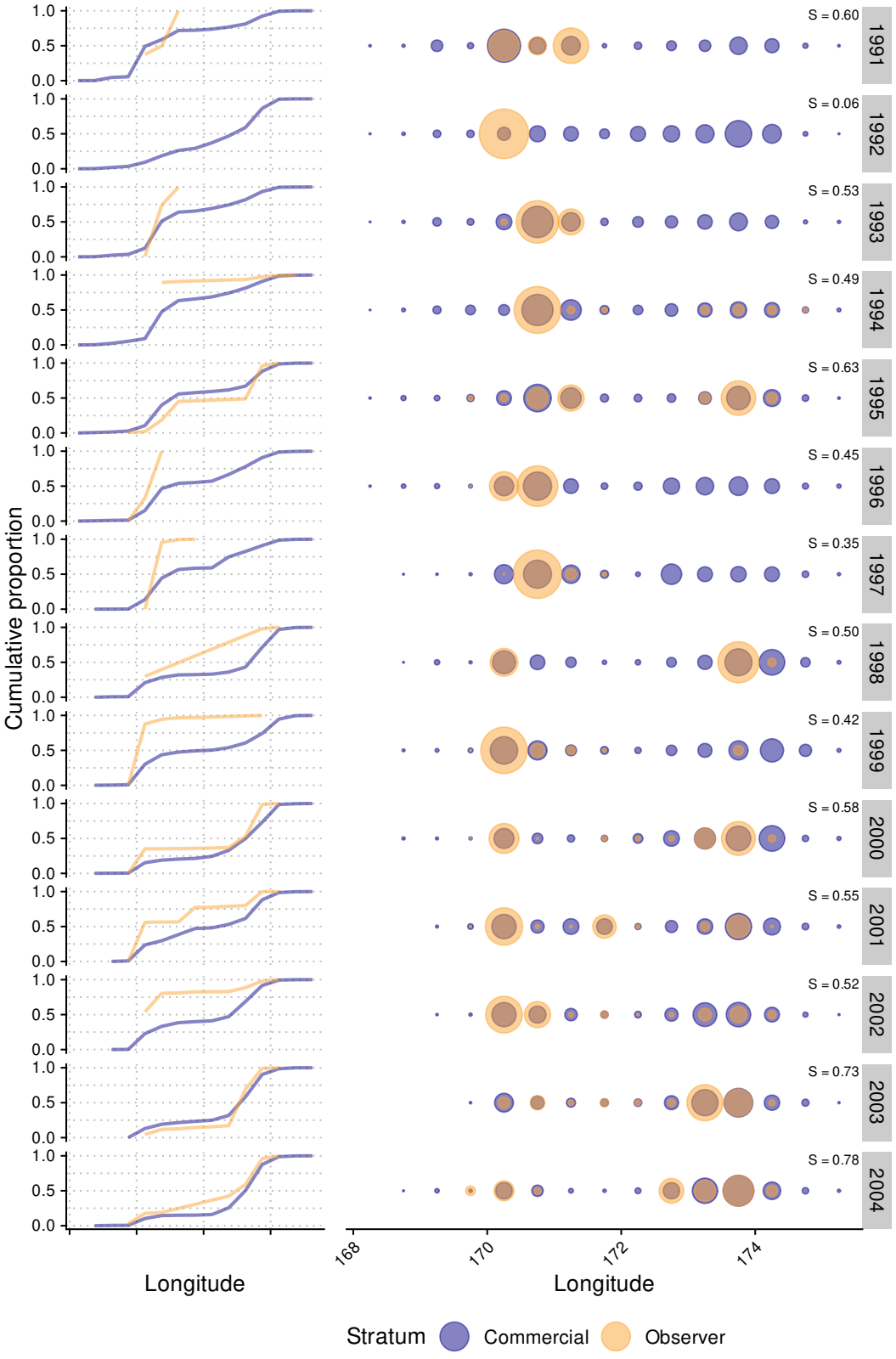


Figure 66: Longitudinal representativeness of observer sampling coverage of Trawl catch in BAR 7, from events where the barracouta catch exceeded the 50kg threshold, in 1991 to 2004. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

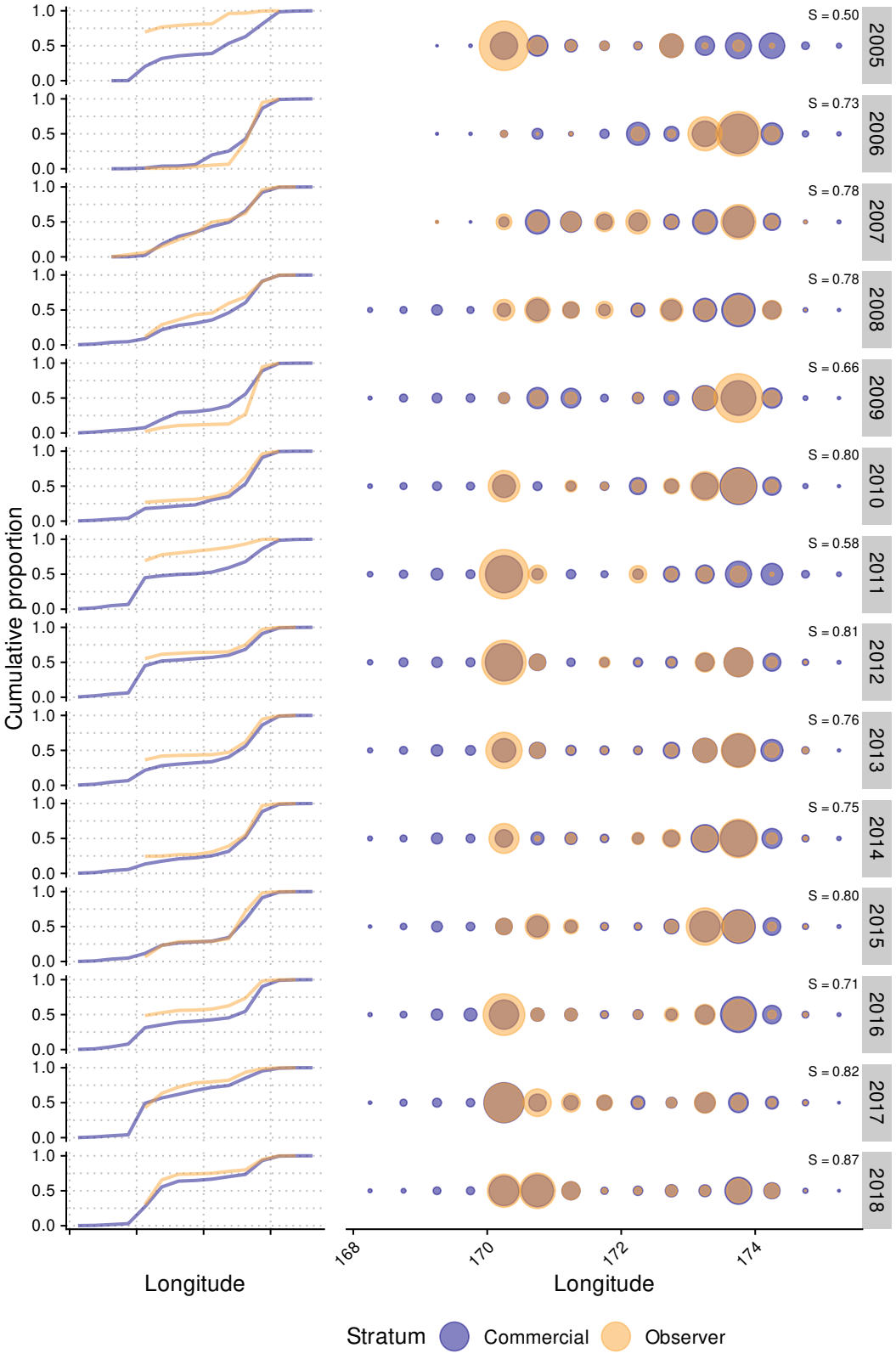


Figure 67: Longitudinal representativeness of observer sampling coverage of Trawl catch in BAR 7, from events where the barracouta catch exceeded the 50kg threshold, in 2005 to 2018. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

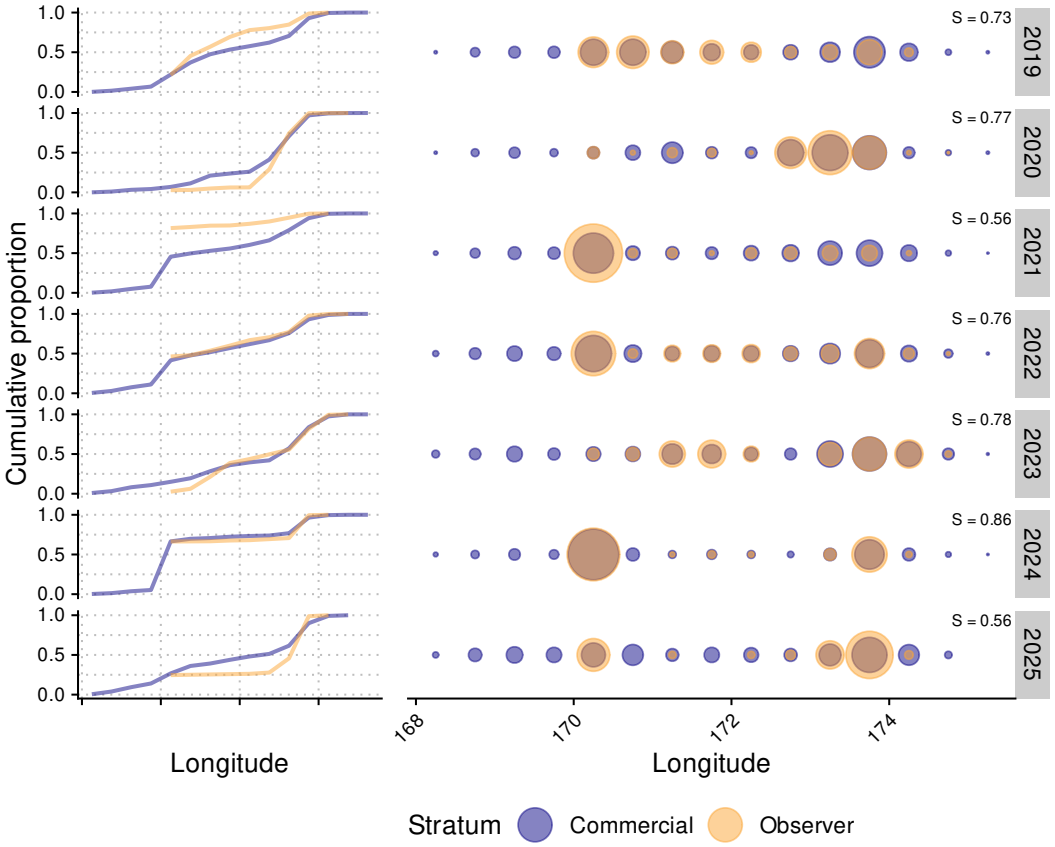


Figure 68: **Longitudinal representativeness of observer sampling coverage of Trawl catch in BAR 7, from events where the barracouta catch exceeded the 50kg threshold, in 2019 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

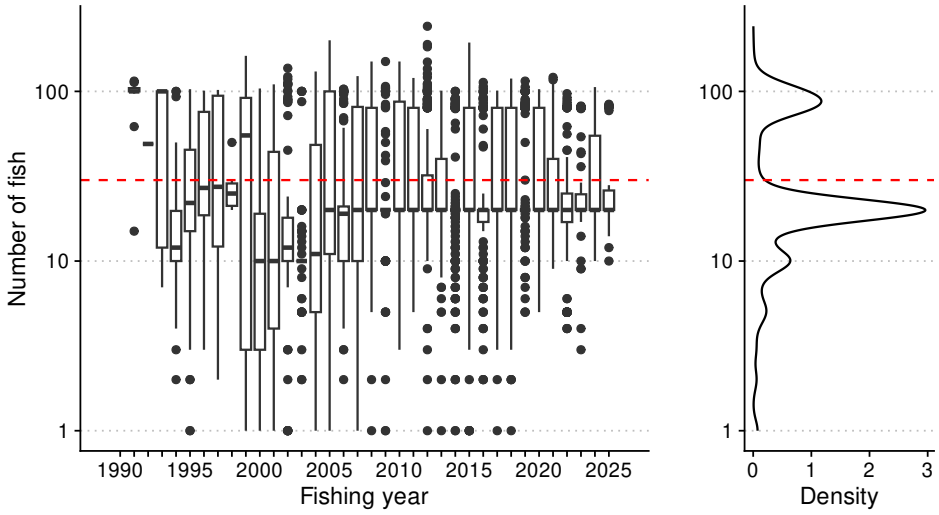


Figure 69: **Length-frequency sample sizes for observed fishing events in BAR 7 where barracouta were sampled. The red dashed line indicates a sample size of 30 fish.**

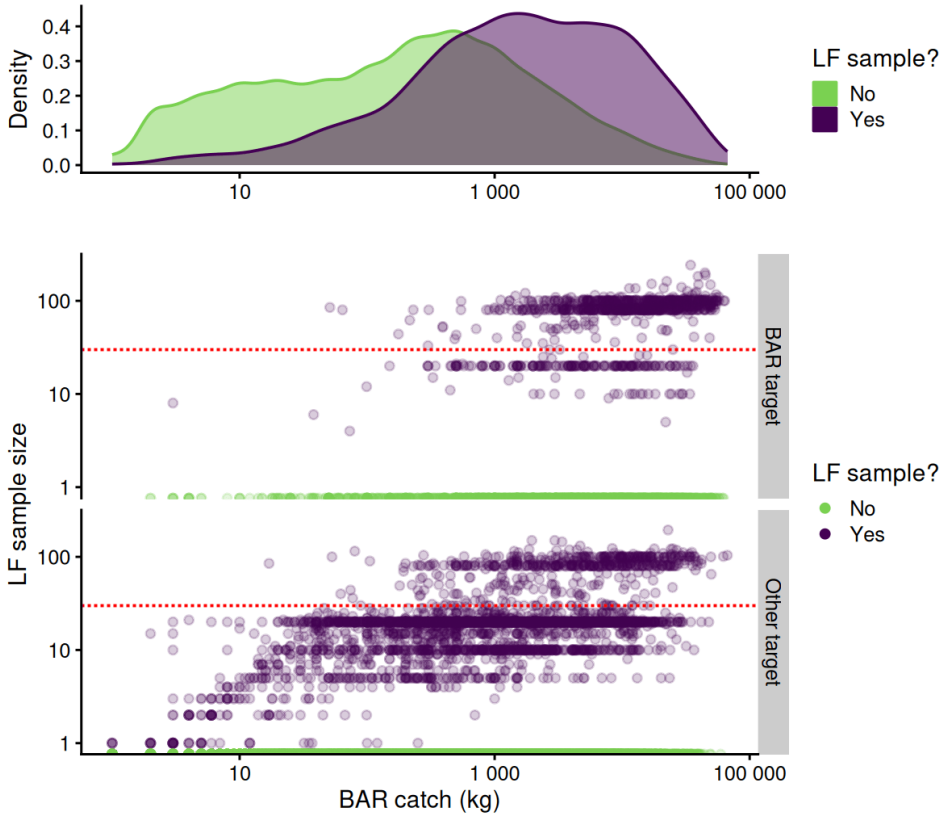


Figure 70: **Length-frequency sample sizes (number of fish sampled) for observed fishing events in BAR 7 in relation to the total barracouta catch from an event, separately for barracouta target events and other target species. The red dashed line indicates a sample size of 30 fish.**

2.1.3.2 Otolith samples

Table 6: Otolith samples of barracouta from the BAR 7 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of barracouta exceeded a potential sampling threshold of 50 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	6 877	0	0	0.00
1991	8 057	0	0	0.00
1992	9 525	0	0	0.00
1993	12 057	0	0	0.00
1994	8 819	0	0	0.00
1995	10 666	0	0	0.00
1996	10 531	0	0	0.00
1997	12 223	0	0	0.00
1998	9 152	0	0	0.00
1999	9 547	0	0	0.00
2000	8 583	0	0	0.00
2001	9 448	0	0	0.00
2002	8 876	0	0	0.00
2003	8 610	0	0	0.00
2004	9 698	0	0	0.00
2005	10 016	0	0	0.00
2006	6 859	0	0	0.00
2007	8 035	0	0	0.00
2008	6 336	0	0	0.00
2009	6 578	13	70	0.20
2010	5 482	16	115	0.29
2011	5 054	11	88	0.22
2012	5 497	153	942	2.78
2013	5 316	250	1 452	4.70
2014	5 235	203	1 142	3.88
2015	4 930	73	372	1.48
2016	4 578	83	402	1.81
2017	3 867	166	949	4.29
2018	3 957	293	1 533	7.40
2019	3 609	229	1 258	6.35
2020	3 808	249	1 252	6.54
2021	3 476	94	585	2.70
2022	3 490	156	1 049	4.47
2023	2 934	113	788	3.85
2024	2 854	111	647	3.89
2025	2 982	42	294	1.41

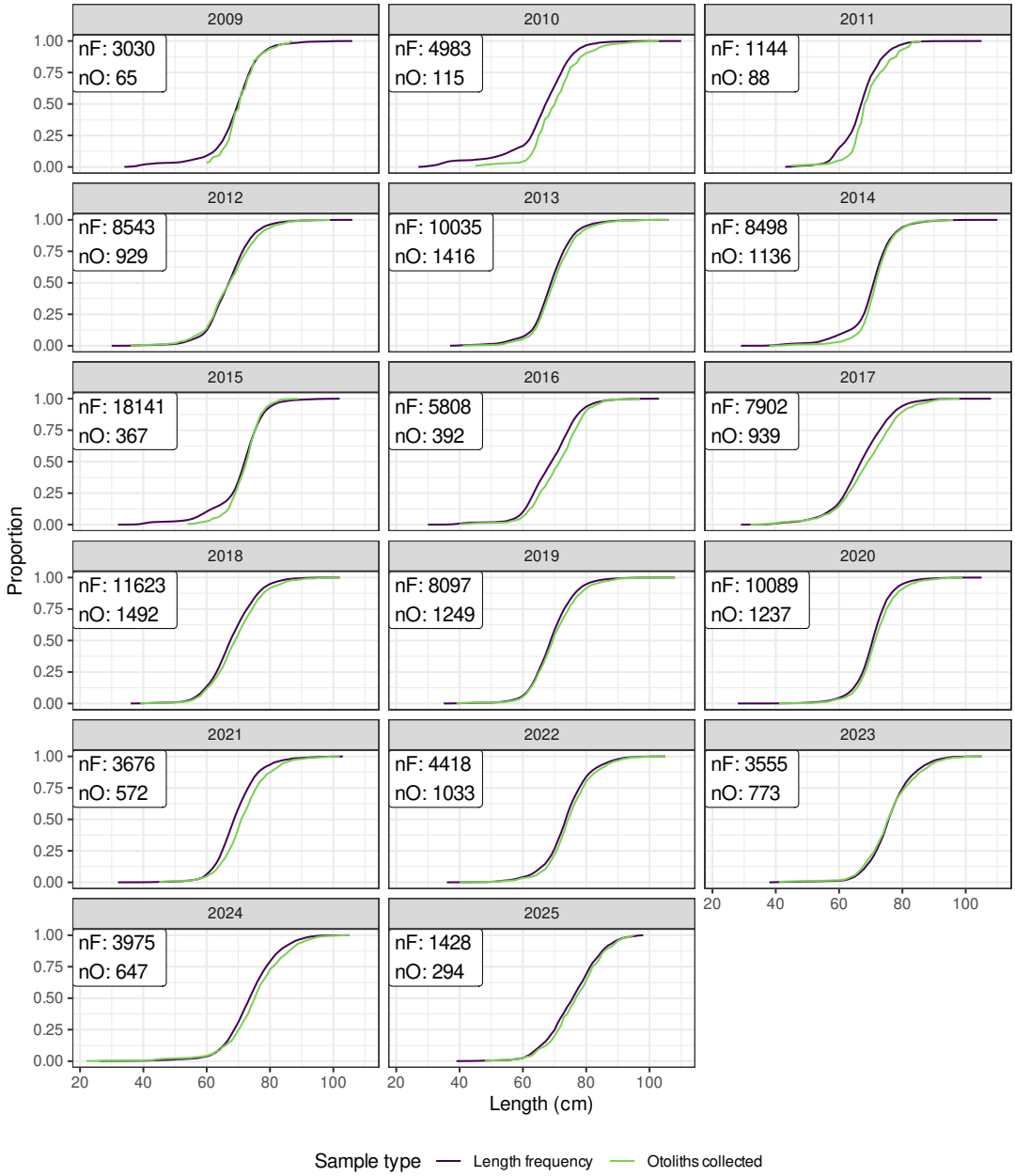


Figure 71: Cumulative distributions of the length of fish in the length frequency and otolith samples of barracouta in the BAR 7 Trawl fishery for the 2009 to 2025 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

2.1.3.3 Catch quantification

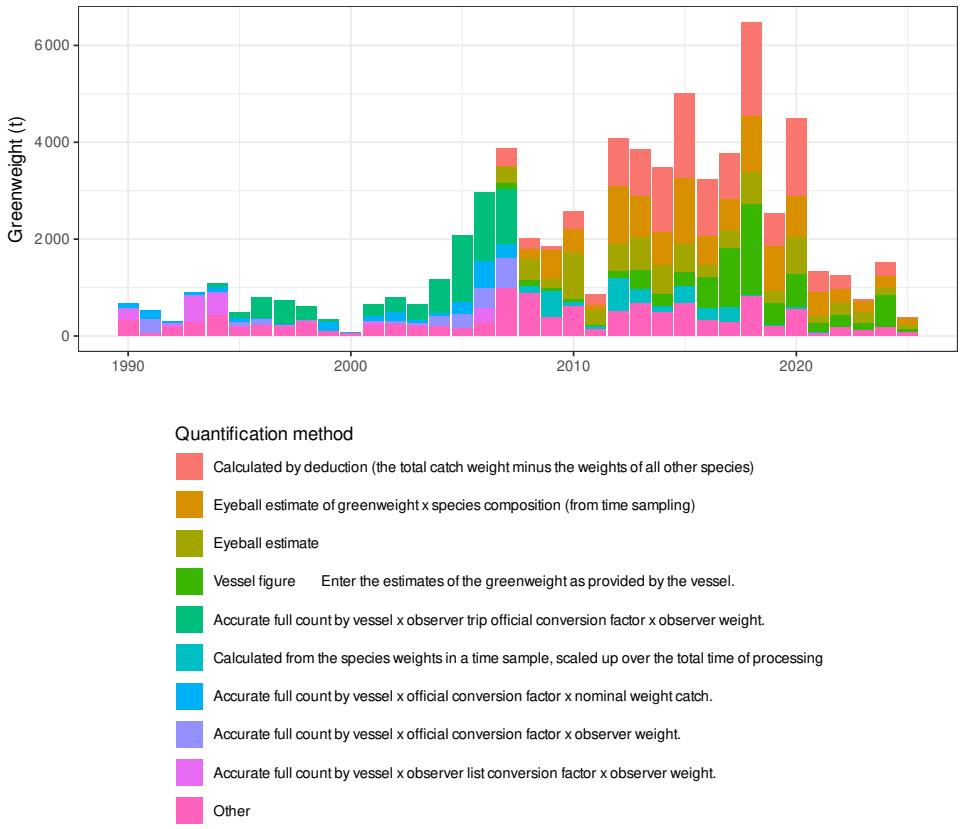


Figure 72: Methods used by observers to quantify the catch of barracouta in the BAR 7 Trawl fishery. The legend lists the methods used in descending order of total catch.

2.2 BOE stocks

Observer sampling of black oreo is considered with respect to the oreo Quota Management Areas.

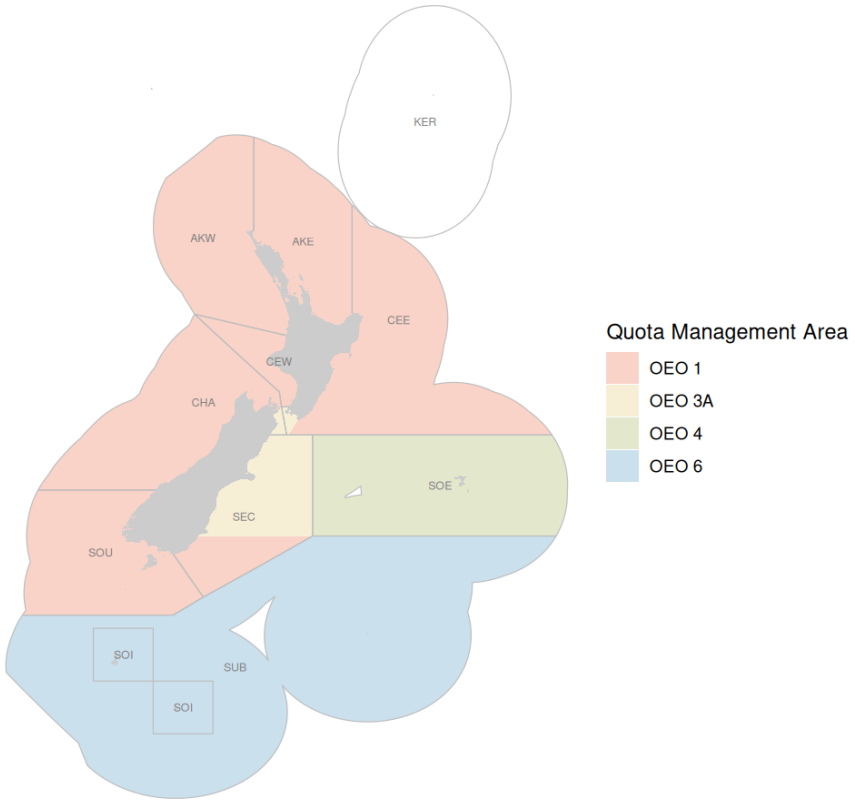


Figure 73: Observer Fisheries Management Areas (black borders, labels on plot) in relation to the Quota Management Area for oreo (coloured areas, per legend).

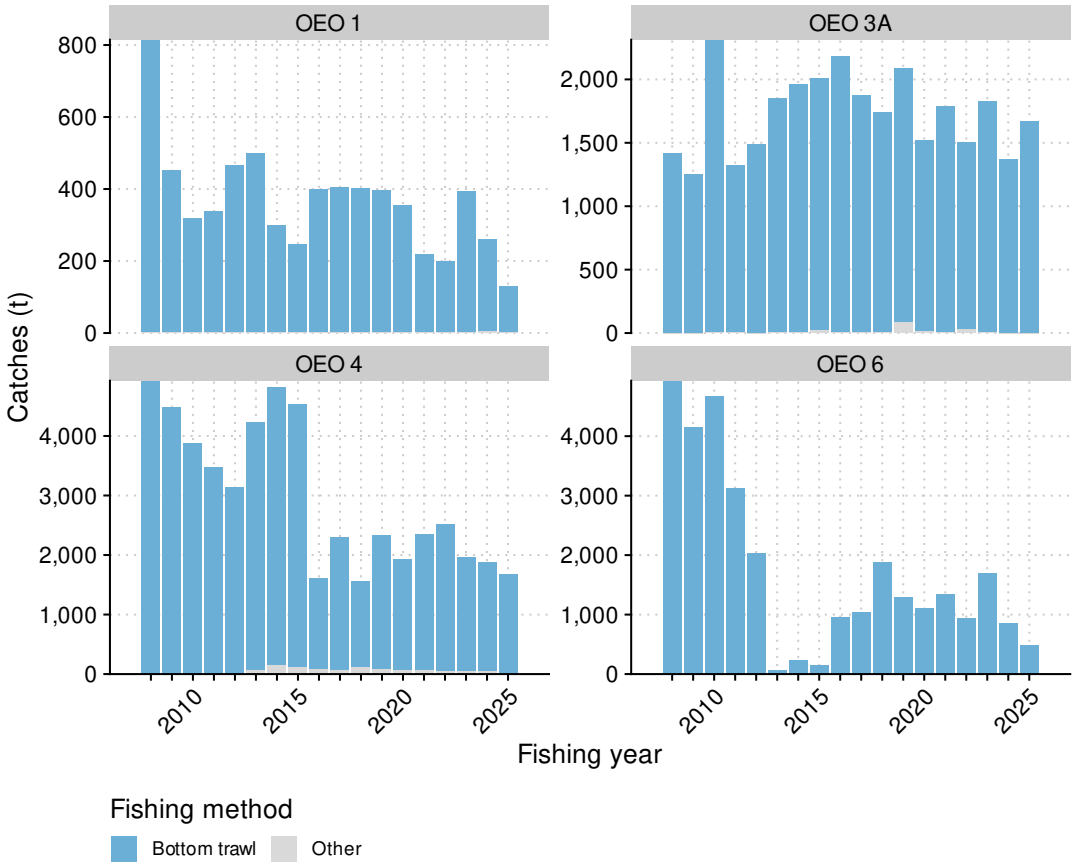


Figure 74: **Catches of black oreo by fishing method, for events within the oreo Quota Management Areas. Methods grouped as Other include: BLL, BS, DL, HL, MW, POT, PRB, PRM, SN, T.**

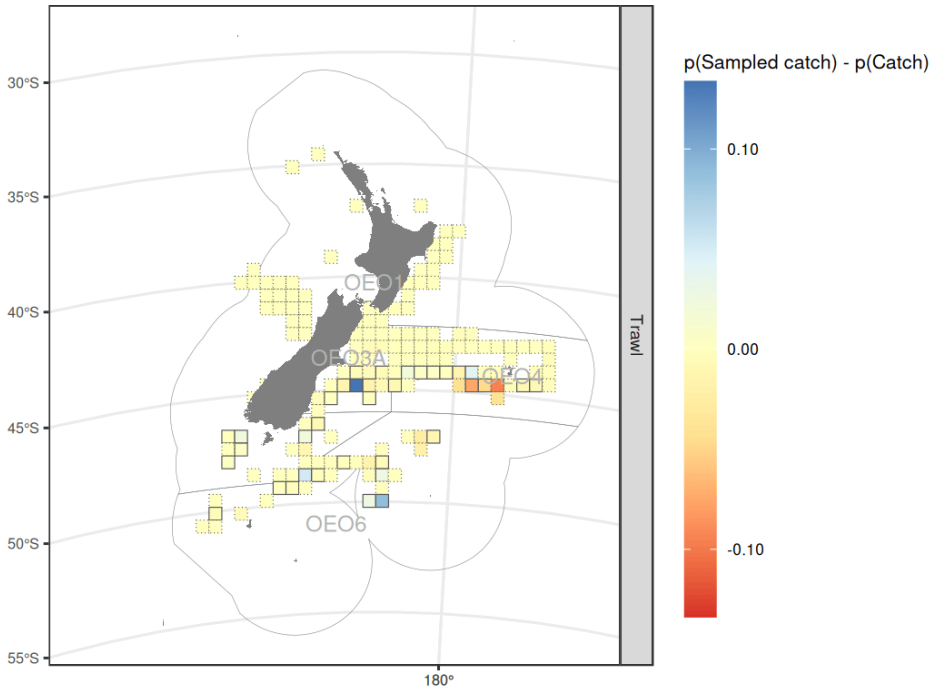


Figure 75: **Differences in the relative proportions of catch and sampled catch for black oreo during 2021–2025. Cells with a dotted border had no sampling.**

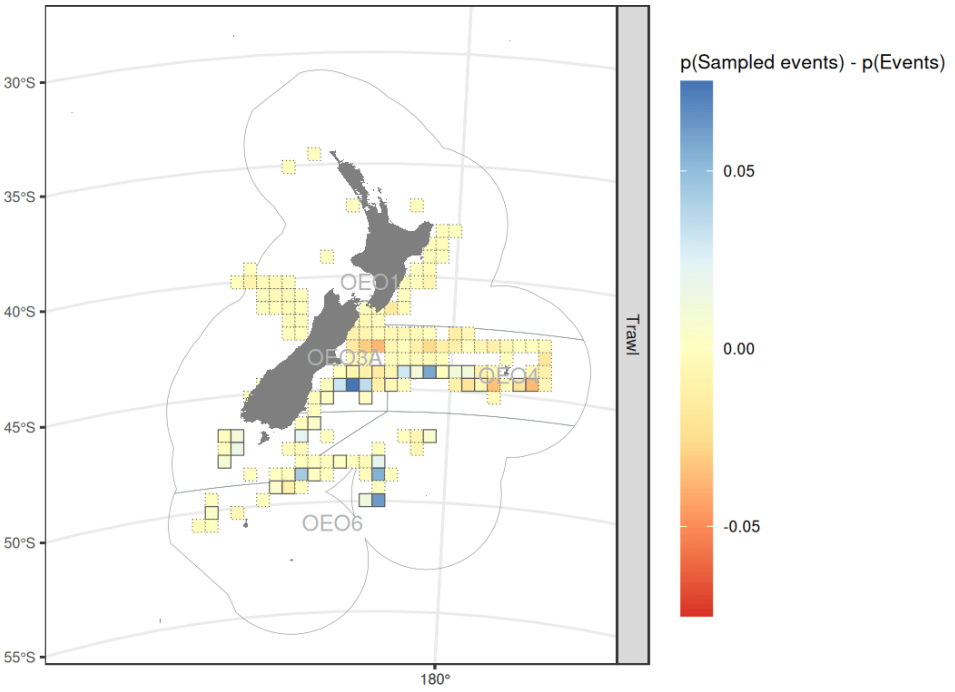


Figure 76: **Differences in the relative proportions of events meeting the sampling threshold and sampled events for black oreo during 2021–2025. Cells with a dotted border had no sampling.**

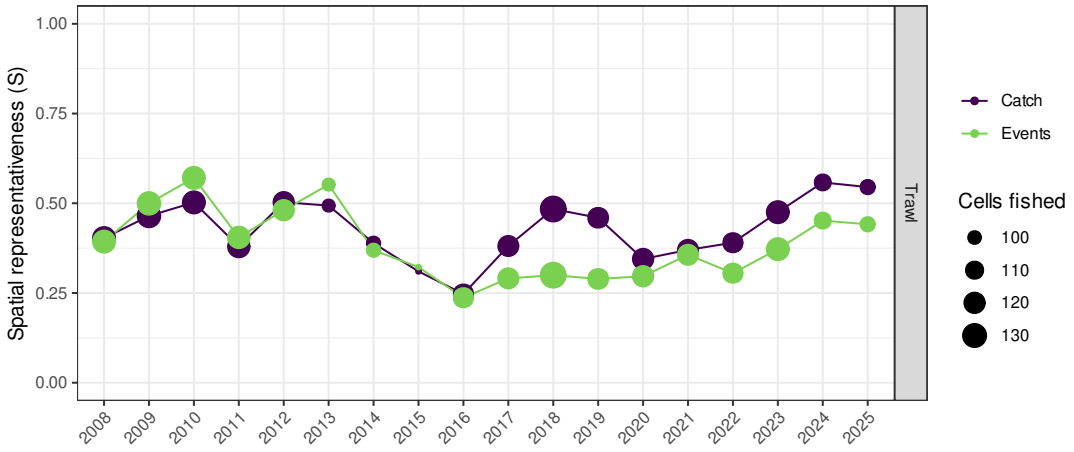


Figure 77: **Spatial representativeness of observer sampling of black oreo by fishing year. Representativeness is assessed using the Manhattan distance metric (*S*) applied to 64 km grid cells, for both the proportion of catch sampled and the proportion of positive events sampled.**

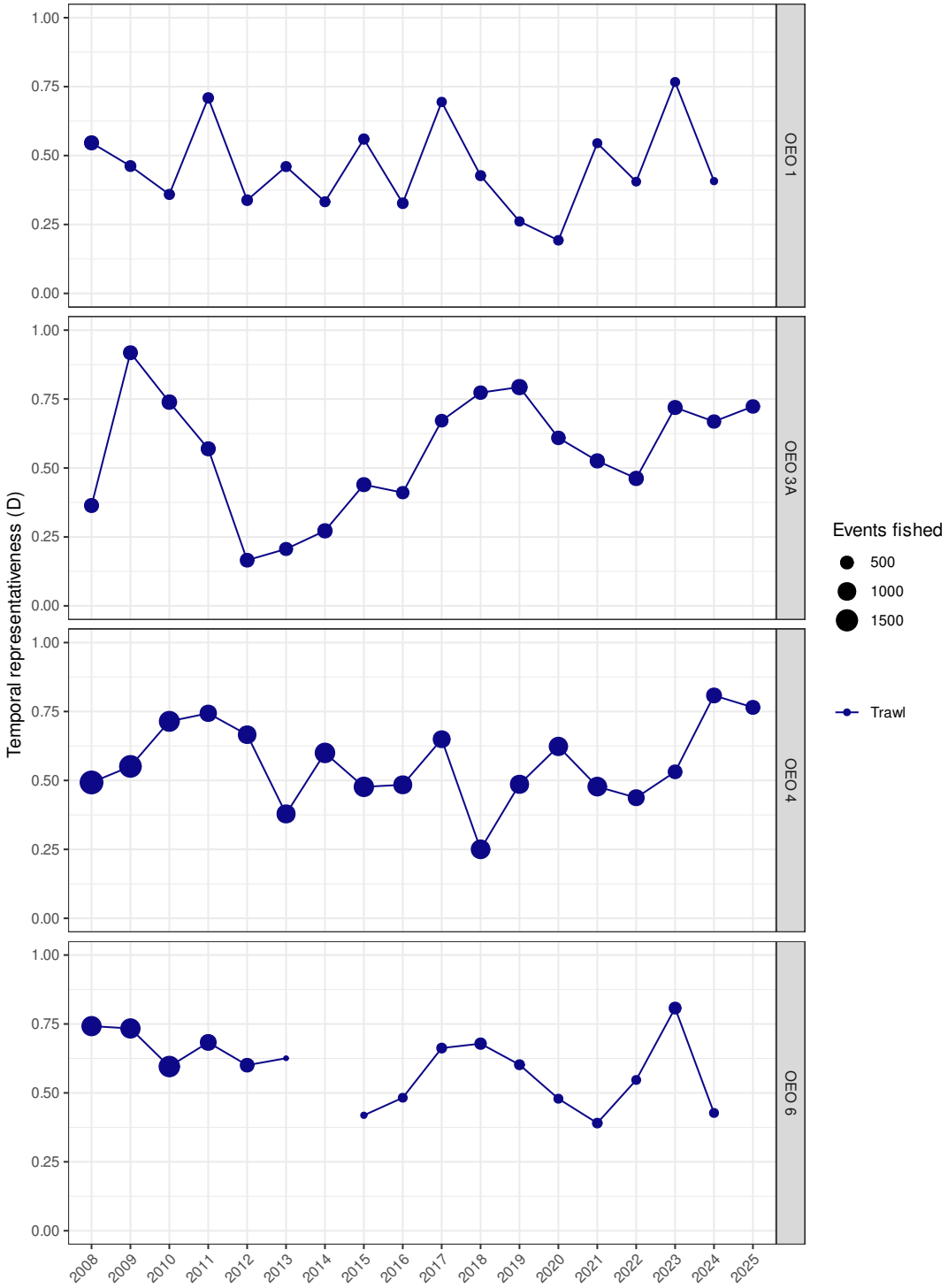


Figure 78: Temporal representativeness of observer sanpling of black oreo by fishing year and area. Temporal representativeness is assessed using the KS statistic (*D*) applied to the start date-times of all fishing events and all sampled fishing events, weighted by catch weight.

2.2.1 BOE 1: Trawl fishery

2.2.1.1 Length-frequency samples

Table 7: Length-frequency samples of black oreo from the BOE 1 Trawl fishery sampled by the Observer Programme in fishing years 2008 to 2025. Positive fishing events are those where the catch of black oreo exceeded a potential sampling threshold of 30 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
2008	489	8	640	1.64
2009	339	15	1 008	4.42
2010	295	4	175	1.36
2011	319	5	264	1.57
2012	318	6	670	1.89
2013	272	7	446	2.57
2014	259	1	20	0.39
2015	271	4	390	1.48
2016	267	5	239	1.87
2017	240	8	520	3.33
2018	289	4	320	1.38
2019	237	1	20	0.42
2020	253	1	38	0.40
2021	226	6	350	2.65
2022	207	4	141	1.93
2023	225	8	679	3.56
2024	130	6	216	4.62
2025	102	0	0	0.00

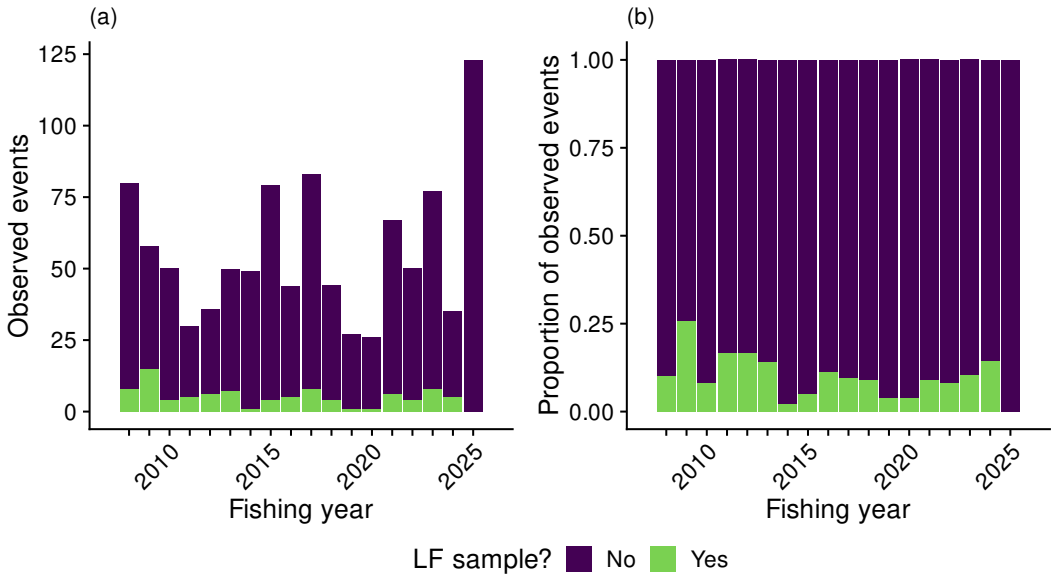


Figure 79: (a) Observed Trawl fishing events, and (b) proportion of observed events, in BOE 1 where the black oreo catch exceeded the 30 kg threshold, with and without length-frequency sampling.

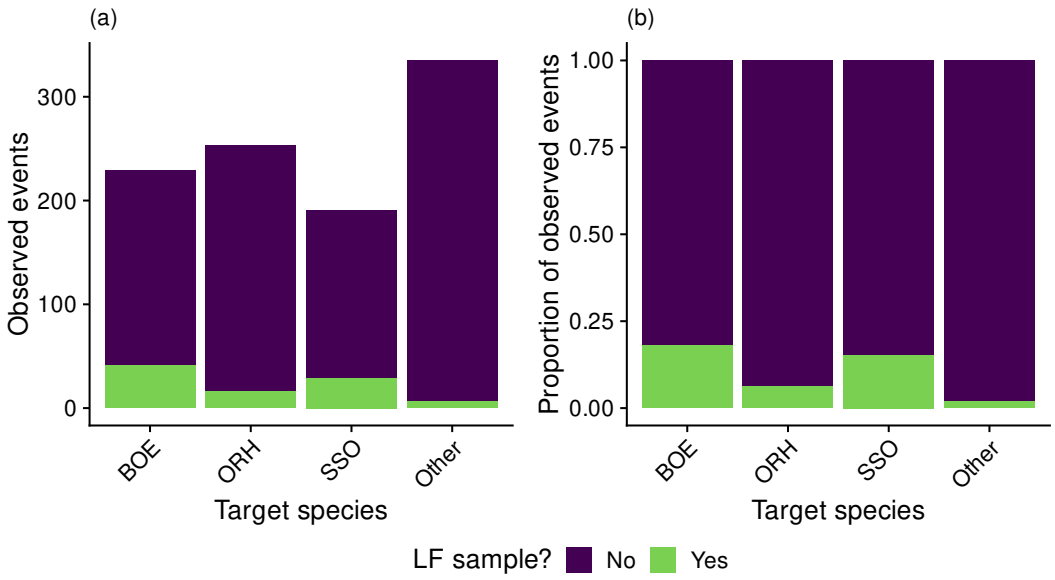


Figure 80: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in BOE 1 where the black oreo catch exceeded the 30 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

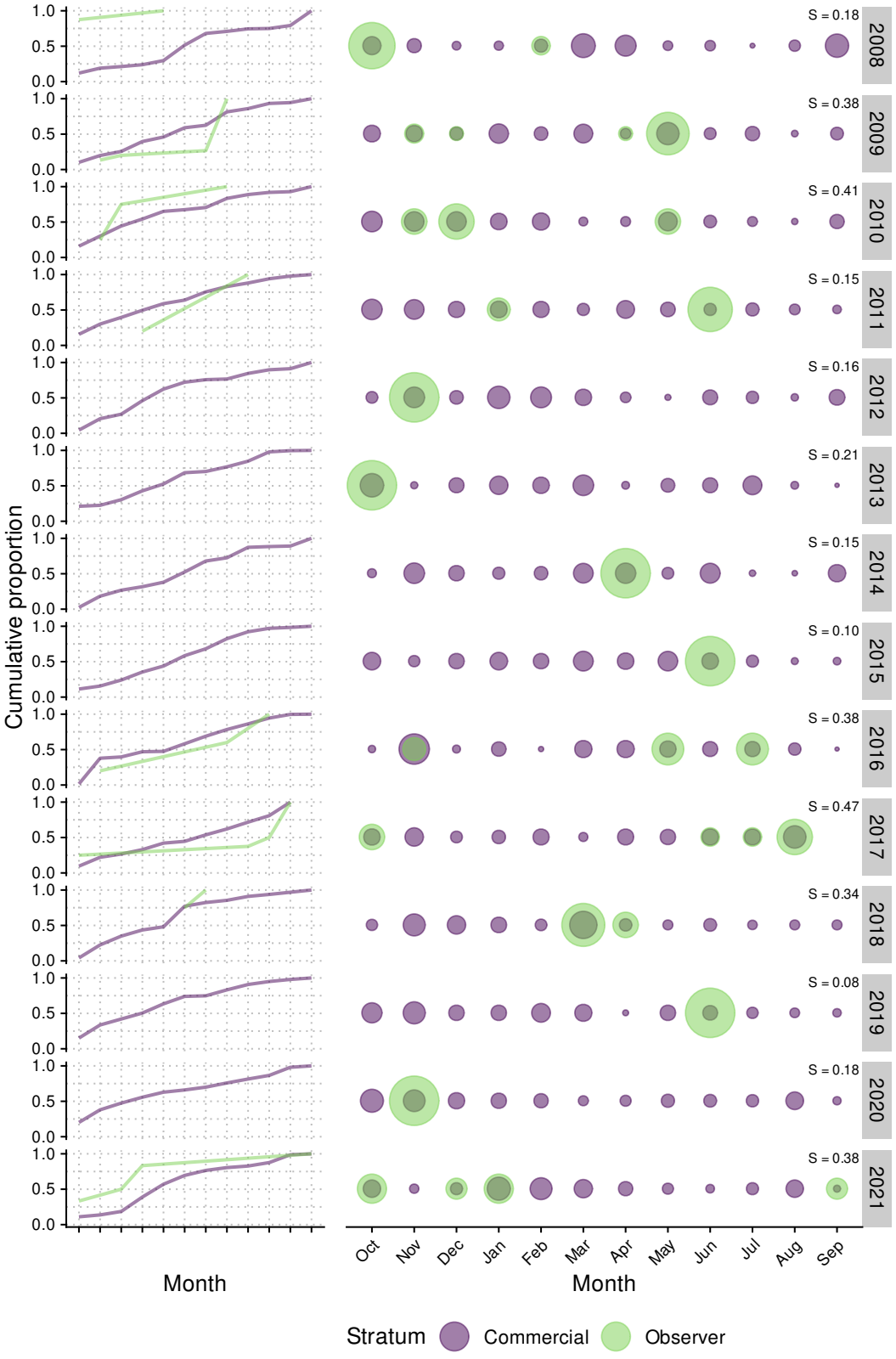


Figure 81: Monthly representativeness of observer sampling coverage of Trawl fishing events in BOE 1, where the black oreo catch exceeded the 30kg threshold, in 2008 to 2021. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

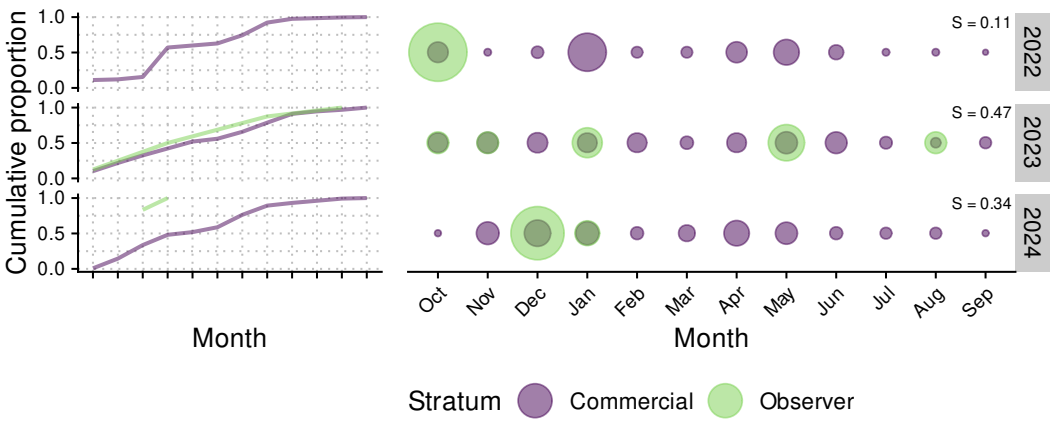


Figure 82: Monthly representativeness of observer sampling coverage of Trawl fishing events in BOE 1, where the black oreo catch exceeded the 30kg threshold, in 2022 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

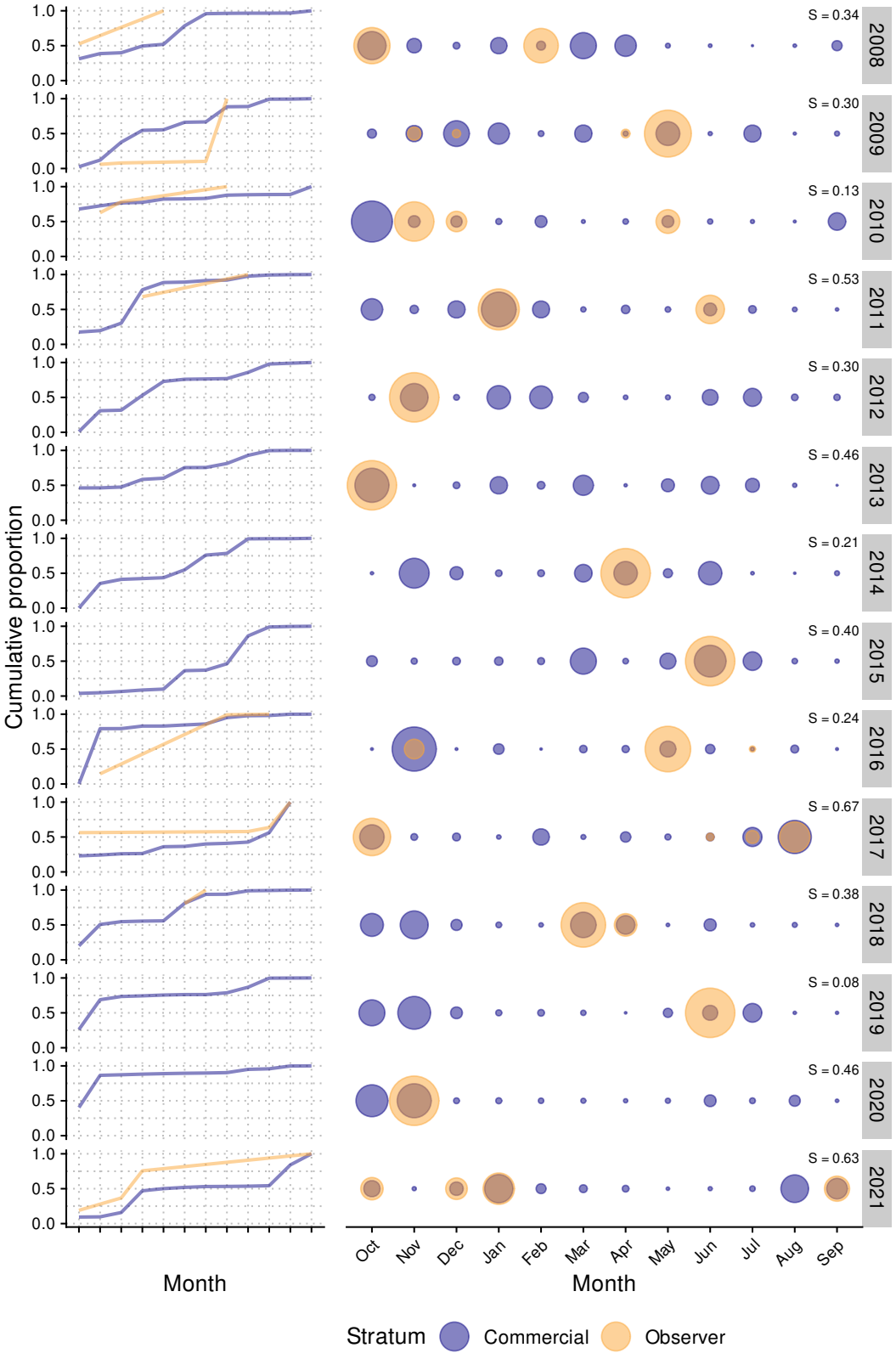


Figure 83: **Monthly representativeness of observer sampling coverage of Trawl catch in BOE 1, from events where the black oreo catch exceeded the 30kg threshold, in 2008 to 2021. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

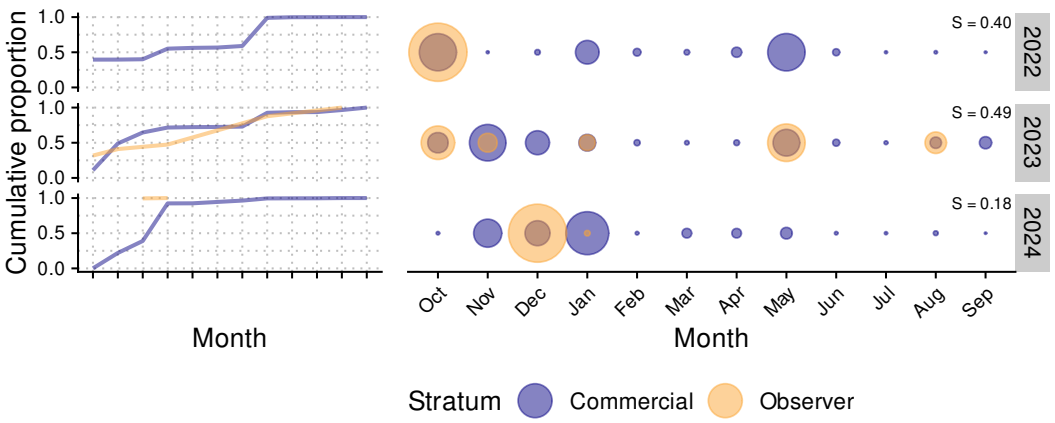


Figure 84: Monthly representativeness of observer sampling coverage of Trawl catch in BOE 1, from events where the black oreo catch exceeded the 30kg threshold, in 2022 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

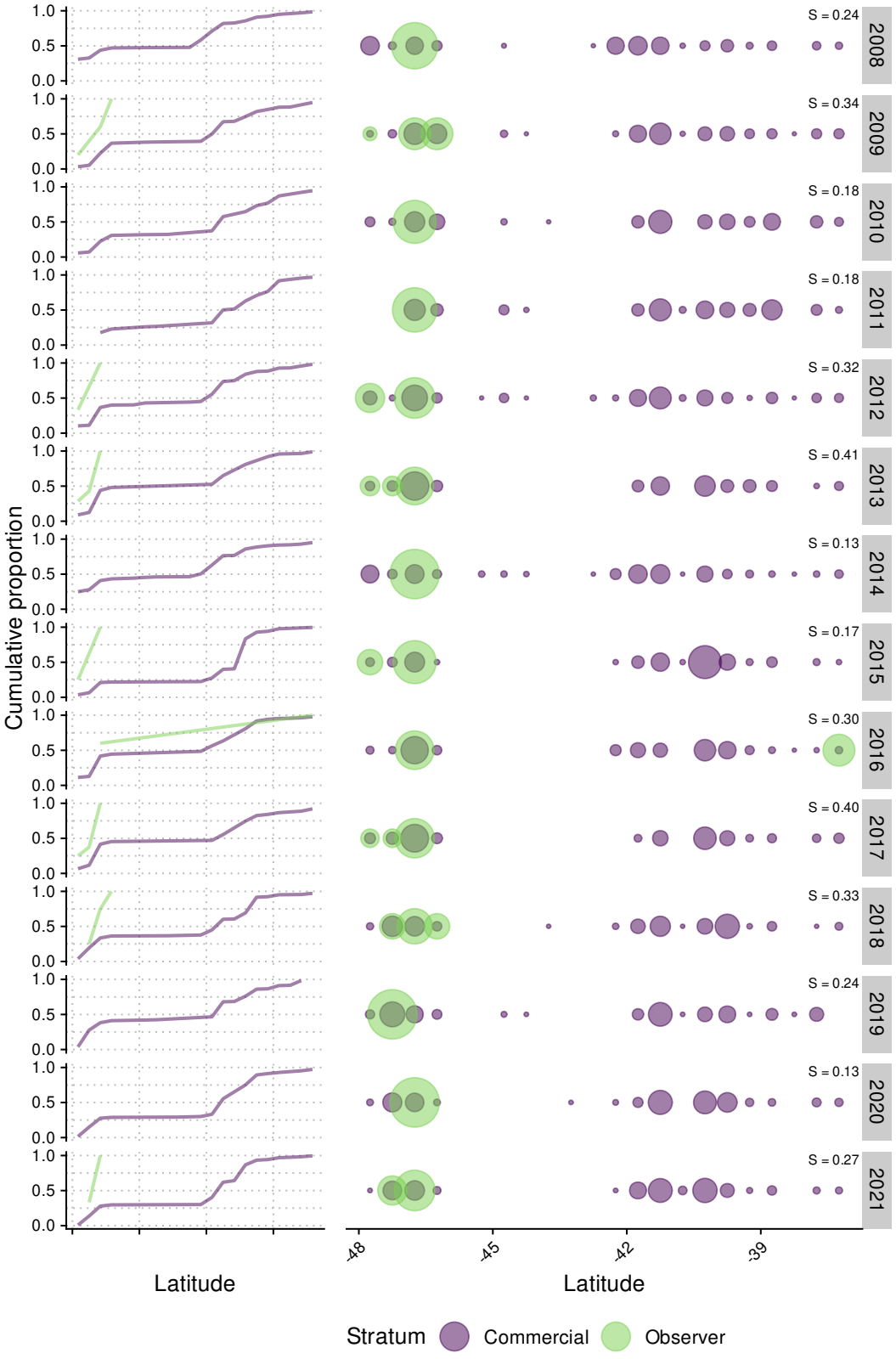


Figure 85: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in BOE 1, where the black oreo catch exceeded the 30kg threshold, in 2008 to 2021. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

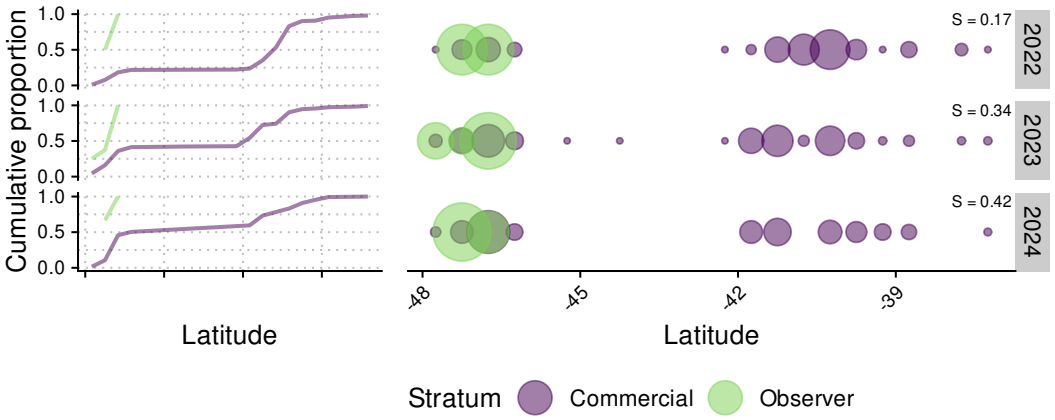


Figure 86: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in BOE 1, where the black oreo catch exceeded the 30kg threshold, in 2022 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

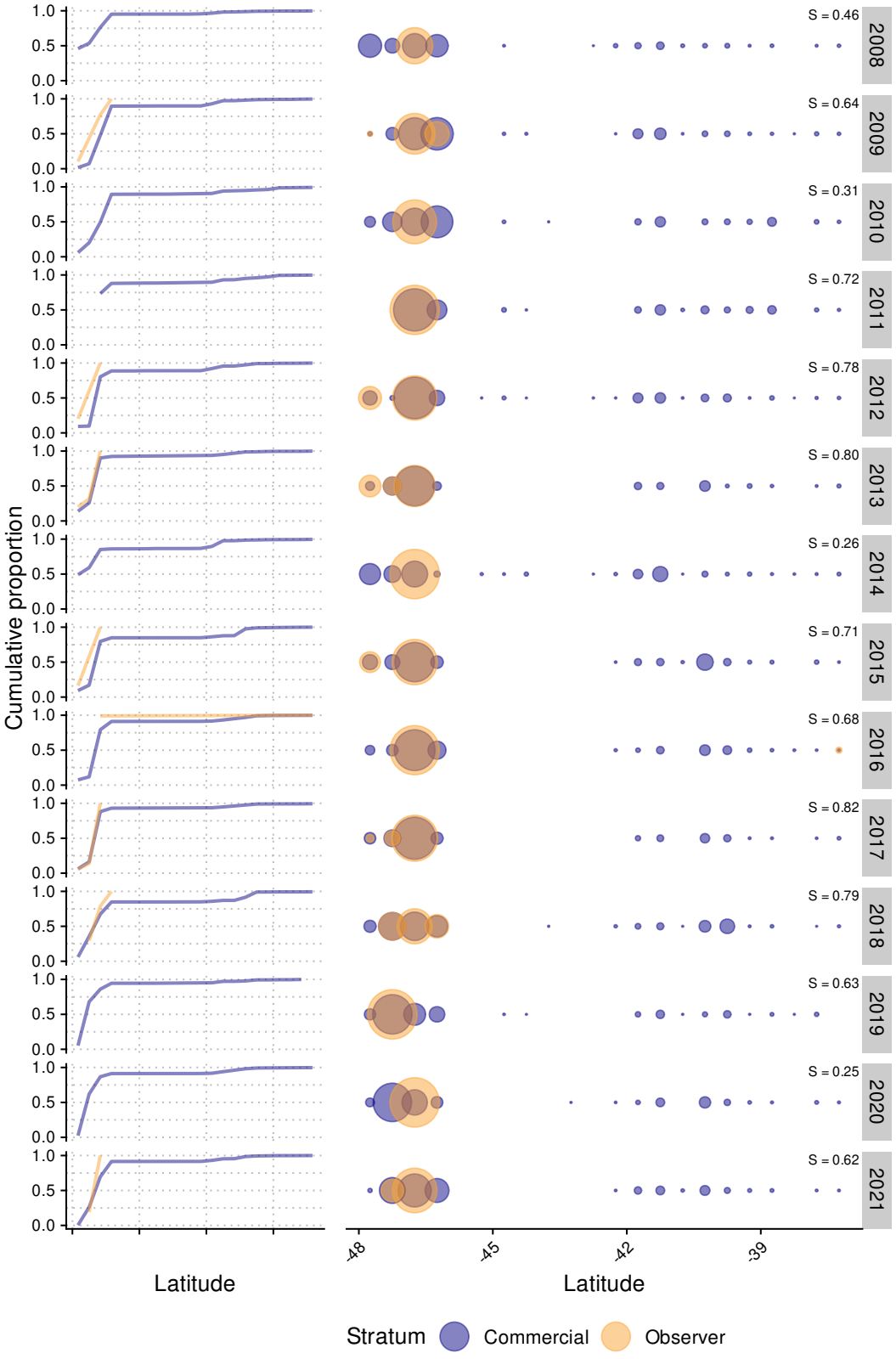


Figure 87: **Latitudinal representativeness of observer sampling coverage of Trawl catch in BOE 1, from events where the black oreo catch exceeded the 30kg threshold, in 2008 to 2021. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

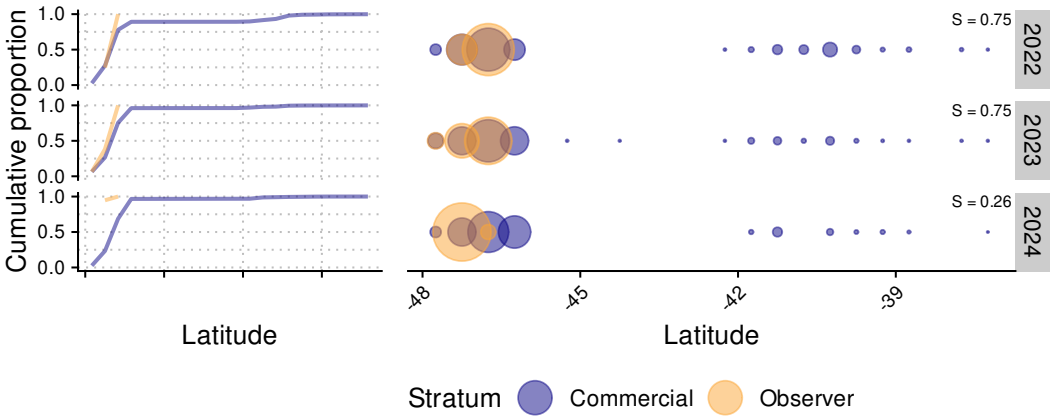


Figure 88: **Latitudinal representativeness of observer sampling coverage of Trawl catch in BOE 1, from events where the black oreo catch exceeded the 30kg threshold, in 2022 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

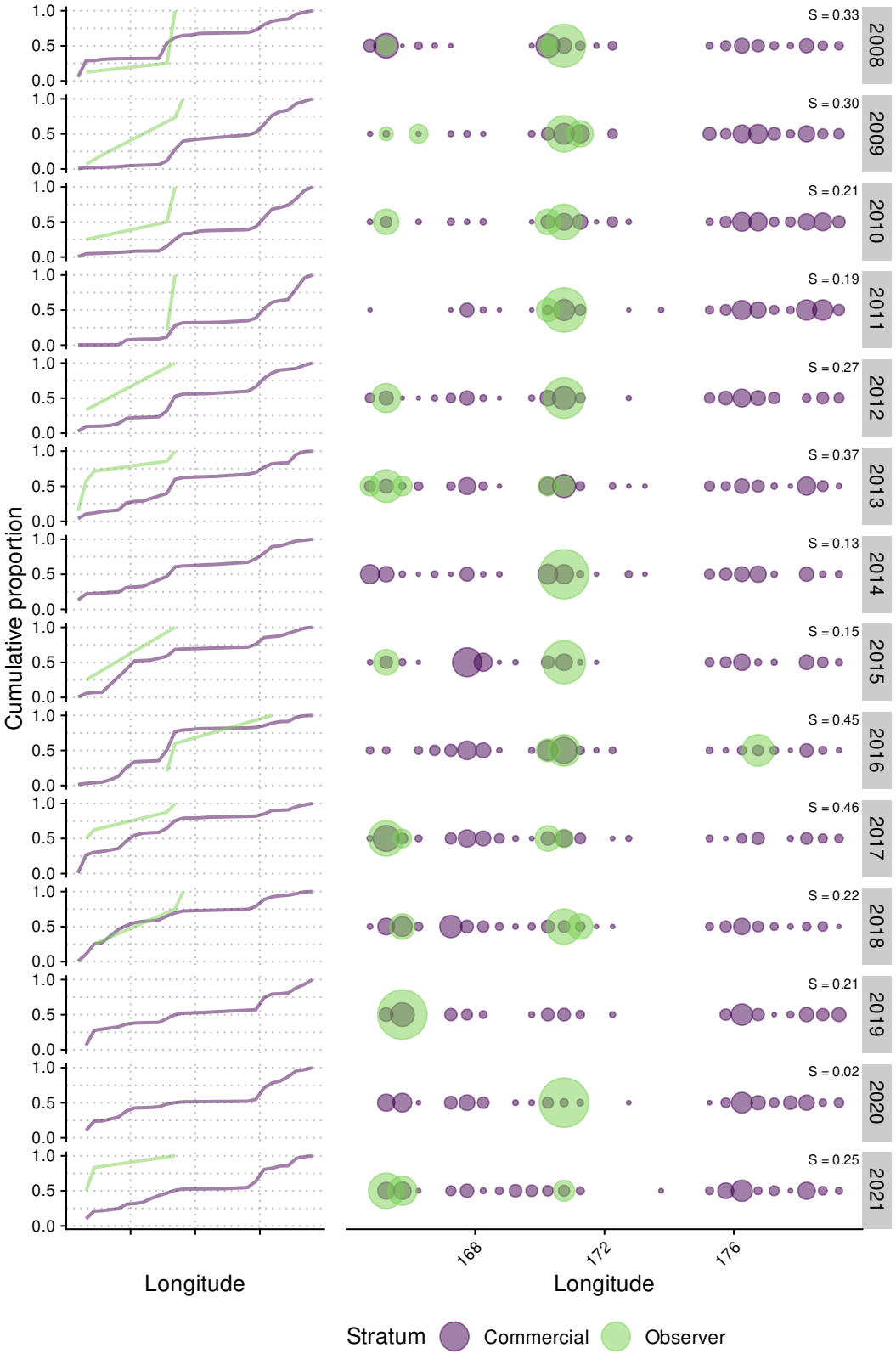


Figure 89: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in BOE 1, where the black oreo catch exceeded the 30kg threshold, in 2008 to 2021. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

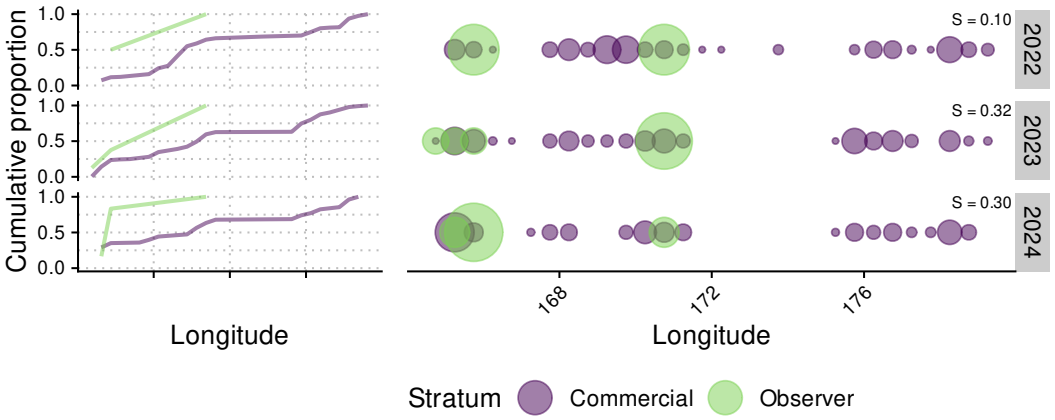


Figure 90: **Longitudinal representativeness of observer sampling coverage of Trawl fishing events in BOE 1, where the black oreo catch exceeded the 30kg threshold, in 2022 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

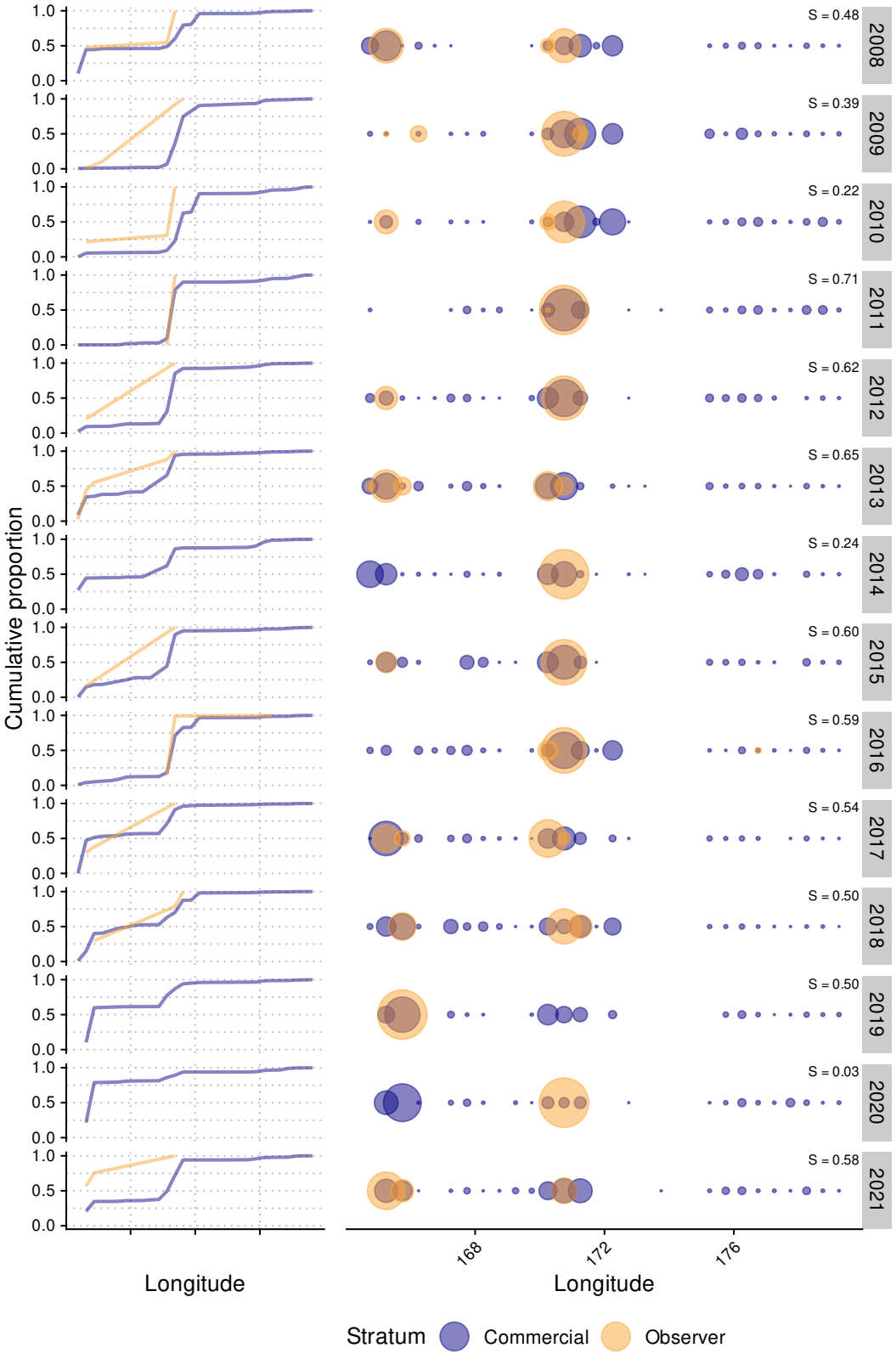


Figure 91: Longitudinal representativeness of observer sampling coverage of Trawl catch in BOE 1, from events where the black oreo catch exceeded the 30kg threshold, in 2008 to 2021. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

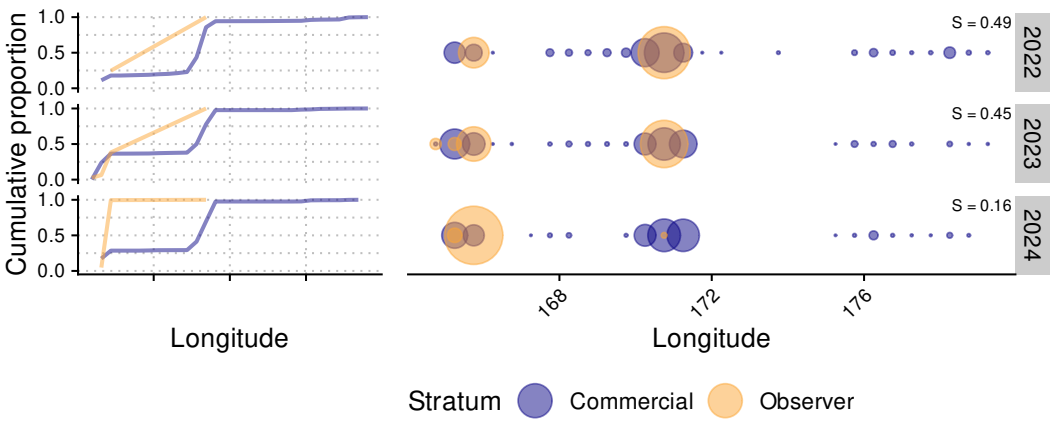


Figure 92: **Longitudinal representativeness of observer sampling coverage of Trawl catch in BOE 1, from events where the black oreo catch exceeded the 30kg threshold, in 2022 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

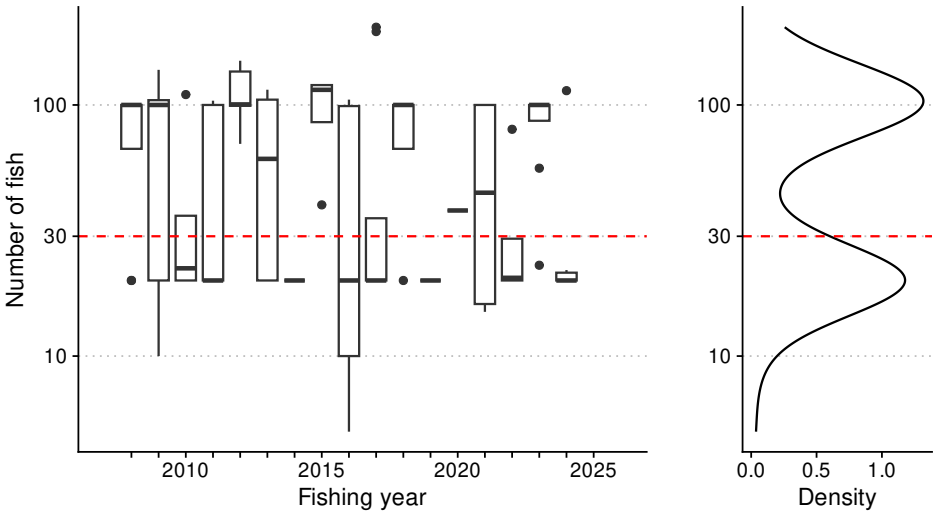


Figure 93: **Length-frequency sample sizes for observed fishing events in BOE 1 where black oreo were sampled. The red dashed line indicates a sample size of 30 fish.**

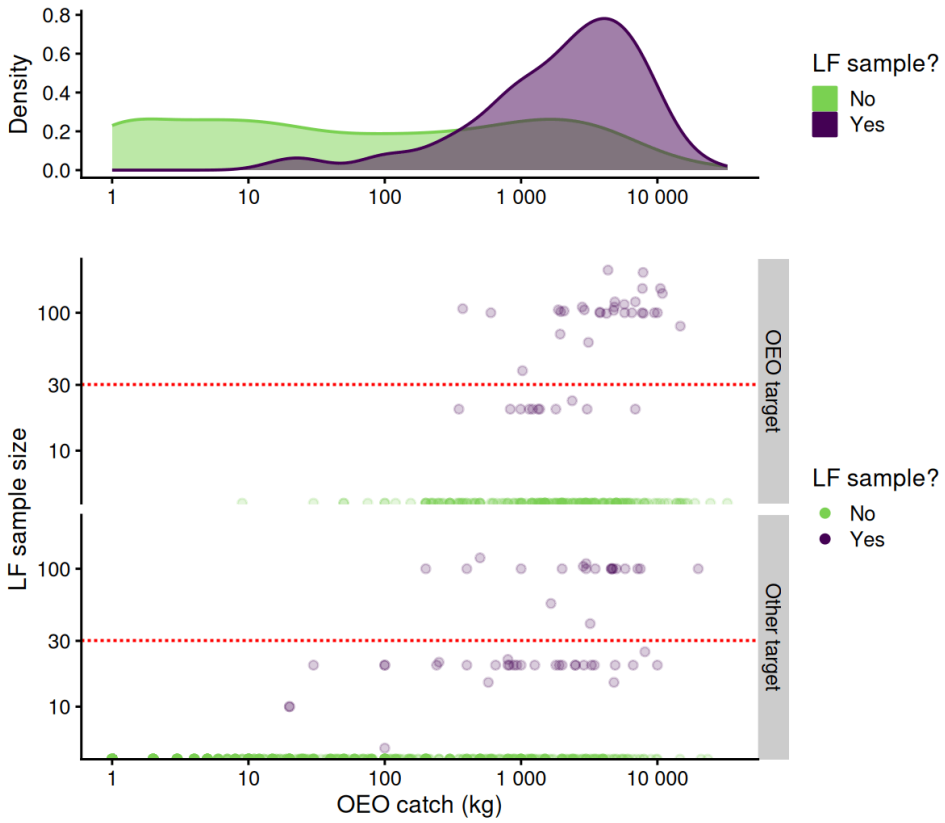


Figure 94: Length-frequency sample sizes (number of fish sampled) for observed fishing events in BOE 1 in relation to the total black oreo catch from an event, separately for black oreo target events and other target species. The red dashed line indicates a sample size of 30 fish.

2.2.1.2 Otolith samples

Table 8: Otolith samples of black oreo from the BOE 1 Trawl fishery sampled by the Observer Programme in fishing years 2008 to 2025. Positive fishing events are those where the catch of black oreo exceeded a potential sampling threshold of 30 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
2008	489	0	0	0.00
2009	339	0	0	0.00
2010	295	1	11	0.34
2011	319	2	21	0.63
2012	318	6	64	1.89
2013	272	6	47	2.21
2014	259	1	5	0.39
2015	271	0	0	0.00
2016	267	0	0	0.00
2017	240	0	0	0.00
2018	289	4	36	1.38
2019	237	1	5	0.42
2020	253	0	0	0.00
2021	226	6	46	2.65
2022	207	4	25	1.93
2023	225	6	60	2.67
2024	130	6	34	4.62
2025	102	0	0	0.00

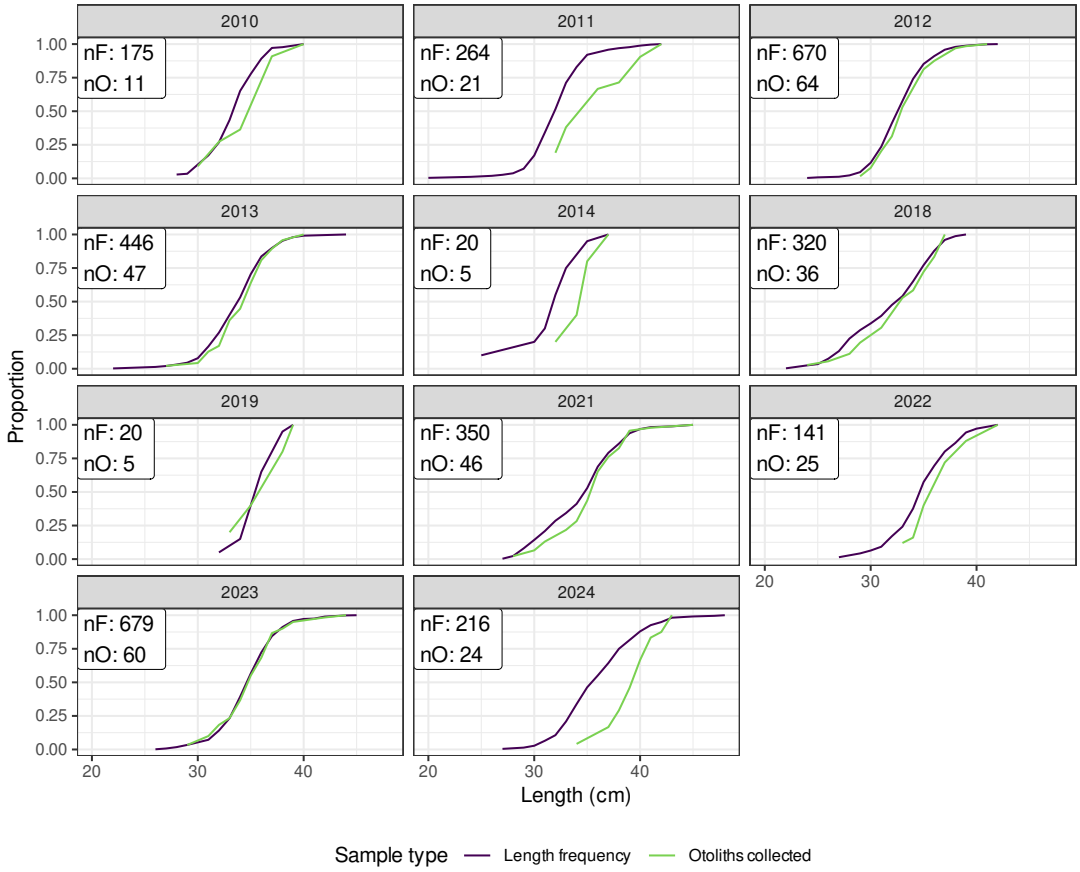


Figure 95: Cumulative distributions of the length of fish in the length frequency and otolith samples of black oreo in the BOE 1 Trawl fishery for the 2010 to 2024 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

2.2.1.3 Catch quantification

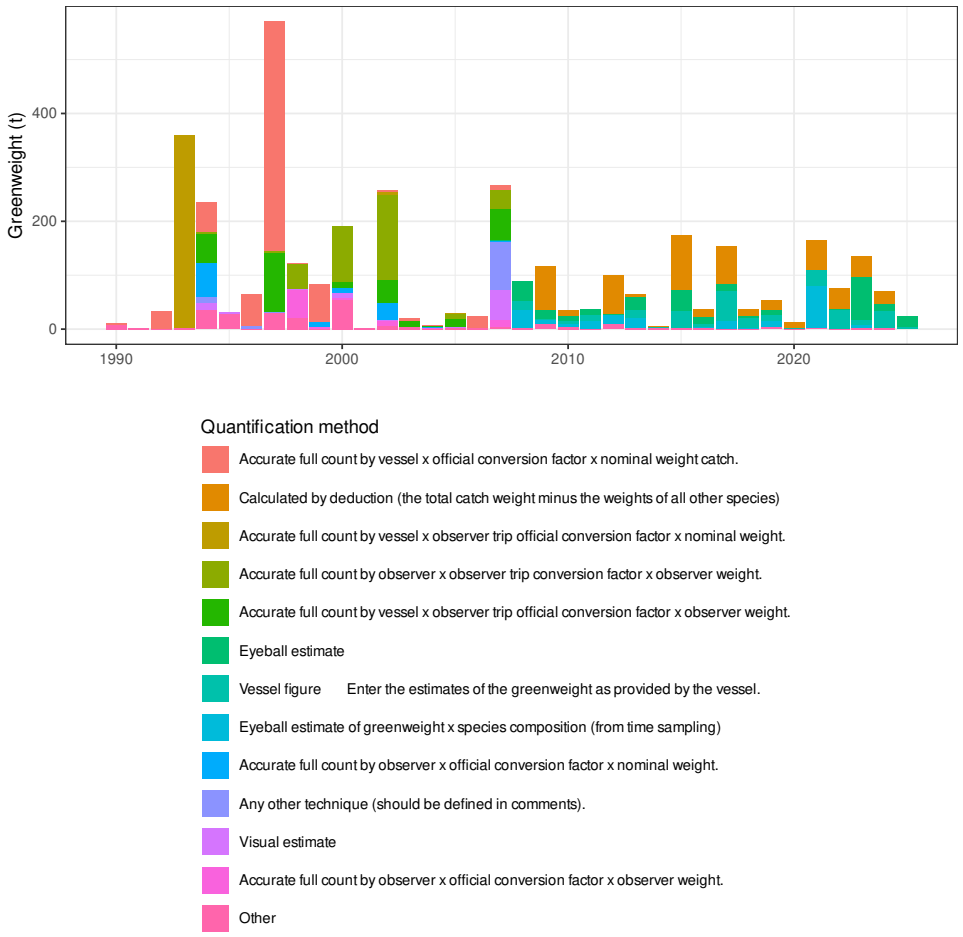


Figure 96: Methods used by observers to quantify the catch of black oreo in the BOE 1 Trawl fishery. The legend lists the methods used in descending order of total catch.

2.2.2 BOE 3A: Trawl fishery

2.2.2.1 Length-frequency samples

Table 9: Length-frequency samples of black oreo from the BOE 3A Trawl fishery sampled by the Observer Programme in fishing years 2008 to 2025. Positive fishing events are those where the catch of black oreo exceeded a potential sampling threshold of 30 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
2008	610	26	1 298	4.26
2009	597	54	3 915	9.05
2010	660	33	1 857	5.00
2011	614	30	3 139	4.89
2012	582	24	1 452	4.12
2013	517	21	1 602	4.06
2014	638	33	1 553	5.17
2015	564	26	1 346	4.61
2016	452	2	40	0.44
2017	486	13	757	2.67
2018	559	18	1 163	3.22
2019	737	37	2 268	5.02
2020	564	8	240	1.42
2021	631	11	294	1.74
2022	640	9	699	1.41
2023	615	28	1 906	4.55
2024	548	22	835	4.01
2025	562	30	2 017	5.34

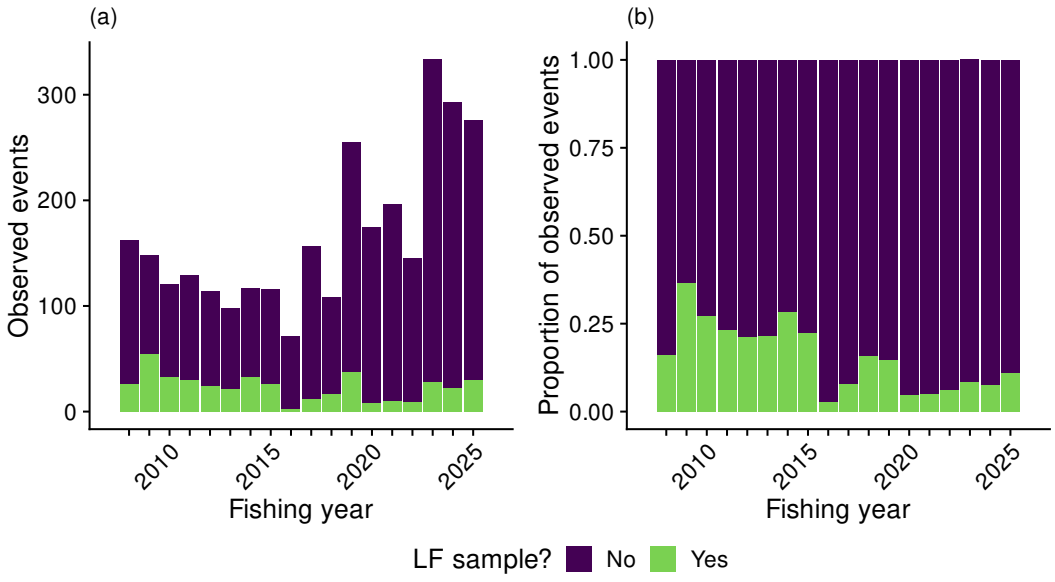


Figure 97: (a) Observed Trawl fishing events, and (b) proportion of observed events, in BOE 3A where the black oreo catch exceeded the 30 kg threshold, with and without length-frequency sampling.

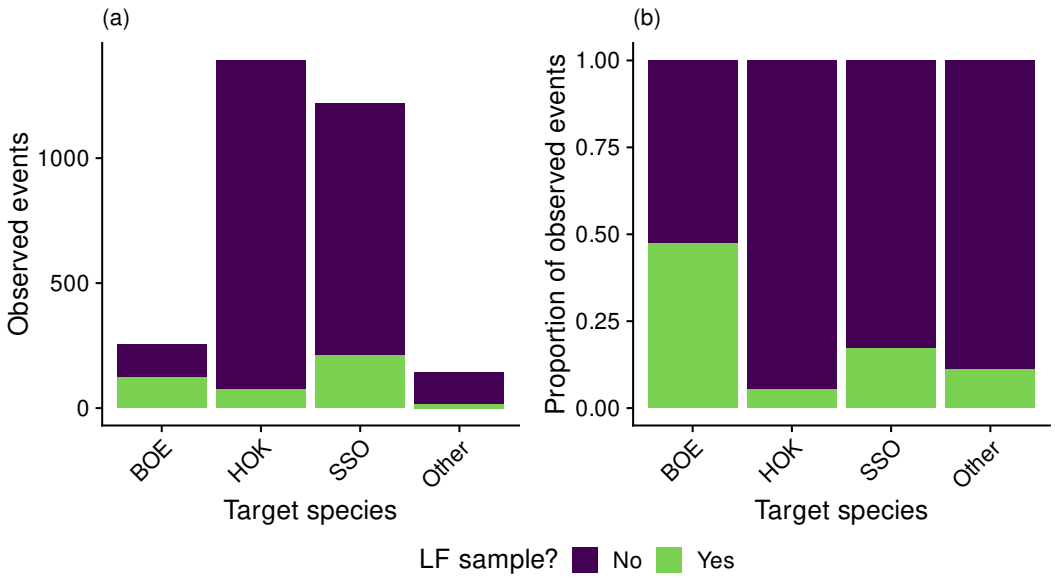


Figure 98: (a) Observed Trawl fishing events, and (b) proportion of observed events, in BOE 3A where the black oreo catch exceeded the 30 kg threshold, with and without length-frequency sampling, by observer assessed target species.

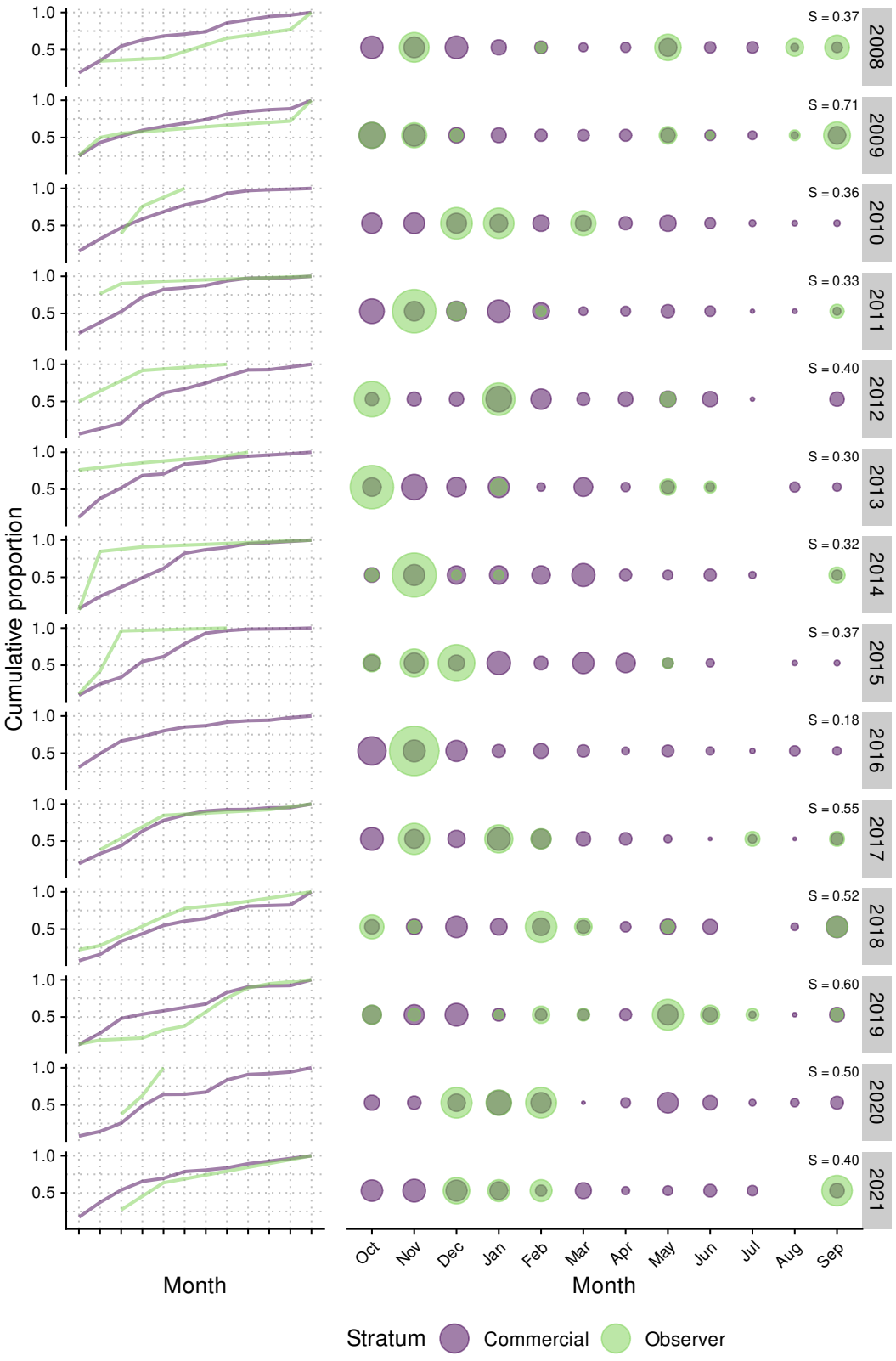


Figure 99: Monthly representativeness of observer sampling coverage of Trawl fishing events in BOE 3A, where the black oreo catch exceeded the 30kg threshold, in 2008 to 2021. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

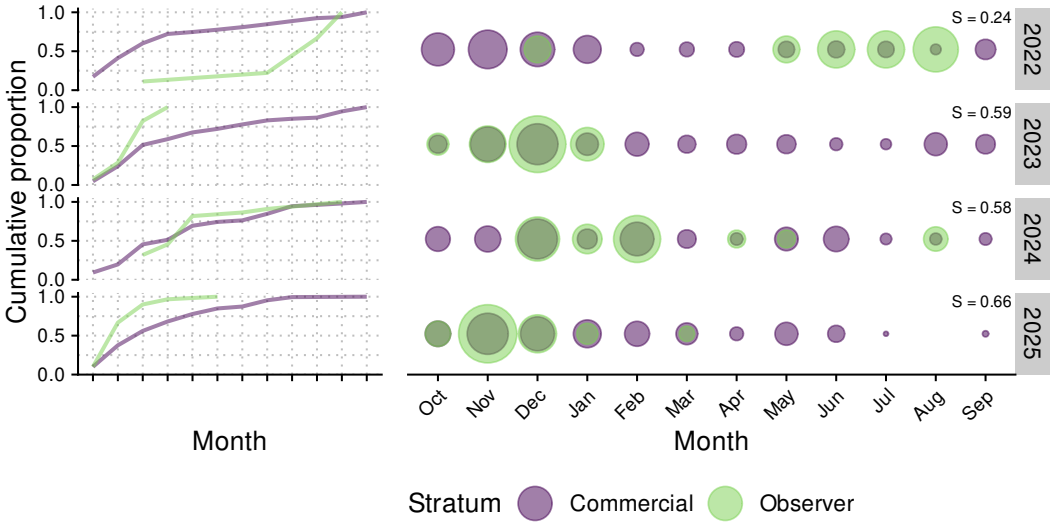


Figure 100: Monthly representativeness of observer sampling coverage of Trawl fishing events in BOE 3A, where the black oreo catch exceeded the 30kg threshold, in 2022 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

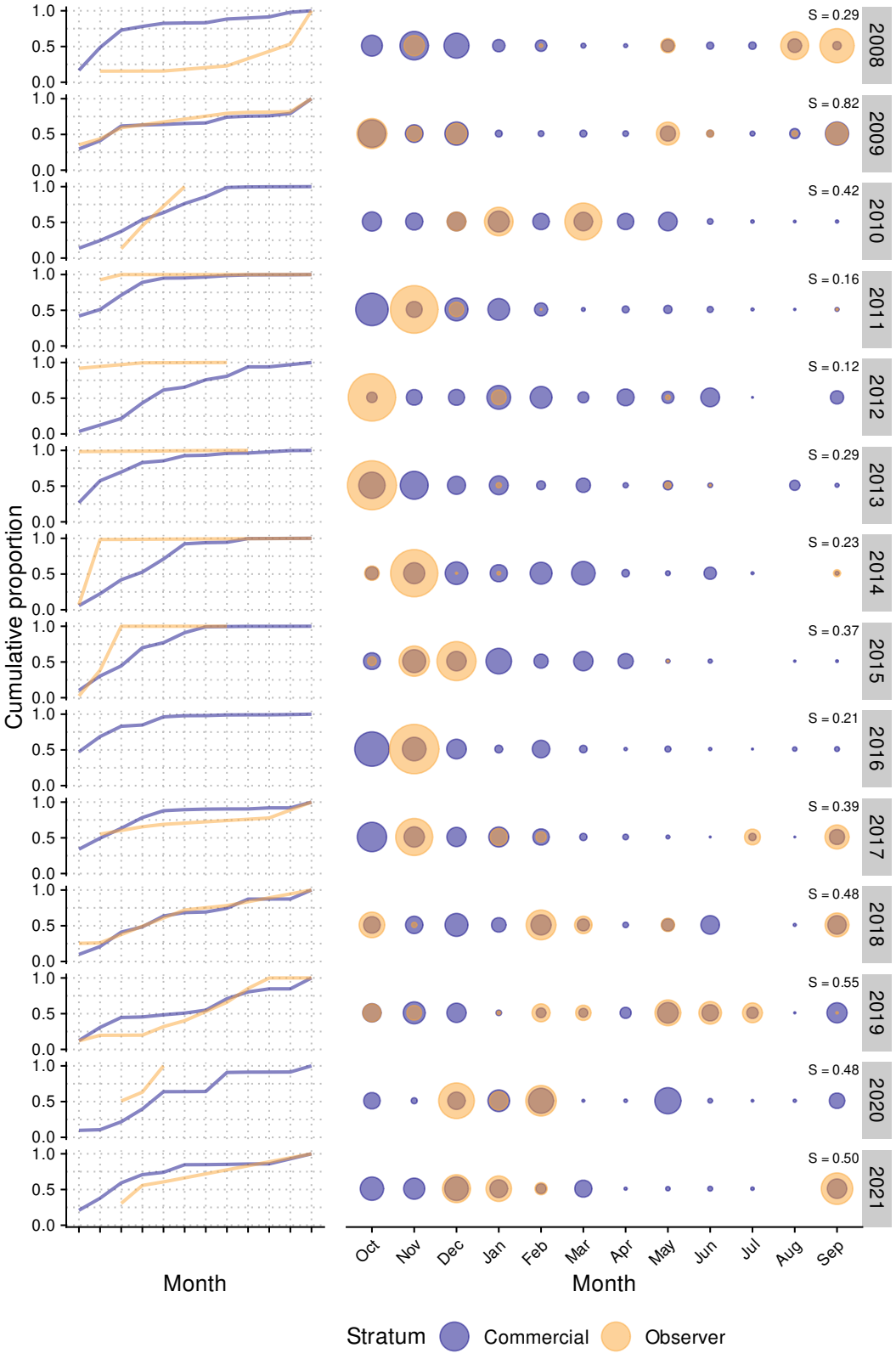


Figure 101: Monthly representativeness of observer sampling coverage of Trawl catch in BOE 3A, from events where the black oreo catch exceeded the 30kg threshold, in 2008 to 2021. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

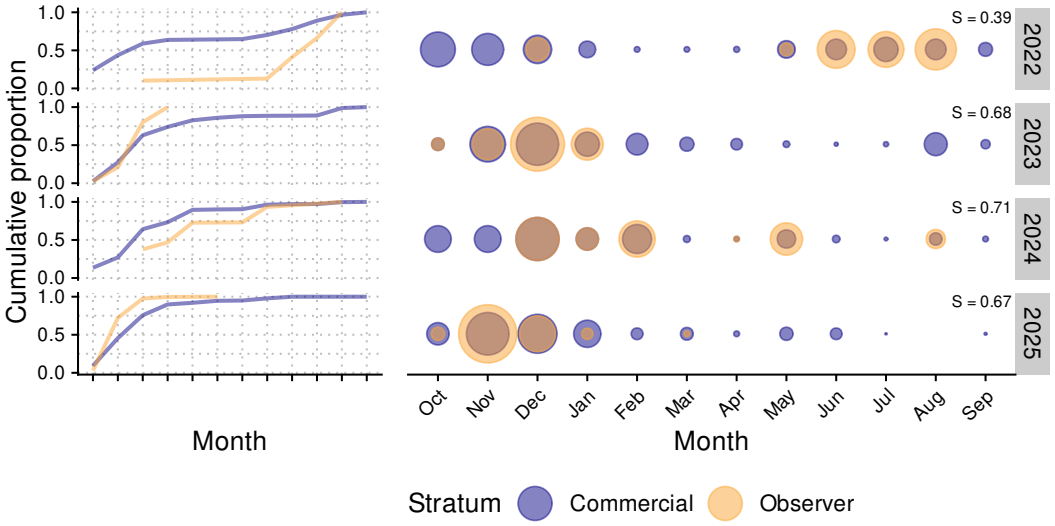


Figure 102: **Monthly representativeness of observer sampling coverage of Trawl catch in BOE 3A, from events where the black oreo catch exceeded the 30kg threshold, in 2022 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

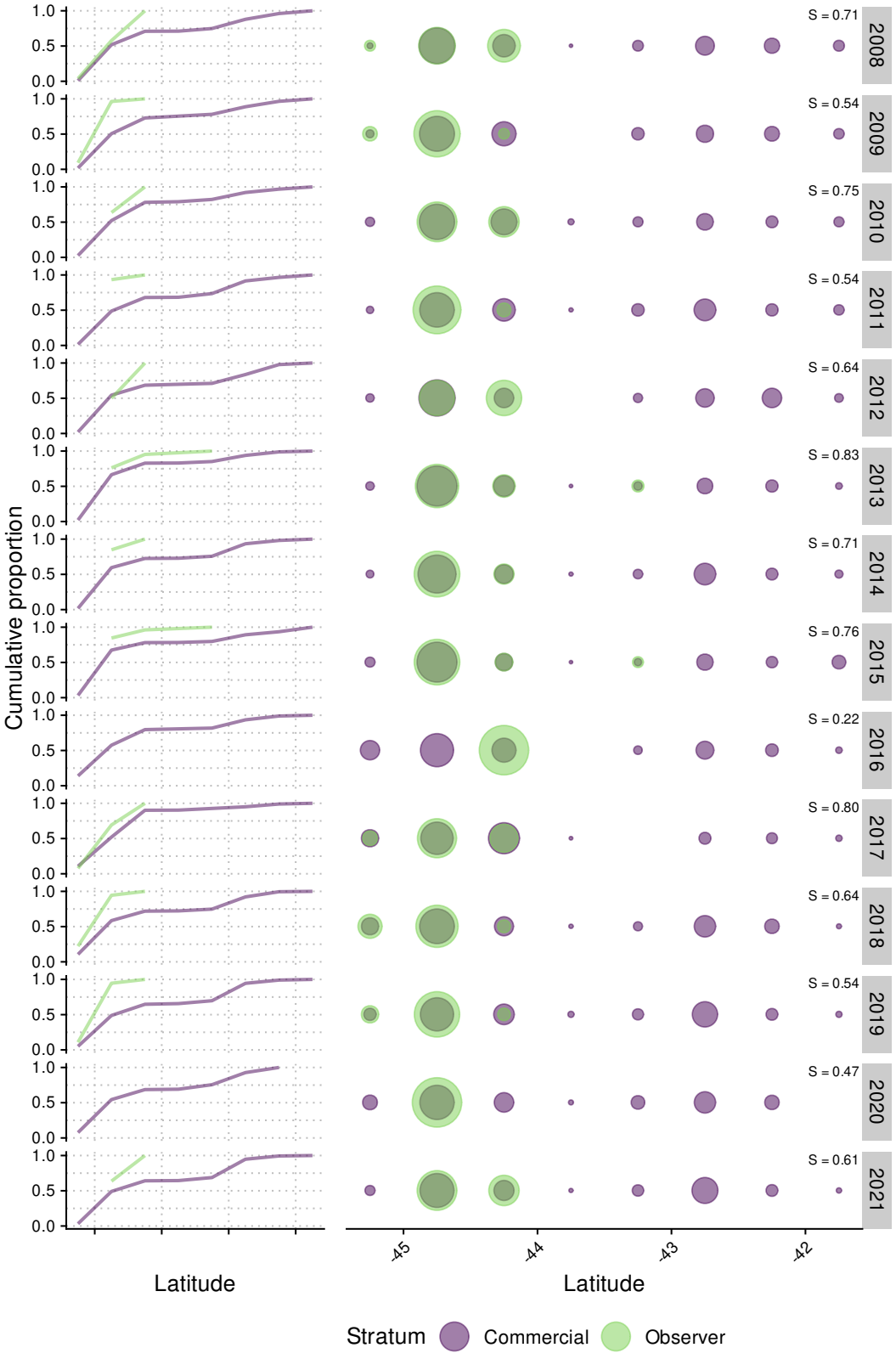


Figure 103: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in BOE 3A, where the black oreo catch exceeded the 30kg threshold, in 2008 to 2021. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

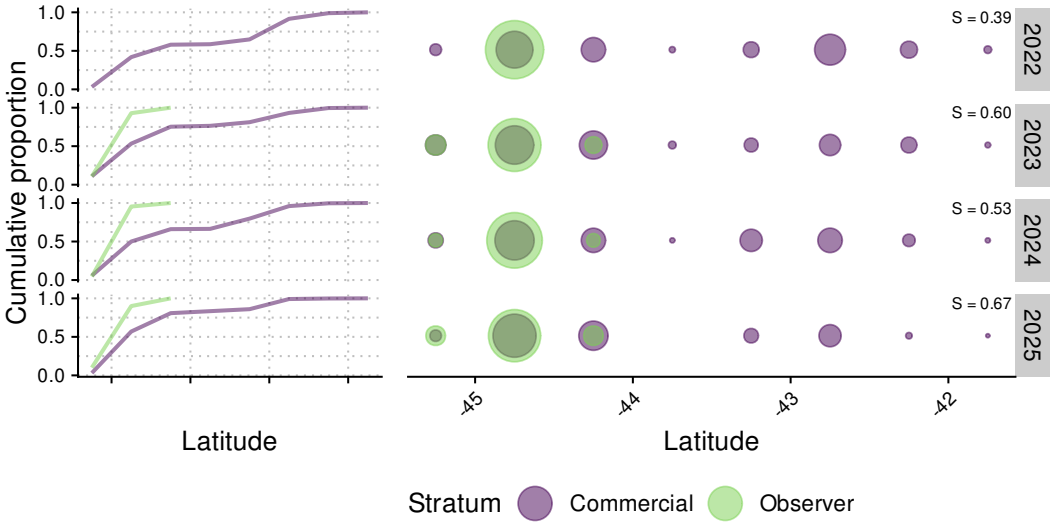


Figure 104: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in BOE 3A, where the black oreo catch exceeded the 30kg threshold, in 2022 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

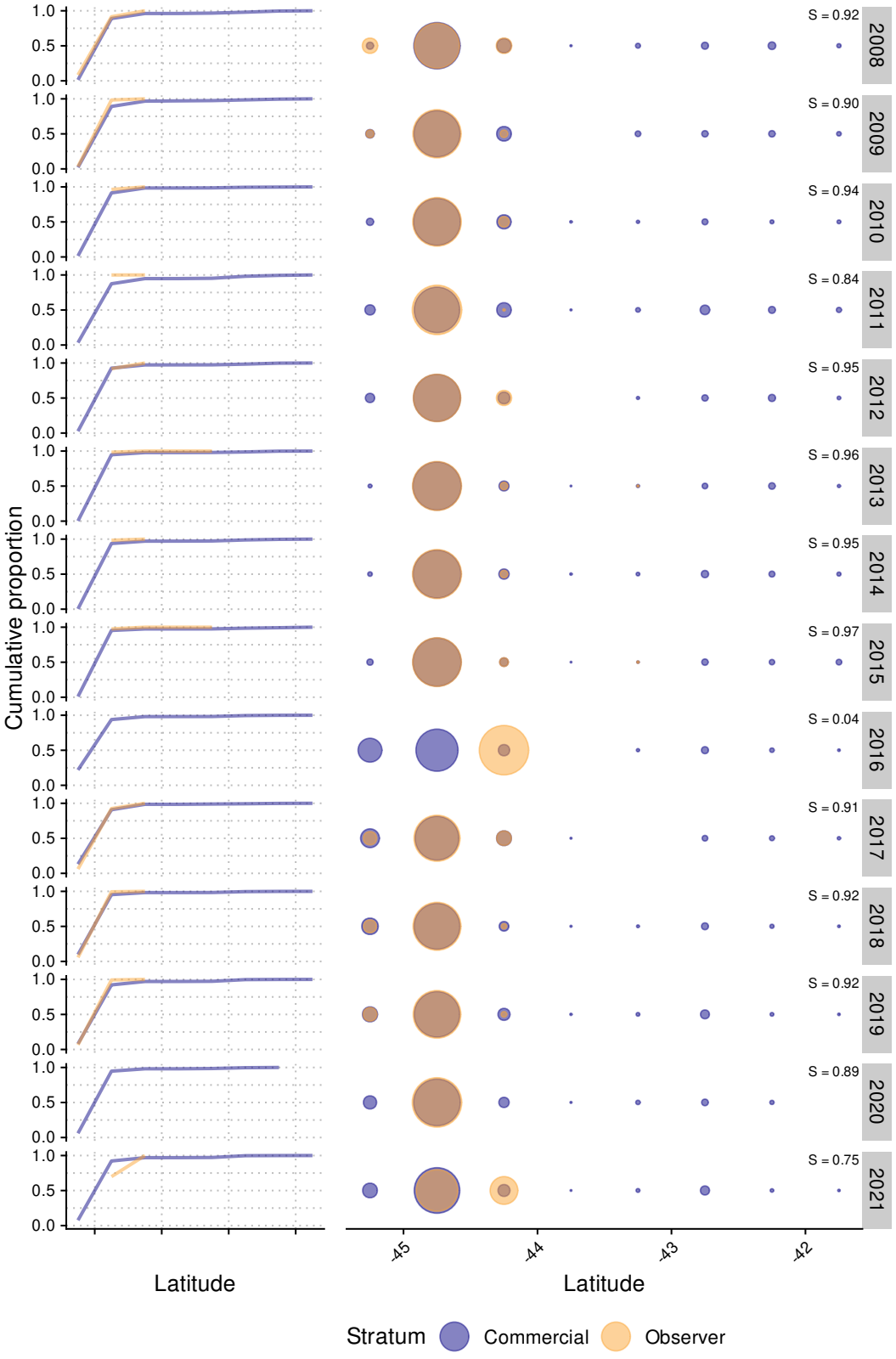


Figure 105: **Latitudinal representativeness of observer sampling coverage of Trawl catch in BOE 3A, from events where the black oreo catch exceeded the 30kg threshold, in 2008 to 2021. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

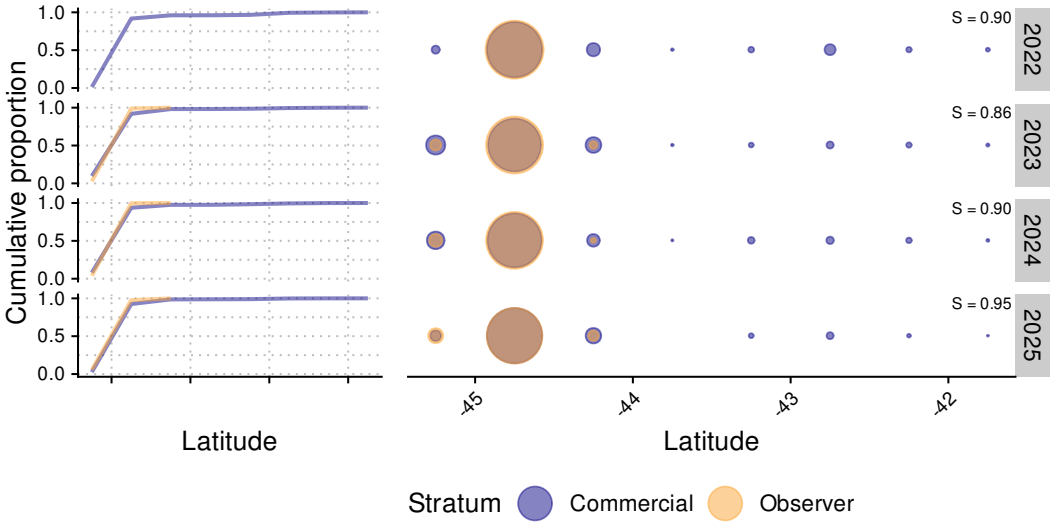


Figure 106: **Latitudinal representativeness of observer sampling coverage of Trawl catch in BOE 3A, from events where the black oreo catch exceeded the 30kg threshold, in 2022 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

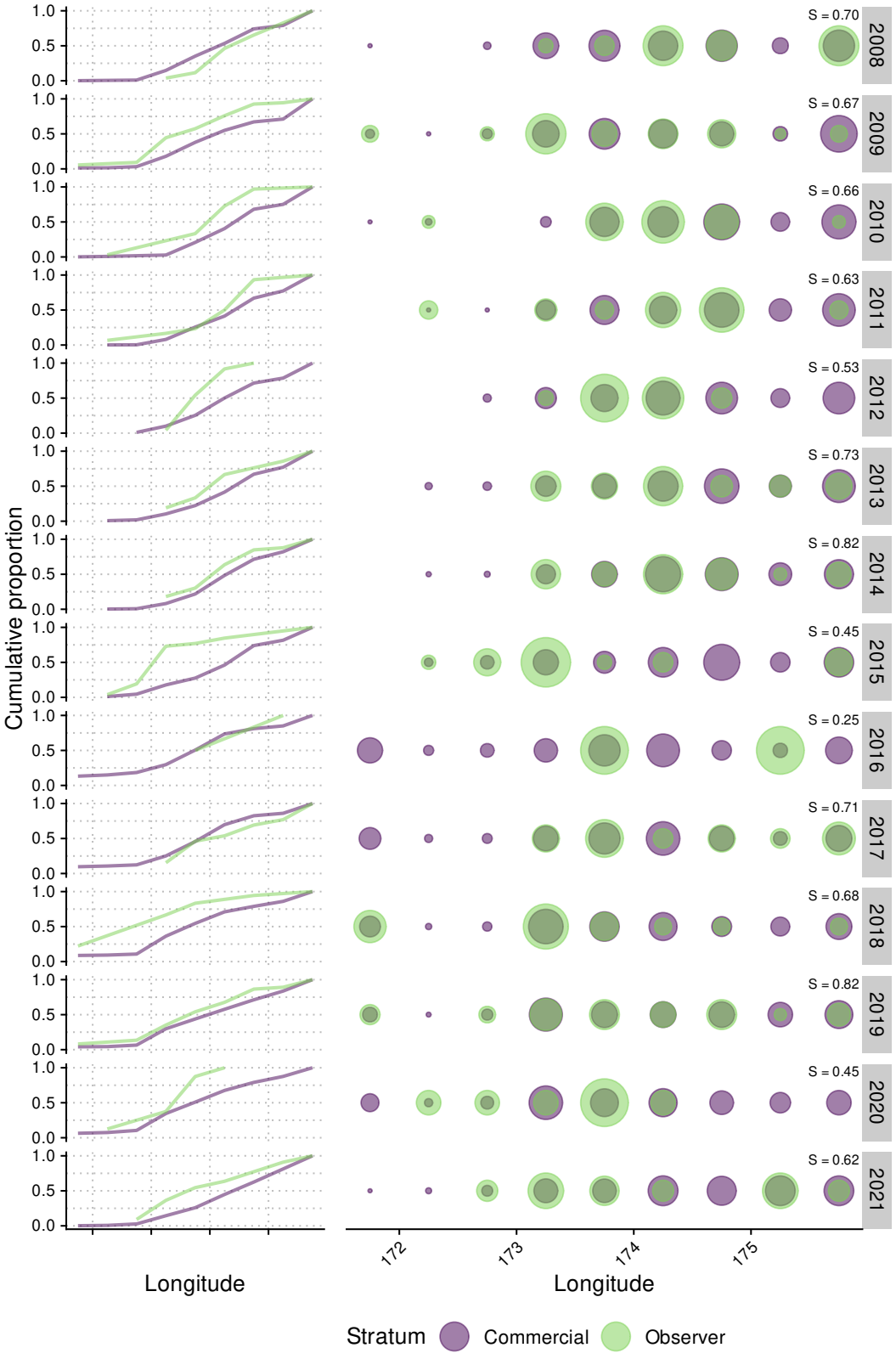


Figure 107: **Longitudinal representativeness of observer sampling coverage of Trawl fishing events in BOE 3A, where the black oreo catch exceeded the 30kg threshold, in 2008 to 2021. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

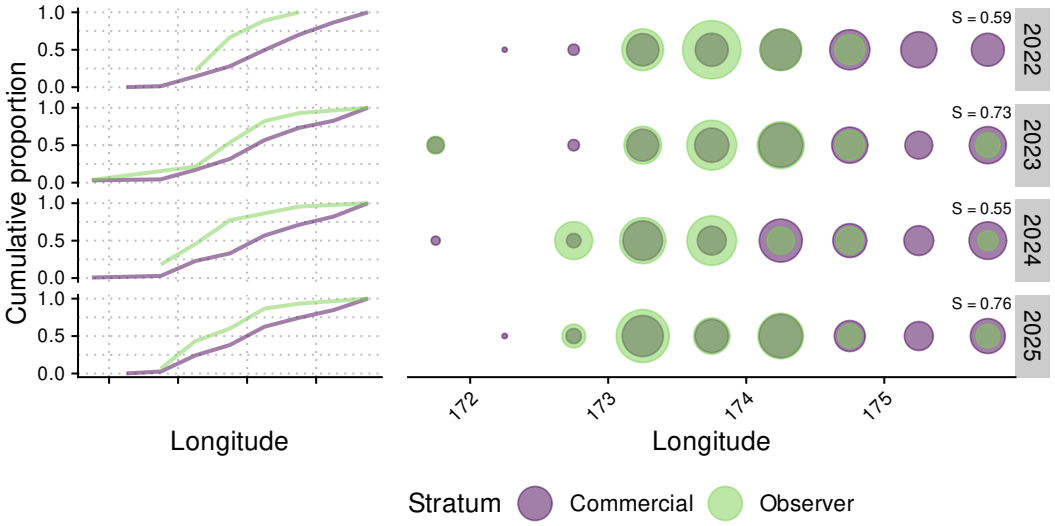


Figure 108: **Longitudinal representativeness of observer sampling coverage of Trawl fishing events in BOE 3A, where the black oreo catch exceeded the 30kg threshold, in 2022 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

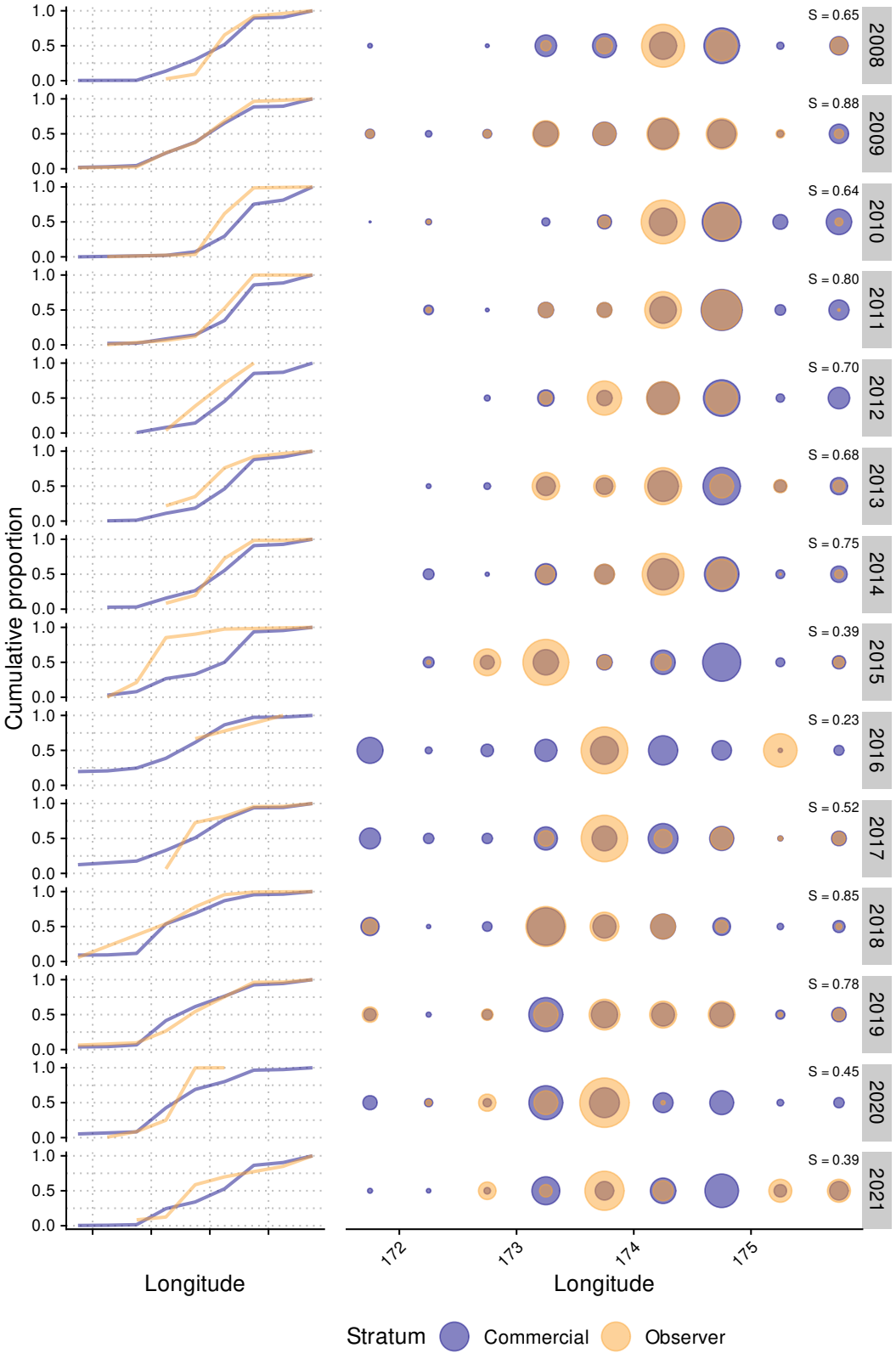


Figure 109: **Longitudinal representativeness of observer sampling coverage of Trawl catch in BOE 3A, from events where the black oreo catch exceeded the 30kg threshold, in 2008 to 2021. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

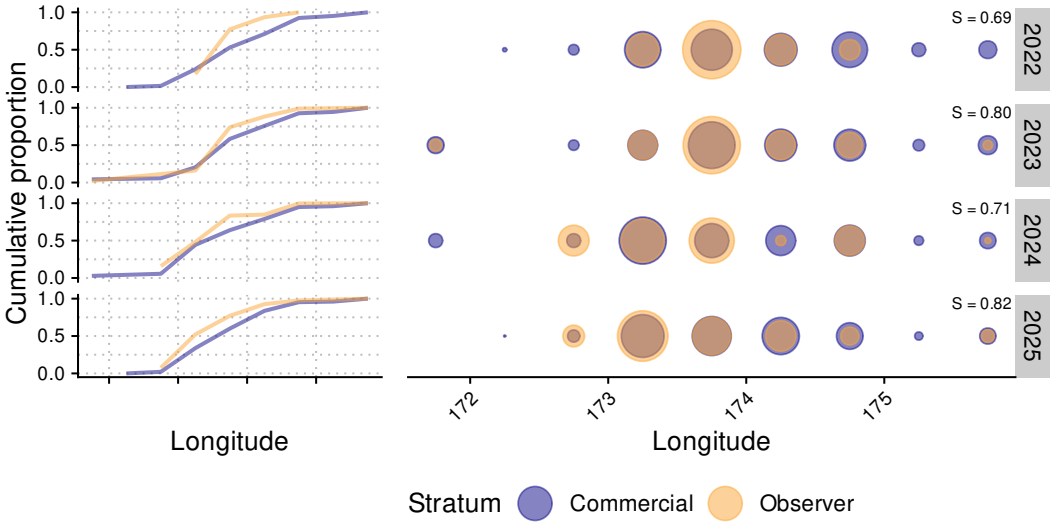


Figure 110: **Longitudinal representativeness of observer sampling coverage of Trawl catch in BOE 3A, from events where the black oreo catch exceeded the 30kg threshold, in 2022 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

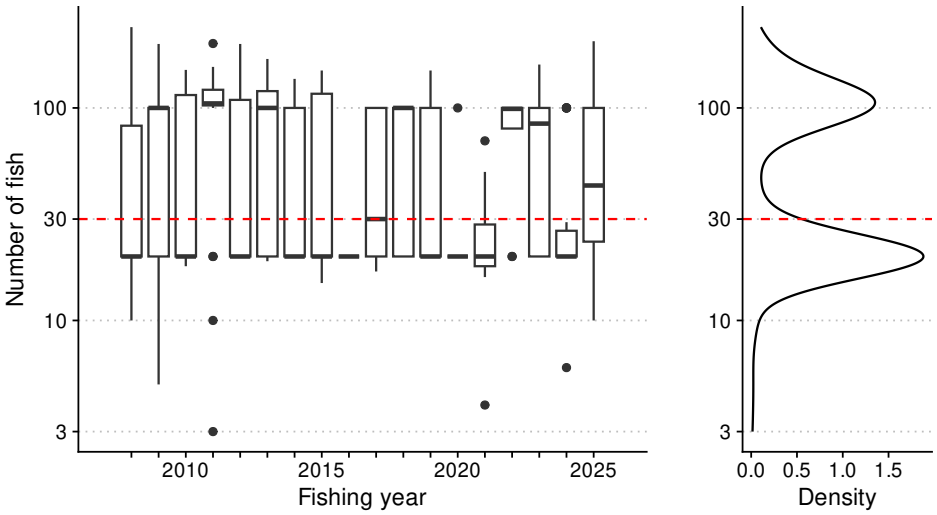


Figure 111: **Length-frequency sample sizes for observed fishing events in BOE 3A where black oreo were sampled. The red dashed line indicates a sample size of 30 fish.**

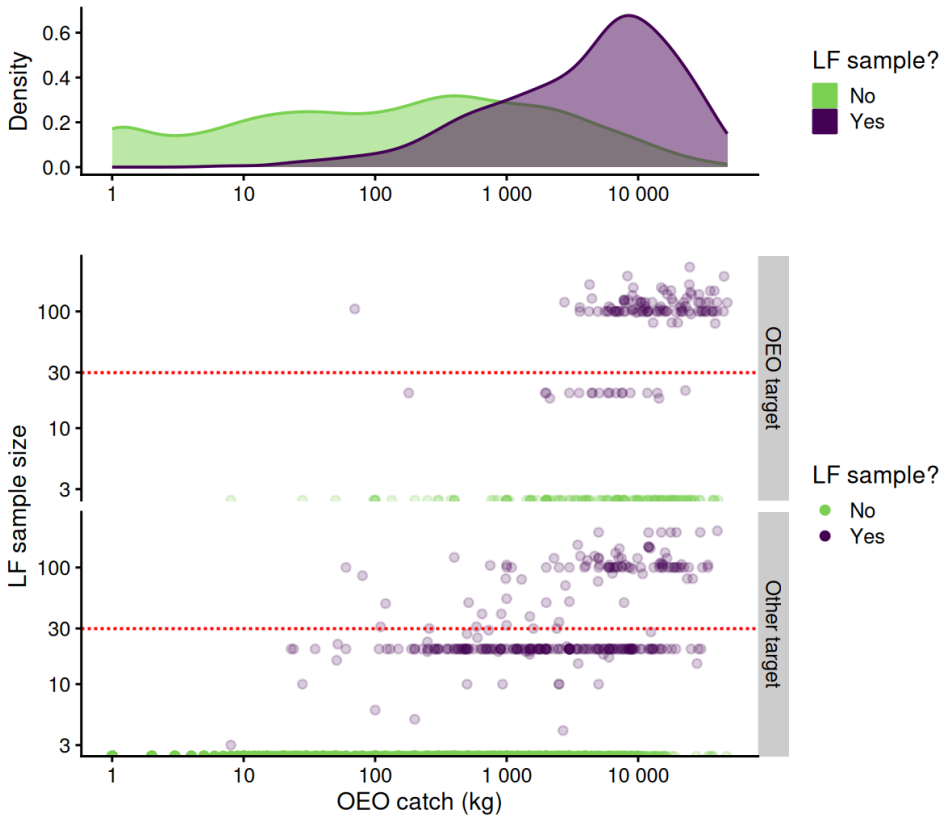


Figure 112: Length-frequency sample sizes (number of fish sampled) for observed fishing events in BOE 3A in relation to the total black oreo catch from an event, separately for black oreo target events and other target species. The red dashed line indicates a sample size of 30 fish.

2.2.2.2 Otolith samples

Table 10: Otolith samples of black oreo from the BOE 3A Trawl fishery sampled by the Observer Programme in fishing years 2008 to 2025. Positive fishing events are those where the catch of black oreo exceeded a potential sampling threshold of 30 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
2008	610	0	0	0.00
2009	597	17	112	2.85
2010	660	20	112	3.03
2011	614	25	282	4.07
2012	582	23	199	3.95
2013	517	19	163	3.68
2014	638	33	168	5.17
2015	564	2	10	0.35
2016	452	1	5	0.22
2017	486	12	83	2.47
2018	559	18	166	3.22
2019	737	37	288	5.02
2020	564	8	46	1.42
2021	631	10	49	1.58
2022	640	9	82	1.41
2023	615	28	229	4.55
2024	548	22	135	4.01
2025	562	30	239	5.34

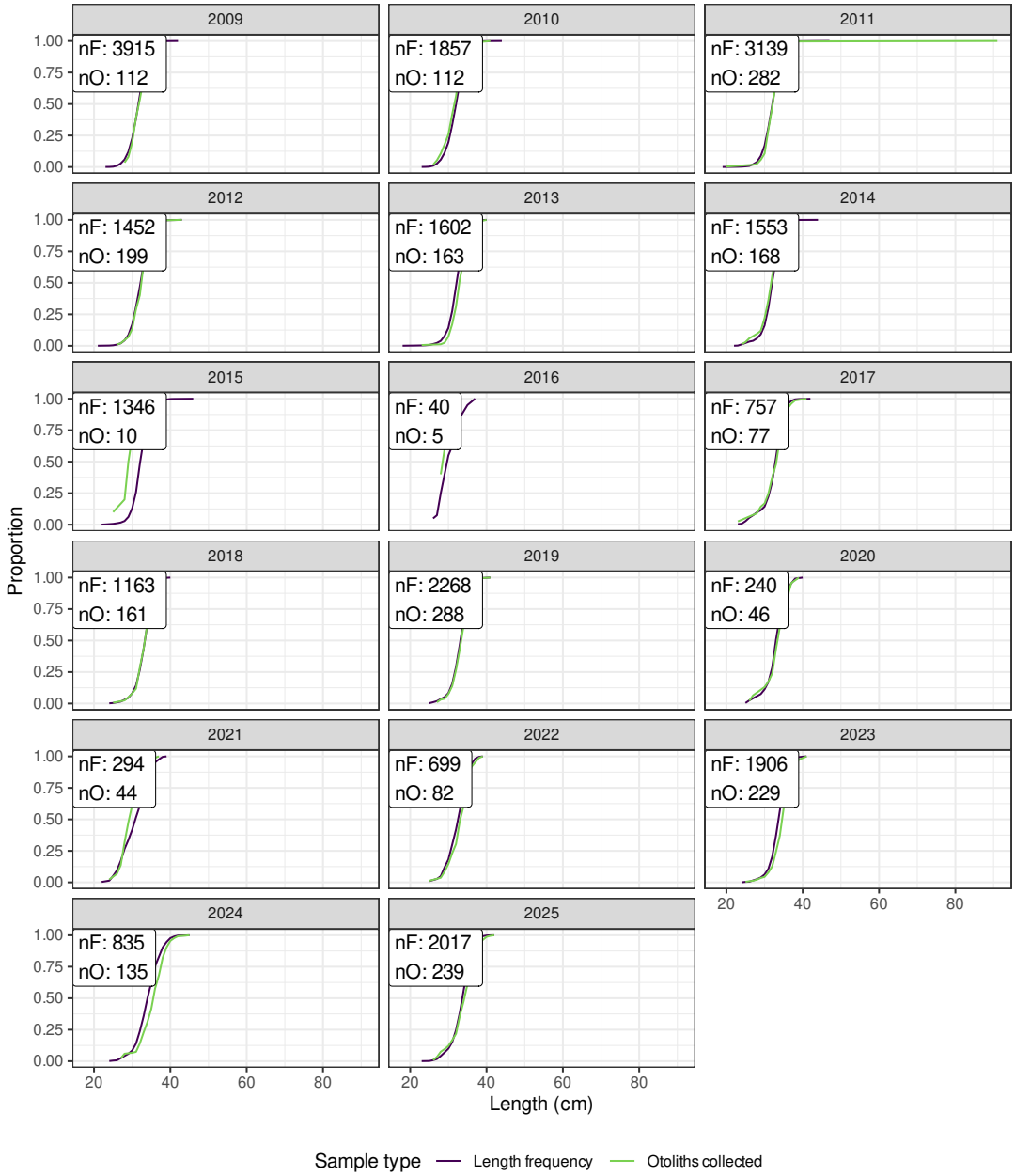


Figure 113: Cumulative distributions of the length of fish in the length frequency and otolith samples of black oreo in the BOE 3A Trawl fishery for the 2009 to 2025 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

2.2.2.3 Catch quantification

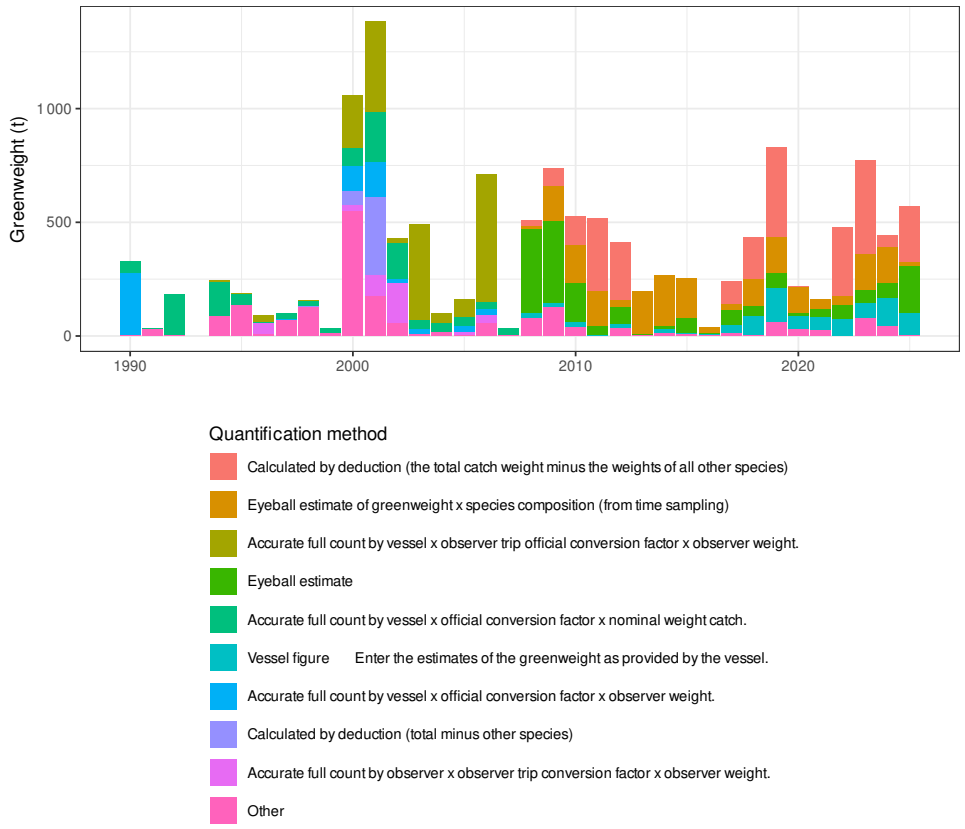


Figure 114: Methods used by observers to quantify the catch of black oreo in the BOE 3A Trawl fishery. The legend lists the methods used in descending order of total catch.

2.2.3 BOE 4: Trawl fishery

2.2.3.1 Length-frequency samples

Table 11: Length-frequency samples of black oreo from the BOE 4 Trawl fishery sampled by the Observer Programme in fishing years 2008 to 2025. Positive fishing events are those where the catch of black oreo exceeded a potential sampling threshold of 30 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
2008	1 745	15	559	0.86
2009	1 574	30	997	1.91
2010	1 318	48	1 923	3.64
2011	850	11	592	1.29
2012	1 002	22	636	2.20
2013	1 059	31	941	2.93
2014	1 256	30	1 191	2.39
2015	1 200	16	609	1.33
2016	1 041	15	1 039	1.44
2017	913	8	406	0.88
2018	1 141	3	120	0.26
2019	1 069	6	522	0.56
2020	1 097	13	387	1.19
2021	1 143	17	885	1.49
2022	806	11	312	1.36
2023	581	8	466	1.38
2024	648	20	798	3.09
2025	600	22	1 274	3.67

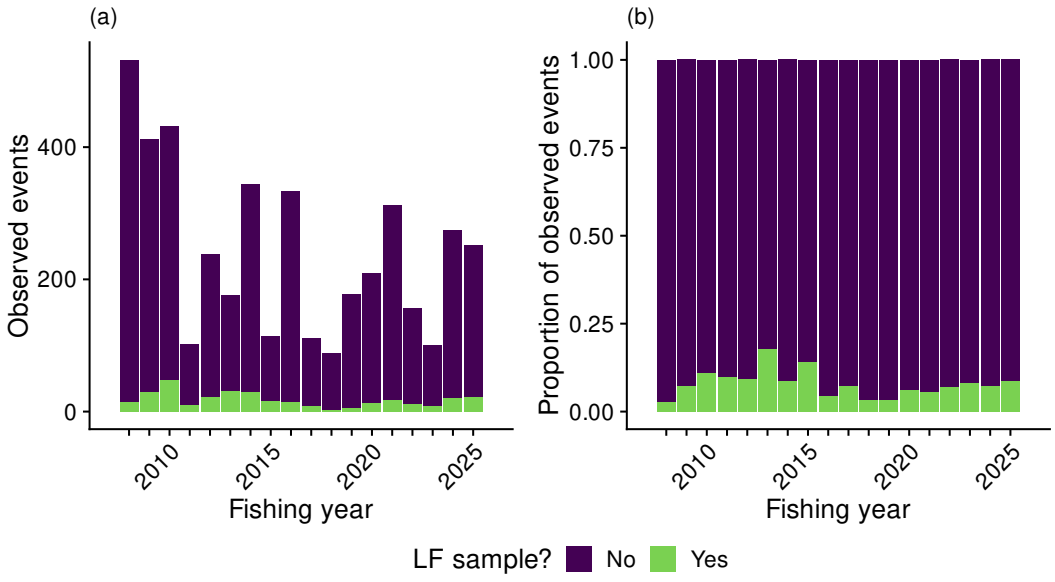


Figure 115: (a) Observed Trawl fishing events, and (b) proportion of observed events, in BOE 4 where the black oreo catch exceeded the 30 kg threshold, with and without length-frequency sampling.

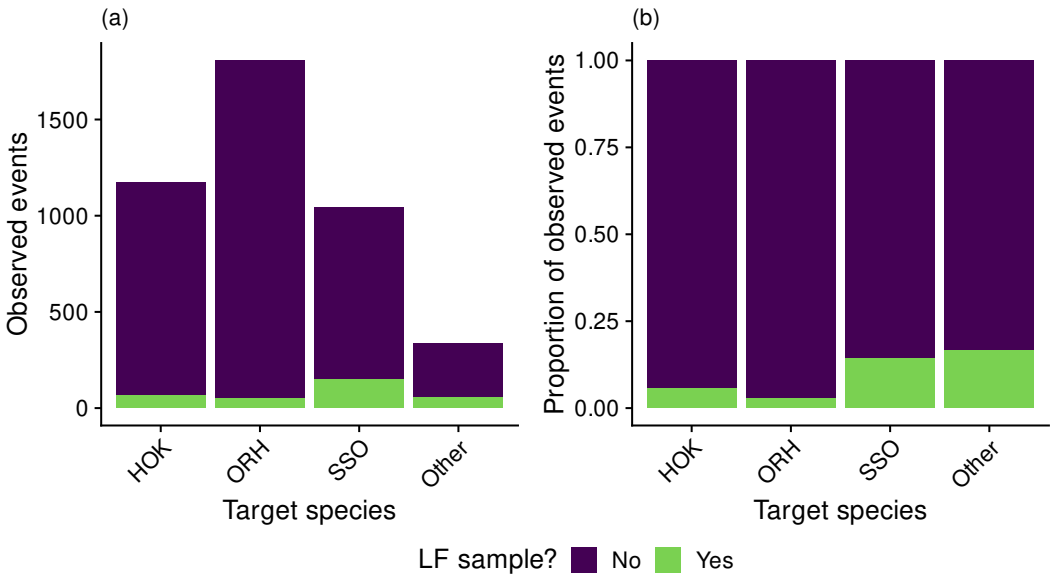


Figure 116: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in BOE 4 where the black oreo catch exceeded the 30 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

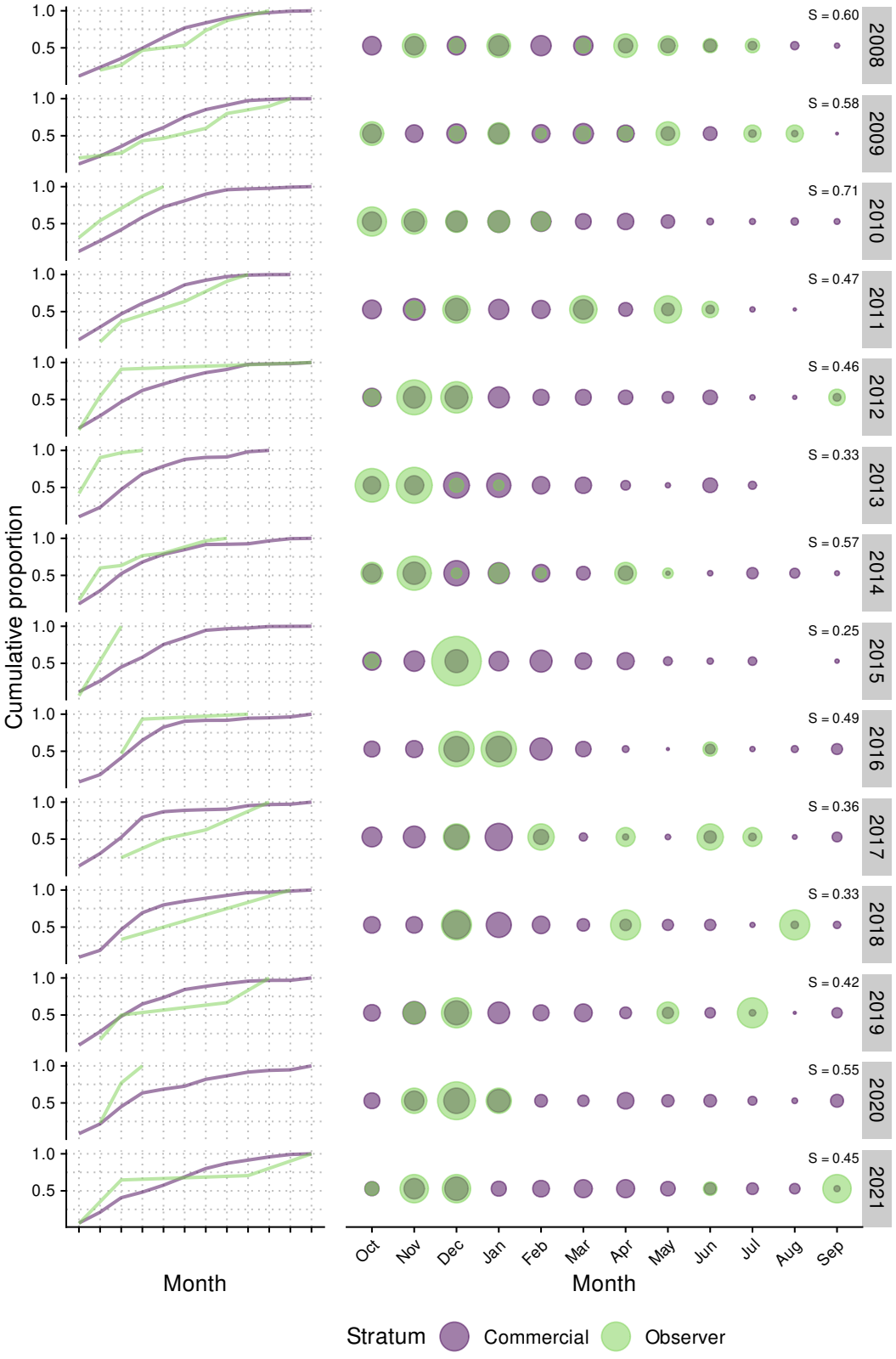


Figure 117: Monthly representativeness of observer sampling coverage of Trawl fishing events in BOE 4, where the black oreo catch exceeded the 30kg threshold, in 2008 to 2021. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

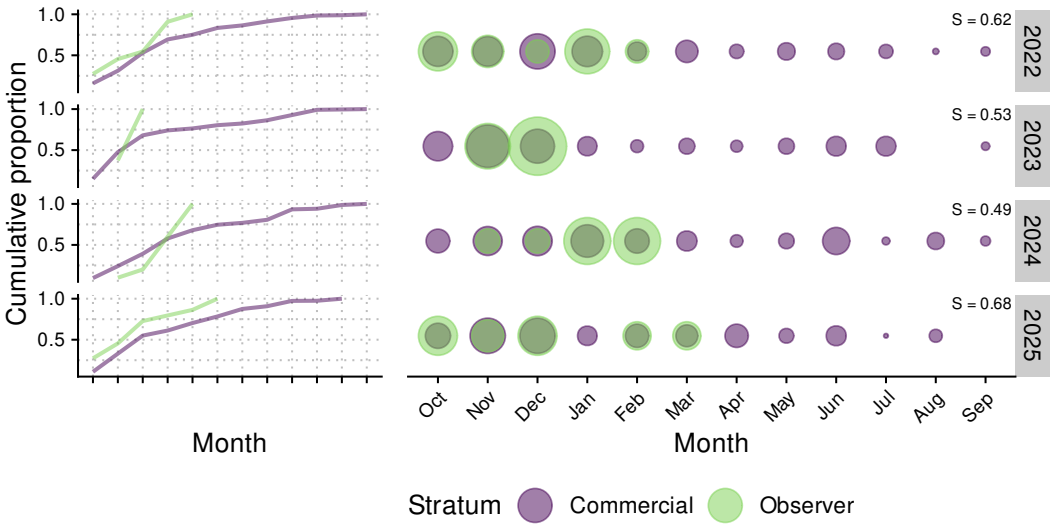


Figure 118: Monthly representativeness of observer sampling coverage of Trawl fishing events in BOE 4, where the black oreo catch exceeded the 30kg threshold, in 2022 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

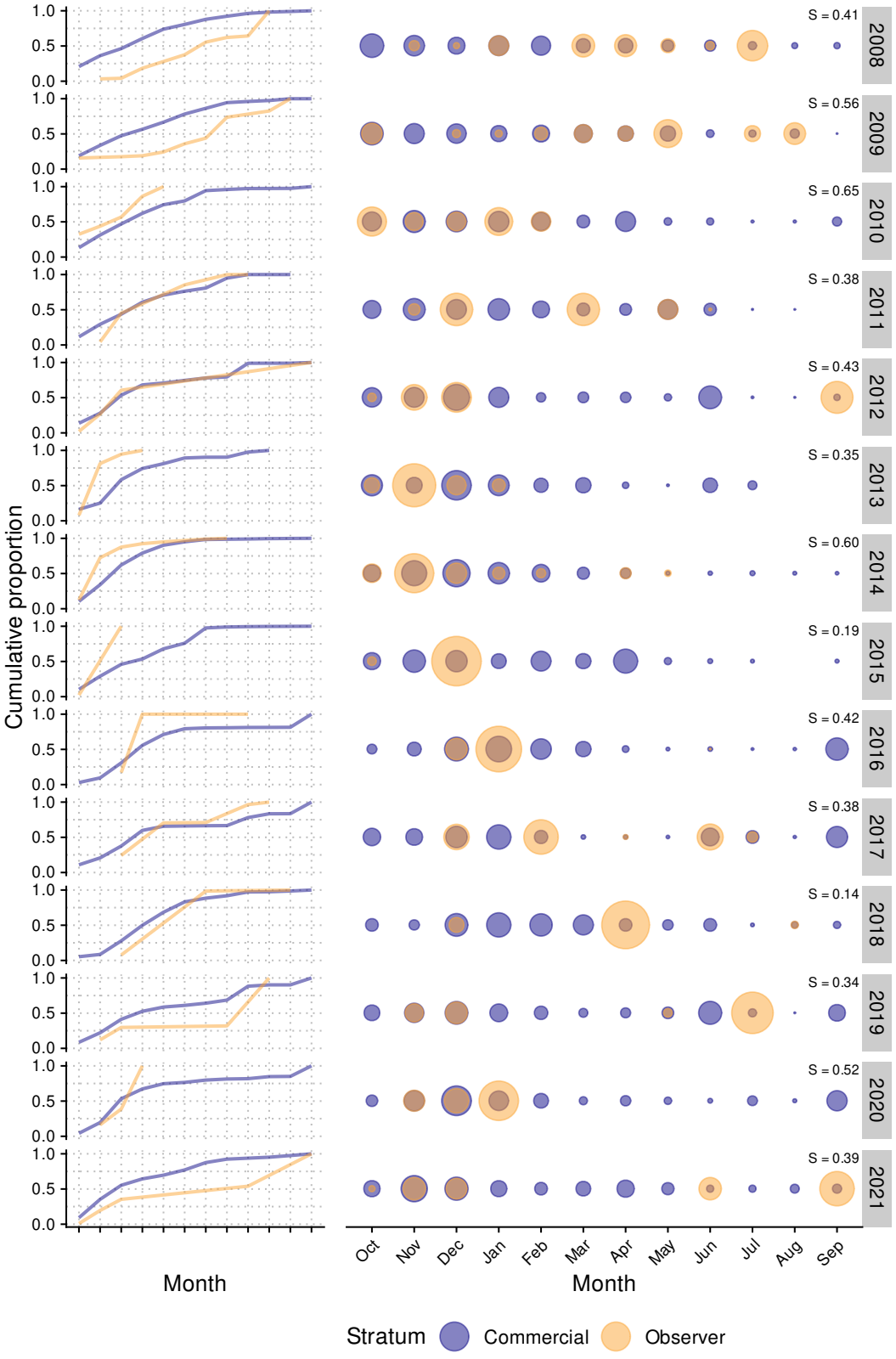


Figure 119: Monthly representativeness of observer sampling coverage of Trawl catch in BOE 4, from events where the black oreo catch exceeded the 30kg threshold, in 2008 to 2021. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

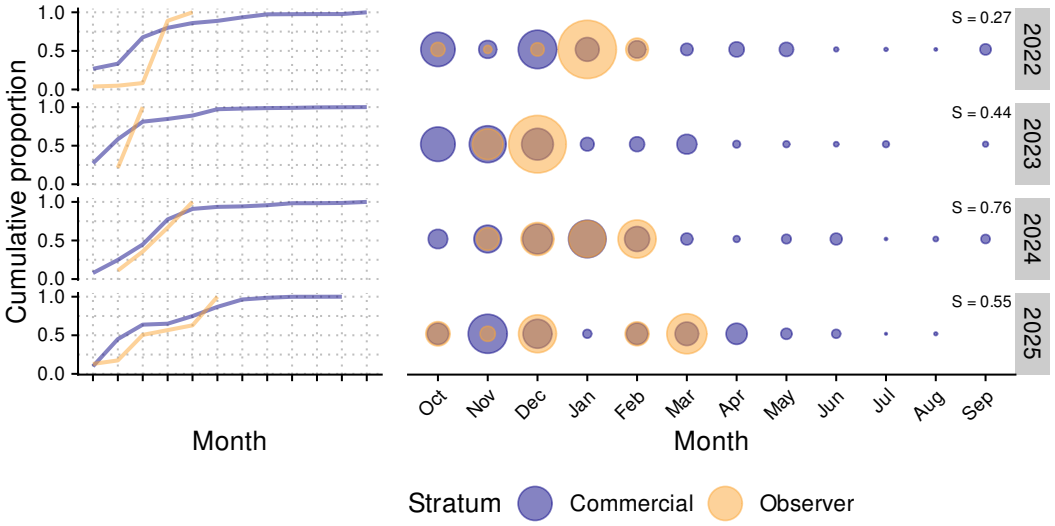


Figure 120: Monthly representativeness of observer sampling coverage of Trawl catch in BOE 4, from events where the black oreo catch exceeded the 30kg threshold, in 2022 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

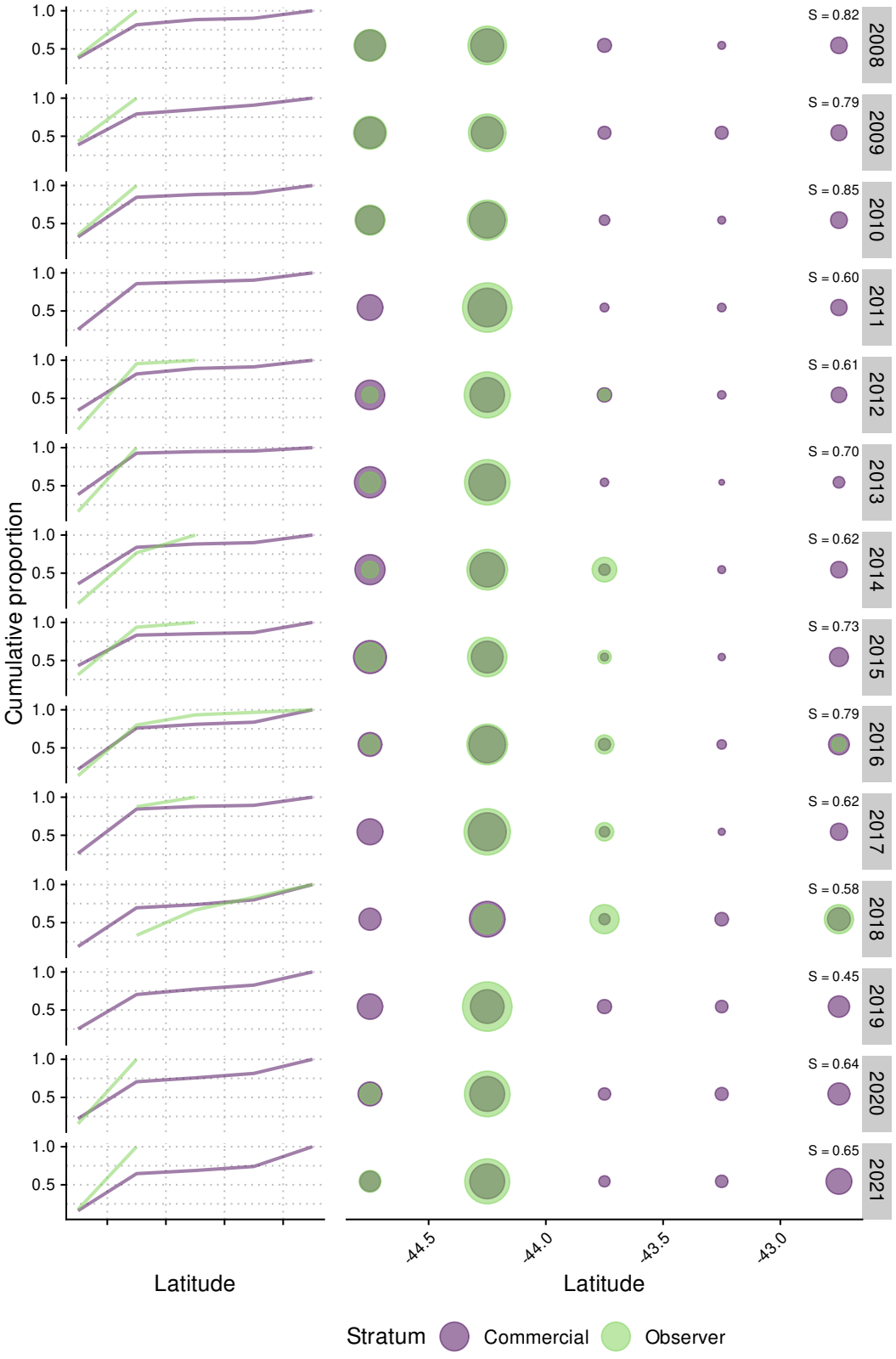


Figure 121: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in BOE 4, where the black oreo catch exceeded the 30kg threshold, in 2008 to 2021. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

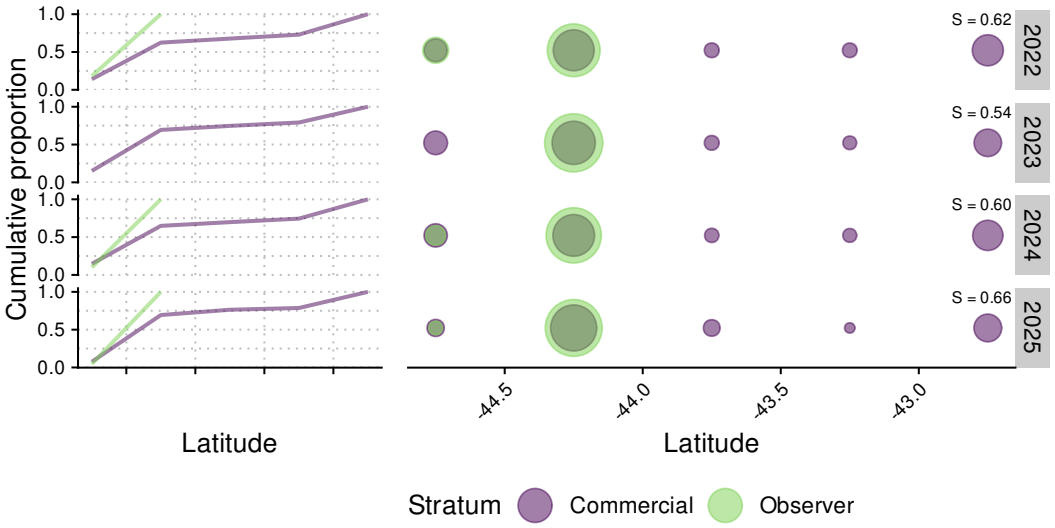


Figure 122: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in BOE 4, where the black oreo catch exceeded the 30kg threshold, in 2022 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

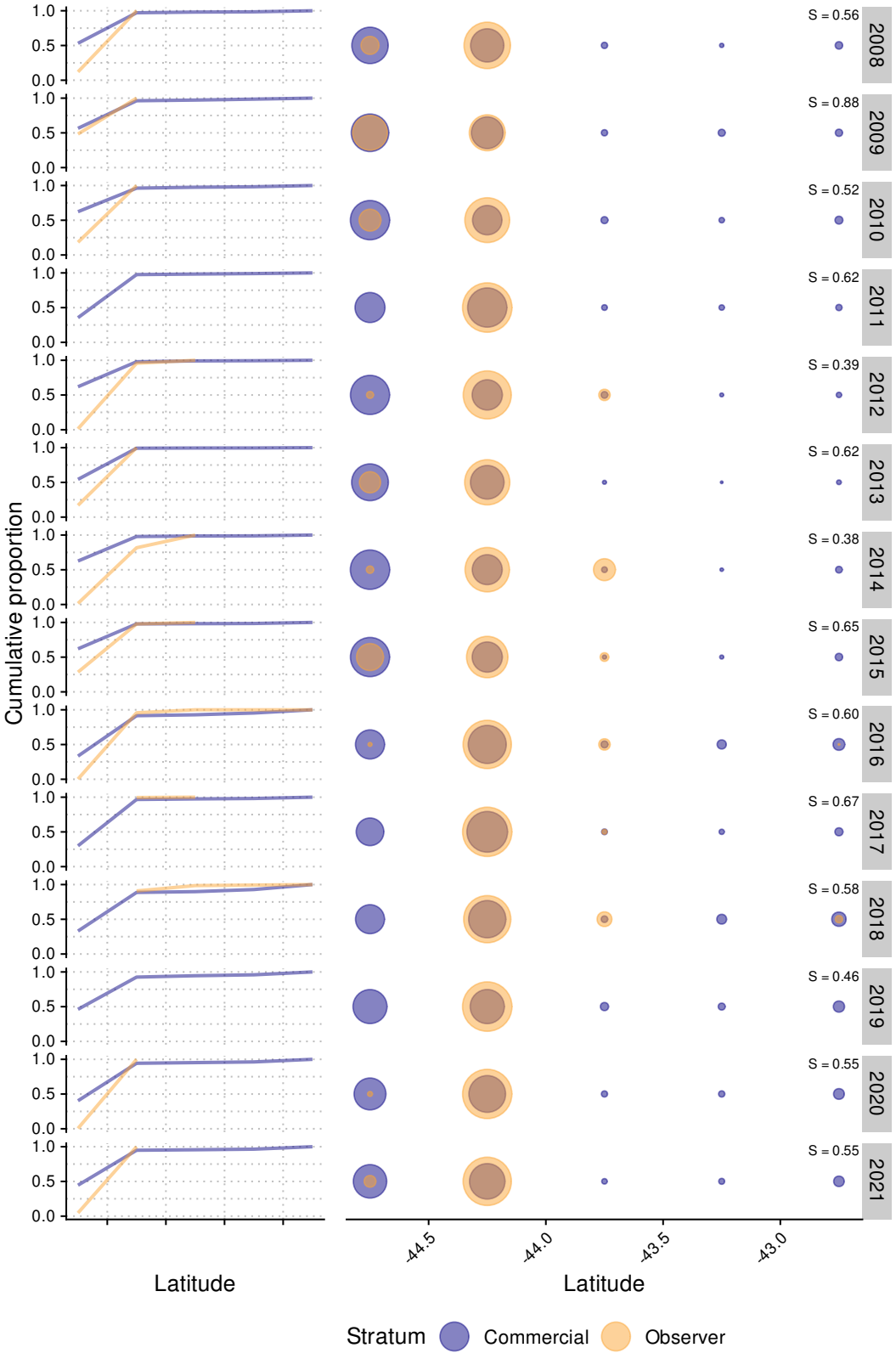


Figure 123: **Latitudinal representativeness of observer sampling coverage of Trawl catch in BOE 4, from events where the black oreo catch exceeded the 30kg threshold, in 2008 to 2021. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

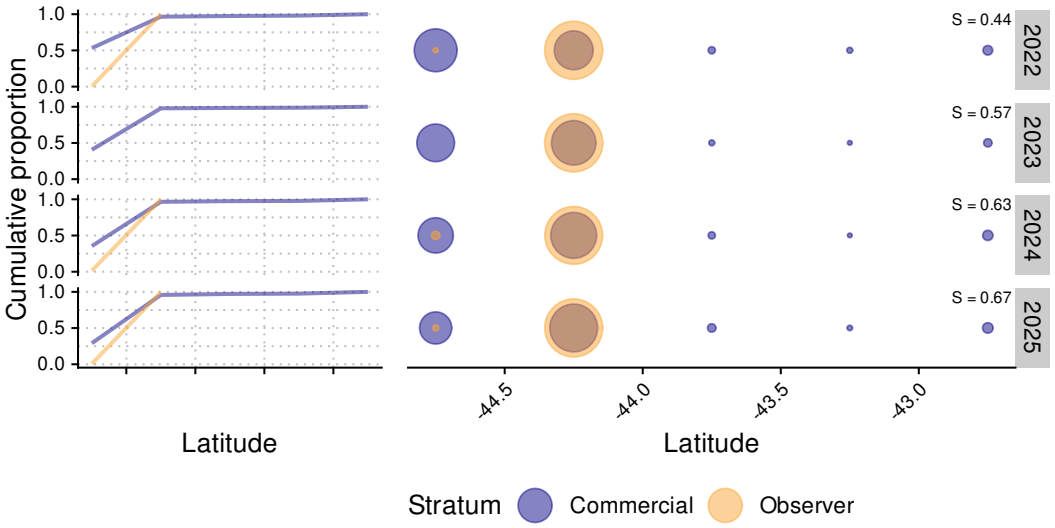


Figure 124: Latitudinal representativeness of observer sampling coverage of Trawl catch in BOE 4, from events where the black oreo catch exceeded the 30kg threshold, in 2022 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

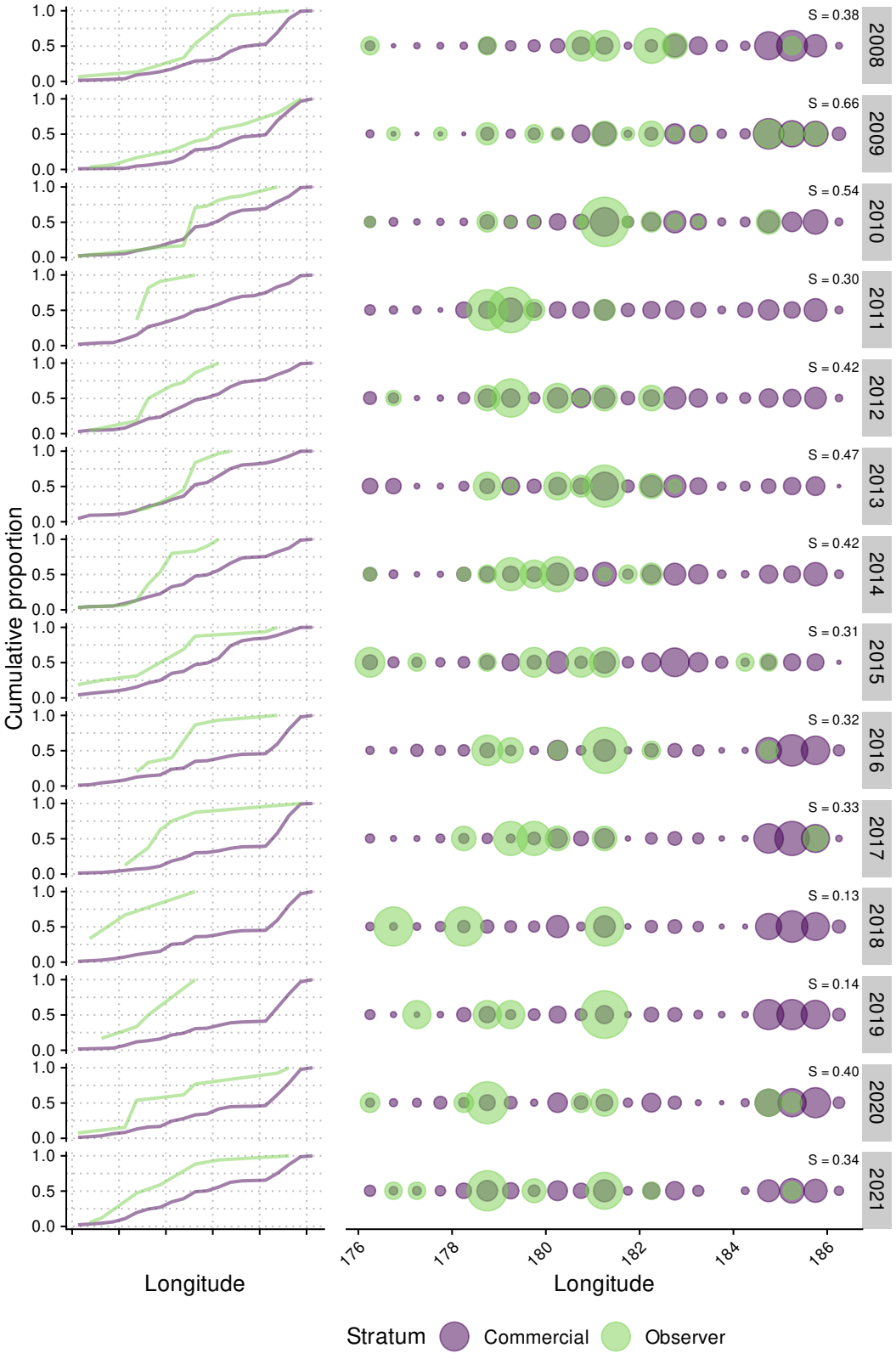


Figure 125: **Longitudinal representativeness of observer sampling coverage of Trawl fishing events in BOE 4, where the black oreo catch exceeded the 30kg threshold, in 2008 to 2021. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

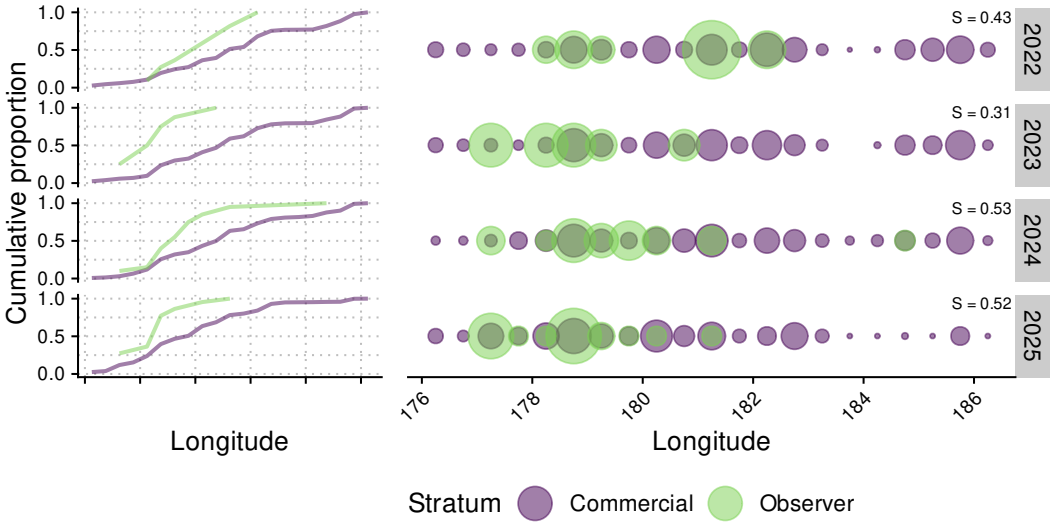


Figure 126: **Longitudinal representativeness of observer sampling coverage of Trawl fishing events in BOE 4, where the black oreo catch exceeded the 30kg threshold, in 2022 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

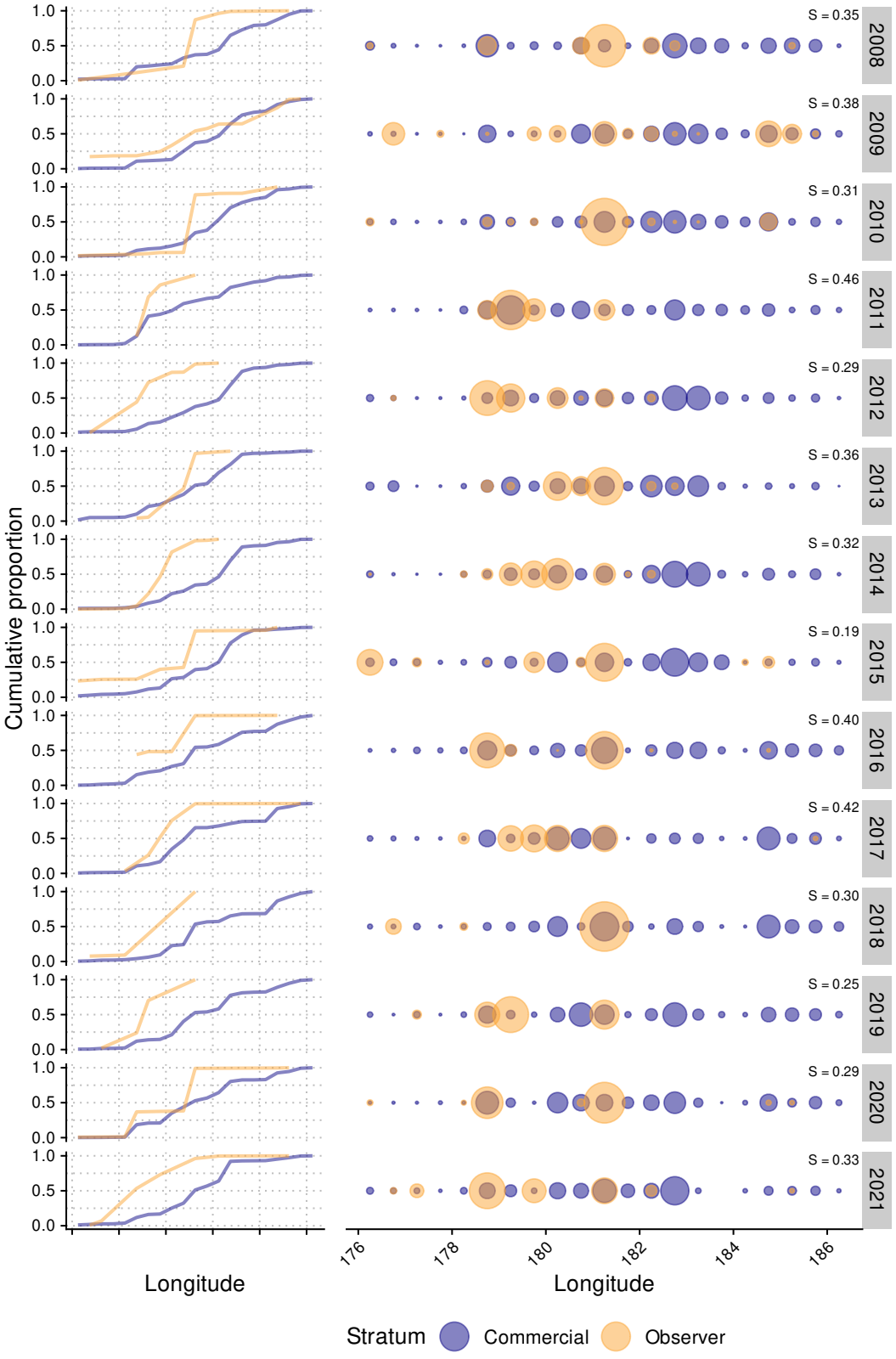


Figure 127: Longitudinal representativeness of observer sampling coverage of Trawl catch in BOE 4, from events where the black oreo catch exceeded the 30kg threshold, in 2008 to 2021. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

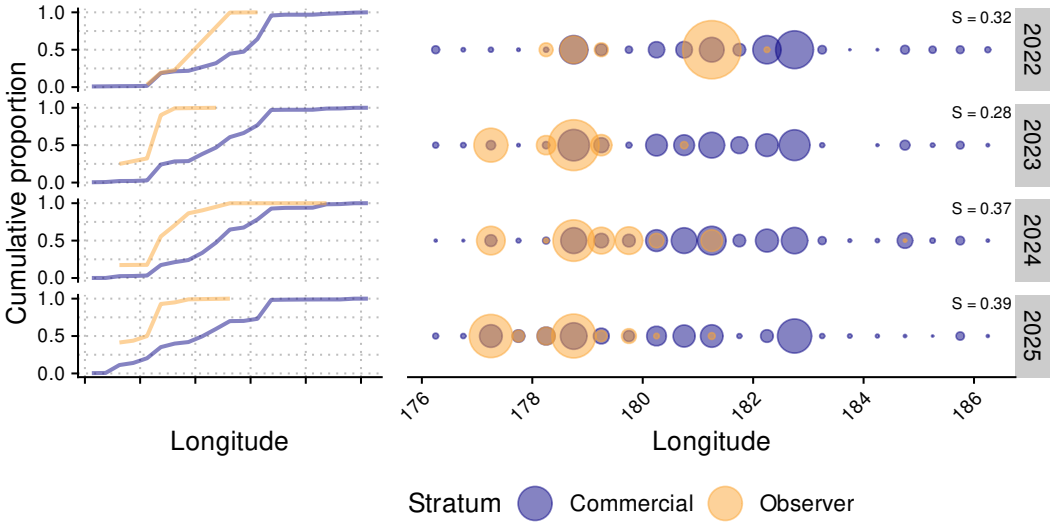


Figure 128: **Longitudinal representativeness of observer sampling coverage of Trawl catch in BOE 4, from events where the black oreo catch exceeded the 30kg threshold, in 2022 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

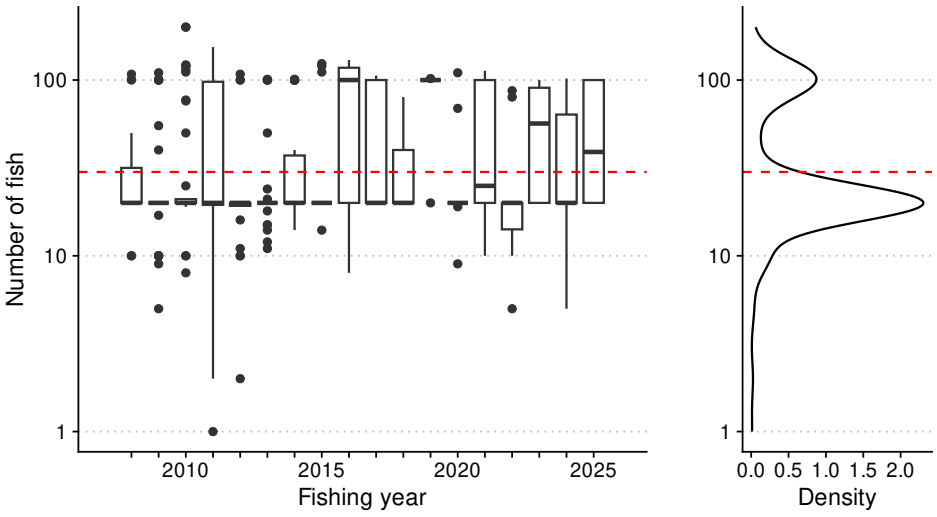


Figure 129: **Length-frequency sample sizes for observed fishing events in BOE 4 where black oreo were sampled. The red dashed line indicates a sample size of 30 fish.**

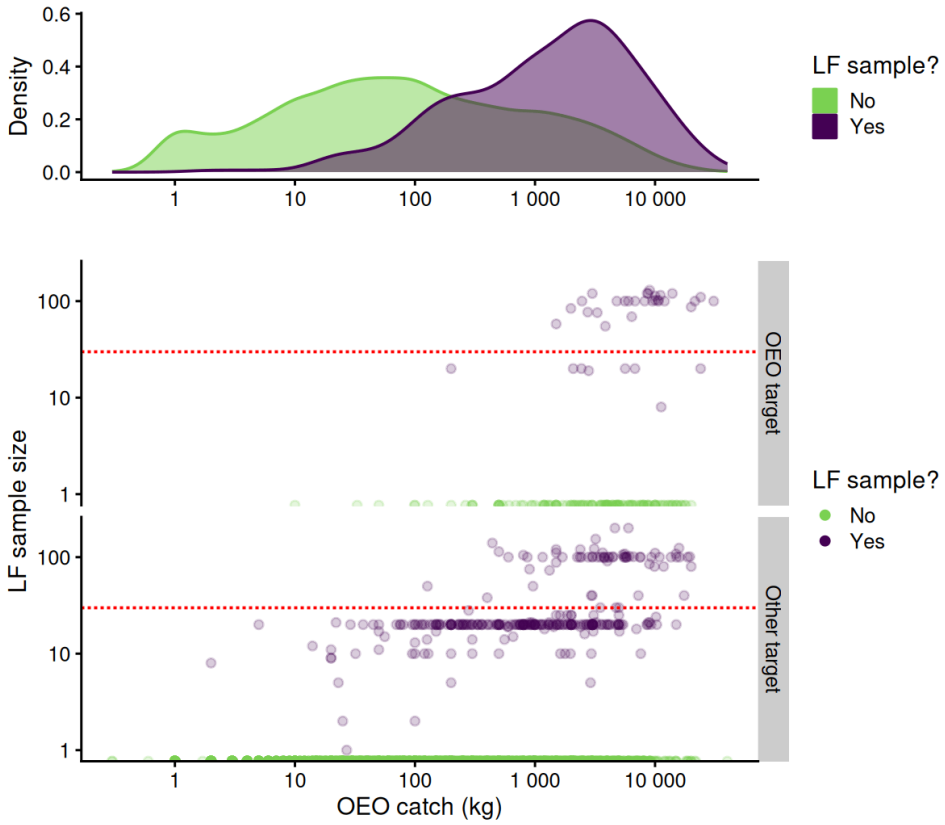


Figure 130: Length-frequency sample sizes (number of fish sampled) for observed fishing events in BOE 4 in relation to the total black oreo catch from an event, separately for black oreo target events and other target species. The red dashed line indicates a sample size of 30 fish.

2.2.3.2 Otolith samples

Table 12: Otolith samples of black oreo from the BOE 4 Trawl fishery sampled by the Observer Programme in fishing years 2008 to 2025. Positive fishing events are those where the catch of black oreo exceeded a potential sampling threshold of 30 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
2008	1 745	0	0	0.00
2009	1 574	11	78	0.70
2010	1 318	31	206	2.35
2011	850	4	17	0.47
2012	1 002	15	121	1.50
2013	1 059	31	137	2.93
2014	1 256	29	172	2.31
2015	1 200	1	2	0.08
2016	1 041	1	5	0.10
2017	913	4	30	0.44
2018	1 141	3	15	0.26
2019	1 069	6	53	0.56
2020	1 097	13	73	1.19
2021	1 143	13	84	1.14
2022	806	11	69	1.36
2023	581	6	50	1.03
2024	648	19	124	2.93
2025	600	22	173	3.67

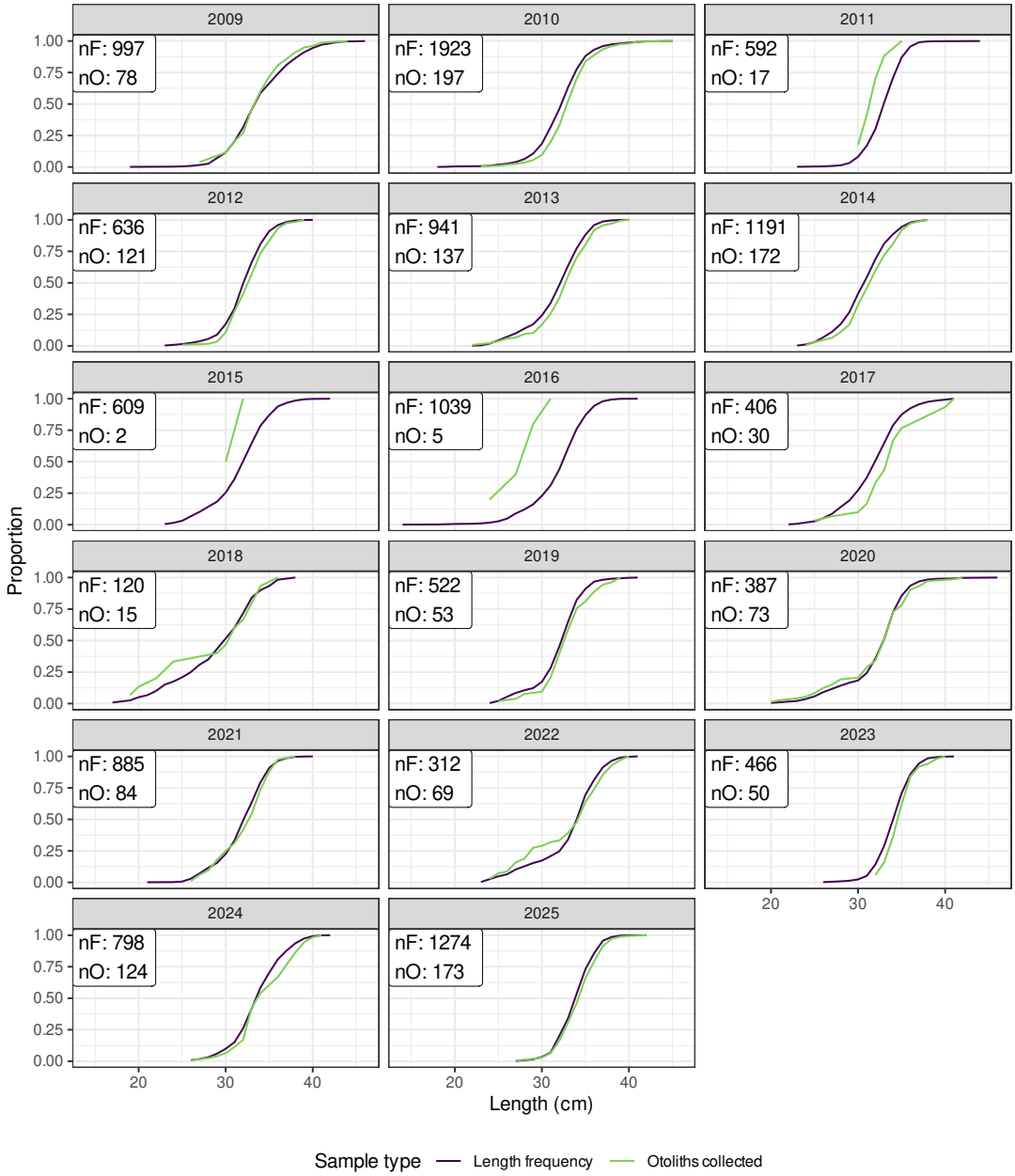


Figure 131: Cumulative distributions of the length of fish in the length frequency and otolith samples of black oreo in the BOE 4 Trawl fishery for the 2009 to 2025 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

2.2.3.3 Catch quantification

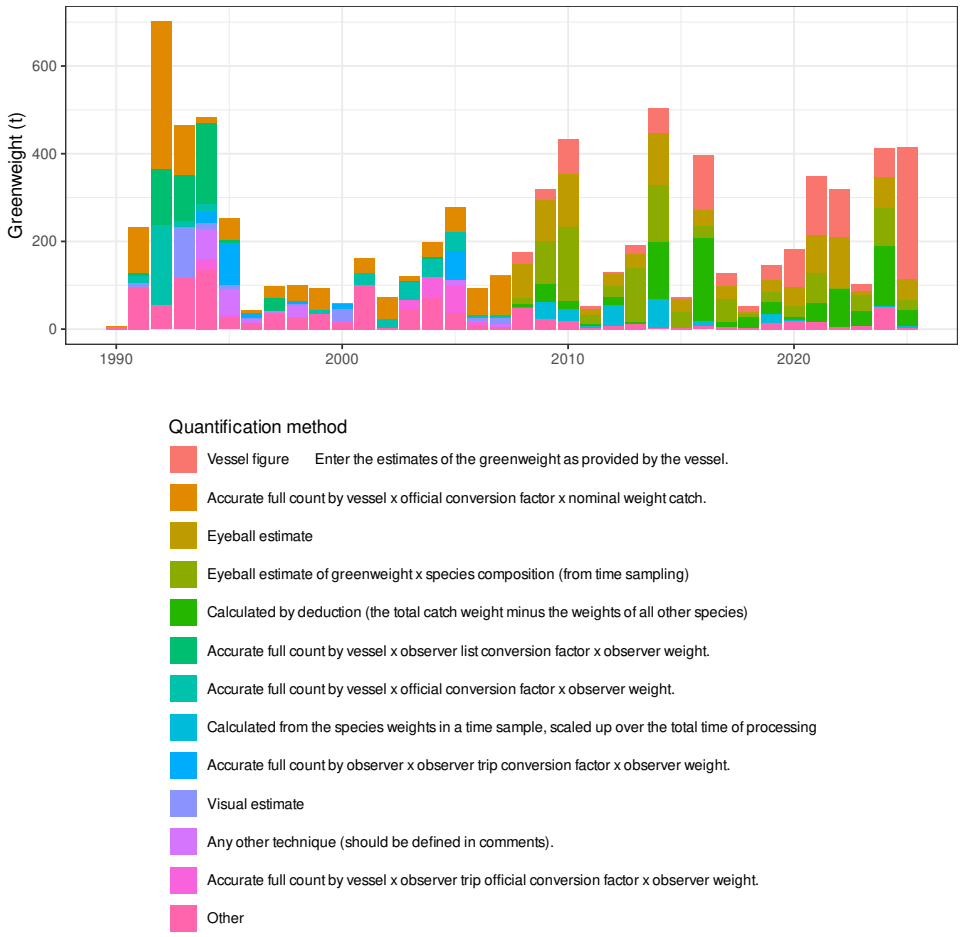


Figure 132: Methods used by observers to quantify the catch of black oreo in the BOE 4 Trawl fishery. The legend lists the methods used in descending order of total catch.

2.2.4 BOE 6: Trawl fishery

2.2.4.1 Length-frequency samples

Table 13: Length-frequency samples of black oreo from the BOE 6 Trawl fishery sampled by the Observer Programme in fishing years 2008 to 2025. Positive fishing events are those where the catch of black oreo exceeded a potential sampling threshold of 30 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
2008	1 217	195	15 877	16.02
2009	1 220	95	9 613	7.79
2010	1 393	96	8 787	6.89
2011	795	124	7 157	15.60
2012	576	36	4 012	6.25
2013	44	4	183	9.09
2014	139	0	0	0.00
2015	92	1	20	1.09
2016	208	18	1 666	8.65
2017	272	6	280	2.21
2018	380	20	1 203	5.26
2019	280	19	1 596	6.79
2020	219	3	260	1.37
2021	261	23	1 507	8.81
2022	213	9	502	4.23
2023	419	38	2 729	9.07
2024	217	22	1 826	10.14
2025	113	0	0	0.00

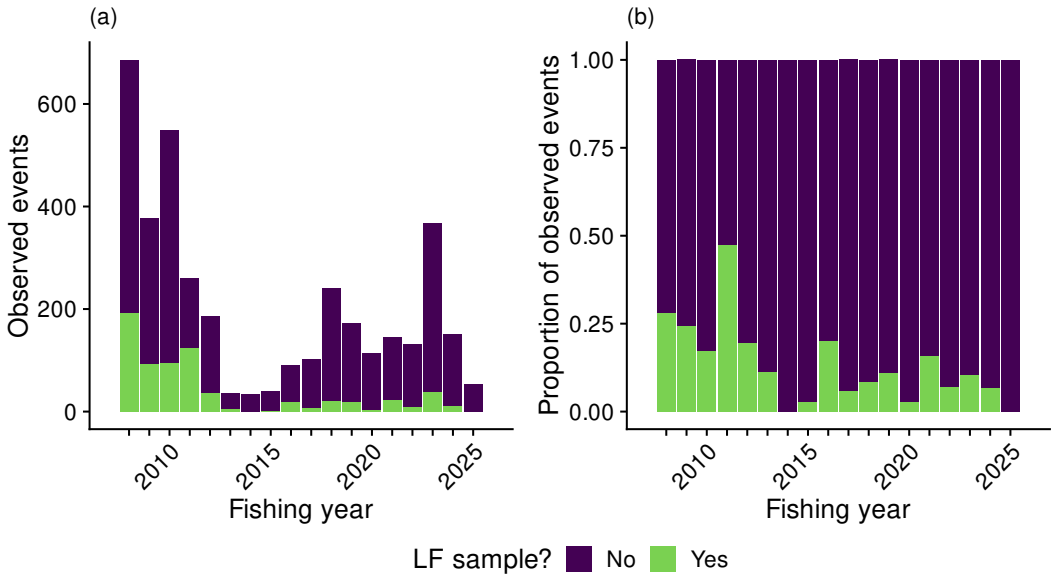


Figure 133: (a) Observed Trawl fishing events, and (b) proportion of observed events, in BOE 6 where the black oreo catch exceeded the 30 kg threshold, with and without length-frequency sampling.

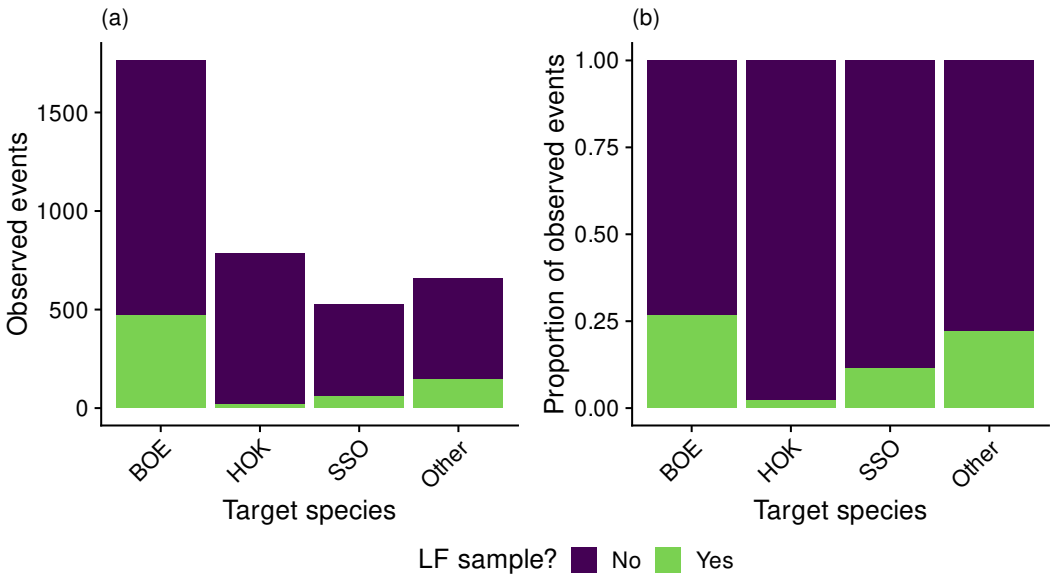


Figure 134: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in BOE 6 where the black oreo catch exceeded the 30 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

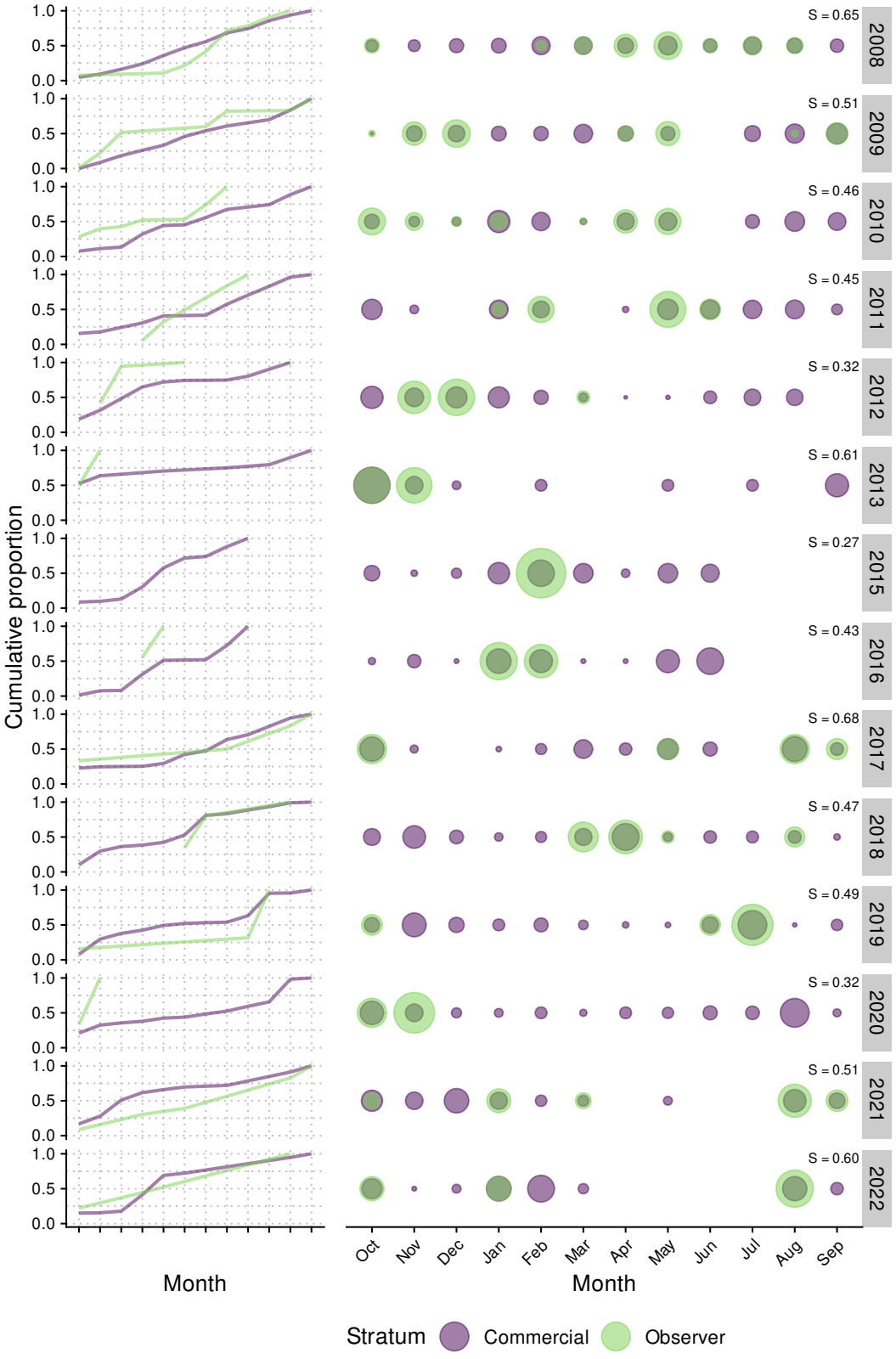


Figure 135: Monthly representativeness of observer sampling coverage of Trawl fishing events in BOE 6, where the black oreo catch exceeded the 30kg threshold, in 2008 to 2022. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

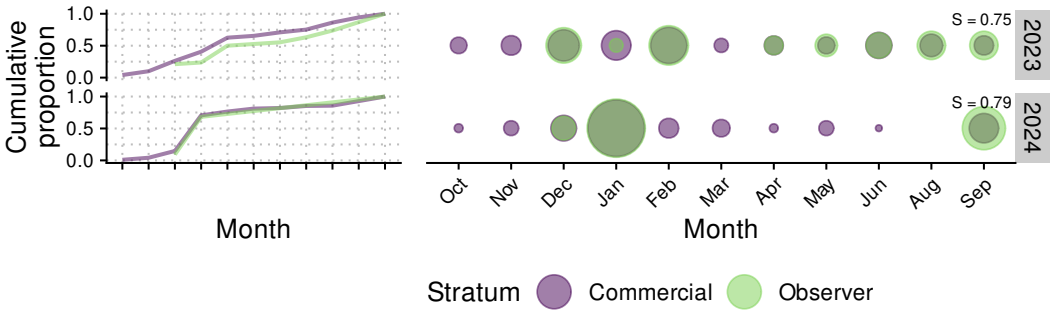


Figure 136: Monthly representativeness of observer sampling coverage of Trawl fishing events in BOE 6, where the black oreo catch exceeded the 30kg threshold, in 2023 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

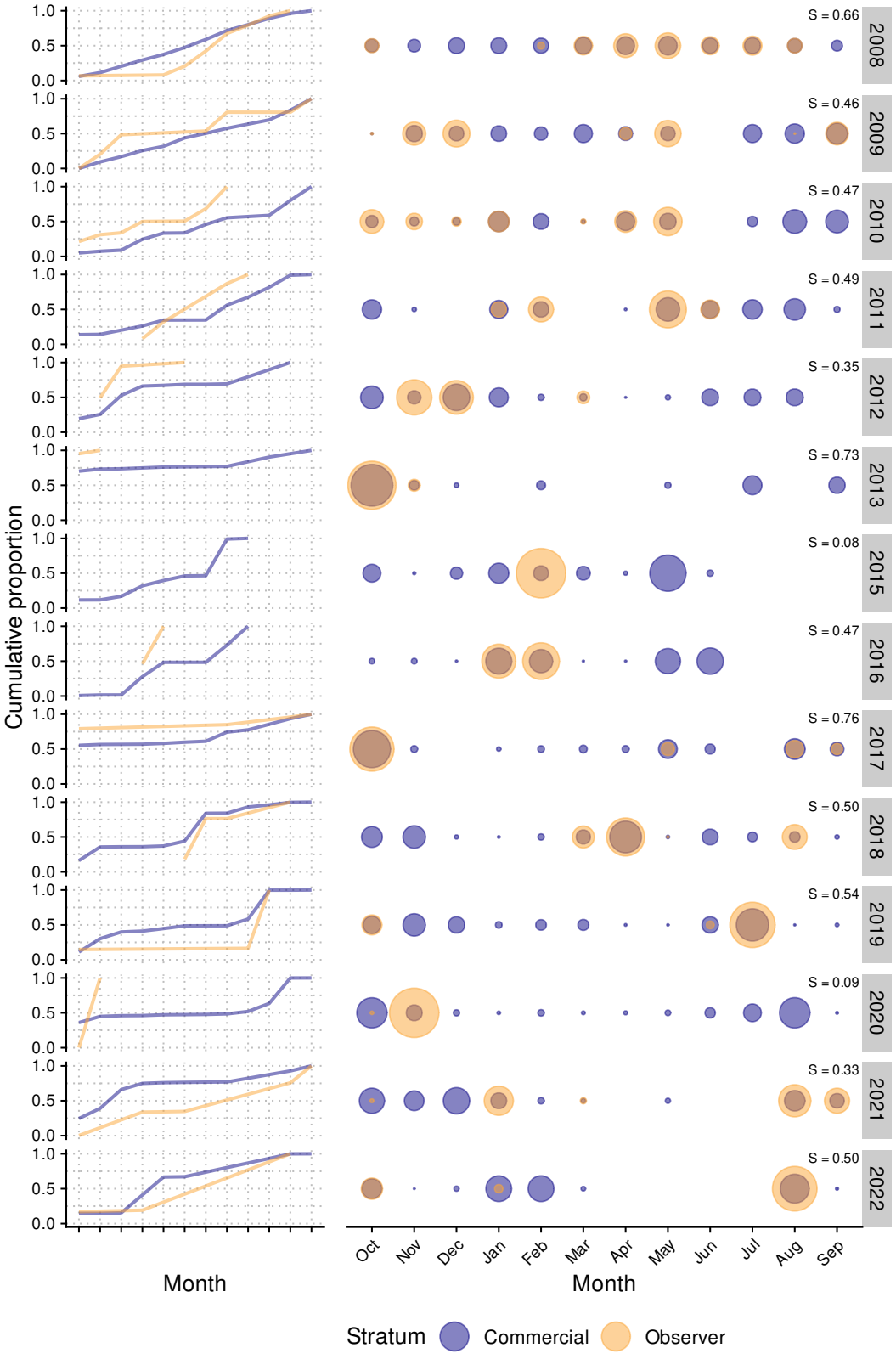


Figure 137: **Monthly representativeness of observer sampling coverage of Trawl catch in BOE 6, from events where the black oreo catch exceeded the 30kg threshold, in 2008 to 2022. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

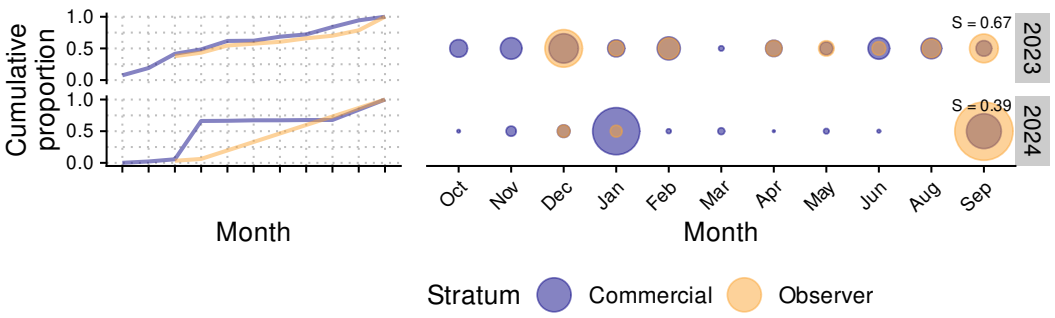


Figure 138: Monthly representativeness of observer sampling coverage of Trawl catch in BOE 6, from events where the black oreo catch exceeded the 30kg threshold, in 2023 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

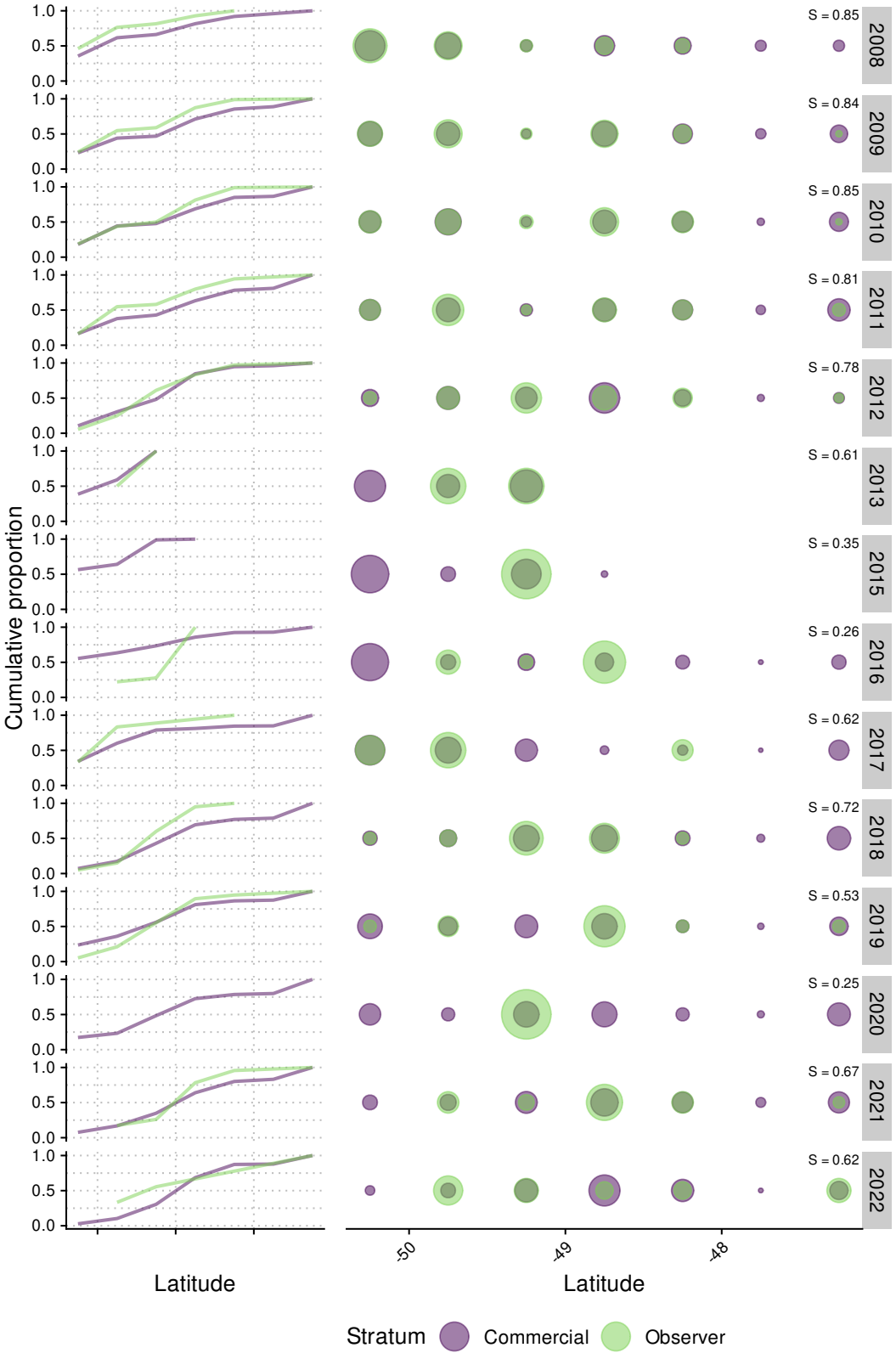


Figure 139: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in BOE 6, where the black oreo catch exceeded the 30kg threshold, in 2008 to 2022. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

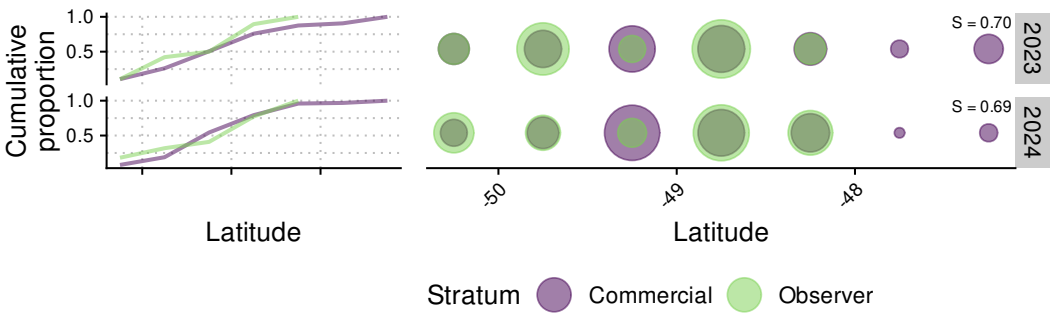


Figure 140: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in BOE 6, where the black oreo catch exceeded the 30kg threshold, in 2023 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

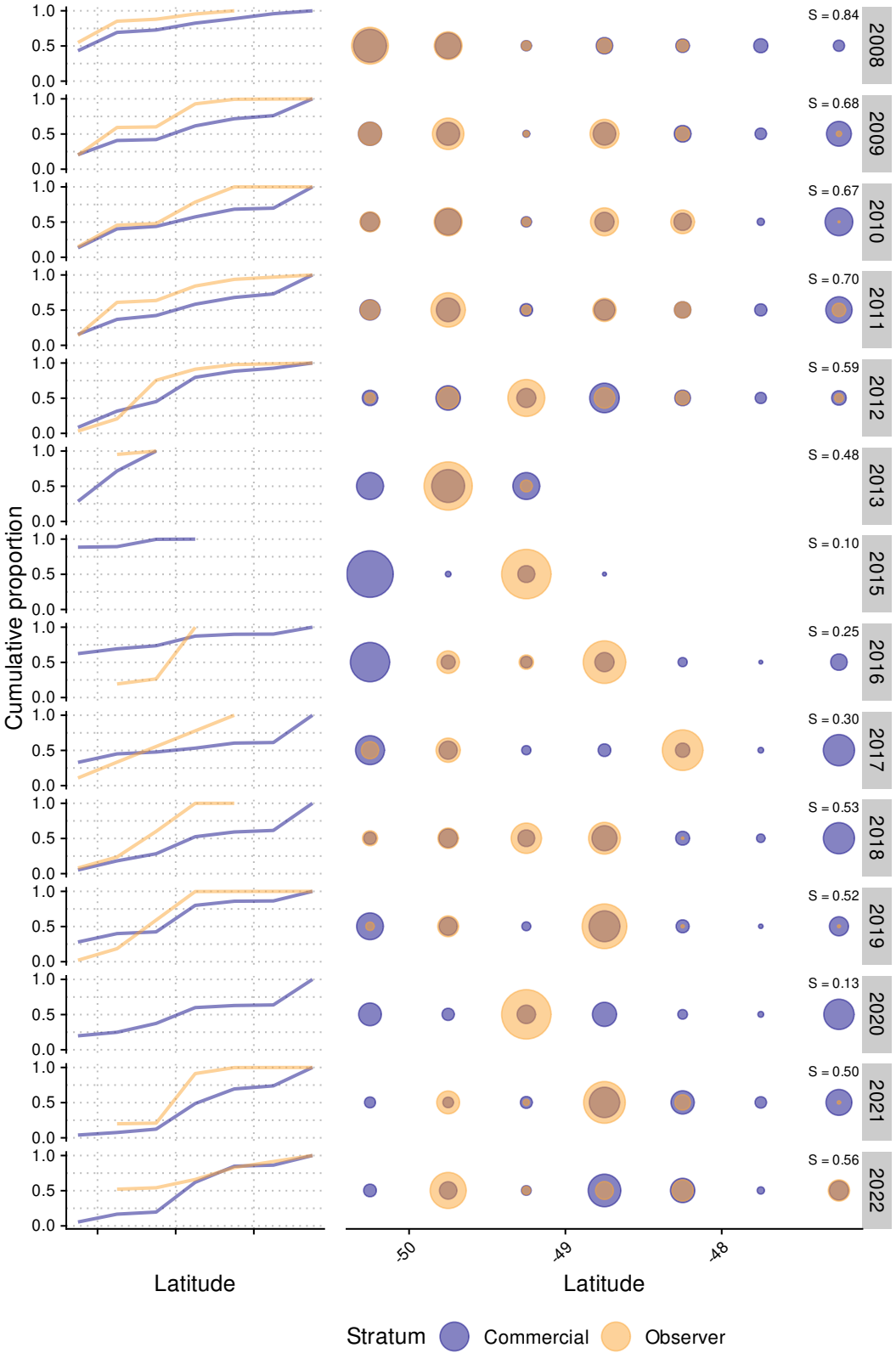


Figure 141: **Latitudinal representativeness of observer sampling coverage of Trawl catch in BOE 6, from events where the black oreo catch exceeded the 30kg threshold, in 2008 to 2022. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

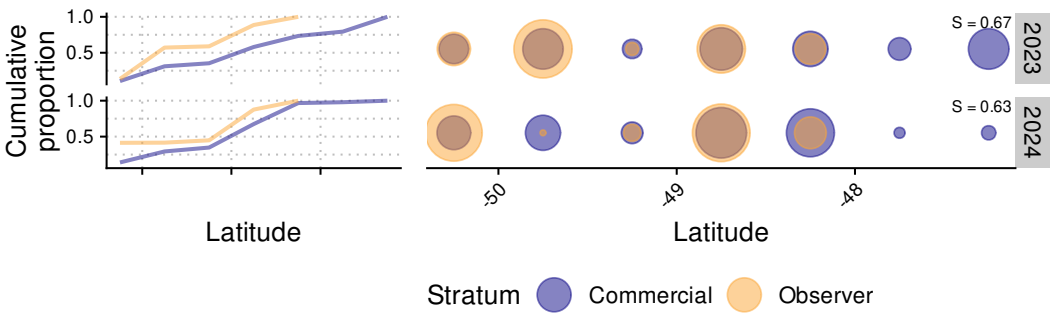


Figure 142: Latitudinal representativeness of observer sampling coverage of Trawl catch in BOE 6, from events where the black oreo catch exceeded the 30kg threshold, in 2023 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

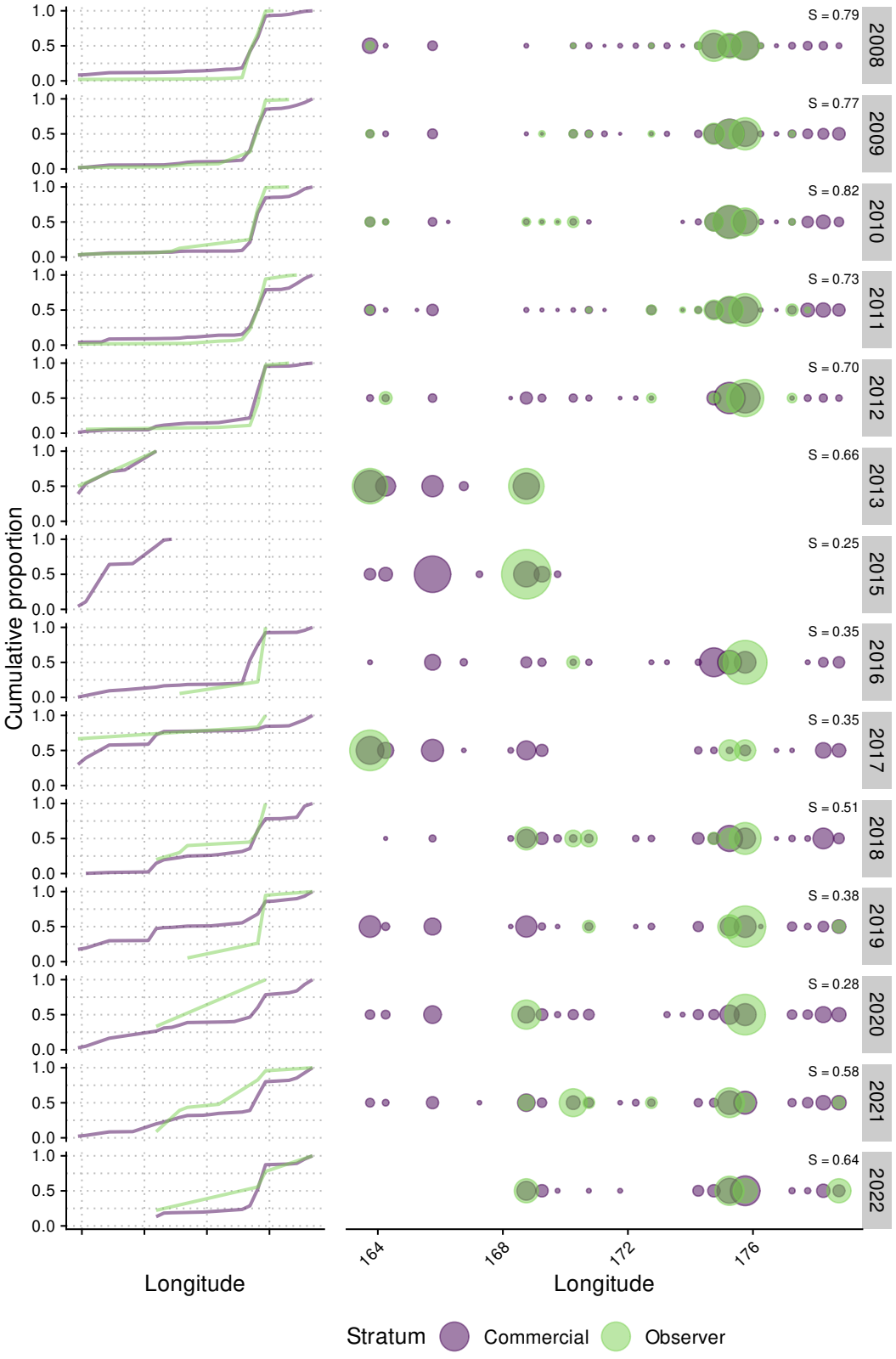


Figure 143: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in BOE 6, where the black oreo catch exceeded the 30kg threshold, in 2008 to 2022. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

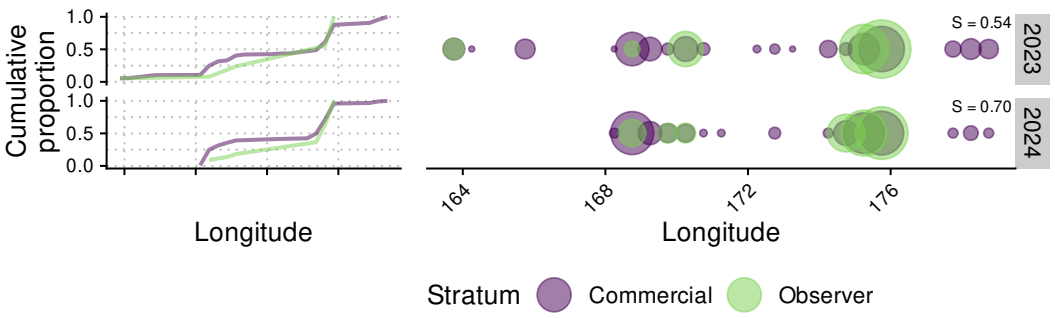


Figure 144: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in BOE 6, where the black oreo catch exceeded the 30kg threshold, in 2023 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

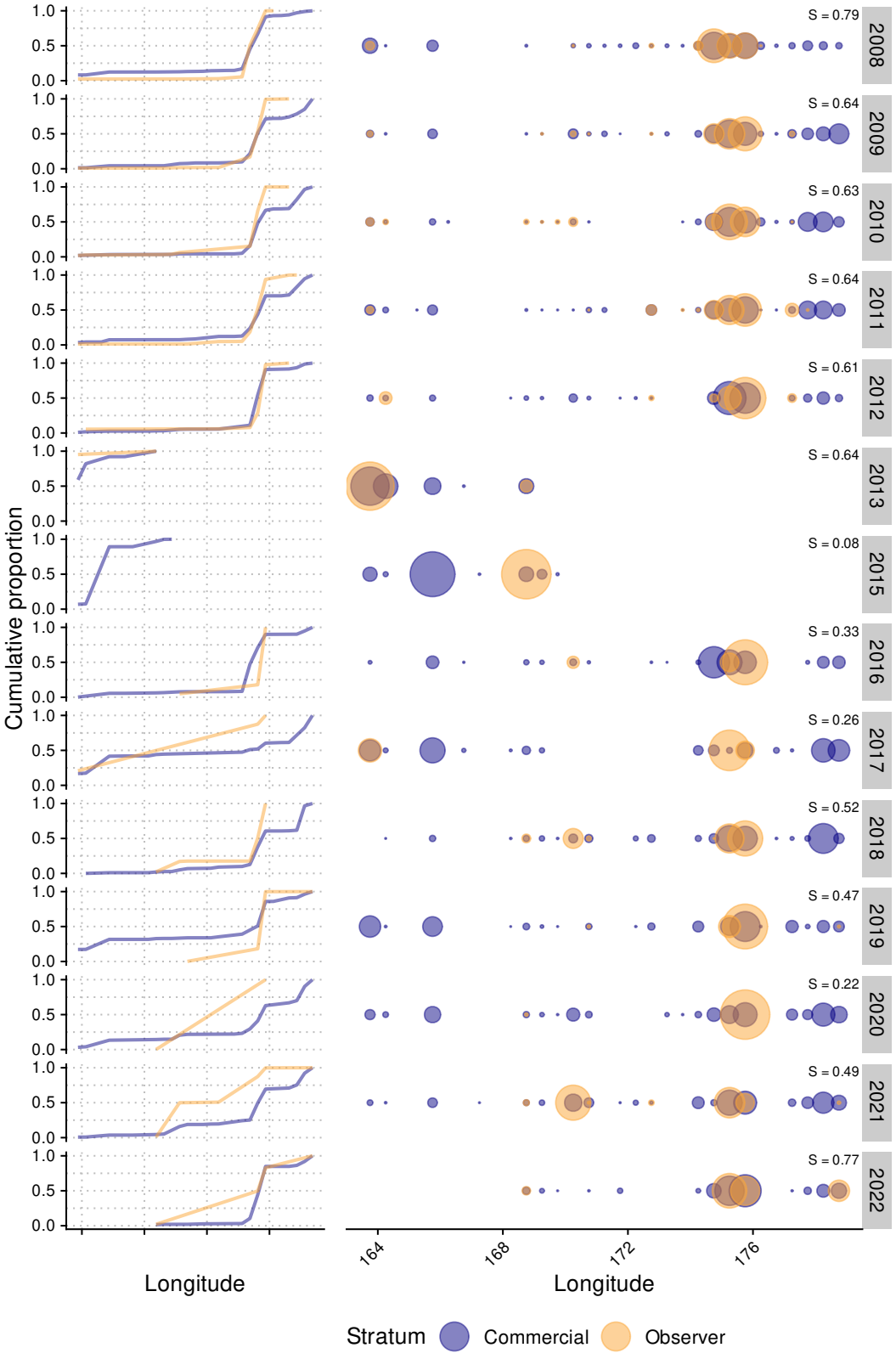


Figure 145: **Longitudinal representativeness of observer sampling coverage of Trawl catch in BOE 6, from events where the black oreo catch exceeded the 30kg threshold, in 2008 to 2022. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

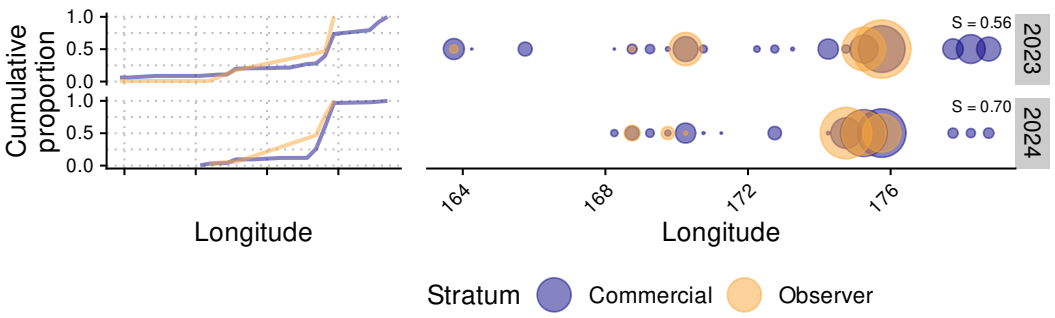


Figure 146: **Longitudinal representativeness of observer sampling coverage of Trawl catch in BOE 6, from events where the black oreo catch exceeded the 30kg threshold, in 2023 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

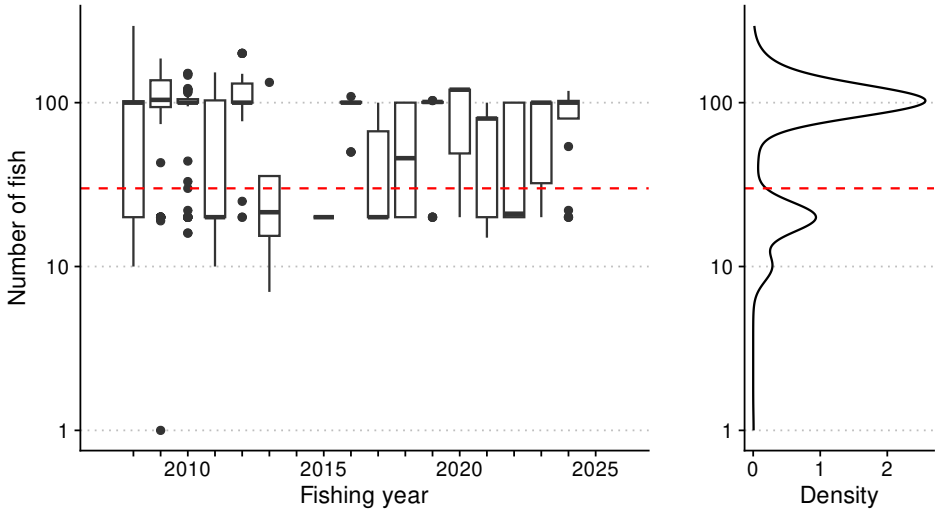


Figure 147: **Length-frequency sample sizes for observed fishing events in BOE 6 where black oreo were sampled. The red dashed line indicates a sample size of 30 fish.**

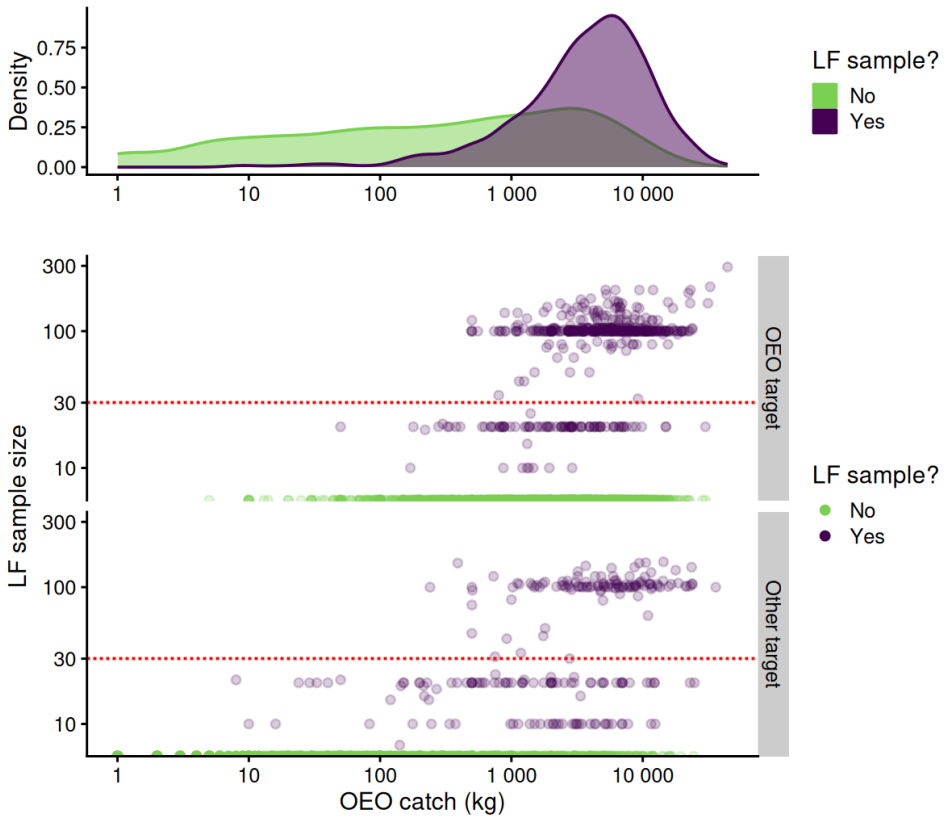


Figure 148: **Length-frequency sample sizes (number of fish sampled) for observed fishing events in BOE 6 in relation to the total black oreo catch from an event, separately for black oreo target events and other target species. The red dashed line indicates a sample size of 30 fish.**

2.2.4.2 Otolith samples

Table 14: Otolith samples of black oreo from the BOE 6 Trawl fishery sampled by the Observer Programme in fishing years 2008 to 2025. Positive fishing events are those where the catch of black oreo exceeded a potential sampling threshold of 30 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
2008	1 217	0	0	0.00
2009	1 220	11	81	0.90
2010	1 393	59	574	4.24
2011	795	50	461	6.29
2012	576	33	381	5.73
2013	44	3	29	6.82
2014	139	0	0	0.00
2015	92	0	0	0.00
2016	208	0	0	0.00
2017	272	5	26	1.84
2018	380	20	149	5.26
2019	280	18	178	6.43
2020	219	2	24	0.91
2021	261	23	196	8.81
2022	213	9	65	4.23
2023	419	37	322	8.83
2024	217	22	204	10.14
2025	113	0	0	0.00

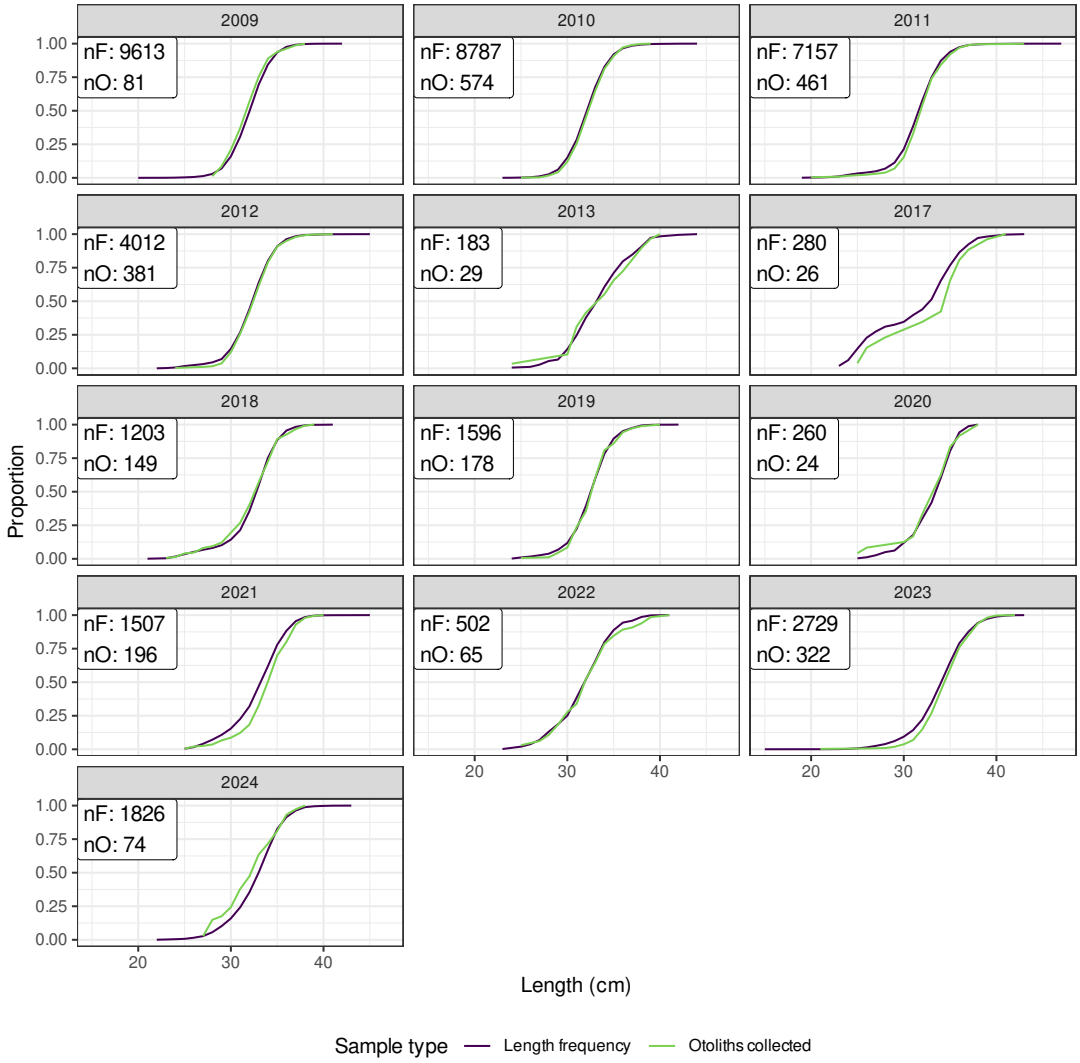


Figure 149: Cumulative distributions of the length of fish in the length frequency and otolith samples of black oreo in the BOE 6 Trawl fishery for the 2009 to 2024 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

2.2.4.3 Catch quantification

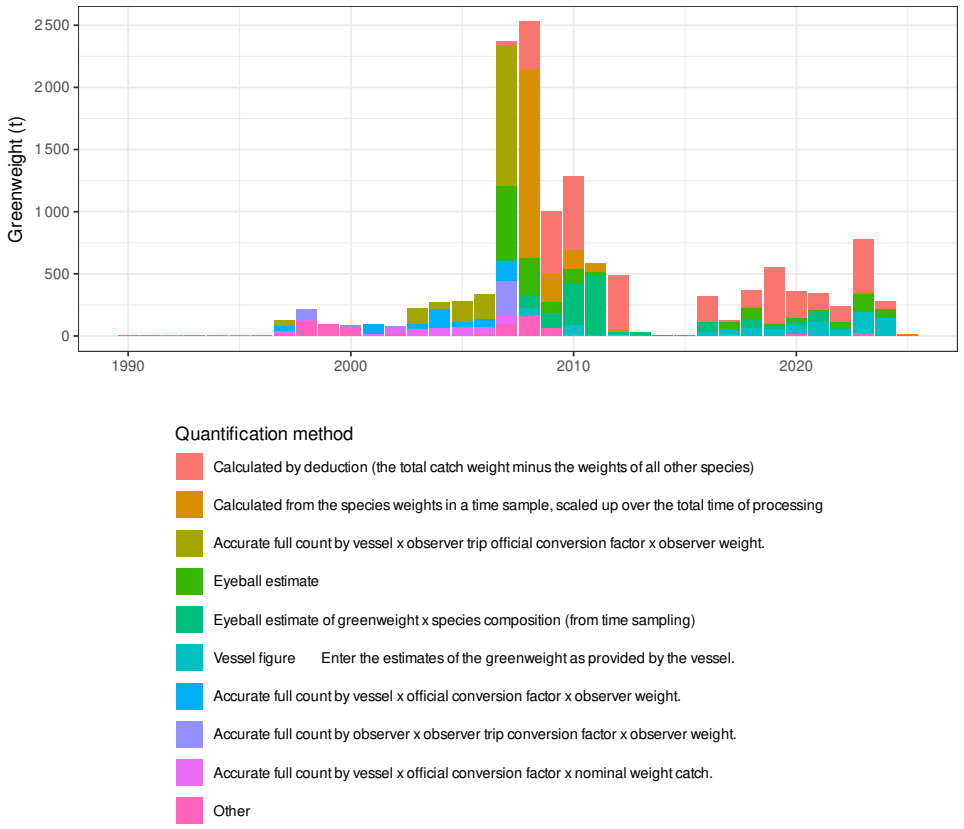


Figure 150: Methods used by observers to quantify the catch of black oreo in the BOE 6 Trawl fishery. The legend lists the methods used in descending order of total catch.

2.3 BYX stocks

Observer sampling of alfonsino is considered with respect to the alfonsino Quota Management Areas.

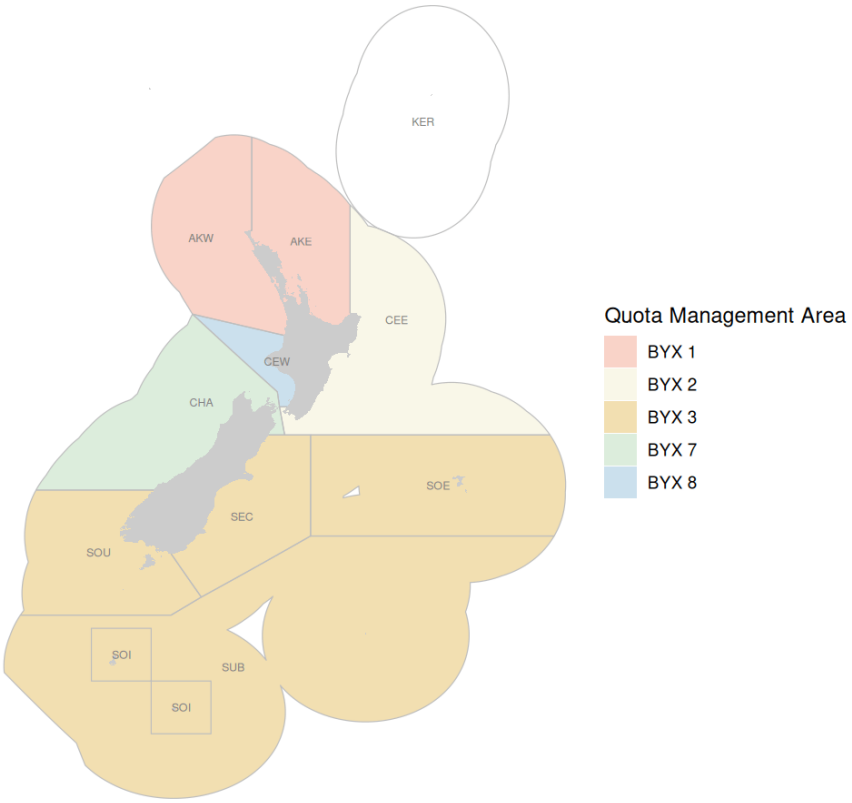


Figure 151: Observer Fisheries Management Areas (black borders, labels on plot) in relation to the Quota Management Area for alfonsino (coloured areas, per legend).

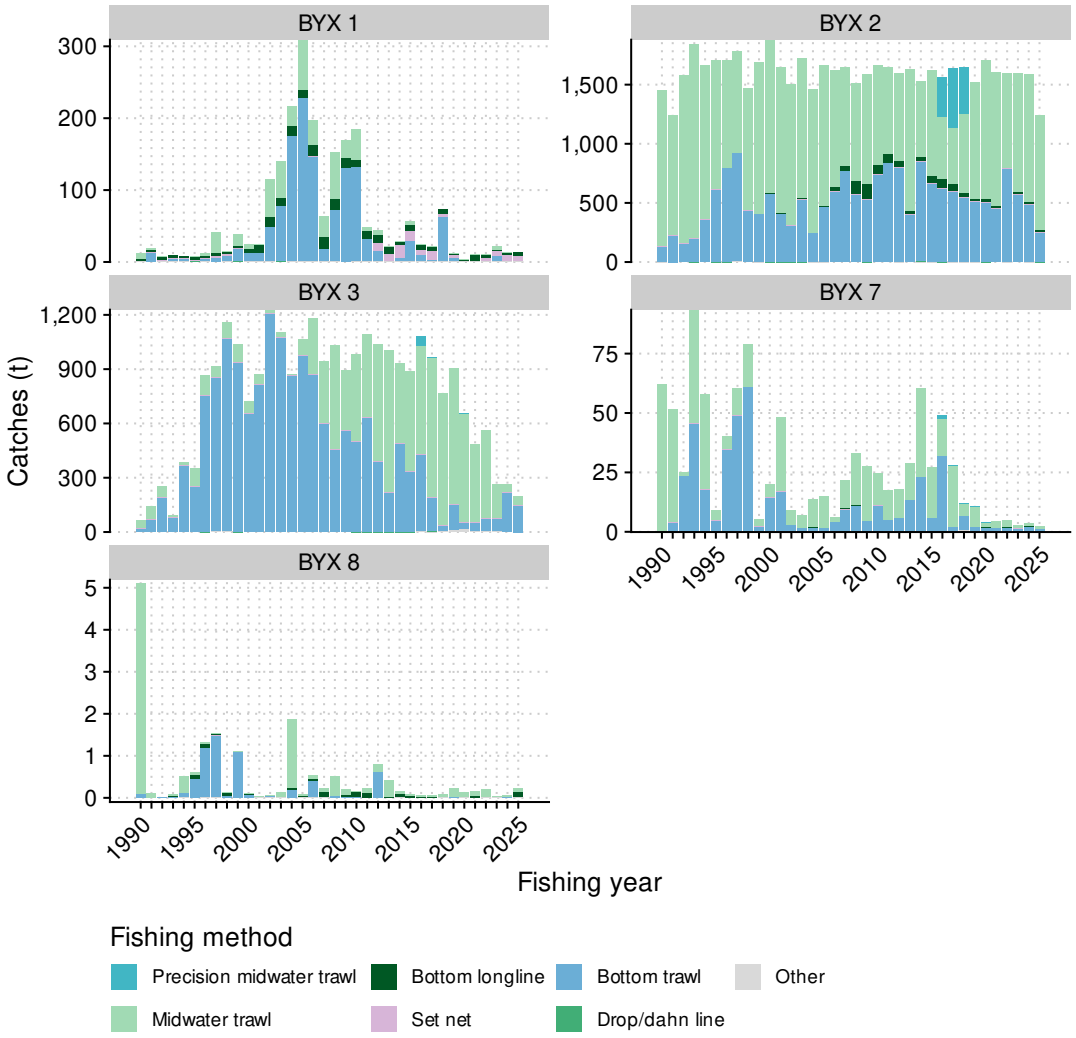


Figure 152: Catches of alfonsino by fishing method, for events within the alfonsino Quota Management Areas. Methods grouped as Other include: BPT, CP, CRP, D, DN, DS, FP, HL, MPT, PL, POT, PRB, PS, PSH, RLP, RN, SLL, T, TL.

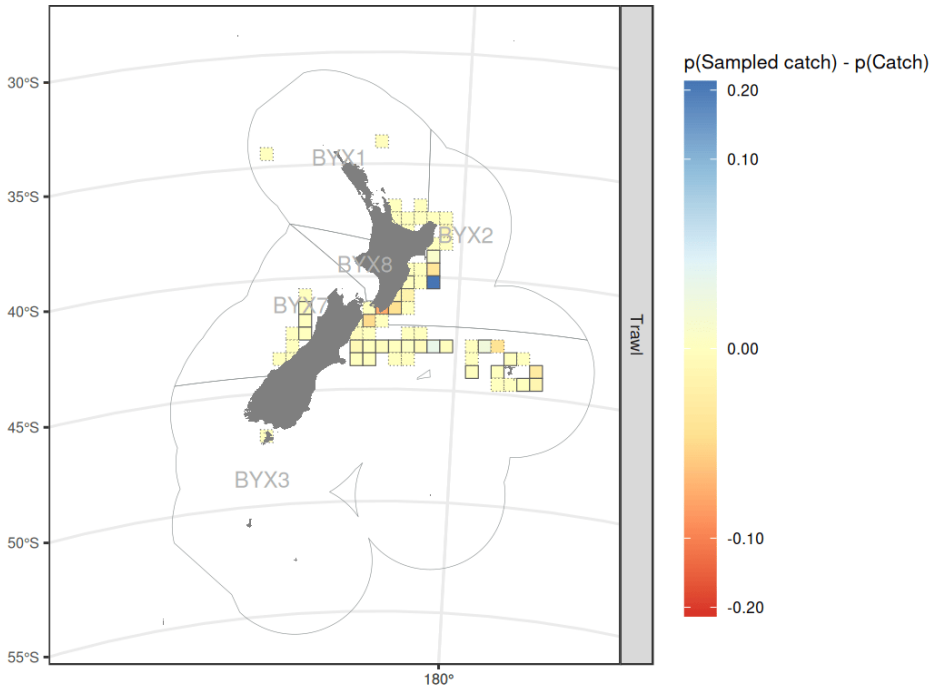


Figure 153: Differences in the relative proportions of catch and sampled catch for alfonsino during 2021–2025. Cells with a dotted border had no sampling.

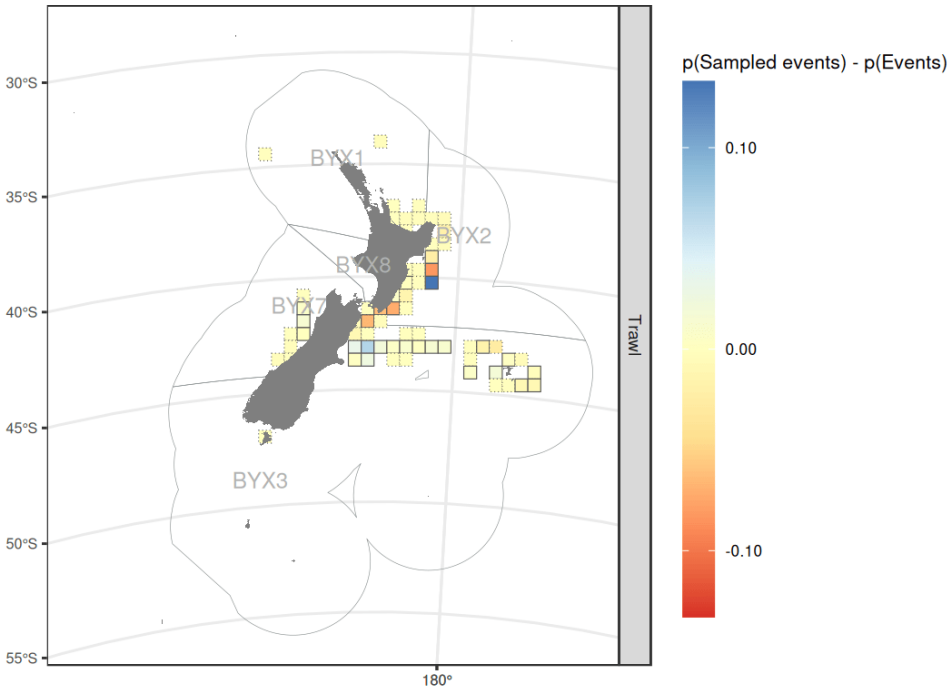


Figure 154: Differences in the relative proportions of events meeting the sampling threshold and sampled events for alfonsino during 2021–2025. Cells with a dotted border had no sampling.

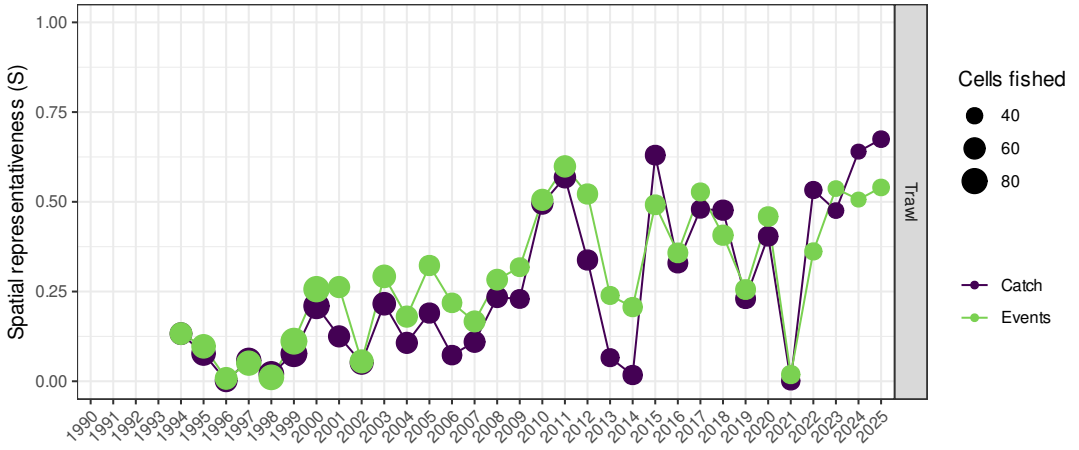


Figure 155: Spatial representativeness of observer sampling of alfonsino by fishing year. Representativeness is assessed using the Manhattan distance metric (*S*) applied to 64 km grid cells, for both the proportion of catch sampled and the proportion of positive events sampled.

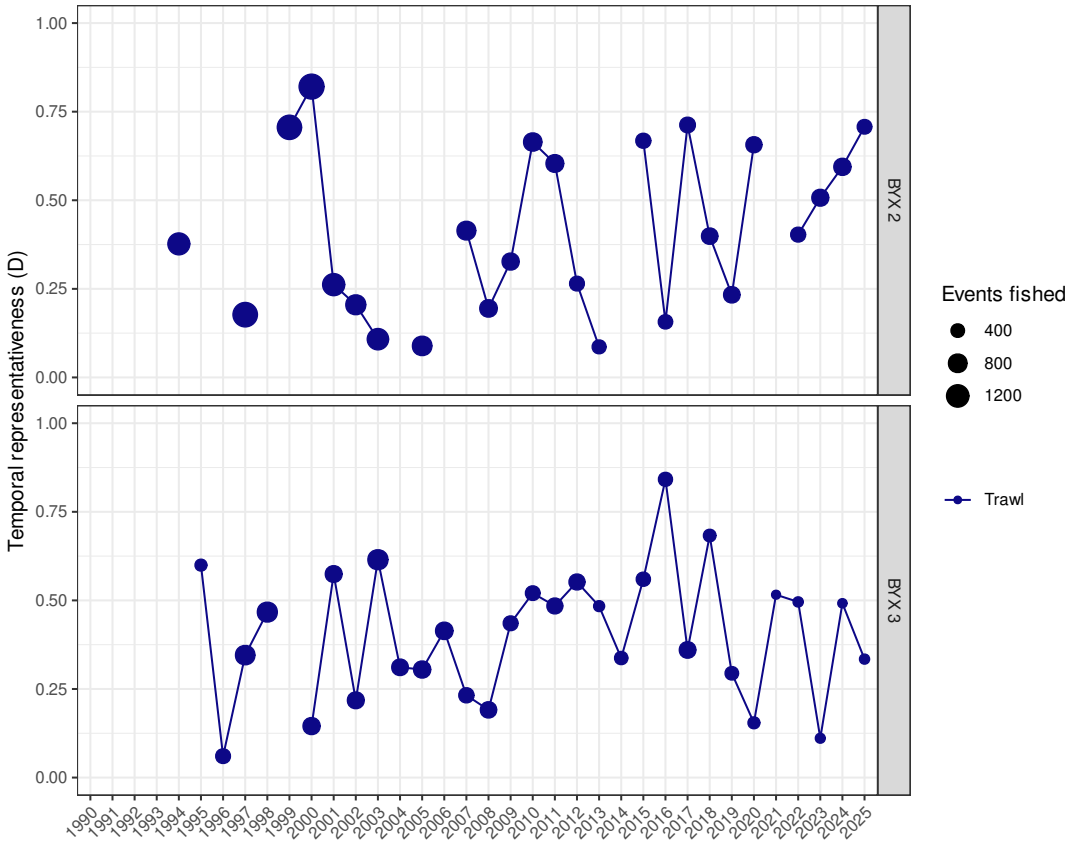


Figure 156: Temporal representativeness of observer sanpling of alfonsino by fishing year and area. Temporal representativeness is assessed using the KS statistic (*D*) applied to the start date-times of all fishing events and all sampled fishing events, weighted by catch weight.

2.3.1 BYX 2: Trawl fishery

2.3.1.1 Length-frequency samples

Table 15: Length-frequency samples of alfonsino from the BYX 2 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of alfonsino exceeded a potential sampling threshold of 10 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	990	0	0	0.00
1991	881	0	0	0.00
1992	763	0	0	0.00
1993	810	0	0	0.00
1994	945	2	9	0.21
1995	881	0	0	0.00
1996	1 130	0	0	0.00
1997	1 353	1	62	0.07
1998	1 115	0	0	0.00
1999	1 309	15	780	1.15
2000	1 388	11	840	0.79
2001	1 087	4	107	0.37
2002	889	1	1	0.11
2003	1 046	3	3	0.29
2004	749	0	0	0.00
2005	877	4	18	0.46
2006	889	0	0	0.00
2007	792	2	100	0.25
2008	687	10	555	1.46
2009	671	11	524	1.64
2010	779	39	1 995	5.01
2011	727	28	1 280	3.85
2012	483	8	517	1.66
2013	402	2	40	0.50
2014	489	0	0	0.00
2015	456	17	739	3.73
2016	448	1	20	0.22
2017	476	16	1 401	3.36
2018	612	10	655	1.63
2019	614	2	35	0.33
2020	586	10	384	1.71
2021	613	0	0	0.00
2022	499	19	1 512	3.81
2023	655	15	1 035	2.29
2024	677	35	1 848	5.17
2025	475	41	2 599	8.63

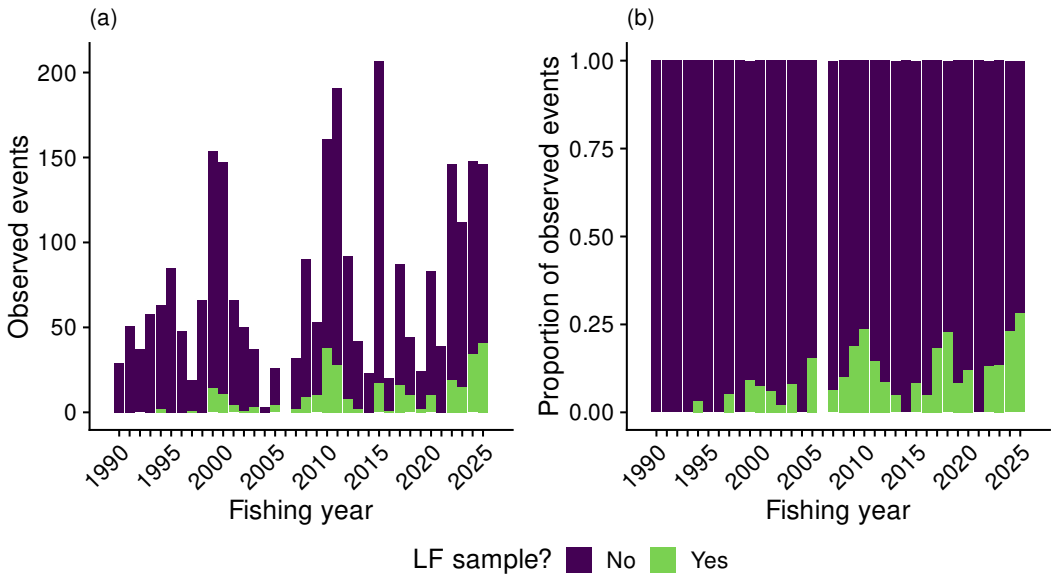


Figure 157: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in BYX 2 where the alfonsino catch exceeded the 10 kg threshold, with and without length-frequency sampling.**

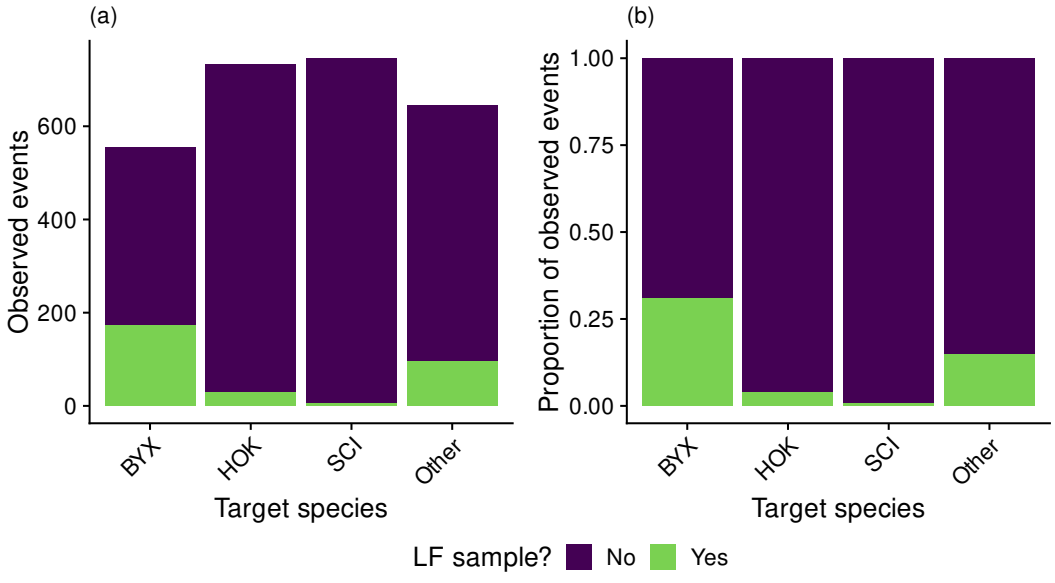


Figure 158: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in BYX 2 where the alfonsino catch exceeded the 10 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

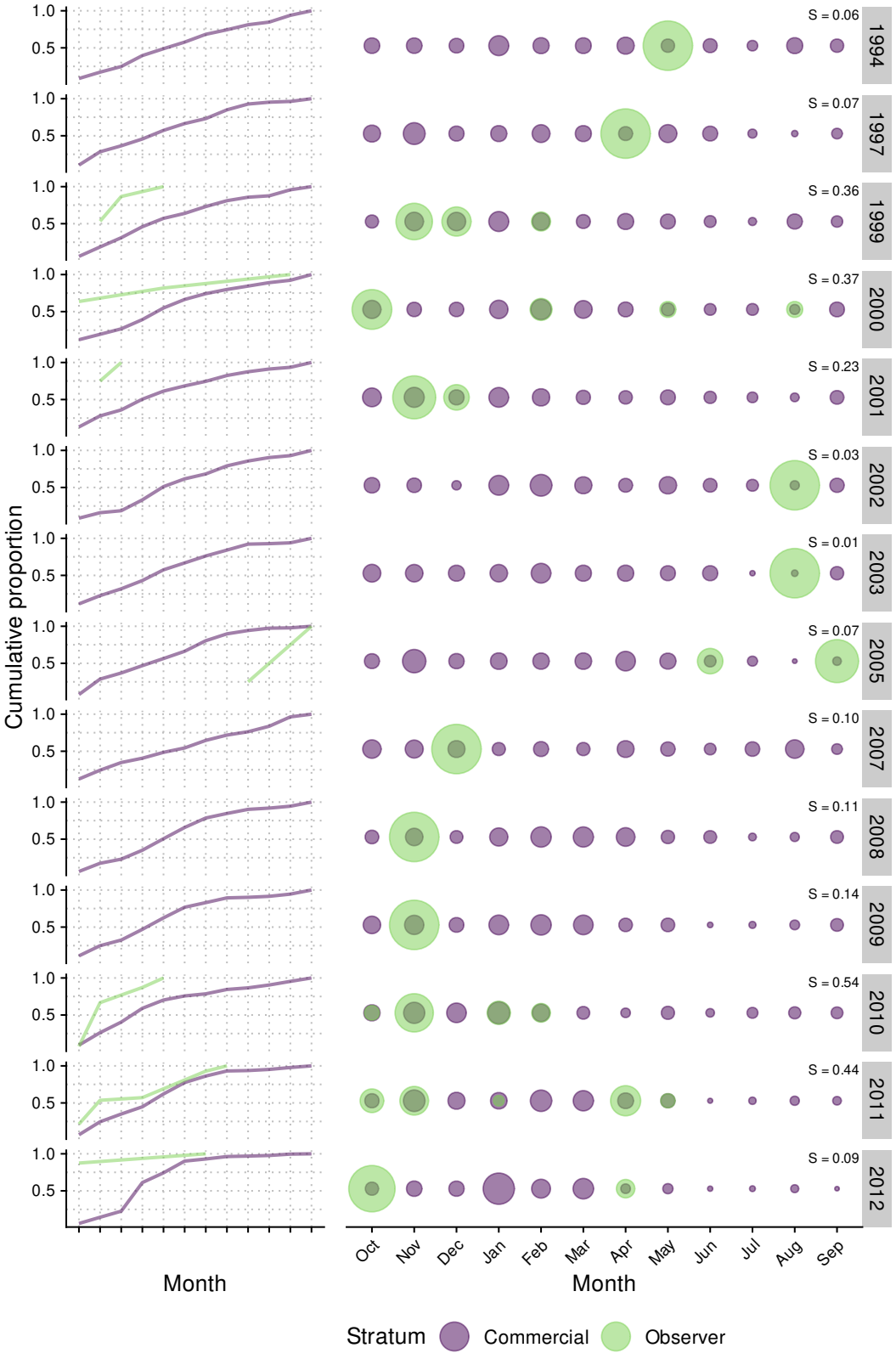


Figure 159: **Monthly representativeness of observer sampling coverage of Trawl fishing events in BYX 2, where the alfonsino catch exceeded the 10kg threshold, in 1994 to 2012. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

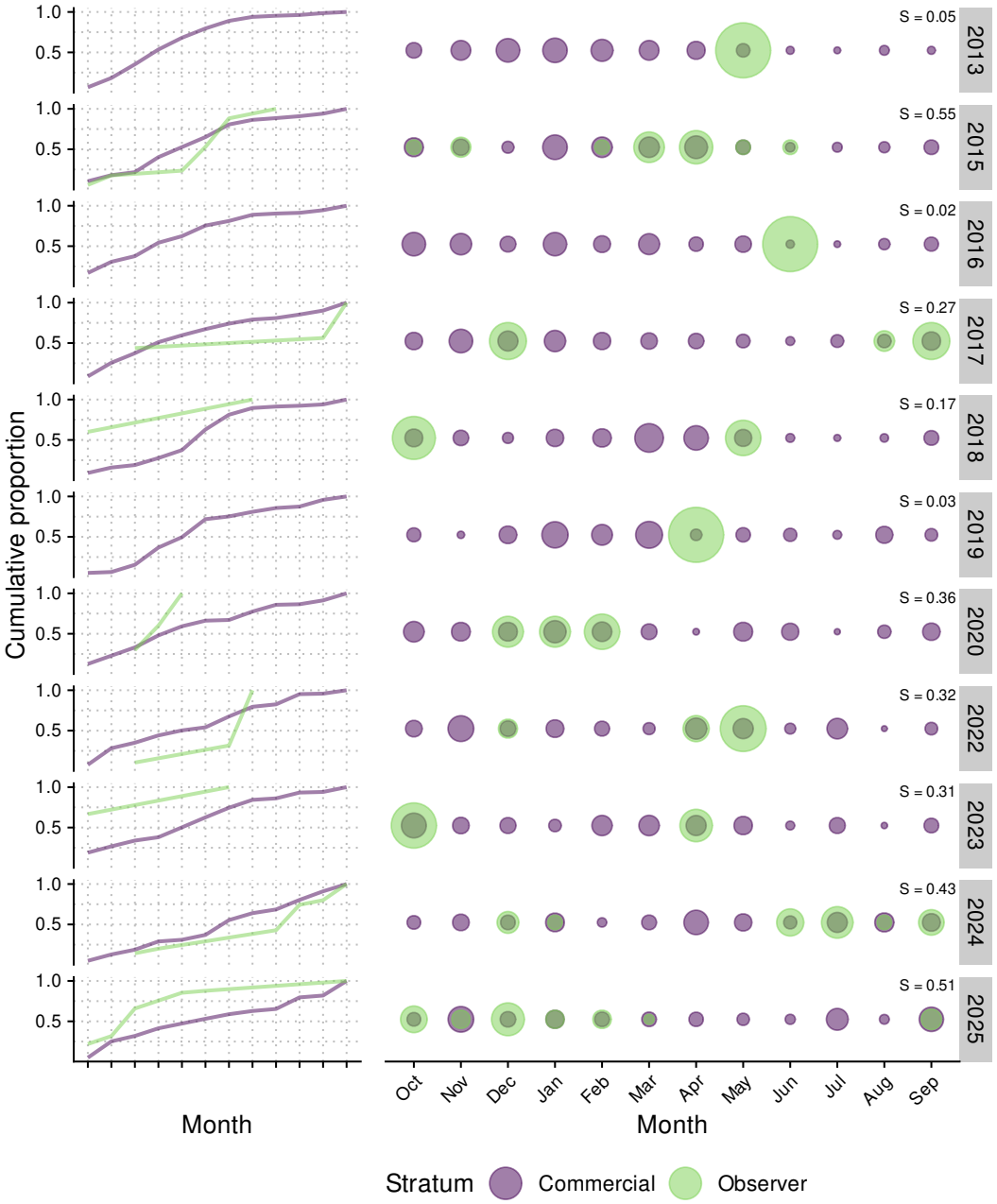


Figure 160: **Monthly representativeness of observer sampling coverage of Trawl fishing events in BYX 2, where the alfonsino catch exceeded the 10kg threshold, in 2013 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

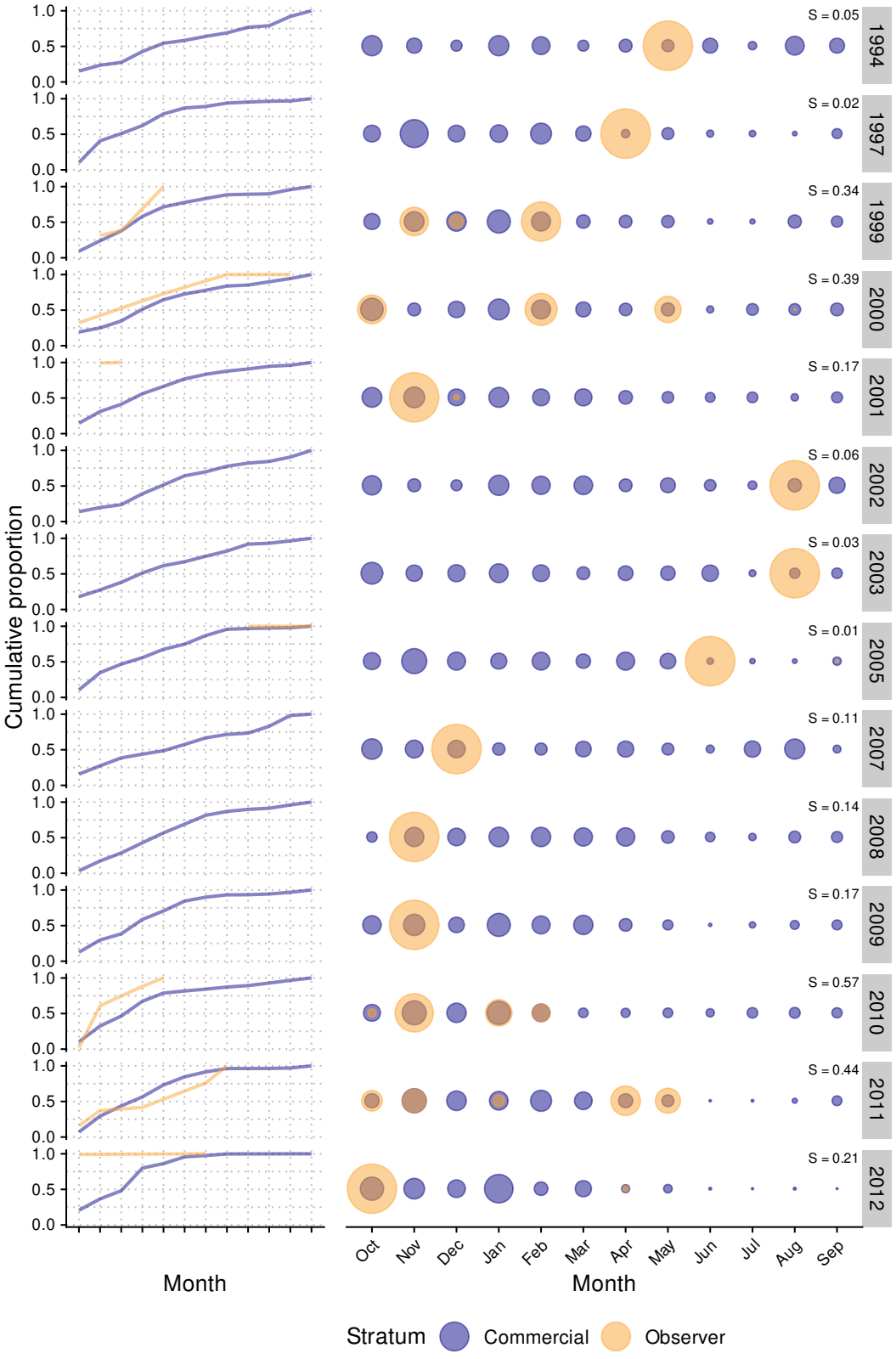


Figure 161: **Monthly representativeness of observer sampling coverage of Trawl catch in BYX 2, from events where the alfonsino catch exceeded the 10kg threshold, in 1994 to 2012. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

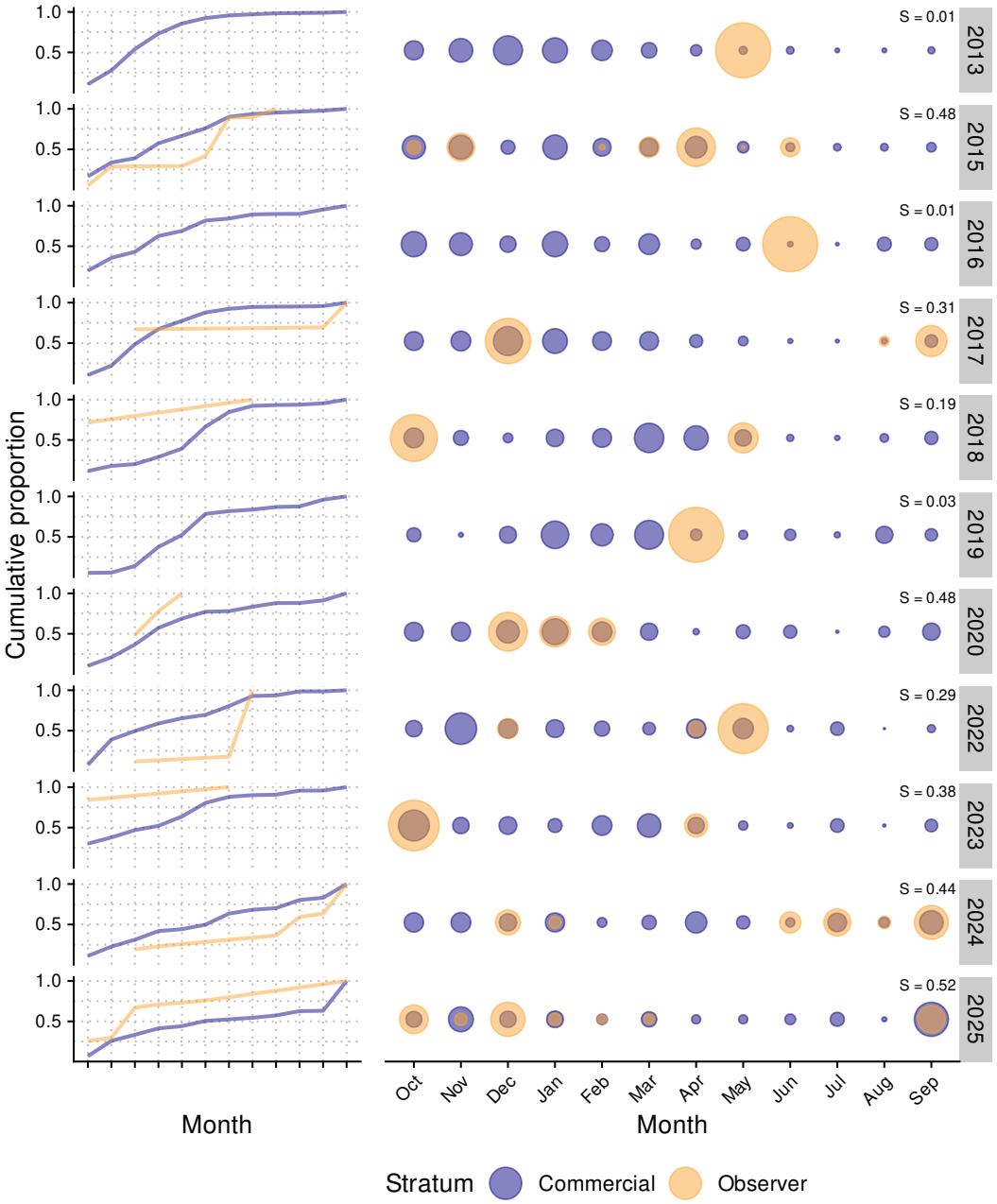


Figure 162: **Monthly representativeness of observer sampling coverage of Trawl catch in BYX 2, from events where the alfonsino catch exceeded the 10kg threshold, in 2013 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

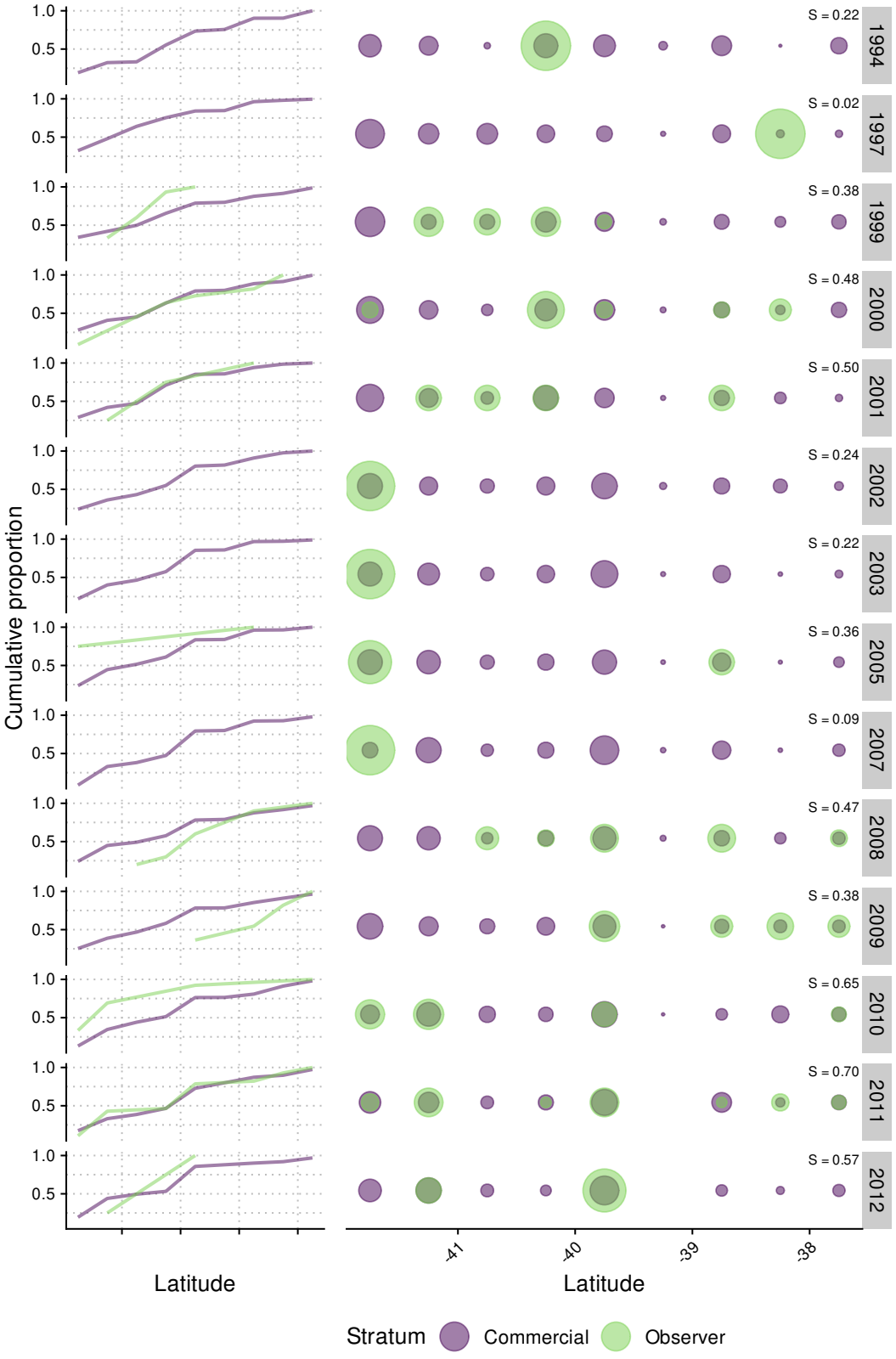


Figure 163: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in BYX 2, where the alfonsino catch exceeded the 10kg threshold, in 1994 to 2012. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

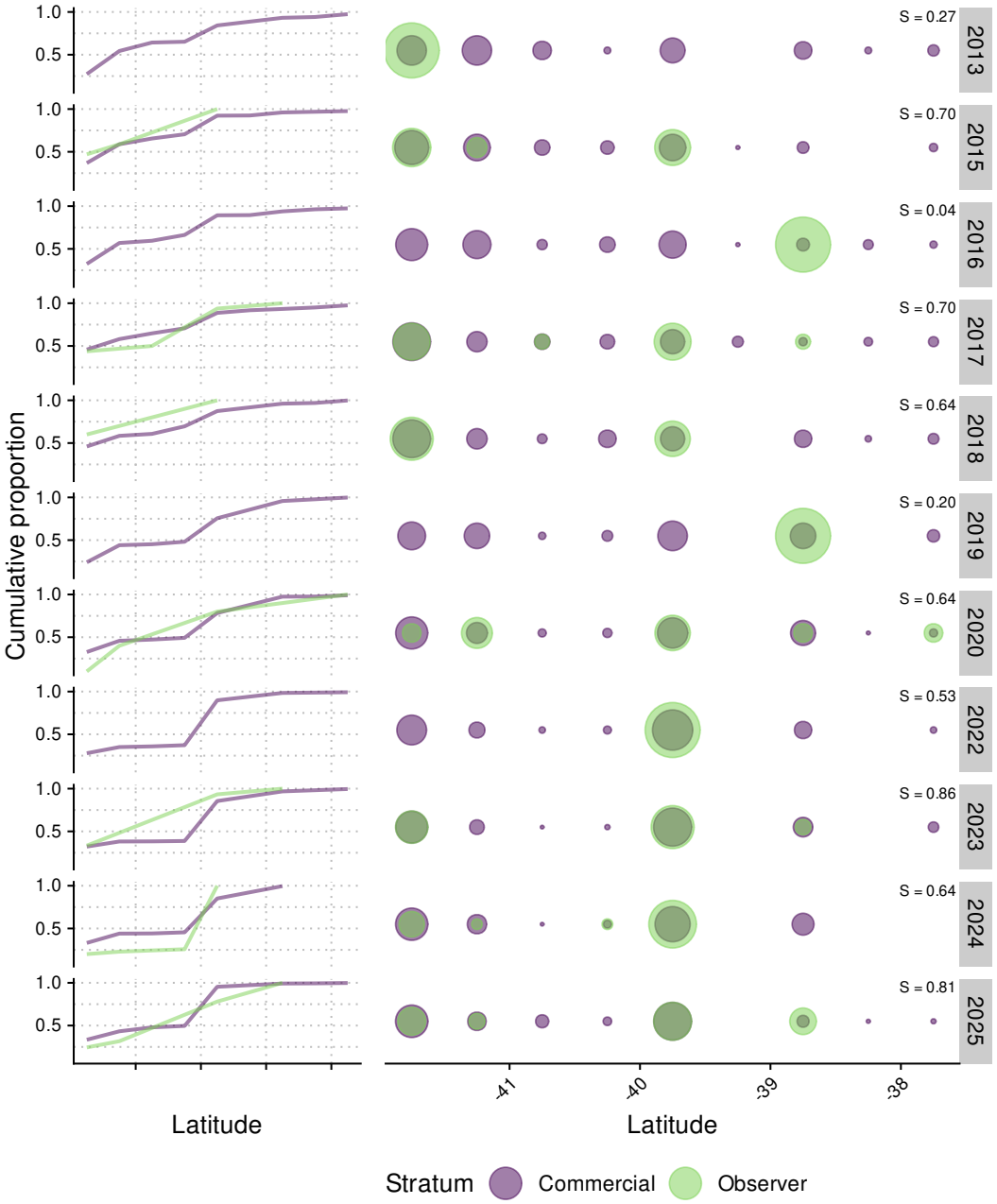


Figure 164: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in BYX 2, where the alfonsino catch exceeded the 10kg threshold, in 2013 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

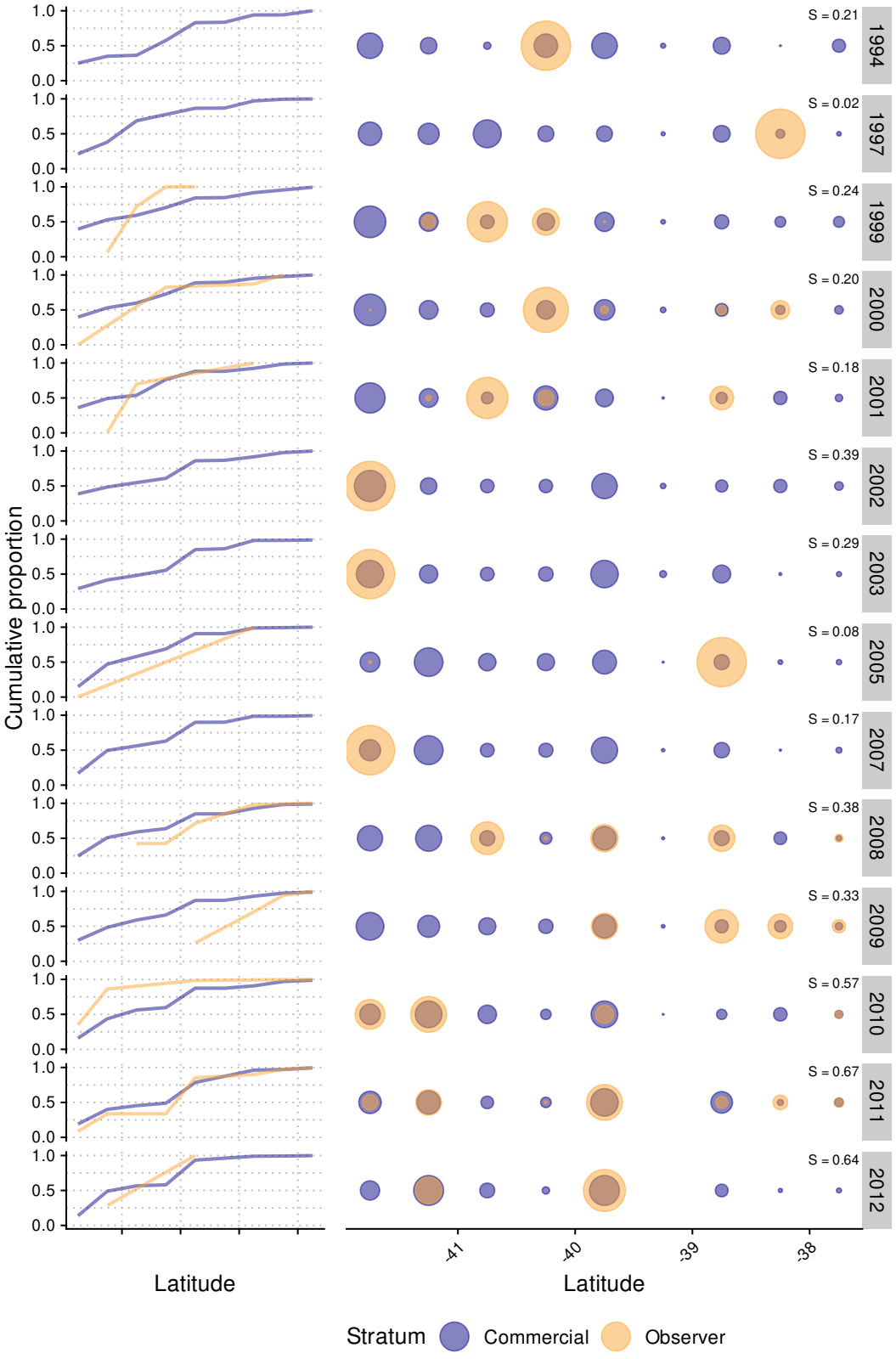


Figure 165: **Latitudinal representativeness of observer sampling coverage of Trawl catch in BYX 2, from events where the alfonsino catch exceeded the 10kg threshold, in 1994 to 2012. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

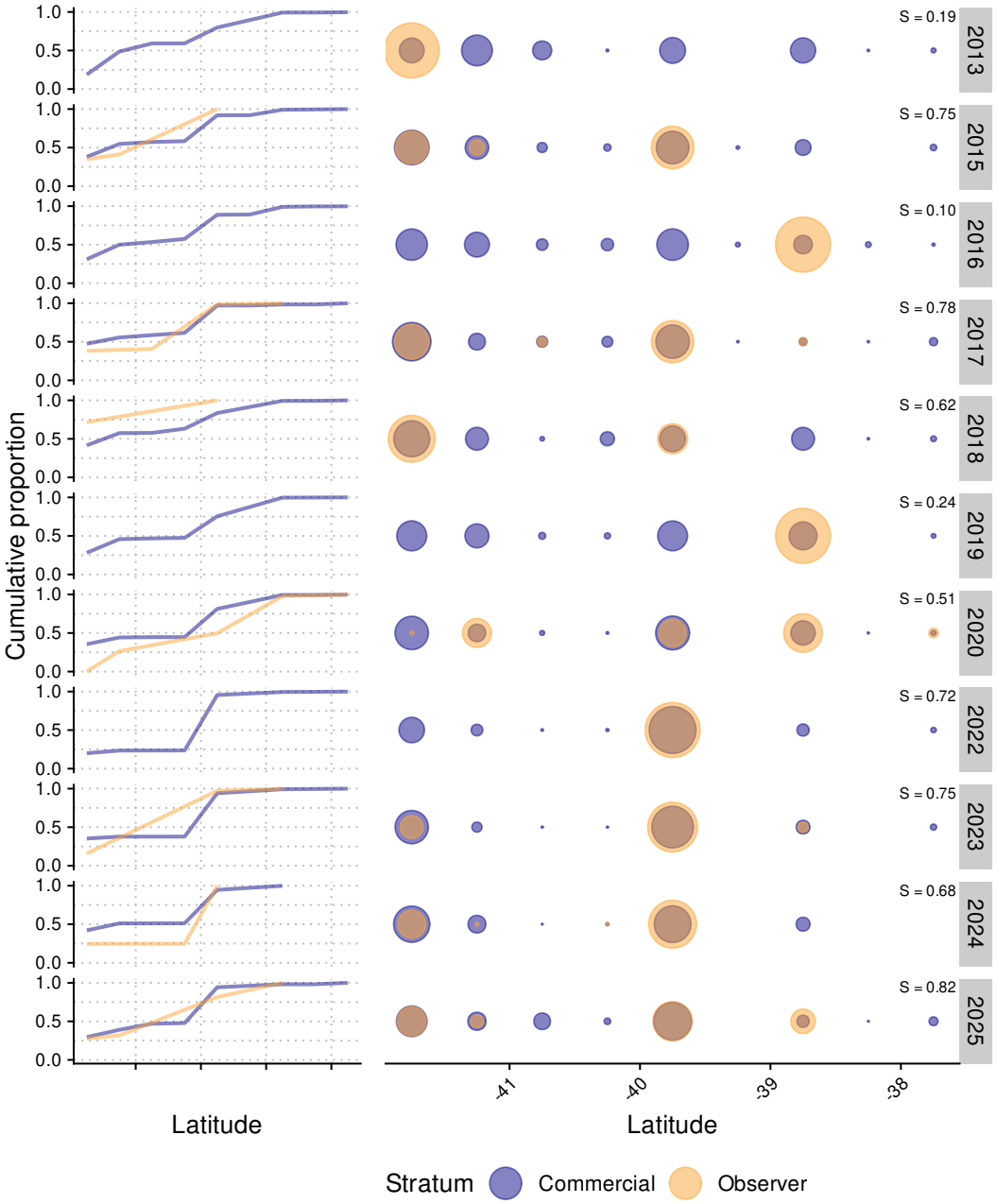


Figure 166: Latitudinal representativeness of observer sampling coverage of Trawl catch in BYX 2, from events where the alfonsino catch exceeded the 10kg threshold, in 2013 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

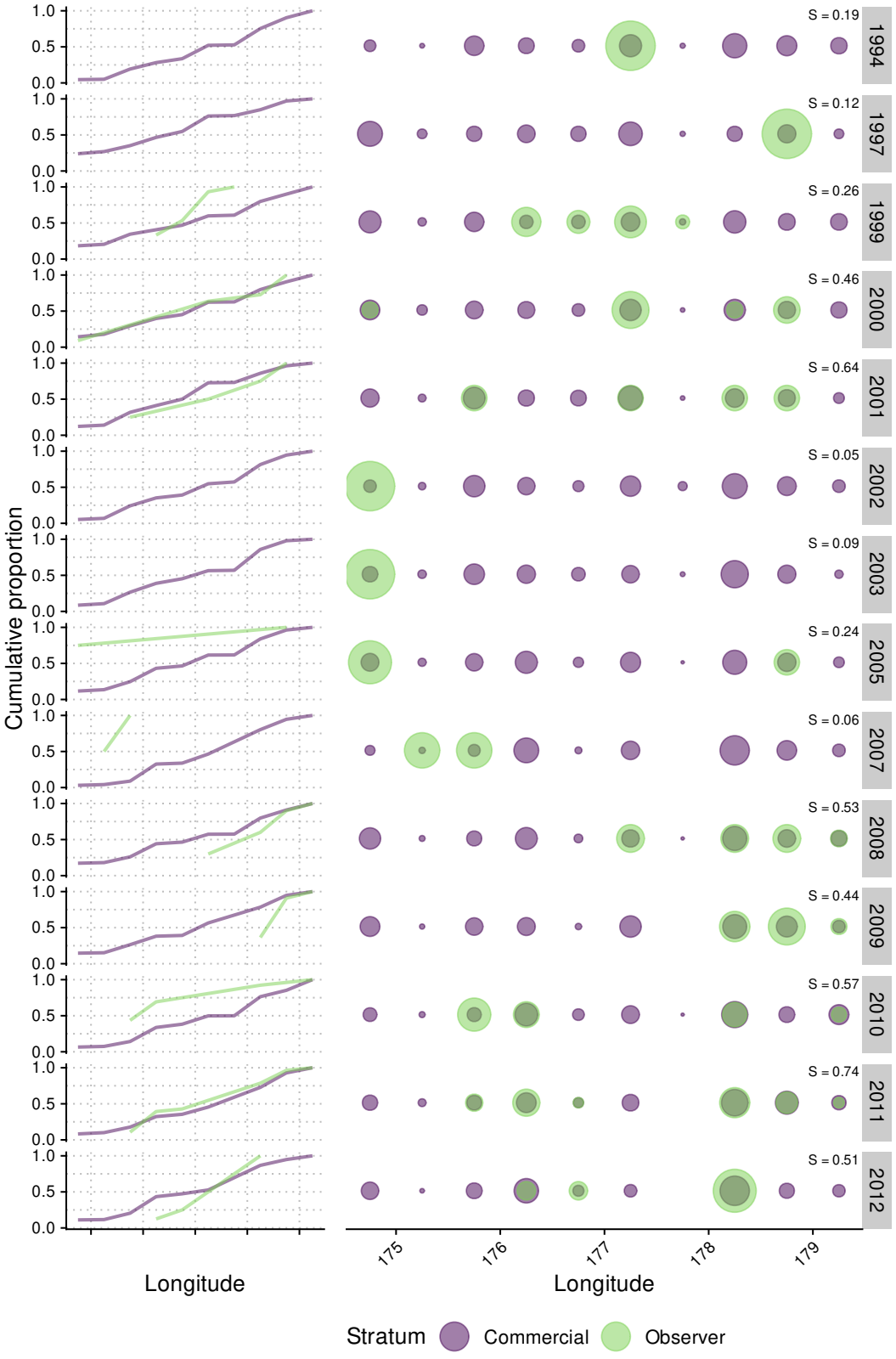


Figure 167: **Longitudinal representativeness of observer sampling coverage of Trawl fishing events in BYX 2, where the alfonsino catch exceeded the 10kg threshold, in 1994 to 2012. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

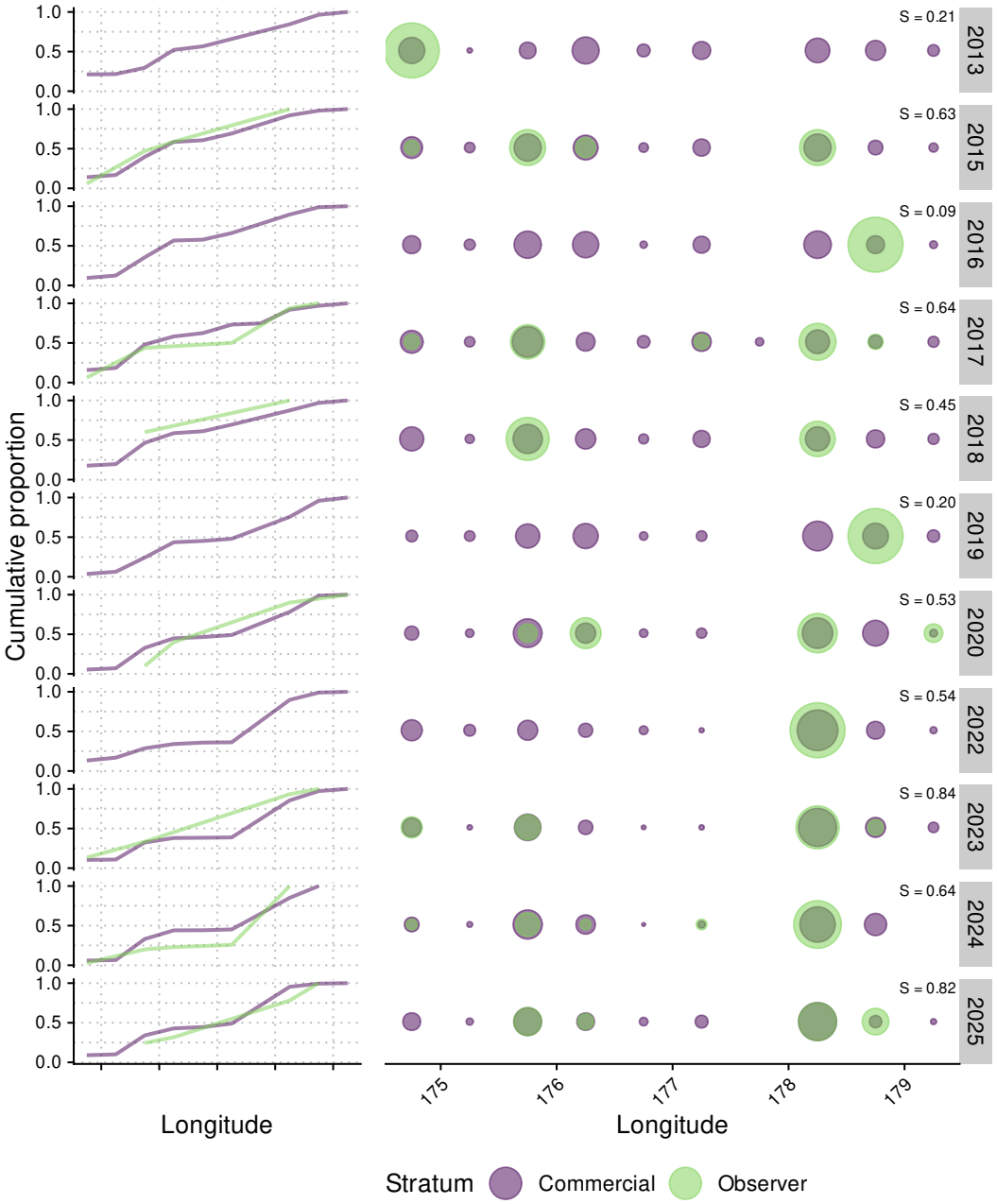


Figure 168: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in BYX 2, where the alfonsino catch exceeded the 10kg threshold, in 2013 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

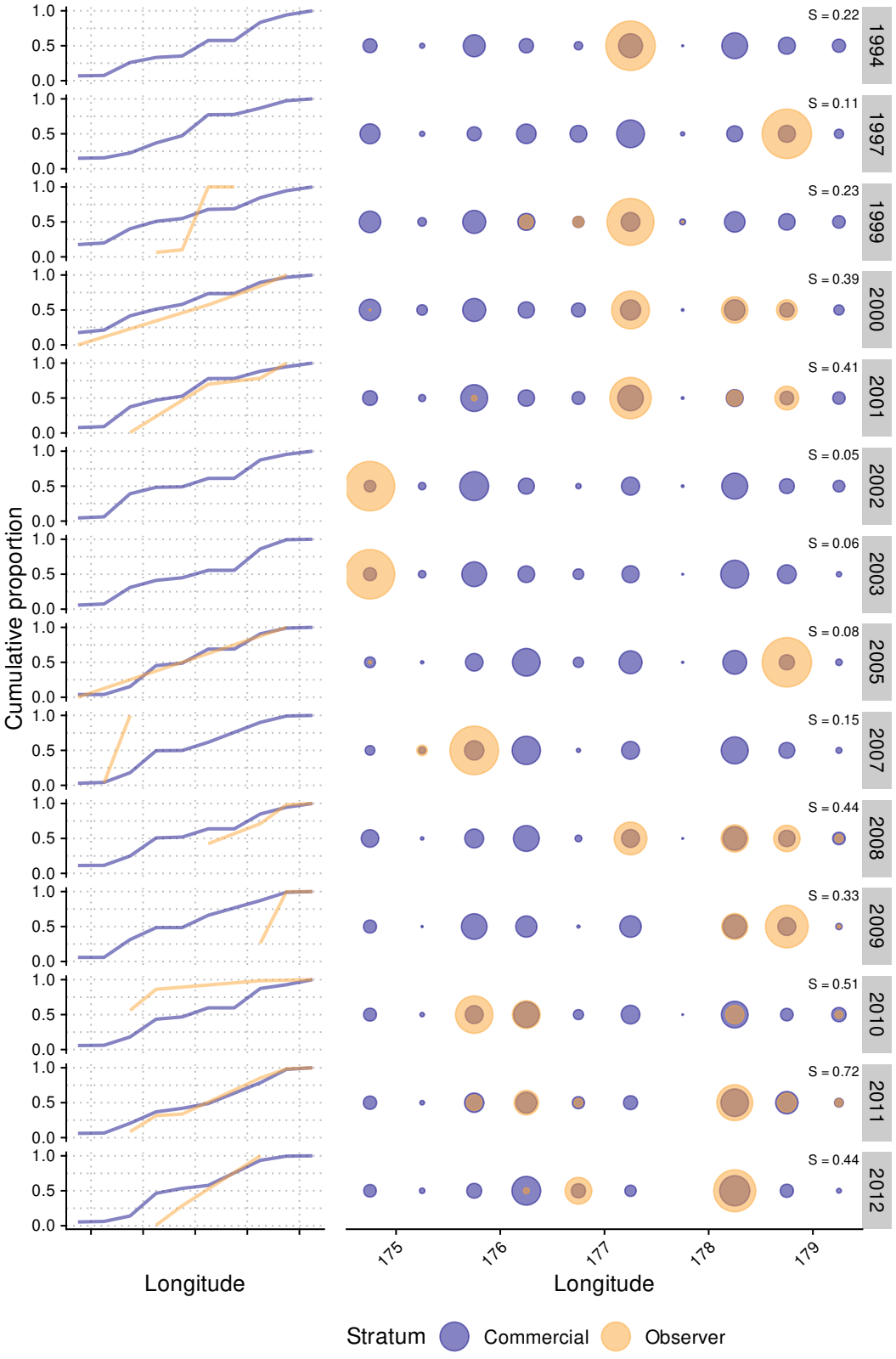


Figure 169: **Longitudinal representativeness of observer sampling coverage of Trawl catch in BYX 2, from events where the alfonsino catch exceeded the 10kg threshold, in 1994 to 2012. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

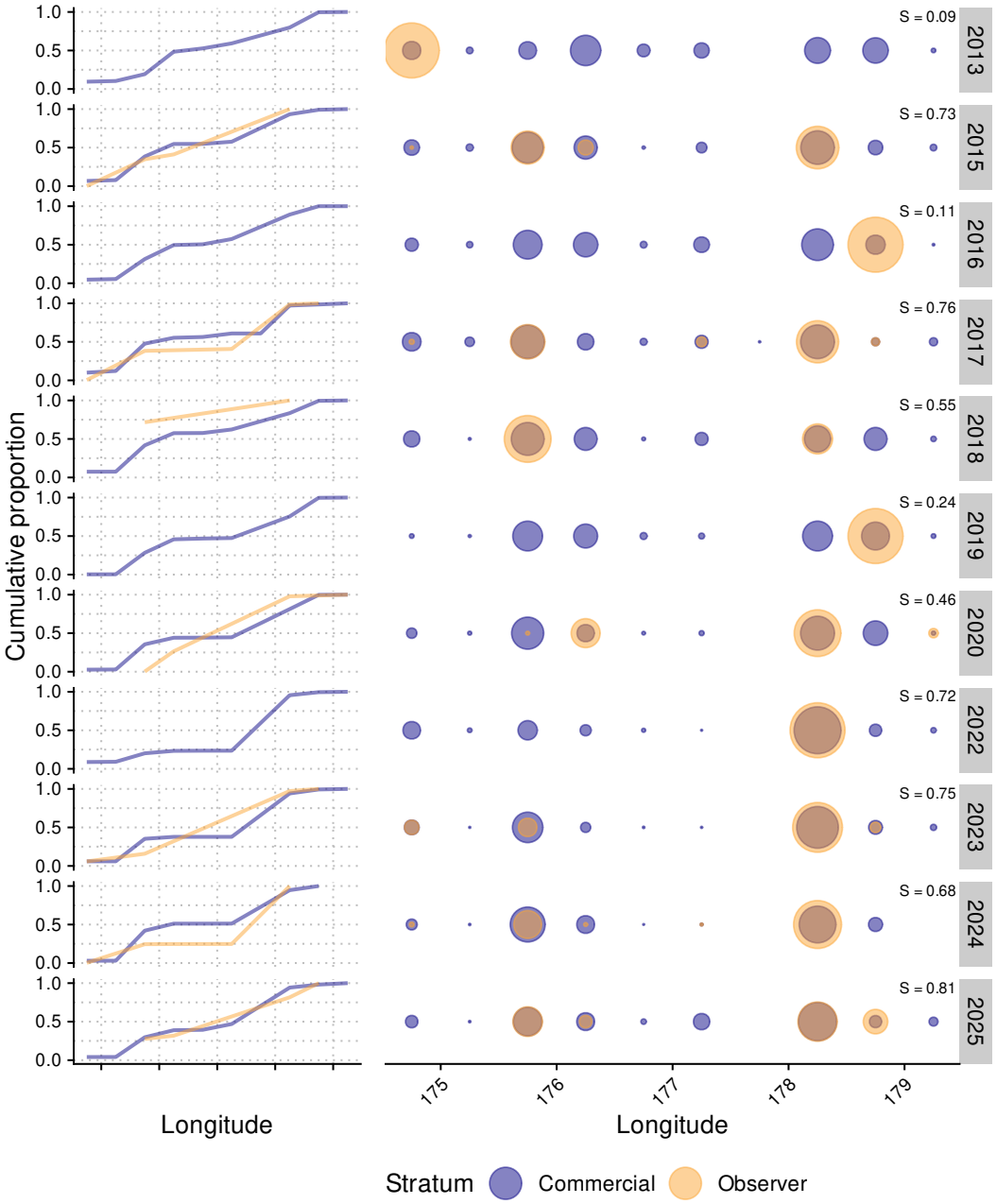


Figure 170: **Longitudinal representativeness of observer sampling coverage of Trawl catch in BYX 2, from events where the alfonsino catch exceeded the 10kg threshold, in 2013 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

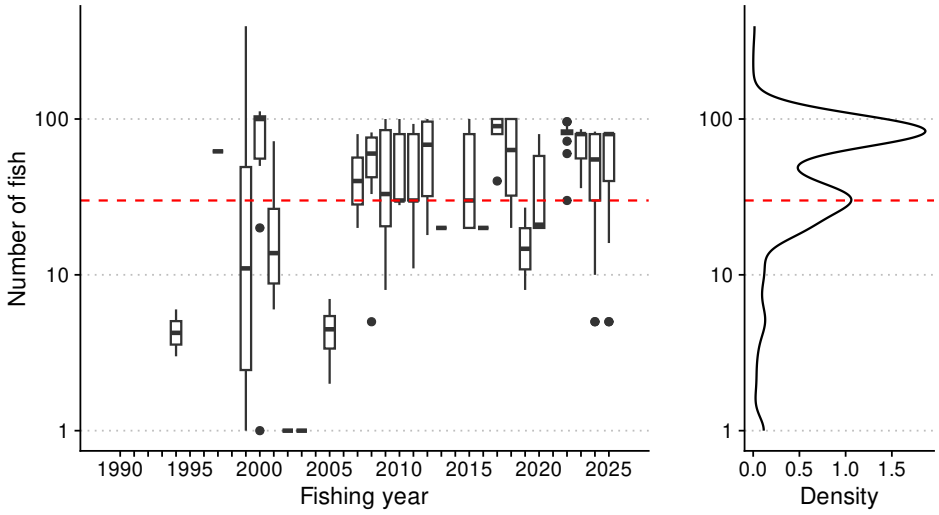


Figure 171: **Length-frequency sample sizes for observed fishing events in BYX 2 where alfonsino were sampled. The red dashed line indicates a sample size of 30 fish.**

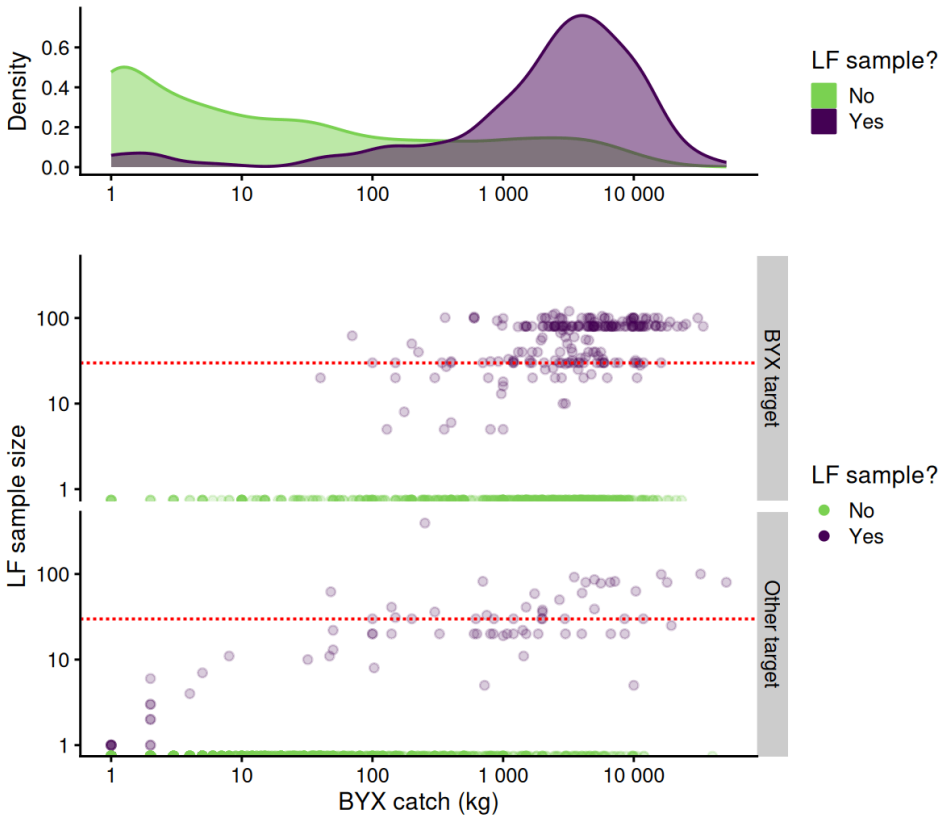


Figure 172: **Length-frequency sample sizes (number of fish sampled) for observed fishing events in BYX 2 in relation to the total alfonsino catch from an event, separately for alfonsino target events and other target species. The red dashed line indicates a sample size of 30 fish.**

2.3.1.2 Otolith samples

Table 16: Otolith samples of alfonsino from the BYX 2 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of alfonsino exceeded a potential sampling threshold of 10 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	990	0	0	0.00
1991	881	0	0	0.00
1992	763	0	0	0.00
1993	810	0	0	0.00
1994	945	0	0	0.00
1995	881	0	0	0.00
1996	1 130	0	0	0.00
1997	1 353	0	0	0.00
1998	1 115	0	0	0.00
1999	1 309	0	0	0.00
2000	1 388	0	0	0.00
2001	1 087	0	0	0.00
2002	889	0	0	0.00
2003	1 046	0	0	0.00
2004	749	0	0	0.00
2005	877	0	0	0.00
2006	889	0	0	0.00
2007	792	0	0	0.00
2008	687	0	0	0.00
2009	671	0	0	0.00
2010	779	27	347	3.47
2011	727	15	207	2.06
2012	483	7	105	1.45
2013	402	2	10	0.50
2014	489	0	0	0.00
2015	456	1	5	0.22
2016	448	0	0	0.00
2017	476	16	155	3.36
2018	612	9	69	1.47
2019	614	2	5	0.33
2020	586	3	15	0.51
2021	613	0	0	0.00
2022	499	12	138	2.40
2023	655	15	75	2.29
2024	677	34	167	5.02
2025	475	41	281	8.63

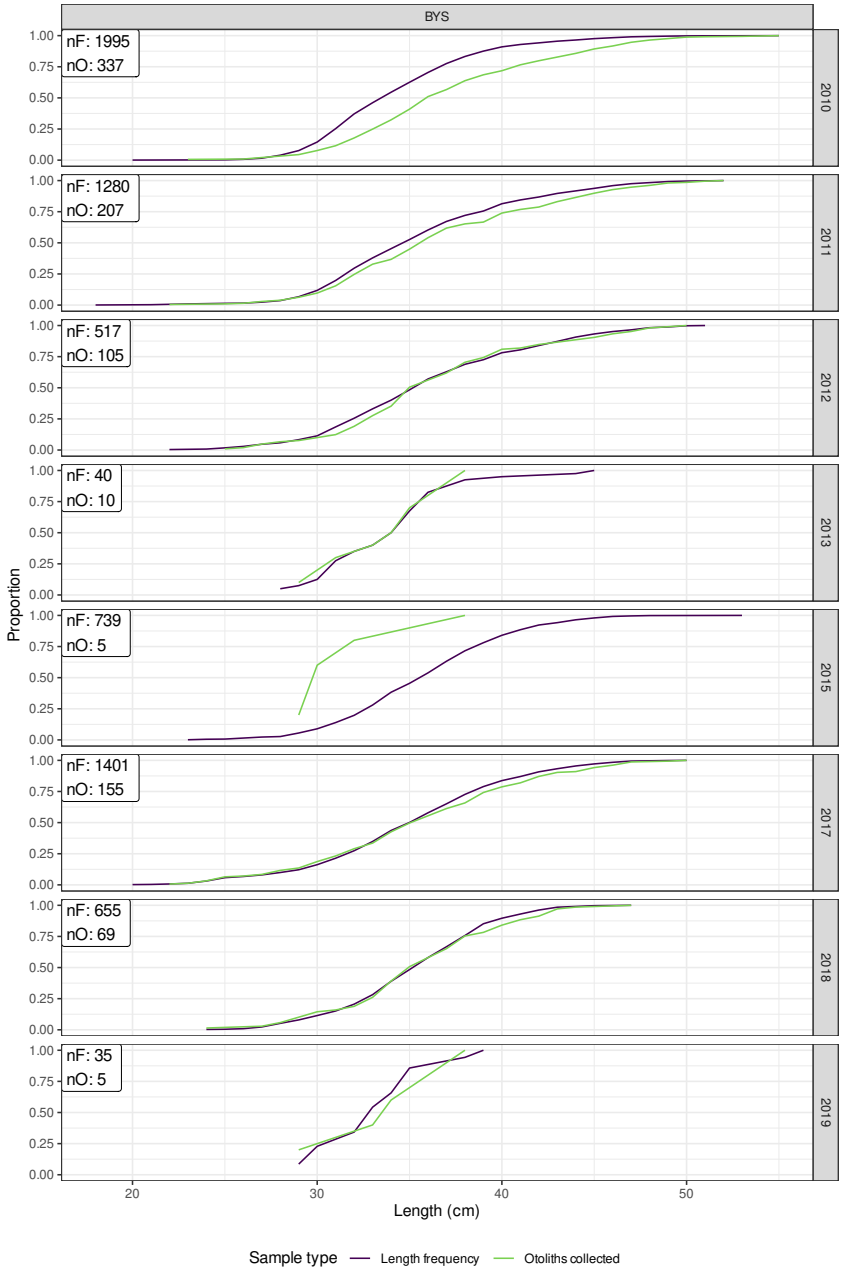


Figure 173: Cumulative distributions of the length of fish in the length frequency and otolith samples of alfonsino in the BYX 2 Trawl fishery for the 2010 to 2019 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

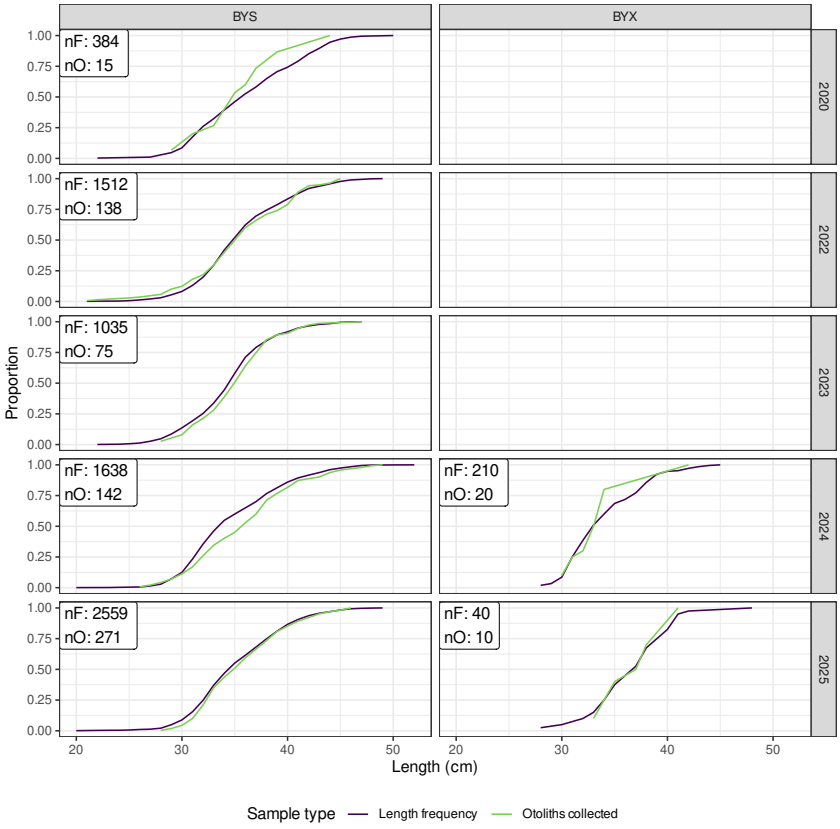


Figure 174: Cumulative distributions of the length of fish in the length frequency and otolith samples of alfonsino in the BYX 2 Trawl fishery for the 2020 to 2025 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

2.3.1.3 Catch quantification

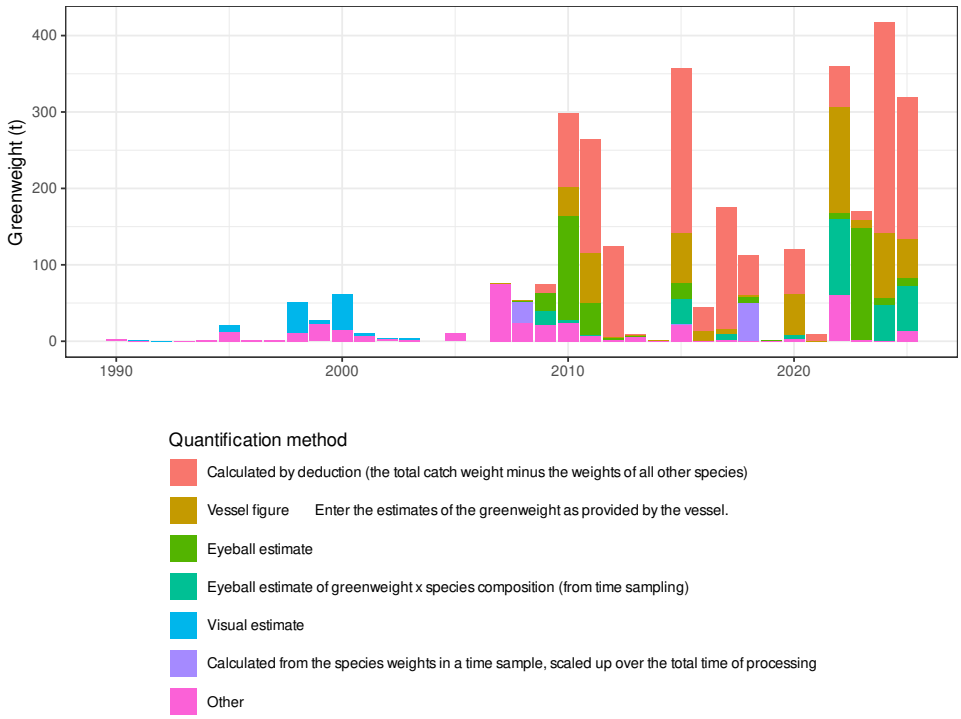


Figure 175: Methods used by observers to quantify the catch of alfonsino in the BYX 2 Trawl fishery. The legend lists the methods used in descending order of total catch.

2.3.2 BYX 3: Trawl fishery

2.3.2.1 Length-frequency samples

Table 17: Length-frequency samples of alfonsino from the BYX 3 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of alfonsino exceeded a potential sampling threshold of 10 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	41	0	0	0.00
1991	55	0	0	0.00
1992	91	0	0	0.00
1993	124	0	0	0.00
1994	222	0	0	0.00
1995	259	19	1 269	7.34
1996	315	2	28	0.63
1997	459	4	58	0.87
1998	510	2	219	0.39
1999	752	0	0	0.00
2000	548	1	43	0.18
2001	546	12	183	2.20
2002	524	4	76	0.76
2003	688	38	1 131	5.52
2004	552	8	83	1.45
2005	664	19	460	2.86
2006	692	22	190	3.18
2007	493	19	160	3.85
2008	452	2	10	0.44
2009	477	2	105	0.42
2010	479	30	1 717	6.26
2011	438	23	731	5.25
2012	515	24	736	4.66
2013	241	2	42	0.83
2014	384	1	40	0.26
2015	392	17	963	4.34
2016	355	23	1 548	6.48
2017	411	5	83	1.22
2018	341	37	1 012	10.85
2019	349	21	969	6.02
2020	302	3	176	0.99
2021	155	3	60	1.94
2022	211	2	54	0.95
2023	198	5	340	2.53
2024	158	35	298	22.15
2025	158	9	330	5.70

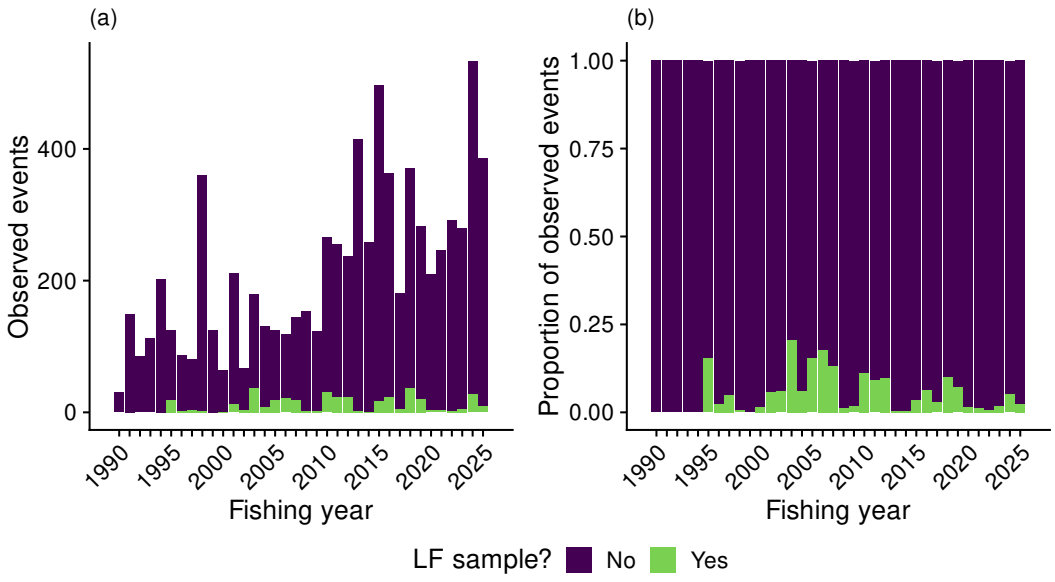


Figure 176: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in BYX 3 where the alfonsino catch exceeded the 10 kg threshold, with and without length-frequency sampling.**

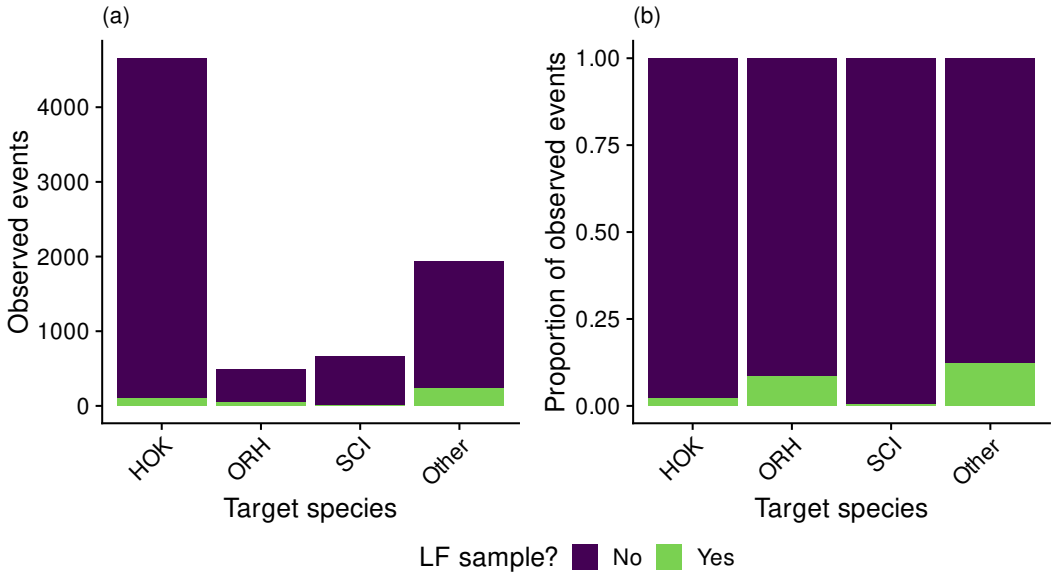


Figure 177: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in BYX 3 where the alfonsino catch exceeded the 10 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

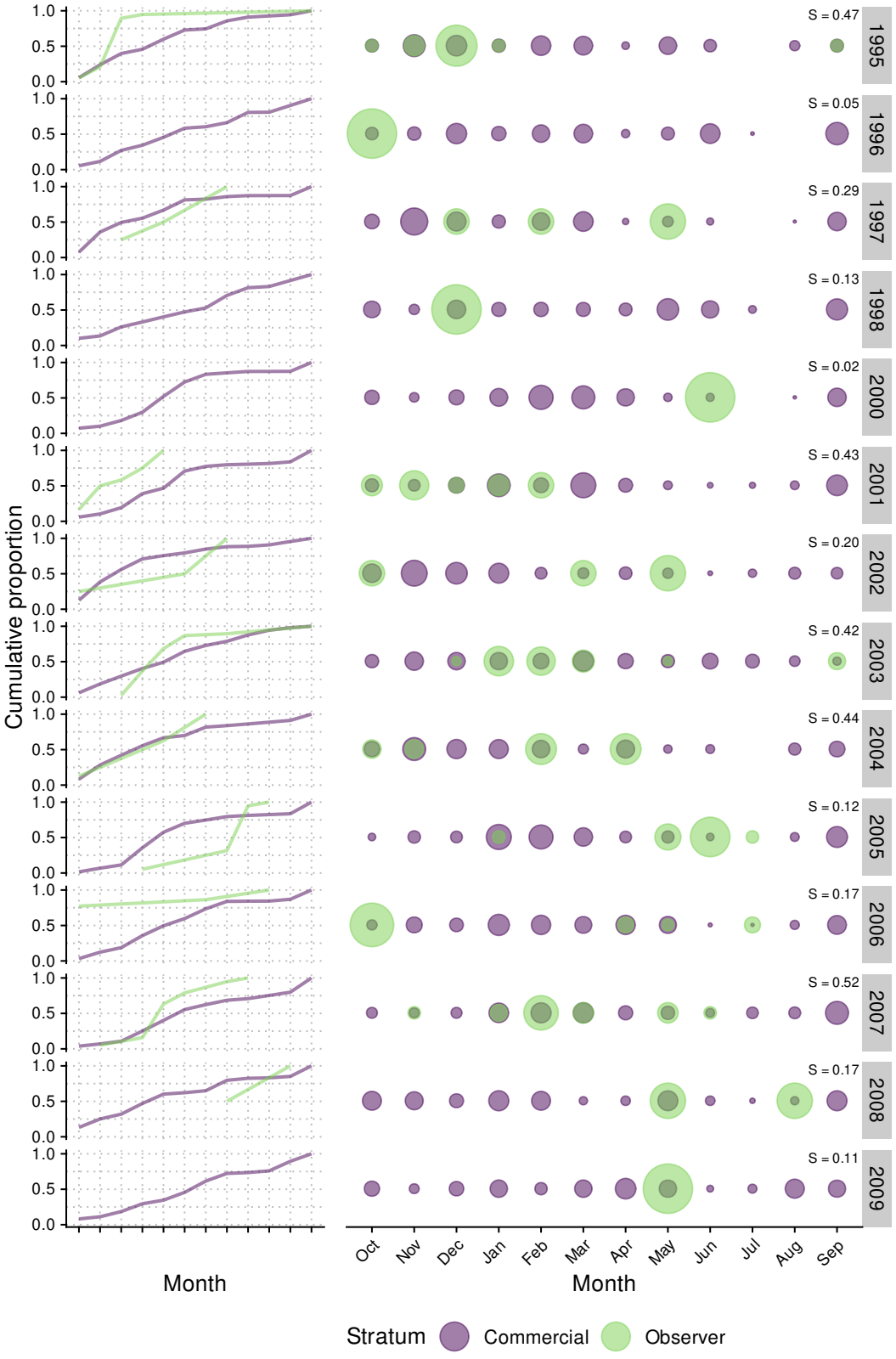


Figure 178: Monthly representativeness of observer sampling coverage of Trawl fishing events in BYX 3, where the alfonsino catch exceeded the 10kg threshold, in 1995 to 2009. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

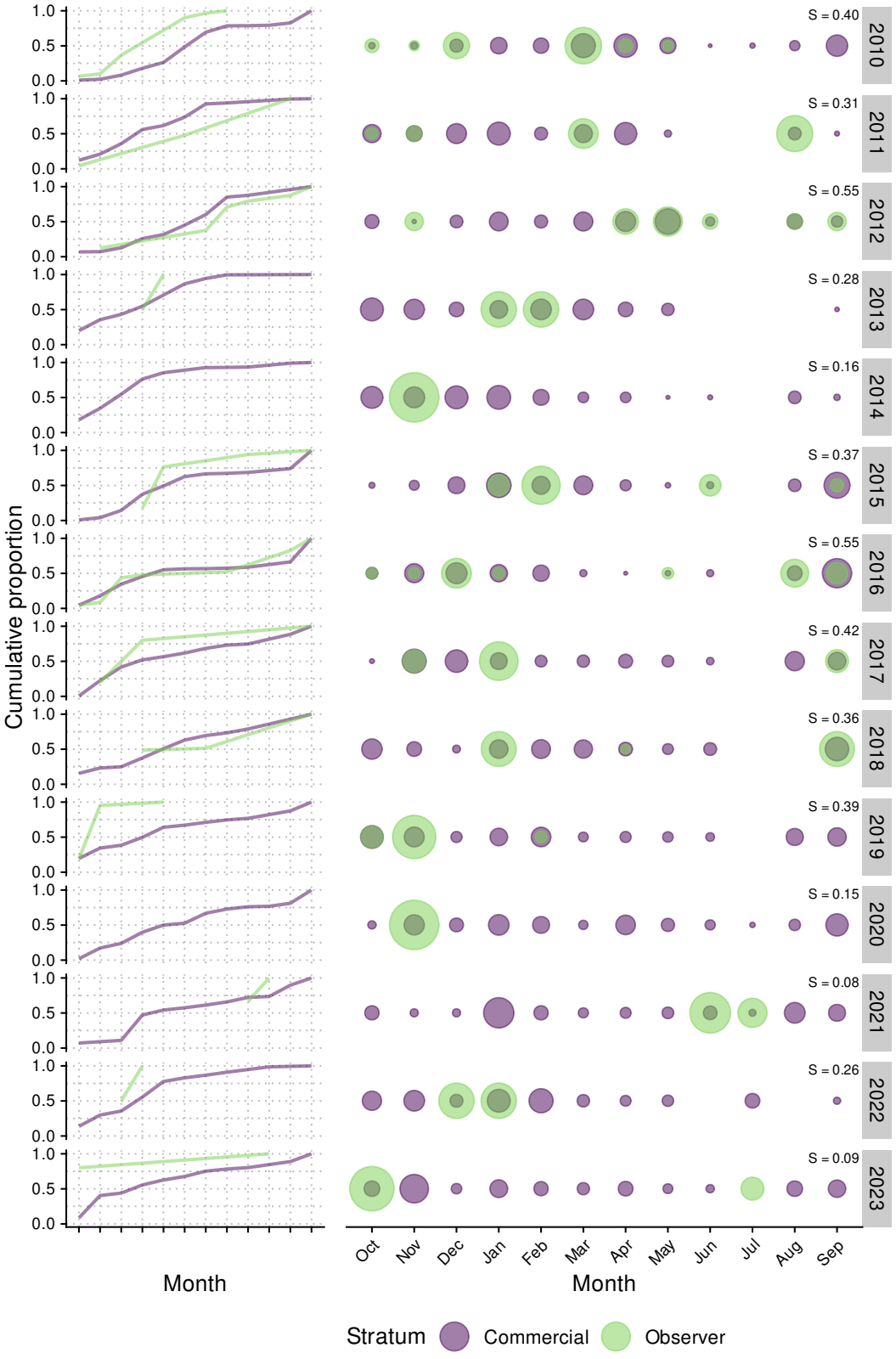


Figure 179: Monthly representativeness of observer sampling coverage of Trawl fishing events in BYX 3, where the alfonsino catch exceeded the 10kg threshold, in 2010 to 2023. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

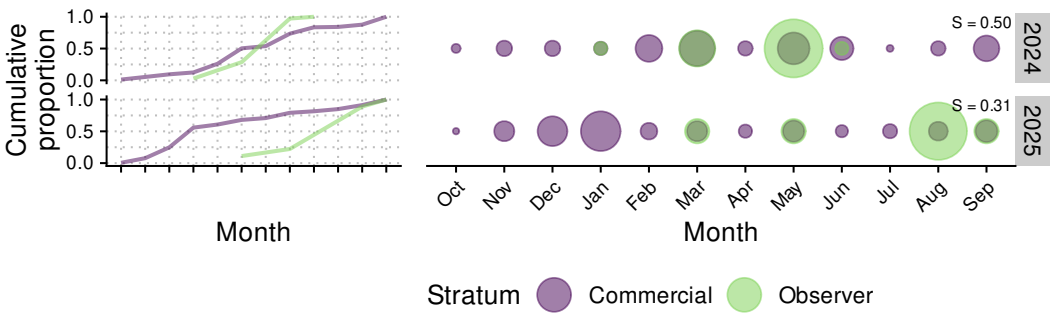


Figure 180: Monthly representativeness of observer sampling coverage of Trawl fishing events in BYX 3, where the alfonsino catch exceeded the 10kg threshold, in 2024 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

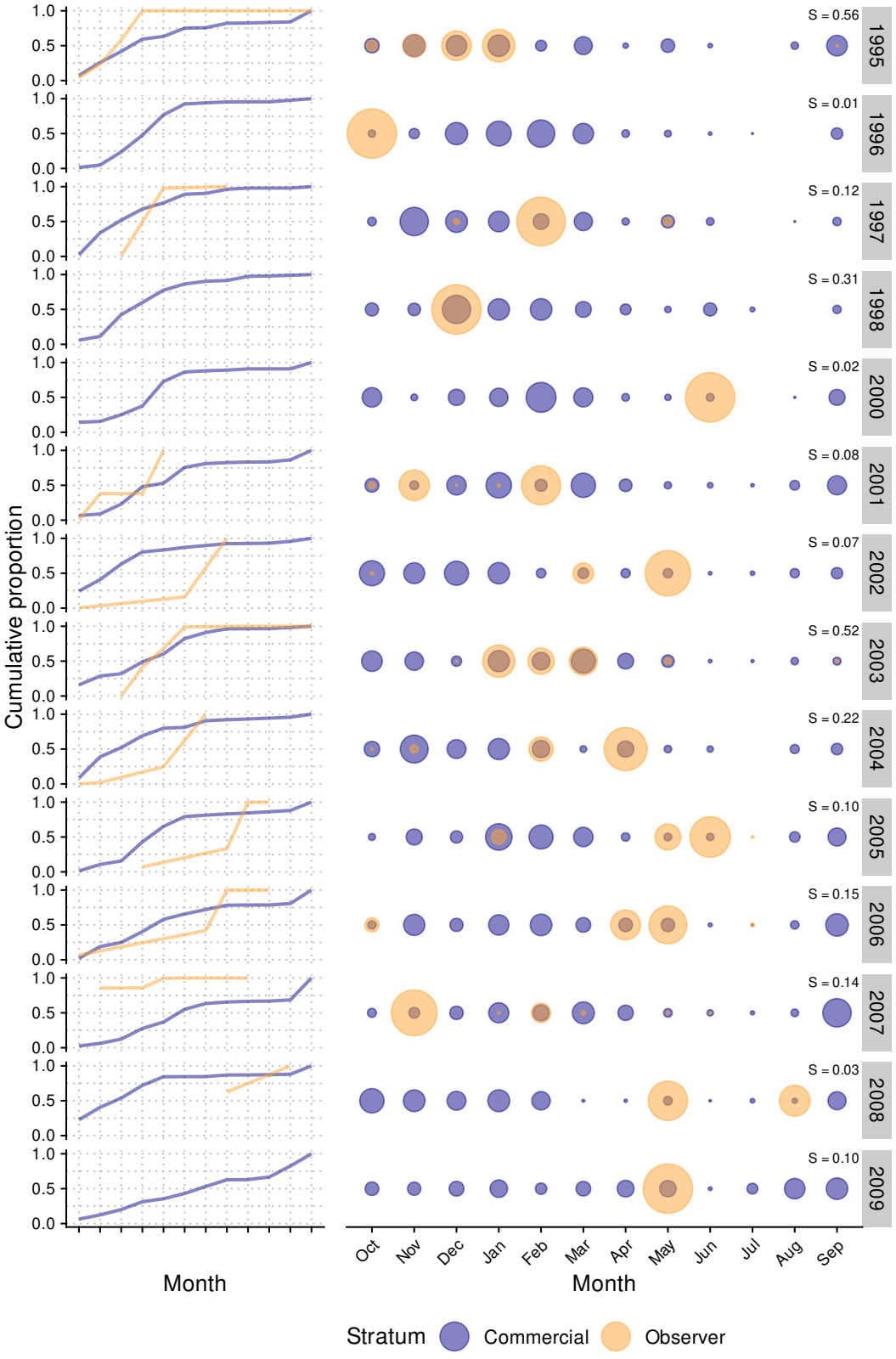


Figure 181: **Monthly representativeness of observer sampling coverage of Trawl catch in BYX 3, from events where the alfonsino catch exceeded the 10kg threshold, in 1995 to 2009. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

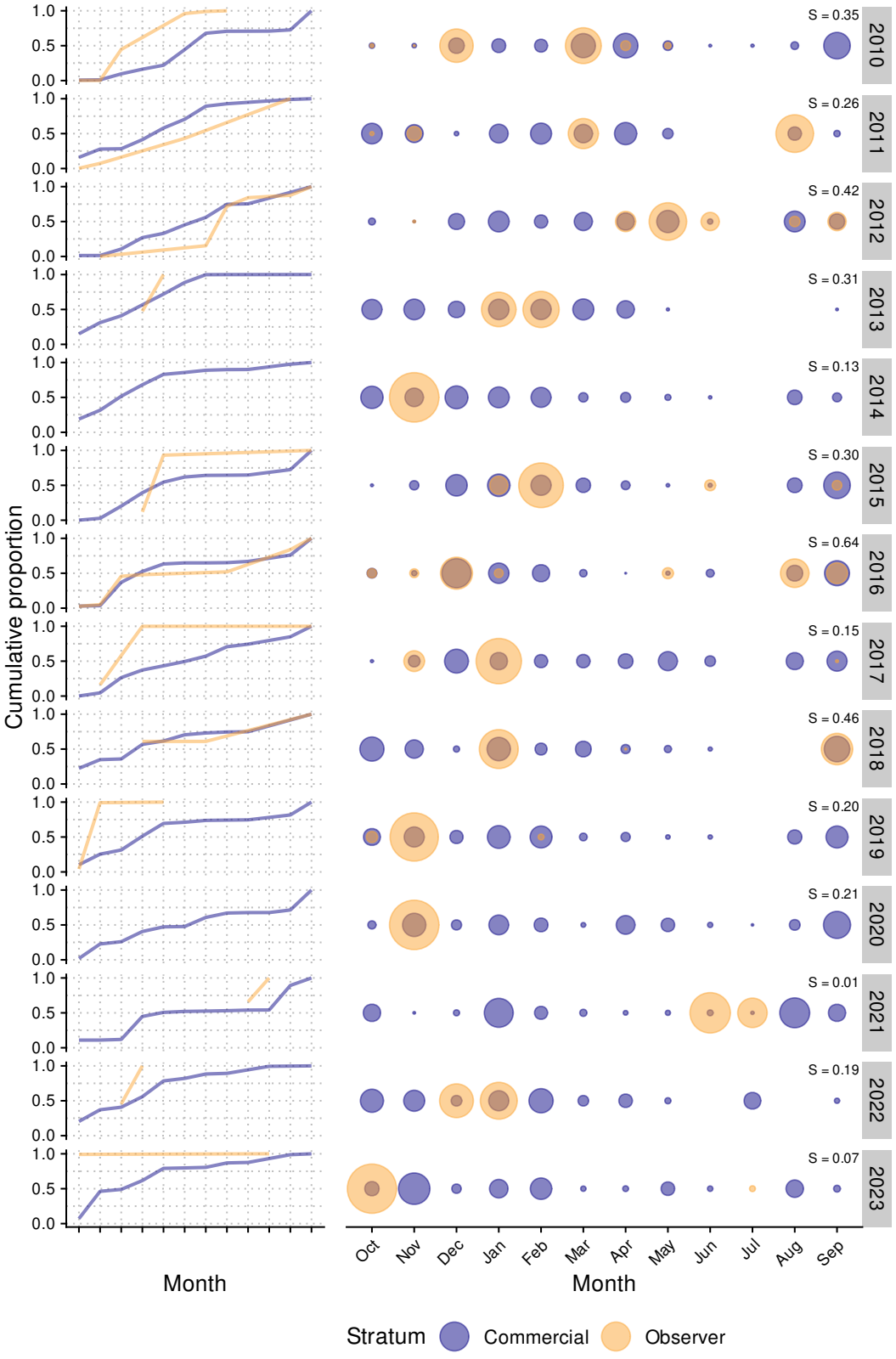


Figure 182: **Monthly representativeness of observer sampling coverage of Trawl catch in BYX 3, from events where the alfonsino catch exceeded the 10kg threshold, in 2010 to 2023. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

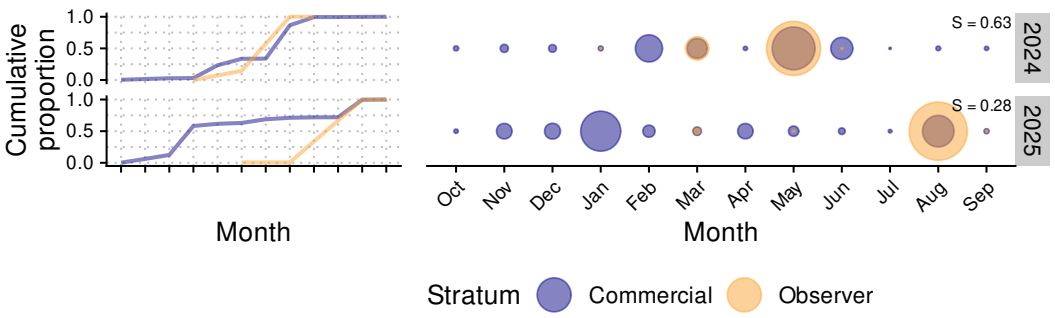


Figure 183: Monthly representativeness of observer sampling coverage of Trawl catch in BYX 3, from events where the alfonsino catch exceeded the 10kg threshold, in 2024 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

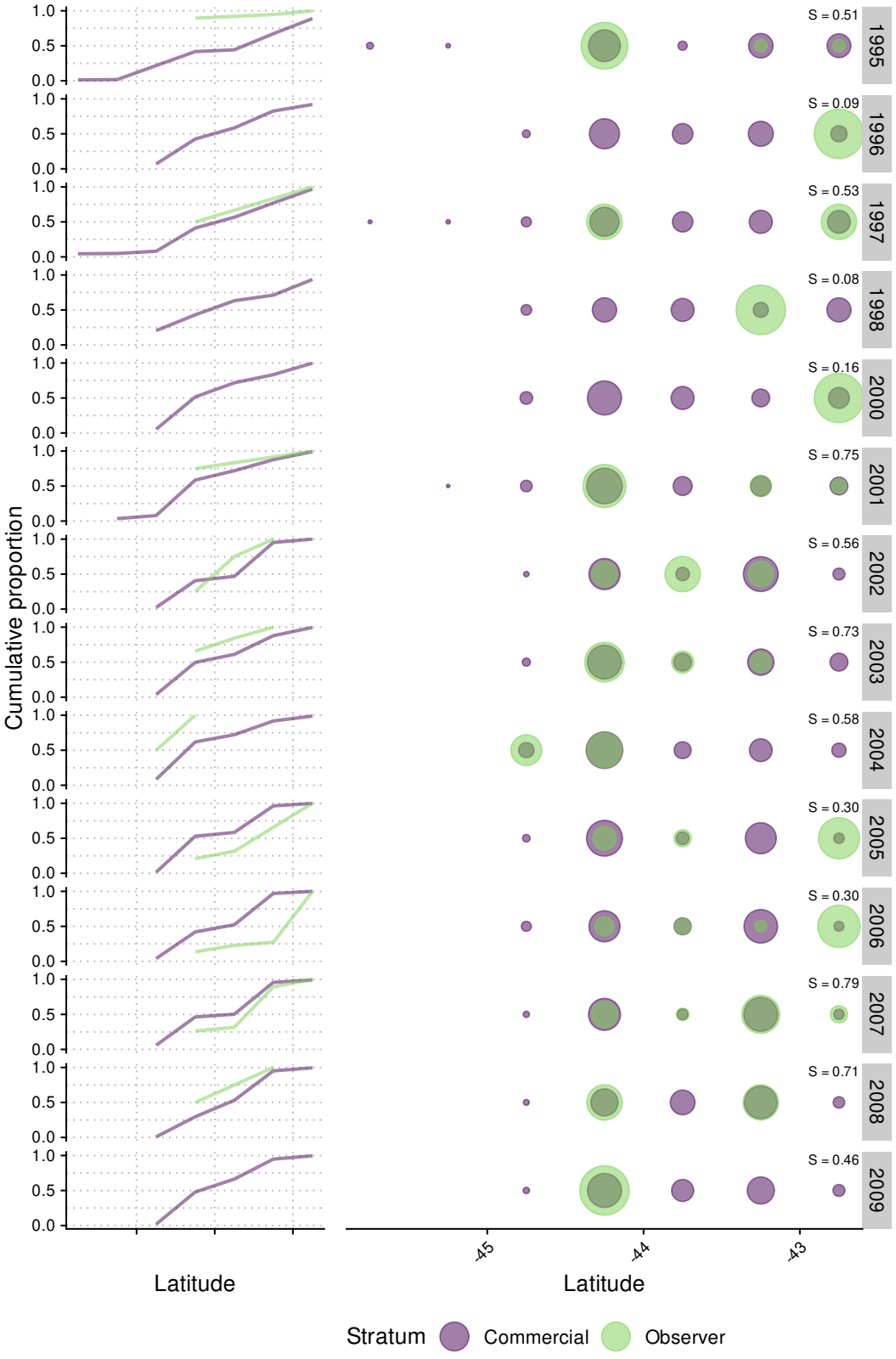


Figure 184: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in BYX 3, where the alfonsino catch exceeded the 10kg threshold, in 1995 to 2009. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

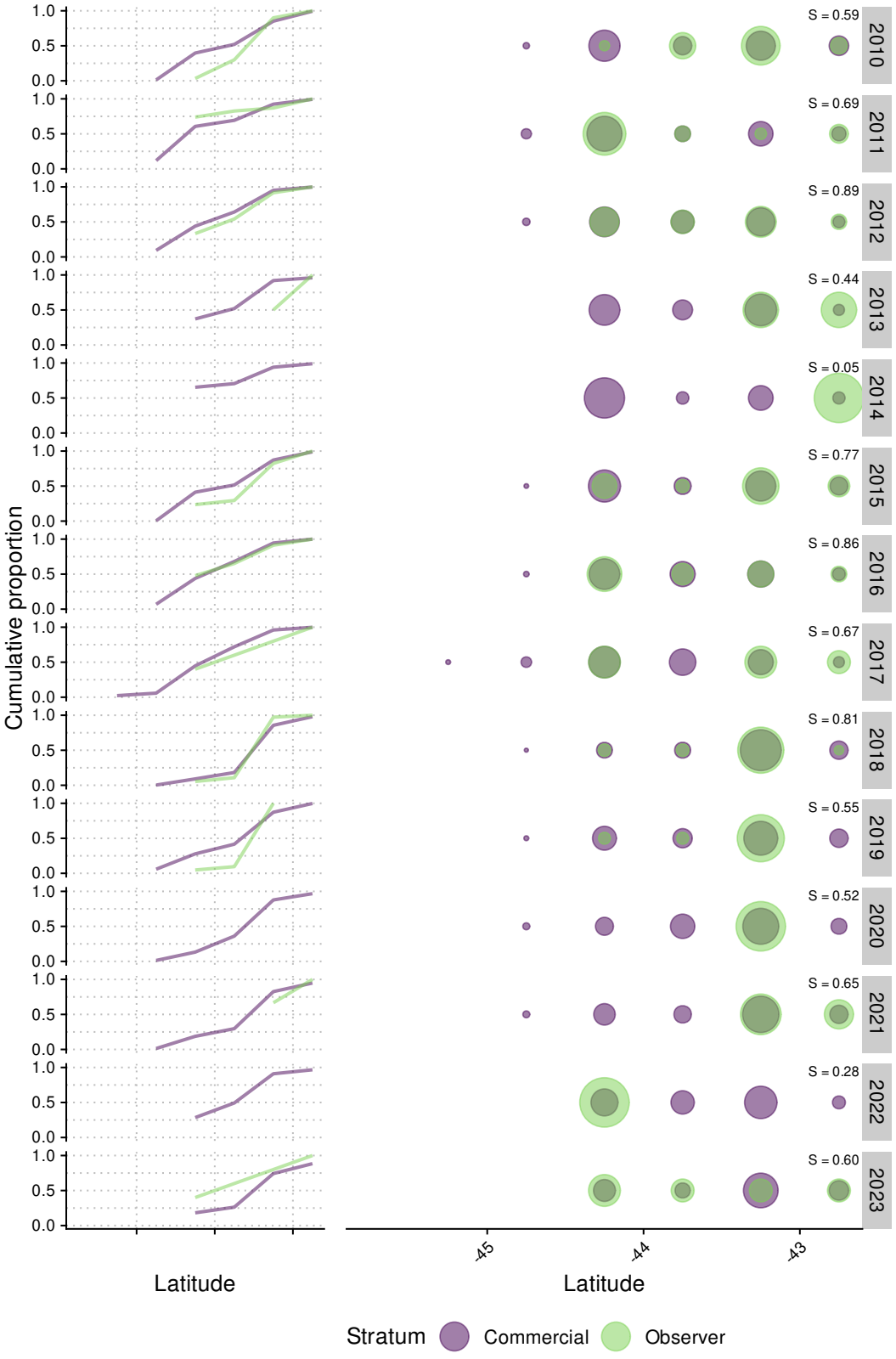


Figure 185: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in BYX 3, where the alfonsino catch exceeded the 10kg threshold, in 2010 to 2023. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

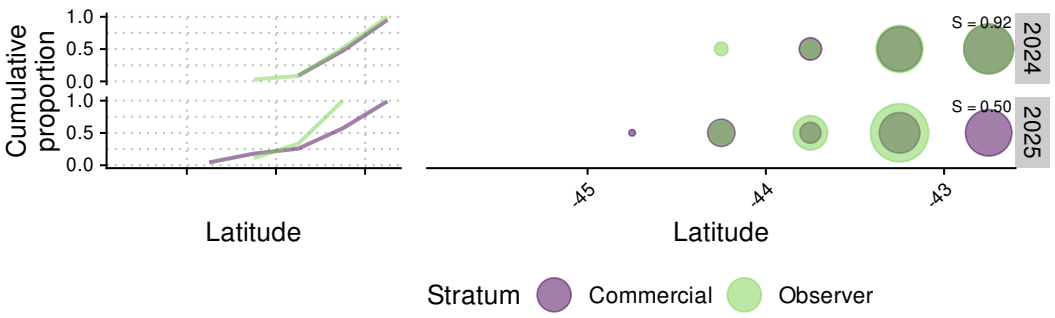


Figure 186: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in BYX 3, where the alfonsino catch exceeded the 10kg threshold, in 2024 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

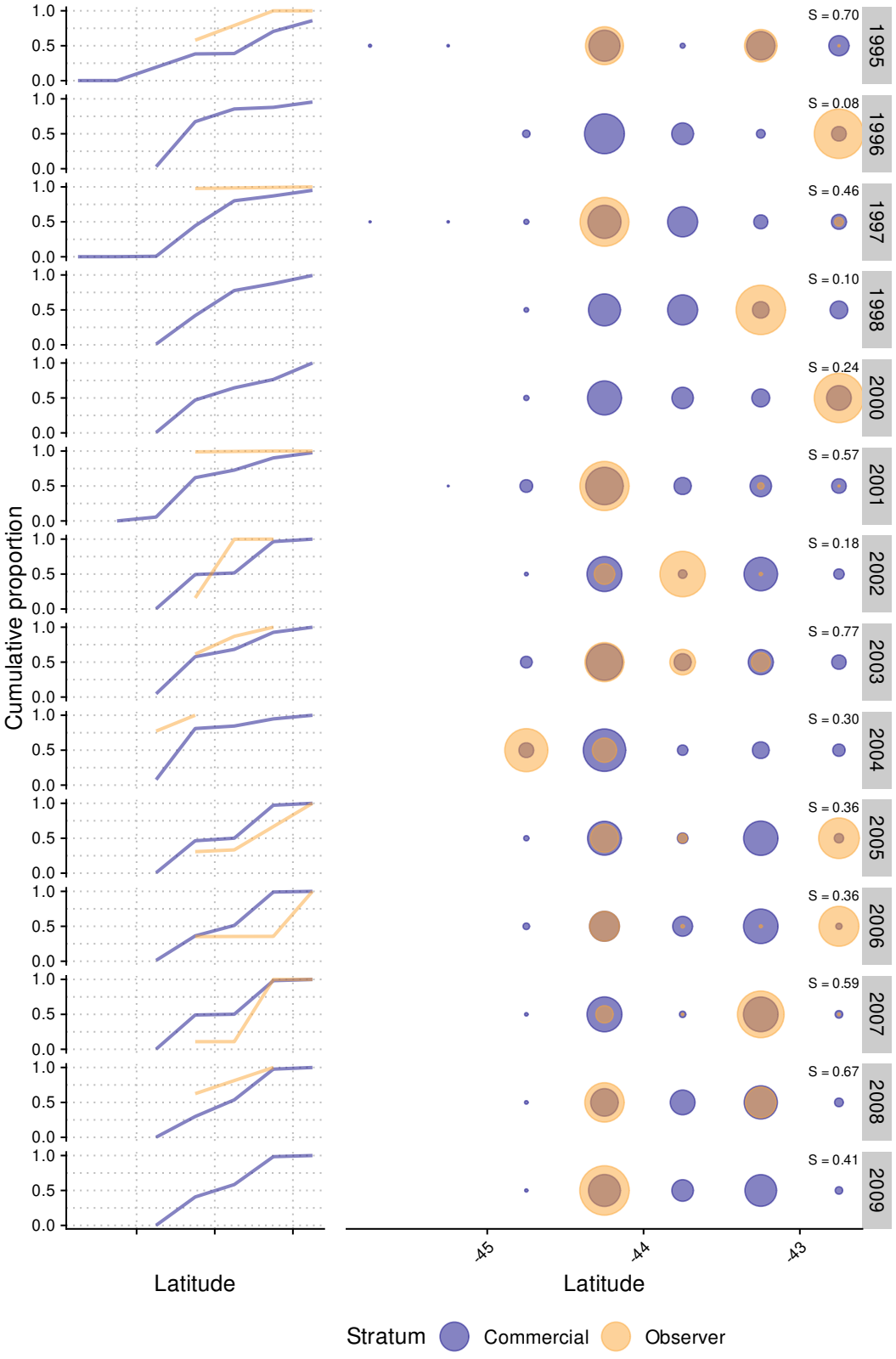


Figure 187: **Latitudinal representativeness of observer sampling coverage of Trawl catch in BYX 3, from events where the alfonsino catch exceeded the 10kg threshold, in 1995 to 2009. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

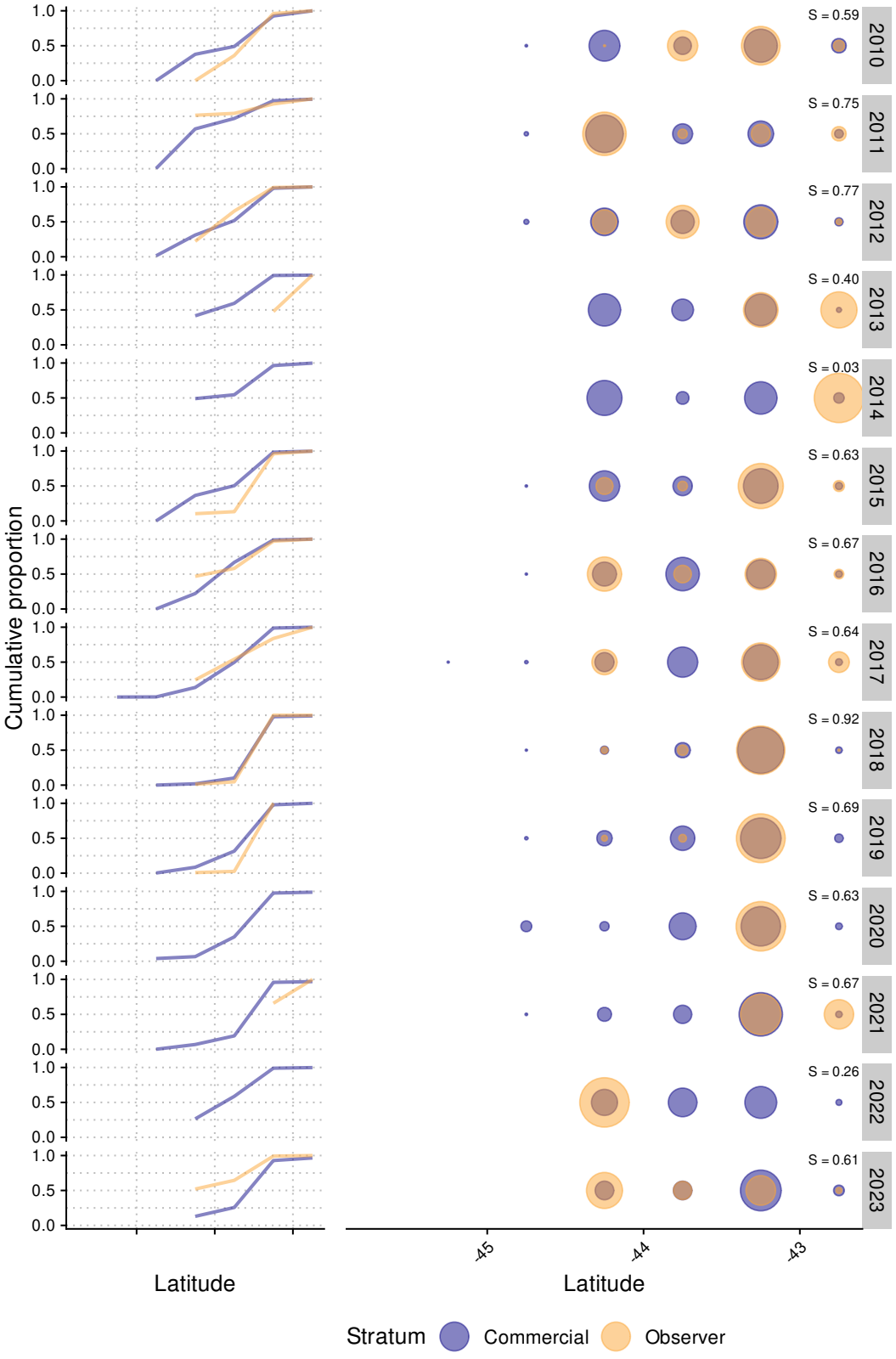


Figure 188: **Latitudinal representativeness of observer sampling coverage of Trawl catch in BYX 3, from events where the alfonsino catch exceeded the 10kg threshold, in 2010 to 2023. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

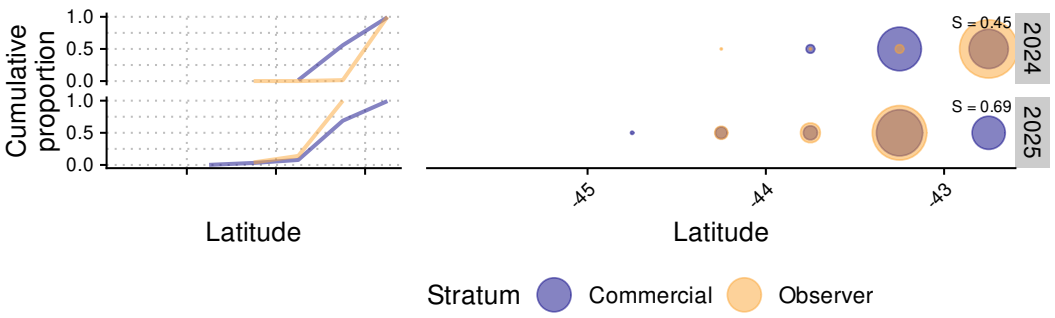


Figure 189: Latitudinal representativeness of observer sampling coverage of Trawl catch in BYX 3, from events where the alfonsino catch exceeded the 10kg threshold, in 2024 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

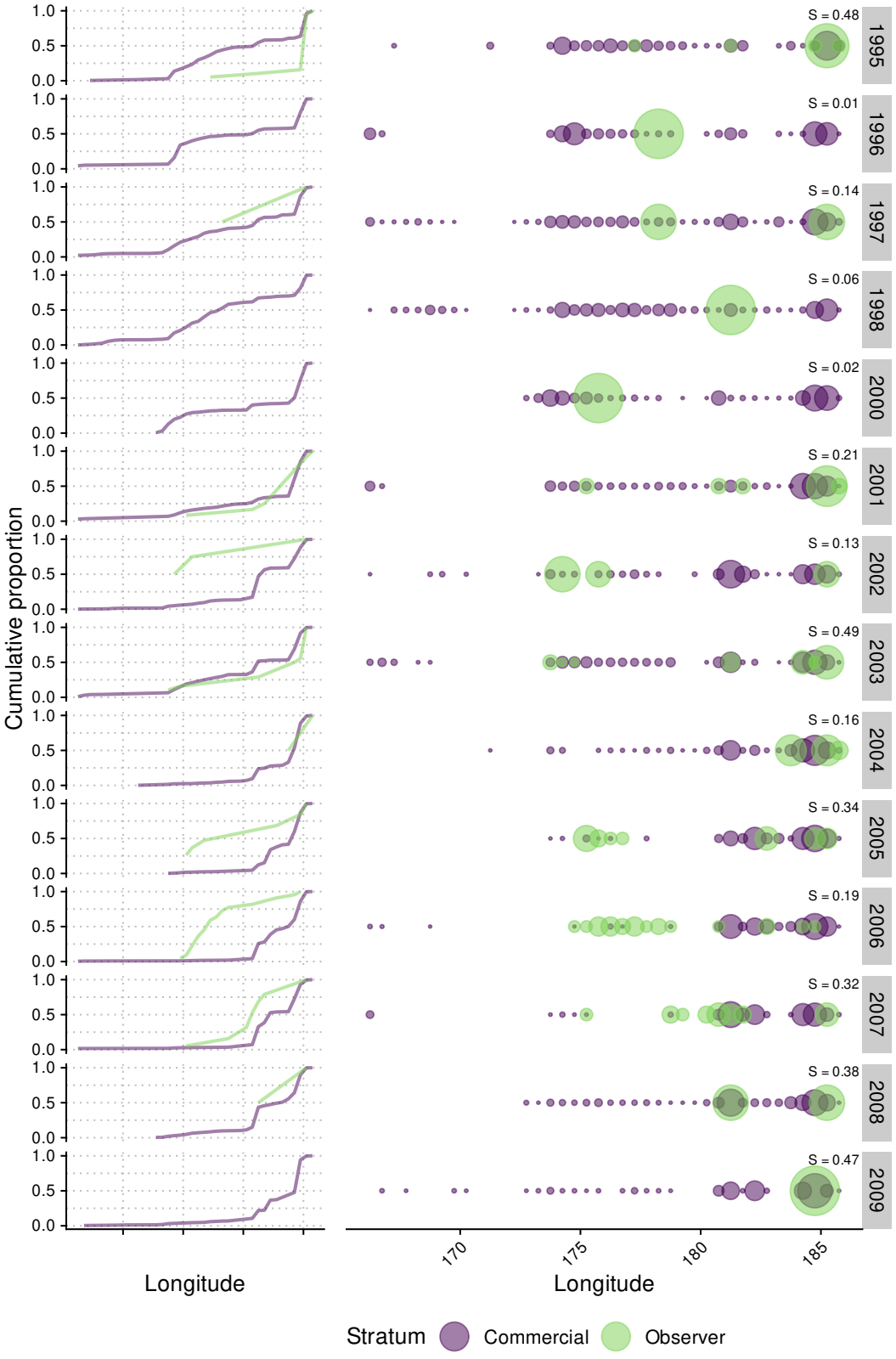


Figure 190: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in BYX 3, where the alfonsino catch exceeded the 10kg threshold, in 1995 to 2009. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

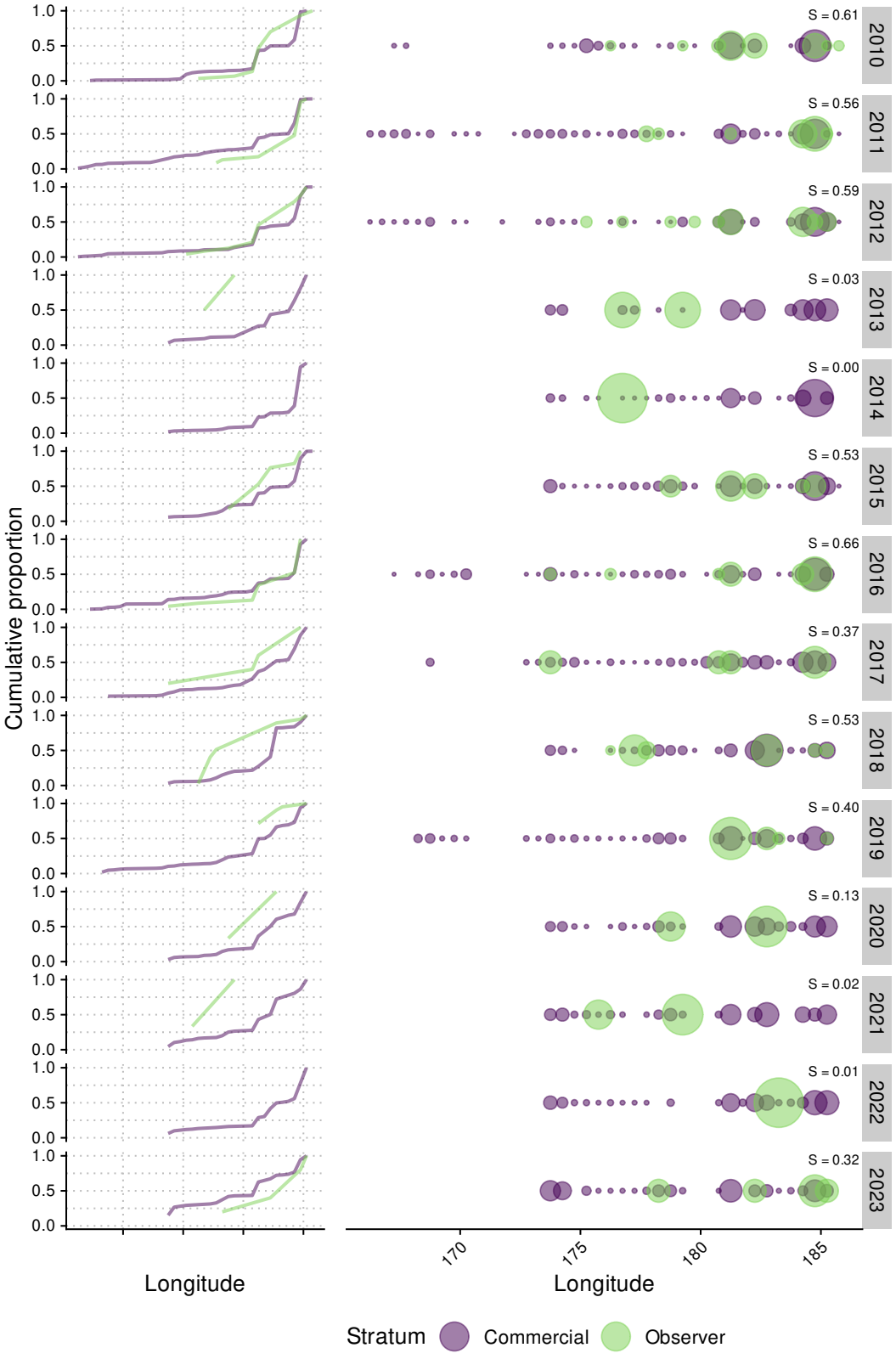


Figure 191: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in BYX 3, where the alfonsino catch exceeded the 10kg threshold, in 2010 to 2023. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

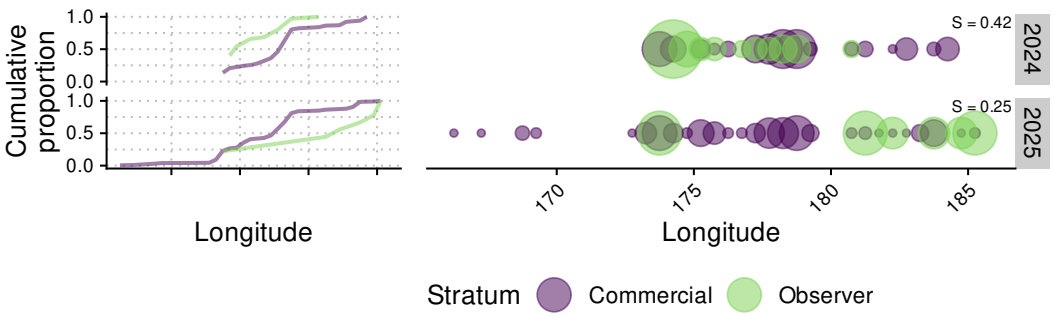


Figure 192: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in BYX 3, where the alfonsino catch exceeded the 10kg threshold, in 2024 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

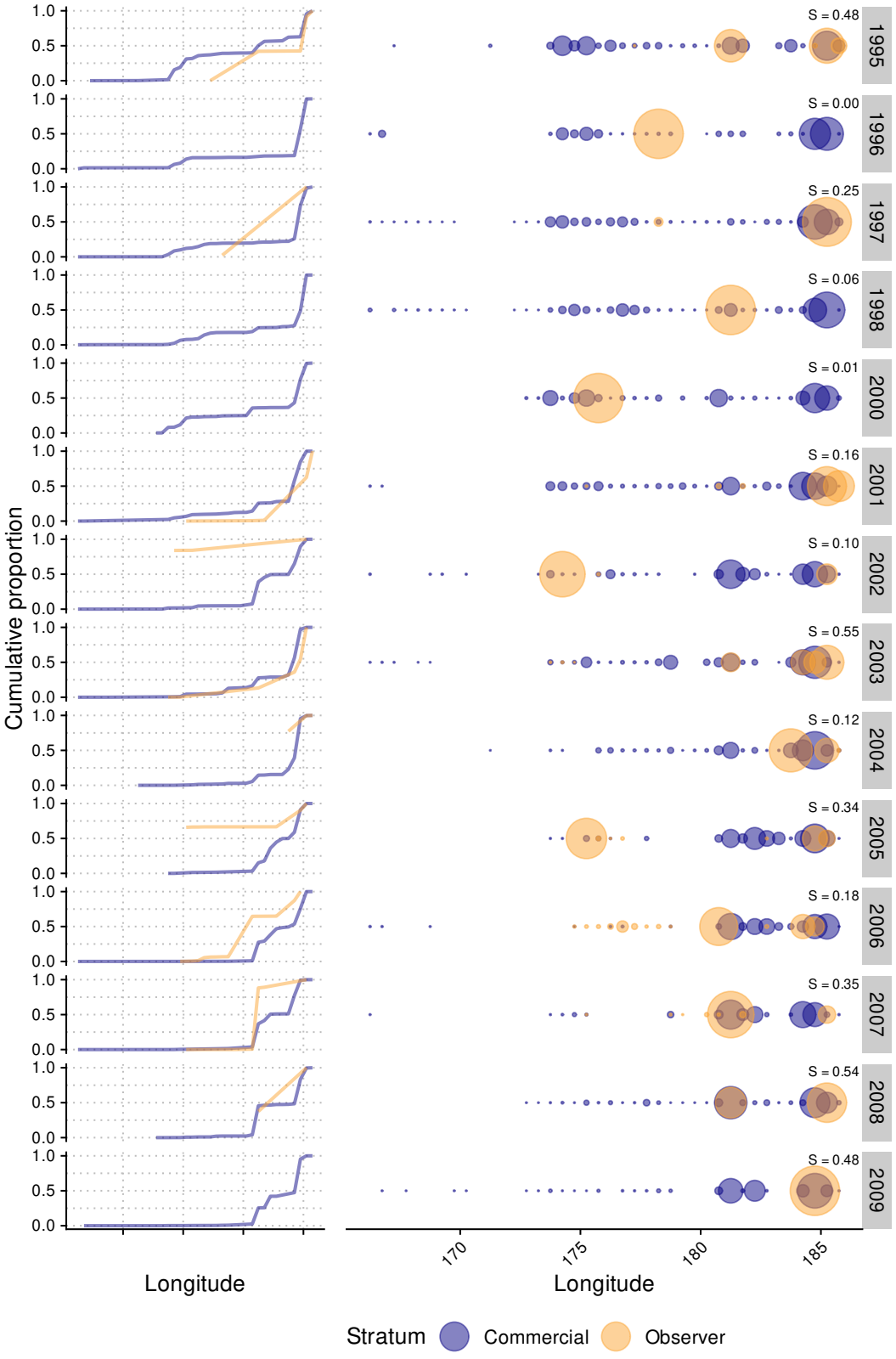


Figure 193: **Longitudinal representativeness of observer sampling coverage of Trawl catch in BYX 3, from events where the alfonsino catch exceeded the 10kg threshold, in 1995 to 2009. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

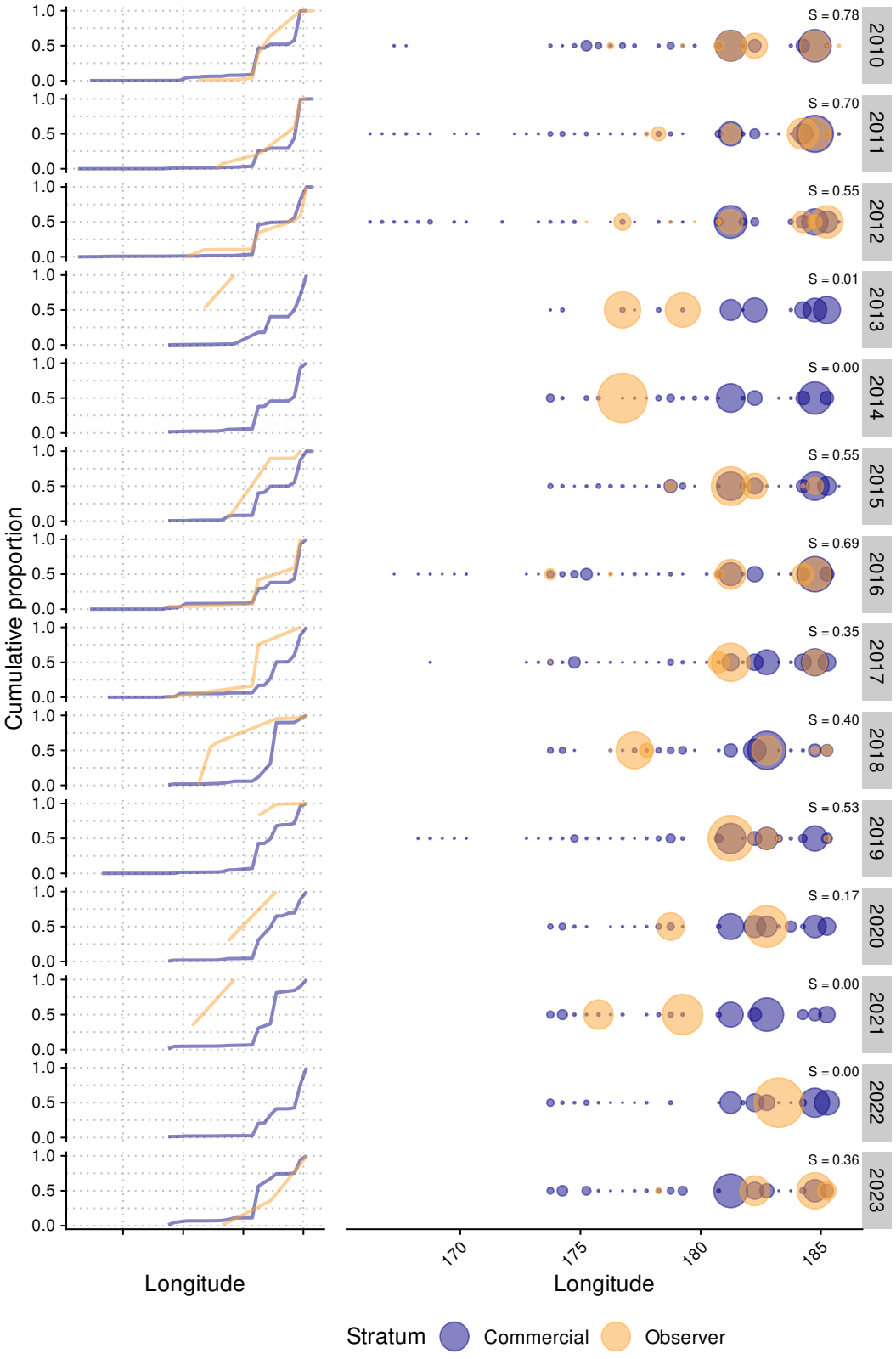


Figure 194: **Longitudinal representativeness of observer sampling coverage of Trawl catch in BYX 3, from events where the alfonsino catch exceeded the 10kg threshold, in 2010 to 2023. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

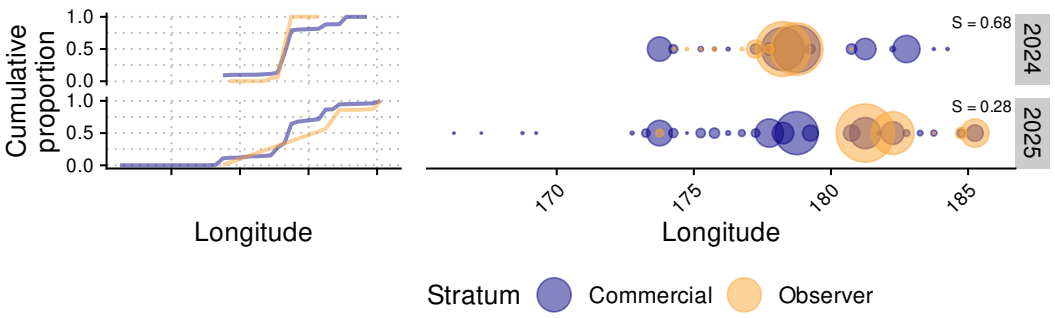


Figure 195: **Longitudinal representativeness of observer sampling coverage of Trawl catch in BYX 3, from events where the alfonsino catch exceeded the 10kg threshold, in 2024 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

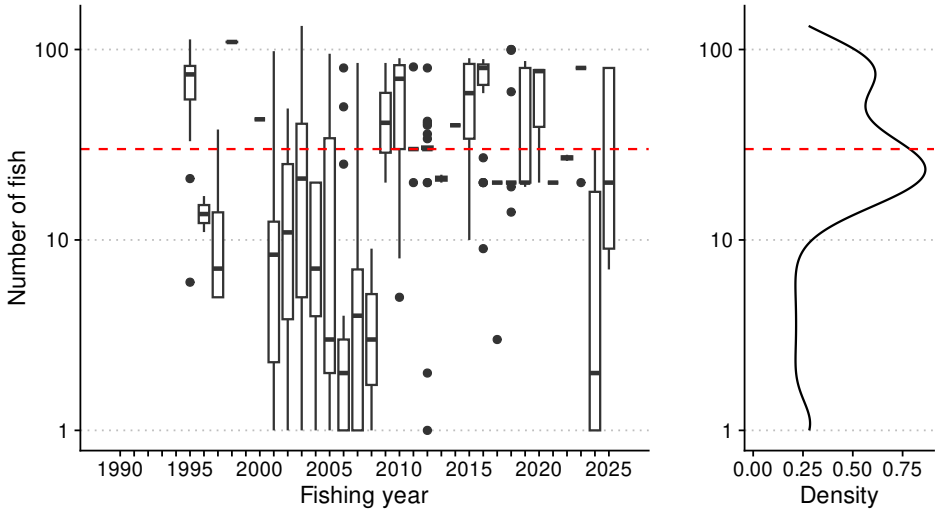


Figure 196: **Length-frequency sample sizes for observed fishing events in BYX 3 where alfonsino were sampled. The red dashed line indicates a sample size of 30 fish.**

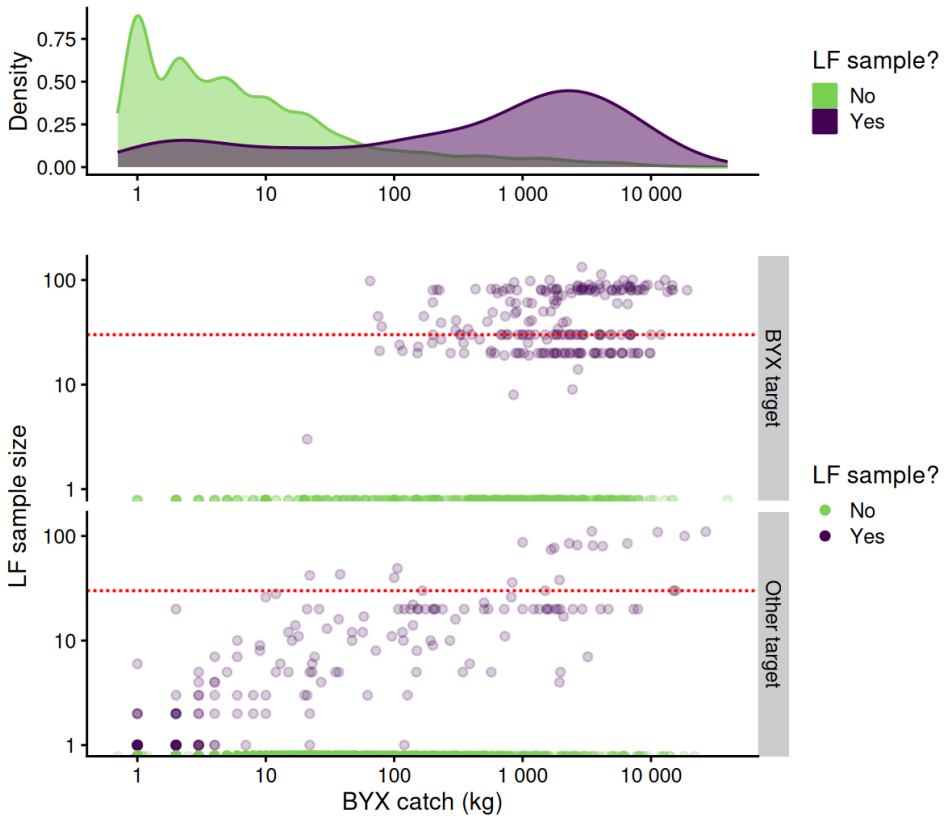


Figure 197: **Length-frequency sample sizes (number of fish sampled) for observed fishing events in BYX 3 in relation to the total alfonsino catch from an event, separately for alfonsino target events and other target species. The red dashed line indicates a sample size of 30 fish.**

2.3.2.2 Otolith samples

Table 18: Otolith samples of alfonsino from the BYX 3 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of alfonsino exceeded a potential sampling threshold of 10 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	41	0	0	0.00
1991	55	0	0	0.00
1992	91	0	0	0.00
1993	124	0	0	0.00
1994	222	0	0	0.00
1995	259	0	0	0.00
1996	315	0	0	0.00
1997	459	0	0	0.00
1998	510	0	0	0.00
1999	752	0	0	0.00
2000	548	0	0	0.00
2001	546	0	0	0.00
2002	524	0	0	0.00
2003	688	0	0	0.00
2004	552	0	0	0.00
2005	664	0	0	0.00
2006	692	0	0	0.00
2007	493	0	0	0.00
2008	452	0	0	0.00
2009	477	2	10	0.42
2010	479	3	16	0.63
2011	438	23	327	5.25
2012	515	13	161	2.52
2013	241	2	11	0.83
2014	384	1	10	0.26
2015	392	0	0	0.00
2016	355	2	10	0.56
2017	411	2	8	0.49
2018	341	2	7	0.59
2019	349	21	110	6.02
2020	302	3	25	0.99
2021	155	3	15	1.94
2022	211	2	10	0.95
2023	198	5	25	2.53
2024	158	30	126	18.99
2025	158	8	123	5.06

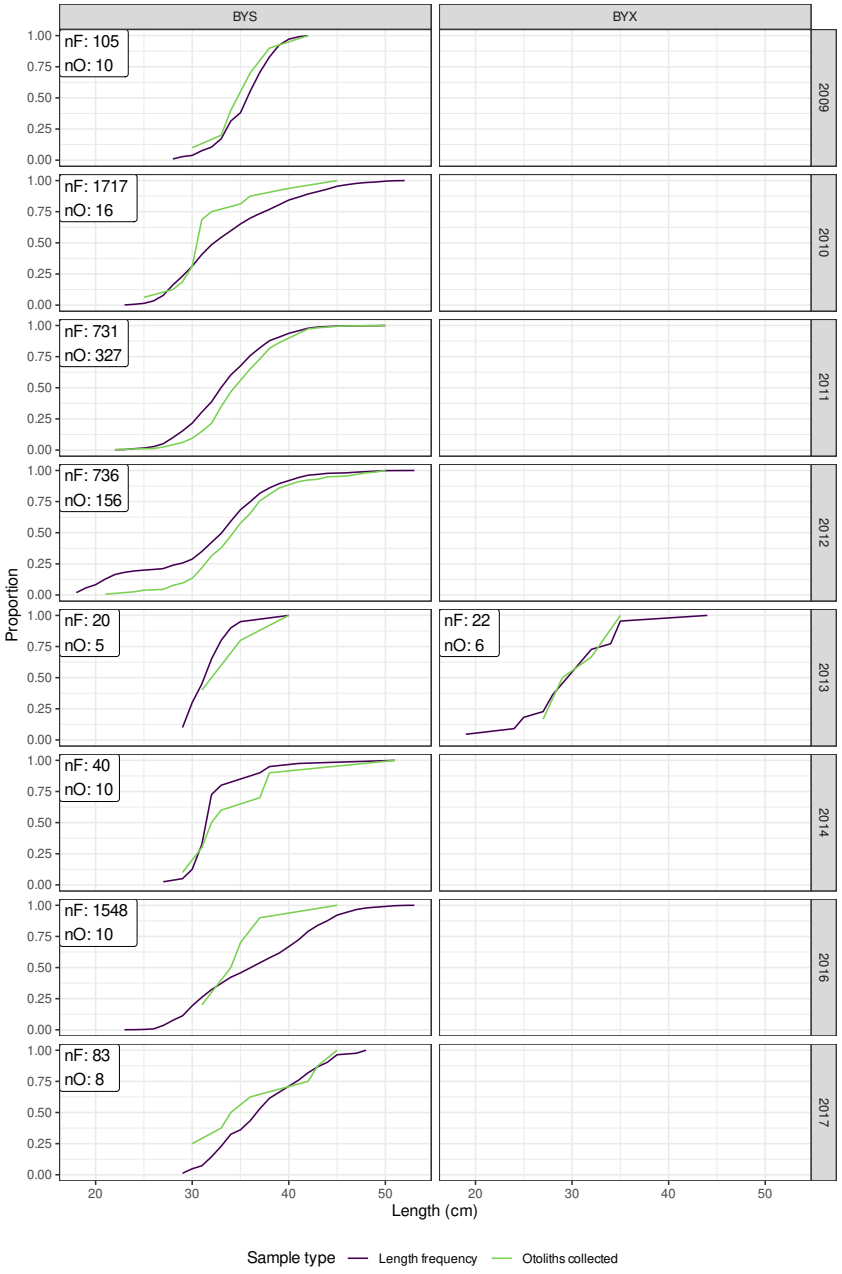


Figure 198: Cumulative distributions of the length of fish in the length frequency and otolith samples of alfonsino in the BYX 3 Trawl fishery for the 2009 to 2017 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

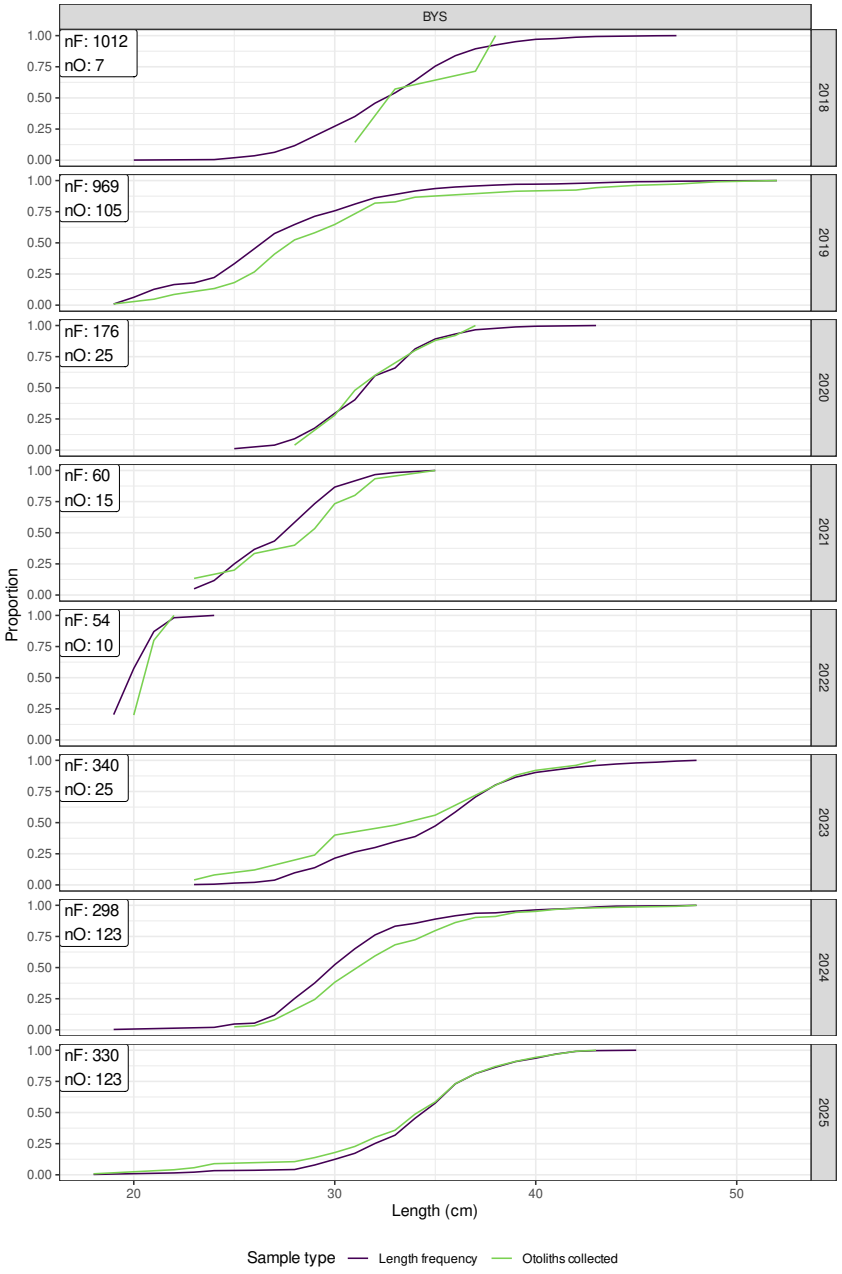


Figure 199: Cumulative distributions of the length of fish in the length frequency and otolith samples of alfonsino in the BYX 3 Trawl fishery for the 2018 to 2025 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

2.3.2.3 Catch quantification

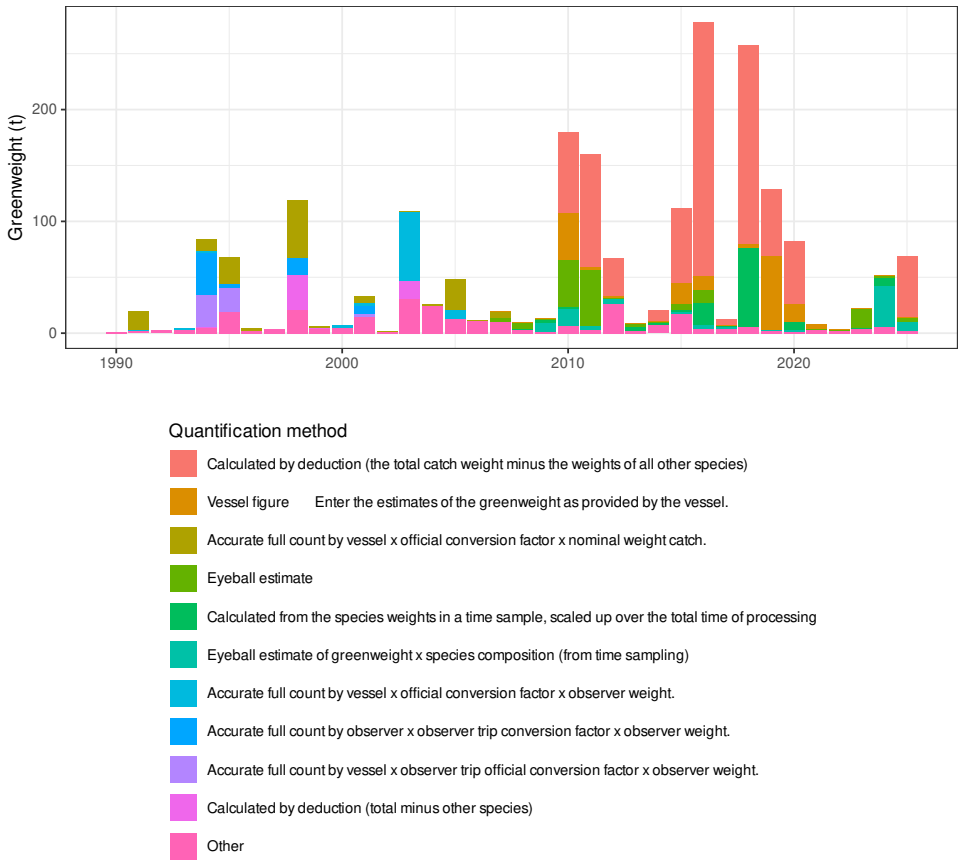


Figure 200: Methods used by observers to quantify the catch of alfonsino in the BYX 3 Trawl fishery. The legend lists the methods used in descending order of total catch.

2.4 CDL stocks

Observer sampling of cardinal fish is considered with respect to the cardinal fish Quota Management Areas.

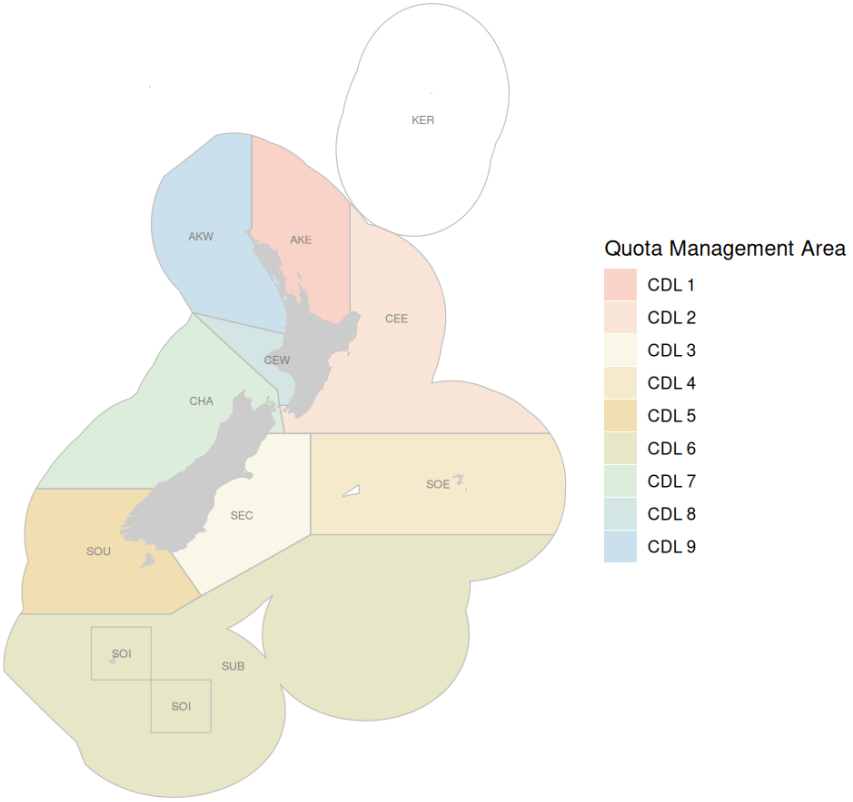


Figure 201: Observer Fisheries Management Areas (black borders, labels on plot) in relation to the Quota Management Area for cardinal fish (coloured areas, per legend).

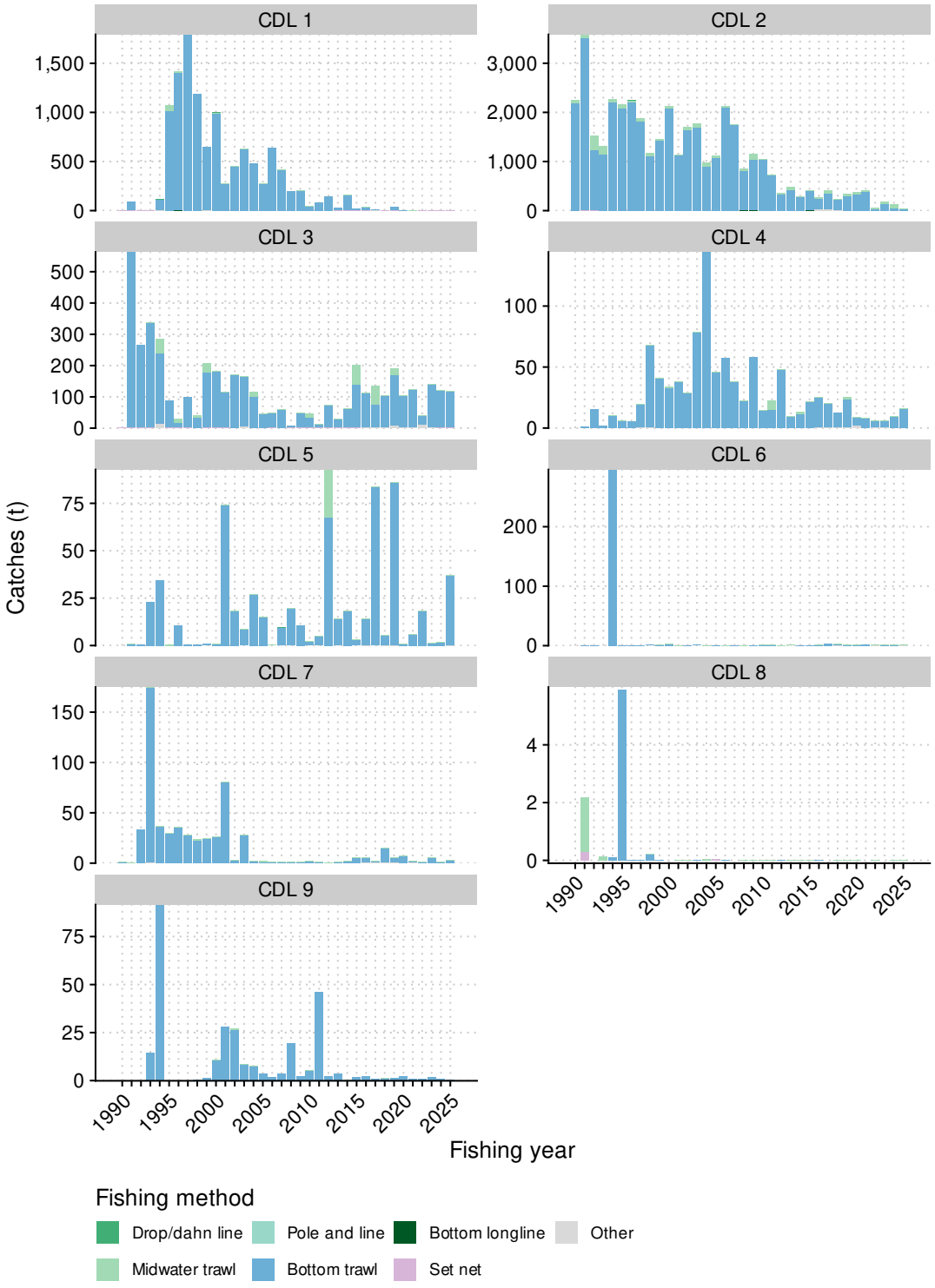


Figure 202: Catches of cardinal fish by fishing method, for events within the cardinal fish Quota Management Areas. Methods grouped as Other include: DV, H, HL, PRB, PRM, PSH, RLP, SCN, SLL, T, TL.

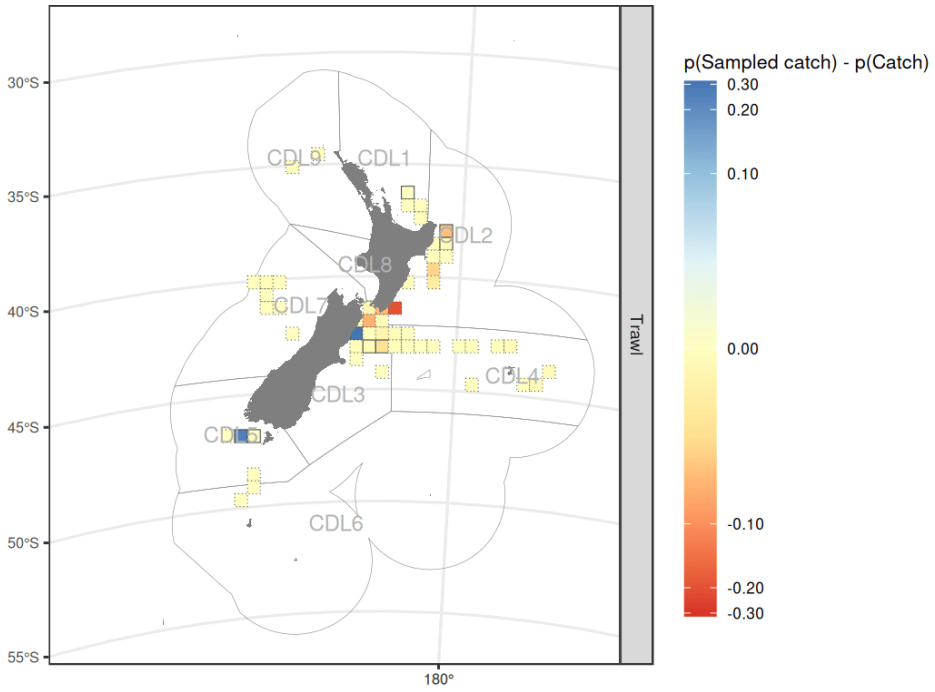


Figure 203: Differences in the relative proportions of catch and sampled catch for cardinal fish during 2021–2025. Cells with a dotted border had no sampling.

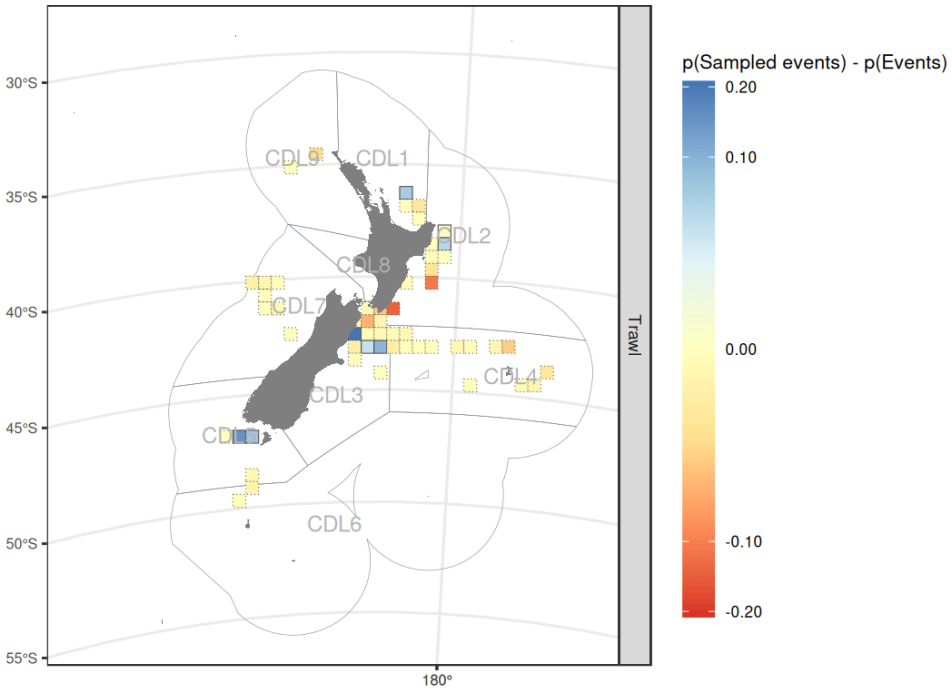


Figure 204: Differences in the relative proportions of events meeting the sampling threshold and sampled events for cardinal fish during 2021–2025. Cells with a dotted border had no sampling.

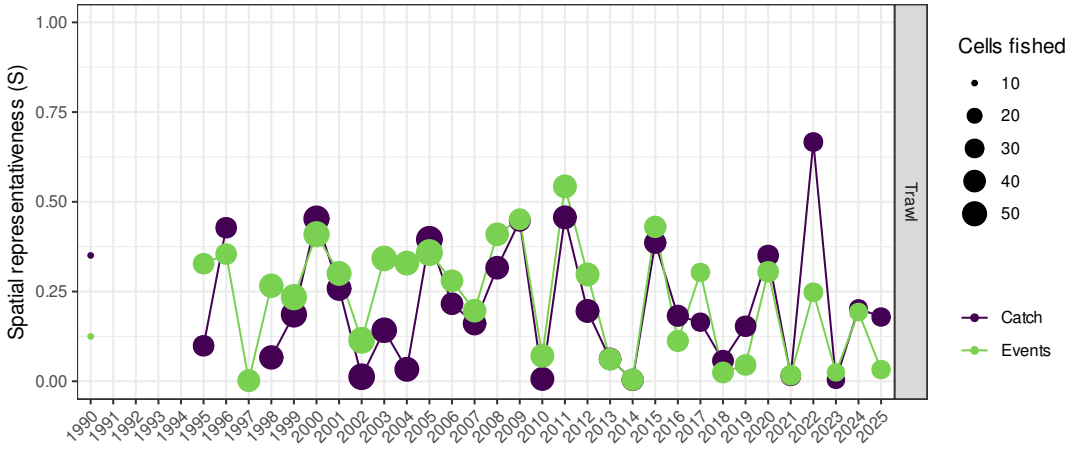


Figure 205: Spatial representativeness of observer sampling of cardinal fish by fishing year. Representativeness is assessed using the Manhattan distance metric (*S*) applied to 64 km grid cells, for both the proportion of catch sampled and the proportion of positive events sampled.

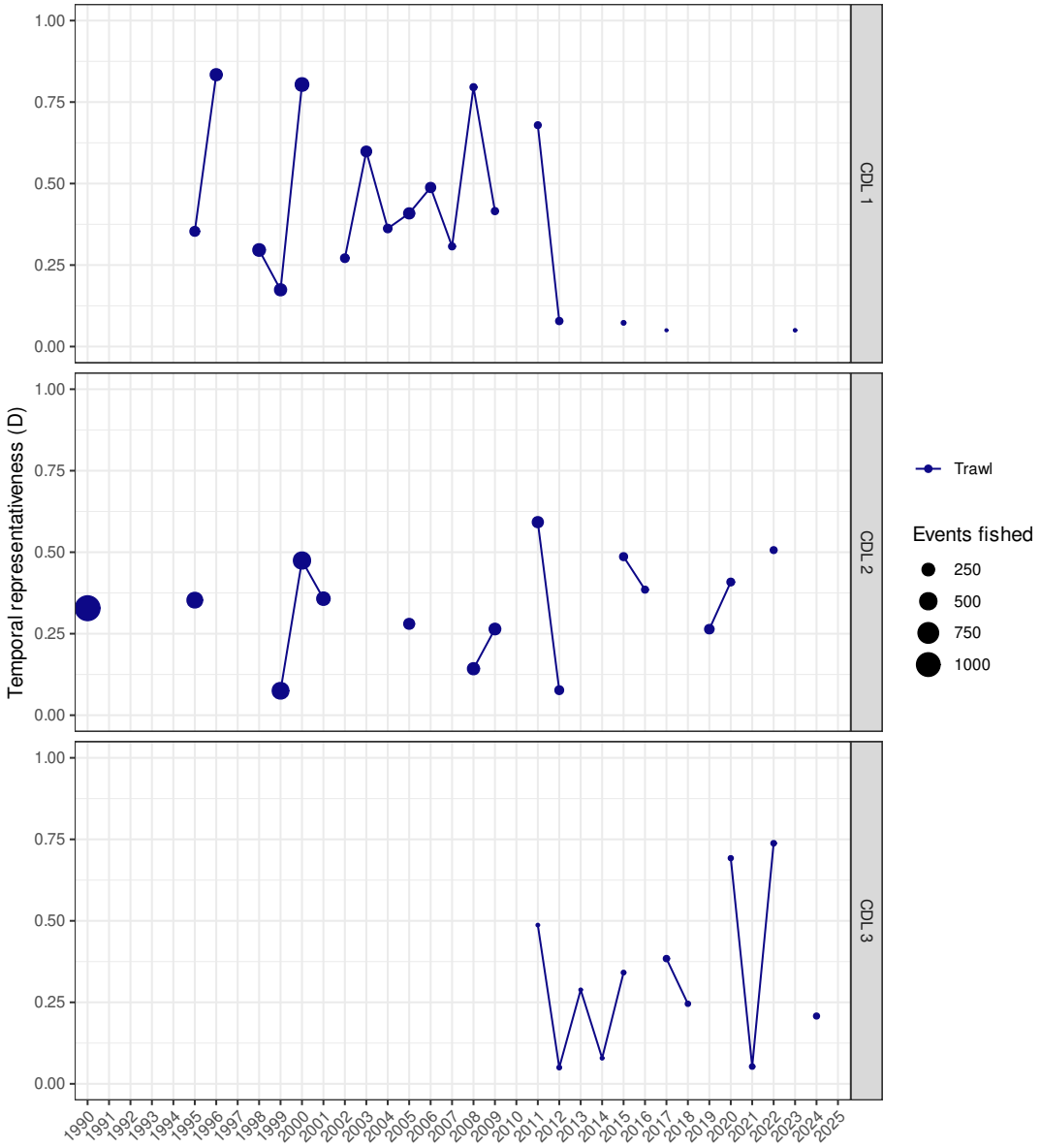


Figure 206: Temporal representativeness of observer sanpling of cardinal fish by fishing year and area. Temporal representativeness is assessed using the KS statistic (*D*) applied to the start date-times of all fishing events and all sampled fishing events, weighted by catch weight.

2.4.1 CDL 1: Trawl fishery

2.4.1.1 Length-frequency samples

Table 19: Length-frequency samples of cardinal fish from the CDL 1 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of cardinal fish exceeded a potential sampling threshold of 30 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	5	0	0	0.00
1991	71	0	0	0.00
1992	4	0	0	0.00
1993	7	0	0	0.00
1994	17	0	0	0.00
1995	141	2	153	1.42
1996	204	8	447	3.92
1997	227	0	0	0.00
1998	242	3	261	1.24
1999	212	8	556	3.77
2000	298	90	1 809	30.20
2001	94	0	0	0.00
2002	103	2	27	1.94
2003	171	27	649	15.79
2004	100	13	99	13.00
2005	163	6	141	3.68
2006	147	19	284	12.93
2007	62	7	314	11.29
2008	62	21	588	33.87
2009	65	9	413	13.85
2010	55	0	0	0.00
2011	58	3	159	5.17
2012	67	2	20	2.99
2013	32	0	0	0.00
2014	51	0	0	0.00
2015	21	1	20	4.76
2016	40	0	0	0.00
2017	4	1	100	25.00
2018	10	0	0	0.00
2019	5	0	0	0.00
2020	20	0	0	0.00
2021	8	0	0	0.00
2022	4	0	0	0.00
2023	8	1	20	12.50
2025	2	0	0	0.00

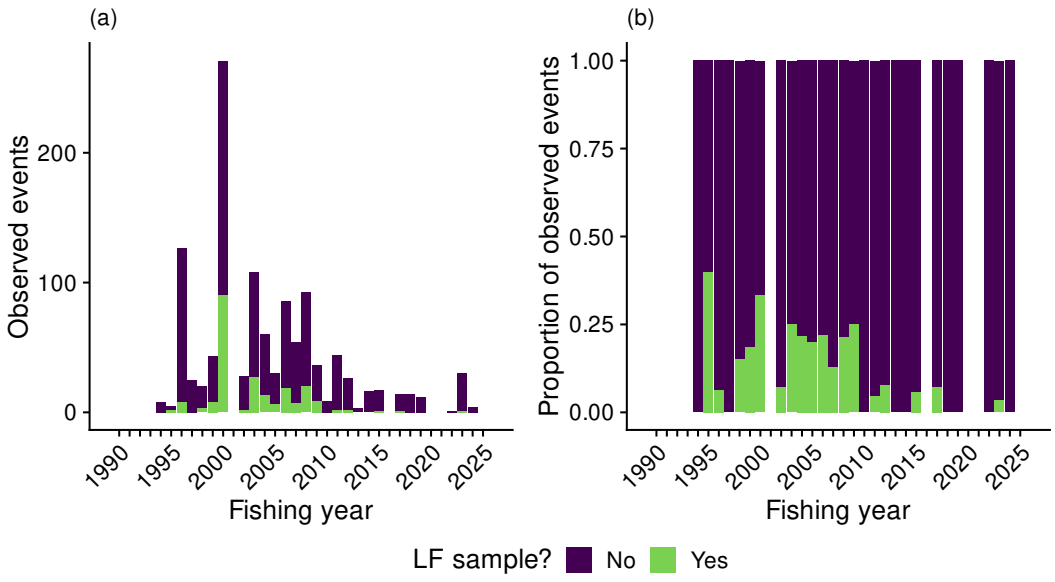


Figure 207: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in CDL 1 where the cardinal fish catch exceeded the 30 kg threshold, with and without length-frequency sampling.**

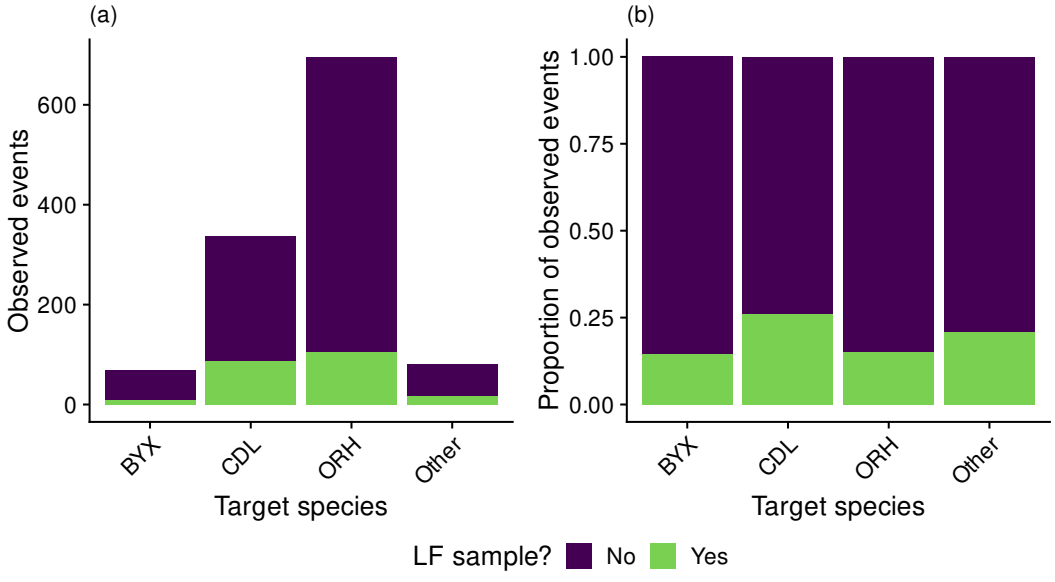


Figure 208: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in CDL 1 where the cardinal fish catch exceeded the 30 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

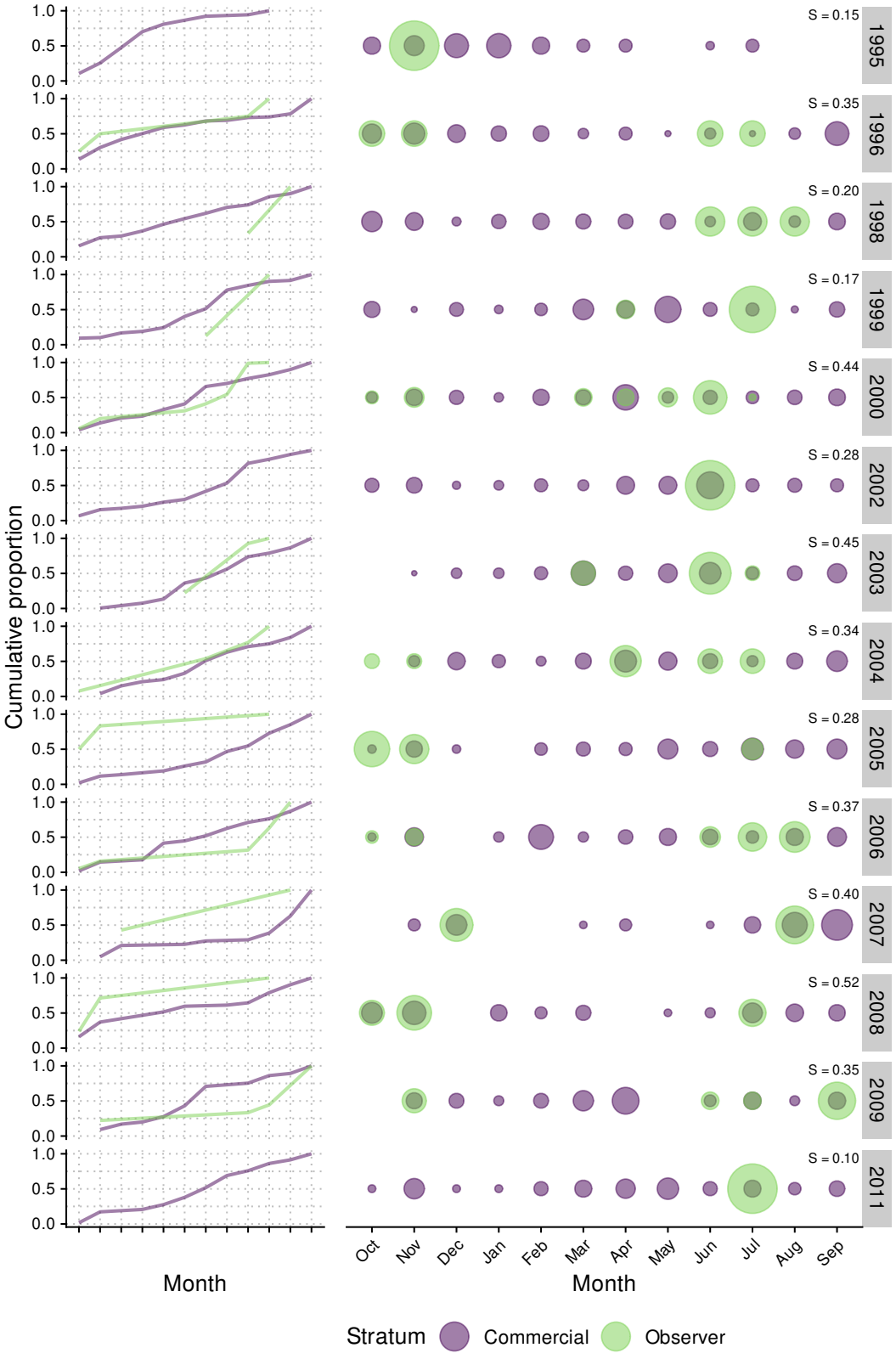


Figure 209: Monthly representativeness of observer sampling coverage of Trawl fishing events in CDL 1, where the cardinal fish catch exceeded the 30kg threshold, in 1995 to 2011. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

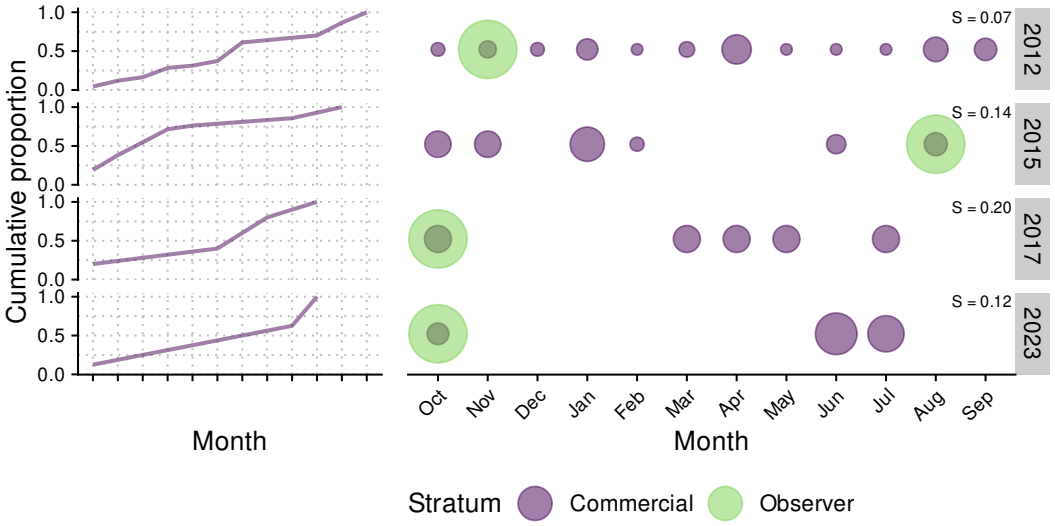


Figure 210: Monthly representativeness of observer sampling coverage of Trawl fishing events in CDL 1, where the cardinal fish catch exceeded the 30kg threshold, in 2012 to 2023. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

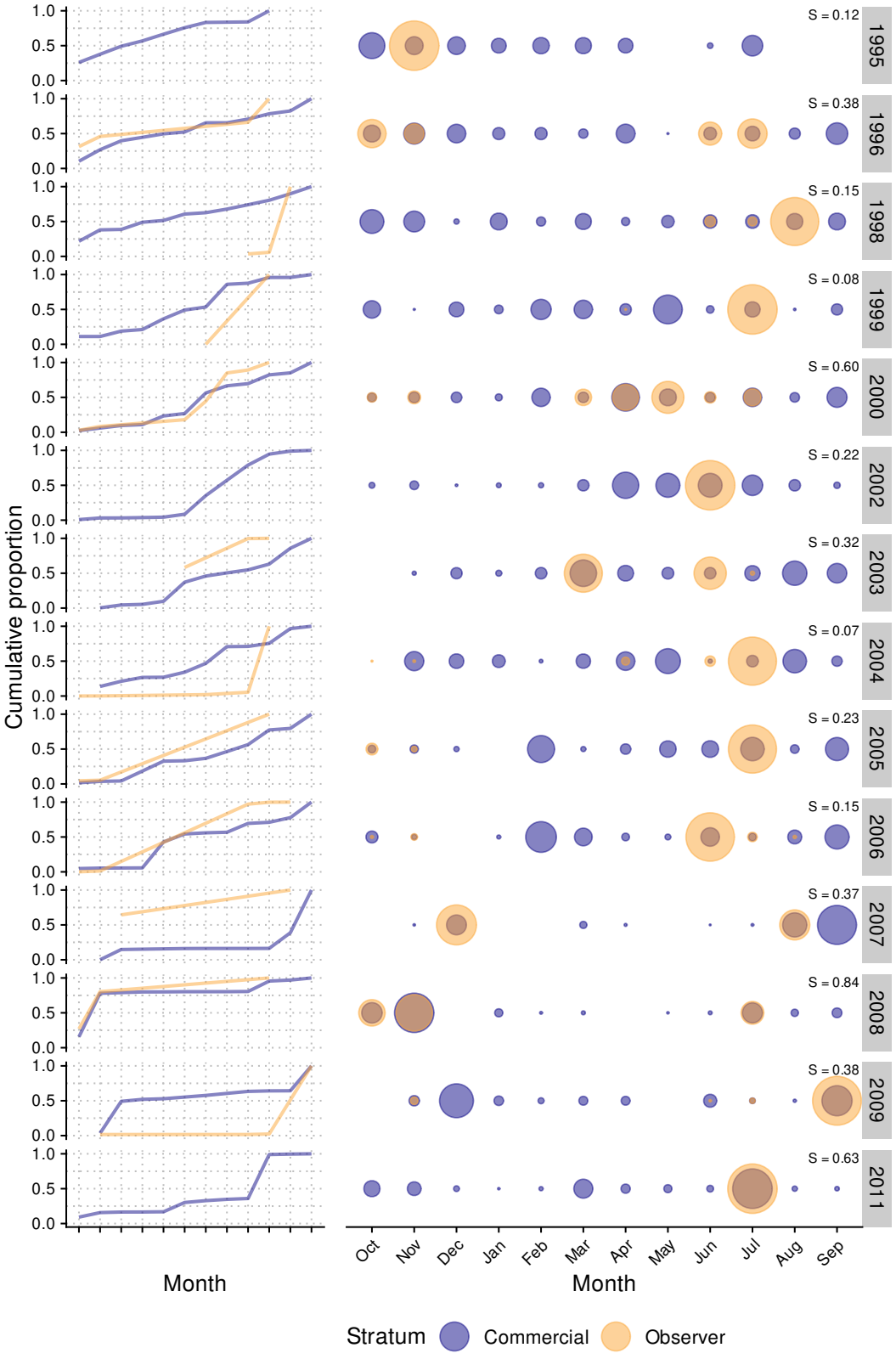


Figure 211: Monthly representativeness of observer sampling coverage of Trawl catch in CDL 1, from events where the cardinal fish catch exceeded the 30kg threshold, in 1995 to 2011. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

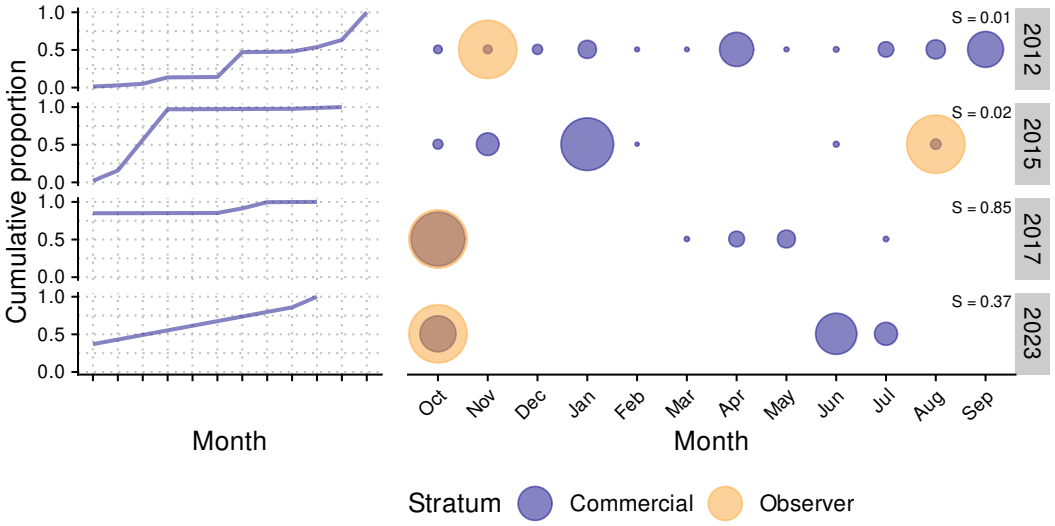


Figure 212: Monthly representativeness of observer sampling coverage of Trawl catch in CDL 1, from events where the cardinal fish catch exceeded the 30kg threshold, in 2012 to 2023. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

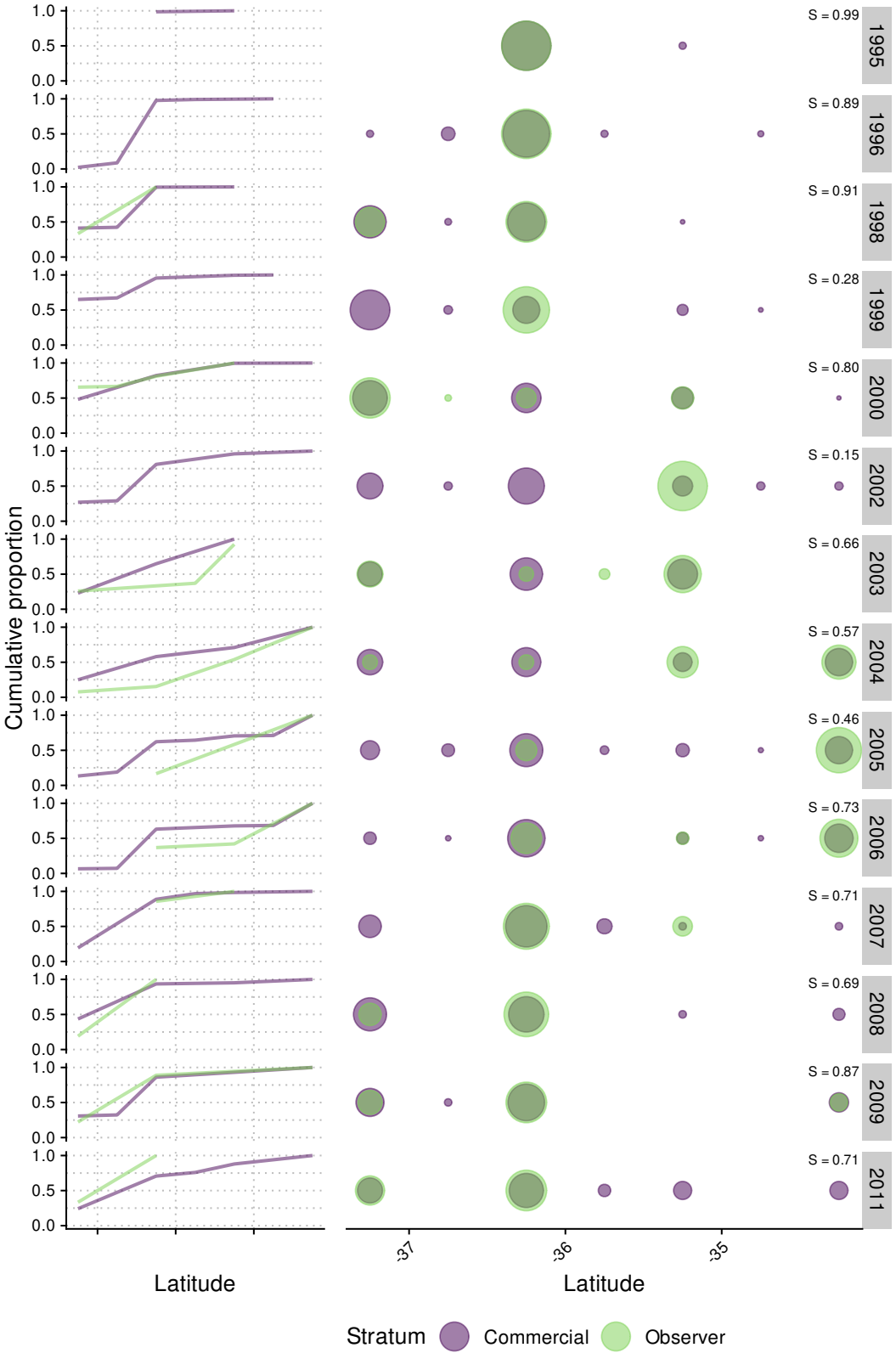


Figure 213: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in CDL 1, where the cardinal fish catch exceeded the 30kg threshold, in 1995 to 2011. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

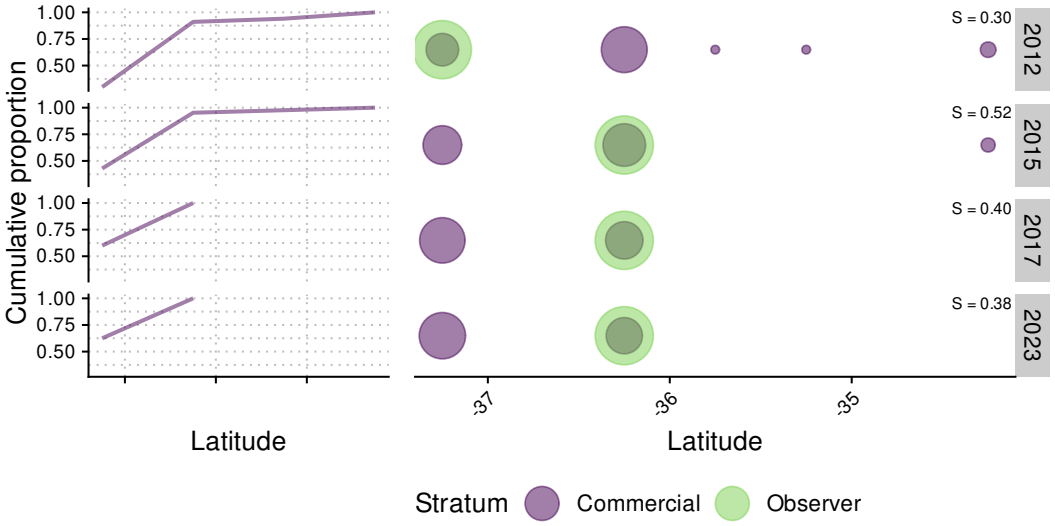


Figure 214: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in CDL 1, where the cardinal fish catch exceeded the 30kg threshold, in 2012 to 2023. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

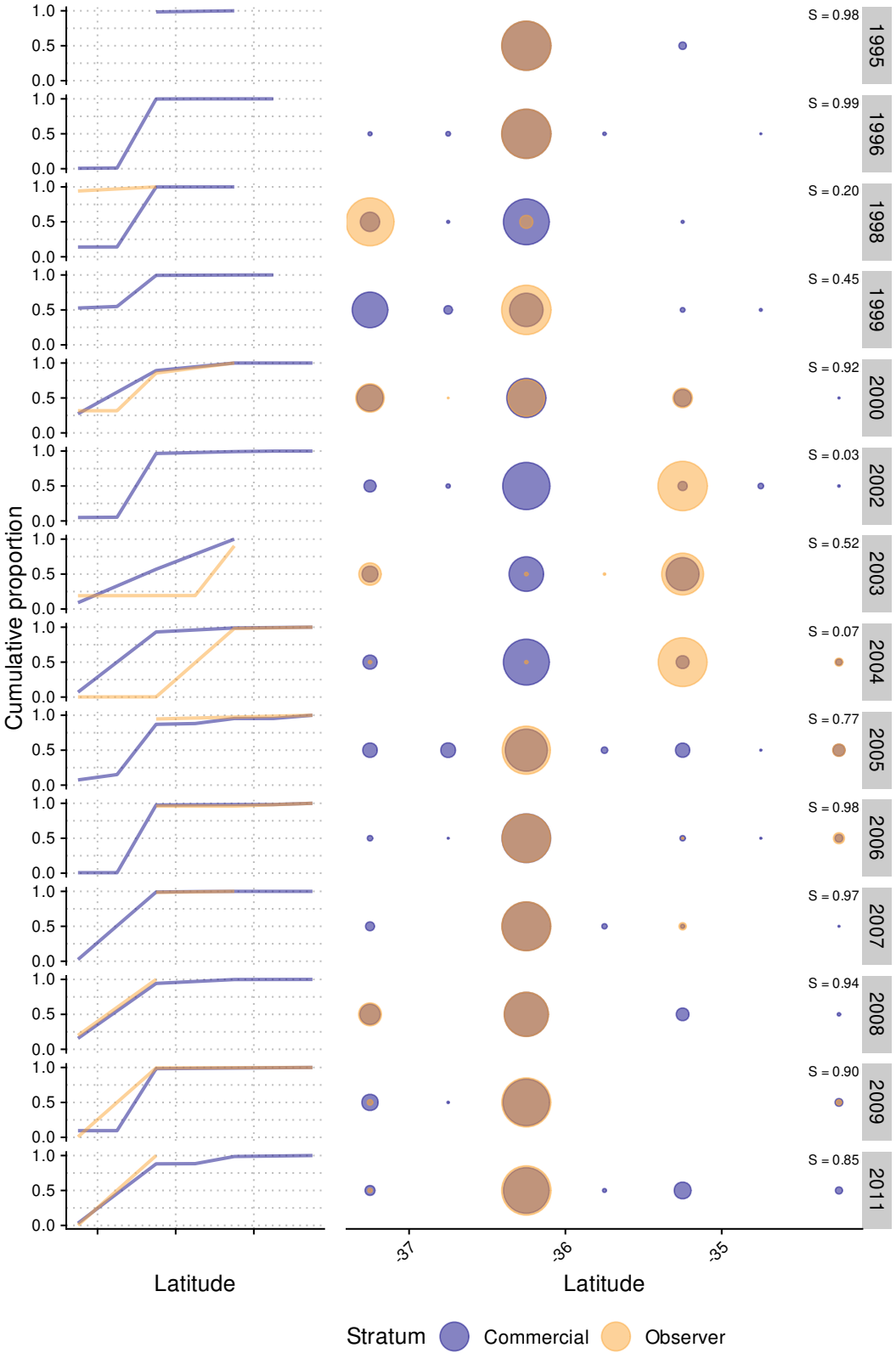


Figure 215: **Latitudinal representativeness of observer sampling coverage of Trawl catch in CDL 1, from events where the cardinal fish catch exceeded the 30kg threshold, in 1995 to 2011. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

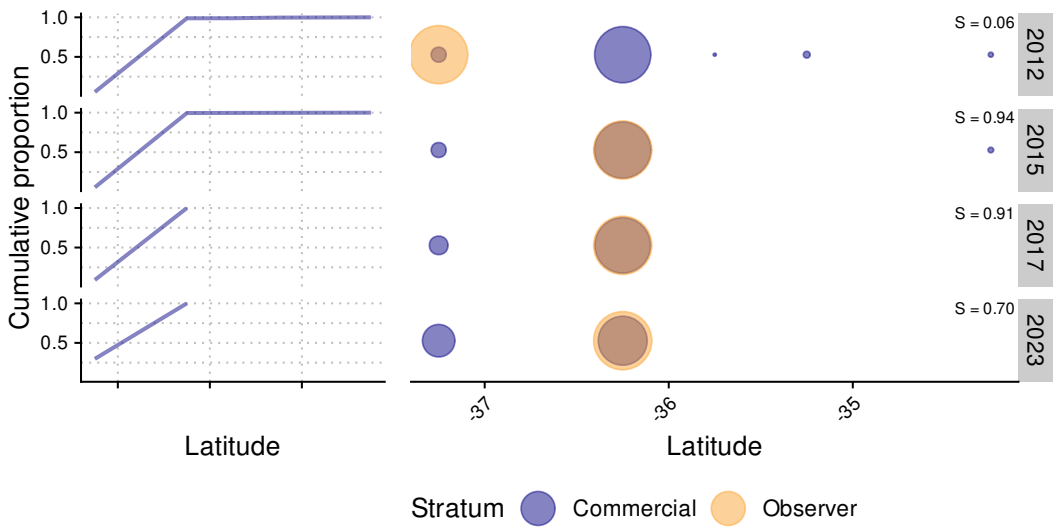


Figure 216: **Latitudinal representativeness of observer sampling coverage of Trawl catch in CDL 1, from events where the cardinal fish catch exceeded the 30kg threshold, in 2012 to 2023. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

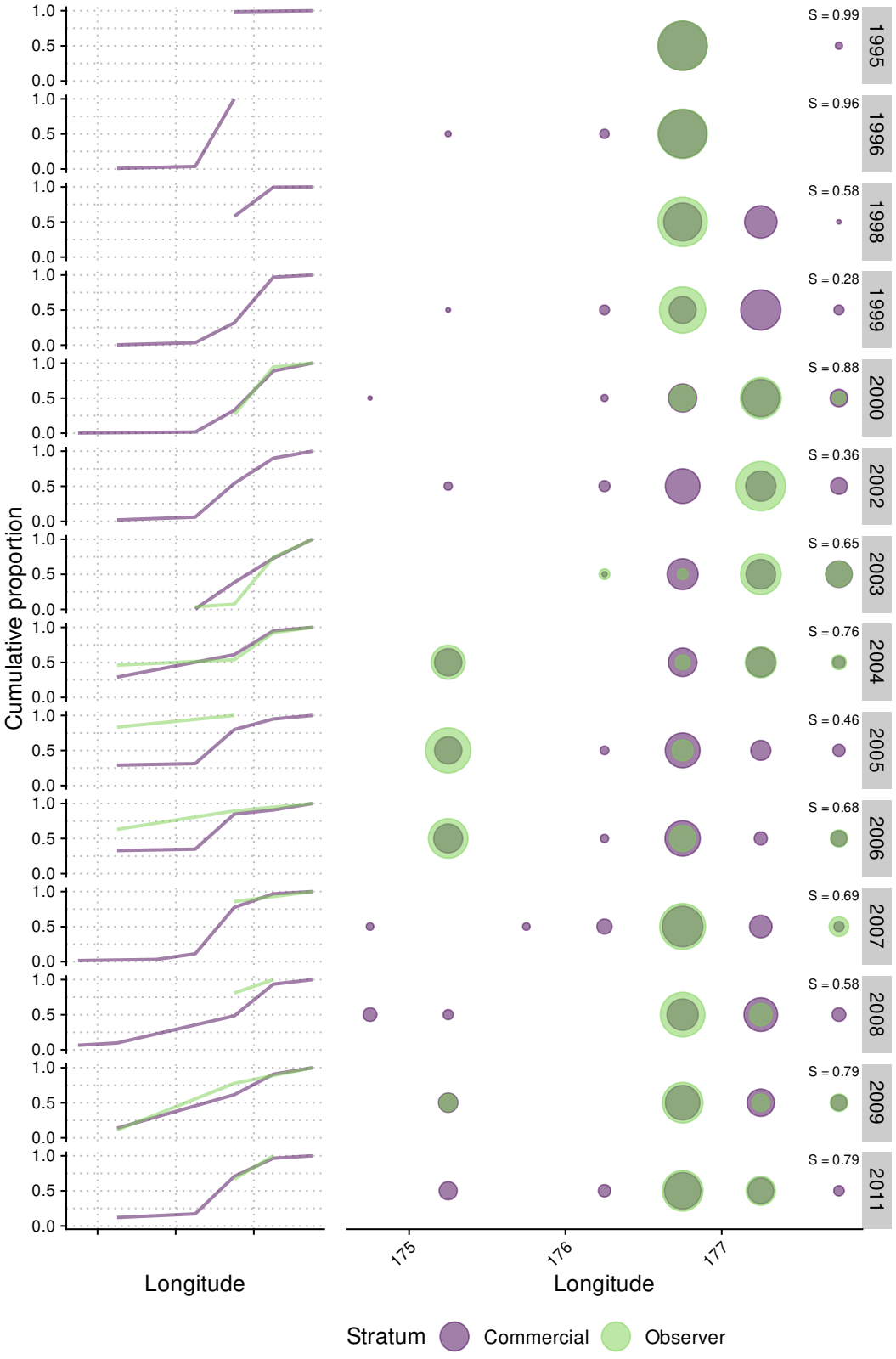


Figure 217: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in CDL 1, where the cardinal fish catch exceeded the 30kg threshold, in 1995 to 2011. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

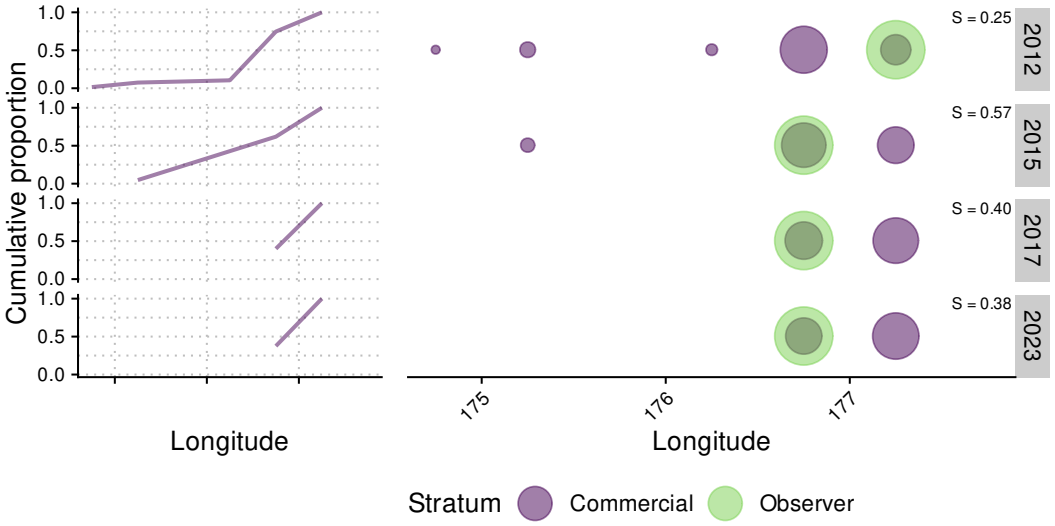


Figure 218: **Longitudinal representativeness of observer sampling coverage of Trawl fishing events in CDL 1, where the cardinal fish catch exceeded the 30kg threshold, in 2012 to 2023. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

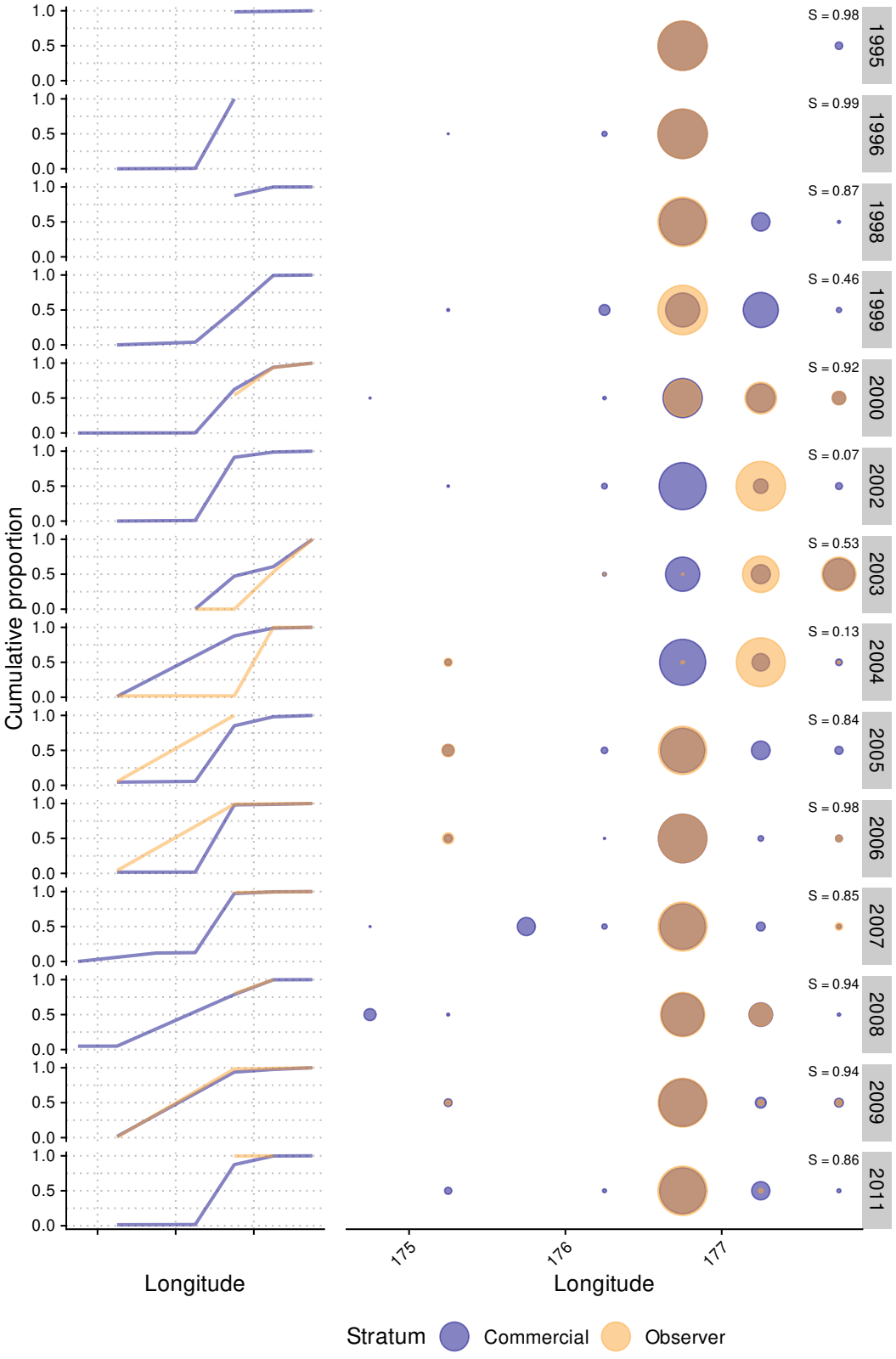


Figure 219: Longitudinal representativeness of observer sampling coverage of Trawl catch in CDL 1, from events where the cardinal fish catch exceeded the 30kg threshold, in 1995 to 2011. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

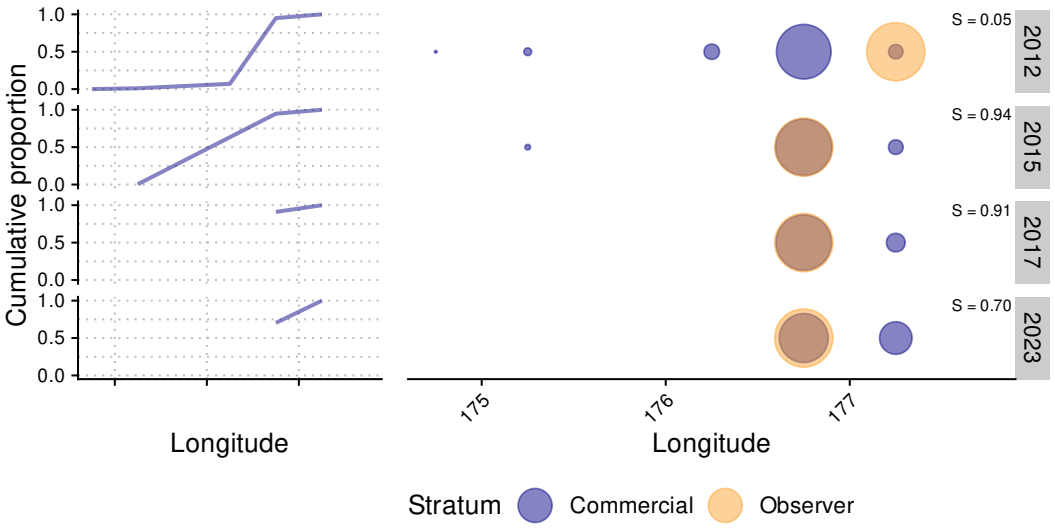


Figure 220: Longitudinal representativeness of observer sampling coverage of Trawl catch in CDL 1, from events where the cardinal fish catch exceeded the 30kg threshold, in 2012 to 2023. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

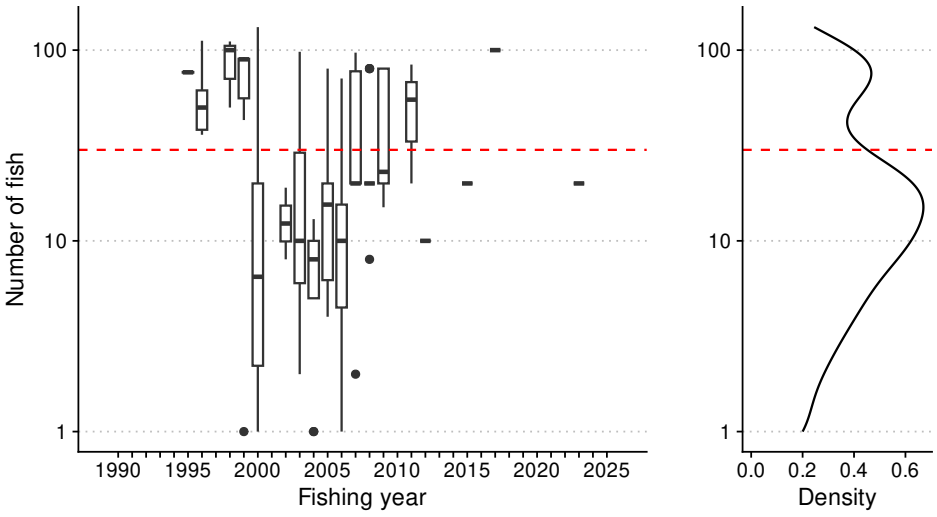


Figure 221: Length-frequency sample sizes for observed fishing events in CDL 1 where cardinal fish were sampled. The red dashed line indicates a sample size of 30 fish.

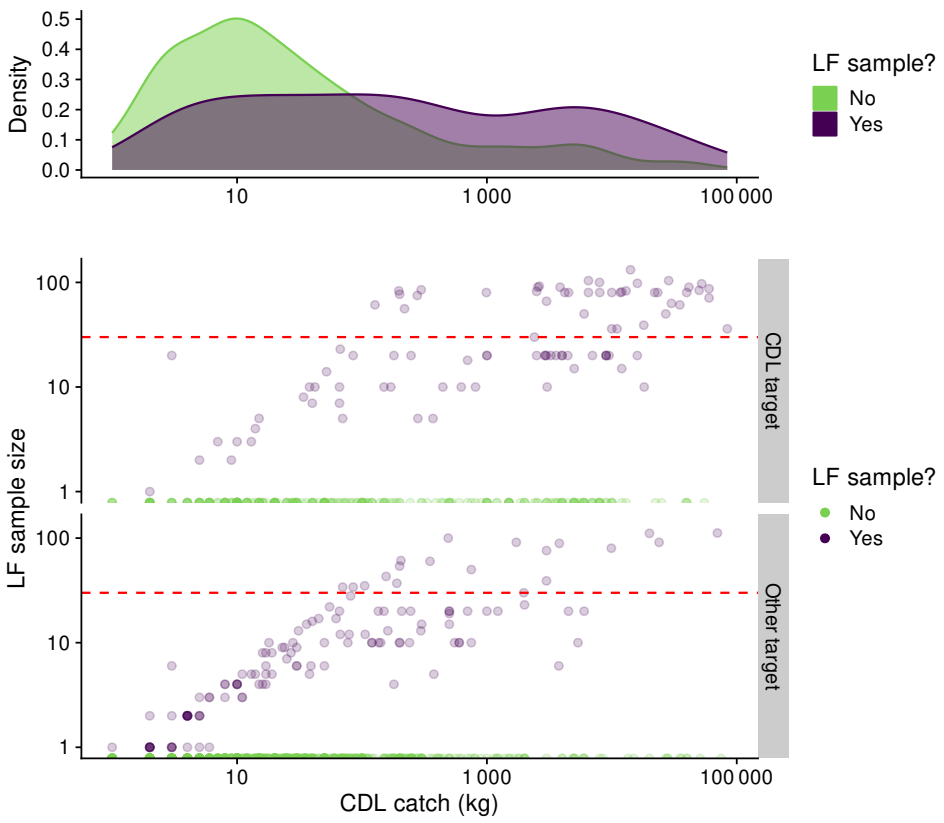


Figure 222: Length-frequency sample sizes (number of fish sampled) for observed fishing events in CDL 1 in relation to the total cardinal fish catch from an event, separately for cardinal fish target events and other target species. The red dashed line indicates a sample size of 30 fish.

2.4.1.2 Otolith samples

Table 20: Otolith samples of cardinal fish from the CDL 1 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of cardinal fish exceeded a potential sampling threshold of 30 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	5	0	0	0.00
1991	71	0	0	0.00
1992	4	0	0	0.00
1993	7	0	0	0.00
1994	17	0	0	0.00
1995	141	0	0	0.00
1996	204	0	0	0.00
1997	227	0	0	0.00
1998	242	0	0	0.00
1999	212	0	0	0.00
2000	298	0	0	0.00
2001	94	0	0	0.00
2002	103	0	0	0.00
2003	171	0	0	0.00
2004	100	0	0	0.00
2005	163	0	0	0.00
2006	147	0	0	0.00
2007	62	0	0	0.00
2008	62	0	0	0.00
2009	65	5	45	7.69
2010	55	0	0	0.00
2011	58	0	0	0.00
2012	67	2	10	2.99
2013	32	0	0	0.00
2014	51	0	0	0.00
2015	21	0	0	0.00
2016	40	0	0	0.00
2017	4	0	0	0.00
2018	10	0	0	0.00
2019	5	0	0	0.00
2020	20	0	0	0.00
2021	8	0	0	0.00
2022	4	0	0	0.00
2023	8	0	0	0.00
2025	2	0	0	0.00

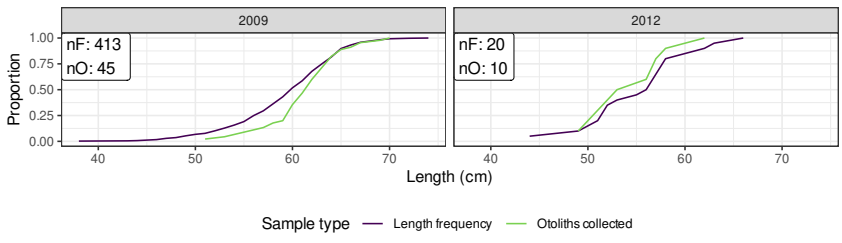


Figure 223: Cumulative distributions of the length of fish in the length frequency and otolith samples of cardinal fish in the CDL 1 Trawl fishery for the 2009 to 2012 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

2.4.1.3 Catch quantification

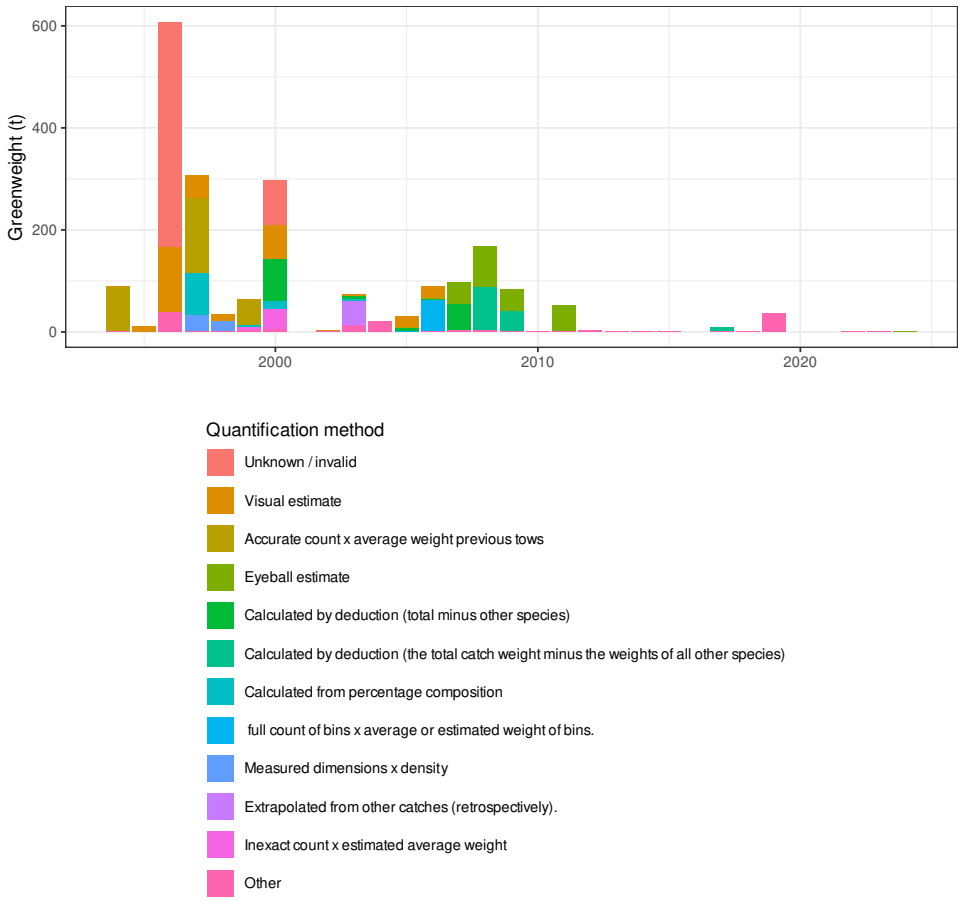


Figure 224: Methods used by observers to quantify the catch of cardinal fish in the CDL 1 Trawl fishery. The legend lists the methods used in descending order of total catch.

2.4.2 CDL 2: Trawl fishery

2.4.2.1 Length-frequency samples

Table 21: Length-frequency samples of cardinal fish from the CDL 2 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of cardinal fish exceeded a potential sampling threshold of 30 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	955	1	56	0.10
1991	713	0	0	0.00
1992	349	0	0	0.00
1993	272	0	0	0.00
1994	374	0	0	0.00
1995	375	1	105	0.27
1996	380	0	0	0.00
1997	347	0	0	0.00
1998	287	0	0	0.00
1999	393	3	130	0.76
2000	412	5	386	1.21
2001	284	2	86	0.70
2002	274	0	0	0.00
2003	342	0	0	0.00
2004	158	0	0	0.00
2005	169	1	5	0.59
2006	367	0	0	0.00
2007	354	0	0	0.00
2008	216	6	198	2.78
2009	209	5	227	2.39
2010	246	0	0	0.00
2011	186	11	555	5.91
2012	107	2	40	1.87
2013	108	0	0	0.00
2014	97	0	0	0.00
2015	77	5	360	6.49
2016	60	2	40	3.33
2017	65	0	0	0.00
2018	75	0	0	0.00
2019	129	1	20	0.78
2020	80	2	127	2.50
2021	96	0	0	0.00
2022	59	2	136	3.39
2023	67	0	0	0.00
2024	61	0	0	0.00
2025	43	0	0	0.00

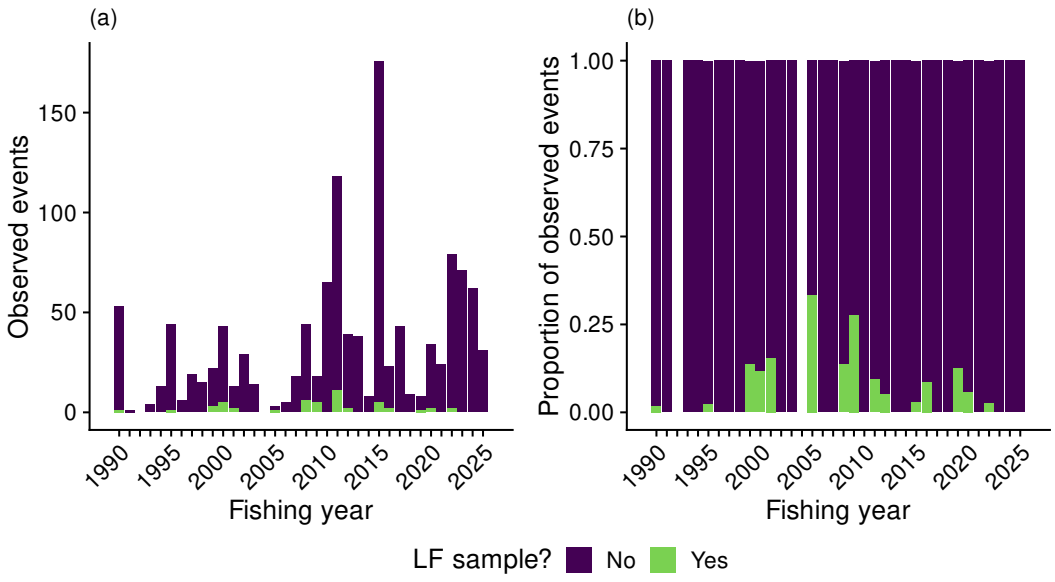


Figure 225: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in CDL 2 where the cardinal fish catch exceeded the 30 kg threshold, with and without length-frequency sampling.**

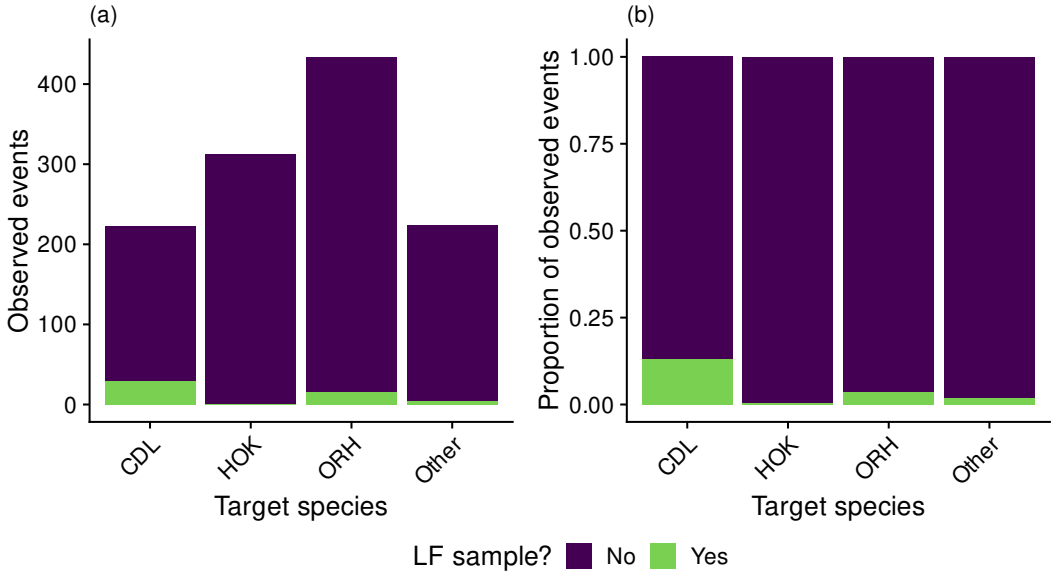


Figure 226: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in CDL 2 where the cardinal fish catch exceeded the 30 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

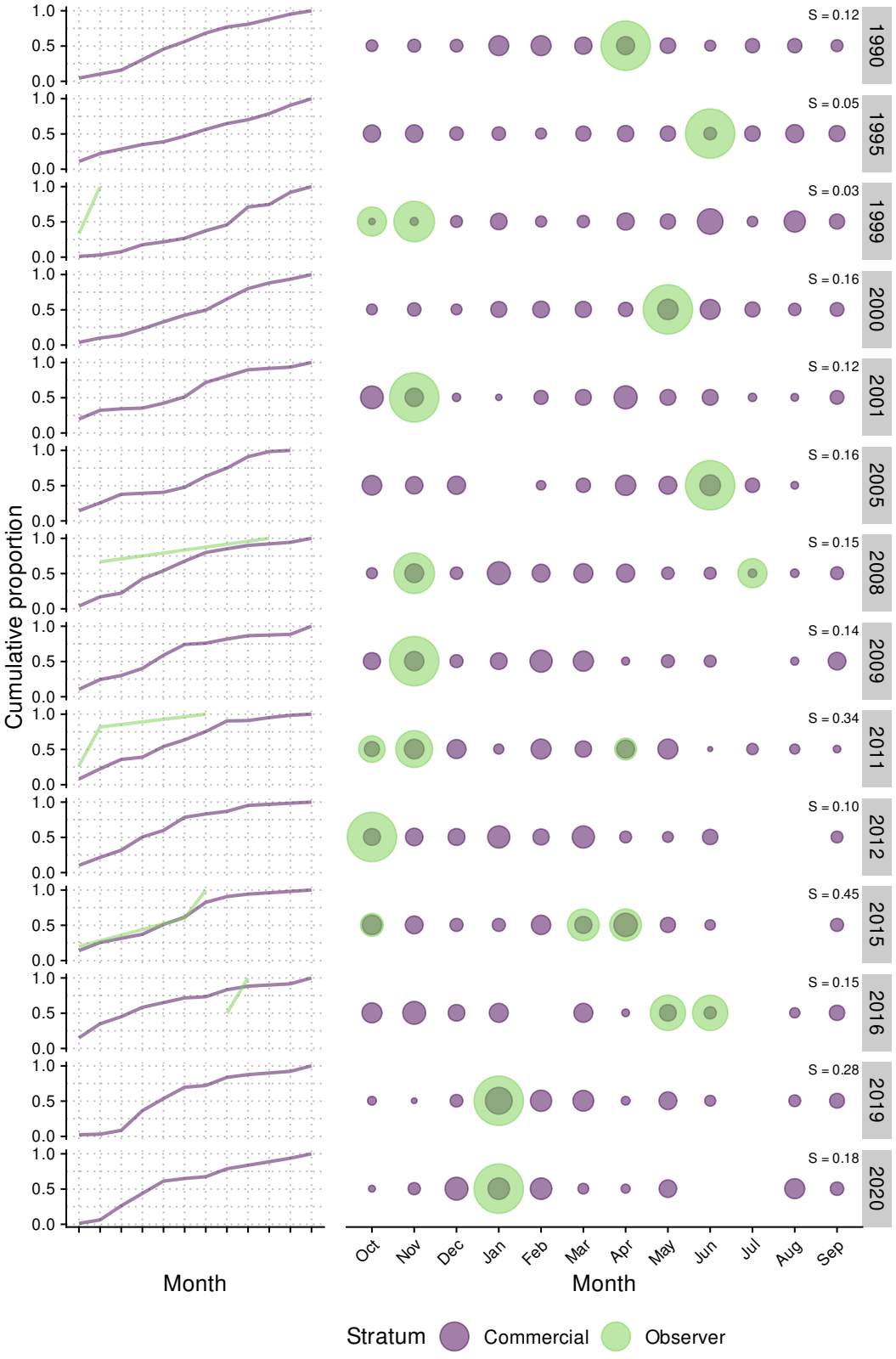


Figure 227: Monthly representativeness of observer sampling coverage of Trawl fishing events in CDL 2, where the cardinal fish catch exceeded the 30kg threshold, in 1990 to 2020. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

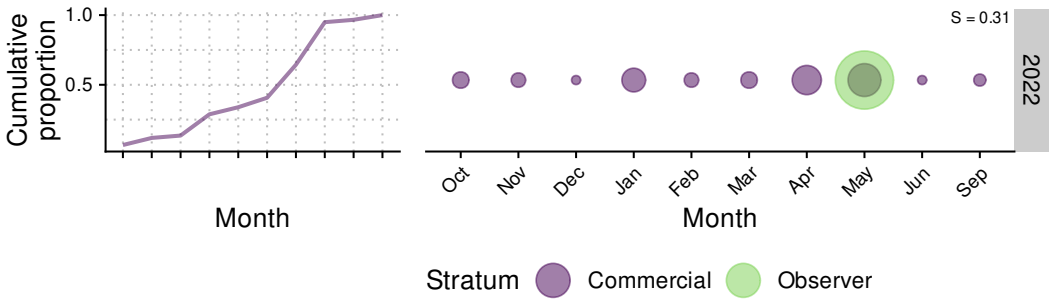


Figure 228: **Monthly representativeness of observer sampling coverage of Trawl fishing events in CDL 2, where the cardinal fish catch exceeded the 30kg threshold, in 2022 to 2022. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

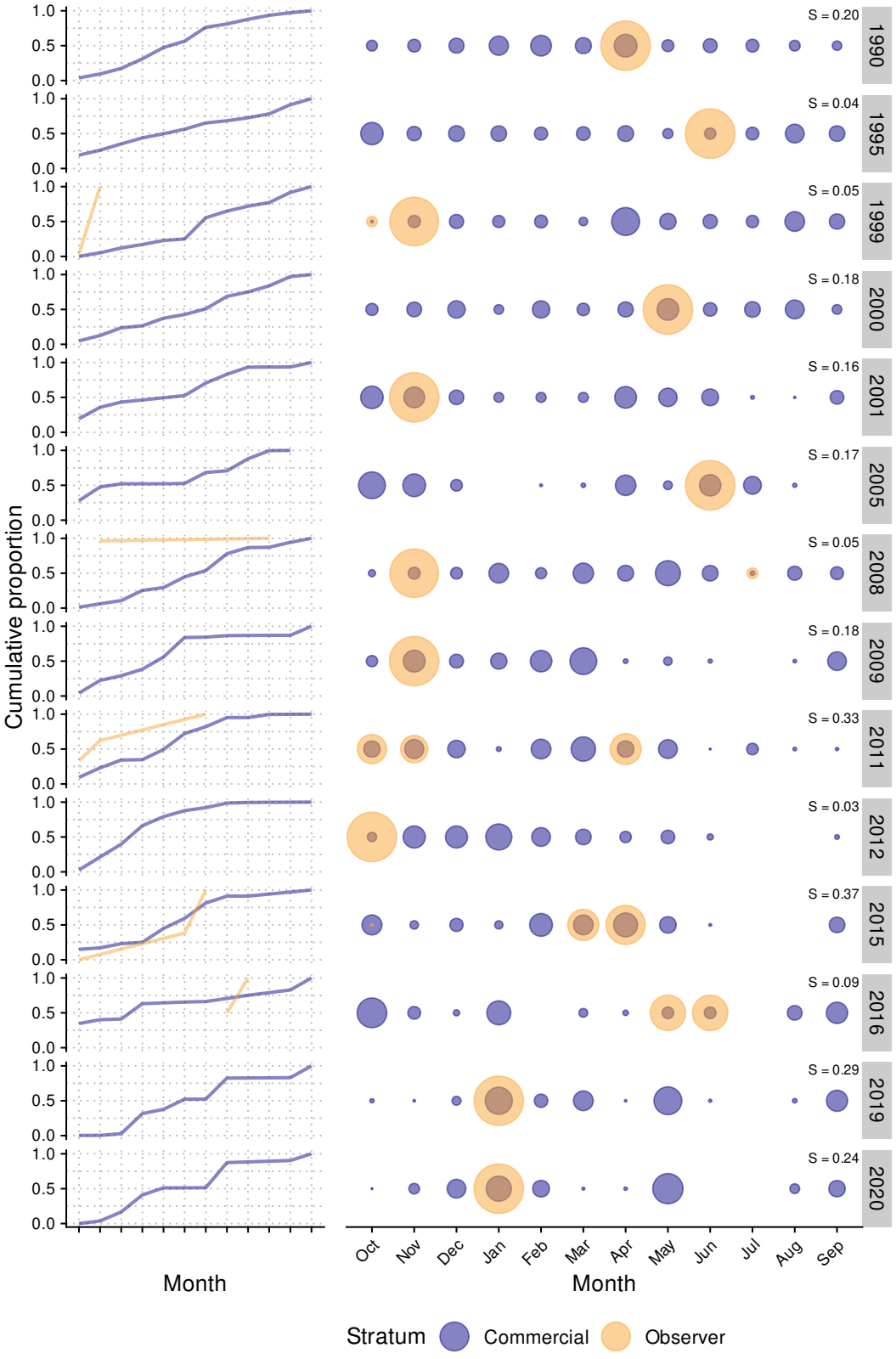


Figure 229: **Monthly representativeness of observer sampling coverage of Trawl catch in CDL 2, from events where the cardinal fish catch exceeded the 30kg threshold, in 1990 to 2020. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

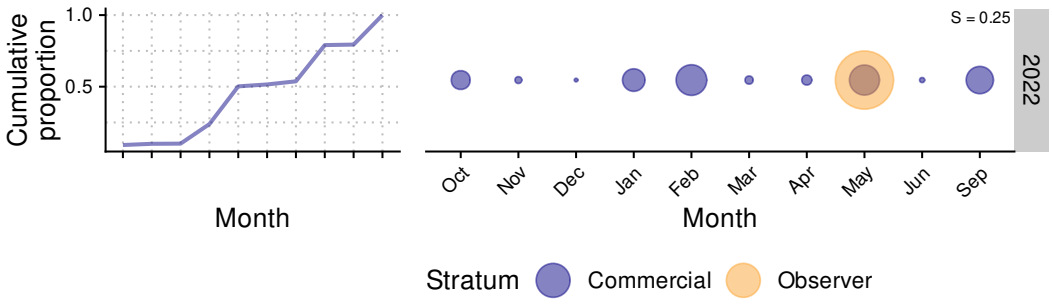


Figure 230: **Monthly representativeness of observer sampling coverage of Trawl catch in CDL 2, from events where the cardinal fish catch exceeded the 30kg threshold, in 2022 to 2022. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

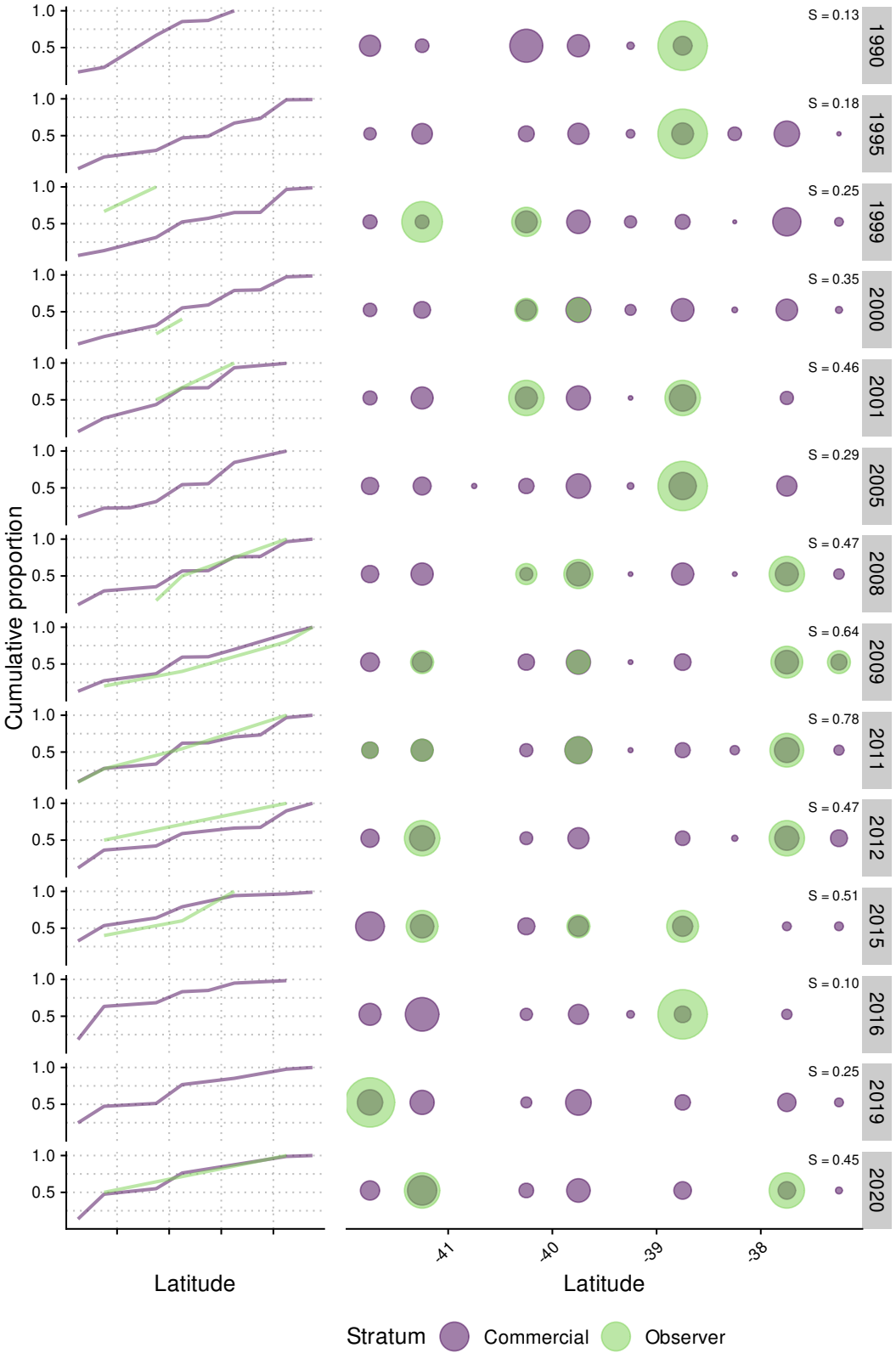


Figure 231: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in CDL 2, where the cardinal fish catch exceeded the 30kg threshold, in 1990 to 2020. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

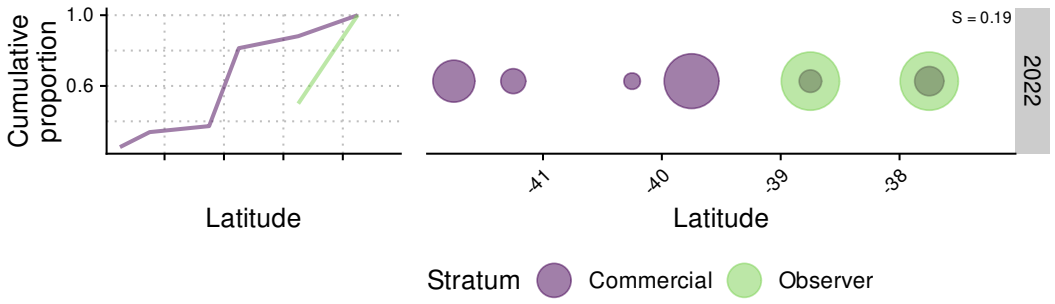


Figure 232: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in CDL 2, where the cardinal fish catch exceeded the 30kg threshold, in 2022 to 2022. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

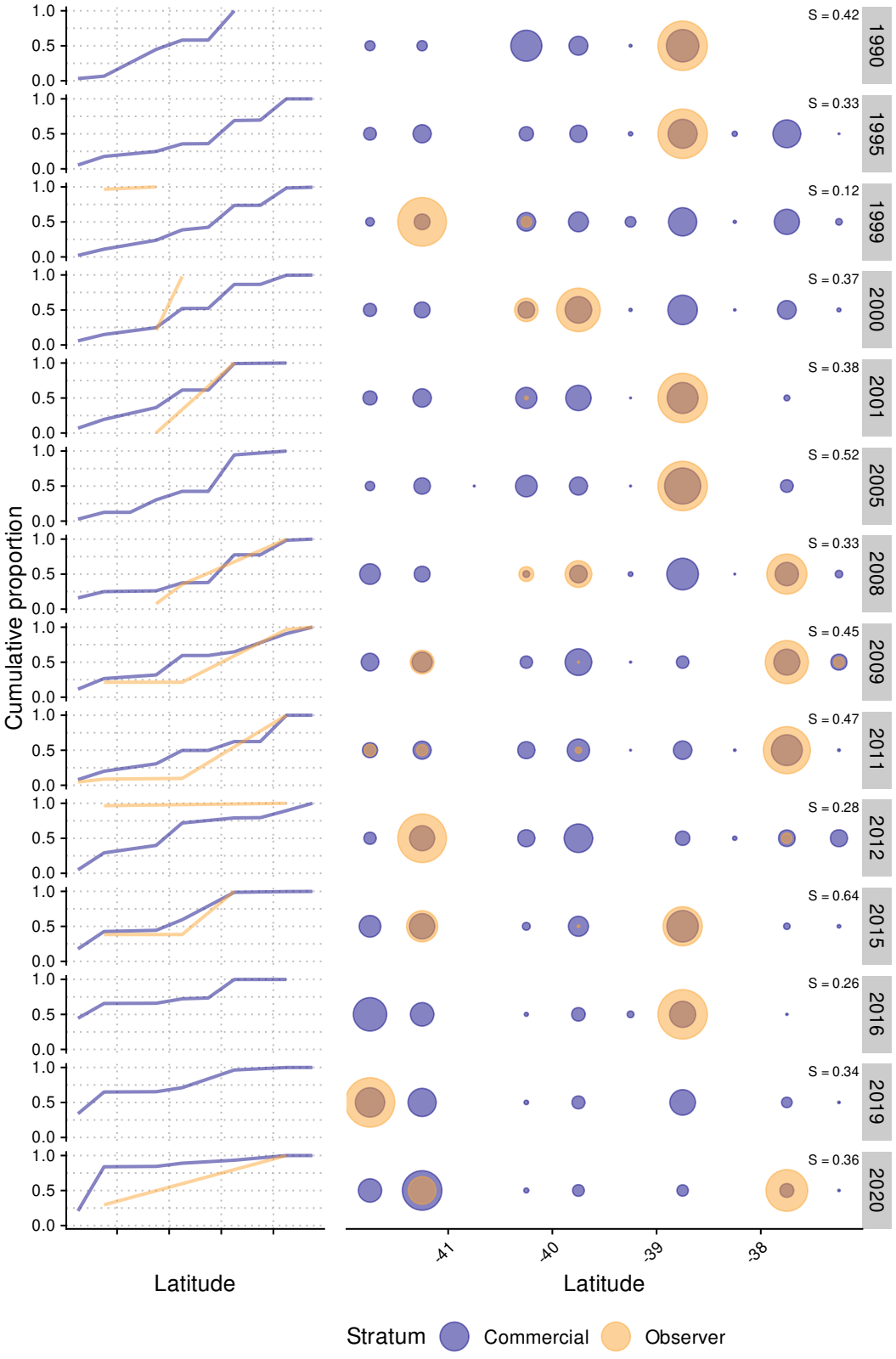


Figure 233: **Latitudinal representativeness of observer sampling coverage of Trawl catch in CDL 2, from events where the cardinal fish catch exceeded the 30kg threshold, in 1990 to 2020. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

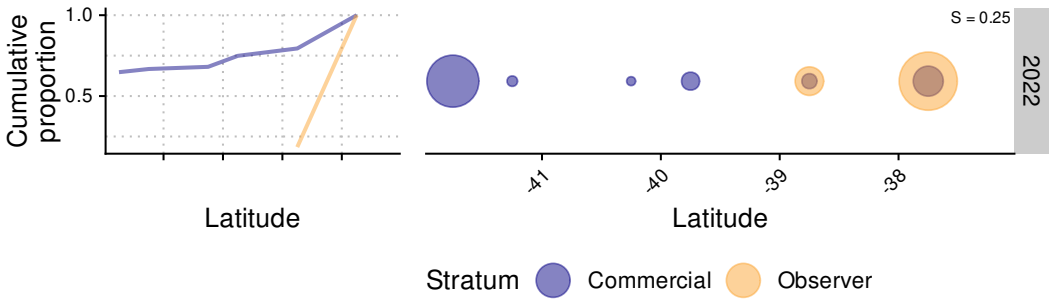


Figure 234: **Latitudinal representativeness of observer sampling coverage of Trawl catch in CDL 2, from events where the cardinal fish catch exceeded the 30kg threshold, in 2022 to 2022. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

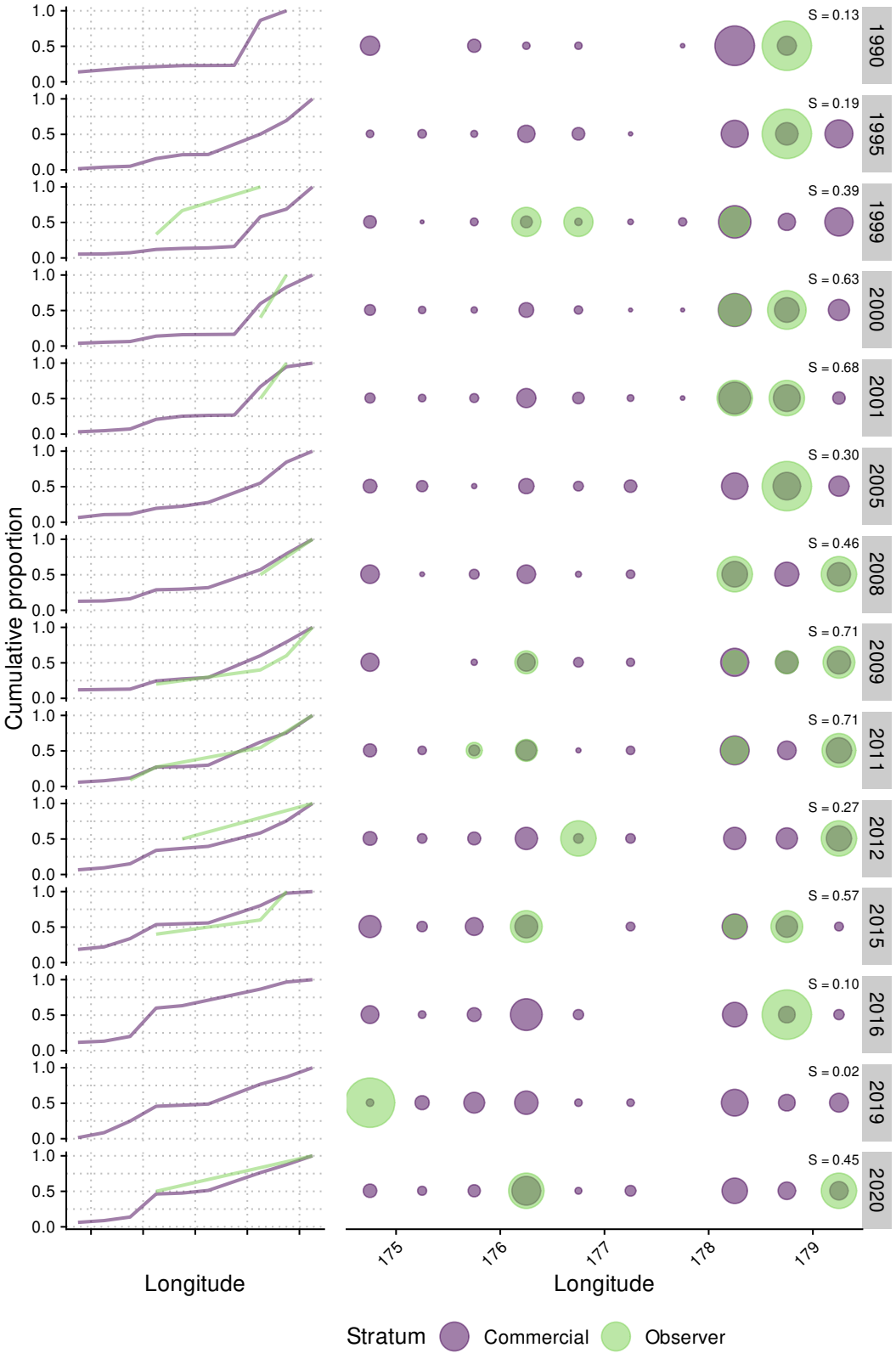


Figure 235: **Longitudinal representativeness of observer sampling coverage of Trawl fishing events in CDL 2, where the cardinal fish catch exceeded the 30kg threshold, in 1990 to 2020. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

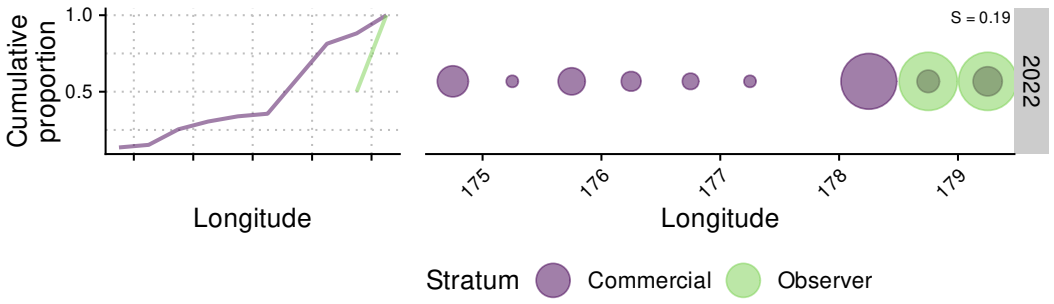


Figure 236: **Longitudinal representativeness of observer sampling coverage of Trawl fishing events in CDL 2, where the cardinal fish catch exceeded the 30kg threshold, in 2022 to 2022. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

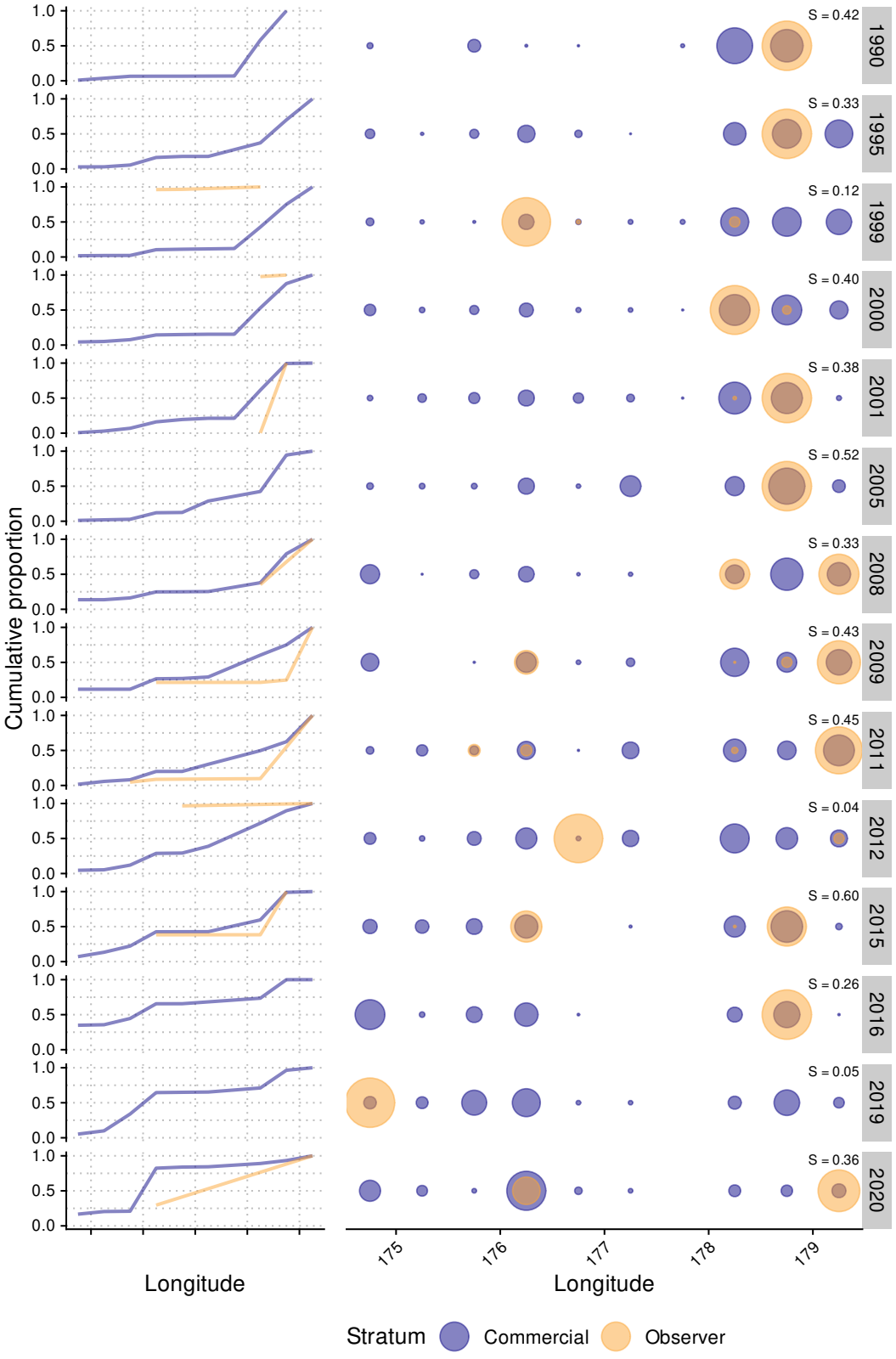


Figure 237: **Longitudinal representativeness of observer sampling coverage of Trawl catch in CDL 2, from events where the cardinal fish catch exceeded the 30kg threshold, in 1990 to 2020. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

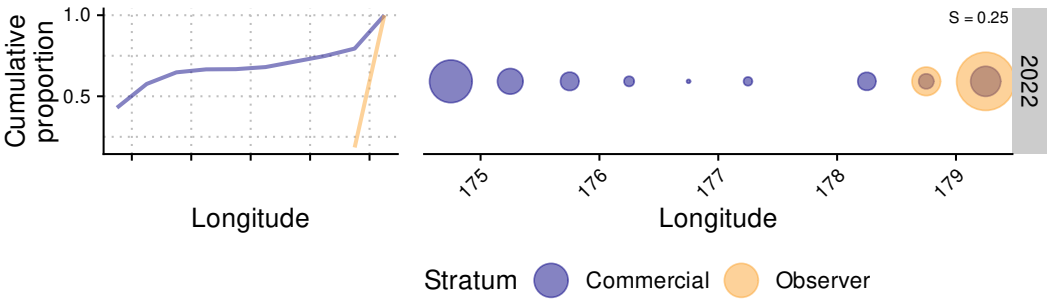


Figure 238: **Longitudinal representativeness of observer sampling coverage of Trawl catch in CDL 2, from events where the cardinal fish catch exceeded the 30kg threshold, in 2022 to 2022. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

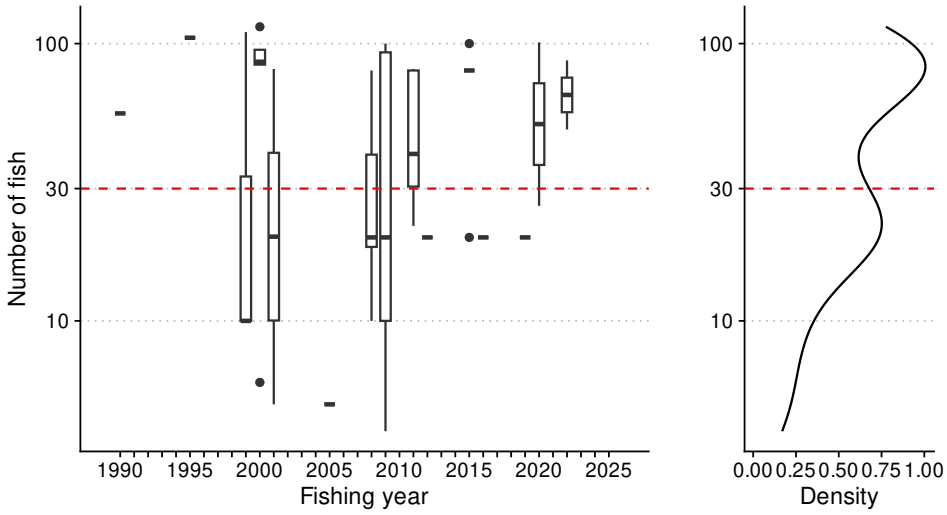


Figure 239: **Length-frequency sample sizes for observed fishing events in CDL 2 where cardinal fish were sampled. The red dashed line indicates a sample size of 30 fish.**

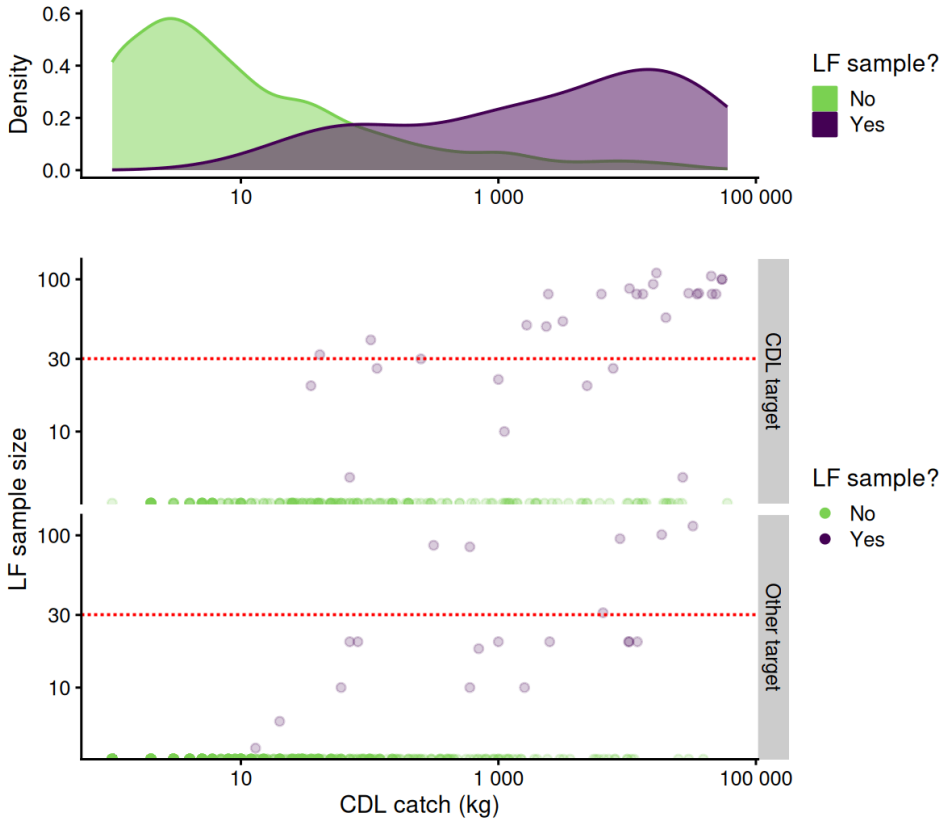


Figure 240: **Length-frequency sample sizes (number of fish sampled) for observed fishing events in CDL 2 in relation to the total cardinal fish catch from an event, separately for cardinal fish target events and other target species. The red dashed line indicates a sample size of 30 fish.**

2.4.2.2 Otolith samples

Table 22: Otolith samples of cardinal fish from the CDL 2 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of cardinal fish exceeded a potential sampling threshold of 30 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	955	0	0	0.00
1991	713	0	0	0.00
1992	349	0	0	0.00
1993	272	0	0	0.00
1994	374	0	0	0.00
1995	375	0	0	0.00
1996	380	0	0	0.00
1997	347	0	0	0.00
1998	287	0	0	0.00
1999	393	0	0	0.00
2000	412	0	0	0.00
2001	284	0	0	0.00
2002	274	0	0	0.00
2003	342	0	0	0.00
2004	158	0	0	0.00
2005	169	0	0	0.00
2006	367	0	0	0.00
2007	354	0	0	0.00
2008	216	0	0	0.00
2009	209	0	0	0.00
2010	246	0	0	0.00
2011	186	9	120	4.84
2012	107	2	20	1.87
2013	108	0	0	0.00
2014	97	0	0	0.00
2015	77	0	0	0.00
2016	60	0	0	0.00
2017	65	0	0	0.00
2018	75	0	0	0.00
2019	129	1	5	0.78
2020	80	0	0	0.00
2021	96	0	0	0.00
2022	59	2	15	3.39
2023	67	0	0	0.00
2024	61	0	0	0.00
2025	43	0	0	0.00

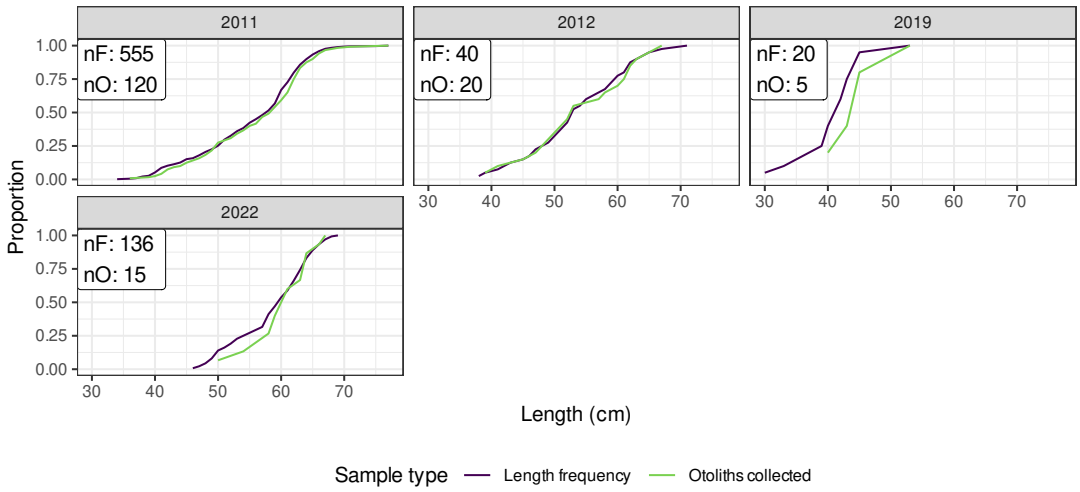


Figure 241: Cumulative distributions of the length of fish in the length frequency and otolith samples of cardinal fish in the CDL 2 Trawl fishery for the 2011 to 2022 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

2.4.2.3 Catch quantification

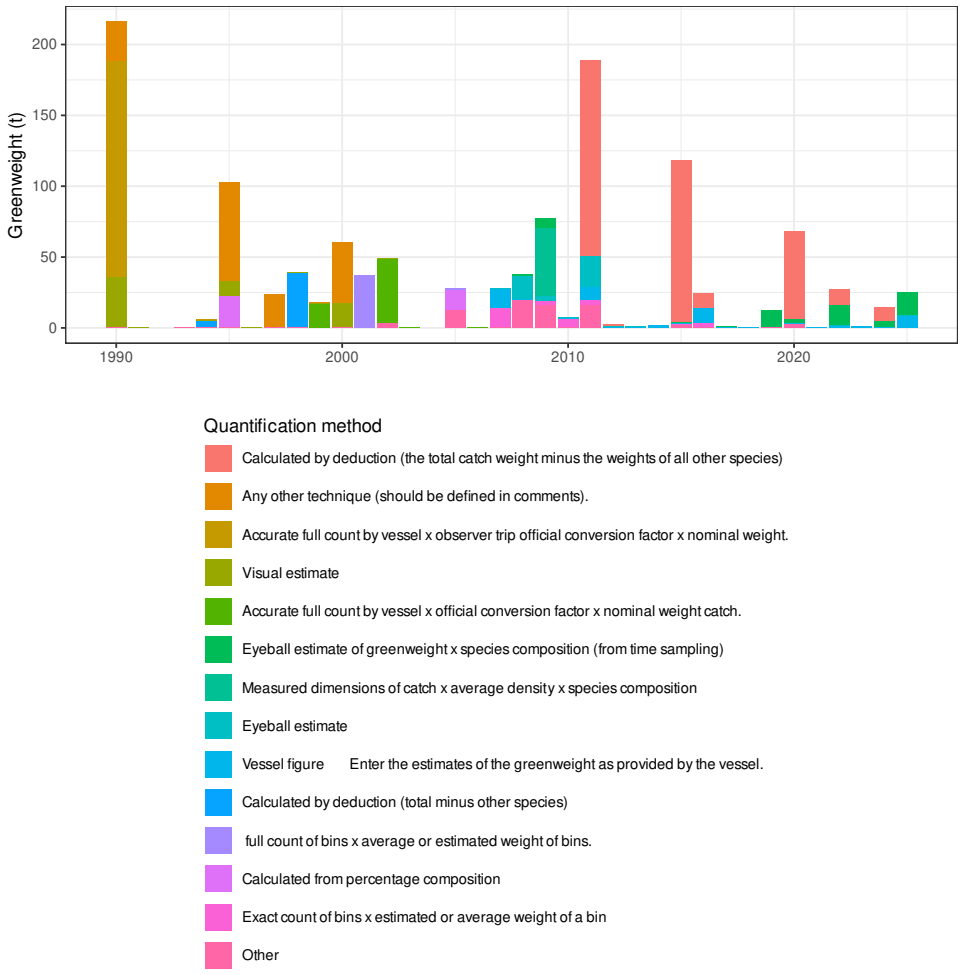


Figure 242: Methods used by observers to quantify the catch of cardinal fish in the CDL 2 Trawl fishery. The legend lists the methods used in descending order of total catch.

2.4.3 CDL 3: Trawl fishery

2.4.3.1 Length-frequency samples

Table 23: Length-frequency samples of cardinal fish from the CDL 3 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of cardinal fish exceeded a potential sampling threshold of 30 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	2	0	0	0.00
1991	85	0	0	0.00
1992	40	0	0	0.00
1993	58	0	0	0.00
1994	82	0	0	0.00
1995	24	0	0	0.00
1996	11	0	0	0.00
1997	27	0	0	0.00
1998	24	0	0	0.00
1999	51	0	0	0.00
2000	48	0	0	0.00
2001	28	1	2	3.57
2002	35	0	0	0.00
2003	35	0	0	0.00
2004	33	0	0	0.00
2005	18	0	0	0.00
2006	9	0	0	0.00
2007	25	0	0	0.00
2008	12	0	0	0.00
2009	14	0	0	0.00
2010	26	0	0	0.00
2011	9	1	20	11.11
2012	21	1	1	4.76
2013	9	1	50	11.11
2014	11	1	1	9.09
2015	21	2	45	9.52
2016	11	0	0	0.00
2017	18	1	18	5.56
2018	30	1	80	3.33
2019	28	0	0	0.00
2020	27	6	268	22.22
2021	33	1	20	3.03
2022	34	4	380	11.76
2023	21	0	0	0.00
2024	42	2	40	4.76
2025	22	0	0	0.00

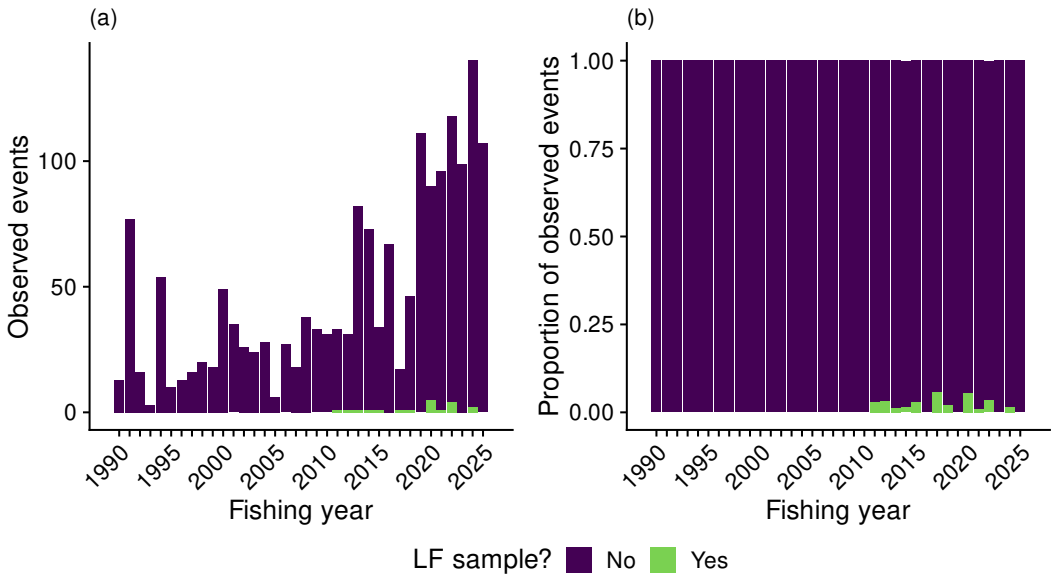


Figure 243: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in CDL 3 where the cardinal fish catch exceeded the 30 kg threshold, with and without length-frequency sampling.**

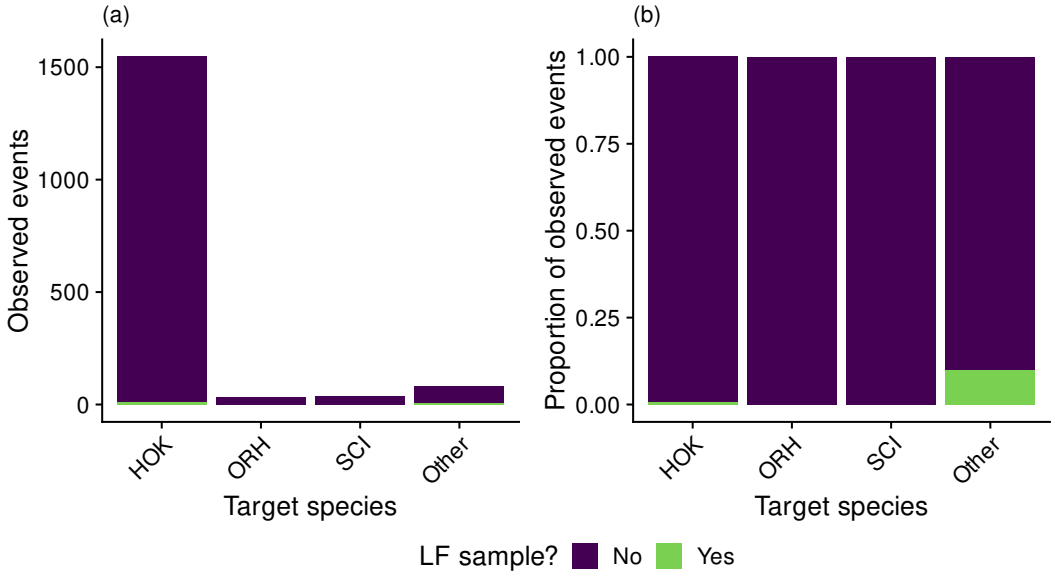


Figure 244: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in CDL 3 where the cardinal fish catch exceeded the 30 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

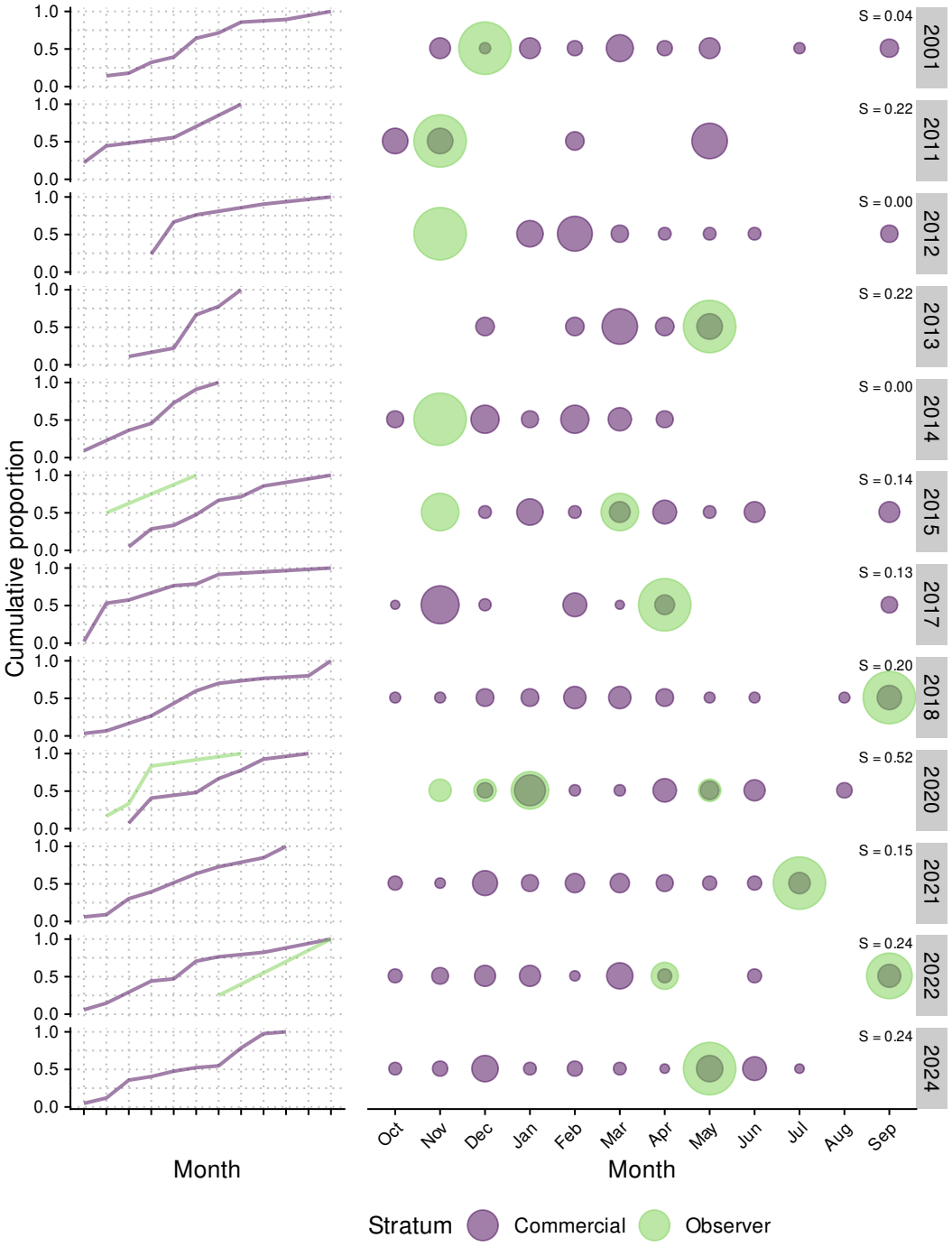


Figure 245: Monthly representativeness of observer sampling coverage of Trawl fishing events in CDL 3, where the cardinal fish catch exceeded the 30kg threshold, in 2001 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

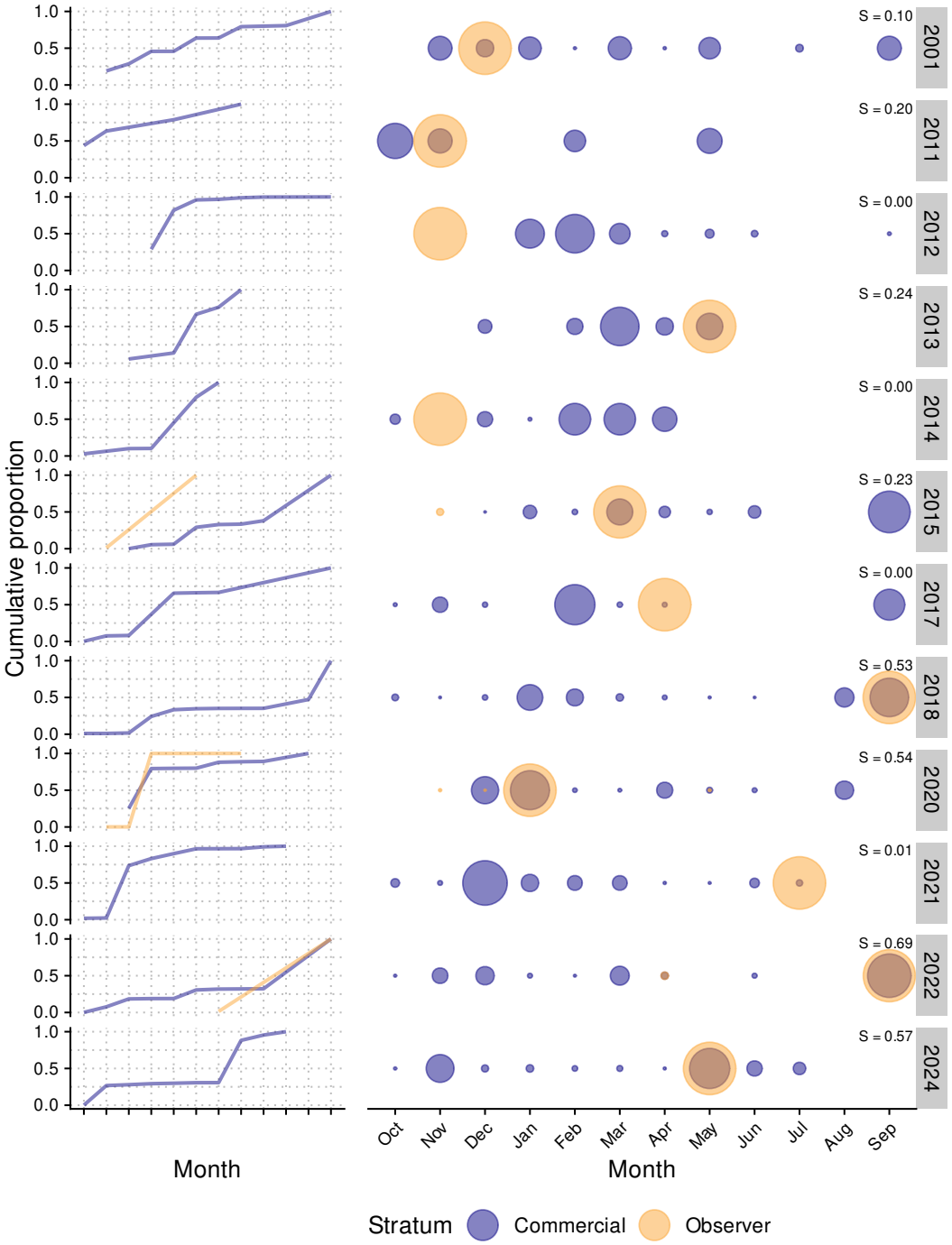


Figure 246: **Monthly representativeness of observer sampling coverage of Trawl catch in CDL 3, from events where the cardinal fish catch exceeded the 30kg threshold, in 2001 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

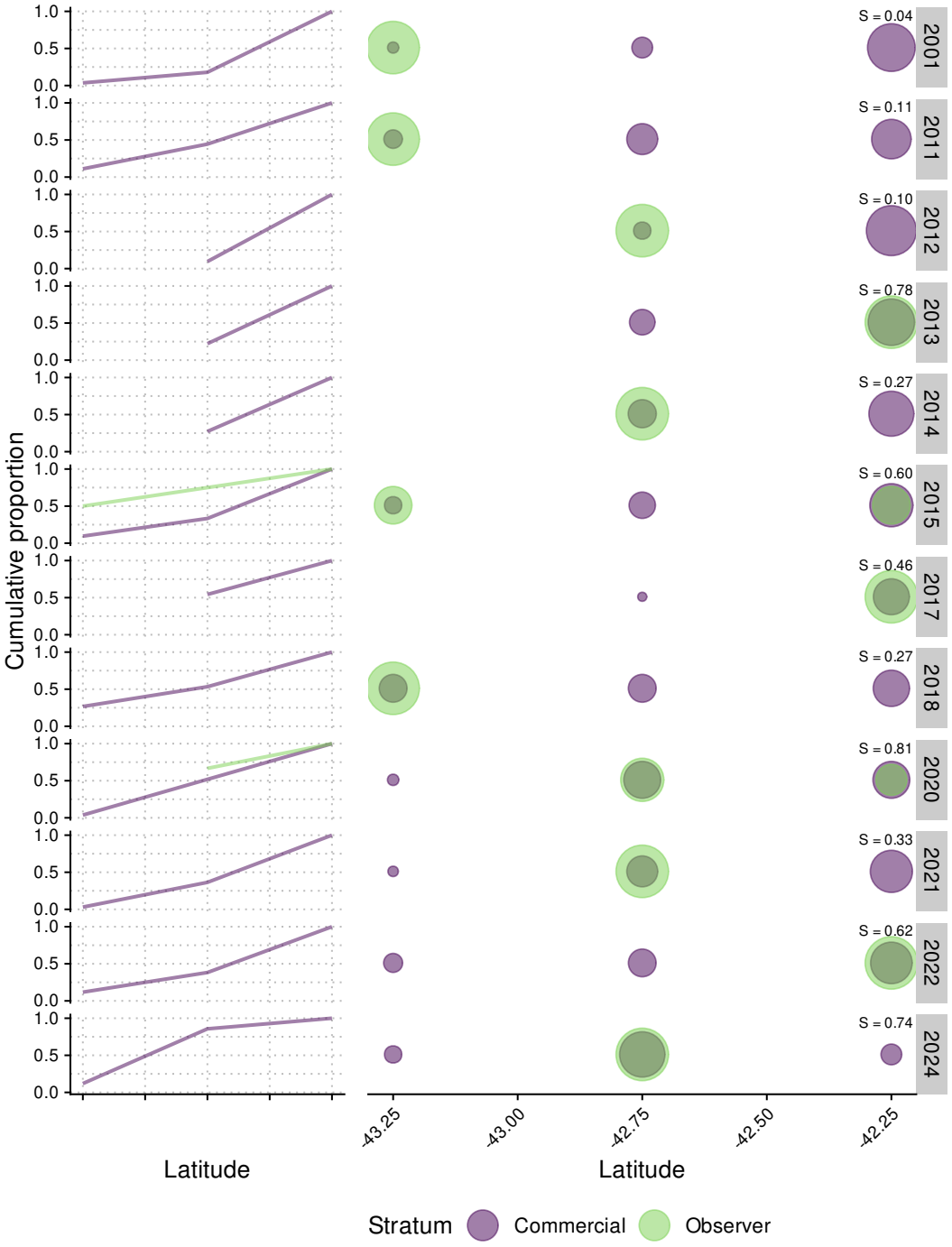


Figure 247: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in CDL 3, where the cardinal fish catch exceeded the 30kg threshold, in 2001 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

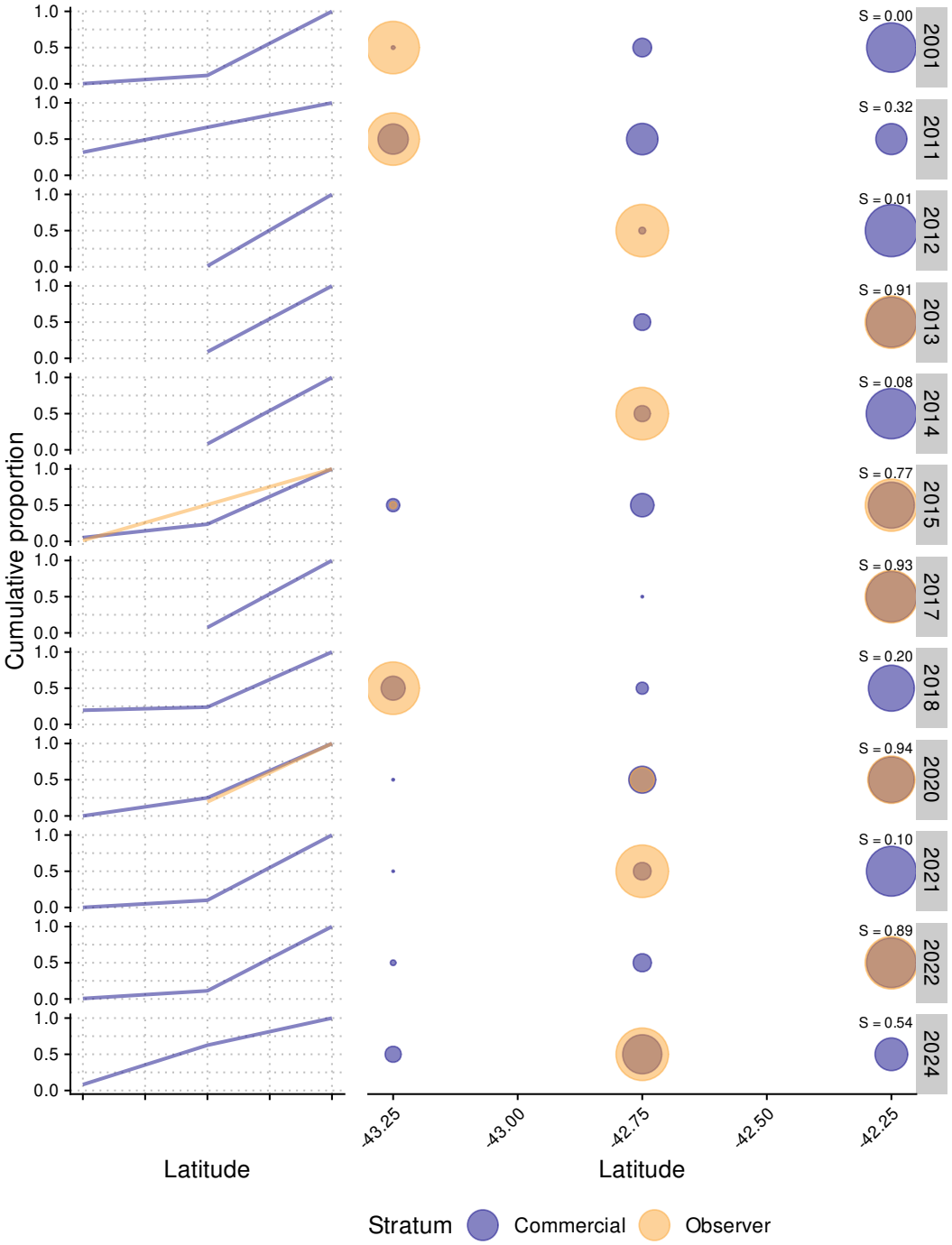


Figure 248: Latitudinal representativeness of observer sampling coverage of Trawl catch in CDL 3, from events where the cardinal fish catch exceeded the 30kg threshold, in 2001 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

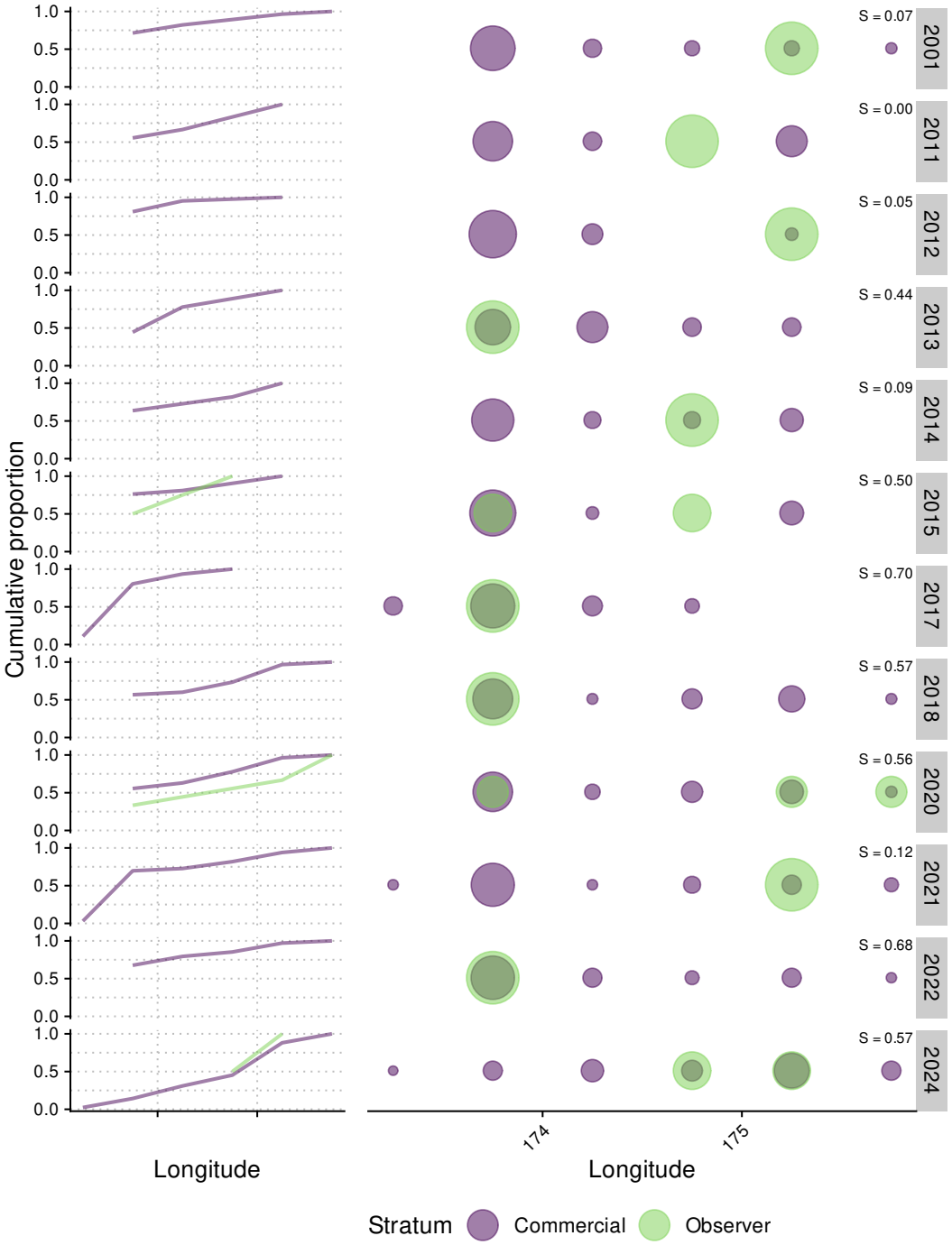


Figure 249: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in CDL 3, where the cardinal fish catch exceeded the 30kg threshold, in 2001 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

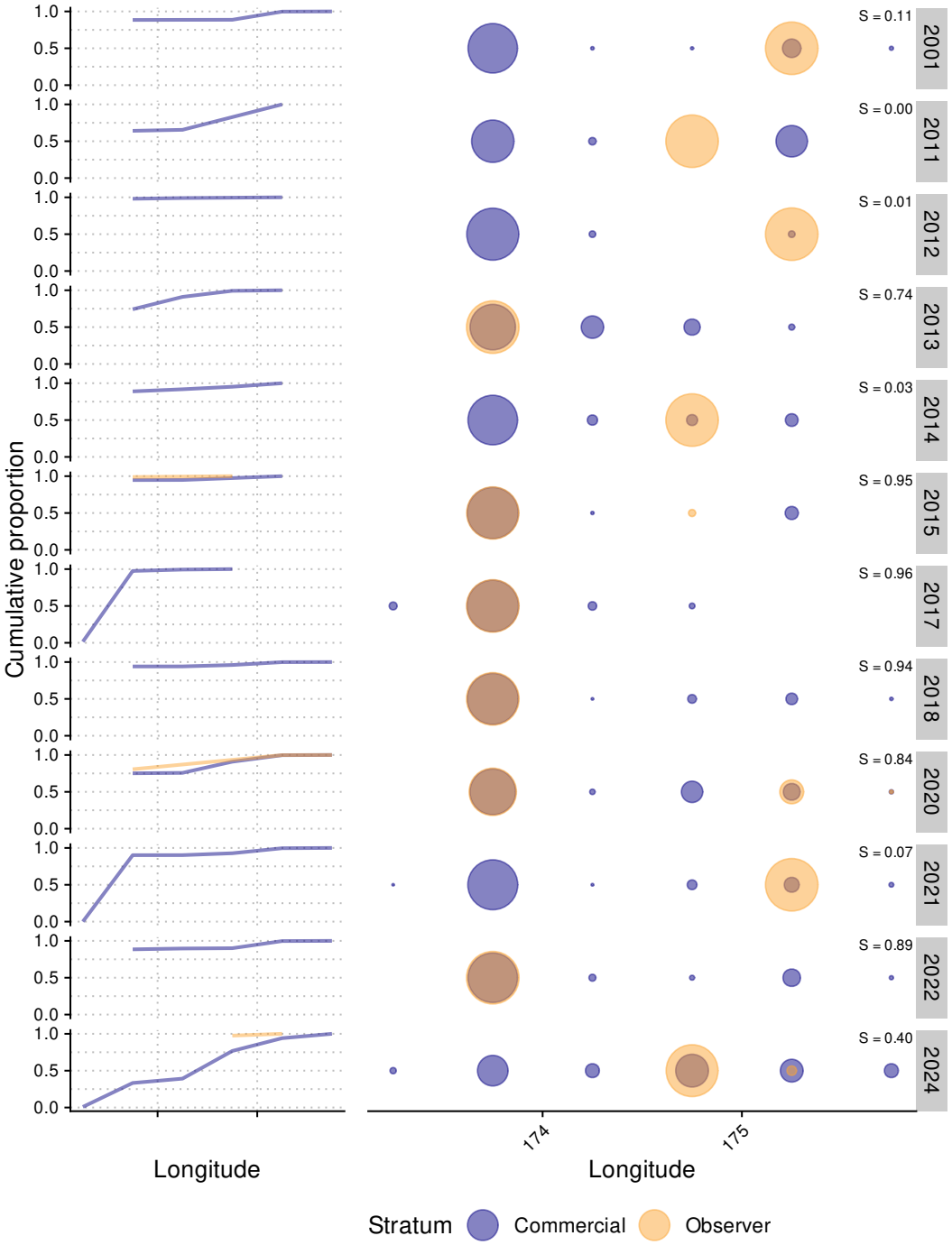


Figure 250: Longitudinal representativeness of observer sampling coverage of Trawl catch in CDL 3, from events where the cardinal fish catch exceeded the 30kg threshold, in 2001 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

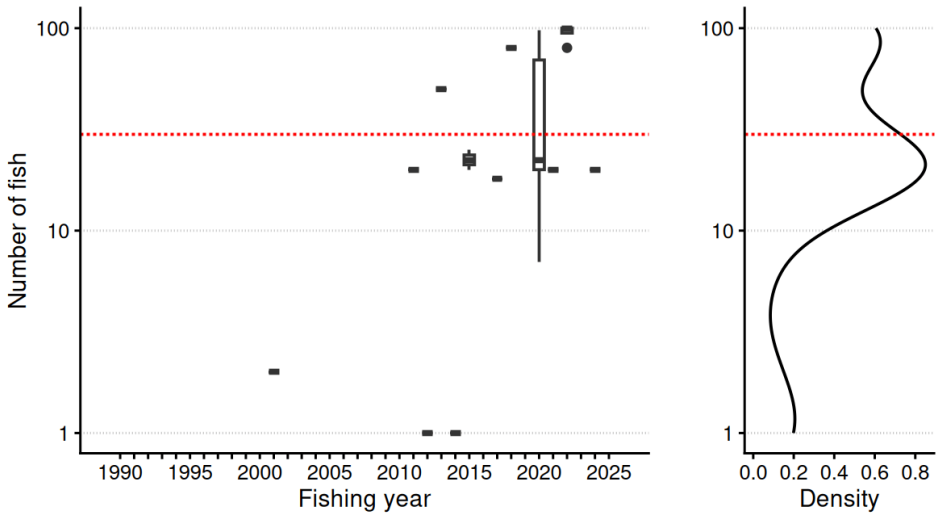


Figure 251: **Length-frequency sample sizes for observed fishing events in CDL 3 where cardinal fish were sampled. The red dashed line indicates a sample size of 30 fish.**

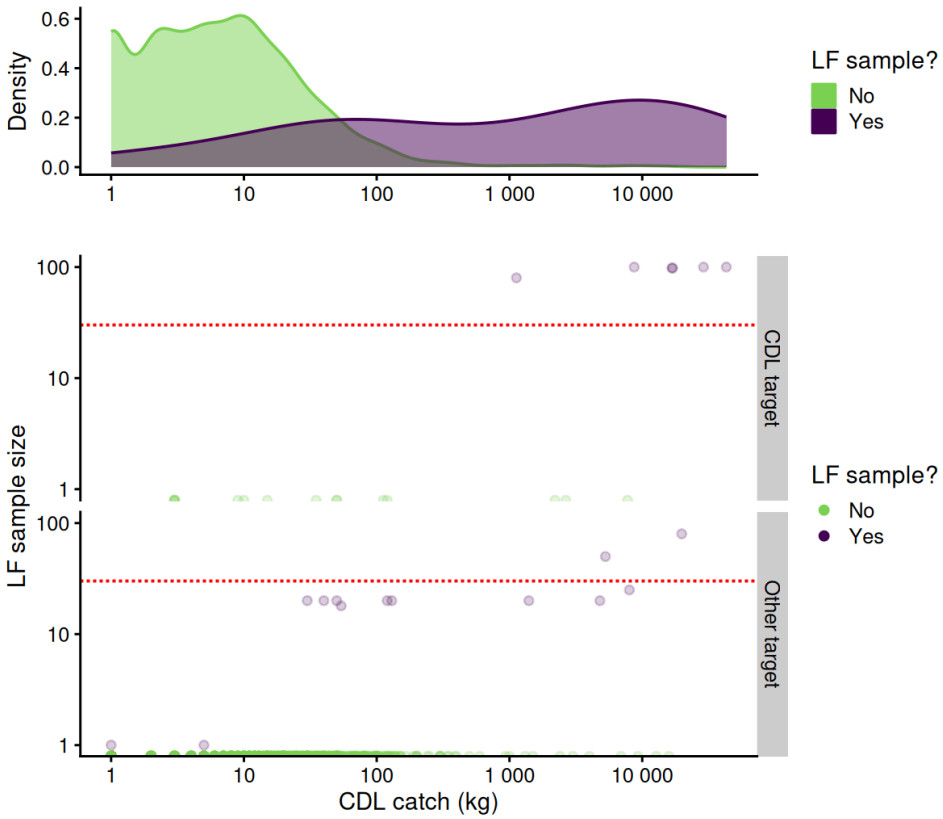


Figure 252: **Length-frequency sample sizes (number of fish sampled) for observed fishing events in CDL 3 in relation to the total cardinal fish catch from an event, separately for cardinal fish target events and other target species. The red dashed line indicates a sample size of 30 fish.**

2.4.3.2 Otolith samples

Table 24: Otolith samples of cardinal fish from the CDL 3 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of cardinal fish exceeded a potential sampling threshold of 30 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	2	0	0	0.00
1991	85	0	0	0.00
1992	40	0	0	0.00
1993	58	0	0	0.00
1994	82	0	0	0.00
1995	24	0	0	0.00
1996	11	0	0	0.00
1997	27	0	0	0.00
1998	24	0	0	0.00
1999	51	0	0	0.00
2000	48	0	0	0.00
2001	28	0	0	0.00
2002	35	0	0	0.00
2003	35	0	0	0.00
2004	33	0	0	0.00
2005	18	0	0	0.00
2006	9	0	0	0.00
2007	25	0	0	0.00
2008	12	0	0	0.00
2009	14	0	0	0.00
2010	26	0	0	0.00
2011	9	1	5	11.11
2012	21	0	0	0.00
2013	9	1	10	11.11
2014	11	1	1	9.09
2015	21	0	0	0.00
2016	11	0	0	0.00
2017	18	1	5	5.56
2018	30	1	5	3.33
2019	28	0	0	0.00
2020	27	4	20	14.81
2021	33	1	5	3.03
2022	34	3	15	8.82
2023	21	0	0	0.00
2024	42	2	10	4.76
2025	22	0	0	0.00

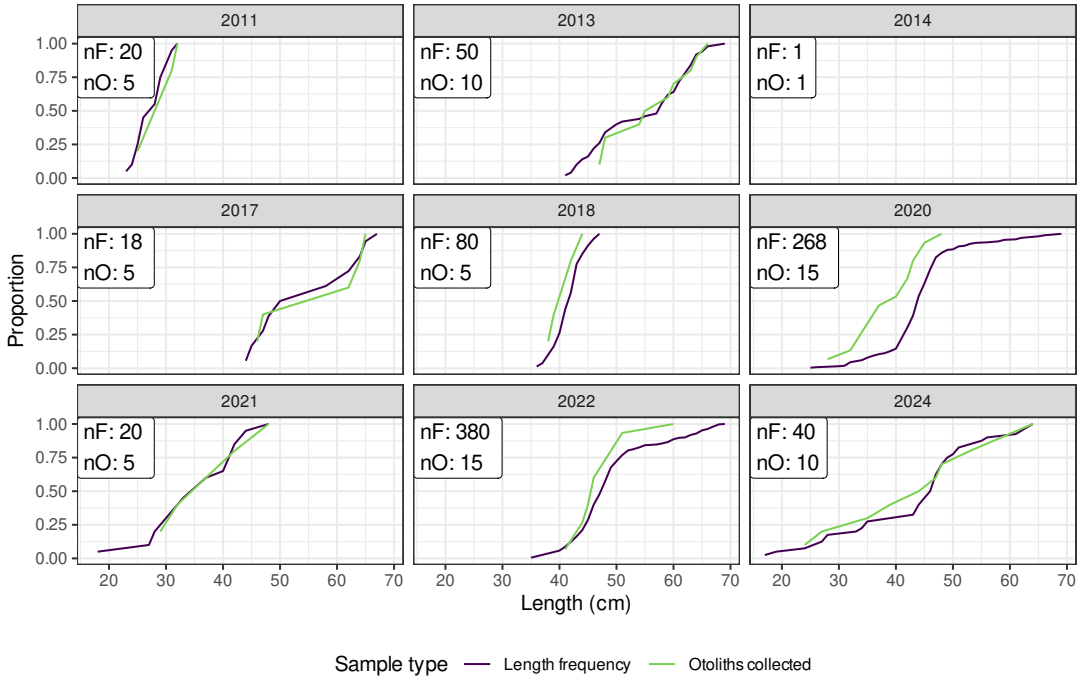


Figure 253: Cumulative distributions of the length of fish in the length frequency and otolith samples of cardinal fish in the CDL 3 Trawl fishery for the 2011 to 2024 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

2.4.3.3 Catch quantification

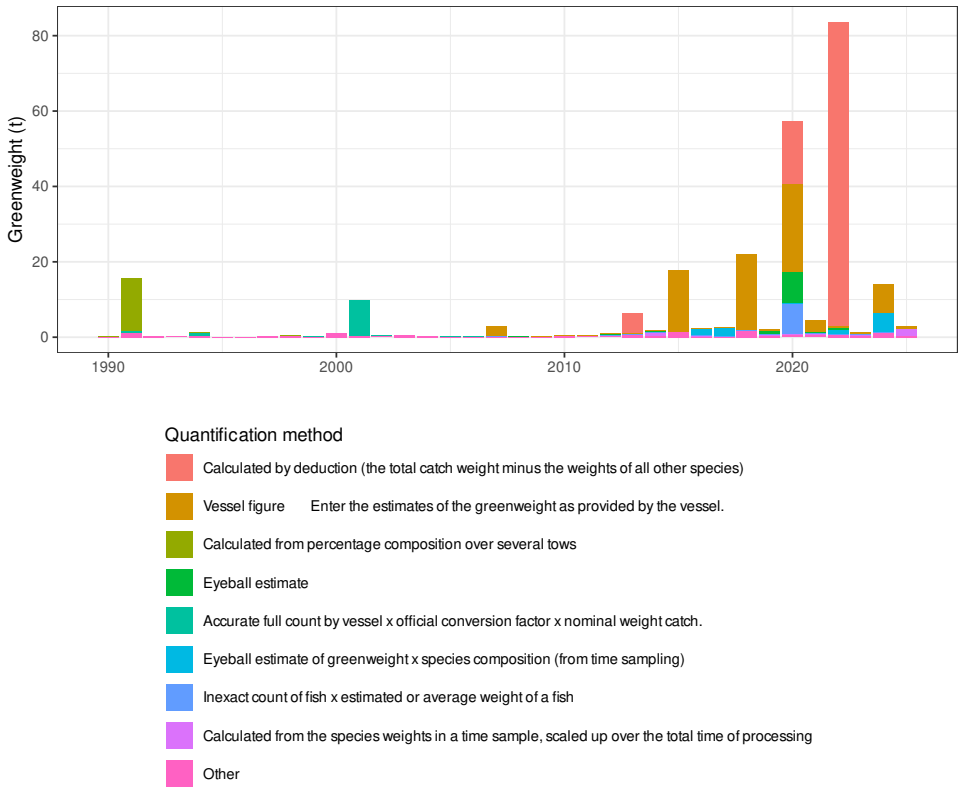


Figure 254: Methods used by observers to quantify the catch of cardinal fish in the CDL 3 Trawl fishery. The legend lists the methods used in descending order of total catch.

2.5 EMA stocks

Observer sampling of blue (english) mackerel is considered with respect to the blue (english) mackerel Quota Management Areas.

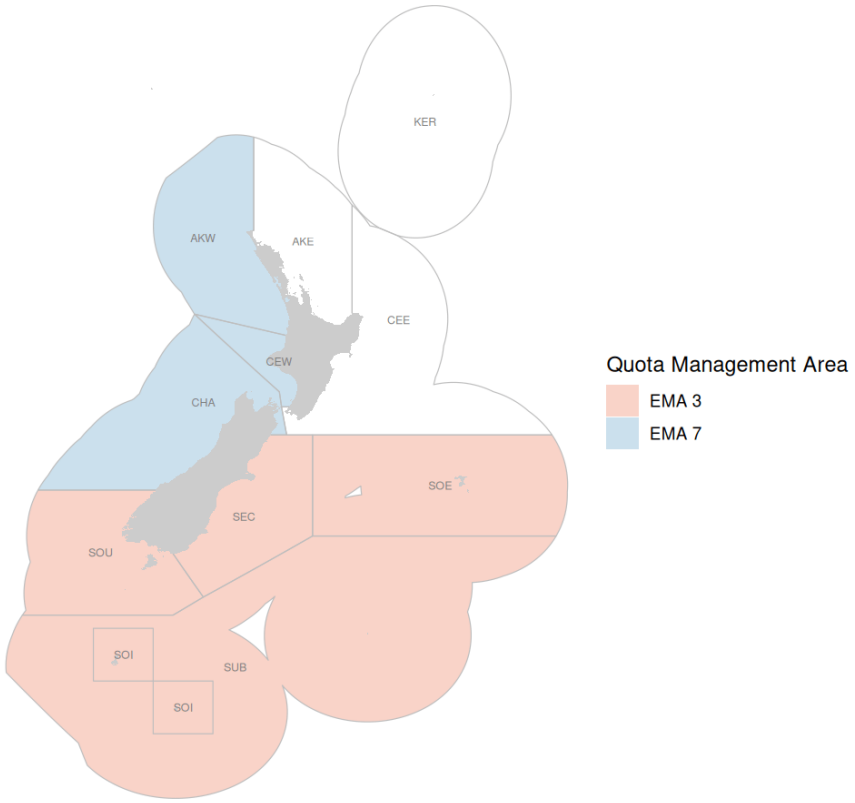


Figure 255: Observer Fisheries Management Areas (black borders, labels on plot) in relation to the Quota Management Area for blue (english) mackerel (coloured areas, per legend).

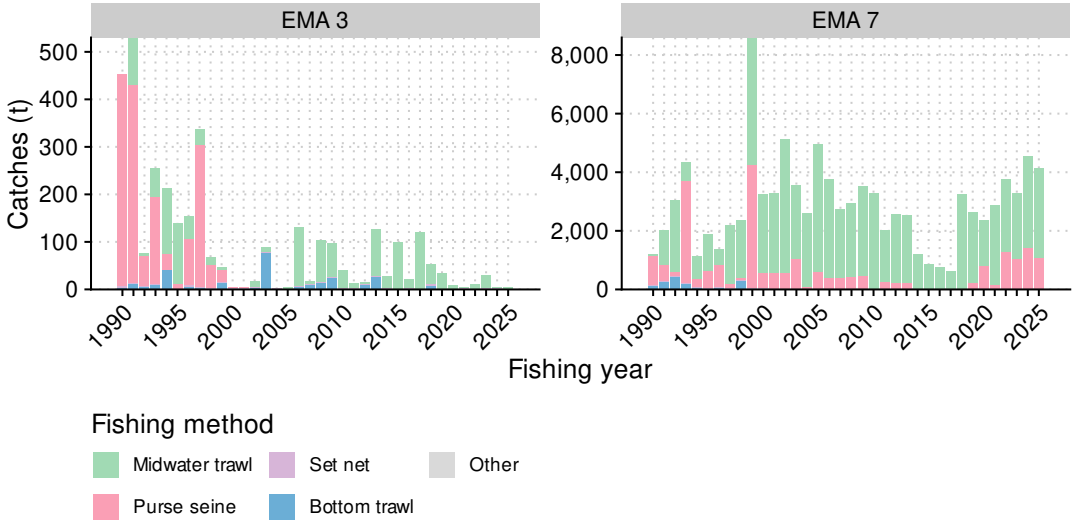


Figure 256: Catches of blue (english) mackerel by fishing method, for events within the blue (english) mackerel Quota Management Areas. Methods grouped as Other include: BLL, BPT, BS, CP, DL, DS, FP, HL, MPT, PL, POT, PRB, PRM, PSH, RLP, T, TL.

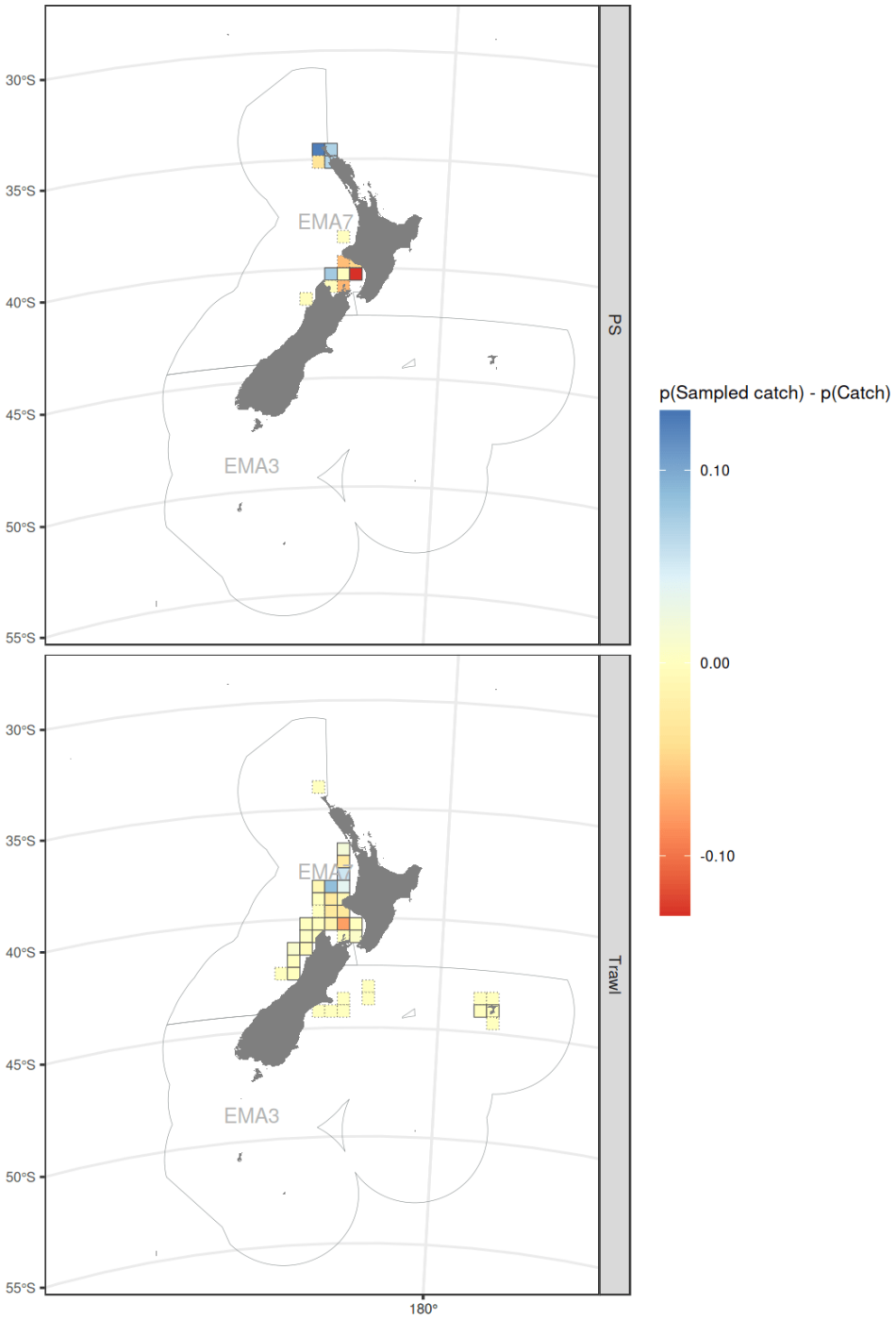


Figure 257: Differences in the relative proportions of catch and sampled catch for blue (english) mackerel during 2021–2025. Cells with a dotted border had no sampling.

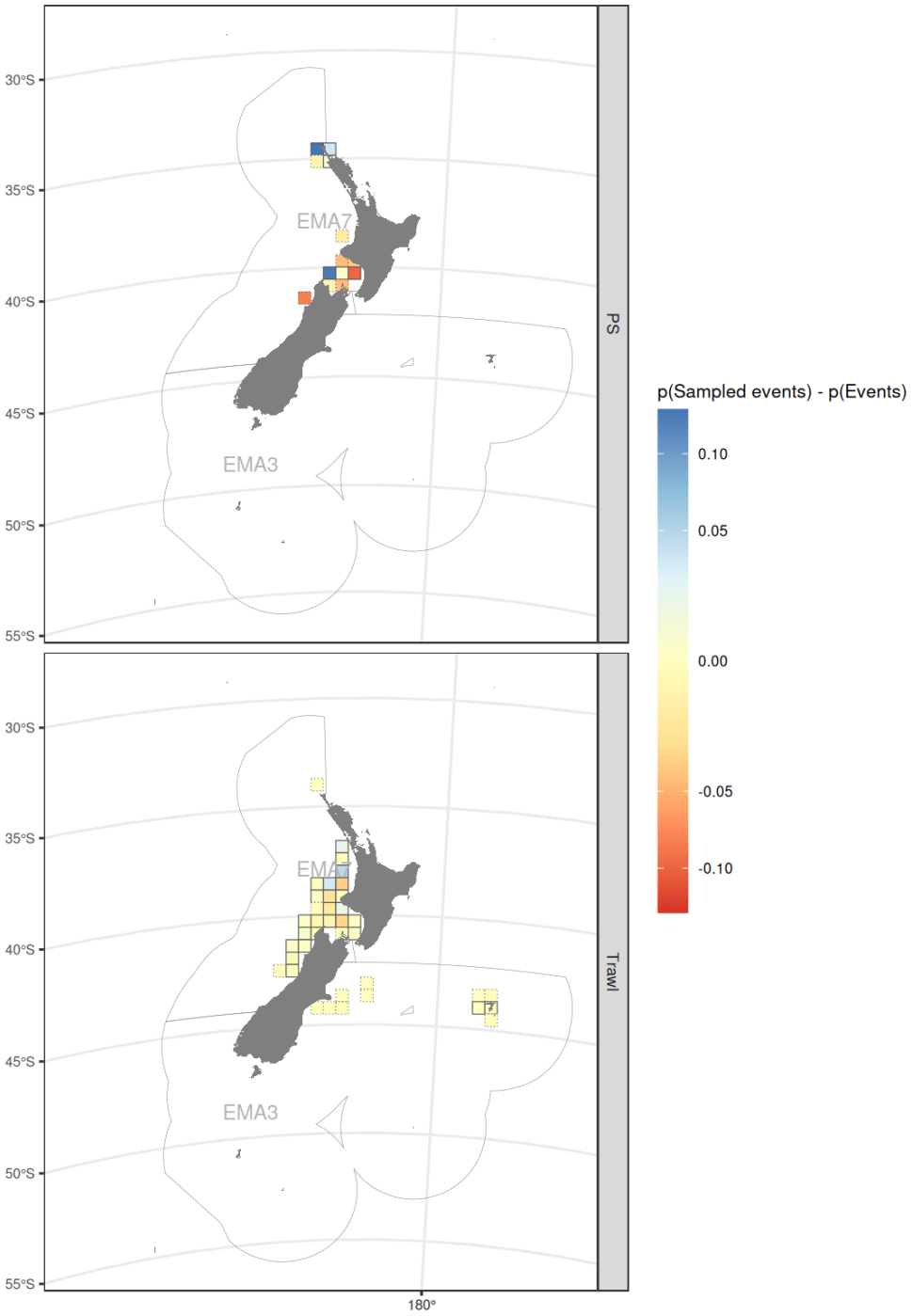


Figure 258: Differences in the relative proportions of events meeting the sampling threshold and sampled events for blue (english) mackerel during 2021–2025. Cells with a dotted border had no sampling.

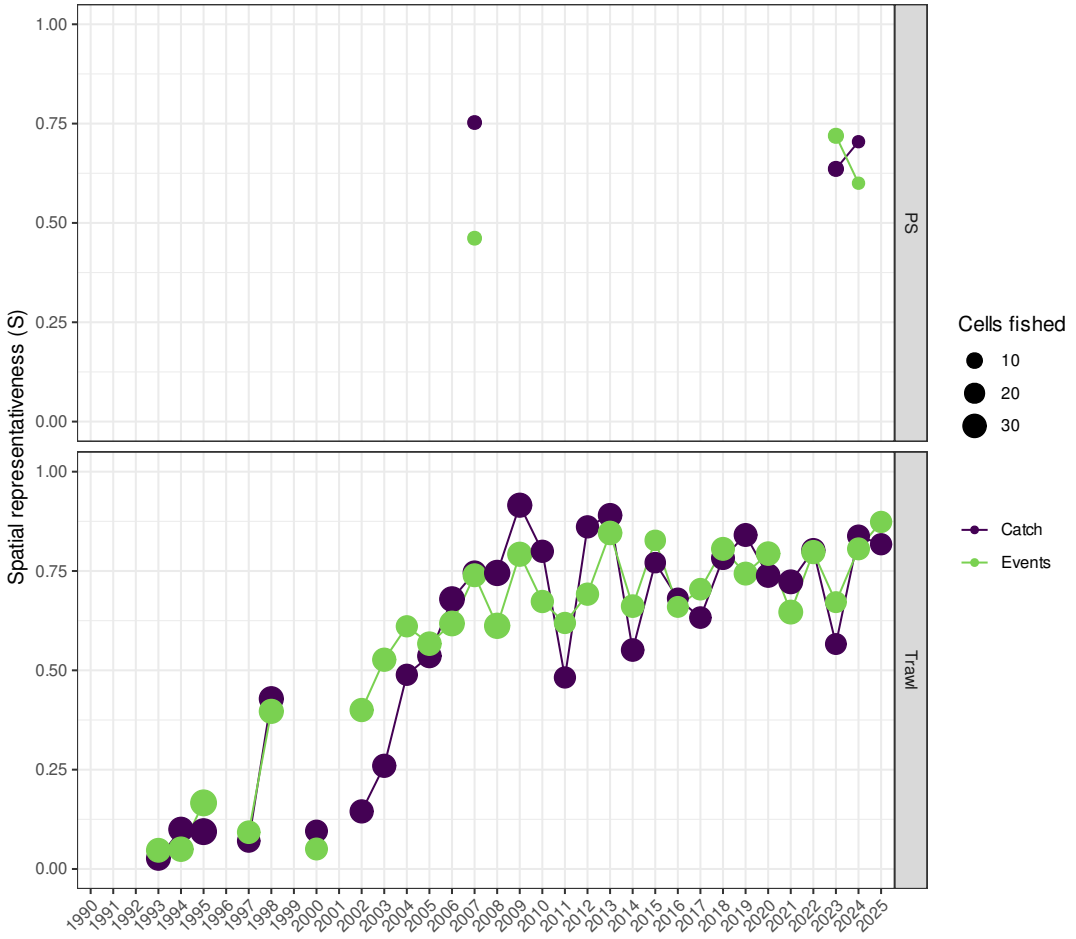


Figure 259: **Spatial representativeness of observer sampling of blue (english) mackerel by fishing year. Representativeness is assessed using the Manhattan distance metric (*S*) applied to 64 km grid cells, for both the proportion of catch sampled and the proportion of positive events sampled.**

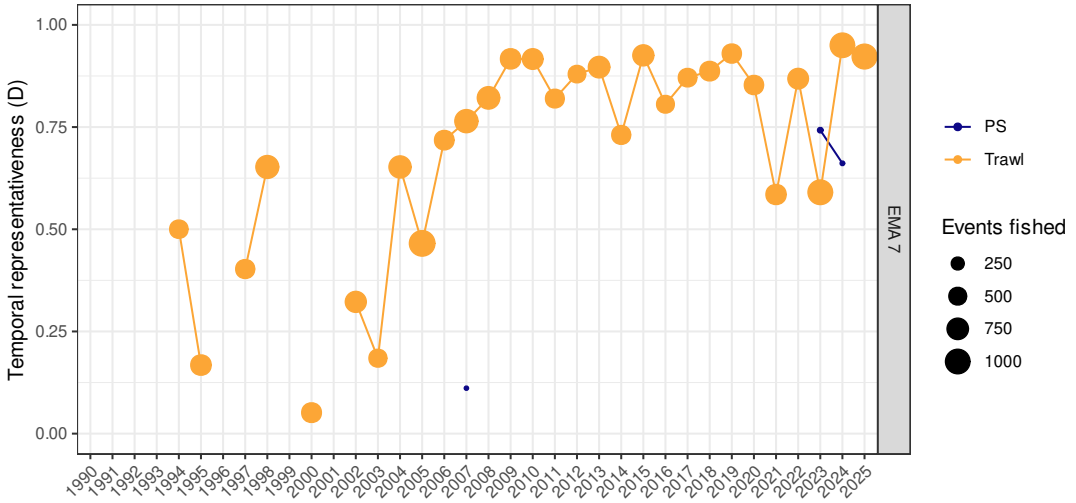


Figure 260: **Temporal representativeness of observer sanpling of blue (english) mackerel by fishing year and area. Temporal representativeness is assessed using the KS statistic (*D*) applied to the start date-times of all fishing events and all sampled fishing events, weighted by catch weight.**

2.5.1 EMA 7: Trawl fishery

2.5.1.1 Length-frequency samples

Table 25: Length-frequency samples of blue (english) mackerel from the EMA 7 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of blue (english) mackerel exceeded a potential sampling threshold of 20 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	324	0	0	0.00
1991	518	0	0	0.00
1992	817	0	0	0.00
1993	542	0	0	0.00
1994	382	1	24	0.26
1995	597	5	135	0.84
1996	340	0	0	0.00
1997	526	1	41	0.19
1998	777	7	427	0.90
1999	762	0	0	0.00
2000	517	1	97	0.19
2001	552	0	0	0.00
2002	715	27	378	3.78
2003	509	57	557	11.20
2004	758	39	2 000	5.15
2005	1 002	35	3 303	3.49
2006	602	72	3 509	11.96
2007	881	139	5 095	15.78
2008	826	164	6 828	19.85
2009	639	135	7 646	21.13
2010	691	126	6 882	18.23
2011	562	68	5 320	12.10
2012	483	166	7 732	34.37
2013	561	250	9 449	44.56
2014	449	202	5 706	44.99
2015	418	246	6 722	58.85
2016	202	172	3 772	85.15
2017	214	74	1 450	34.58
2018	538	137	3 927	25.46
2019	429	145	4 182	33.80
2020	486	127	3 028	26.13
2021	623	60	2 472	9.63
2022	687	74	3 726	10.77
2023	1 004	64	2 178	6.37
2024	991	190	4 849	19.17
2025	1 018	156	4 844	15.32

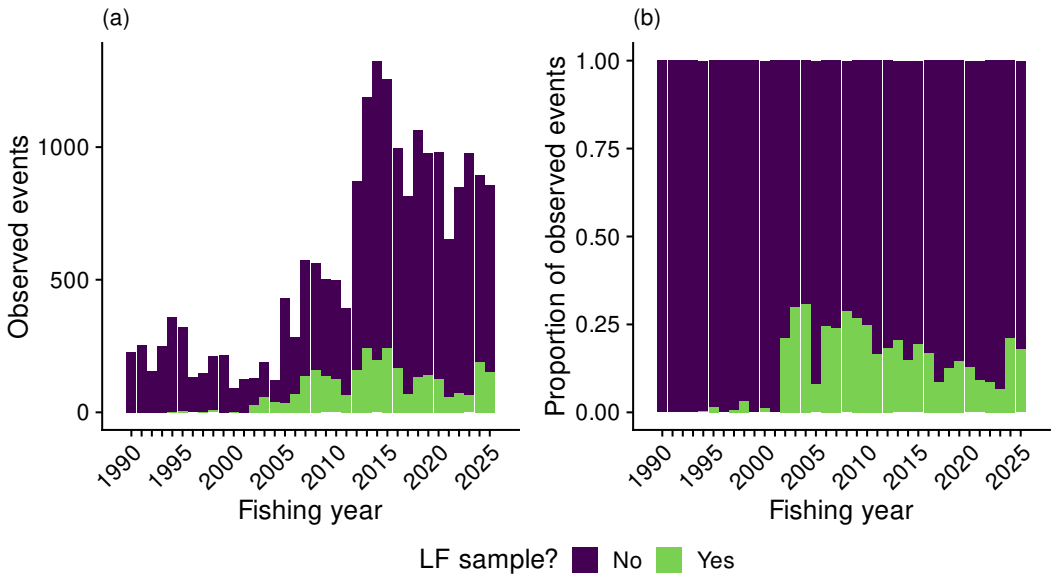


Figure 261: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in EMA 7 where the blue (english) mackerel catch exceeded the 20 kg threshold, with and without length-frequency sampling.**

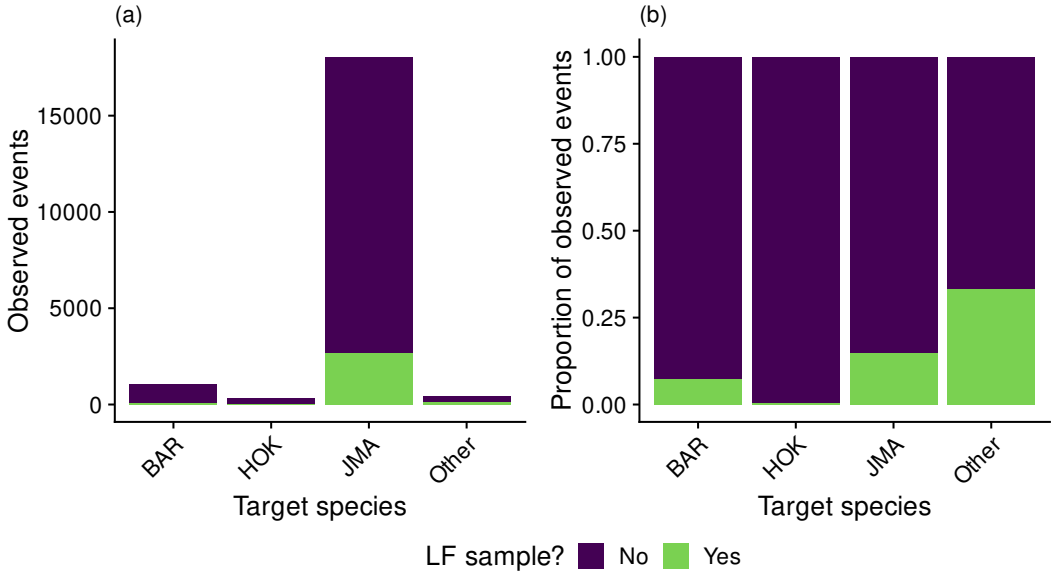


Figure 262: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in EMA 7 where the blue (english) mackerel catch exceeded the 20 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

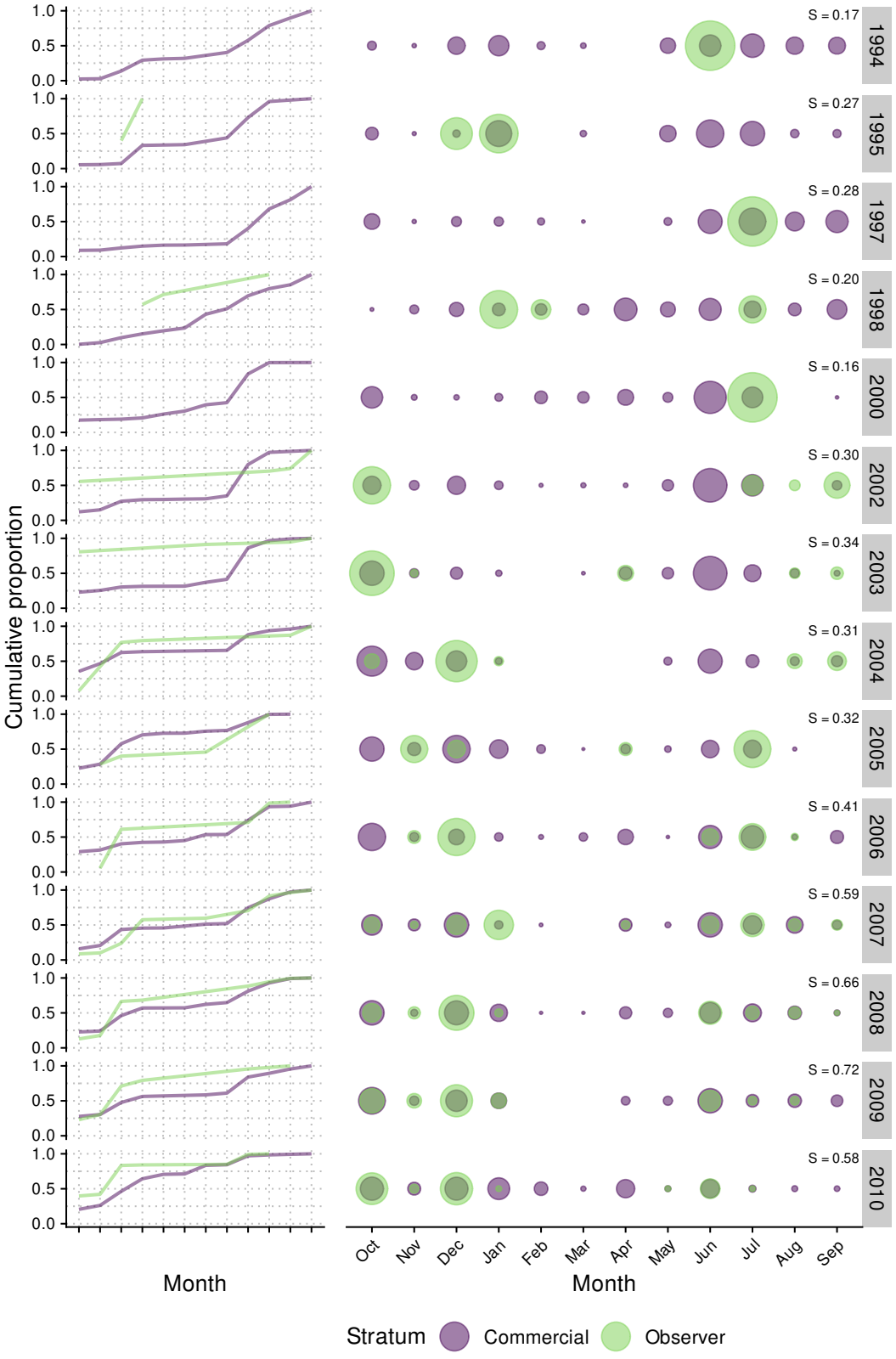


Figure 263: Monthly representativeness of observer sampling coverage of Trawl fishing events in EMA 7, where the blue (english) mackerel catch exceeded the 20kg threshold, in 1994 to 2010. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

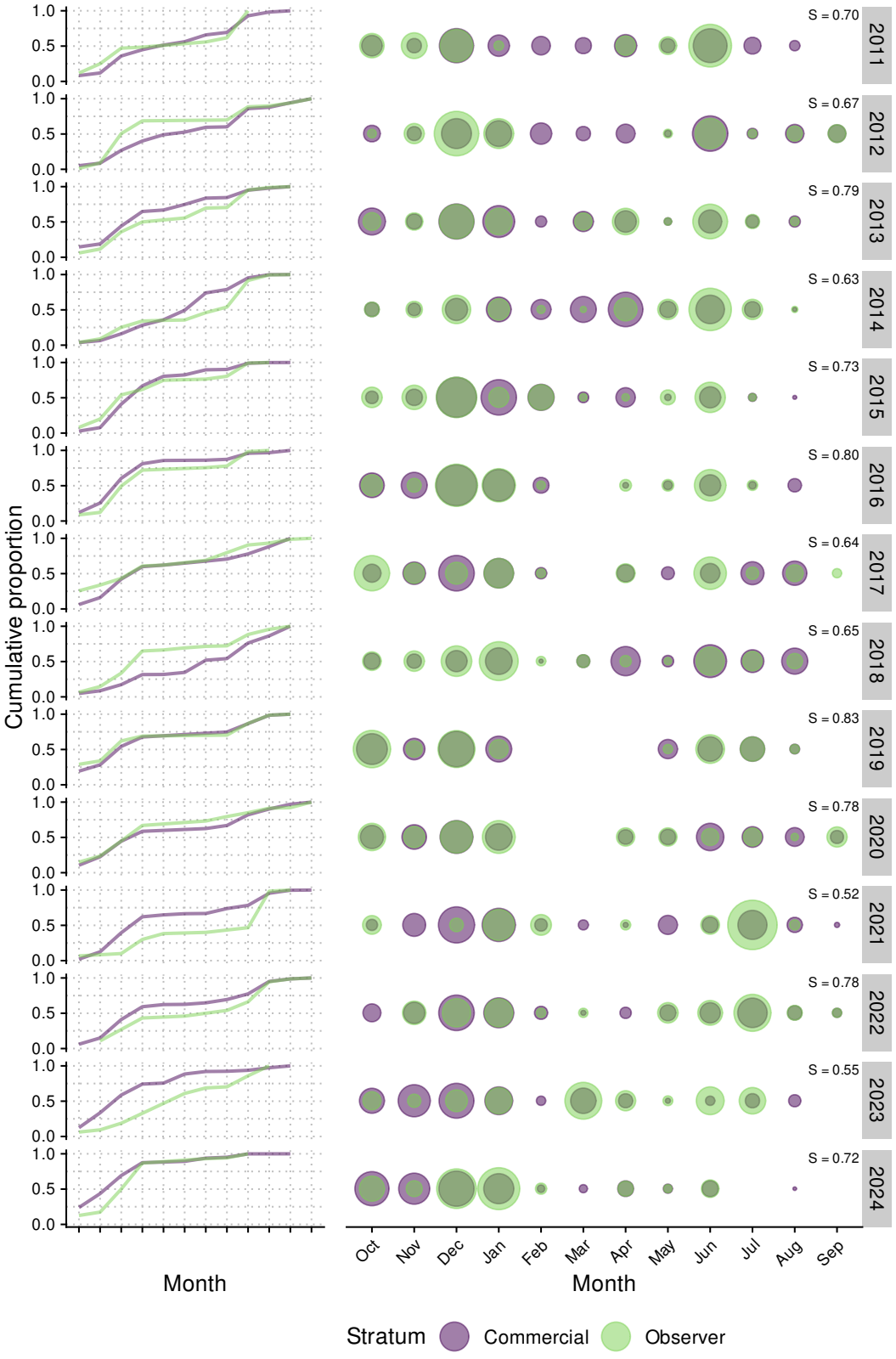


Figure 264: Monthly representativeness of observer sampling coverage of Trawl fishing events in EMA 7, where the blue (english) mackerel catch exceeded the 20kg threshold, in 2011 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

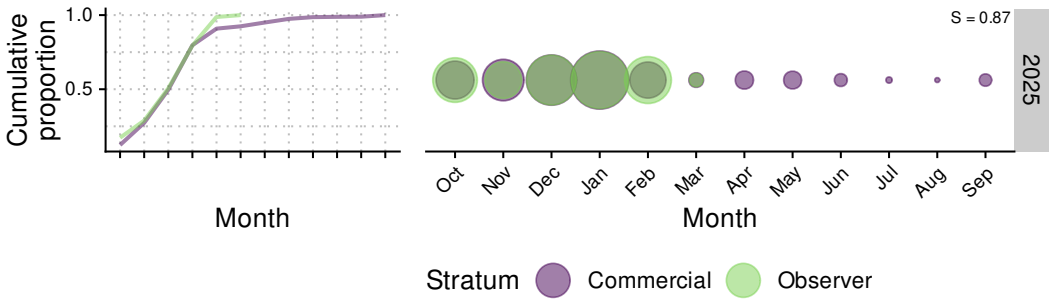


Figure 265: **Monthly representativeness of observer sampling coverage of Trawl fishing events in EMA 7, where the blue (english) mackerel catch exceeded the 20kg threshold, in 2025 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

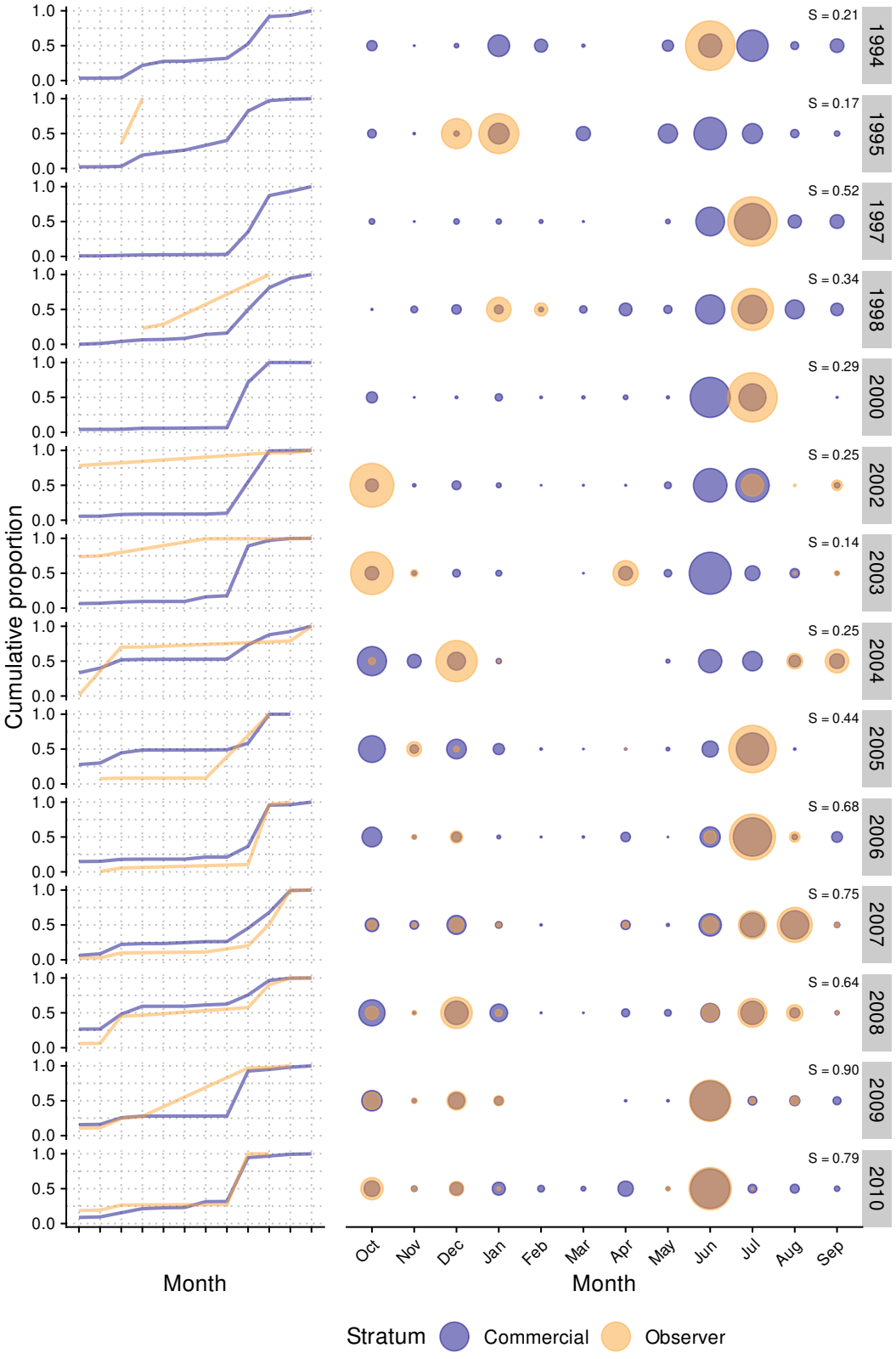


Figure 266: Monthly representativeness of observer sampling coverage of Trawl catch in EMA 7, from events where the blue (english) mackerel catch exceeded the 20kg threshold, in 1994 to 2010. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

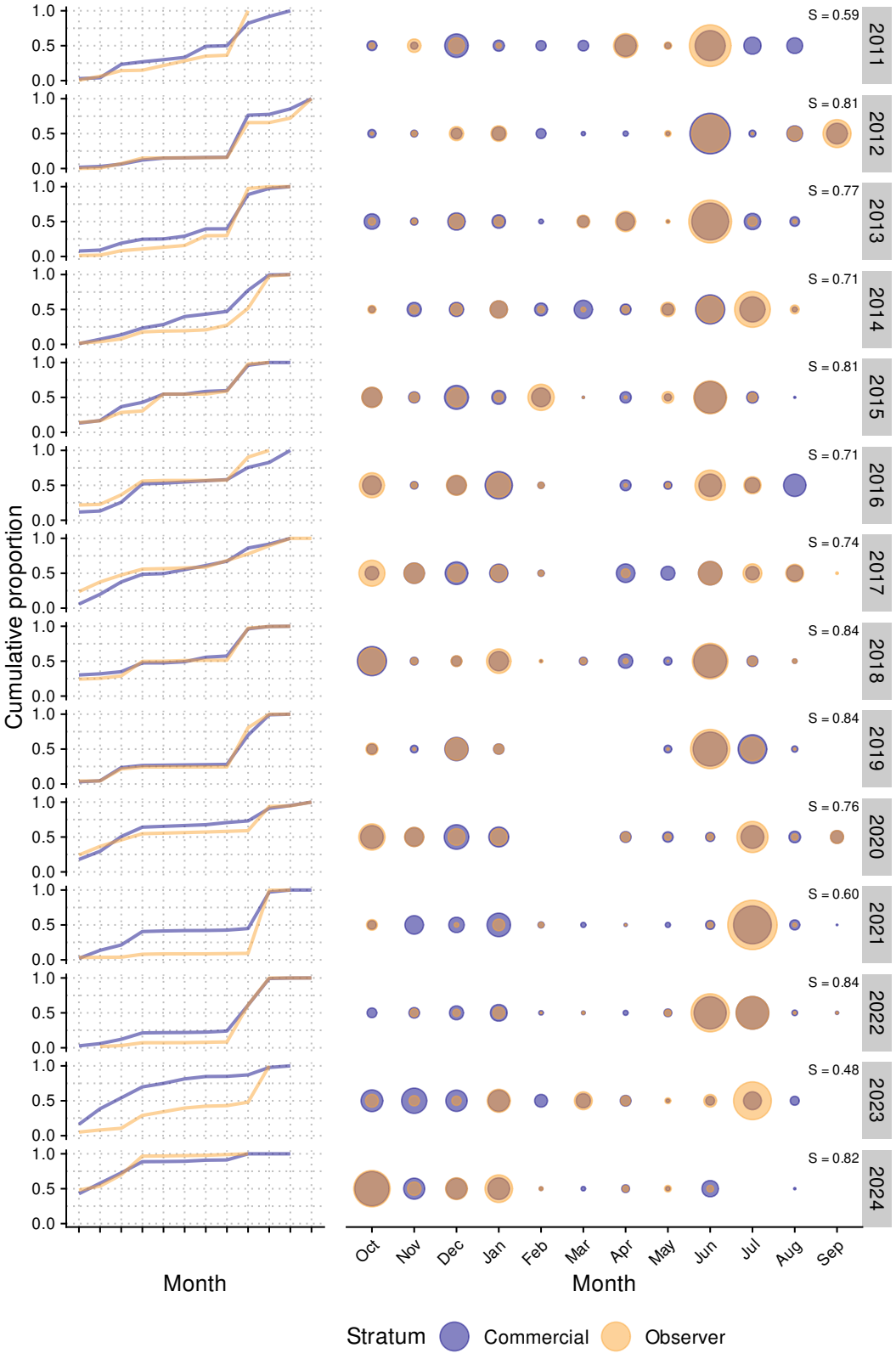


Figure 267: **Monthly representativeness of observer sampling coverage of Trawl catch in EMA 7, from events where the blue (english) mackerel catch exceeded the 20kg threshold, in 2011 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

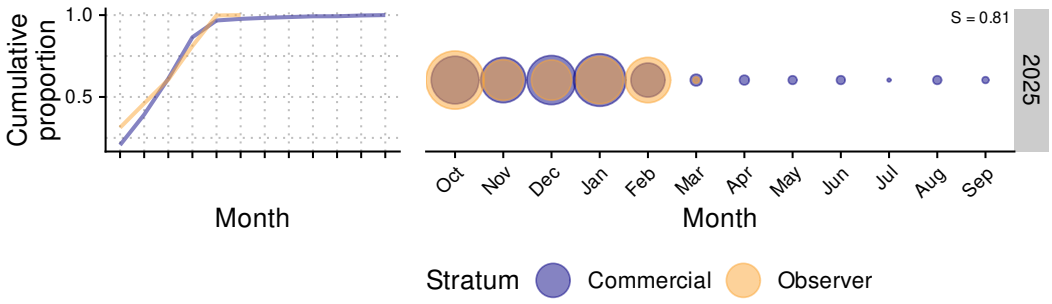


Figure 268: **Monthly representativeness of observer sampling coverage of Trawl catch in EMA 7, from events where the blue (english) mackerel catch exceeded the 20kg threshold, in 2025 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

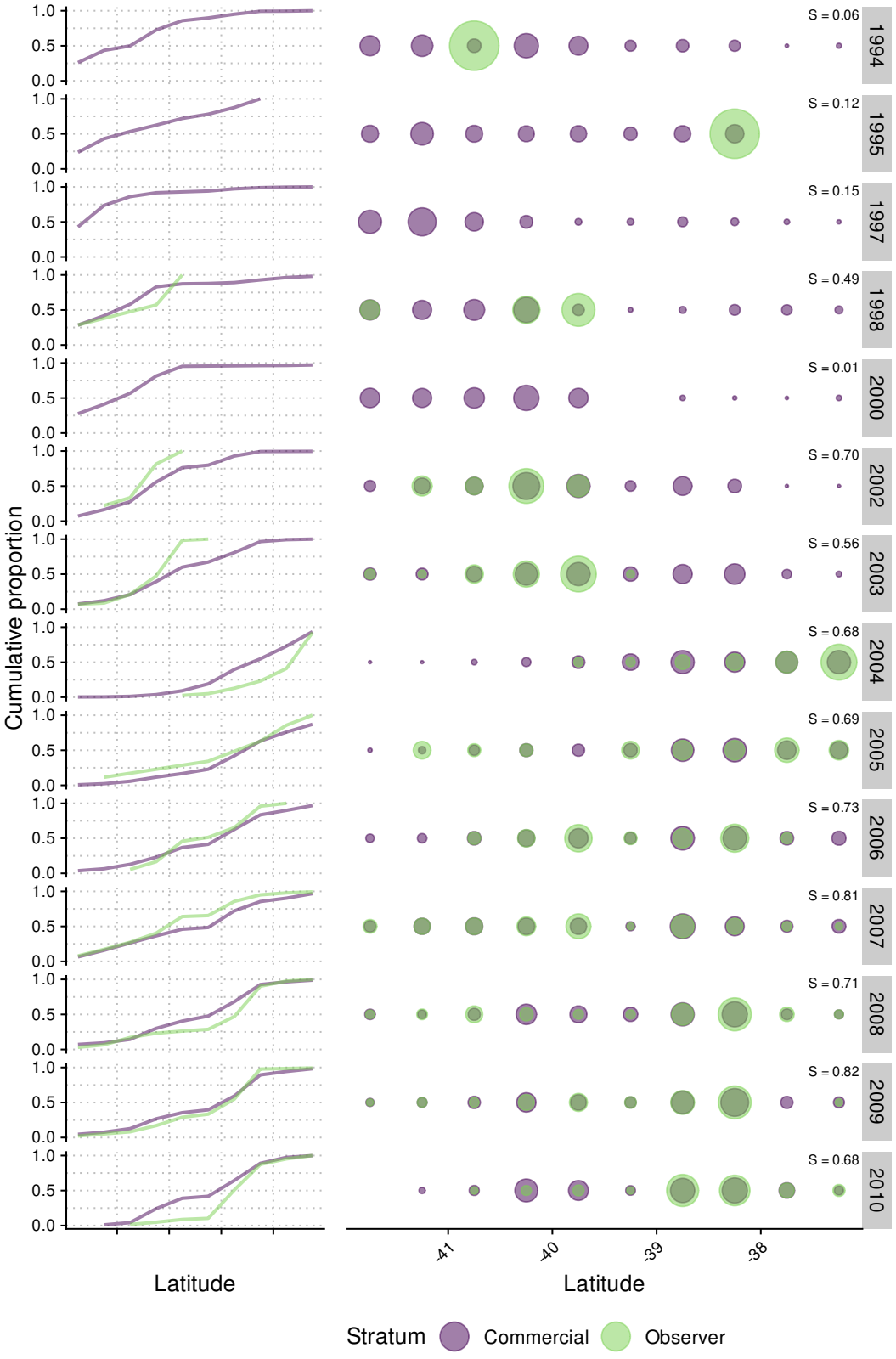


Figure 269: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in EMA 7, where the blue (english) mackerel catch exceeded the 20kg threshold, in 1994 to 2010. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

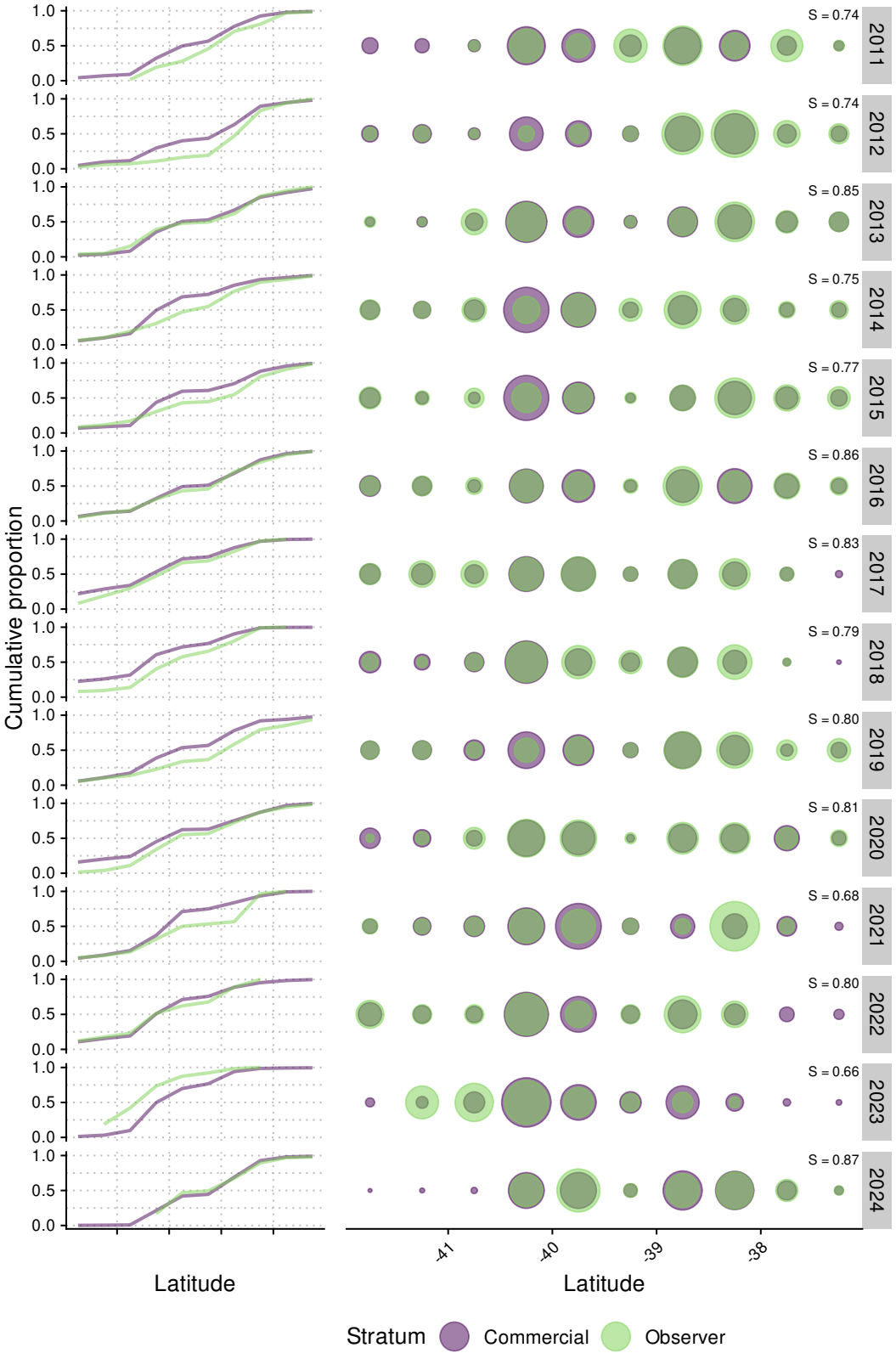


Figure 270: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in EMA 7, where the blue (english) mackerel catch exceeded the 20kg threshold, in 2011 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

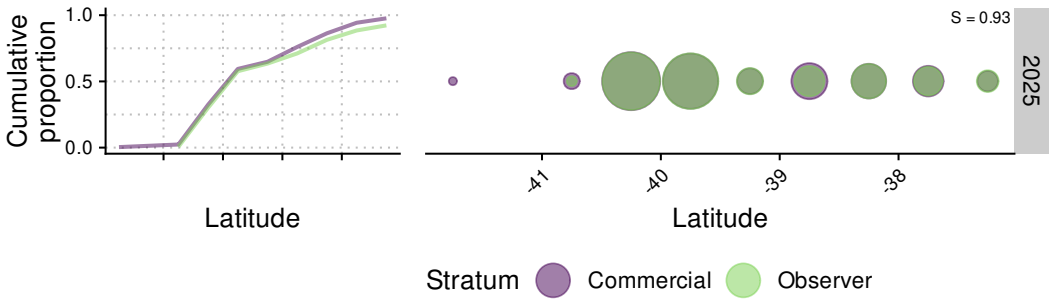


Figure 271: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in EMA 7, where the blue (english) mackerel catch exceeded the 20kg threshold, in 2025 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

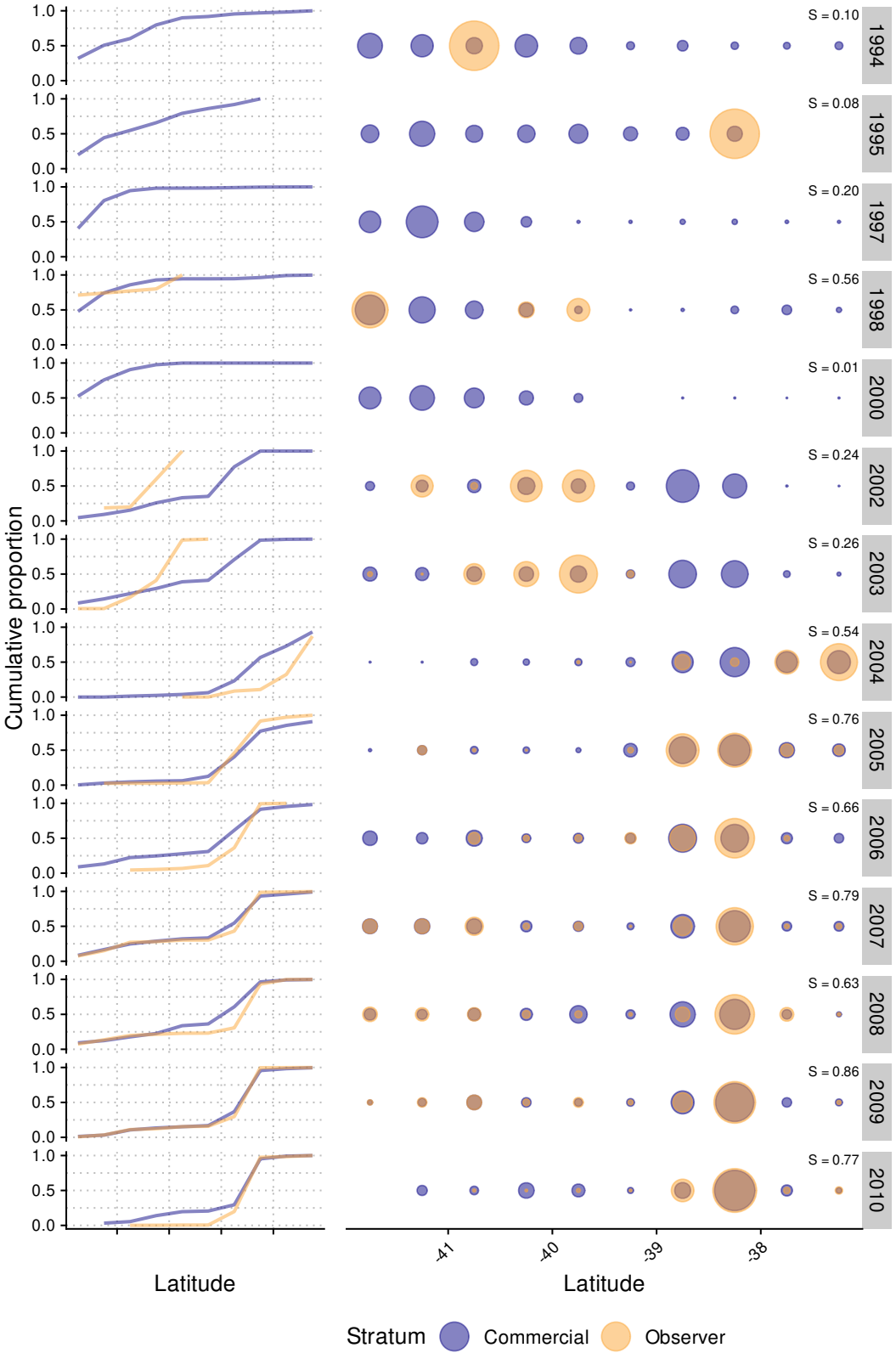


Figure 272: **Latitudinal representativeness of observer sampling coverage of Trawl catch in EMA 7, from events where the blue (english) mackerel catch exceeded the 20kg threshold, in 1994 to 2010. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

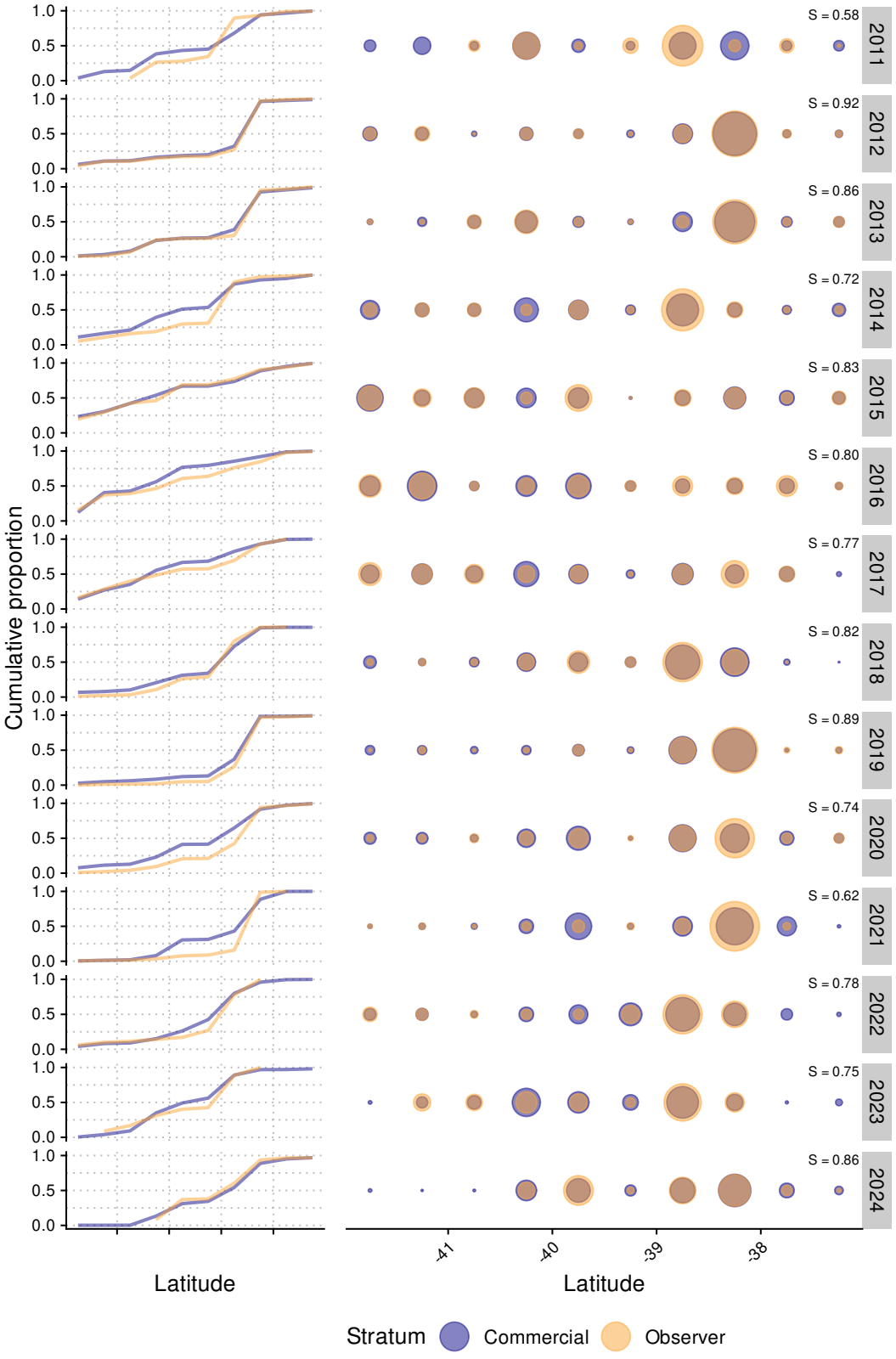


Figure 273: **Latitudinal representativeness of observer sampling coverage of Trawl catch in EMA 7, from events where the blue (english) mackerel catch exceeded the 20kg threshold, in 2011 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

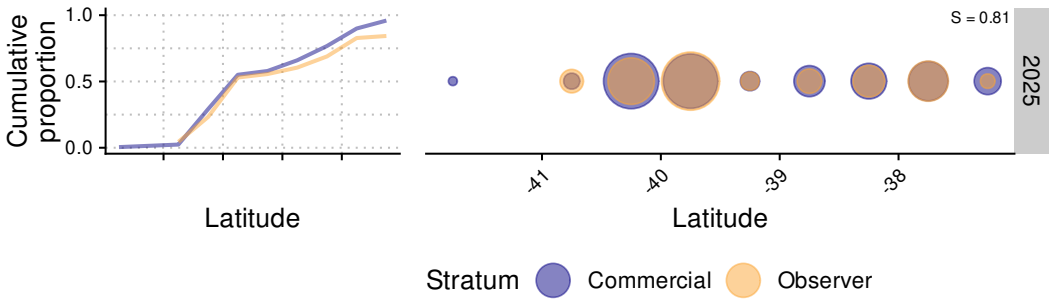


Figure 274: **Latitudinal representativeness of observer sampling coverage of Trawl catch in EMA 7, from events where the blue (english) mackerel catch exceeded the 20kg threshold, in 2025 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

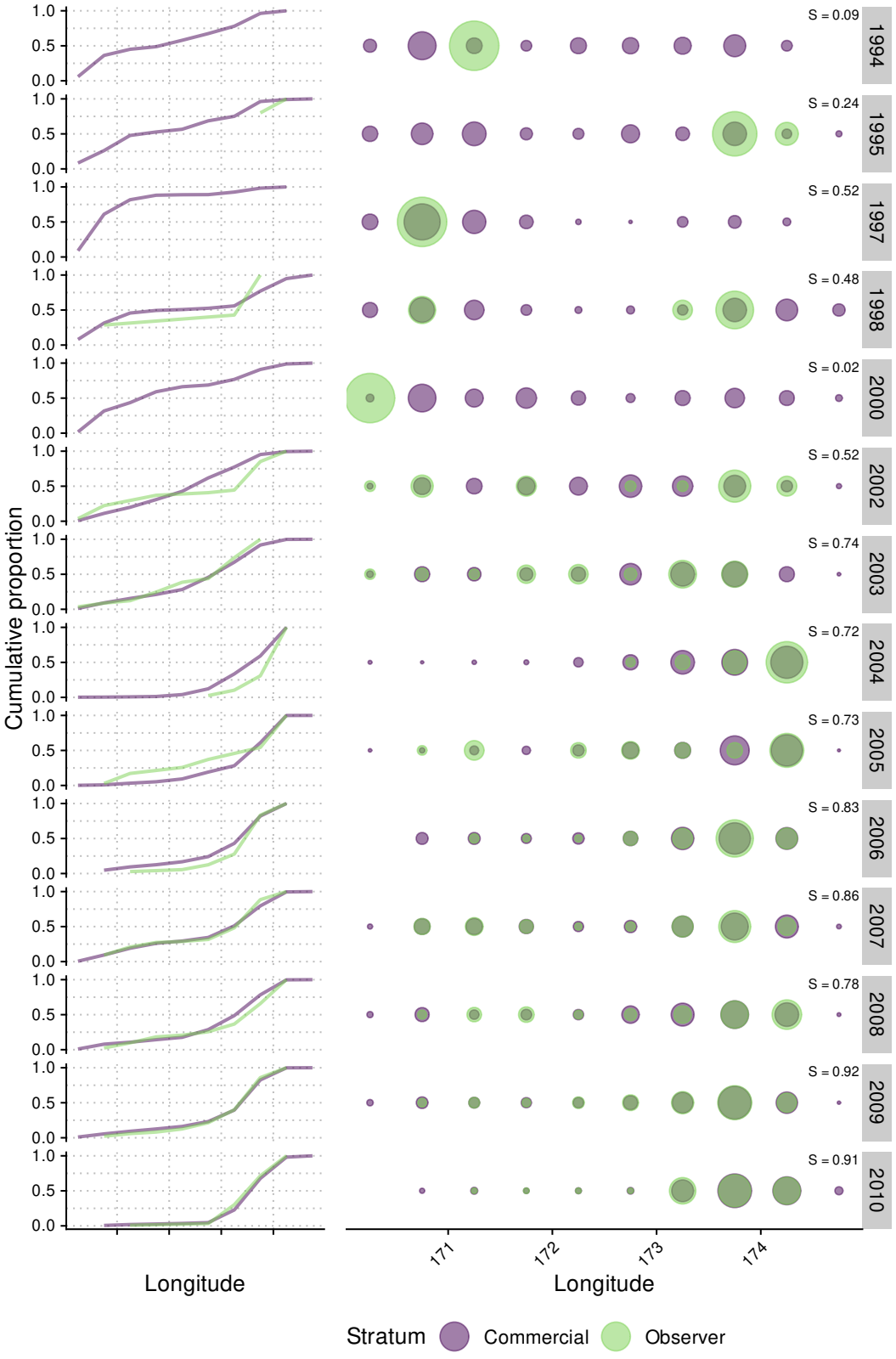


Figure 275: **Longitudinal representativeness of observer sampling coverage of Trawl fishing events in EMA 7, where the blue (english) mackerel catch exceeded the 20kg threshold, in 1994 to 2010. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

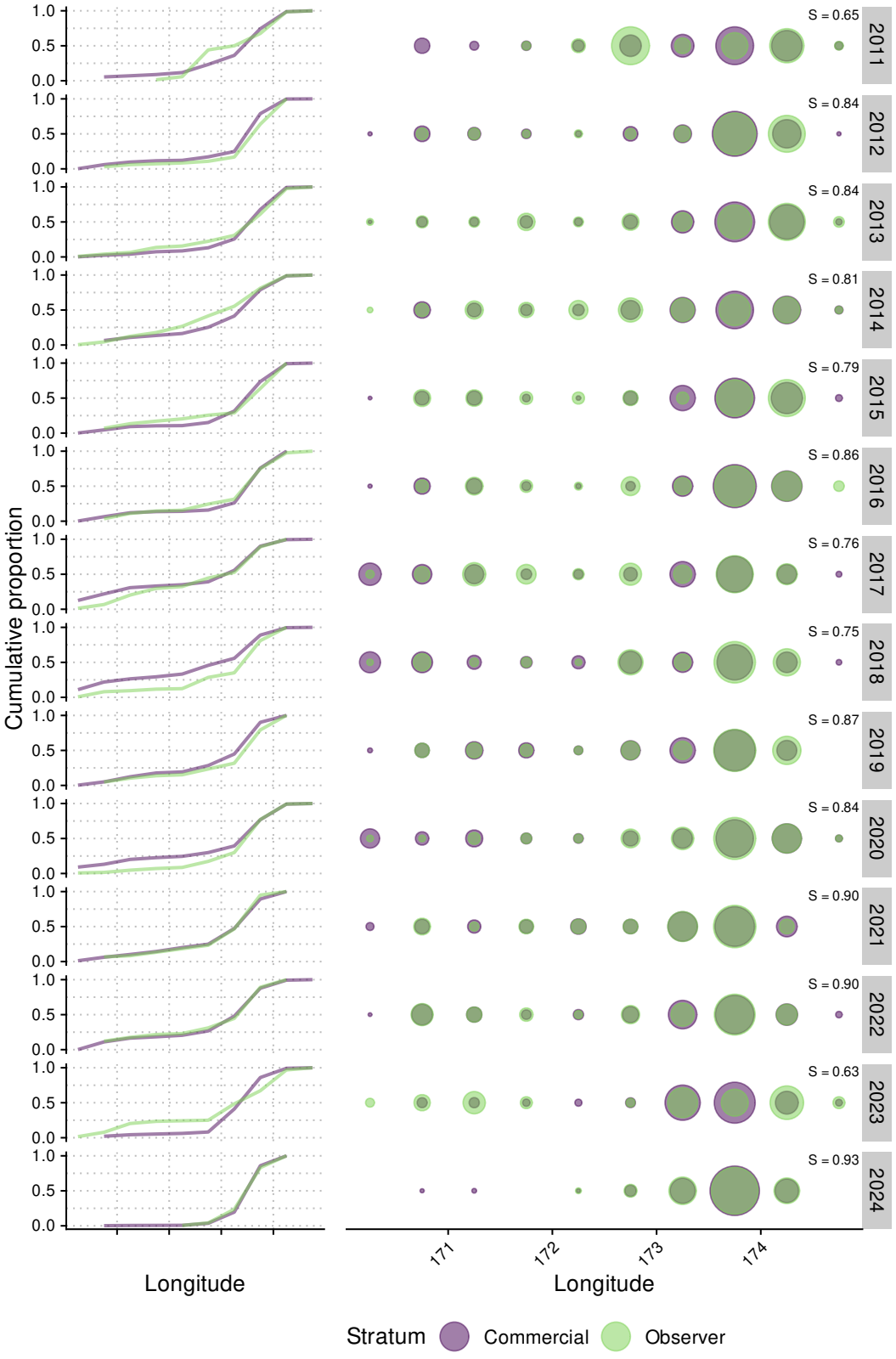


Figure 276: **Longitudinal representativeness of observer sampling coverage of Trawl fishing events in EMA 7, where the blue (english) mackerel catch exceeded the 20kg threshold, in 2011 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

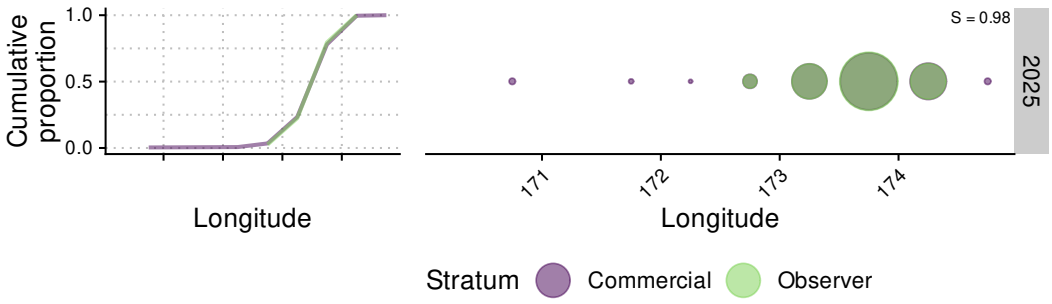


Figure 277: **Longitudinal representativeness of observer sampling coverage of Trawl fishing events in EMA 7, where the blue (english) mackerel catch exceeded the 20kg threshold, in 2025 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

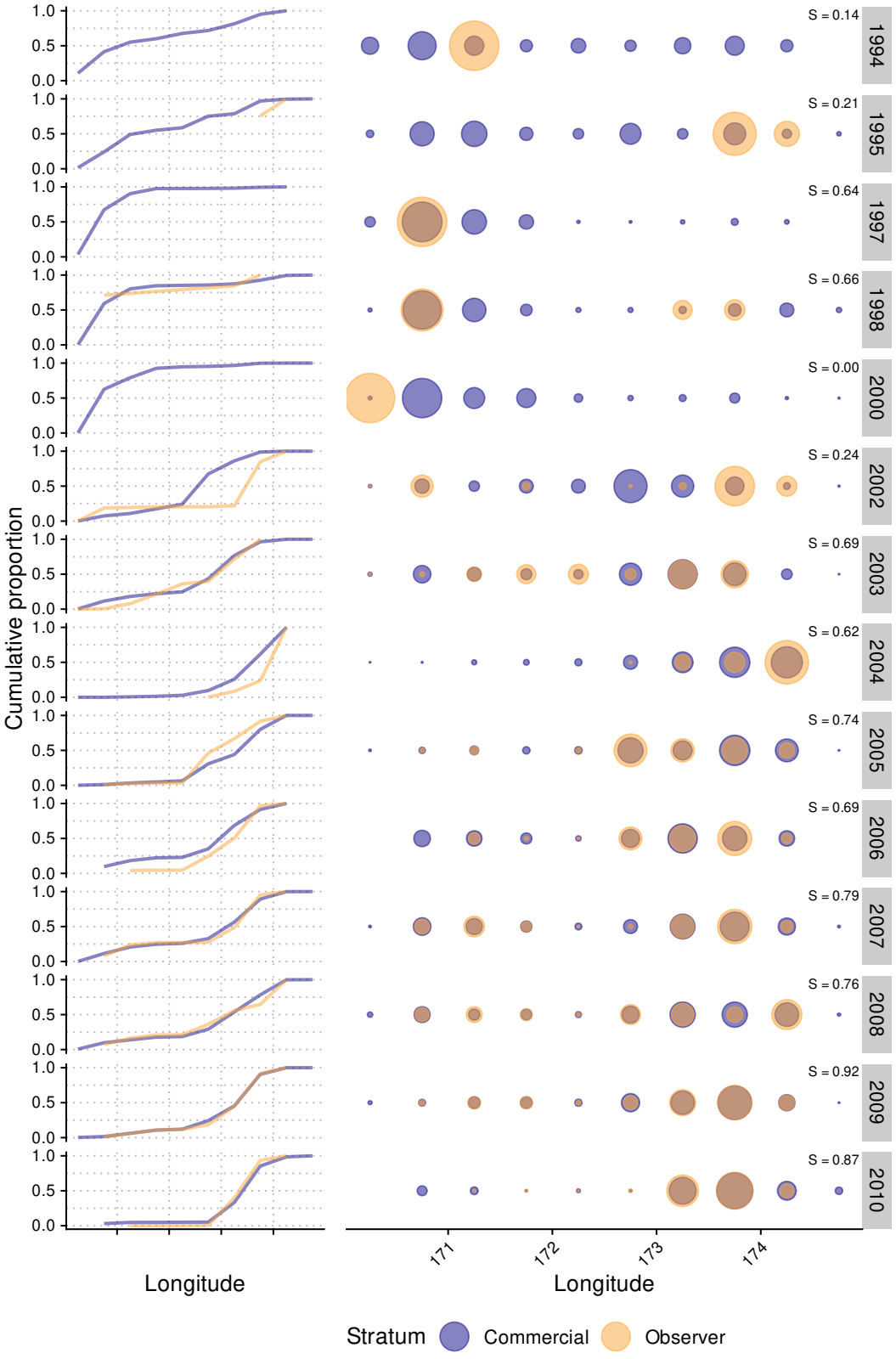


Figure 278: **Longitudinal representativeness of observer sampling coverage of Trawl catch in EMA 7, from events where the blue (english) mackerel catch exceeded the 20kg threshold, in 1994 to 2010. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

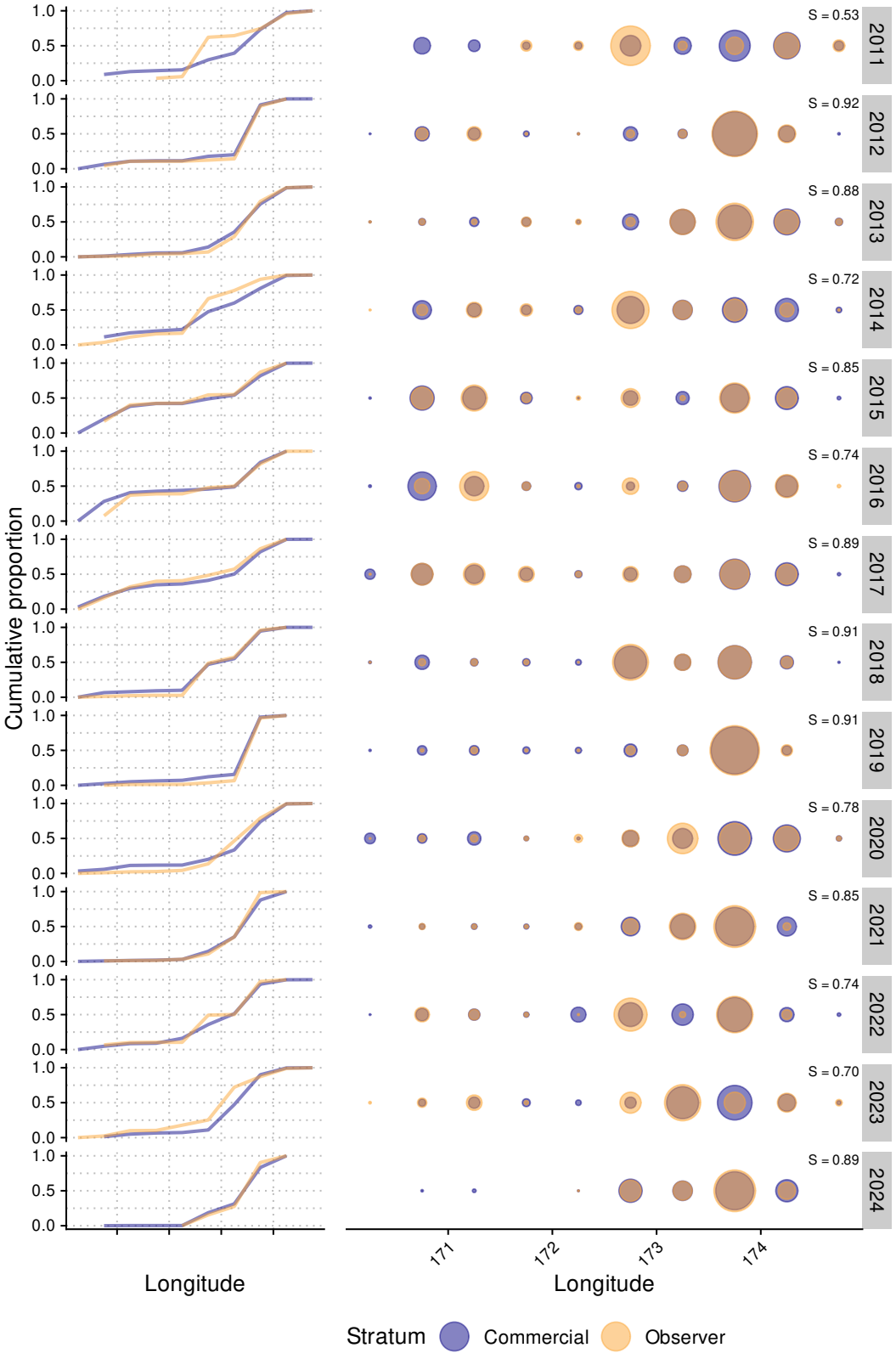


Figure 279: **Longitudinal representativeness of observer sampling coverage of Trawl catch in EMA 7, from events where the blue (english) mackerel catch exceeded the 20kg threshold, in 2011 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

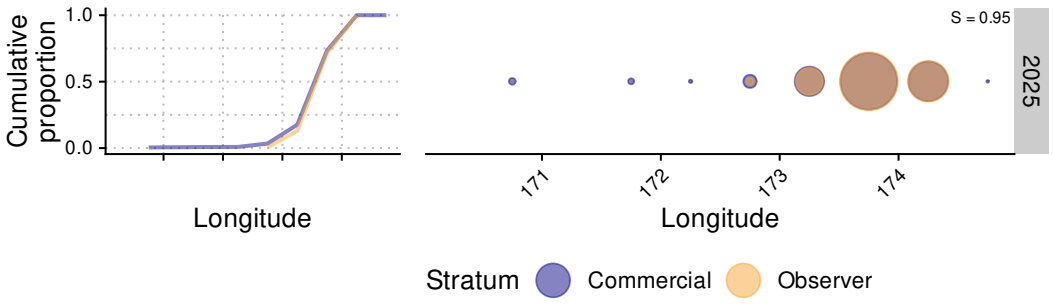


Figure 280: **Longitudinal representativeness of observer sampling coverage of Trawl catch in EMA 7, from events where the blue (english) mackerel catch exceeded the 20kg threshold, in 2025 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

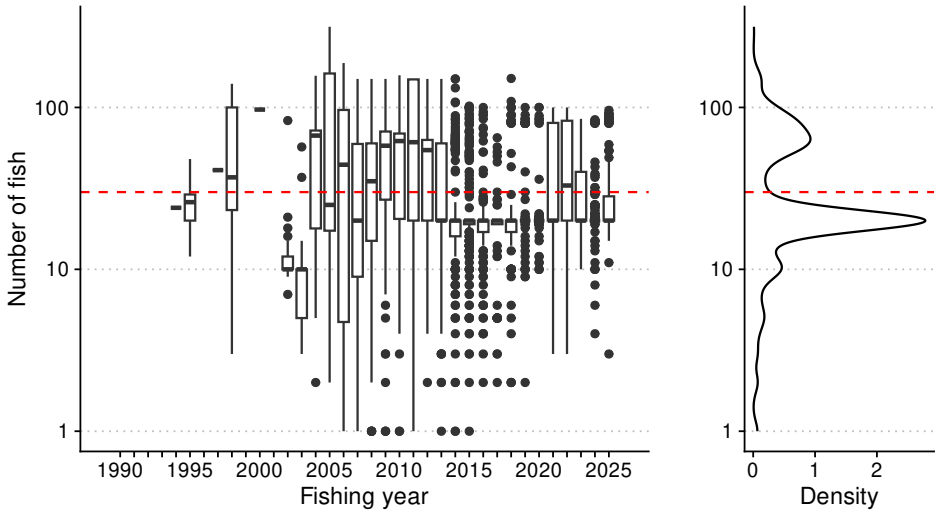


Figure 281: **Length-frequency sample sizes for observed fishing events in EMA 7 where blue (english) mackerel were sampled. The red dashed line indicates a sample size of 30 fish.**

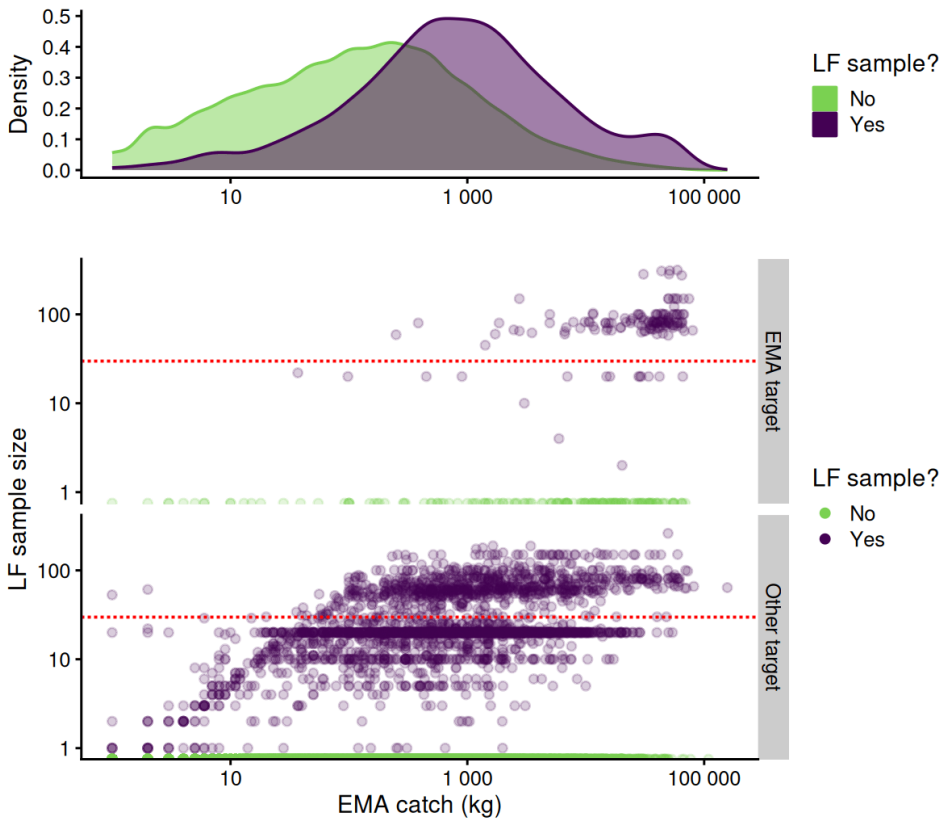


Figure 282: **Length-frequency sample sizes (number of fish sampled) for observed fishing events in EMA 7 in relation to the total blue (english) mackerel catch from an event, separately for blue (english) mackerel target events and other target species. The red dashed line indicates a sample size of 30 fish.**

2.5.1.2 Otolith samples

Table 26: Otolith samples of blue (english) mackerel from the EMA 7 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of blue (english) mackerel exceeded a potential sampling threshold of 20 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	324	0	0	0.00
1991	518	0	0	0.00
1992	817	0	0	0.00
1993	542	0	0	0.00
1994	382	0	0	0.00
1995	597	0	0	0.00
1996	340	0	0	0.00
1997	526	0	0	0.00
1998	777	0	0	0.00
1999	762	0	0	0.00
2000	517	0	0	0.00
2001	552	0	0	0.00
2002	715	0	0	0.00
2003	509	0	0	0.00
2004	758	0	0	0.00
2005	1 002	0	0	0.00
2006	602	0	0	0.00
2007	881	0	0	0.00
2008	826	0	0	0.00
2009	639	1	5	0.16
2010	691	0	0	0.00
2011	562	11	116	1.96
2012	483	104	683	21.53
2013	561	176	1 363	31.37
2014	449	126	791	28.06
2015	418	43	237	10.29
2016	202	63	313	31.19
2017	214	67	344	31.31
2018	538	126	709	23.42
2019	429	143	737	33.33
2020	486	125	643	25.72
2021	623	54	356	8.67
2022	687	68	427	9.90
2023	1 004	60	316	5.98
2024	991	188	955	18.97
2025	1 018	151	896	14.83

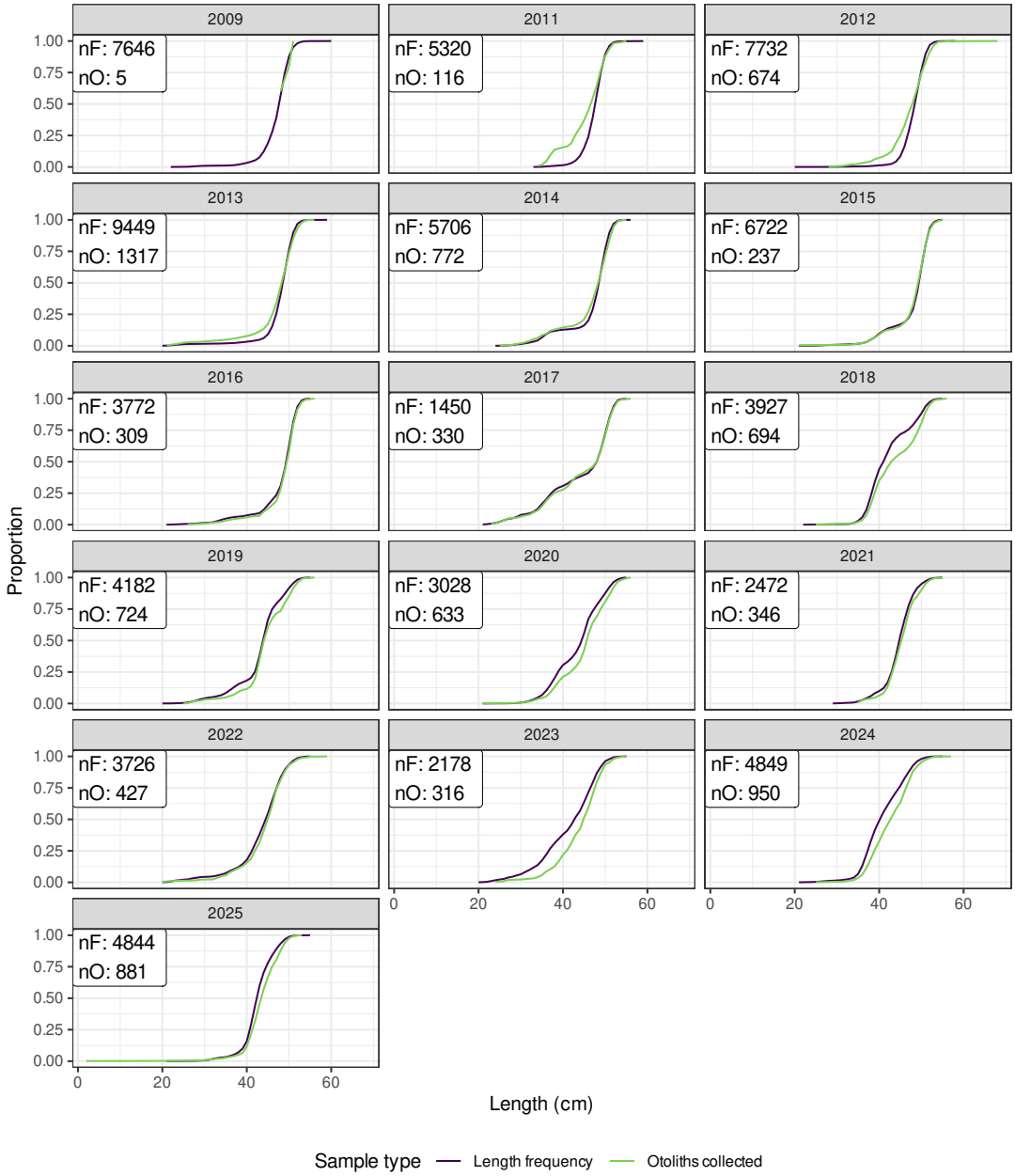


Figure 283: Cumulative distributions of the length of fish in the length frequency and otolith samples of blue (english) mackerel in the EMA 7 Trawl fishery for the 2009 to 2025 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

2.5.1.3 Catch quantification

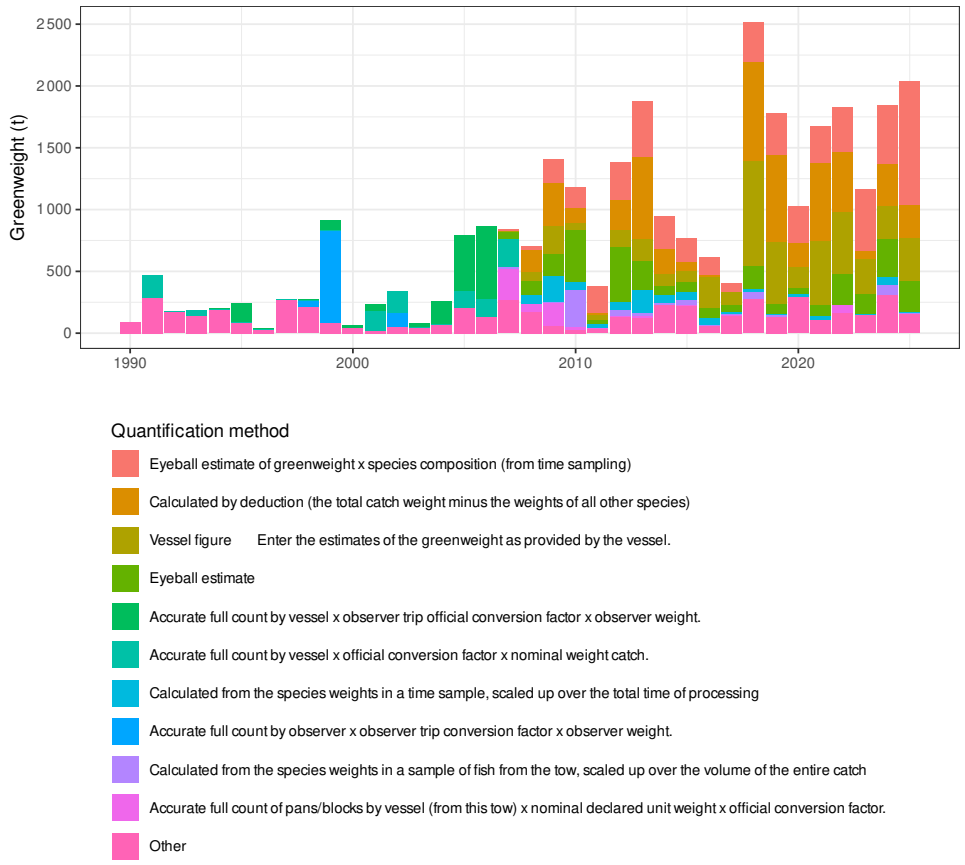


Figure 284: Methods used by observers to quantify the catch of blue (english) mackerel in the EMA 7 Trawl fishery. The legend lists the methods used in descending order of total catch.

2.5.2 EMA 7: PS fishery

2.5.2.1 Length-frequency samples

Table 27: Length-frequency samples of blue (english) mackerel from the EMA 7 PS fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of blue (english) mackerel exceeded a potential sampling threshold of 20 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	121	0	0	0.00
1991	57	0	0	0.00
1992	32	0	0	0.00
1993	140	0	0	0.00
1994	24	0	0	0.00
1995	22	0	0	0.00
1996	56	0	0	0.00
1997	36	0	0	0.00
1998	11	0	0	0.00
1999	164	0	0	0.00
2000	35	0	0	0.00
2001	46	0	0	0.00
2002	15	0	0	0.00
2003	60	0	0	0.00
2004	15	0	0	0.00
2005	21	0	0	0.00
2006	10	0	0	0.00
2007	16	2	117	12.50
2008	13	0	0	0.00
2009	14	0	0	0.00
2010	3	0	0	0.00
2011	5	0	0	0.00
2012	8	0	0	0.00
2013	6	0	0	0.00
2016	10	0	0	0.00
2017	2	0	0	0.00
2018	2	0	0	0.00
2019	2	0	0	0.00
2020	9	0	0	0.00
2021	4	0	0	0.00
2022	35	0	0	0.00
2023	33	19	2035	57.58
2024	20	3	300	15.00
2025	21	0	0	0.00

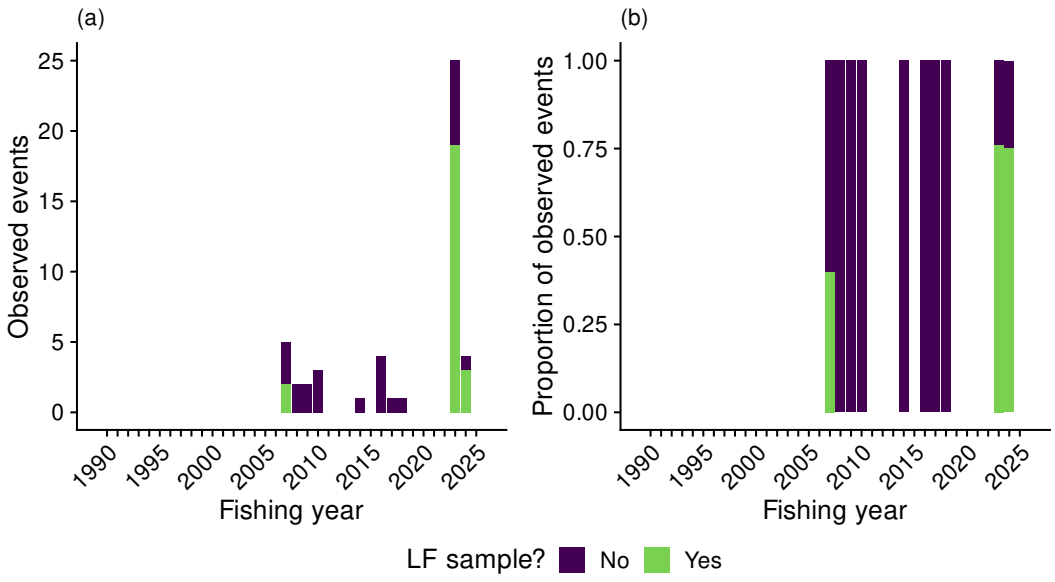


Figure 285: **(a) Observed PS fishing events, and (b) proportion of observed events, in EMA 7 where the blue (english) mackerel catch exceeded the 20 kg threshold, with and without length-frequency sampling.**

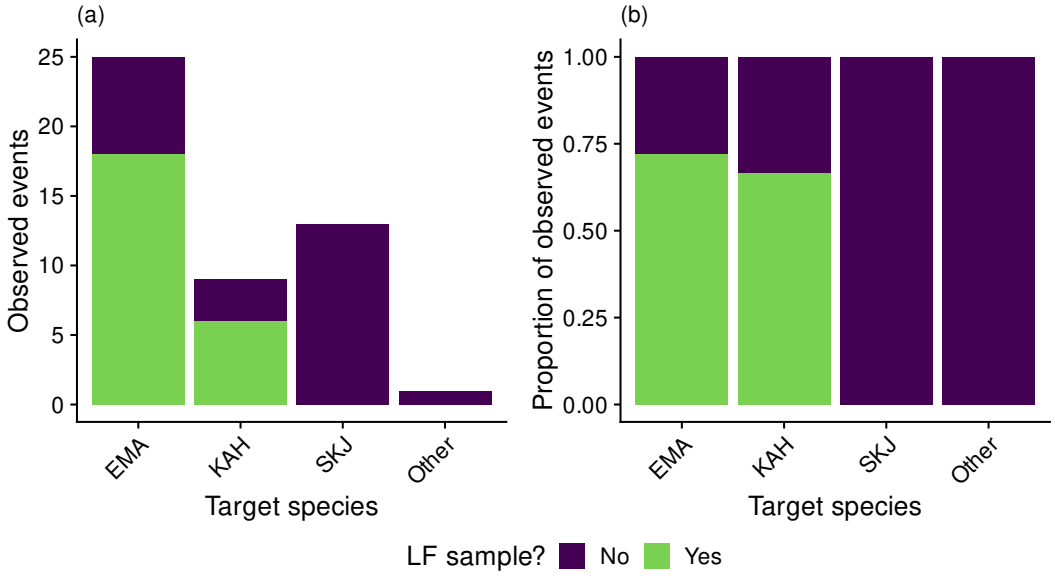


Figure 286: **(a) Observed PS fishing events, and (b) proportion of observed events, in EMA 7 where the blue (english) mackerel catch exceeded the 20 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

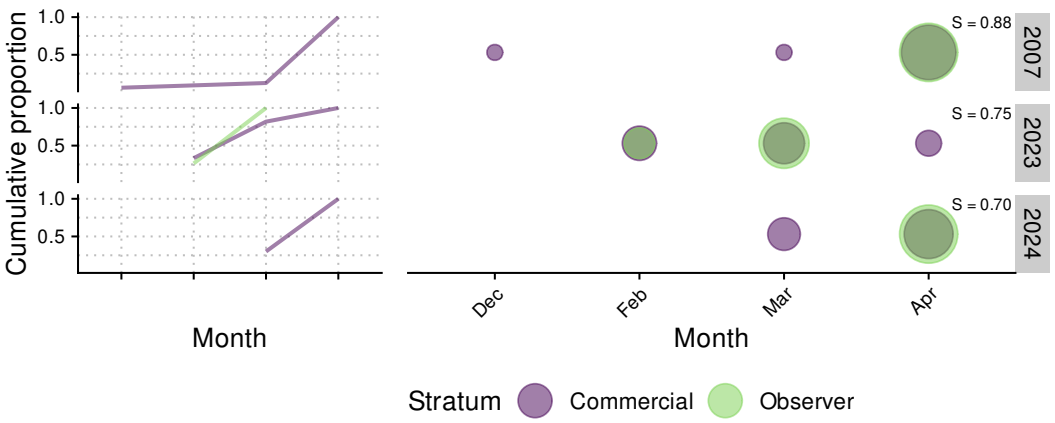


Figure 287: **Monthly representativeness of observer sampling coverage of PS fishing events in EMA 7, where the blue (english) mackerel catch exceeded the 20kg threshold, in 2007 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

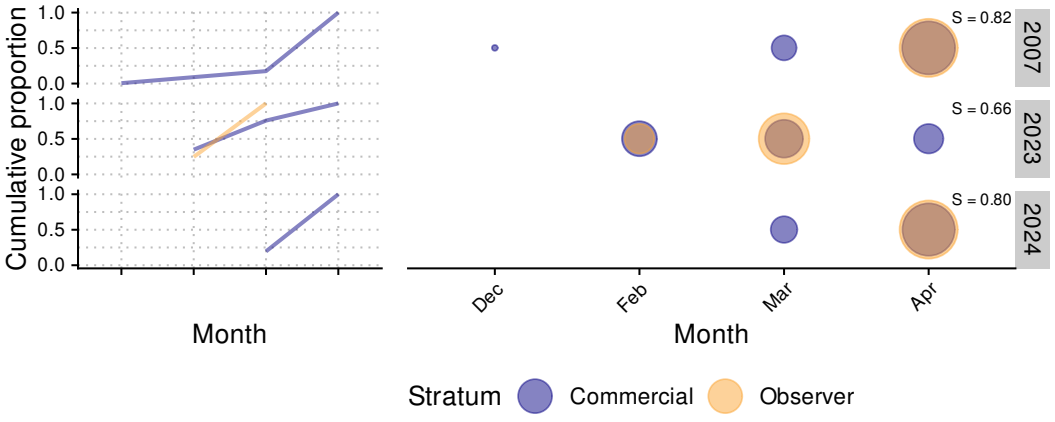


Figure 288: **Monthly representativeness of observer sampling coverage of PS catch in EMA 7, from events where the blue (english) mackerel catch exceeded the 20kg threshold, in 2007 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

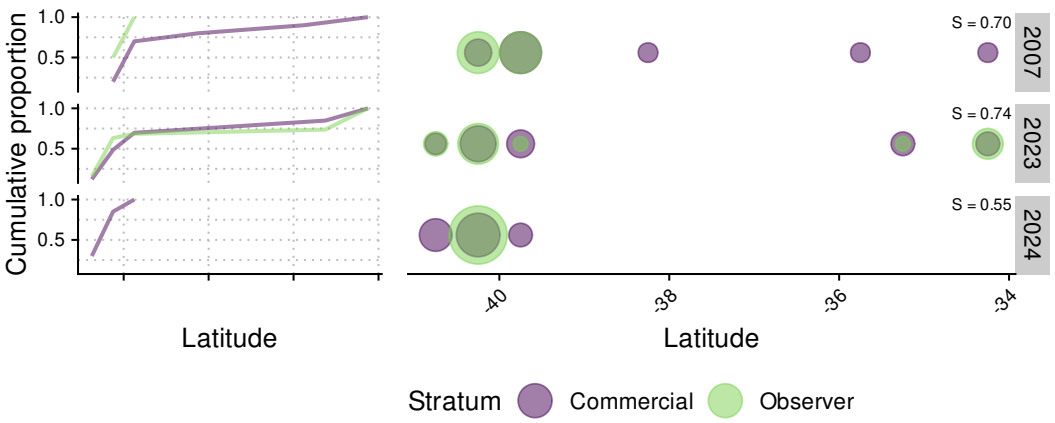


Figure 289: **Latitudinal representativeness of observer sampling coverage of PS fishing events in EMA 7, where the blue (english) mackerel catch exceeded the 20kg threshold, in 2007 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

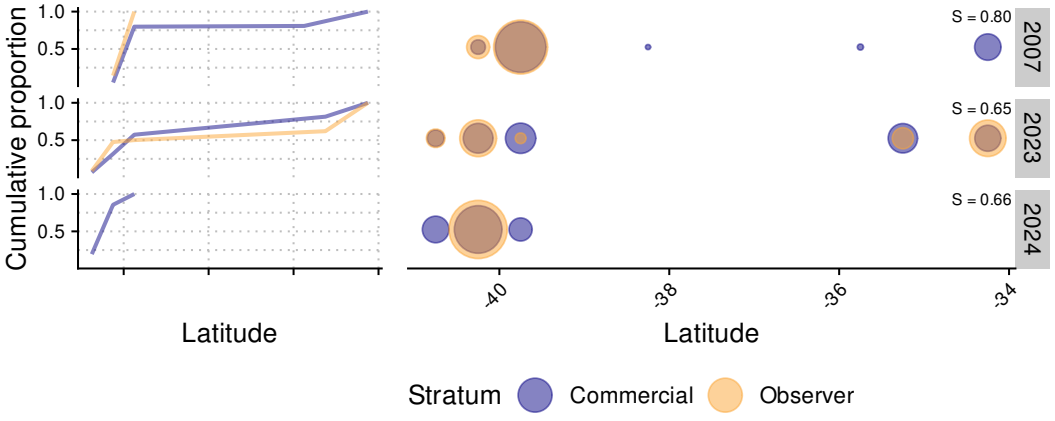


Figure 290: **Latitudinal representativeness of observer sampling coverage of PS catch in EMA 7, from events where the blue (english) mackerel catch exceeded the 20kg threshold, in 2007 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

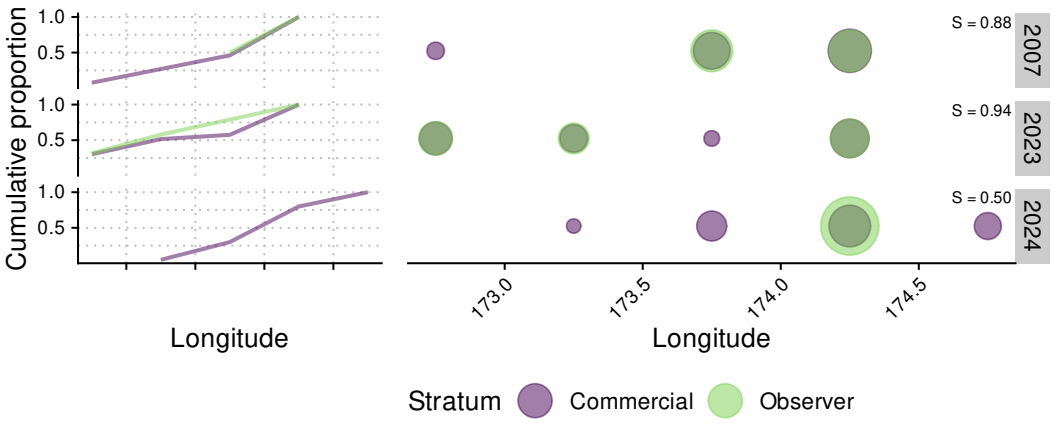


Figure 291: **Longitudinal representativeness of observer sampling coverage of PS fishing events in EMA 7, where the blue (english) mackerel catch exceeded the 20kg threshold, in 2007 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

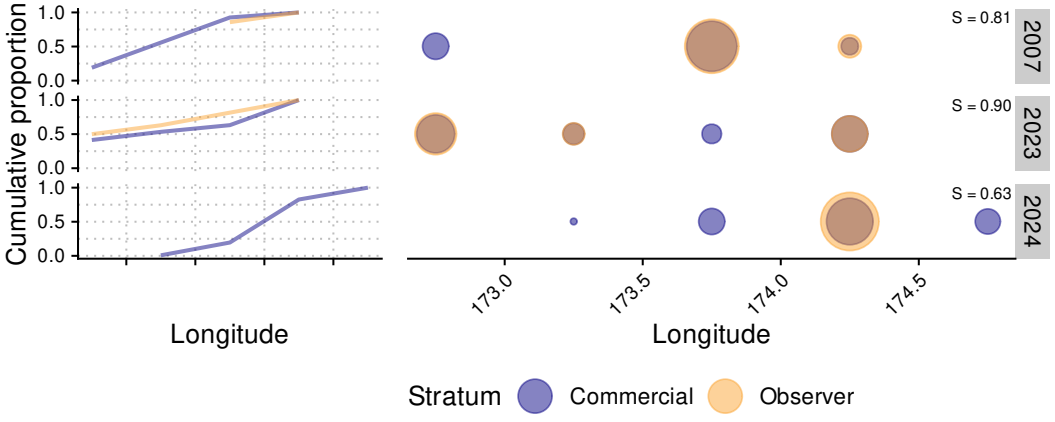


Figure 292: **Longitudinal representativeness of observer sampling coverage of PS catch in EMA 7, from events where the blue (english) mackerel catch exceeded the 20kg threshold, in 2007 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

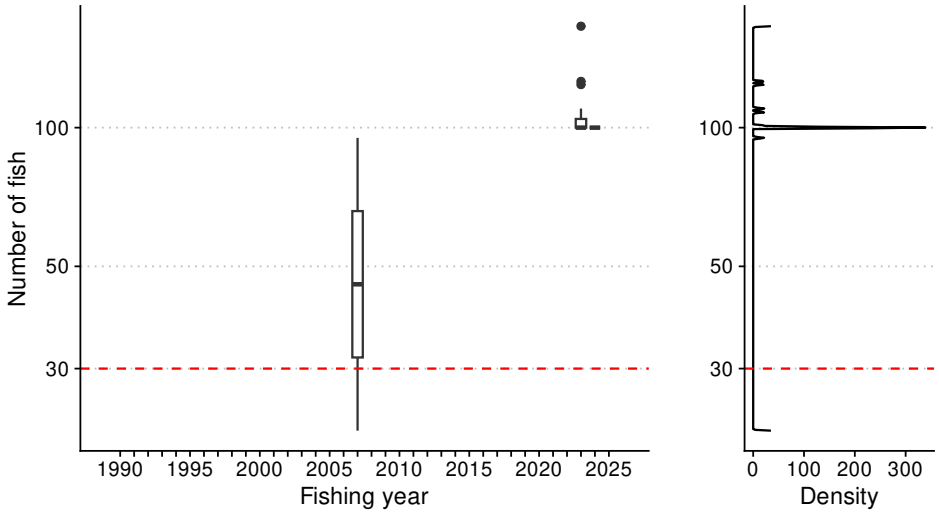


Figure 293: Length-frequency sample sizes for observed fishing events in EMA 7 where blue (english) mackerel were sampled. The red dashed line indicates a sample size of 30 fish.

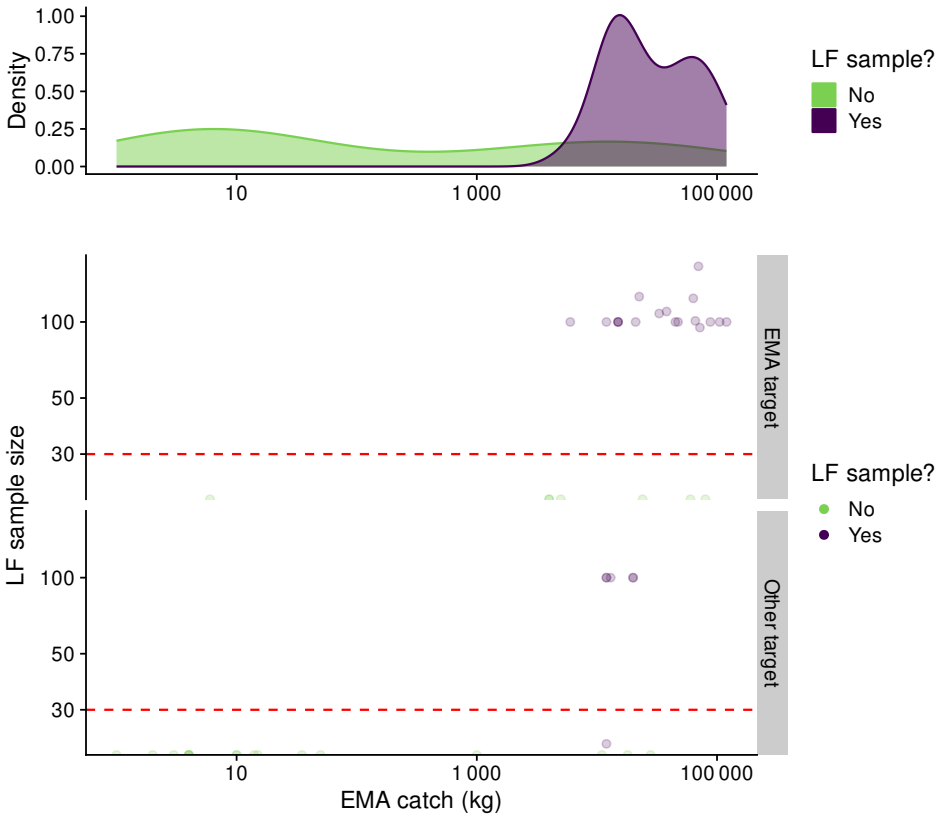


Figure 294: Length-frequency sample sizes (number of fish sampled) for observed fishing events in EMA 7 in relation to the total blue (english) mackerel catch from an event, separately for blue (english) mackerel target events and other target species. The red dashed line indicates a sample size of 30 fish.

2.5.2.2 Catch quantification

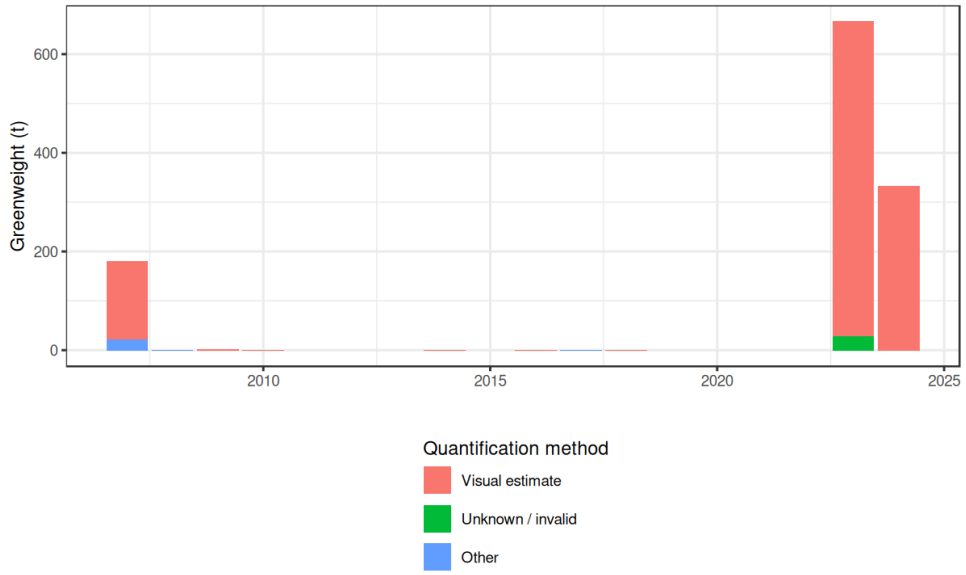


Figure 295: Methods used by observers to quantify the catch of blue (english) mackerel in the EMA 7 PS fishery. The legend lists the methods used in descending order of total catch.

2.6 FRO stocks

Observer sampling of frostfish is considered with respect to the frostfish Quota Management Areas.

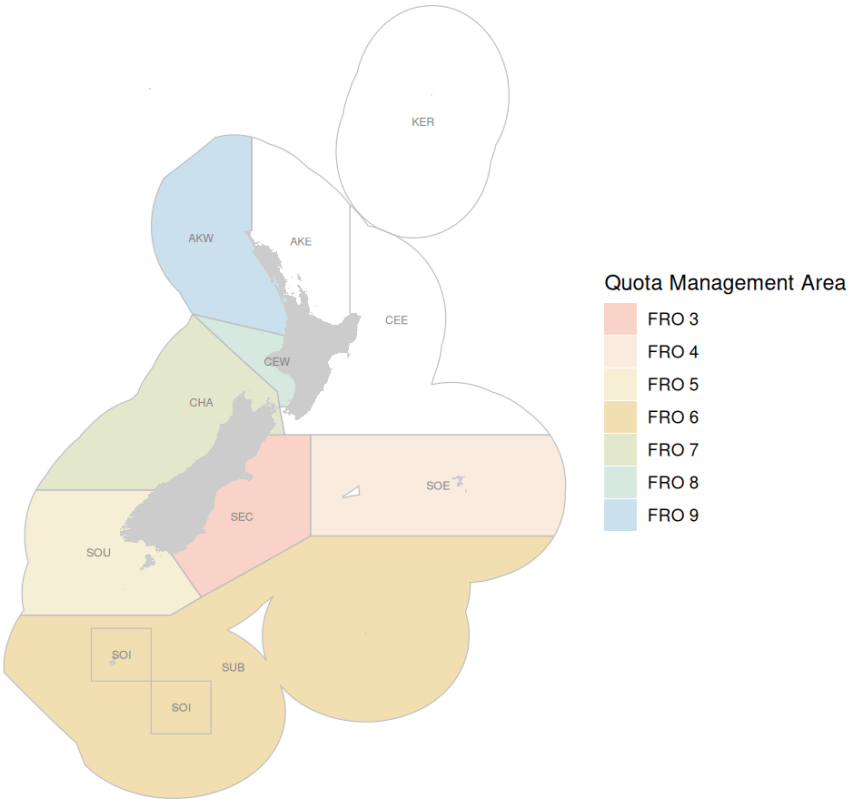


Figure 296: Observer Fisheries Management Areas (black borders, labels on plot) in relation to the Quota Management Area for frostfish (coloured areas, per legend).

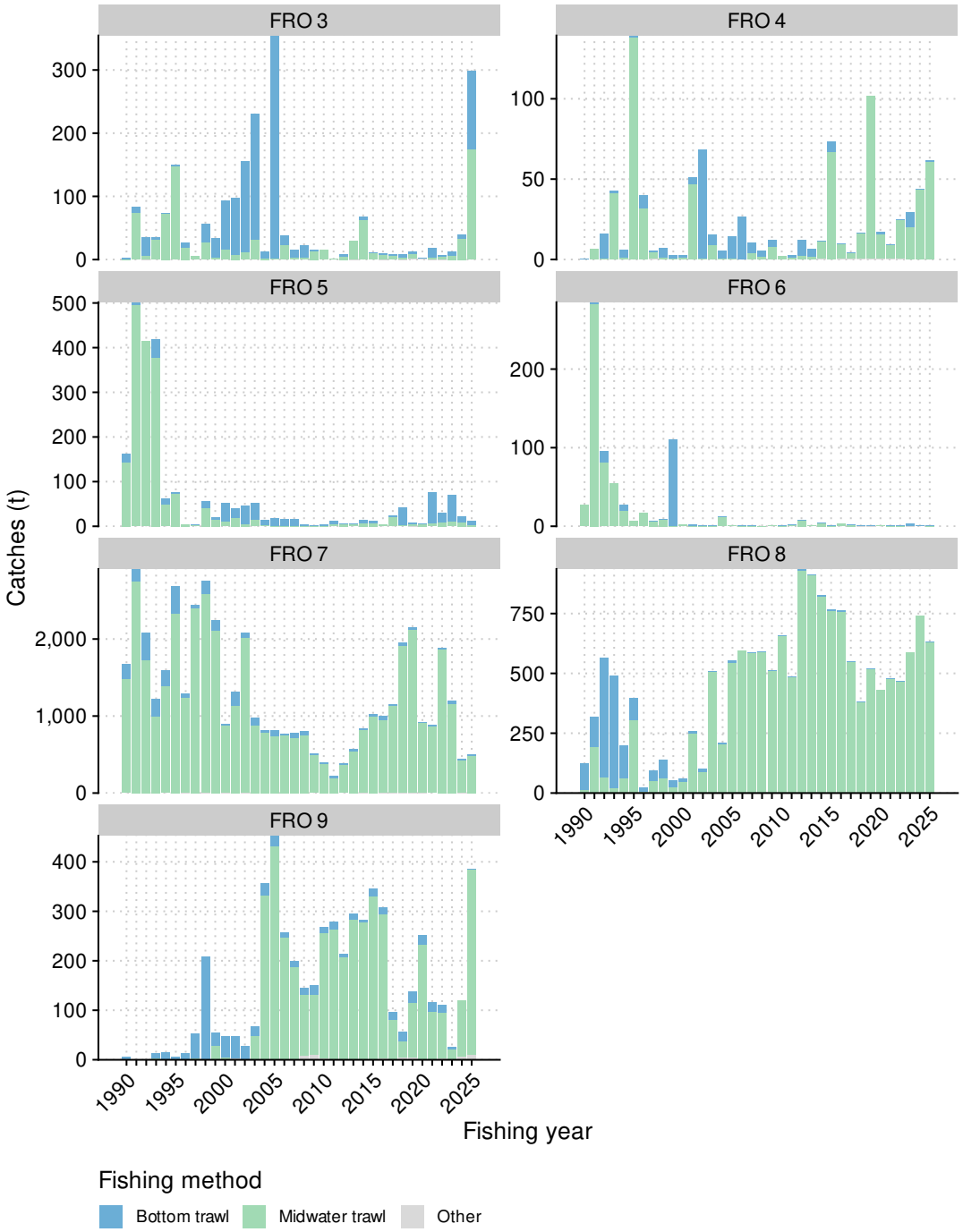


Figure 297: Catches of frostfish by fishing method, for events within the frostfish Quota Management Areas. Methods grouped as Other include: BLL, BPT, CP, D, DL, DS, DV, HL, L, MPT, PRB, PRM, PS, PSH, SN, T.

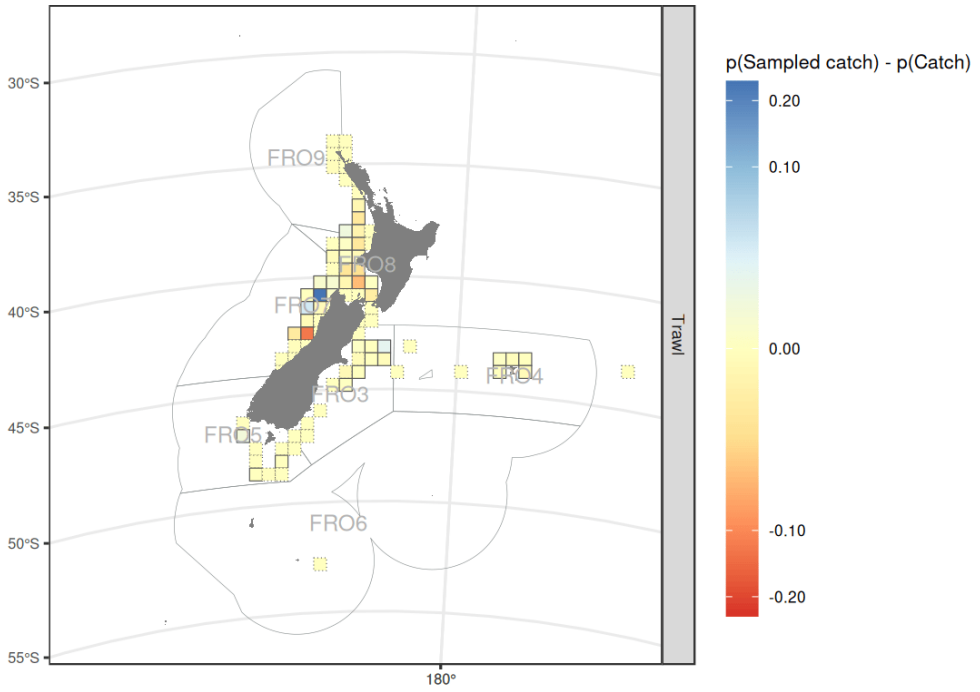


Figure 298: Differences in the relative proportions of catch and sampled catch for frostfish during 2021–2025. Cells with a dotted border had no sampling.

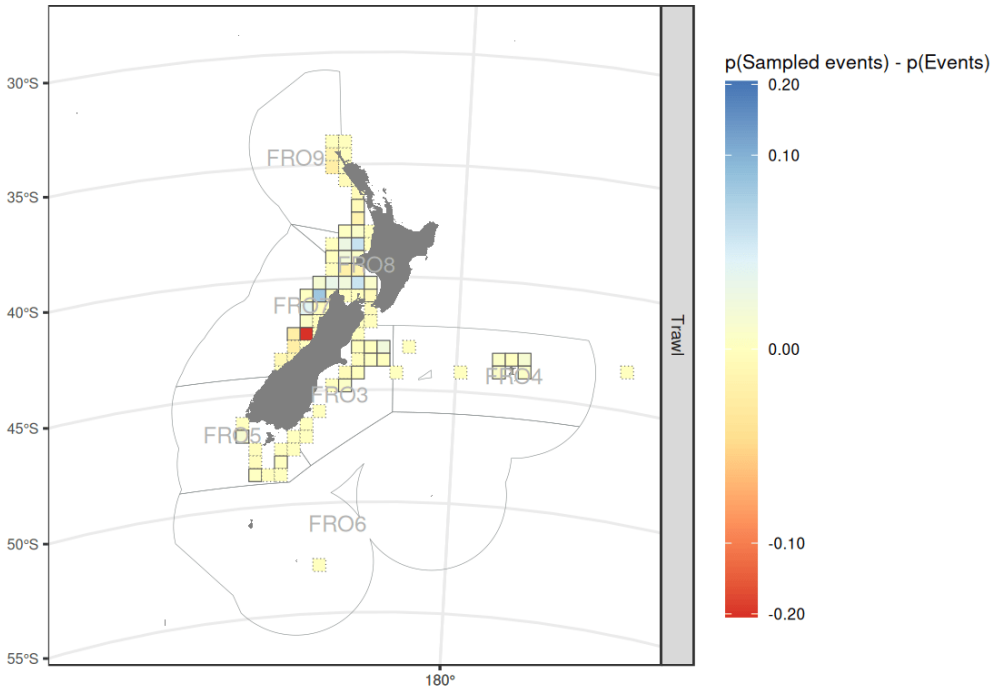


Figure 299: Differences in the relative proportions of events meeting the sampling threshold and sampled events for frostfish during 2021–2025. Cells with a dotted border had no sampling.

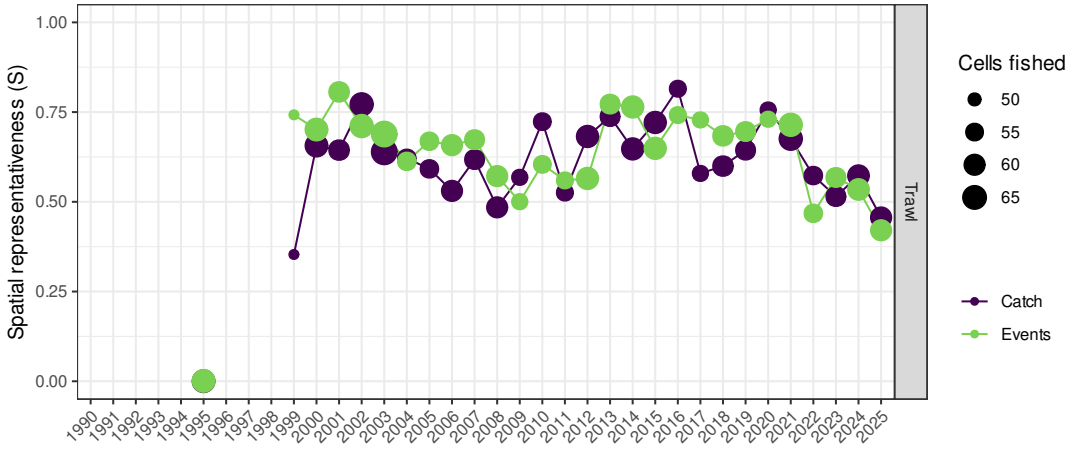


Figure 300: Spatial representativeness of observer sampling of frostfish by fishing year. Representativeness is assessed using the Manhattan distance metric (*S*) applied to 64 km grid cells, for both the proportion of catch sampled and the proportion of positive events sampled.

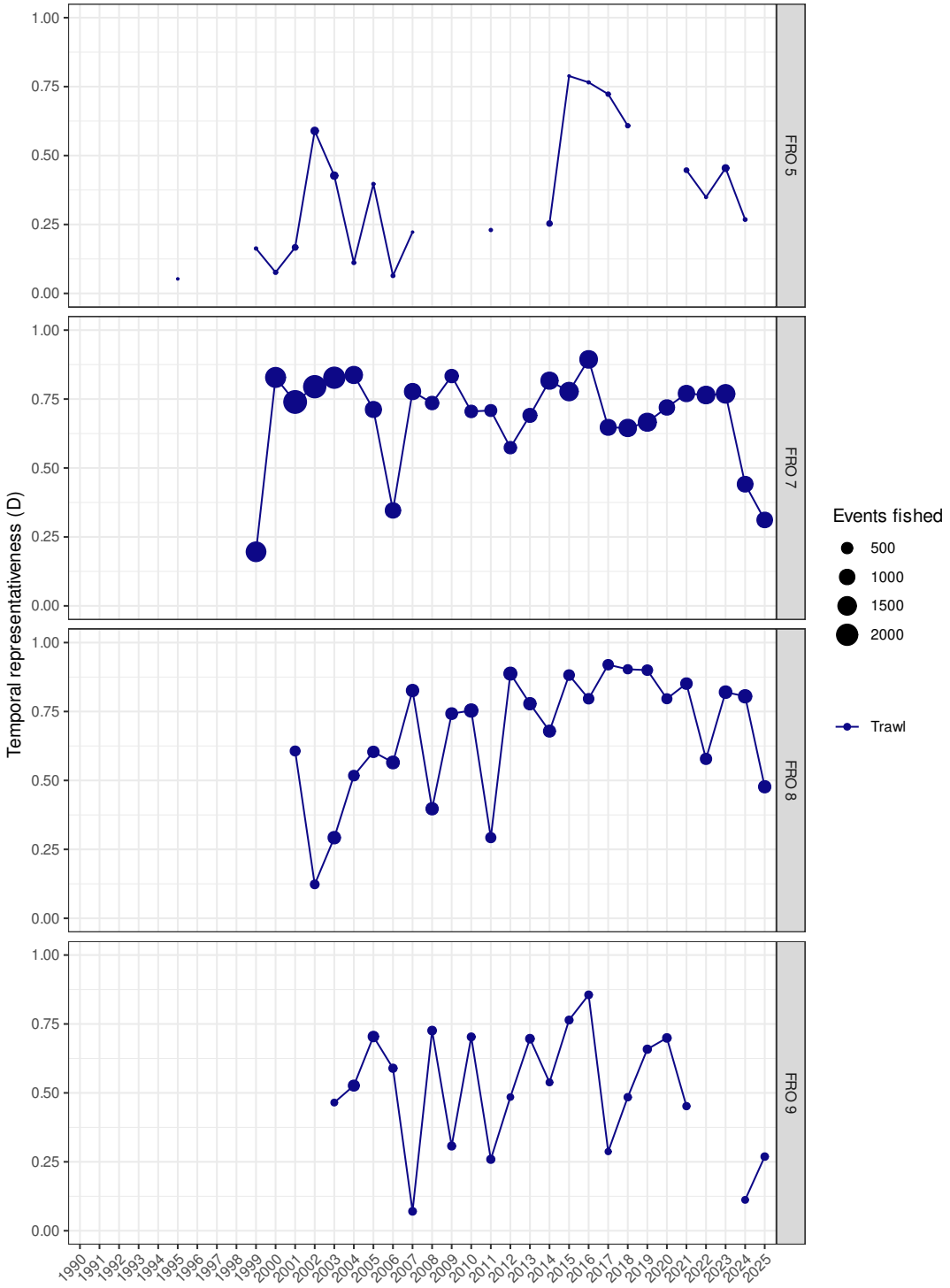


Figure 301: Temporal representativeness of observer sanpling of frostfish by fishing year and area. Temporal representativeness is assessed using the KS statistic (*D*) applied to the start date-times of all fishing events and all sampled fishing events, weighted by catch weight.

2.6.1 FRO 5: Trawl fishery

2.6.1.1 Length-frequency samples

Table 28: Length-frequency samples of frostfish from the FRO 5 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of frostfish exceeded a potential sampling threshold of 30 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	128	0	0	0.00
1991	160	0	0	0.00
1992	158	0	0	0.00
1993	164	0	0	0.00
1994	35	0	0	0.00
1995	7	2	6	28.57
1996	7	0	0	0.00
1997	5	0	0	0.00
1998	13	0	0	0.00
1999	10	1	1	10.00
2000	17	2	2	11.76
2001	41	2	2	4.88
2002	176	5	30	2.84
2003	177	24	232	13.56
2004	16	4	13	25.00
2005	20	3	26	15.00
2006	7	1	1	14.29
2007	6	1	20	16.67
2008	5	0	0	0.00
2009	1	1	10	100.00
2010	5	0	0	0.00
2011	20	2	40	10.00
2012	4	0	0	0.00
2013	5	0	0	0.00
2014	10	1	20	10.00
2015	8	2	40	25.00
2016	3	1	10	33.33
2017	10	6	124	60.00
2018	47	5	72	10.64
2019	15	0	0	0.00
2020	3	0	0	0.00
2021	60	4	80	6.67
2022	14	2	40	14.29
2023	36	2	105	5.56
2024	32	1	1	3.12
2025	24	0	0	0.00

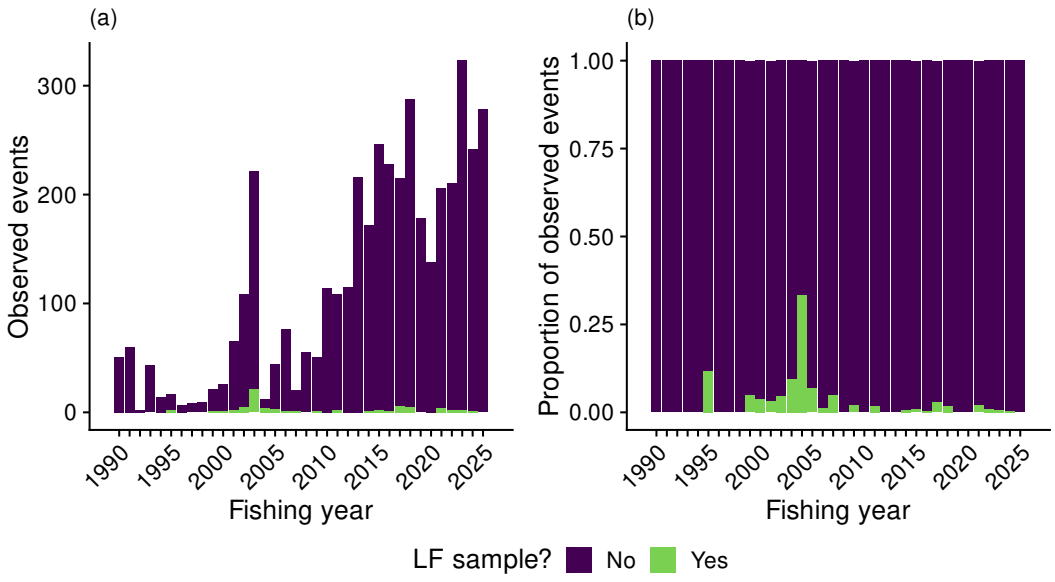


Figure 302: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in FRO 5 where the frostfish catch exceeded the 30 kg threshold, with and without length-frequency sampling.**

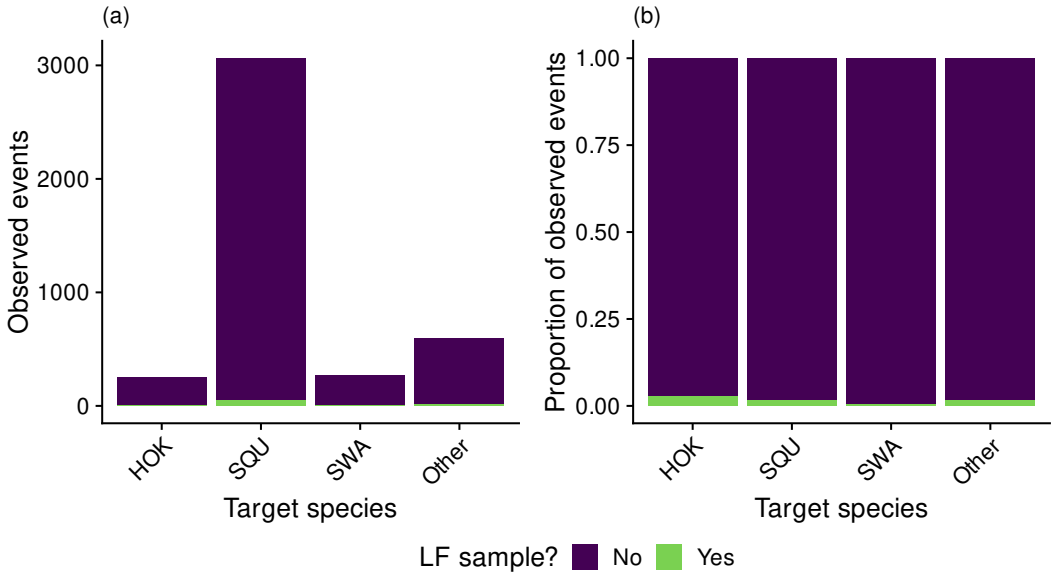


Figure 303: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in FRO 5 where the frostfish catch exceeded the 30 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

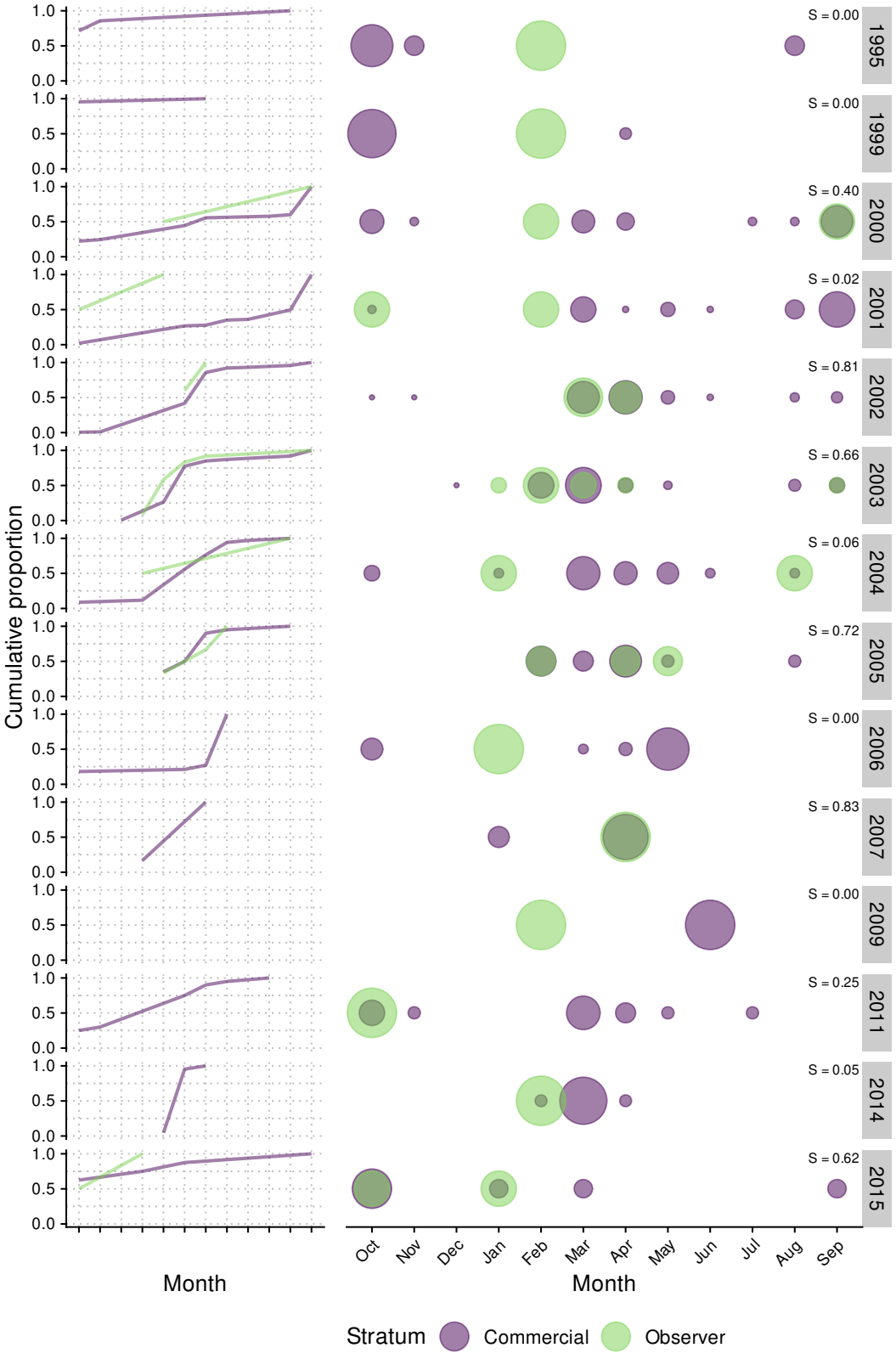


Figure 304: Monthly representativeness of observer sampling coverage of Trawl fishing events in FRO 5, where the frostfish catch exceeded the 30kg threshold, in 1995 to 2015. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

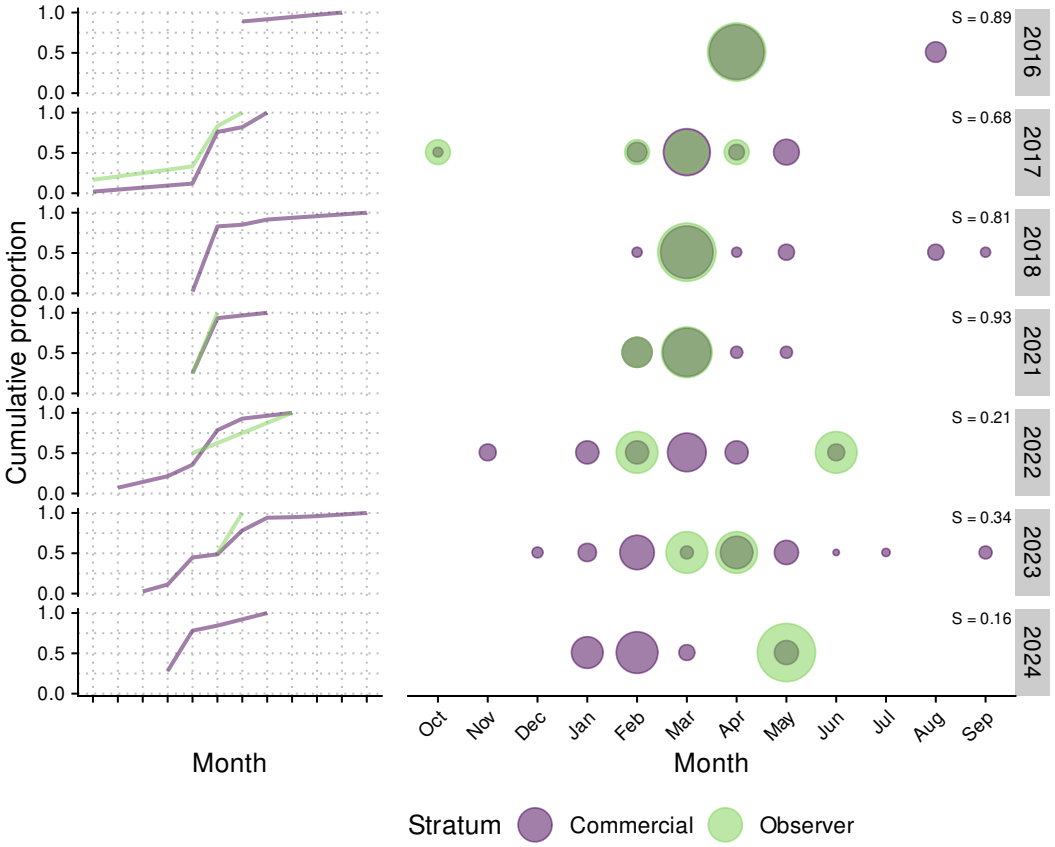


Figure 305: Monthly representativeness of observer sampling coverage of Trawl fishing events in FRO 5, where the frostfish catch exceeded the 30kg threshold, in 2016 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

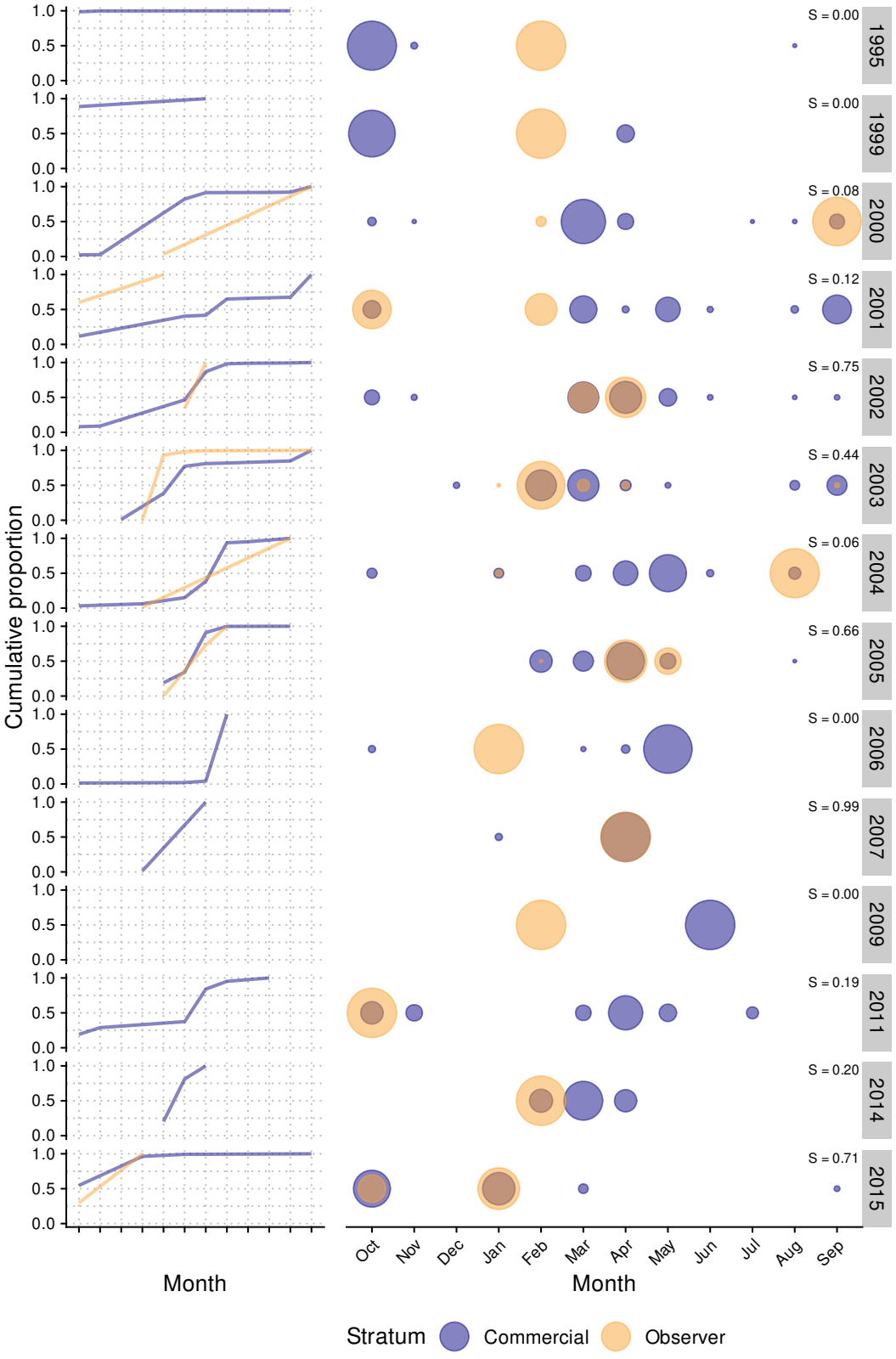


Figure 306: **Monthly representativeness of observer sampling coverage of Trawl catch in FRO 5, from events where the frostfish catch exceeded the 30kg threshold, in 1995 to 2015. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

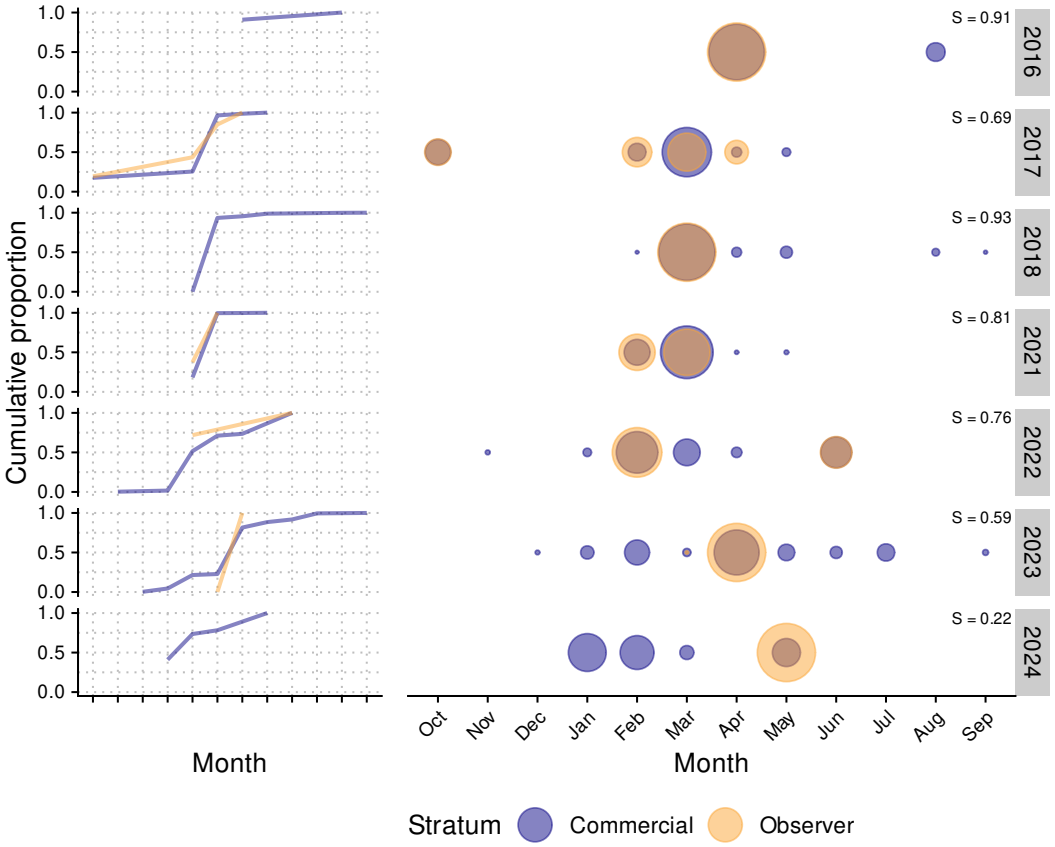


Figure 307: Monthly representativeness of observer sampling coverage of Trawl catch in FRO 5, from events where the frostfish catch exceeded the 30kg threshold, in 2016 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

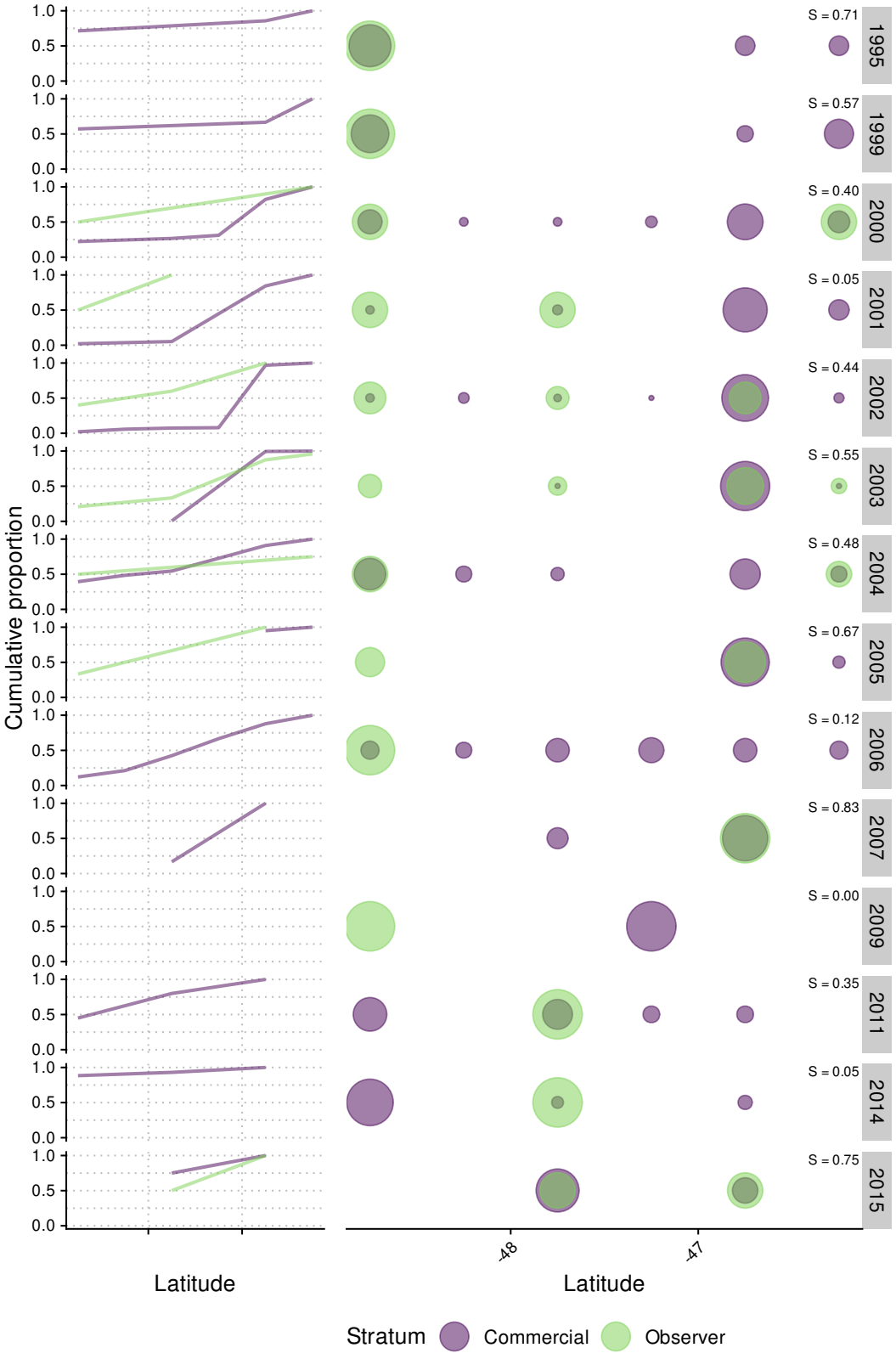


Figure 308: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in FRO 5, where the frostfish catch exceeded the 30kg threshold, in 1995 to 2015. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

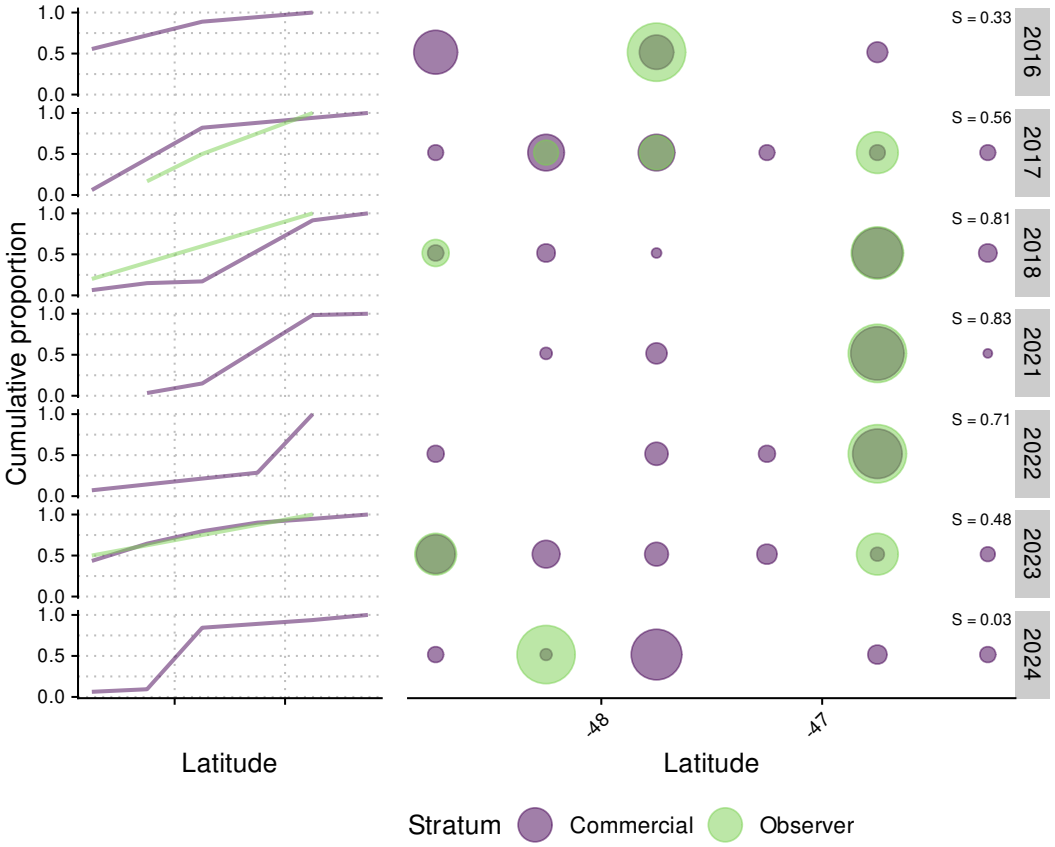


Figure 309: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in FRO 5, where the frostfish catch exceeded the 30kg threshold, in 2016 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

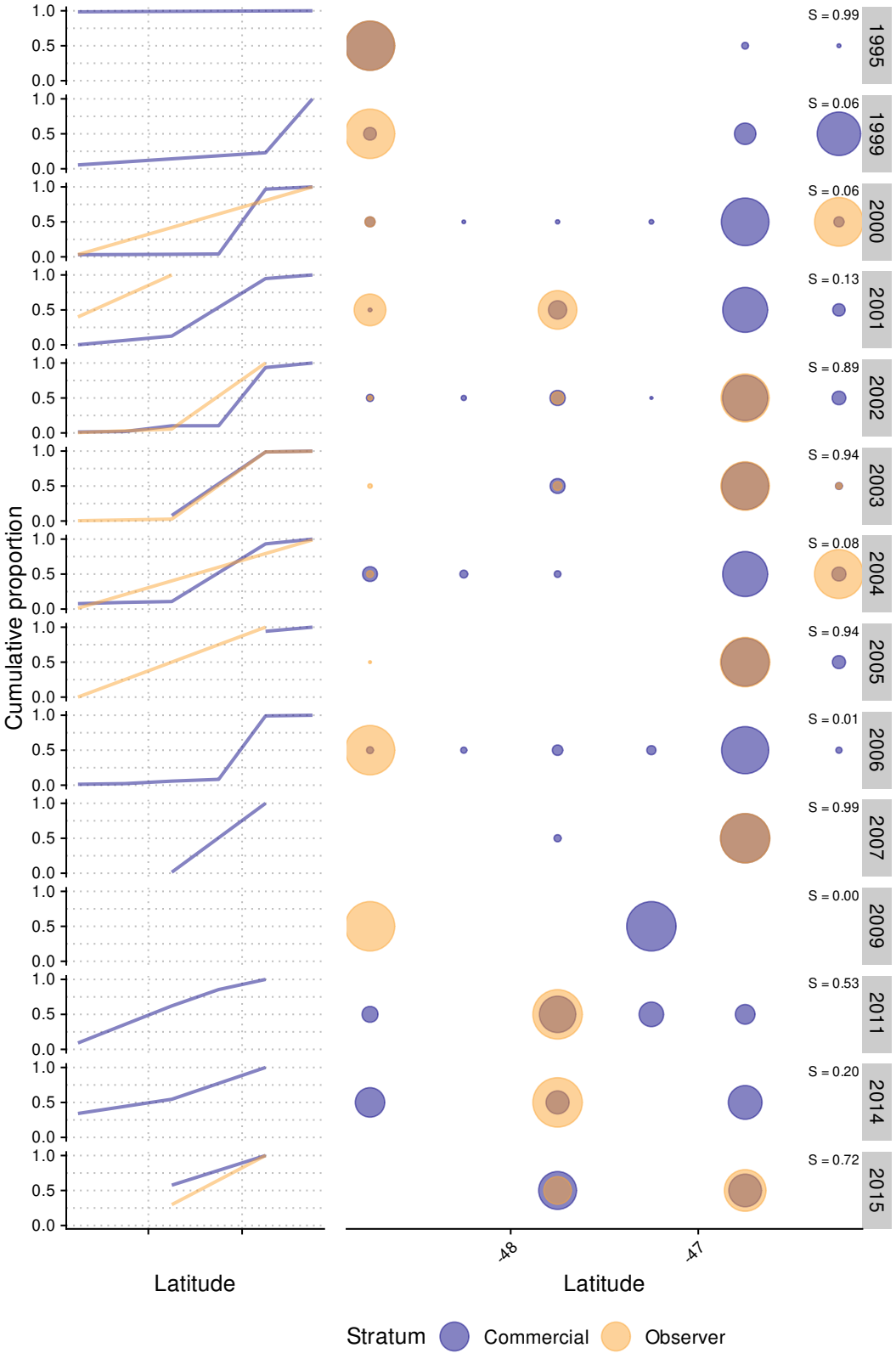


Figure 310: **Latitudinal representativeness of observer sampling coverage of Trawl catch in FRO 5, from events where the frostfish catch exceeded the 30kg threshold, in 1995 to 2015. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

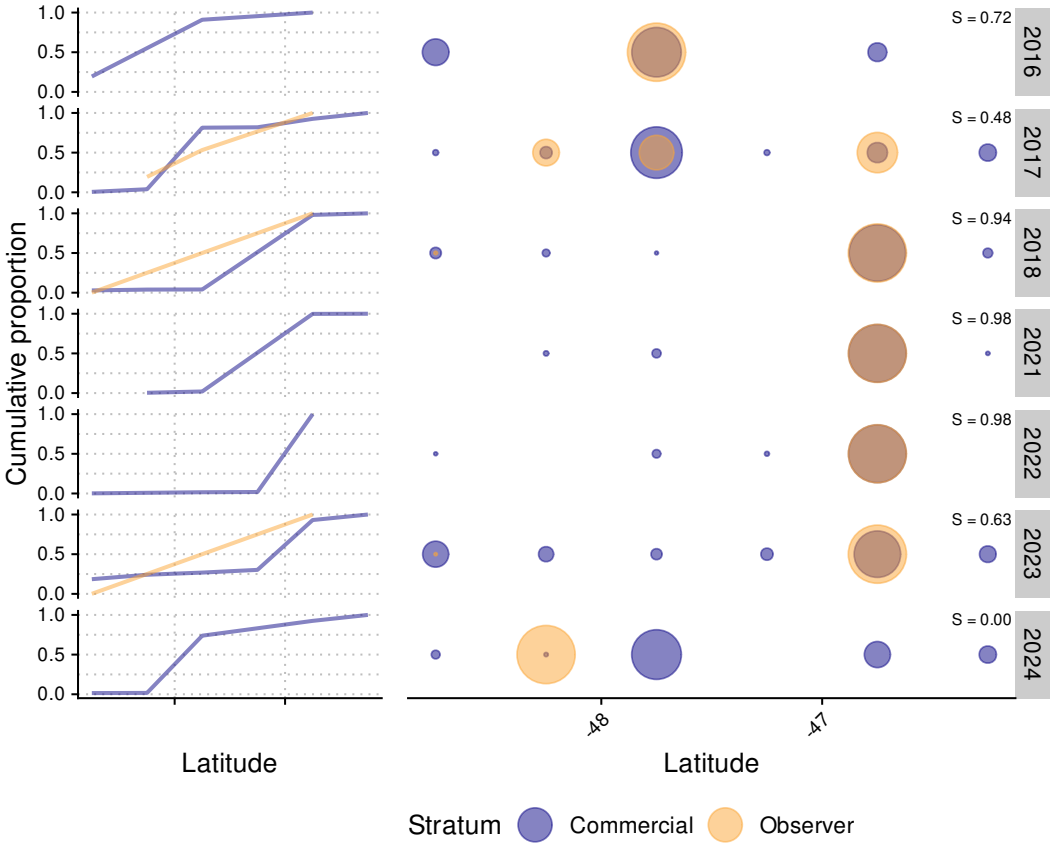


Figure 311: Latitudinal representativeness of observer sampling coverage of Trawl catch in FRO 5, from events where the frostfish catch exceeded the 30kg threshold, in 2016 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

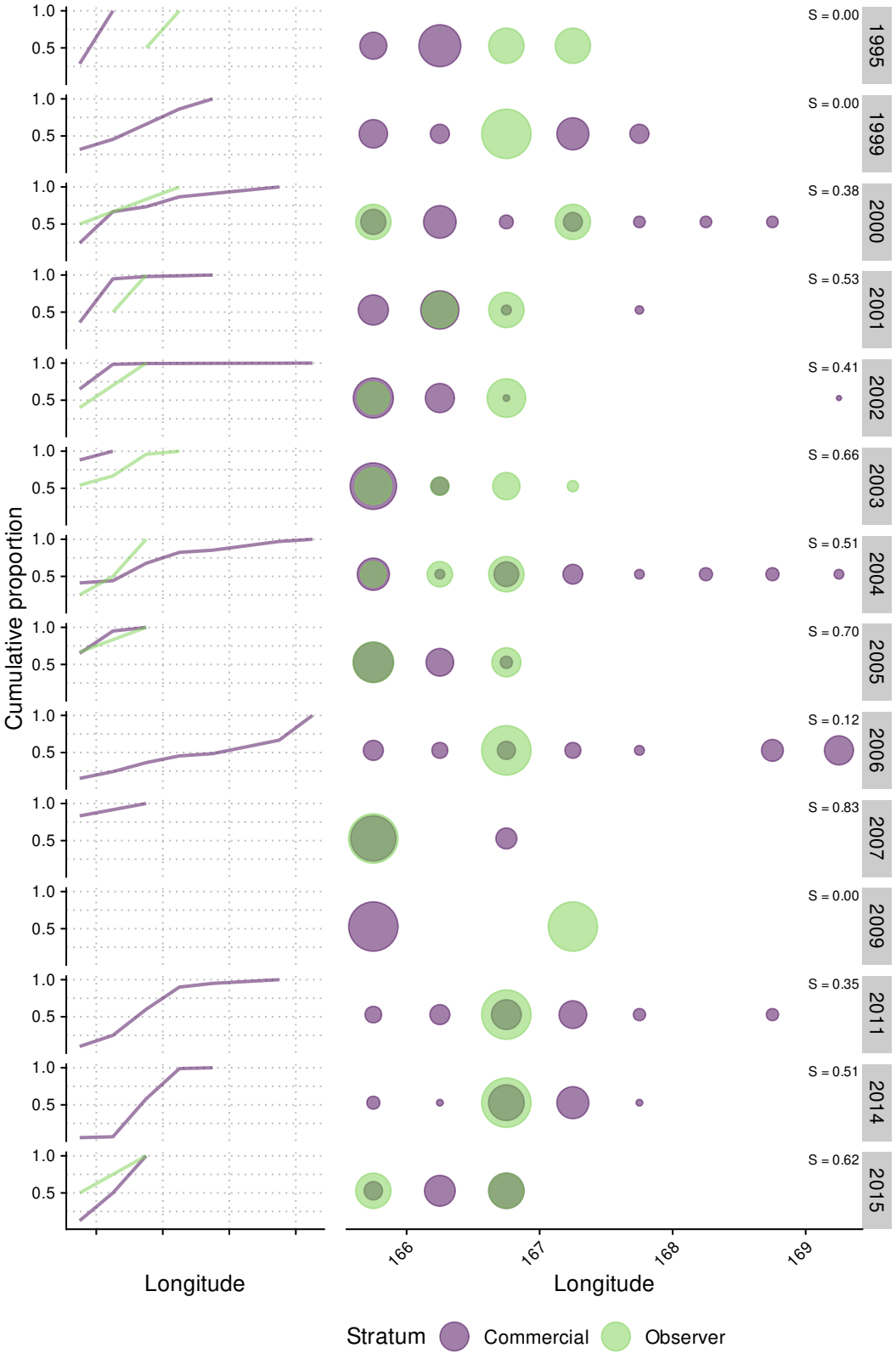


Figure 312: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in FRO 5, where the frostfish catch exceeded the 30kg threshold, in 1995 to 2015. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

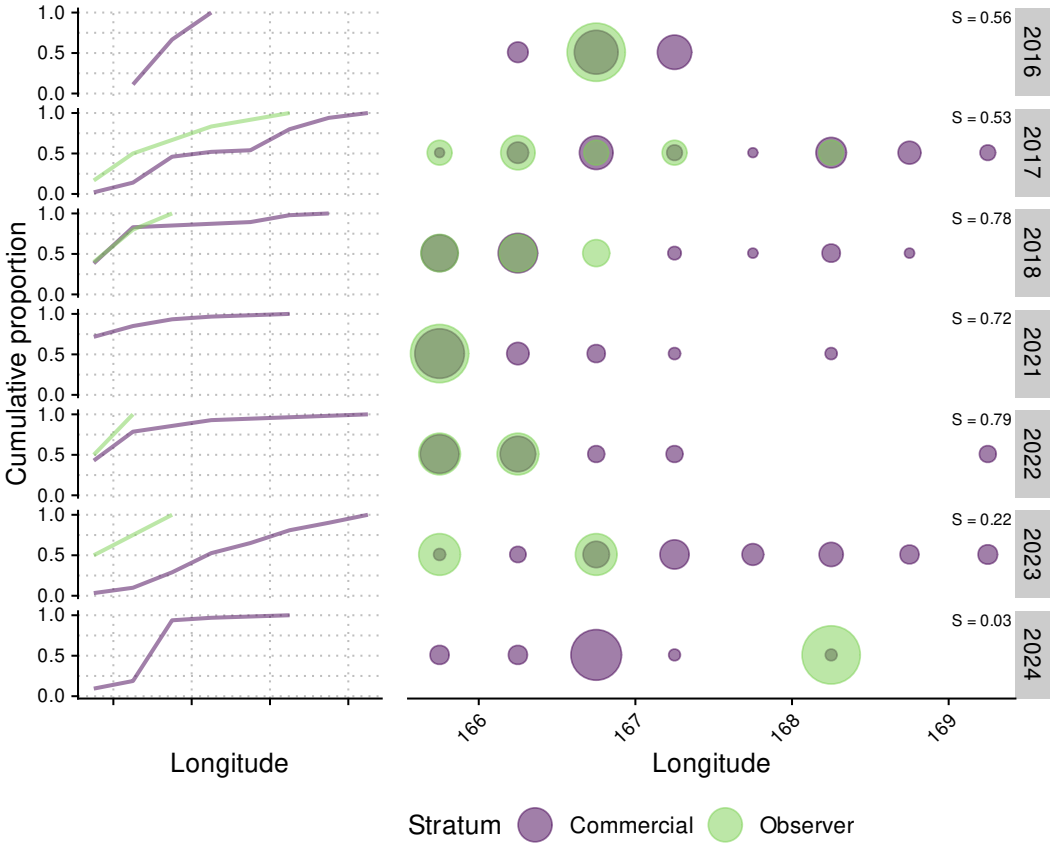


Figure 313: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in FRO 5, where the frostfish catch exceeded the 30kg threshold, in 2016 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

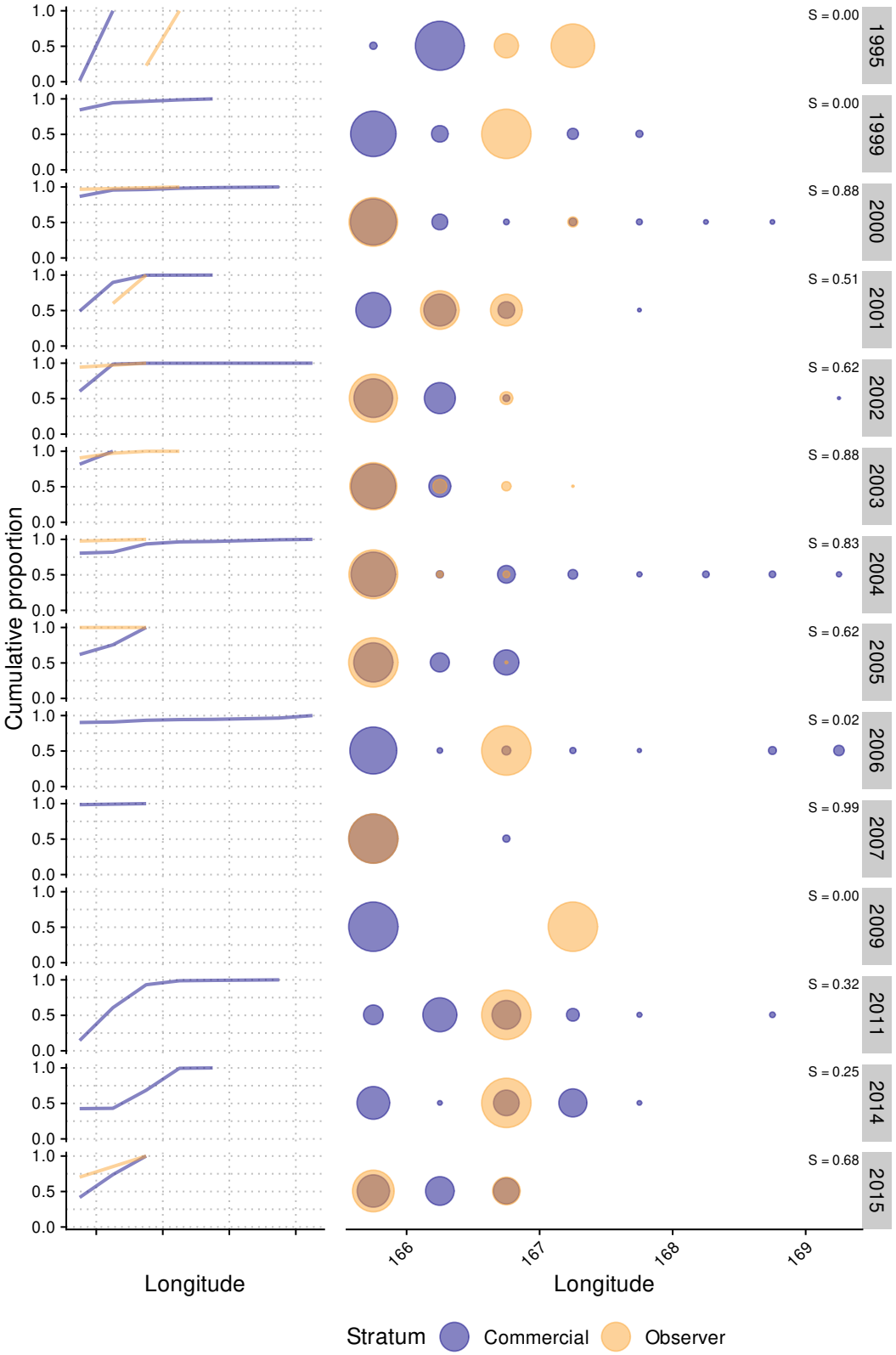


Figure 314: **Longitudinal representativeness of observer sampling coverage of Trawl catch in FRO 5, from events where the frostfish catch exceeded the 30kg threshold, in 1995 to 2015. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

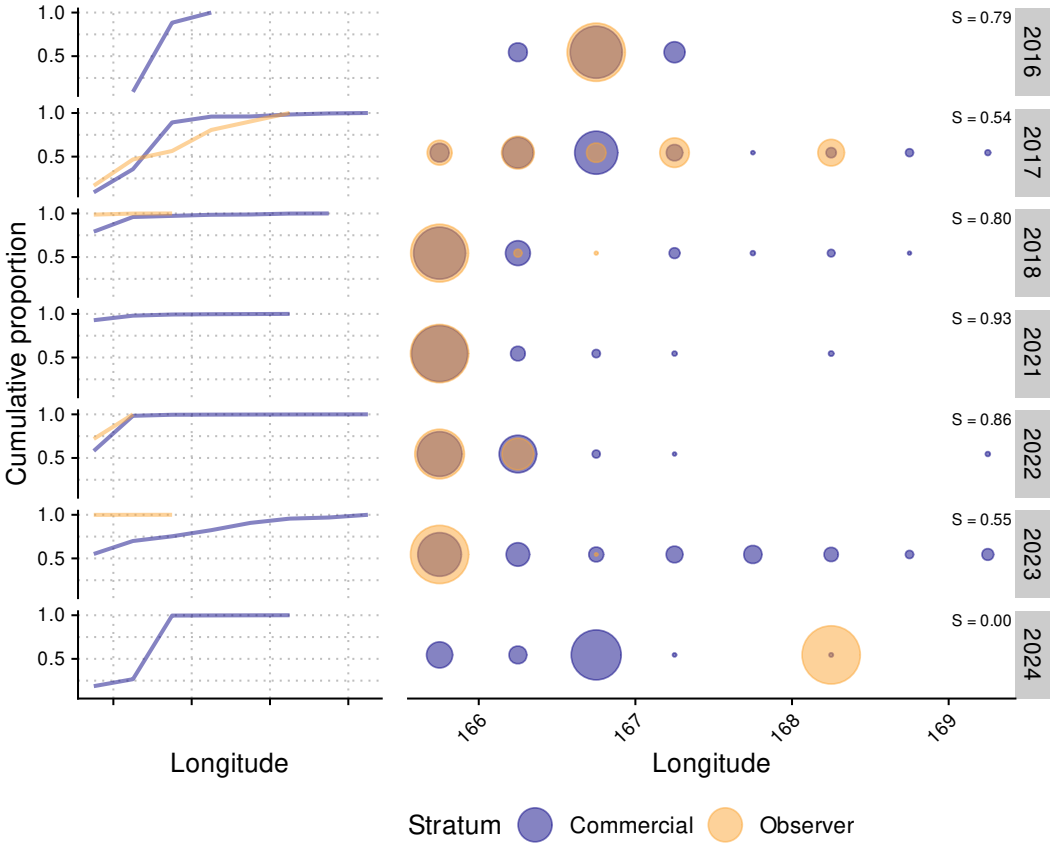


Figure 315: **Longitudinal representativeness of observer sampling coverage of Trawl catch in FRO 5, from events where the frostfish catch exceeded the 30kg threshold, in 2016 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

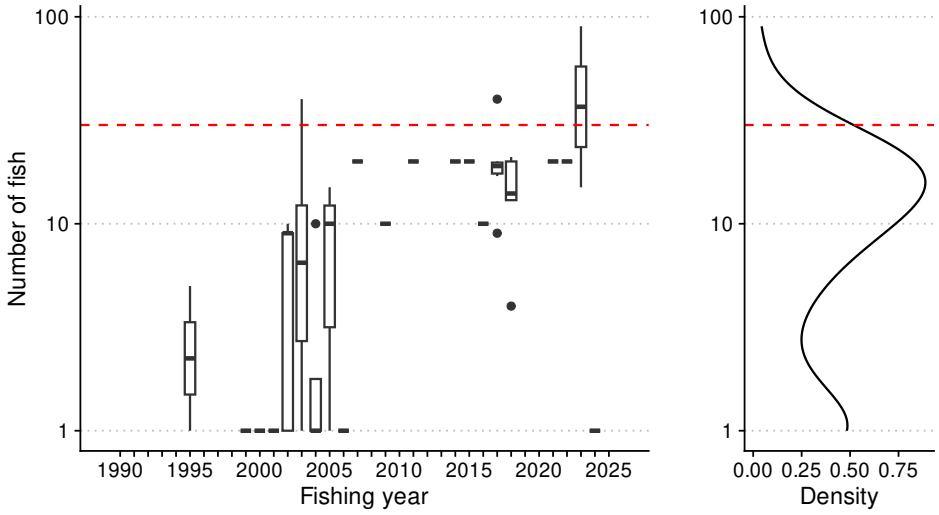


Figure 316: **Length-frequency sample sizes for observed fishing events in FRO 5 where frostfish were sampled. The red dashed line indicates a sample size of 30 fish.**

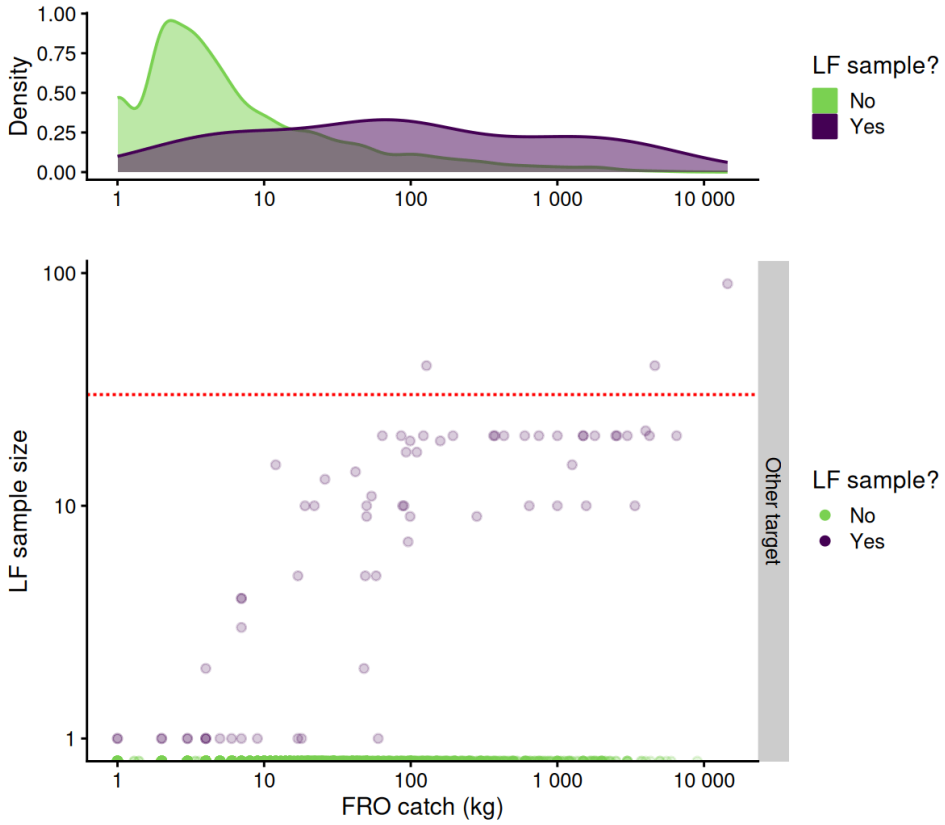


Figure 317: Length-frequency sample sizes (number of fish sampled) for observed fishing events in FRO 5 in relation to the total frostfish catch from an event, separately for frostfish target events and other target species. The red dashed line indicates a sample size of 30 fish.

2.6.1.2 Otolith samples

Table 29: Otolith samples of frostfish from the FRO 5 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of frostfish exceeded a potential sampling threshold of 30 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	128	0	0	0.00
1991	160	0	0	0.00
1992	158	0	0	0.00
1993	164	0	0	0.00
1994	35	0	0	0.00
1995	7	0	0	0.00
1996	7	0	0	0.00
1997	5	0	0	0.00
1998	13	0	0	0.00
1999	10	0	0	0.00
2000	17	0	0	0.00
2001	41	0	0	0.00
2002	176	0	0	0.00
2003	177	0	0	0.00
2004	16	0	0	0.00
2005	20	0	0	0.00
2006	7	0	0	0.00
2007	6	0	0	0.00
2008	5	0	0	0.00
2009	1	0	0	0.00
2010	5	0	0	0.00
2011	20	0	0	0.00
2012	4	0	0	0.00
2013	5	0	0	0.00
2014	10	1	5	10.00
2015	8	1	4	12.50
2016	3	0	0	0.00
2017	10	3	14	30.00
2018	47	5	24	10.64
2019	15	0	0	0.00
2020	3	0	0	0.00
2021	60	4	20	6.67
2022	14	2	10	14.29
2023	36	1	10	2.78
2024	32	1	1	3.12
2025	24	0	0	0.00

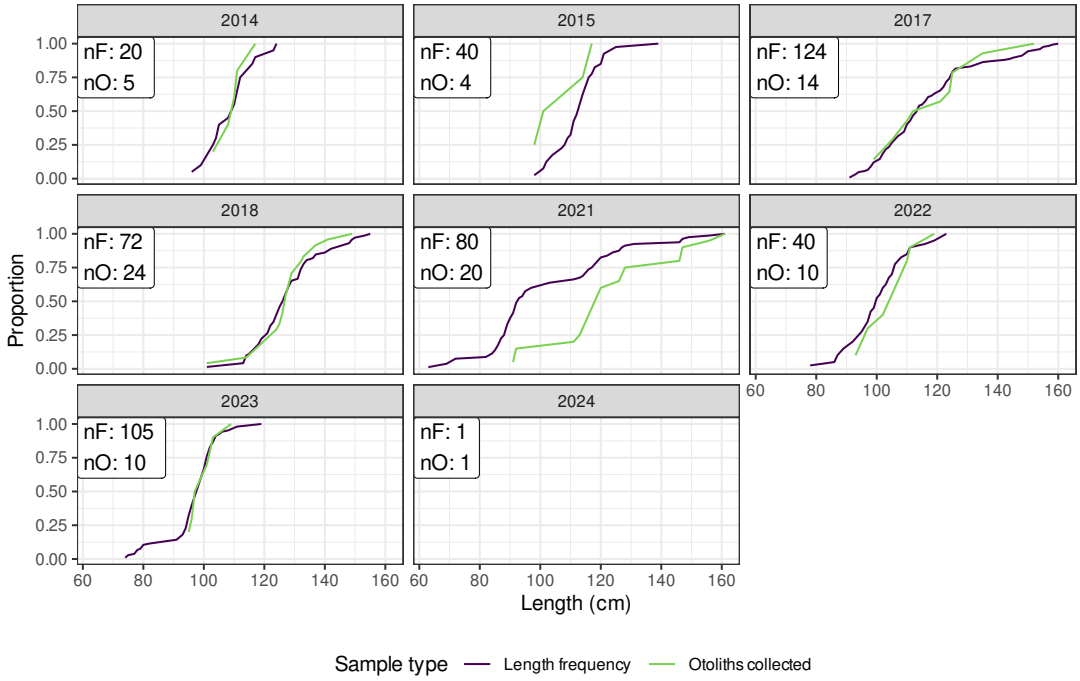


Figure 318: Cumulative distributions of the length of fish in the length frequency and otolith samples of frostfish in the FRO 5 Trawl fishery for the 2014 to 2024 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

2.6.1.3 Catch quantification

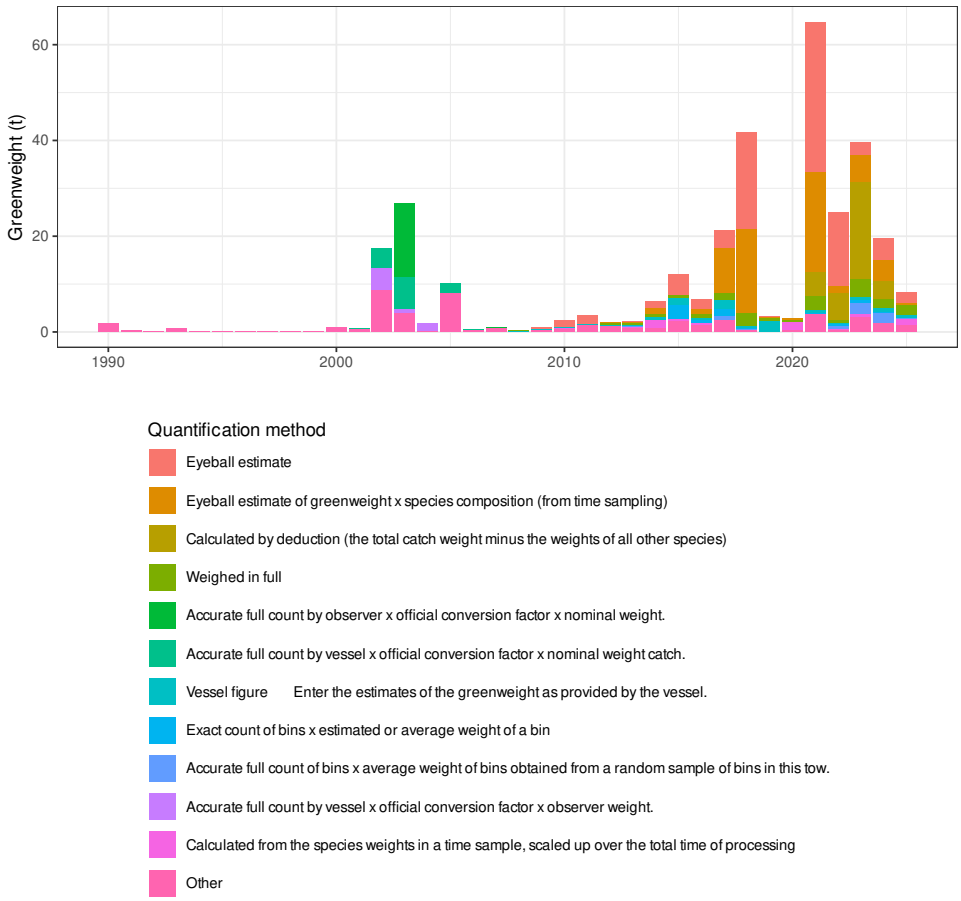


Figure 319: Methods used by observers to quantify the catch of frostfish in the FRO 5 Trawl fishery. The legend lists the methods used in descending order of total catch.

2.6.2 FRO 7: Trawl fishery

2.6.2.1 Length-frequency samples

Table 30: Length-frequency samples of frostfish from the FRO 7 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of frostfish exceeded a potential sampling threshold of 30 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	1 624	0	0	0.00
1991	1 564	0	0	0.00
1992	1 639	0	0	0.00
1993	1 255	0	0	0.00
1994	1 884	0	0	0.00
1995	1 388	0	0	0.00
1996	917	0	0	0.00
1997	1 559	0	0	0.00
1998	1 591	0	0	0.00
1999	1 546	11	674	0.71
2000	1 634	156	1 622	9.55
2001	2 079	113	1 552	5.44
2002	1 842	103	1 158	5.59
2003	1 698	147	1 522	8.66
2004	1 266	92	667	7.27
2005	1 048	36	656	3.44
2006	931	31	484	3.33
2007	939	65	869	6.92
2008	741	74	1 317	9.99
2009	731	70	1 377	9.58
2010	632	19	327	3.01
2011	561	19	410	3.39
2012	559	29	559	5.19
2013	803	51	1 035	6.35
2014	1 200	110	2 071	9.17
2015	1 338	120	2 465	8.97
2016	1 258	125	2 381	9.94
2017	935	66	1 687	7.06
2018	1 288	74	2 164	5.75
2019	1 354	144	3 637	10.64
2020	956	62	1 195	6.49
2021	1 100	56	1 263	5.09
2022	1 308	69	3 419	5.28
2023	1 480	67	2 171	4.53
2024	1 040	21	454	2.02
2025	1 023	7	260	0.68

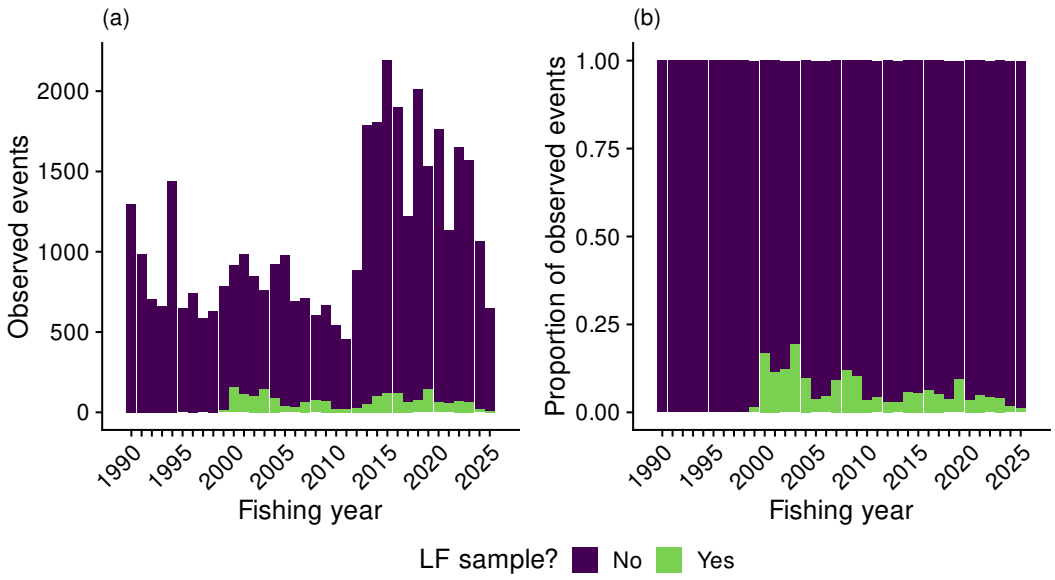


Figure 320: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in FRO 7 where the frostfish catch exceeded the 30 kg threshold, with and without length-frequency sampling.**

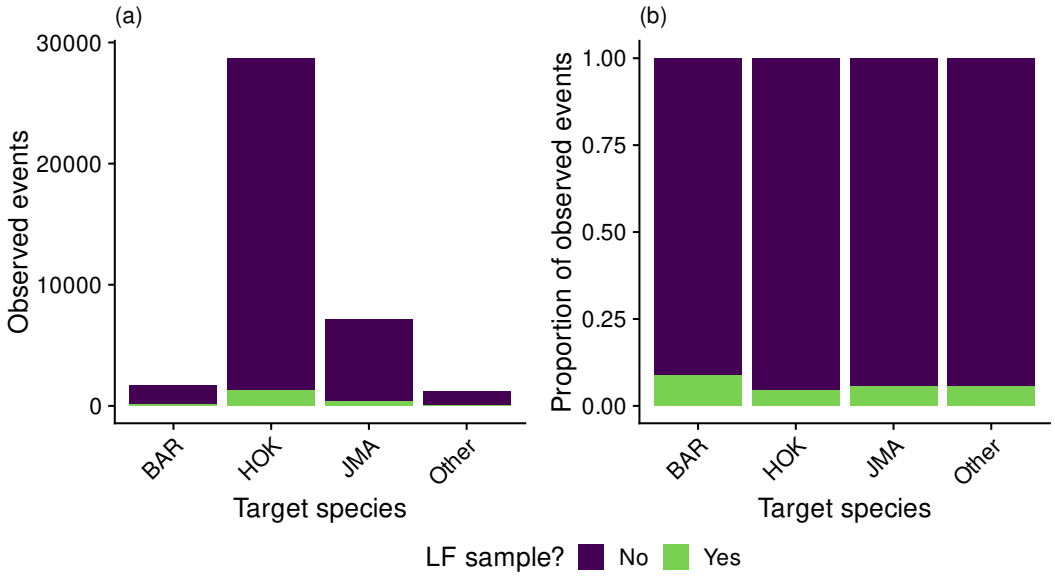


Figure 321: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in FRO 7 where the frostfish catch exceeded the 30 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

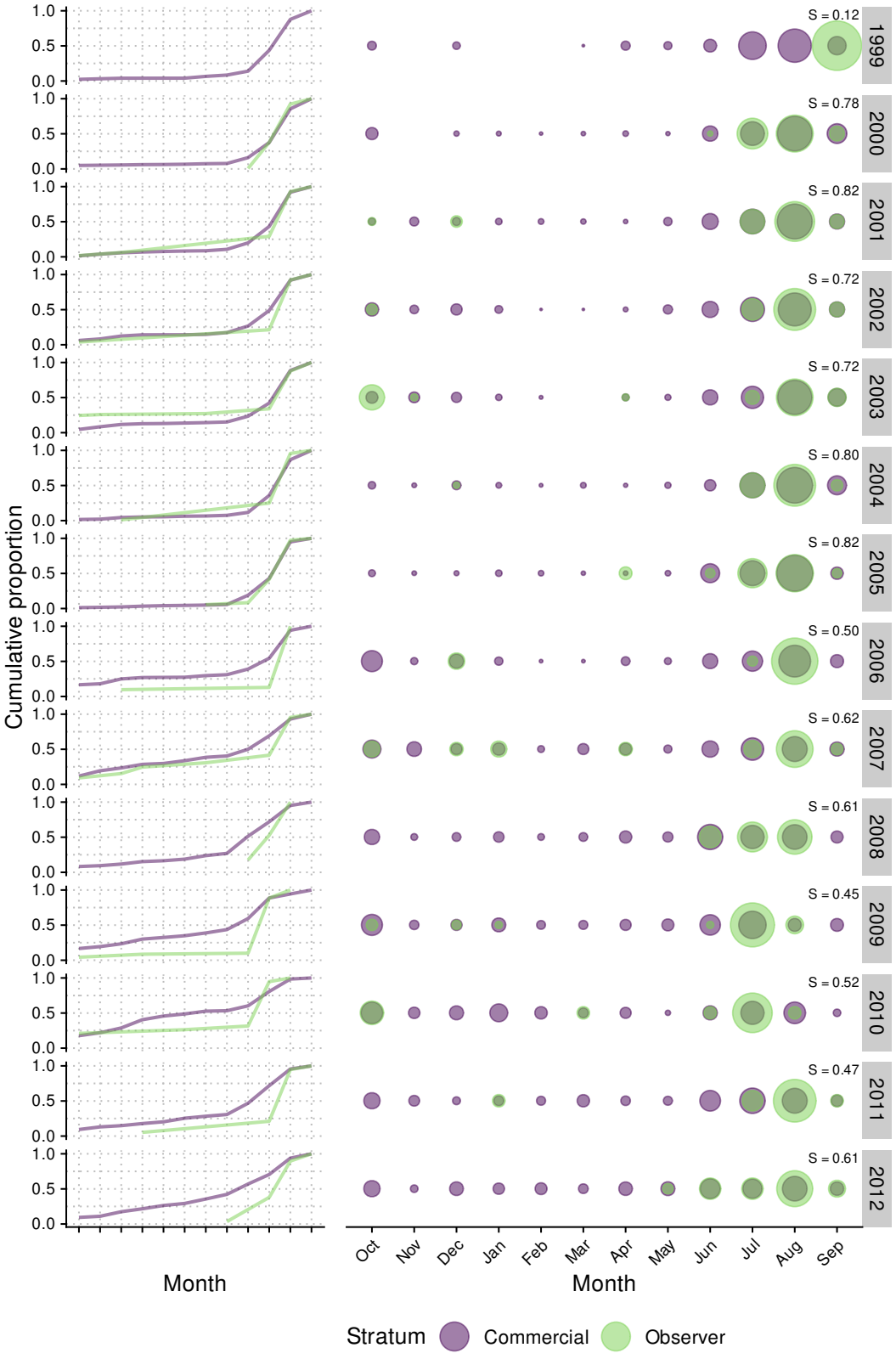


Figure 322: Monthly representativeness of observer sampling coverage of Trawl fishing events in FRO 7, where the frostfish catch exceeded the 30kg threshold, in 1999 to 2012. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

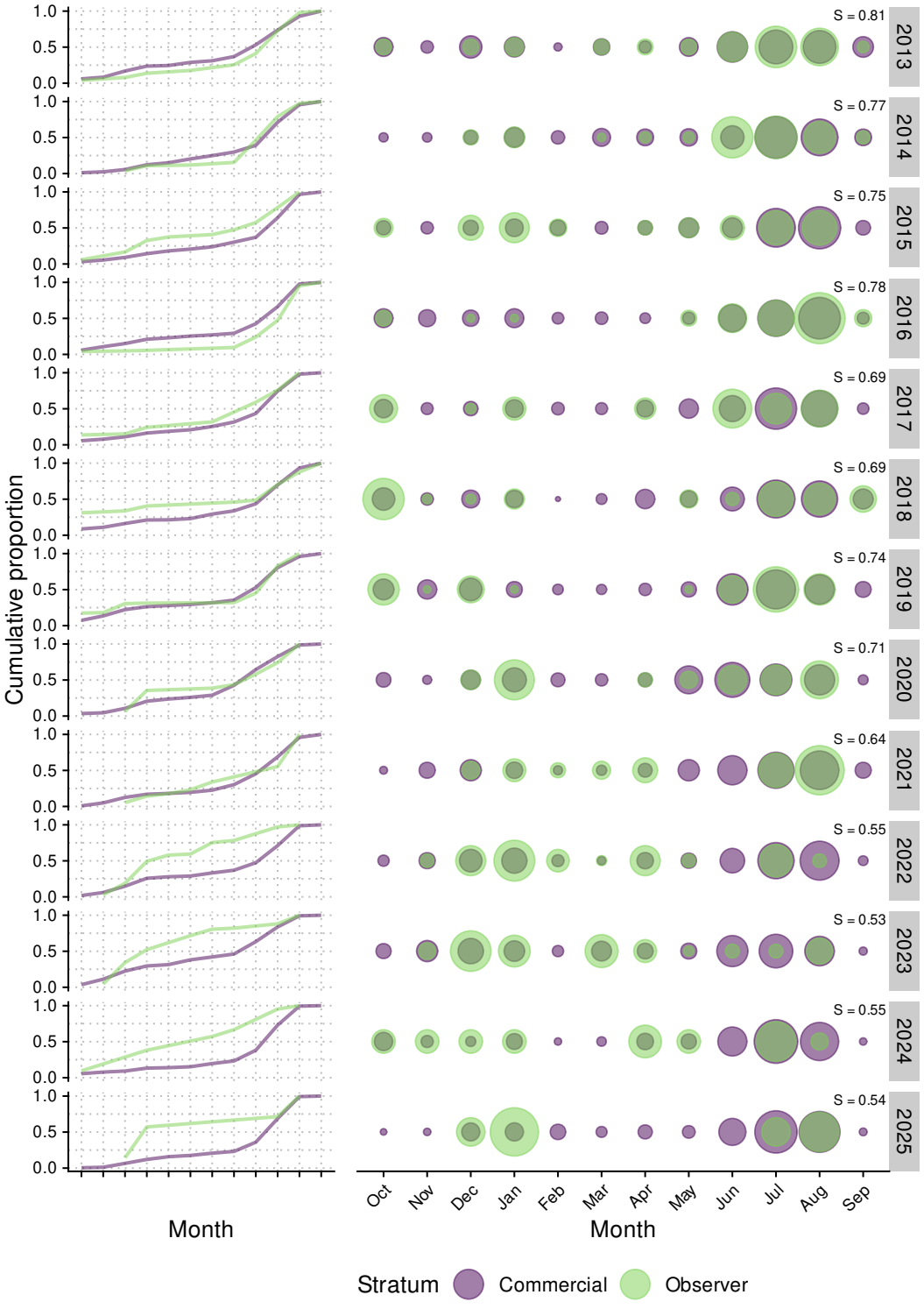


Figure 323: Monthly representativeness of observer sampling coverage of Trawl fishing events in FRO 7, where the frostfish catch exceeded the 30kg threshold, in 2013 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

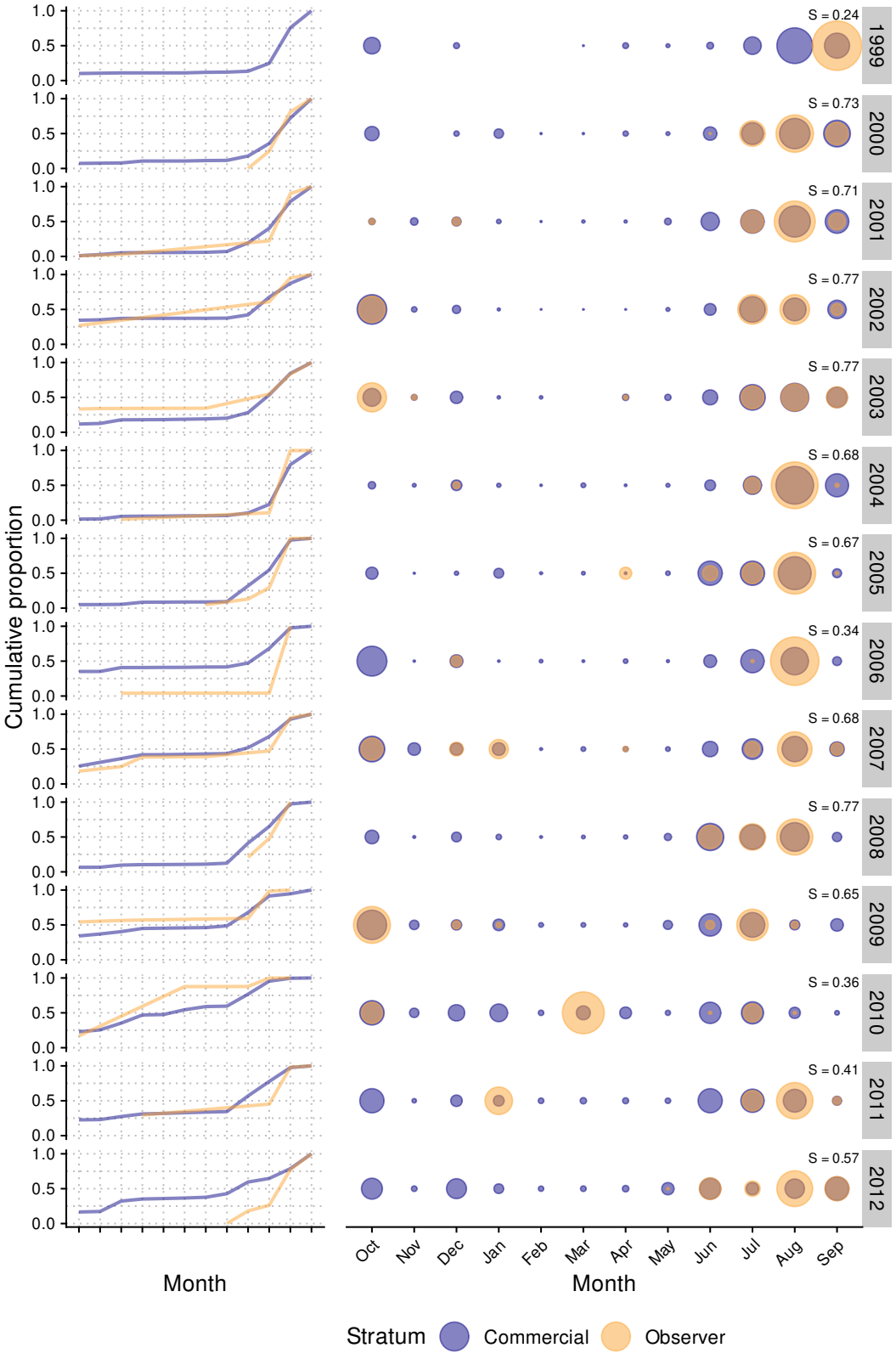


Figure 324: **Monthly representativeness of observer sampling coverage of Trawl catch in FRO 7, from events where the frostfish catch exceeded the 30kg threshold, in 1999 to 2012. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

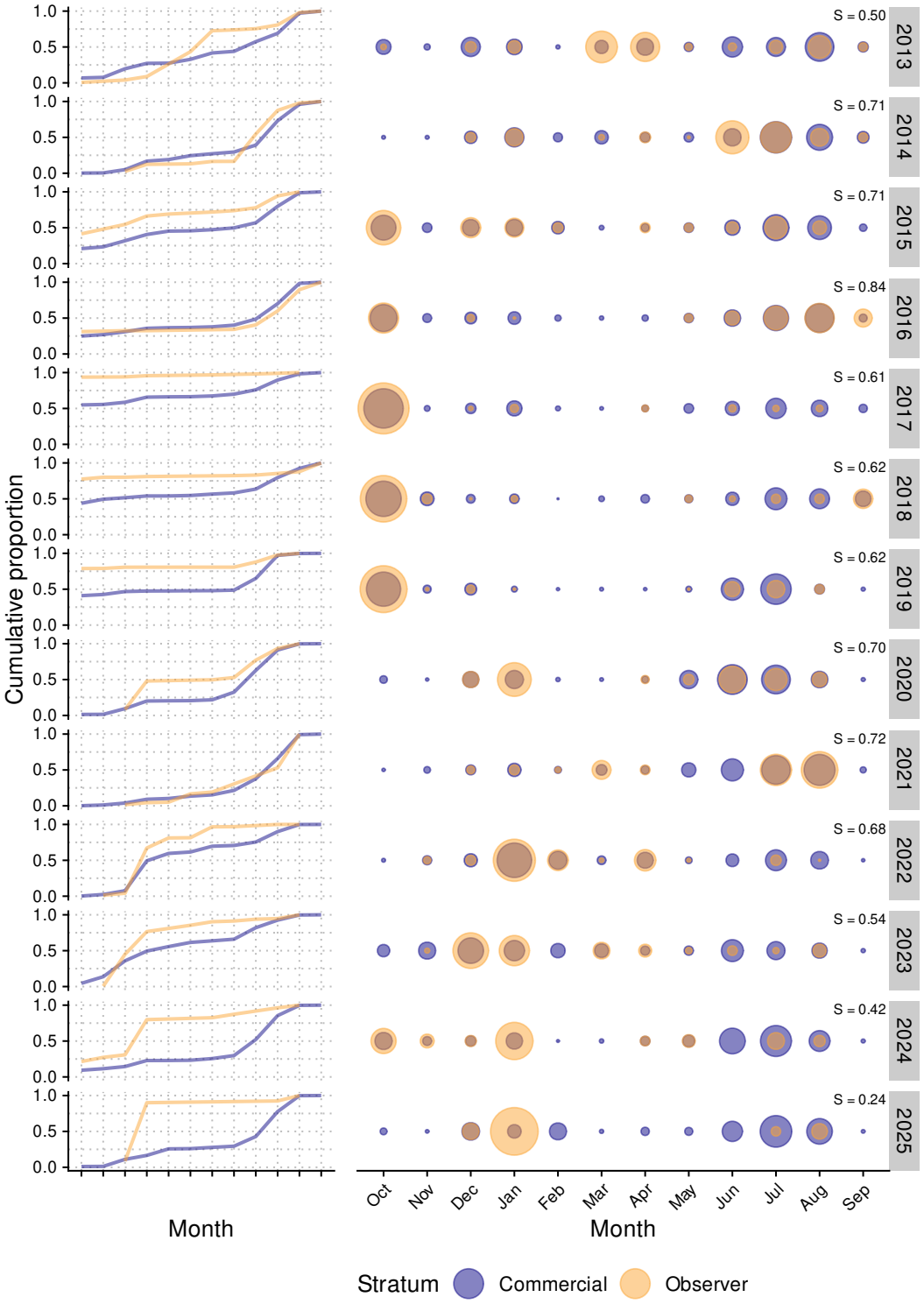


Figure 325: Monthly representativeness of observer sampling coverage of Trawl catch in FRO 7, from events where the frostfish catch exceeded the 30kg threshold, in 2013 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

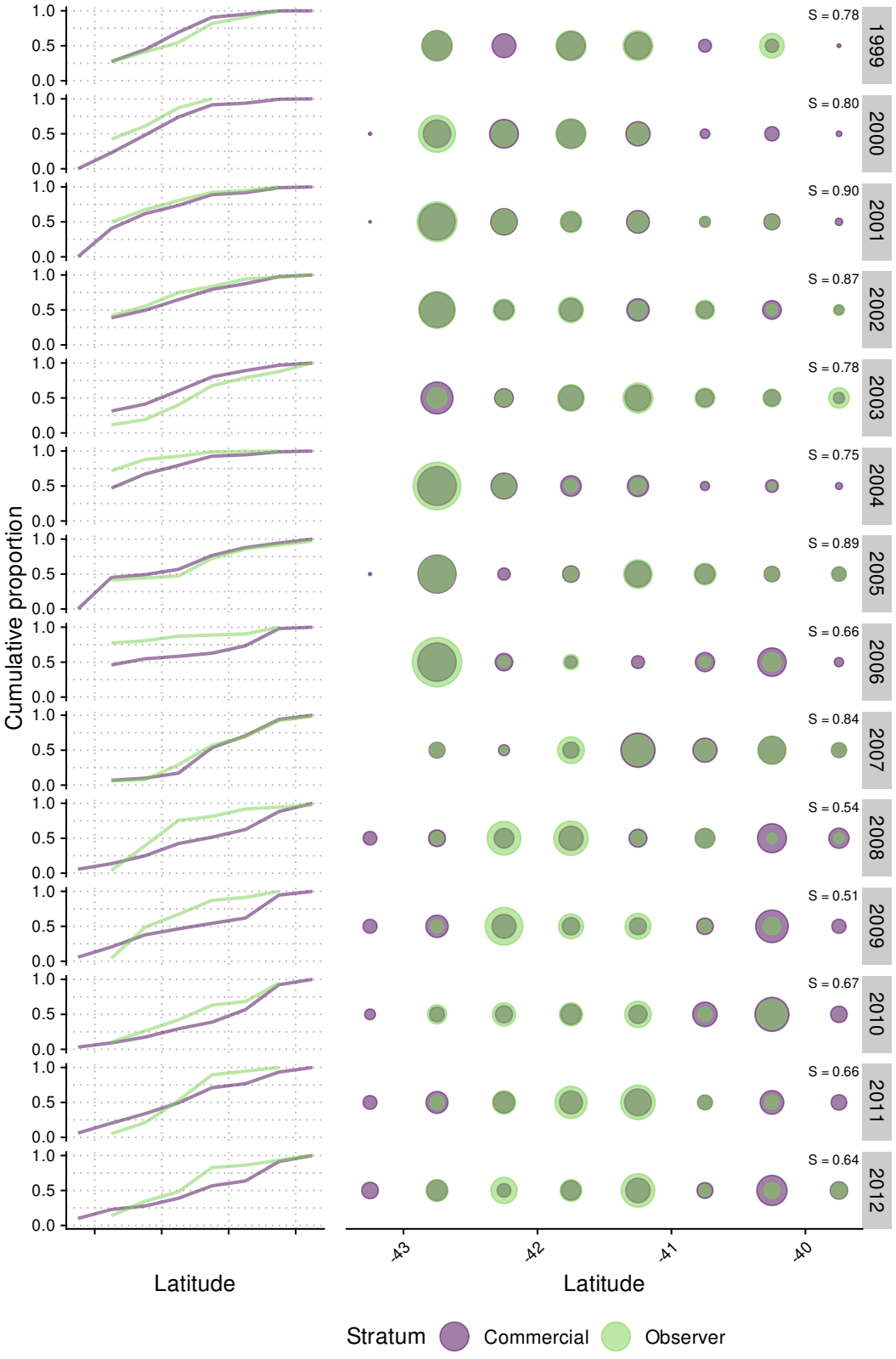


Figure 326: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in FRO 7, where the frostfish catch exceeded the 30kg threshold, in 1999 to 2012. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

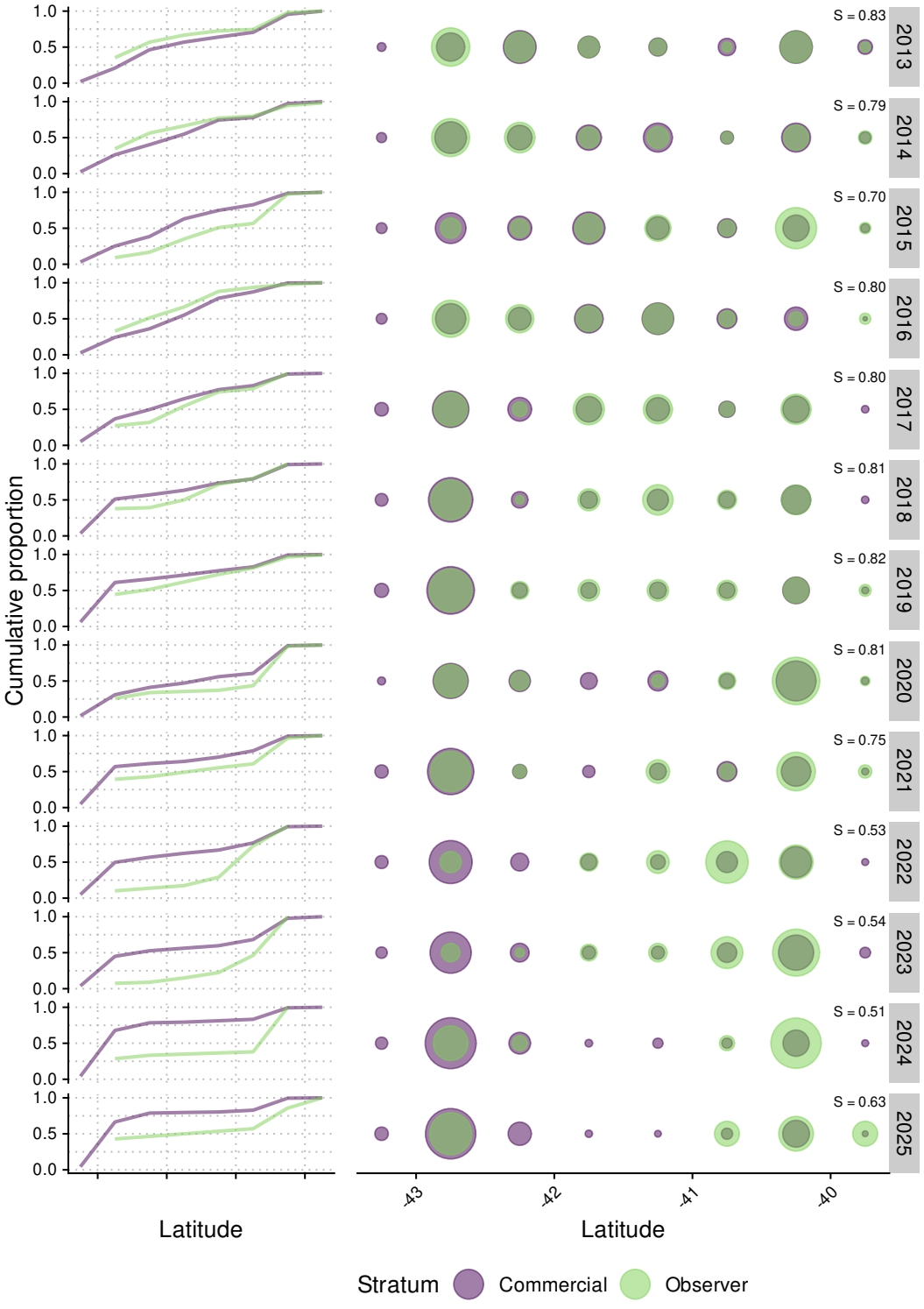


Figure 327: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in FRO 7, where the frostfish catch exceeded the 30kg threshold, in 2013 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

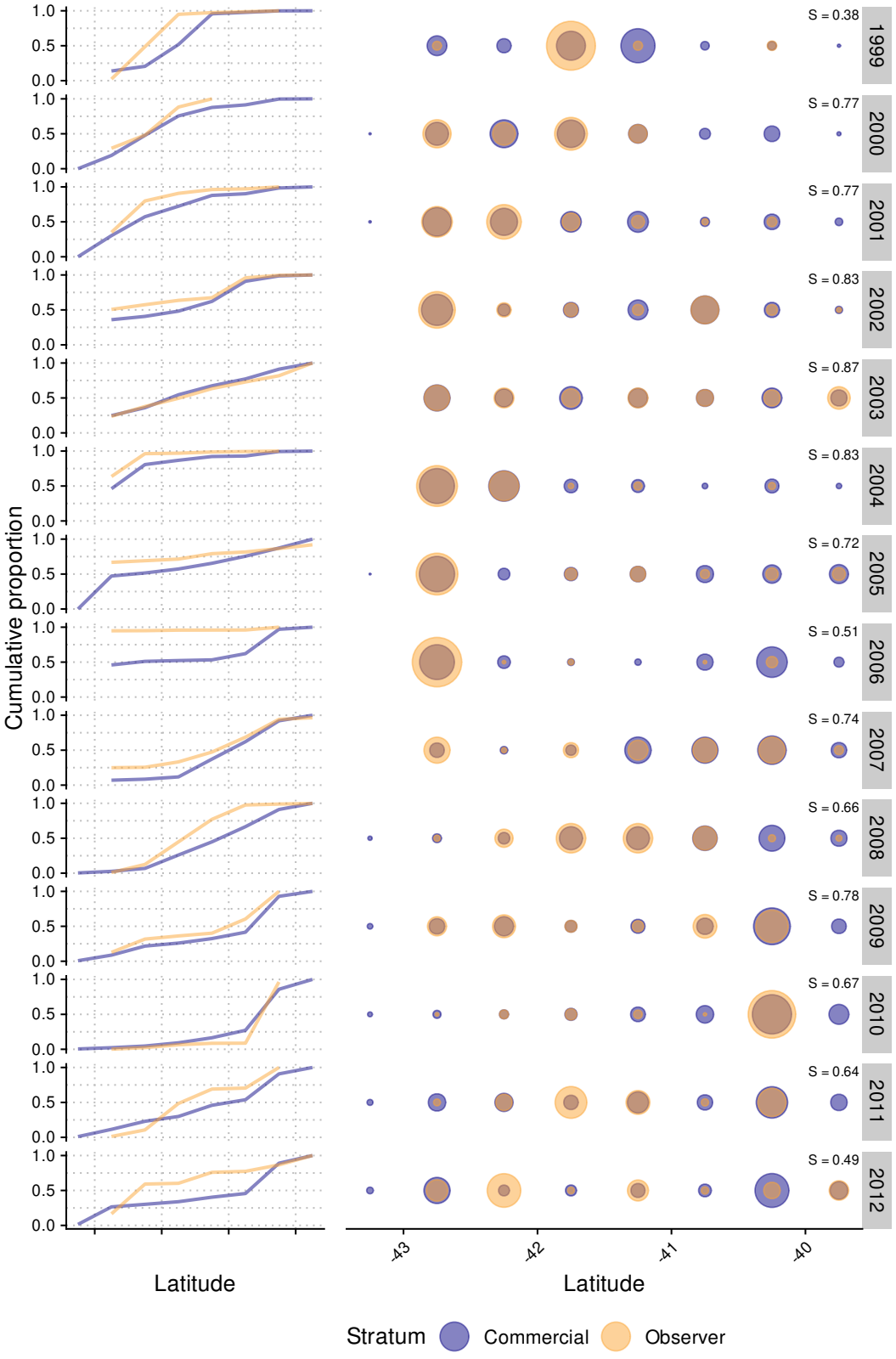


Figure 328: **Latitudinal representativeness of observer sampling coverage of Trawl catch in FRO 7, from events where the frostfish catch exceeded the 30kg threshold, in 1999 to 2012. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

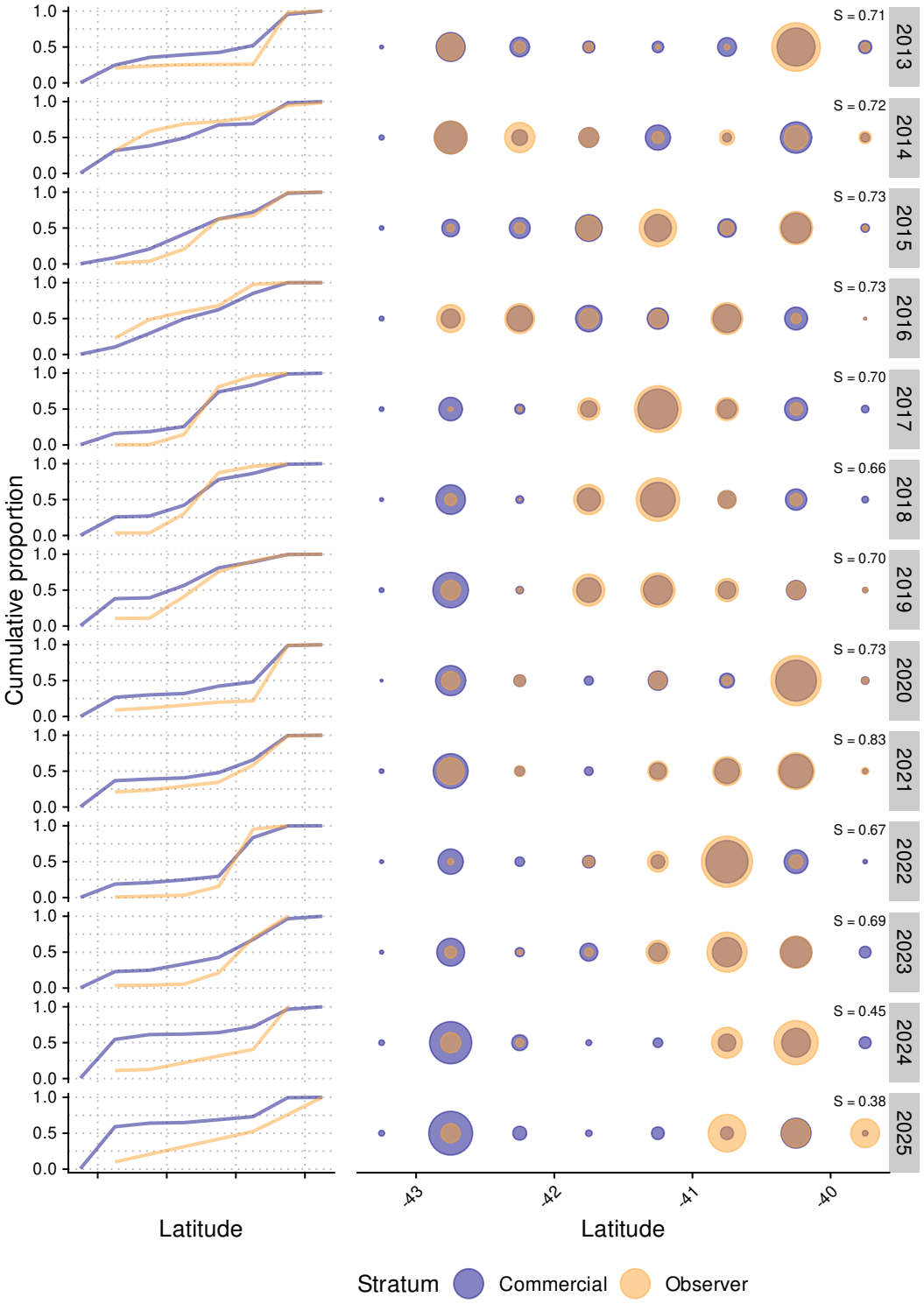


Figure 329: Latitudinal representativeness of observer sampling coverage of Trawl catch in FRO 7, from events where the frostfish catch exceeded the 30kg threshold, in 2013 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

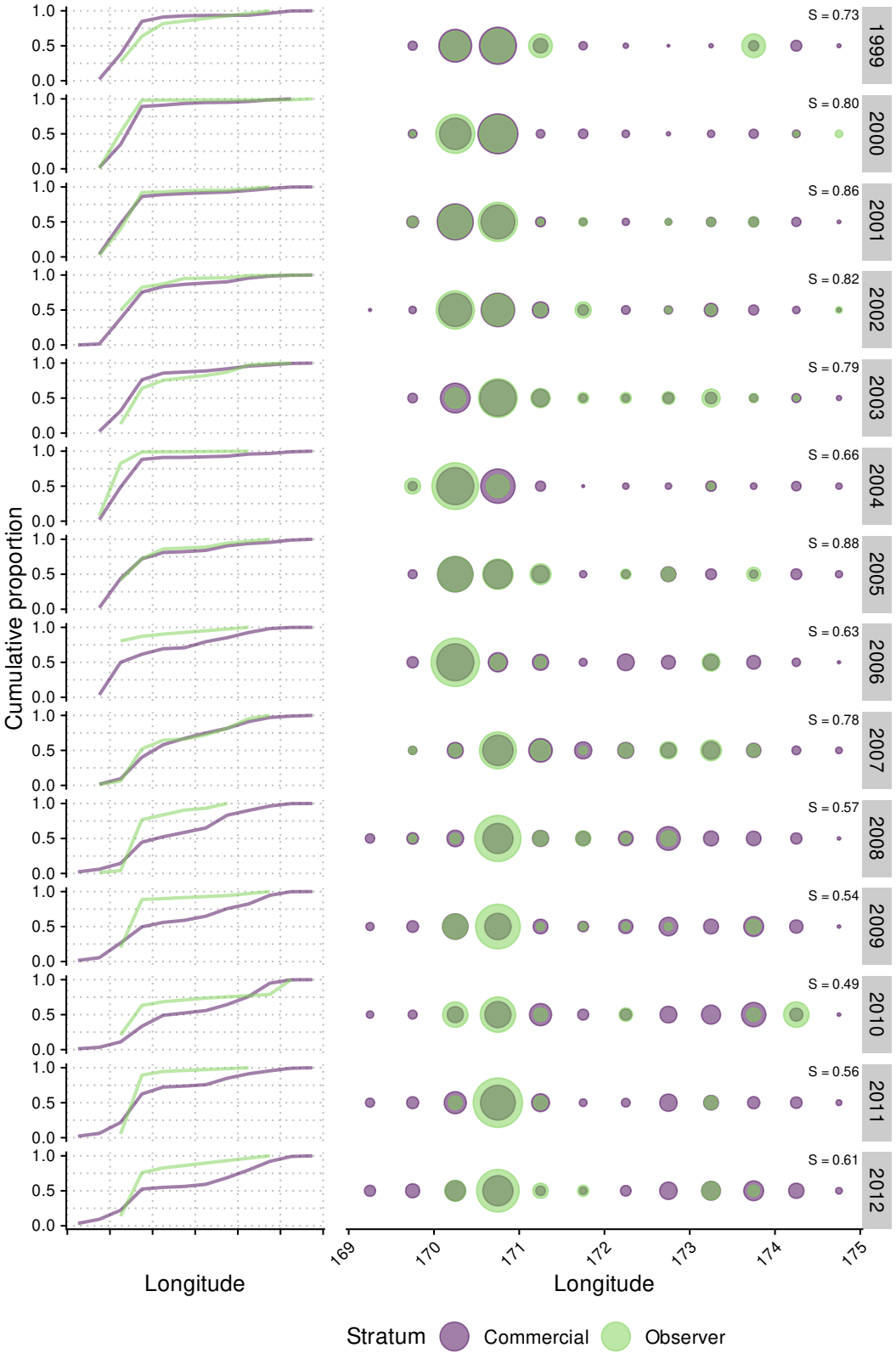


Figure 330: **Longitudinal representativeness of observer sampling coverage of Trawl fishing events in FRO 7, where the frostfish catch exceeded the 30kg threshold, in 1999 to 2012. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

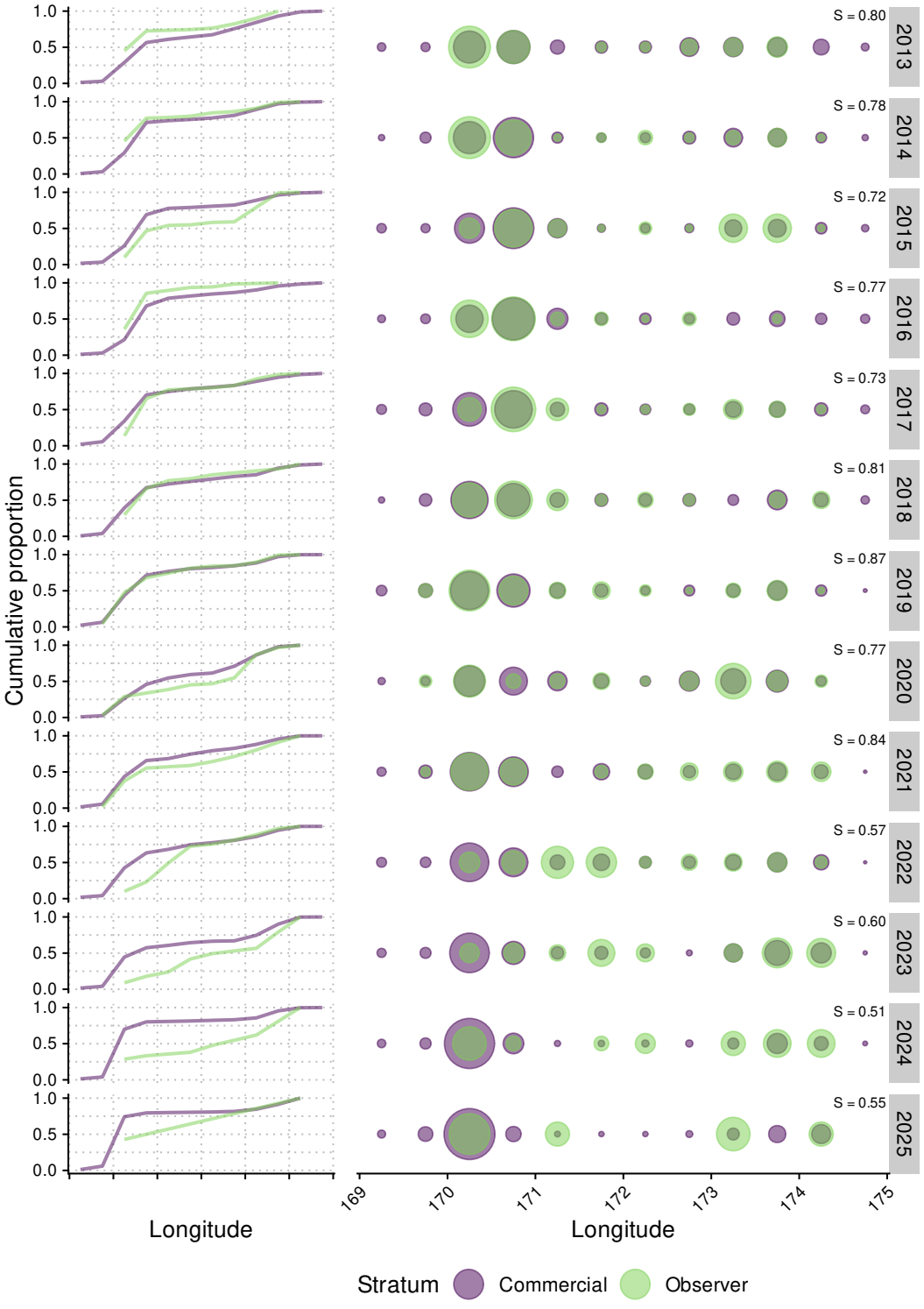


Figure 331: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in FRO 7, where the frostfish catch exceeded the 30kg threshold, in 2013 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

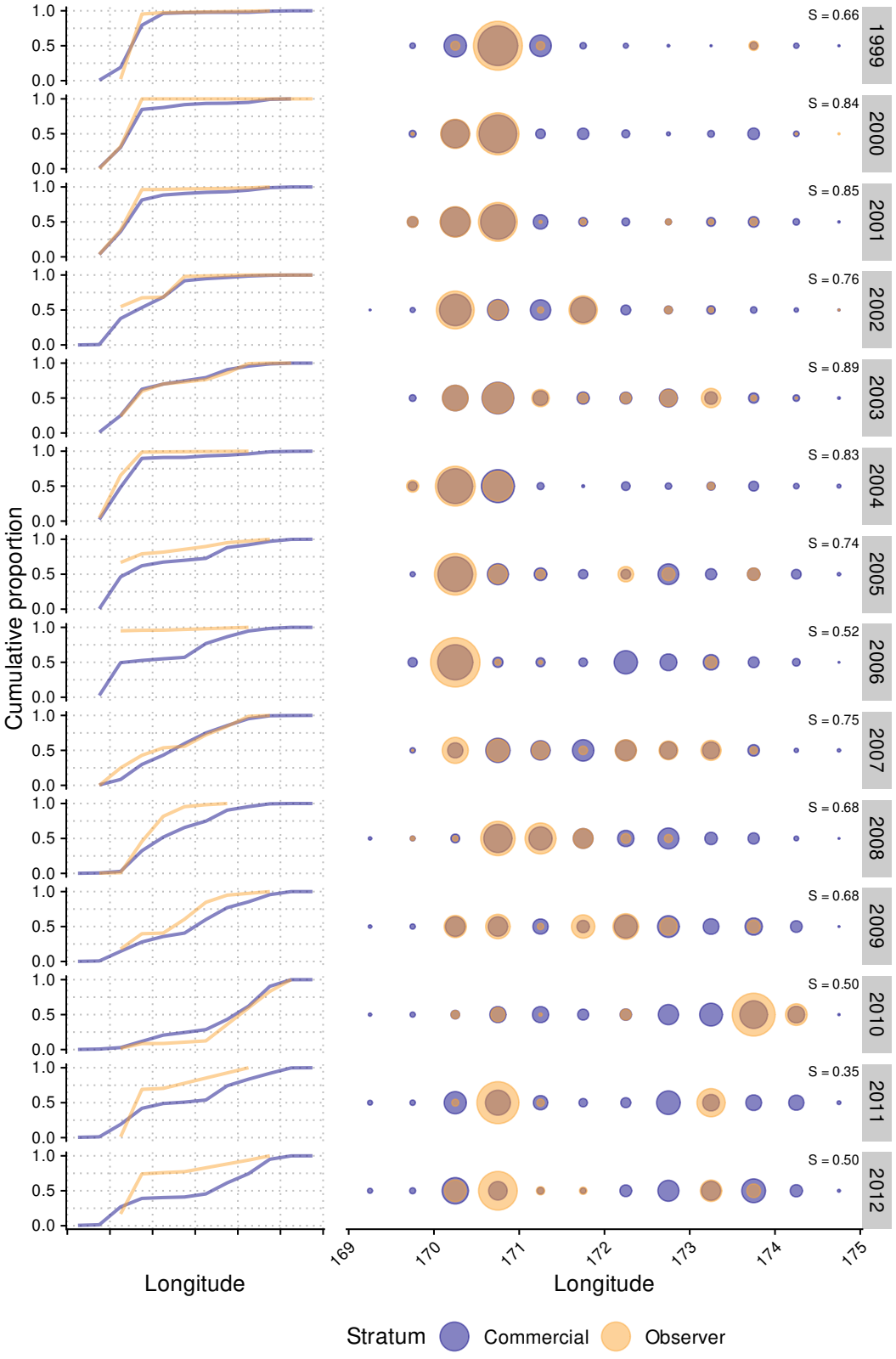


Figure 332: Longitudinal representativeness of observer sampling coverage of Trawl catch in FRO 7, from events where the frostfish catch exceeded the 30kg threshold, in 1999 to 2012. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

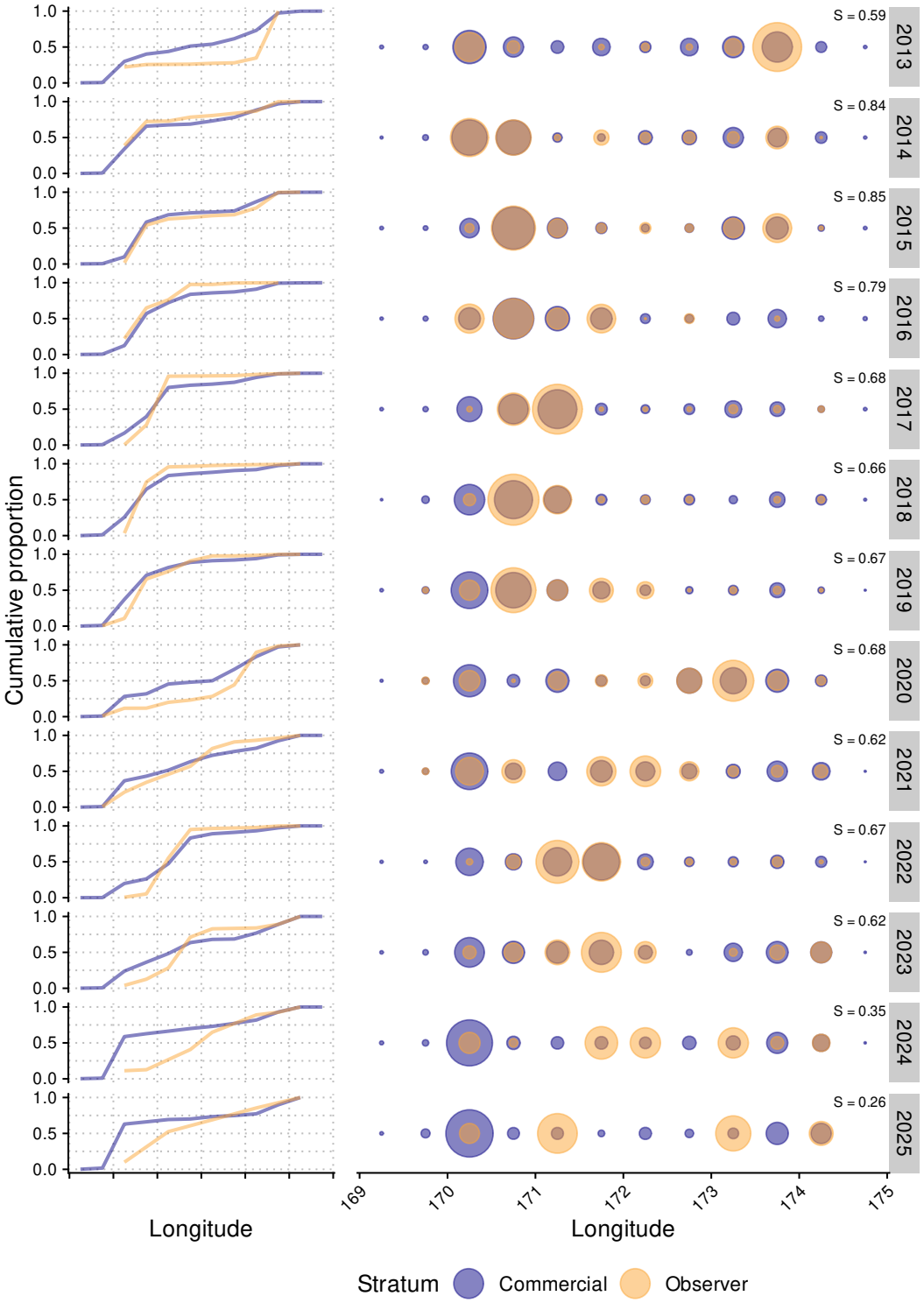


Figure 333: Longitudinal representativeness of observer sampling coverage of Trawl catch in FRO 7, from events where the frostfish catch exceeded the 30kg threshold, in 2013 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

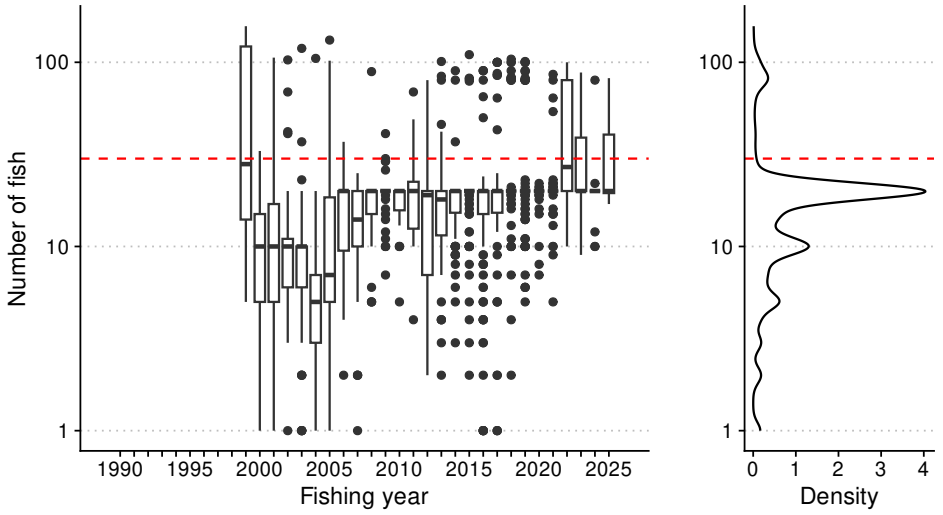


Figure 334: Length-frequency sample sizes for observed fishing events in FRO 7 where frostfish were sampled. The red dashed line indicates a sample size of 30 fish.

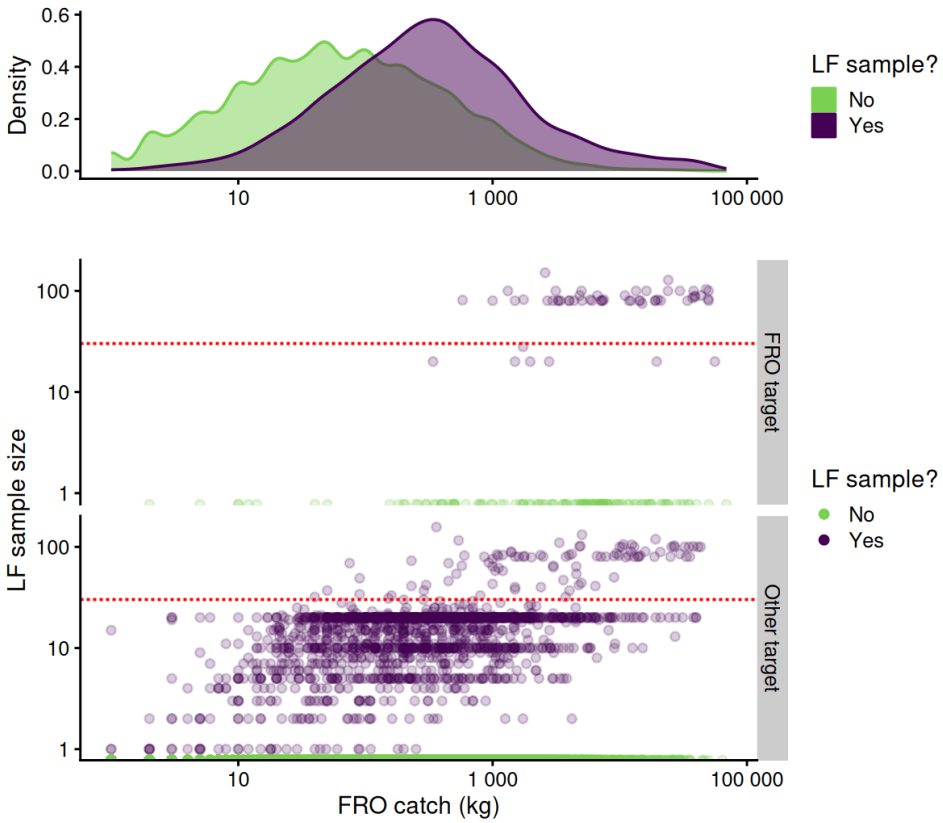


Figure 335: Length-frequency sample sizes (number of fish sampled) for observed fishing events in FRO 7 in relation to the total frostfish catch from an event, separately for frostfish target events and other target species. The red dashed line indicates a sample size of 30 fish.

2.6.2.2 Otolith samples

Table 31: Otolith samples of frostfish from the FRO 7 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of frostfish exceeded a potential sampling threshold of 30 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	1 624	0	0	0.00
1991	1 564	0	0	0.00
1992	1 639	0	0	0.00
1993	1 255	0	0	0.00
1994	1 884	0	0	0.00
1995	1 388	0	0	0.00
1996	917	0	0	0.00
1997	1 559	0	0	0.00
1998	1 591	0	0	0.00
1999	1 546	0	0	0.00
2000	1 634	0	0	0.00
2001	2 079	0	0	0.00
2002	1 842	0	0	0.00
2003	1 698	0	0	0.00
2004	1 266	0	0	0.00
2005	1 048	0	0	0.00
2006	931	0	0	0.00
2007	939	0	0	0.00
2008	741	0	0	0.00
2009	731	22	107	3.01
2010	632	1	5	0.16
2011	561	15	108	2.67
2012	559	19	94	3.40
2013	803	43	269	5.35
2014	1 200	87	413	7.25
2015	1 338	21	104	1.57
2016	1 258	81	406	6.44
2017	935	57	325	6.10
2018	1 288	72	364	5.59
2019	1 354	143	709	10.56
2020	956	61	303	6.38
2021	1 100	48	242	4.36
2022	1 308	67	345	5.12
2023	1 480	57	291	3.85
2024	1 040	21	105	2.02
2025	1 023	7	39	0.68

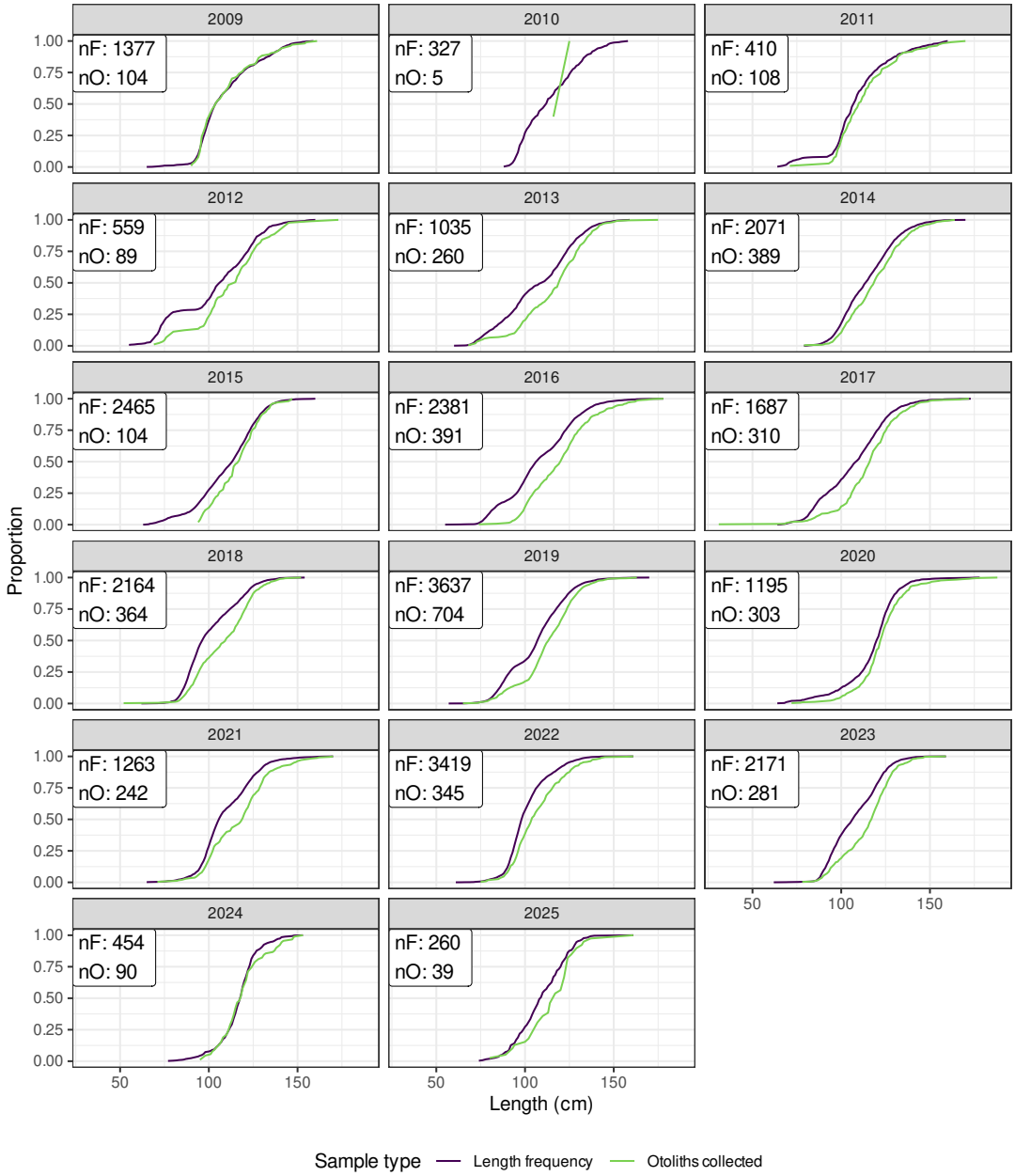


Figure 336: Cumulative distributions of the length of fish in the length frequency and otolith samples of frostfish in the FRO 7 Trawl fishery for the 2009 to 2025 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

2.6.2.3 Catch quantification

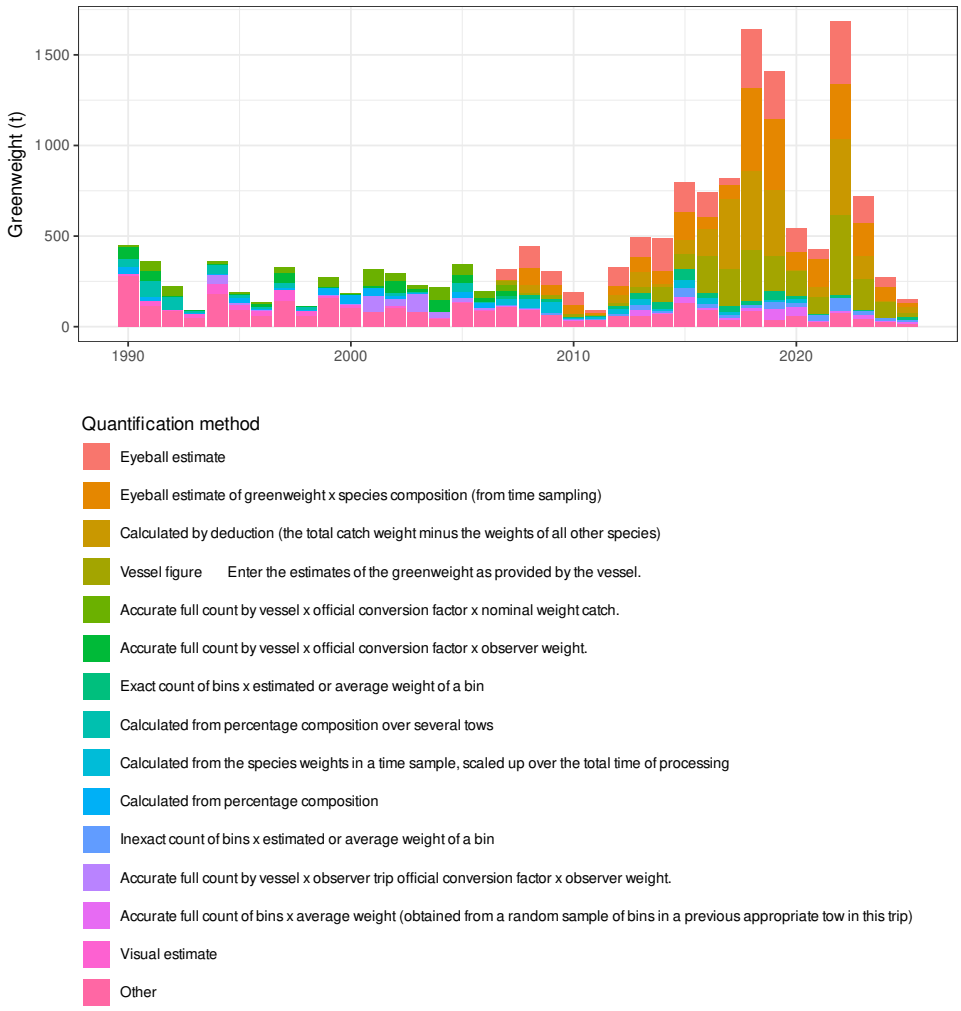


Figure 337: Methods used by observers to quantify the catch of frostfish in the FRO 7 Trawl fishery. The legend lists the methods used in descending order of total catch.

2.6.3 FRO 8: Trawl fishery

2.6.3.1 Length-frequency samples

Table 32: Length-frequency samples of frostfish from the FRO 8 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of frostfish exceeded a potential sampling threshold of 30 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	253	0	0	0.00
1991	254	0	0	0.00
1992	959	0	0	0.00
1993	948	0	0	0.00
1994	364	0	0	0.00
1995	432	0	0	0.00
1996	45	0	0	0.00
1997	167	0	0	0.00
1998	265	0	0	0.00
1999	127	0	0	0.00
2000	95	0	0	0.00
2001	311	18	213	5.79
2002	268	25	250	9.33
2003	605	64	612	10.58
2004	430	6	45	1.40
2005	509	11	161	2.16
2006	655	20	211	3.05
2007	611	31	314	5.07
2008	607	25	571	4.12
2009	547	20	387	3.66
2010	729	39	629	5.35
2011	388	8	320	2.06
2012	674	46	964	6.82
2013	612	40	792	6.54
2014	560	57	1 358	10.18
2015	436	92	2 933	21.10
2016	404	27	514	6.68
2017	382	47	1 107	12.30
2018	309	21	437	6.80
2019	395	66	1 320	16.71
2020	383	43	893	11.23
2021	524	28	550	5.34
2022	496	11	304	2.22
2023	641	19	403	2.96
2024	723	68	1 442	9.41
2025	604	31	906	5.13

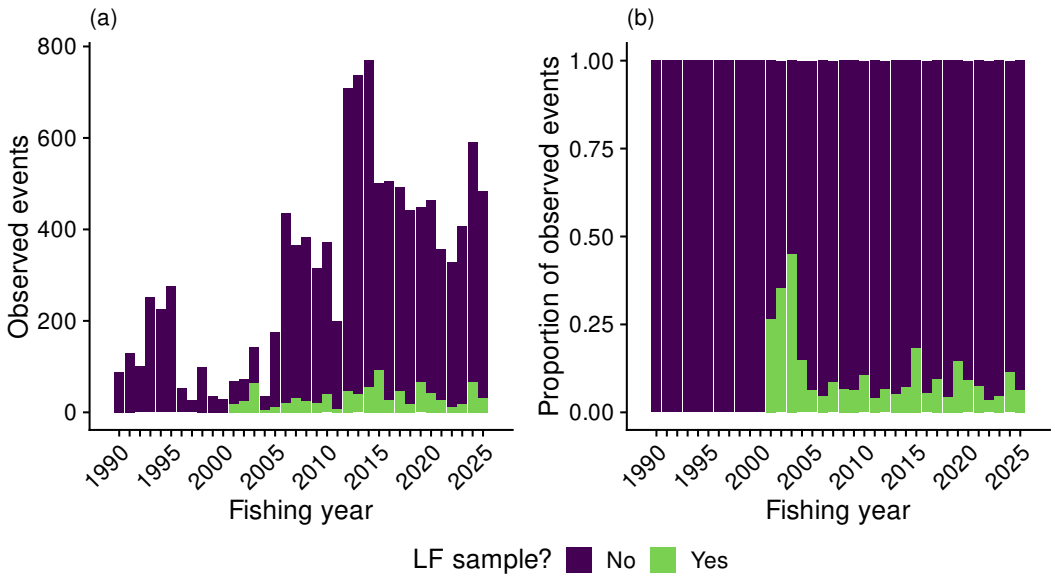


Figure 338: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in FRO 8 where the frostfish catch exceeded the 30 kg threshold, with and without length-frequency sampling.**

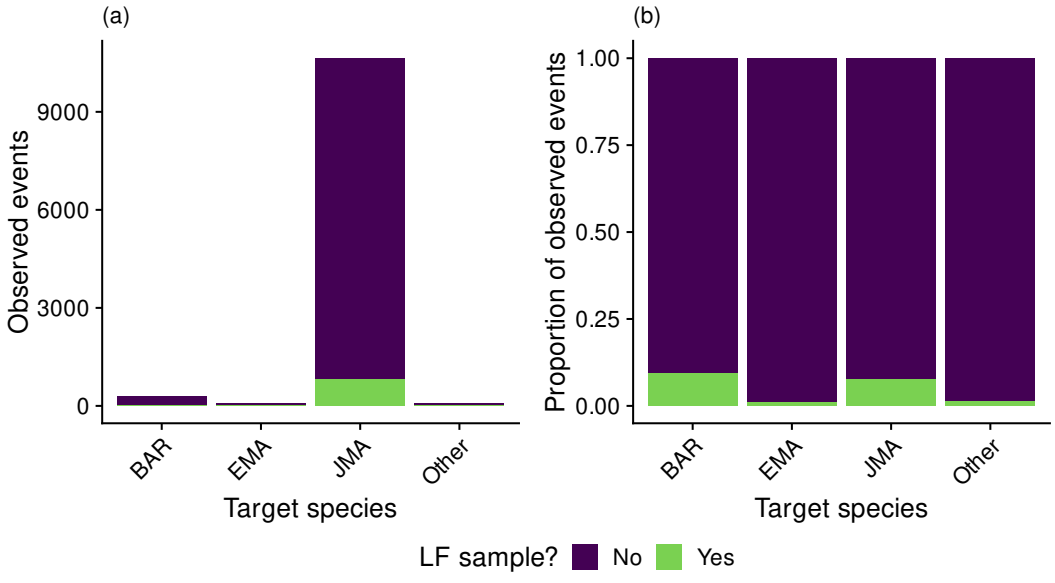


Figure 339: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in FRO 8 where the frostfish catch exceeded the 30 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

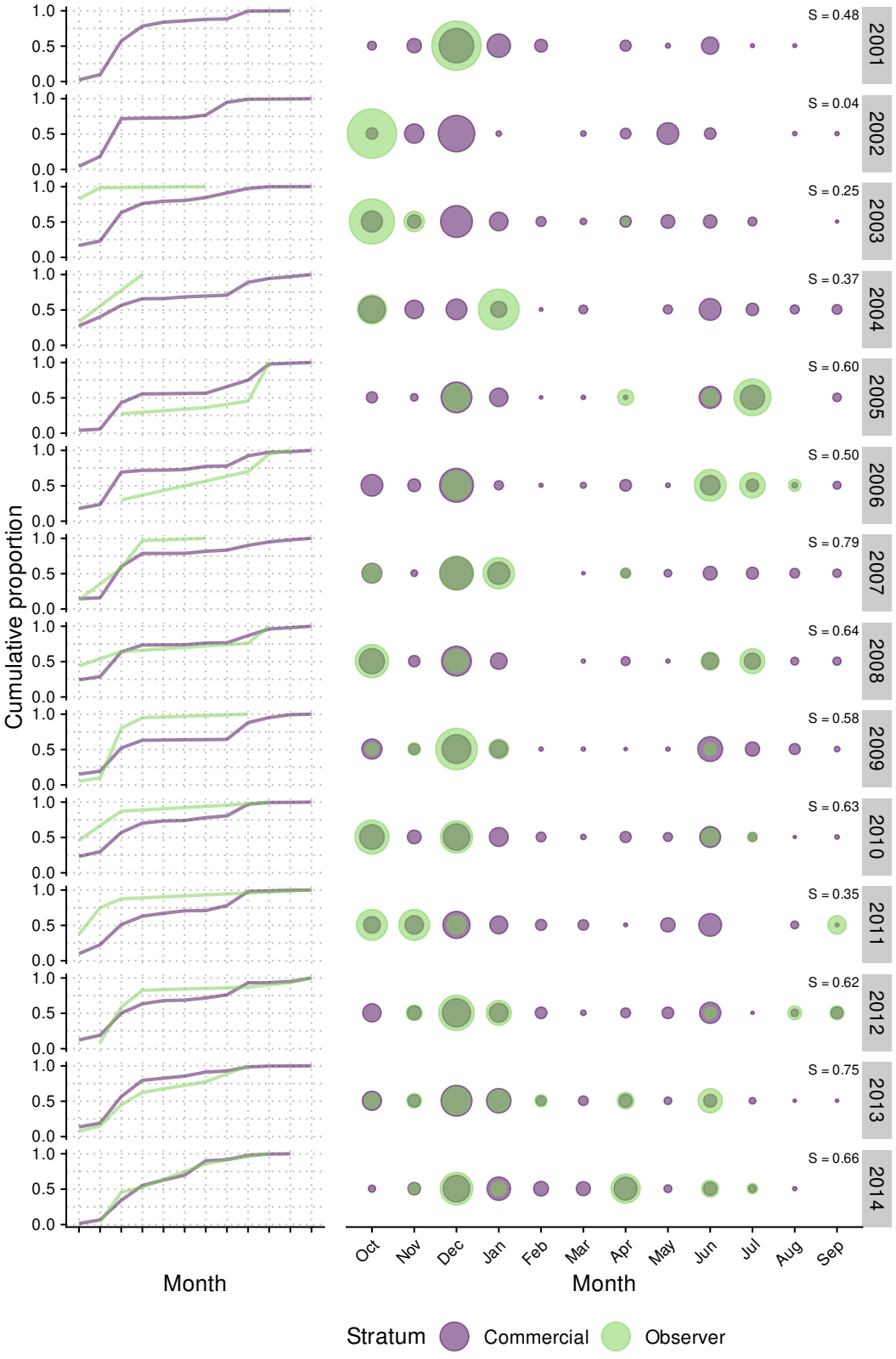


Figure 340: Monthly representativeness of observer sampling coverage of Trawl fishing events in FRO 8, where the frostfish catch exceeded the 30kg threshold, in 2001 to 2014. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

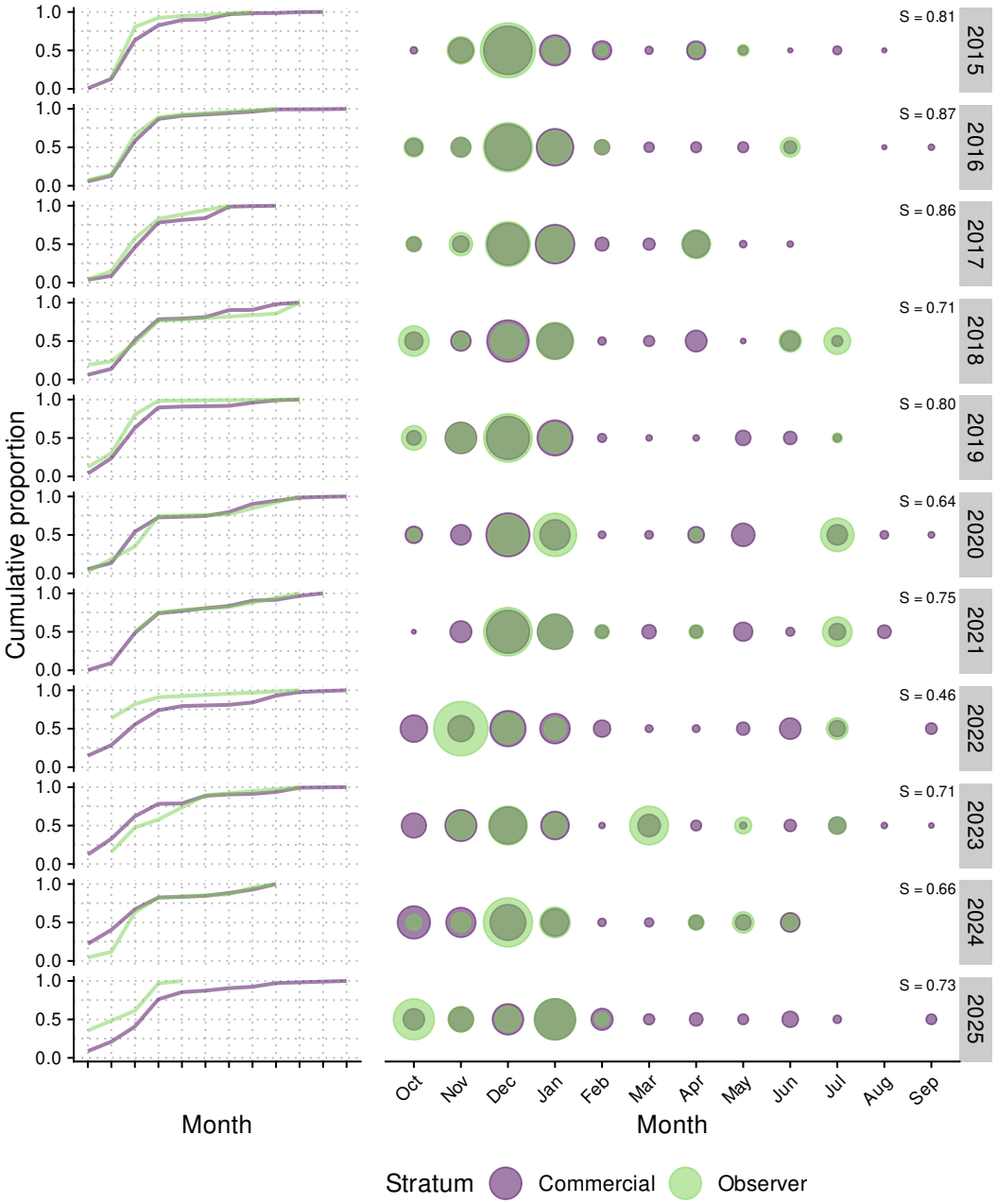


Figure 341: Monthly representativeness of observer sampling coverage of Trawl fishing events in FRO 8, where the frostfish catch exceeded the 30kg threshold, in 2015 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

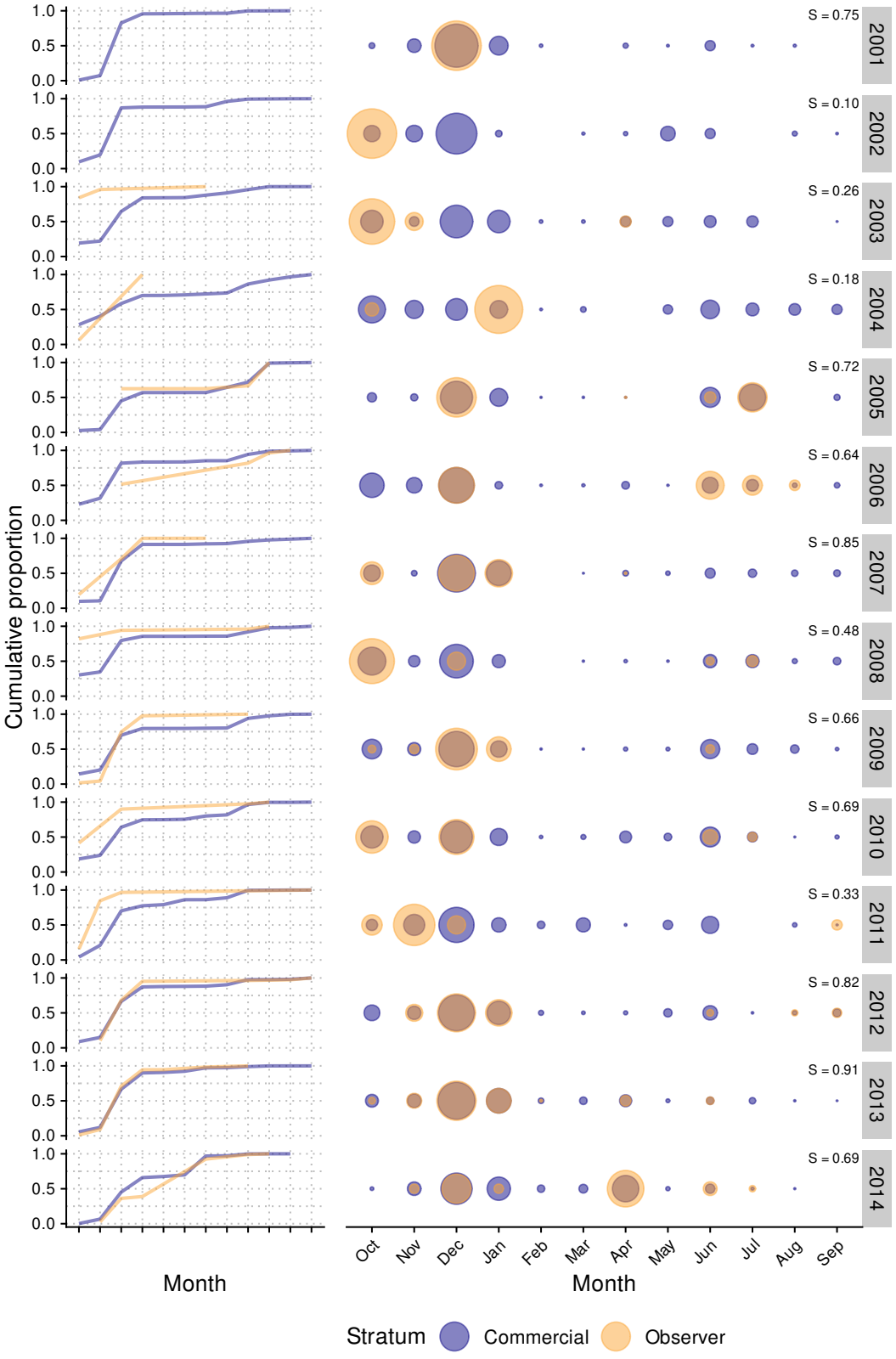


Figure 342: **Monthly representativeness of observer sampling coverage of Trawl catch in FRO 8, from events where the frostfish catch exceeded the 30kg threshold, in 2001 to 2014. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

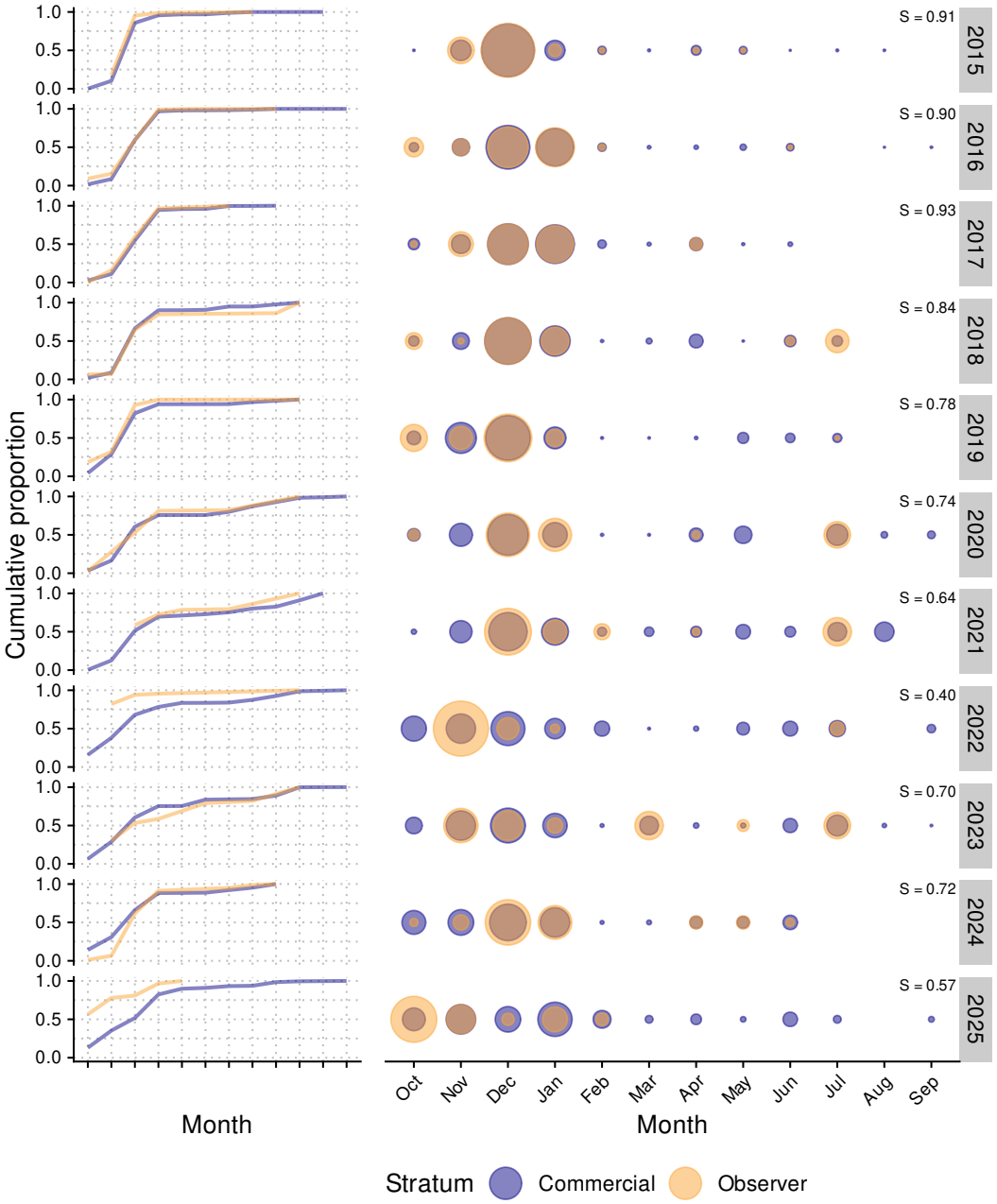


Figure 343: **Monthly representativeness of observer sampling coverage of Trawl catch in FRO 8, from events where the frostfish catch exceeded the 30kg threshold, in 2015 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

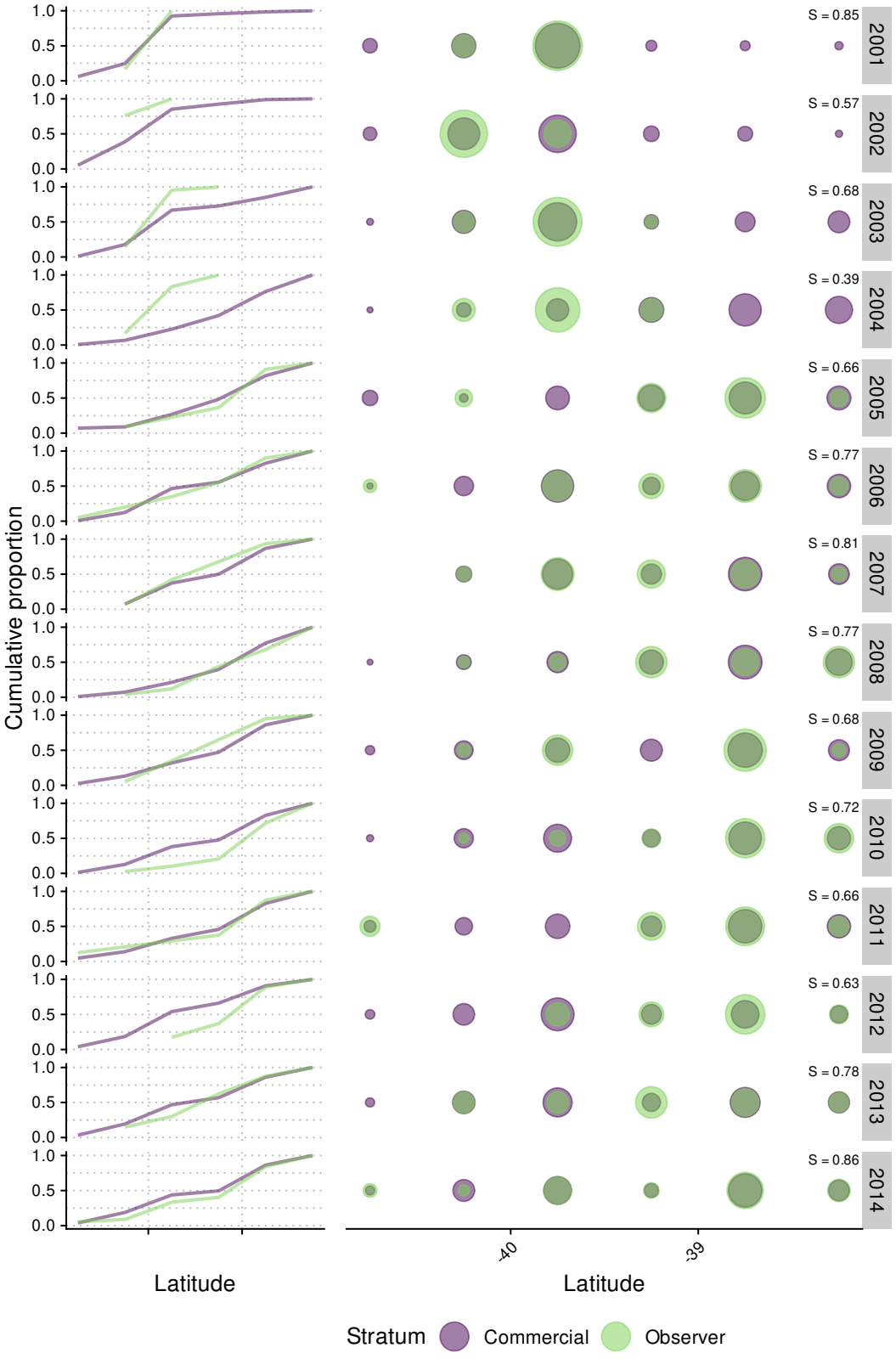


Figure 344: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in FRO 8, where the frostfish catch exceeded the 30kg threshold, in 2001 to 2014. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

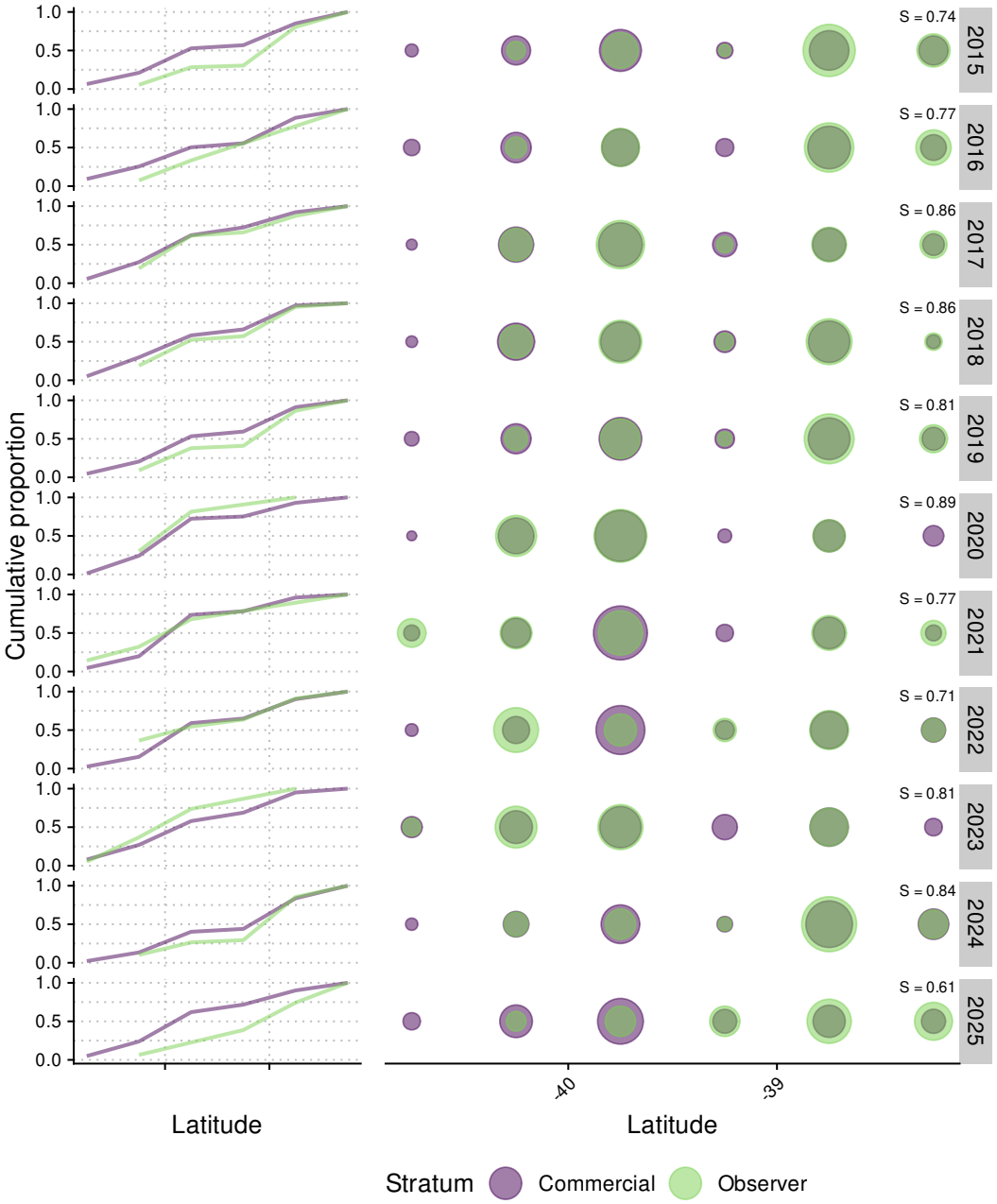


Figure 345: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in FRO 8, where the frostfish catch exceeded the 30kg threshold, in 2015 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

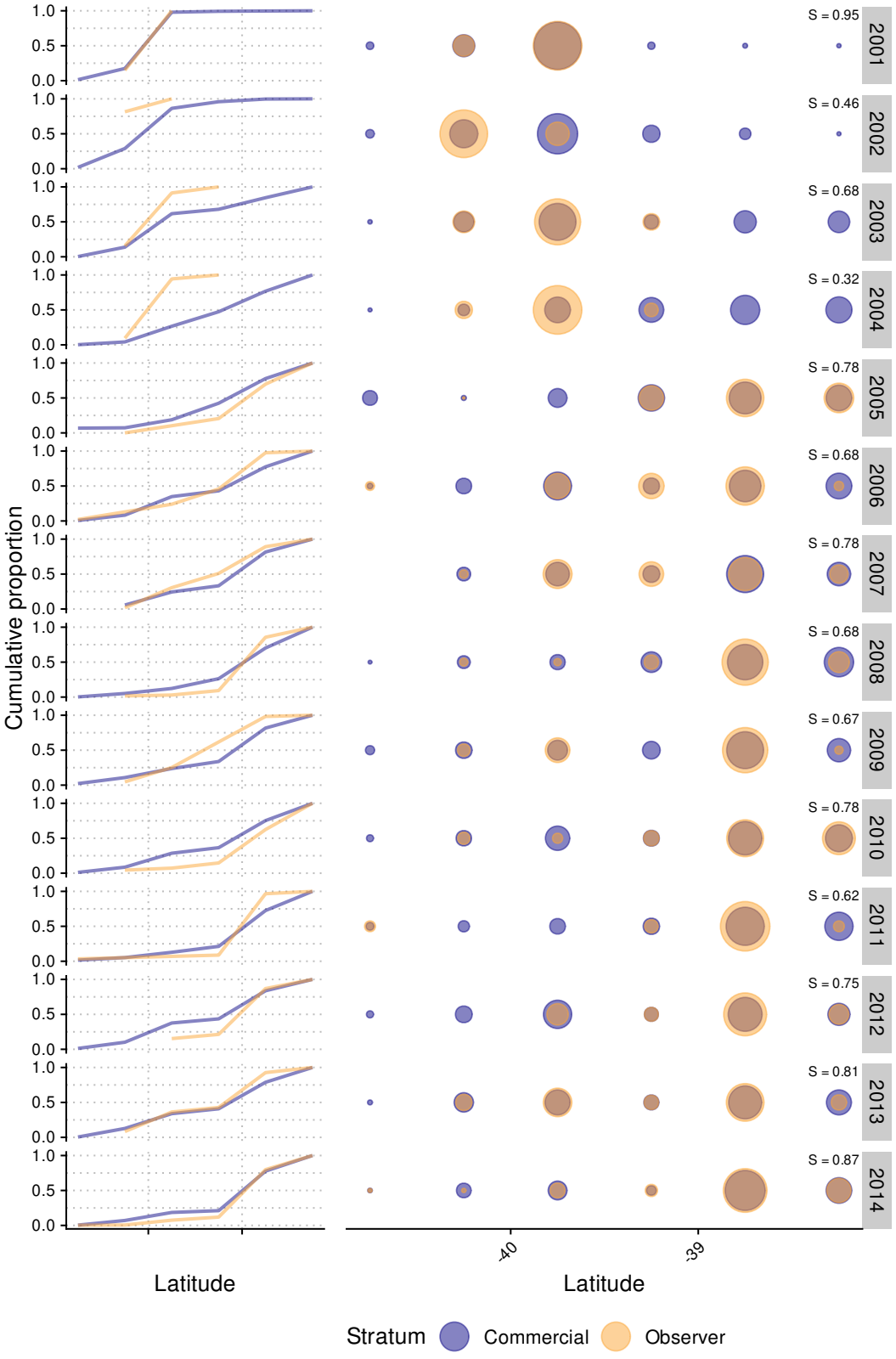


Figure 346: **Latitudinal representativeness of observer sampling coverage of Trawl catch in FRO 8, from events where the frostfish catch exceeded the 30kg threshold, in 2001 to 2014. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

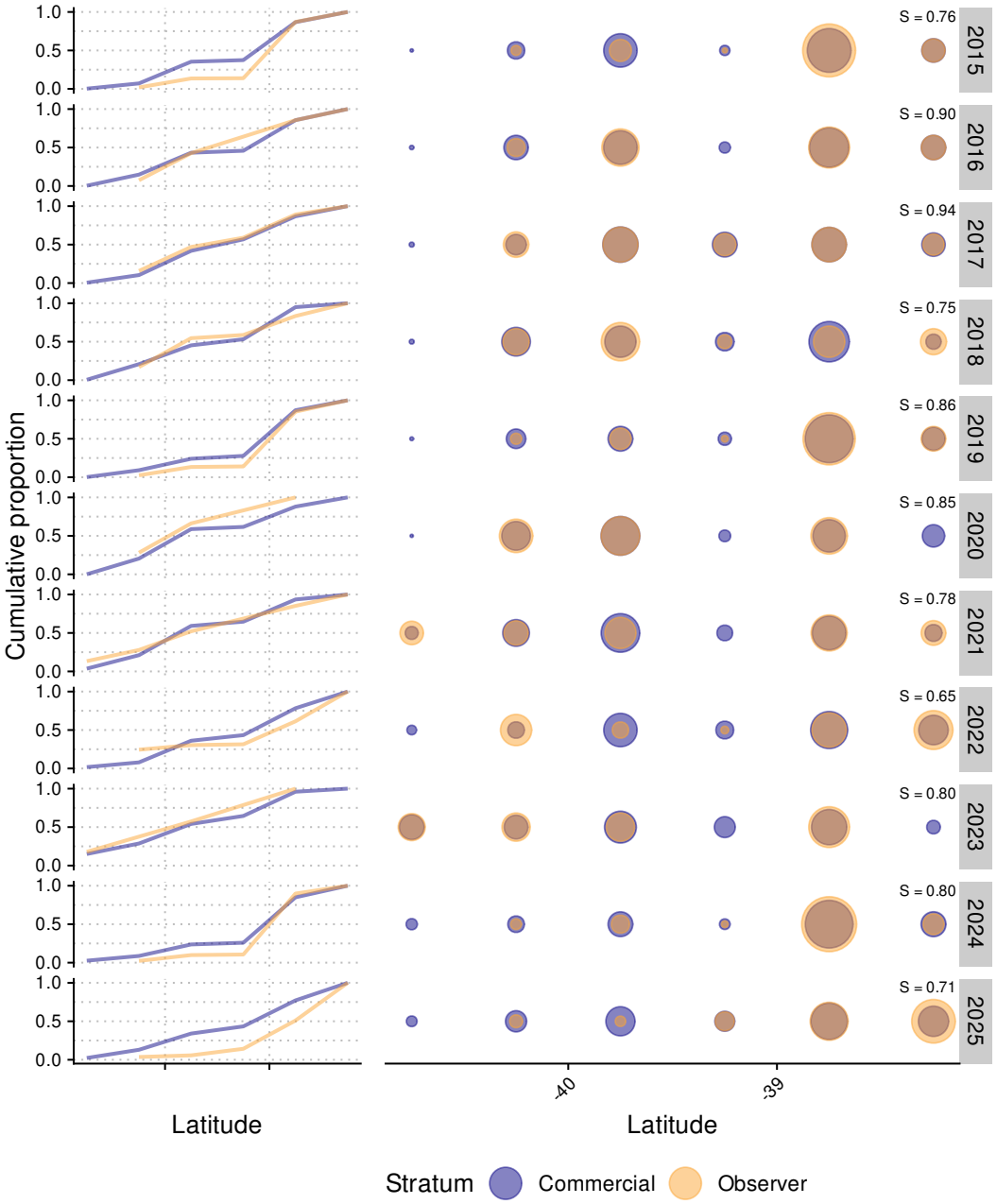


Figure 347: **Latitudinal representativeness of observer sampling coverage of Trawl catch in FRO 8, from events where the frostfish catch exceeded the 30kg threshold, in 2015 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

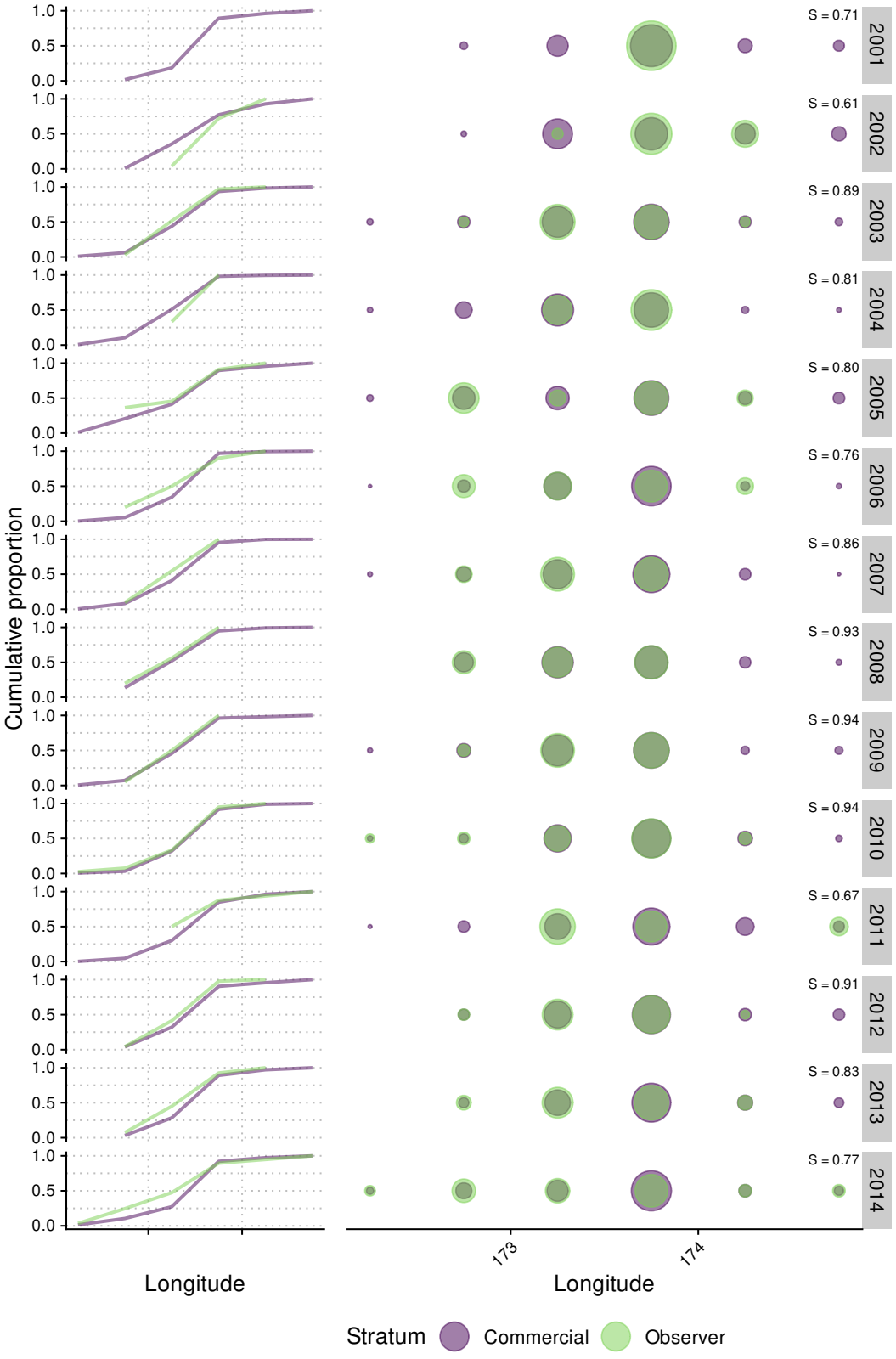


Figure 348: **Longitudinal representativeness of observer sampling coverage of Trawl fishing events in FRO 8, where the frostfish catch exceeded the 30kg threshold, in 2001 to 2014. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

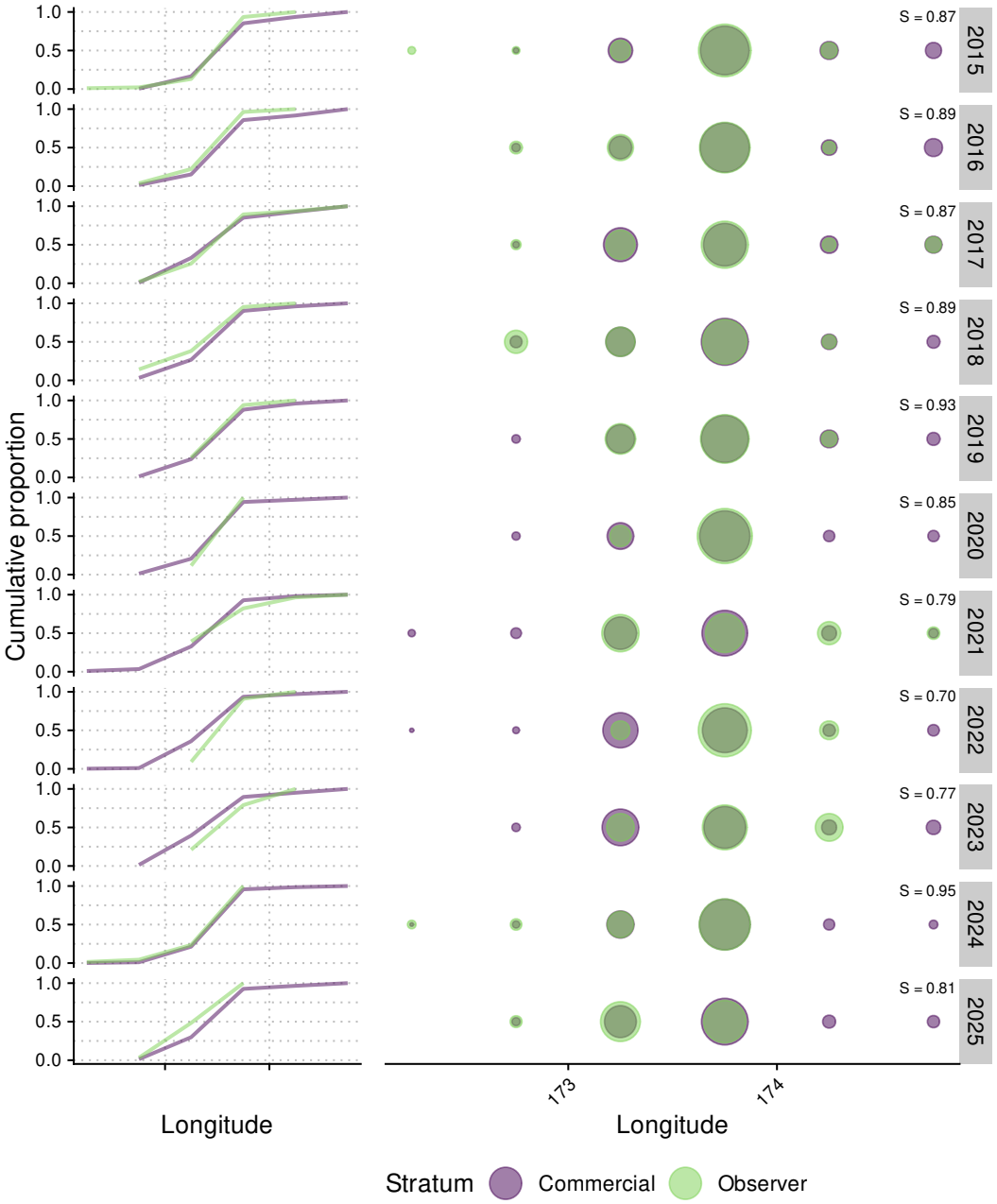


Figure 349: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in FRO 8, where the frostfish catch exceeded the 30kg threshold, in 2015 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

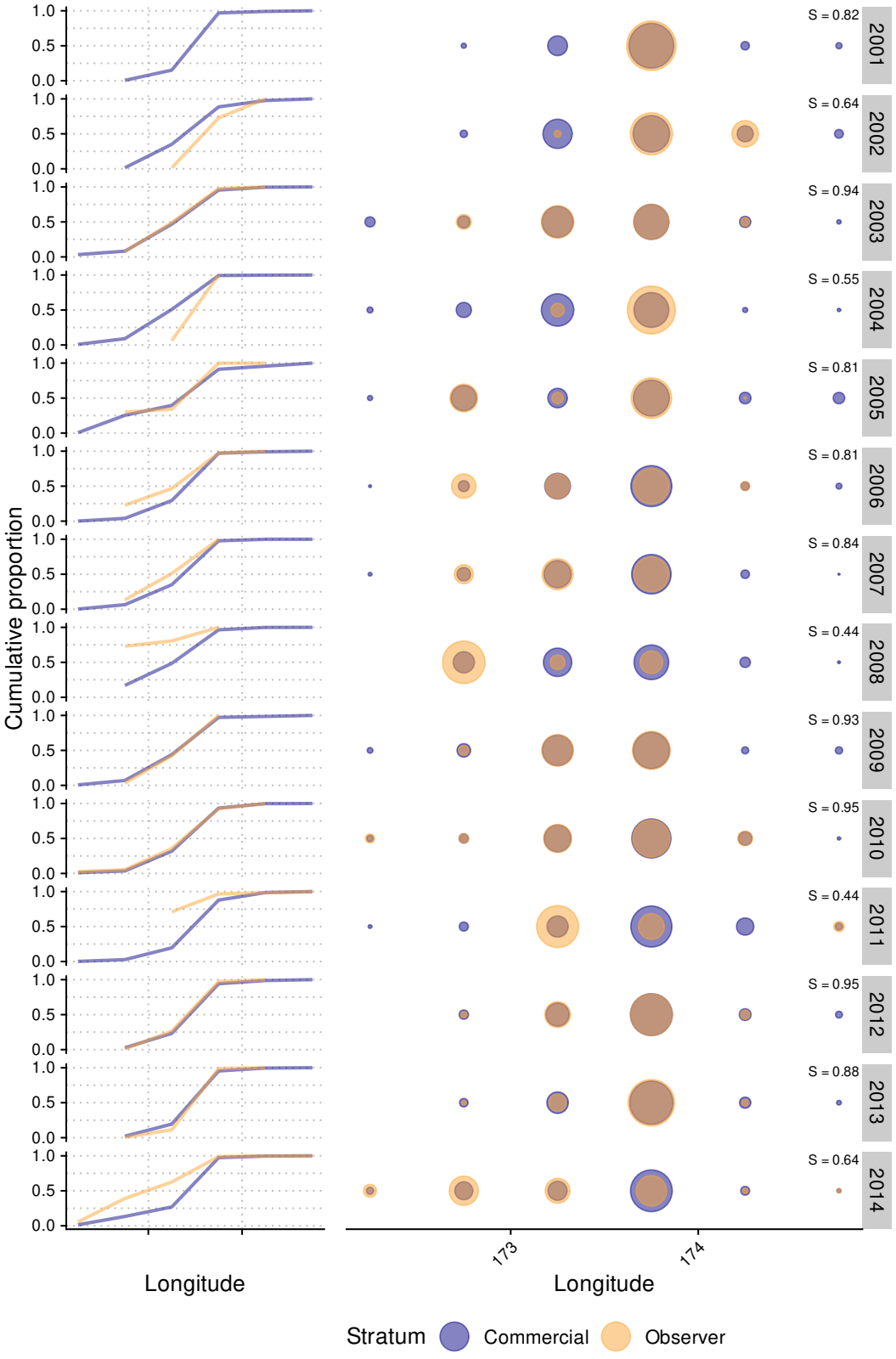


Figure 350: **Longitudinal representativeness of observer sampling coverage of Trawl catch in FRO 8, from events where the frostfish catch exceeded the 30kg threshold, in 2001 to 2014. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

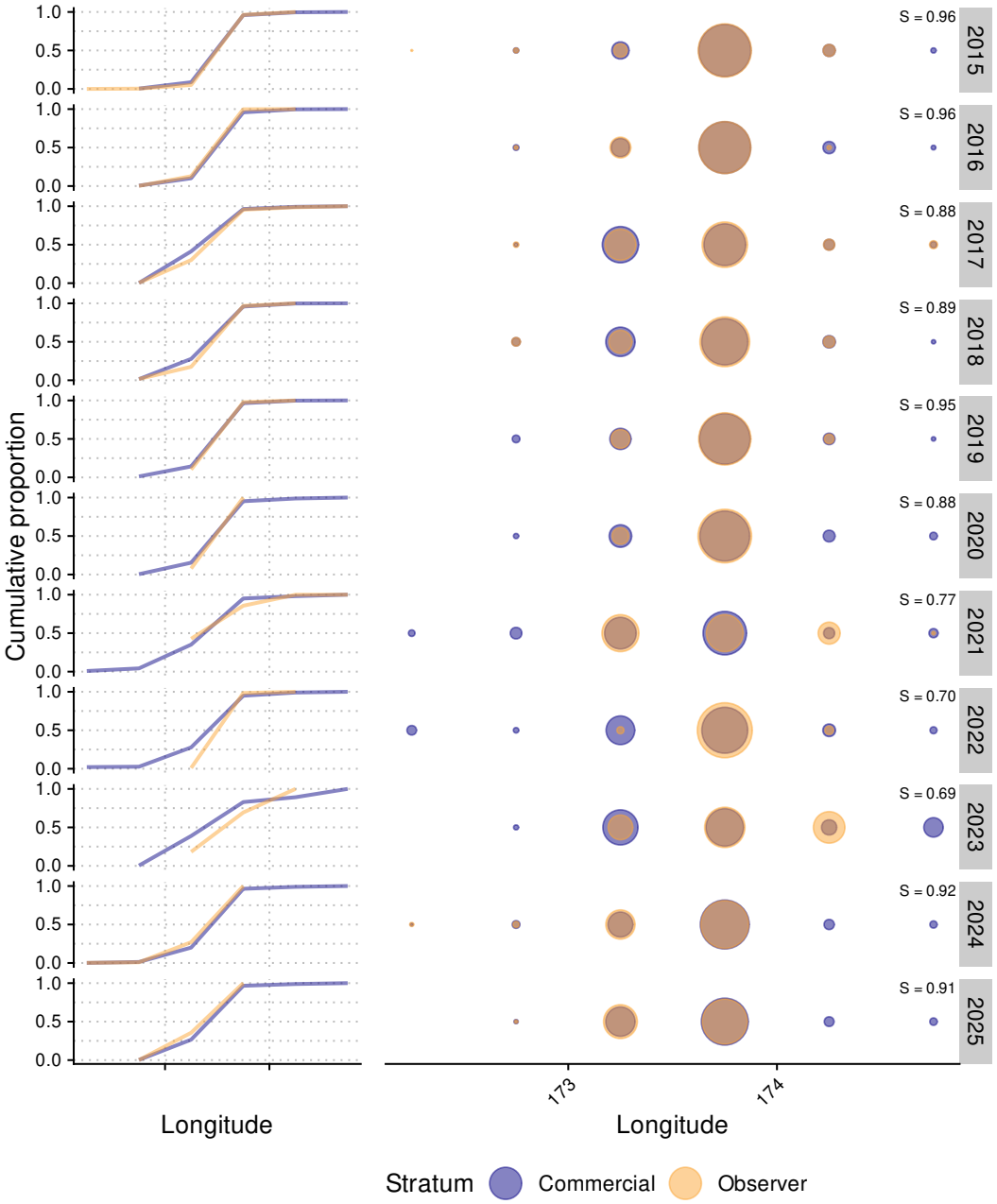


Figure 351: **Longitudinal representativeness of observer sampling coverage of Trawl catch in FRO 8, from events where the frostfish catch exceeded the 30kg threshold, in 2015 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

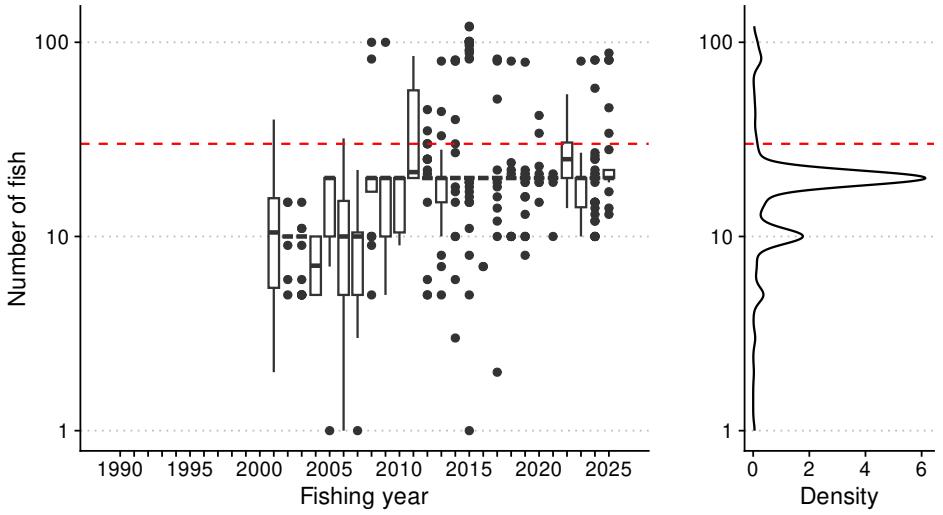


Figure 352: Length-frequency sample sizes for observed fishing events in FRO 8 where frostfish were sampled. The red dashed line indicates a sample size of 30 fish.

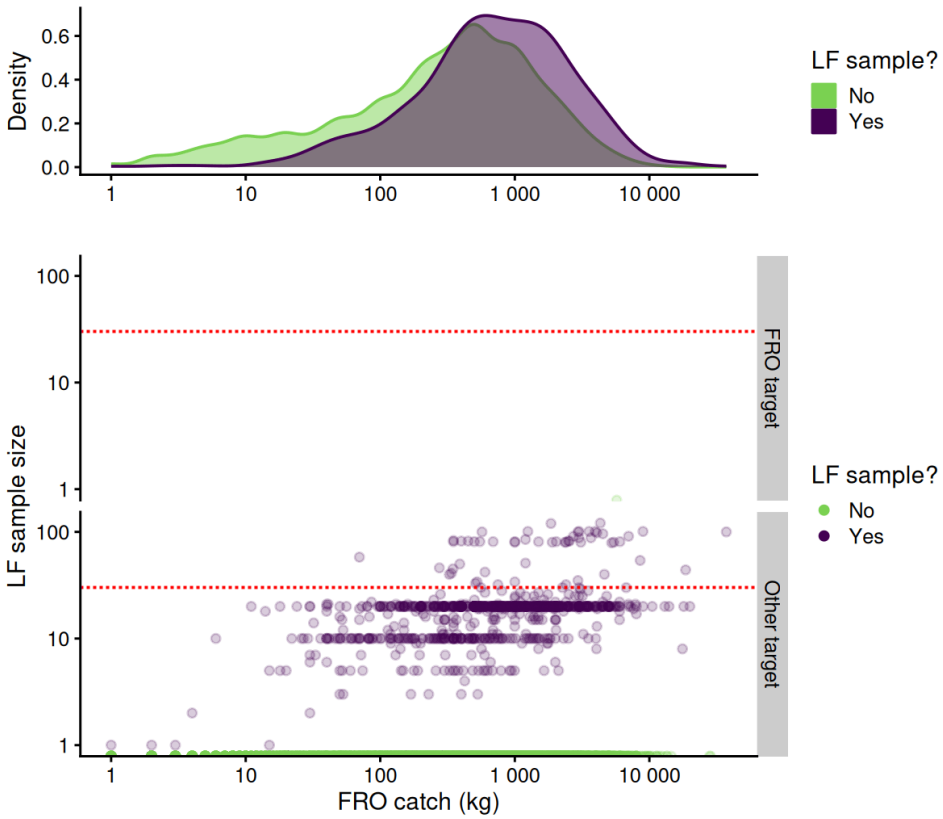


Figure 353: Length-frequency sample sizes (number of fish sampled) for observed fishing events in FRO 8 in relation to the total frostfish catch from an event, separately for frostfish target events and other target species. The red dashed line indicates a sample size of 30 fish.

2.6.3.2 Otolith samples

Table 33: Otolith samples of frostfish from the FRO 8 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of frostfish exceeded a potential sampling threshold of 30 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	253	0	0	0.00
1991	254	0	0	0.00
1992	959	0	0	0.00
1993	948	0	0	0.00
1994	364	0	0	0.00
1995	432	0	0	0.00
1996	45	0	0	0.00
1997	167	0	0	0.00
1998	265	0	0	0.00
1999	127	0	0	0.00
2000	95	0	0	0.00
2001	311	0	0	0.00
2002	268	0	0	0.00
2003	605	0	0	0.00
2004	430	0	0	0.00
2005	509	0	0	0.00
2006	655	0	0	0.00
2007	611	0	0	0.00
2008	607	0	0	0.00
2009	547	1	5	0.18
2010	729	1	5	0.14
2011	388	5	45	1.29
2012	674	43	244	6.38
2013	612	23	122	3.76
2014	560	47	253	8.39
2015	436	0	0	0.00
2016	404	3	15	0.74
2017	382	38	190	9.95
2018	309	21	107	6.80
2019	395	66	335	16.71
2020	383	42	207	10.97
2021	524	28	147	5.34
2022	496	7	43	1.41
2023	641	14	70	2.18
2024	723	67	335	9.27
2025	604	30	155	4.97

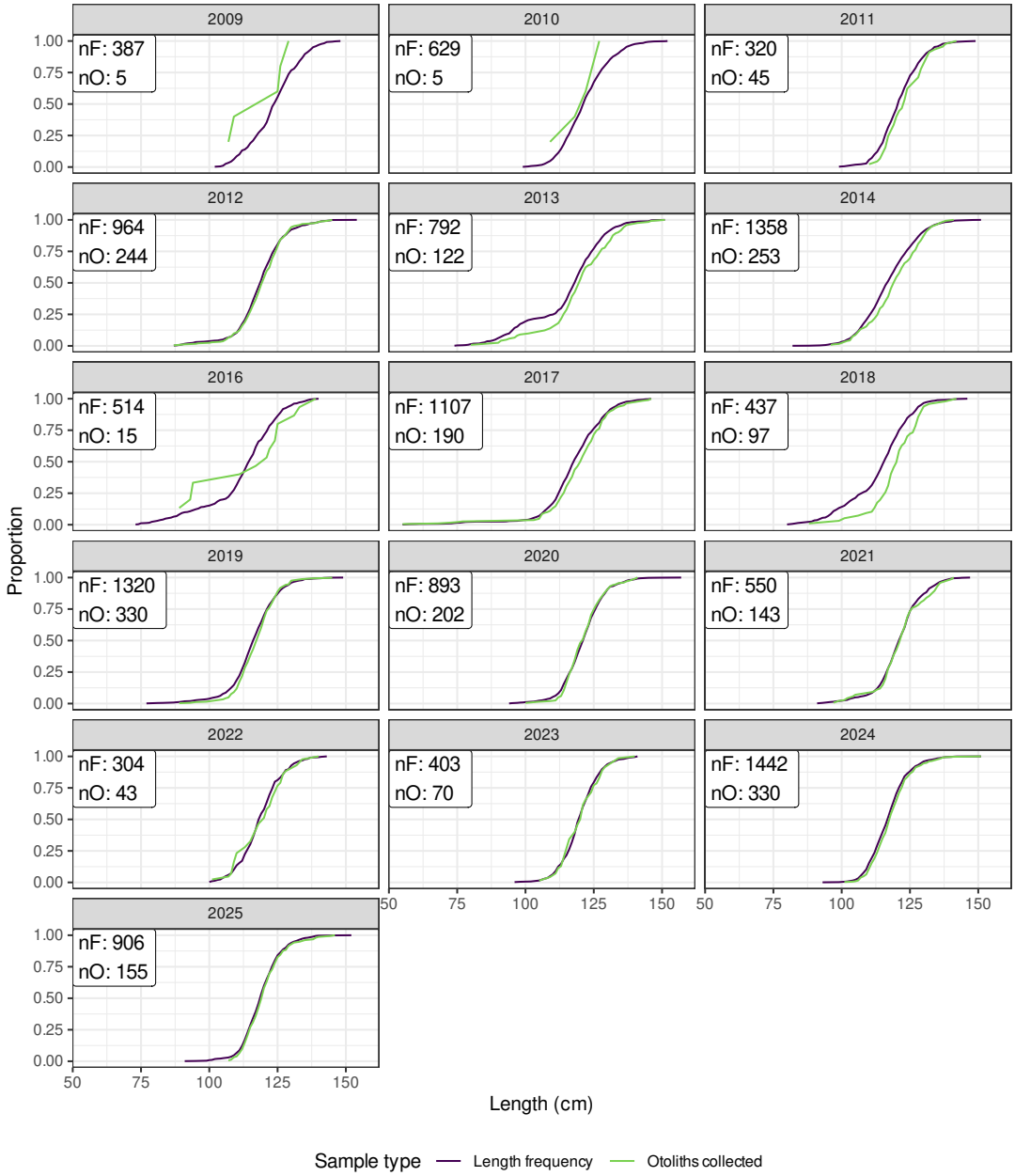


Figure 354: Cumulative distributions of the length of fish in the length frequency and otolith samples of frostfish in the FRO 8 Trawl fishery for the 2009 to 2025 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

2.6.3.3 Catch quantification

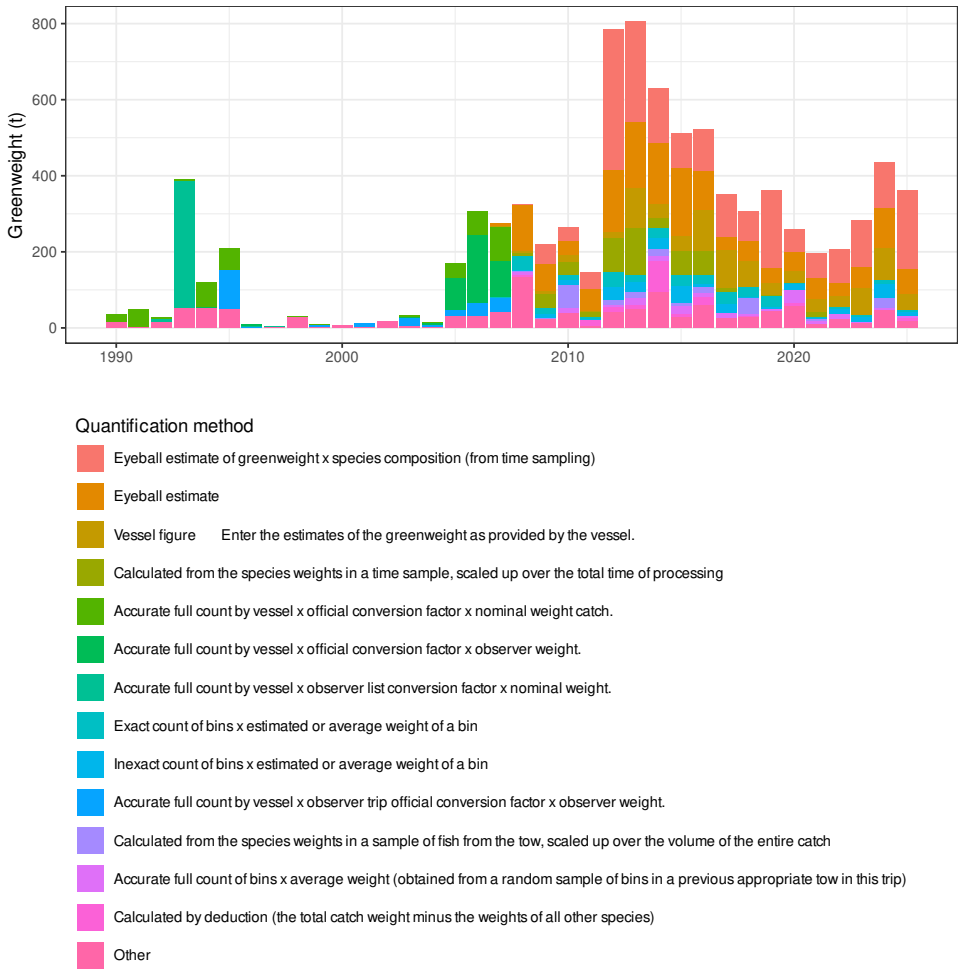


Figure 355: Methods used by observers to quantify the catch of frostfish in the FRO 8 Trawl fishery. The legend lists the methods used in descending order of total catch.

2.6.4 FRO 9: Trawl fishery

2.6.4.1 Length-frequency samples

Table 34: Length-frequency samples of frostfish from the FRO 9 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of frostfish exceeded a potential sampling threshold of 30 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	16	0	0	0.00
1992	6	0	0	0.00
1993	52	0	0	0.00
1994	45	0	0	0.00
1995	9	0	0	0.00
1996	20	0	0	0.00
1997	48	0	0	0.00
1998	180	0	0	0.00
1999	111	0	0	0.00
2000	175	0	0	0.00
2001	202	0	0	0.00
2002	108	0	0	0.00
2003	150	4	37	2.67
2004	470	23	415	4.89
2005	407	12	206	2.95
2006	227	11	285	4.85
2007	203	2	32	0.99
2008	252	8	154	3.17
2009	227	1	19	0.44
2010	218	18	322	8.26
2011	207	1	50	0.48
2012	140	8	282	5.71
2013	234	11	214	4.70
2014	155	12	206	7.74
2015	217	70	2 899	32.26
2016	205	17	312	8.29
2017	97	3	59	3.09
2018	166	6	126	3.61
2019	240	17	413	7.08
2020	264	11	280	4.17
2021	178	2	40	1.12
2022	185	0	0	0.00
2023	73	0	0	0.00
2024	147	4	60	2.72
2025	190	3	118	1.58

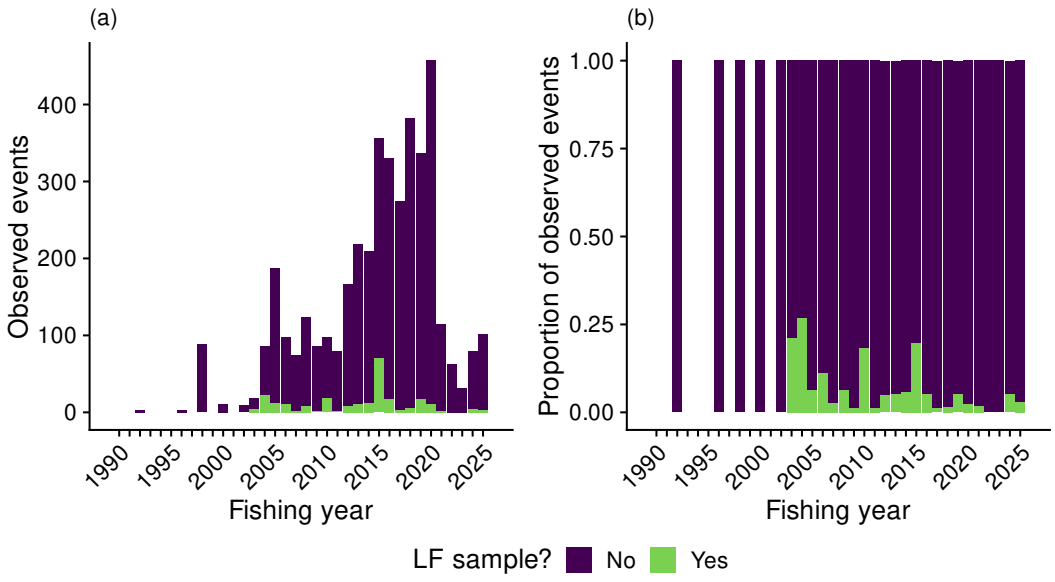


Figure 356: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in FRO 9 where the frostfish catch exceeded the 30 kg threshold, with and without length-frequency sampling.**

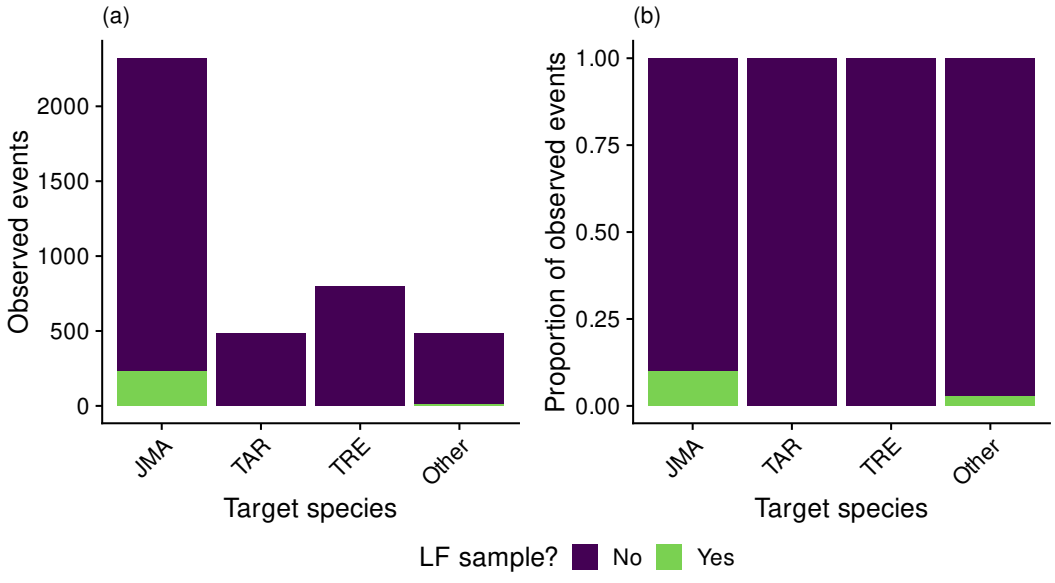


Figure 357: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in FRO 9 where the frostfish catch exceeded the 30 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

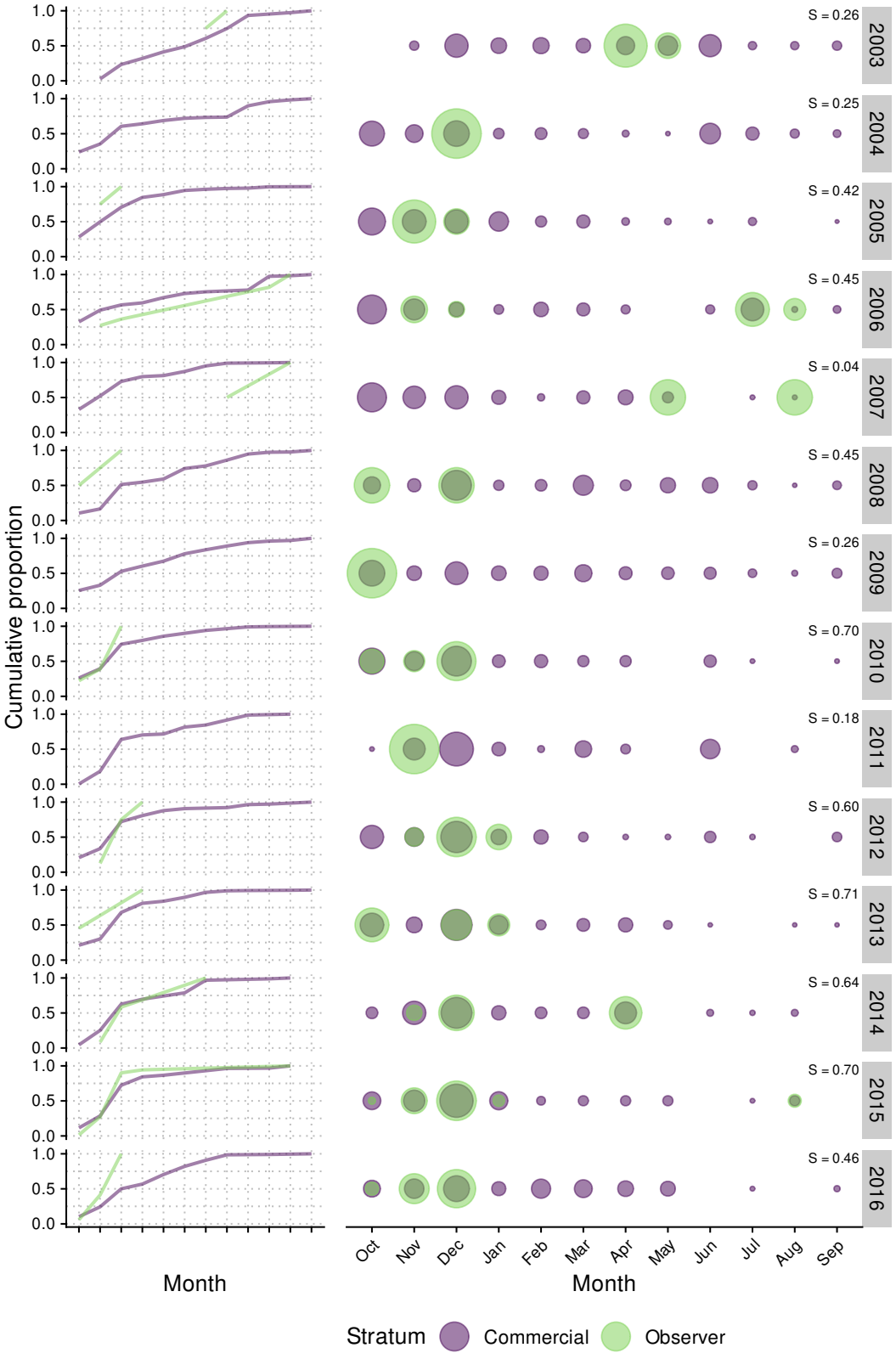


Figure 358: **Monthly representativeness of observer sampling coverage of Trawl fishing events in FRO 9, where the frostfish catch exceeded the 30kg threshold, in 2003 to 2016. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

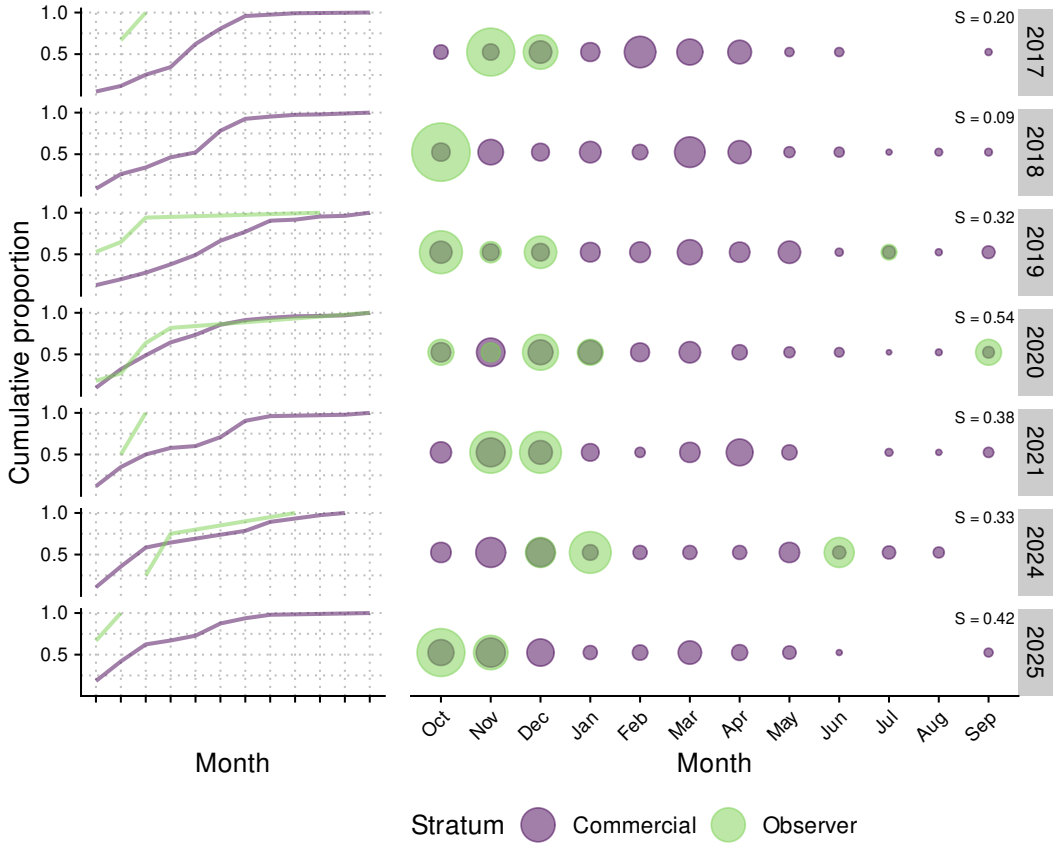


Figure 359: Monthly representativeness of observer sampling coverage of Trawl fishing events in FRO 9, where the frostfish catch exceeded the 30kg threshold, in 2017 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

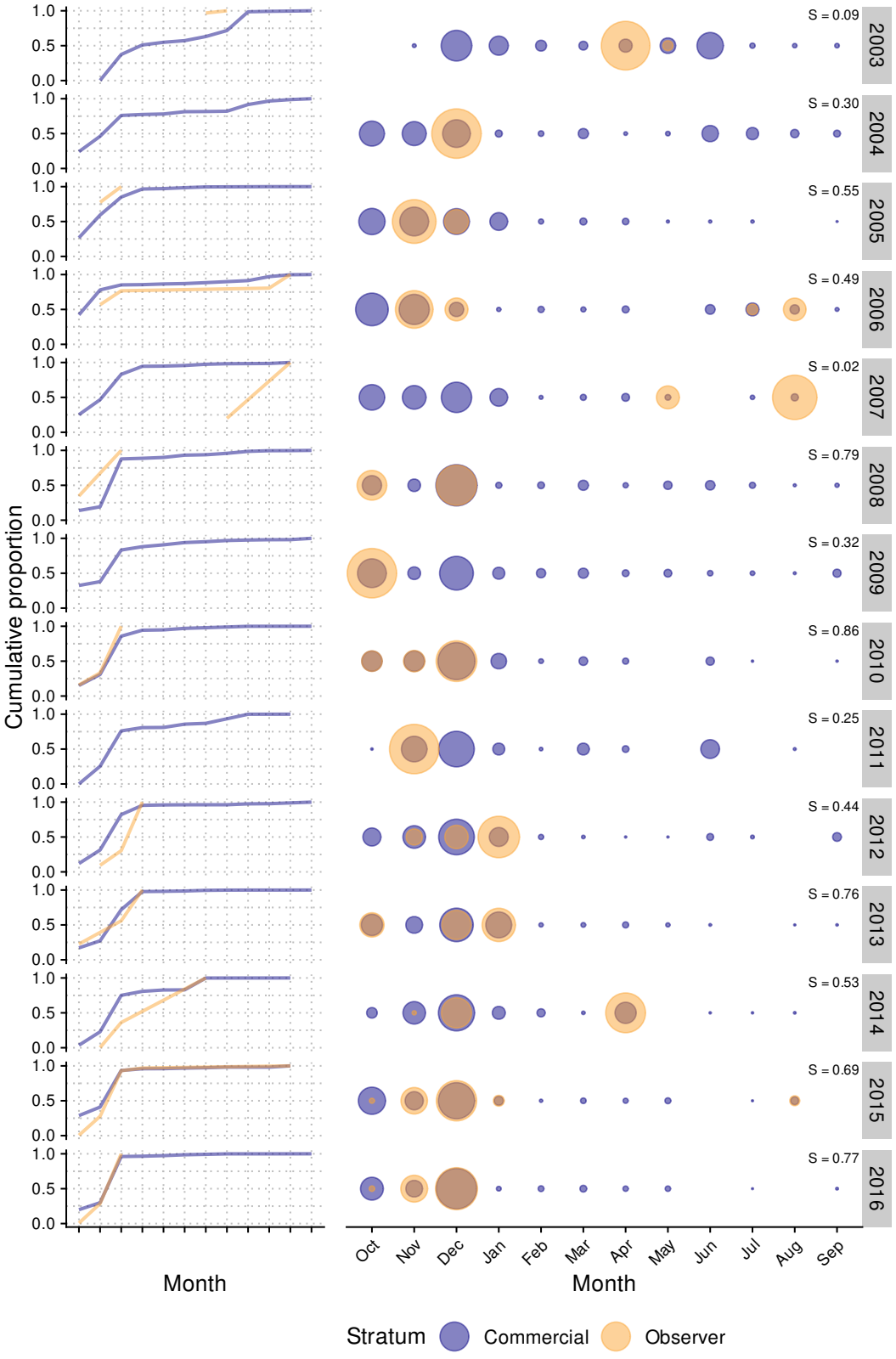


Figure 360: **Monthly representativeness of observer sampling coverage of Trawl catch in FRO 9, from events where the frostfish catch exceeded the 30kg threshold, in 2003 to 2016. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

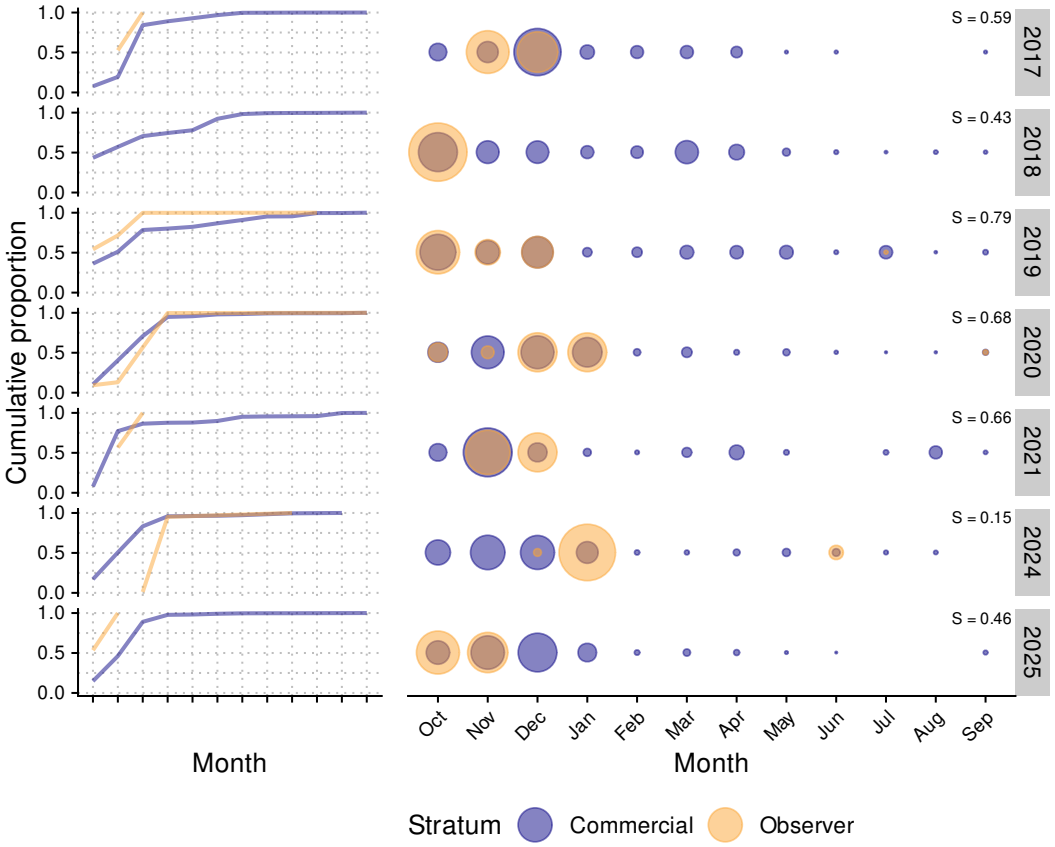


Figure 361: Monthly representativeness of observer sampling coverage of Trawl catch in FRO 9, from events where the frostfish catch exceeded the 30kg threshold, in 2017 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

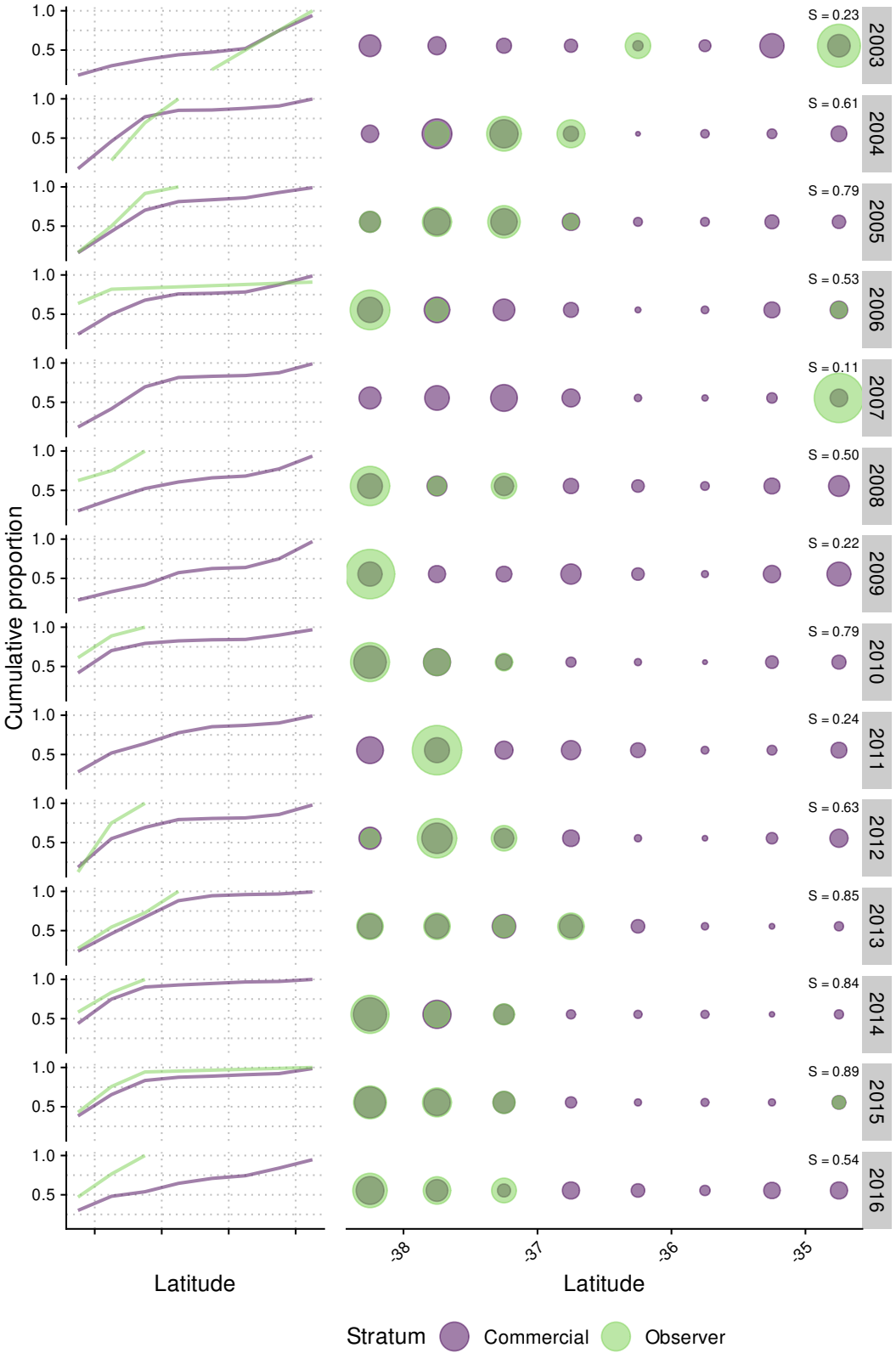


Figure 362: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in FRO 9, where the frostfish catch exceeded the 30kg threshold, in 2003 to 2016. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

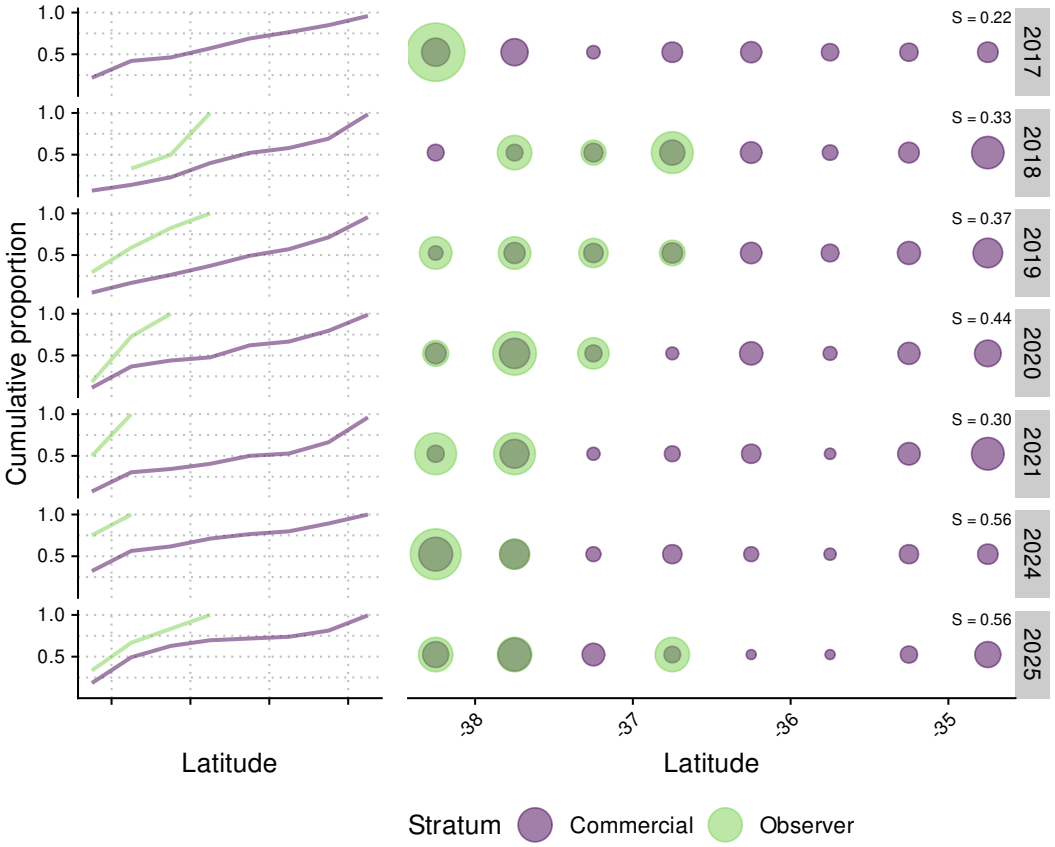


Figure 363: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in FRO 9, where the frostfish catch exceeded the 30kg threshold, in 2017 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

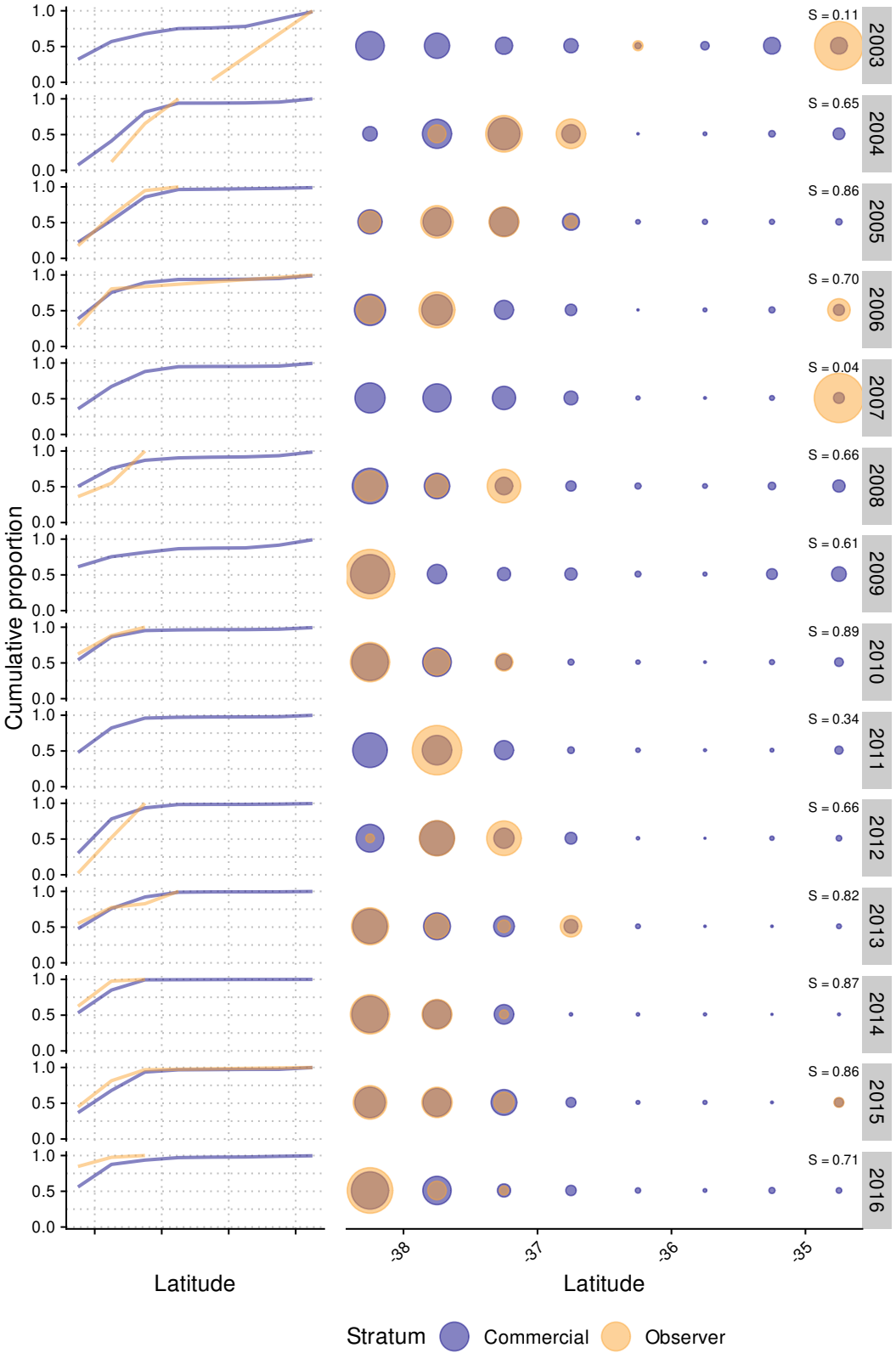


Figure 364: **Latitudinal representativeness of observer sampling coverage of Trawl catch in FRO 9, from events where the frostfish catch exceeded the 30kg threshold, in 2003 to 2016. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

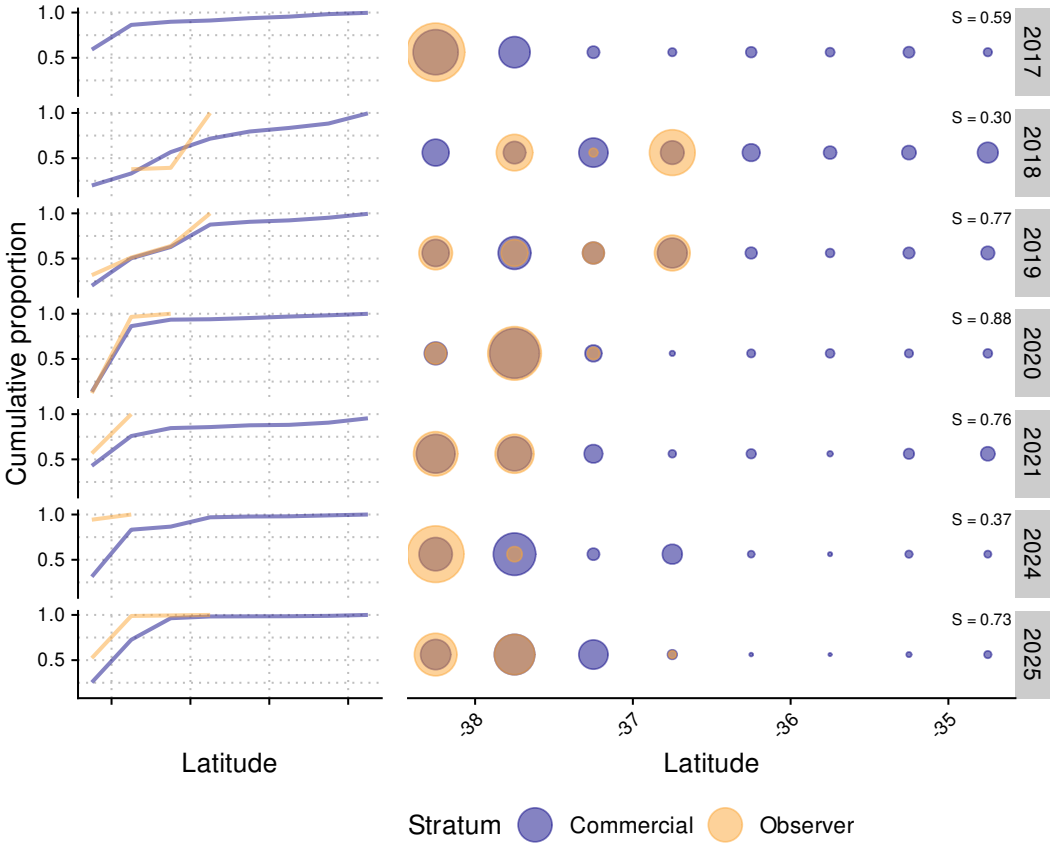


Figure 365: Latitudinal representativeness of observer sampling coverage of Trawl catch in FRO 9, from events where the frostfish catch exceeded the 30kg threshold, in 2017 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

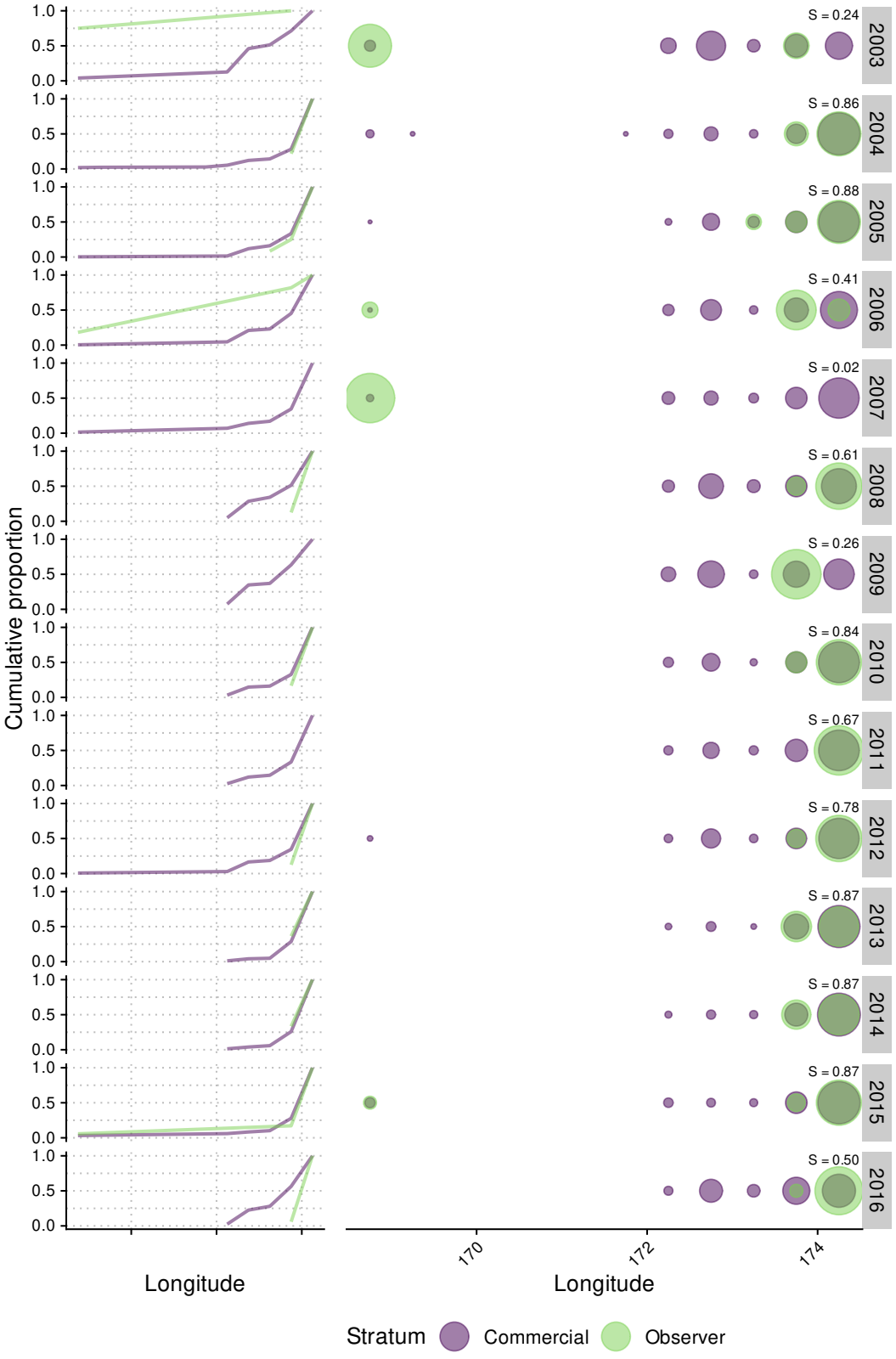


Figure 366: **Longitudinal representativeness of observer sampling coverage of Trawl fishing events in FRO 9, where the frostfish catch exceeded the 30kg threshold, in 2003 to 2016. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

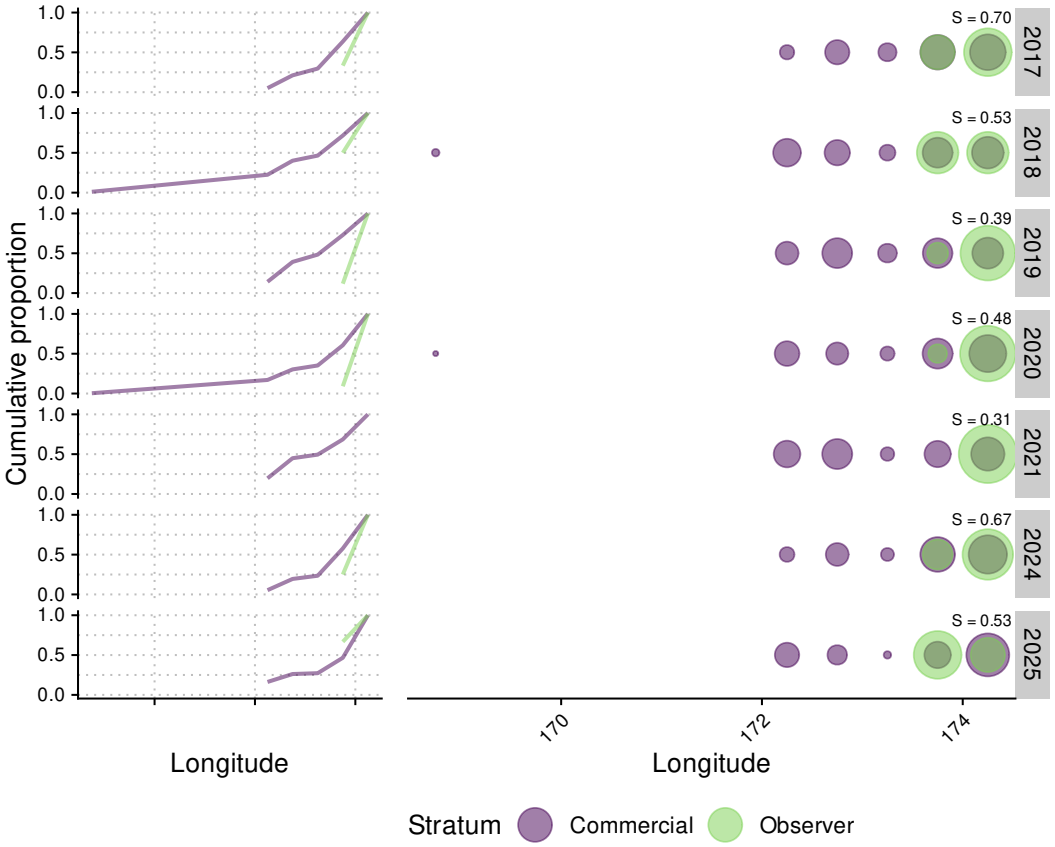


Figure 367: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in FRO 9, where the frostfish catch exceeded the 30kg threshold, in 2017 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

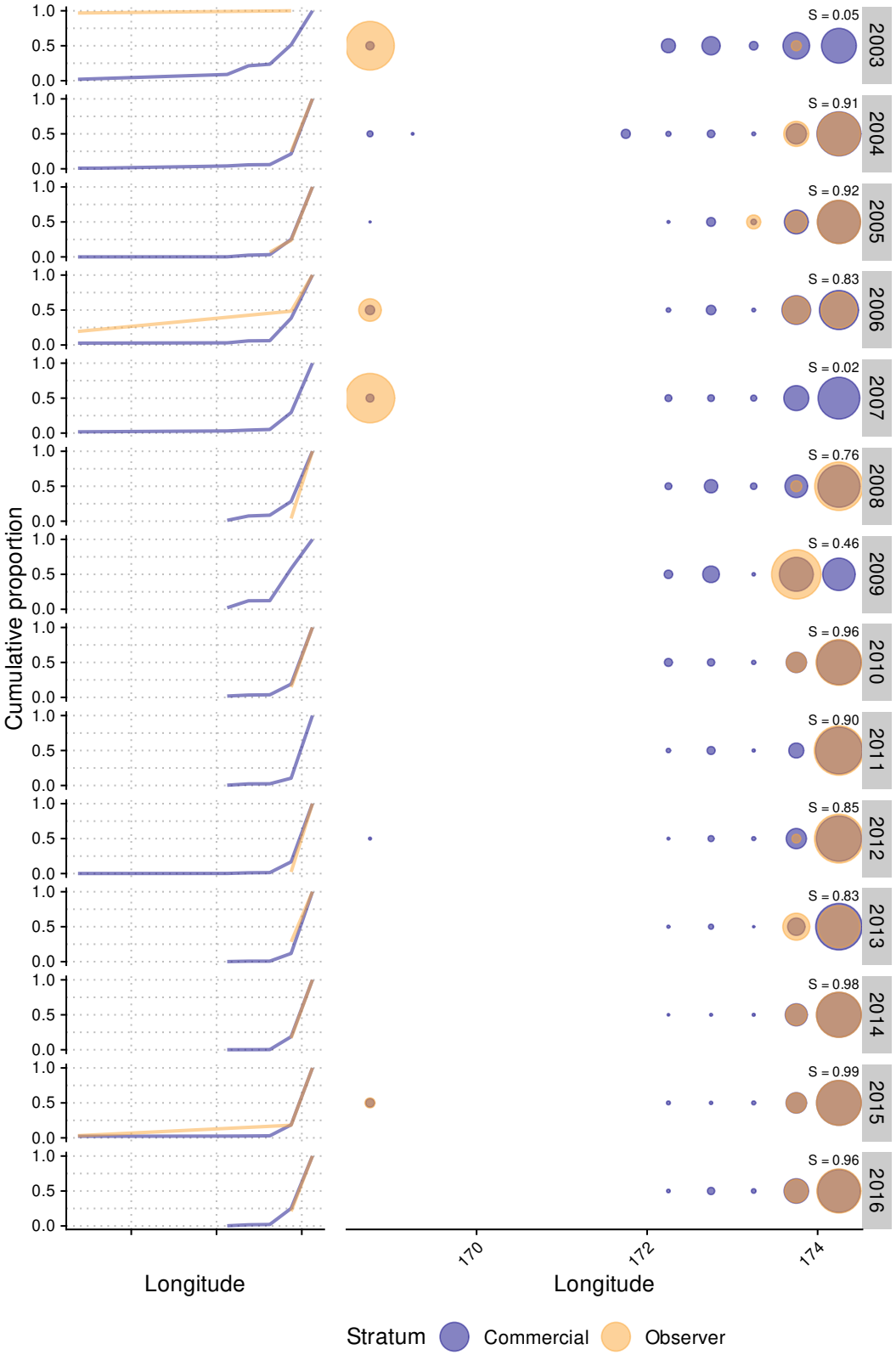


Figure 368: Longitudinal representativeness of observer sampling coverage of Trawl catch in FRO 9, from events where the frostfish catch exceeded the 30kg threshold, in 2003 to 2016. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

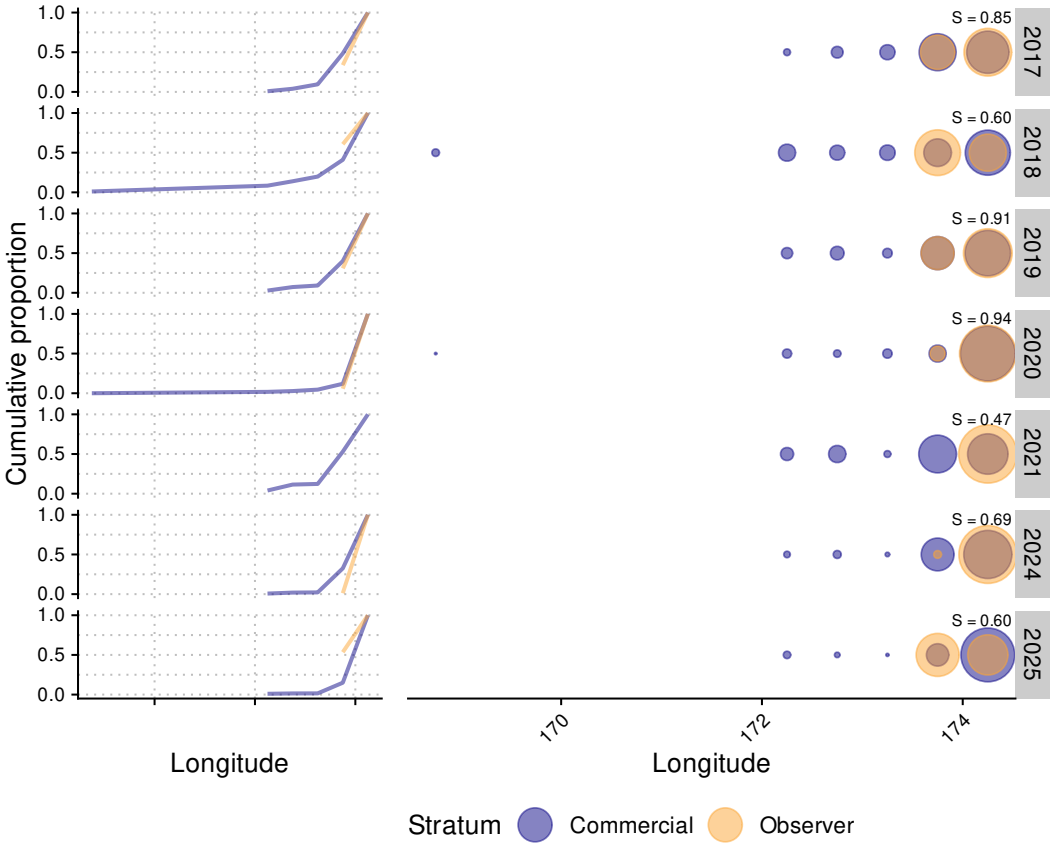


Figure 369: Longitudinal representativeness of observer sampling coverage of Trawl catch in FRO 9, from events where the frostfish catch exceeded the 30kg threshold, in 2017 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

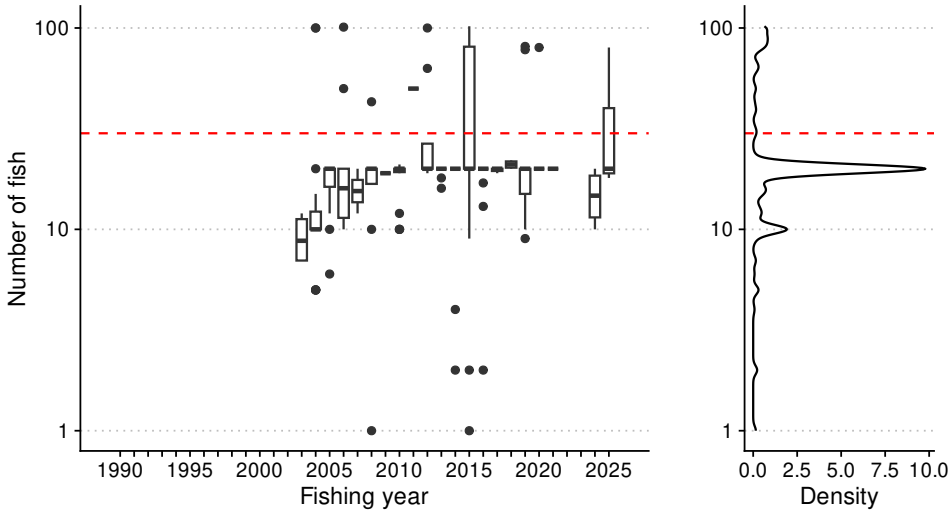


Figure 370: Length-frequency sample sizes for observed fishing events in FRO 9 where frostfish were sampled. The red dashed line indicates a sample size of 30 fish.

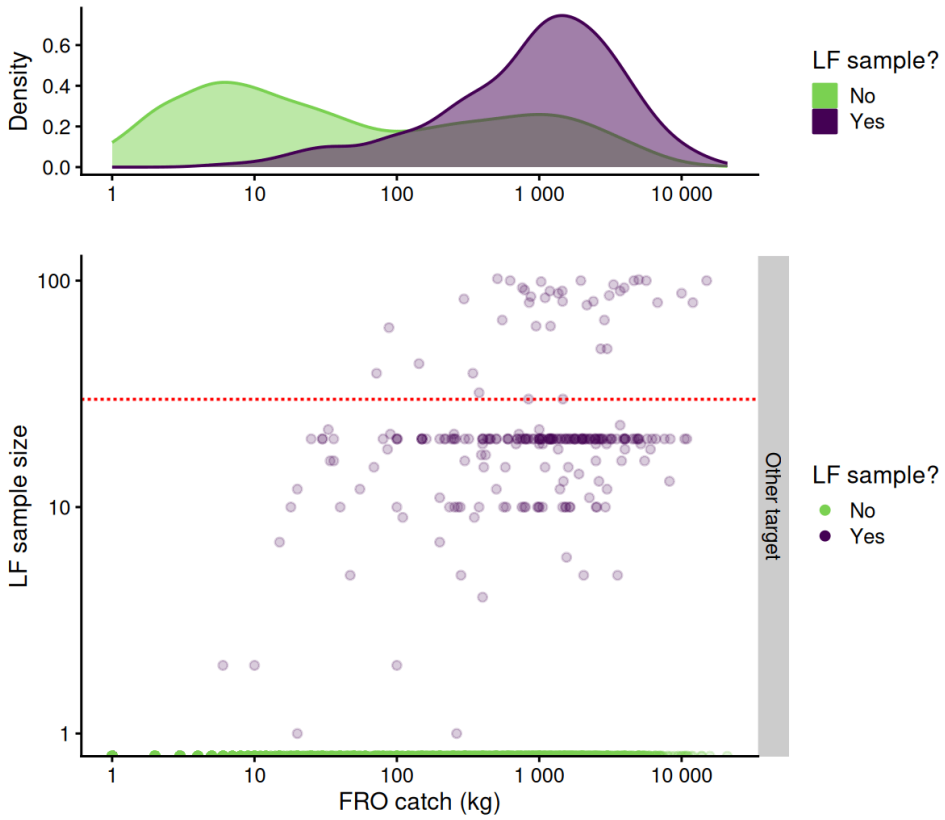


Figure 371: Length-frequency sample sizes (number of fish sampled) for observed fishing events in FRO 9 in relation to the total frostfish catch from an event, separately for frostfish target events and other target species. The red dashed line indicates a sample size of 30 fish.

2.6.4.2 Otolith samples

Table 35: Otolith samples of frostfish from the FRO 9 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of frostfish exceeded a potential sampling threshold of 30 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	16	0	0	0.00
1992	6	0	0	0.00
1993	52	0	0	0.00
1994	45	0	0	0.00
1995	9	0	0	0.00
1996	20	0	0	0.00
1997	48	0	0	0.00
1998	180	0	0	0.00
1999	111	0	0	0.00
2000	175	0	0	0.00
2001	202	0	0	0.00
2002	108	0	0	0.00
2003	150	0	0	0.00
2004	470	0	0	0.00
2005	407	0	0	0.00
2006	227	0	0	0.00
2007	203	0	0	0.00
2008	252	0	0	0.00
2009	227	0	0	0.00
2010	218	0	0	0.00
2011	207	0	0	0.00
2012	140	7	35	5.00
2013	234	9	48	3.85
2014	155	7	39	4.52
2015	217	1	5	0.46
2016	205	0	0	0.00
2017	97	3	14	3.09
2018	166	6	32	3.61
2019	240	17	105	7.08
2020	264	10	50	3.79
2021	178	2	9	1.12
2022	185	0	0	0.00
2023	73	0	0	0.00
2024	147	4	20	2.72
2025	190	3	15	1.58

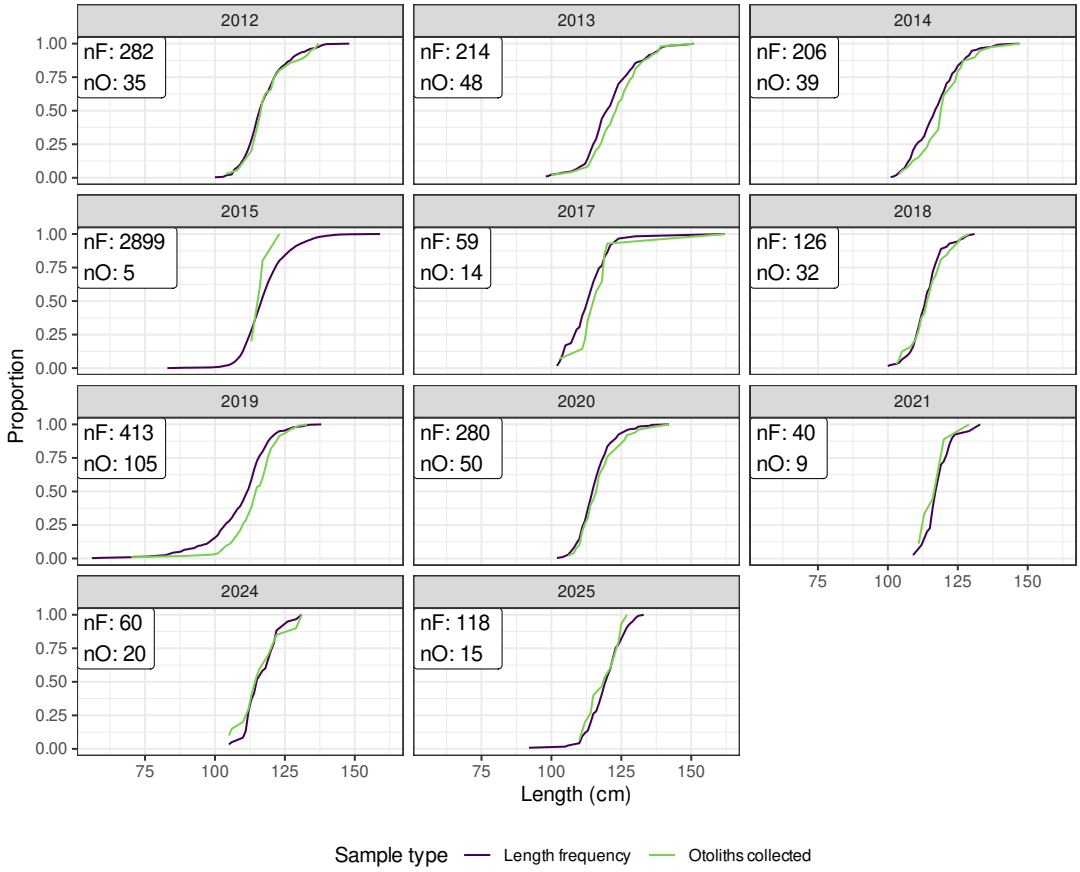


Figure 372: Cumulative distributions of the length of fish in the length frequency and otolith samples of frostfish in the FRO 9 Trawl fishery for the 2012 to 2025 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

2.6.4.3 Catch quantification

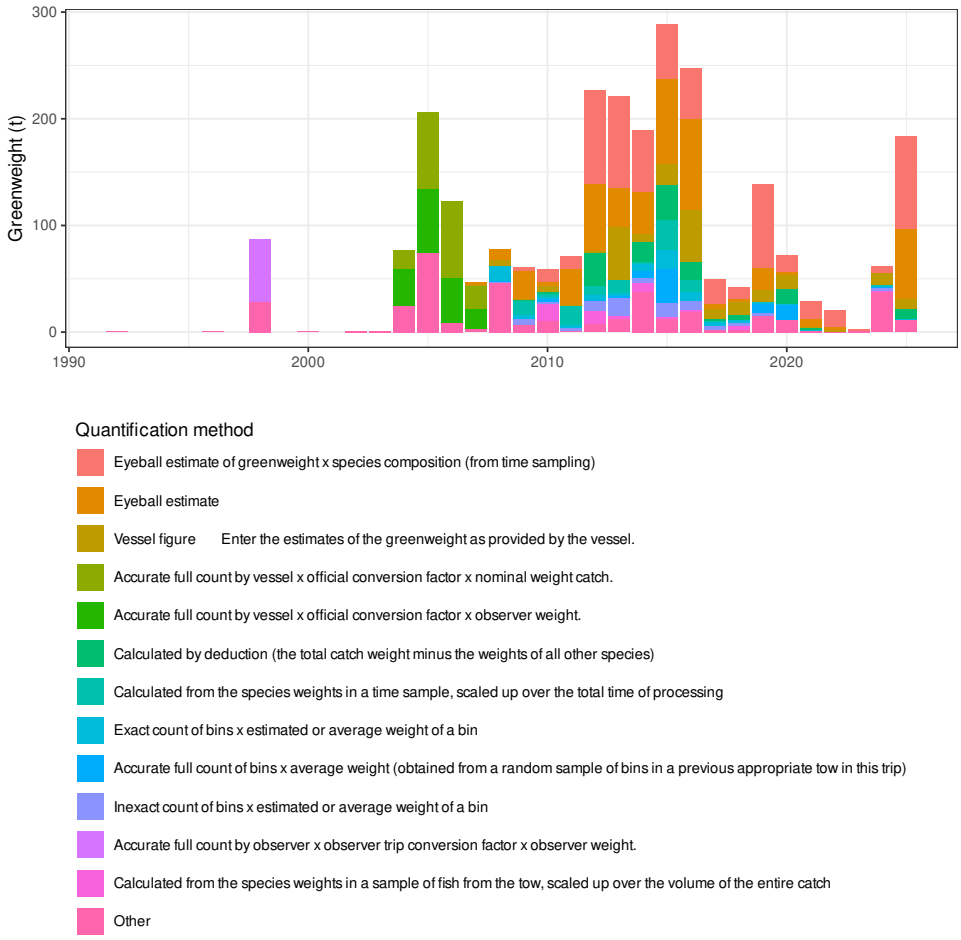


Figure 373: Methods used by observers to quantify the catch of frostfish in the FRO 9 Trawl fishery. The legend lists the methods used in descending order of total catch.

2.7 GSH stocks

Observer sampling of ghost shark - dark is considered with respect to the ghost shark - dark Quota Management Areas.

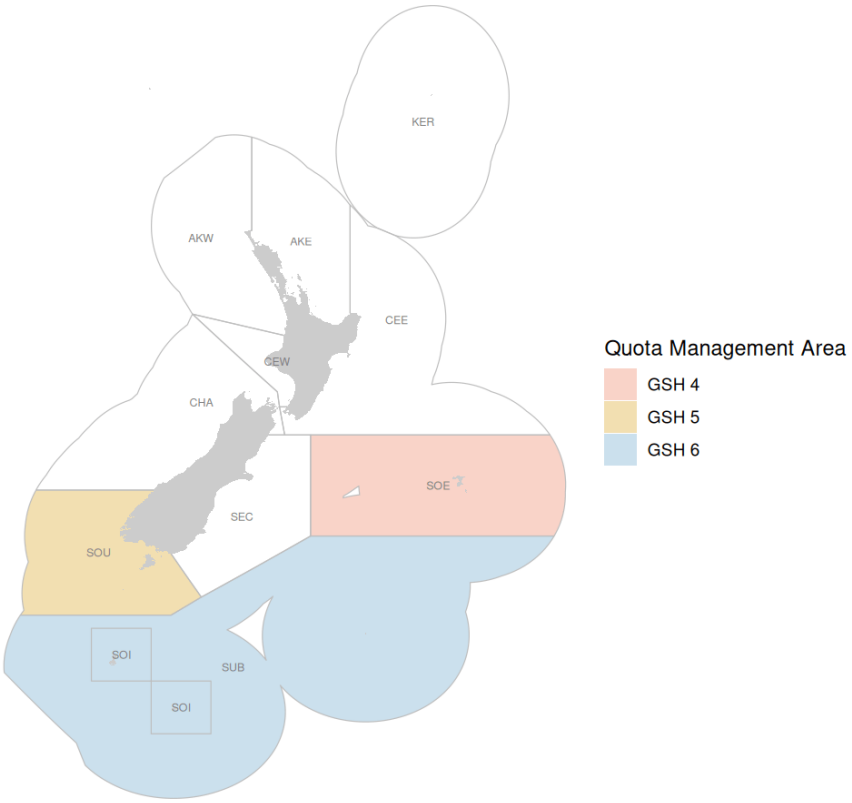


Figure 374: Observer Fisheries Management Areas (black borders, labels on plot) in relation to the Quota Management Area for ghost shark - dark (coloured areas, per legend).

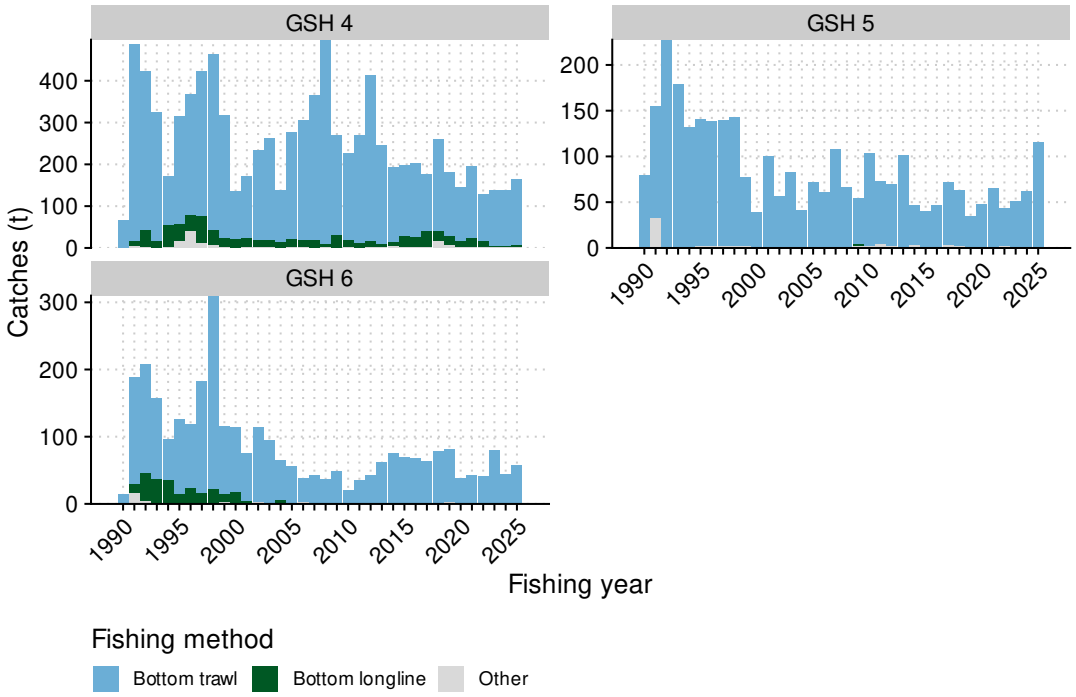


Figure 375: **Catches of ghost shark - dark by fishing method, for events within the ghost shark - dark Quota Management Areas. Methods grouped as Other include: BPT, BS, CP, D, DL, HL, L, MW, POT, PRB, PRM, PSH, RLP, SN, TL.**

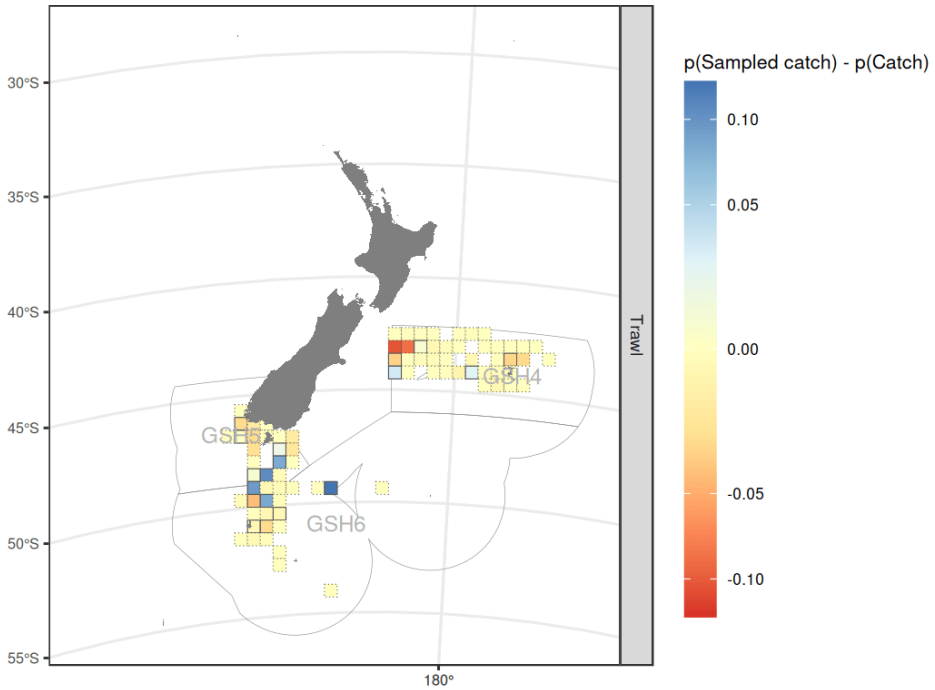


Figure 376: **Differences in the relative proportions of catch and sampled catch for ghost shark - dark during 2021–2025. Cells with a dotted border had no sampling.**

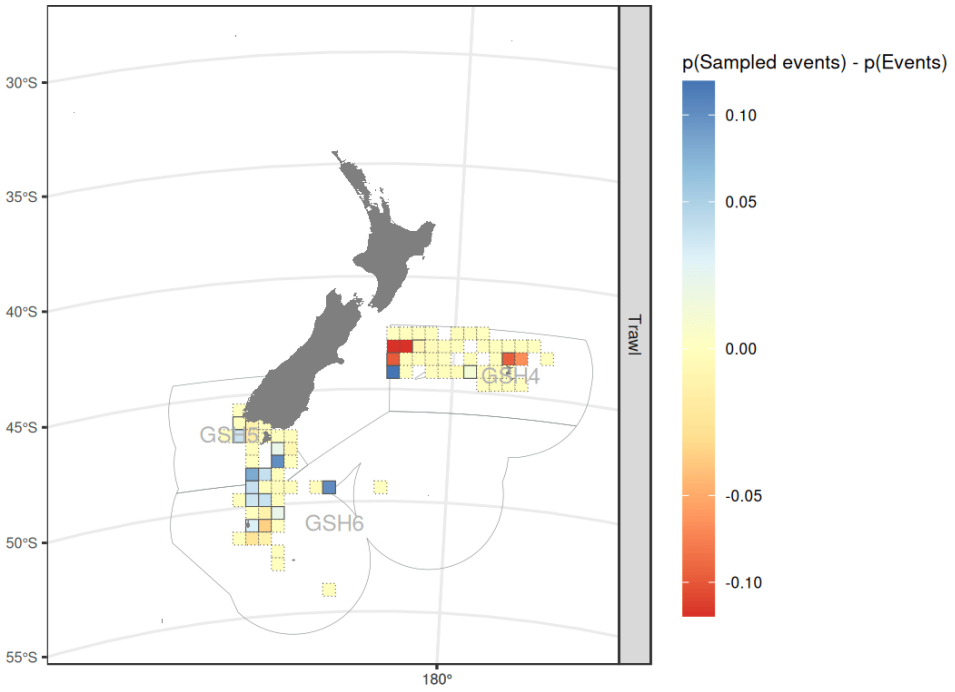


Figure 377: Differences in the relative proportions of events meeting the sampling threshold and sampled events for ghost shark - dark during 2021–2025. Cells with a dotted border had no sampling.

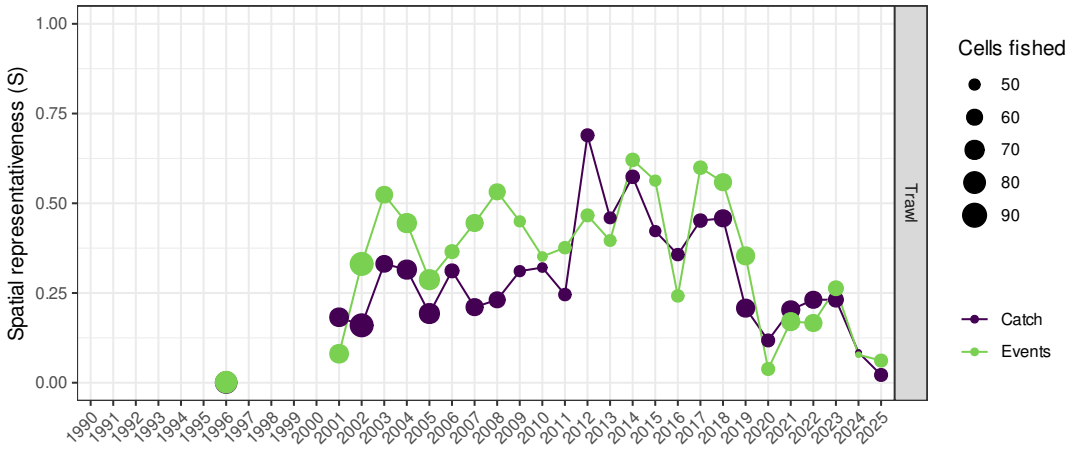


Figure 378: Spatial representativeness of observer sampling of ghost shark - dark by fishing year. Representativeness is assessed using the Manhattan distance metric (*S*) applied to 64 km grid cells, for both the proportion of catch sampled and the proportion of positive events sampled.

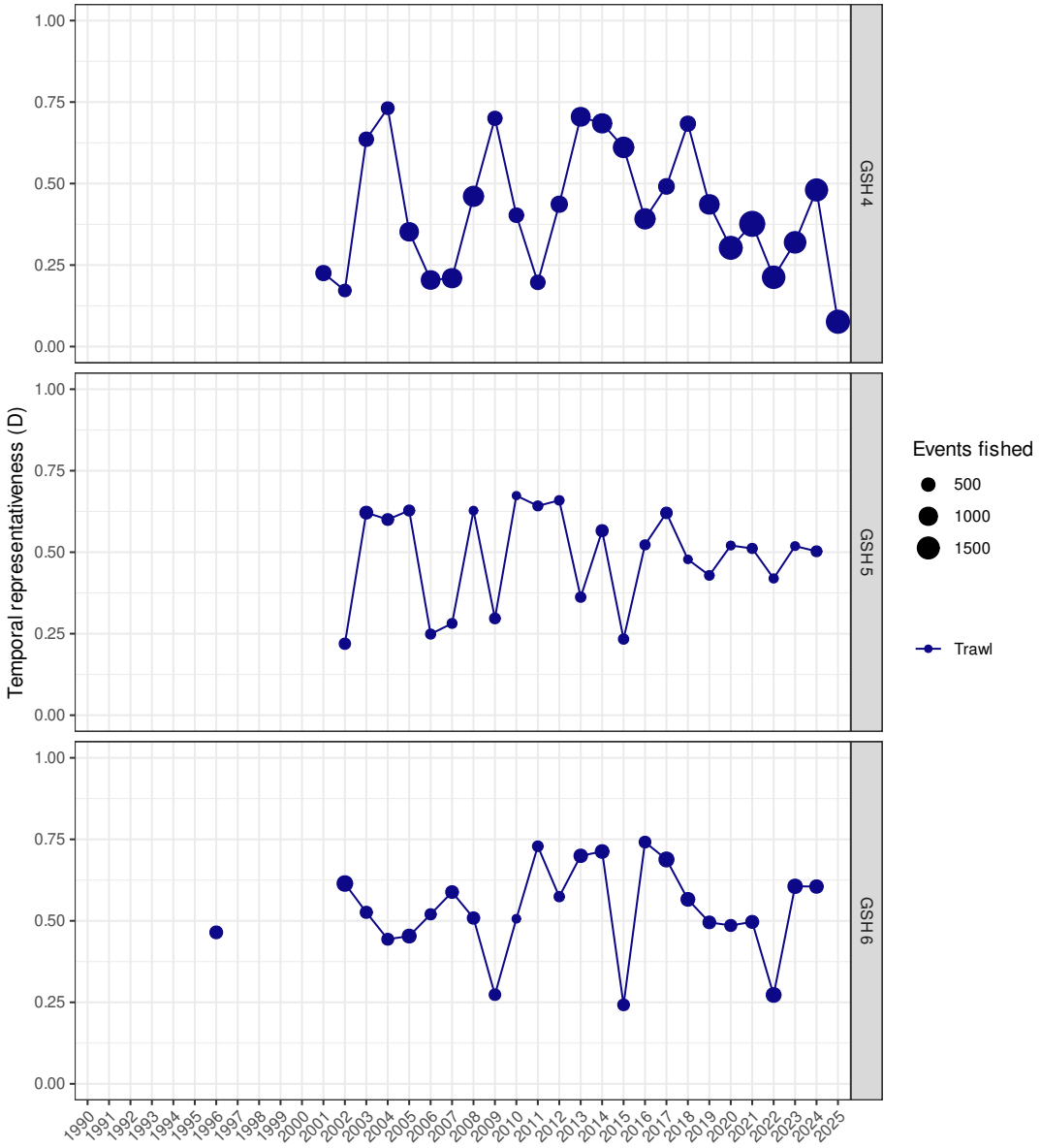


Figure 379: Temporal representativeness of observer sanpling of ghost shark - dark by fishing year and area. Temporal representativeness is assessed using the KS statistic (*D*) applied to the start date-times of all fishing events and all sampled fishing events, weighted by catch weight.

2.7.1 GSH 4: Trawl fishery

2.7.1.1 Length-frequency samples

Table 36: Length-frequency samples of ghost shark - dark from the GSH 4 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of ghost shark - dark exceeded a potential sampling threshold of 10 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	97	0	0	0.00
1991	433	0	0	0.00
1992	895	0	0	0.00
1993	649	0	0	0.00
1994	359	0	0	0.00
1995	792	0	0	0.00
1996	606	0	0	0.00
1997	695	0	0	0.00
1998	950	0	0	0.00
1999	960	0	0	0.00
2000	355	0	0	0.00
2001	286	5	455	1.75
2002	378	5	41	1.32
2003	318	14	235	4.40
2004	246	19	411	7.72
2005	753	8	68	1.06
2006	957	20	539	2.09
2007	905	14	116	1.55
2008	1 092	43	788	3.94
2009	480	56	985	11.67
2010	492	8	230	1.63
2011	571	6	331	1.05
2012	771	24	691	3.11
2013	940	11	559	1.17
2014	996	32	800	3.21
2015	929	42	768	4.52
2016	739	13	206	1.76
2017	503	26	522	5.17
2018	671	23	572	3.43
2019	874	12	308	1.37
2020	1 493	1	20	0.07
2021	1 642	1	20	0.06
2022	1 249	5	189	0.40
2023	1 286	3	99	0.23
2024	1 218	2	32	0.16
2025	1 275	1	40	0.08

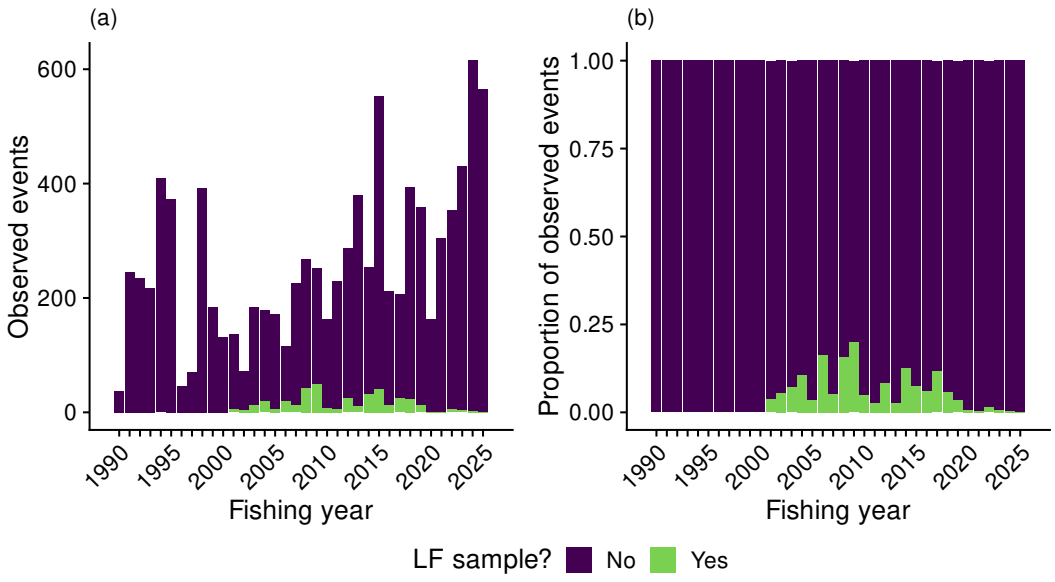


Figure 380: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in GSH 4 where the ghost shark - dark catch exceeded the 10 kg threshold, with and without length-frequency sampling.**

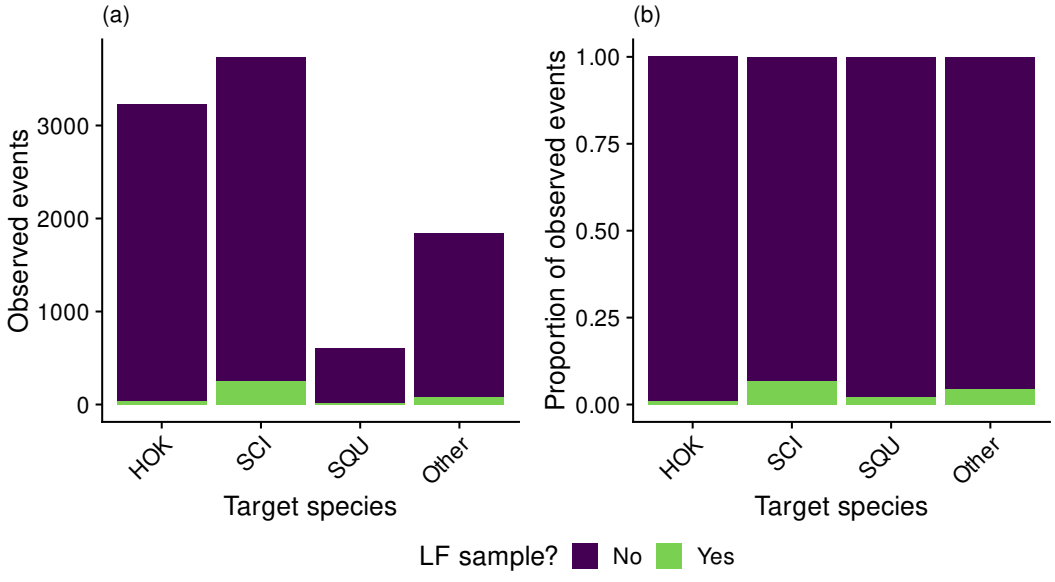


Figure 381: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in GSH 4 where the ghost shark - dark catch exceeded the 10 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

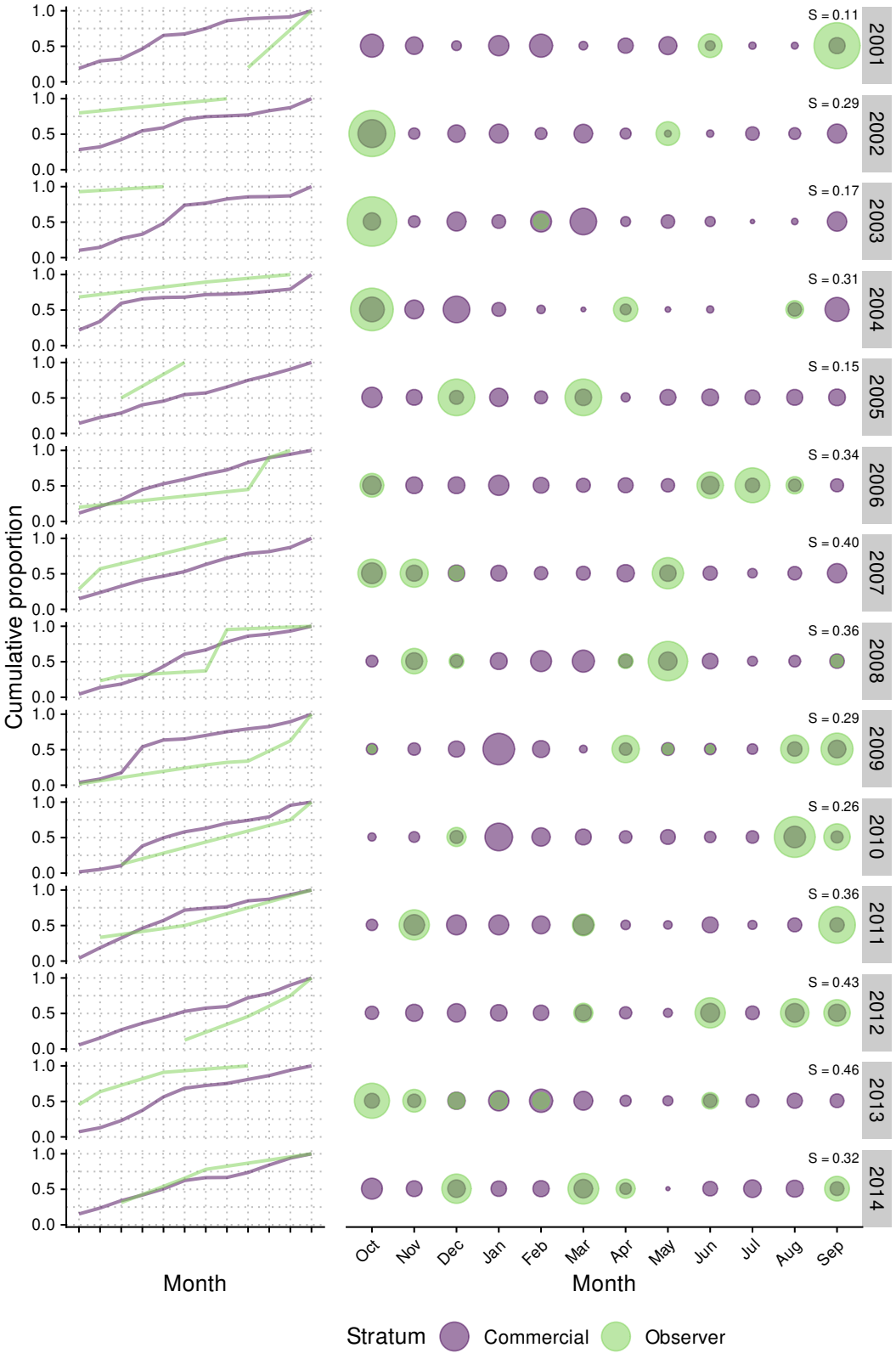


Figure 382: **Monthly representativeness of observer sampling coverage of Trawl fishing events in GSH 4, where the ghost shark - dark catch exceeded the 10kg threshold, in 2001 to 2014. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

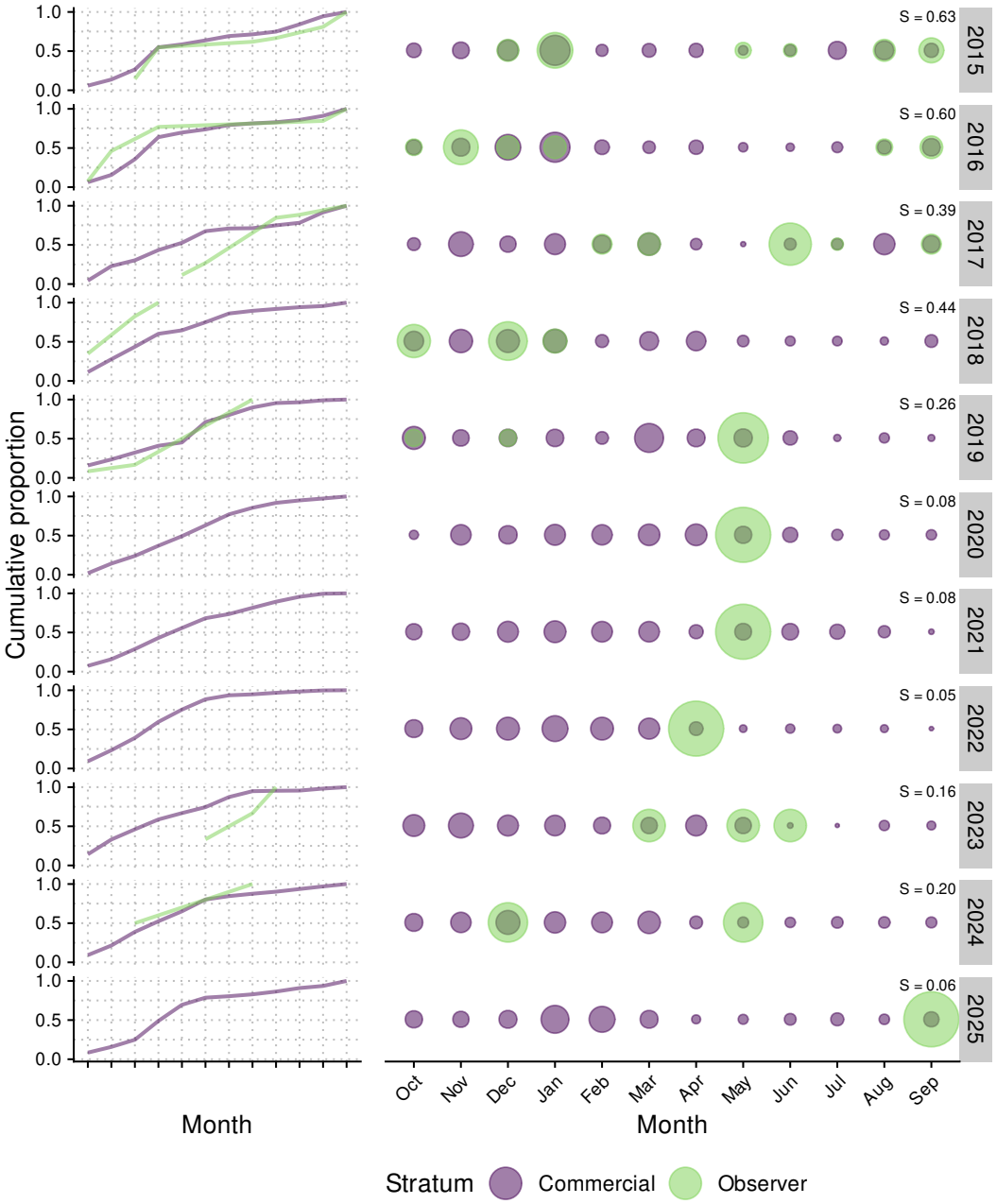


Figure 383: Monthly representativeness of observer sampling coverage of Trawl fishing events in GSH 4, where the ghost shark - dark catch exceeded the 10kg threshold, in 2015 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

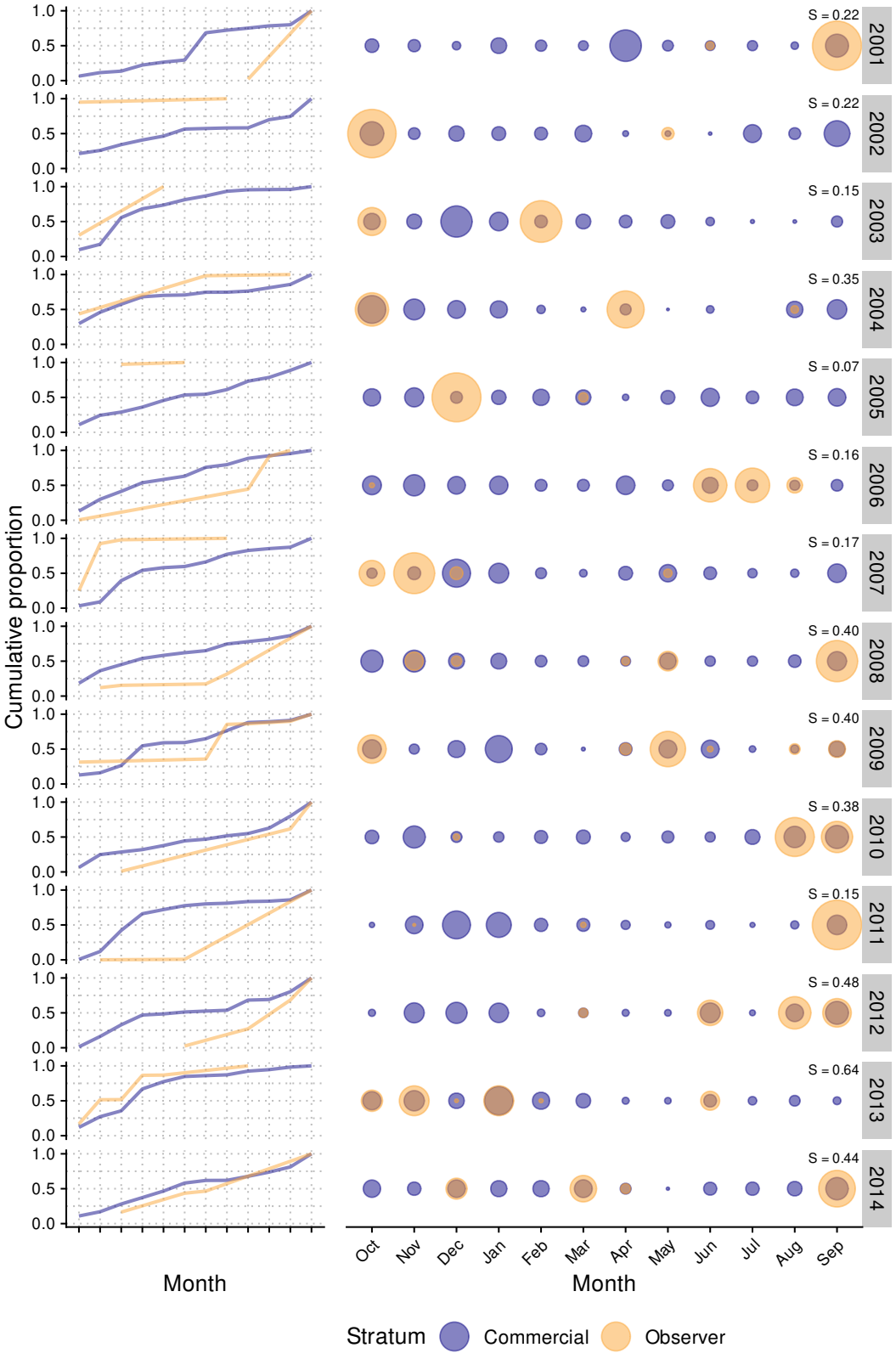


Figure 384: **Monthly representativeness of observer sampling coverage of Trawl catch in GSH 4, from events where the ghost shark - dark catch exceeded the 10kg threshold, in 2001 to 2014. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

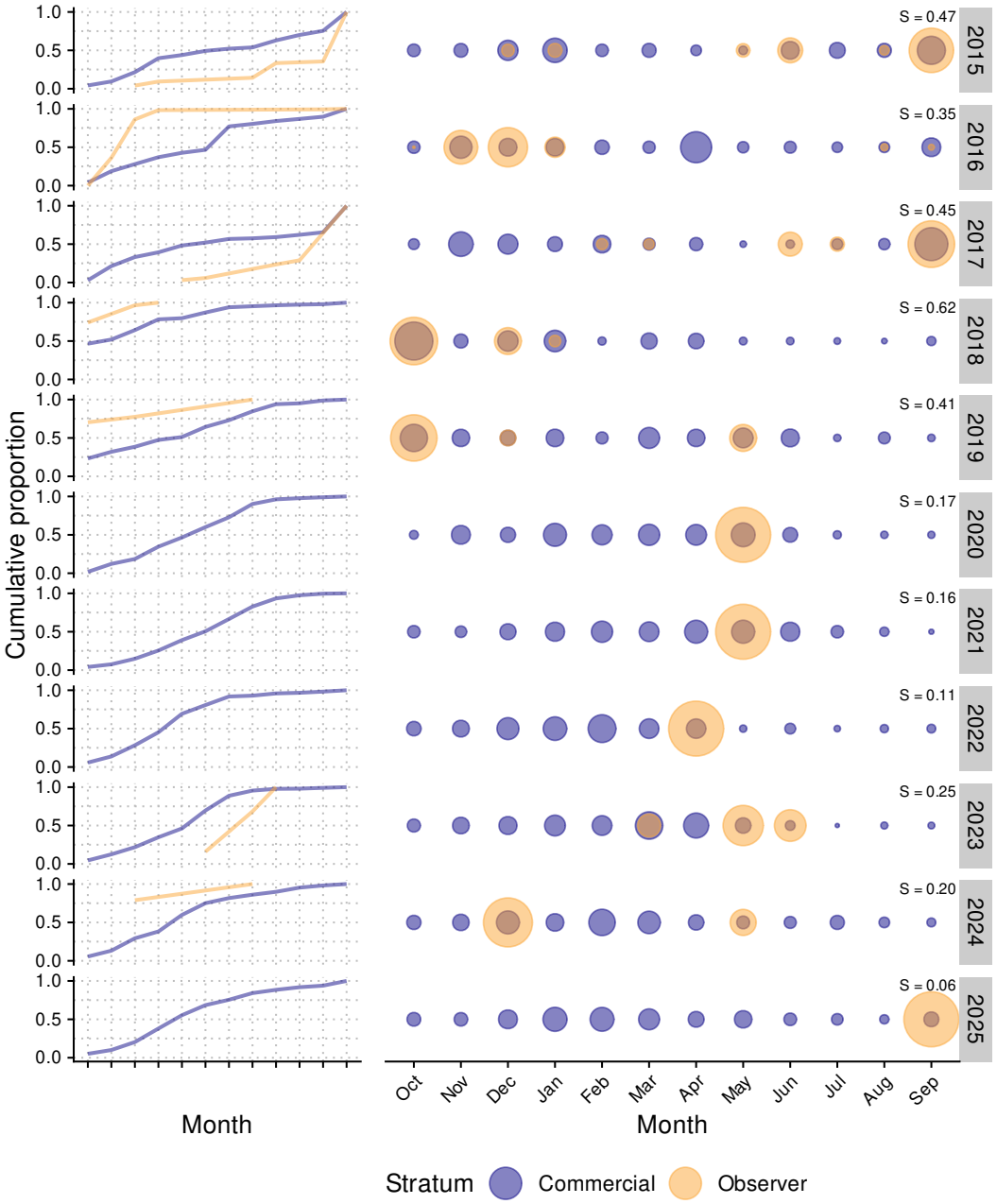


Figure 385: **Monthly representativeness of observer sampling coverage of Trawl catch in GSH 4, from events where the ghost shark - dark catch exceeded the 10kg threshold, in 2015 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

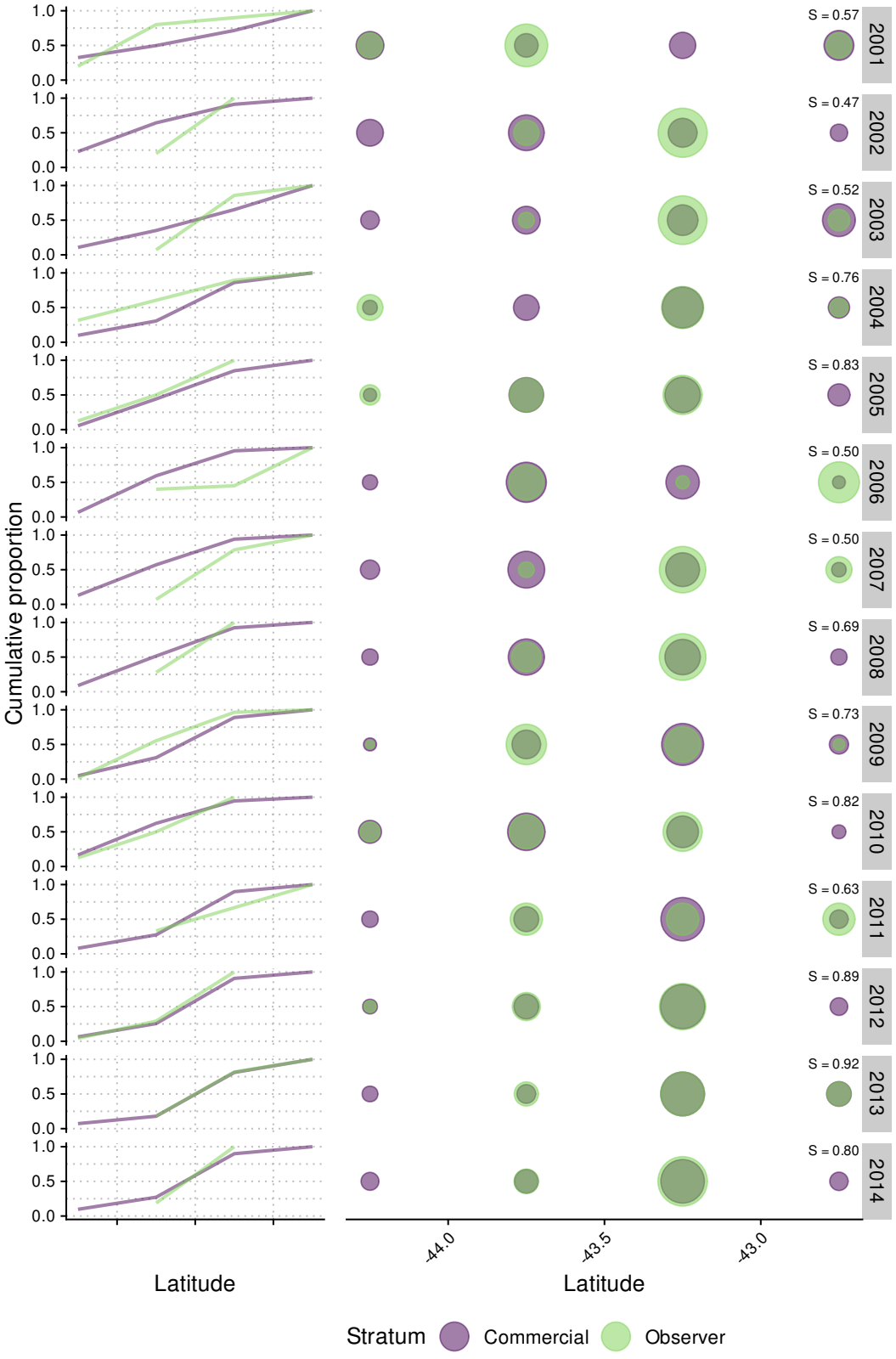


Figure 386: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in GSH 4, where the ghost shark - dark catch exceeded the 10kg threshold, in 2001 to 2014. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

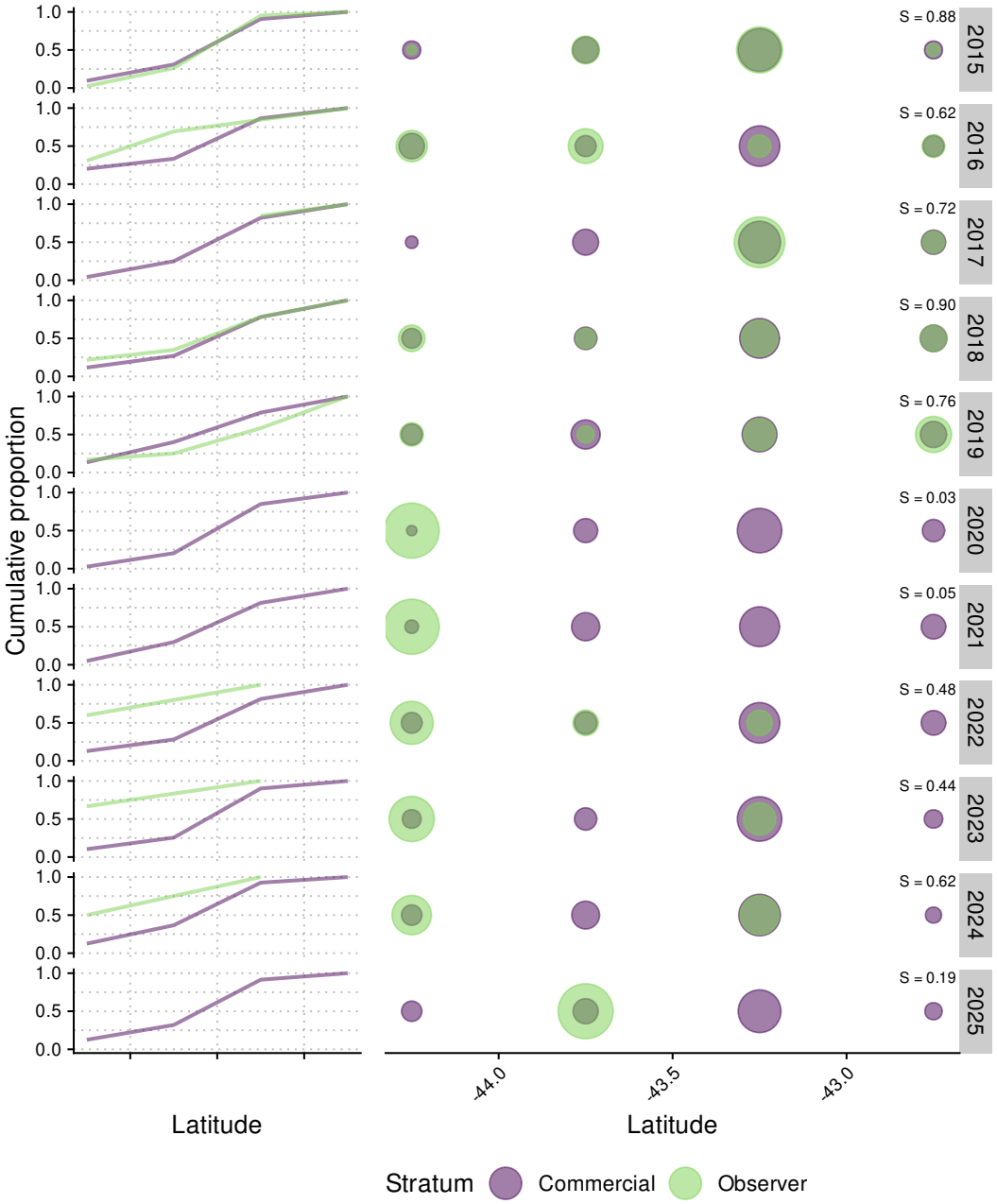


Figure 387: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in GSH 4, where the ghost shark - dark catch exceeded the 10kg threshold, in 2015 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

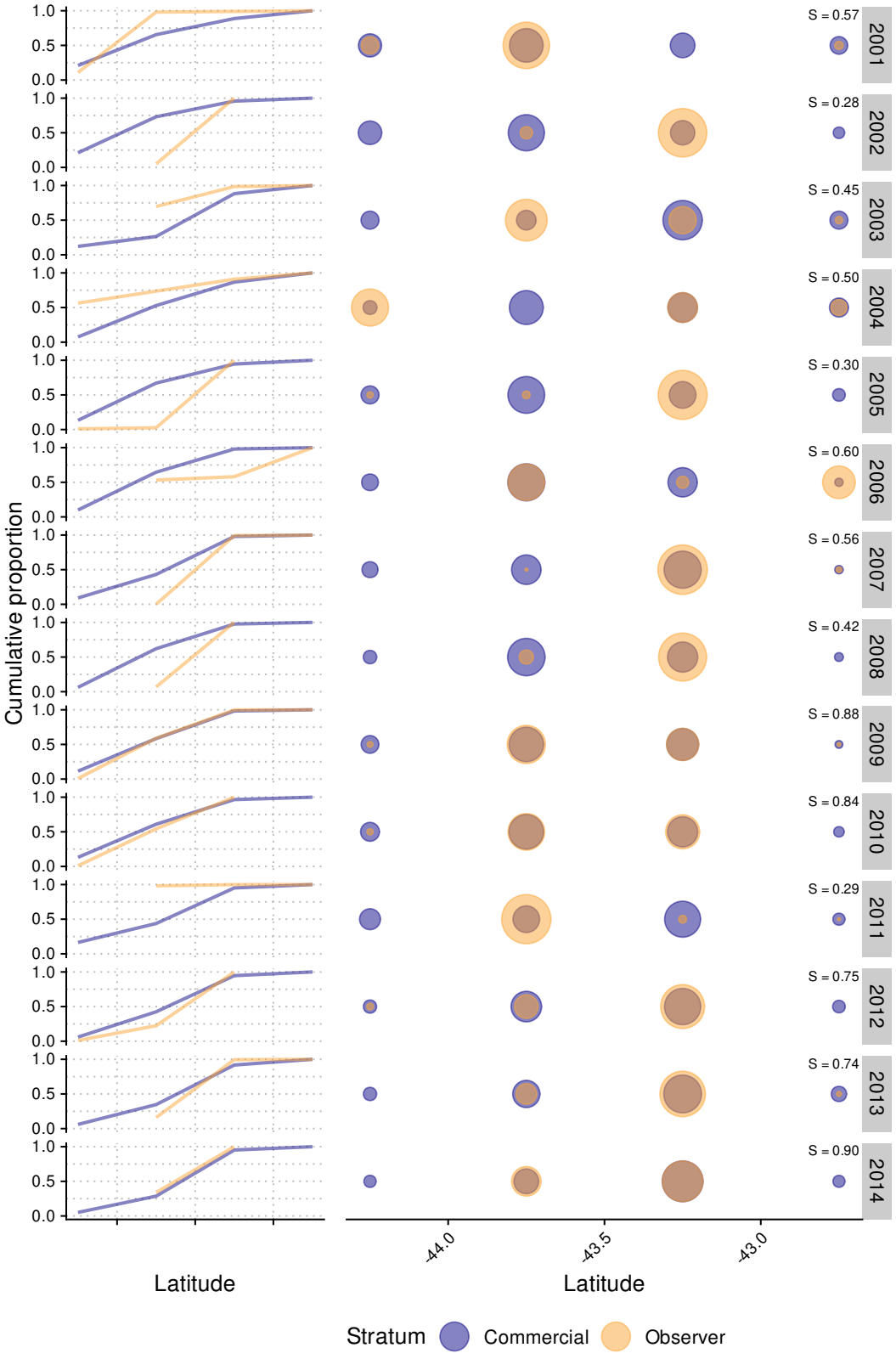


Figure 388: **Latitudinal representativeness of observer sampling coverage of Trawl catch in GSH 4, from events where the ghost shark - dark catch exceeded the 10kg threshold, in 2001 to 2014. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

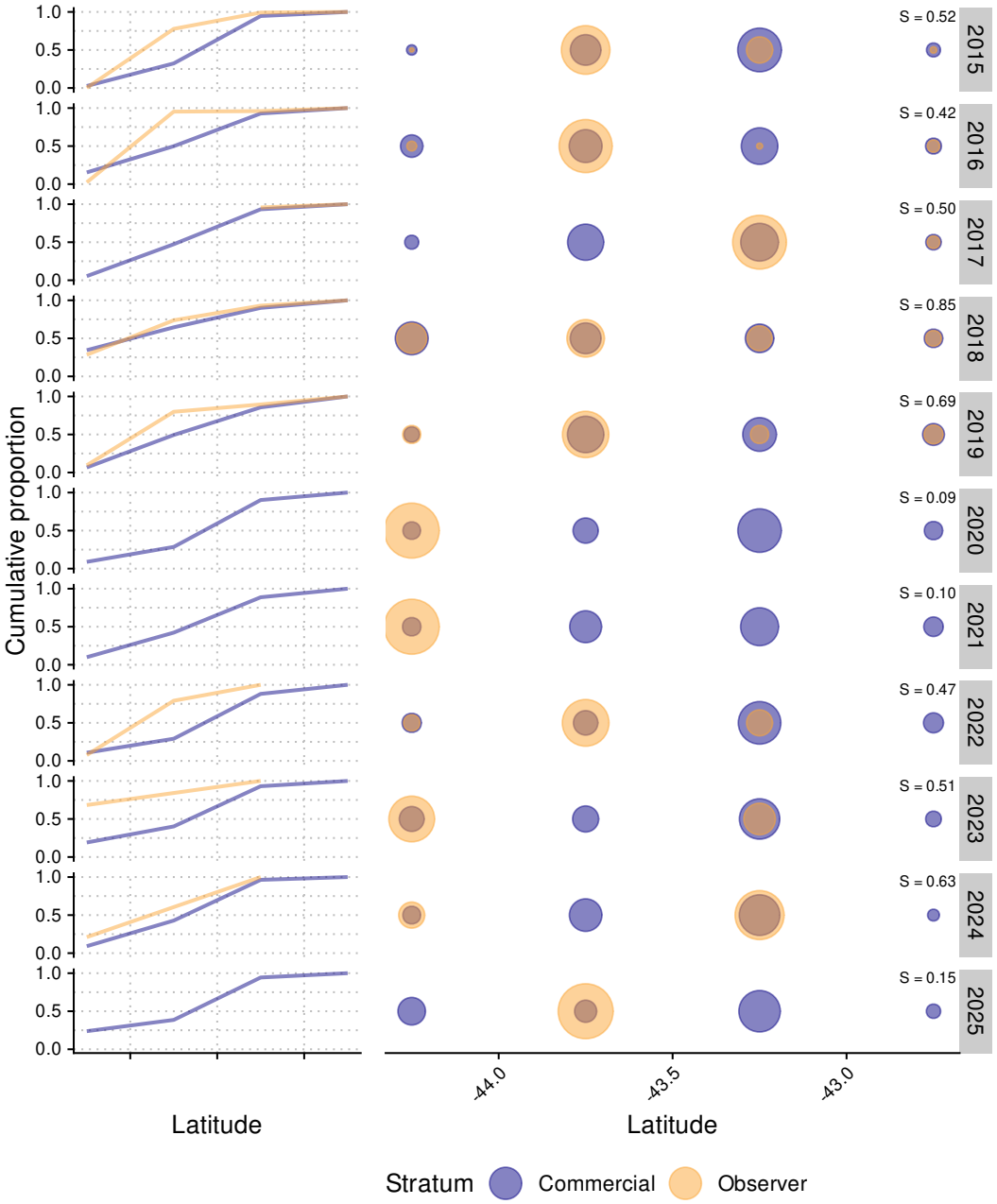


Figure 389: **Latitudinal representativeness of observer sampling coverage of Trawl catch in GSH 4, from events where the ghost shark - dark catch exceeded the 10kg threshold, in 2015 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

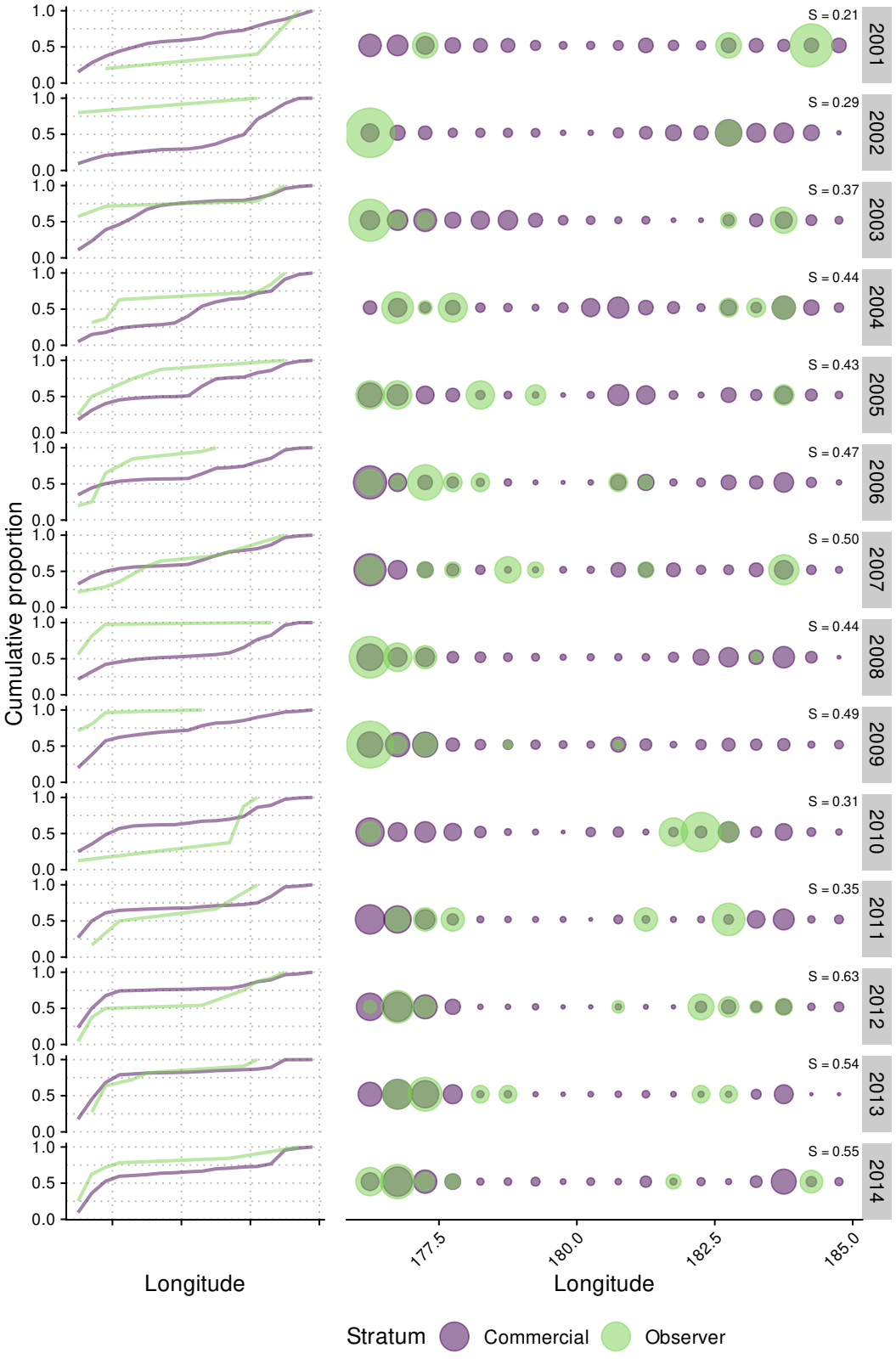


Figure 390: **Longitudinal representativeness of observer sampling coverage of Trawl fishing events in GSH 4, where the ghost shark - dark catch exceeded the 10kg threshold, in 2001 to 2014. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

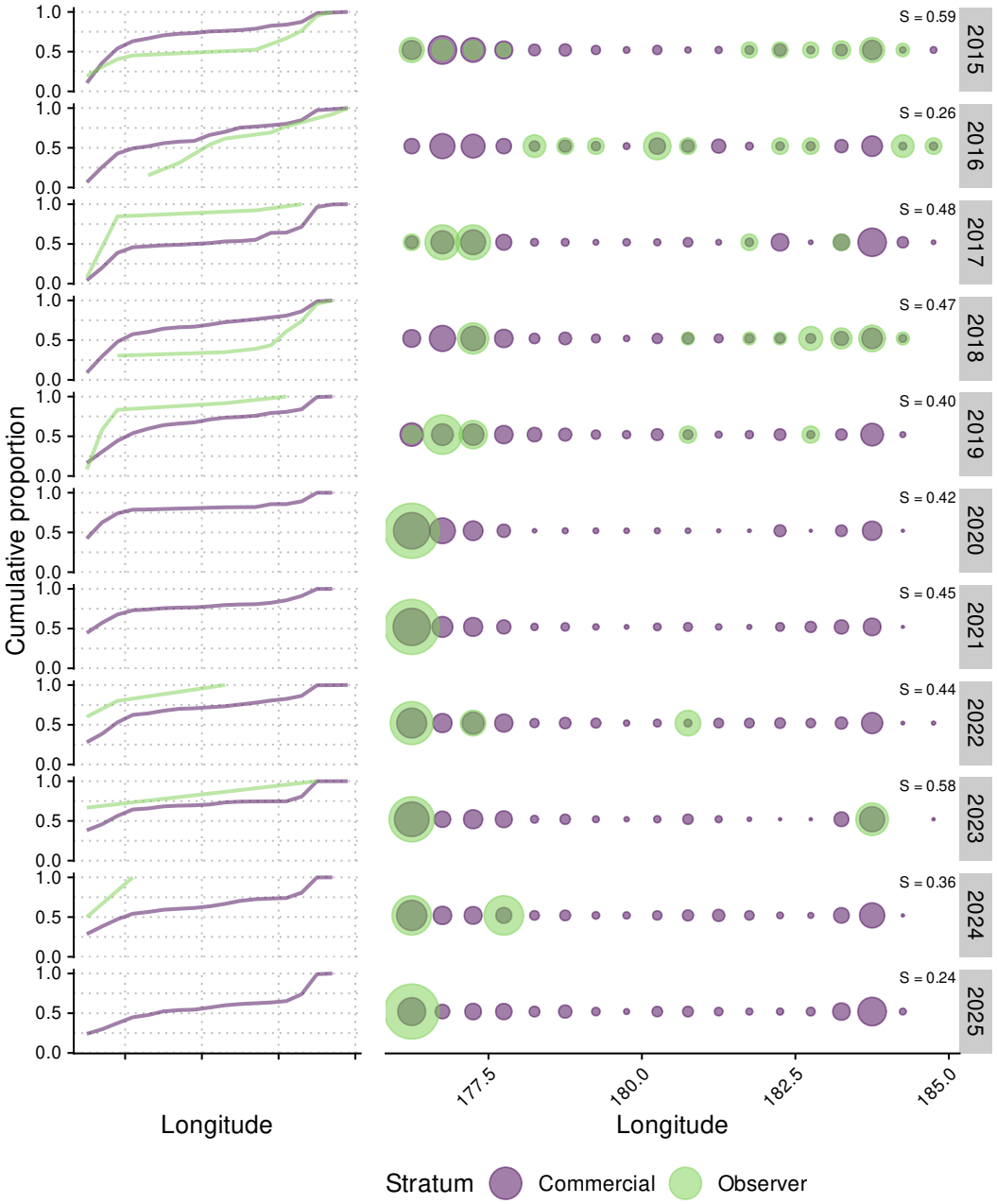


Figure 391: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in GSH 4, where the ghost shark - dark catch exceeded the 10kg threshold, in 2015 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

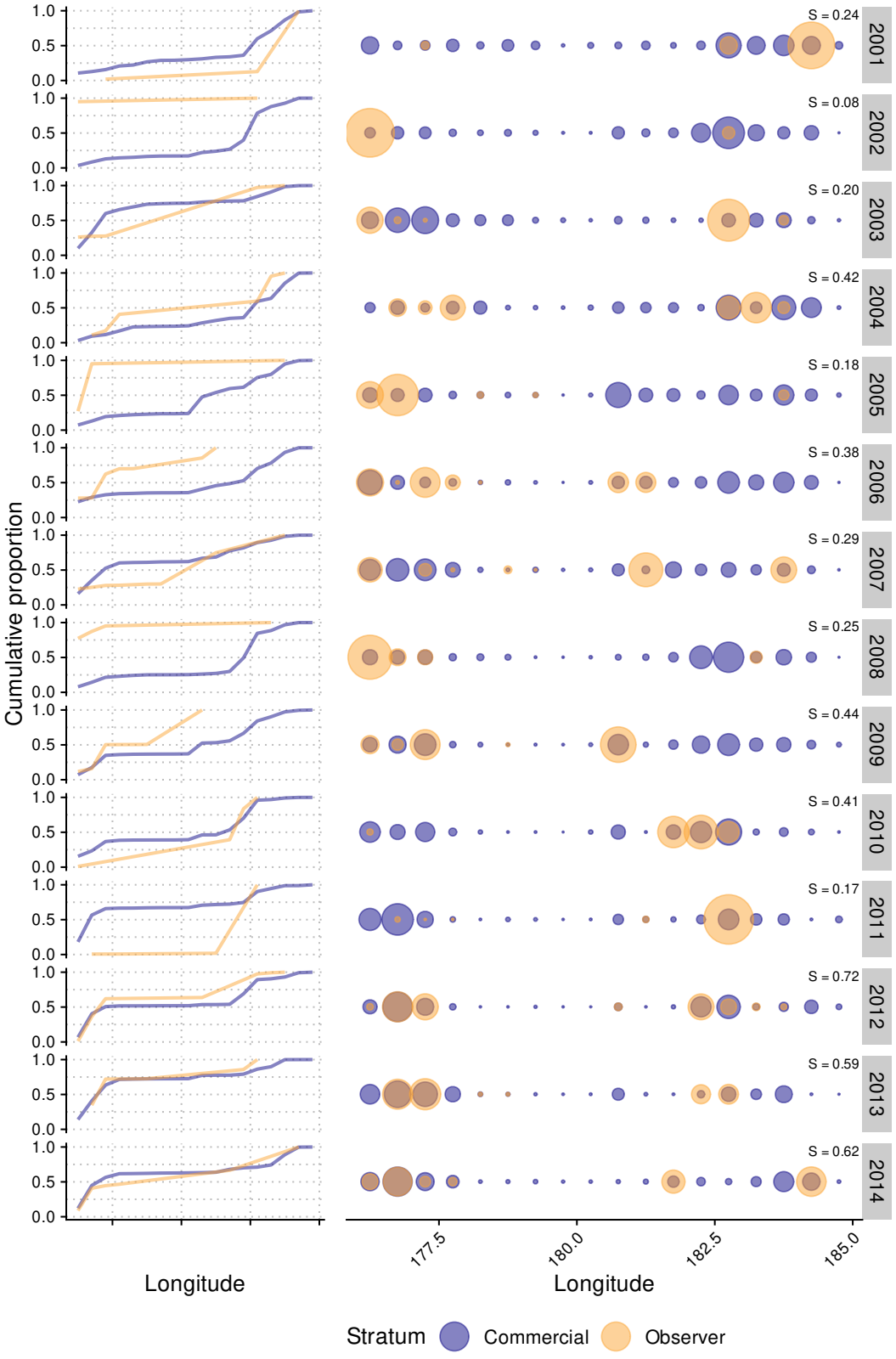


Figure 392: **Longitudinal representativeness of observer sampling coverage of Trawl catch in GSH 4, from events where the ghost shark - dark catch exceeded the 10kg threshold, in 2001 to 2014. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

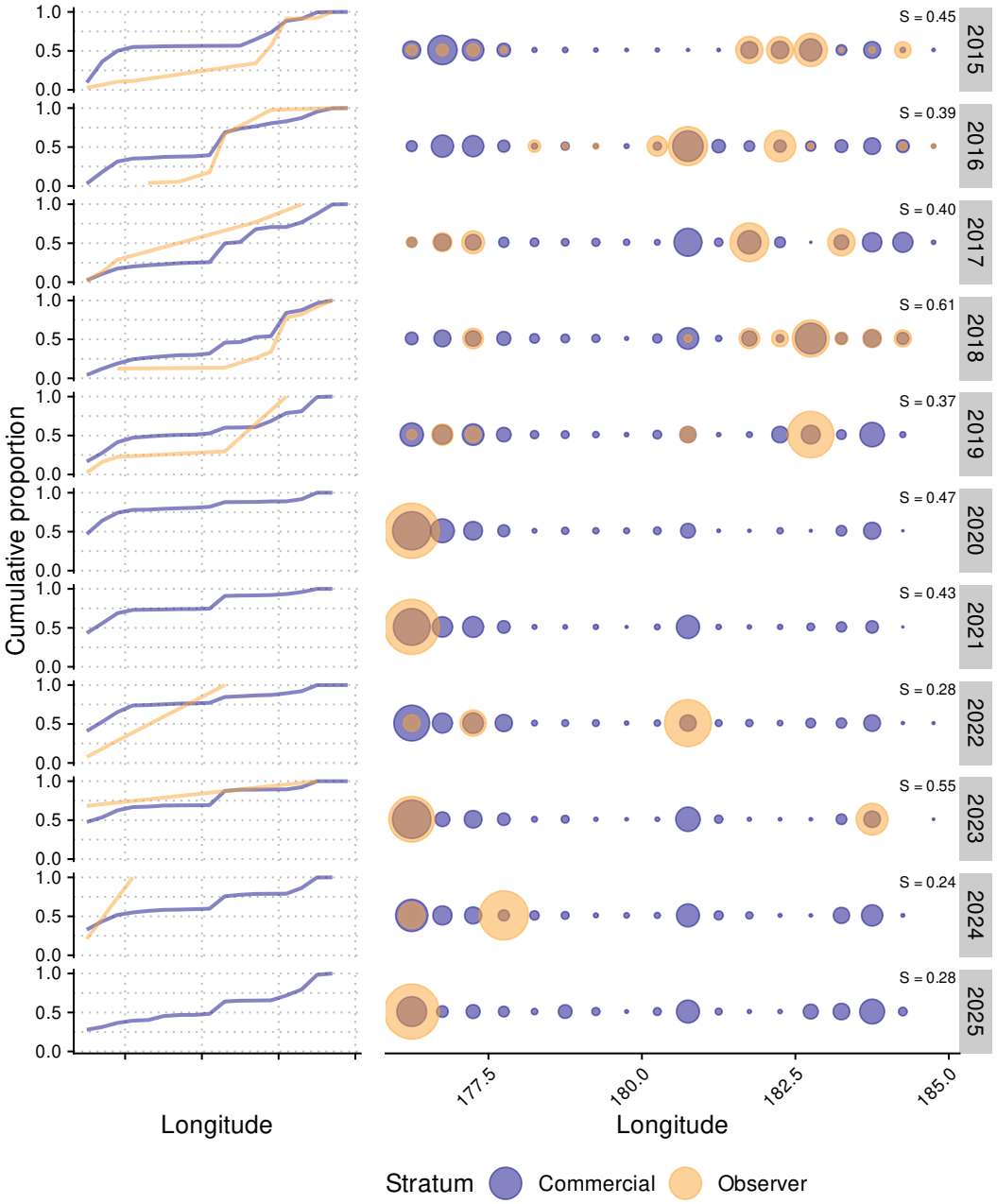


Figure 393: **Longitudinal representativeness of observer sampling coverage of Trawl catch in GSH 4, from events where the ghost shark - dark catch exceeded the 10kg threshold, in 2015 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

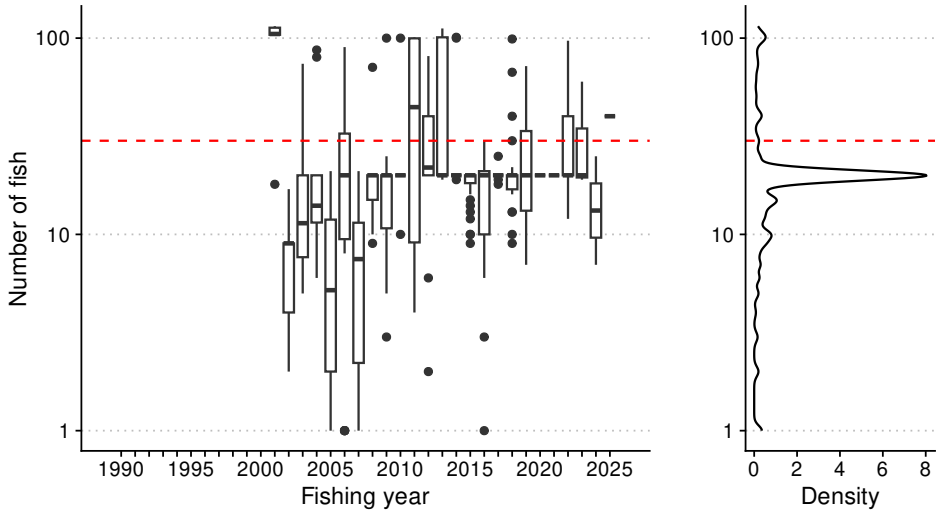


Figure 394: Length-frequency sample sizes for observed fishing events in GSH 4 where ghost shark - dark were sampled. The red dashed line indicates a sample size of 30 fish.

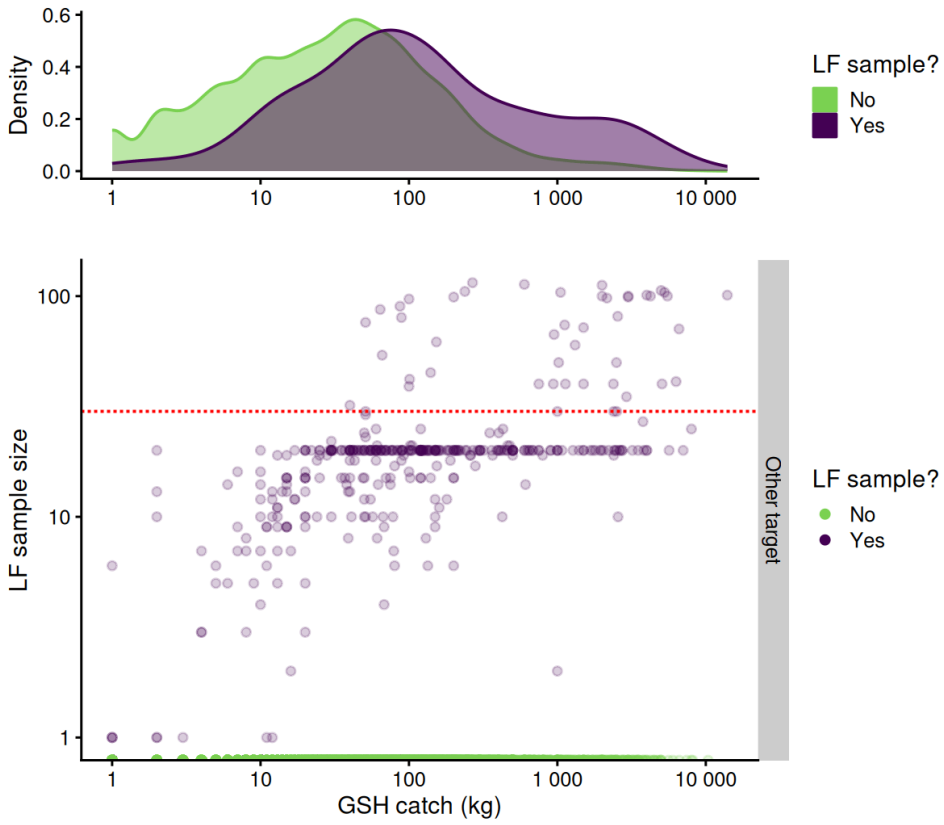


Figure 395: Length-frequency sample sizes (number of fish sampled) for observed fishing events in GSH 4 in relation to the total ghost shark - dark catch from an event, separately for ghost shark - dark target events and other target species. The red dashed line indicates a sample size of 30 fish.

2.7.1.2 Catch quantification

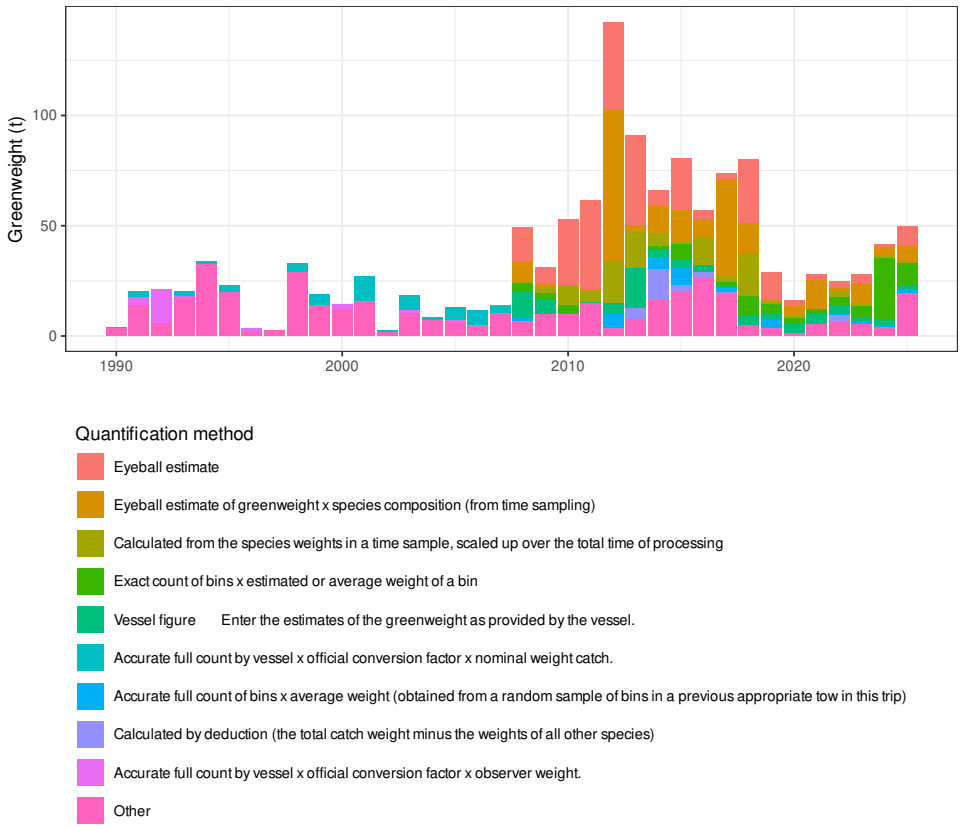


Figure 396: Methods used by observers to quantify the catch of ghost shark - dark in the GSH 4 Trawl fishery. The legend lists the methods used in descending order of total catch.

2.7.2 GSH 5: Trawl fishery

2.7.2.1 Length-frequency samples

Table 37: Length-frequency samples of ghost shark - dark from the GSH 5 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of ghost shark - dark exceeded a potential sampling threshold of 10 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	277	0	0	0.00
1991	371	0	0	0.00
1992	586	0	0	0.00
1993	620	0	0	0.00
1994	538	0	0	0.00
1995	687	0	0	0.00
1996	409	0	0	0.00
1997	542	0	0	0.00
1998	475	0	0	0.00
1999	200	0	0	0.00
2000	181	0	0	0.00
2001	152	0	0	0.00
2002	105	5	159	4.76
2003	250	17	253	6.80
2004	172	5	64	2.91
2005	179	15	307	8.38
2006	102	29	180	28.43
2007	139	9	98	6.47
2008	143	3	10	2.10
2009	86	3	45	3.49
2010	139	4	115	2.88
2011	115	5	177	4.35
2012	105	15	244	14.29
2013	160	10	187	6.25
2014	71	9	171	12.68
2015	68	3	75	4.41
2016	68	44	921	64.71
2017	73	3	131	4.11
2018	105	5	81	4.76
2019	87	6	210	6.90
2020	109	4	79	3.67
2021	157	8	151	5.10
2022	107	3	53	2.80
2023	134	4	70	2.99
2024	229	1	20	0.44
2025	230	0	0	0.00

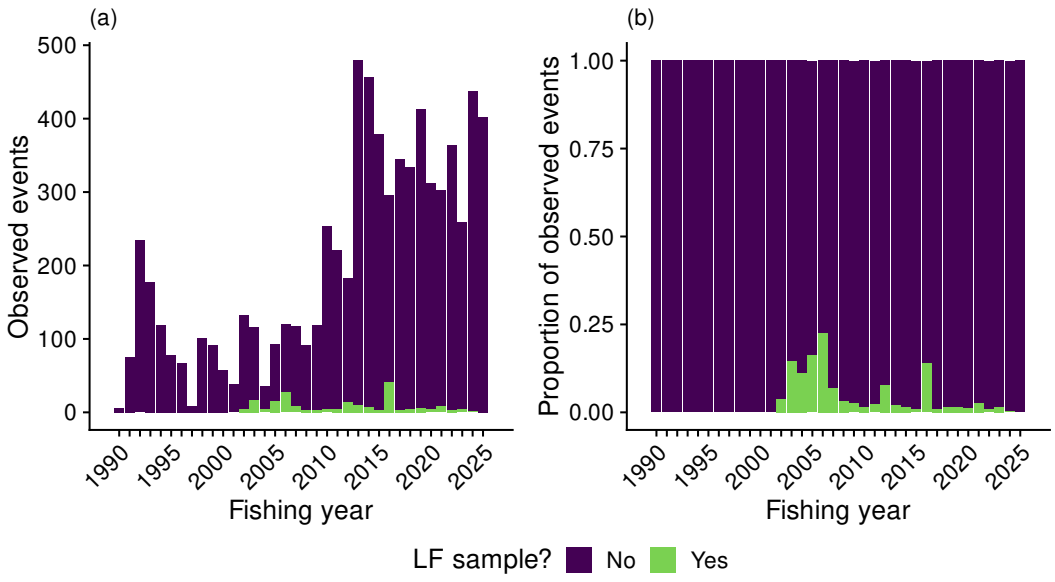


Figure 397: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in GSH 5 where the ghost shark - dark catch exceeded the 10 kg threshold, with and without length-frequency sampling.**

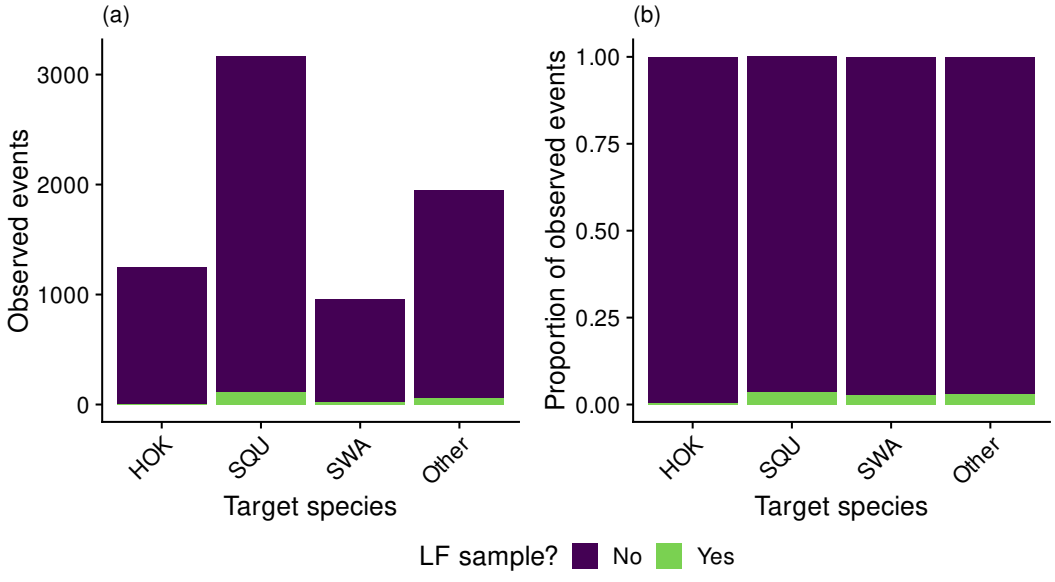


Figure 398: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in GSH 5 where the ghost shark - dark catch exceeded the 10 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

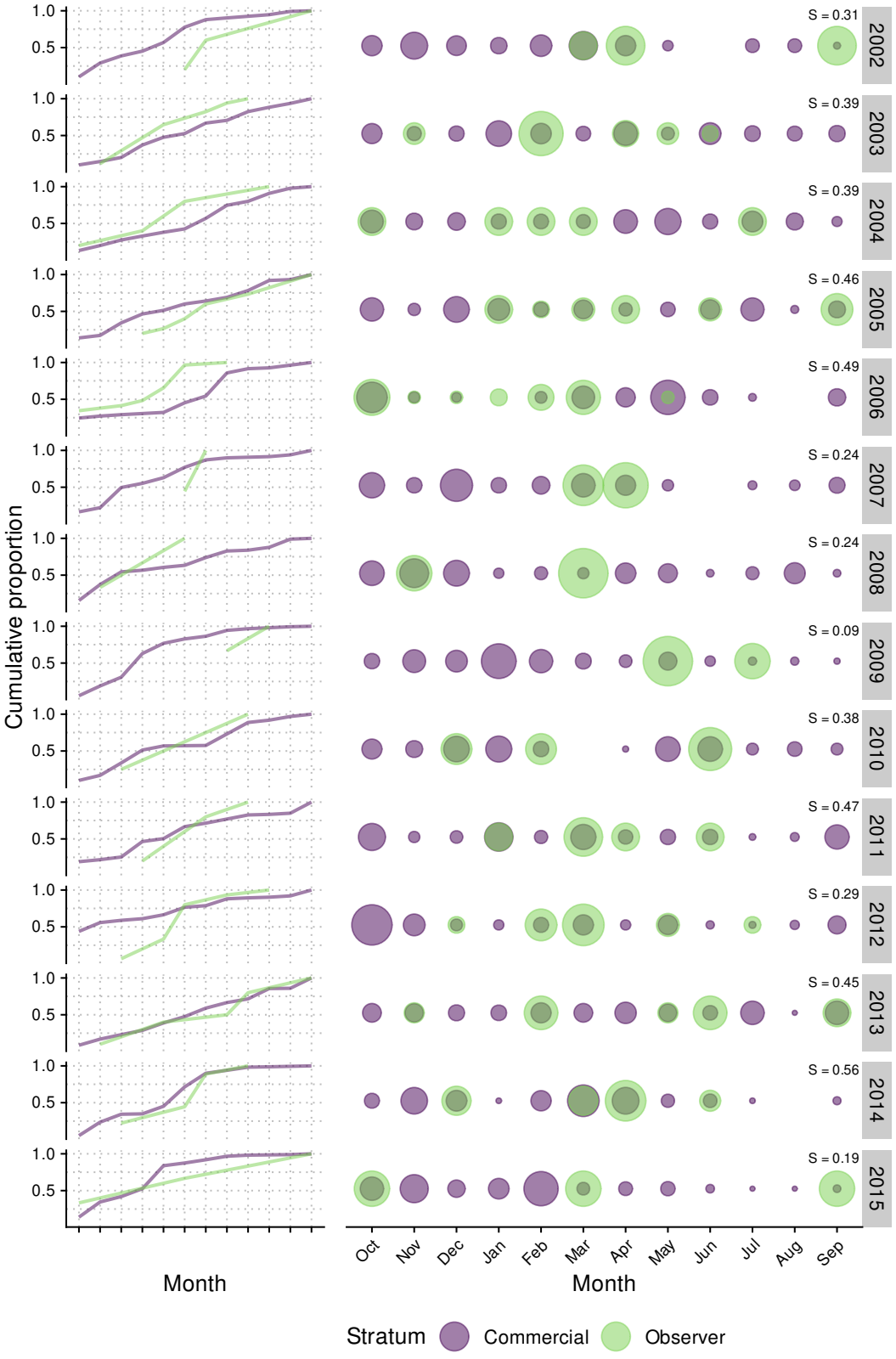


Figure 399: Monthly representativeness of observer sampling coverage of Trawl fishing events in GSH 5, where the ghost shark - dark catch exceeded the 10kg threshold, in 2002 to 2015. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

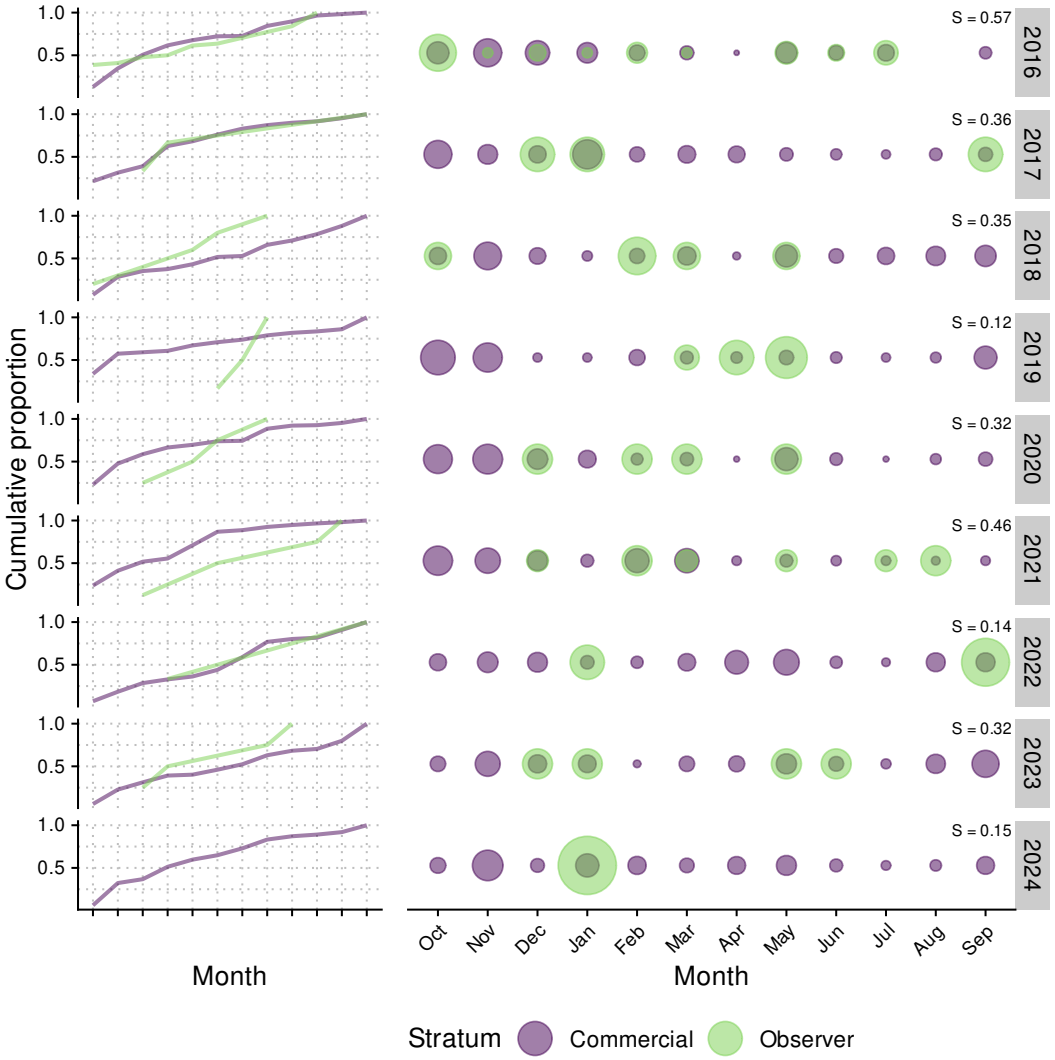


Figure 400: Monthly representativeness of observer sampling coverage of Trawl fishing events in GSH 5, where the ghost shark - dark catch exceeded the 10kg threshold, in 2016 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

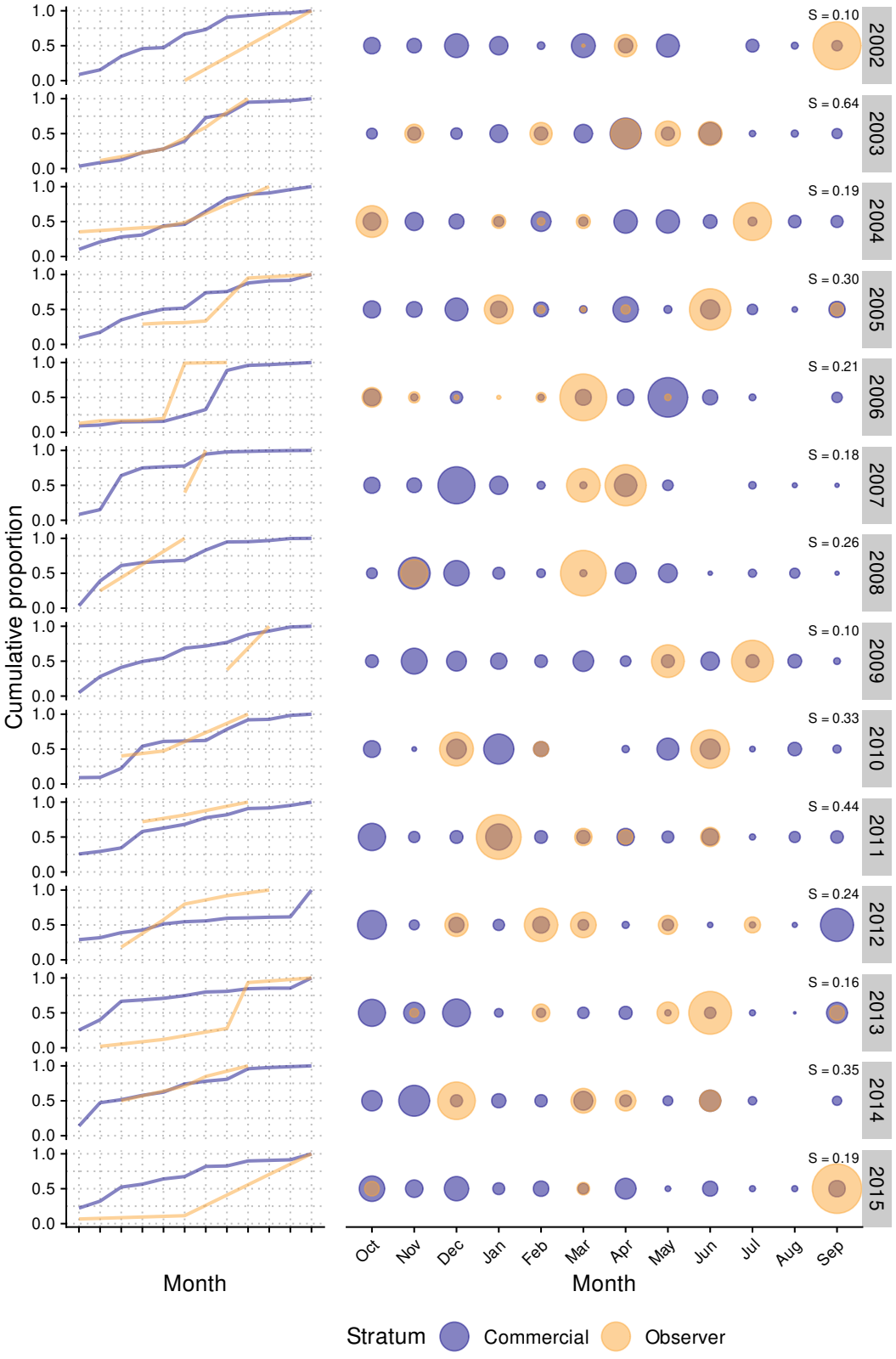


Figure 401: **Monthly representativeness of observer sampling coverage of Trawl catch in GSH 5, from events where the ghost shark - dark catch exceeded the 10kg threshold, in 2002 to 2015. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

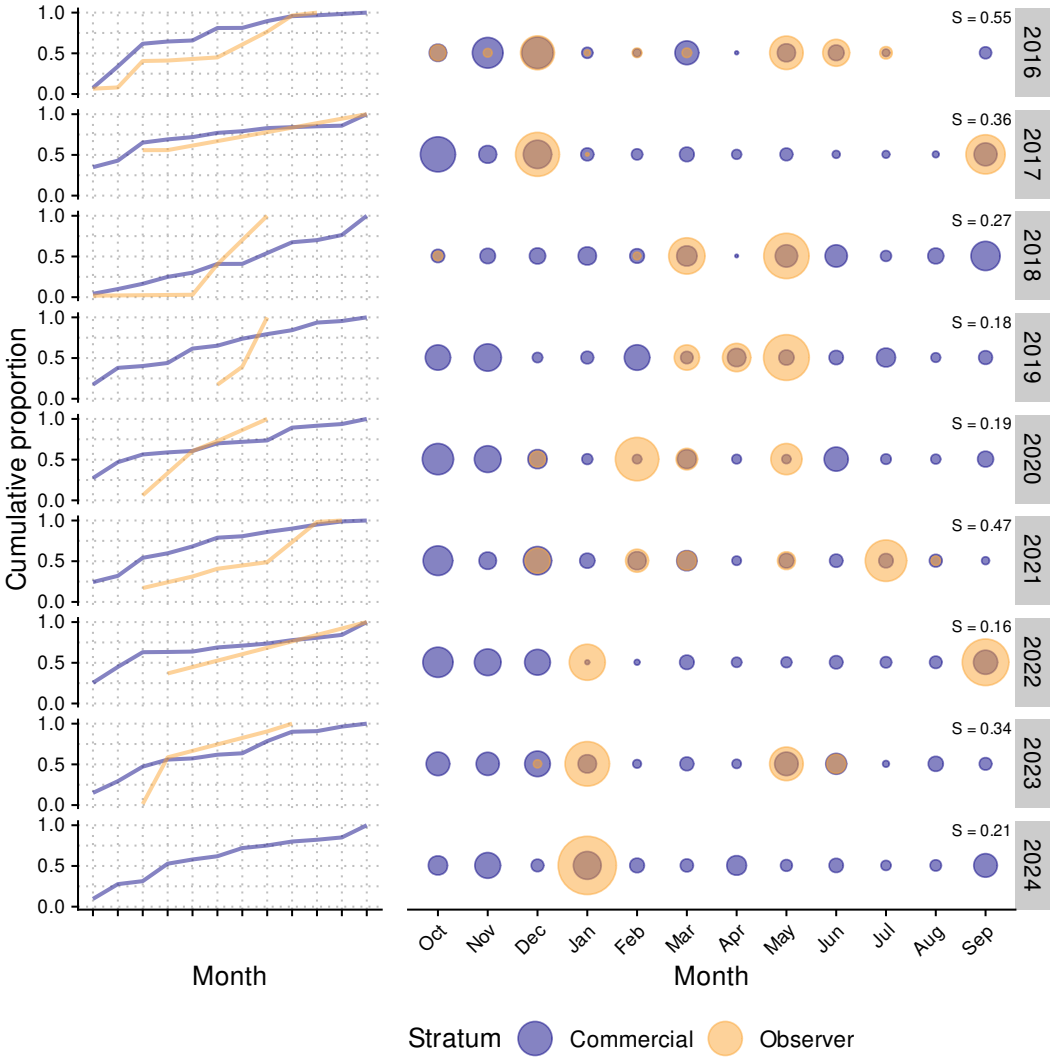


Figure 402: **Monthly representativeness of observer sampling coverage of Trawl catch in GSH 5, from events where the ghost shark - dark catch exceeded the 10kg threshold, in 2016 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

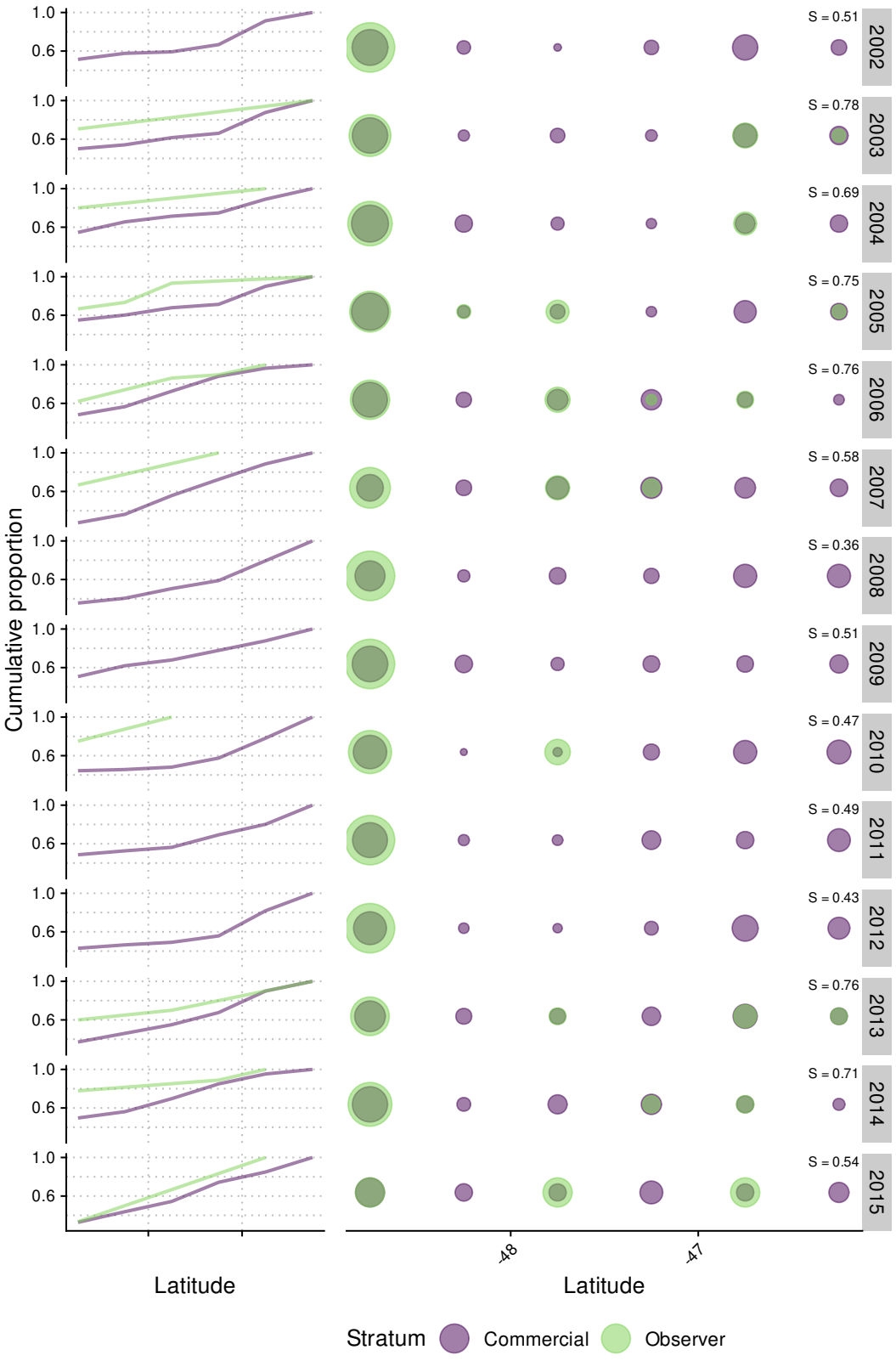


Figure 403: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in GSH 5, where the ghost shark - dark catch exceeded the 10kg threshold, in 2002 to 2015. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

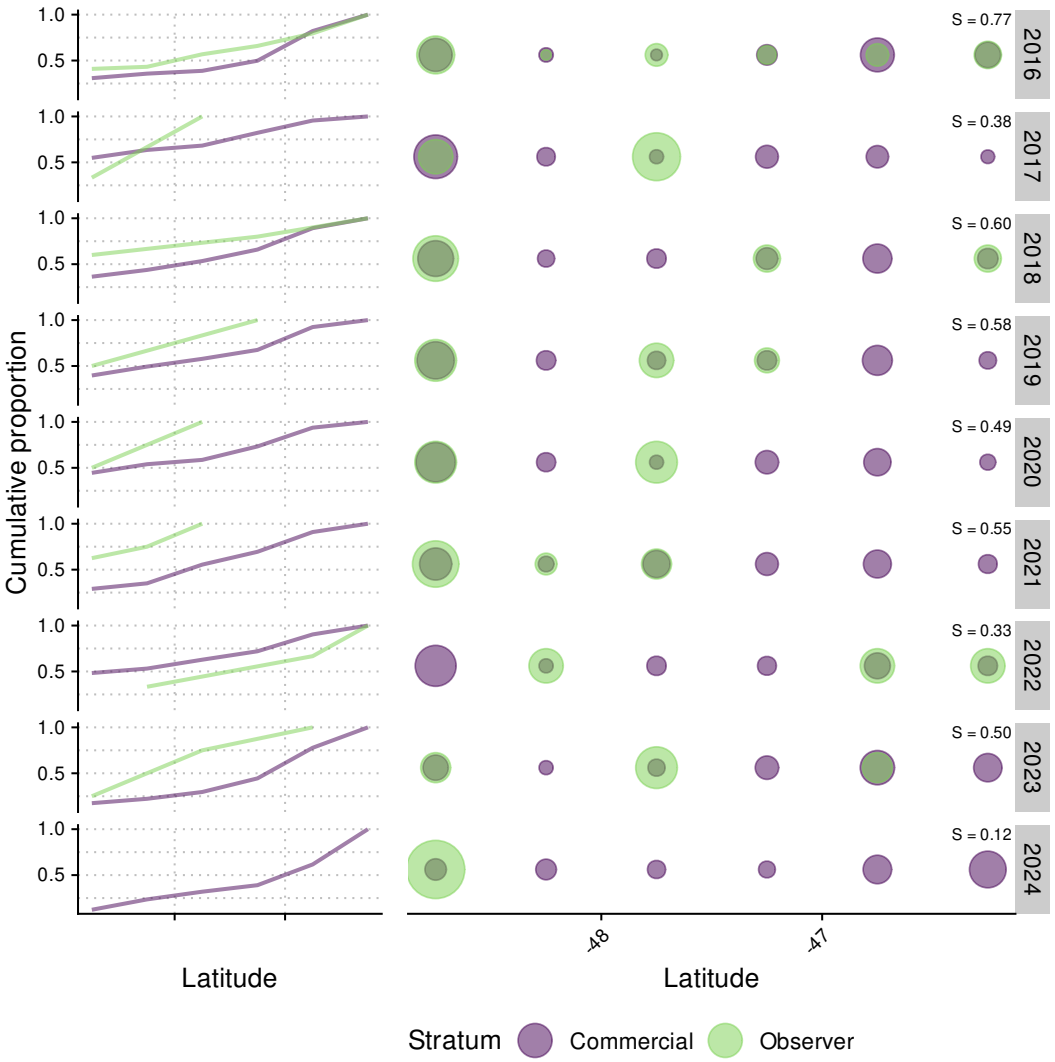


Figure 404: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in GSH 5, where the ghost shark - dark catch exceeded the 10kg threshold, in 2016 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

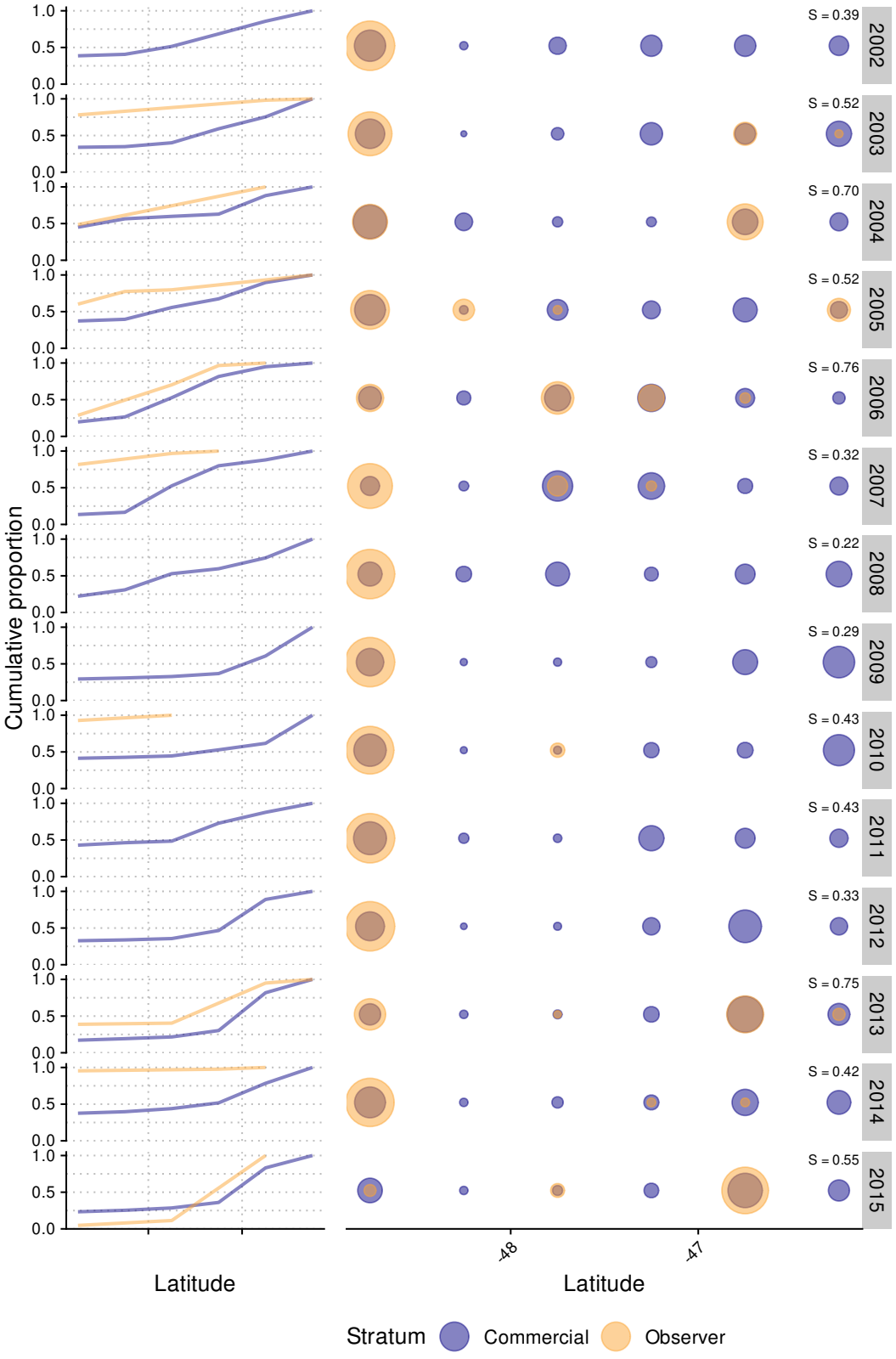


Figure 405: **Latitudinal representativeness of observer sampling coverage of Trawl catch in GSH 5, from events where the ghost shark - dark catch exceeded the 10kg threshold, in 2002 to 2015. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

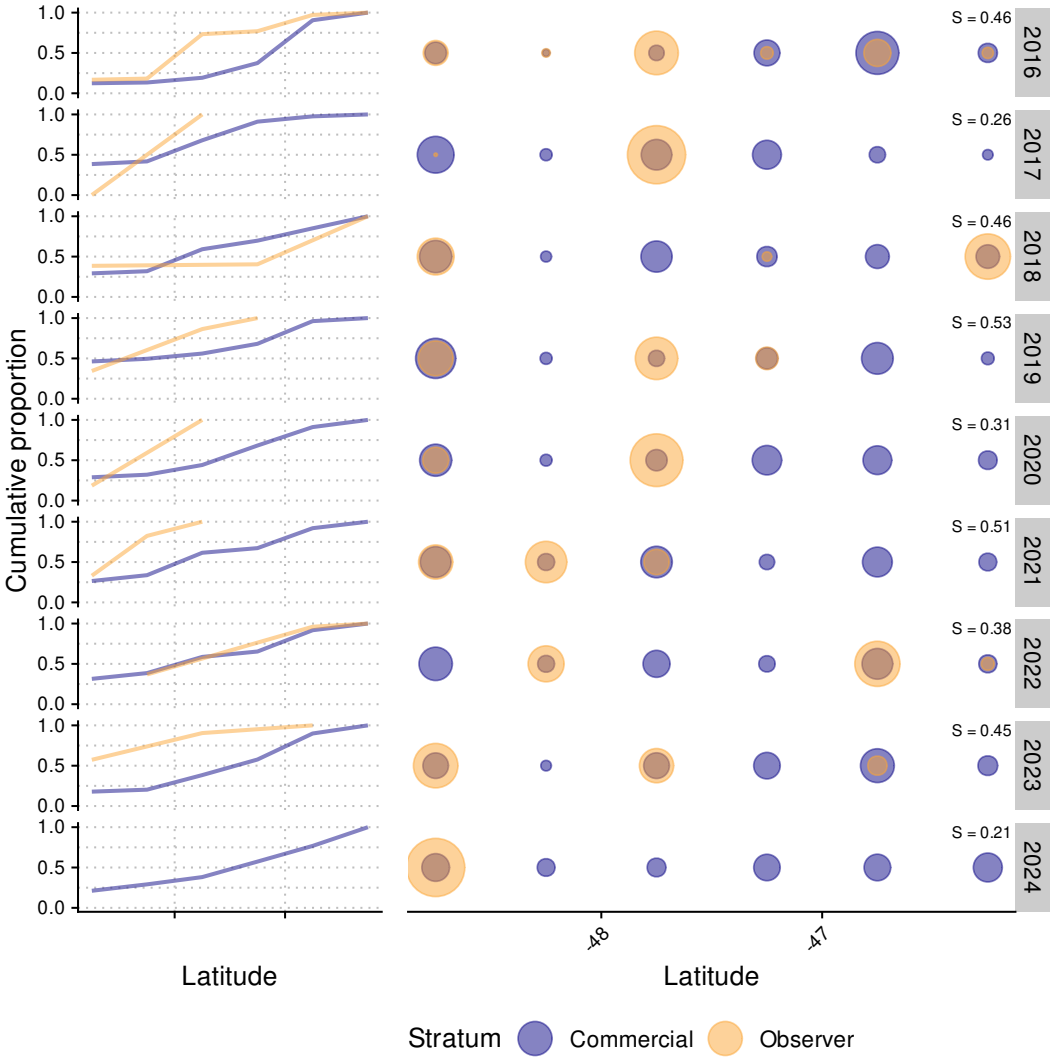


Figure 406: **Latitudinal representativeness of observer sampling coverage of Trawl catch in GSH 5, from events where the ghost shark - dark catch exceeded the 10kg threshold, in 2016 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

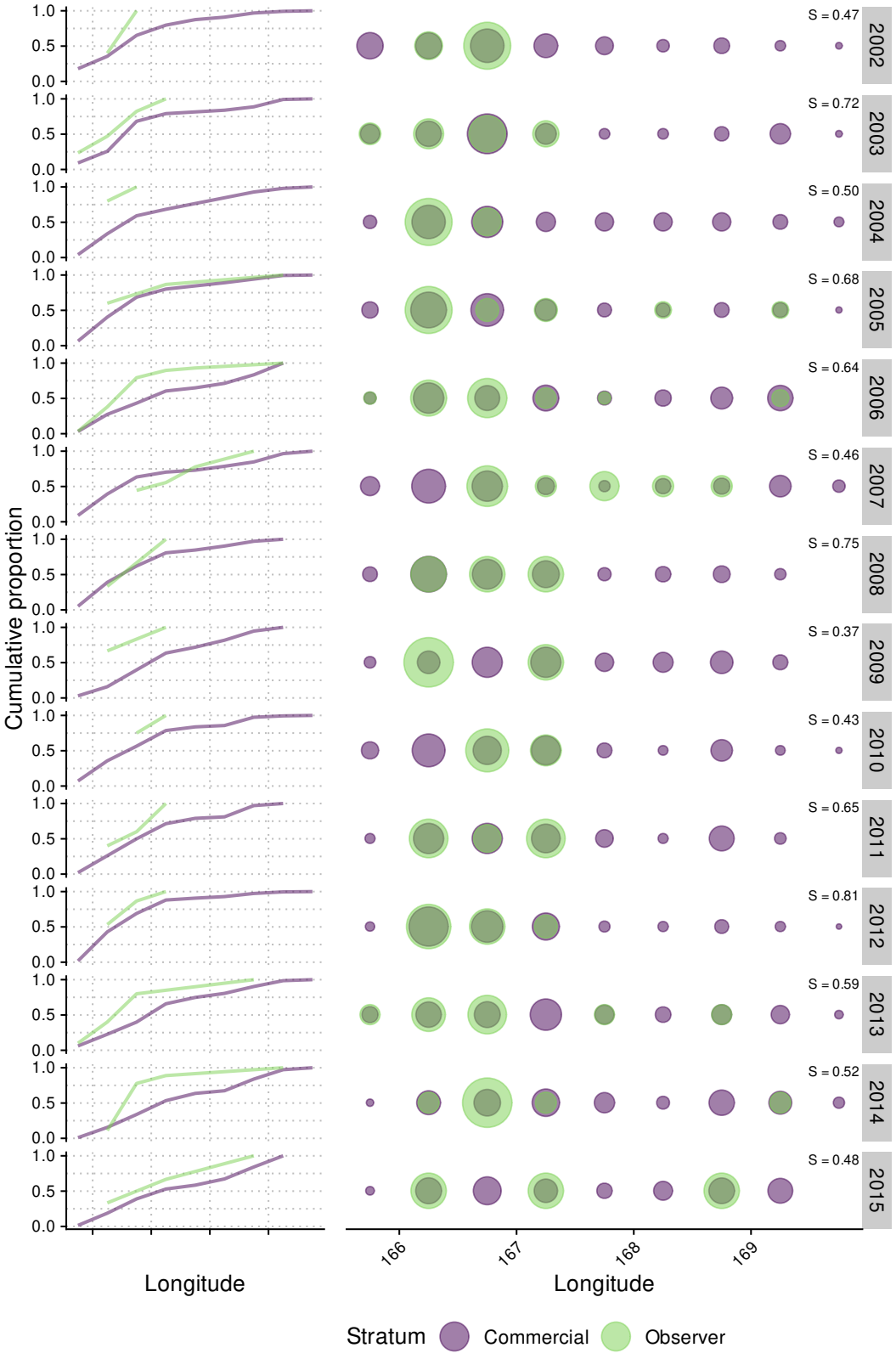


Figure 407: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in GSH 5, where the ghost shark - dark catch exceeded the 10kg threshold, in 2002 to 2015. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

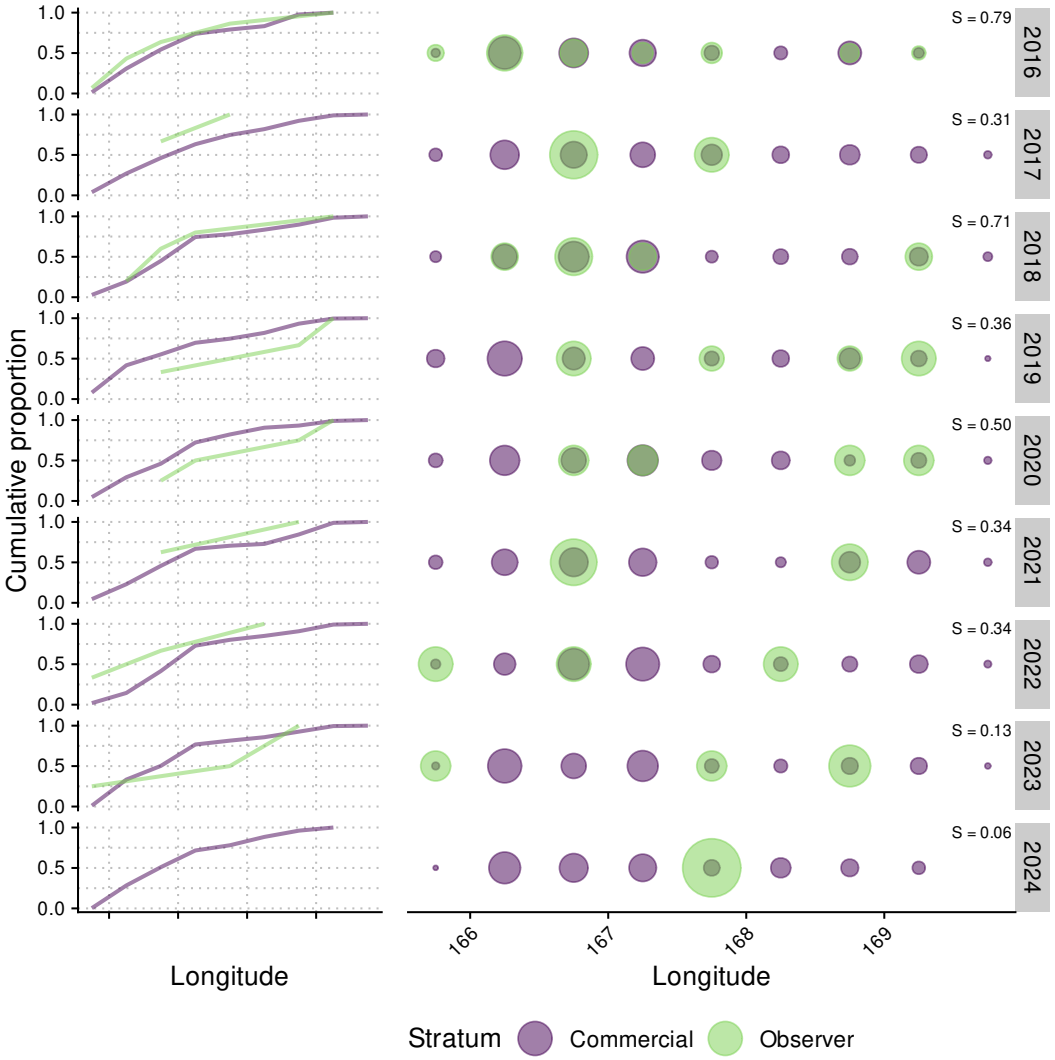


Figure 408: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in GSH 5, where the ghost shark - dark catch exceeded the 10kg threshold, in 2016 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

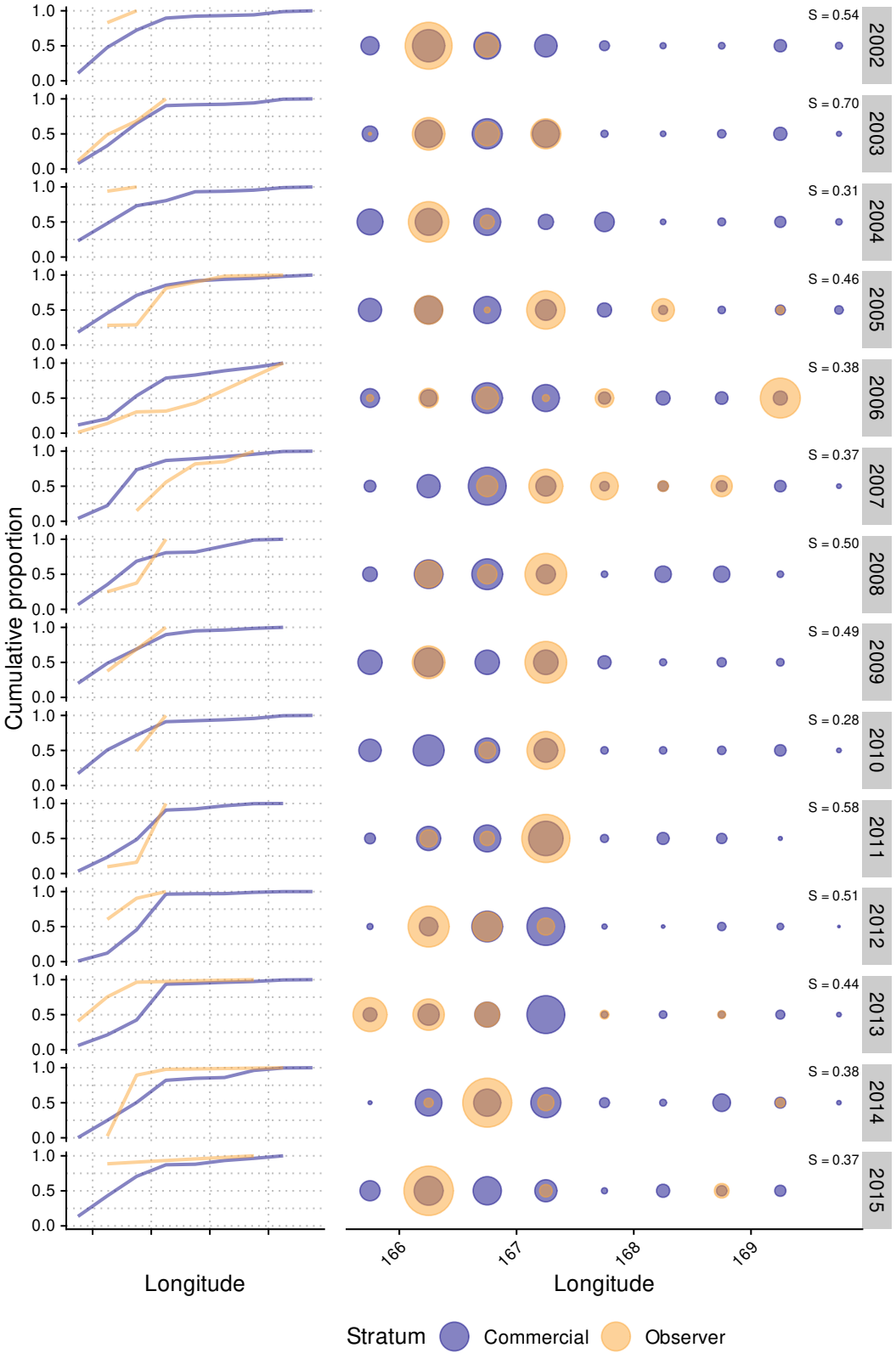


Figure 409: **Longitudinal representativeness of observer sampling coverage of Trawl catch in GSH 5, from events where the ghost shark - dark catch exceeded the 10kg threshold, in 2002 to 2015. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

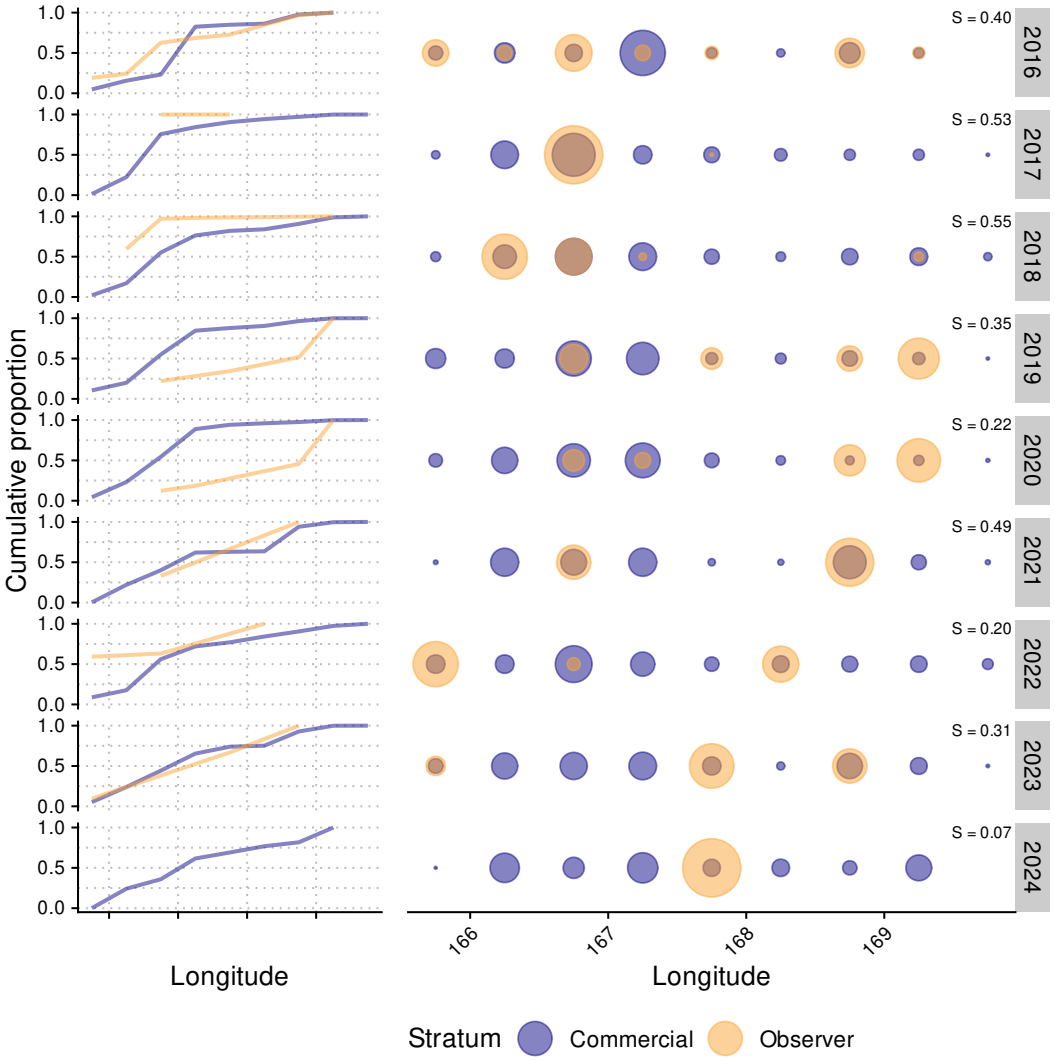


Figure 410: **Longitudinal representativeness of observer sampling coverage of Trawl catch in GSH 5, from events where the ghost shark - dark catch exceeded the 10kg threshold, in 2016 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

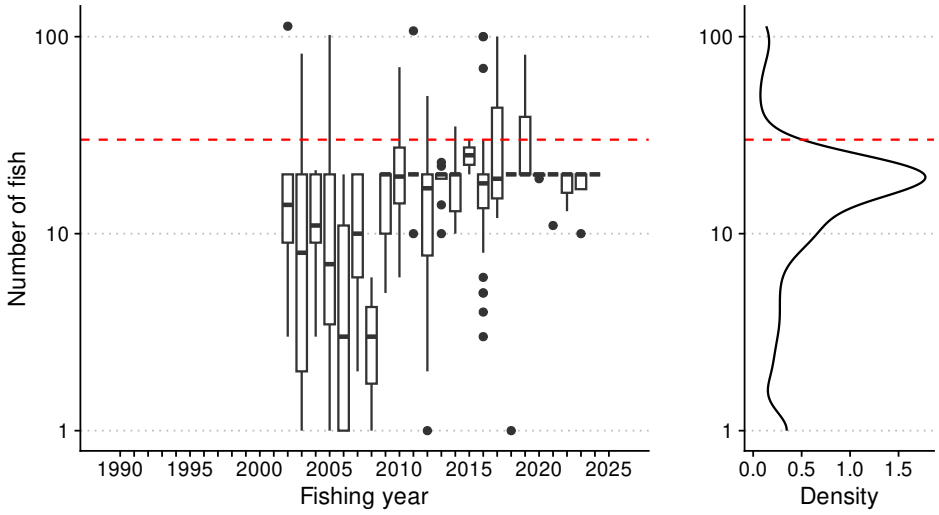


Figure 411: Length-frequency sample sizes for observed fishing events in GSH 5 where ghost shark - dark were sampled. The red dashed line indicates a sample size of 30 fish.

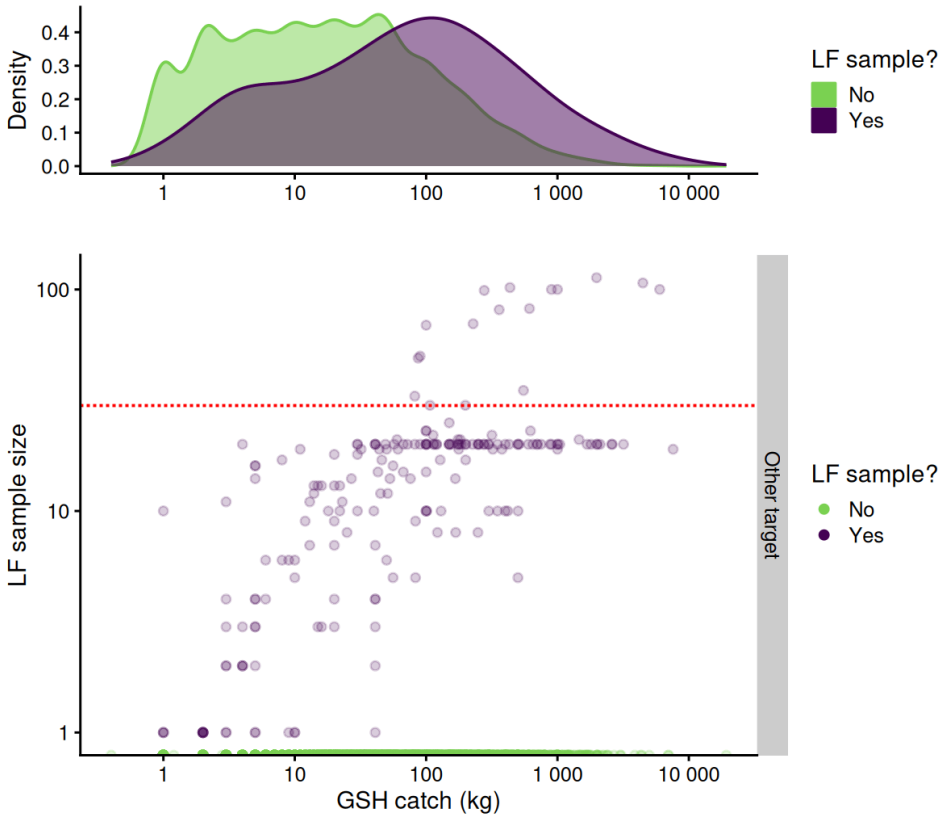


Figure 412: Length-frequency sample sizes (number of fish sampled) for observed fishing events in GSH 5 in relation to the total ghost shark - dark catch from an event, separately for ghost shark - dark target events and other target species. The red dashed line indicates a sample size of 30 fish.

2.7.2.2 Catch quantification

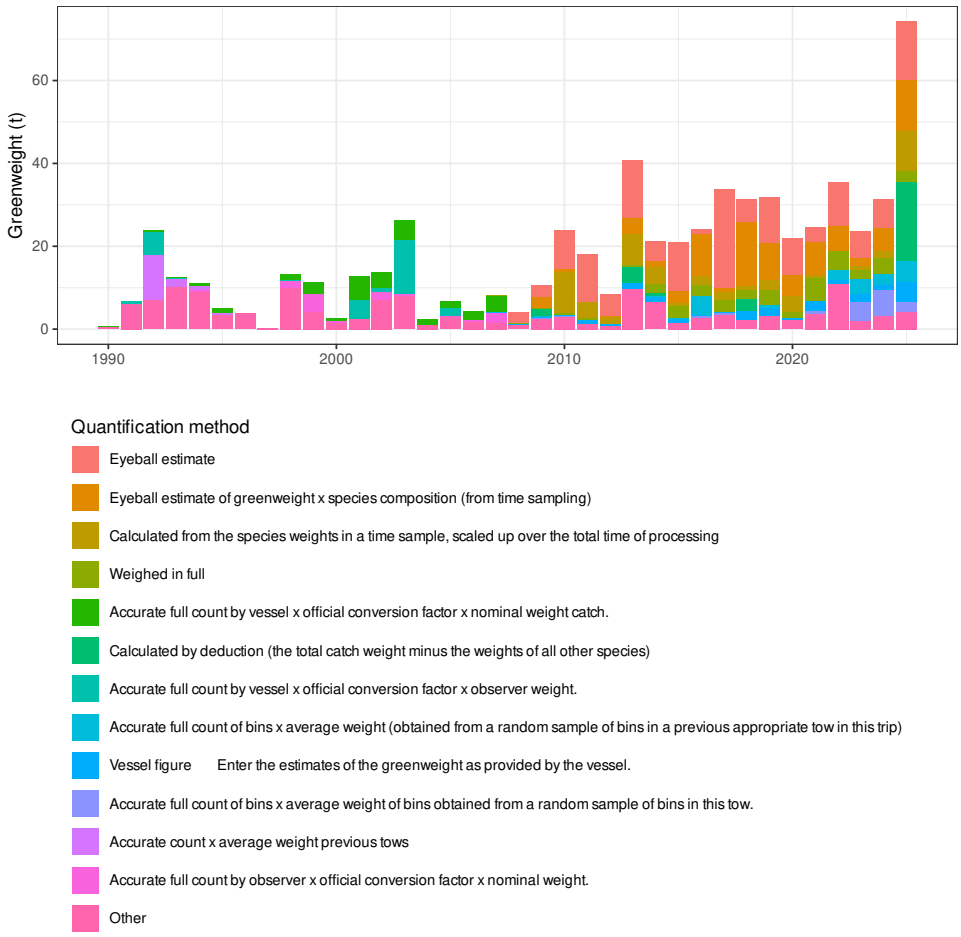


Figure 413: Methods used by observers to quantify the catch of ghost shark - dark in the GSH 5 Trawl fishery. The legend lists the methods used in descending order of total catch.

2.7.3 GSH 6: Trawl fishery

2.7.3.1 Length-frequency samples

Table 38: Length-frequency samples of ghost shark - dark from the GSH 6 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of ghost shark - dark exceeded a potential sampling threshold of 10 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	63	0	0	0.00
1991	496	0	0	0.00
1992	477	0	0	0.00
1993	351	0	0	0.00
1994	306	0	0	0.00
1995	390	0	0	0.00
1996	290	1	3	0.34
1997	665	0	0	0.00
1998	975	0	0	0.00
1999	567	0	0	0.00
2000	519	0	0	0.00
2001	560	0	0	0.00
2002	504	31	427	6.15
2003	369	27	939	7.32
2004	214	31	640	14.49
2005	395	11	63	2.78
2006	242	35	462	14.46
2007	362	37	664	10.22
2008	373	26	483	6.97
2009	262	6	124	2.29
2010	141	29	402	20.57
2011	251	34	378	13.55
2012	178	9	116	5.06
2013	349	26	566	7.45
2014	343	13	388	3.79
2015	168	8	86	4.76
2016	195	55	834	28.21
2017	311	42	779	13.50
2018	417	30	424	7.19
2019	356	5	100	1.40
2020	337	3	61	0.89
2021	396	6	113	1.52
2022	513	4	63	0.78
2023	503	5	105	0.99
2024	435	4	112	0.92
2025	619	0	0	0.00

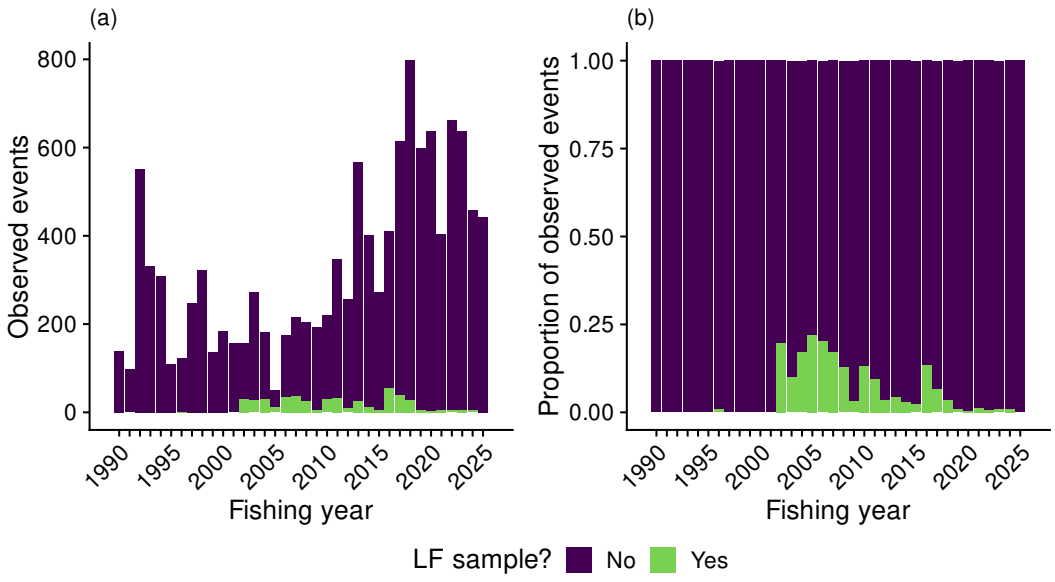


Figure 414: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in GSH 6 where the ghost shark - dark catch exceeded the 10 kg threshold, with and without length-frequency sampling.**

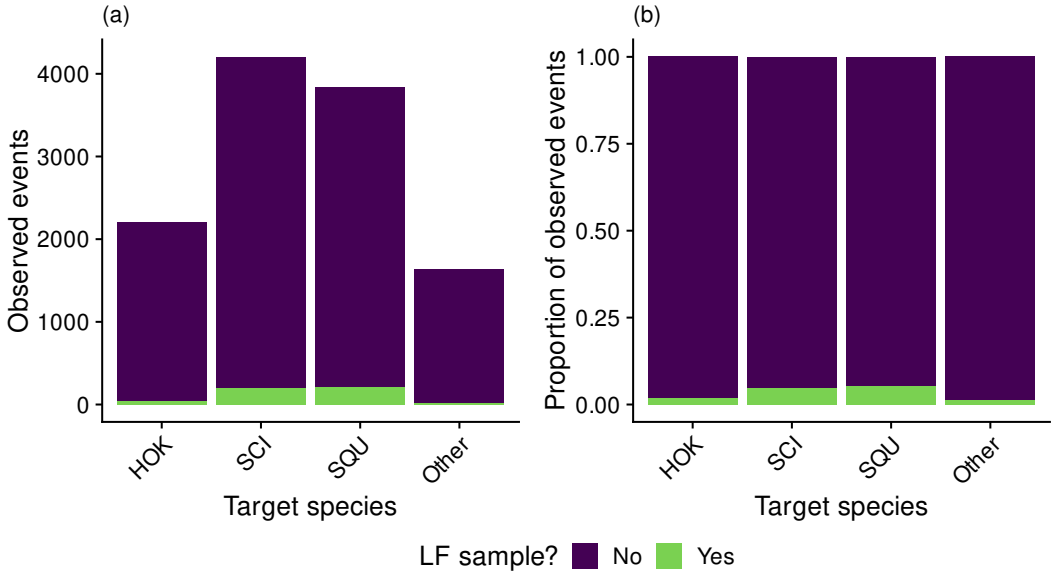


Figure 415: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in GSH 6 where the ghost shark - dark catch exceeded the 10 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

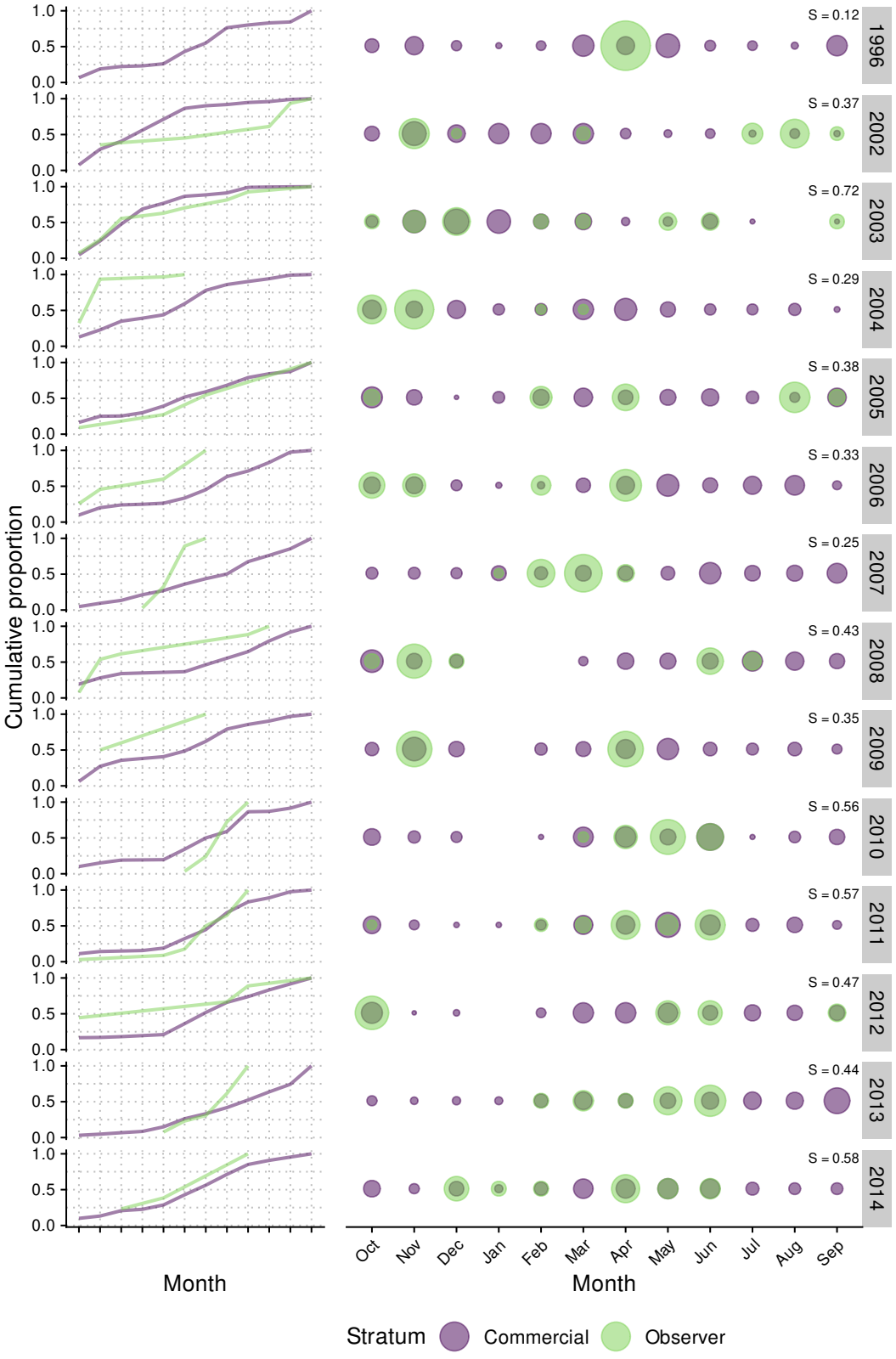


Figure 416: Monthly representativeness of observer sampling coverage of Trawl fishing events in GSH 6, where the ghost shark - dark catch exceeded the 10kg threshold, in 1996 to 2014. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

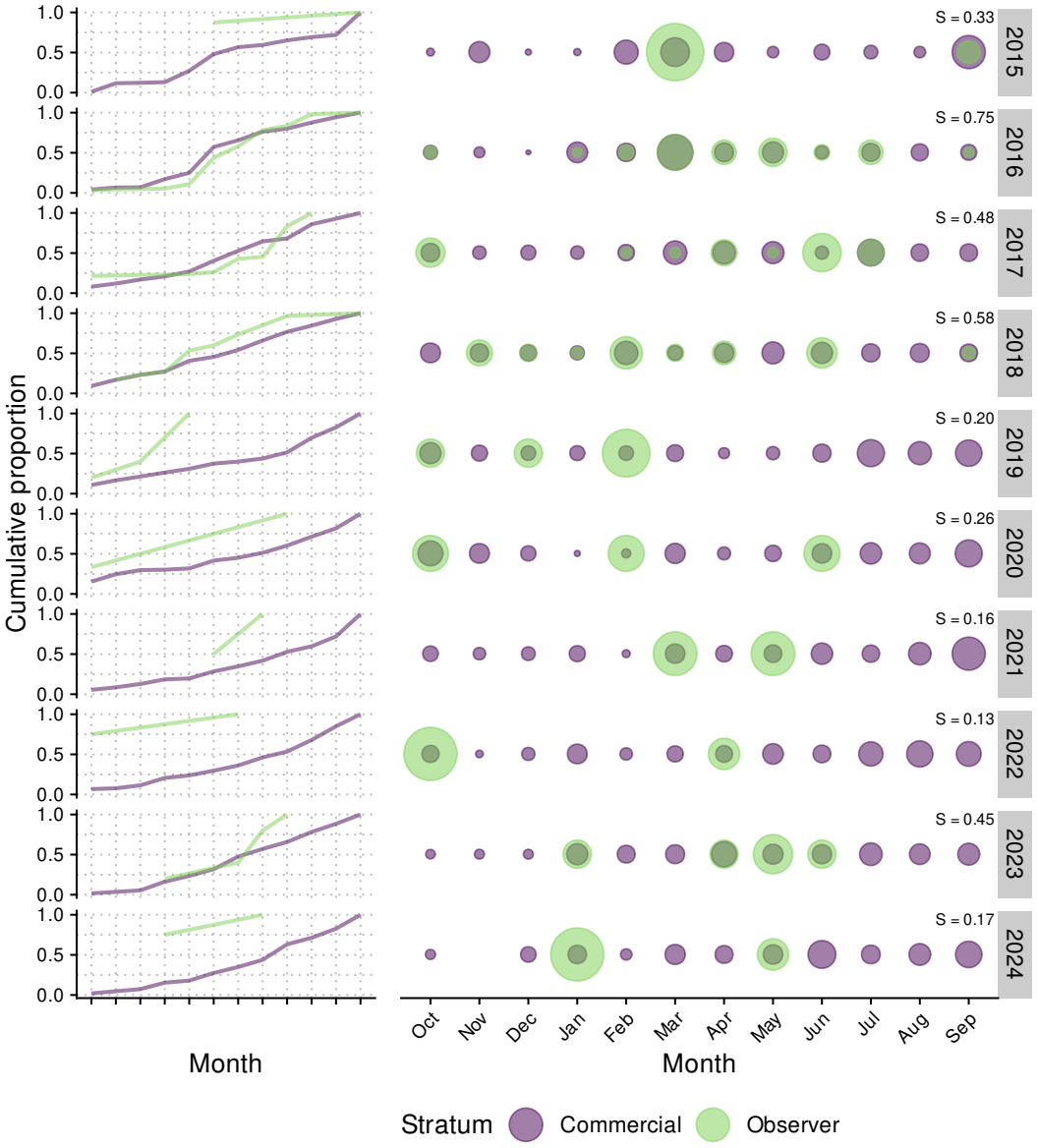


Figure 417: Monthly representativeness of observer sampling coverage of Trawl fishing events in GSH 6, where the ghost shark - dark catch exceeded the 10kg threshold, in 2015 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

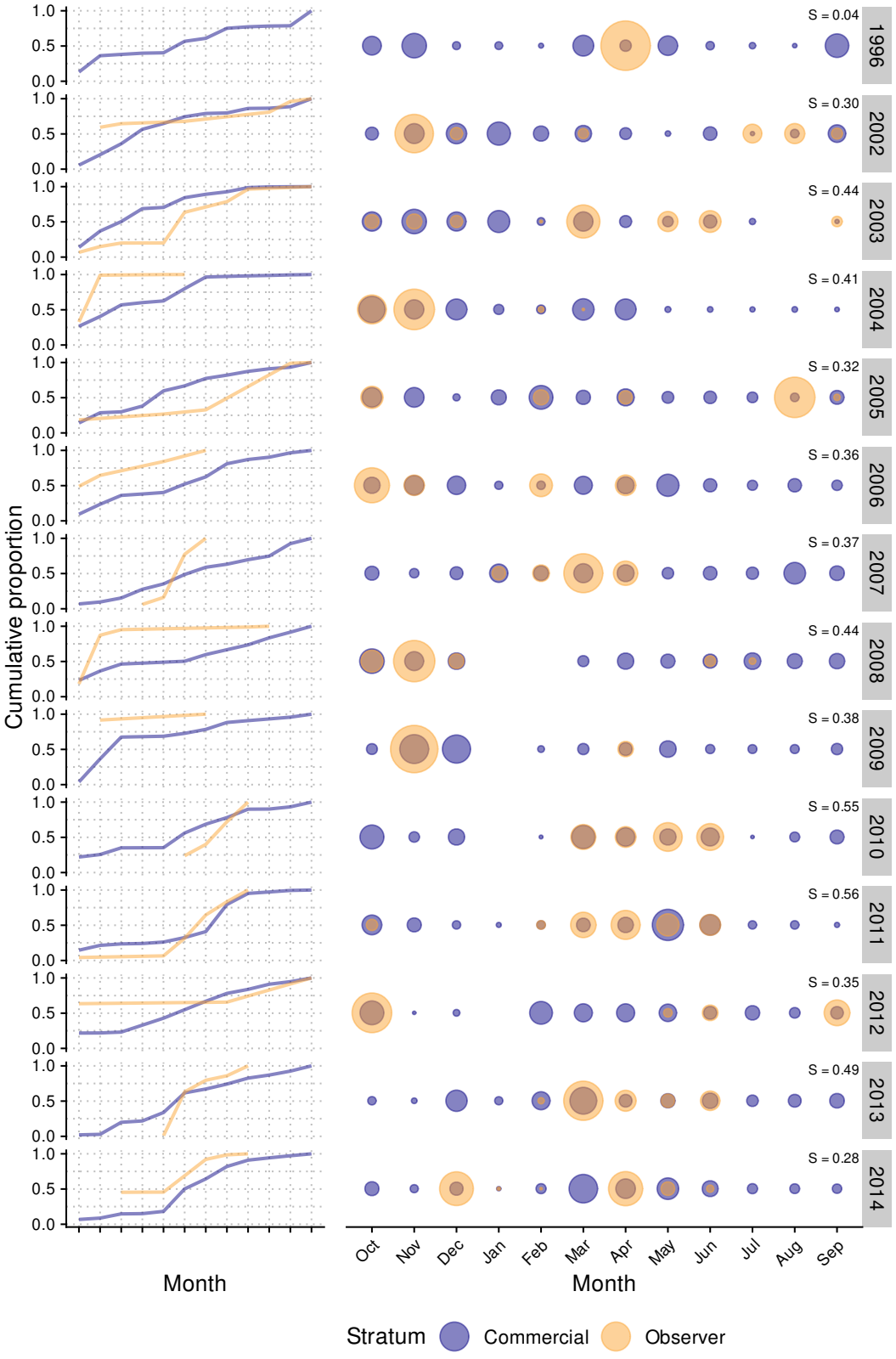


Figure 418: Monthly representativeness of observer sampling coverage of Trawl catch in GSH 6, from events where the ghost shark - dark catch exceeded the 10kg threshold, in 1996 to 2014. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

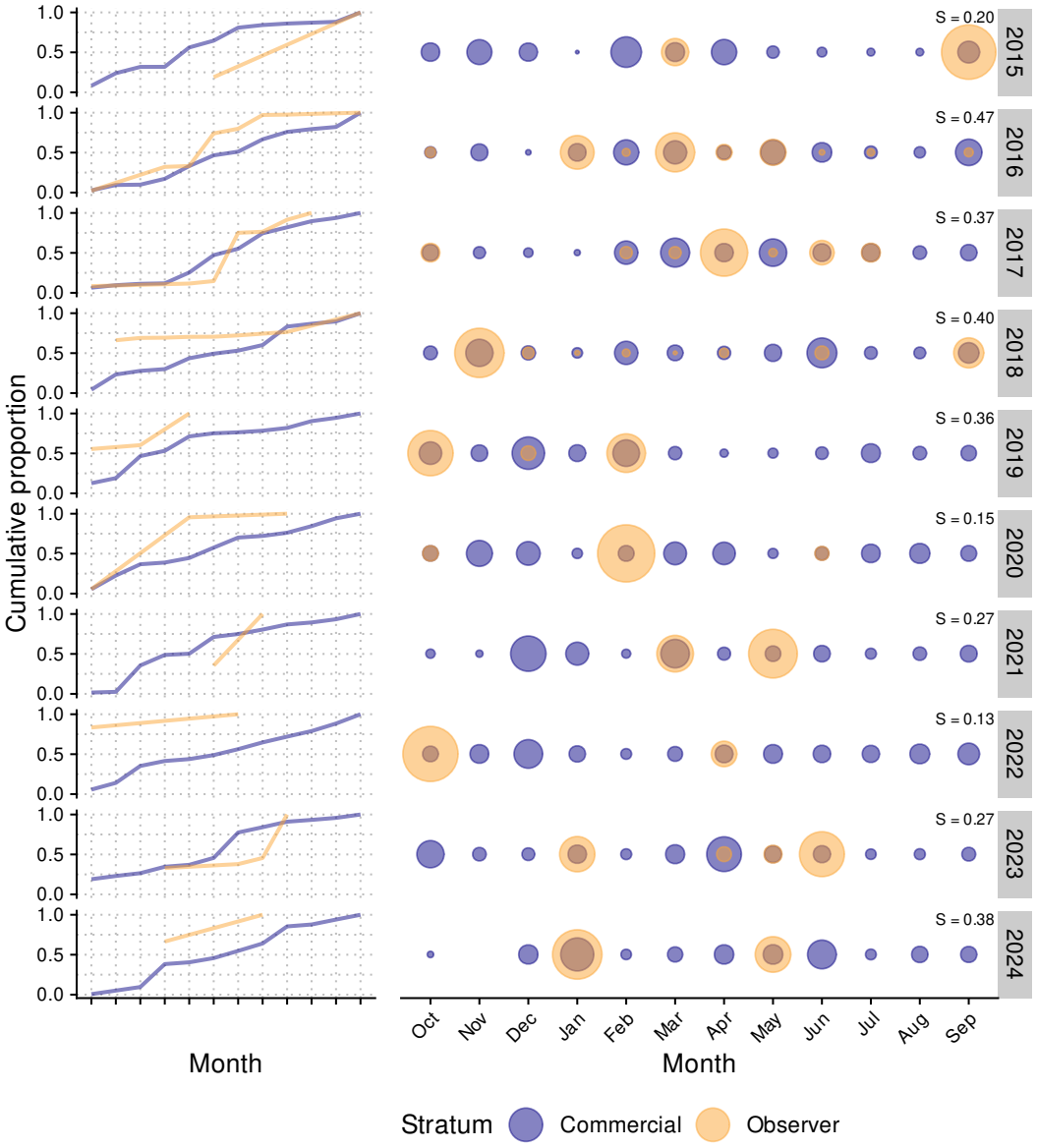


Figure 419: Monthly representativeness of observer sampling coverage of Trawl catch in GSH 6, from events where the ghost shark - dark catch exceeded the 10kg threshold, in 2015 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

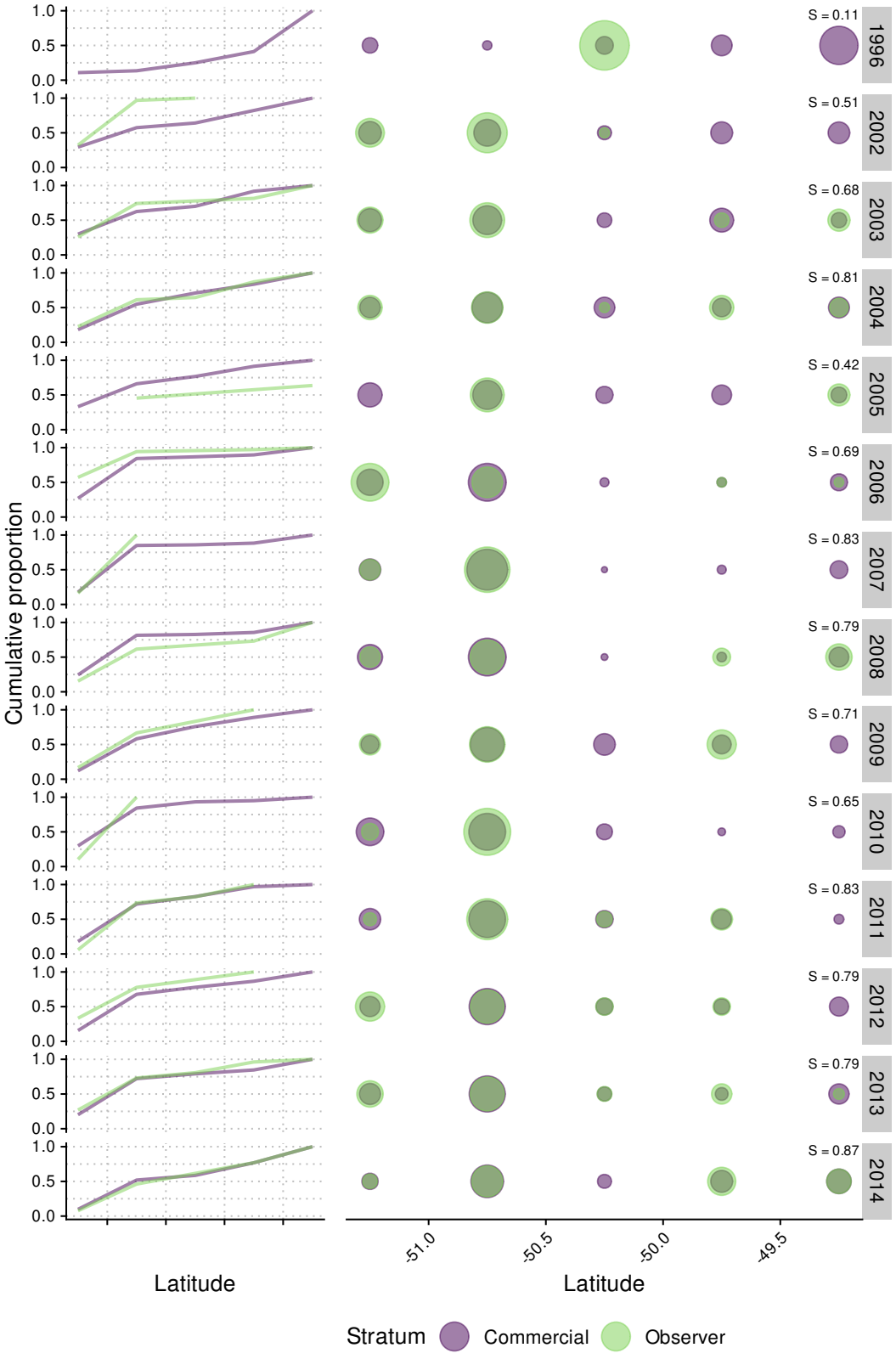


Figure 420: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in GSH 6, where the ghost shark - dark catch exceeded the 10kg threshold, in 1996 to 2014. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

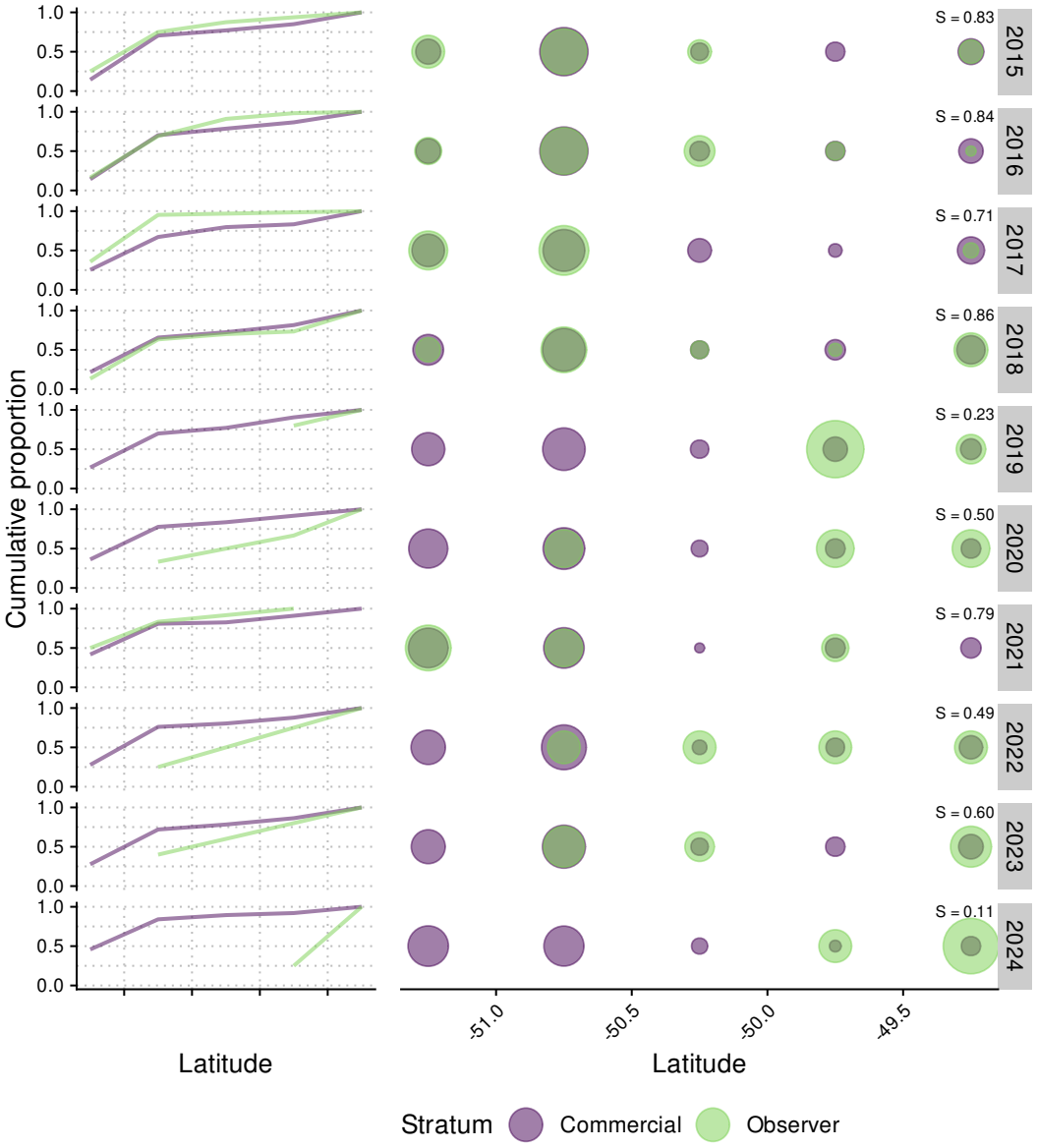


Figure 421: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in GSH 6, where the ghost shark - dark catch exceeded the 10kg threshold, in 2015 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

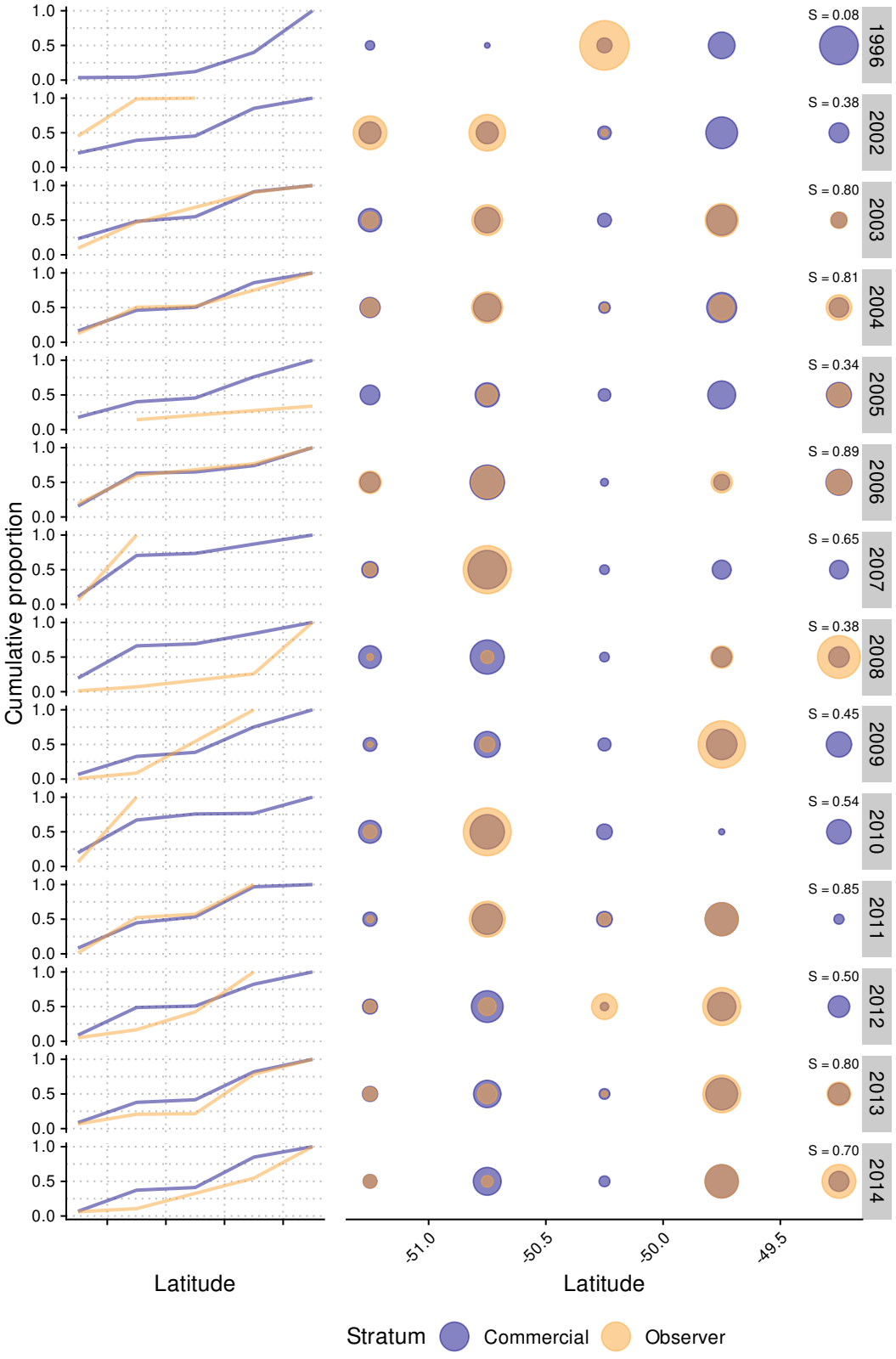


Figure 422: **Latitudinal representativeness of observer sampling coverage of Trawl catch in GSH 6, from events where the ghost shark - dark catch exceeded the 10kg threshold, in 1996 to 2014. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

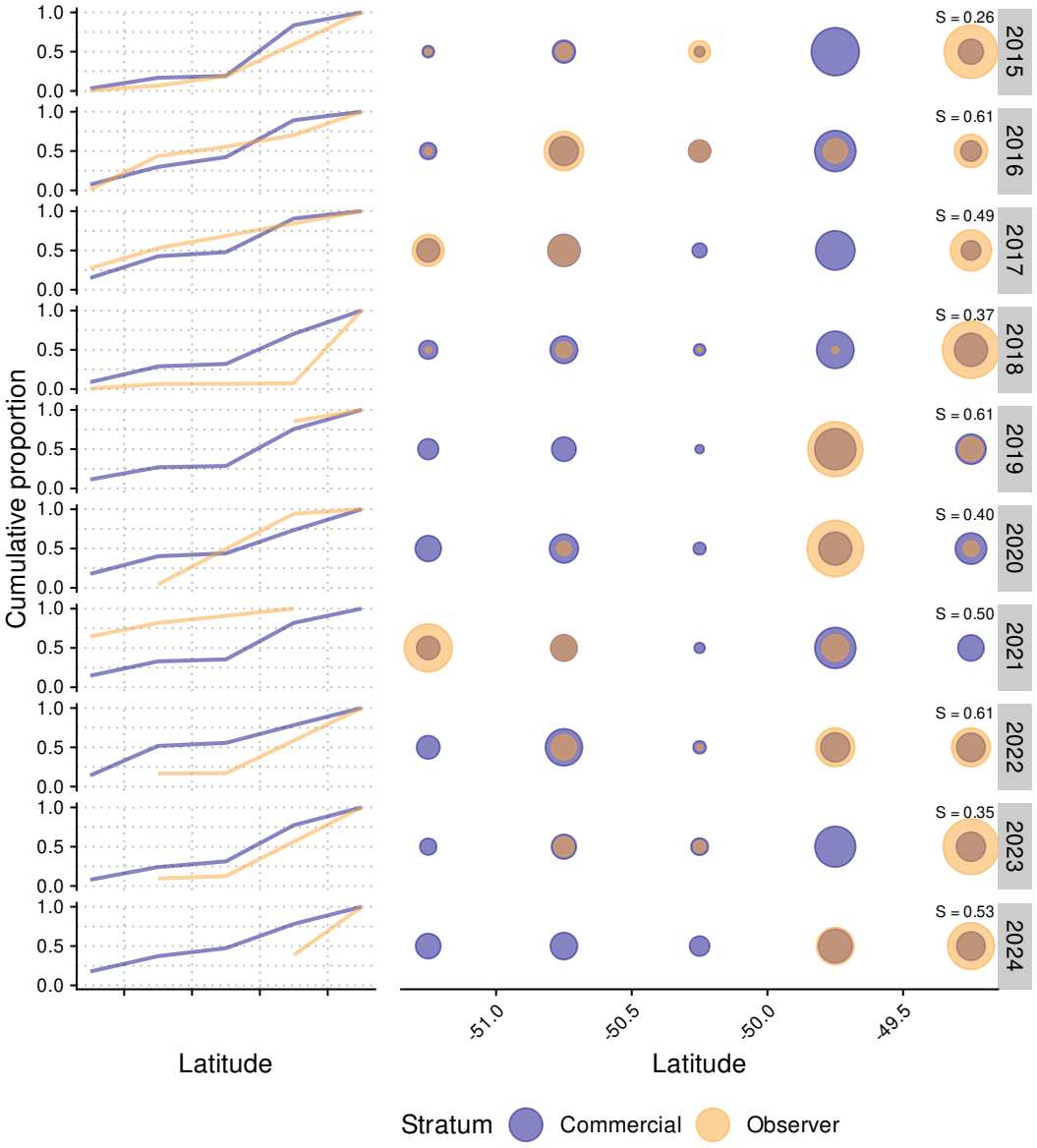


Figure 423: Latitudinal representativeness of observer sampling coverage of Trawl catch in GSH 6, from events where the ghost shark - dark catch exceeded the 10kg threshold, in 2015 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

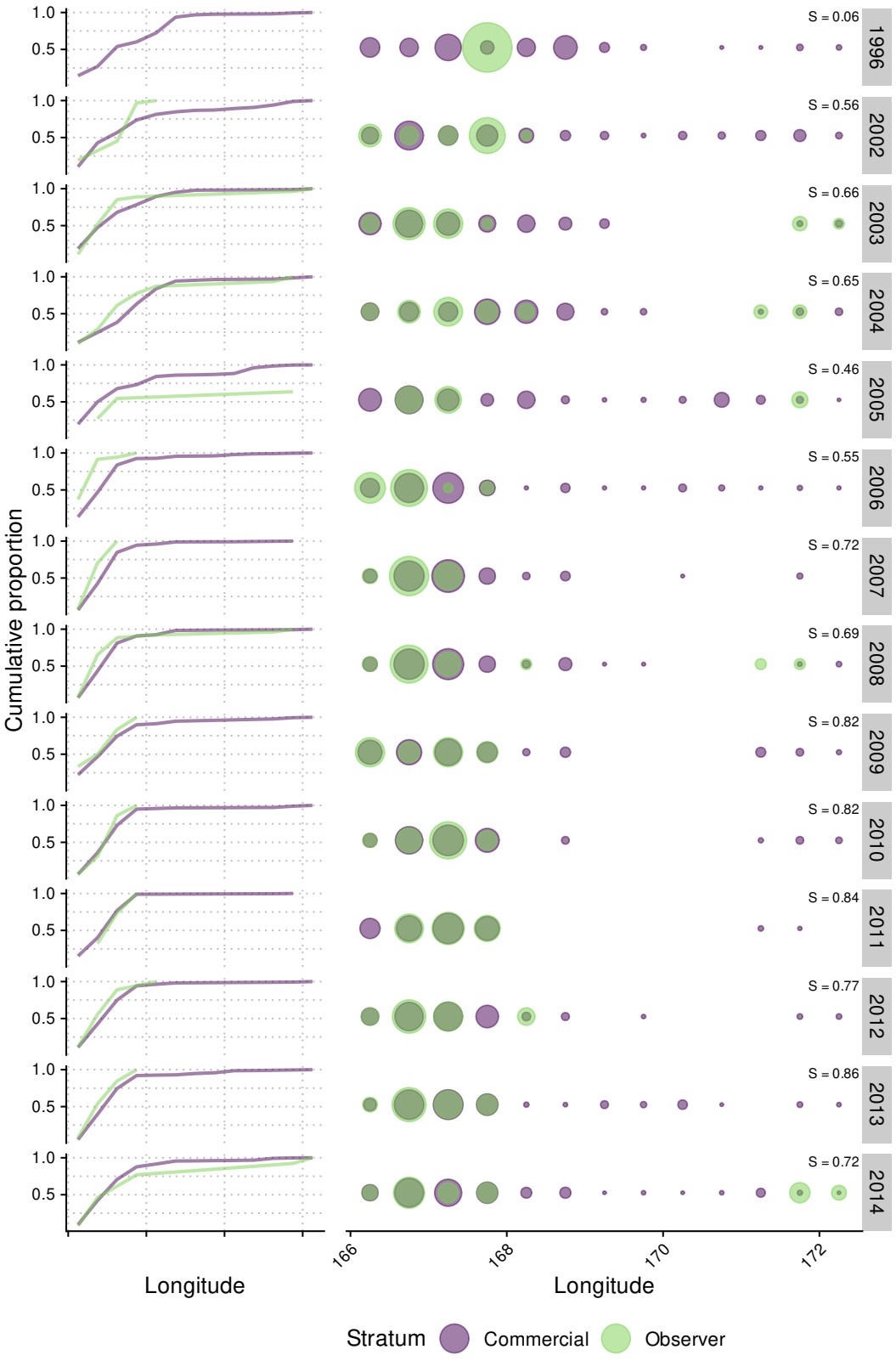


Figure 424: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in GSH 6, where the ghost shark - dark catch exceeded the 10kg threshold, in 1996 to 2014. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

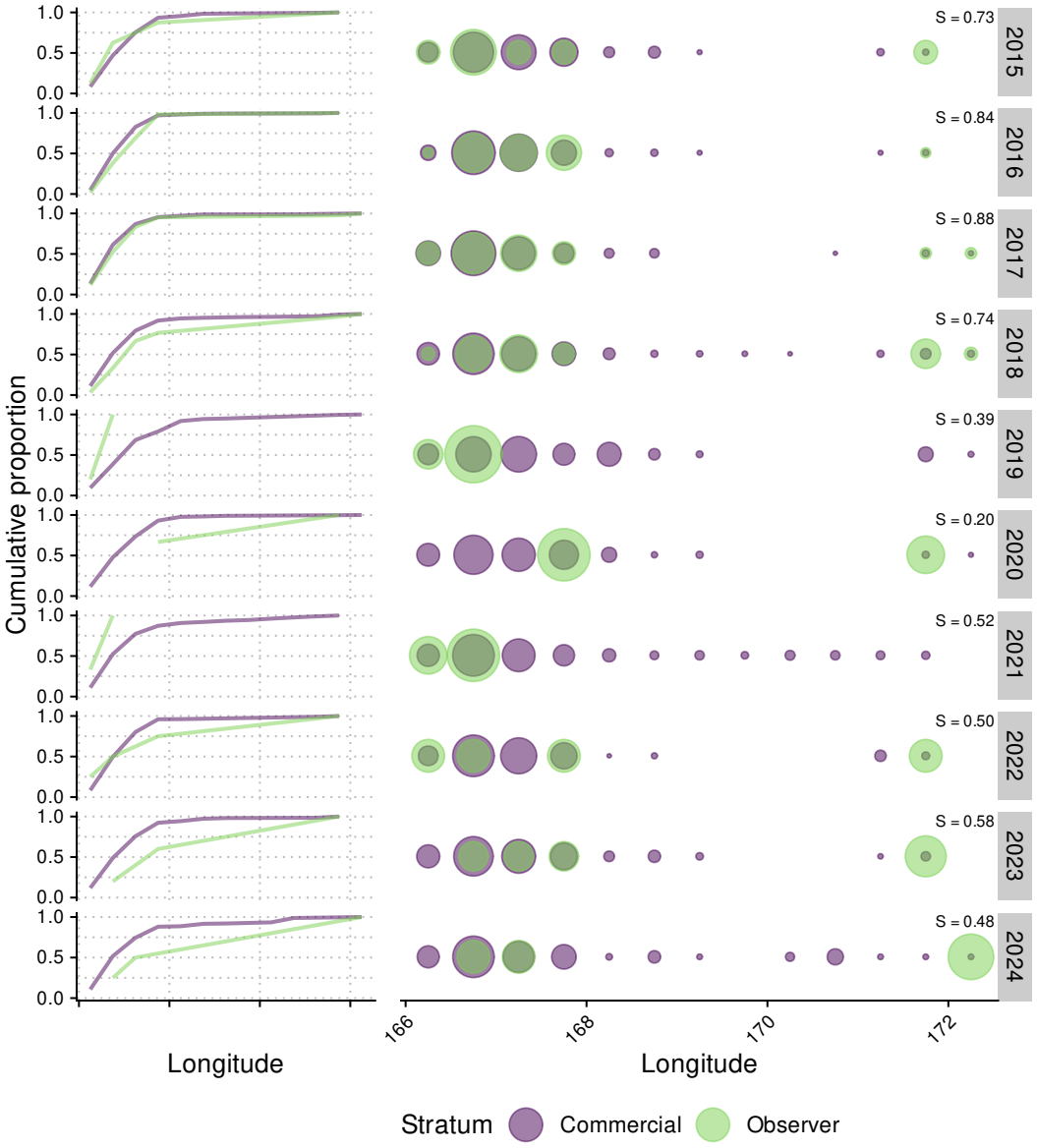


Figure 425: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in GSH 6, where the ghost shark - dark catch exceeded the 10kg threshold, in 2015 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

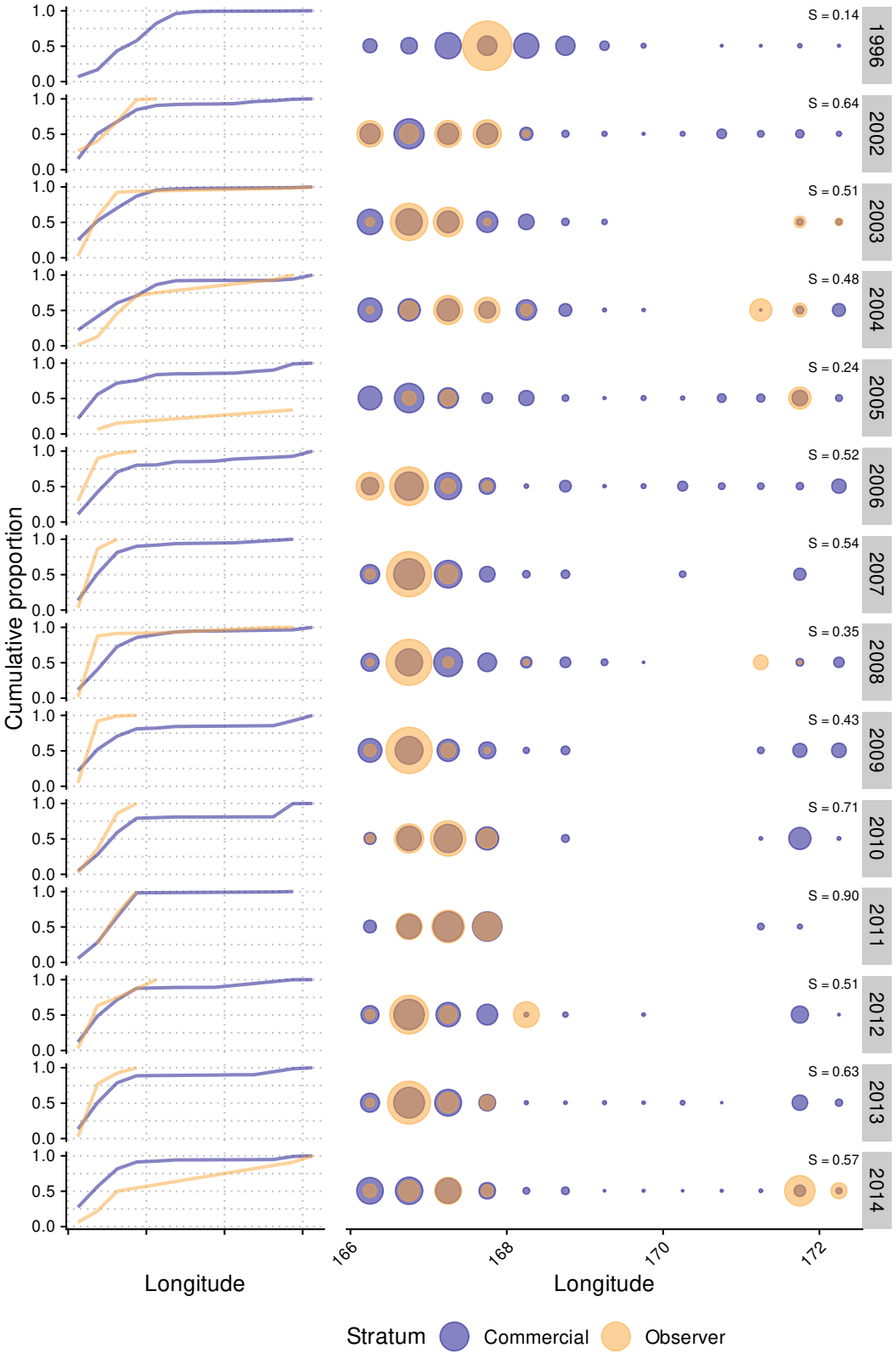


Figure 426: **Longitudinal representativeness of observer sampling coverage of Trawl catch in GSH 6, from events where the ghost shark - dark catch exceeded the 10kg threshold, in 1996 to 2014. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

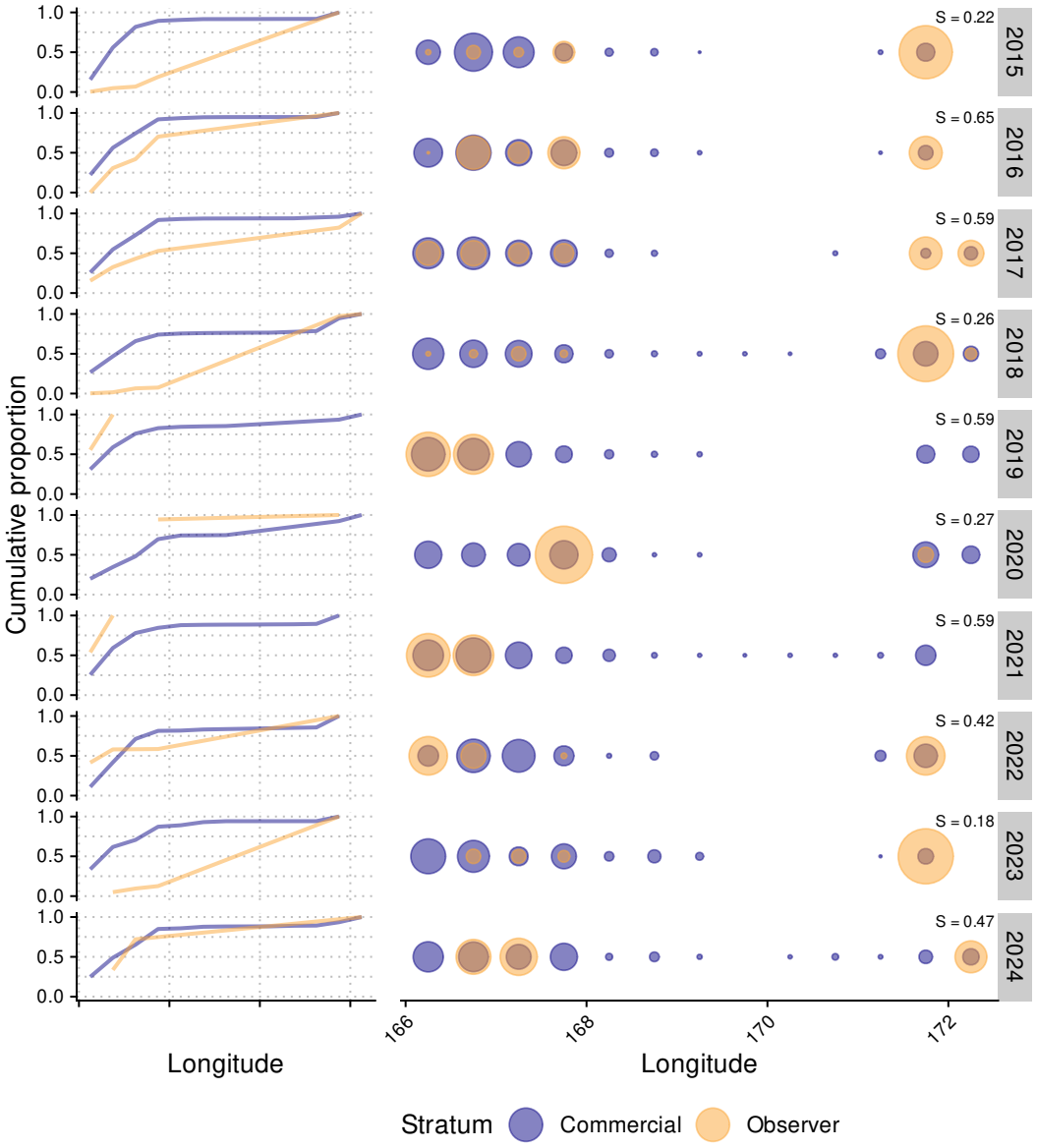


Figure 427: Longitudinal representativeness of observer sampling coverage of Trawl catch in GSH 6, from events where the ghost shark - dark catch exceeded the 10kg threshold, in 2015 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

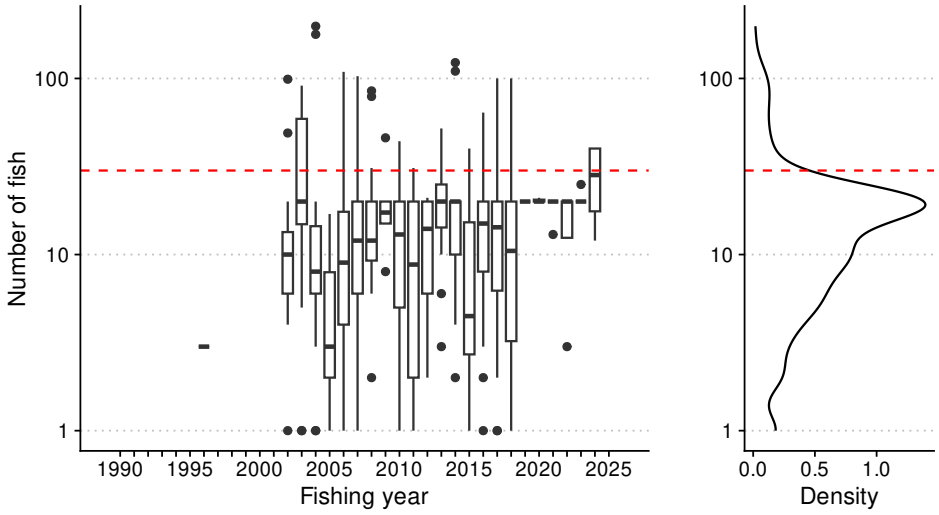


Figure 428: Length-frequency sample sizes for observed fishing events in GSH 6 where ghost shark - dark were sampled. The red dashed line indicates a sample size of 30 fish.

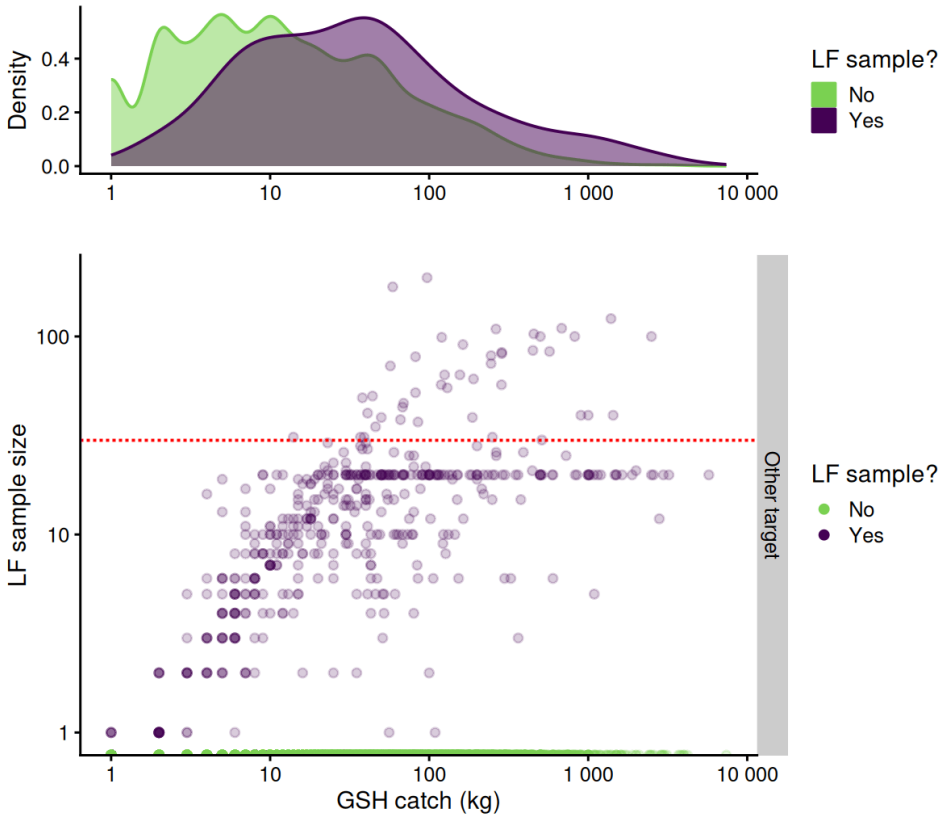


Figure 429: Length-frequency sample sizes (number of fish sampled) for observed fishing events in GSH 6 in relation to the total ghost shark - dark catch from an event, separately for ghost shark - dark target events and other target species. The red dashed line indicates a sample size of 30 fish.

2.7.3.2 Catch quantification

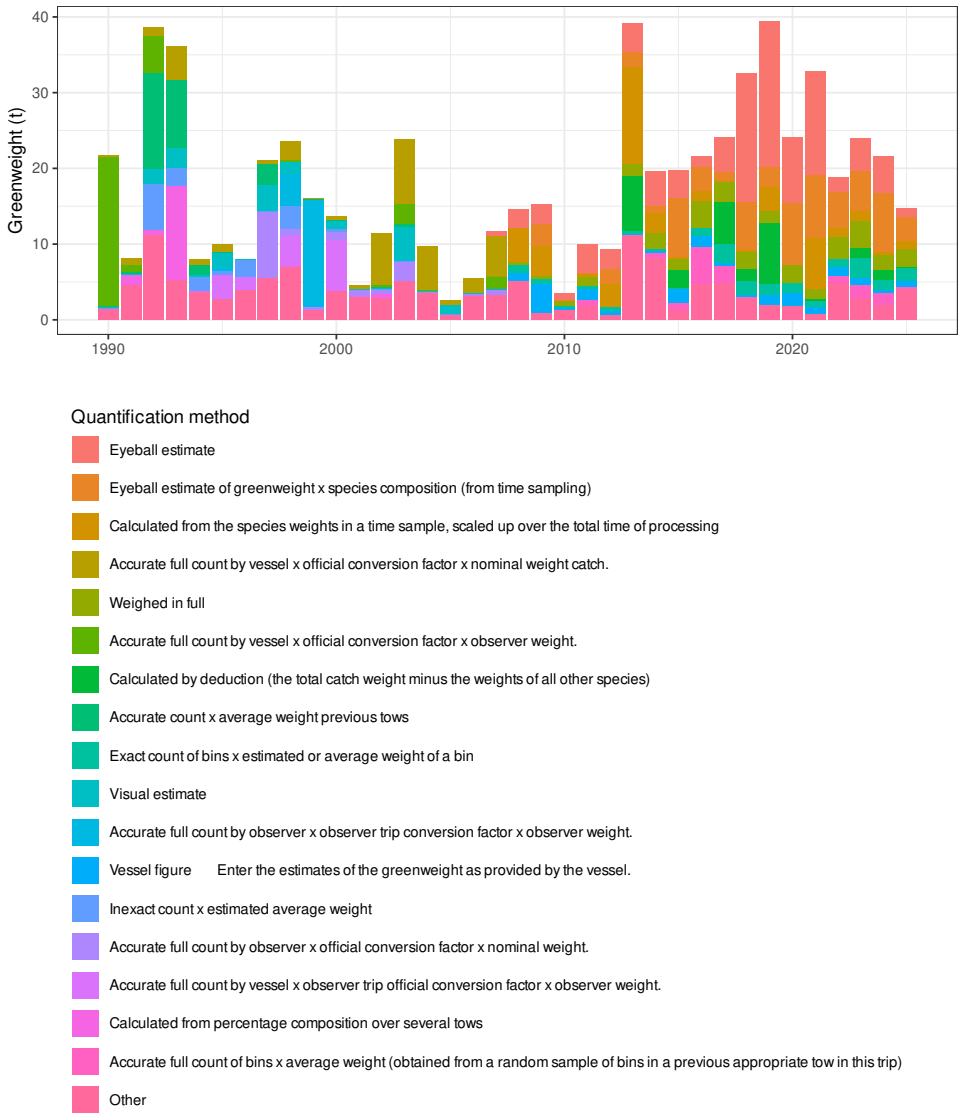


Figure 430: Methods used by observers to quantify the catch of ghost shark - dark in the GSH 6 Trawl fishery. The legend lists the methods used in descending order of total catch.

2.8 GSP stocks

Observer sampling of ghost shark - pale is considered with respect to the ghost shark - pale Quota Management Areas.

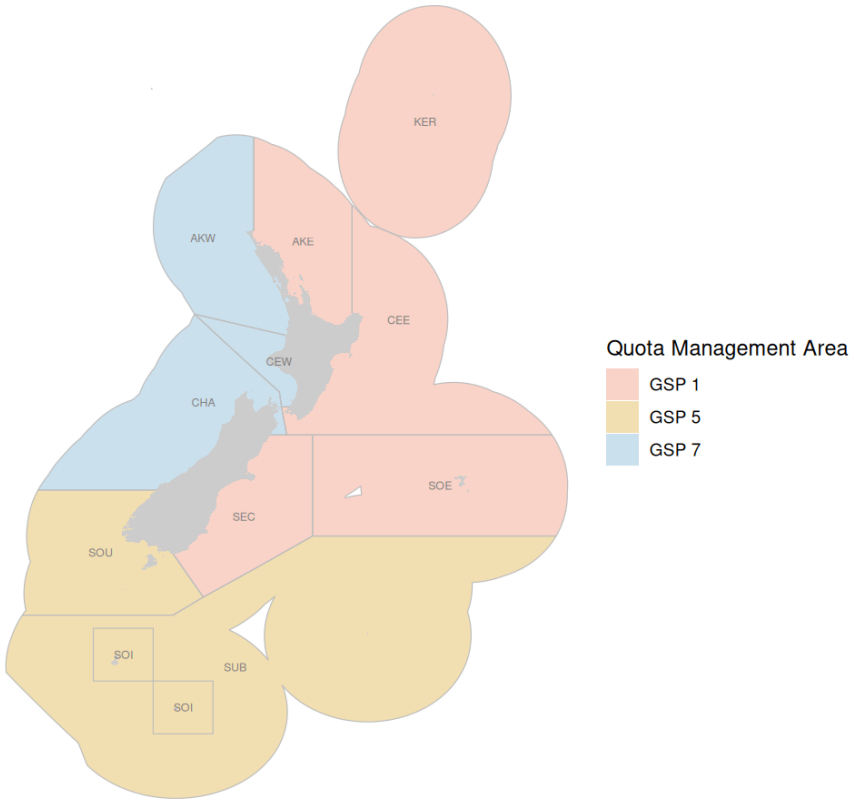


Figure 431: Observer Fisheries Management Areas (black borders, labels on plot) in relation to the Quota Management Area for ghost shark - pale (coloured areas, per legend).

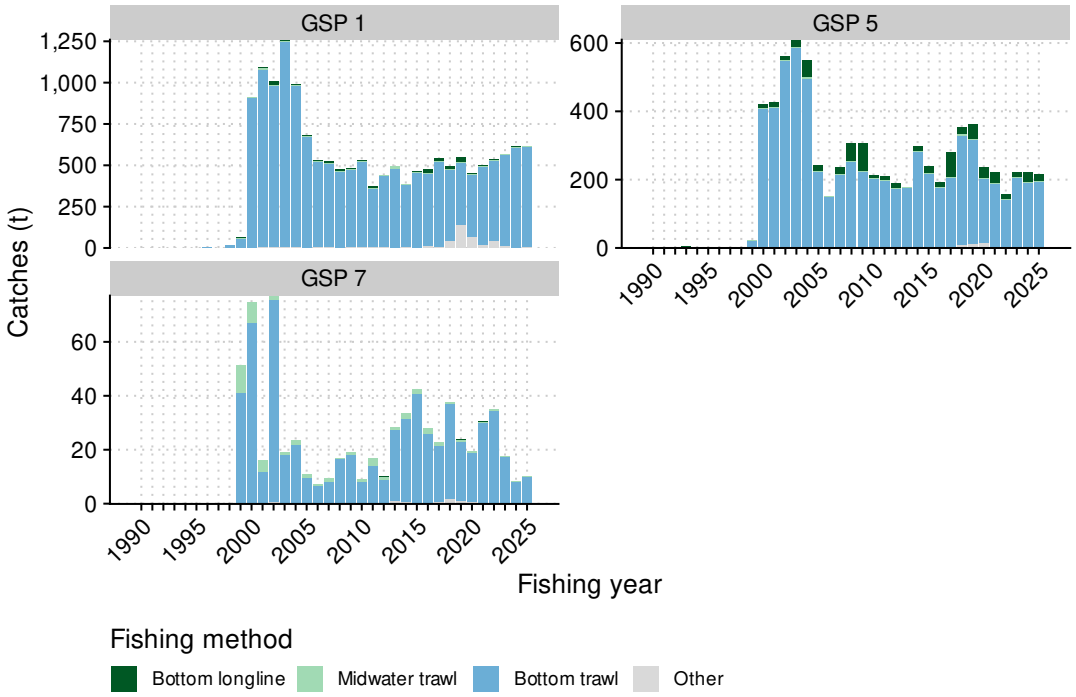


Figure 432: **Catches of ghost shark - pale by fishing method, for events within the ghost shark - pale Quota Management Areas. Methods grouped as Other include: BPT, CP, DL, DS, FP, HL, PL, POT, PRB, PRM, PS, PSH, SN, T, TL.**

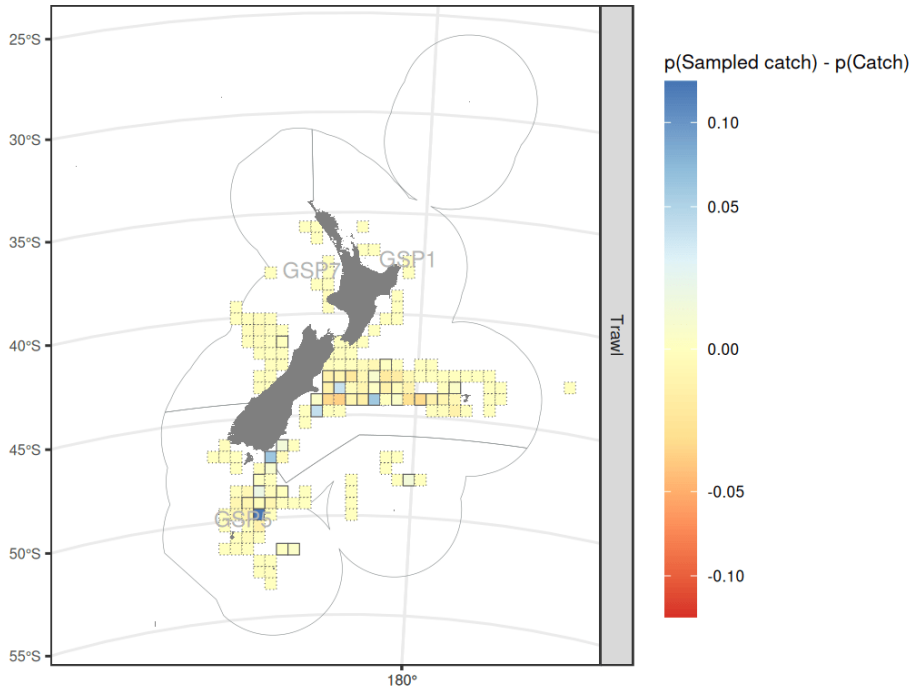


Figure 433: **Differences in the relative proportions of catch and sampled catch for ghost shark - pale during 2021–2025. Cells with a dotted border had no sampling.**

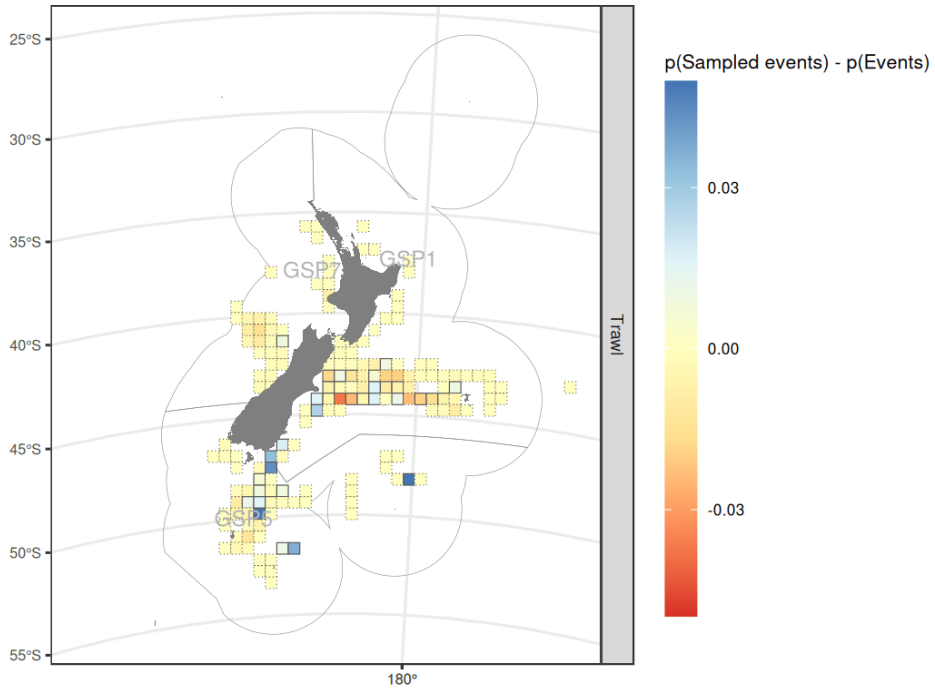


Figure 434: **Differences in the relative proportions of events meeting the sampling threshold and sampled events for ghost shark - pale during 2021–2025. Cells with a dotted border had no sampling.**

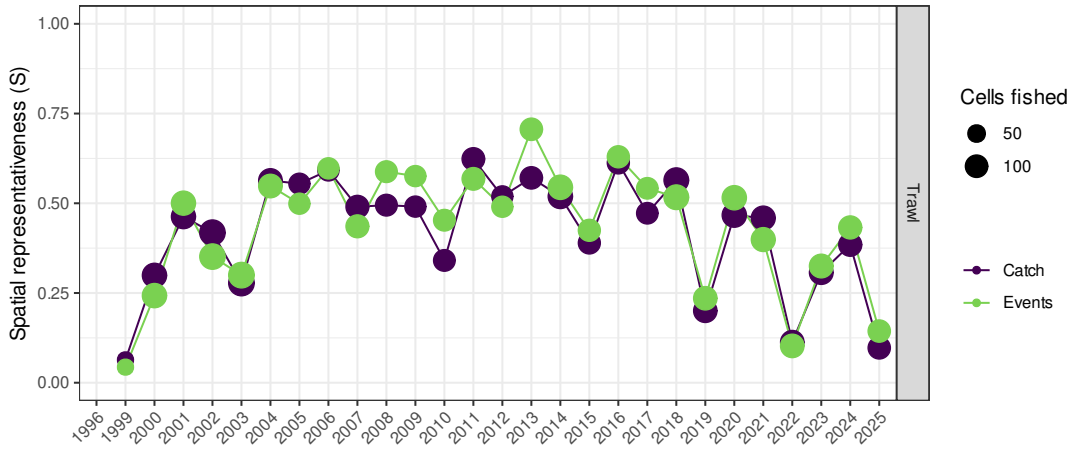


Figure 435: **Spatial representativeness of observer sampling of ghost shark - pale by fishing year. Representativeness is assessed using the Manhattan distance metric (*S*) applied to 64 km grid cells, for both the proportion of catch sampled and the proportion of positive events sampled.**

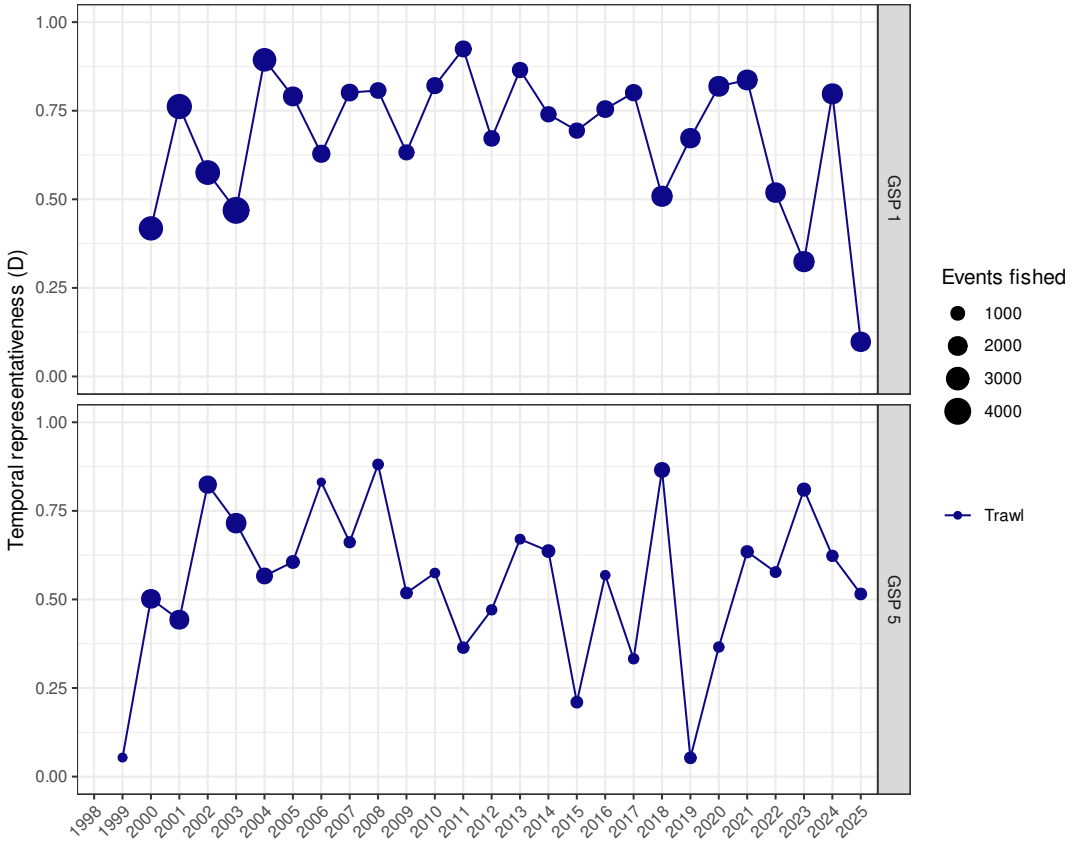


Figure 436: Temporal representativeness of observer sanpling of ghost shark - pale by fishing year and area. Temporal representativeness is assessed using the KS statistic (*D*) applied to the start date-times of all fishing events and all sampled fishing events, weighted by catch weight.

2.8.1 GSP 1: Trawl fishery

2.8.1.1 Length-frequency samples

Table 39: Length-frequency samples of ghost shark - pale from the GSP 1 Trawl fishery sampled by the Observer Programme in fishing years 1996 to 2025. Positive fishing events are those where the catch of ghost shark - pale exceeded a potential sampling threshold of 20 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1996	1	0	0	0.00
1999	44	0	0	0.00
2000	1 661	33	291	1.99
2001	2 406	40	1 321	1.66
2002	2 086	65	595	3.12
2003	3 118	46	306	1.48
2004	2 374	57	665	2.40
2005	1 455	70	700	4.81
2006	1 178	89	1 101	7.56
2007	1 085	77	830	7.10
2008	983	72	1 108	7.32
2009	777	46	547	5.92
2010	1 363	36	474	2.64
2011	861	227	6 512	26.36
2012	926	139	4 381	15.01
2013	1 006	74	1 566	7.36
2014	806	47	1 026	5.83
2015	659	34	639	5.16
2016	943	108	1 966	11.45
2017	941	67	1 154	7.12
2018	2 003	28	433	1.40
2019	2 018	16	311	0.79
2020	1 922	51	977	2.65
2021	2 169	21	359	0.97
2022	2 186	4	71	0.18
2023	2 288	9	159	0.39
2024	2 296	24	375	1.05
2025	2 088	3	65	0.14

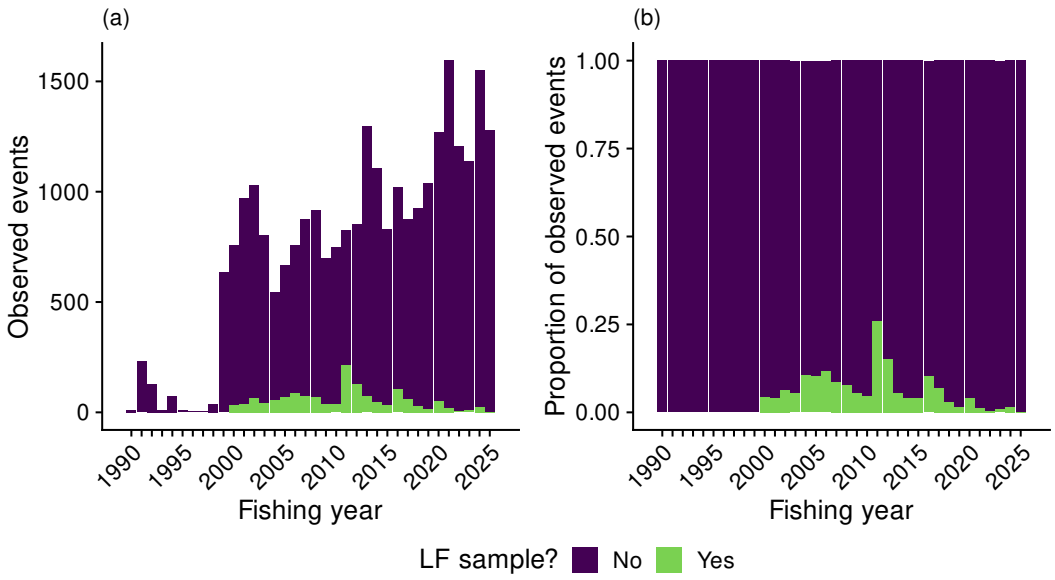


Figure 437: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in GSP 1 where the ghost shark - pale catch exceeded the 20 kg threshold, with and without length-frequency sampling.**

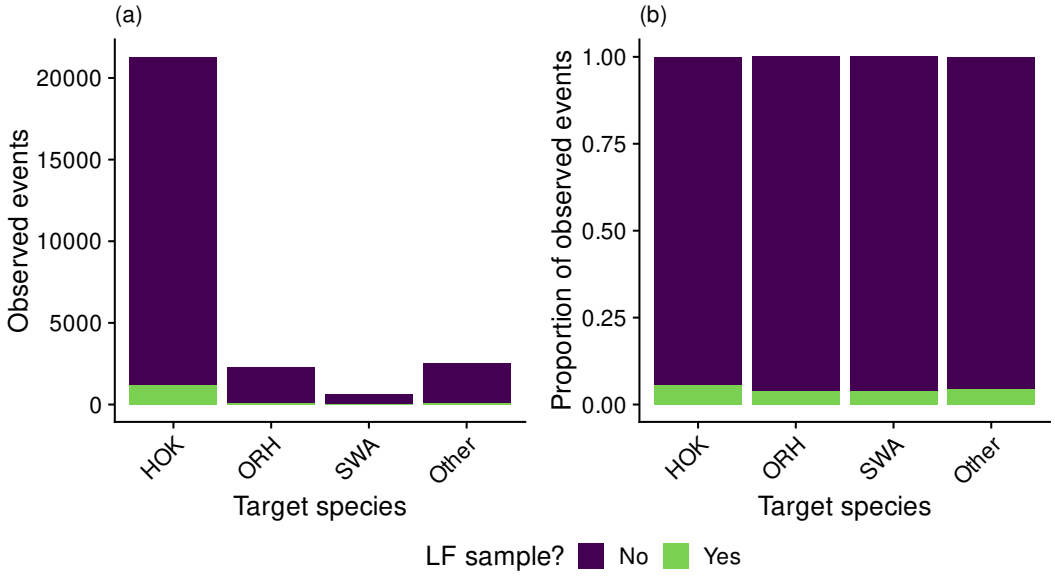


Figure 438: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in GSP 1 where the ghost shark - pale catch exceeded the 20 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

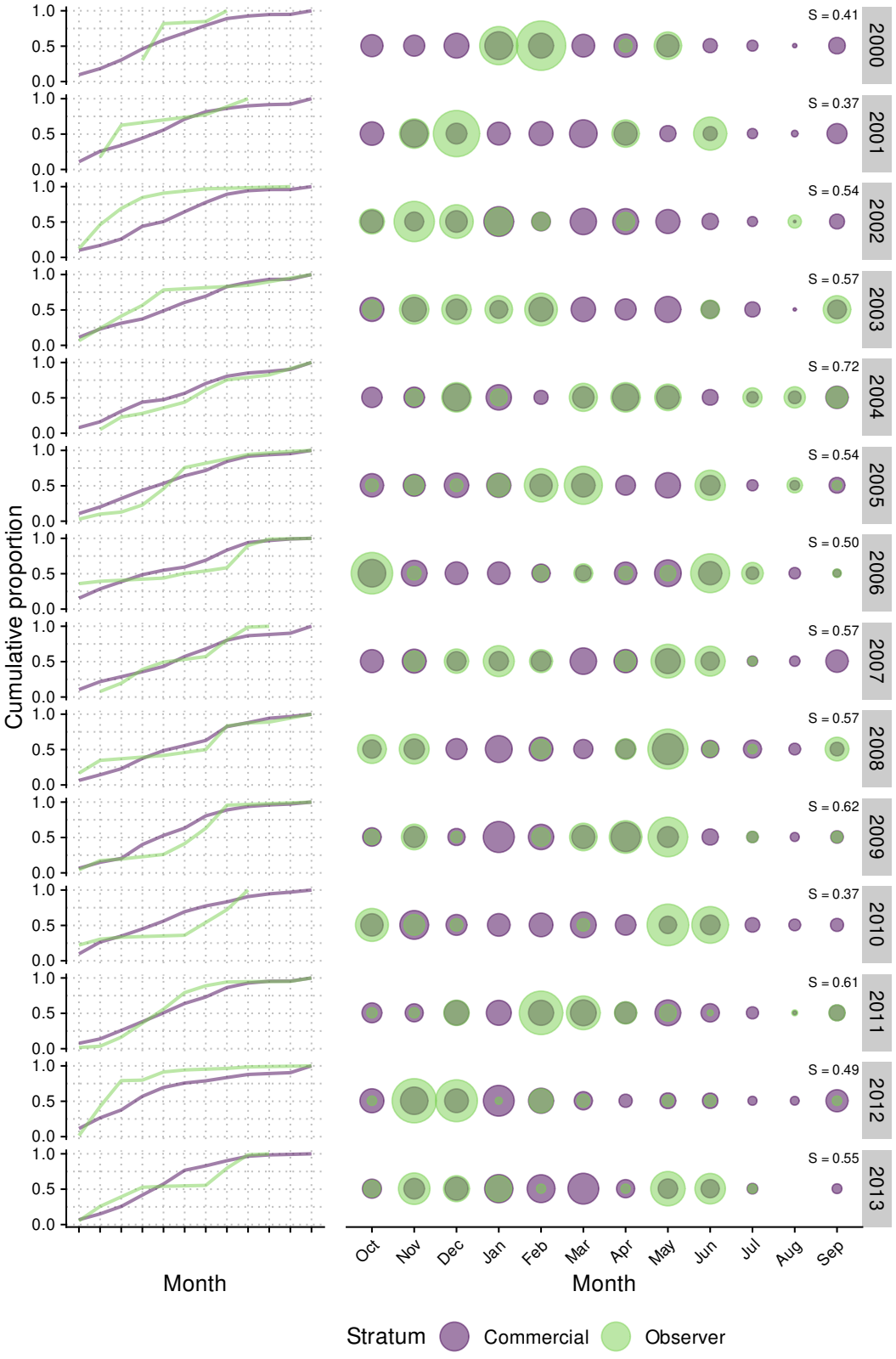


Figure 439: Monthly representativeness of observer sampling coverage of Trawl fishing events in GSP 1, where the ghost shark - pale catch exceeded the 20kg threshold, in 2000 to 2013. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

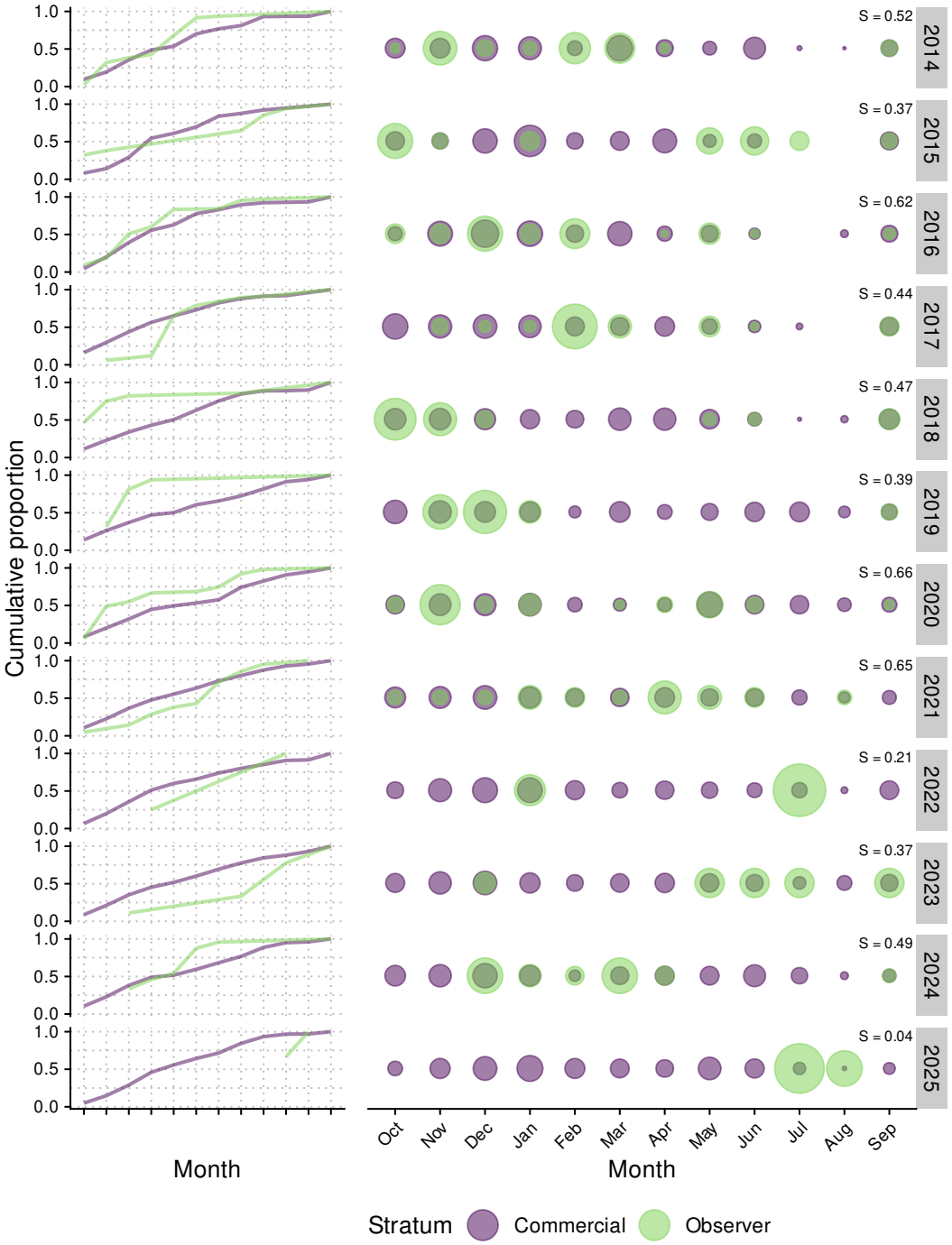


Figure 440: Monthly representativeness of observer sampling coverage of Trawl fishing events in GSP 1, where the ghost shark - pale catch exceeded the 20kg threshold, in 2014 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

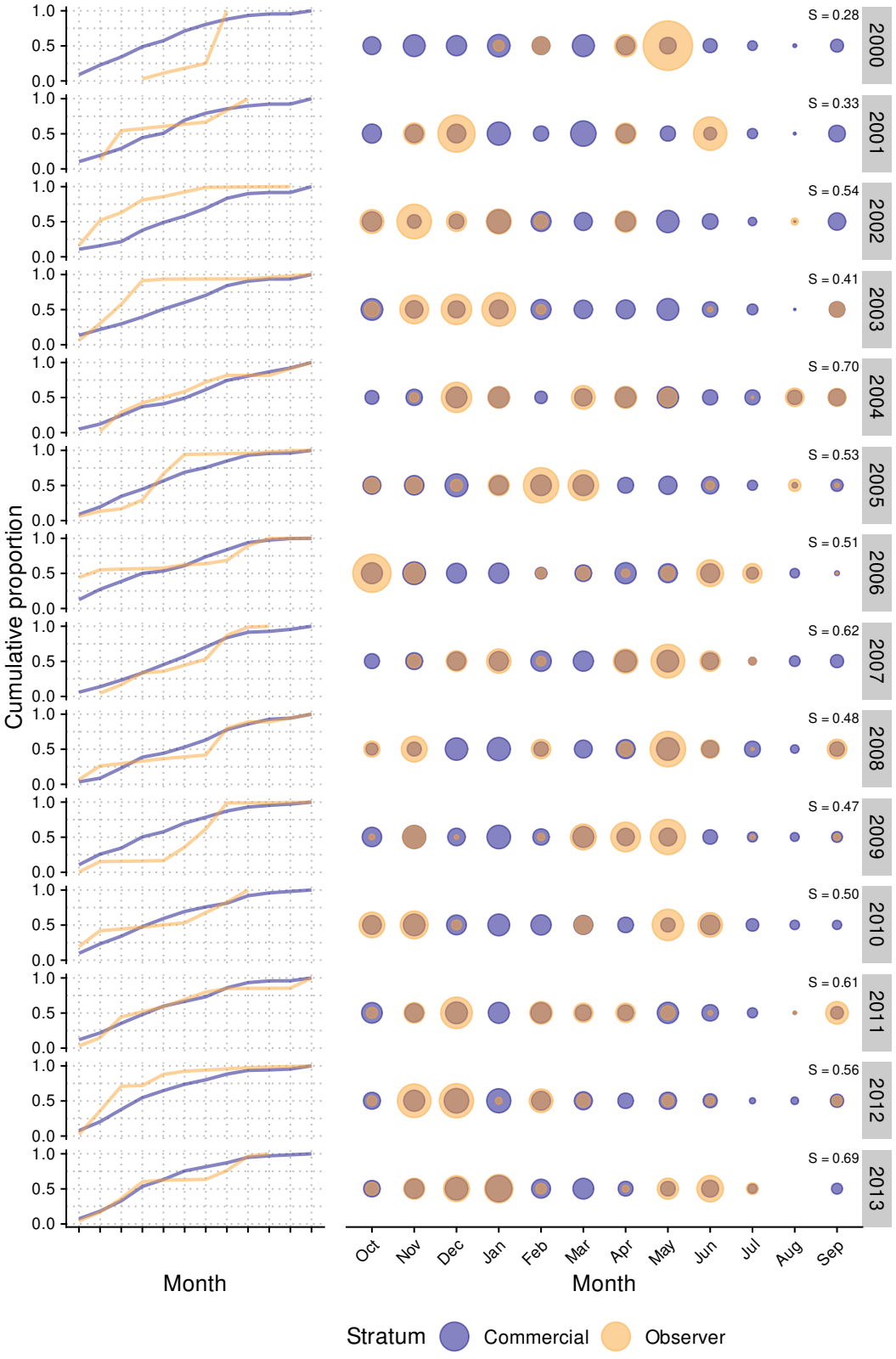


Figure 441: Monthly representativeness of observer sampling coverage of Trawl catch in GSP 1, from events where the ghost shark - pale catch exceeded the 20kg threshold, in 2000 to 2013. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

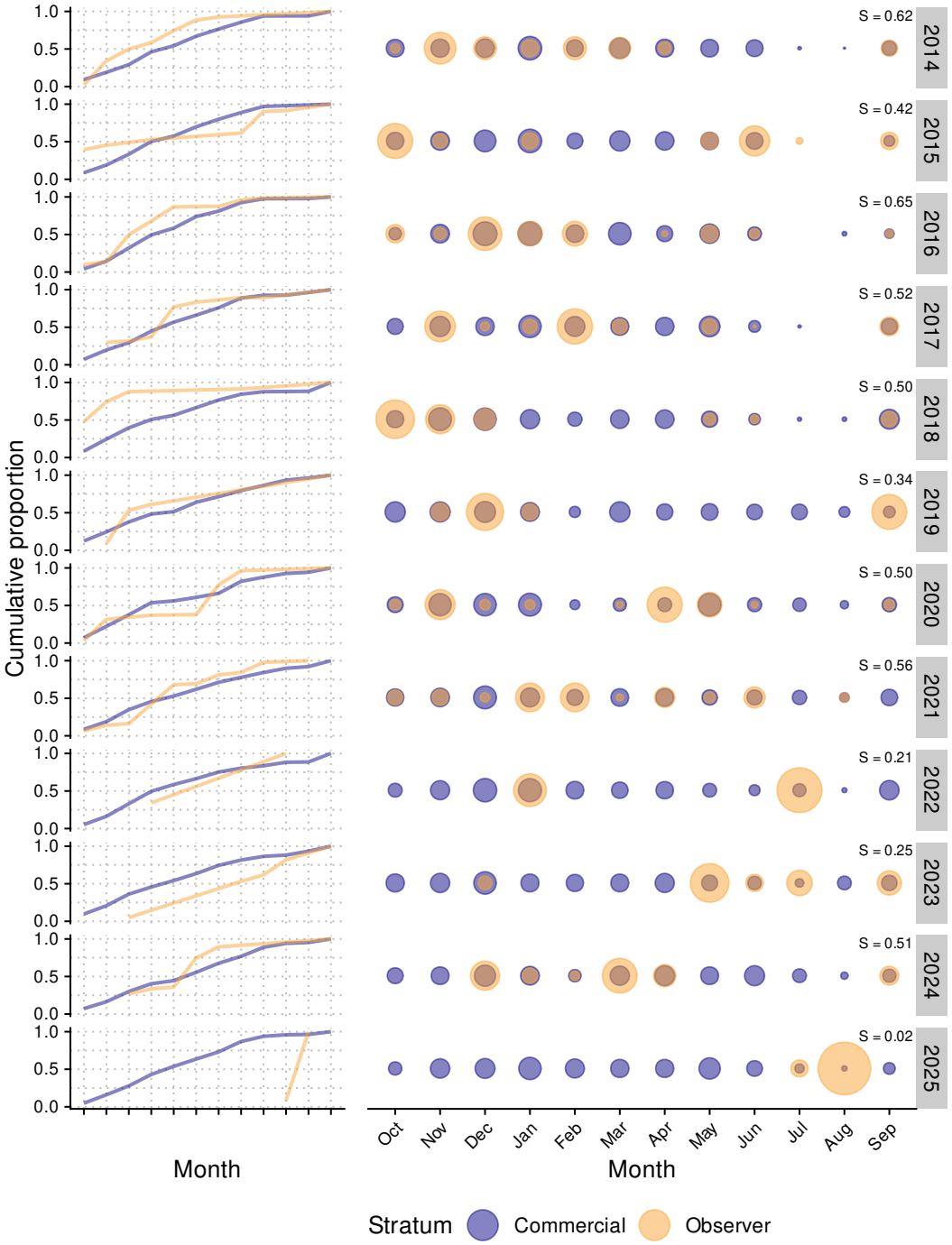


Figure 442: Monthly representativeness of observer sampling coverage of Trawl catch in GSP 1, from events where the ghost shark - pale catch exceeded the 20kg threshold, in 2014 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

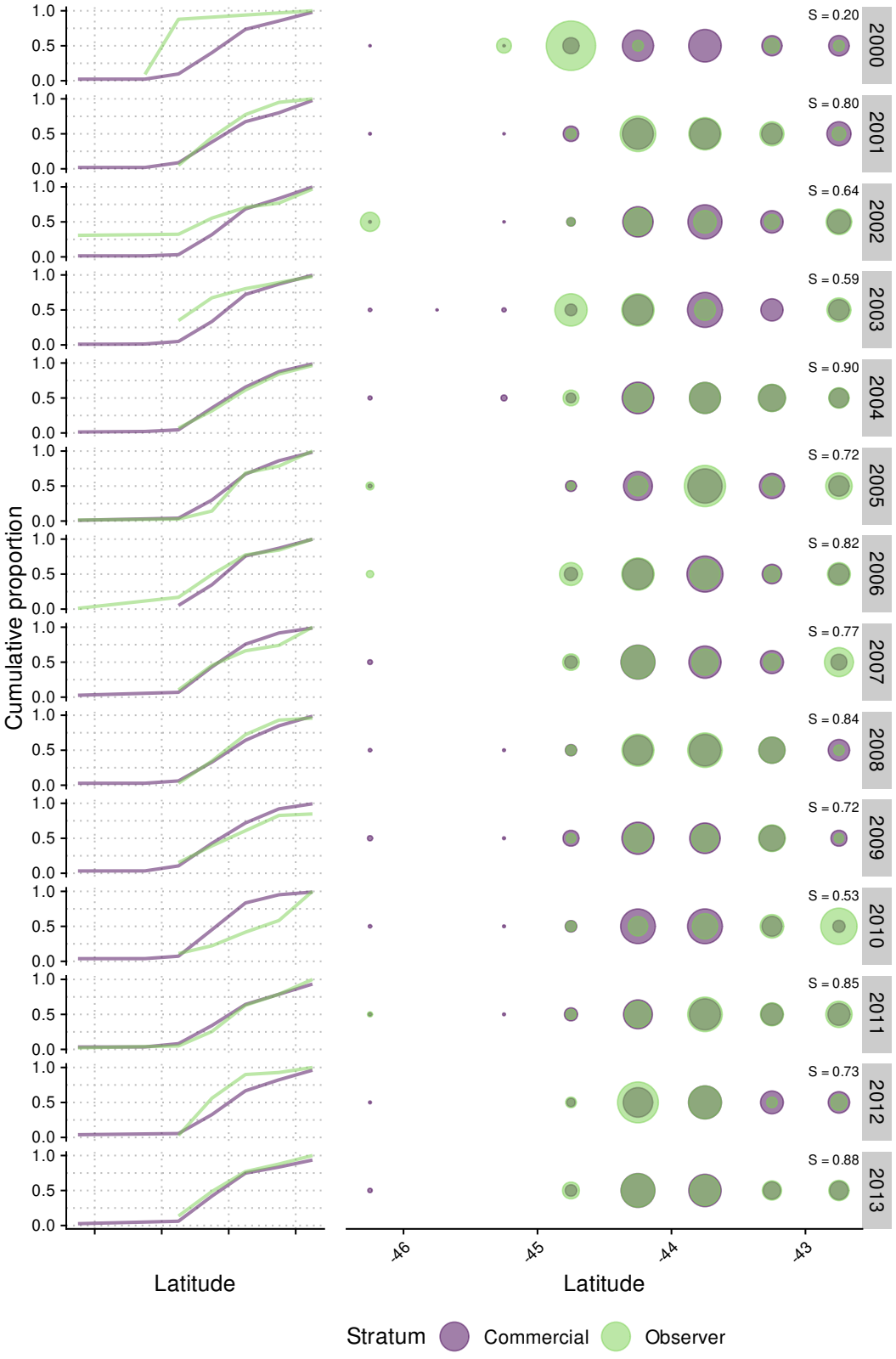


Figure 443: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in GSP 1, where the ghost shark - pale catch exceeded the 20kg threshold, in 2000 to 2013. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

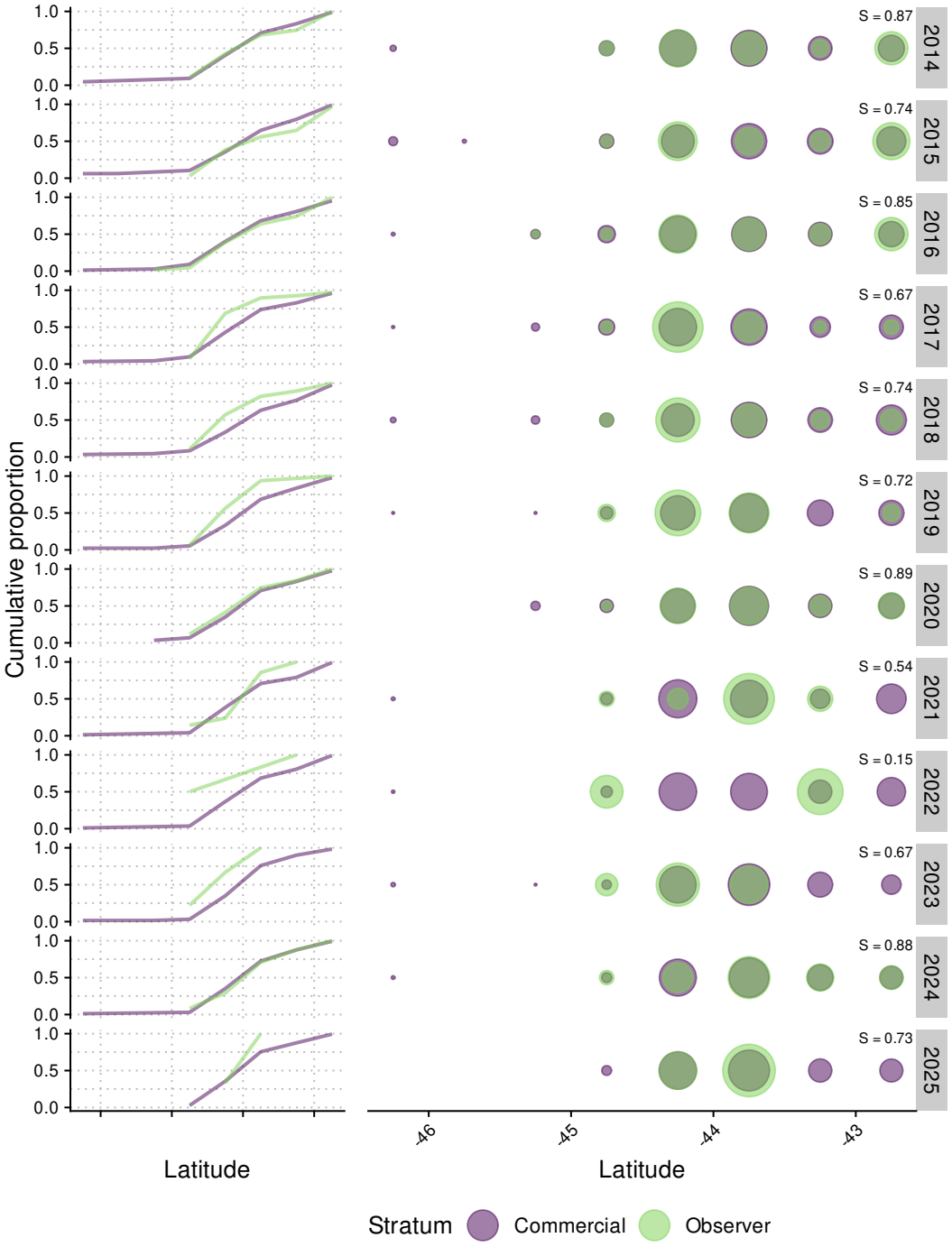


Figure 444: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in GSP 1, where the ghost shark - pale catch exceeded the 20kg threshold, in 2014 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

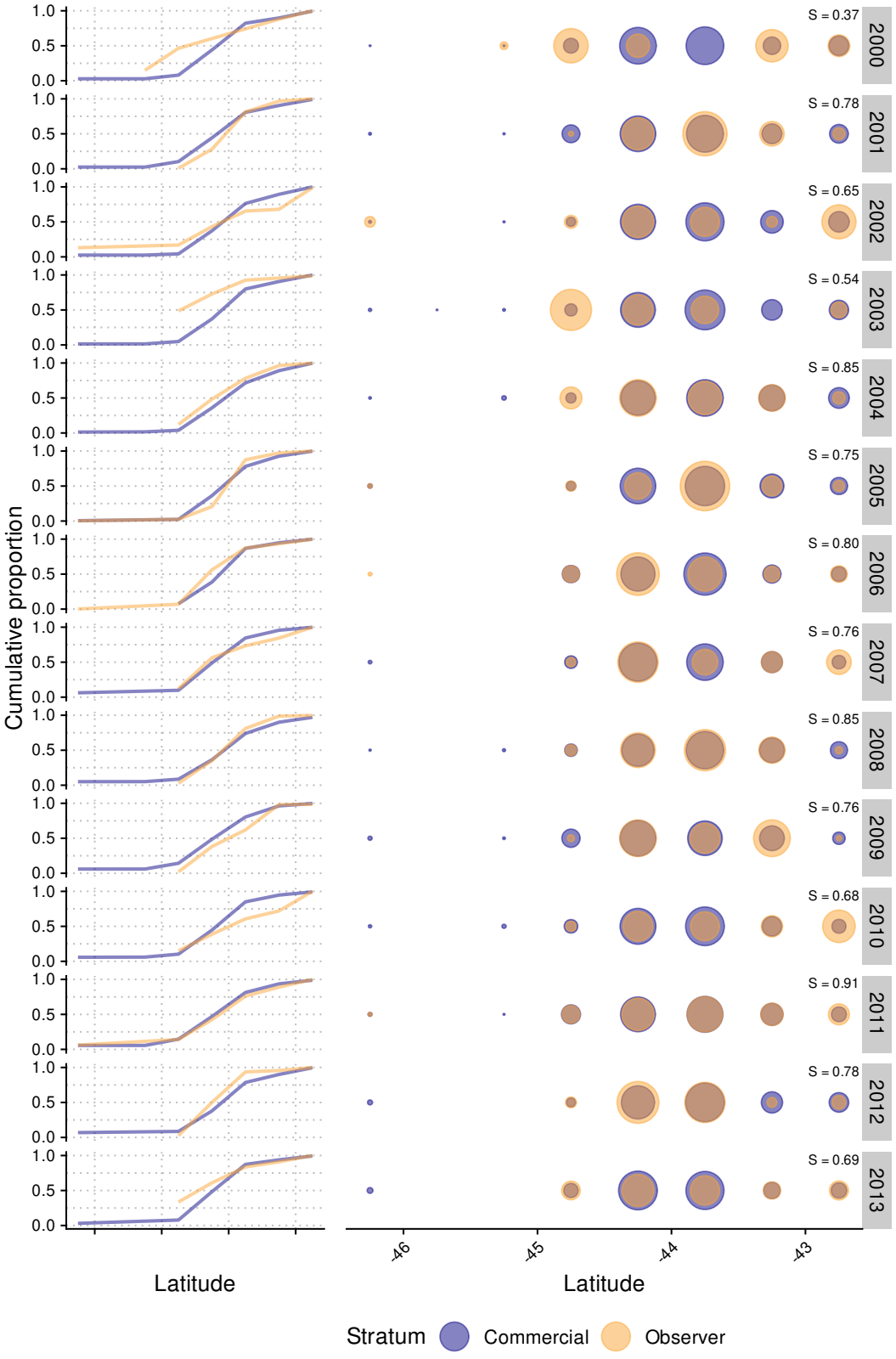


Figure 445: **Latitudinal representativeness of observer sampling coverage of Trawl catch in GSP 1, from events where the ghost shark - pale catch exceeded the 20kg threshold, in 2000 to 2013. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

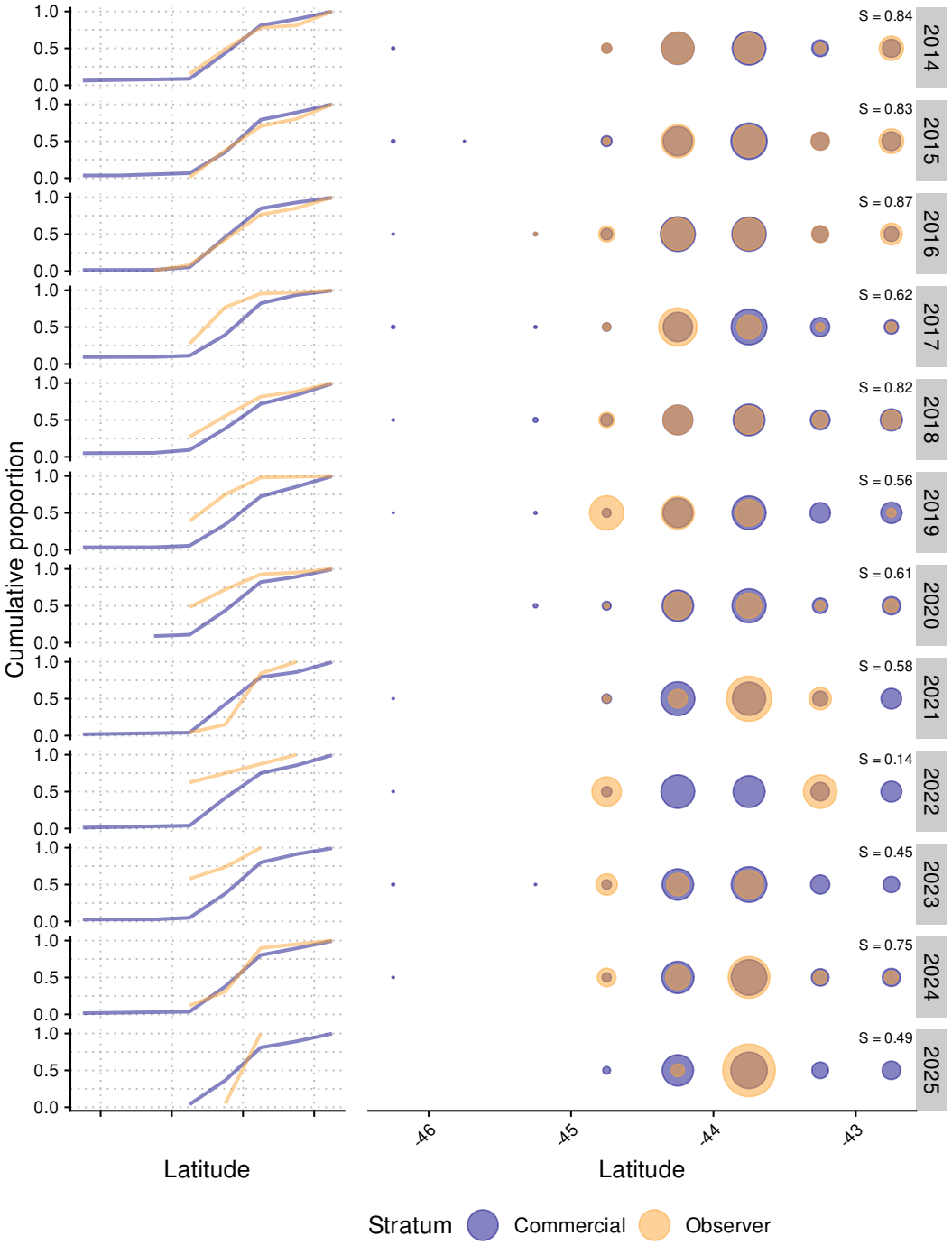


Figure 446: Latitudinal representativeness of observer sampling coverage of Trawl catch in GSP 1, from events where the ghost shark - pale catch exceeded the 20kg threshold, in 2014 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

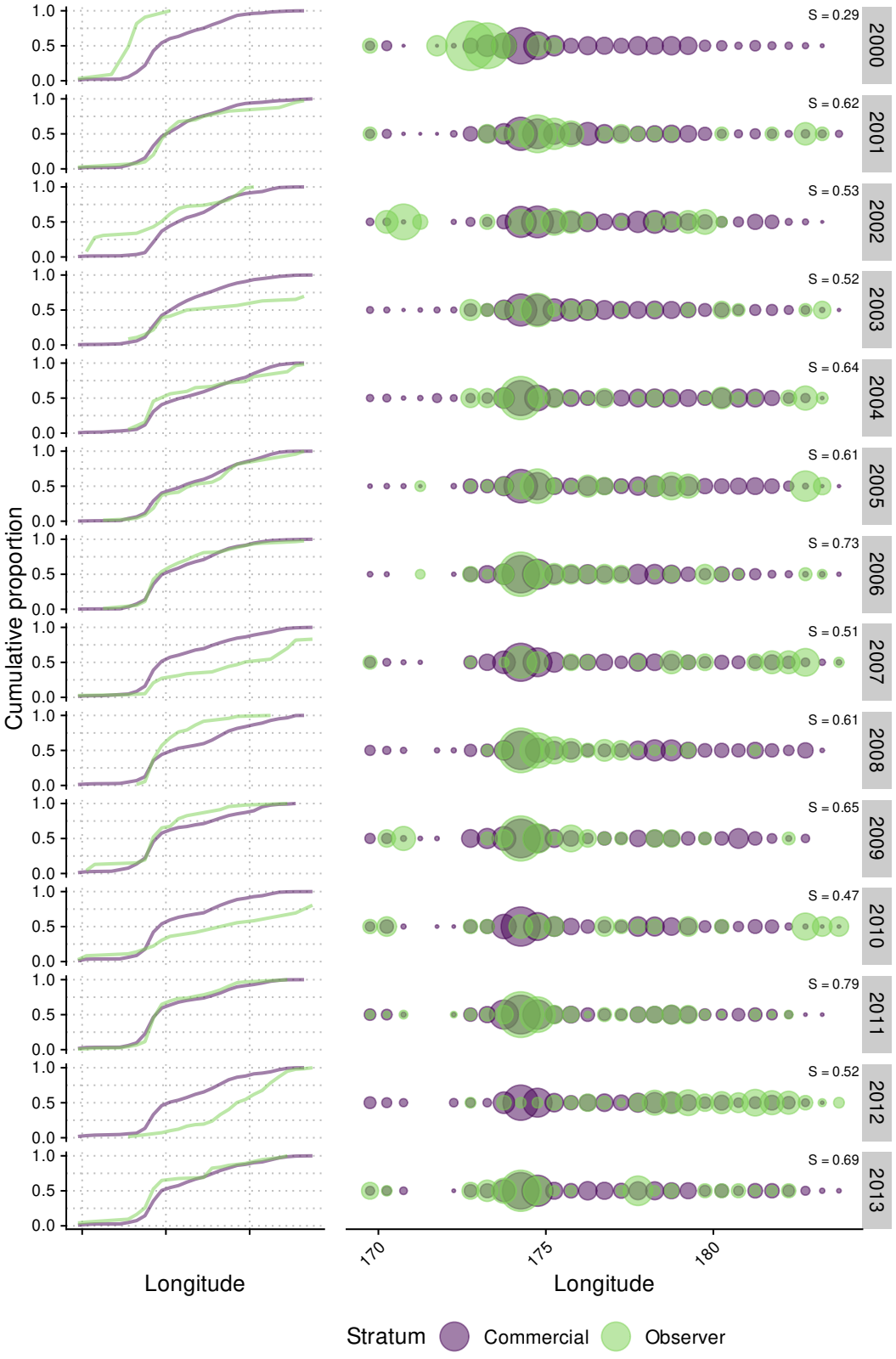


Figure 447: **Longitudinal representativeness of observer sampling coverage of Trawl fishing events in GSP 1, where the ghost shark - pale catch exceeded the 20kg threshold, in 2000 to 2013. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

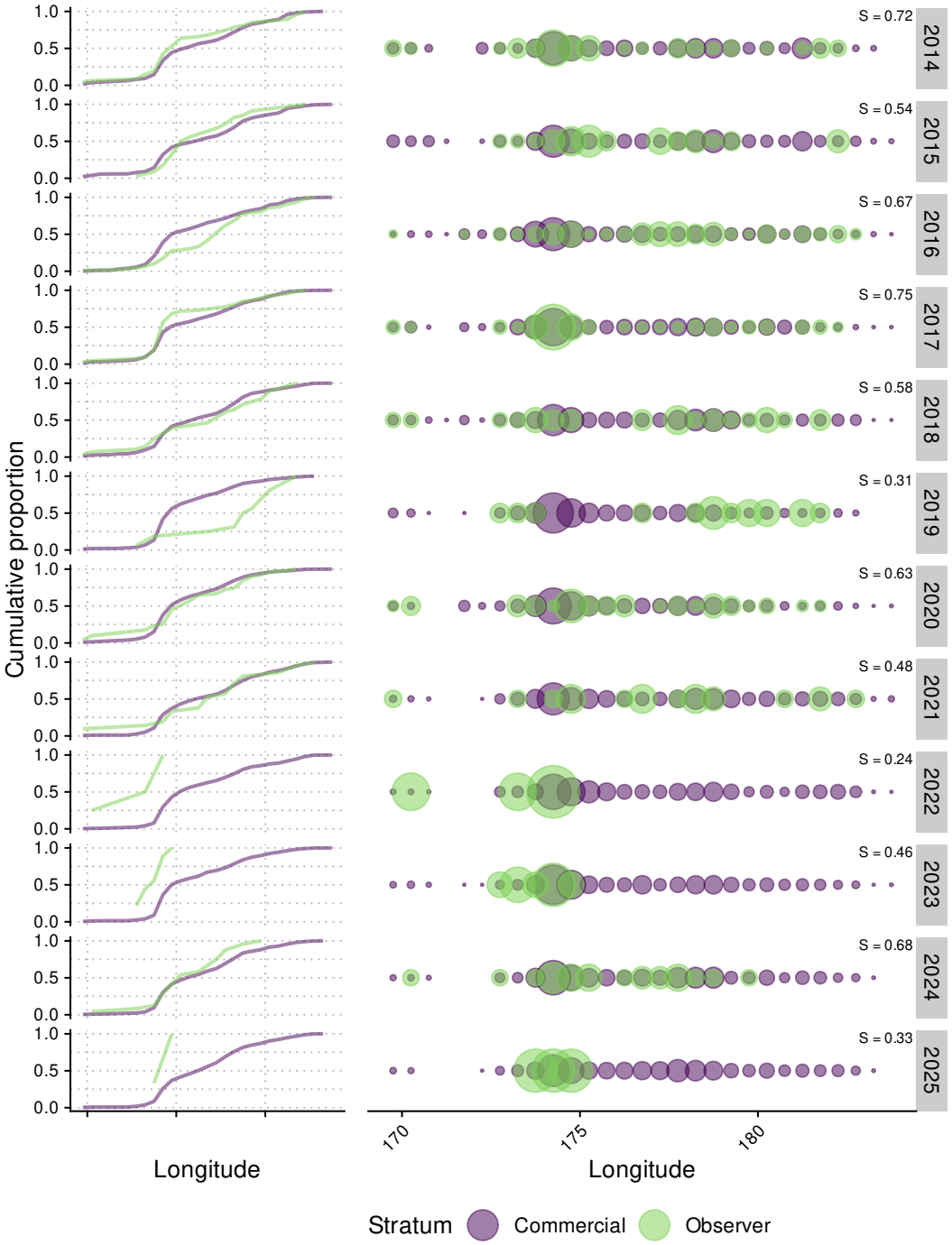


Figure 448: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in GSP 1, where the ghost shark - pale catch exceeded the 20kg threshold, in 2014 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

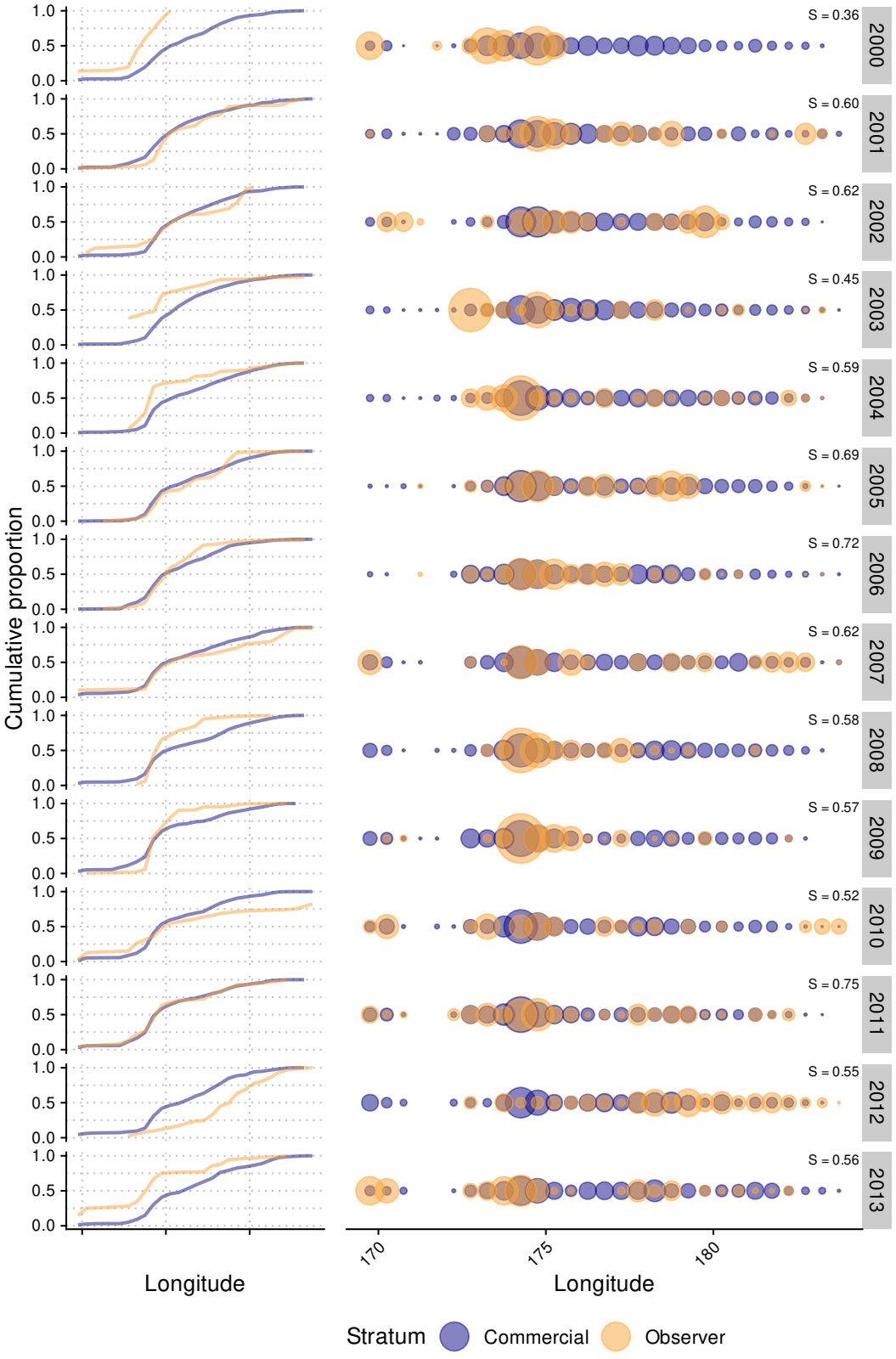


Figure 449: **Longitudinal representativeness of observer sampling coverage of Trawl catch in GSP 1, from events where the ghost shark - pale catch exceeded the 20kg threshold, in 2000 to 2013. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

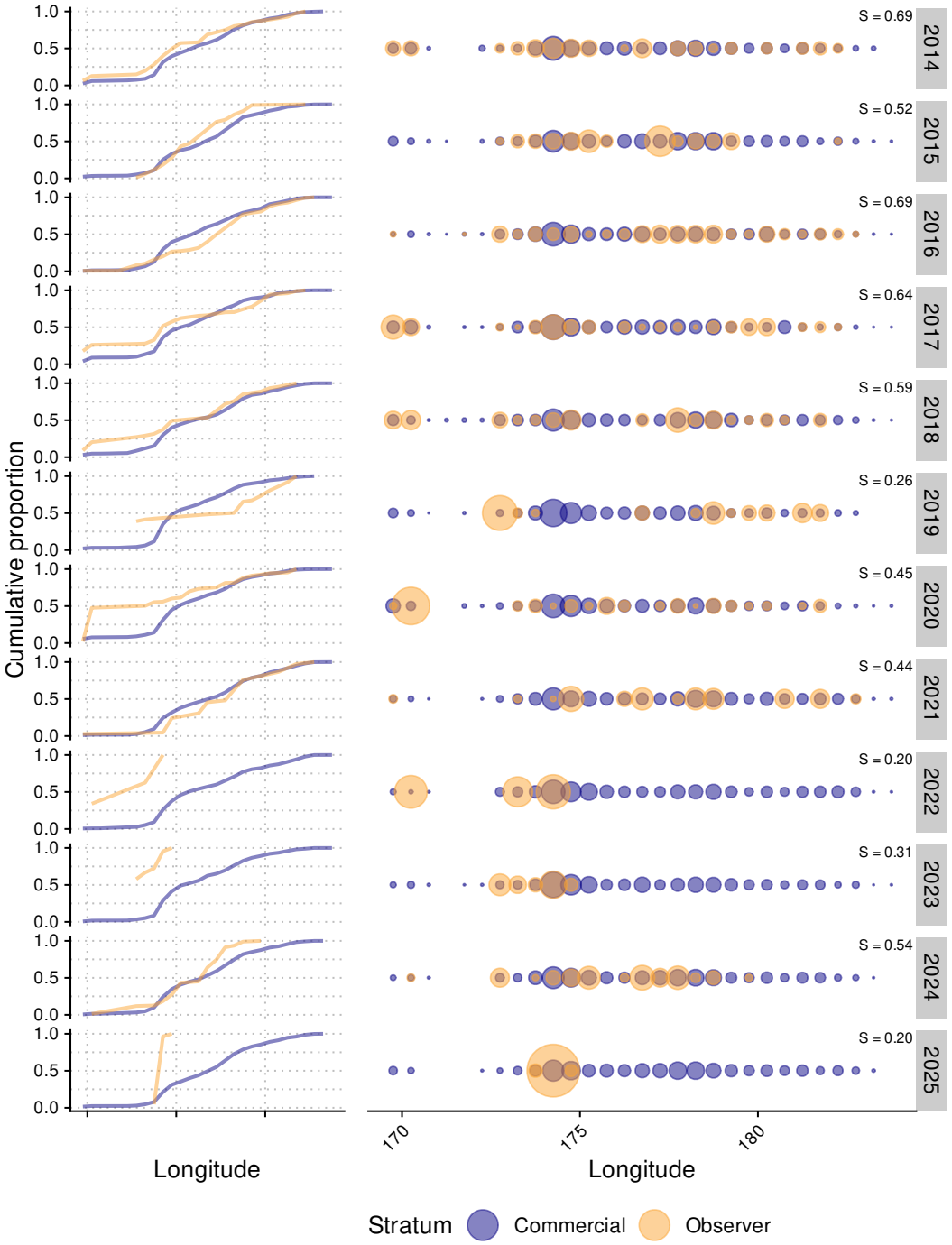


Figure 450: Longitudinal representativeness of observer sampling coverage of Trawl catch in GSP 1, from events where the ghost shark - pale catch exceeded the 20kg threshold, in 2014 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

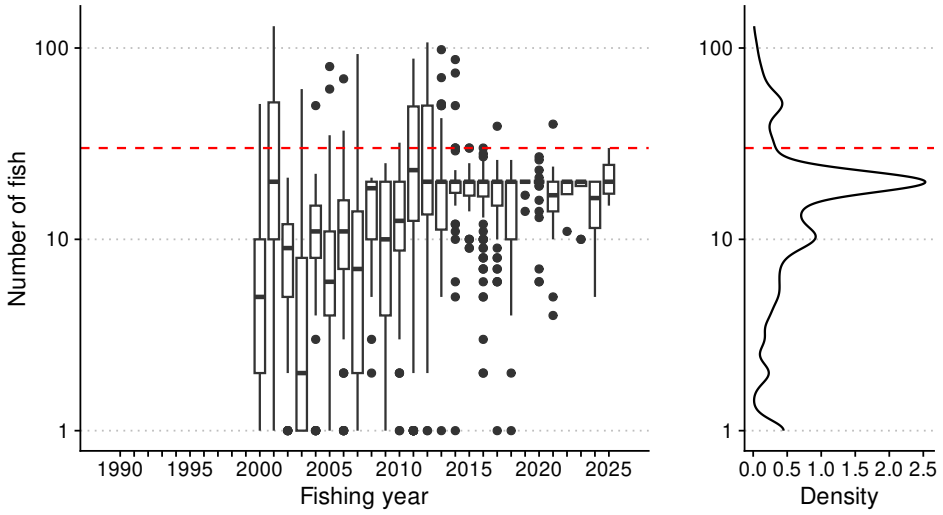


Figure 451: **Length-frequency sample sizes for observed fishing events in GSP 1 where ghost shark - pale were sampled. The red dashed line indicates a sample size of 30 fish.**

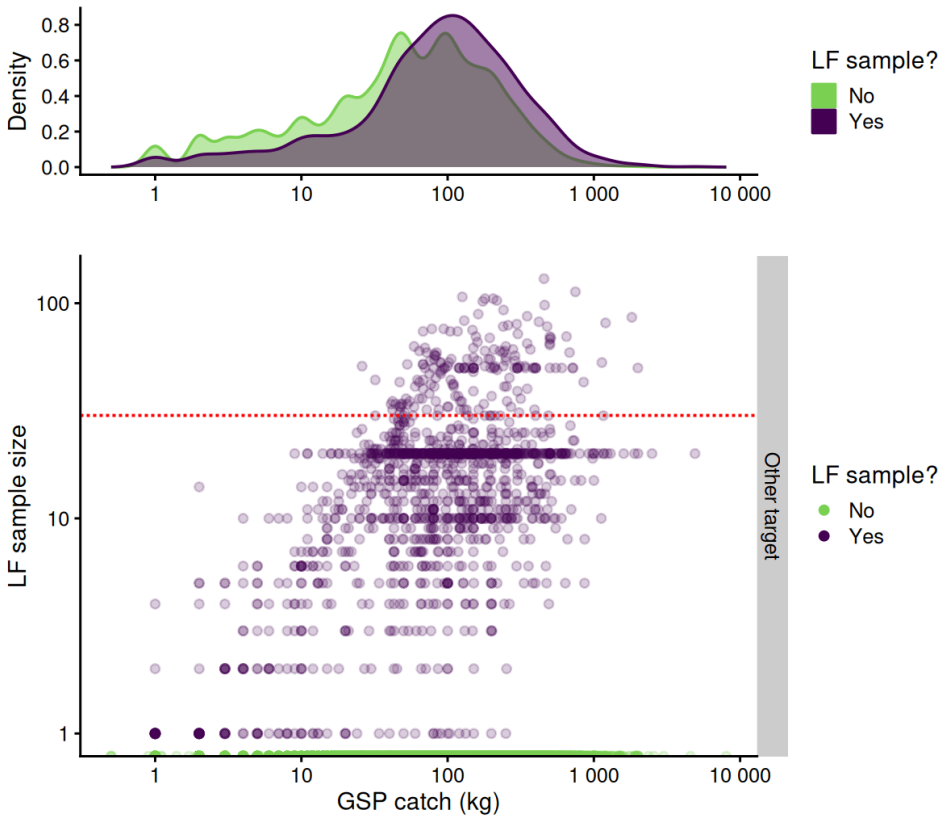


Figure 452: **Length-frequency sample sizes (number of fish sampled) for observed fishing events in GSP 1 in relation to the total ghost shark - pale catch from an event, separately for ghost shark - pale target events and other target species. The red dashed line indicates a sample size of 30 fish.**

2.8.1.2 Catch quantification



Figure 453: Methods used by observers to quantify the catch of ghost shark - pale in the GSP 1 Trawl fishery. The legend lists the methods used in descending order of total catch.

2.8.2 GSP 5: Trawl fishery

2.8.2.1 Length-frequency samples

Table 40: Length-frequency samples of ghost shark - pale from the GSP 5 Trawl fishery sampled by the Observer Programme in fishing years 1999 to 2025. Positive fishing events are those where the catch of ghost shark - pale exceeded a potential sampling threshold of 20 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1999	34	2	3	5.88
2000	825	43	923	5.21
2001	1 252	4	330	0.32
2002	1 355	37	444	2.73
2003	1 620	31	302	1.91
2004	1 044	35	448	3.35
2005	366	28	344	7.65
2006	228	20	292	8.77
2007	444	23	248	5.18
2008	491	48	729	9.78
2009	444	34	472	7.66
2010	433	21	568	4.85
2011	514	44	1 138	8.56
2012	368	20	427	5.43
2013	394	33	749	8.38
2014	604	38	743	6.29
2015	481	14	368	2.91
2016	327	46	825	14.07
2017	377	11	214	2.92
2018	1 079	82	1 516	7.60
2019	571	1	12	0.18
2020	488	8	147	1.64
2021	641	21	406	3.28
2022	505	2	40	0.40
2023	806	6	101	0.74
2024	603	10	160	1.66
2025	670	4	69	0.60

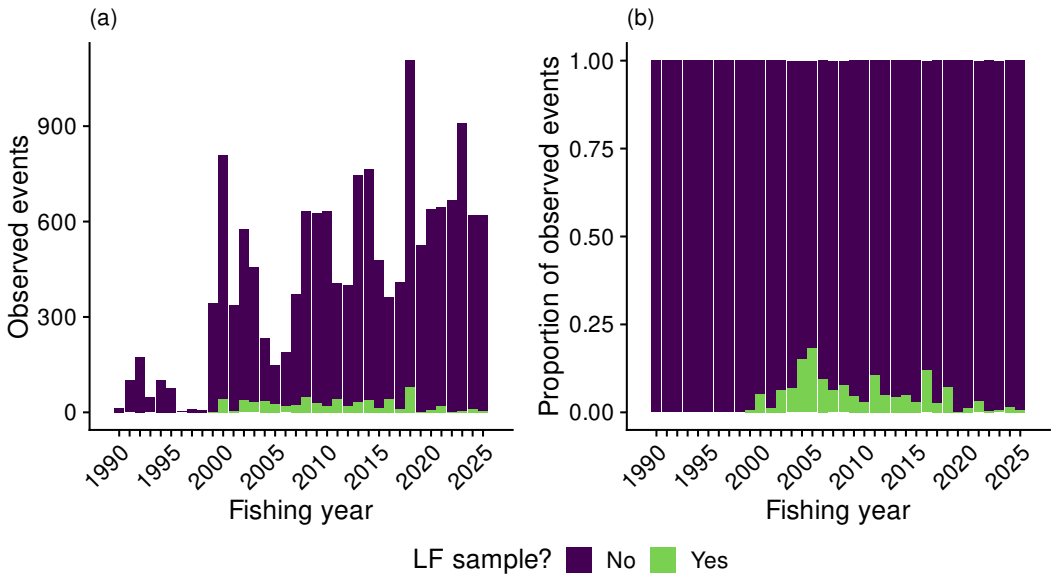


Figure 454: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in GSP 5 where the ghost shark - pale catch exceeded the 20 kg threshold, with and without length-frequency sampling.**

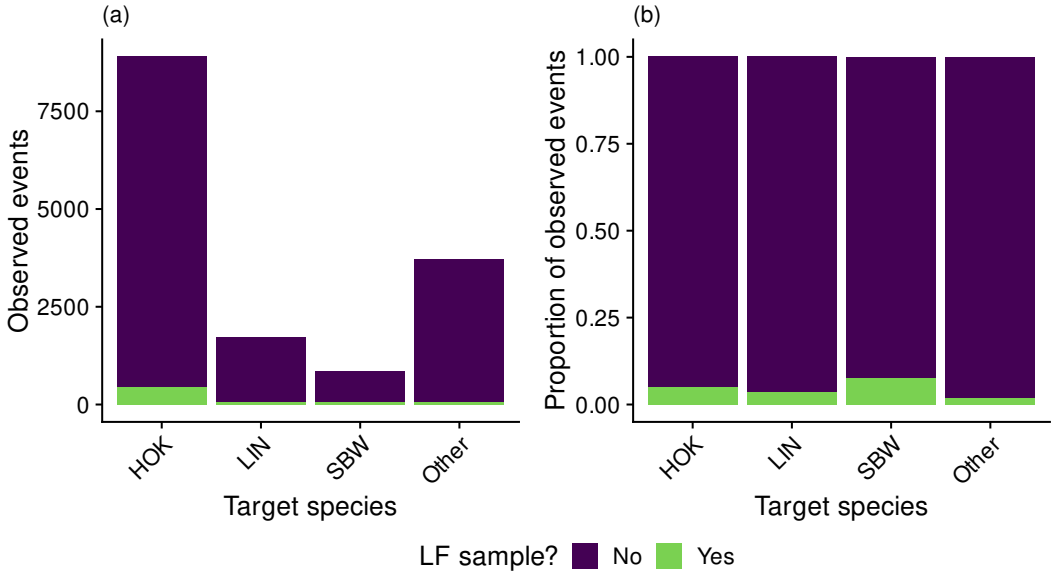


Figure 455: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in GSP 5 where the ghost shark - pale catch exceeded the 20 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

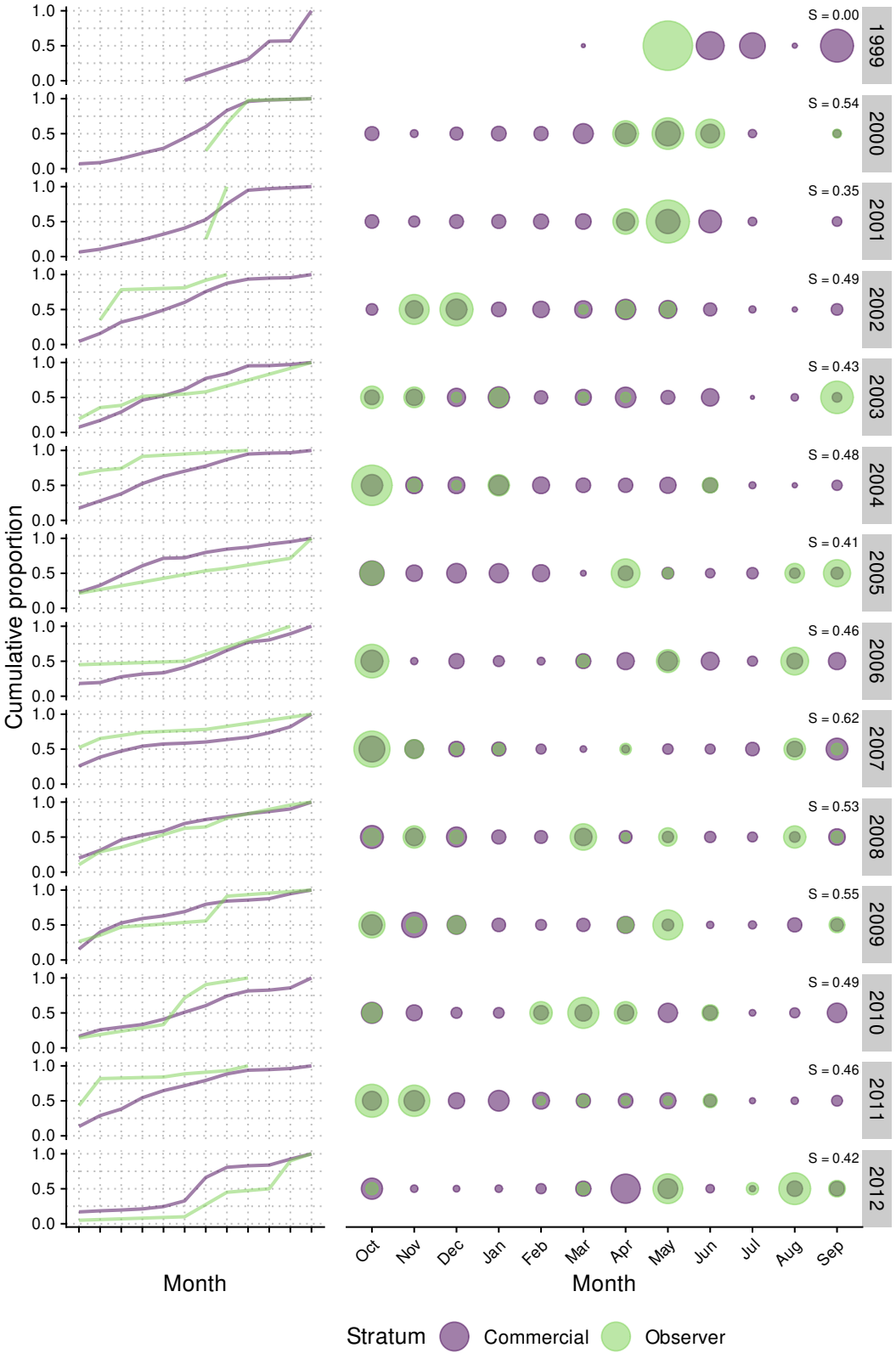


Figure 456: Monthly representativeness of observer sampling coverage of Trawl fishing events in GSP 5, where the ghost shark - pale catch exceeded the 20kg threshold, in 1999 to 2012. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

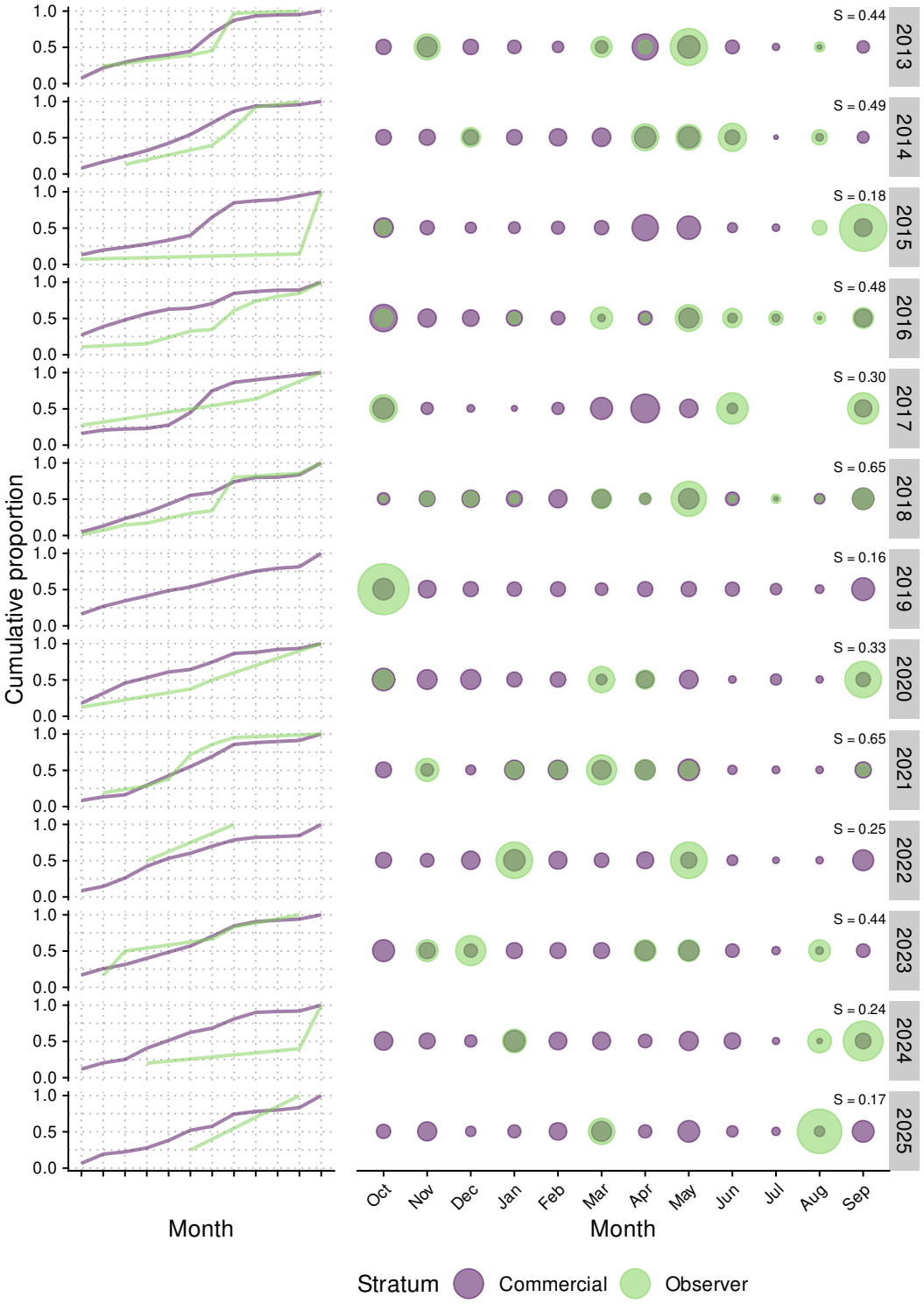


Figure 457: Monthly representativeness of observer sampling coverage of Trawl fishing events in GSP 5, where the ghost shark - pale catch exceeded the 20kg threshold, in 2013 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

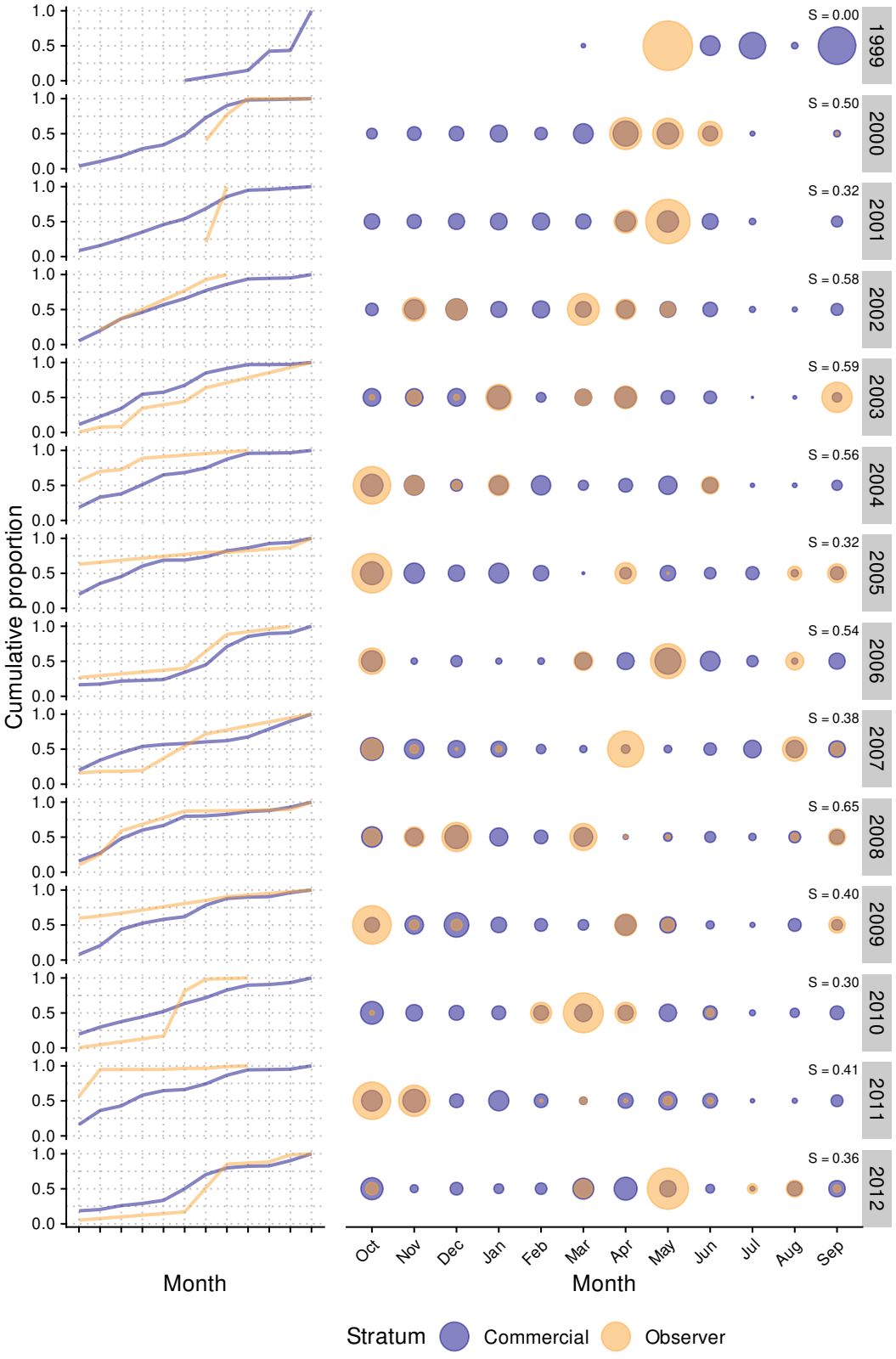


Figure 458: **Monthly representativeness of observer sampling coverage of Trawl catch in GSP 5, from events where the ghost shark - pale catch exceeded the 20kg threshold, in 1999 to 2012. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

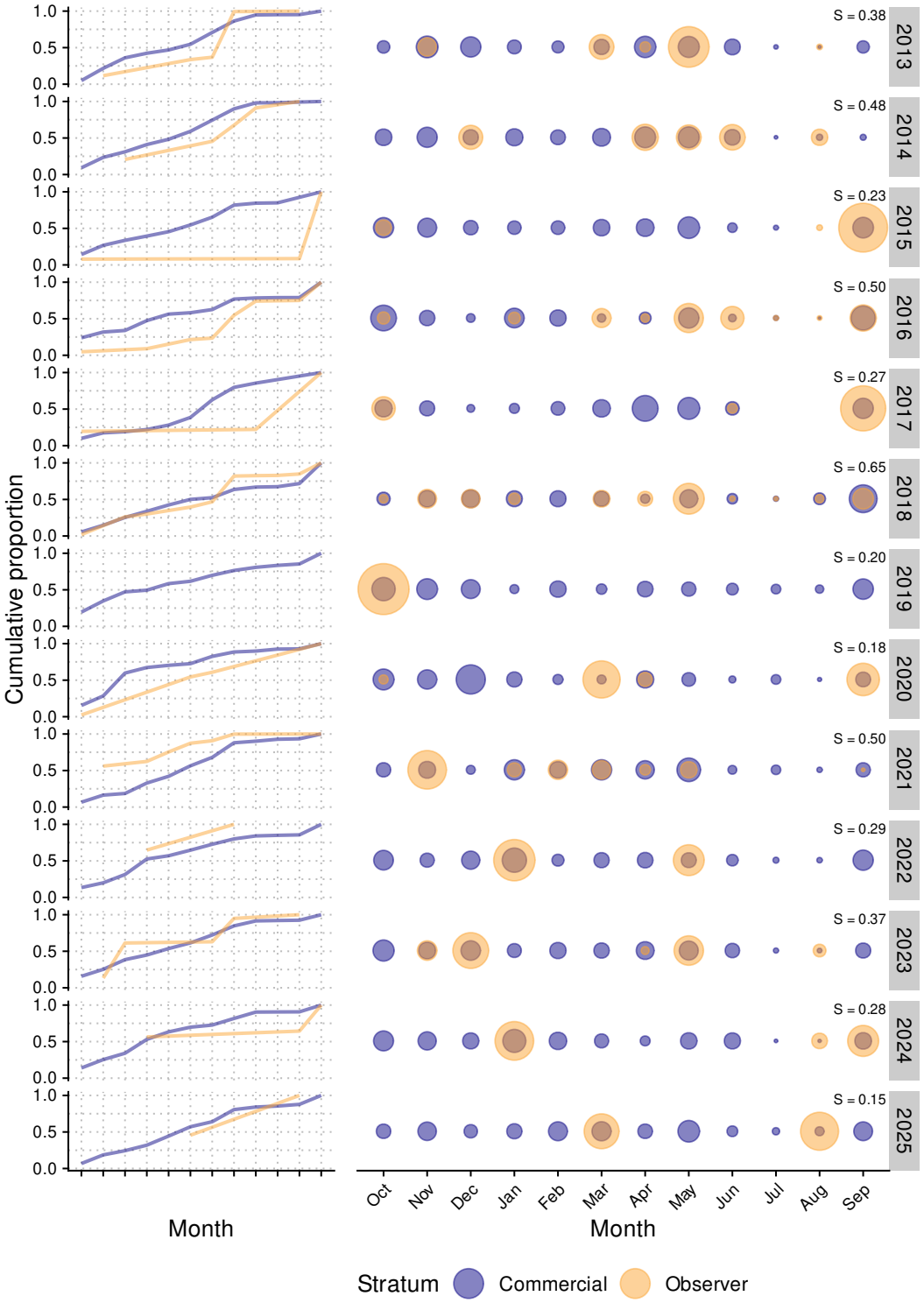


Figure 459: Monthly representativeness of observer sampling coverage of Trawl catch in GSP 5, from events where the ghost shark - pale catch exceeded the 20kg threshold, in 2013 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

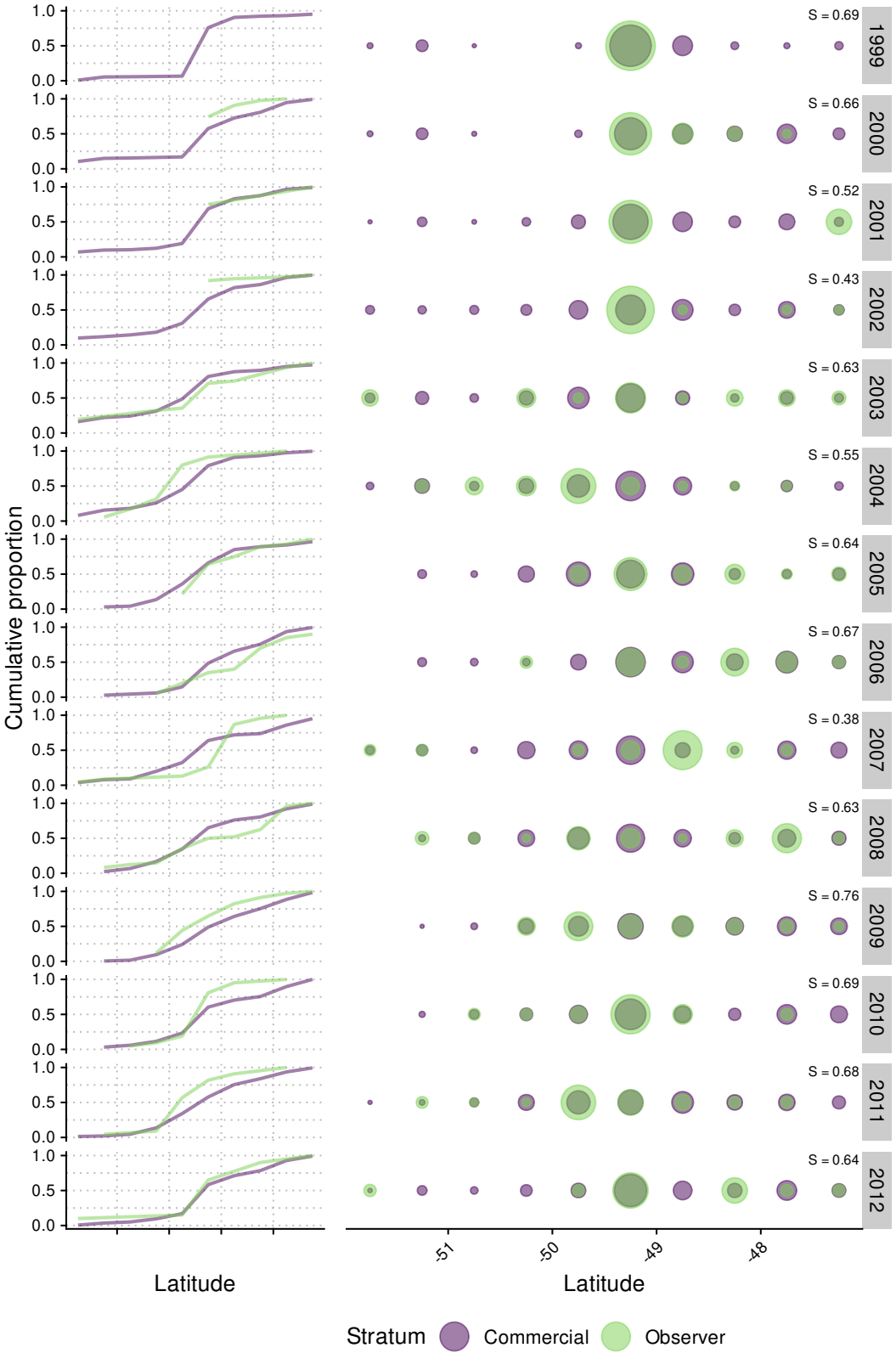


Figure 460: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in GSP 5, where the ghost shark - pale catch exceeded the 20kg threshold, in 1999 to 2012. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

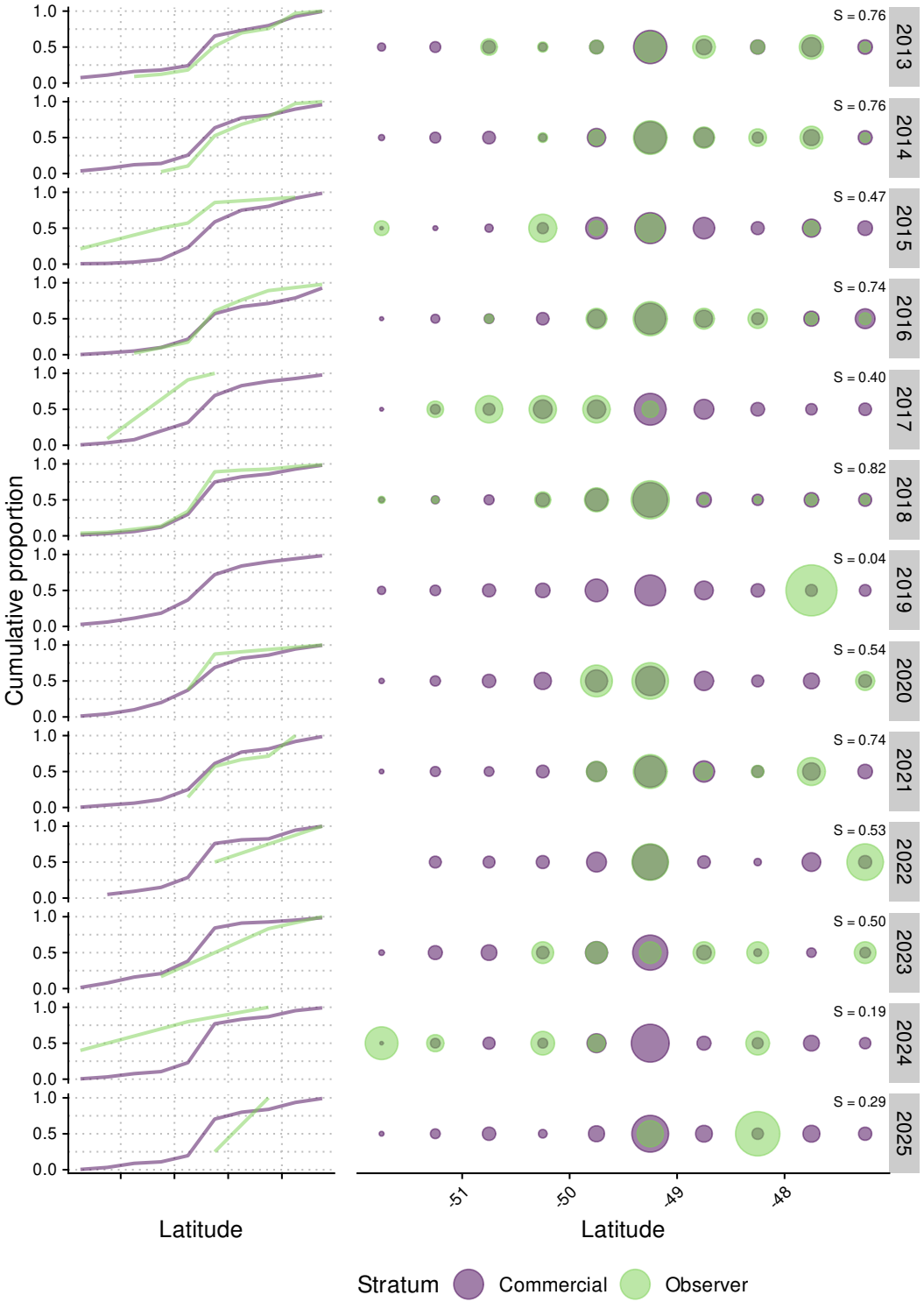


Figure 461: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in GSP 5, where the ghost shark - pale catch exceeded the 20kg threshold, in 2013 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

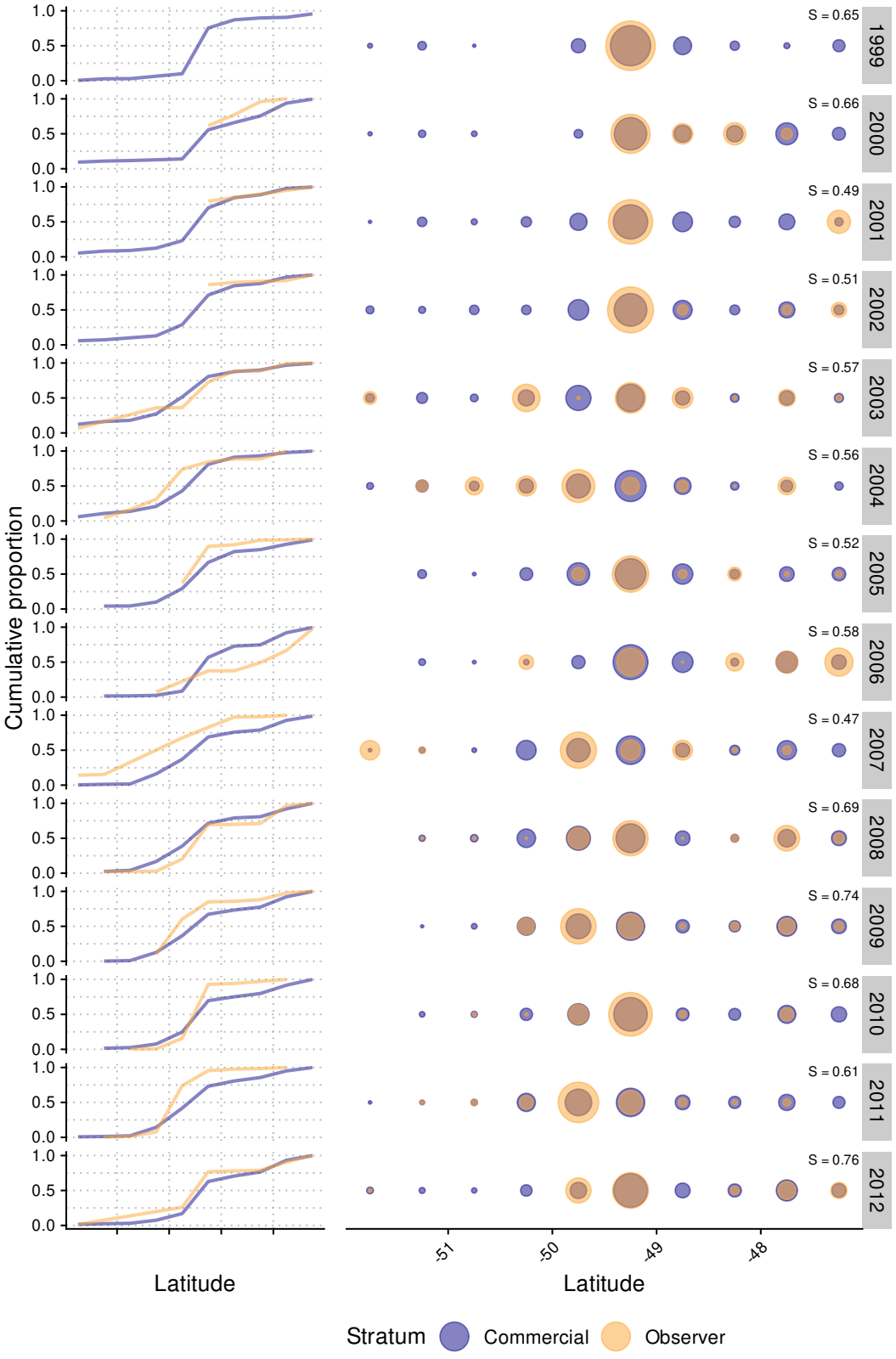


Figure 462: **Latitudinal representativeness of observer sampling coverage of Trawl catch in GSP 5, from events where the ghost shark - pale catch exceeded the 20kg threshold, in 1999 to 2012. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

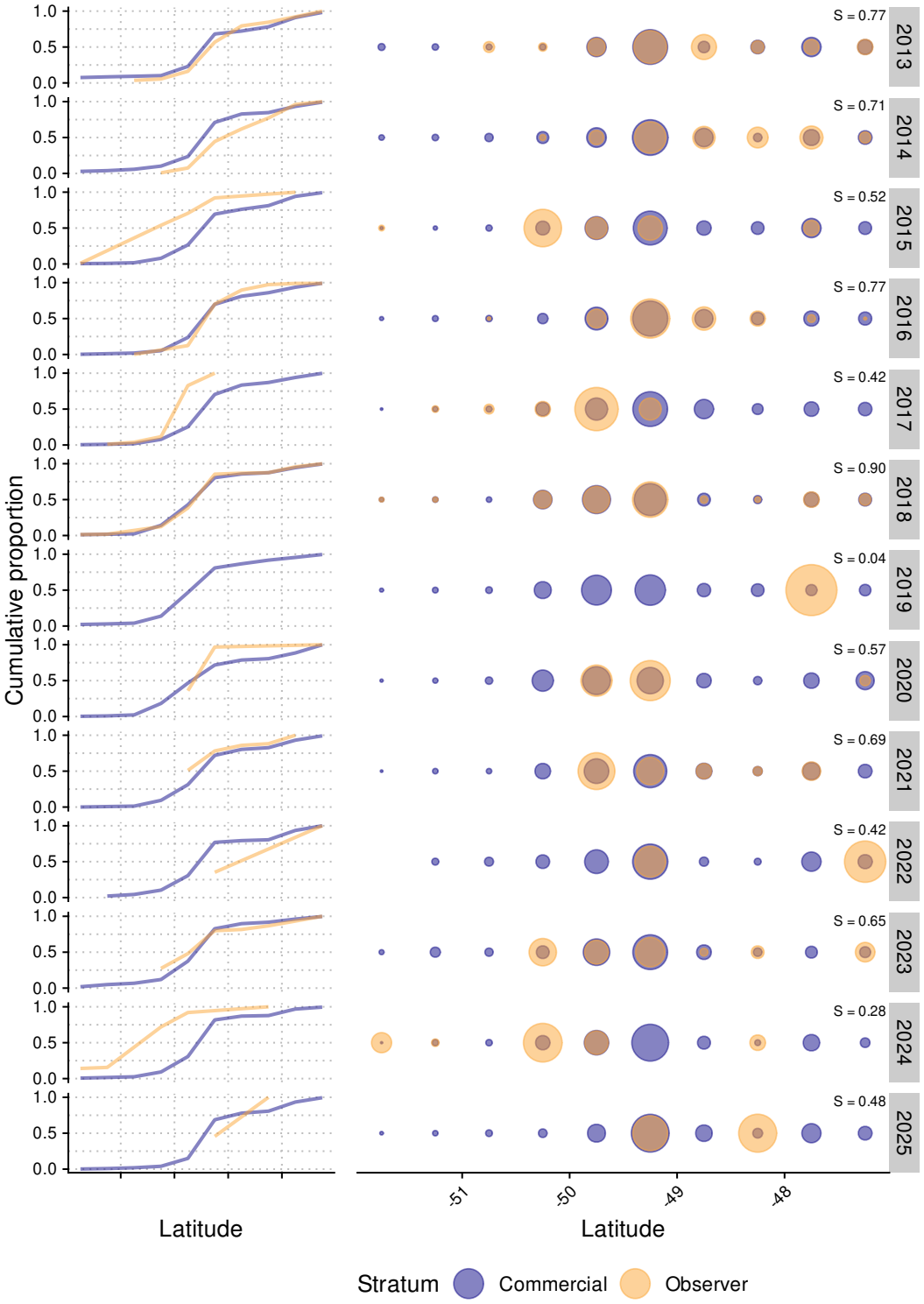


Figure 463: Latitudinal representativeness of observer sampling coverage of Trawl catch in GSP 5, from events where the ghost shark - pale catch exceeded the 20kg threshold, in 2013 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

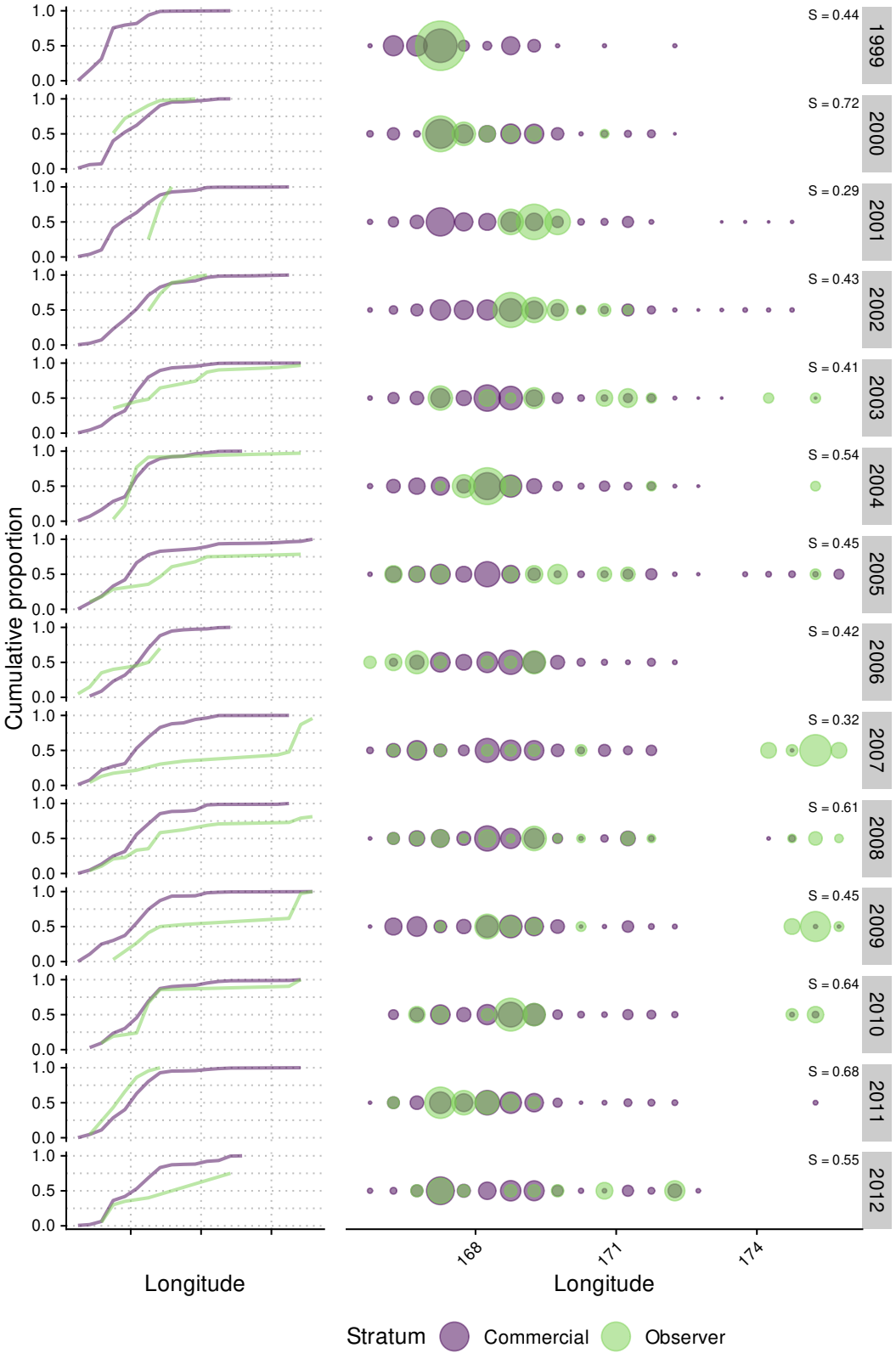


Figure 464: **Longitudinal representativeness of observer sampling coverage of Trawl fishing events in GSP 5, where the ghost shark - pale catch exceeded the 20kg threshold, in 1999 to 2012. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

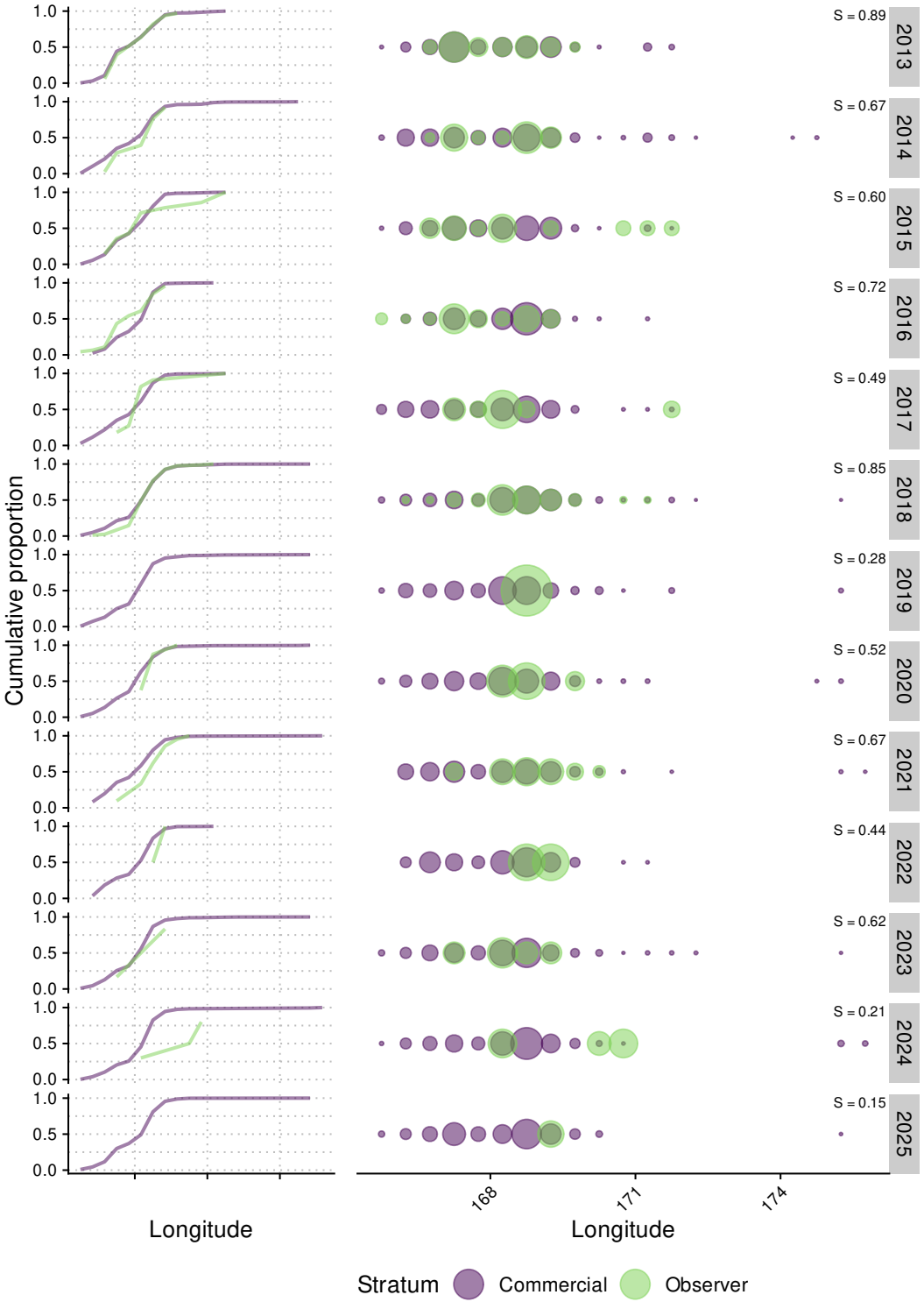


Figure 465: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in GSP 5, where the ghost shark - pale catch exceeded the 20kg threshold, in 2013 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

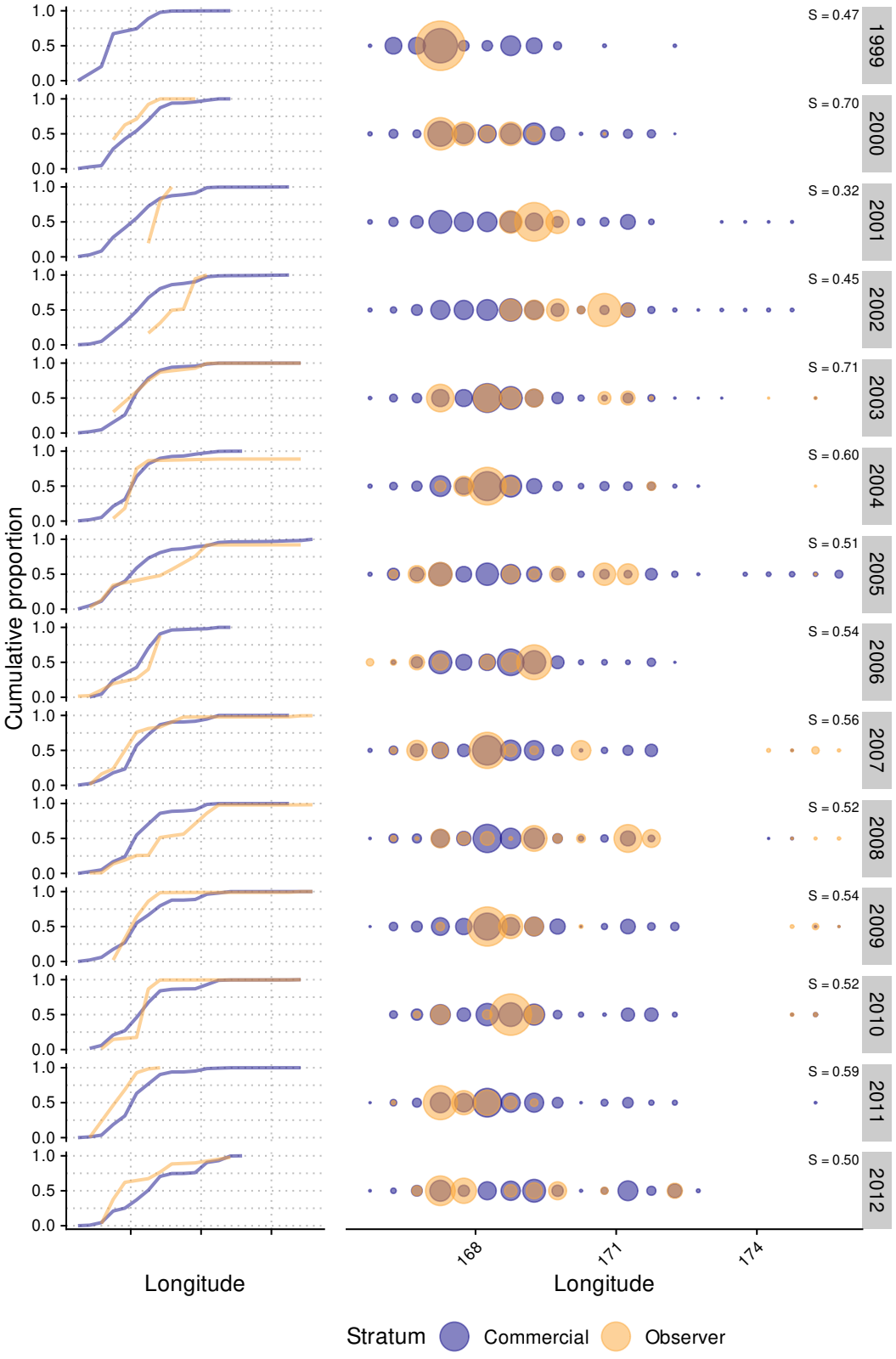


Figure 466: **Longitudinal representativeness of observer sampling coverage of Trawl catch in GSP 5, from events where the ghost shark - pale catch exceeded the 20kg threshold, in 1999 to 2012. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

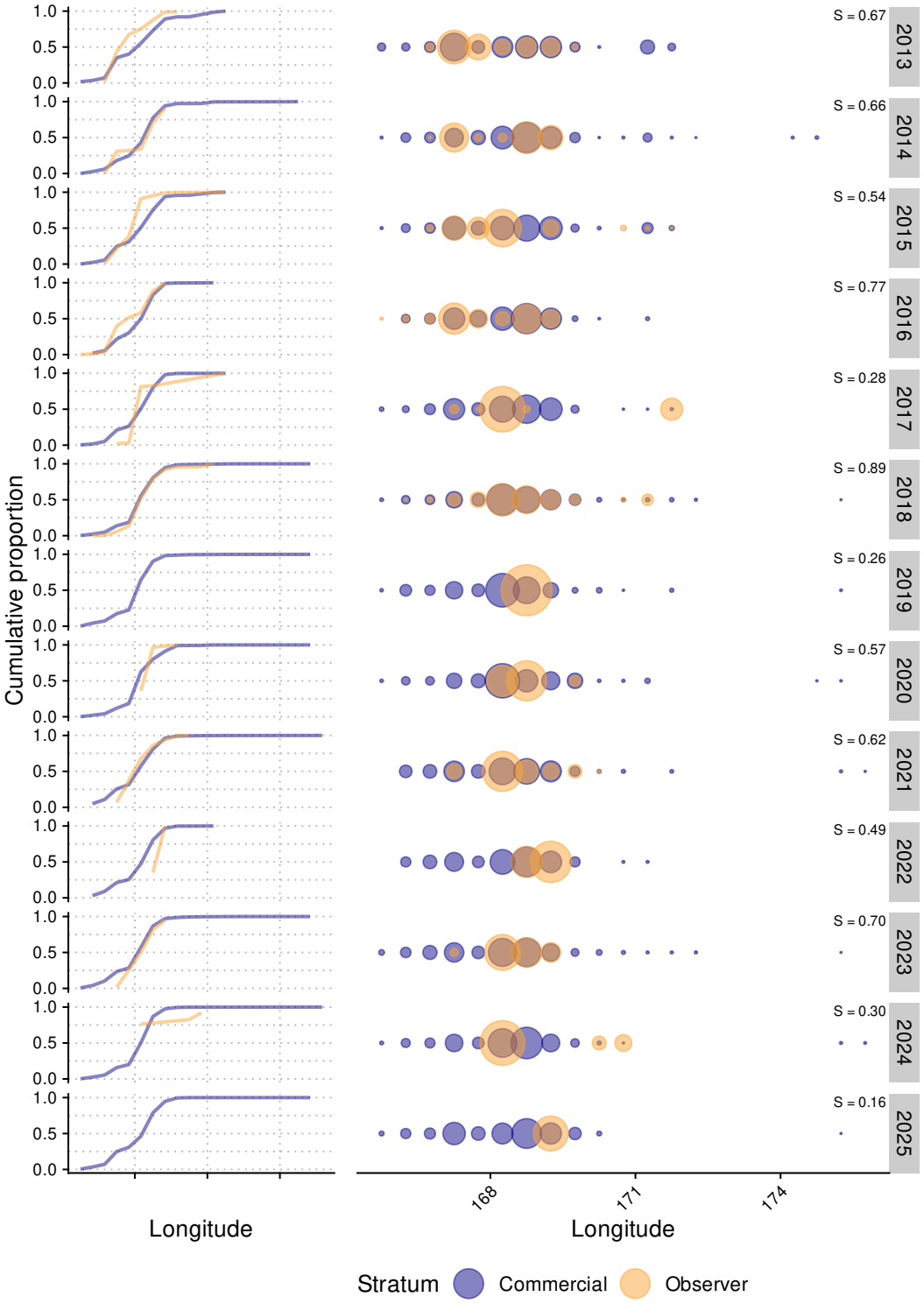


Figure 467: Longitudinal representativeness of observer sampling coverage of Trawl catch in GSP 5, from events where the ghost shark - pale catch exceeded the 20kg threshold, in 2013 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

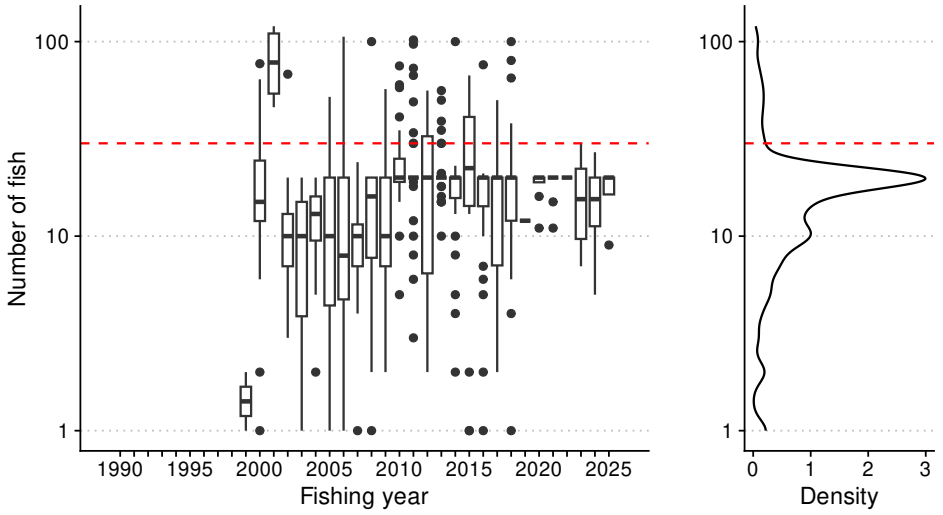


Figure 468: **Length-frequency sample sizes for observed fishing events in GSP 5 where ghost shark - pale were sampled. The red dashed line indicates a sample size of 30 fish.**

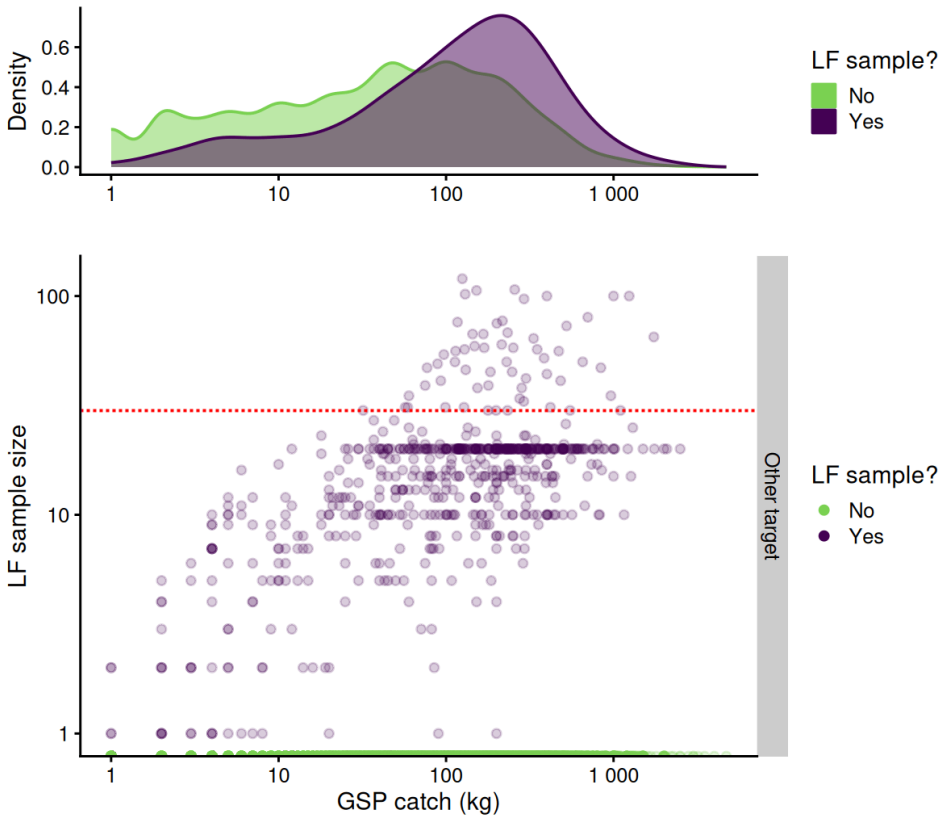


Figure 469: **Length-frequency sample sizes (number of fish sampled) for observed fishing events in GSP 5 in relation to the total ghost shark - pale catch from an event, separately for ghost shark - pale target events and other target species. The red dashed line indicates a sample size of 30 fish.**

2.8.2.2 Catch quantification

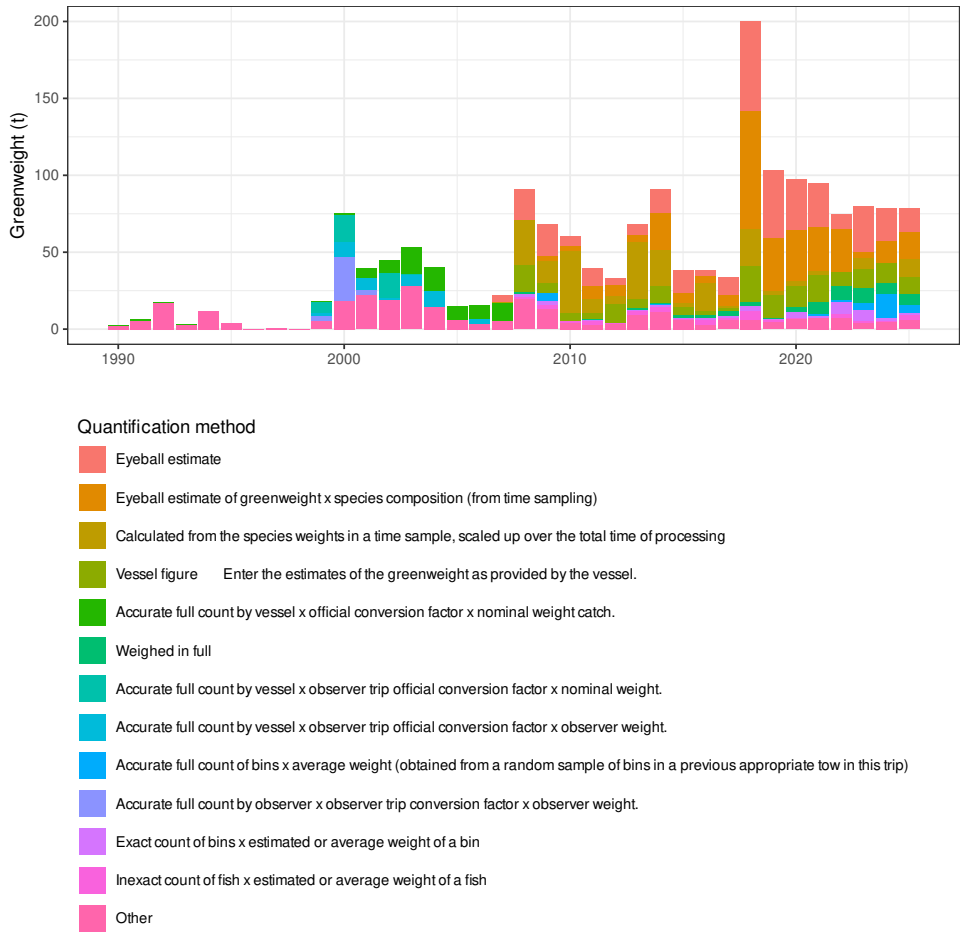


Figure 470: Methods used by observers to quantify the catch of ghost shark - pale in the GSP 5 Trawl fishery. The legend lists the methods used in descending order of total catch.

2.9 HAK stocks

Observer sampling of hake is considered with respect to the hake Assessment Stocks.

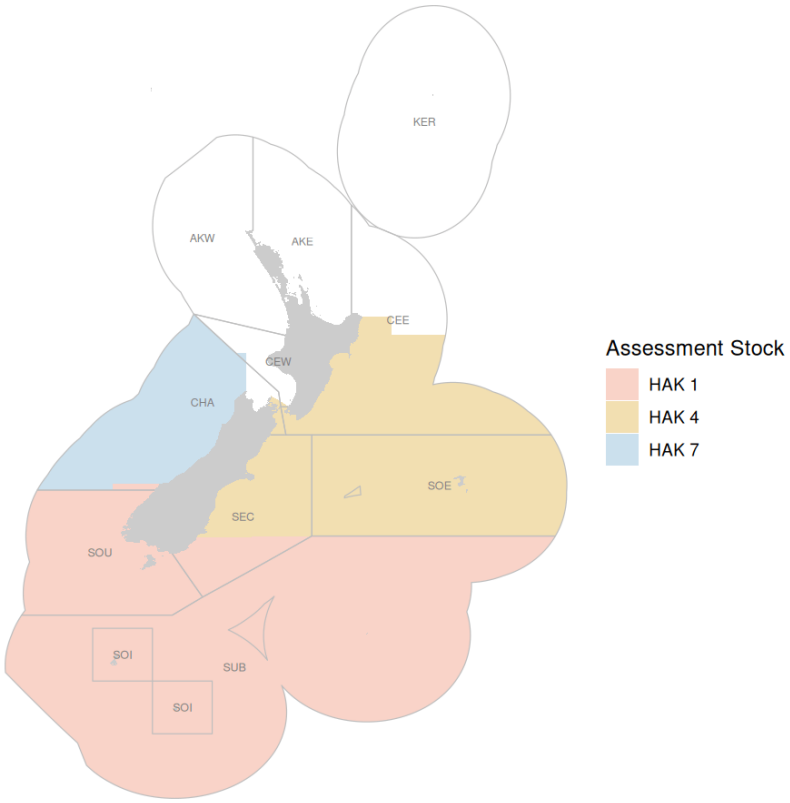


Figure 471: Observer Fisheries Management Areas (black borders, labels on plot) in relation to the Assessment Stock for hake (coloured areas, per legend).

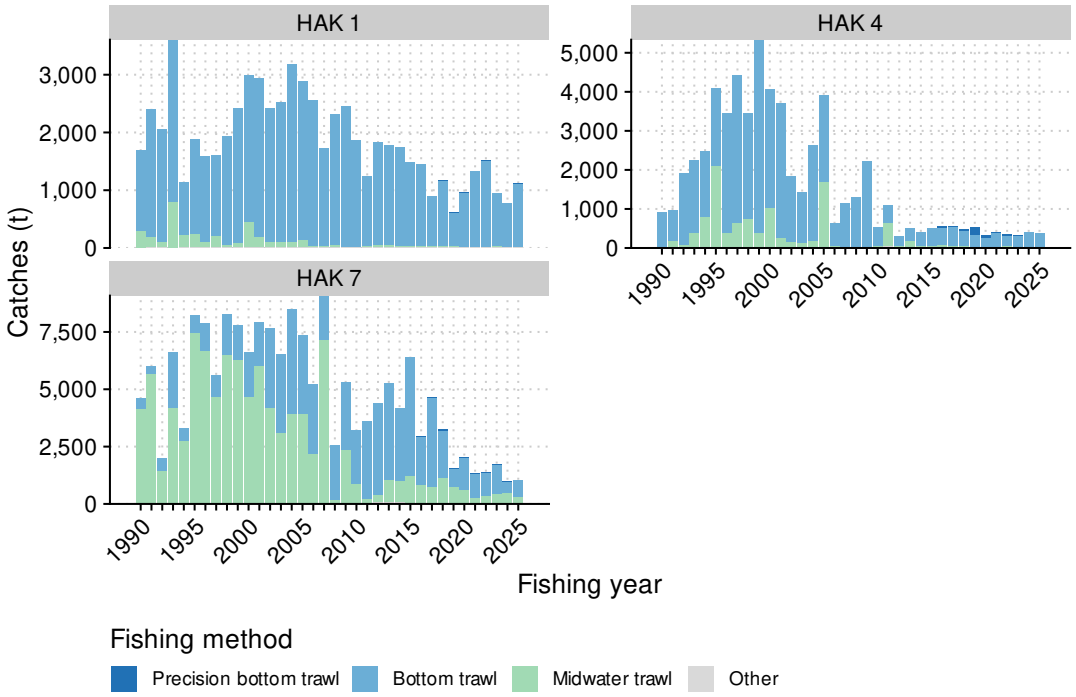


Figure 472: **Catches of hake by fishing method, for events within the hake Assessment Stocks. Methods grouped as Other include: BLL, BPT, BS, CP, DL, DN, DS, DV, FP, HL, MPT, POT, PRM, PSH, RLP, RN, SJ, SLL, SN, T, TL.**

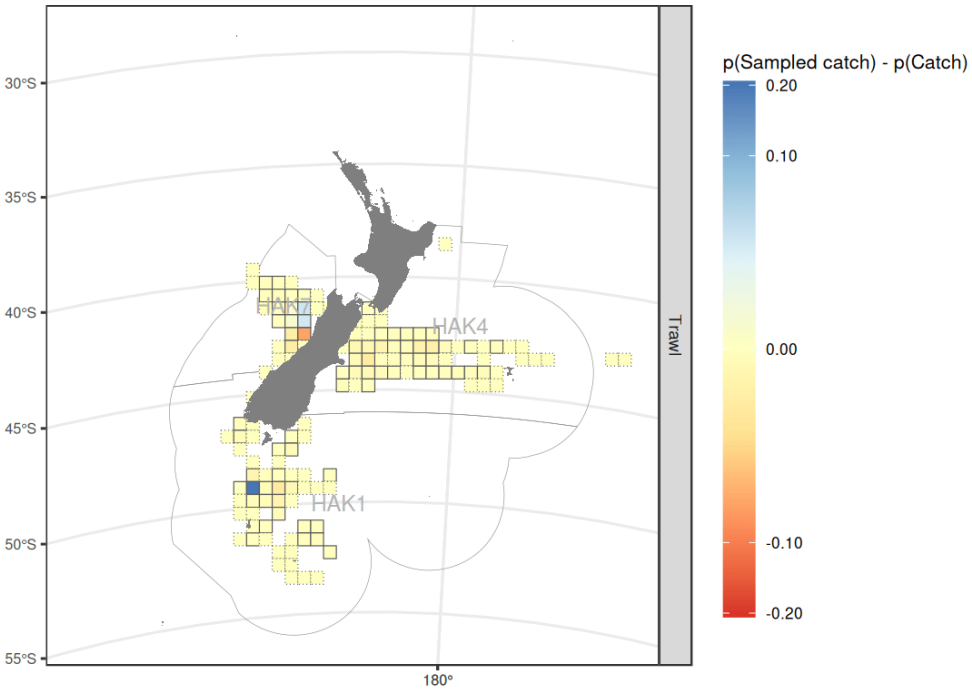


Figure 473: **Differences in the relative proportions of catch and sampled catch for hake during 2021–2025. Cells with a dotted border had no sampling.**

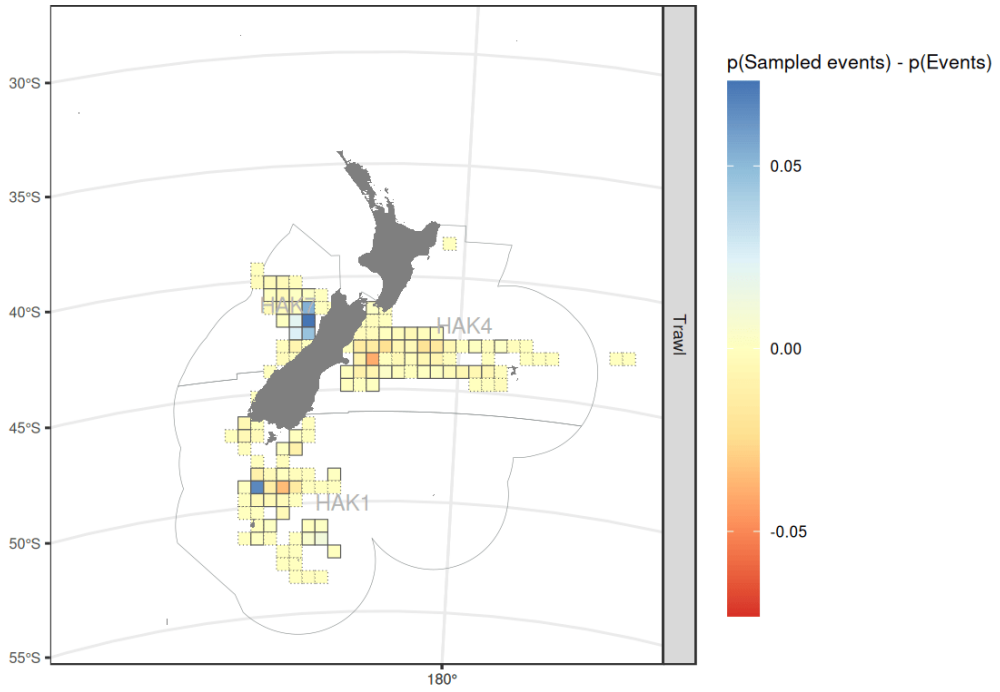


Figure 474: **Differences in the relative proportions of events meeting the sampling threshold and sampled events for hake during 2021–2025. Cells with a dotted border had no sampling.**

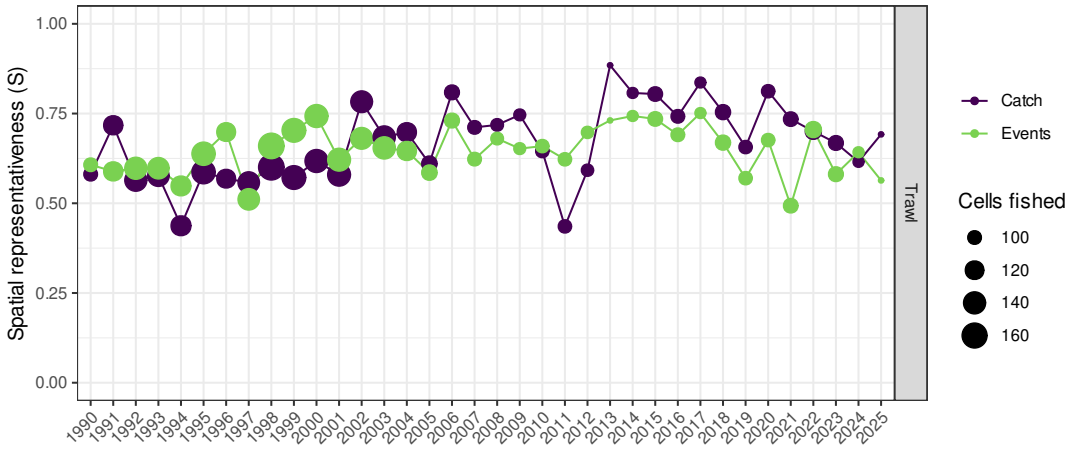


Figure 475: **Spatial representativeness of observer sampling of hake by fishing year. Representativeness is assessed using the Manhattan distance metric (*S*) applied to 64 km grid cells, for both the proportion of catch sampled and the proportion of positive events sampled.**

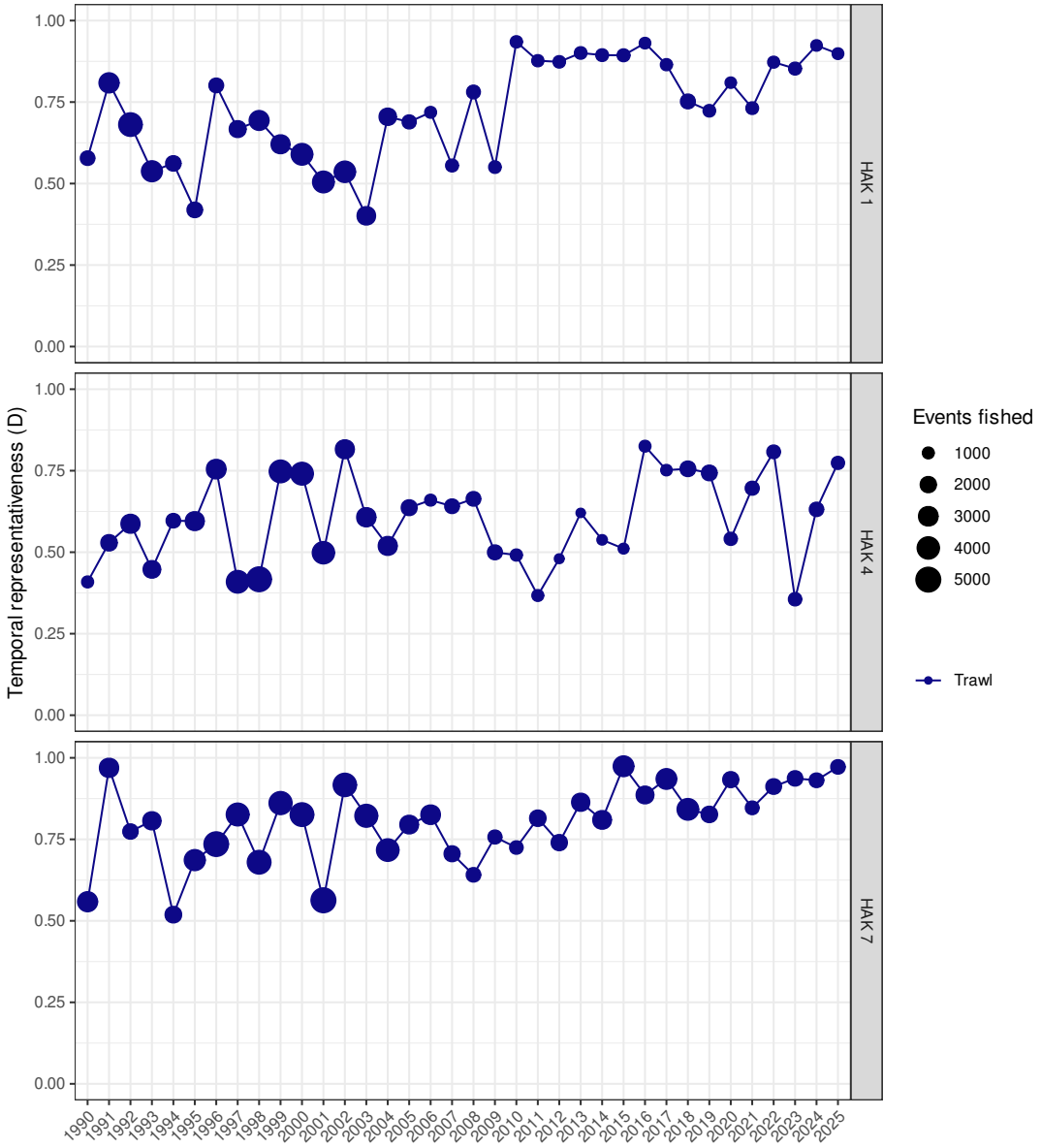


Figure 476: Temporal representativeness of observer sanpling of hake by fishing year and area. Temporal representativeness is assessed using the KS statistic (*D*) applied to the start date-times of all fishing events and all sampled fishing events, weighted by catch weight.

2.9.1 HAK 1: Trawl fishery

2.9.1.1 Length-frequency samples

Table 41: Length-frequency samples of hake from the HAK 1 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of hake exceeded a potential sampling threshold of 70 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	1 569	29	247	1.85
1991	3 042	63	753	2.07
1992	4 016	306	2 486	7.62
1993	3 456	178	1 993	5.15
1994	1 730	153	1 330	8.84
1995	1 795	77	488	4.29
1996	1 535	81	655	5.28
1997	2 066	76	614	3.68
1998	3 030	221	1 650	7.29
1999	2 781	189	1 377	6.80
2000	3 731	415	5 980	11.12
2001	3 605	376	2 901	10.43
2002	3 665	277	2 551	7.56
2003	2 579	198	1 147	7.68
2004	2 295	187	2 324	8.15
2005	1 400	119	850	8.50
2006	985	110	2 614	11.17
2007	1 164	114	1 191	9.79
2008	1 322	126	1 688	9.53
2009	1 099	72	1 932	6.55
2010	1 084	123	2 995	11.35
2011	1 026	122	5 128	11.89
2012	1 073	120	5 737	11.18
2013	1 120	90	3 929	8.04
2014	1 012	149	5 871	14.72
2015	1 081	79	3 766	7.31
2016	797	56	2 924	7.03
2017	820	99	3 330	12.07
2018	1 658	90	3 454	5.43
2019	1 138	32	1 258	2.81
2020	918	53	1 887	5.77
2021	1 166	50	2 486	4.29
2022	1 029	96	3 970	9.33
2023	1 224	90	2 805	7.35
2024	898	49	2 676	5.46
2025	964	64	3 143	6.64

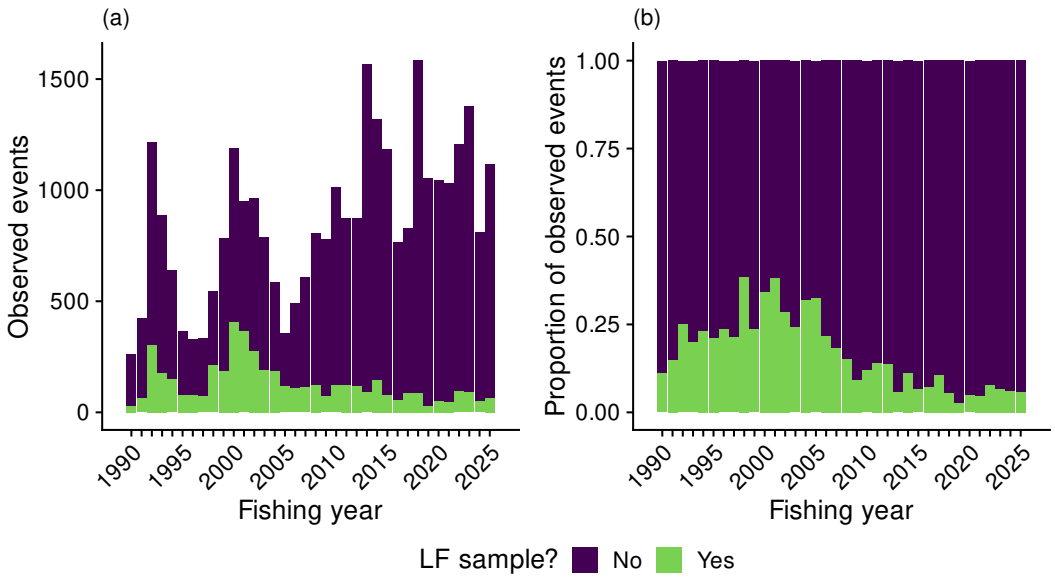


Figure 477: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in HAK 1 where the hake catch exceeded the 70 kg threshold, with and without length-frequency sampling.**

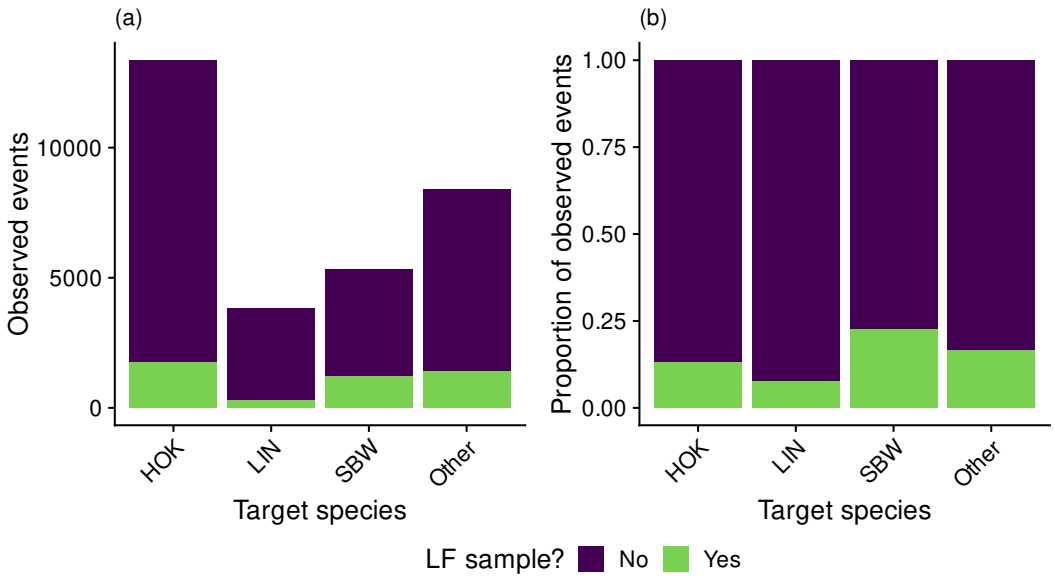


Figure 478: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in HAK 1 where the hake catch exceeded the 70 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

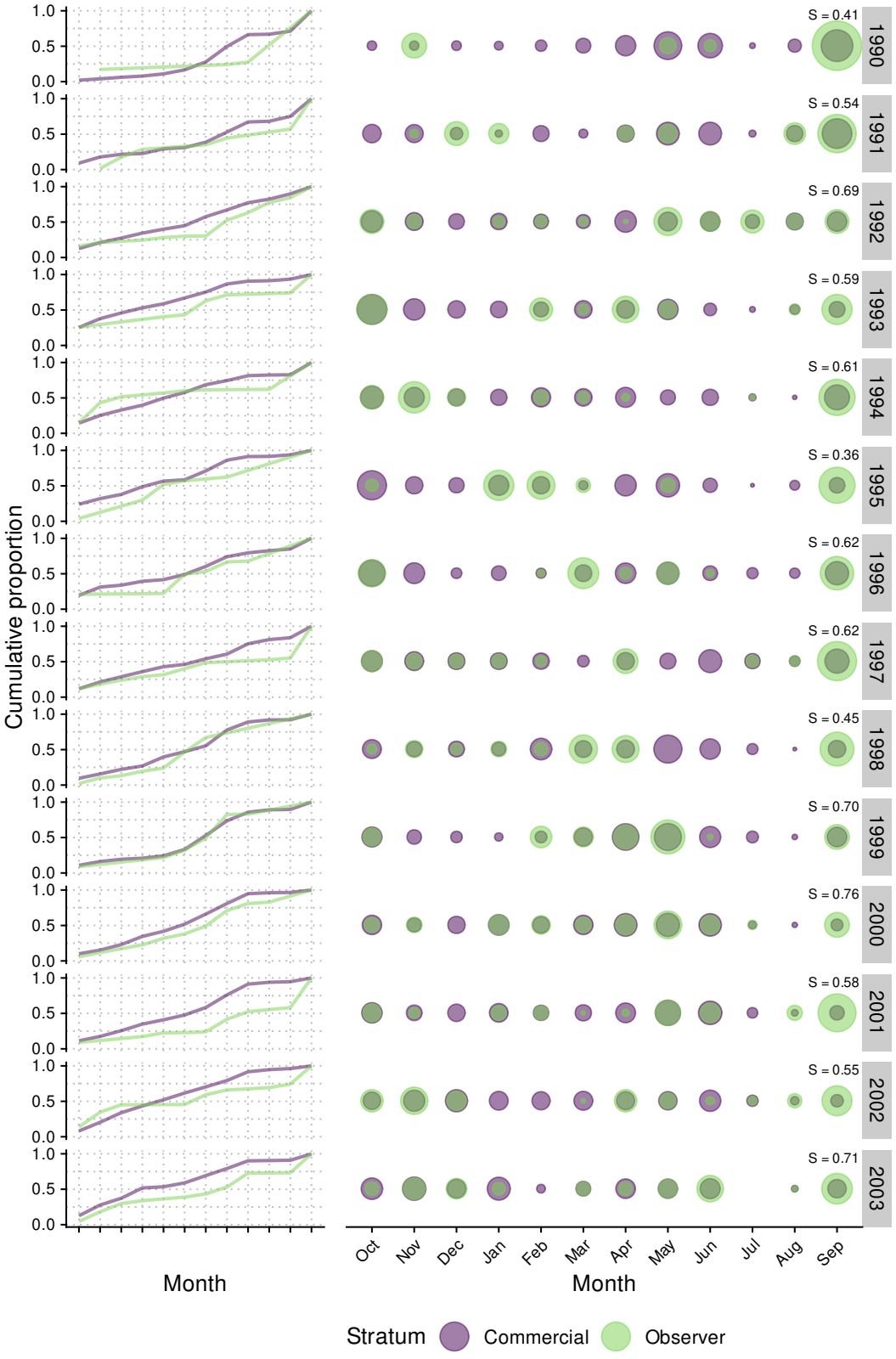


Figure 479: Monthly representativeness of observer sampling coverage of Trawl fishing events in HAK 1, where the hake catch exceeded the 70kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

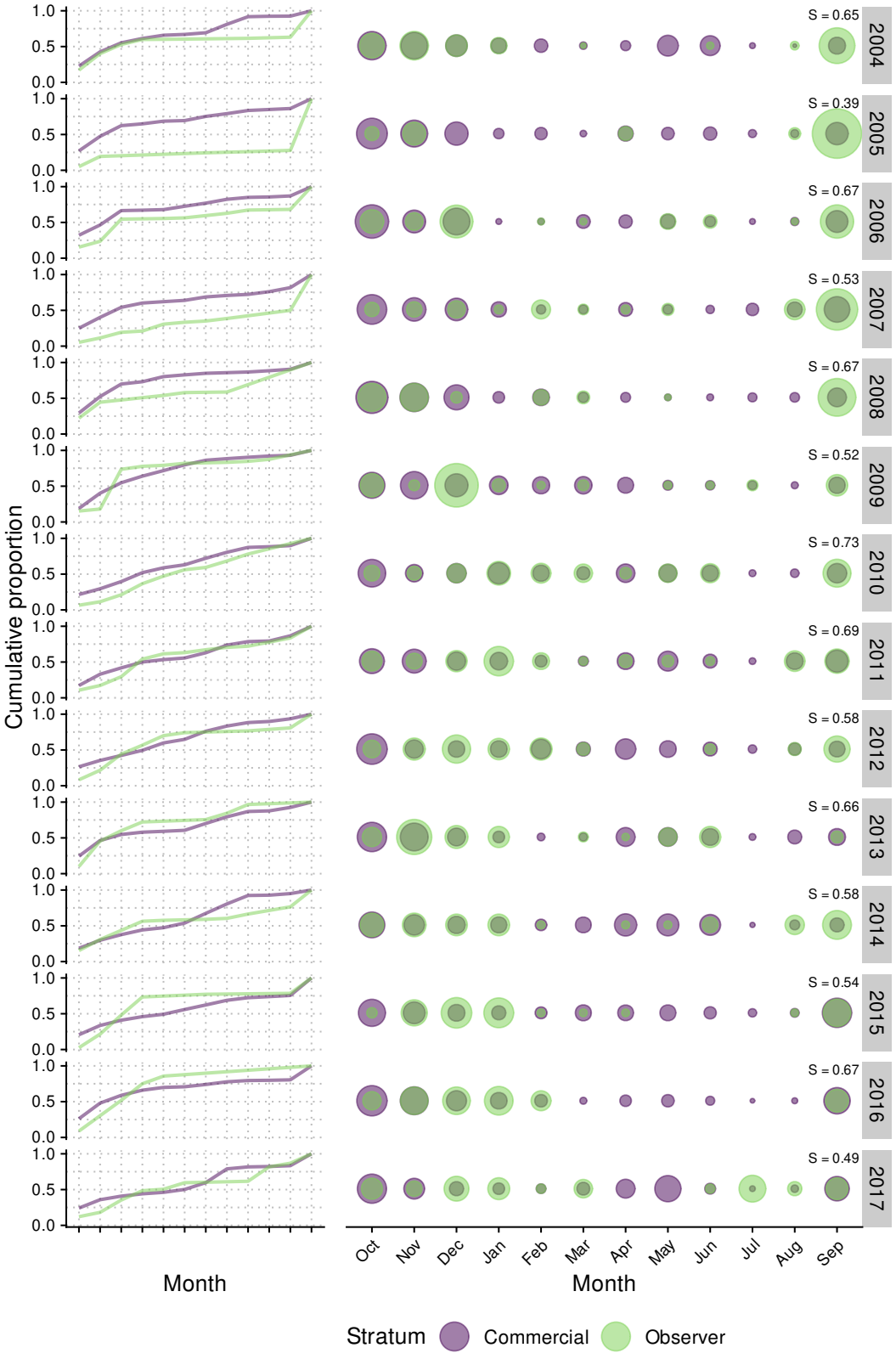


Figure 480: Monthly representativeness of observer sampling coverage of Trawl fishing events in HAK 1, where the hake catch exceeded the 70kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

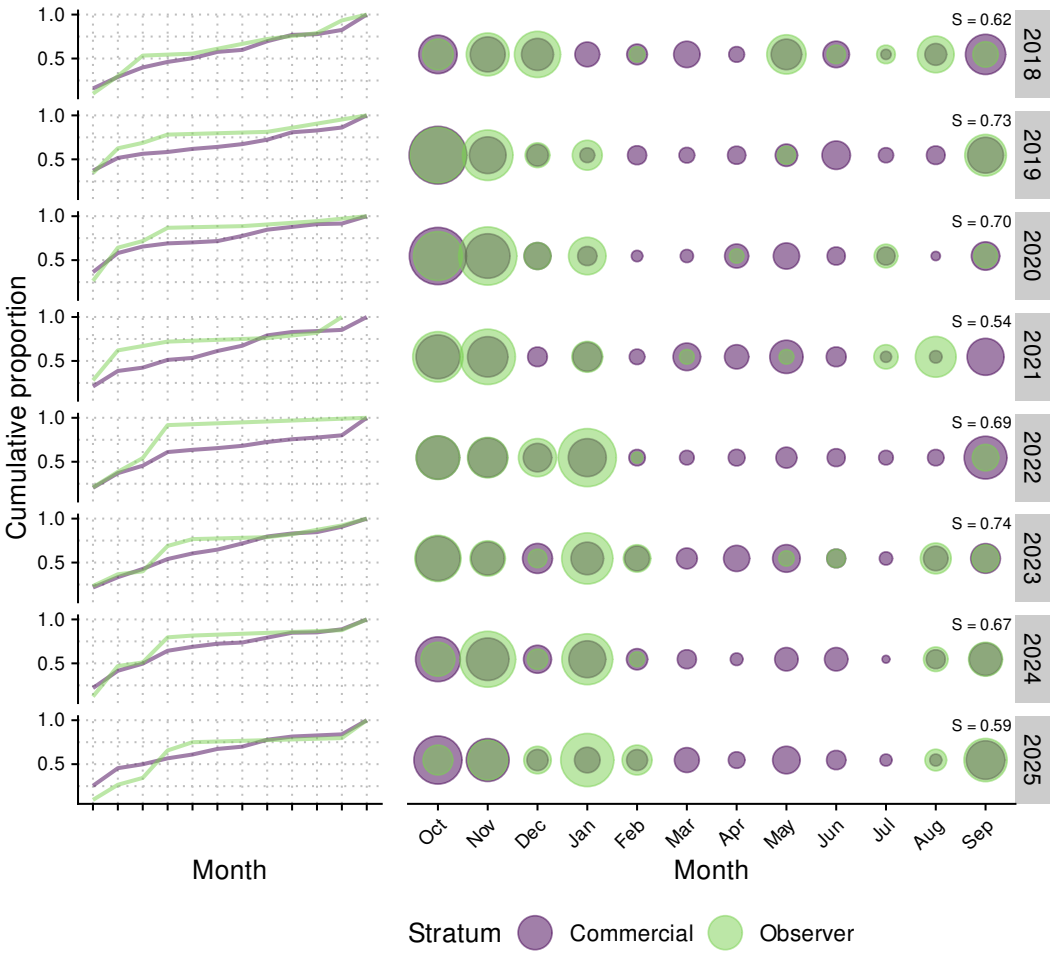


Figure 481: Monthly representativeness of observer sampling coverage of Trawl fishing events in HAK 1, where the hake catch exceeded the 70kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

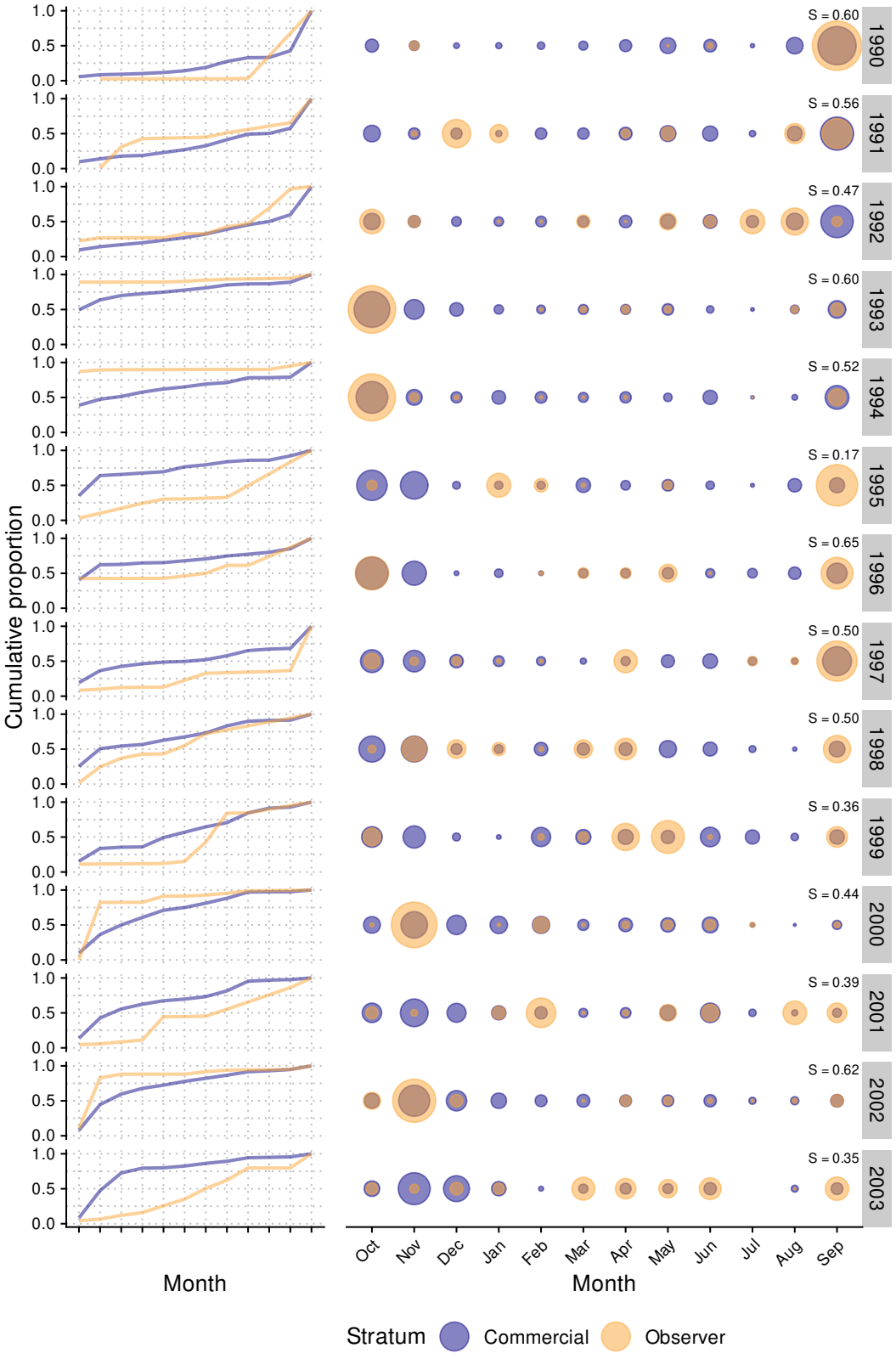


Figure 482: **Monthly representativeness of observer sampling coverage of Trawl catch in HAK 1, from events where the hake catch exceeded the 70kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

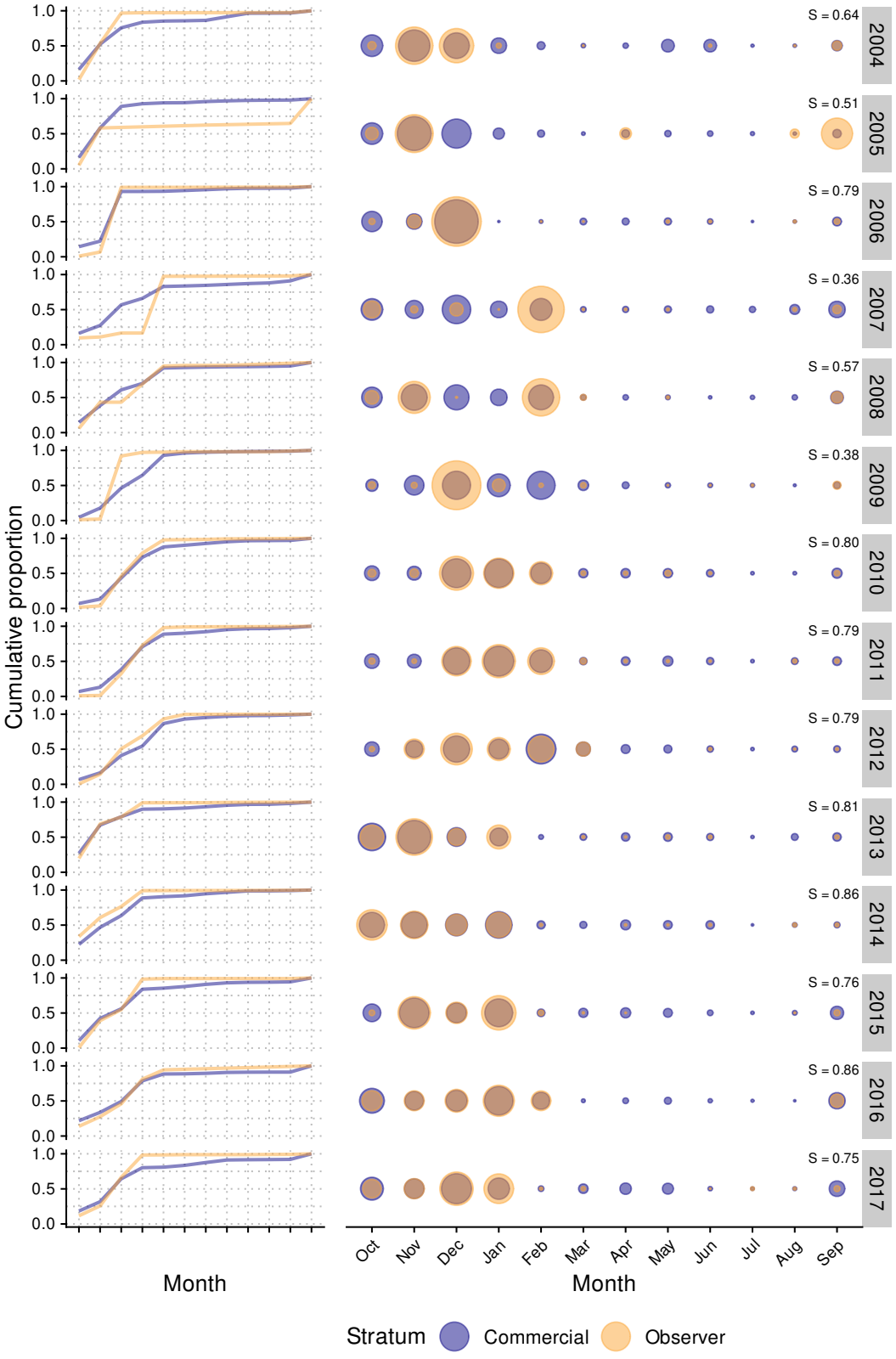


Figure 483: **Monthly representativeness of observer sampling coverage of Trawl catch in HAK 1, from events where the hake catch exceeded the 70kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

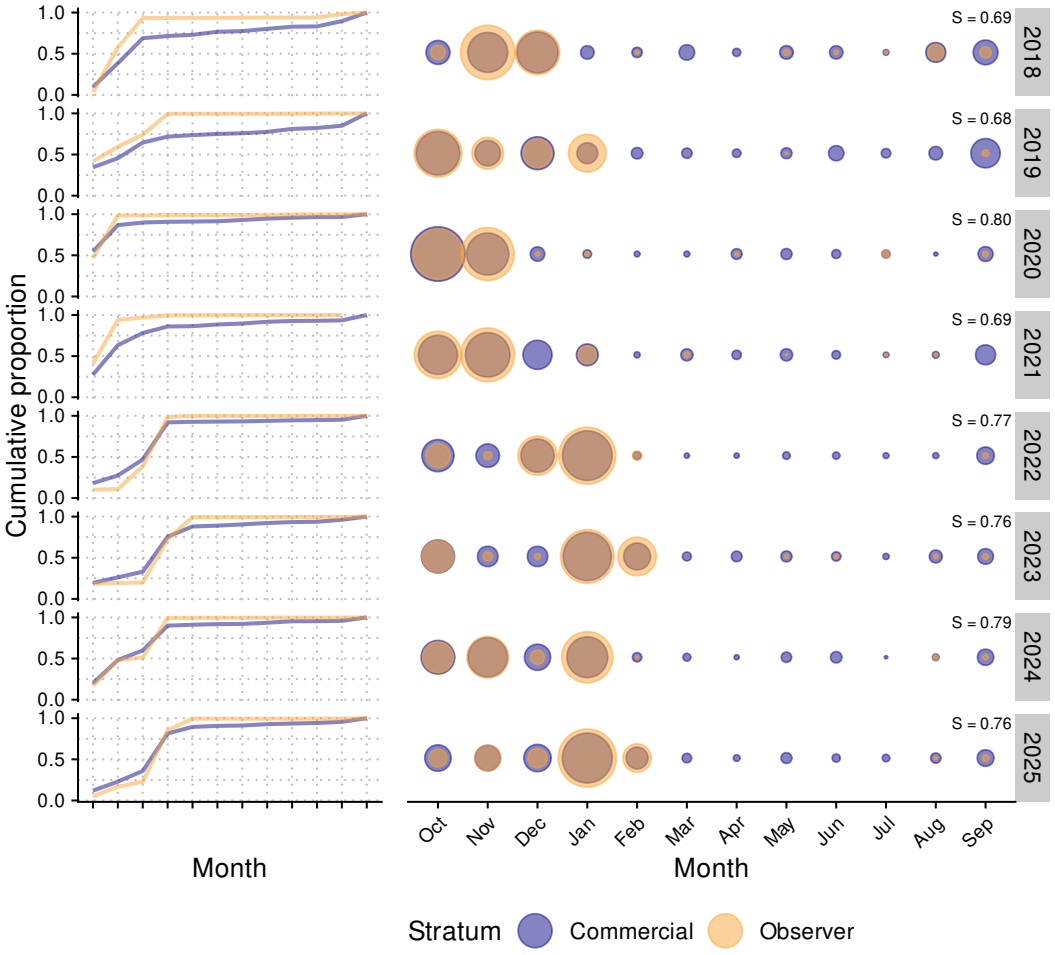


Figure 484: Monthly representativeness of observer sampling coverage of Trawl catch in HAK 1, from events where the hake catch exceeded the 70kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

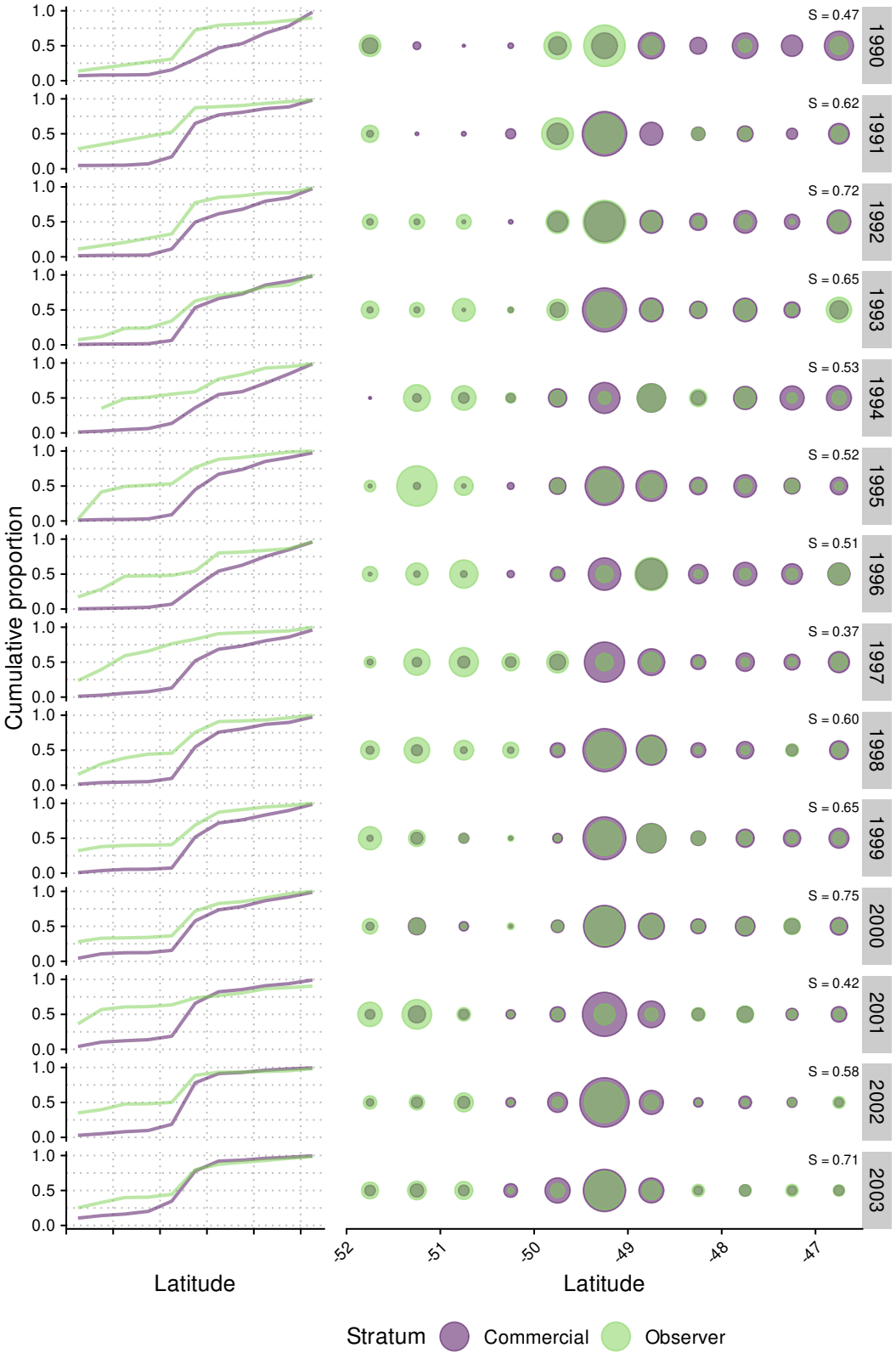


Figure 485: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in HAK 1, where the hake catch exceeded the 70kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

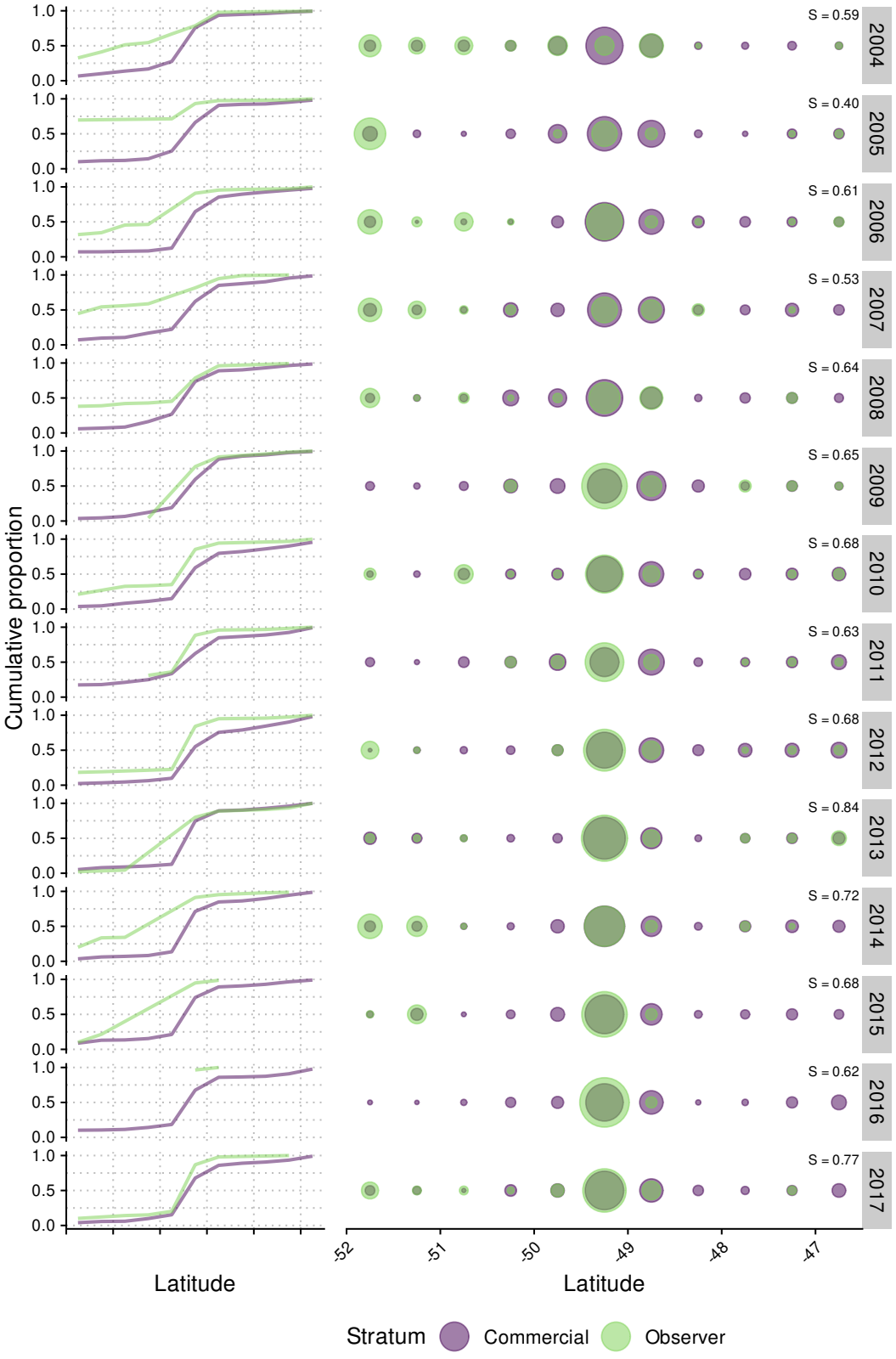


Figure 486: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in HAK 1, where the hake catch exceeded the 70kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

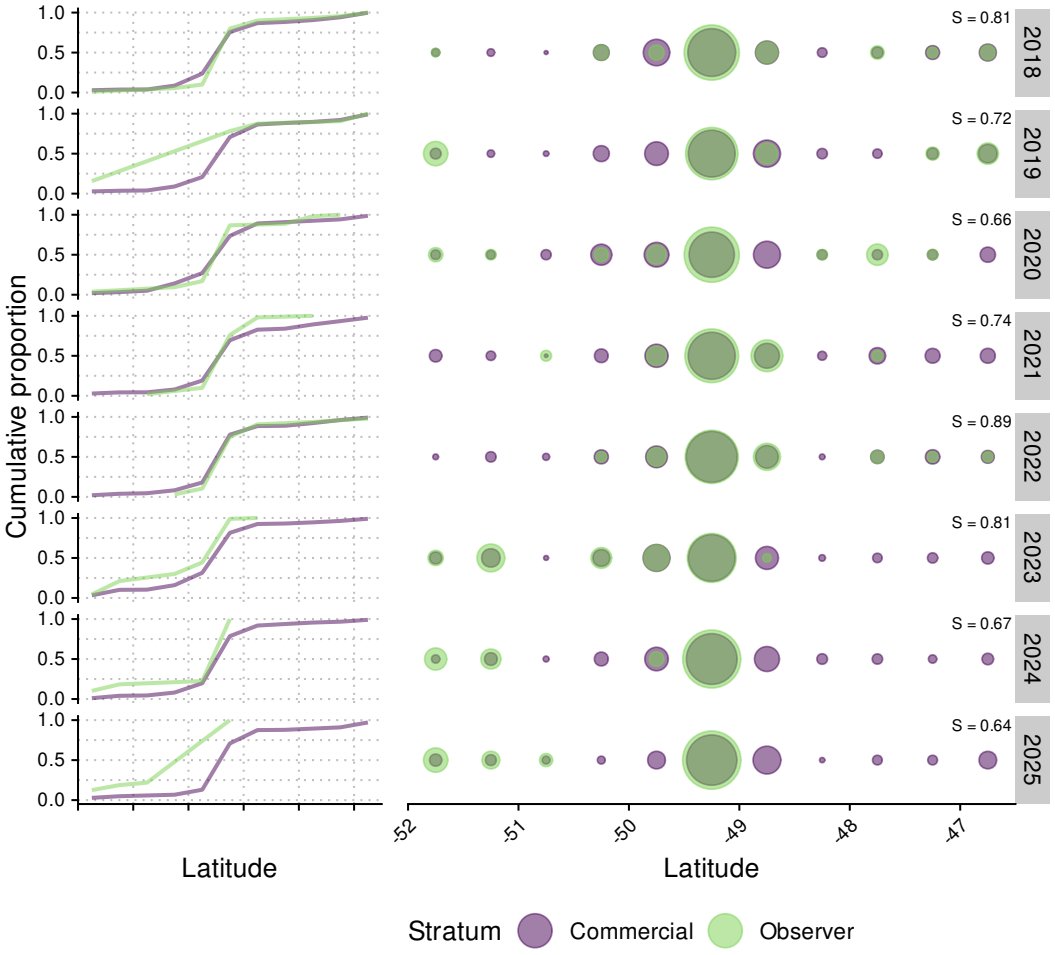


Figure 487: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in HAK 1, where the hake catch exceeded the 70kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

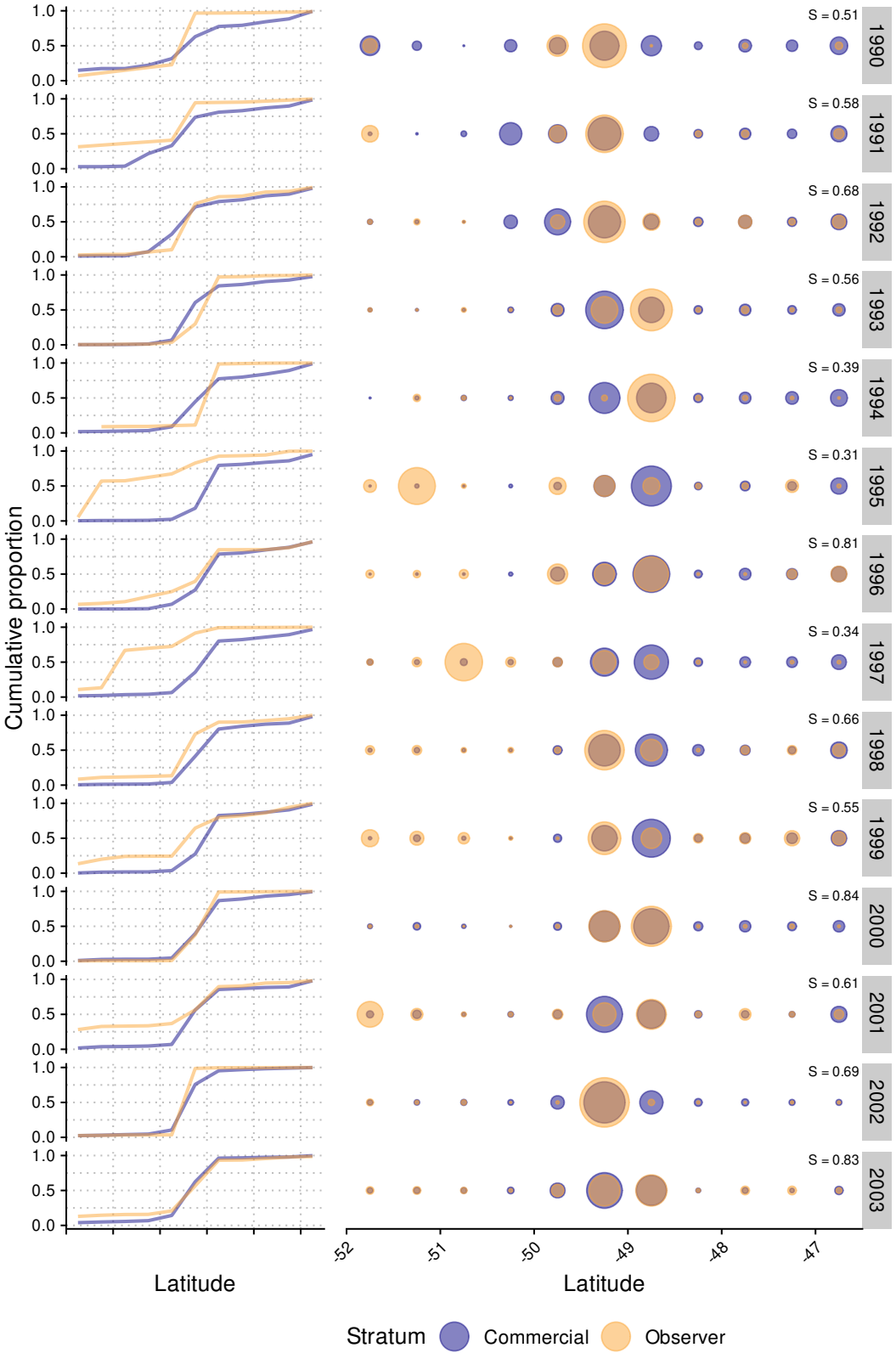


Figure 488: **Latitudinal representativeness of observer sampling coverage of Trawl catch in HAK 1, from events where the hake catch exceeded the 70kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

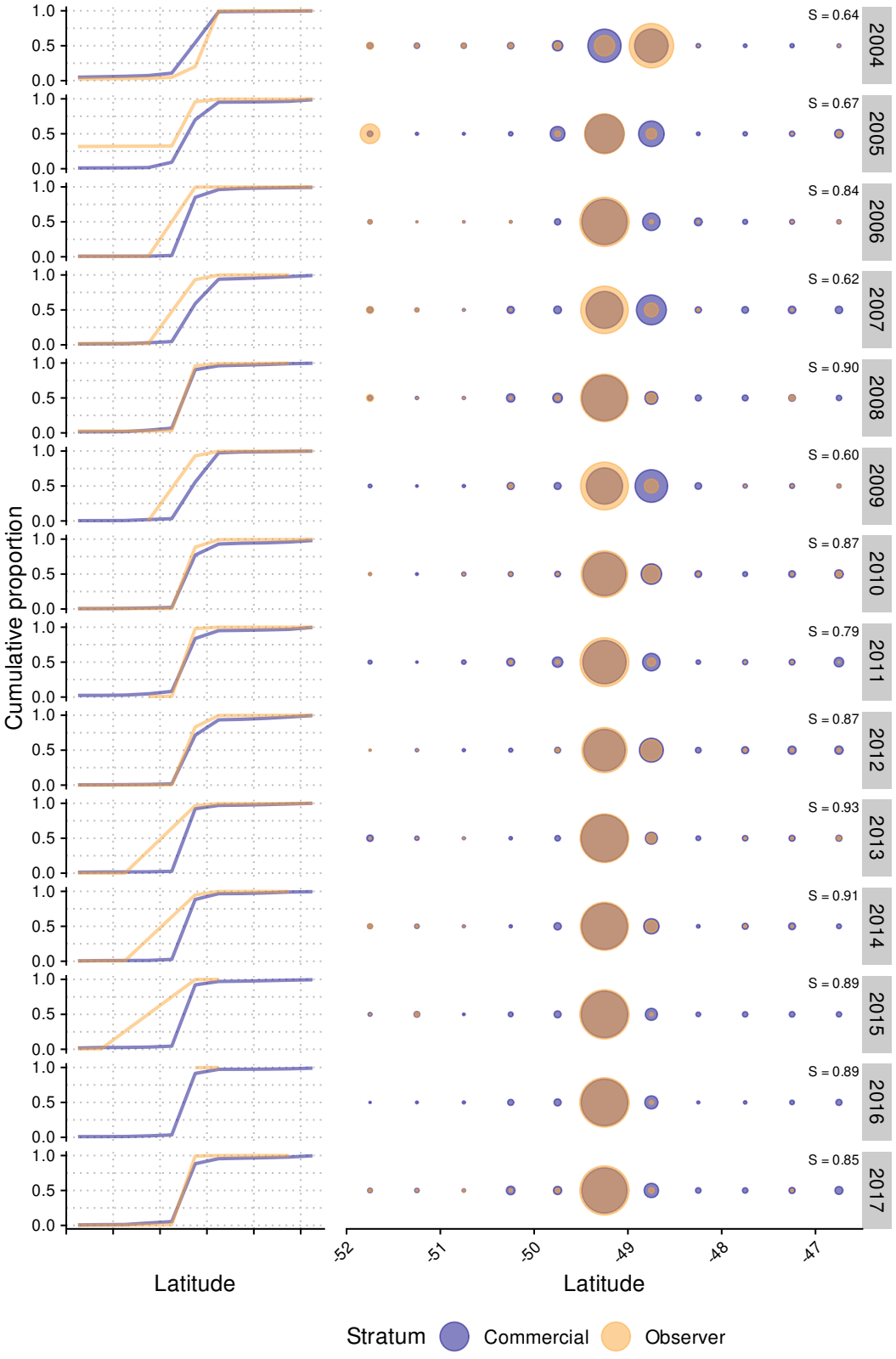


Figure 489: **Latitudinal representativeness of observer sampling coverage of Trawl catch in HAK 1, from events where the hake catch exceeded the 70kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

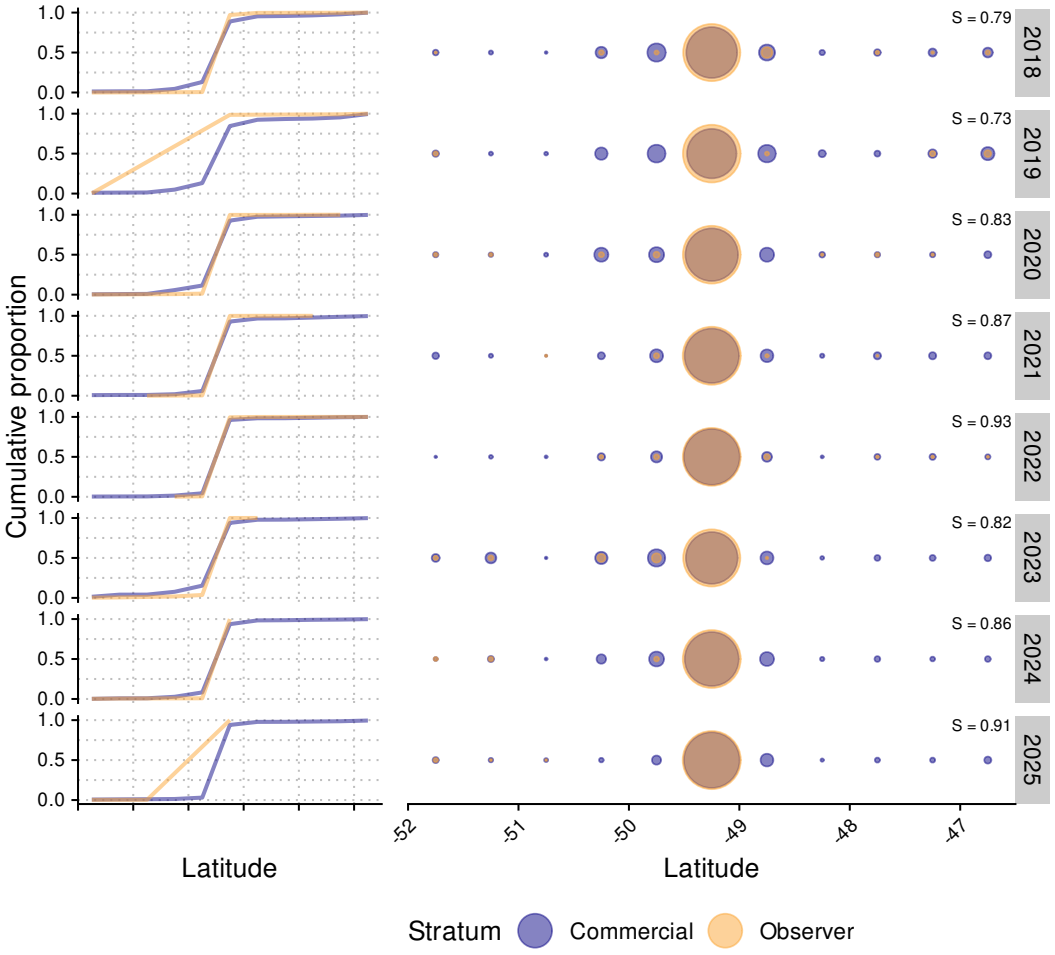


Figure 490: Latitudinal representativeness of observer sampling coverage of Trawl catch in HAK 1, from events where the hake catch exceeded the 70kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

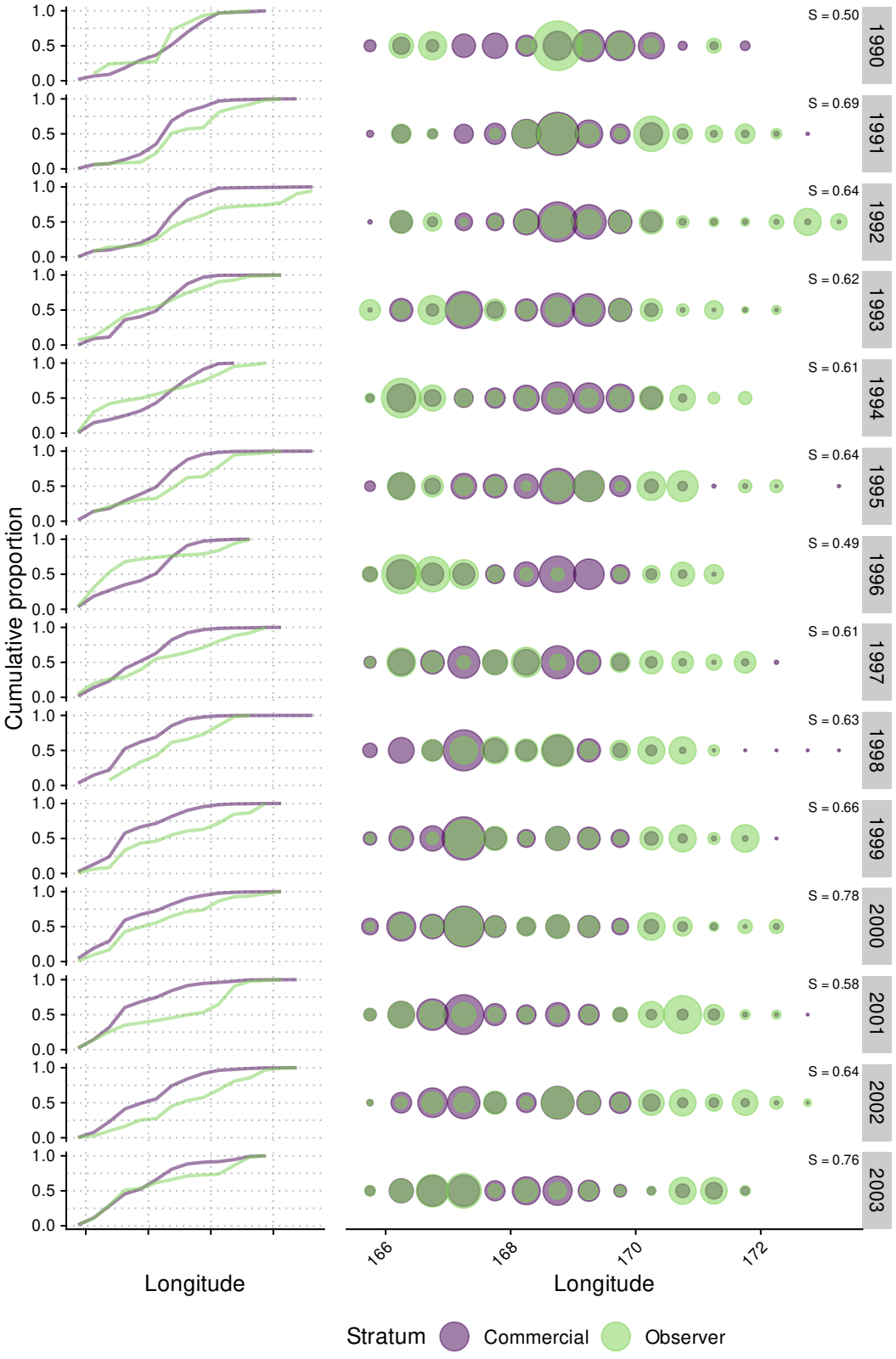


Figure 491: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in HAK 1, where the hake catch exceeded the 70kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

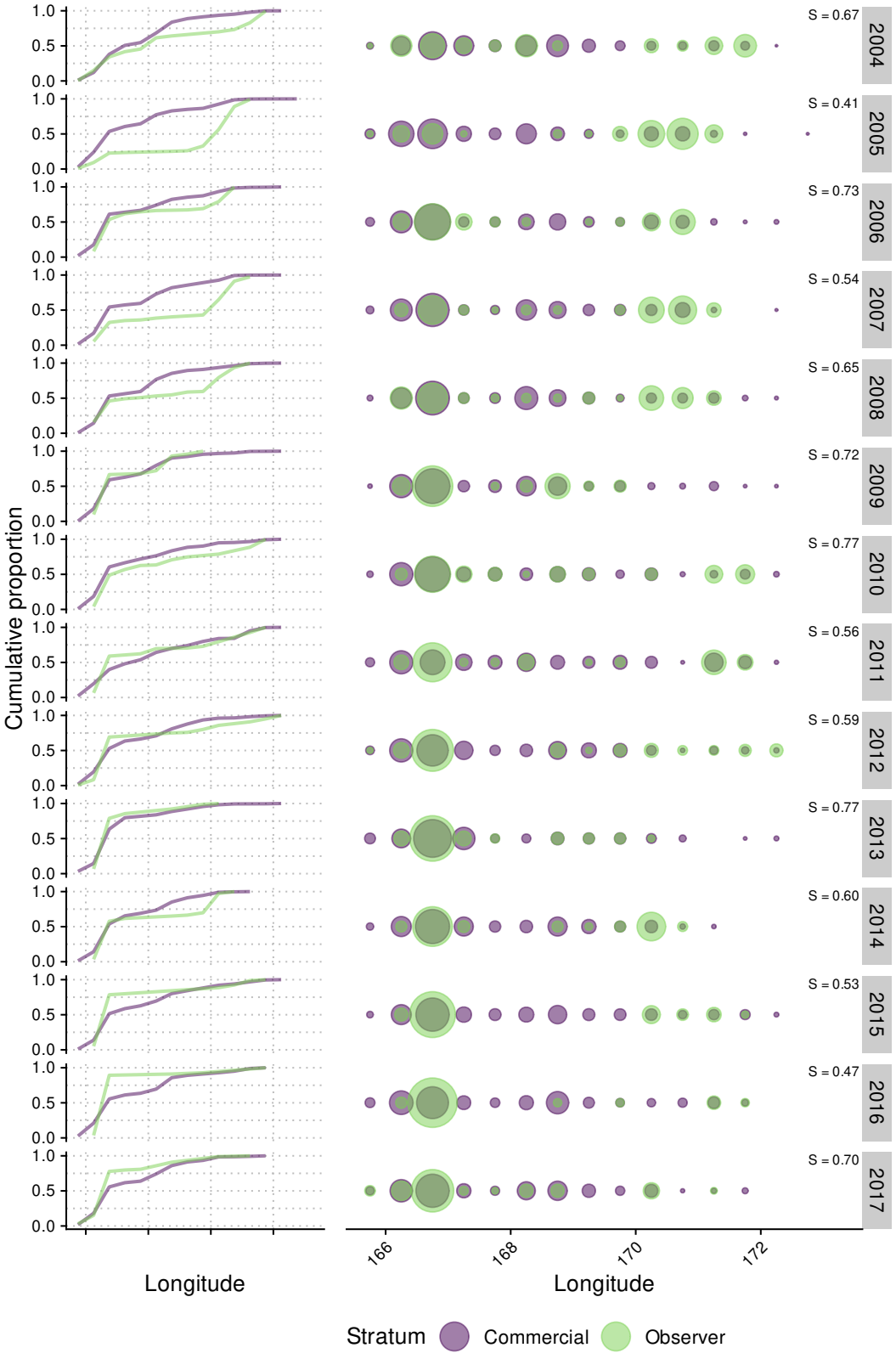


Figure 492: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in HAK 1, where the hake catch exceeded the 70kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

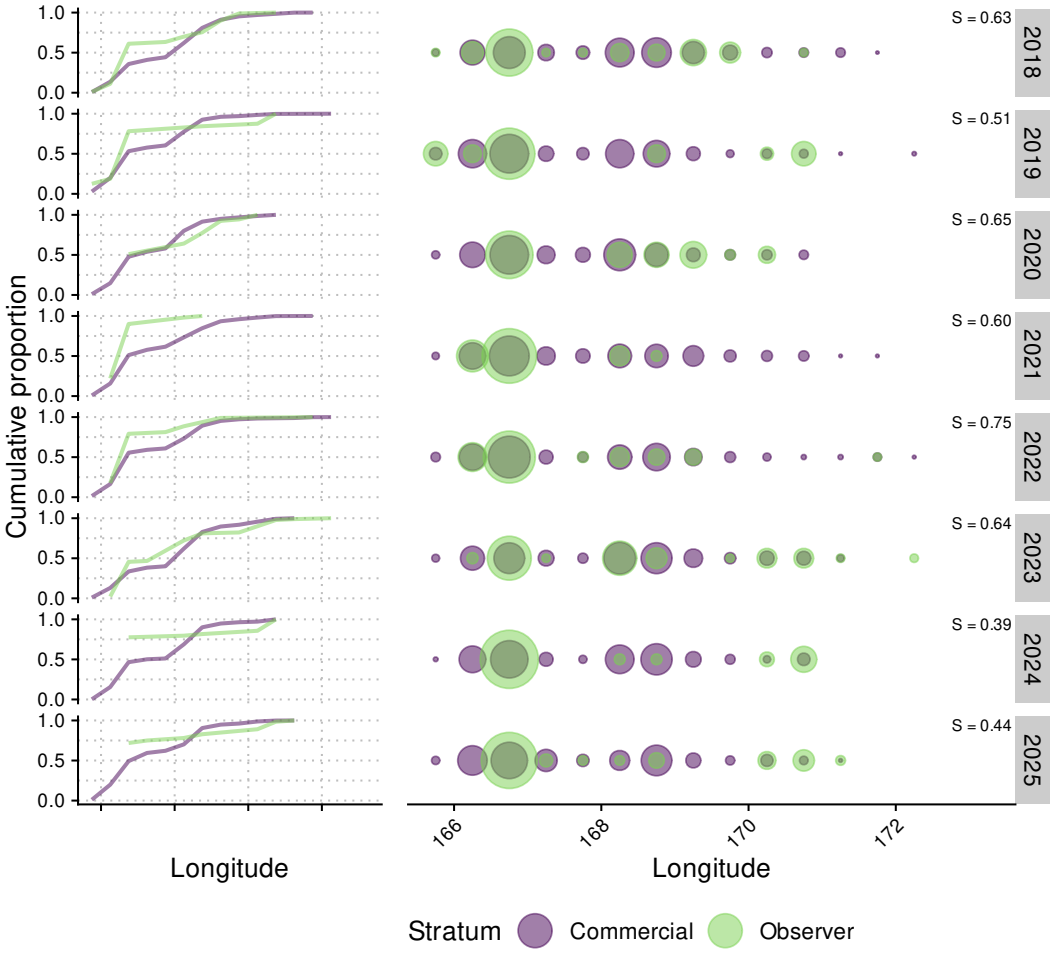


Figure 493: **Longitudinal representativeness of observer sampling coverage of Trawl fishing events in HAK 1, where the hake catch exceeded the 70kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

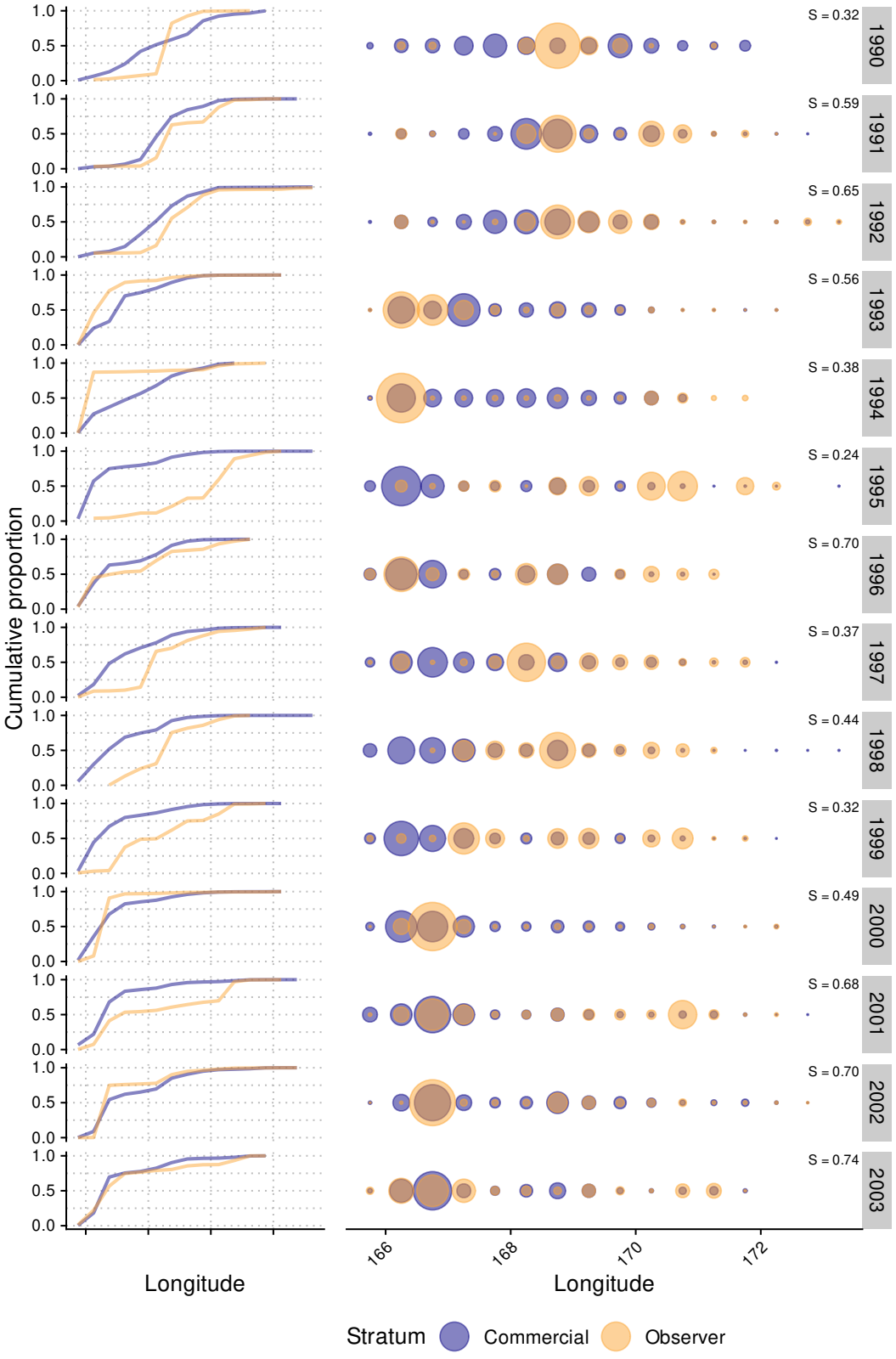


Figure 494: **Longitudinal representativeness of observer sampling coverage of Trawl catch in HAK 1, from events where the hake catch exceeded the 70kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

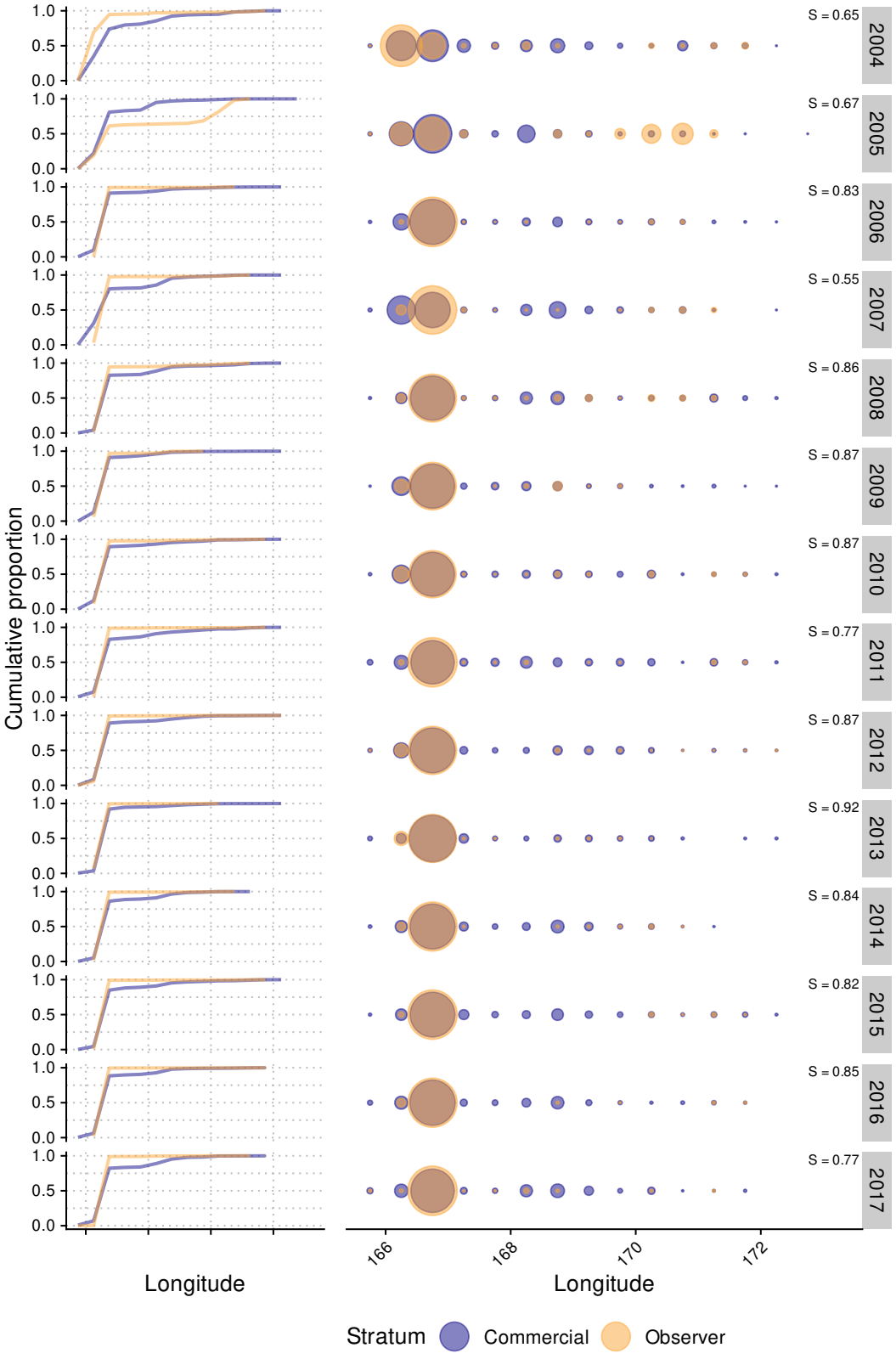


Figure 495: Longitudinal representativeness of observer sampling coverage of Trawl catch in HAK 1, from events where the hake catch exceeded the 70kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

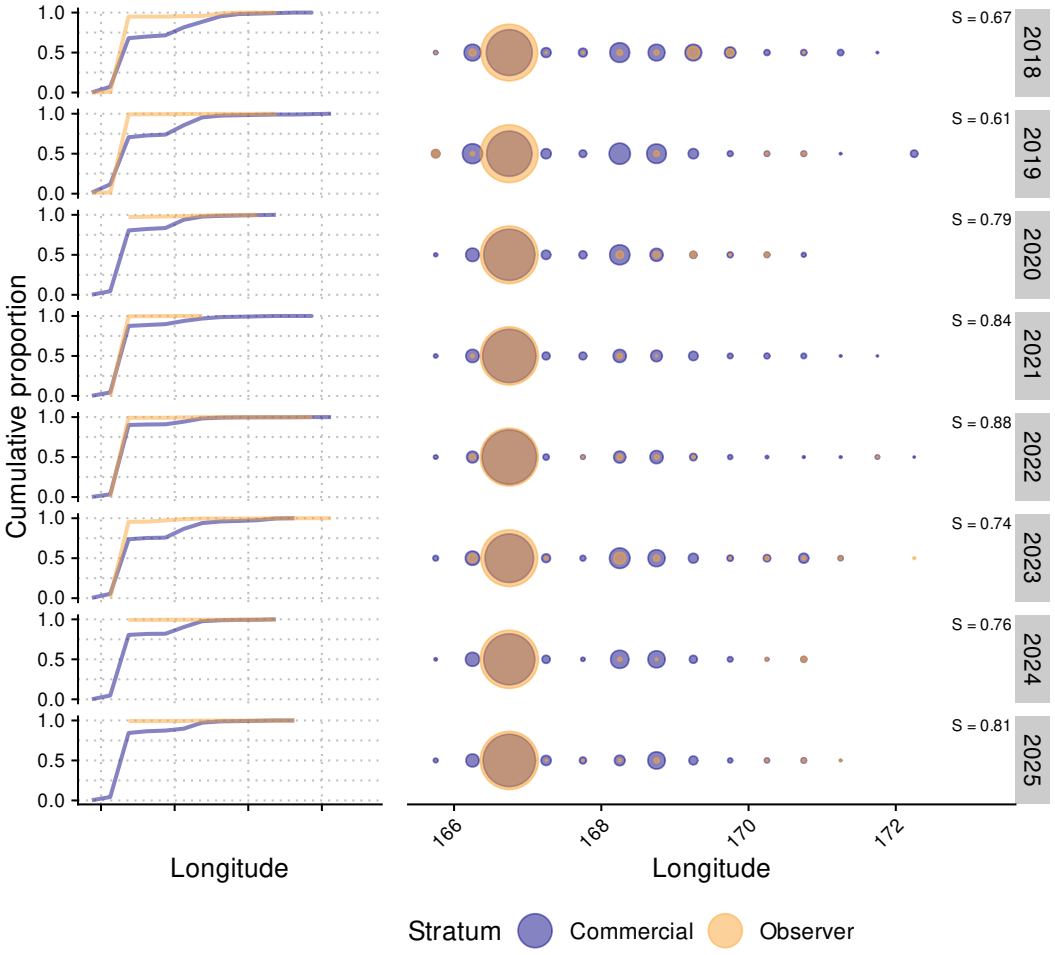


Figure 496: **Longitudinal representativeness of observer sampling coverage of Trawl catch in HAK 1, from events where the hake catch exceeded the 70kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

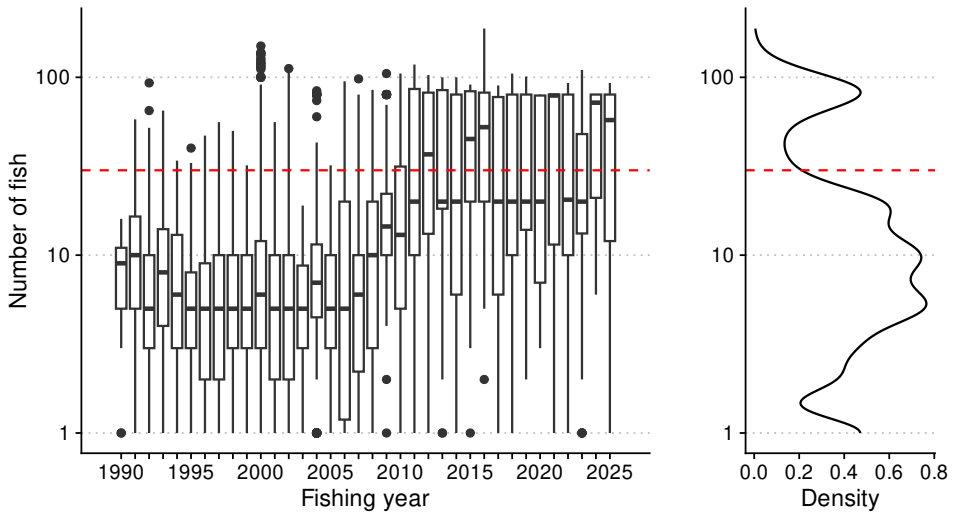


Figure 497: **Length-frequency sample sizes for observed fishing events in HAK 1 where hake were sampled. The red dashed line indicates a sample size of 30 fish.**

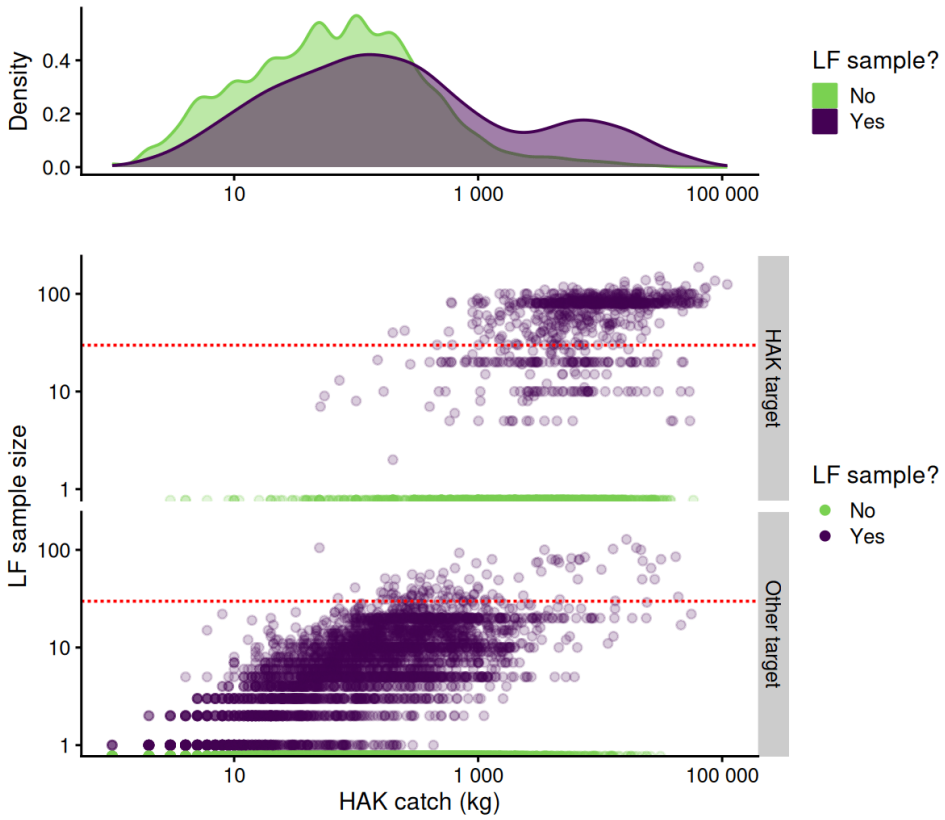


Figure 498: Length-frequency sample sizes (number of fish sampled) for observed fishing events in HAK 1 in relation to the total hake catch from an event, separately for hake target events and other target species. The red dashed line indicates a sample size of 30 fish.

2.9.1.2 Otolith samples

Table 42: Otolith samples of hake from the HAK 1 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of hake exceeded a potential sampling threshold of 70 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	1 569	0	0	0.00
1991	3 042	0	0	0.00
1992	4 016	0	0	0.00
1993	3 456	0	0	0.00
1994	1 730	0	0	0.00
1995	1 795	0	0	0.00
1996	1 535	0	0	0.00
1997	2 066	0	0	0.00
1998	3 030	0	0	0.00
1999	2 781	0	0	0.00
2000	3 731	0	0	0.00
2001	3 605	0	0	0.00
2002	3 665	0	0	0.00
2003	2 579	0	0	0.00
2004	2 295	0	0	0.00
2005	1 400	0	0	0.00
2006	985	0	0	0.00
2007	1 164	0	0	0.00
2008	1 322	0	0	0.00
2009	1 099	9	48	0.82
2010	1 084	48	272	4.43
2011	1 026	27	241	2.63
2012	1 073	87	547	8.11
2013	1 120	56	344	5.00
2014	1 012	115	532	11.36
2015	1 081	8	36	0.74
2016	797	20	98	2.51
2017	820	86	337	10.49
2018	1 658	89	442	5.37
2019	1 138	30	156	2.64
2020	918	50	255	5.45
2021	1 166	47	223	4.03
2022	1 029	85	797	8.26
2023	1 224	90	572	7.35
2024	898	49	404	5.46
2025	964	64	537	6.64

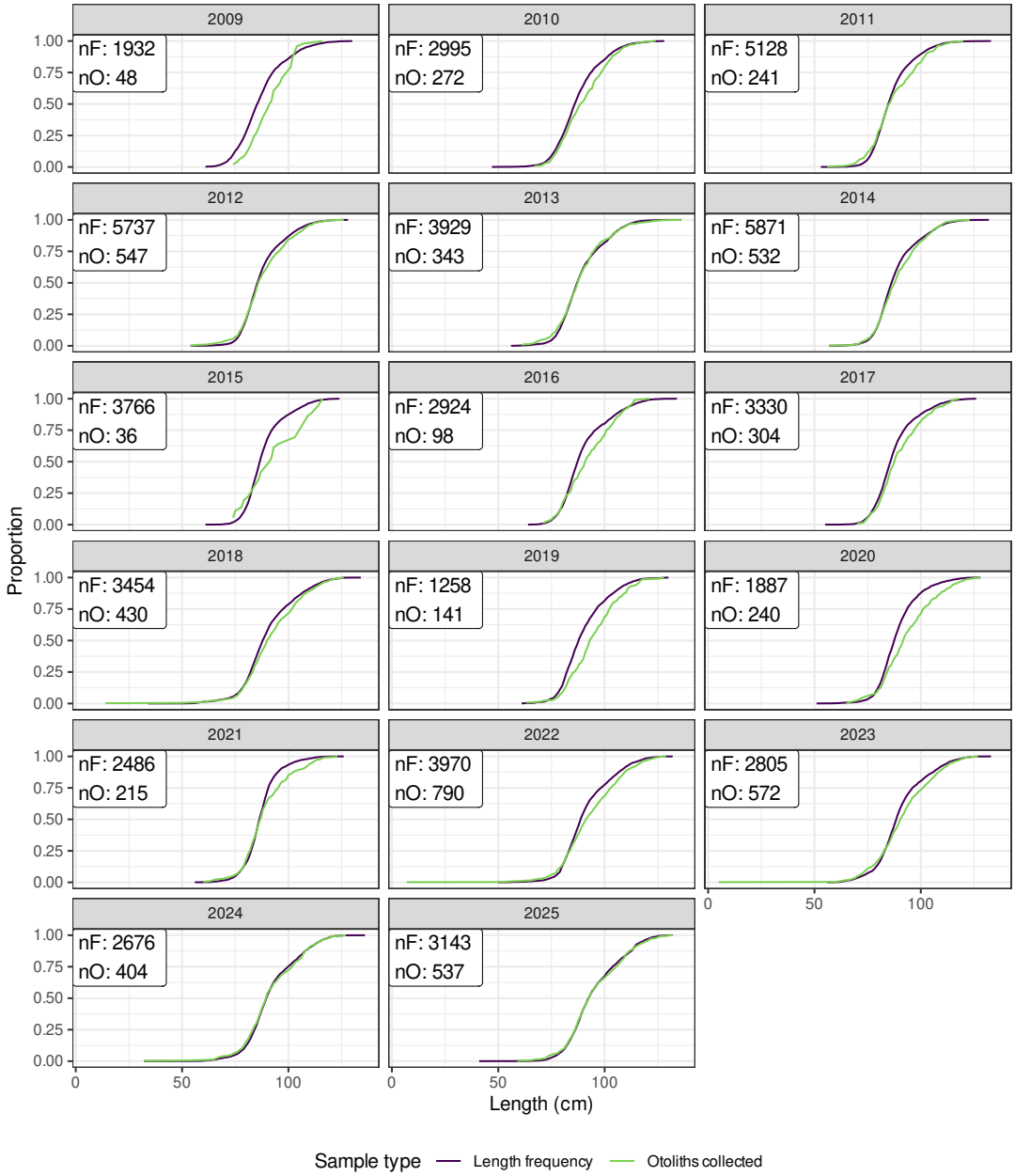


Figure 499: Cumulative distributions of the length of fish in the length frequency and otolith samples of hake in the HAK 1 Trawl fishery for the 2009 to 2025 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

2.9.1.3 Catch quantification

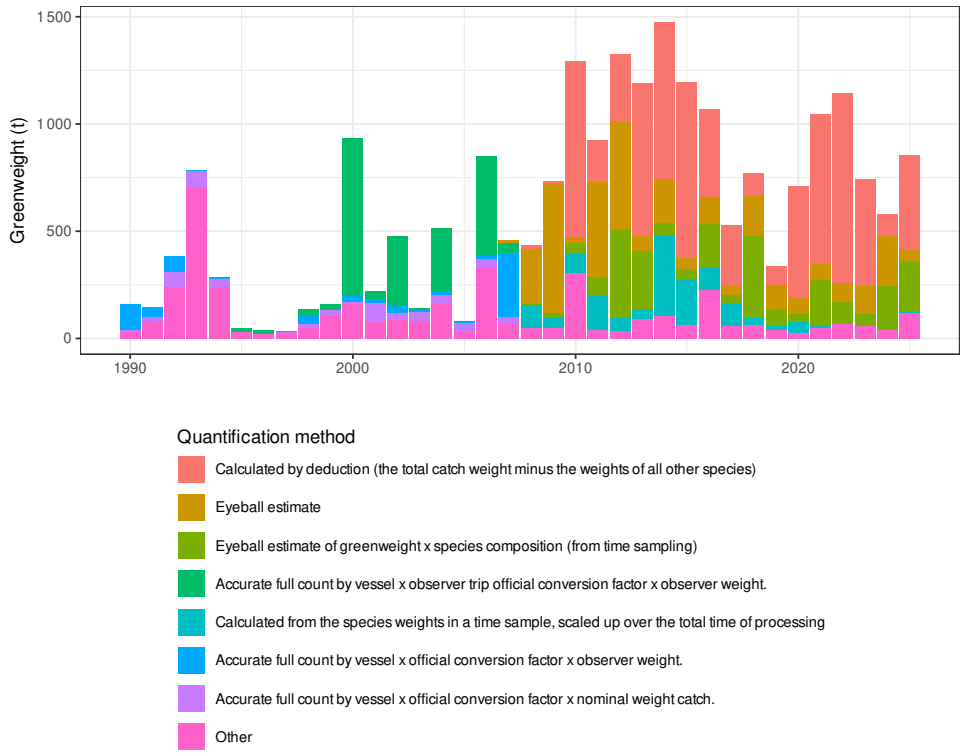


Figure 500: Methods used by observers to quantify the catch of hake in the HAK 1 Trawl fishery. The legend lists the methods used in descending order of total catch.

2.9.2 HAK 4: Trawl fishery

2.9.2.1 Length-frequency samples

Table 43: Length-frequency samples of hake from the HAK 4 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of hake exceeded a potential sampling threshold of 70 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	1 009	25	103	2.48
1991	2 054	201	4 028	9.79
1992	2 730	118	2 205	4.32
1993	2 195	51	418	2.32
1994	1 373	131	1 029	9.54
1995	2 725	90	1 240	3.30
1996	2 933	124	2 457	4.23
1997	4 061	69	906	1.70
1998	4 782	546	6 932	11.42
1999	3 943	331	2 812	8.39
2000	3 828	332	2 398	8.67
2001	3 787	379	3 522	10.01
2002	2 822	201	1 474	7.12
2003	2 907	198	1 260	6.81
2004	2 820	199	1 398	7.06
2005	1 910	179	1 568	9.37
2006	1 001	148	846	14.79
2007	1 501	132	1 094	8.79
2008	1 600	112	1 357	7.00
2009	1 667	51	394	3.06
2010	1 060	55	546	5.19
2011	1 006	63	626	6.26
2012	608	17	76	2.80
2013	580	57	905	9.83
2014	587	44	490	7.50
2015	754	69	1 204	9.15
2016	878	51	755	5.81
2017	926	18	235	1.94
2018	1 845	31	399	1.68
2019	1 865	22	272	1.18
2020	1 273	38	689	2.99
2021	1 456	17	221	1.17
2022	1 383	65	751	4.70
2023	1 308	37	235	2.83
2024	1 546	68	850	4.40
2025	1 254	19	309	1.52

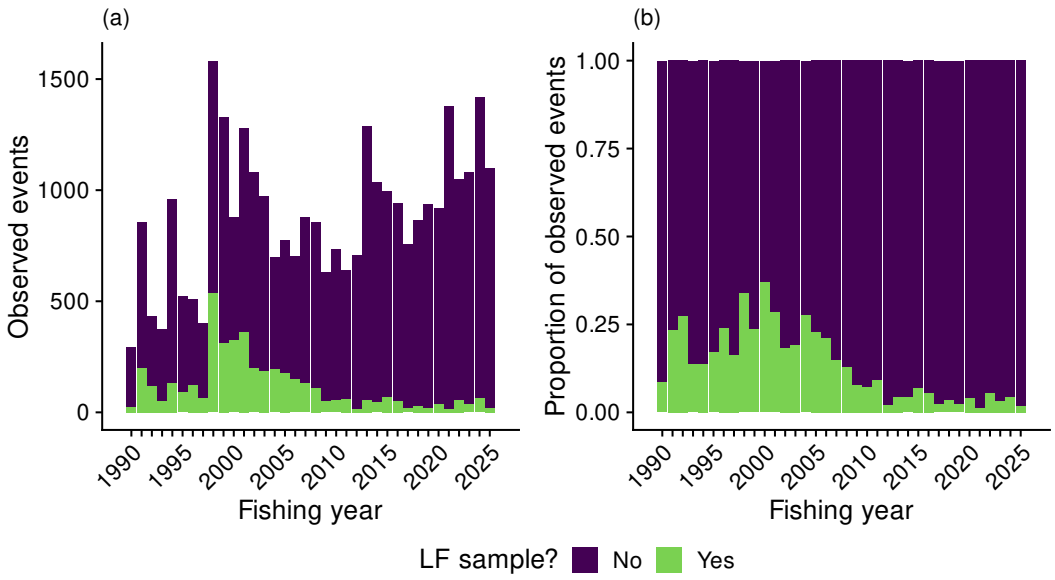


Figure 501: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in HAK 4 where the hake catch exceeded the 70 kg threshold, with and without length-frequency sampling.**

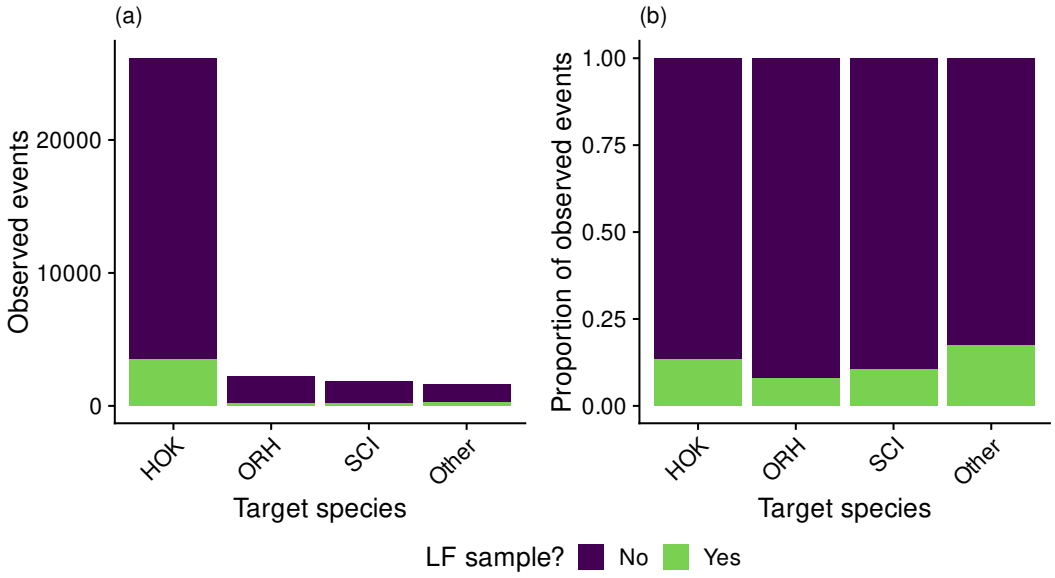


Figure 502: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in HAK 4 where the hake catch exceeded the 70 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

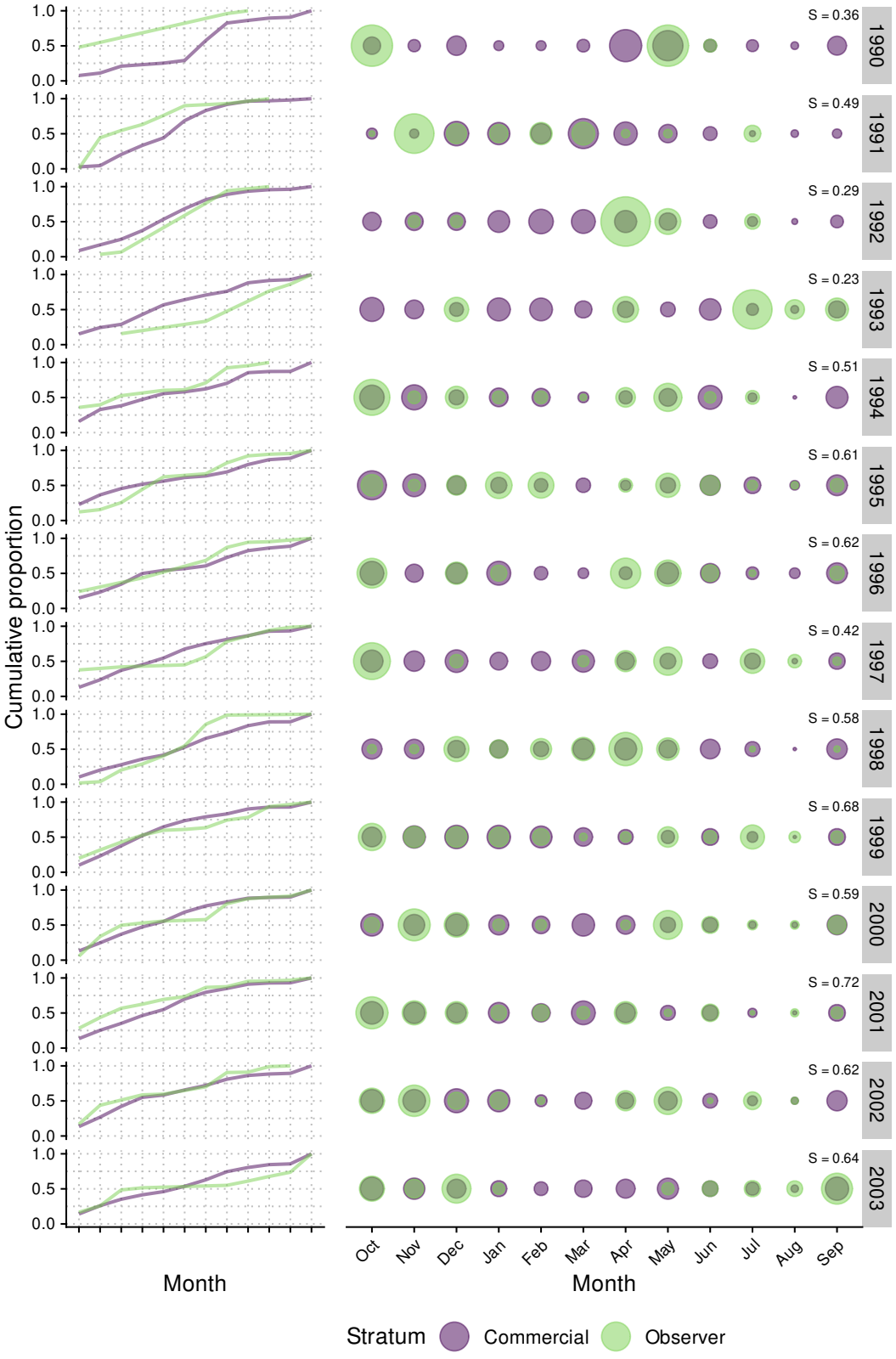


Figure 503: Monthly representativeness of observer sampling coverage of Trawl fishing events in HAK 4, where the hake catch exceeded the 70kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

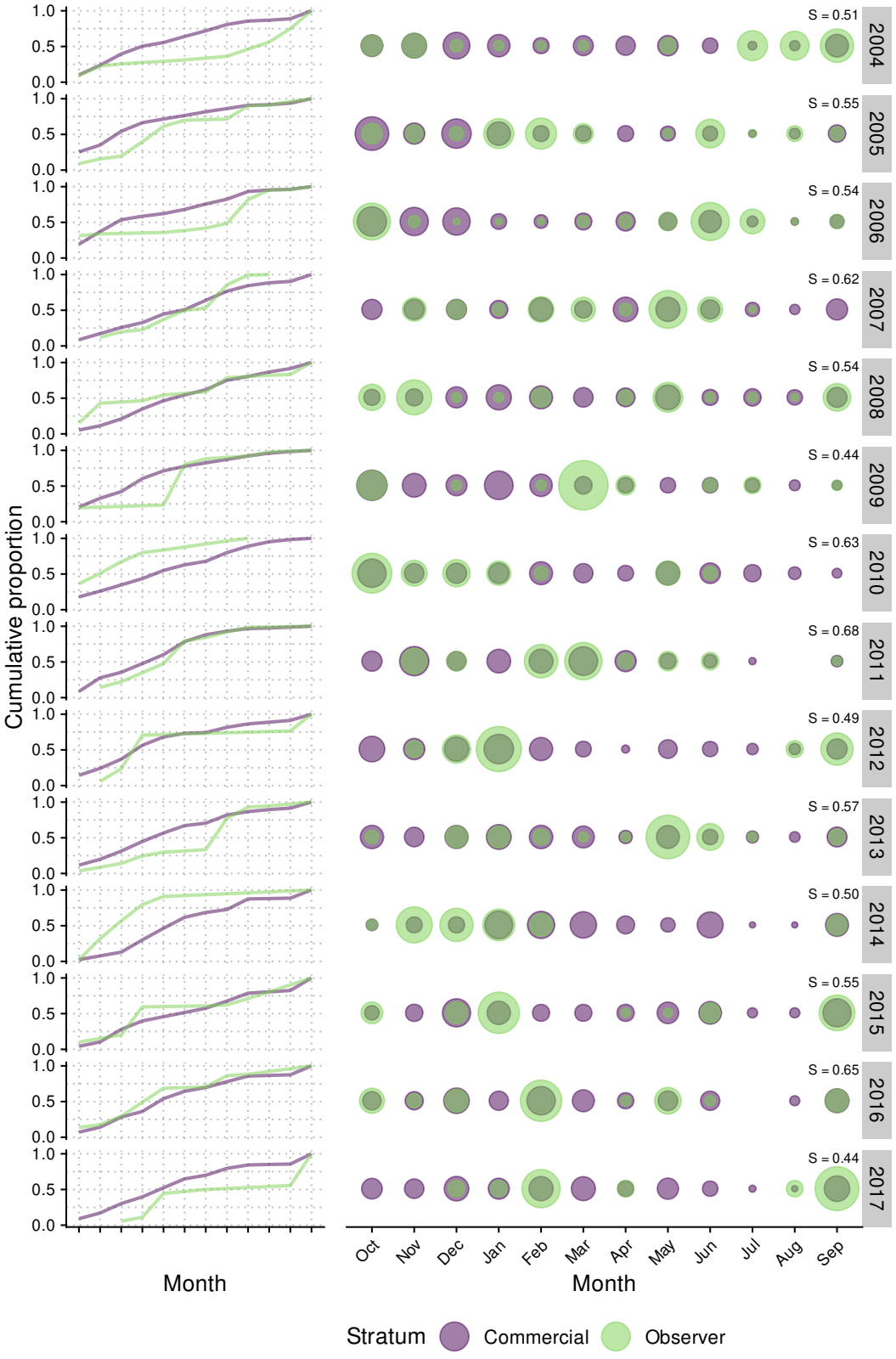


Figure 504: Monthly representativeness of observer sampling coverage of Trawl fishing events in HAK 4, where the hake catch exceeded the 70kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

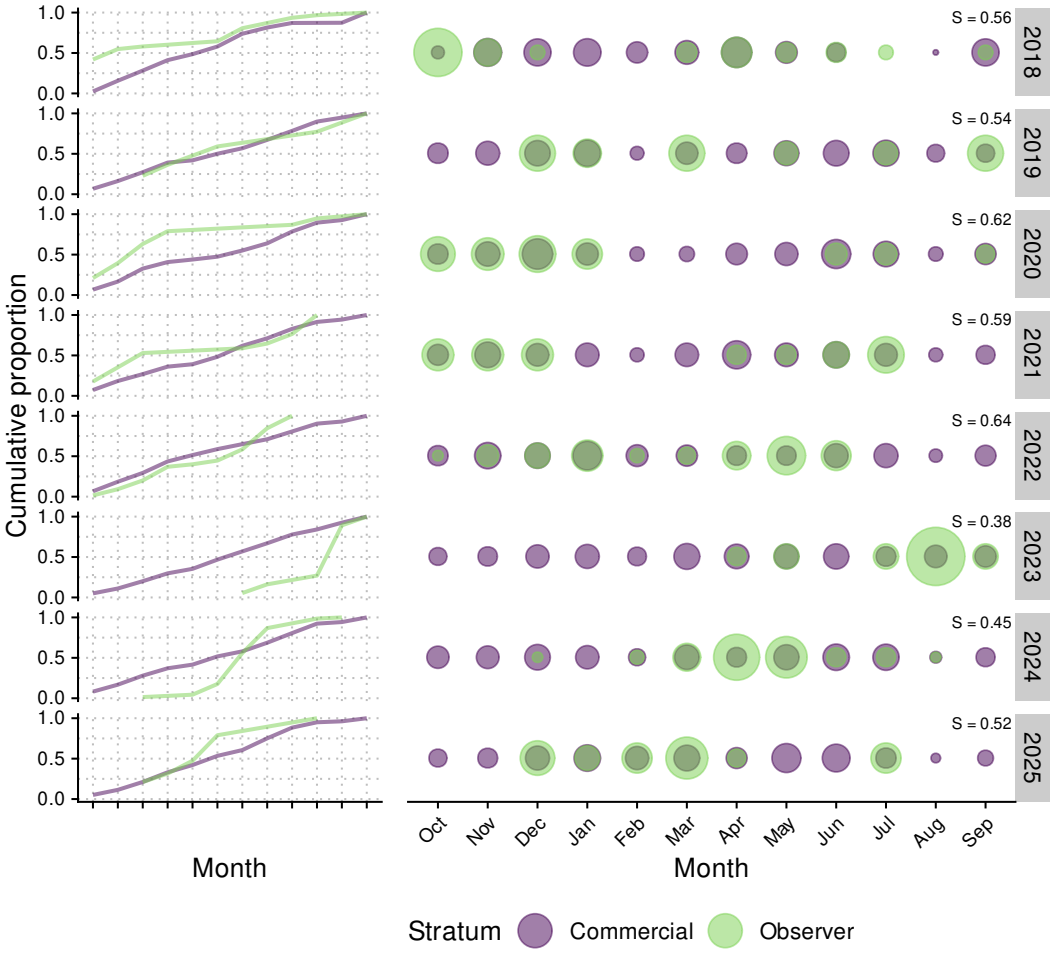


Figure 505: Monthly representativeness of observer sampling coverage of Trawl fishing events in HAK 4, where the hake catch exceeded the 70kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

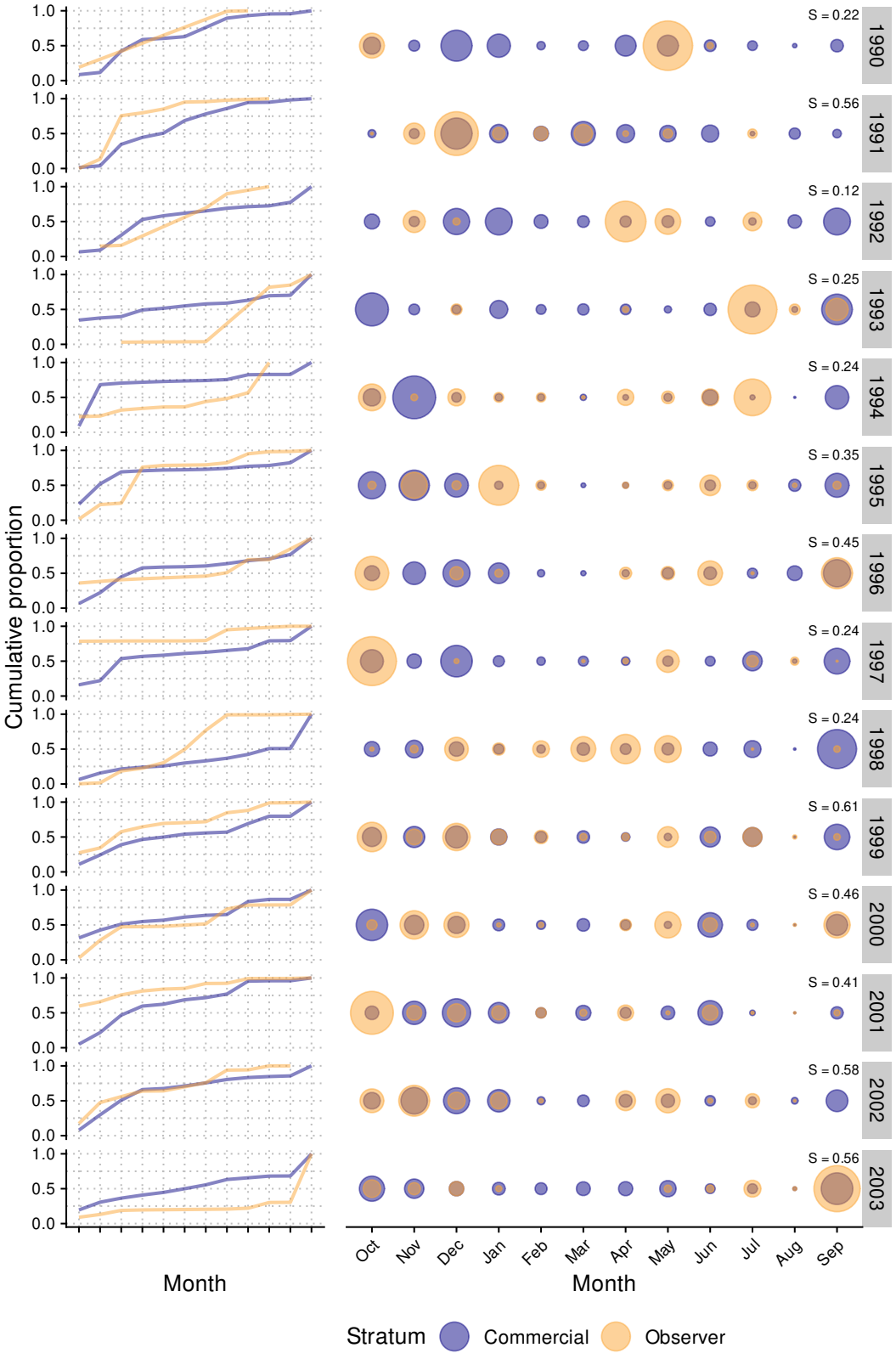


Figure 506: **Monthly representativeness of observer sampling coverage of Trawl catch in HAK 4, from events where the hake catch exceeded the 70kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

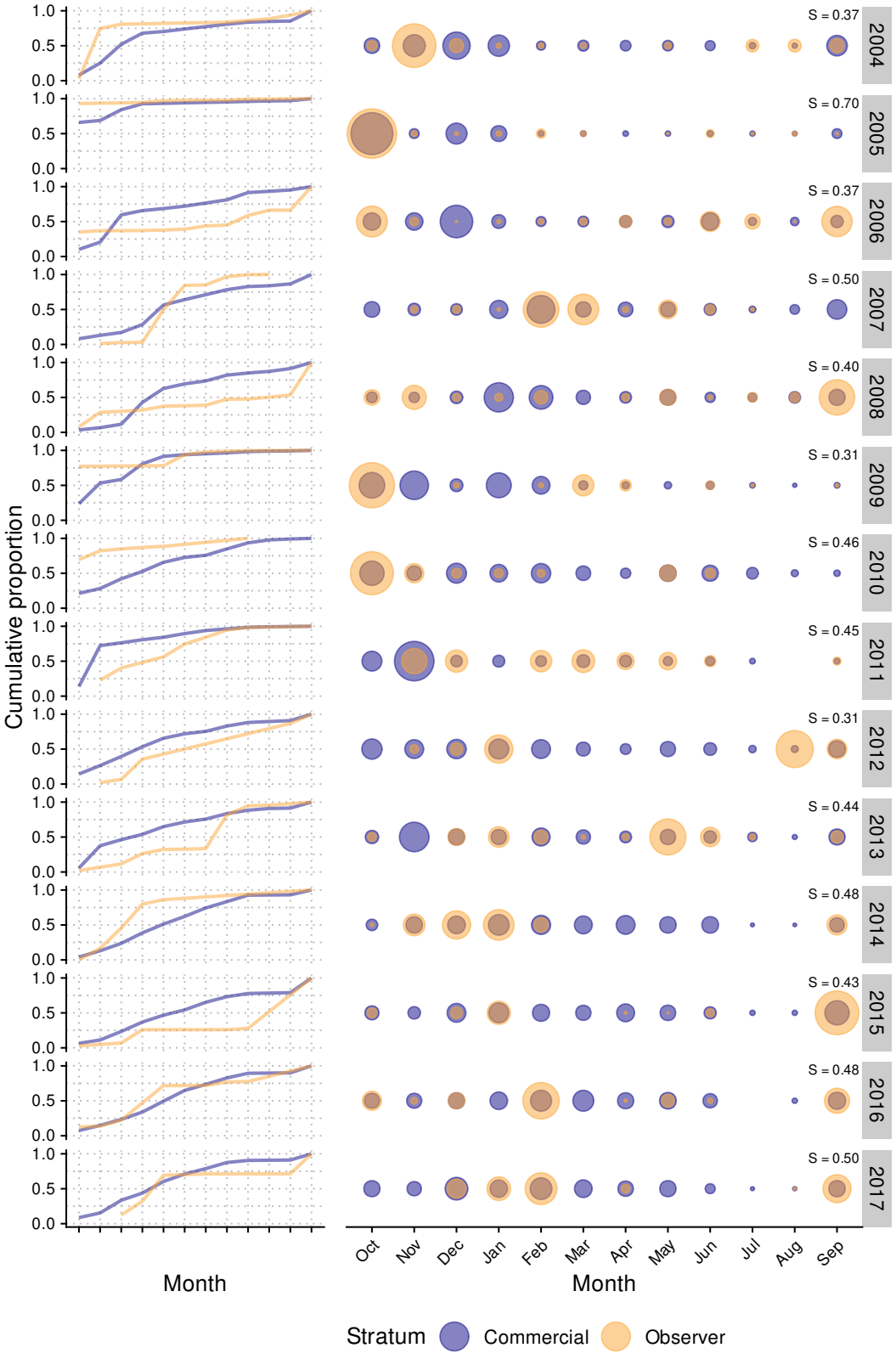


Figure 507: **Monthly representativeness of observer sampling coverage of Trawl catch in HAK 4, from events where the hake catch exceeded the 70kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

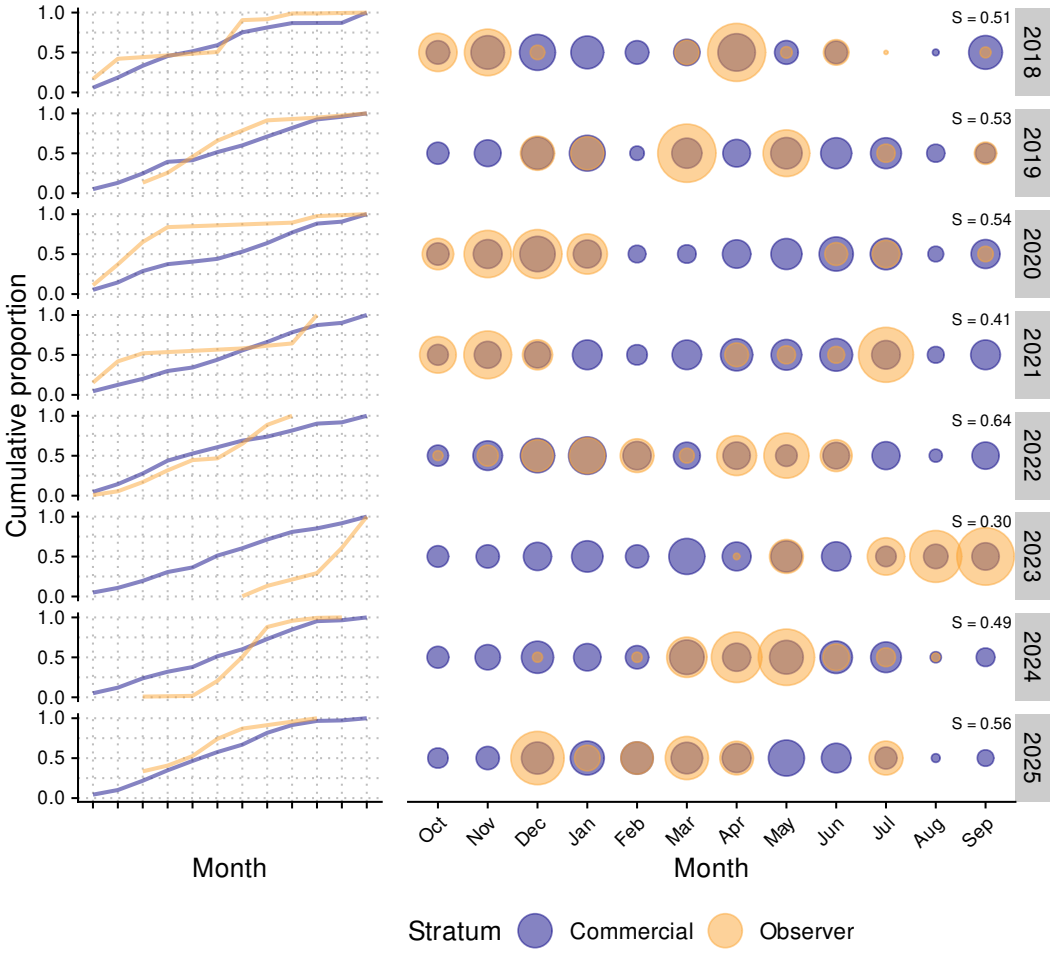


Figure 508: Monthly representativeness of observer sampling coverage of Trawl catch in HAK 4, from events where the hake catch exceeded the 70kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

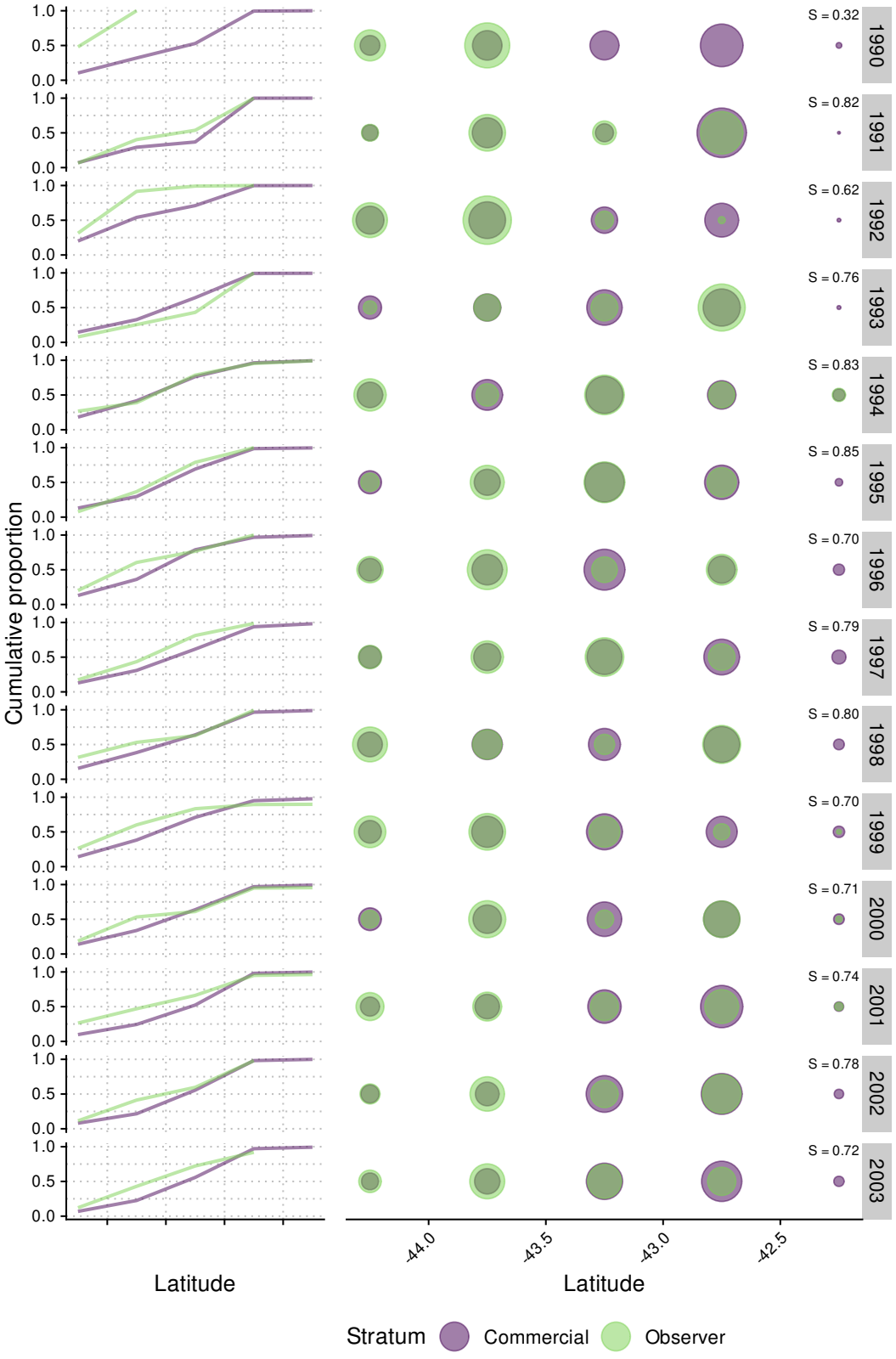


Figure 509: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in HAK 4, where the hake catch exceeded the 70kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

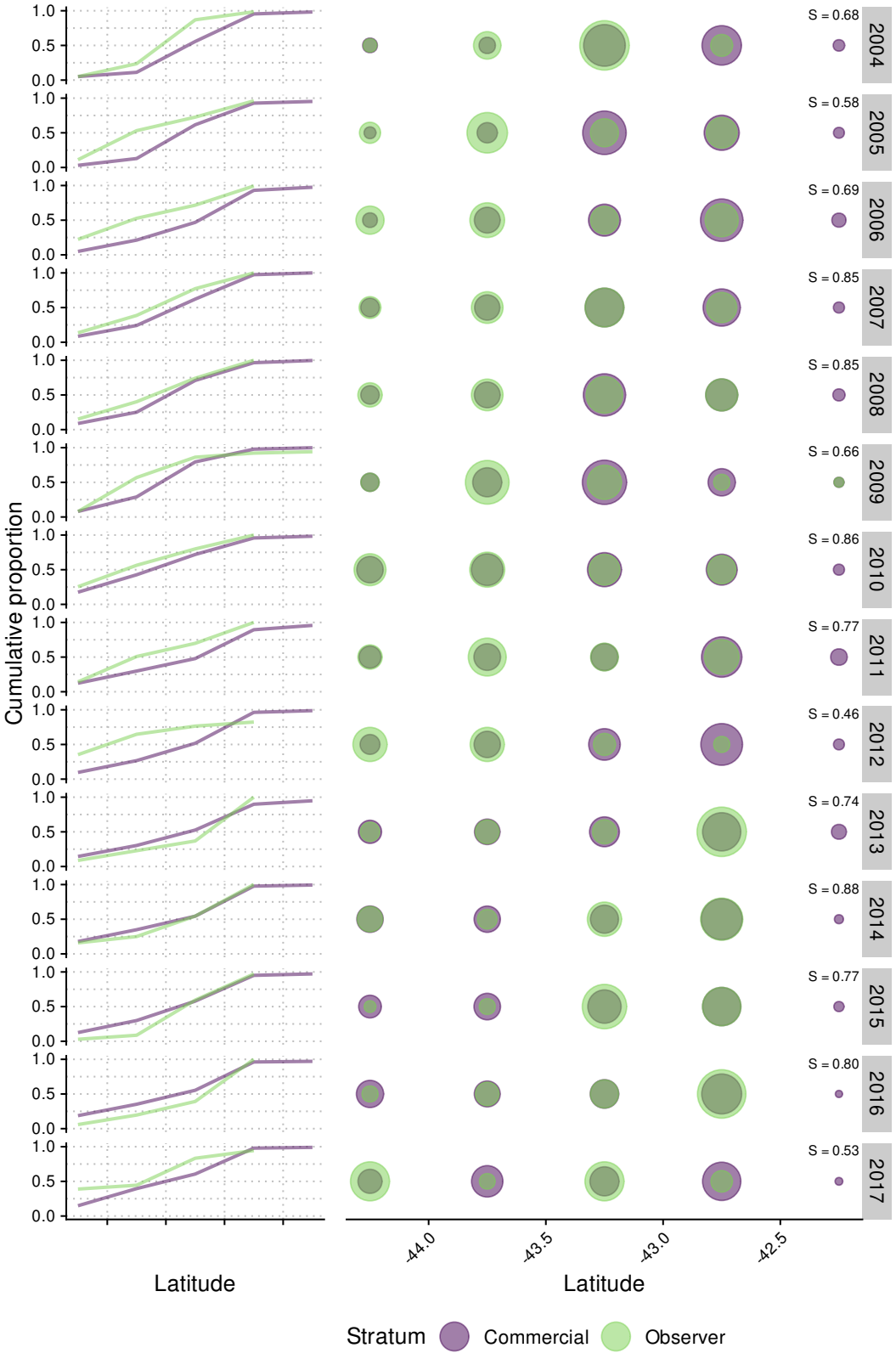


Figure 510: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in HAK 4, where the hake catch exceeded the 70kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

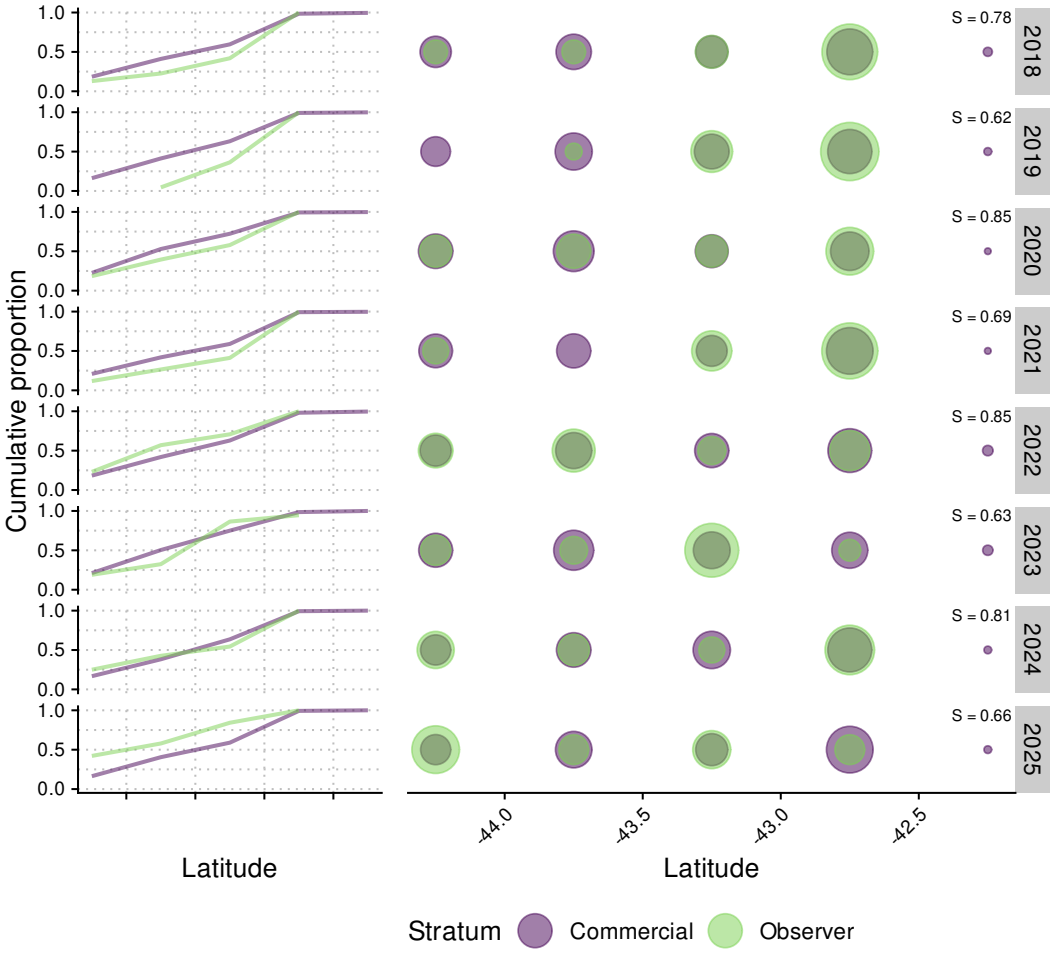


Figure 511: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in HAK 4, where the hake catch exceeded the 70kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

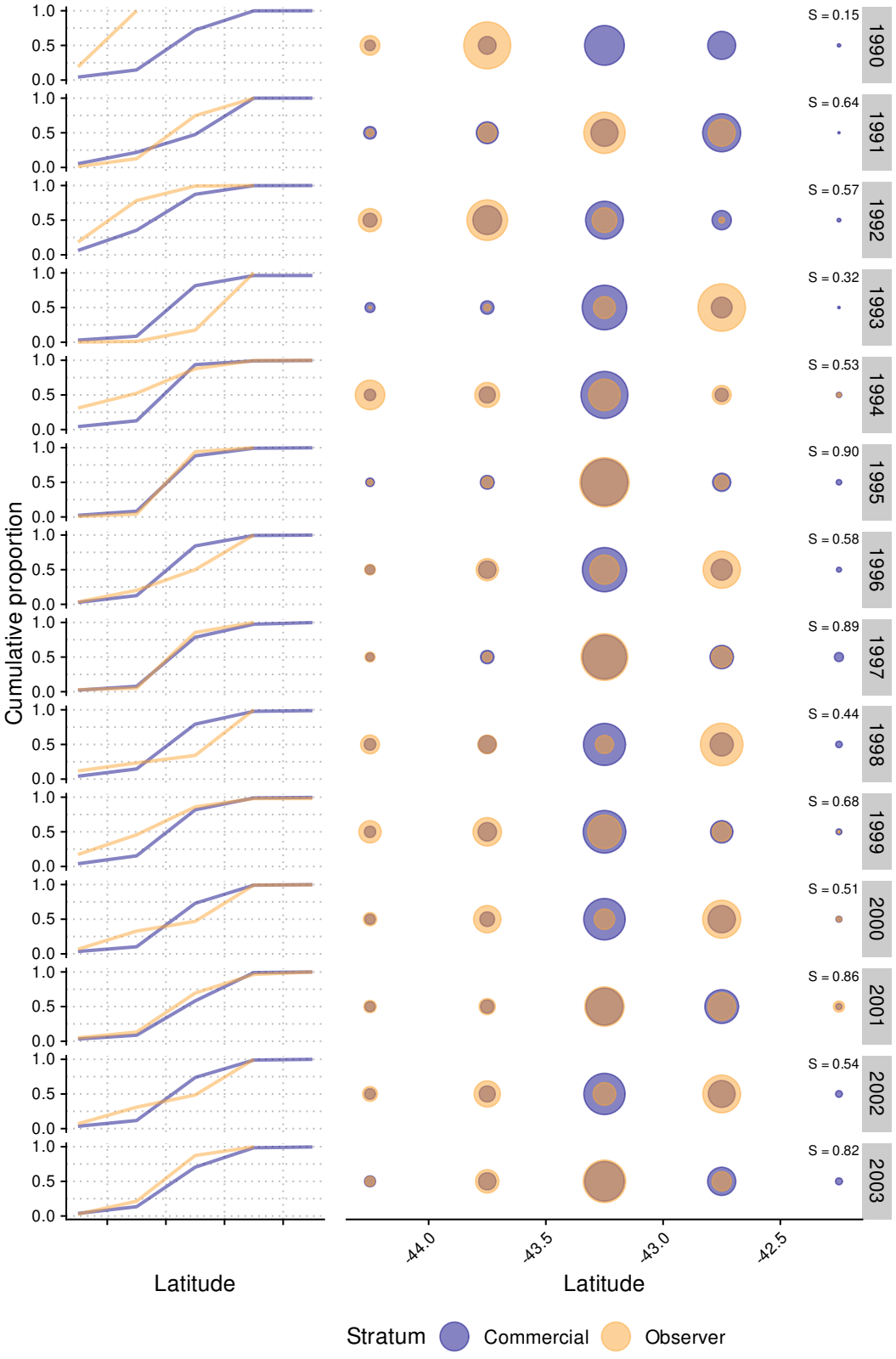


Figure 512: **Latitudinal representativeness of observer sampling coverage of Trawl catch in HAK 4, from events where the hake catch exceeded the 70kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

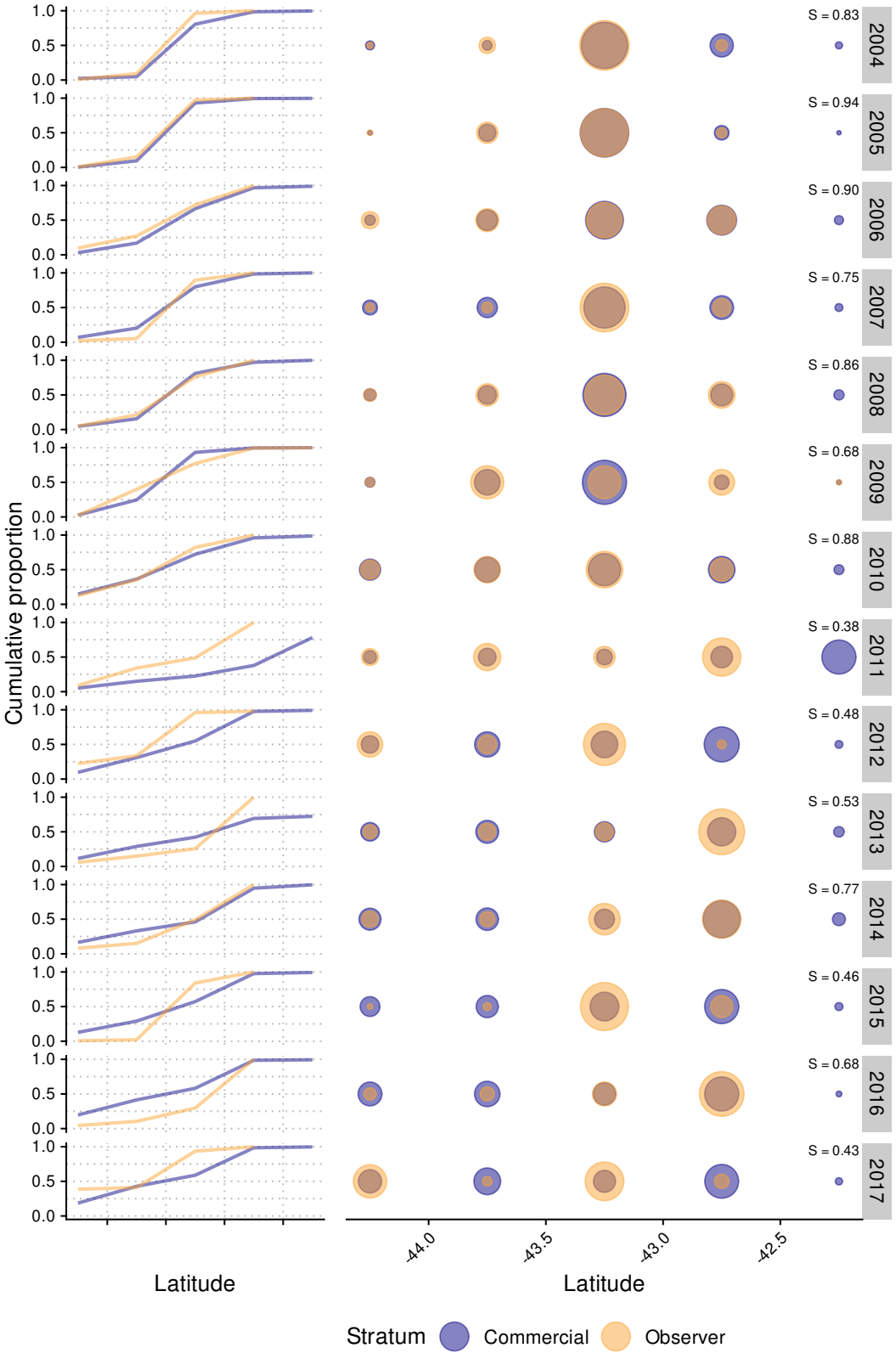


Figure 513: **Latitudinal representativeness of observer sampling coverage of Trawl catch in HAK 4, from events where the hake catch exceeded the 70kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

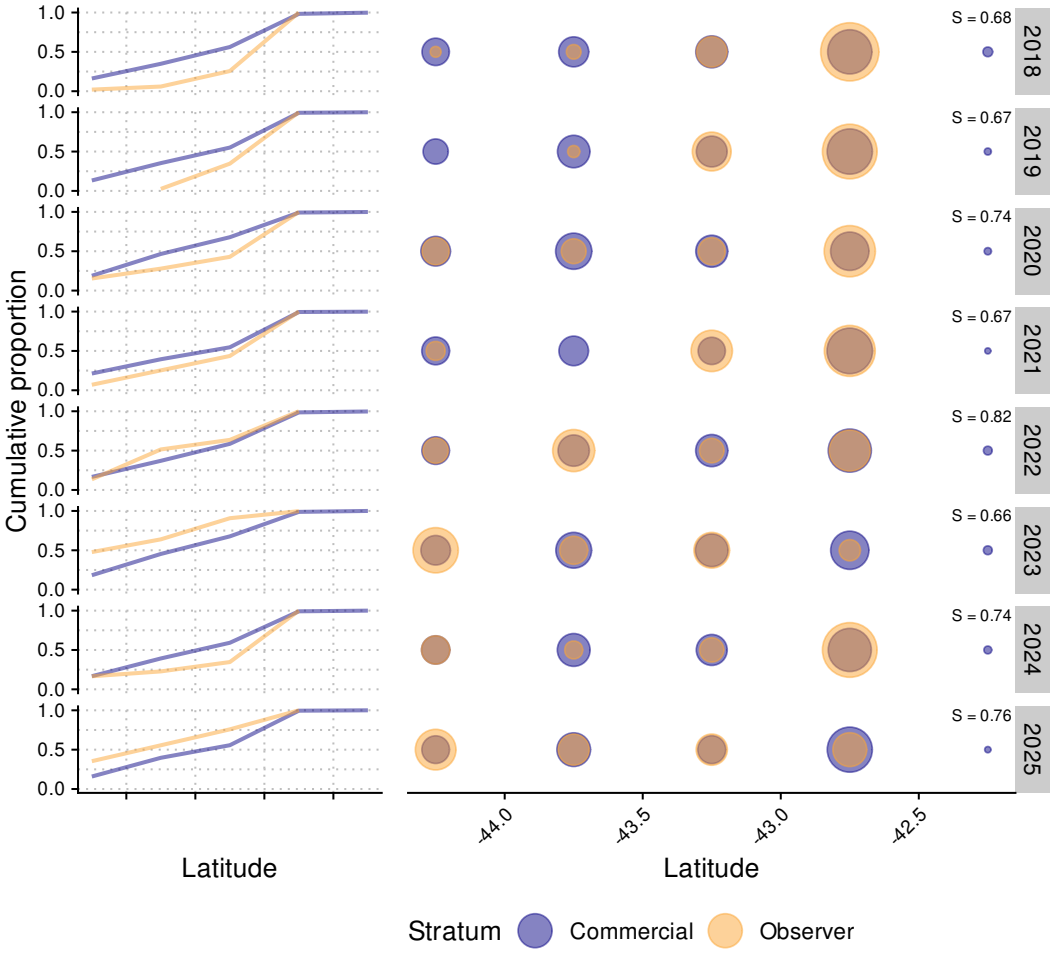


Figure 514: Latitudinal representativeness of observer sampling coverage of Trawl catch in HAK 4, from events where the hake catch exceeded the 70kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

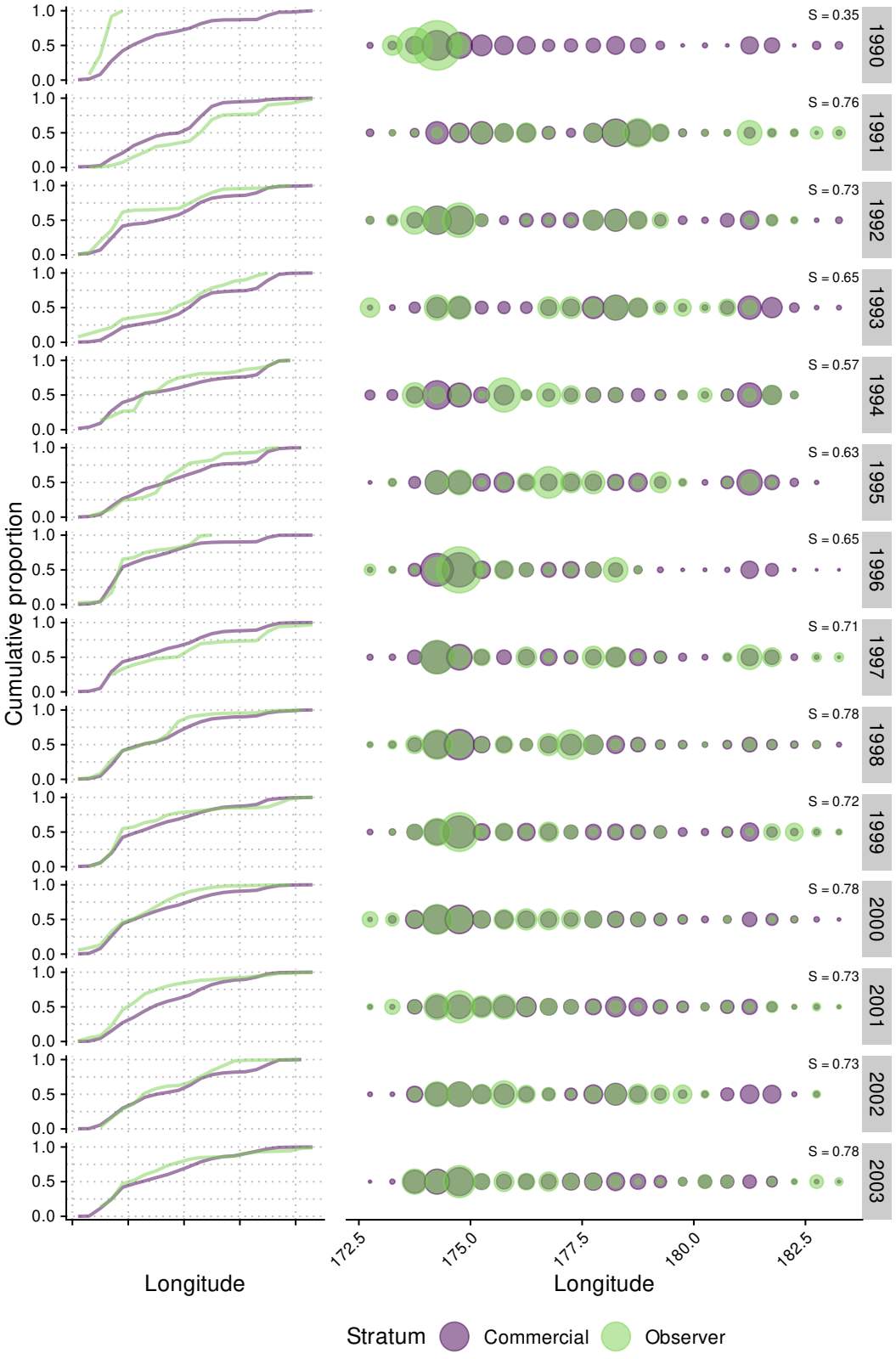


Figure 515: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in HAK 4, where the hake catch exceeded the 70kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

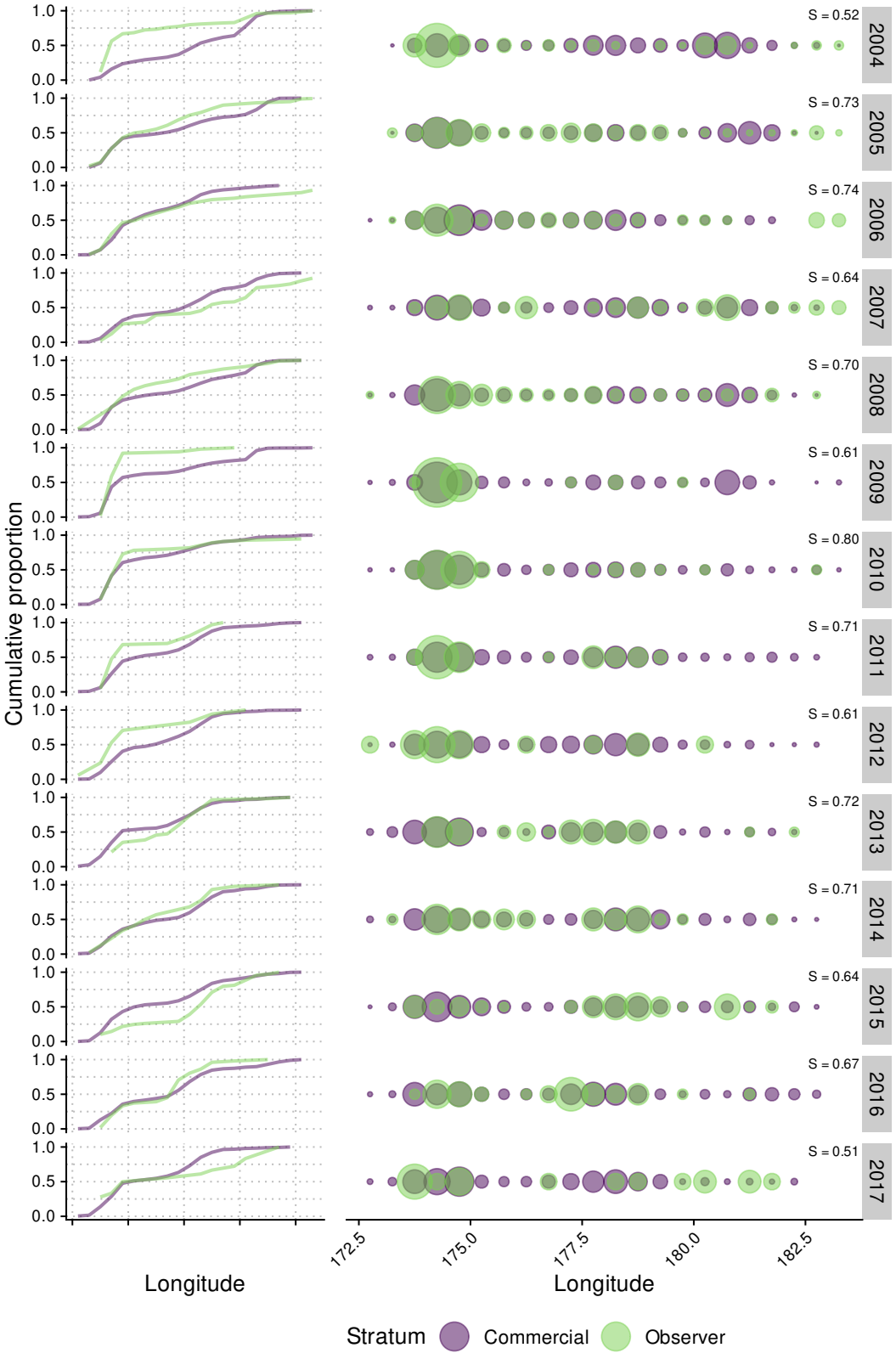


Figure 516: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in HAK 4, where the hake catch exceeded the 70kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

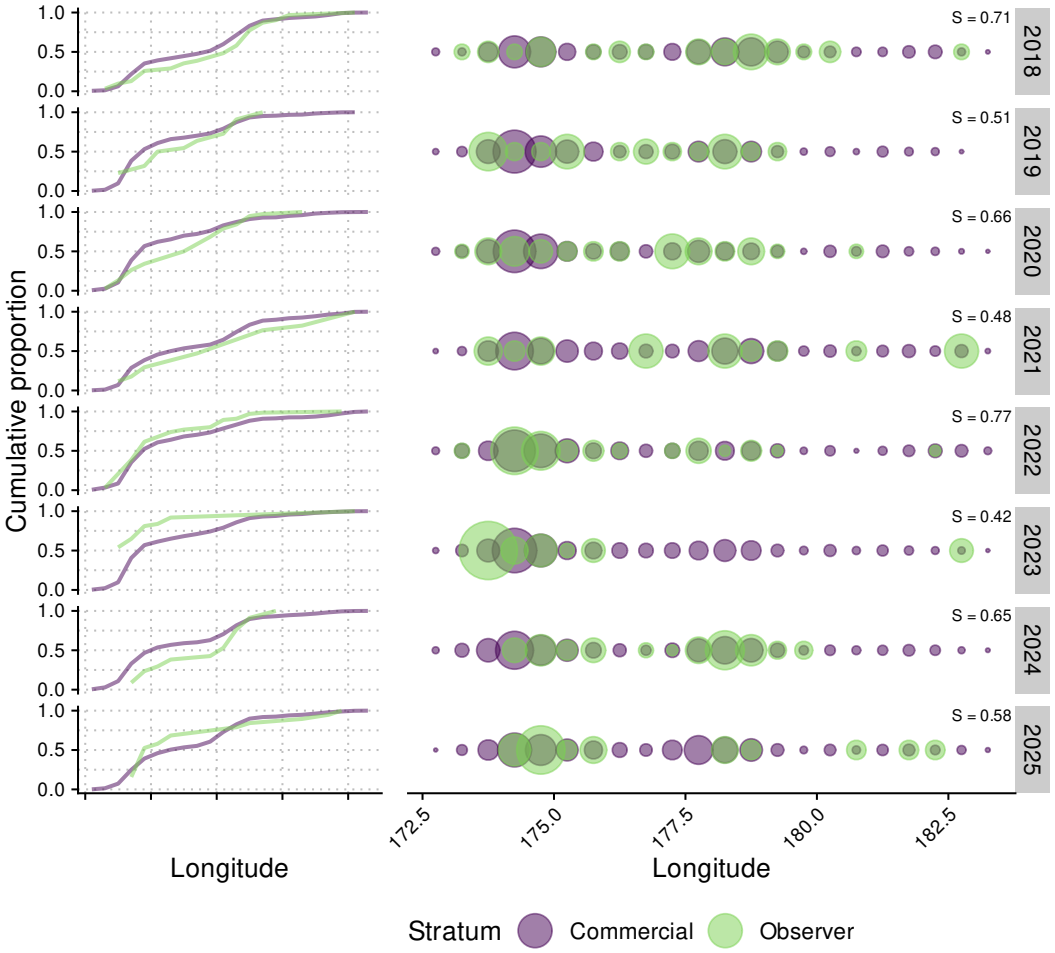


Figure 517: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in HAK 4, where the hake catch exceeded the 70kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

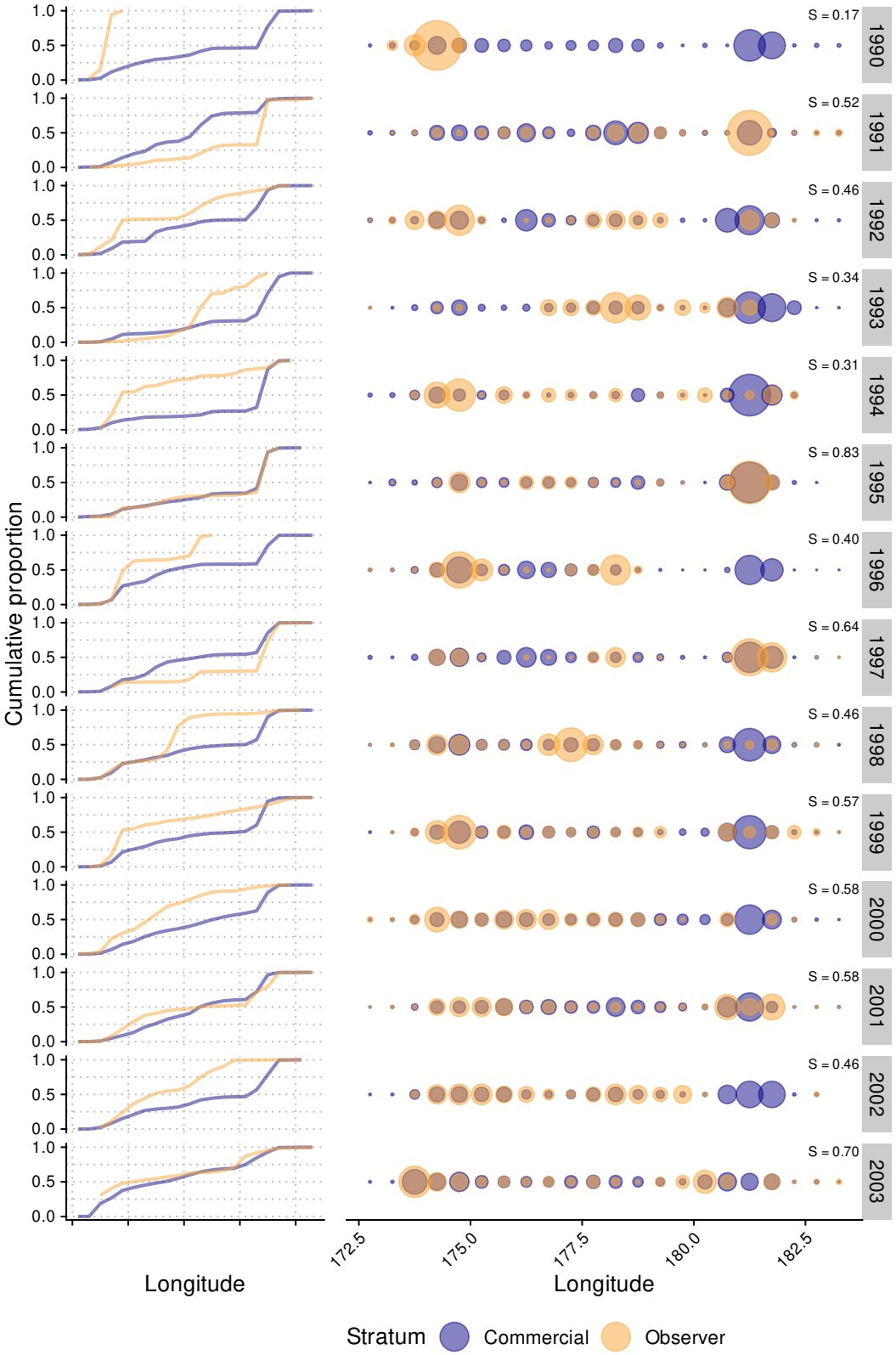


Figure 518: Longitudinal representativeness of observer sampling coverage of Trawl catch in HAK 4, from events where the hake catch exceeded the 70kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

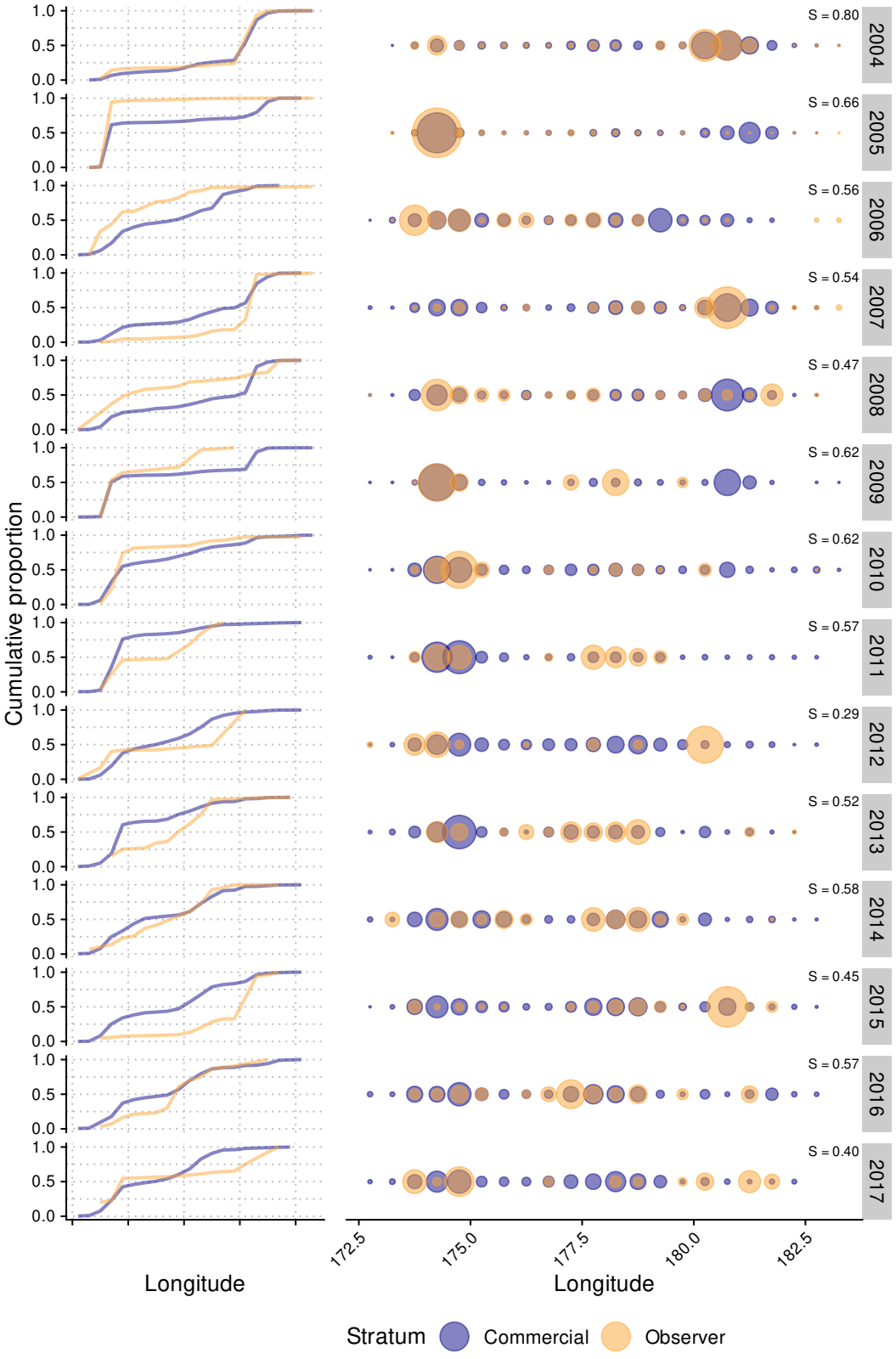


Figure 519: Longitudinal representativeness of observer sampling coverage of Trawl catch in HAK 4, from events where the hake catch exceeded the 70kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

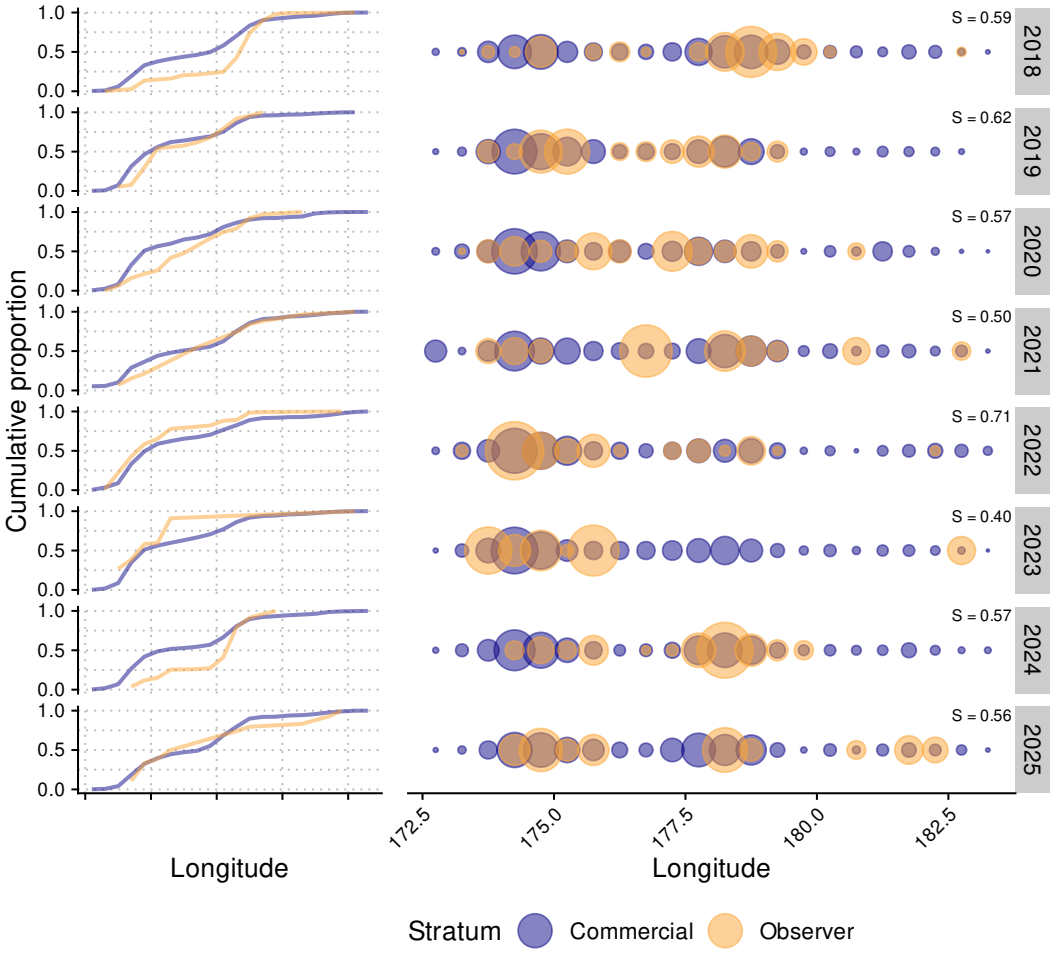


Figure 520: **Longitudinal representativeness of observer sampling coverage of Trawl catch in HAK 4, from events where the hake catch exceeded the 70kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

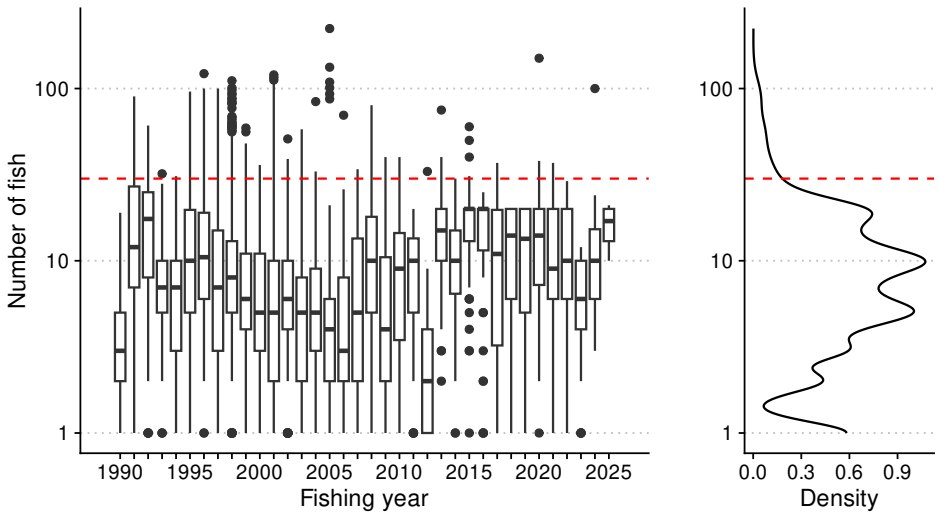


Figure 521: **Length-frequency sample sizes for observed fishing events in HAK 4 where hake were sampled. The red dashed line indicates a sample size of 30 fish.**

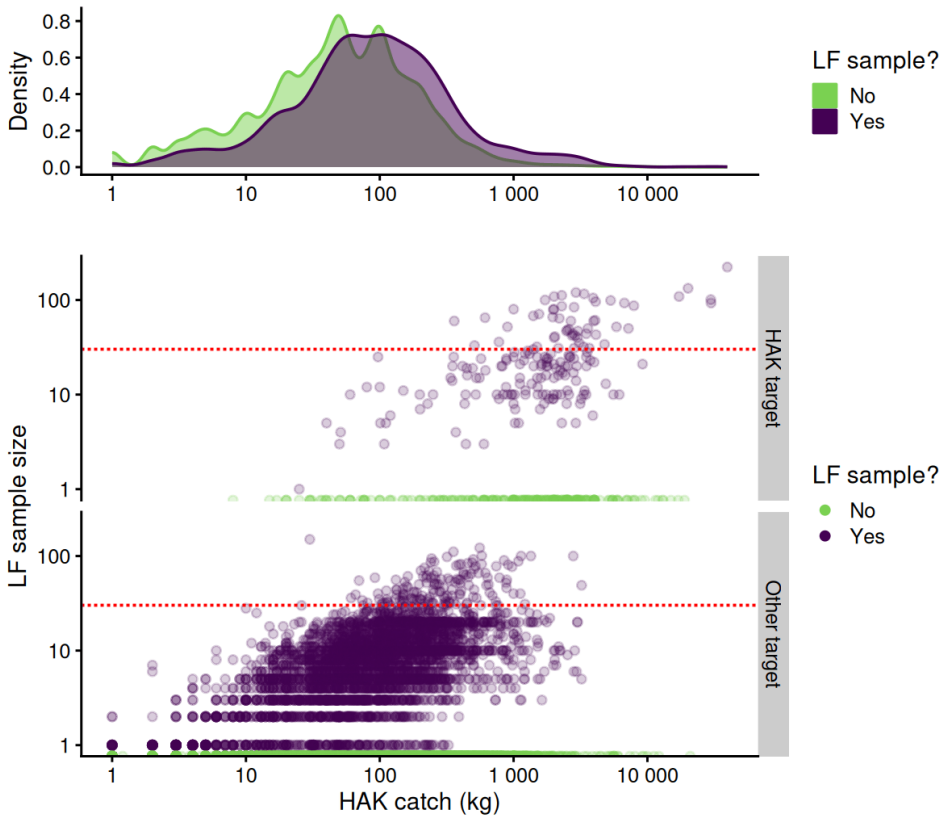


Figure 522: **Length-frequency sample sizes (number of fish sampled) for observed fishing events in HAK 4 in relation to the total hake catch from an event, separately for hake target events and other target species. The red dashed line indicates a sample size of 30 fish.**

2.9.2.2 Otolith samples

Table 44: Otolith samples of hake from the HAK 4 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of hake exceeded a potential sampling threshold of 70 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	1 009	0	0	0.00
1991	2 054	0	0	0.00
1992	2 730	0	0	0.00
1993	2 195	0	0	0.00
1994	1 373	0	0	0.00
1995	2 725	0	0	0.00
1996	2 933	0	0	0.00
1997	4 061	0	0	0.00
1998	4 782	0	0	0.00
1999	3 943	0	0	0.00
2000	3 828	0	0	0.00
2001	3 787	0	0	0.00
2002	2 822	0	0	0.00
2003	2 907	0	0	0.00
2004	2 820	0	0	0.00
2005	1 910	0	0	0.00
2006	1 001	0	0	0.00
2007	1 501	0	0	0.00
2008	1 600	0	0	0.00
2009	1 667	11	52	0.66
2010	1 060	32	132	3.02
2011	1 006	23	117	2.29
2012	608	10	26	1.64
2013	580	52	265	8.97
2014	587	25	107	4.26
2015	754	18	92	2.39
2016	878	30	144	3.42
2017	926	11	42	1.19
2018	1 845	26	118	1.41
2019	1 865	17	70	0.91
2020	1 273	37	194	2.91
2021	1 456	16	70	1.10
2022	1 383	59	434	4.27
2023	1 308	37	173	2.83
2024	1 546	68	379	4.40
2025	1 254	19	98	1.52

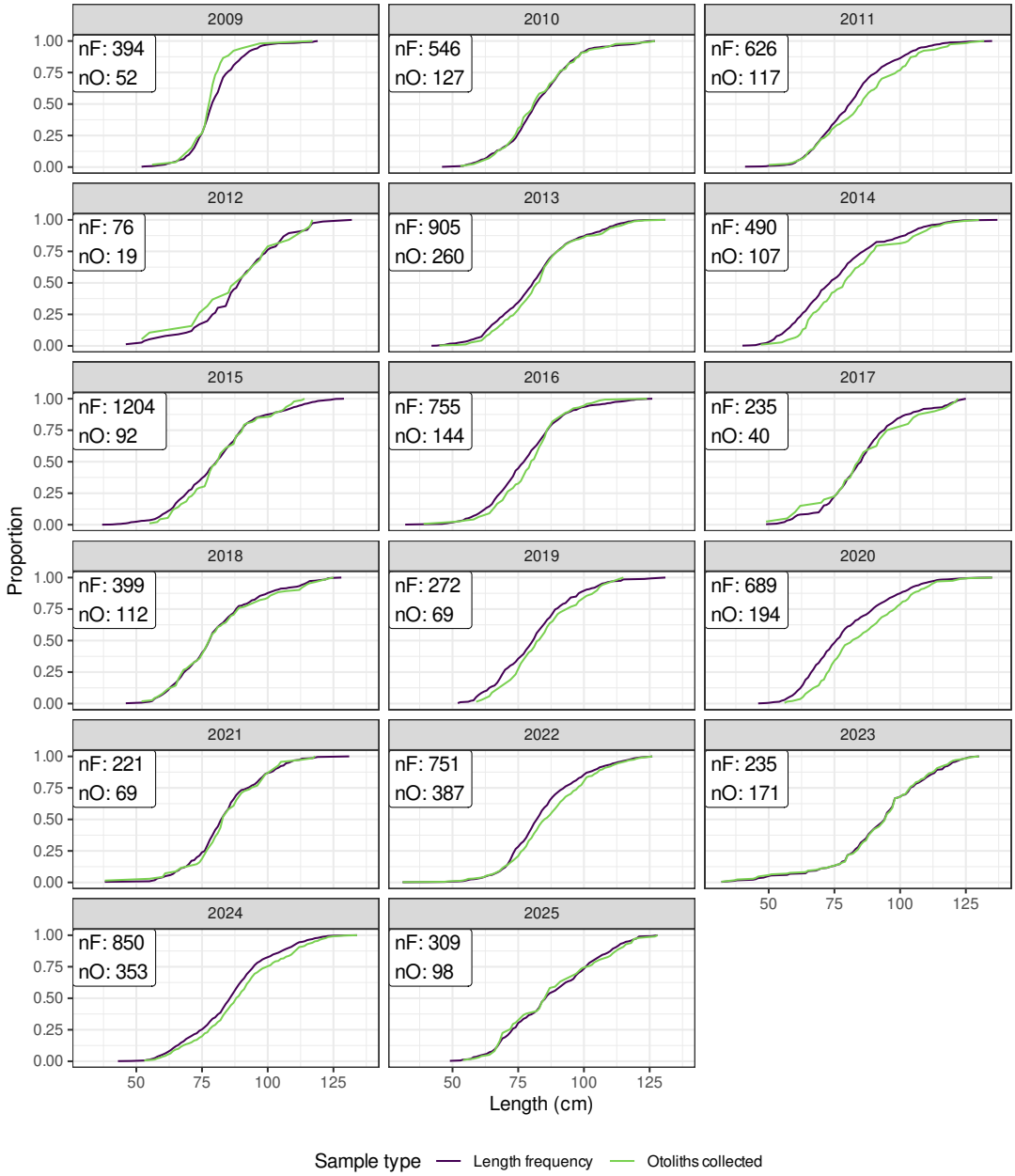


Figure 523: Cumulative distributions of the length of fish in the length frequency and otolith samples of hake in the HAK 4 Trawl fishery for the 2009 to 2025 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

2.9.2.3 Catch quantification

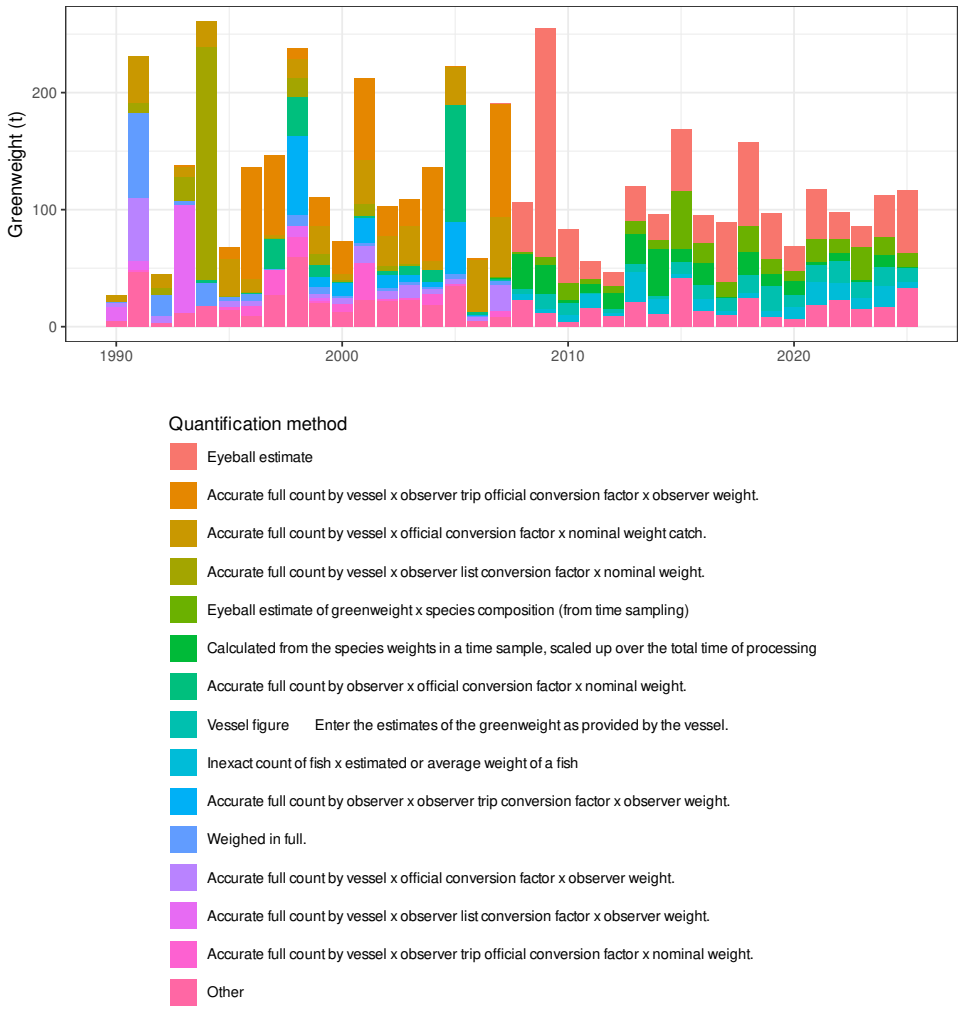


Figure 524: Methods used by observers to quantify the catch of hake in the HAK 4 Trawl fishery. The legend lists the methods used in descending order of total catch.

2.9.3 HAK 7: Trawl fishery

2.9.3.1 Length-frequency samples

Table 45: Length-frequency samples of hake from the HAK 7 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of hake exceeded a potential sampling threshold of 70 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	3 110	67	1 208	2.15
1991	2 655	168	4 083	6.33
1992	1 650	147	3 874	8.91
1993	2 473	124	3 832	5.01
1994	1 967	226	3 324	11.49
1995	3 336	161	5 274	4.83
1996	4 704	209	4 652	4.44
1997	3 972	283	5 148	7.12
1998	4 314	269	3 940	6.24
1999	3 948	339	7 993	8.59
2000	4 466	386	5 355	8.64
2001	4 888	322	3 724	6.59
2002	4 391	492	5 014	11.20
2003	4 196	414	4 314	9.87
2004	4 064	503	5 313	12.38
2005	2 669	266	5 495	9.97
2006	2 966	419	10 177	14.13
2007	1 879	134	6 644	7.13
2008	1 576	112	5 355	7.11
2009	1 454	182	9 530	12.52
2010	1 331	78	4 320	5.86
2011	2 061	104	4 976	5.05
2012	1 994	139	4 573	6.97
2013	2 503	518	21 037	20.70
2014	2 671	364	15 261	13.63
2015	3 244	503	22 452	15.51
2016	2 451	246	9 902	10.04
2017	3 391	407	16 566	12.00
2018	3 721	388	9 099	10.43
2019	2 037	157	3 203	7.71
2020	1 936	205	7 431	10.59
2021	1 383	134	3 935	9.69
2022	1 849	167	3 817	9.03
2023	1 795	239	9 729	13.31
2024	1 598	151	3 447	9.45
2025	1 564	172	4 159	11.00

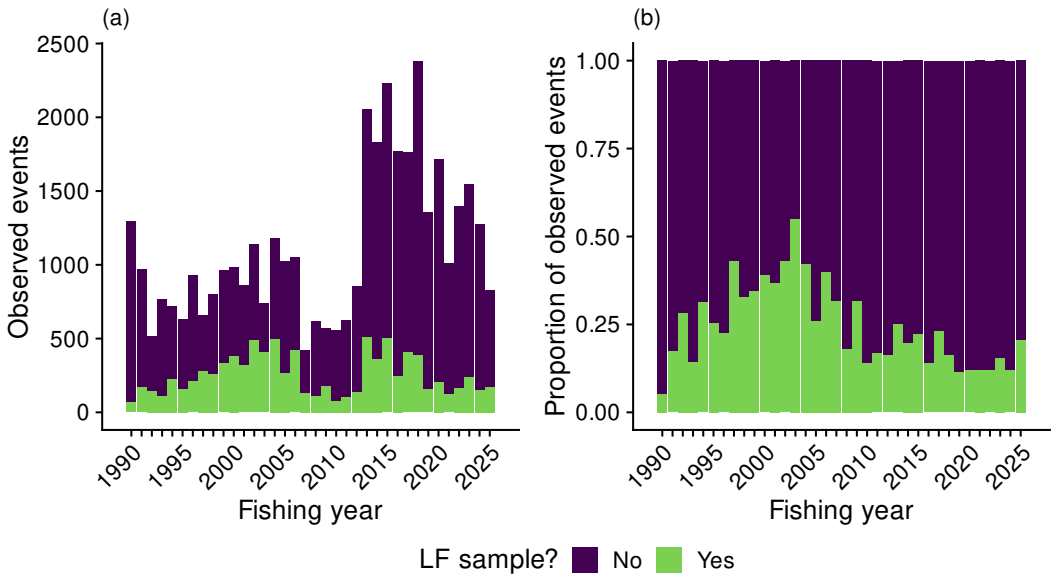


Figure 525: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in HAK 7 where the hake catch exceeded the 70 kg threshold, with and without length-frequency sampling.**

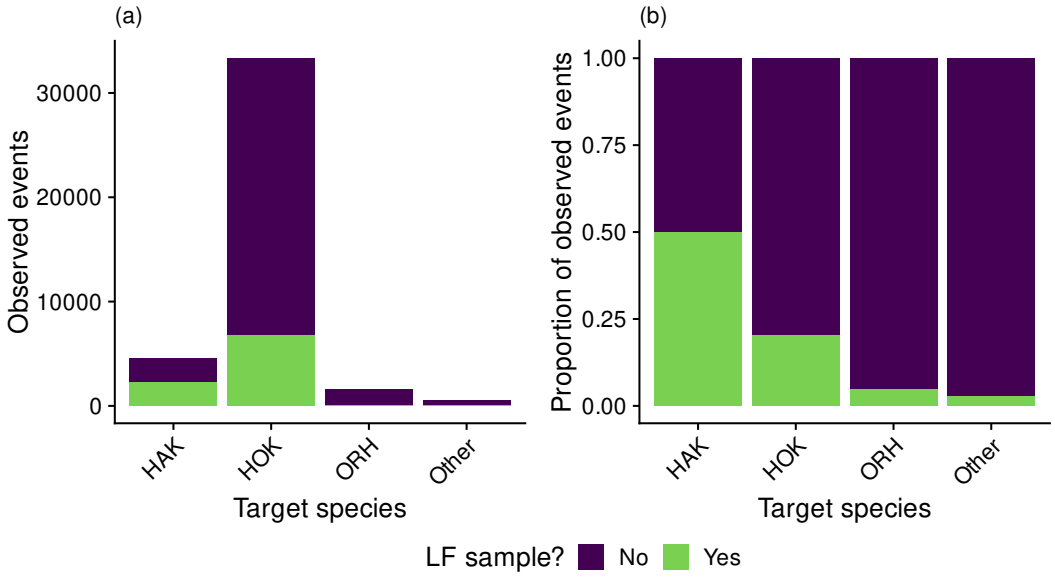


Figure 526: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in HAK 7 where the hake catch exceeded the 70 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

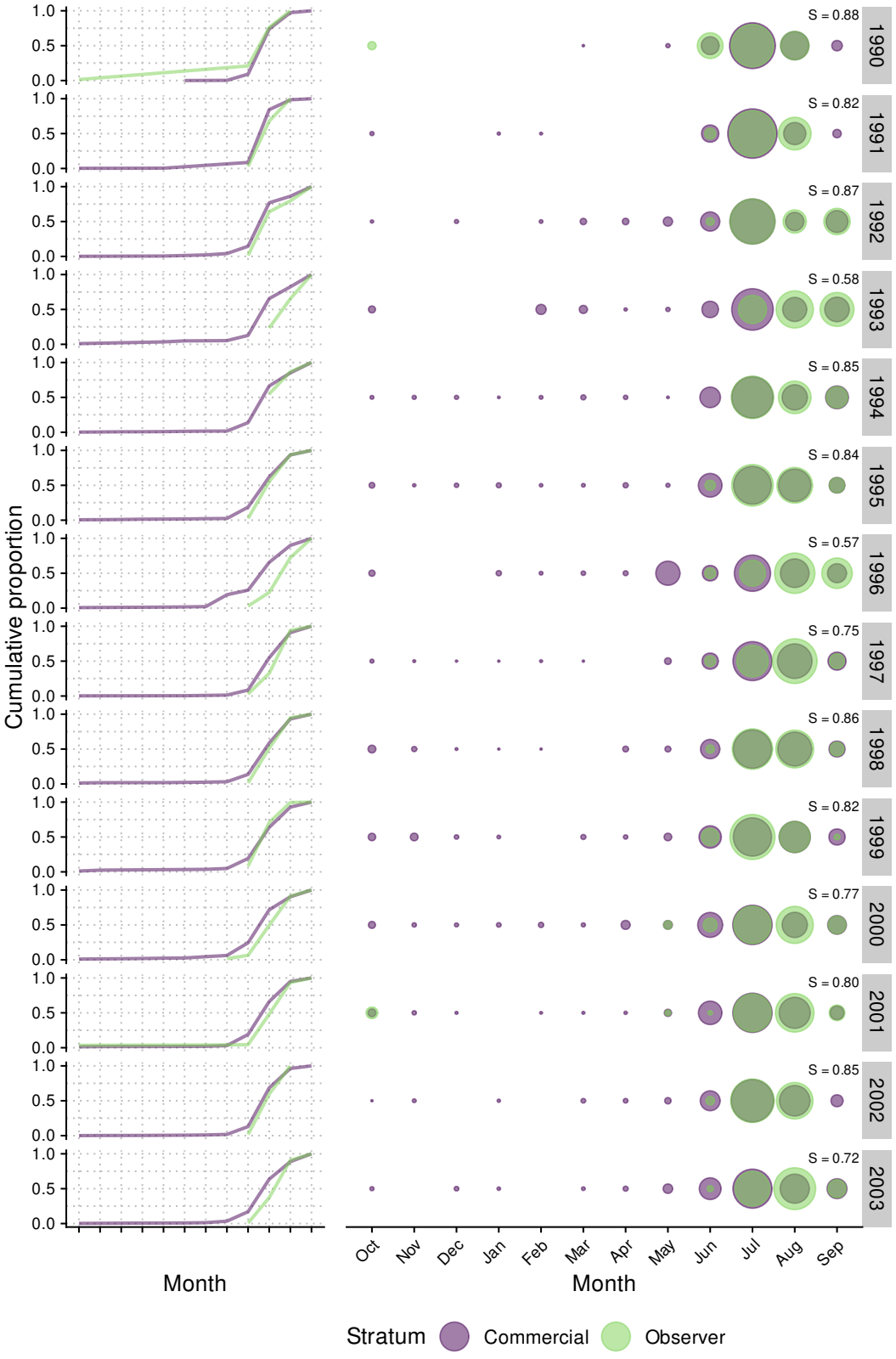


Figure 527: Monthly representativeness of observer sampling coverage of Trawl fishing events in HAK 7, where the hake catch exceeded the 70kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

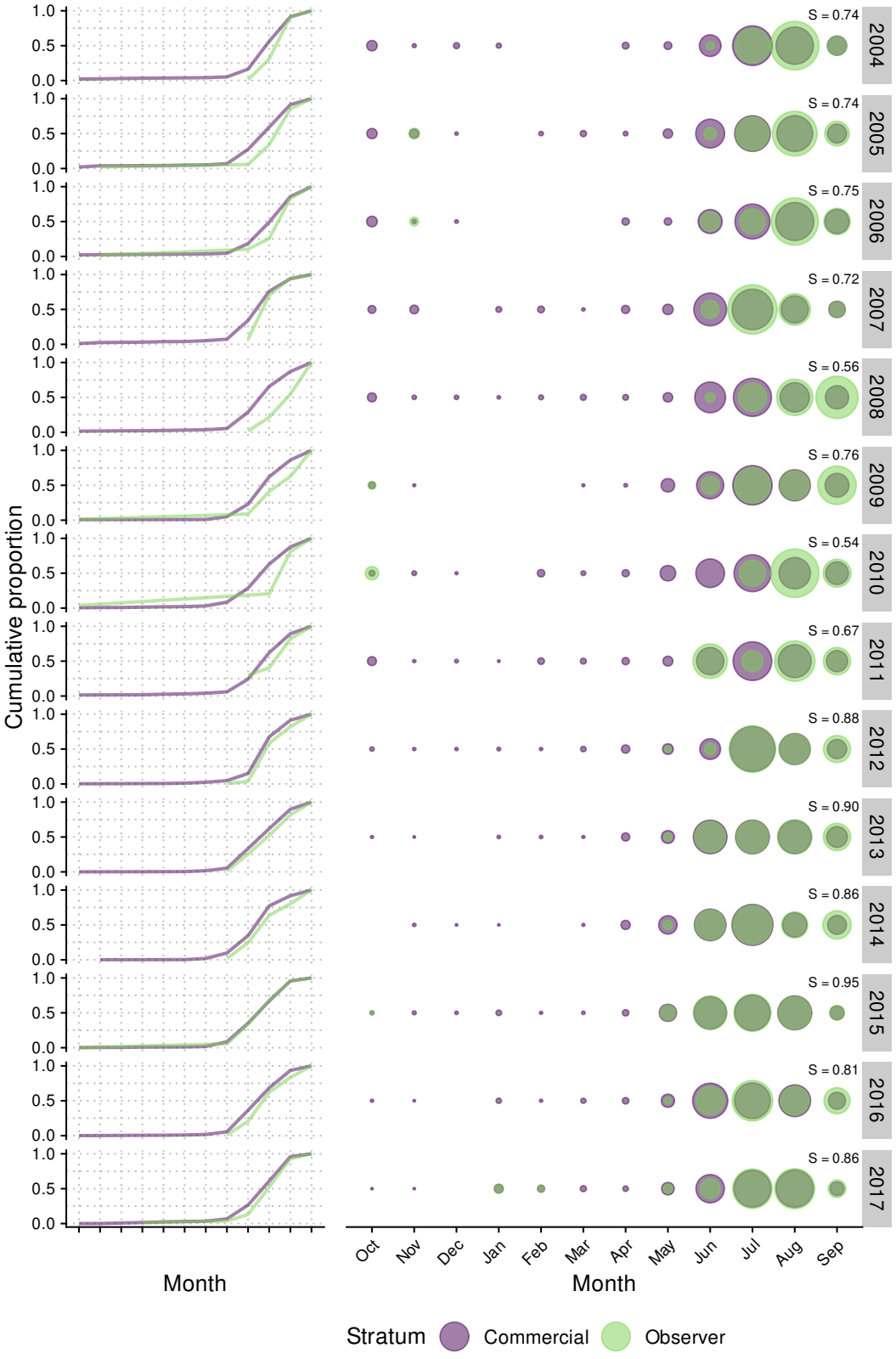


Figure 528: Monthly representativeness of observer sampling coverage of Trawl fishing events in HAK 7, where the hake catch exceeded the 70kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

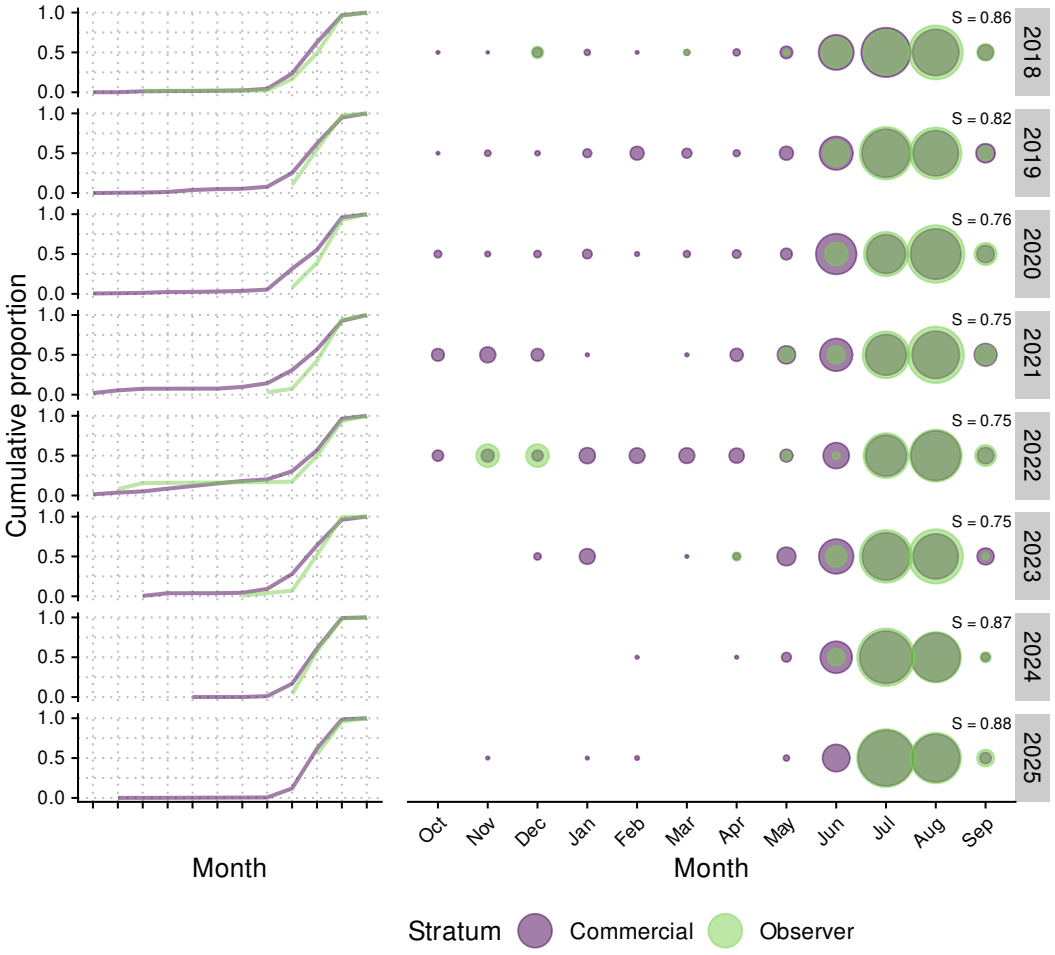


Figure 529: Monthly representativeness of observer sampling coverage of Trawl fishing events in HAK 7, where the hake catch exceeded the 70kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

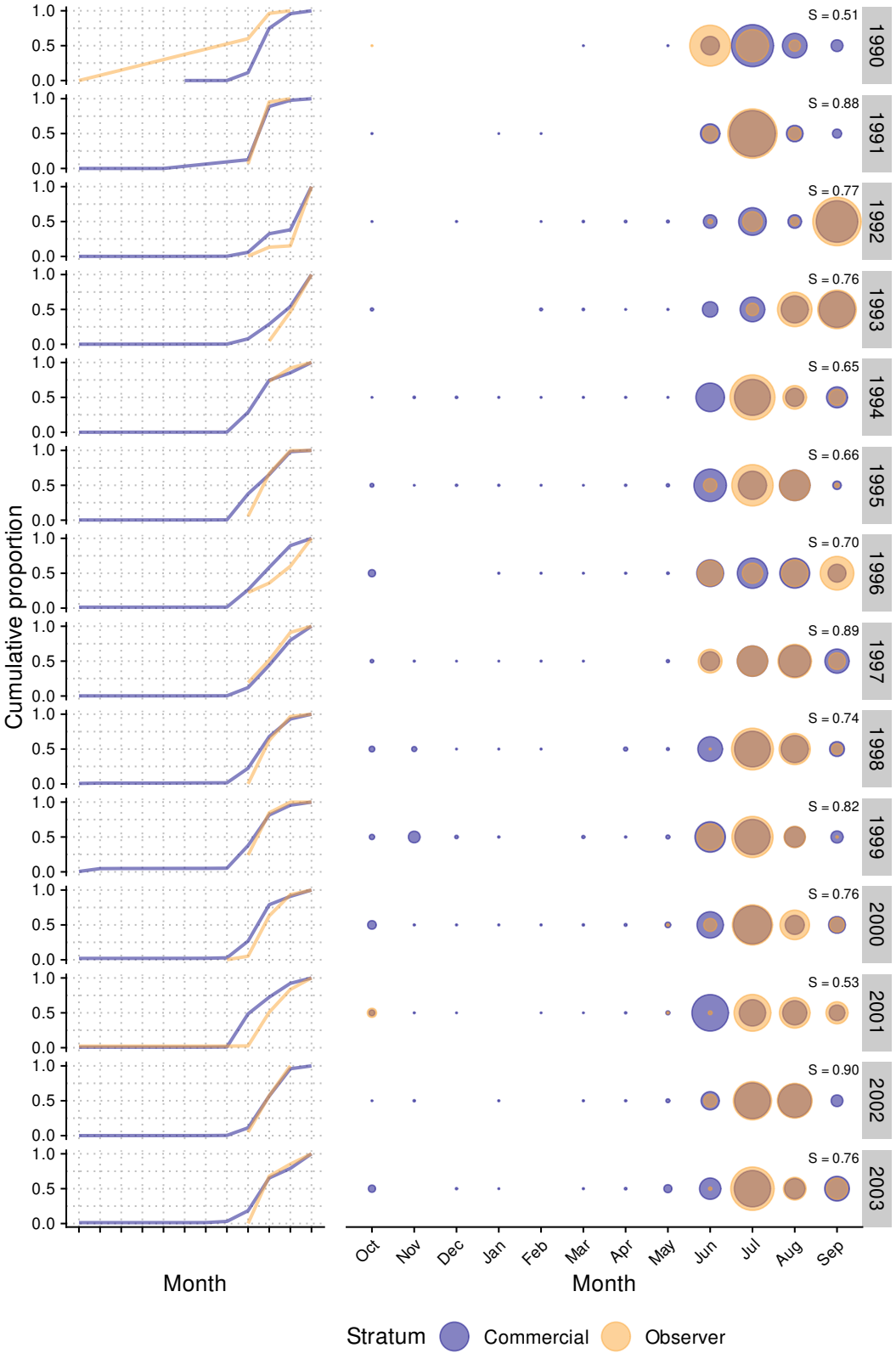


Figure 530: **Monthly representativeness of observer sampling coverage of Trawl catch in HAK 7, from events where the hake catch exceeded the 70kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

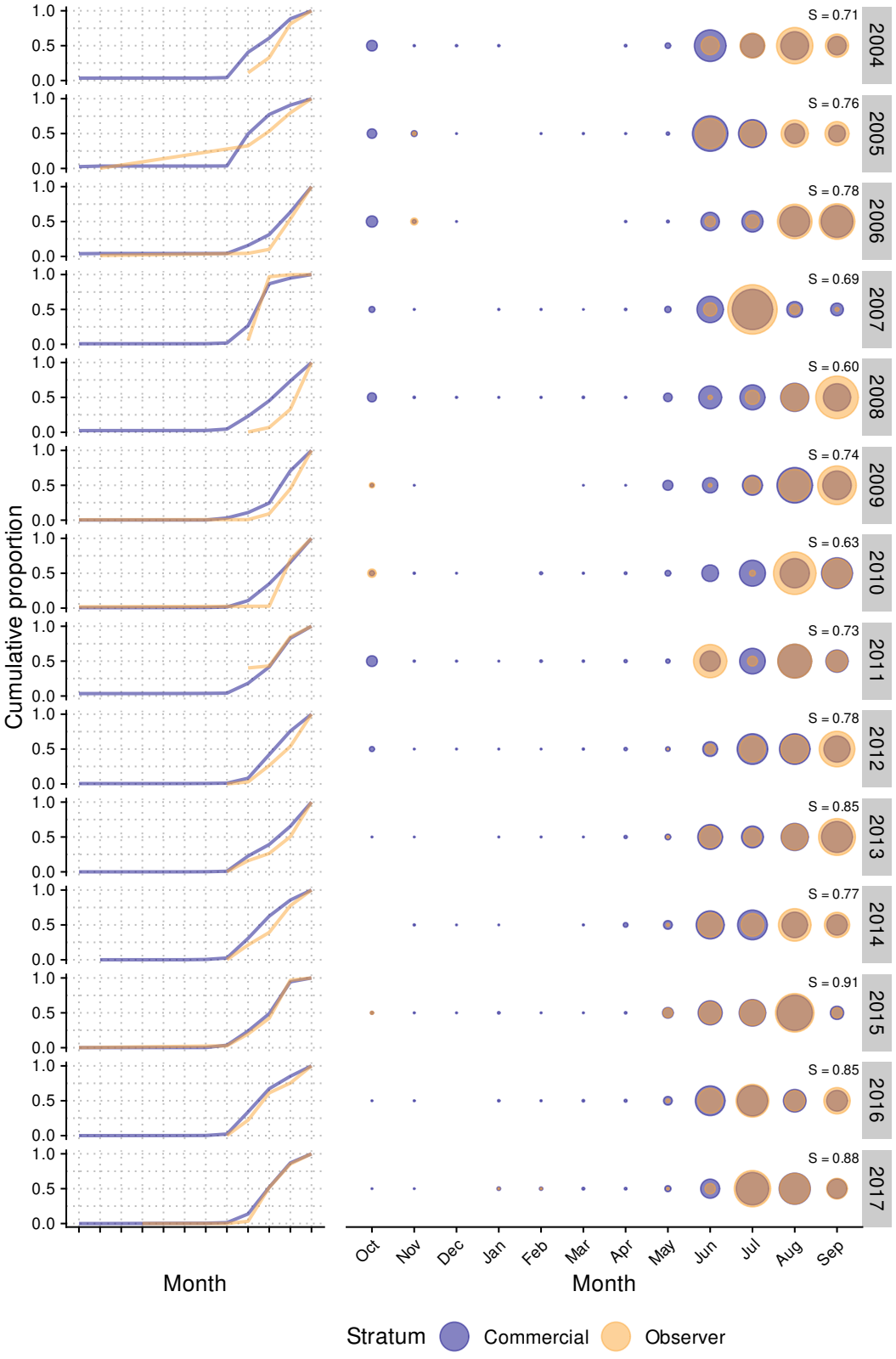


Figure 531: Monthly representativeness of observer sampling coverage of Trawl catch in HAK 7, from events where the hake catch exceeded the 70kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

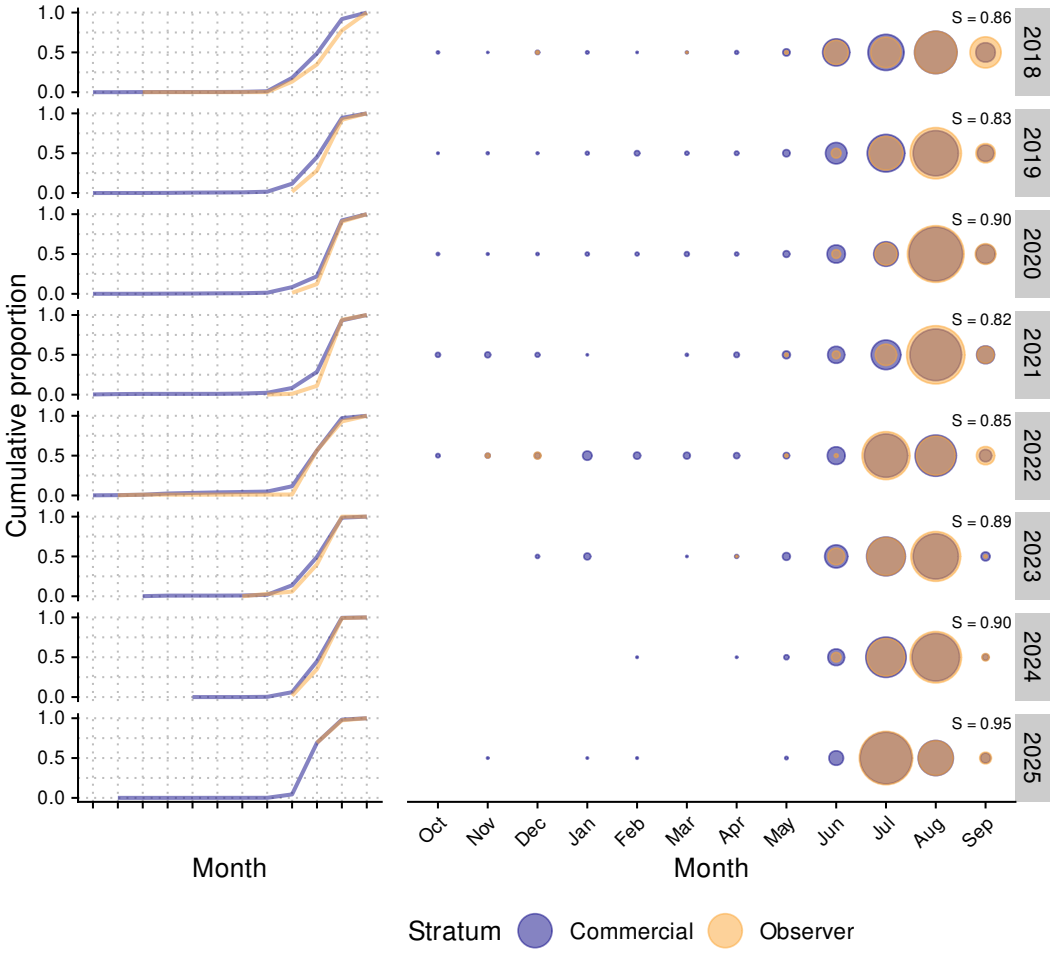


Figure 532: Monthly representativeness of observer sampling coverage of Trawl catch in HAK 7, from events where the hake catch exceeded the 70kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

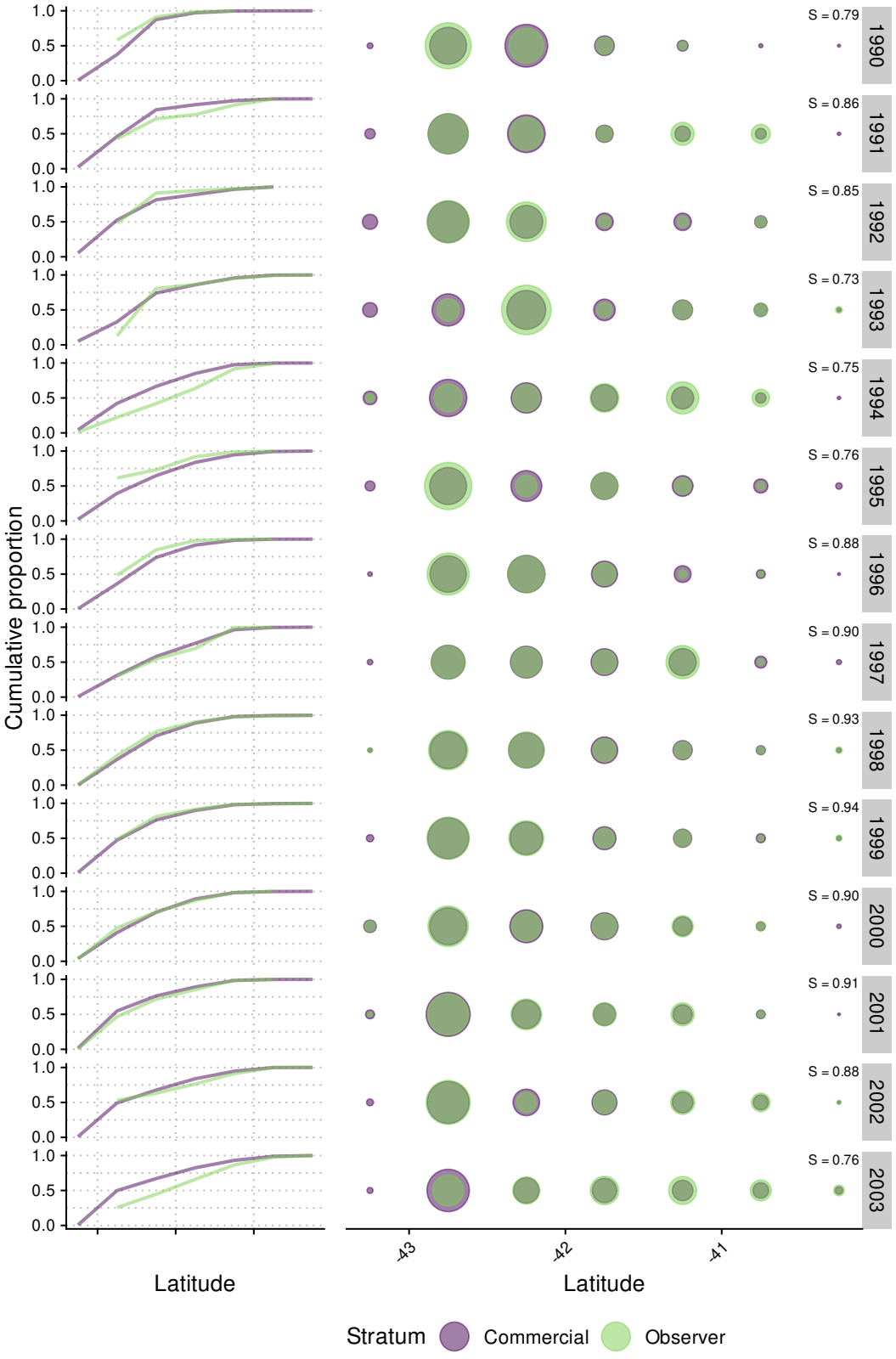


Figure 533: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in HAK 7, where the hake catch exceeded the 70kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

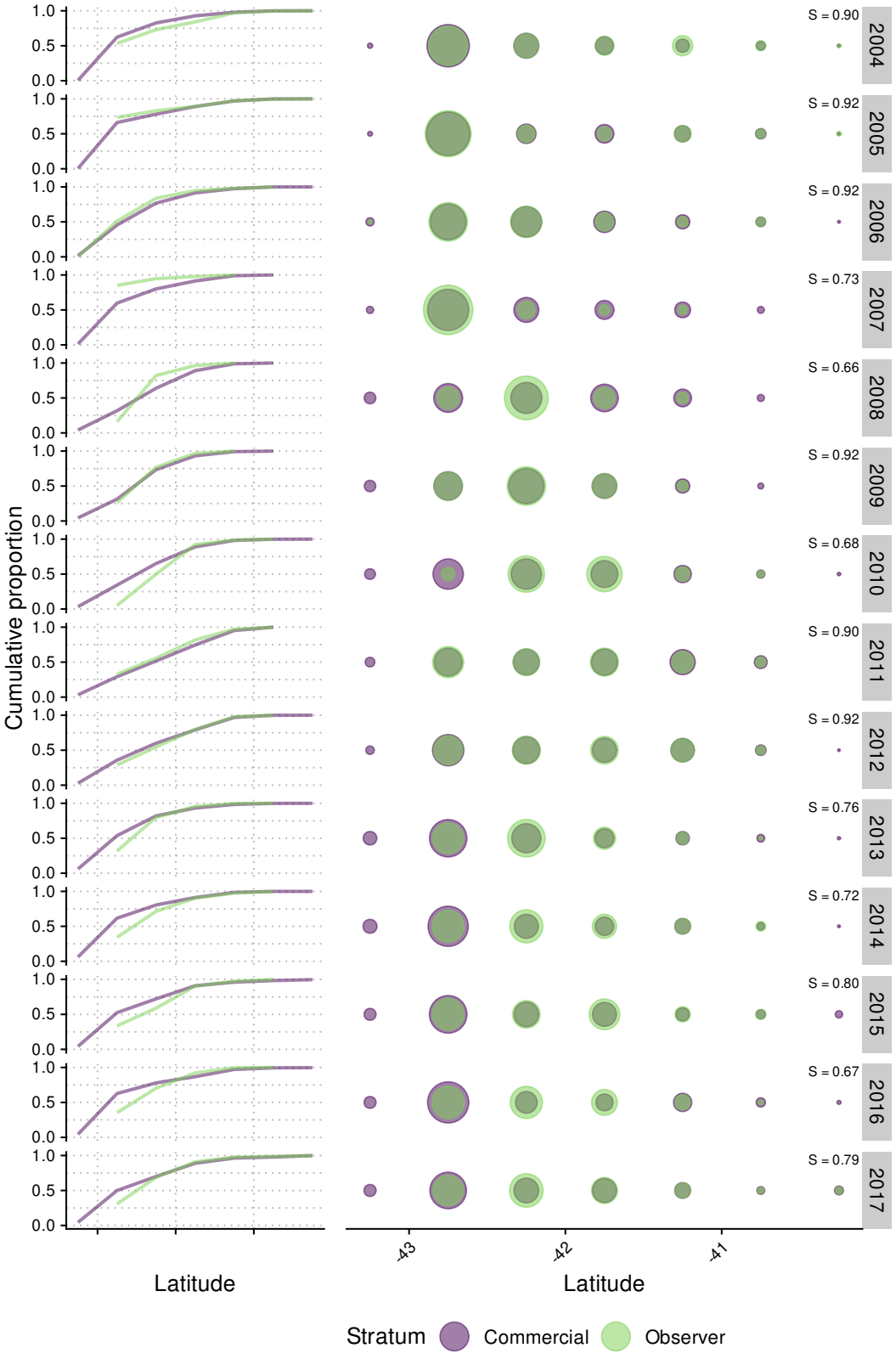


Figure 534: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in HAK 7, where the hake catch exceeded the 70kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

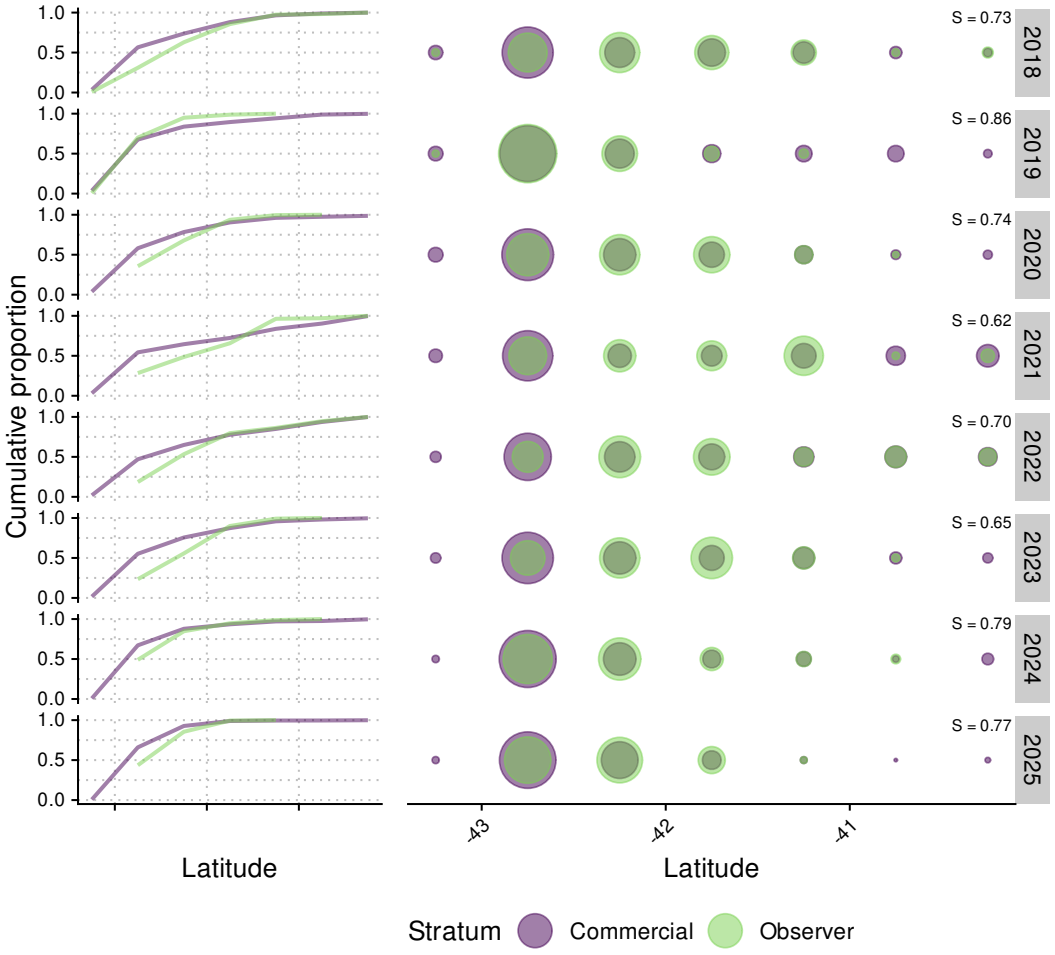


Figure 535: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in HAK 7, where the hake catch exceeded the 70kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

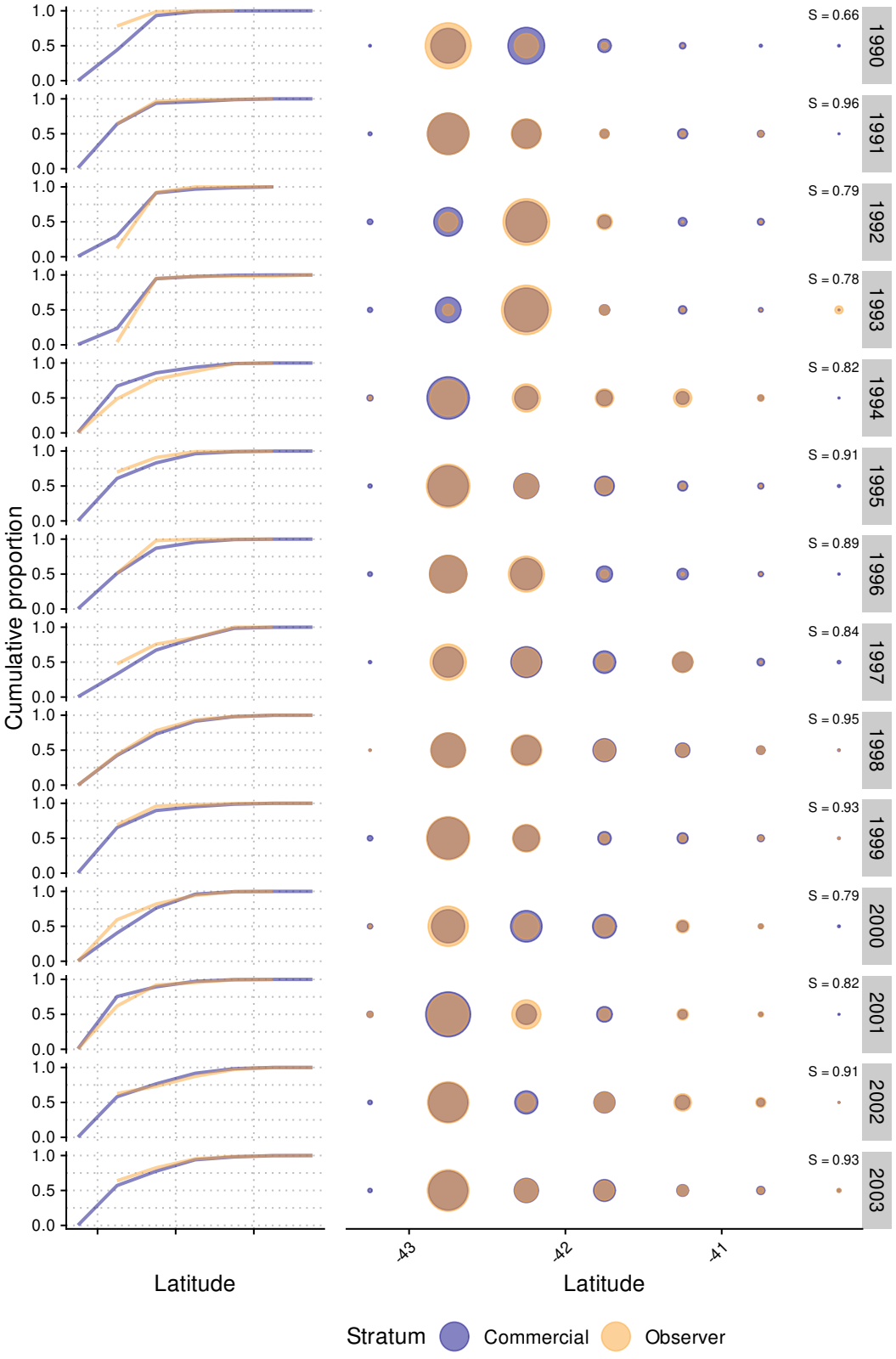


Figure 536: **Latitudinal representativeness of observer sampling coverage of Trawl catch in HAK 7, from events where the hake catch exceeded the 70kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

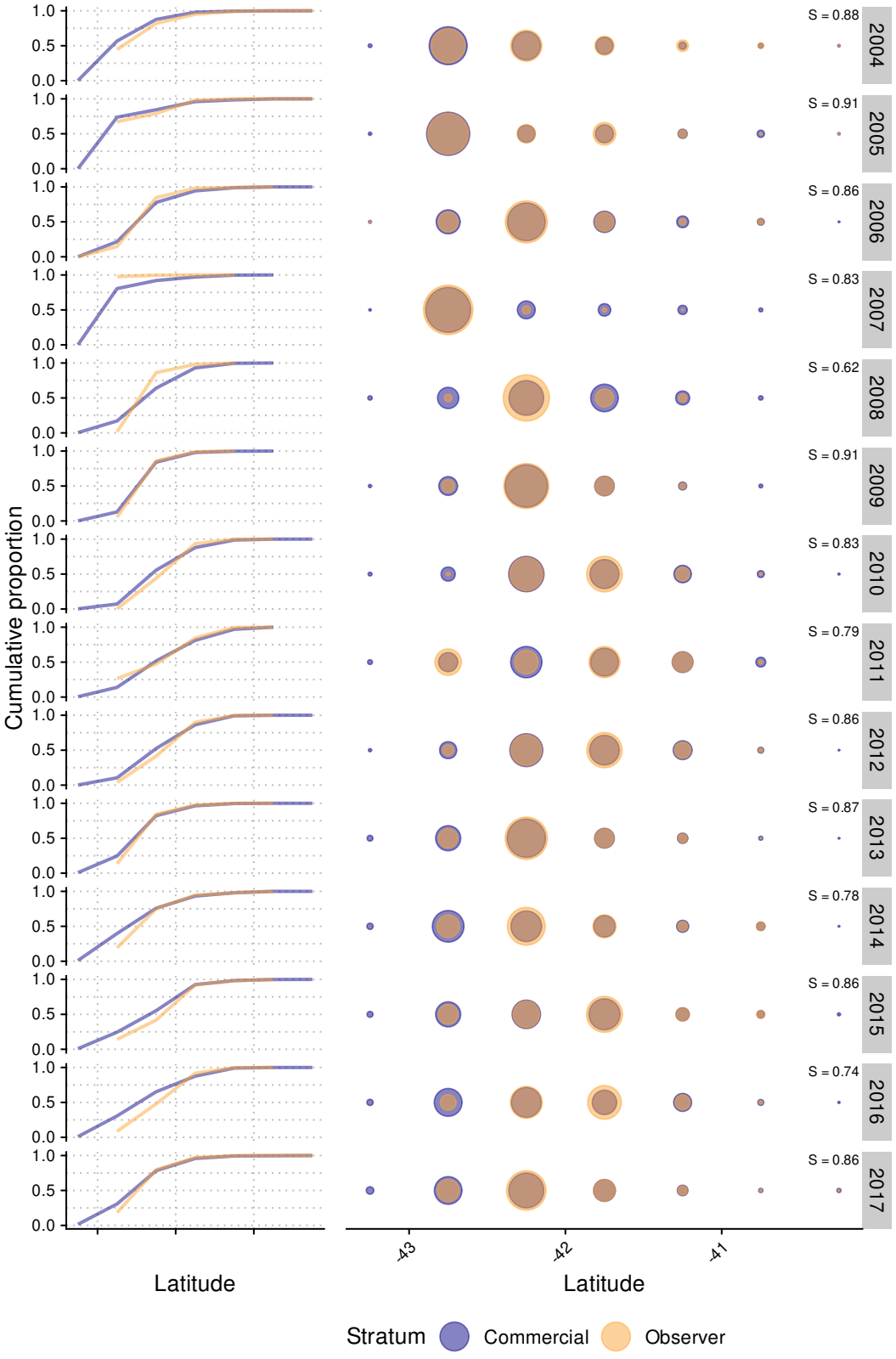


Figure 537: **Latitudinal representativeness of observer sampling coverage of Trawl catch in HAK 7, from events where the hake catch exceeded the 70kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

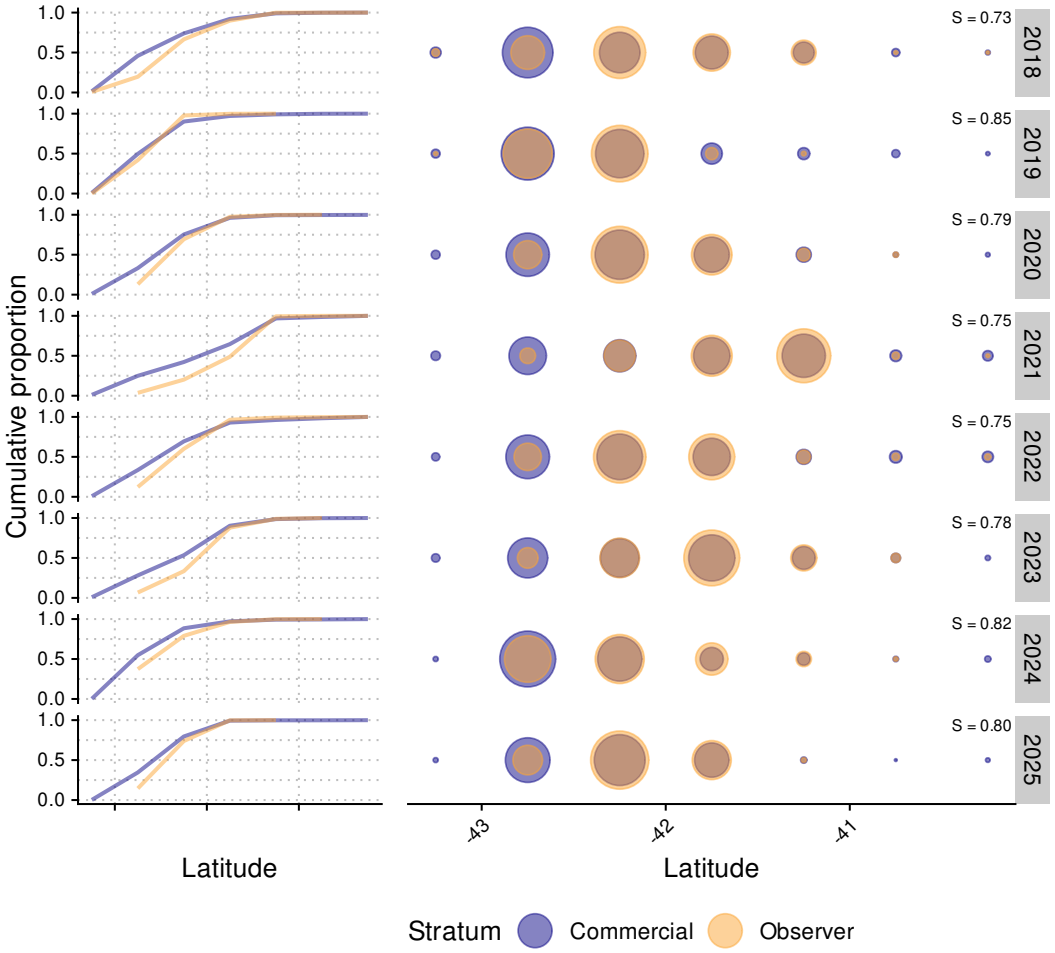


Figure 538: Latitudinal representativeness of observer sampling coverage of Trawl catch in HAK 7, from events where the hake catch exceeded the 70kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

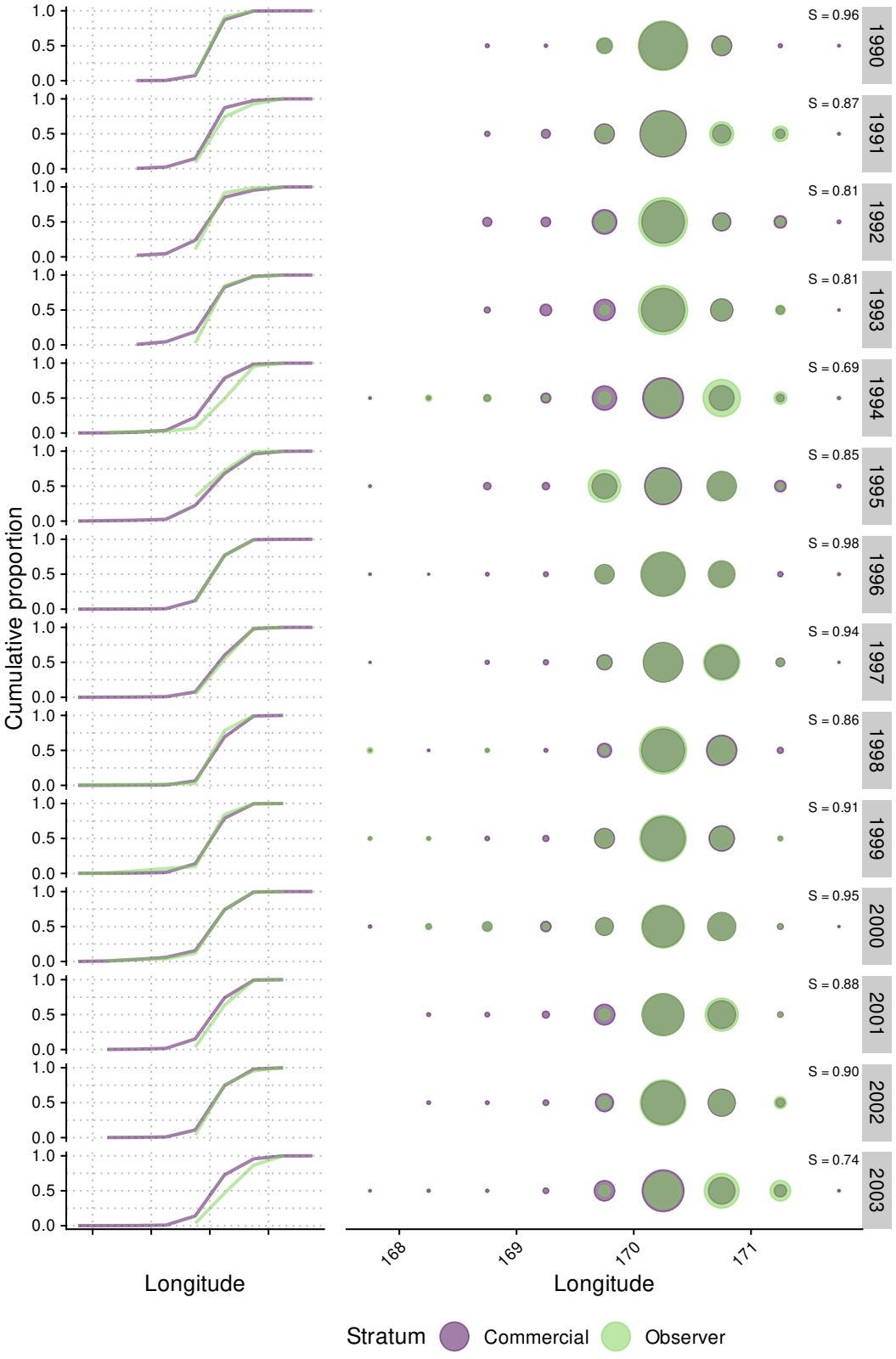


Figure 539: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in HAK 7, where the hake catch exceeded the 70kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

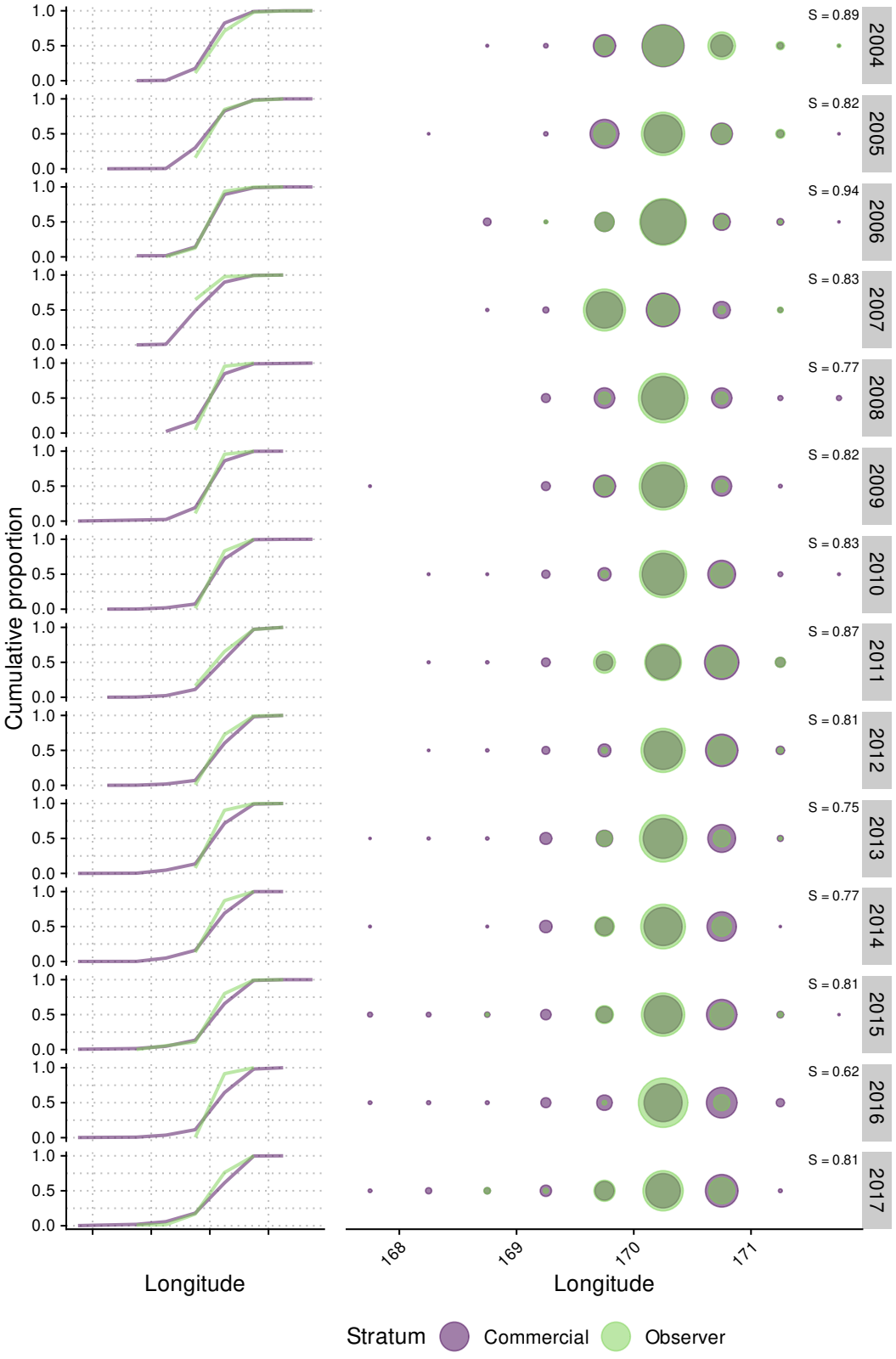


Figure 540: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in HAK 7, where the hake catch exceeded the 70kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

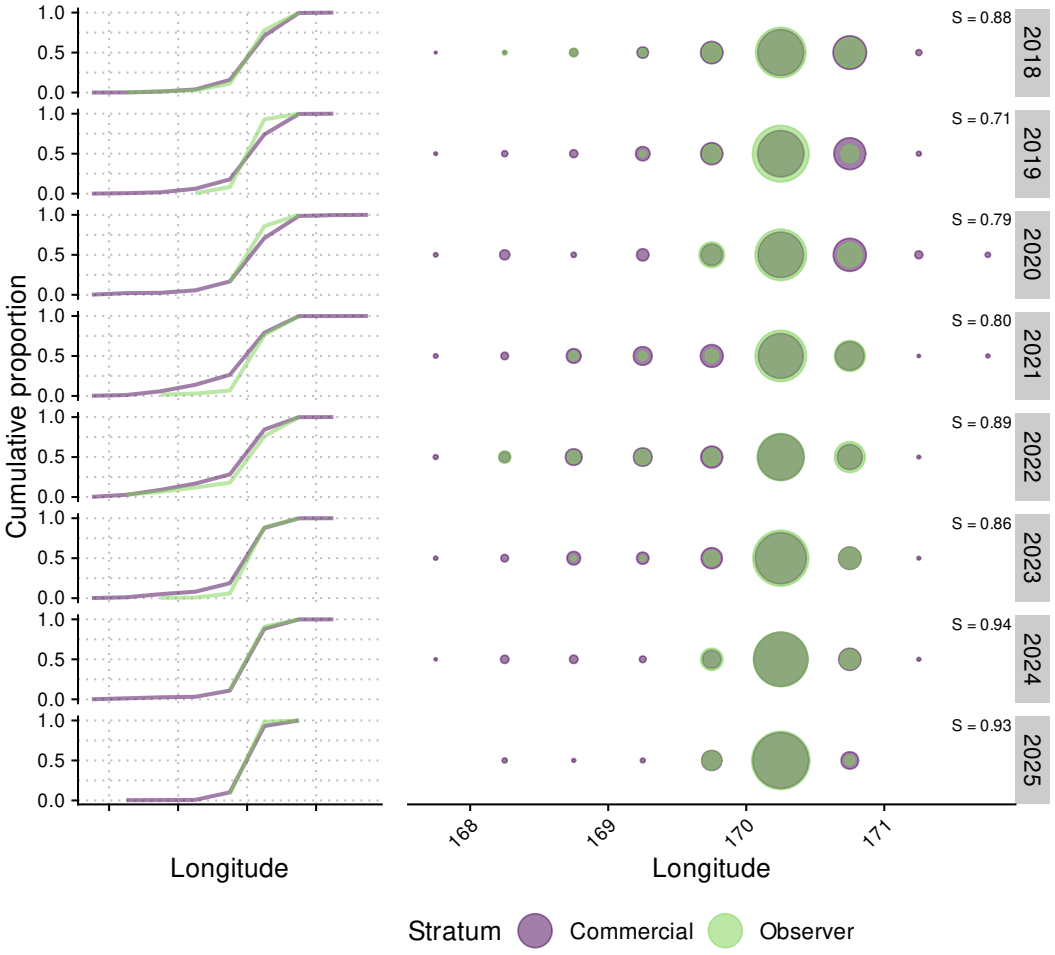


Figure 541: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in HAK 7, where the hake catch exceeded the 70kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

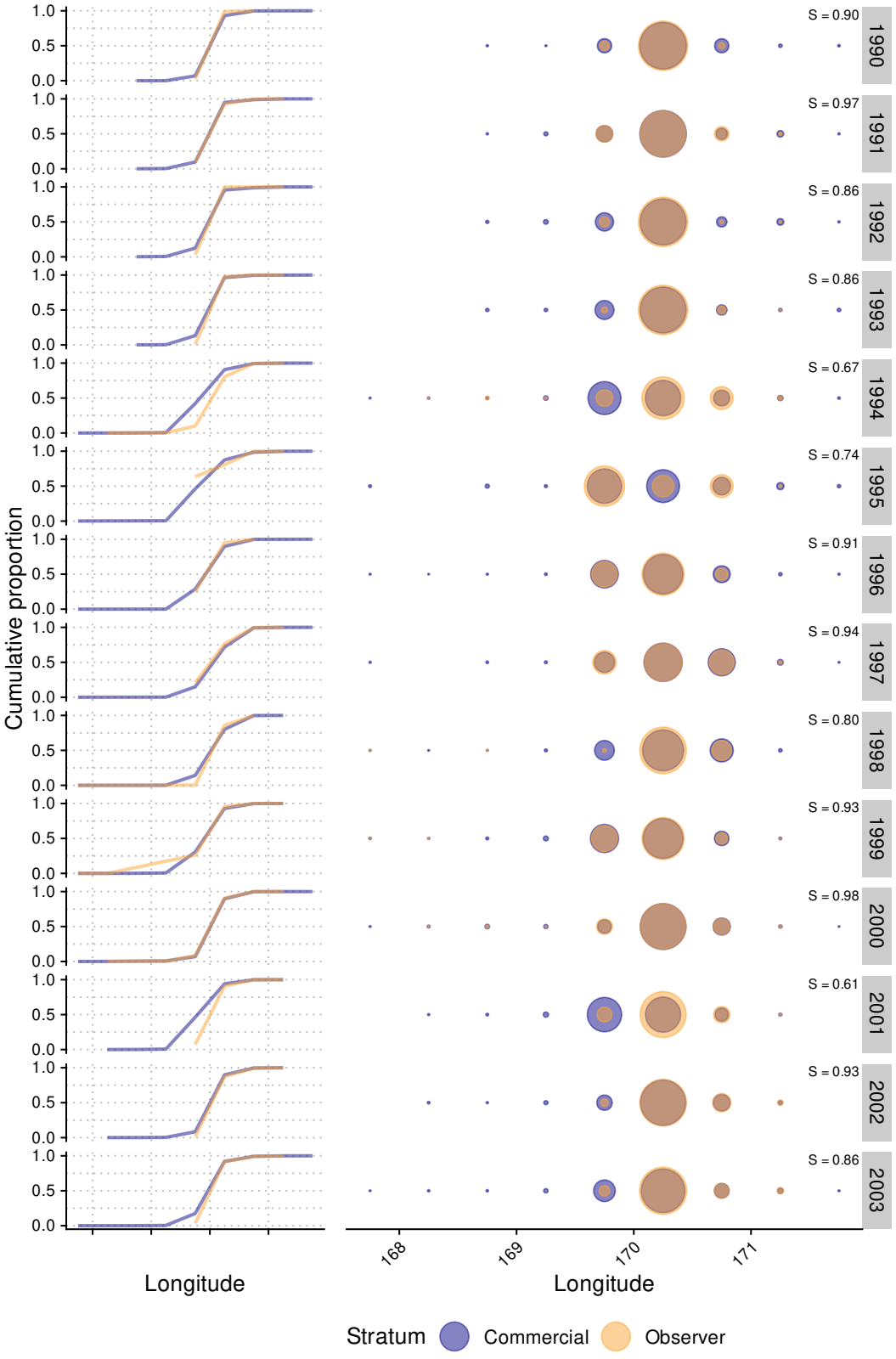


Figure 542: Longitudinal representativeness of observer sampling coverage of Trawl catch in HAK 7, from events where the hake catch exceeded the 70kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

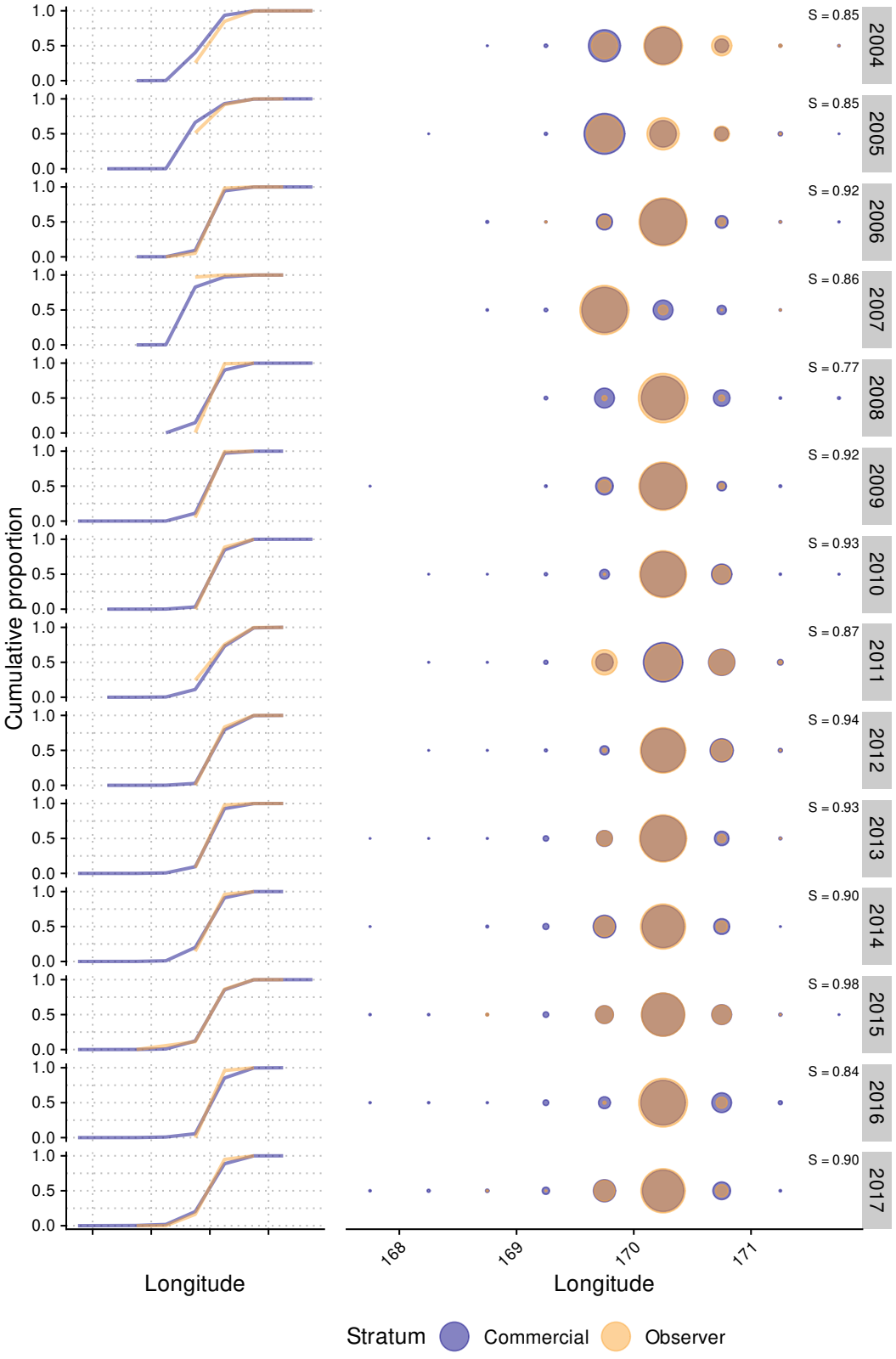


Figure 543: Longitudinal representativeness of observer sampling coverage of Trawl catch in HAK 7, from events where the hake catch exceeded the 70kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

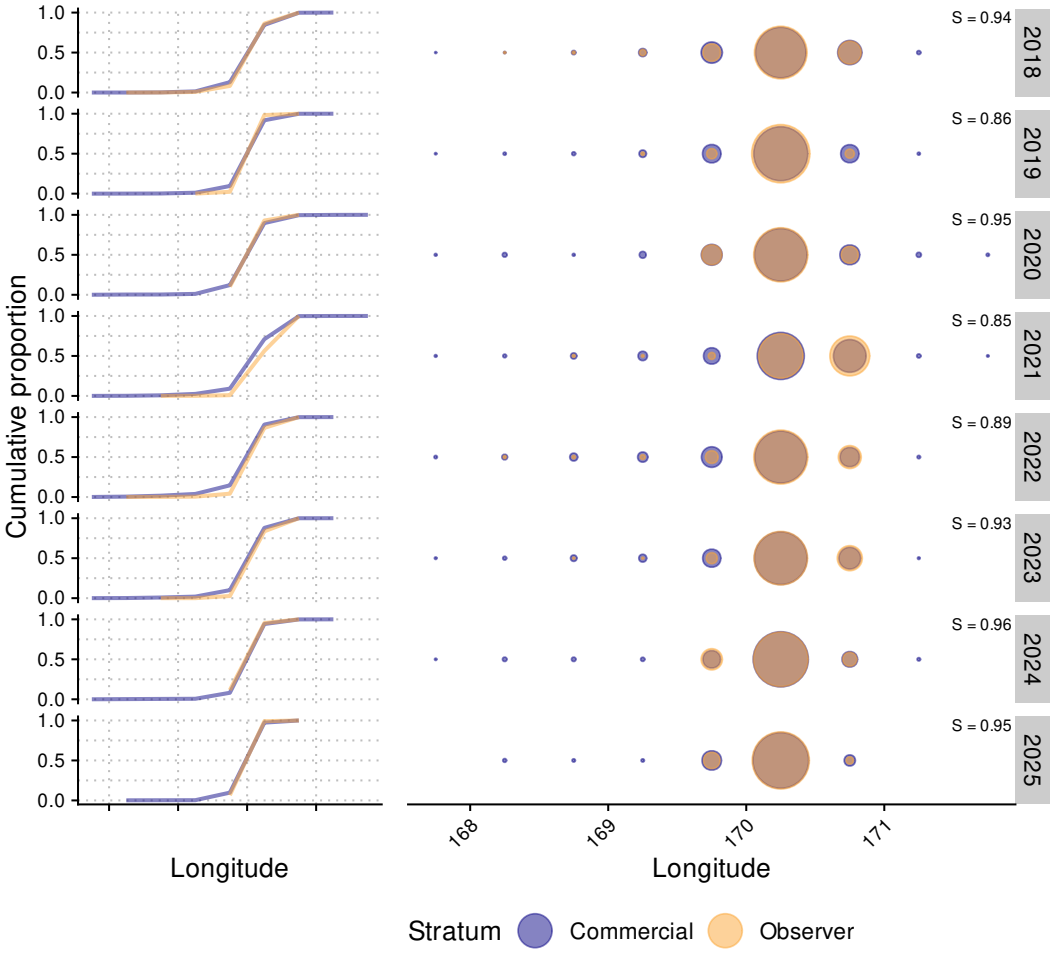


Figure 544: **Longitudinal representativeness of observer sampling coverage of Trawl catch in HAK 7, from events where the hake catch exceeded the 70kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

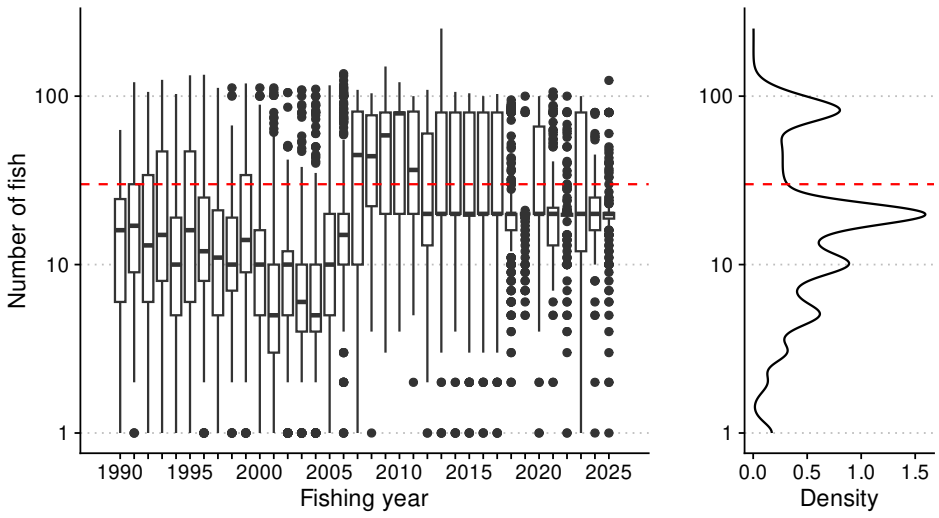


Figure 545: **Length-frequency sample sizes for observed fishing events in HAK 7 where hake were sampled. The red dashed line indicates a sample size of 30 fish.**

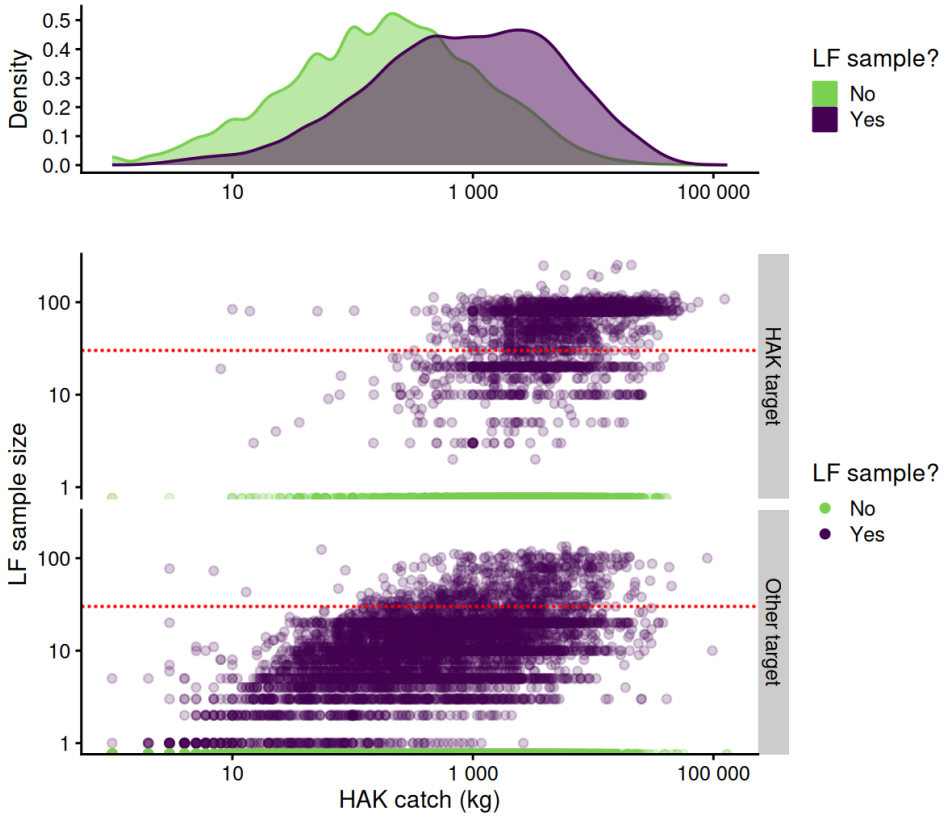


Figure 546: **Length-frequency sample sizes (number of fish sampled) for observed fishing events in HAK 7 in relation to the total hake catch from an event, separately for hake target events and other target species. The red dashed line indicates a sample size of 30 fish.**

2.9.3.2 Otolith samples

Table 46: Otolith samples of hake from the HAK 7 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of hake exceeded a potential sampling threshold of 70 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	3 110	0	0	0.00
1991	2 655	0	0	0.00
1992	1 650	0	0	0.00
1993	2 473	0	0	0.00
1994	1 967	0	0	0.00
1995	3 336	0	0	0.00
1996	4 704	0	0	0.00
1997	3 972	0	0	0.00
1998	4 314	0	0	0.00
1999	3 948	0	0	0.00
2000	4 466	0	0	0.00
2001	4 888	0	0	0.00
2002	4 391	0	0	0.00
2003	4 196	0	0	0.00
2004	4 064	0	0	0.00
2005	2 669	0	0	0.00
2006	2 966	0	0	0.00
2007	1 879	0	0	0.00
2008	1 576	0	0	0.00
2009	1 454	113	549	7.77
2010	1 331	30	122	2.25
2011	2 061	86	472	4.17
2012	1 994	125	708	6.27
2013	2 503	445	2 713	17.78
2014	2 671	226	1 111	8.46
2015	3 244	38	192	1.17
2016	2 451	215	1 083	8.77
2017	3 391	359	1 828	10.59
2018	3 721	363	1 881	9.76
2019	2 037	149	766	7.31
2020	1 936	205	1 135	10.59
2021	1 383	131	716	9.47
2022	1 849	166	1 143	8.98
2023	1 795	236	1 680	13.15
2024	1 598	151	1 059	9.45
2025	1 564	168	1 157	10.74

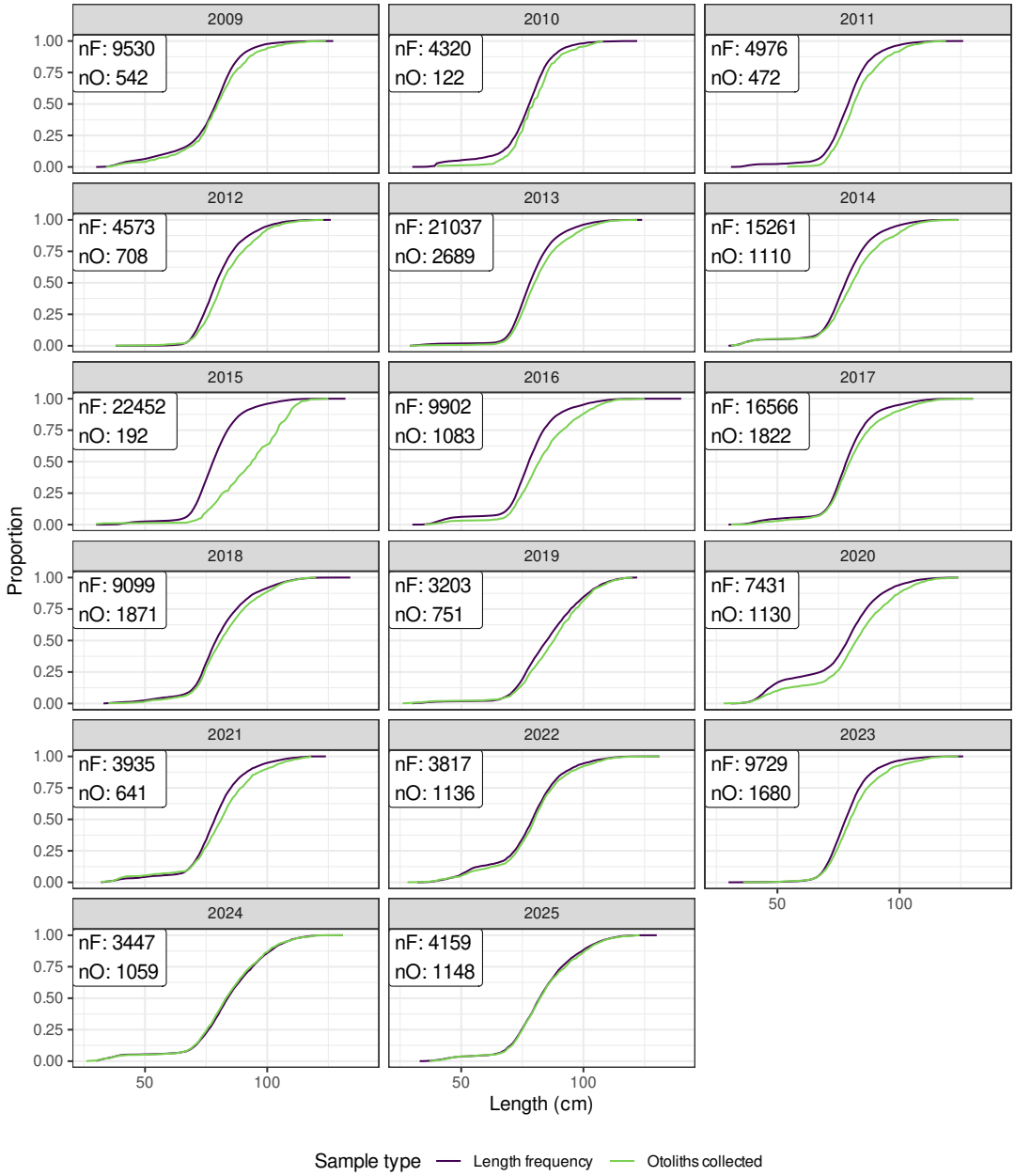


Figure 547: Cumulative distributions of the length of fish in the length frequency and otolith samples of hake in the HAK 7 Trawl fishery for the 2009 to 2025 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

2.9.3.3 Catch quantification

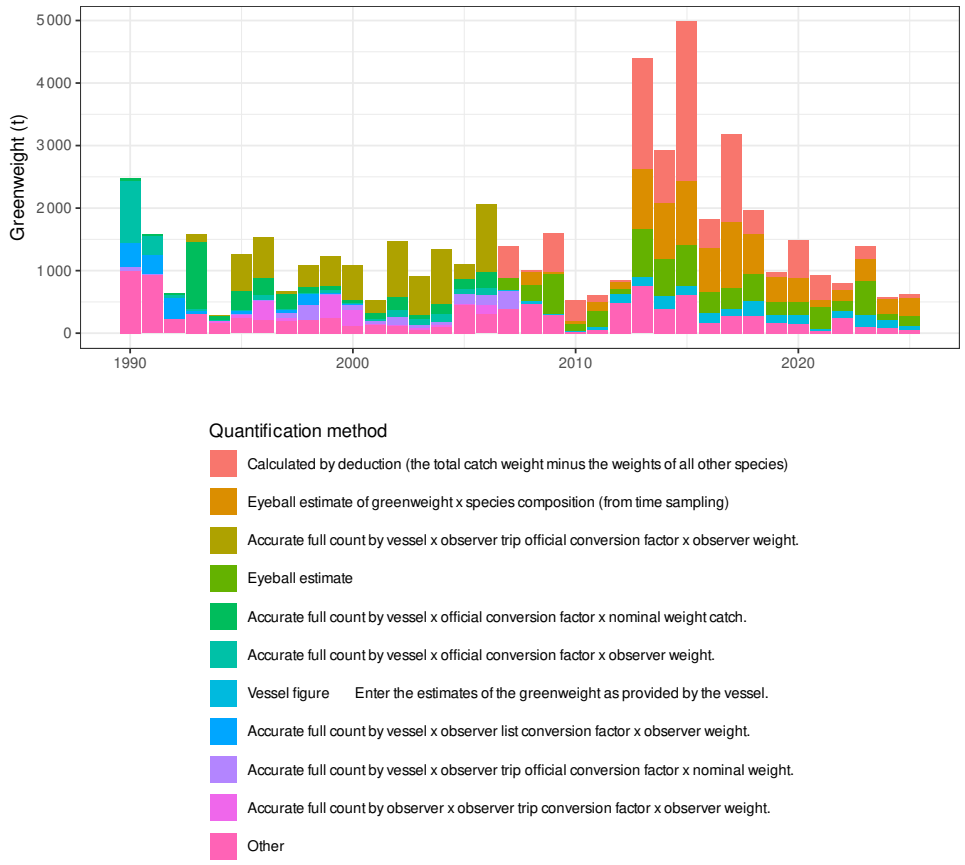


Figure 548: Methods used by observers to quantify the catch of hake in the HAK 7 Trawl fishery. The legend lists the methods used in descending order of total catch.

2.10 HOK stocks

Observer sampling of hoki is considered with respect to the hoki Fishery Areas.

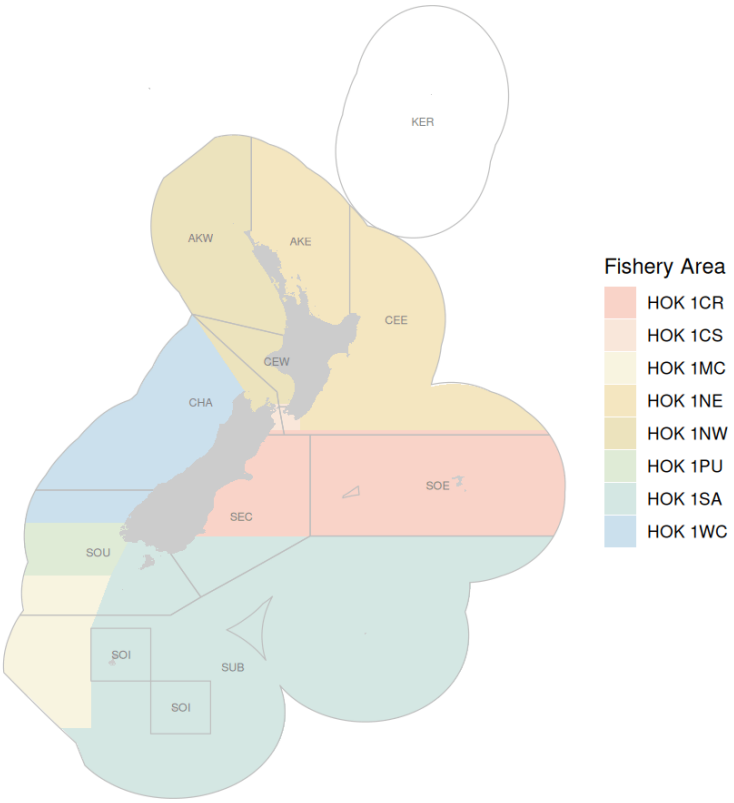


Figure 549: Observer Fisheries Management Areas (black borders, labels on plot) in relation to the Fishery Area for hoki (coloured areas, per legend).

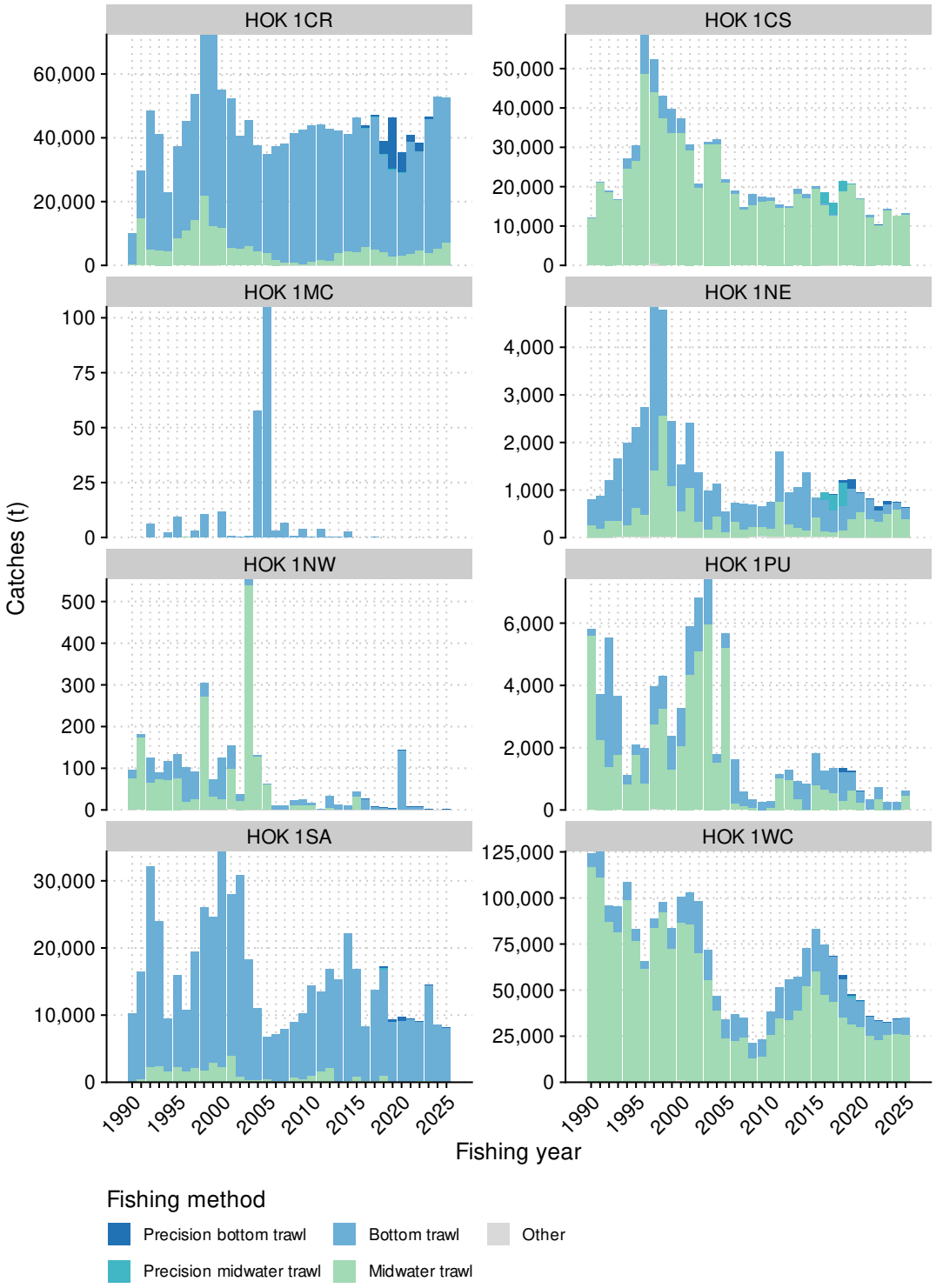


Figure 550: Catches of hoki by fishing method, for events within the hoki Fishery Areas. Methods grouped as Other include: BLL, BPT, BS, CP, D, DL, DN, DS, DV, HL, MPT, POT, PSH, SN, T, TL.

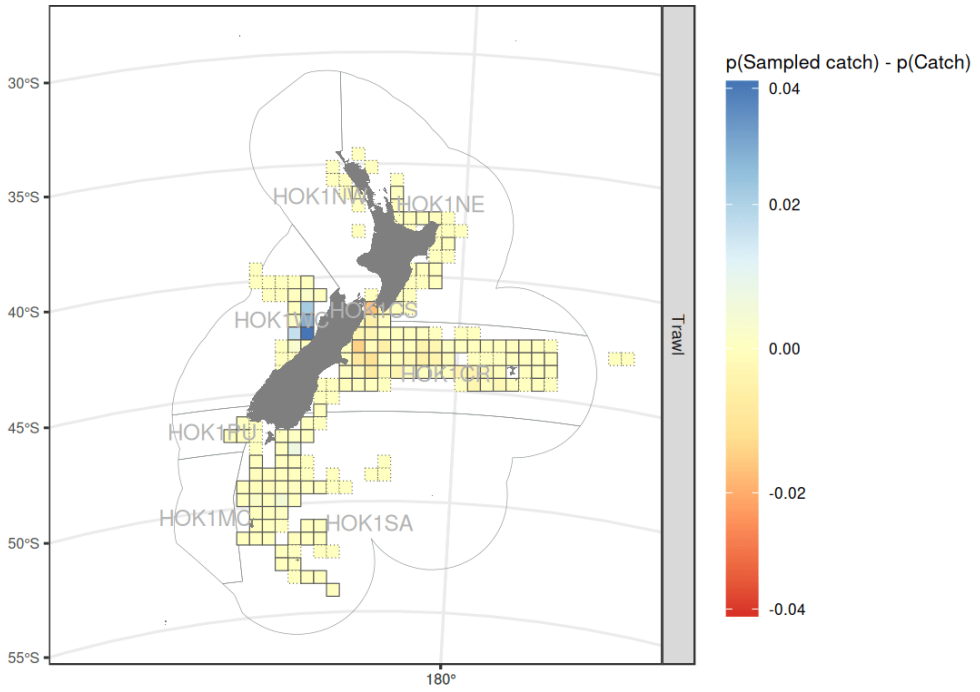


Figure 551: Differences in the relative proportions of catch and sampled catch for hoki during 2021–2025. Cells with a dotted border had no sampling.

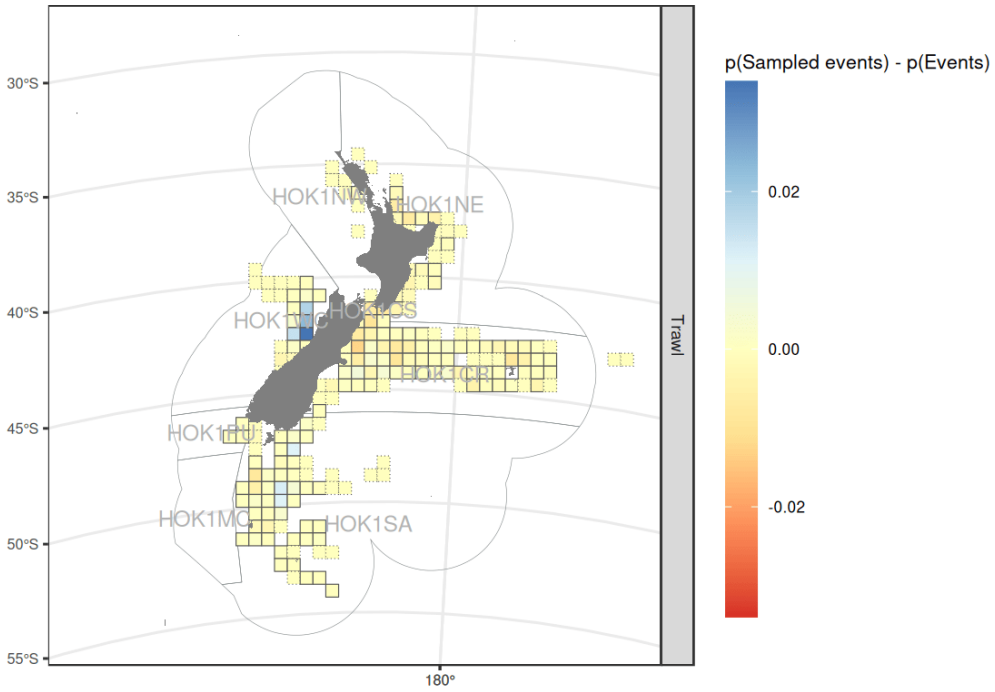


Figure 552: Differences in the relative proportions of events meeting the sampling threshold and sampled events for hoki during 2021–2025. Cells with a dotted border had no sampling.

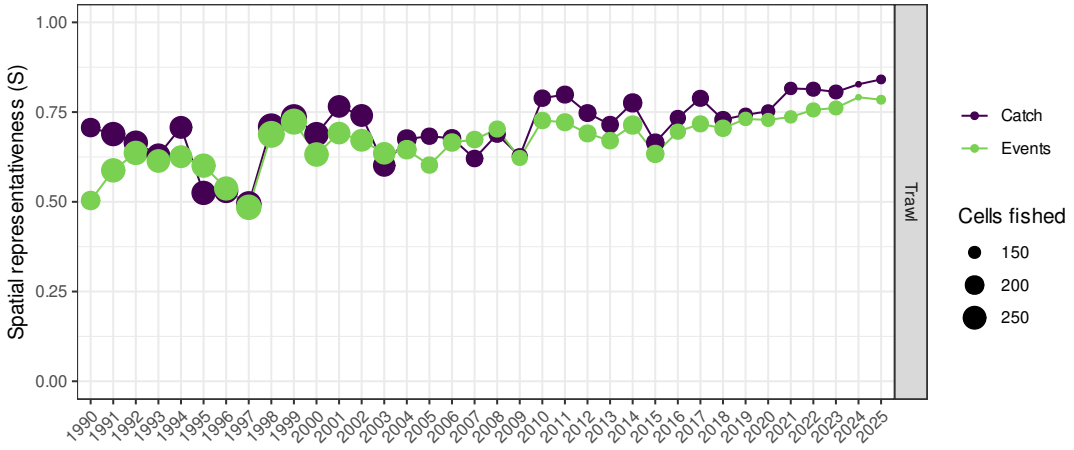


Figure 553: Spatial representativeness of observer sampling of hoki by fishing year. Representativeness is assessed using the Manhattan distance metric (*S*) applied to 64 km grid cells, for both the proportion of catch sampled and the proportion of positive events sampled.

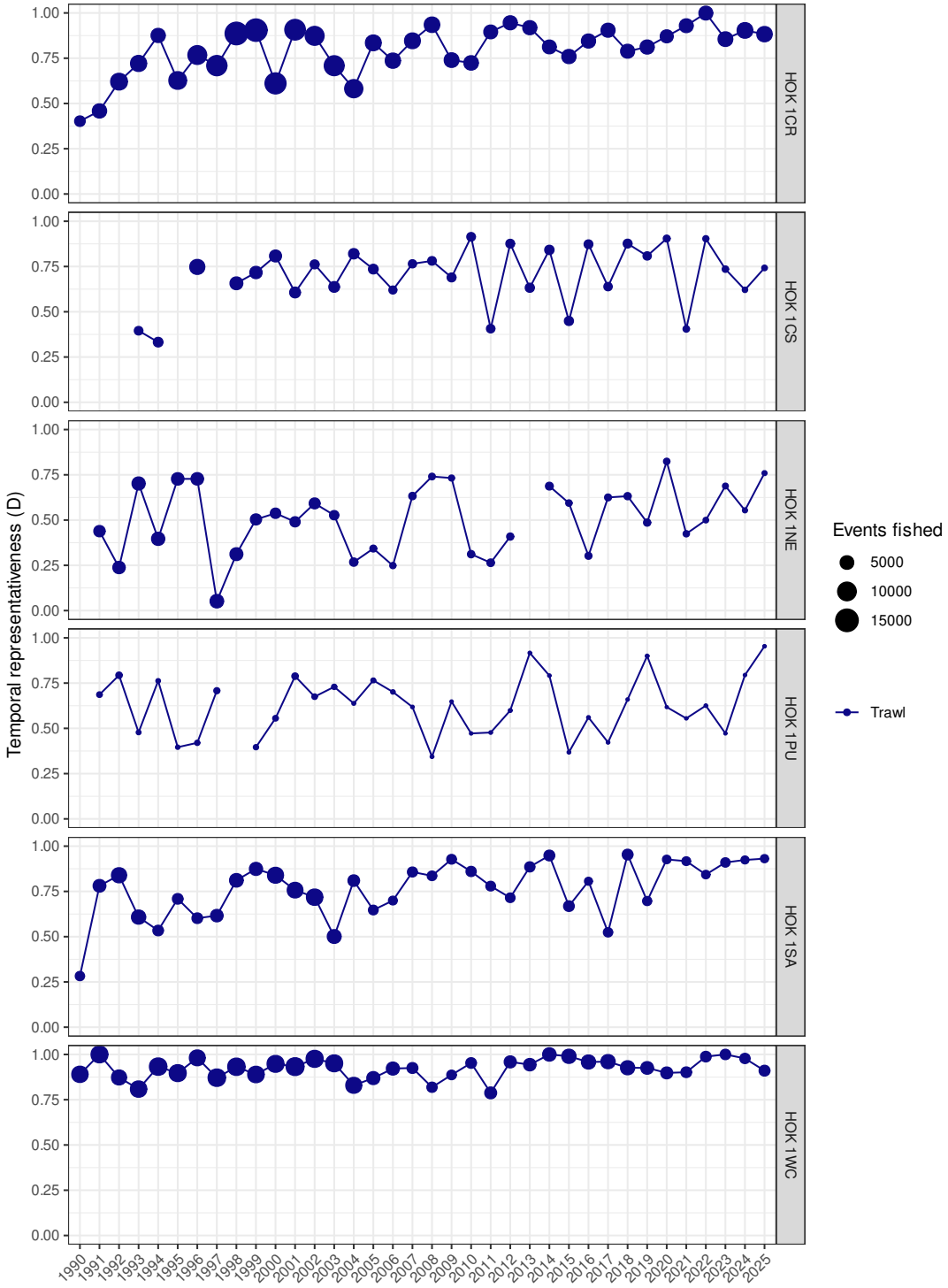


Figure 554: Temporal representativeness of observer sanpling of hoki by fishing year and area. Temporal representativeness is assessed using the KS statistic (*D*) applied to the start date-times of all fishing events and all sampled fishing events, weighted by catch weight.

2.10.1 HOK 1CR: Trawl fishery

2.10.1.1 Length-frequency samples

Table 47: Length-frequency samples of hoki from the HOK 1CR Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of hoki exceeded a potential sampling threshold of 70 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	2 851	58	6 278	2.03
1991	5 546	165	15 410	2.98
1992	7 897	149	15 326	1.89
1993	7 215	87	7 585	1.21
1994	5 502	234	21 209	4.25
1995	8 915	145	14 217	1.63
1996	10 128	285	30 127	2.81
1997	11 845	170	17 417	1.44
1998	15 019	717	78 842	4.77
1999	14 742	539	56 591	3.66
2000	12 909	380	36 435	2.94
2001	12 339	592	56 422	4.80
2002	10 255	380	36 782	3.71
2003	11 492	307	26 148	2.67
2004	9 424	313	26 370	3.32
2005	6 936	304	31 088	4.38
2006	6 465	466	40 188	7.21
2007	6 930	367	27 891	5.30
2008	6 651	410	40 992	6.16
2009	5 915	243	20 300	4.11
2010	5 747	350	33 443	6.09
2011	5 167	381	40 063	7.37
2012	5 398	373	36 629	6.91
2013	5 415	702	70 977	12.96
2014	5 175	672	64 030	12.99
2015	5 521	370	30 975	6.70
2016	5 434	343	32 819	6.31
2017	5 383	328	31 956	6.09
2018	5 299	391	37 384	7.38
2019	5 454	419	38 816	7.68
2020	4 534	505	48 719	11.14
2021	5 203	1 010	95 448	19.41
2022	5 228	729	67 912	13.94
2023	5 949	787	76 686	13.23
2024	6 844	1 001	96 375	14.63
2025	6 529	853	80 825	13.06

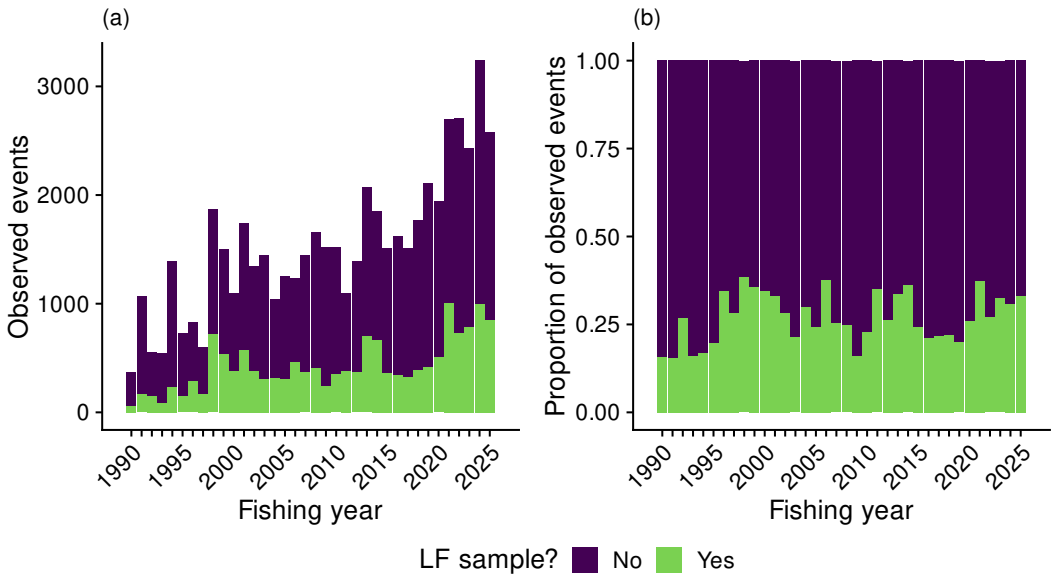


Figure 555: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in HOK 1CR where the hoki catch exceeded the 70 kg threshold, with and without length-frequency sampling.**

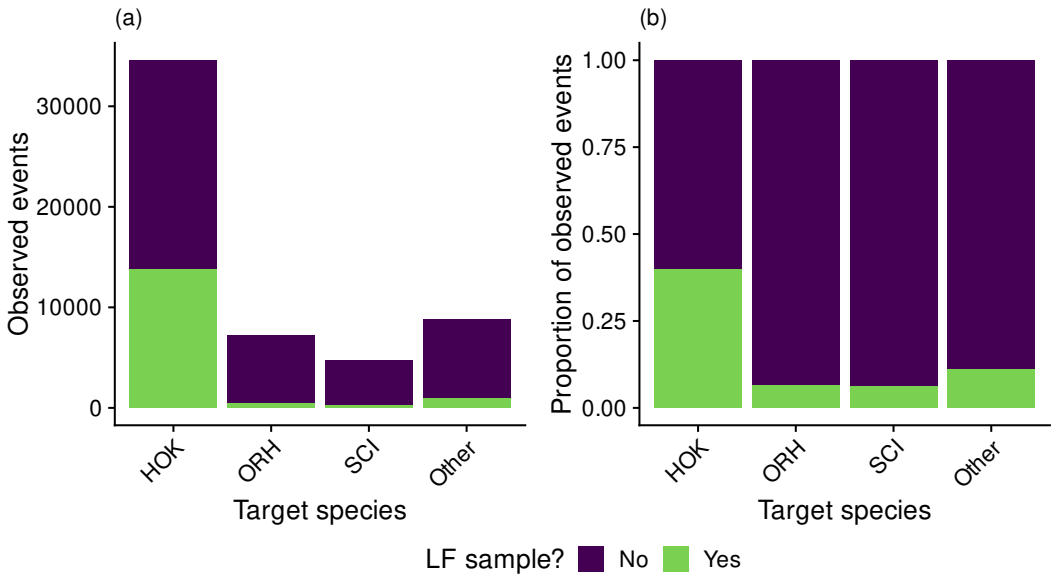


Figure 556: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in HOK 1CR where the hoki catch exceeded the 70 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

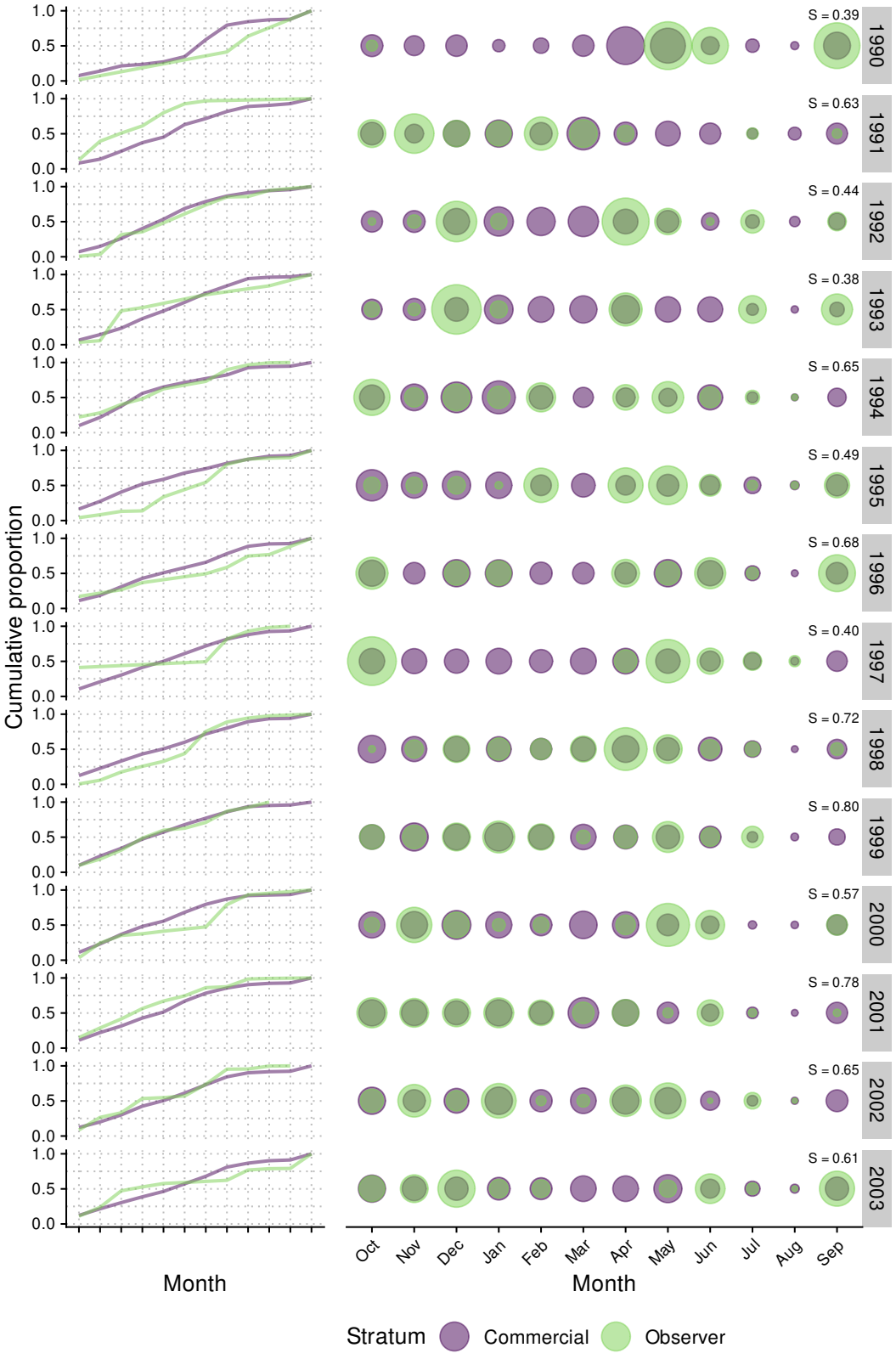


Figure 557: **Monthly representativeness of observer sampling coverage of Trawl fishing events in HOK 1CR, where the hoki catch exceeded the 70kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

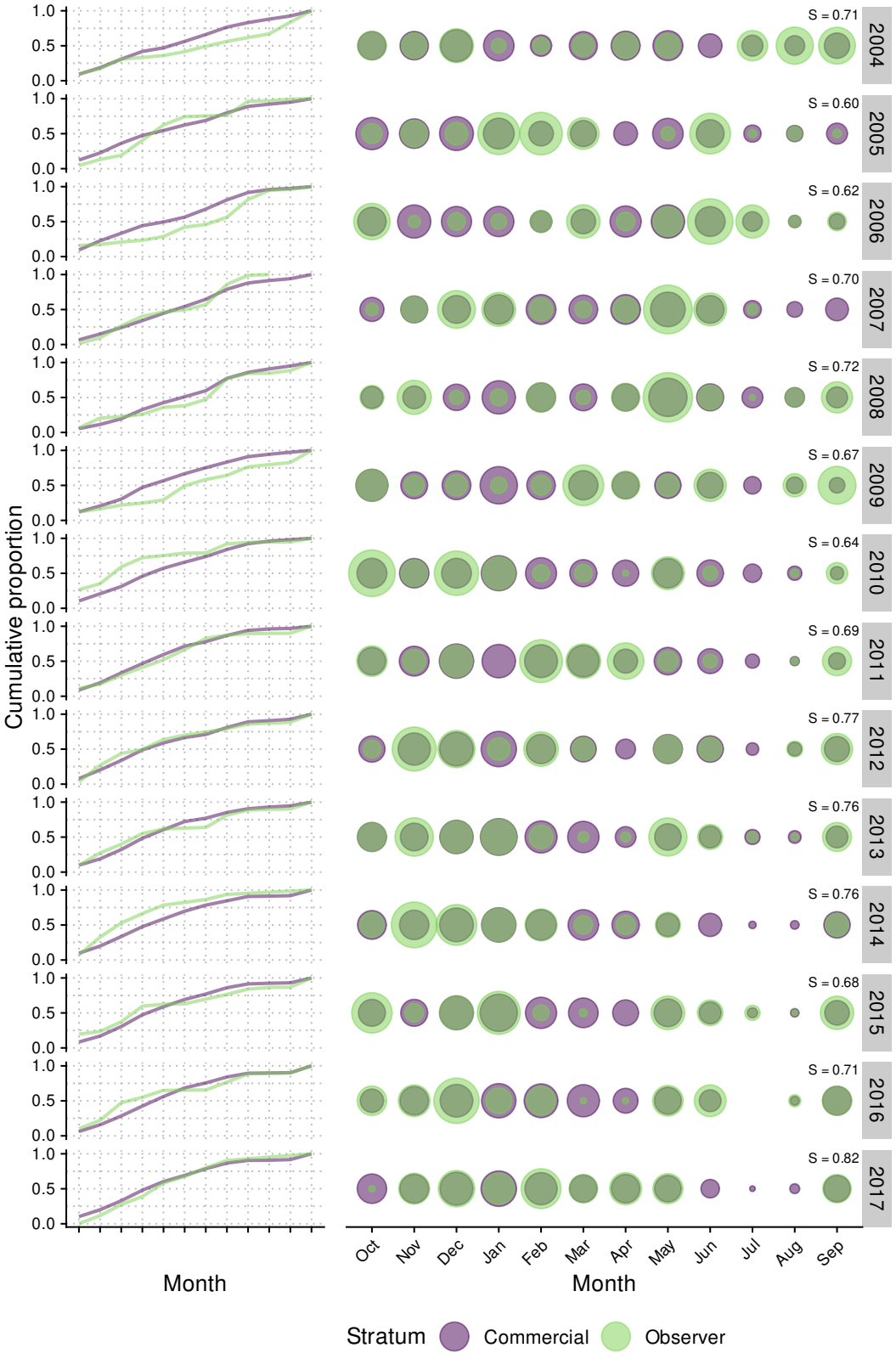


Figure 558: **Monthly representativeness of observer sampling coverage of Trawl fishing events in HOK 1CR, where the hoki catch exceeded the 70kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

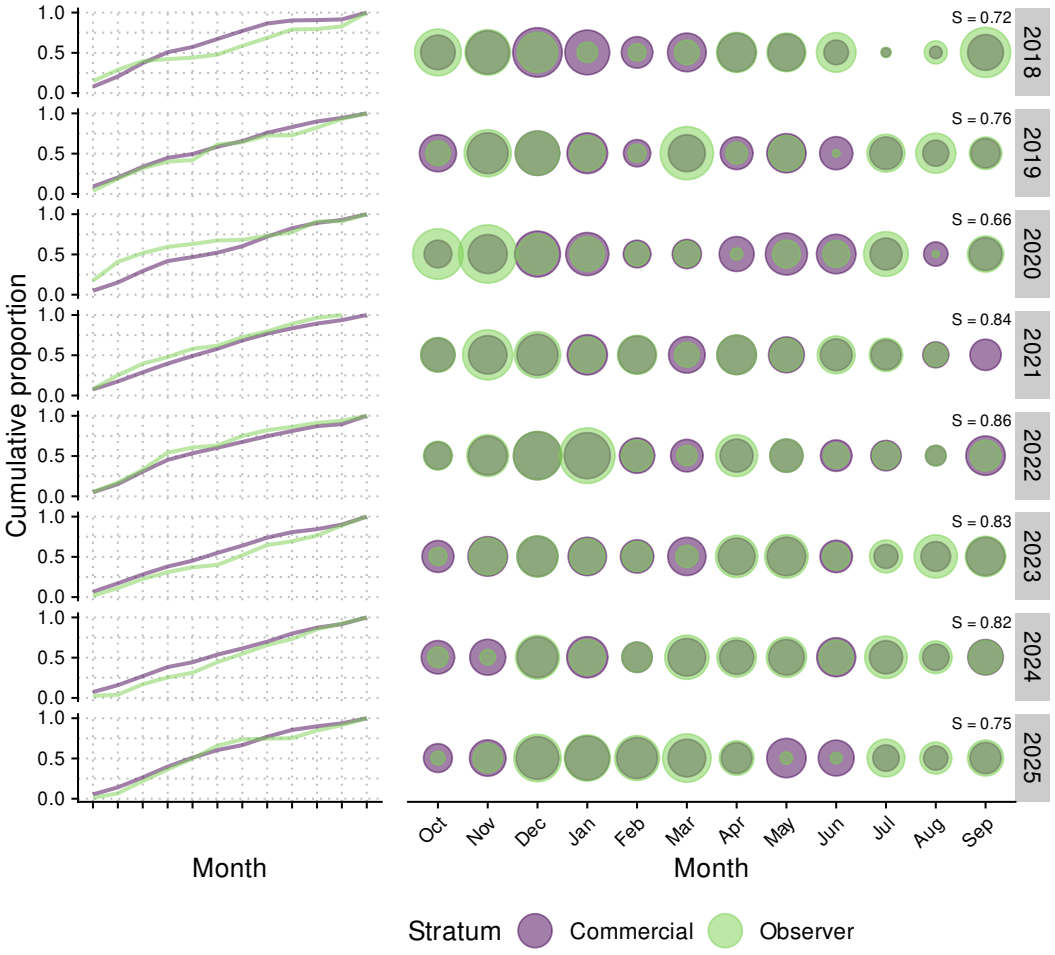


Figure 559: **Monthly representativeness of observer sampling coverage of Trawl fishing events in HOK 1CR, where the hoki catch exceeded the 70kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

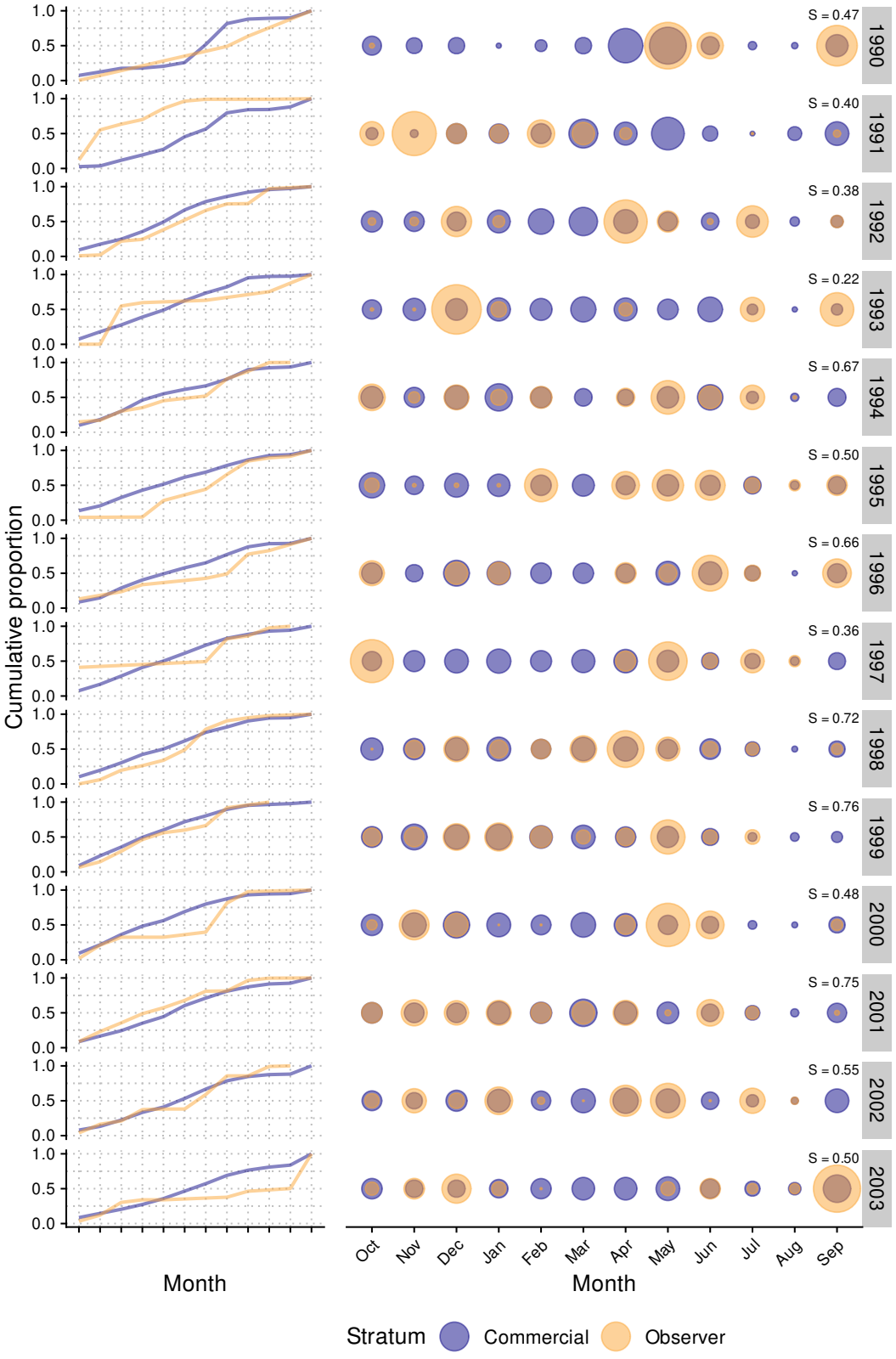


Figure 560: **Monthly representativeness of observer sampling coverage of Trawl catch in HOK 1CR, from events where the hoki catch exceeded the 70kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

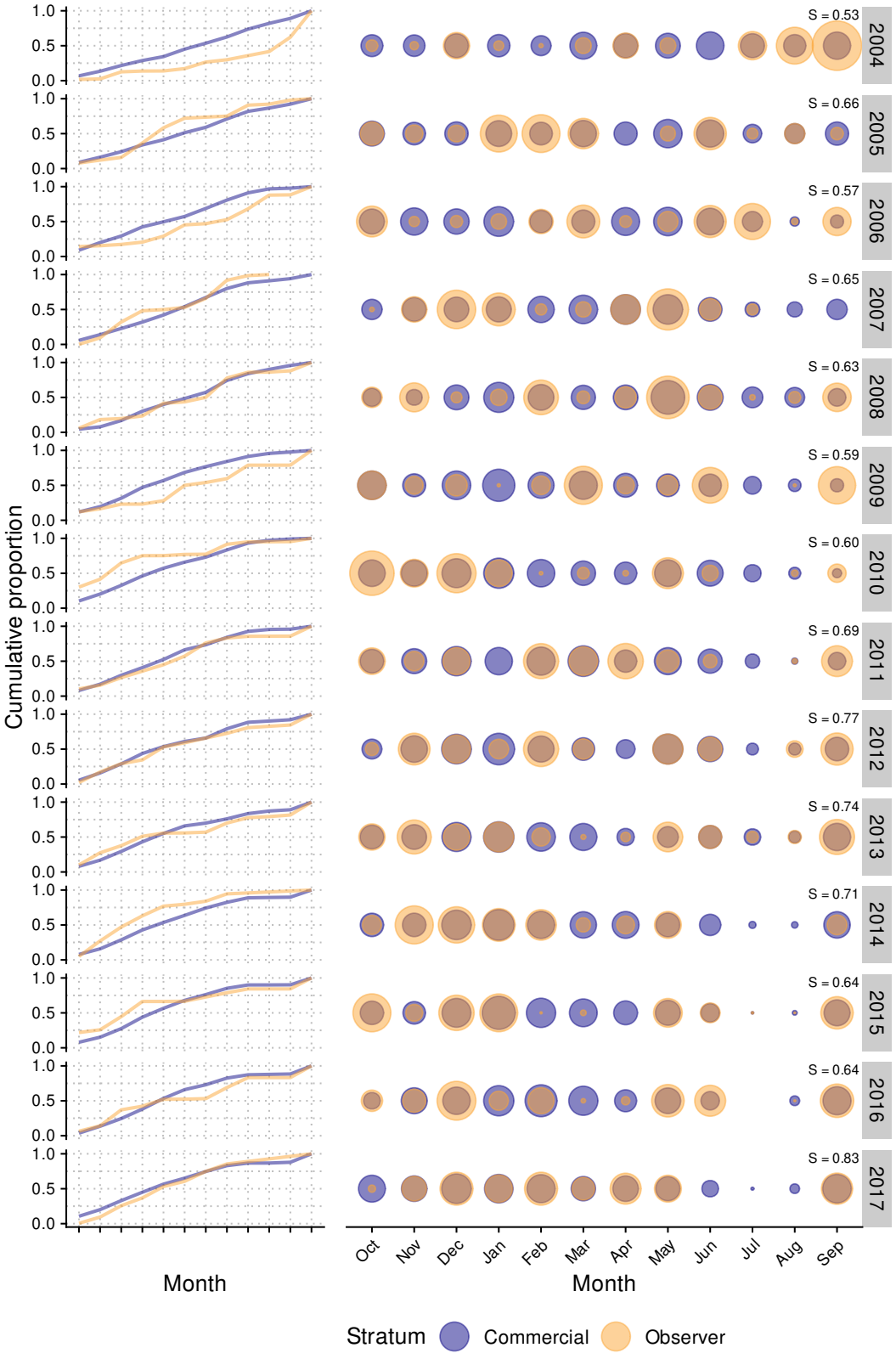


Figure 561: Monthly representativeness of observer sampling coverage of Trawl catch in HOK 1CR, from events where the hoki catch exceeded the 70kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

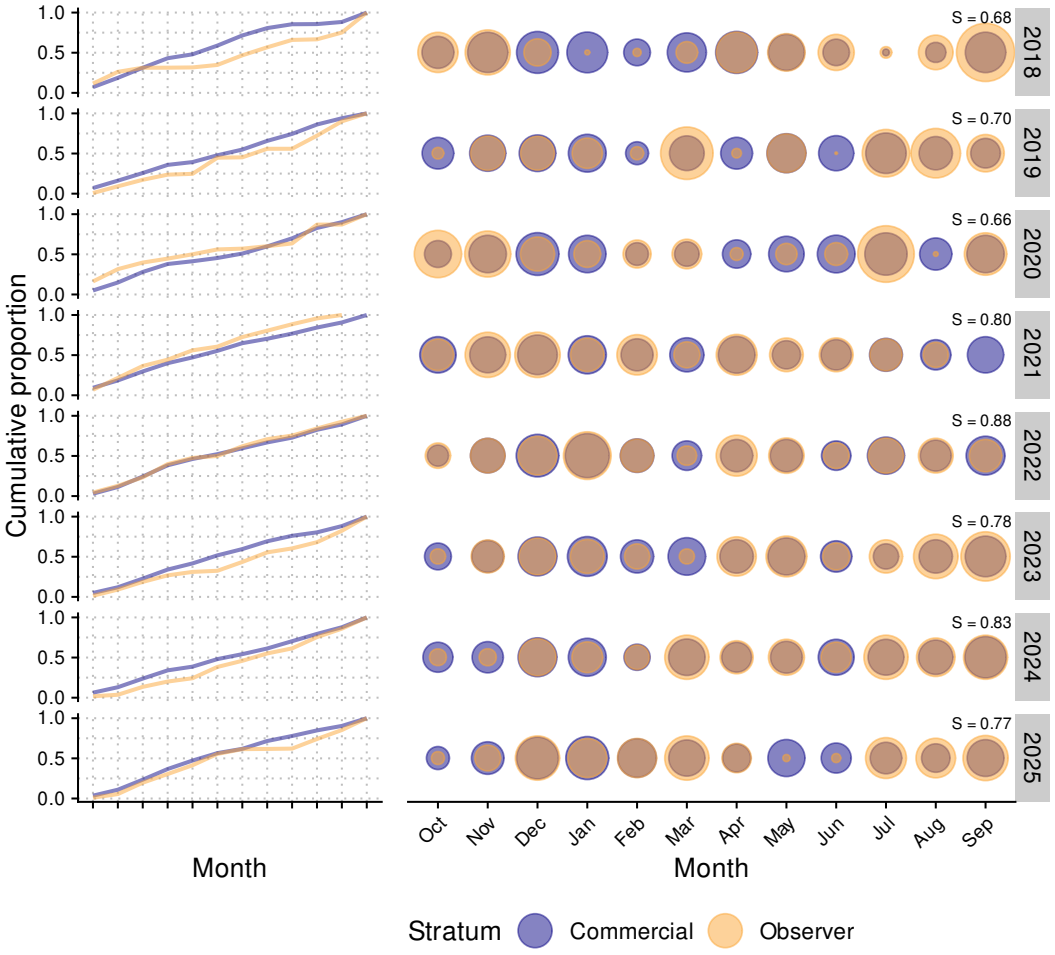


Figure 562: Monthly representativeness of observer sampling coverage of Trawl catch in HOK 1CR, from events where the hoki catch exceeded the 70kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

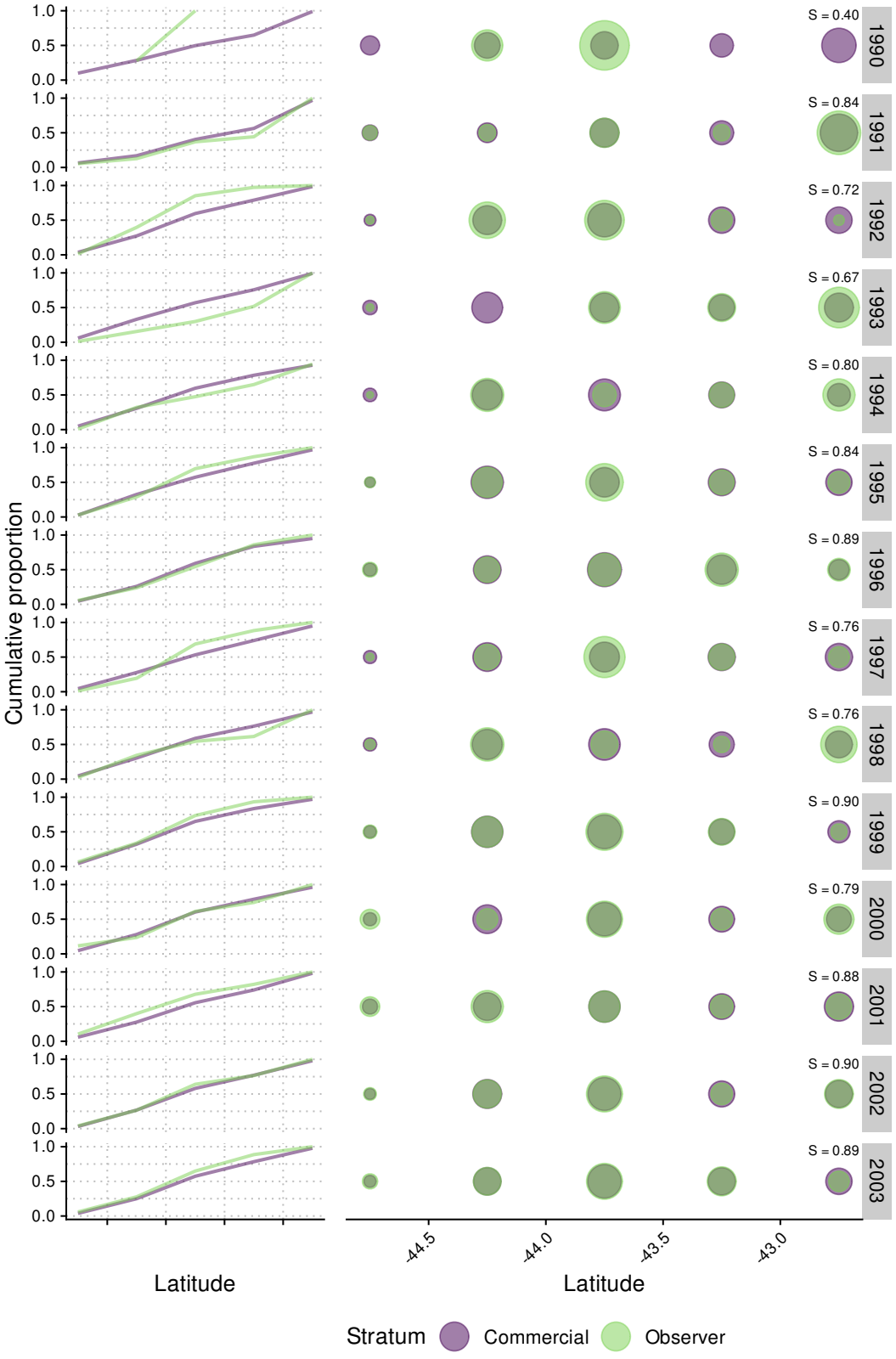


Figure 563: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in HOK 1CR, where the hoki catch exceeded the 70kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

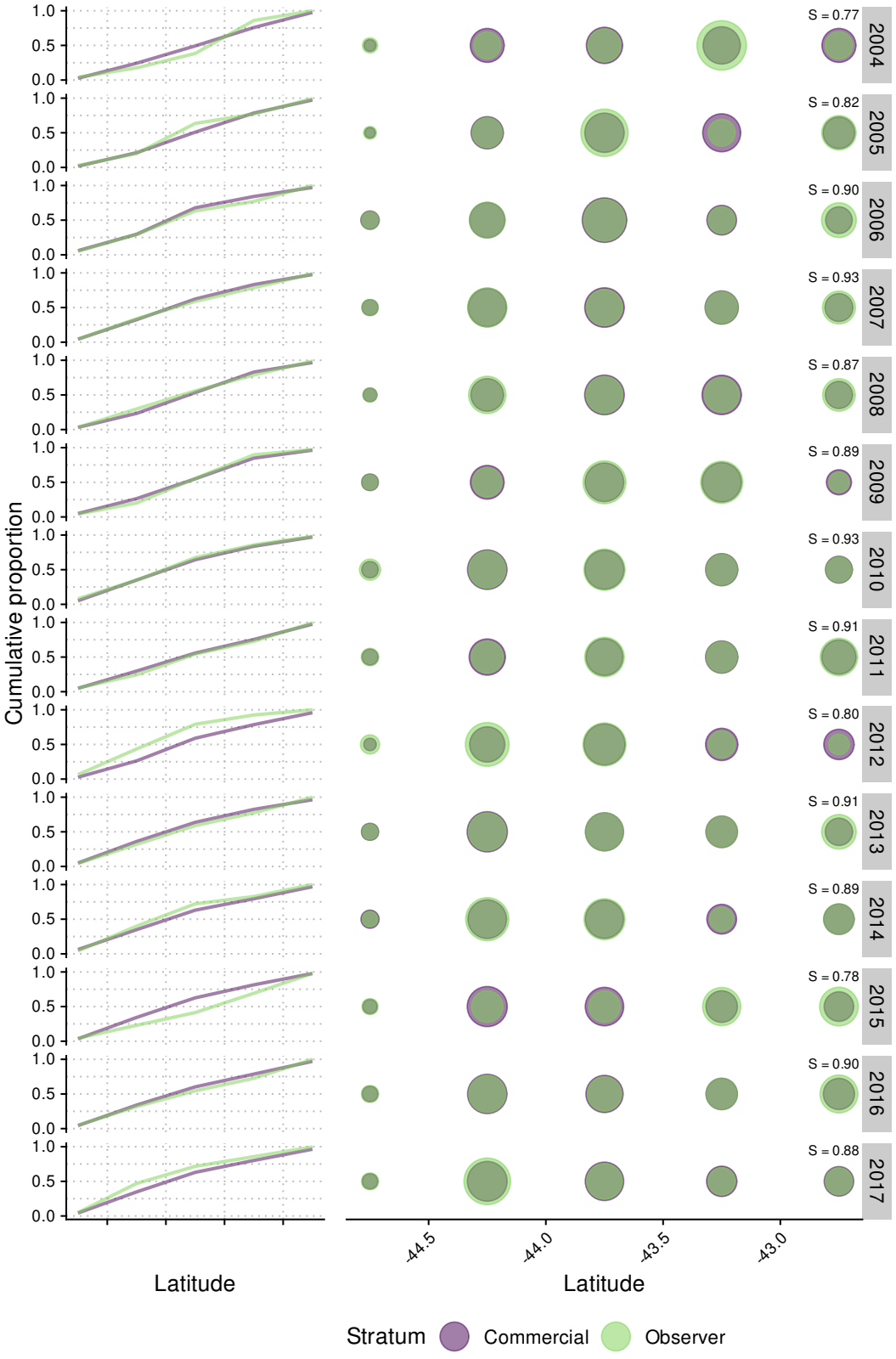


Figure 564: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in HOK 1CR, where the hoki catch exceeded the 70kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

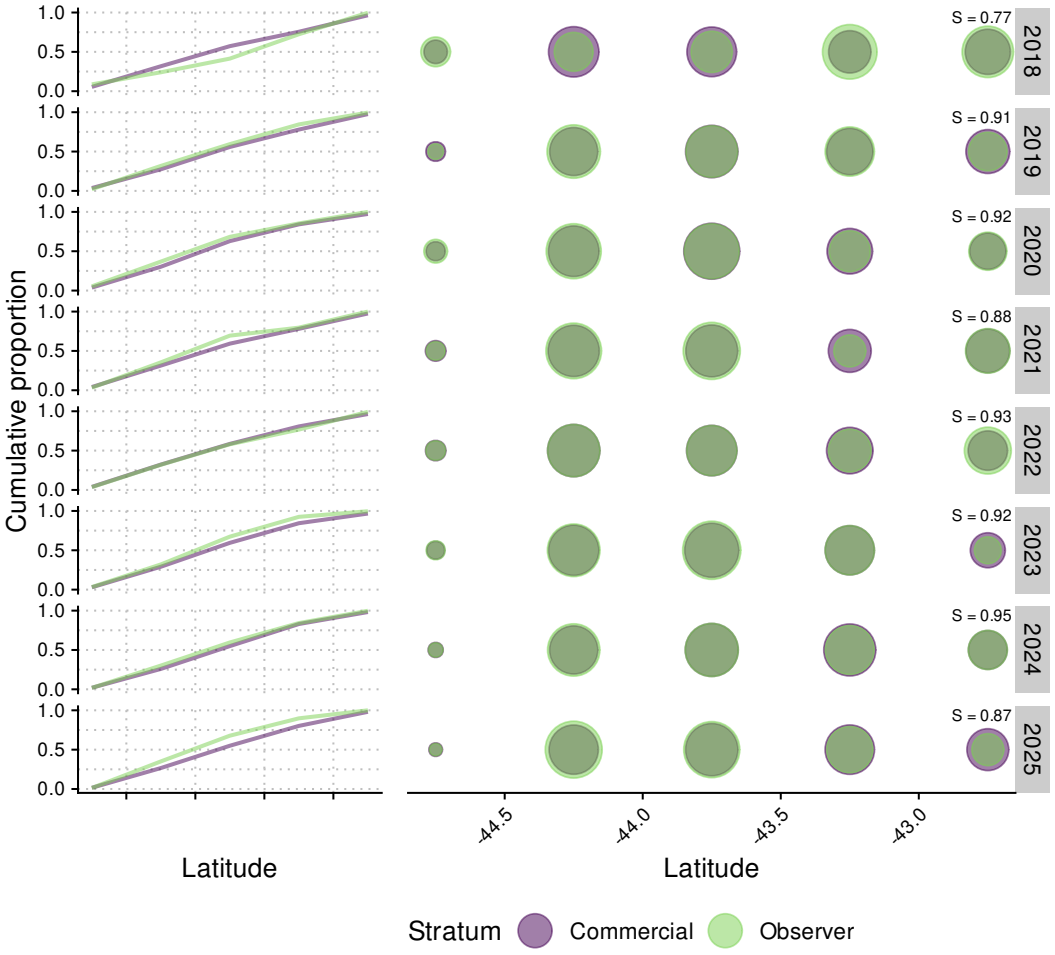


Figure 565: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in HOK 1CR, where the hoki catch exceeded the 70kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

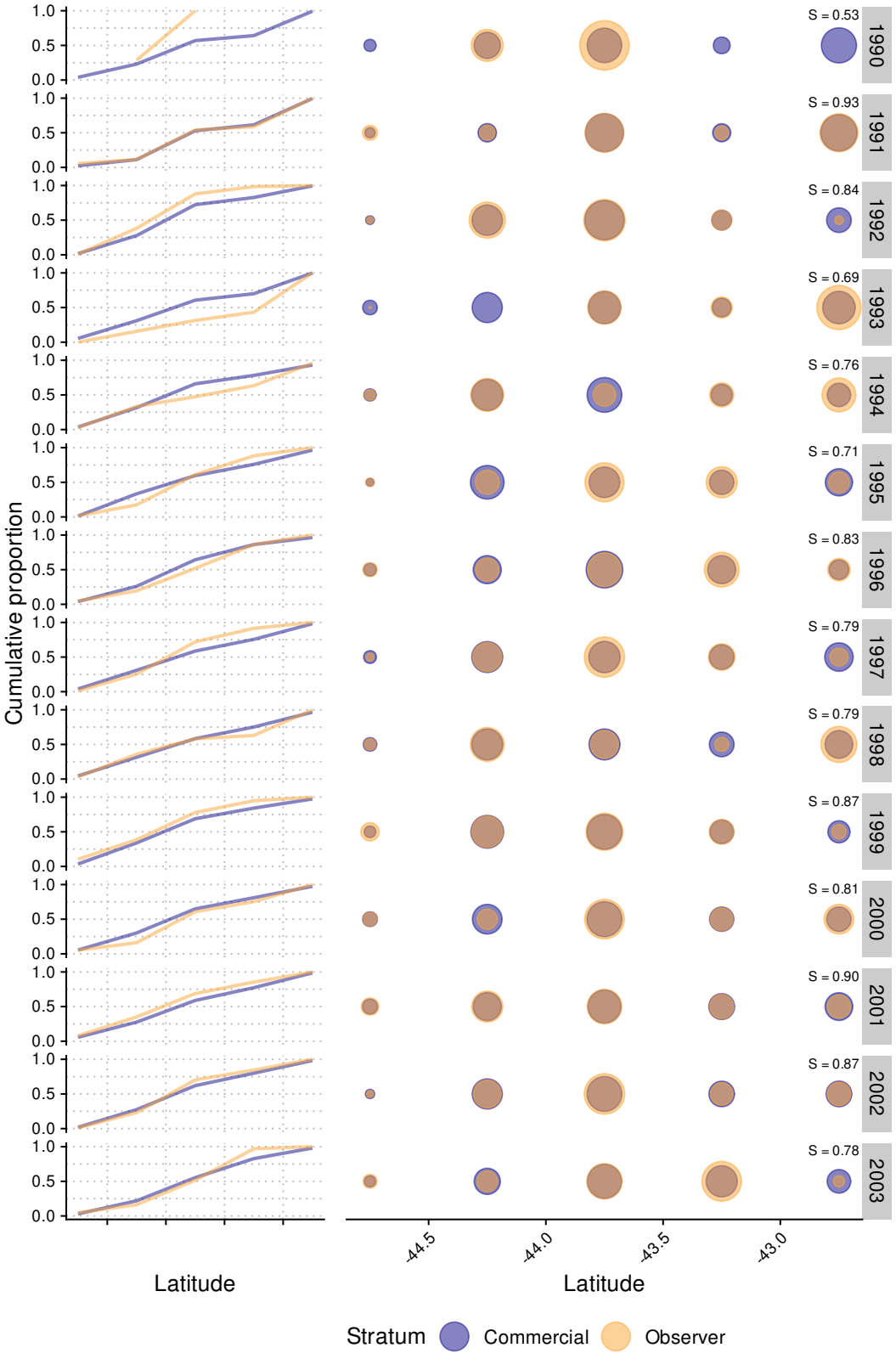


Figure 566: **Latitudinal representativeness of observer sampling coverage of Trawl catch in HOK 1CR, from events where the hoki catch exceeded the 70kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

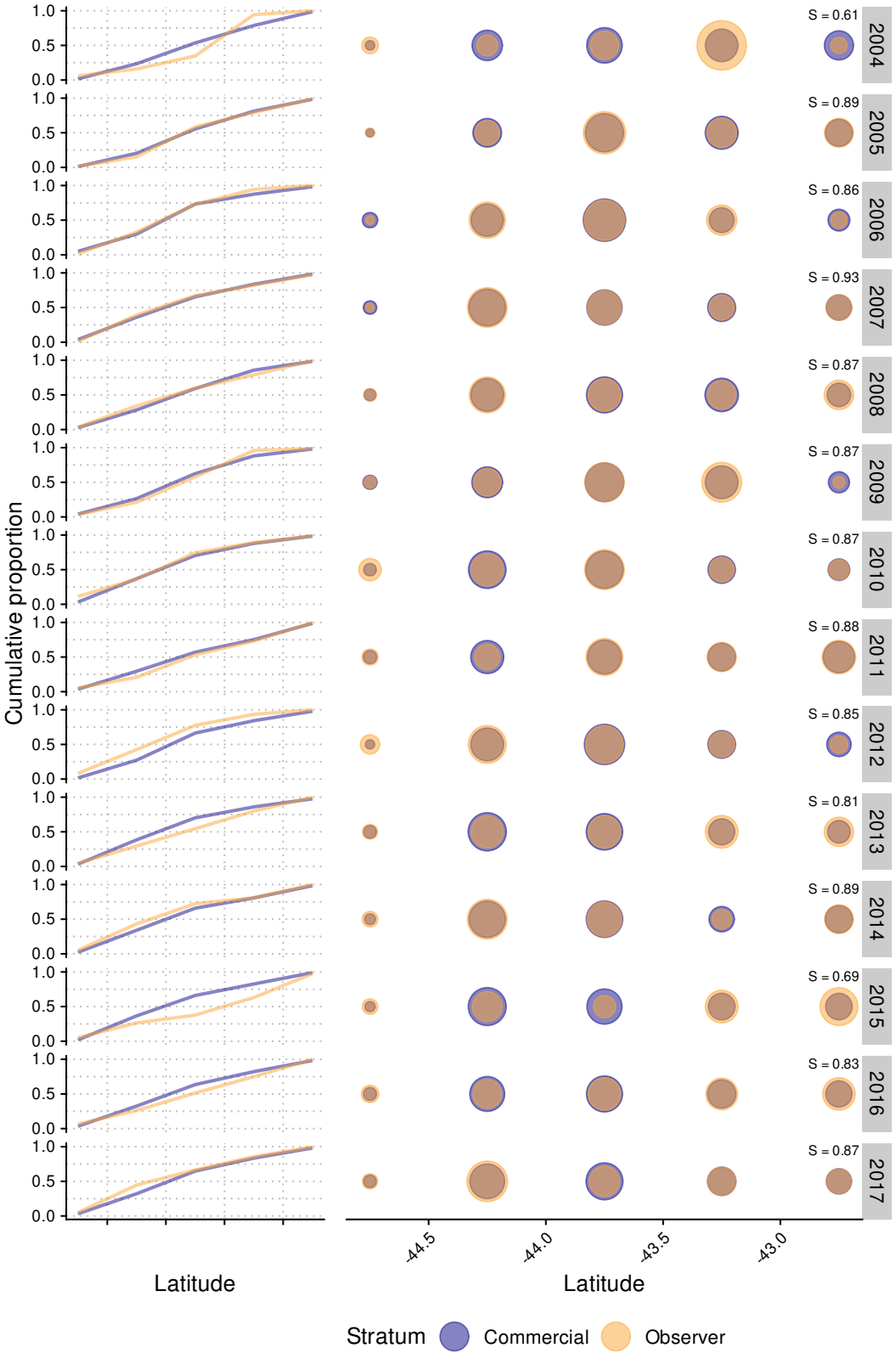


Figure 567: **Latitudinal representativeness of observer sampling coverage of Trawl catch in HOK 1CR, from events where the hoki catch exceeded the 70kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

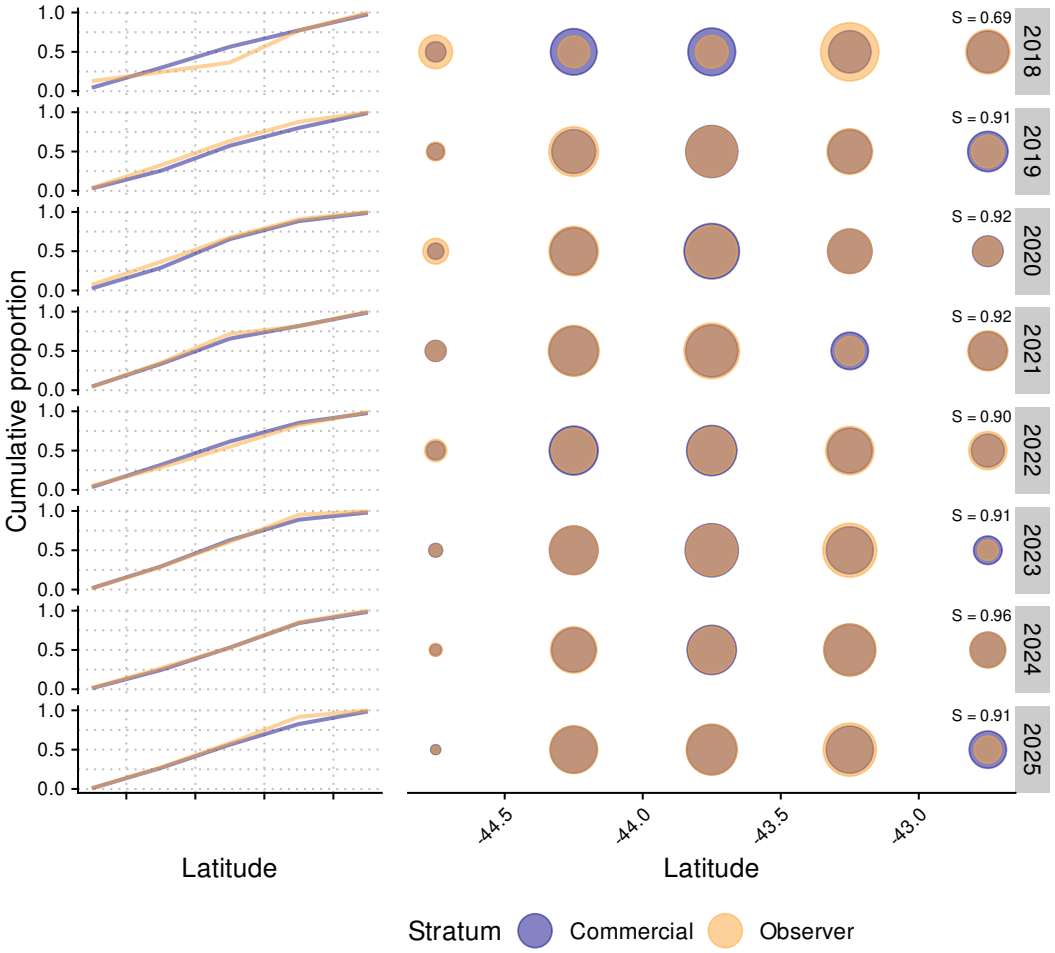


Figure 568: Latitudinal representativeness of observer sampling coverage of Trawl catch in HOK 1CR, from events where the hoki catch exceeded the 70kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

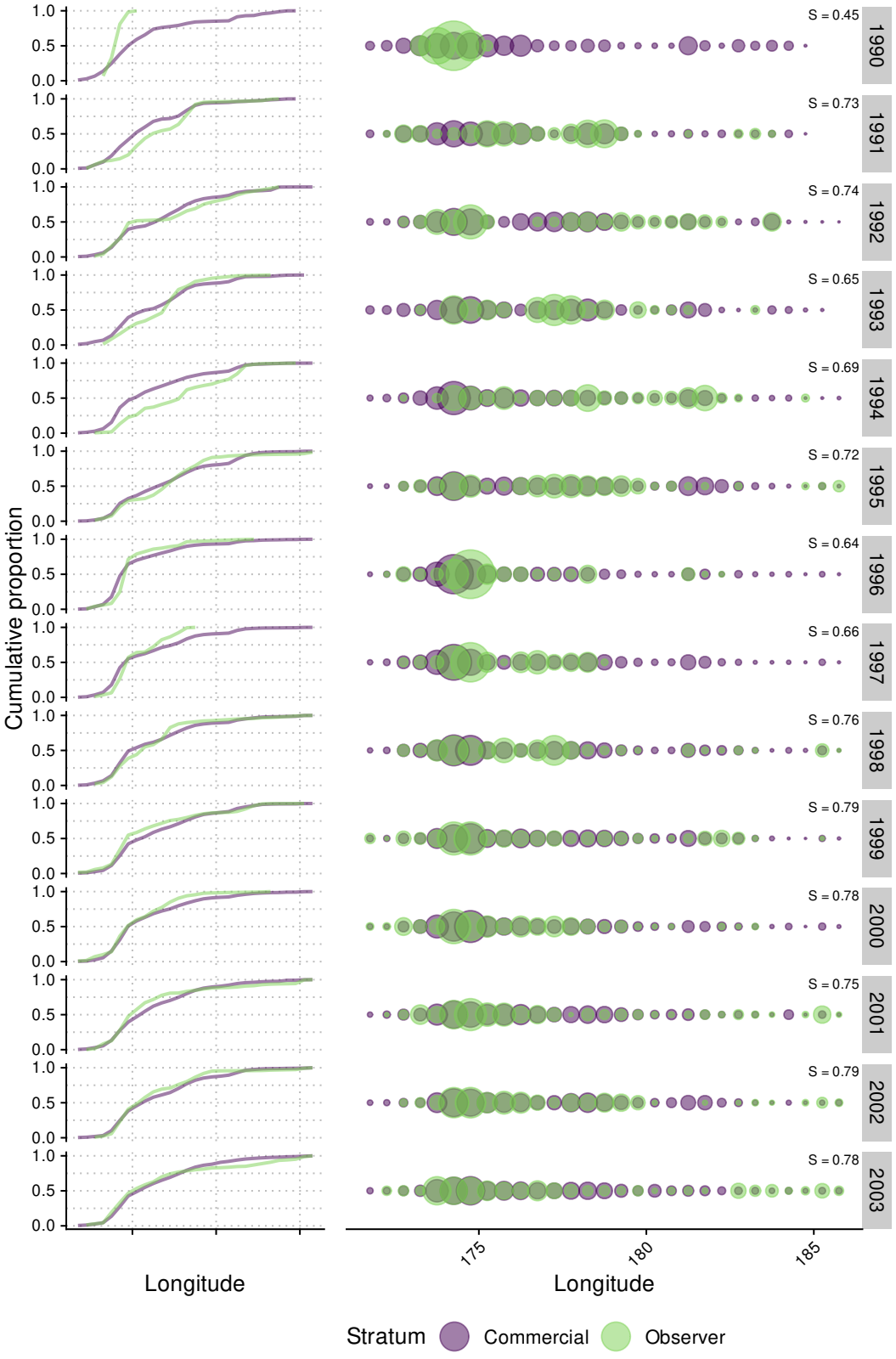


Figure 569: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in HOK 1CR, where the hoki catch exceeded the 70kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

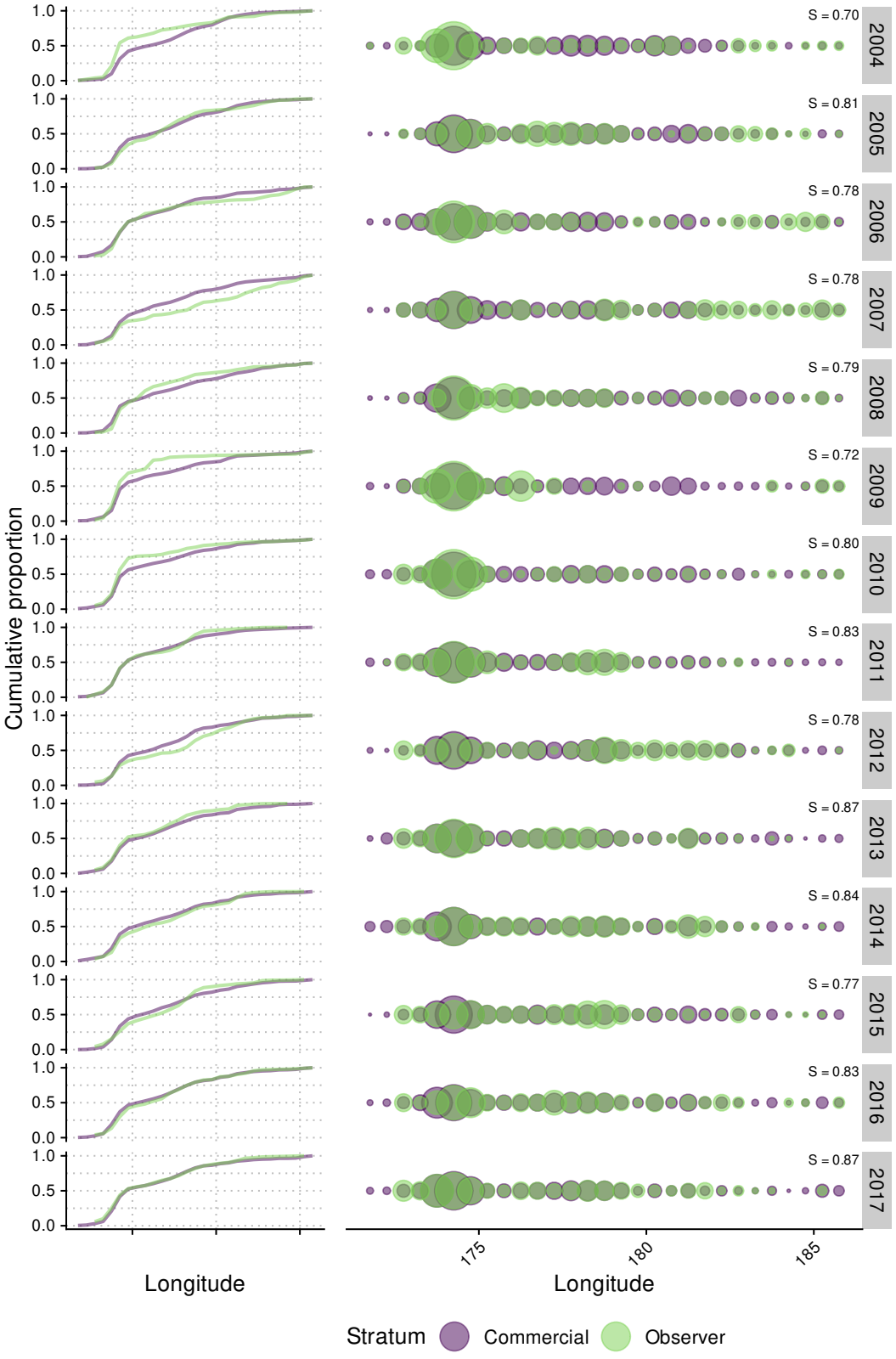


Figure 570: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in HOK 1CR, where the hoki catch exceeded the 70kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

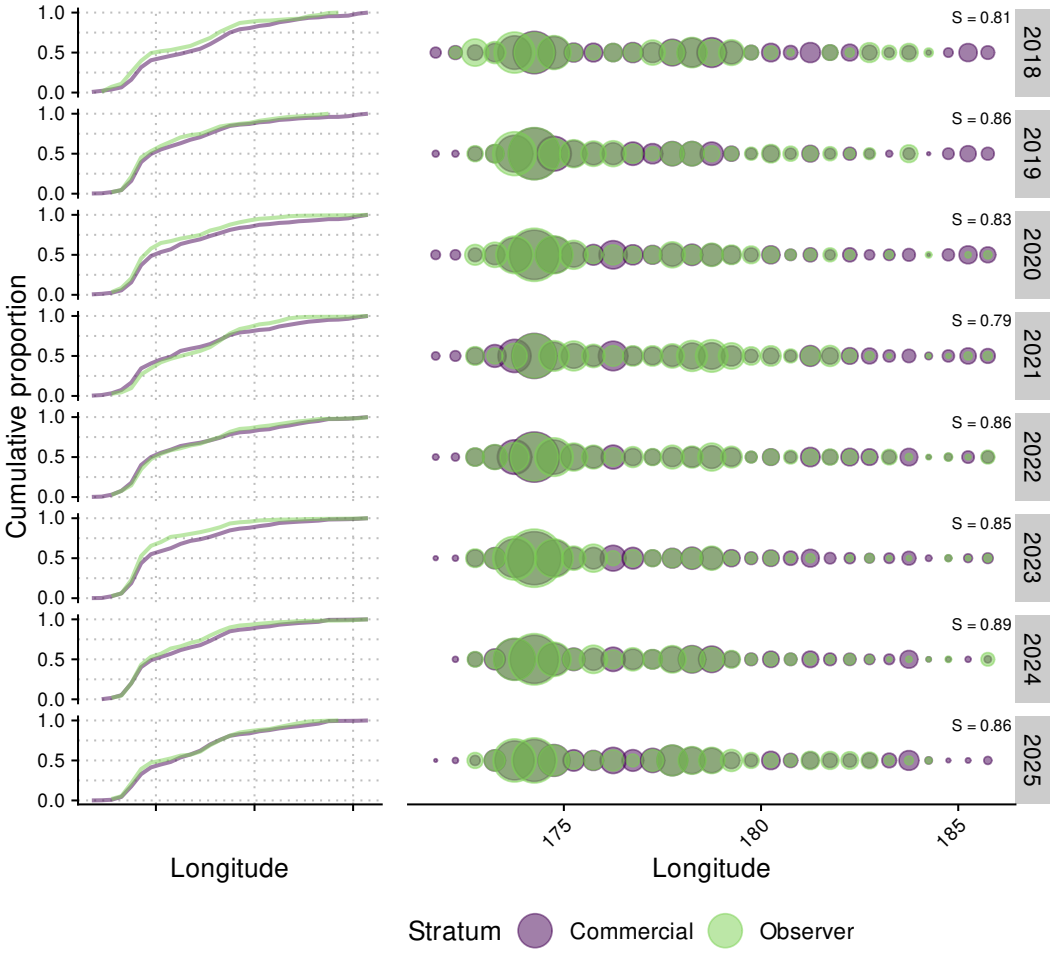


Figure 571: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in HOK 1CR, where the hoki catch exceeded the 70kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

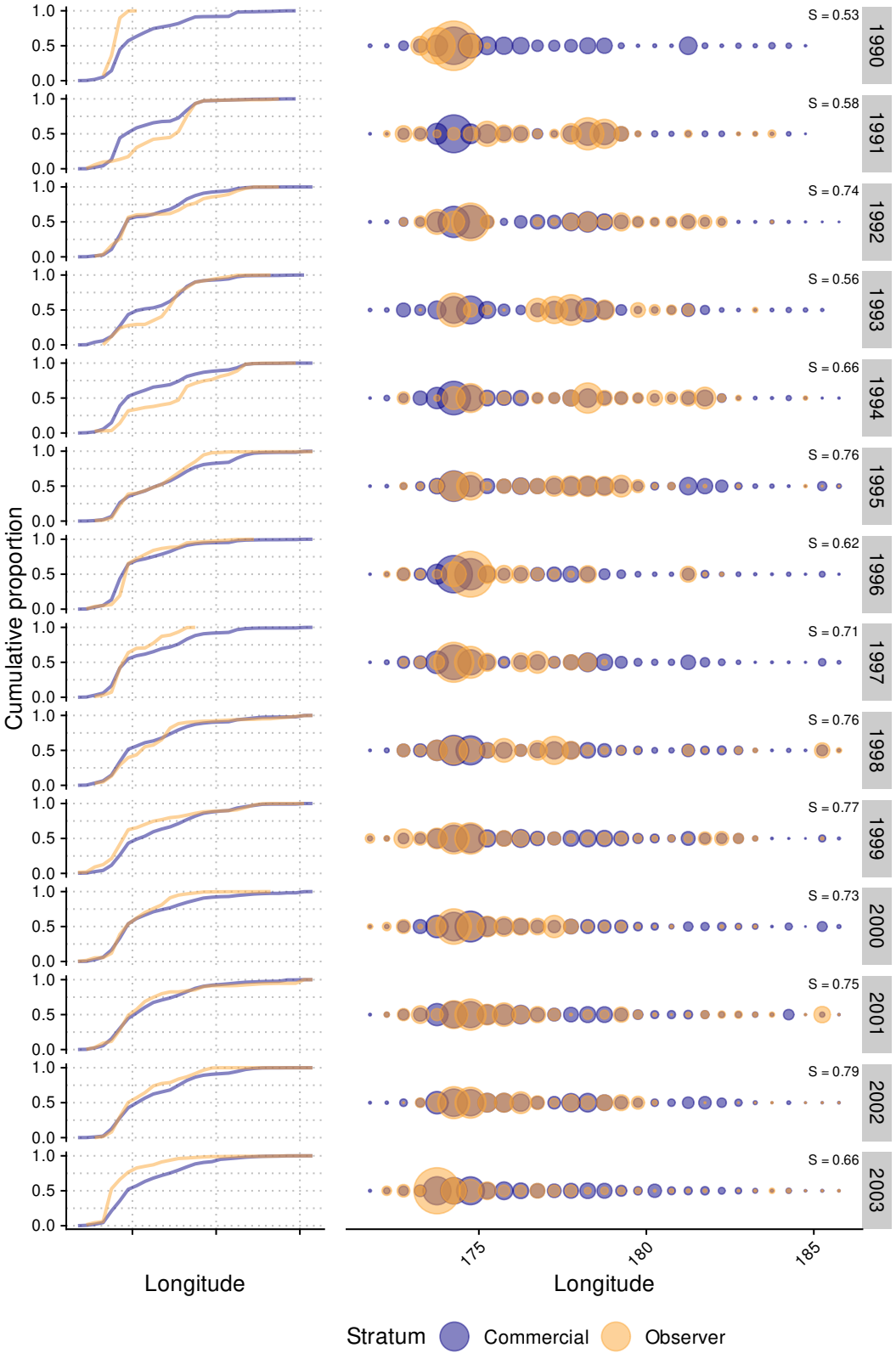


Figure 572: Longitudinal representativeness of observer sampling coverage of Trawl catch in HOK 1CR, from events where the hoki catch exceeded the 70kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

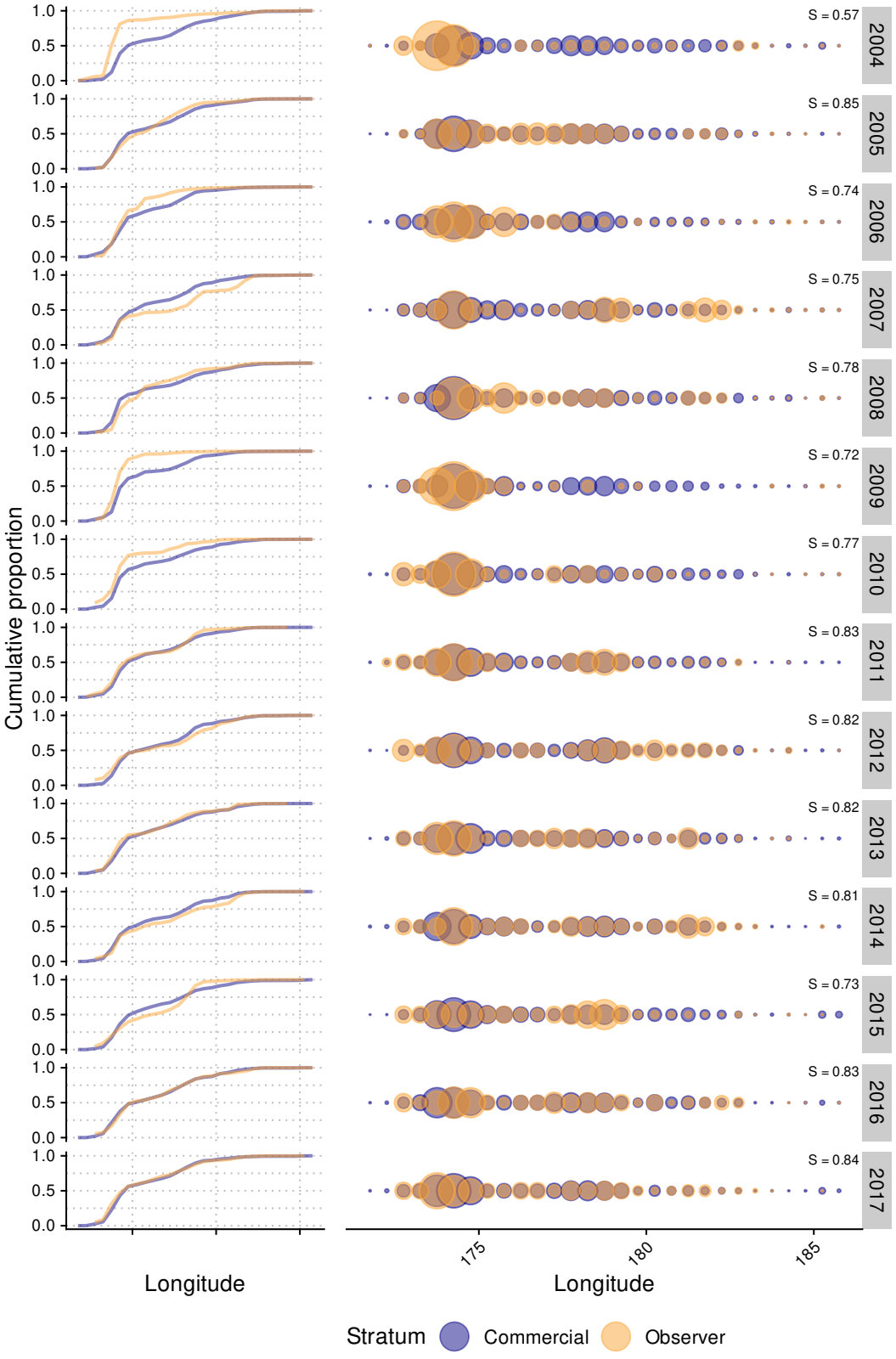


Figure 573: **Longitudinal representativeness of observer sampling coverage of Trawl catch in HOK 1CR, from events where the hoki catch exceeded the 70kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

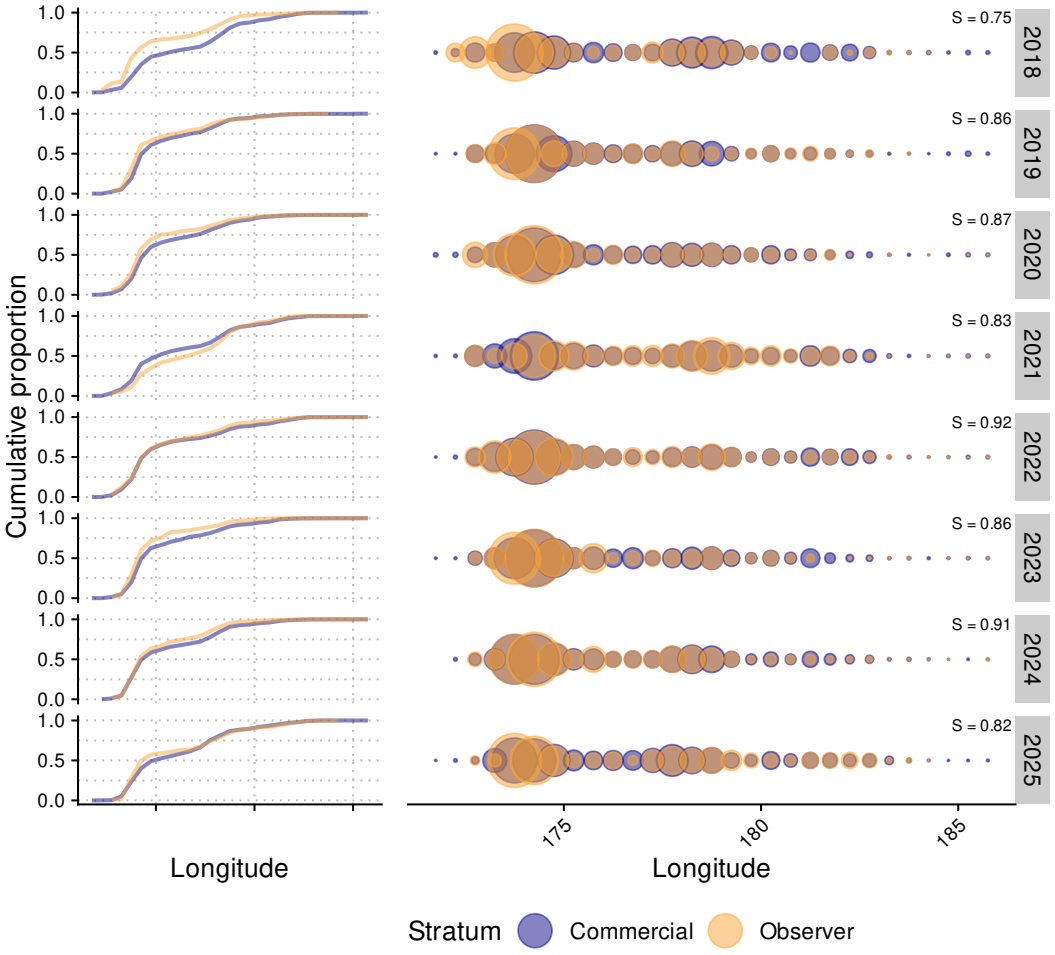


Figure 574: **Longitudinal representativeness of observer sampling coverage of Trawl catch in HOK 1CR, from events where the hoki catch exceeded the 70kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

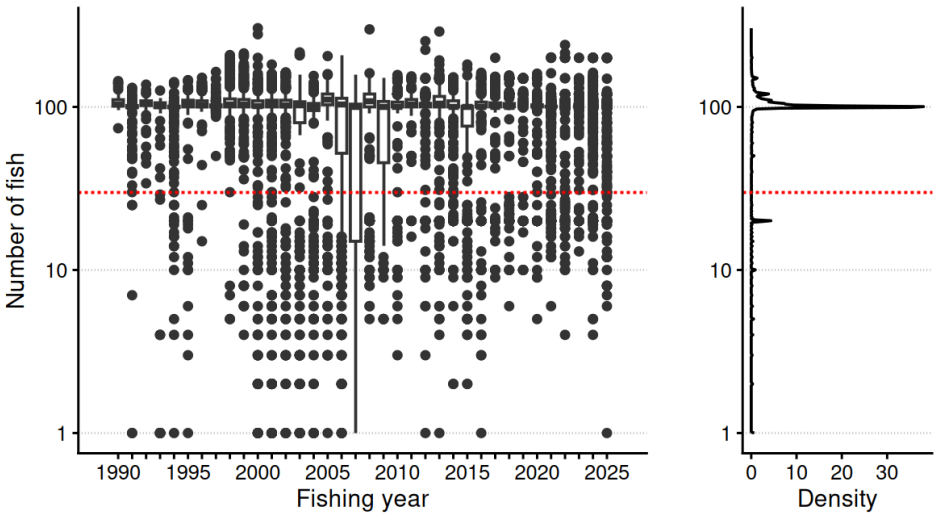


Figure 575: **Length-frequency sample sizes for observed fishing events in HOK 1CR where hoki were sampled. The red dashed line indicates a sample size of 30 fish.**

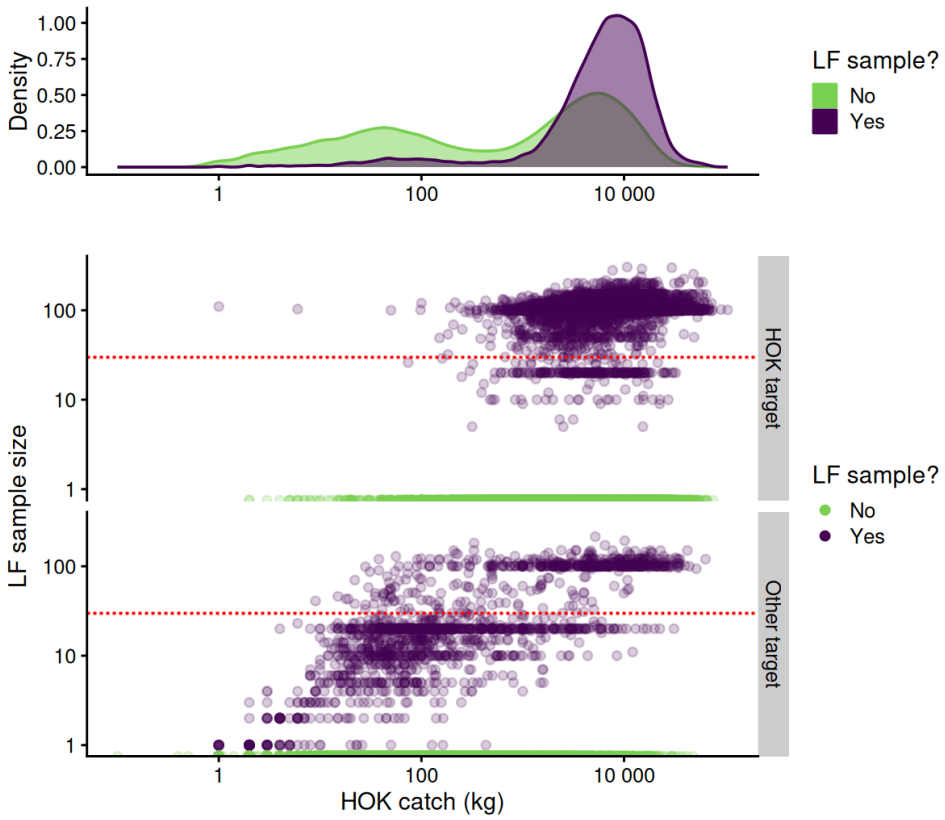


Figure 576: Length-frequency sample sizes (number of fish sampled) for observed fishing events in HOK 1CR in relation to the total hoki catch from an event, separately for hoki target events and other target species. The red dashed line indicates a sample size of 30 fish.

2.10.1.2 Otolith samples

Table 48: Otolith samples of hoki from the HOK 1CR Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of hoki exceeded a potential sampling threshold of 70 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	2 851	0	0	0.00
1991	5 546	0	0	0.00
1992	7 897	0	0	0.00
1993	7 215	0	0	0.00
1994	5 502	0	0	0.00
1995	8 915	0	0	0.00
1996	10 128	0	0	0.00
1997	11 845	0	0	0.00
1998	15 019	0	0	0.00
1999	14 742	0	0	0.00
2000	12 909	0	0	0.00
2001	12 339	0	0	0.00
2002	10 255	0	0	0.00
2003	11 492	0	0	0.00
2004	9 424	0	0	0.00
2005	6 936	0	0	0.00
2006	6 465	0	0	0.00
2007	6 930	0	0	0.00
2008	6 651	0	0	0.00
2009	5 915	98	994	1.66
2010	5 747	241	2 267	4.19
2011	5 167	188	1 866	3.64
2012	5 398	204	1 968	3.78
2013	5 415	593	5 730	10.95
2014	5 175	598	5 649	11.56
2015	5 521	64	558	1.16
2016	5 434	155	1 490	2.85
2017	5 383	218	2 089	4.05
2018	5 299	380	3 721	7.17
2019	5 454	400	3 836	7.33
2020	4 534	501	4 874	11.05
2021	5 203	911	8 946	17.51
2022	5 228	658	6 626	12.59
2023	5 949	786	7 786	13.21
2024	6 844	993	9 749	14.51
2025	6 529	836	8 188	12.80

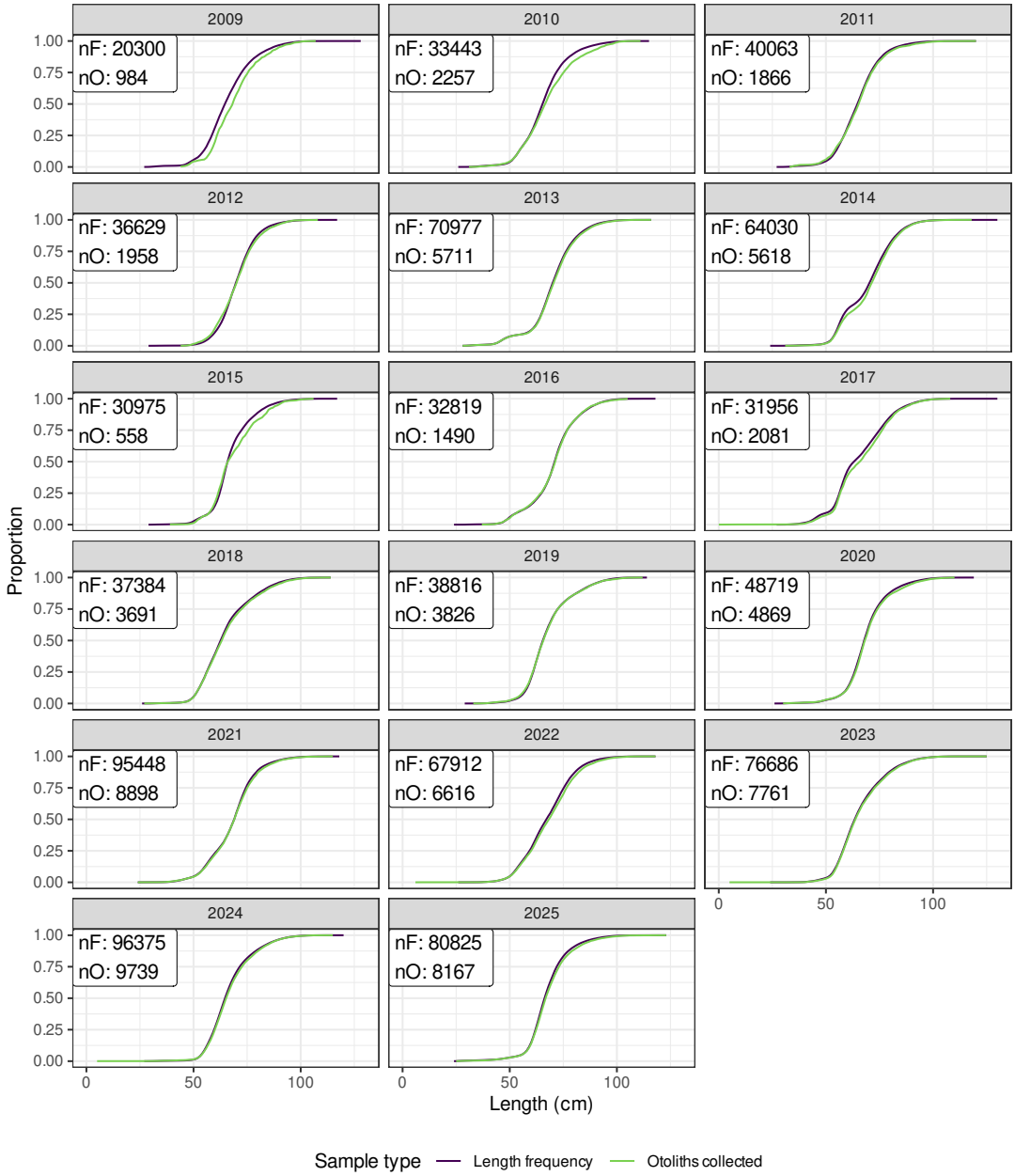


Figure 577: Cumulative distributions of the length of fish in the length frequency and otolith samples of hoki in the HOK 1CR Trawl fishery for the 2009 to 2025 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

2.10.1.3 Catch quantification

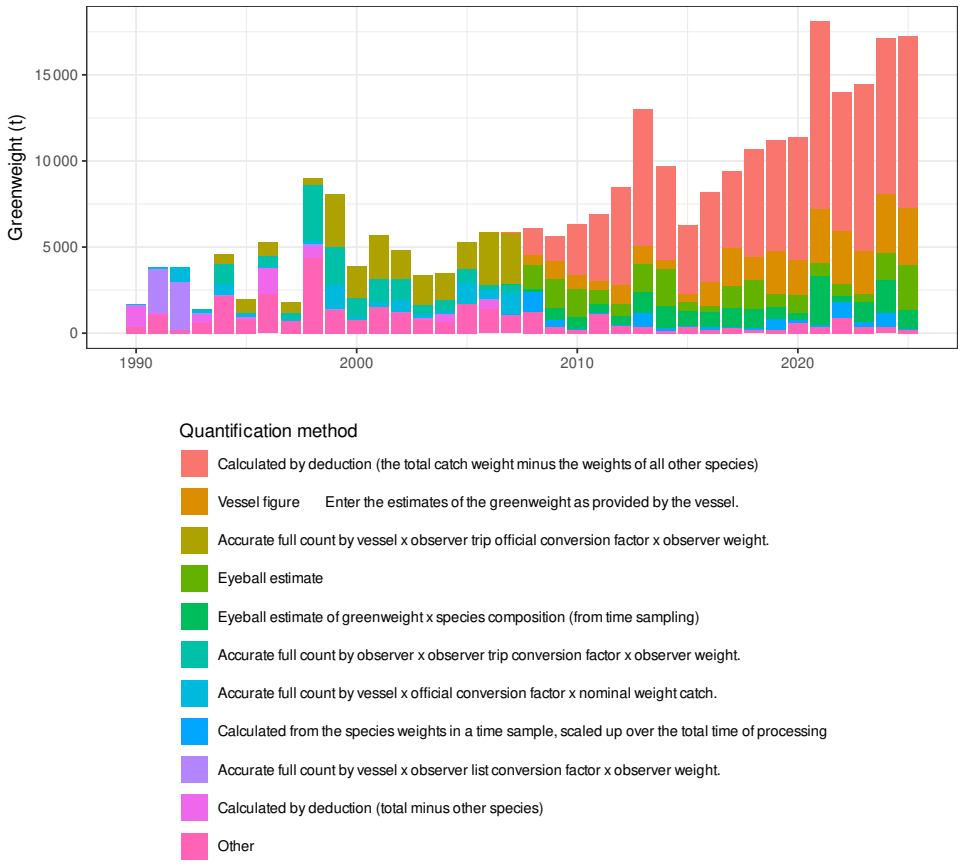


Figure 578: Methods used by observers to quantify the catch of hoki in the HOK 1CR Trawl fishery. The legend lists the methods used in descending order of total catch.

2.10.2 HOK 1CS: Trawl fishery

2.10.2.1 Length-frequency samples

Table 49: Length-frequency samples of hoki from the HOK 1CS Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of hoki exceeded a potential sampling threshold of 70 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	1 095	0	0	0.00
1991	1 998	0	0	0.00
1992	1 722	0	0	0.00
1993	1 770	2	190	0.11
1994	2 307	13	1 302	0.56
1995	3 121	0	0	0.00
1996	6 228	16	1 771	0.26
1997	6 494	0	0	0.00
1998	4 385	125	13 328	2.85
1999	4 029	123	12 959	3.05
2000	3 755	56	6 083	1.49
2001	3 016	111	11 418	3.68
2002	1 954	54	4 863	2.76
2003	2 945	33	3 380	1.12
2004	2 741	74	8 567	2.70
2005	2 339	49	5 433	2.09
2006	1 513	38	3 771	2.51
2007	1 584	69	6 443	4.36
2008	1 793	99	10 090	5.52
2009	1 922	95	10 829	4.94
2010	1 803	165	18 596	9.15
2011	1 717	66	8 925	3.84
2012	1 865	88	8 629	4.72
2013	2 043	60	5 473	2.94
2014	2 141	91	8 891	4.25
2015	2 010	98	8 107	4.88
2016	1 850	35	2 774	1.89
2017	1 661	77	8 215	4.64
2018	1 895	85	7 787	4.49
2019	1 643	99	10 462	6.03
2020	1 064	76	6 674	7.14
2021	902	62	6 073	6.87
2022	785	122	12 210	15.54
2023	891	152	15 725	17.06
2024	566	59	5 570	10.42
2025	632	115	10 670	18.20

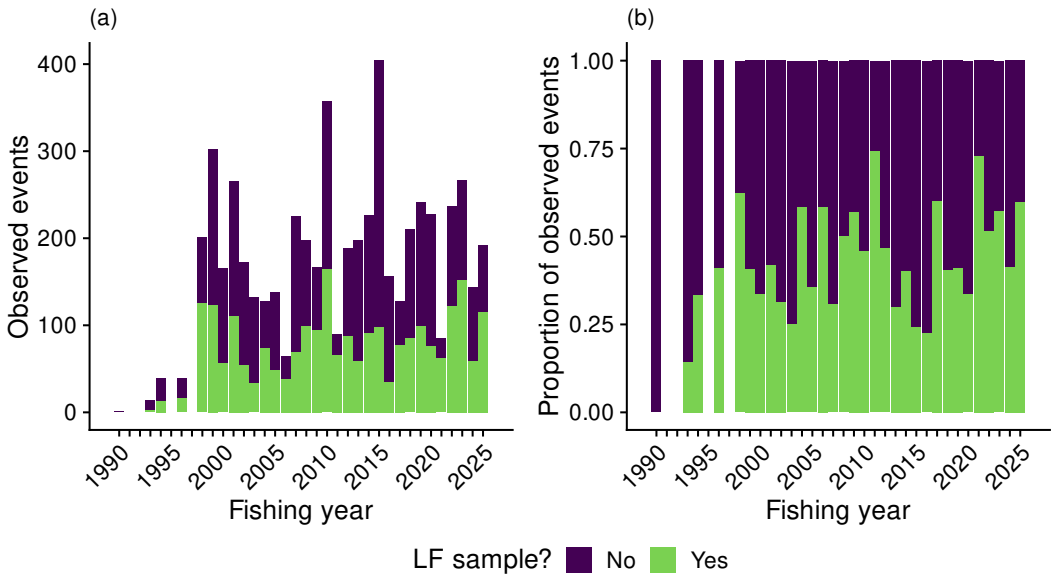


Figure 579: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in HOK 1CS where the hoki catch exceeded the 70 kg threshold, with and without length-frequency sampling.**

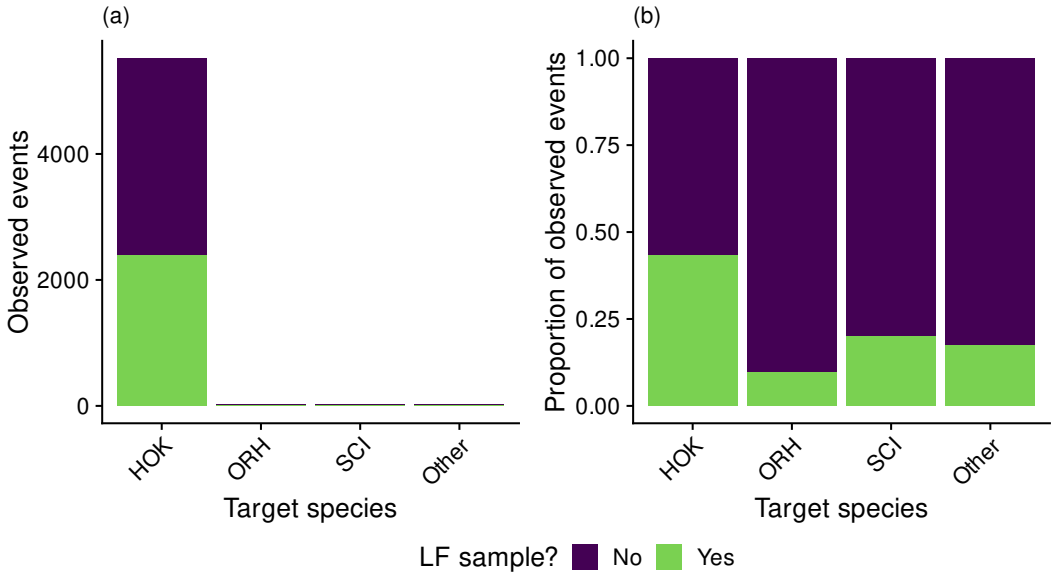


Figure 580: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in HOK 1CS where the hoki catch exceeded the 70 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

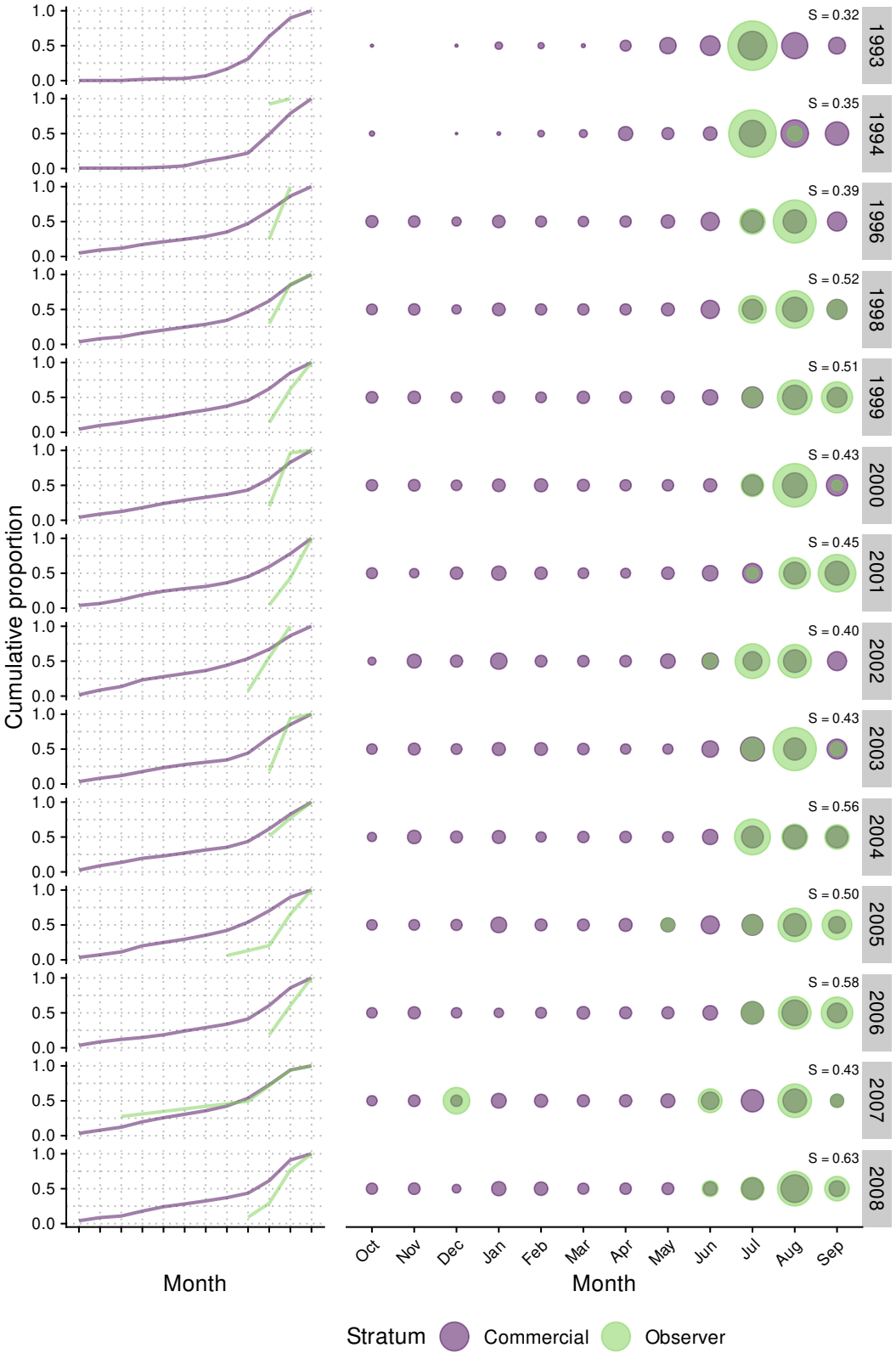


Figure 581: **Monthly representativeness of observer sampling coverage of Trawl fishing events in HOK 1CS, where the hoki catch exceeded the 70kg threshold, in 1993 to 2008. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

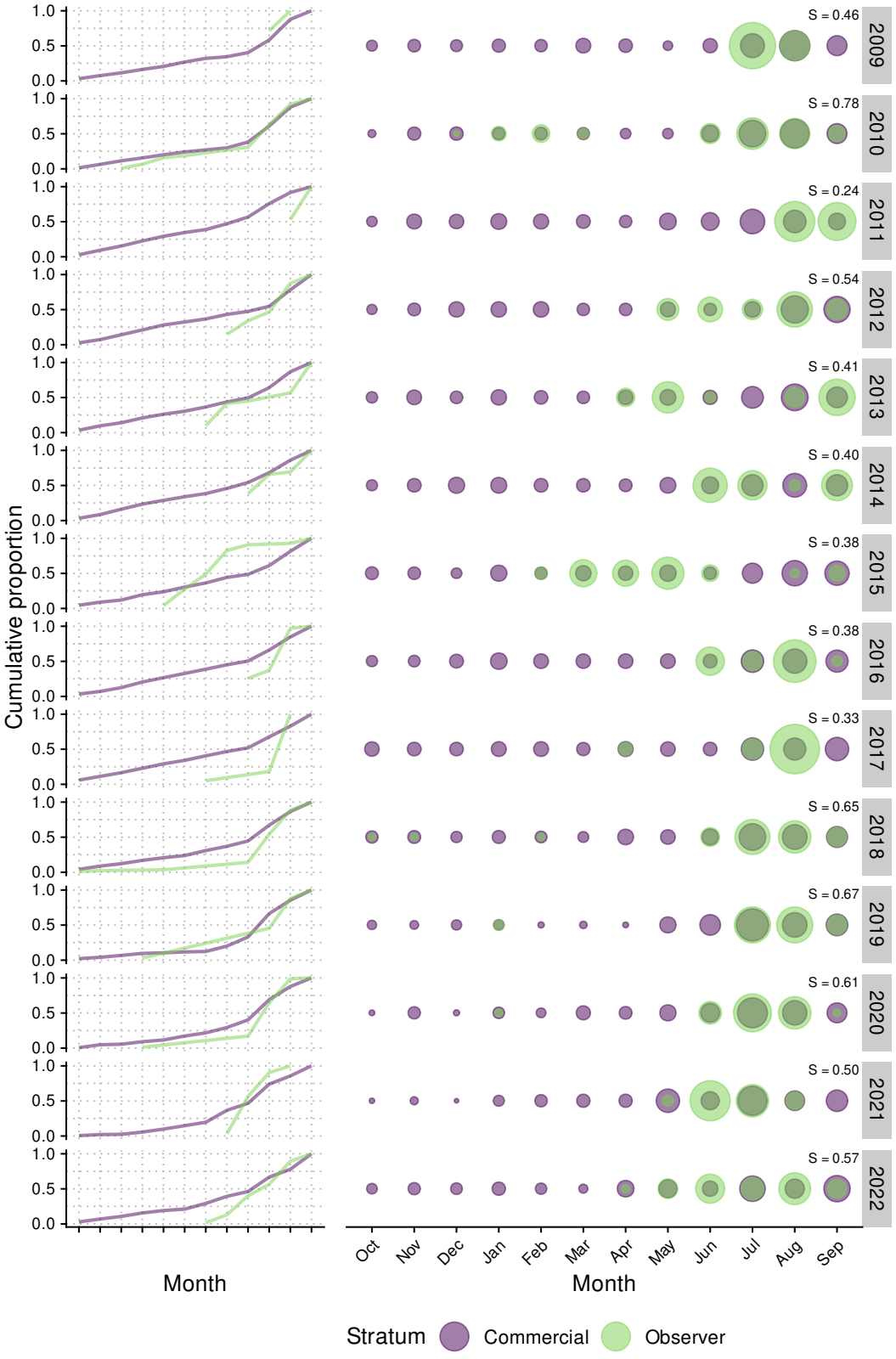


Figure 582: **Monthly representativeness of observer sampling coverage of Trawl fishing events in HOK 1CS, where the hoki catch exceeded the 70kg threshold, in 2009 to 2022. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

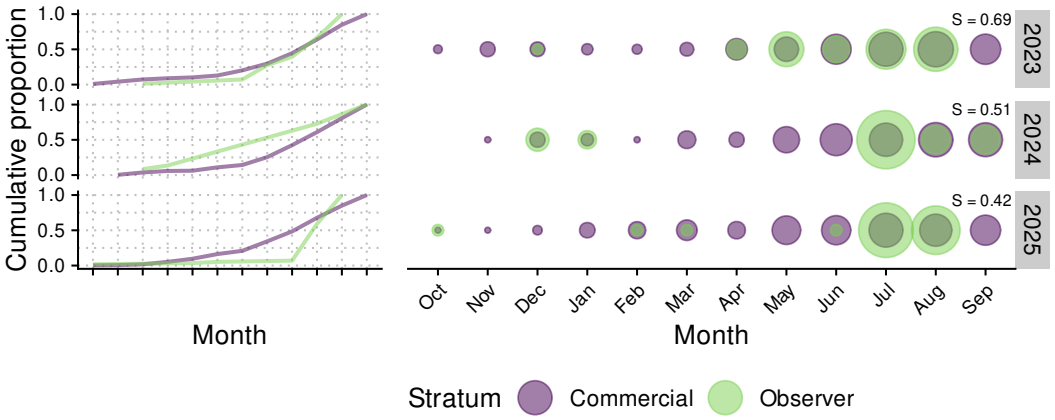


Figure 583: Monthly representativeness of observer sampling coverage of Trawl fishing events in HOK 1CS, where the hoki catch exceeded the 70kg threshold, in 2023 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

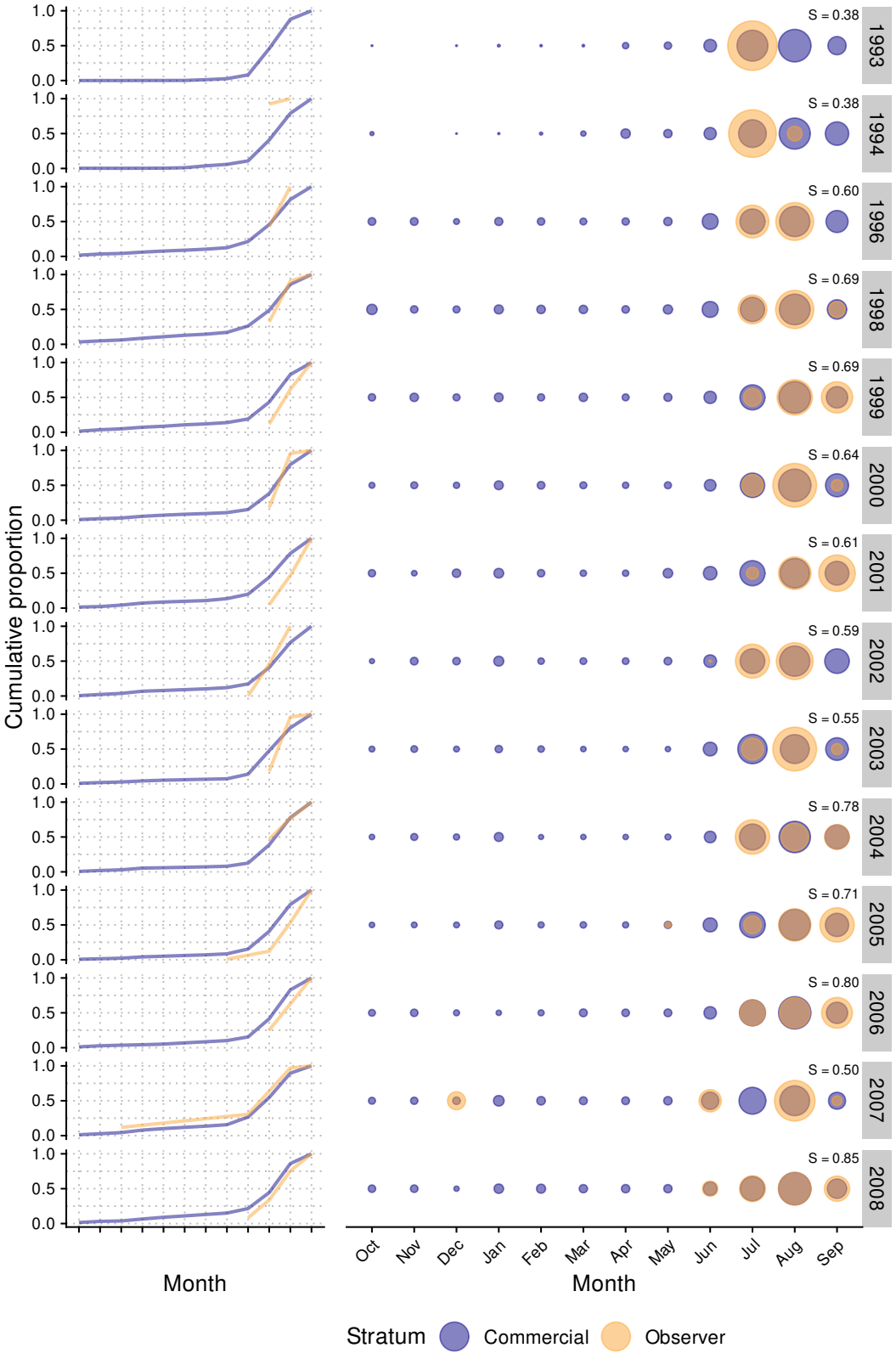


Figure 584: **Monthly representativeness of observer sampling coverage of Trawl catch in HOK 1CS, from events where the hoki catch exceeded the 70kg threshold, in 1993 to 2008. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

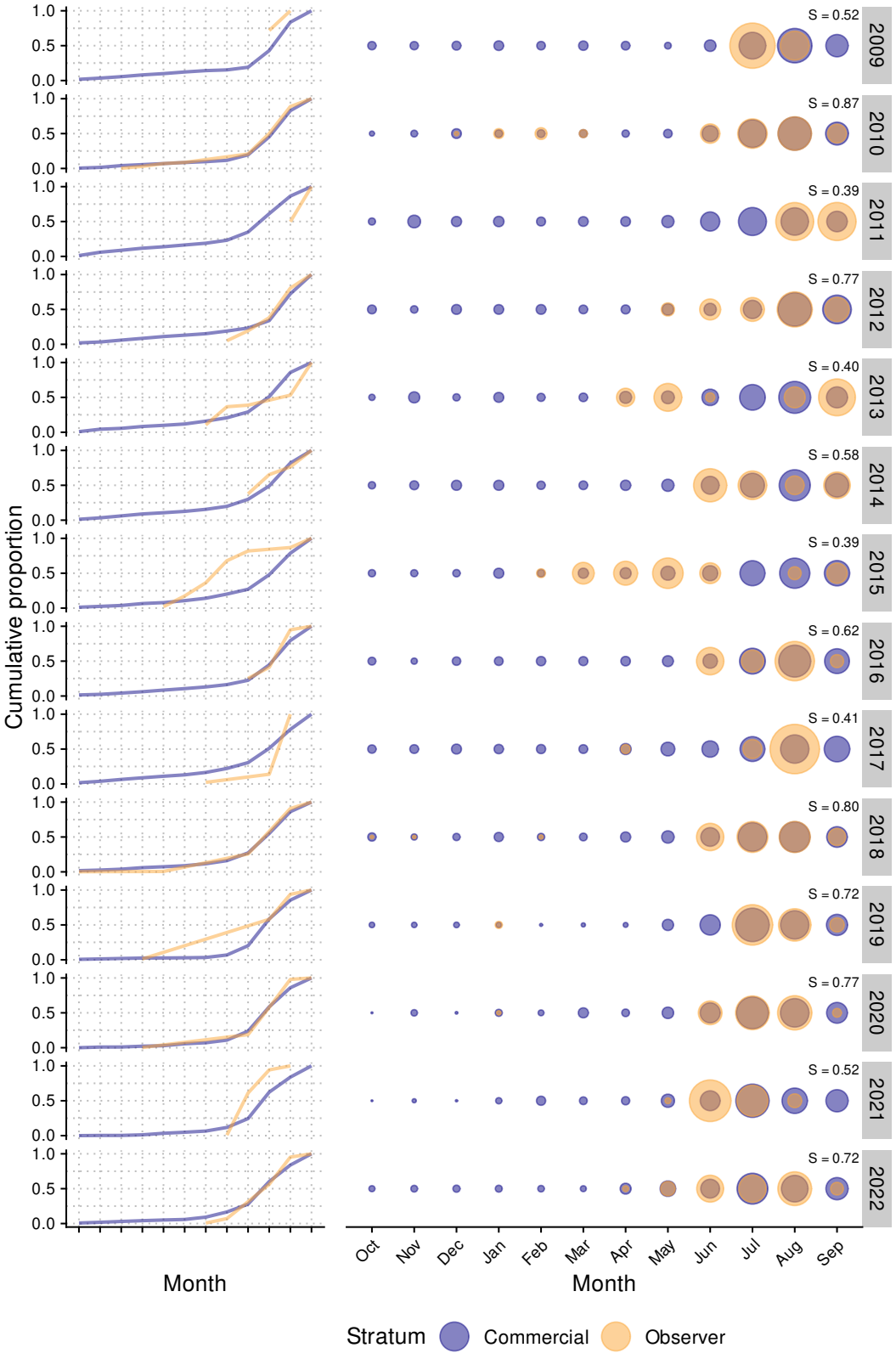


Figure 585: **Monthly representativeness of observer sampling coverage of Trawl catch in HOK 1CS, from events where the hoki catch exceeded the 70kg threshold, in 2009 to 2022. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

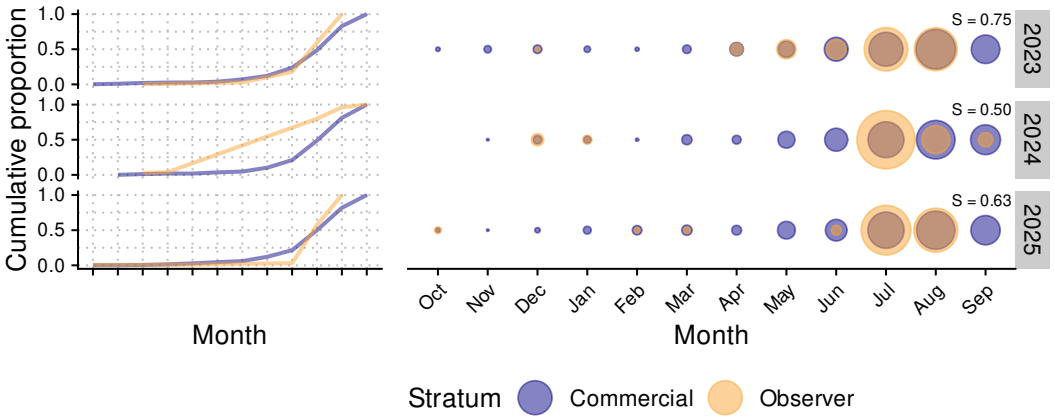


Figure 586: **Monthly representativeness of observer sampling coverage of Trawl catch in HOK 1CS, from events where the hoki catch exceeded the 70kg threshold, in 2023 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

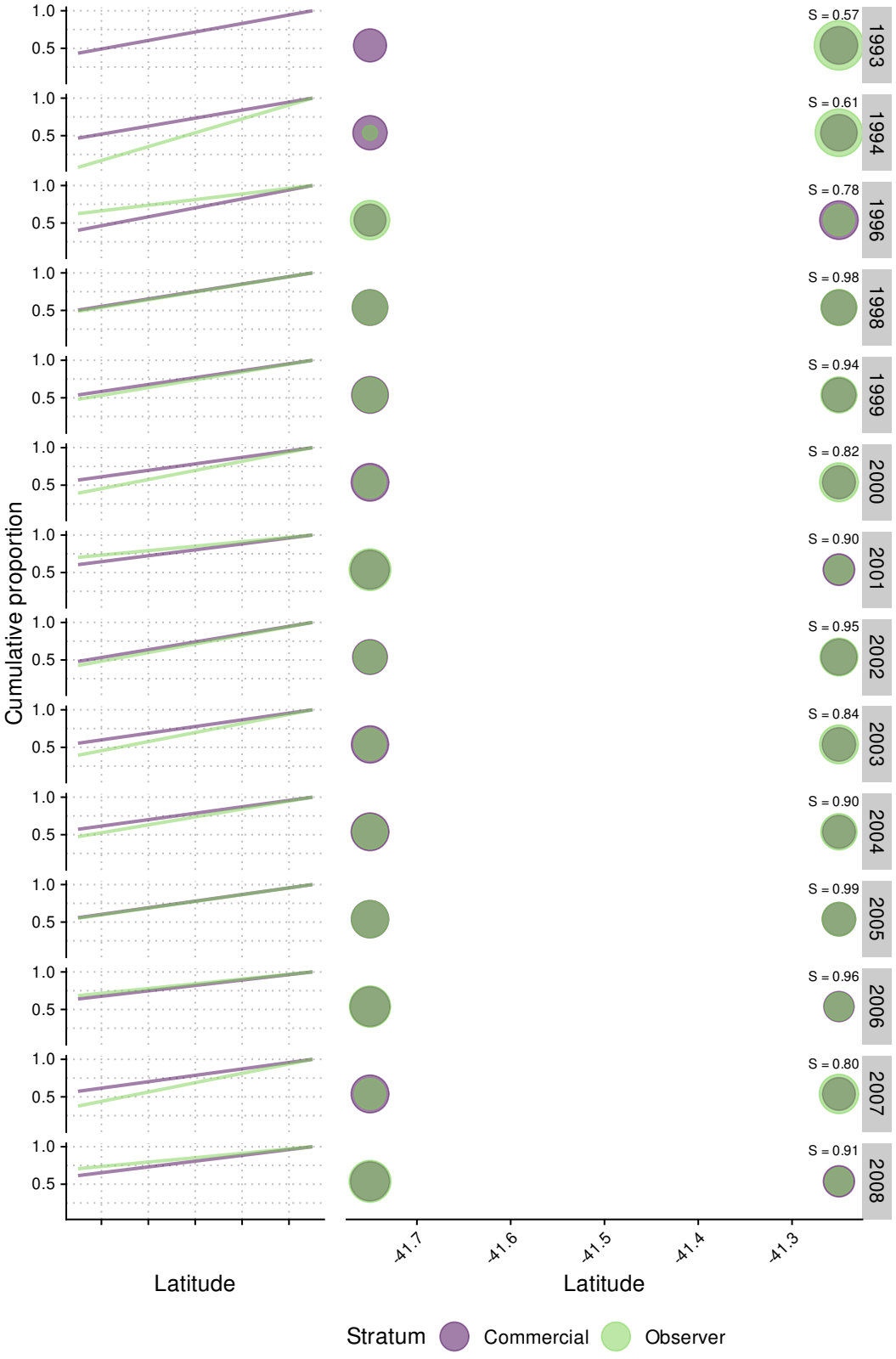


Figure 587: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in HOK 1CS, where the hoki catch exceeded the 70kg threshold, in 1993 to 2008. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

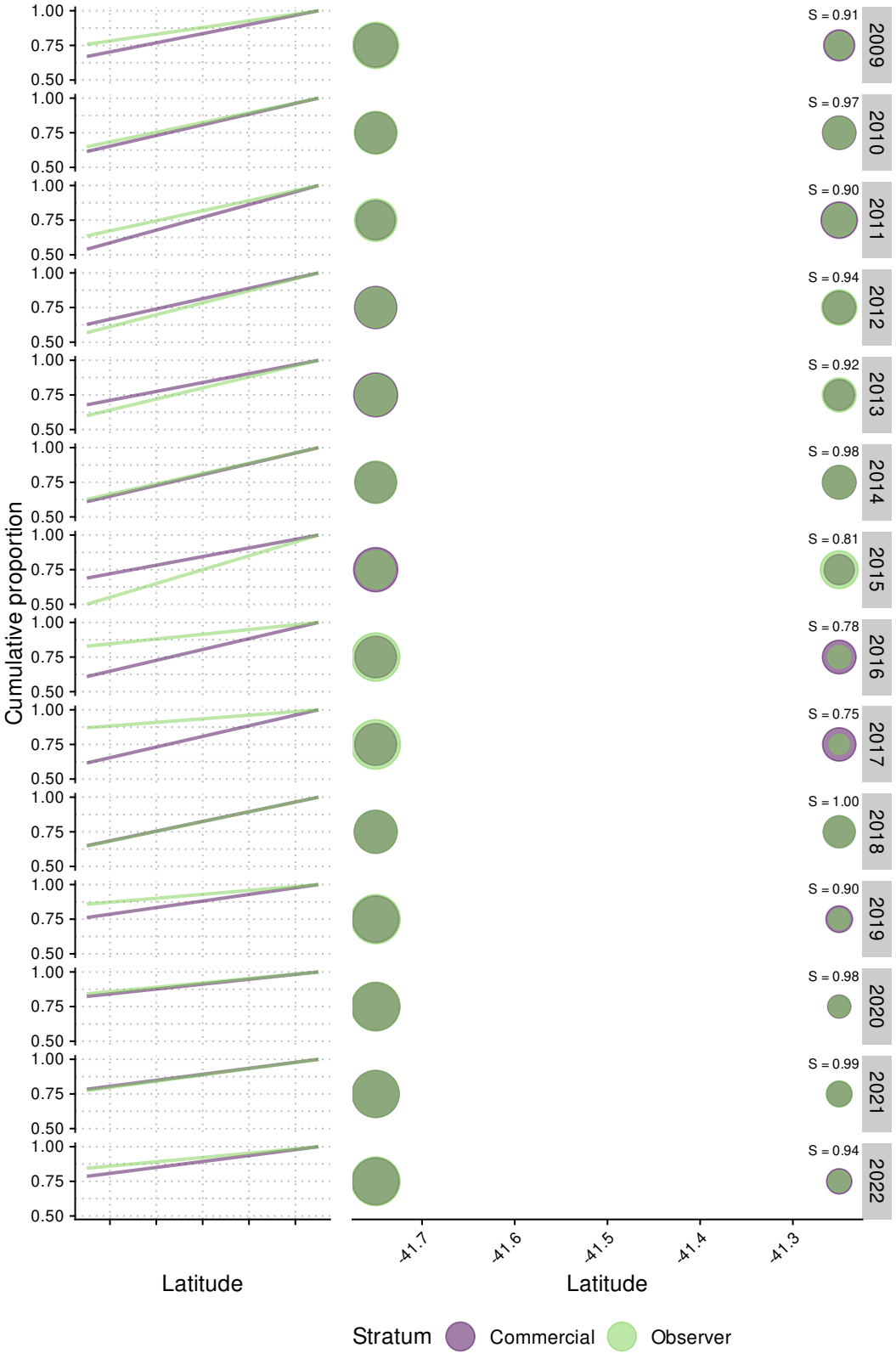


Figure 588: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in HOK 1CS, where the hoki catch exceeded the 70kg threshold, in 2009 to 2022. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

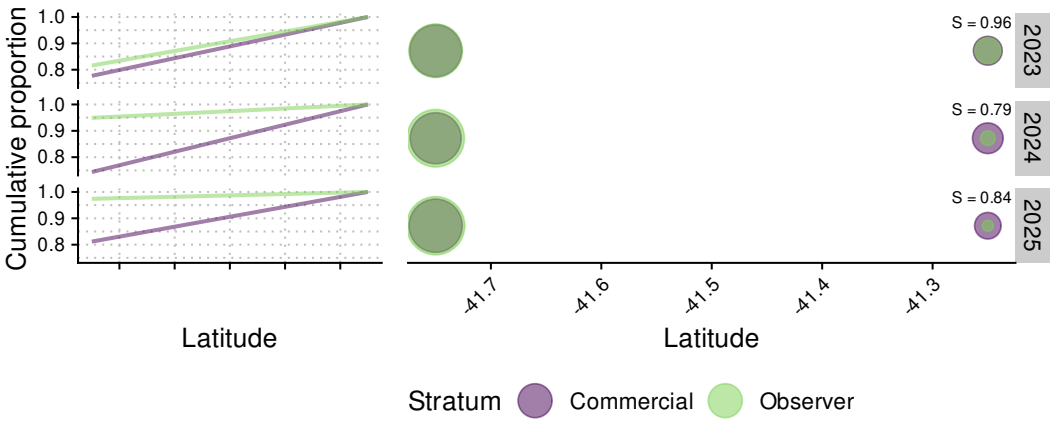


Figure 589: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in HOK 1CS, where the hoki catch exceeded the 70kg threshold, in 2023 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

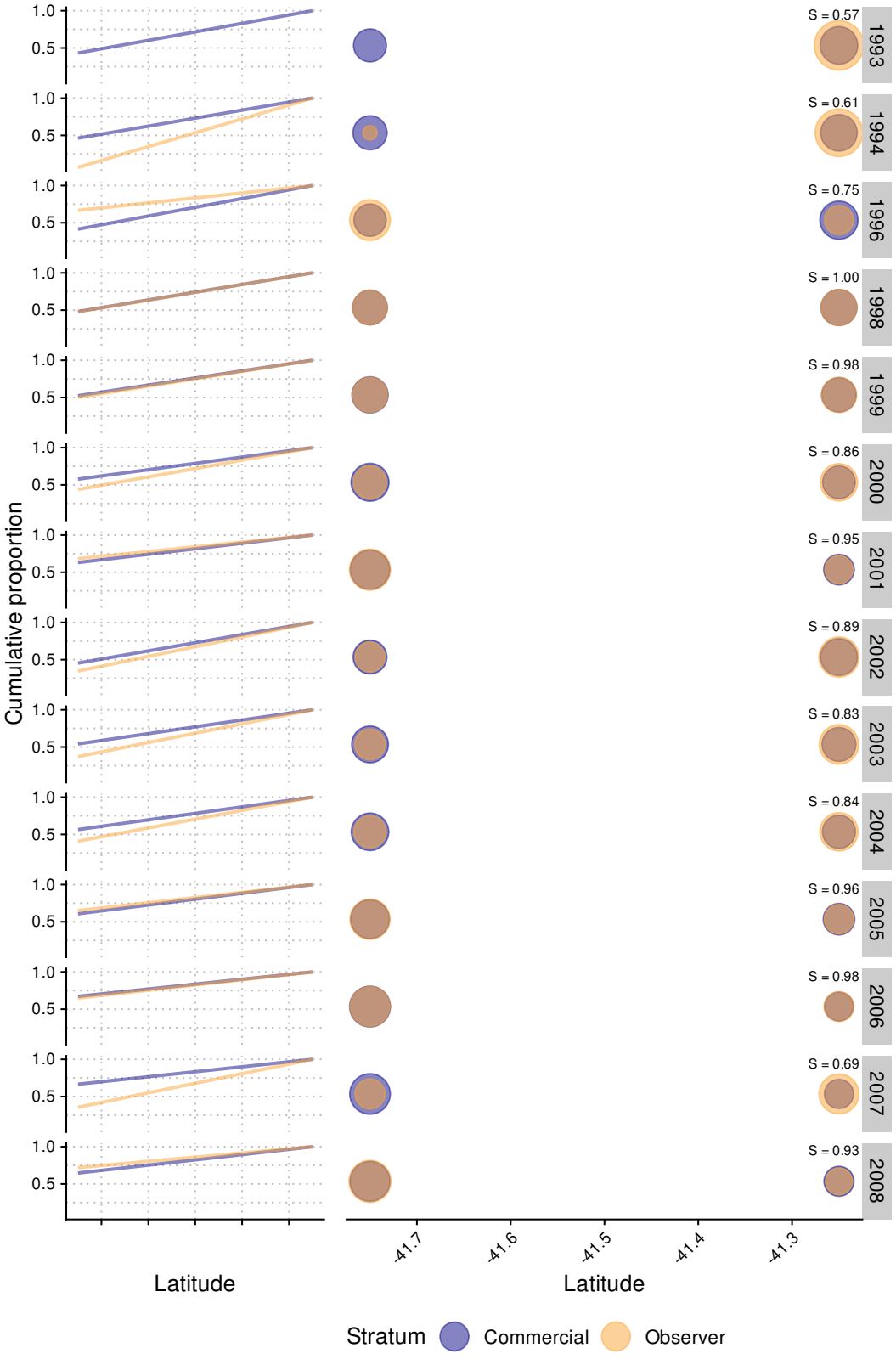


Figure 590: **Latitudinal representativeness of observer sampling coverage of Trawl catch in HOK 1CS, from events where the hoki catch exceeded the 70kg threshold, in 1993 to 2008. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

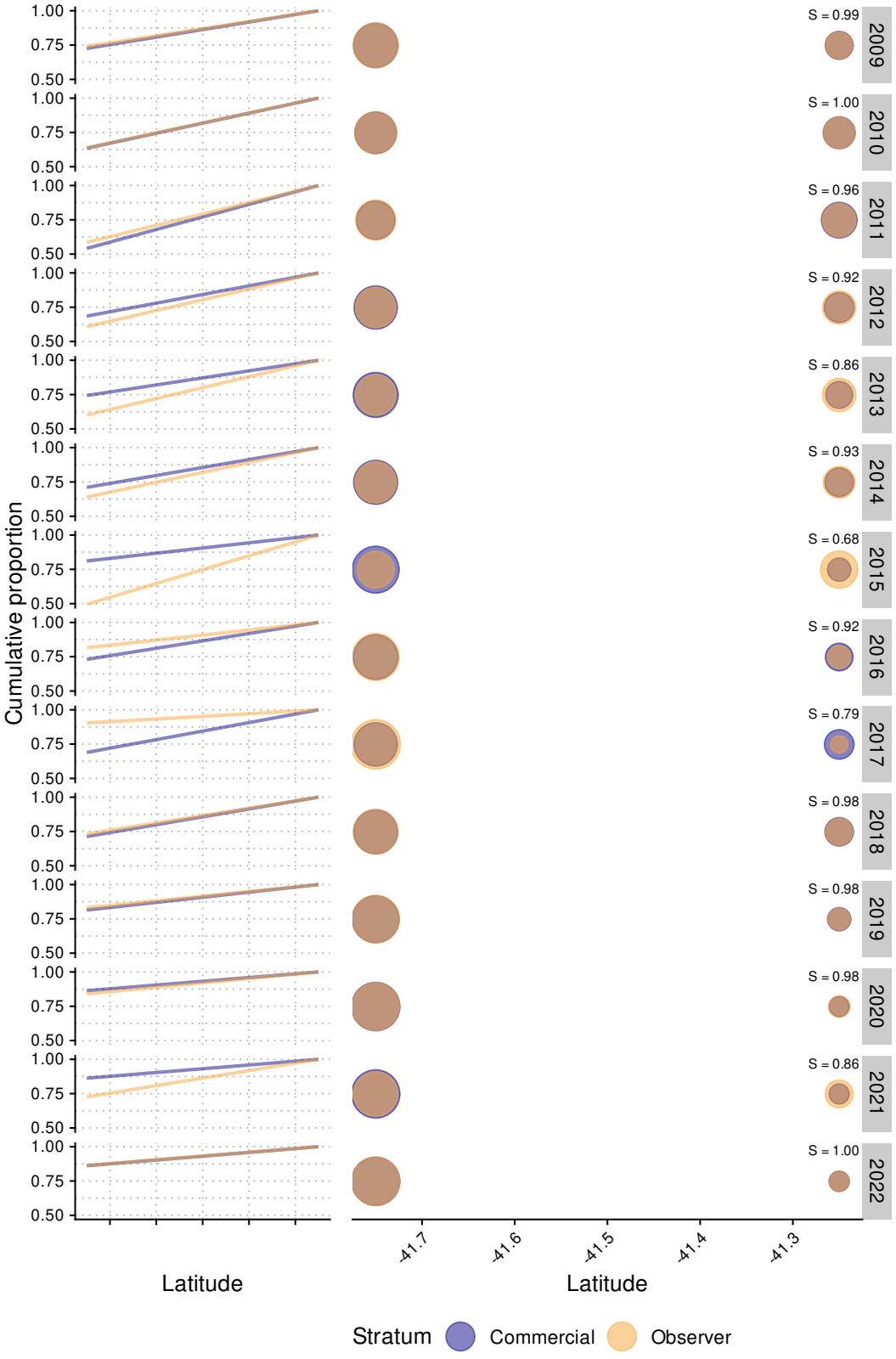


Figure 591: Latitudinal representativeness of observer sampling coverage of Trawl catch in HOK 1CS, from events where the hoki catch exceeded the 70kg threshold, in 2009 to 2022. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

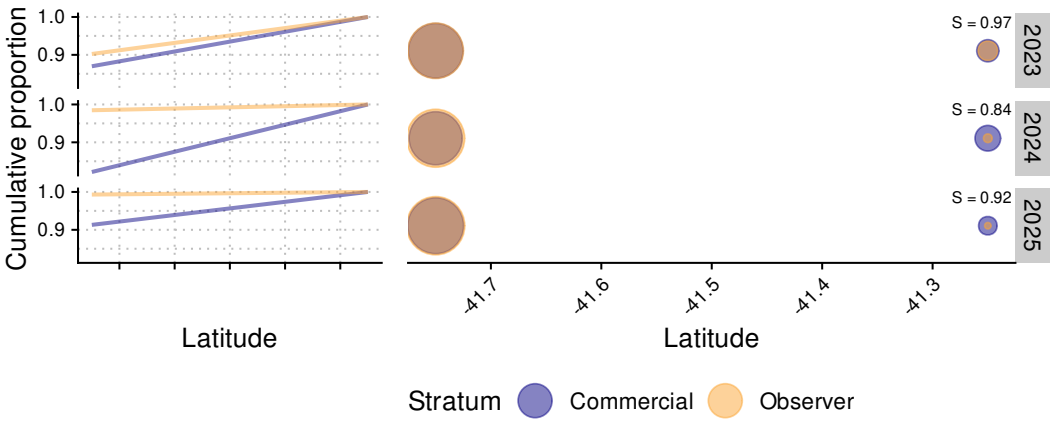


Figure 592: **Latitudinal representativeness of observer sampling coverage of Trawl catch in HOK 1CS, from events where the hoki catch exceeded the 70kg threshold, in 2023 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

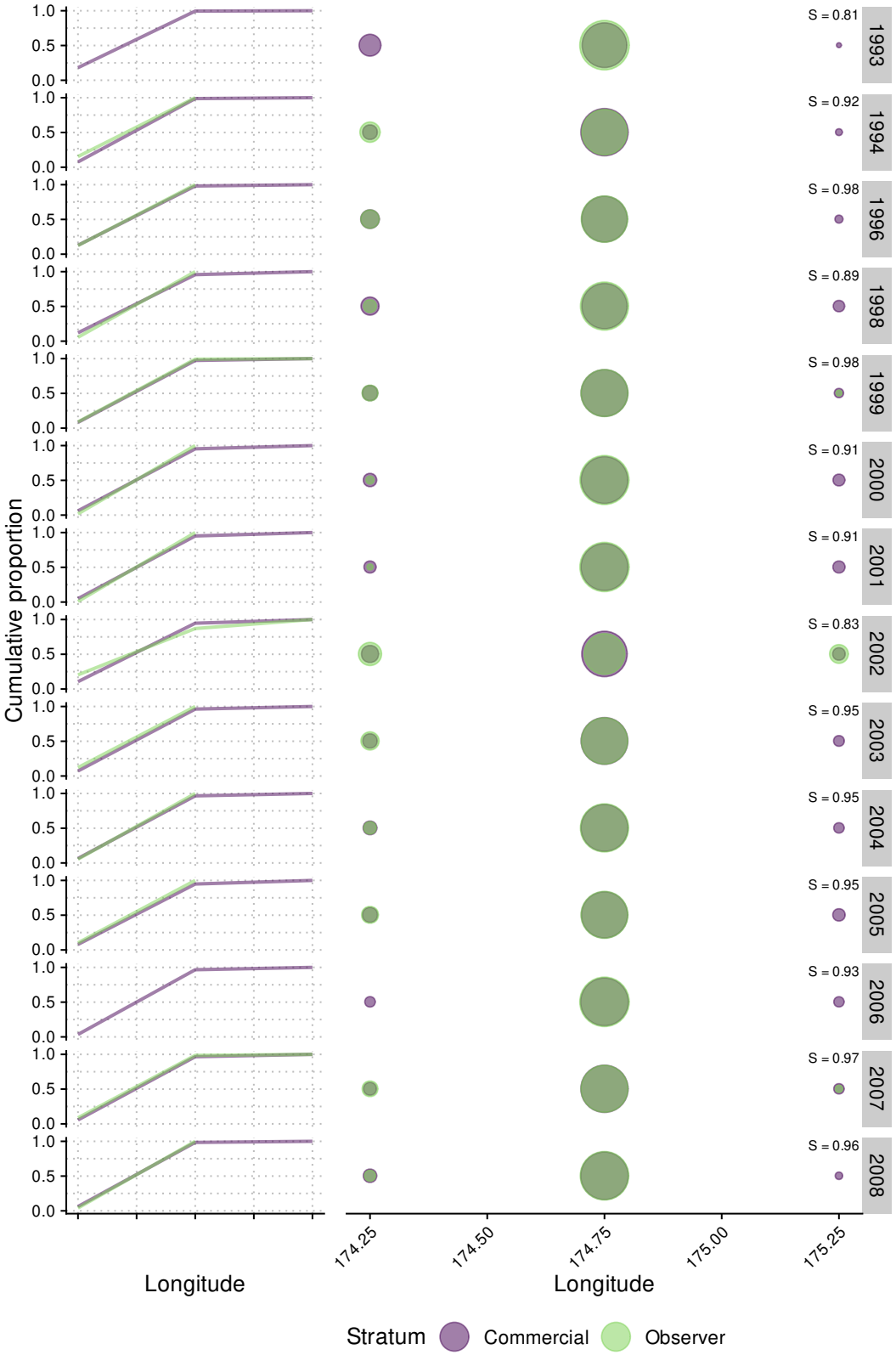


Figure 593: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in HOK 1CS, where the hoki catch exceeded the 70kg threshold, in 1993 to 2008. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

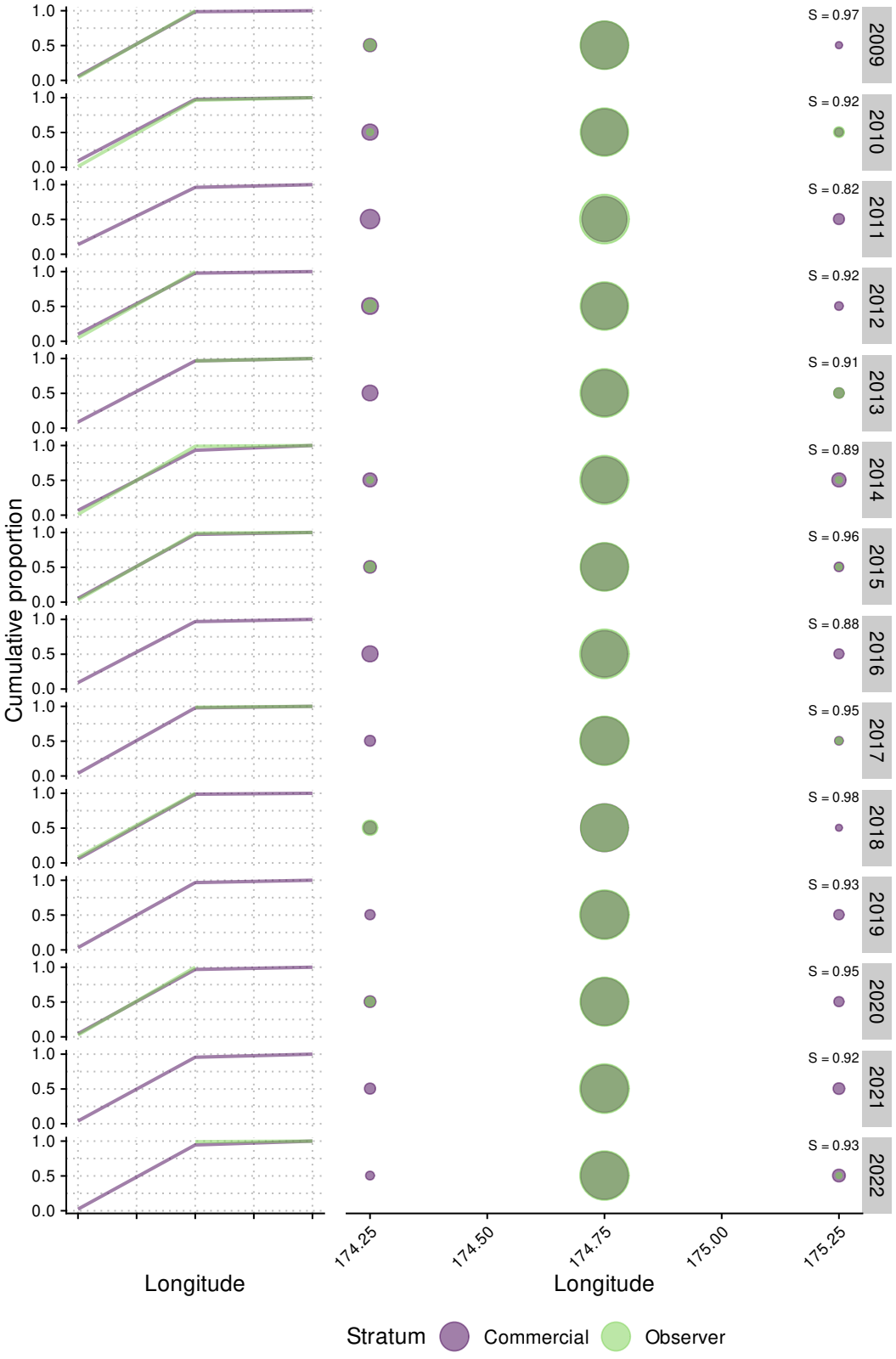


Figure 594: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in HOK 1CS, where the hoki catch exceeded the 70kg threshold, in 2009 to 2022. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

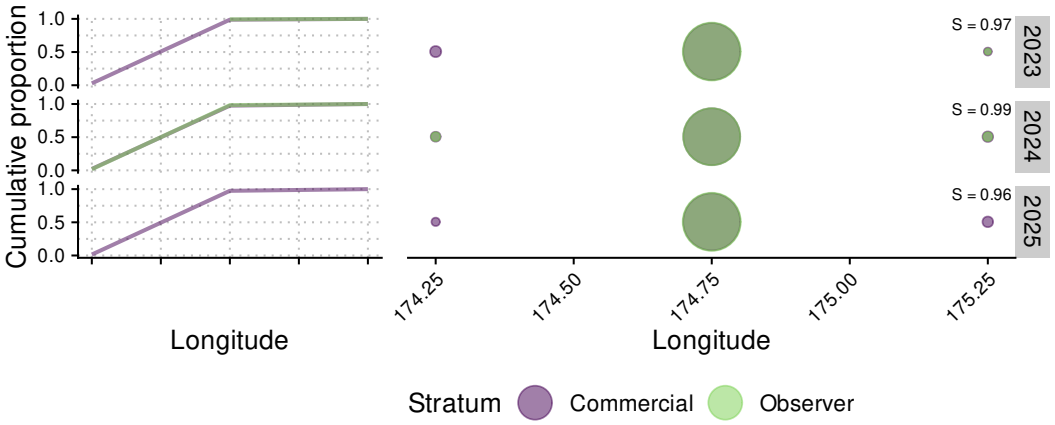


Figure 595: **Longitudinal representativeness of observer sampling coverage of Trawl fishing events in HOK 1CS, where the hoki catch exceeded the 70kg threshold, in 2023 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

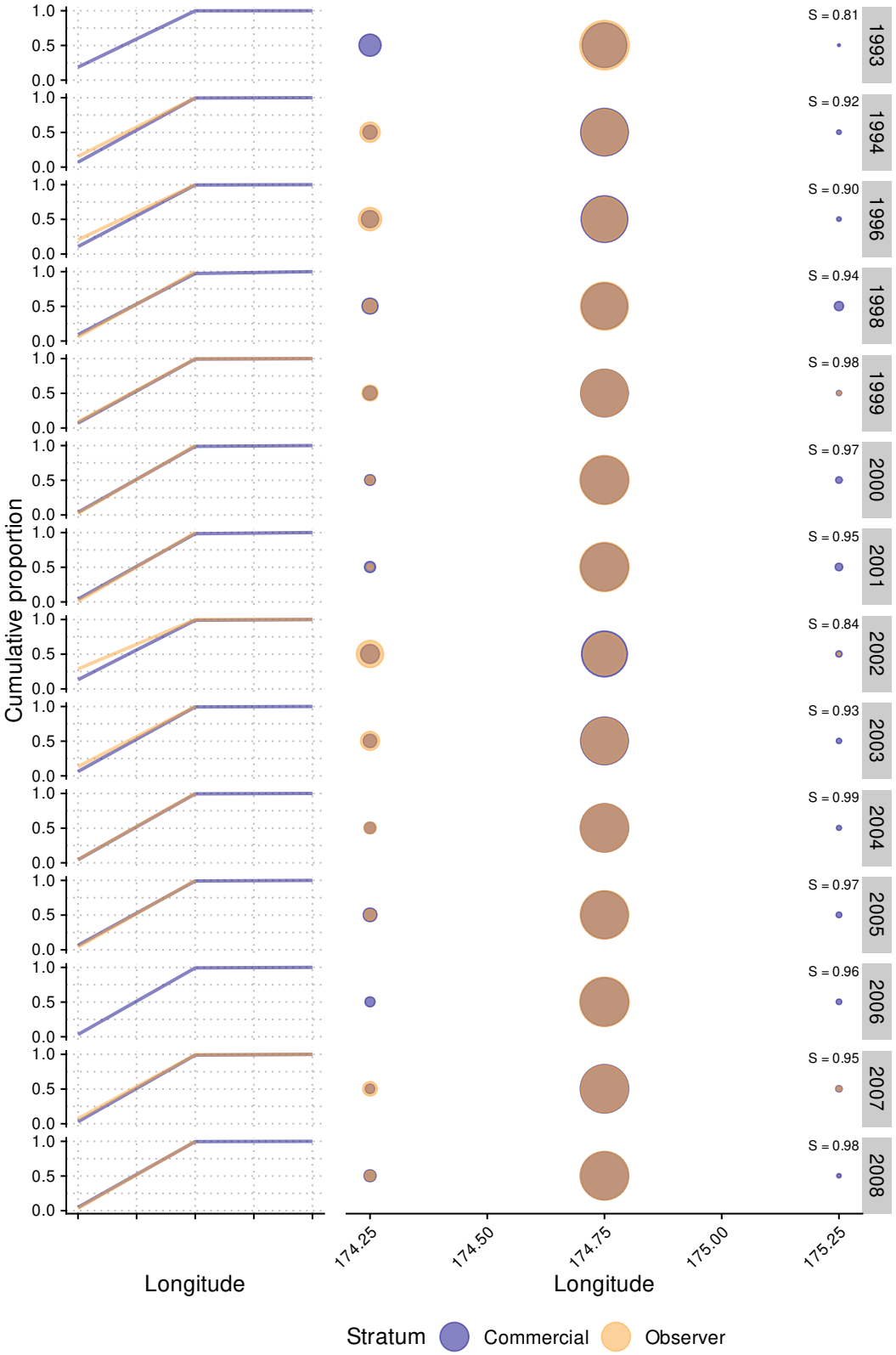


Figure 596: **Longitudinal representativeness of observer sampling coverage of Trawl catch in HOK 1CS, from events where the hoki catch exceeded the 70kg threshold, in 1993 to 2008. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

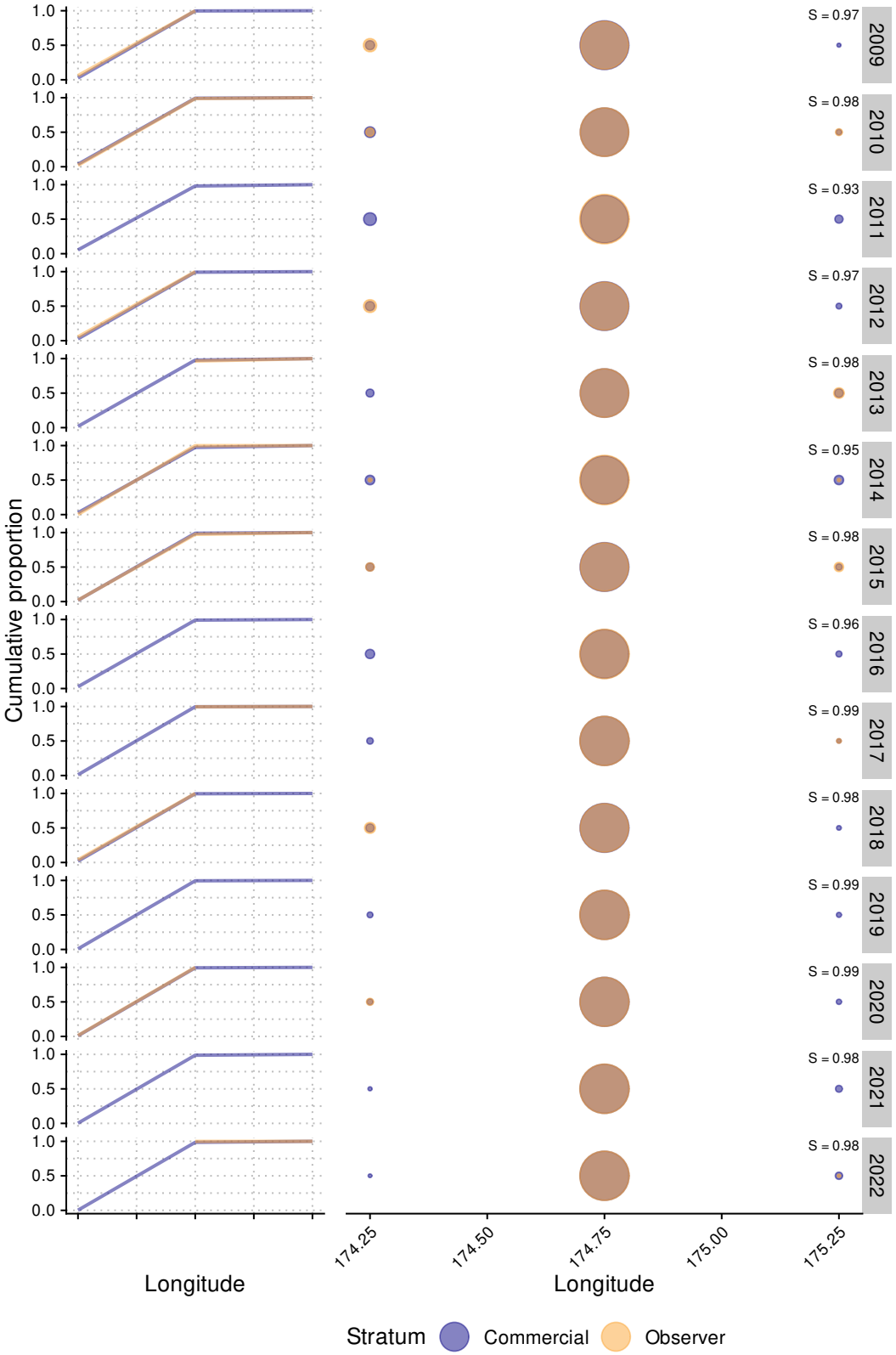


Figure 597: Longitudinal representativeness of observer sampling coverage of Trawl catch in HOK 1CS, from events where the hoki catch exceeded the 70kg threshold, in 2009 to 2022. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

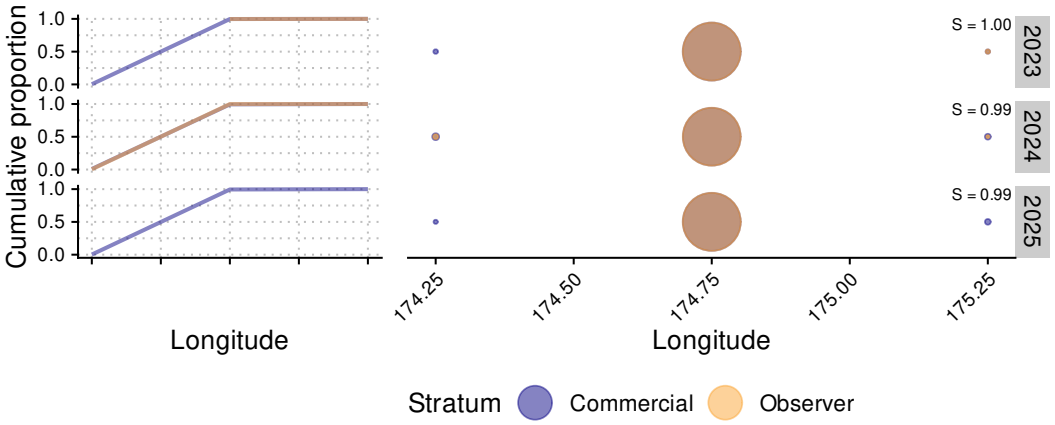


Figure 598: **Longitudinal representativeness of observer sampling coverage of Trawl catch in HOK 1CS, from events where the hoki catch exceeded the 70kg threshold, in 2023 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

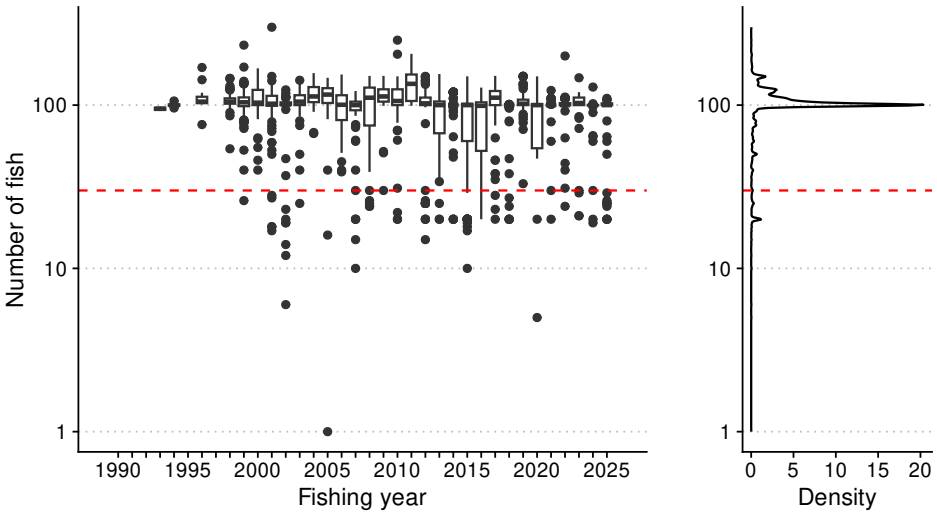


Figure 599: **Length-frequency sample sizes for observed fishing events in HOK 1CS where hoki were sampled. The red dashed line indicates a sample size of 30 fish.**

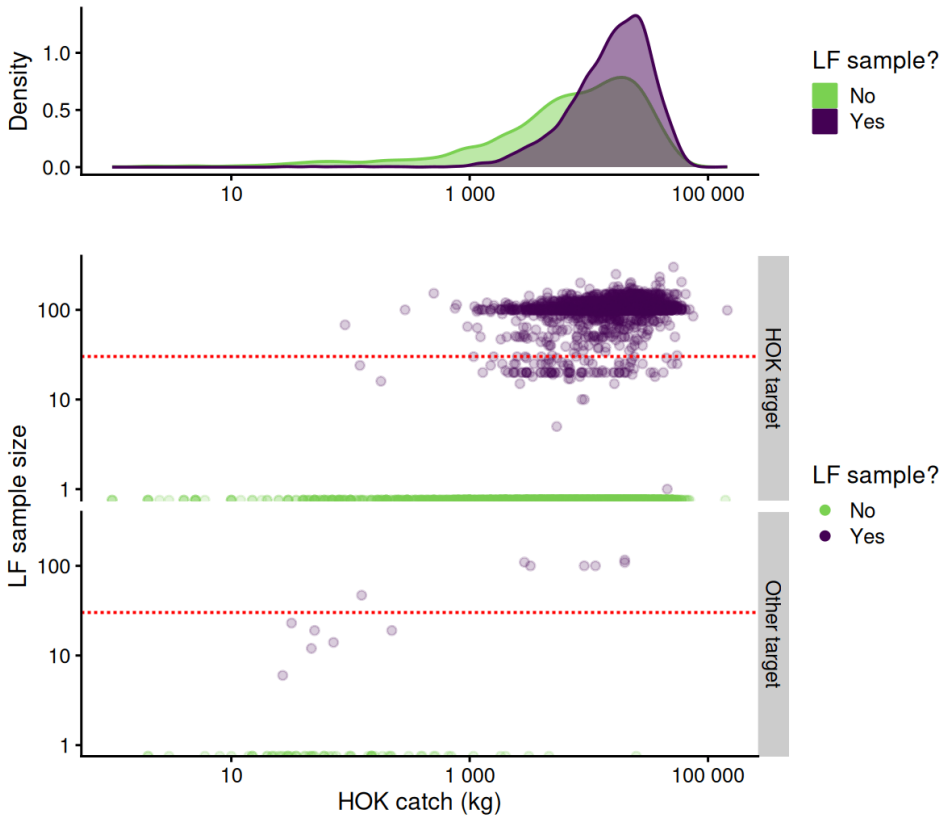


Figure 600: Length-frequency sample sizes (number of fish sampled) for observed fishing events in HOK 1CS in relation to the total hoki catch from an event, separately for hoki target events and other target species. The red dashed line indicates a sample size of 30 fish.

2.10.2.2 Otolith samples

Table 50: Otolith samples of hoki from the HOK 1CS Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of hoki exceeded a potential sampling threshold of 70 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	1 095	0	0	0.00
1991	1 998	0	0	0.00
1992	1 722	0	0	0.00
1993	1 770	0	0	0.00
1994	2 307	0	0	0.00
1995	3 121	0	0	0.00
1996	6 228	0	0	0.00
1997	6 494	0	0	0.00
1998	4 385	0	0	0.00
1999	4 029	0	0	0.00
2000	3 755	0	0	0.00
2001	3 016	0	0	0.00
2002	1 954	0	0	0.00
2003	2 945	0	0	0.00
2004	2 741	0	0	0.00
2005	2 339	0	0	0.00
2006	1 513	0	0	0.00
2007	1 584	0	0	0.00
2008	1 793	0	0	0.00
2009	1 922	51	530	2.65
2010	1 803	77	777	4.27
2011	1 717	0	0	0.00
2012	1 865	57	565	3.06
2013	2 043	36	344	1.76
2014	2 141	70	686	3.27
2015	2 010	9	87	0.45
2016	1 850	17	137	0.92
2017	1 661	68	654	4.09
2018	1 895	82	797	4.33
2019	1 643	58	589	3.53
2020	1 064	47	442	4.42
2021	902	61	597	6.76
2022	785	122	1 208	15.54
2023	891	152	1 499	17.06
2024	566	59	588	10.42
2025	632	115	1 163	18.20

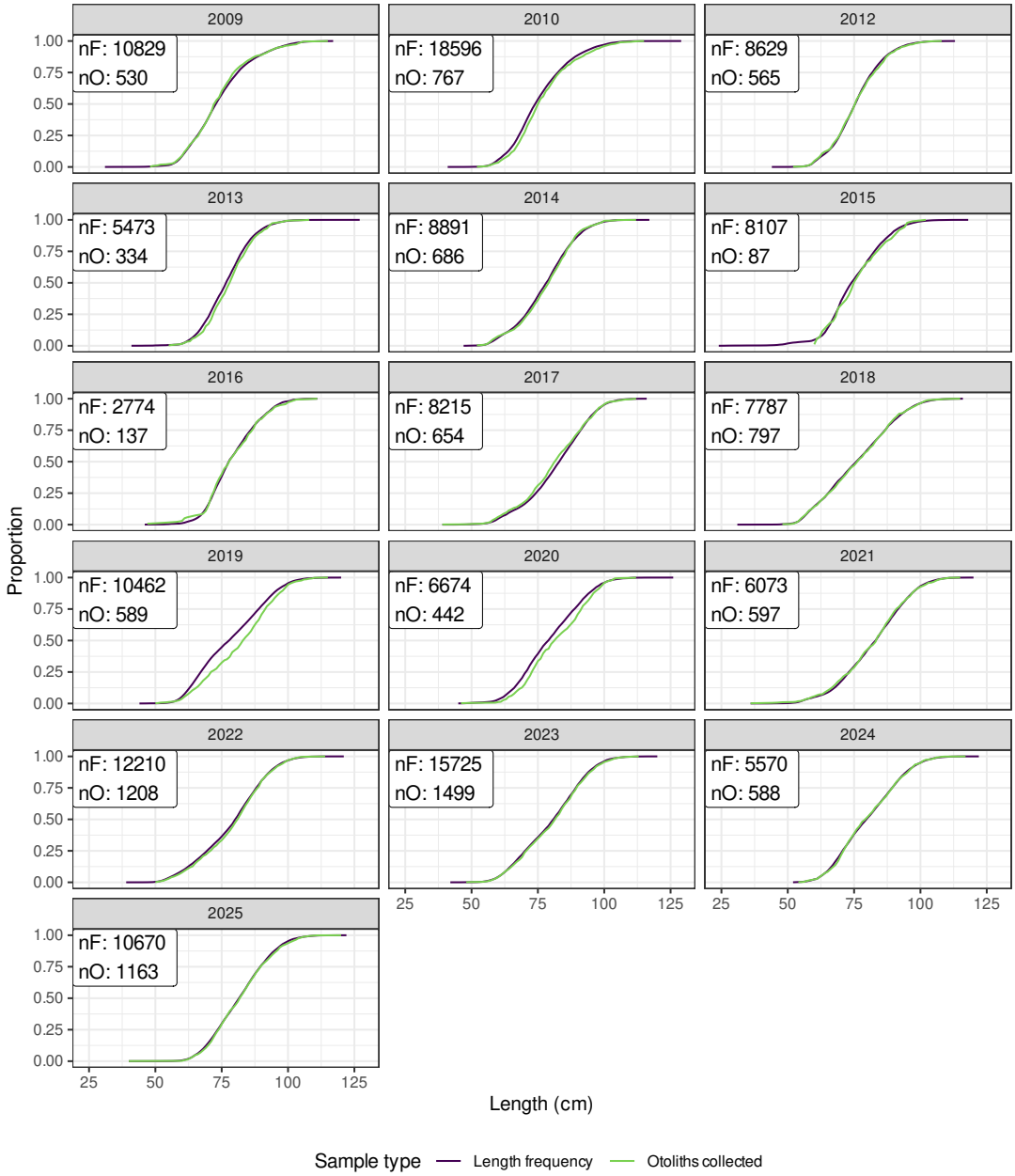


Figure 601: Cumulative distributions of the length of fish in the length frequency and otolith samples of hoki in the HOK 1CS Trawl fishery for the 2009 to 2025 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

2.10.2.3 Catch quantification

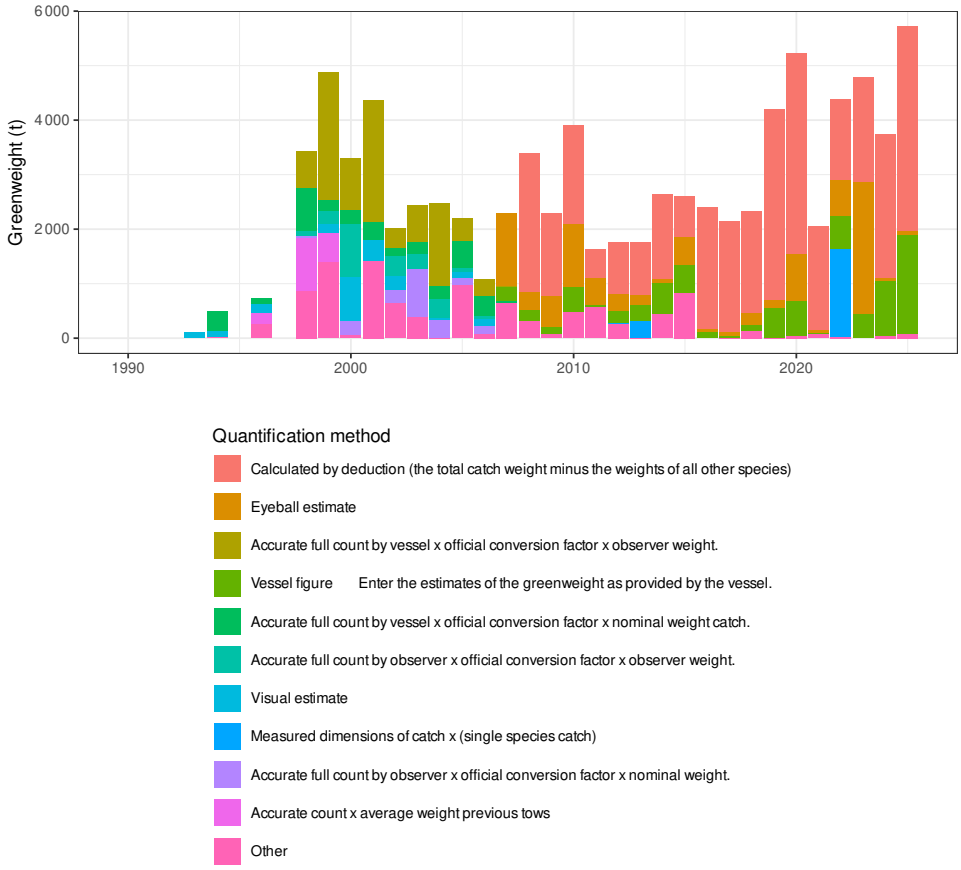


Figure 602: Methods used by observers to quantify the catch of hoki in the HOK 1CS Trawl fishery. The legend lists the methods used in descending order of total catch.

2.10.3 HOK 1NE: Trawl fishery

2.10.3.1 Length-frequency samples

Table 51: Length-frequency samples of hoki from the HOK 1NE Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of hoki exceeded a potential sampling threshold of 70 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	2 570	0	0	0.00
1991	3 332	24	1 067	0.72
1992	4 050	20	1 724	0.49
1993	4 645	10	408	0.22
1994	4 671	27	583	0.58
1995	4 117	54	392	1.31
1996	4 131	9	719	0.22
1997	4 934	2	25	0.04
1998	4 411	23	2 010	0.52
1999	3 197	37	1 009	1.16
2000	2 724	8	168	0.29
2001	2 641	28	640	1.06
2002	3 087	15	455	0.49
2003	2 162	7	183	0.32
2004	1 649	6	11	0.36
2005	1 061	3	22	0.28
2006	827	38	131	4.59
2007	1 239	36	482	2.91
2008	971	32	485	3.30
2009	770	25	153	3.25
2010	1 206	18	343	1.49
2011	1 326	6	120	0.45
2012	1 158	3	194	0.26
2013	1 261	0	0	0.00
2014	1 416	12	433	0.85
2015	887	25	1 104	2.82
2016	1 077	10	347	0.93
2017	1 051	14	262	1.33
2018	1 174	33	1 436	2.81
2019	1 178	20	1 556	1.70
2020	884	72	5 929	8.14
2021	842	29	861	3.44
2022	625	29	1 494	4.64
2023	694	12	807	1.73
2024	474	23	1 216	4.85
2025	465	16	800	3.44

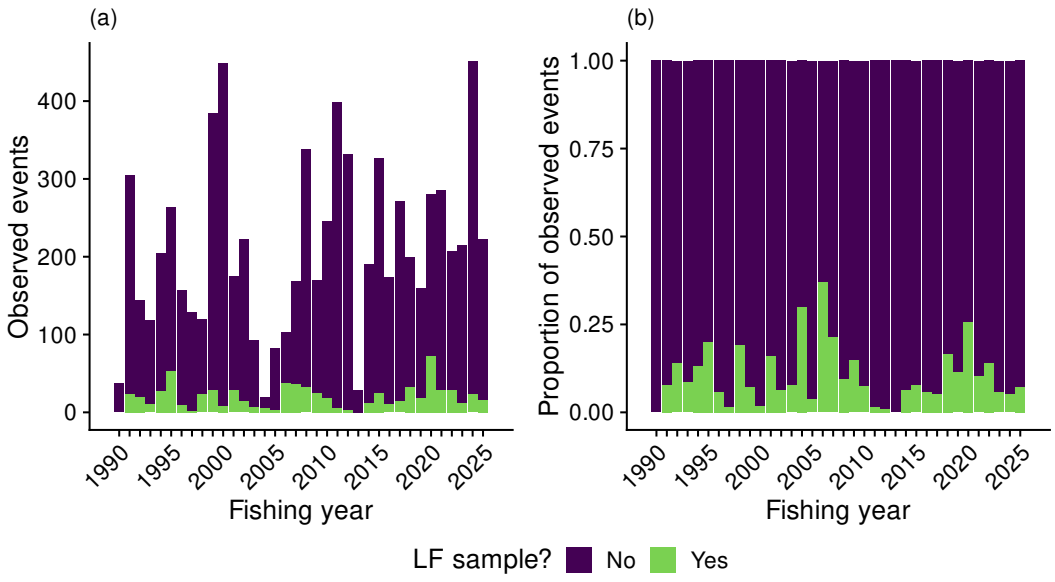


Figure 603: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in HOK 1NE where the hoki catch exceeded the 70 kg threshold, with and without length-frequency sampling.**

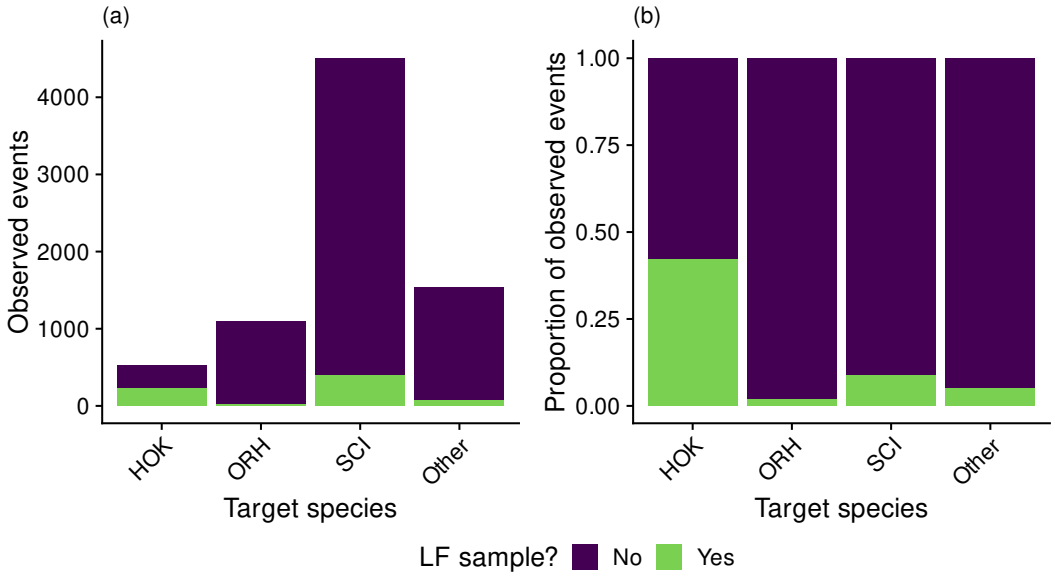


Figure 604: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in HOK 1NE where the hoki catch exceeded the 70 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

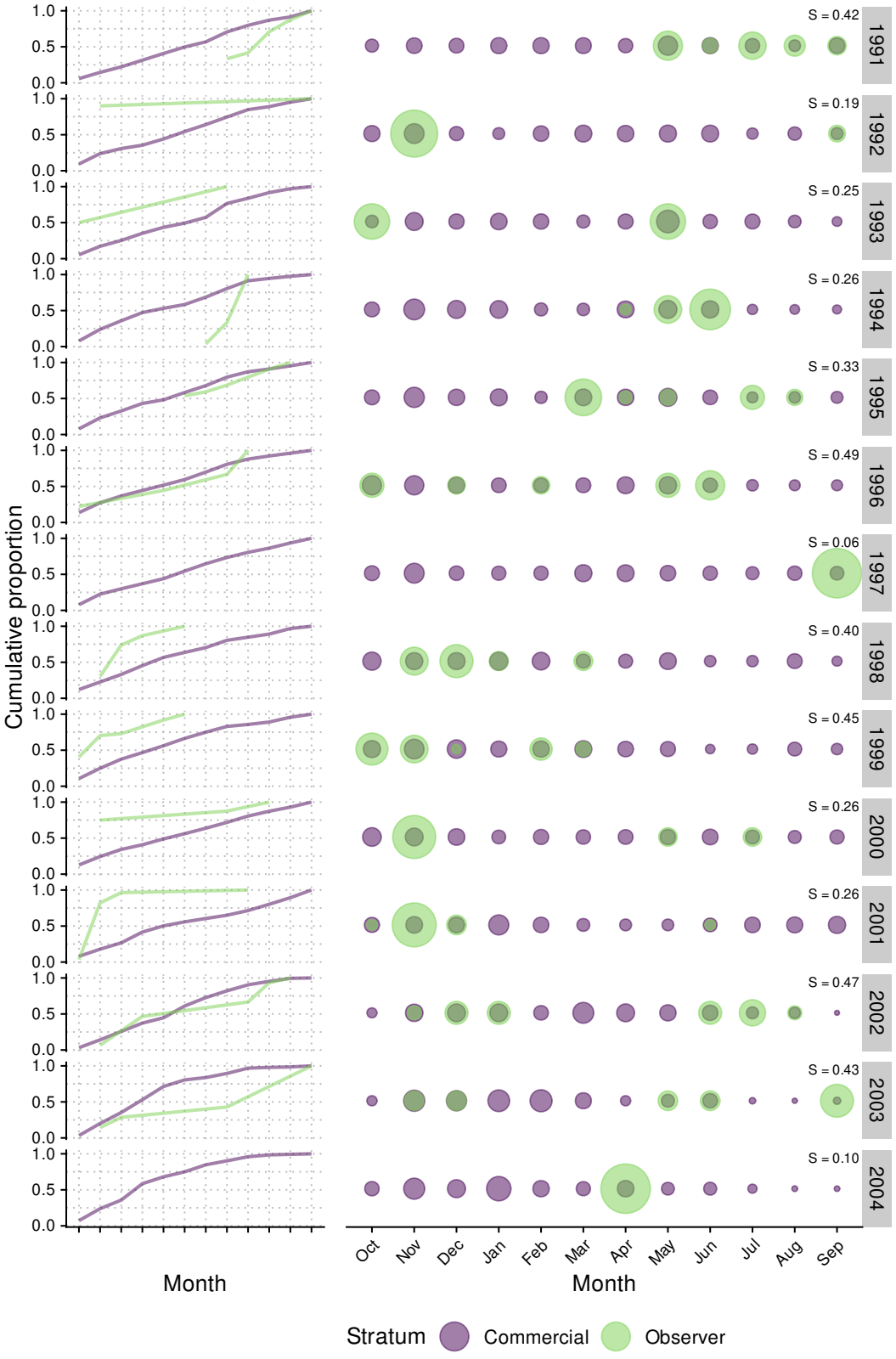


Figure 605: Monthly representativeness of observer sampling coverage of Trawl fishing events in HOK 1NE, where the hoki catch exceeded the 70kg threshold, in 1991 to 2004. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

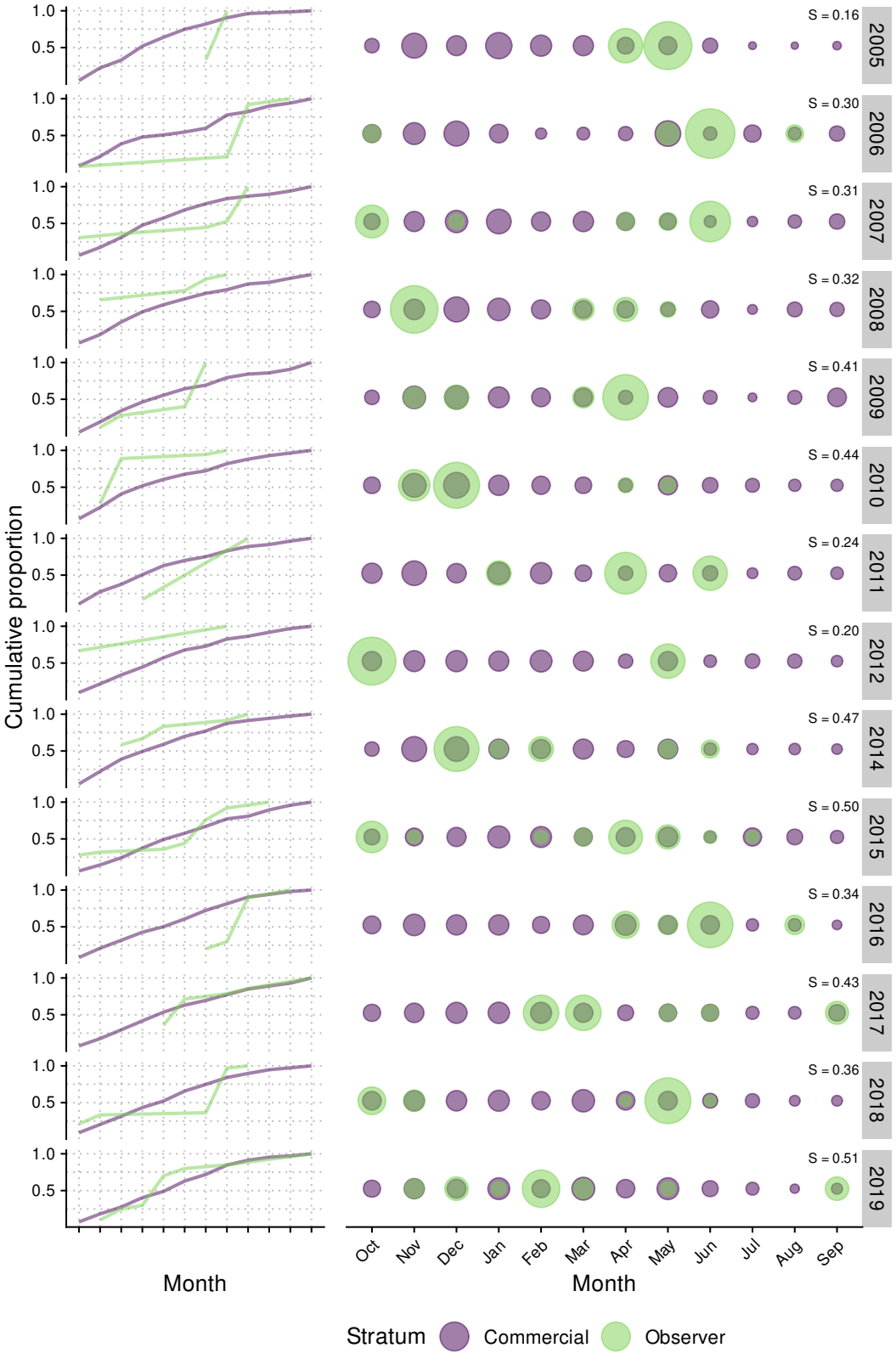


Figure 606: Monthly representativeness of observer sampling coverage of Trawl fishing events in HOK 1NE, where the hoki catch exceeded the 70kg threshold, in 2005 to 2019. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

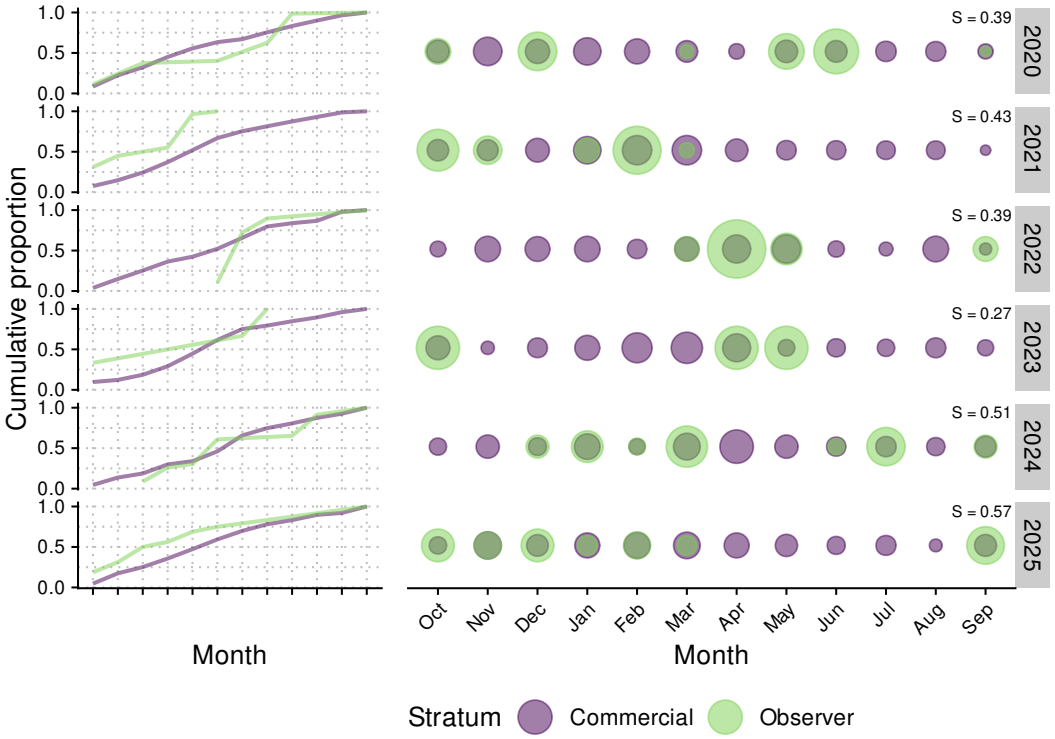


Figure 607: Monthly representativeness of observer sampling coverage of Trawl fishing events in HOK 1NE, where the hoki catch exceeded the 70kg threshold, in 2020 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

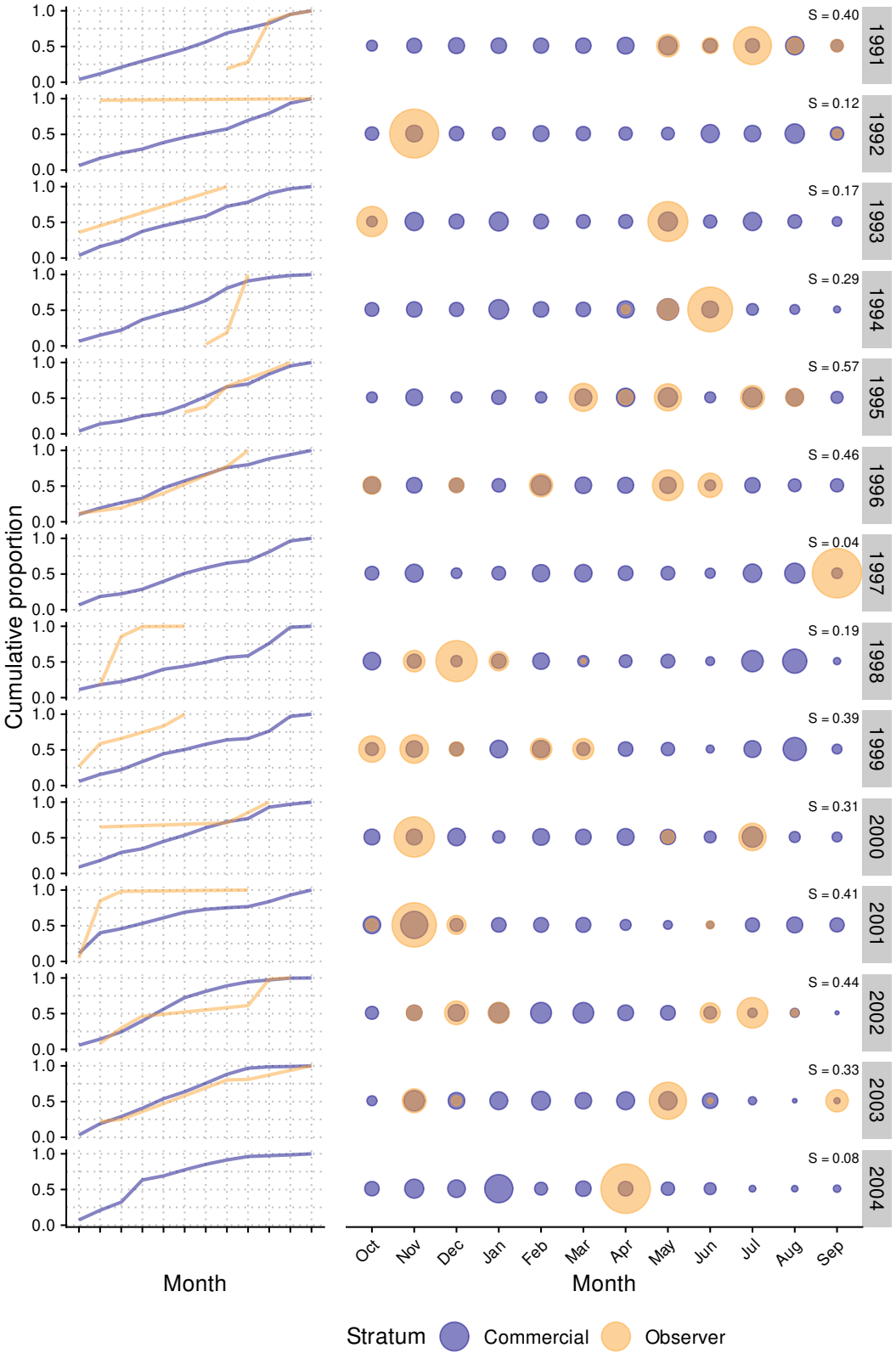


Figure 608: **Monthly representativeness of observer sampling coverage of Trawl catch in HOK 1NE, from events where the hoki catch exceeded the 70kg threshold, in 1991 to 2004. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

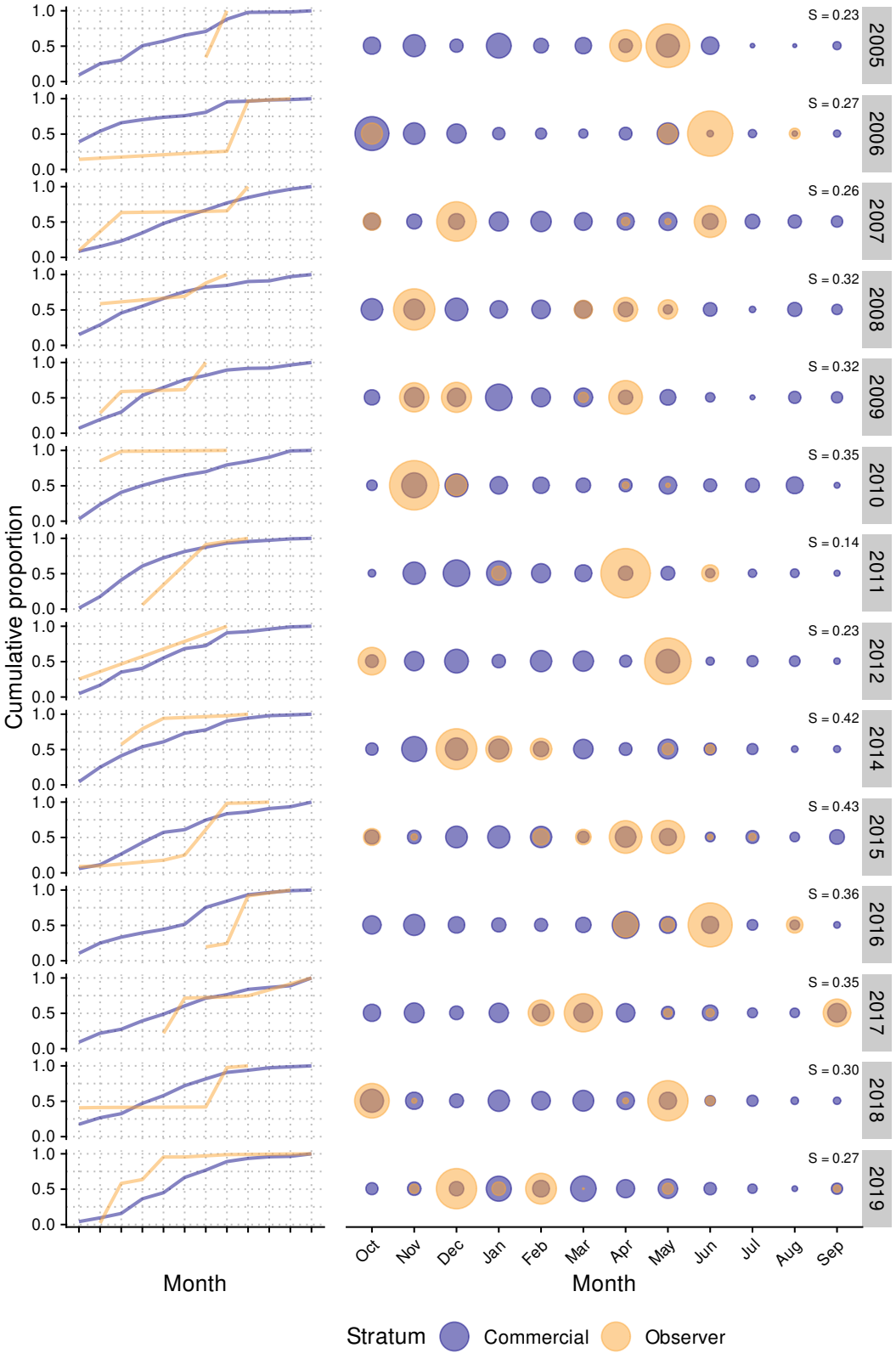


Figure 609: **Monthly representativeness of observer sampling coverage of Trawl catch in HOK 1NE, from events where the hoki catch exceeded the 70kg threshold, in 2005 to 2019. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

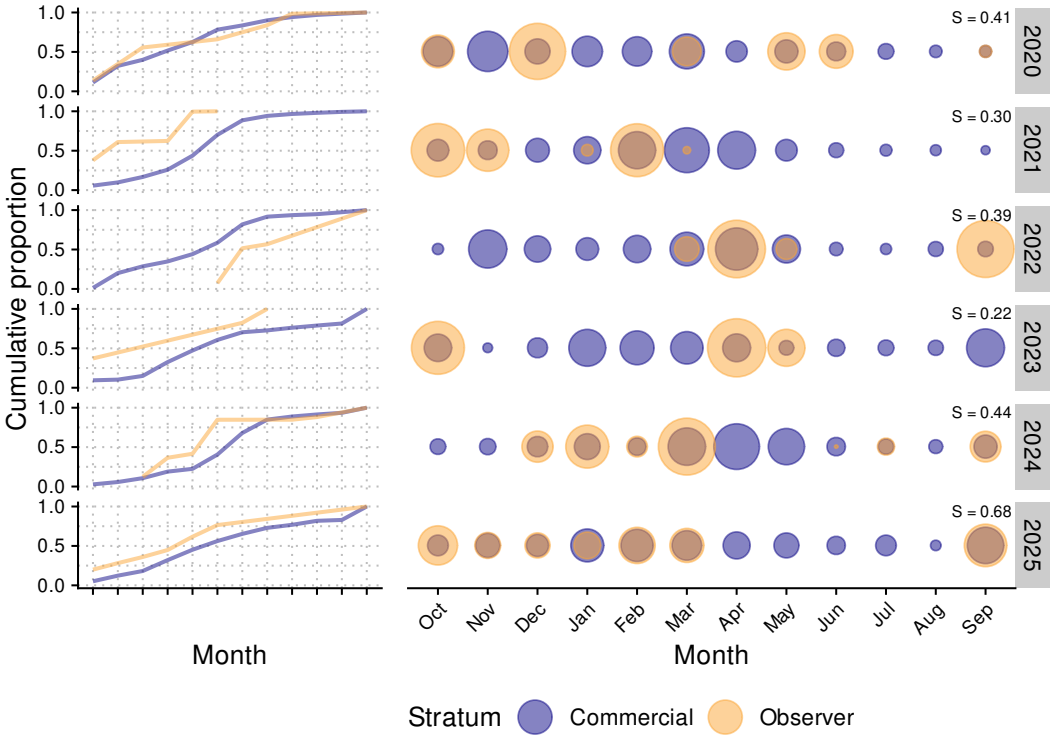


Figure 610: **Monthly representativeness of observer sampling coverage of Trawl catch in HOK 1NE, from events where the hoki catch exceeded the 70kg threshold, in 2020 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

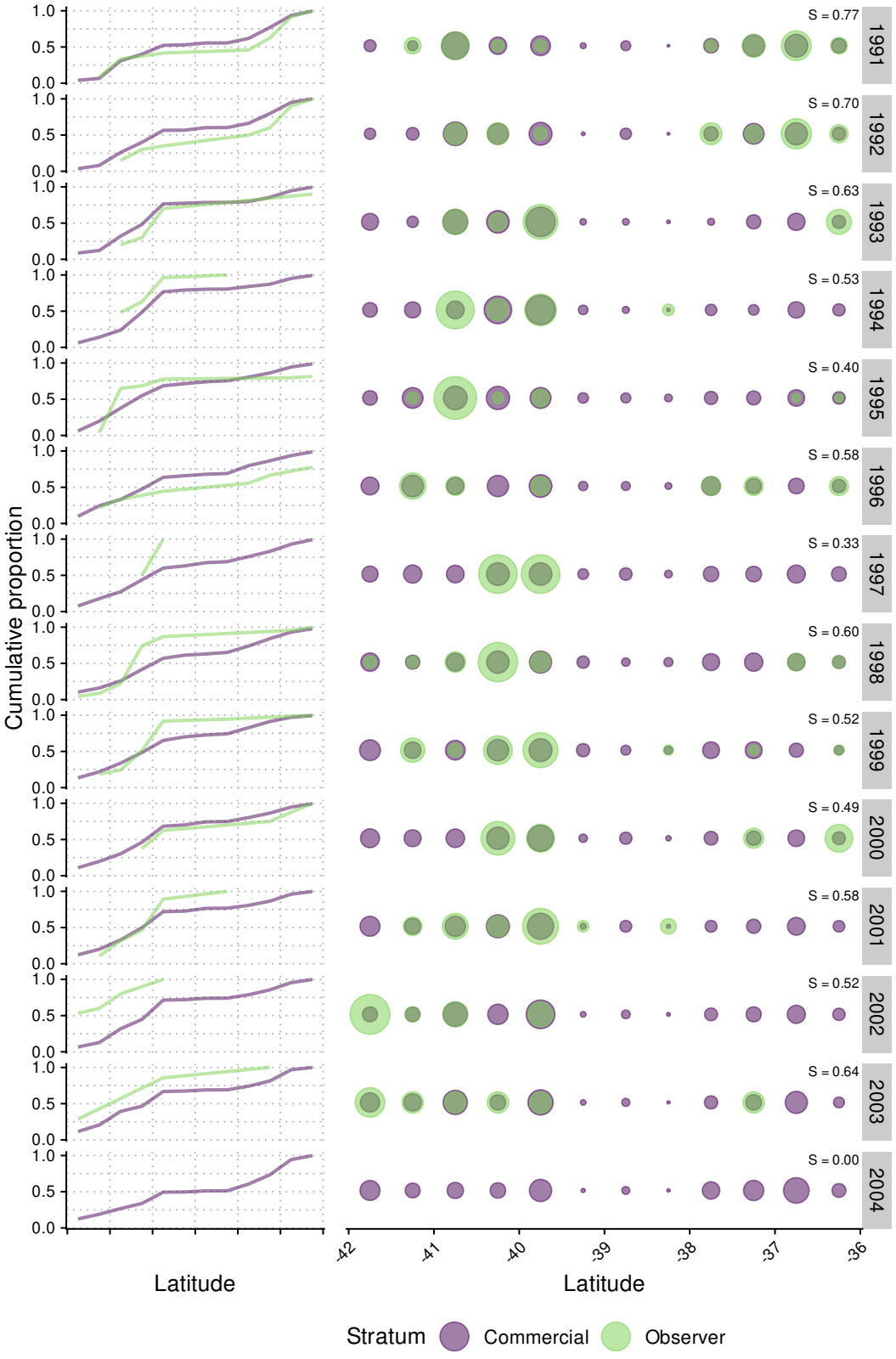


Figure 611: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in HOK 1NE, where the hoki catch exceeded the 70kg threshold, in 1991 to 2004. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

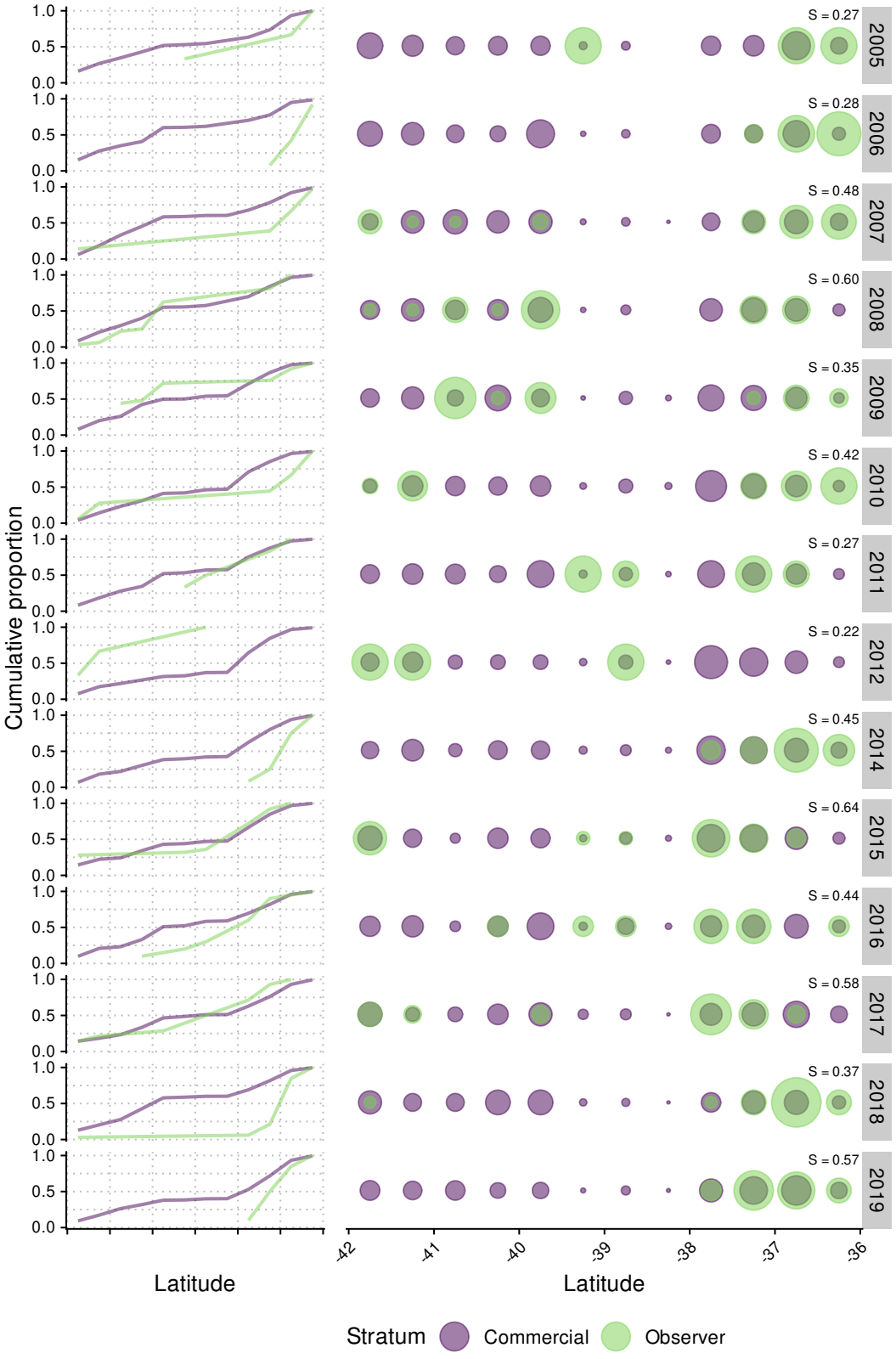


Figure 612: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in HOK 1NE, where the hoki catch exceeded the 70kg threshold, in 2005 to 2019. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

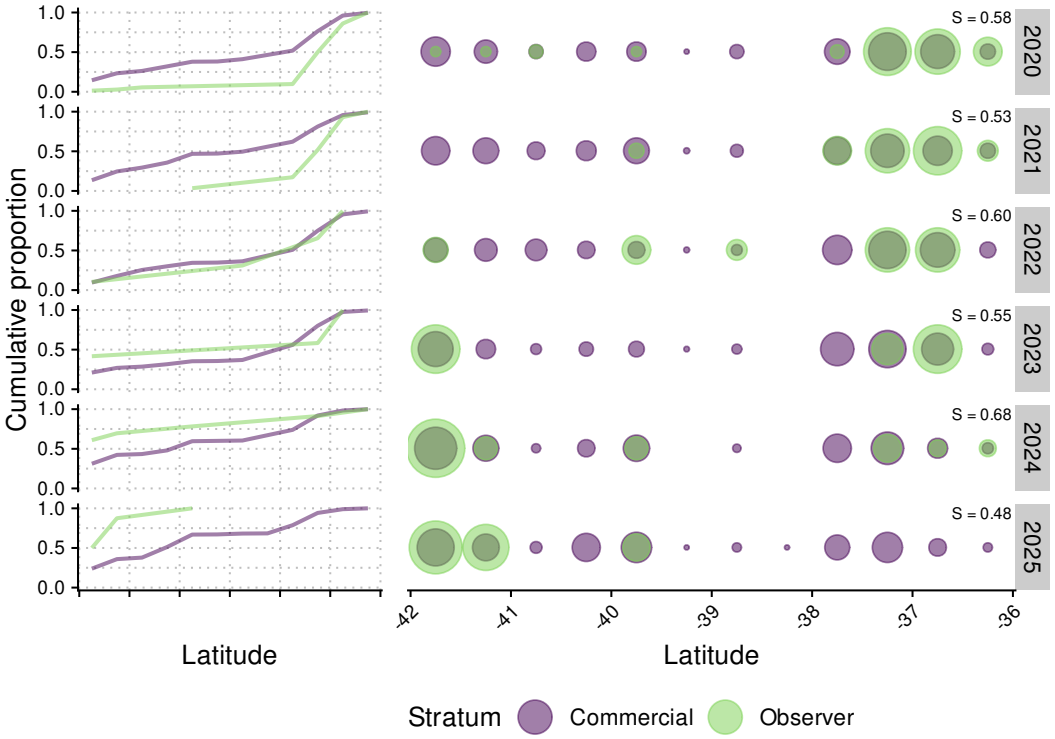


Figure 613: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in HOK 1NE, where the hoki catch exceeded the 70kg threshold, in 2020 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

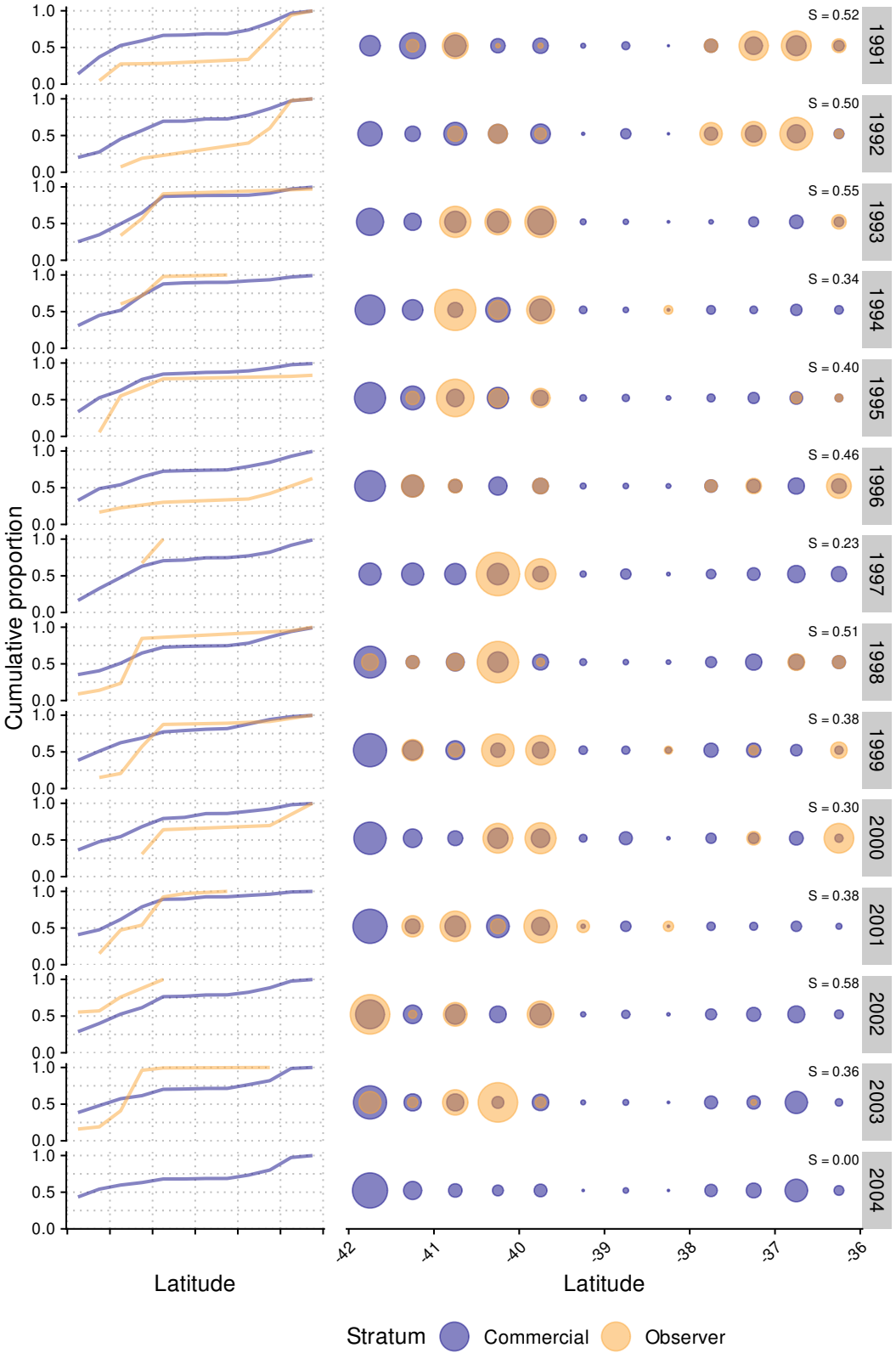


Figure 614: **Latitudinal representativeness of observer sampling coverage of Trawl catch in HOK 1NE, from events where the hoki catch exceeded the 70kg threshold, in 1991 to 2004. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

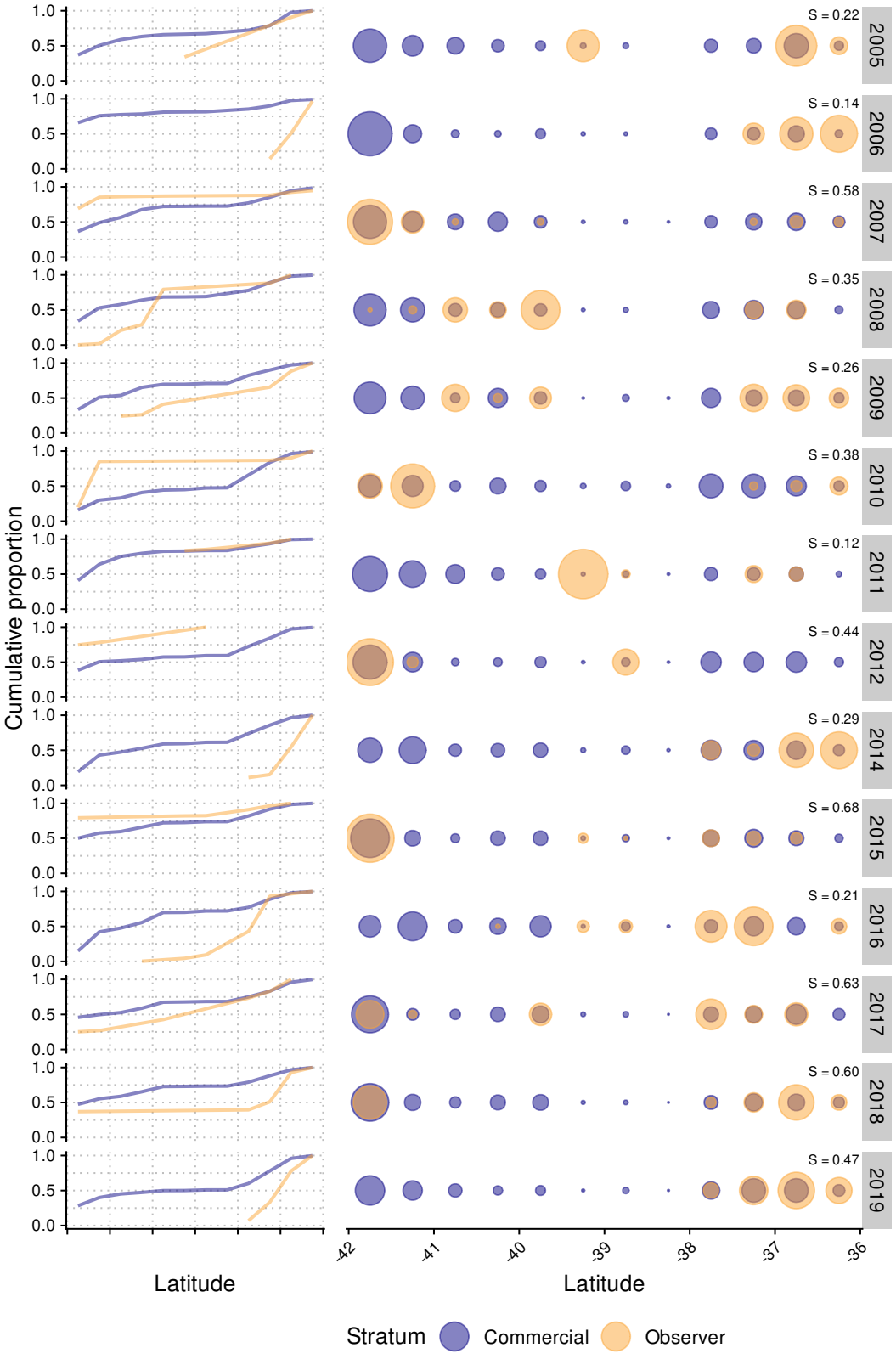


Figure 615: Latitudinal representativeness of observer sampling coverage of Trawl catch in HOK 1NE, from events where the hoki catch exceeded the 70kg threshold, in 2005 to 2019. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

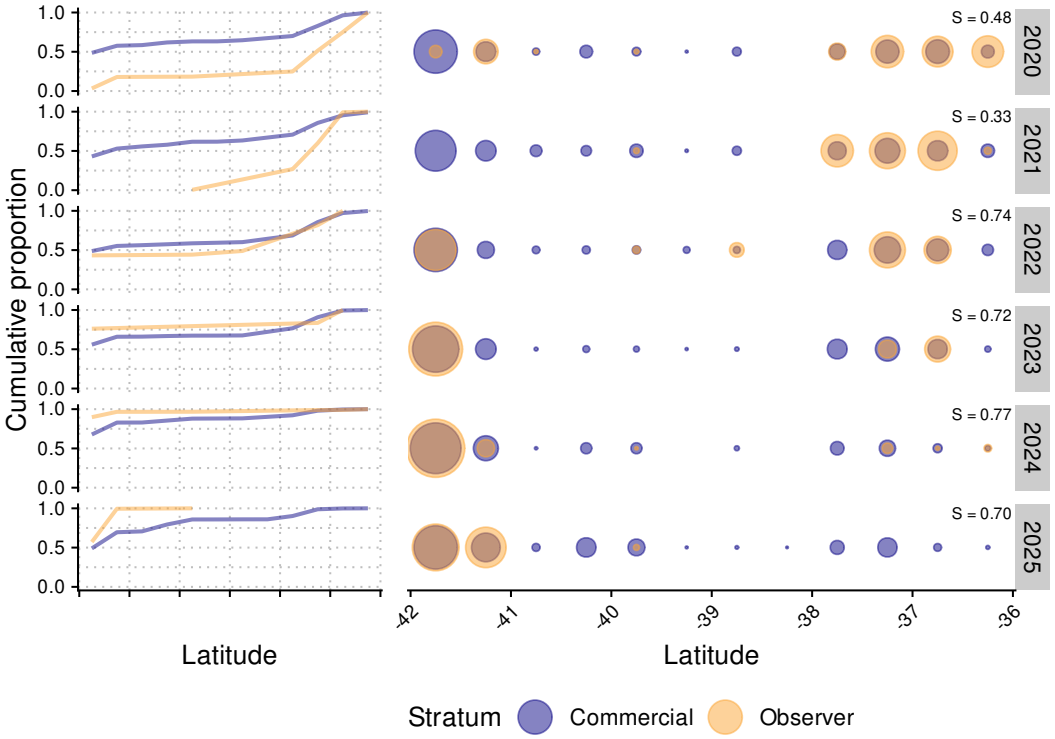


Figure 616: Latitudinal representativeness of observer sampling coverage of Trawl catch in HOK 1NE, from events where the hoki catch exceeded the 70kg threshold, in 2020 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

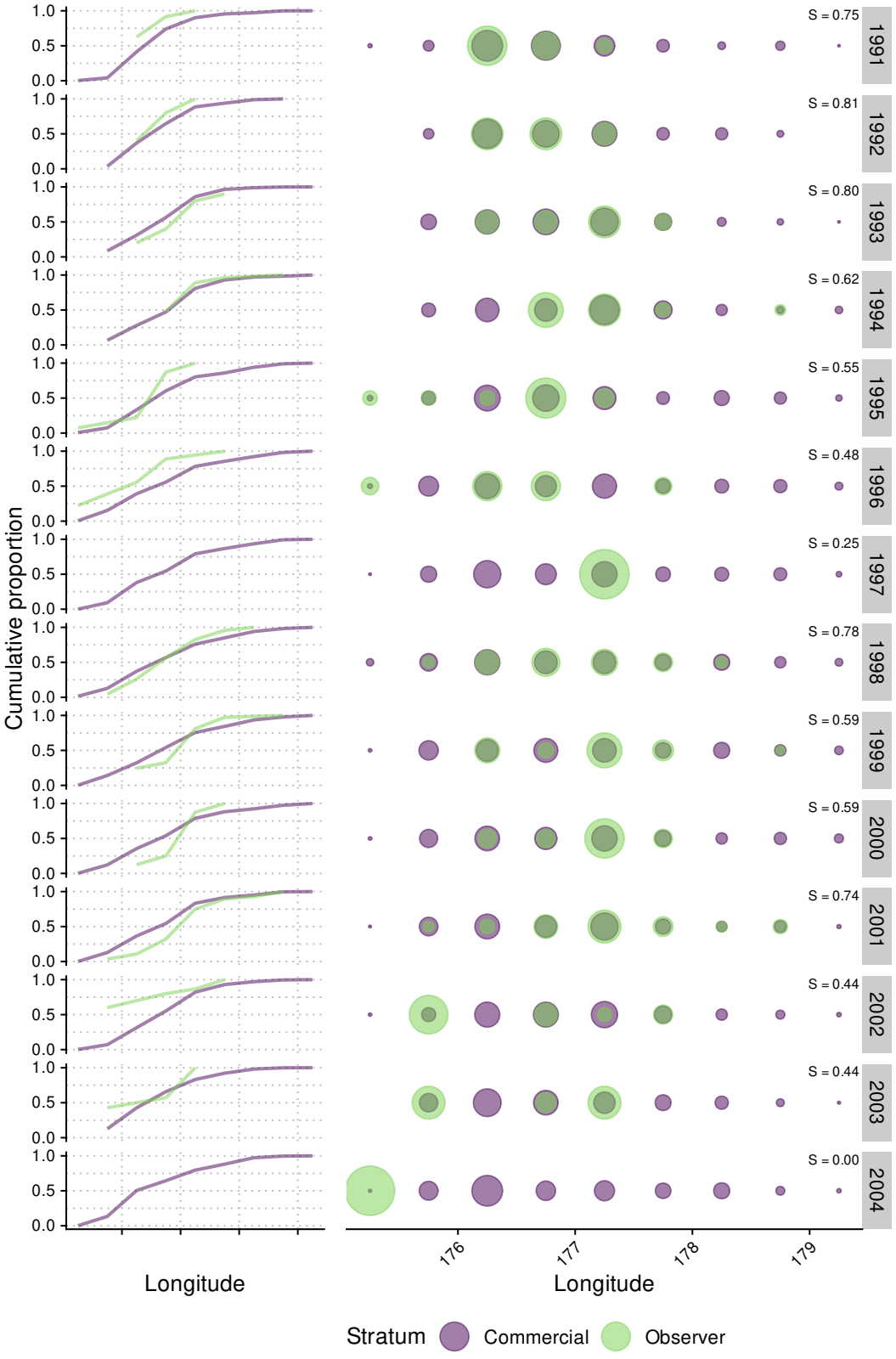


Figure 617: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in HOK 1NE, where the hoki catch exceeded the 70kg threshold, in 1991 to 2004. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

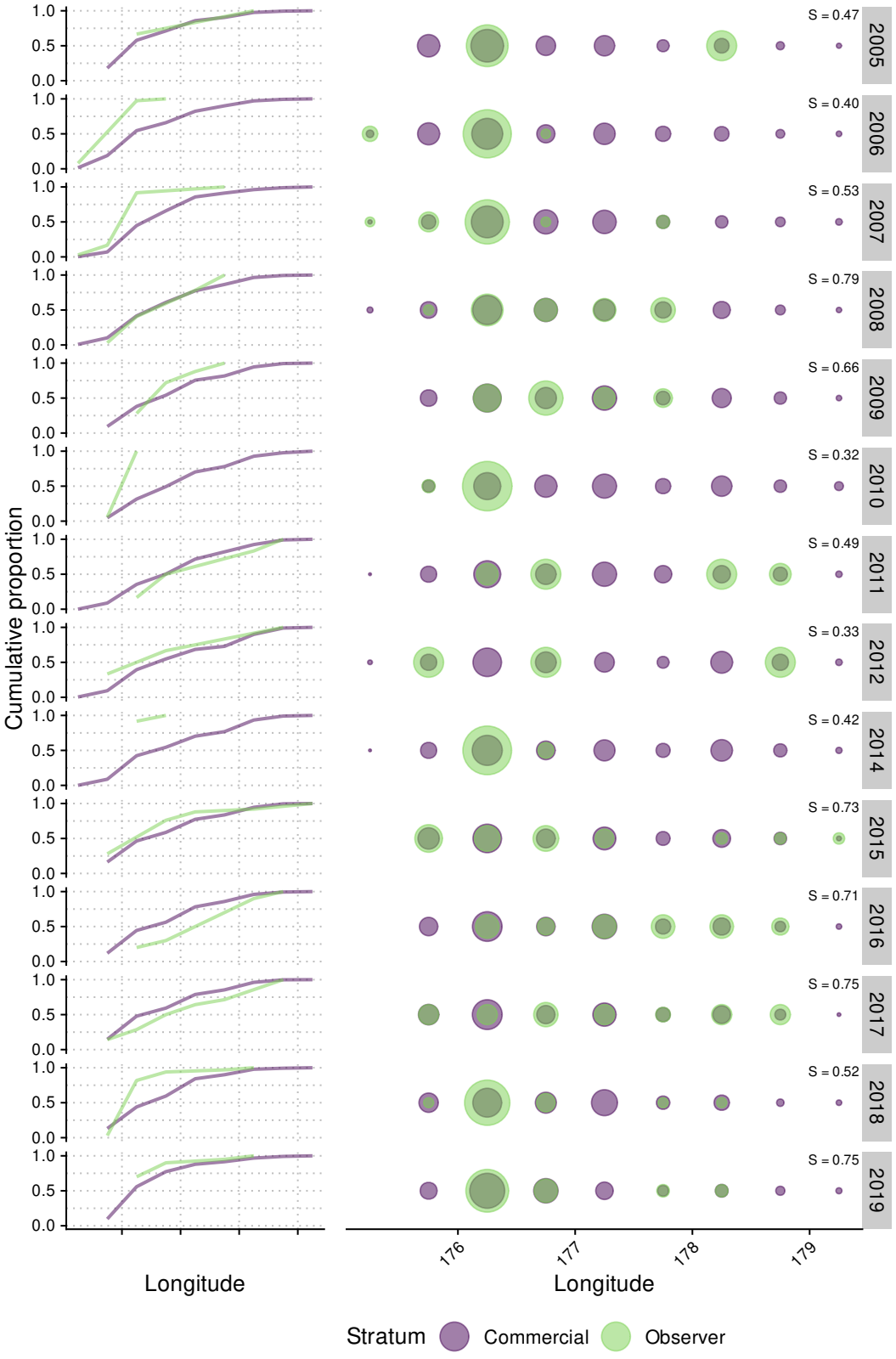


Figure 618: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in HOK 1NE, where the hoki catch exceeded the 70kg threshold, in 2005 to 2019. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

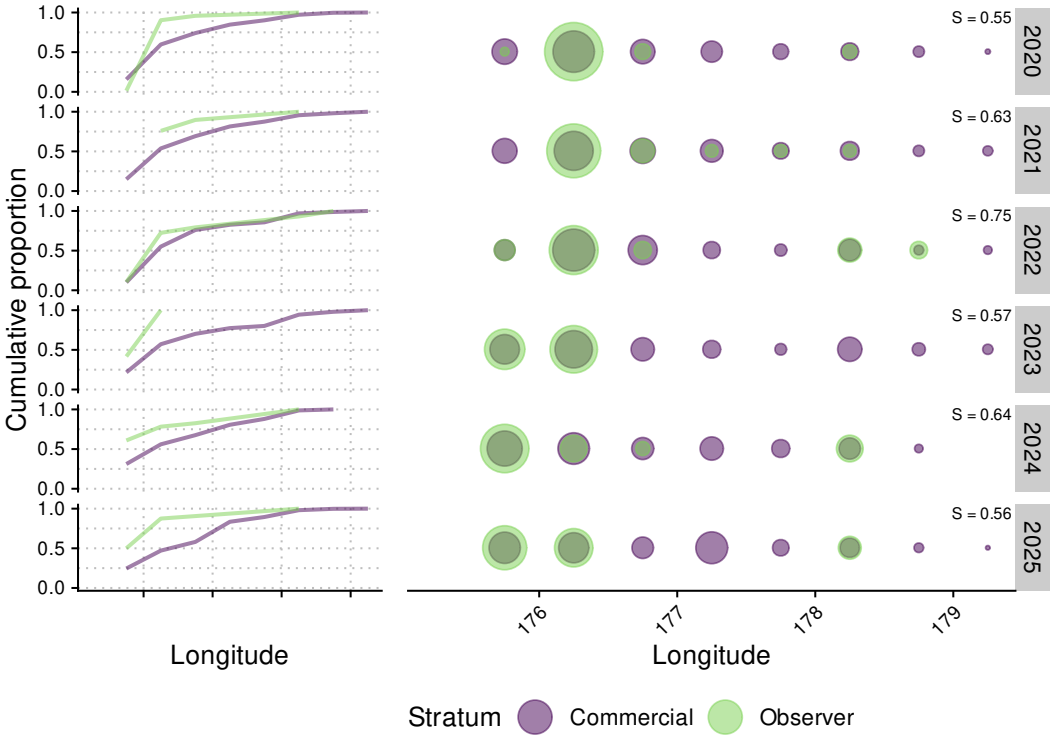


Figure 619: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in HOK 1NE, where the hoki catch exceeded the 70kg threshold, in 2020 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

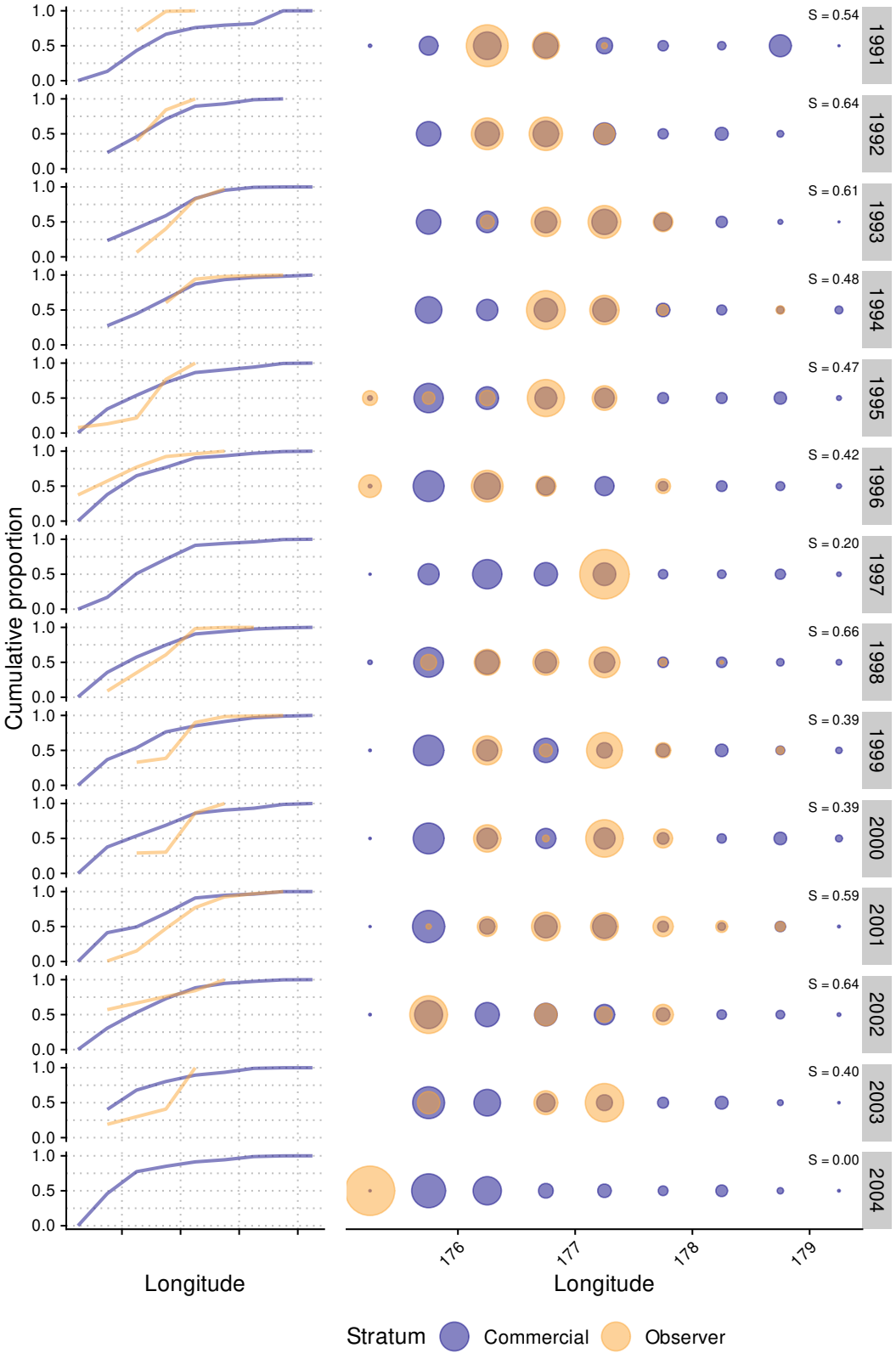


Figure 620: Longitudinal representativeness of observer sampling coverage of Trawl catch in HOK 1NE, from events where the hoki catch exceeded the 70kg threshold, in 1991 to 2004. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

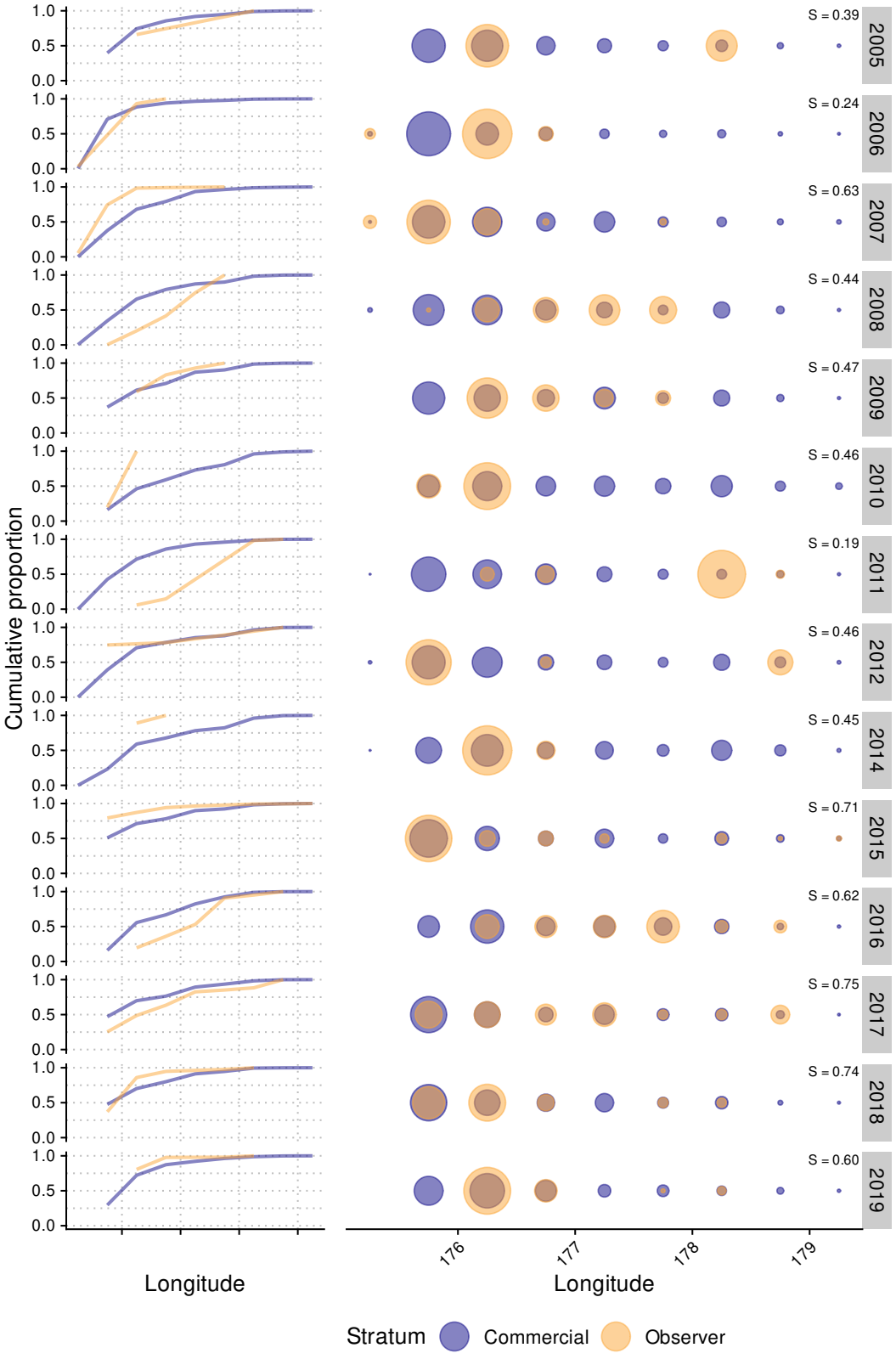


Figure 621: Longitudinal representativeness of observer sampling coverage of Trawl catch in HOK 1NE, from events where the hoki catch exceeded the 70kg threshold, in 2005 to 2019. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

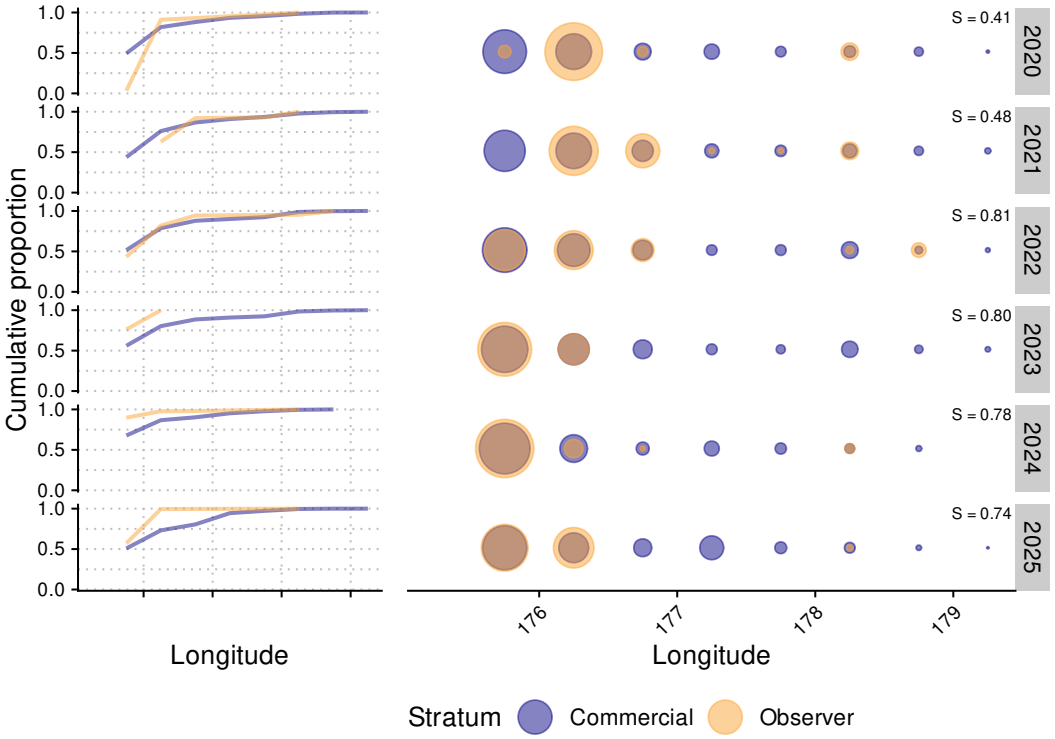


Figure 622: **Longitudinal representativeness of observer sampling coverage of Trawl catch in HOK 1NE, from events where the hoki catch exceeded the 70kg threshold, in 2020 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

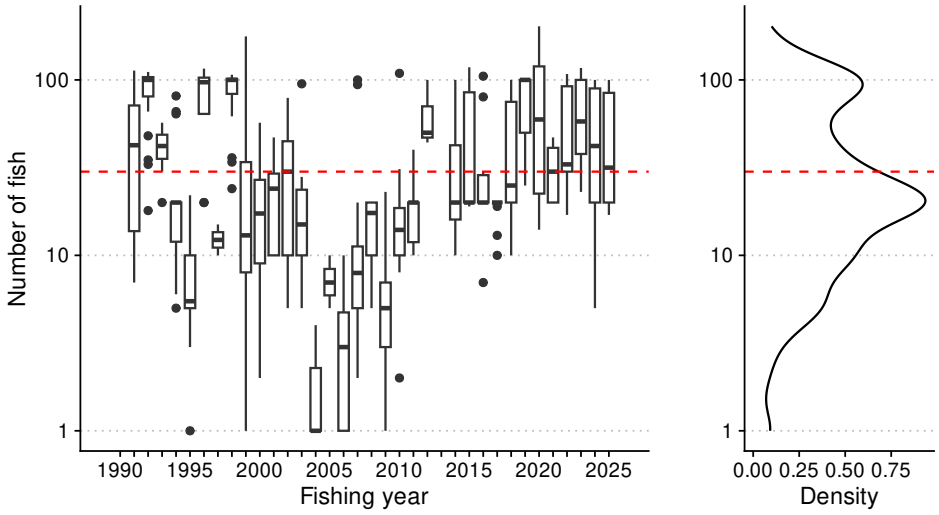


Figure 623: **Length-frequency sample sizes for observed fishing events in HOK 1NE where hoki were sampled. The red dashed line indicates a sample size of 30 fish.**

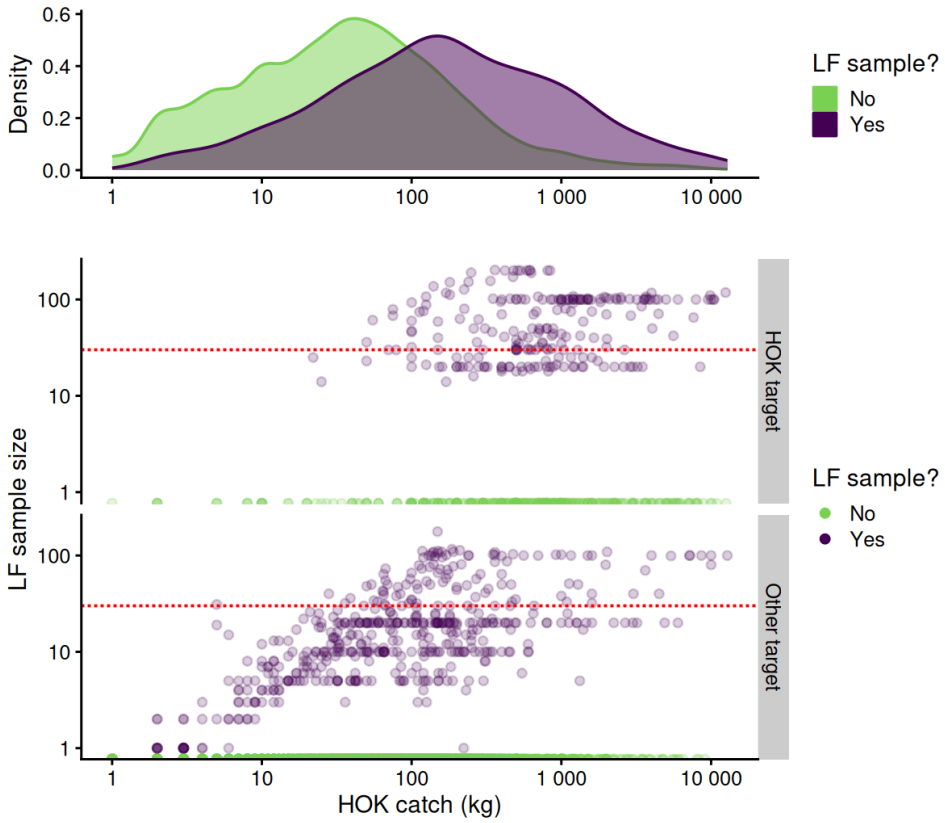


Figure 624: Length-frequency sample sizes (number of fish sampled) for observed fishing events in HOK 1NE in relation to the total hoki catch from an event, separately for hoki target events and other target species. The red dashed line indicates a sample size of 30 fish.

2.10.3.2 Otolith samples

Table 52: Otolith samples of hoki from the HOK 1NE Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of hoki exceeded a potential sampling threshold of 70 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	2 570	0	0	0.00
1991	3 332	0	0	0.00
1992	4 050	0	0	0.00
1993	4 645	0	0	0.00
1994	4 671	0	0	0.00
1995	4 117	0	0	0.00
1996	4 131	0	0	0.00
1997	4 934	0	0	0.00
1998	4 411	0	0	0.00
1999	3 197	0	0	0.00
2000	2 724	0	0	0.00
2001	2 641	0	0	0.00
2002	3 087	0	0	0.00
2003	2 162	0	0	0.00
2004	1 649	0	0	0.00
2005	1 061	0	0	0.00
2006	827	0	0	0.00
2007	1 239	0	0	0.00
2008	971	0	0	0.00
2009	770	0	0	0.00
2010	1 206	0	0	0.00
2011	1 326	5	28	0.38
2012	1 158	3	30	0.26
2013	1 261	0	0	0.00
2014	1 416	5	25	0.35
2015	887	0	0	0.00
2016	1 077	0	0	0.00
2017	1 051	2	10	0.19
2018	1 174	10	103	0.85
2019	1 178	0	0	0.00
2020	884	5	33	0.57
2021	842	13	65	1.54
2022	625	6	45	0.96
2023	694	5	41	0.72
2024	474	18	154	3.80
2025	465	16	130	3.44

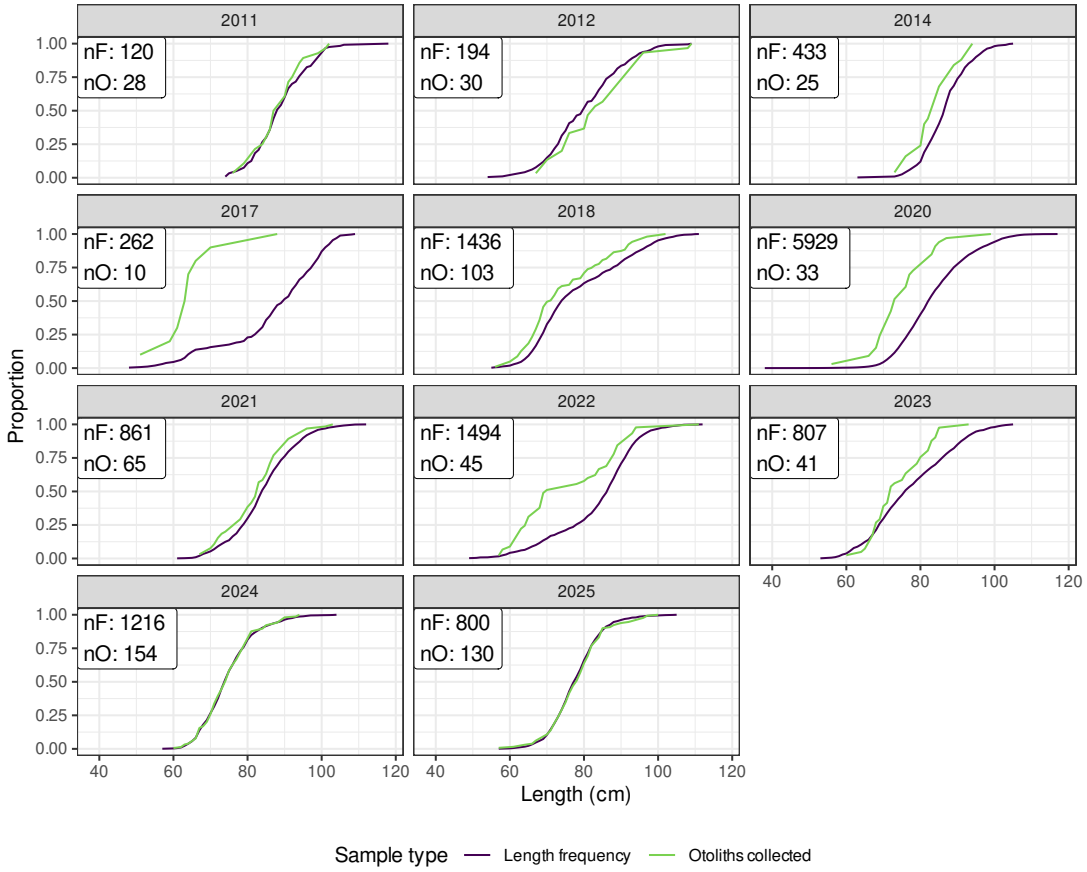


Figure 625: Cumulative distributions of the length of fish in the length frequency and otolith samples of hoki in the HOK 1NE Trawl fishery for the 2011 to 2025 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

2.10.3.3 Catch quantification

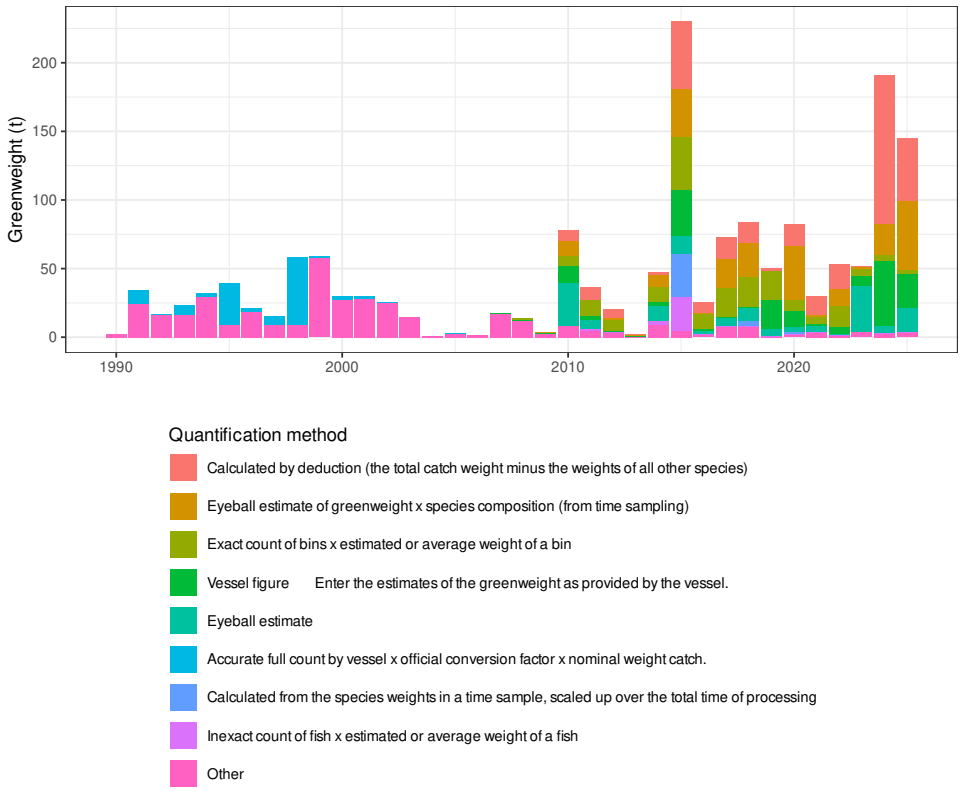


Figure 626: Methods used by observers to quantify the catch of hoki in the HOK 1NE Trawl fishery. The legend lists the methods used in descending order of total catch.

2.10.4 HOK 1PU: Trawl fishery

2.10.4.1 Length-frequency samples

Table 53: Length-frequency samples of hoki from the HOK 1PU Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of hoki exceeded a potential sampling threshold of 70 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	906	0	0	0.00
1991	636	36	3 714	5.66
1992	890	97	10 235	10.90
1993	419	23	2 399	5.49
1994	367	22	2 421	5.99
1995	323	11	1 104	3.41
1996	532	30	3 179	5.64
1997	773	16	1 543	2.07
1998	519	0	0	0.00
1999	530	6	662	1.13
2000	636	21	2 511	3.30
2001	916	49	4 571	5.35
2002	614	35	3 307	5.70
2003	557	30	3 199	5.39
2004	235	26	1 950	11.06
2005	450	40	3 876	8.89
2006	344	35	3 894	10.17
2007	185	17	1 622	9.19
2008	208	5	185	2.40
2009	159	8	271	5.03
2010	151	5	315	3.31
2011	191	6	246	3.14
2012	233	29	2 370	12.45
2013	173	43	3 141	24.86
2014	169	49	3 637	28.99
2015	196	30	2 699	15.31
2016	205	22	996	10.73
2017	177	28	1 838	15.82
2018	156	40	2 923	25.64
2019	211	20	1 455	9.48
2020	123	10	281	8.13
2021	152	21	1 927	13.82
2022	183	27	1 059	14.75
2023	140	11	840	7.86
2024	152	33	1 564	21.71
2025	172	45	2 802	26.16

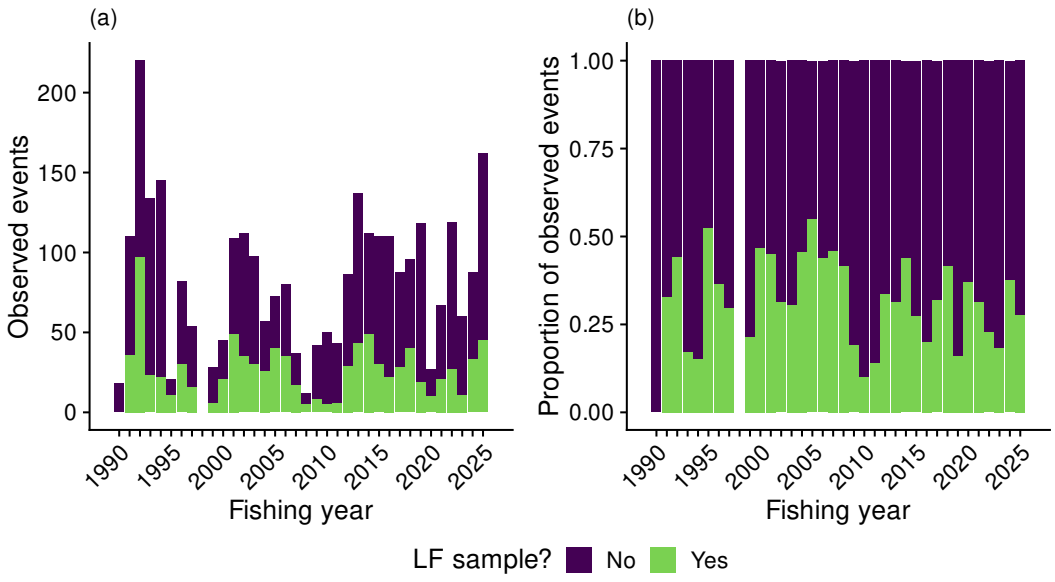


Figure 627: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in HOK 1PU where the hoki catch exceeded the 70 kg threshold, with and without length-frequency sampling.**

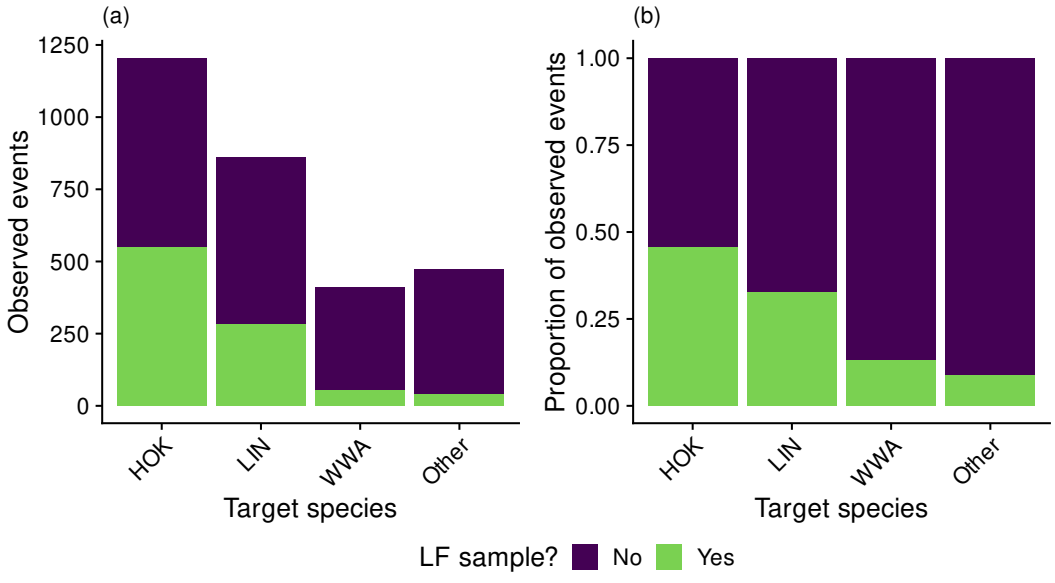


Figure 628: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in HOK 1PU where the hoki catch exceeded the 70 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

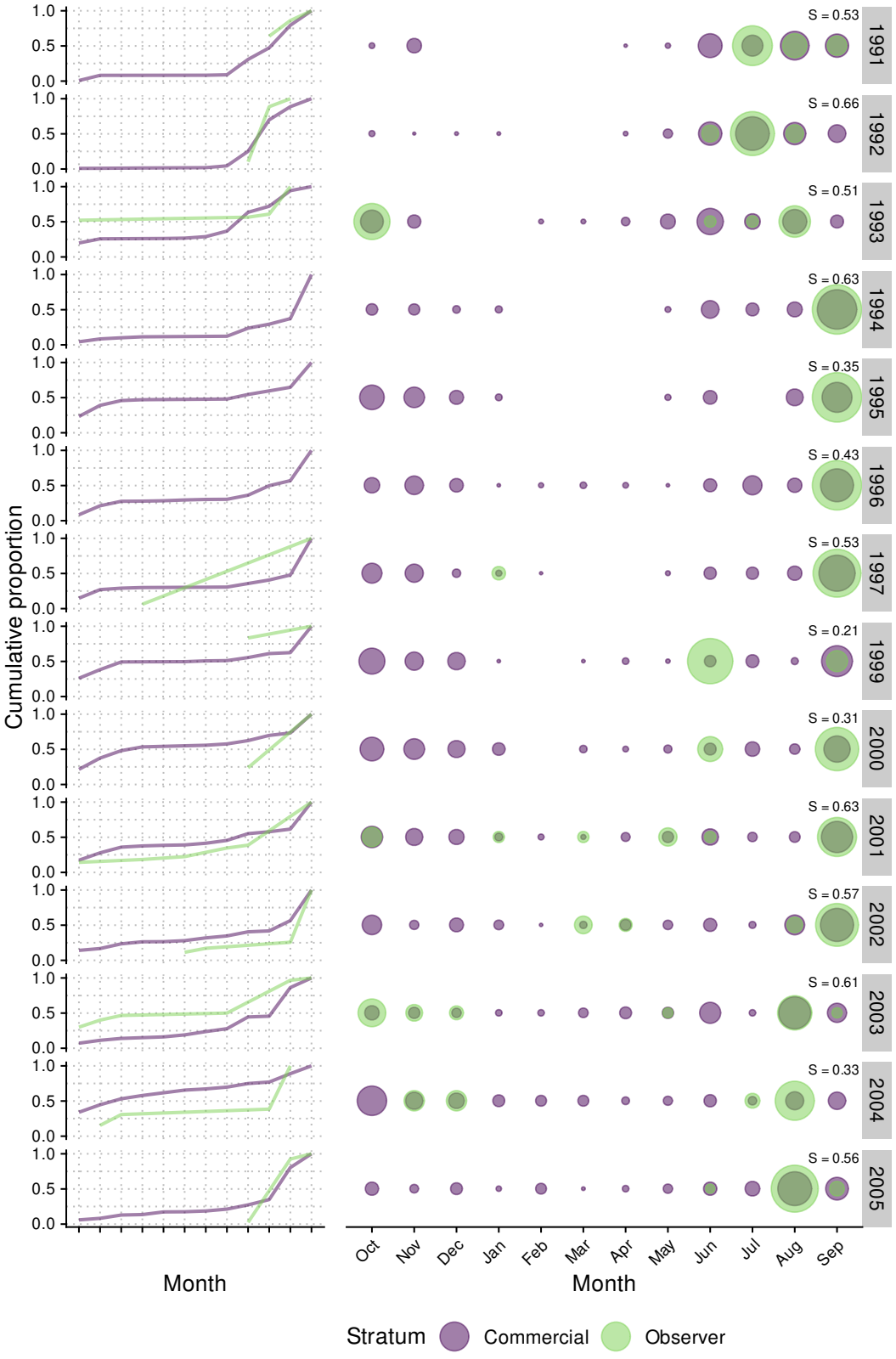


Figure 629: **Monthly representativeness of observer sampling coverage of Trawl fishing events in HOK 1PU, where the hoki catch exceeded the 70kg threshold, in 1991 to 2005. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

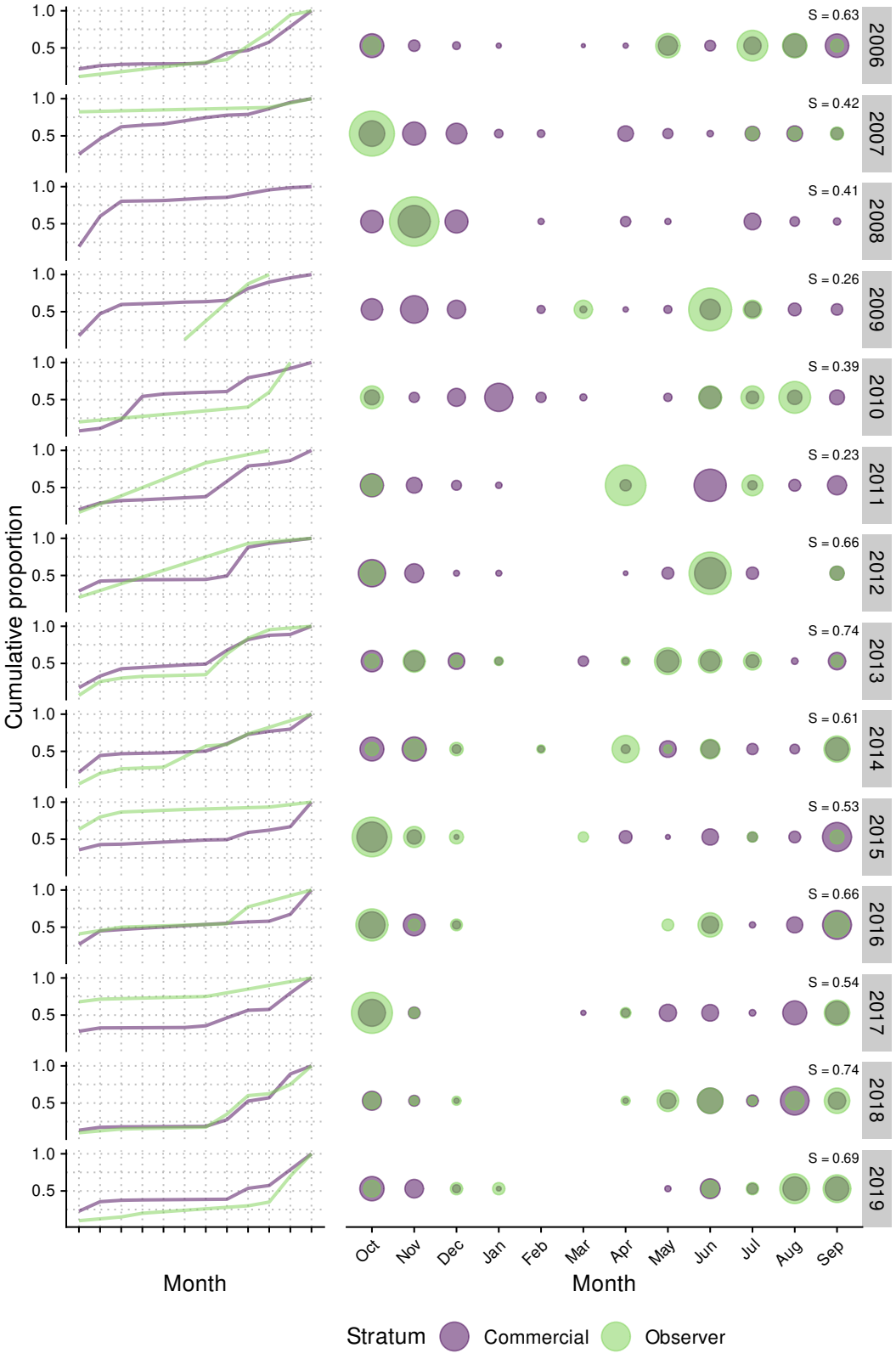


Figure 630: Monthly representativeness of observer sampling coverage of Trawl fishing events in HOK 1PU, where the hoki catch exceeded the 70kg threshold, in 2006 to 2019. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

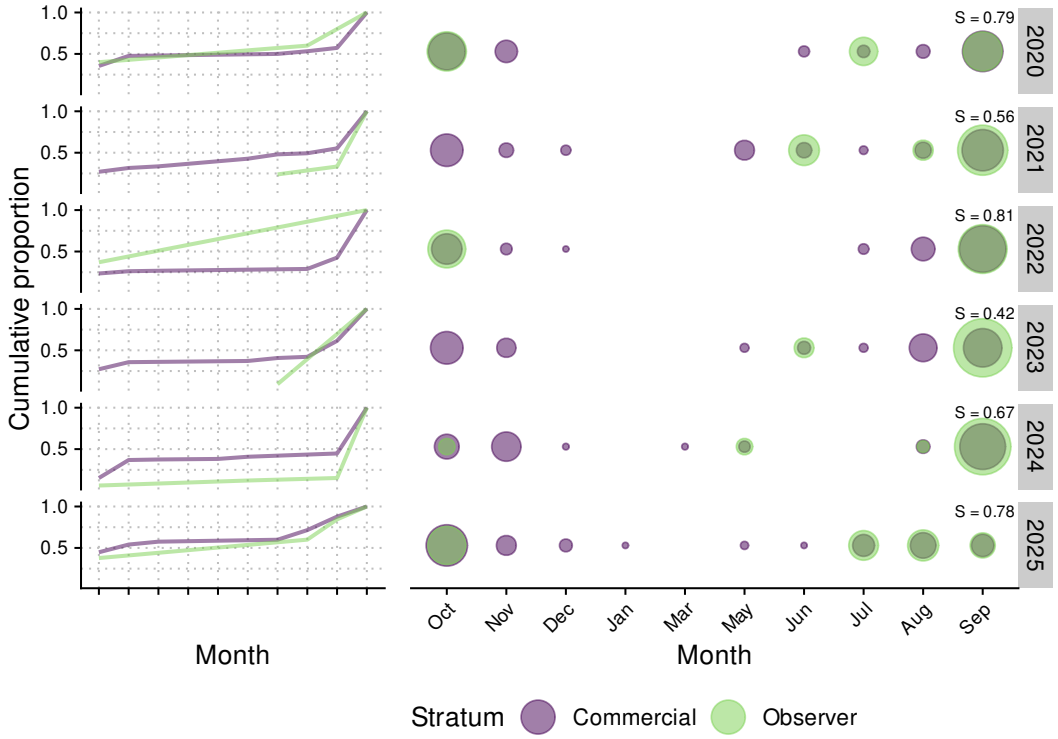


Figure 631: **Monthly representativeness of observer sampling coverage of Trawl fishing events in HOK 1PU, where the hoki catch exceeded the 70kg threshold, in 2020 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

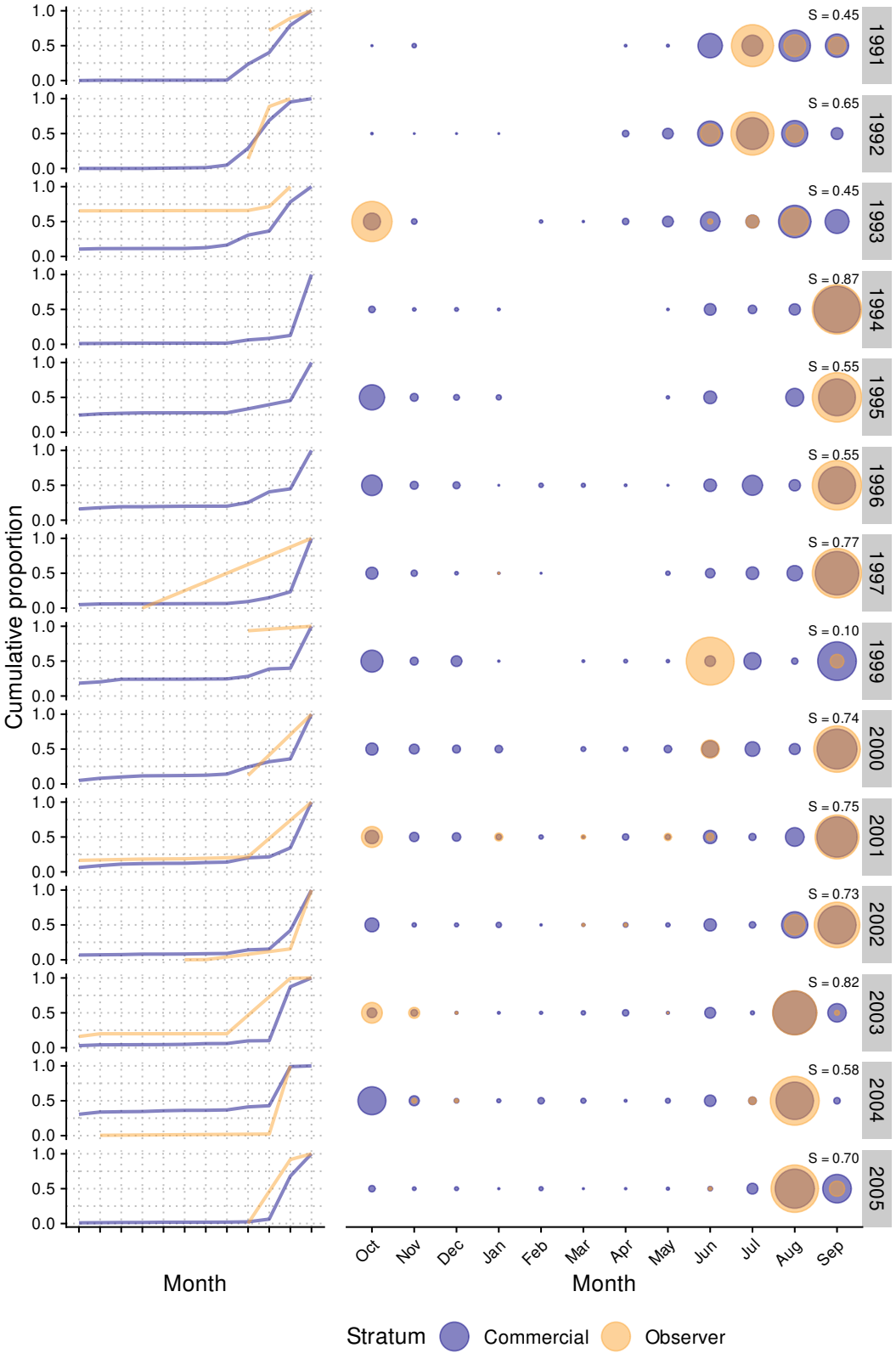


Figure 632: Monthly representativeness of observer sampling coverage of Trawl catch in HOK 1PU, from events where the hoki catch exceeded the 70kg threshold, in 1991 to 2005. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

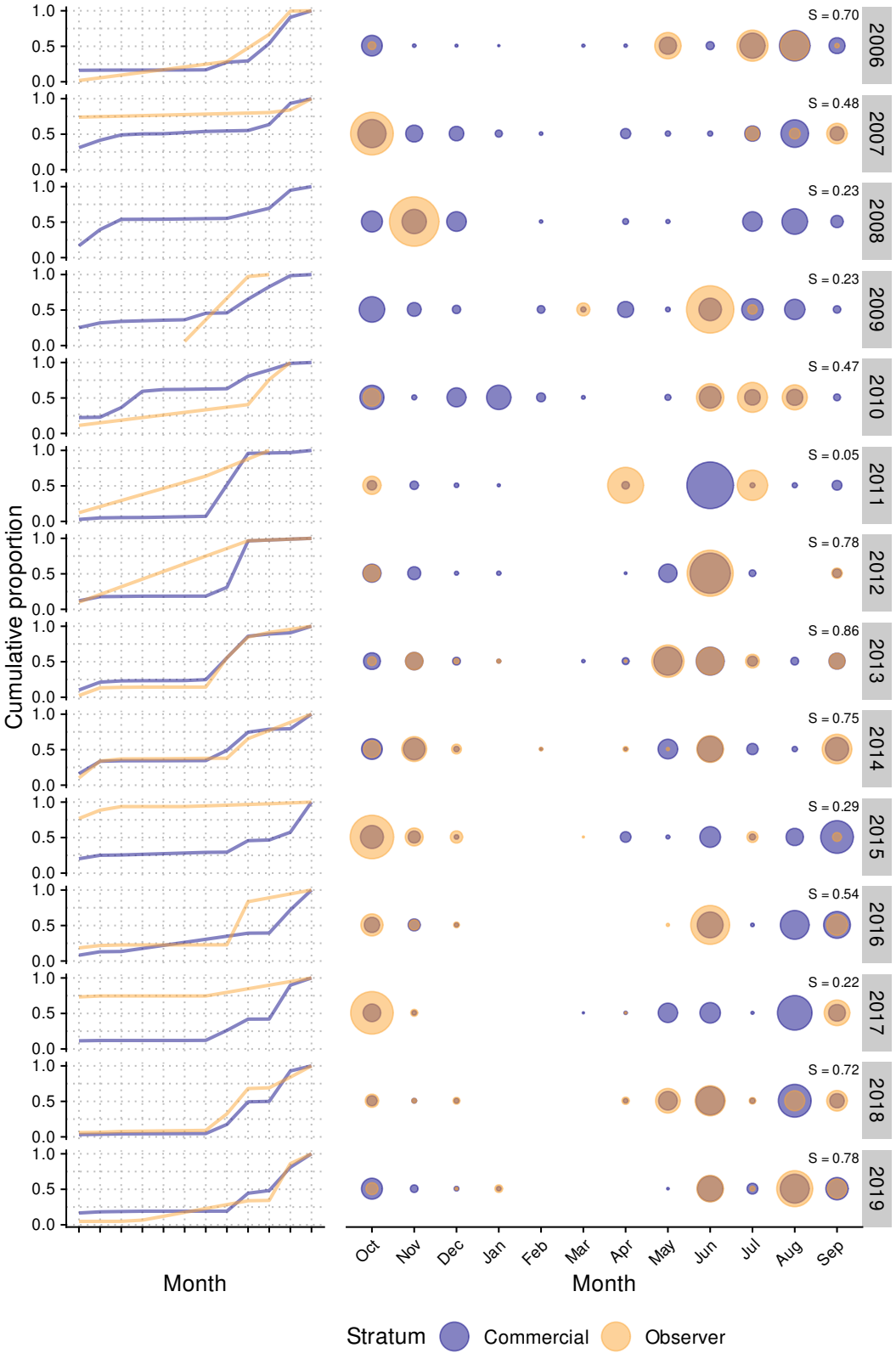


Figure 633: **Monthly representativeness of observer sampling coverage of Trawl catch in HOK 1PU, from events where the hoki catch exceeded the 70kg threshold, in 2006 to 2019. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

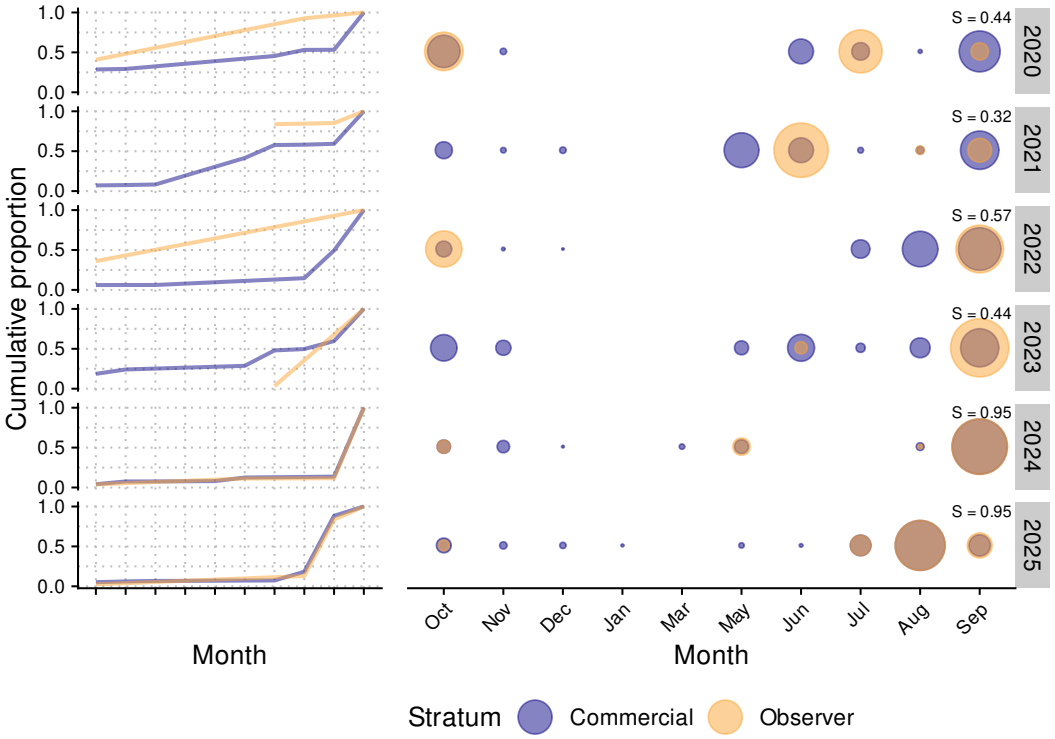


Figure 634: **Monthly representativeness of observer sampling coverage of Trawl catch in HOK 1PU, from events where the hoki catch exceeded the 70kg threshold, in 2020 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

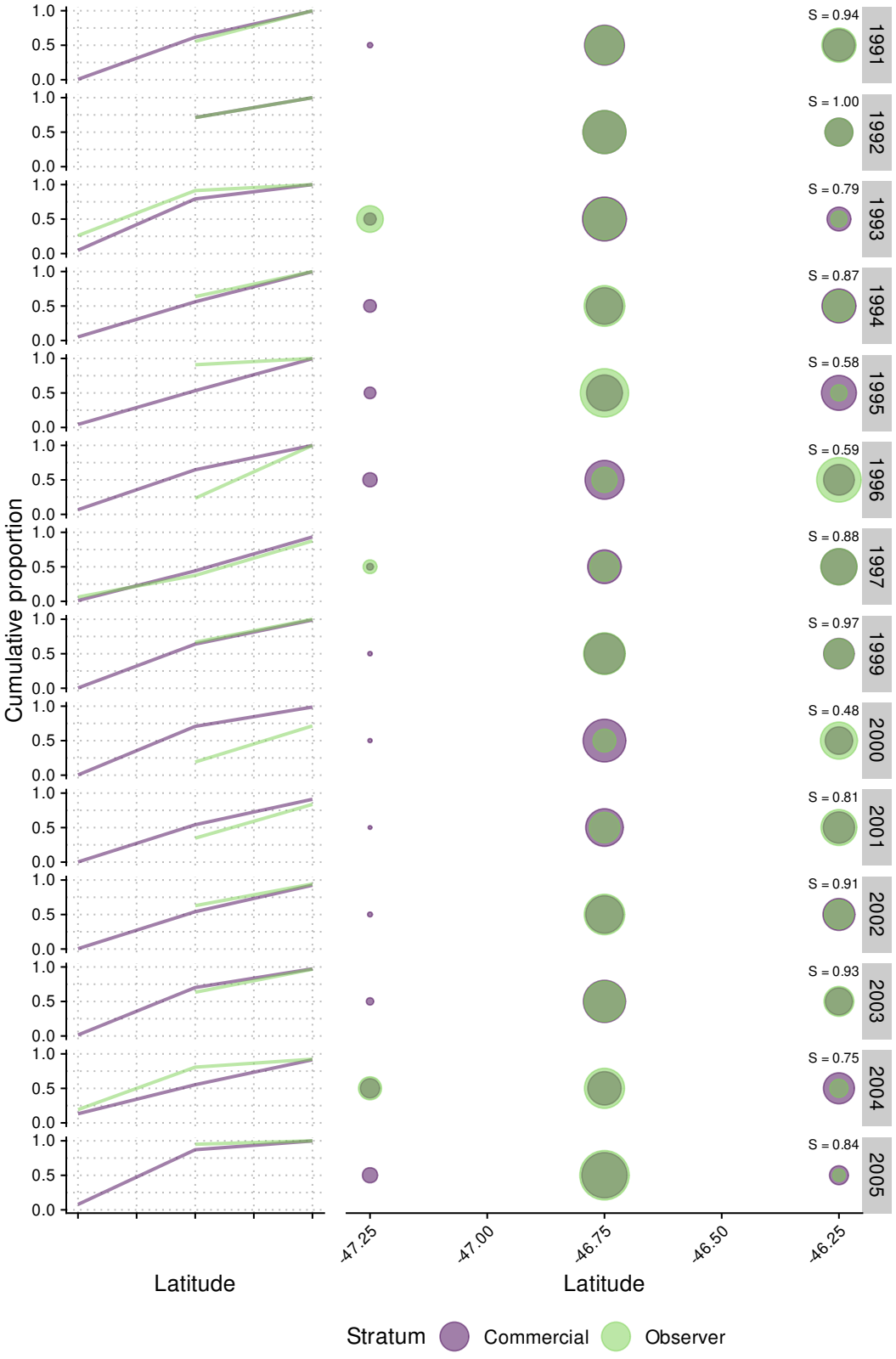


Figure 635: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in HOK 1PU, where the hoki catch exceeded the 70kg threshold, in 1991 to 2005. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

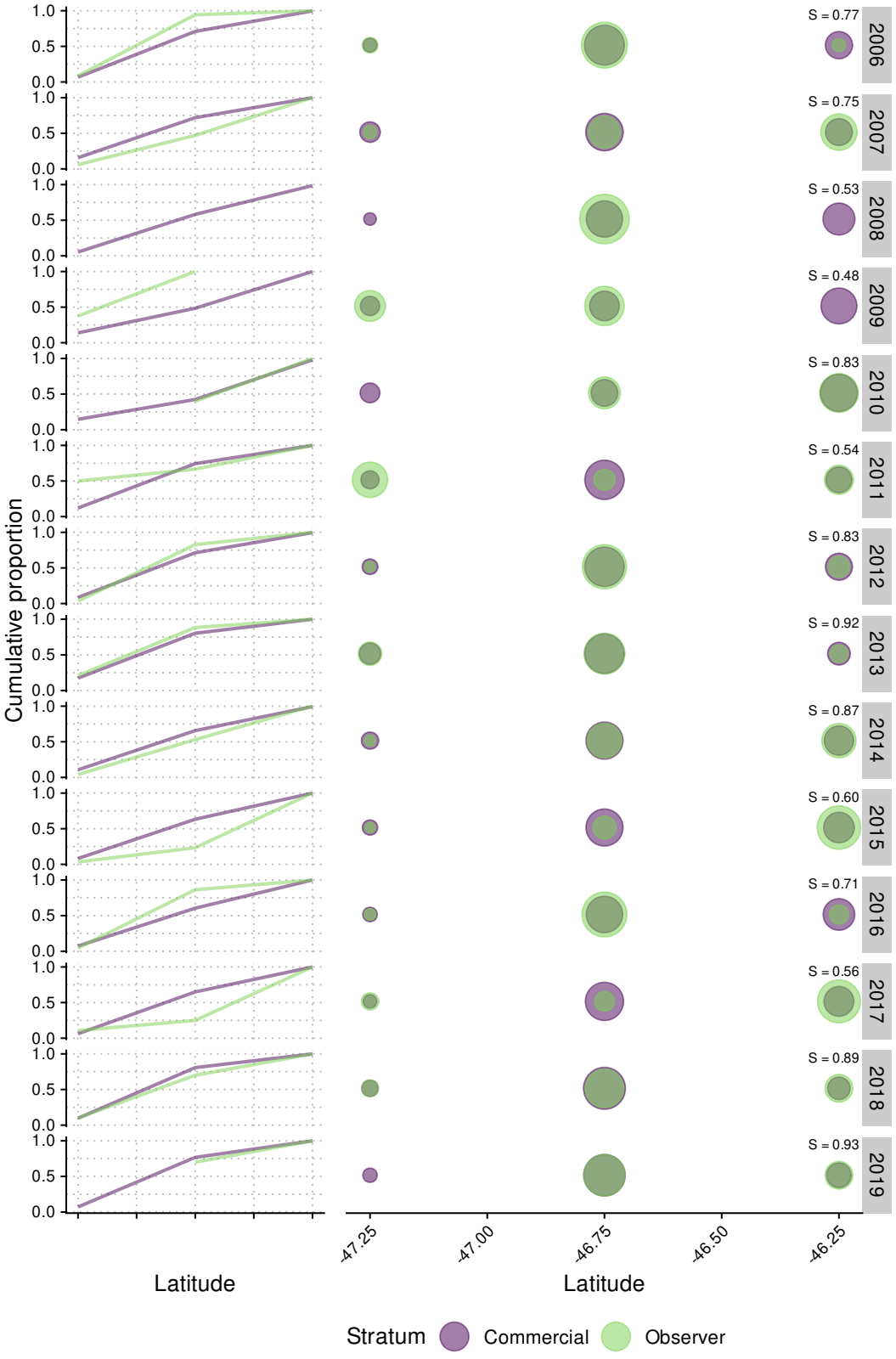


Figure 636: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in HOK 1PU, where the hoki catch exceeded the 70kg threshold, in 2006 to 2019. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

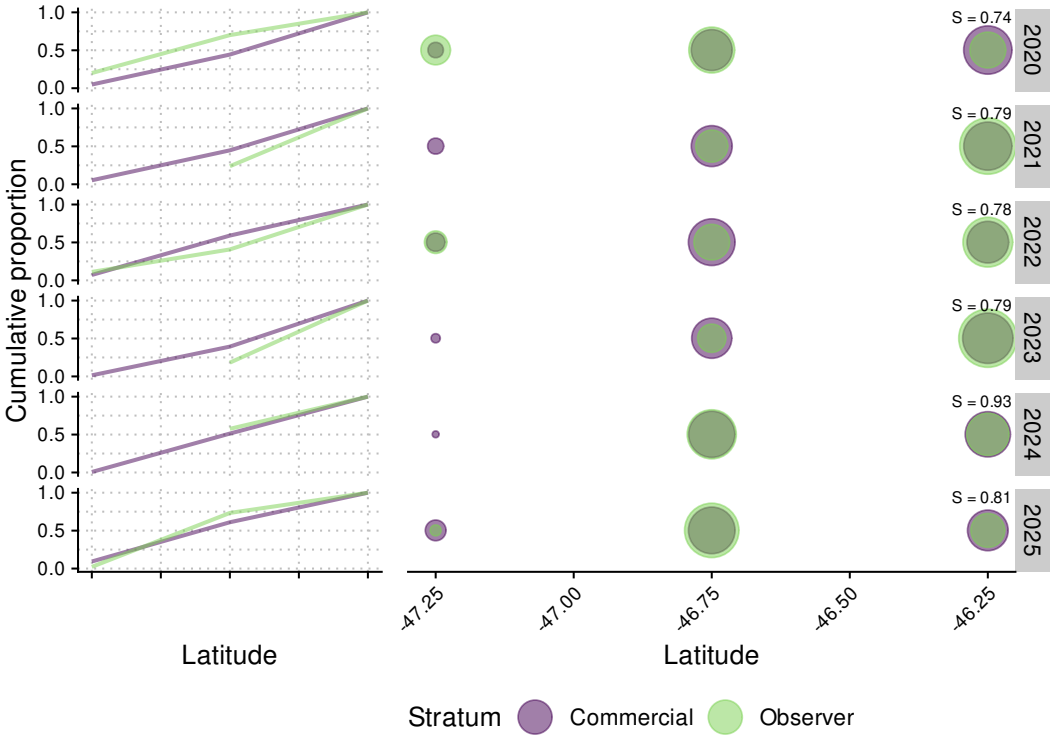


Figure 637: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in HOK 1PU, where the hoki catch exceeded the 70kg threshold, in 2020 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

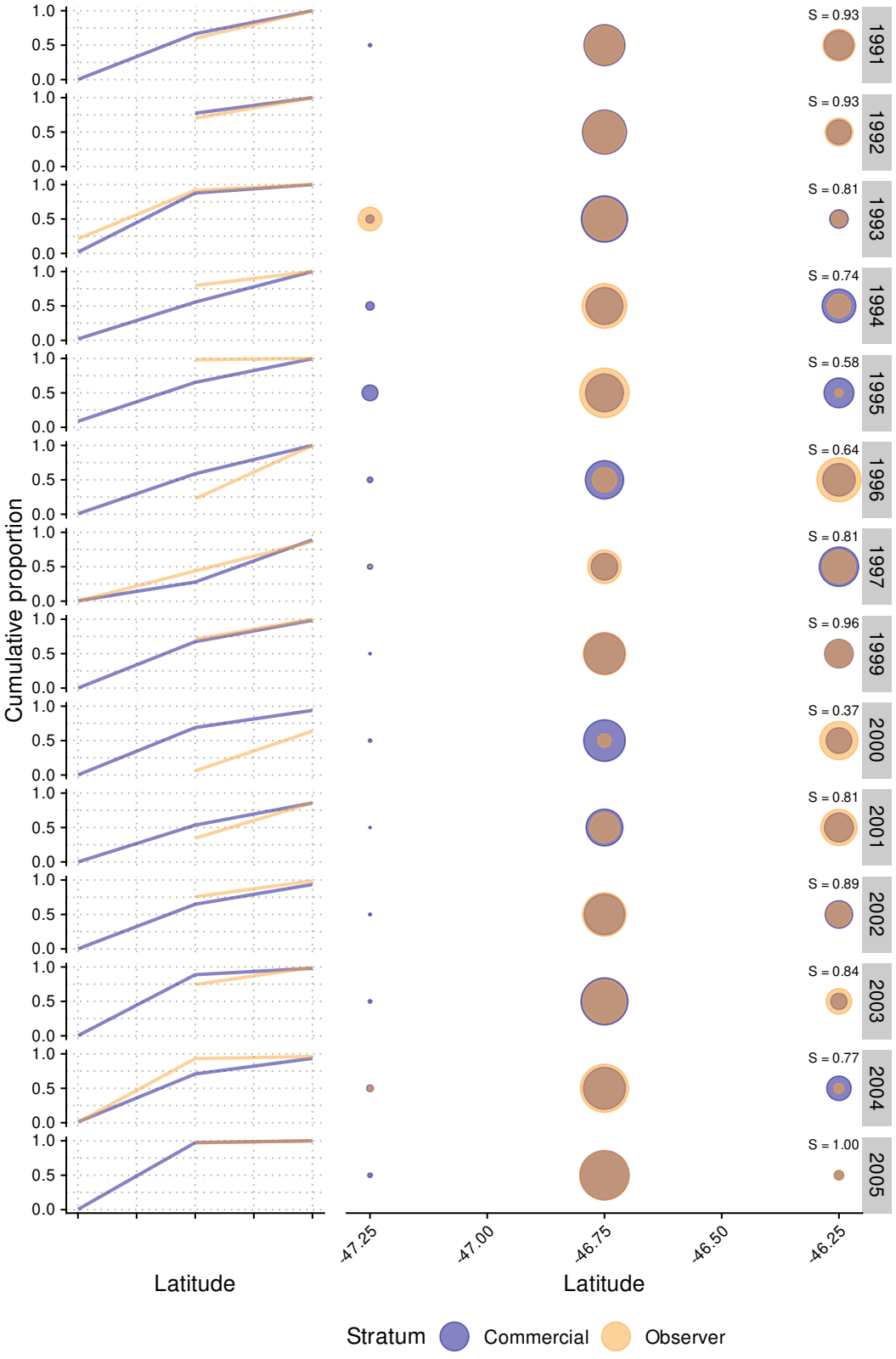


Figure 638: Latitudinal representativeness of observer sampling coverage of Trawl catch in HOK 1PU, from events where the hoki catch exceeded the 70kg threshold, in 1991 to 2005. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

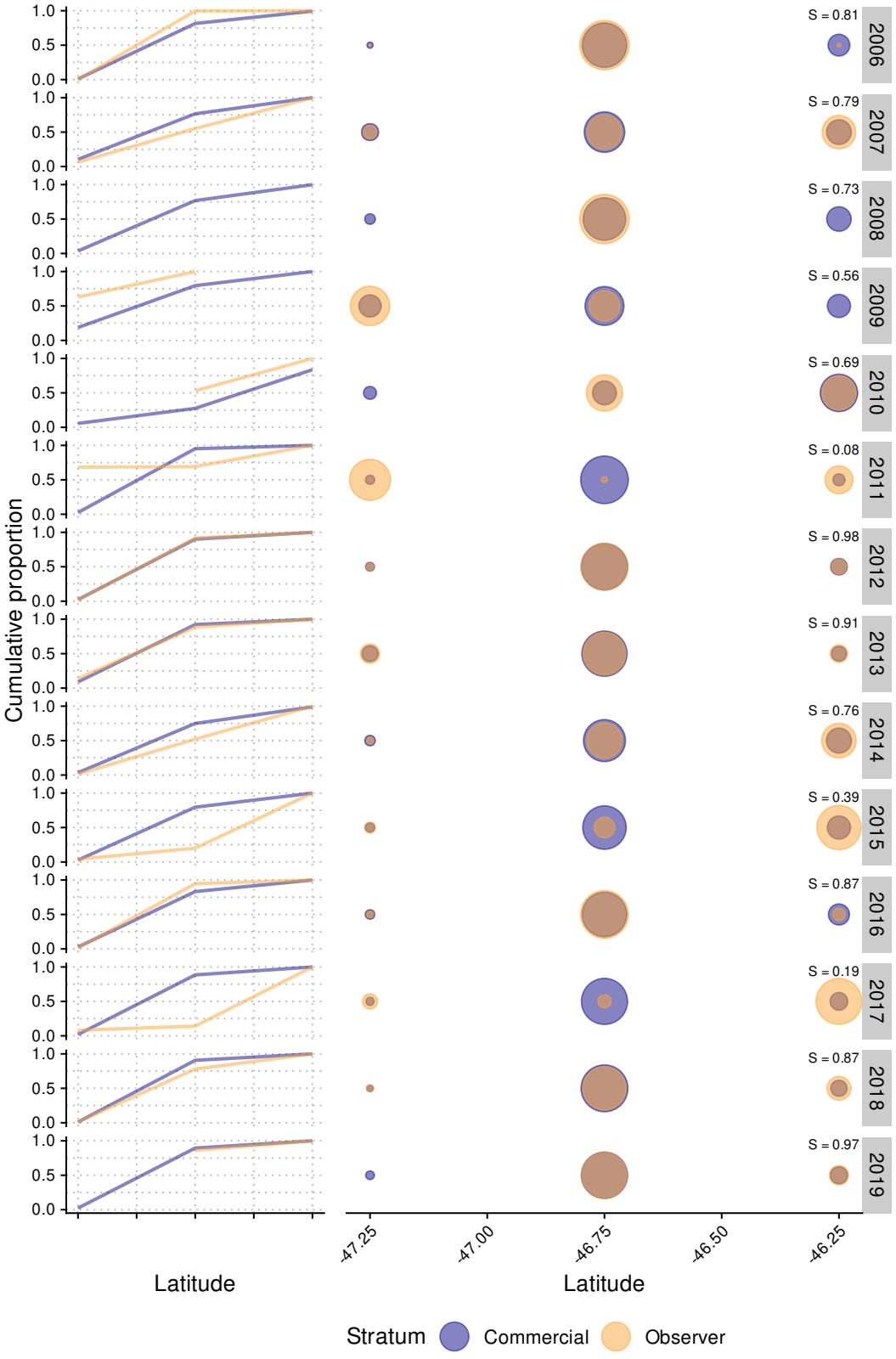


Figure 639: Latitudinal representativeness of observer sampling coverage of Trawl catch in HOK 1PU, from events where the hoki catch exceeded the 70kg threshold, in 2006 to 2019. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

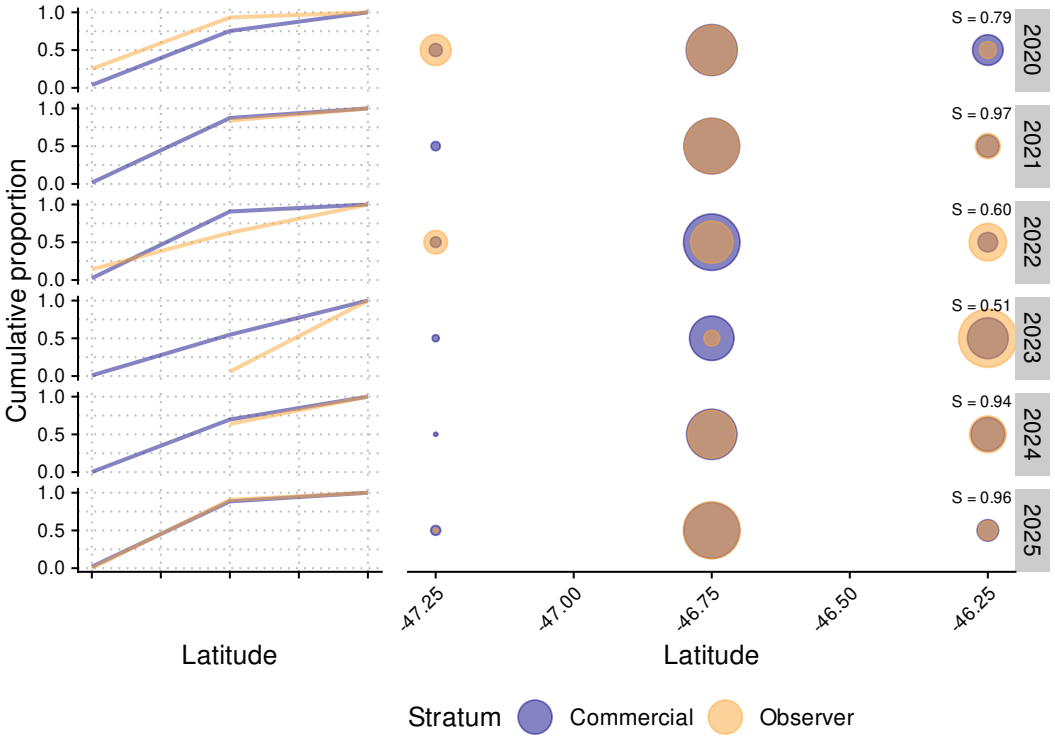


Figure 640: **Latitudinal representativeness of observer sampling coverage of Trawl catch in HOK 1PU, from events where the hoki catch exceeded the 70kg threshold, in 2020 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

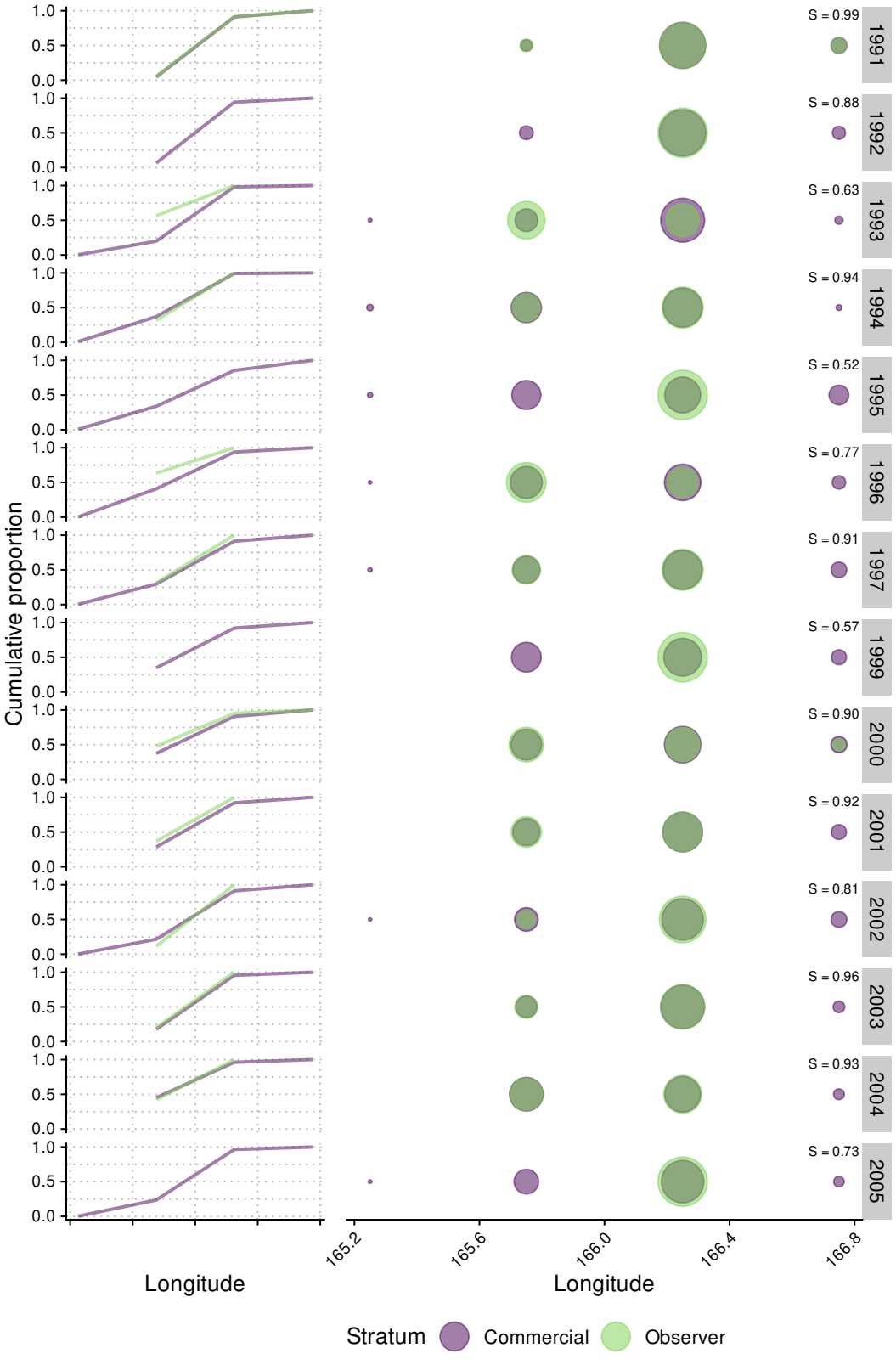


Figure 641: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in HOK 1PU, where the hoki catch exceeded the 70kg threshold, in 1991 to 2005. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

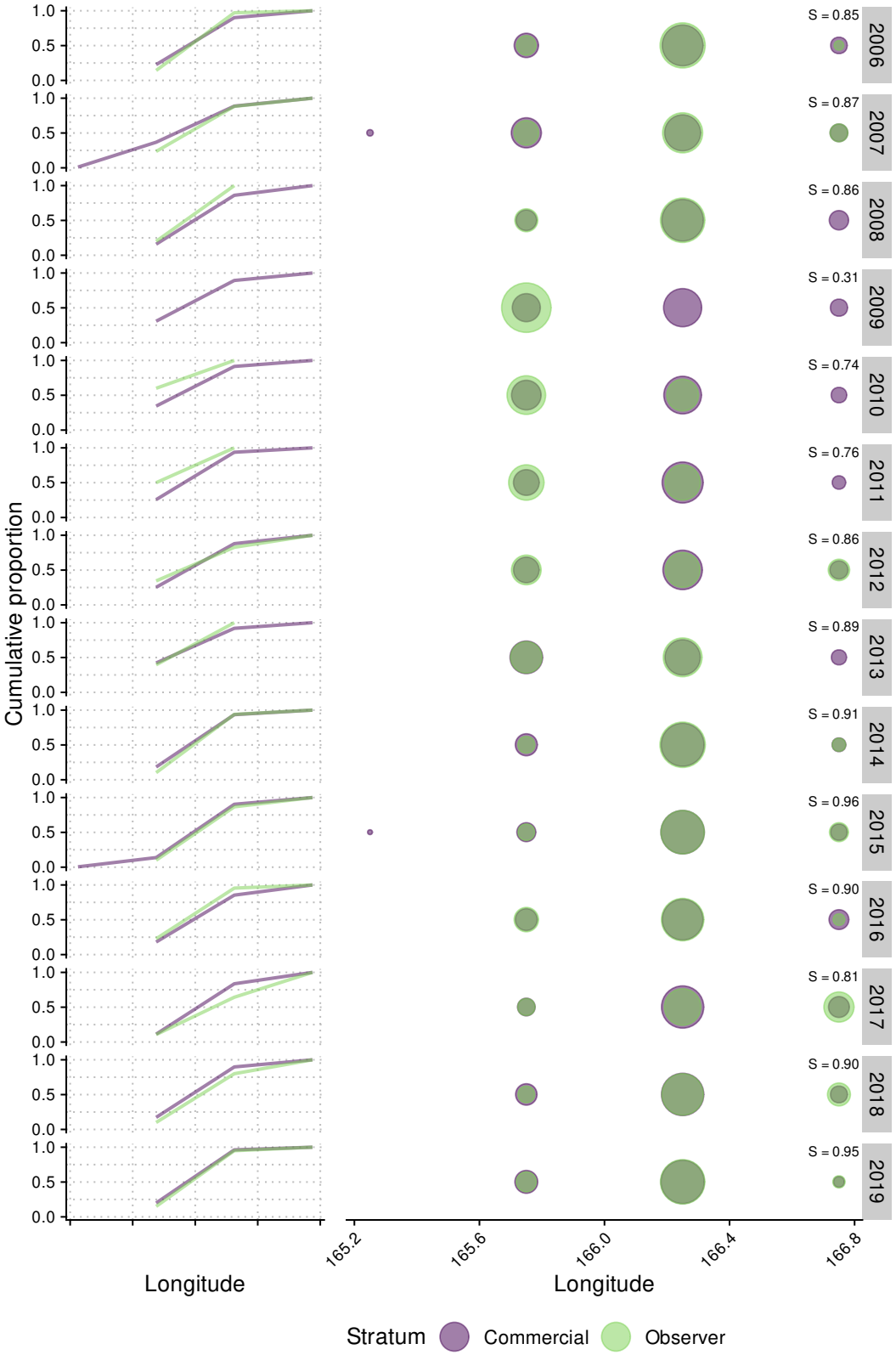


Figure 642: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in HOK 1PU, where the hoki catch exceeded the 70kg threshold, in 2006 to 2019. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

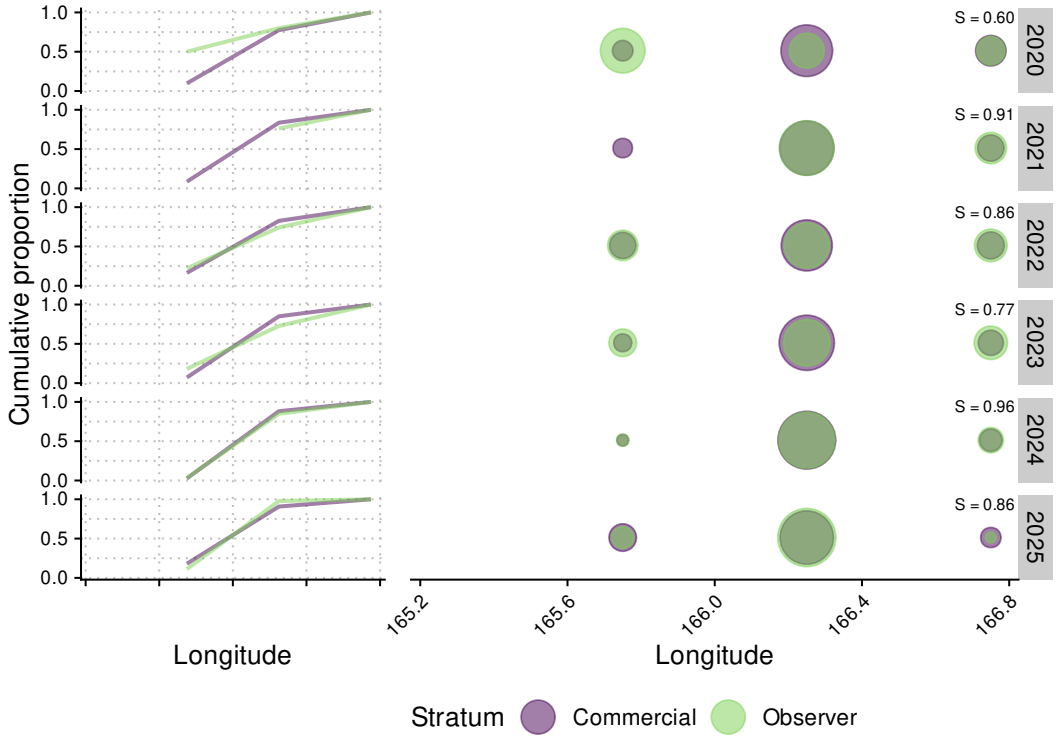


Figure 643: **Longitudinal representativeness of observer sampling coverage of Trawl fishing events in HOK 1PU, where the hoki catch exceeded the 70kg threshold, in 2020 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

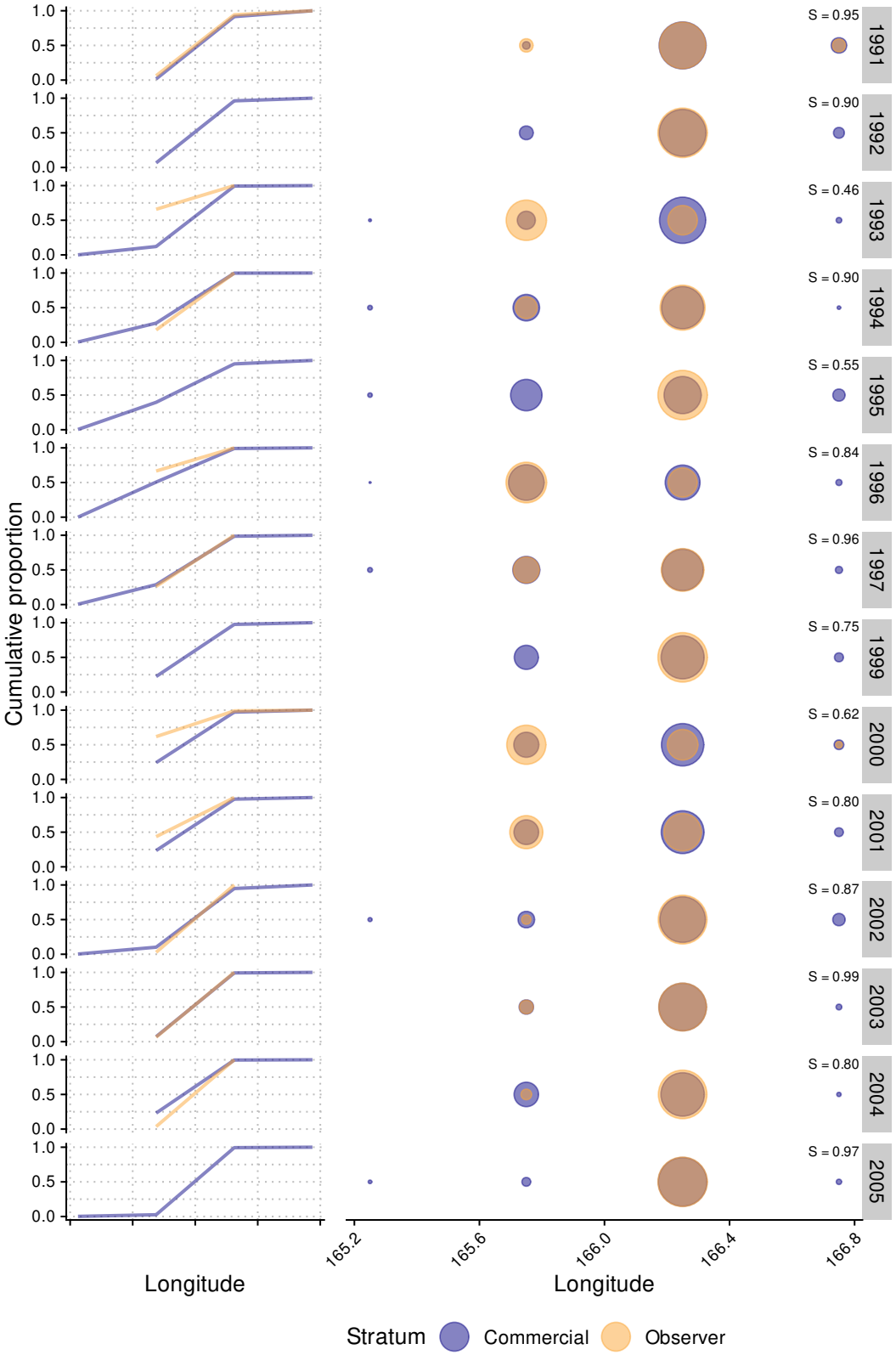


Figure 644: **Longitudinal representativeness of observer sampling coverage of Trawl catch in HOK 1PU, from events where the hoki catch exceeded the 70kg threshold, in 1991 to 2005. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

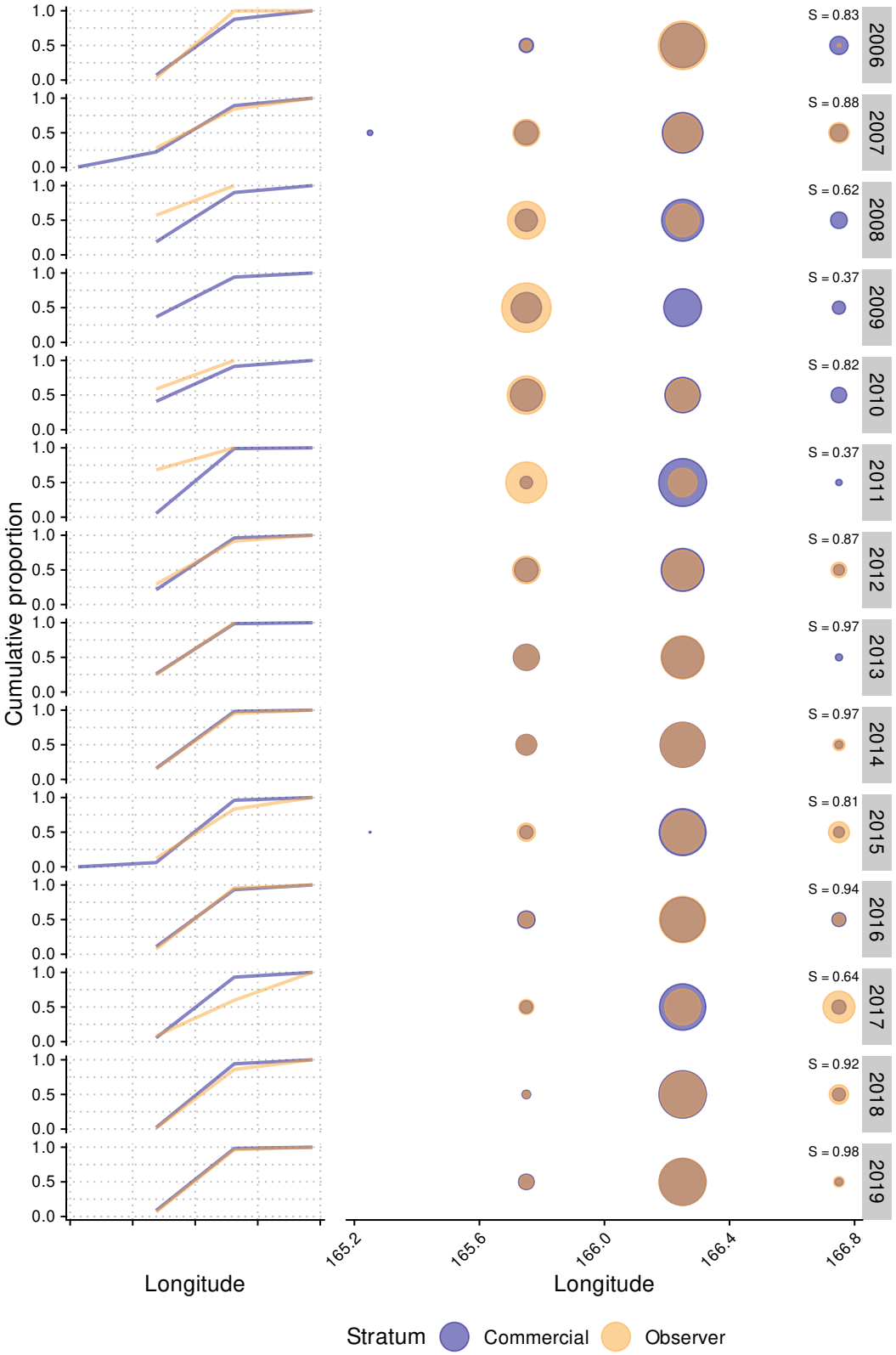


Figure 645: **Longitudinal representativeness of observer sampling coverage of Trawl catch in HOK 1PU, from events where the hoki catch exceeded the 70kg threshold, in 2006 to 2019. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

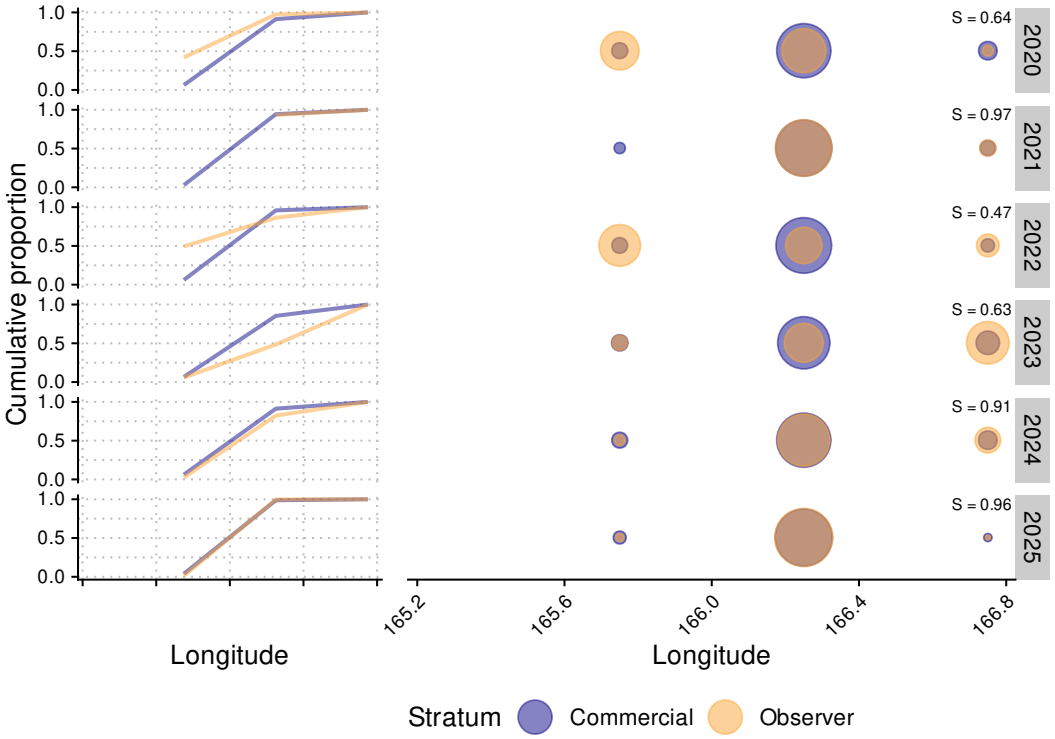


Figure 646: **Longitudinal representativeness of observer sampling coverage of Trawl catch in HOK 1PU, from events where the hoki catch exceeded the 70kg threshold, in 2020 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

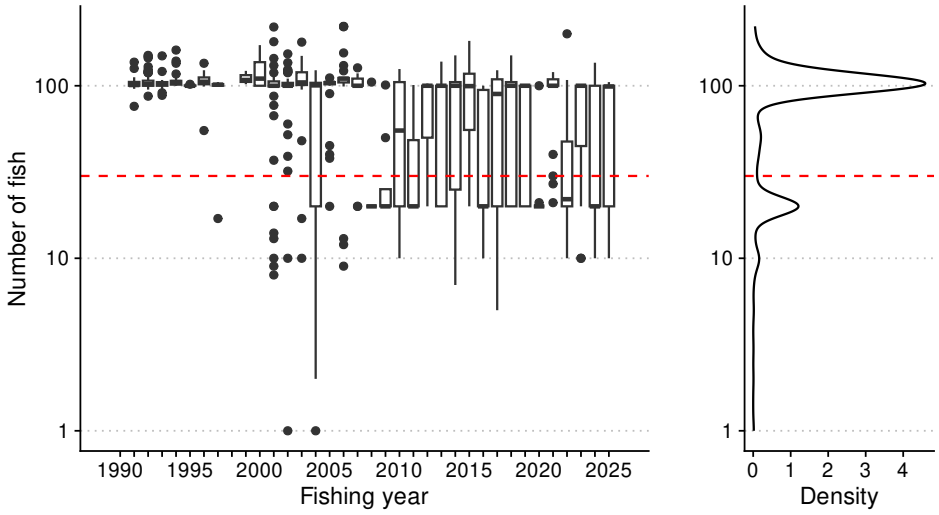


Figure 647: **Length-frequency sample sizes for observed fishing events in HOK 1PU where hoki were sampled. The red dashed line indicates a sample size of 30 fish.**

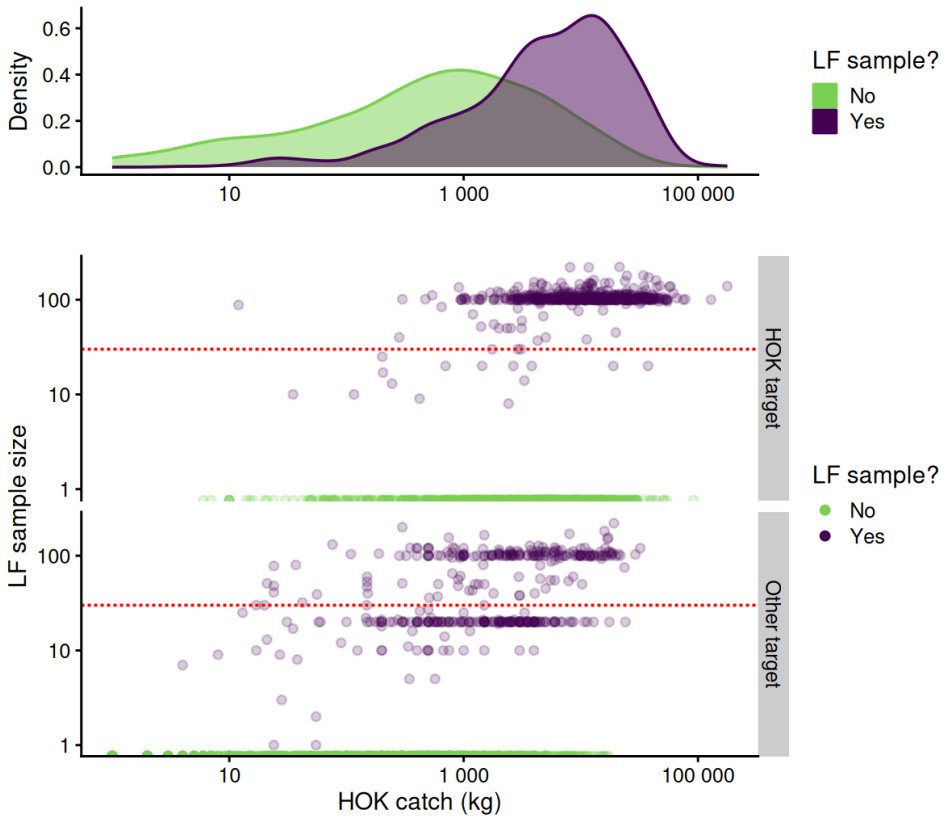


Figure 648: Length-frequency sample sizes (number of fish sampled) for observed fishing events in HOK 1PU in relation to the total hoki catch from an event, separately for hoki target events and other target species. The red dashed line indicates a sample size of 30 fish.

2.10.4.2 Otolith samples

Table 54: Otolith samples of hoki from the HOK 1PU Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of hoki exceeded a potential sampling threshold of 70 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	906	0	0	0.00
1991	636	0	0	0.00
1992	890	0	0	0.00
1993	419	0	0	0.00
1994	367	0	0	0.00
1995	323	0	0	0.00
1996	532	0	0	0.00
1997	773	0	0	0.00
1998	519	0	0	0.00
1999	530	0	0	0.00
2000	636	0	0	0.00
2001	916	0	0	0.00
2002	614	0	0	0.00
2003	557	0	0	0.00
2004	235	0	0	0.00
2005	450	0	0	0.00
2006	344	0	0	0.00
2007	185	0	0	0.00
2008	208	0	0	0.00
2009	159	1	10	0.63
2010	151	1	10	0.66
2011	191	3	26	1.57
2012	233	25	228	10.73
2013	173	36	302	20.81
2014	169	40	357	23.67
2015	196	12	91	6.12
2016	205	14	111	6.83
2017	177	24	188	13.56
2018	156	40	316	25.64
2019	211	12	93	5.69
2020	123	9	47	7.32
2021	152	21	202	13.82
2022	183	27	171	14.75
2023	140	11	91	7.86
2024	152	32	248	21.05
2025	172	44	342	25.58

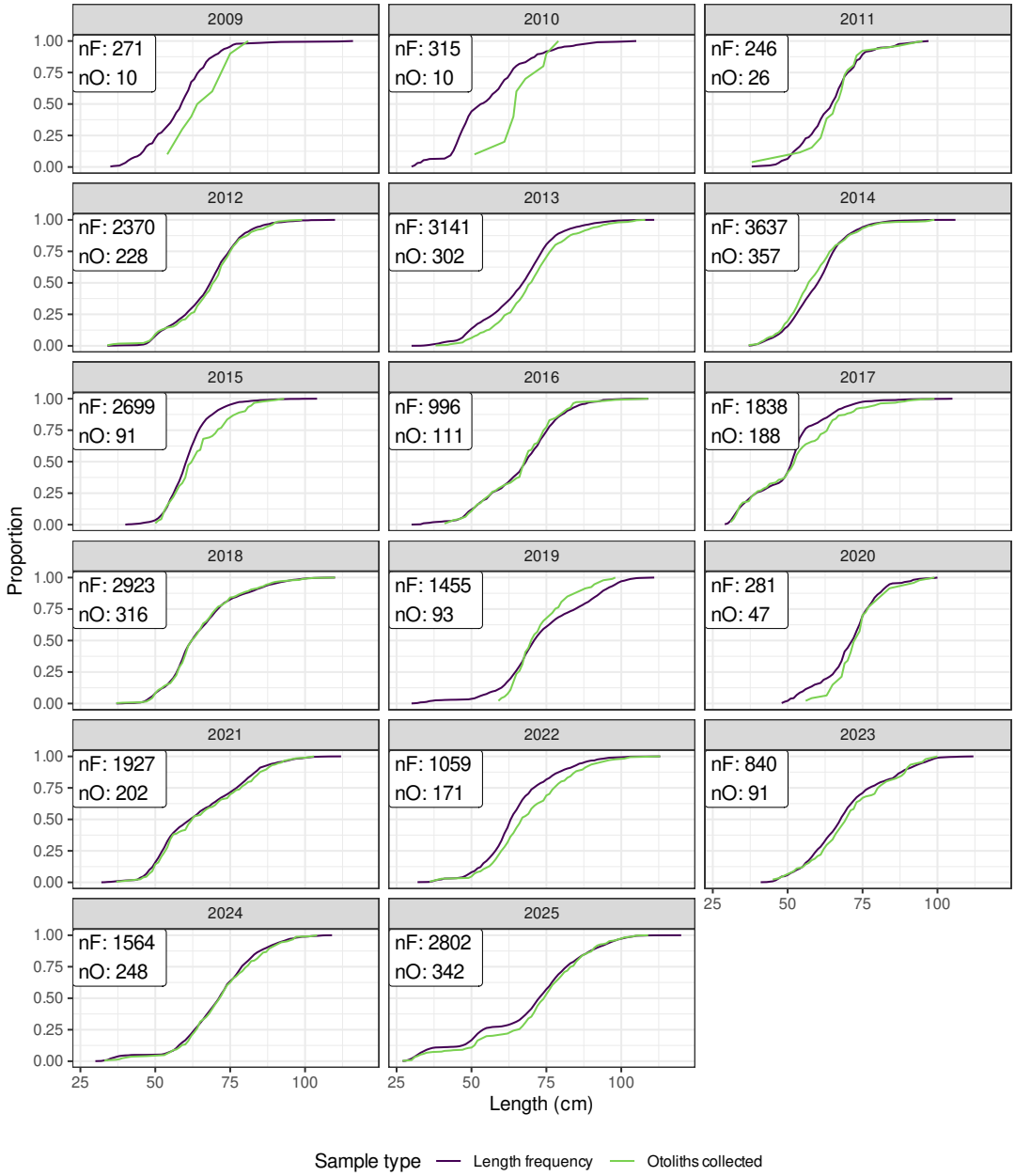


Figure 649: Cumulative distributions of the length of fish in the length frequency and otolith samples of hoki in the HOK 1PU Trawl fishery for the 2009 to 2025 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

2.10.4.3 Catch quantification

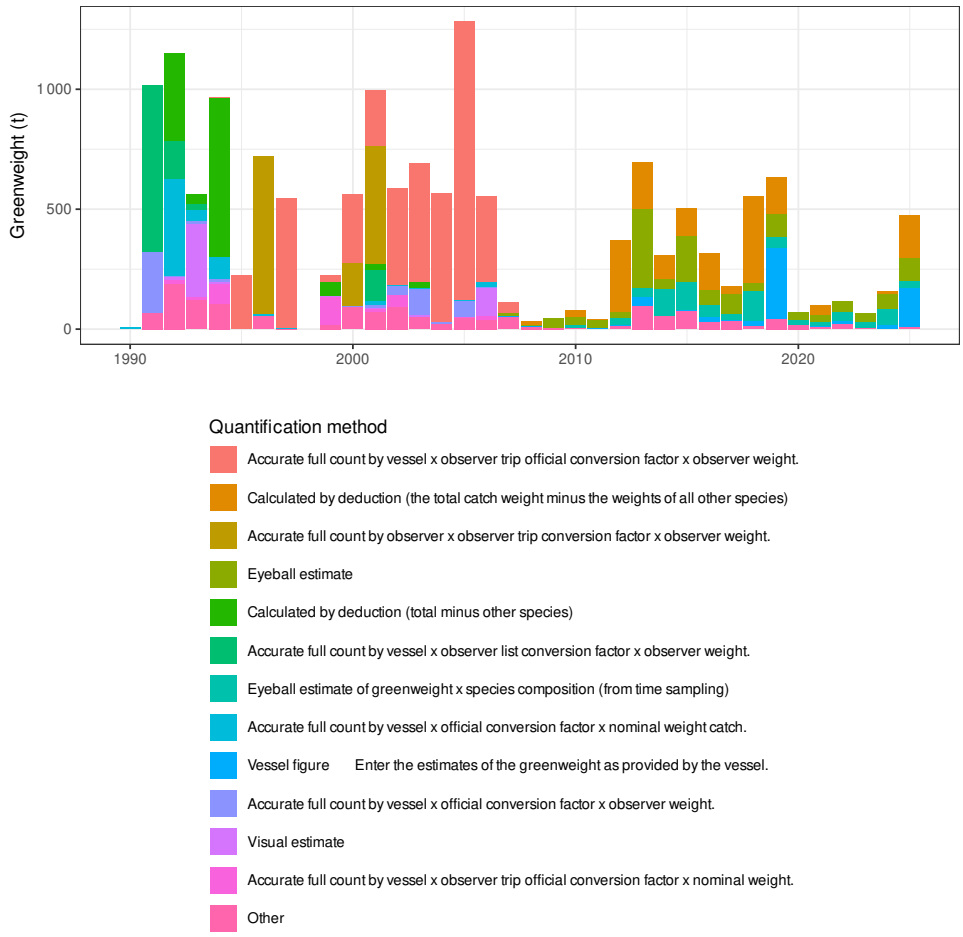


Figure 650: Methods used by observers to quantify the catch of hoki in the HOK 1PU Trawl fishery. The legend lists the methods used in descending order of total catch.

2.10.5 HOK 1SA: Trawl fishery

2.10.5.1 Length-frequency samples

Table 55: Length-frequency samples of hoki from the HOK 1SA Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of hoki exceeded a potential sampling threshold of 70 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	2 123	28	1 067	1.32
1991	4 300	43	3 711	1.00
1992	6 346	267	24 610	4.21
1993	5 499	186	15 049	3.38
1994	2 870	100	6 504	3.48
1995	2 885	80	5 812	2.77
1996	2 901	114	9 877	3.93
1997	4 148	67	3 909	1.62
1998	4 996	175	15 764	3.50
1999	4 600	303	27 060	6.59
2000	7 115	481	45 832	6.76
2001	6 837	388	28 664	5.68
2002	7 514	348	24 769	4.63
2003	5 207	210	17 502	4.03
2004	3 502	158	10 581	4.51
2005	2 345	69	4 062	2.94
2006	1 875	221	10 003	11.79
2007	2 509	198	13 235	7.89
2008	2 279	214	20 886	9.39
2009	2 364	227	20 693	9.60
2010	2 643	259	18 868	9.80
2011	2 347	273	20 300	11.63
2012	2 286	254	17 971	11.11
2013	2 631	484	36 088	18.40
2014	2 982	534	27 035	17.91
2015	2 908	346	18 413	11.90
2016	1 491	208	12 890	13.95
2017	2 146	208	13 037	9.69
2018	2 963	667	49 658	22.51
2019	2 028	310	17 471	15.29
2020	1 730	394	22 982	22.77
2021	1 837	457	35 211	24.88
2022	1 717	335	27 106	19.51
2023	2 179	450	38 081	20.65
2024	1 491	315	23 978	21.13
2025	1 576	293	22 282	18.59

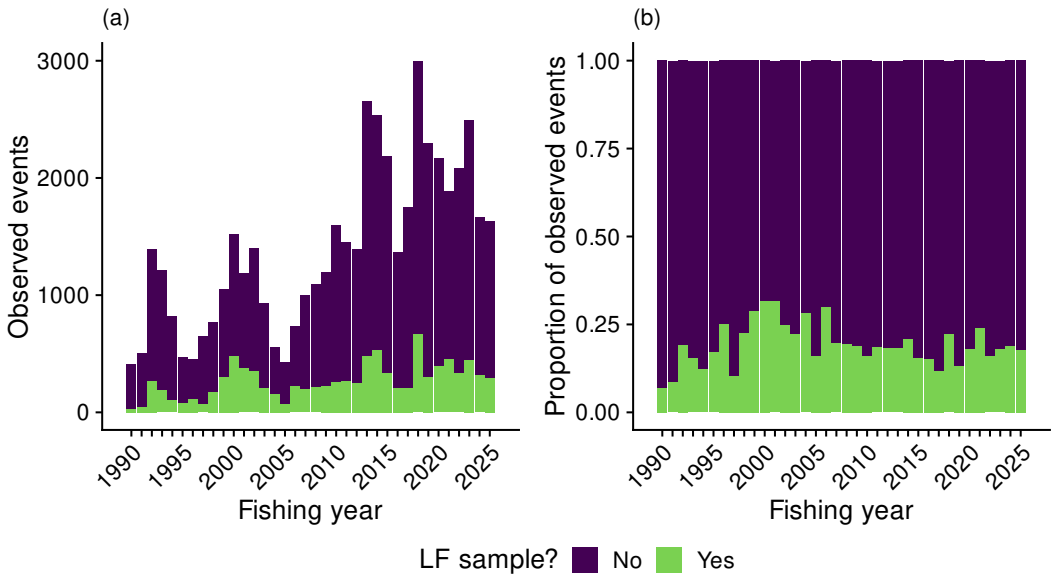


Figure 651: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in HOK 1SA where the hoki catch exceeded the 70 kg threshold, with and without length-frequency sampling.**

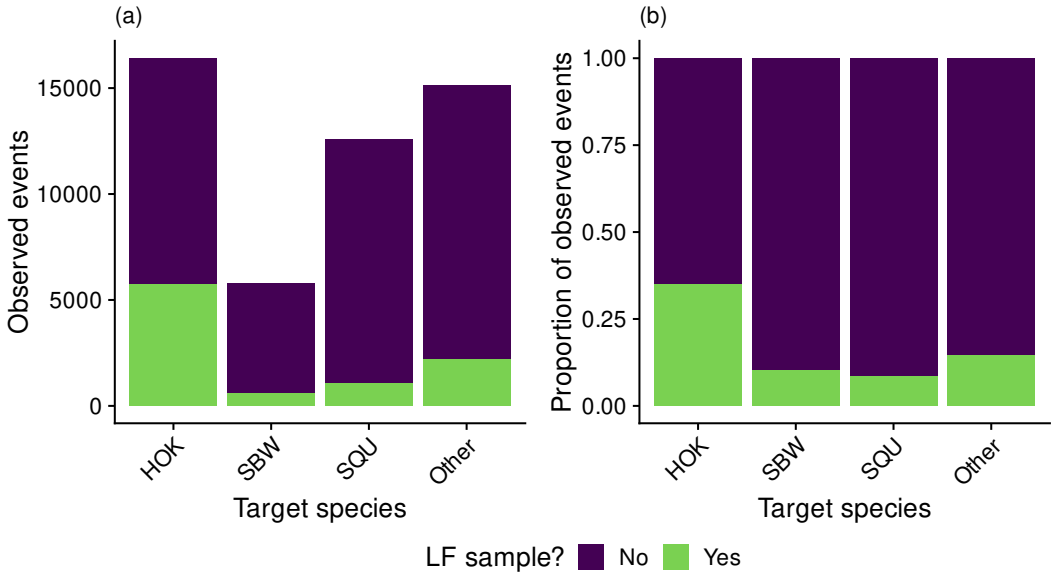


Figure 652: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in HOK 1SA where the hoki catch exceeded the 70 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

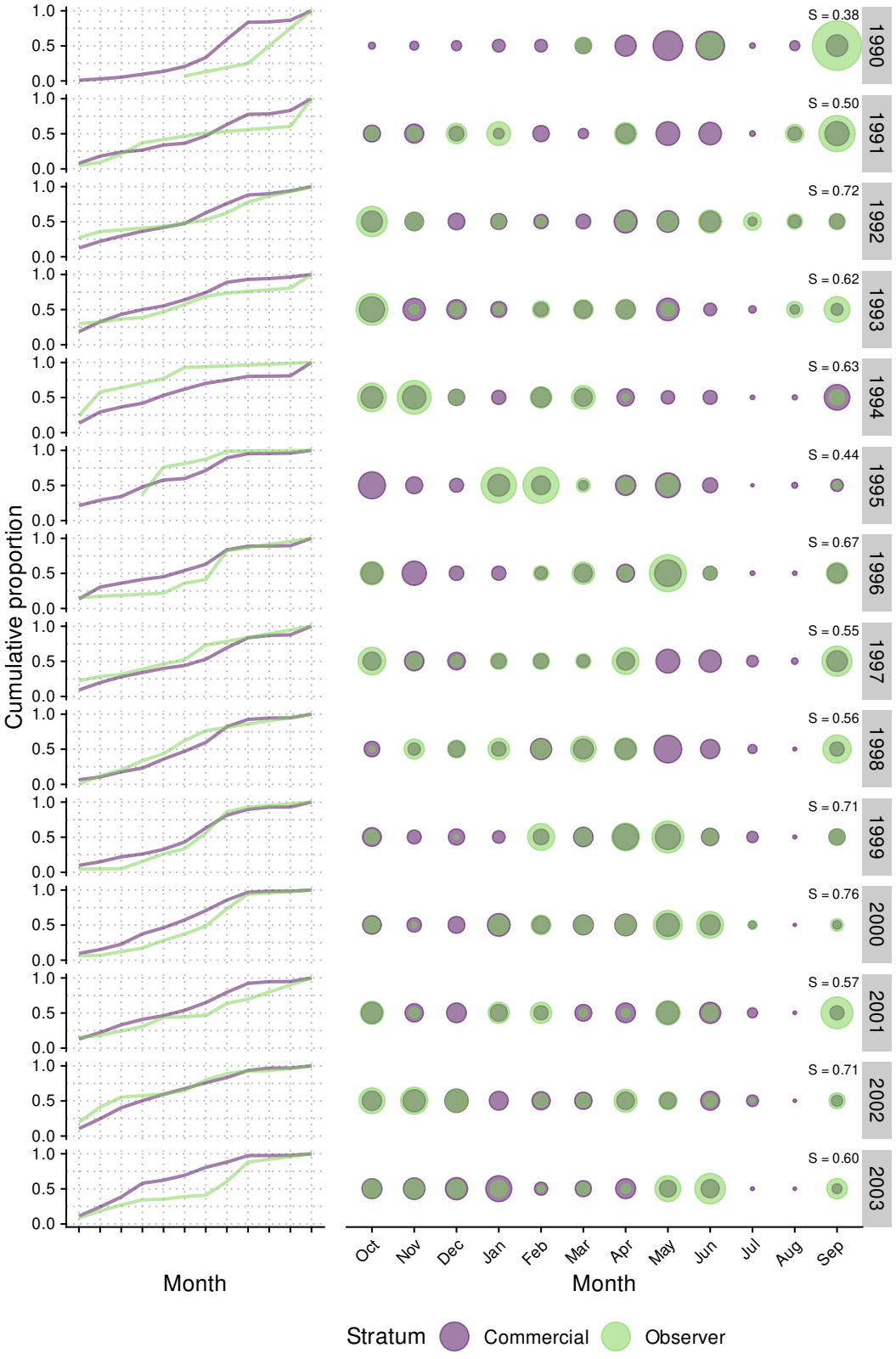


Figure 653: **Monthly representativeness of observer sampling coverage of Trawl fishing events in HOK 1SA, where the hoki catch exceeded the 70kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

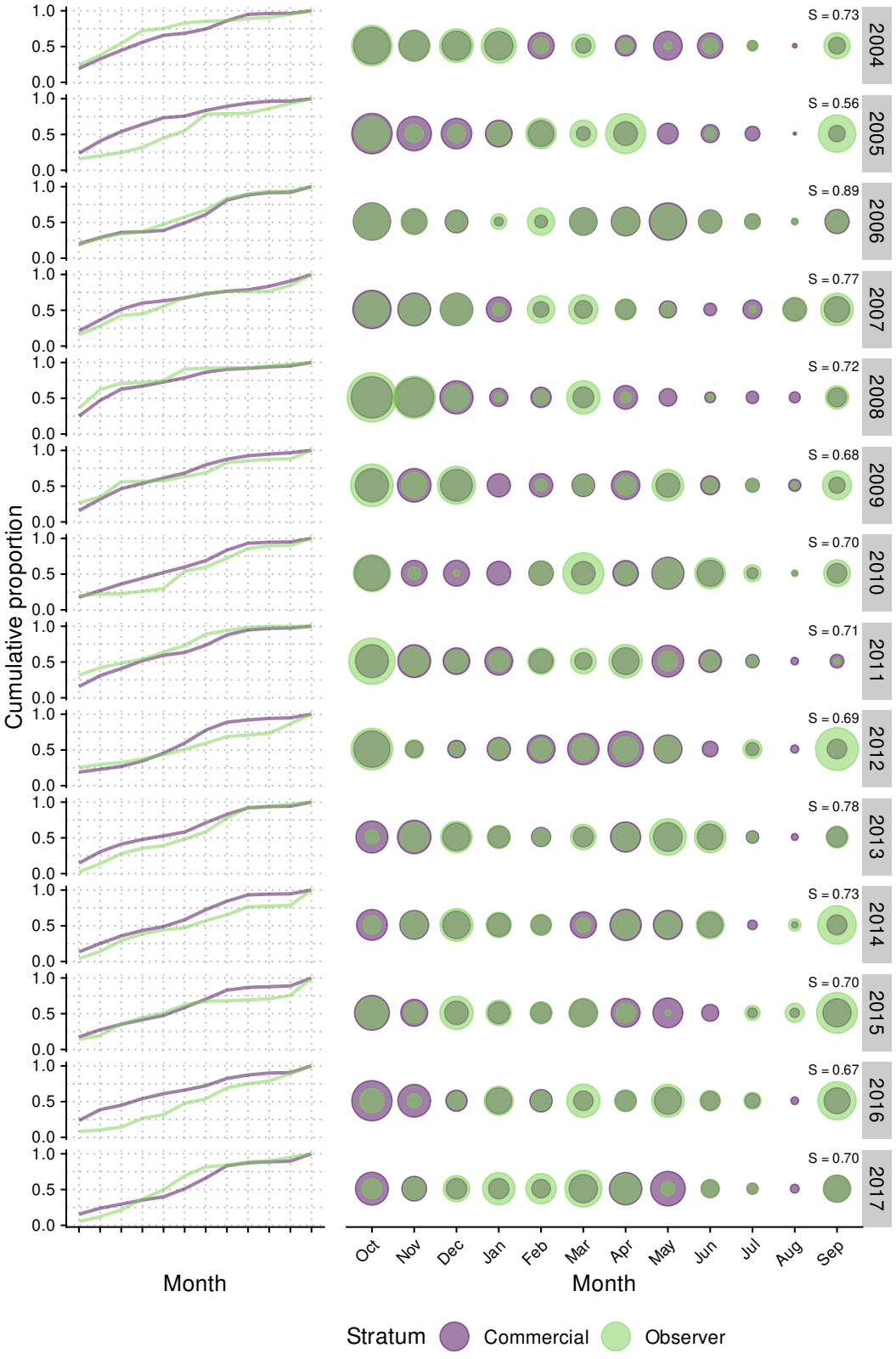


Figure 654: **Monthly representativeness of observer sampling coverage of Trawl fishing events in HOK 1SA, where the hoki catch exceeded the 70kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

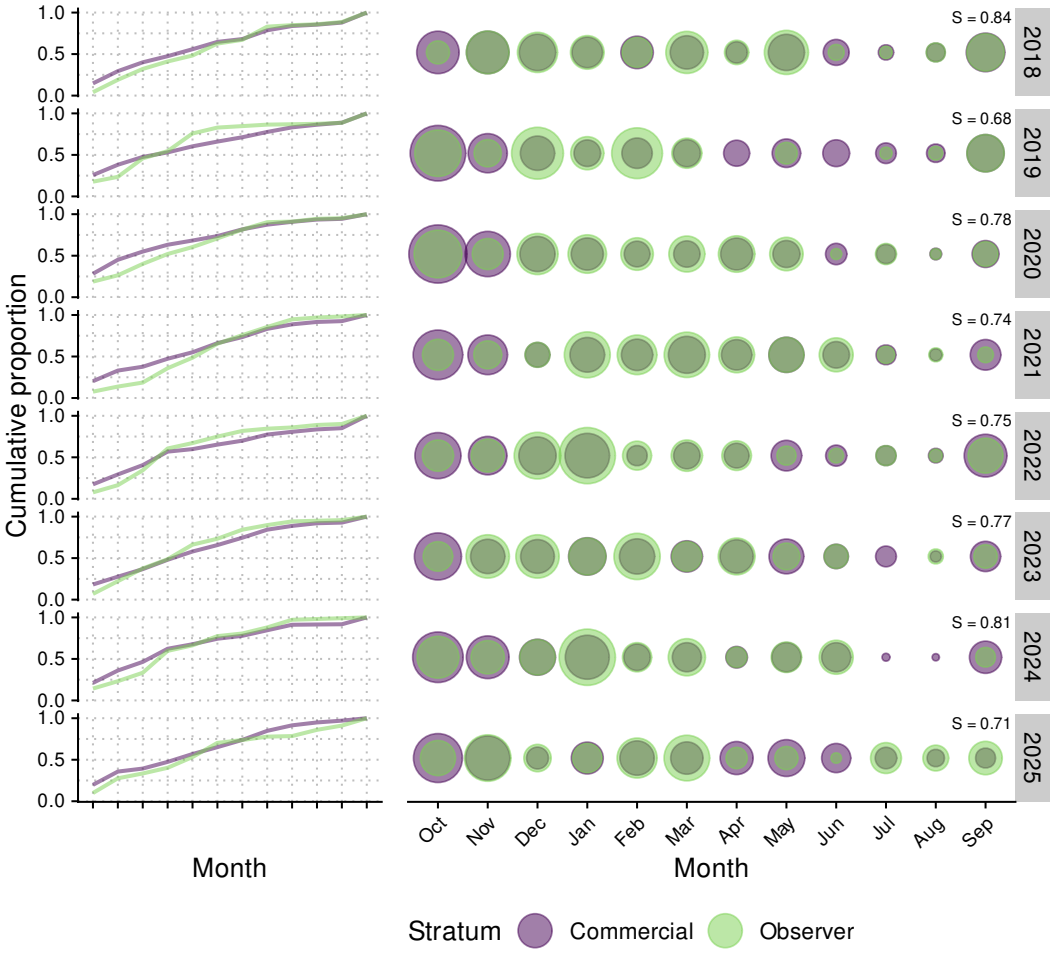


Figure 655: Monthly representativeness of observer sampling coverage of Trawl fishing events in HOK 1SA, where the hoki catch exceeded the 70kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

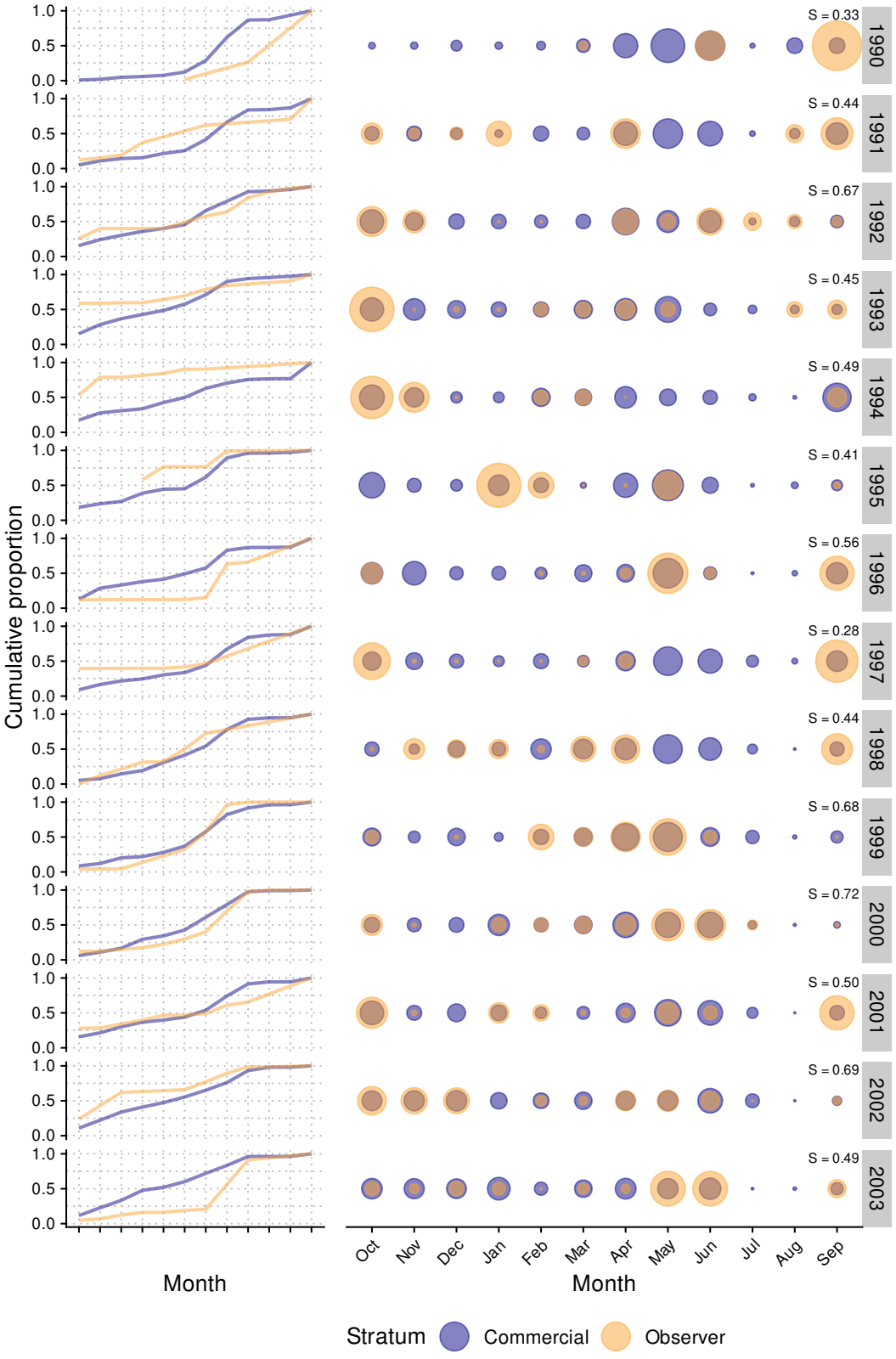


Figure 656: **Monthly representativeness of observer sampling coverage of Trawl catch in HOK 1SA, from events where the hoki catch exceeded the 70kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

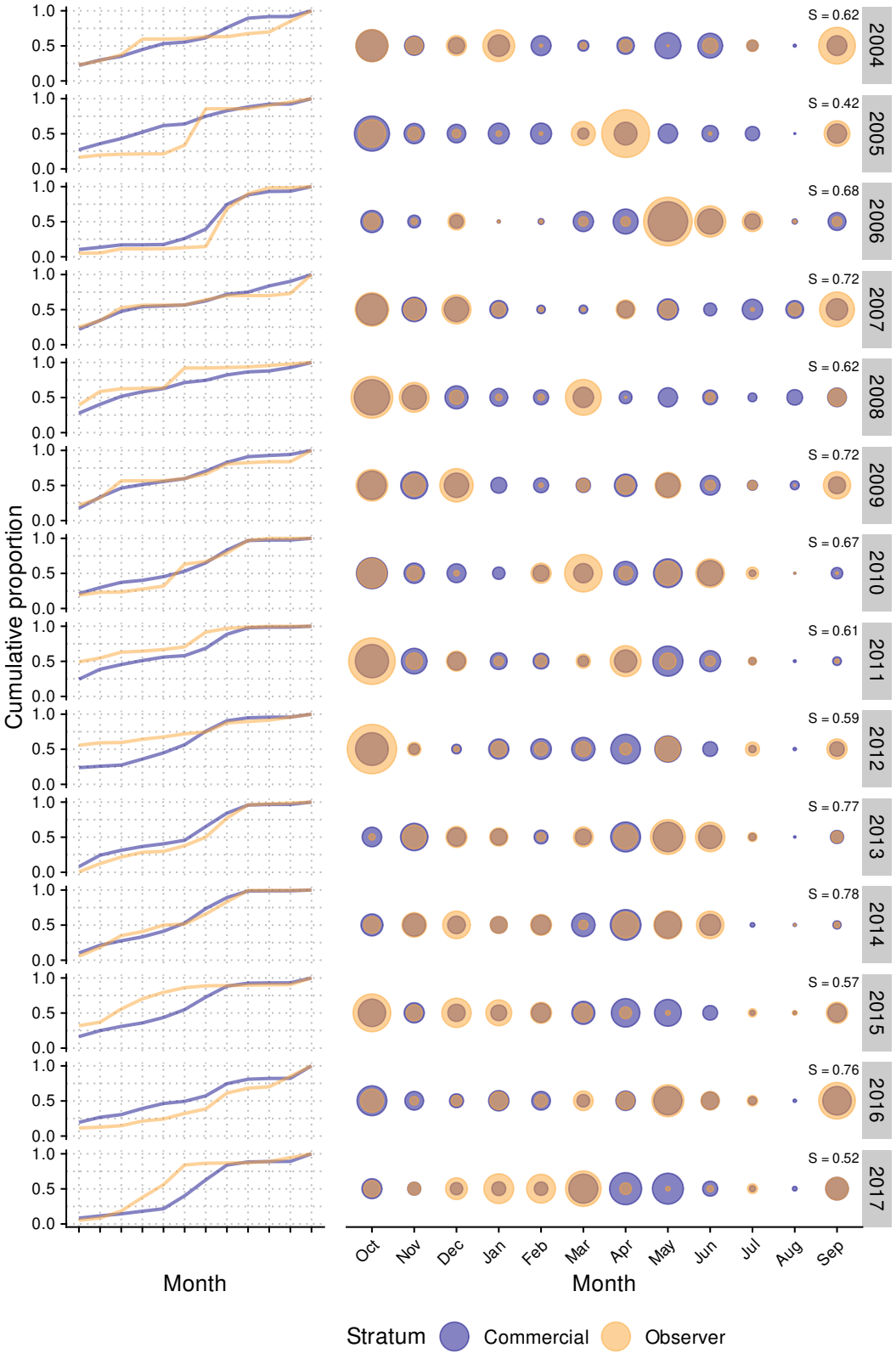


Figure 657: **Monthly representativeness of observer sampling coverage of Trawl catch in HOK 1SA, from events where the hoki catch exceeded the 70kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

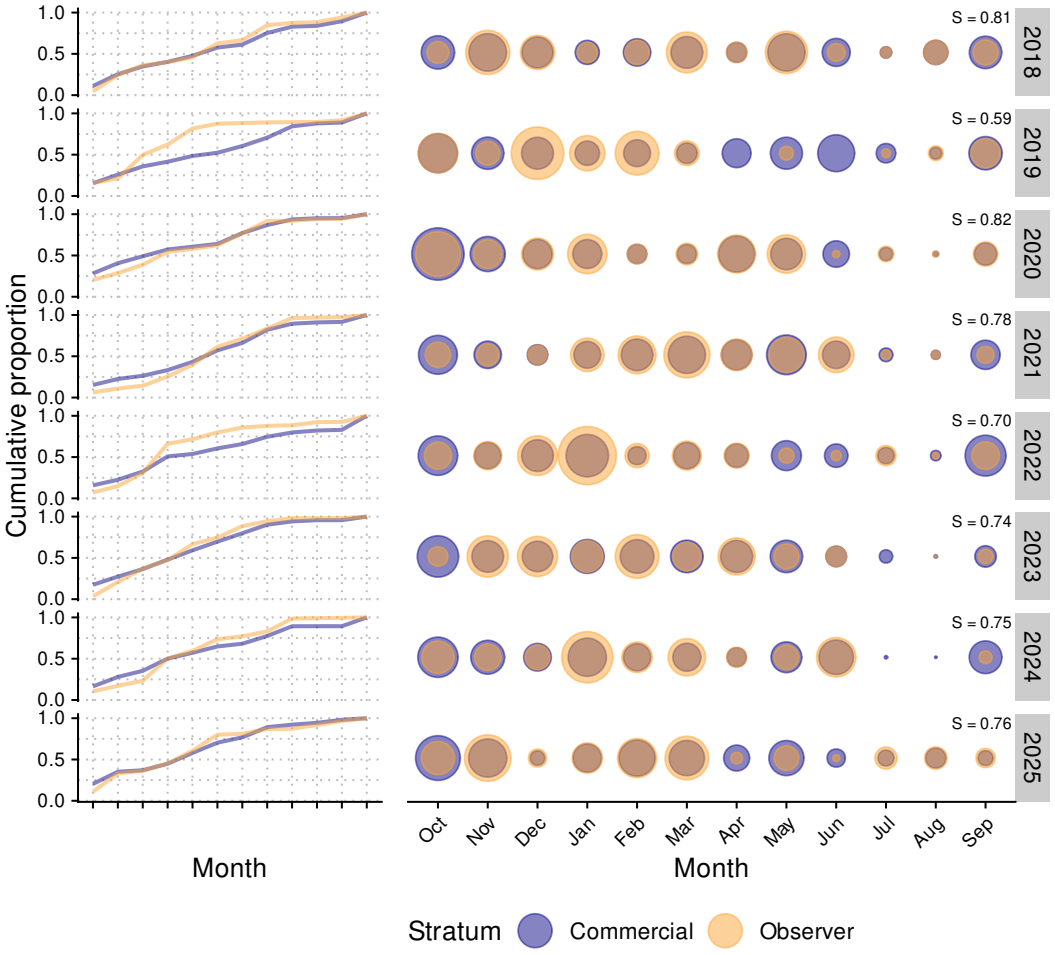


Figure 658: **Monthly representativeness of observer sampling coverage of Trawl catch in HOK 1SA, from events where the hoki catch exceeded the 70kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

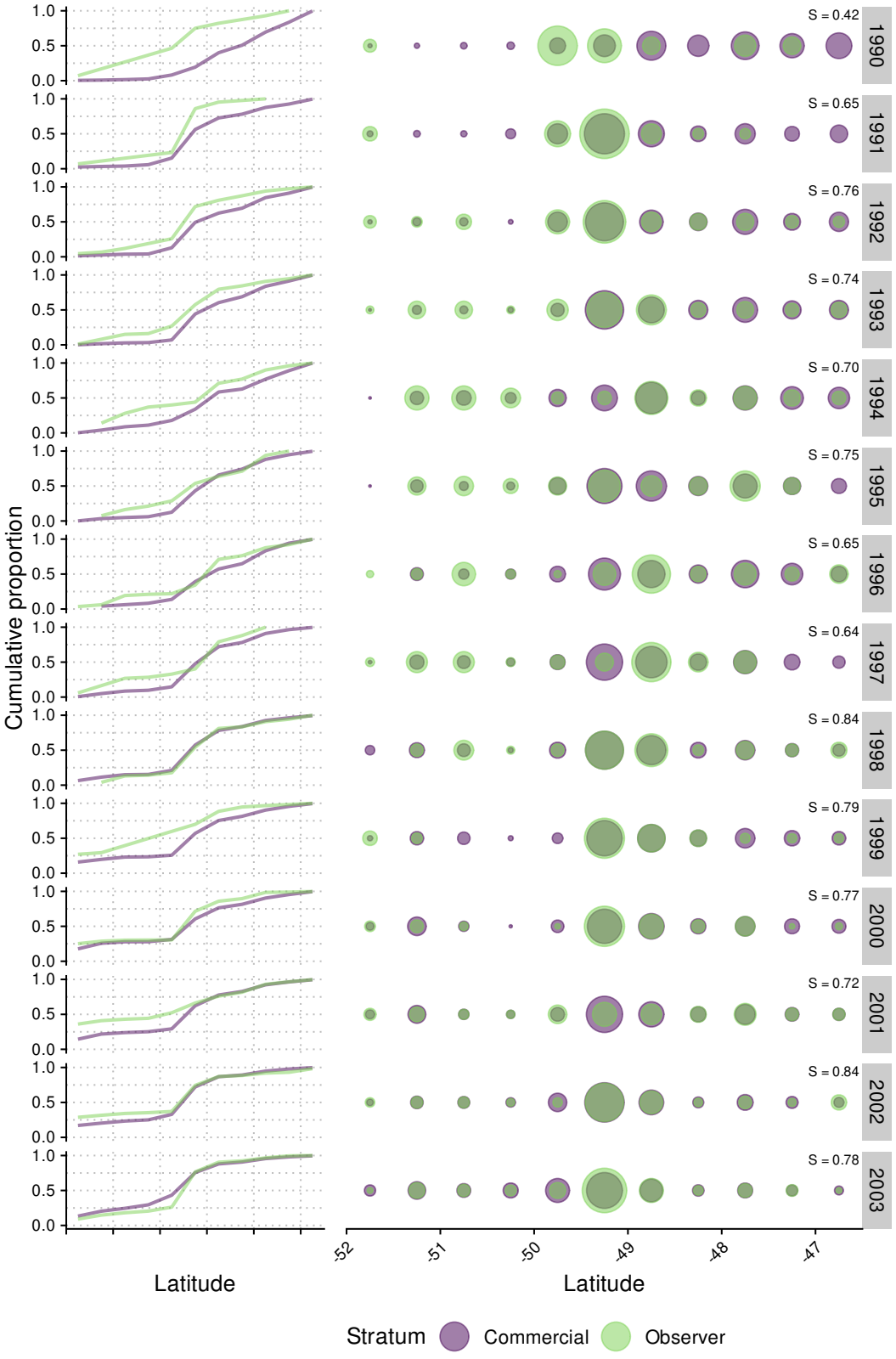


Figure 659: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in HOK 1SA, where the hoki catch exceeded the 70kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

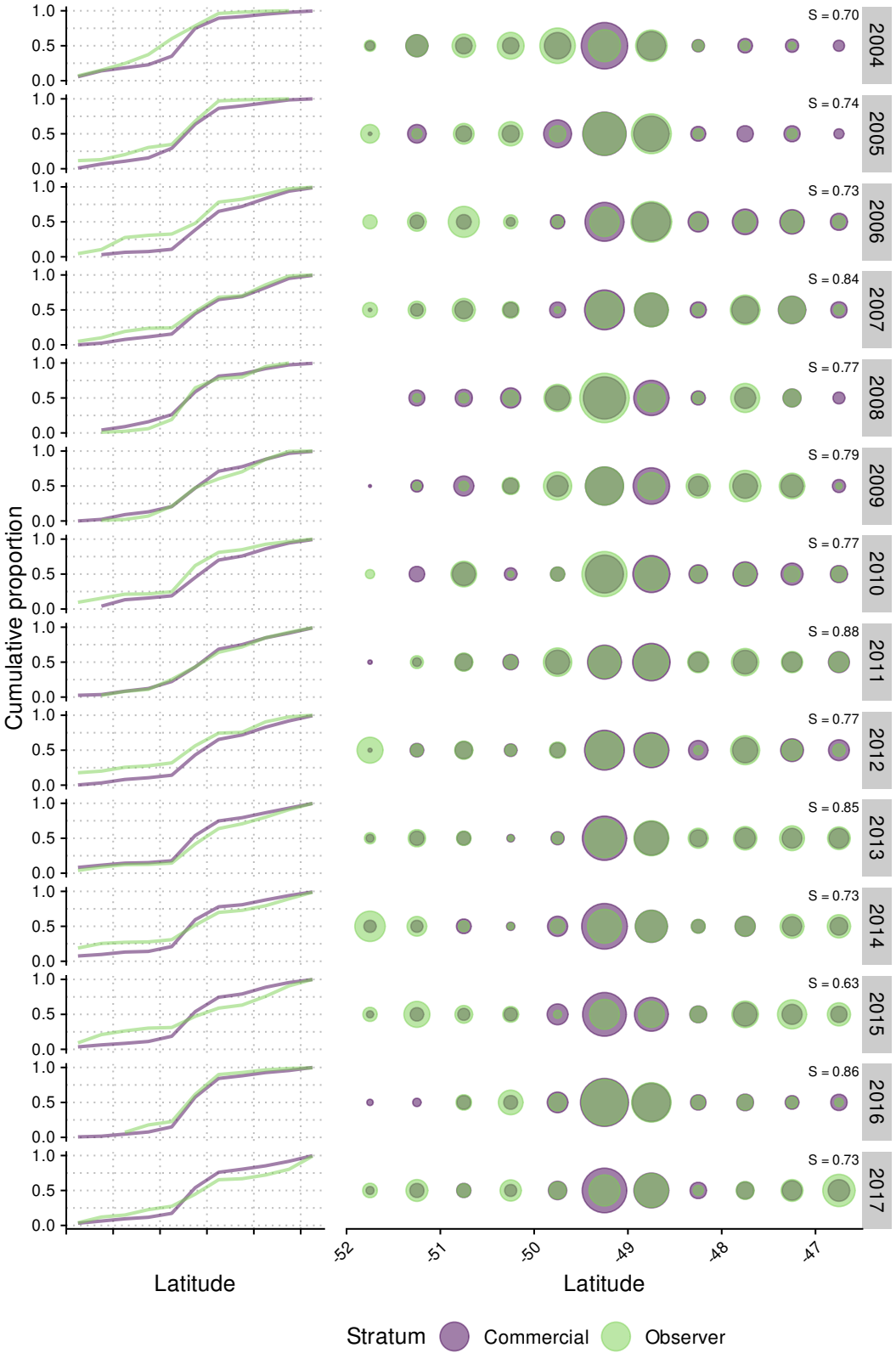


Figure 660: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in HOK 1SA, where the hoki catch exceeded the 70kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

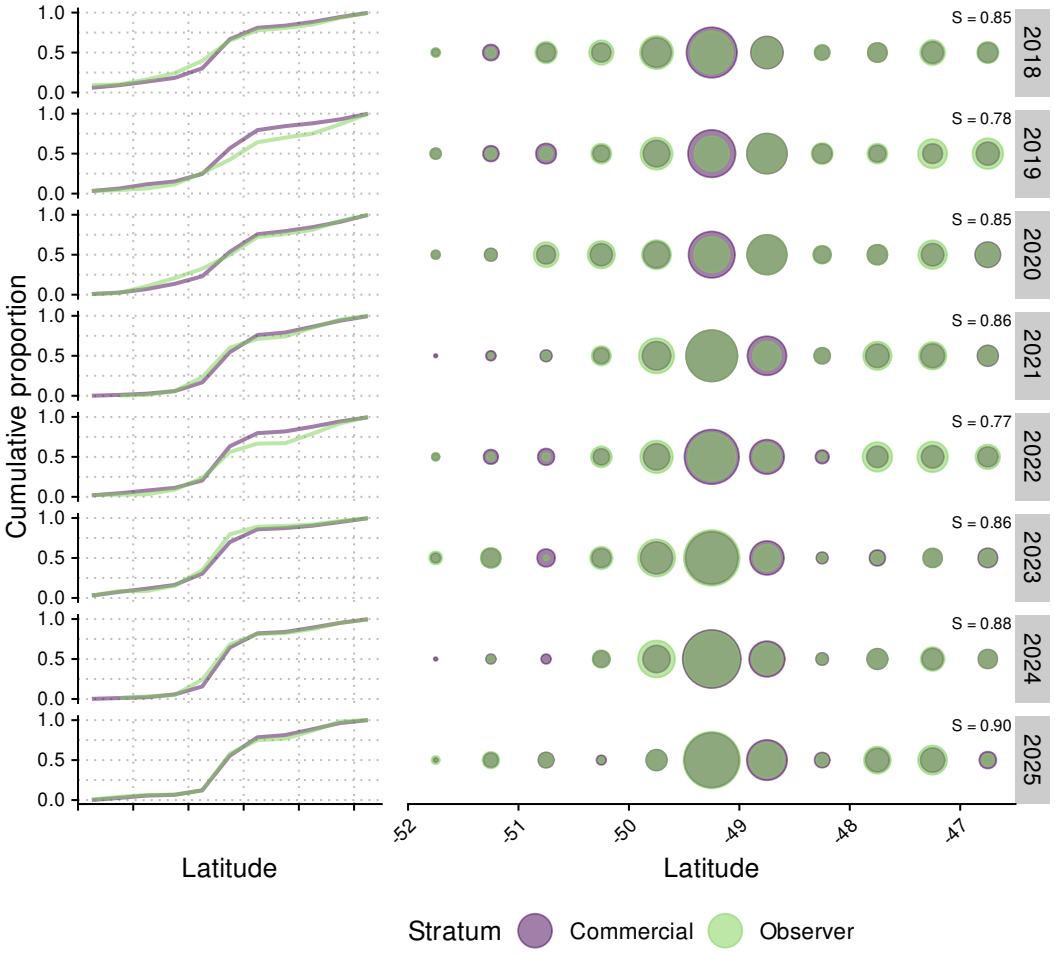


Figure 661: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in HOK 1SA, where the hoki catch exceeded the 70kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

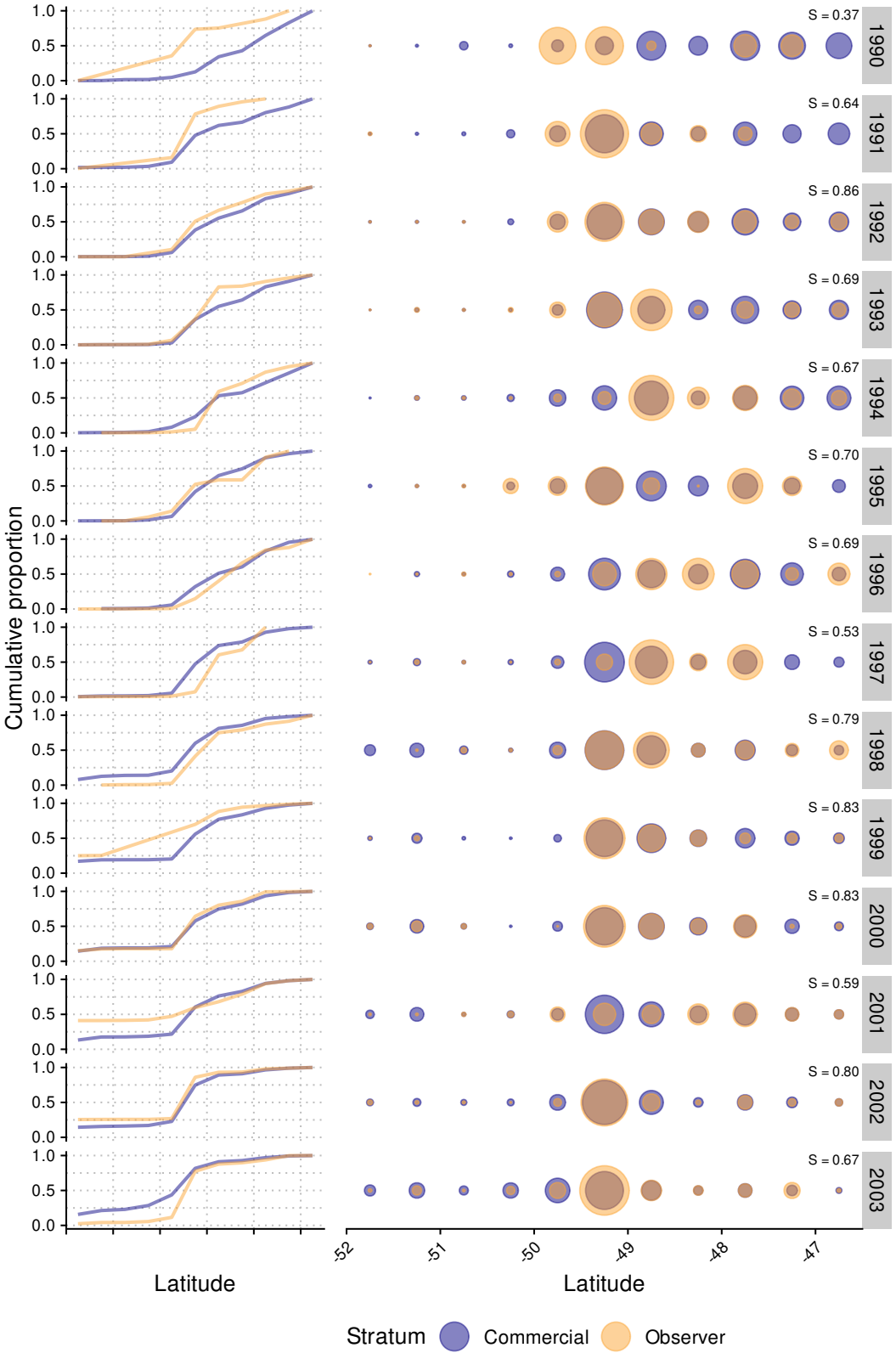


Figure 662: Latitudinal representativeness of observer sampling coverage of Trawl catch in HOK 1SA, from events where the hoki catch exceeded the 70kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

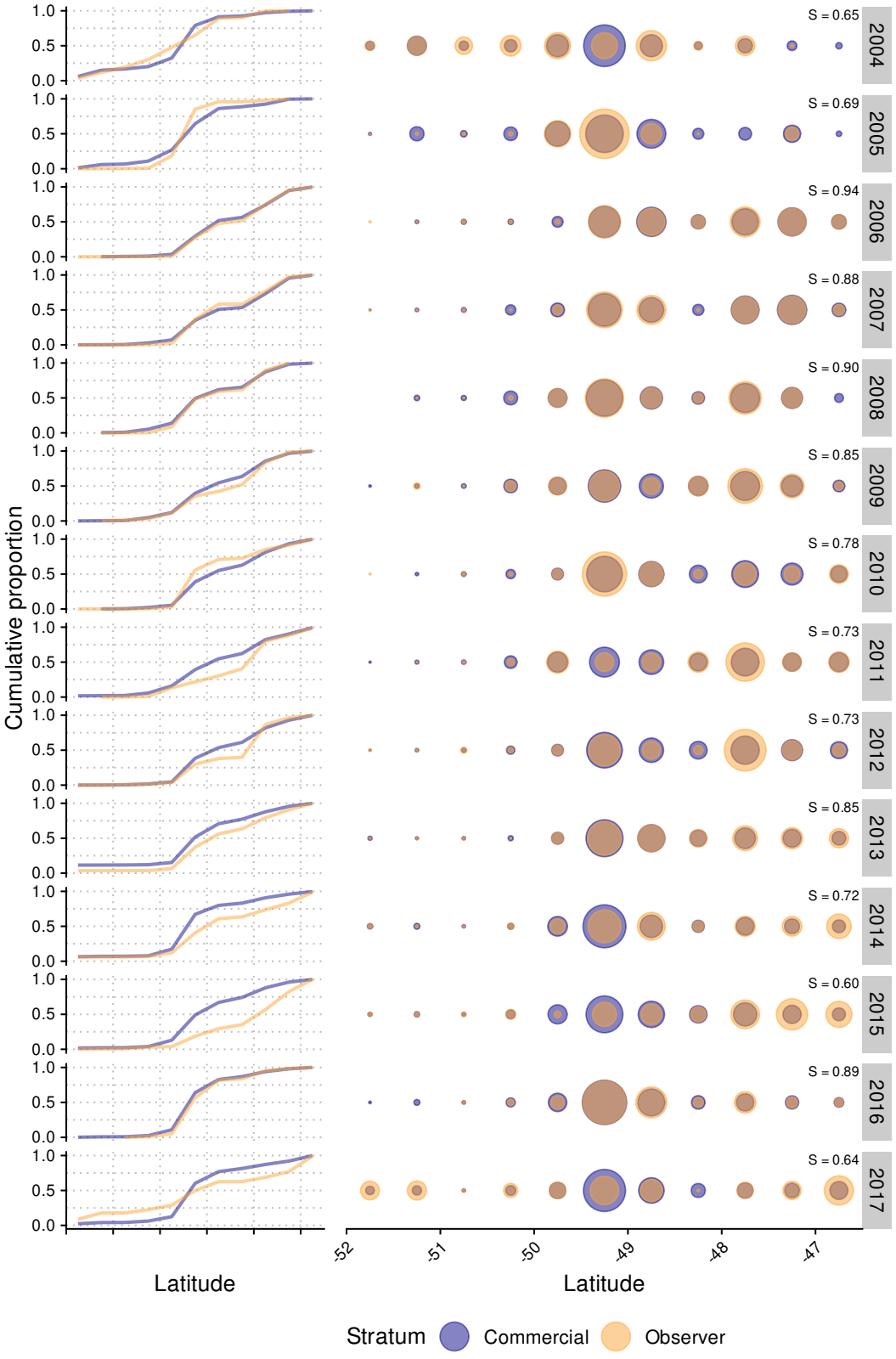


Figure 663: Latitudinal representativeness of observer sampling coverage of Trawl catch in HOK 1SA, from events where the hoki catch exceeded the 70kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

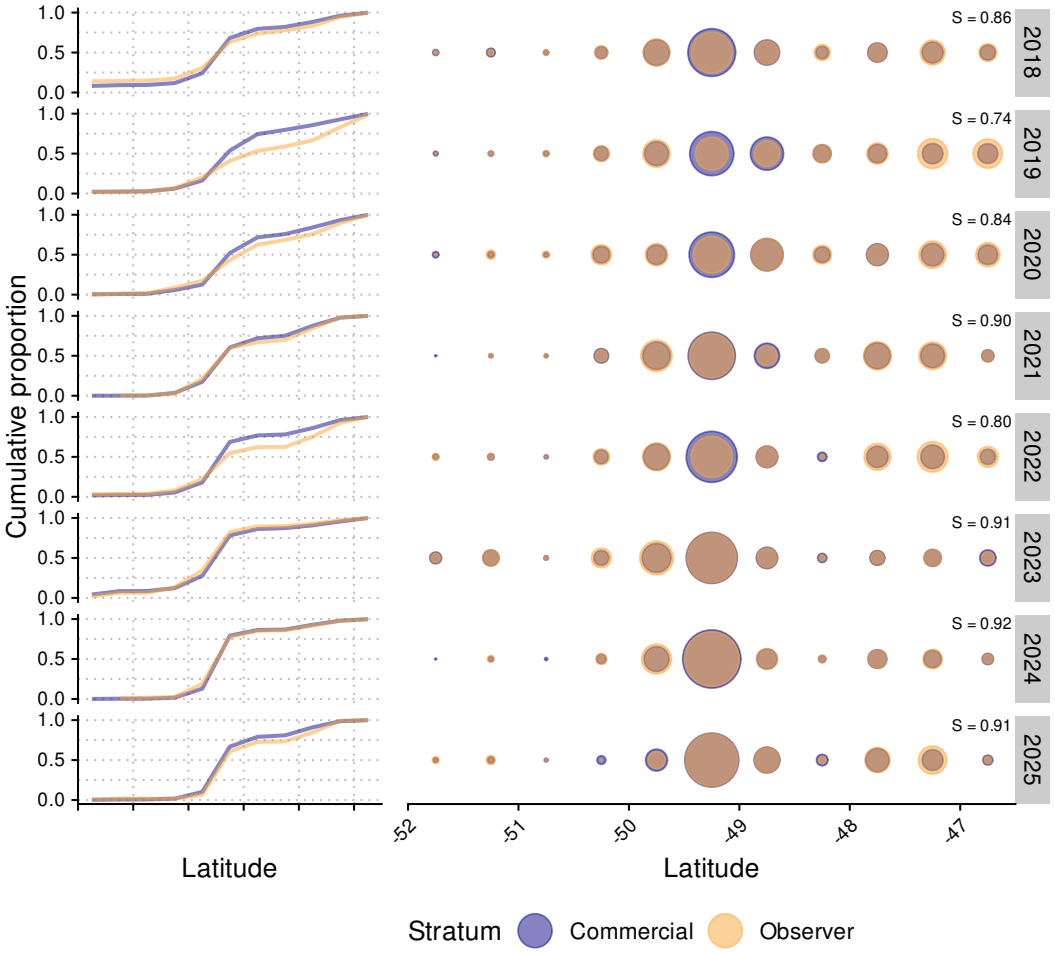


Figure 664: Latitudinal representativeness of observer sampling coverage of Trawl catch in HOK 1SA, from events where the hoki catch exceeded the 70kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

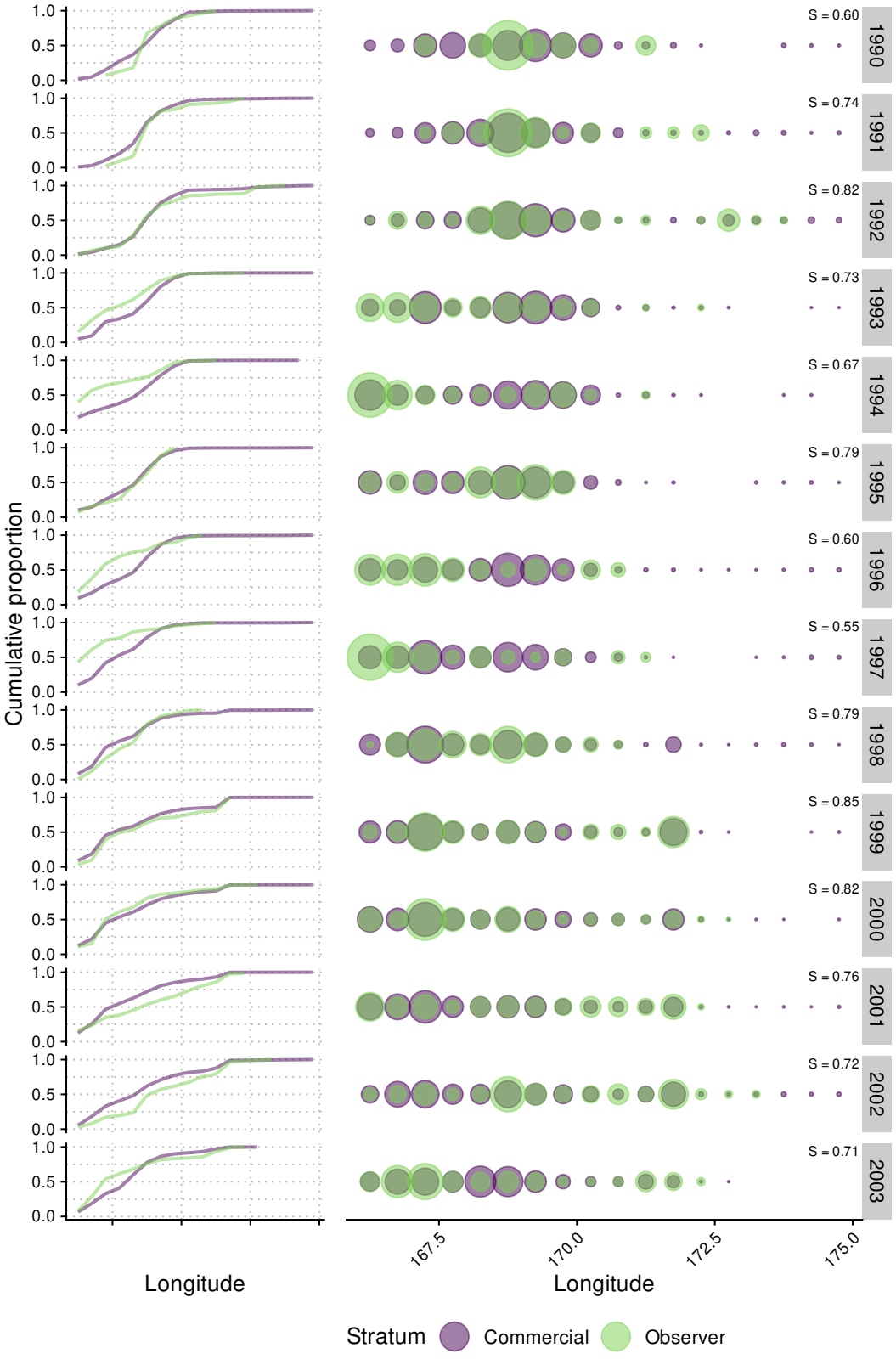


Figure 665: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in HOK 1SA, where the hoki catch exceeded the 70kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

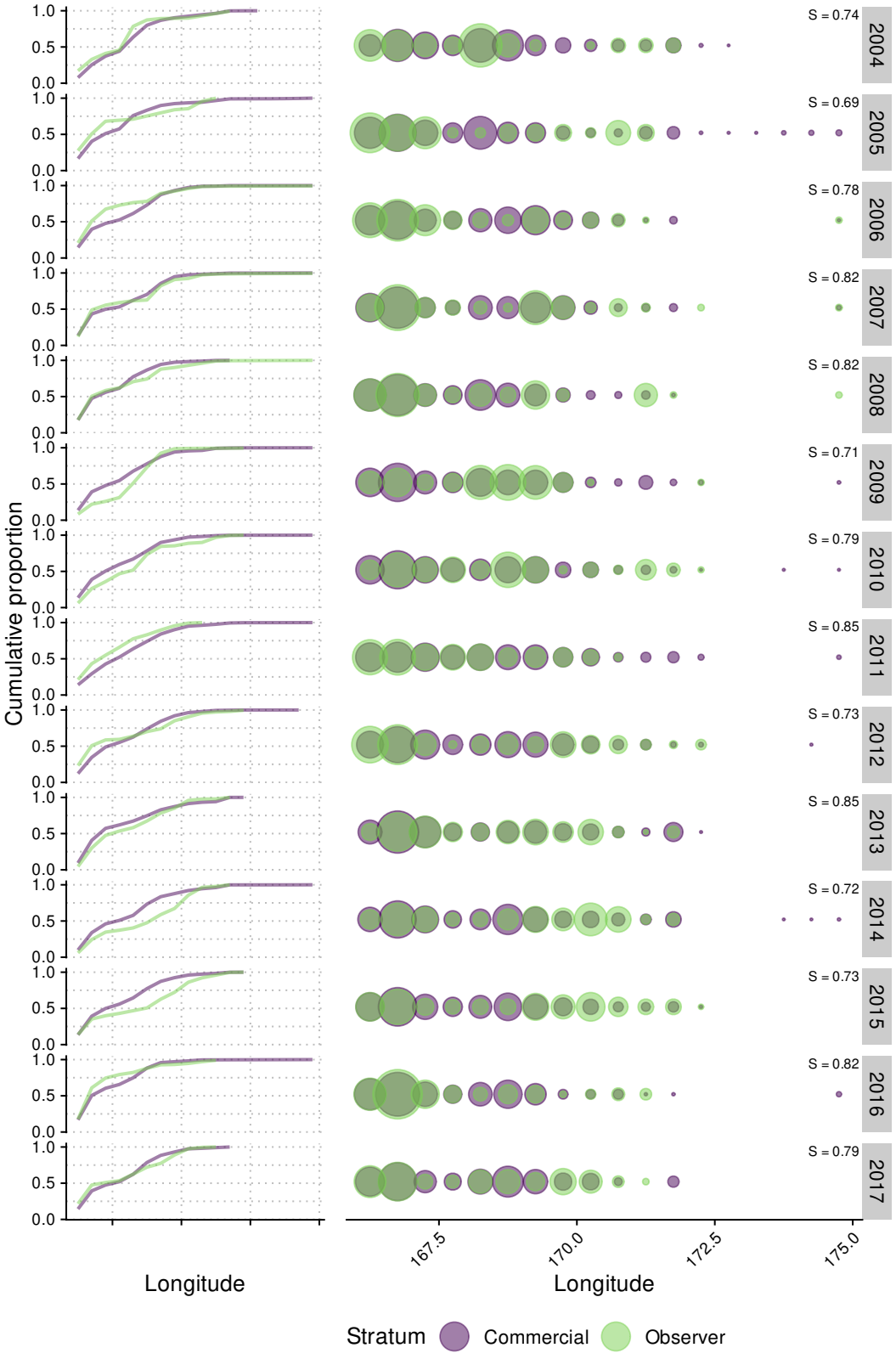


Figure 666: **Longitudinal representativeness of observer sampling coverage of Trawl fishing events in HOK 1SA, where the hoki catch exceeded the 70kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

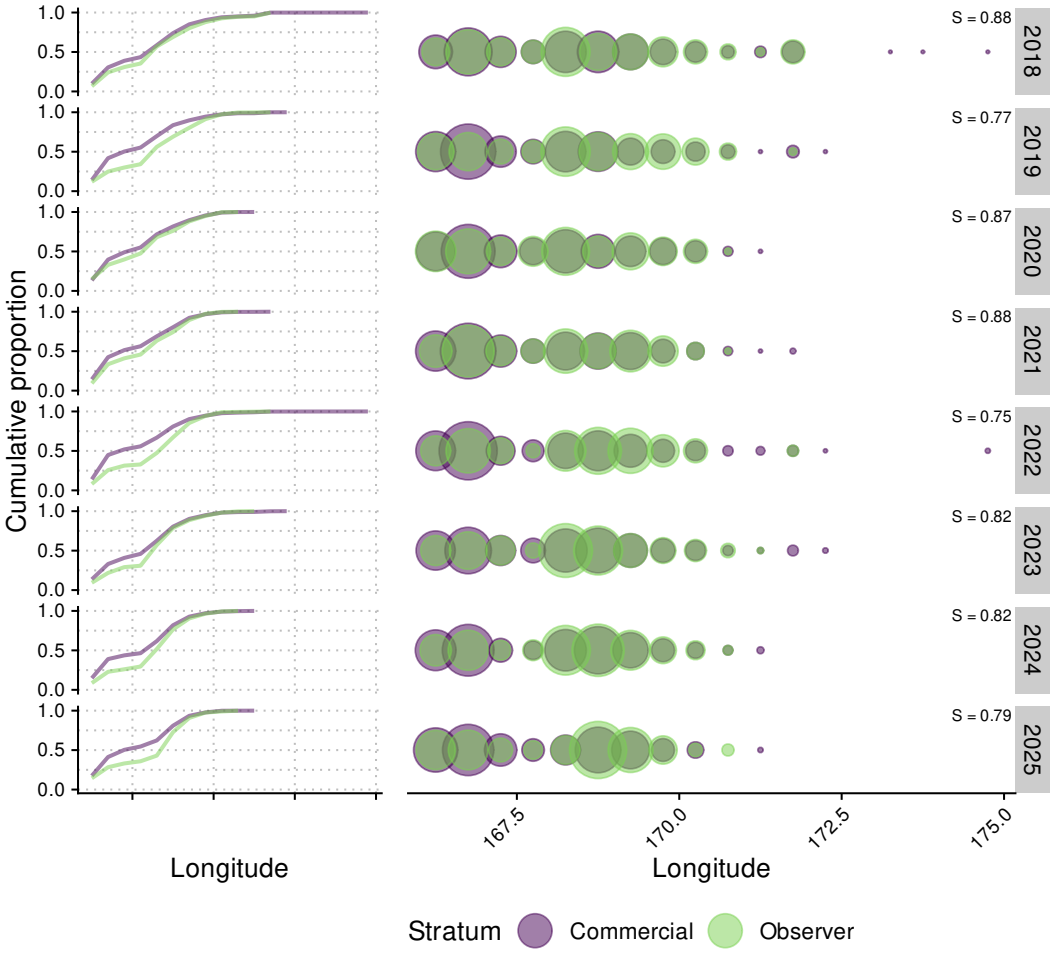


Figure 667: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in HOK 1SA, where the hoki catch exceeded the 70kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

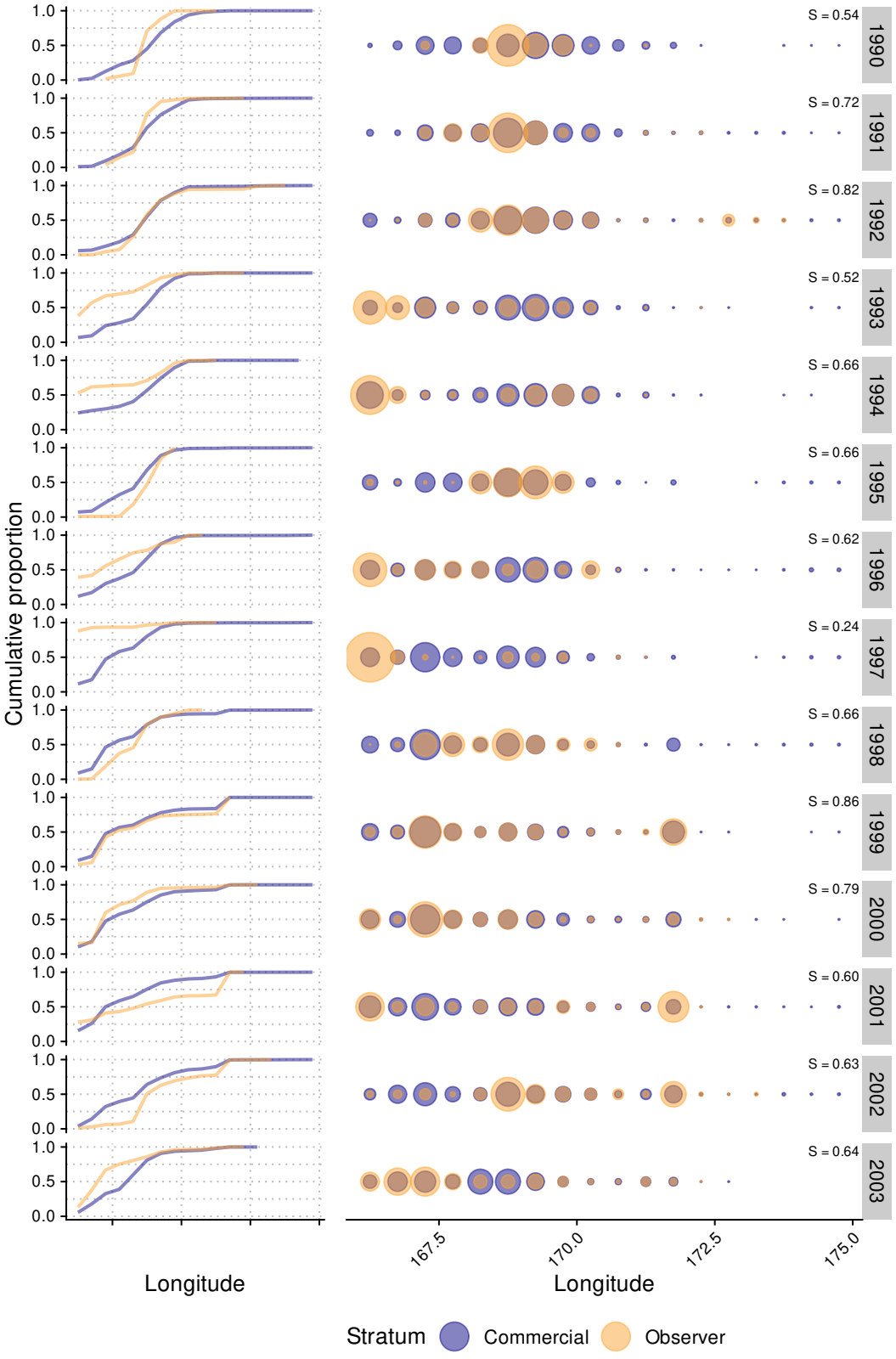


Figure 668: **Longitudinal representativeness of observer sampling coverage of Trawl catch in HOK 1SA, from events where the hoki catch exceeded the 70kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

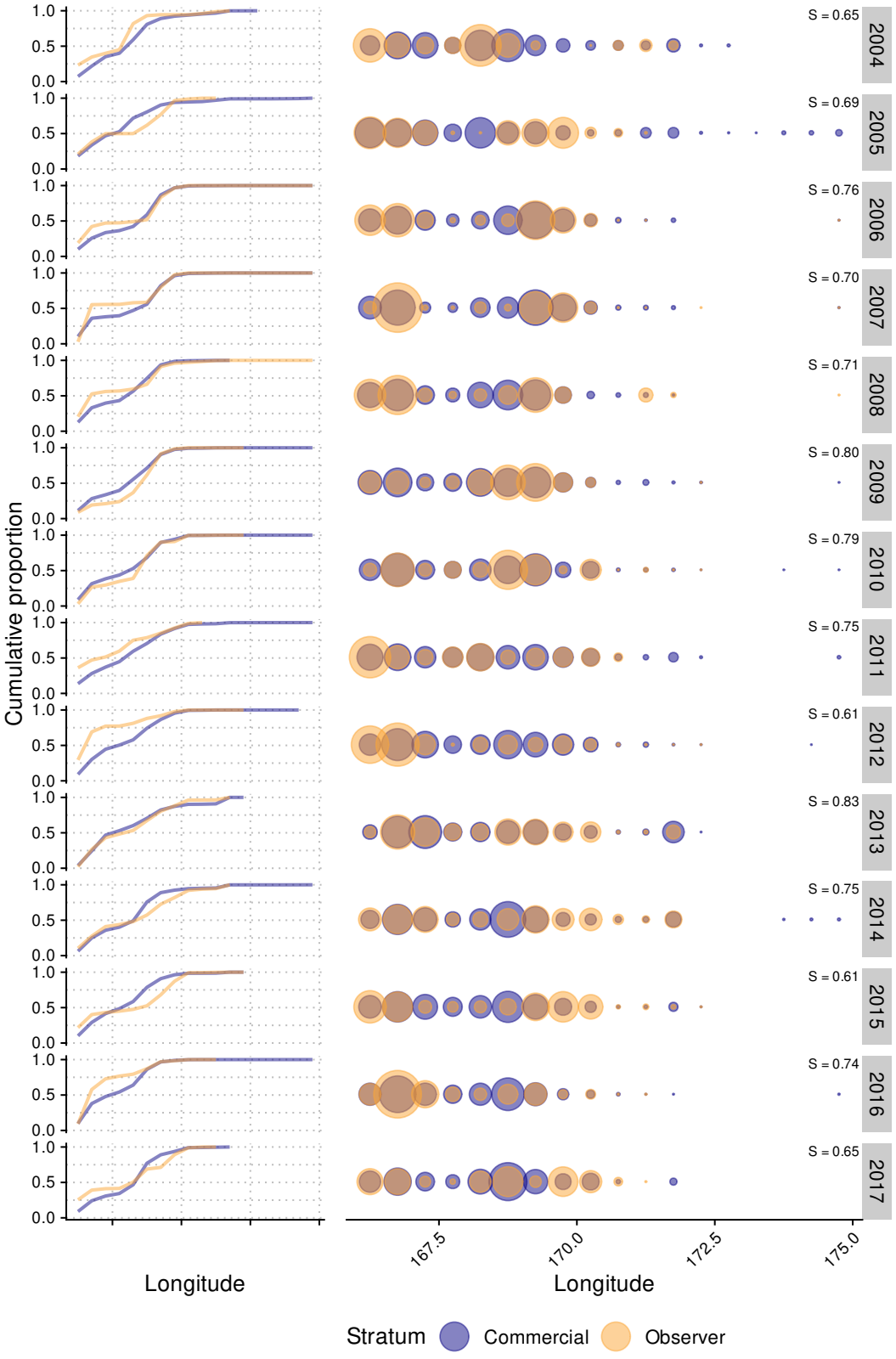


Figure 669: Longitudinal representativeness of observer sampling coverage of Trawl catch in HOK 1SA, from events where the hoki catch exceeded the 70kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

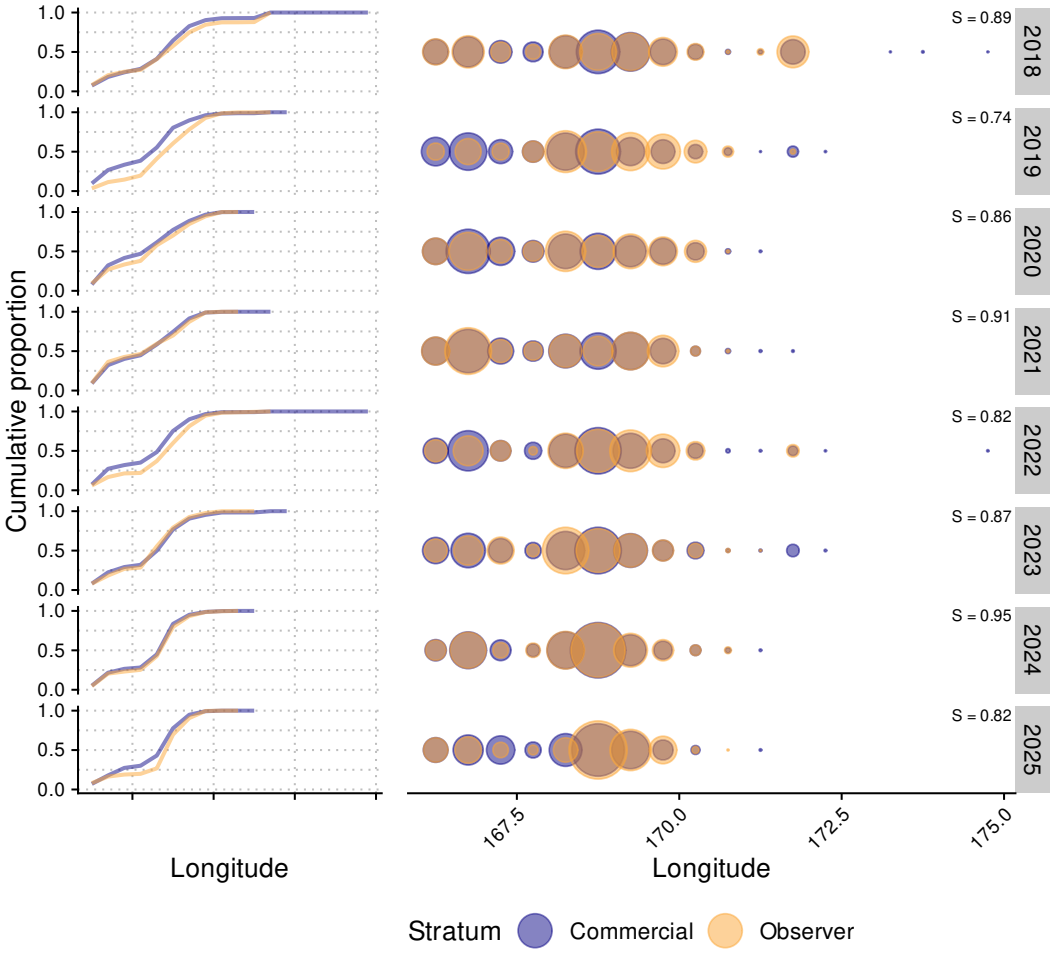


Figure 670: **Longitudinal representativeness of observer sampling coverage of Trawl catch in HOK 1SA, from events where the hoki catch exceeded the 70kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

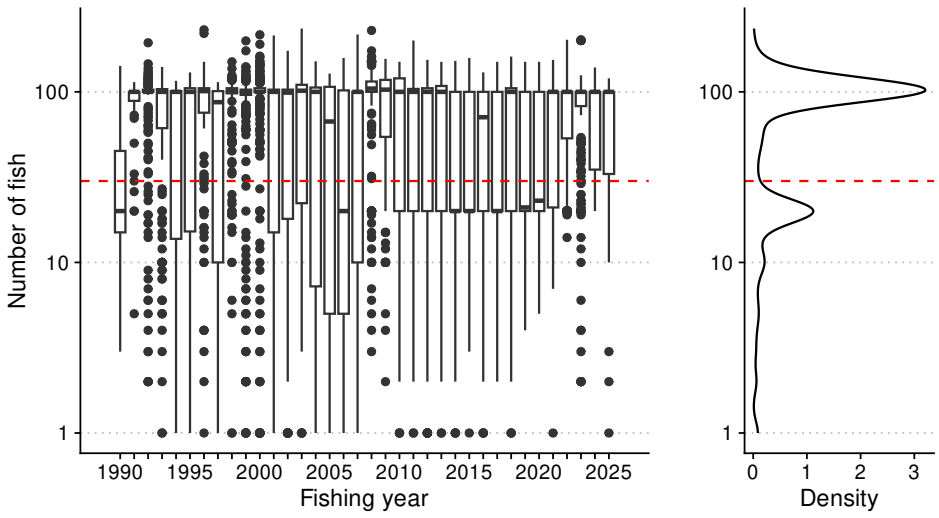


Figure 671: **Length-frequency sample sizes for observed fishing events in HOK 1SA where hoki were sampled. The red dashed line indicates a sample size of 30 fish.**

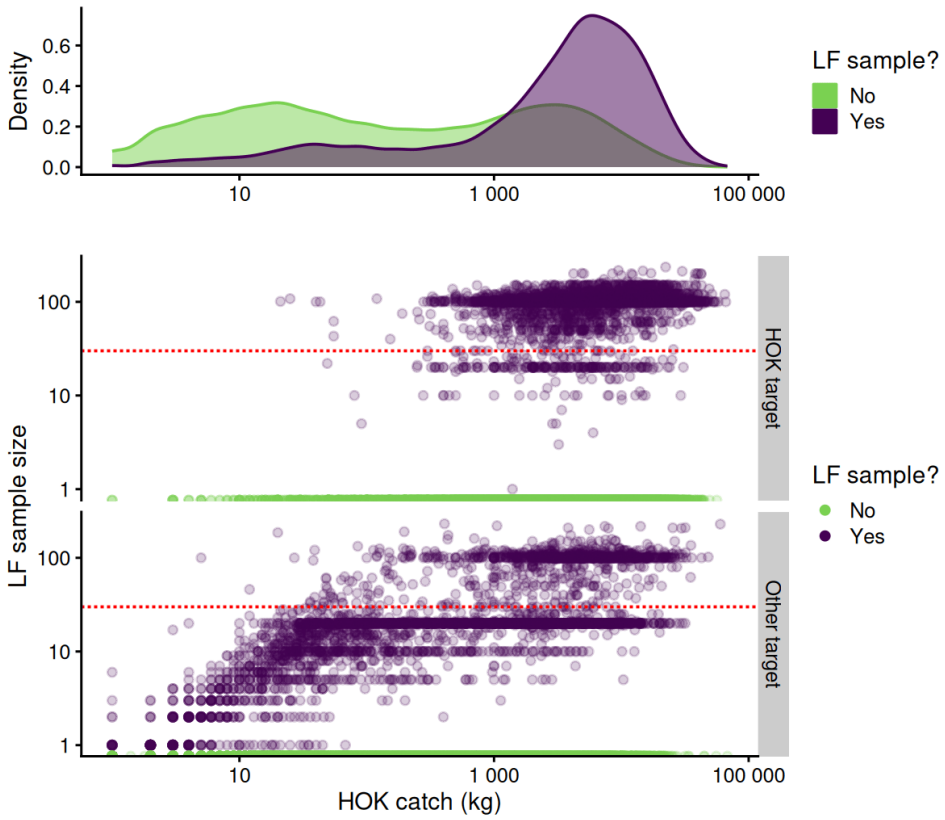


Figure 672: Length-frequency sample sizes (number of fish sampled) for observed fishing events in HOK 1SA in relation to the total hoki catch from an event, separately for hoki target events and other target species. The red dashed line indicates a sample size of 30 fish.

2.10.5.2 Otolith samples

Table 56: Otolith samples of hoki from the HOK 1SA Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of hoki exceeded a potential sampling threshold of 70 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	2 123	0	0	0.00
1991	4 300	0	0	0.00
1992	6 346	0	0	0.00
1993	5 499	0	0	0.00
1994	2 870	0	0	0.00
1995	2 885	0	0	0.00
1996	2 901	0	0	0.00
1997	4 148	0	0	0.00
1998	4 996	0	0	0.00
1999	4 600	0	0	0.00
2000	7 115	0	0	0.00
2001	6 837	0	0	0.00
2002	7 514	0	0	0.00
2003	5 207	0	0	0.00
2004	3 502	0	0	0.00
2005	2 345	0	0	0.00
2006	1 875	0	0	0.00
2007	2 509	0	0	0.00
2008	2 279	0	0	0.00
2009	2 364	32	318	1.35
2010	2 643	108	821	4.09
2011	2 347	86	775	3.66
2012	2 286	175	1 510	7.66
2013	2 631	414	3 791	15.74
2014	2 982	406	3 076	13.62
2015	2 908	75	511	2.58
2016	1 491	100	958	6.71
2017	2 146	173	1 363	8.06
2018	2 963	588	5 152	19.84
2019	2 028	297	2 250	14.64
2020	1 730	364	2 885	21.04
2021	1 837	447	4 009	24.33
2022	1 717	335	3 067	19.51
2023	2 179	422	3 818	19.37
2024	1 491	302	2 680	20.25
2025	1 576	293	2 592	18.59

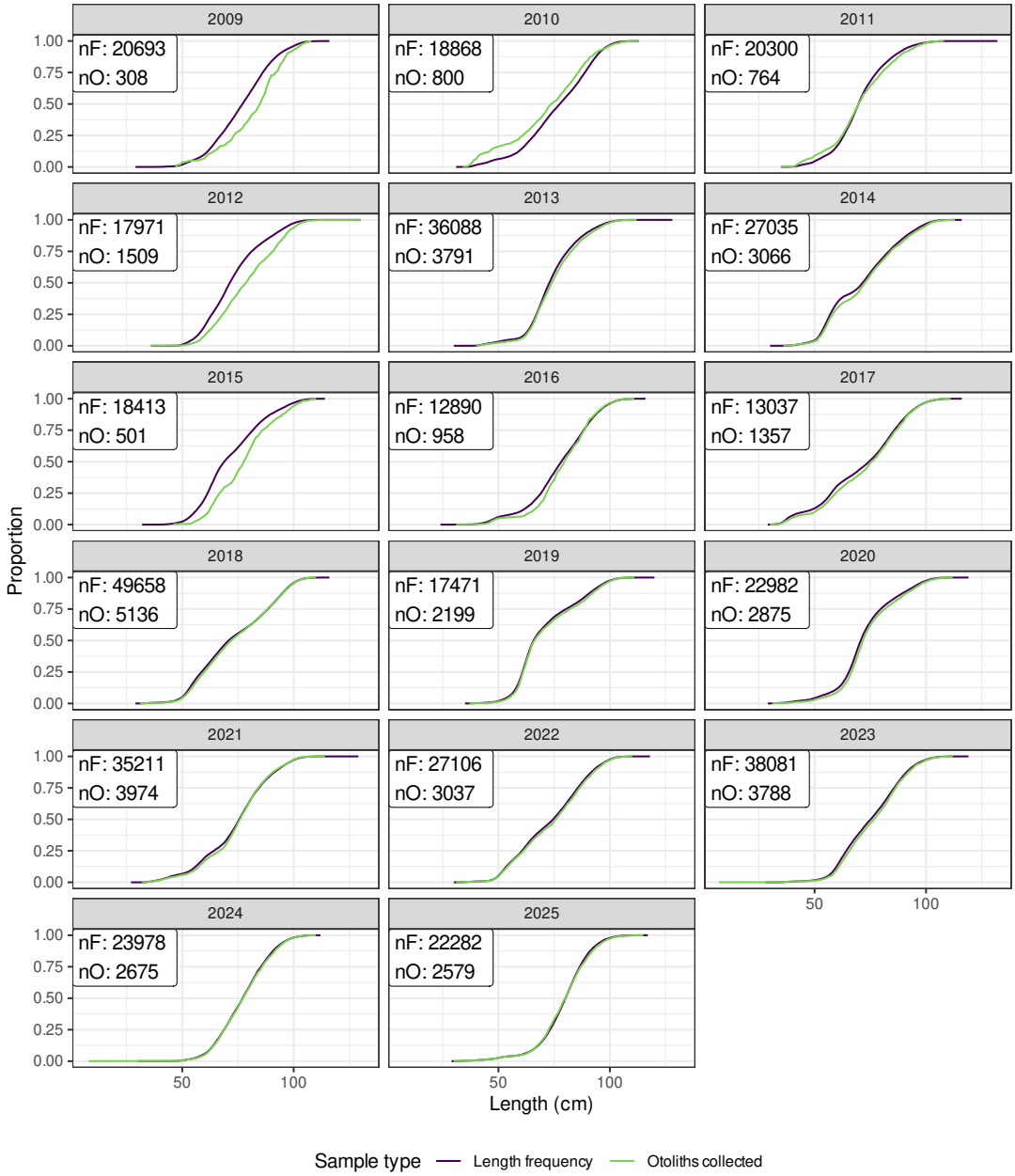


Figure 673: Cumulative distributions of the length of fish in the length frequency and otolith samples of hoki in the HOK 1SA Trawl fishery for the 2009 to 2025 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

2.10.5.3 Catch quantification



Figure 674: Methods used by observers to quantify the catch of hoki in the HOK 1SA Trawl fishery. The legend lists the methods used in descending order of total catch.

2.10.6 HOK 1WC: Trawl fishery

2.10.6.1 Length-frequency samples

Table 57: Length-frequency samples of hoki from the HOK 1WC Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of hoki exceeded a potential sampling threshold of 70 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	7 464	450	46 166	6.03
1991	7 999	609	62 044	7.61
1992	6 235	377	38 877	6.05
1993	7 479	312	32 762	4.17
1994	8 593	607	63 581	7.06
1995	8 114	330	35 954	4.07
1996	6 994	485	51 215	6.93
1997	8 649	377	40 104	4.36
1998	8 551	490	52 938	5.73
1999	7 651	512	55 748	6.69
2000	8 041	564	59 724	7.01
2001	9 061	613	56 889	6.77
2002	8 213	599	63 008	7.29
2003	8 084	549	56 880	6.79
2004	7 128	582	55 258	8.16
2005	4 560	535	55 256	11.73
2006	4 579	451	45 844	9.85
2007	3 049	350	36 891	11.48
2008	2 663	238	26 041	8.94
2009	2 290	326	33 379	14.24
2010	2 889	292	32 611	10.11
2011	3 692	283	29 867	7.67
2012	3 836	428	43 763	11.16
2013	4 104	1 043	110 279	25.41
2014	4 849	877	85 910	18.09
2015	5 538	991	93 609	17.89
2016	5 469	649	63 143	11.87
2017	5 531	690	59 214	12.48
2018	5 434	892	87 834	16.42
2019	4 273	615	60 856	14.39
2020	3 721	810	76 999	21.77
2021	2 921	656	63 547	22.46
2022	2 878	716	68 643	24.88
2023	2 747	828	75 803	30.14
2024	2 675	701	66 744	26.21
2025	3 016	523	51 362	17.34

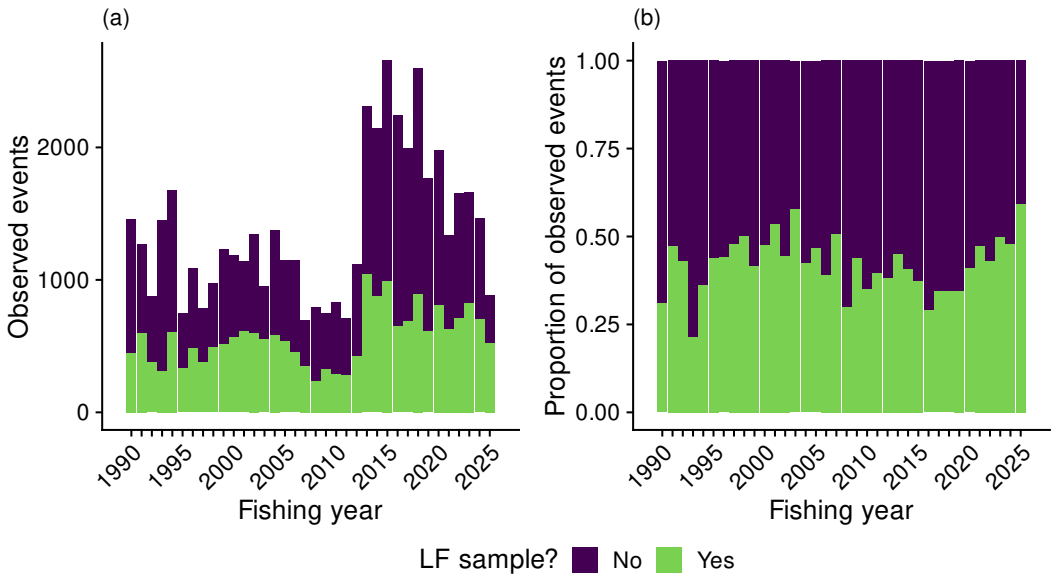


Figure 675: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in HOK 1WC where the hoki catch exceeded the 70 kg threshold, with and without length-frequency sampling.**

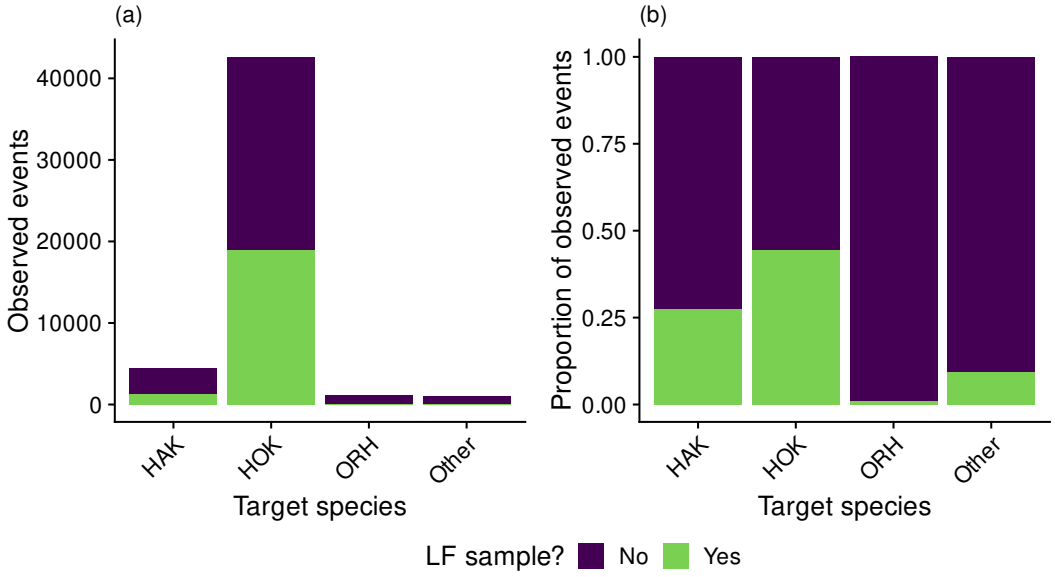


Figure 676: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in HOK 1WC where the hoki catch exceeded the 70 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

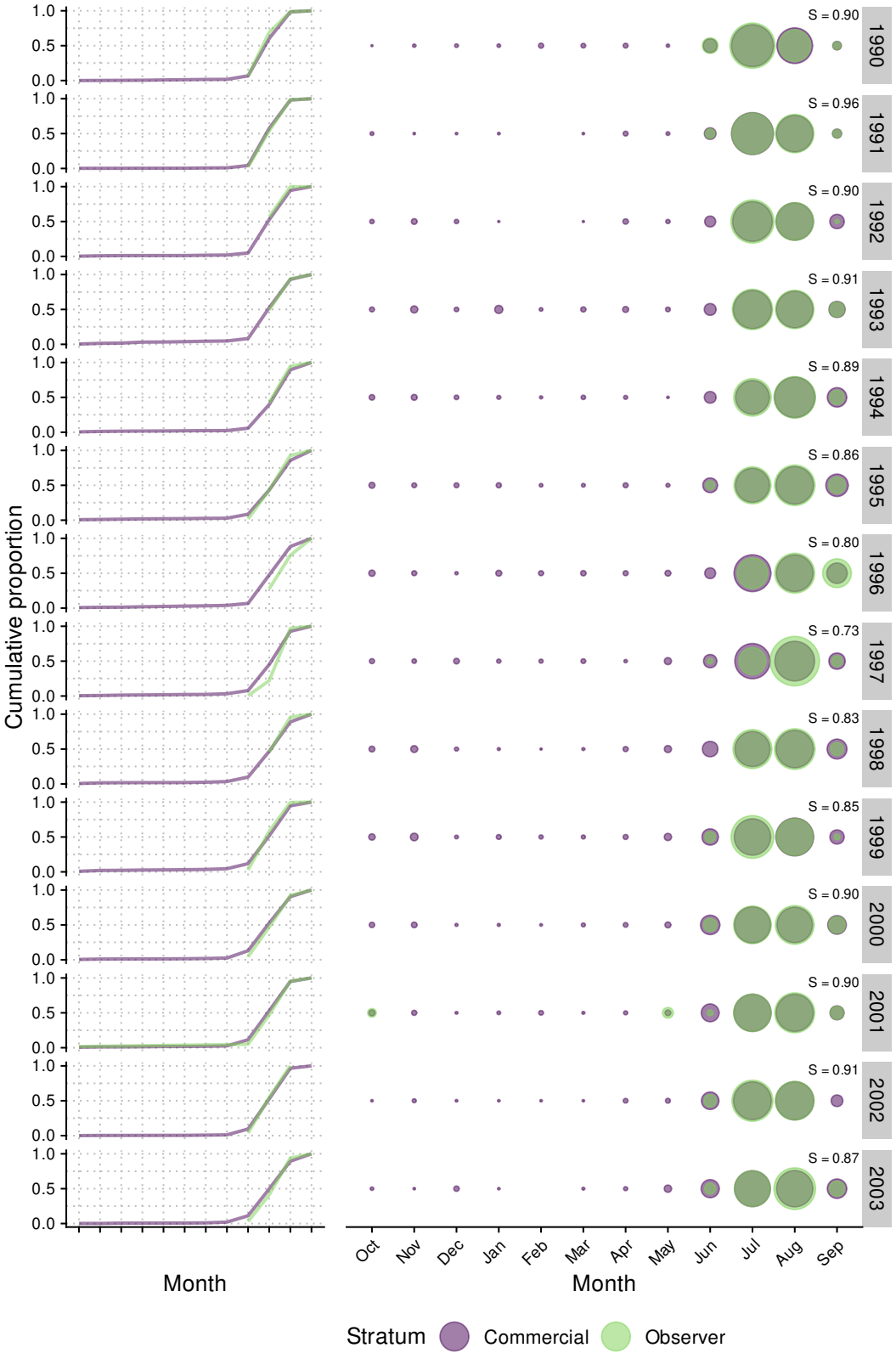


Figure 677: Monthly representativeness of observer sampling coverage of Trawl fishing events in HOK 1WC, where the hoki catch exceeded the 70kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

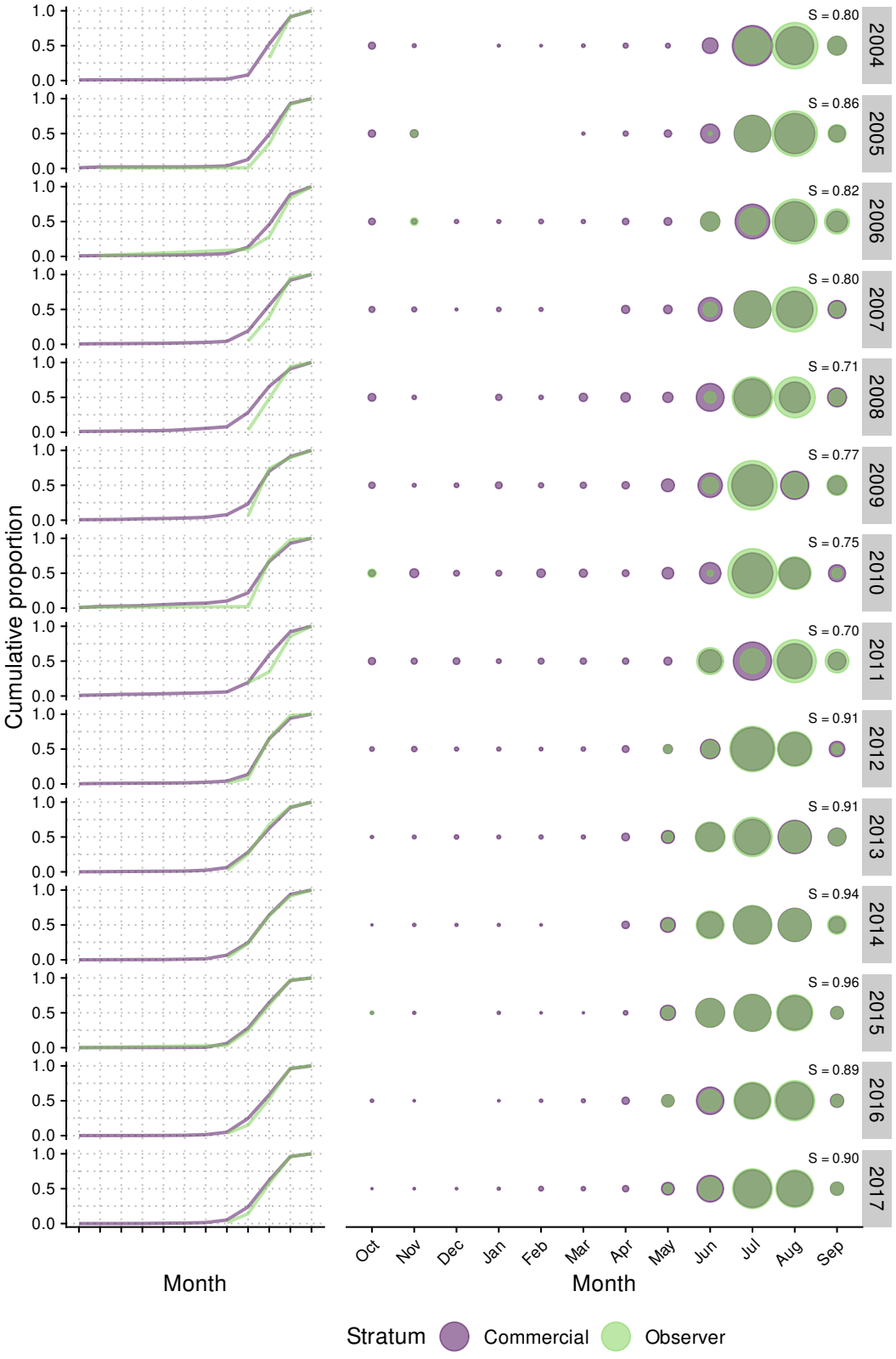


Figure 678: Monthly representativeness of observer sampling coverage of Trawl fishing events in HOK 1WC, where the hoki catch exceeded the 70kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

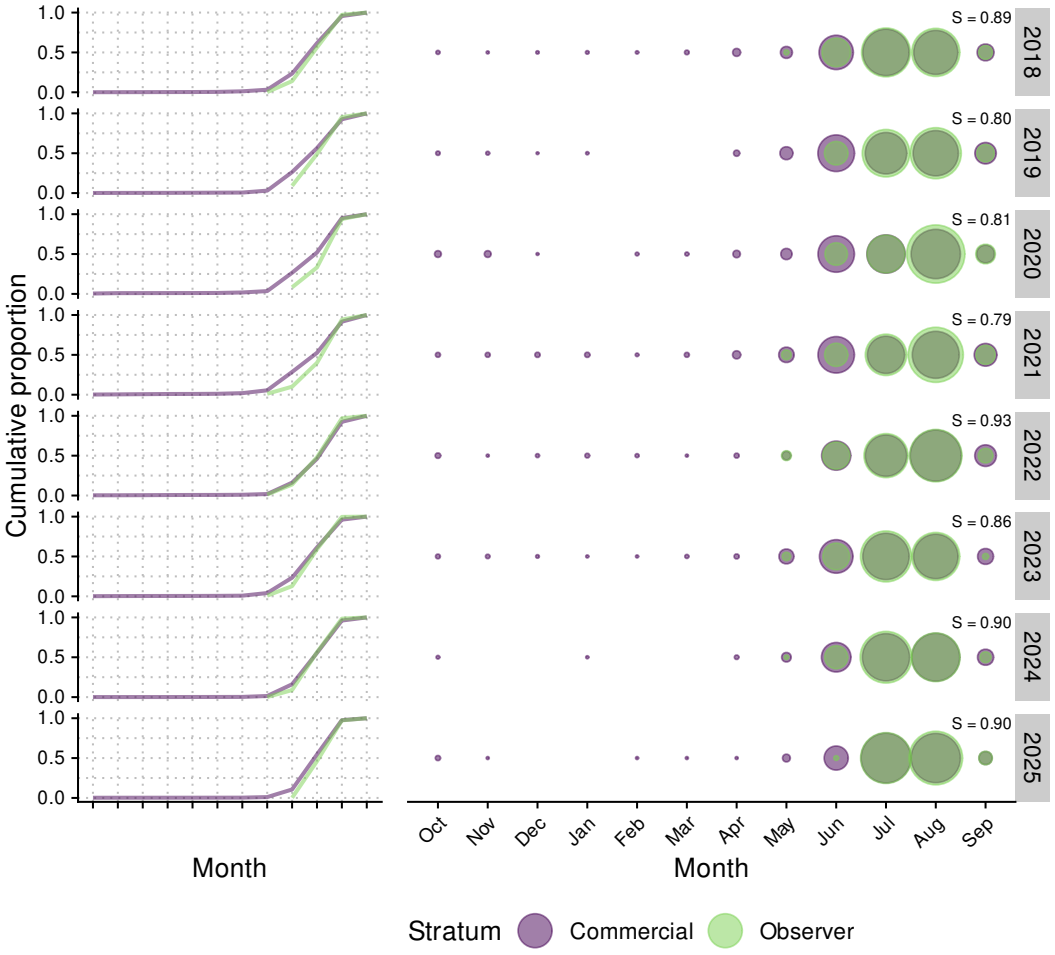


Figure 679: Monthly representativeness of observer sampling coverage of Trawl fishing events in HOK 1WC, where the hoki catch exceeded the 70kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

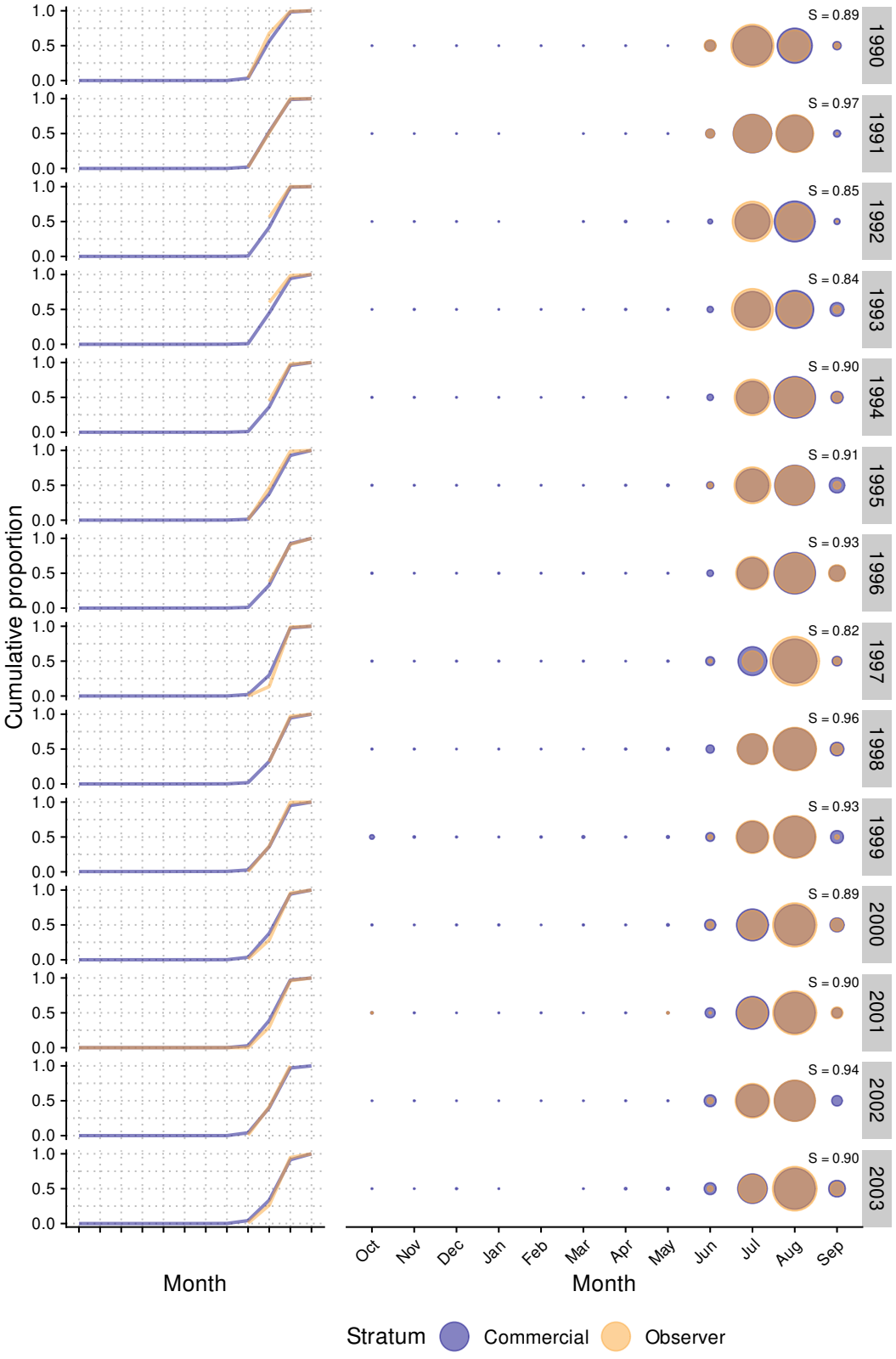


Figure 680: Monthly representativeness of observer sampling coverage of Trawl catch in HOK 1WC, from events where the hoki catch exceeded the 70kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

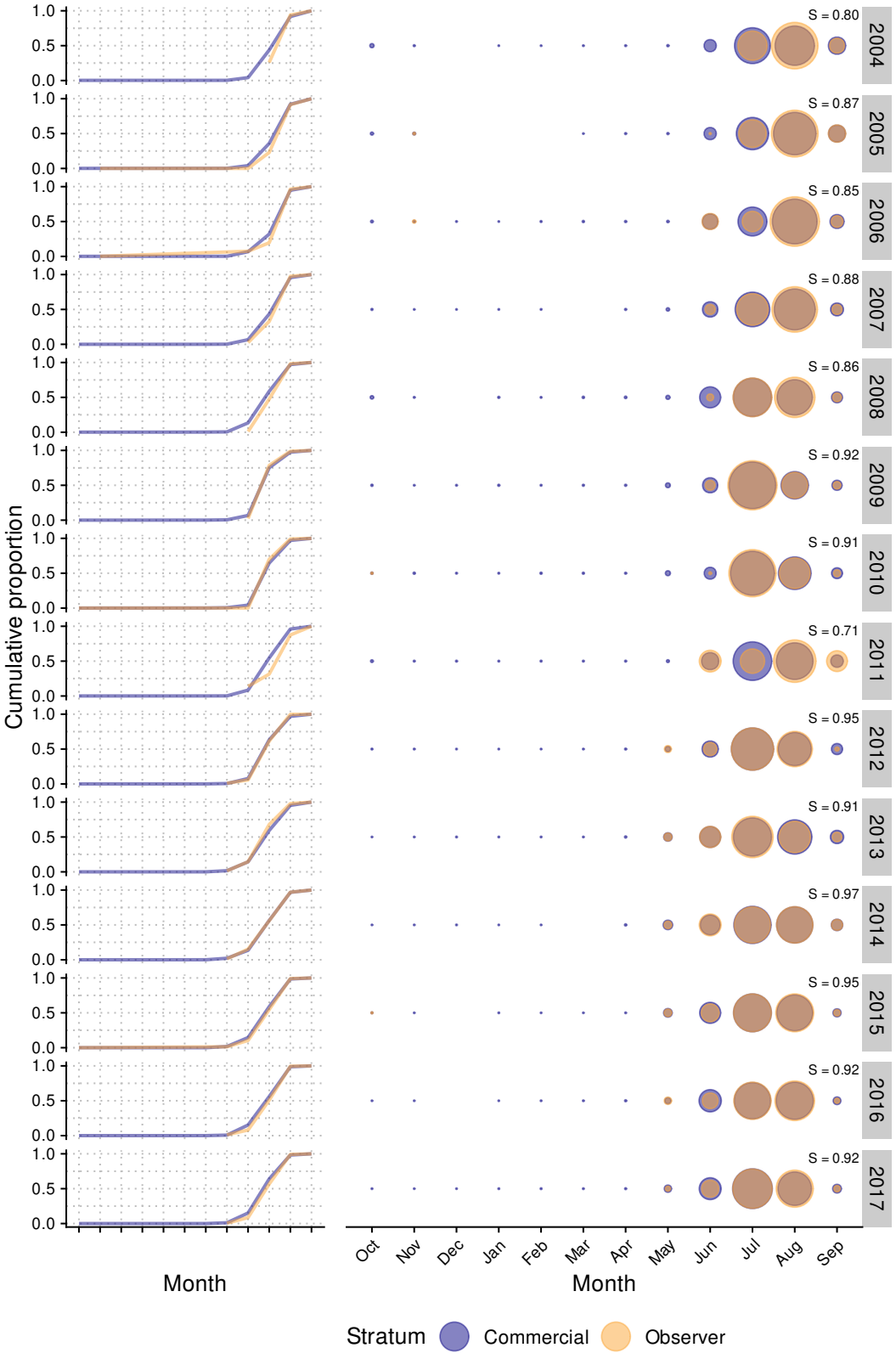


Figure 681: Monthly representativeness of observer sampling coverage of Trawl catch in HOK 1WC, from events where the hoki catch exceeded the 70kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

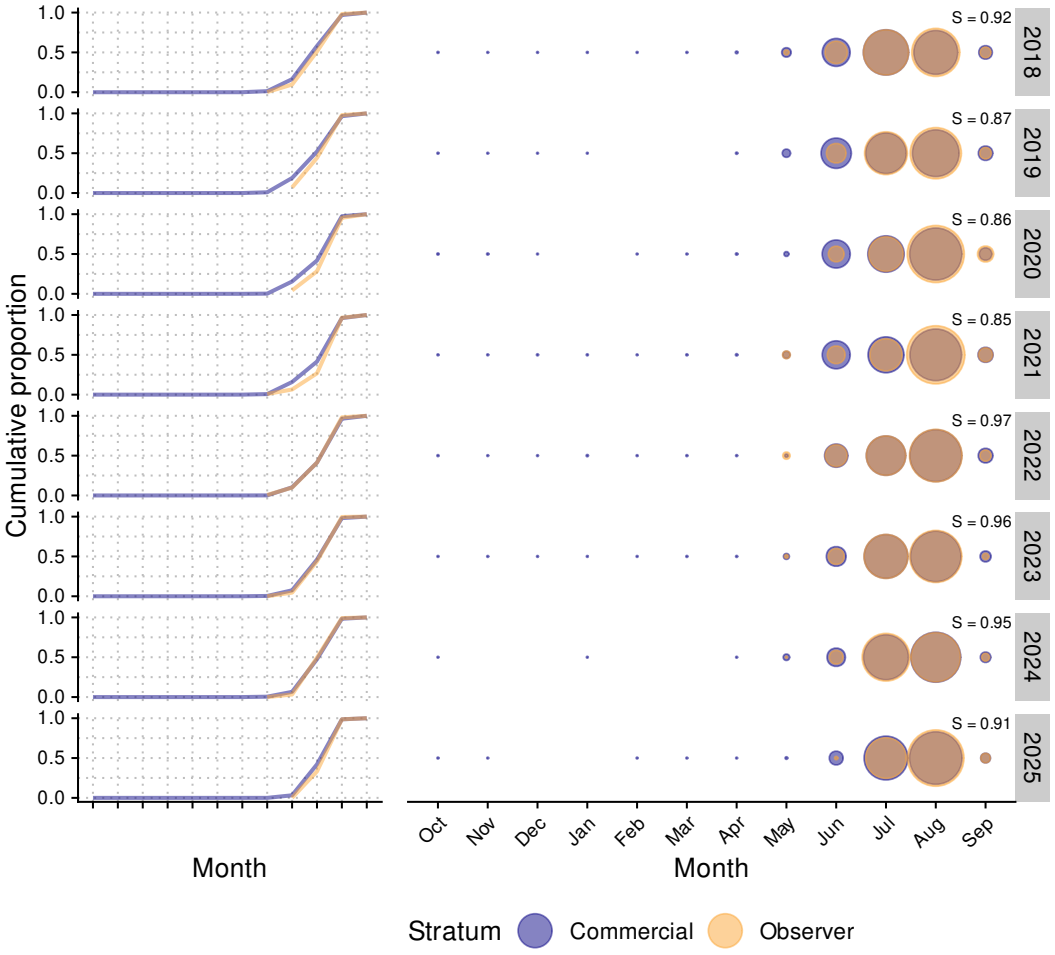


Figure 682: Monthly representativeness of observer sampling coverage of Trawl catch in HOK 1WC, from events where the hoki catch exceeded the 70kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

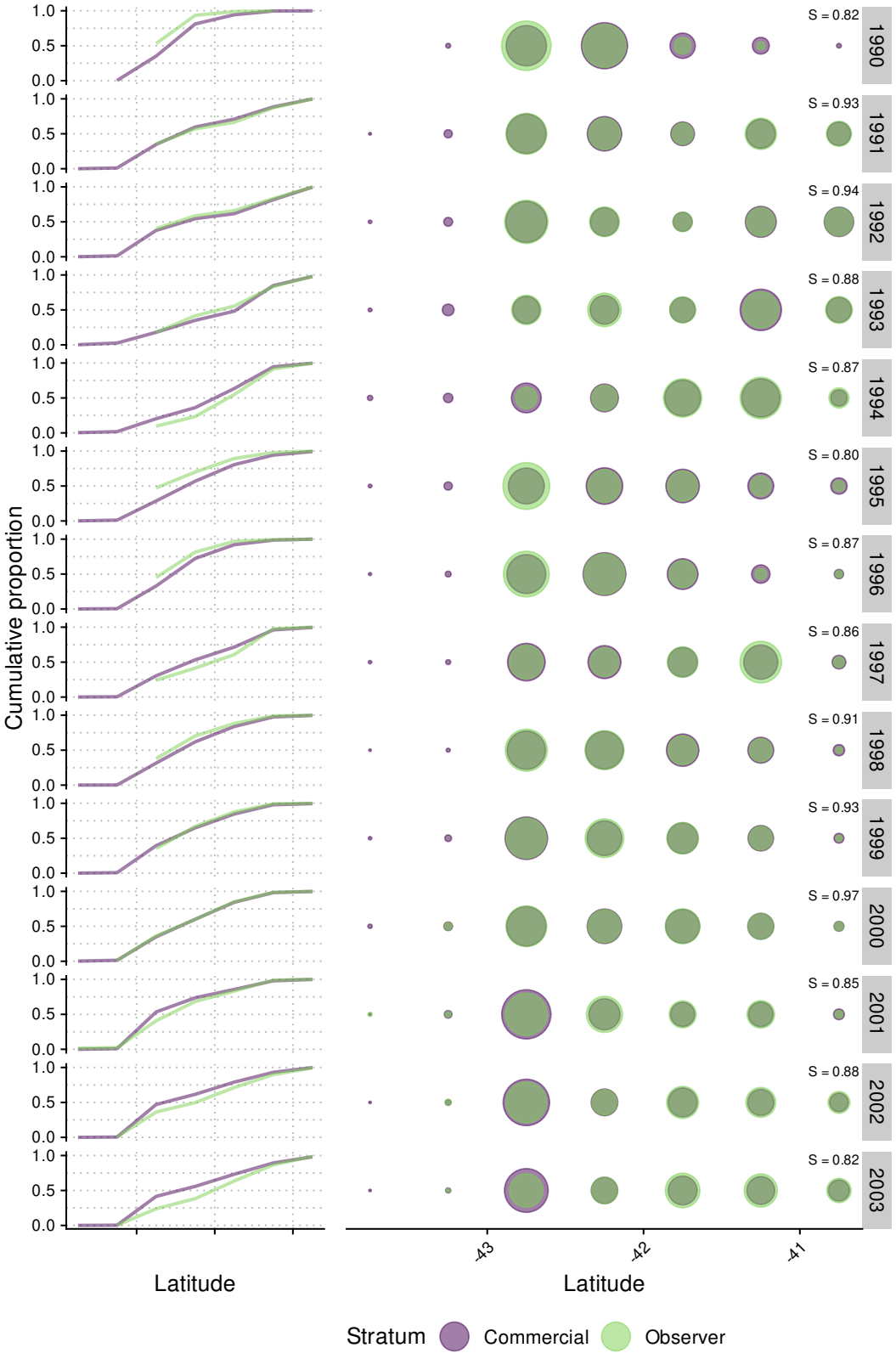


Figure 683: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in HOK 1WC, where the hoki catch exceeded the 70kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

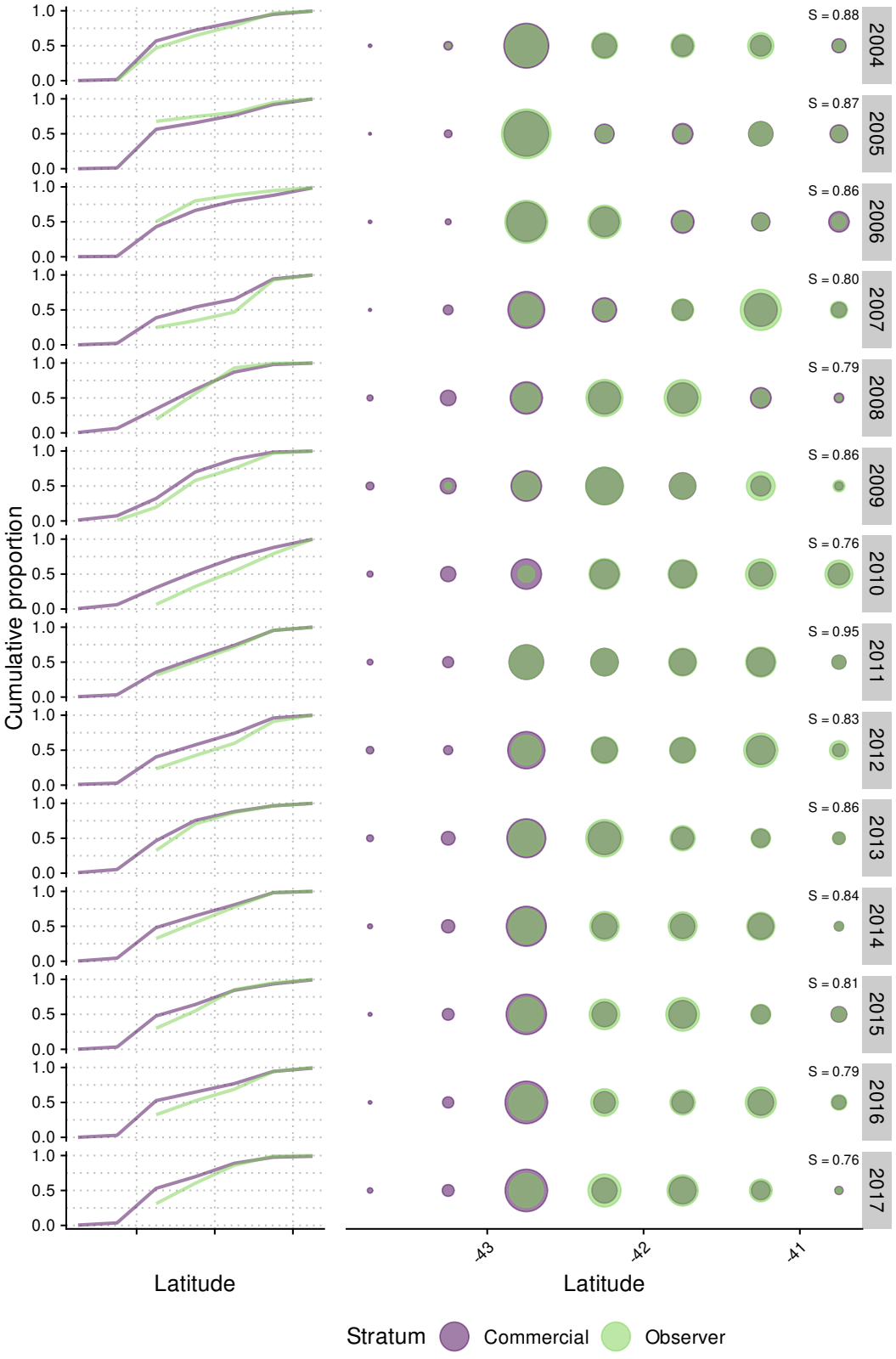


Figure 684: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in HOK 1WC, where the hoki catch exceeded the 70kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

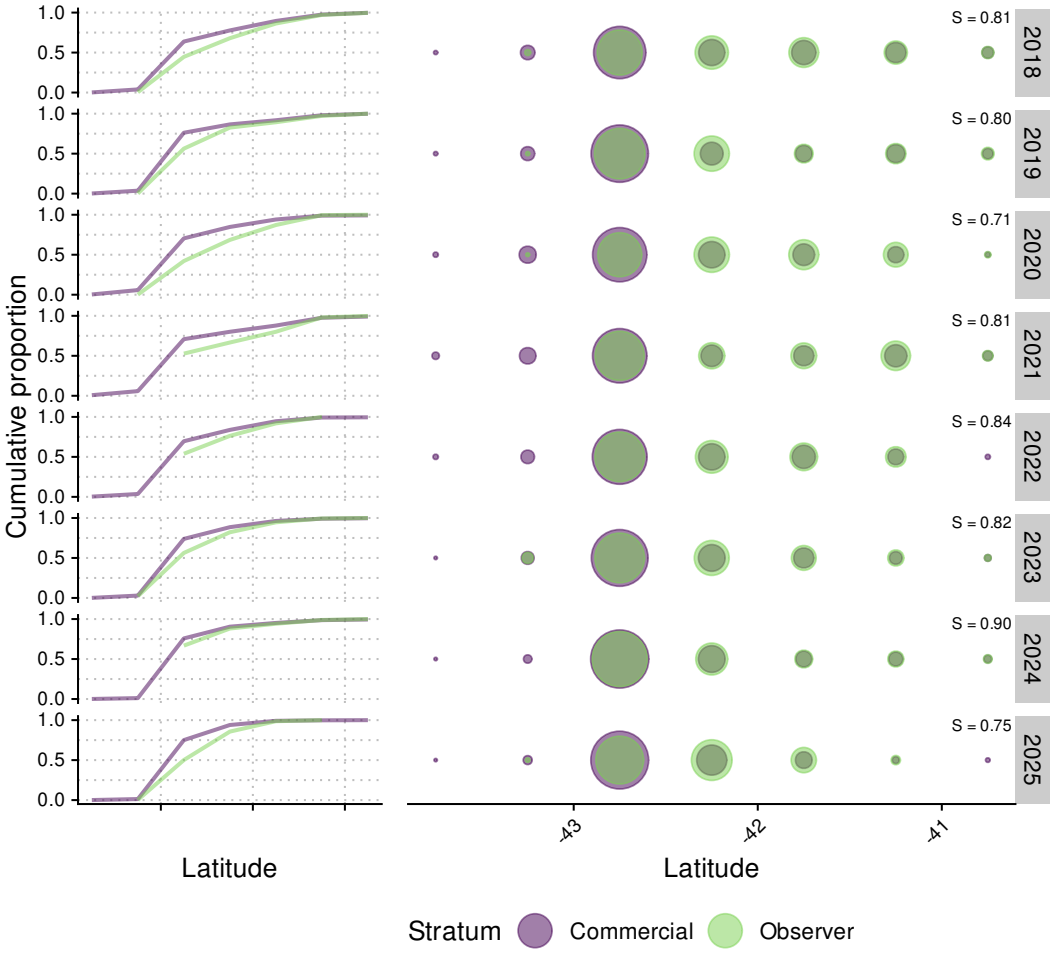


Figure 685: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in HOK 1WC, where the hoki catch exceeded the 70kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

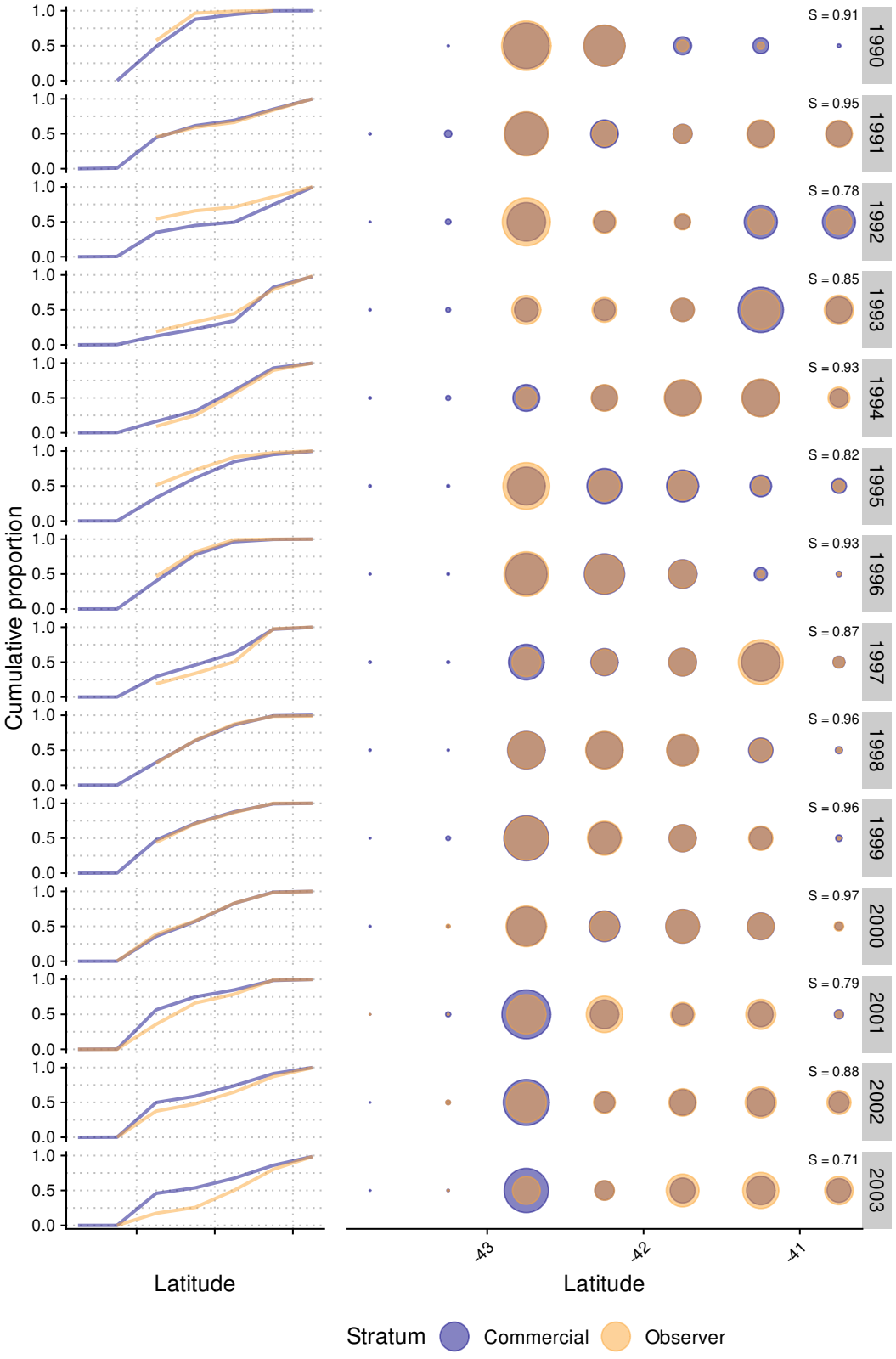


Figure 686: **Latitudinal representativeness of observer sampling coverage of Trawl catch in HOK 1WC, from events where the hoki catch exceeded the 70kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

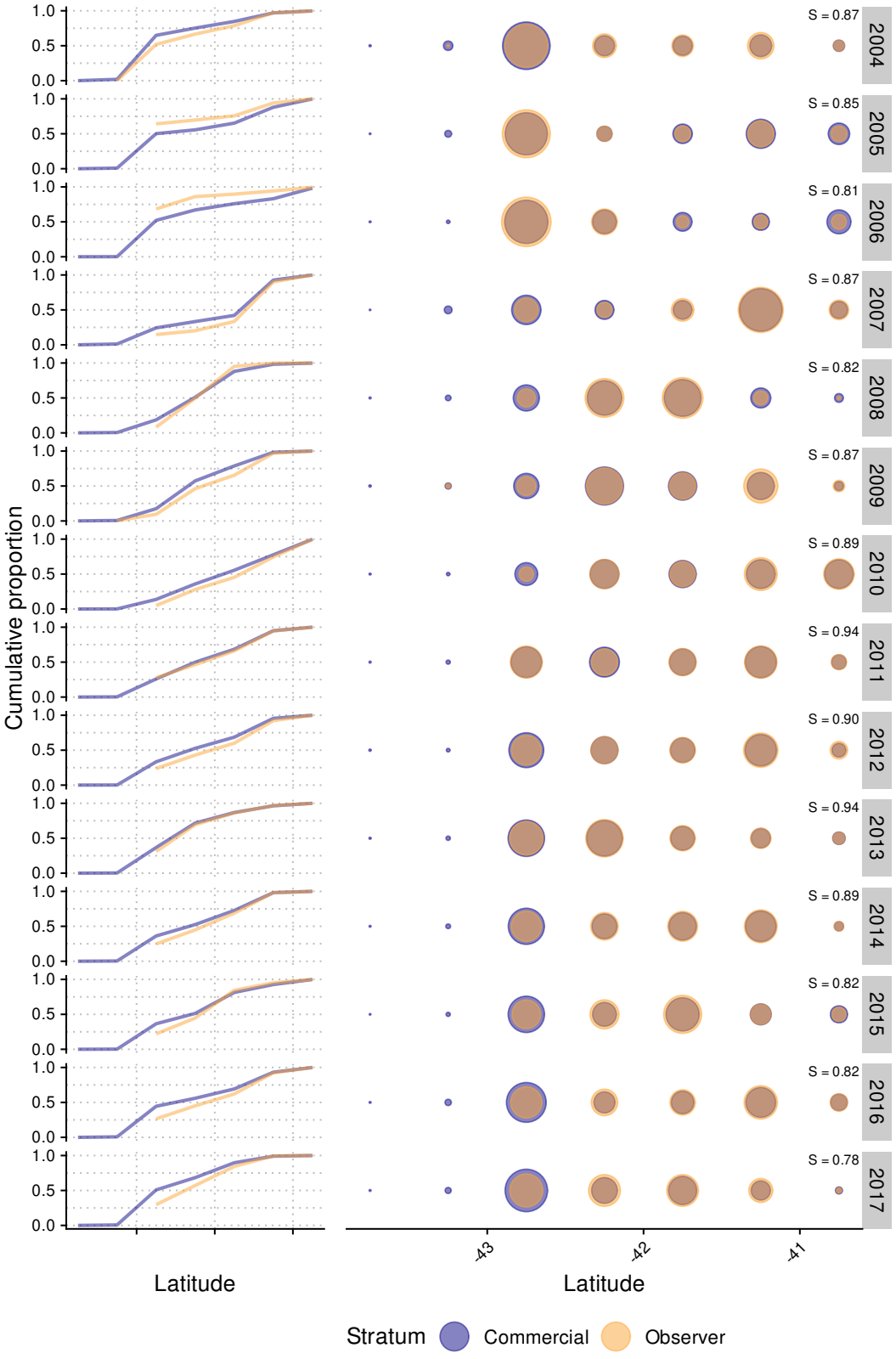


Figure 687: Latitudinal representativeness of observer sampling coverage of Trawl catch in HOK 1WC, from events where the hoki catch exceeded the 70kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

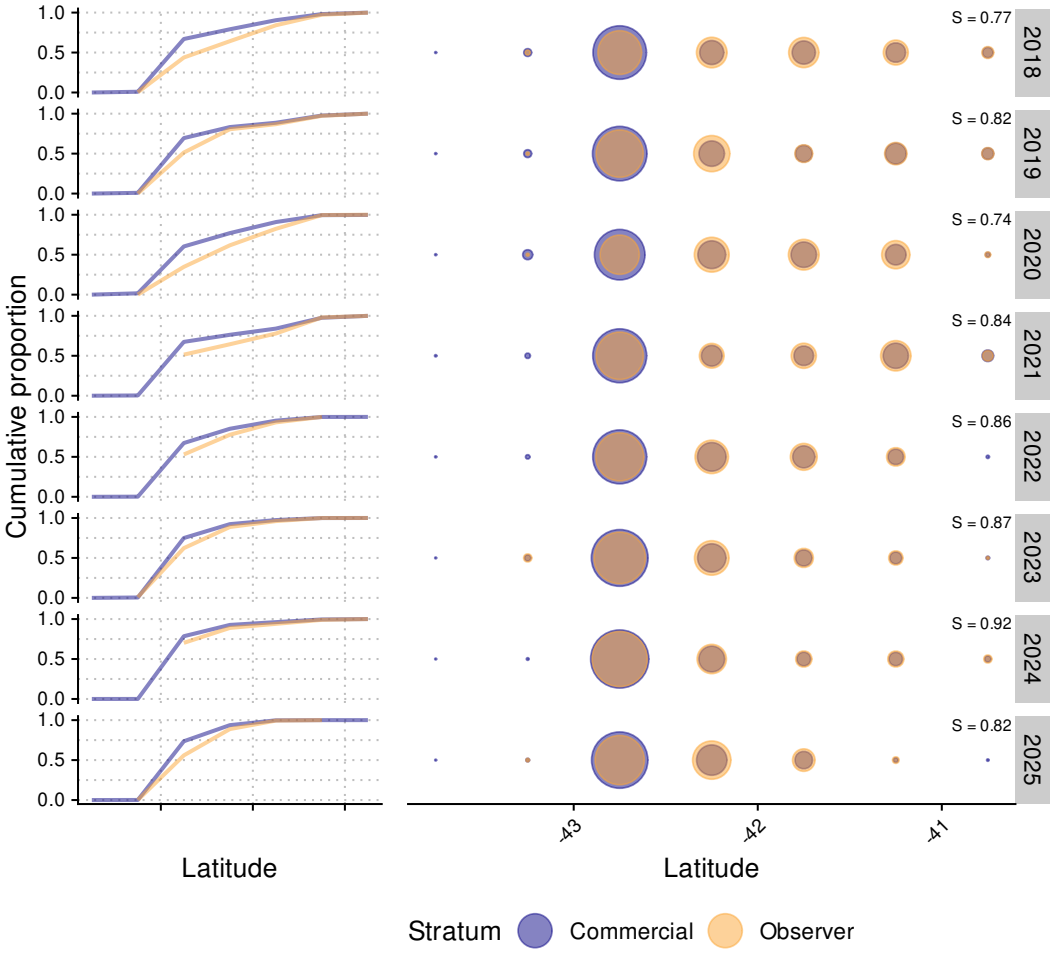


Figure 688: Latitudinal representativeness of observer sampling coverage of Trawl catch in HOK 1WC, from events where the hoki catch exceeded the 70kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

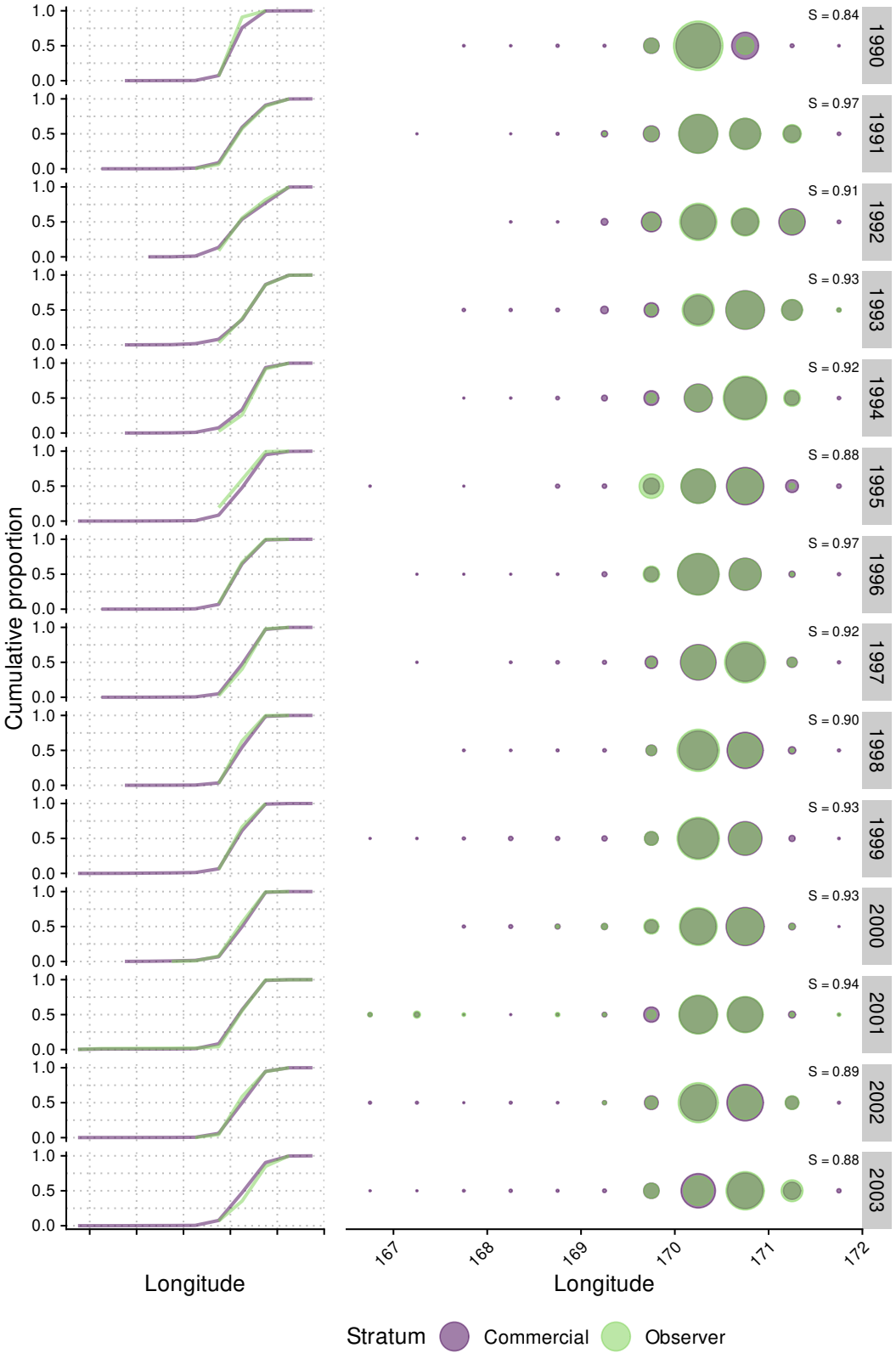


Figure 689: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in HOK 1WC, where the hoki catch exceeded the 70kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

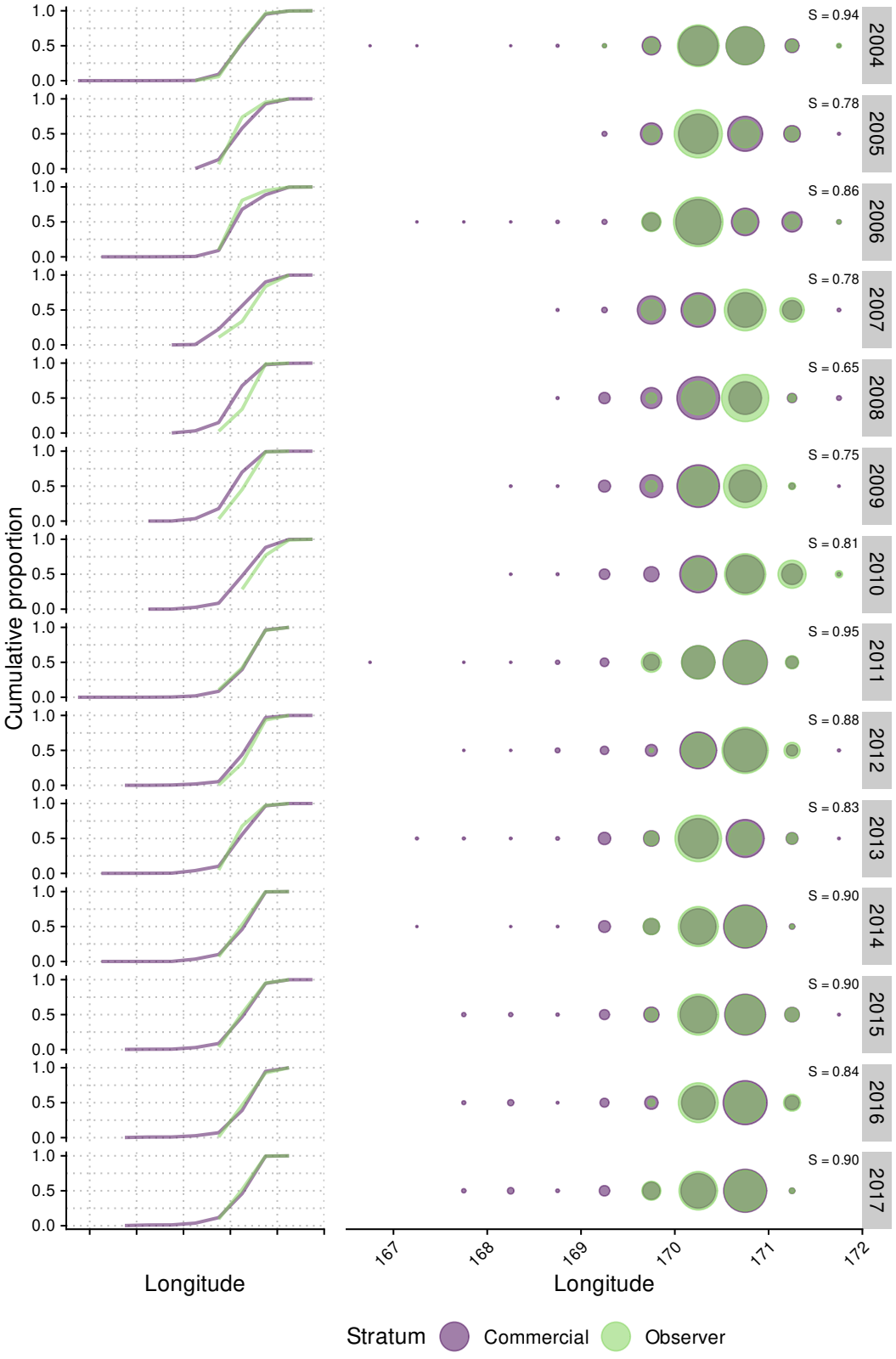


Figure 690: **Longitudinal representativeness of observer sampling coverage of Trawl fishing events in HOK 1WC, where the hoki catch exceeded the 70kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

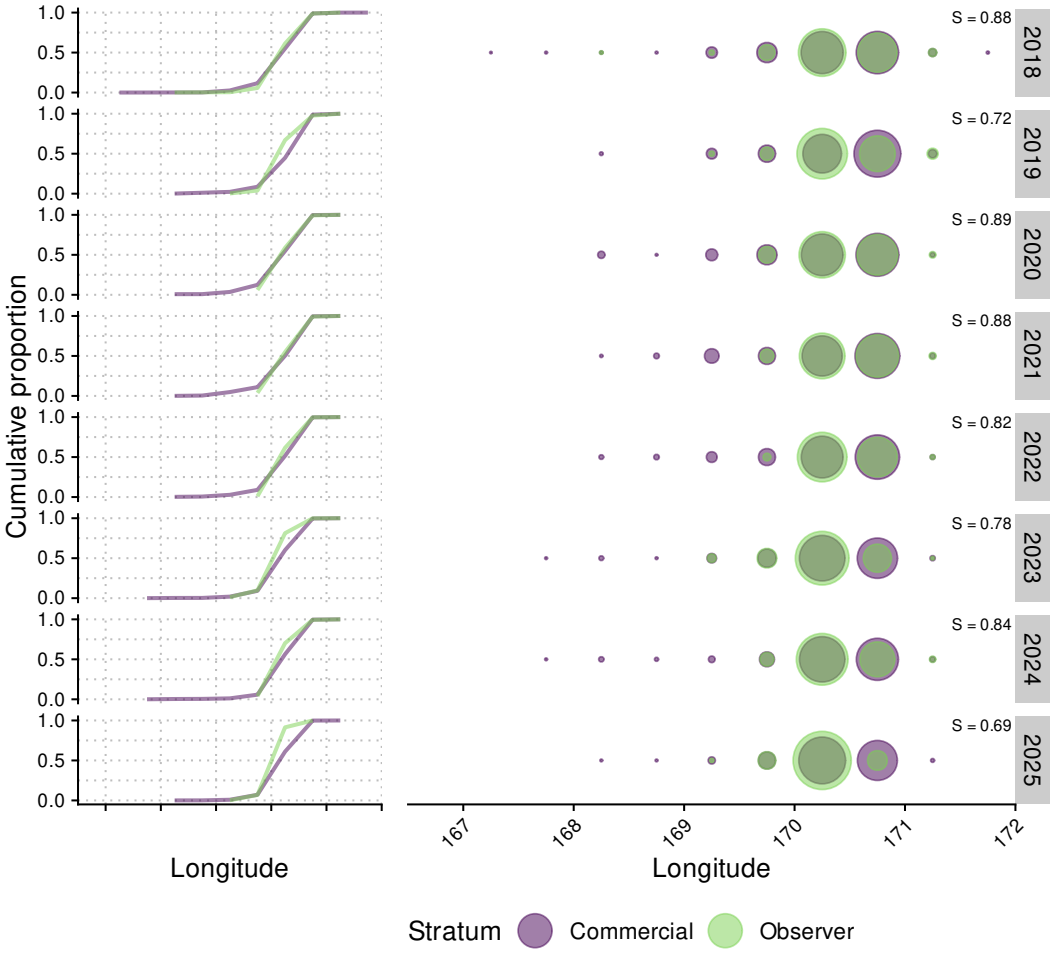


Figure 691: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in HOK 1WC, where the hoki catch exceeded the 70kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

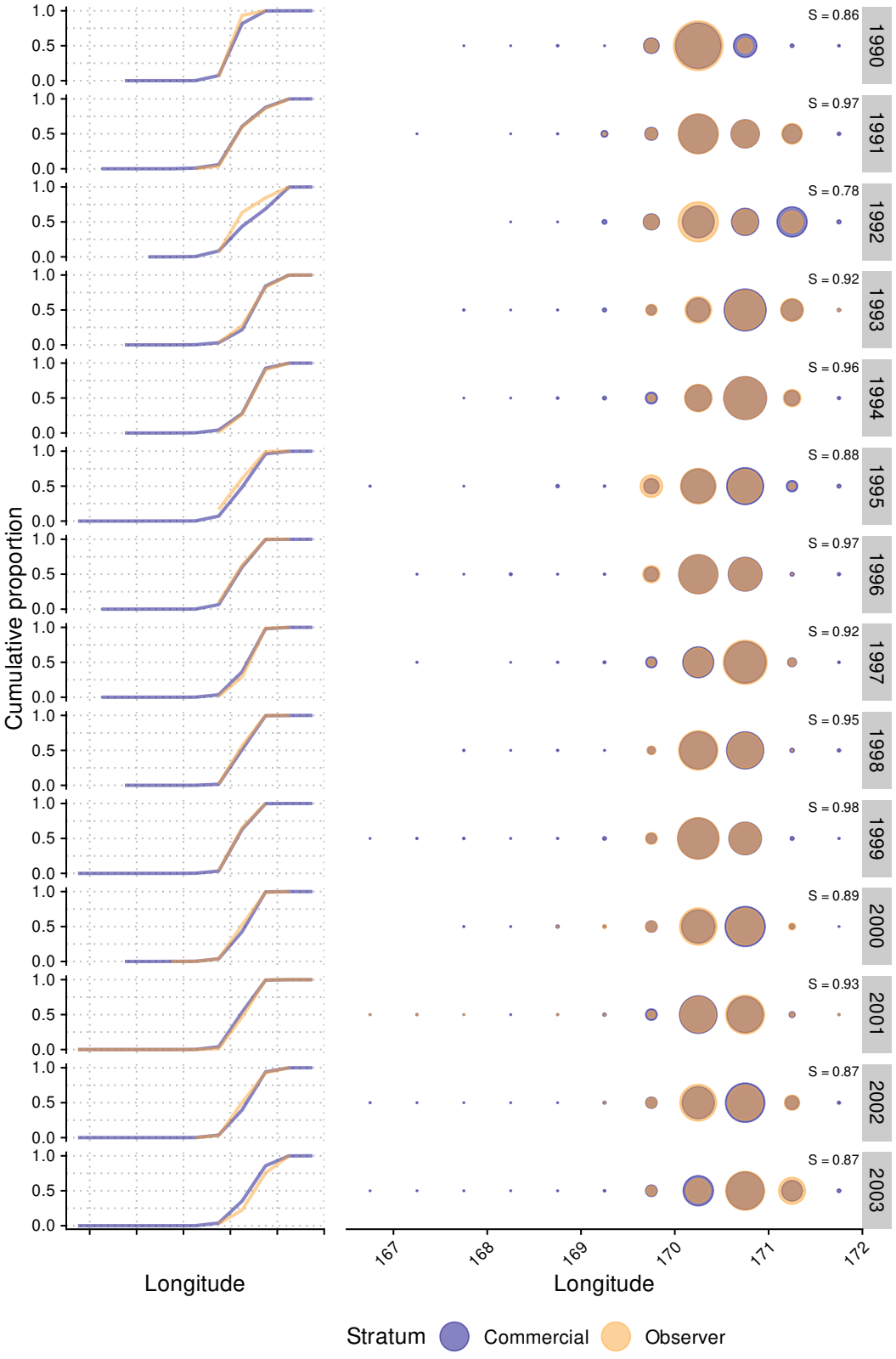


Figure 692: Longitudinal representativeness of observer sampling coverage of Trawl catch in HOK 1WC, from events where the hoki catch exceeded the 70kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

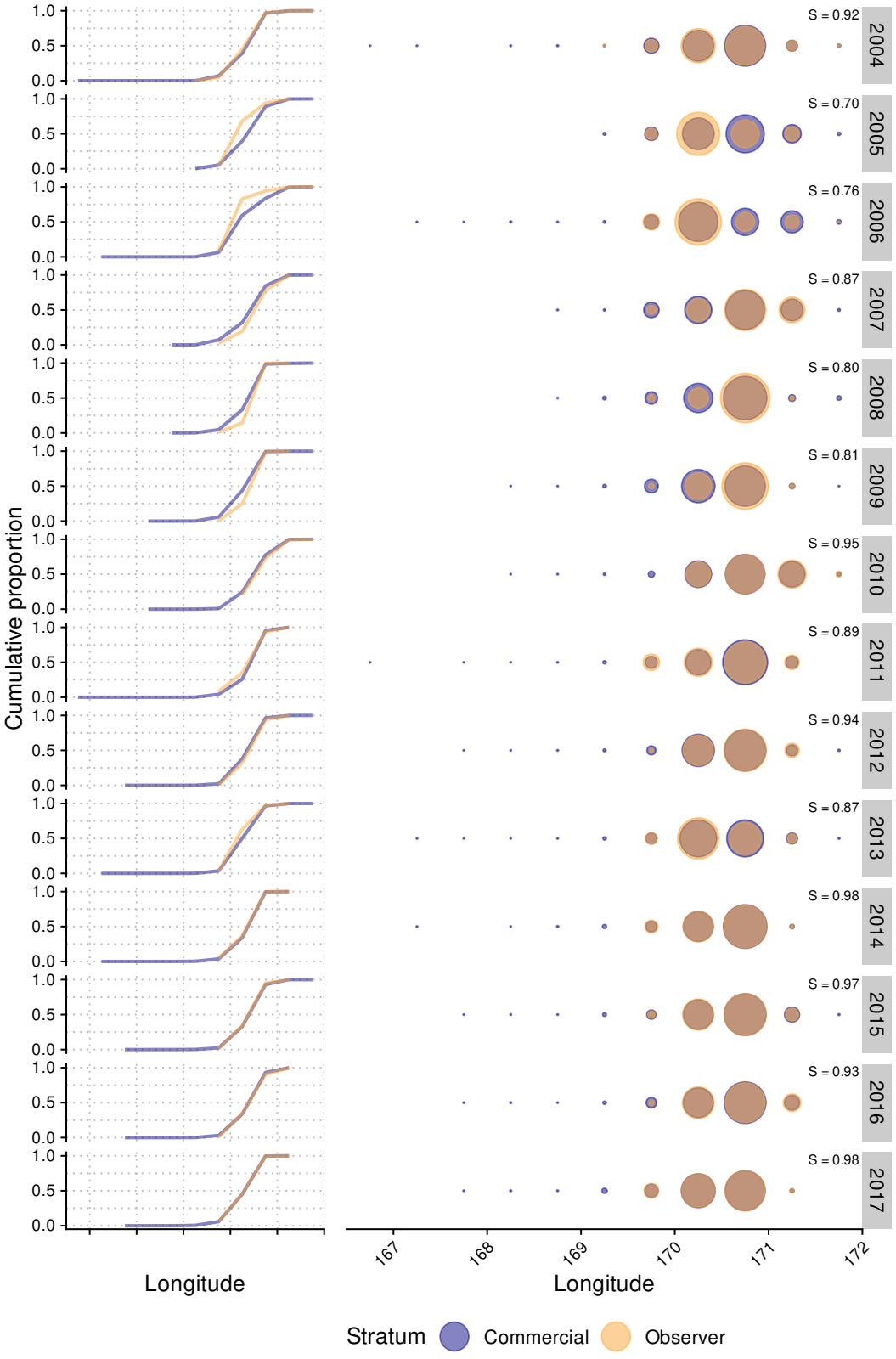


Figure 693: Longitudinal representativeness of observer sampling coverage of Trawl catch in HOK 1WC, from events where the hoki catch exceeded the 70kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

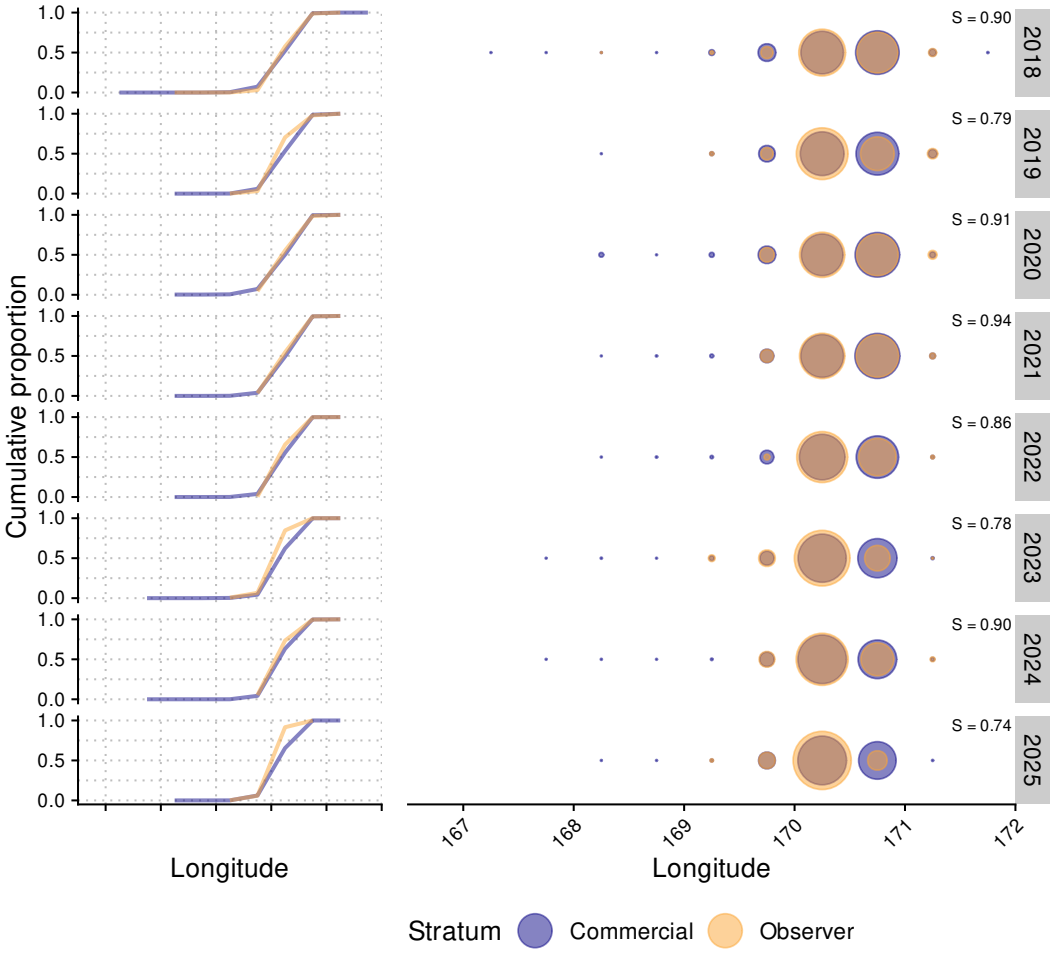


Figure 694: **Longitudinal representativeness of observer sampling coverage of Trawl catch in HOK 1WC, from events where the hoki catch exceeded the 70kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

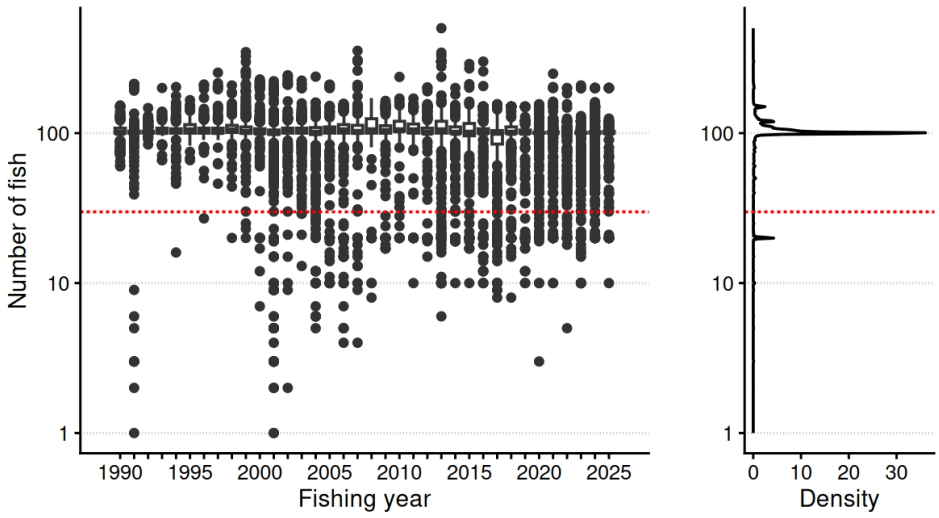


Figure 695: **Length-frequency sample sizes for observed fishing events in HOK 1WC where hoki were sampled. The red dashed line indicates a sample size of 30 fish.**

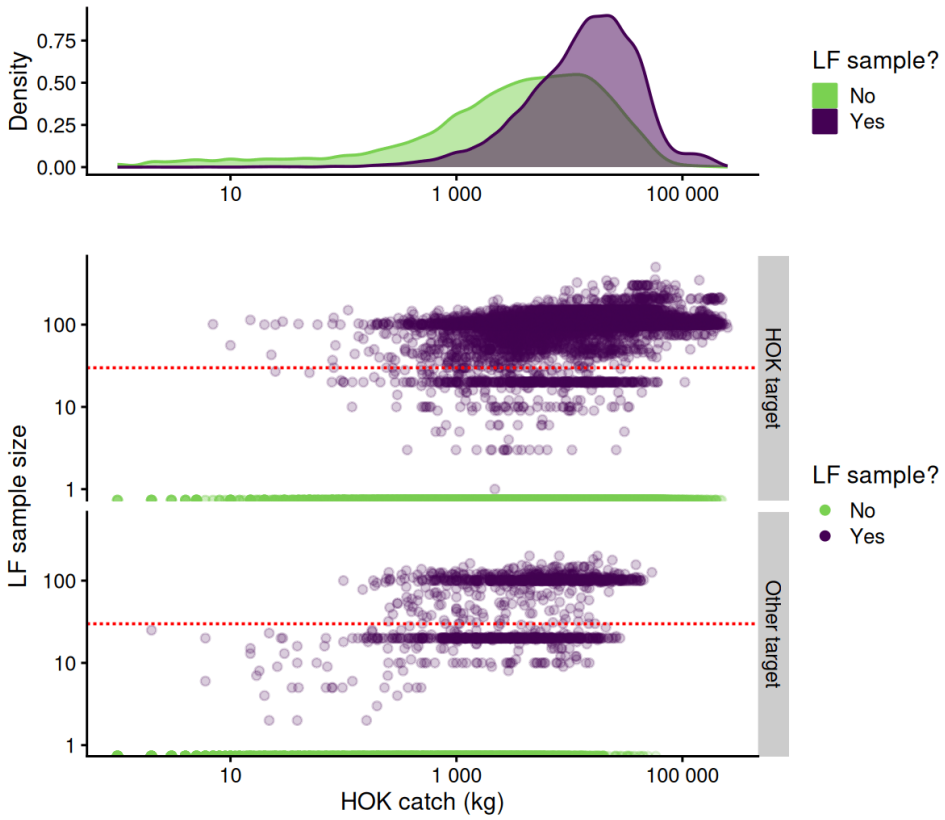


Figure 696: Length-frequency sample sizes (number of fish sampled) for observed fishing events in HOK 1WC in relation to the total hoki catch from an event, separately for hoki target events and other target species. The red dashed line indicates a sample size of 30 fish.

2.10.6.2 Otolith samples

Table 58: Otolith samples of hoki from the HOK 1WC Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of hoki exceeded a potential sampling threshold of 70 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	7464	0	0	0.00
1991	7999	0	0	0.00
1992	6235	0	0	0.00
1993	7479	0	0	0.00
1994	8593	0	0	0.00
1995	8114	0	0	0.00
1996	6994	0	0	0.00
1997	8649	0	0	0.00
1998	8551	0	0	0.00
1999	7651	0	0	0.00
2000	8041	0	0	0.00
2001	9061	0	0	0.00
2002	8213	0	0	0.00
2003	8084	0	0	0.00
2004	7128	0	0	0.00
2005	4560	0	0	0.00
2006	4579	0	0	0.00
2007	3049	0	0	0.00
2008	2663	0	0	0.00
2009	2290	121	1171	5.28
2010	2889	150	1485	5.19
2011	3692	247	2412	6.69
2012	3836	274	2691	7.14
2013	4104	904	8921	22.03
2014	4849	534	5131	11.01
2015	5538	23	120	0.42
2016	5469	514	4989	9.40
2017	5531	612	5495	11.06
2018	5434	813	7893	14.96
2019	4273	580	5685	13.57
2020	3721	735	7277	19.75
2021	2921	600	5996	20.54
2022	2878	652	6468	22.65
2023	2747	802	7672	29.20
2024	2675	682	6967	25.50
2025	3016	521	5360	17.27

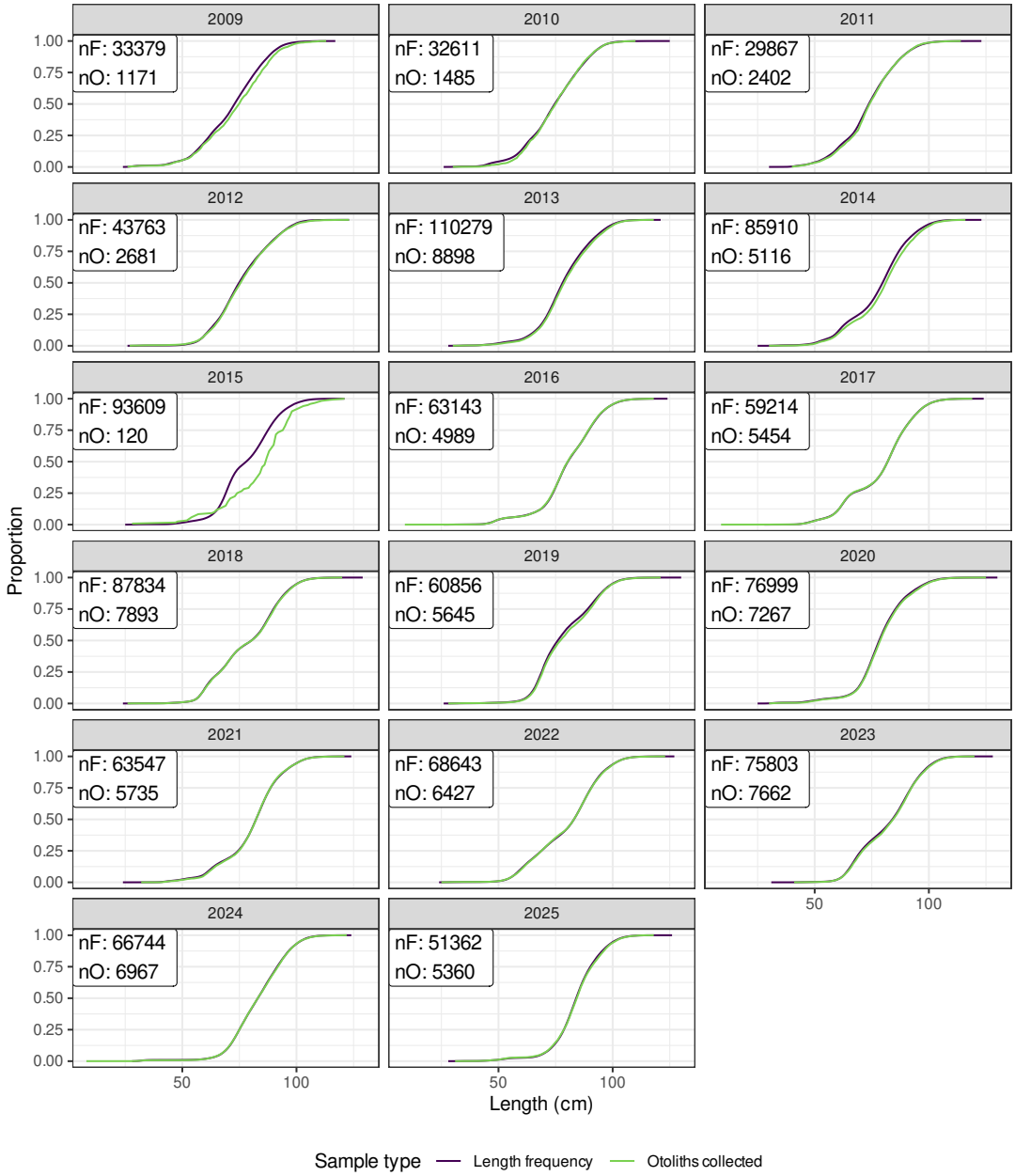


Figure 697: Cumulative distributions of the length of fish in the length frequency and otolith samples of hoki in the HOK 1WC Trawl fishery for the 2009 to 2025 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

2.10.6.3 Catch quantification

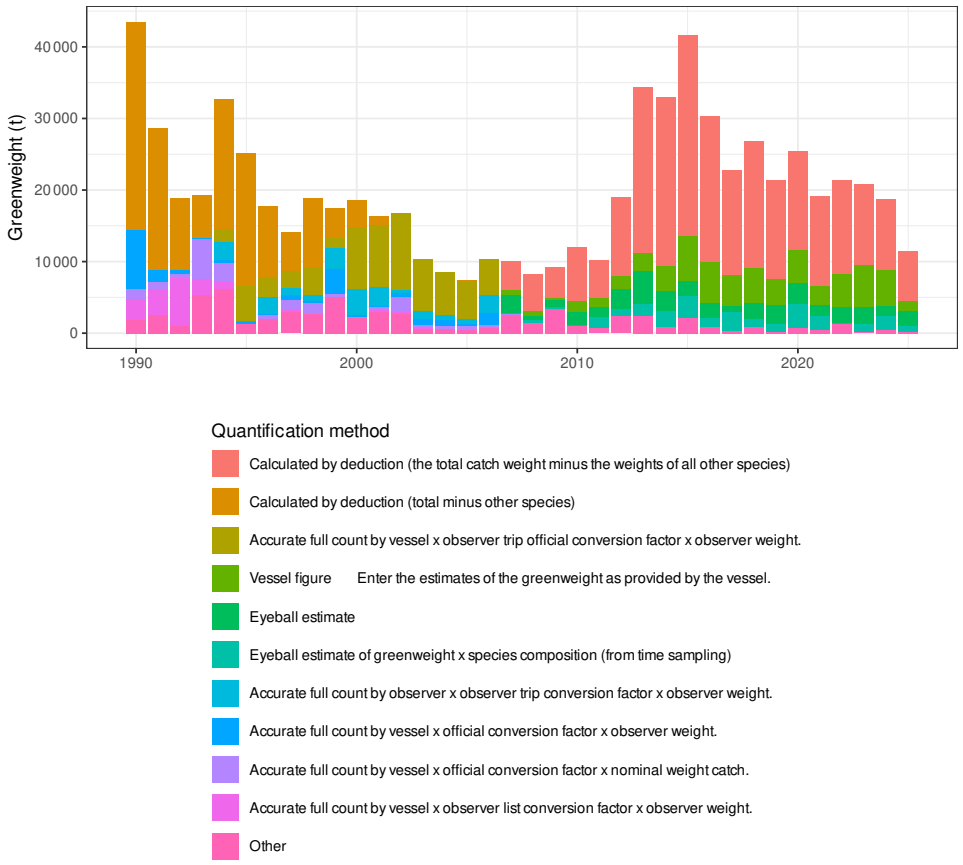


Figure 698: Methods used by observers to quantify the catch of hoki in the HOK 1WC Trawl fishery. The legend lists the methods used in descending order of total catch.

2.11 JMA stocks

Observer sampling of jack mackerel is considered with respect to the jack mackerel Quota Management Areas.

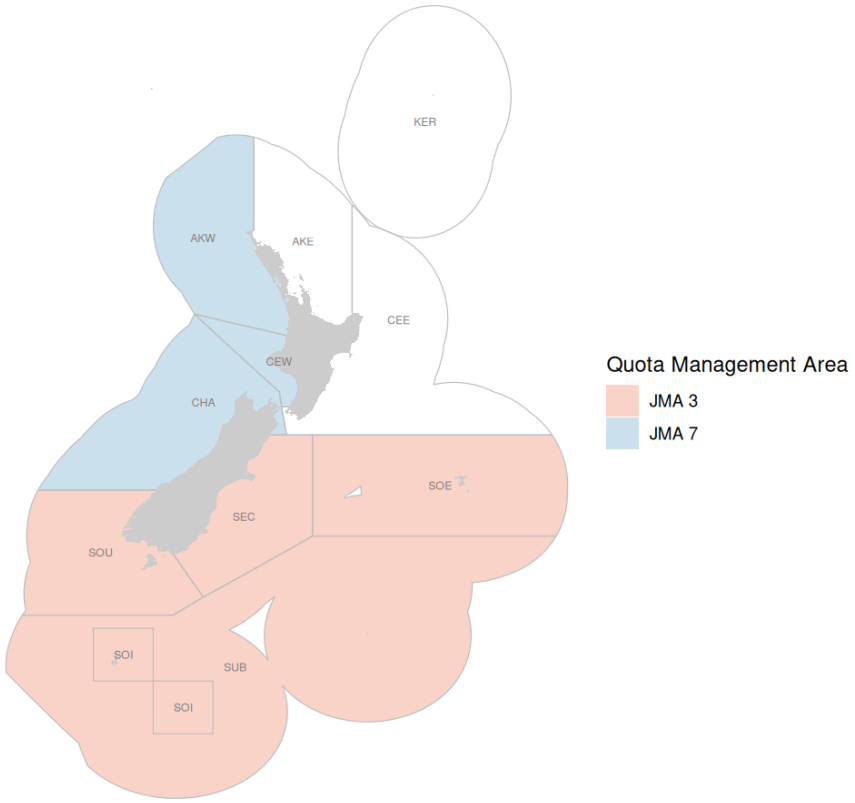


Figure 699: Observer Fisheries Management Areas (black borders, labels on plot) in relation to the Quota Management Area for jack mackerel (coloured areas, per legend).

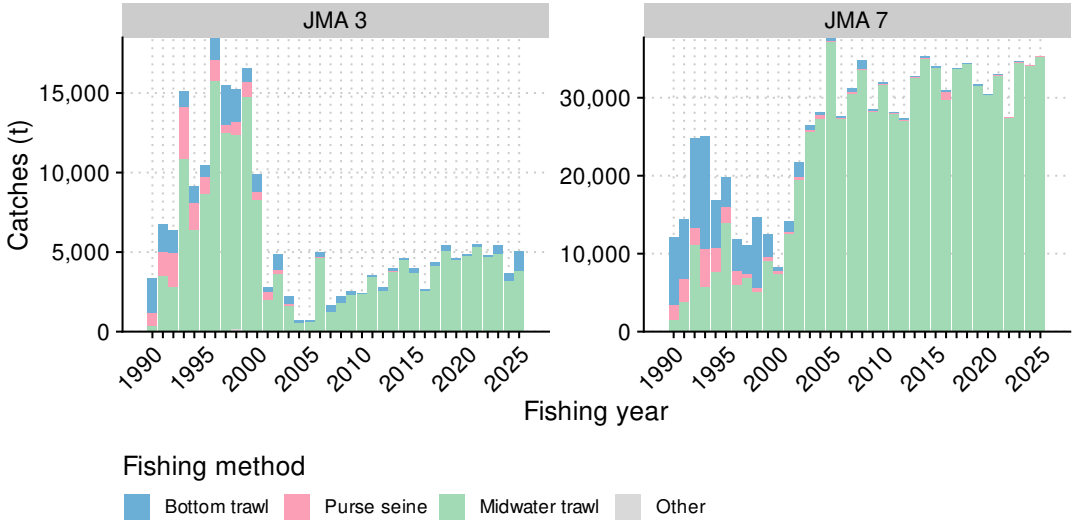


Figure 700: Catches of jack mackerel by fishing method, for events within the jack mackerel Quota Management Areas. Methods grouped as Other include: BLL, BPT, BS, CP, CRP, D, DL, DN, DS, DV, FN, FP, HL, OCP, PL, POT, PRB, PRM, PSH, PSN, RLP, RN, SJ, SN, T, TL.

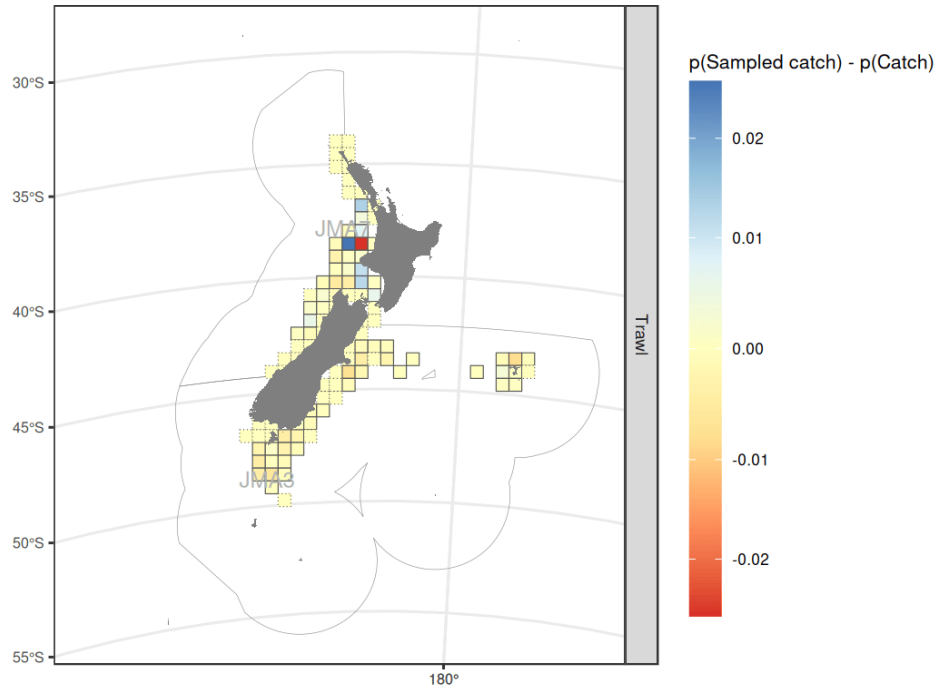


Figure 701: Differences in the relative proportions of catch and sampled catch for jack mackerel during 2021–2025. Cells with a dotted border had no sampling.

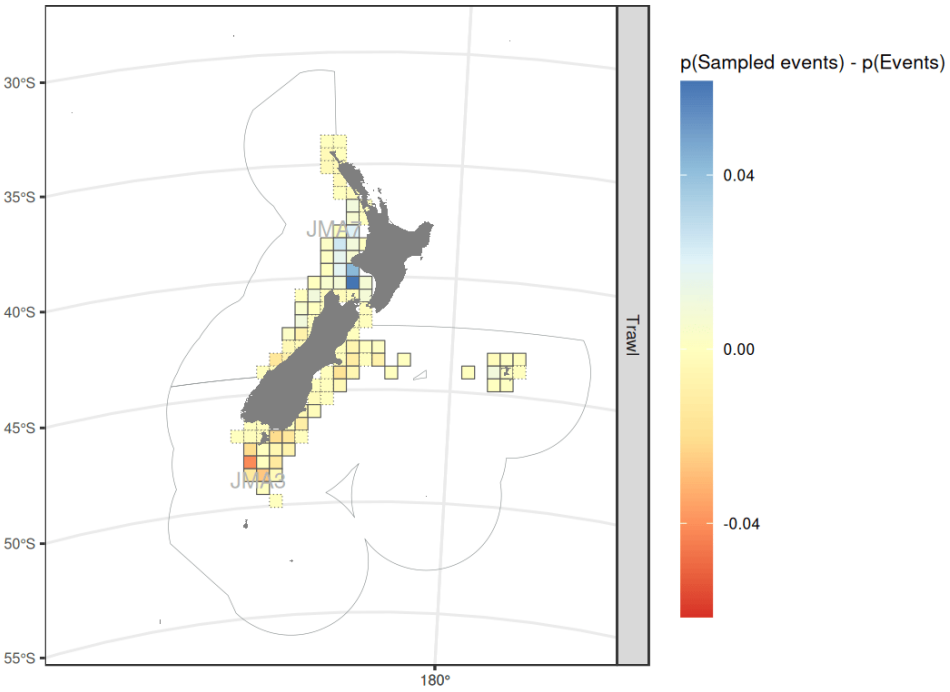


Figure 702: Differences in the relative proportions of events meeting the sampling threshold and sampled events for jack mackerel during 2021–2025. Cells with a dotted border had no sampling.

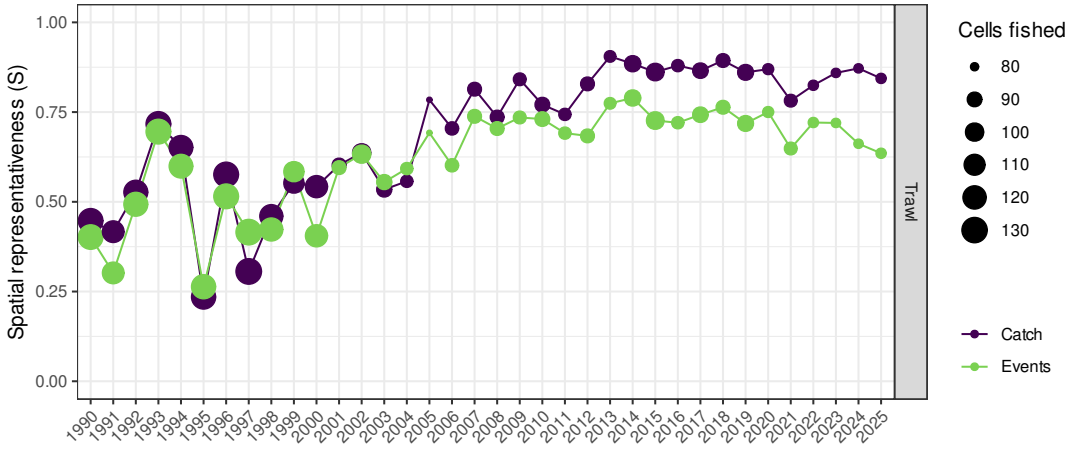


Figure 703: Spatial representativeness of observer sampling of jack mackerel by fishing year. Representativeness is assessed using the Manhattan distance metric (*S*) applied to 64 km grid cells, for both the proportion of catch sampled and the proportion of positive events sampled.

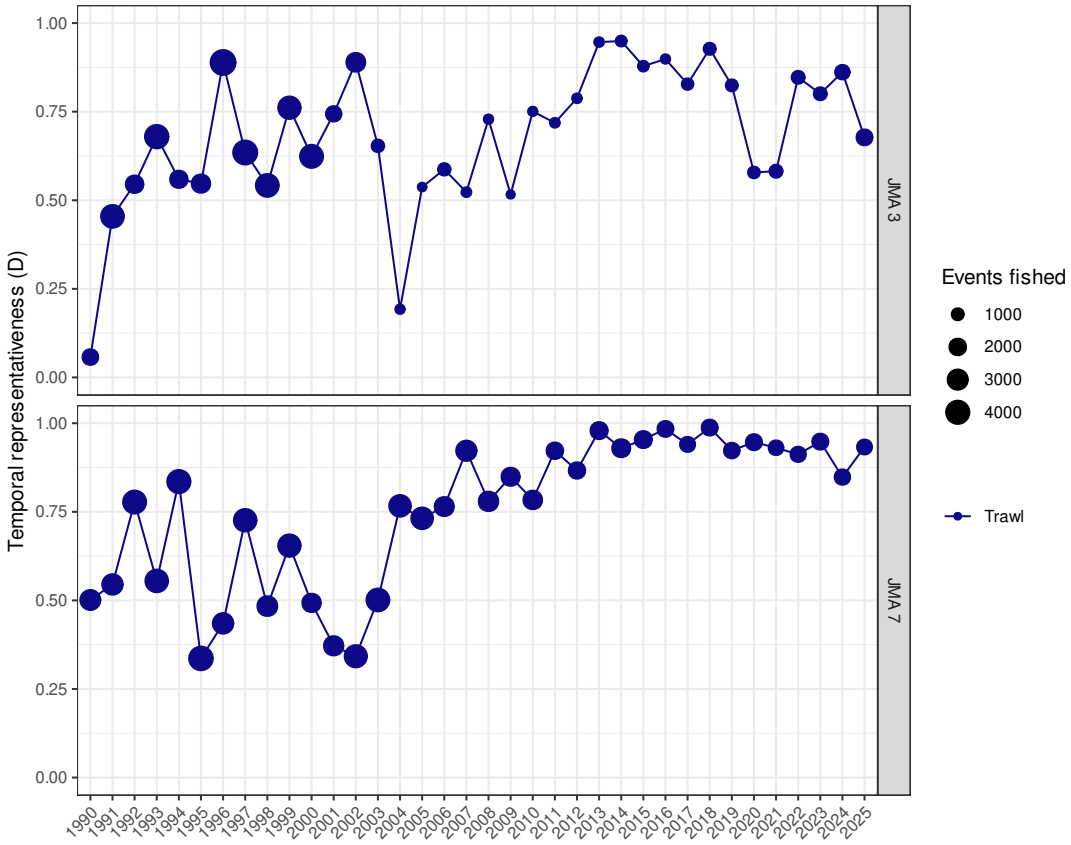


Figure 704: Temporal representativeness of observer sanpling of jack mackerel by fishing year and area. Temporal representativeness is assessed using the KS statistic (*D*) applied to the start date-times of all fishing events and all sampled fishing events, weighted by catch weight.

2.11.1 JMA 3: Trawl fishery

2.11.1.1 Length-frequency samples

Table 59: Length-frequency samples of jack mackerel from the JMA 3 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of jack mackerel exceeded a potential sampling threshold of 120 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	1 480	2	185	0.14
1991	3 309	7	518	0.21
1992	1 869	12	874	0.64
1993	3 753	125	7 636	3.33
1994	2 050	41	1 835	2.00
1995	2 362	11	397	0.47
1996	4 391	102	8 644	2.32
1997	4 098	15	1 036	0.37
1998	3 768	60	5 247	1.59
1999	3 532	51	4 317	1.44
2000	3 759	31	2 555	0.82
2001	1 520	91	3 932	5.99
2002	2 410	86	2 985	3.57
2003	1 088	17	679	1.56
2004	529	7	30	1.32
2005	435	28	185	6.44
2006	1 077	29	808	2.69
2007	640	15	735	2.34
2008	548	25	1 070	4.56
2009	450	15	394	3.33
2010	588	48	1 601	8.16
2011	649	54	5 479	8.32
2012	637	46	1 884	7.22
2013	633	115	7 906	18.17
2014	831	194	11 965	23.35
2015	786	102	5 852	12.98
2016	560	64	3 117	11.43
2017	917	112	4 301	12.21
2018	1 025	176	10 984	17.17
2019	1 007	130	5 325	12.91
2020	963	99	5 724	10.28
2021	1 201	83	3 296	6.91
2022	1 179	153	5 864	12.98
2023	1 191	89	3 884	7.47
2024	1 507	120	5 253	7.96
2025	1 824	148	5 895	8.11

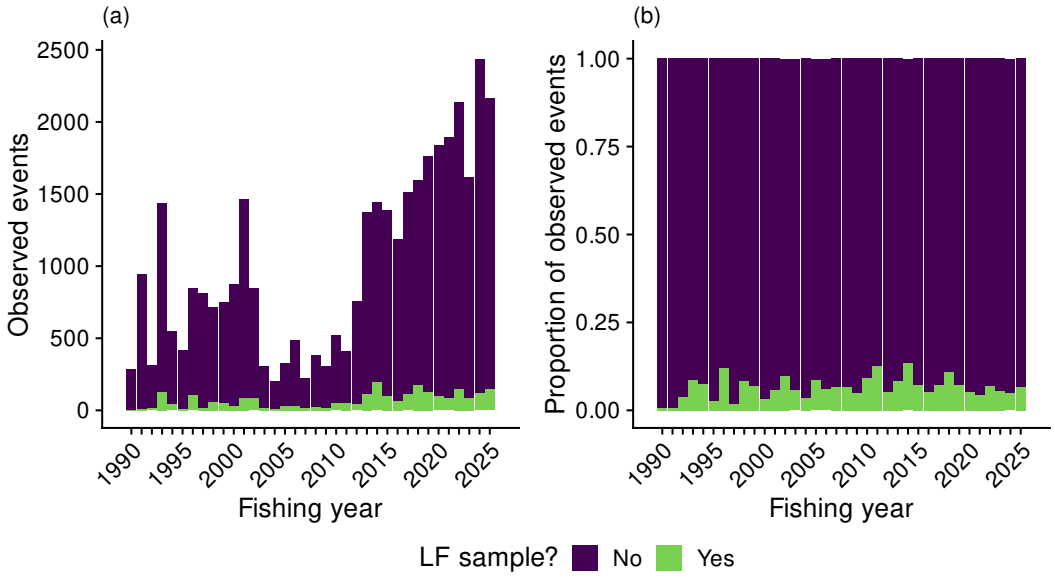


Figure 705: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in JMA 3 where the jack mackerel catch exceeded the 120 kg threshold, with and without length-frequency sampling.**

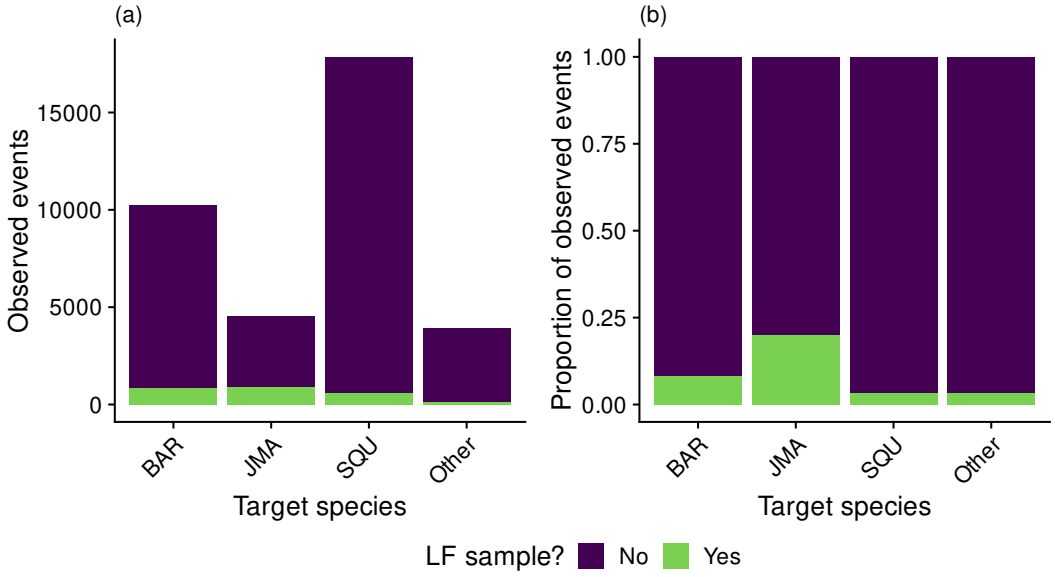


Figure 706: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in JMA 3 where the jack mackerel catch exceeded the 120 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

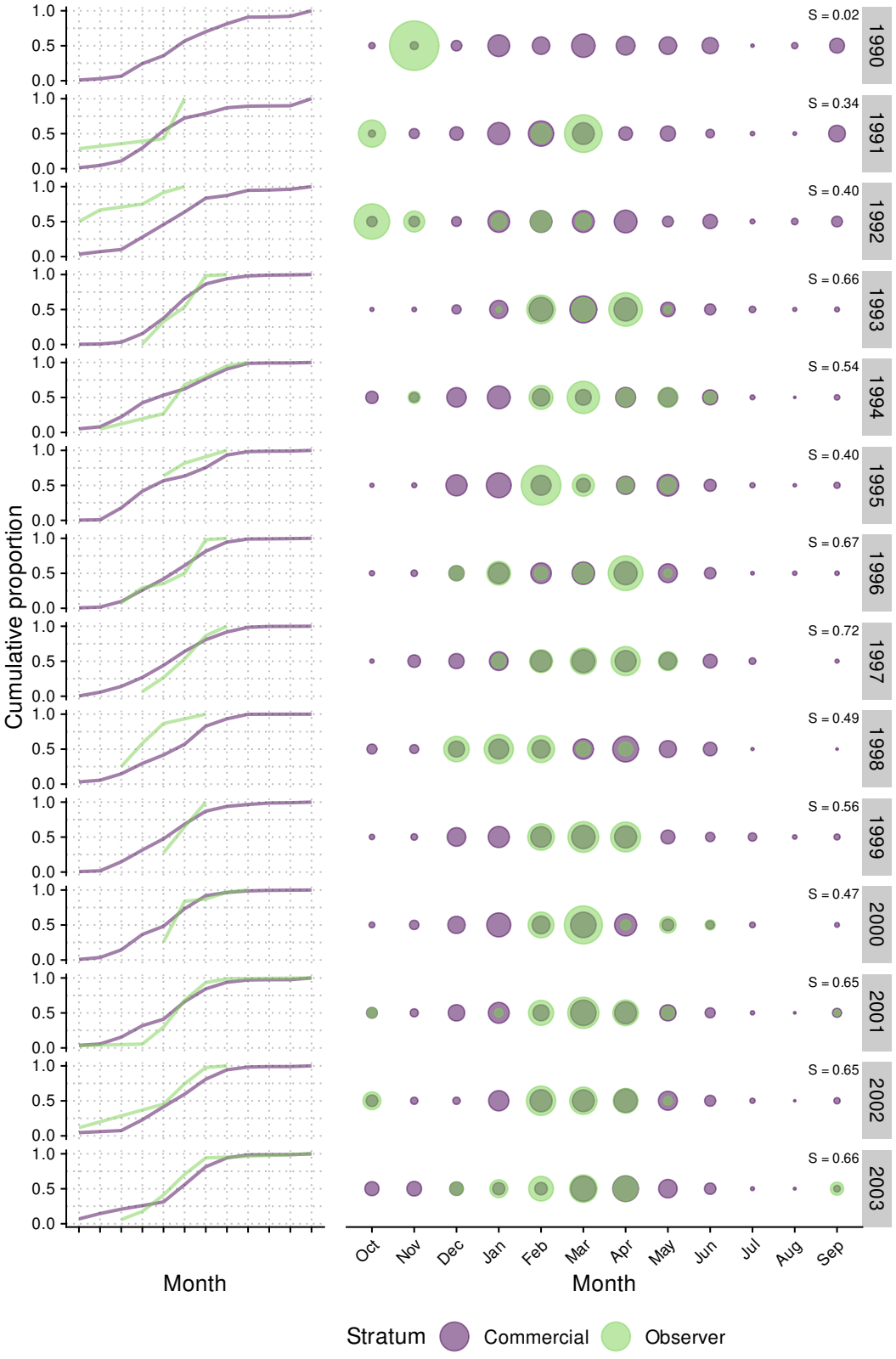


Figure 707: Monthly representativeness of observer sampling coverage of Trawl fishing events in JMA 3, where the jack mackerel catch exceeded the 120kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

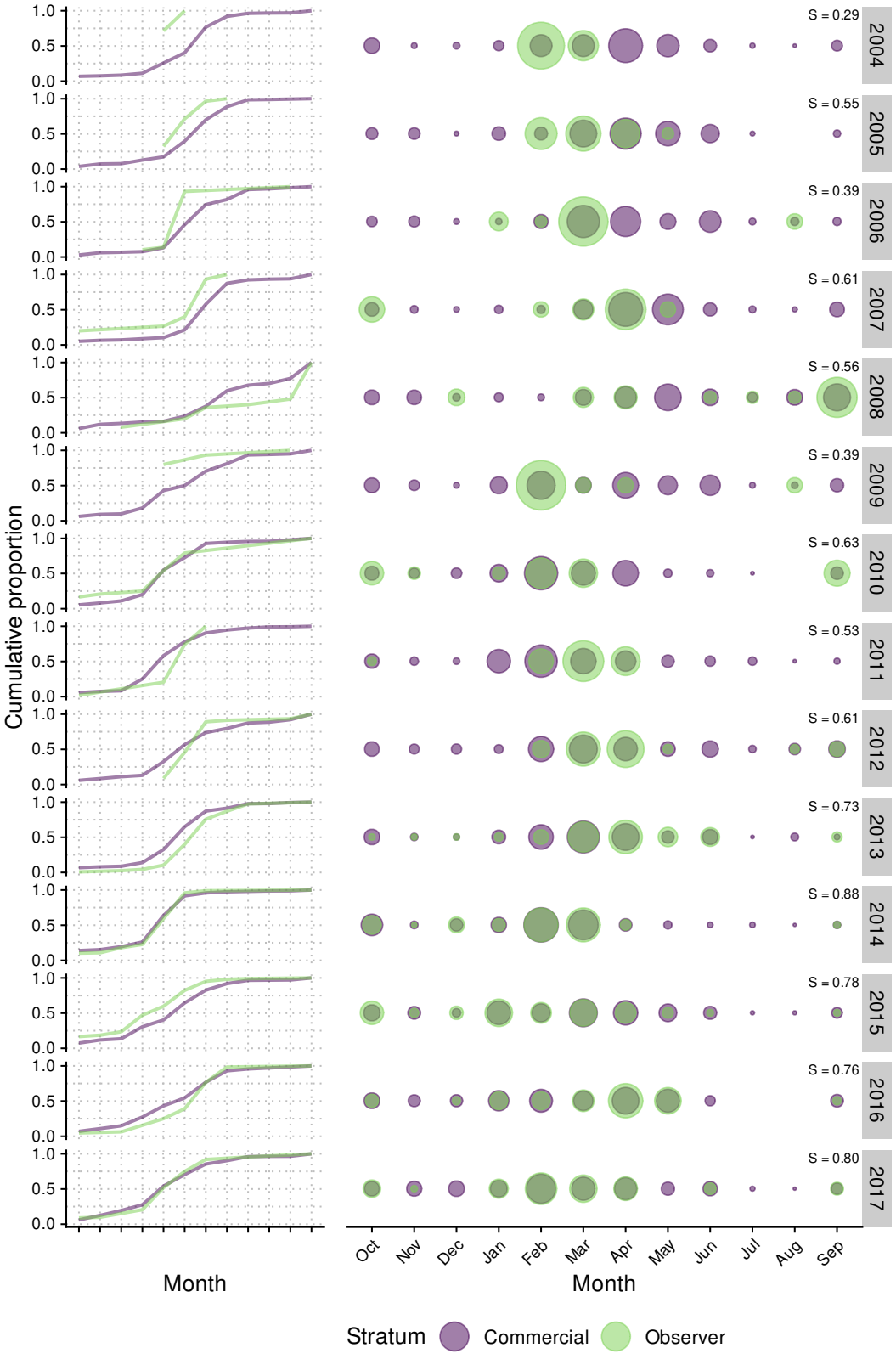


Figure 708: Monthly representativeness of observer sampling coverage of Trawl fishing events in JMA 3, where the jack mackerel catch exceeded the 120kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

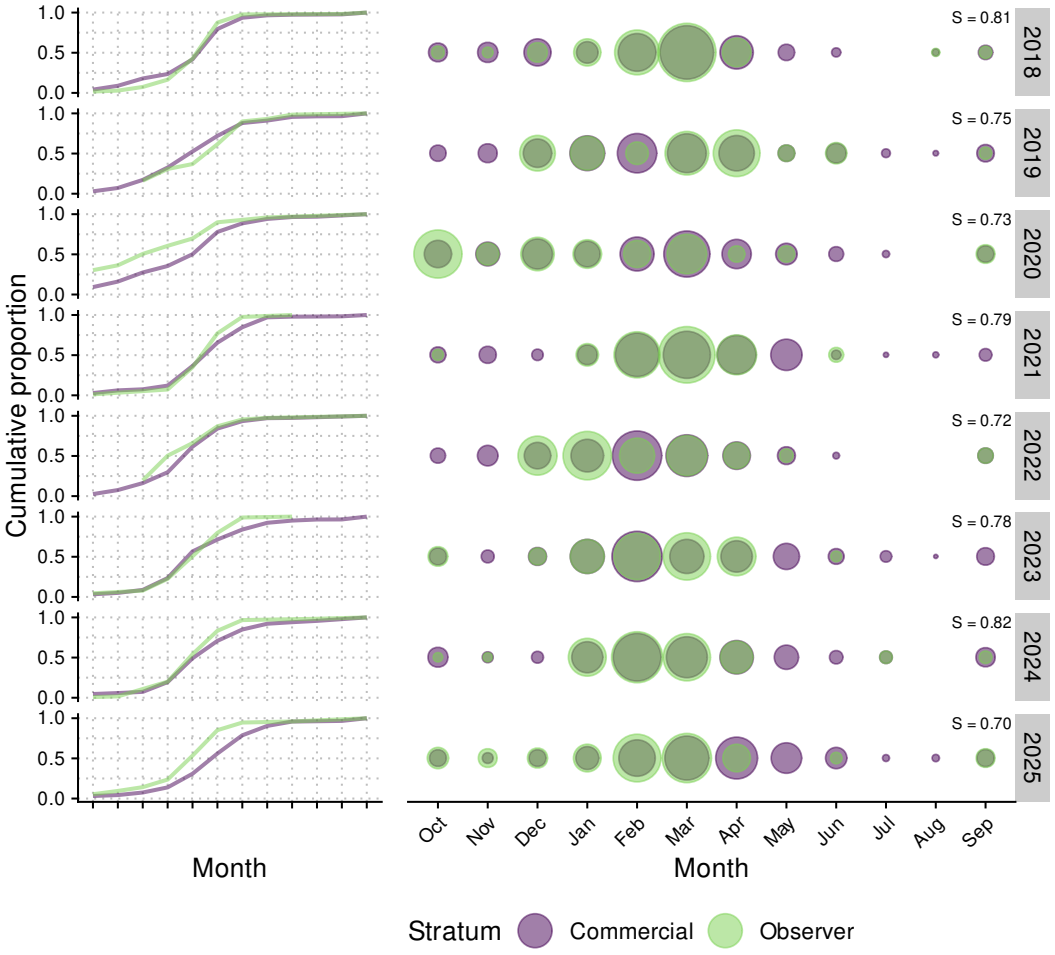


Figure 709: Monthly representativeness of observer sampling coverage of Trawl fishing events in JMA 3, where the jack mackerel catch exceeded the 120kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

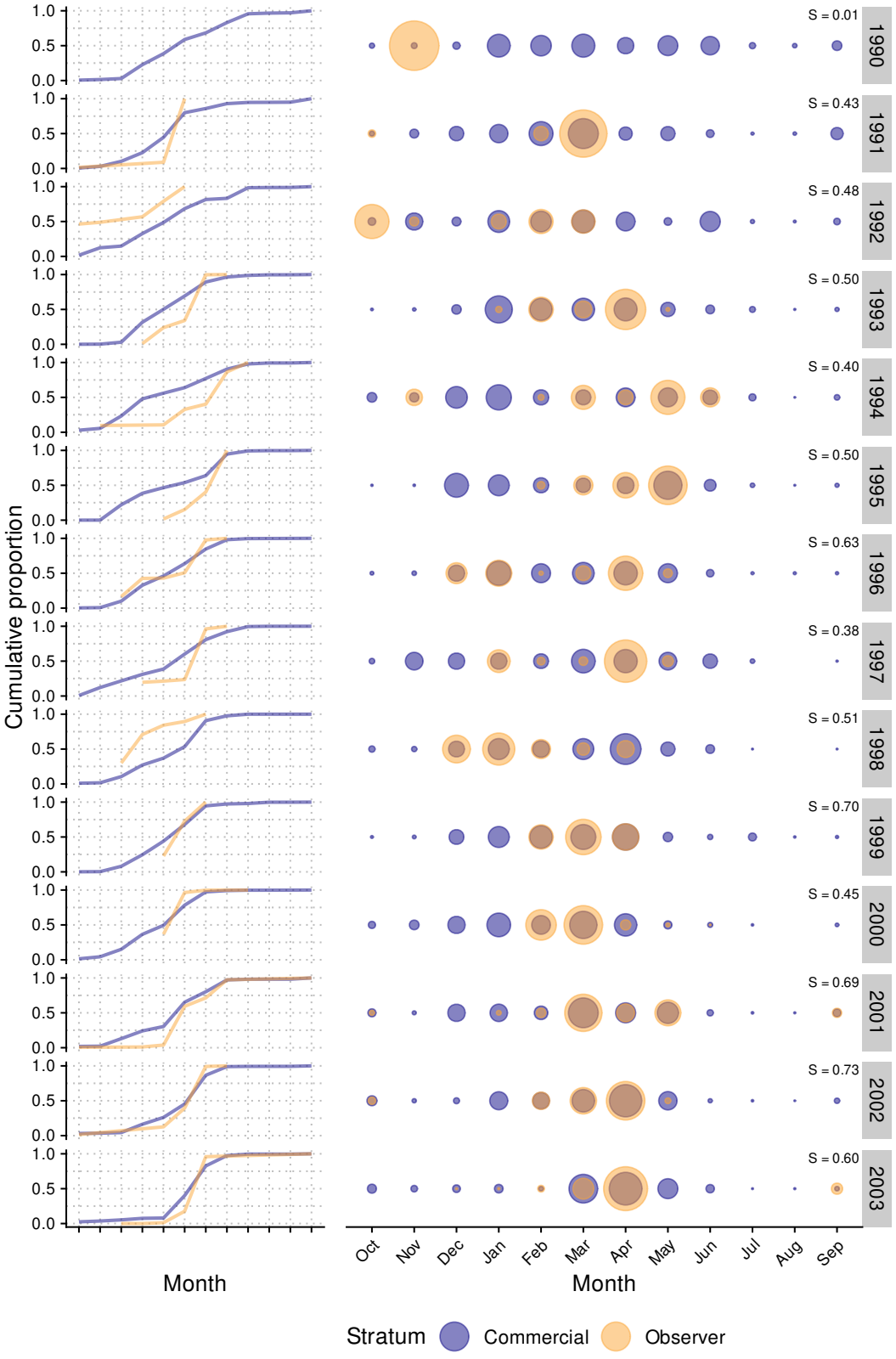


Figure 710: Monthly representativeness of observer sampling coverage of Trawl catch in JMA 3, from events where the jack mackerel catch exceeded the 120kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

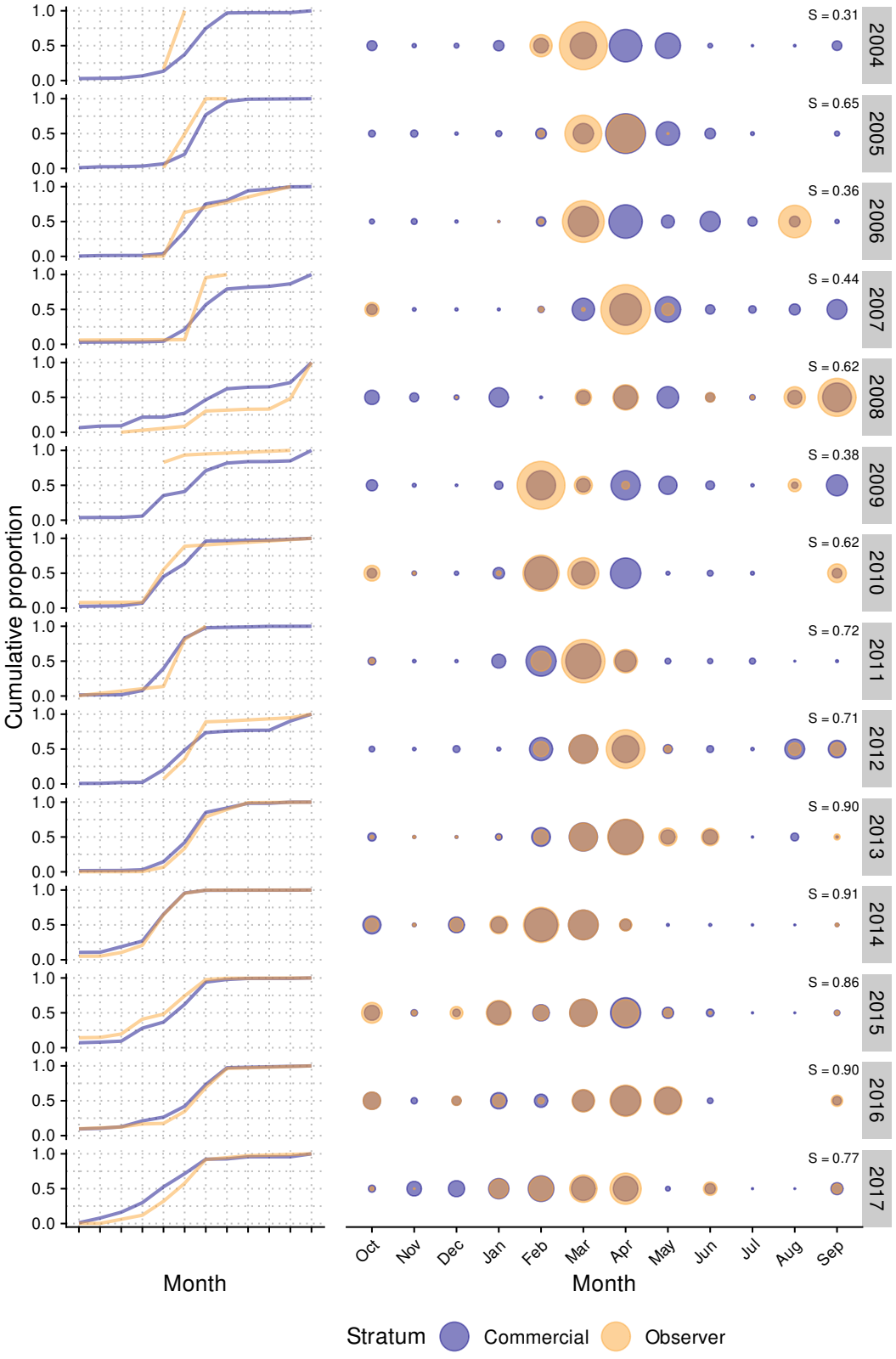


Figure 711: Monthly representativeness of observer sampling coverage of Trawl catch in JMA 3, from events where the jack mackerel catch exceeded the 120kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

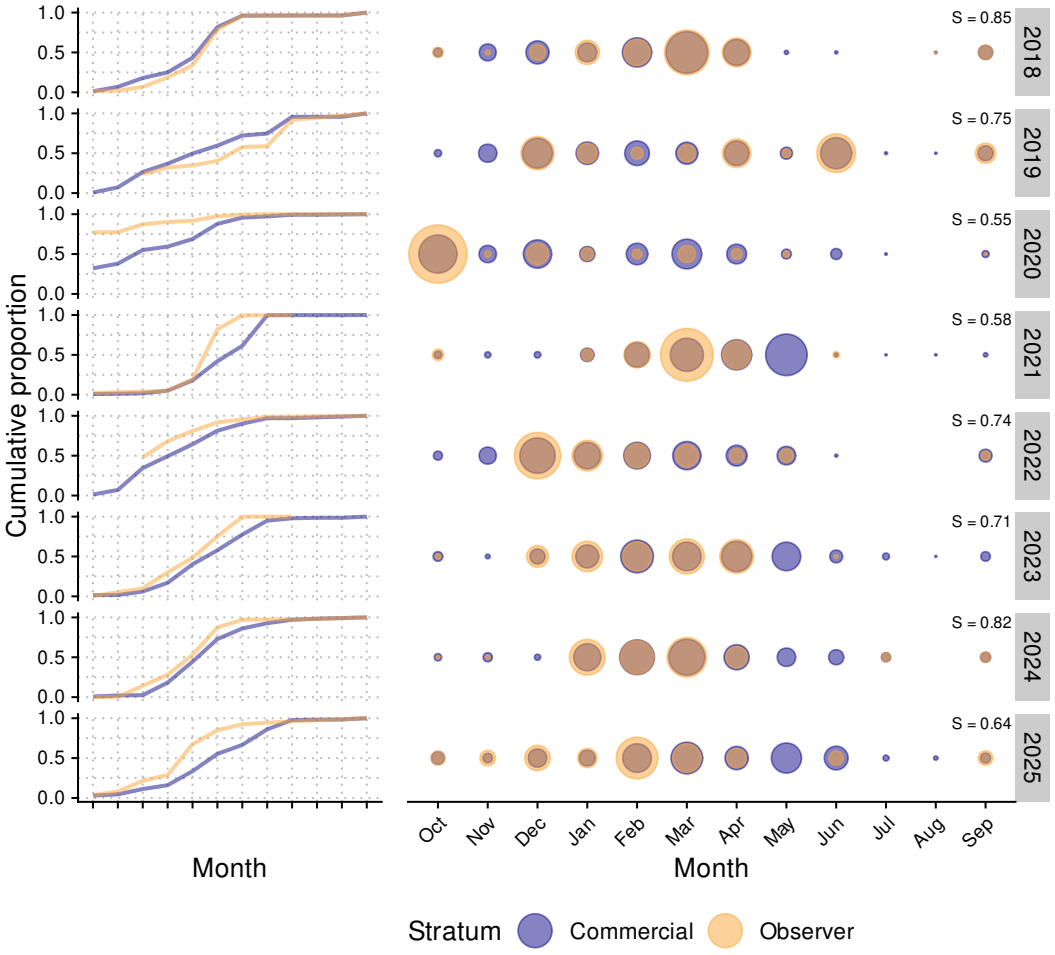


Figure 712: Monthly representativeness of observer sampling coverage of Trawl catch in JMA 3, from events where the jack mackerel catch exceeded the 120kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

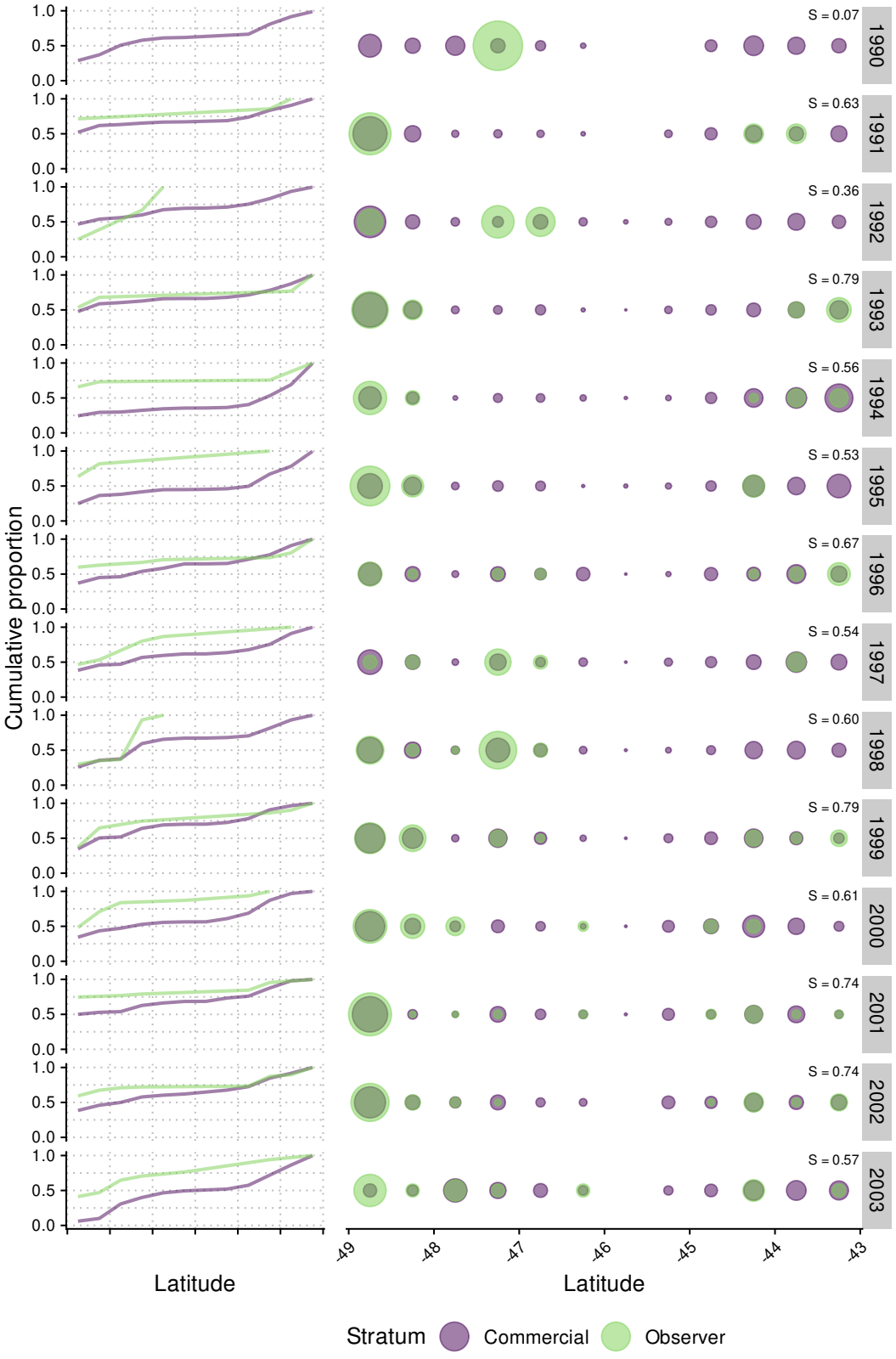


Figure 713: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in JMA 3, where the jack mackerel catch exceeded the 120kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

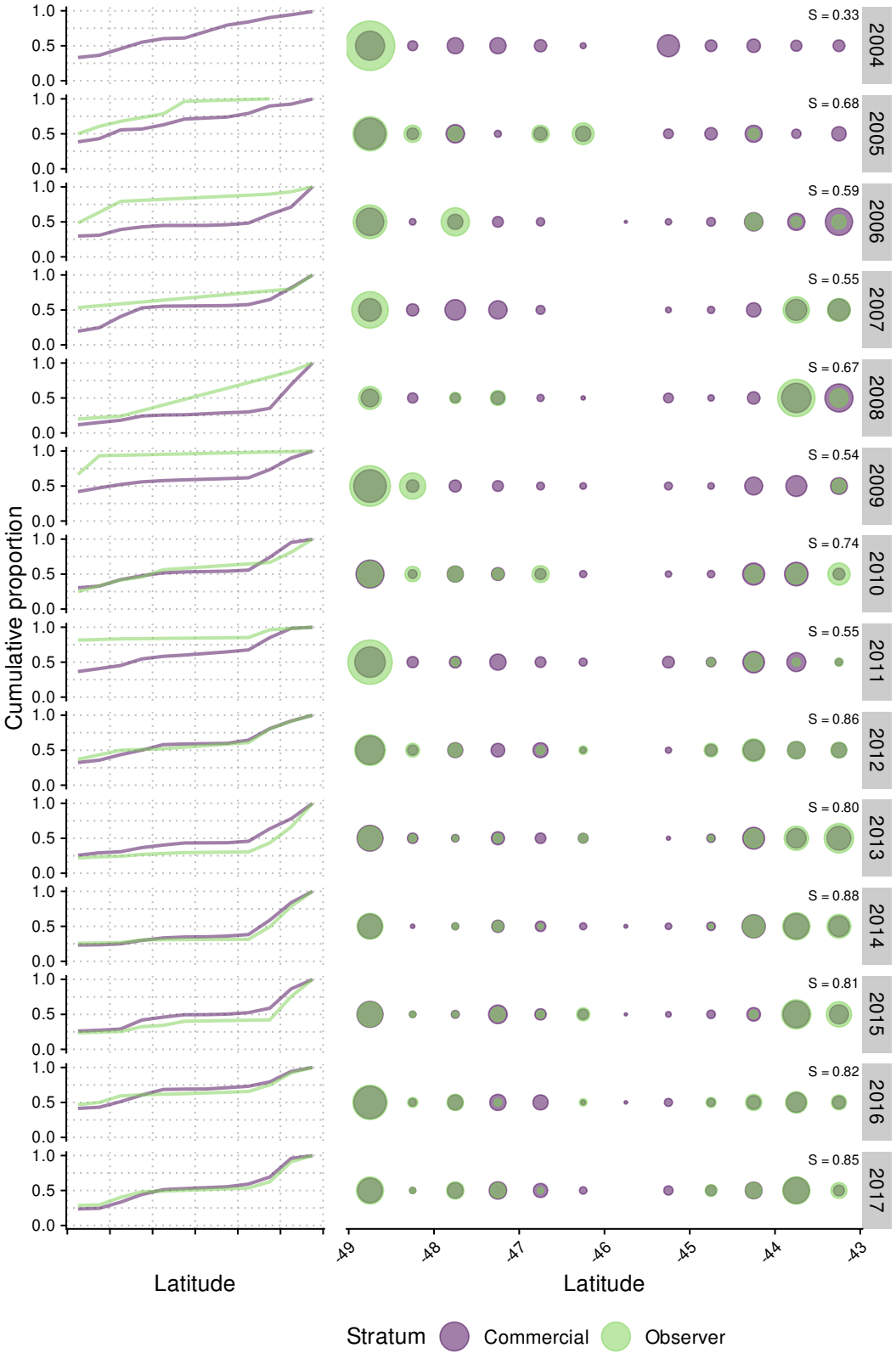


Figure 714: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in JMA 3, where the jack mackerel catch exceeded the 120kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

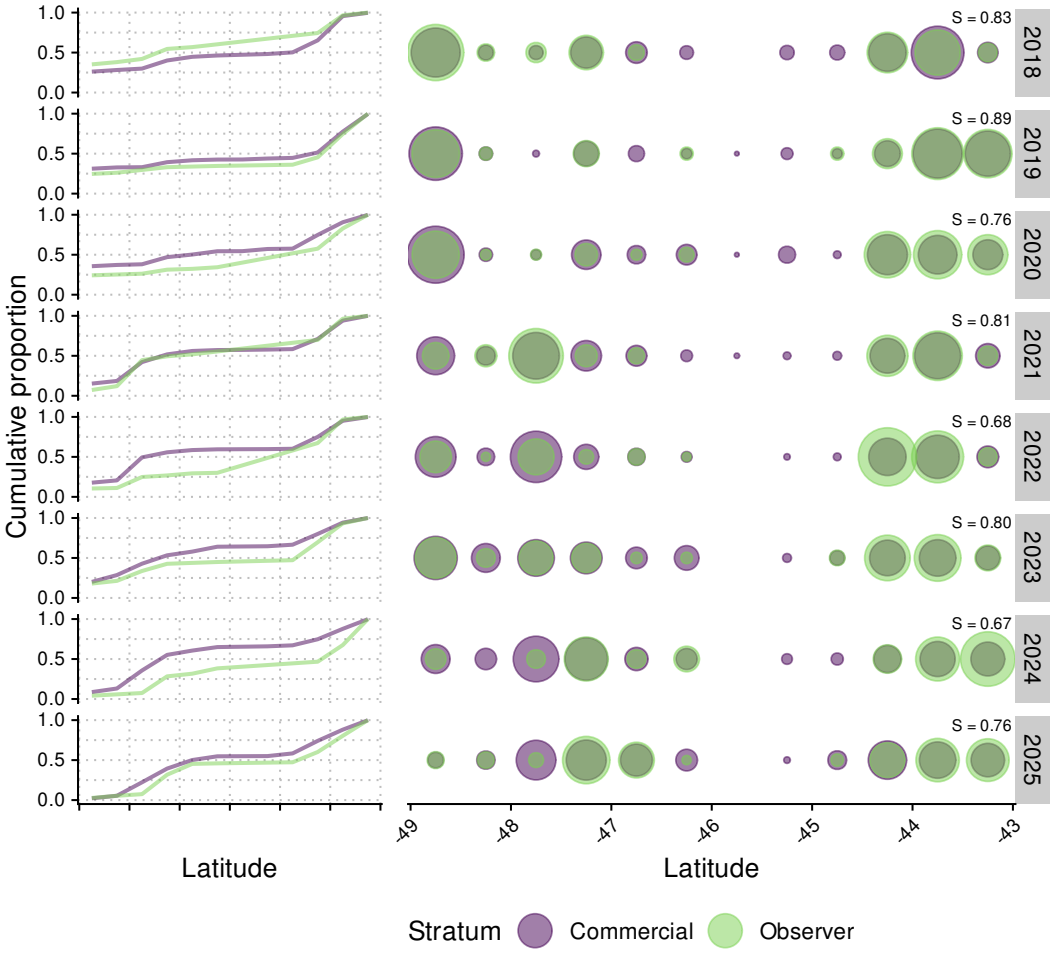


Figure 715: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in JMA 3, where the jack mackerel catch exceeded the 120kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

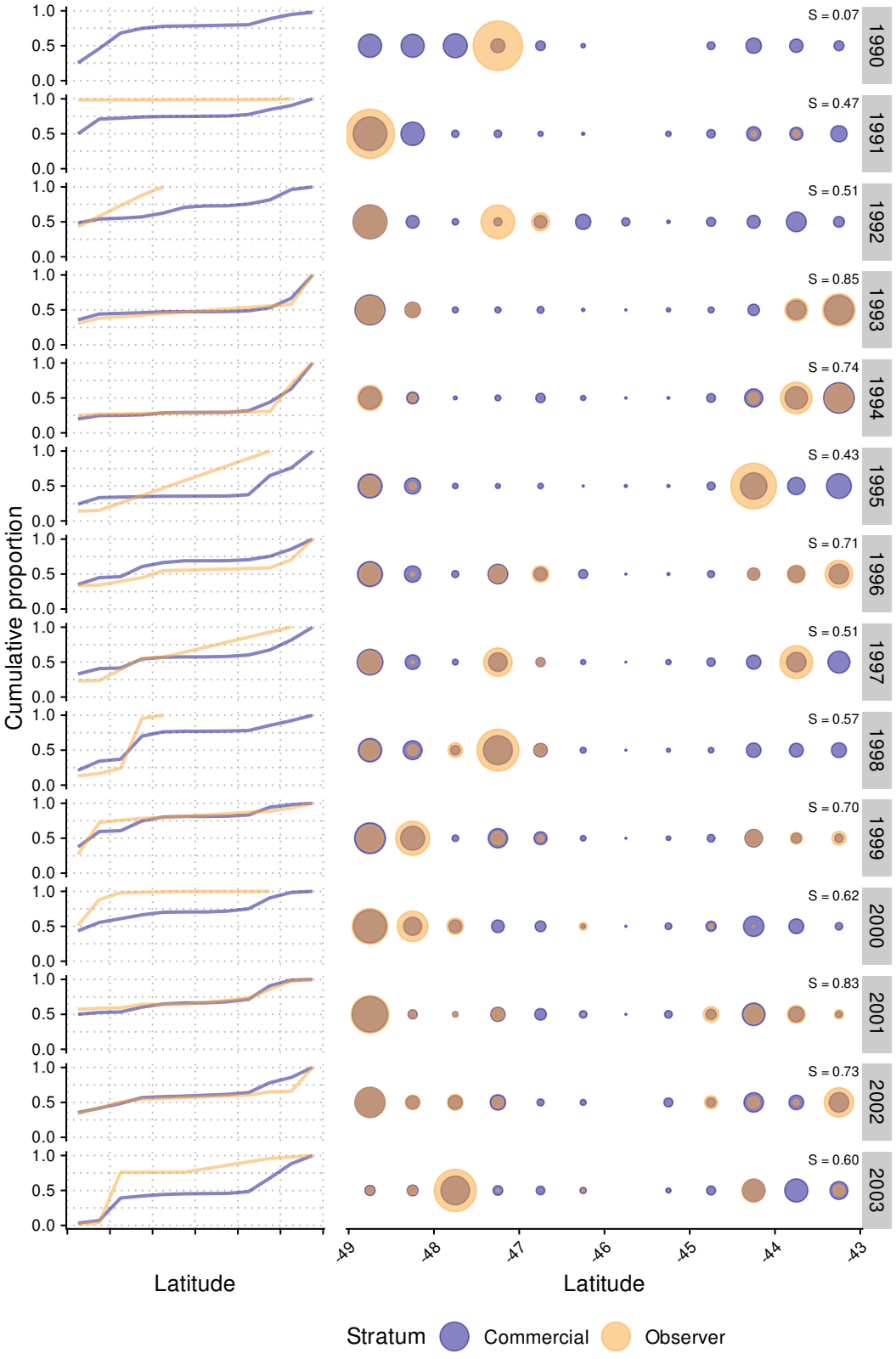


Figure 716: Latitudinal representativeness of observer sampling coverage of Trawl catch in JMA 3, from events where the jack mackerel catch exceeded the 120kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

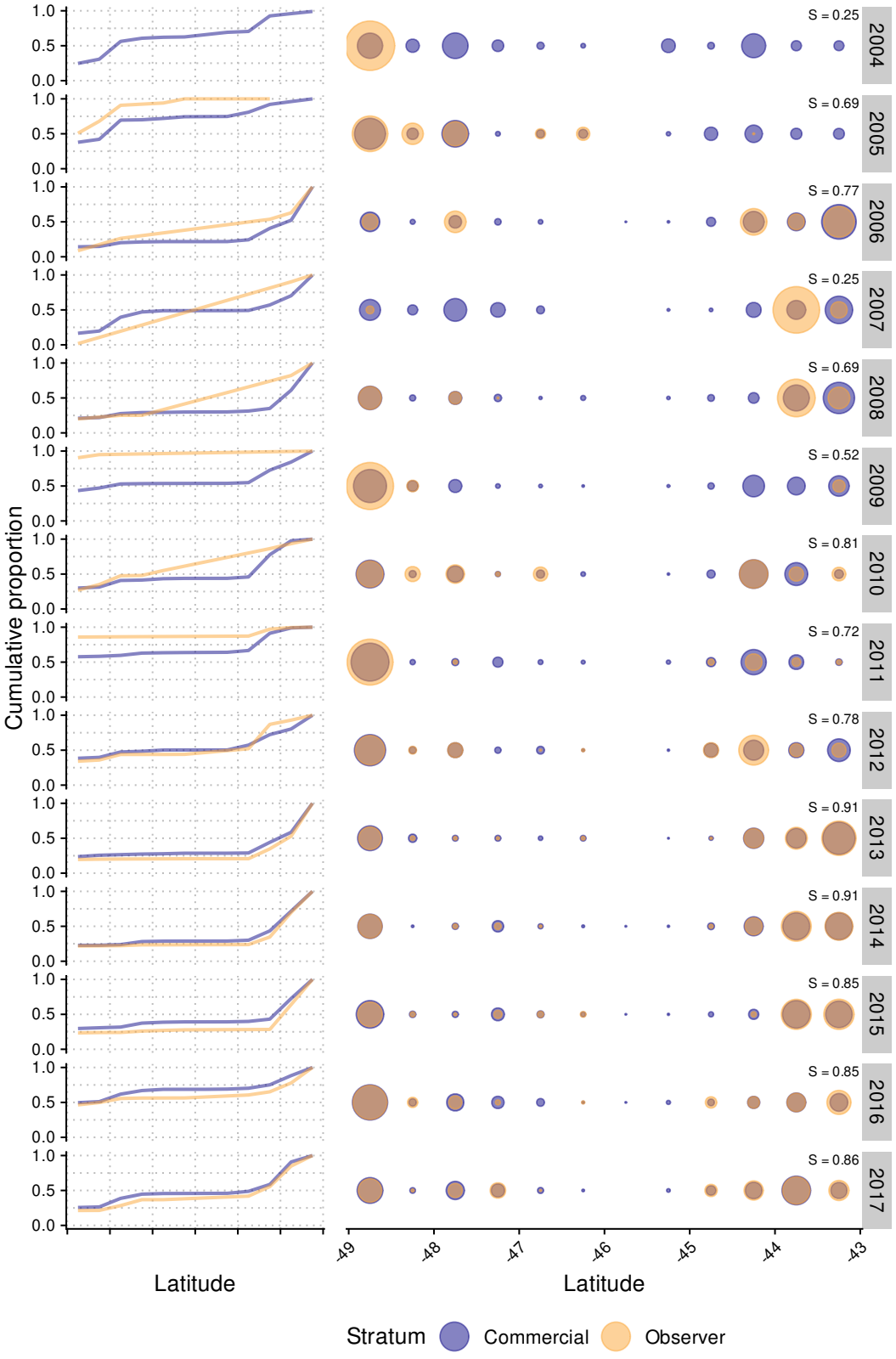


Figure 717: Latitudinal representativeness of observer sampling coverage of Trawl catch in JMA 3, from events where the jack mackerel catch exceeded the 120kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

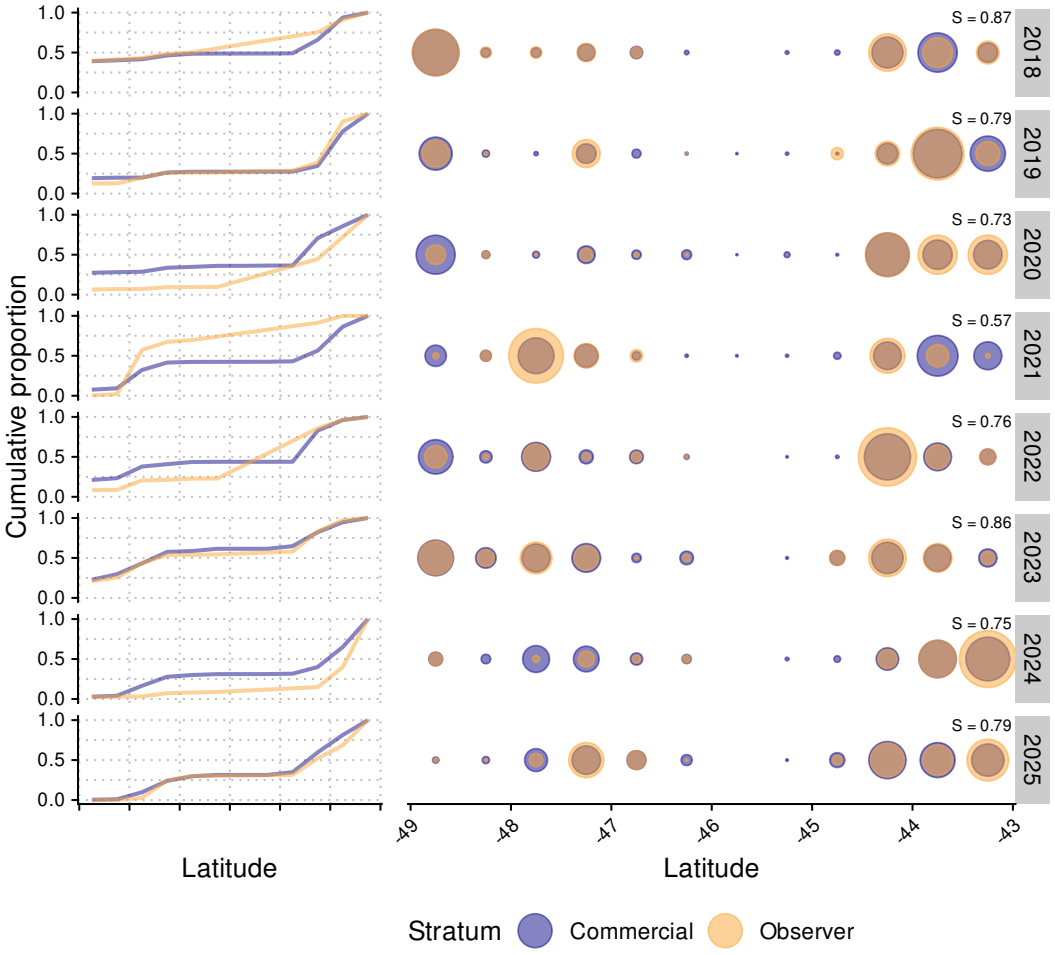


Figure 718: Latitudinal representativeness of observer sampling coverage of Trawl catch in JMA 3, from events where the jack mackerel catch exceeded the 120kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

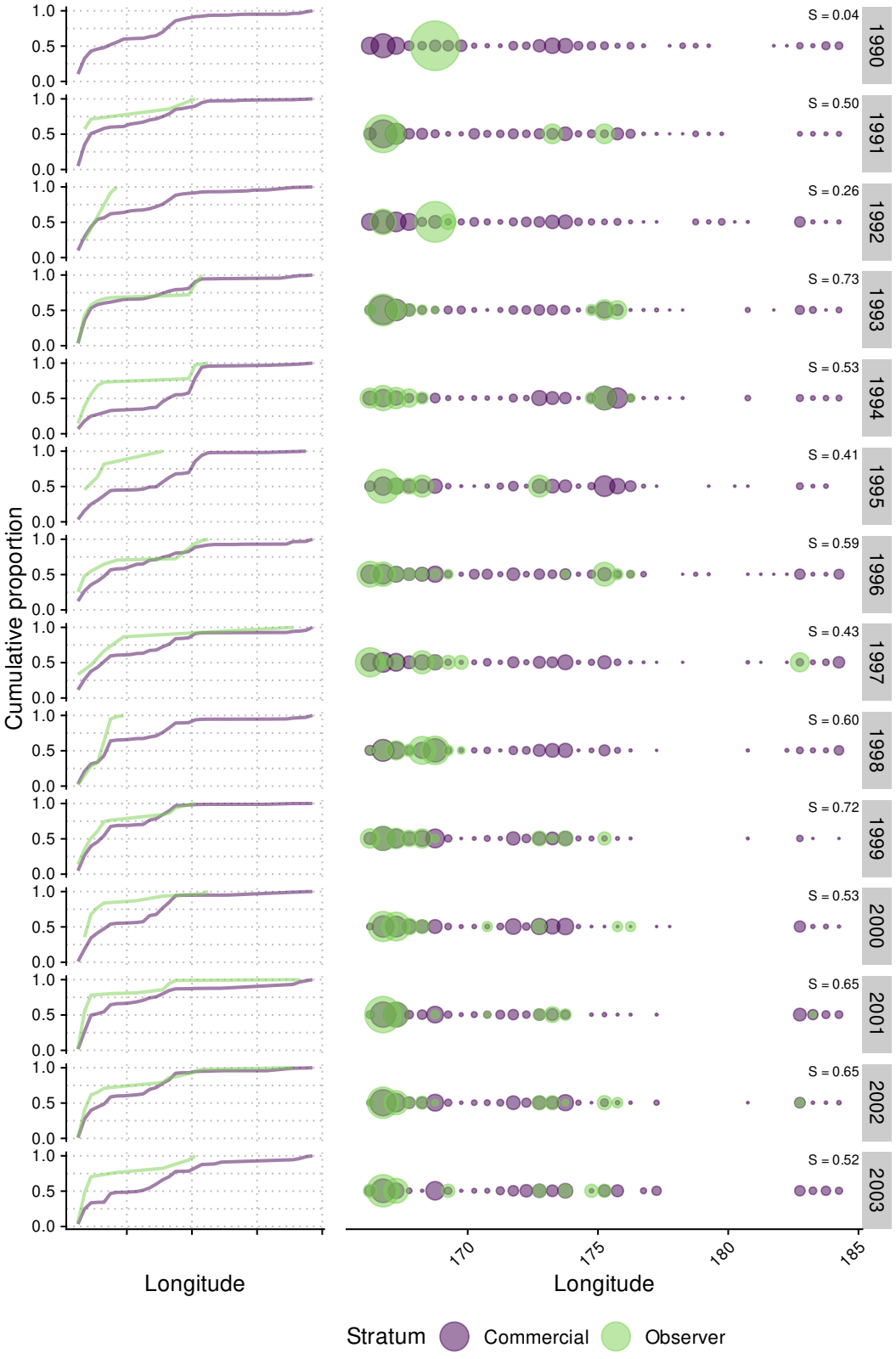


Figure 719: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in JMA 3, where the jack mackerel catch exceeded the 120kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

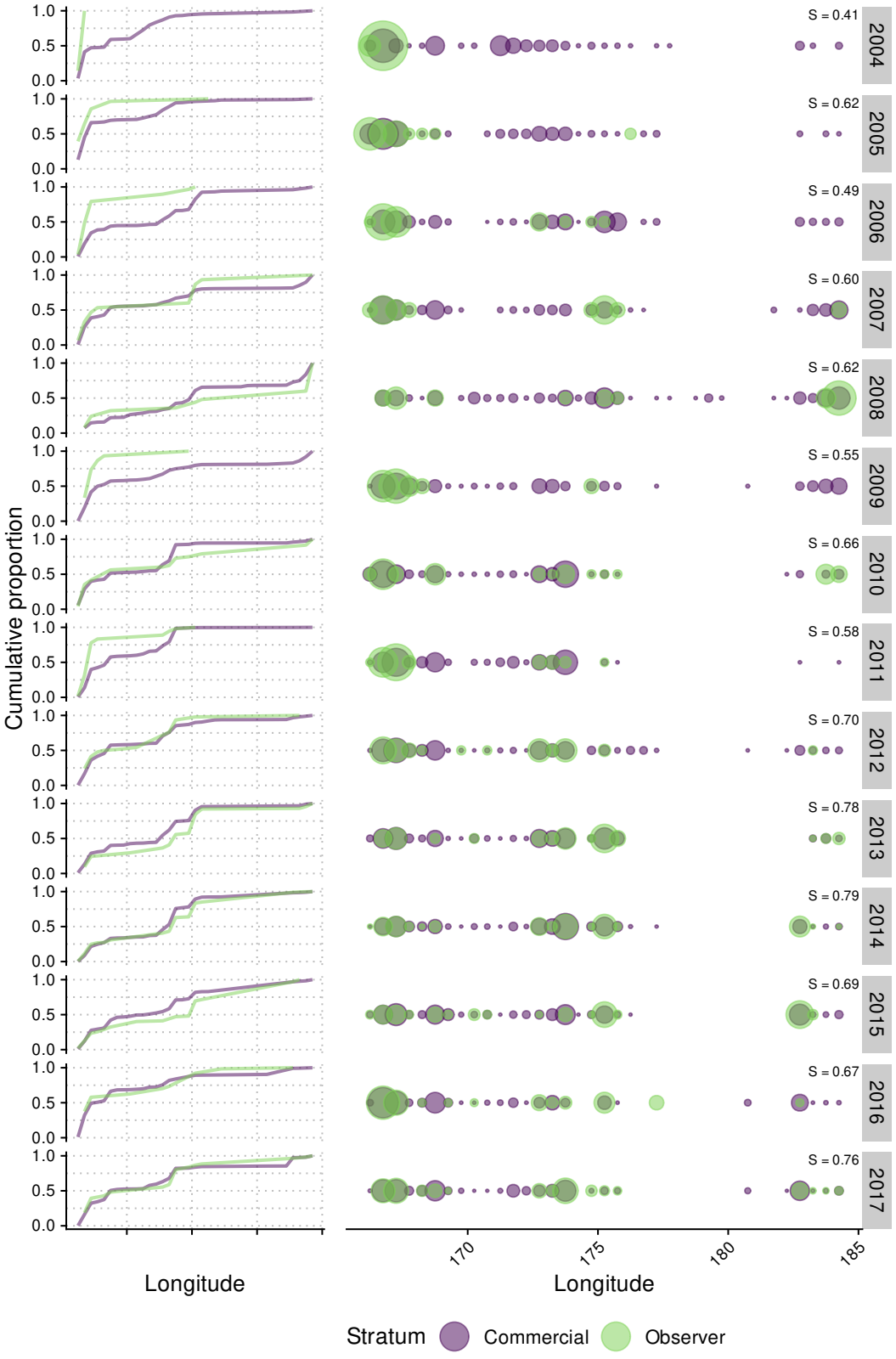


Figure 720: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in JMA 3, where the jack mackerel catch exceeded the 120kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

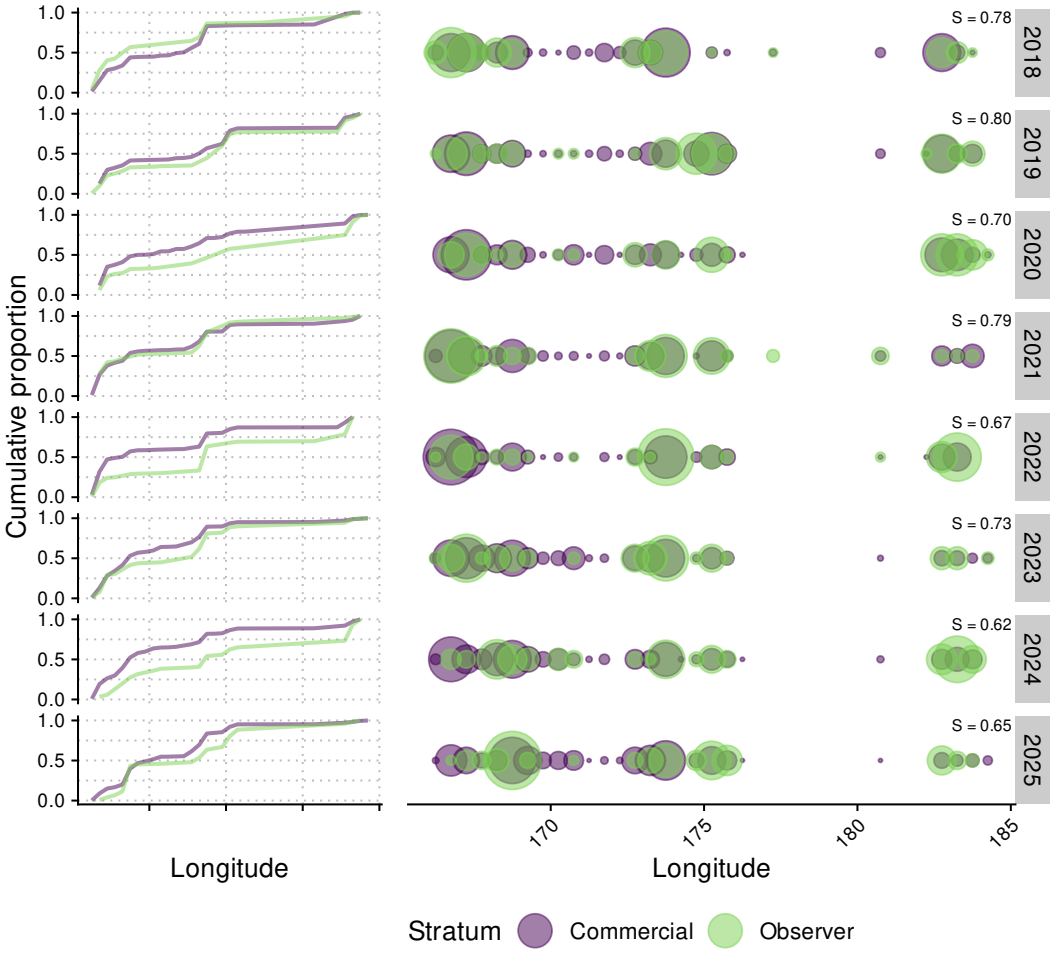


Figure 721: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in JMA 3, where the jack mackerel catch exceeded the 120kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

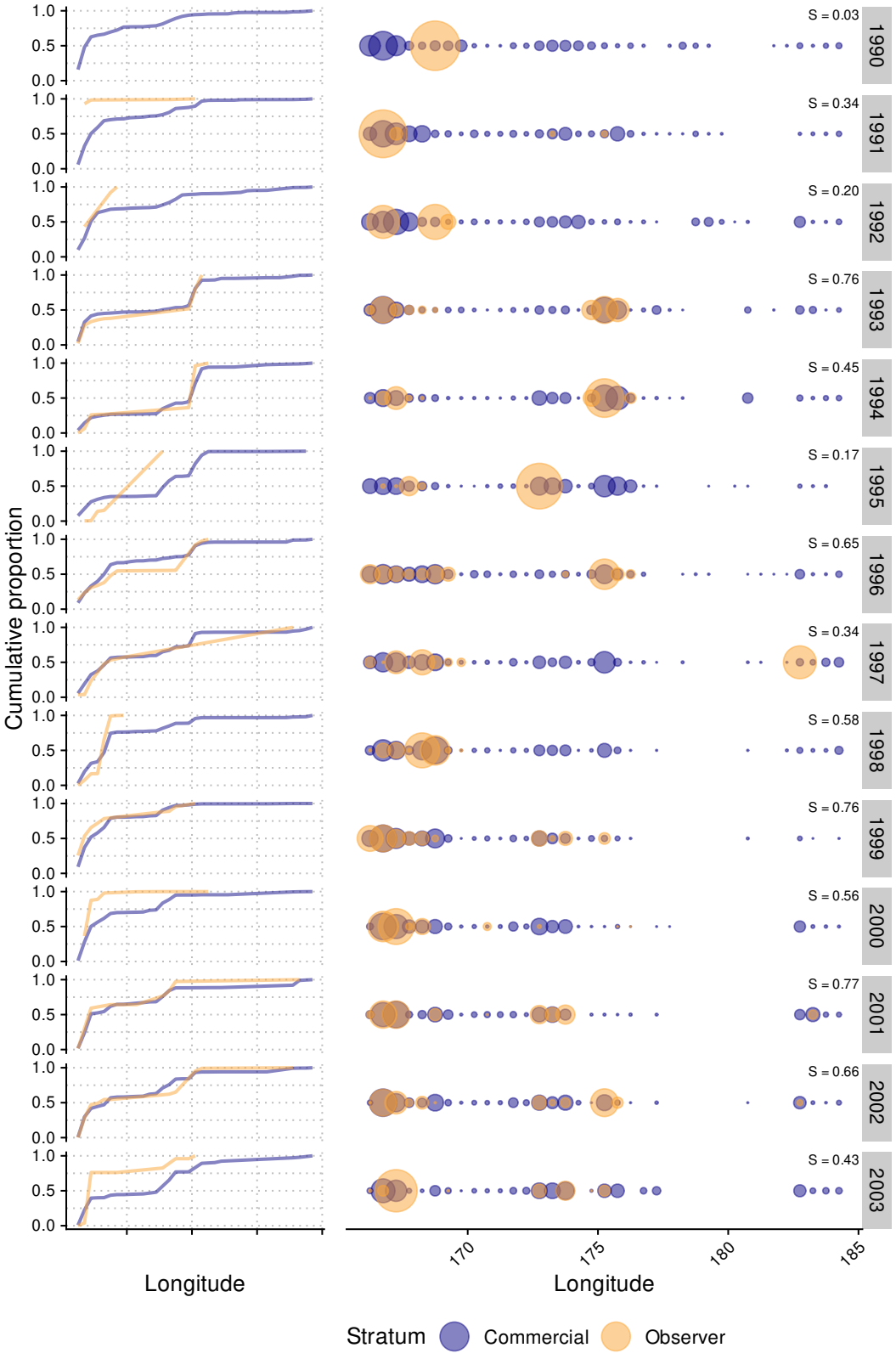


Figure 722: **Longitudinal representativeness of observer sampling coverage of Trawl catch in JMA 3, from events where the jack mackerel catch exceeded the 120kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

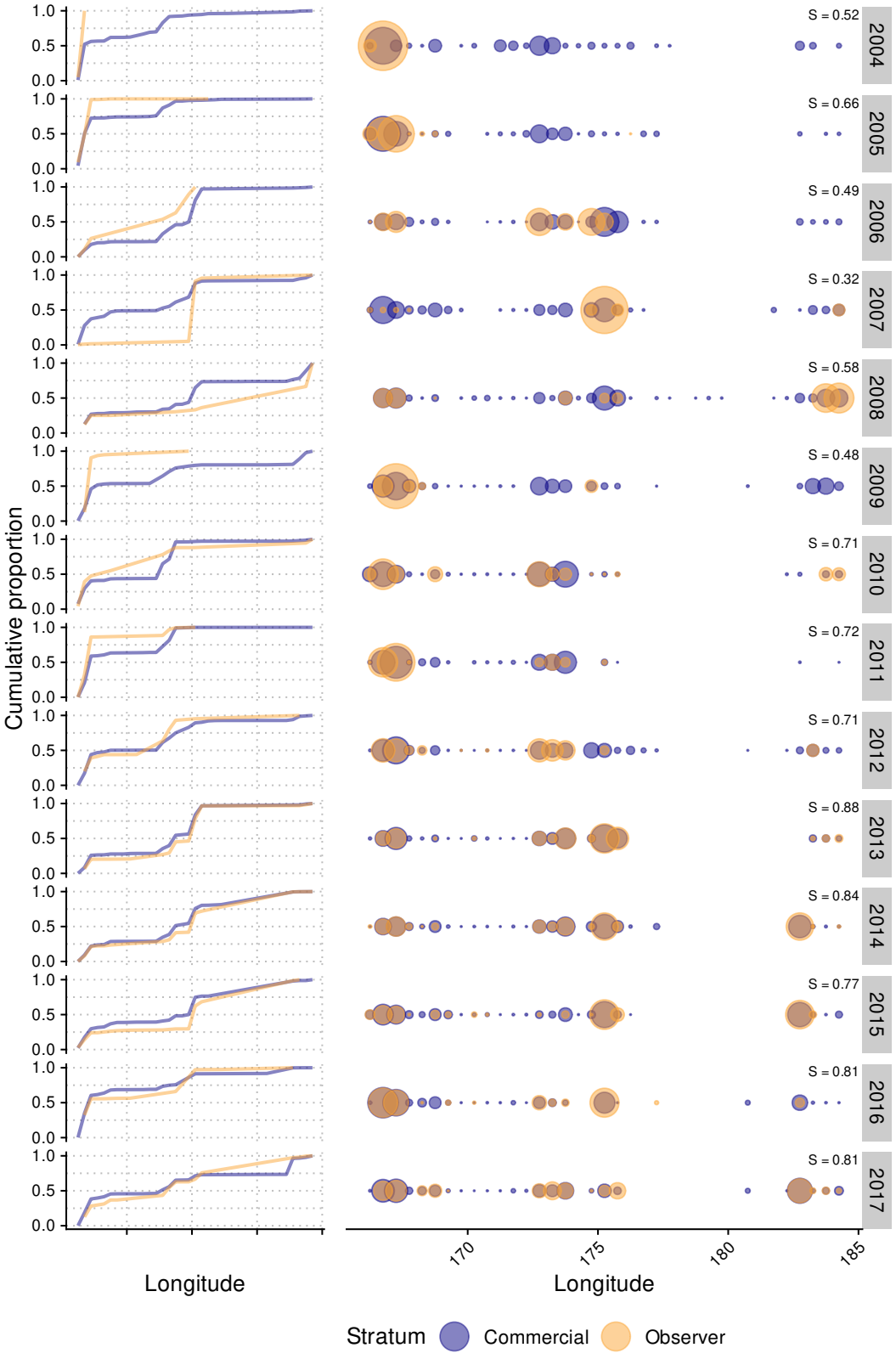


Figure 723: **Longitudinal representativeness of observer sampling coverage of Trawl catch in JMA 3, from events where the jack mackerel catch exceeded the 120kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

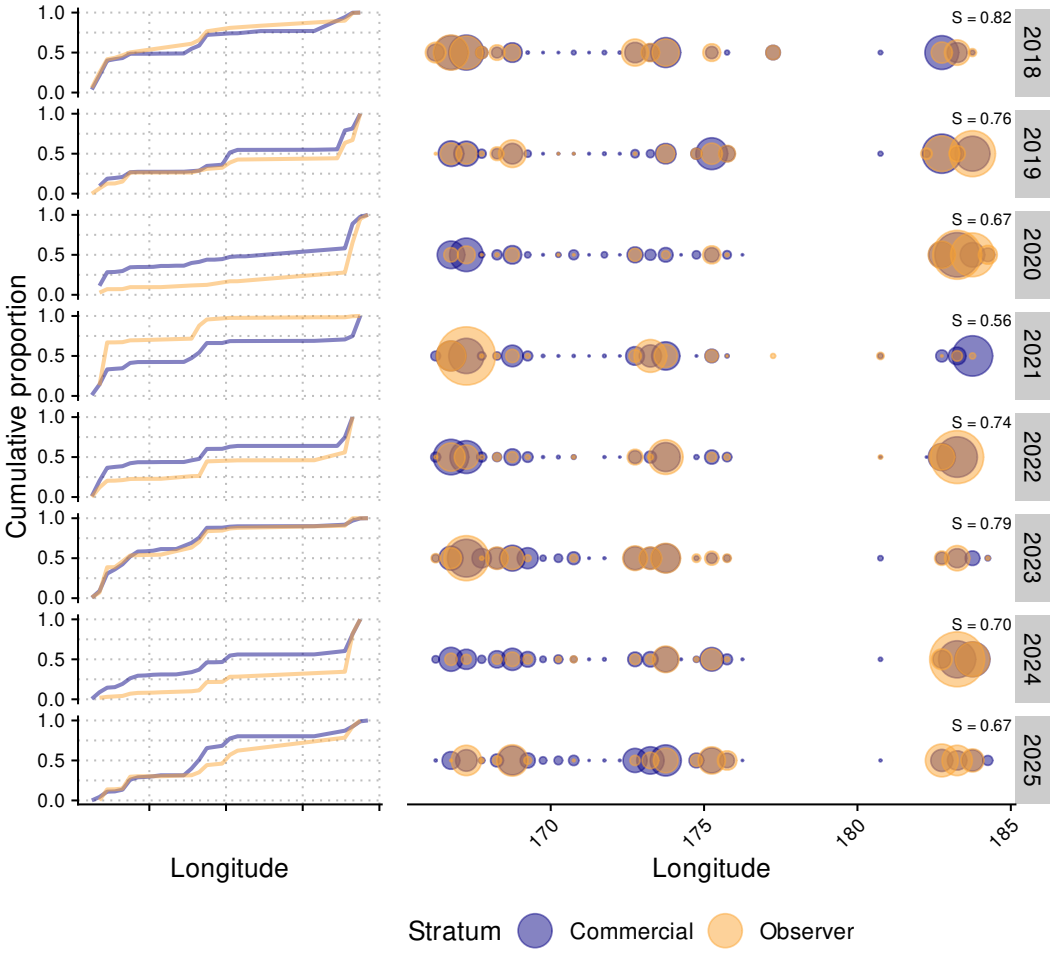


Figure 724: **Longitudinal representativeness of observer sampling coverage of Trawl catch in JMA 3, from events where the jack mackerel catch exceeded the 120kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

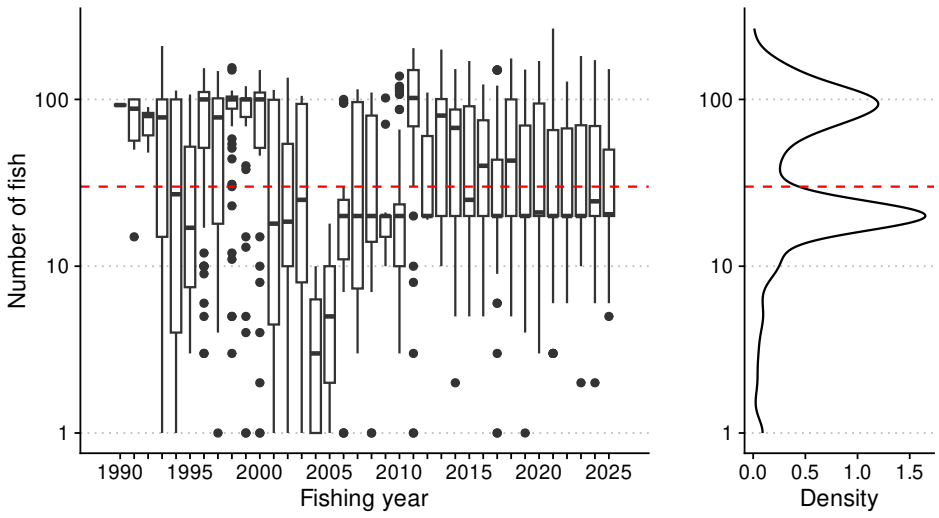


Figure 725: **Length-frequency sample sizes for observed fishing events in JMA 3 where jack mackerel were sampled. The red dashed line indicates a sample size of 30 fish.**

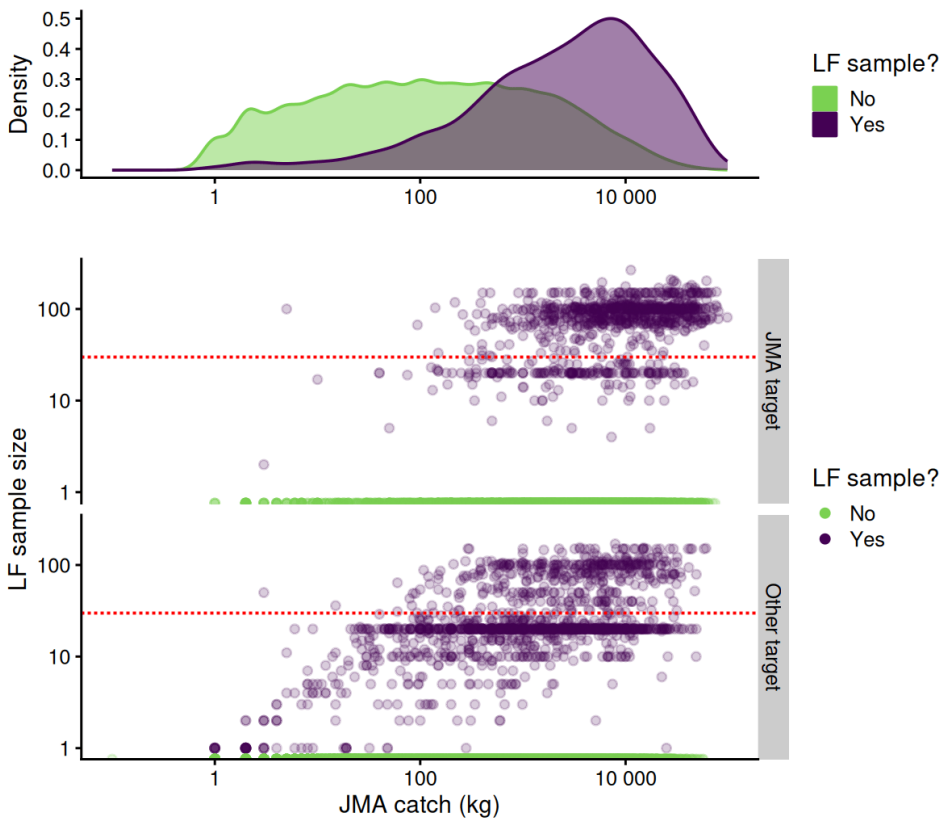


Figure 726: Length-frequency sample sizes (number of fish sampled) for observed fishing events in JMA 3 in relation to the total jack mackerel catch from an event, separately for jack mackerel target events and other target species. The red dashed line indicates a sample size of 30 fish.

2.11.1.2 Otolith samples

Table 60: Otolith samples of jack mackerel from the JMA 3 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of jack mackerel exceeded a potential sampling threshold of 120 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	1 480	0	0	0.00
1991	3 309	0	0	0.00
1992	1 869	0	0	0.00
1993	3 753	0	0	0.00
1994	2 050	0	0	0.00
1995	2 362	0	0	0.00
1996	4 391	0	0	0.00
1997	4 098	0	0	0.00
1998	3 768	0	0	0.00
1999	3 532	0	0	0.00
2000	3 759	0	0	0.00
2001	1 520	0	0	0.00
2002	2 410	0	0	0.00
2003	1 088	0	0	0.00
2004	529	0	0	0.00
2005	435	0	0	0.00
2006	1 077	0	0	0.00
2007	640	0	0	0.00
2008	548	0	0	0.00
2009	450	1	11	0.22
2010	588	17	109	2.89
2011	649	28	301	4.31
2012	637	10	56	1.57
2013	633	97	840	15.32
2014	831	169	1 397	20.34
2015	786	24	186	3.05
2016	560	20	182	3.57
2017	917	82	645	8.94
2018	1 025	167	1 342	16.29
2019	1 007	127	863	12.61
2020	963	95	739	9.87
2021	1 201	52	381	4.33
2022	1 179	143	1 074	12.13
2023	1 191	82	610	6.88
2024	1 507	110	701	7.30
2025	1 824	127	802	6.96

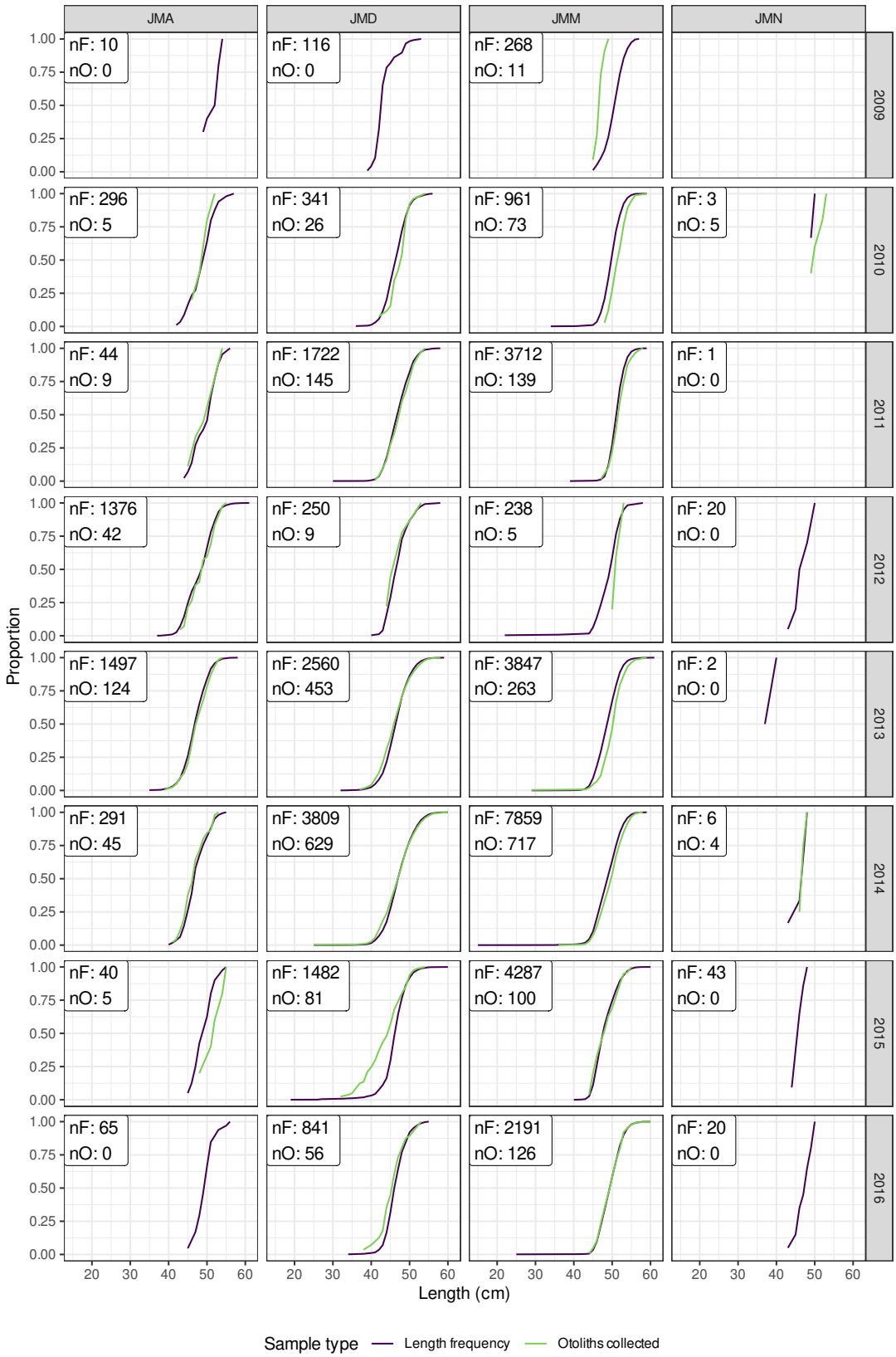


Figure 727: Cumulative distributions of the length of fish in the length frequency and otolith samples of jack mackerel in the JMA 3 Trawl fishery for the 2009 to 2016 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

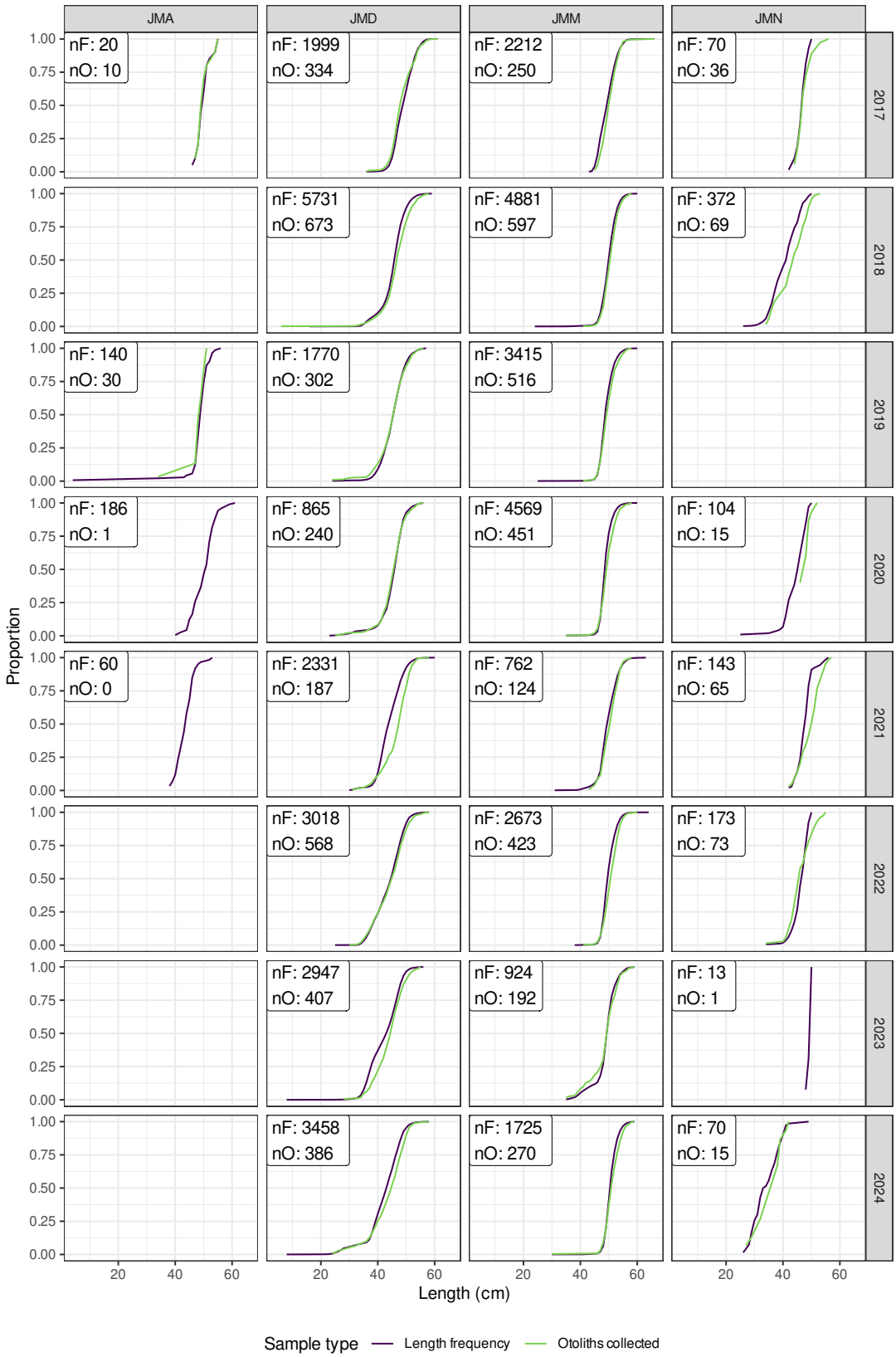


Figure 728: Cumulative distributions of the length of fish in the length frequency and otolith samples of jack mackerel in the JMA 3 Trawl fishery for the 2017 to 2024 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

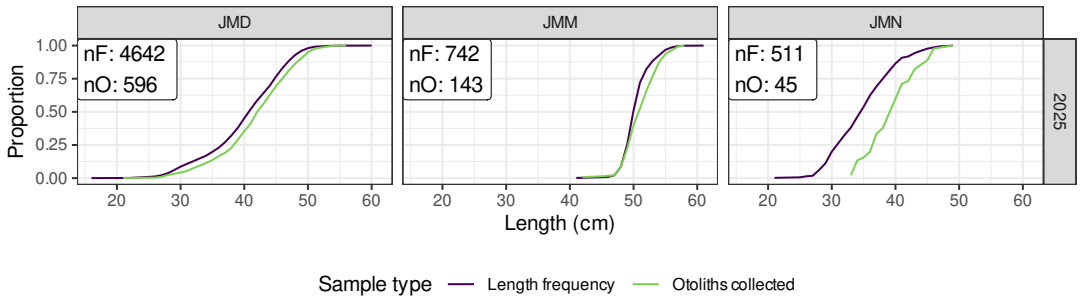


Figure 729: Cumulative distributions of the length of fish in the length frequency and otolith samples of jack mackerel in the JMA 3 Trawl fishery for the 2025 to 2025 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

2.11.1.3 Catch quantification

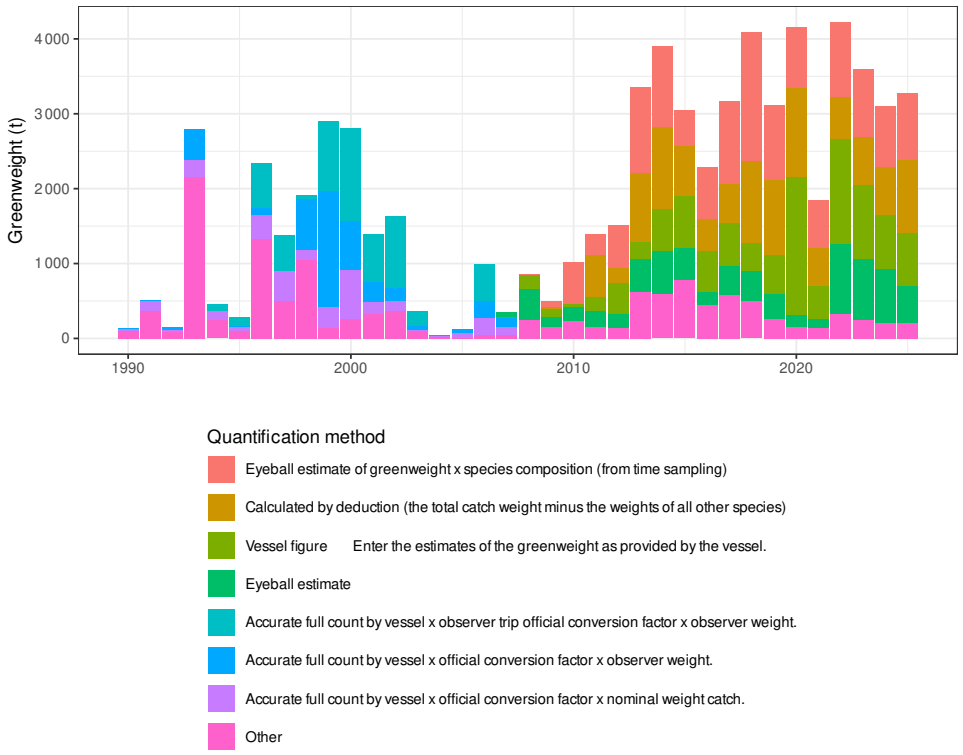


Figure 730: Methods used by observers to quantify the catch of jack mackerel in the JMA 3 Trawl fishery. The legend lists the methods used in descending order of total catch.

2.11.2 JMA 7: Trawl fishery

2.11.2.1 Length-frequency samples

Table 61: Length-frequency samples of jack mackerel from the JMA 7 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of jack mackerel exceeded a potential sampling threshold of 120 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	2 665	110	10 961	4.13
1991	2 817	201	20 953	7.14
1992	3 662	87	7 697	2.38
1993	3 562	152	12 793	4.27
1994	3 710	193	17 761	5.20
1995	3 751	147	14 536	3.92
1996	2 768	63	13 007	2.28
1997	2 784	55	6 819	1.98
1998	2 689	175	19 532	6.51
1999	3 109	92	11 894	2.96
2000	2 053	63	5 853	3.07
2001	2 511	81	9 076	3.23
2002	3 410	67	6 802	1.96
2003	3 619	105	10 765	2.90
2004	3 388	90	10 502	2.66
2005	3 442	276	67 361	8.02
2006	2 623	423	78 878	16.13
2007	3 032	457	55 337	15.07
2008	2 785	533	66 429	19.14
2009	2 397	554	70 965	23.11
2010	2 534	493	60 252	19.46
2011	1 986	315	37 196	15.86
2012	1 950	723	91 200	37.08
2013	2 125	661	87 256	31.11
2014	2 360	693	83 085	29.36
2015	2 112	682	84 673	32.29
2016	1 833	432	50 465	23.57
2017	1 625	348	43 891	21.42
2018	1 844	456	56 326	24.73
2019	1 747	401	52 754	22.95
2020	1 821	425	52 635	23.34
2021	1 551	284	45 708	18.31
2022	1 683	348	41 797	20.68
2023	1 846	420	57 278	22.75
2024	1 718	425	59 779	24.74
2025	1 593	406	53 682	25.49

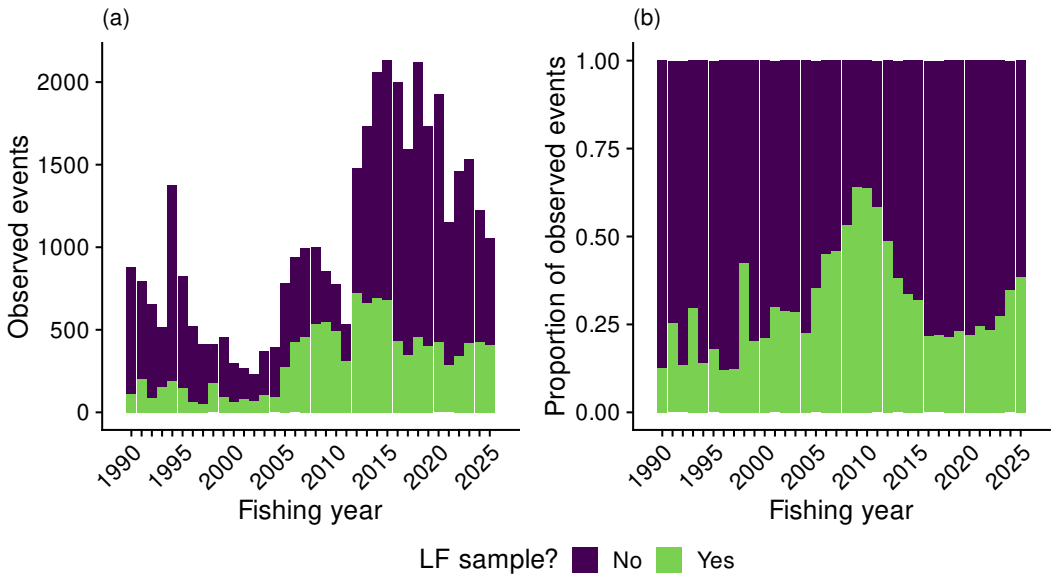


Figure 731: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in JMA 7 where the jack mackerel catch exceeded the 120 kg threshold, with and without length-frequency sampling.**

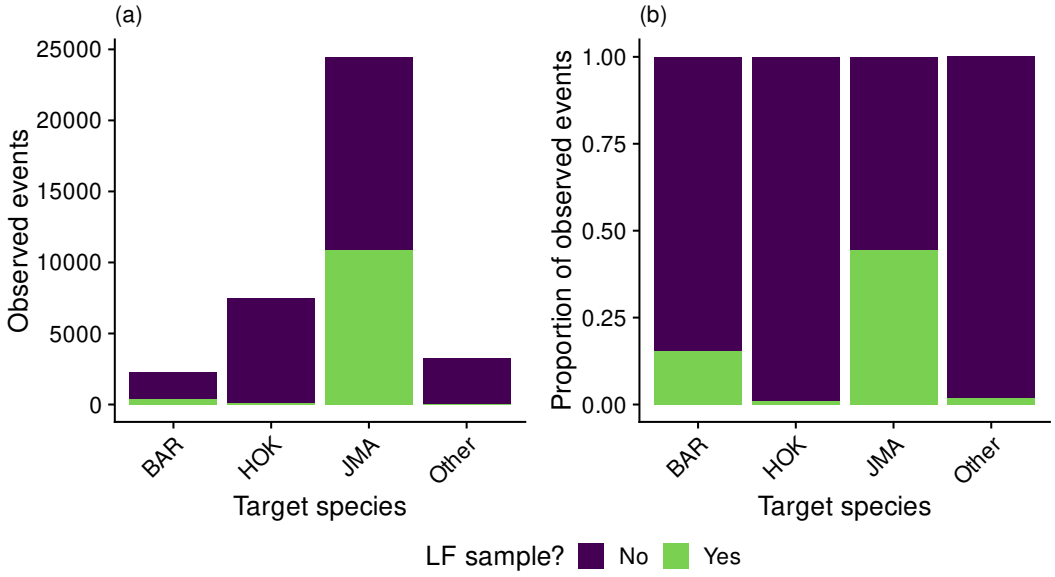


Figure 732: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in JMA 7 where the jack mackerel catch exceeded the 120 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

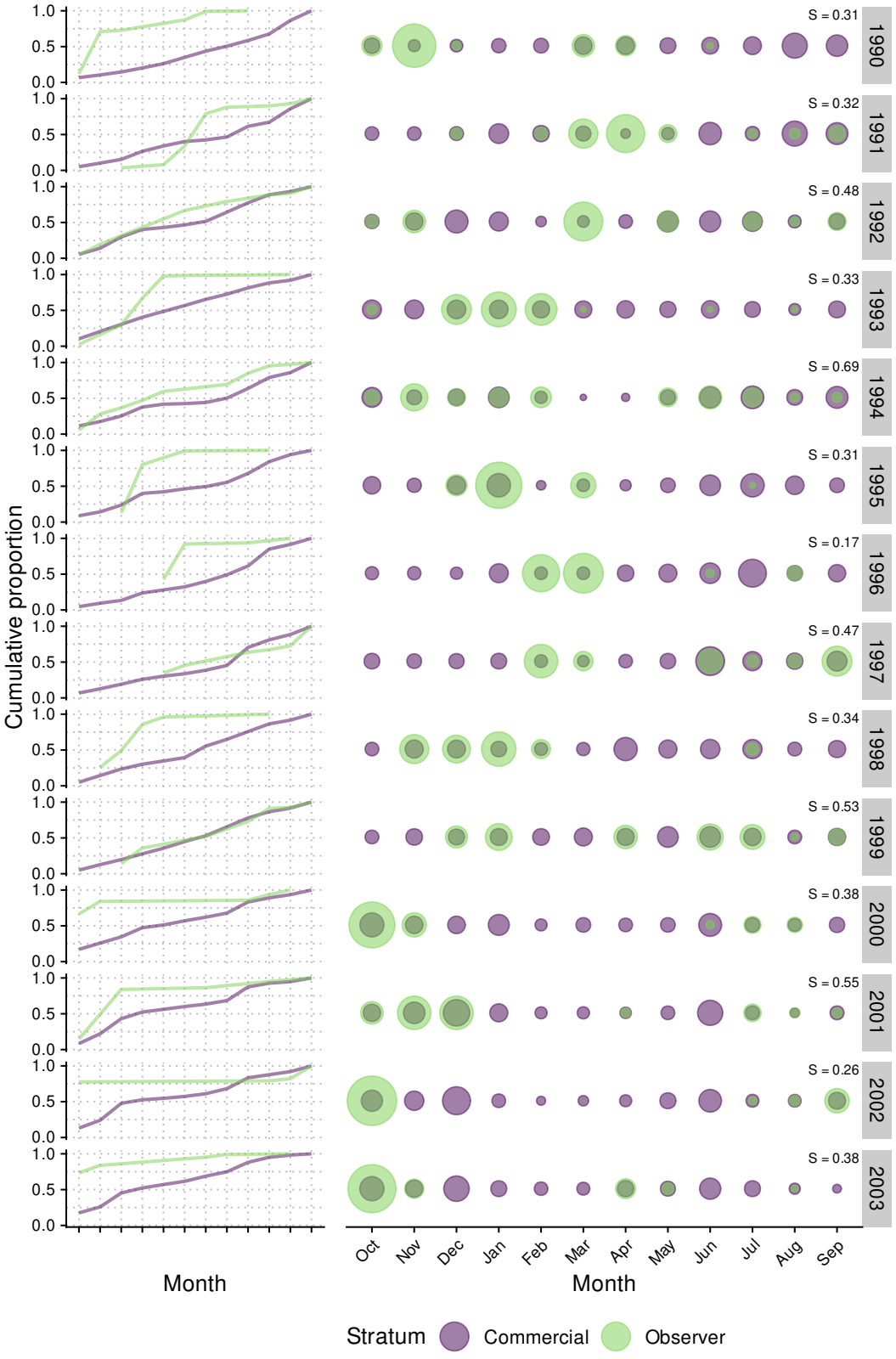


Figure 733: Monthly representativeness of observer sampling coverage of Trawl fishing events in JMA 7, where the jack mackerel catch exceeded the 120kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

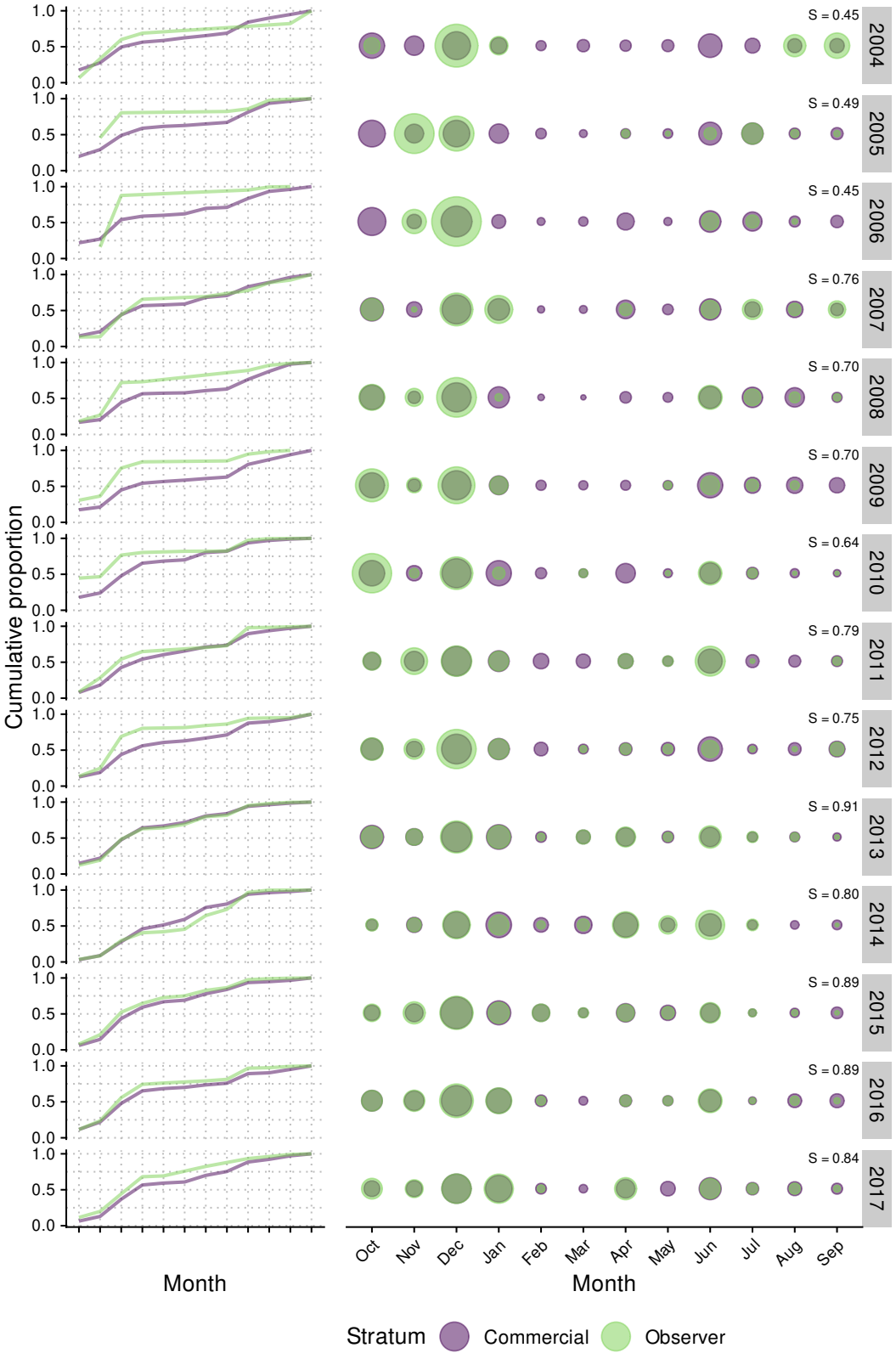


Figure 734: Monthly representativeness of observer sampling coverage of Trawl fishing events in JMA 7, where the jack mackerel catch exceeded the 120kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

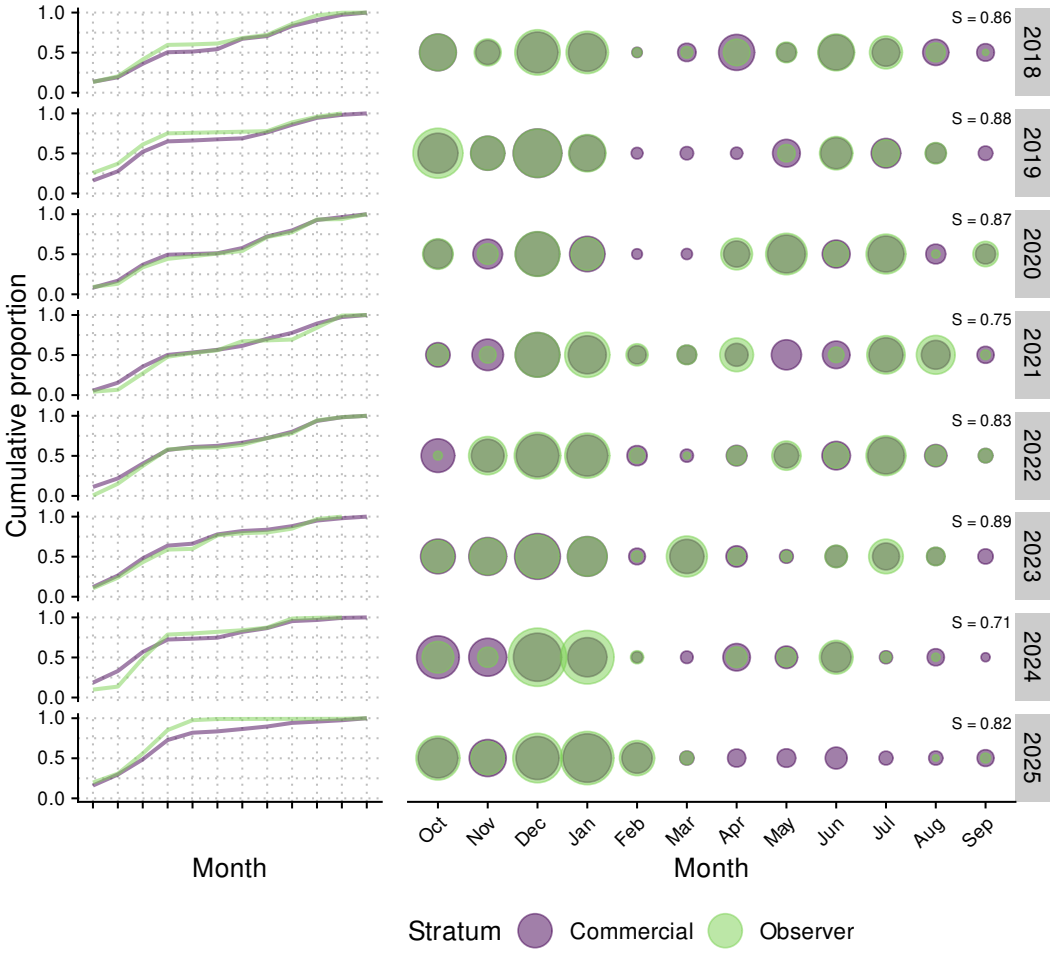


Figure 735: Monthly representativeness of observer sampling coverage of Trawl fishing events in JMA 7, where the jack mackerel catch exceeded the 120kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

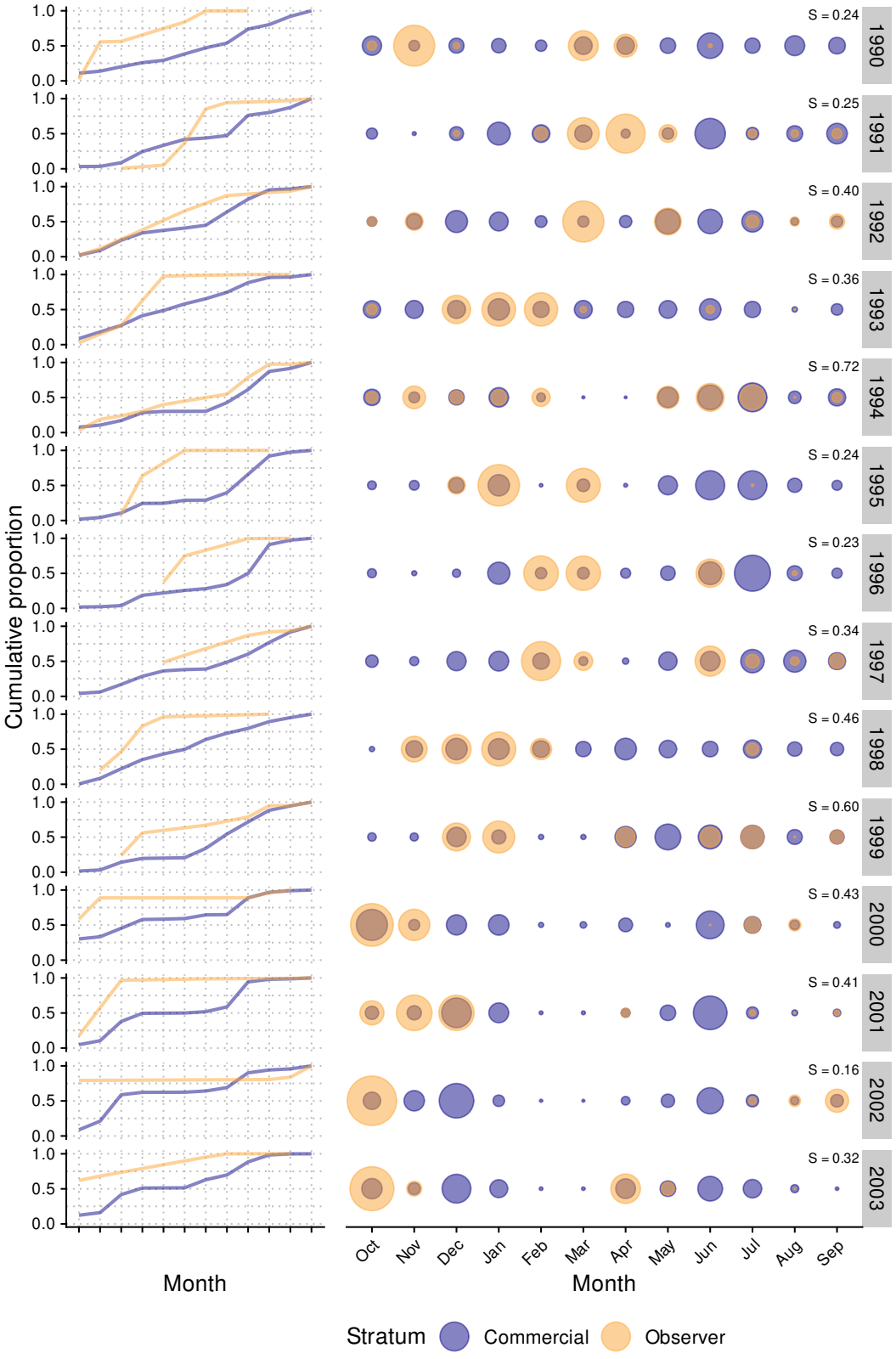


Figure 736: Monthly representativeness of observer sampling coverage of Trawl catch in JMA 7, from events where the jack mackerel catch exceeded the 120kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

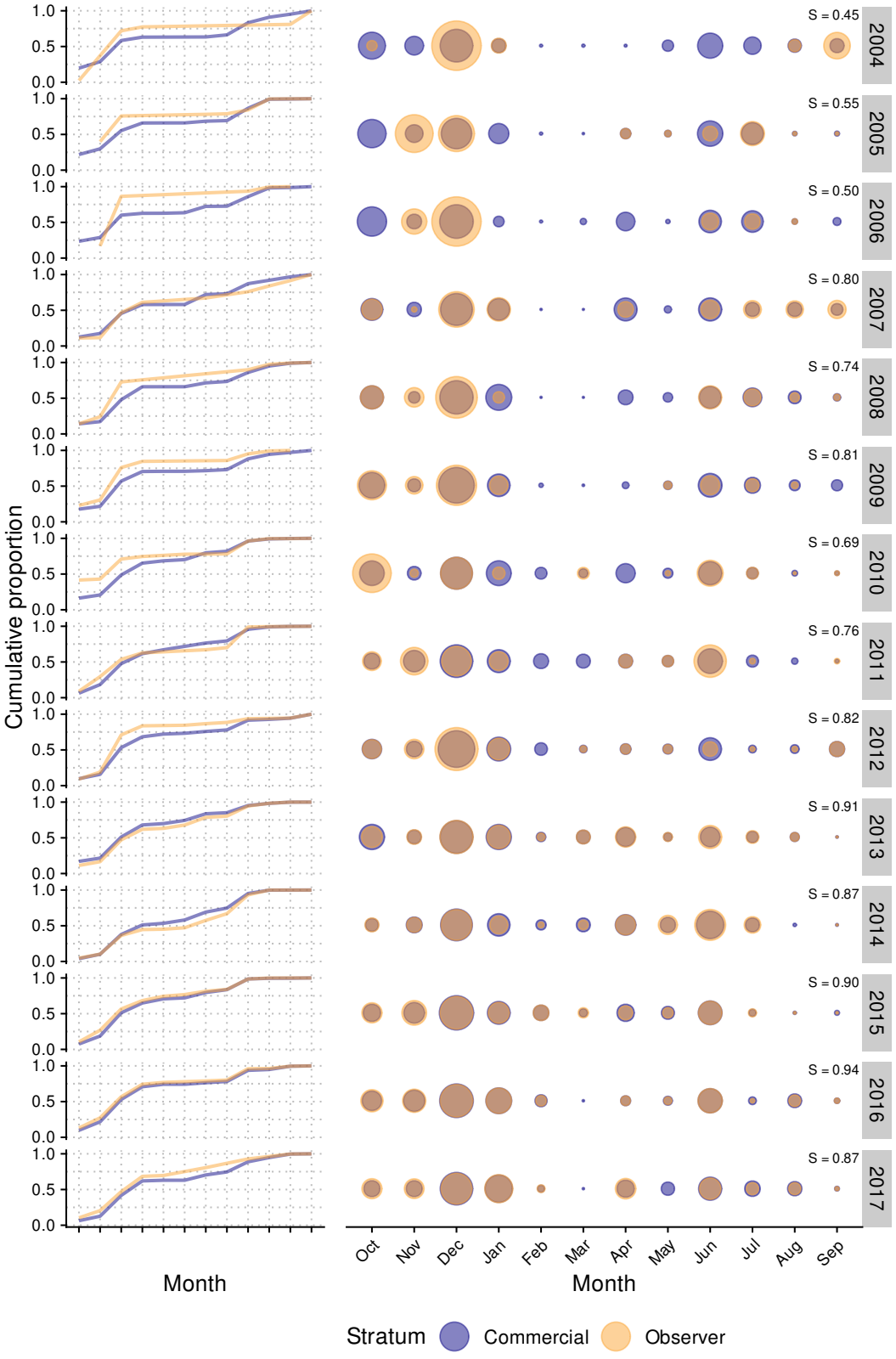


Figure 737: Monthly representativeness of observer sampling coverage of Trawl catch in JMA 7, from events where the jack mackerel catch exceeded the 120kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

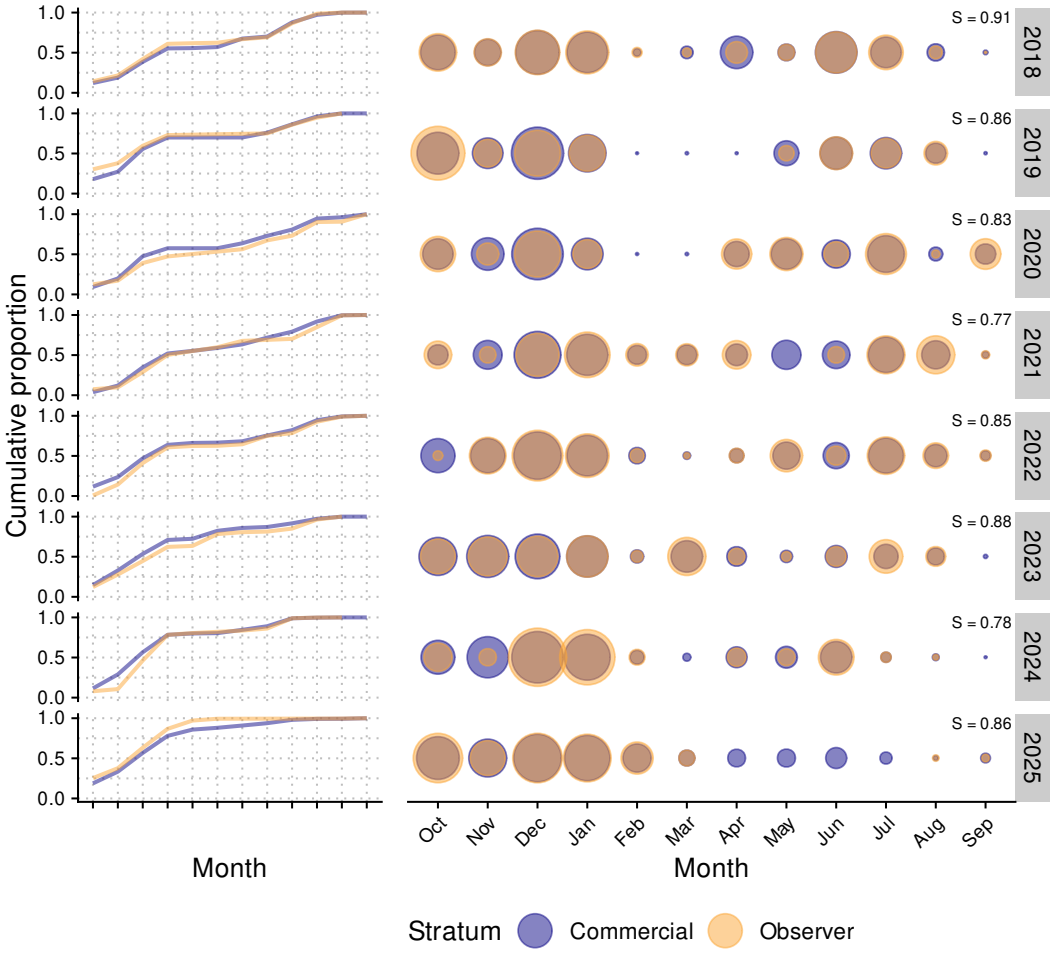


Figure 738: Monthly representativeness of observer sampling coverage of Trawl catch in JMA 7, from events where the jack mackerel catch exceeded the 120kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

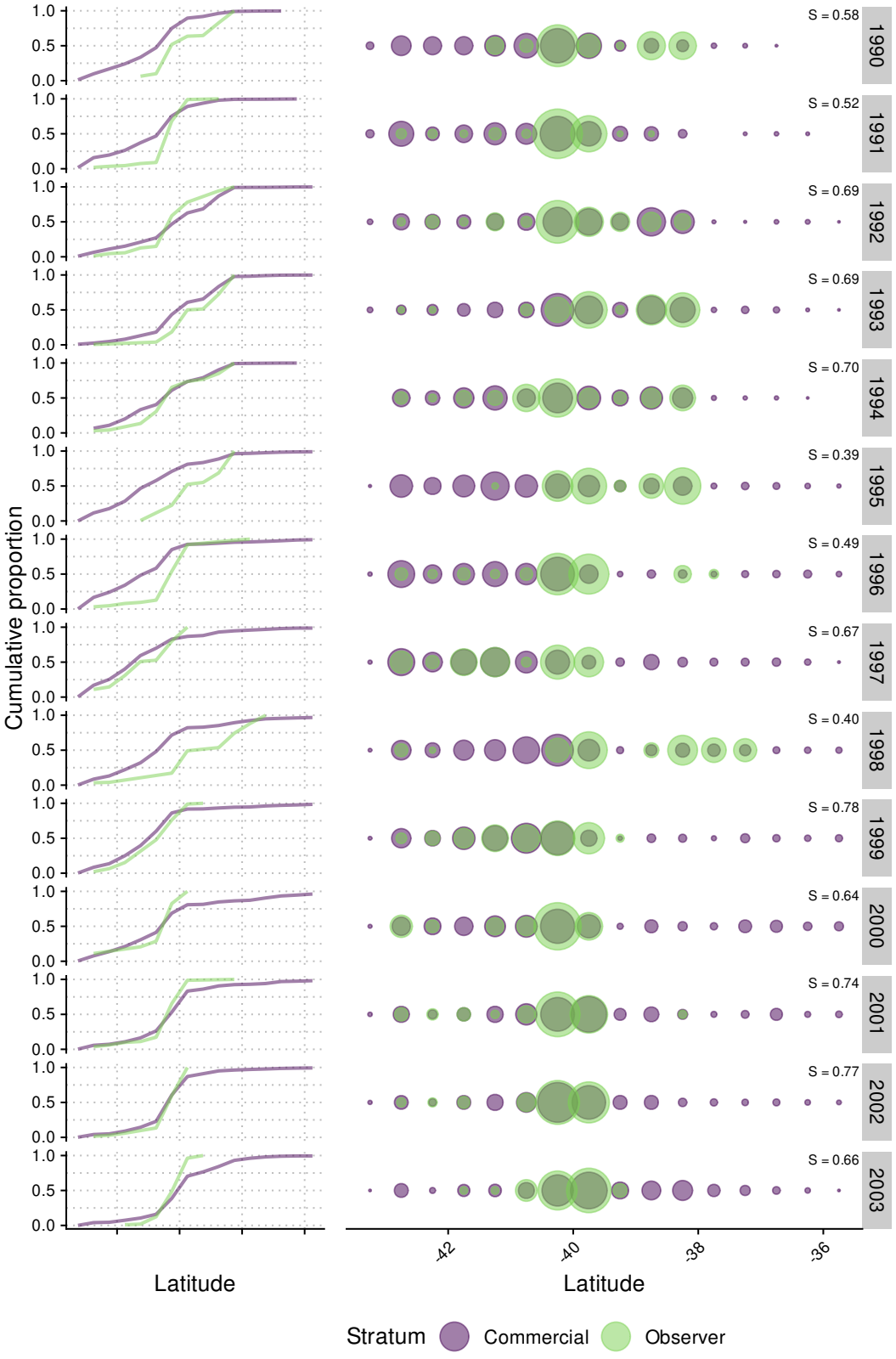


Figure 739: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in JMA 7, where the jack mackerel catch exceeded the 120kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

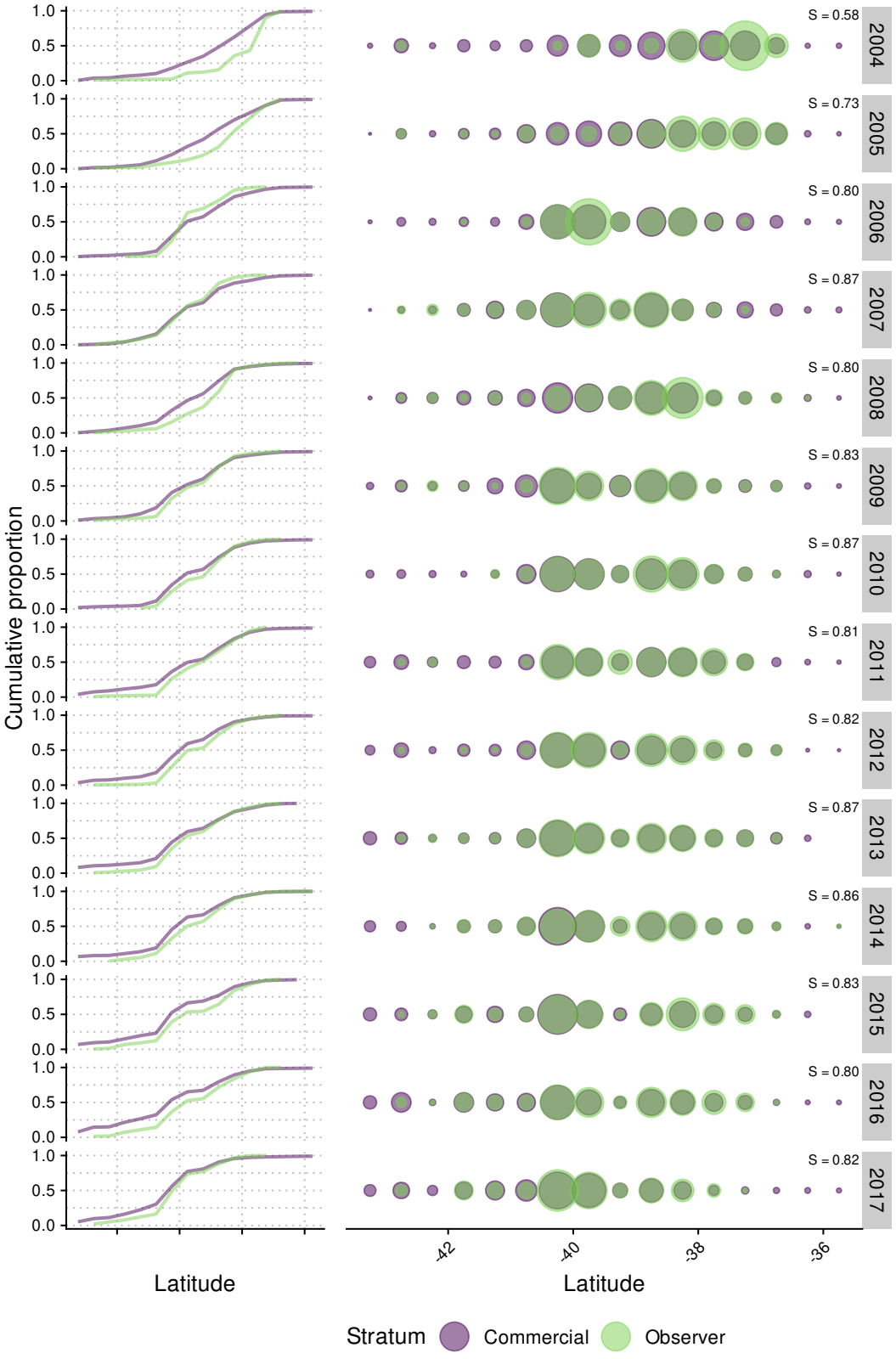


Figure 740: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in JMA 7, where the jack mackerel catch exceeded the 120kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

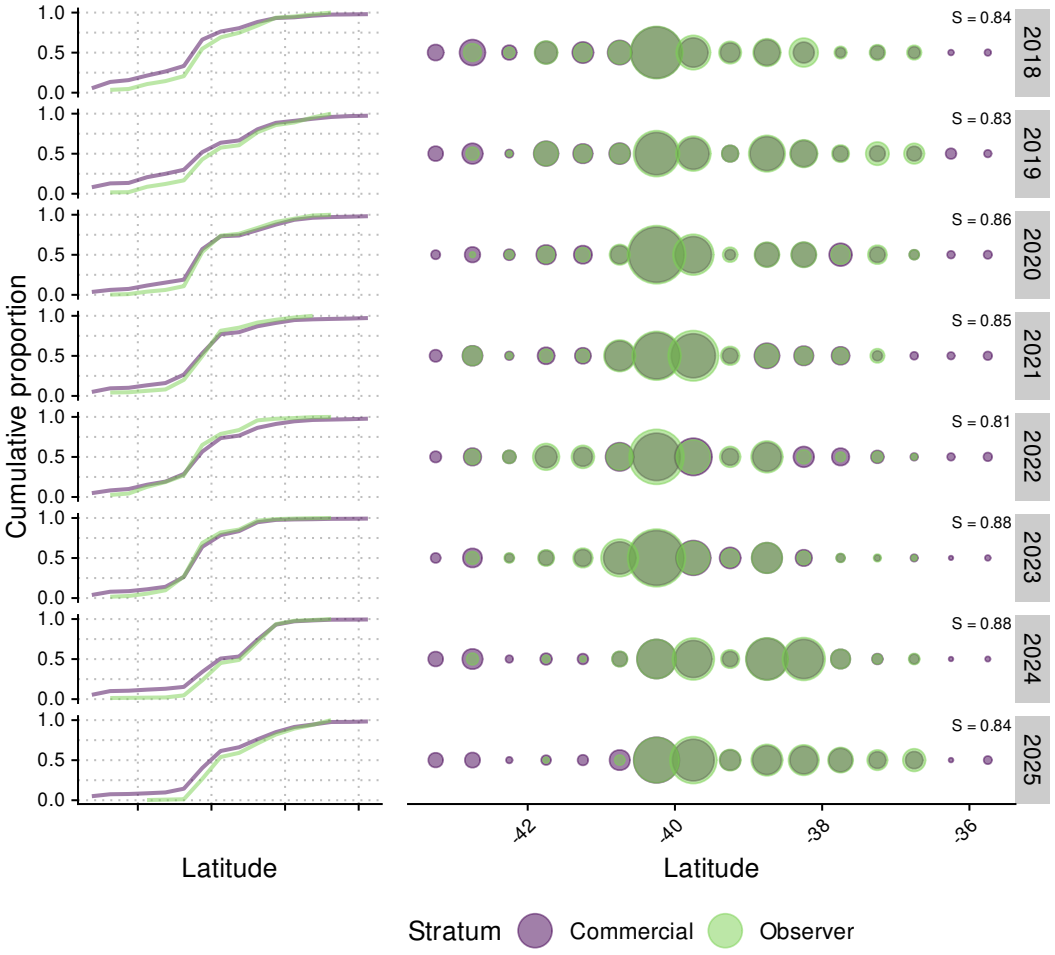


Figure 741: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in JMA 7, where the jack mackerel catch exceeded the 120kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

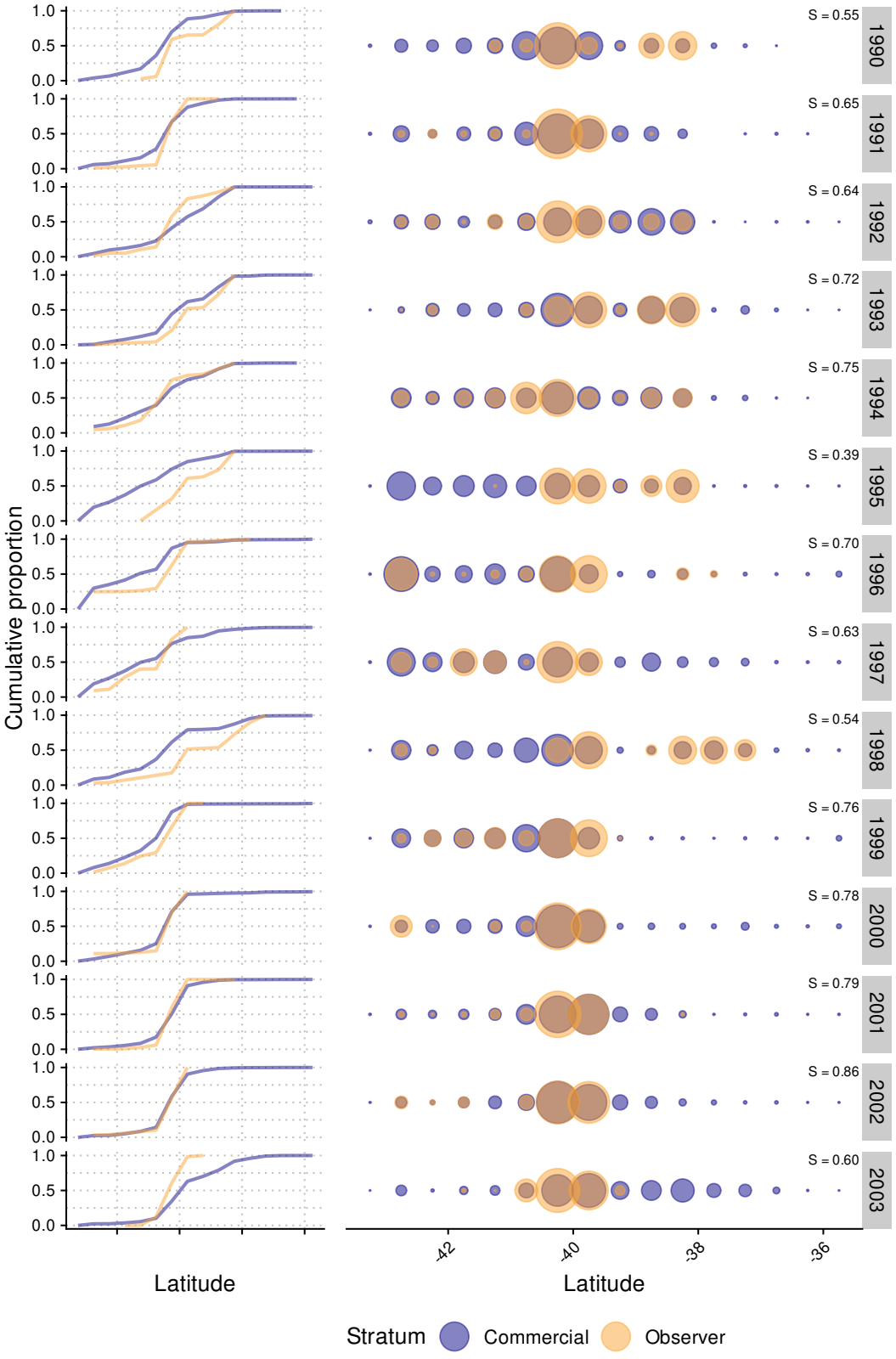


Figure 742: **Latitudinal representativeness of observer sampling coverage of Trawl catch in JMA 7, from events where the jack mackerel catch exceeded the 120kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

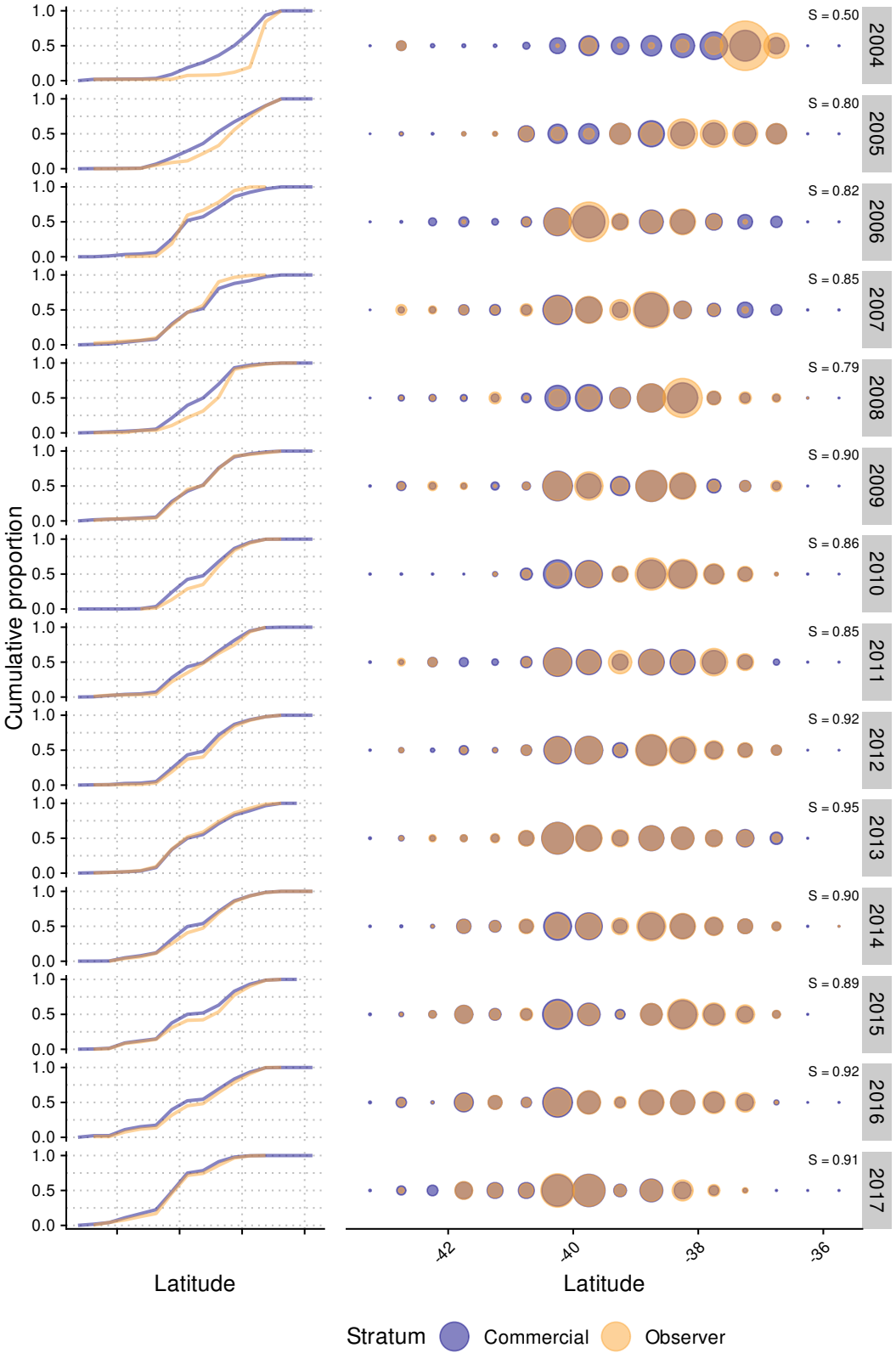


Figure 743: **Latitudinal representativeness of observer sampling coverage of Trawl catch in JMA 7, from events where the jack mackerel catch exceeded the 120kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

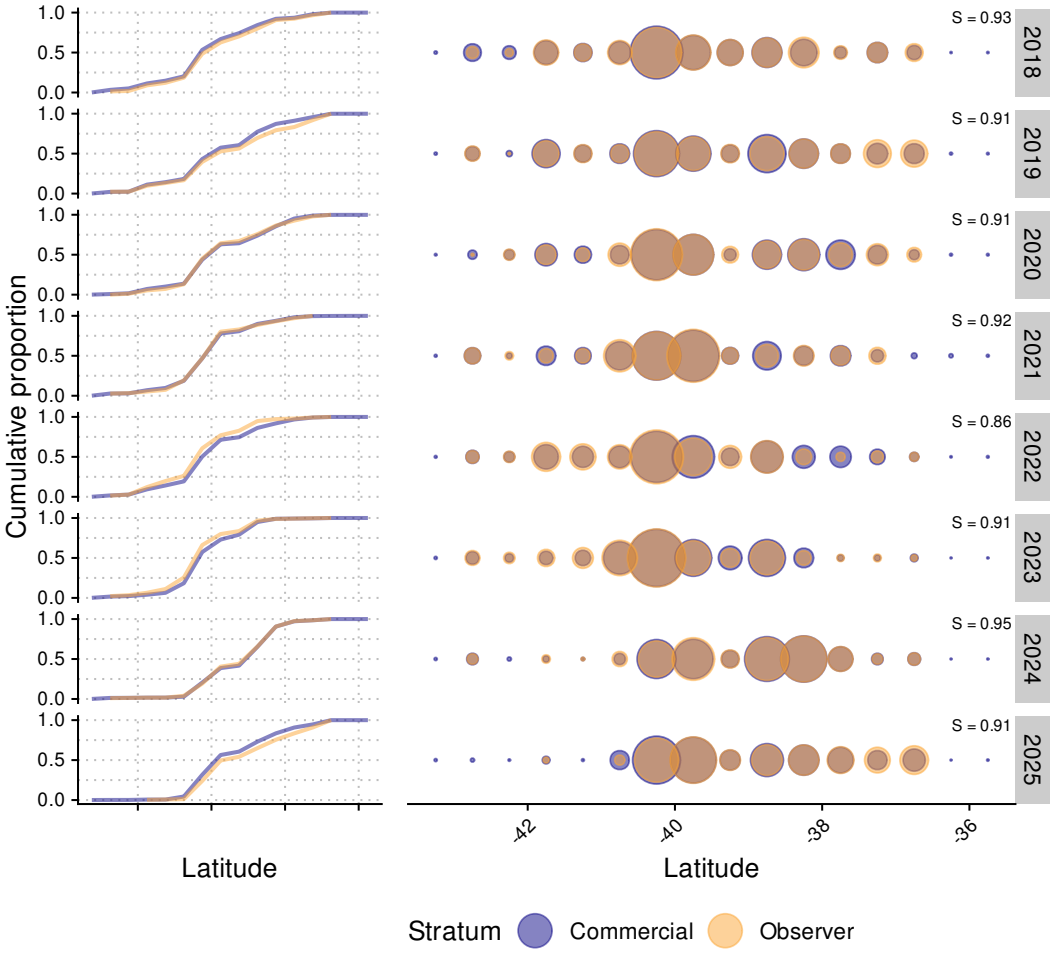


Figure 744: **Latitudinal representativeness of observer sampling coverage of Trawl catch in JMA 7, from events where the jack mackerel catch exceeded the 120kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

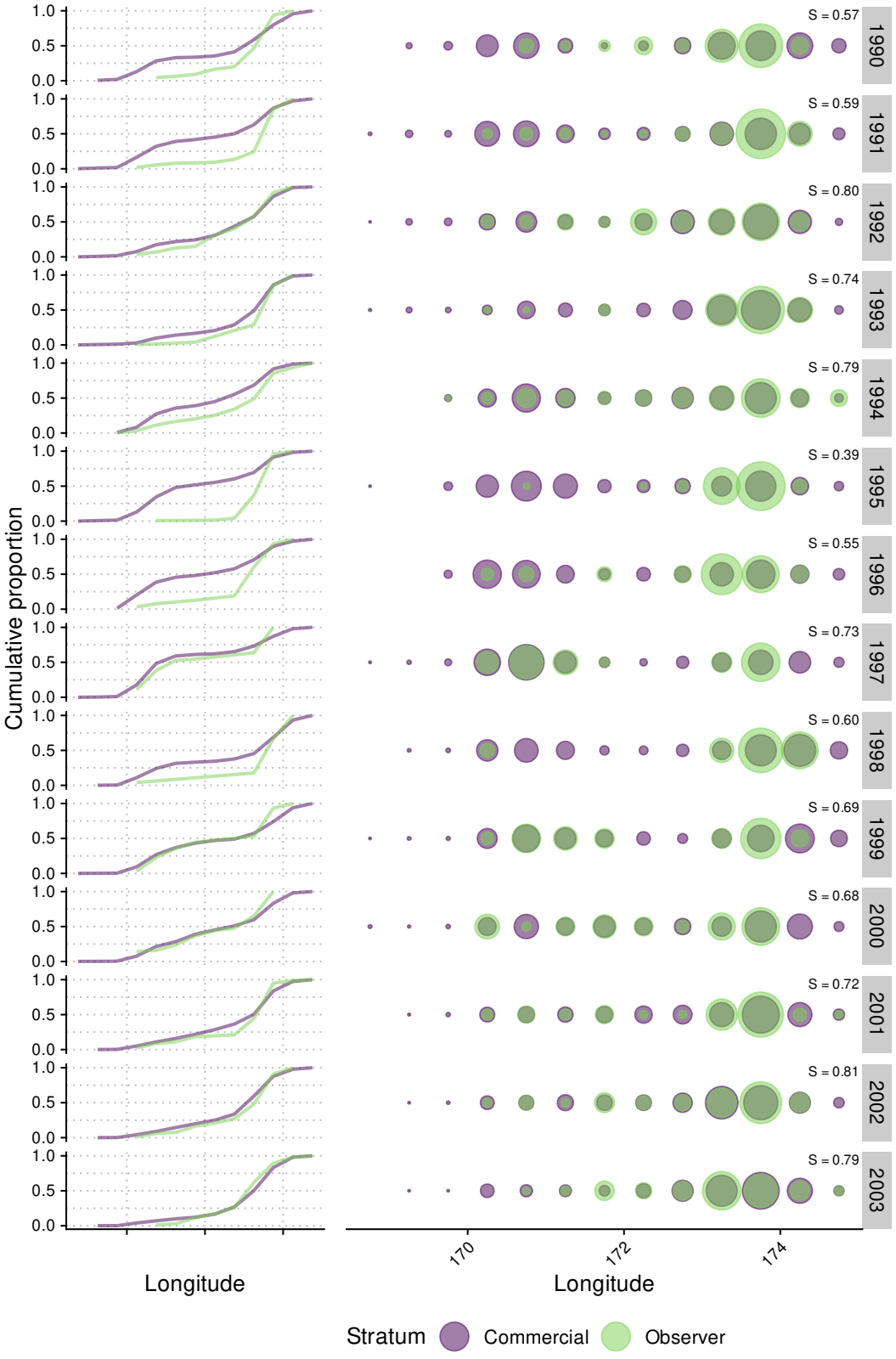


Figure 745: **Longitudinal representativeness of observer sampling coverage of Trawl fishing events in JMA 7, where the jack mackerel catch exceeded the 120kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

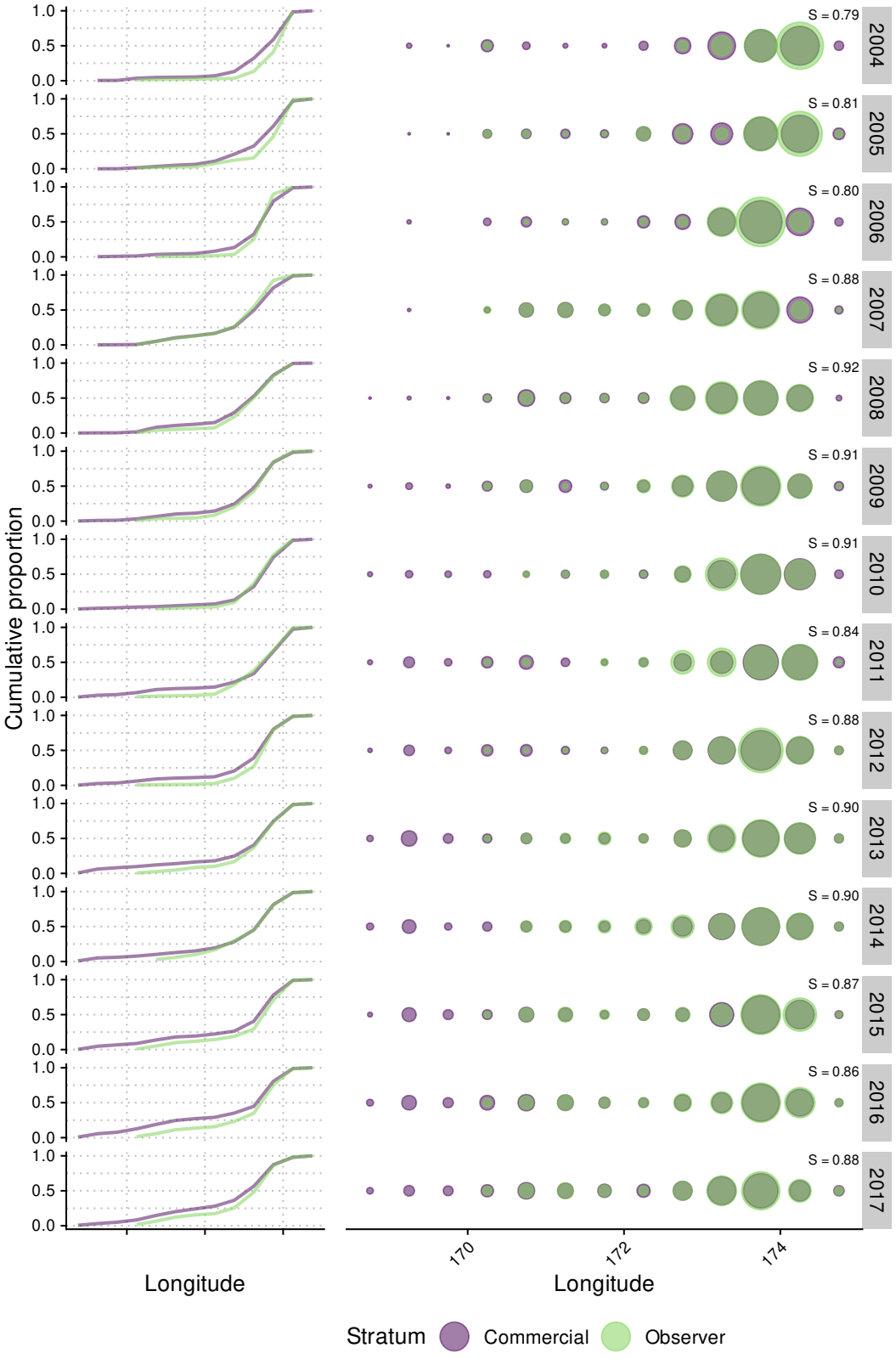


Figure 746: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in JMA 7, where the jack mackerel catch exceeded the 120kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

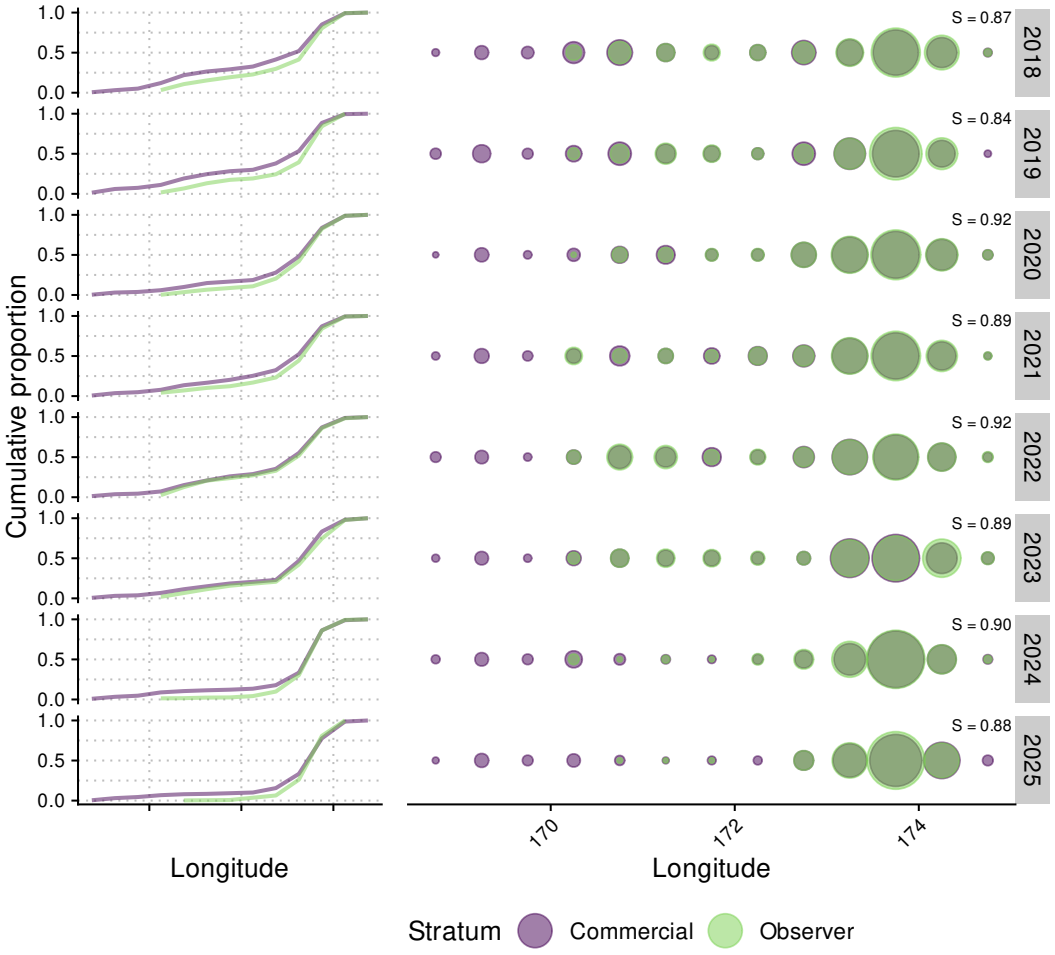


Figure 747: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in JMA 7, where the jack mackerel catch exceeded the 120kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

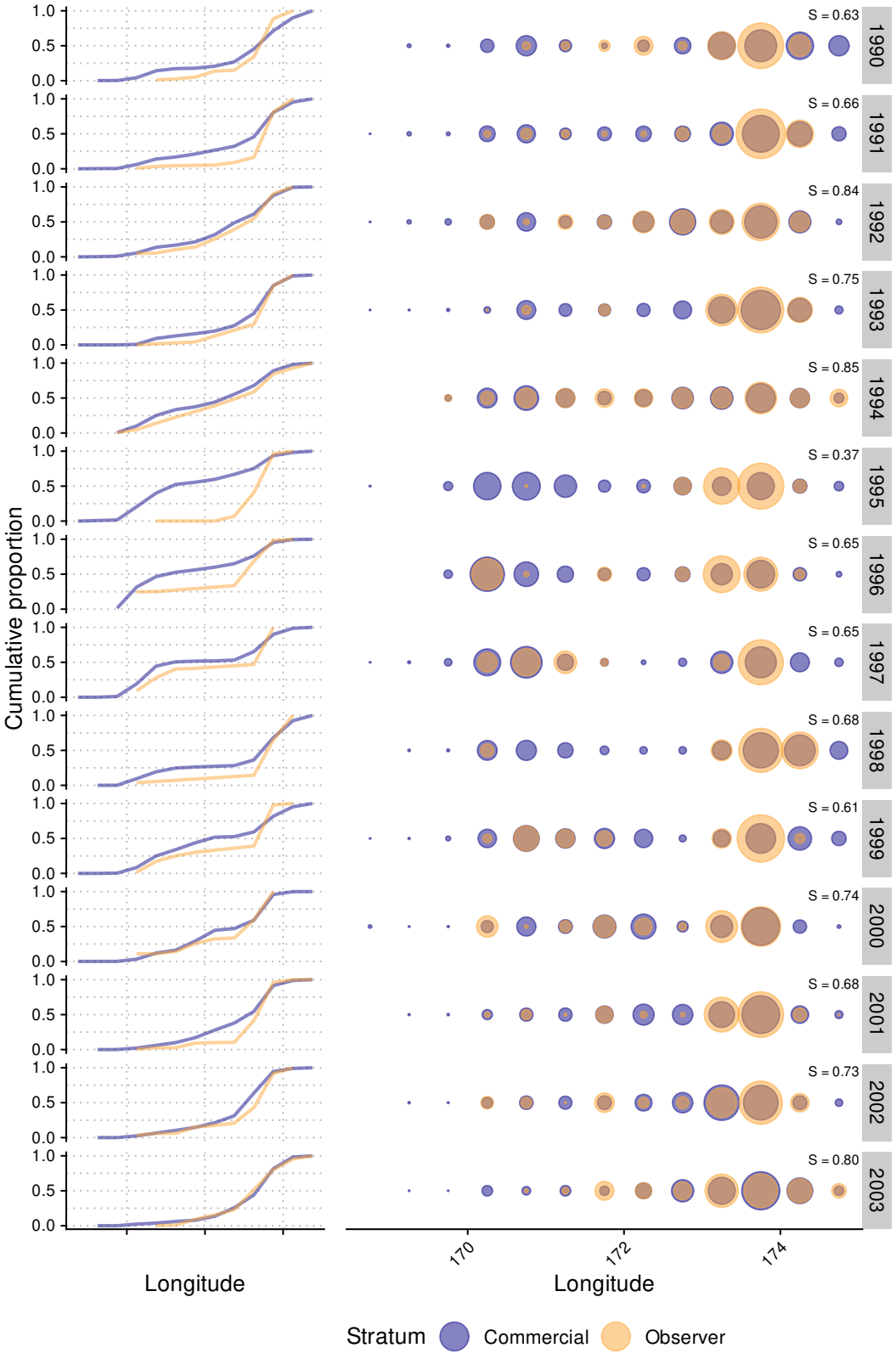


Figure 748: Longitudinal representativeness of observer sampling coverage of Trawl catch in JMA 7, from events where the jack mackerel catch exceeded the 120kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

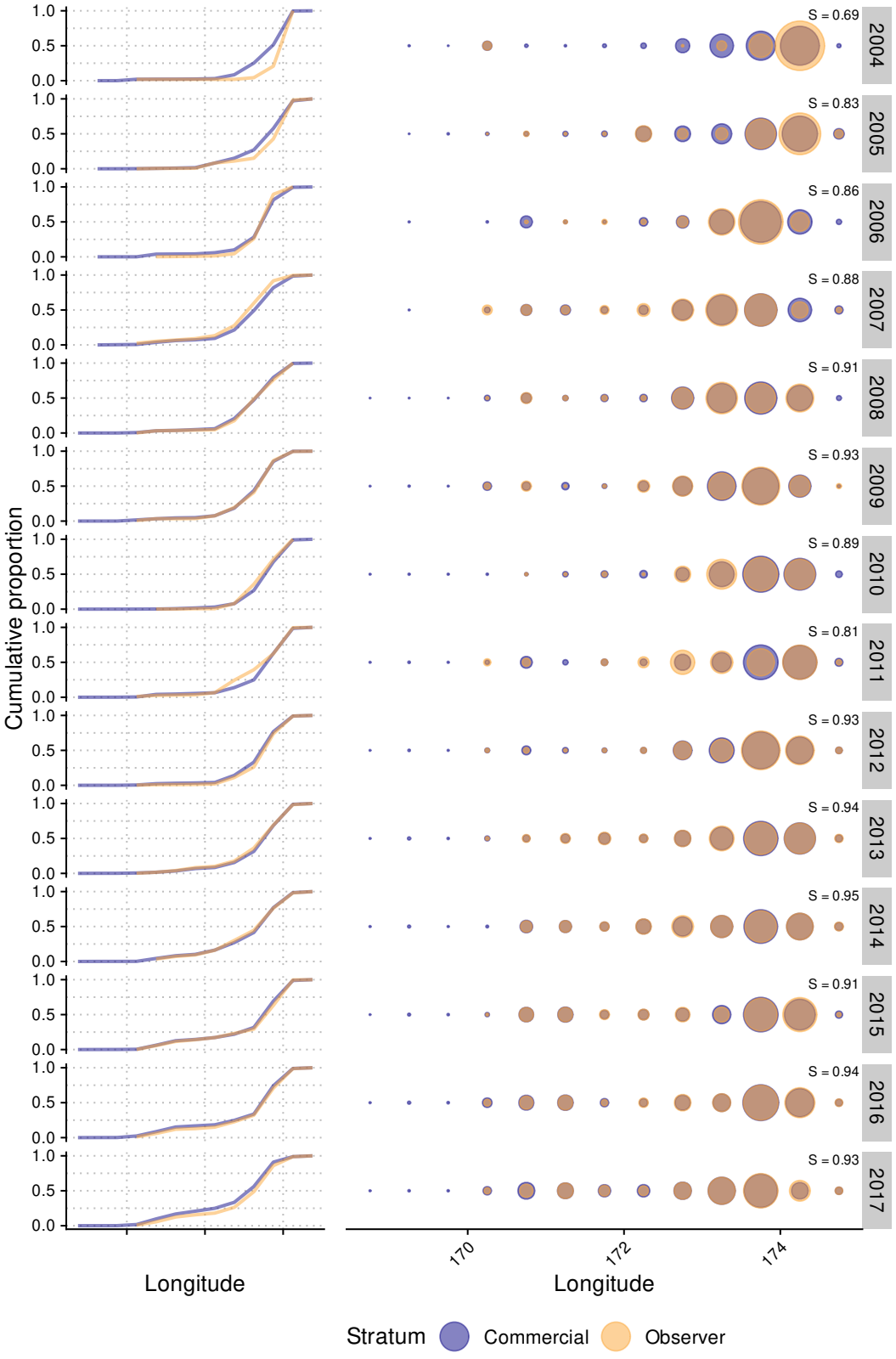


Figure 749: Longitudinal representativeness of observer sampling coverage of Trawl catch in JMA 7, from events where the jack mackerel catch exceeded the 120kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

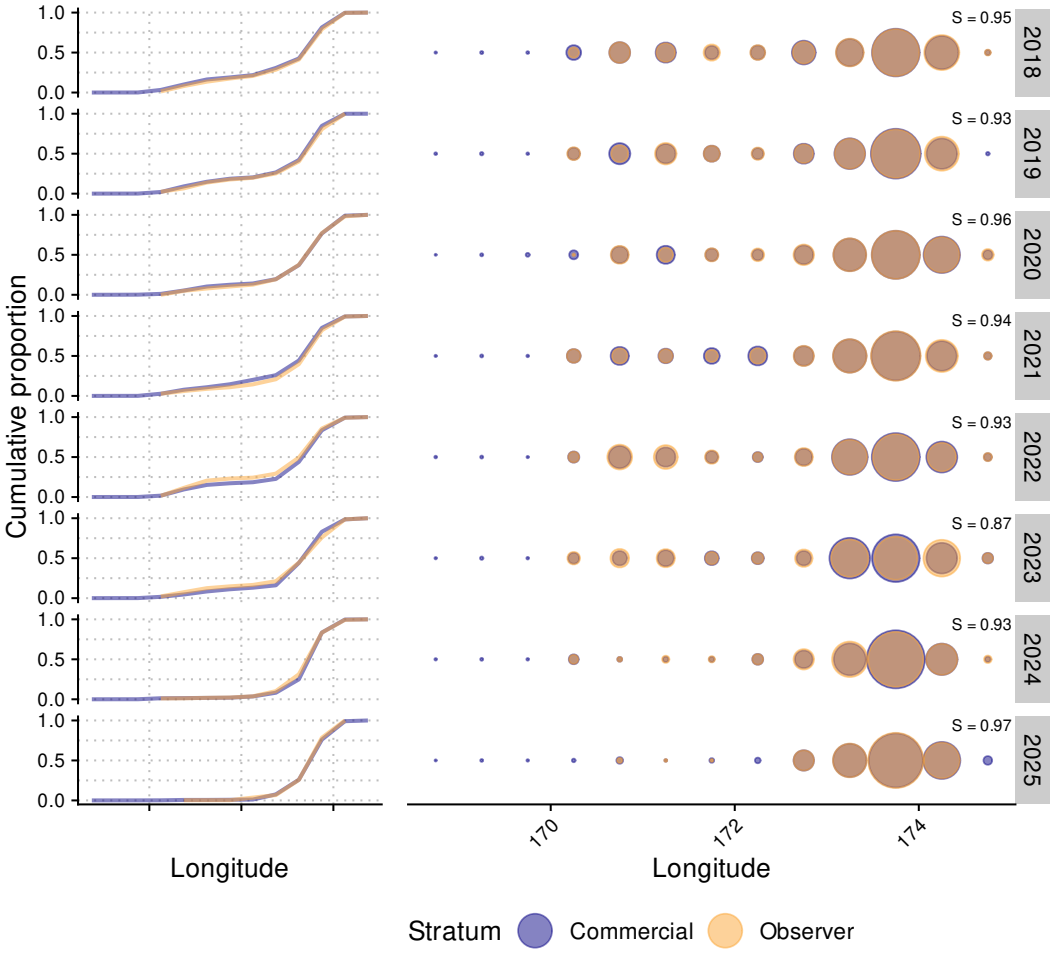


Figure 750: **Longitudinal representativeness of observer sampling coverage of Trawl catch in JMA 7, from events where the jack mackerel catch exceeded the 120kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

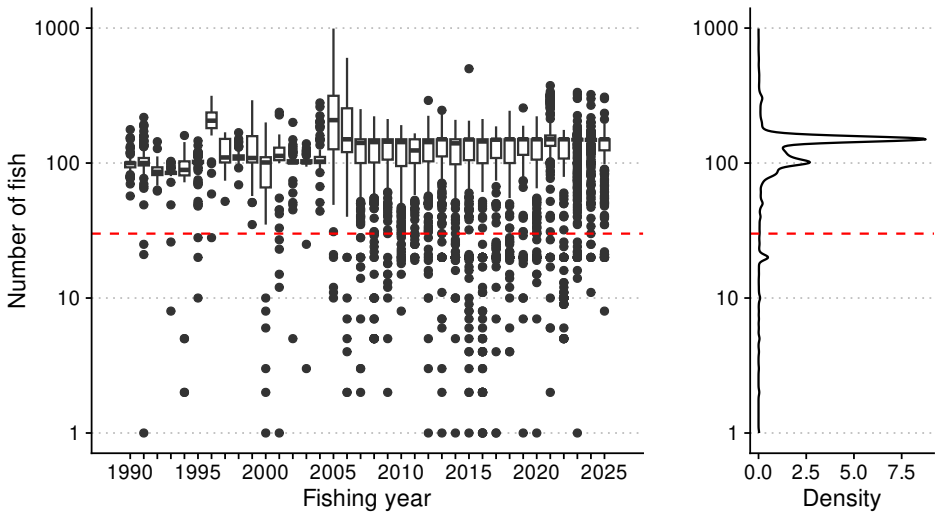


Figure 751: **Length-frequency sample sizes for observed fishing events in JMA 7 where jack mackerel were sampled. The red dashed line indicates a sample size of 30 fish.**

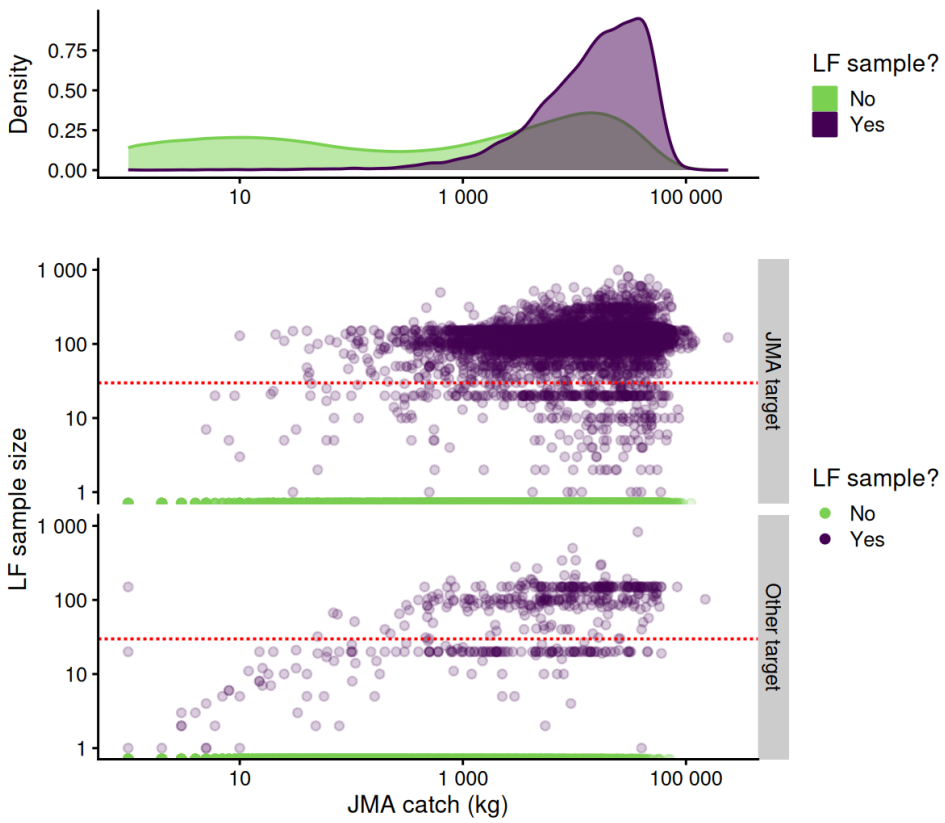


Figure 752: Length-frequency sample sizes (number of fish sampled) for observed fishing events in JMA 7 in relation to the total jack mackerel catch from an event, separately for jack mackerel target events and other target species. The red dashed line indicates a sample size of 30 fish.

2.11.2.2 Otolith samples

Table 62: Otolith samples of jack mackerel from the JMA 7 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of jack mackerel exceeded a potential sampling threshold of 120 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	2 665	0	0	0.00
1991	2 817	0	0	0.00
1992	3 662	0	0	0.00
1993	3 562	0	0	0.00
1994	3 710	0	0	0.00
1995	3 751	0	0	0.00
1996	2 768	0	0	0.00
1997	2 784	0	0	0.00
1998	2 689	0	0	0.00
1999	3 109	0	0	0.00
2000	2 053	0	0	0.00
2001	2 511	0	0	0.00
2002	3 410	0	0	0.00
2003	3 619	0	0	0.00
2004	3 388	0	0	0.00
2005	3 442	0	0	0.00
2006	2 623	0	0	0.00
2007	3 032	0	0	0.00
2008	2 785	0	0	0.00
2009	2 397	9	65	0.38
2010	2 534	1	3	0.04
2011	1 986	58	688	2.92
2012	1 950	424	4 419	21.74
2013	2 125	496	6 549	23.34
2014	2 360	475	4 829	20.13
2015	2 112	56	512	2.65
2016	1 833	152	1 440	8.29
2017	1 625	268	3 062	16.49
2018	1 844	409	3 987	22.18
2019	1 747	377	4 414	21.58
2020	1 821	389	4 758	21.36
2021	1 551	181	1 890	11.67
2022	1 683	252	2 757	14.97
2023	1 846	244	2 313	13.22
2024	1 718	326	3 058	18.98
2025	1 593	346	3 805	21.72

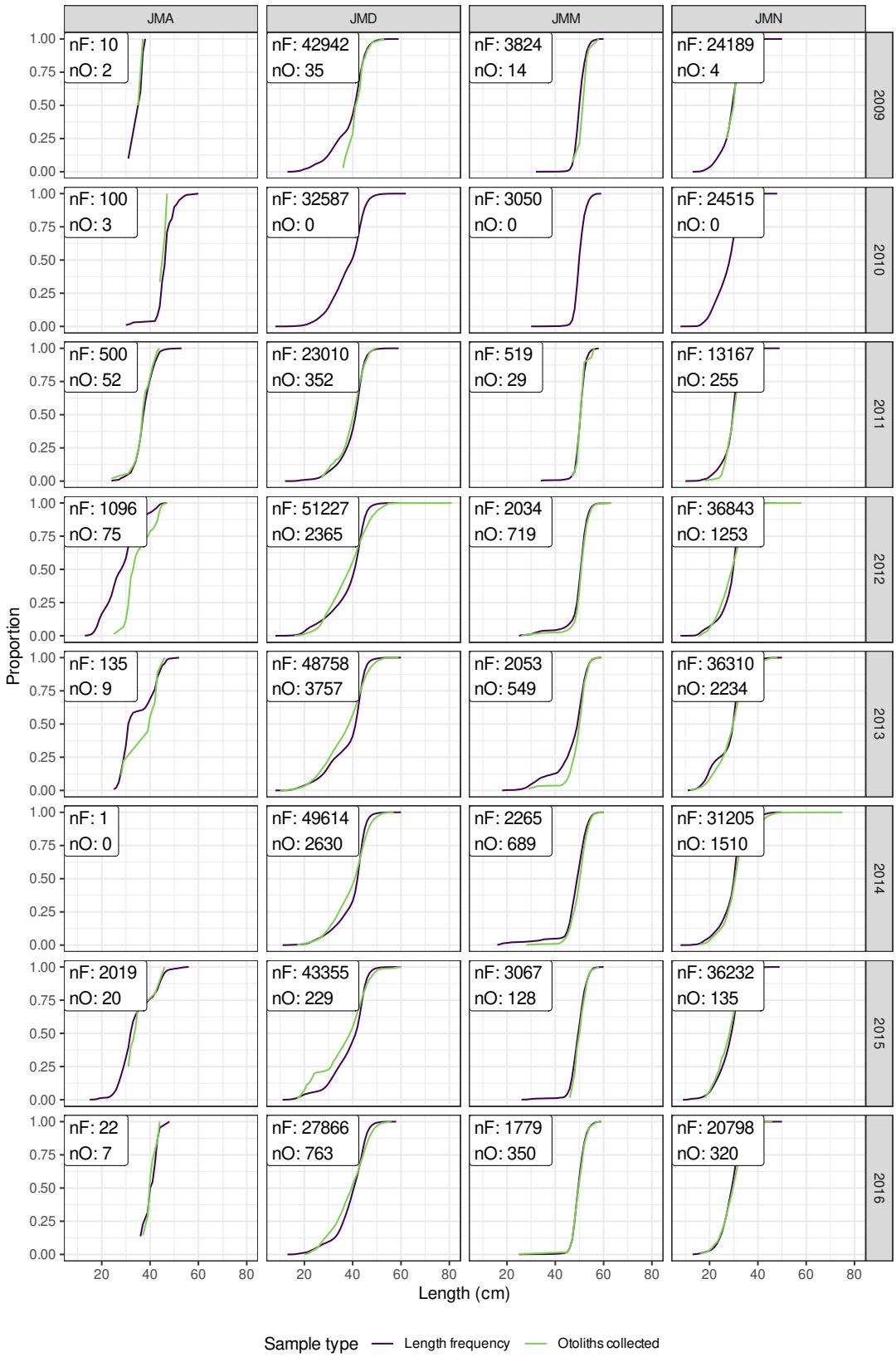


Figure 753: Cumulative distributions of the length of fish in the length frequency and otolith samples of jack mackerel in the JMA 7 Trawl fishery for the 2009 to 2016 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

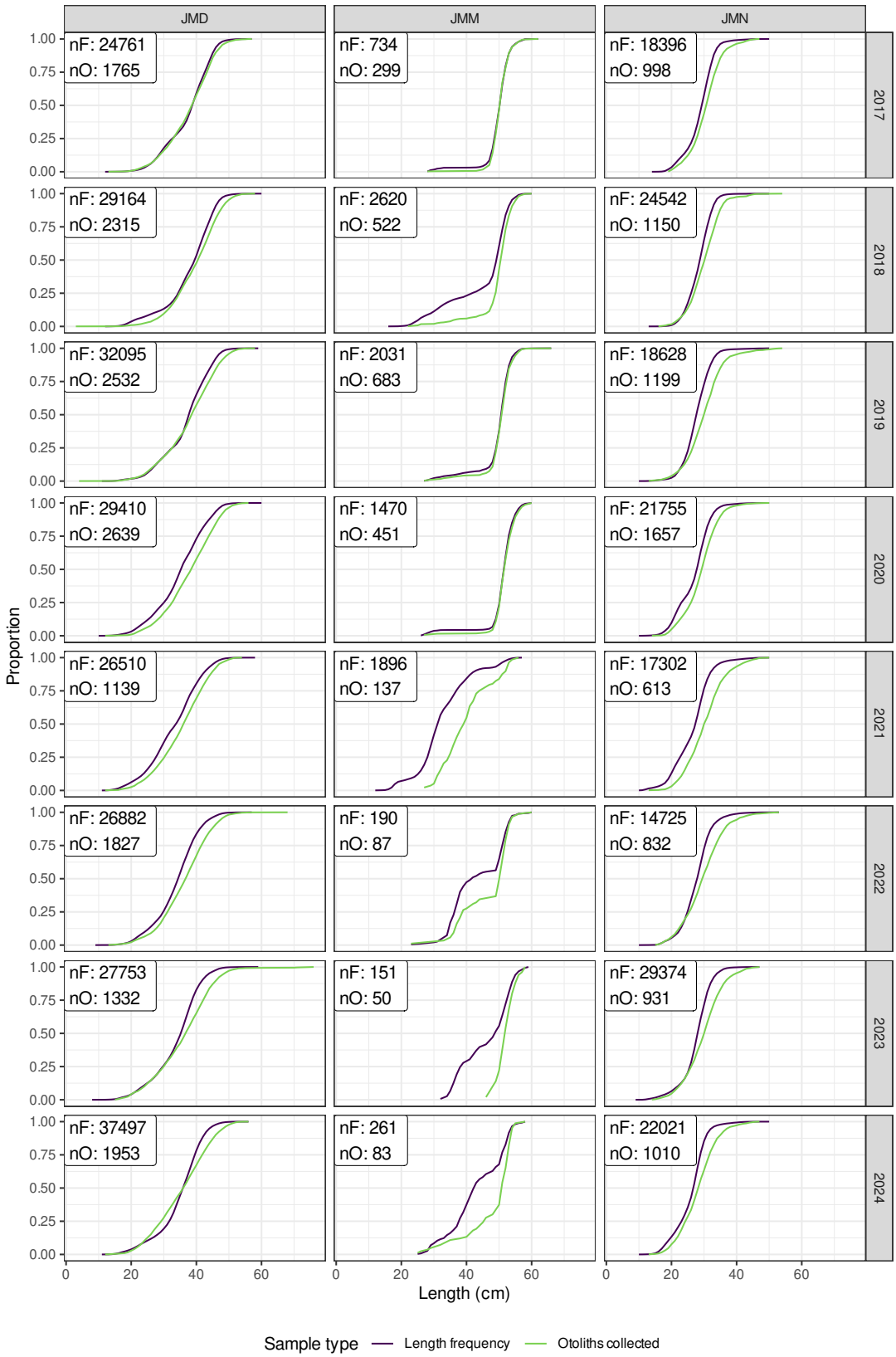


Figure 754: Cumulative distributions of the length of fish in the length frequency and otolith samples of jack mackerel in the JMA 7 Trawl fishery for the 2017 to 2024 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

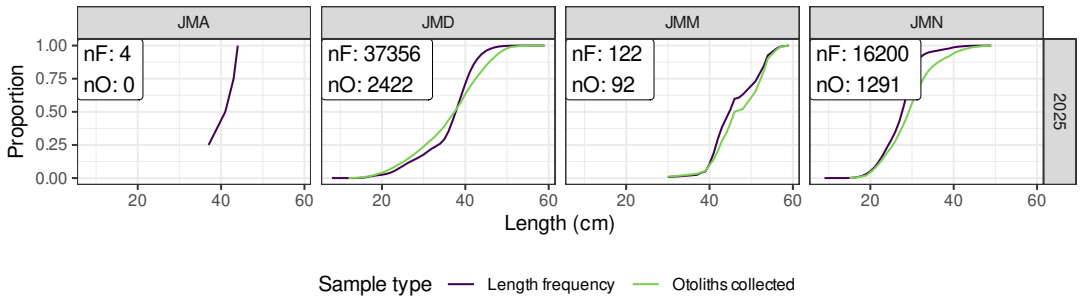


Figure 755: Cumulative distributions of the length of fish in the length frequency and otolith samples of jack mackerel in the JMA 7 Trawl fishery for the 2025 to 2025 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

2.11.2.3 Catch quantification



Figure 756: Methods used by observers to quantify the catch of jack mackerel in the JMA 7 Trawl fishery. The legend lists the methods used in descending order of total catch.

2.12 LDO stocks

Observer sampling of lookdown dory is considered with respect to the lookdown dory Quota Management Areas.

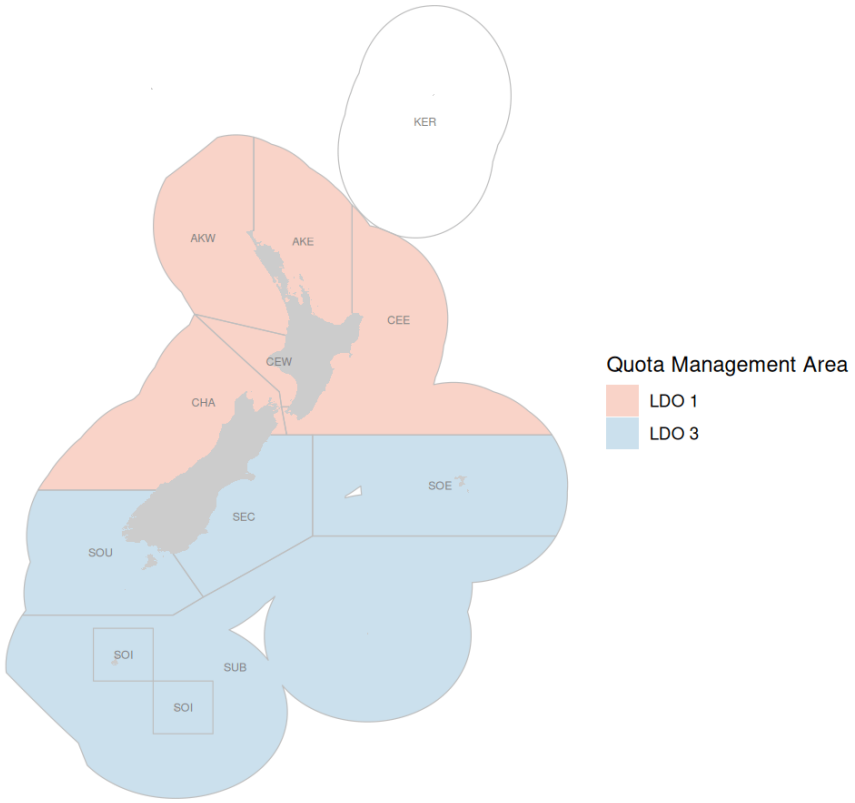


Figure 757: Observer Fisheries Management Areas (black borders, labels on plot) in relation to the Quota Management Area for lookdown dory (coloured areas, per legend).

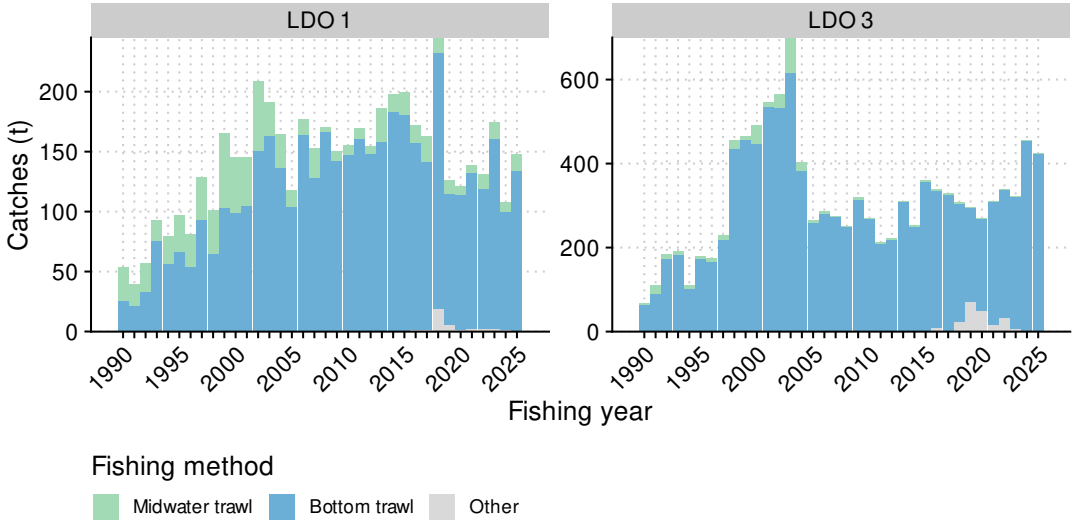


Figure 758: Catches of lookdown dory by fishing method, for events within the lookdown dory Quota Management Areas. Methods grouped as Other include: BLL, BPT, BS, CP, DL, DS, HL, MPT, PL, POT, PRB, PRM, PS, PSH, RLP, SJ, SLL, SN, T, TL.

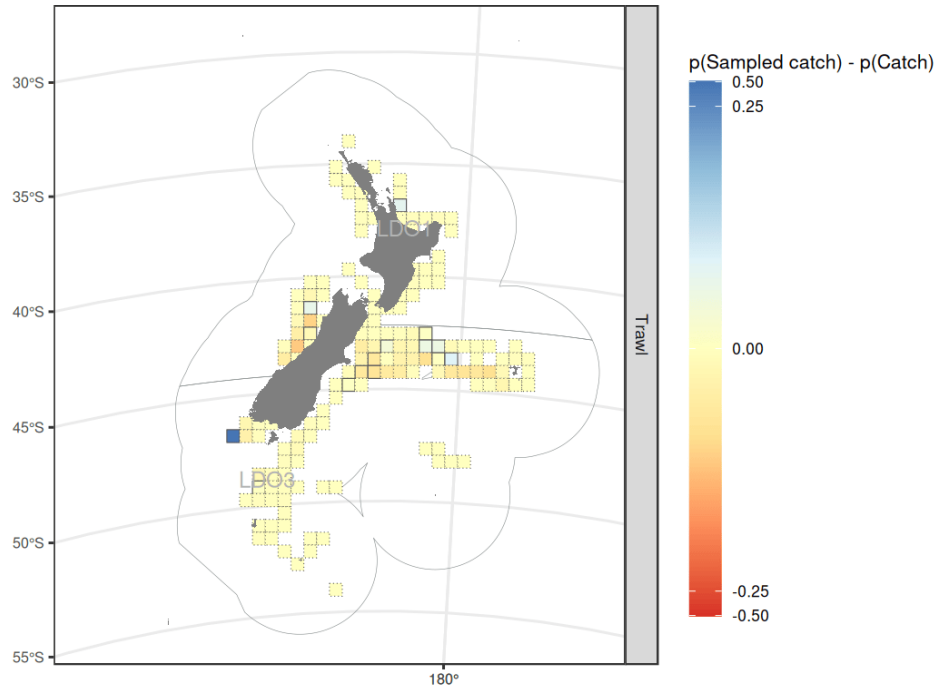


Figure 759: Differences in the relative proportions of catch and sampled catch for lookdown dory during 2021–2025. Cells with a dotted border had no sampling.

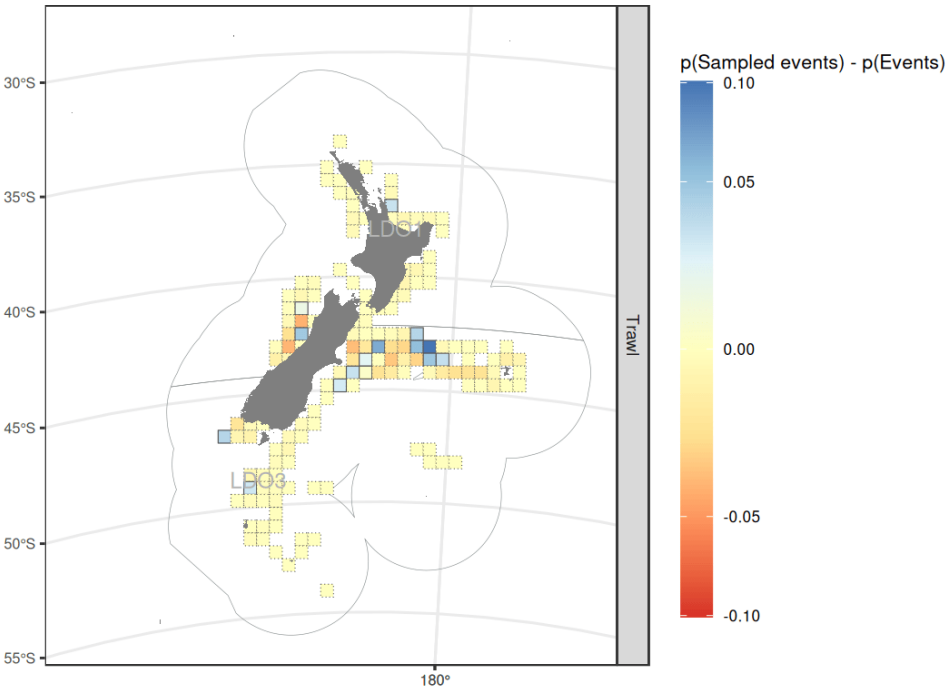


Figure 760: Differences in the relative proportions of events meeting the sampling threshold and sampled events for lookdown dory during 2021–2025. Cells with a dotted border had no sampling.

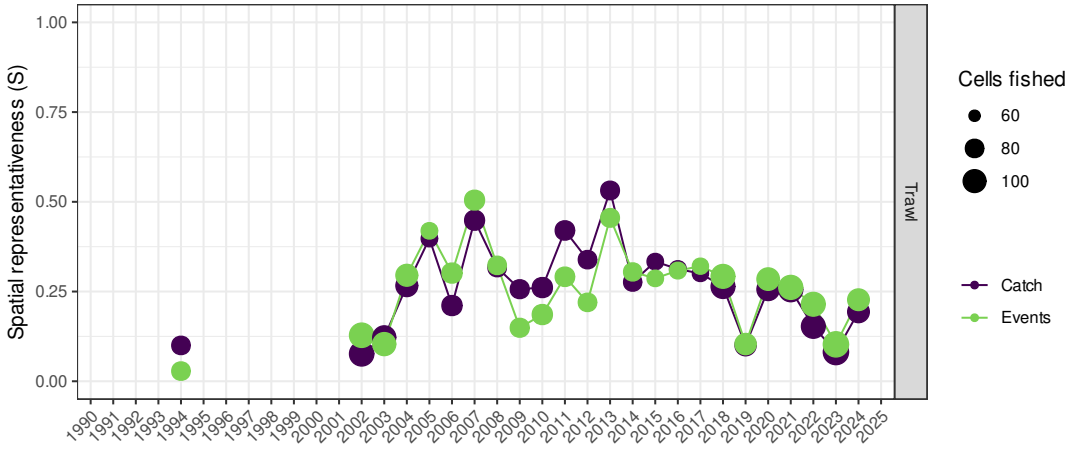


Figure 761: Spatial representativeness of observer sampling of lookdown dory by fishing year. Representativeness is assessed using the Manhattan distance metric (*S*) applied to 64 km grid cells, for both the proportion of catch sampled and the proportion of positive events sampled.

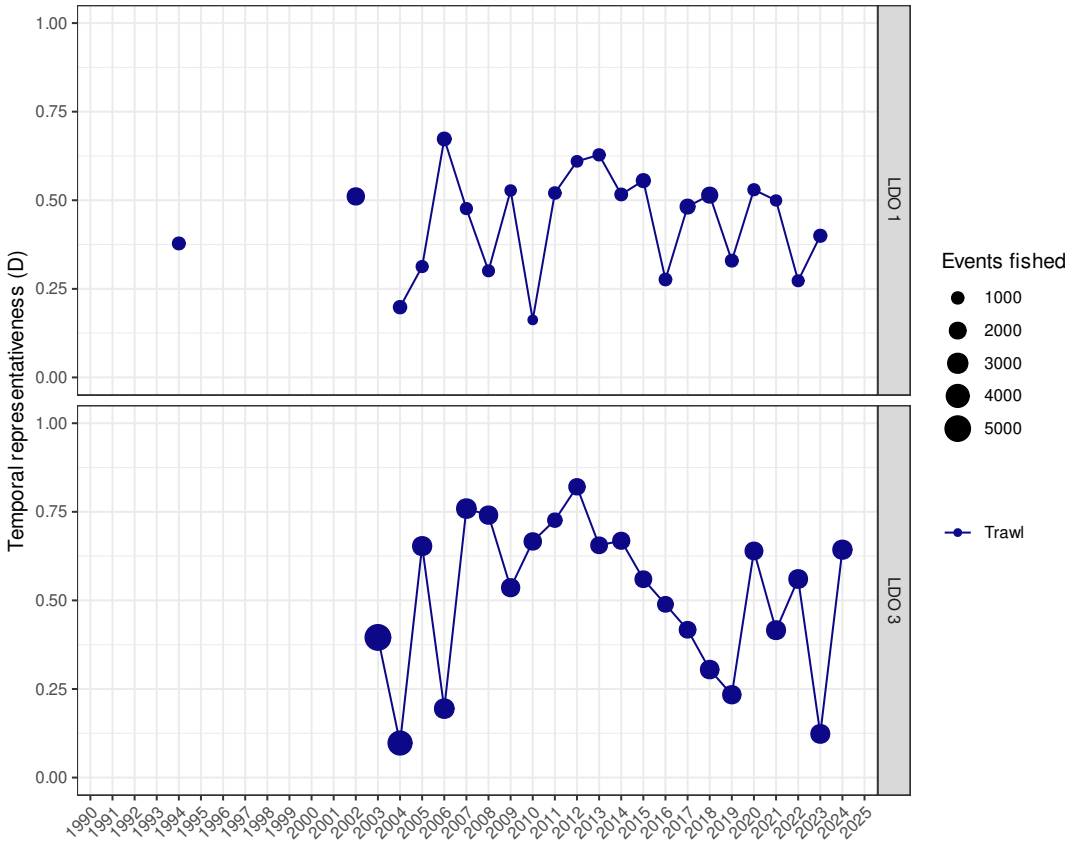


Figure 762: Temporal representativeness of observer sanpling of lookdown dory by fishing year and area. Temporal representativeness is assessed using the KS statistic (*D*) applied to the start date-times of all fishing events and all sampled fishing events, weighted by catch weight.

2.12.1 LDO 1: Trawl fishery

2.12.1.1 Length-frequency samples

Table 63: Length-frequency samples of lookdown dory from the LDO 1 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of lookdown dory exceeded a potential sampling threshold of 10 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	213	0	0	0.00
1991	198	0	0	0.00
1992	201	0	0	0.00
1993	287	0	0	0.00
1994	210	2	8	0.95
1995	387	0	0	0.00
1996	266	0	0	0.00
1997	584	0	0	0.00
1998	417	0	0	0.00
1999	507	0	0	0.00
2000	440	0	0	0.00
2001	365	0	0	0.00
2002	646	6	23	0.93
2003	457	0	0	0.00
2004	340	8	23	2.35
2005	304	15	124	4.93
2006	611	21	336	3.44
2007	340	9	89	2.65
2008	563	18	255	3.20
2009	411	3	59	0.73
2010	434	1	20	0.23
2011	462	5	39	1.08
2012	380	2	40	0.53
2013	654	21	259	3.21
2014	745	8	105	1.07
2015	579	5	99	0.86
2016	579	2	35	0.35
2017	658	4	38	0.61
2018	1 439	11	125	0.76
2019	754	4	77	0.53
2020	789	4	65	0.51
2021	794	3	35	0.38
2022	806	1	90	0.12
2023	1 132	1	20	0.09
2024	843	0	0	0.00
2025	1 040	0	0	0.00

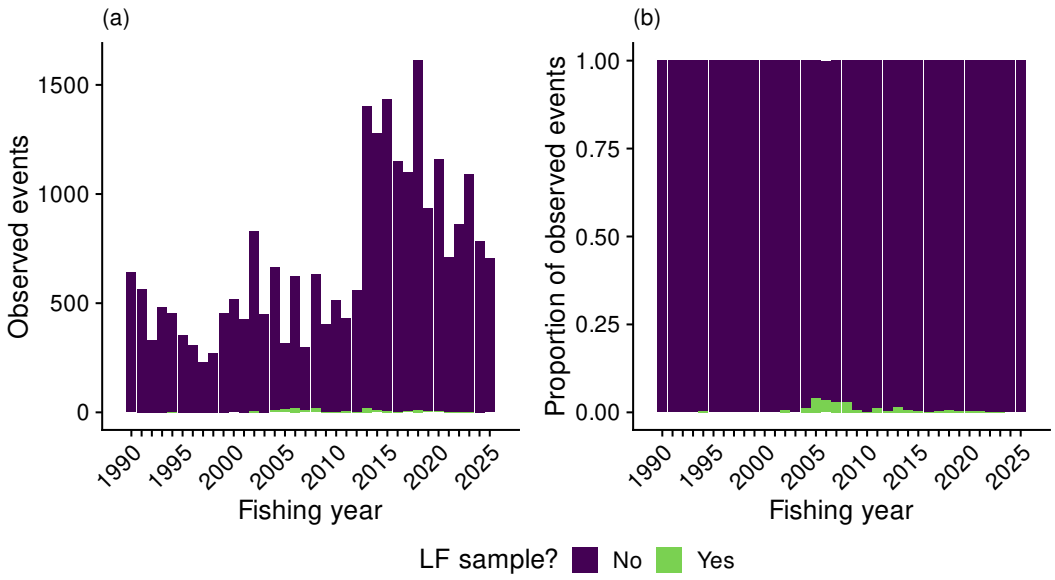


Figure 763: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in LDO 1 where the lookdown dory catch exceeded the 10 kg threshold, with and without length-frequency sampling.**

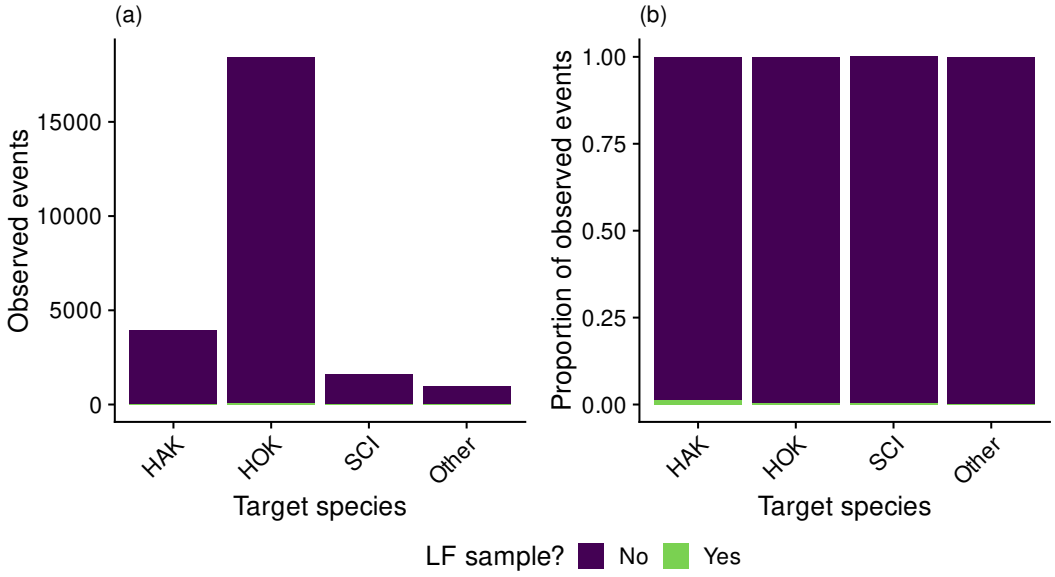


Figure 764: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in LDO 1 where the lookdown dory catch exceeded the 10 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

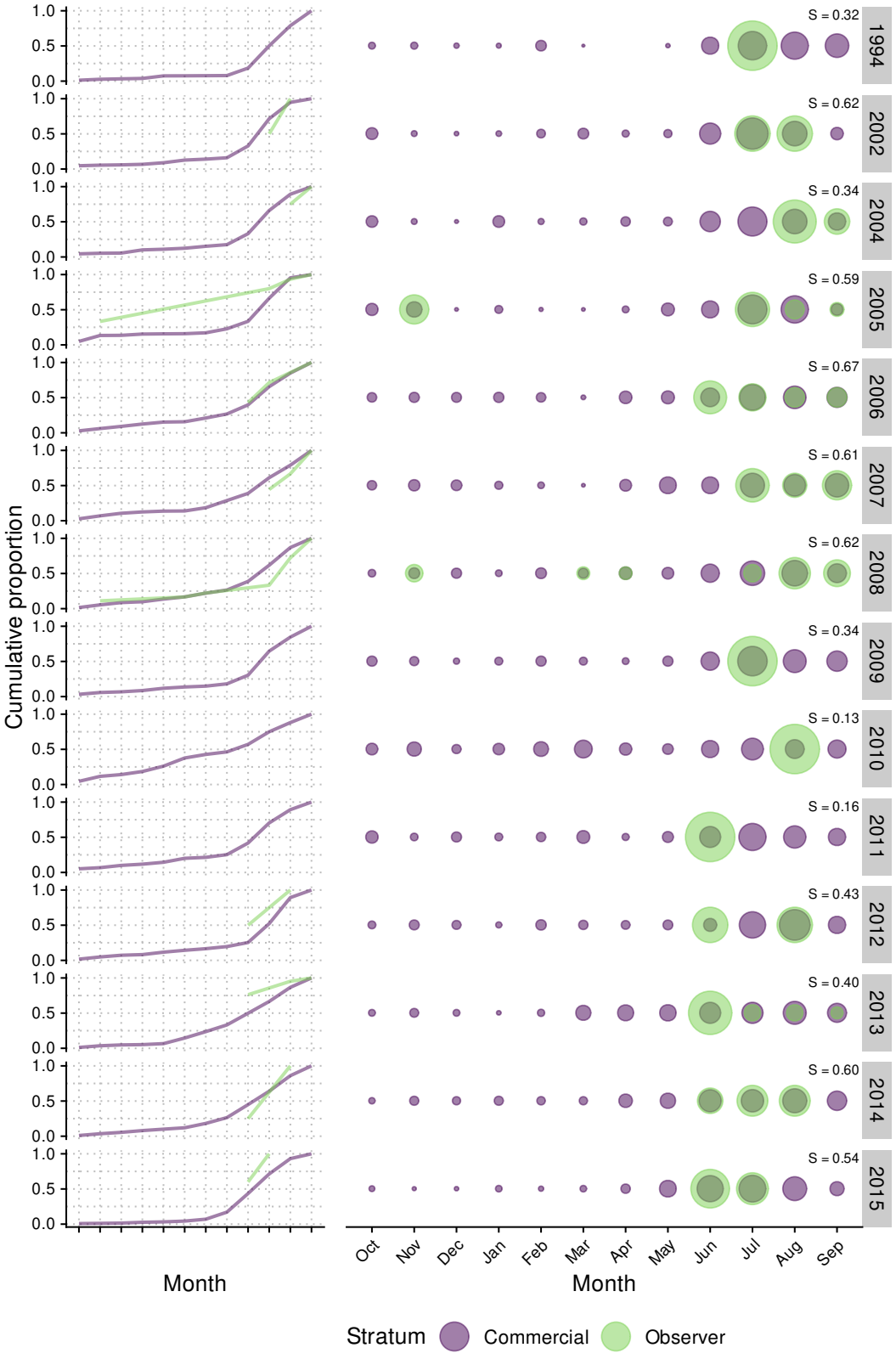


Figure 765: Monthly representativeness of observer sampling coverage of Trawl fishing events in LDO 1, where the lookdown dory catch exceeded the 10kg threshold, in 1994 to 2015. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

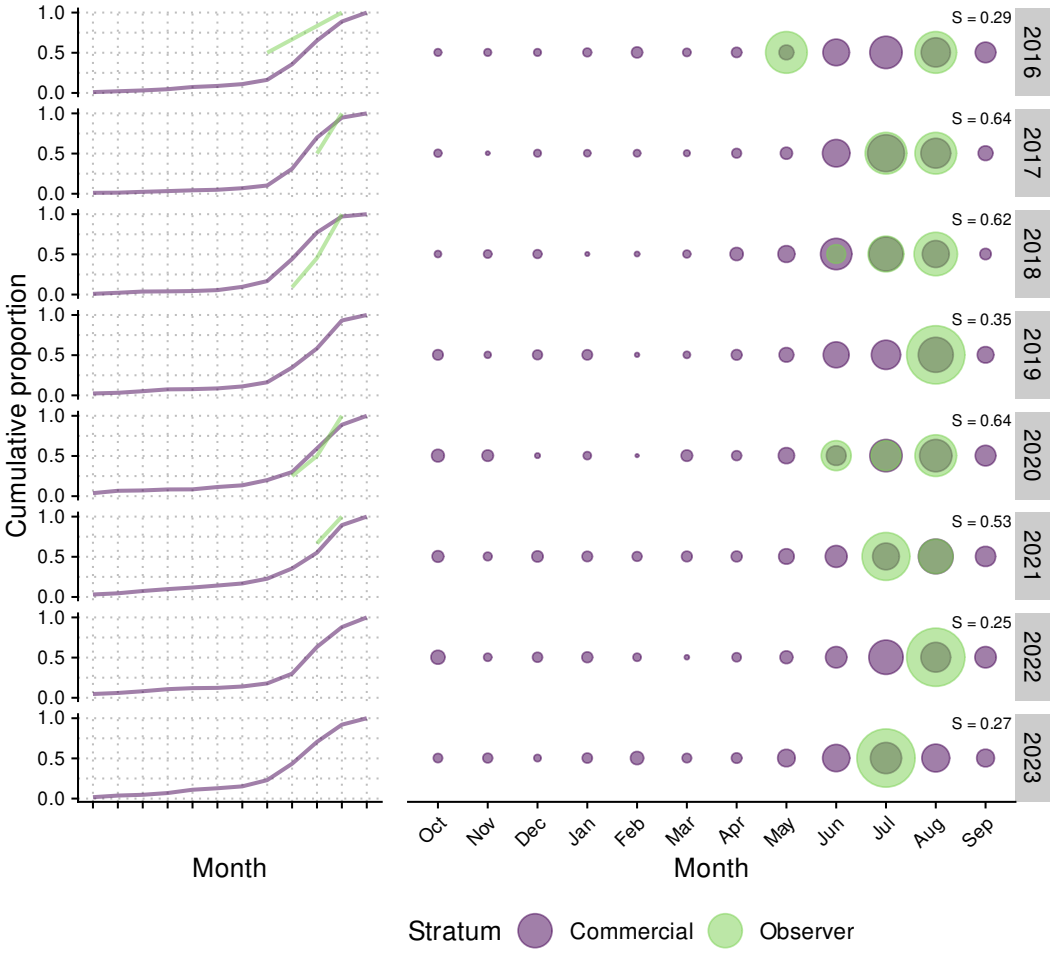


Figure 766: Monthly representativeness of observer sampling coverage of Trawl fishing events in LDO 1, where the lookdown dory catch exceeded the 10kg threshold, in 2016 to 2023. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

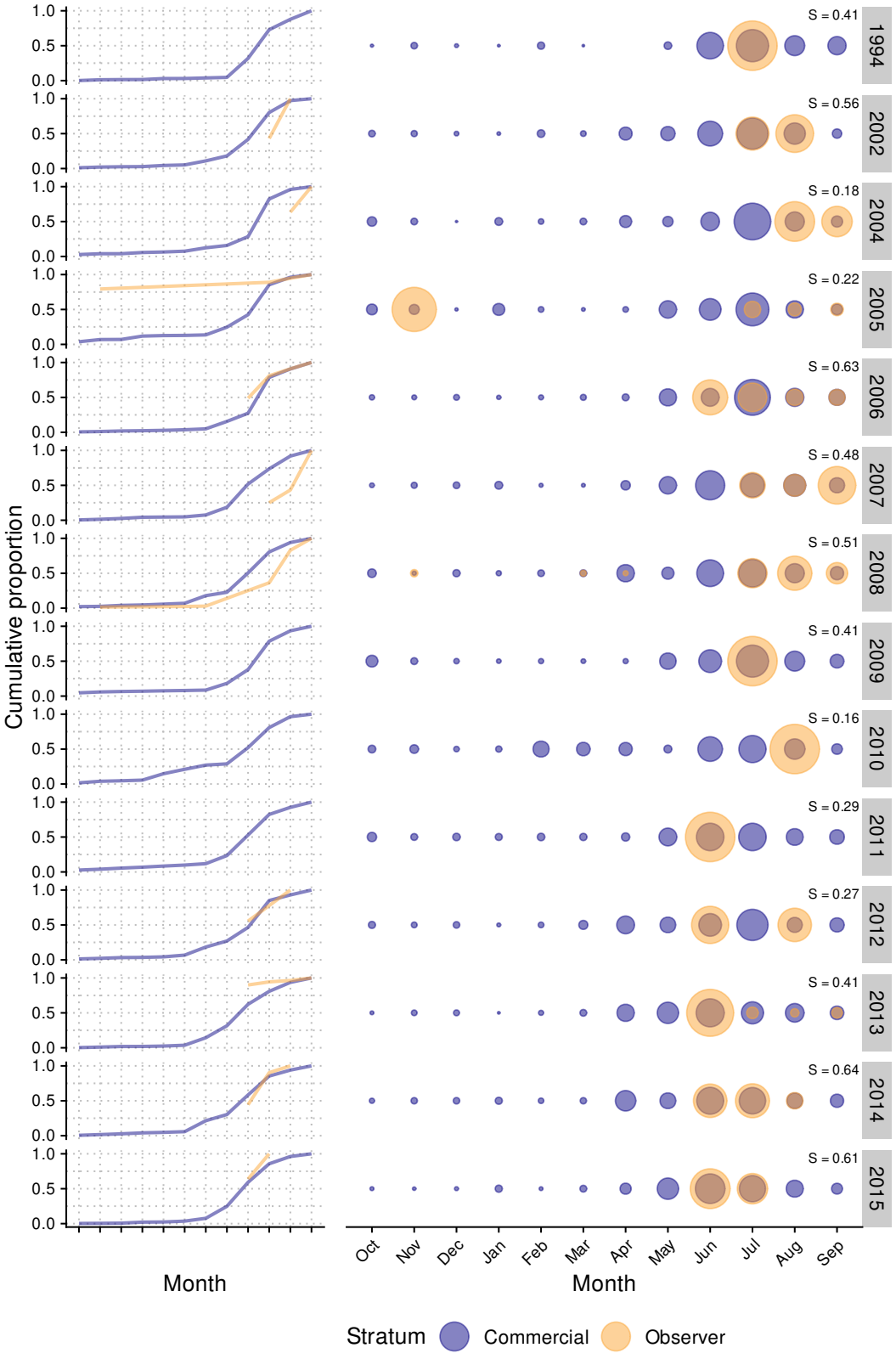


Figure 767: Monthly representativeness of observer sampling coverage of Trawl catch in LDO 1, from events where the lookdown dory catch exceeded the 10kg threshold, in 1994 to 2015. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

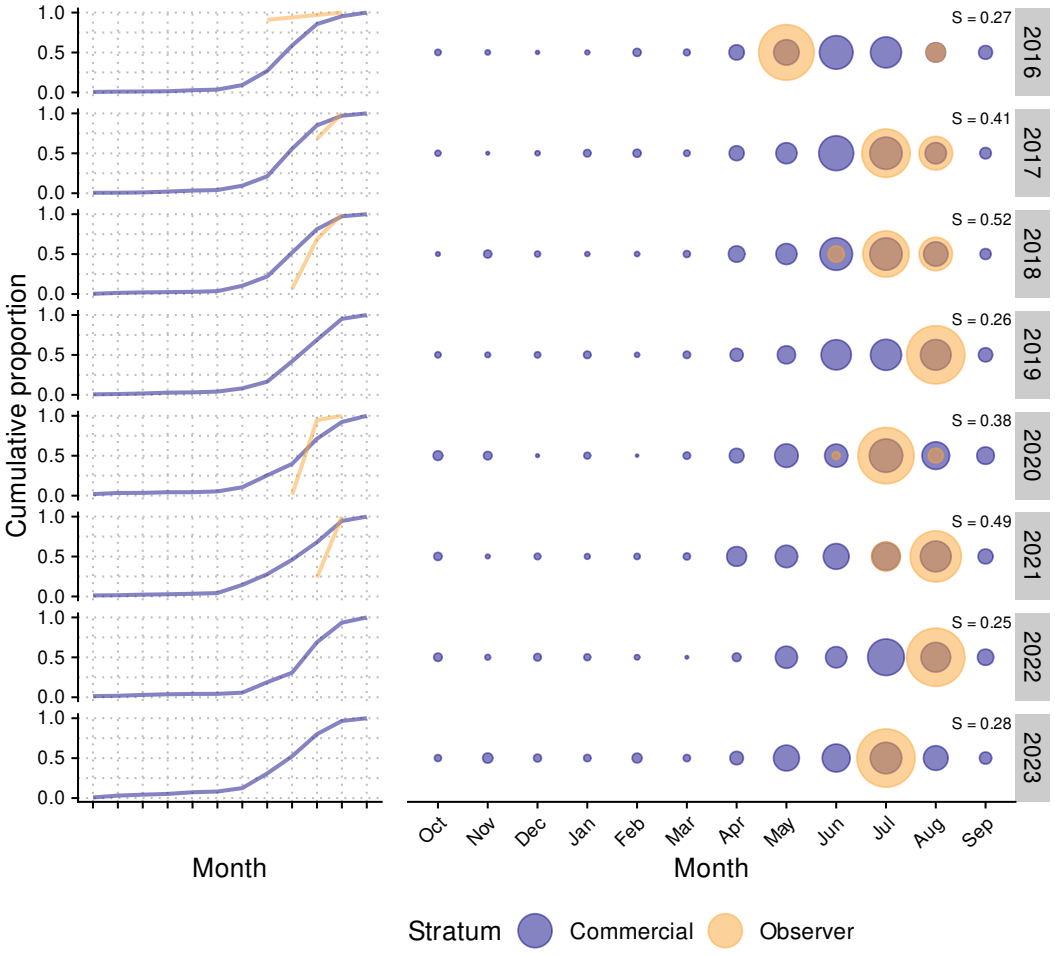


Figure 768: Monthly representativeness of observer sampling coverage of Trawl catch in LDO 1, from events where the lookdown dory catch exceeded the 10kg threshold, in 2016 to 2023. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

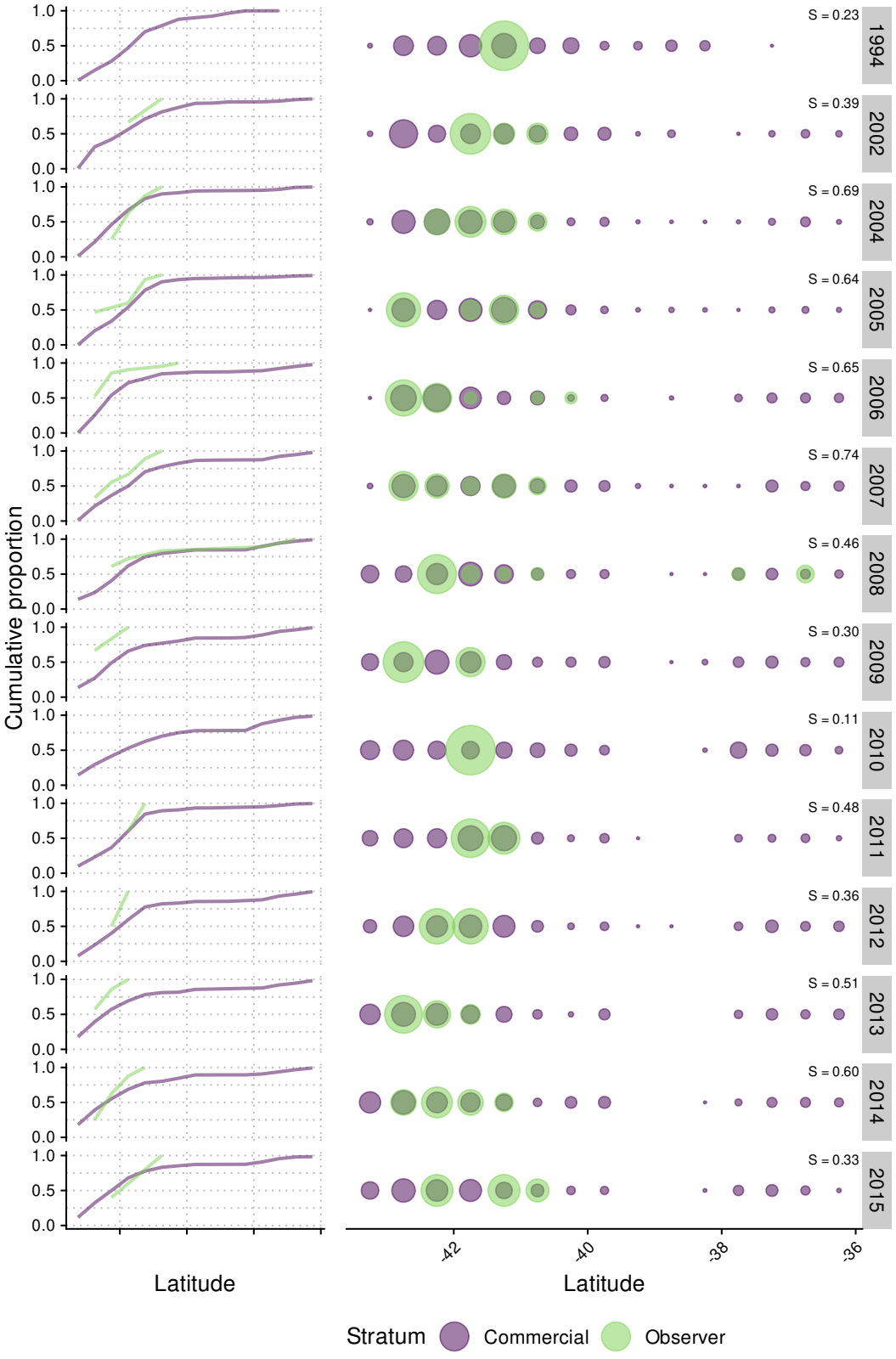


Figure 769: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in LDO 1, where the lookdown dory catch exceeded the 10kg threshold, in 1994 to 2015. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

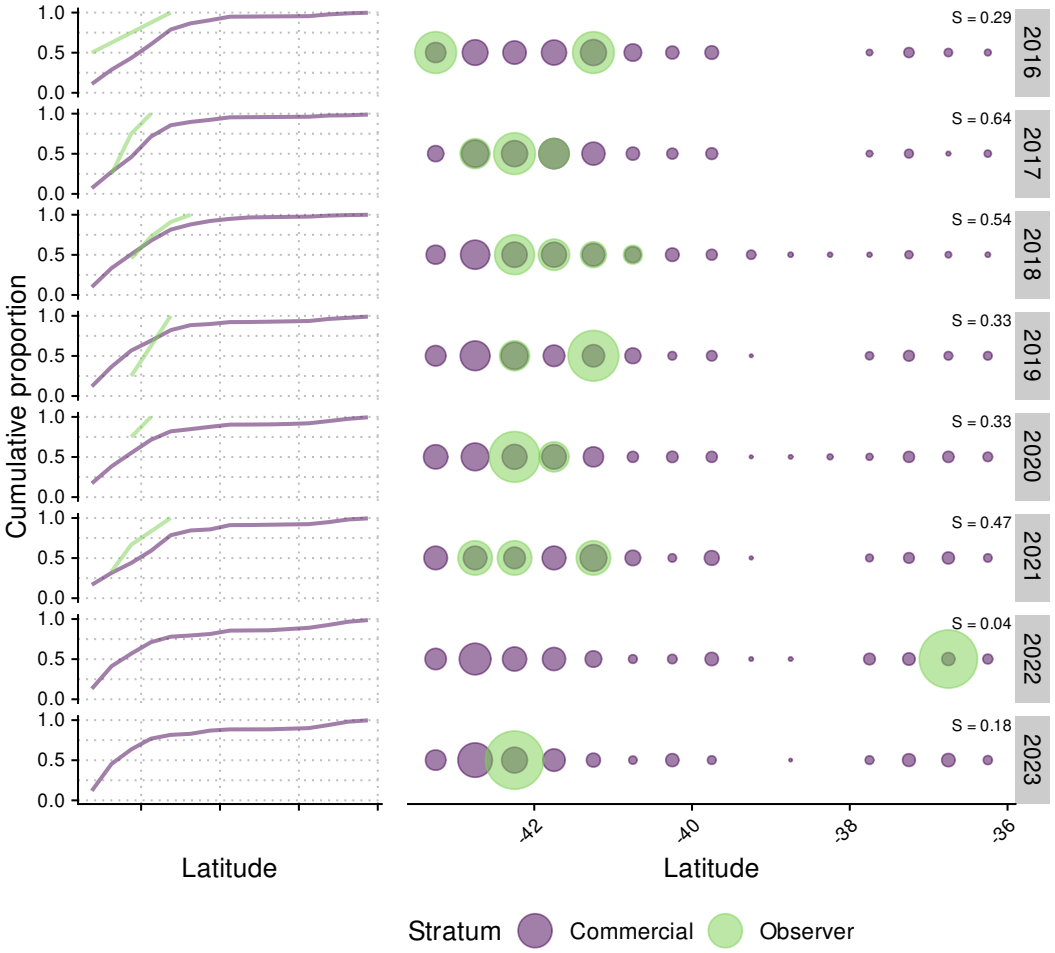


Figure 770: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in LDO 1, where the lookdown dory catch exceeded the 10kg threshold, in 2016 to 2023. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

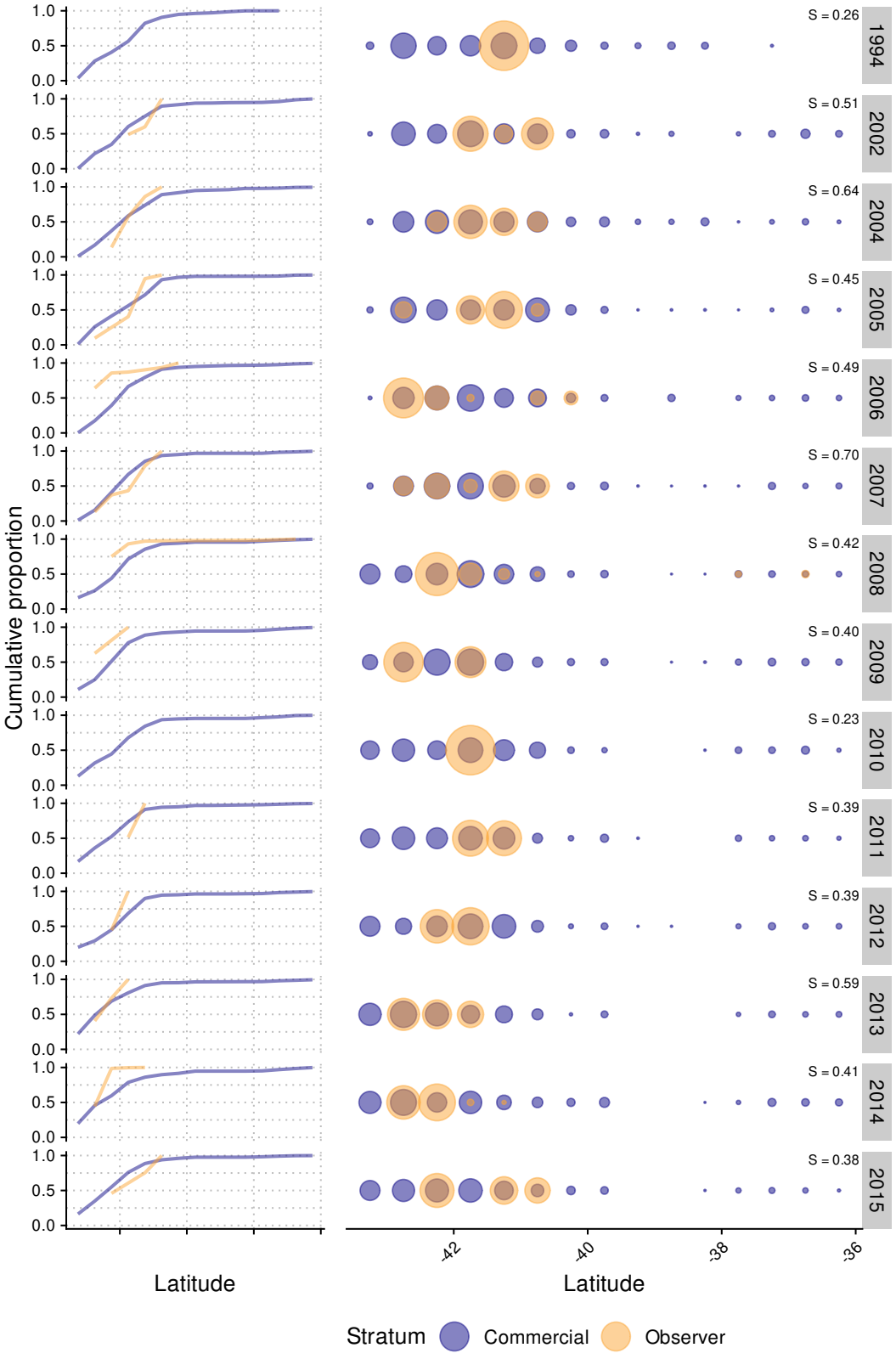


Figure 771: **Latitudinal representativeness of observer sampling coverage of Trawl catch in LDO 1, from events where the lookdown dory catch exceeded the 10kg threshold, in 1994 to 2015. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

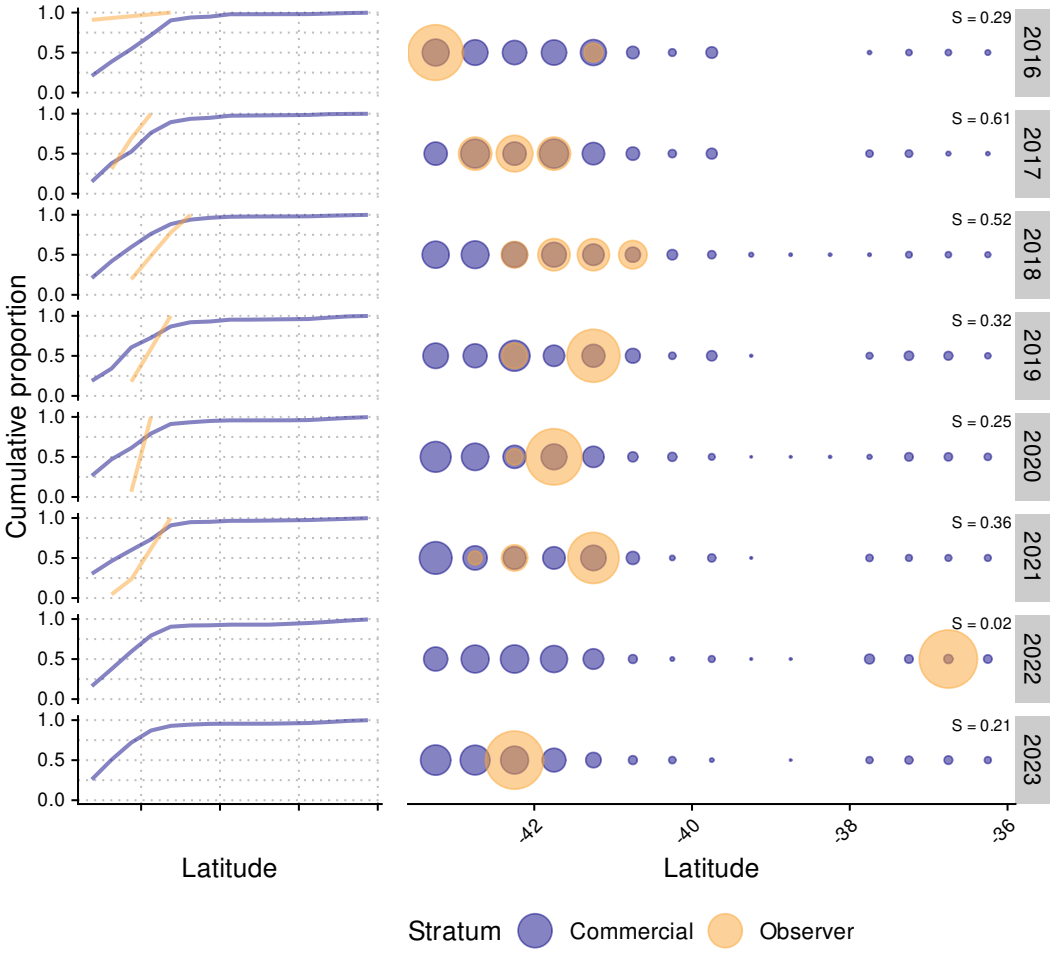


Figure 772: Latitudinal representativeness of observer sampling coverage of Trawl catch in LDO 1, from events where the lookdown dory catch exceeded the 10kg threshold, in 2016 to 2023. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

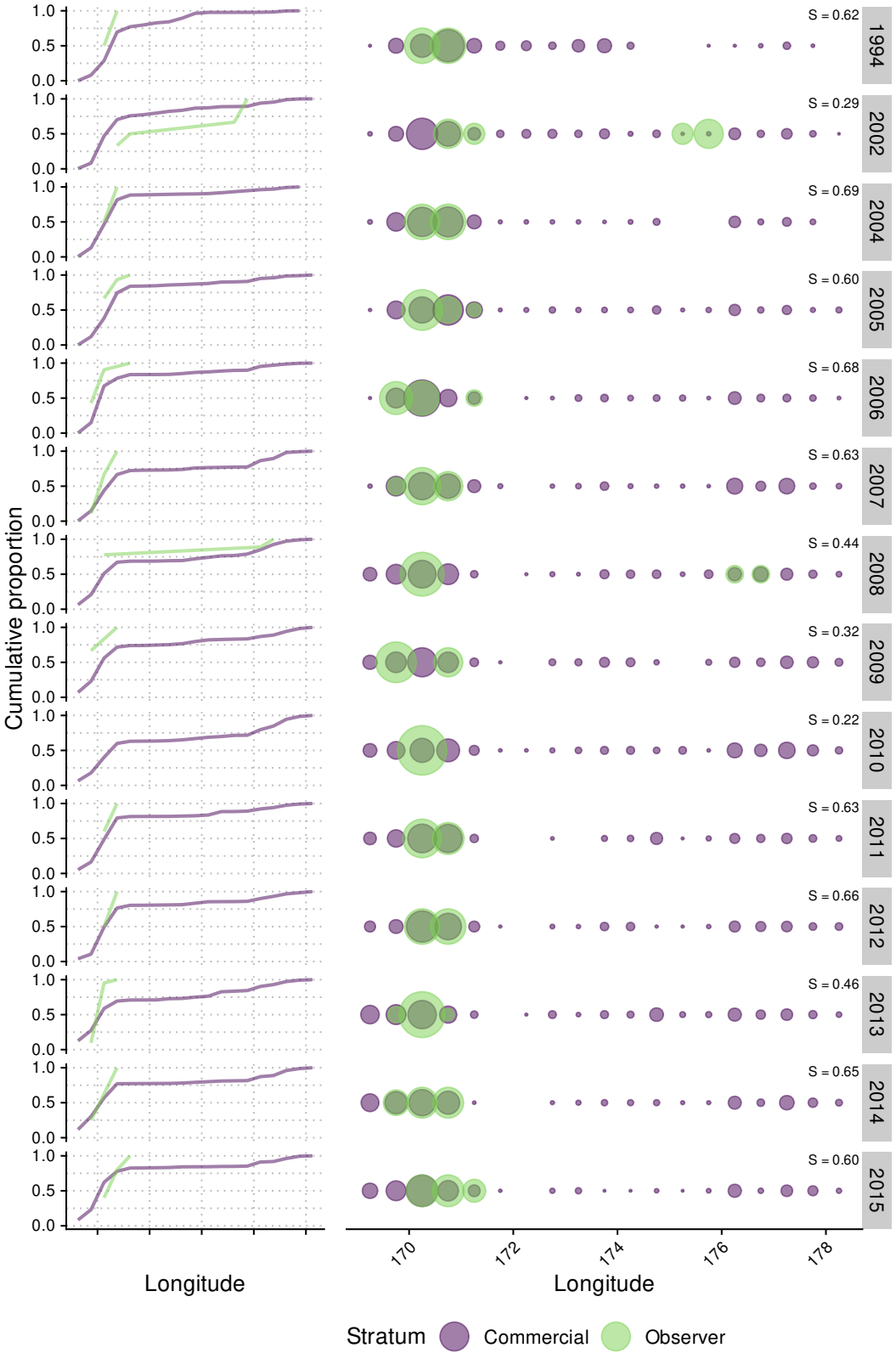


Figure 773: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in LDO 1, where the lookdown dory catch exceeded the 10kg threshold, in 1994 to 2015. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

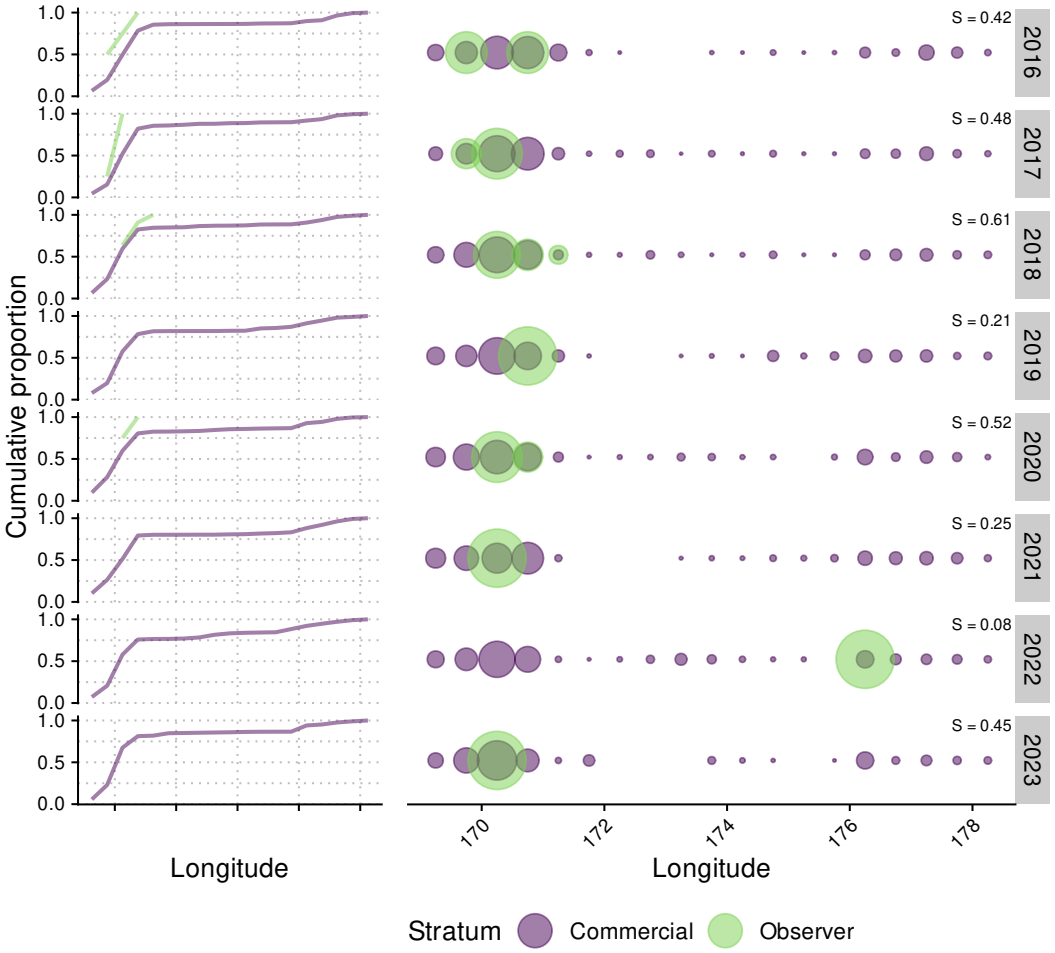


Figure 774: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in LDO 1, where the lookdown dory catch exceeded the 10kg threshold, in 2016 to 2023. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

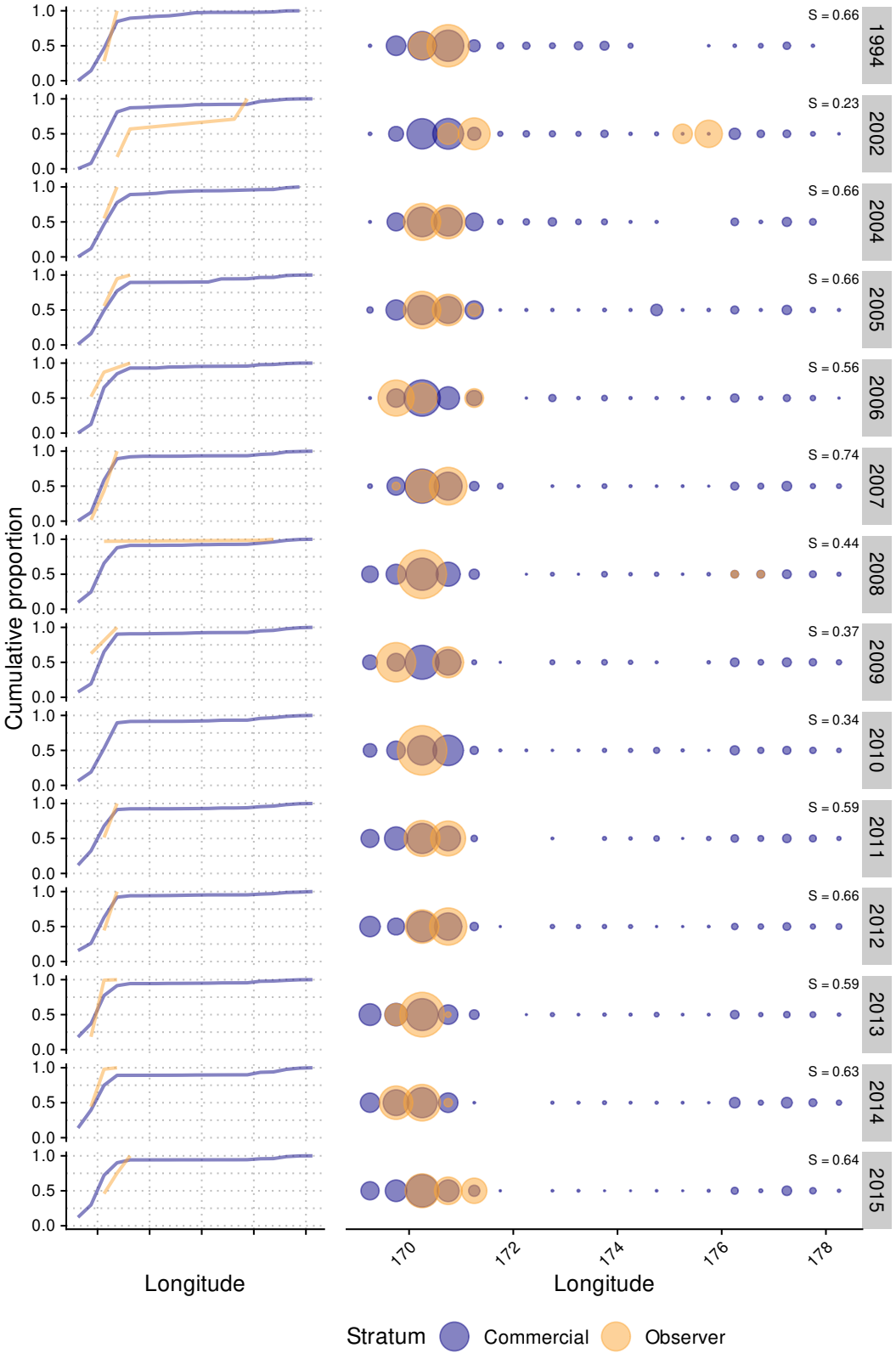


Figure 775: **Longitudinal representativeness of observer sampling coverage of Trawl catch in LDO 1, from events where the lookdown dory catch exceeded the 10kg threshold, in 1994 to 2015. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

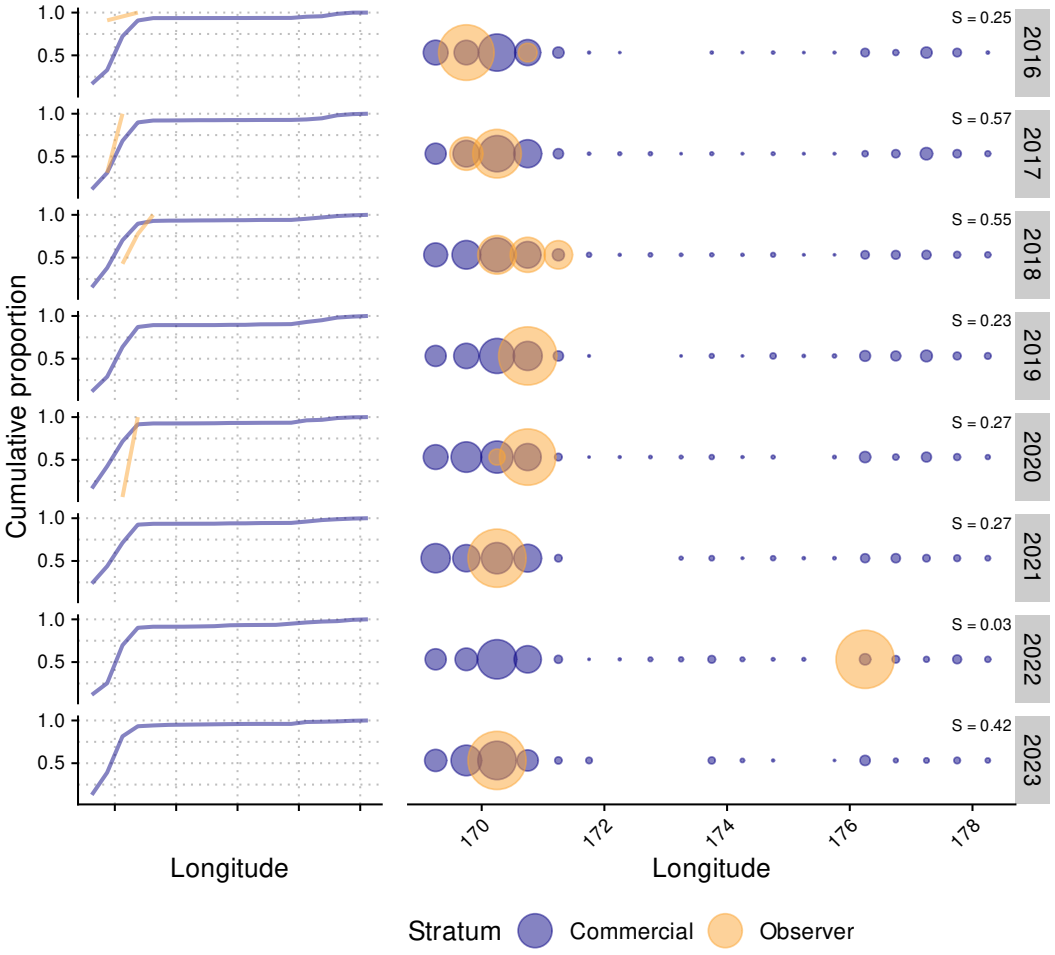


Figure 776: **Longitudinal representativeness of observer sampling coverage of Trawl catch in LDO 1, from events where the lookdown dory catch exceeded the 10kg threshold, in 2016 to 2023. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

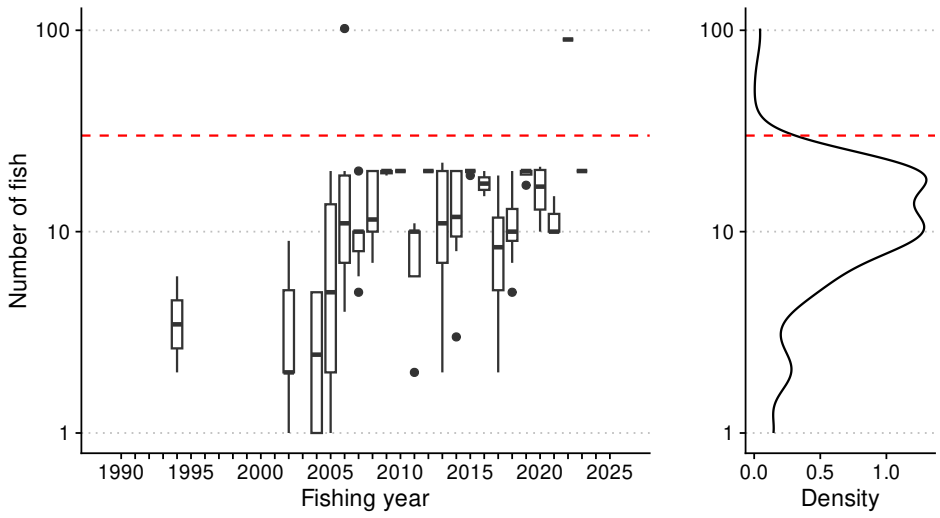


Figure 777: **Length-frequency sample sizes for observed fishing events in LDO 1 where lookdown dory were sampled. The red dashed line indicates a sample size of 30 fish.**

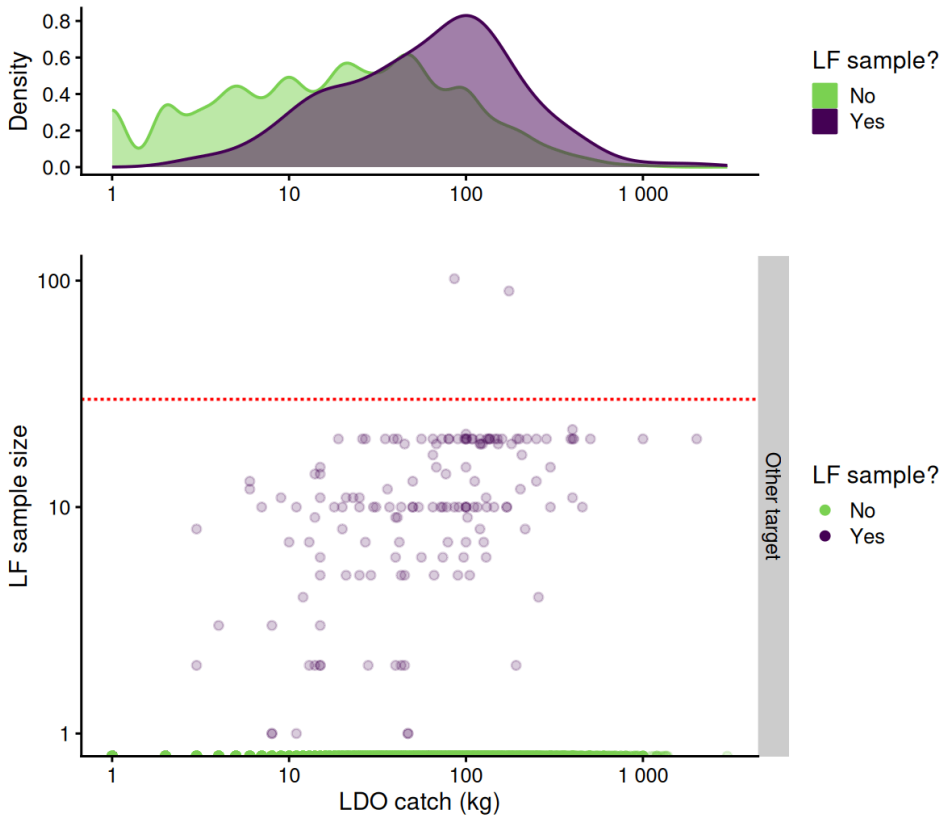


Figure 778: **Length-frequency sample sizes (number of fish sampled) for observed fishing events in LDO 1 in relation to the total lookdown dory catch from an event, separately for lookdown dory target events and other target species. The red dashed line indicates a sample size of 30 fish.**

2.12.1.2 Catch quantification

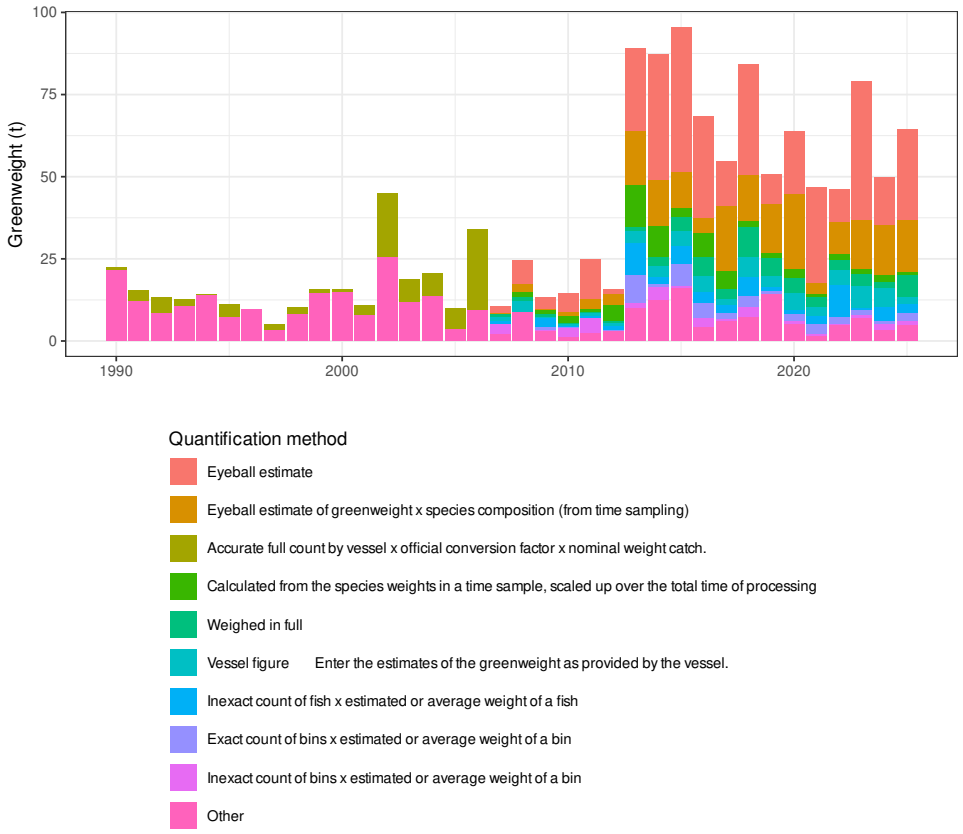


Figure 779: Methods used by observers to quantify the catch of lookdown dory in the LDO 1 Trawl fishery. The legend lists the methods used in descending order of total catch.

2.12.2 LDO 3: Trawl fishery

2.12.2.1 Length-frequency samples

Table 64: Length-frequency samples of lookdown dory from the LDO 3 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of lookdown dory exceeded a potential sampling threshold of 10 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	215	0	0	0.00
1991	495	0	0	0.00
1992	759	0	0	0.00
1993	672	0	0	0.00
1994	824	0	0	0.00
1995	706	0	0	0.00
1996	758	0	0	0.00
1997	1 073	0	0	0.00
1998	1 457	0	0	0.00
1999	1 347	0	0	0.00
2000	831	0	0	0.00
2001	854	0	0	0.00
2002	921	0	0	0.00
2003	917	4	50	0.44
2004	473	14	108	2.96
2005	321	46	264	14.33
2006	405	14	168	3.46
2007	477	38	524	7.97
2008	299	23	250	7.69
2009	461	6	53	1.30
2010	405	41	489	10.12
2011	250	45	449	18.00
2012	238	50	708	21.01
2013	424	29	481	6.84
2014	335	45	879	13.43
2015	389	13	200	3.34
2016	403	12	200	2.98
2017	356	15	290	4.21
2018	2 050	1	21	0.05
2019	1 996	2	40	0.10
2020	2 228	14	277	0.63
2021	2 409	5	92	0.21
2022	2 241	5	100	0.22
2023	2 444	2	71	0.08
2024	2 566	8	127	0.31
2025	2 318	0	0	0.00

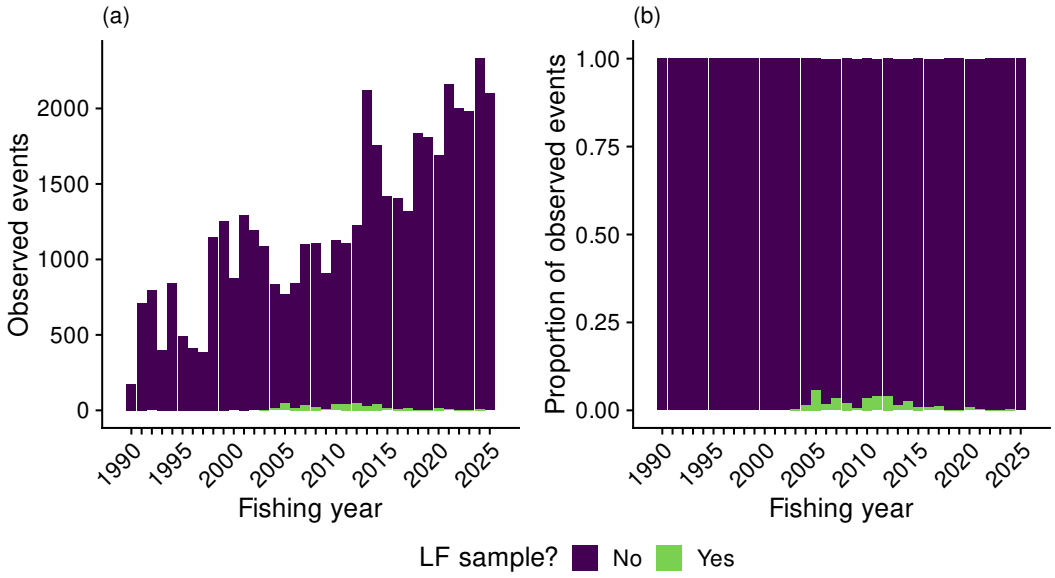


Figure 780: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in LDO 3 where the lookdown dory catch exceeded the 10 kg threshold, with and without length-frequency sampling.**

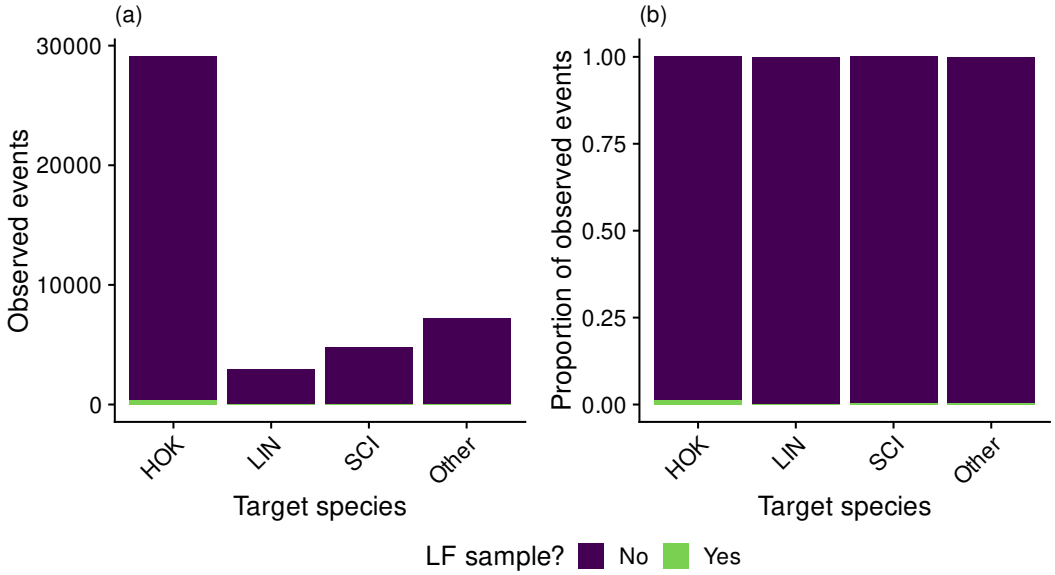


Figure 781: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in LDO 3 where the lookdown dory catch exceeded the 10 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

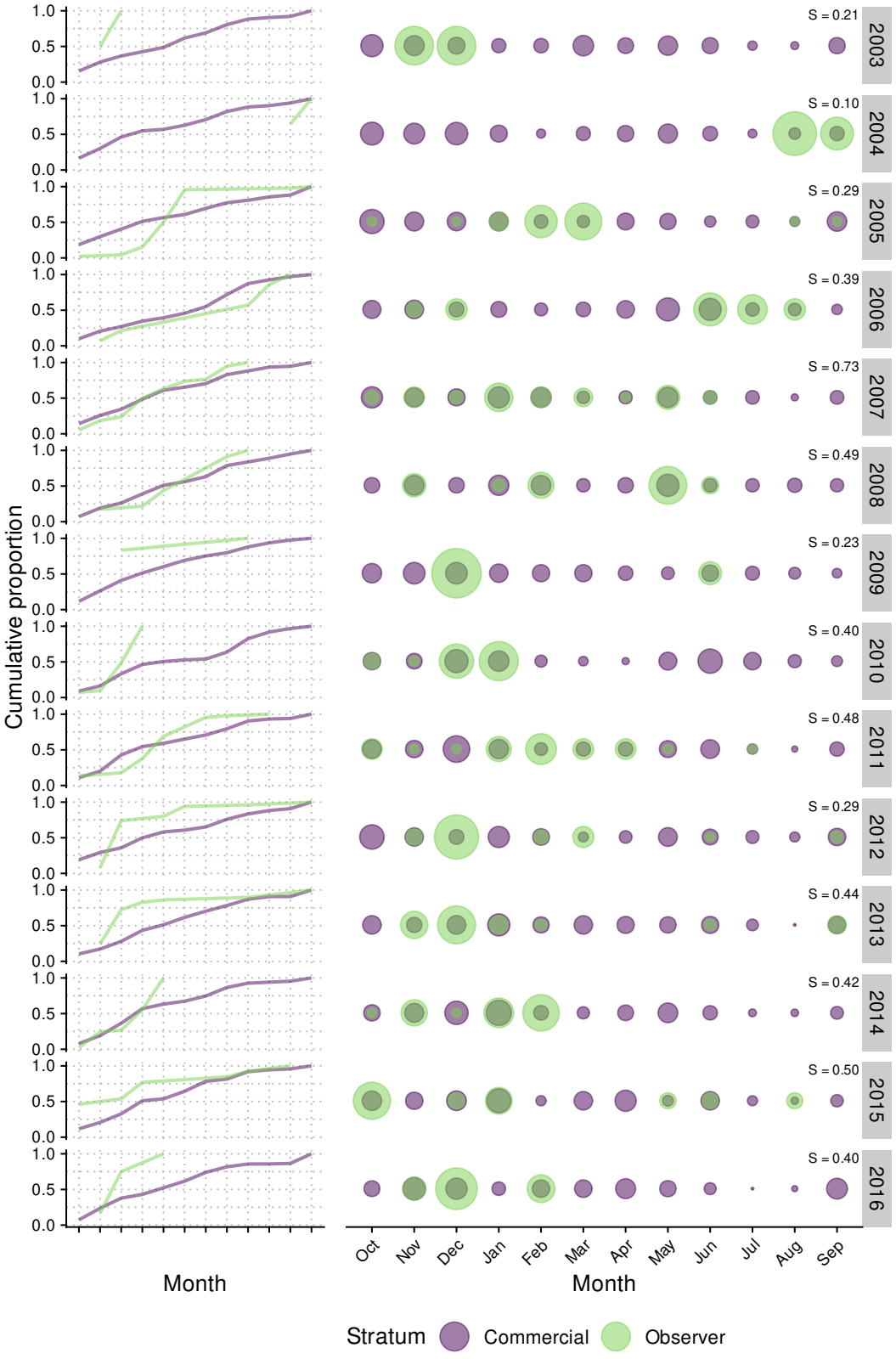


Figure 782: Monthly representativeness of observer sampling coverage of Trawl fishing events in LDO 3, where the lookdown dory catch exceeded the 10kg threshold, in 2003 to 2016. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

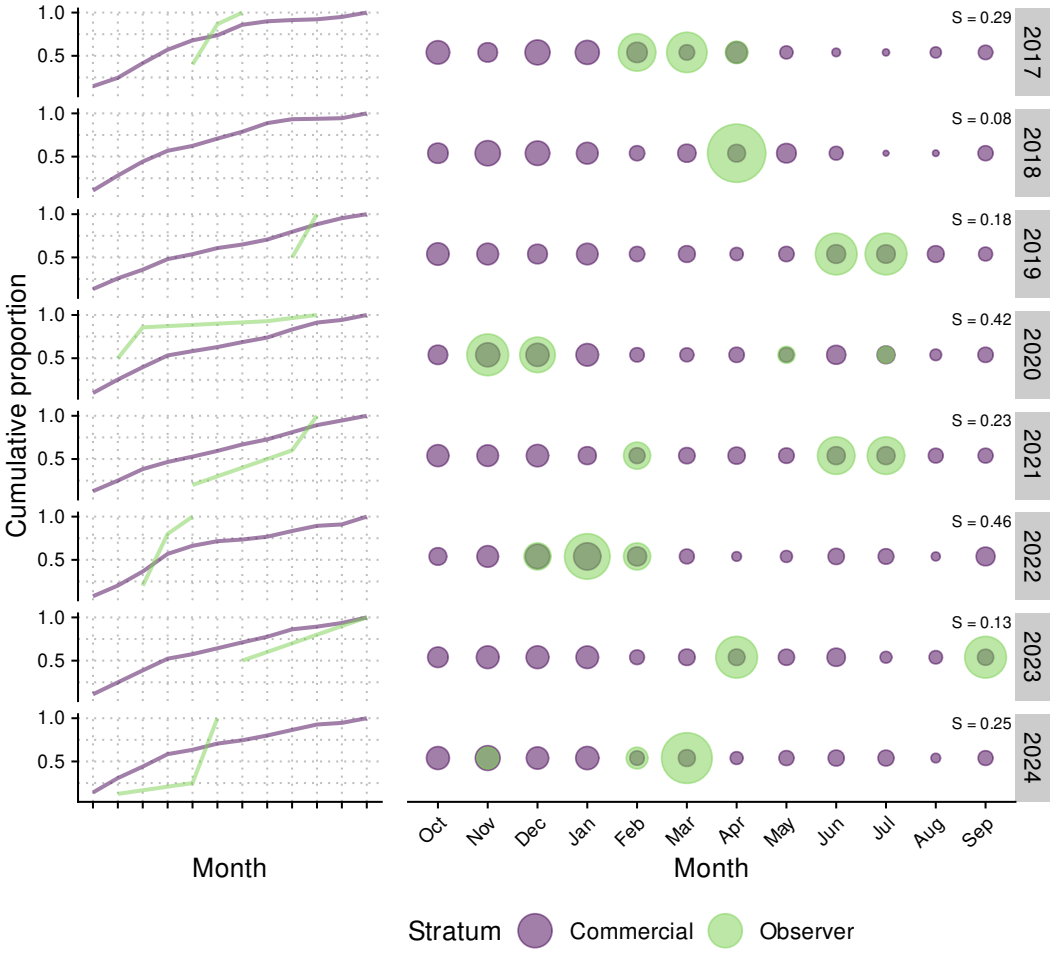


Figure 783: Monthly representativeness of observer sampling coverage of Trawl fishing events in LDO 3, where the lookdown dory catch exceeded the 10kg threshold, in 2017 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

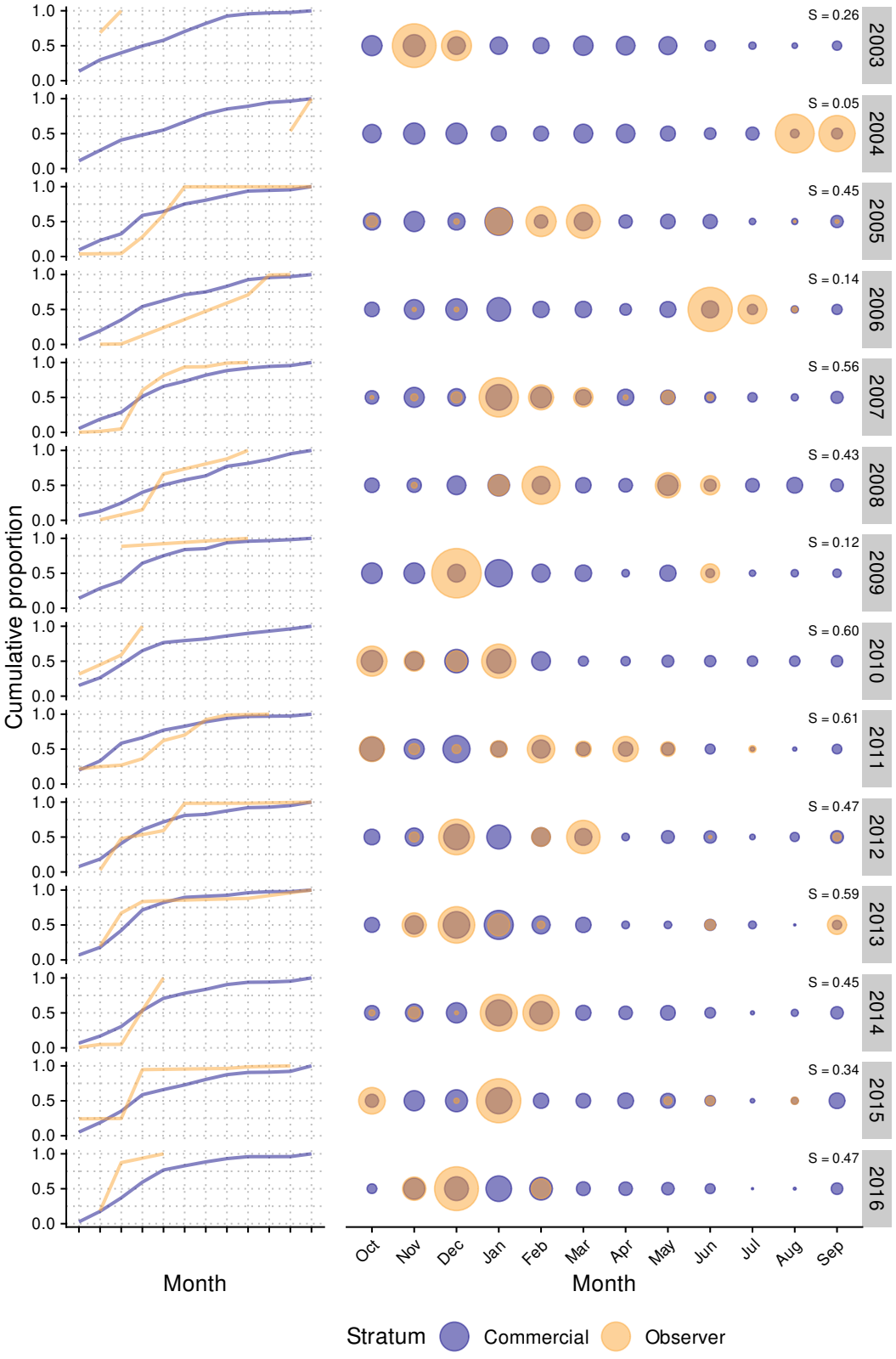


Figure 784: **Monthly representativeness of observer sampling coverage of Trawl catch in LDO 3, from events where the lookdown dory catch exceeded the 10kg threshold, in 2003 to 2016. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

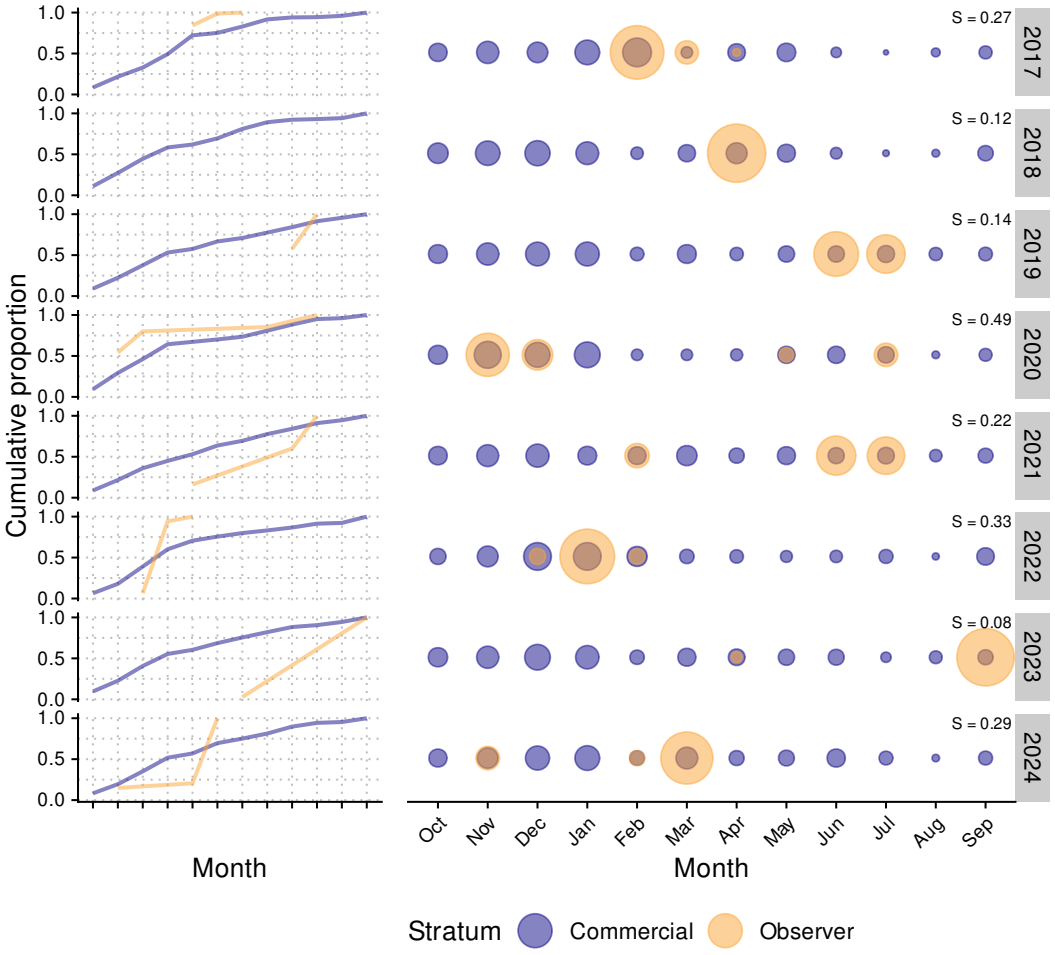


Figure 785: **Monthly representativeness of observer sampling coverage of Trawl catch in LDO 3, from events where the lookdown dory catch exceeded the 10kg threshold, in 2017 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

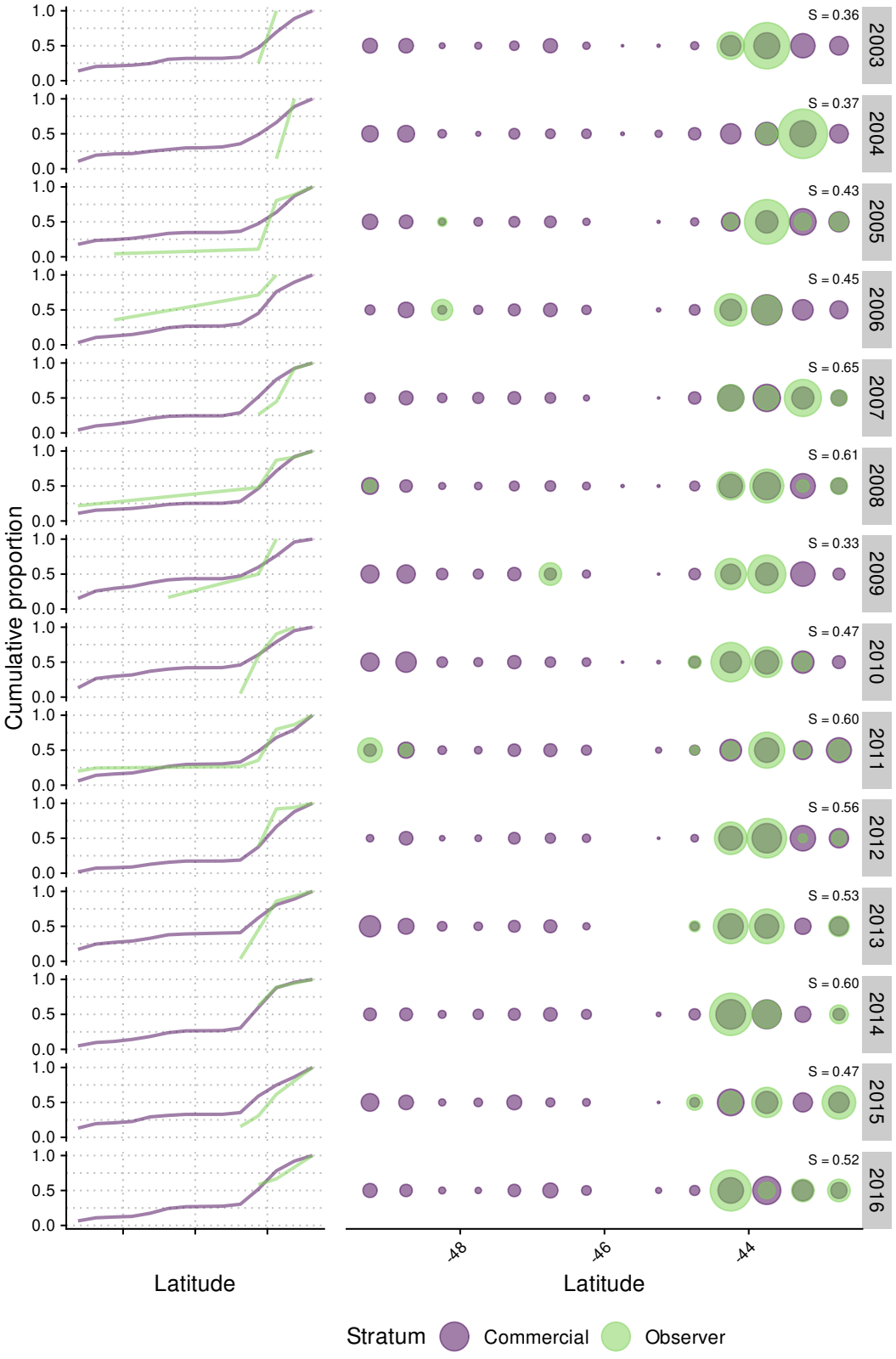


Figure 786: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in LDO 3, where the lookdown dory catch exceeded the 10kg threshold, in 2003 to 2016. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

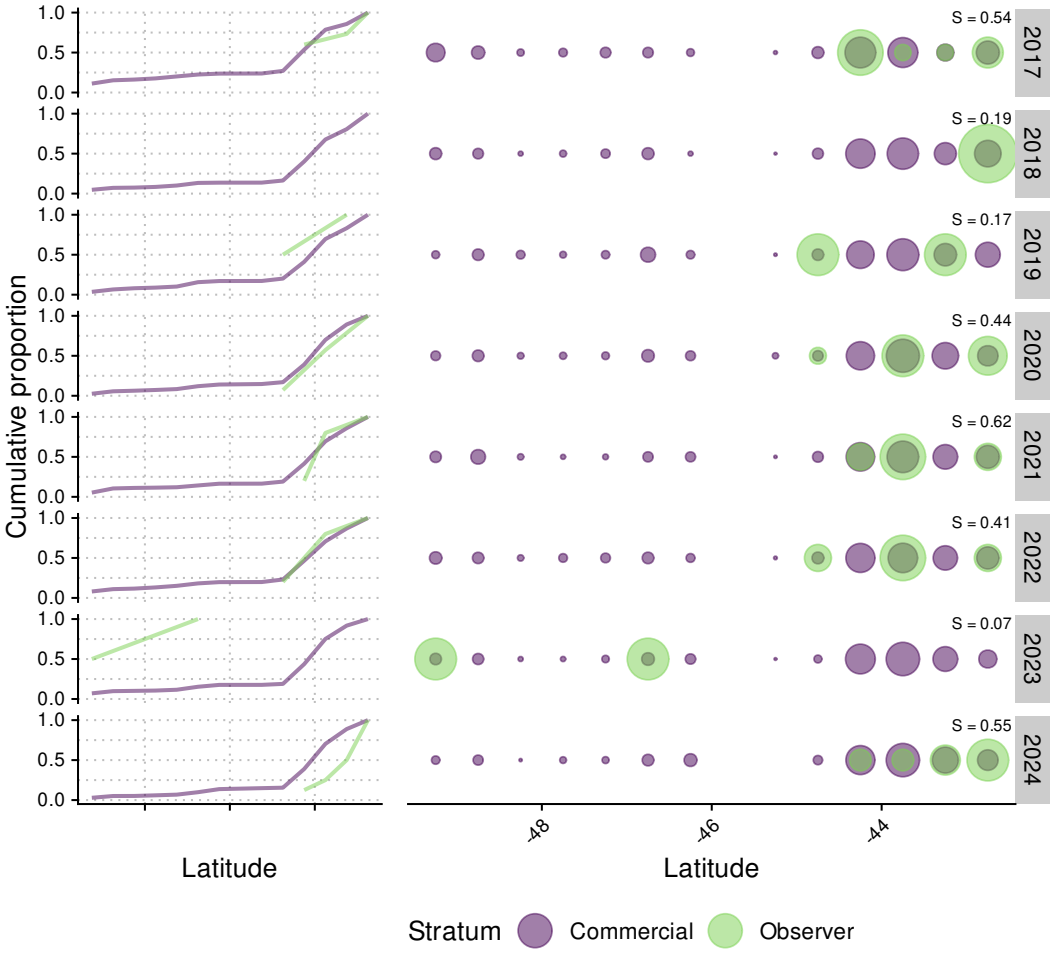


Figure 787: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in LDO 3, where the lookdown dory catch exceeded the 10kg threshold, in 2017 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

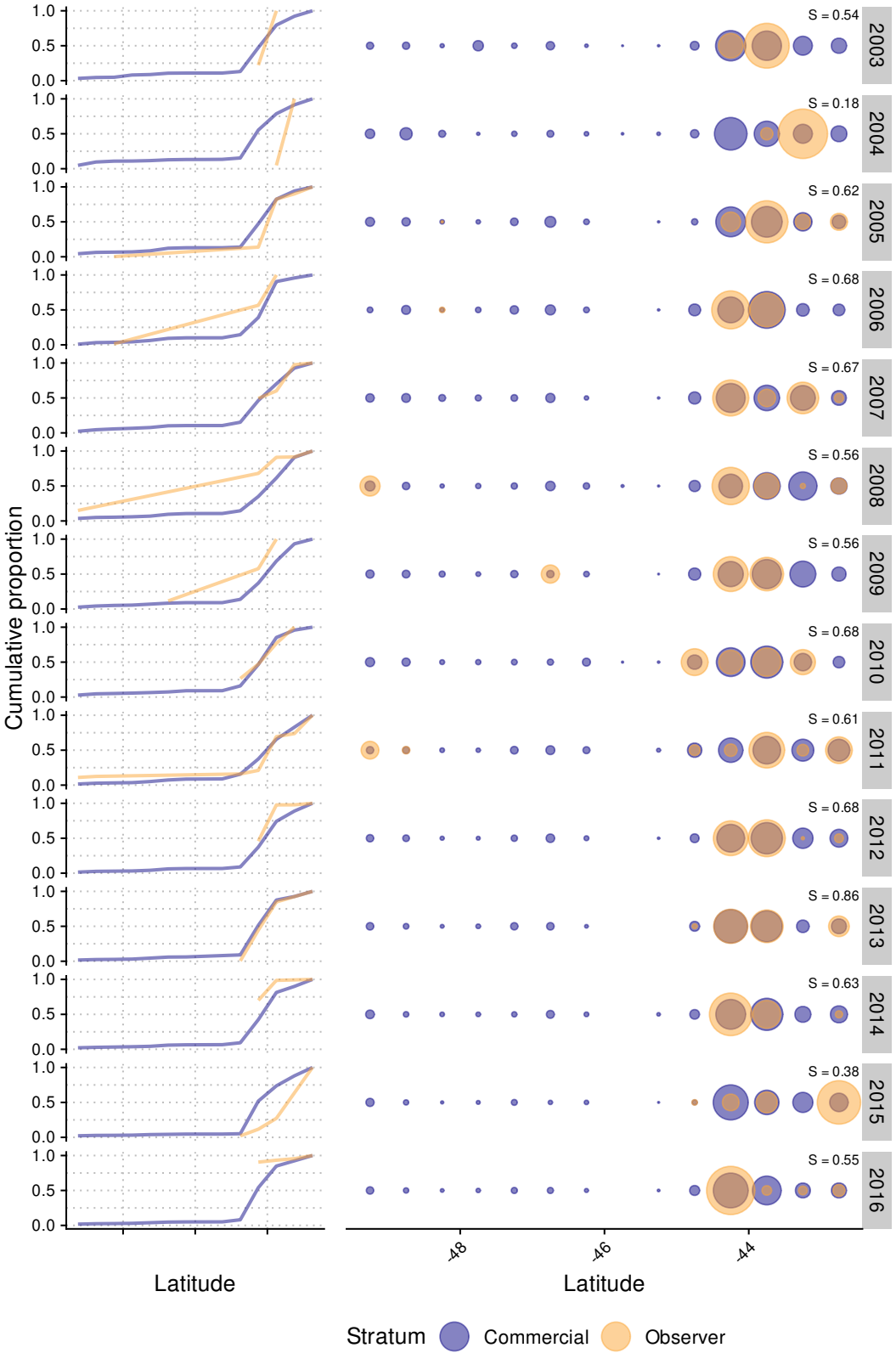


Figure 788: **Latitudinal representativeness of observer sampling coverage of Trawl catch in LDO 3, from events where the lookdown dory catch exceeded the 10kg threshold, in 2003 to 2016. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

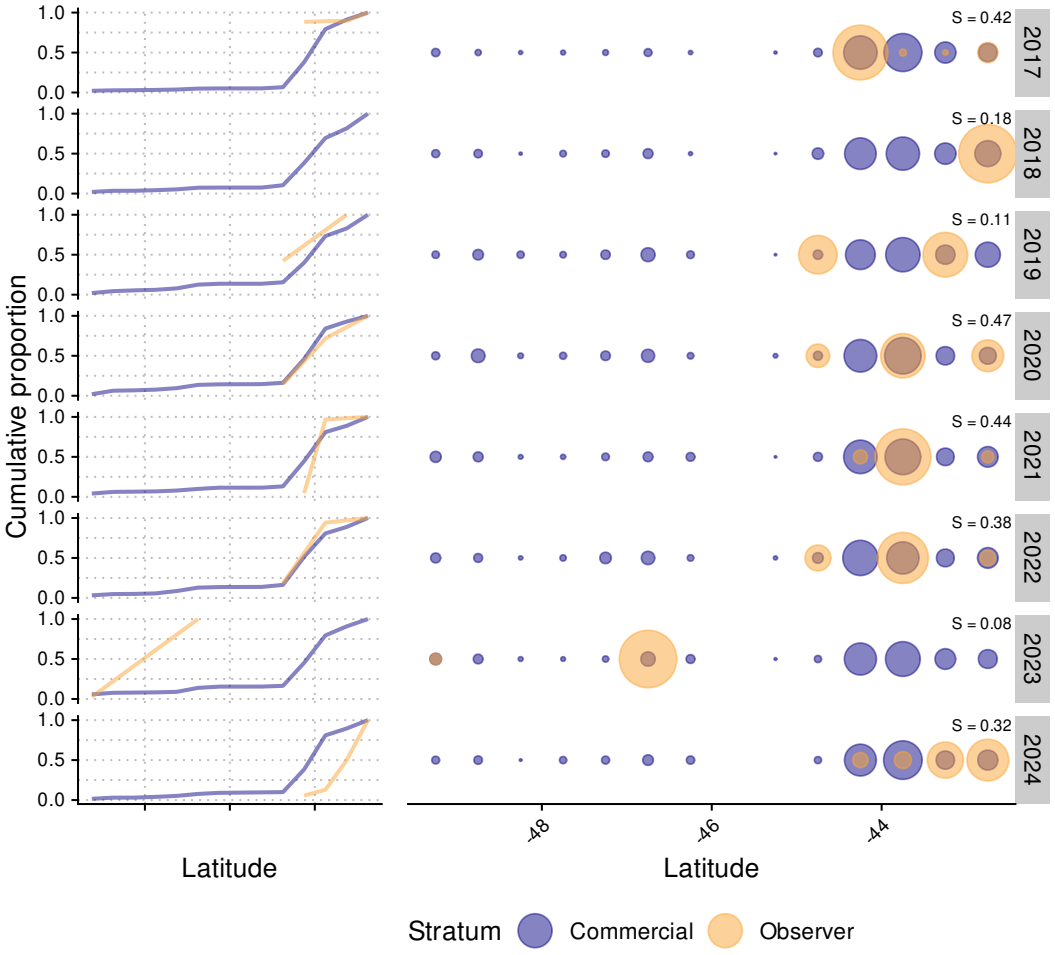


Figure 789: **Latitudinal representativeness of observer sampling coverage of Trawl catch in LDO 3, from events where the lookdown dory catch exceeded the 10kg threshold, in 2017 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

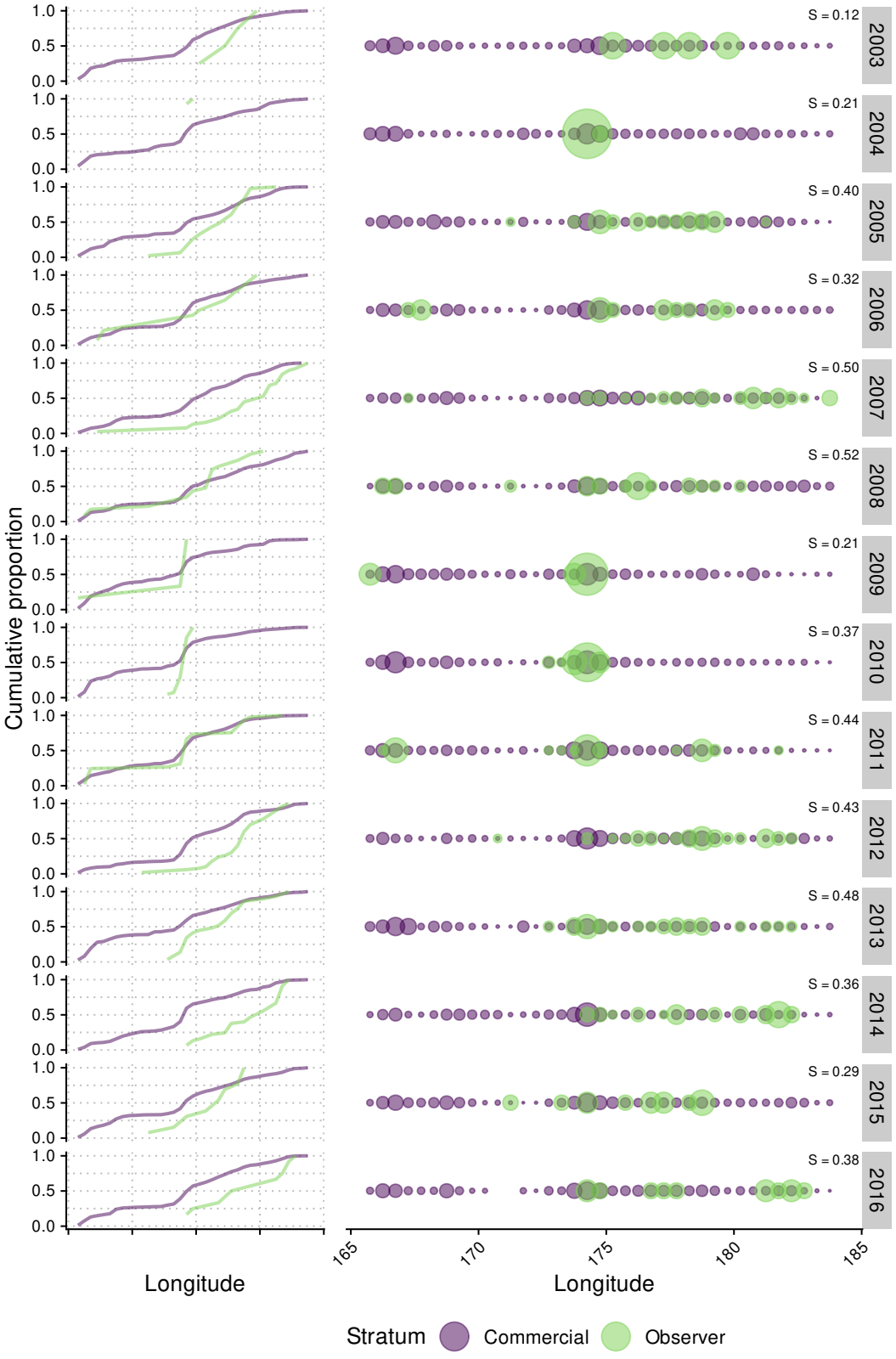


Figure 790: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in LDO 3, where the lookdown dory catch exceeded the 10kg threshold, in 2003 to 2016. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

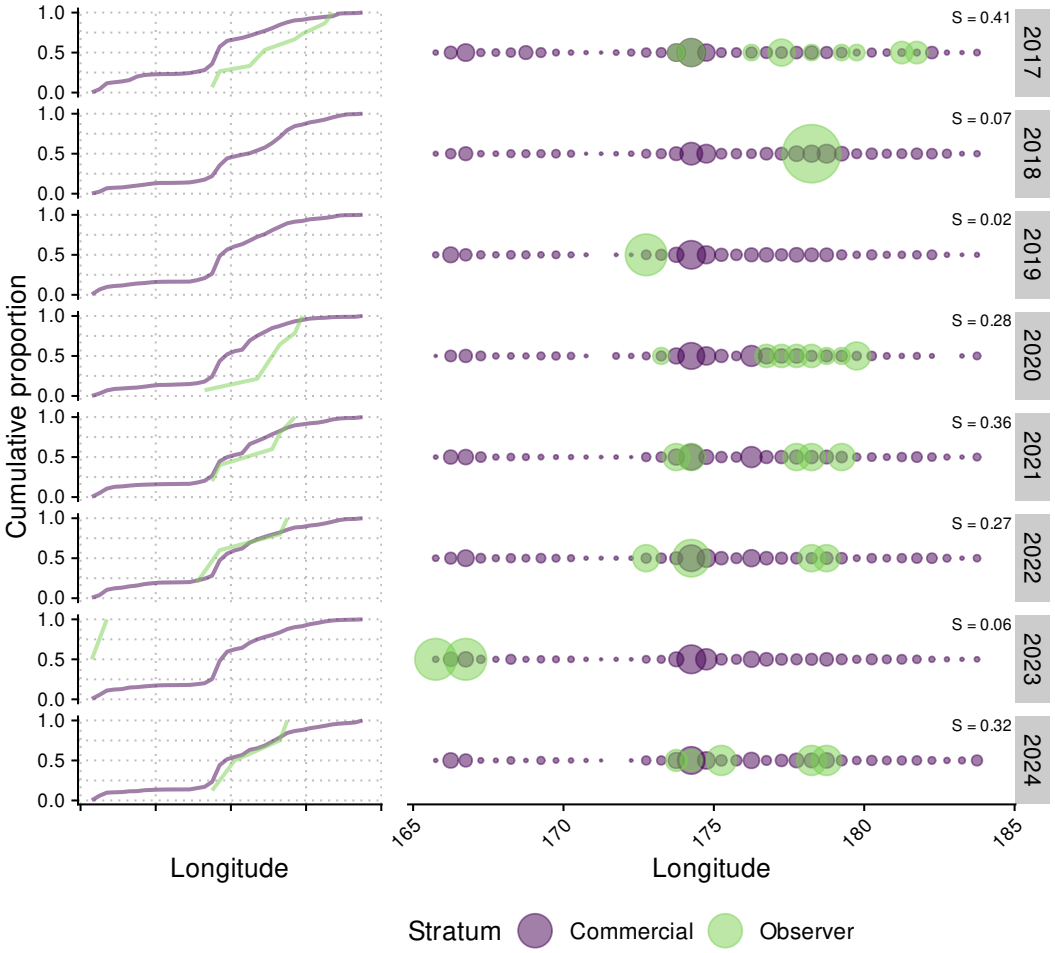


Figure 791: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in LDO 3, where the lookdown dory catch exceeded the 10kg threshold, in 2017 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

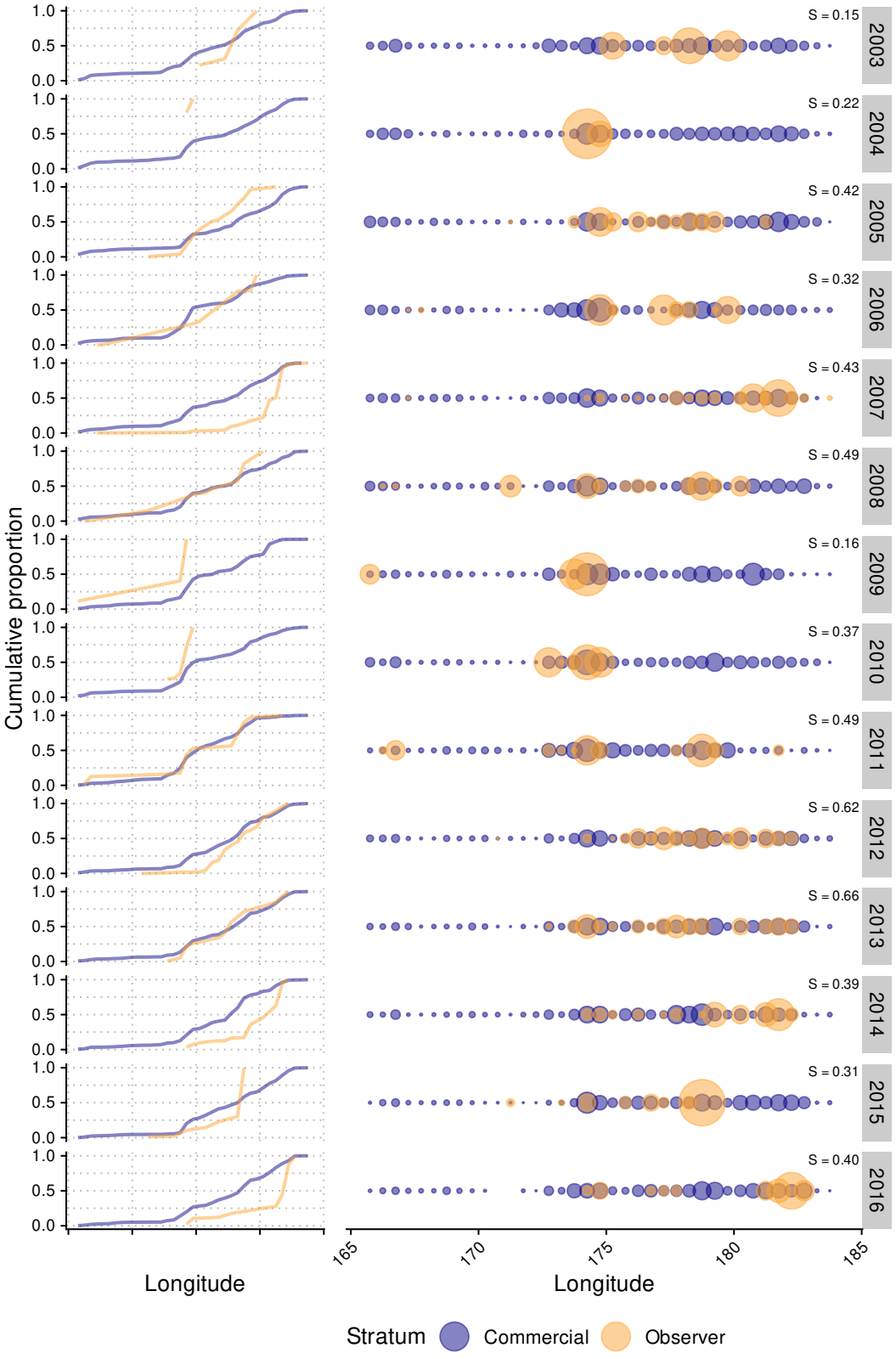


Figure 792: **Longitudinal representativeness of observer sampling coverage of Trawl catch in LDO 3, from events where the lookdown dory catch exceeded the 10kg threshold, in 2003 to 2016. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

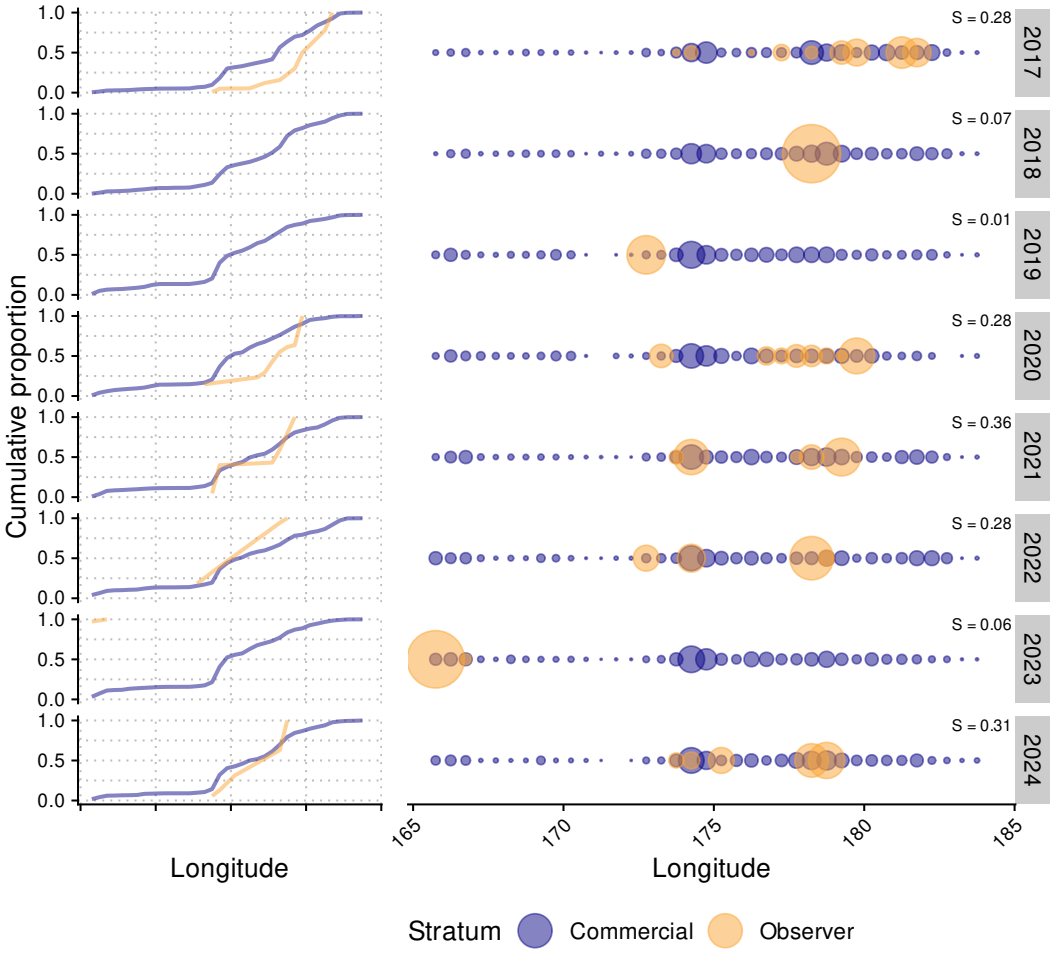


Figure 793: **Longitudinal representativeness of observer sampling coverage of Trawl catch in LDO 3, from events where the lookdown dory catch exceeded the 10kg threshold, in 2017 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

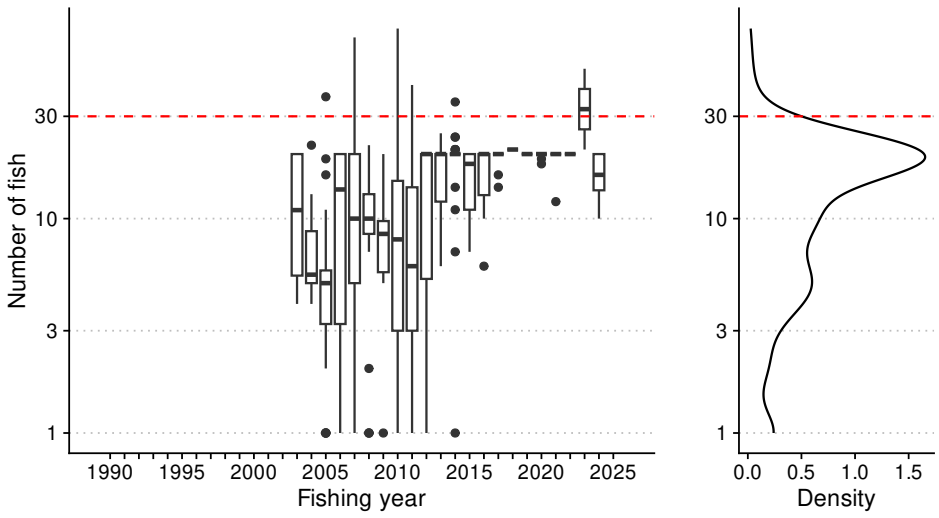


Figure 794: **Length-frequency sample sizes for observed fishing events in LDO 3 where lookdown dory were sampled. The red dashed line indicates a sample size of 30 fish.**

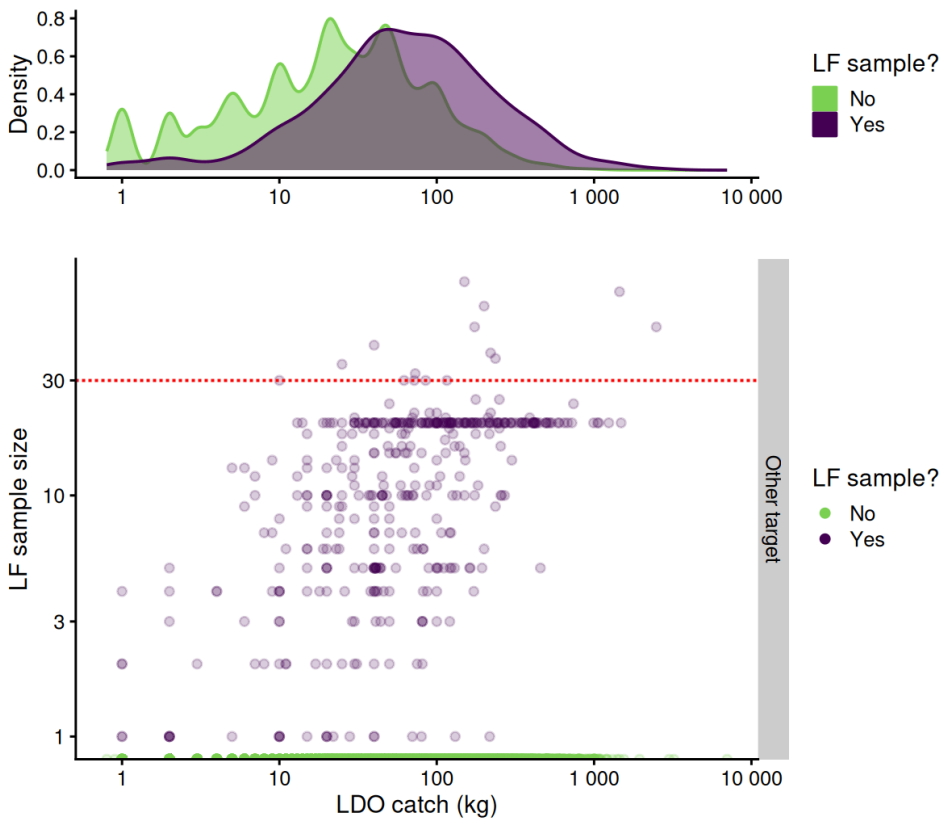


Figure 795: **Length-frequency sample sizes (number of fish sampled) for observed fishing events in LDO 3 in relation to the total lookdown dory catch from an event, separately for lookdown dory target events and other target species. The red dashed line indicates a sample size of 30 fish.**

2.12.2.2 Otolith samples

Table 65: Otolith samples of lookdown dory from the LDO 3 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of lookdown dory exceeded a potential sampling threshold of 10 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	215	0	0	0.00
1991	495	0	0	0.00
1992	759	0	0	0.00
1993	672	0	0	0.00
1994	824	0	0	0.00
1995	706	0	0	0.00
1996	758	0	0	0.00
1997	1 073	0	0	0.00
1998	1 457	0	0	0.00
1999	1 347	0	0	0.00
2000	831	0	0	0.00
2001	854	0	0	0.00
2002	921	0	0	0.00
2003	917	0	0	0.00
2004	473	0	0	0.00
2005	321	0	0	0.00
2006	405	0	0	0.00
2007	477	0	0	0.00
2008	299	0	0	0.00
2009	461	0	0	0.00
2010	405	0	0	0.00
2011	250	0	0	0.00
2012	238	0	0	0.00
2013	424	0	0	0.00
2014	335	0	0	0.00
2015	389	1	5	0.26
2016	403	0	0	0.00
2017	356	0	0	0.00
2018	2 050	0	0	0.00
2019	1 996	0	0	0.00
2020	2 228	0	0	0.00
2021	2 409	0	0	0.00
2022	2 241	0	0	0.00
2023	2 444	0	0	0.00
2024	2 566	0	0	0.00
2025	2 318	0	0	0.00

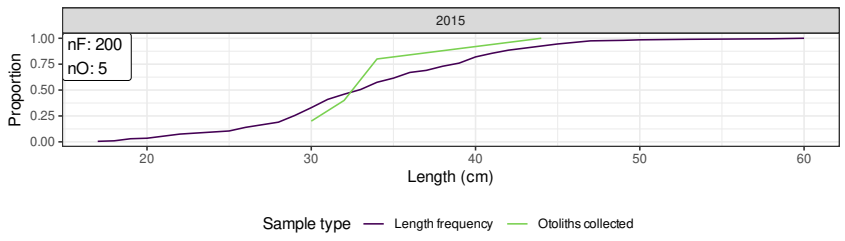


Figure 796: Cumulative distributions of the length of fish in the length frequency and otolith samples of lookdown dory in the LDO 3 Trawl fishery for the 2015 to 2015 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

2.12.2.3 Catch quantification

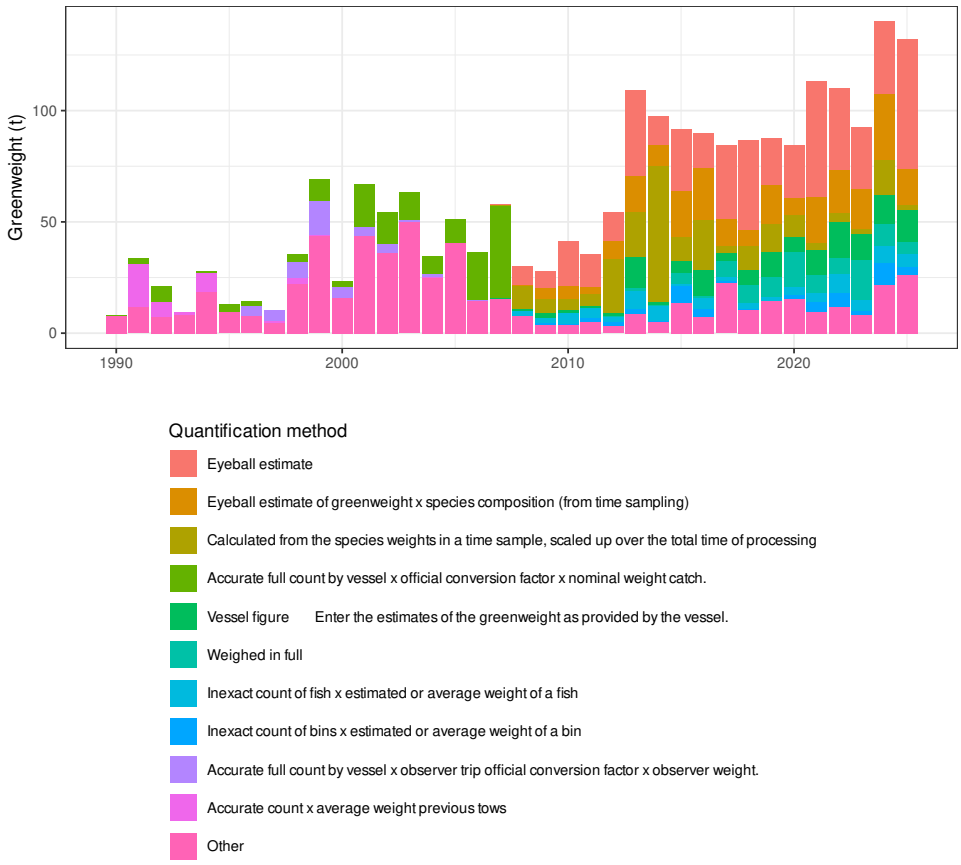


Figure 797: Methods used by observers to quantify the catch of lookdown dory in the LDO 3 Trawl fishery. The legend lists the methods used in descending order of total catch.

2.13 LIN stocks

Observer sampling of ling is considered with respect to the ling Assessment Stocks.

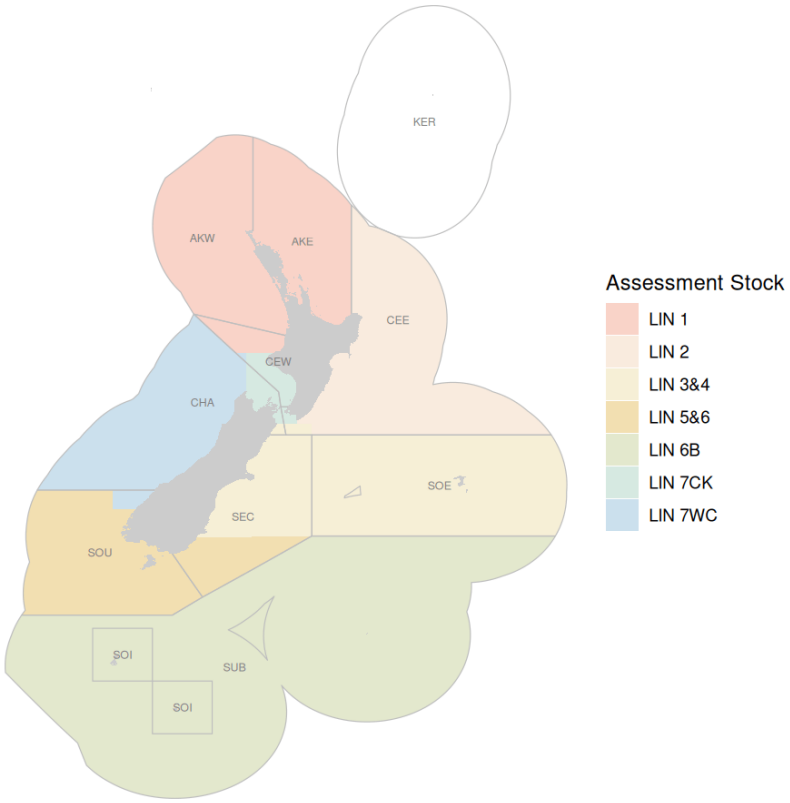


Figure 798: Observer Fisheries Management Areas (black borders, labels on plot) in relation to the Assessment Stock for ling (coloured areas, per legend).

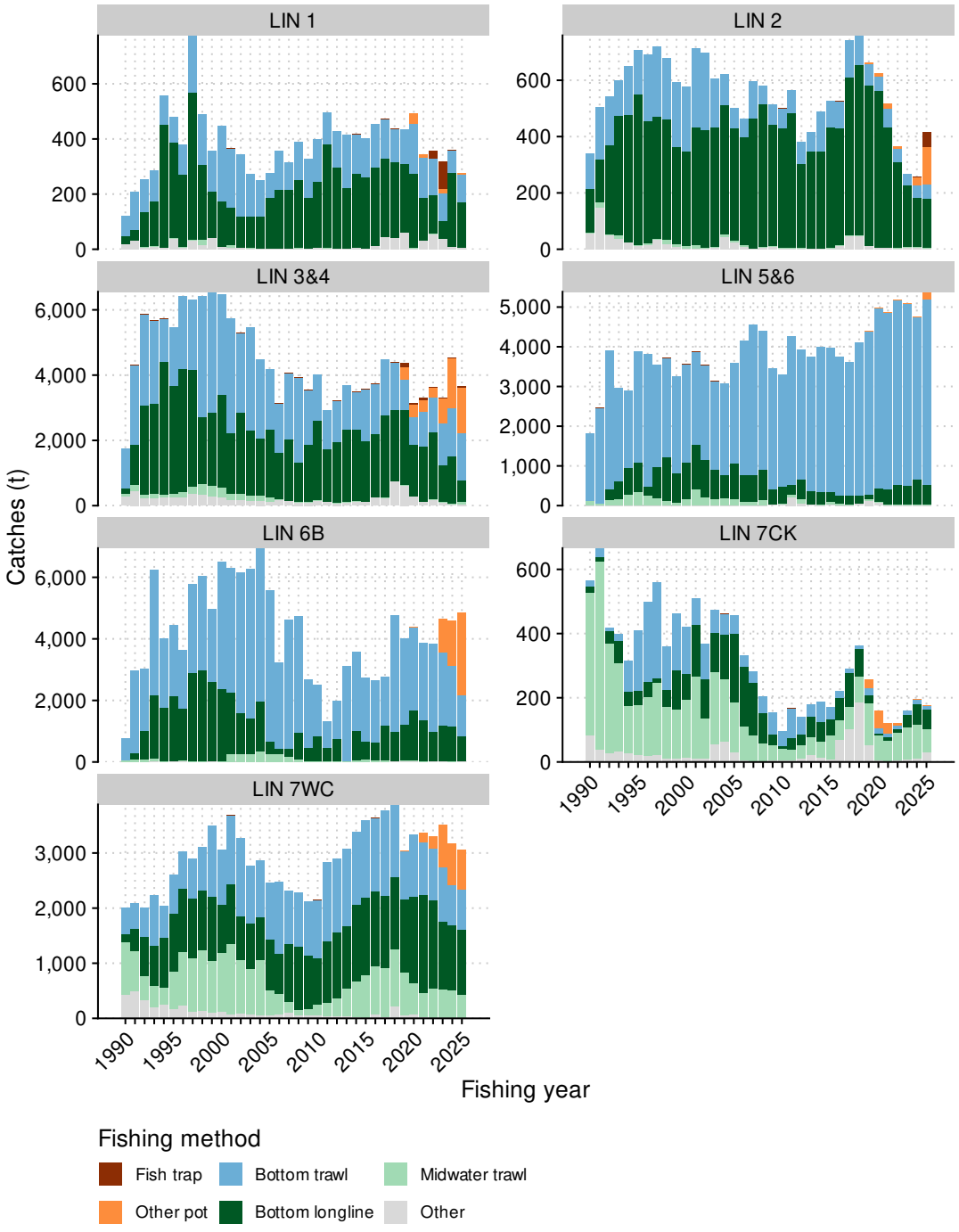


Figure 799: **Catches of ling by fishing method, for events within the ling Assessment Stocks. Methods grouped as Other include: BPT, BS, CP, CRP, D, DL, DN, DPN, DPS, DS, DV, EP, FN, H, HL, L, MH, MPT, PL, PRB, PRM, PS, PSH, RLP, RN, SCN, SLL, SN, T, TL.**

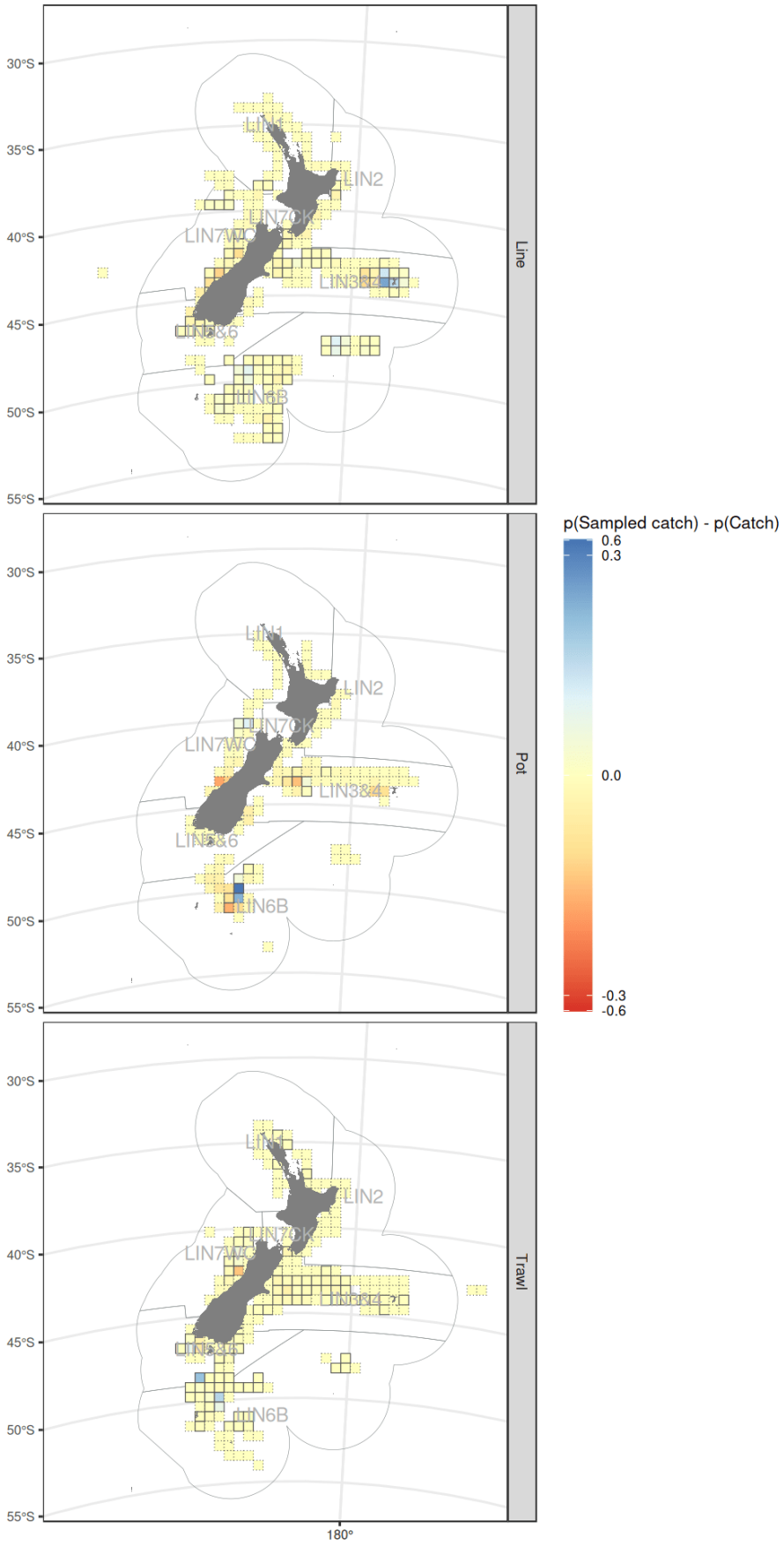


Figure 800: Differences in the relative proportions of catch and sampled catch for ling during 2021–2025. Cells with a dotted border had no sampling.

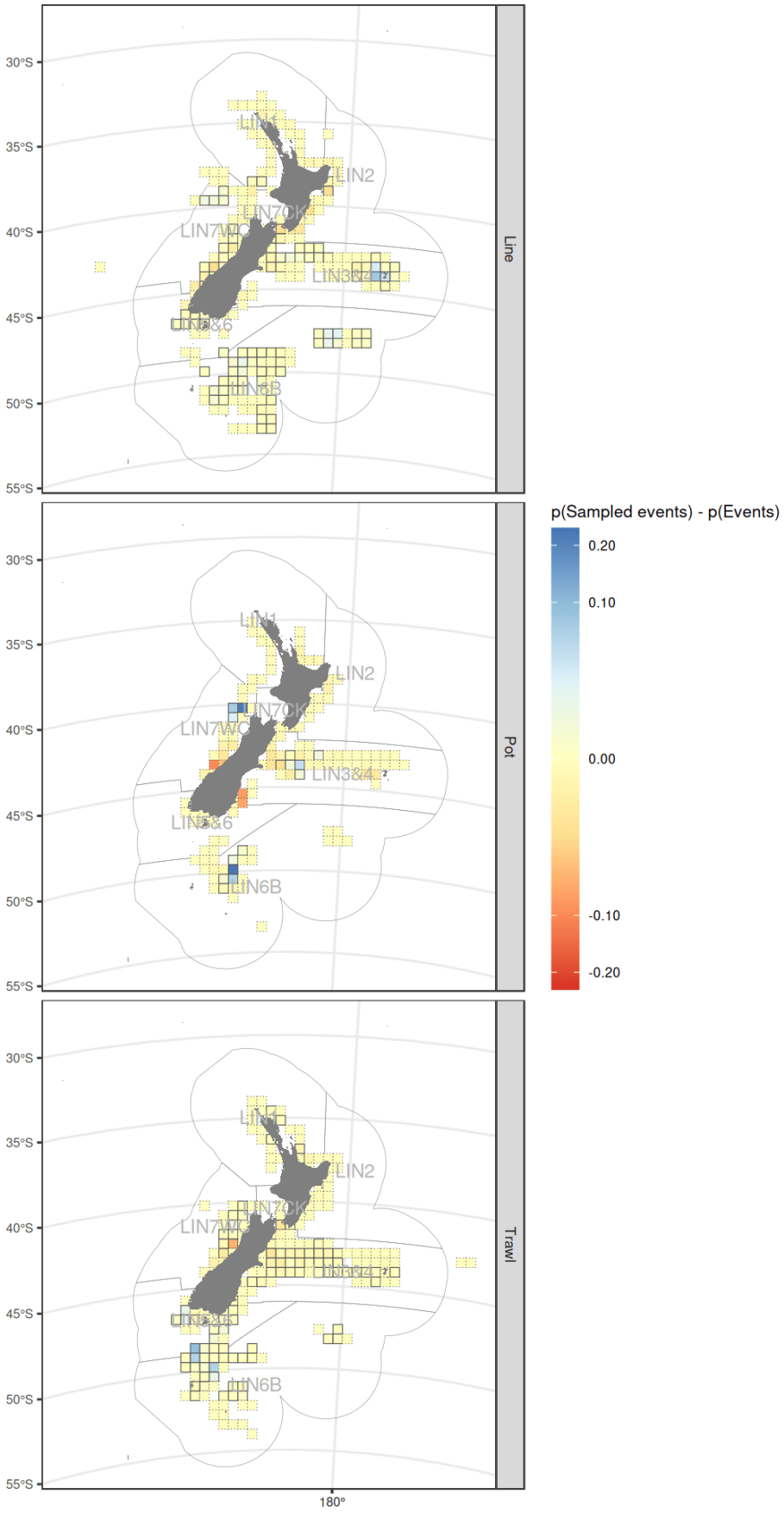


Figure 801: Differences in the relative proportions of events meeting the sampling threshold and sampled events for ling during 2021–2025. Cells with a dotted border had no sampling.

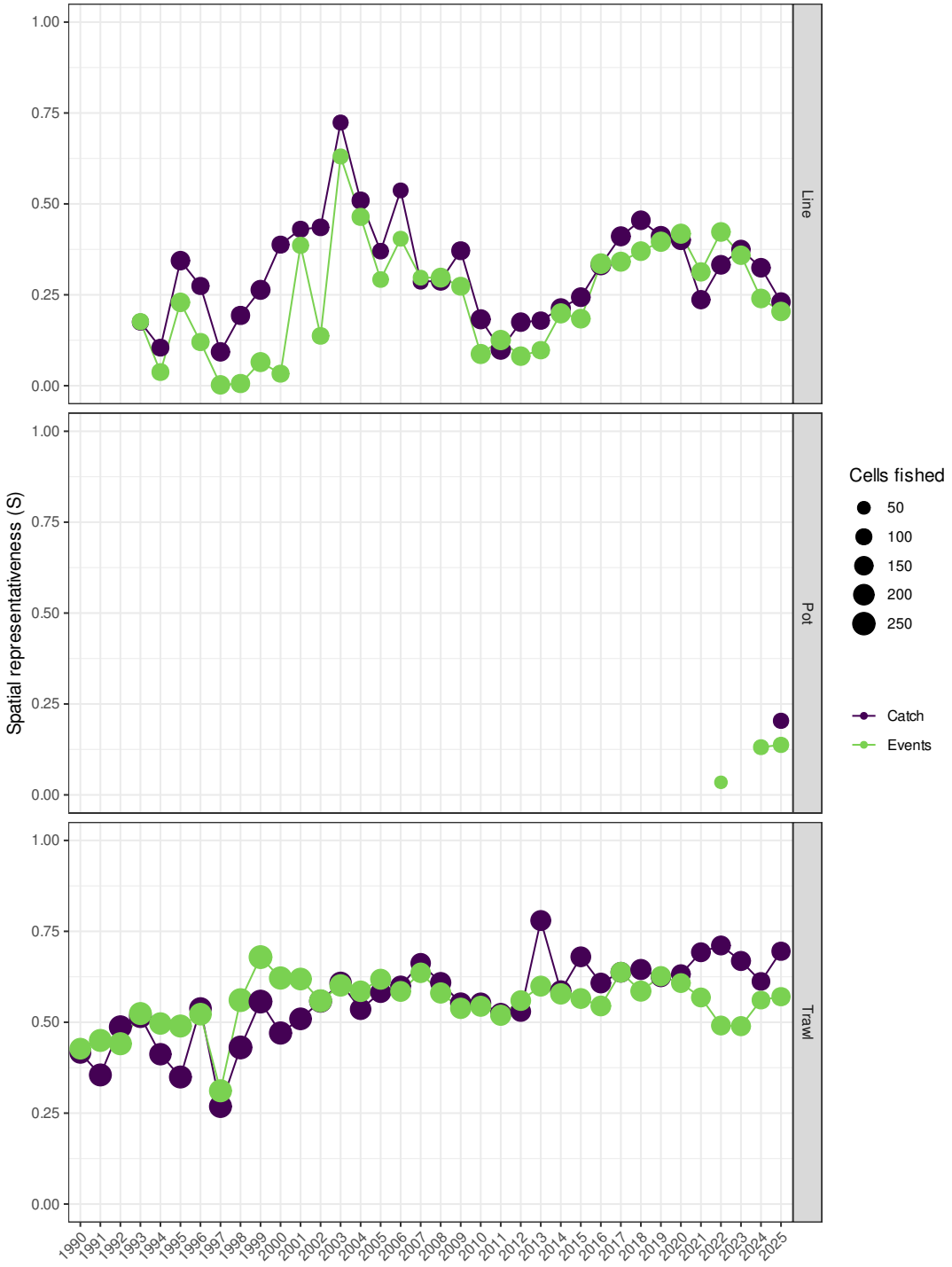


Figure 802: Spatial representativeness of observer sampling of ling by fishing year. Representativeness is assessed using the Manhattan distance metric (*S*) applied to 64 km grid cells, for both the proportion of catch sampled and the proportion of positive events sampled.

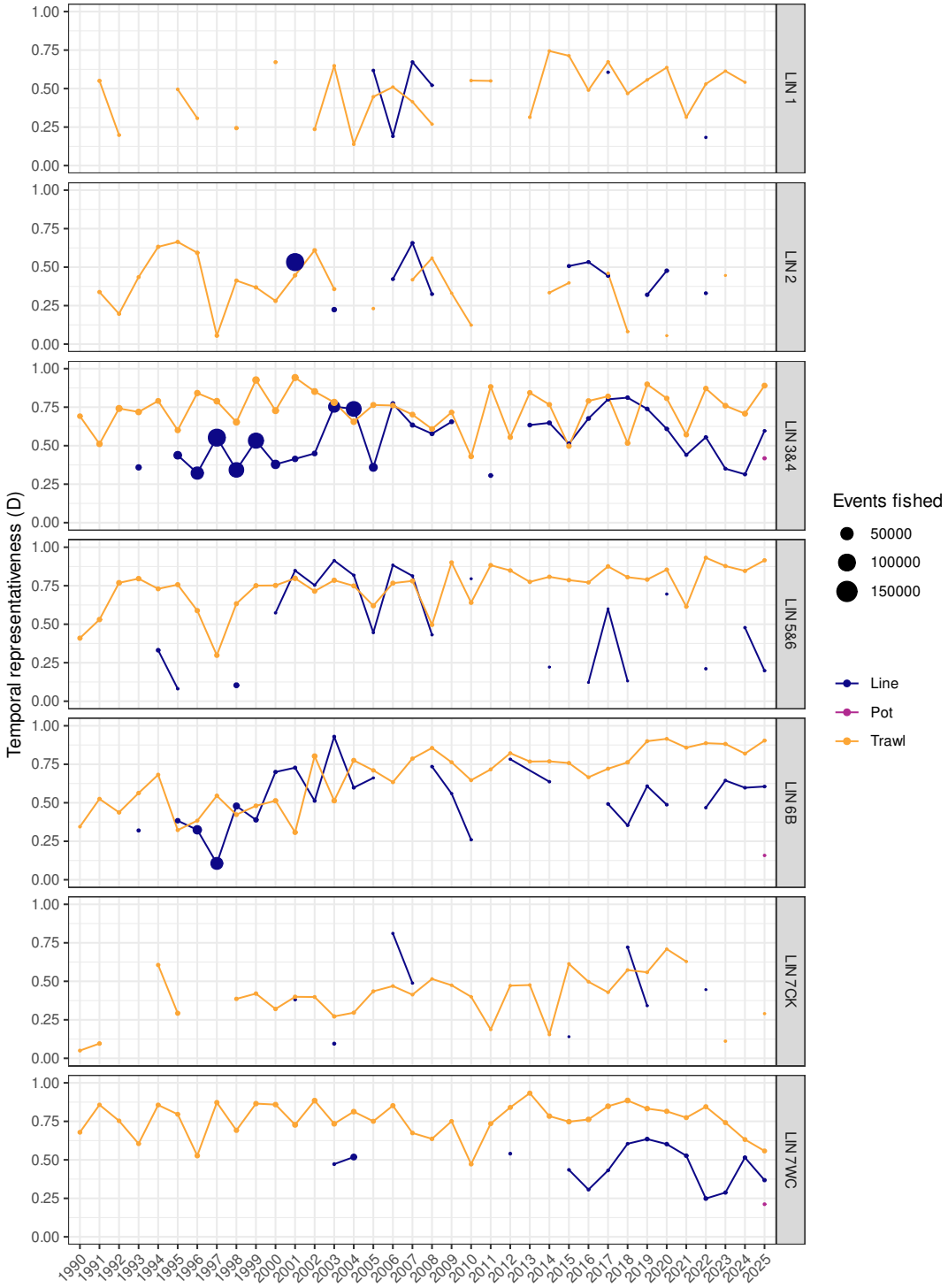


Figure 803: Temporal representativeness of observer sanpling of ling by fishing year and area. Temporal representativeness is assessed using the KS statistic (*D*) applied to the start date-times of all fishing events and all sampled fishing events, weighted by catch weight.

2.13.1 LIN 1: Line fishery

2.13.1.1 Length-frequency samples

Table 66: Length-frequency samples of ling from the LIN 1 Line fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of ling exceeded a potential sampling threshold of 40 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	1 177	0	0	0.00
1991	678	0	0	0.00
1992	15 762	0	0	0.00
1993	6 609	0	0	0.00
1994	810	0	0	0.00
1995	3 356	0	0	0.00
1996	3 207	0	0	0.00
1997	17 412	0	0	0.00
1998	16 989	0	0	0.00
1999	13 479	0	0	0.00
2000	9 091	0	0	0.00
2001	550	0	0	0.00
2002	583	0	0	0.00
2003	1 618	0	0	0.00
2004	514	0	0	0.00
2005	605	27	420	4.46
2006	713	1	5	0.14
2007	744	83	1 150	11.16
2008	696	22	557	3.16
2009	387	0	0	0.00
2010	629	0	0	0.00
2011	877	0	0	0.00
2012	650	0	0	0.00
2013	497	0	0	0.00
2014	588	0	0	0.00
2015	602	0	0	0.00
2016	573	0	0	0.00
2017	530	10	132	1.89
2018	570	0	0	0.00
2019	557	0	0	0.00
2020	480	0	0	0.00
2021	436	0	0	0.00
2022	351	2	15	0.57
2023	137	0	0	0.00
2024	640	0	0	0.00
2025	446	0	0	0.00

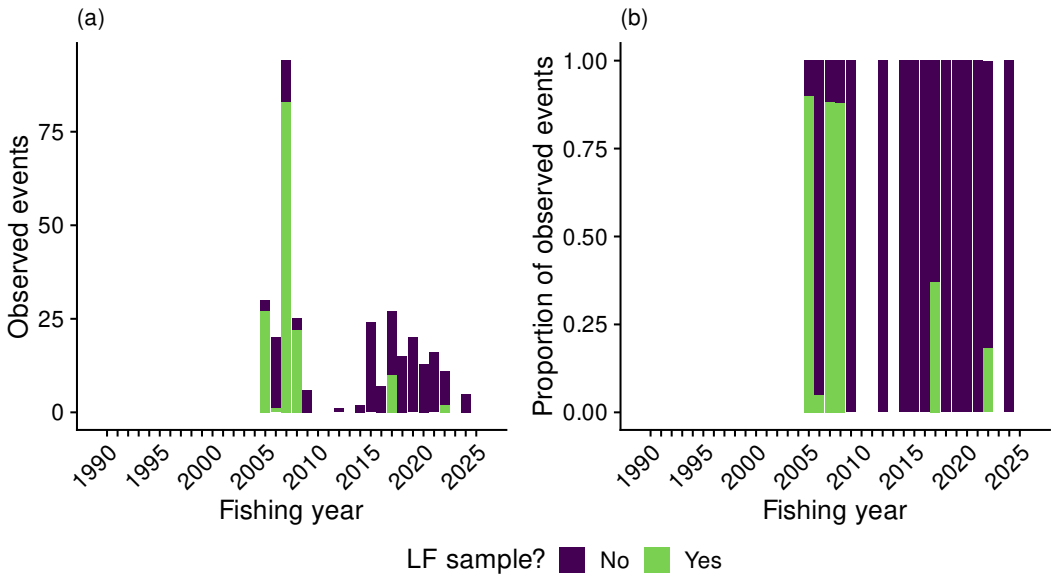


Figure 804: **(a) Observed Line fishing events, and (b) proportion of observed events, in LIN 1 where the ling catch exceeded the 40 kg threshold, with and without length-frequency sampling.**

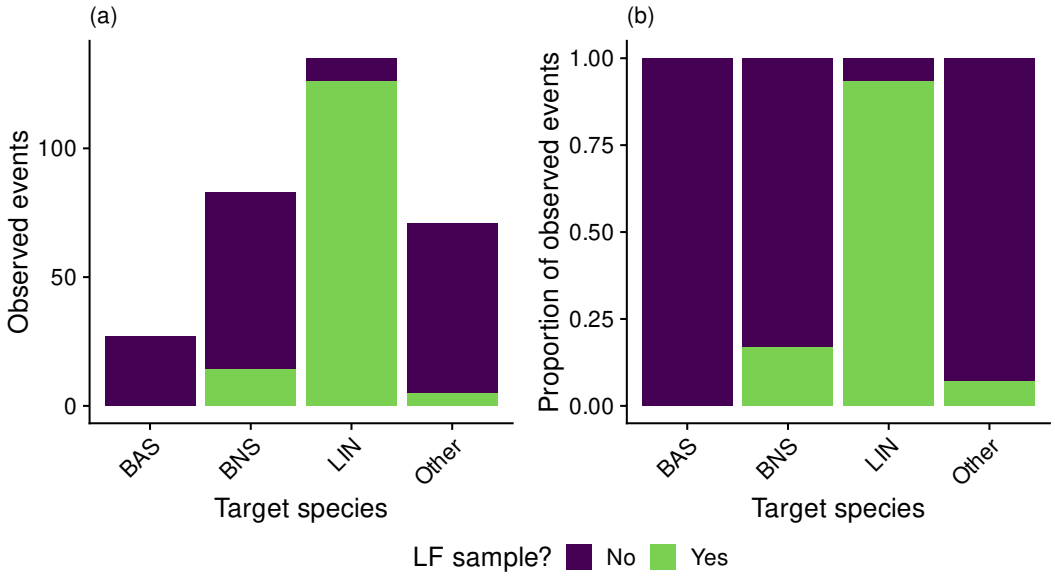


Figure 805: **(a) Observed Line fishing events, and (b) proportion of observed events, in LIN 1 where the ling catch exceeded the 40 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

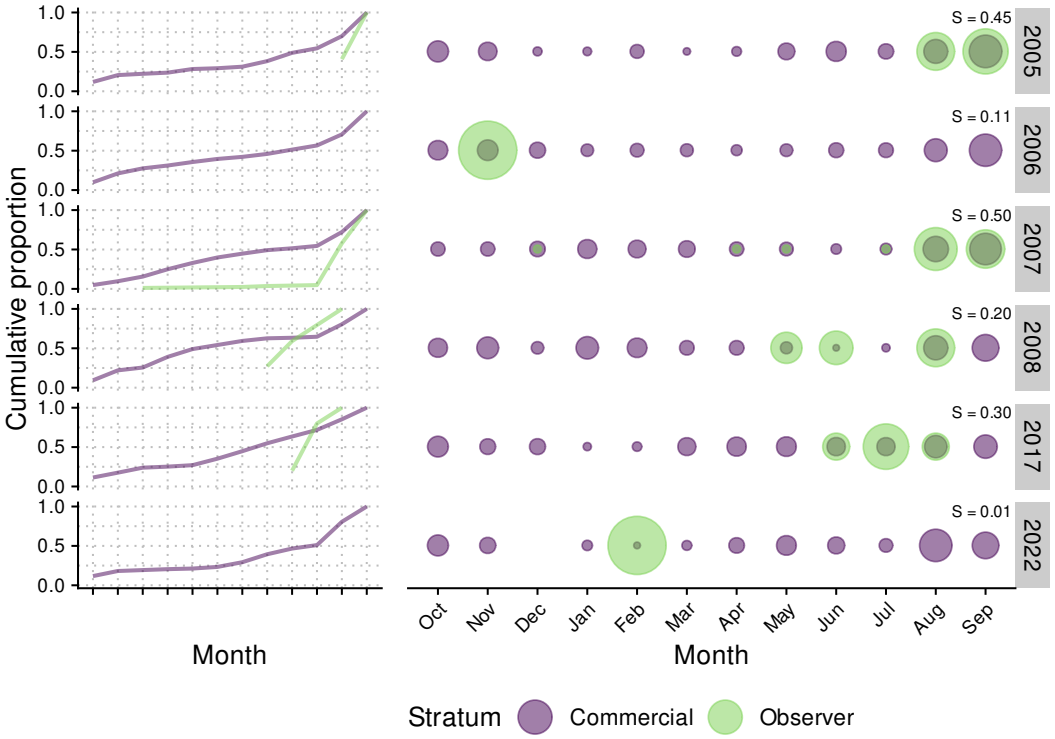


Figure 806: Monthly representativeness of observer sampling coverage of Line fishing events in LIN 1, where the ling catch exceeded the 40kg threshold, in 2005 to 2022. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

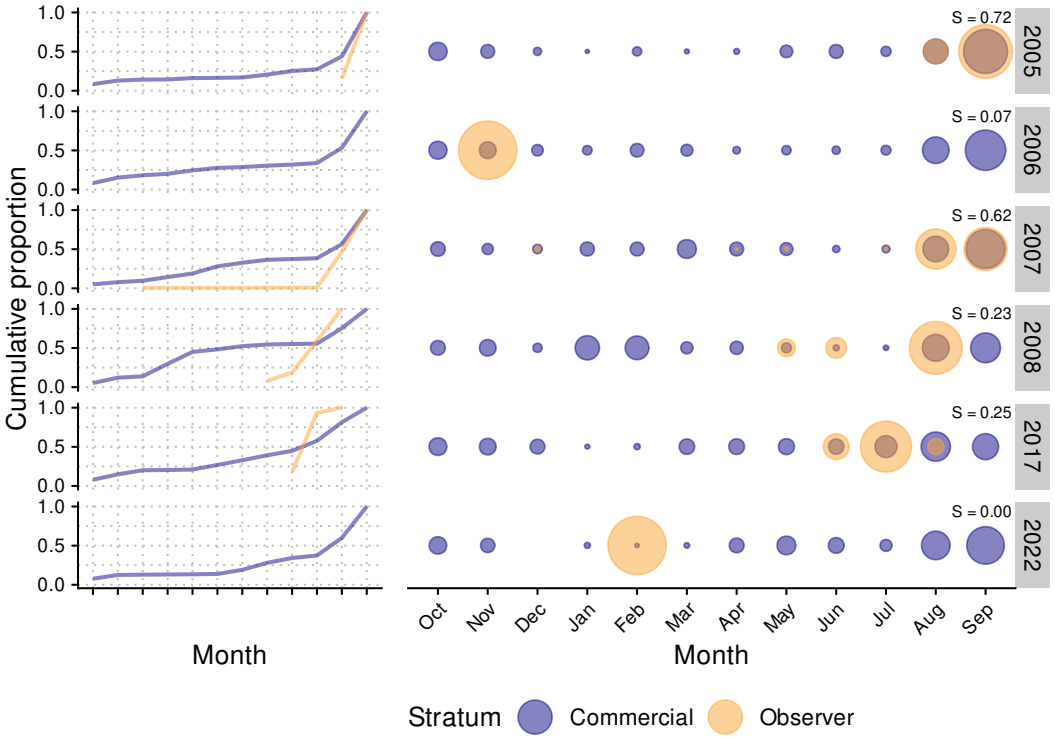


Figure 807: **Monthly representativeness of observer sampling coverage of Line catch in LIN 1, from events where the ling catch exceeded the 40kg threshold, in 2005 to 2022. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

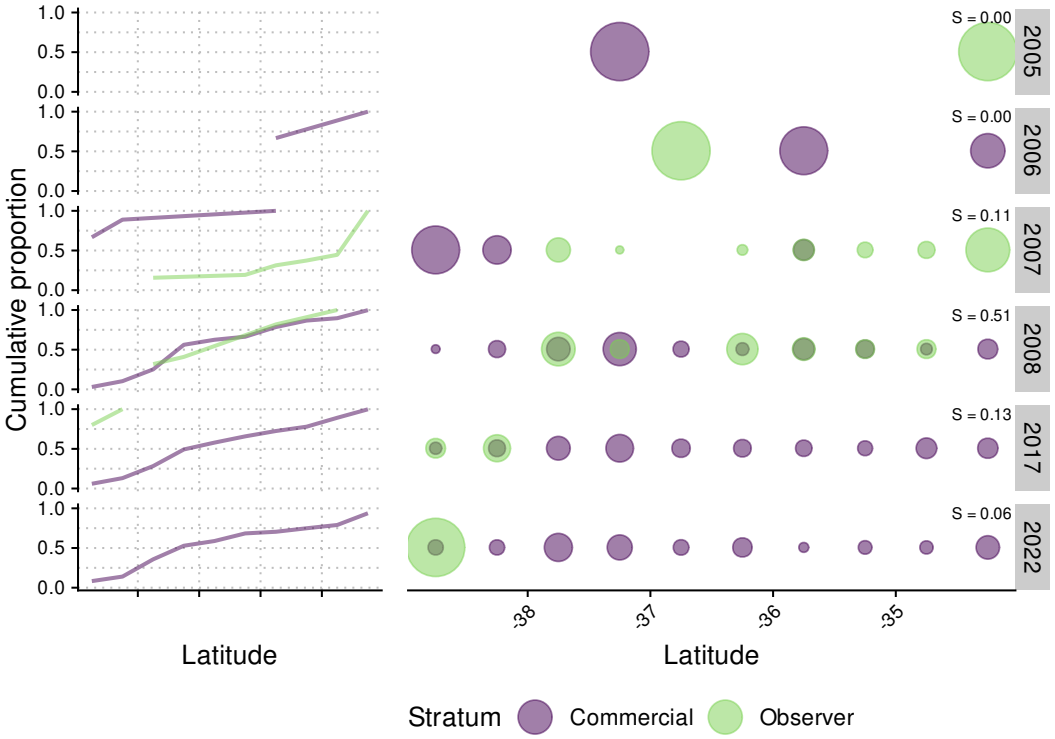


Figure 808: **Latitudinal representativeness of observer sampling coverage of Line fishing events in LIN 1, where the ling catch exceeded the 40kg threshold, in 2005 to 2022. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

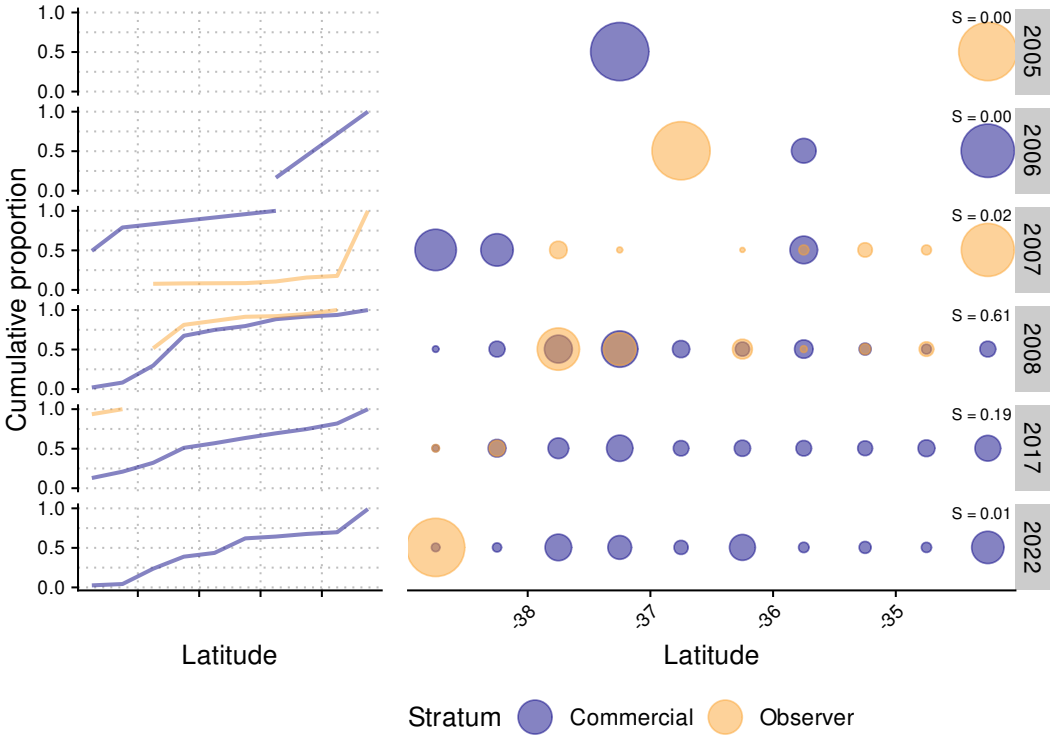


Figure 809: **Latitudinal representativeness of observer sampling coverage of Line catch in LIN 1, from events where the ling catch exceeded the 40kg threshold, in 2005 to 2022. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

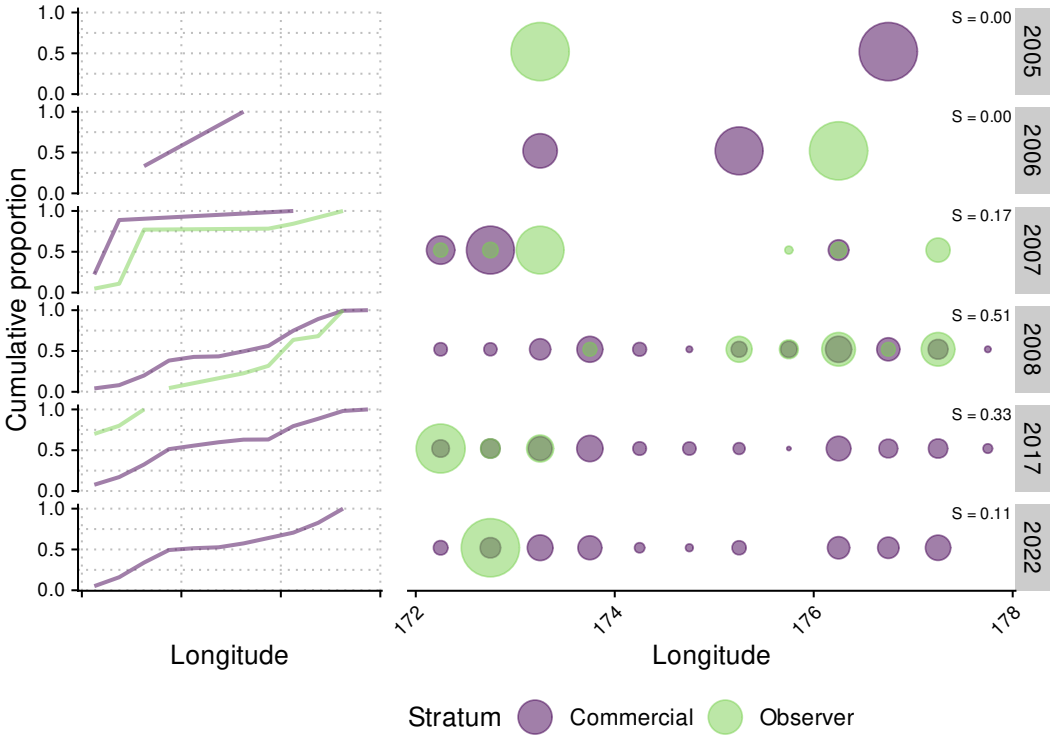


Figure 810: **Longitudinal representativeness of observer sampling coverage of Line fishing events in LIN 1, where the ling catch exceeded the 40kg threshold, in 2005 to 2022. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

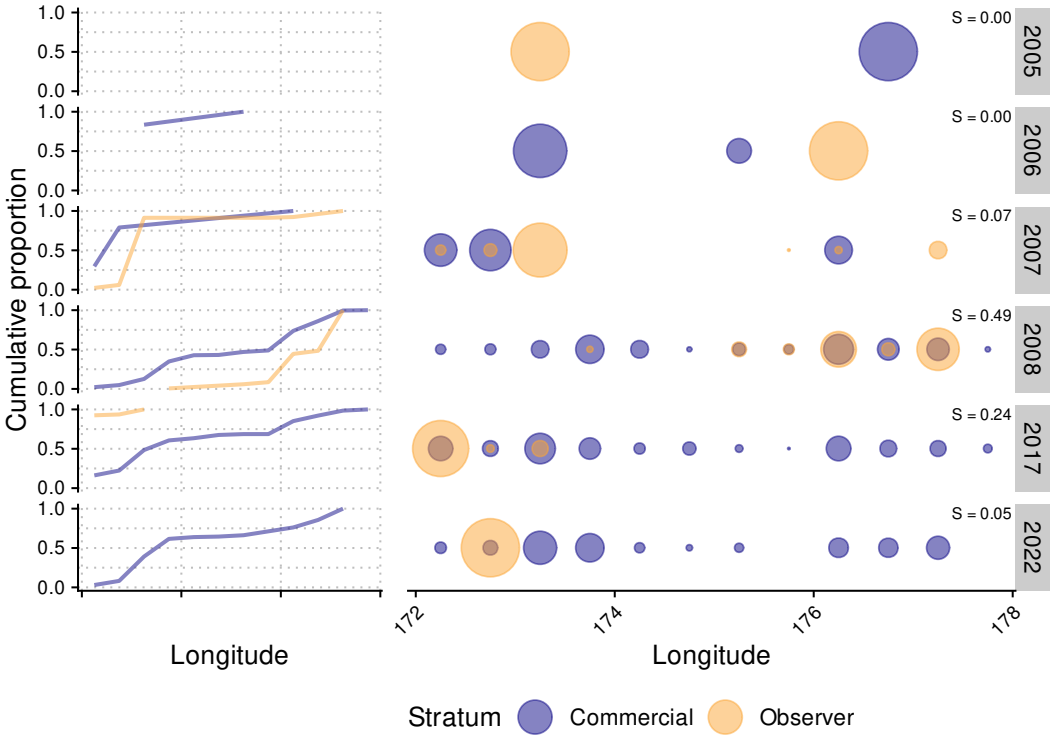


Figure 811: **Longitudinal representativeness of observer sampling coverage of Line catch in LIN 1, from events where the ling catch exceeded the 40kg threshold, in 2005 to 2022. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

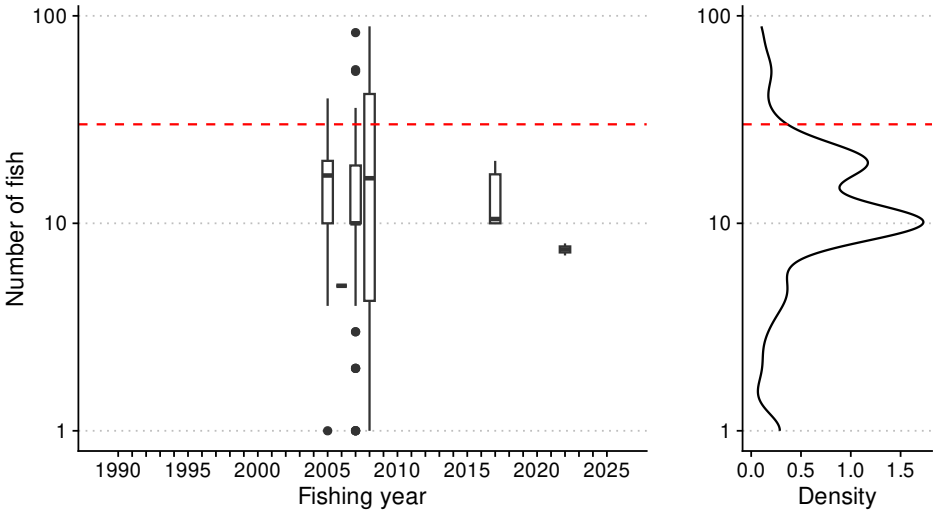


Figure 812: **Length-frequency sample sizes for observed fishing events in LIN 1 where ling were sampled. The red dashed line indicates a sample size of 30 fish.**

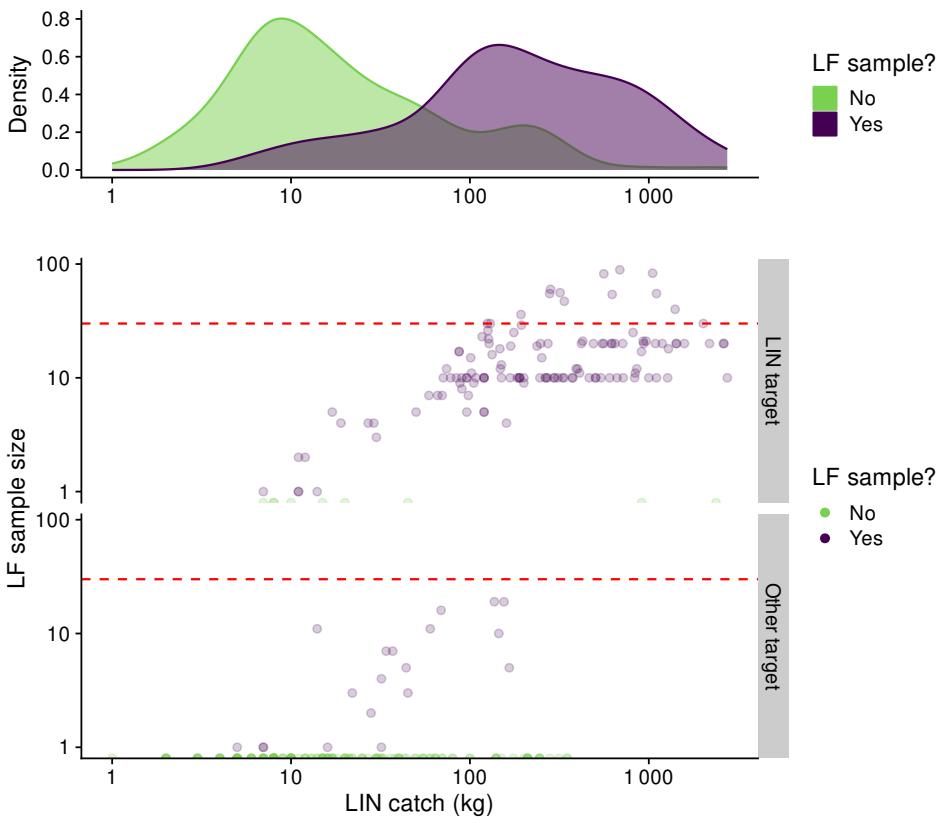


Figure 813: Length-frequency sample sizes (number of fish sampled) for observed fishing events in LIN 1 in relation to the total ling catch from an event, separately for ling target events and other target species. The red dashed line indicates a sample size of 30 fish.

2.13.1.2 Catch quantification

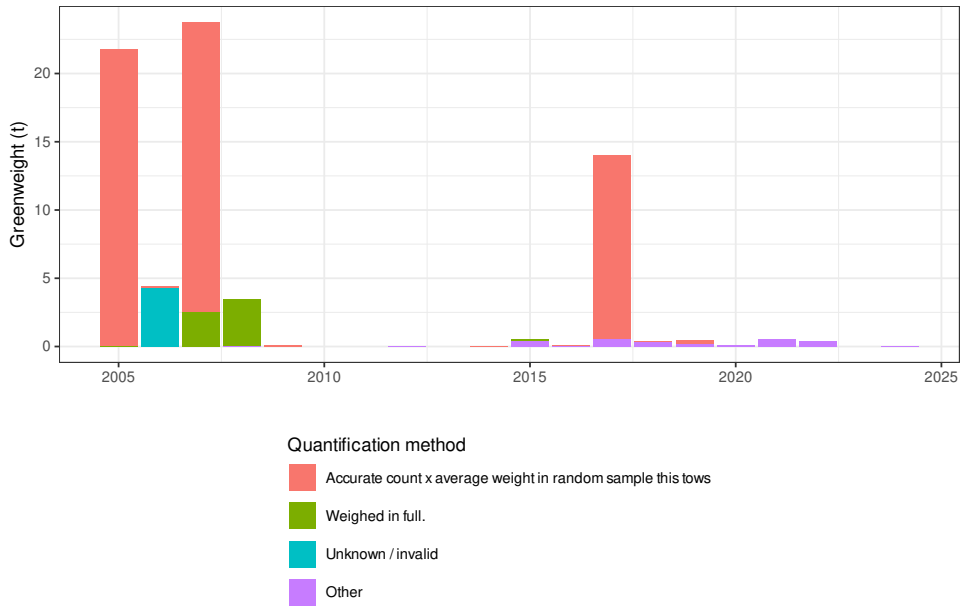


Figure 814: Methods used by observers to quantify the catch of ling in the LIN 1 Line fishery. The legend lists the methods used in descending order of total catch.

2.13.2 LIN 1: Trawl fishery

2.13.2.1 Length-frequency samples

Table 67: Length-frequency samples of ling from the LIN 1 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of ling exceeded a potential sampling threshold of 40 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	602	0	0	0.00
1991	1 348	4	95	0.30
1992	912	7	93	0.77
1993	840	0	0	0.00
1994	812	0	0	0.00
1995	637	17	82	2.67
1996	630	3	18	0.48
1997	1 235	0	0	0.00
1998	1 753	1	6	0.06
1999	733	0	0	0.00
2000	1 164	18	573	1.55
2001	1 134	0	0	0.00
2002	1 056	2	7	0.19
2003	723	6	9	0.83
2004	755	2	19	0.26
2005	626	2	10	0.32
2006	539	41	98	7.61
2007	412	35	142	8.50
2008	429	2	10	0.47
2009	379	0	0	0.00
2010	574	10	68	1.74
2011	484	2	25	0.41
2012	502	0	0	0.00
2013	664	2	21	0.30
2014	514	5	100	0.97
2015	520	12	241	2.31
2016	601	7	201	1.16
2017	596	9	194	1.51
2018	602	3	37	0.50
2019	562	10	410	1.78
2020	481	44	1 619	9.15
2021	365	1	20	0.27
2022	487	2	108	0.41
2023	430	4	92	0.93
2024	350	1	30	0.29
2025	405	0	0	0.00

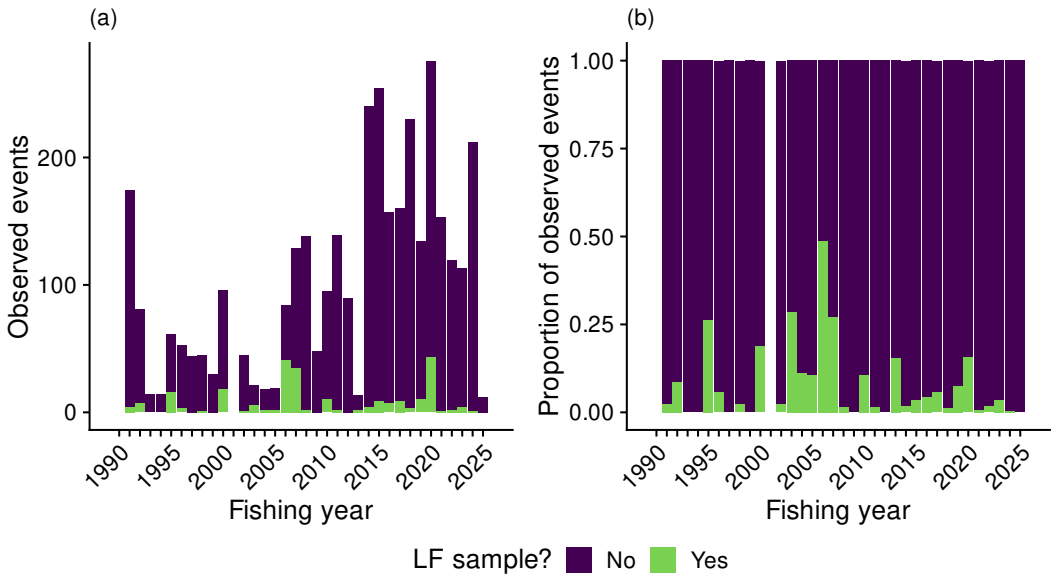


Figure 815: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in LIN 1 where the ling catch exceeded the 40 kg threshold, with and without length-frequency sampling.**

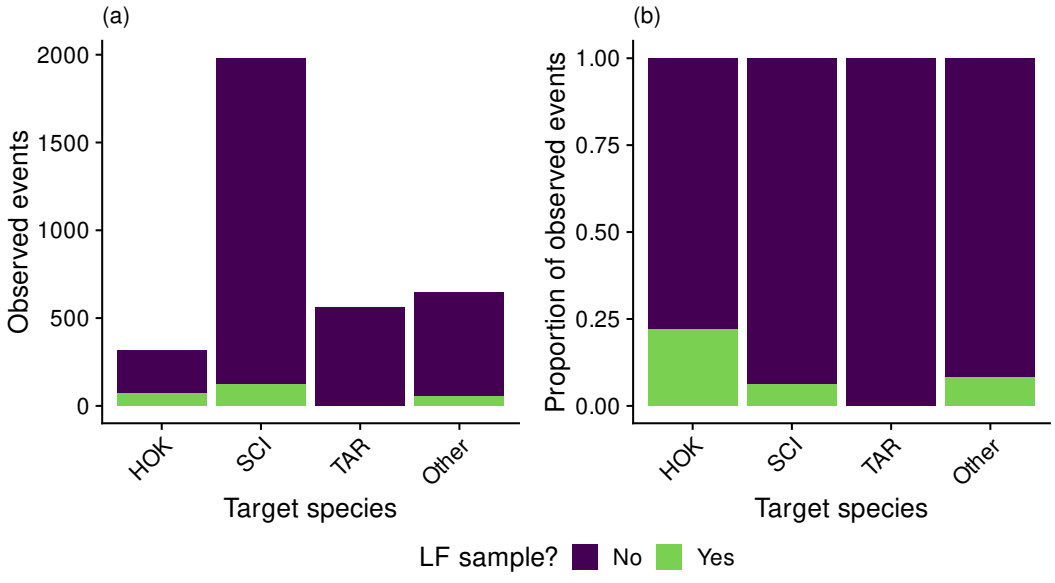


Figure 816: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in LIN 1 where the ling catch exceeded the 40 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

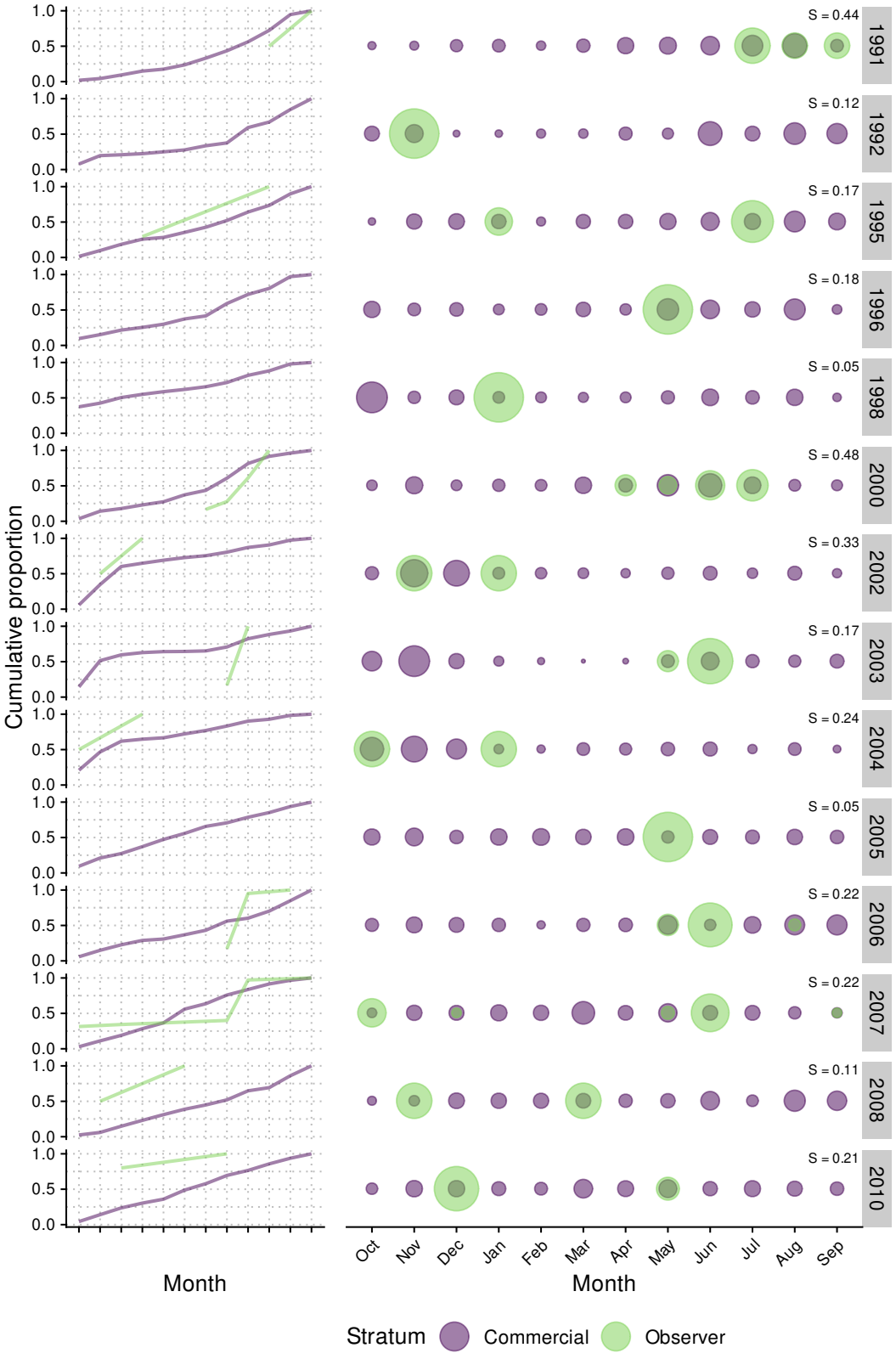


Figure 817: Monthly representativeness of observer sampling coverage of Trawl fishing events in LIN 1, where the ling catch exceeded the 40kg threshold, in 1991 to 2010. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

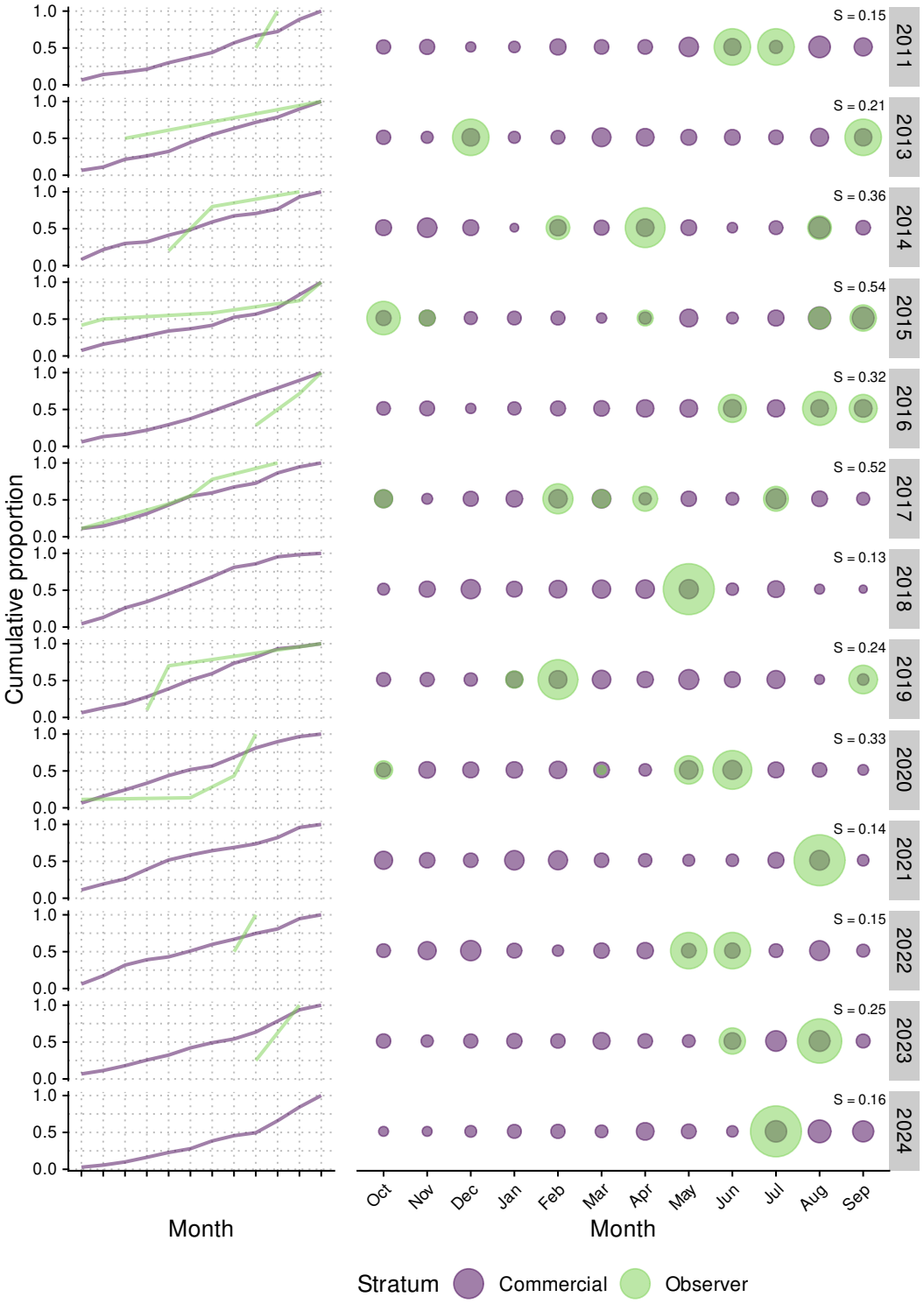


Figure 818: Monthly representativeness of observer sampling coverage of Trawl fishing events in LIN 1, where the ling catch exceeded the 40kg threshold, in 2011 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

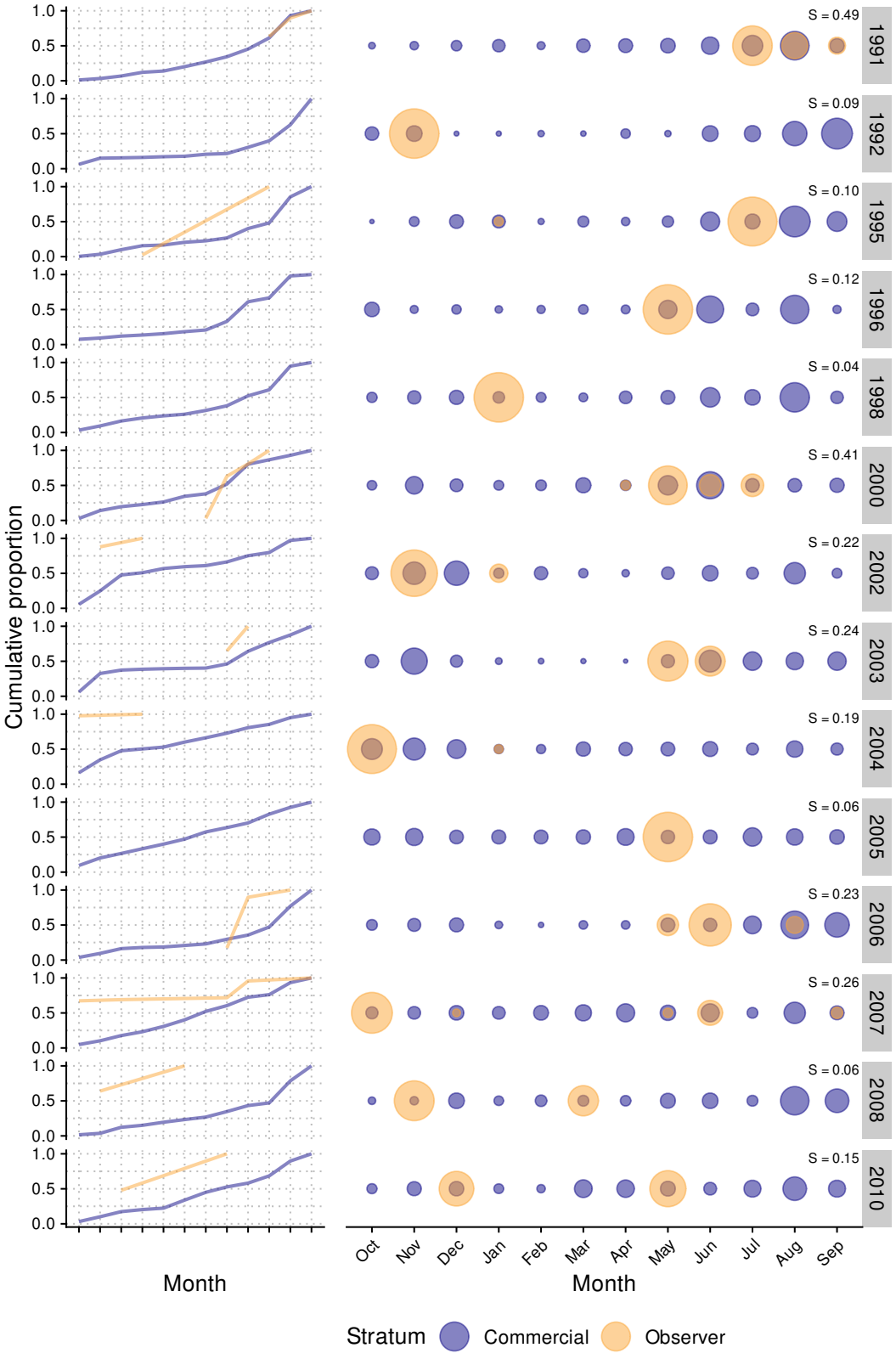


Figure 819: **Monthly representativeness of observer sampling coverage of Trawl catch in LIN 1, from events where the ling catch exceeded the 40kg threshold, in 1991 to 2010. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

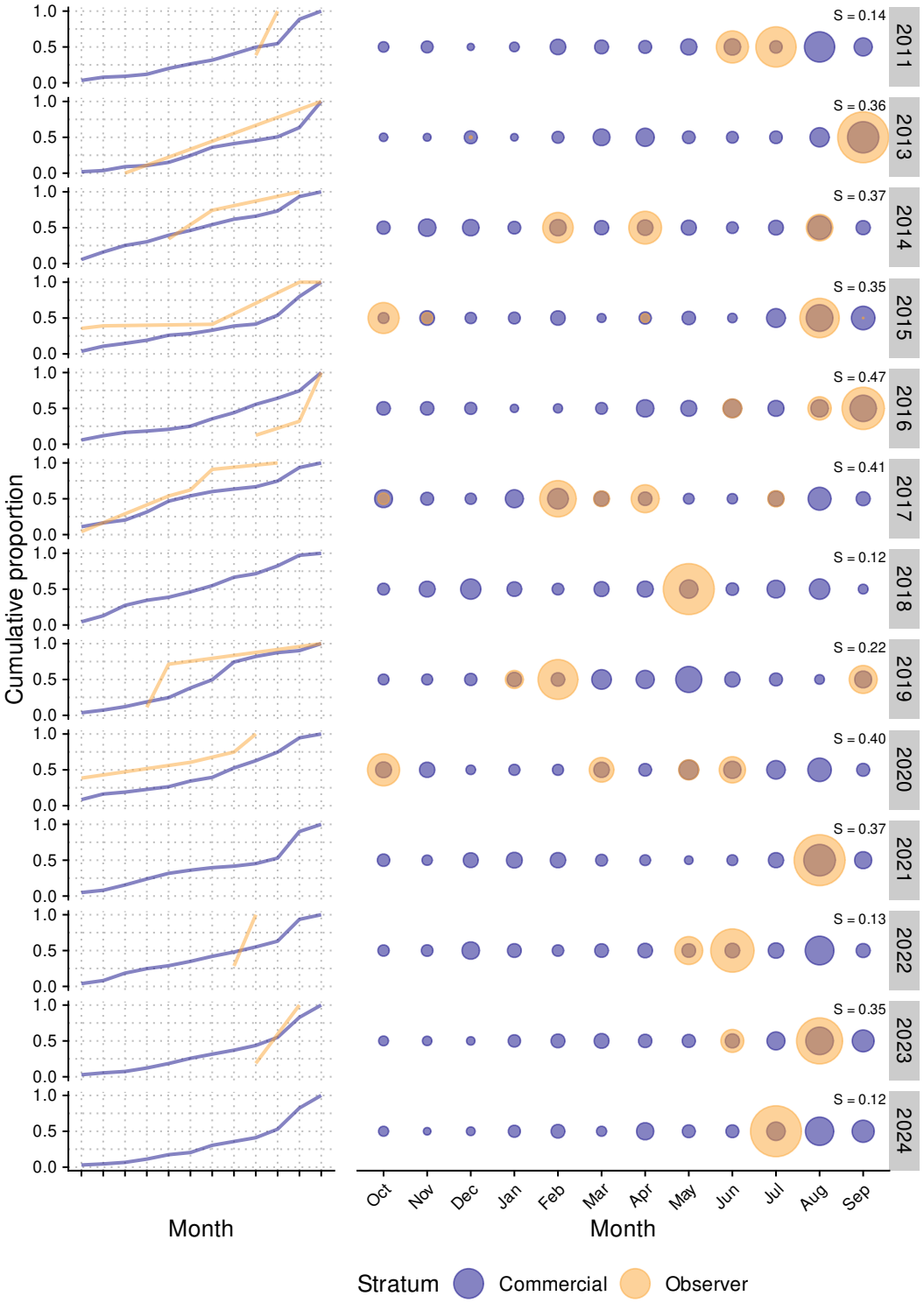


Figure 820: Monthly representativeness of observer sampling coverage of Trawl catch in LIN 1, from events where the ling catch exceeded the 40kg threshold, in 2011 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

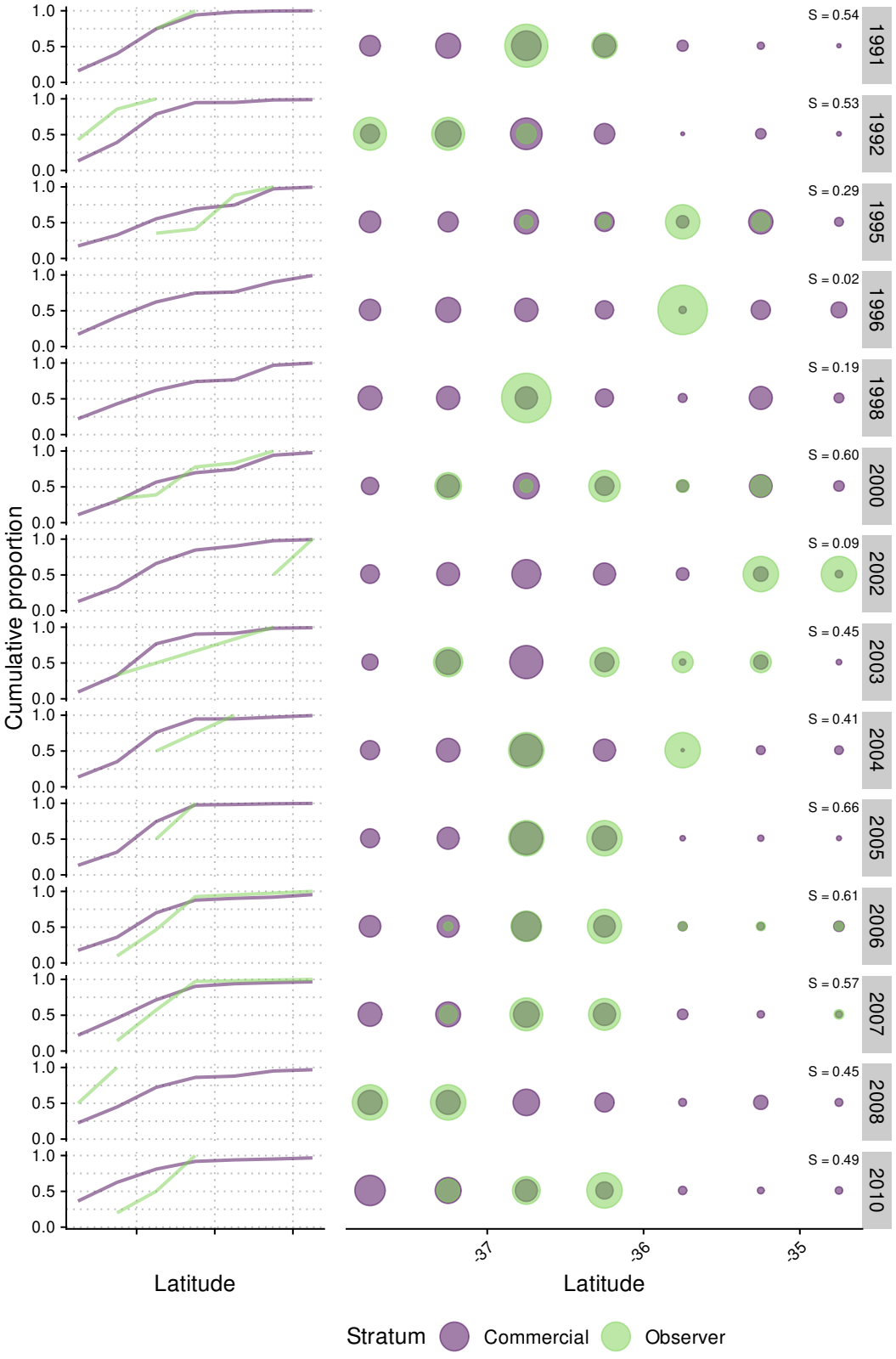


Figure 821: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in LIN 1, where the ling catch exceeded the 40kg threshold, in 1991 to 2010. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

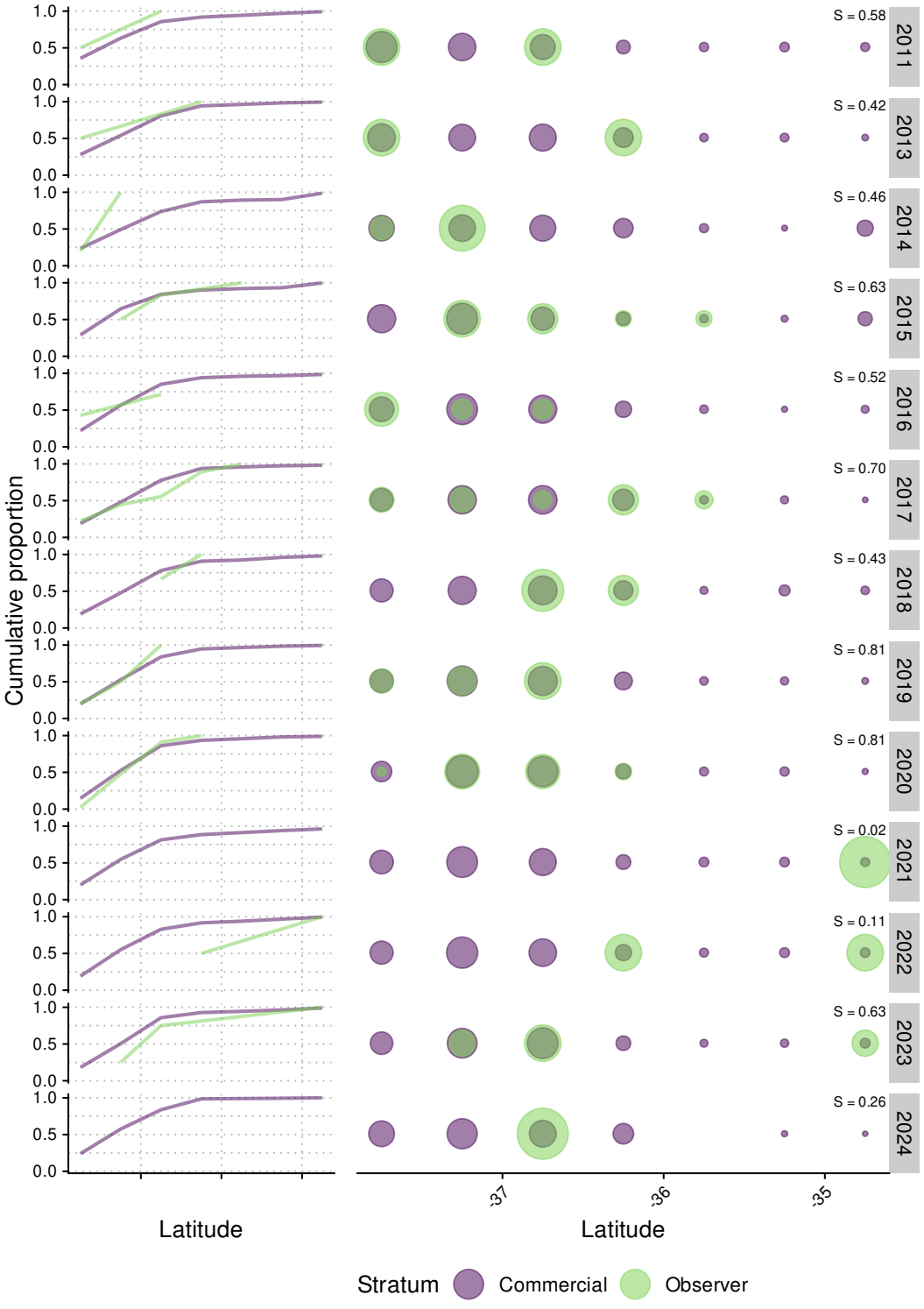


Figure 822: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in LIN 1, where the ling catch exceeded the 40kg threshold, in 2011 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

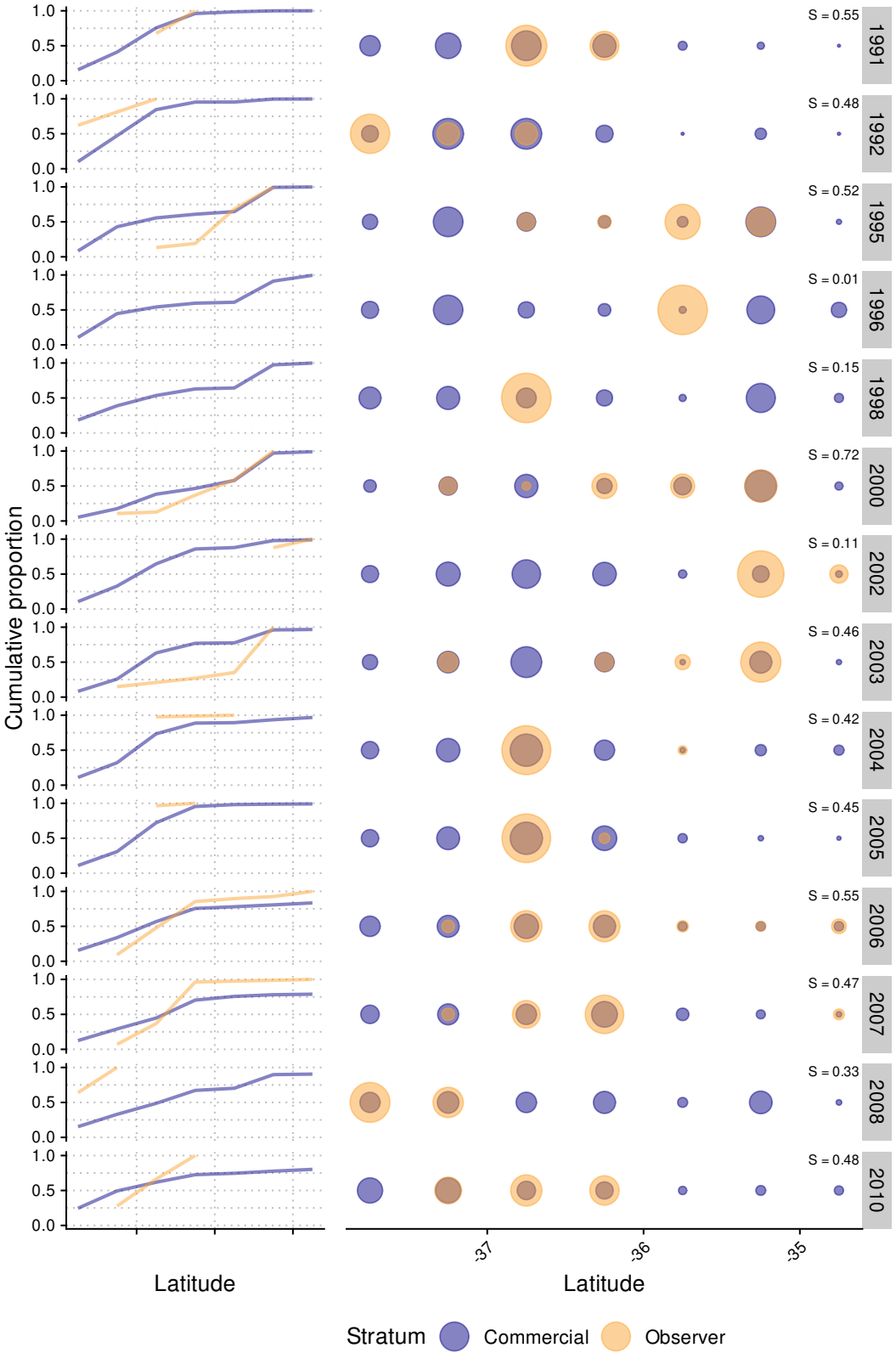


Figure 823: **Latitudinal representativeness of observer sampling coverage of Trawl catch in LIN 1, from events where the ling catch exceeded the 40kg threshold, in 1991 to 2010. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

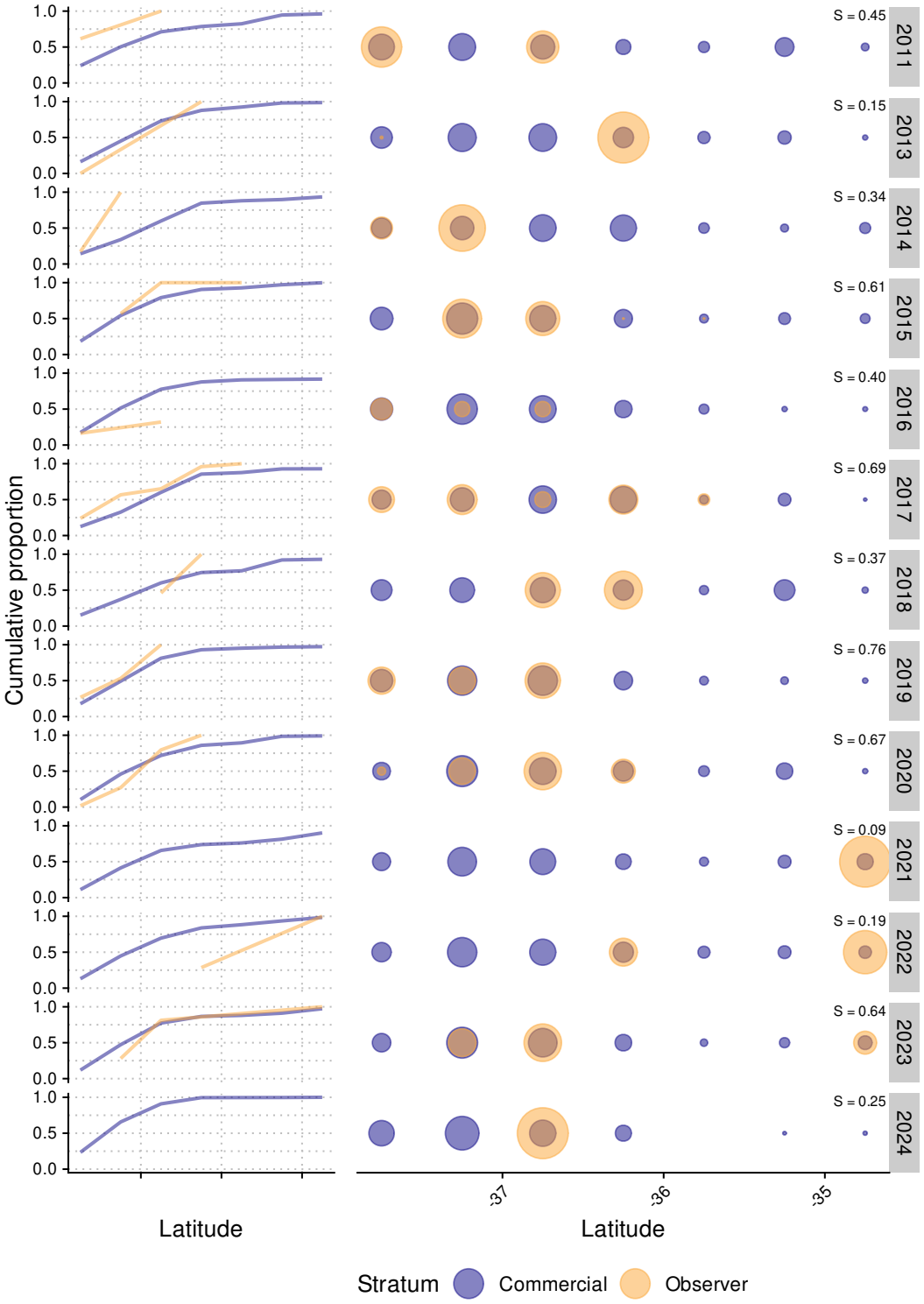


Figure 824: Latitudinal representativeness of observer sampling coverage of Trawl catch in LIN 1, from events where the ling catch exceeded the 40kg threshold, in 2011 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

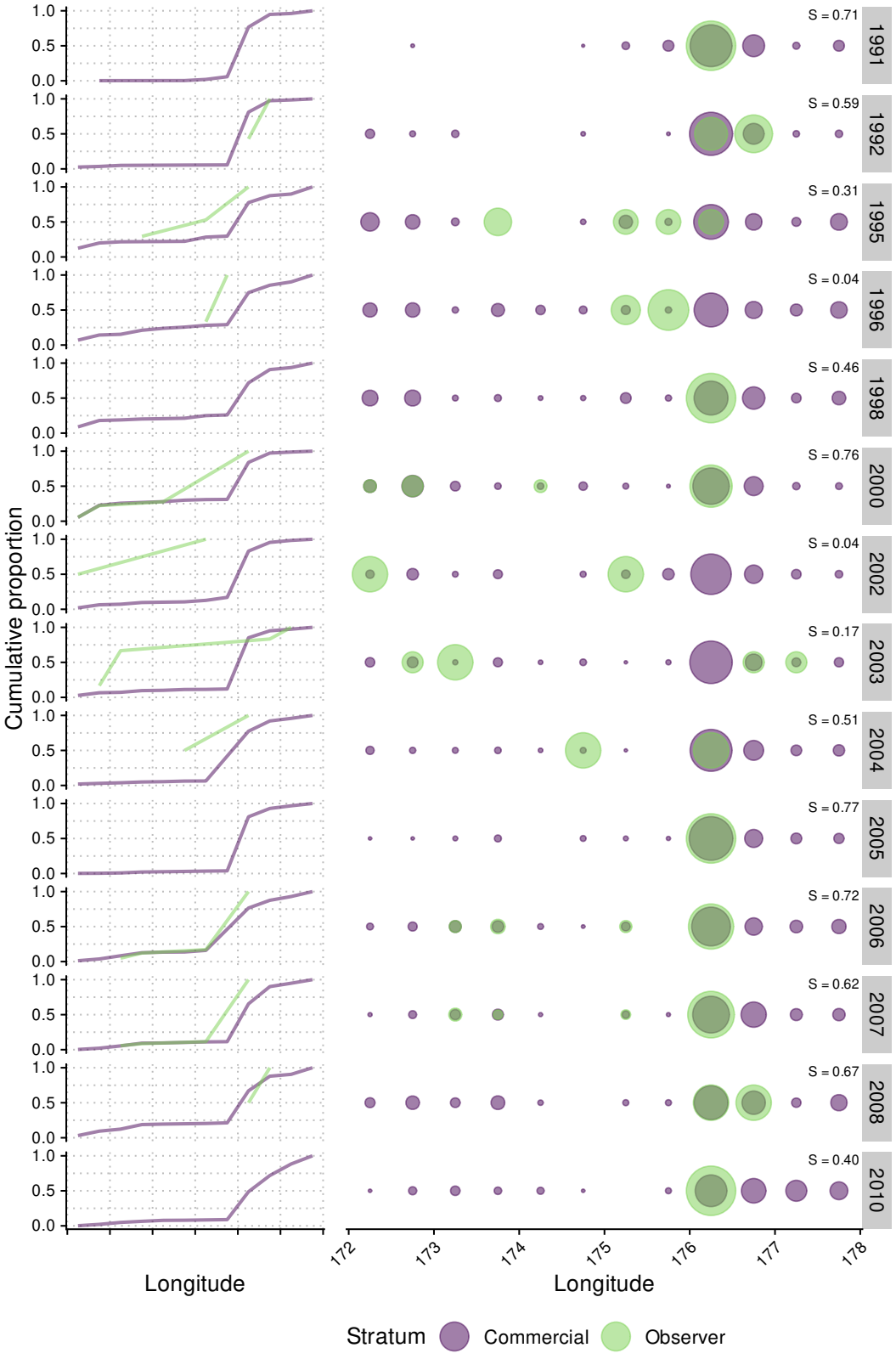


Figure 825: **Longitudinal representativeness of observer sampling coverage of Trawl fishing events in LIN 1, where the ling catch exceeded the 40kg threshold, in 1991 to 2010. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

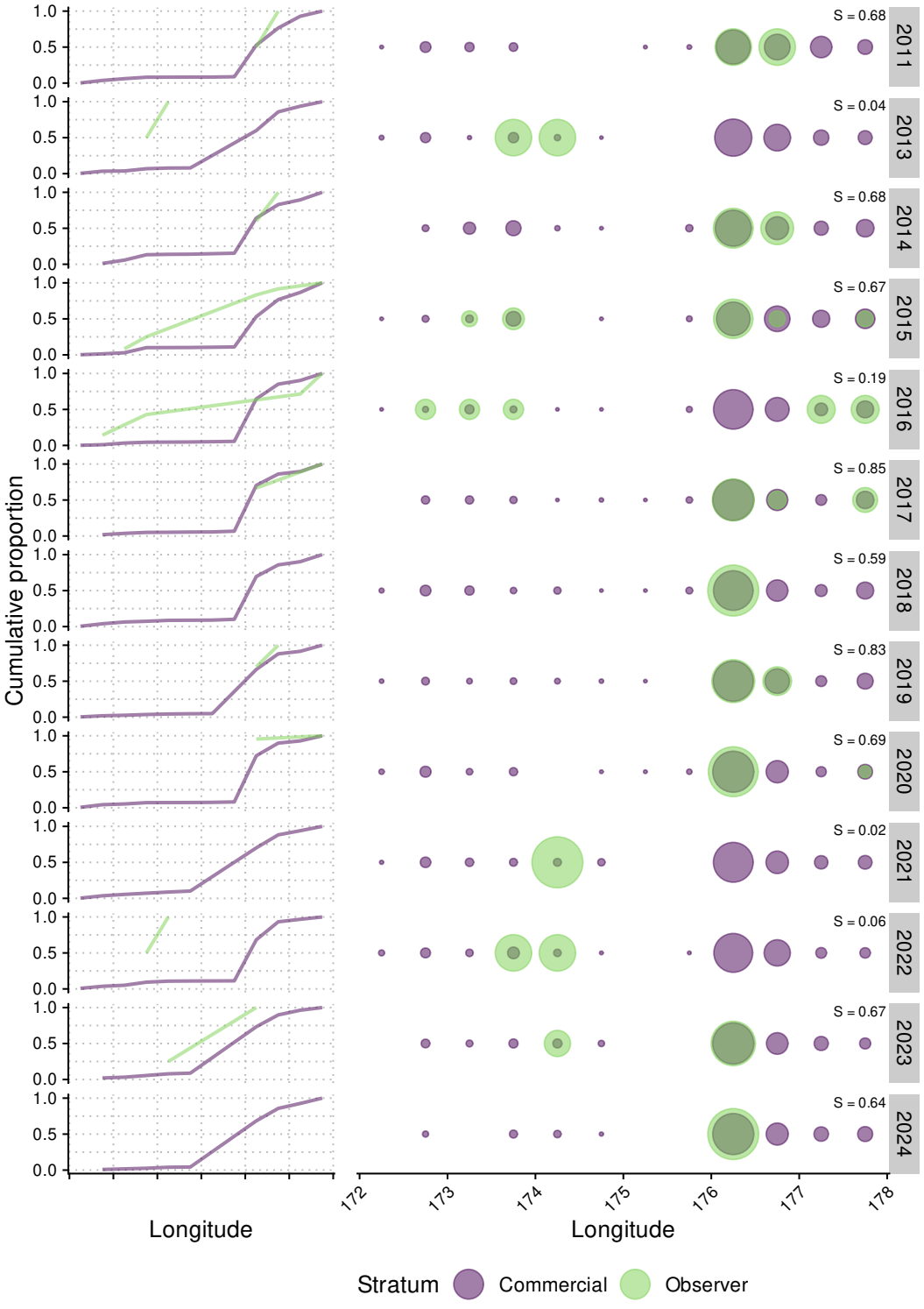


Figure 826: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in LIN 1, where the ling catch exceeded the 40kg threshold, in 2011 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

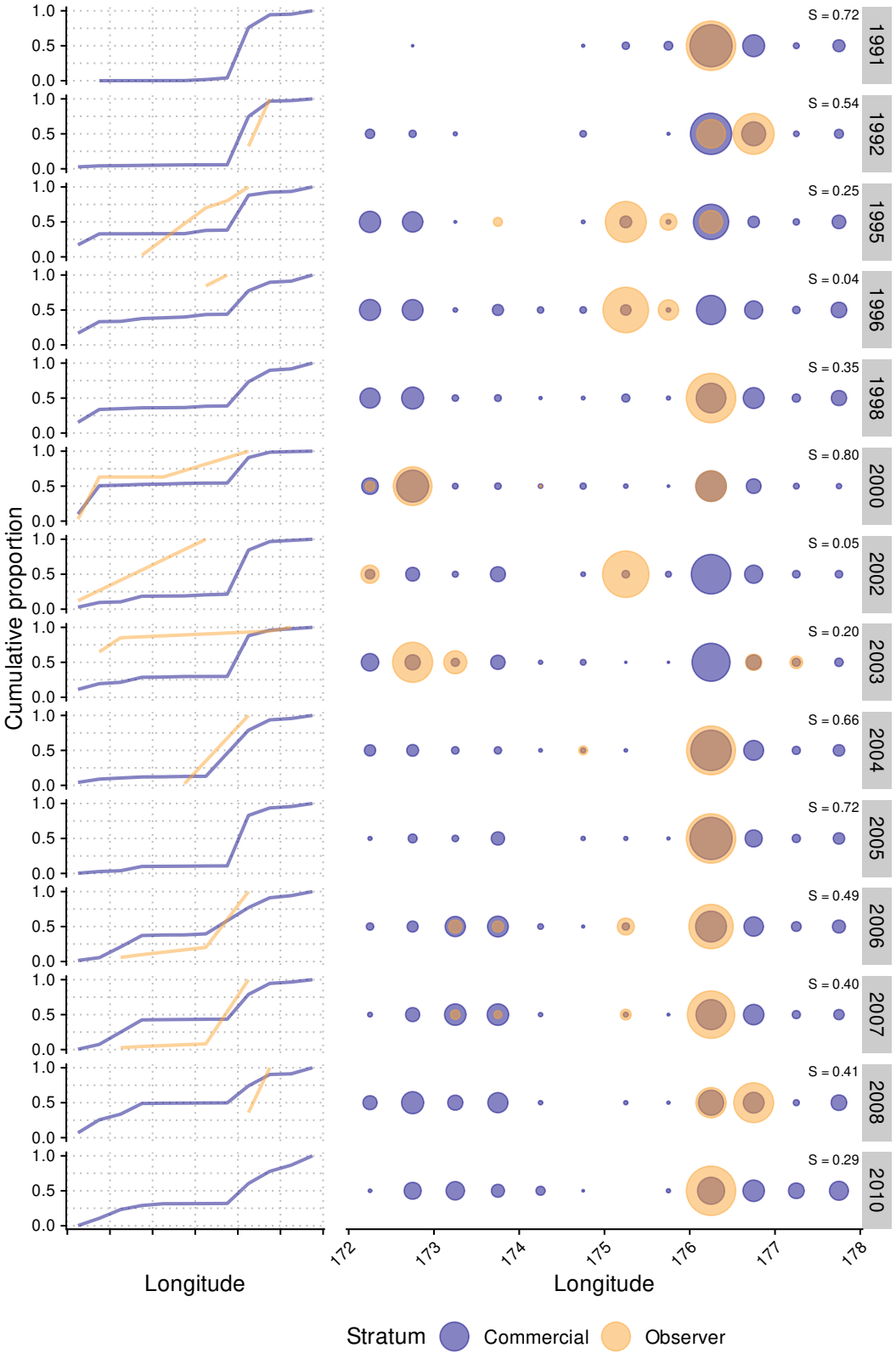


Figure 827: **Longitudinal representativeness of observer sampling coverage of Trawl catch in LIN 1, from events where the ling catch exceeded the 40kg threshold, in 1991 to 2010. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

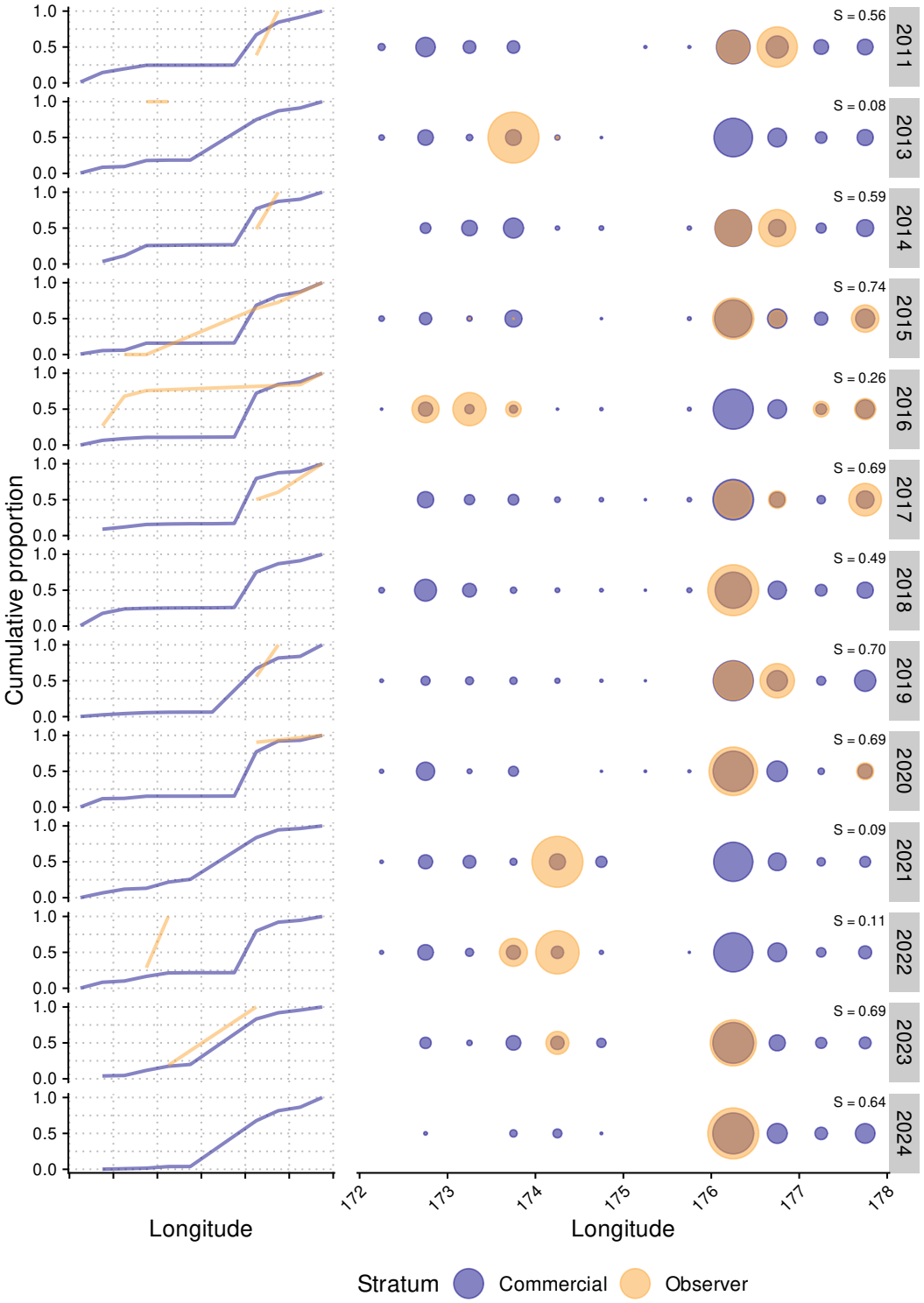


Figure 828: Longitudinal representativeness of observer sampling coverage of Trawl catch in LIN 1, from events where the ling catch exceeded the 40kg threshold, in 2011 to 2024. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

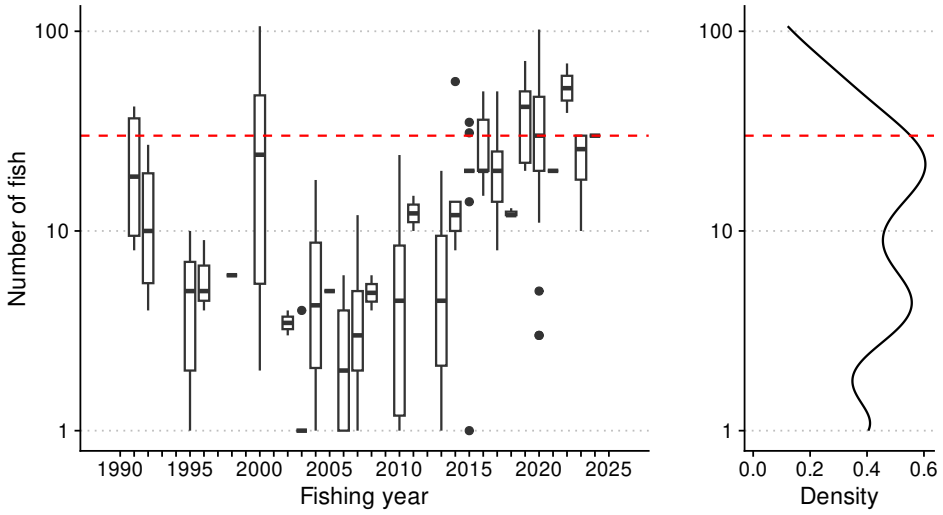


Figure 829: **Length-frequency sample sizes for observed fishing events in LIN 1 where ling were sampled. The red dashed line indicates a sample size of 30 fish.**

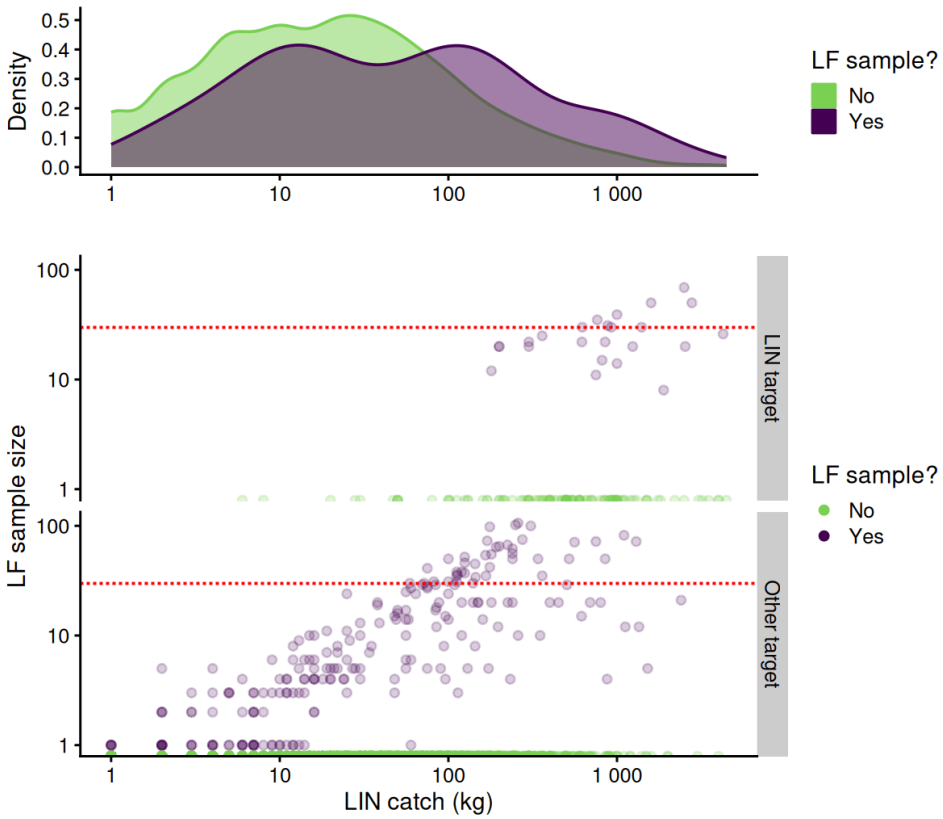


Figure 830: **Length-frequency sample sizes (number of fish sampled) for observed fishing events in LIN 1 in relation to the total ling catch from an event, separately for ling target events and other target species. The red dashed line indicates a sample size of 30 fish.**

2.13.2.2 Otolith samples

Table 68: Otolith samples of ling from the LIN 1 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of ling exceeded a potential sampling threshold of 40 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	602	0	0	0.00
1991	1 348	0	0	0.00
1992	912	0	0	0.00
1993	840	0	0	0.00
1994	812	0	0	0.00
1995	637	0	0	0.00
1996	630	0	0	0.00
1997	1 235	0	0	0.00
1998	1 753	0	0	0.00
1999	733	0	0	0.00
2000	1 164	0	0	0.00
2001	1 134	0	0	0.00
2002	1 056	0	0	0.00
2003	723	0	0	0.00
2004	755	0	0	0.00
2005	626	0	0	0.00
2006	539	0	0	0.00
2007	412	0	0	0.00
2008	429	0	0	0.00
2009	379	0	0	0.00
2010	574	0	0	0.00
2011	484	2	10	0.41
2012	502	0	0	0.00
2013	664	0	0	0.00
2014	514	0	0	0.00
2015	520	0	0	0.00
2016	601	0	0	0.00
2017	596	0	0	0.00
2018	602	0	0	0.00
2019	562	0	0	0.00
2020	481	0	0	0.00
2021	365	0	0	0.00
2022	487	0	0	0.00
2023	430	0	0	0.00
2024	350	0	0	0.00
2025	405	0	0	0.00

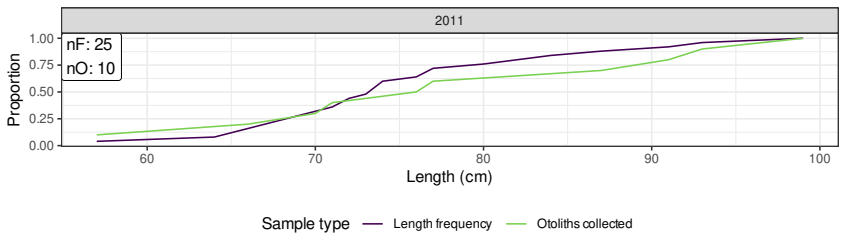


Figure 831: Cumulative distributions of the length of fish in the length frequency and otolith samples of ling in the LIN 1 Trawl fishery for the 2011 to 2011 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

2.13.2.3 Catch quantification

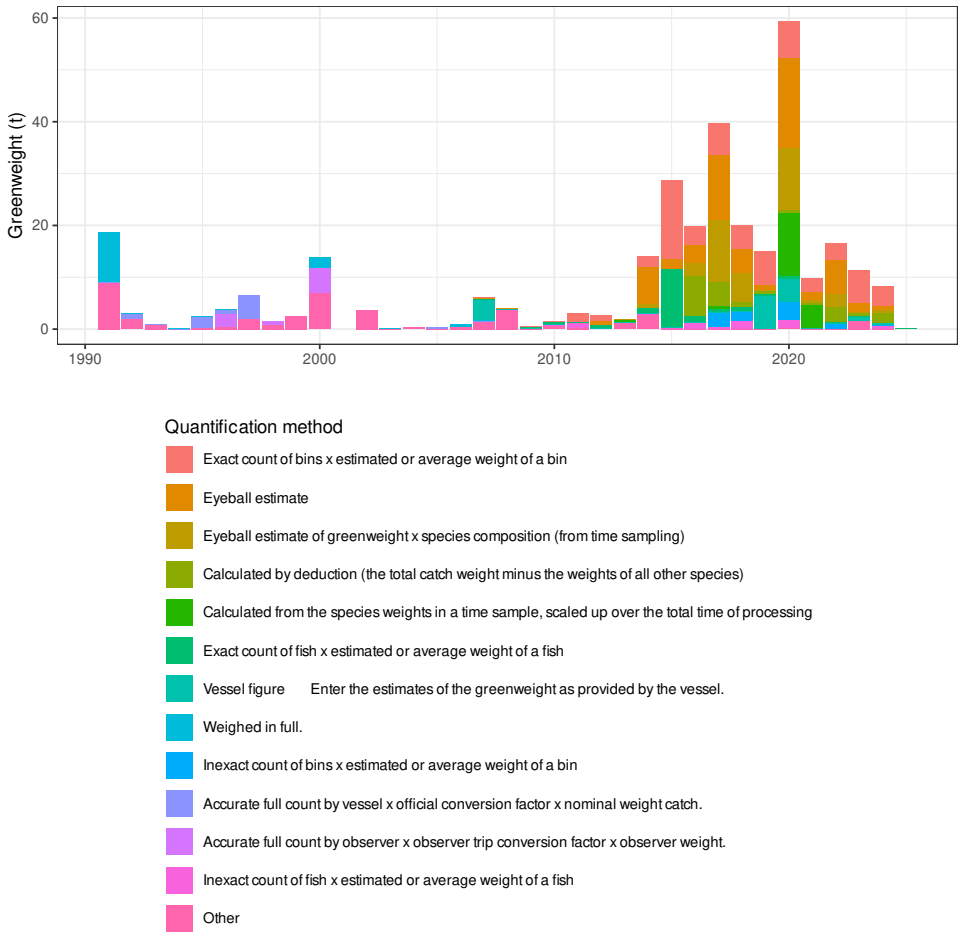


Figure 832: Methods used by observers to quantify the catch of ling in the LIN 1 Trawl fishery. The legend lists the methods used in descending order of total catch.

2.13.3 LIN 2: Line fishery

2.13.3.1 Length-frequency samples

Table 69: Length-frequency samples of ling from the LIN 2 Line fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of ling exceeded a potential sampling threshold of 40 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	237	0	0	0.00
1991	406	0	0	0.00
1992	609	0	0	0.00
1993	842	0	0	0.00
1994	872	0	0	0.00
1995	4 772	0	0	0.00
1996	6 822	0	0	0.00
1997	11 074	0	0	0.00
1998	10 886	0	0	0.00
1999	16 031	0	0	0.00
2000	842	0	0	0.00
2001	103 074	7	145	0.01
2002	588	0	0	0.00
2003	4 309	24	240	0.56
2004	3 430	0	0	0.00
2005	1 011	0	0	0.00
2006	1 070	48	460	4.49
2007	1 239	42	424	3.39
2008	1 021	3	13	0.29
2009	814	0	0	0.00
2010	913	0	0	0.00
2011	1 295	0	0	0.00
2012	800	0	0	0.00
2013	881	0	0	0.00
2014	993	0	0	0.00
2015	1 415	6	54	0.42
2016	1 225	15	131	1.22
2017	1 544	21	135	1.36
2018	1 818	0	0	0.00
2019	1 936	17	712	0.88
2020	2 153	22	264	1.02
2021	1 835	0	0	0.00
2022	1 047	10	139	0.96
2023	758	0	0	0.00
2024	654	0	0	0.00
2025	537	0	0	0.00

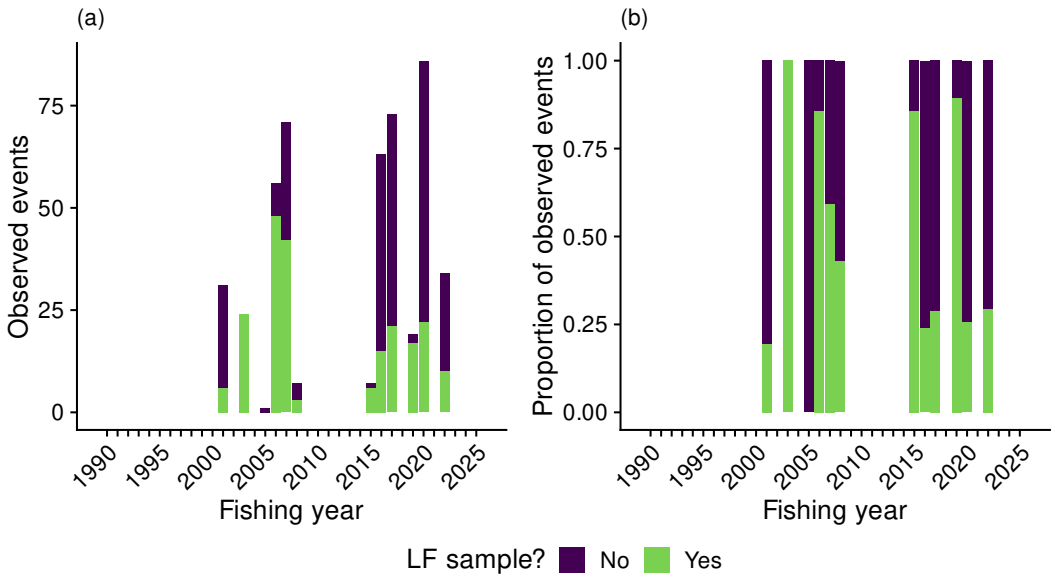


Figure 833: **(a) Observed Line fishing events, and (b) proportion of observed events, in LIN 2 where the ling catch exceeded the 40 kg threshold, with and without length-frequency sampling.**

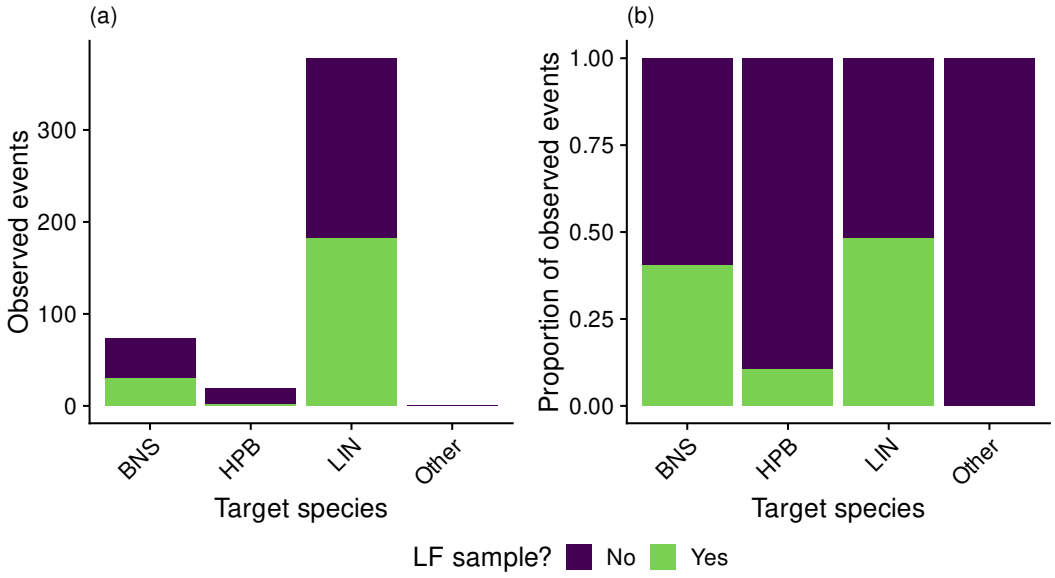


Figure 834: **(a) Observed Line fishing events, and (b) proportion of observed events, in LIN 2 where the ling catch exceeded the 40 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

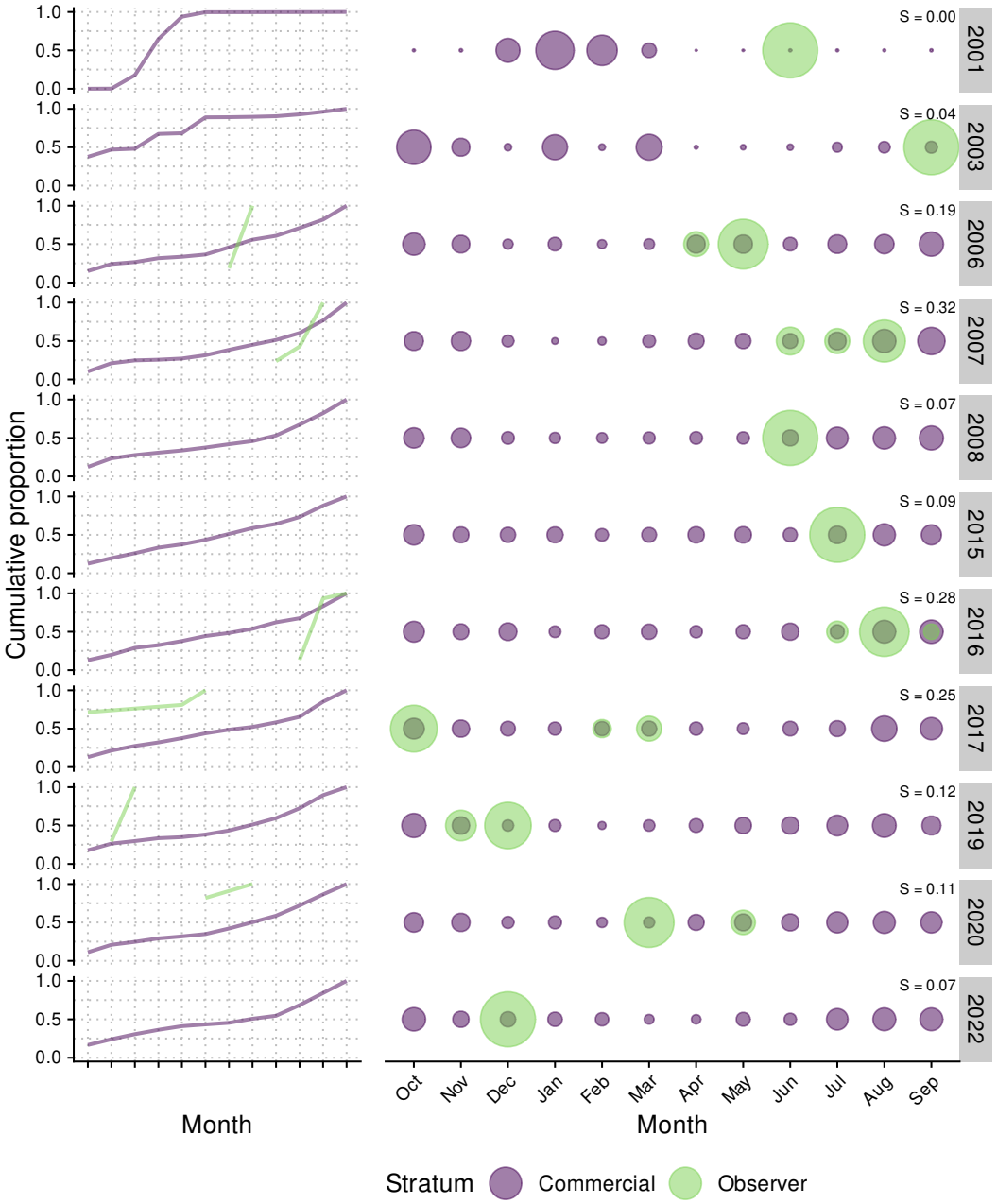


Figure 835: Monthly representativeness of observer sampling coverage of Line fishing events in LIN 2, where the ling catch exceeded the 40kg threshold, in 2001 to 2022. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

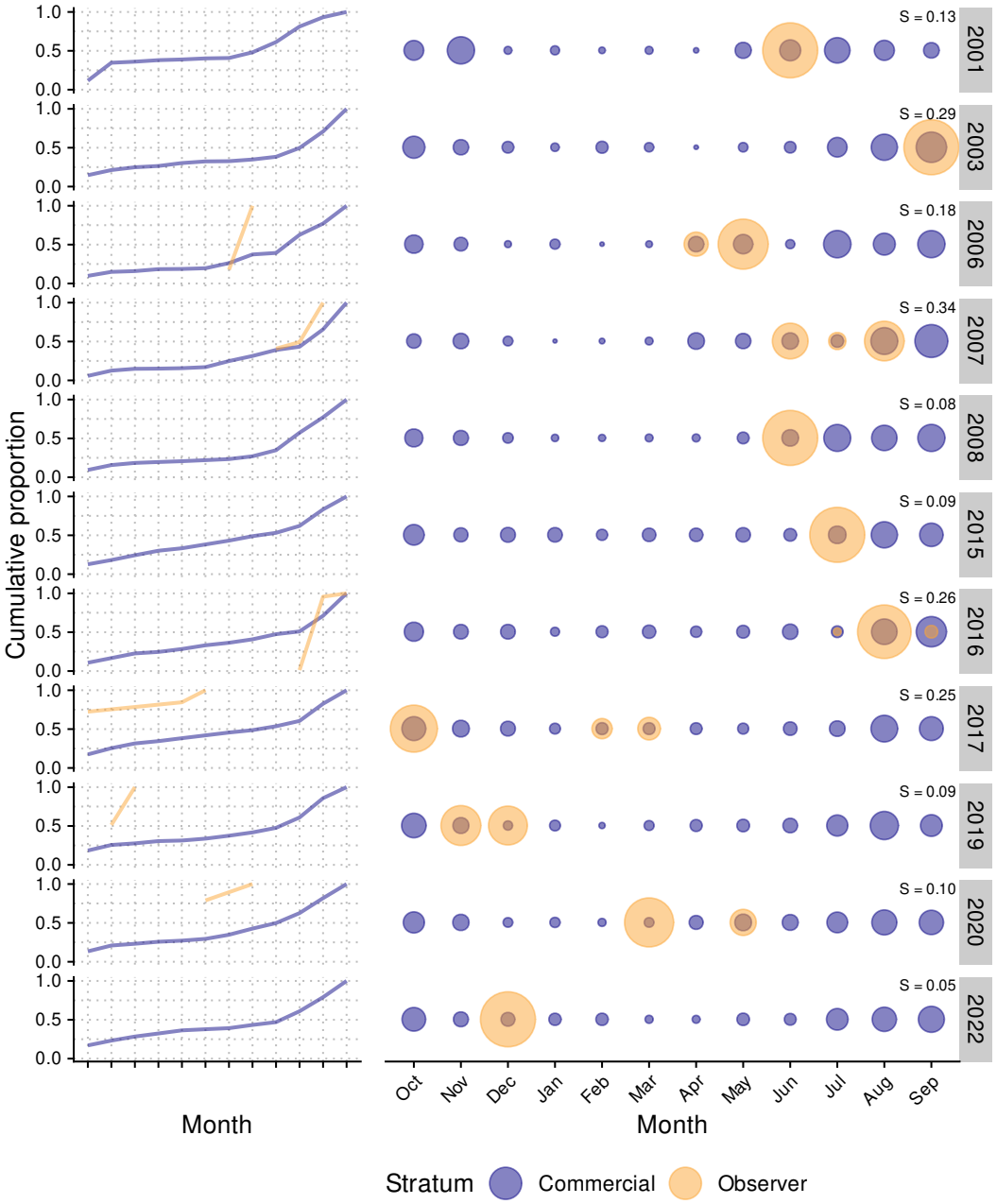


Figure 836: **Monthly representativeness of observer sampling coverage of Line catch in LIN 2, from events where the ling catch exceeded the 40kg threshold, in 2001 to 2022. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

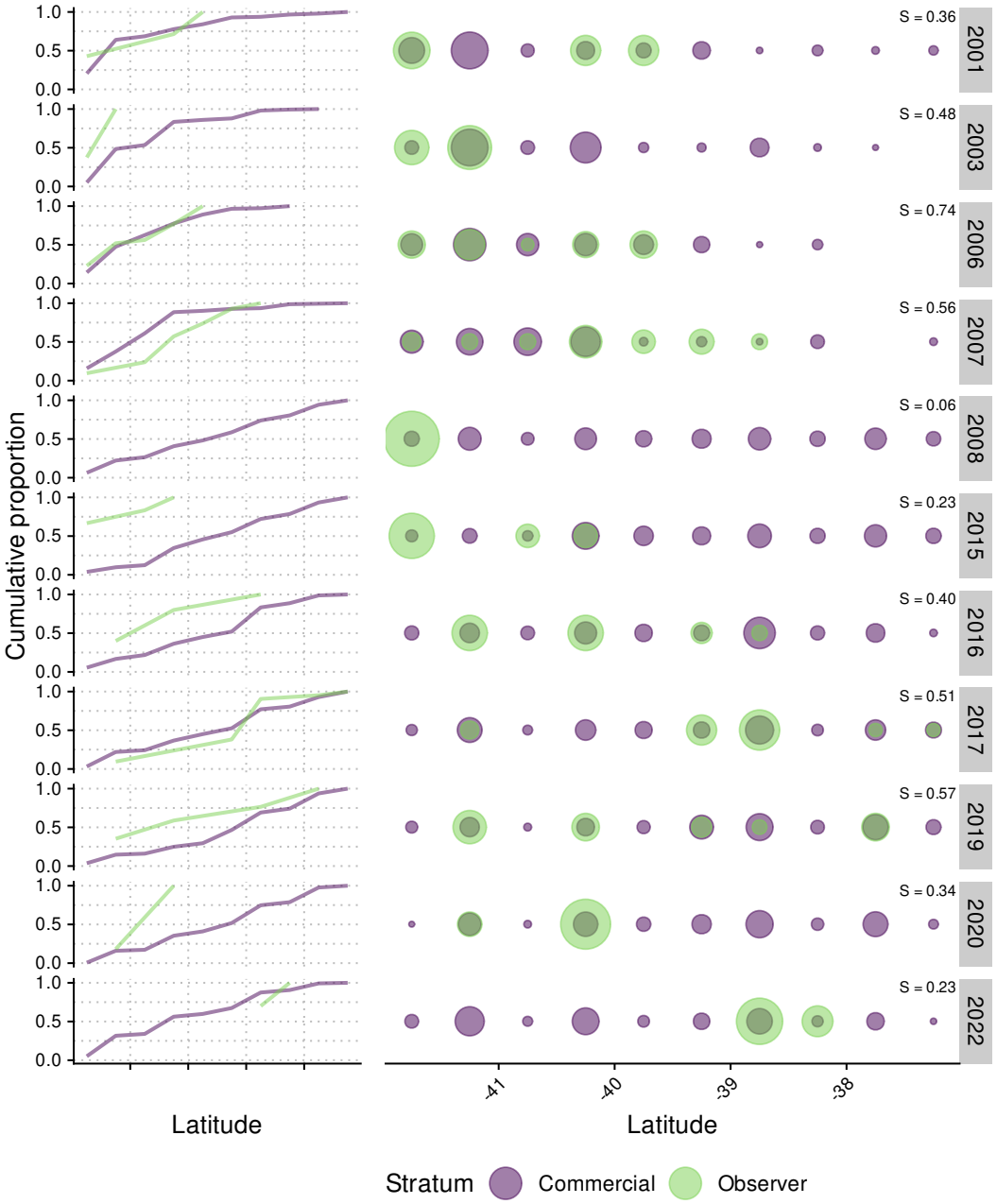


Figure 837: Latitudinal representativeness of observer sampling coverage of Line fishing events in LIN 2, where the ling catch exceeded the 40kg threshold, in 2001 to 2022. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

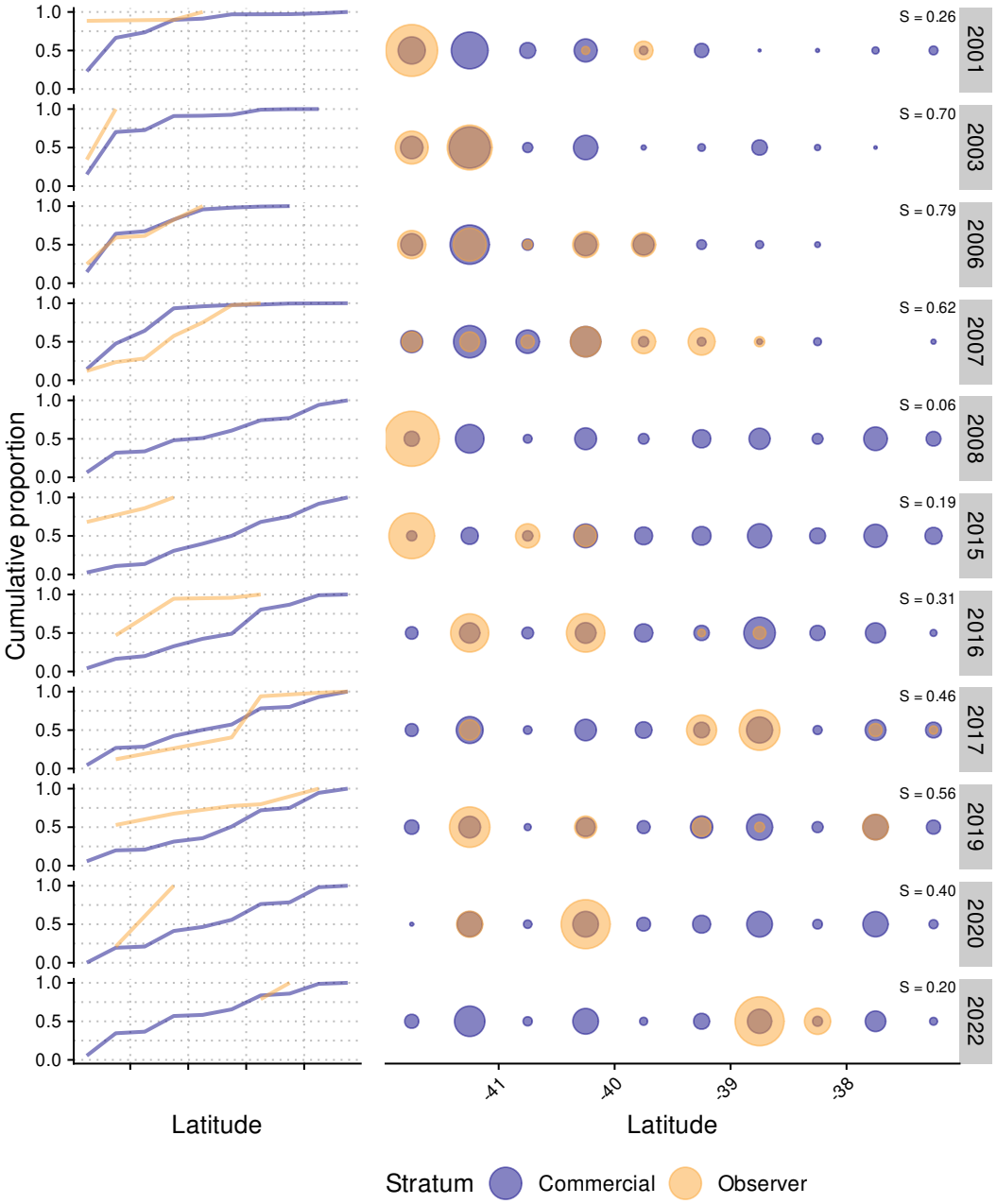


Figure 838: **Latitudinal representativeness of observer sampling coverage of Line catch in LIN 2, from events where the ling catch exceeded the 40kg threshold, in 2001 to 2022. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

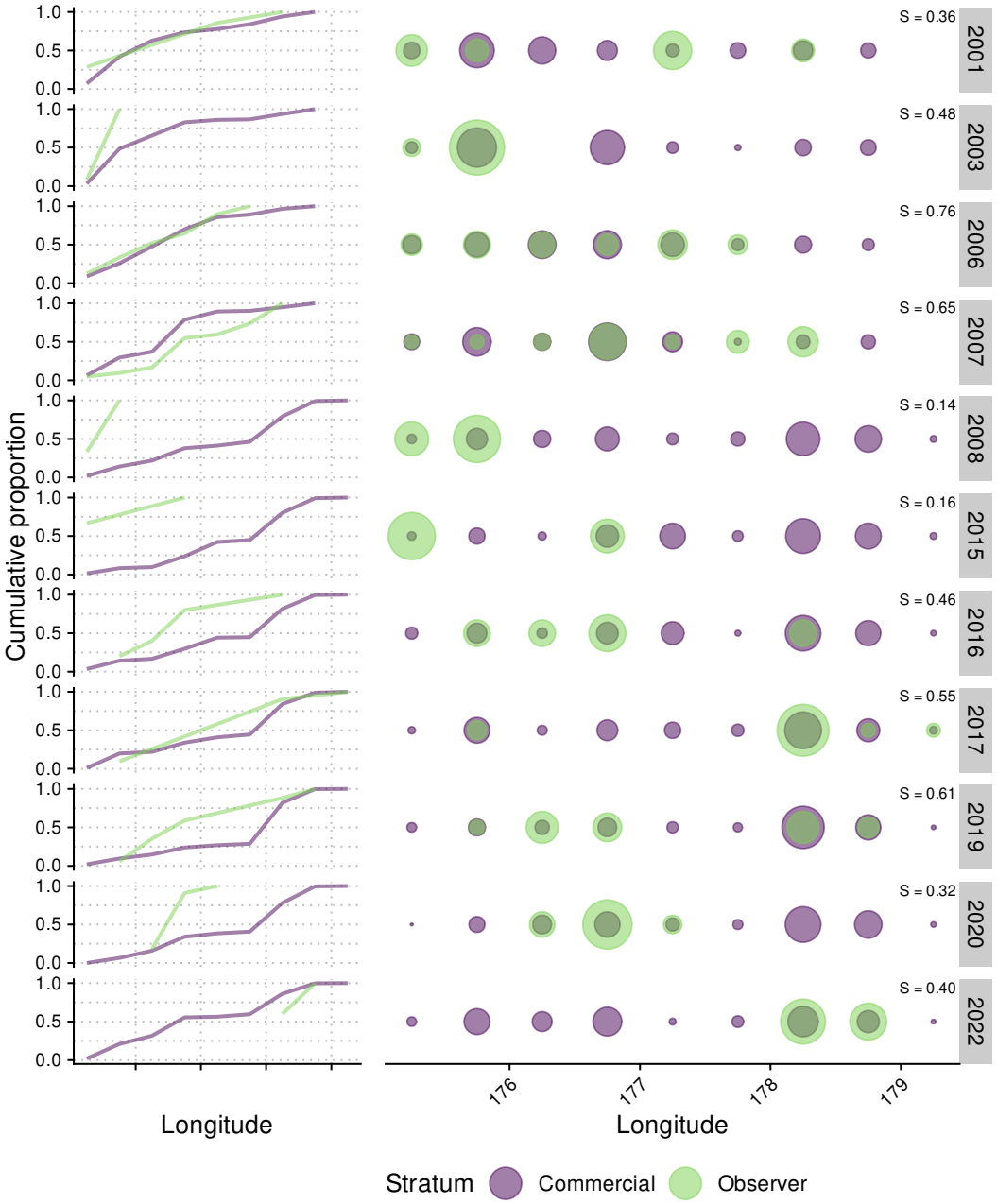


Figure 839: Longitudinal representativeness of observer sampling coverage of Line fishing events in LIN 2, where the ling catch exceeded the 40kg threshold, in 2001 to 2022. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

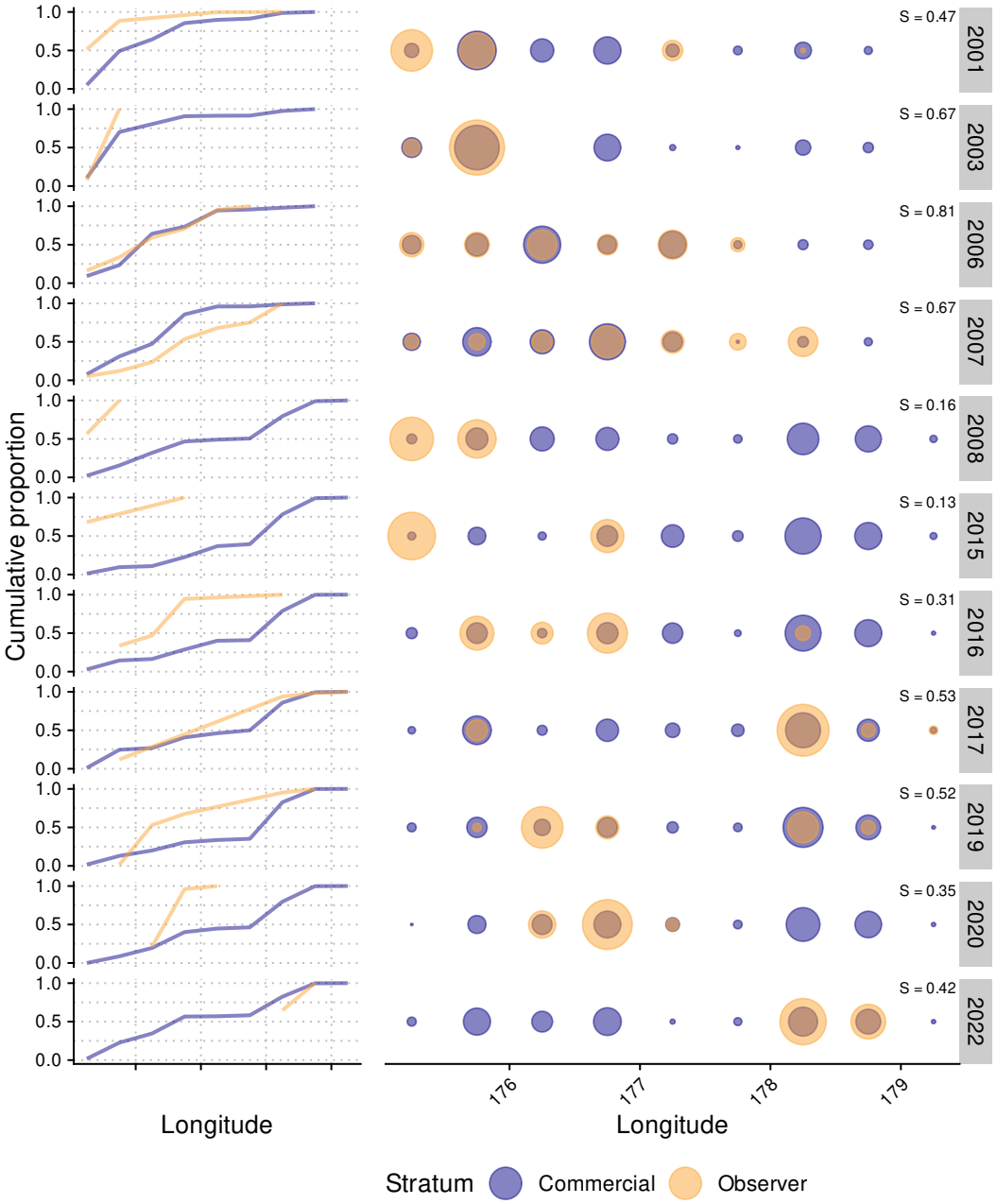


Figure 840: **Longitudinal representativeness of observer sampling coverage of Line catch in LIN 2, from events where the ling catch exceeded the 40kg threshold, in 2001 to 2022. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

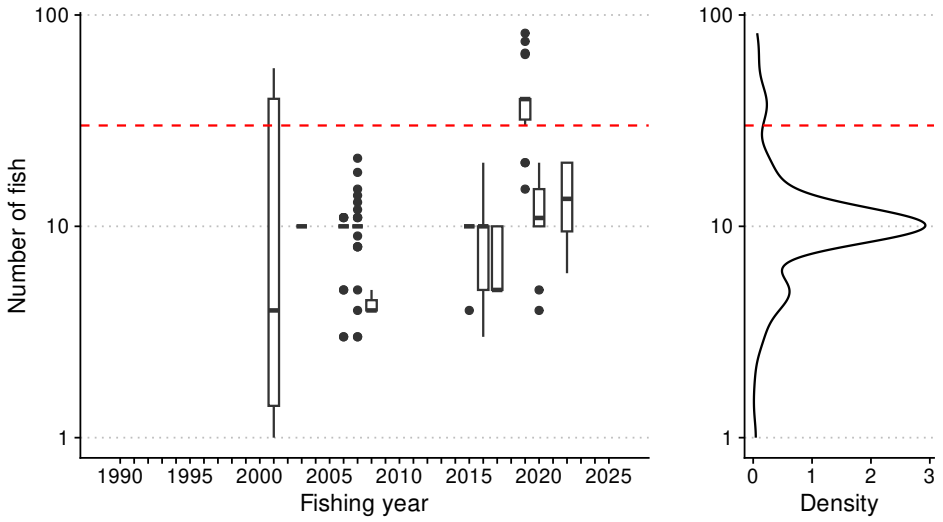


Figure 841: Length-frequency sample sizes for observed fishing events in LIN 2 where ling were sampled. The red dashed line indicates a sample size of 30 fish.

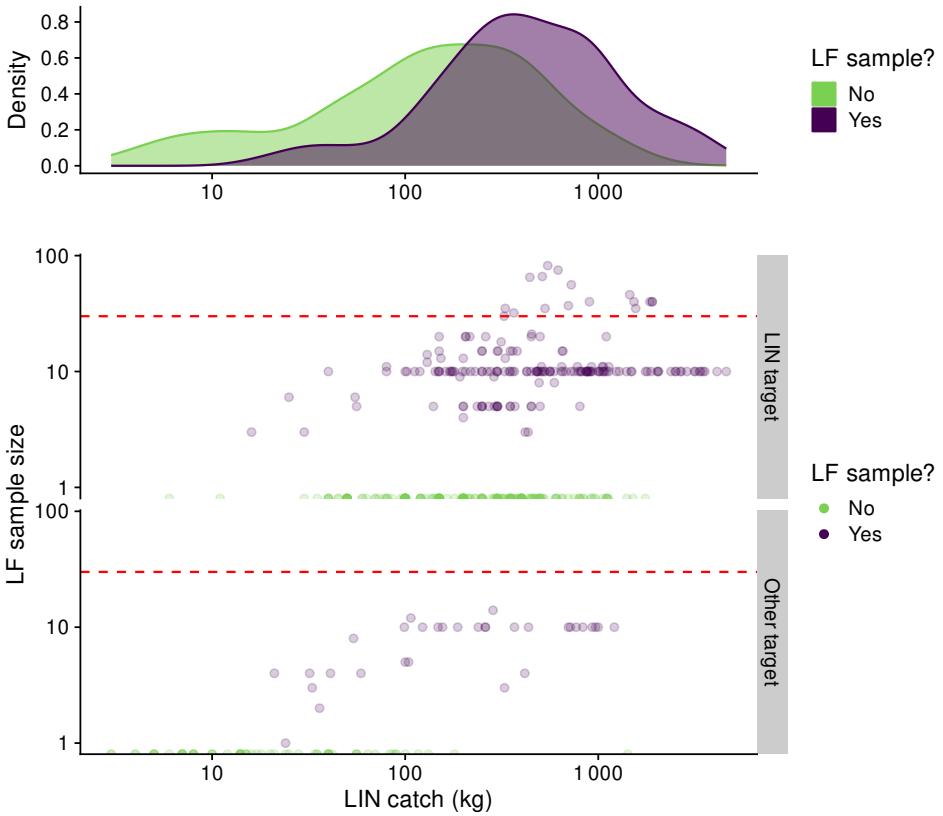


Figure 842: Length-frequency sample sizes (number of fish sampled) for observed fishing events in LIN 2 in relation to the total ling catch from an event, separately for ling target events and other target species. The red dashed line indicates a sample size of 30 fish.

2.13.3.2 Catch quantification

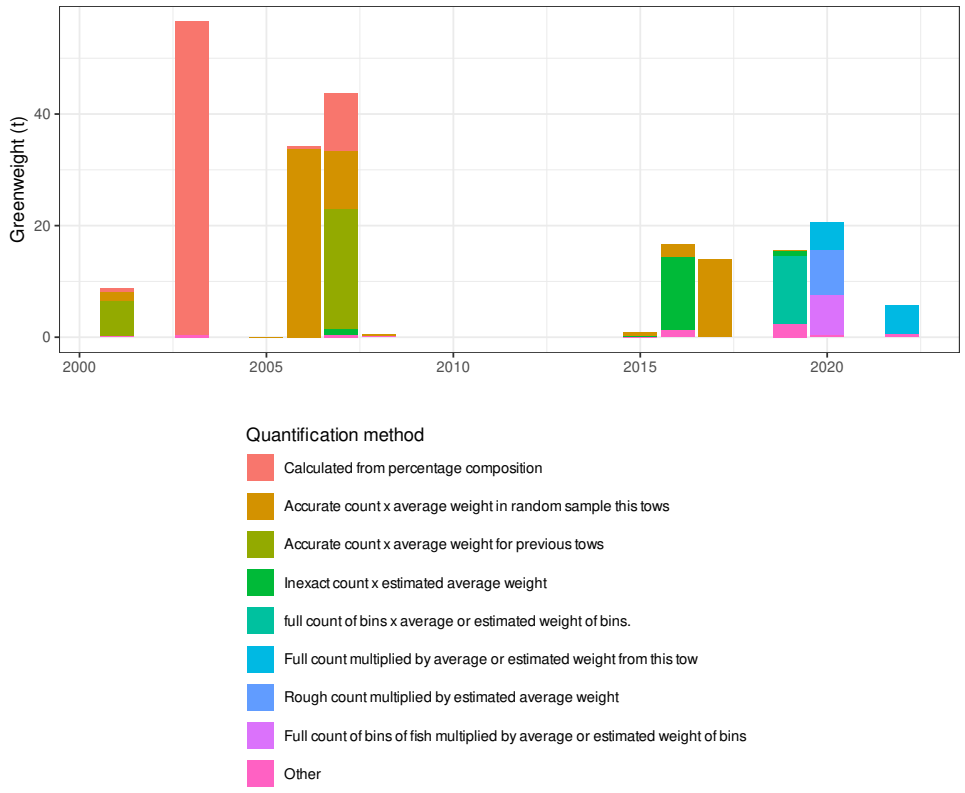


Figure 843: Methods used by observers to quantify the catch of ling in the LIN 2 Line fishery. The legend lists the methods used in descending order of total catch.

2.13.4 LIN 2: Trawl fishery

2.13.4.1 Length-frequency samples

Table 70: Length-frequency samples of ling from the LIN 2 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of ling exceeded a potential sampling threshold of 40 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	1 038	0	0	0.00
1991	1 544	7	72	0.45
1992	1 254	6	412	0.48
1993	1 117	10	211	0.90
1994	1 451	31	727	2.14
1995	1 344	33	208	2.46
1996	1 630	12	409	0.74
1997	1 754	1	3	0.06
1998	1 469	4	85	0.27
1999	1 621	104	1 813	6.42
2000	1 610	42	221	2.61
2001	1 761	31	444	1.76
2002	1 948	36	432	1.85
2003	1 401	7	48	0.50
2004	886	0	0	0.00
2005	572	4	12	0.70
2006	478	0	0	0.00
2007	568	4	16	0.70
2008	334	8	127	2.40
2009	288	4	12	1.39
2010	400	1	10	0.25
2011	371	0	0	0.00
2012	241	0	0	0.00
2013	308	0	0	0.00
2014	558	1	63	0.18
2015	432	1	3	0.23
2016	327	0	0	0.00
2017	524	5	86	0.95
2018	602	3	8	0.50
2019	408	0	0	0.00
2020	197	1	22	0.51
2021	413	0	0	0.00
2022	288	0	0	0.00
2023	161	1	6	0.62
2024	140	0	0	0.00
2025	191	0	0	0.00

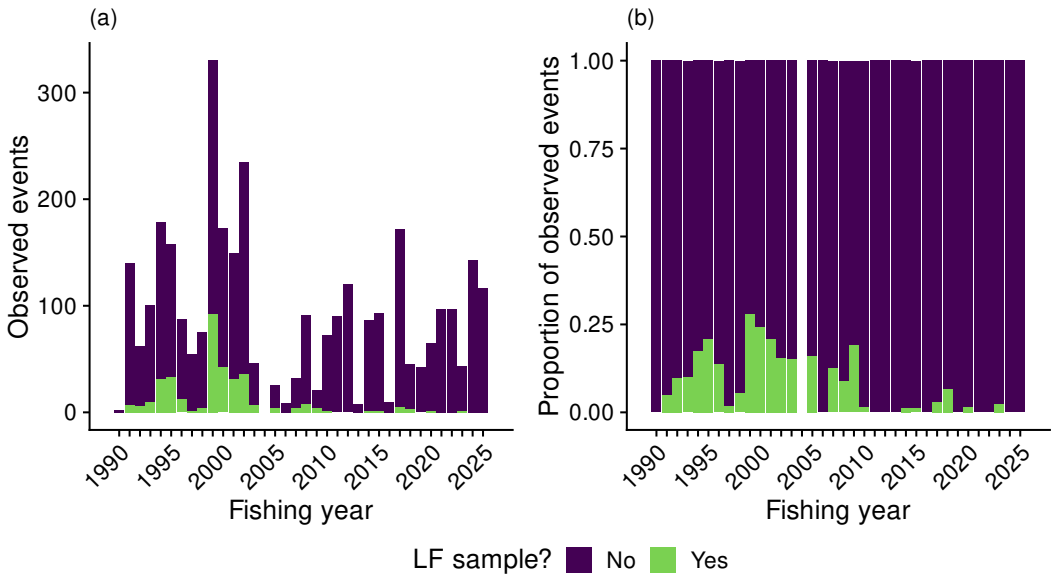


Figure 844: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in LIN 2 where the ling catch exceeded the 40 kg threshold, with and without length-frequency sampling.**

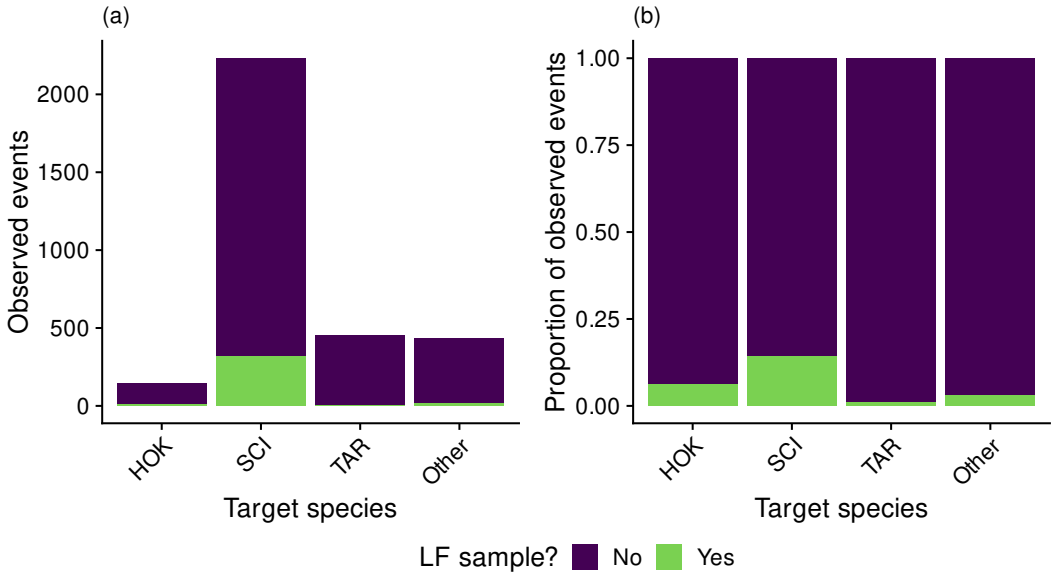


Figure 845: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in LIN 2 where the ling catch exceeded the 40 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

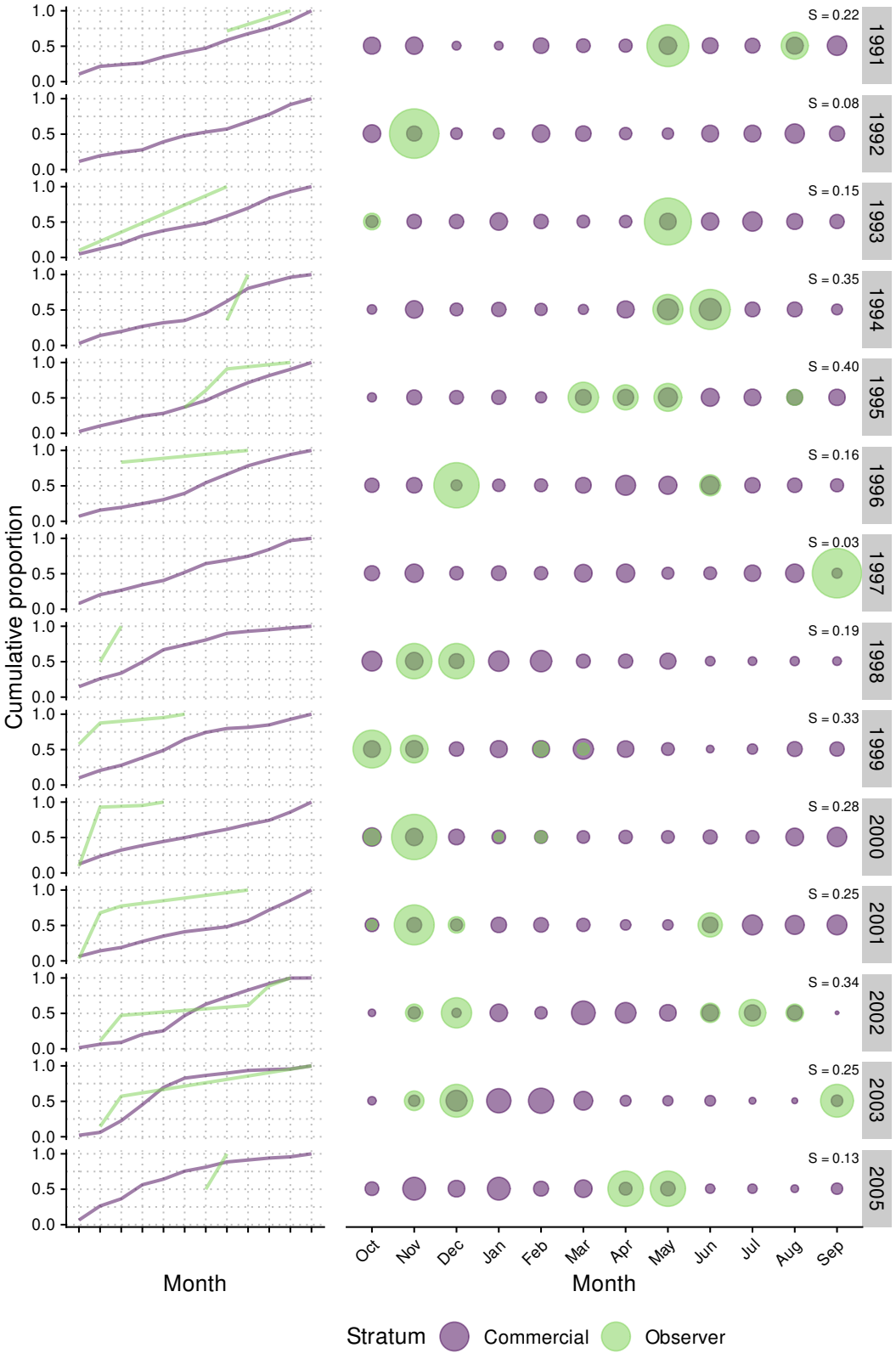


Figure 846: Monthly representativeness of observer sampling coverage of Trawl fishing events in LIN 2, where the ling catch exceeded the 40kg threshold, in 1991 to 2005. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

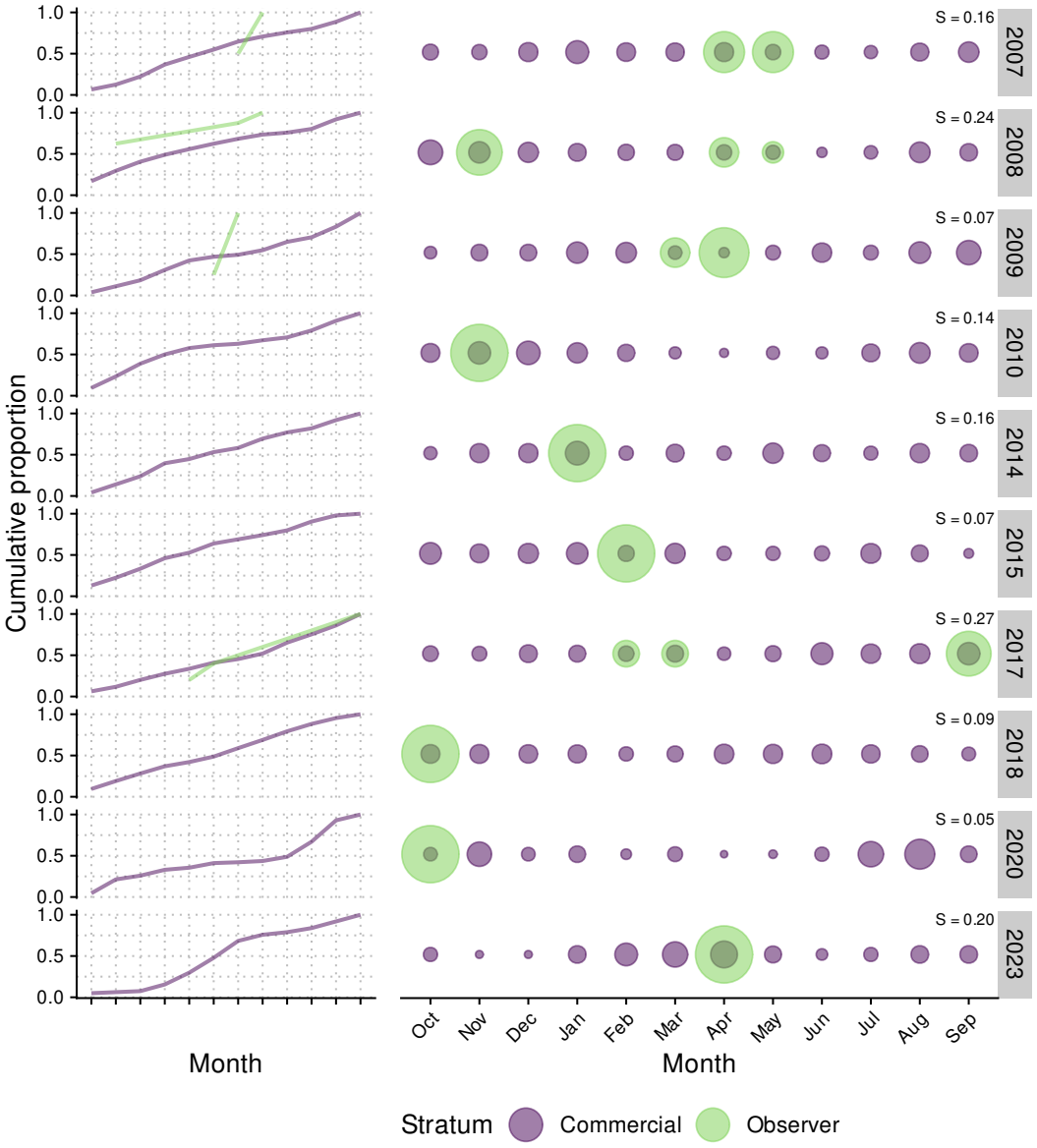


Figure 847: **Monthly representativeness of observer sampling coverage of Trawl fishing events in LIN 2, where the ling catch exceeded the 40kg threshold, in 2007 to 2023. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

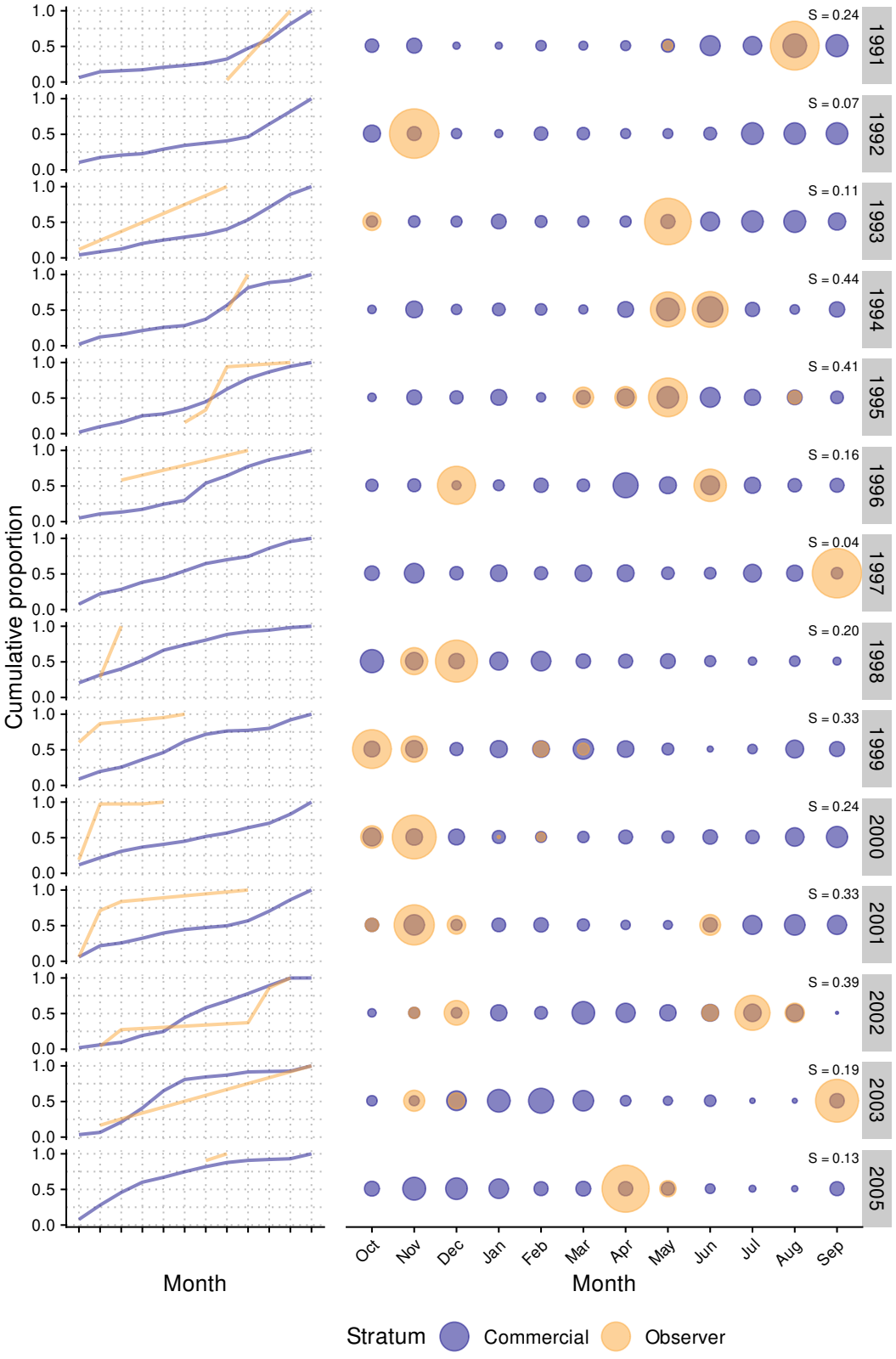


Figure 848: **Monthly representativeness of observer sampling coverage of Trawl catch in LIN 2, from events where the ling catch exceeded the 40kg threshold, in 1991 to 2005. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

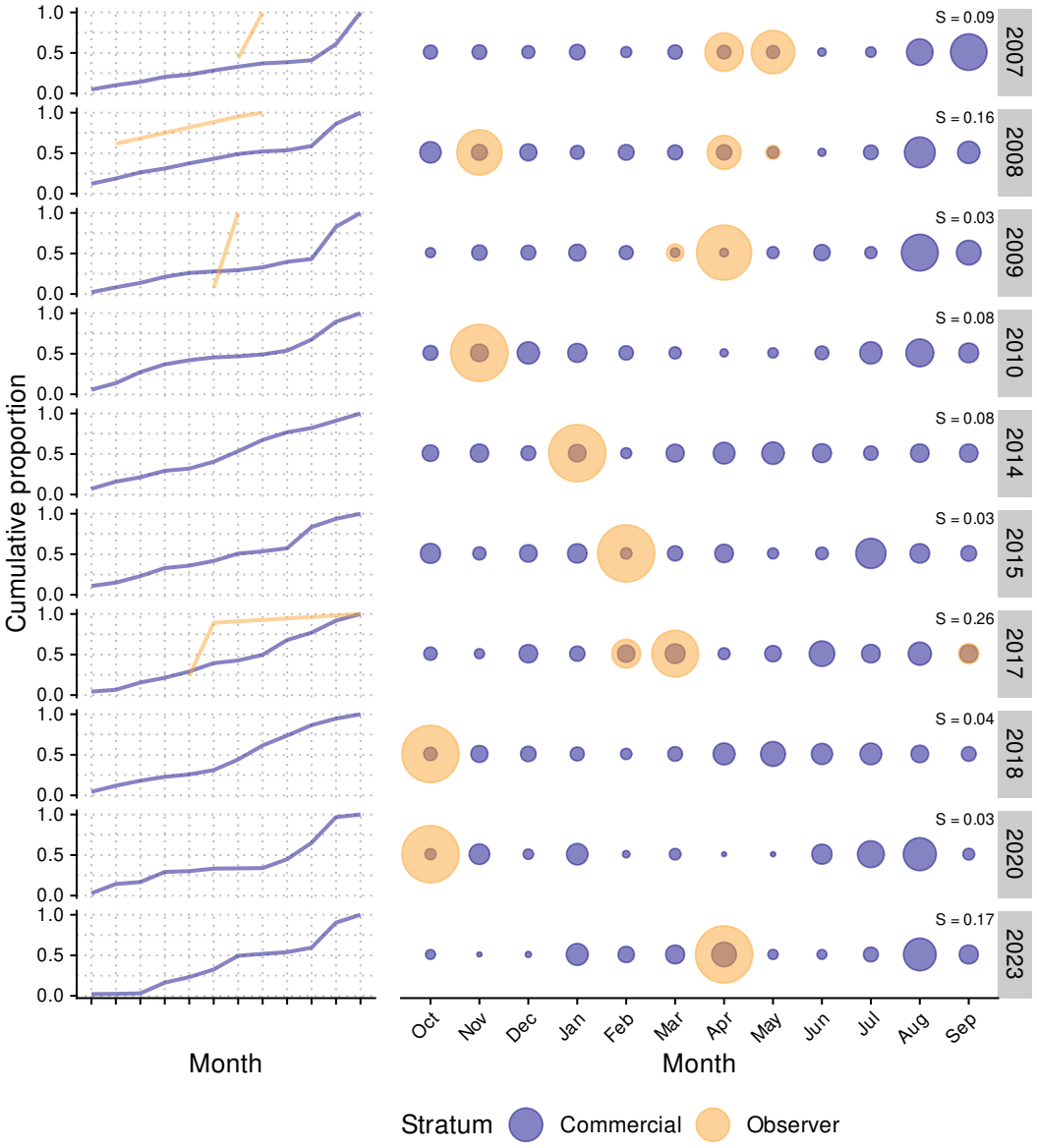


Figure 849: **Monthly representativeness of observer sampling coverage of Trawl catch in LIN 2, from events where the ling catch exceeded the 40kg threshold, in 2007 to 2023. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

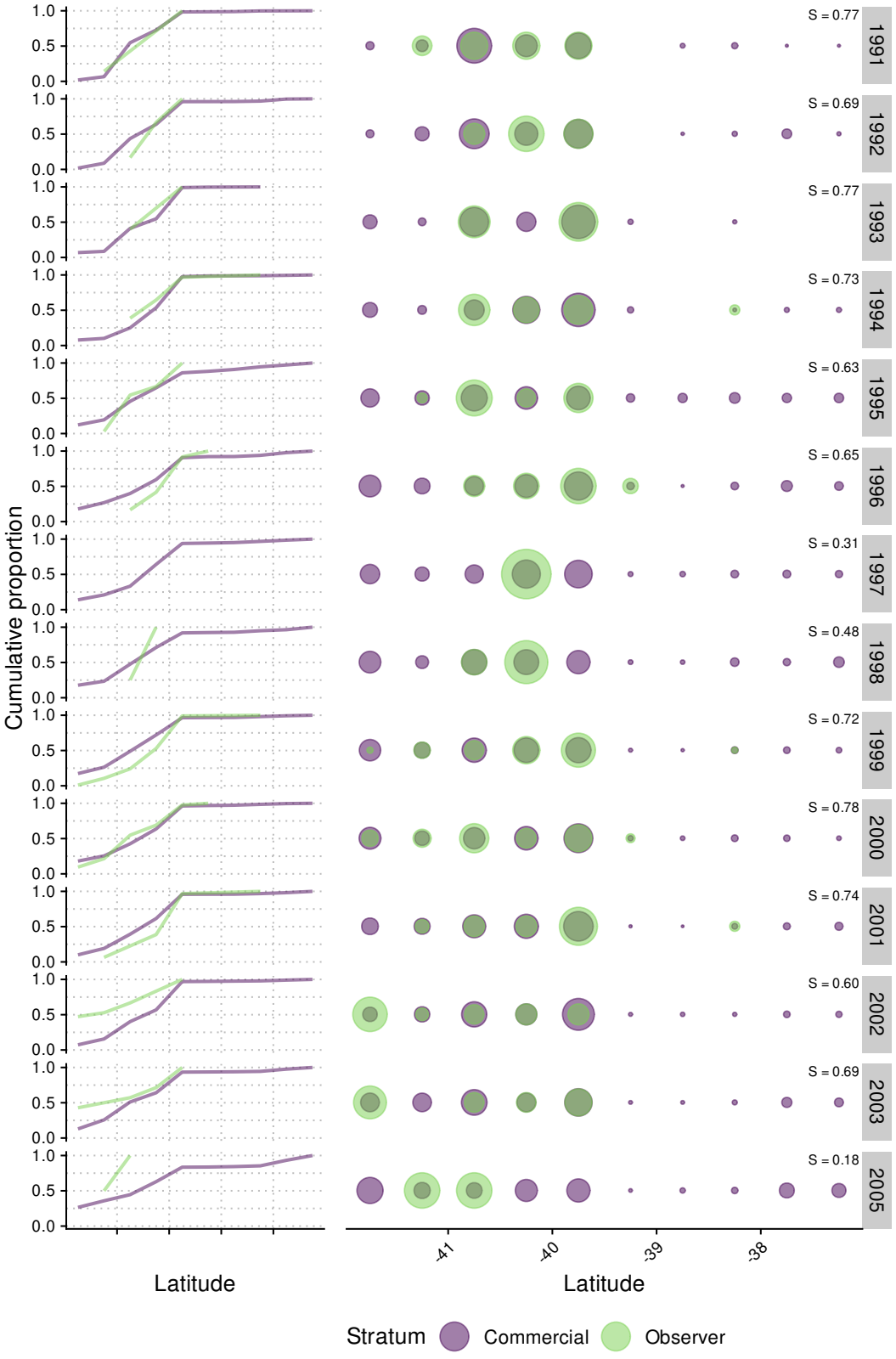


Figure 850: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in LIN 2, where the ling catch exceeded the 40kg threshold, in 1991 to 2005. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

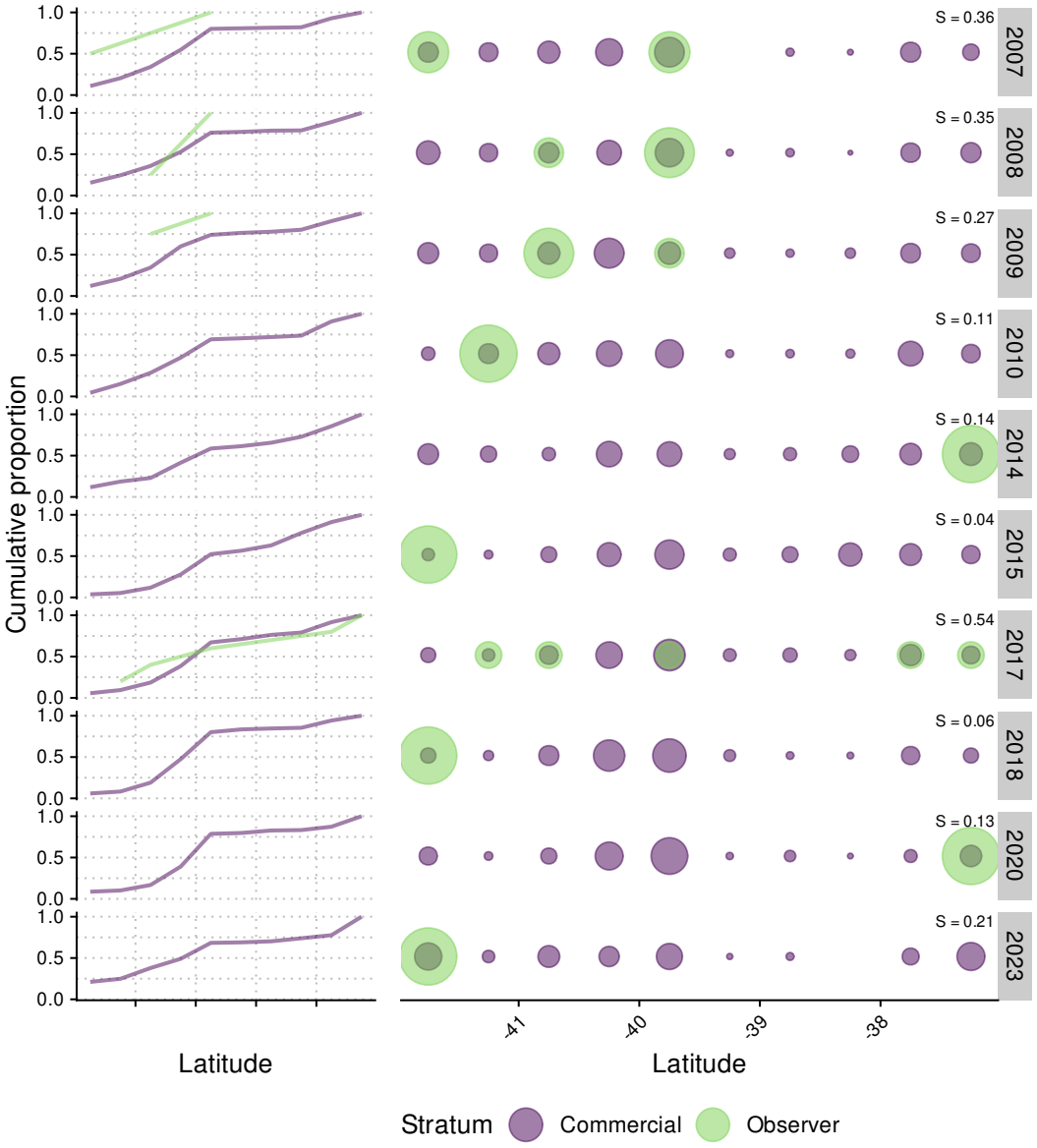


Figure 851: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in LIN 2, where the ling catch exceeded the 40kg threshold, in 2007 to 2023. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

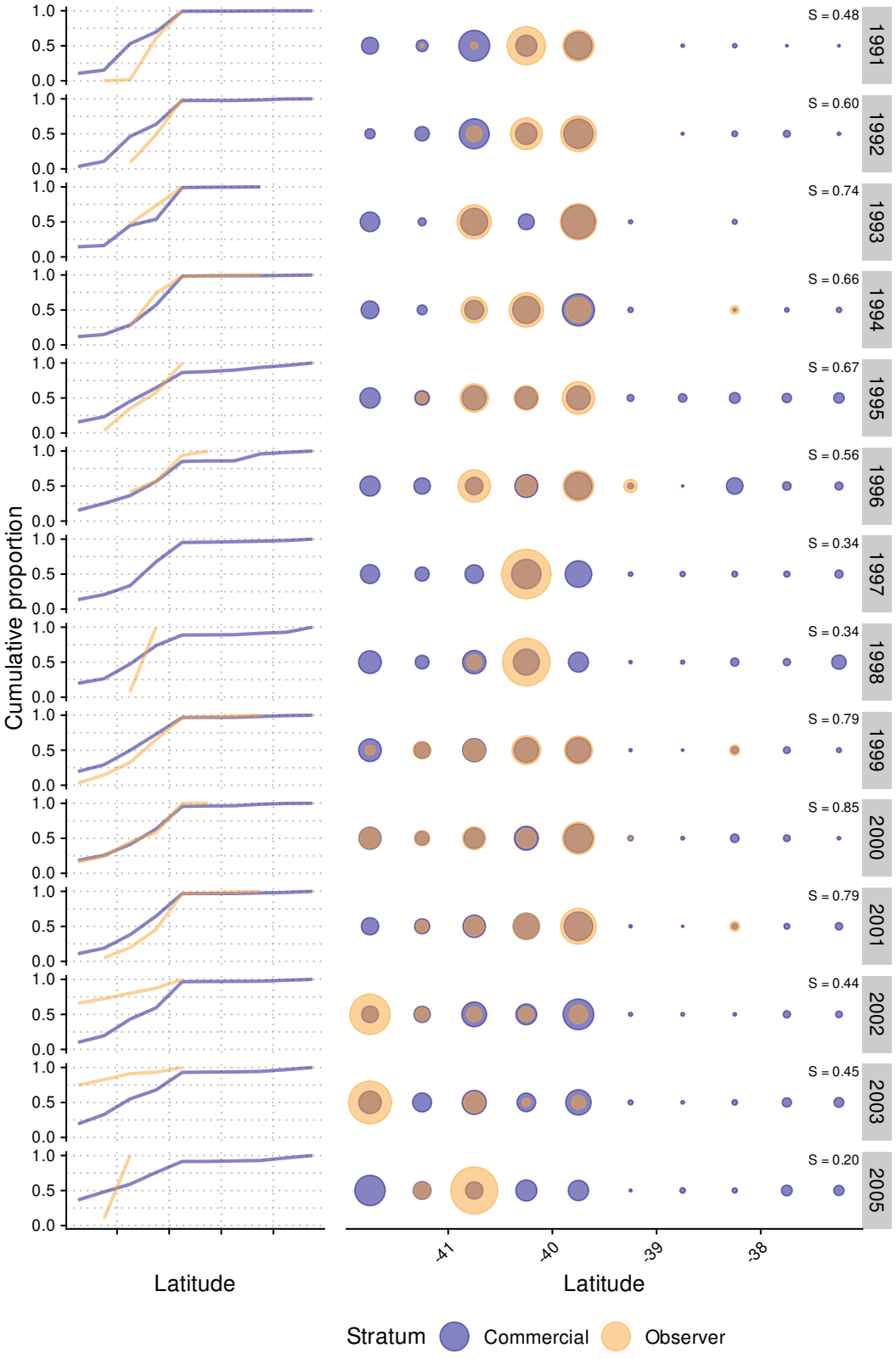


Figure 852: **Latitudinal representativeness of observer sampling coverage of Trawl catch in LIN 2, from events where the ling catch exceeded the 40kg threshold, in 1991 to 2005. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

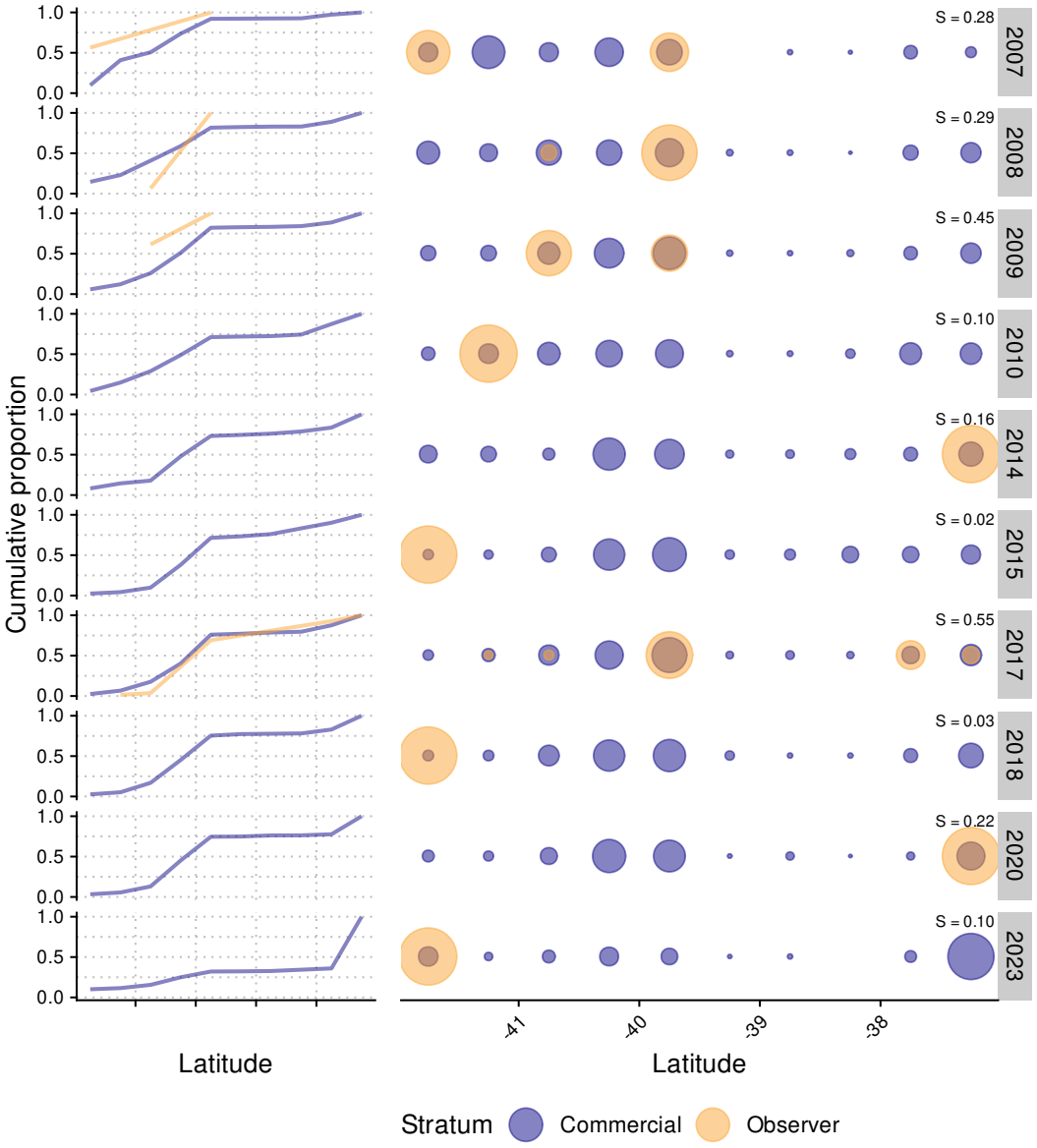


Figure 853: **Latitudinal representativeness of observer sampling coverage of Trawl catch in LIN 2, from events where the ling catch exceeded the 40kg threshold, in 2007 to 2023. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

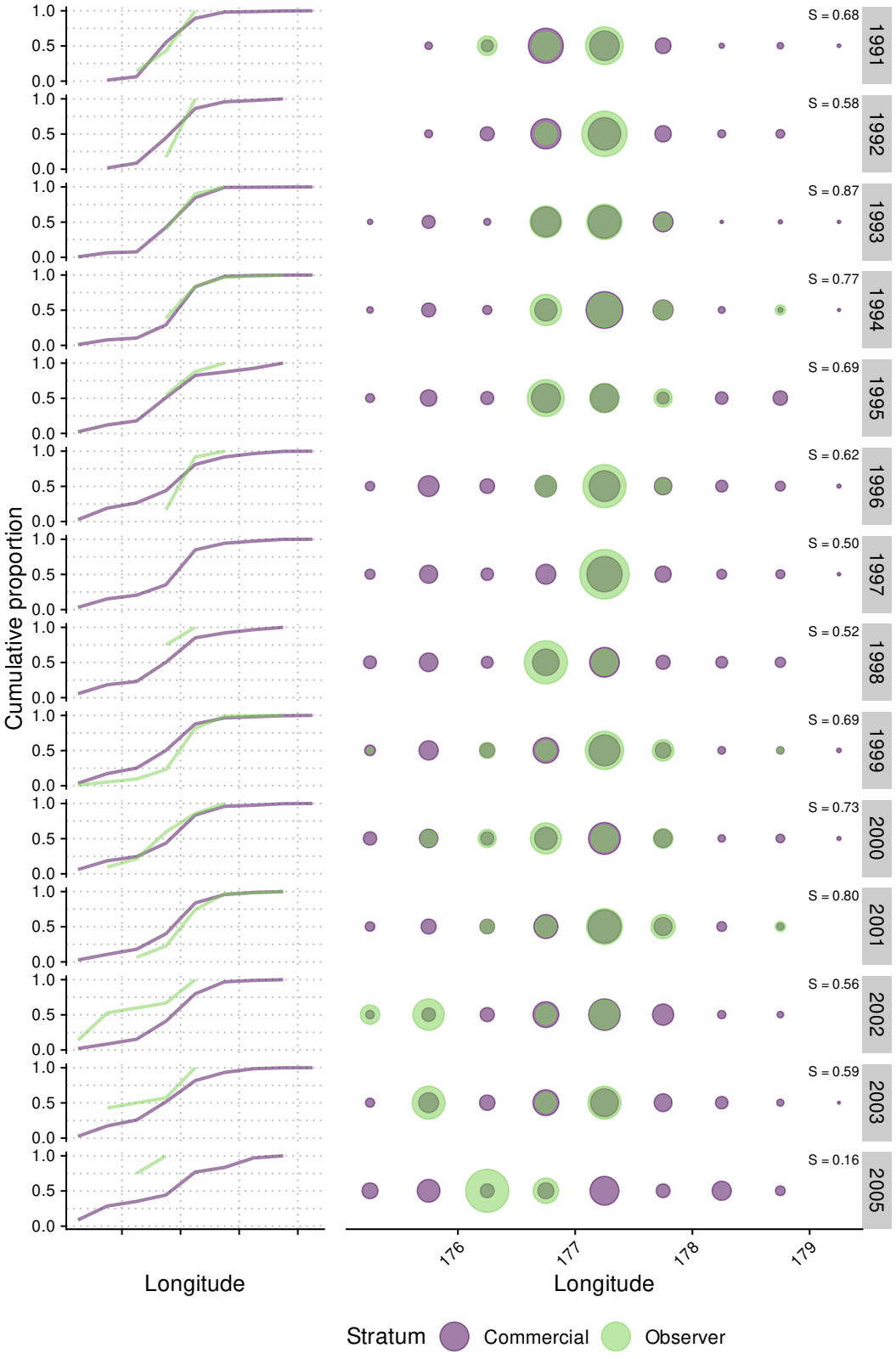


Figure 854: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in LIN 2, where the ling catch exceeded the 40kg threshold, in 1991 to 2005. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

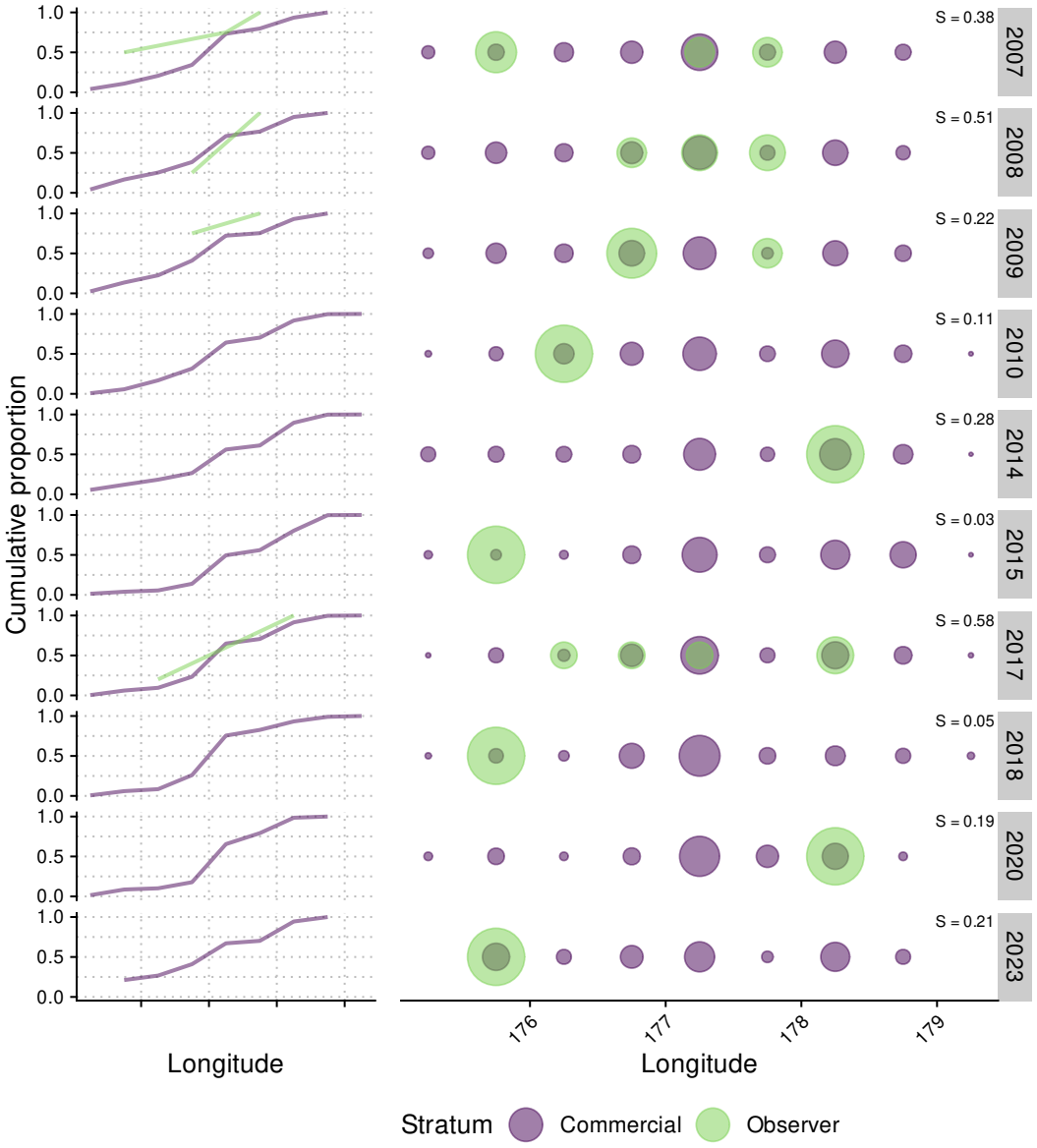


Figure 855: **Longitudinal representativeness of observer sampling coverage of Trawl fishing events in LIN 2, where the ling catch exceeded the 40kg threshold, in 2007 to 2023. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

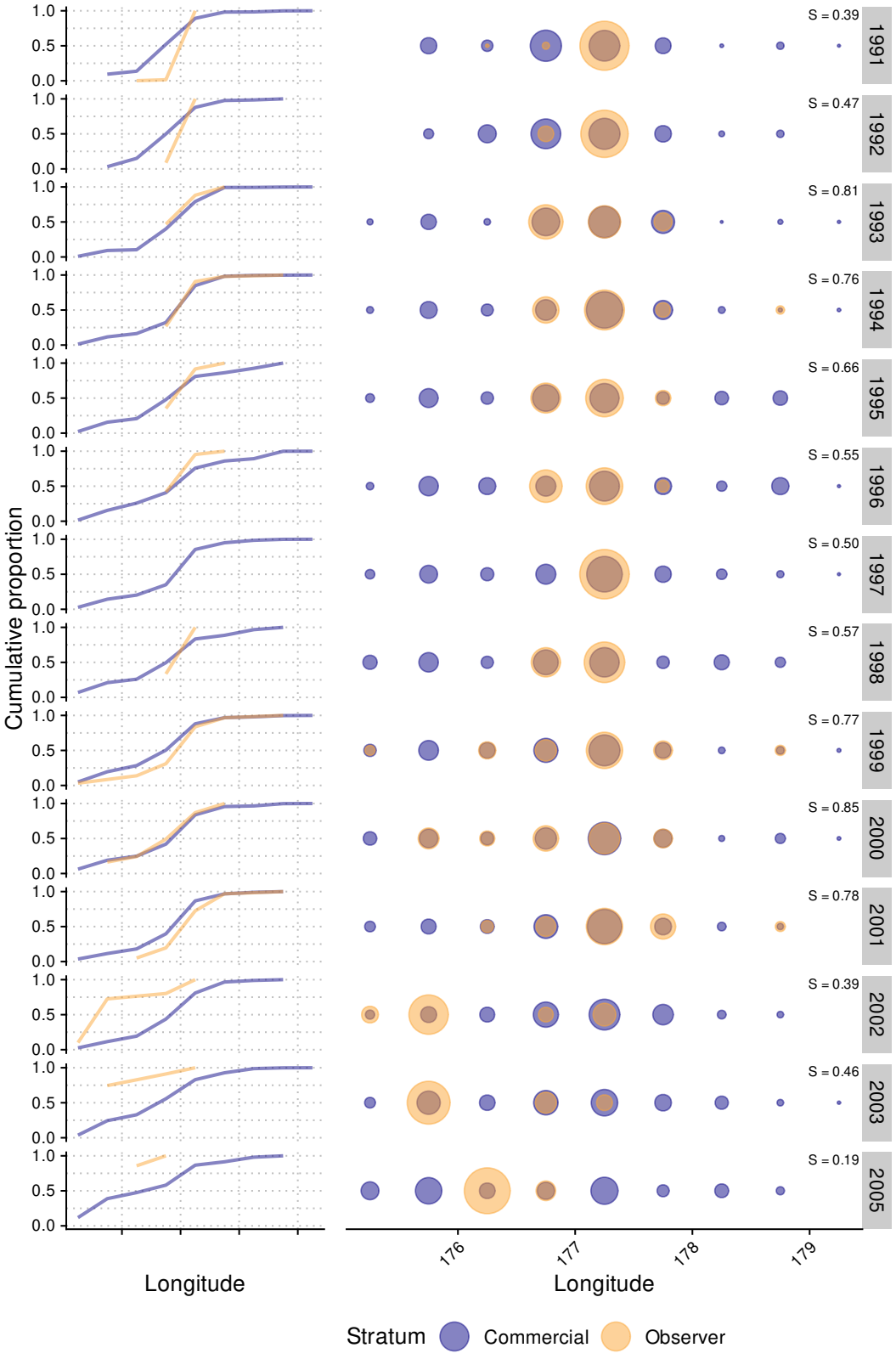


Figure 856: **Longitudinal representativeness of observer sampling coverage of Trawl catch in LIN 2, from events where the ling catch exceeded the 40kg threshold, in 1991 to 2005. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

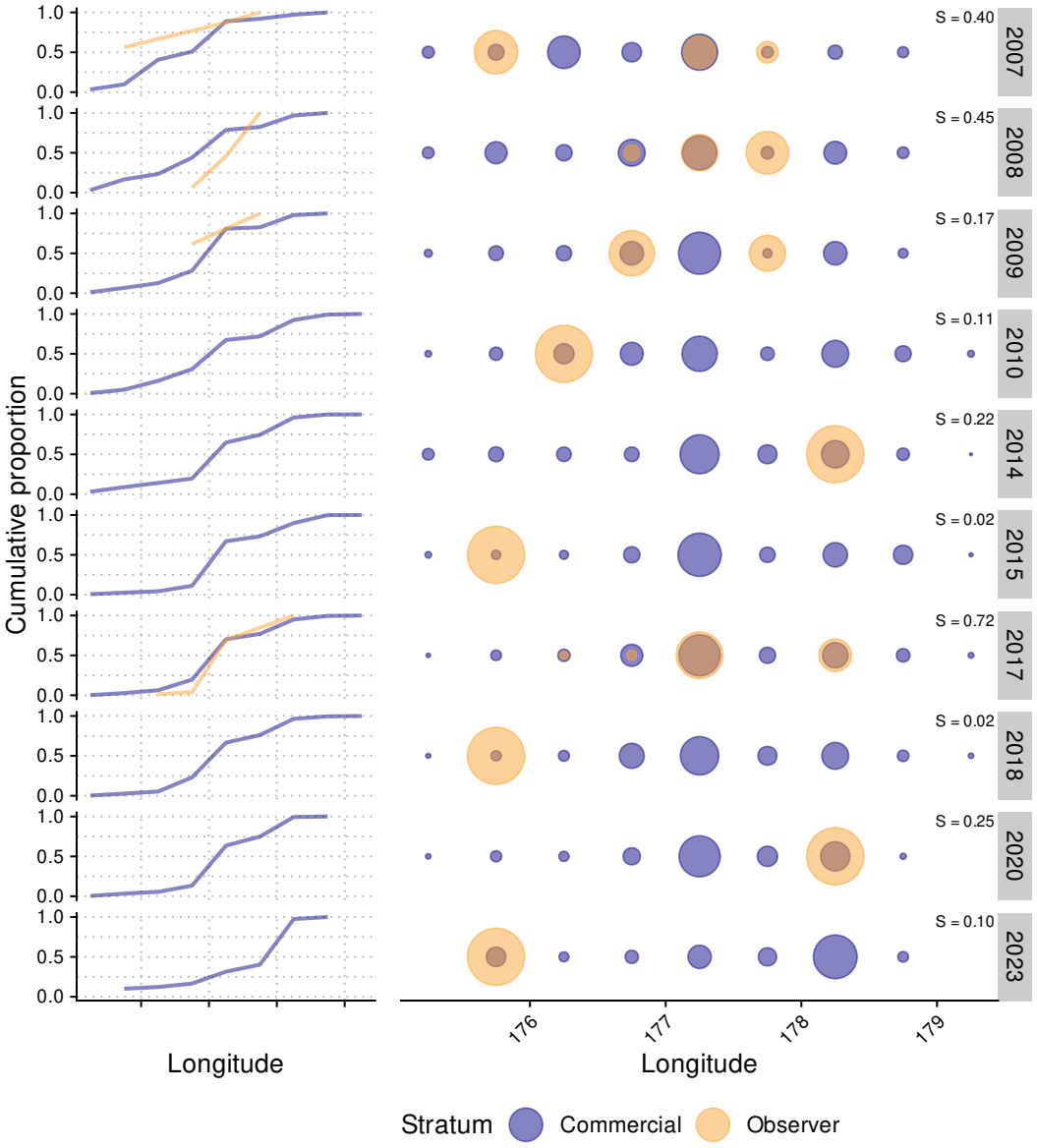


Figure 857: Longitudinal representativeness of observer sampling coverage of Trawl catch in LIN 2, from events where the ling catch exceeded the 40kg threshold, in 2007 to 2023. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

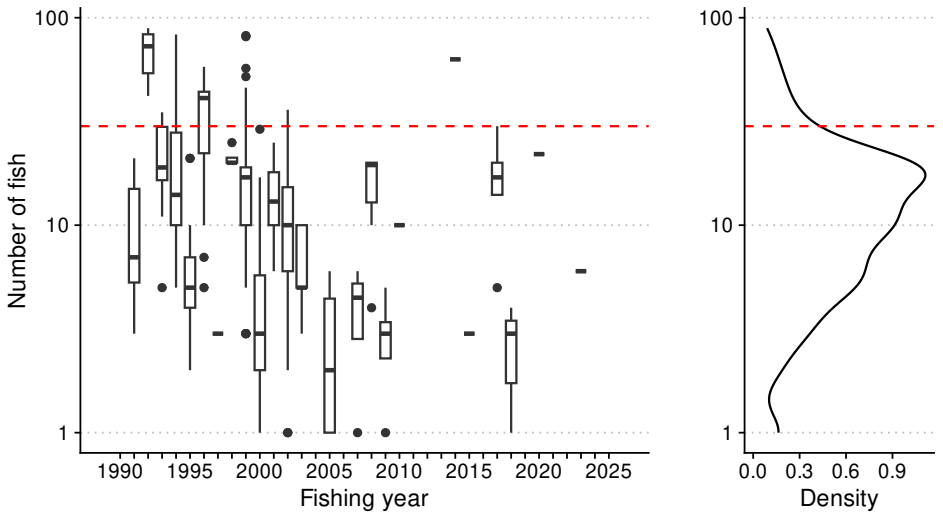


Figure 858: **Length-frequency sample sizes for observed fishing events in LIN 2 where ling were sampled. The red dashed line indicates a sample size of 30 fish.**

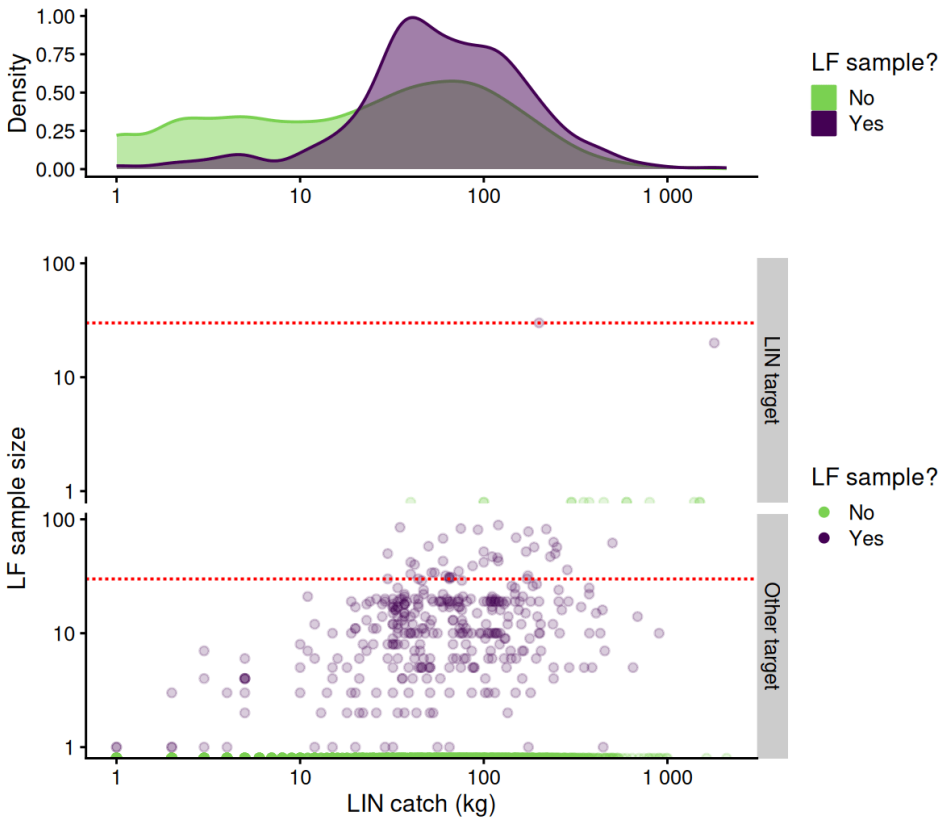


Figure 859: **Length-frequency sample sizes (number of fish sampled) for observed fishing events in LIN 2 in relation to the total ling catch from an event, separately for ling target events and other target species. The red dashed line indicates a sample size of 30 fish.**

2.13.4.2 Otolith samples

Table 71: Otolith samples of ling from the LIN 2 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of ling exceeded a potential sampling threshold of 40 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	1 038	0	0	0.00
1991	1 544	0	0	0.00
1992	1 254	0	0	0.00
1993	1 117	0	0	0.00
1994	1 451	0	0	0.00
1995	1 344	0	0	0.00
1996	1 630	0	0	0.00
1997	1 754	0	0	0.00
1998	1 469	0	0	0.00
1999	1 621	0	0	0.00
2000	1 610	0	0	0.00
2001	1 761	0	0	0.00
2002	1 948	0	0	0.00
2003	1 401	0	0	0.00
2004	886	0	0	0.00
2005	572	0	0	0.00
2006	478	0	0	0.00
2007	568	0	0	0.00
2008	334	0	0	0.00
2009	288	0	0	0.00
2010	400	0	0	0.00
2011	371	0	0	0.00
2012	241	0	0	0.00
2013	308	0	0	0.00
2014	558	0	0	0.00
2015	432	0	0	0.00
2016	327	0	0	0.00
2017	524	2	10	0.38
2018	602	2	5	0.33
2019	408	0	0	0.00
2020	197	0	0	0.00
2021	413	0	0	0.00
2022	288	0	0	0.00
2023	161	1	3	0.62
2024	140	0	0	0.00
2025	191	0	0	0.00

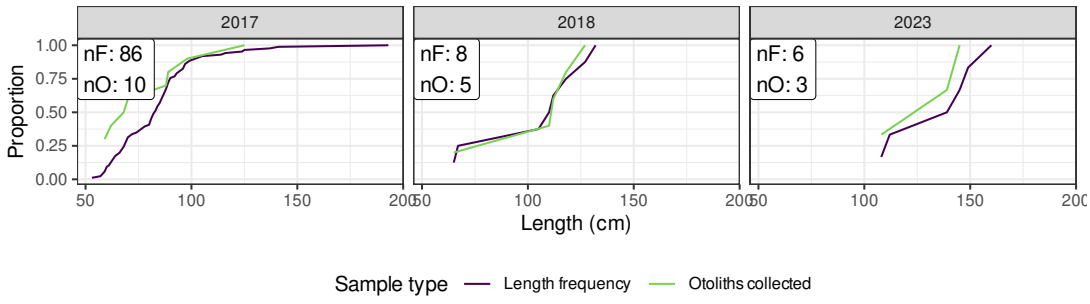


Figure 860: Cumulative distributions of the length of fish in the length frequency and otolith samples of ling in the LIN 2 Trawl fishery for the 2017 to 2023 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

2.13.4.3 Catch quantification

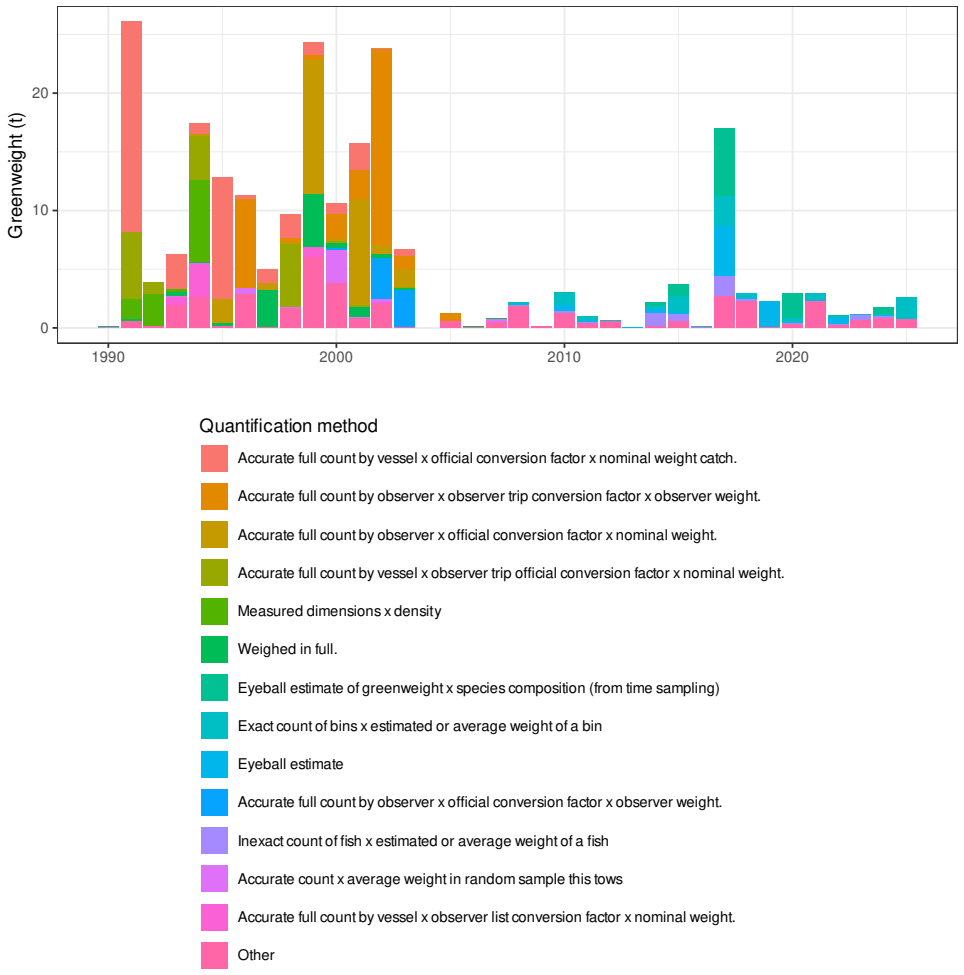


Figure 861: Methods used by observers to quantify the catch of ling in the LIN 2 Trawl fishery. The legend lists the methods used in descending order of total catch.

2.13.5 LIN 3&4: Line fishery

2.13.5.1 Length-frequency samples

Table 72: Length-frequency samples of ling from the LIN 3&4 Line fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of ling exceeded a potential sampling threshold of 40 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	1 123	0	0	0.00
1991	13 591	0	0	0.00
1992	9 025	0	0	0.00
1993	6 598	26	486	0.39
1994	13 292	0	0	0.00
1995	16 443	85	2 356	0.52
1996	49 704	17	398	0.03
1997	101 999	89	2 686	0.09
1998	73 081	39	4 966	0.05
1999	79 213	68	2 000	0.09
2000	20 681	11	593	0.05
2001	7 133	7	199	0.10
2002	4 798	472	7 175	9.84
2003	40 193	603	7 019	1.50
2004	75 119	158	2 136	0.21
2005	17 710	109	1 089	0.62
2006	2 654	116	1 245	4.37
2007	3 369	49	482	1.45
2008	2 993	102	1 273	3.41
2009	2 724	151	1 540	5.54
2010	2 944	0	0	0.00
2011	2 690	49	712	1.82
2012	2 123	0	0	0.00
2013	2 504	50	970	2.00
2014	2 794	142	1 459	5.08
2015	2 272	77	778	3.39
2016	2 706	162	1 806	5.99
2017	2 278	166	1 705	7.29
2018	2 114	304	3 802	14.38
2019	2 113	76	858	3.60
2020	2 210	54	692	2.44
2021	1 267	110	1 197	8.68
2022	1 517	167	2 292	11.01
2023	1 036	65	921	6.27
2024	1 393	26	565	1.87
2025	789	141	11 831	17.87

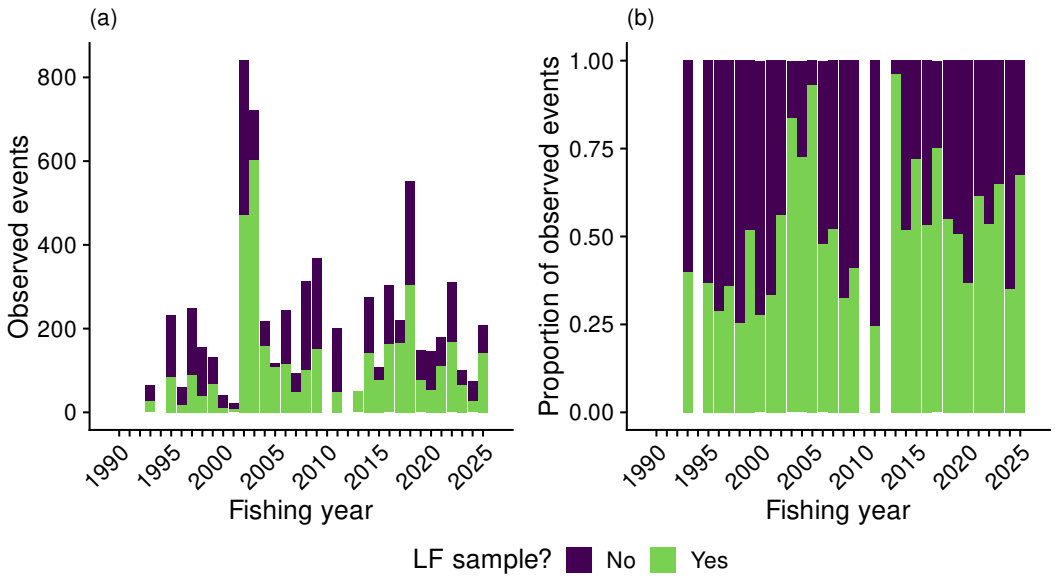


Figure 862: **(a) Observed Line fishing events, and (b) proportion of observed events, in LIN 3&4 where the ling catch exceeded the 40 kg threshold, with and without length-frequency sampling.**

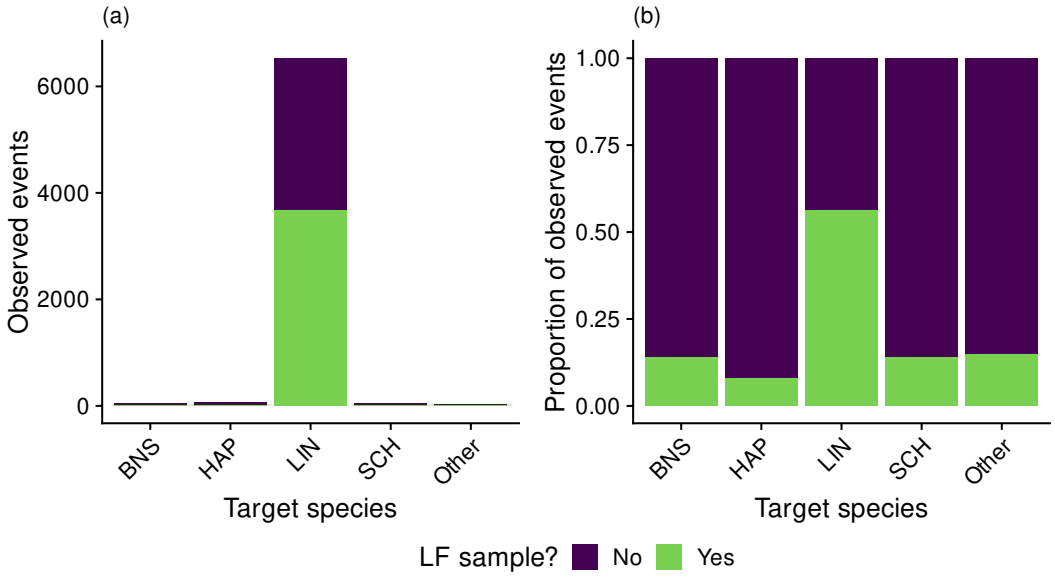


Figure 863: **(a) Observed Line fishing events, and (b) proportion of observed events, in LIN 3&4 where the ling catch exceeded the 40 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

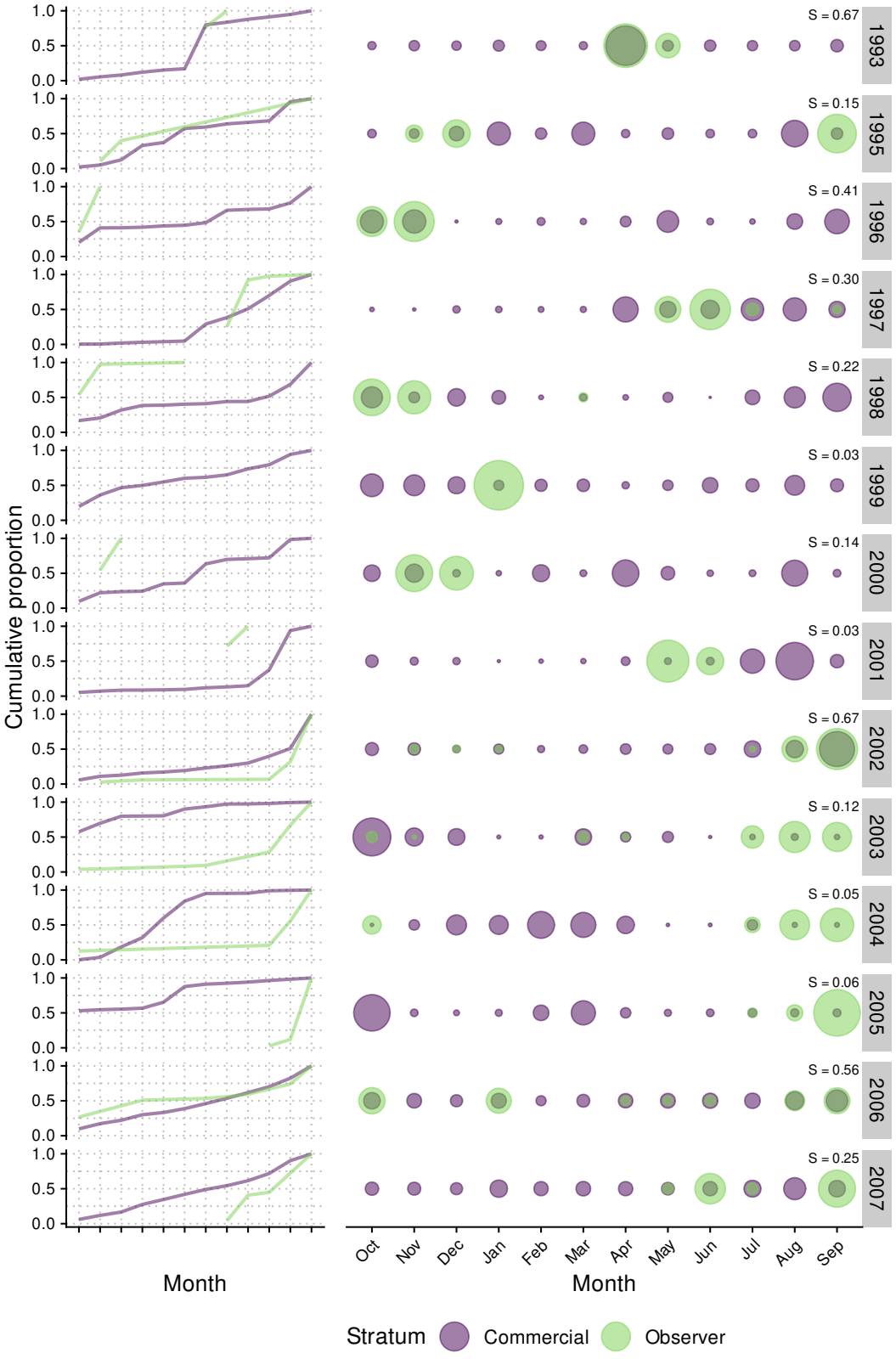


Figure 864: **Monthly representativeness of observer sampling coverage of Line fishing events in LIN 3&4, where the ling catch exceeded the 40kg threshold, in 1993 to 2007. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

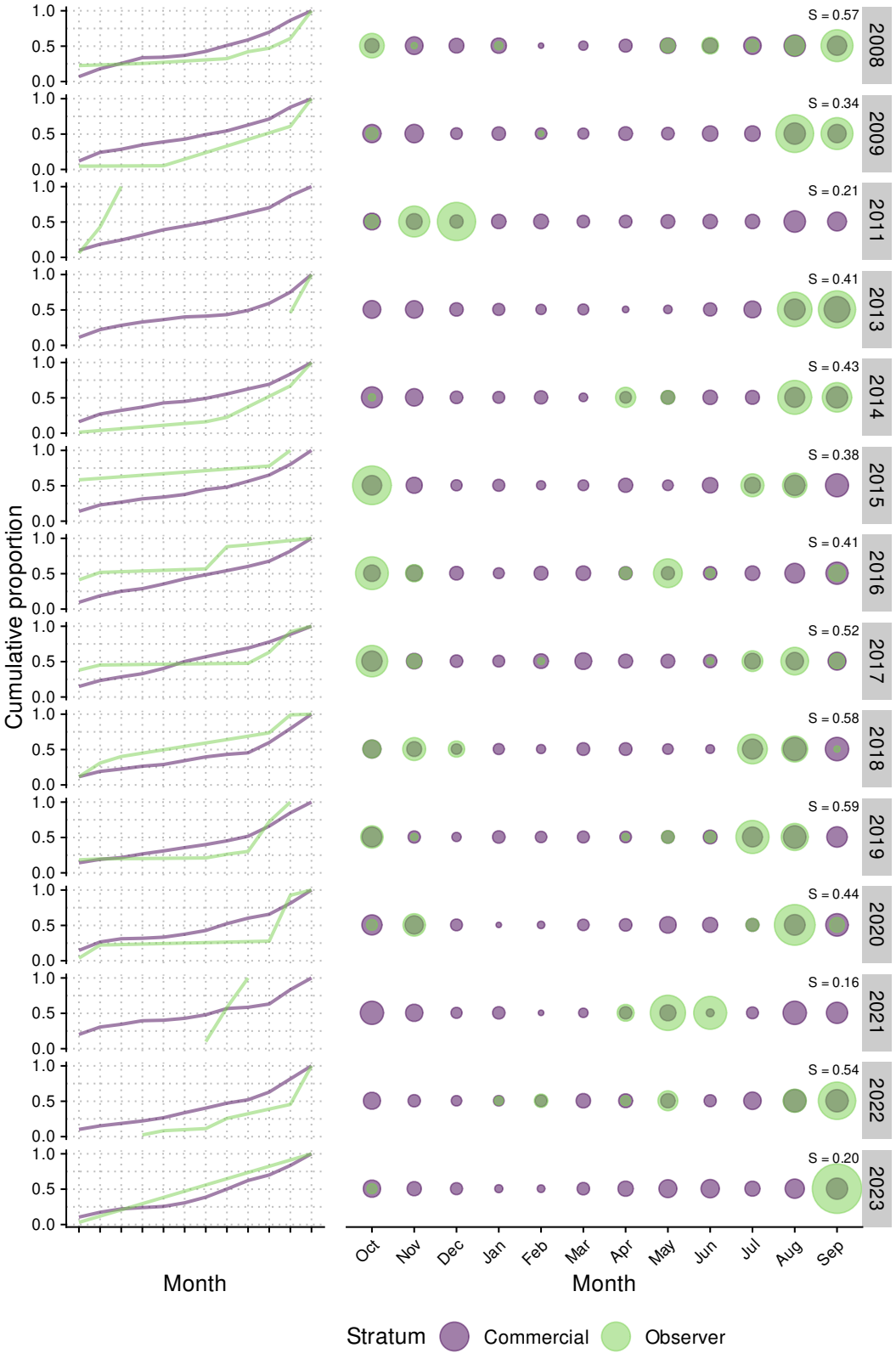


Figure 865: Monthly representativeness of observer sampling coverage of Line fishing events in LIN 3&4, where the ling catch exceeded the 40kg threshold, in 2008 to 2023. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

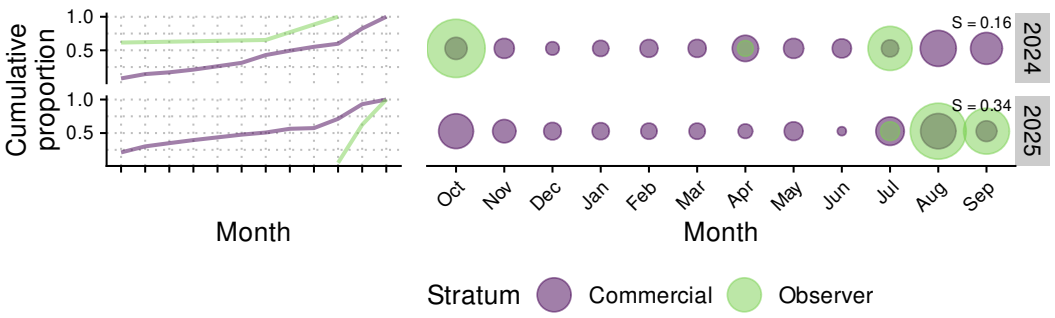


Figure 866: Monthly representativeness of observer sampling coverage of Line fishing events in LIN 3&4, where the ling catch exceeded the 40kg threshold, in 2024 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

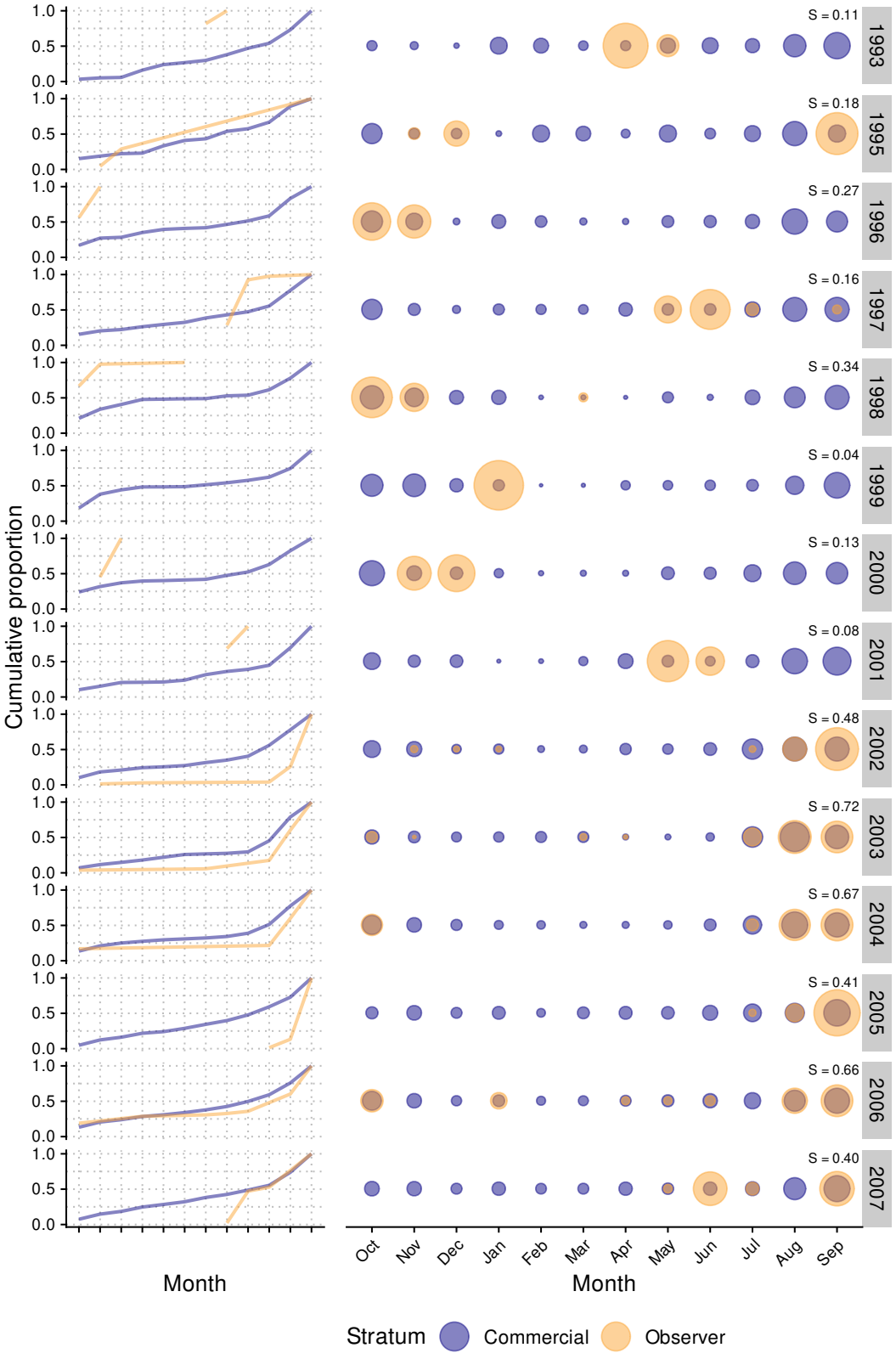


Figure 867: **Monthly representativeness of observer sampling coverage of Line catch in LIN 3&4, from events where the ling catch exceeded the 40kg threshold, in 1993 to 2007. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

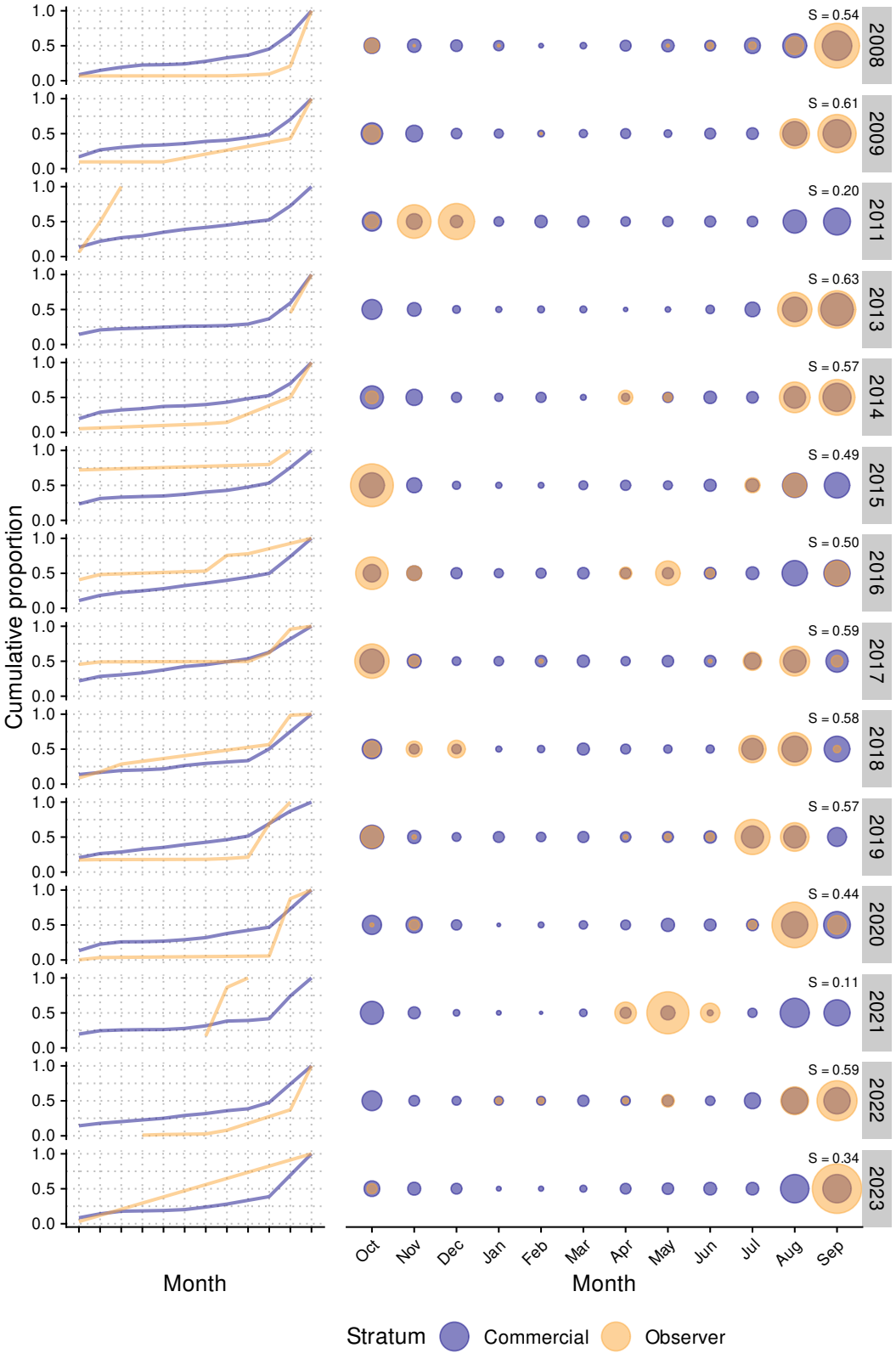


Figure 868: Monthly representativeness of observer sampling coverage of Line catch in LIN 3&4, from events where the ling catch exceeded the 40kg threshold, in 2008 to 2023. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

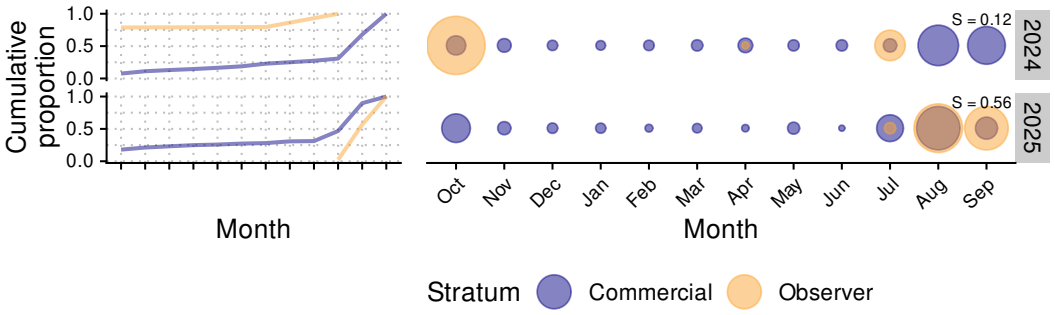


Figure 869: Monthly representativeness of observer sampling coverage of Line catch in LIN 3&4, from events where the ling catch exceeded the 40kg threshold, in 2024 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

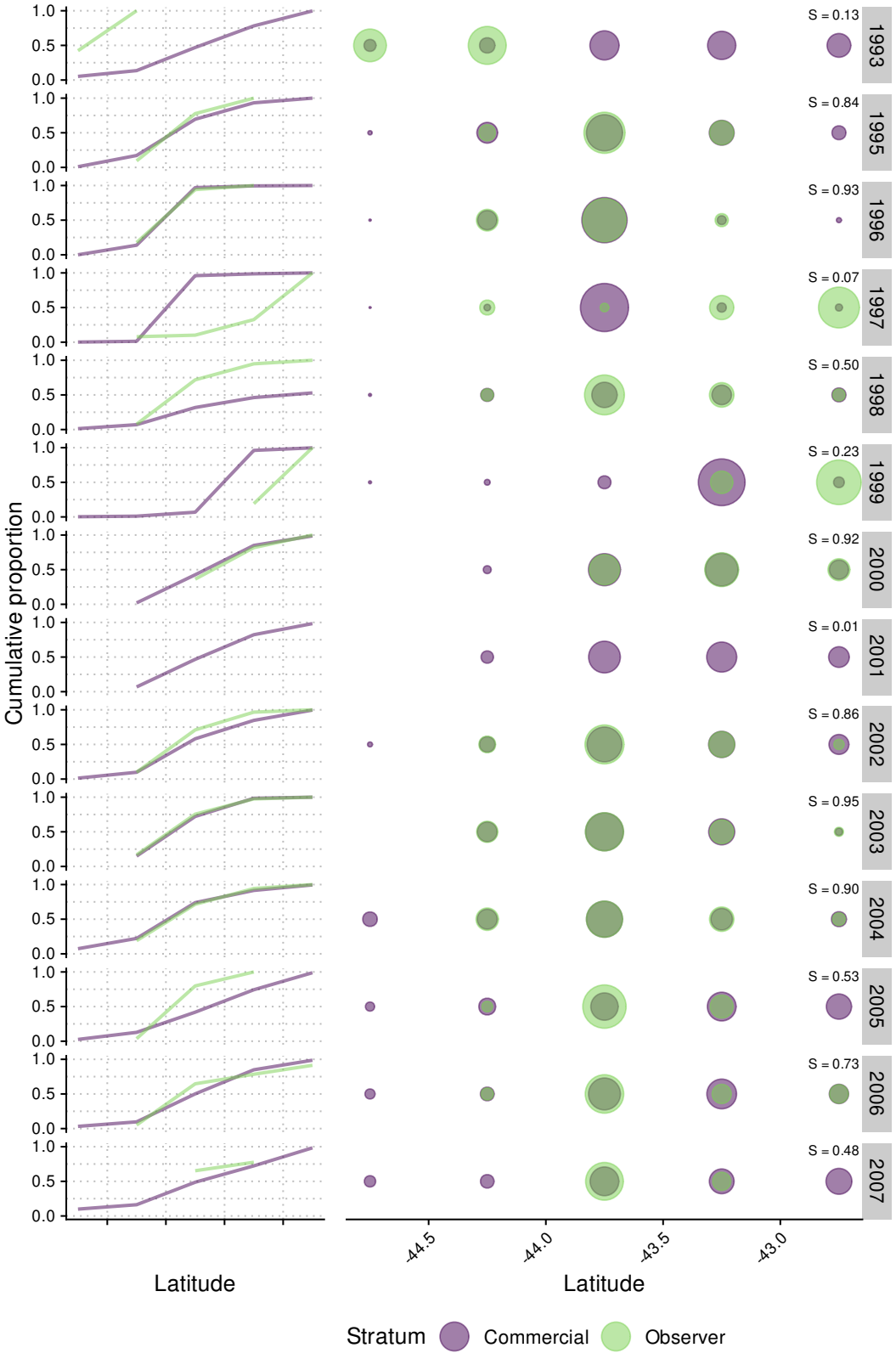


Figure 870: **Latitudinal representativeness of observer sampling coverage of Line fishing events in LIN 3&4, where the ling catch exceeded the 40kg threshold, in 1993 to 2007. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

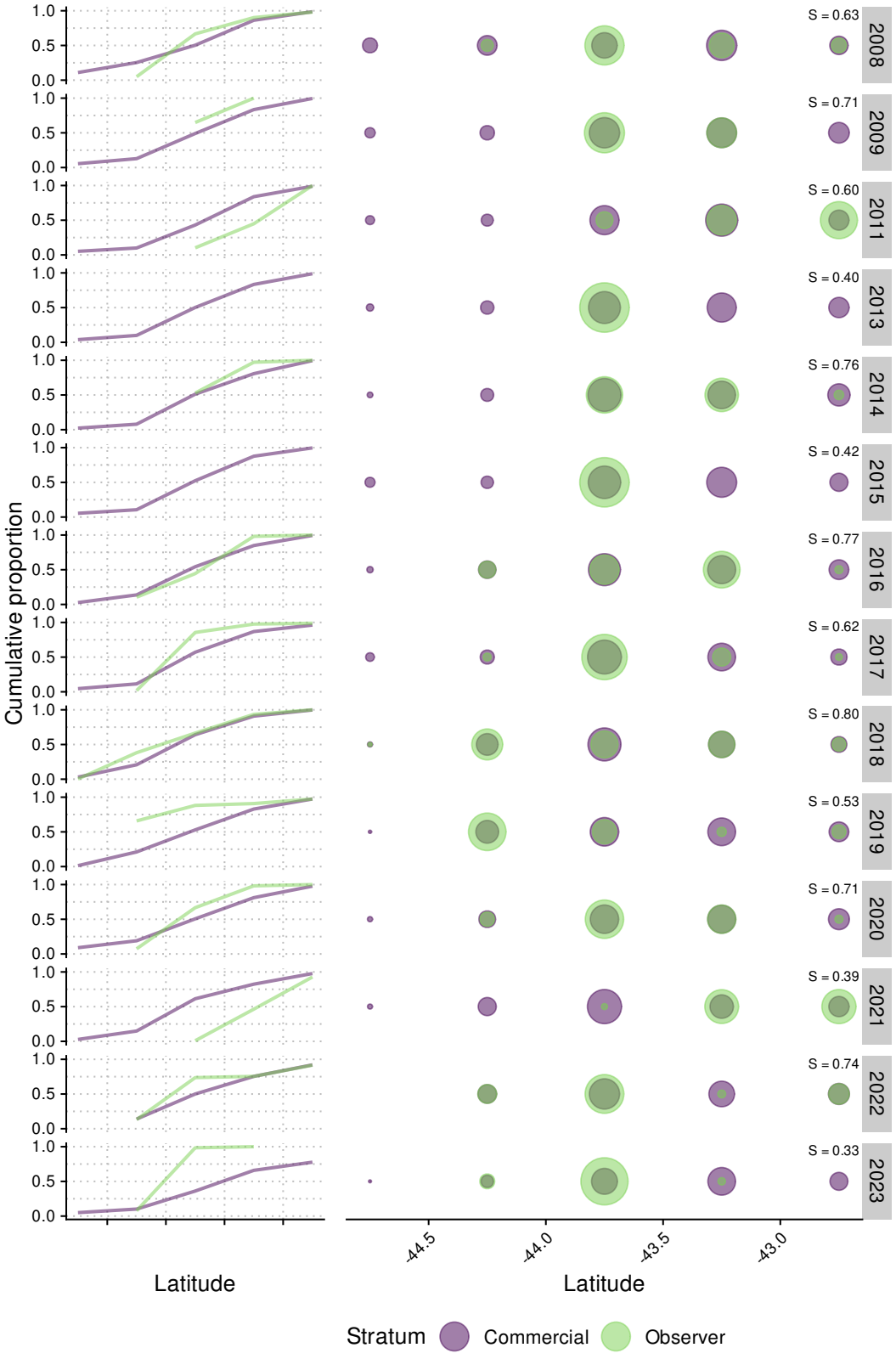


Figure 871: Latitudinal representativeness of observer sampling coverage of Line fishing events in LIN 3&4, where the ling catch exceeded the 40kg threshold, in 2008 to 2023. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

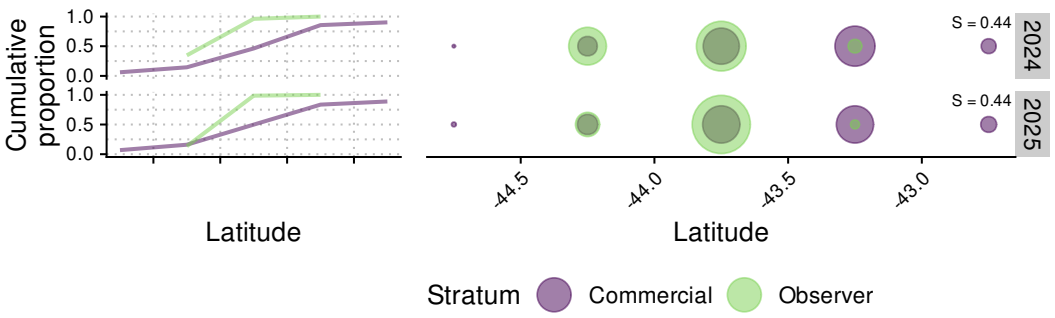


Figure 872: Latitudinal representativeness of observer sampling coverage of Line fishing events in LIN 3&4, where the ling catch exceeded the 40kg threshold, in 2024 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

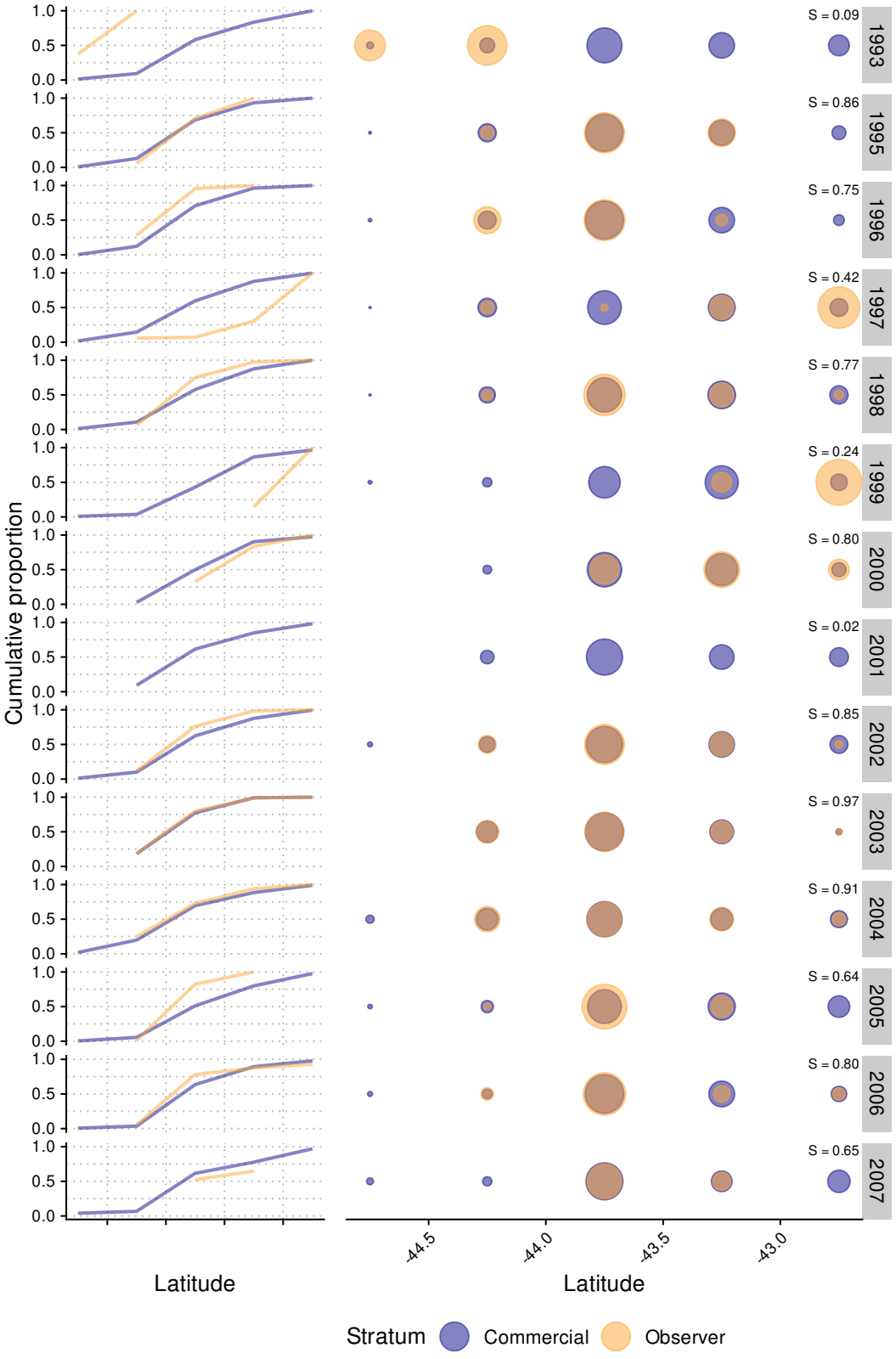


Figure 873: **Latitudinal representativeness of observer sampling coverage of Line catch in LIN 3&4, from events where the ling catch exceeded the 40kg threshold, in 1993 to 2007. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

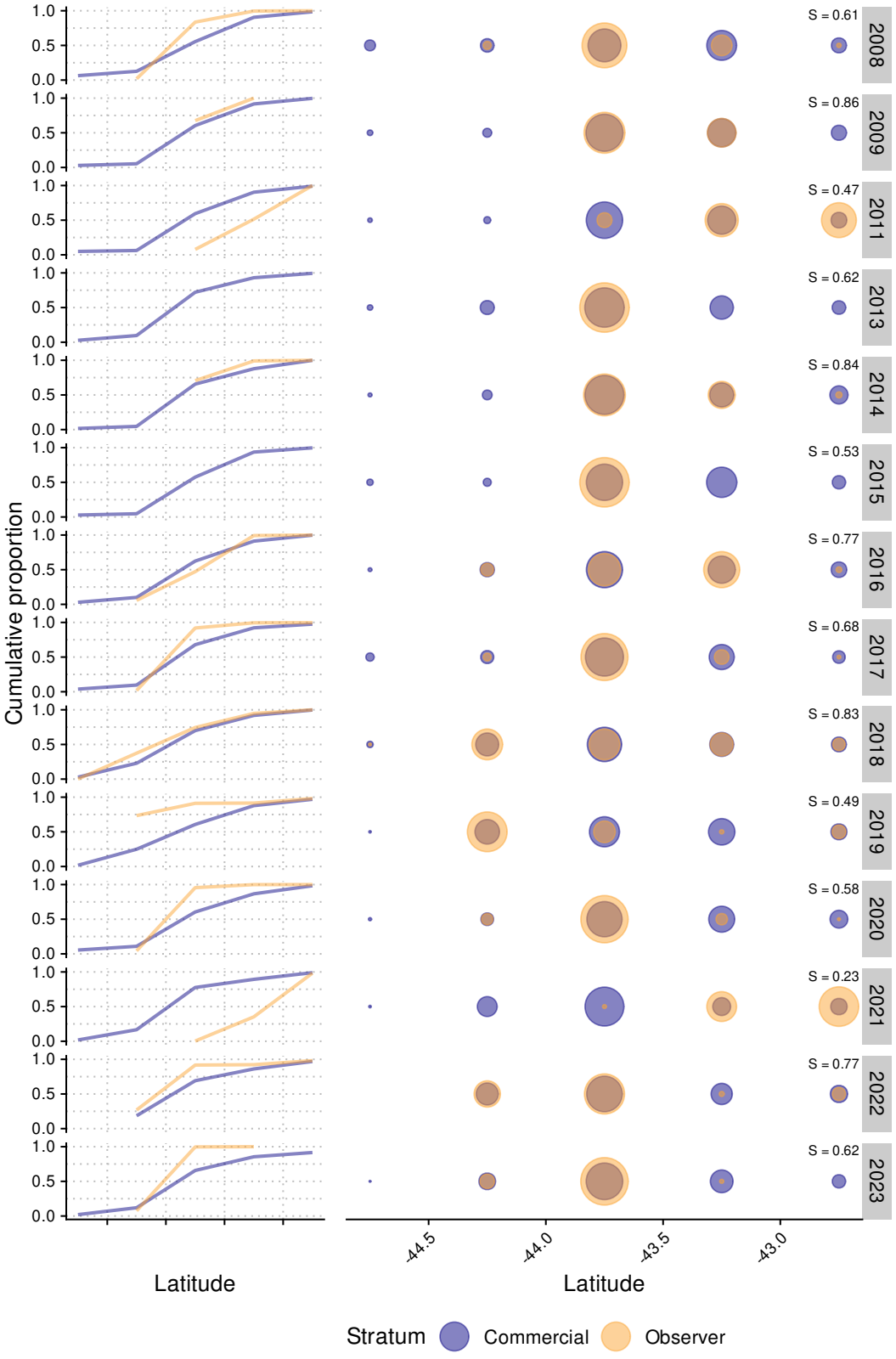


Figure 874: **Latitudinal representativeness of observer sampling coverage of Line catch in LIN 3&4, from events where the ling catch exceeded the 40kg threshold, in 2008 to 2023. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

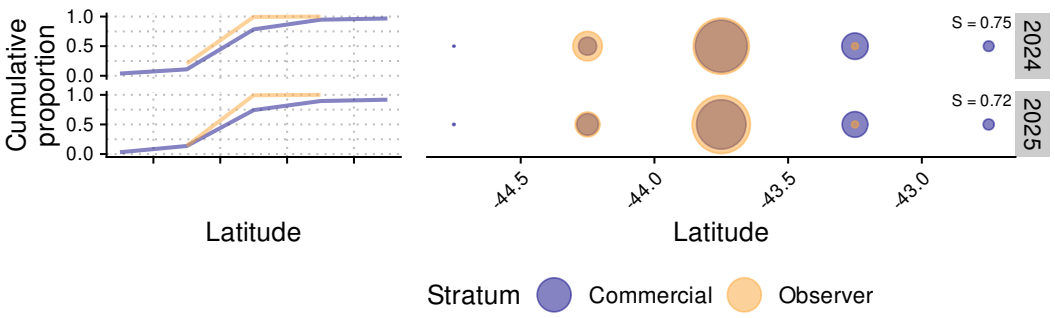


Figure 875: Latitudinal representativeness of observer sampling coverage of Line catch in LIN 3&4, from events where the ling catch exceeded the 40kg threshold, in 2024 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

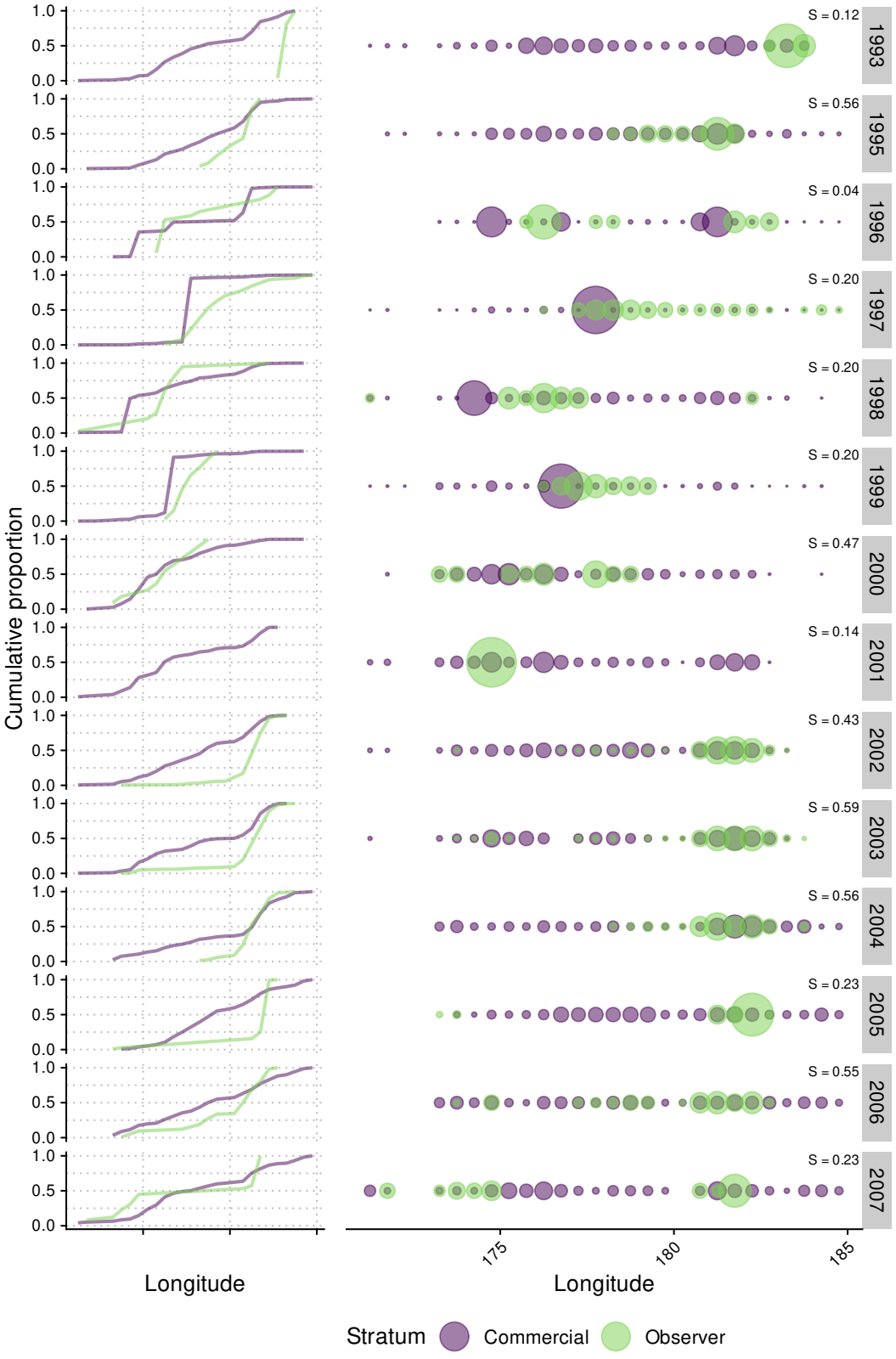


Figure 876: Longitudinal representativeness of observer sampling coverage of Line fishing events in LIN 3&4, where the ling catch exceeded the 40kg threshold, in 1993 to 2007. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

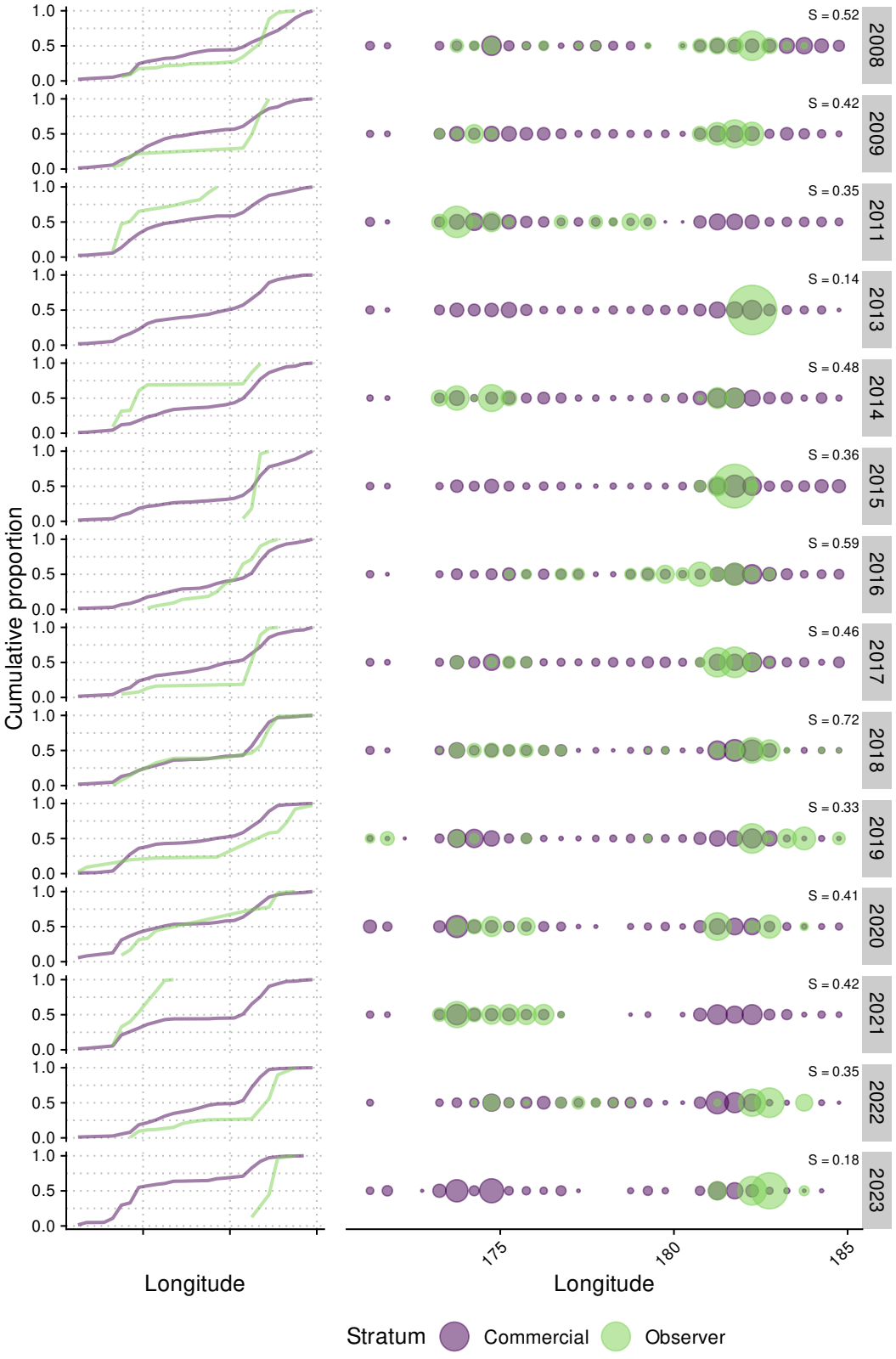


Figure 877: Longitudinal representativeness of observer sampling coverage of Line fishing events in LIN 3&4, where the ling catch exceeded the 40kg threshold, in 2008 to 2023. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

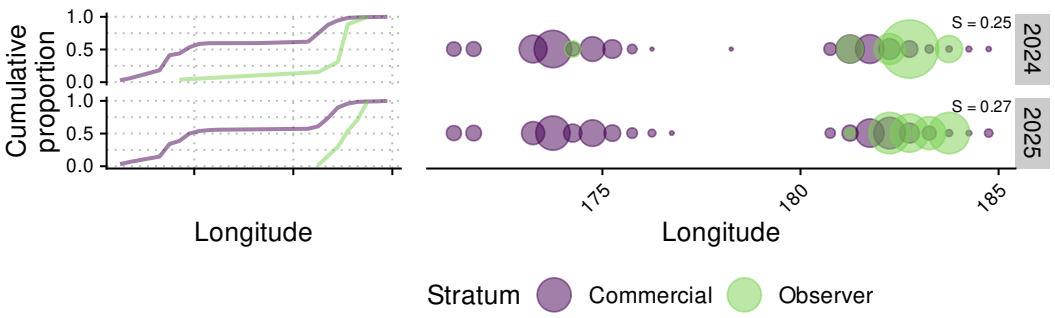


Figure 878: Longitudinal representativeness of observer sampling coverage of Line fishing events in LIN 3&4, where the ling catch exceeded the 40kg threshold, in 2024 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

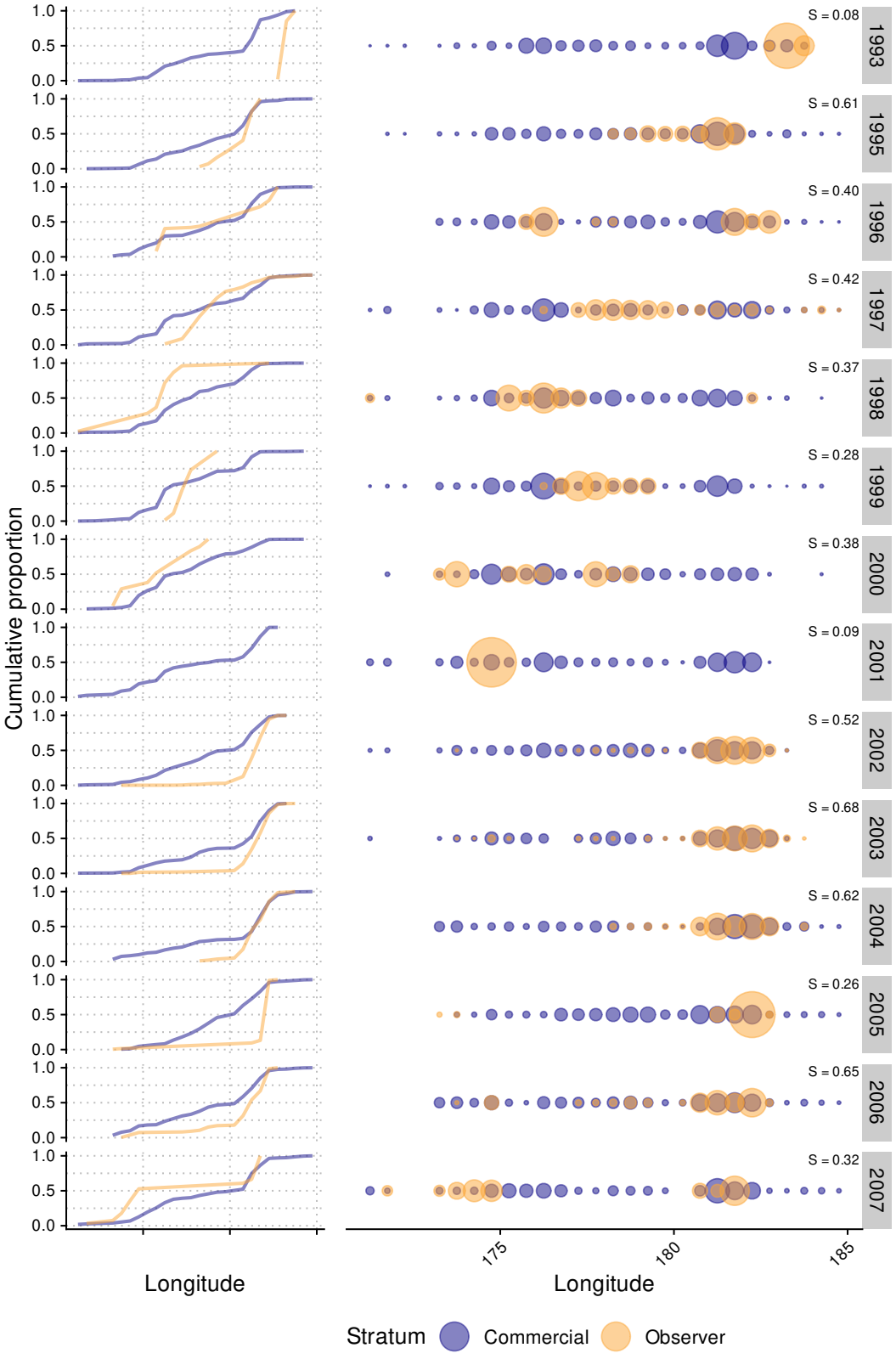


Figure 879: Longitudinal representativeness of observer sampling coverage of Line catch in LIN 3&4, from events where the ling catch exceeded the 40kg threshold, in 1993 to 2007. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

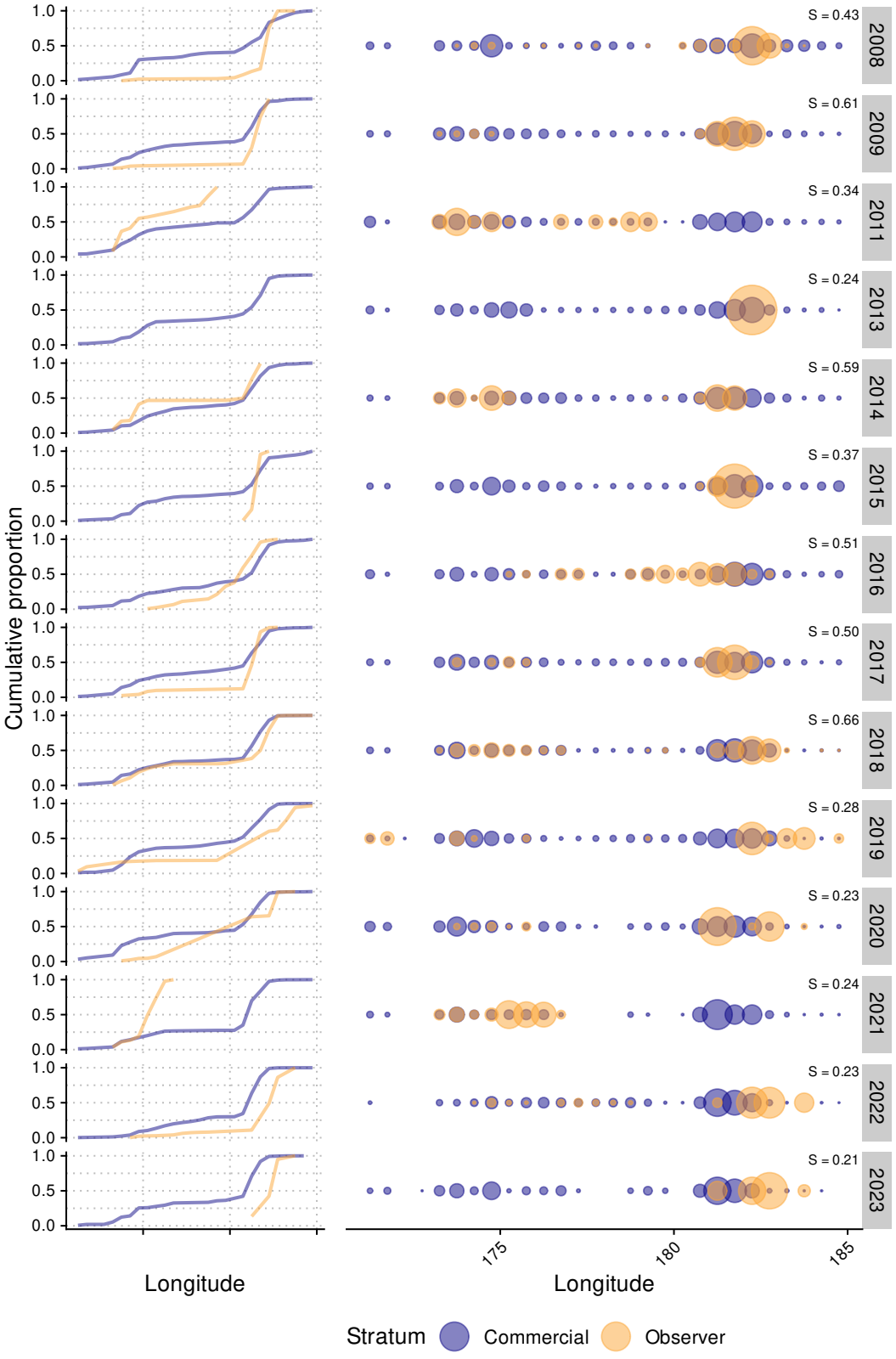


Figure 880: **Longitudinal representativeness of observer sampling coverage of Line catch in LIN 3&4, from events where the ling catch exceeded the 40kg threshold, in 2008 to 2023. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

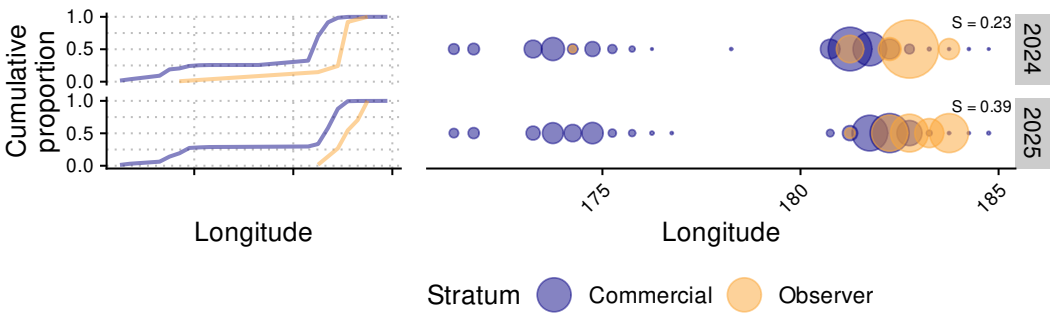


Figure 881: **Longitudinal representativeness of observer sampling coverage of Line catch in LIN 3&4, from events where the ling catch exceeded the 40kg threshold, in 2024 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

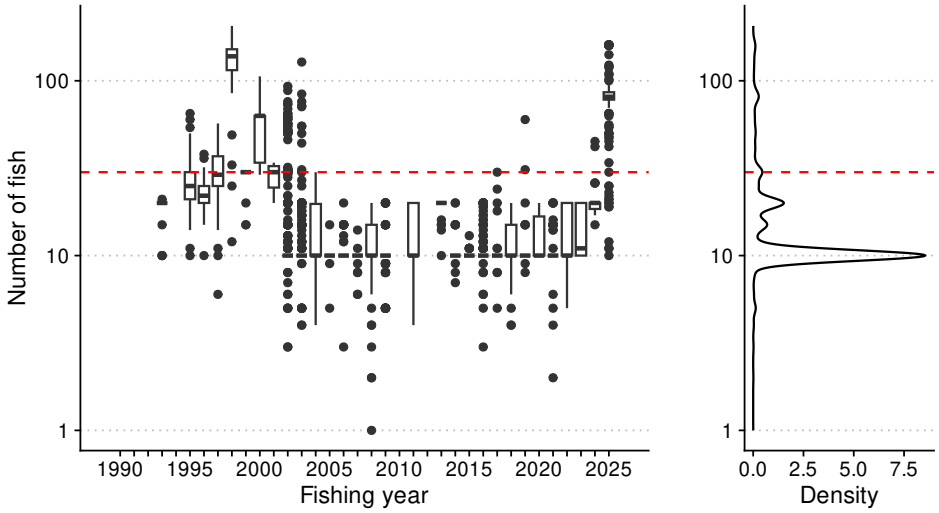


Figure 882: **Length-frequency sample sizes for observed fishing events in LIN 3&4 where ling were sampled. The red dashed line indicates a sample size of 30 fish.**

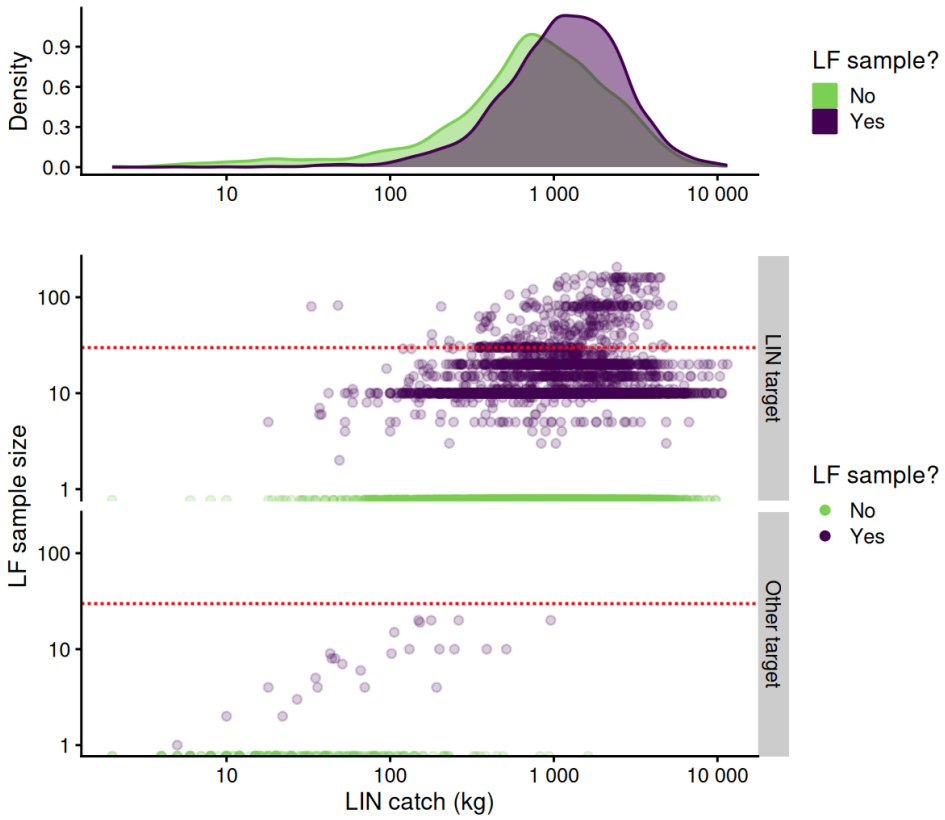


Figure 883: **Length-frequency sample sizes (number of fish sampled) for observed fishing events in LIN 3&4 in relation to the total ling catch from an event, separately for ling target events and other target species. The red dashed line indicates a sample size of 30 fish.**

2.13.5.2 Otolith samples

Table 73: Otolith samples of ling from the LIN 3&4 Line fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of ling exceeded a potential sampling threshold of 40 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	1 123	0	0	0.00
1991	13 591	0	0	0.00
1992	9 025	0	0	0.00
1993	6 598	0	0	0.00
1994	13 292	0	0	0.00
1995	16 443	0	0	0.00
1996	49 704	0	0	0.00
1997	101 999	0	0	0.00
1998	73 081	0	0	0.00
1999	79 213	0	0	0.00
2000	20 681	0	0	0.00
2001	7 133	0	0	0.00
2002	4 798	0	0	0.00
2003	40 193	0	0	0.00
2004	75 119	0	0	0.00
2005	17 710	0	0	0.00
2006	2 654	0	0	0.00
2007	3 369	0	0	0.00
2008	2 993	0	0	0.00
2009	2 724	0	0	0.00
2010	2 944	0	0	0.00
2011	2 690	0	0	0.00
2012	2 123	0	0	0.00
2013	2 504	0	0	0.00
2014	2 794	0	0	0.00
2015	2 272	0	0	0.00
2016	2 706	0	0	0.00
2017	2 278	0	0	0.00
2018	2 114	0	0	0.00
2019	2 113	0	0	0.00
2020	2 210	0	0	0.00
2021	1 267	0	0	0.00
2022	1 517	0	0	0.00
2023	1 036	0	0	0.00
2024	1 393	9	75	0.65
2025	789	140	2 541	17.74

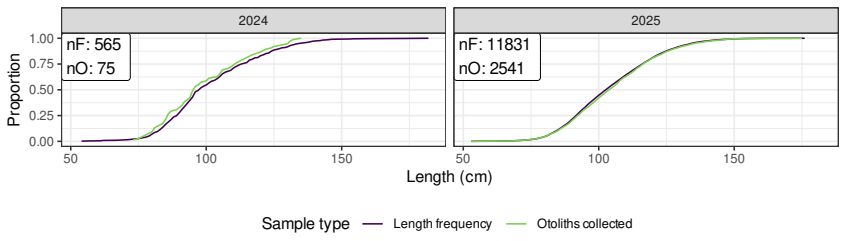


Figure 884: Cumulative distributions of the length of fish in the length frequency and otolith samples of ling in the LIN 3&4 Line fishery for the 2024 to 2025 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

2.13.5.3 Catch quantification

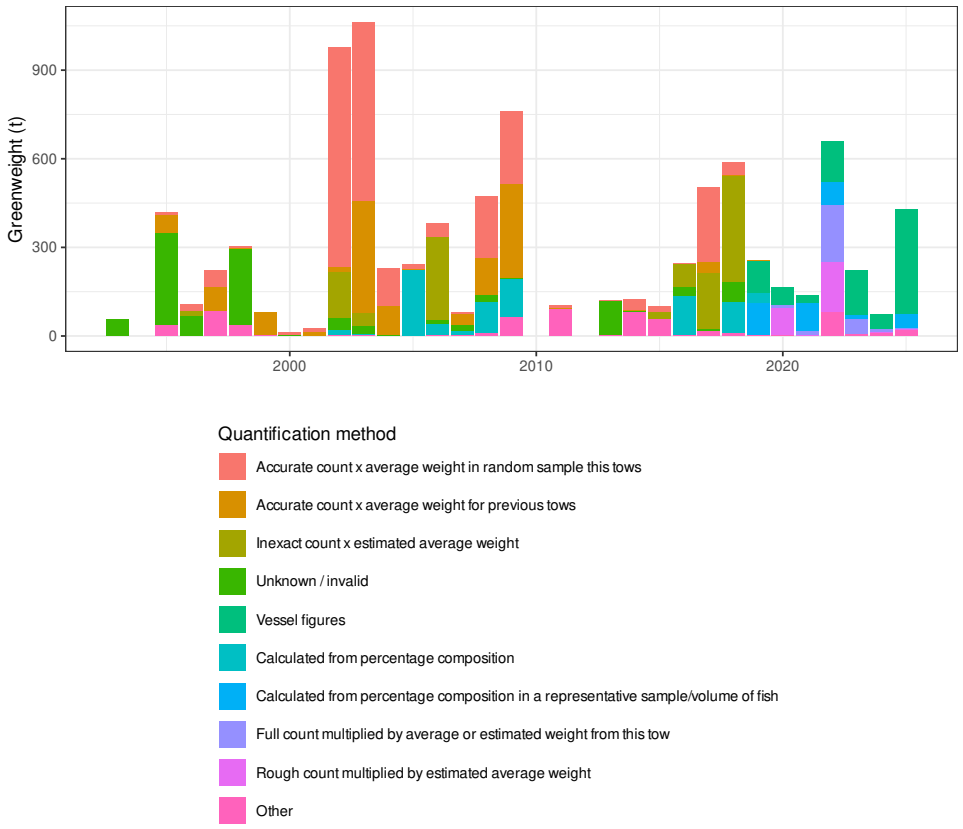


Figure 885: Methods used by observers to quantify the catch of ling in the LIN 3&4 Line fishery. The legend lists the methods used in descending order of total catch.

2.13.6 LIN 3&4: Trawl fishery

2.13.6.1 Length-frequency samples

Table 74: Length-frequency samples of ling from the LIN 3&4 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of ling exceeded a potential sampling threshold of 40 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	4 504	19	154	0.42
1991	7 012	108	2 667	1.54
1992	9 235	70	2 118	0.76
1993	7 560	34	331	0.45
1994	5 272	100	1 603	1.90
1995	6 063	77	748	1.27
1996	6 852	103	984	1.50
1997	7 808	48	506	0.61
1998	9 418	549	6 992	5.83
1999	10 888	369	6 377	3.39
2000	9 369	226	2 305	2.41
2001	9 491	265	2 738	2.79
2002	8 639	162	1 567	1.88
2003	9 857	192	1 952	1.95
2004	7 388	251	1 927	3.40
2005	5 844	266	1 935	4.55
2006	4 710	139	1 570	2.95
2007	4 996	155	1 544	3.10
2008	4 721	347	6 055	7.35
2009	4 051	183	2 722	4.52
2010	4 342	113	2 015	2.60
2011	3 665	84	1 209	2.29
2012	4 004	113	3 514	2.82
2013	3 840	160	2 532	4.17
2014	3 683	174	3 225	4.72
2015	4 003	93	1 915	2.32
2016	4 318	72	1 223	1.67
2017	4 219	92	1 747	2.18
2018	4 533	111	2 214	2.45
2019	4 673	117	2 073	2.50
2020	3 976	128	2 353	3.22
2021	4 209	110	2 929	2.61
2022	4 202	117	2 099	2.78
2023	4 837	90	1 513	1.86
2024	5 485	132	2 239	2.41
2025	5 167	159	3 118	3.08

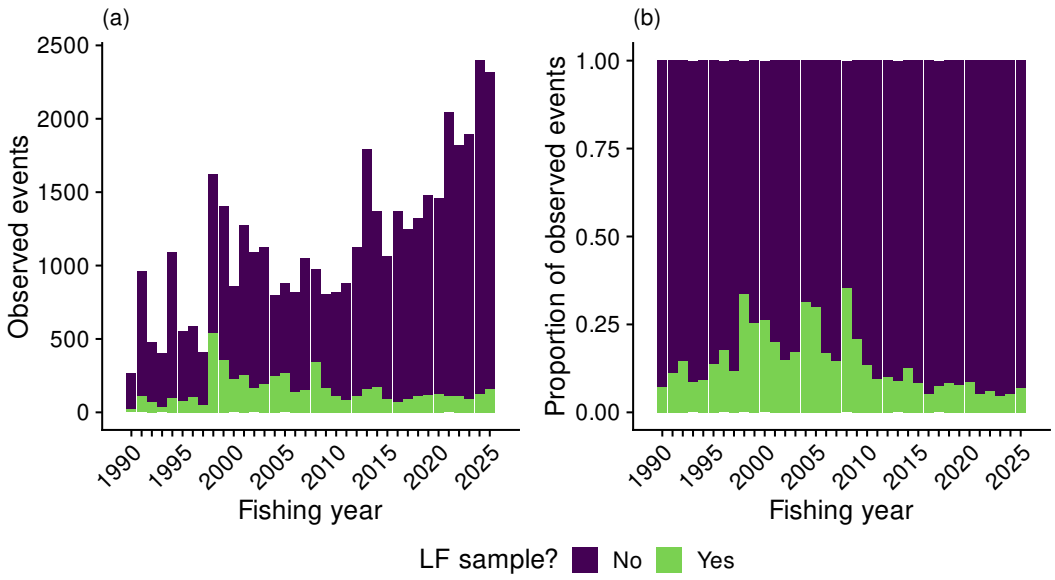


Figure 886: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in LIN 3&4 where the ling catch exceeded the 40 kg threshold, with and without length-frequency sampling.**

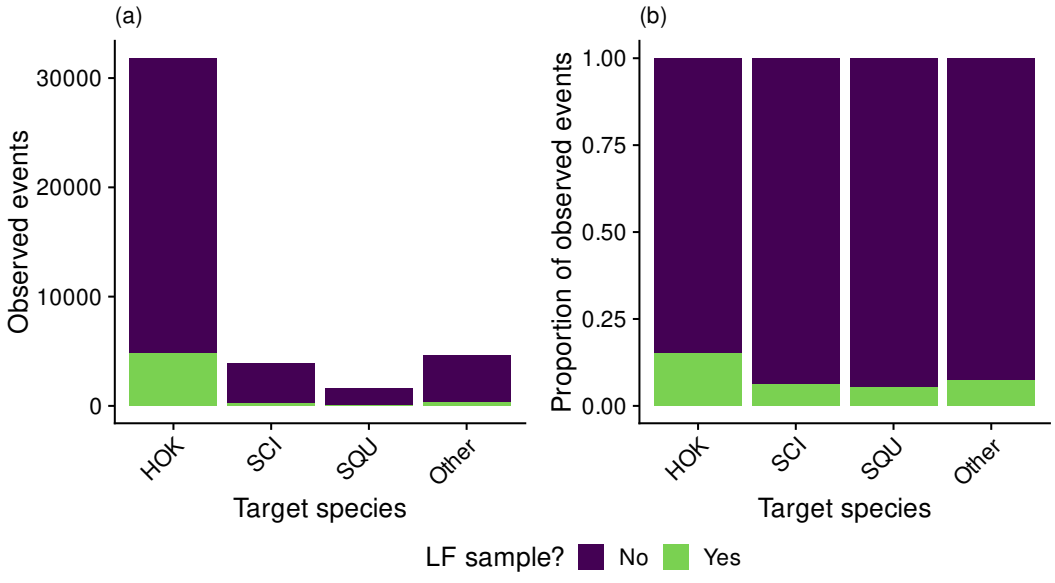


Figure 887: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in LIN 3&4 where the ling catch exceeded the 40 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

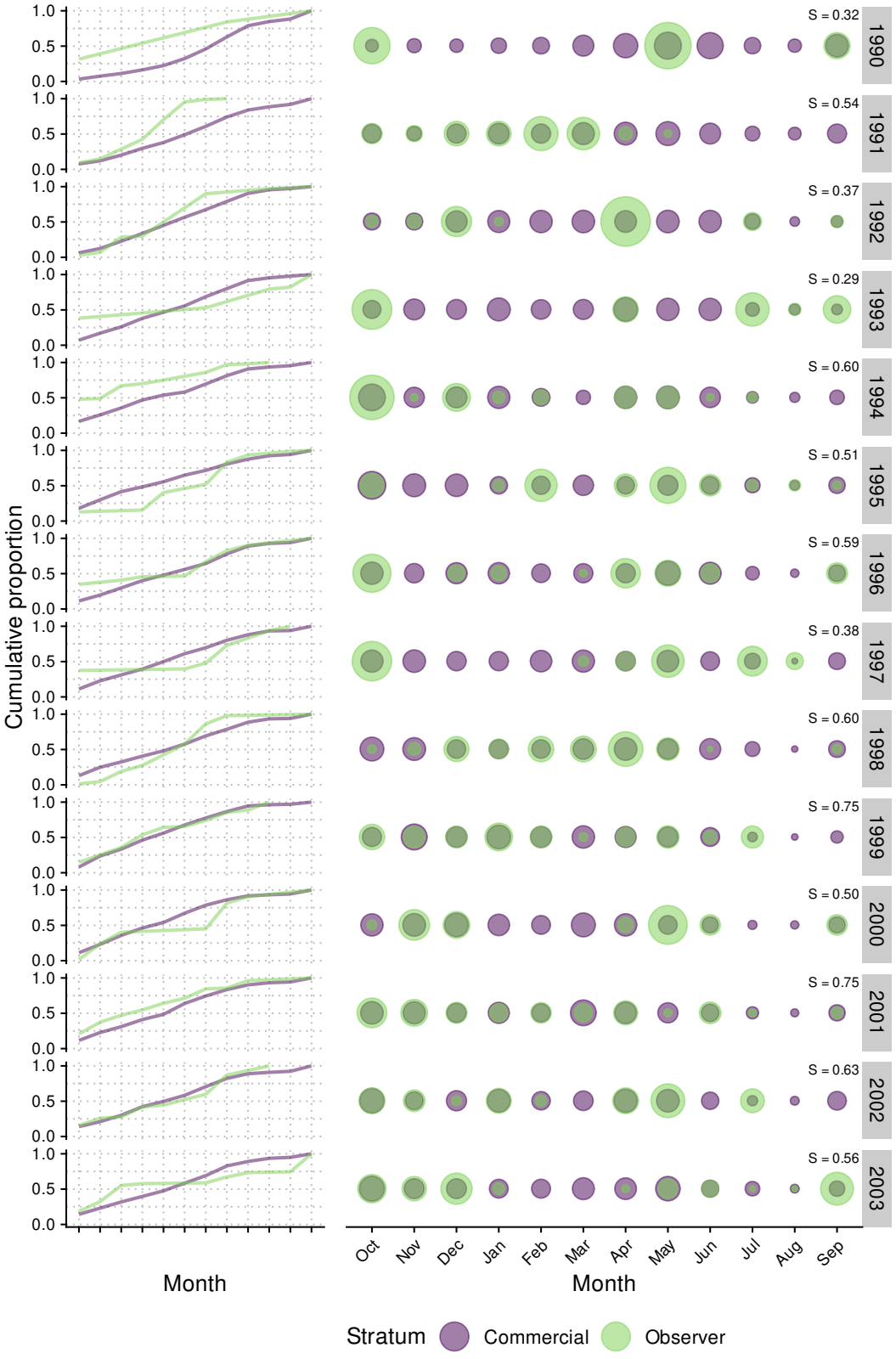


Figure 888: Monthly representativeness of observer sampling coverage of Trawl fishing events in LIN 3&4, where the ling catch exceeded the 40kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

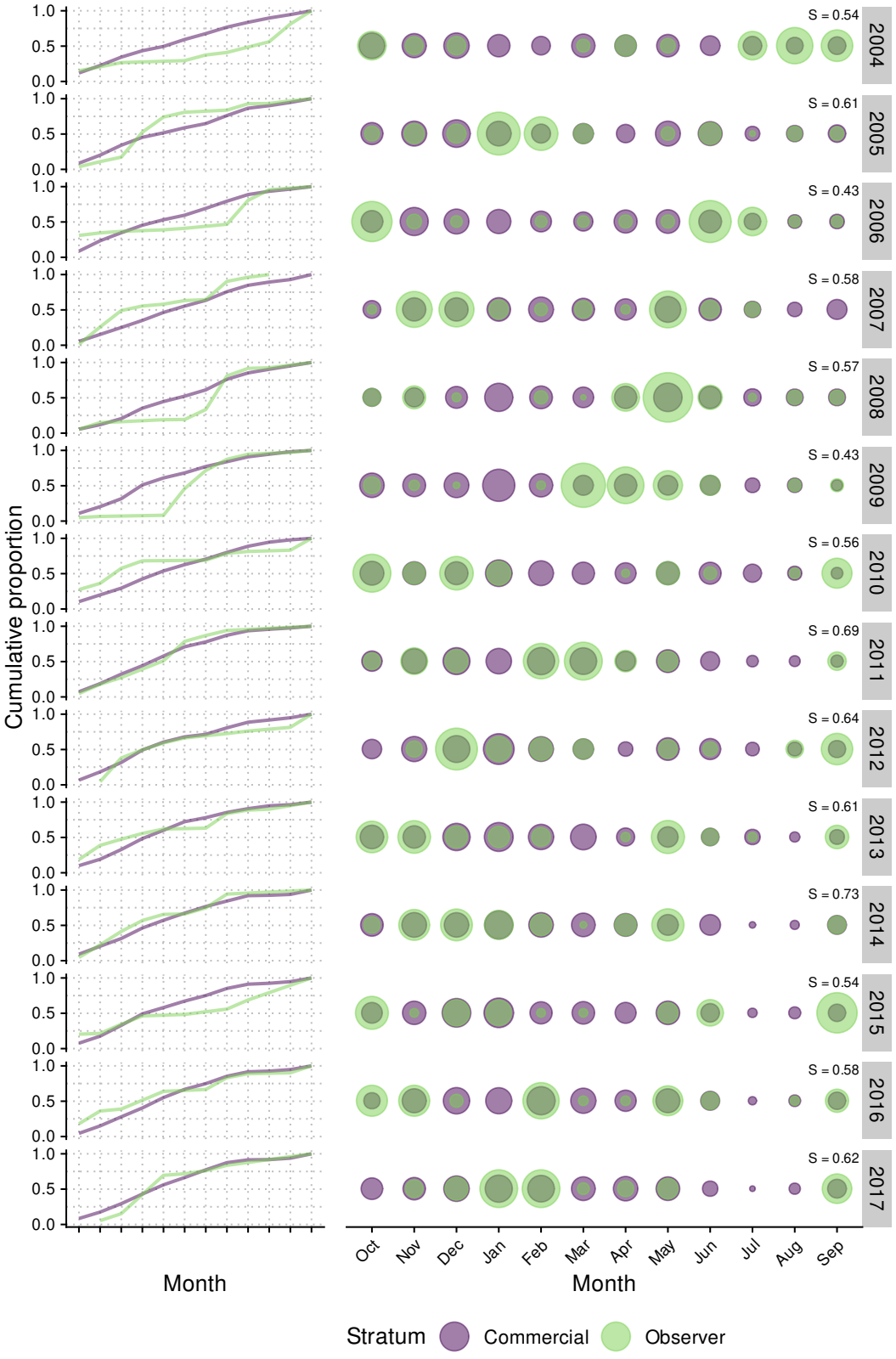


Figure 889: Monthly representativeness of observer sampling coverage of Trawl fishing events in LIN 3&4, where the ling catch exceeded the 40kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

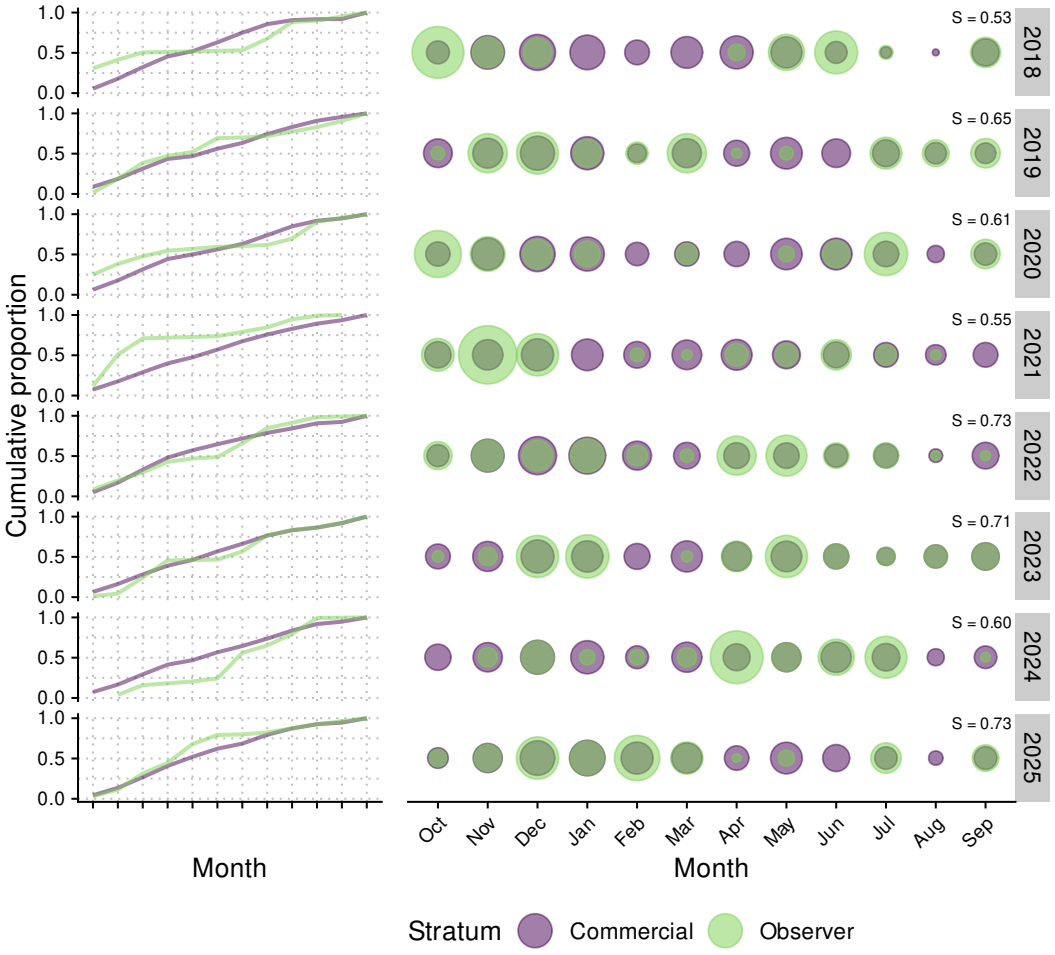


Figure 890: Monthly representativeness of observer sampling coverage of Trawl fishing events in LIN 3&4, where the ling catch exceeded the 40kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

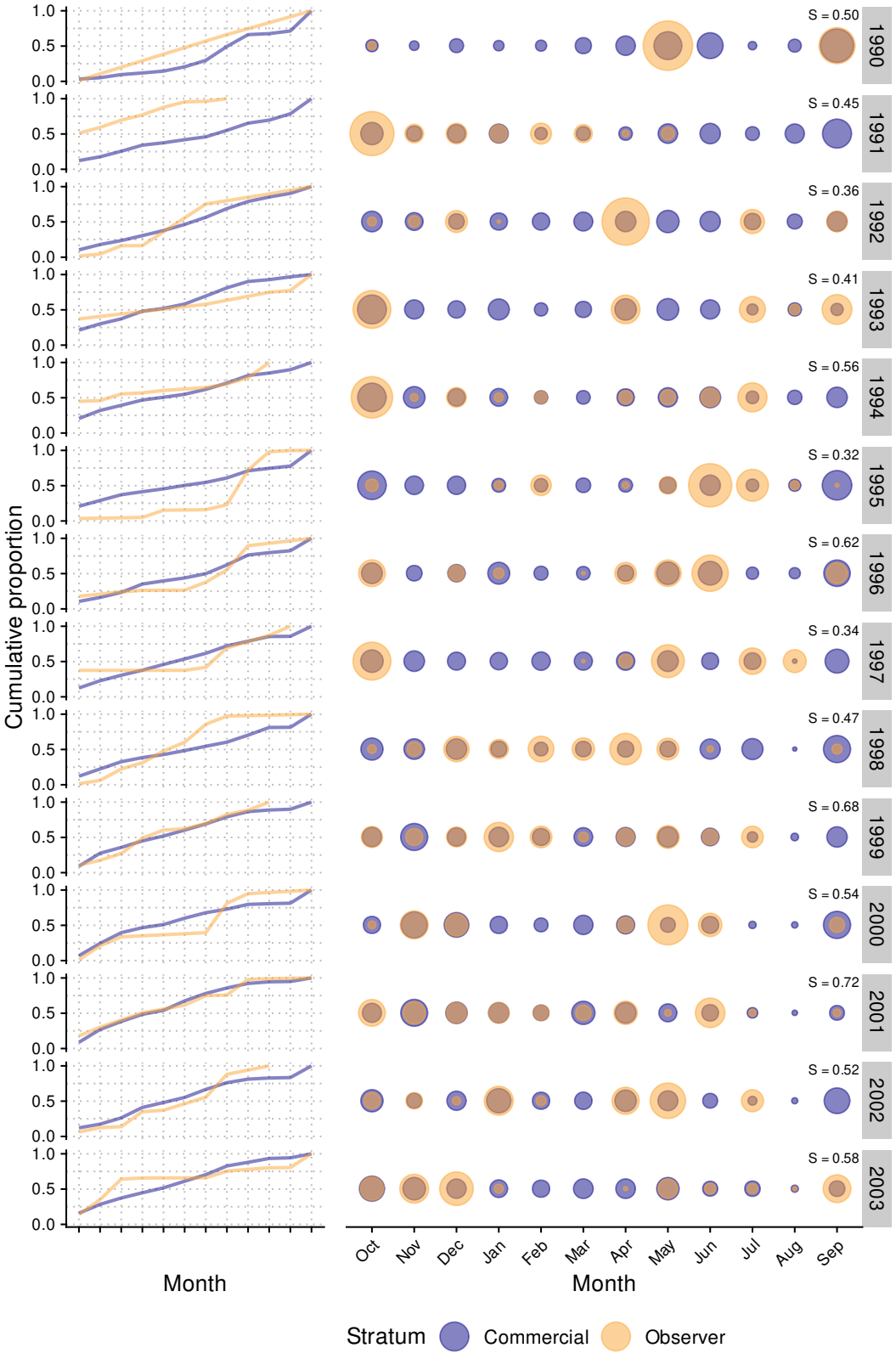


Figure 891: Monthly representativeness of observer sampling coverage of Trawl catch in LIN 3&4, from events where the ling catch exceeded the 40kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

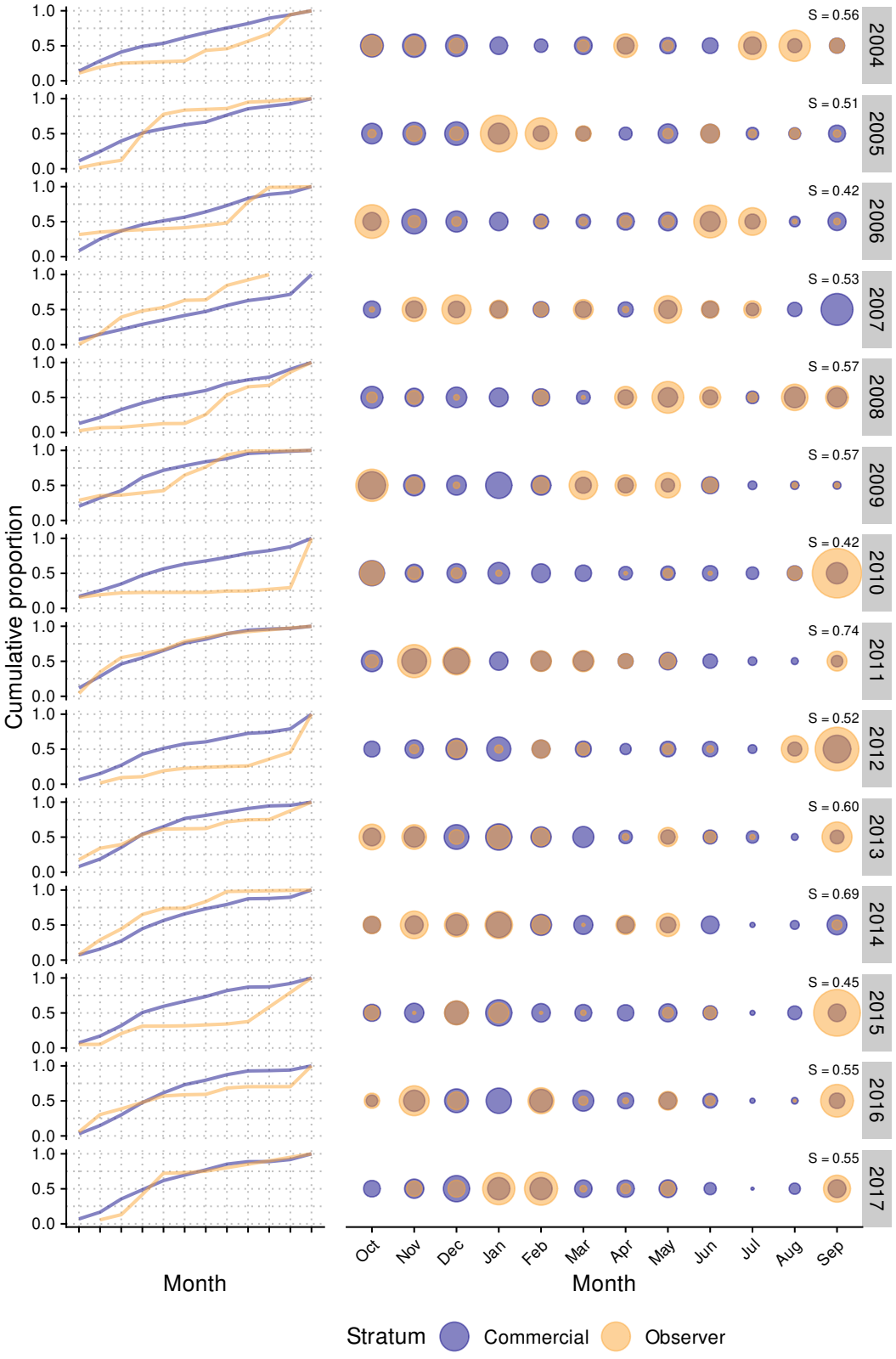


Figure 892: **Monthly representativeness of observer sampling coverage of Trawl catch in LIN 3&4, from events where the ling catch exceeded the 40kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

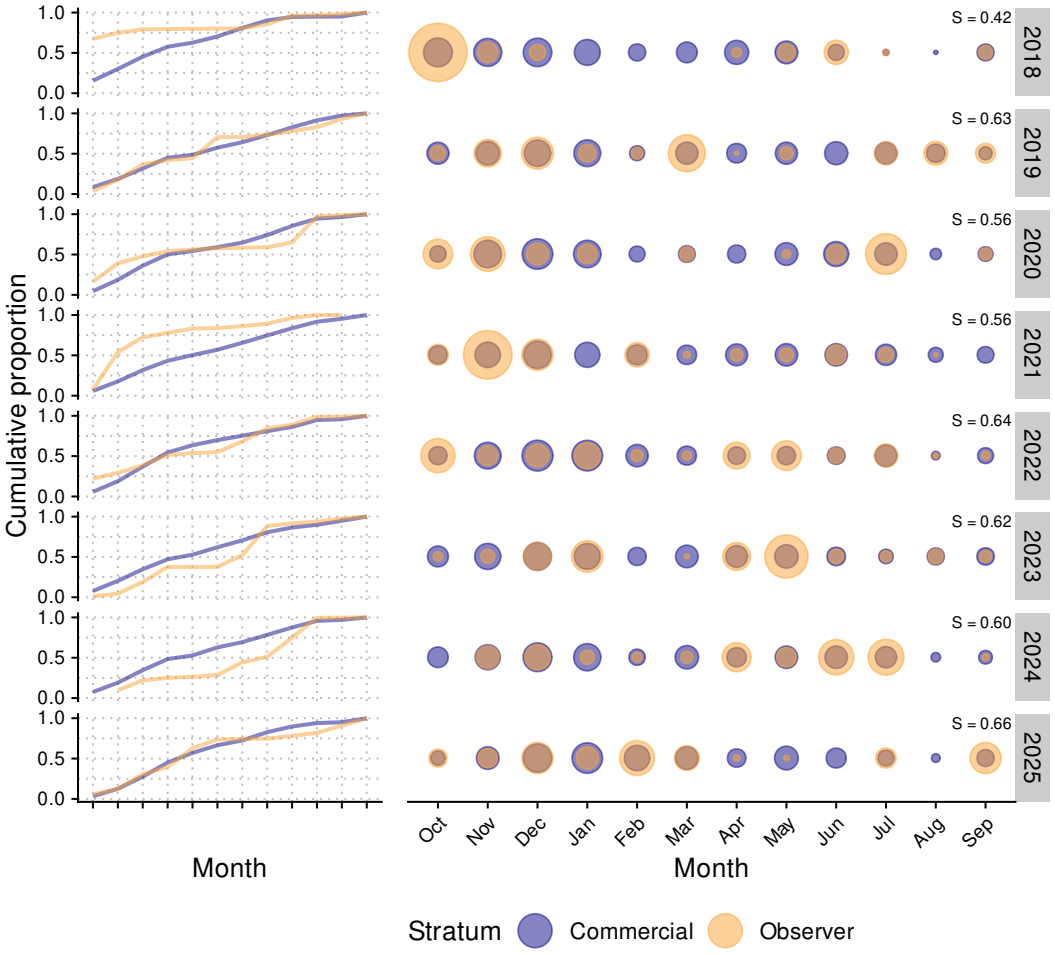


Figure 893: Monthly representativeness of observer sampling coverage of Trawl catch in LIN 3&4, from events where the ling catch exceeded the 40kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

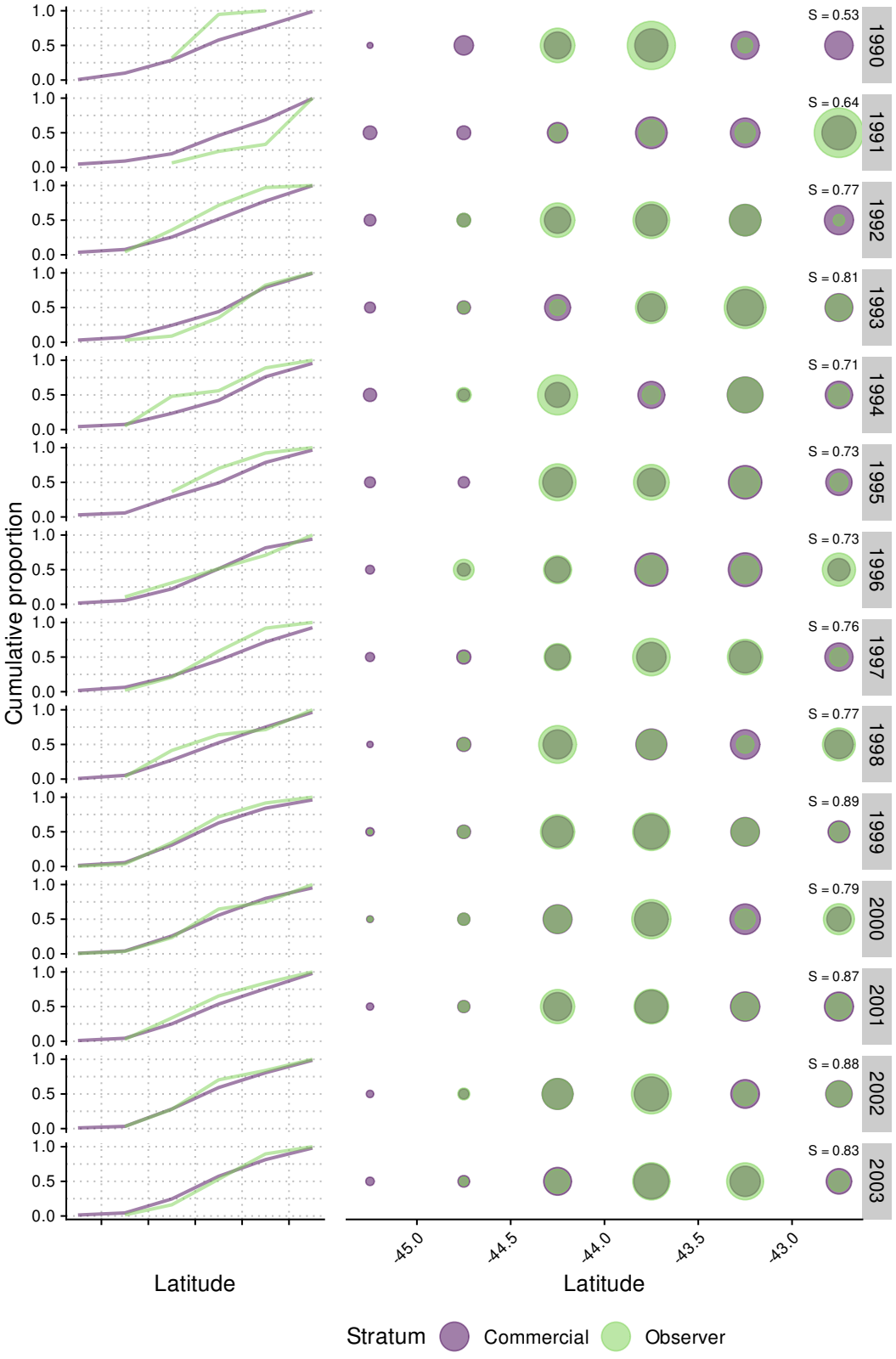


Figure 894: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in LIN 3&4, where the ling catch exceeded the 40kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

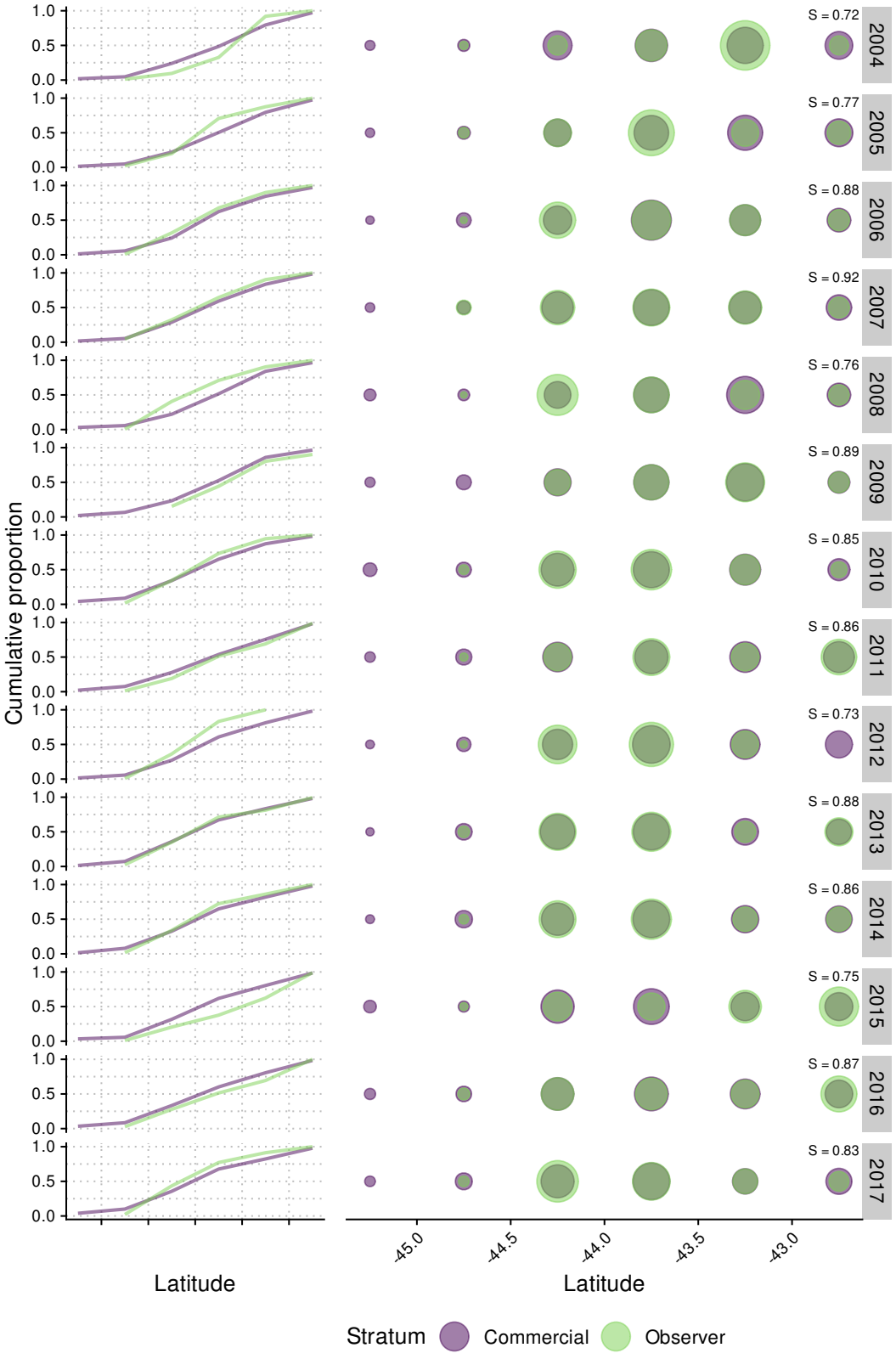


Figure 895: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in LIN 3&4, where the ling catch exceeded the 40kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

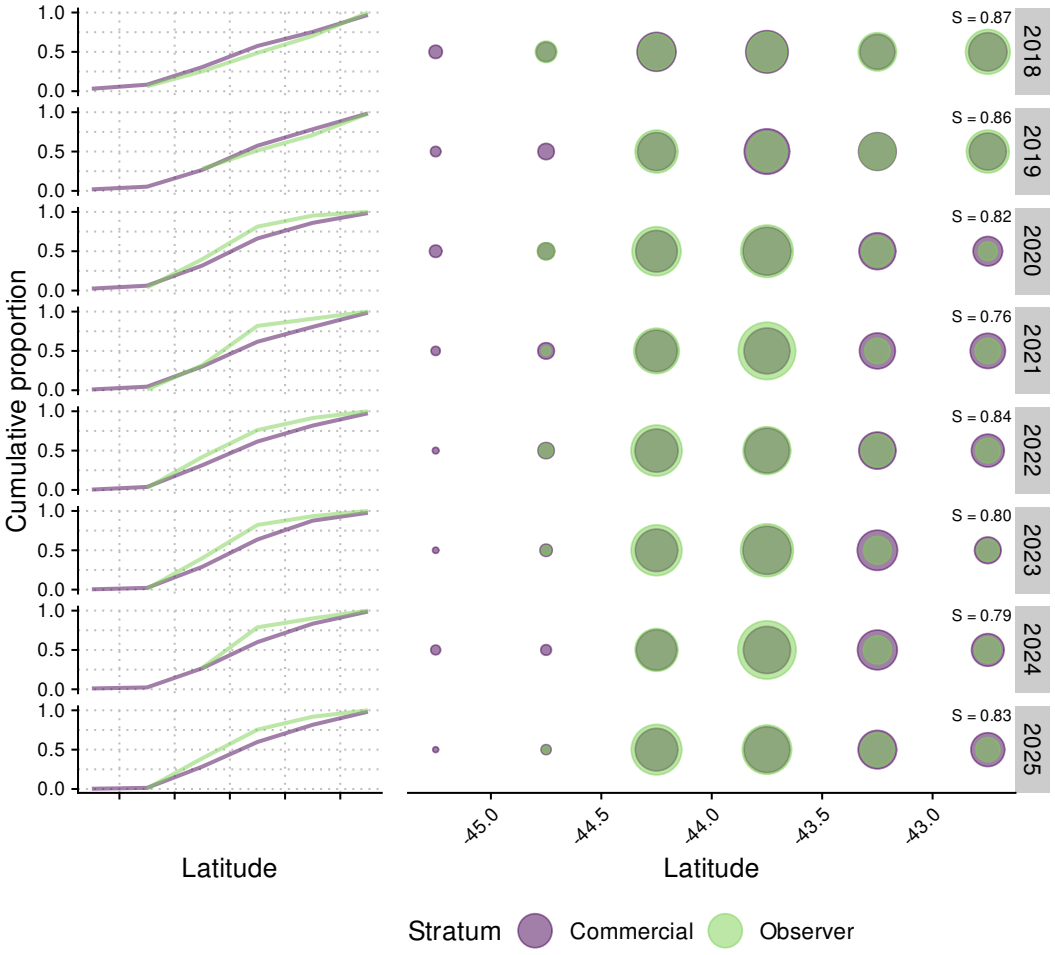


Figure 896: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in LIN 3&4, where the ling catch exceeded the 40kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

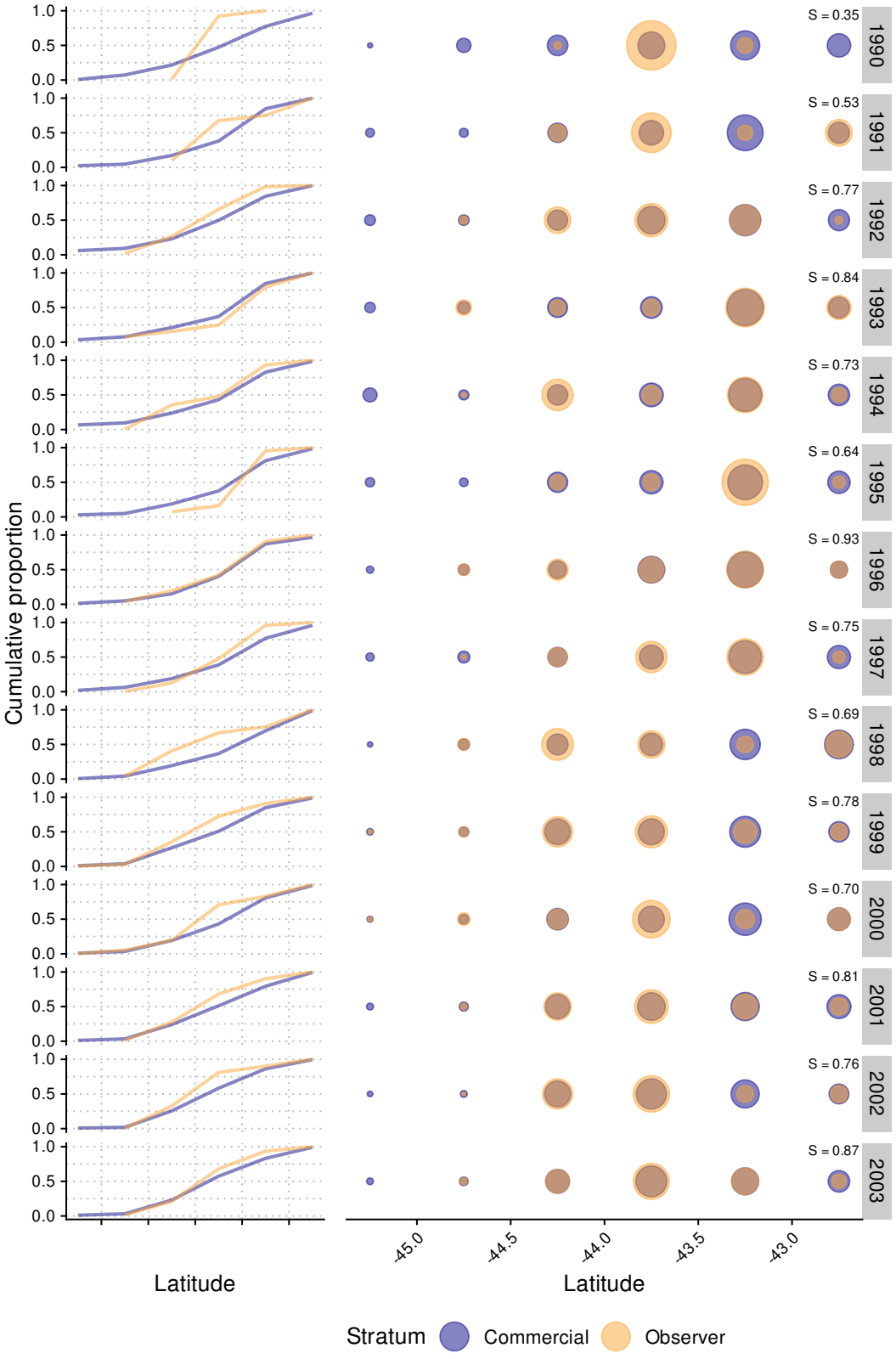


Figure 897: **Latitudinal representativeness of observer sampling coverage of Trawl catch in LIN 3&4, from events where the ling catch exceeded the 40kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

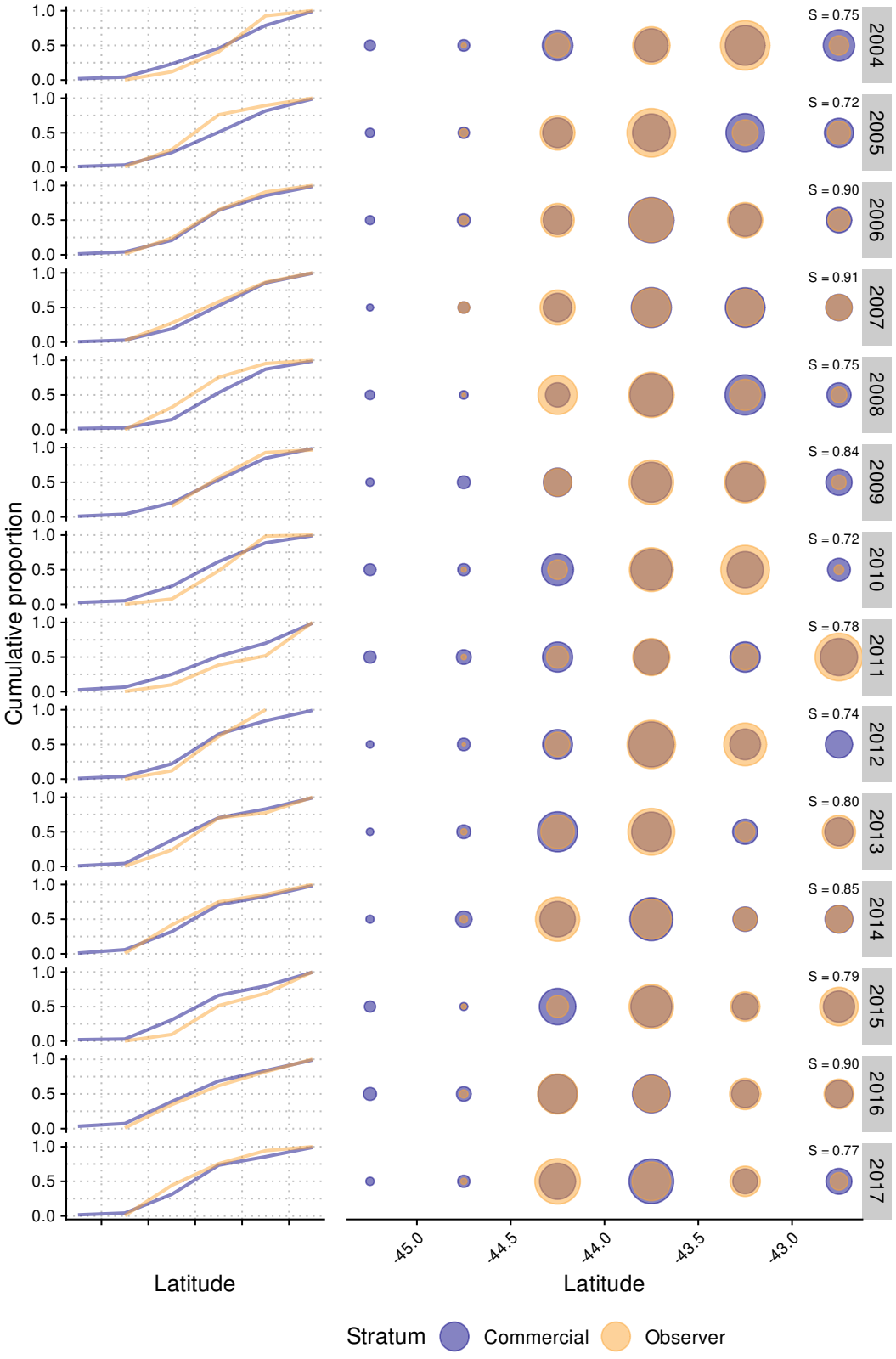


Figure 898: Latitudinal representativeness of observer sampling coverage of Trawl catch in LIN 3&4, from events where the ling catch exceeded the 40kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

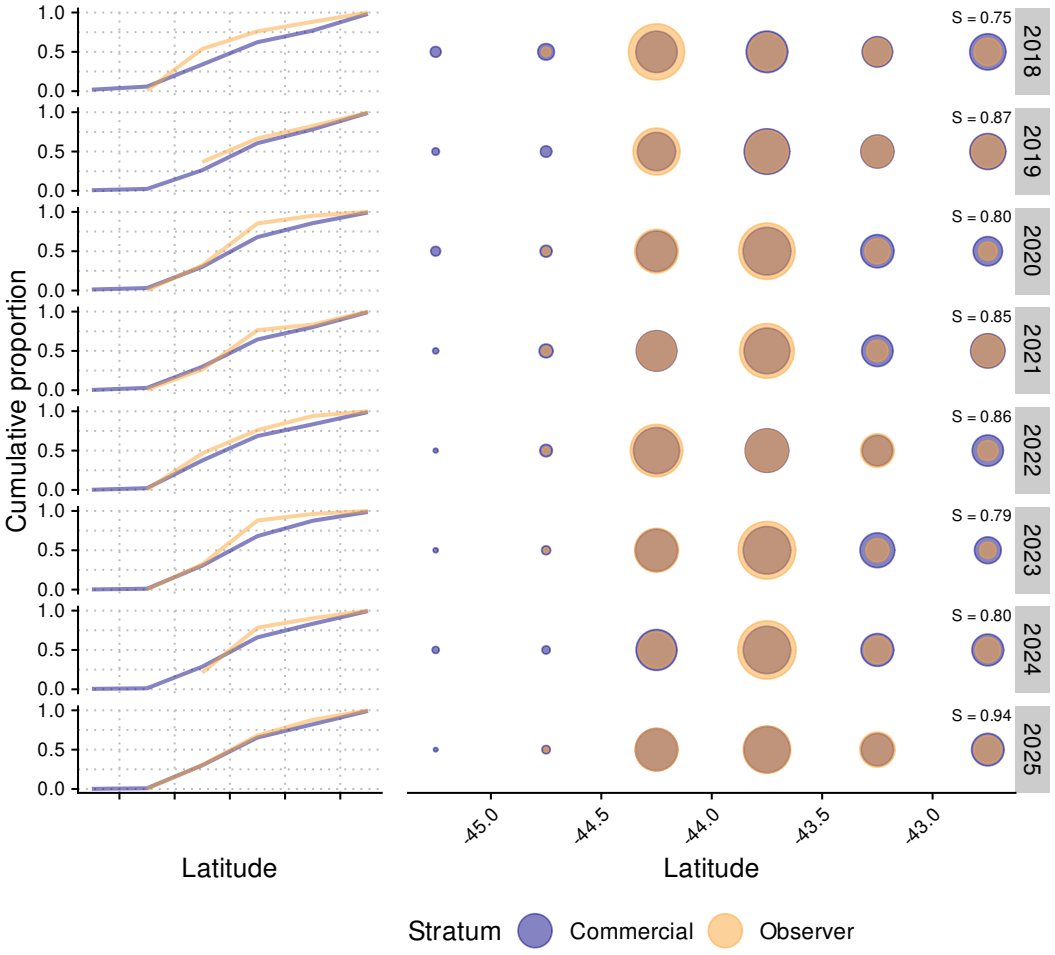


Figure 899: **Latitudinal representativeness of observer sampling coverage of Trawl catch in LIN 3&4, from events where the ling catch exceeded the 40kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

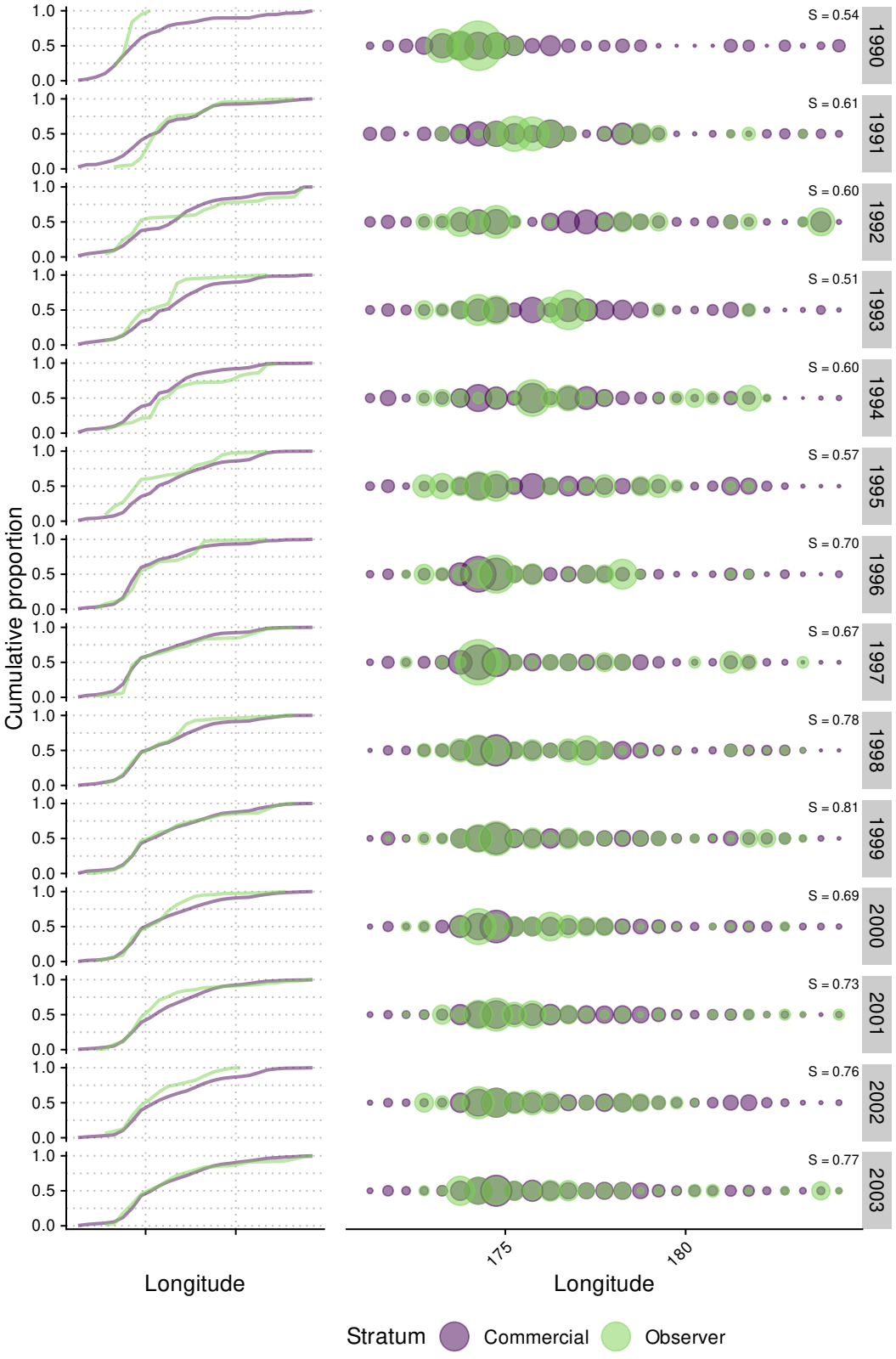


Figure 900: **Longitudinal representativeness of observer sampling coverage of Trawl fishing events in LIN 3&4, where the ling catch exceeded the 40kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

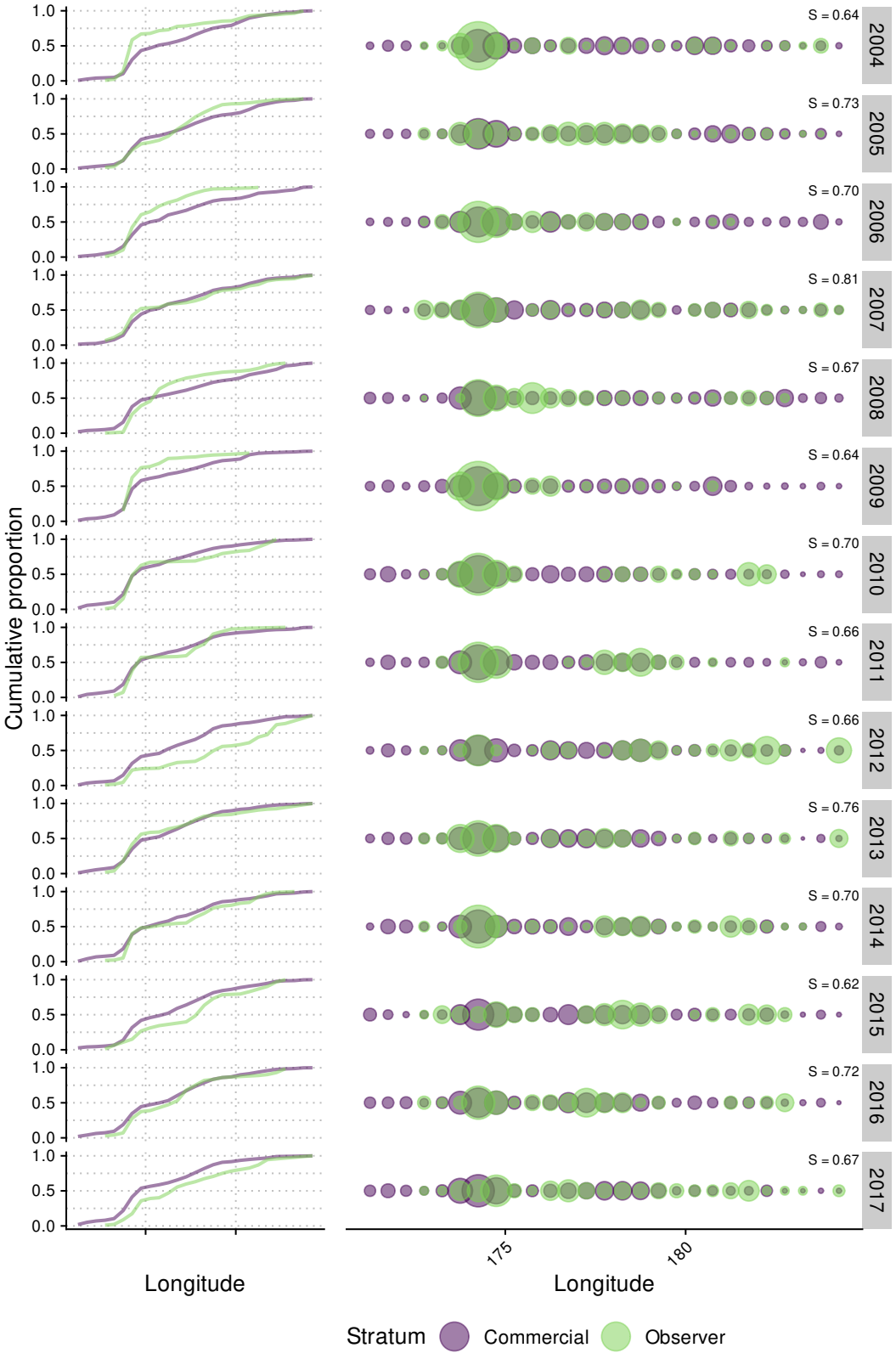


Figure 901: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in LIN 3&4, where the ling catch exceeded the 40kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

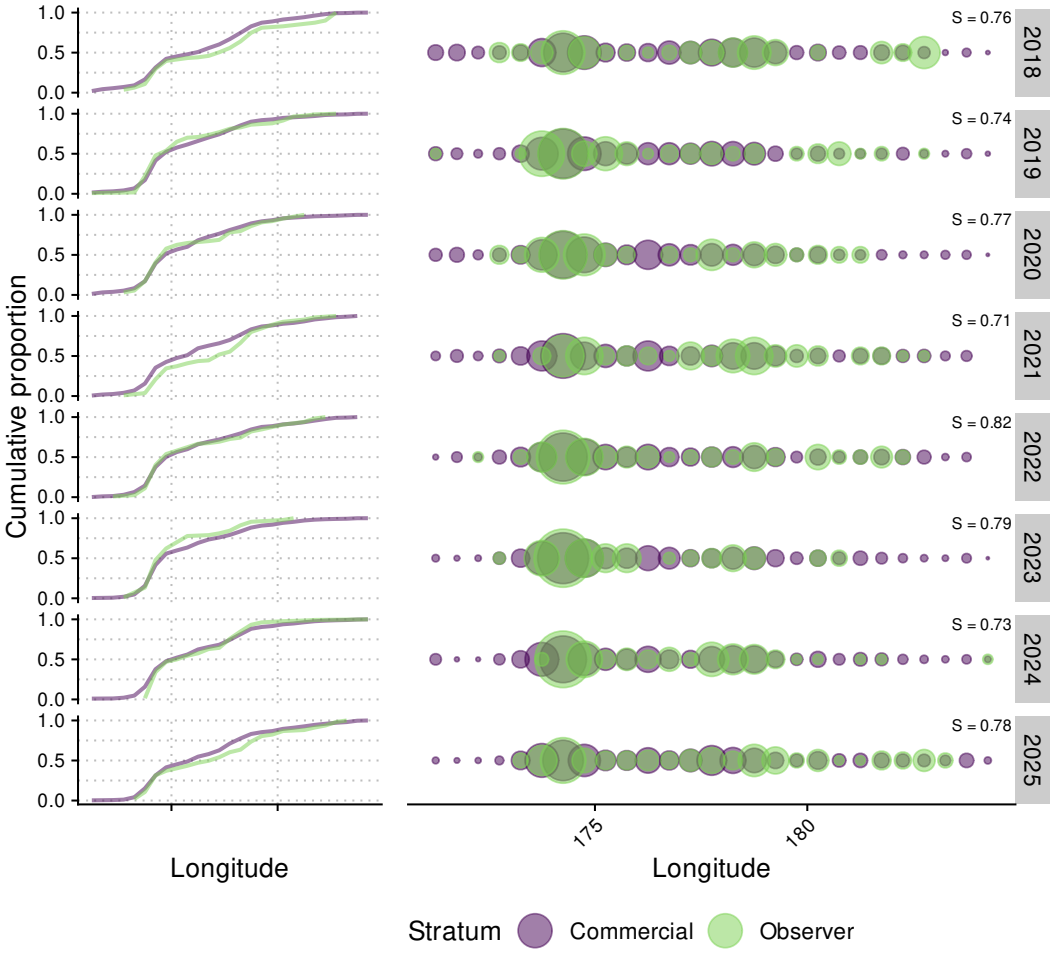


Figure 902: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in LIN 3&4, where the ling catch exceeded the 40kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

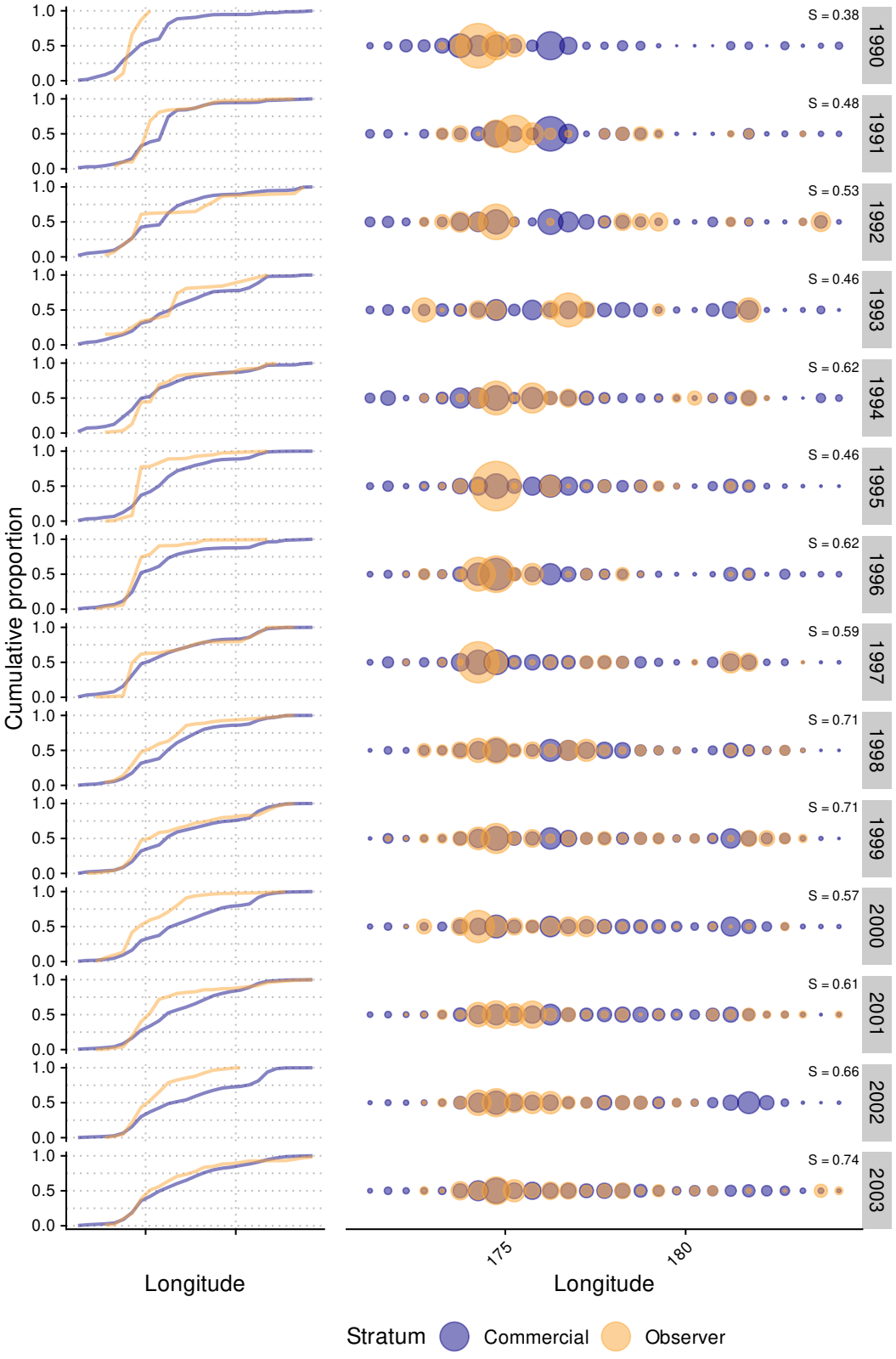


Figure 903: **Longitudinal representativeness of observer sampling coverage of Trawl catch in LIN 3&4, from events where the ling catch exceeded the 40kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

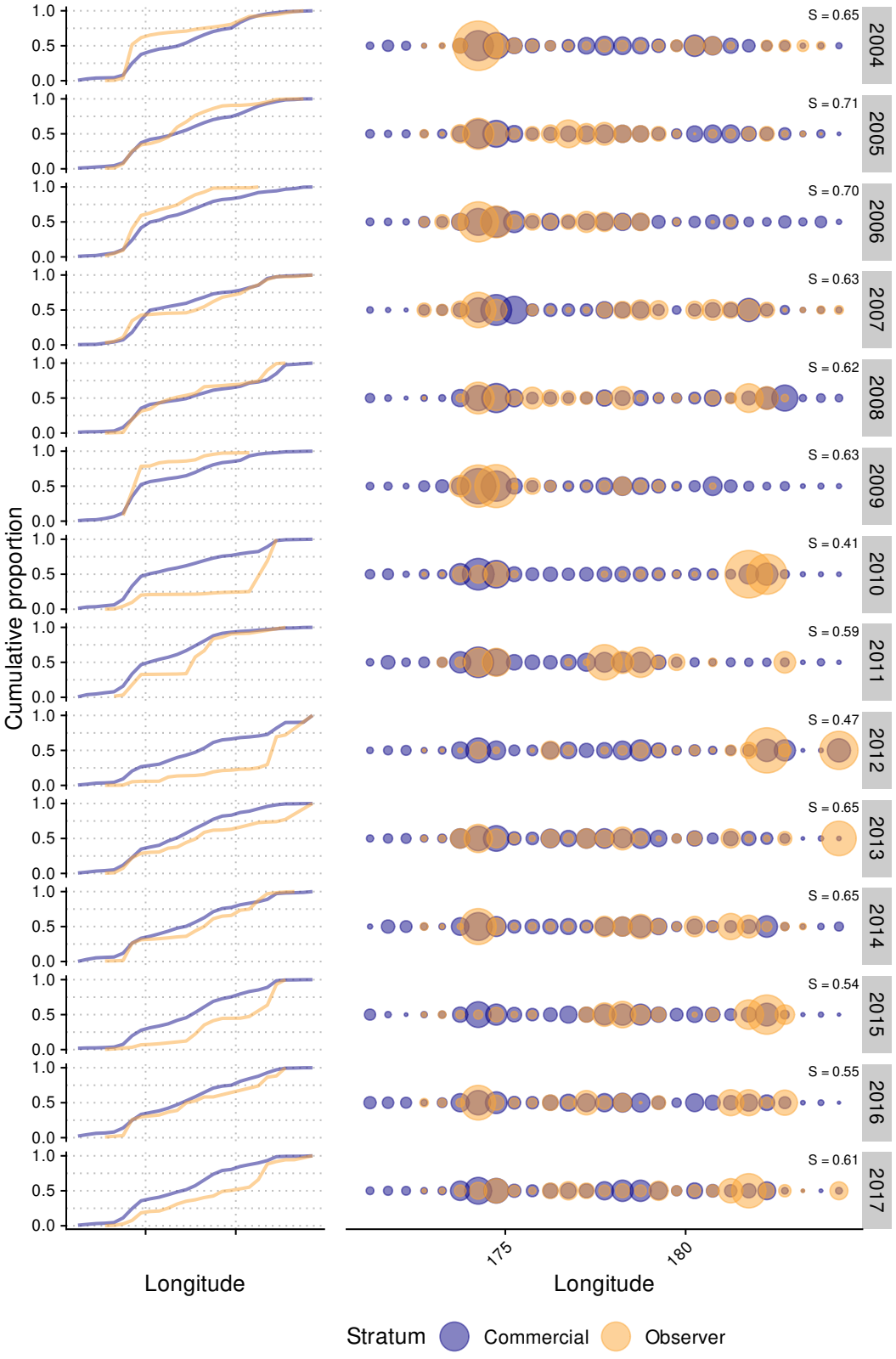


Figure 904: **Longitudinal representativeness of observer sampling coverage of Trawl catch in LIN 3&4, from events where the ling catch exceeded the 40kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

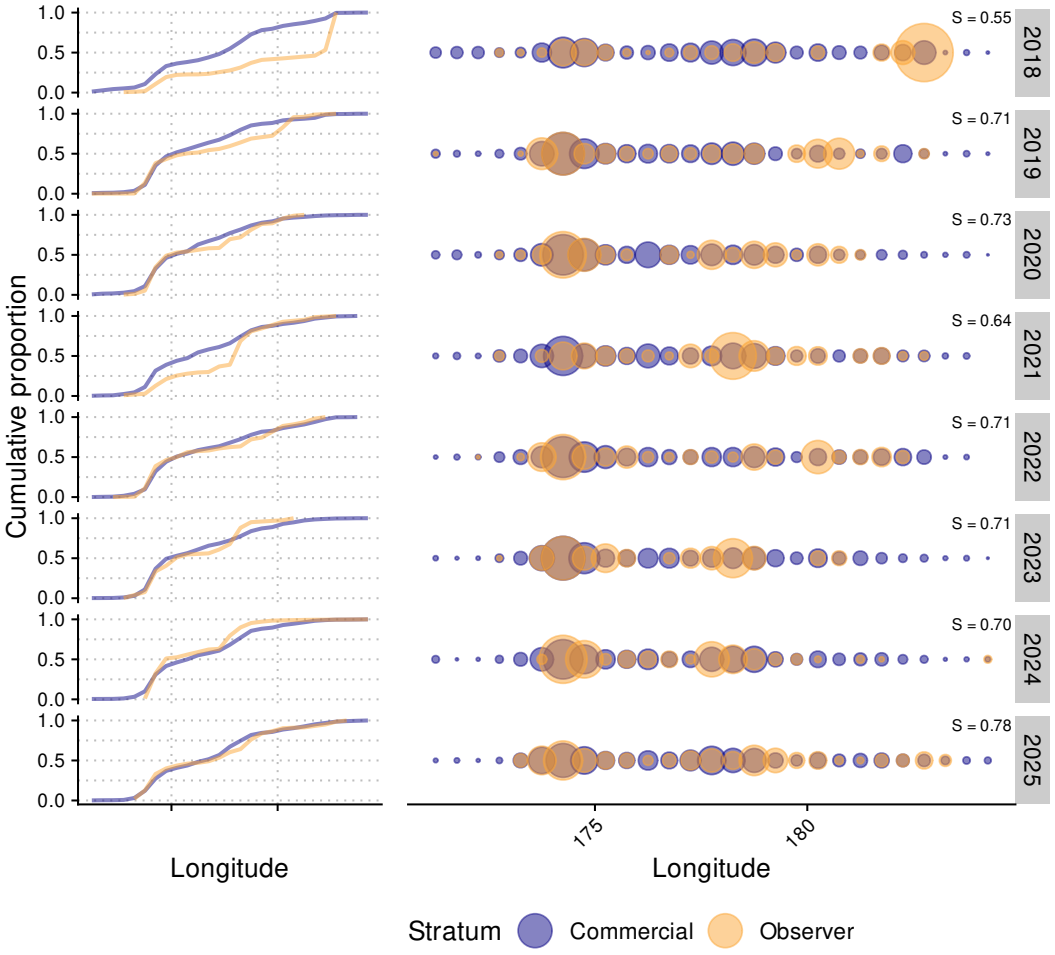


Figure 905: **Longitudinal representativeness of observer sampling coverage of Trawl catch in LIN 3&4, from events where the ling catch exceeded the 40kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

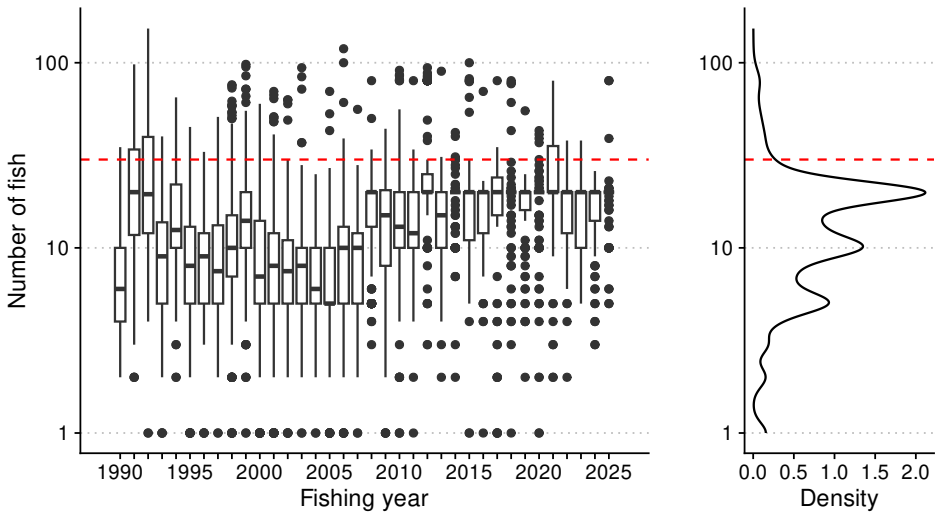


Figure 906: **Length-frequency sample sizes for observed fishing events in LIN 3&4 where ling were sampled. The red dashed line indicates a sample size of 30 fish.**

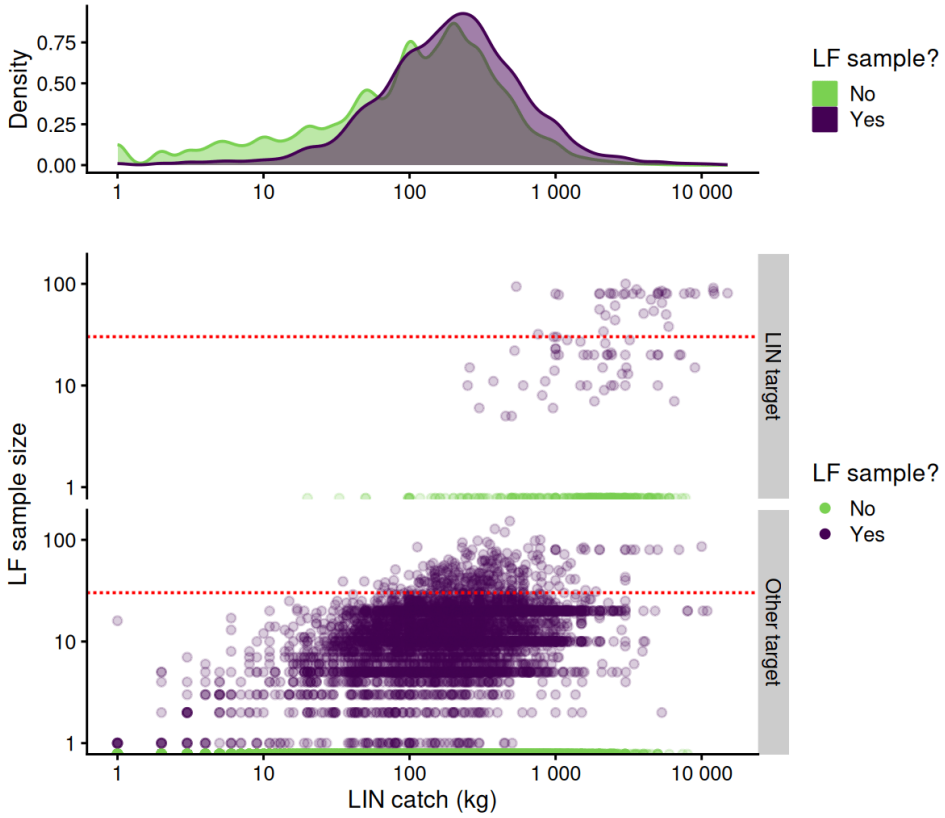


Figure 907: Length-frequency sample sizes (number of fish sampled) for observed fishing events in LIN 3&4 in relation to the total ling catch from an event, separately for ling target events and other target species. The red dashed line indicates a sample size of 30 fish.

2.13.6.2 Otolith samples

Table 75: Otolith samples of ling from the LIN 3&4 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of ling exceeded a potential sampling threshold of 40 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	4 504	0	0	0.00
1991	7 012	0	0	0.00
1992	9 235	0	0	0.00
1993	7 560	0	0	0.00
1994	5 272	0	0	0.00
1995	6 063	0	0	0.00
1996	6 852	0	0	0.00
1997	7 808	0	0	0.00
1998	9 418	0	0	0.00
1999	10 888	0	0	0.00
2000	9 369	0	0	0.00
2001	9 491	0	0	0.00
2002	8 639	0	0	0.00
2003	9 857	0	0	0.00
2004	7 388	0	0	0.00
2005	5 844	0	0	0.00
2006	4 710	0	0	0.00
2007	4 996	0	0	0.00
2008	4 721	0	0	0.00
2009	4 051	132	655	3.26
2010	4 342	63	288	1.45
2011	3 665	31	161	0.85
2012	4 004	48	240	1.20
2013	3 840	124	623	3.23
2014	3 683	149	756	4.05
2015	4 003	34	173	0.85
2016	4 318	35	171	0.81
2017	4 219	70	316	1.66
2018	4 533	105	512	2.32
2019	4 673	112	544	2.40
2020	3 976	127	642	3.19
2021	4 209	105	539	2.49
2022	4 202	109	598	2.59
2023	4 837	90	504	1.86
2024	5 485	132	702	2.41
2025	5 167	158	874	3.06

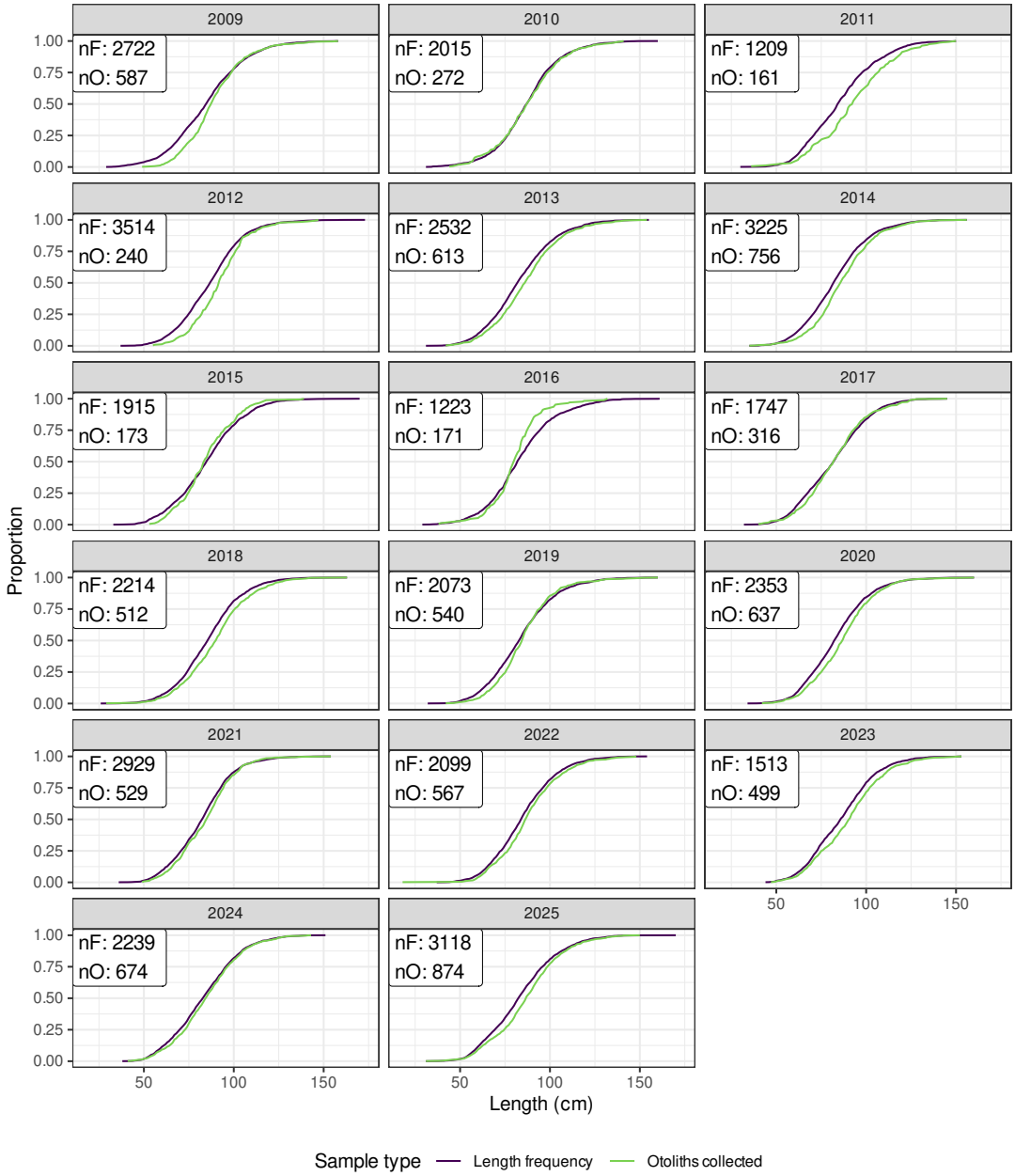


Figure 908: Cumulative distributions of the length of fish in the length frequency and otolith samples of ling in the LIN 3&4 Trawl fishery for the 2009 to 2025 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

2.13.6.3 Catch quantification



Figure 909: Methods used by observers to quantify the catch of ling in the LIN 3&4 Trawl fishery. The legend lists the methods used in descending order of total catch.

2.13.7 LIN 3&4: Pot fishery

2.13.7.1 Length-frequency samples

Table 76: Length-frequency samples of ling from the LIN 3&4 Pot fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of ling exceeded a potential sampling threshold of 40 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	37	0	0	0.00
1991	558	0	0	0.00
1992	1 627	0	0	0.00
1993	1 394	0	0	0.00
1994	394	0	0	0.00
1995	134	0	0	0.00
1996	85	0	0	0.00
1997	977	0	0	0.00
1998	1 442	0	0	0.00
1999	1 834	0	0	0.00
2000	2 053	0	0	0.00
2001	164	0	0	0.00
2002	148	0	0	0.00
2003	65	0	0	0.00
2004	376	0	0	0.00
2005	234	0	0	0.00
2006	2 665	0	0	0.00
2007	3 126	0	0	0.00
2008	2 457	0	0	0.00
2009	748	0	0	0.00
2010	3 160	0	0	0.00
2011	3 186	0	0	0.00
2012	761	0	0	0.00
2013	2 676	0	0	0.00
2014	4 189	0	0	0.00
2015	3 992	0	0	0.00
2016	5 686	0	0	0.00
2017	9 381	0	0	0.00
2018	26 309	0	0	0.00
2019	11 050	0	0	0.00
2020	969	0	0	0.00
2021	941	0	0	0.00
2022	763	3	50	0.39
2023	898	0	0	0.00
2024	1 431	9	199	0.63
2025	1 516	10	501	0.66

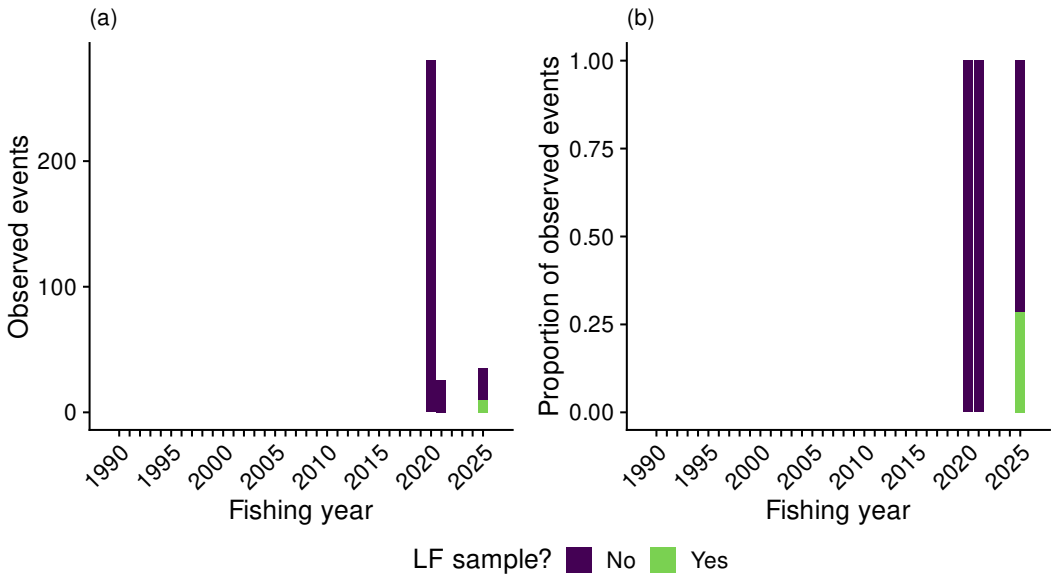


Figure 910: **(a) Observed Pot fishing events, and (b) proportion of observed events, in LIN 3&4 where the ling catch exceeded the 40 kg threshold, with and without length-frequency sampling.**

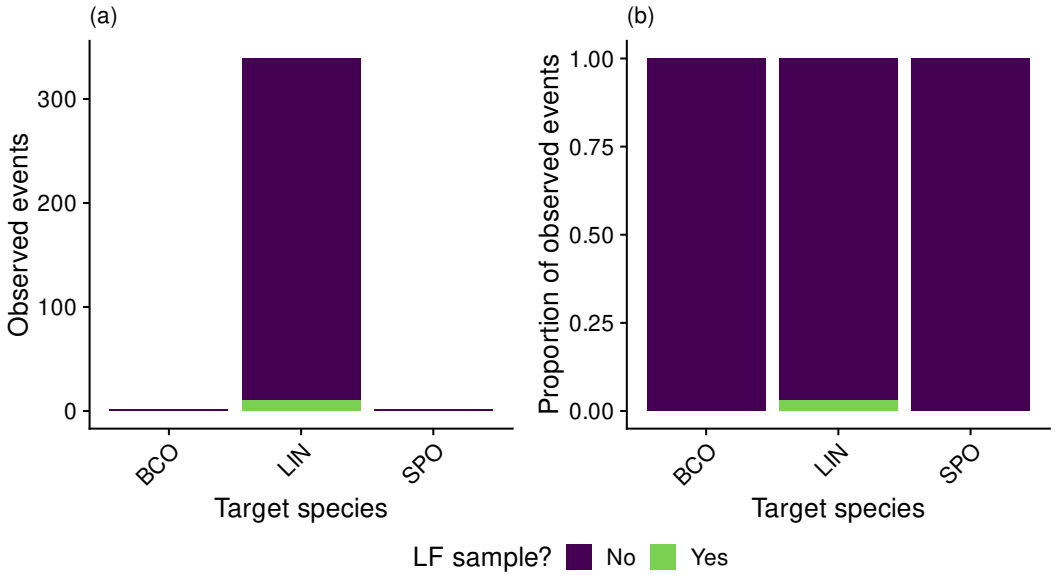


Figure 911: **(a) Observed Pot fishing events, and (b) proportion of observed events, in LIN 3&4 where the ling catch exceeded the 40 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

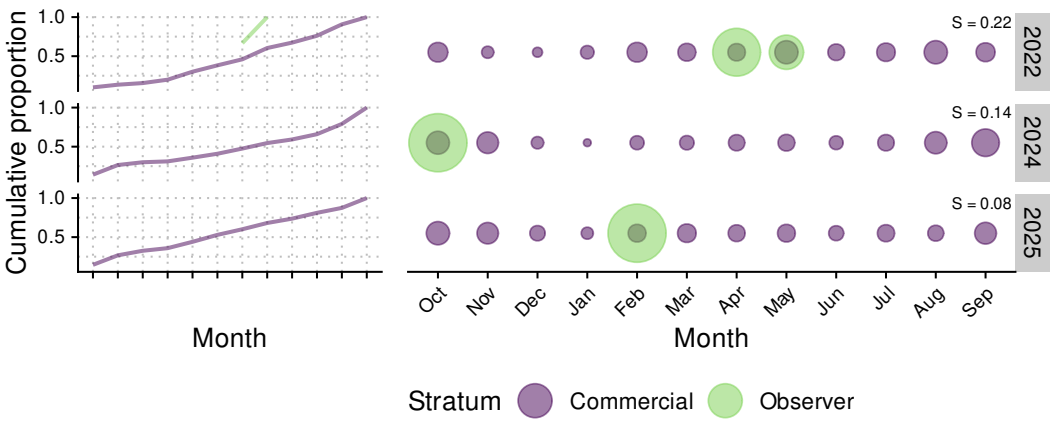


Figure 912: **Monthly representativeness of observer sampling coverage of Pot fishing events in LIN 3&4, where the ling catch exceeded the 40kg threshold, in 2022 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

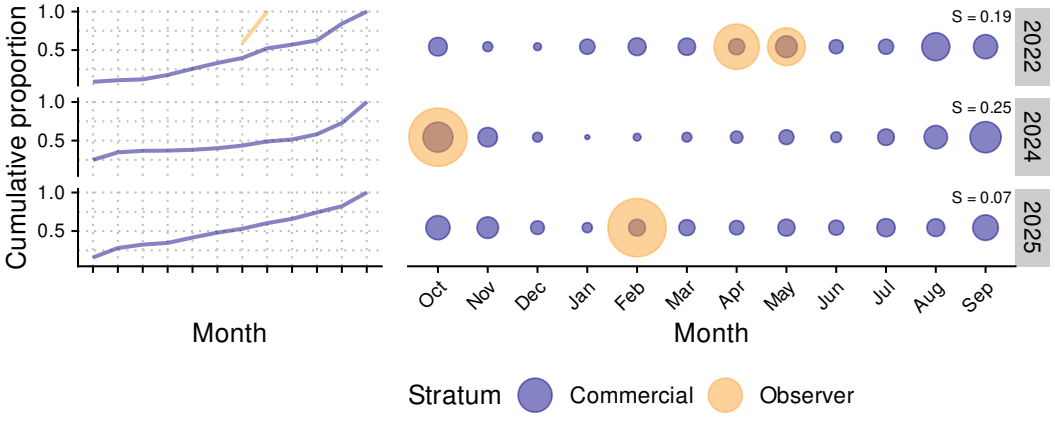


Figure 913: **Monthly representativeness of observer sampling coverage of Pot catch in LIN 3&4, from events where the ling catch exceeded the 40kg threshold, in 2022 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

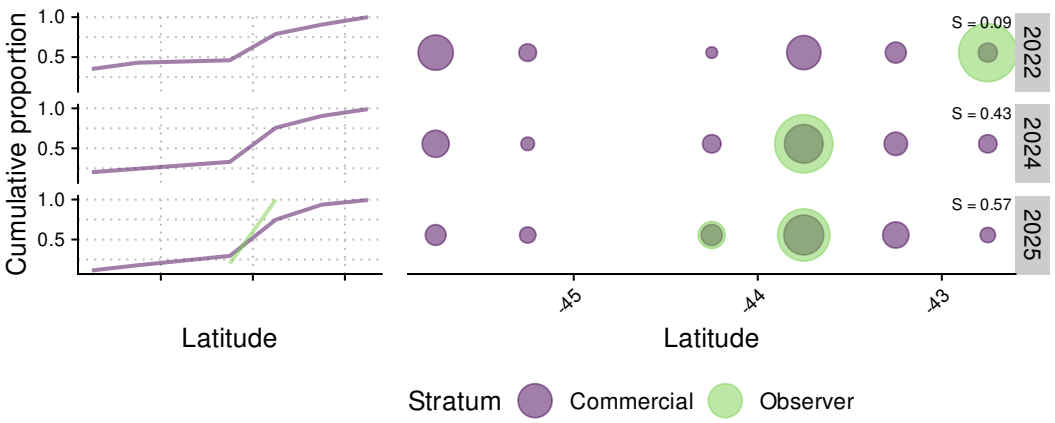


Figure 914: **Latitudinal representativeness of observer sampling coverage of Pot fishing events in LIN 3&4, where the ling catch exceeded the 40kg threshold, in 2022 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

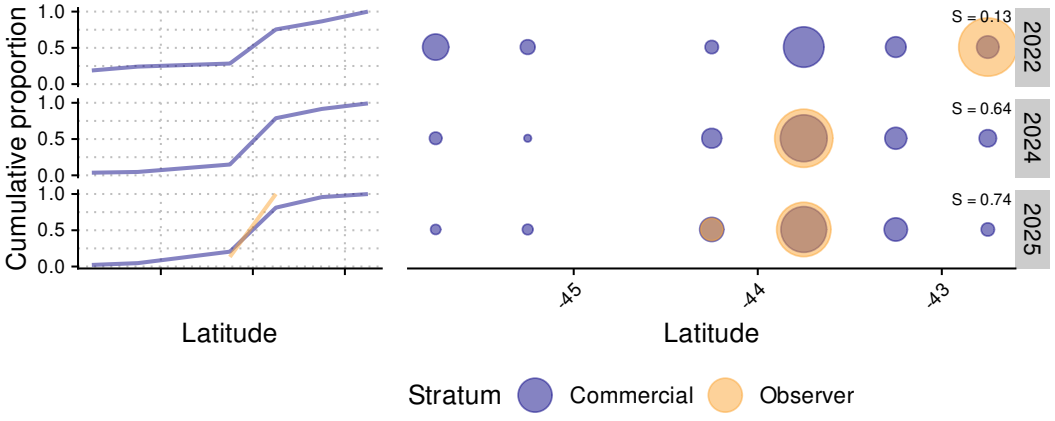


Figure 915: **Latitudinal representativeness of observer sampling coverage of Pot catch in LIN 3&4, from events where the ling catch exceeded the 40kg threshold, in 2022 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

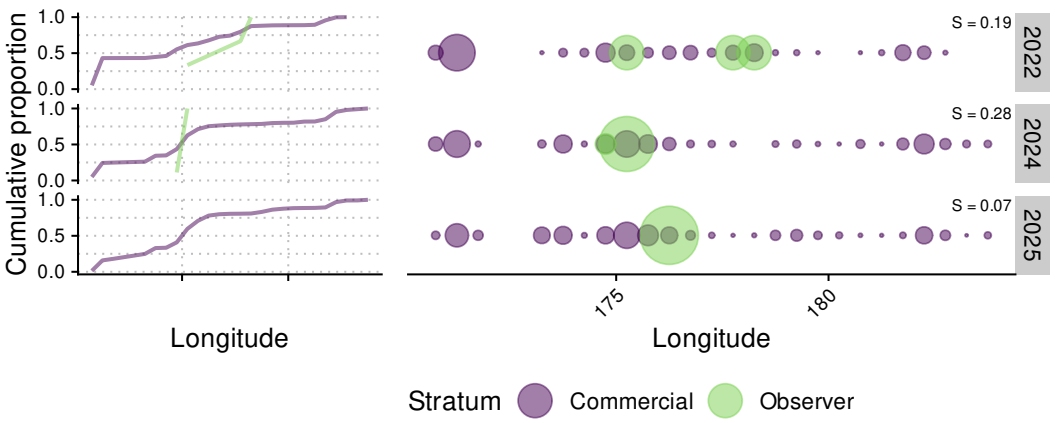


Figure 916: **Longitudinal representativeness of observer sampling coverage of Pot fishing events in LIN 3&4, where the ling catch exceeded the 40kg threshold, in 2022 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

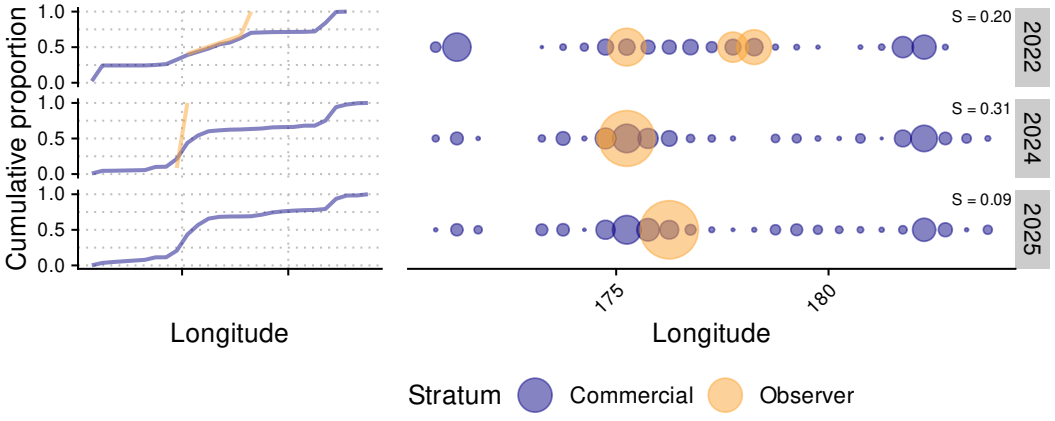


Figure 917: **Longitudinal representativeness of observer sampling coverage of Pot catch in LIN 3&4, from events where the ling catch exceeded the 40kg threshold, in 2022 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

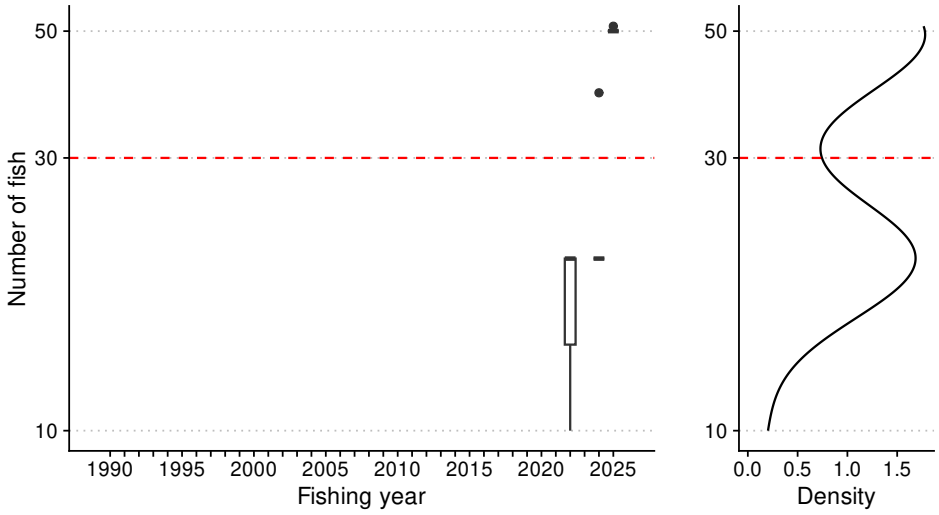


Figure 918: Length-frequency sample sizes for observed fishing events in LIN 3&4 where ling were sampled. The red dashed line indicates a sample size of 30 fish.

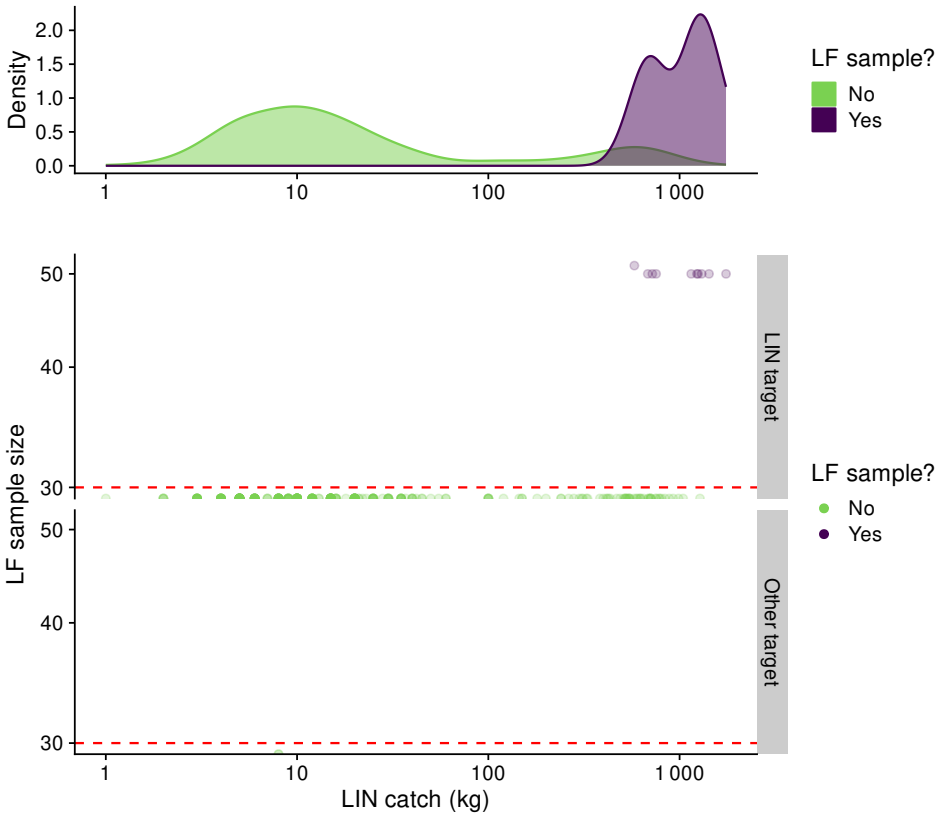


Figure 919: Length-frequency sample sizes (number of fish sampled) for observed fishing events in LIN 3&4 in relation to the total ling catch from an event, separately for ling target events and other target species. The red dashed line indicates a sample size of 30 fish.

2.13.7.2 Otolith samples

Table 77: Otolith samples of ling from the LIN 3&4 Pot fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of ling exceeded a potential sampling threshold of 40 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	37	0	0	0.00
1991	558	0	0	0.00
1992	1 627	0	0	0.00
1993	1 394	0	0	0.00
1994	394	0	0	0.00
1995	134	0	0	0.00
1996	85	0	0	0.00
1997	977	0	0	0.00
1998	1 442	0	0	0.00
1999	1 834	0	0	0.00
2000	2 053	0	0	0.00
2001	164	0	0	0.00
2002	148	0	0	0.00
2003	65	0	0	0.00
2004	376	0	0	0.00
2005	234	0	0	0.00
2006	2 665	0	0	0.00
2007	3 126	0	0	0.00
2008	2 457	0	0	0.00
2009	748	0	0	0.00
2010	3 160	0	0	0.00
2011	3 186	0	0	0.00
2012	761	0	0	0.00
2013	2 676	0	0	0.00
2014	4 189	0	0	0.00
2015	3 992	0	0	0.00
2016	5 686	0	0	0.00
2017	9 381	0	0	0.00
2018	26 309	0	0	0.00
2019	11 050	0	0	0.00
2020	969	0	0	0.00
2021	941	0	0	0.00
2022	763	0	0	0.00
2023	898	0	0	0.00
2024	1 431	0	0	0.00
2025	1 516	10	100	0.66

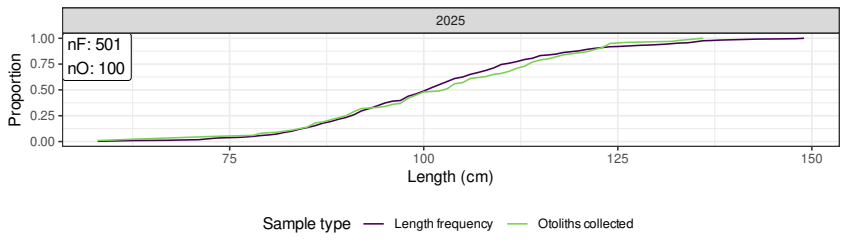


Figure 920: Cumulative distributions of the length of fish in the length frequency and otolith samples of ling in the LIN 3&4 Pot fishery for the 2025 to 2025 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

2.13.7.3 Catch quantification

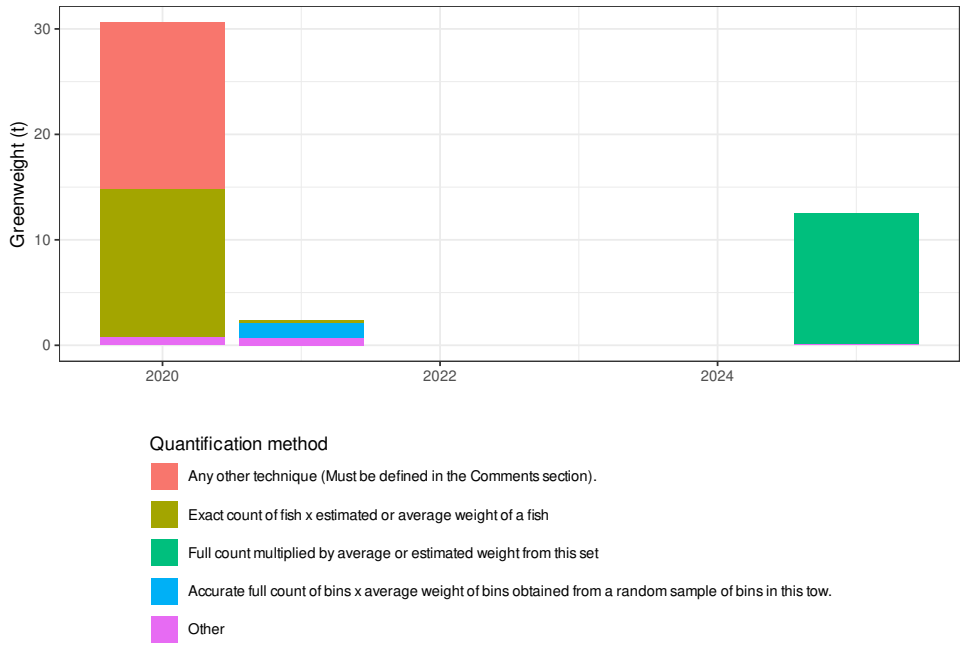


Figure 921: Methods used by observers to quantify the catch of ling in the LIN 3&4 Pot fishery. The legend lists the methods used in descending order of total catch.

2.13.8 LIN 5&6: Trawl fishery

2.13.8.1 Length-frequency samples

Table 78: Length-frequency samples of ling from the LIN 5&6 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of ling exceeded a potential sampling threshold of 40 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	3 356	18	575	0.54
1991	4 058	34	537	0.84
1992	5 007	76	1 586	1.52
1993	4 224	85	1 897	2.01
1994	2 977	85	1 206	2.86
1995	3 368	57	547	1.69
1996	3 778	83	1 415	2.20
1997	3 820	37	207	0.97
1998	3 135	124	1 151	3.96
1999	3 260	135	1 476	4.14
2000	3 515	145	2 702	4.13
2001	4 202	235	2 598	5.59
2002	3 650	137	1 086	3.75
2003	3 780	128	1 250	3.39
2004	3 024	108	1 174	3.57
2005	3 612	144	2 293	3.99
2006	3 217	167	3 386	5.19
2007	3 198	159	2 804	4.97
2008	2 143	98	4 484	4.57
2009	2 061	101	3 047	4.90
2010	2 298	75	2 599	3.26
2011	2 235	158	4 350	7.07
2012	2 170	96	3 872	4.42
2013	1 828	203	6 583	11.11
2014	1 868	158	5 352	8.46
2015	2 037	161	5 469	7.90
2016	1 543	128	6 559	8.30
2017	2 003	153	6 186	7.64
2018	1 956	200	7 389	10.22
2019	2 134	217	8 616	10.17
2020	1 841	131	5 413	7.12
2021	1 795	100	4 380	5.57
2022	1 517	172	9 865	11.34
2023	1 598	129	8 633	8.07
2024	1 660	196	10 241	11.81
2025	1 596	249	14 365	15.60

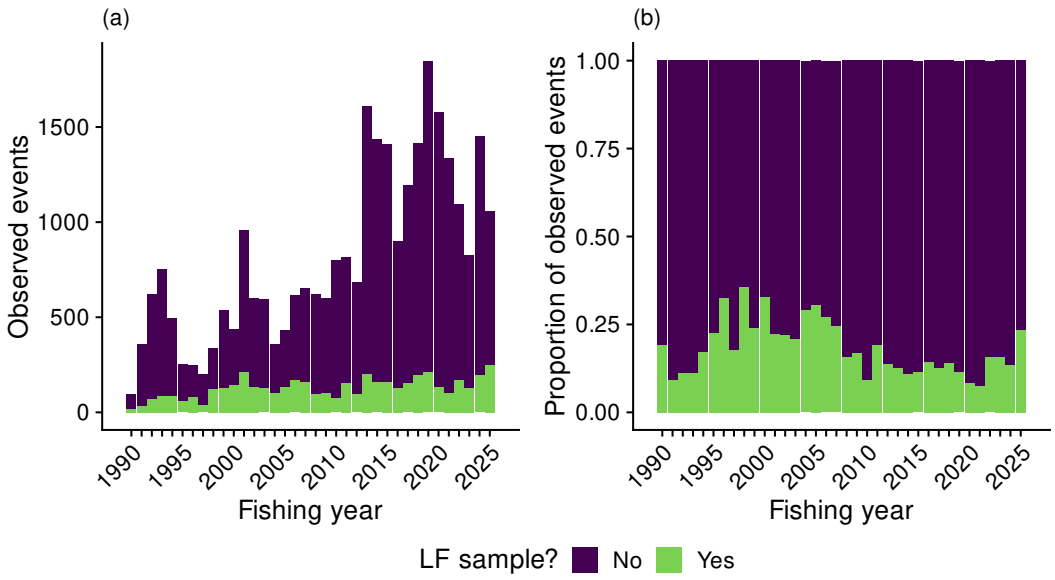


Figure 922: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in LIN 5&6 where the ling catch exceeded the 40 kg threshold, with and without length-frequency sampling.**

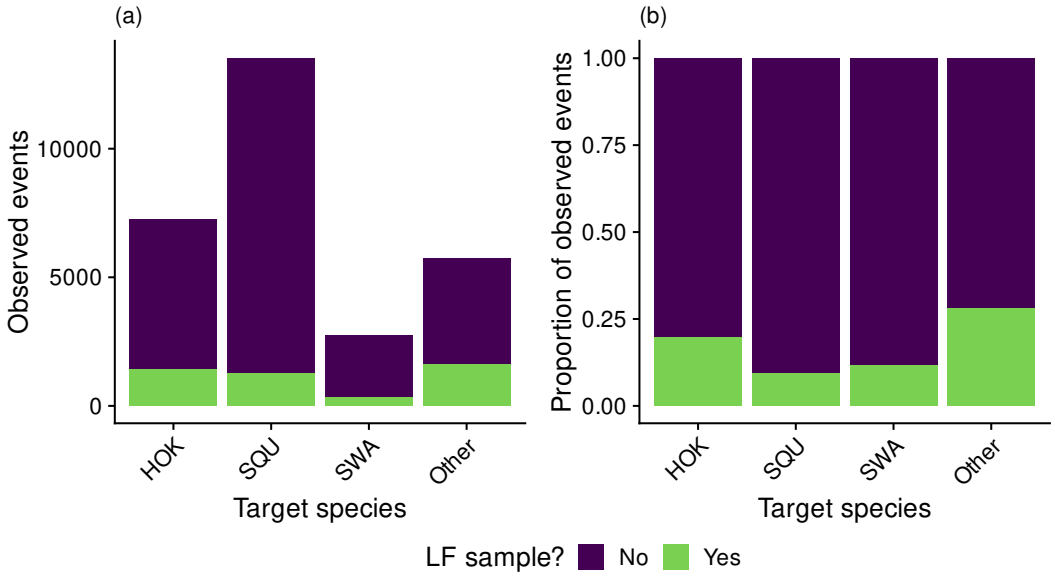


Figure 923: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in LIN 5&6 where the ling catch exceeded the 40 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

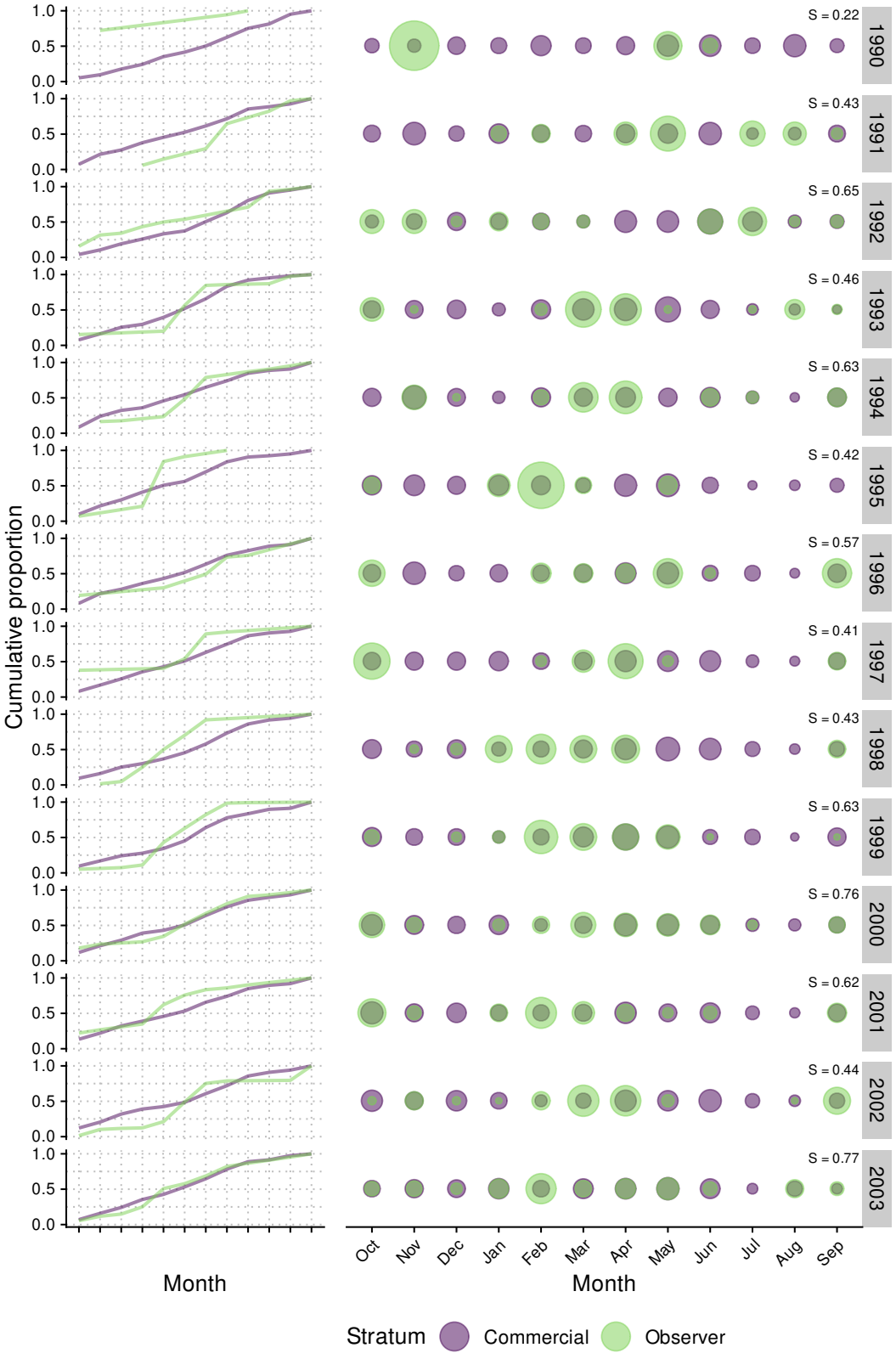


Figure 924: Monthly representativeness of observer sampling coverage of Trawl fishing events in LIN 5&6, where the ling catch exceeded the 40kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

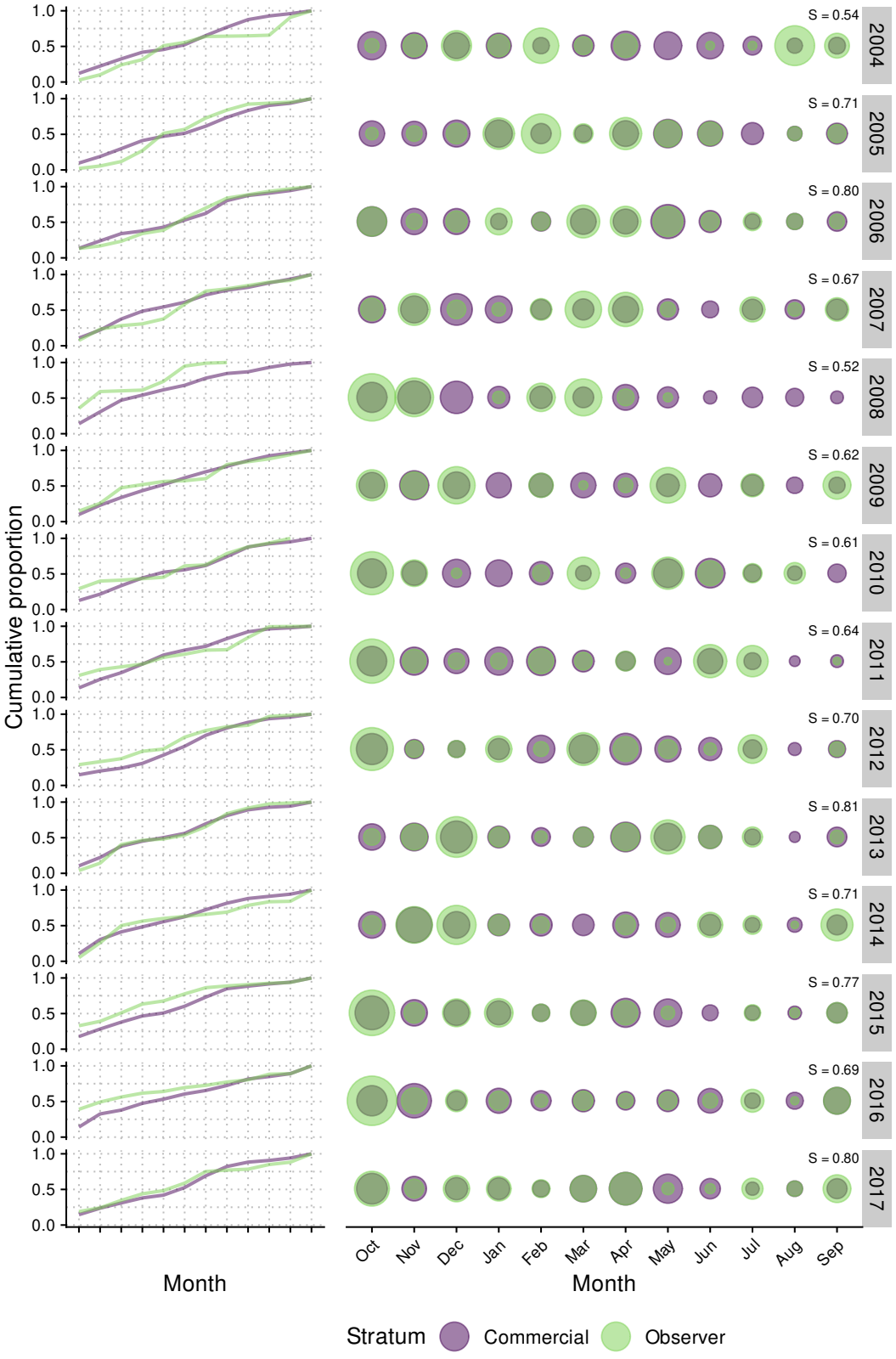


Figure 925: Monthly representativeness of observer sampling coverage of Trawl fishing events in LIN 5&6, where the ling catch exceeded the 40kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

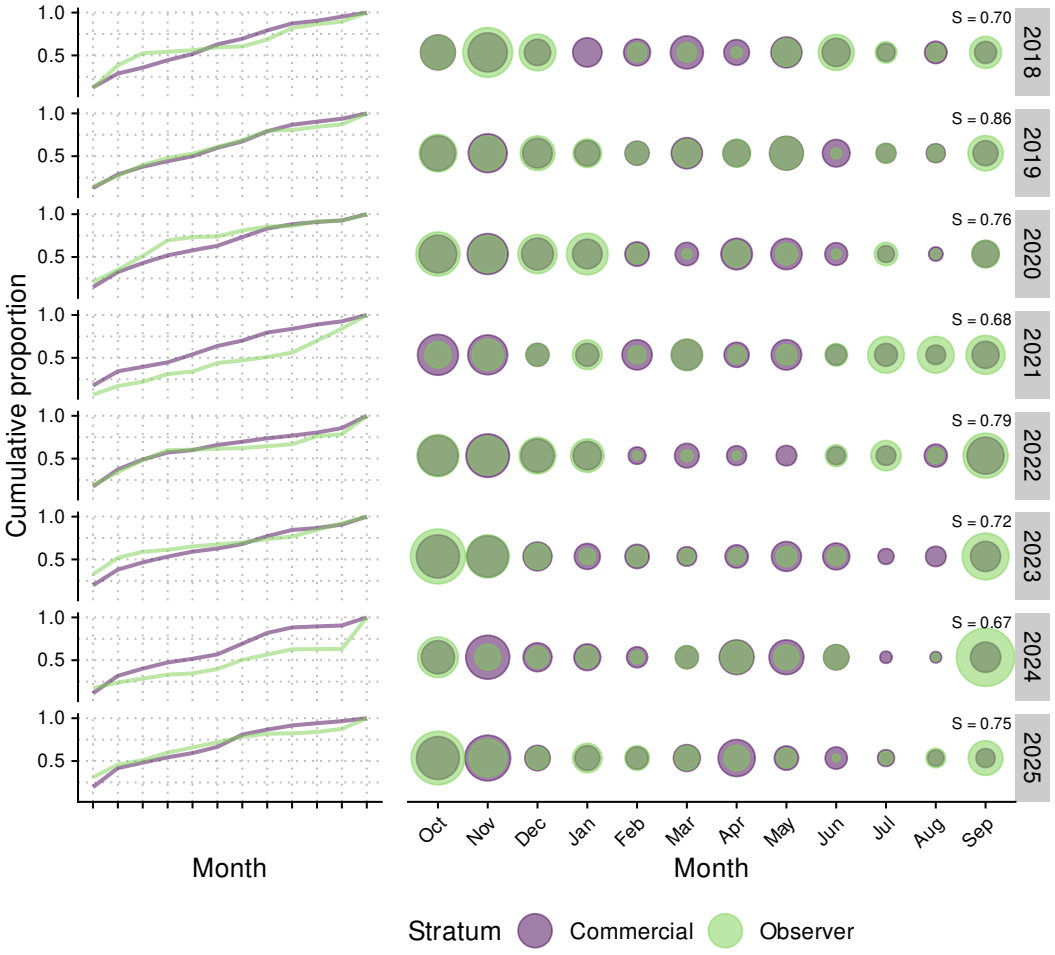


Figure 926: Monthly representativeness of observer sampling coverage of Trawl fishing events in LIN 5&6, where the ling catch exceeded the 40kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

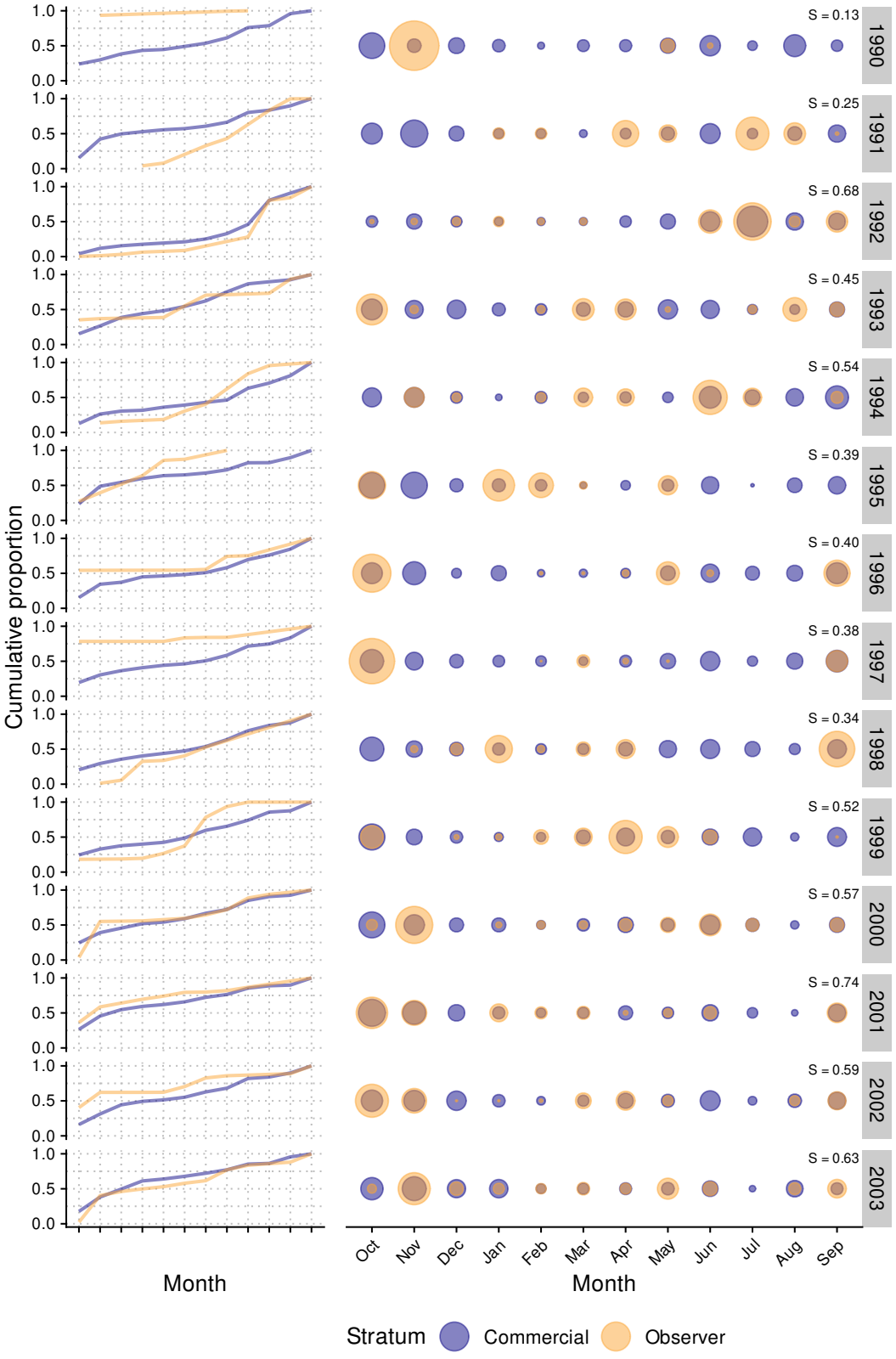


Figure 927: **Monthly representativeness of observer sampling coverage of Trawl catch in LIN 5&6, from events where the ling catch exceeded the 40kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

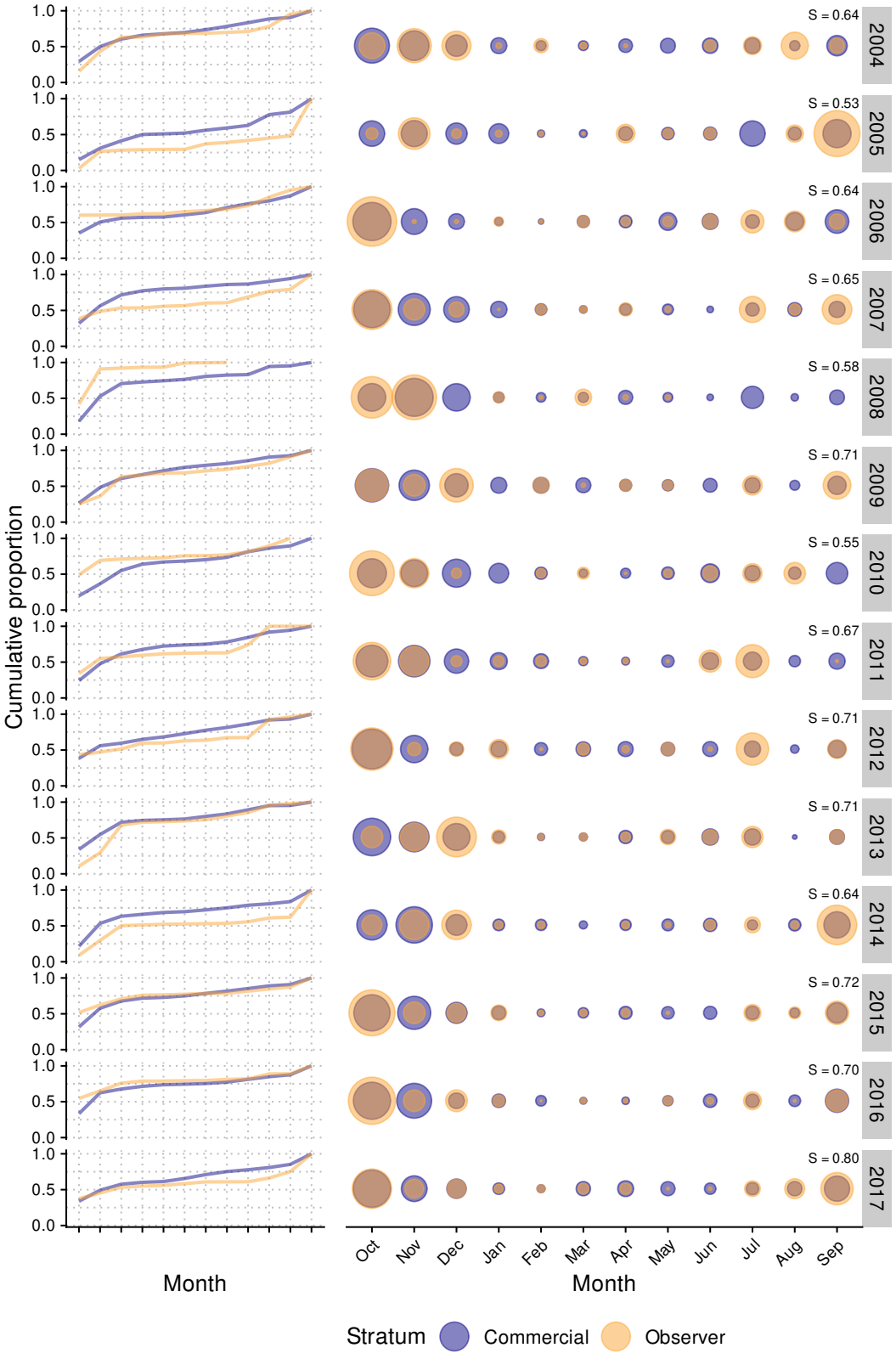


Figure 928: **Monthly representativeness of observer sampling coverage of Trawl catch in LIN 5&6, from events where the ling catch exceeded the 40kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

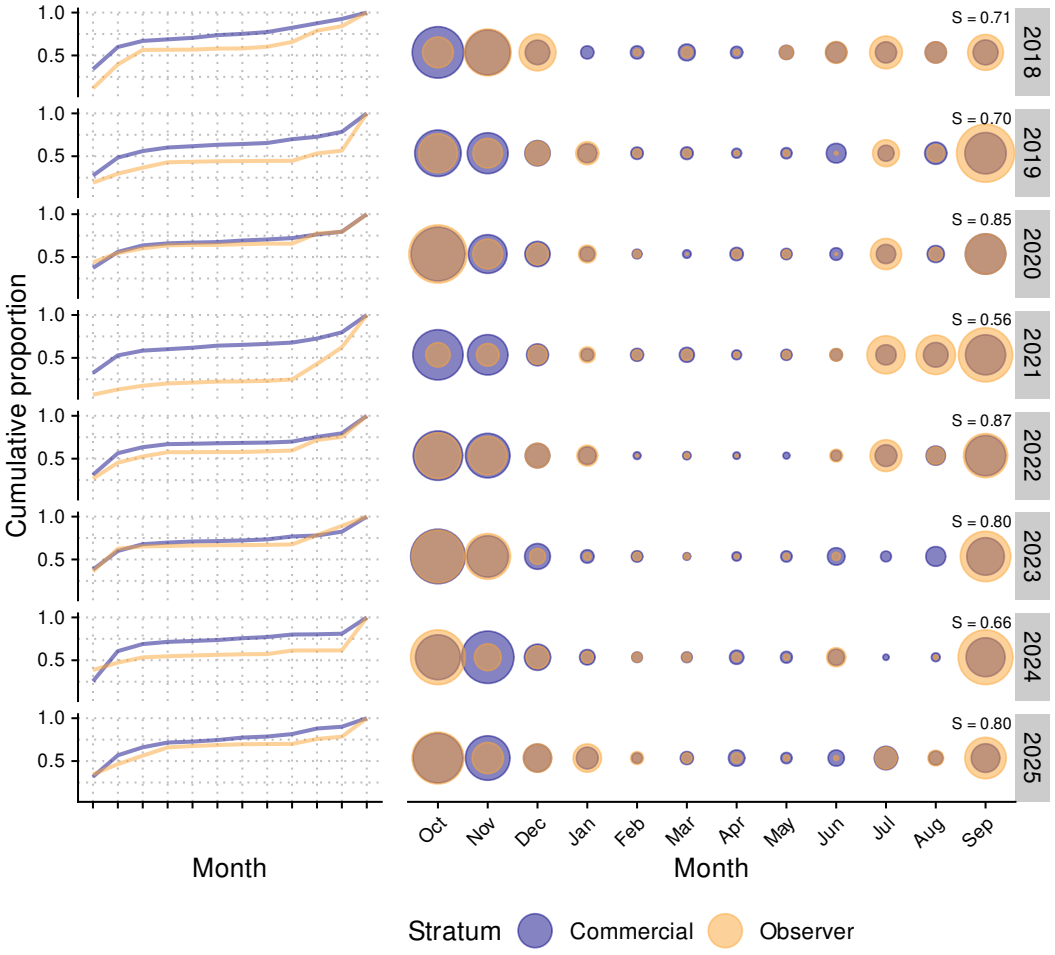


Figure 929: Monthly representativeness of observer sampling coverage of Trawl catch in LIN 5&6, from events where the ling catch exceeded the 40kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

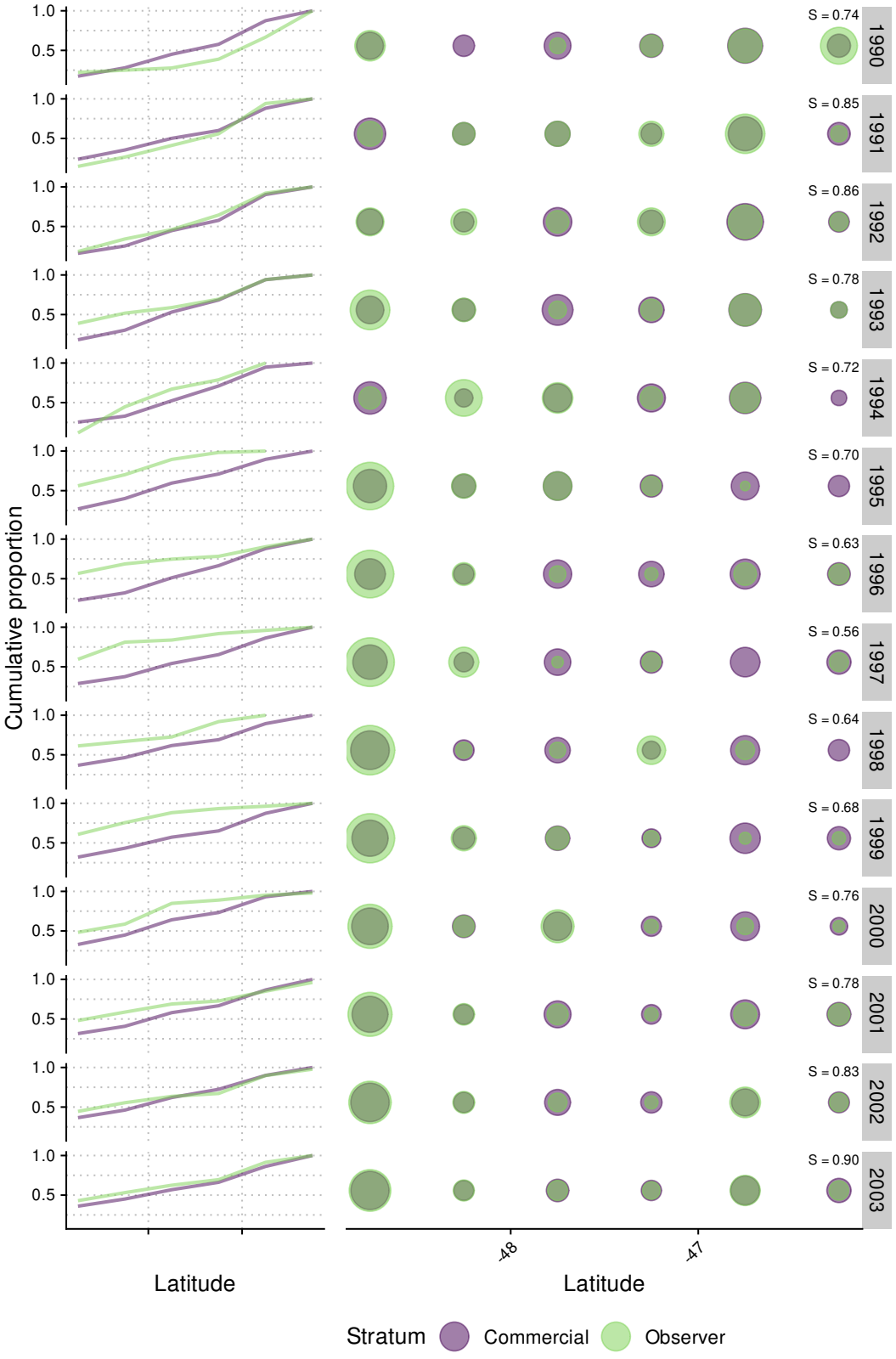


Figure 930: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in LIN 5&6, where the ling catch exceeded the 40kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

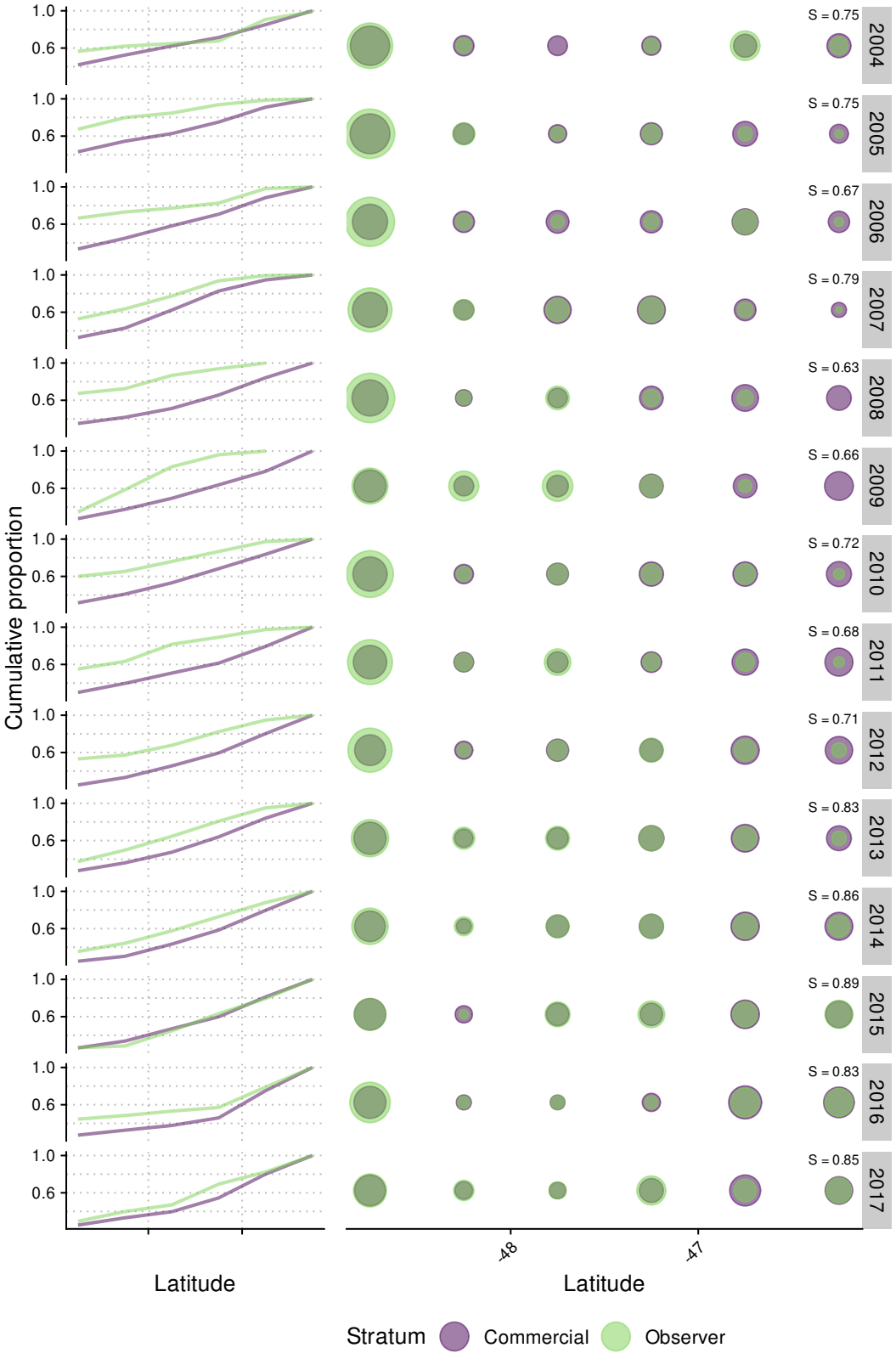


Figure 931: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in LIN 5&6, where the ling catch exceeded the 40kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

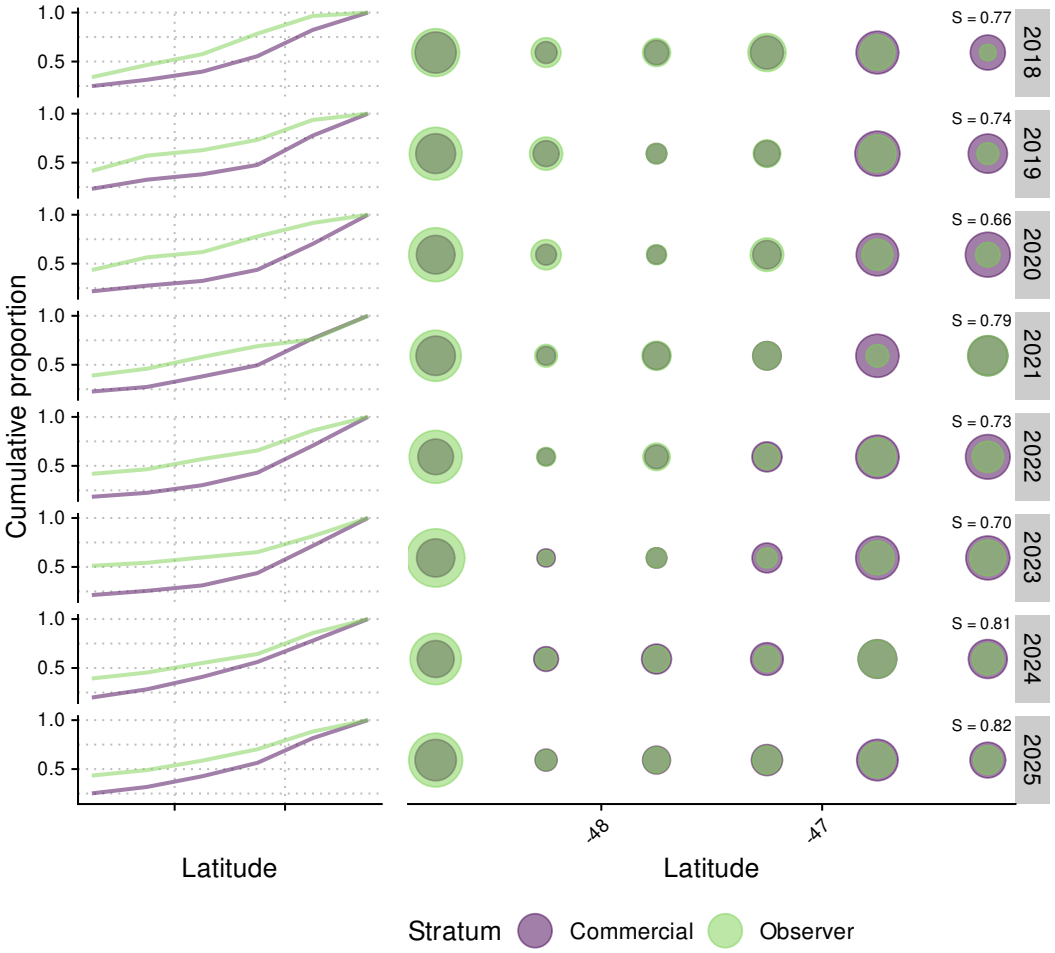


Figure 932: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in LIN 5&6, where the ling catch exceeded the 40kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

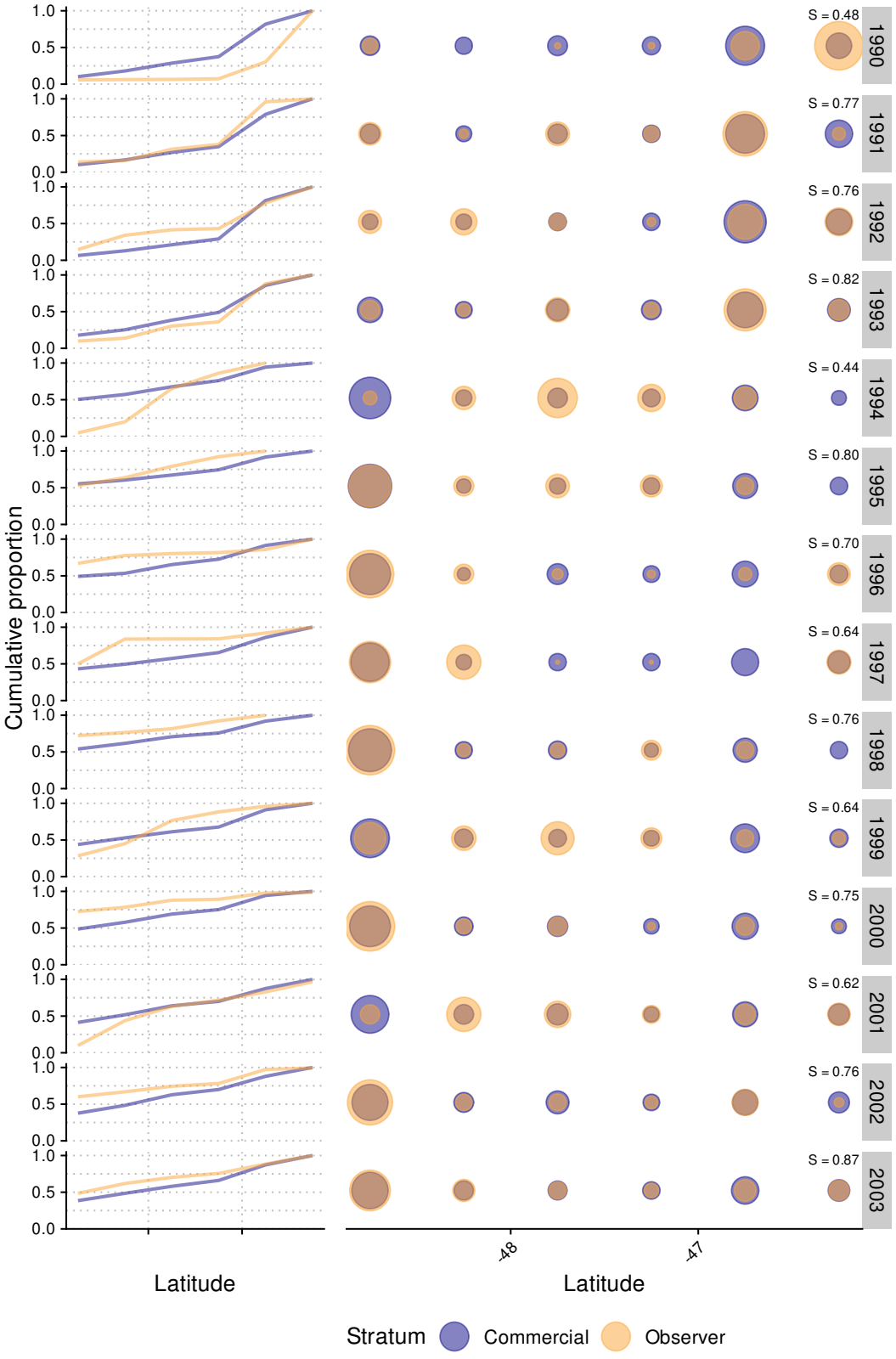


Figure 933: **Latitudinal representativeness of observer sampling coverage of Trawl catch in LIN 5&6, from events where the ling catch exceeded the 40kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

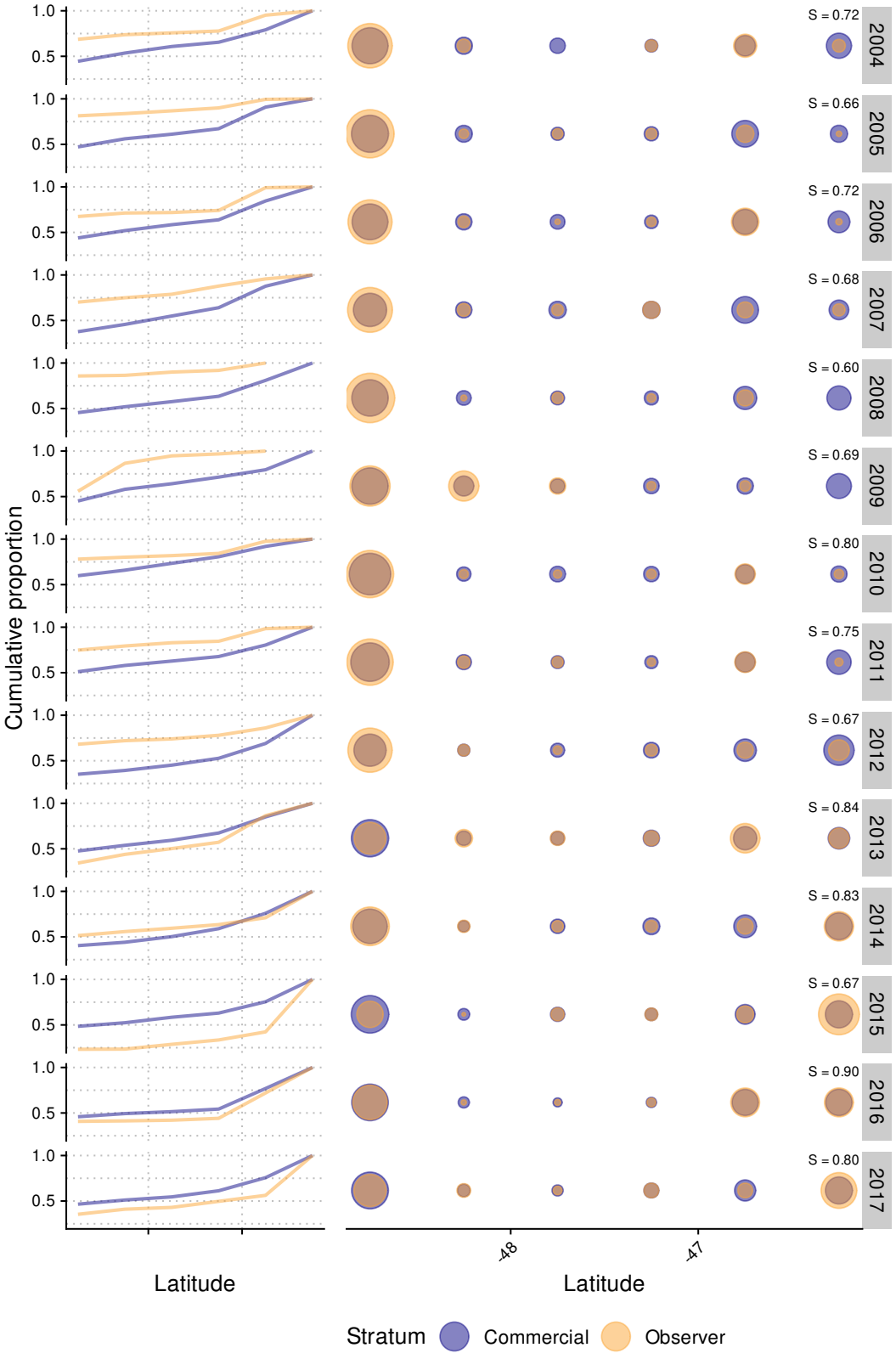


Figure 934: **Latitudinal representativeness of observer sampling coverage of Trawl catch in LIN 5&6, from events where the ling catch exceeded the 40kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

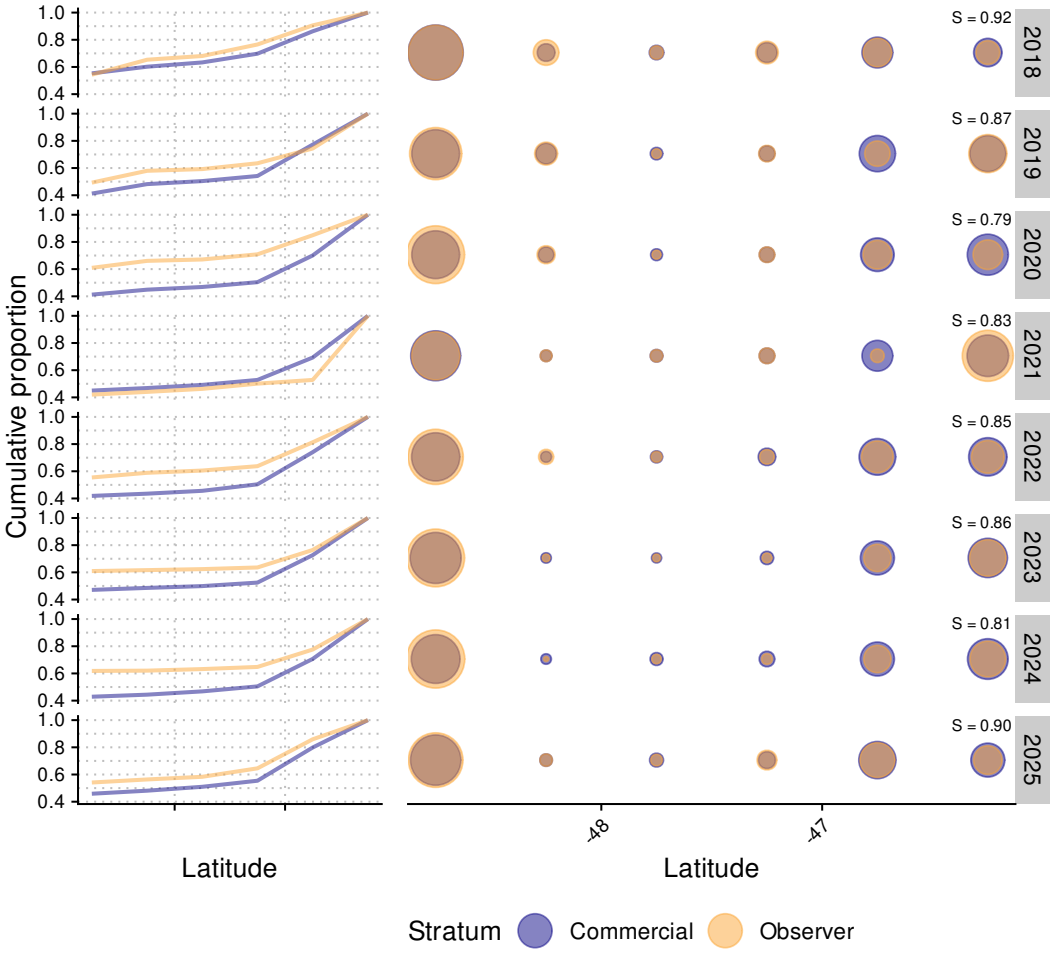


Figure 935: Latitudinal representativeness of observer sampling coverage of Trawl catch in LIN 5&6, from events where the ling catch exceeded the 40kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

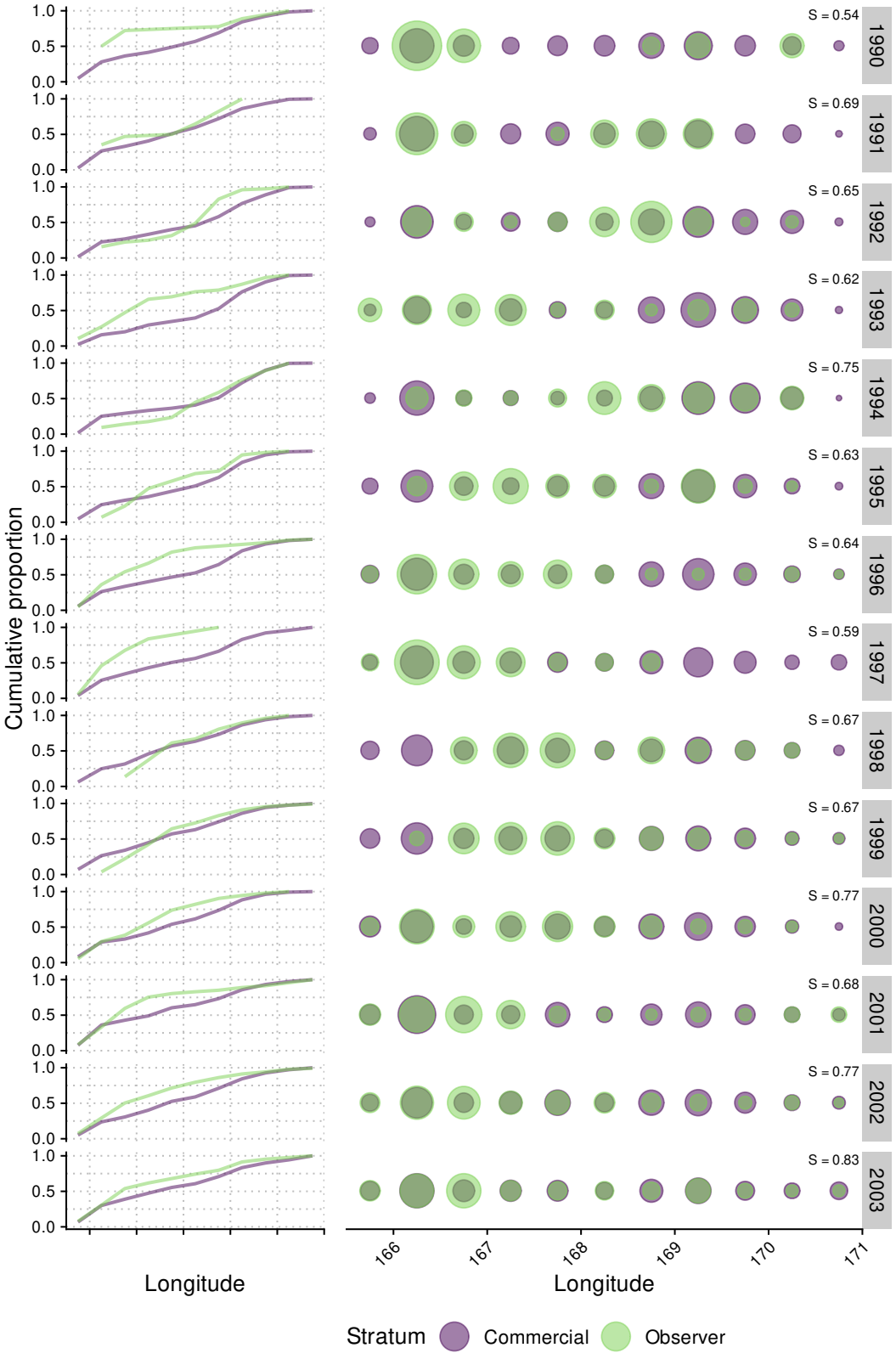


Figure 936: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in LIN 5&6, where the ling catch exceeded the 40kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

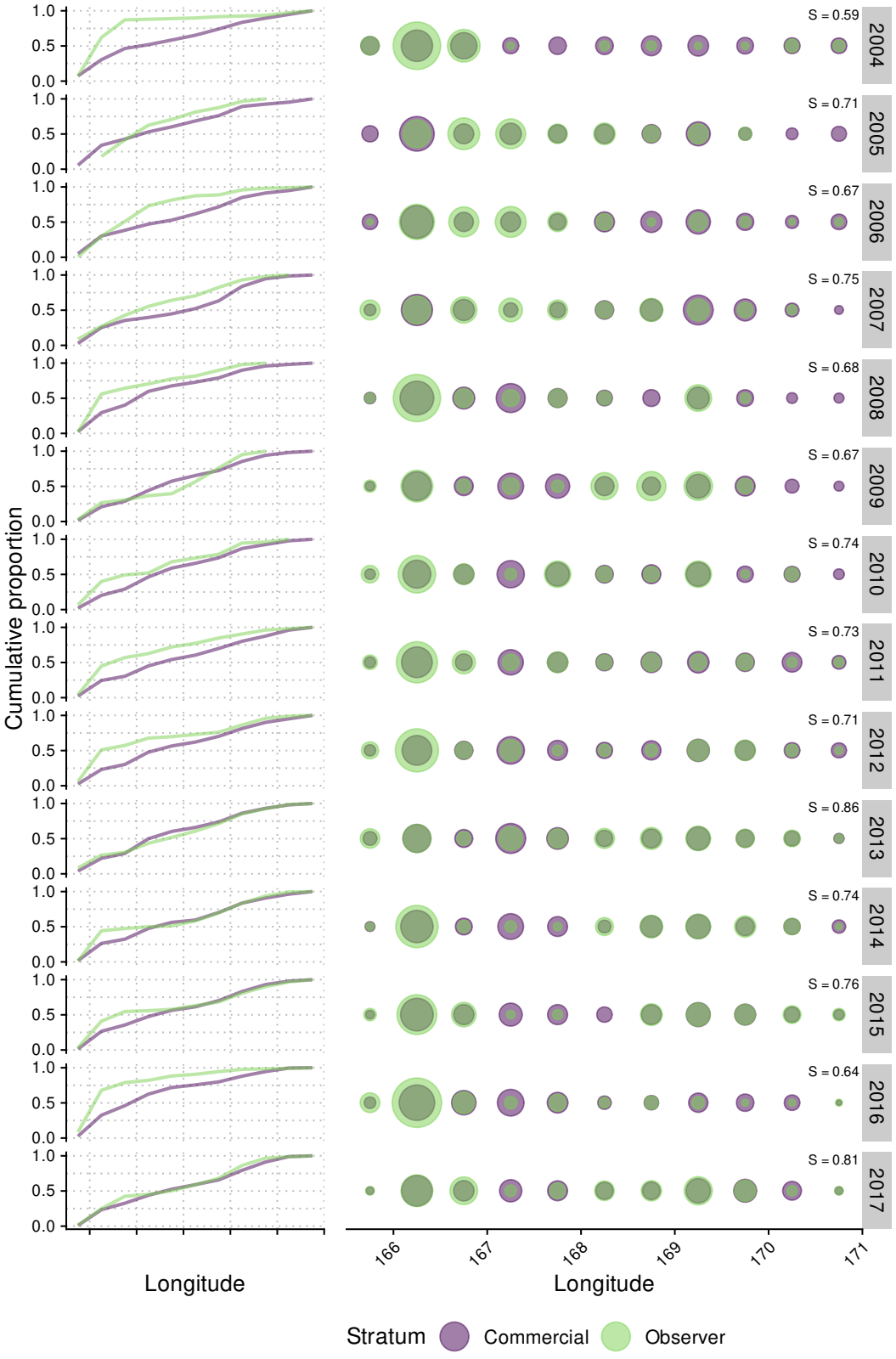


Figure 937: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in LIN 5&6, where the ling catch exceeded the 40kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

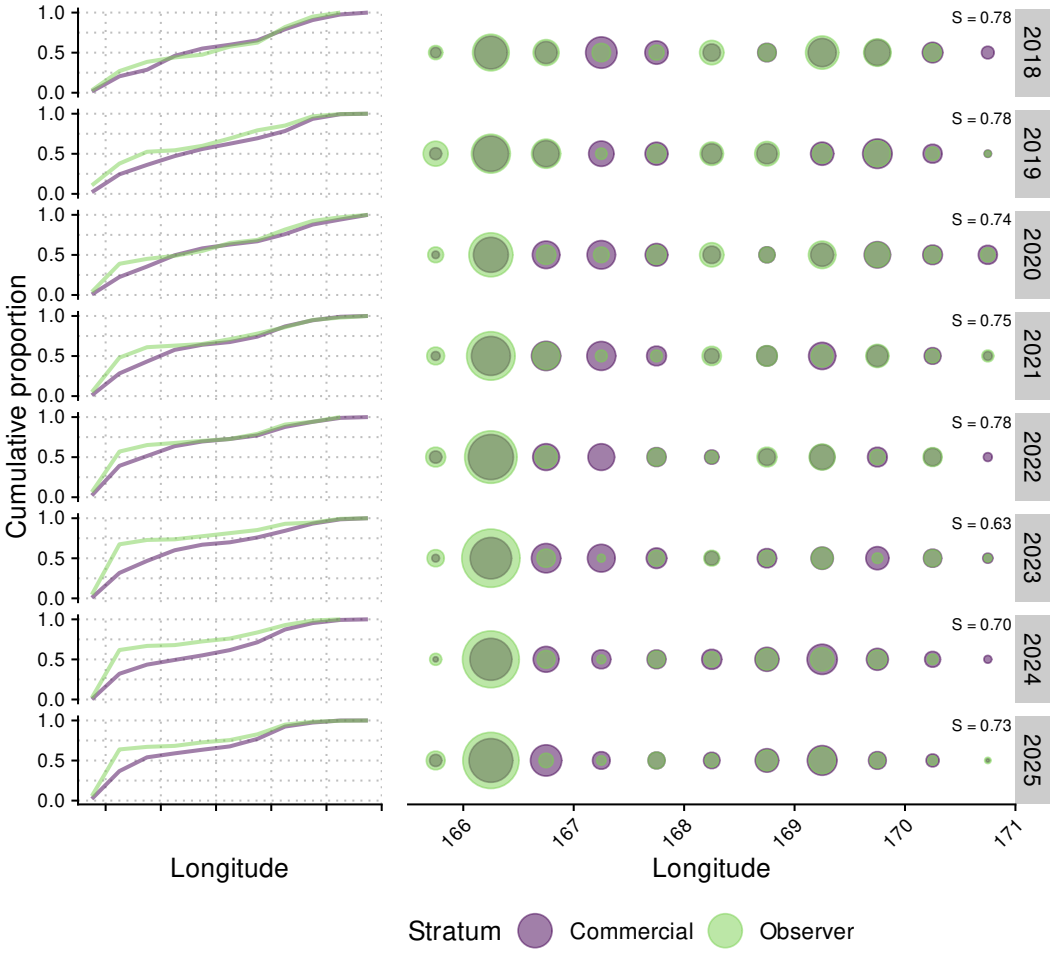


Figure 938: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in LIN 5&6, where the ling catch exceeded the 40kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

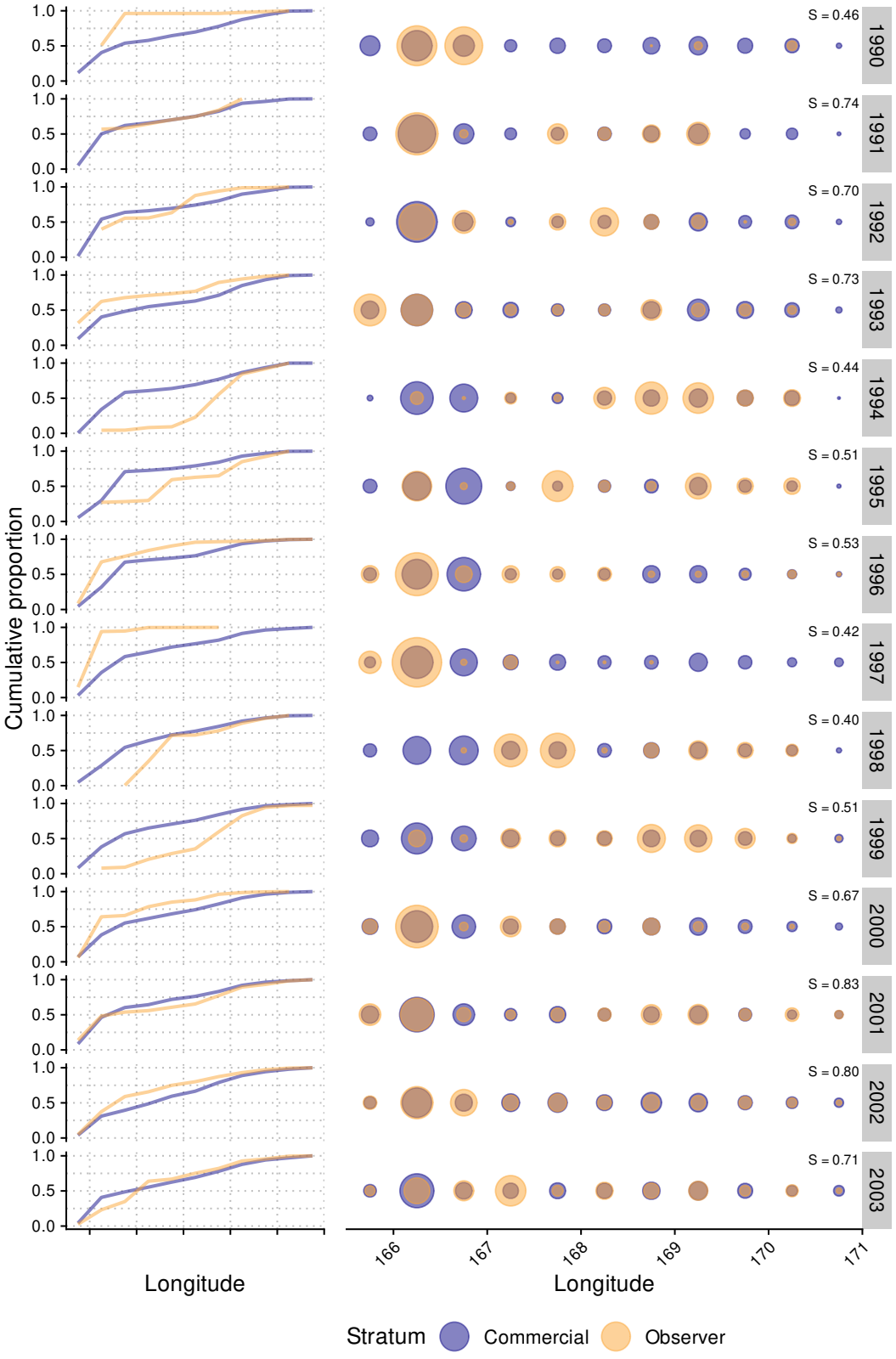


Figure 939: **Longitudinal representativeness of observer sampling coverage of Trawl catch in LIN 5&6, from events where the ling catch exceeded the 40kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

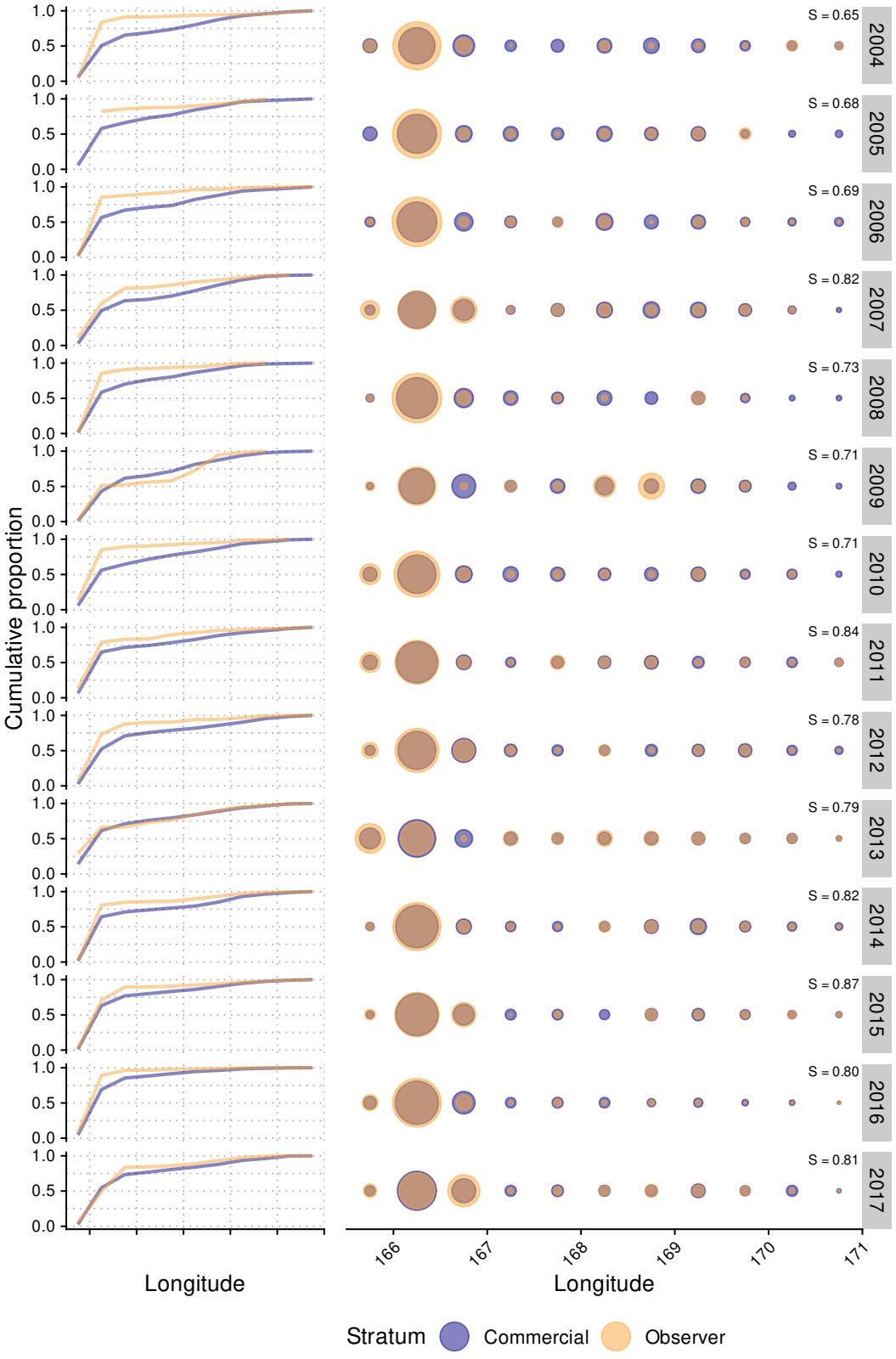


Figure 940: **Longitudinal representativeness of observer sampling coverage of Trawl catch in LIN 5&6, from events where the ling catch exceeded the 40kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

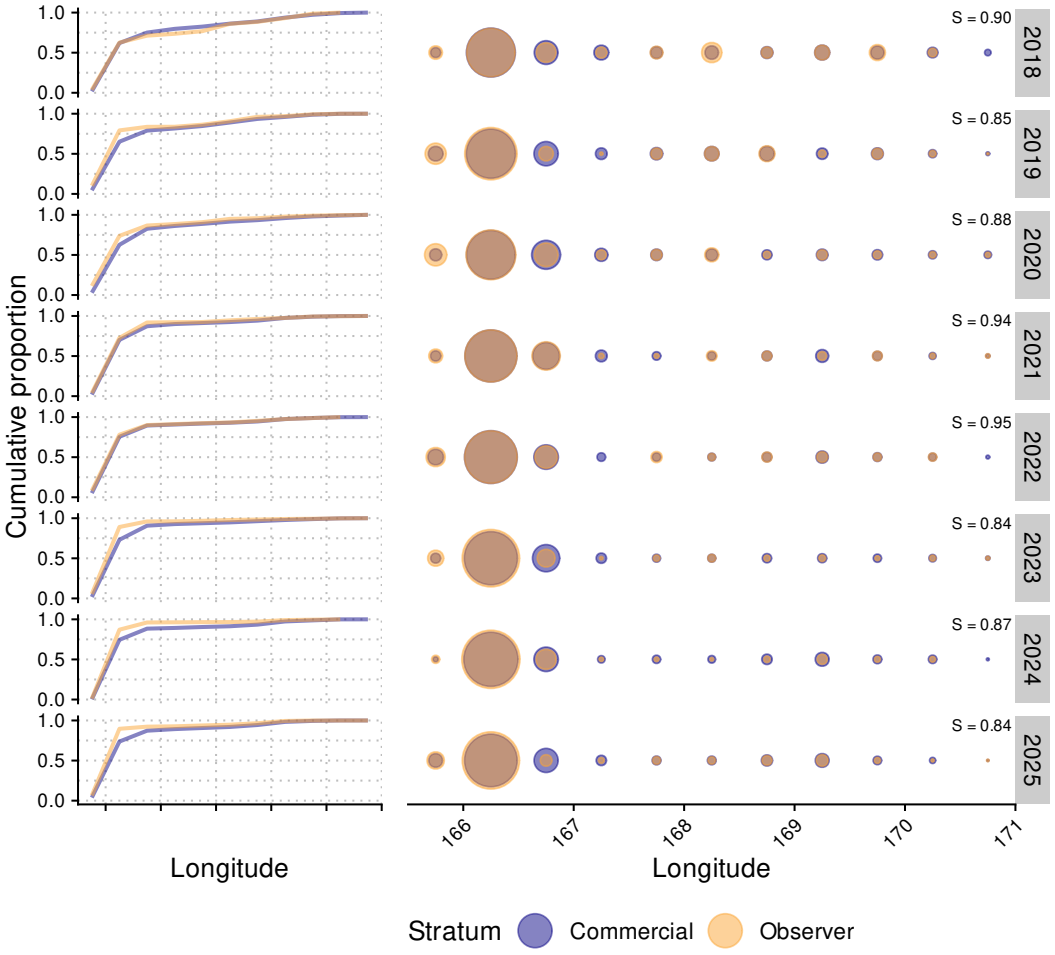


Figure 941: **Longitudinal representativeness of observer sampling coverage of Trawl catch in LIN 5&6, from events where the ling catch exceeded the 40kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

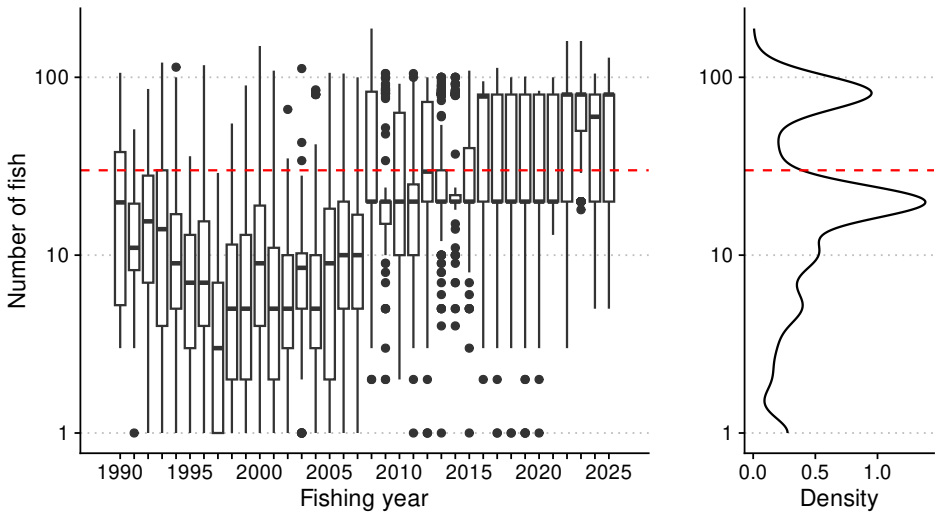


Figure 942: **Length-frequency sample sizes for observed fishing events in LIN 5&6 where ling were sampled. The red dashed line indicates a sample size of 30 fish.**

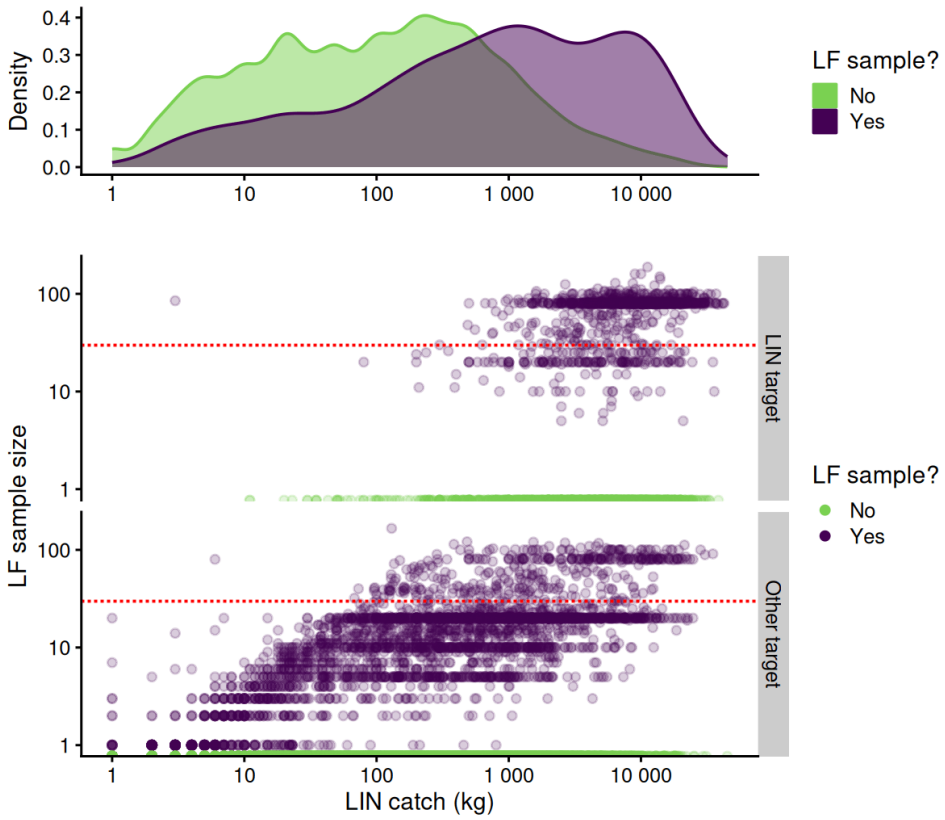


Figure 943: Length-frequency sample sizes (number of fish sampled) for observed fishing events in LIN 5&6 in relation to the total ling catch from an event, separately for ling target events and other target species. The red dashed line indicates a sample size of 30 fish.

2.13.8.2 Otolith samples

Table 79: Otolith samples of ling from the LIN 5&6 Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of ling exceeded a potential sampling threshold of 40 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	3 356	0	0	0.00
1991	4 058	0	0	0.00
1992	5 007	0	0	0.00
1993	4 224	0	0	0.00
1994	2 977	0	0	0.00
1995	3 368	0	0	0.00
1996	3 778	0	0	0.00
1997	3 820	0	0	0.00
1998	3 135	0	0	0.00
1999	3 260	0	0	0.00
2000	3 515	0	0	0.00
2001	4 202	0	0	0.00
2002	3 650	0	0	0.00
2003	3 780	0	0	0.00
2004	3 024	0	0	0.00
2005	3 612	0	0	0.00
2006	3 217	0	0	0.00
2007	3 198	0	0	0.00
2008	2 143	0	0	0.00
2009	2 061	19	95	0.92
2010	2 298	46	252	2.00
2011	2 235	88	455	3.94
2012	2 170	66	352	3.04
2013	1 828	165	846	9.03
2014	1 868	131	630	7.01
2015	2 037	53	264	2.60
2016	1 543	67	336	4.34
2017	2 003	118	604	5.89
2018	1 956	185	1 003	9.46
2019	2 134	192	1 060	9.00
2020	1 841	120	586	6.52
2021	1 795	99	500	5.52
2022	1 517	172	1 441	11.34
2023	1 598	122	1 075	7.63
2024	1 660	195	1 546	11.75
2025	1 596	248	2 109	15.54

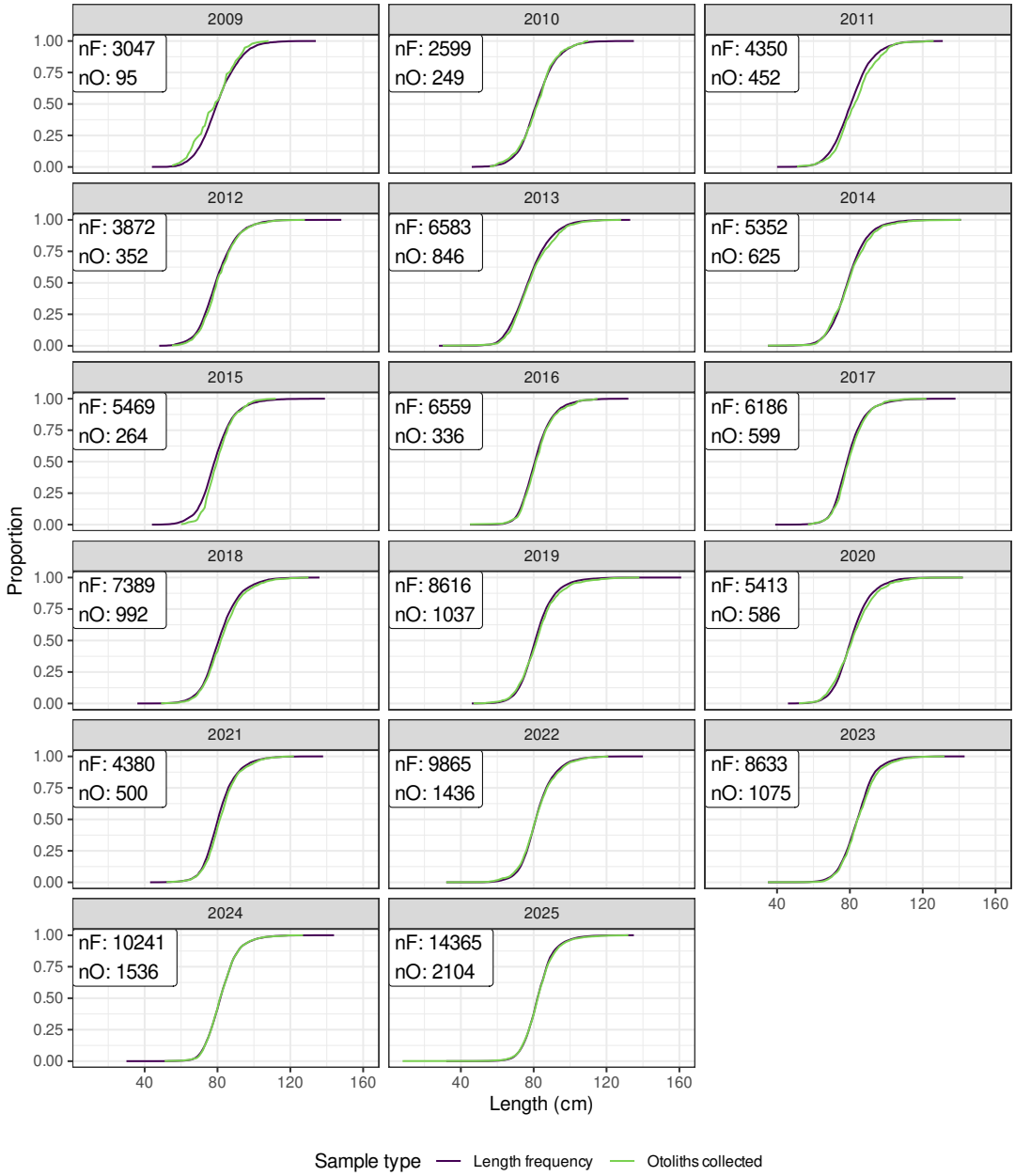


Figure 944: Cumulative distributions of the length of fish in the length frequency and otolith samples of ling in the LIN 5&6 Trawl fishery for the 2009 to 2025 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

2.13.8.3 Catch quantification

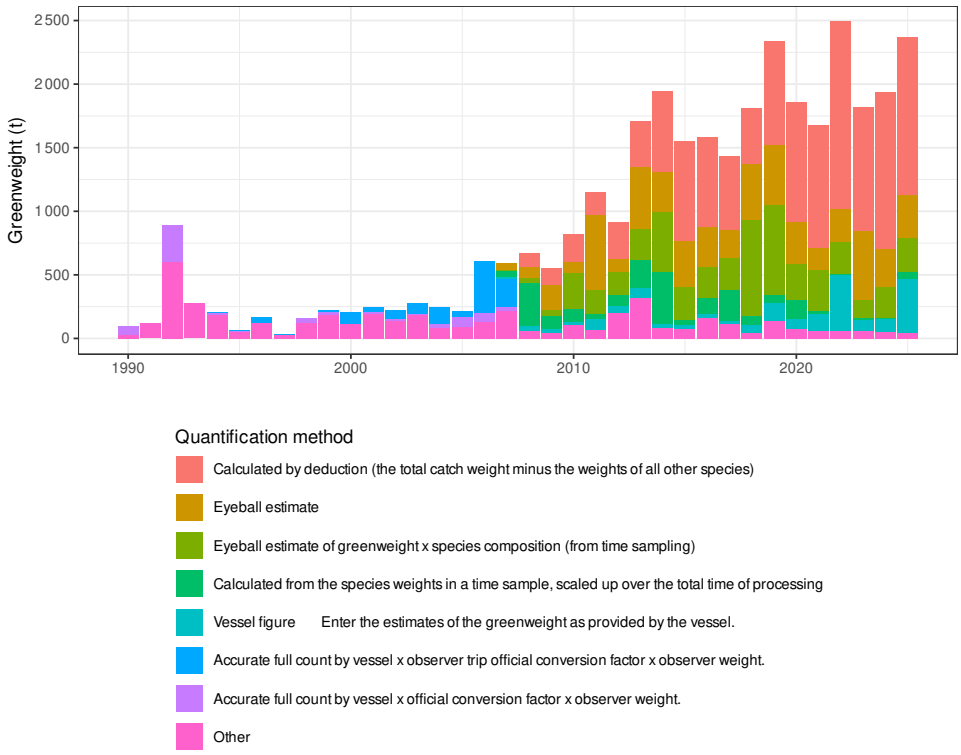


Figure 945: Methods used by observers to quantify the catch of ling in the LIN 5&6 Trawl fishery. The legend lists the methods used in descending order of total catch.

2.13.9 LIN 5&6: Line fishery

2.13.9.1 Length-frequency samples

Table 80: Length-frequency samples of ling from the LIN 5&6 Line fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of ling exceeded a potential sampling threshold of 40 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	2	0	0	0.00
1991	14	0	0	0.00
1992	265	0	0	0.00
1993	313	0	0	0.00
1994	2 300	47	1 243	2.04
1995	509	2	11	0.39
1996	225	0	0	0.00
1997	479	0	0	0.00
1998	5 410	9	670	0.17
1999	510	0	0	0.00
2000	344	83	8 298	24.13
2001	502	55	4 047	10.96
2002	431	157	1 570	36.43
2003	369	214	2 939	57.99
2004	414	168	2 017	40.58
2005	376	51	525	13.56
2006	349	93	930	26.65
2007	390	96	980	24.62
2008	344	22	395	6.40
2009	279	0	0	0.00
2010	173	45	450	26.01
2011	221	0	0	0.00
2012	280	0	0	0.00
2013	176	0	0	0.00
2014	163	7	90	4.29
2015	161	0	0	0.00
2016	129	16	153	12.40
2017	100	17	287	17.00
2018	103	3	30	2.91
2019	104	0	0	0.00
2020	283	29	467	10.25
2021	375	0	0	0.00
2022	467	4	76	0.86
2023	456	0	0	0.00
2024	485	65	650	13.40
2025	532	20	404	3.76

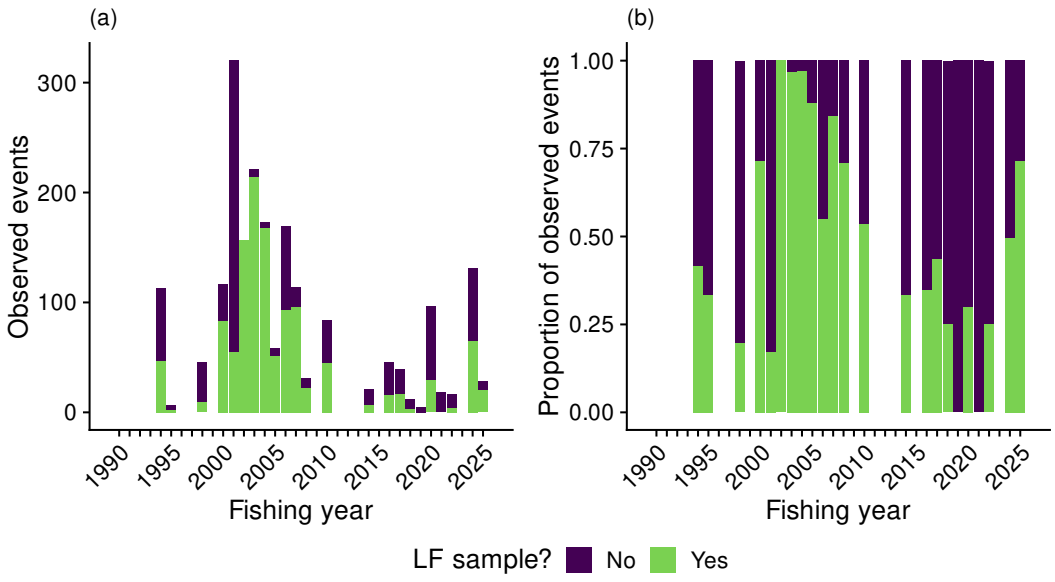


Figure 946: **(a) Observed Line fishing events, and (b) proportion of observed events, in LIN 5&6 where the ling catch exceeded the 40 kg threshold, with and without length-frequency sampling.**

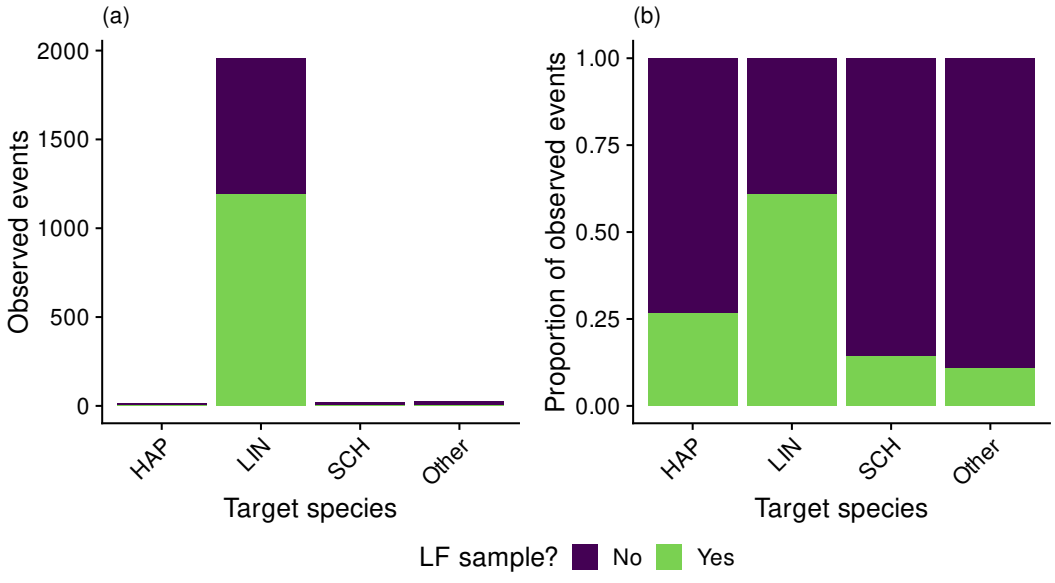


Figure 947: **(a) Observed Line fishing events, and (b) proportion of observed events, in LIN 5&6 where the ling catch exceeded the 40 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

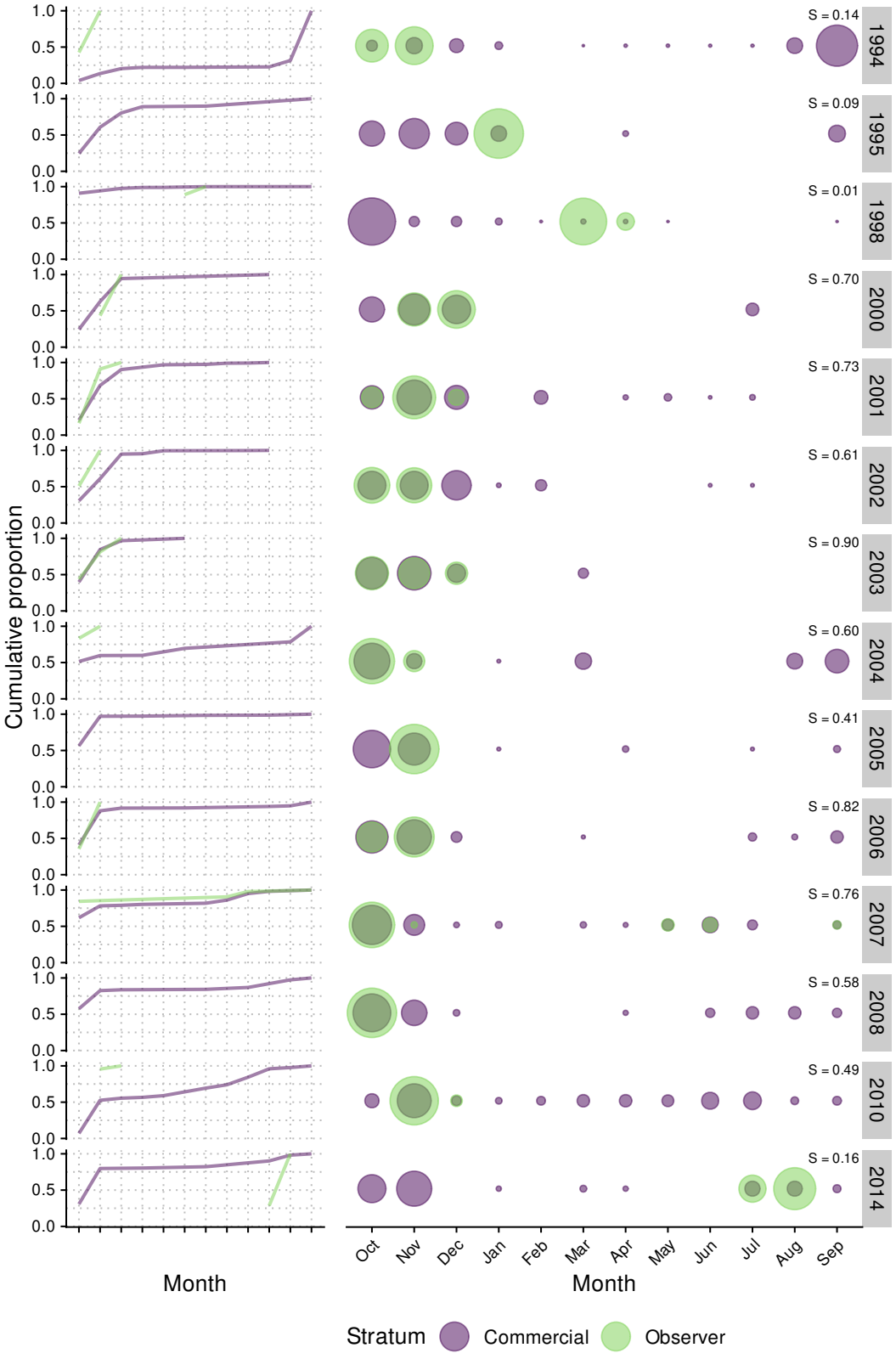


Figure 948: Monthly representativeness of observer sampling coverage of Line fishing events in LIN 5&6, where the ling catch exceeded the 40kg threshold, in 1994 to 2014. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

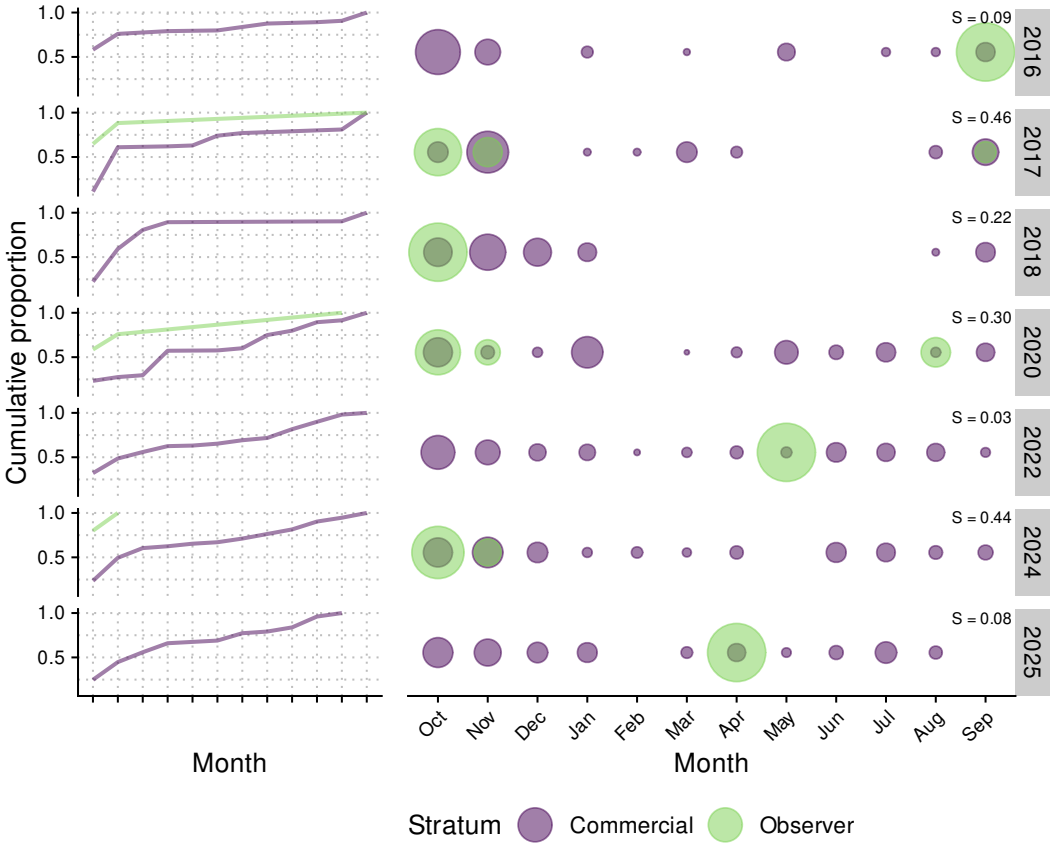


Figure 949: Monthly representativeness of observer sampling coverage of Line fishing events in LIN 5&6, where the ling catch exceeded the 40kg threshold, in 2016 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

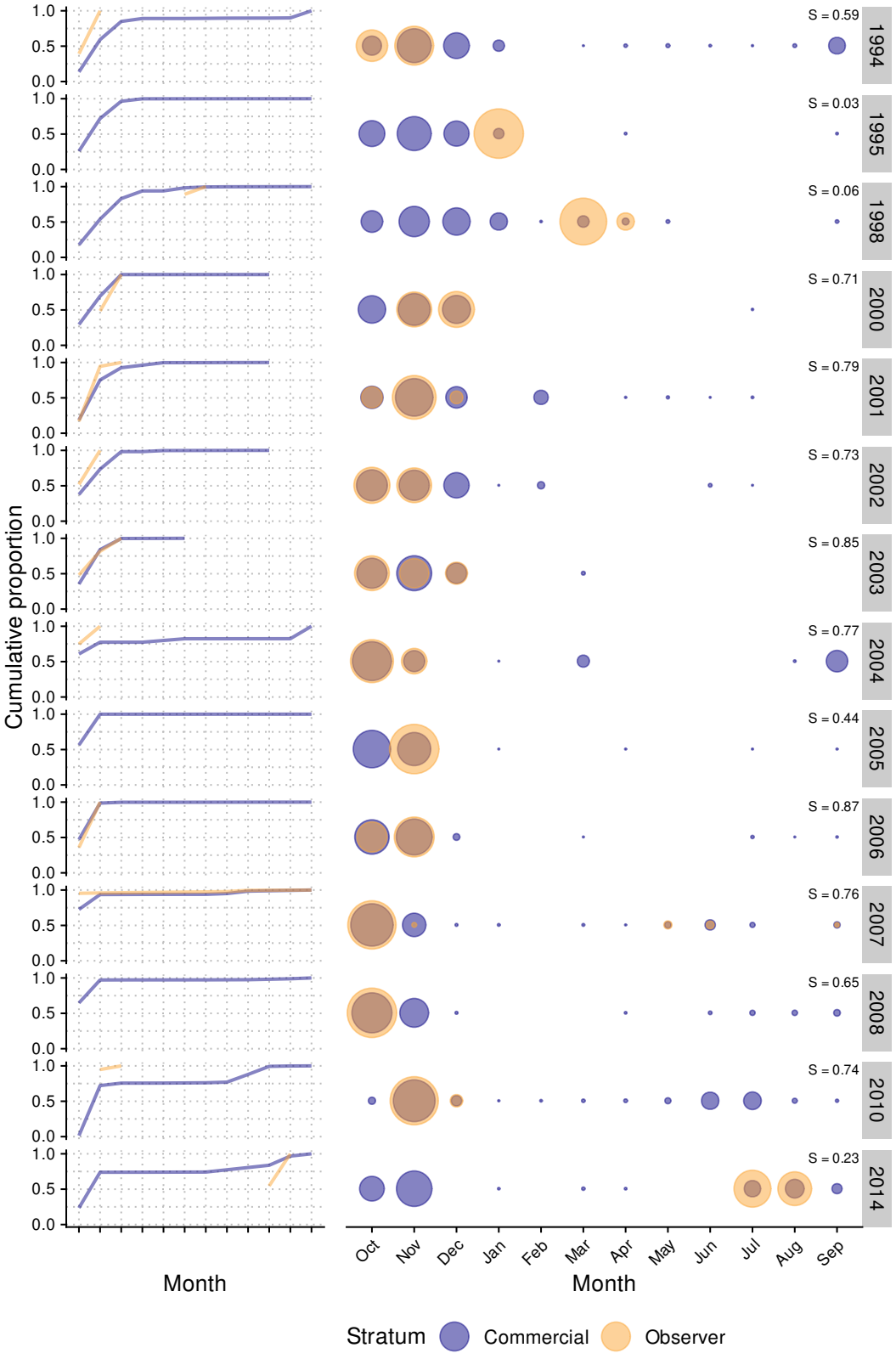


Figure 950: **Monthly representativeness of observer sampling coverage of Line catch in LIN 5&6, from events where the ling catch exceeded the 40kg threshold, in 1994 to 2014. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

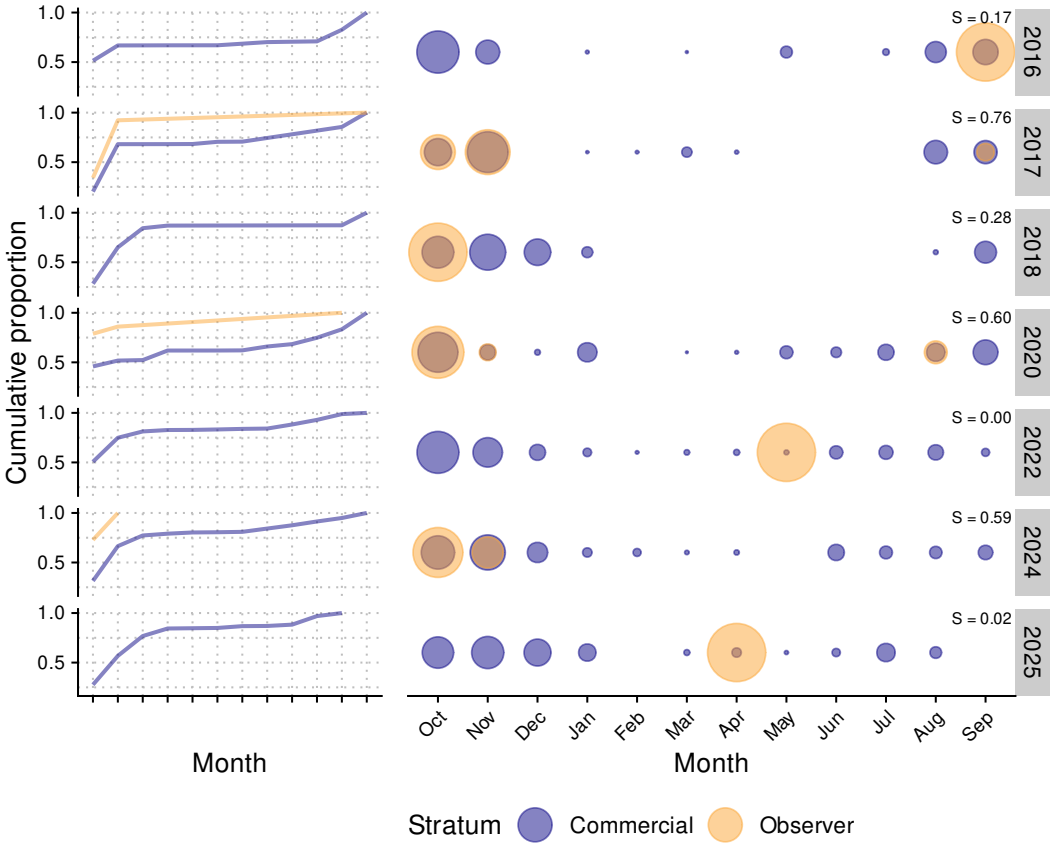


Figure 951: Monthly representativeness of observer sampling coverage of Line catch in LIN 5&6, from events where the ling catch exceeded the 40kg threshold, in 2016 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

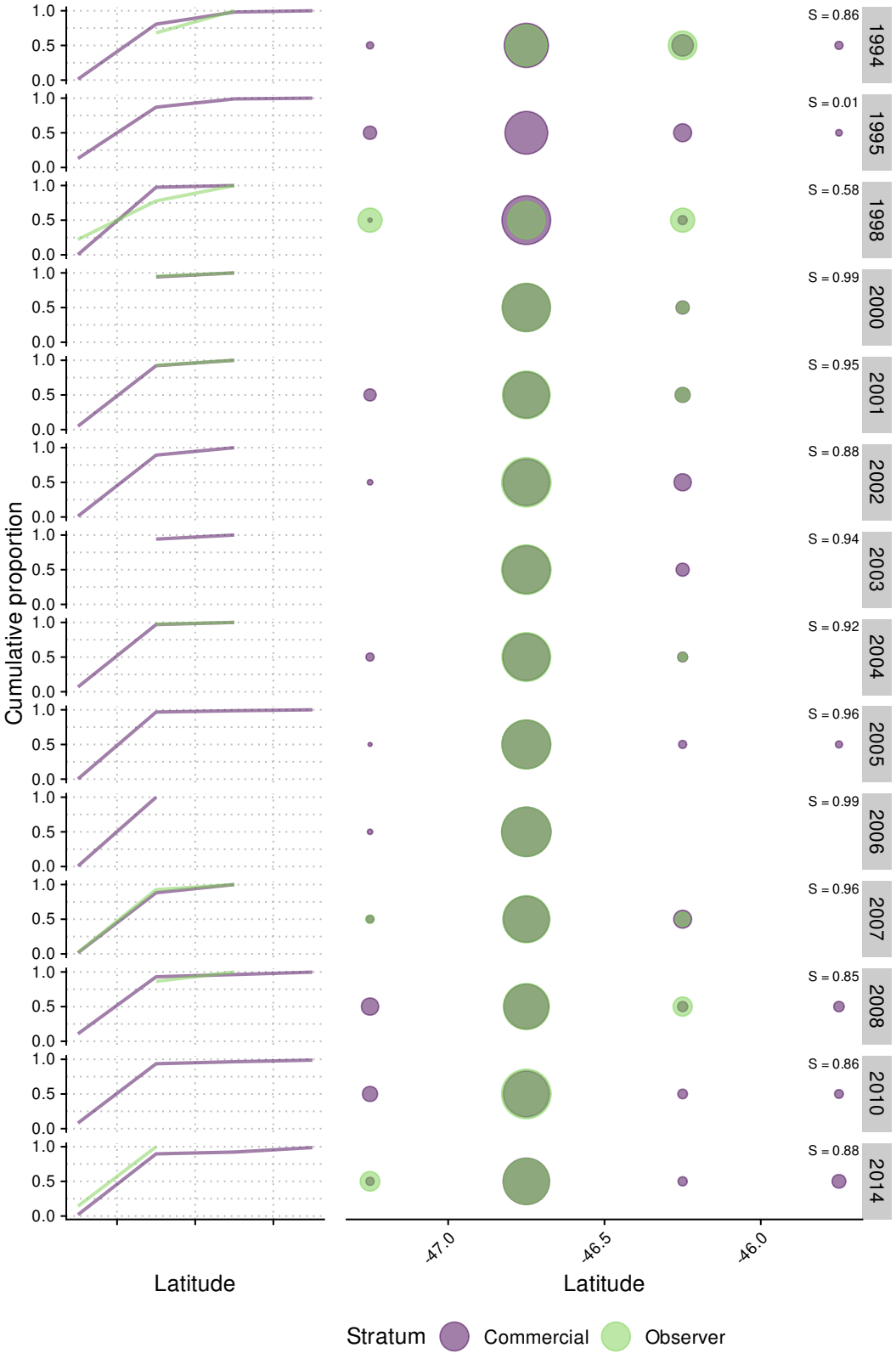


Figure 952: Latitudinal representativeness of observer sampling coverage of Line fishing events in LIN 5&6, where the ling catch exceeded the 40kg threshold, in 1994 to 2014. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

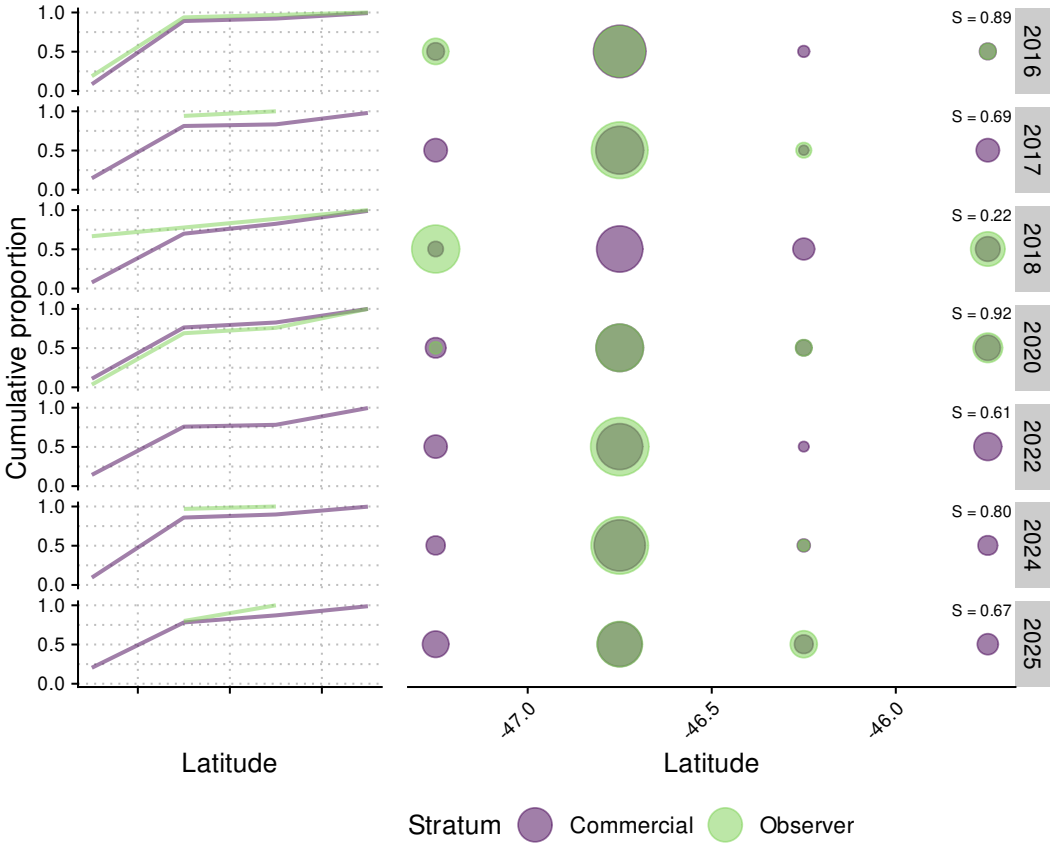


Figure 953: Latitudinal representativeness of observer sampling coverage of Line fishing events in LIN 5&6, where the ling catch exceeded the 40kg threshold, in 2016 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

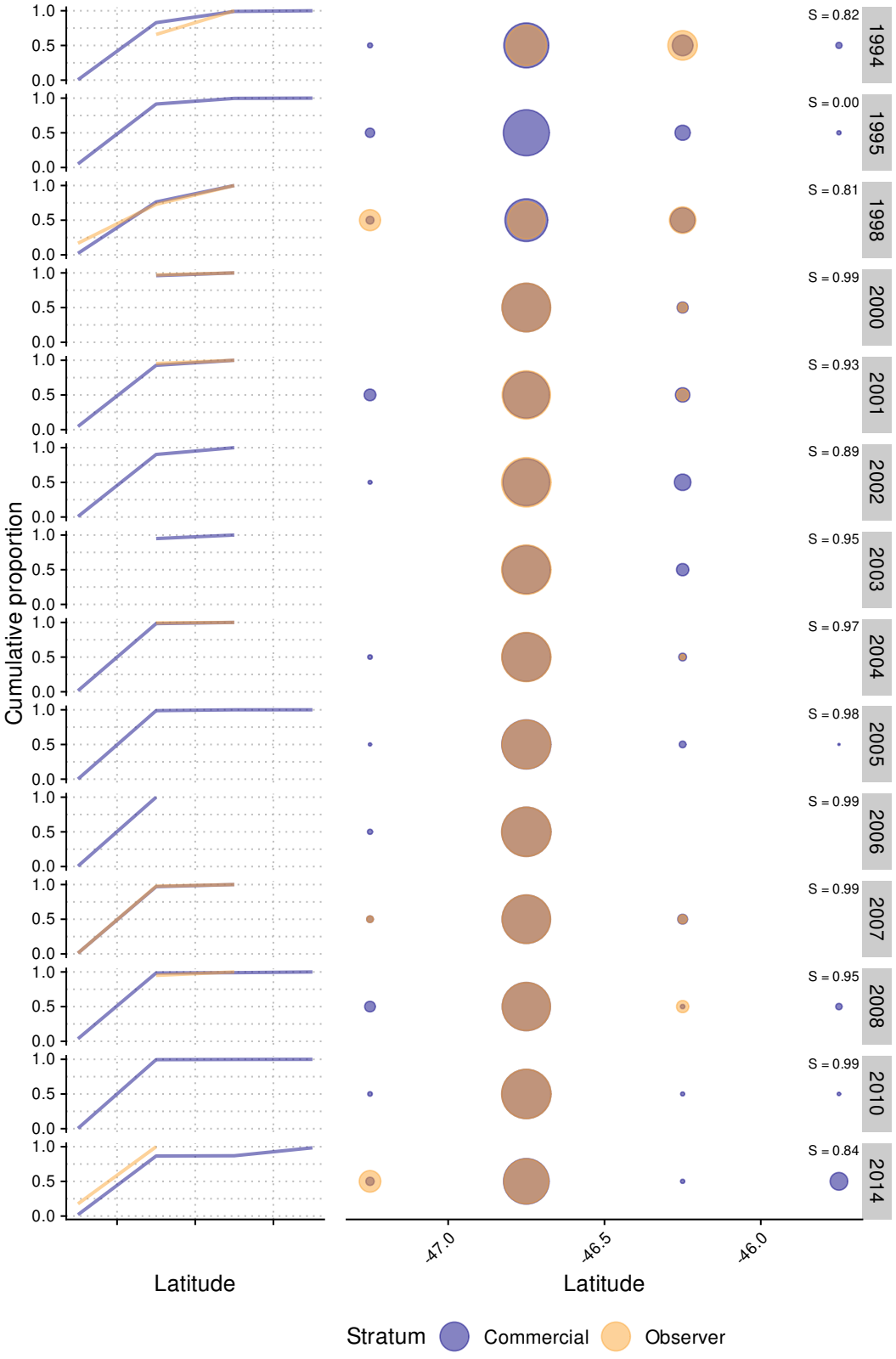


Figure 954: **Latitudinal representativeness of observer sampling coverage of Line catch in LIN 5&6, from events where the ling catch exceeded the 40kg threshold, in 1994 to 2014. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

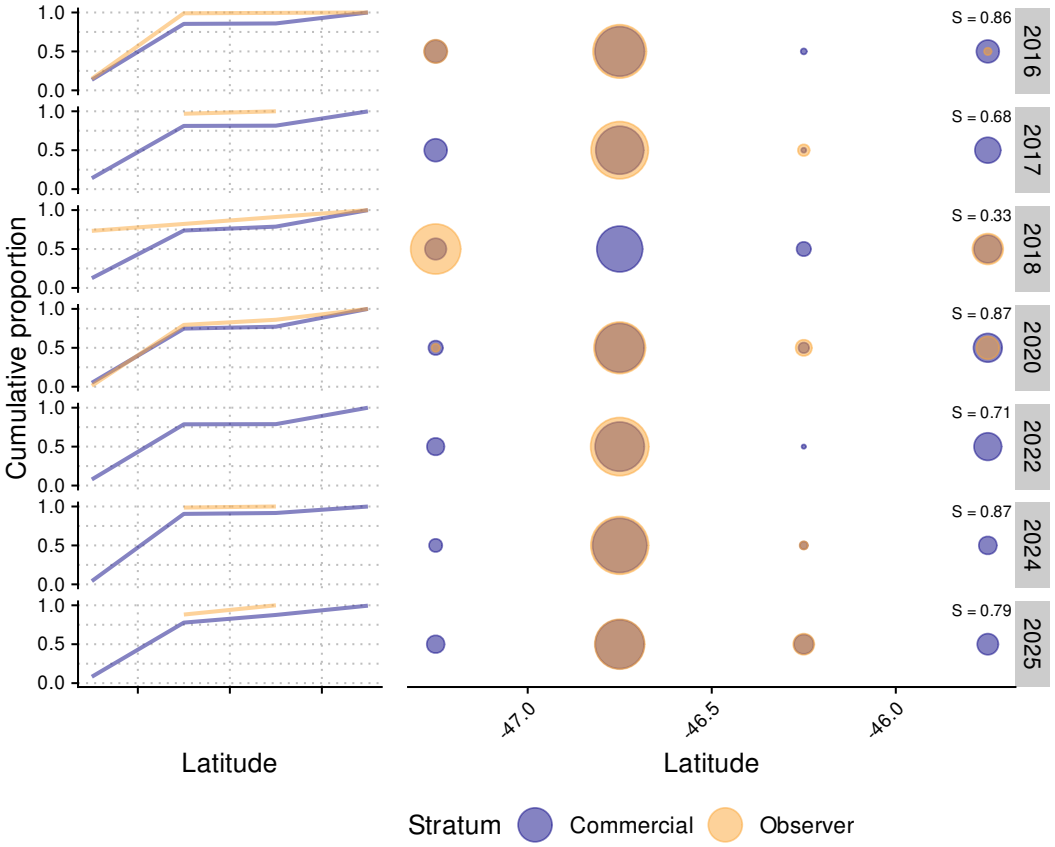


Figure 955: **Latitudinal representativeness of observer sampling coverage of Line catch in LIN 5&6, from events where the ling catch exceeded the 40kg threshold, in 2016 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

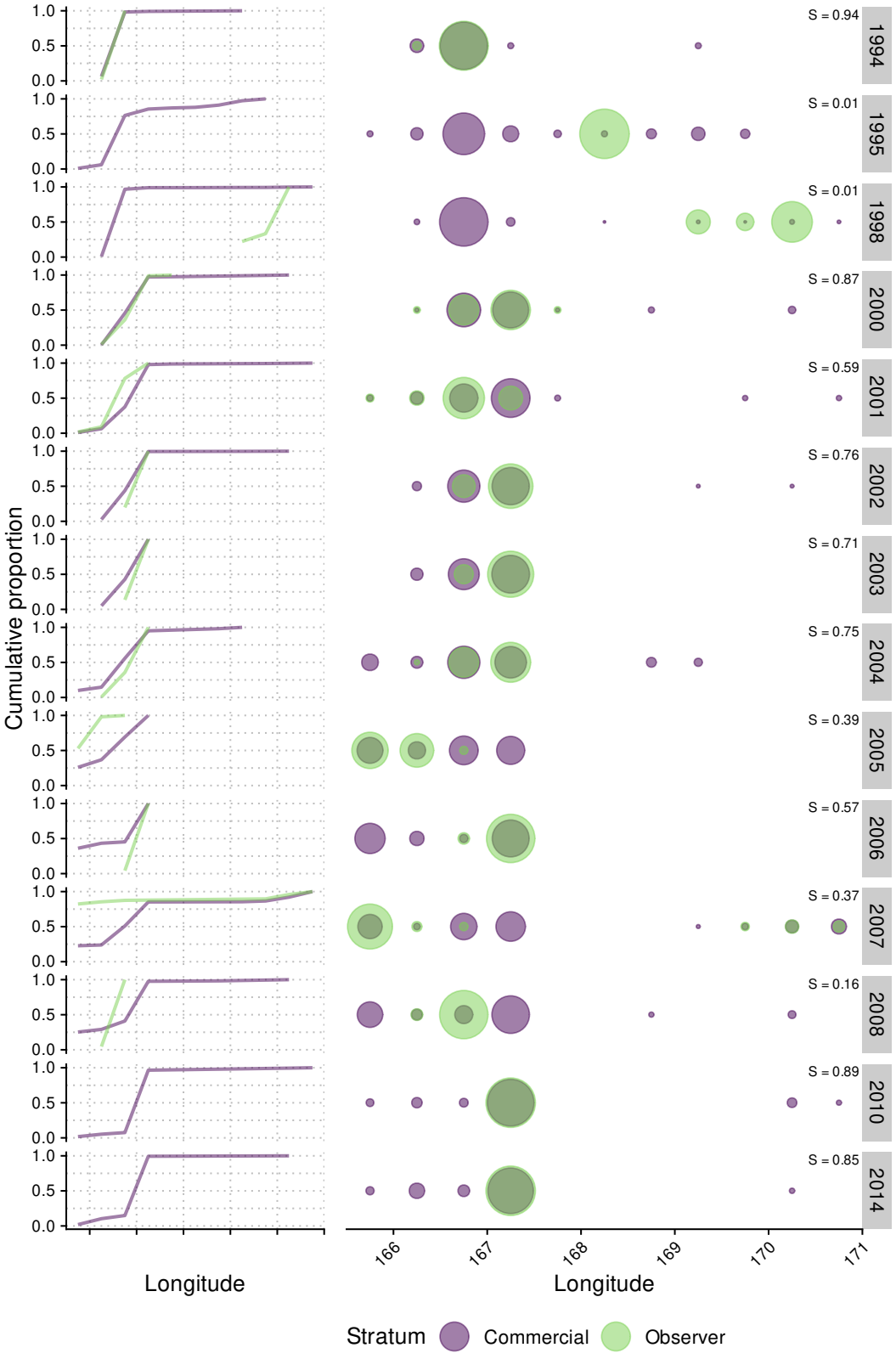


Figure 956: Longitudinal representativeness of observer sampling coverage of Line fishing events in LIN 5&6, where the ling catch exceeded the 40kg threshold, in 1994 to 2014. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

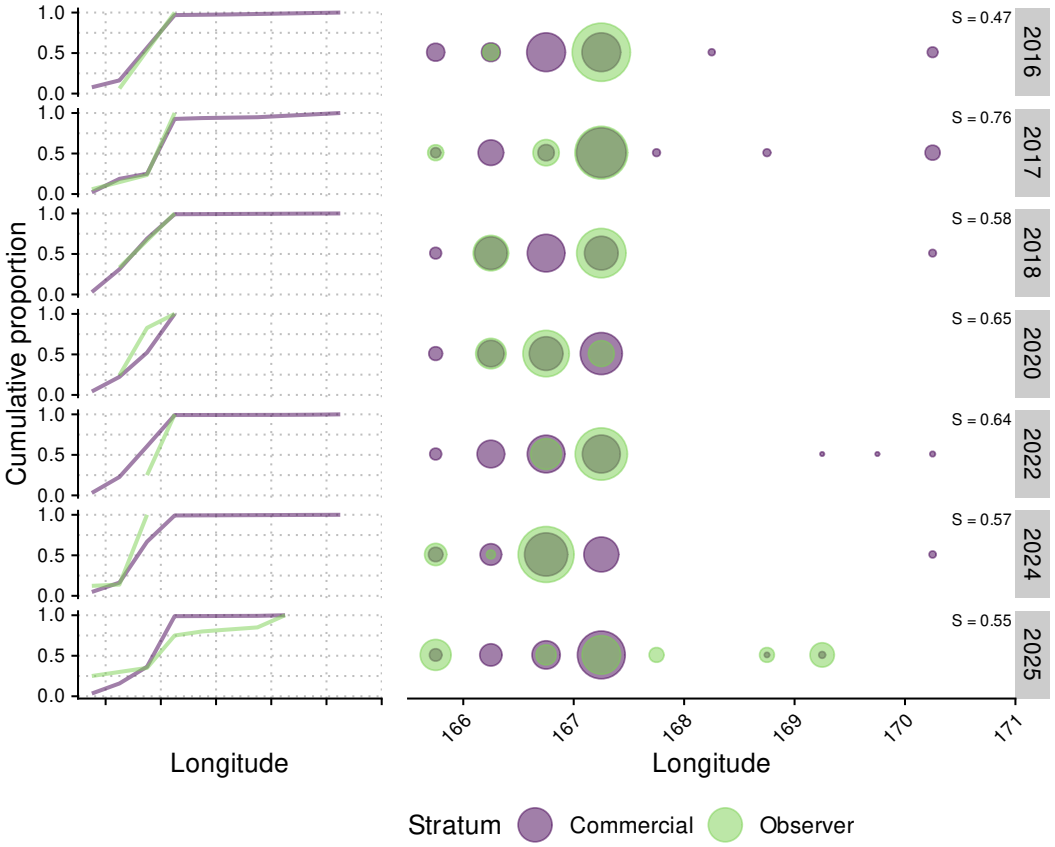


Figure 957: Longitudinal representativeness of observer sampling coverage of Line fishing events in LIN 5&6, where the ling catch exceeded the 40kg threshold, in 2016 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

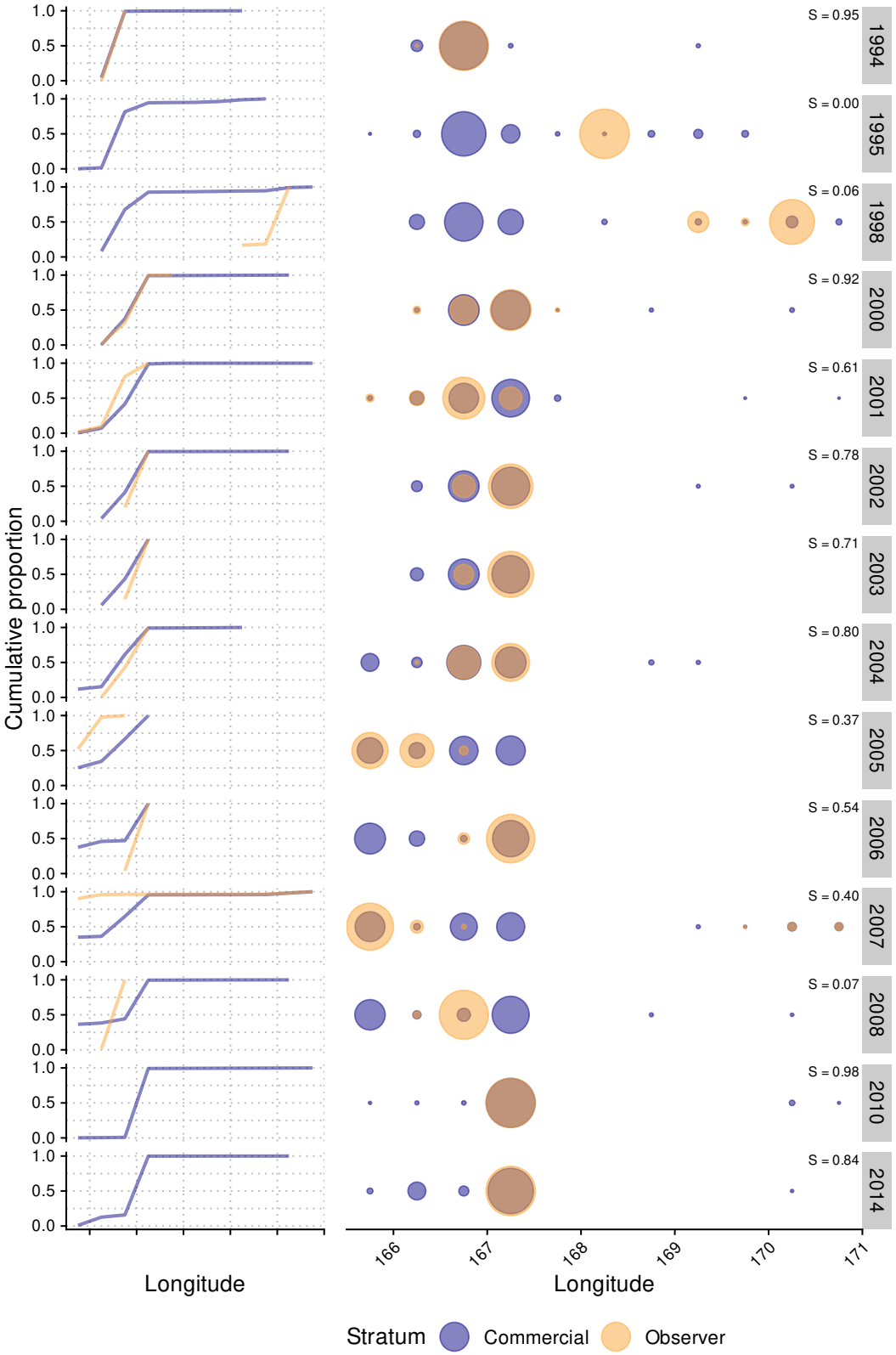


Figure 958: **Longitudinal representativeness of observer sampling coverage of Line catch in LIN 5&6, from events where the ling catch exceeded the 40kg threshold, in 1994 to 2014. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

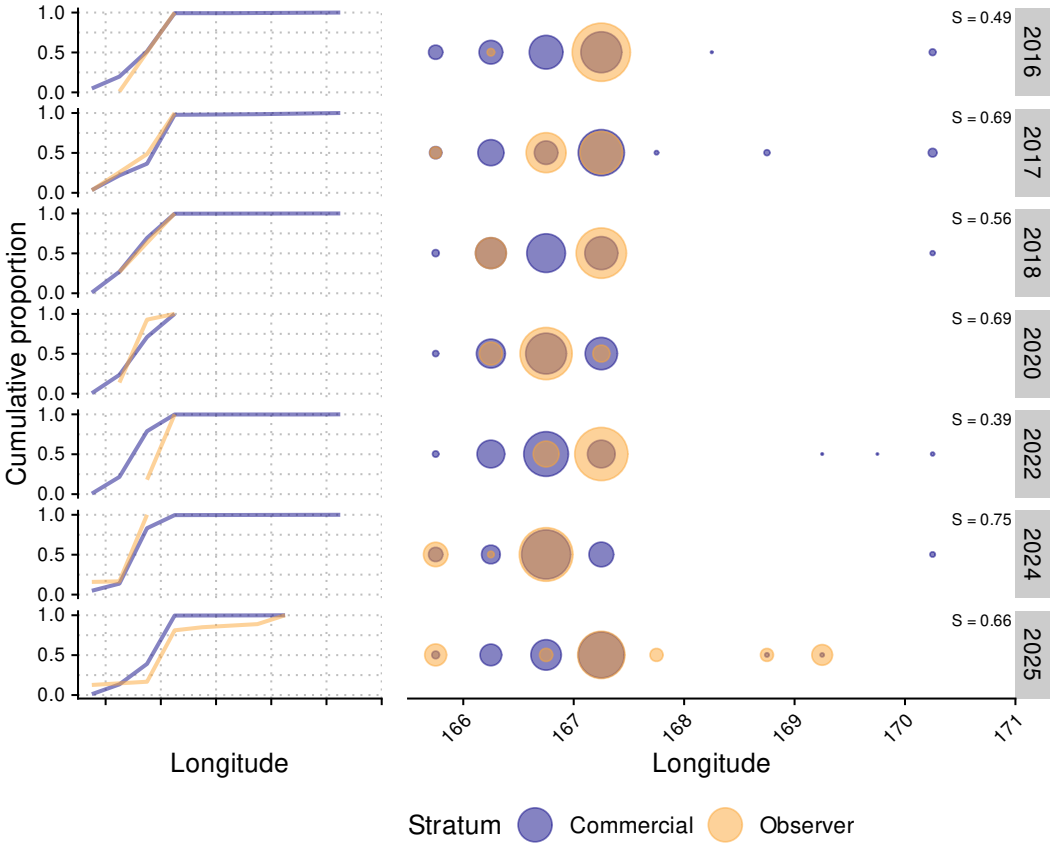


Figure 959: **Longitudinal representativeness of observer sampling coverage of Line catch in LIN 5&6, from events where the ling catch exceeded the 40kg threshold, in 2016 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

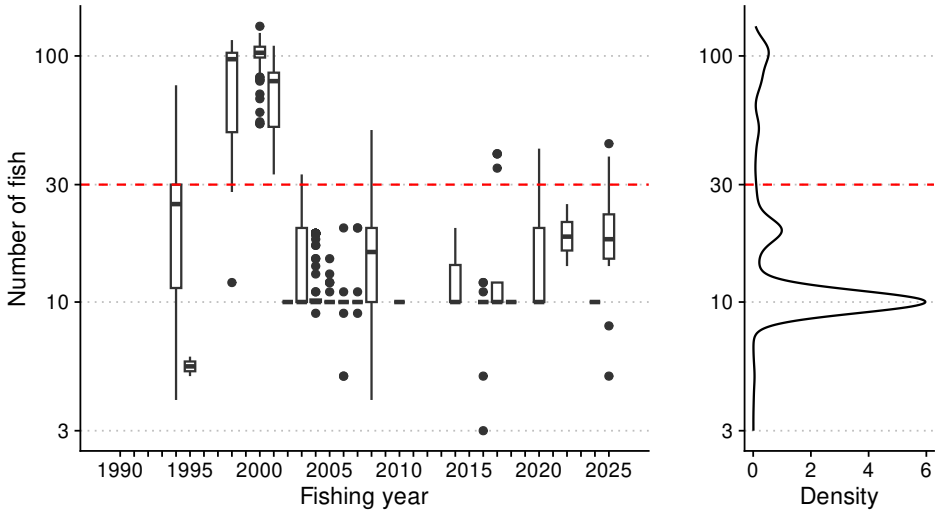


Figure 960: **Length-frequency sample sizes for observed fishing events in LIN 5&6 where ling were sampled. The red dashed line indicates a sample size of 30 fish.**

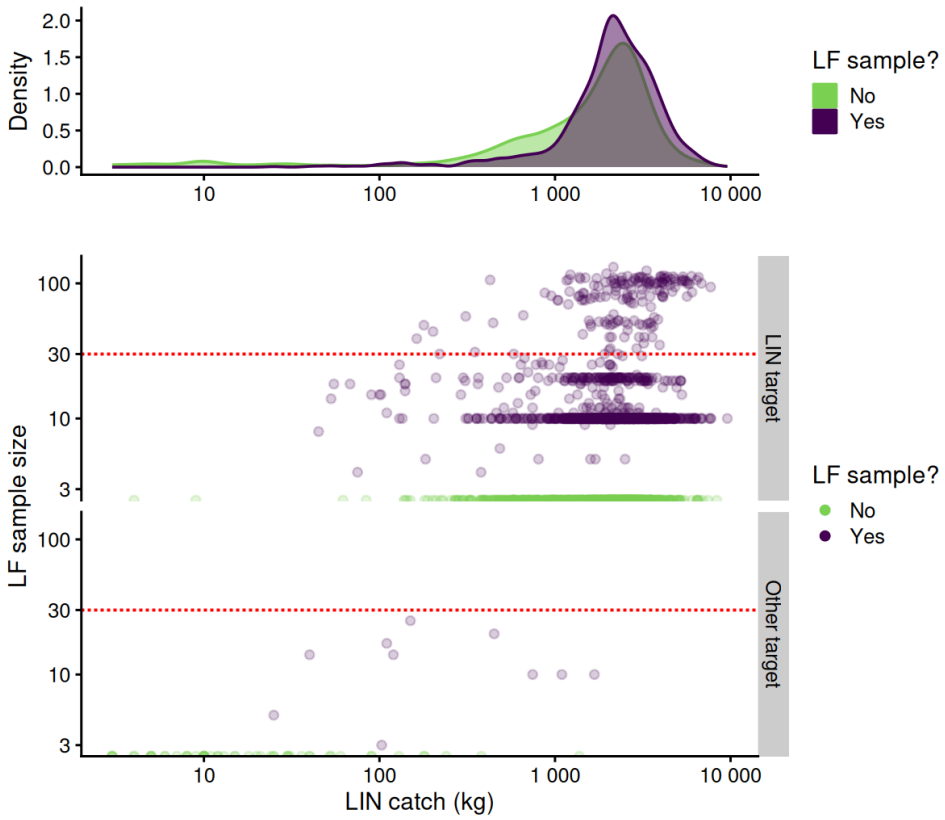


Figure 961: Length-frequency sample sizes (number of fish sampled) for observed fishing events in LIN 5&6 in relation to the total ling catch from an event, separately for ling target events and other target species. The red dashed line indicates a sample size of 30 fish.

2.13.9.2 Otolith samples

Table 81: Otolith samples of ling from the LIN 5&6 Line fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of ling exceeded a potential sampling threshold of 40 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	2	0	0	0.00
1991	14	0	0	0.00
1992	265	0	0	0.00
1993	313	0	0	0.00
1994	2300	0	0	0.00
1995	509	0	0	0.00
1996	225	0	0	0.00
1997	479	0	0	0.00
1998	5410	0	0	0.00
1999	510	0	0	0.00
2000	344	0	0	0.00
2001	502	0	0	0.00
2002	431	0	0	0.00
2003	369	0	0	0.00
2004	414	0	0	0.00
2005	376	0	0	0.00
2006	349	0	0	0.00
2007	390	0	0	0.00
2008	344	0	0	0.00
2009	279	0	0	0.00
2010	173	0	0	0.00
2011	221	0	0	0.00
2012	280	0	0	0.00
2013	176	0	0	0.00
2014	163	0	0	0.00
2015	161	0	0	0.00
2016	129	0	0	0.00
2017	100	0	0	0.00
2018	103	0	0	0.00
2019	104	0	0	0.00
2020	283	0	0	0.00
2021	375	0	0	0.00
2022	467	0	0	0.00
2023	456	0	0	0.00
2024	485	0	0	0.00
2025	532	20	120	3.76

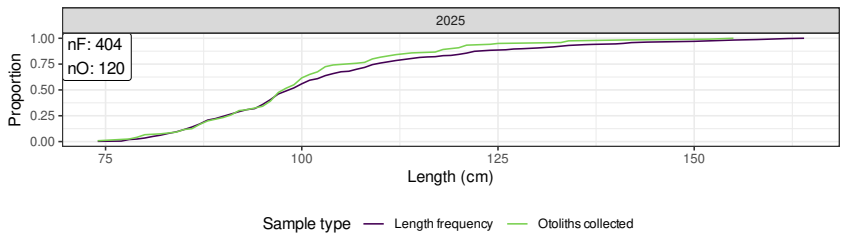


Figure 962: Cumulative distributions of the length of fish in the length frequency and otolith samples of ling in the LIN 5&6 Line fishery for the 2025 to 2025 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

2.13.9.3 Catch quantification

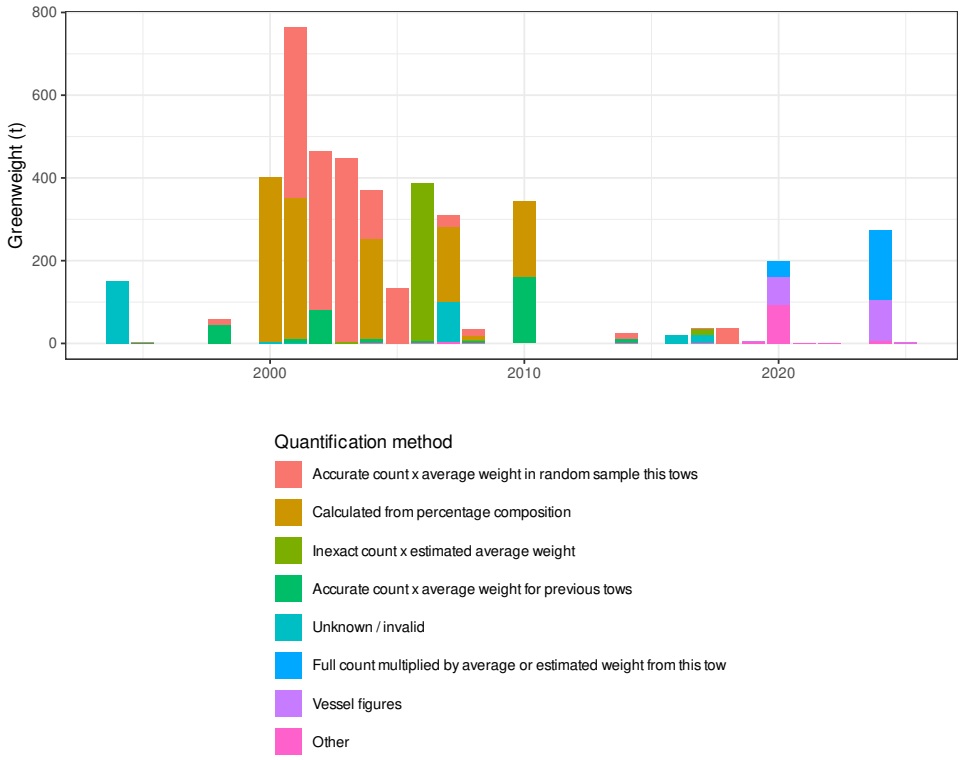


Figure 963: Methods used by observers to quantify the catch of ling in the LIN 5&6 Line fishery. The legend lists the methods used in descending order of total catch.

2.13.10 LIN 6B: Trawl fishery

2.13.10.1 Length-frequency samples

Table 82: Length-frequency samples of ling from the LIN 6B Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of ling exceeded a potential sampling threshold of 40 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	611	17	227	2.78
1991	1 611	50	546	3.10
1992	1 949	211	3 091	10.83
1993	2 035	94	1 412	4.62
1994	1 399	107	1 057	7.65
1995	1 310	80	735	6.11
1996	1 209	57	811	4.71
1997	1 880	75	1 675	3.99
1998	2 575	204	3 231	7.92
1999	2 458	218	2 082	8.87
2000	3 814	288	3 741	7.55
2001	3 748	261	3 699	6.96
2002	4 752	277	3 338	5.83
2003	4 125	210	2 583	5.09
2004	3 139	158	1 661	5.03
2005	1 836	138	3 548	7.52
2006	1 210	140	2 126	11.57
2007	1 496	148	2 913	9.89
2008	1 440	121	3 407	8.40
2009	1 306	118	4 943	9.04
2010	1 175	116	3 591	9.87
2011	1 047	114	2 027	10.89
2012	1 113	118	3 419	10.60
2013	1 492	166	6 646	11.13
2014	1 635	144	2 522	8.81
2015	1 545	149	3 778	9.64
2016	1 034	76	1 971	7.35
2017	1 295	121	4 129	9.34
2018	1 976	287	11 830	14.52
2019	1 206	109	4 857	9.04
2020	961	120	6 431	12.49
2021	1 241	112	6 445	9.02
2022	1 196	161	9 122	13.46
2023	1 531	242	12 144	15.81
2024	1 073	134	7 005	12.49
2025	1 175	144	5 239	12.26

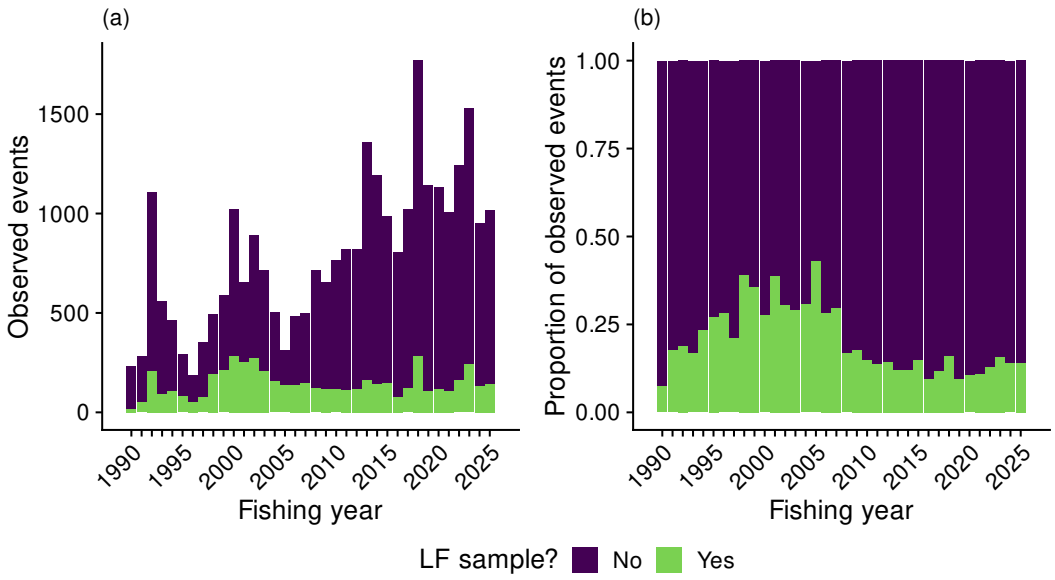


Figure 964: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in LIN 6B where the ling catch exceeded the 40 kg threshold, with and without length-frequency sampling.**

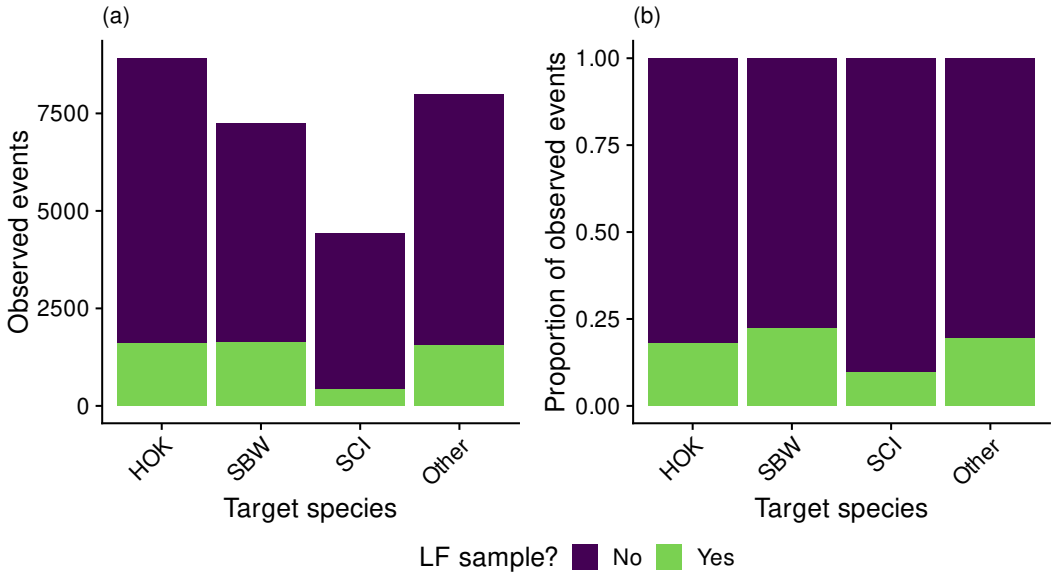


Figure 965: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in LIN 6B where the ling catch exceeded the 40 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

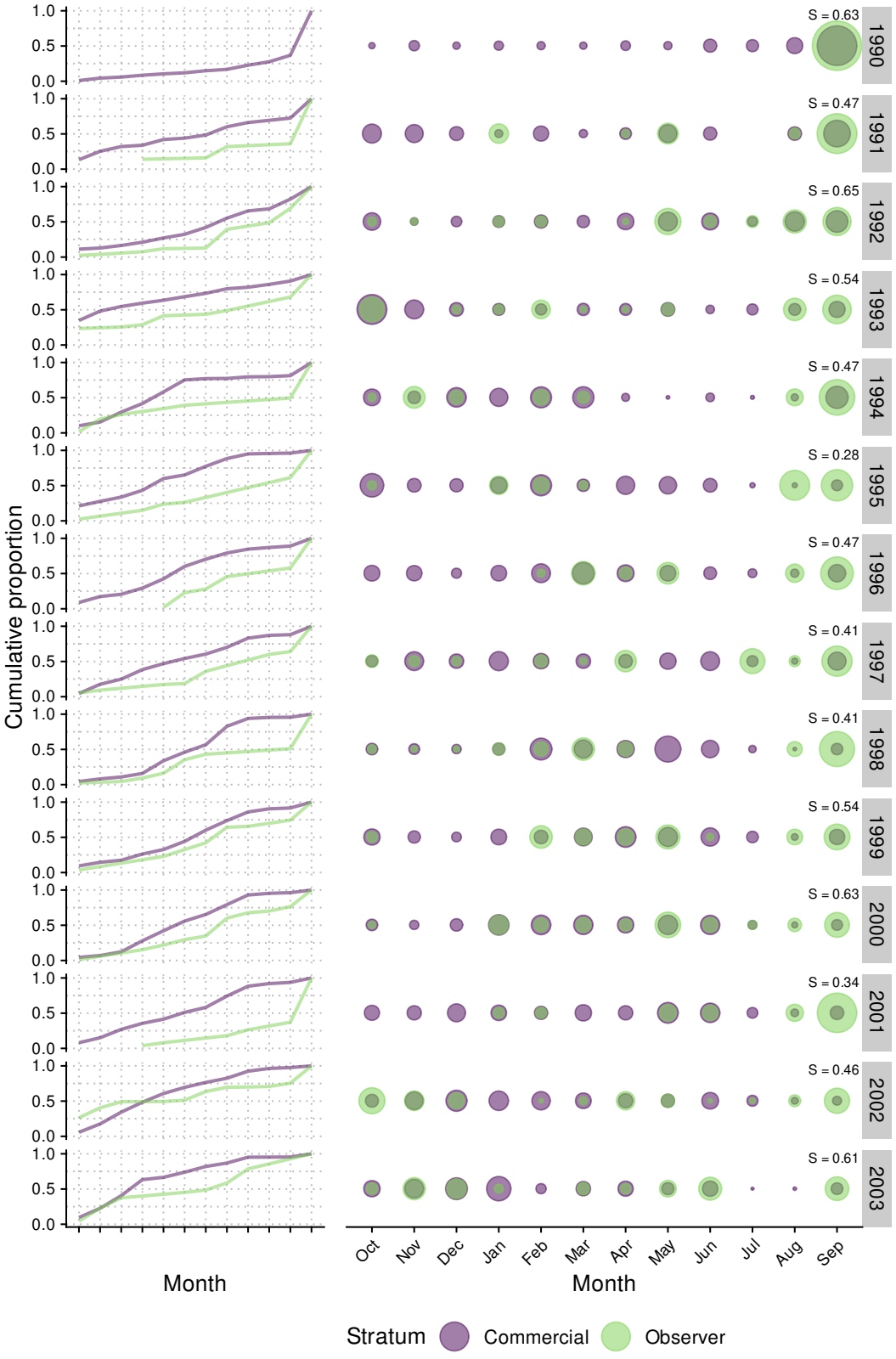


Figure 966: Monthly representativeness of observer sampling coverage of Trawl fishing events in LIN 6B, where the ling catch exceeded the 40kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

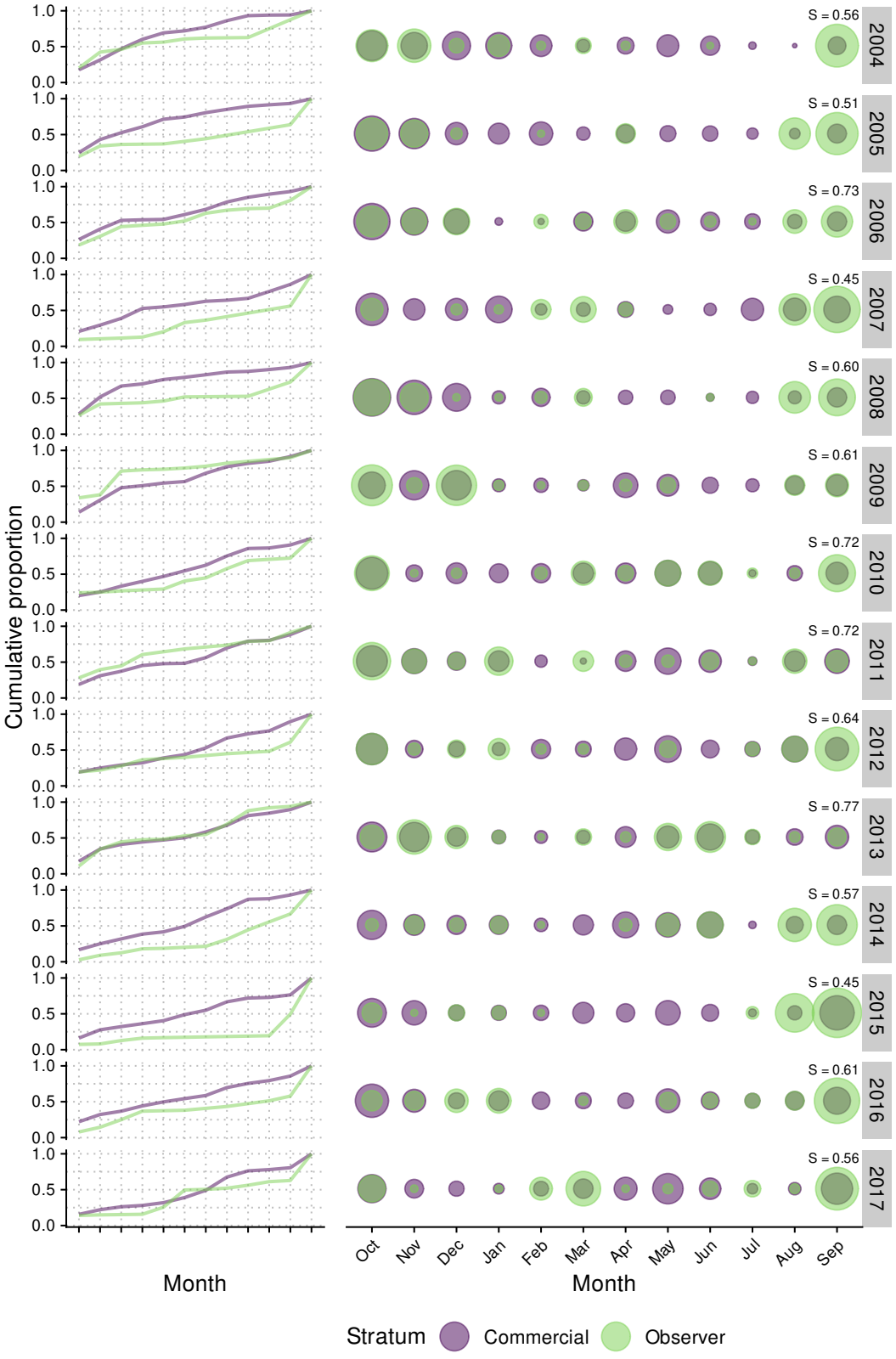


Figure 967: Monthly representativeness of observer sampling coverage of Trawl fishing events in LIN 6B, where the ling catch exceeded the 40kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

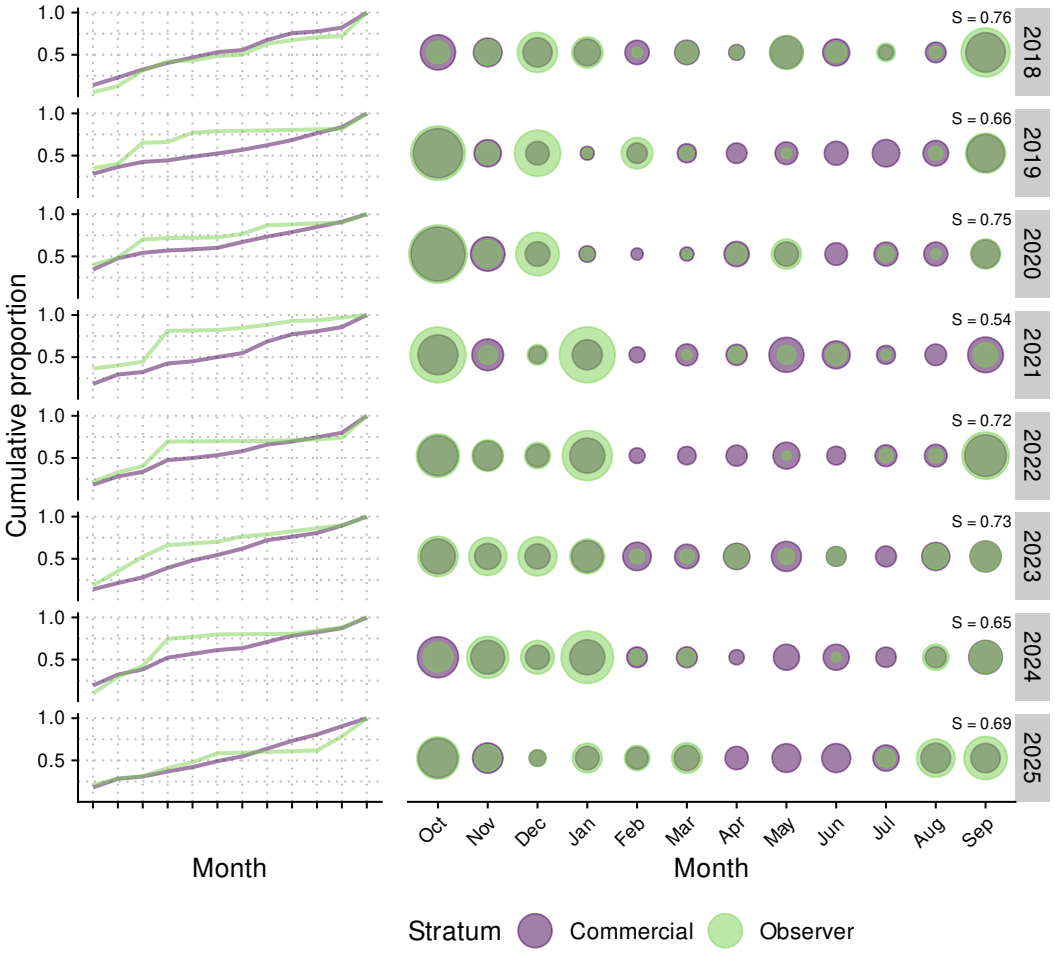


Figure 968: Monthly representativeness of observer sampling coverage of Trawl fishing events in LIN 6B, where the ling catch exceeded the 40kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

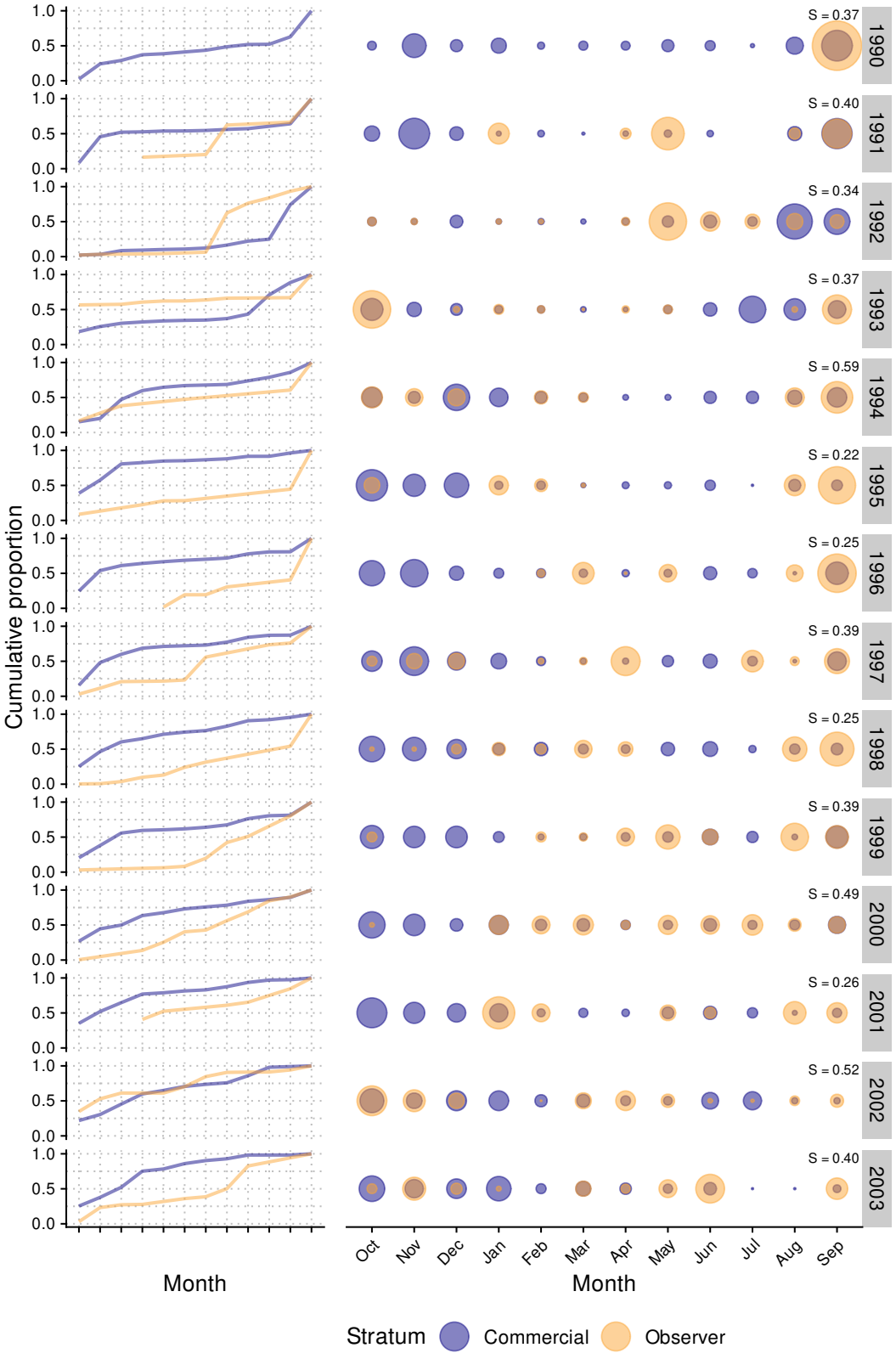


Figure 969: **Monthly representativeness of observer sampling coverage of Trawl catch in LIN 6B, from events where the ling catch exceeded the 40kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

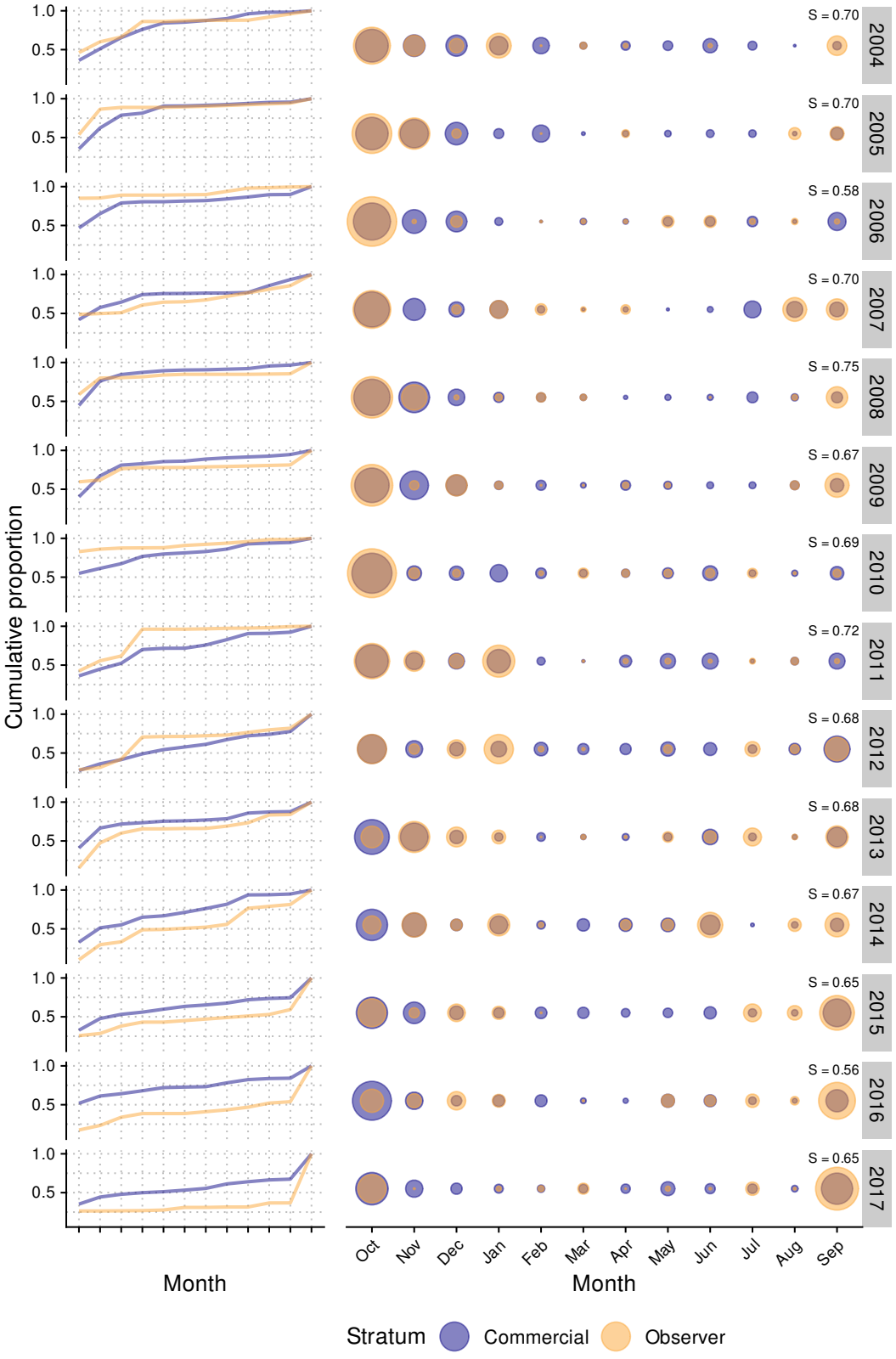


Figure 970: **Monthly representativeness of observer sampling coverage of Trawl catch in LIN 6B, from events where the ling catch exceeded the 40kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

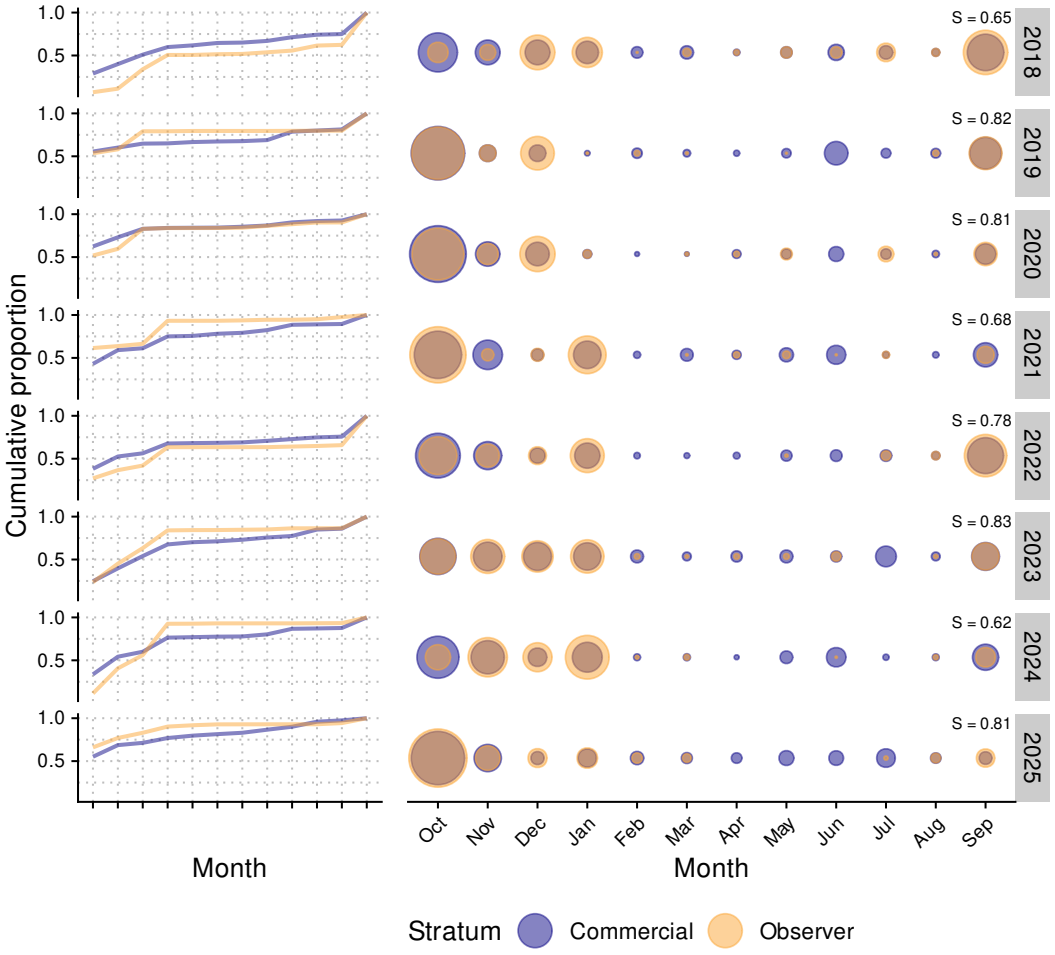


Figure 971: Monthly representativeness of observer sampling coverage of Trawl catch in LIN 6B, from events where the ling catch exceeded the 40kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

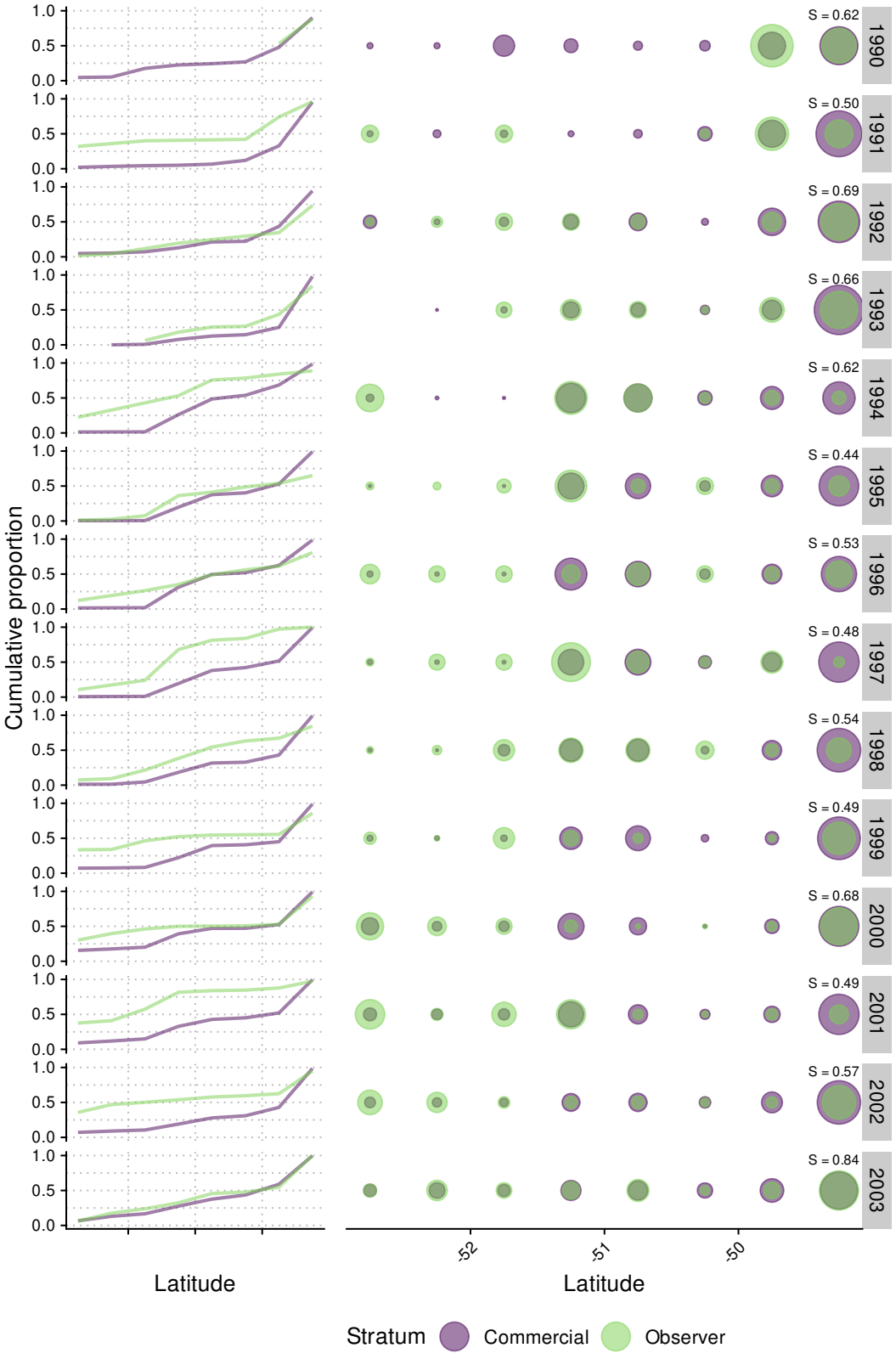


Figure 972: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in LIN 6B, where the ling catch exceeded the 40kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

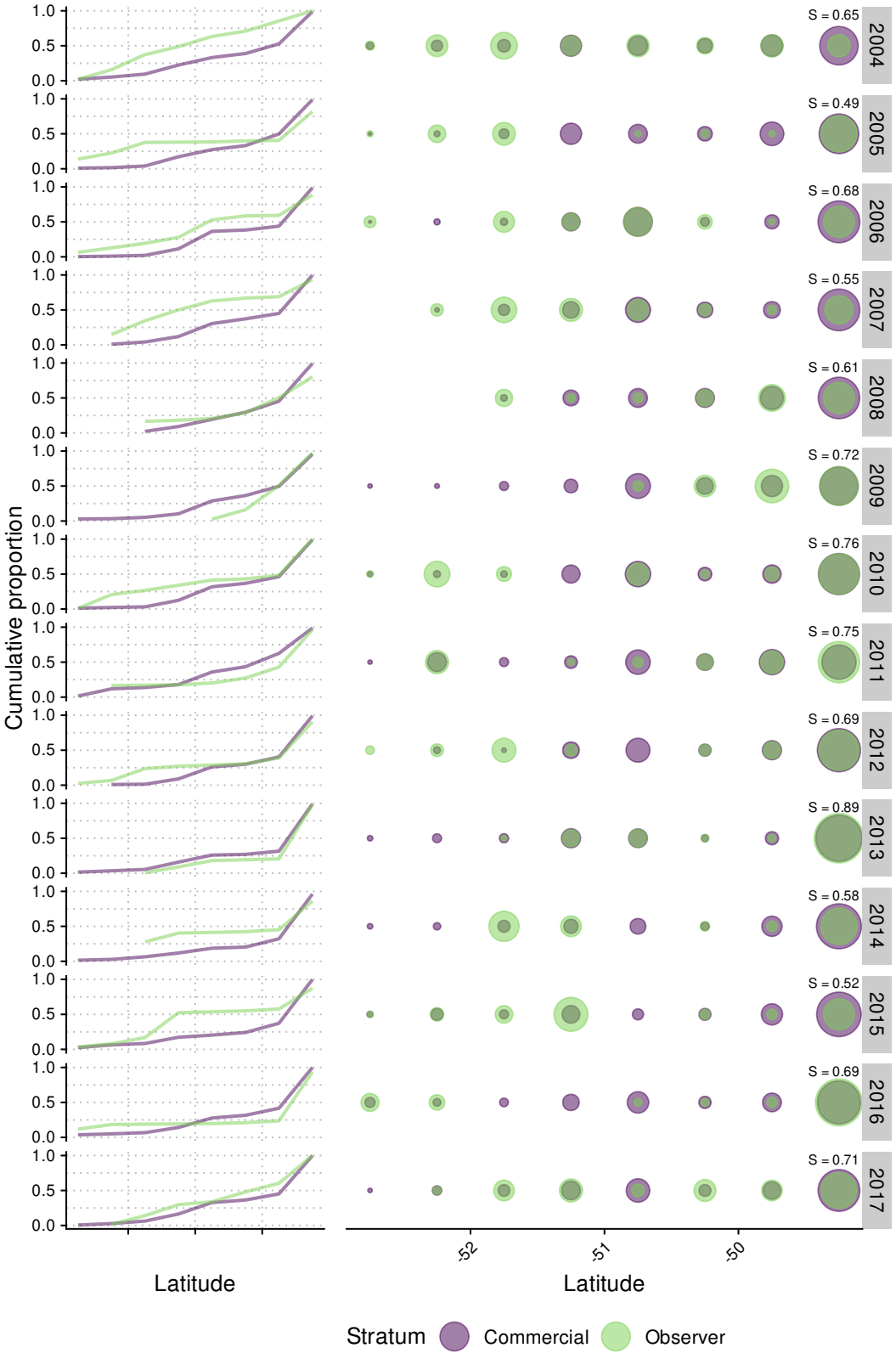


Figure 973: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in LIN 6B, where the ling catch exceeded the 40kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

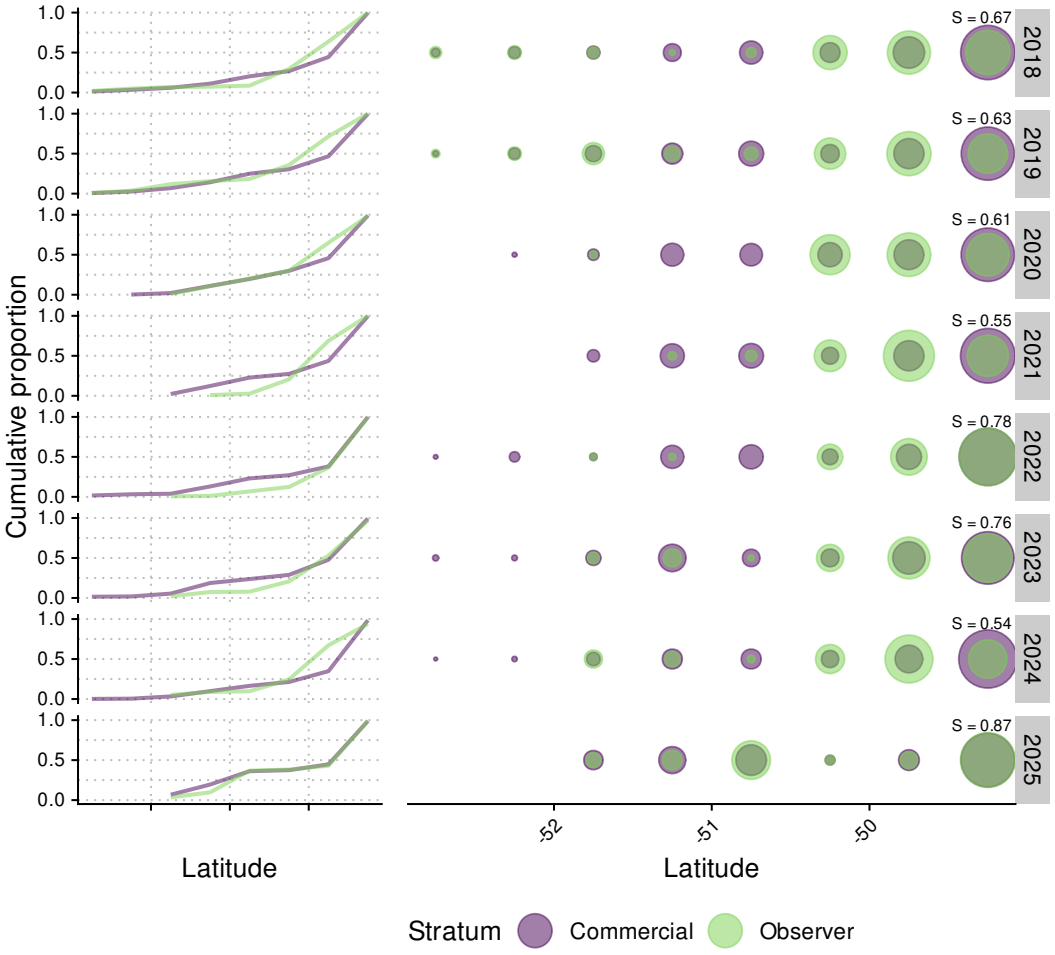


Figure 974: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in LIN 6B, where the ling catch exceeded the 40kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

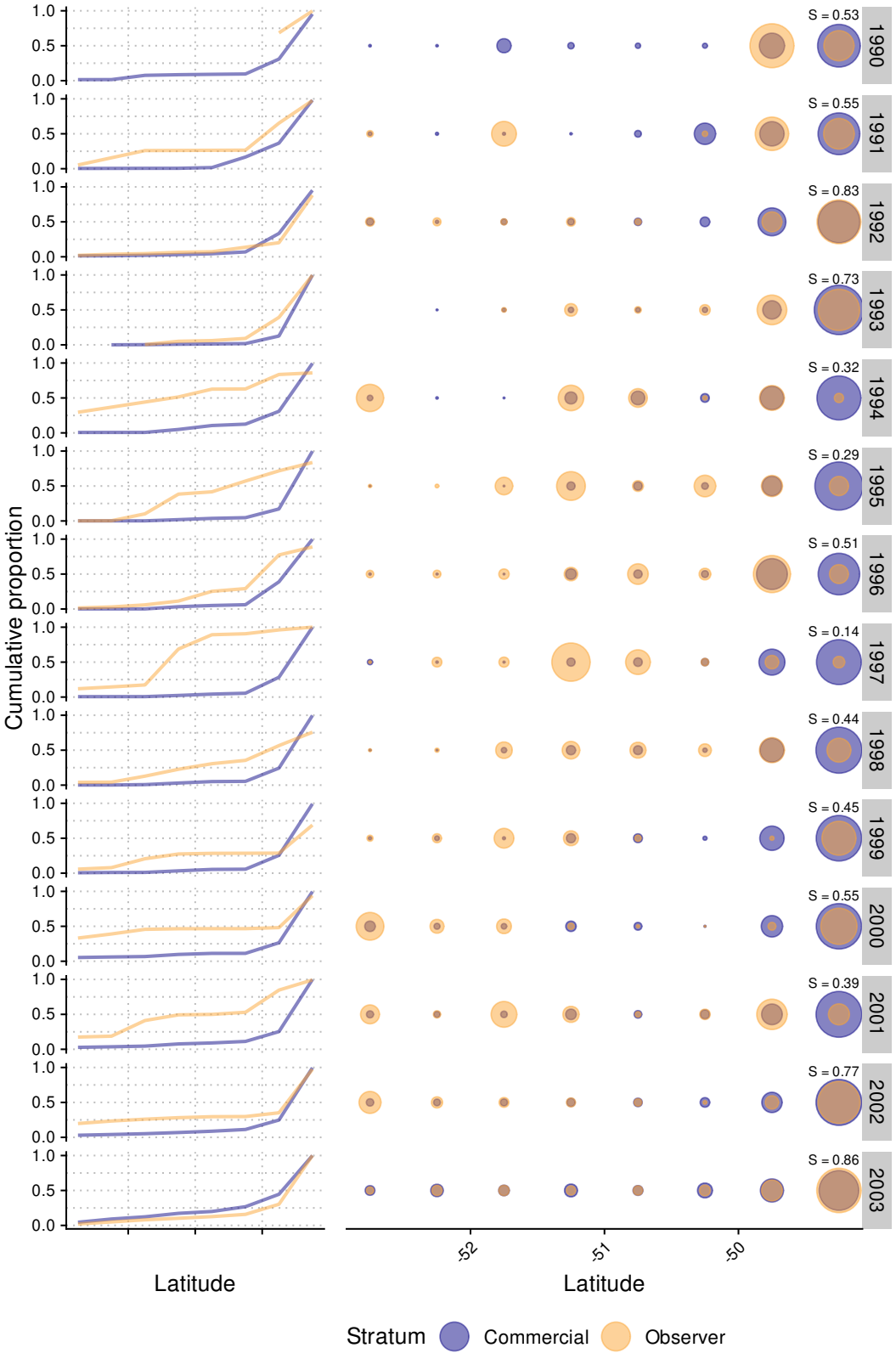


Figure 975: **Latitudinal representativeness of observer sampling coverage of Trawl catch in LIN 6B, from events where the ling catch exceeded the 40kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

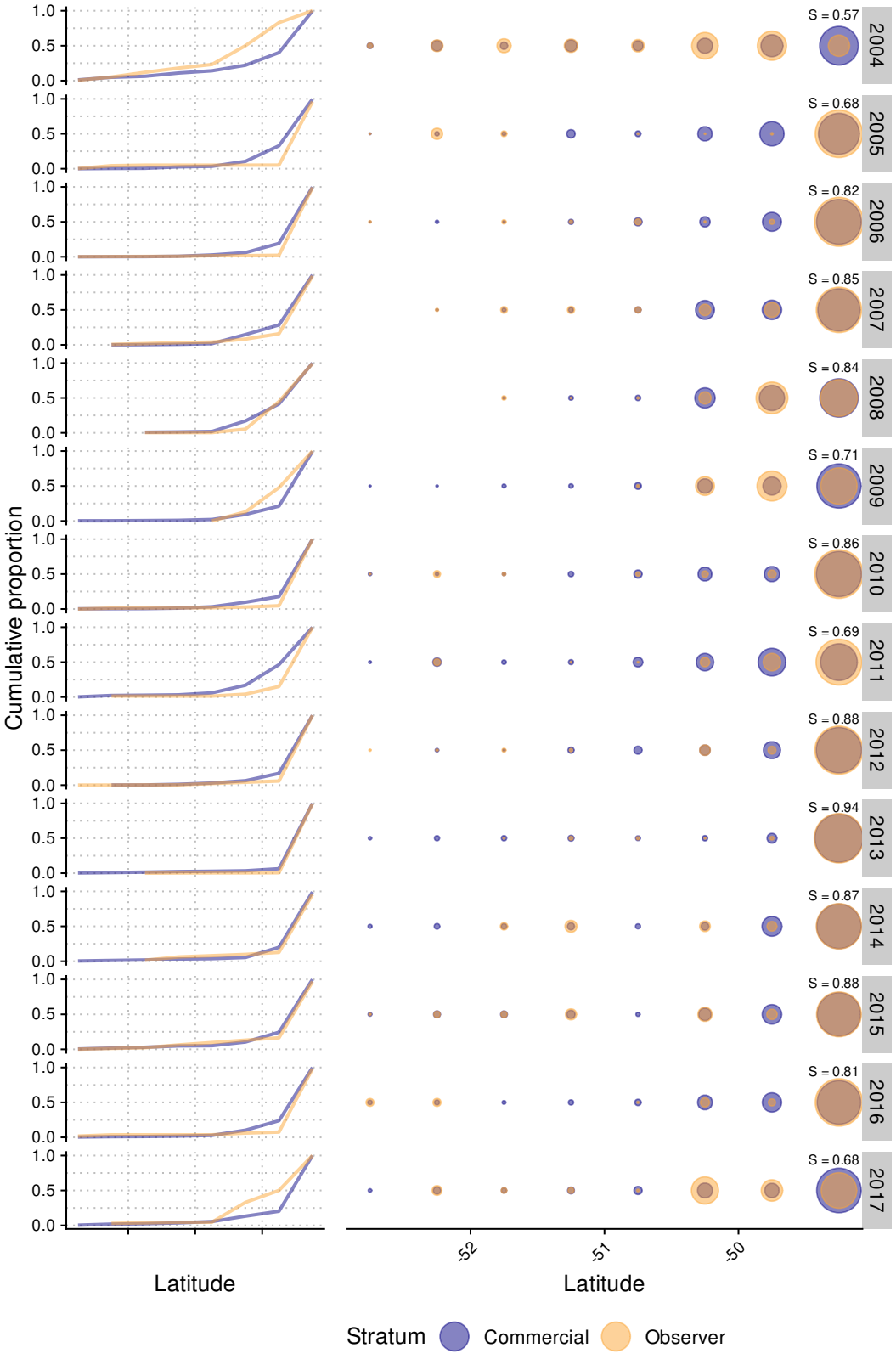


Figure 976: **Latitudinal representativeness of observer sampling coverage of Trawl catch in LIN 6B, from events where the ling catch exceeded the 40kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

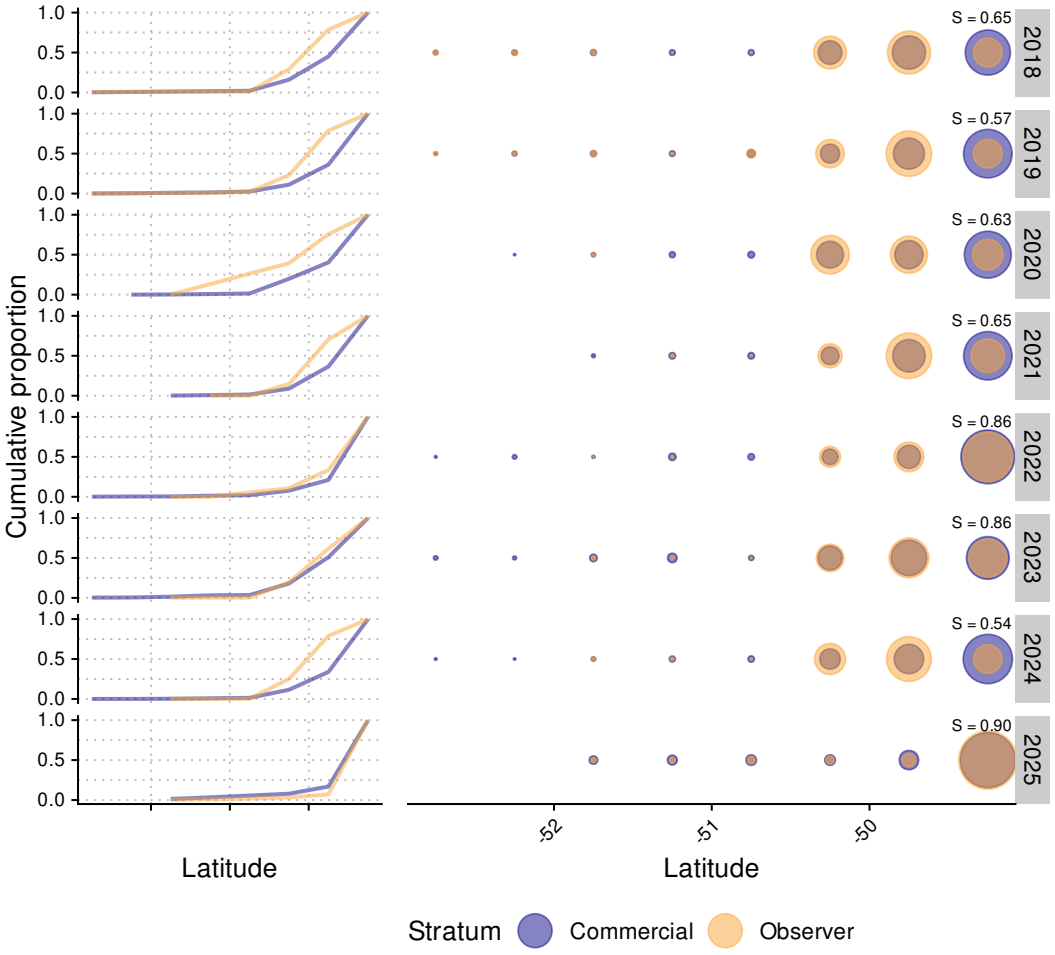


Figure 977: Latitudinal representativeness of observer sampling coverage of Trawl catch in LIN 6B, from events where the ling catch exceeded the 40kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

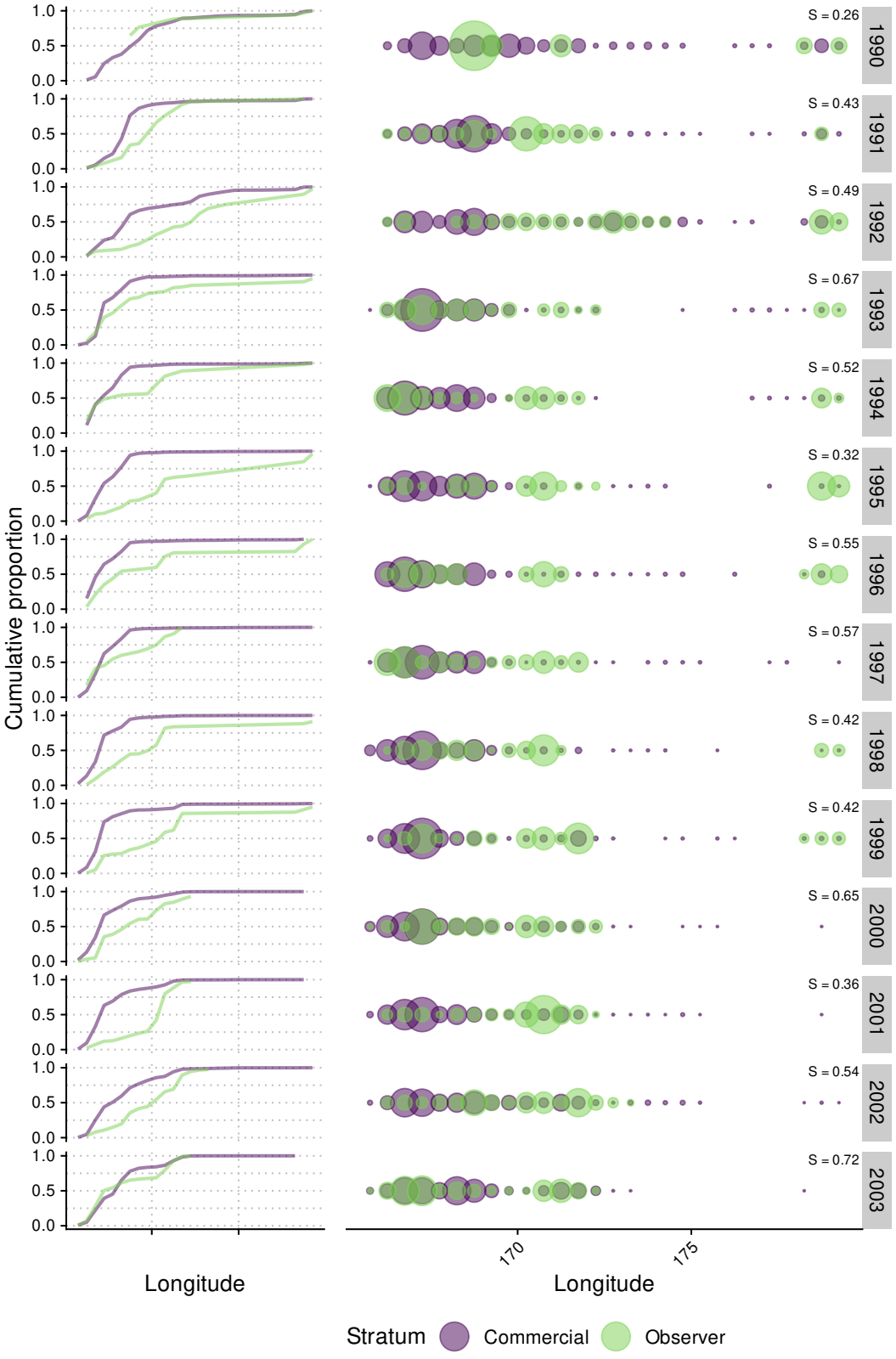


Figure 978: **Longitudinal representativeness of observer sampling coverage of Trawl fishing events in LIN 6B, where the ling catch exceeded the 40kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

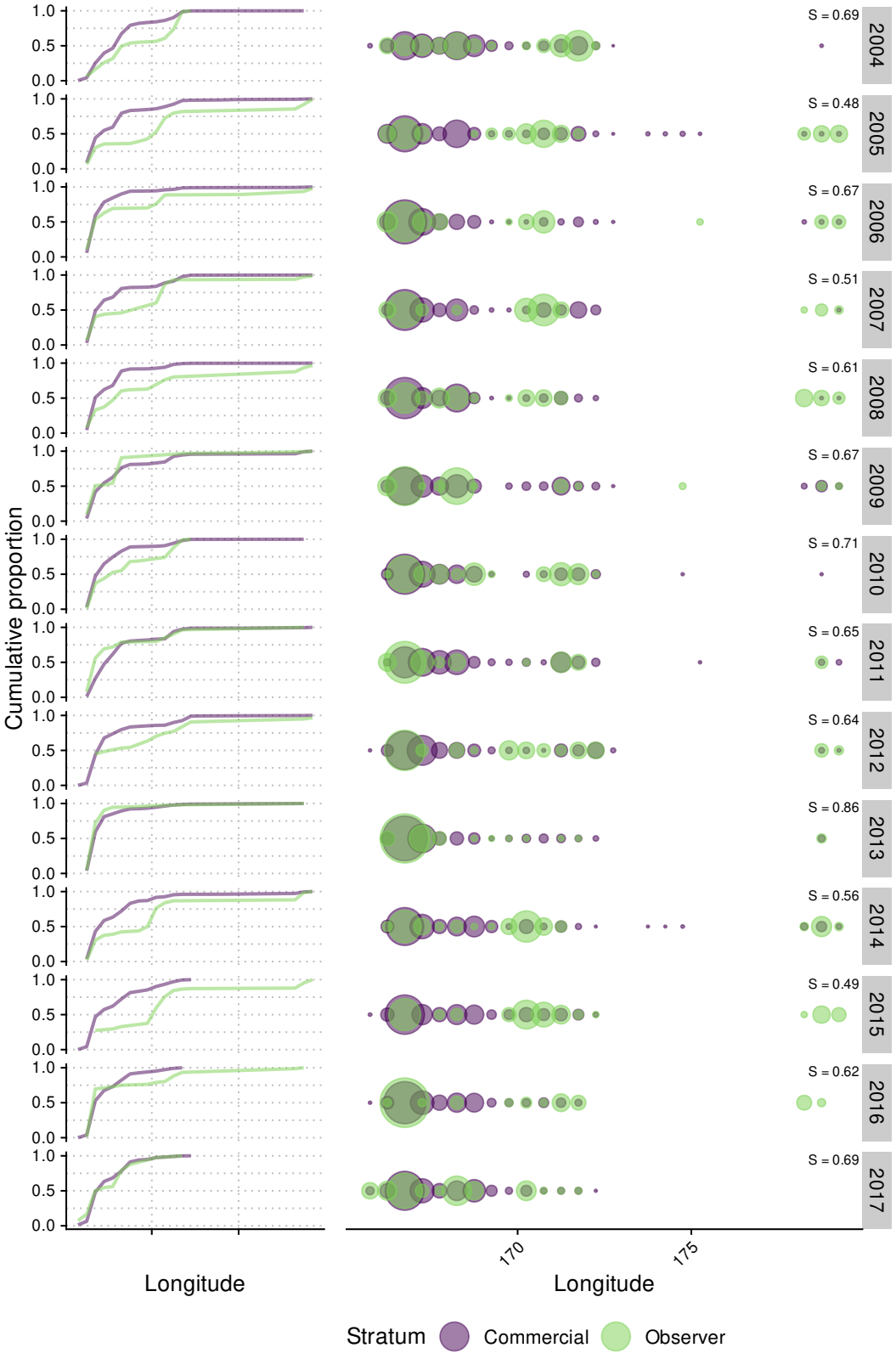


Figure 979: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in LIN 6B, where the ling catch exceeded the 40kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

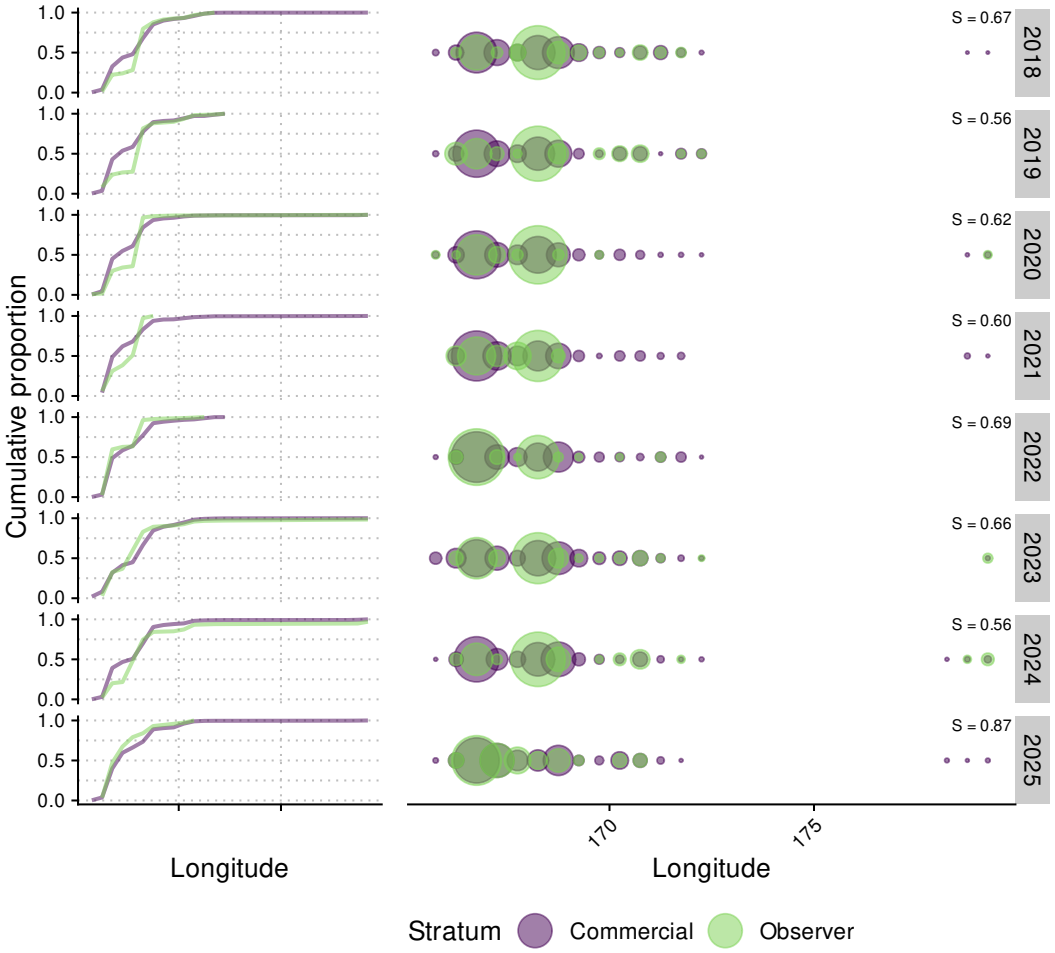


Figure 980: **Longitudinal representativeness of observer sampling coverage of Trawl fishing events in LIN 6B, where the ling catch exceeded the 40kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

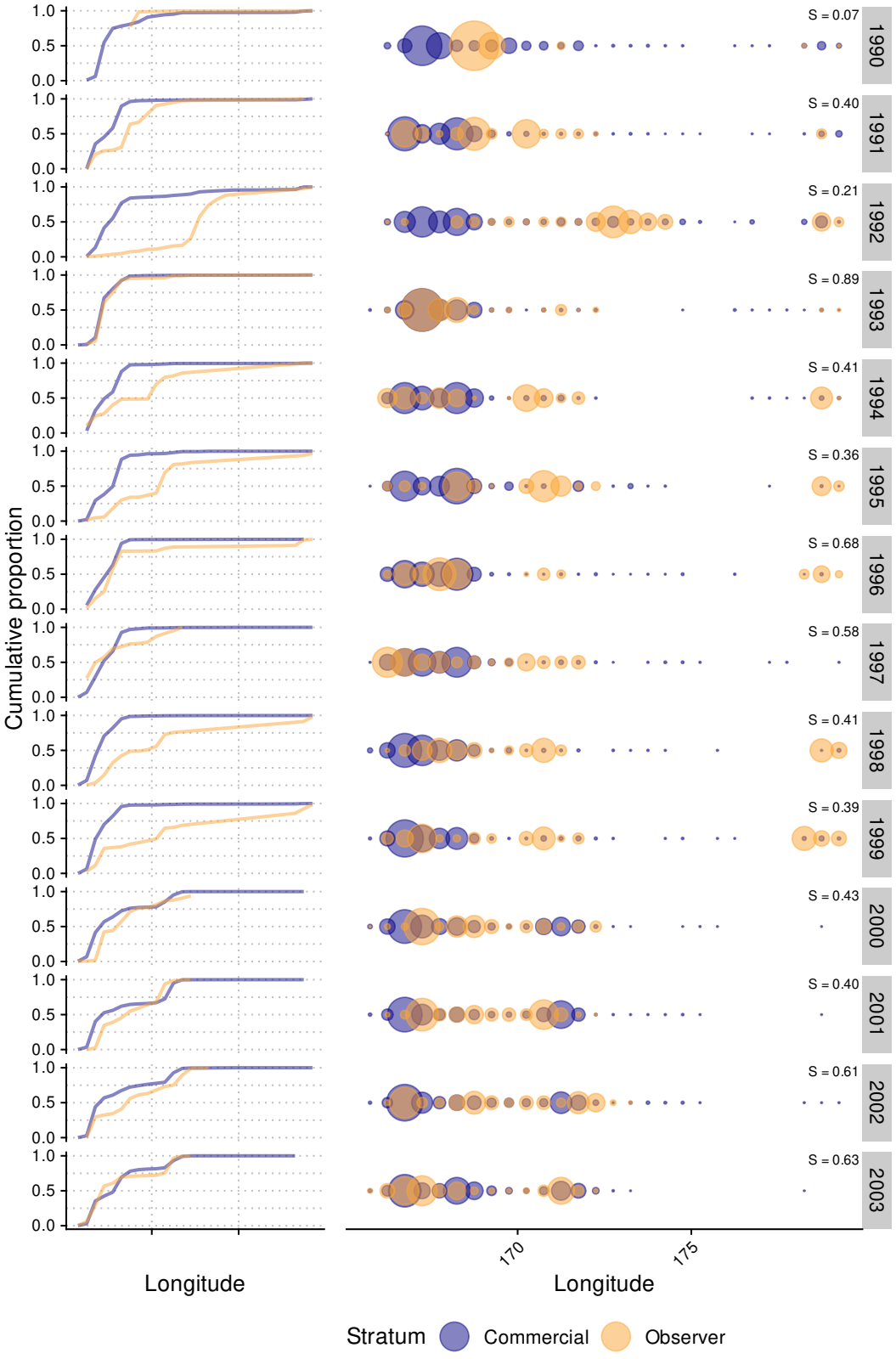


Figure 981: Longitudinal representativeness of observer sampling coverage of Trawl catch in LIN 6B, from events where the ling catch exceeded the 40kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

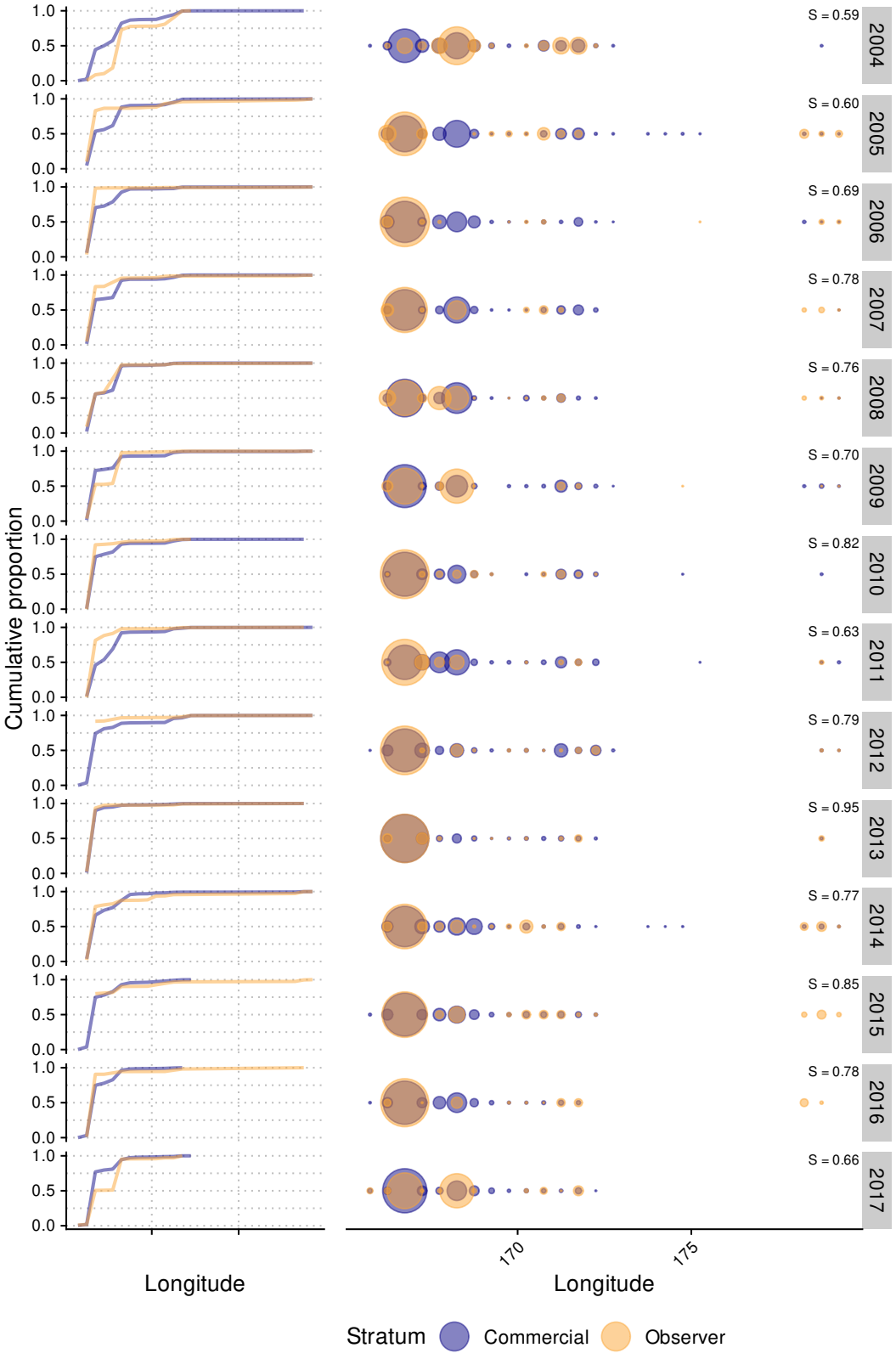


Figure 982: **Longitudinal representativeness of observer sampling coverage of Trawl catch in LIN 6B, from events where the ling catch exceeded the 40kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

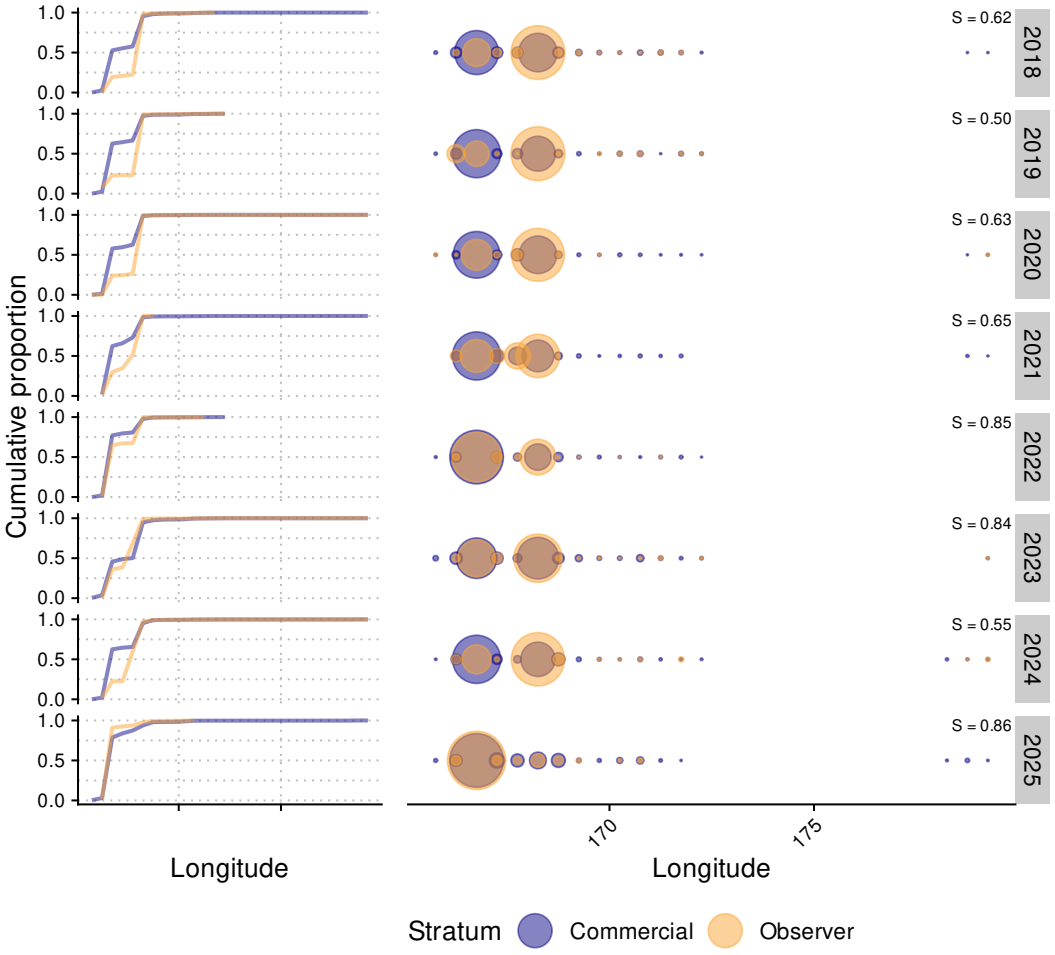


Figure 983: **Longitudinal representativeness of observer sampling coverage of Trawl catch in LIN 6B, from events where the ling catch exceeded the 40kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

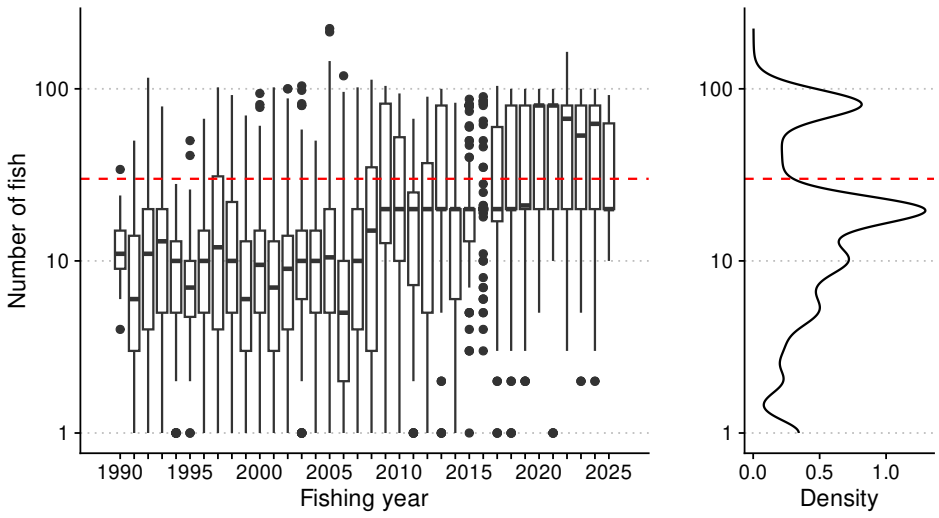


Figure 984: **Length-frequency sample sizes for observed fishing events in LIN 6B where ling were sampled. The red dashed line indicates a sample size of 30 fish.**

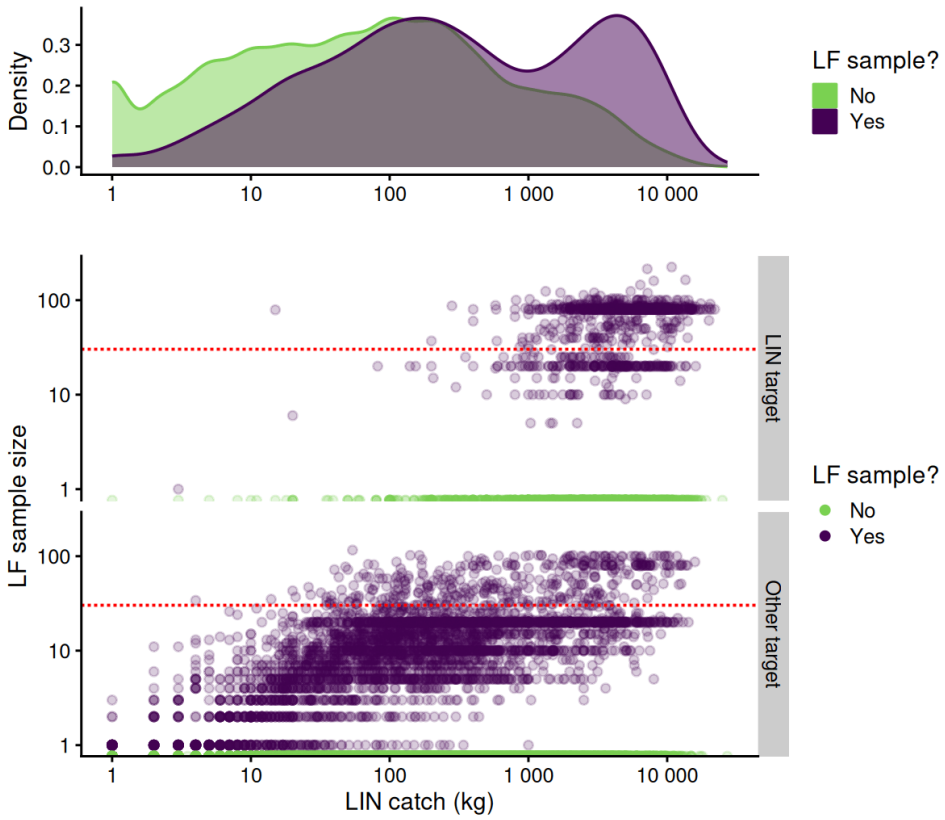


Figure 985: Length-frequency sample sizes (number of fish sampled) for observed fishing events in LIN 6B in relation to the total ling catch from an event, separately for ling target events and other target species. The red dashed line indicates a sample size of 30 fish.

2.13.10.2 Otolith samples

Table 83: Otolith samples of ling from the LIN 6B Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of ling exceeded a potential sampling threshold of 40 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	611	0	0	0.00
1991	1 611	0	0	0.00
1992	1 949	0	0	0.00
1993	2 035	0	0	0.00
1994	1 399	0	0	0.00
1995	1 310	0	0	0.00
1996	1 209	0	0	0.00
1997	1 880	0	0	0.00
1998	2 575	0	0	0.00
1999	2 458	0	0	0.00
2000	3 814	0	0	0.00
2001	3 748	0	0	0.00
2002	4 752	0	0	0.00
2003	4 125	0	0	0.00
2004	3 139	0	0	0.00
2005	1 836	0	0	0.00
2006	1 210	0	0	0.00
2007	1 496	0	0	0.00
2008	1 440	0	0	0.00
2009	1 306	17	86	1.30
2010	1 175	59	279	5.02
2011	1 047	36	153	3.44
2012	1 113	107	484	9.61
2013	1 492	129	641	8.65
2014	1 635	86	400	5.26
2015	1 545	38	190	2.46
2016	1 034	44	223	4.26
2017	1 295	90	425	6.95
2018	1 976	271	1 399	13.71
2019	1 206	108	533	8.96
2020	961	109	546	11.34
2021	1 241	102	534	8.22
2022	1 196	156	1 222	13.04
2023	1 531	224	1 659	14.63
2024	1 073	117	889	10.90
2025	1 175	144	955	12.26

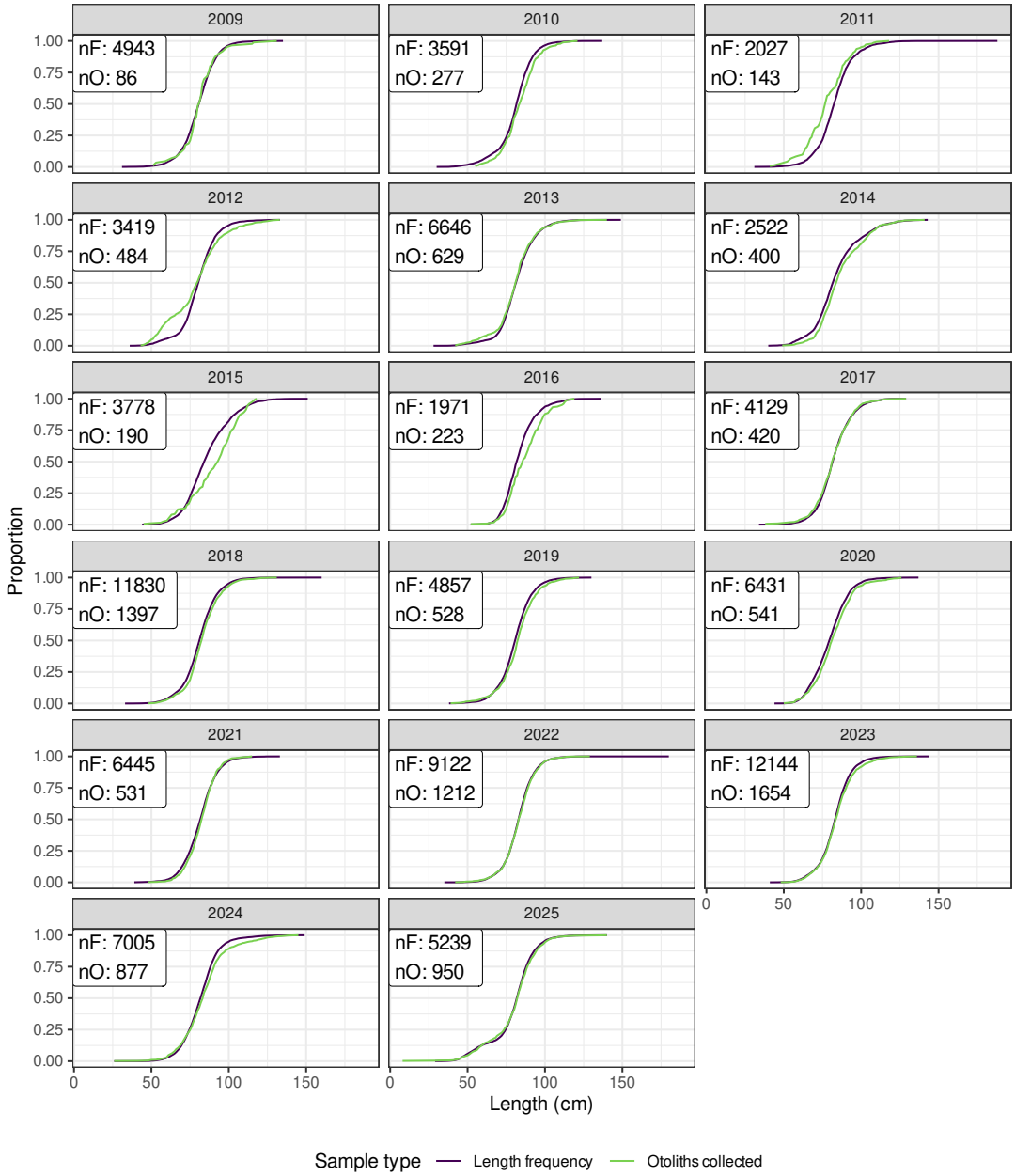


Figure 986: Cumulative distributions of the length of fish in the length frequency and otolith samples of ling in the LIN 6B Trawl fishery for the 2009 to 2025 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

2.13.10.3 Catch quantification

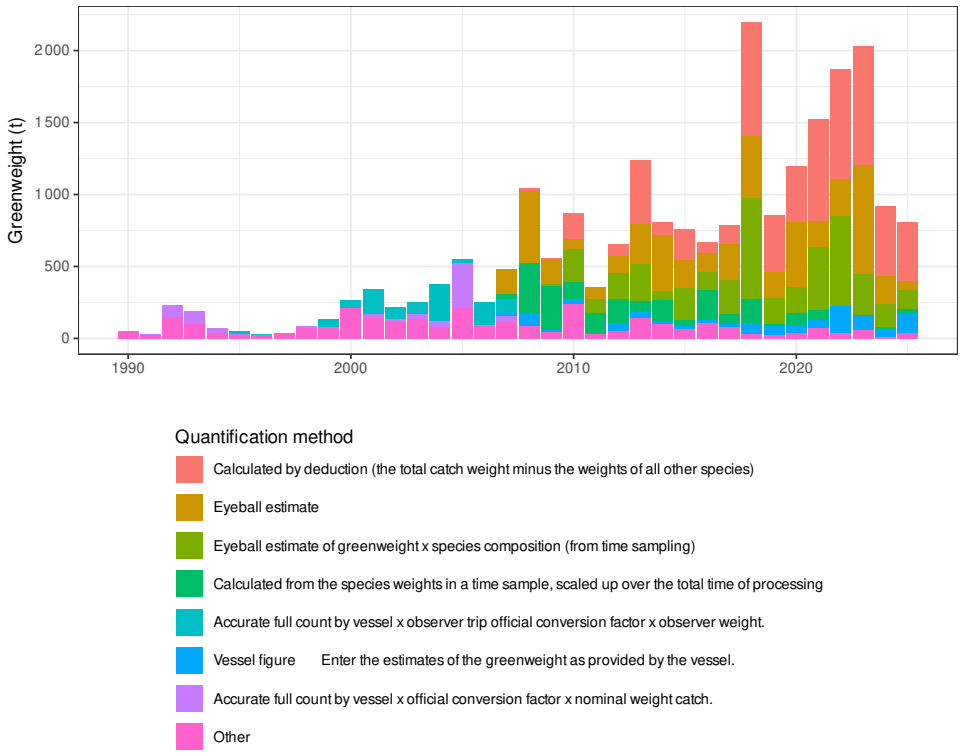


Figure 987: Methods used by observers to quantify the catch of ling in the LIN 6B Trawl fishery. The legend lists the methods used in descending order of total catch.

2.13.11 LIN 6B: Line fishery

2.13.11.1 Length-frequency samples

Table 84: Length-frequency samples of ling from the LIN 6B Line fishery sampled by the Observer Programme in fishing years 1991 to 2025. Positive fishing events are those where the catch of ling exceeded a potential sampling threshold of 40 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1991	286	0	0	0.00
1992	859	0	0	0.00
1993	1 403	21	393	1.50
1994	11 473	0	0	0.00
1995	4 273	26	458	0.61
1996	20 578	97	2 346	0.47
1997	46 927	1	20	0.00
1998	9 320	24	2 694	0.26
1999	4 018	136	10 853	3.38
2000	1 718	64	4 644	3.73
2001	1 464	79	3 865	5.40
2002	1 046	83	974	7.93
2003	923	496	6 438	53.74
2004	1 099	294	3 314	26.75
2005	232	116	1 159	50.00
2006	178	0	0	0.00
2007	177	0	0	0.00
2008	663	86	870	12.97
2009	312	91	1 091	29.17
2010	428	49	575	11.45
2011	336	0	0	0.00
2012	362	91	1 291	25.14
2014	509	52	849	10.22
2015	439	0	0	0.00
2016	556	0	0	0.00
2017	798	49	482	6.14
2018	523	82	1 636	15.68
2019	688	21	215	3.05
2020	778	78	798	10.03
2021	829	0	0	0.00
2022	500	92	2 638	18.40
2023	609	132	2 038	21.67
2024	756	140	2 327	18.52
2025	733	100	2 387	13.64

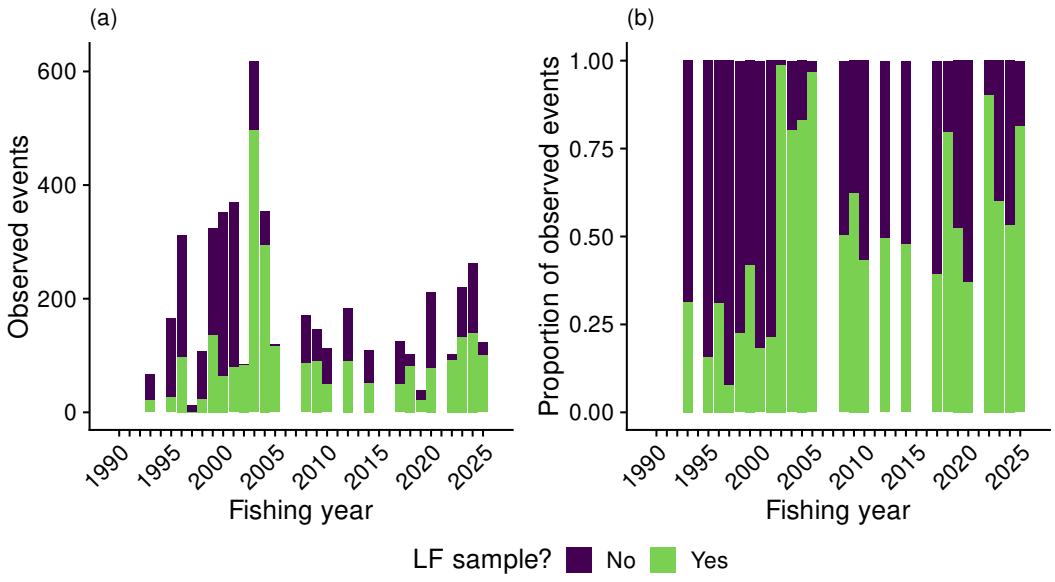


Figure 988: **(a) Observed Line fishing events, and (b) proportion of observed events, in LIN 6B where the ling catch exceeded the 40 kg threshold, with and without length-frequency sampling.**

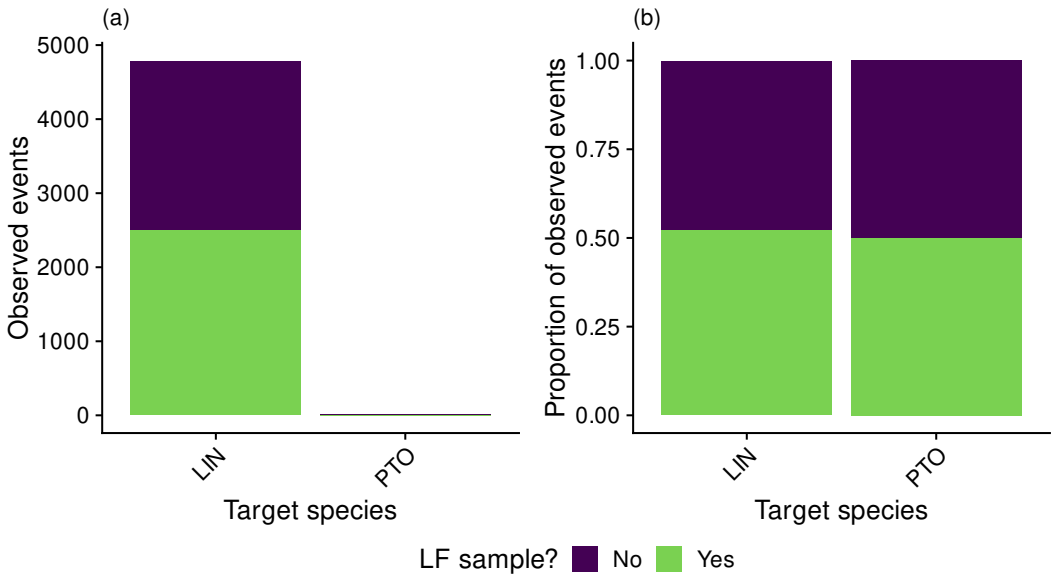


Figure 989: **(a) Observed Line fishing events, and (b) proportion of observed events, in LIN 6B where the ling catch exceeded the 40 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

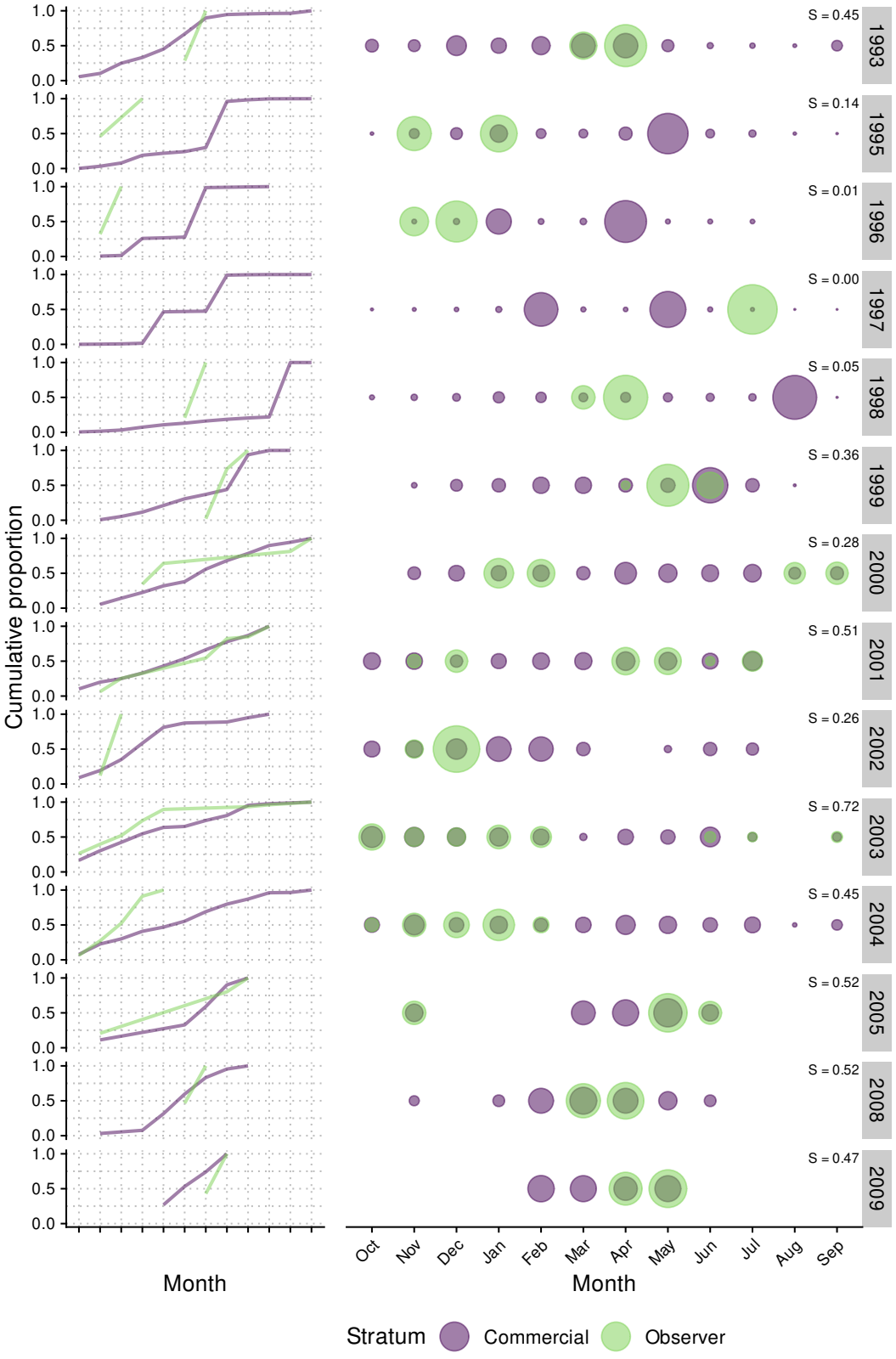


Figure 990: **Monthly representativeness of observer sampling coverage of Line fishing events in LIN 6B, where the ling catch exceeded the 40kg threshold, in 1993 to 2009. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

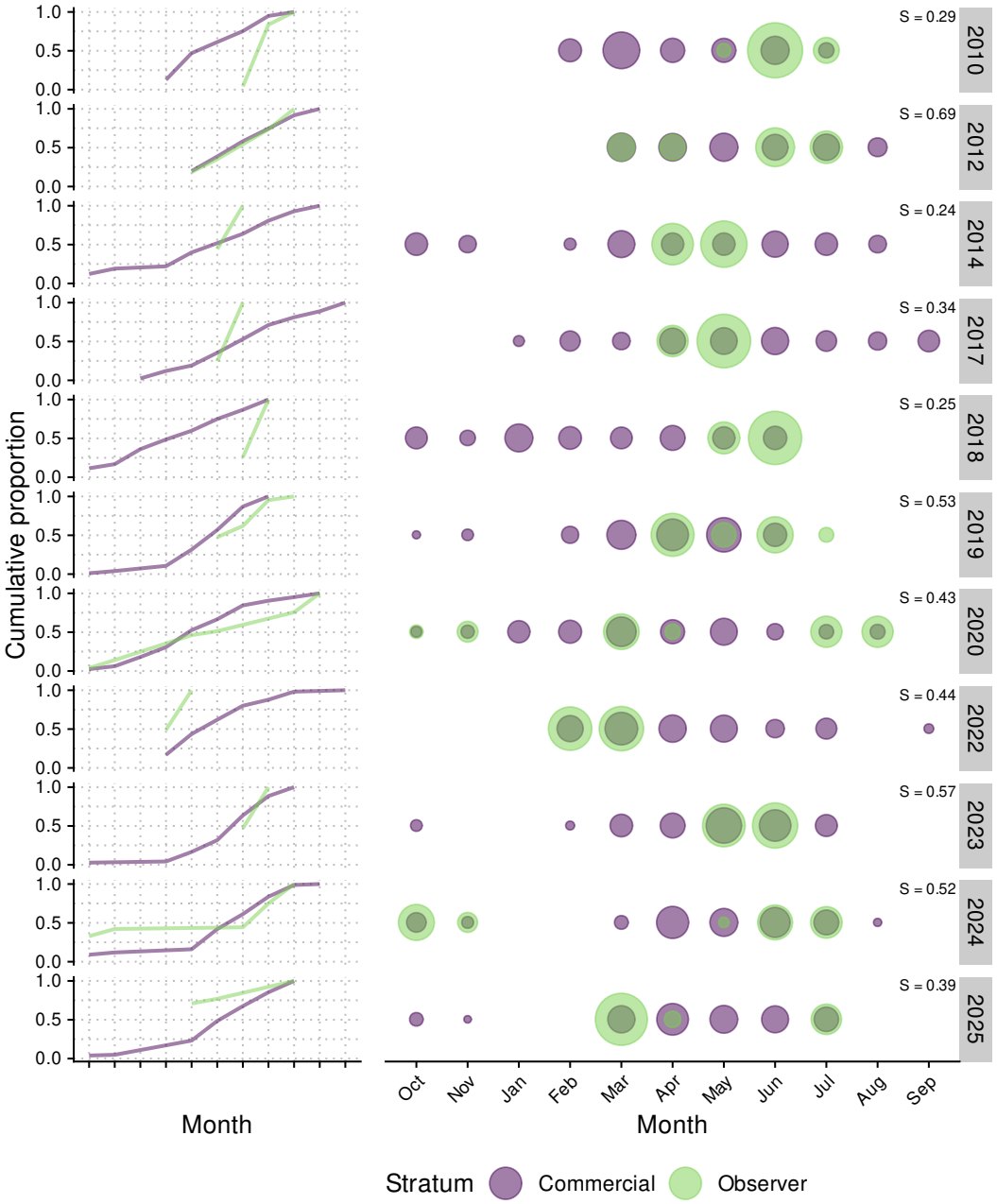


Figure 991: Monthly representativeness of observer sampling coverage of Line fishing events in LIN 6B, where the ling catch exceeded the 40kg threshold, in 2010 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

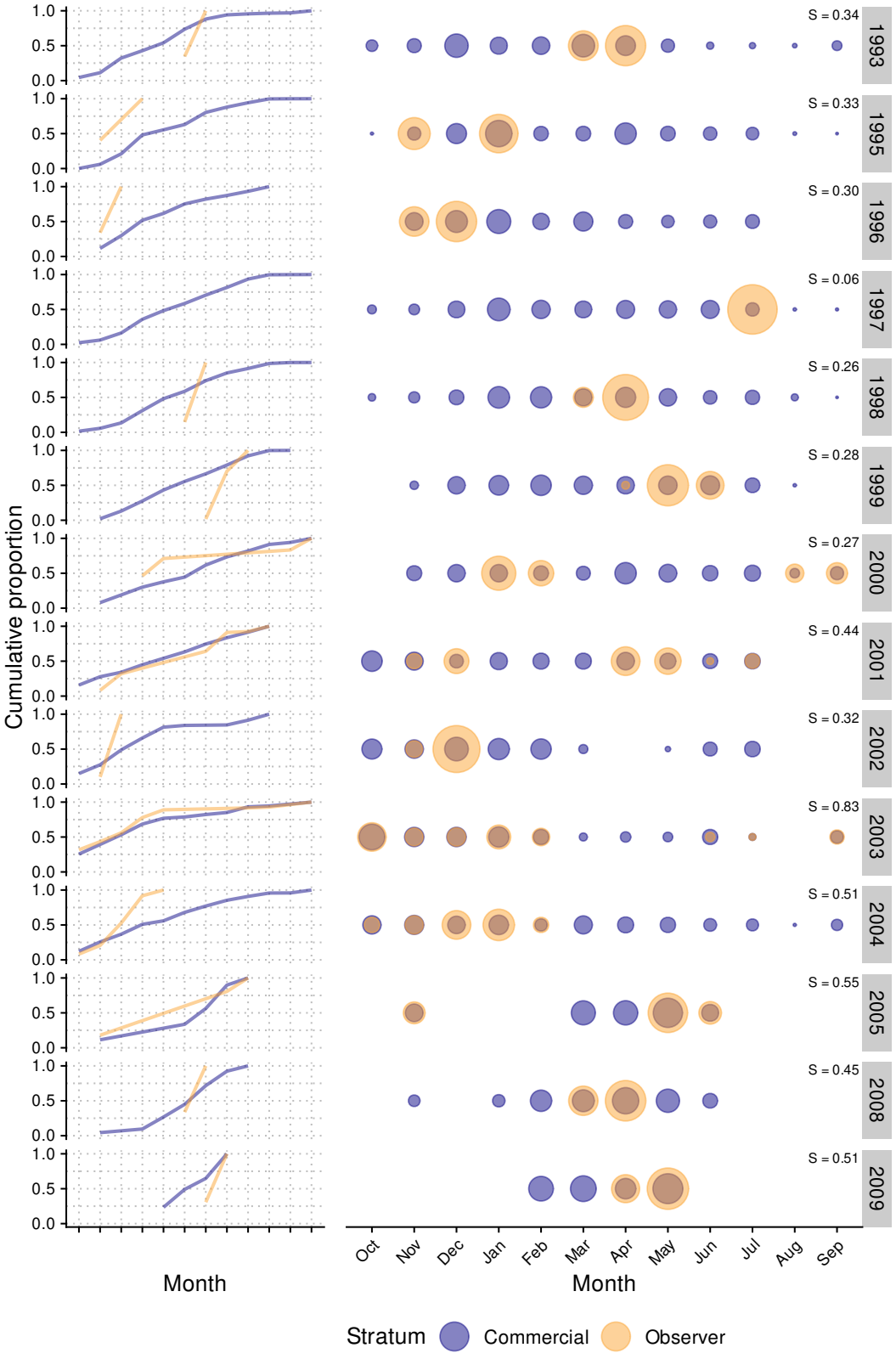


Figure 992: **Monthly representativeness of observer sampling coverage of Line catch in LIN 6B, from events where the ling catch exceeded the 40kg threshold, in 1993 to 2009. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

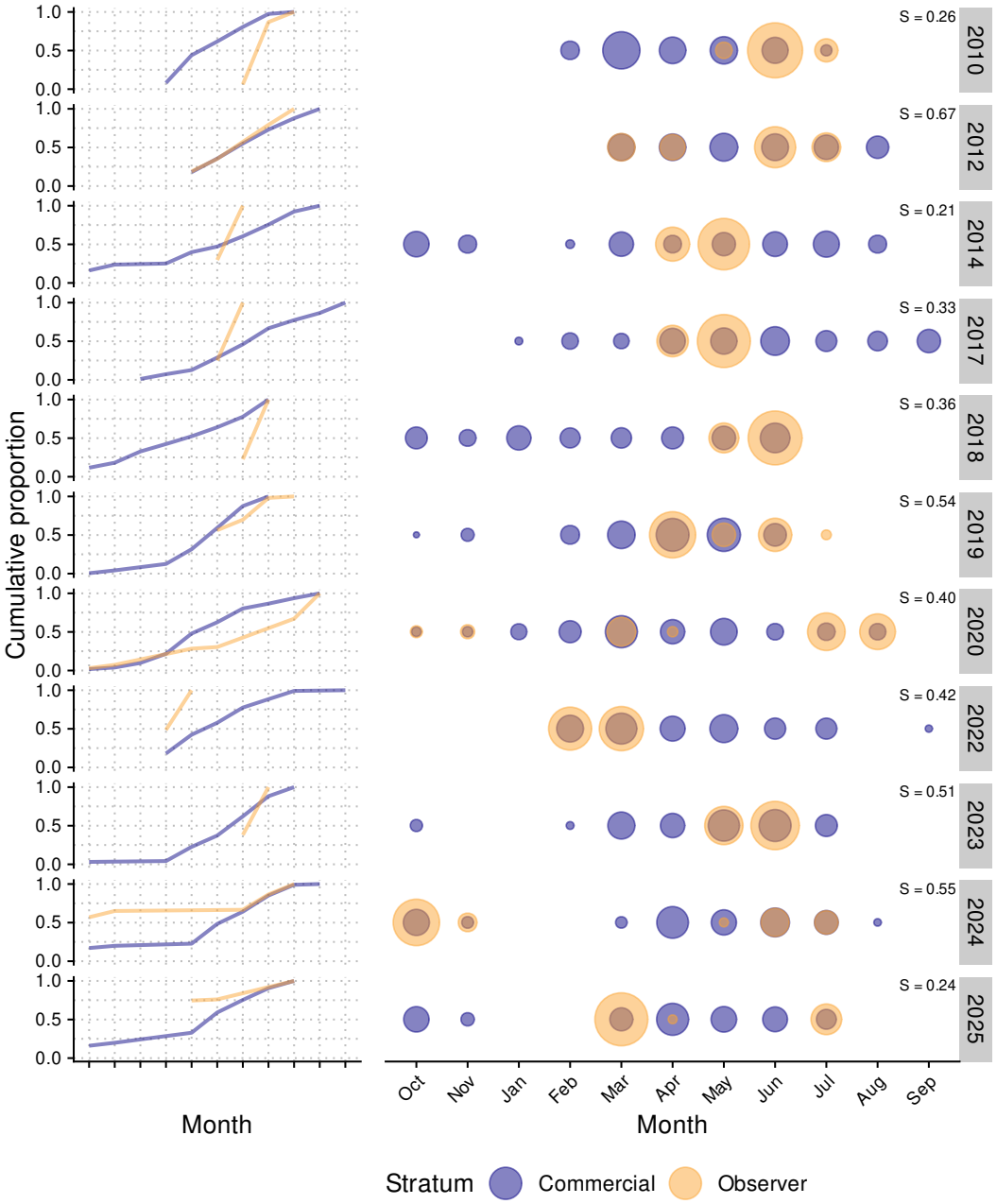


Figure 993: **Monthly representativeness of observer sampling coverage of Line catch in LIN 6B, from events where the ling catch exceeded the 40kg threshold, in 2010 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

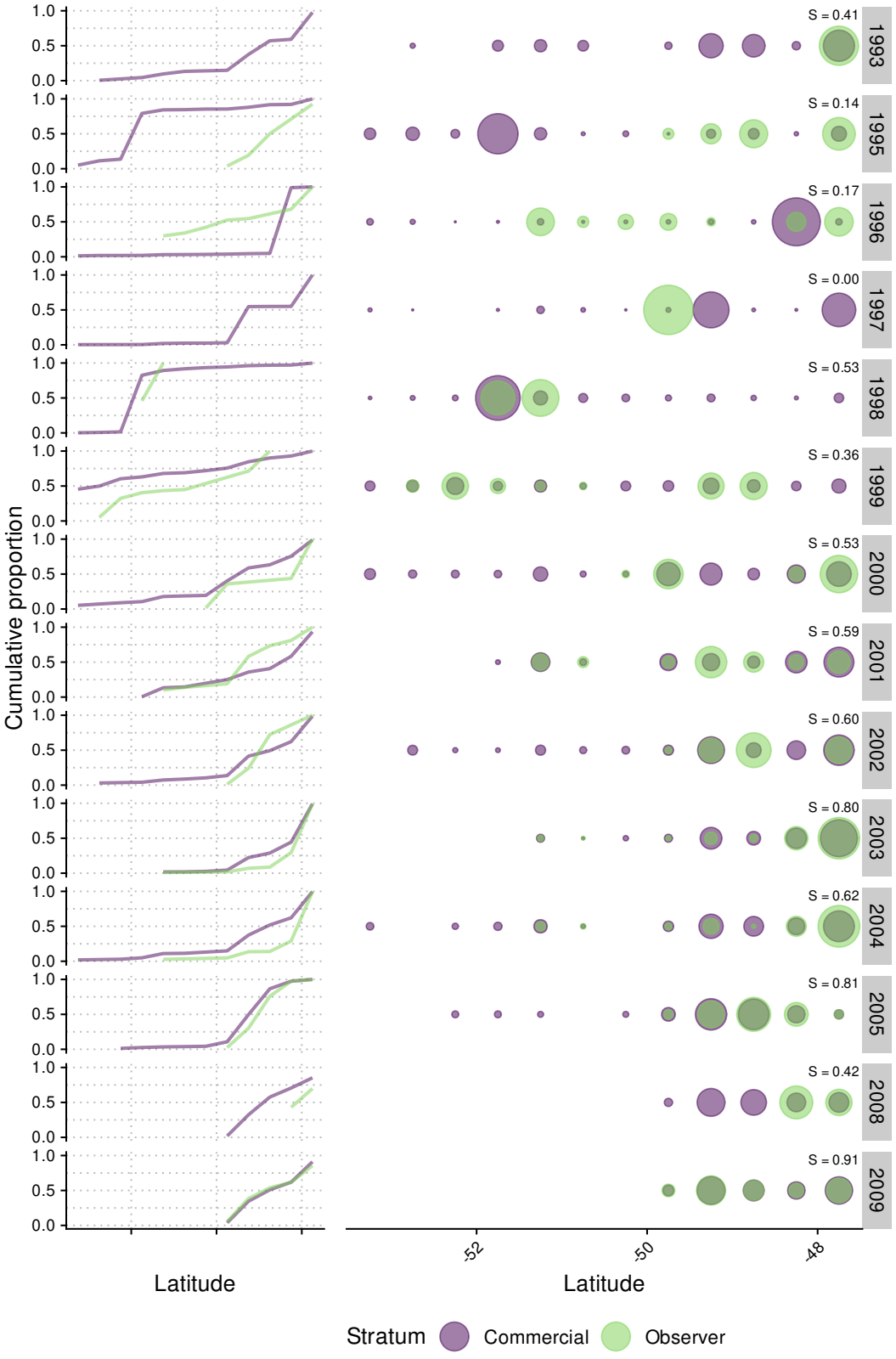


Figure 994: **Latitudinal representativeness of observer sampling coverage of Line fishing events in LIN 6B, where the ling catch exceeded the 40kg threshold, in 1993 to 2009. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

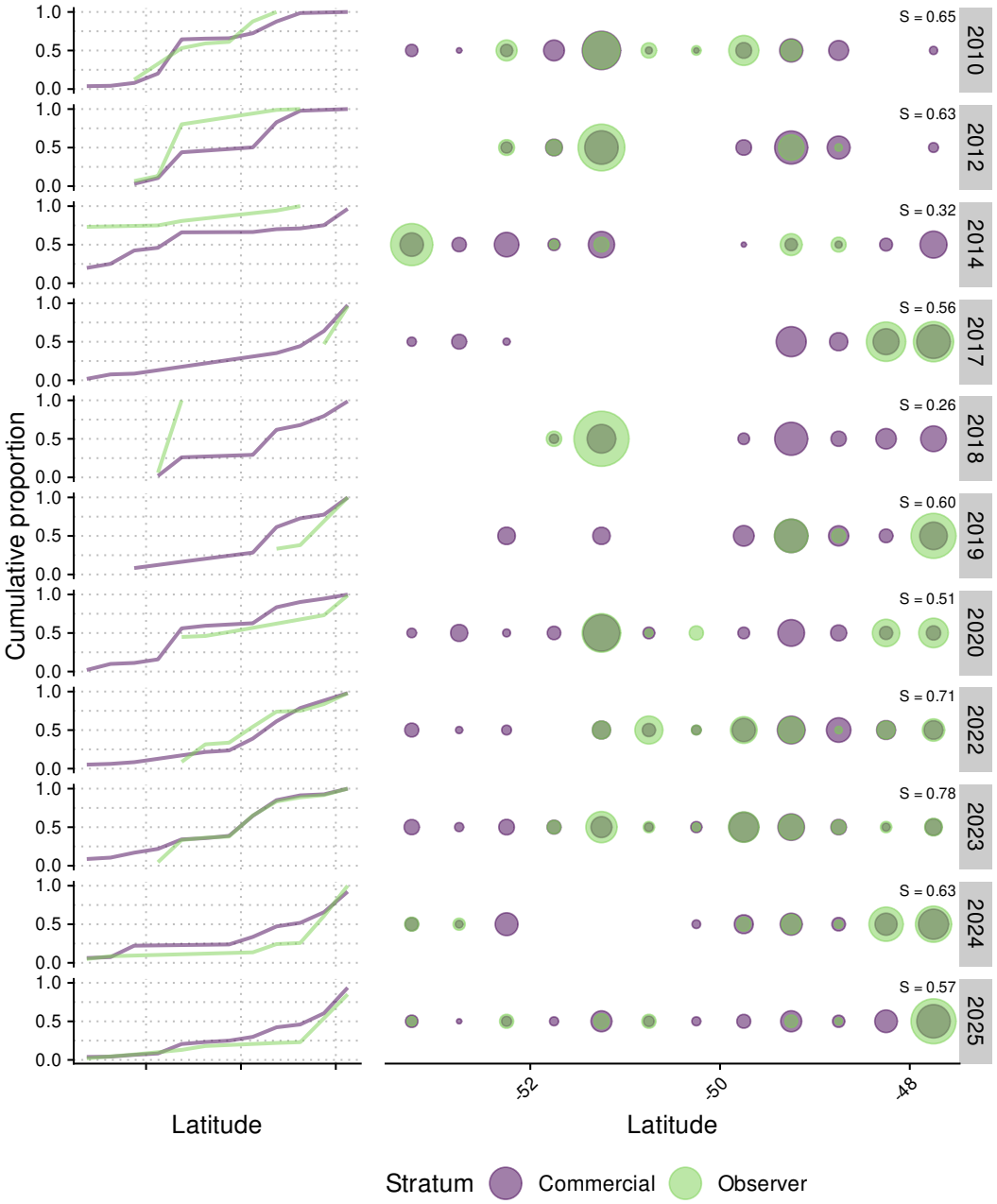


Figure 995: Latitudinal representativeness of observer sampling coverage of Line fishing events in LIN 6B, where the ling catch exceeded the 40kg threshold, in 2010 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

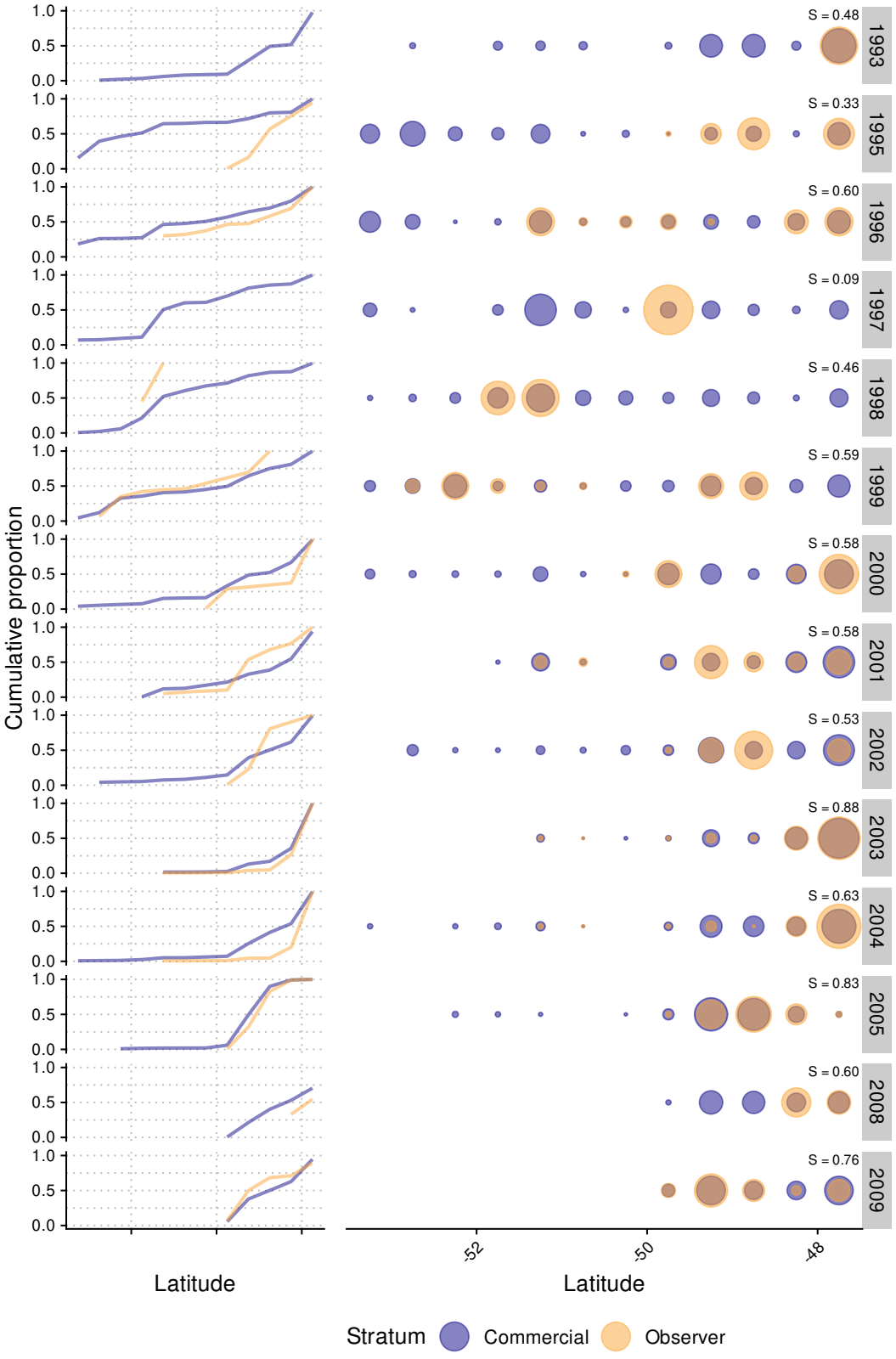


Figure 996: **Latitudinal representativeness of observer sampling coverage of Line catch in LIN 6B, from events where the ling catch exceeded the 40kg threshold, in 1993 to 2009. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

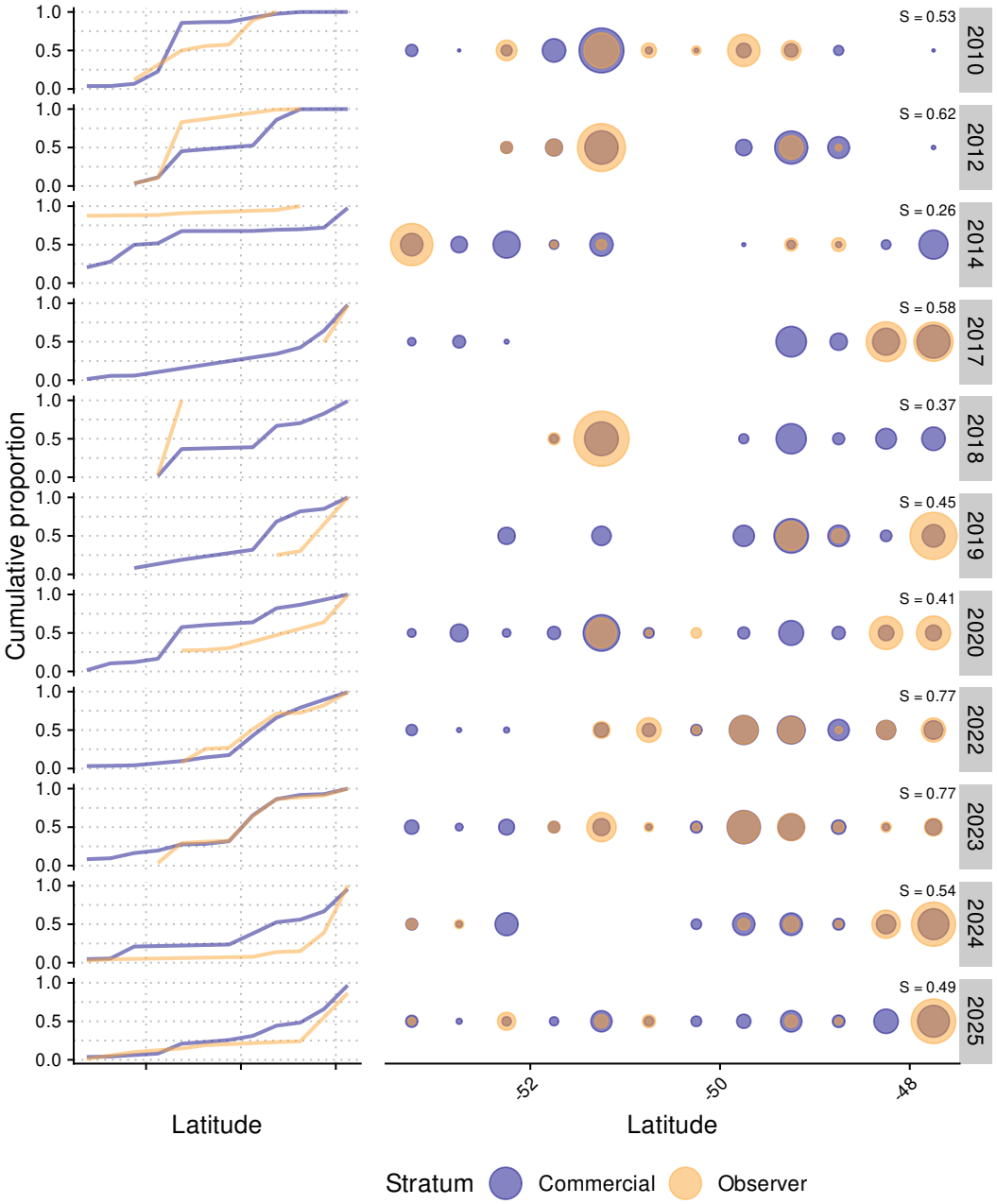


Figure 997: **Latitudinal representativeness of observer sampling coverage of Line catch in LIN 6B, from events where the ling catch exceeded the 40kg threshold, in 2010 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

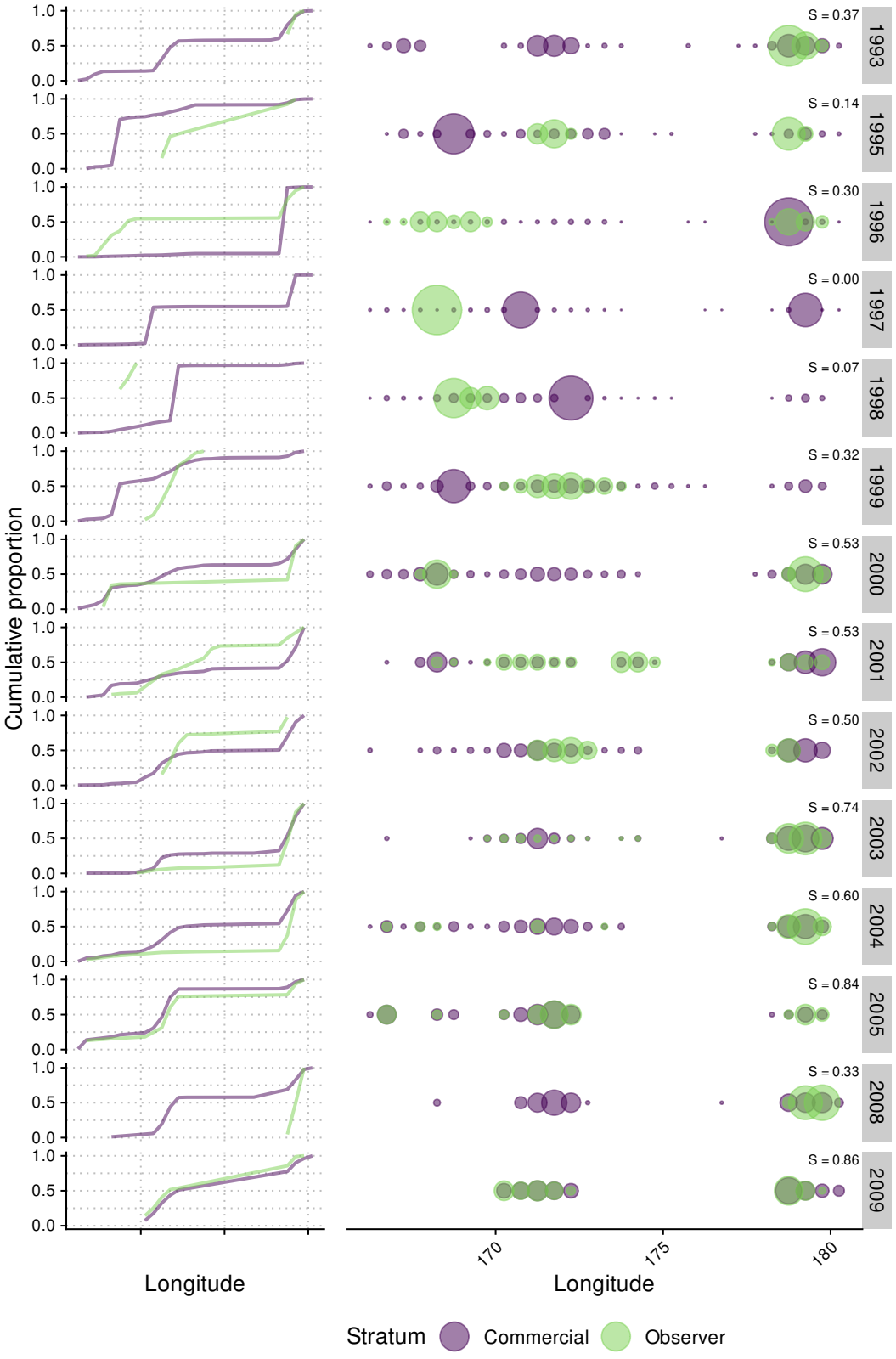


Figure 998: Longitudinal representativeness of observer sampling coverage of Line fishing events in LIN 6B, where the ling catch exceeded the 40kg threshold, in 1993 to 2009. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

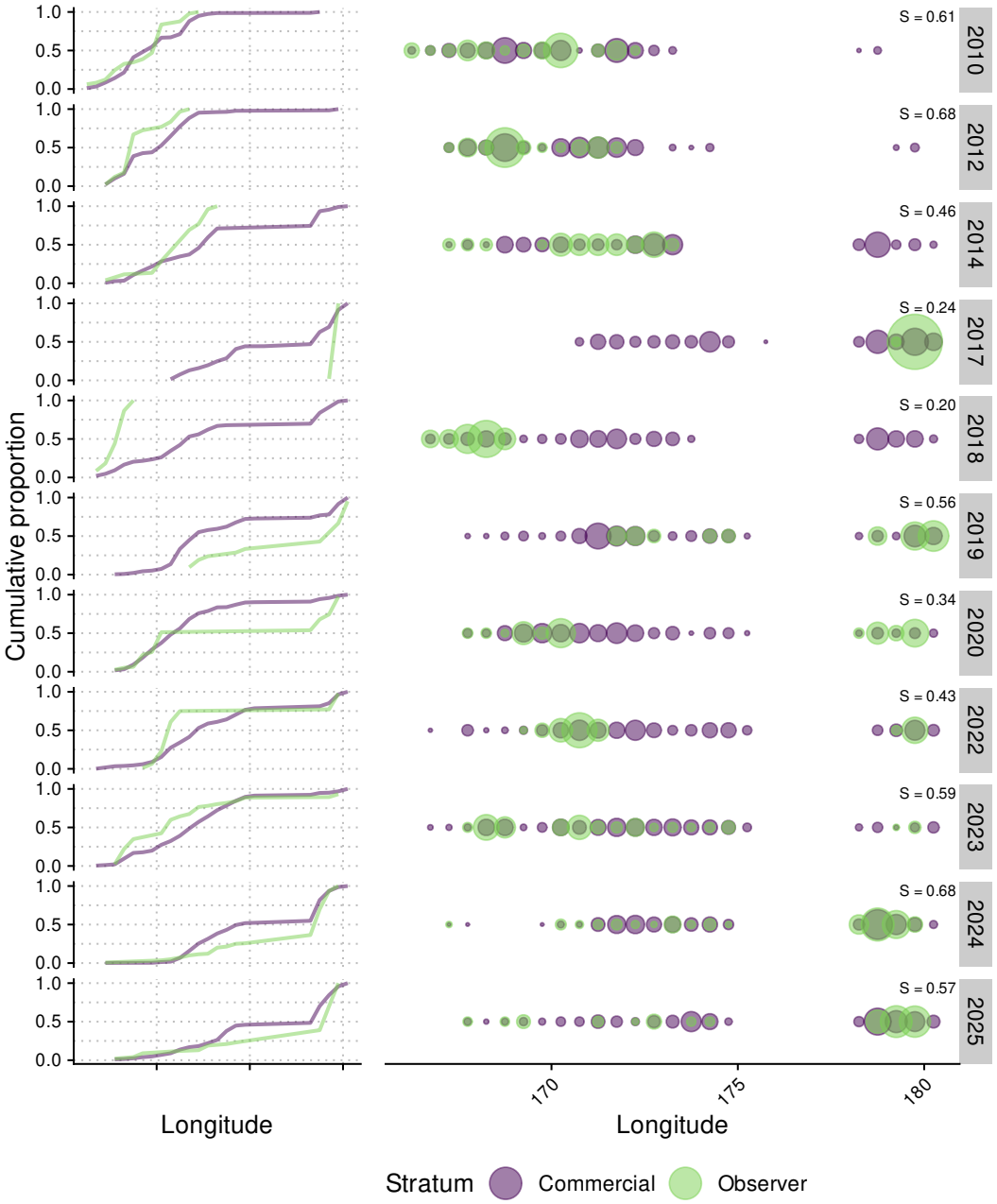


Figure 999: Longitudinal representativeness of observer sampling coverage of Line fishing events in LIN 6B, where the ling catch exceeded the 40kg threshold, in 2010 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

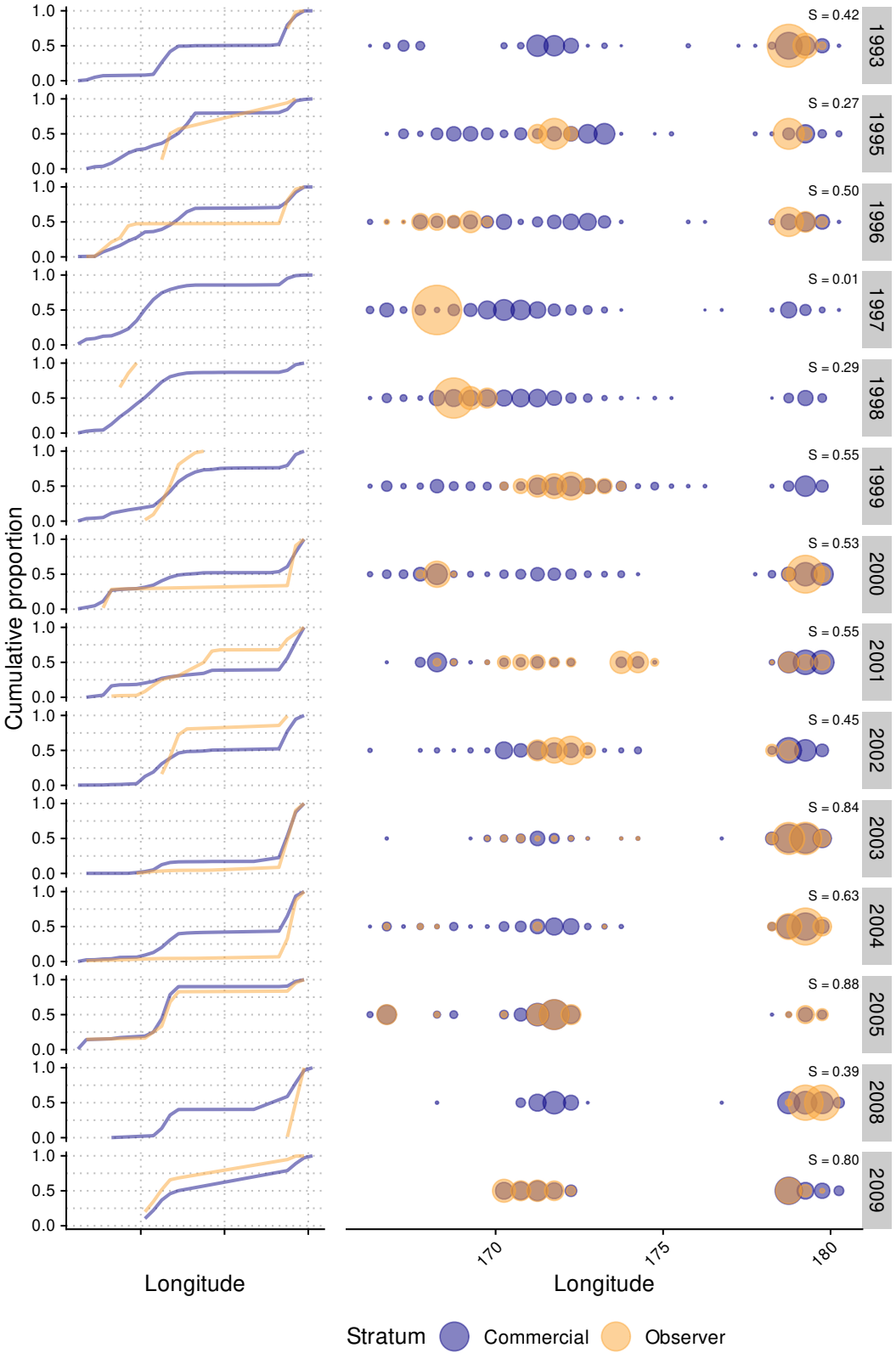


Figure 1000: **Longitudinal representativeness of observer sampling coverage of Line catch in LIN 6B, from events where the ling catch exceeded the 40kg threshold, in 1993 to 2009. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

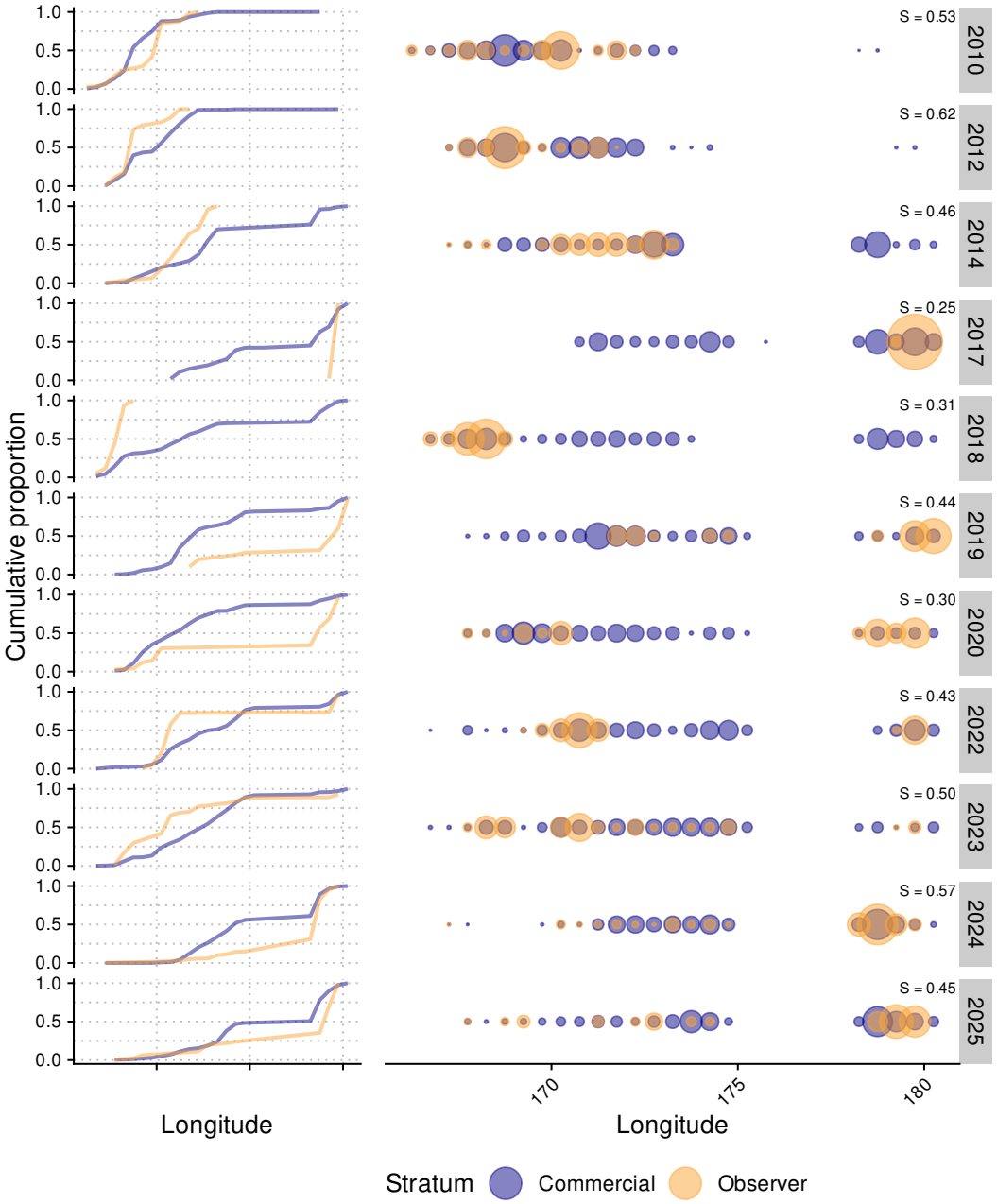


Figure 1001: Longitudinal representativeness of observer sampling coverage of Line catch in LIN 6B, from events where the ling catch exceeded the 40kg threshold, in 2010 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

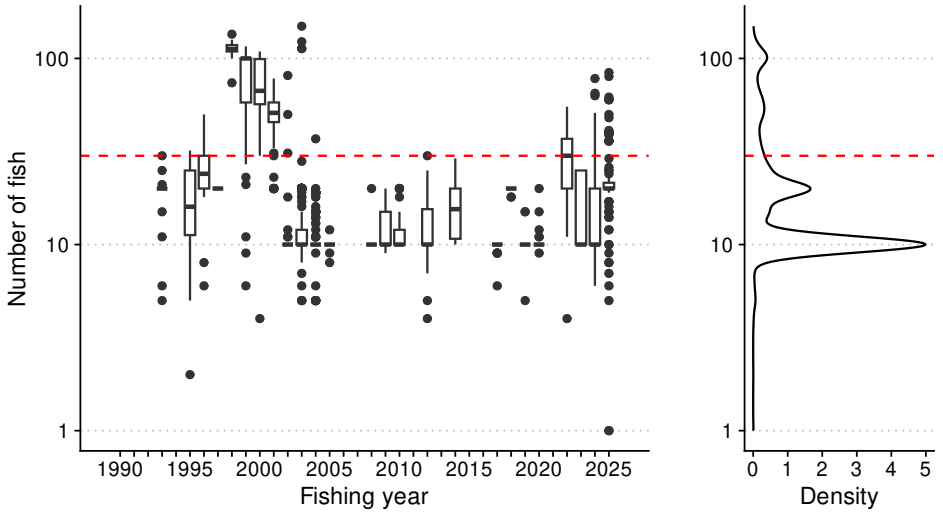


Figure 1002: **Length-frequency sample sizes for observed fishing events in LIN 6B where ling were sampled. The red dashed line indicates a sample size of 30 fish.**

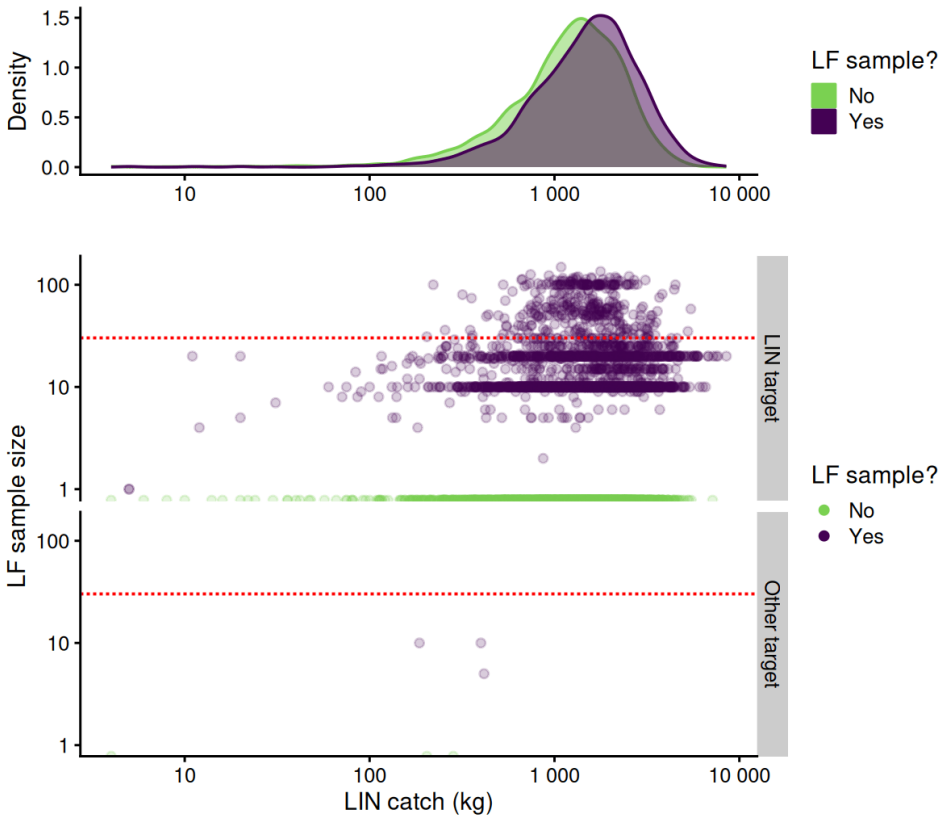


Figure 1003: **Length-frequency sample sizes (number of fish sampled) for observed fishing events in LIN 6B in relation to the total ling catch from an event, separately for ling target events and other target species. The red dashed line indicates a sample size of 30 fish.**

2.13.11.2 Otolith samples

Table 85: Otolith samples of ling from the LIN 6B Line fishery sampled by the Observer Programme in fishing years 1991 to 2025. Positive fishing events are those where the catch of ling exceeded a potential sampling threshold of 40 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1991	286	0	0	0.00
1992	859	0	0	0.00
1993	1 403	0	0	0.00
1994	11 473	0	0	0.00
1995	4 273	0	0	0.00
1996	20 578	0	0	0.00
1997	46 927	0	0	0.00
1998	9 320	0	0	0.00
1999	4 018	0	0	0.00
2000	1 718	0	0	0.00
2001	1 464	0	0	0.00
2002	1 046	0	0	0.00
2003	923	0	0	0.00
2004	1 099	2	10	0.18
2005	232	0	0	0.00
2006	178	0	0	0.00
2007	177	0	0	0.00
2008	663	0	0	0.00
2009	312	0	0	0.00
2010	428	0	0	0.00
2011	336	0	0	0.00
2012	362	0	0	0.00
2014	509	0	0	0.00
2015	439	0	0	0.00
2016	556	0	0	0.00
2017	798	0	0	0.00
2018	523	0	0	0.00
2019	688	0	0	0.00
2020	778	0	0	0.00
2021	829	0	0	0.00
2022	500	0	0	0.00
2023	609	0	0	0.00
2024	756	80	724	10.58
2025	733	99	811	13.51

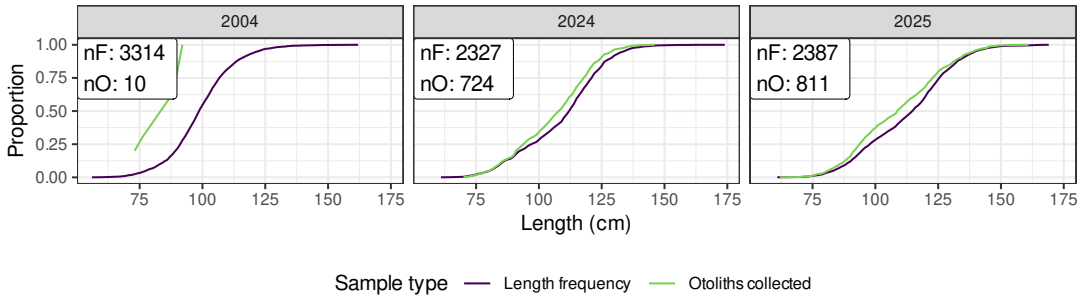


Figure 1004: Cumulative distributions of the length of fish in the length frequency and otolith samples of ling in the LIN 6B Line fishery for the 2004 to 2025 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

2.13.11.3 Catch quantification

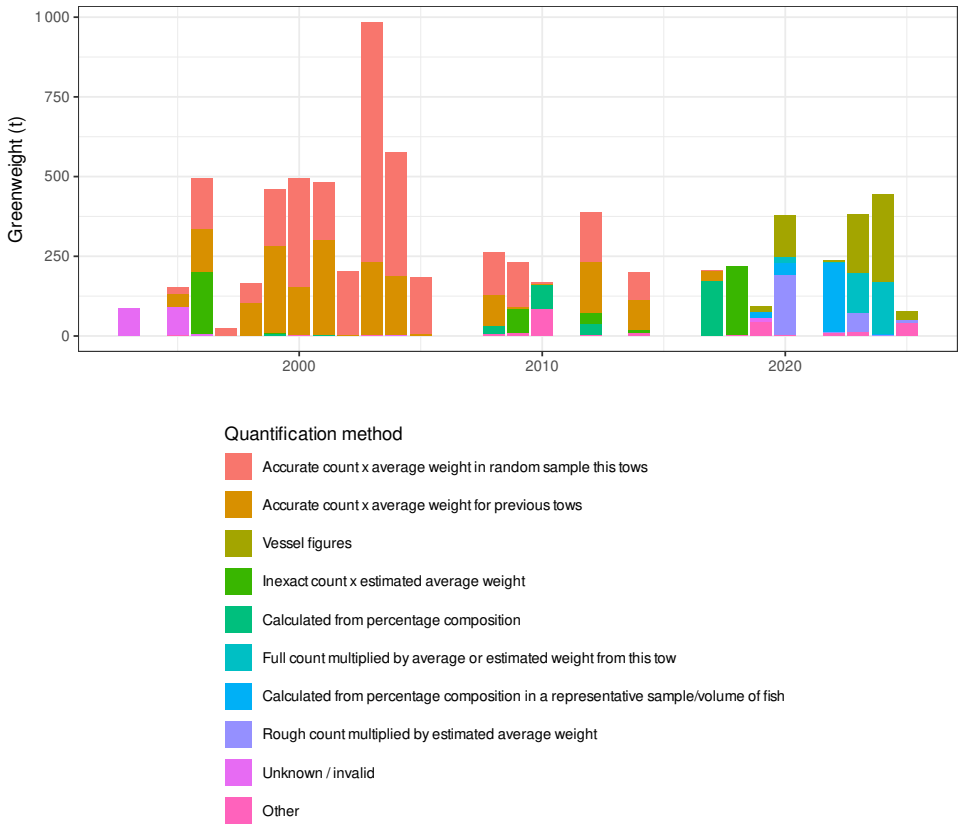


Figure 1005: Methods used by observers to quantify the catch of ling in the LIN 6B Line fishery. The legend lists the methods used in descending order of total catch.

2.13.12 LIN 6B: Pot fishery

2.13.12.1 Length-frequency samples

Table 86: Length-frequency samples of ling from the LIN 6B Pot fishery sampled by the Observer Programme in fishing years 2019 to 2025. Positive fishing events are those where the catch of ling exceeded a potential sampling threshold of 40 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
2019	3	0	0	0.00
2023	120	0	0	0.00
2024	222	0	0	0.00
2025	468	41	2621	8.76

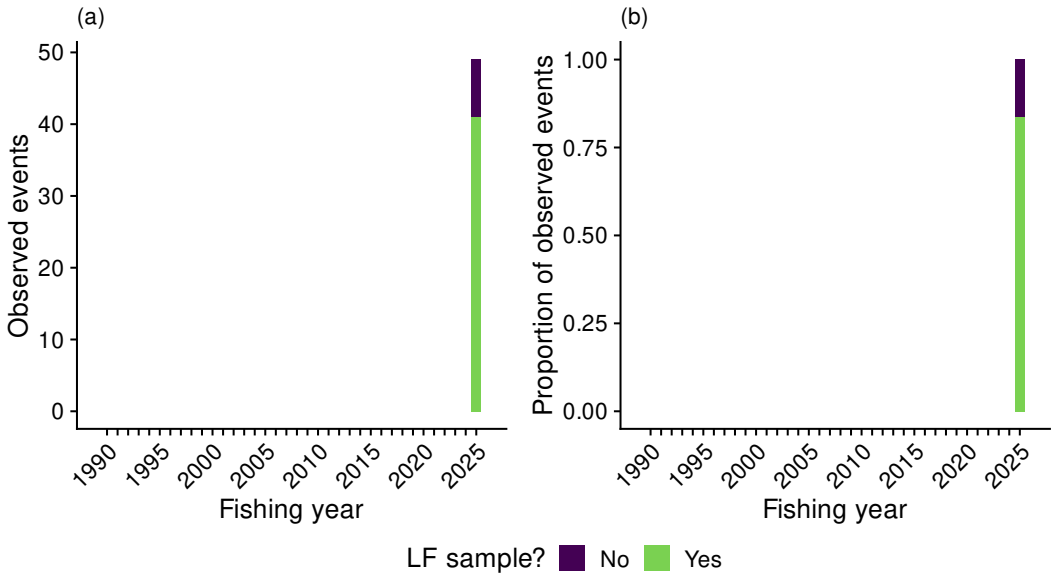


Figure 1006: (a) Observed Pot fishing events, and (b) proportion of observed events, in LIN 6B where the ling catch exceeded the 40 kg threshold, with and without length-frequency sampling.

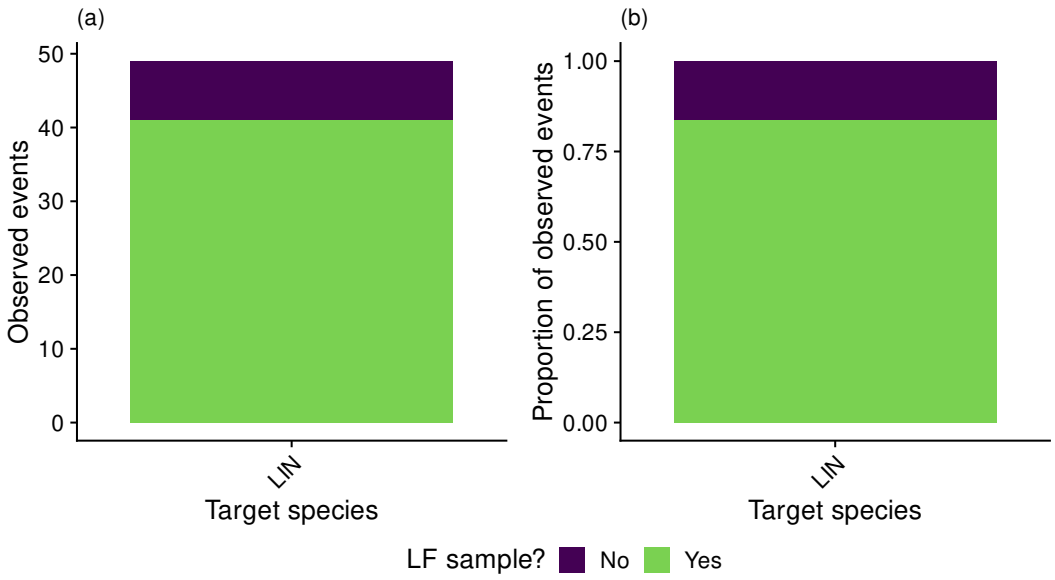


Figure 1007: **(a) Observed Pot fishing events, and (b) proportion of observed events, in LIN 6B where the ling catch exceeded the 40 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

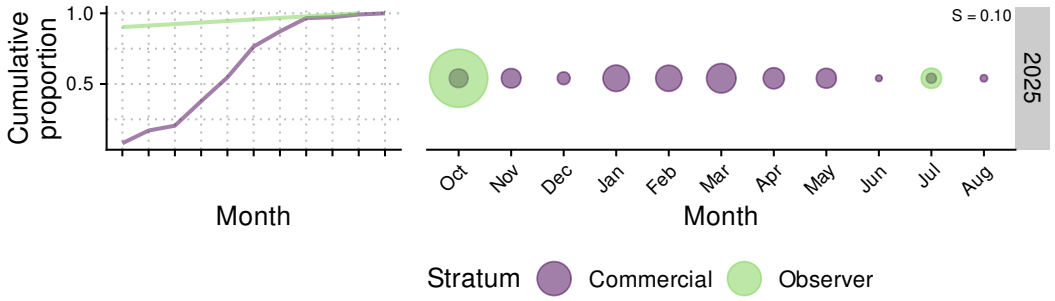


Figure 1008: **Monthly representativeness of observer sampling coverage of Pot fishing events in LIN 6B, where the ling catch exceeded the 40kg threshold, in 2025 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

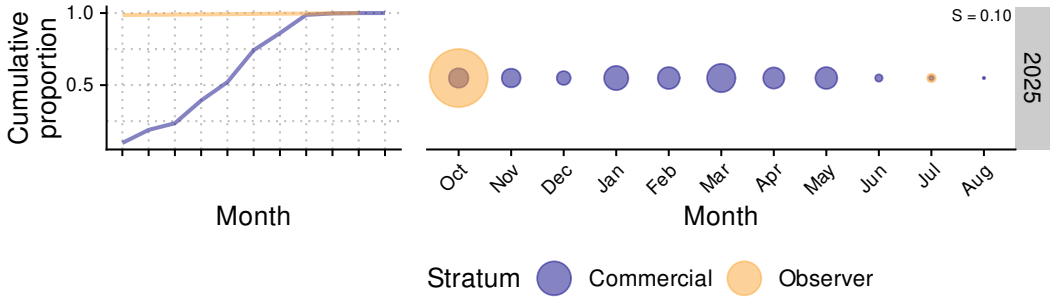


Figure 1009: **Monthly representativeness of observer sampling coverage of Pot catch in LIN 6B, from events where the ling catch exceeded the 40kg threshold, in 2025 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

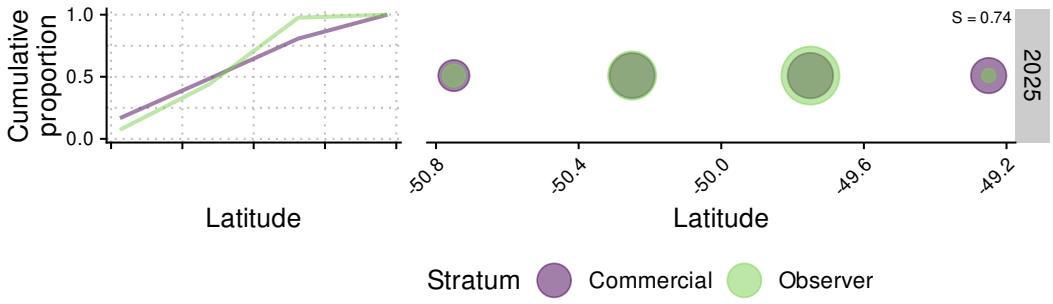


Figure 1010: **Latitudinal representativeness of observer sampling coverage of Pot fishing events in LIN 6B, where the ling catch exceeded the 40kg threshold, in 2025 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

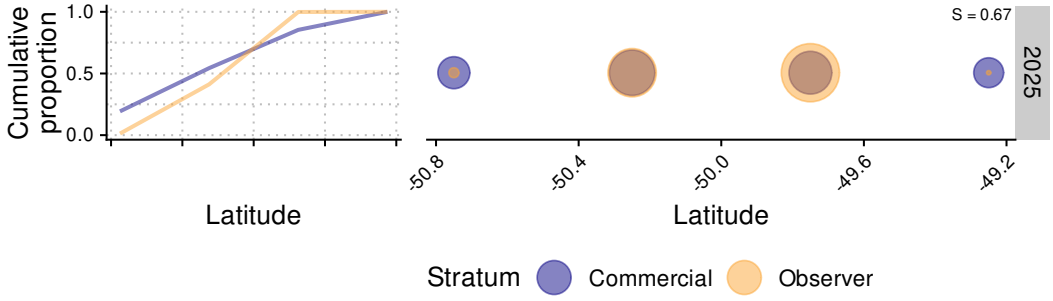


Figure 1011: **Latitudinal representativeness of observer sampling coverage of Pot catch in LIN 6B, from events where the ling catch exceeded the 40kg threshold, in 2025 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

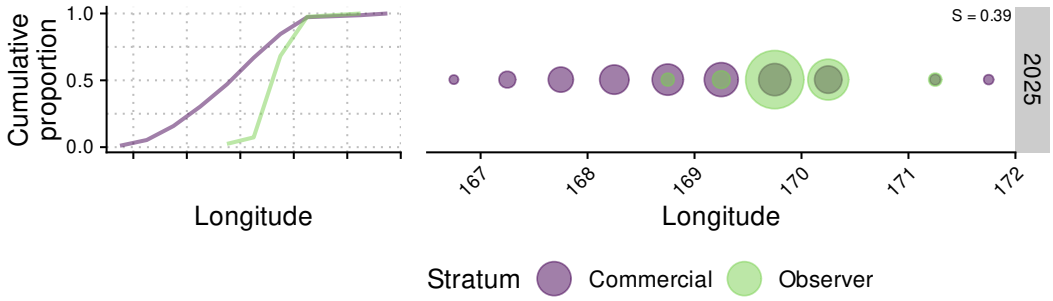


Figure 1012: **Longitudinal representativeness of observer sampling coverage of Pot fishing events in LIN 6B, where the ling catch exceeded the 40kg threshold, in 2025 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

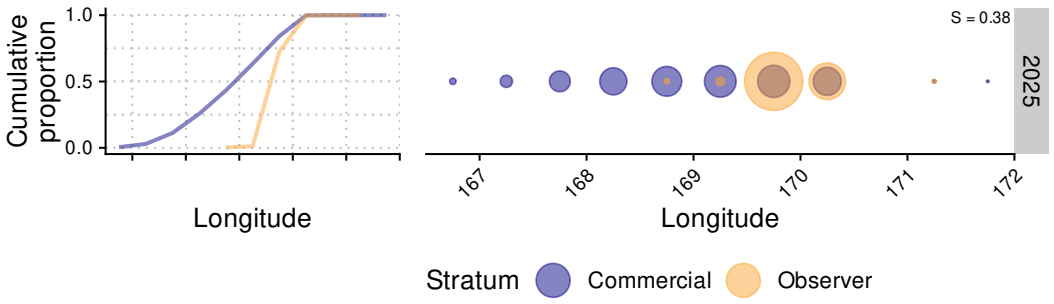


Figure 1013: **Longitudinal representativeness of observer sampling coverage of Pot catch in LIN 6B, from events where the ling catch exceeded the 40kg threshold, in 2025 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

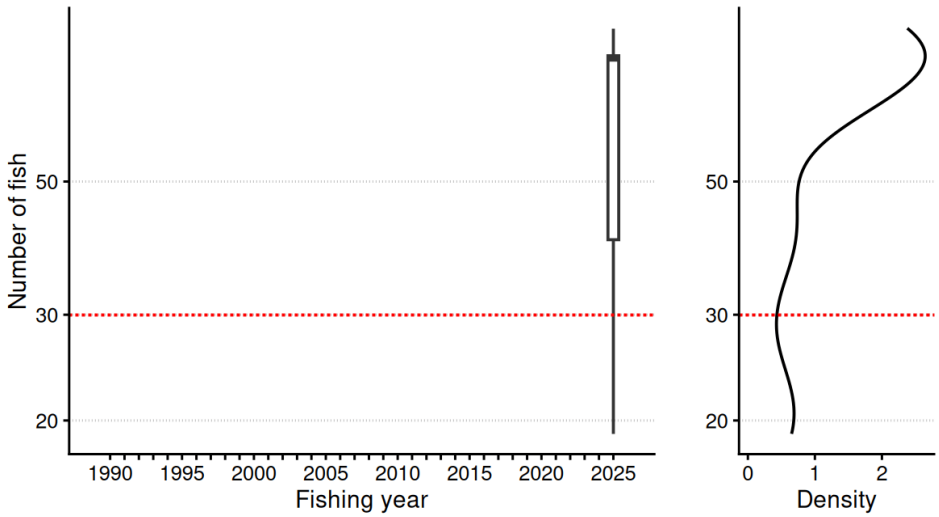


Figure 1014: **Length-frequency sample sizes for observed fishing events in LIN 6B where ling were sampled. The red dashed line indicates a sample size of 30 fish.**

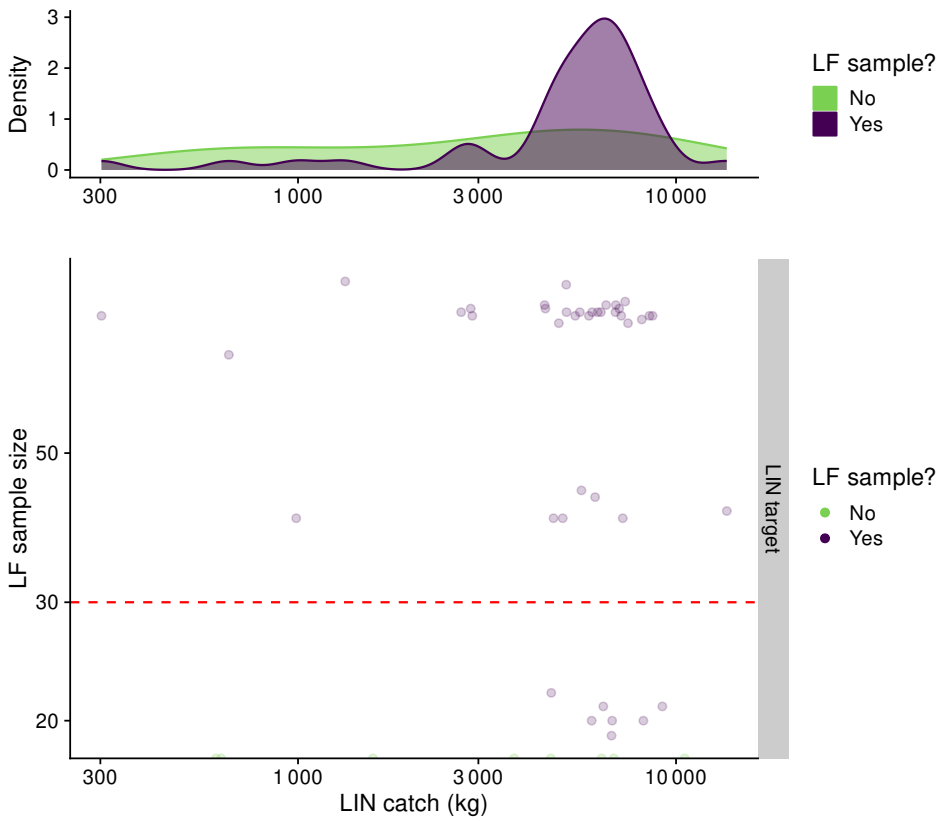


Figure 1015: Length-frequency sample sizes (number of fish sampled) for observed fishing events in LIN 6B in relation to the total ling catch from an event, separately for ling target events and other target species. The red dashed line indicates a sample size of 30 fish.

2.13.12.2 Otolith samples

Table 87: Otolith samples of ling from the LIN 6B Pot fishery sampled by the Observer Programme in fishing years 2019 to 2025. Positive fishing events are those where the catch of ling exceeded a potential sampling threshold of 40 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
2019	3	0	0	0.00
2023	120	0	0	0.00
2024	222	0	0	0.00
2025	468	41	488	8.76

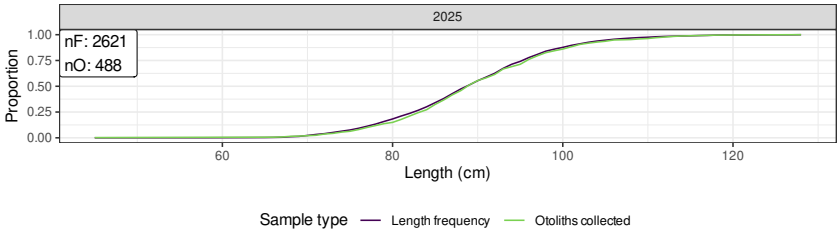


Figure 1016: Cumulative distributions of the length of fish in the length frequency and otolith samples of ling in the LIN 6B Pot fishery for the 2025 to 2025 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

2.13.12.3 Catch quantification

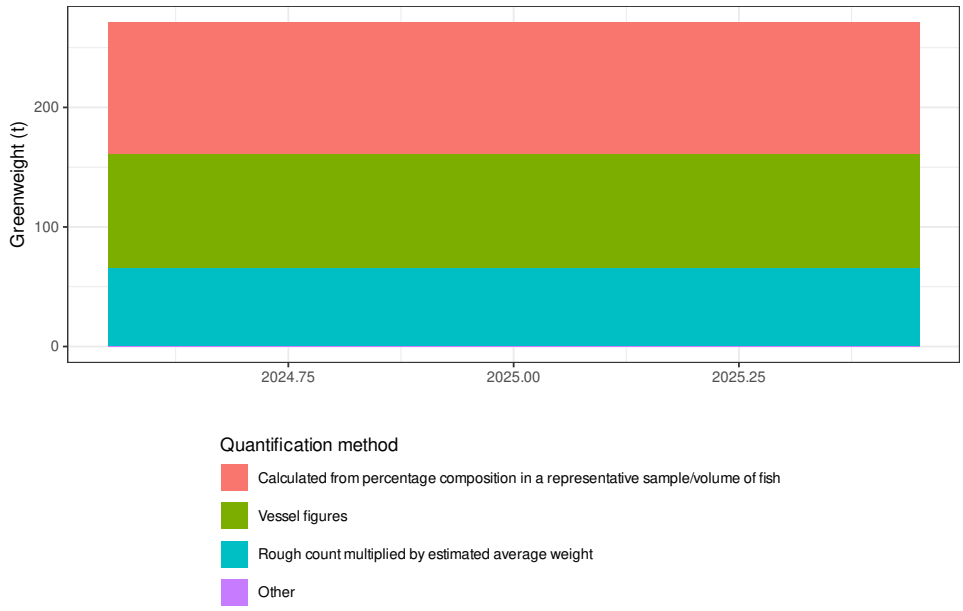


Figure 1017: Methods used by observers to quantify the catch of ling in the LIN 6B Pot fishery. The legend lists the methods used in descending order of total catch.

2.13.13 LIN 7CK: Trawl fishery

2.13.13.1 Length-frequency samples

Table 88: Length-frequency samples of ling from the LIN 7CK Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of ling exceeded a potential sampling threshold of 40 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	938	1	1	0.11
1991	2 081	1	3	0.05
1992	1 218	0	0	0.00
1993	1 522	0	0	0.00
1994	1 624	14	79	0.86
1995	3 242	4	12	0.12
1996	2 590	0	0	0.00
1997	3 481	0	0	0.00
1998	1 742	21	103	1.21
1999	1 898	59	415	3.11
2000	1 822	60	378	3.29
2001	1 734	57	326	3.29
2002	1 099	23	122	2.09
2003	1 707	42	204	2.46
2004	1 508	30	167	1.99
2005	1 142	57	241	4.99
2006	782	10	31	1.28
2007	704	10	70	1.42
2008	581	29	255	4.99
2009	542	41	178	7.56
2010	468	21	207	4.49
2011	450	13	61	2.89
2012	521	34	439	6.53
2013	524	2	40	0.38
2014	559	2	13	0.36
2015	606	24	285	3.96
2016	733	8	92	1.09
2017	648	42	170	6.48
2018	744	48	350	6.45
2019	826	26	335	3.15
2020	430	19	237	4.42
2021	389	5	151	1.29
2022	336	0	0	0.00
2023	487	1	27	0.21
2024	312	0	0	0.00
2025	309	5	31	1.62

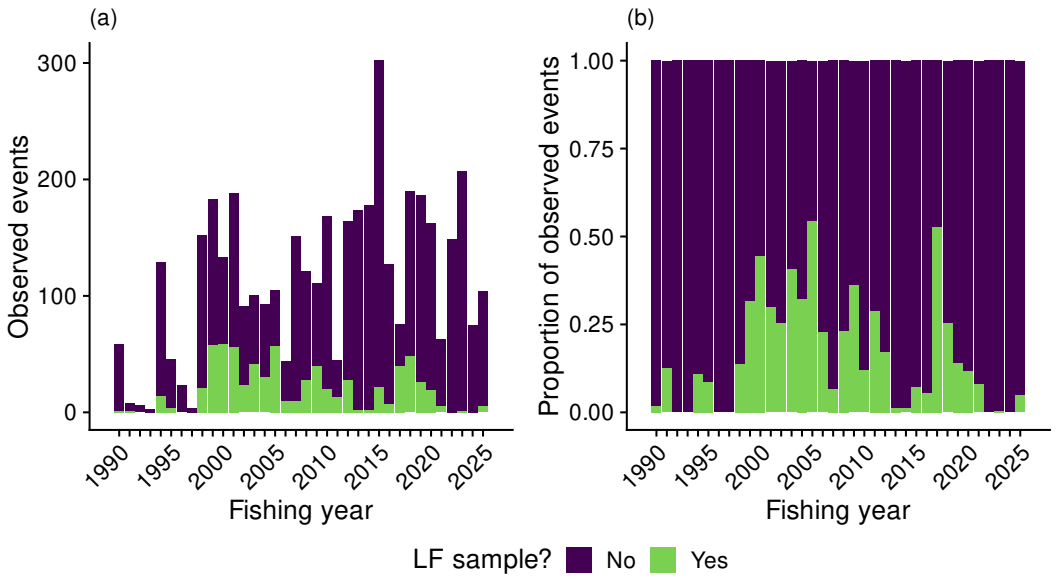


Figure 1018: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in LIN 7CK where the ling catch exceeded the 40 kg threshold, with and without length-frequency sampling.**

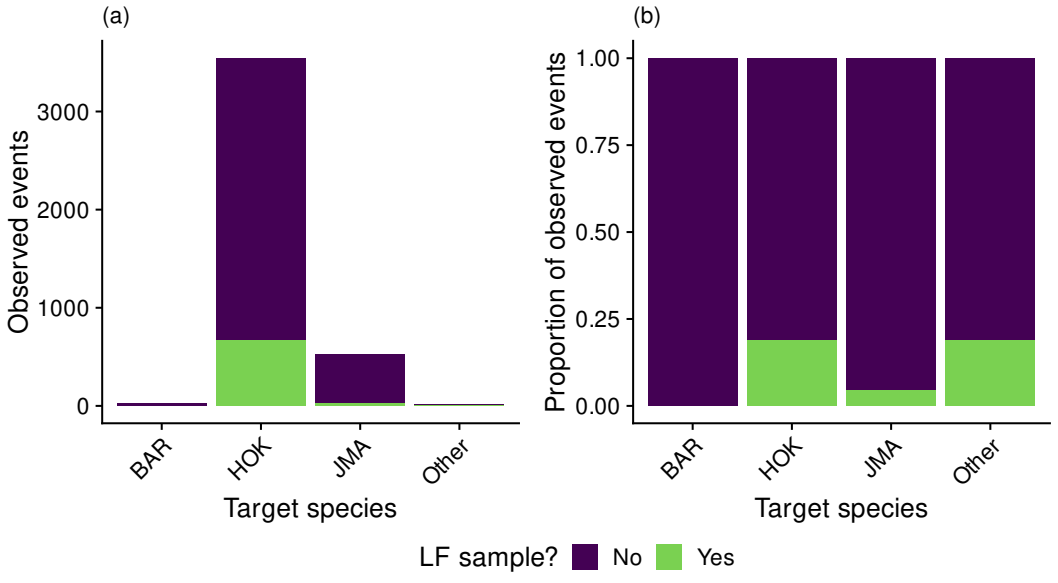


Figure 1019: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in LIN 7CK where the ling catch exceeded the 40 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

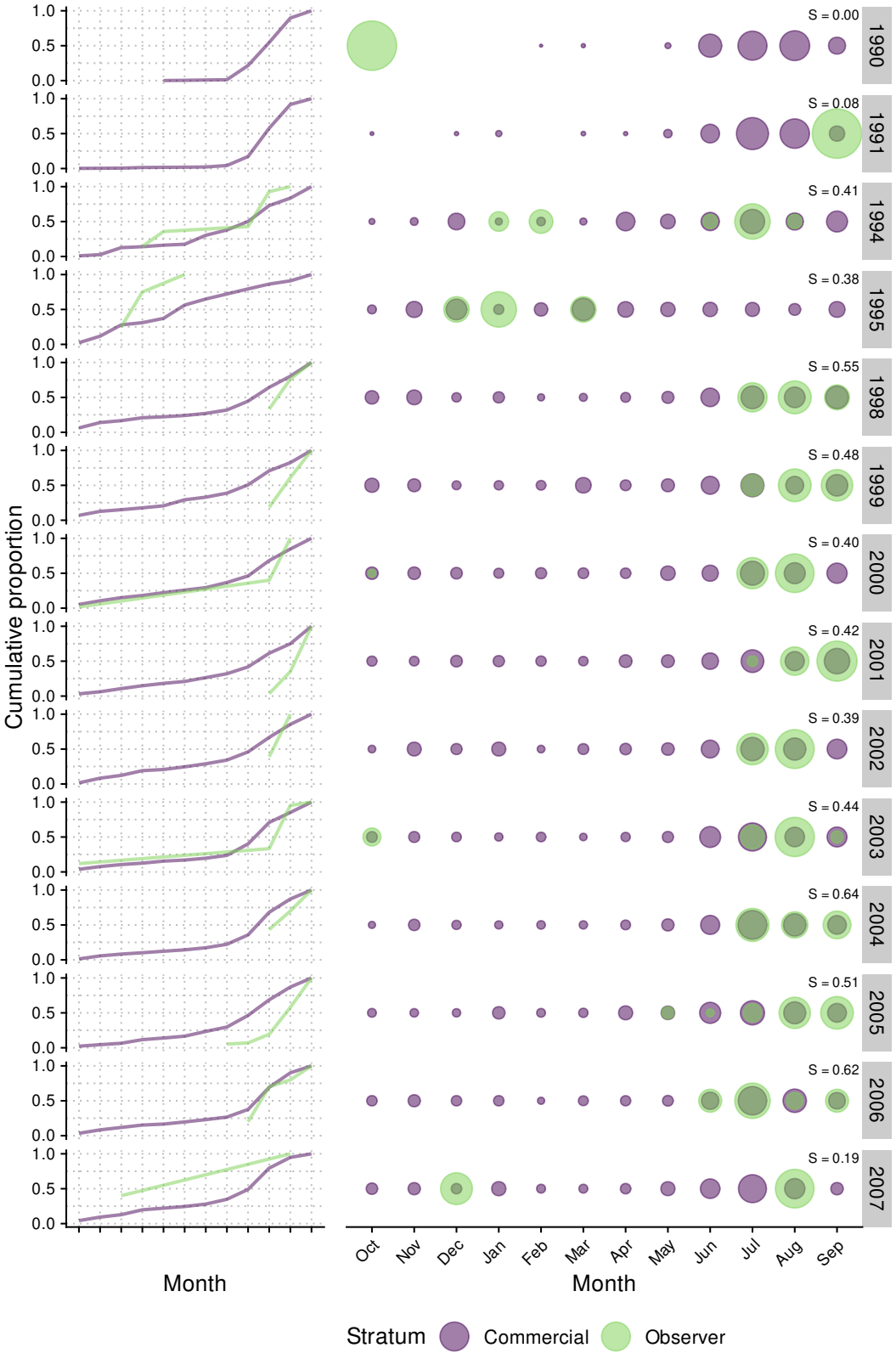


Figure 1020: **Monthly representativeness of observer sampling coverage of Trawl fishing events in LIN 7CK, where the ling catch exceeded the 40kg threshold, in 1990 to 2007. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

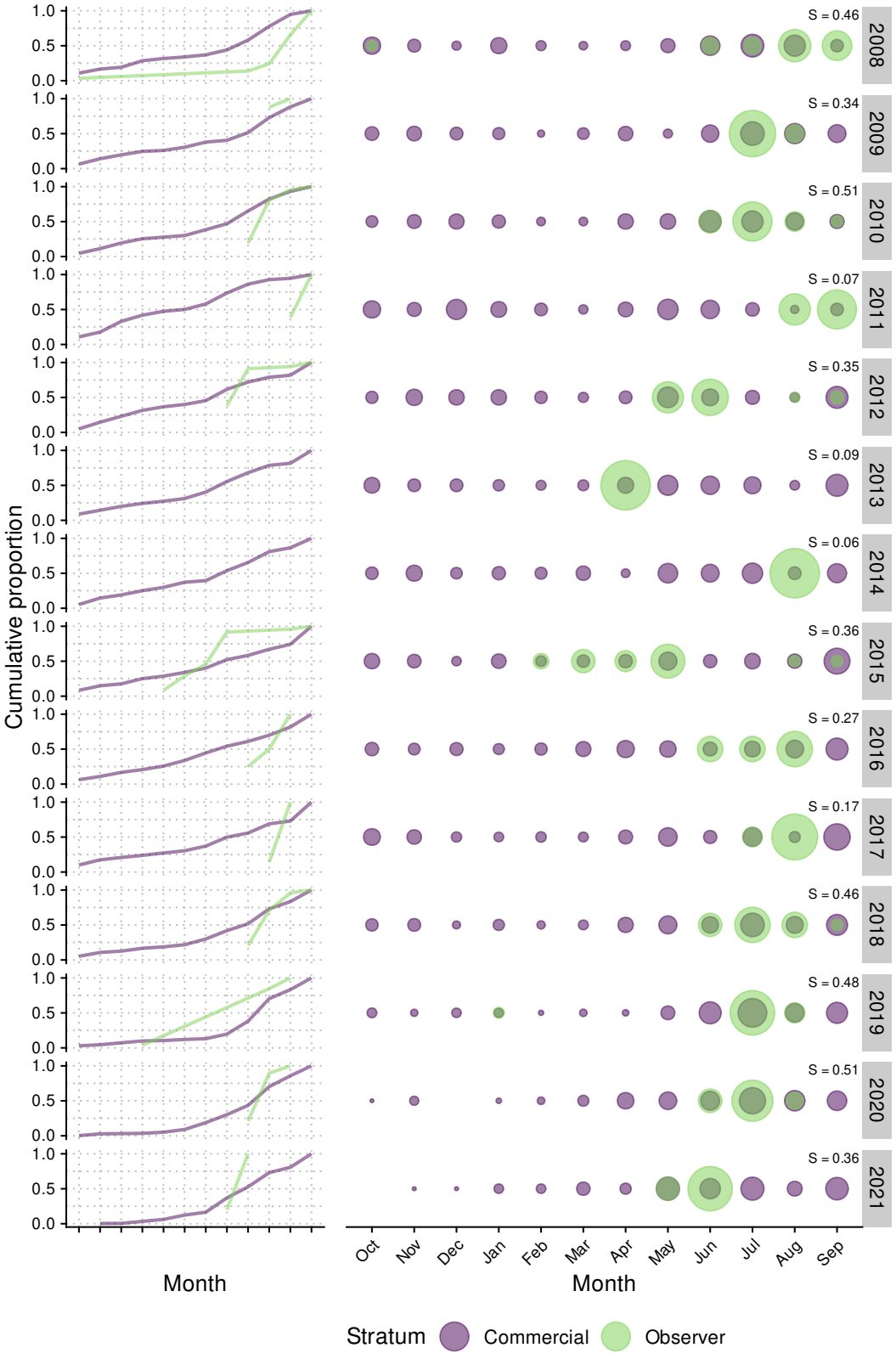


Figure 1021: **Monthly representativeness of observer sampling coverage of Trawl fishing events in LIN 7CK, where the ling catch exceeded the 40kg threshold, in 2008 to 2021. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

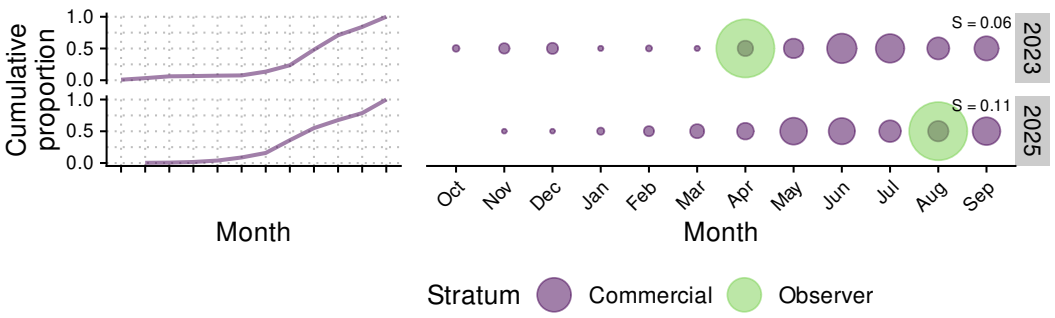


Figure 1022: Monthly representativeness of observer sampling coverage of Trawl fishing events in LIN 7CK, where the ling catch exceeded the 40kg threshold, in 2023 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

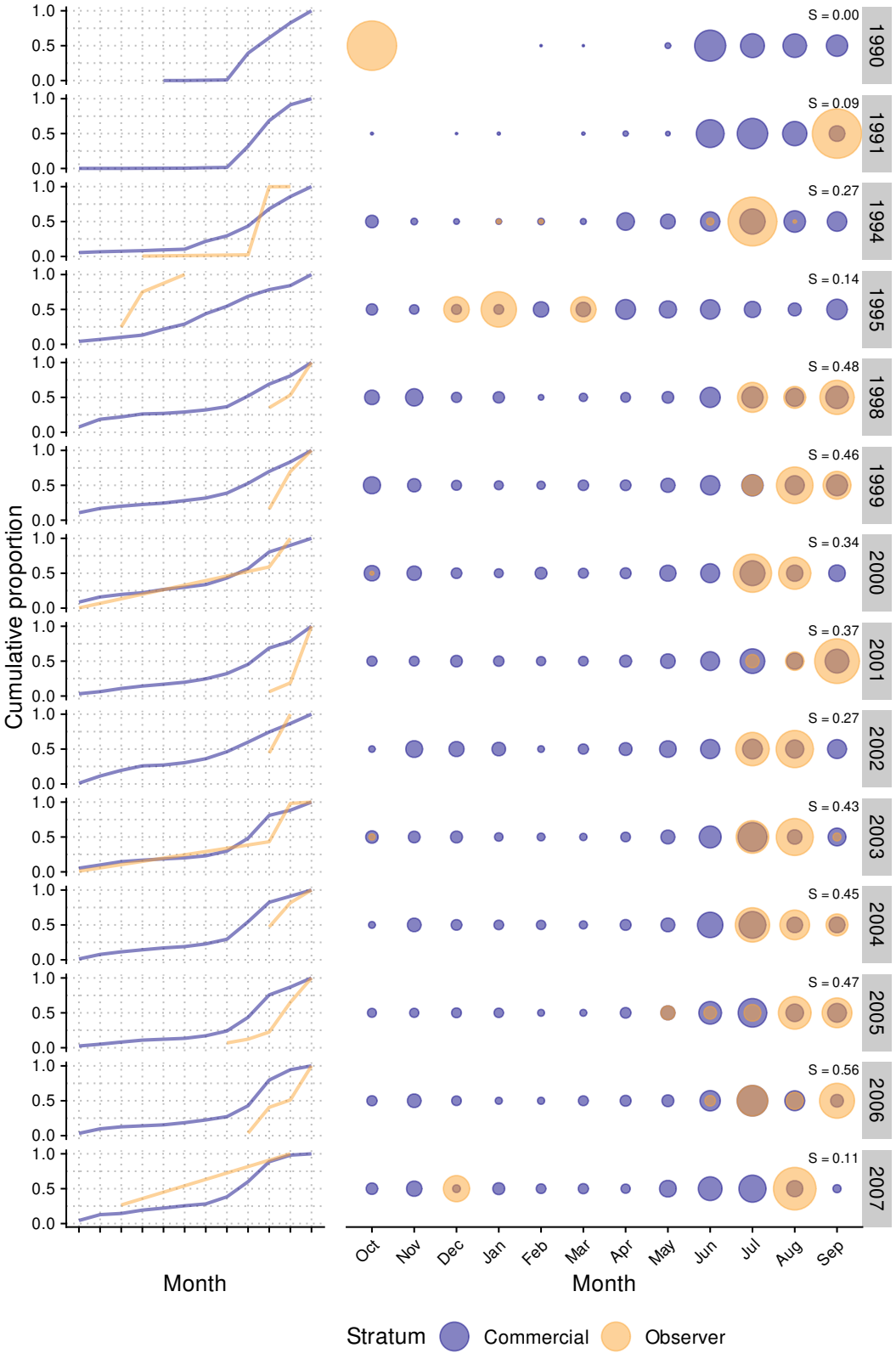


Figure 1023: **Monthly representativeness of observer sampling coverage of Trawl catch in LIN 7CK, from events where the ling catch exceeded the 40kg threshold, in 1990 to 2007. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

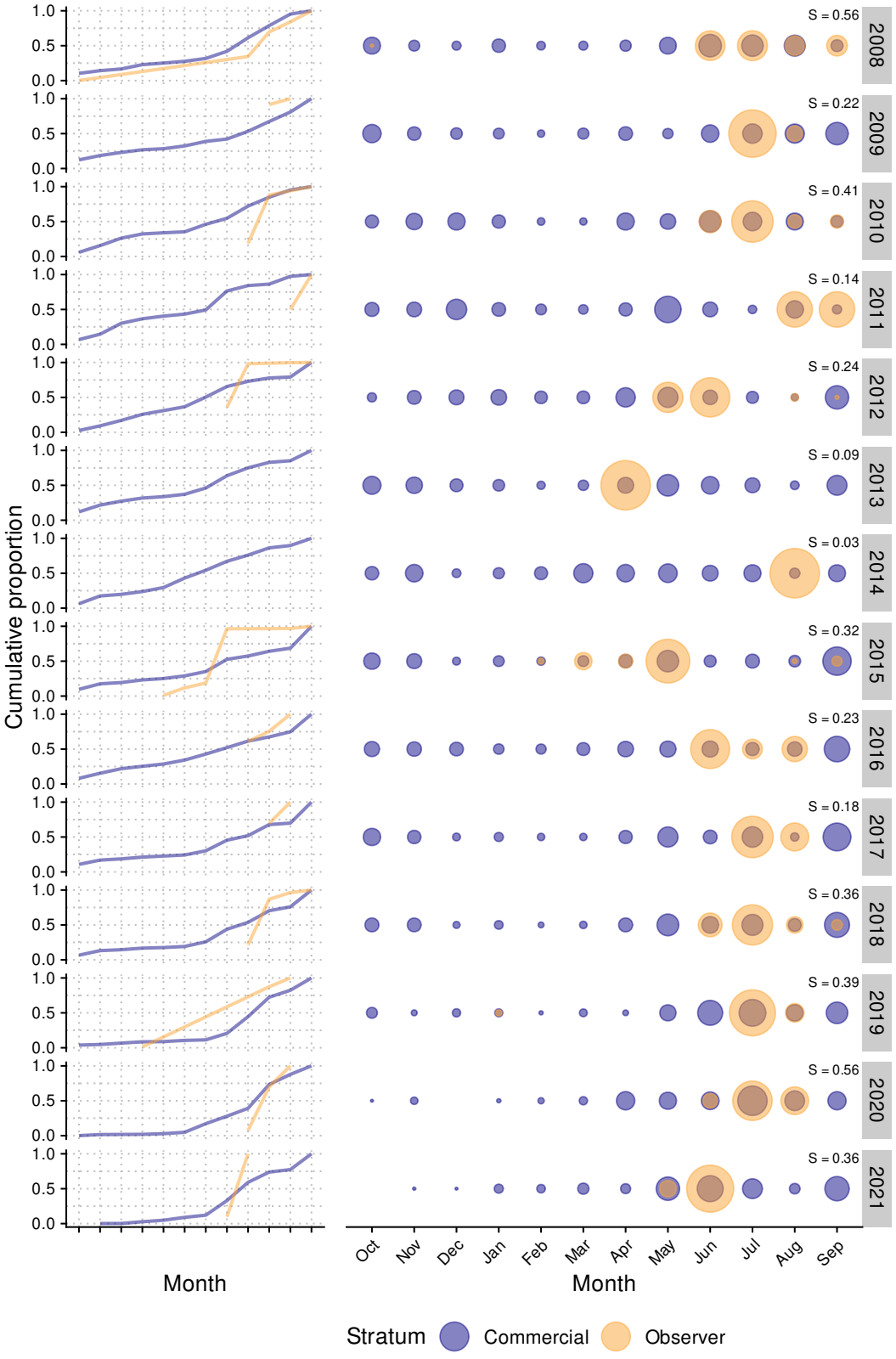


Figure 1024: **Monthly representativeness of observer sampling coverage of Trawl catch in LIN 7CK, from events where the ling catch exceeded the 40kg threshold, in 2008 to 2021. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

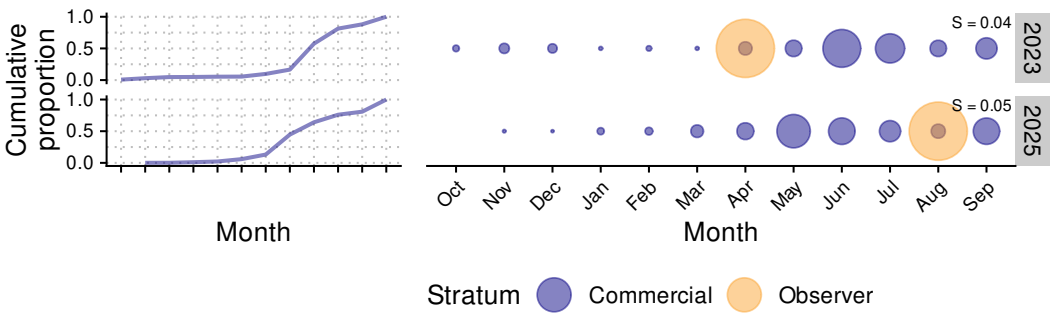


Figure 1025: Monthly representativeness of observer sampling coverage of Trawl catch in LIN 7CK, from events where the ling catch exceeded the 40kg threshold, in 2023 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

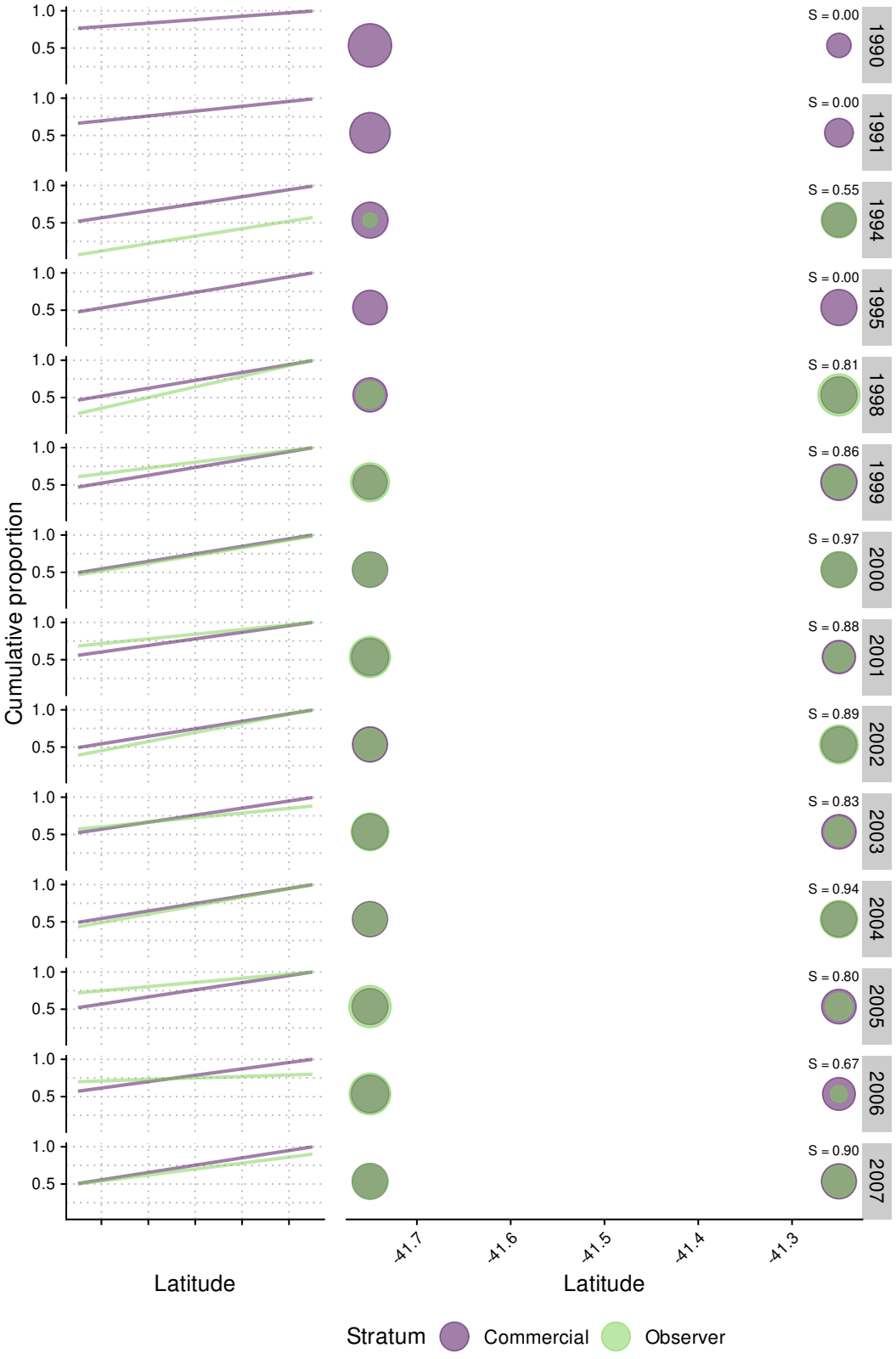


Figure 1026: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in LIN 7CK, where the ling catch exceeded the 40kg threshold, in 1990 to 2007. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

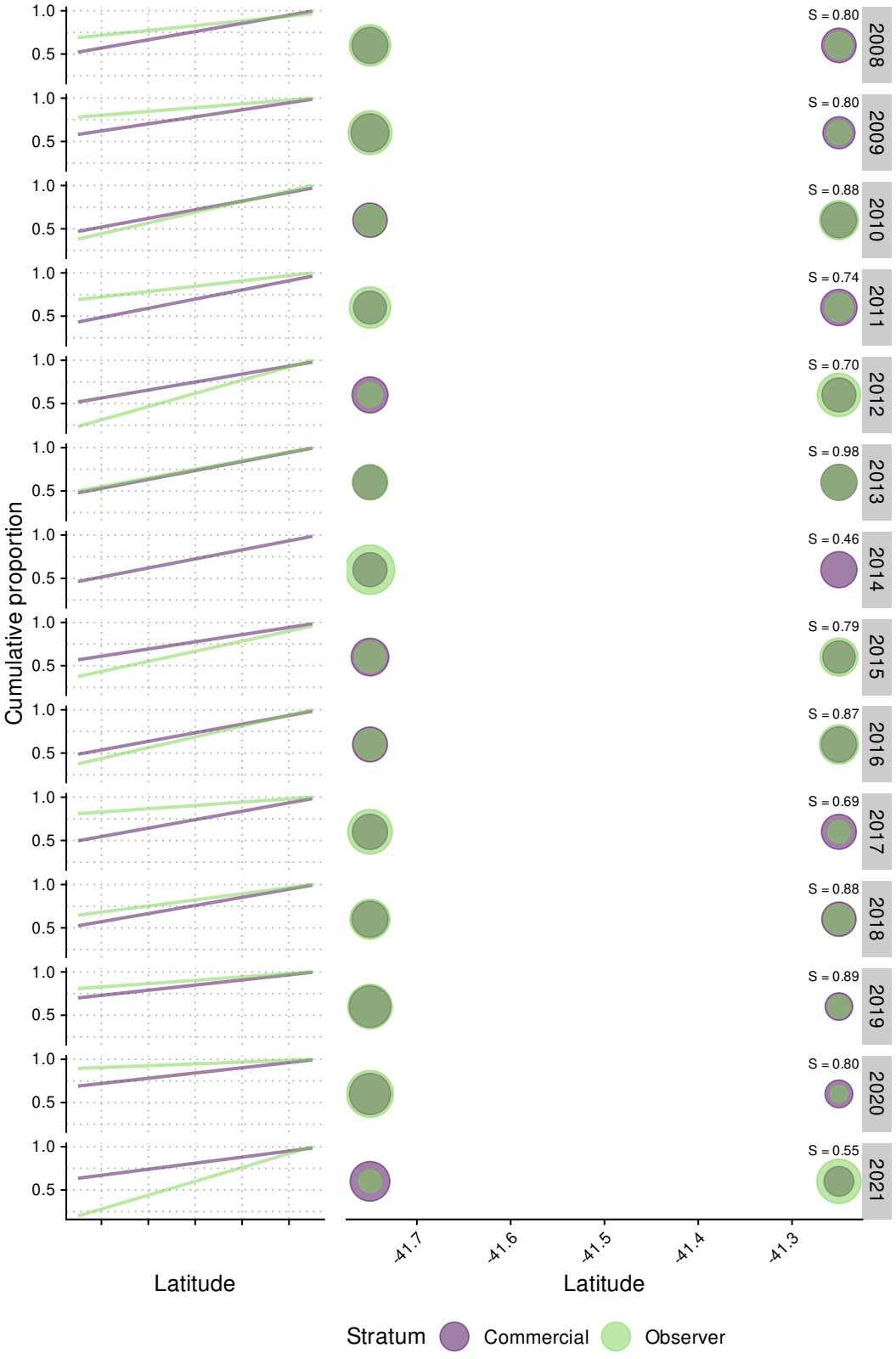


Figure 1027: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in LIN 7CK, where the ling catch exceeded the 40kg threshold, in 2008 to 2021. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

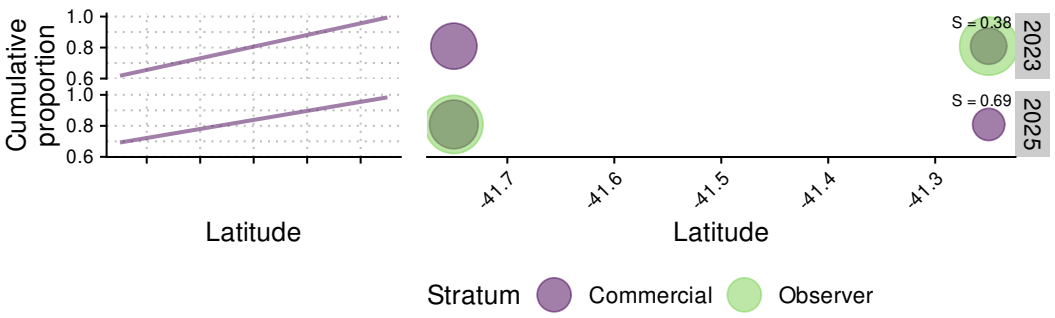


Figure 1028: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in LIN 7CK, where the ling catch exceeded the 40kg threshold, in 2023 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

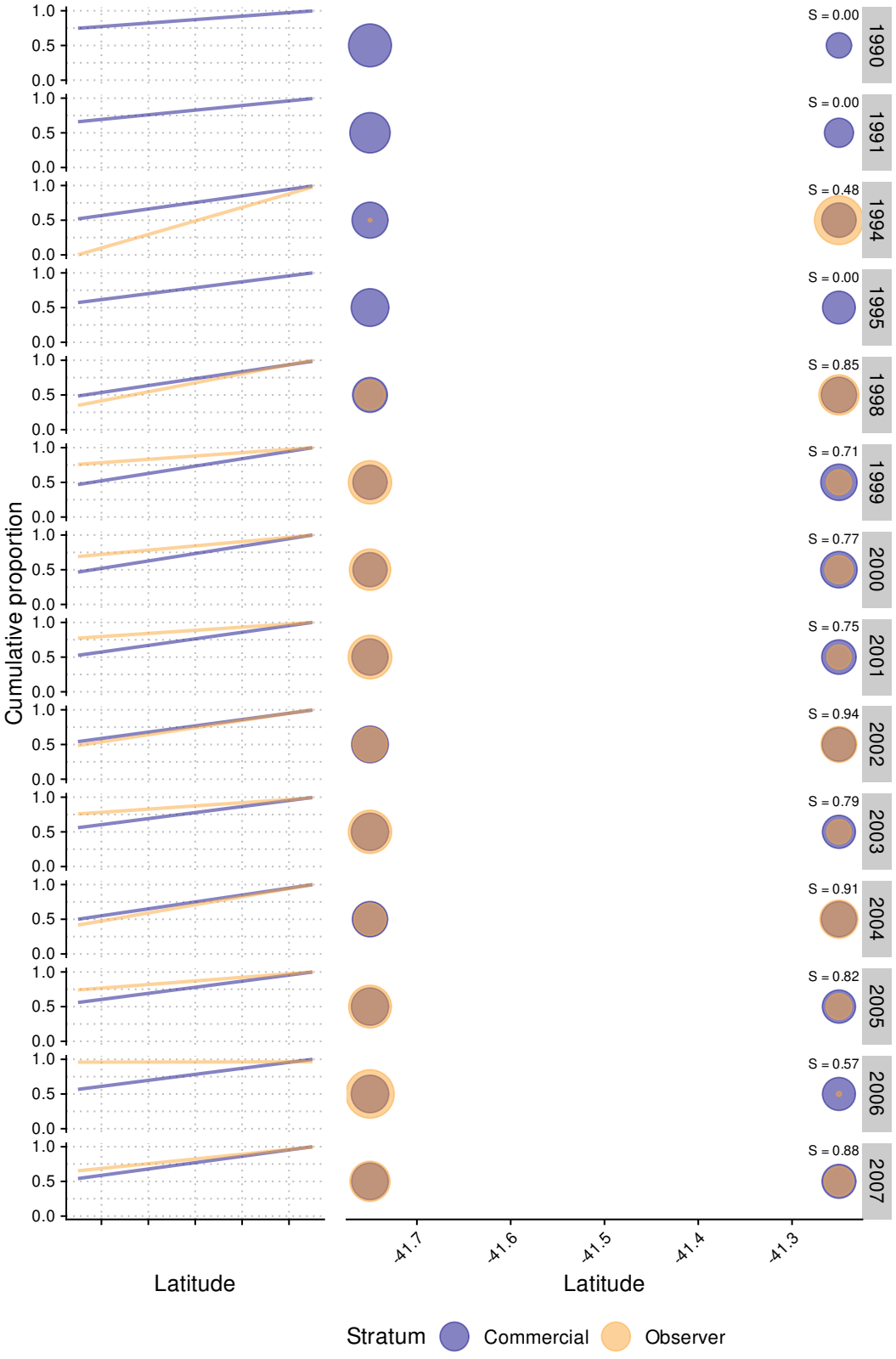


Figure 1029: Latitudinal representativeness of observer sampling coverage of Trawl catch in LIN 7CK, from events where the ling catch exceeded the 40kg threshold, in 1990 to 2007. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

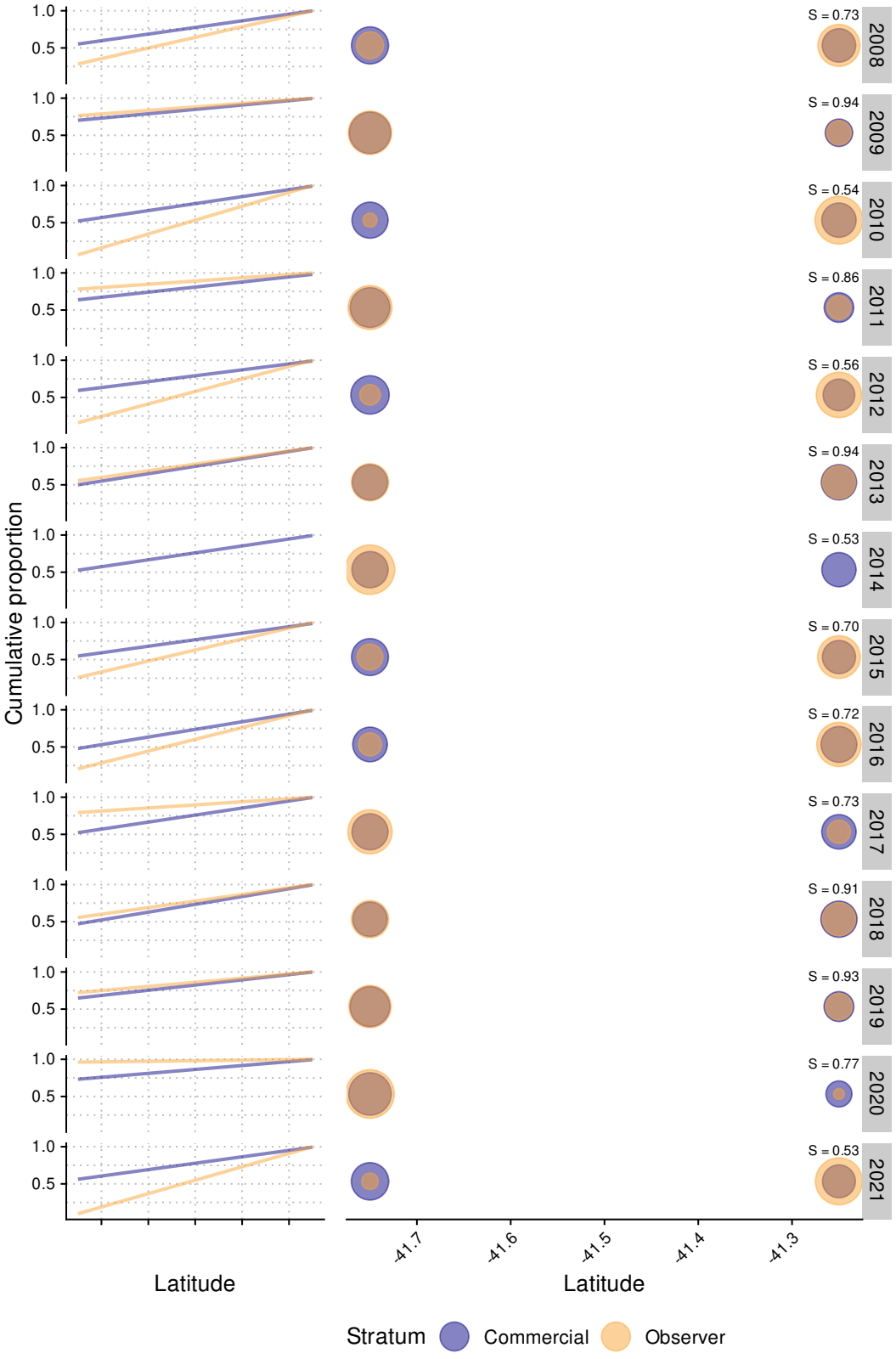


Figure 1030: Latitudinal representativeness of observer sampling coverage of Trawl catch in LIN 7CK, from events where the ling catch exceeded the 40kg threshold, in 2008 to 2021. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

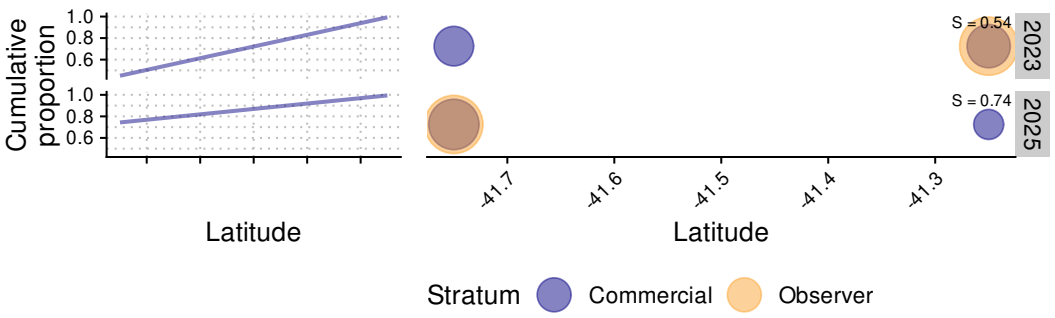


Figure 1031: Latitudinal representativeness of observer sampling coverage of Trawl catch in LIN 7CK, from events where the ling catch exceeded the 40kg threshold, in 2023 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

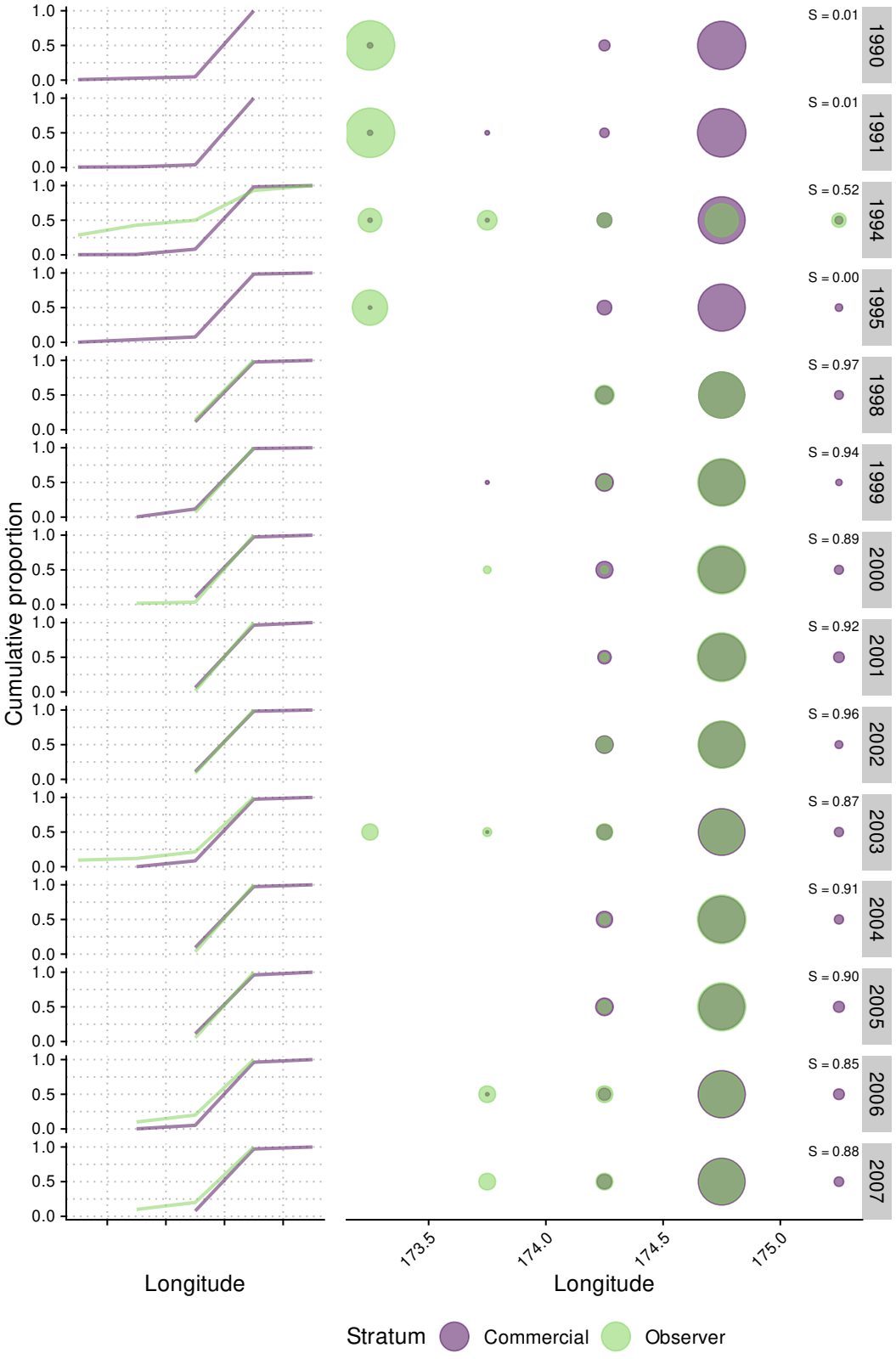


Figure 1032: **Longitudinal representativeness of observer sampling coverage of Trawl fishing events in LIN 7CK, where the ling catch exceeded the 40kg threshold, in 1990 to 2007. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

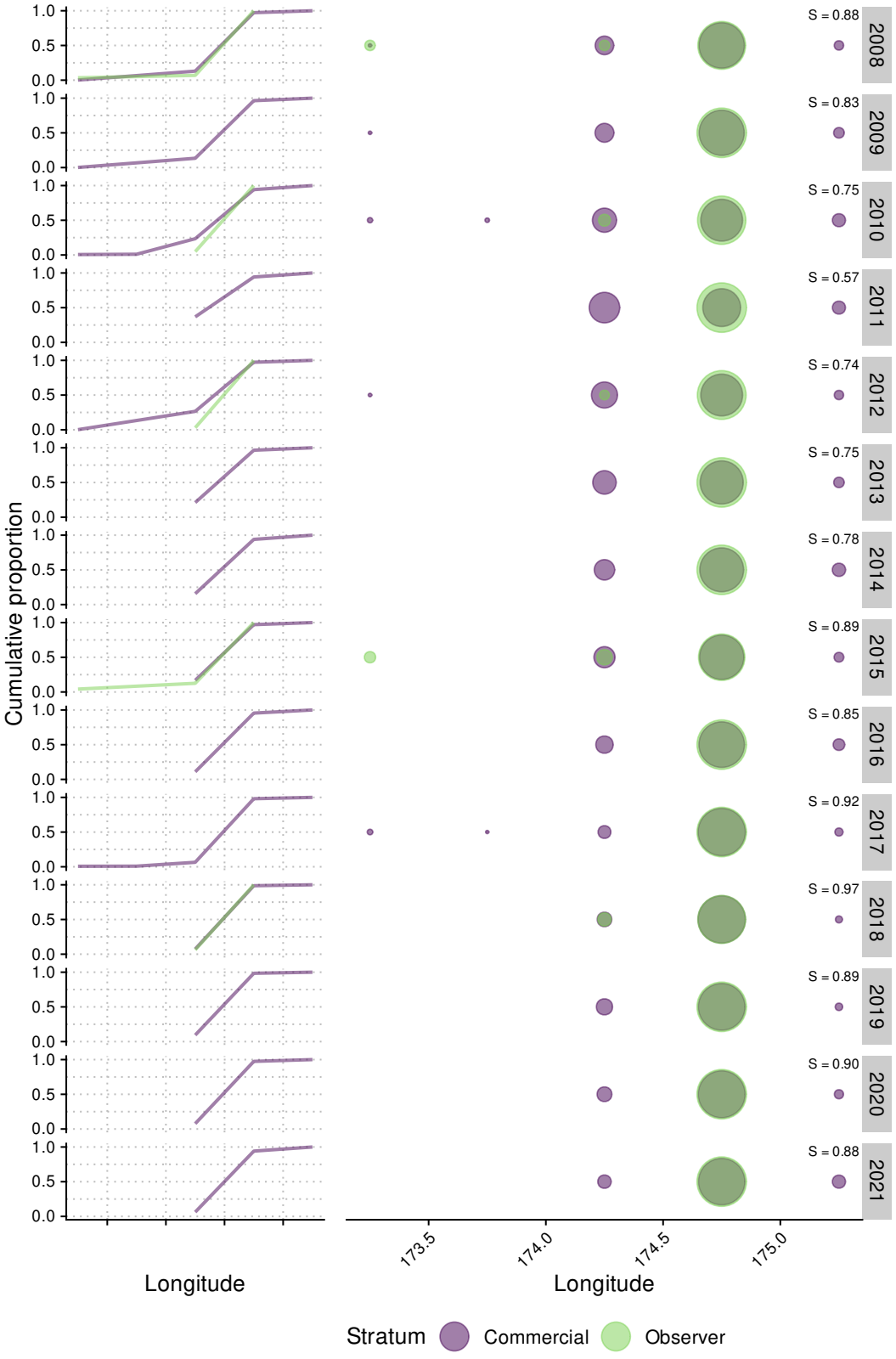


Figure 1033: **Longitudinal representativeness of observer sampling coverage of Trawl fishing events in LIN 7CK, where the ling catch exceeded the 40kg threshold, in 2008 to 2021. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

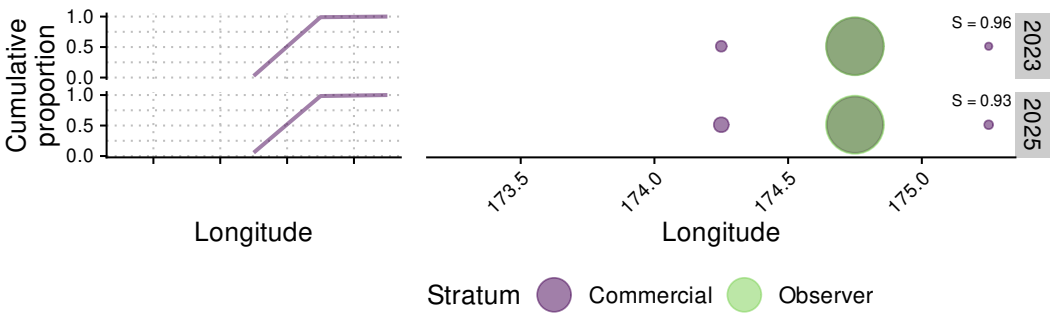


Figure 1034: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in LIN 7CK, where the ling catch exceeded the 40kg threshold, in 2023 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

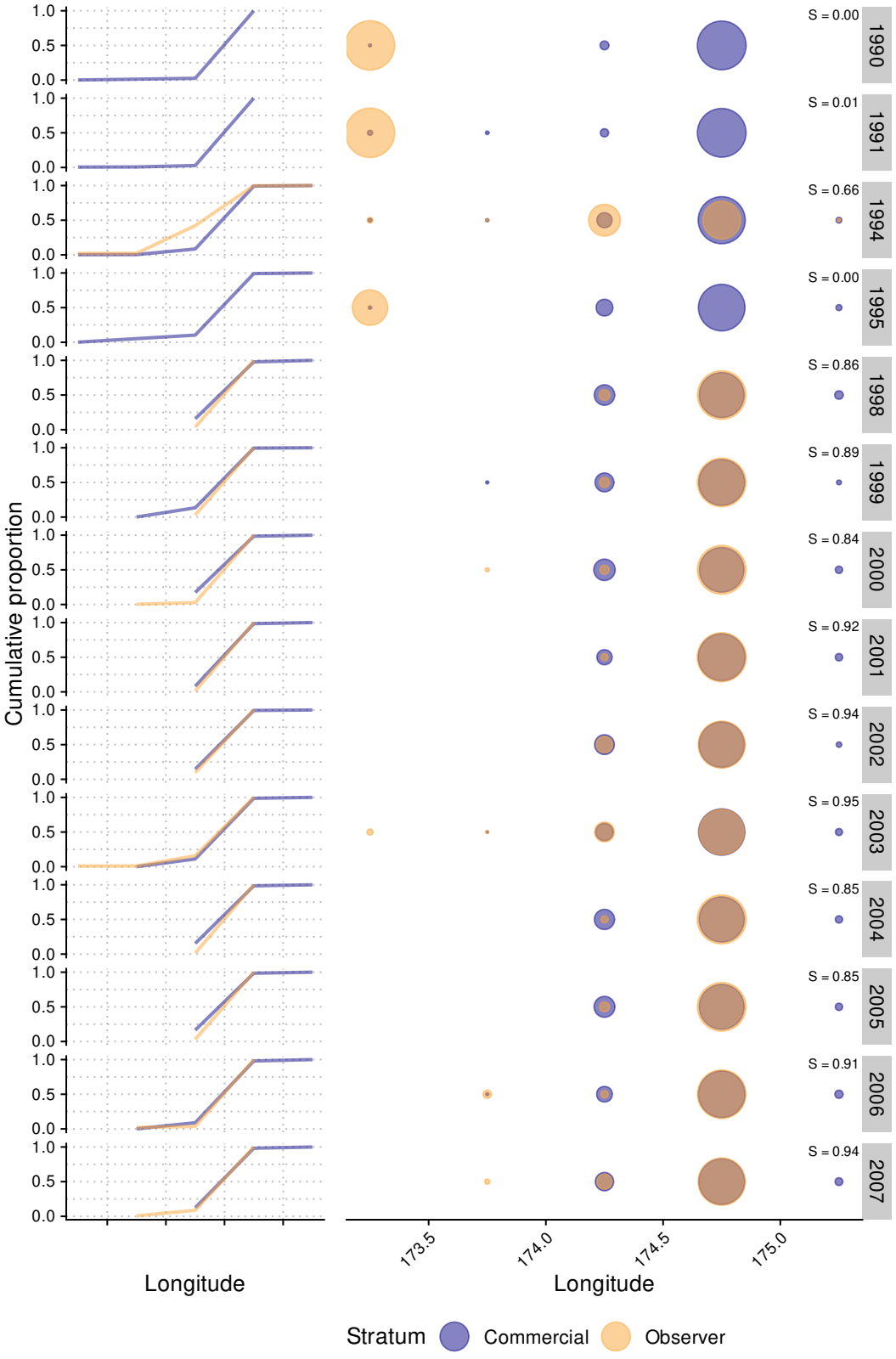


Figure 1035: Longitudinal representativeness of observer sampling coverage of Trawl catch in LIN 7CK, from events where the ling catch exceeded the 40kg threshold, in 1990 to 2007. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

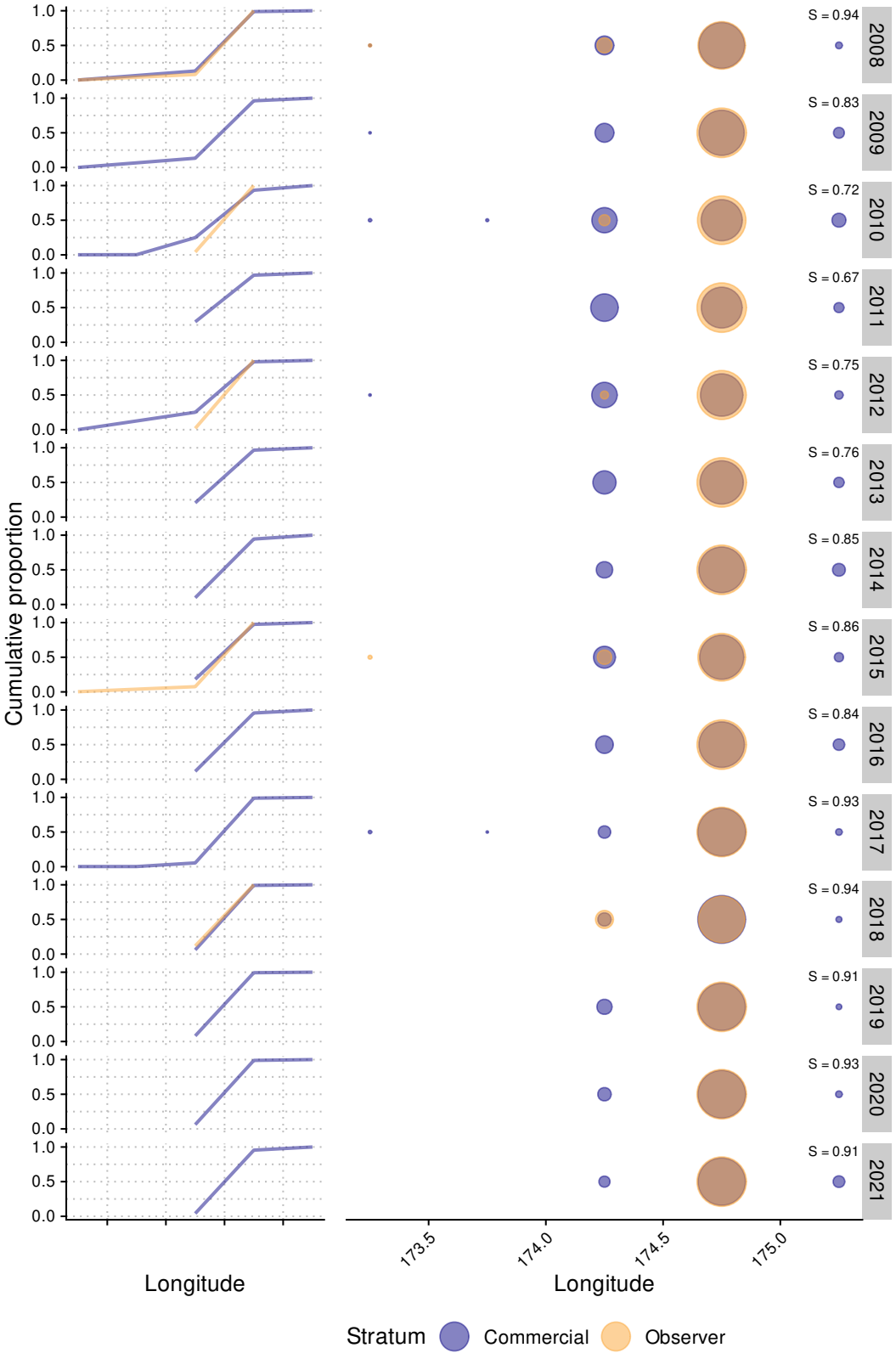


Figure 1036: Longitudinal representativeness of observer sampling coverage of Trawl catch in LIN 7CK, from events where the ling catch exceeded the 40kg threshold, in 2008 to 2021. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

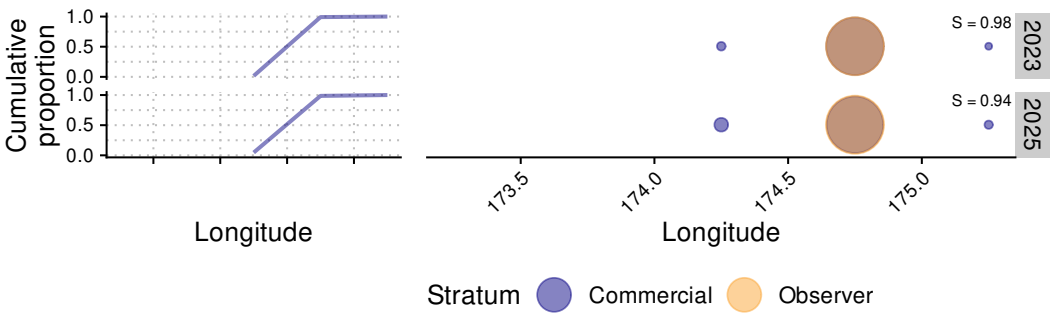


Figure 1037: Longitudinal representativeness of observer sampling coverage of Trawl catch in LIN 7CK, from events where the ling catch exceeded the 40kg threshold, in 2023 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

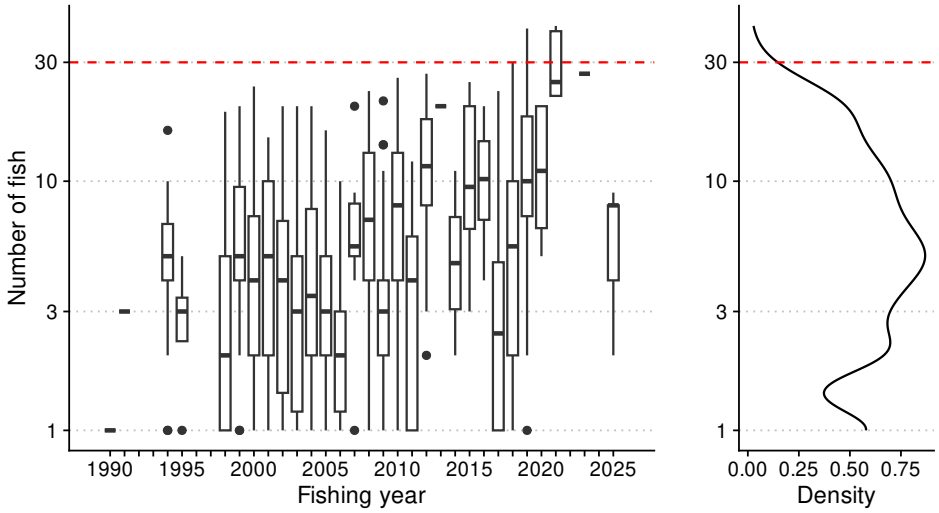


Figure 1038: Length-frequency sample sizes for observed fishing events in LIN 7CK where ling were sampled. The red dashed line indicates a sample size of 30 fish.

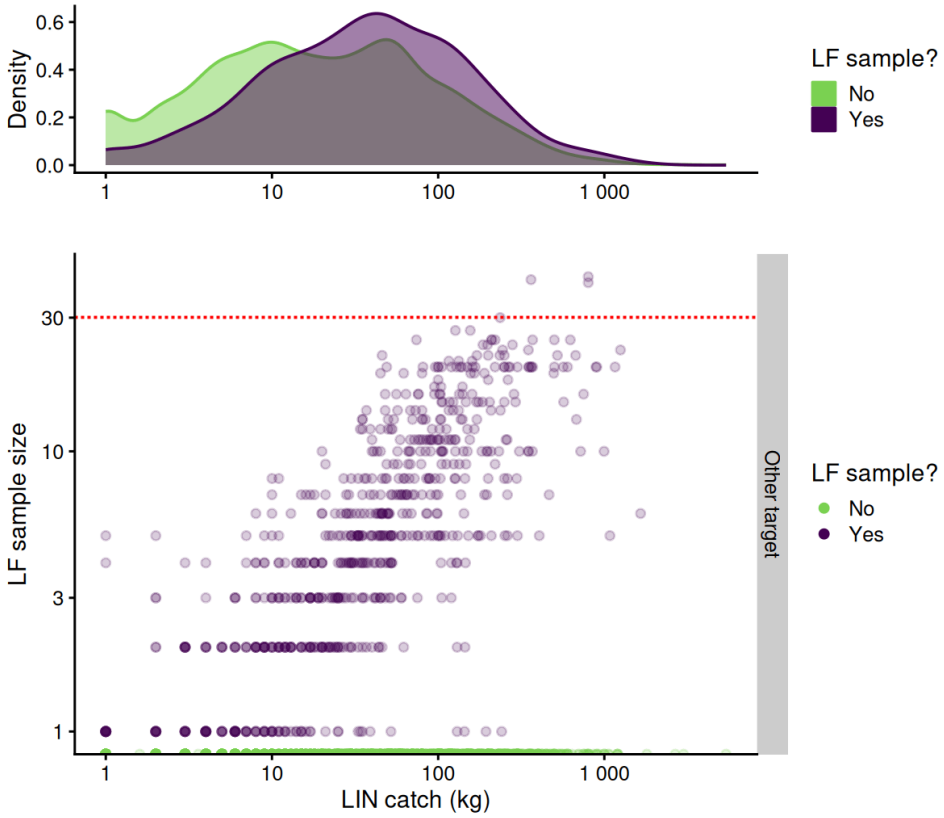


Figure 1039: Length-frequency sample sizes (number of fish sampled) for observed fishing events in LIN 7CK in relation to the total ling catch from an event, separately for ling target events and other target species. The red dashed line indicates a sample size of 30 fish.

2.13.13.2 Otolith samples

Table 89: Otolith samples of ling from the LIN 7CK Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of ling exceeded a potential sampling threshold of 40 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	938	0	0	0.00
1991	2 081	0	0	0.00
1992	1 218	0	0	0.00
1993	1 522	0	0	0.00
1994	1 624	0	0	0.00
1995	3 242	0	0	0.00
1996	2 590	0	0	0.00
1997	3 481	0	0	0.00
1998	1 742	0	0	0.00
1999	1 898	0	0	0.00
2000	1 822	0	0	0.00
2001	1 734	0	0	0.00
2002	1 099	0	0	0.00
2003	1 707	0	0	0.00
2004	1 508	0	0	0.00
2005	1 142	0	0	0.00
2006	782	0	0	0.00
2007	704	0	0	0.00
2008	581	0	0	0.00
2009	542	35	100	6.46
2010	468	6	44	1.28
2011	450	0	0	0.00
2012	521	5	24	0.96
2013	524	2	10	0.38
2014	559	0	0	0.00
2015	606	2	9	0.33
2016	733	3	13	0.41
2017	648	36	93	5.56
2018	744	47	162	6.32
2019	826	15	71	1.82
2020	430	8	32	1.86
2021	389	5	24	1.29
2022	336	0	0	0.00
2023	487	1	5	0.21
2024	312	0	0	0.00
2025	309	5	31	1.62

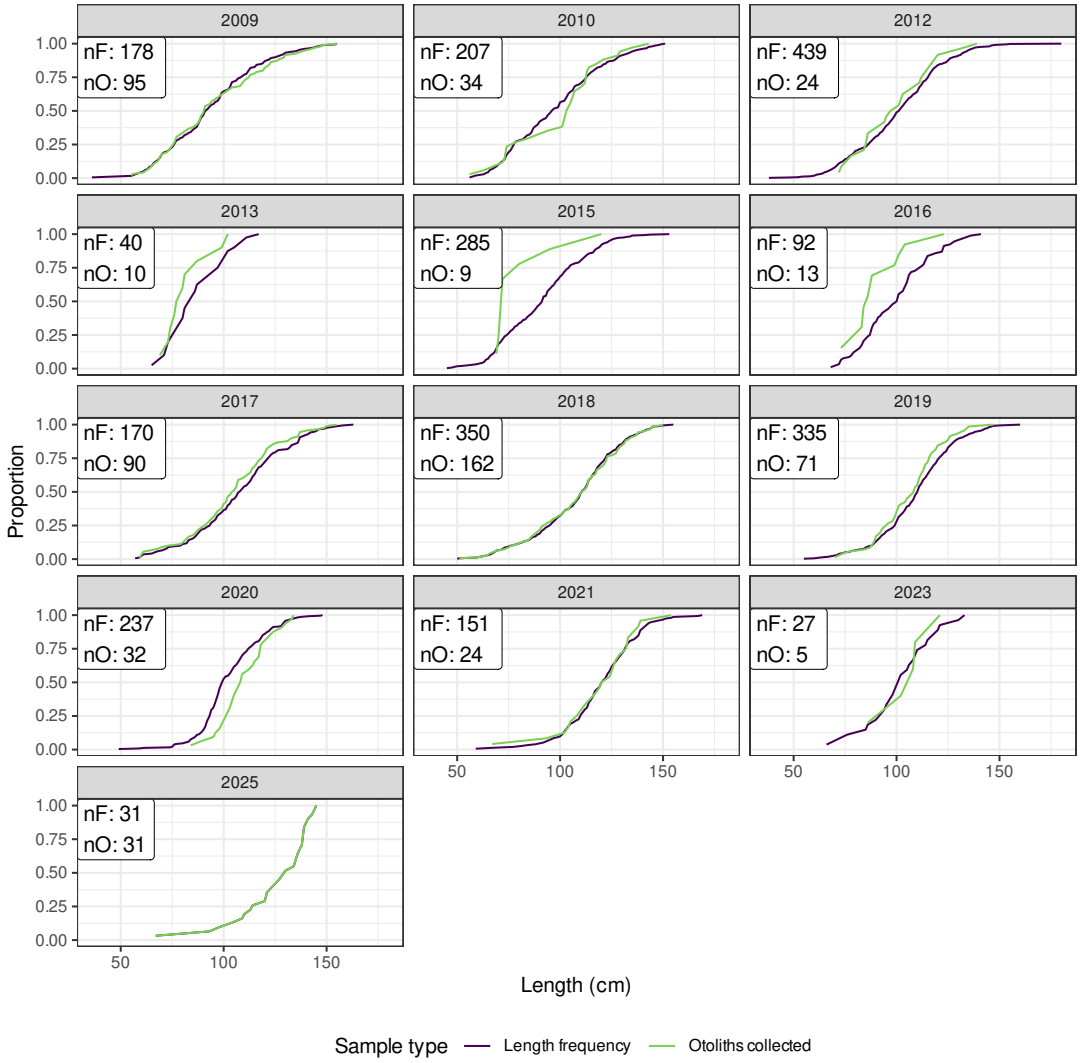


Figure 1040: Cumulative distributions of the length of fish in the length frequency and otolith samples of ling in the LIN 7CK Trawl fishery for the 2009 to 2025 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

2.13.13.3 Catch quantification

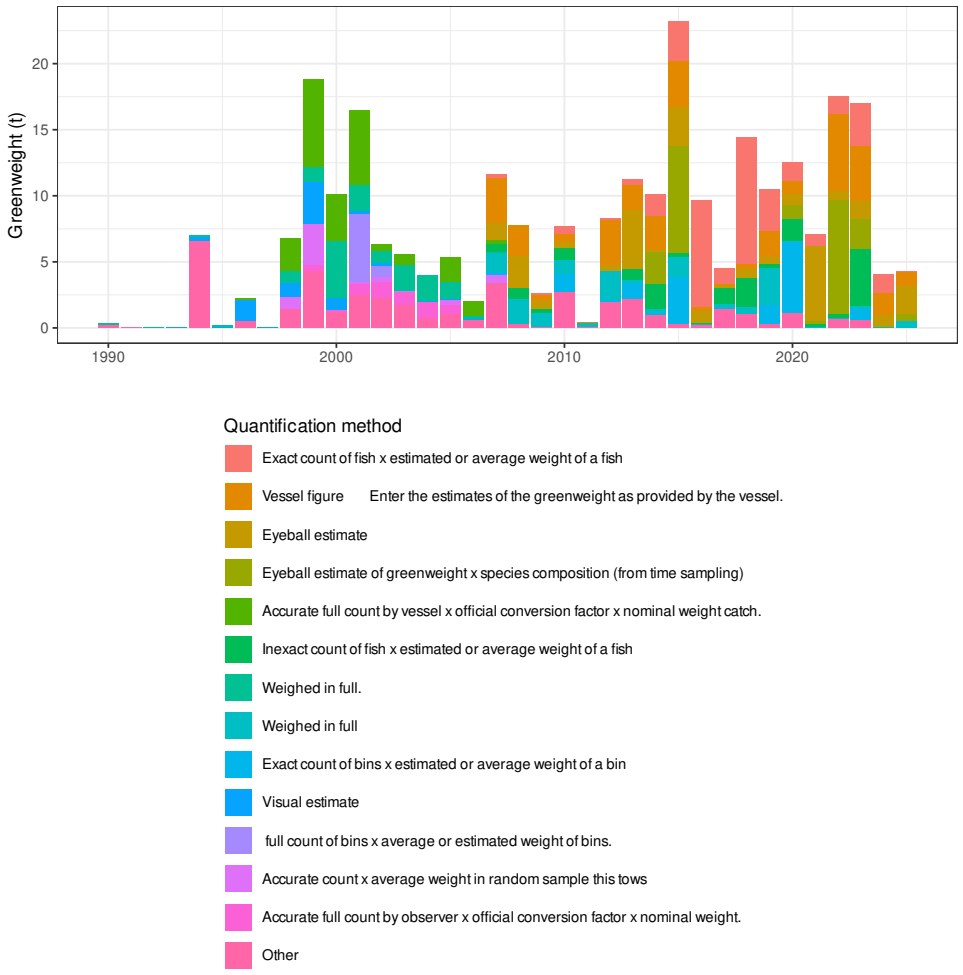


Figure 1041: Methods used by observers to quantify the catch of ling in the LIN 7CK Trawl fishery. The legend lists the methods used in descending order of total catch.

2.13.14 LIN 7CK: Line fishery

2.13.14.1 Length-frequency samples

Table 90: Length-frequency samples of ling from the LIN 7CK Line fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of ling exceeded a potential sampling threshold of 40 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	446	0	0	0.00
1991	438	0	0	0.00
1992	768	0	0	0.00
1993	1 588	0	0	0.00
1994	3 409	0	0	0.00
1995	1 624	0	0	0.00
1996	500	0	0	0.00
1997	1 026	0	0	0.00
1998	825	0	0	0.00
1999	721	0	0	0.00
2000	1 722	0	0	0.00
2001	500	7	335	1.40
2002	389	0	0	0.00
2003	1 179	7	70	0.59
2004	2 743	0	0	0.00
2005	957	0	0	0.00
2006	353	100	985	28.33
2007	369	28	277	7.59
2008	193	0	0	0.00
2009	188	0	0	0.00
2010	88	0	0	0.00
2011	173	0	0	0.00
2012	650	0	0	0.00
2013	955	0	0	0.00
2014	279	0	0	0.00
2015	152	1	10	0.66
2016	345	0	0	0.00
2017	593	0	0	0.00
2018	478	21	362	4.39
2019	207	4	108	1.93
2020	95	0	0	0.00
2021	72	0	0	0.00
2022	130	8	145	6.15
2023	264	0	0	0.00
2024	502	0	0	0.00
2025	328	0	0	0.00

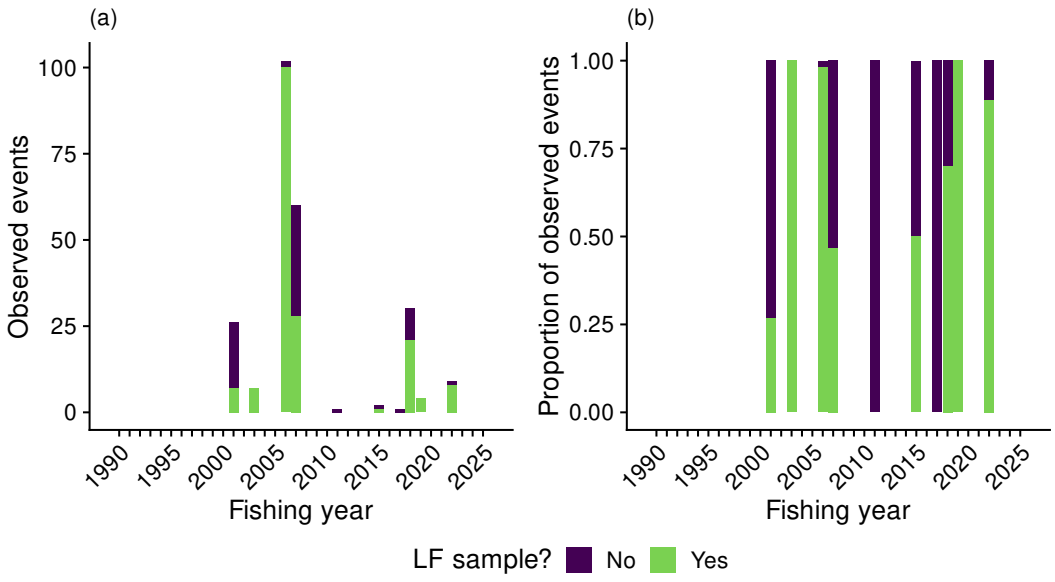


Figure 1042: **(a) Observed Line fishing events, and (b) proportion of observed events, in LIN 7CK where the ling catch exceeded the 40 kg threshold, with and without length-frequency sampling.**

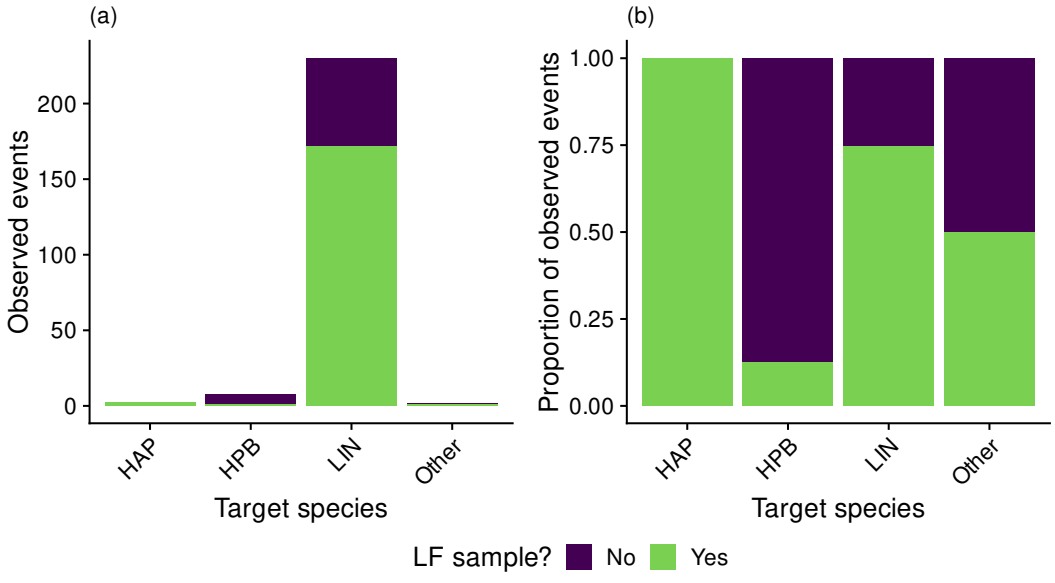


Figure 1043: **(a) Observed Line fishing events, and (b) proportion of observed events, in LIN 7CK where the ling catch exceeded the 40 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

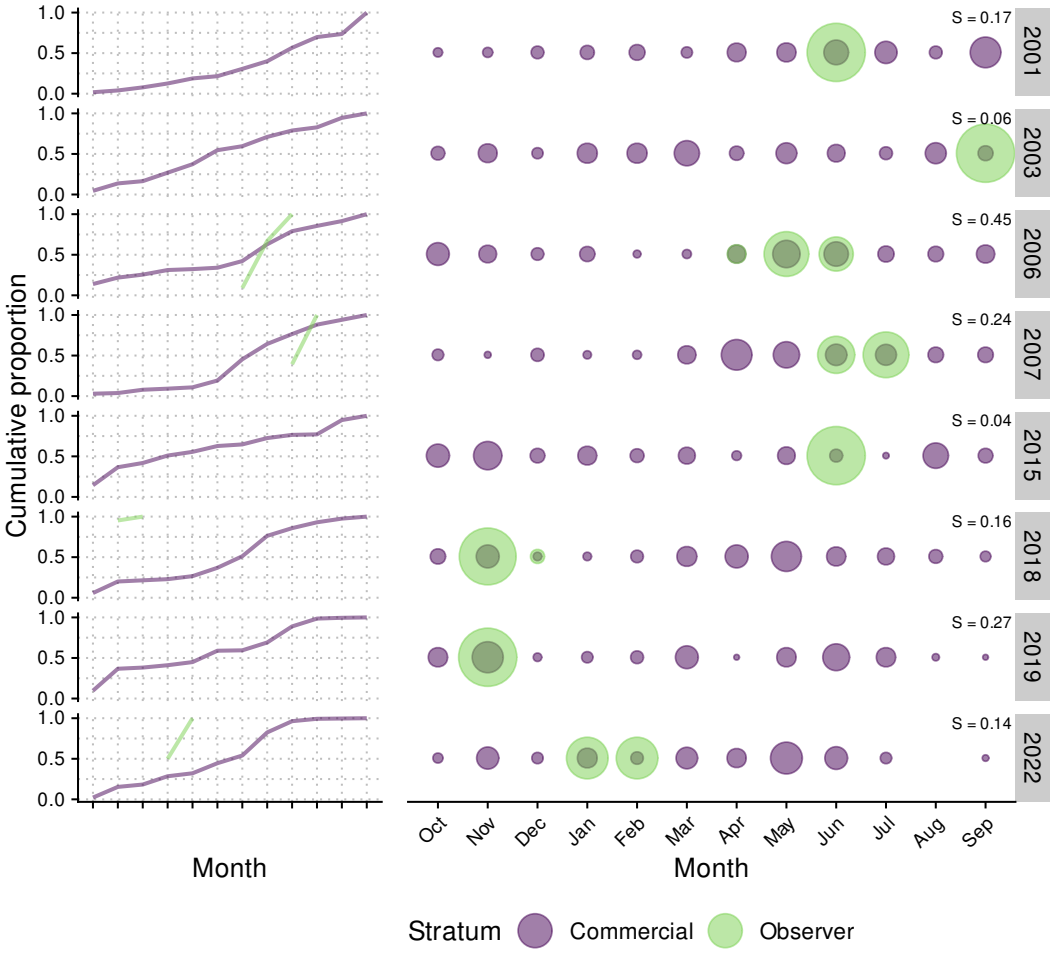


Figure 1044: **Monthly representativeness of observer sampling coverage of Line fishing events in LIN 7CK, where the ling catch exceeded the 40kg threshold, in 2001 to 2022. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

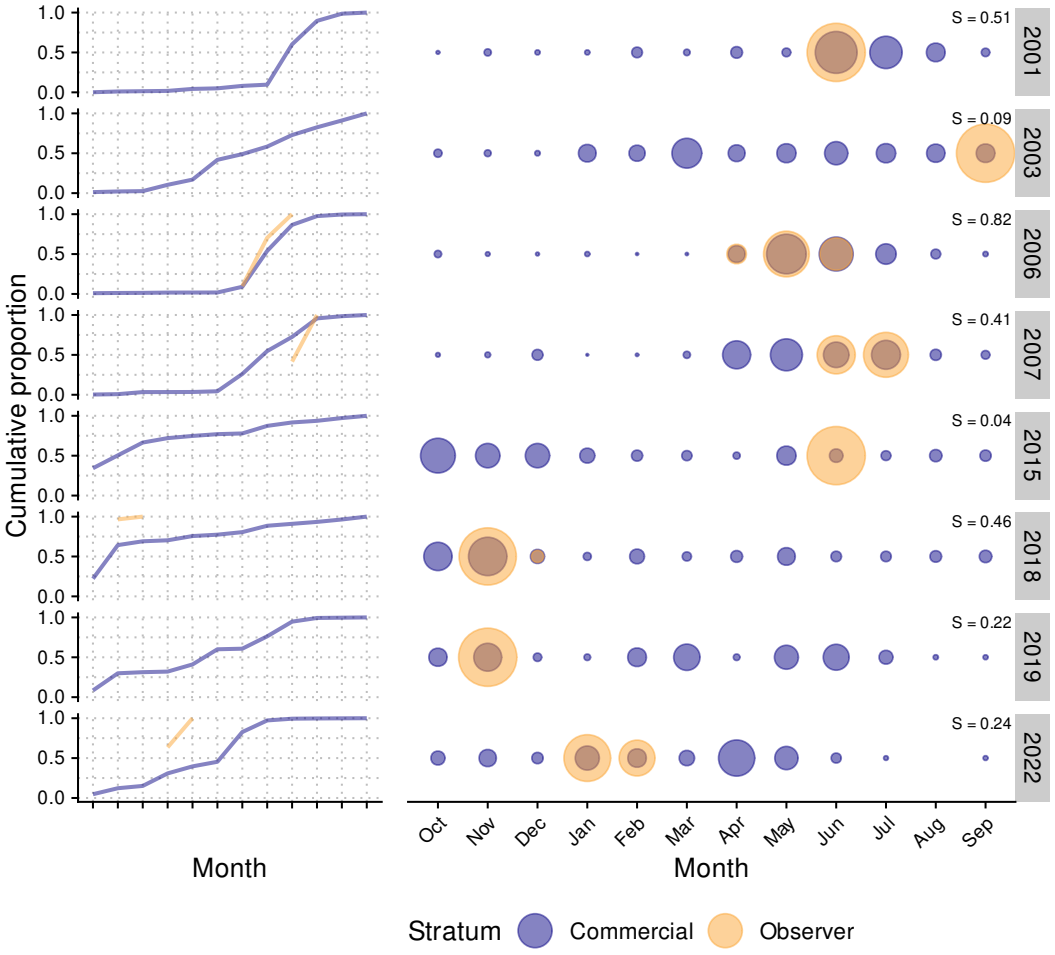


Figure 1045: **Monthly representativeness of observer sampling coverage of Line catch in LIN 7CK, from events where the ling catch exceeded the 40kg threshold, in 2001 to 2022. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

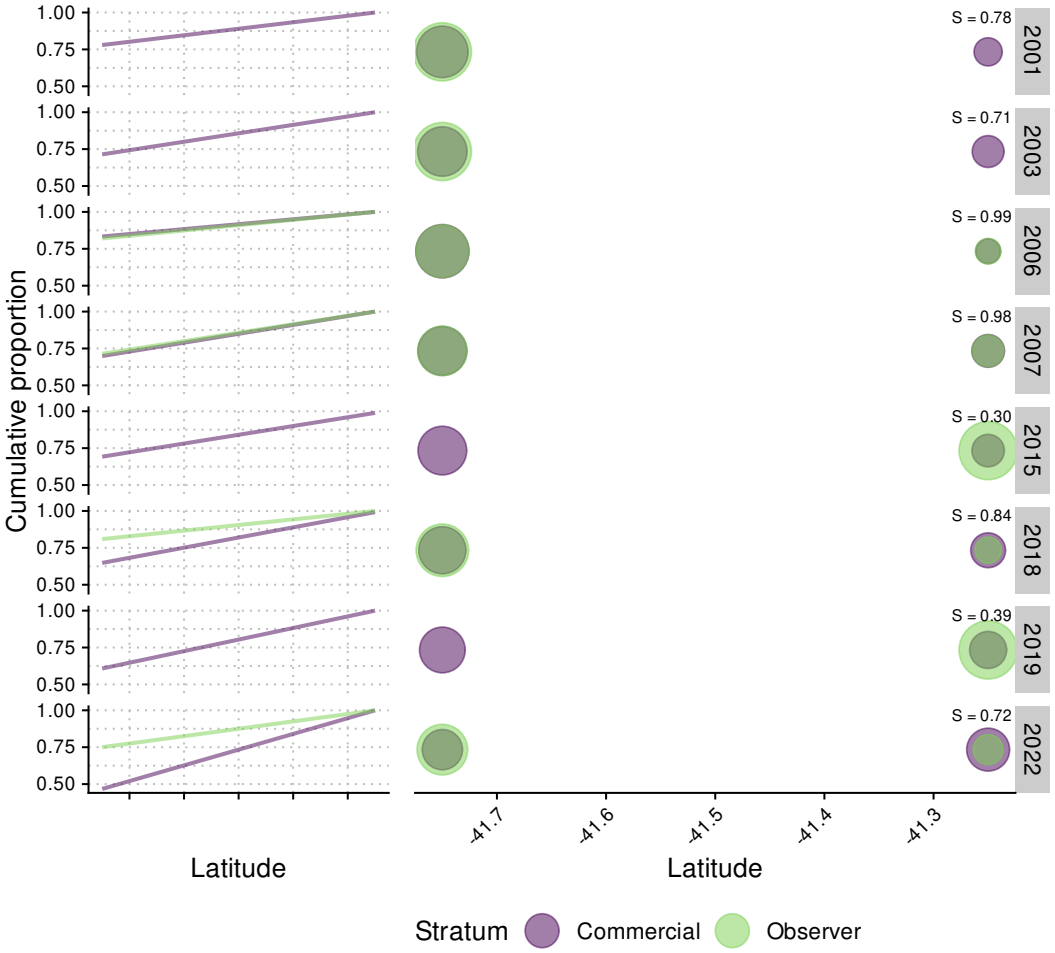


Figure 1046: Latitudinal representativeness of observer sampling coverage of Line fishing events in LIN 7CK, where the ling catch exceeded the 40kg threshold, in 2001 to 2022. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

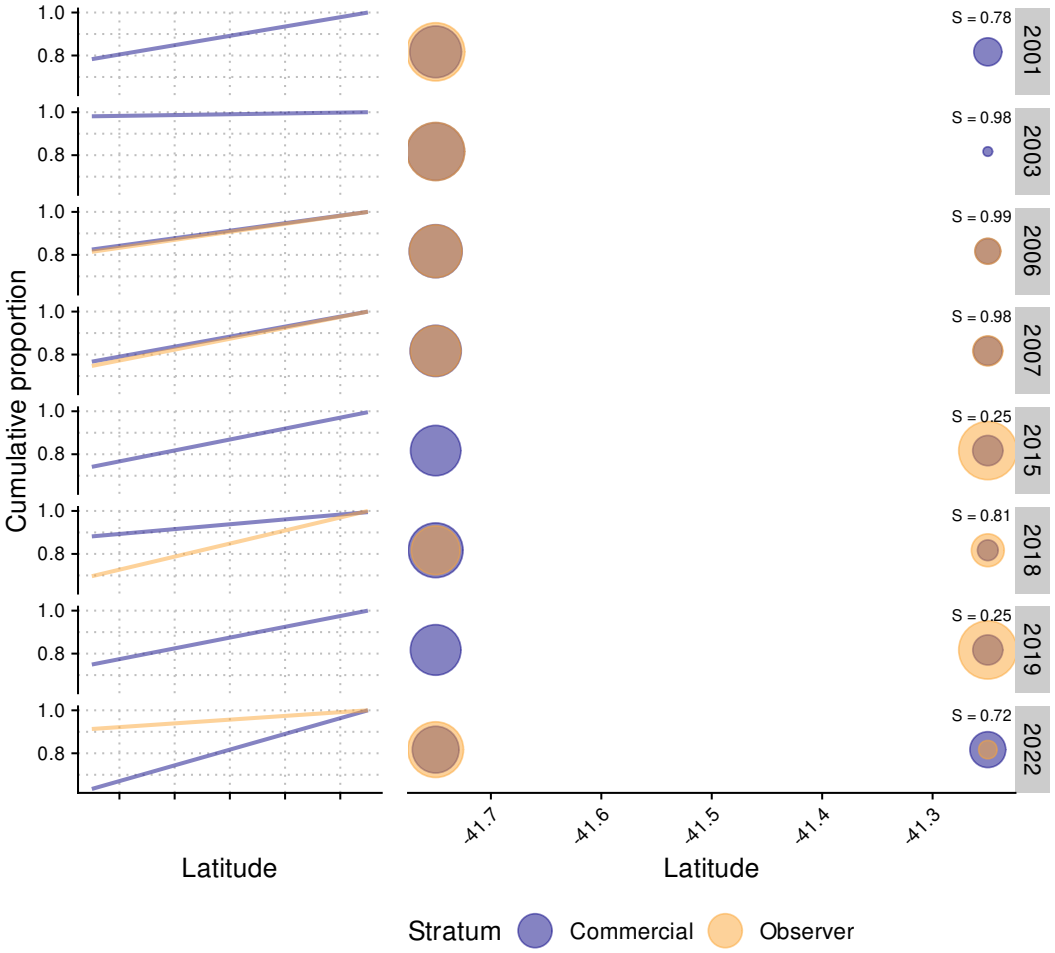


Figure 1047: Latitudinal representativeness of observer sampling coverage of Line catch in LIN 7CK, from events where the ling catch exceeded the 40kg threshold, in 2001 to 2022. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

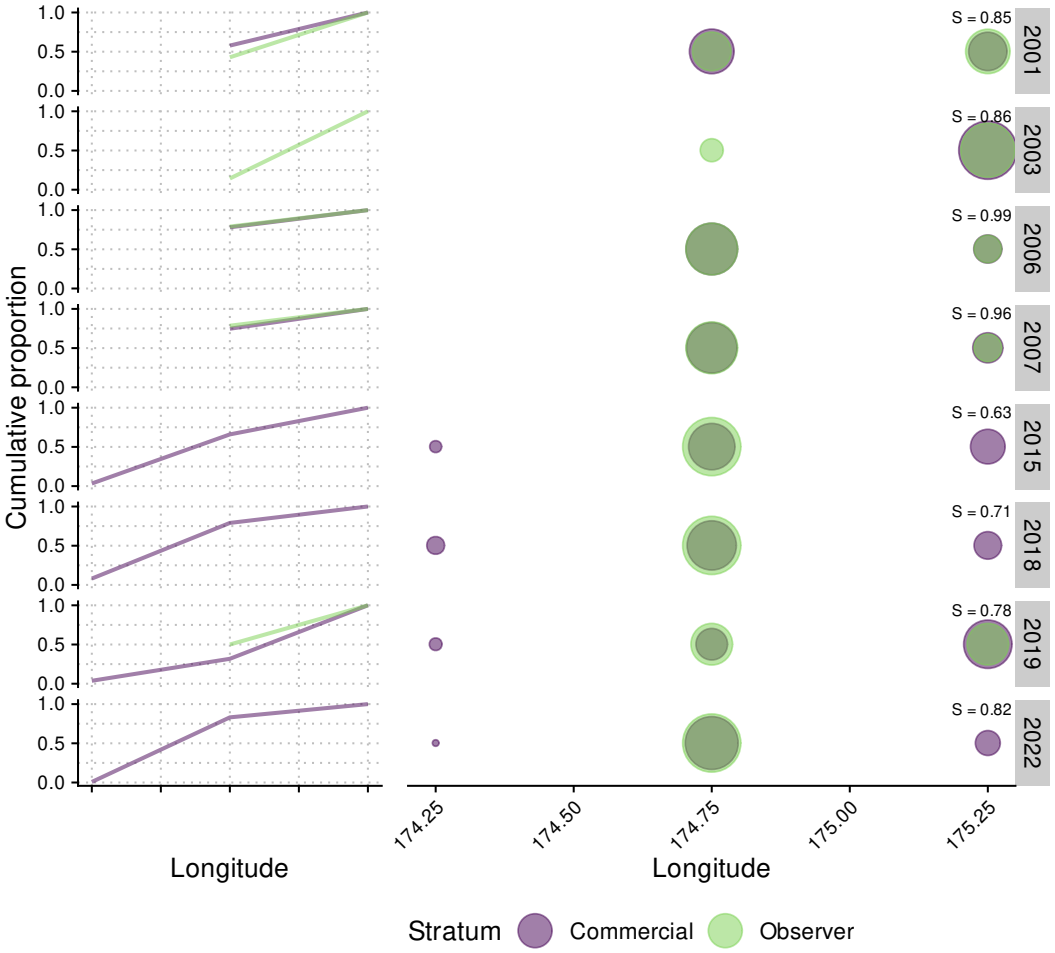


Figure 1048: Longitudinal representativeness of observer sampling coverage of Line fishing events in LIN 7CK, where the ling catch exceeded the 40kg threshold, in 2001 to 2022. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

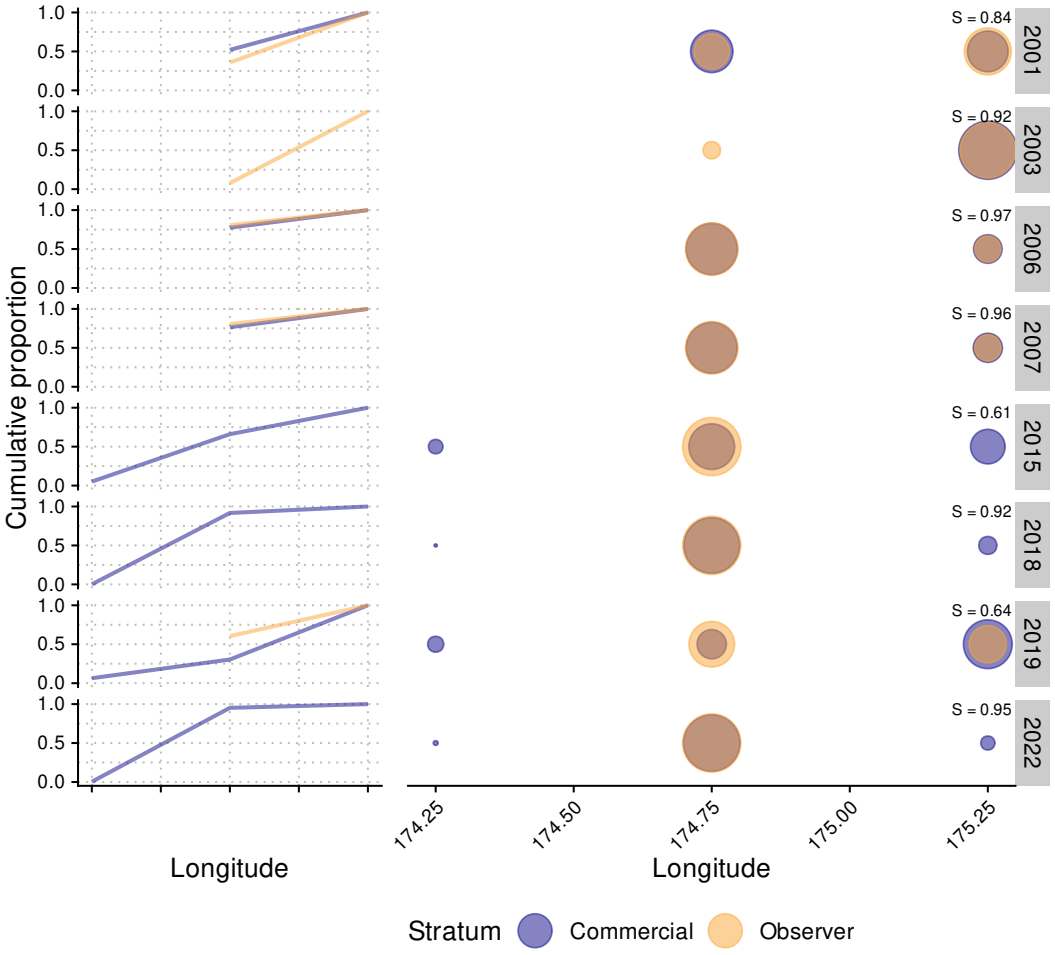


Figure 1049: **Longitudinal representativeness of observer sampling coverage of Line catch in LIN 7CK, from events where the ling catch exceeded the 40kg threshold, in 2001 to 2022. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

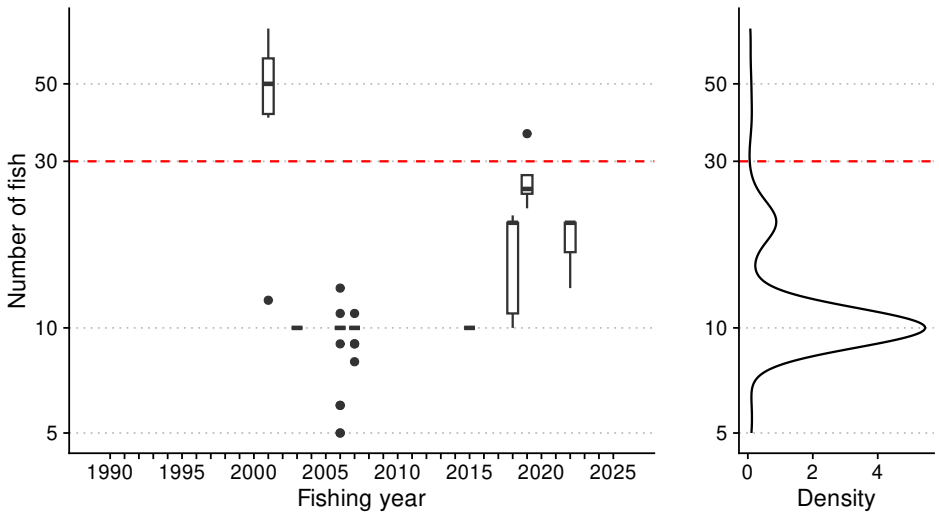


Figure 1050: **Length-frequency sample sizes for observed fishing events in LIN 7CK where ling were sampled. The red dashed line indicates a sample size of 30 fish.**

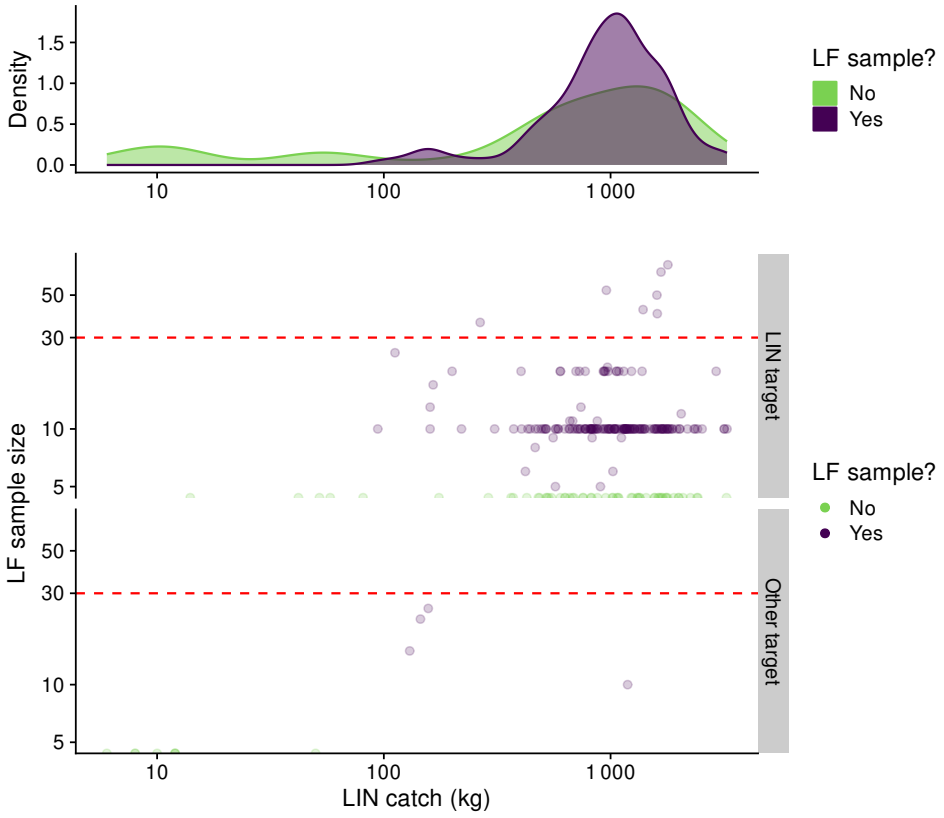


Figure 1051: Length-frequency sample sizes (number of fish sampled) for observed fishing events in LIN 7CK in relation to the total ling catch from an event, separately for ling target events and other target species. The red dashed line indicates a sample size of 30 fish.

2.13.14.2 Catch quantification

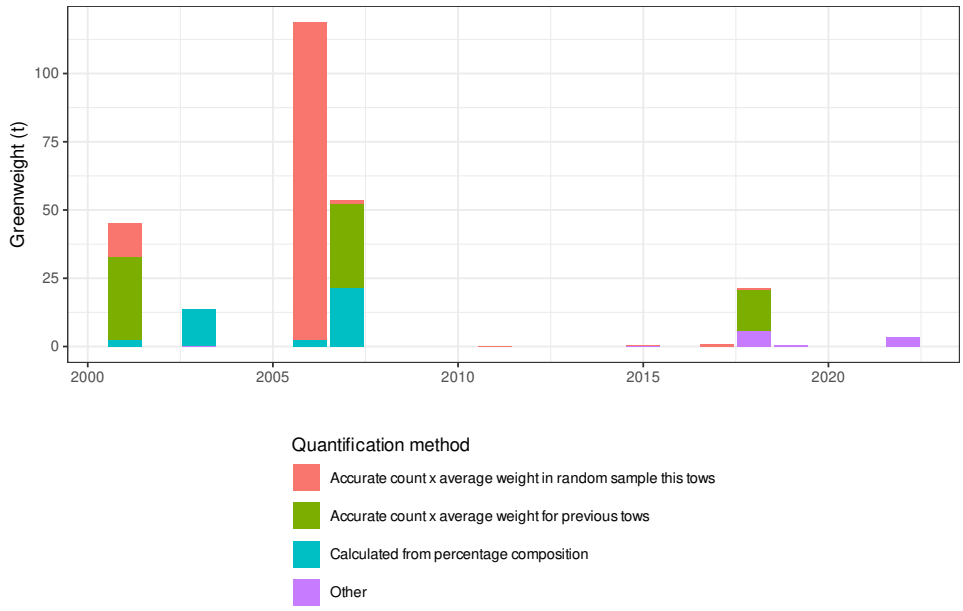


Figure 1052: Methods used by observers to quantify the catch of ling in the LIN 7CK Line fishery. The legend lists the methods used in descending order of total catch.

2.13.15 LIN 7WC: Trawl fishery

2.13.15.1 Length-frequency samples

Table 91: Length-frequency samples of ling from the LIN 7WC Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of ling exceeded a potential sampling threshold of 40 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	2 594	44	658	1.70
1991	1 832	92	1 062	5.02
1992	2 093	110	1 418	5.26
1993	2 639	66	680	2.50
1994	2 835	217	2 107	7.65
1995	2 936	149	1 956	5.07
1996	3 972	115	1 023	2.90
1997	3 417	269	2 659	7.87
1998	3 749	203	1 881	5.41
1999	4 101	297	3 175	7.24
2000	4 299	238	1 777	5.54
2001	5 458	286	2 288	5.24
2002	4 810	404	3 002	8.40
2003	4 791	386	2 694	8.06
2004	4 789	438	2 826	9.15
2005	3 175	230	2 006	7.24
2006	3 334	186	1 688	5.58
2007	2 165	70	505	3.23
2008	2 168	99	1 644	4.57
2009	2 031	23	334	1.13
2010	2 429	30	354	1.24
2011	3 125	43	751	1.38
2012	3 052	89	1 290	2.92
2013	3 445	156	2 628	4.53
2014	3 952	104	1 417	2.63
2015	4 330	428	7 508	9.88
2016	4 674	284	4 643	6.08
2017	4 848	212	3 757	4.37
2018	5 142	235	4 124	4.57
2019	4 379	148	2 846	3.38
2020	3 665	141	2 502	3.85
2021	3 092	61	1 217	1.97
2022	3 189	72	1 892	2.26
2023	3 194	98	2 823	3.07
2024	2 811	98	3 277	3.49
2025	2 878	94	2 290	3.27

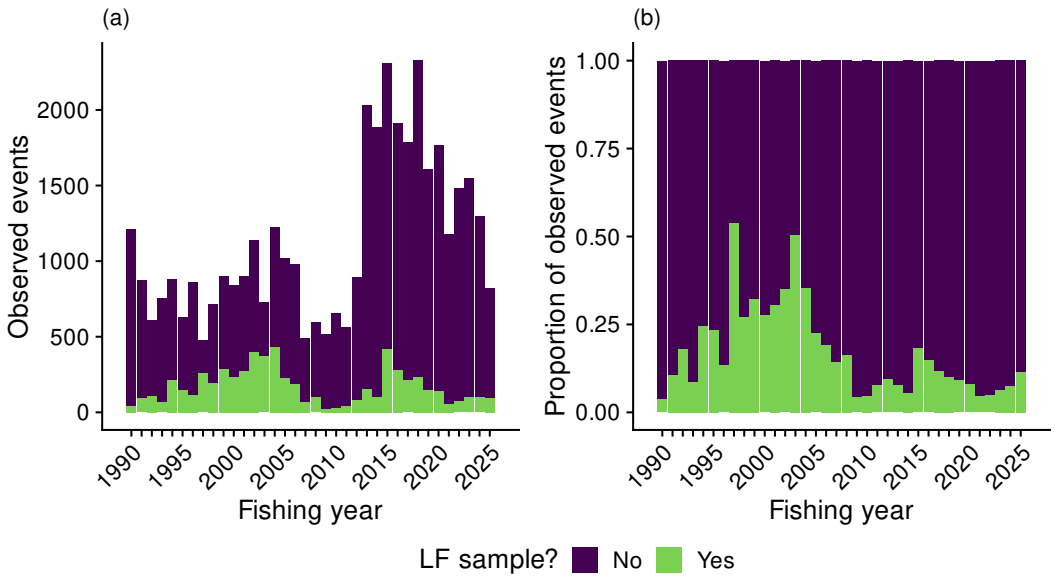


Figure 1053: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in LIN 7WC where the ling catch exceeded the 40 kg threshold, with and without length-frequency sampling.**

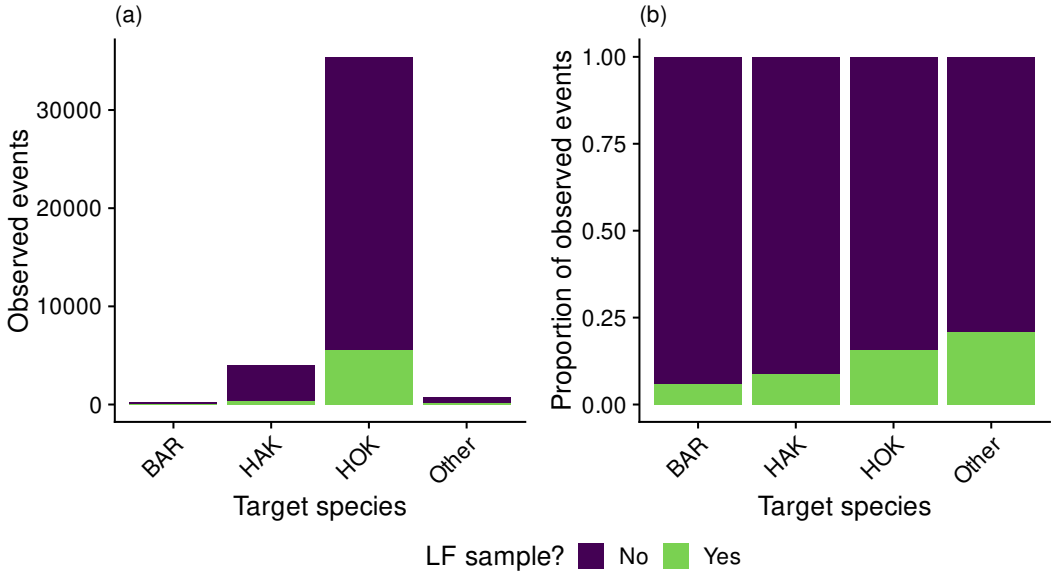


Figure 1054: **(a) Observed Trawl fishing events, and (b) proportion of observed events, in LIN 7WC where the ling catch exceeded the 40 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

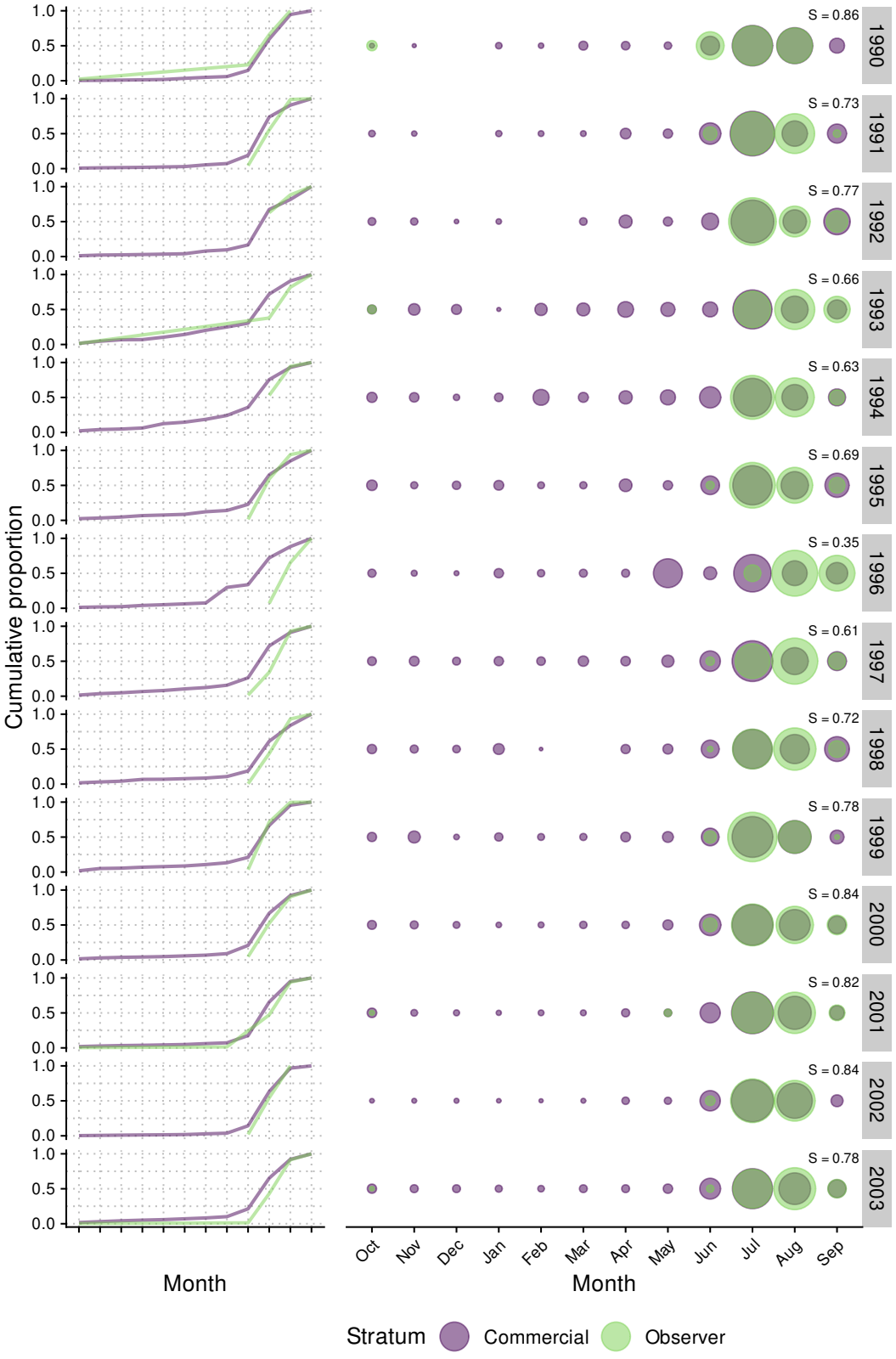


Figure 1055: **Monthly representativeness of observer sampling coverage of Trawl fishing events in LIN 7WC, where the ling catch exceeded the 40kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

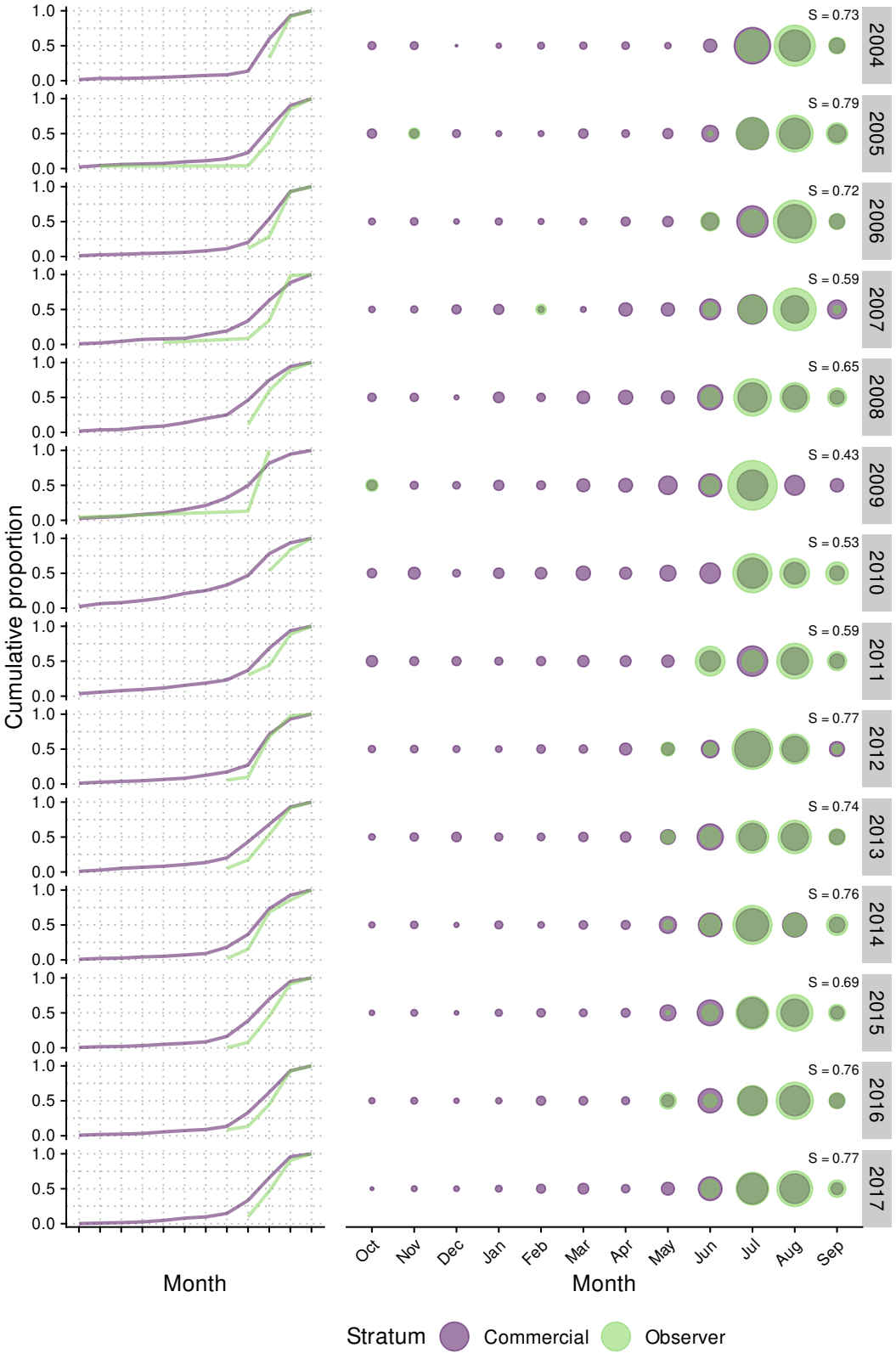


Figure 1056: Monthly representativeness of observer sampling coverage of Trawl fishing events in LIN 7WC, where the ling catch exceeded the 40kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

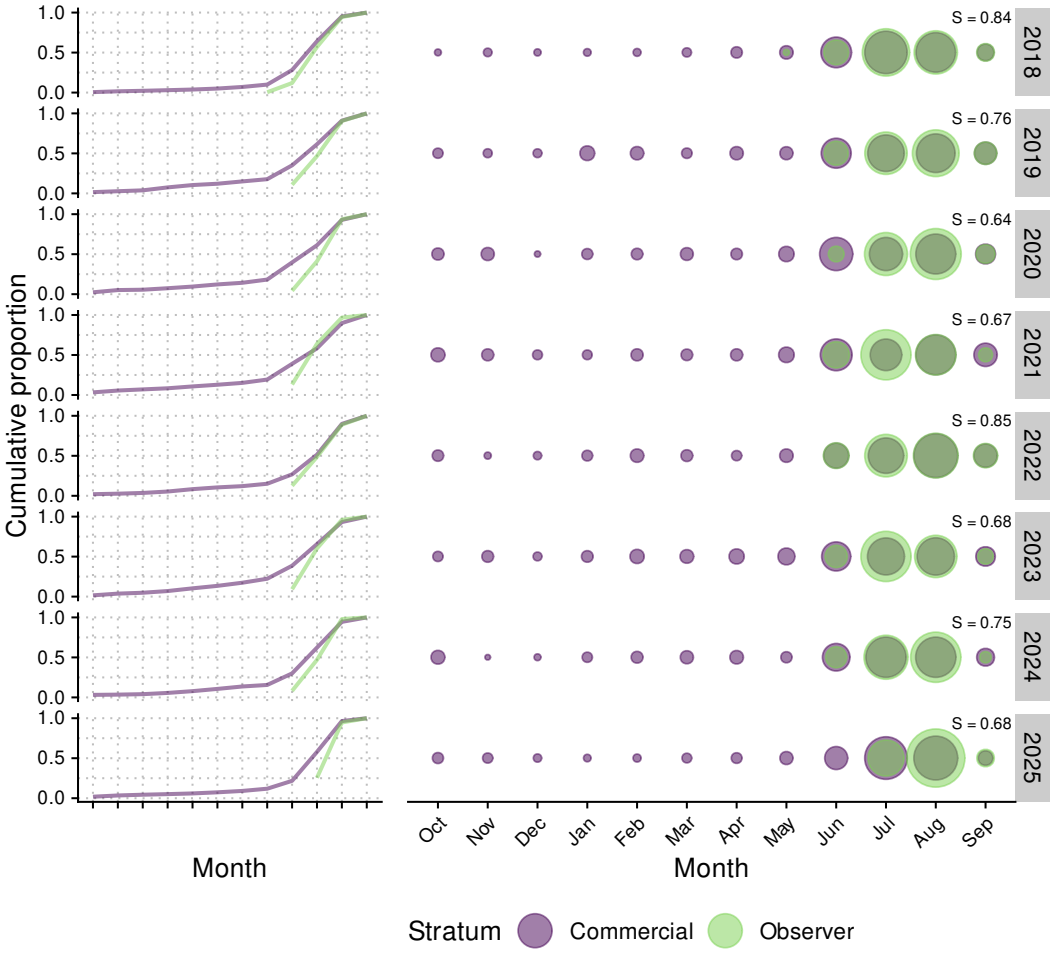


Figure 1057: Monthly representativeness of observer sampling coverage of Trawl fishing events in LIN 7WC, where the ling catch exceeded the 40kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

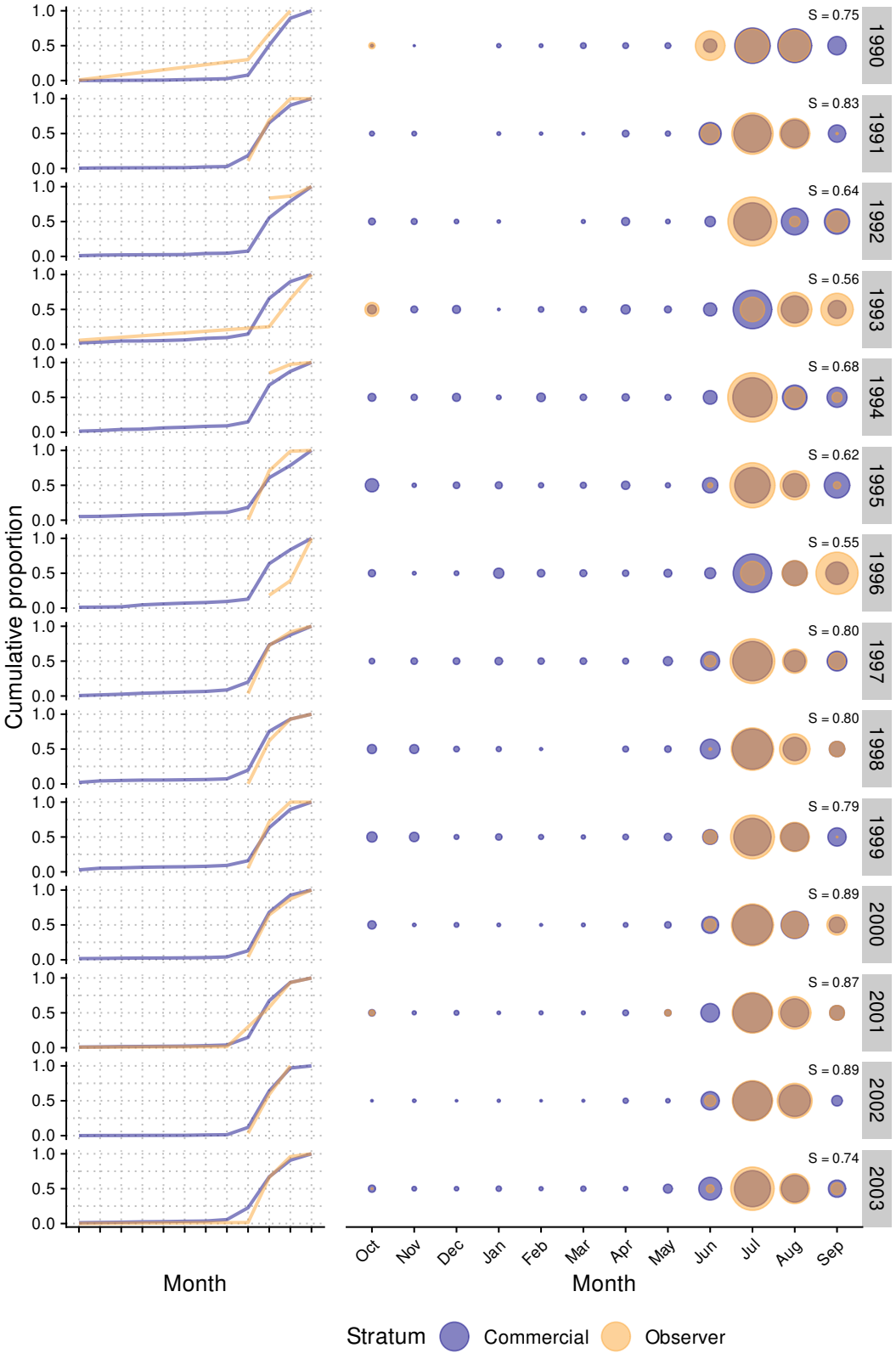


Figure 1058: Monthly representativeness of observer sampling coverage of Trawl catch in LIN 7WC, from events where the ling catch exceeded the 40kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

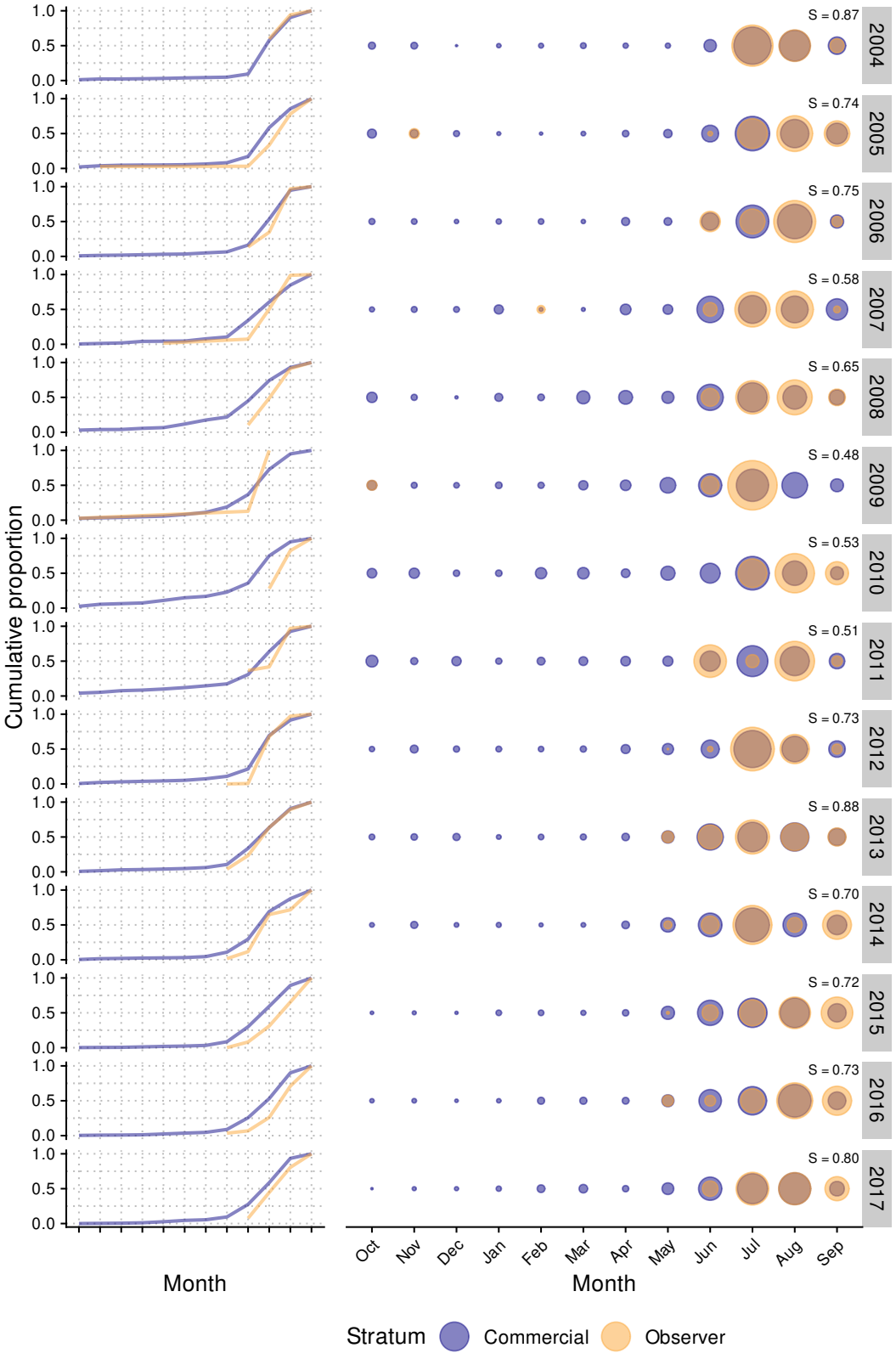


Figure 1059: Monthly representativeness of observer sampling coverage of Trawl catch in LIN 7WC, from events where the ling catch exceeded the 40kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

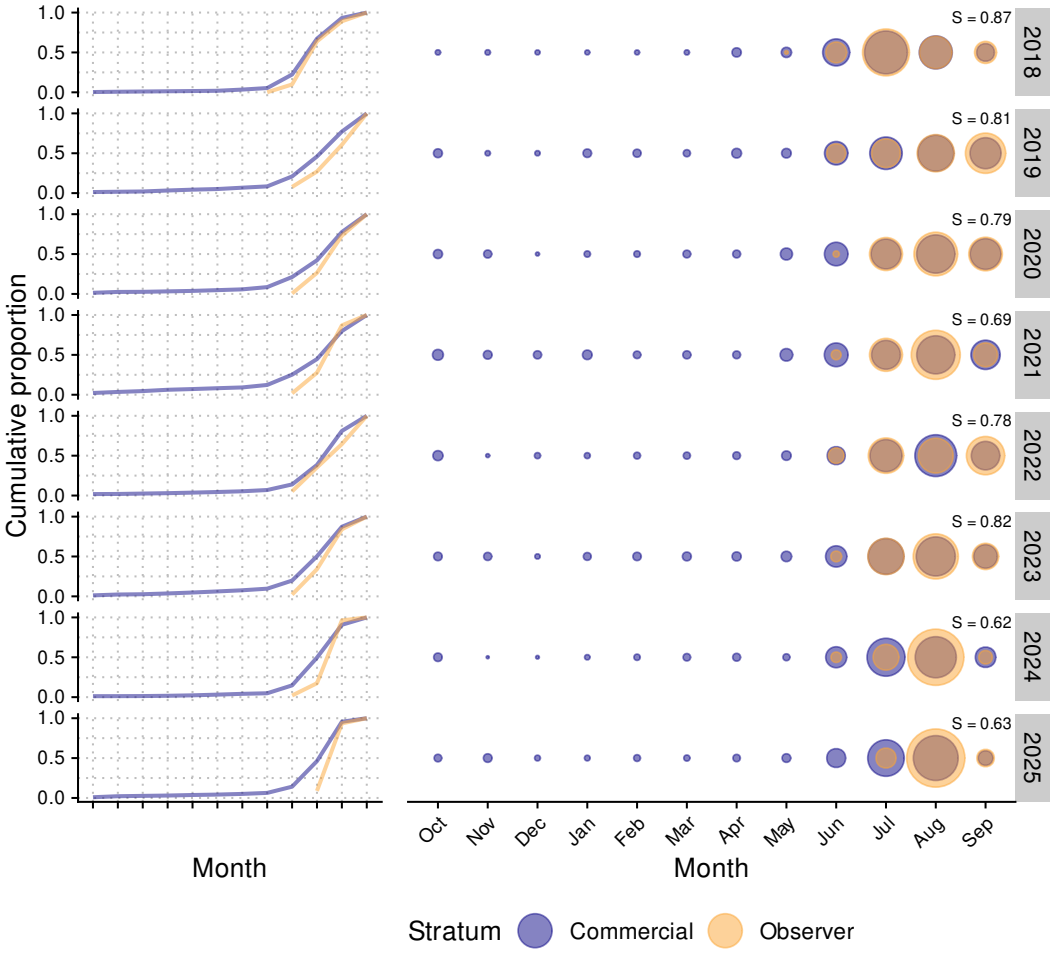


Figure 1060: Monthly representativeness of observer sampling coverage of Trawl catch in LIN 7WC, from events where the ling catch exceeded the 40kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

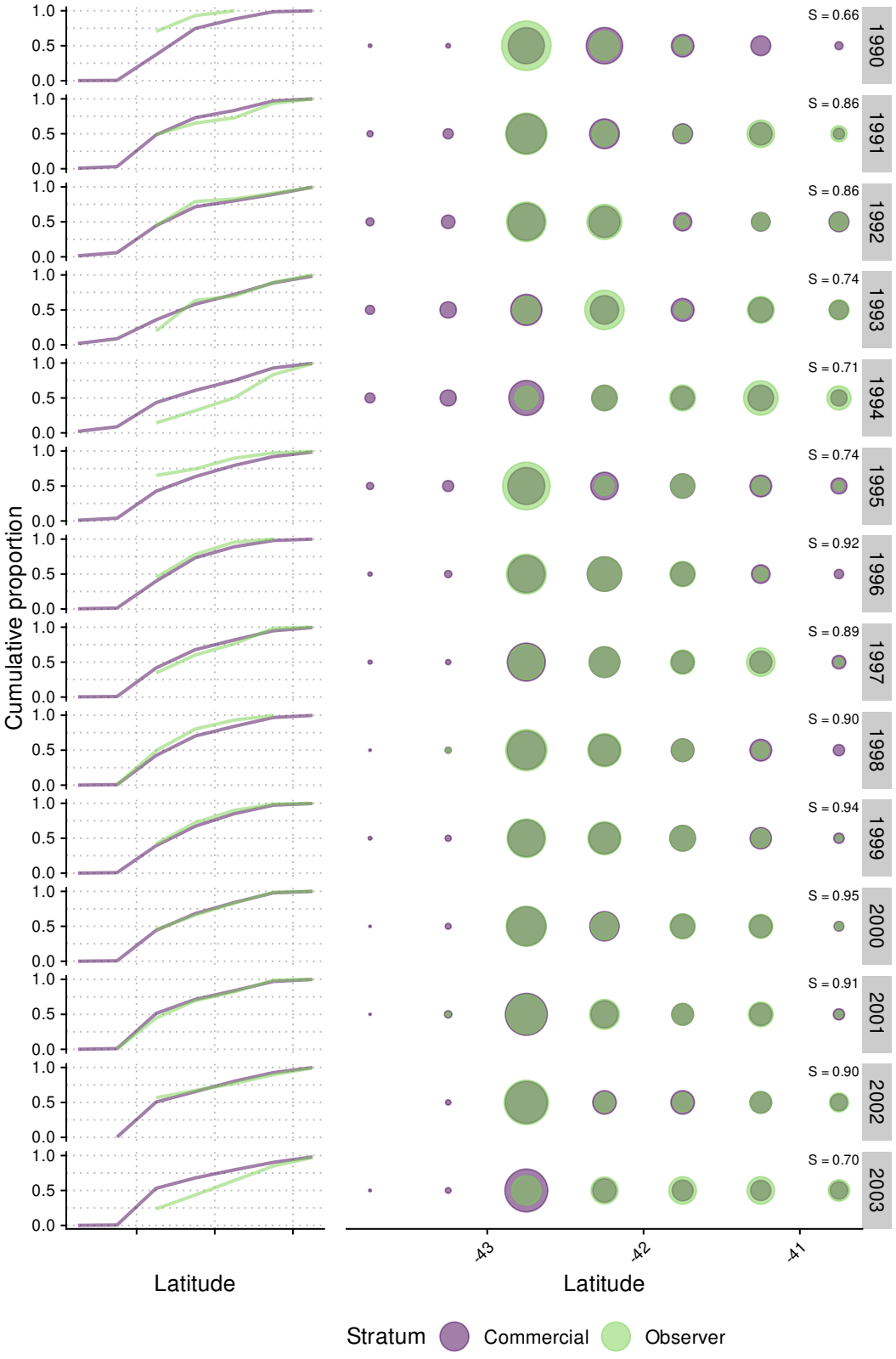


Figure 1061: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in LIN 7WC, where the ling catch exceeded the 40kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

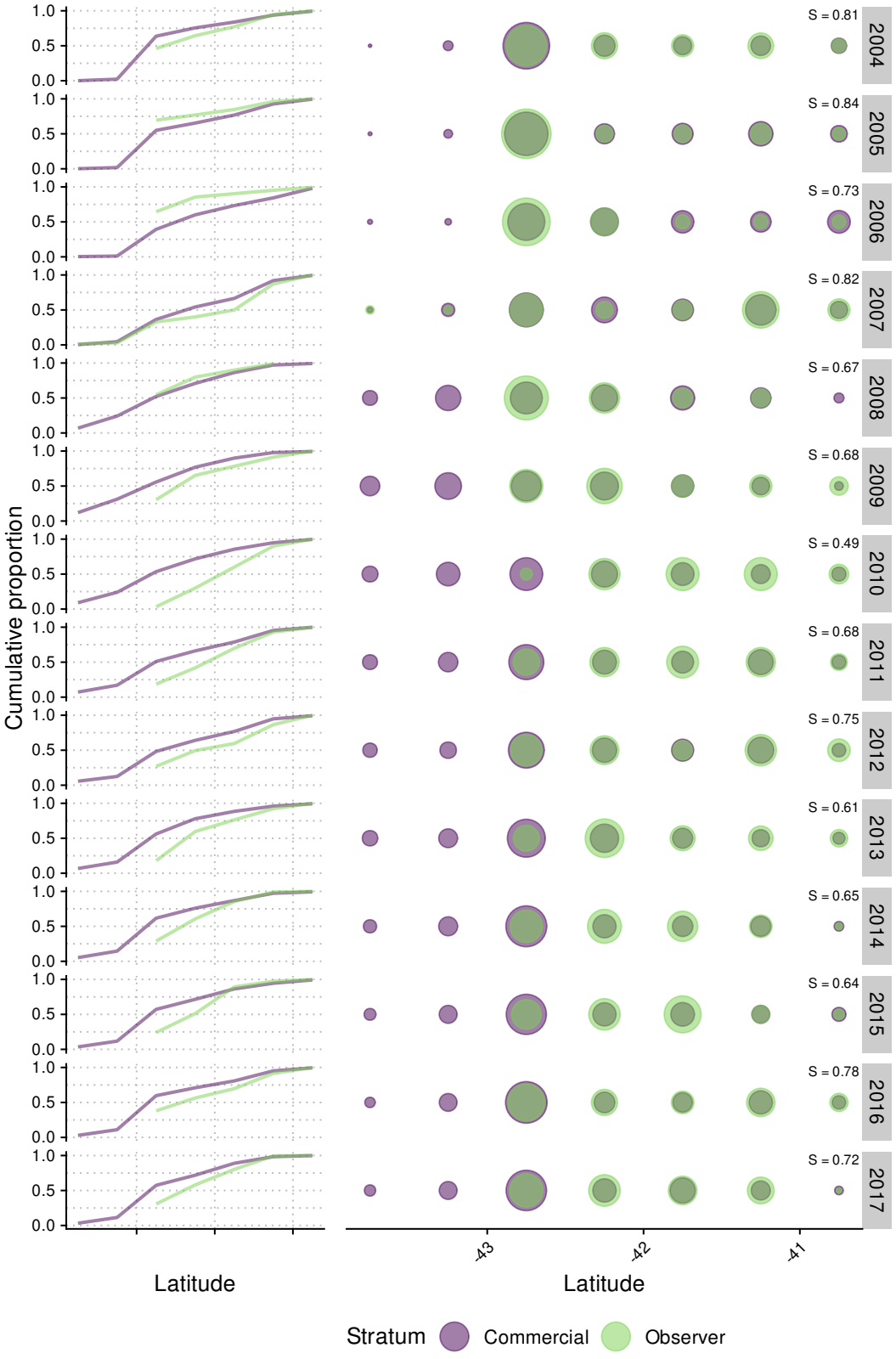


Figure 1062: **Latitudinal representativeness of observer sampling coverage of Trawl fishing events in LIN 7WC, where the ling catch exceeded the 40kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

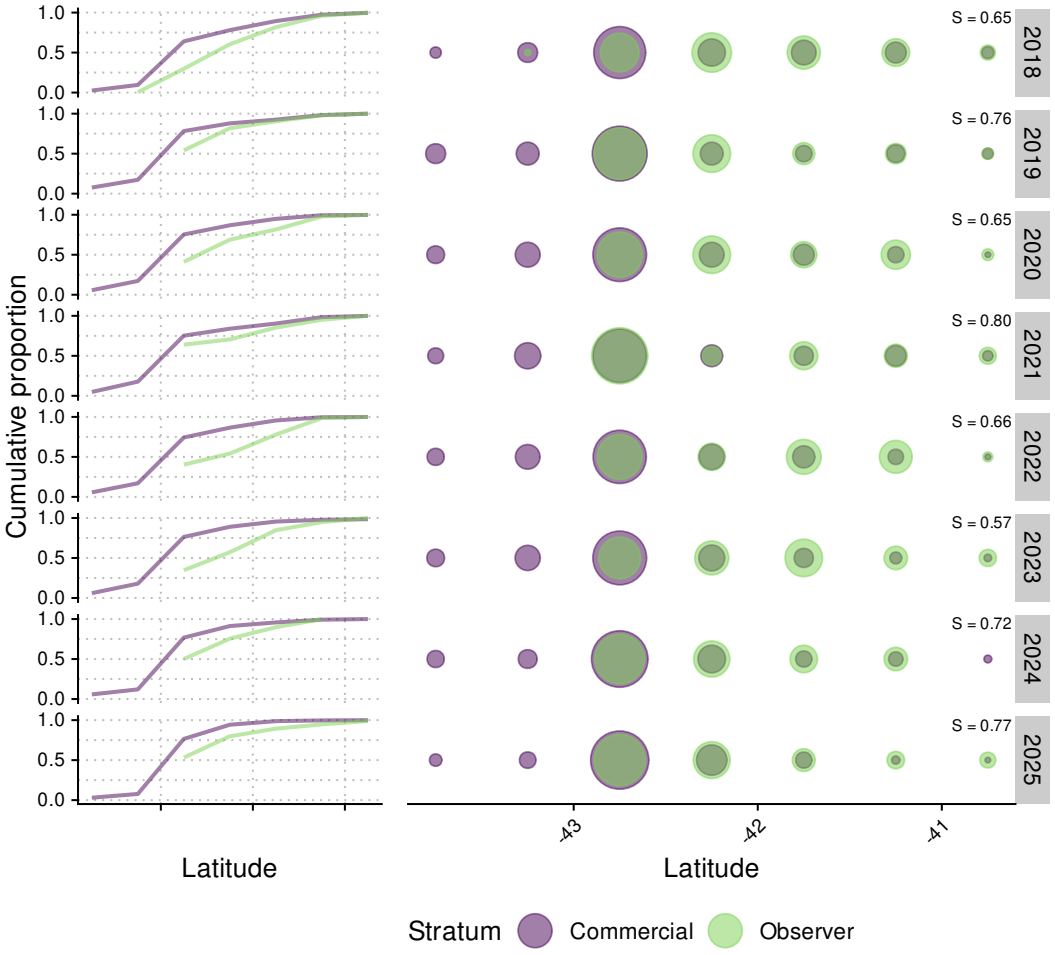


Figure 1063: Latitudinal representativeness of observer sampling coverage of Trawl fishing events in LIN 7WC, where the ling catch exceeded the 40kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

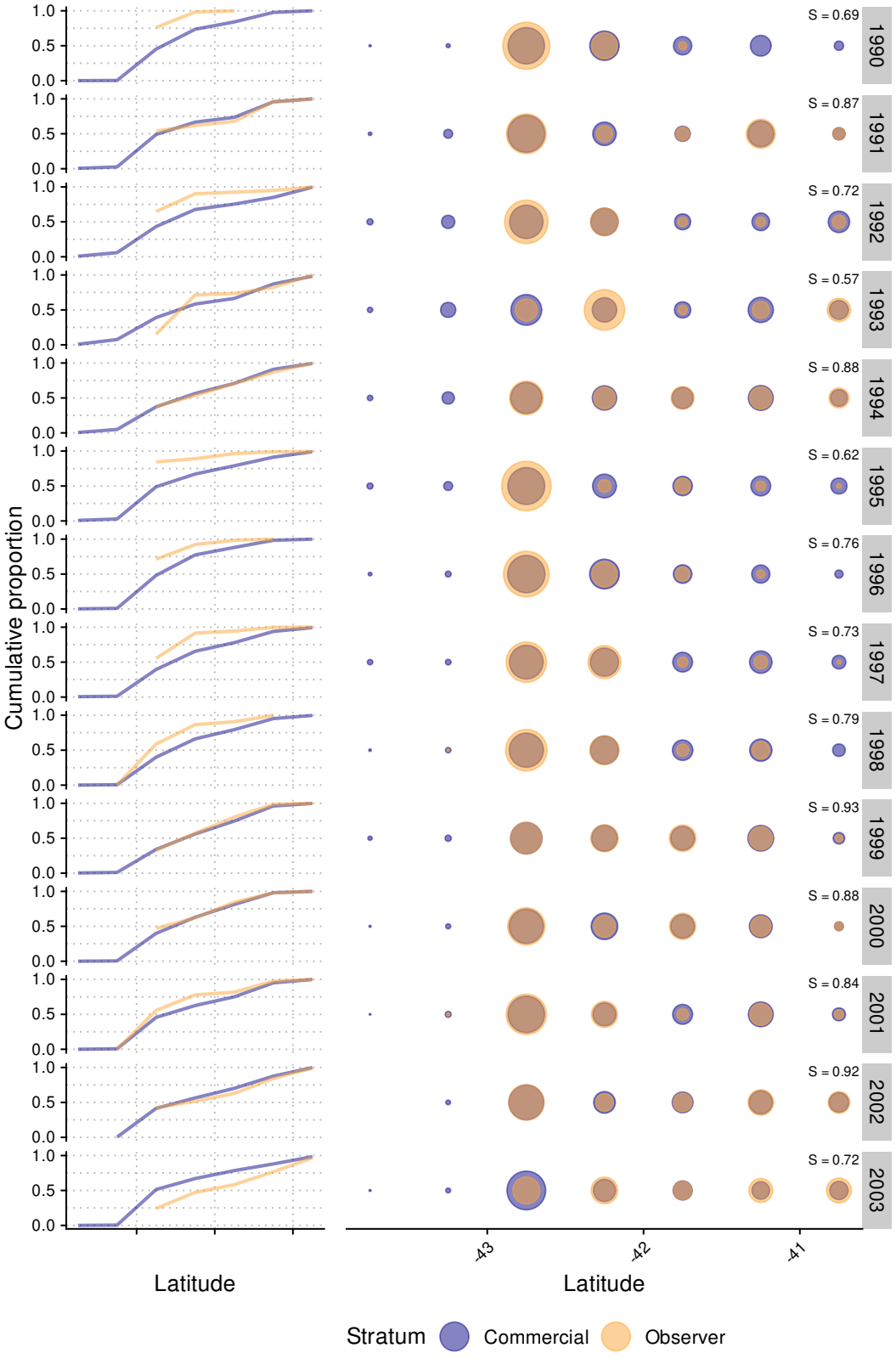


Figure 1064: Latitudinal representativeness of observer sampling coverage of Trawl catch in LIN 7WC, from events where the ling catch exceeded the 40kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

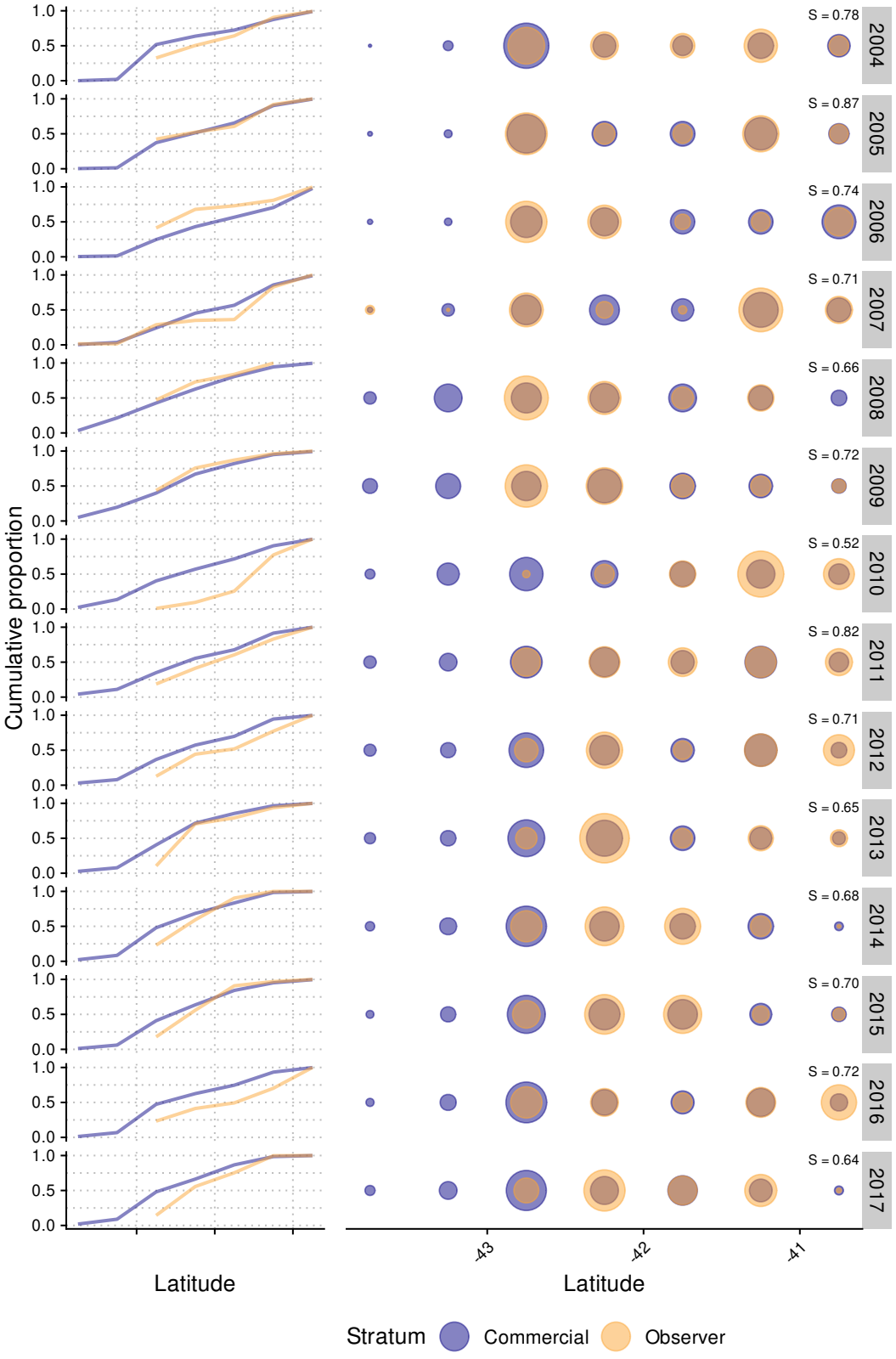


Figure 1065: Latitudinal representativeness of observer sampling coverage of Trawl catch in LIN 7WC, from events where the ling catch exceeded the 40kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

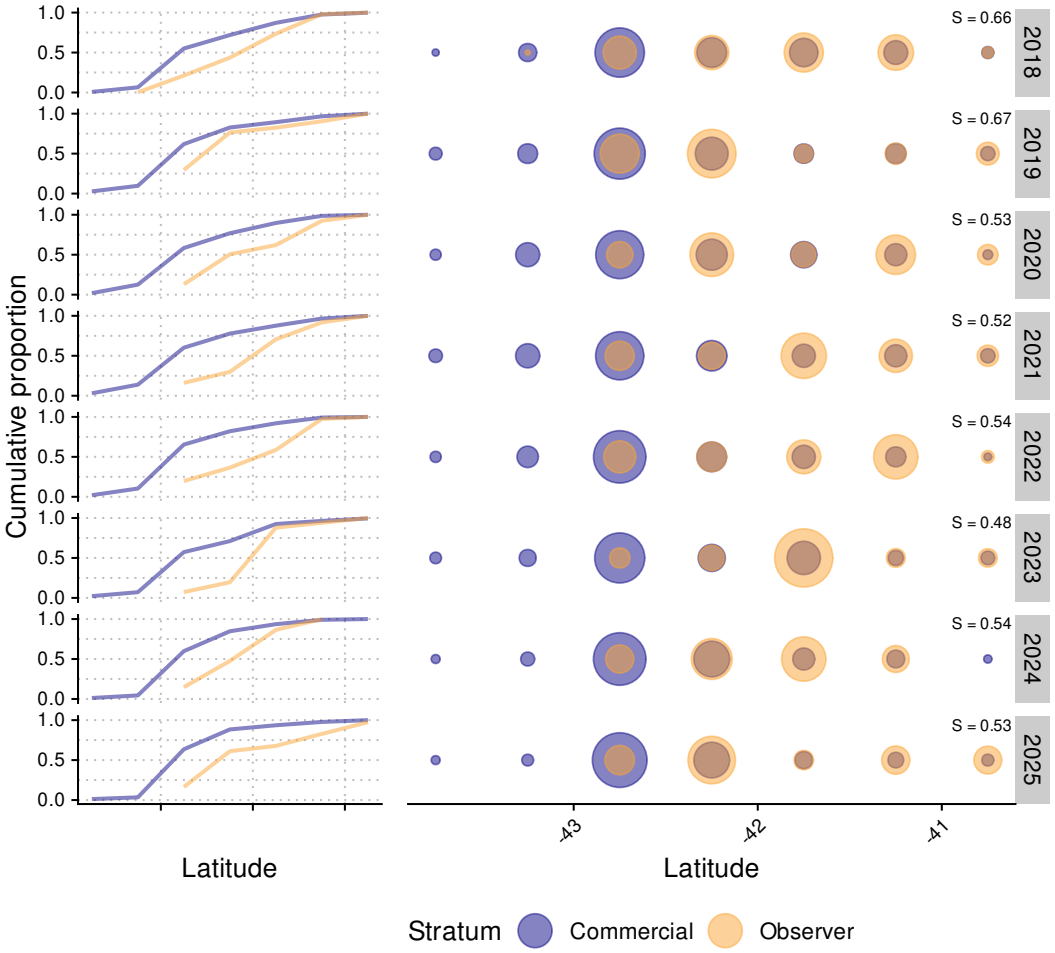


Figure 1066: Latitudinal representativeness of observer sampling coverage of Trawl catch in LIN 7WC, from events where the ling catch exceeded the 40kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

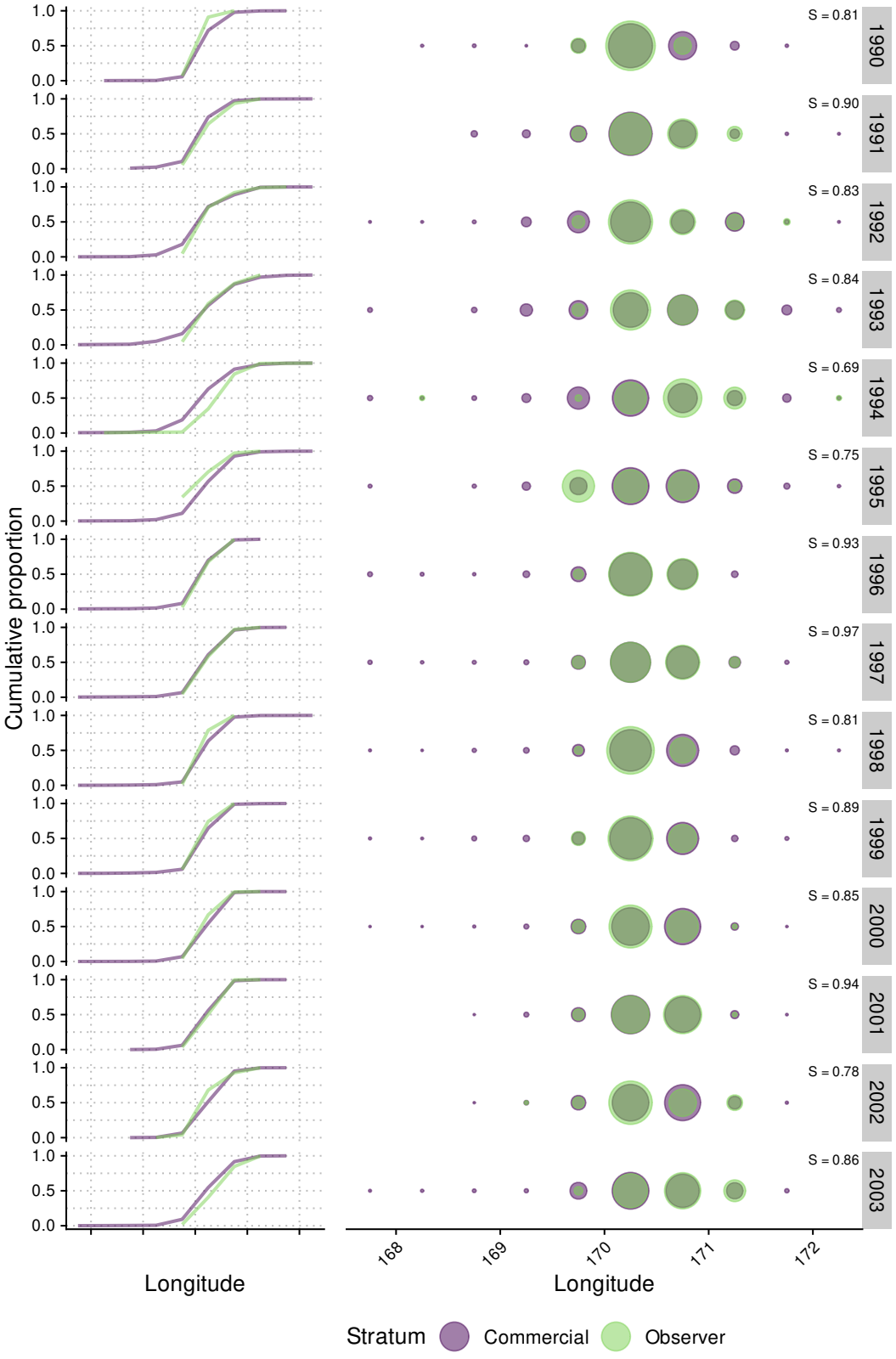


Figure 1067: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in LIN 7WC, where the ling catch exceeded the 40kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

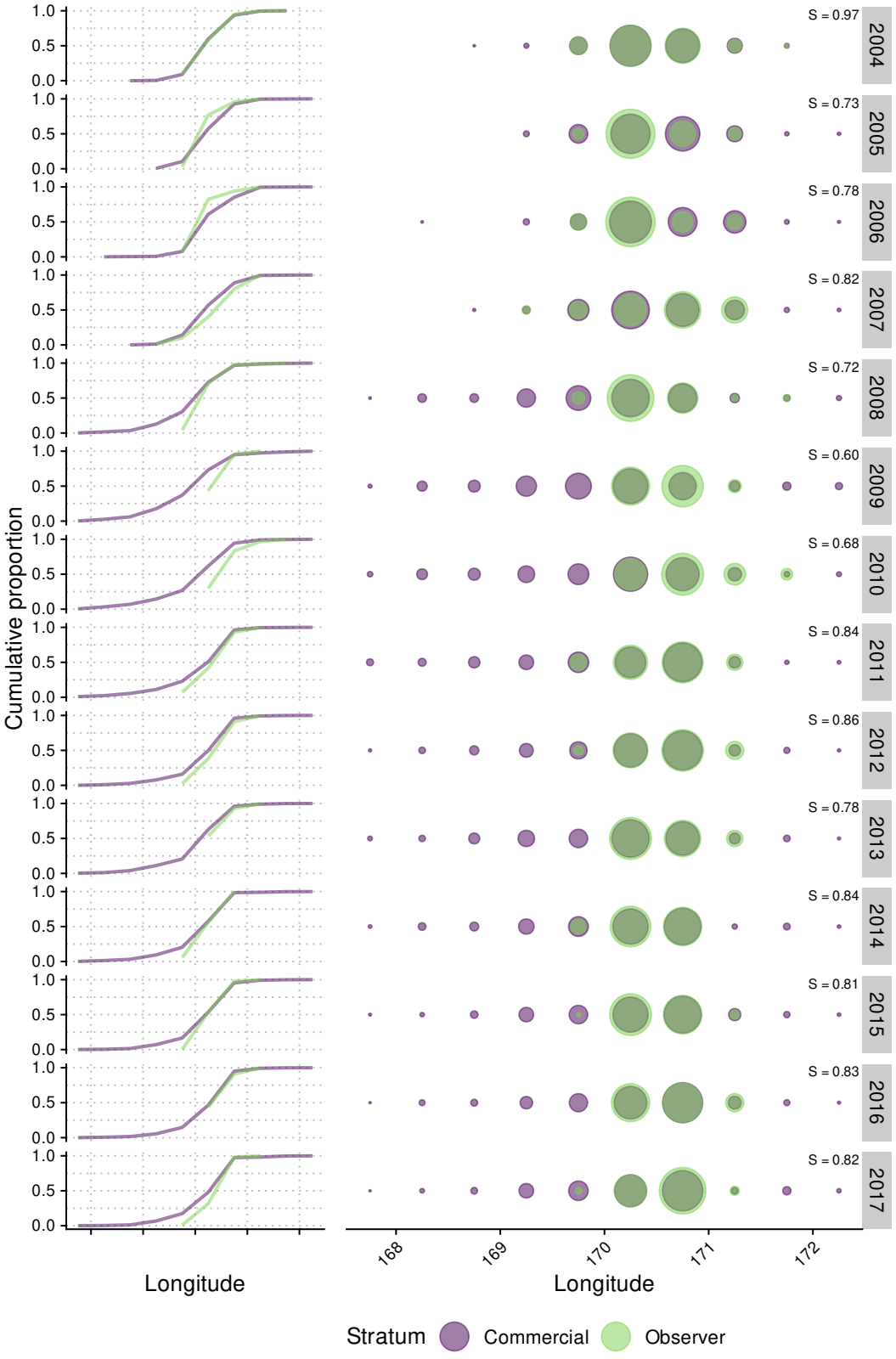


Figure 1068: **Longitudinal representativeness of observer sampling coverage of Trawl fishing events in LIN 7WC, where the ling catch exceeded the 40kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

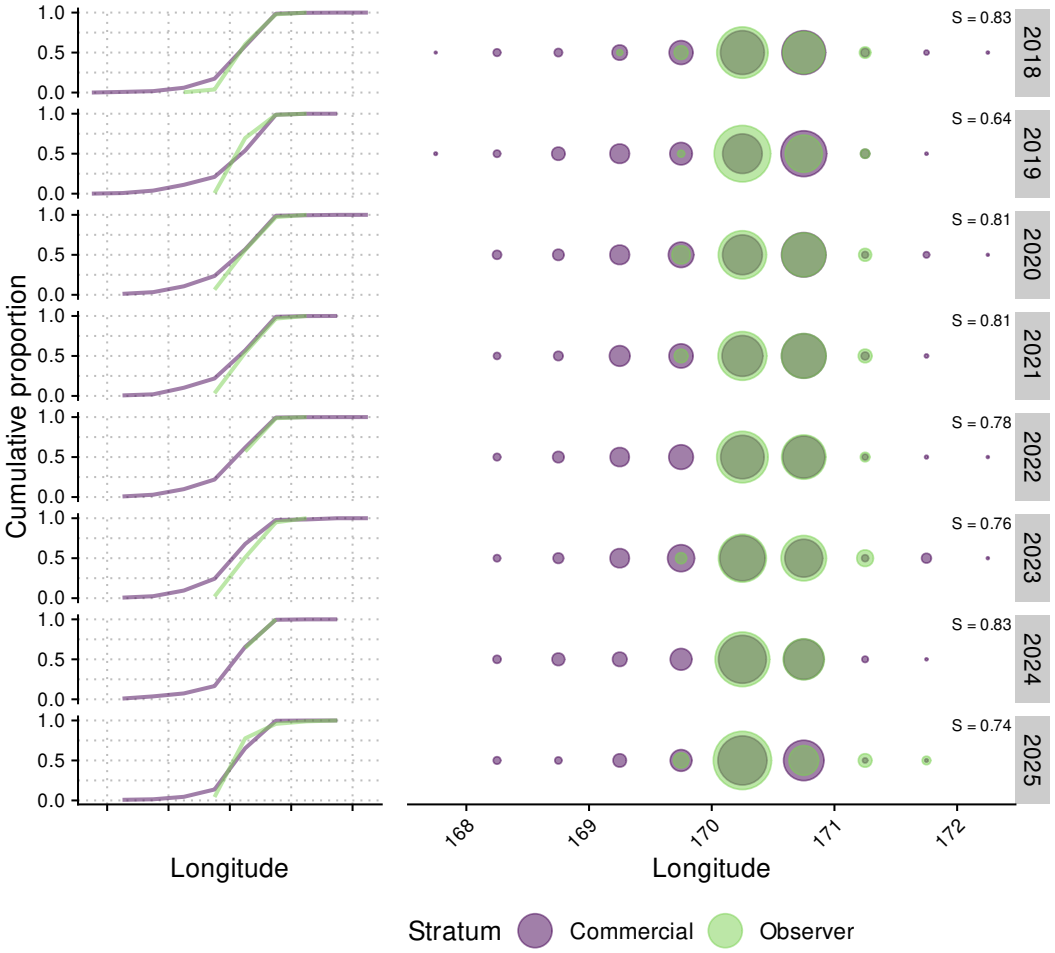


Figure 1069: Longitudinal representativeness of observer sampling coverage of Trawl fishing events in LIN 7WC, where the ling catch exceeded the 40kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

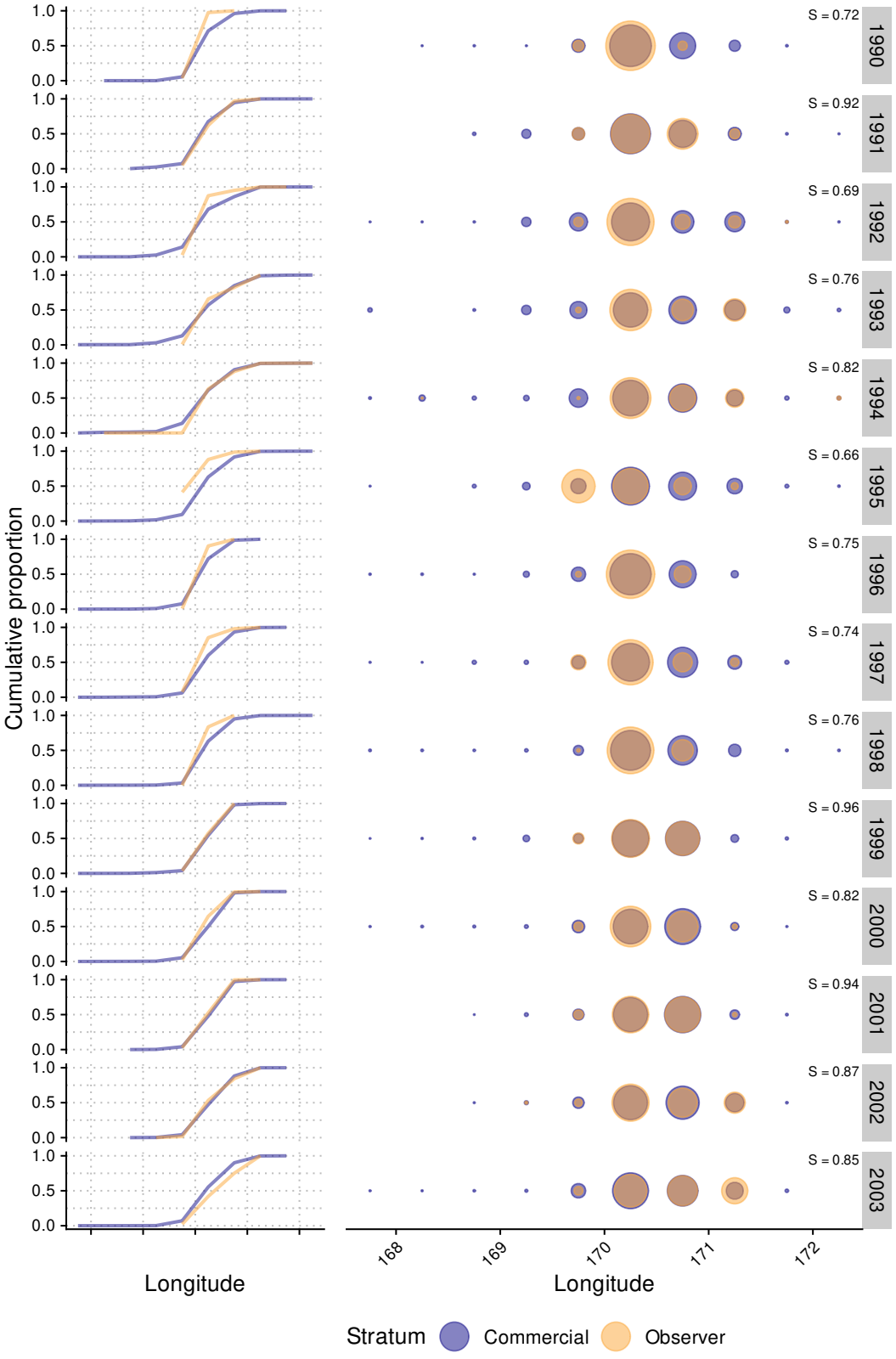


Figure 1070: Longitudinal representativeness of observer sampling coverage of Trawl catch in LIN 7WC, from events where the ling catch exceeded the 40kg threshold, in 1990 to 2003. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

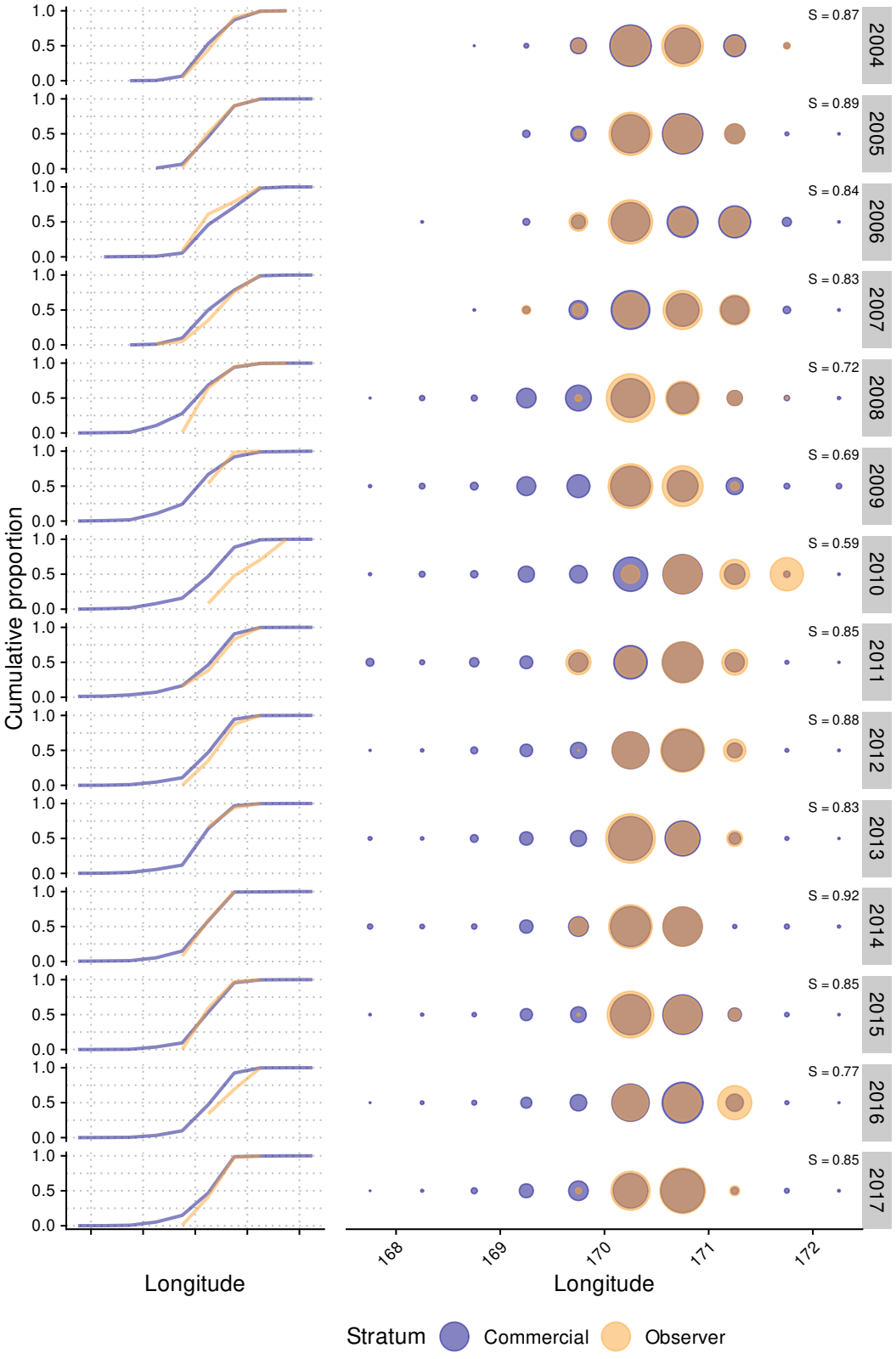


Figure 1071: Longitudinal representativeness of observer sampling coverage of Trawl catch in LIN 7WC, from events where the ling catch exceeded the 40kg threshold, in 2004 to 2017. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

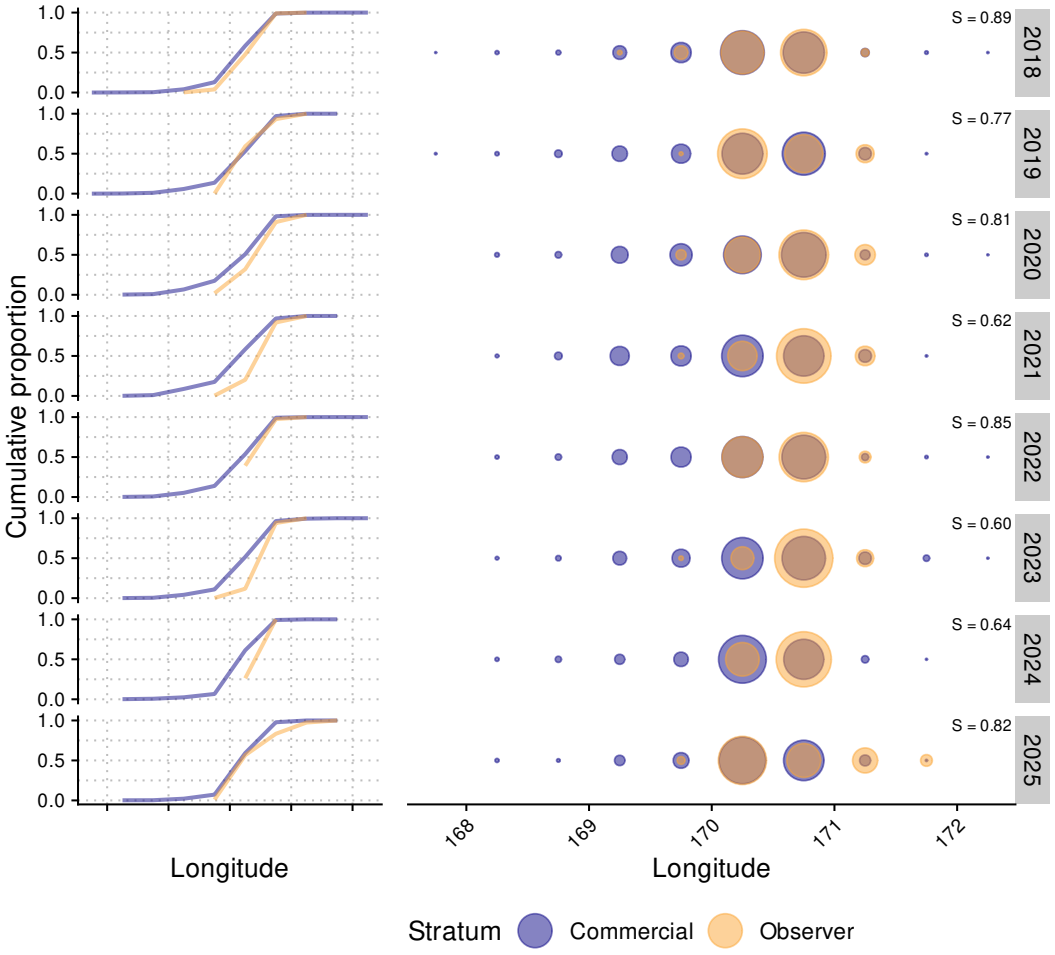


Figure 1072: **Longitudinal representativeness of observer sampling coverage of Trawl catch in LIN 7WC, from events where the ling catch exceeded the 40kg threshold, in 2018 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

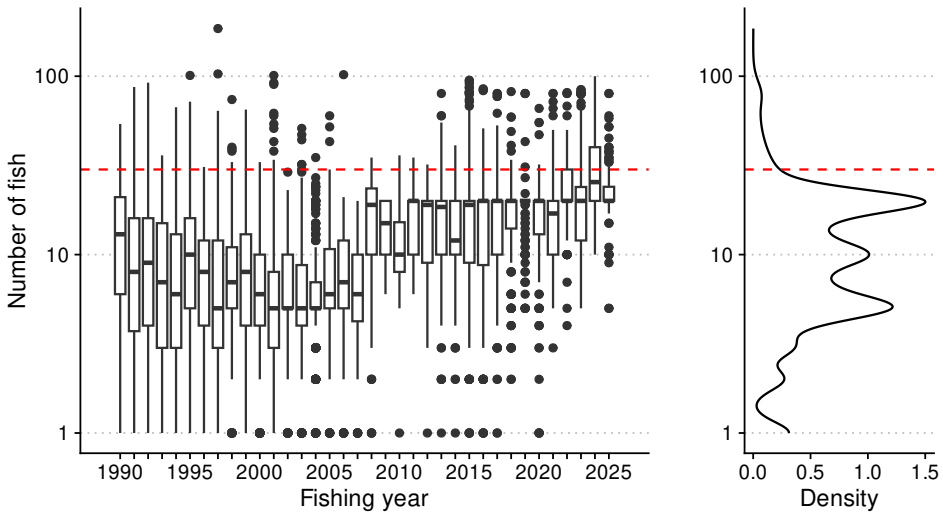


Figure 1073: **Length-frequency sample sizes for observed fishing events in LIN 7WC where ling were sampled. The red dashed line indicates a sample size of 30 fish.**

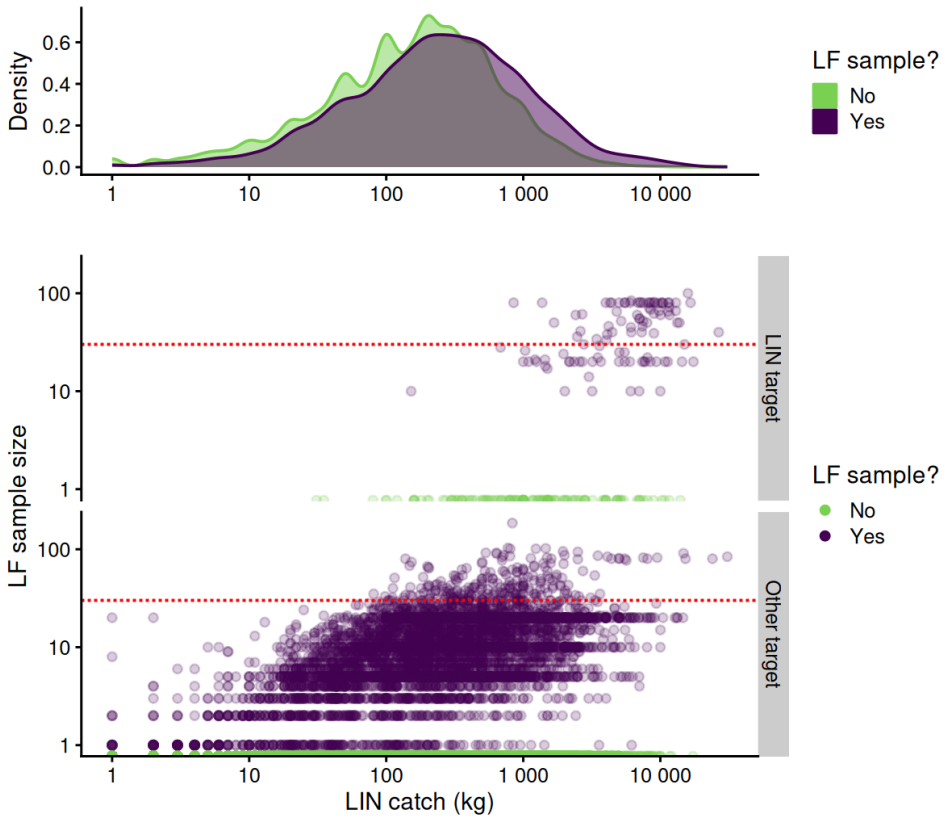


Figure 1074: **Length-frequency sample sizes (number of fish sampled) for observed fishing events in LIN 7WC in relation to the total ling catch from an event, separately for ling target events and other target species. The red dashed line indicates a sample size of 30 fish.**

2.13.15.2 Otolith samples

Table 92: Otolith samples of ling from the LIN 7WC Trawl fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of ling exceeded a potential sampling threshold of 40 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	2 594	0	0	0.00
1991	1 832	0	0	0.00
1992	2 093	0	0	0.00
1993	2 639	0	0	0.00
1994	2 835	0	0	0.00
1995	2 936	0	0	0.00
1996	3 972	0	0	0.00
1997	3 417	0	0	0.00
1998	3 749	0	0	0.00
1999	4 101	0	0	0.00
2000	4 299	0	0	0.00
2001	5 458	0	0	0.00
2002	4 810	0	0	0.00
2003	4 791	0	0	0.00
2004	4 789	0	0	0.00
2005	3 175	0	0	0.00
2006	3 334	0	0	0.00
2007	2 165	0	0	0.00
2008	2 168	0	0	0.00
2009	2 031	9	45	0.44
2010	2 429	16	74	0.66
2011	3 125	33	158	1.06
2012	3 052	65	322	2.13
2013	3 445	137	715	3.98
2014	3 952	50	225	1.27
2015	4 330	96	611	2.22
2016	4 674	206	957	4.41
2017	4 848	175	898	3.61
2018	5 142	212	1 030	4.12
2019	4 379	141	694	3.22
2020	3 665	133	676	3.63
2021	3 092	52	277	1.68
2022	3 189	69	445	2.16
2023	3 194	97	586	3.04
2024	2 811	91	757	3.24
2025	2 878	92	531	3.20

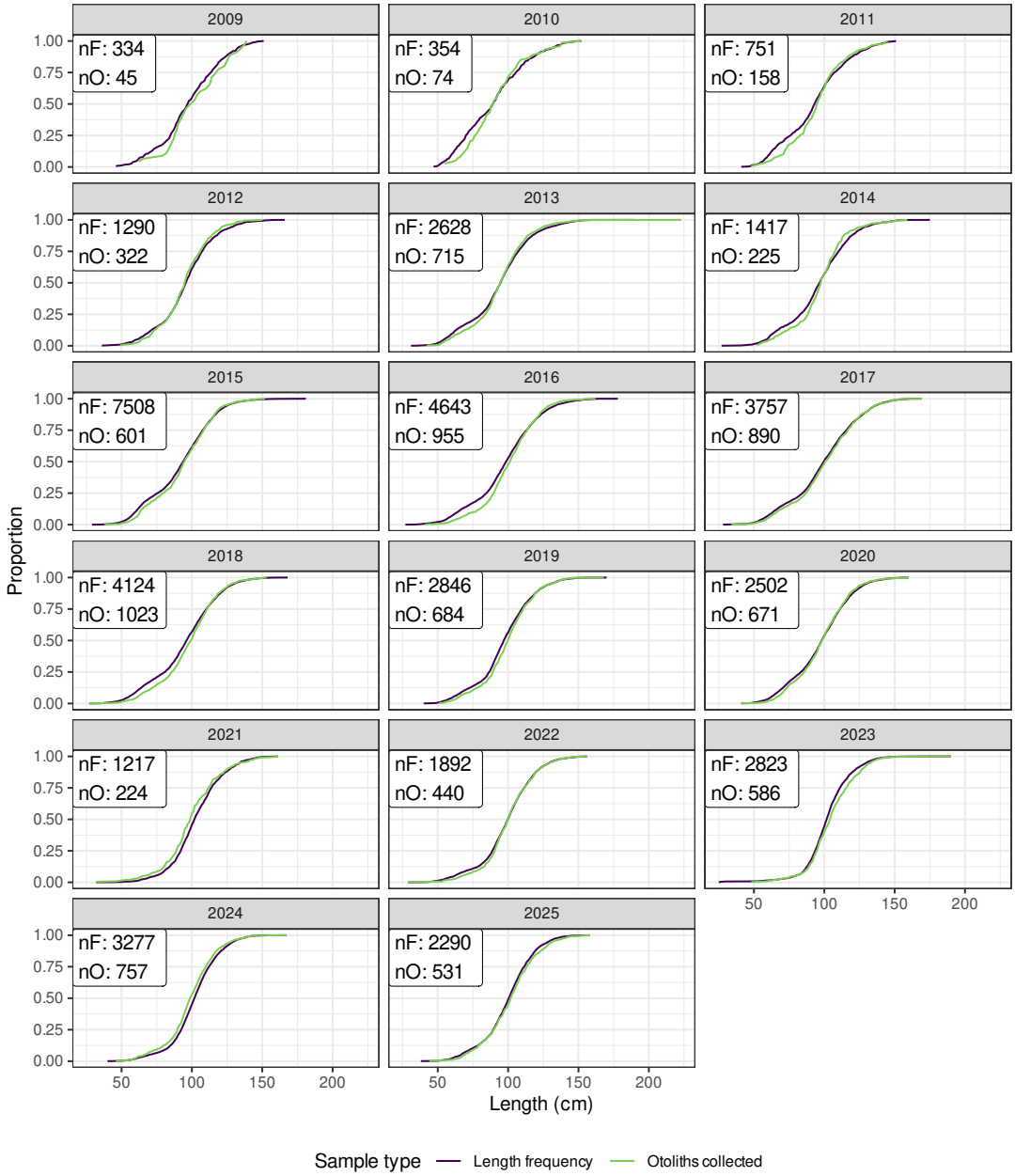


Figure 1075: Cumulative distributions of the length of fish in the length frequency and otolith samples of ling in the LIN 7WC Trawl fishery for the 2009 to 2025 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

2.13.15.3 Catch quantification

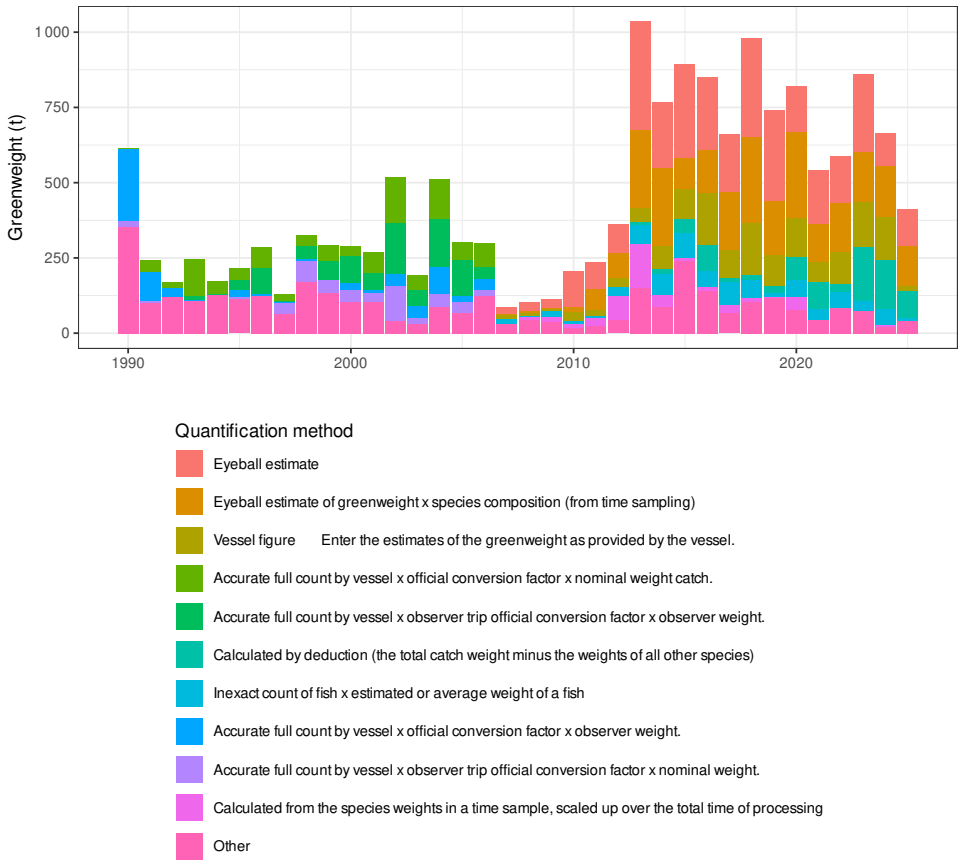


Figure 1076: Methods used by observers to quantify the catch of ling in the LIN 7WC Trawl fishery. The legend lists the methods used in descending order of total catch.

2.13.16 LIN 7WC: Line fishery

2.13.16.1 Length-frequency samples

Table 93: Length-frequency samples of ling from the LIN 7WC Line fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of ling exceeded a potential sampling threshold of 40 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	18 877	0	0	0.00
1991	6 654	0	0	0.00
1992	19 159	0	0	0.00
1993	697	0	0	0.00
1994	4 414	0	0	0.00
1995	73 902	0	0	0.00
1996	167 324	0	0	0.00
1997	191 796	0	0	0.00
1998	164 276	0	0	0.00
1999	165 902	0	0	0.00
2000	77 393	0	0	0.00
2001	3 885	0	0	0.00
2002	12 633	0	0	0.00
2003	852	8	114	0.94
2004	8 309	16	157	0.19
2005	988	0	0	0.00
2006	715	0	0	0.00
2007	807	0	0	0.00
2008	870	0	0	0.00
2009	1 167	0	0	0.00
2010	487	0	0	0.00
2011	982	0	0	0.00
2012	848	32	569	3.77
2013	753	0	0	0.00
2014	923	0	0	0.00
2015	704	50	492	7.10
2016	845	14	279	1.66
2017	723	21	350	2.90
2018	633	35	1 158	5.53
2019	2 444	54	1 657	2.21
2020	2 064	162	1 550	7.85
2021	2 212	121	1 418	5.47
2022	2 417	104	1 373	4.30
2023	1 629	62	1 230	3.81
2024	1 914	92	1 852	4.81
2025	1 678	1	8	0.06

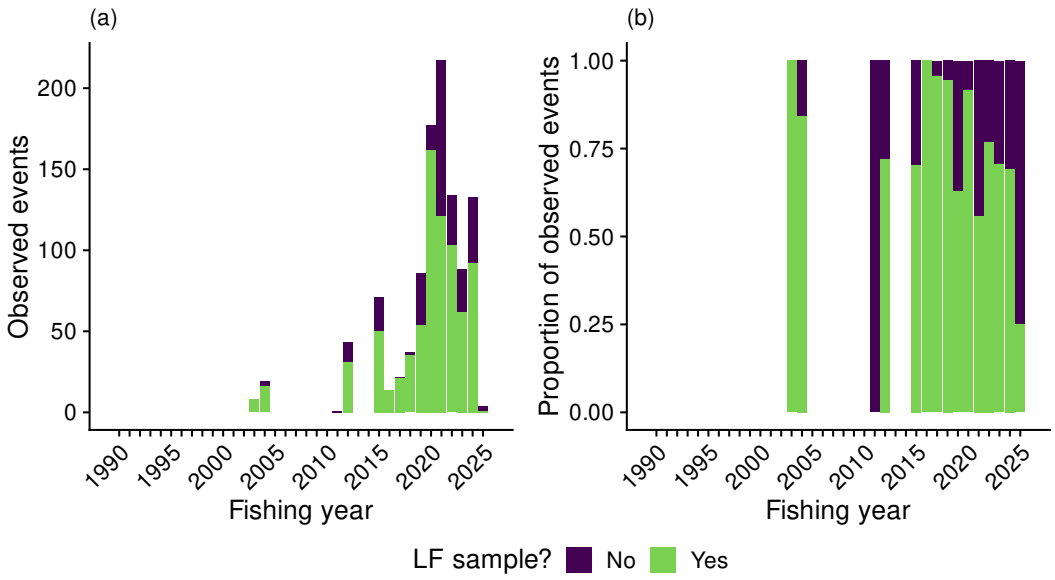


Figure 1077: **(a) Observed Line fishing events, and (b) proportion of observed events, in LIN 7WC where the ling catch exceeded the 40 kg threshold, with and without length-frequency sampling.**

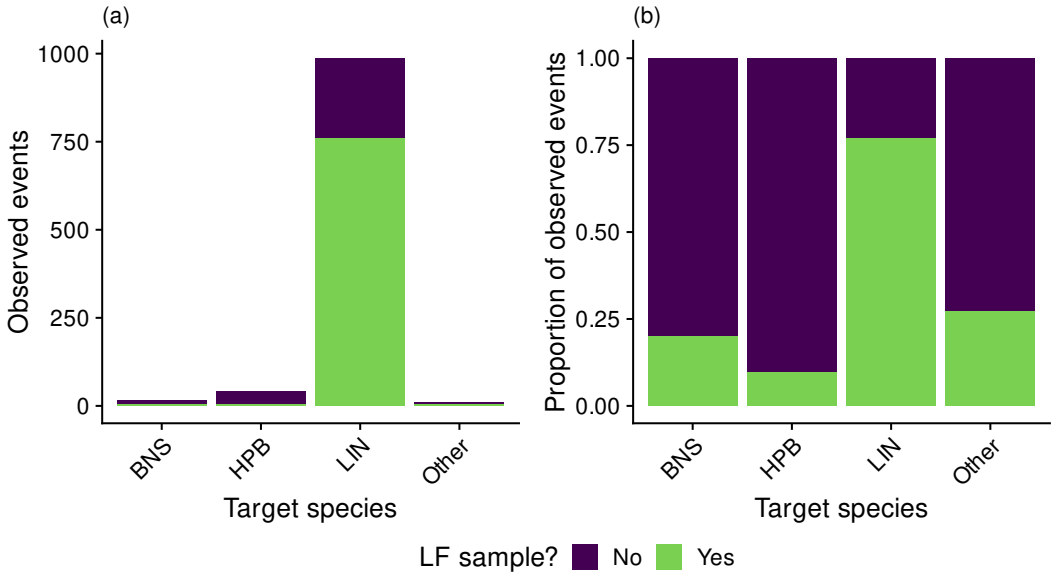


Figure 1078: **(a) Observed Line fishing events, and (b) proportion of observed events, in LIN 7WC where the ling catch exceeded the 40 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

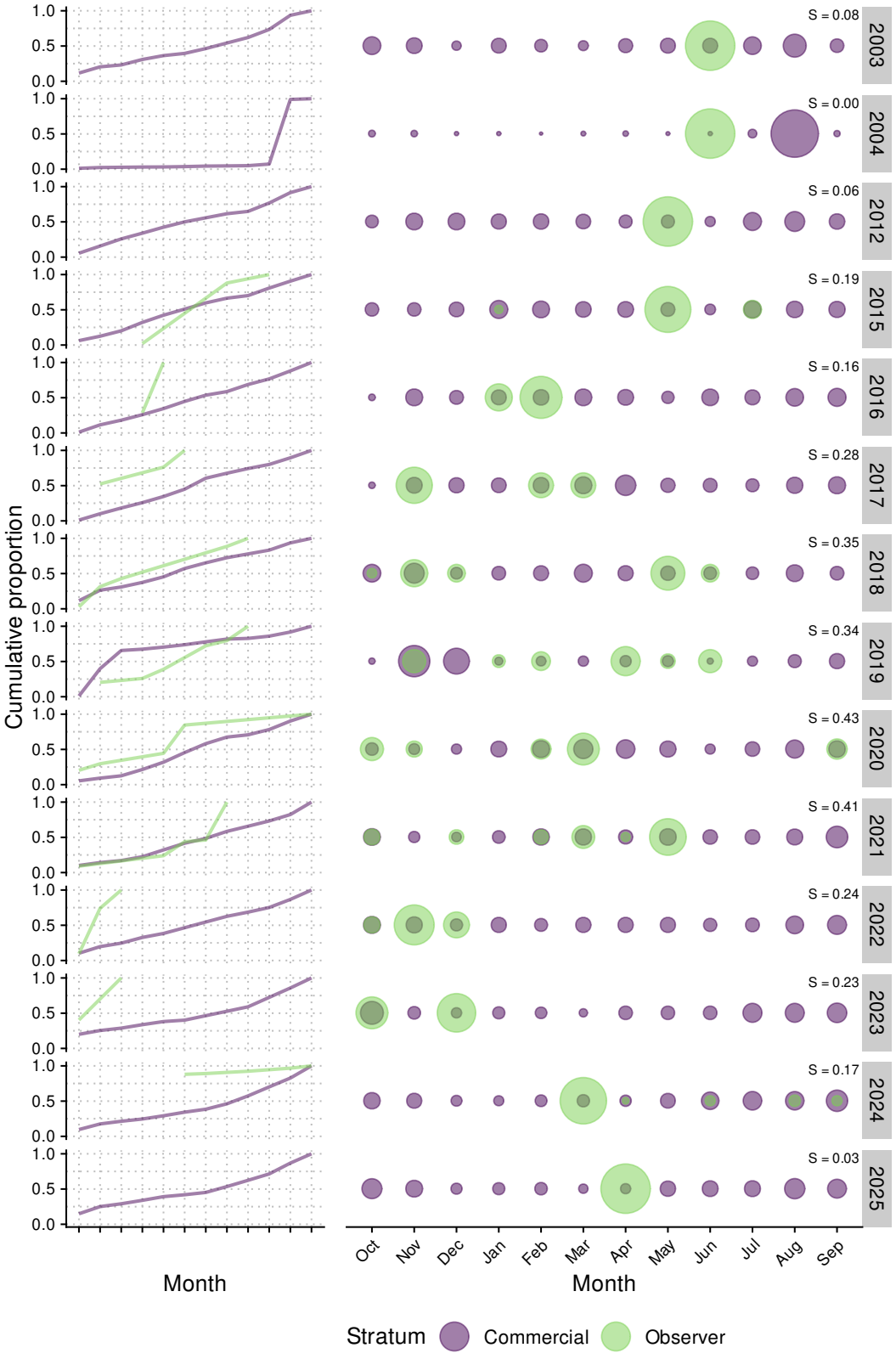


Figure 1079: Monthly representativeness of observer sampling coverage of Line fishing events in LIN 7WC, where the ling catch exceeded the 40kg threshold, in 2003 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.

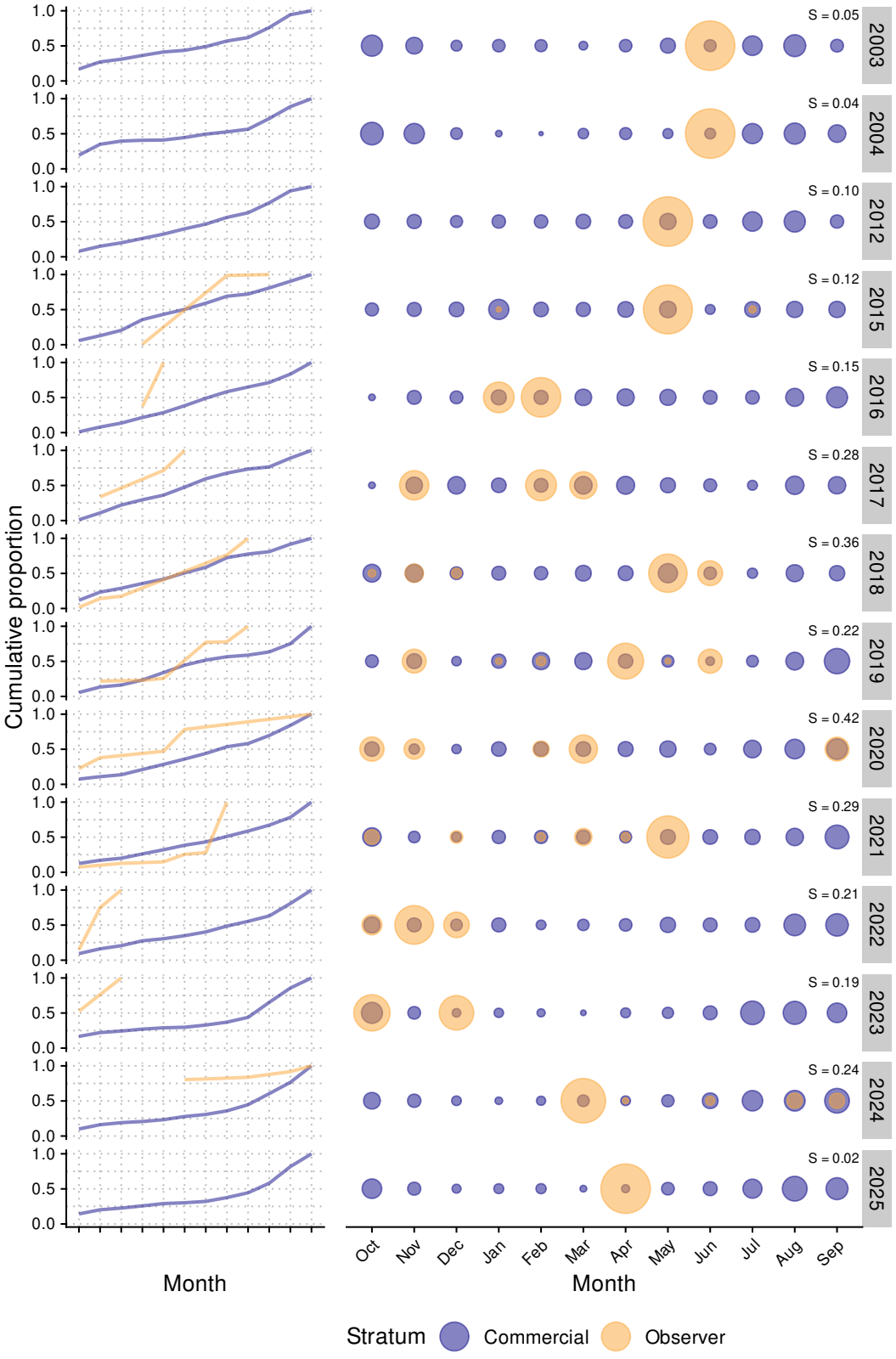


Figure 1080: **Monthly representativeness of observer sampling coverage of Line catch in LIN 7WC, from events where the ling catch exceeded the 40kg threshold, in 2003 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

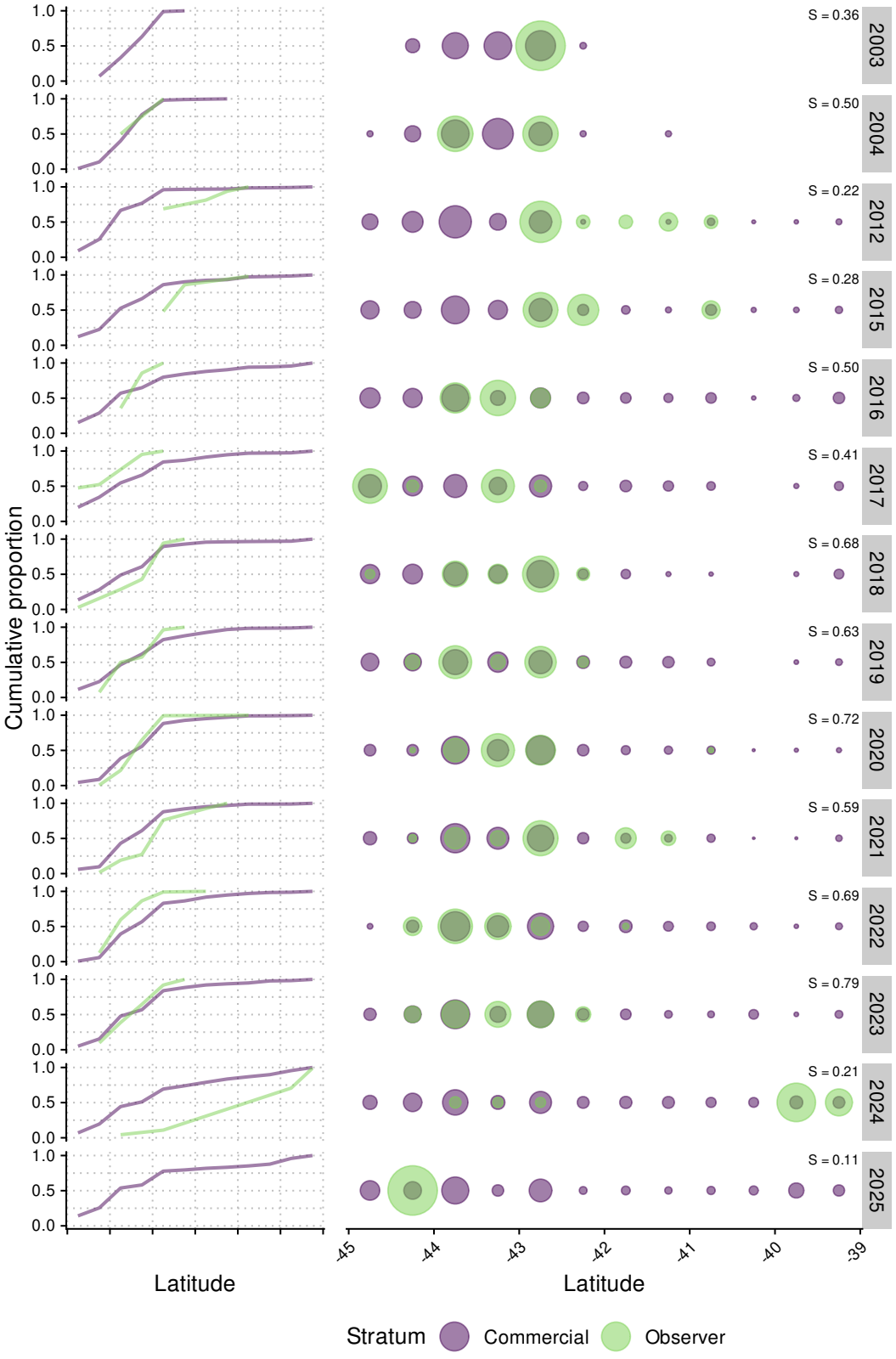


Figure 1081: **Latitudinal representativeness of observer sampling coverage of Line fishing events in LIN 7WC, where the ling catch exceeded the 40kg threshold, in 2003 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

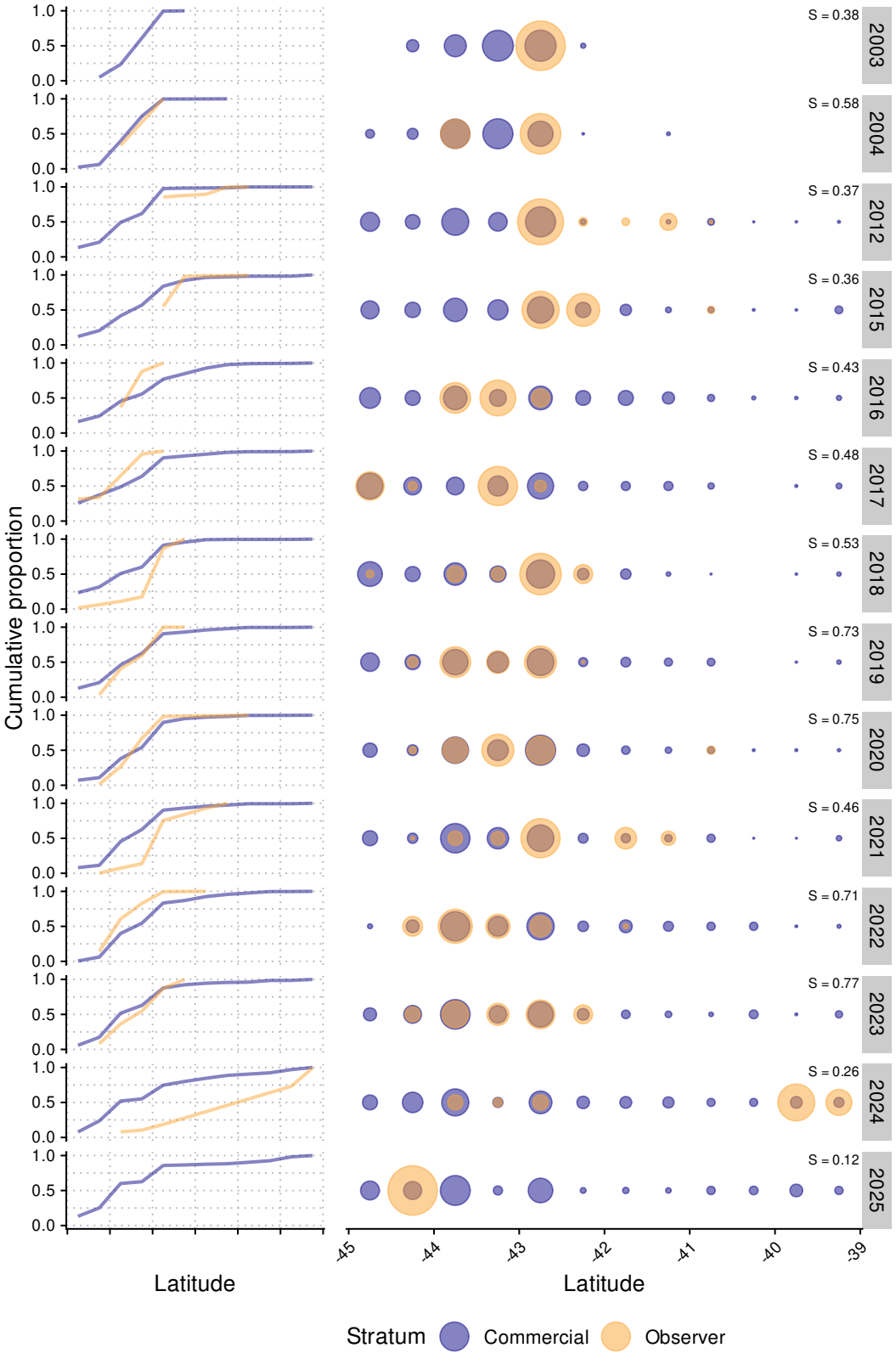


Figure 1082: Latitudinal representativeness of observer sampling coverage of Line catch in LIN 7WC, from events where the ling catch exceeded the 40kg threshold, in 2003 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

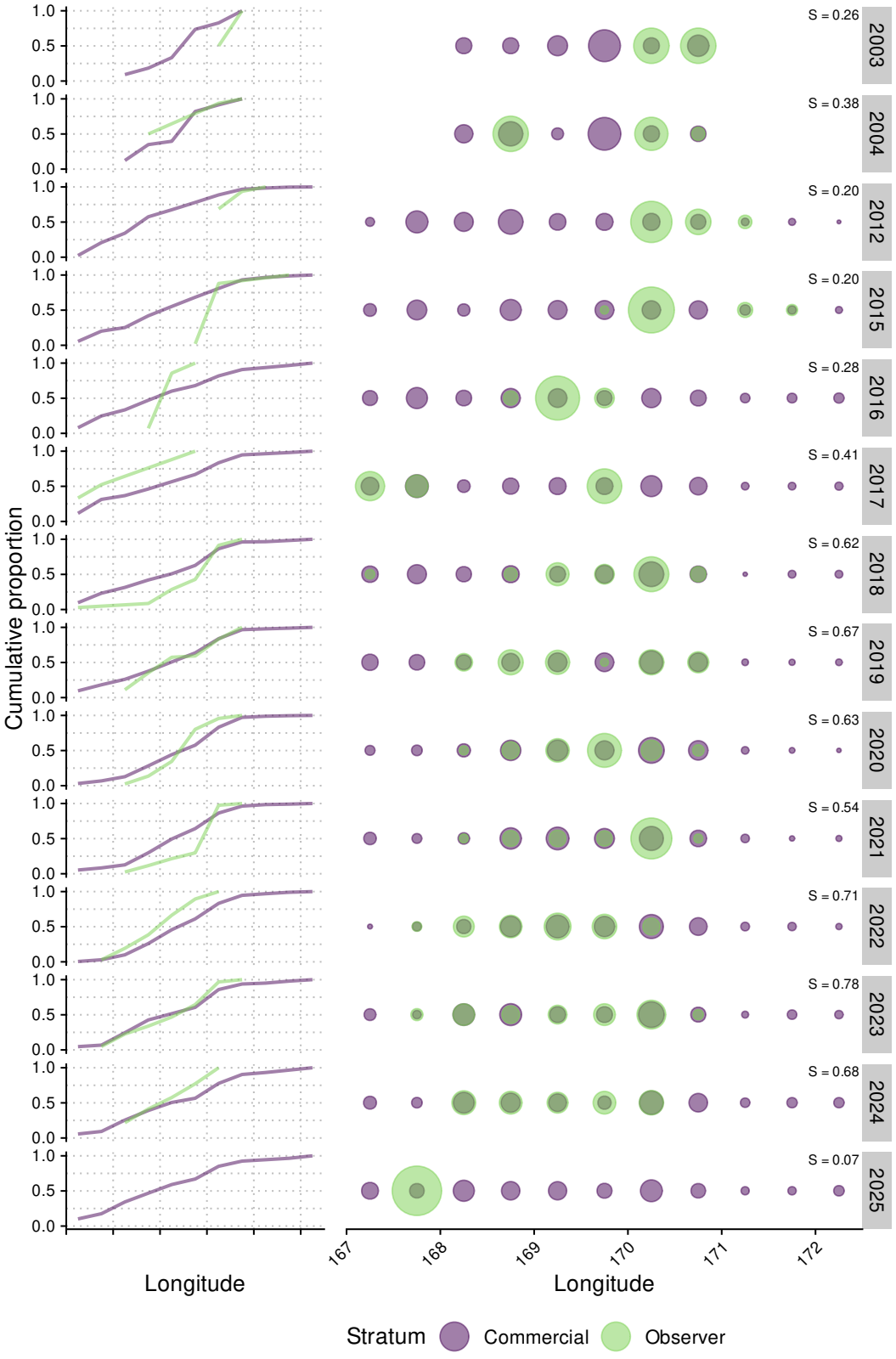


Figure 1083: **Longitudinal representativeness of observer sampling coverage of Line fishing events in LIN 7WC, where the ling catch exceeded the 40kg threshold, in 2003 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

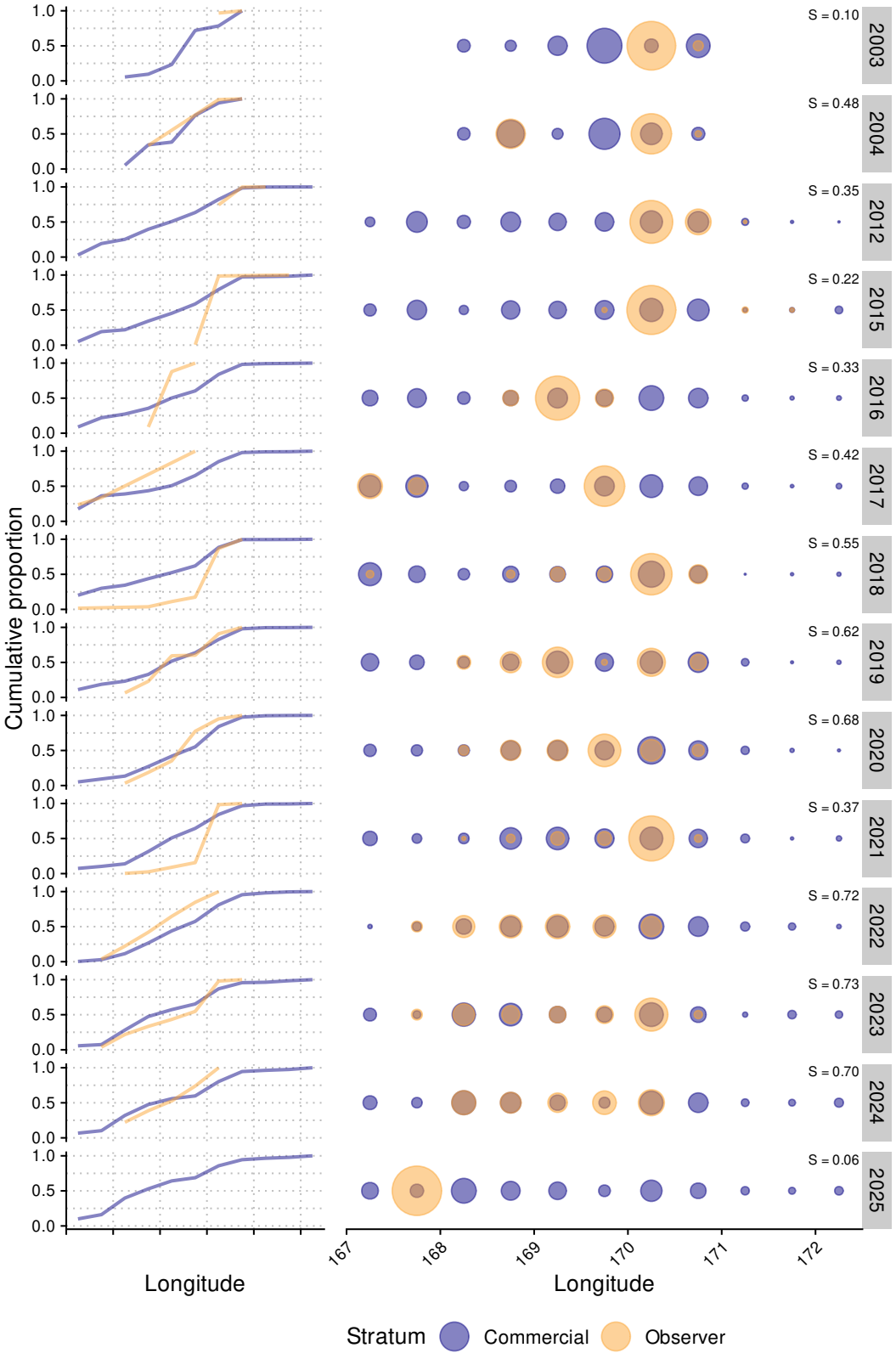


Figure 1084: Longitudinal representativeness of observer sampling coverage of Line catch in LIN 7WC, from events where the ling catch exceeded the 40kg threshold, in 2003 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.

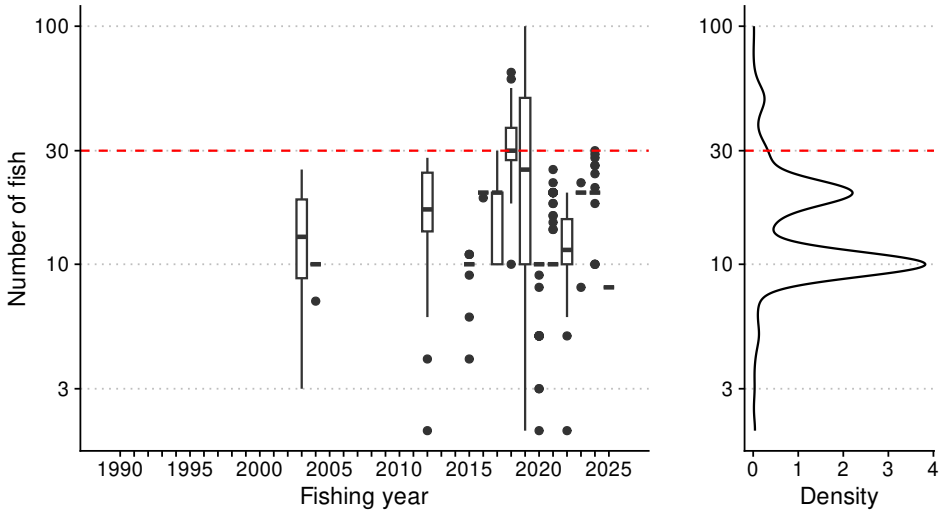


Figure 1085: **Length-frequency sample sizes for observed fishing events in LIN 7WC where ling were sampled. The red dashed line indicates a sample size of 30 fish.**

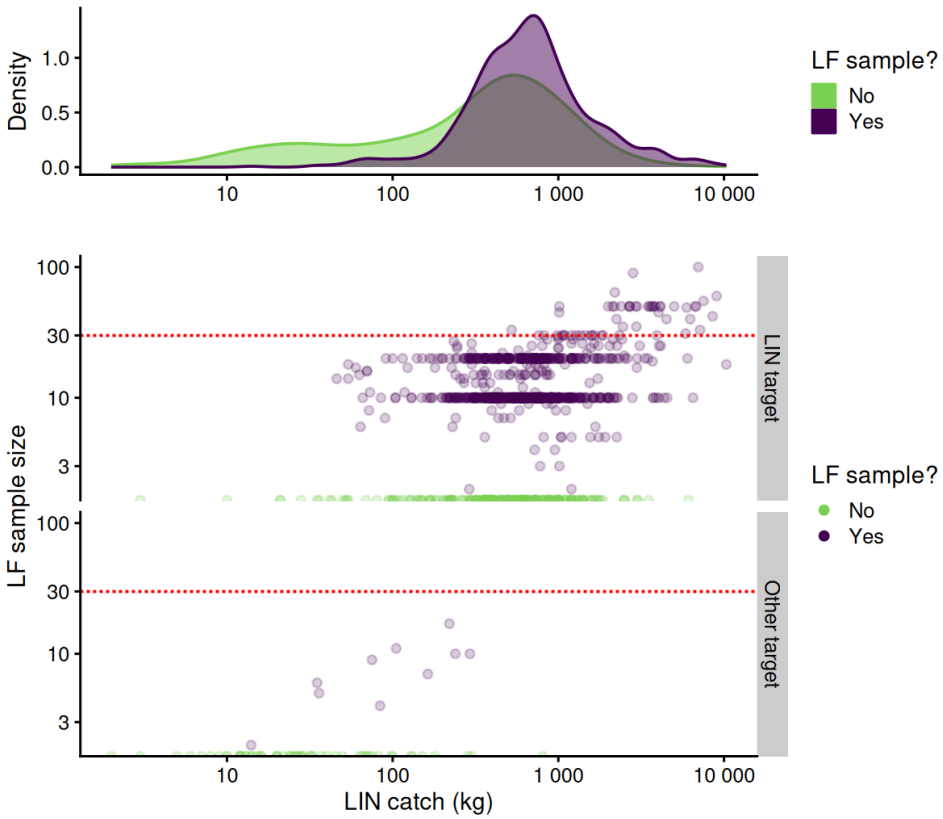


Figure 1086: **Length-frequency sample sizes (number of fish sampled) for observed fishing events in LIN 7WC in relation to the total ling catch from an event, separately for ling target events and other target species. The red dashed line indicates a sample size of 30 fish.**

2.13.16.2 Otolith samples

Table 94: Otolith samples of ling from the LIN 7WC Line fishery sampled by the Observer Programme in fishing years 1990 to 2025. Positive fishing events are those where the catch of ling exceeded a potential sampling threshold of 40 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
1990	18 877	0	0	0.00
1991	6 654	0	0	0.00
1992	19 159	0	0	0.00
1993	697	0	0	0.00
1994	4 414	0	0	0.00
1995	73 902	0	0	0.00
1996	167 324	0	0	0.00
1997	191 796	0	0	0.00
1998	164 276	0	0	0.00
1999	165 902	0	0	0.00
2000	77 393	0	0	0.00
2001	3 885	0	0	0.00
2002	12 633	0	0	0.00
2003	852	0	0	0.00
2004	8 309	0	0	0.00
2005	988	0	0	0.00
2006	715	0	0	0.00
2007	807	0	0	0.00
2008	870	0	0	0.00
2009	1 167	0	0	0.00
2010	487	0	0	0.00
2011	982	0	0	0.00
2012	848	0	0	0.00
2013	753	0	0	0.00
2014	923	0	0	0.00
2015	704	0	0	0.00
2016	845	0	0	0.00
2017	723	0	0	0.00
2018	633	0	0	0.00
2019	2 444	0	0	0.00
2020	2 064	0	0	0.00
2021	2 212	0	0	0.00
2022	2 417	0	0	0.00
2023	1 629	0	0	0.00
2024	1 914	10	63	0.52
2025	1 678	1	8	0.06

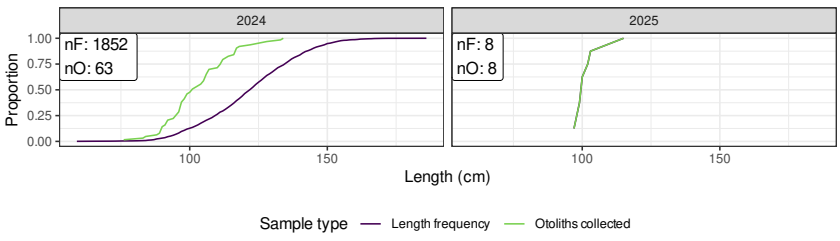


Figure 1087: Cumulative distributions of the length of fish in the length frequency and otolith samples of ling in the LIN 7WC Line fishery for the 2024 to 2025 fishing years. nF: number of fish in the length-frequency sample, nO: number of fish in the otolith sample.

2.13.16.3 Catch quantification

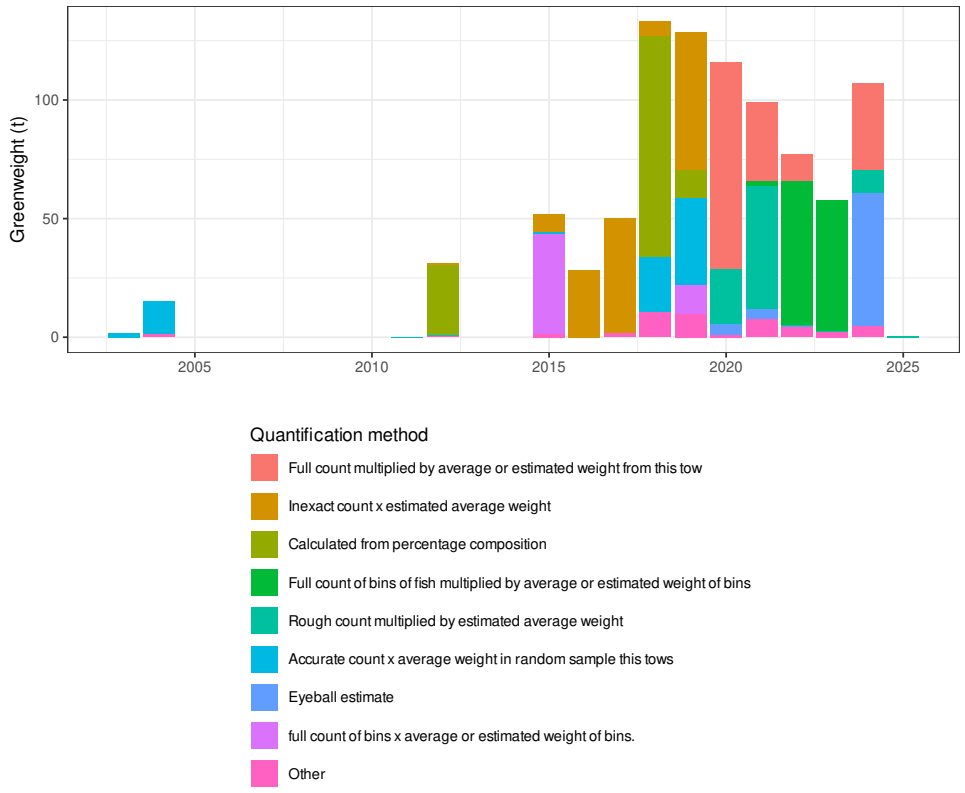


Figure 1088: Methods used by observers to quantify the catch of ling in the LIN 7WC Line fishery. The legend lists the methods used in descending order of total catch.

2.13.17 LIN 7WC: Pot fishery

2.13.17.1 Length-frequency samples

Table 95: Length-frequency samples of ling from the LIN 7WC Pot fishery sampled by the Observer Programme in fishing years 2001 to 2025. Positive fishing events are those where the catch of ling exceeded a potential sampling threshold of 40 kg.

Fishing year	Positive fishing events	Sampled events	Number of fish	Percent events sampled
2001	10	0	0	0.00
2010	9	0	0	0.00
2015	30	0	0	0.00
2016	811	0	0	0.00
2017	89	0	0	0.00
2018	900	0	0	0.00
2019	6	0	0	0.00
2021	144	0	0	0.00
2022	277	0	0	0.00
2023	662	0	0	0.00
2024	1 049	0	0	0.00
2025	801	37	1 200	4.62

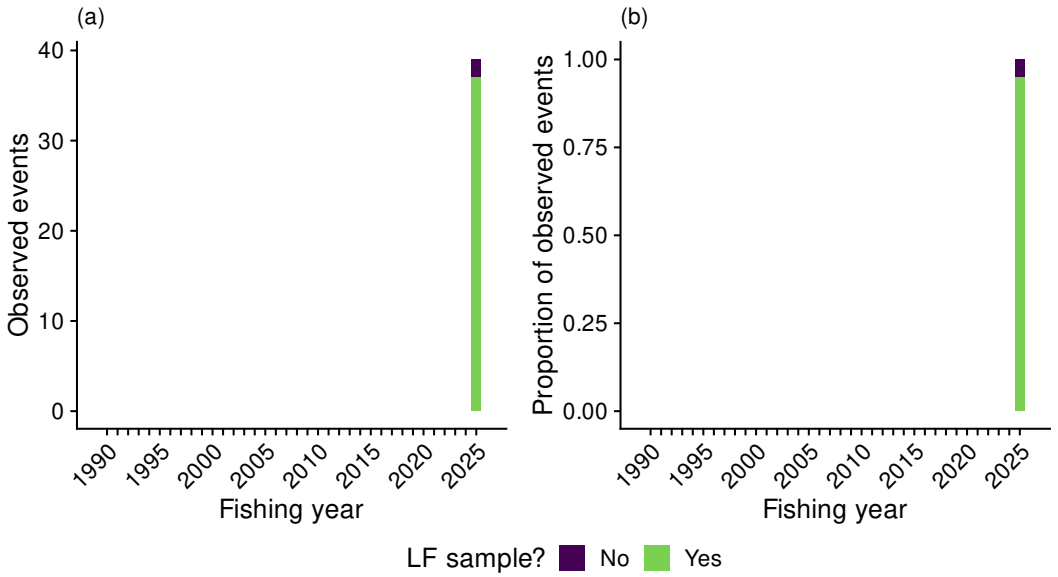


Figure 1089: (a) Observed Pot fishing events, and (b) proportion of observed events, in LIN 7WC where the ling catch exceeded the 40 kg threshold, with and without length-frequency sampling.

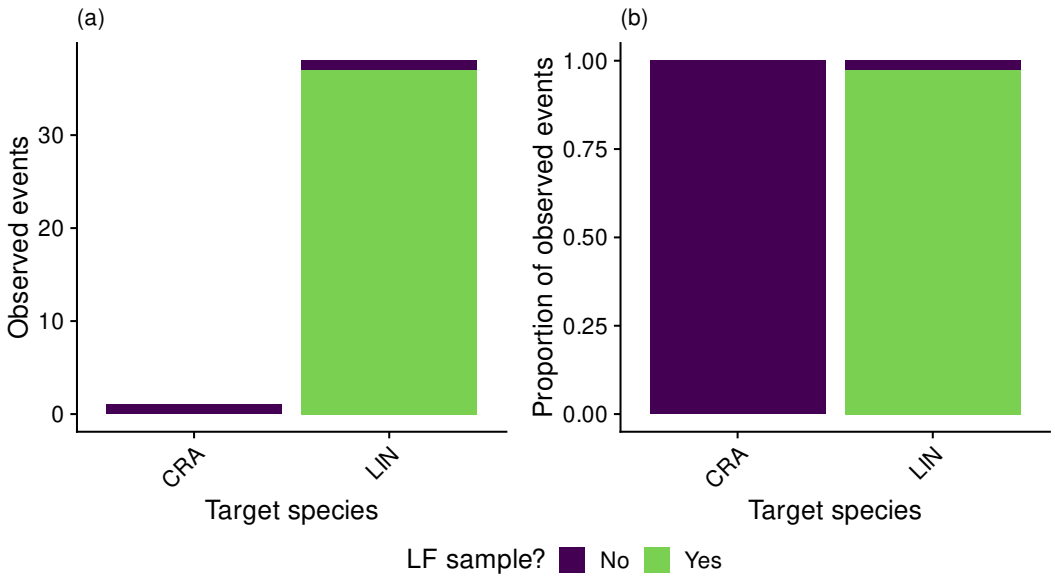


Figure 1090: **(a) Observed Pot fishing events, and (b) proportion of observed events, in LIN 7WC where the ling catch exceeded the 40 kg threshold, with and without length-frequency sampling, by observer assessed target species.**

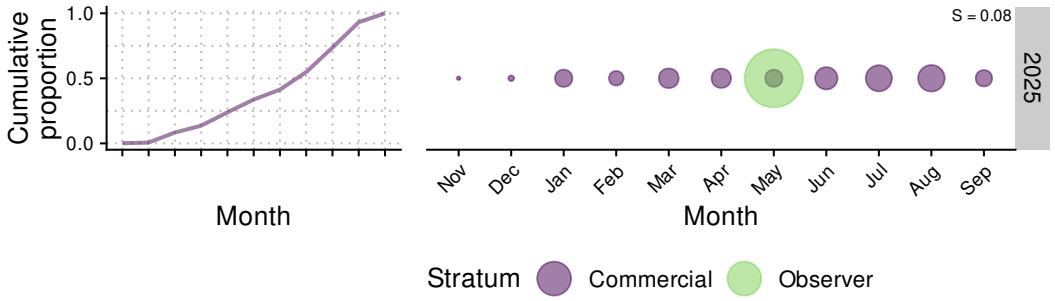


Figure 1091: **Monthly representativeness of observer sampling coverage of Pot fishing events in LIN 7WC, where the ling catch exceeded the 40kg threshold, in 2025 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

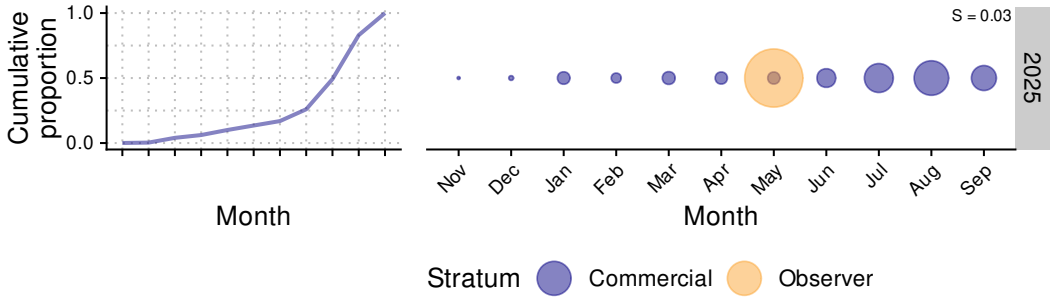


Figure 1092: **Monthly representativeness of observer sampling coverage of Pot catch in LIN 7WC, from events where the ling catch exceeded the 40kg threshold, in 2025 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a month, with proportions summing to one within each fishing year. S: Manhattan block distance.**

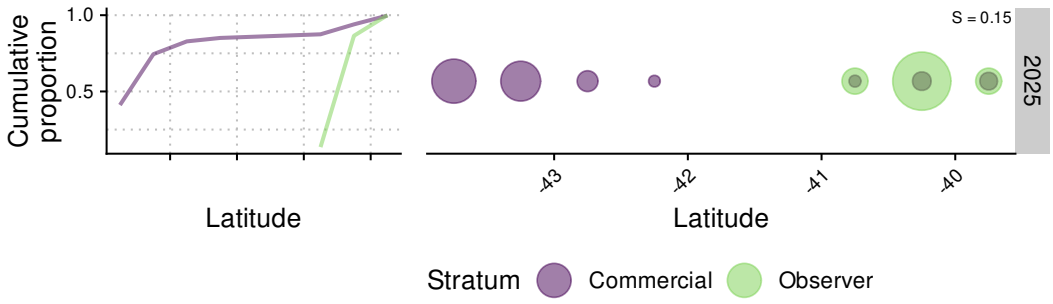


Figure 1093: **Latitudinal representativeness of observer sampling coverage of Pot fishing events in LIN 7WC, where the ling catch exceeded the 40kg threshold, in 2025 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

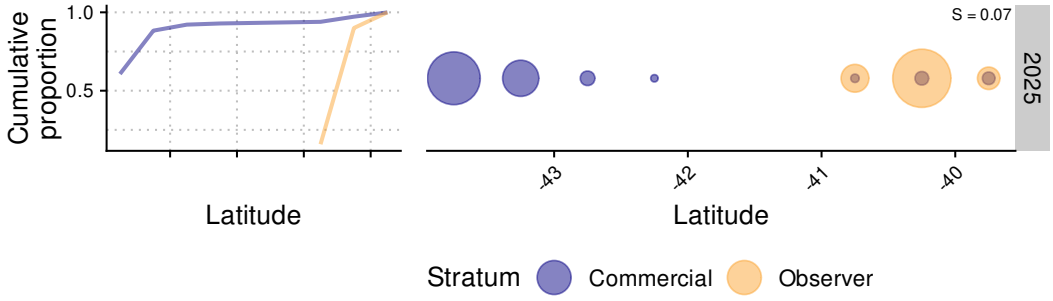


Figure 1094: **Latitudinal representativeness of observer sampling coverage of Pot catch in LIN 7WC, from events where the ling catch exceeded the 40kg threshold, in 2025 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a latitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

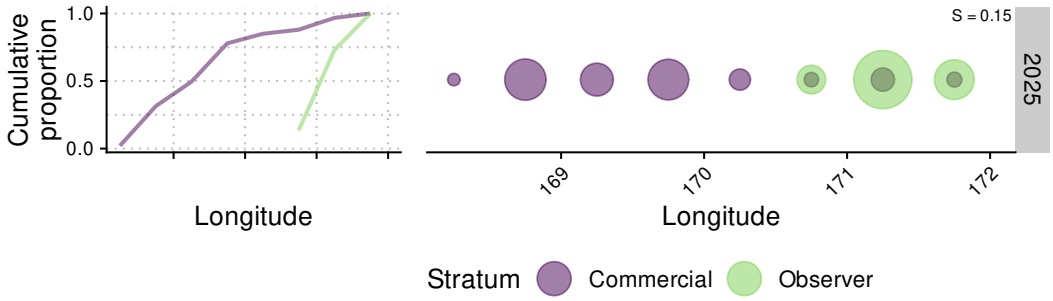


Figure 1095: **Longitudinal representativeness of observer sampling coverage of Pot fishing events in LIN 7WC, where the ling catch exceeded the 40kg threshold, in 2025 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of events in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

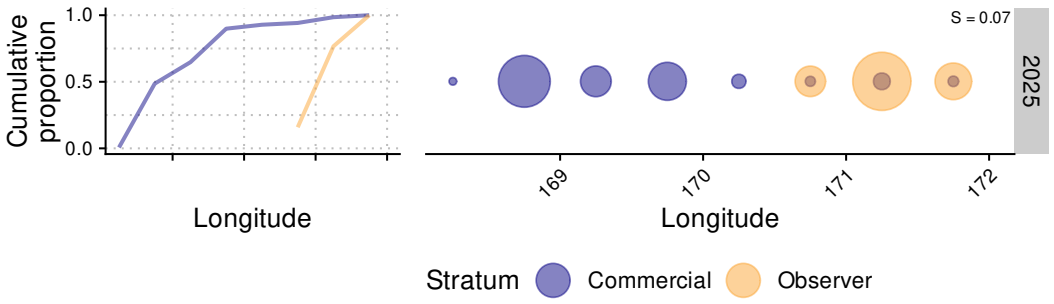


Figure 1096: **Longitudinal representativeness of observer sampling coverage of Pot catch in LIN 7WC, from events where the ling catch exceeded the 40kg threshold, in 2025 to 2025. Observer data are for observed events with length sampling. Circle area is proportional to the proportion of catch in a longitude bin, with proportions summing to one within each fishing year. S: Manhattan block distance.**

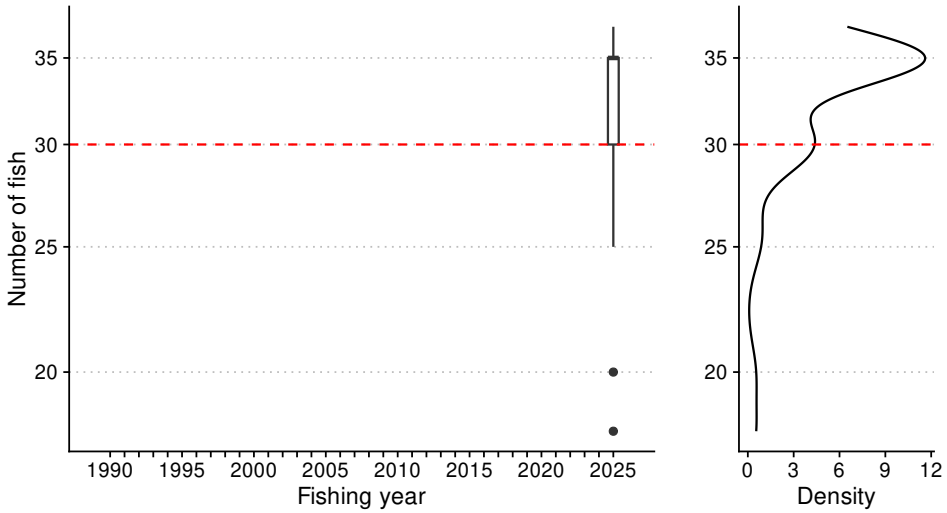


Figure 1097: **Length-frequency sample sizes for observed fishing events in LIN 7WC where ling were sampled. The red dashed line indicates a sample size of 30 fish.**

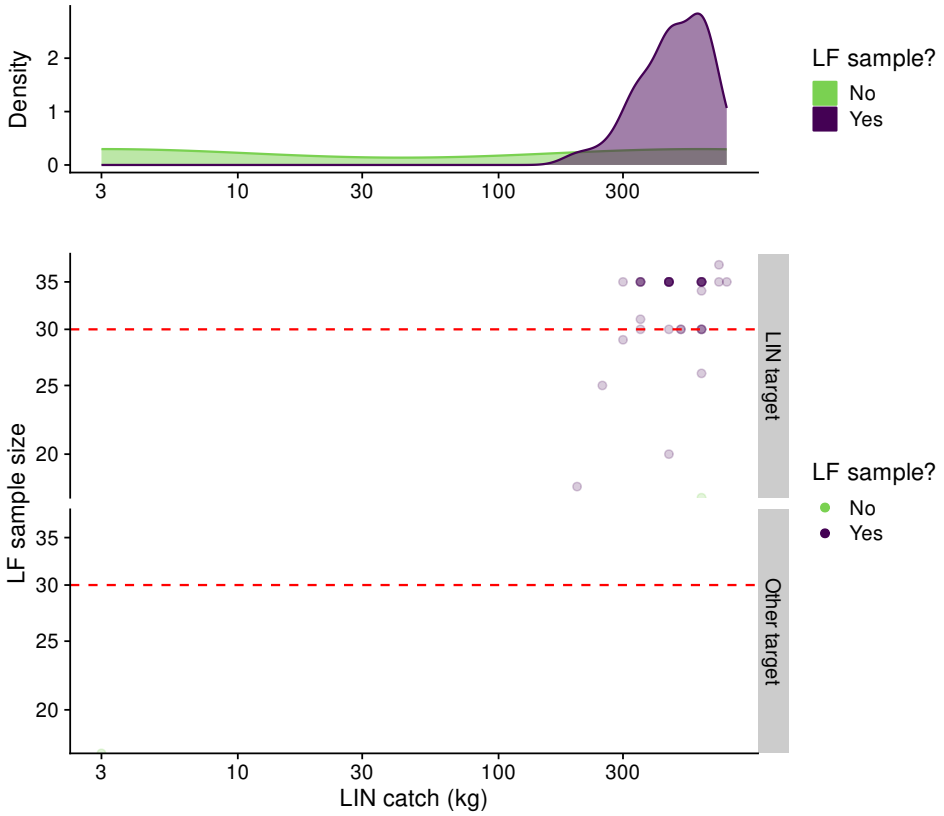


Figure 1098: Length-frequency sample sizes (number of fish sampled) for observed fishing events in LIN 7WC in relation to the total ling catch from an event, separately for ling target events and other target species. The red dashed line indicates a sample size of 30 fish.

2.13.17.2 Catch quantification

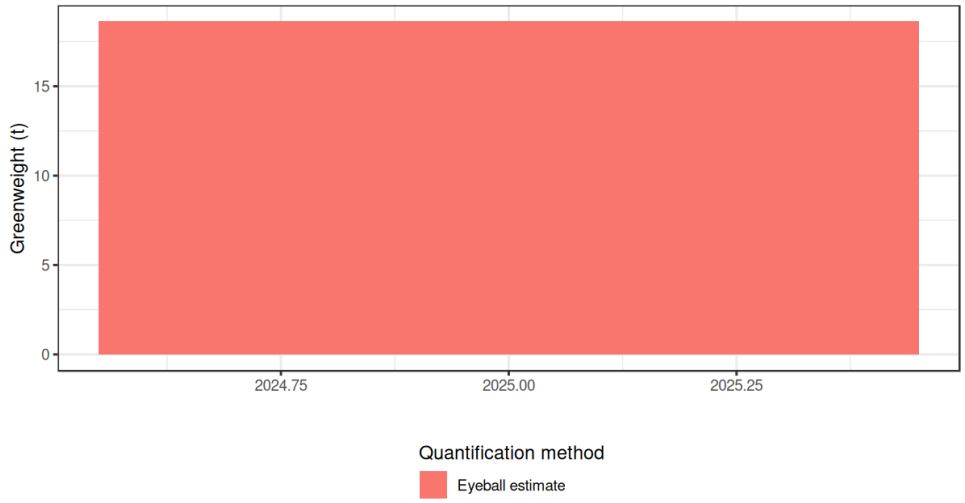


Figure 1099: Methods used by observers to quantify the catch of ling in the LIN 7WC Pot fishery. The legend lists the methods used in descending order of total catch.

3. ACKNOWLEDGEMENTS

This work was funded by Fisheries New Zealand, under project OBS2025-01.

4. REFERENCES

Middleton, D.A.J. (2026). Observer sampling of deepwater fisheries: reporting methods. *New Zealand Fisheries Assessment Report 2026/41*. 60 p.