

Fig. 24. Sentinel survey CPUE by Division, gear, location and date.

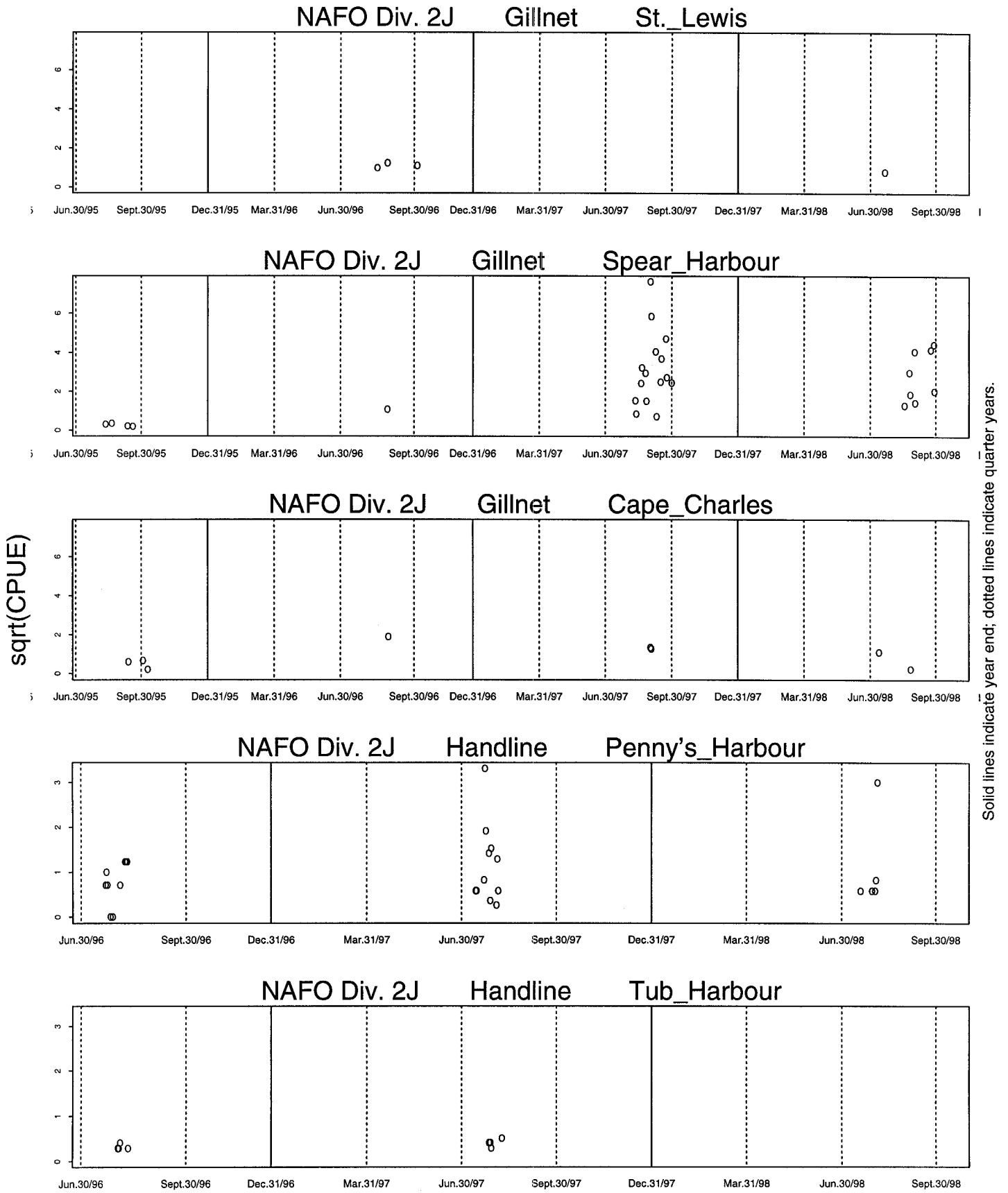


Fig 24 (cont'd). Sentinel survey CPUE by Division, gear, location and date.

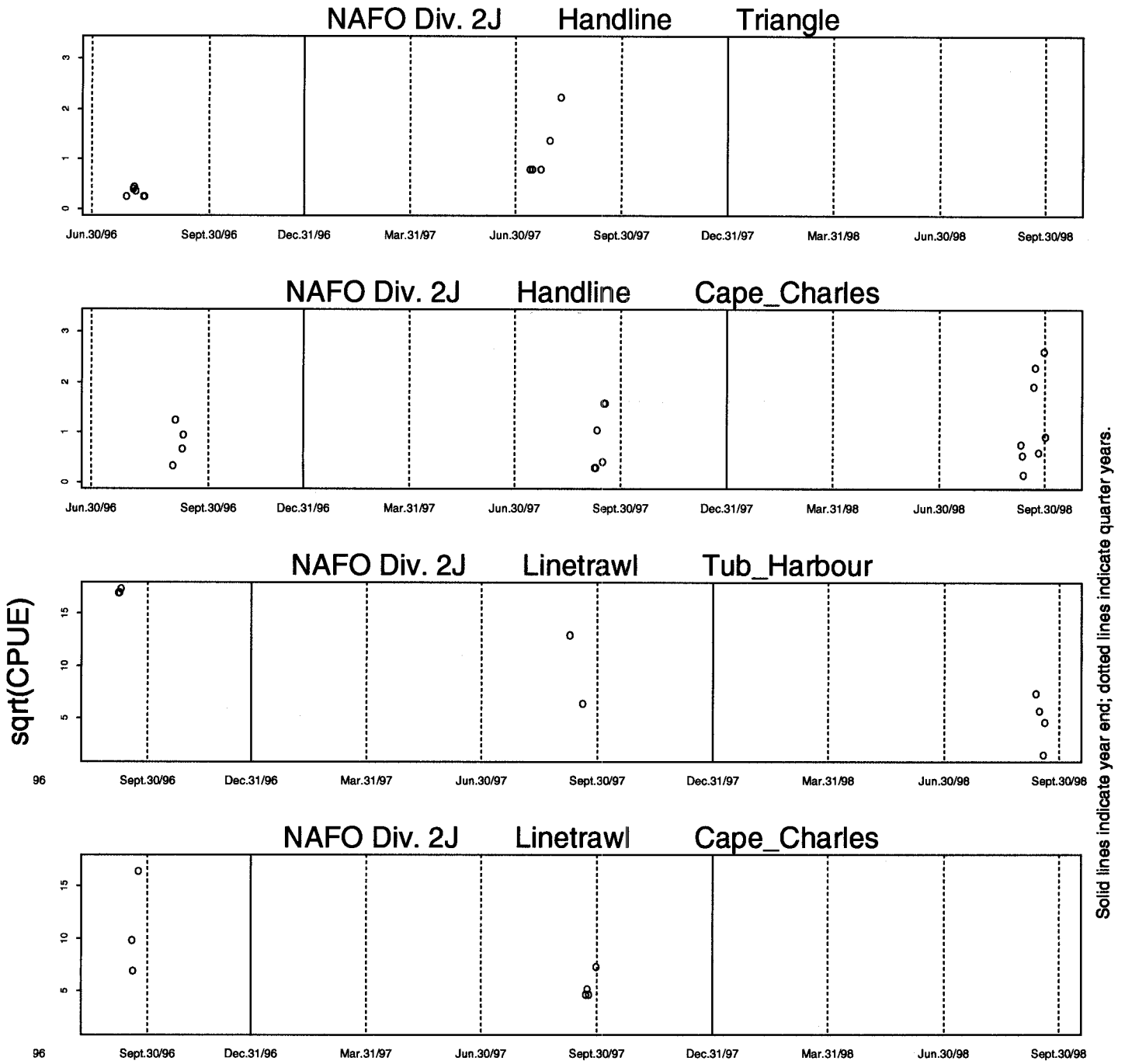
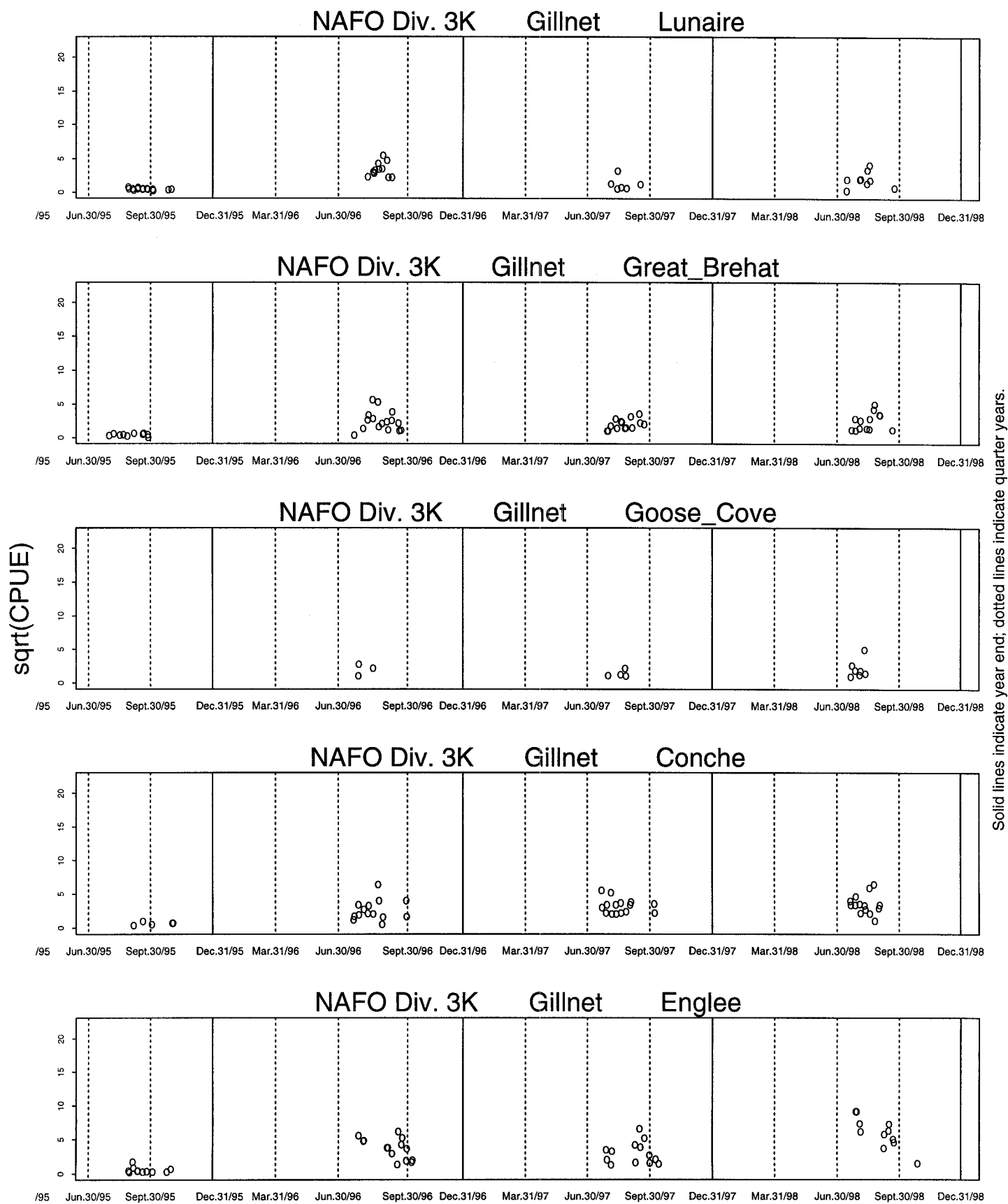
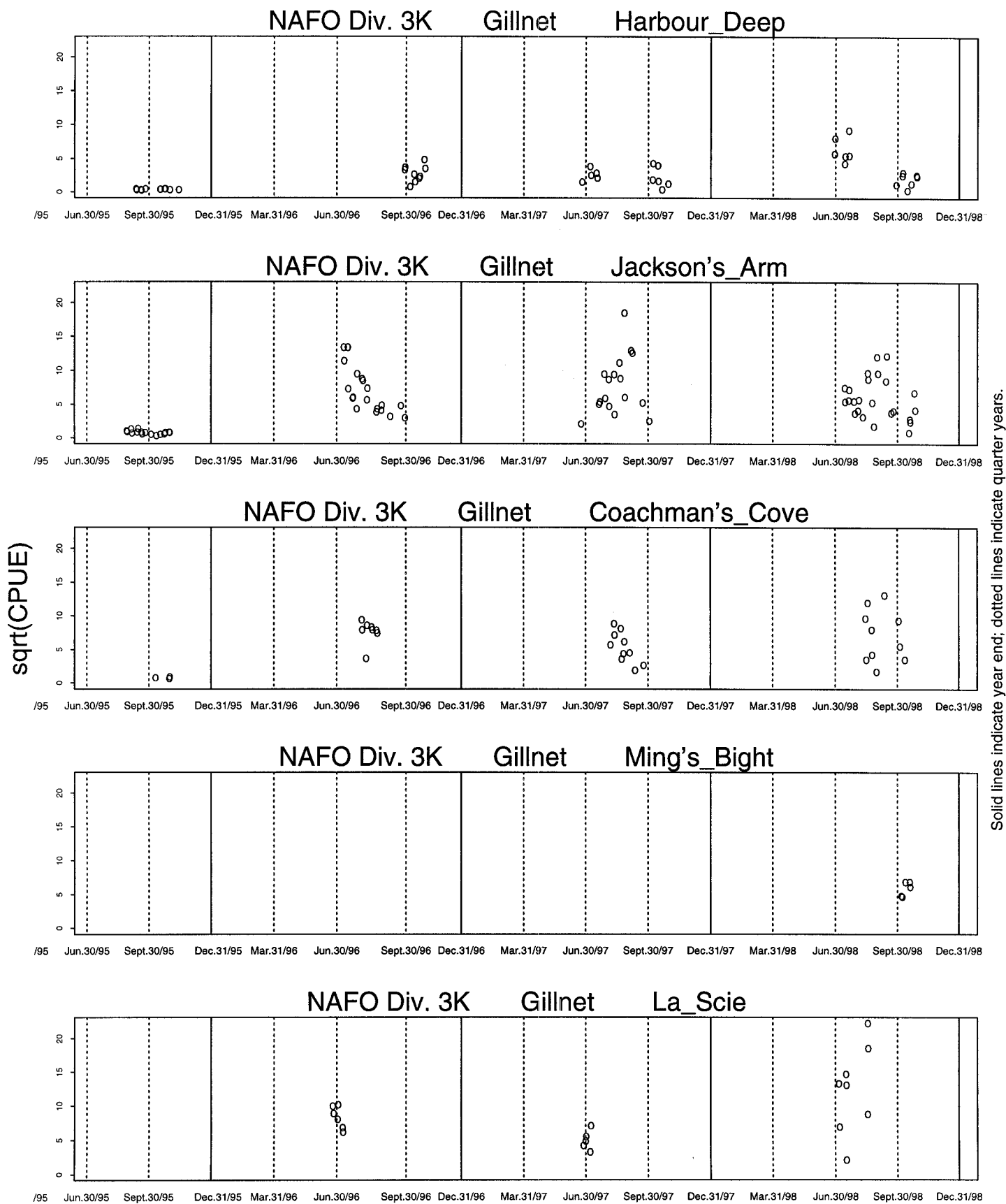


Fig 24 (cont'd). Sentinel survey CPUE by Division, gear, location and date.



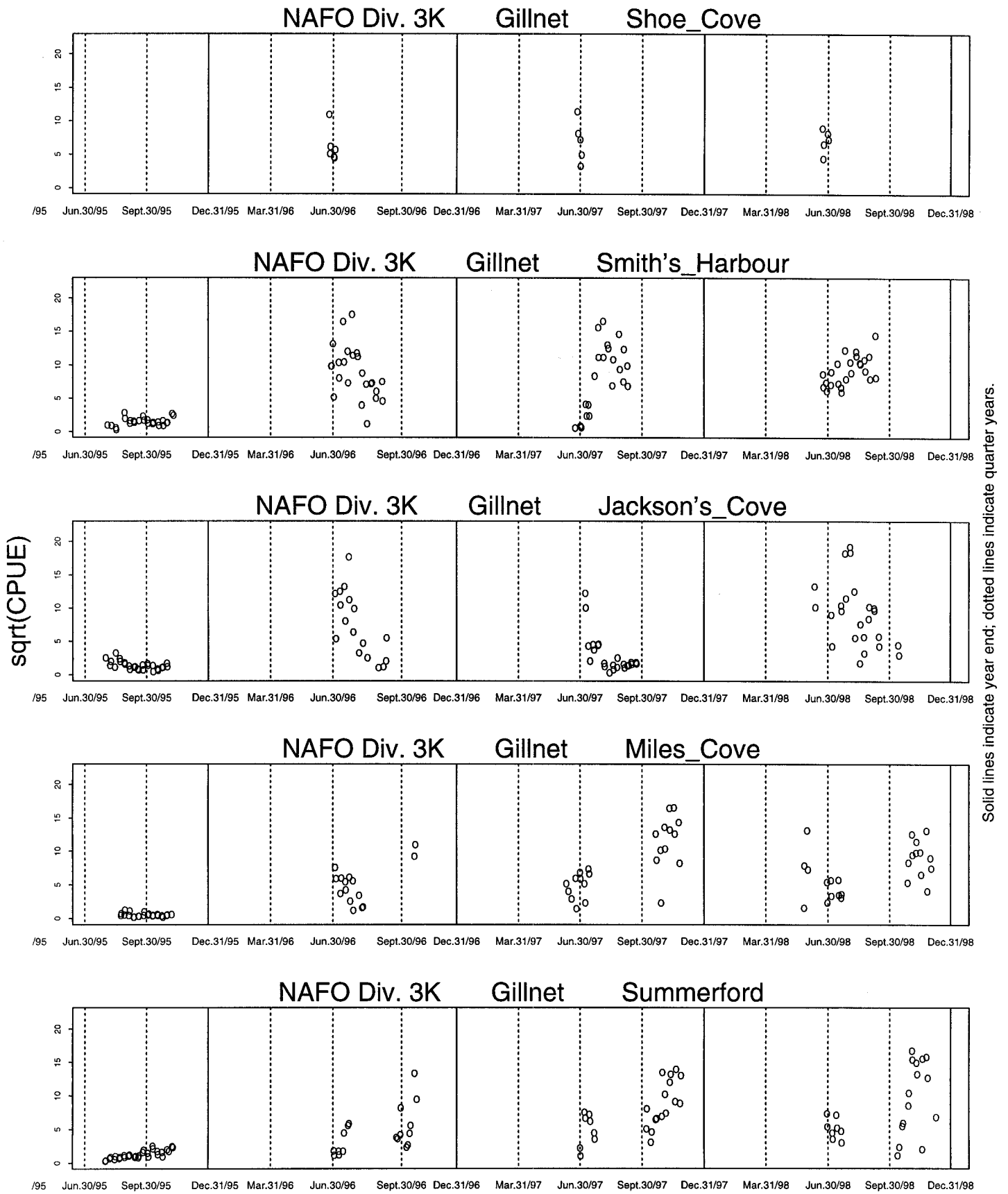
Solid lines indicate year end; dotted lines indicate quarter years.

Fig 24 (cont'd). Sentinel survey CPUE by Division, gear, location and date.



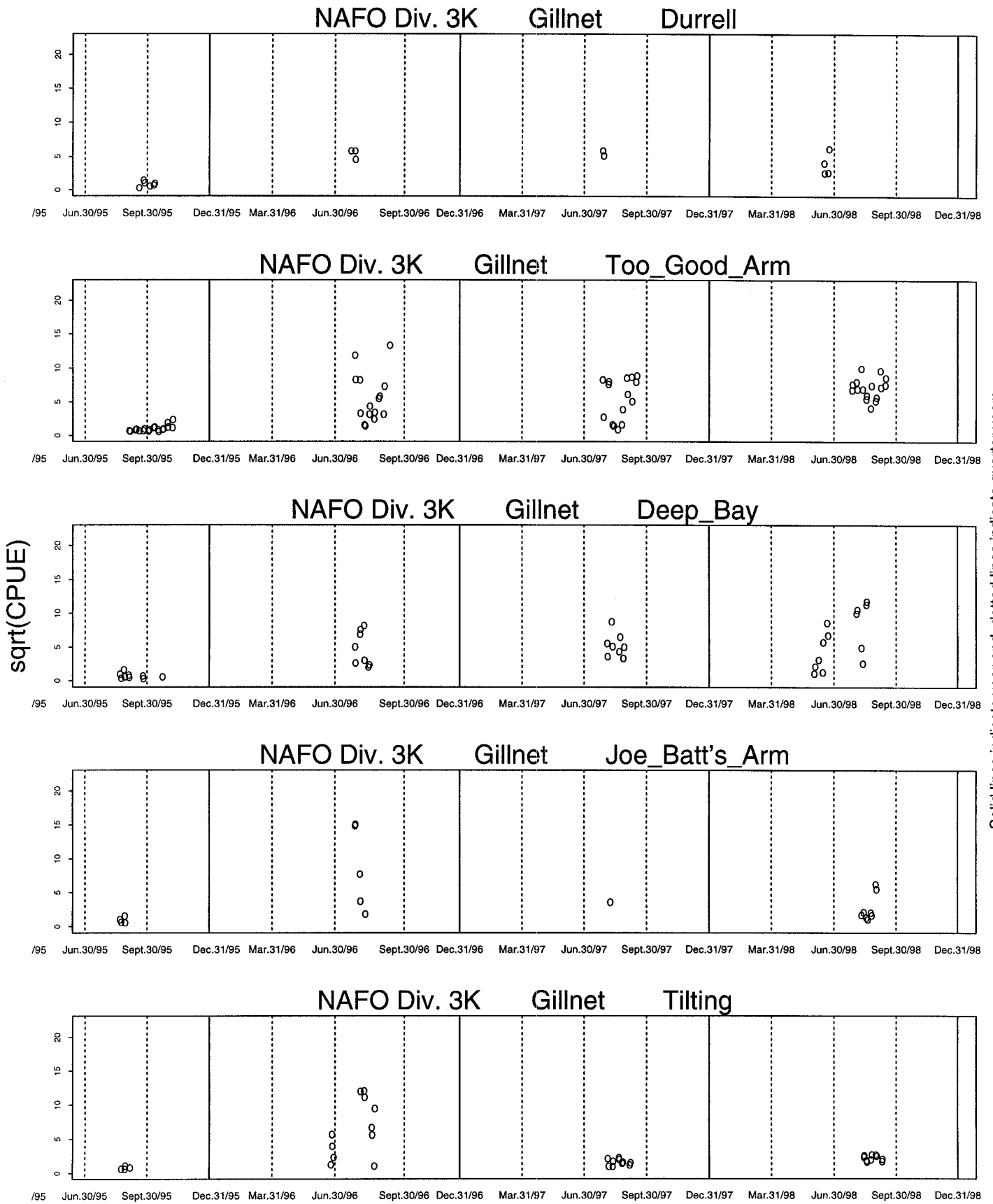
Solid lines indicate year end; dotted lines indicate quarter years.

Fig 24 (cont'd). Sentinel survey CPUE by Division, gear, location and date.



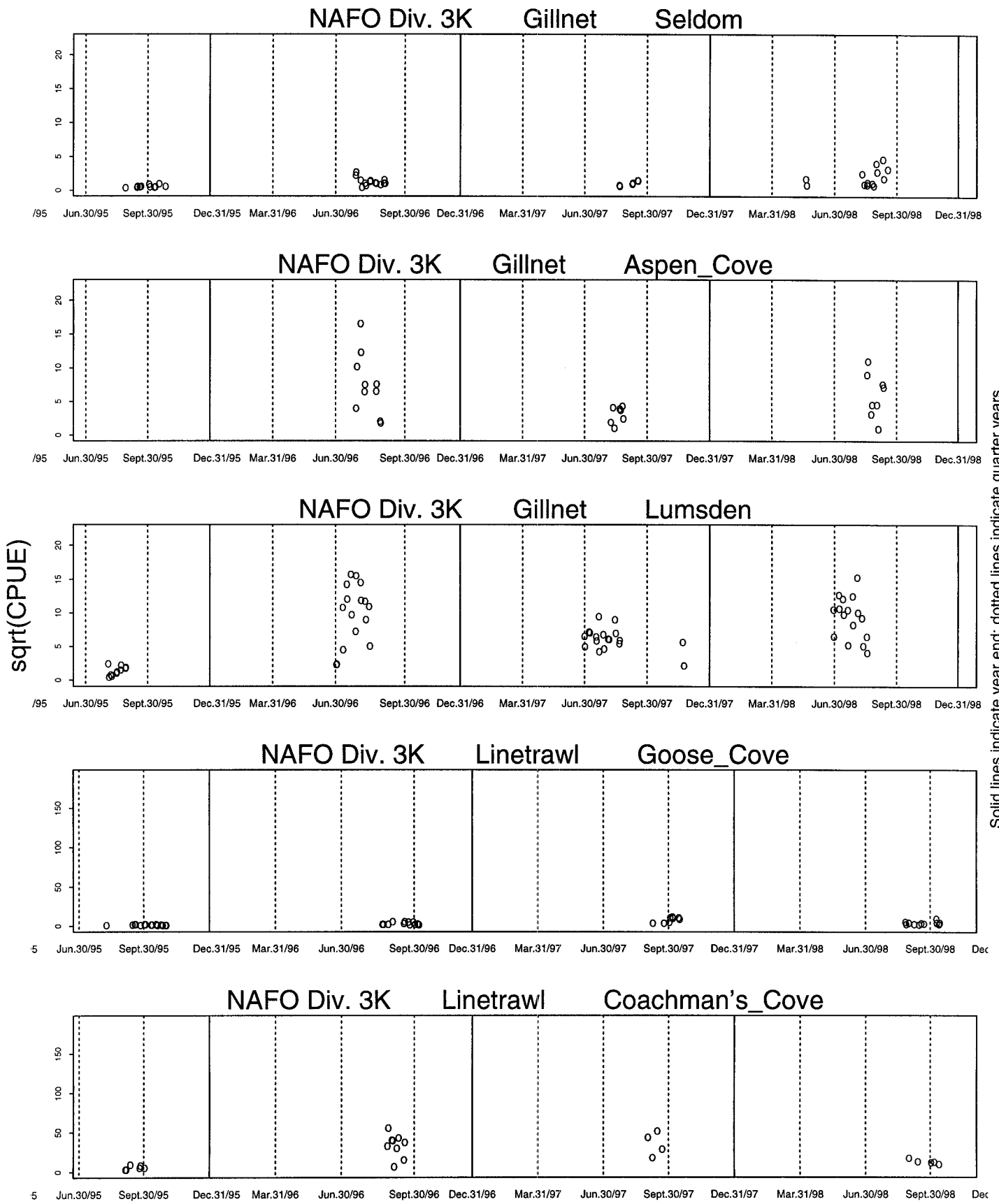
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Fig 24 (cont'd). Sentinel survey CPUE by Division, gear, location and date.



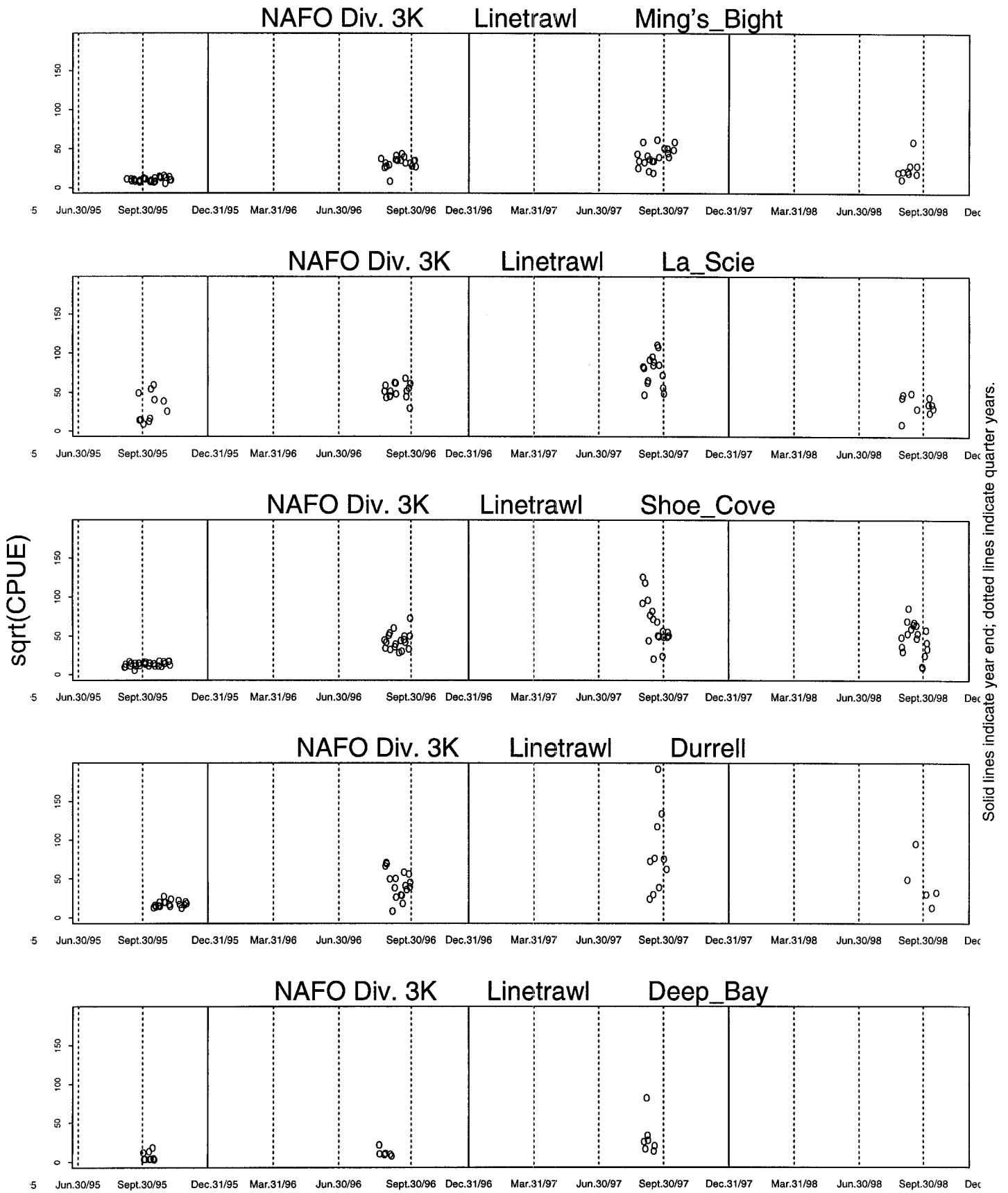
Solid lines indicate year end; dotted lines indicate quarter years.

Fig 24 (cont'd). Sentinel survey CPUE by Division, gear, location and date.



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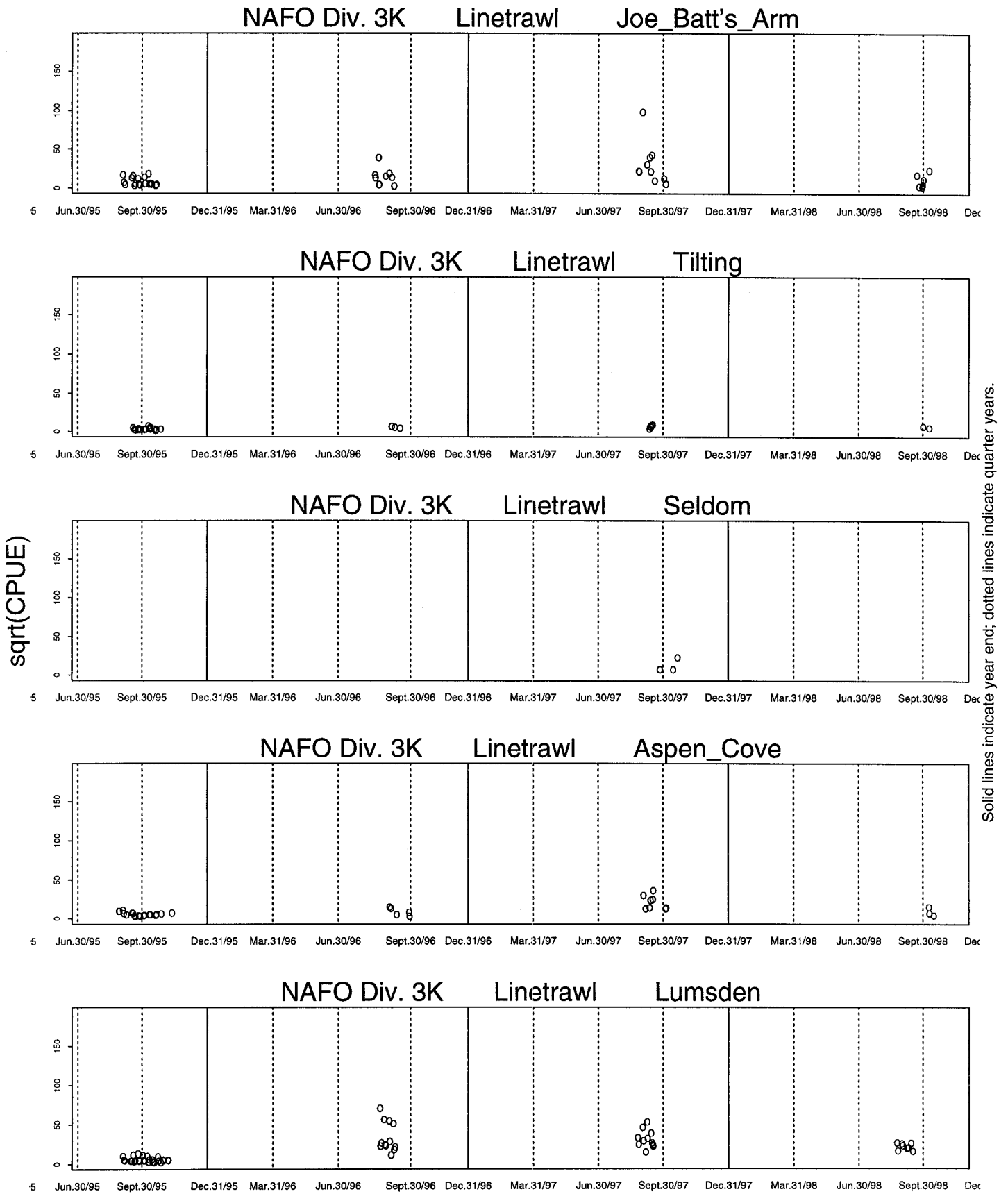
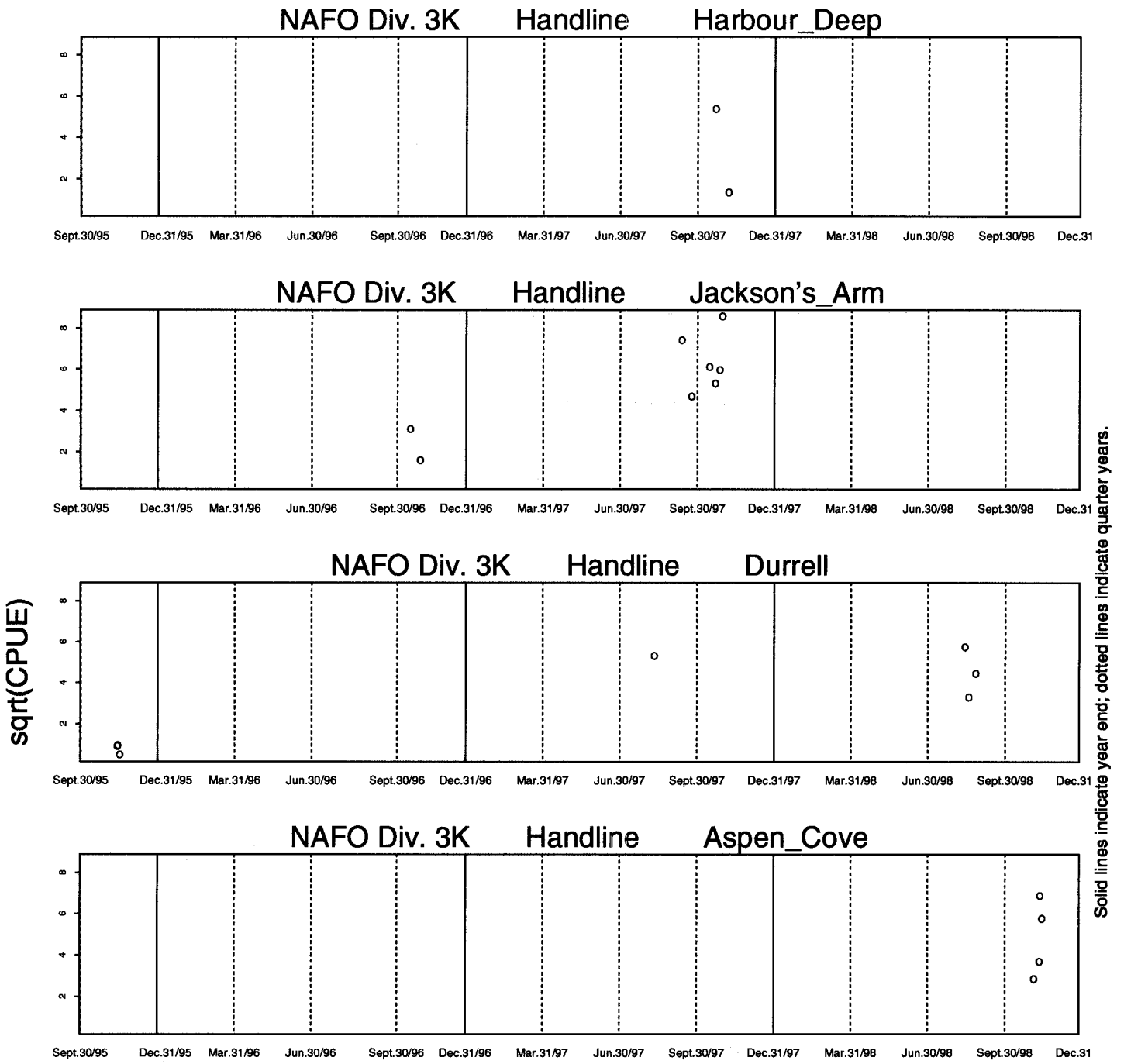
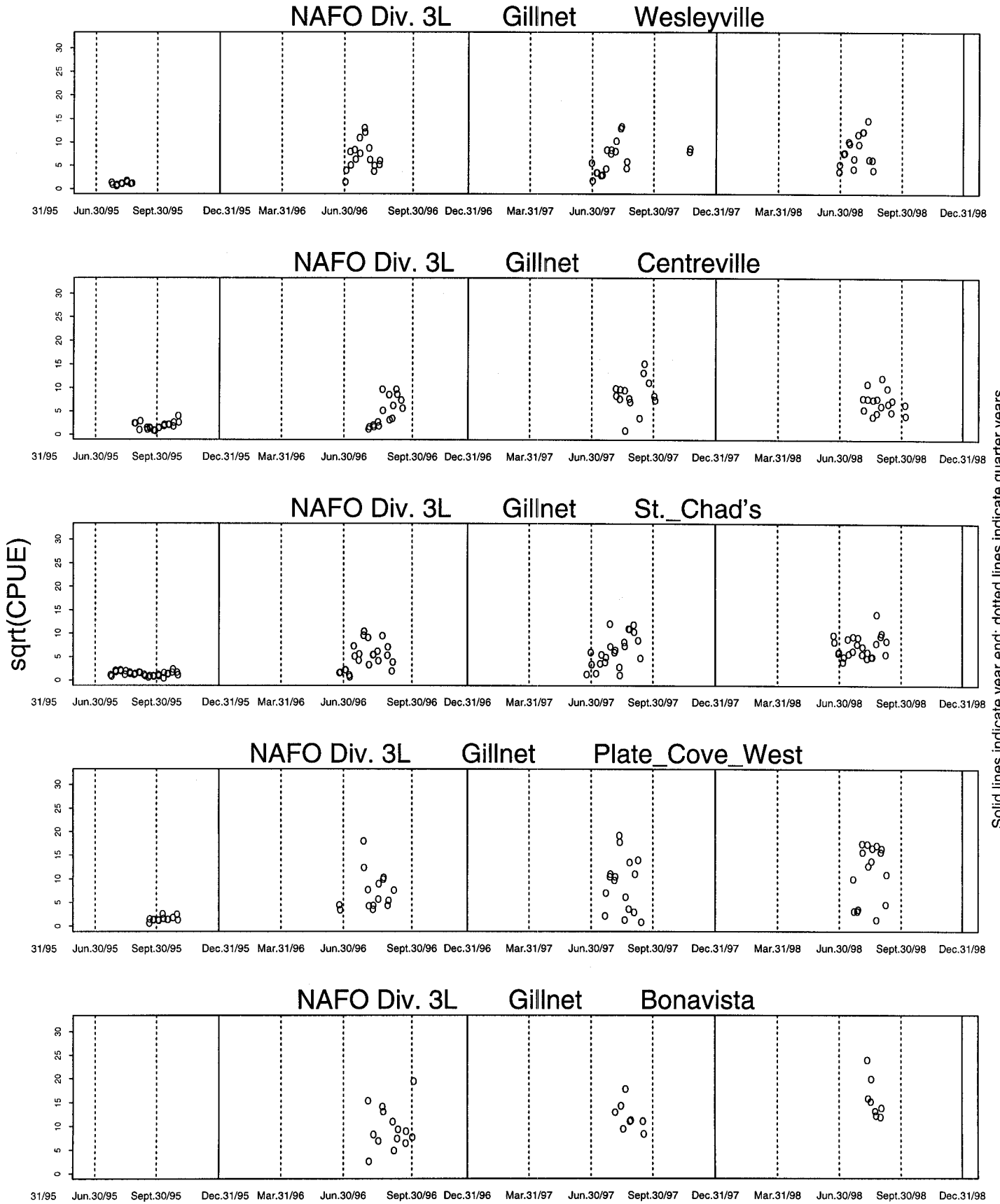


Fig 24 (cont'd). Sentinel survey CPUE by Division, gear, location and date.



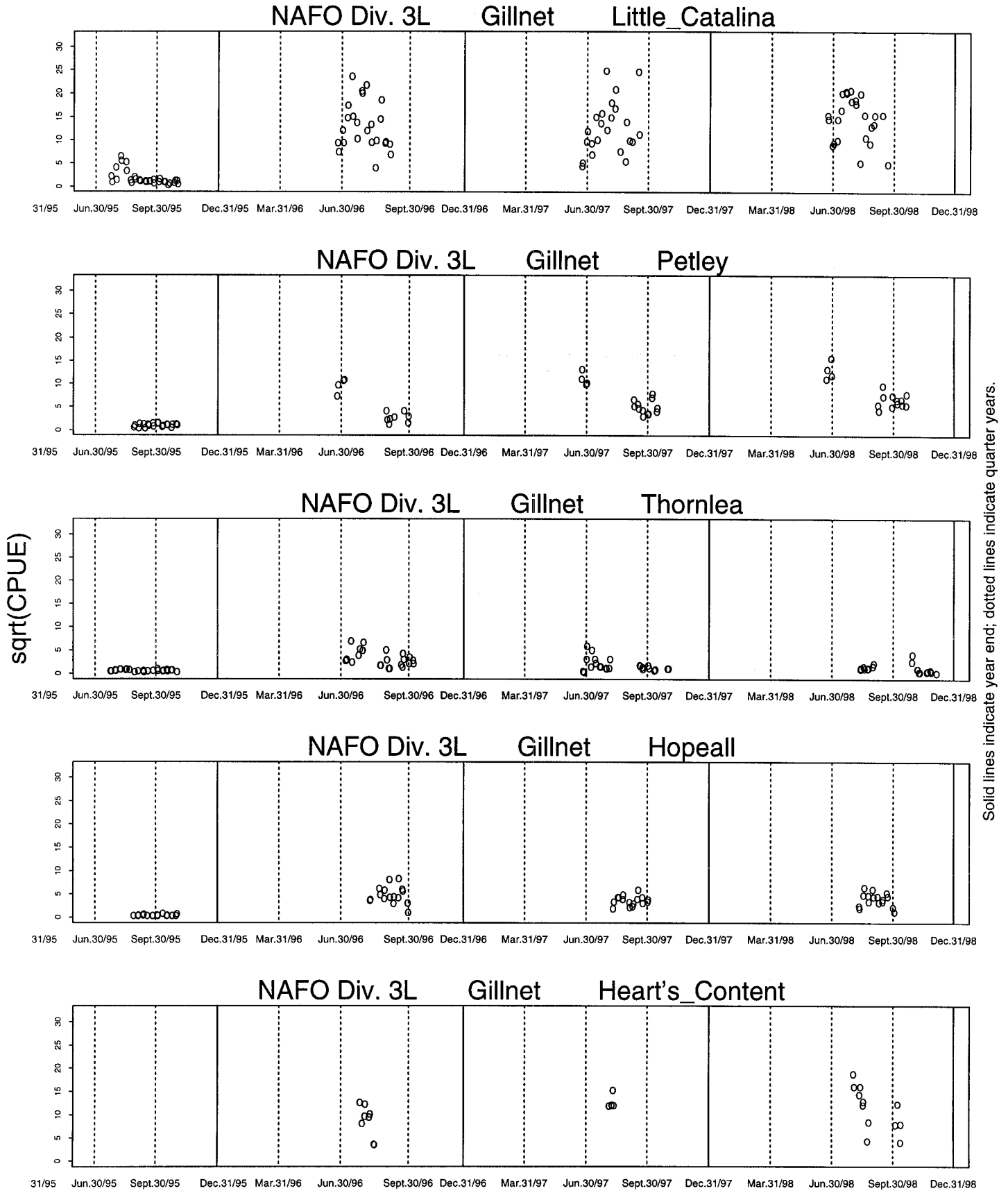
Solid lines indicate year end; dotted lines indicate quarter years.

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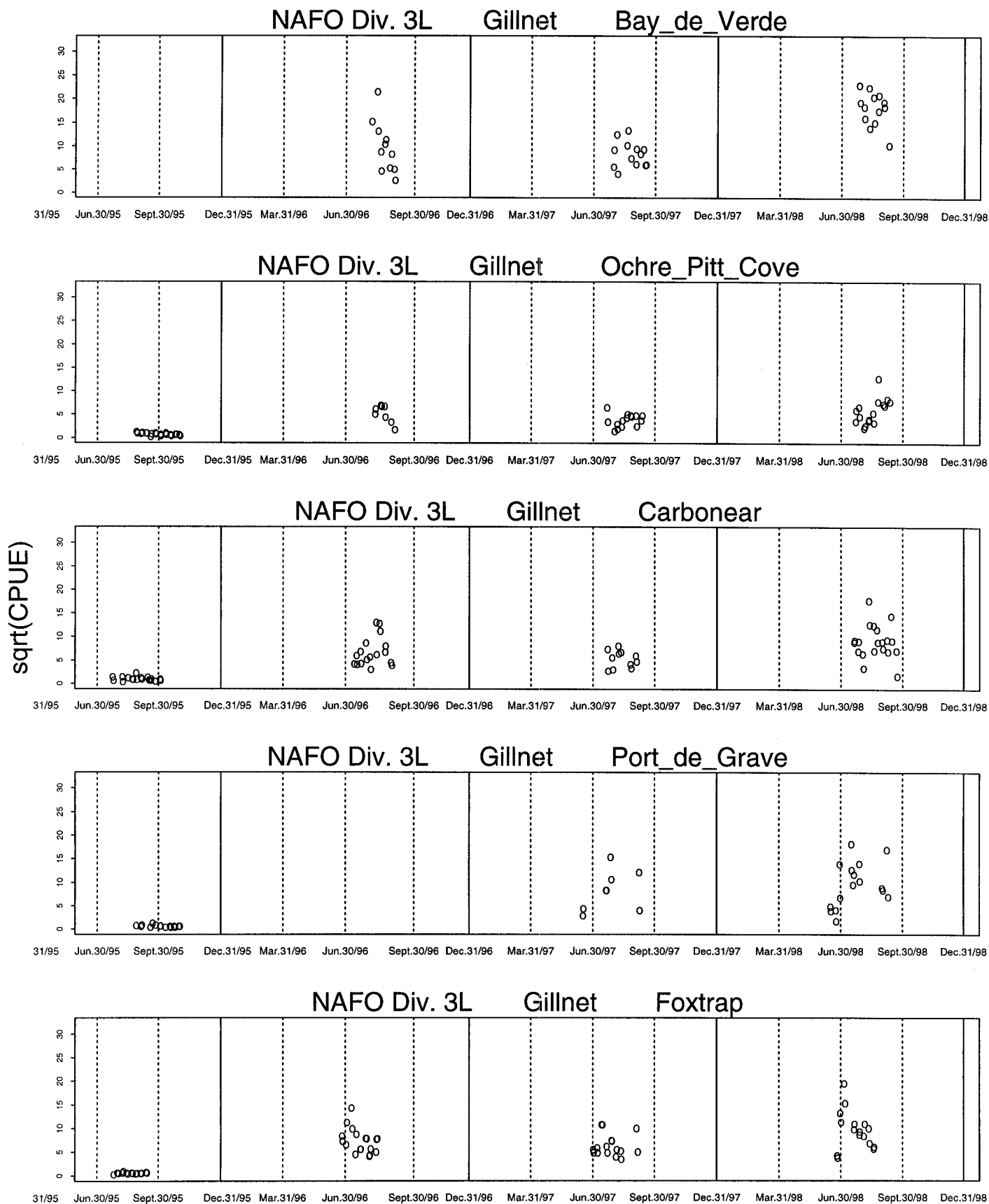
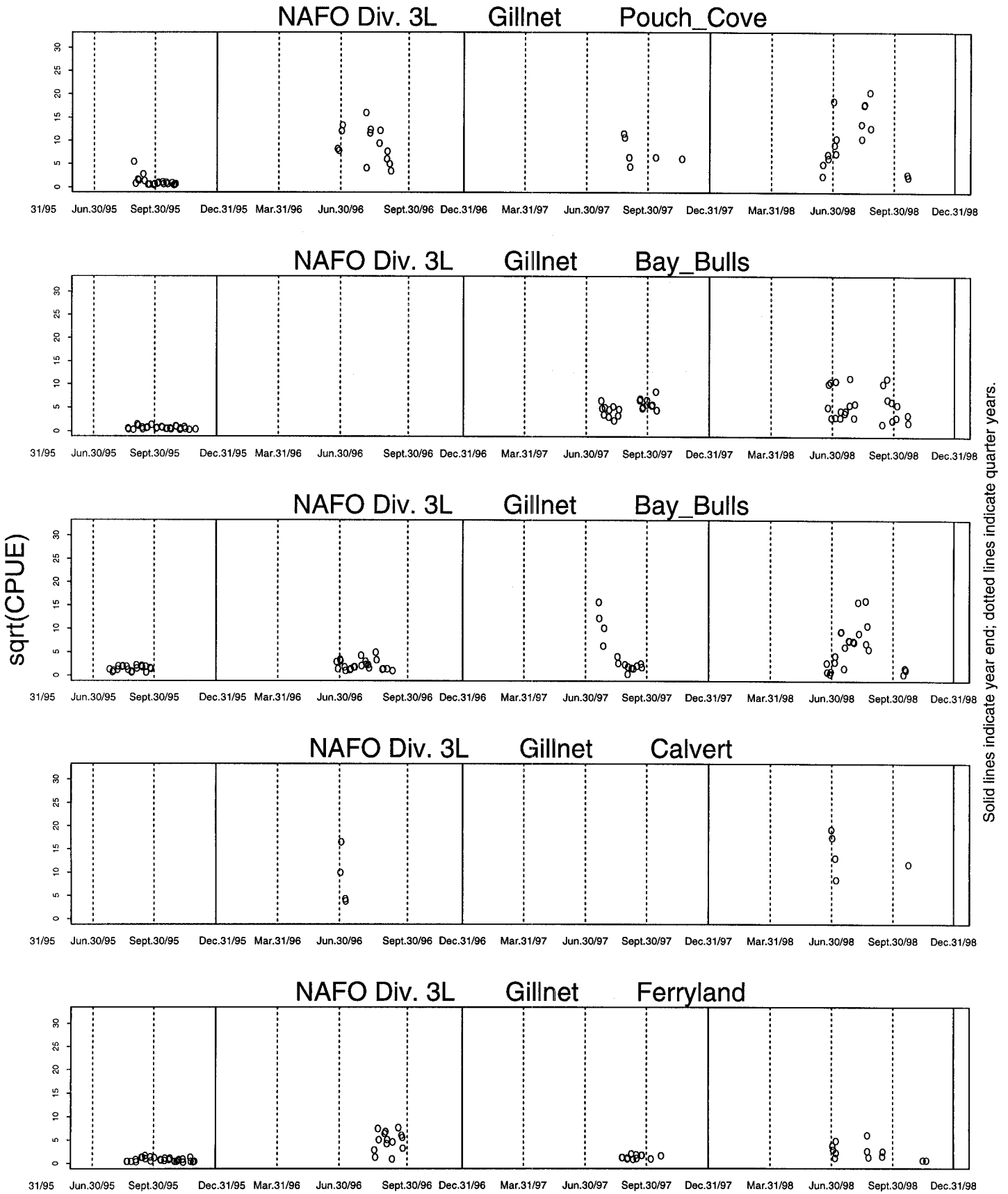
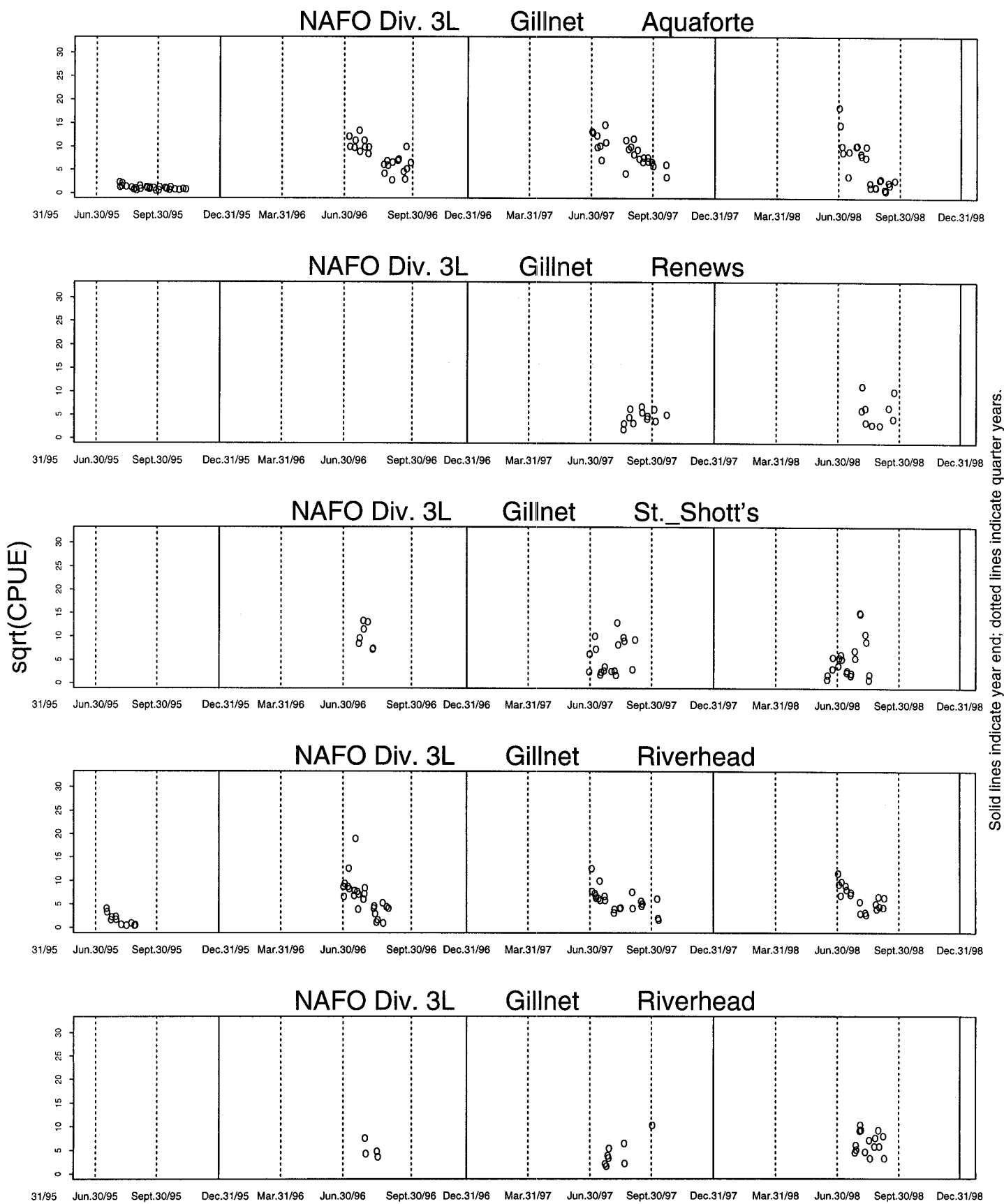


Fig 24 (cont'd). Sentinel survey CPUE by Division, gear, location and date.



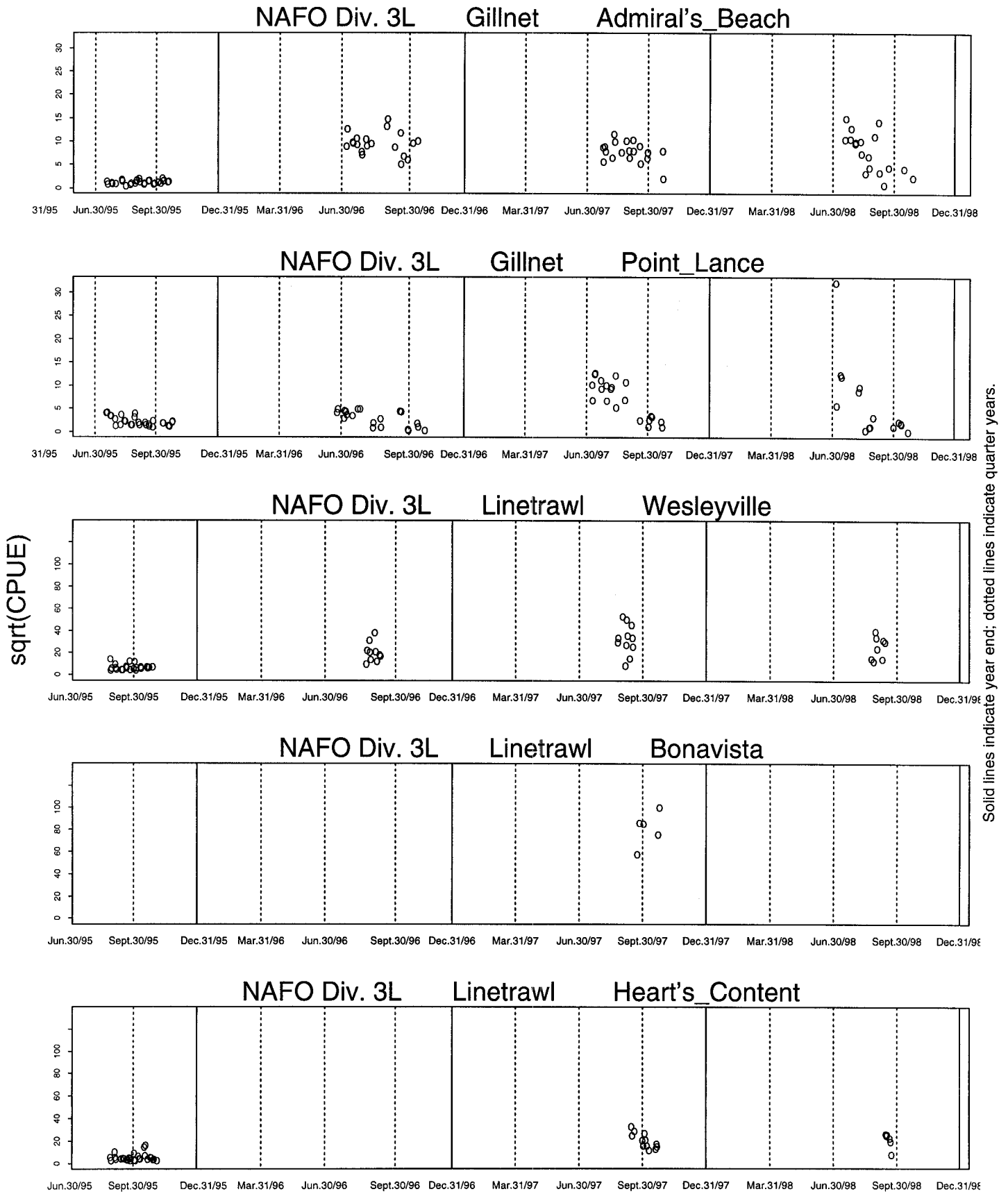
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Fig 24 (cont'd). Sentinel survey CPUE by Division, gear, location and date.



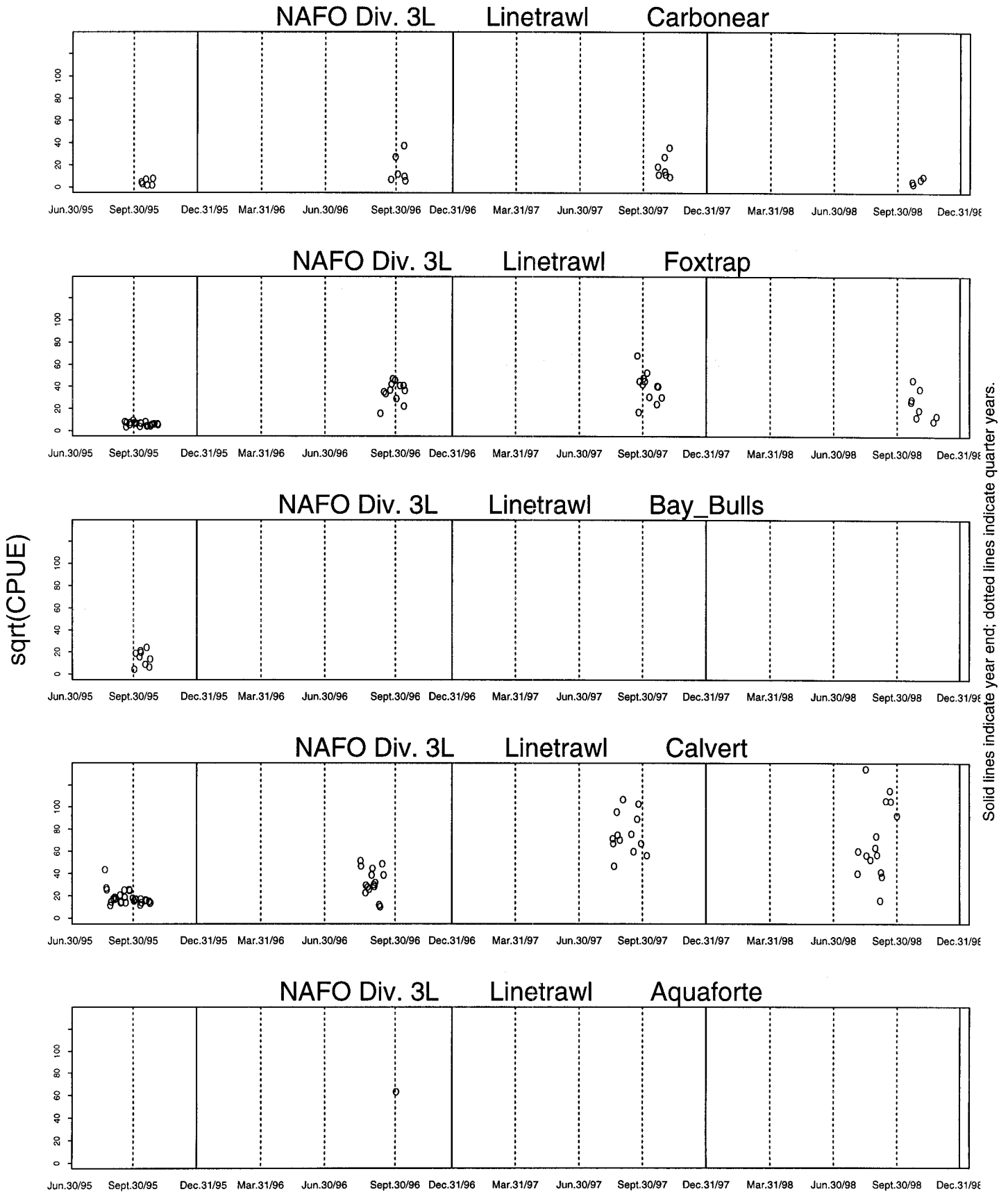
Solid lines indicate year end; dotted lines indicate quarter years.

Fig 24 (cont'd). Sentinel survey CPUE by Division, gear, location and date.



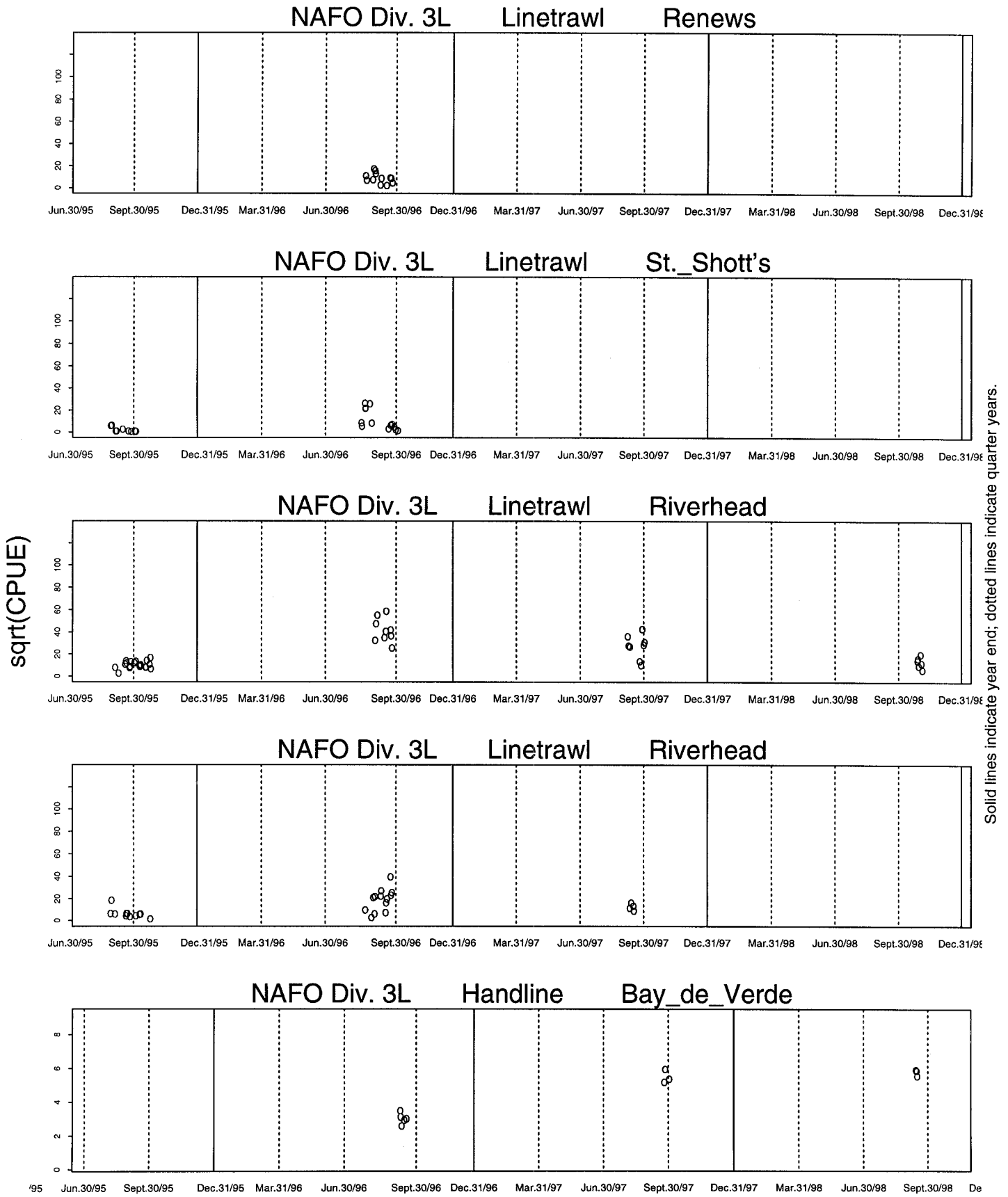
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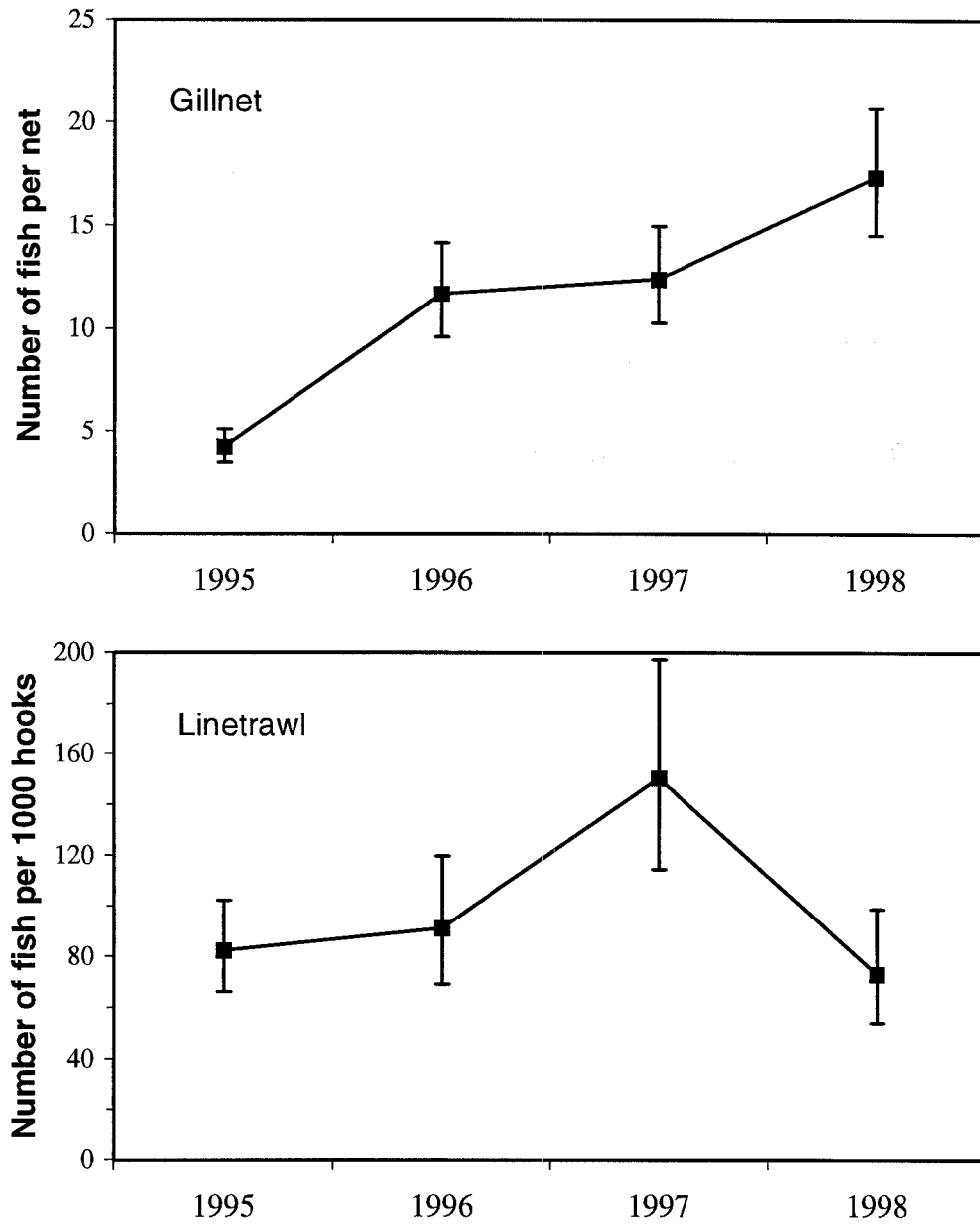
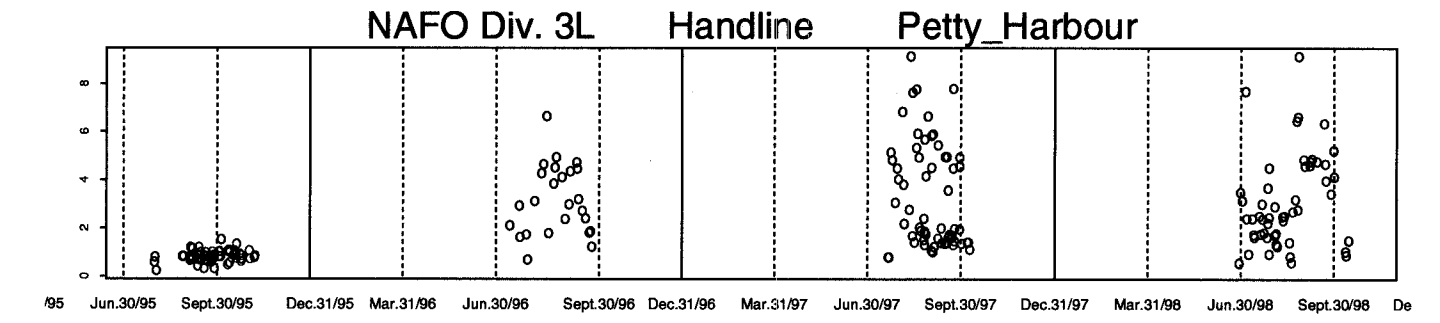


Fig. 26. Standardized catch rates from sentinel surveys for divisions 3K and 3L combined.



sqrt(CPUE)

Solid lines indicate year end; dotted lines indicate quarter years.

Fig 24 (cont'd). Sentinel survey CPUE by Division, gear, location and date.

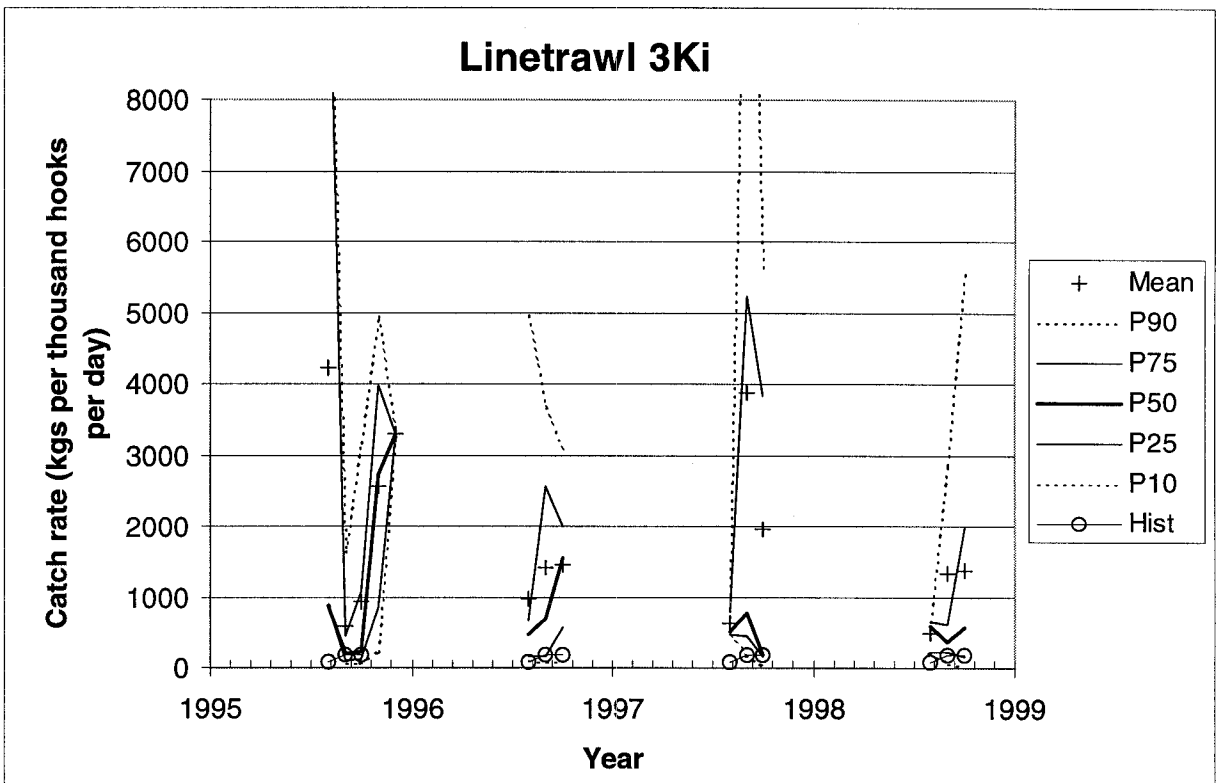
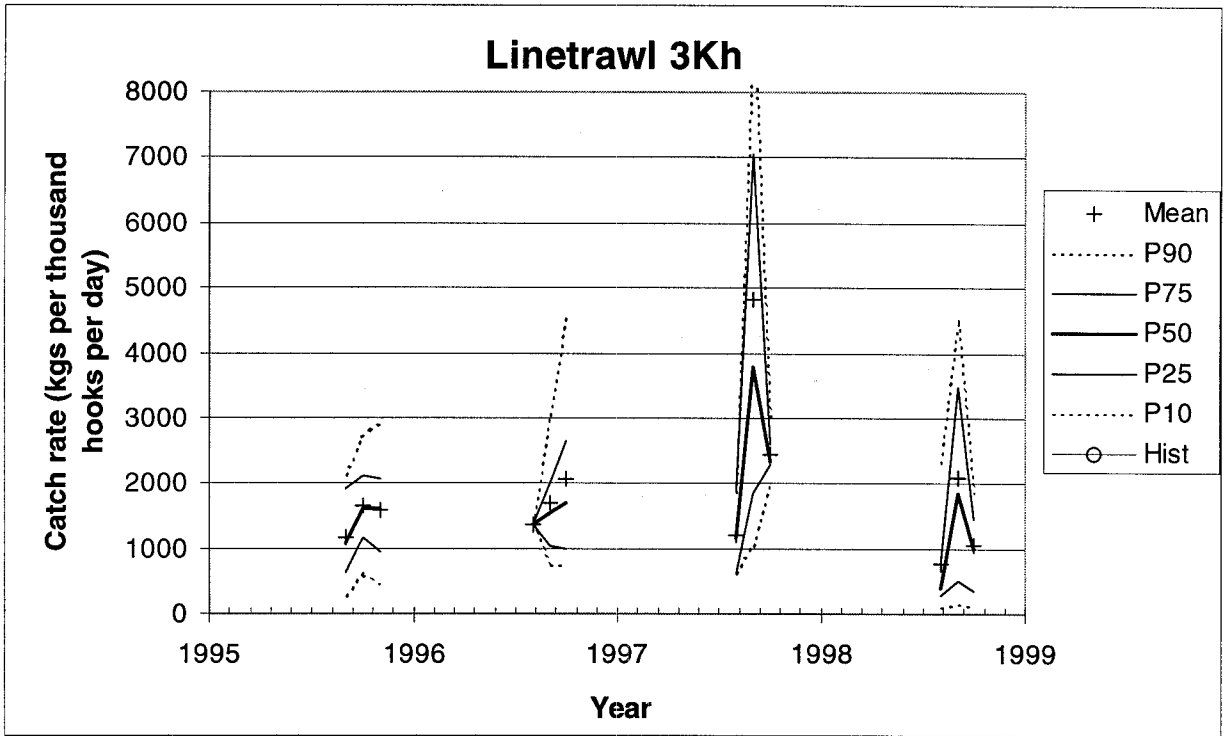


Fig. 25. Mean and percentiles of sentinel survey catch rates, by gear, unit area, year and month.

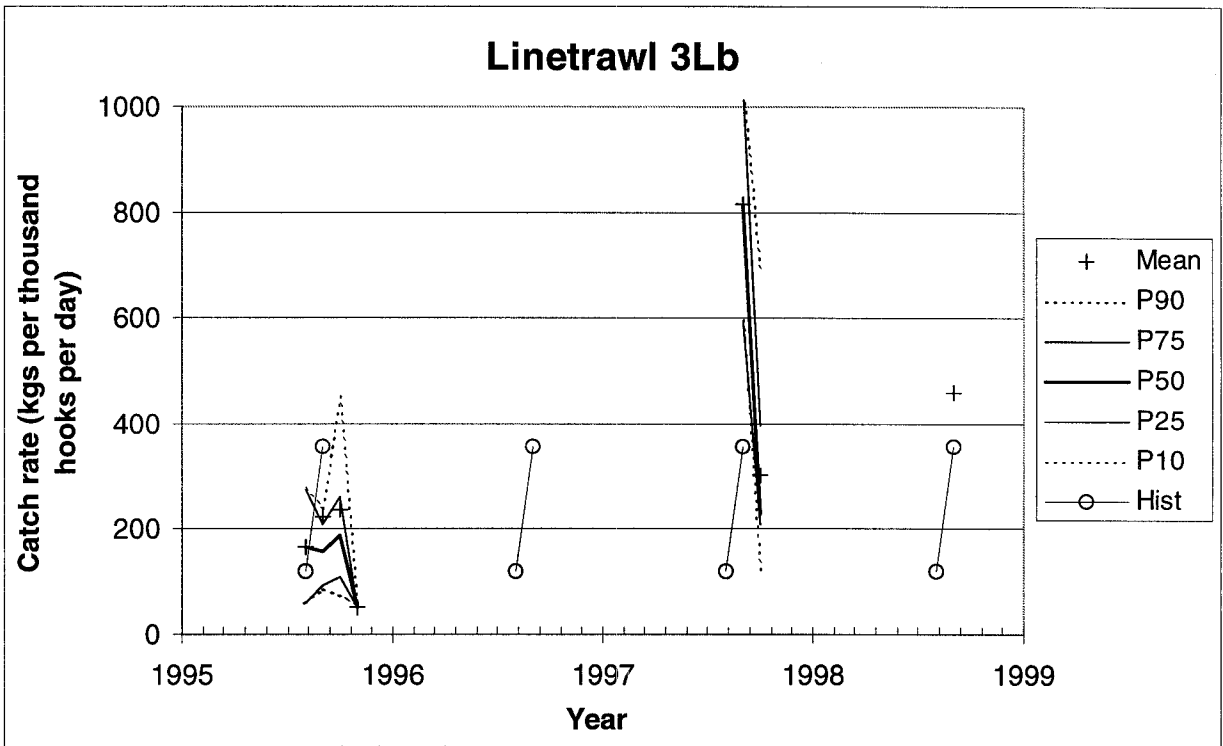
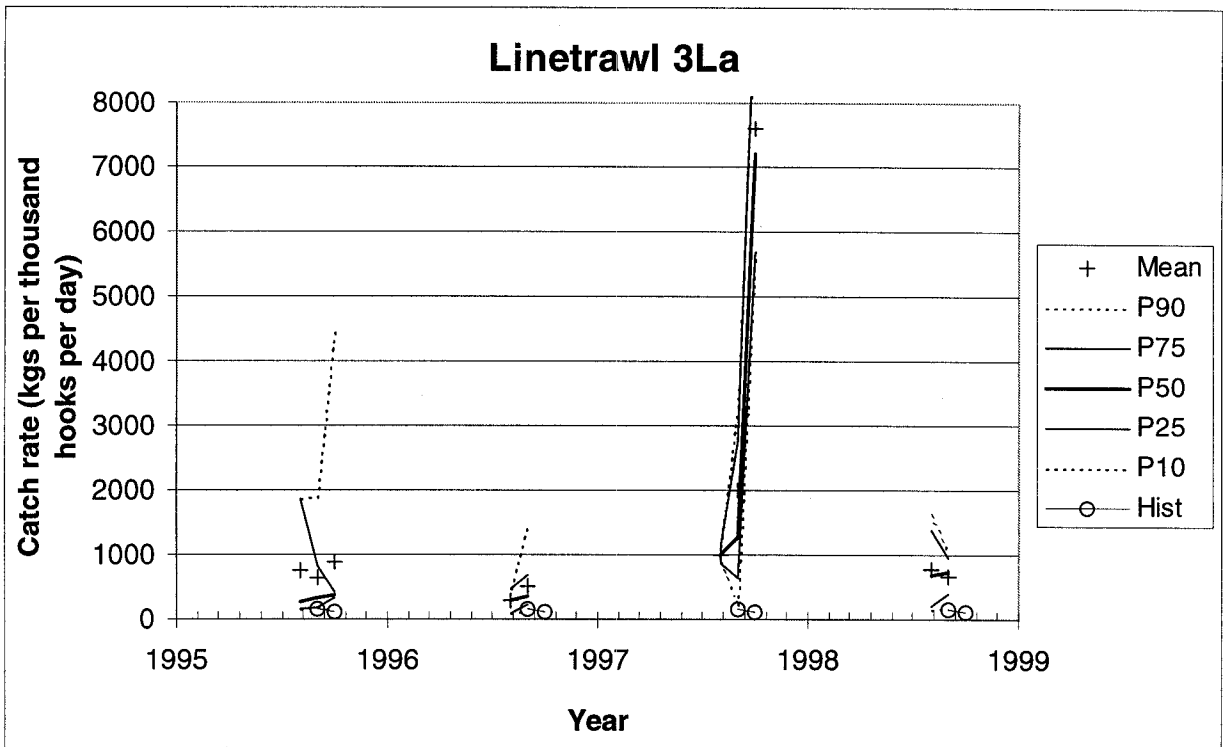


Fig. 25 (cont'd). Mean and percentiles of sentinel survey catch rates, by gear, unit area, year and month.

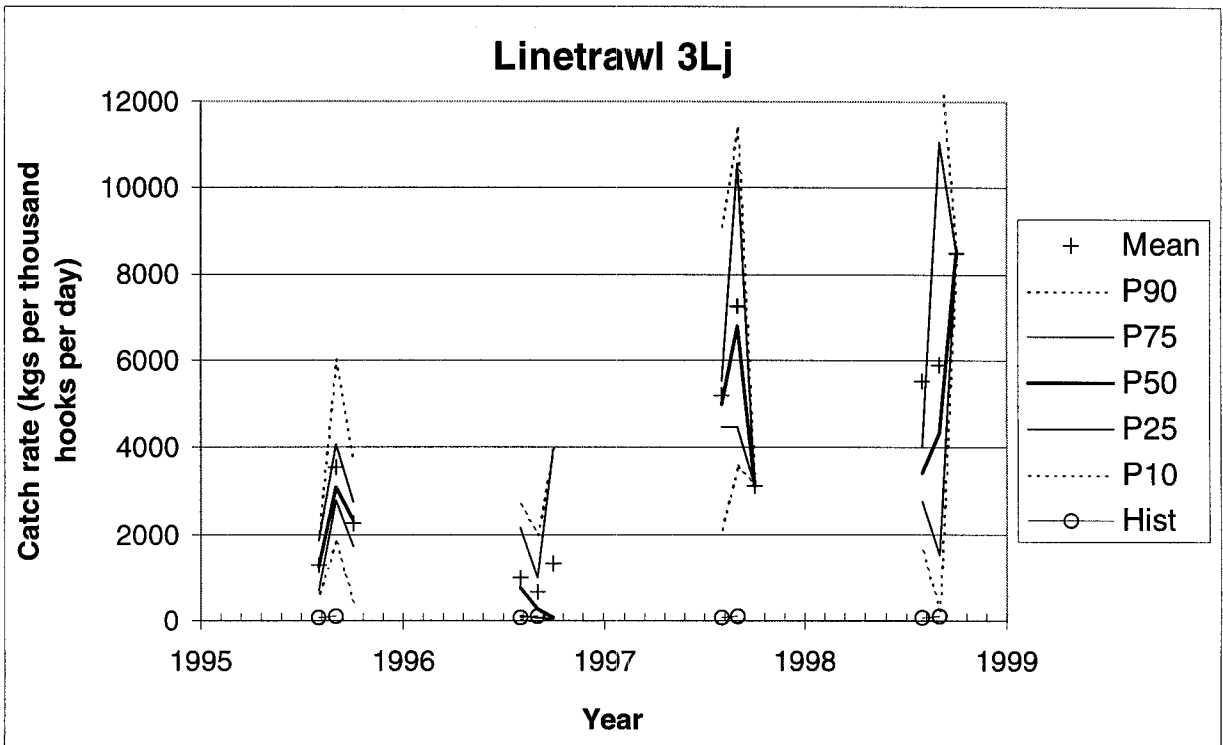
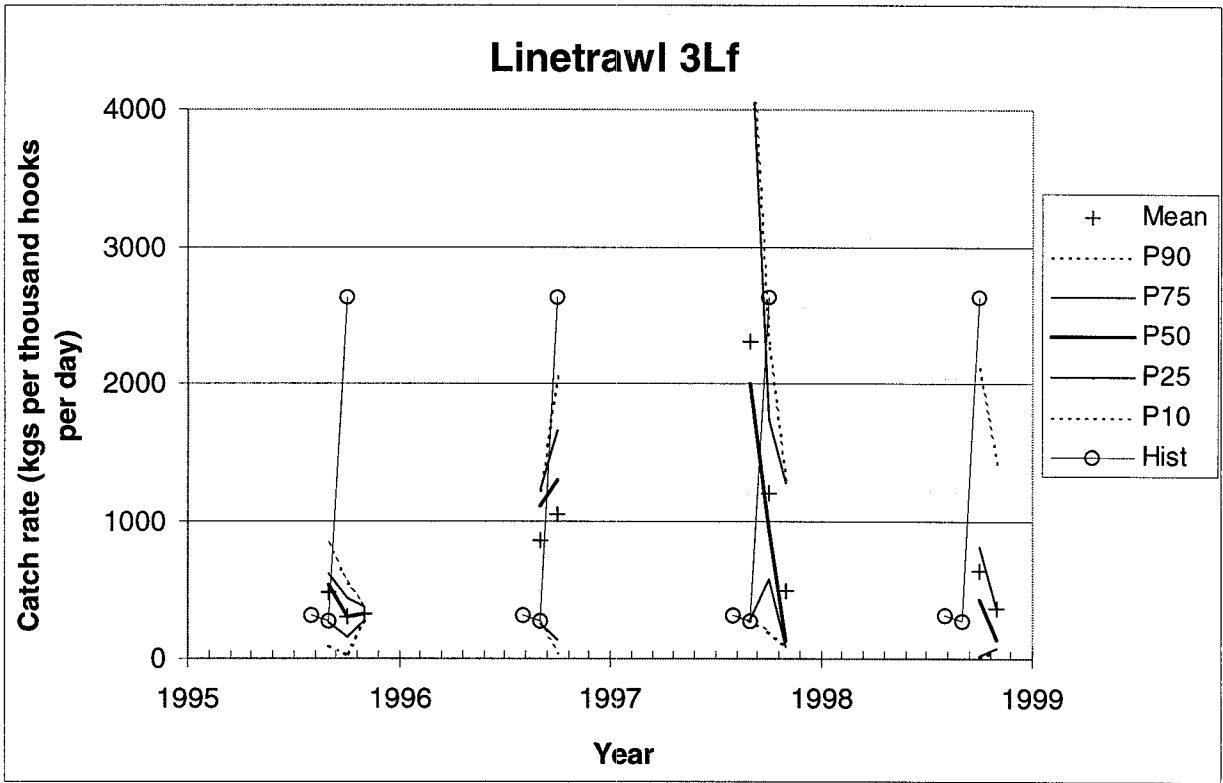


Fig. 25 (cont'd). Mean and percentiles of sentinel survey catch rates, by gear, unit area, year and month.

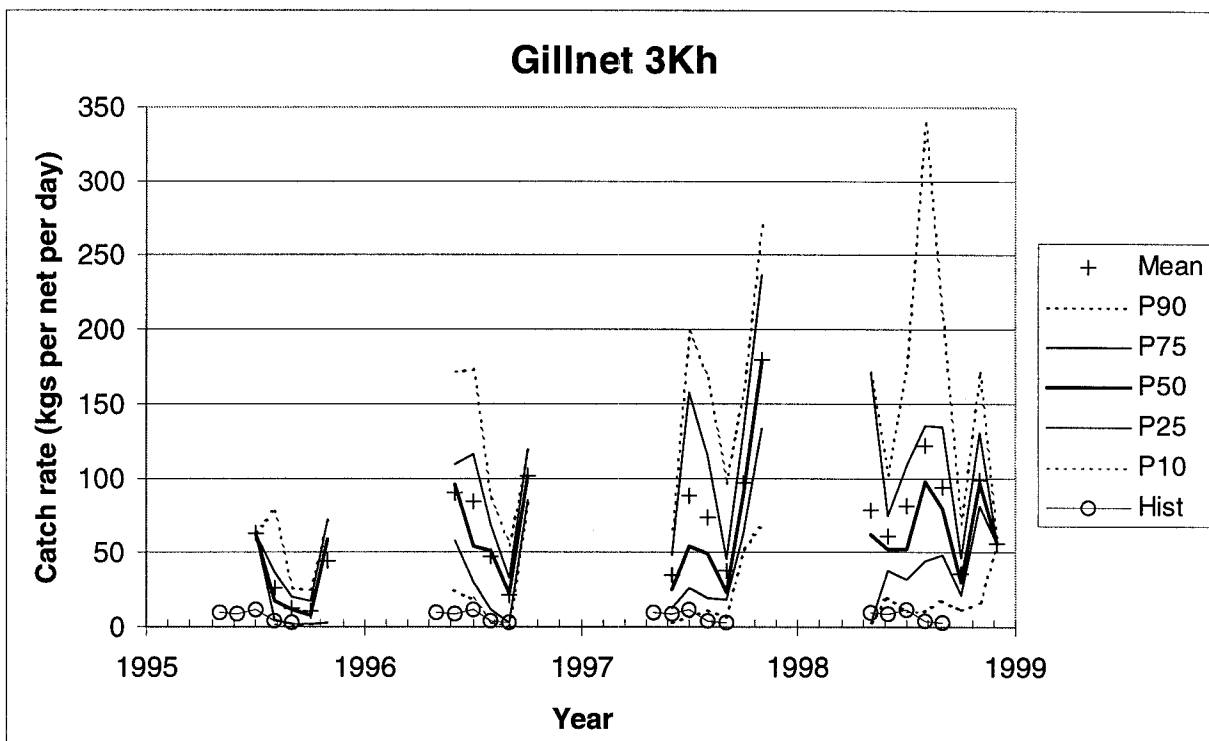
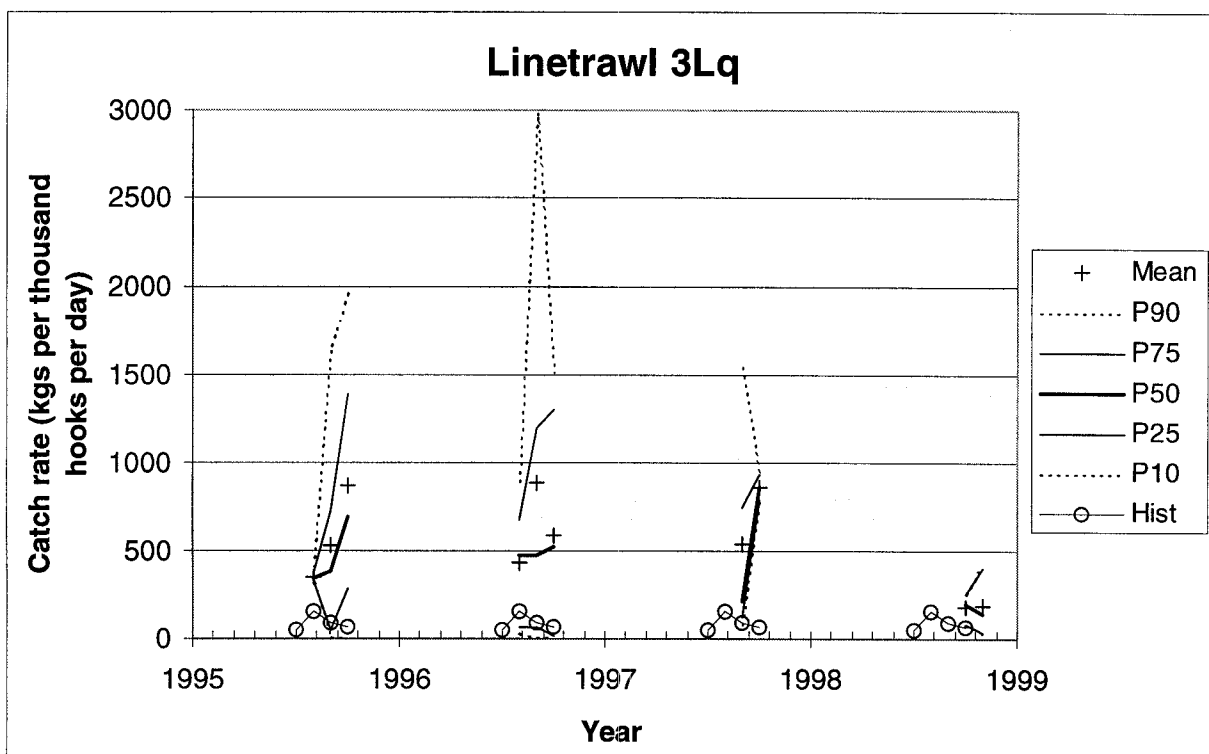


Fig. 25 (cont'd). Mean and percentiles of sentinel survey catch rates, by gear, unit area, year and month.

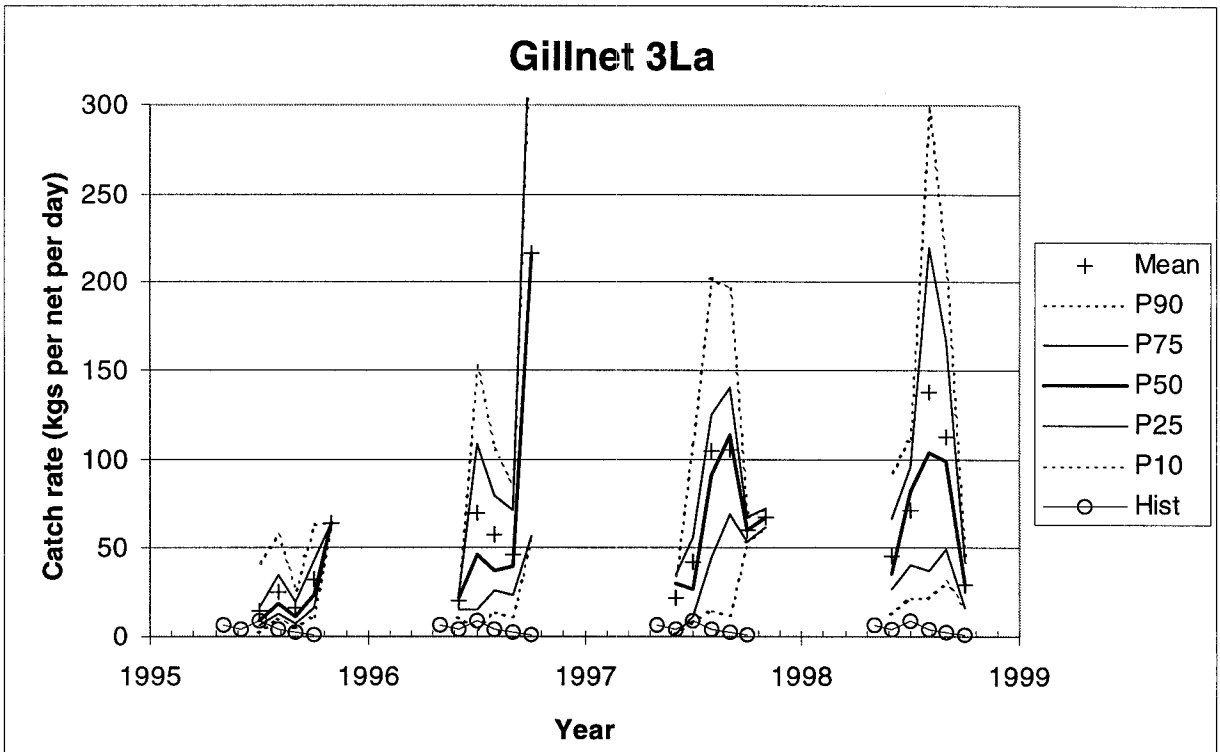
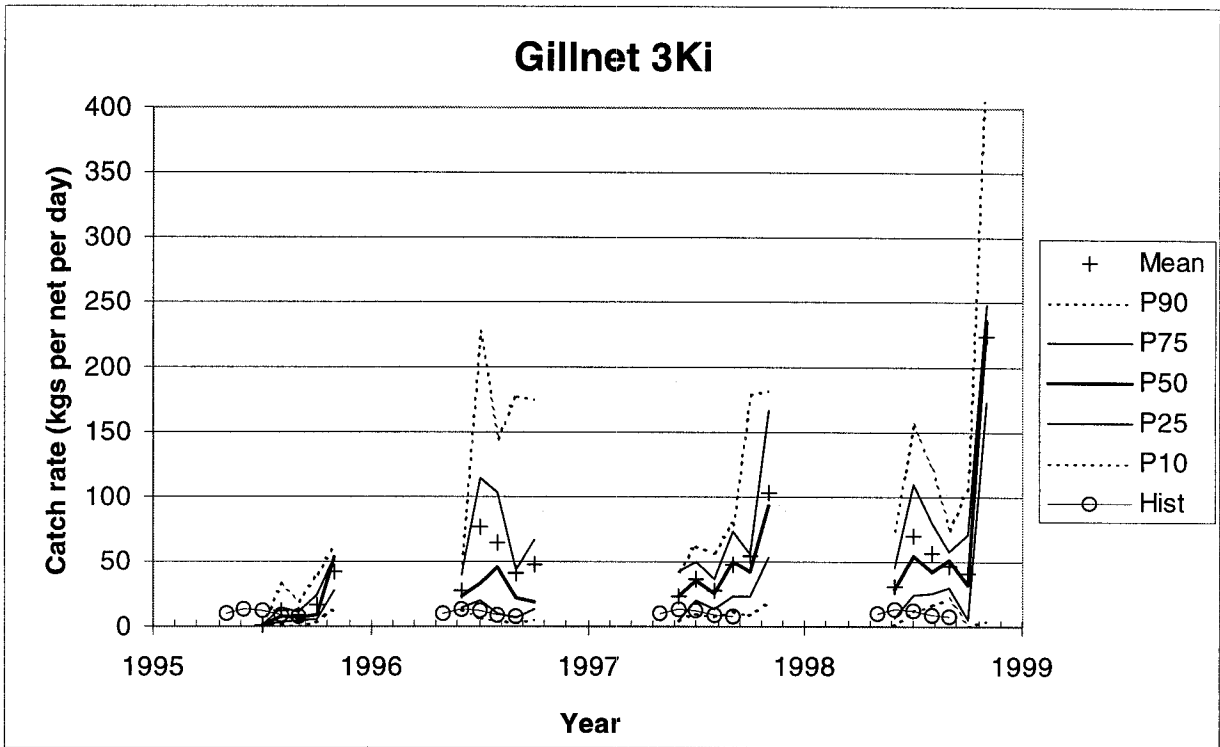


Fig. 25 (cont'd). Mean and percentiles of sentinel survey catch rates, by gear, unit area, year and month.

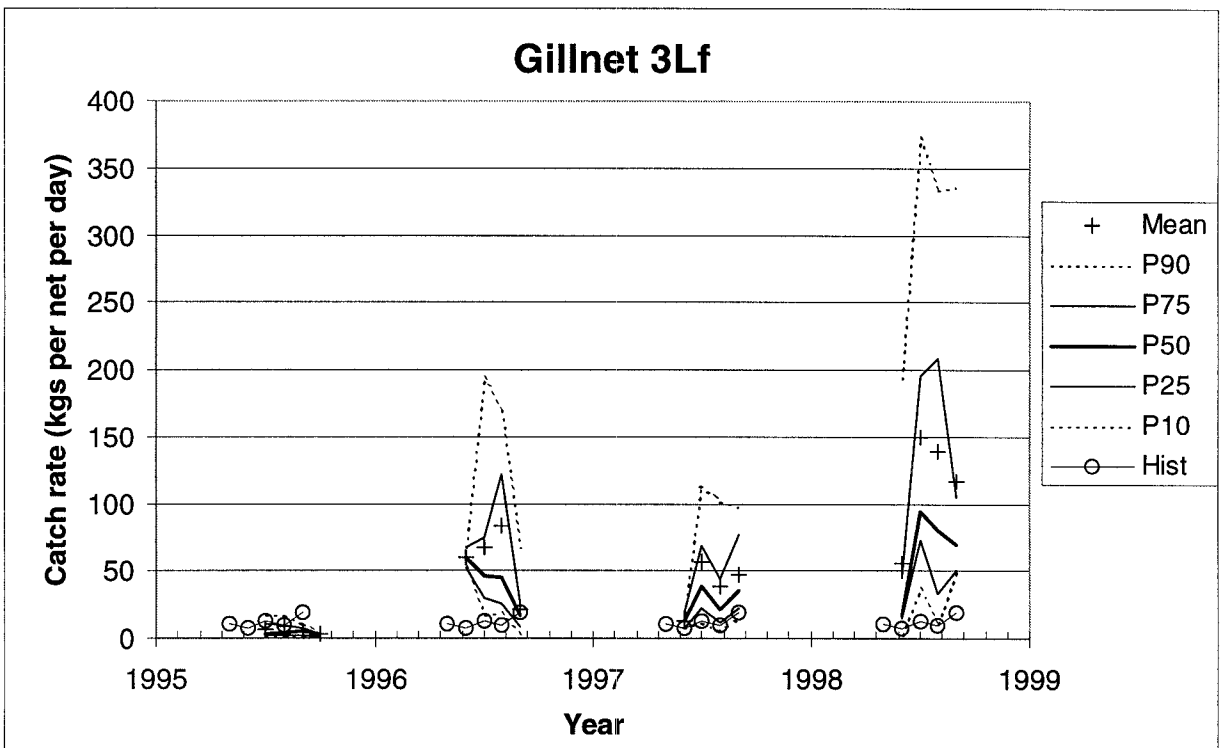
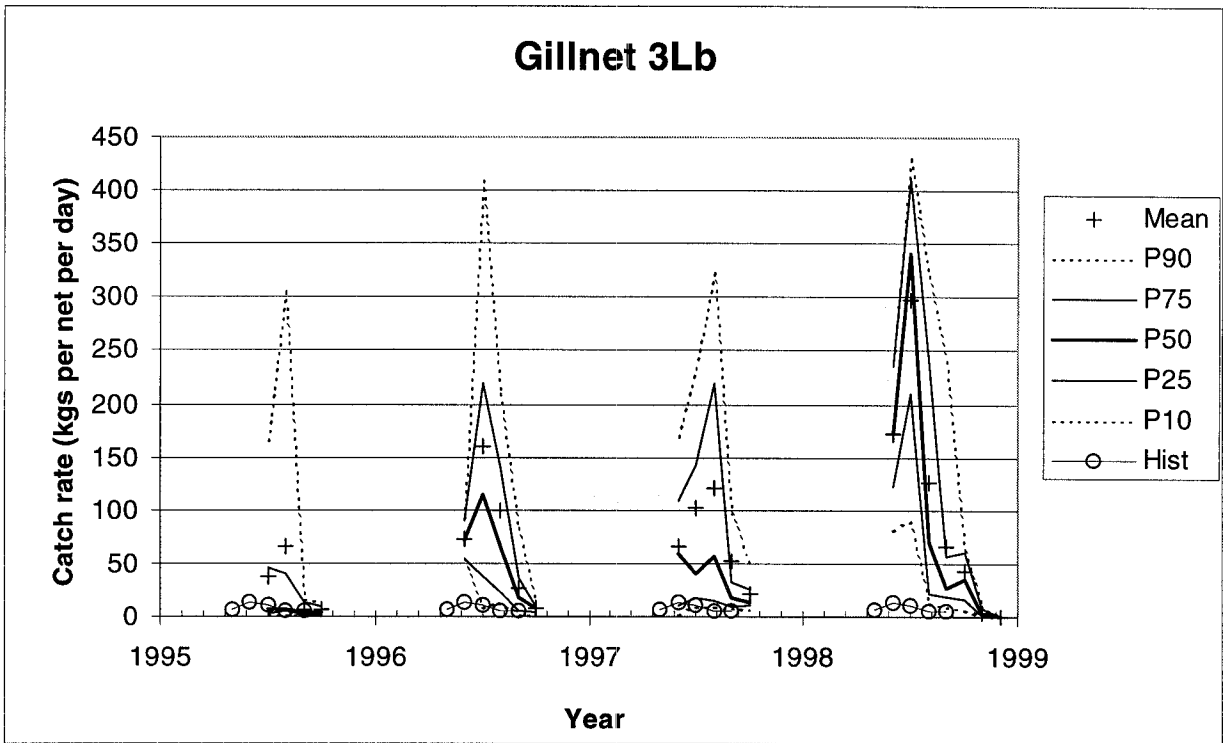


Fig. 25 (cont'd). Mean and percentiles of sentinel survey catch rates, by gear, unit area, year and month.

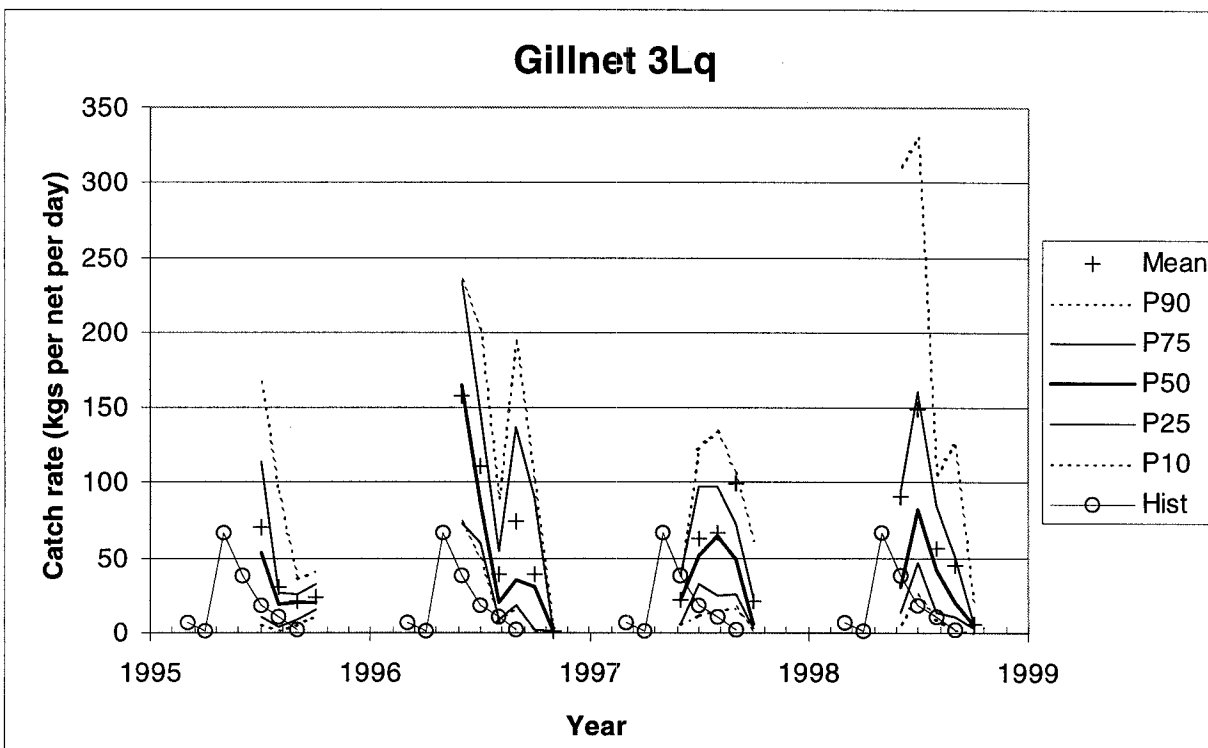
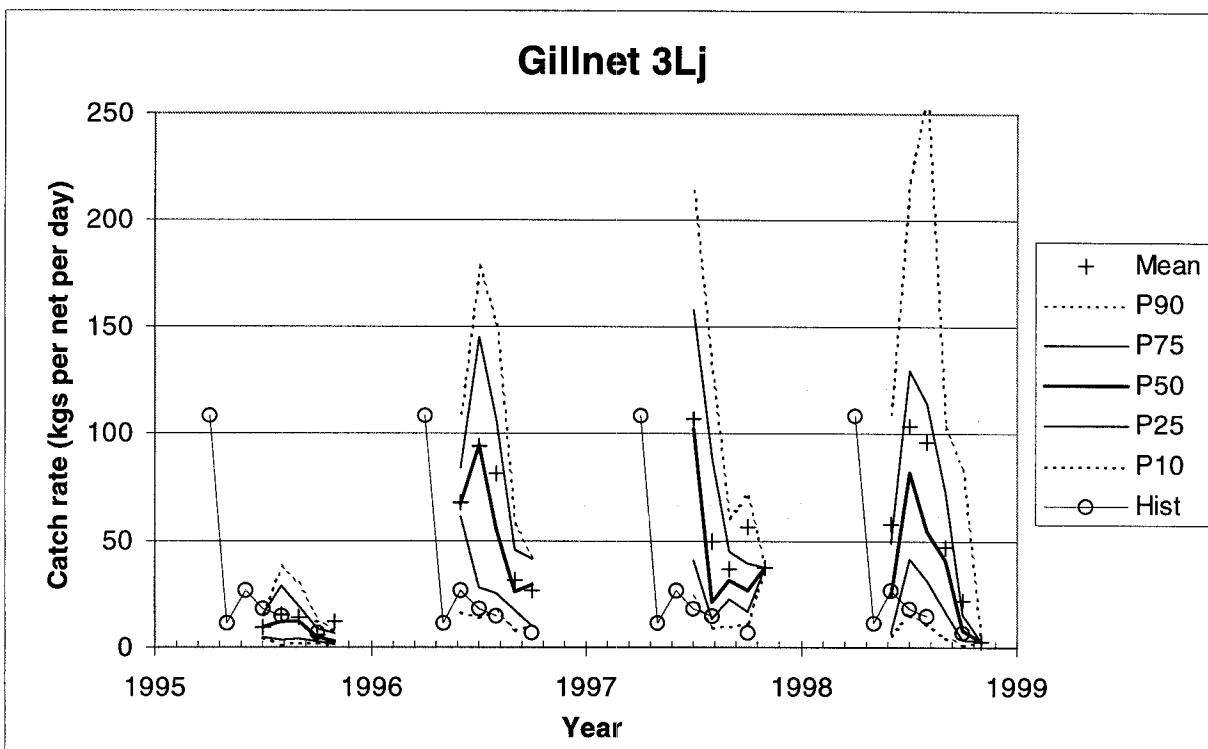


Fig. 25 (cont'd). Mean and percentiles of sentinel survey catch rates, by gear, unit area, year and month.

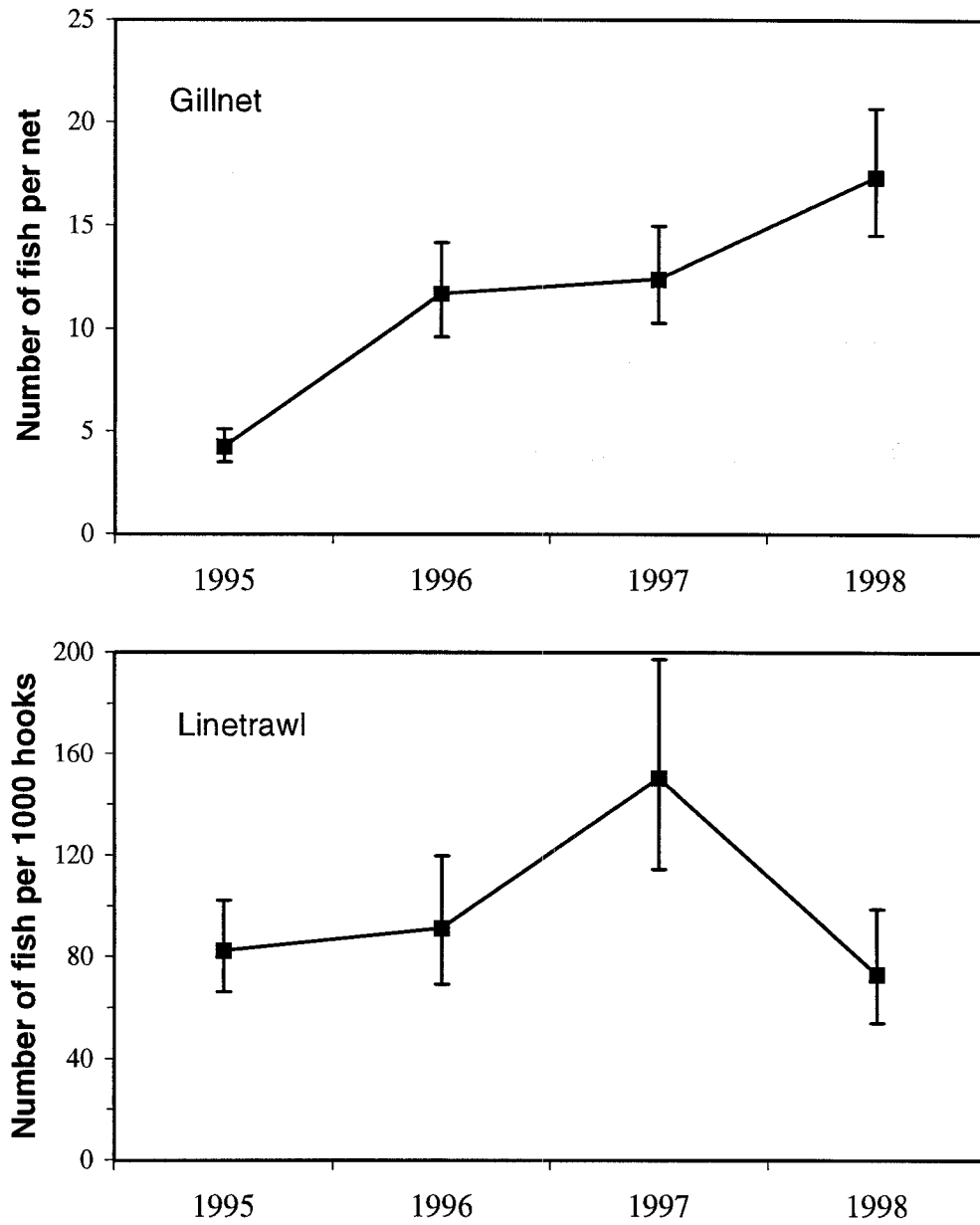


Fig. 26. Standardized catch rates from sentinel surveys for divisions 3K and 3L combined.

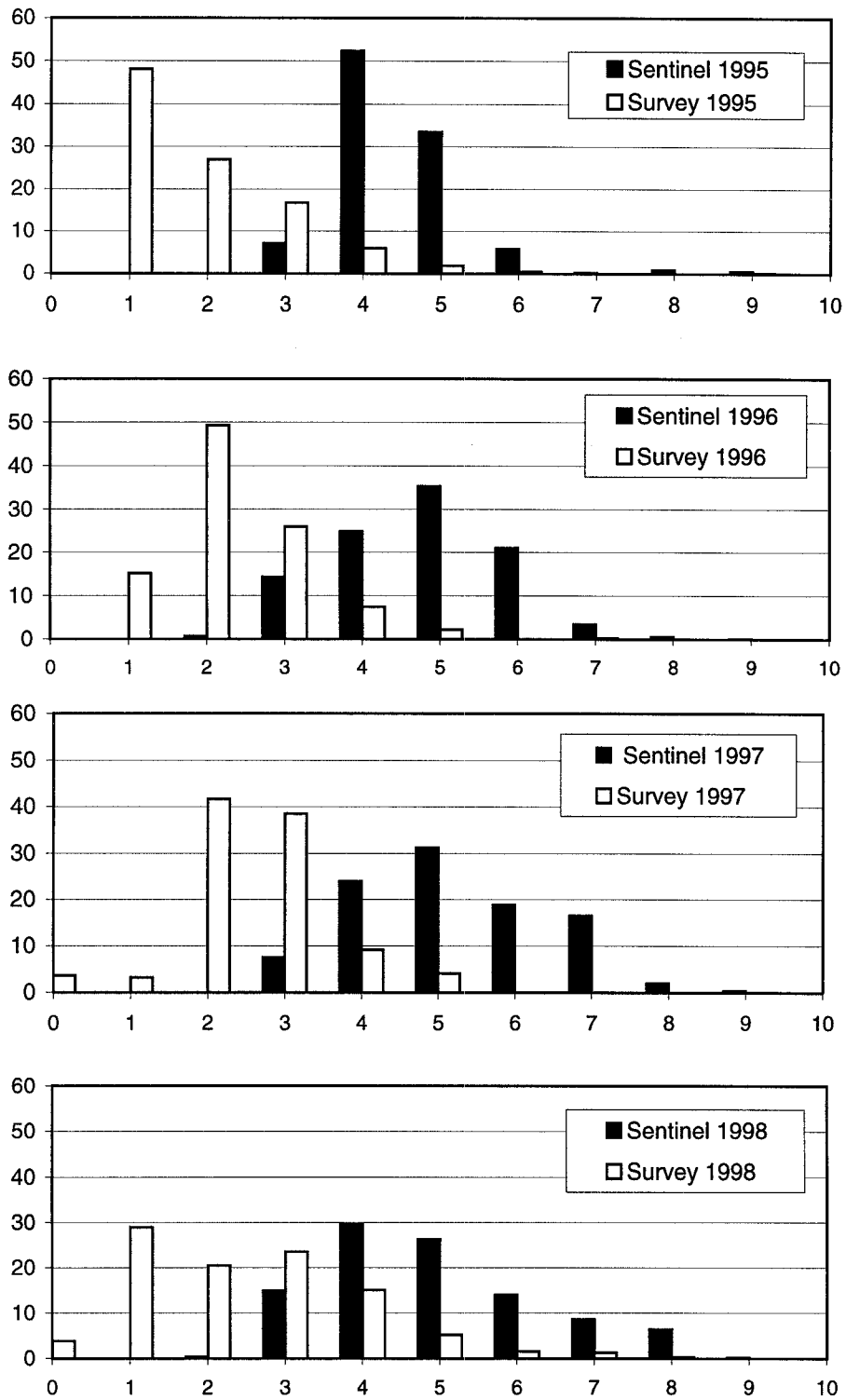
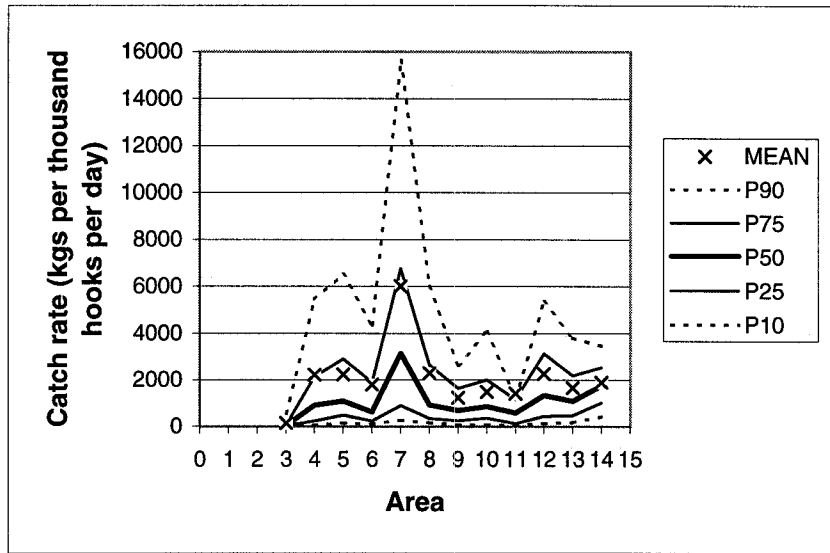


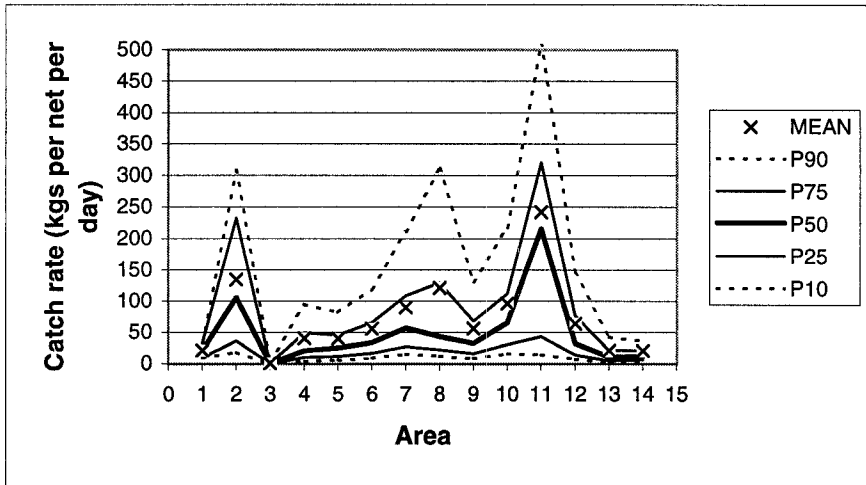
Fig. 27. Age compositions of cod caught in the sentinel surveys and the research vessel surveys in Division 3K in 1995-1998.

Linetrawl catch rates from science logbooks for vessels <35ft in 1998



UA	3KA	3KD	3KH	3KI	3LA	3LB
Area	3	4	5	6	7	8
N	5	44	29	269	66	140
UA	3LF	3LJ	3LQ	3PC	3PB	3PA
Area	9	10	11	12	13	14
N	71	32	12	693	1246	1468

Gillnet catch rates from science logbooks for vessels < 35ft in 1998



UA	2JD	2JM	3KA	3KD	3KH	3KI	3LA
Area	1	2	3	4	5	6	7
N	2	4	5	468	817	1419	604
UA	3LB	3LF	3LJ	3LQ	3PC	3PB	3PA
Area	8	9	10	11	12	13	14
N	516	589	305	34	4587	2388	1138

Fig. 28. Mean and percentiles of linetrawl and gillnet catch rates during the index fishery, by unit area. Unit areas are illustrated in Fig. 1b.

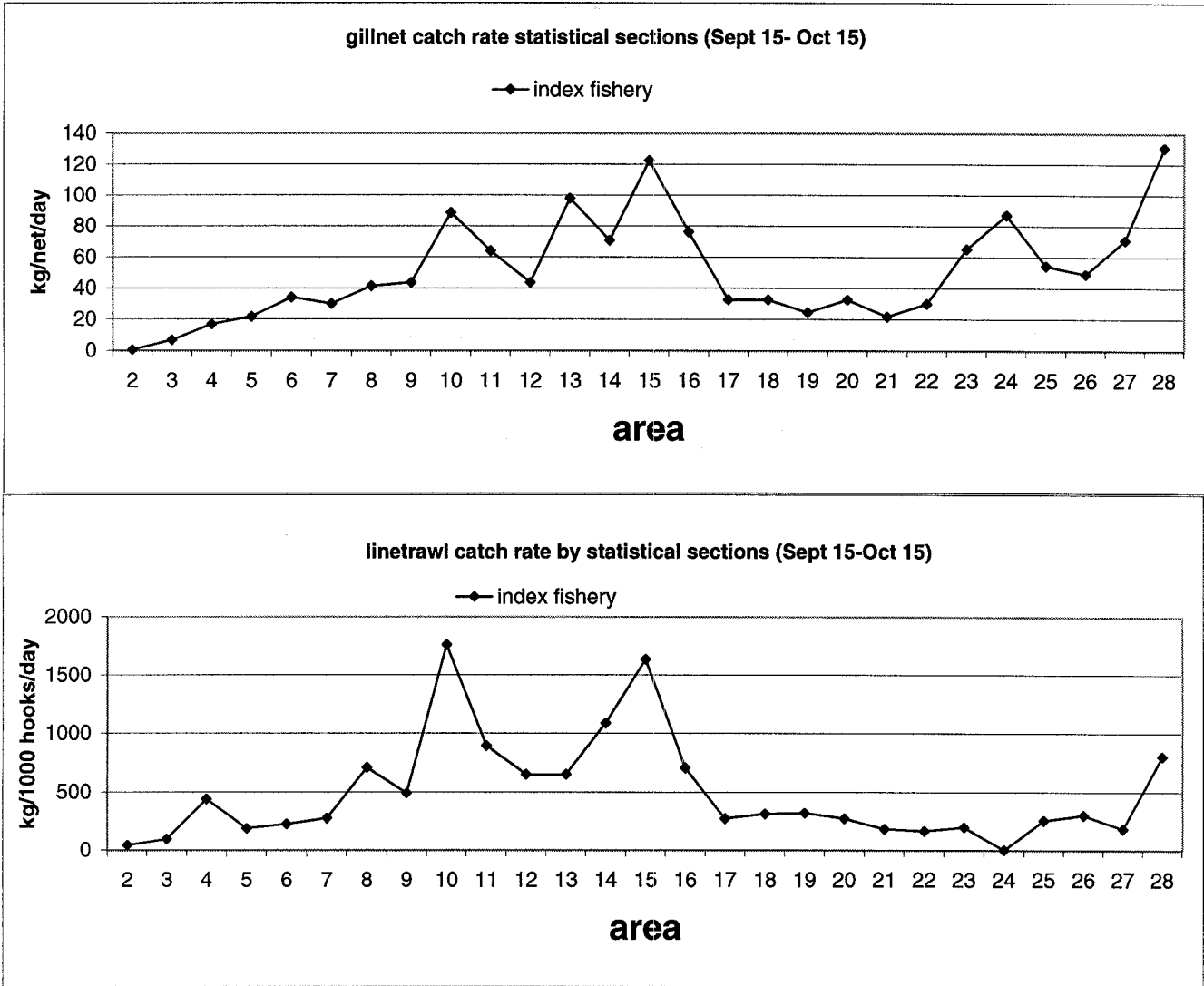


Fig. 29. Mean gillnet and linetrawl catch rates during the index fishery, by statistical section. Statistical sections are illustrated in Fig. 1c.

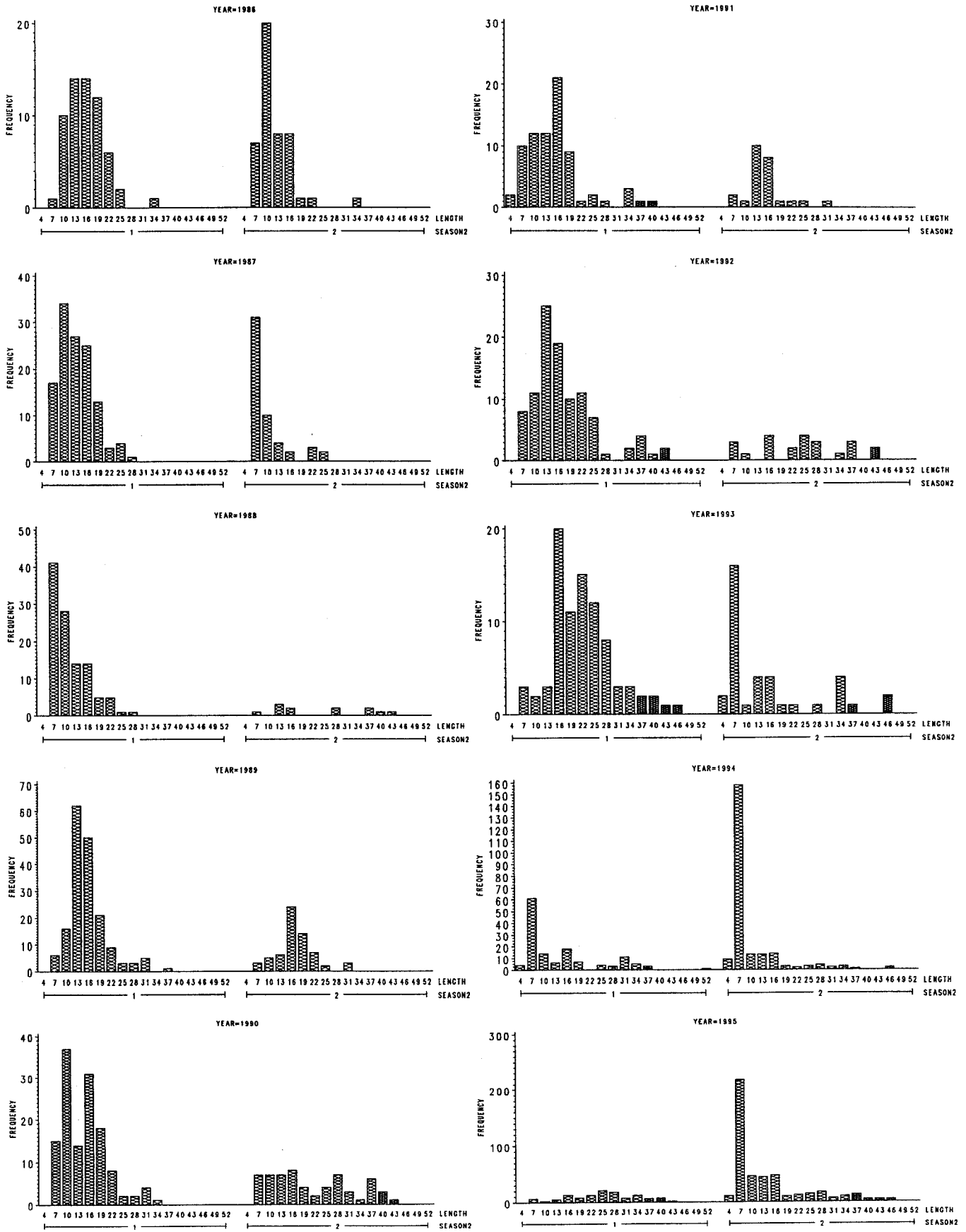


Fig. 30. Semi-annual cod length frequencies calculated from the sizes of otoliths found in seal stomachs in NAFO divisions 2J, 3K and 3L combined.

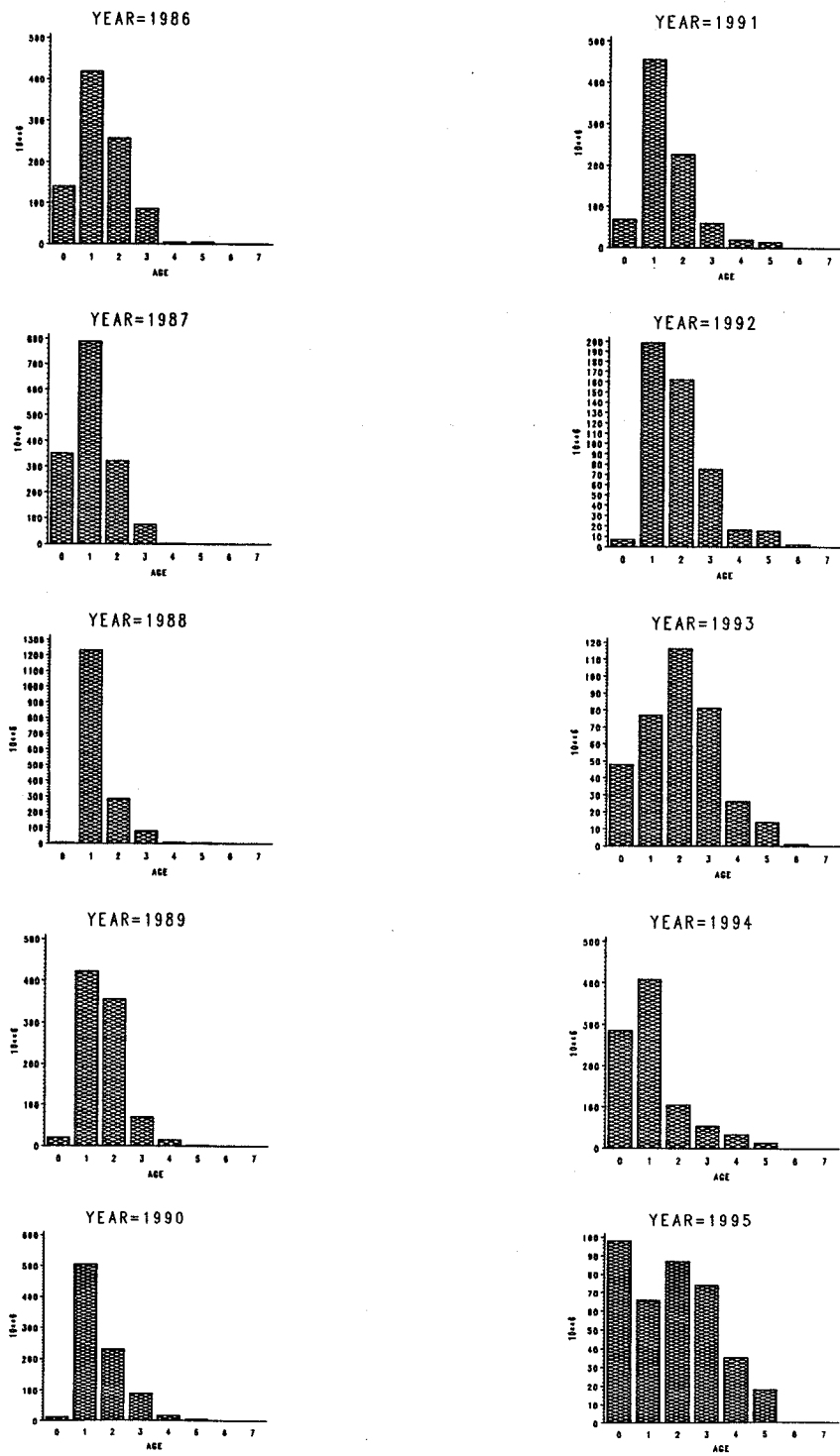


Fig. 31. Estimates of the number of cod consumed at age by harp seals in divisions 2J, 3K and 3L in 1986-1995.

Appendix 1. Extrapolation of 3Ps tagging estimates to 3KL using sentinel catch rates

The following calculations were conducted on instruction from the Chair of the Cod Zonal Assessment meeting.

Cadigan and Bratley (MS 1999) provided a mark recapture estimate for Placentia Bay (3Psc) of 70,000 tons for 1998. Winters and Bratley (MS 1998) carried out an extrapolation of the 1997 tagging estimate for Placentia Bay in an attempt to estimate the biomass of cod in 3KL. Their approach is repeated on the 1998 tagging estimate for Placentia Bay using the 1998 sentinel gillnet catch rate data for Placentia Bay and 3KL. Following their approach the Q for the summer gillnet fishery (week 24-40) in Placentia Bay is calculated and applied to the bay by bay sentinel CPUE data for inshore (<120m) 3KL to compute the estimate.

Tagging estimate	SQ/KM UNITAREA <120METERS	Q	CPUE	Calculated Biomass
70000 3PsC	3840	0.000546	9.9565	69999
3Lq	2427		31.3631	139362
3Lj	841		31.5778	48622
3Lf	1016		51.3333	95488
3Lb	2039		55.7585	208154
3La	2178		40.5172	161567
3Ks (3Kh,i)	4045		27.9184	206759
3Kn (3kd)	995		12.6071	22966
Extrapolated 3KL Biomass				882,920

According to Winters and Bratley (MS 1998) the estimate should be an underestimate since it excludes cod north of White Bay and any cod at depths greater than 120m which did not contribute to sentinel catch rates.

References:

- Cadigan, N.G., and Bratley, J. MS 1999a. Estimation of coarse exploitation and migration rates of cod in 3Psc and 3KL during 1997 and 1998 based on tagging experiments. Department of Fisheries and Oceans Canadian Stock Assessment Secretariat Res. Doc. 99/38.
- Winters, G.H., and Bratley, J. MS 1998. Considerations on the demise or otherwise of northern cod. Department of Fisheries and Oceans Canadian Stock Assessment Secretariat Research Document 98/64.