



Fisheries and Oceans
Canada

Pêches et Océans
Canada

Science

Sciences

C S A S

Canadian Science Advisory Secretariat

S C C S

Secrétariat canadien de consultation scientifique

Research Document 2002/089

Document de recherche 2002/089

Not to be cited without
permission of the authors *

Ne pas citer sans
autorisation des auteurs *

**2002 Summer Groundfish Survey
update for selected Scotia-Fundy
groundfish stocks.**

**Mise à jour d'enquête d'été 2002 pour
les stocks choisis de poisson de fond
de Scotia-Fundy.**

R. Branton and G. Black

Department of Fisheries and Oceans
Maritimes Region, Science Branch
Bedford Institute of Oceanography
1 Challenger Drive, Dartmouth
Nova Scotia, B2Y 4A2
Canada

* This series documents the scientific basis for the evaluation of fisheries resources in Canada. As such, it addresses the issues of the day in the time frames required and the documents it contains are not intended as definitive statements on the subjects addressed but rather as progress reports on ongoing investigations.

* La présente série documente les bases scientifiques des évaluations des ressources halieutiques du Canada. Elle traite des problèmes courants selon les échéanciers dictés. Les documents qu'elle contient ne doivent pas être considérés comme des énoncés définitifs sur les sujets traités, mais plutôt comme des rapports d'étape sur les études en cours.

Research documents are produced in the official language in which they are provided to the Secretariat.

Les documents de recherche sont publiés dans la langue officielle utilisée dans le manuscrit envoyé au Secrétariat.

This document is available on the Internet at:

Ce document est disponible sur l'Internet à:

<http://www.dfo-mpo.gc.ca/csas/>

ISSN 1480-4883

© Her Majesty the Queen in Right of Canada, 2002

© Sa majesté la Reine, Chef du Canada, 2002

Canada

Abstract

A synopsis of the results of the 2002 DFO summer bottom trawl survey on the Scotian Shelf and Bay of Fundy is provided. Survey trends for each stock from 1970 to present are shown as a series of histograms and expanding symbol maps. This information is used in assessment meetings as a key source of information on trends for selected groundfish stocks.

Résumé

Un résumé des résultats du relevé au chalut de fond qui a été effectué pendant l'été de 2002 par le Ministère de Pêches et Océans dans les eaux du plateau néoécossais et de la baie de Fundy est présenté. Les tendances pour chaque stock dans les relevés de 1970 jusqu'à aujourd'hui sont présentées sous forme d'une série d'histogrammes et de cartes de distribution. Ces résultats sont utilisés lors de réunions d'évaluation comme principale source d'information sur les tendances des stocks de poisson de fond sélectionnés.

Introduction

The annual groundfish bottom trawl survey was conducted by DFO on the Scotian Shelf and Bay of Fundy as planned from 3 July to 30 July 2002. The results of this survey were compiled for selected stocks to provide clients with a preliminary view of biomass, abundance, resource concentration, area occupied, size composition, and distribution as determined by the survey. The groundfish stocks covered by the report and the lead scientific investigator are listed in Table 1. The distribution of sampling effort compared with the past three years is shown in Figures 1 to 4. Survey trends for each stock from 1970 to present are shown in Figures 5 to 112. Mean weight and number caught per tow and long term frequency distribution histograms are not adjusted for the research vessel and survey gear changes which occurred in 1982-3. Fanning (1985) reported vessel conversion factors from comparative fishing experiments, which are large for some species.

Branton and Black (1999, 2000, 2001) reported similar results for the 1999 - 2001 surveys. This document includes the resource concentration, prevalence, and CPUE where present indicators which measure demersal fish population distribution (Halliday, 2001). An estimate of resource concentration is calculated as the proportion of total survey area occupied by the top 75% of the total $\log(1 + \text{catch})$ [sets grouped in 10 minute squares]. An estimate of resource prevalence is the proportion of sets containing the species of interest. This provides an indication of how widely the species is distributed within the survey area without reference to density. A third distribution index, CPUE where present, is the average of the \log (non-zero catches) and is indicative of the average local density.

Comprehensive interpretations of stock status are contained in stock assessment documents prepared annually for many of the stocks described here (<http://www.dfo-mpo.gc.ca/csas/>). Such reports contain information on commercial fishery catch rates and other survey results when available. Therefore, the abundance trends reported here, based on the survey information only, are not directly comparable to those provided in recent assessments.

Survey Description

The 32nd annual Scotian Shelf groundfish survey was conducted from the research vessel CSS *Alfred Needler* out of the Bedford Institute of Oceanography, Dartmouth, N.S., on two trips N2002037 (3-15 July 2002) and N2002040 (20 July - 30 July 2002). The survey was conducted using the standard protocol (Koeller, 1981). Two hundred and fourteen fishing stations, from the Upper Bay of Fundy to the northern tip of Cape Breton and offshore to the 400 fathom contour, were completed.

Samples were obtained with a Western IIA bottom trawl towed for 30 minutes at a speed of 3.5 knots. The trawl has a 106 foot roller-rigged footrope and 2000 pound Portuguese doors. The codend is lined with 3/4 inch mesh to retain small fish. All finfish caught were sampled for length and weight and some species were sampled additionally for

otoliths to determine age, for evidence of sexual maturity and for stomach contents. Vertical profiles of temperature, salinity, nutrients and oxygen were observed at all fishing stations.

References

- Branton, R. and J. Black. 1999. 1999 Summer Groundfish Survey update for selected Scotia-Fundy groundfish stocks. CSAS Res Doc. 99/151. 60p.
- Branton, R. and G. Black. 2000. 2000 Summer Groundfish Survey update for selected Scotia-Fundy groundfish stocks. CSAS Res Doc. 2000/129. 61p.
- Branton, R. and G. Black. 2001. 2001 Summer Groundfish Survey update for selected Scotia-Fundy groundfish stocks. CSAS Res Doc. 2000/096. 63 p.
- Fanning, L.P. 1985. Intercalibration of research vessel survey results obtained by different vessels. CAFSAC Res. Doc. 85/3: 43p.
- Halliday, R.G. 2001. Proceedings of the Fisheries Management Studies Working Group (15-16 and 31 May 2001). CSAS Proc. Ser. 2001/21. 82p.
- Koeller, P. 1981. Manual for groundfish survey personnel - cruise preparation, conduct and standing orders. DFO Marine Fish Division Laboratory Reference No. 81/3.

Table 1. Stock name, figure list, page list, as well as name, telephone number and email address of the lead investigator for groundfish stocks observed on 2002 summer bottom trawl survey.

Stock	Figures	Pages	Investigator	Telephone	E-mail
4Vn Cod*	5 - 8	9-10	Showell	(902) 426-3501	ShowellM@mar.dfo-mpo.gc.ca
4VsW Cod*	9 - 12	11-12	Fanning	(902) 426-3190	FanningP@mar.dfo-mpo.gc.ca
4X Cod*	13 - 16	13-14	Clark	(506) 529-8854	ClarkD@mar.dfo-mpo.gc.ca
4VW Haddock*	17 - 20	15-16	Mohn	(902) 426-4592	MohnR@mar.dfo-mpo.gc.ca
4X Haddock*	21 - 24	17-18	Hurley	(902) 426-3520	HurleyP@mar.dfo-mpo.gc.ca
4VWX Pollock*	25 - 28	19-20	Neilson	(506) 529-8854	NeilsonJ@mar.dfo-mpo.gc.ca
Unit 3 Redfish*	29 - 32	21-22	Branton	(902) 426-3537	BrantonB@mar.dfo-mpo.gc.ca
4VW Plaice*	33 - 36	23-24	Fowler	(902) 426-3529	FowlerM@mar.dfo-mpo.gc.ca
4VW Yellowtail*	37 - 40	25-26	Fowler	(902) 426-3529	FowlerM@mar.dfo-mpo.gc.ca
4VW Witch*	41 - 44	27-28	McRuer	(902) 426-3585	McRuerJ@mar.dfo-mpo.gc.ca
4VW Winter Flounder	45 - 48	29-30	Fowler	(902) 426-3529	Fowler@mar.dfo-mpo.gc.ca
4X Plaice*	49 - 52	31-32	Fowler	(902) 426-3316	Fowler@mar.dfo-mpo.gc.ca
4X Yellowtail*	53 - 58	33-34	Fowler	(902) 426-3529	Fowler@mar.dfo-mpo.gc.ca
4X Witch*	57 - 60	35-36	McRuer	(902) 426-3585	McruerJ@mar.dfo-mpo.gc.ca
4X Winter Flounder*	61 - 64	37-38	Fowler	(902) 426-3529	FowlerM@mar.dfo-mpo.gc.ca
4VWX Halibut	65 - 68	39-40	Zwanenburg	(902) 426-3310	ZwanenburgK@mar.dfo-mpo.gc.ca
4VWX Silver Hake*	69 - 72	41-42	Showell	(902) 426-3501	ShowellM@mar.dfo-mpo.gc.ca
4VsW Winter Skate*	73 - 76	43-44	Simon	(902) 426-4136	SimonJ@mar.dfo-mpo.gc.ca
4VWX Monkfish*	77 - 80	45-46	Beanlands	(902) 426-3515	BeanlandsD@mar.dfo-mpo.gc.ca
4VW White Hake*	81 - 84	47-48	Bundy	(902) 426-8353	BundyA@mar.dfo-mpo.gc.ca
4X White Hake*	85 - 88	49-50	Bundy	(902) 426-8353	BundyA@mar.dfo-mpo.gc.ca
4VWX Wolffish*	89-92	51-52	McRuer	(902) 426-3310	McruerJ@mar.dfo-mpo.gc.ca
4VWX Cusk*	93-96	53-54	Comeau	(902) 426-5418	ComeauP@mar.dfo-mpo.gc.ca
4VW Lumpfish	97-100	55-56	Wilson	(902) 426-3318	WilsonS@mar.dfo-mpo.gc.ca
4X Lumpfish	101-104	57-58	Wilson	(902) 426-3318	WilsonS@mar.dfo-mpo.gc.ca

Stock	Figures	Pages	Investigator	Telephone	E-mail
4VW Turbot	105-108	59-60	Stobo	(902) 426-3316	StoboW@mar.dfo-mpo.gc.ca
4VWX Spiny Dogfish	109-112	61-62	Campana	(902) 426-3233	CampanaS@dfo-mpo.gc.ca

* was assessed in 2002. Stock Status reports are available at <http://www.dfo-mpo.gc.ca/csas/>.

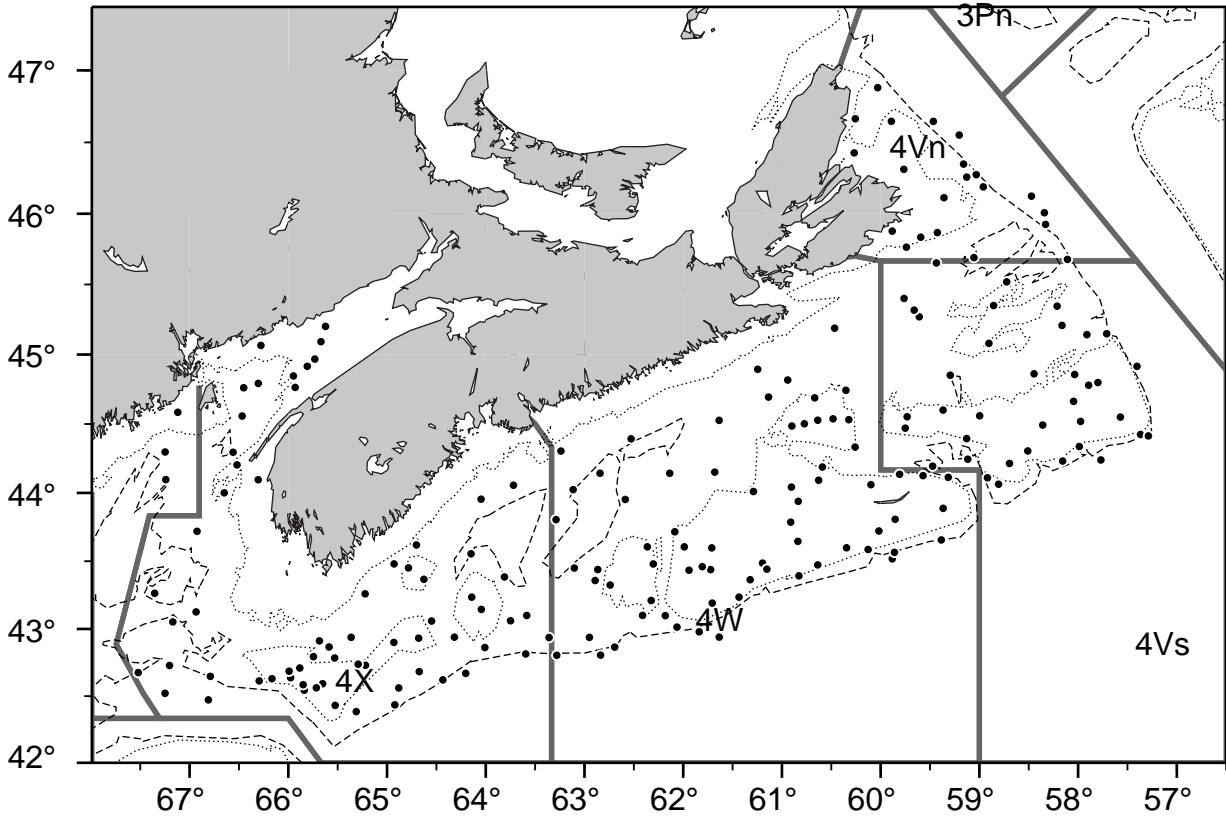


Fig. 1. SUMMER Groundfish Survey Positions 1999

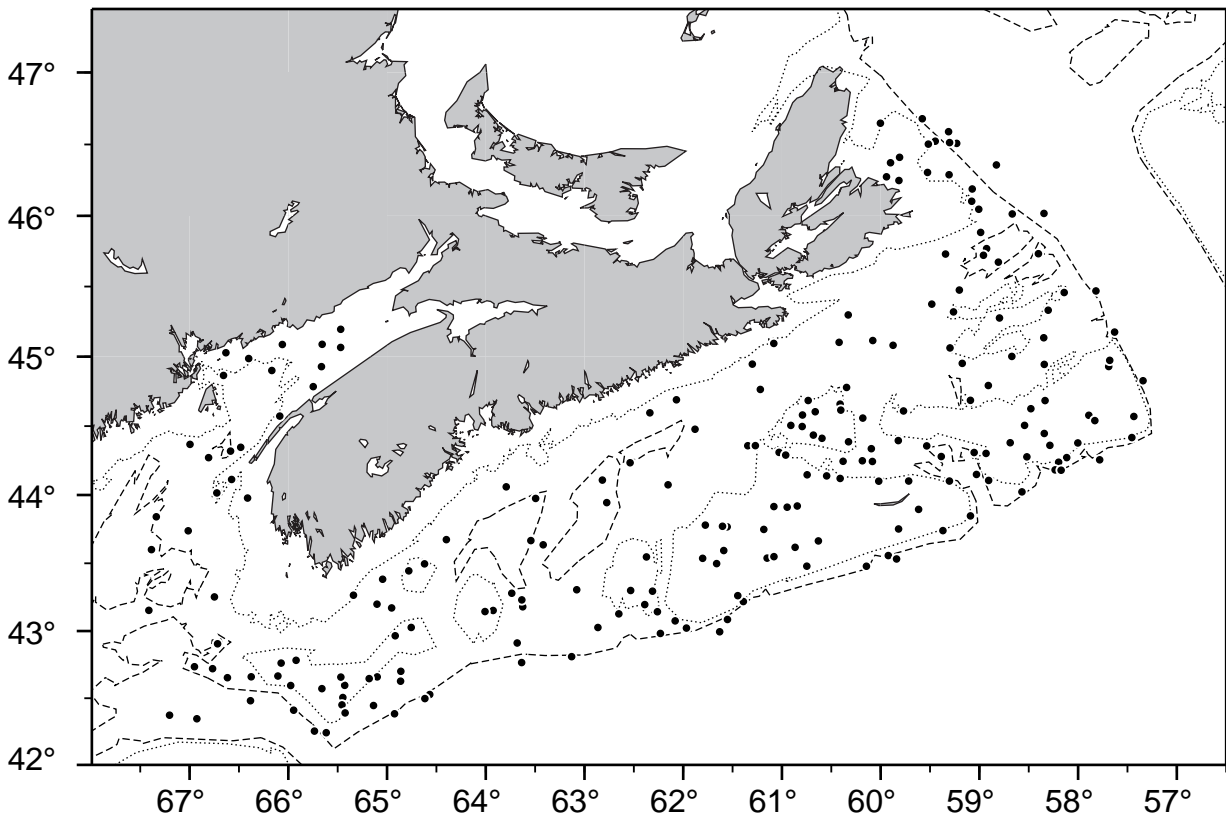


Fig. 2. SUMMER Groundfish Survey Positions 2000

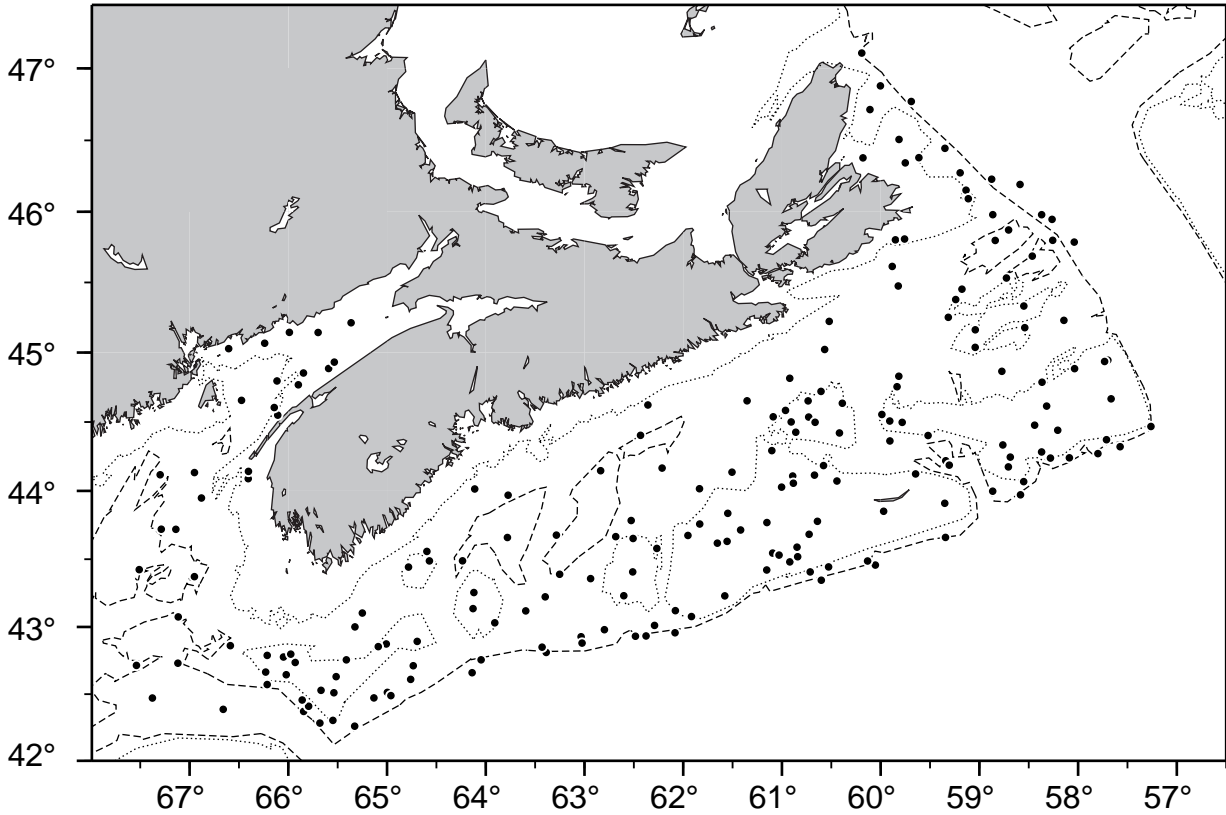


Fig. 3. SUMMER Groundfish Survey Positions 2001

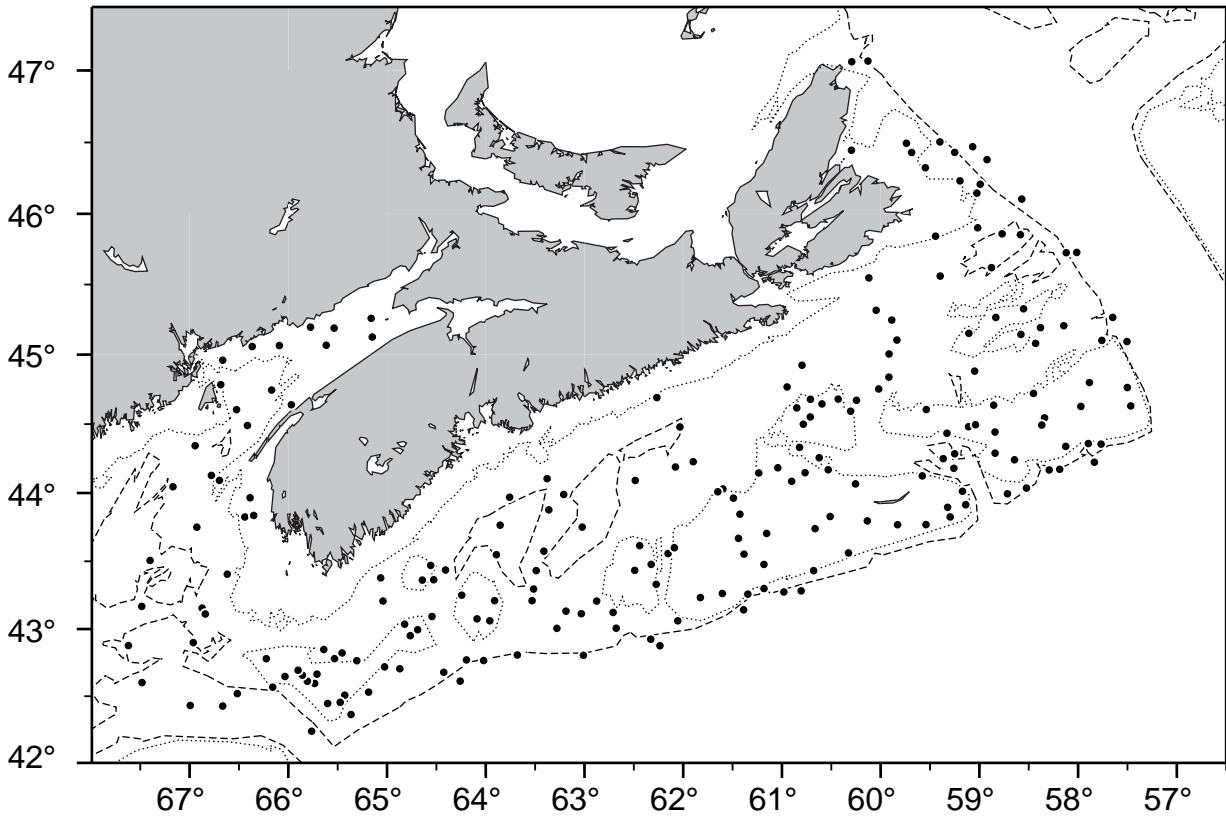


Fig. 4. SUMMER Groundfish Survey Positions 2002

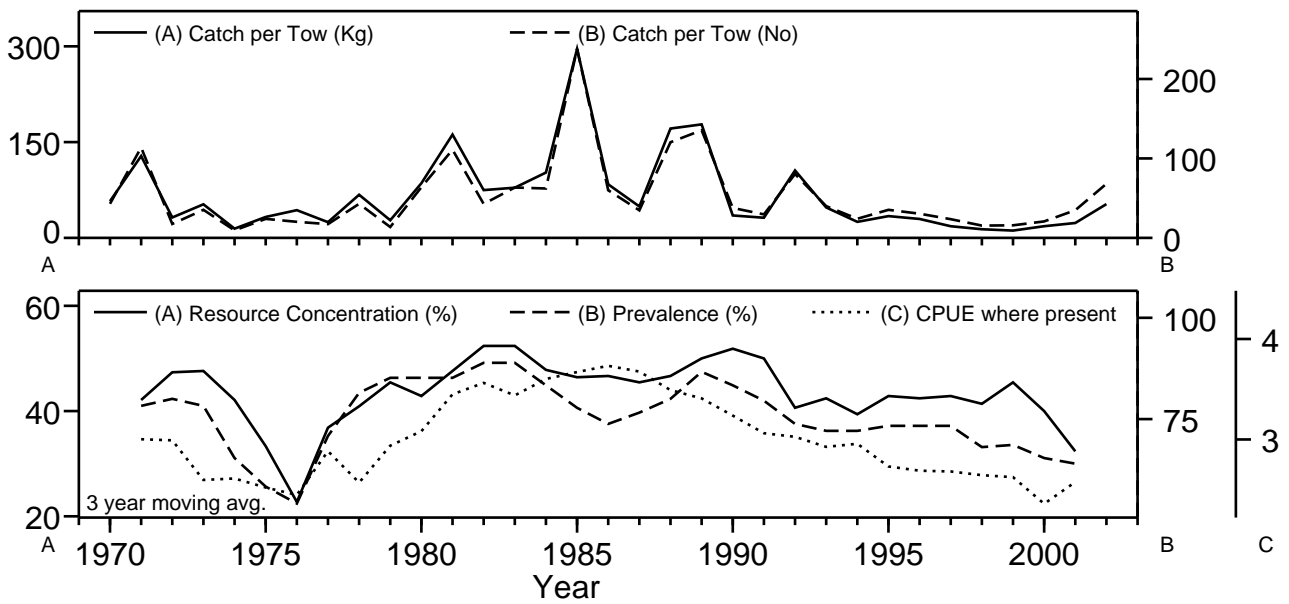


Fig. 5. 4Vn Cod stratified mean weight caught per tow, stratified mean number caught per tow, resource concentration, prevalence and CPUE where present (log number/tow) from the SUMMER Groundfish surveys.

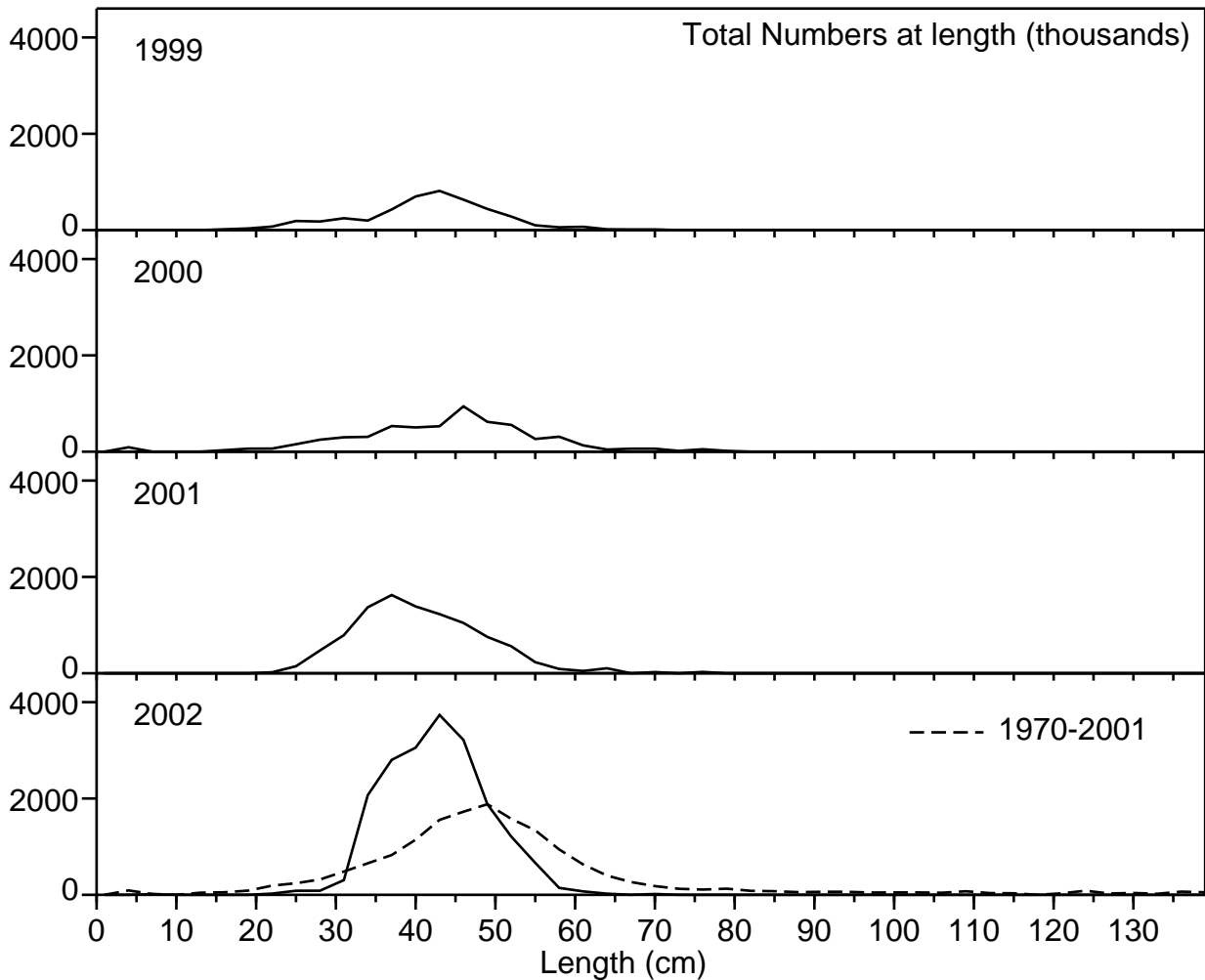


Fig. 6. 4Vn Cod length frequency distribution from the SUMMER Groundfish surveys.

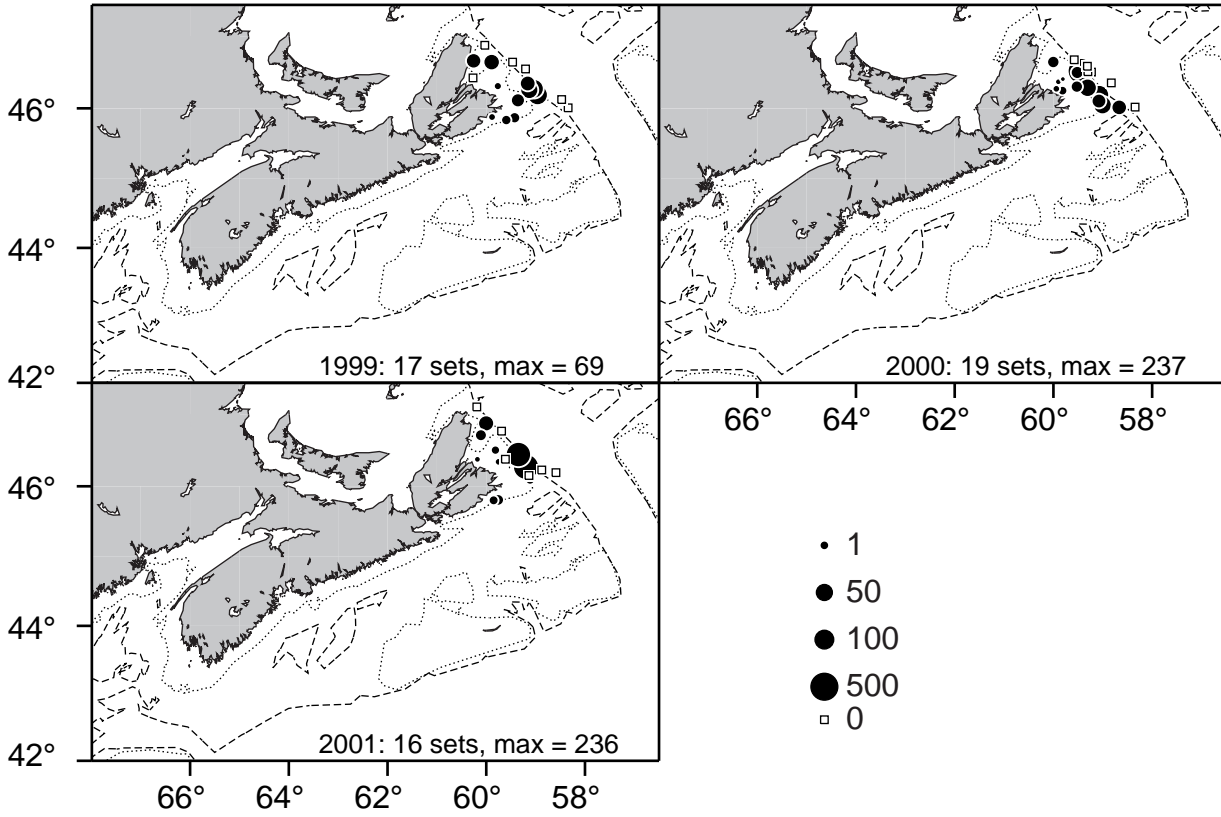


Fig. 7. 4Vn Cod Biomass (kg/tow) from the 1999-2001 SUMMER Groundfish Surveys.

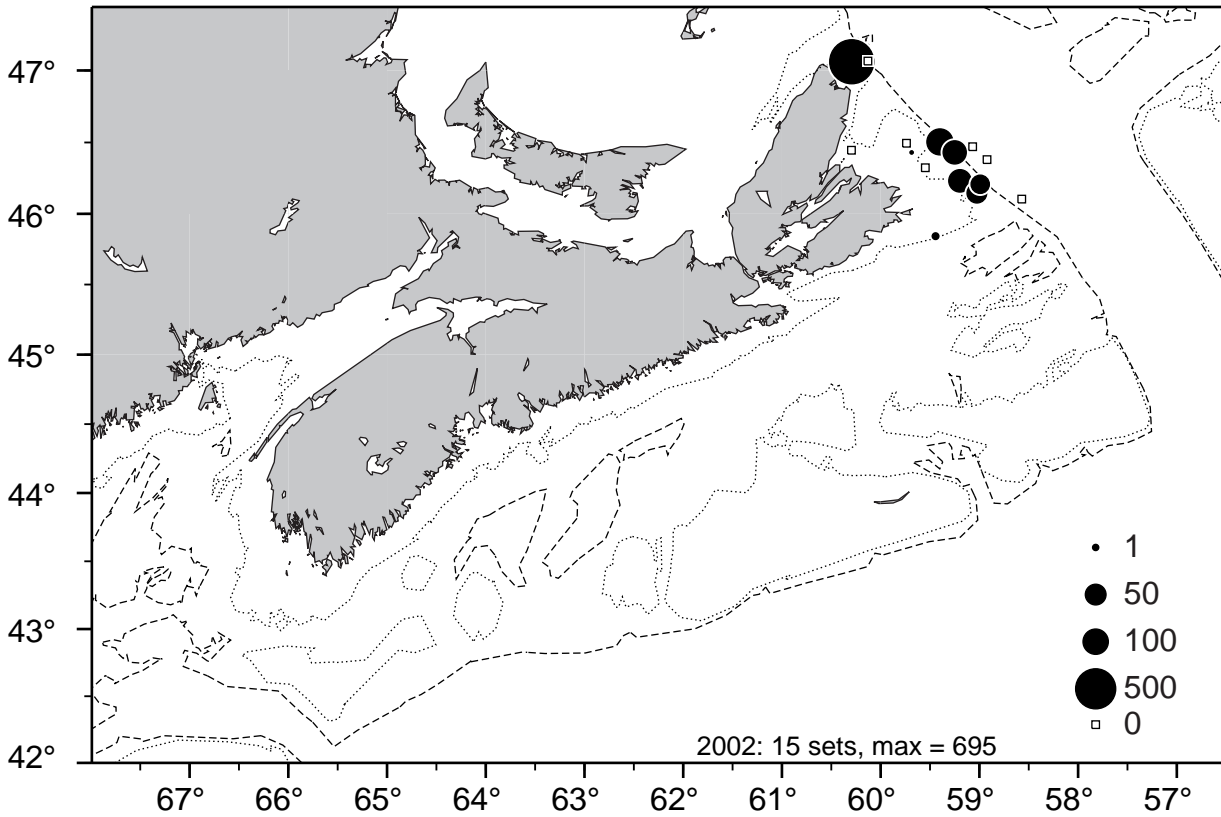


Fig. 8. 4Vn Cod Biomass (kg/tow) from the 2002 SUMMER Groundfish Survey.

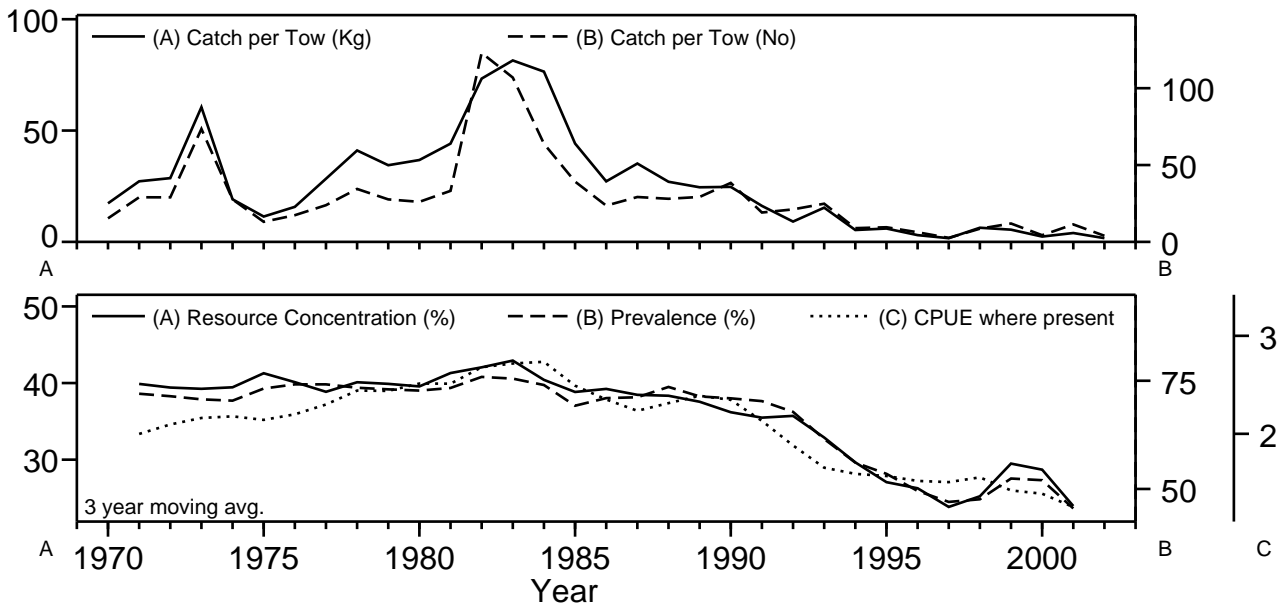


Fig. 9. 4VsW Cod stratified mean weight caught per tow, stratified mean number caught per tow, resource concentration, prevalence and CPUE where present (log number/tow) from the SUMMER Groundfish surveys.

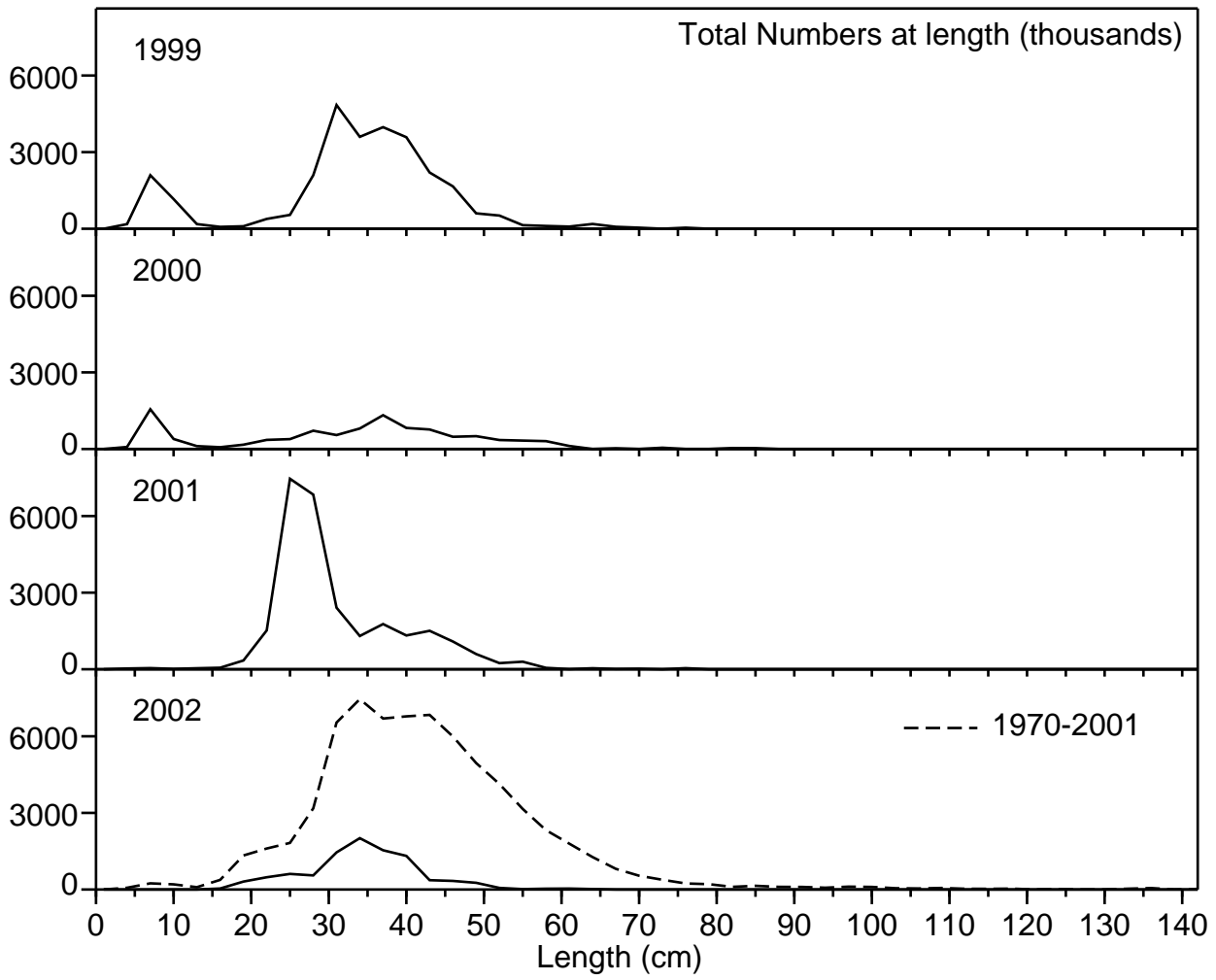


Fig. 10. 4VsW Cod length frequency distribution from the SUMMER Groundfish surveys.

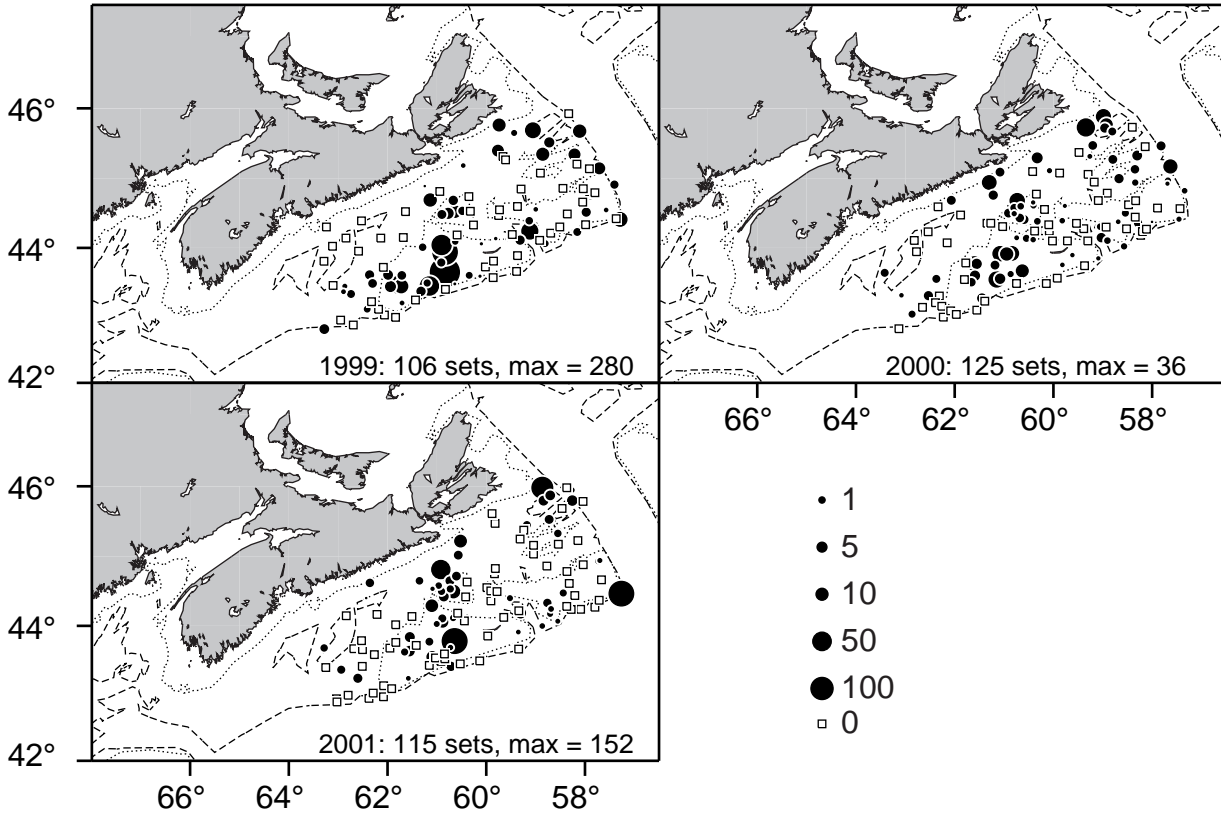


Fig. 11. 4VsW Cod Biomass (kg/tow) from the 1999-2001 SUMMER Groundfish Surveys.

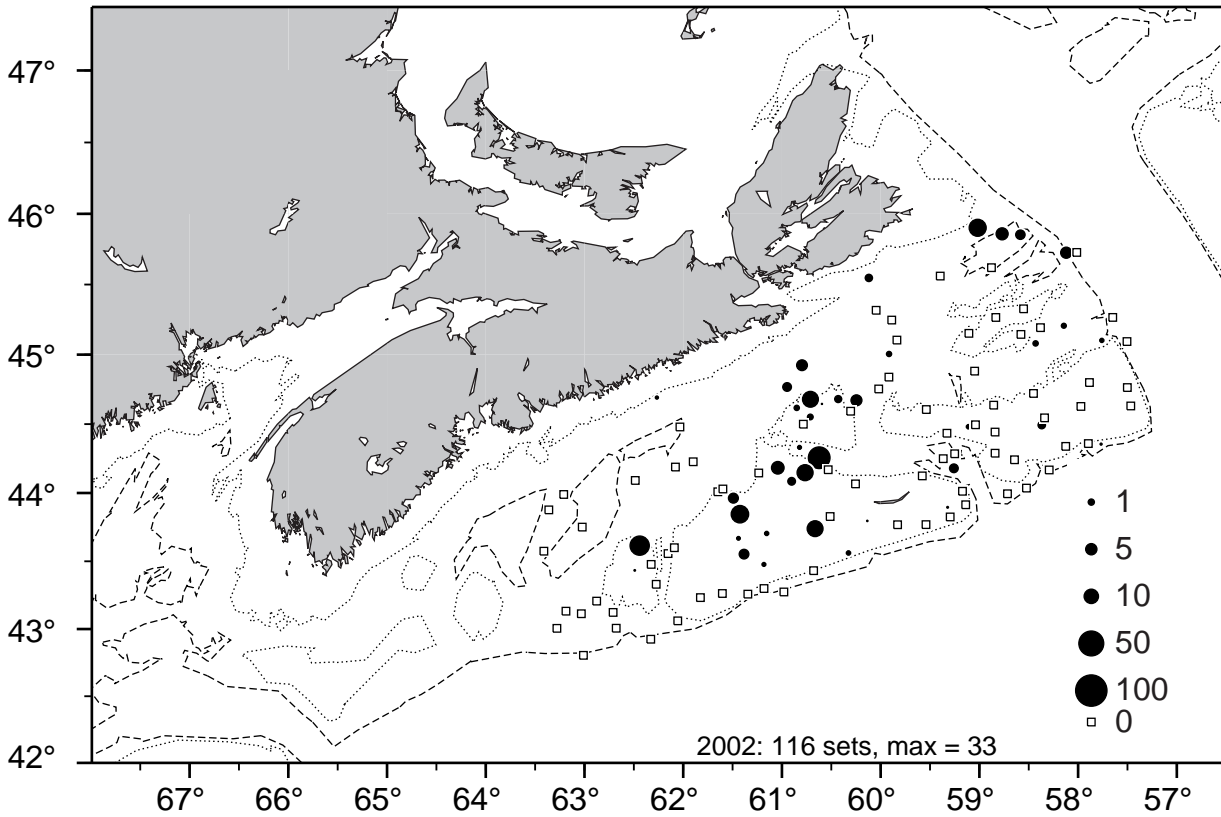


Fig. 12. 4VsW Cod Biomass (kg/tow) from the 2002 SUMMER Groundfish Survey.

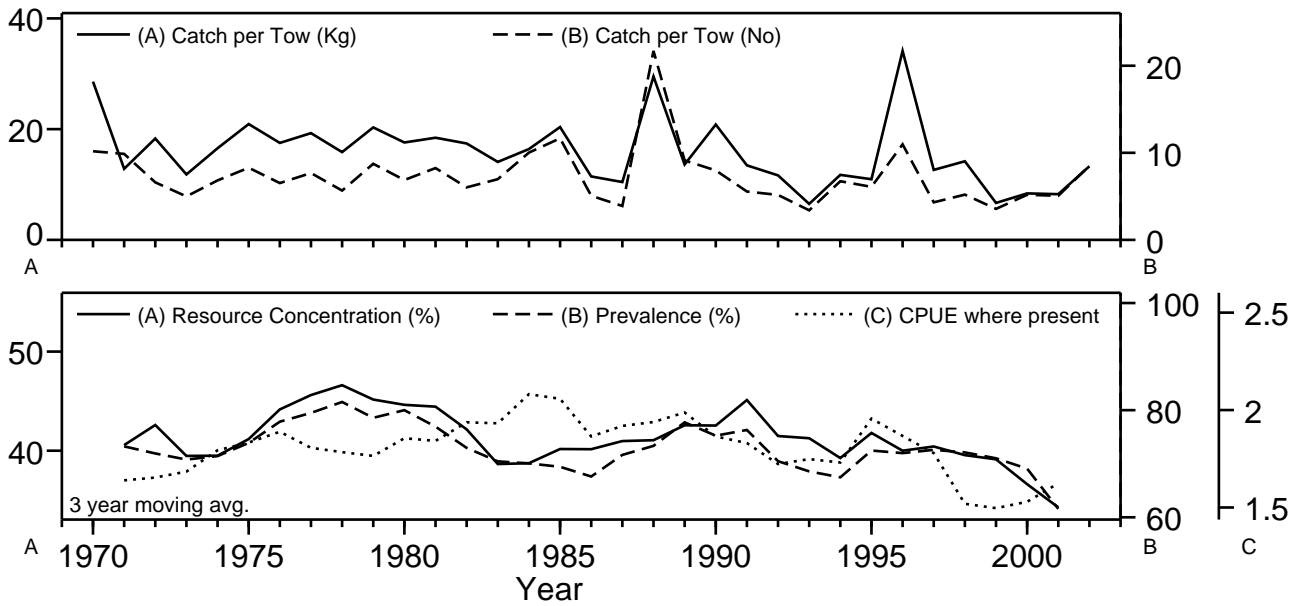


Fig. 13. 4X Cod stratified mean weight caught per tow, stratified mean number caught per tow, resource concentration, prevalence and CPUE where present (log number/tow) from the SUMMER Groundfish surveys.

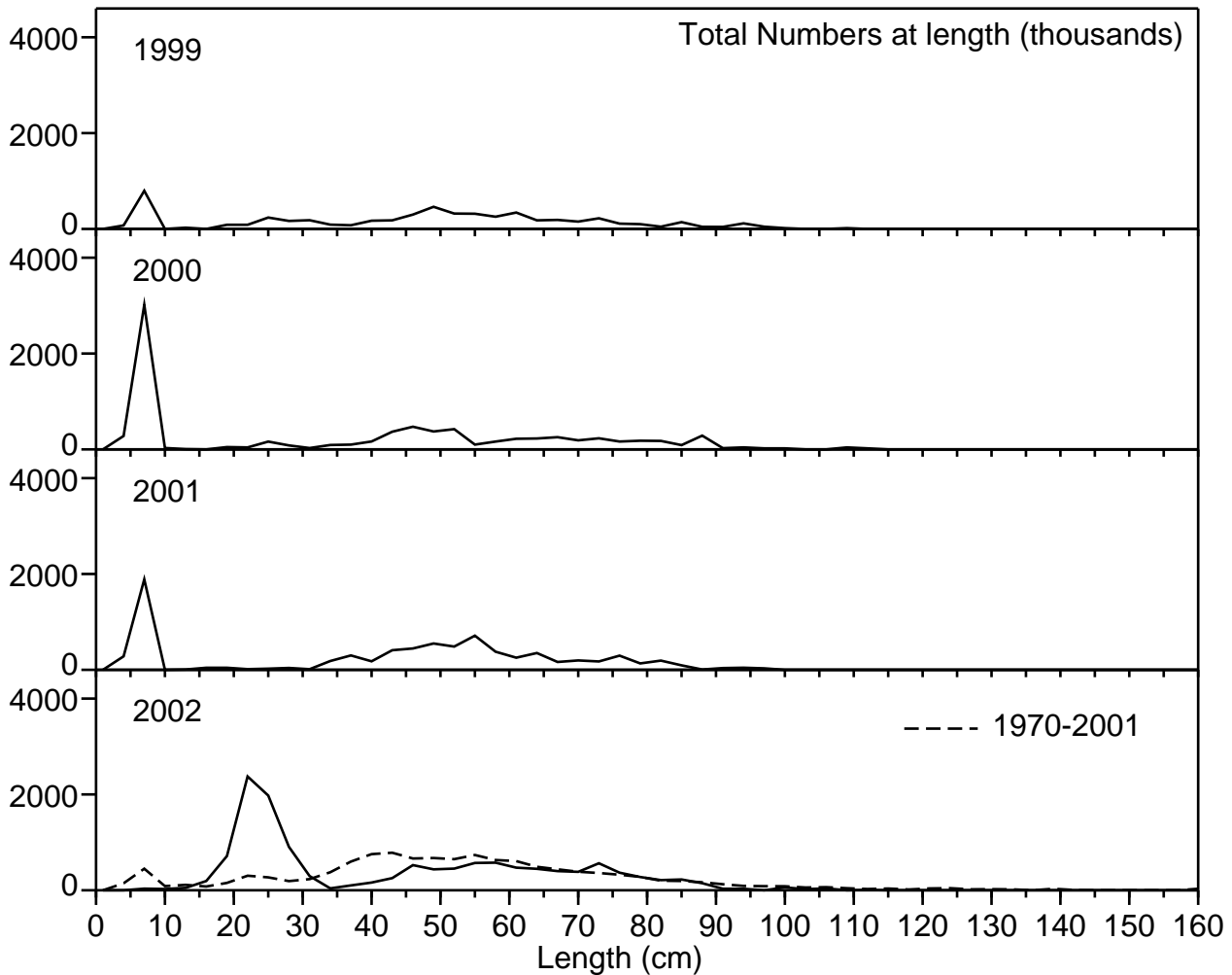


Fig. 14. 4X Cod length frequency distribution from the SUMMER Groundfish surveys.

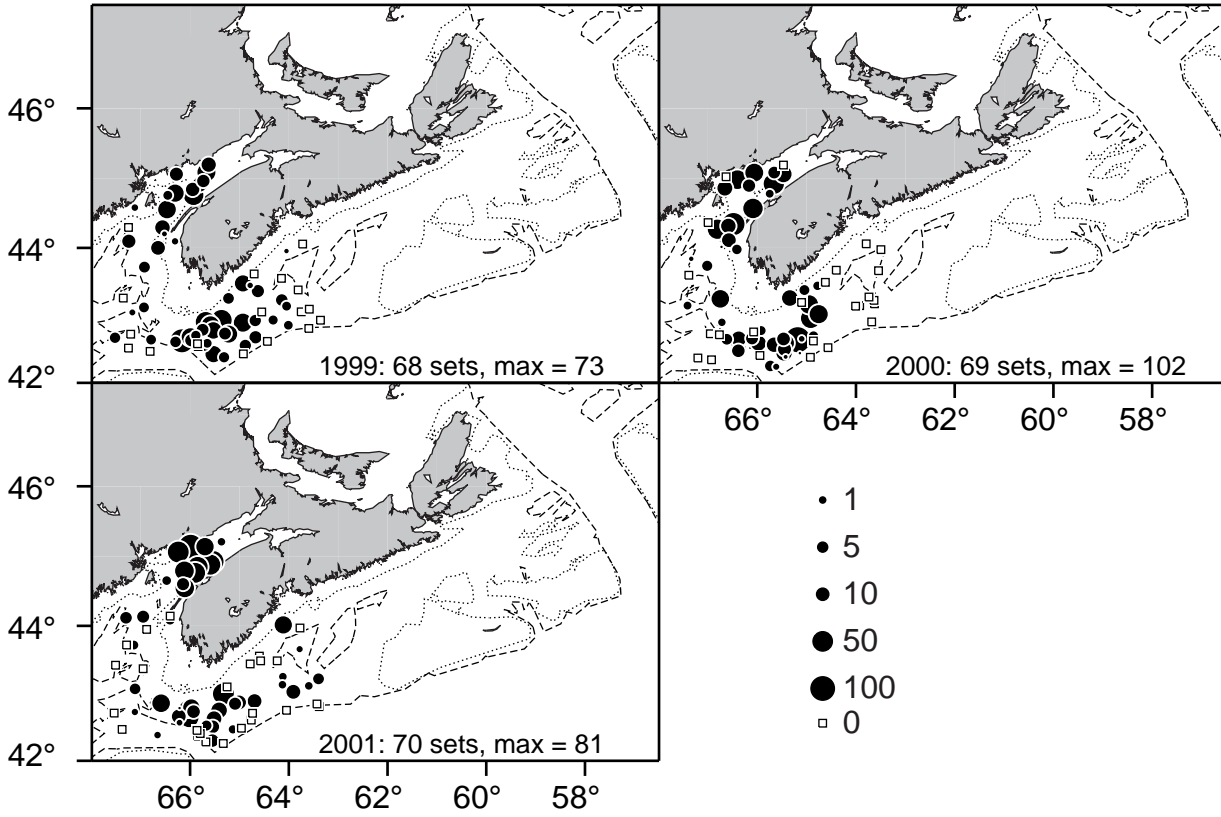


Fig. 15. 4X Cod Biomass (kg/tow) from the 1999-2001 SUMMER Groundfish Surveys.

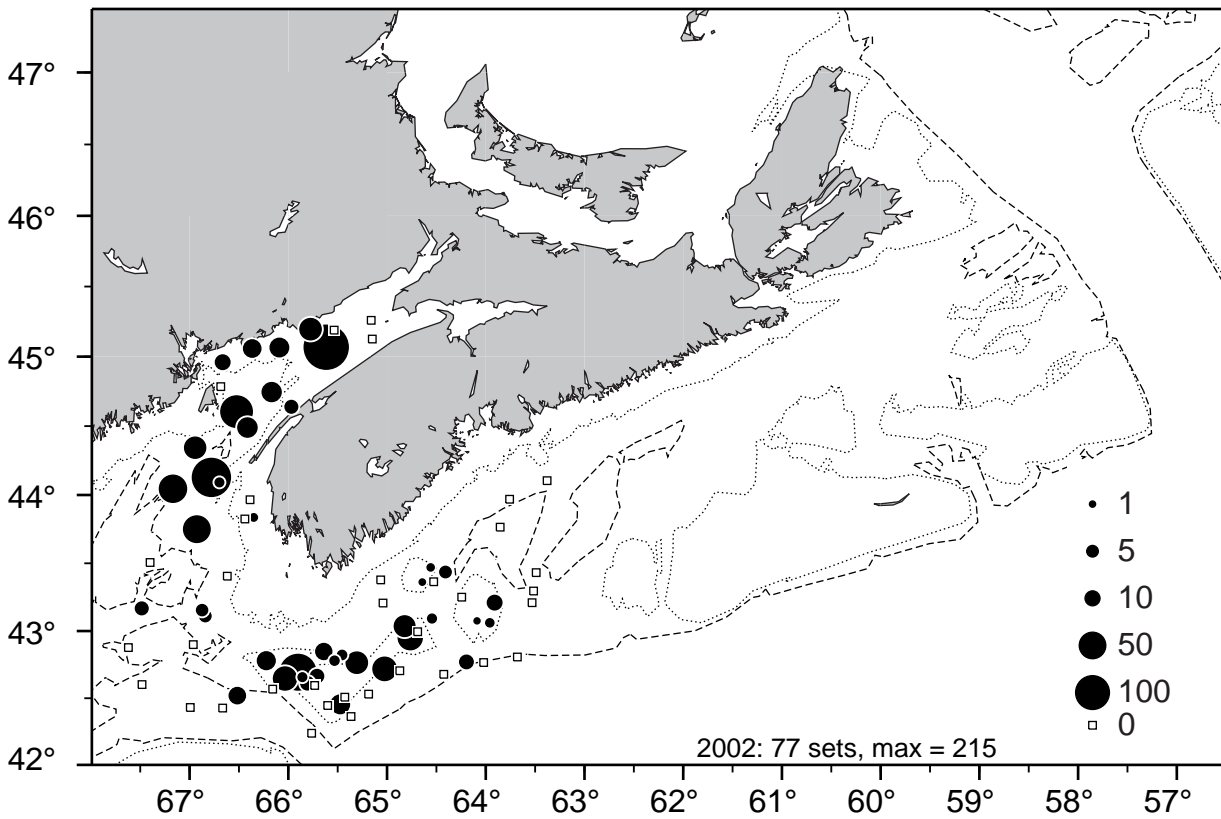


Fig. 16. 4X Cod Biomass (kg/tow) from the 2002 SUMMER Groundfish Survey.

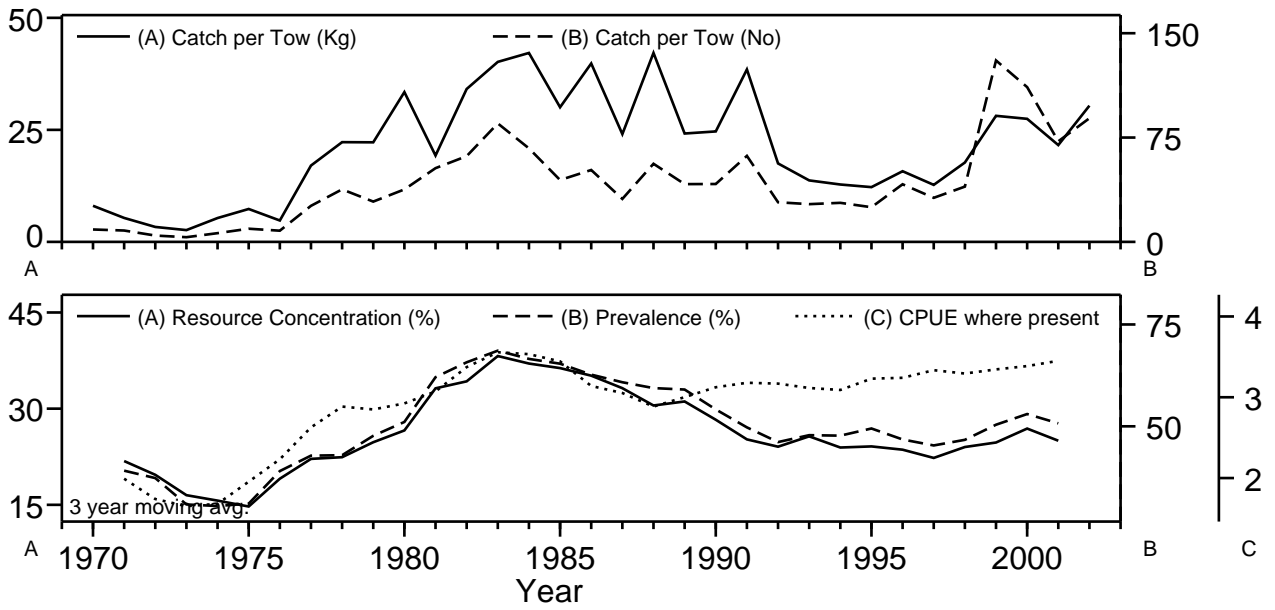


Fig. 17. 4VW Haddock stratified mean weight caught per tow, stratified mean number caught per tow, resource concentration, prevalence and CPUE where present (log number/tow) from the SUMMER Groundfish surveys.

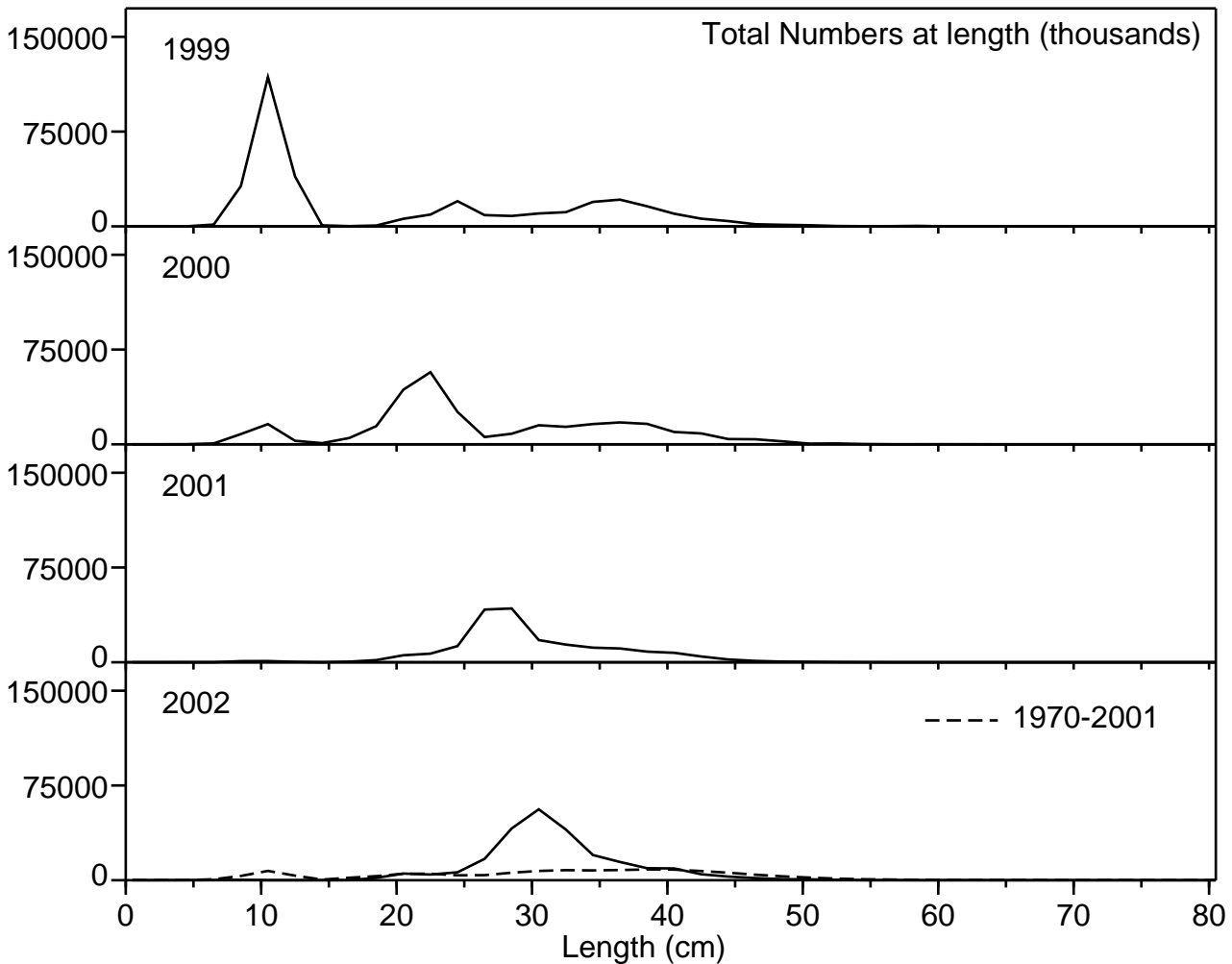


Fig. 18. 4VW Haddock length frequency distribution from the SUMMER Groundfish surveys.

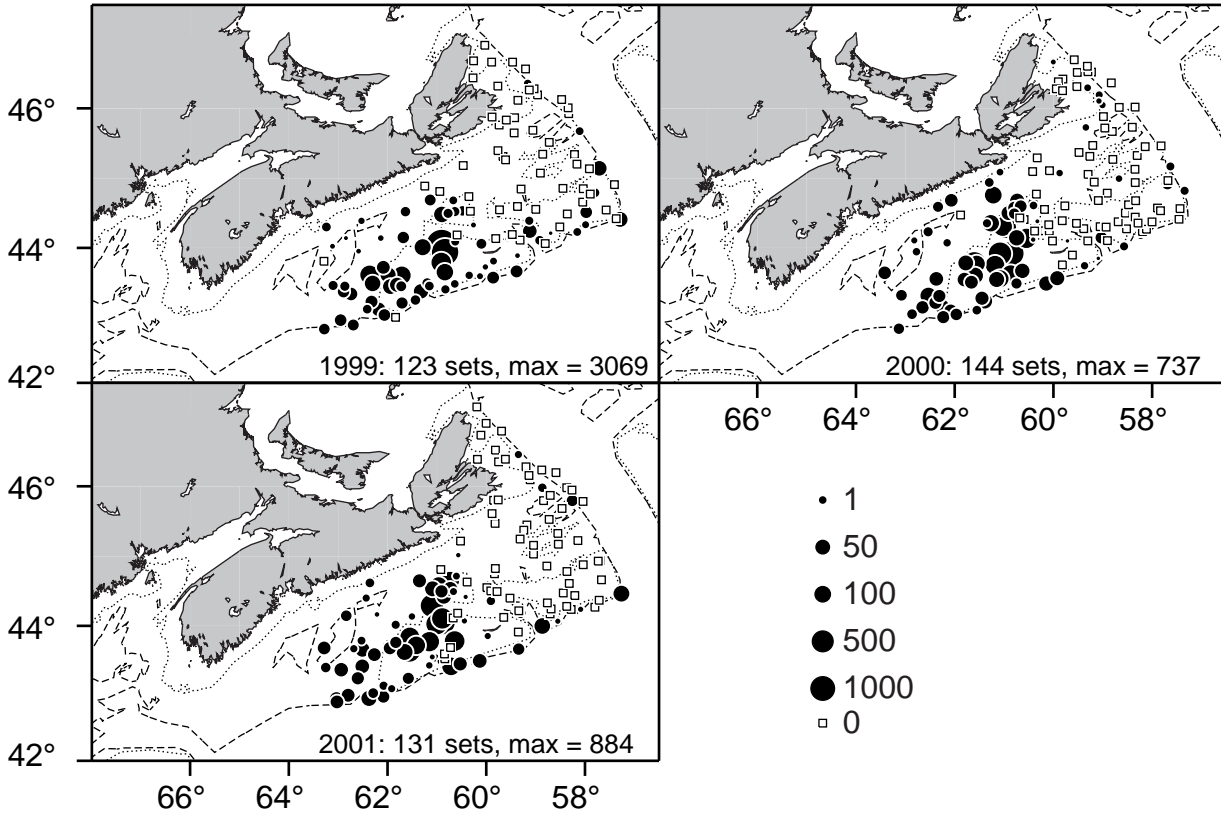


Fig. 19. 4VW Haddock Biomass (kg/tow) from the 1999-2001 SUMMER Groundfish Surveys.

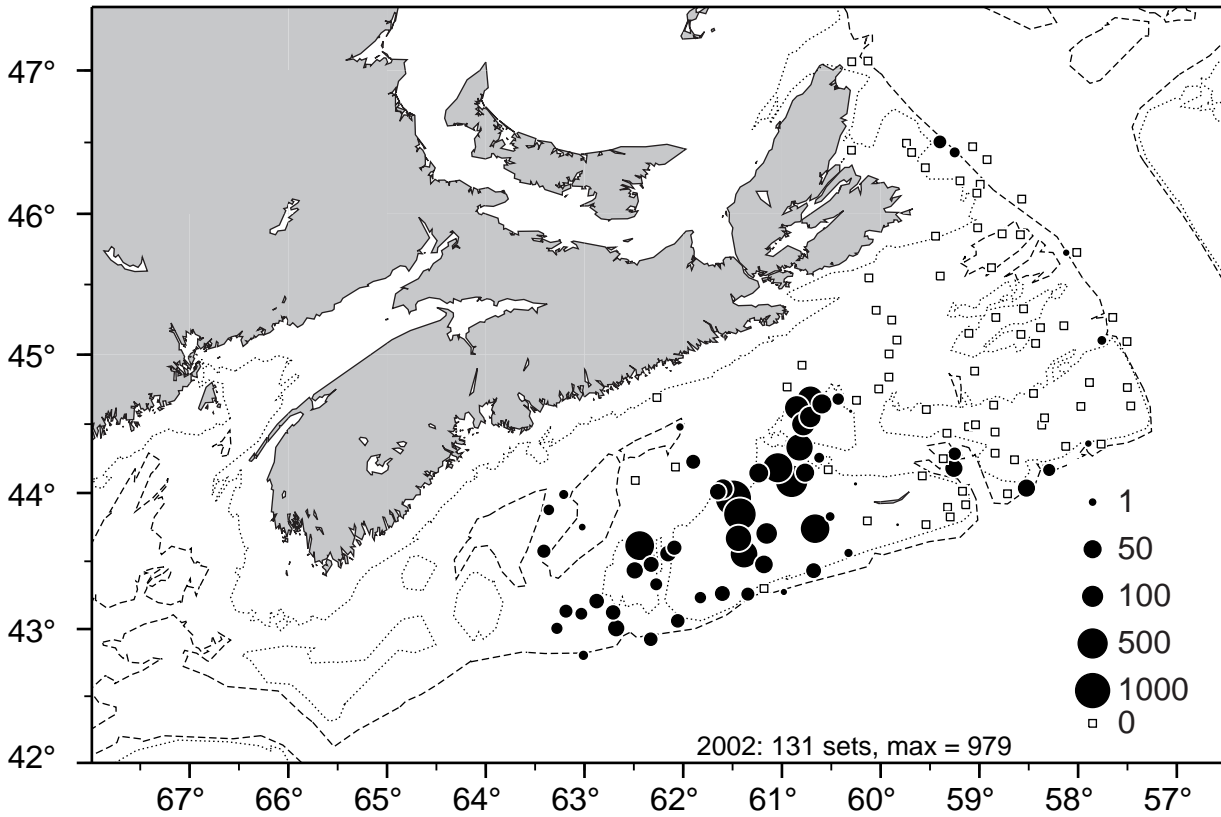


Fig. 20. 4VW Haddock Biomass (kg/tow) from the 2002 SUMMER Groundfish Survey.

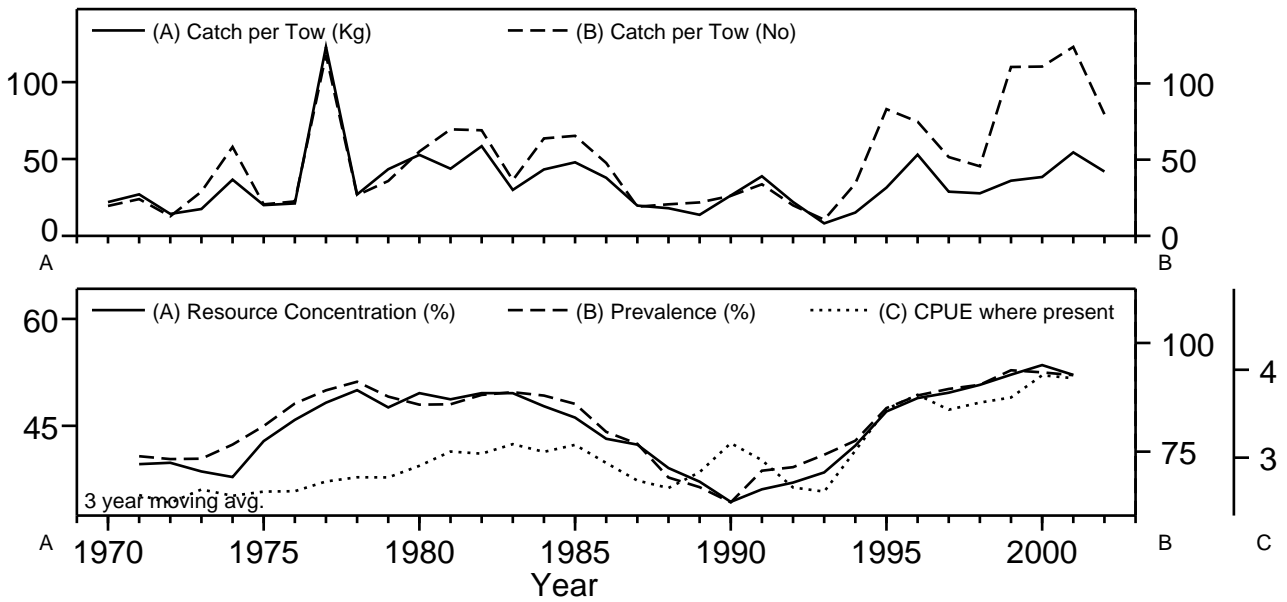


Fig. 21. 4X Haddock stratified mean weight caught per tow, stratified mean number caught per tow, resource concentration, prevalence and CPUE where present (log number/tow) from the SUMMER Groundfish surveys.

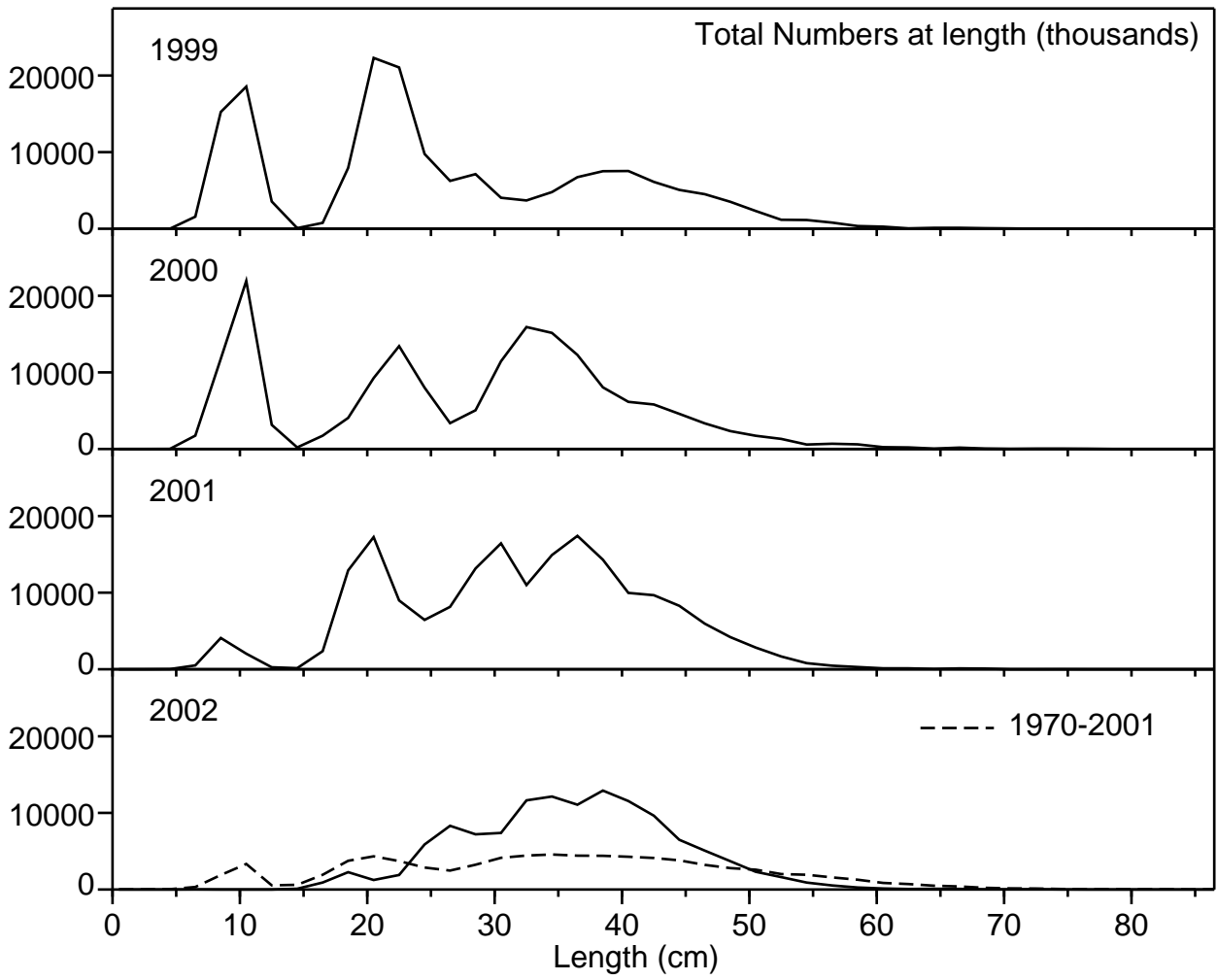


Fig. 22. 4X Haddock length frequency distribution from the SUMMER Groundfish surveys.

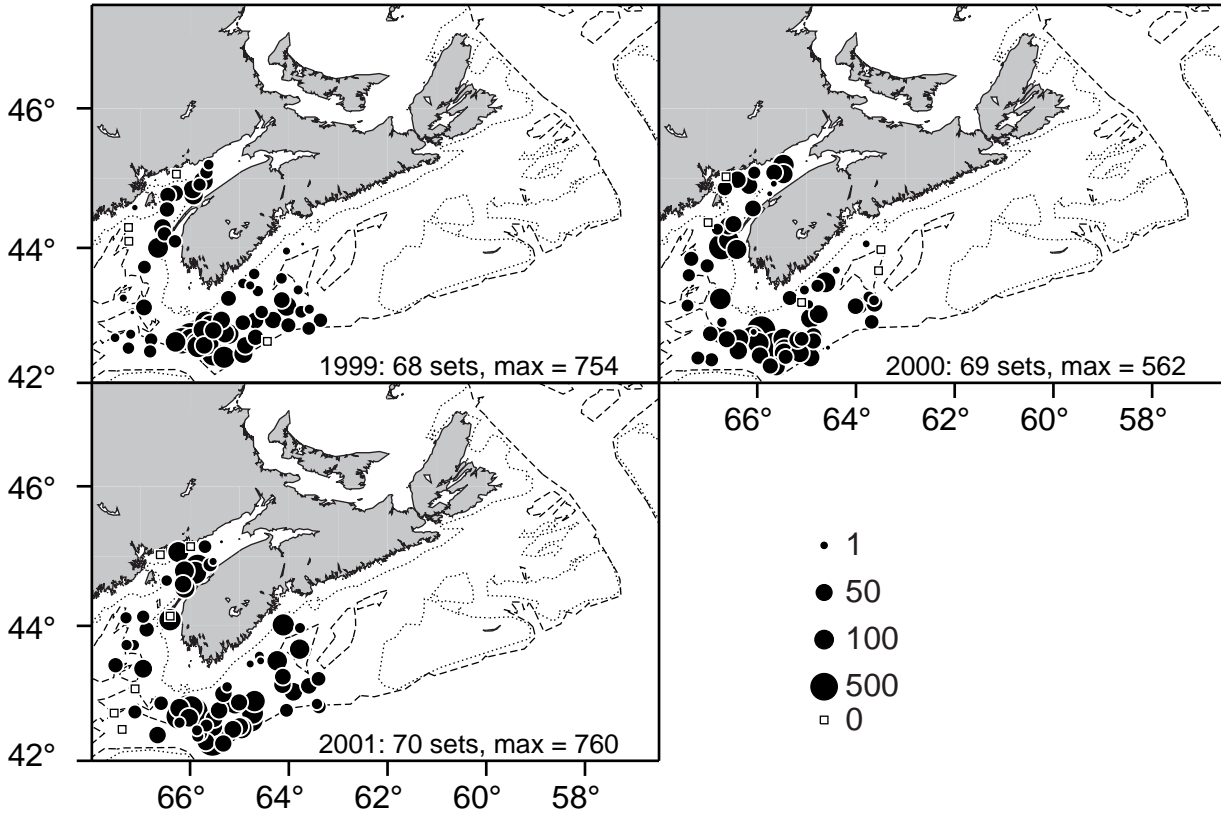


Fig. 23. 4X Haddock Biomass (kg/tow) from the 1999-2001 SUMMER Groundfish Surveys.

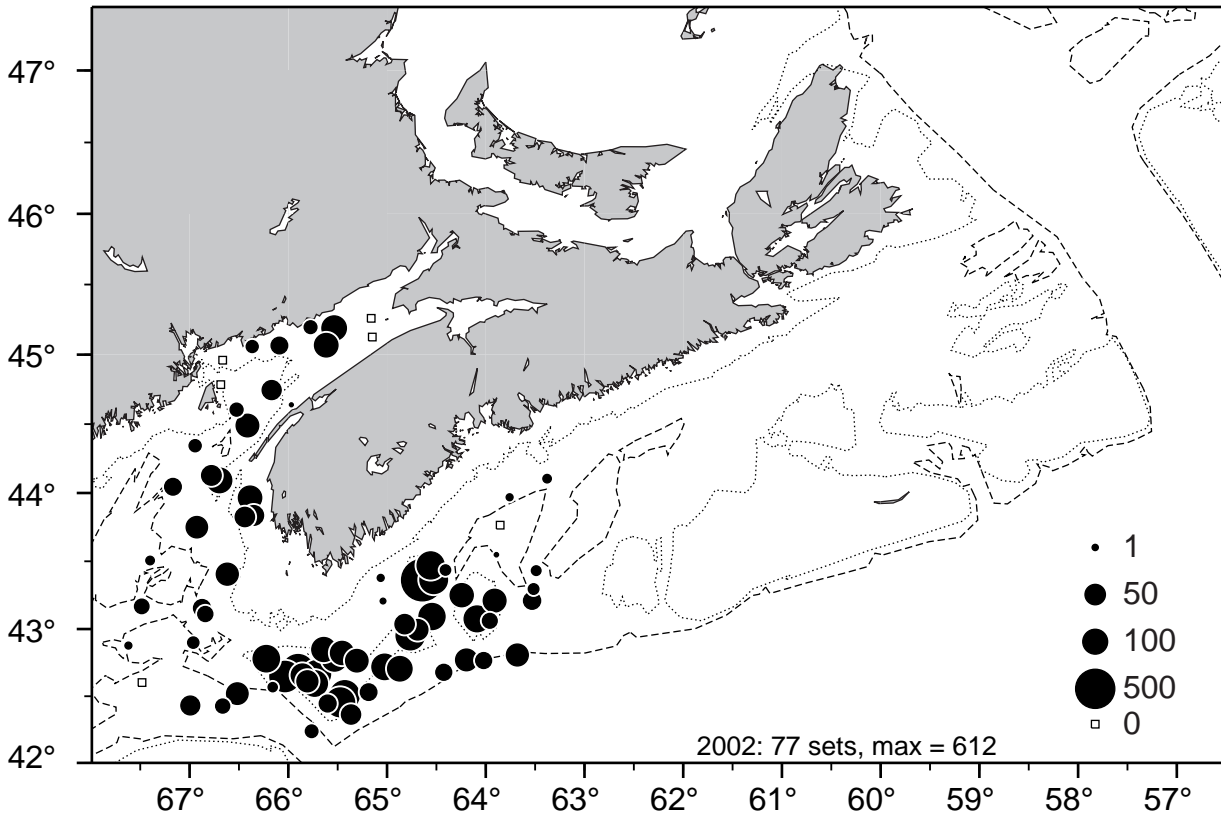


Fig. 24. 4X Haddock Biomass (kg/tow) from the 2002 SUMMER Groundfish Survey.

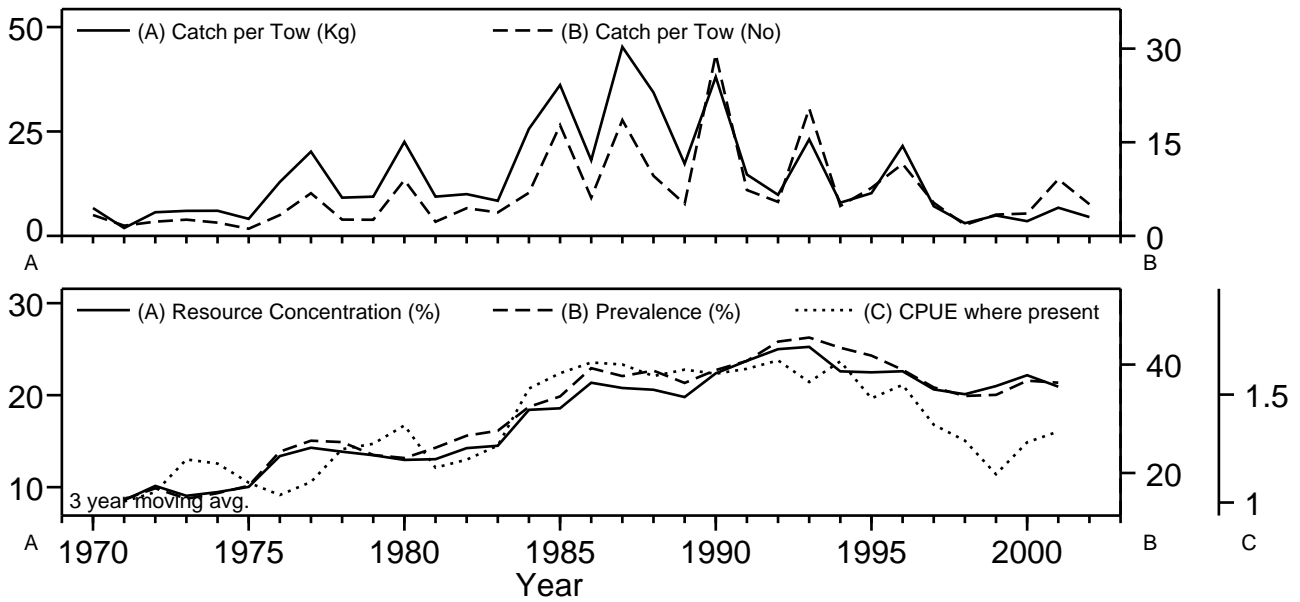


Fig. 25. 4VWX Pollock stratified mean weight caught per tow, stratified mean number caught per tow, resource concentration, prevalence and CPUE where present (log number/tow) from the SUMMER Groundfish surveys.

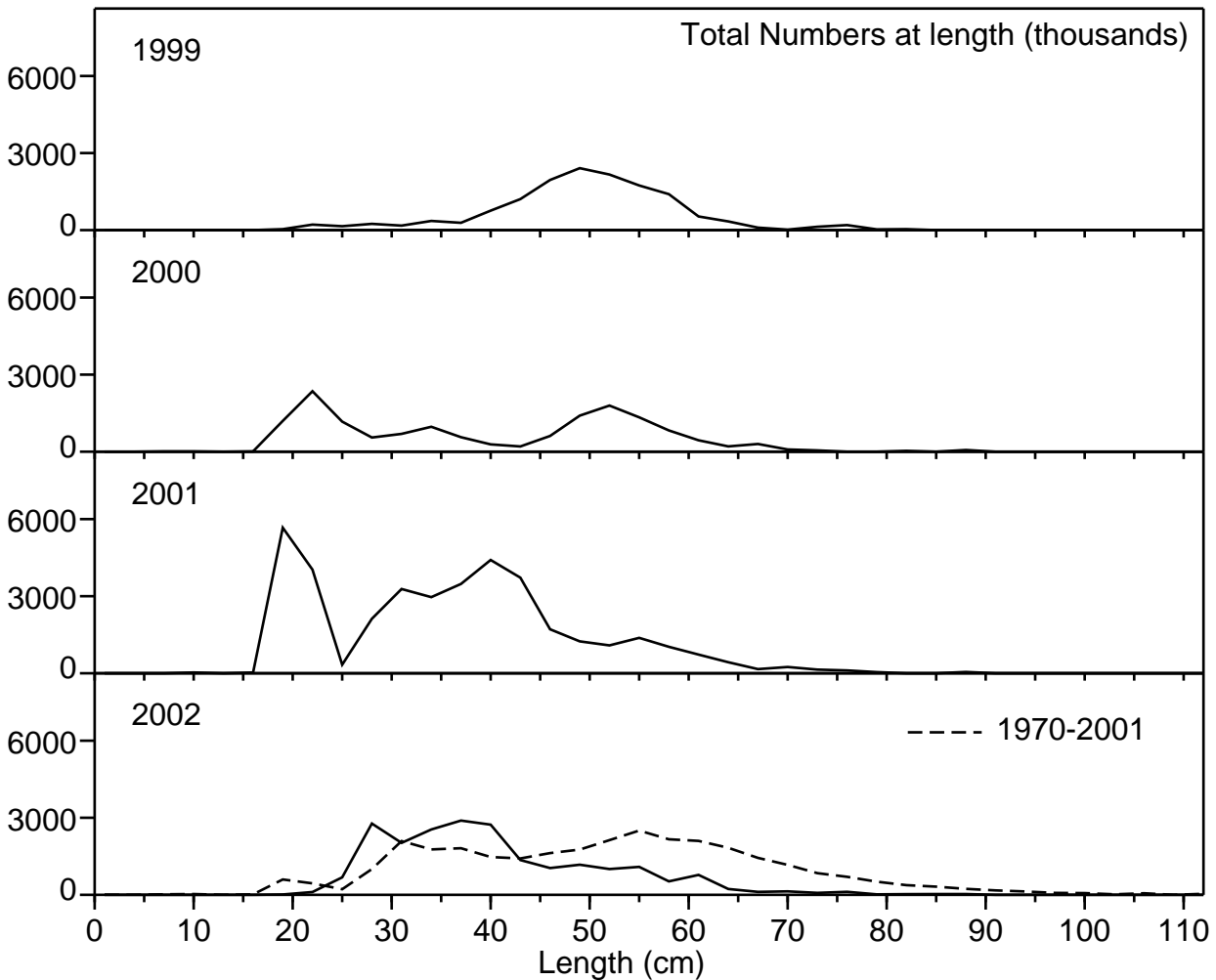


Fig. 26. 4VWX Pollock length frequency distribution from the SUMMER Groundfish surveys.

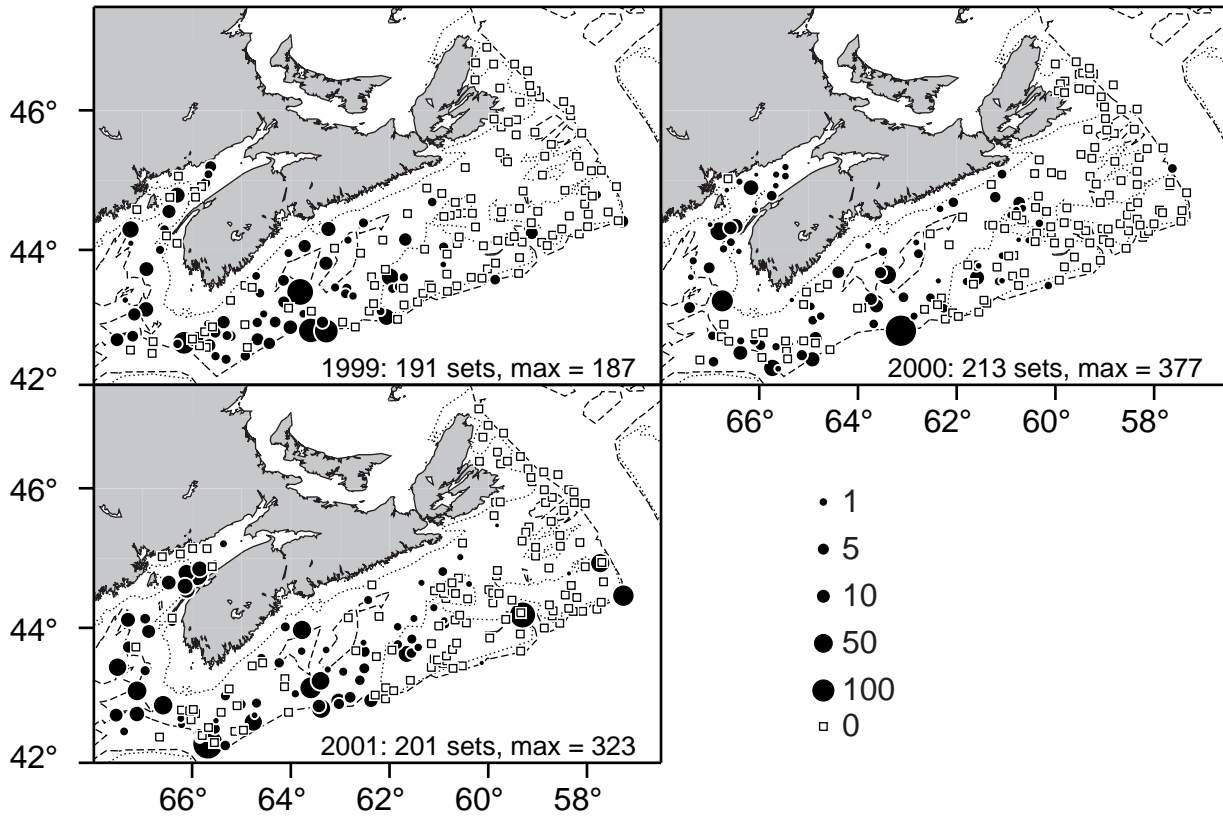


Fig. 27. 4VWX Pollock Biomass (kg/tow) from the 1999-2001 SUMMER Groundfish Surveys.

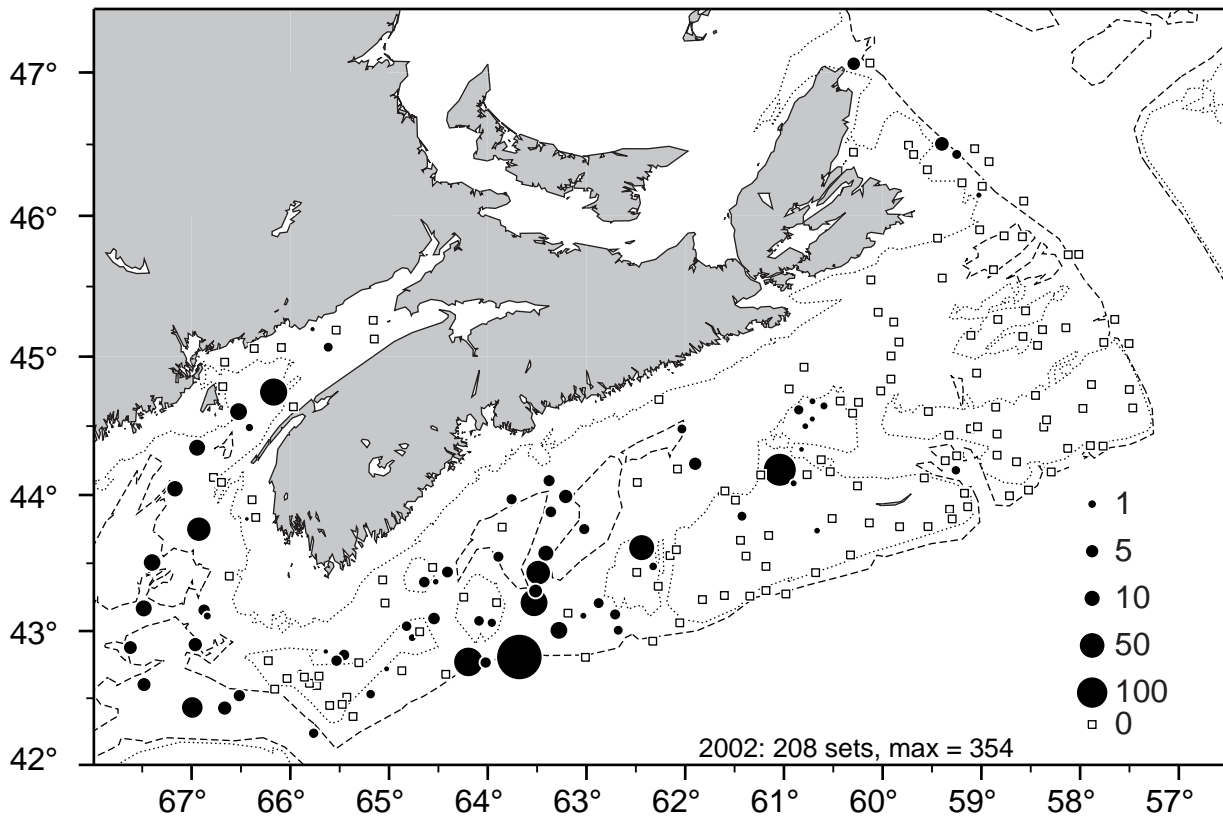


Fig. 28. 4VWX Pollock Biomass (kg/tow) from the 2002 SUMMER Groundfish Survey.

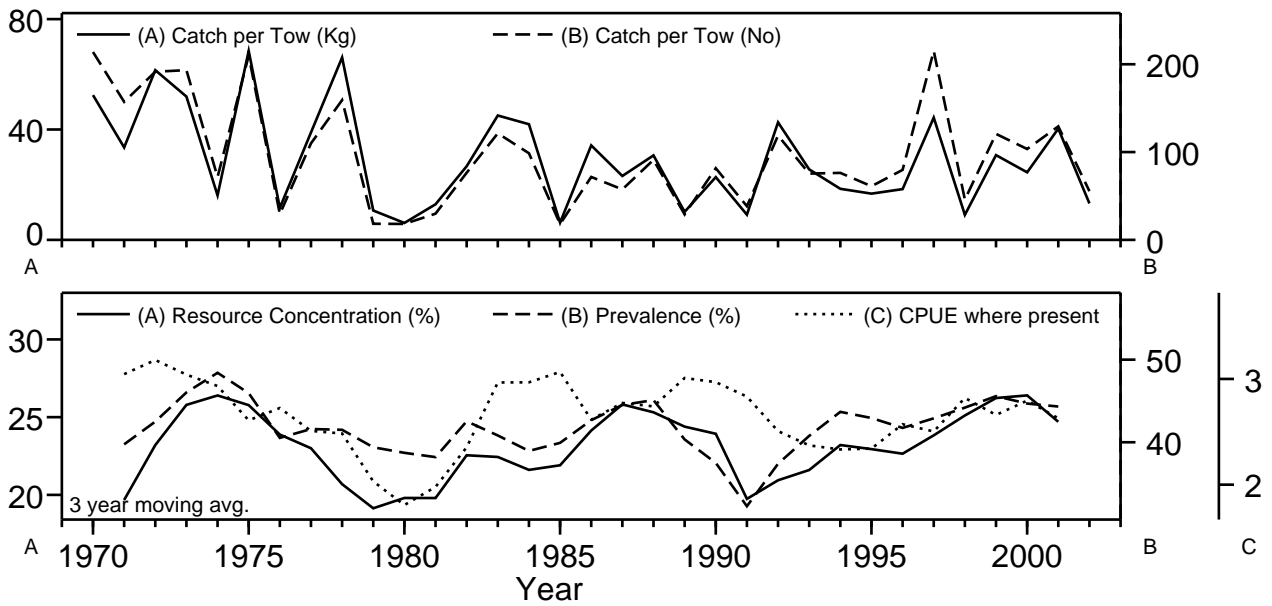


Fig. 29. Unit3 Redfish stratified mean weight caught per tow, stratified mean number caught per tow, resource concentration, prevalence and CPUE where present (log number/tow) from the SUMMER Groundfish surveys.

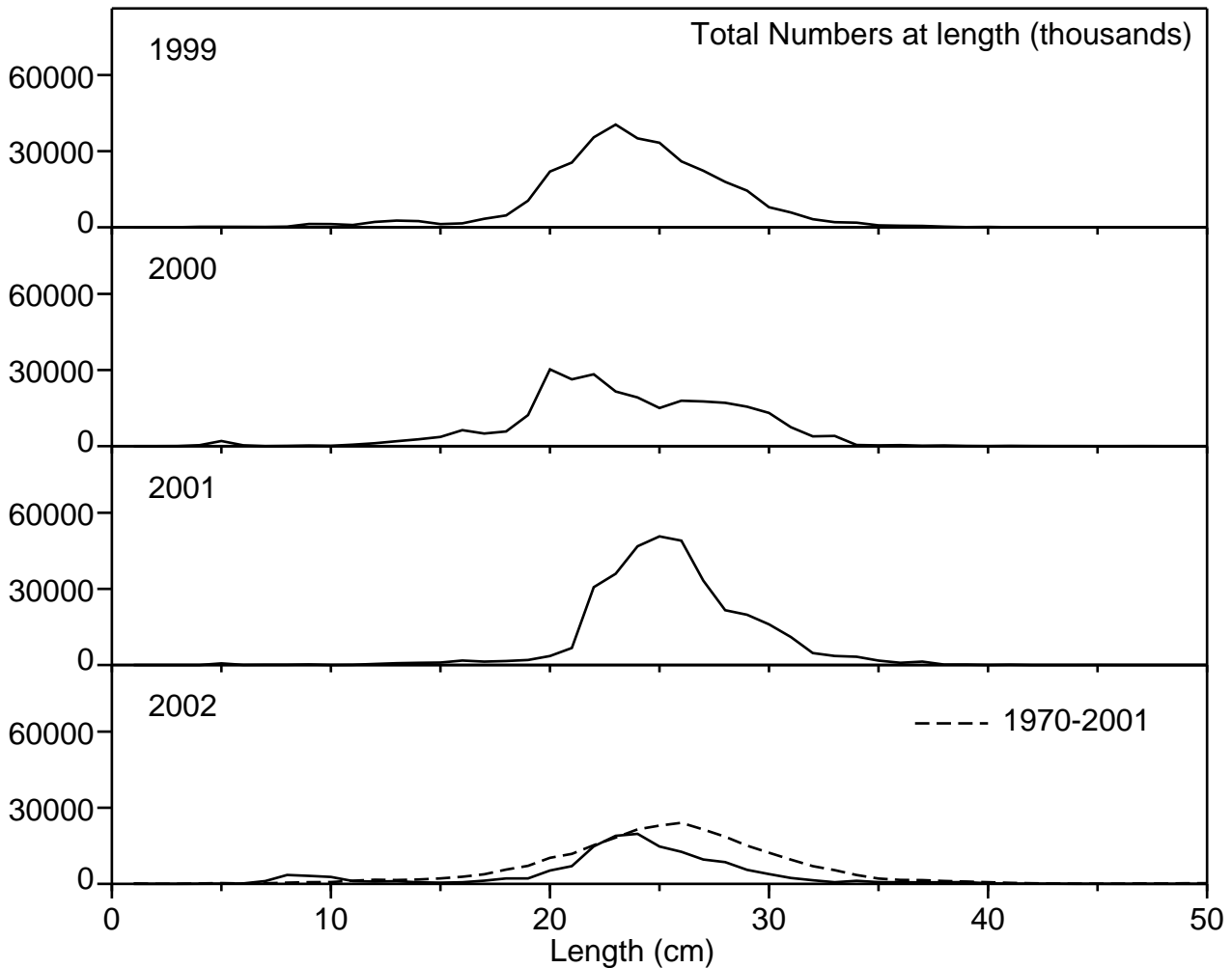


Fig. 30. Unit3 Redfish length frequency distribution from the SUMMER Groundfish surveys.

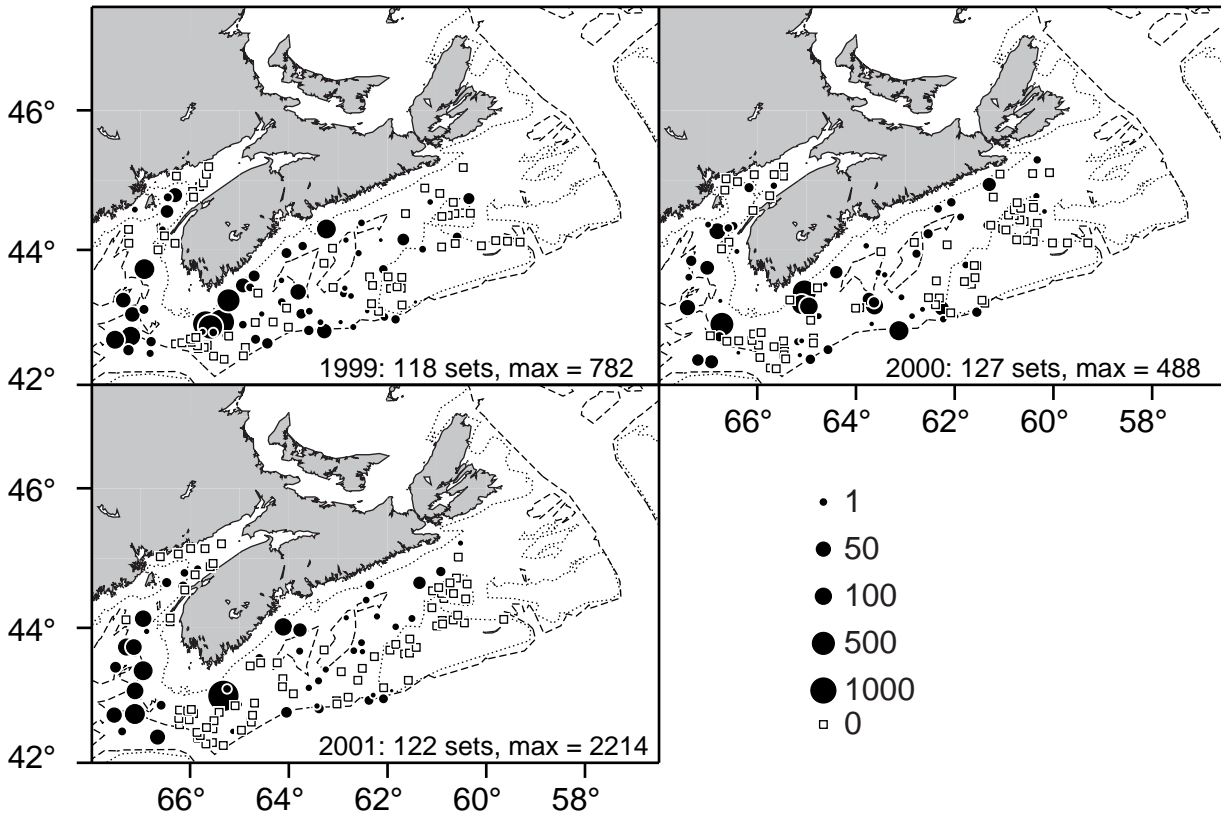


Fig. 31. Unit3 Redfish Biomass (kg/tow) from the 1999-2001 SUMMER Groundfish Surveys.

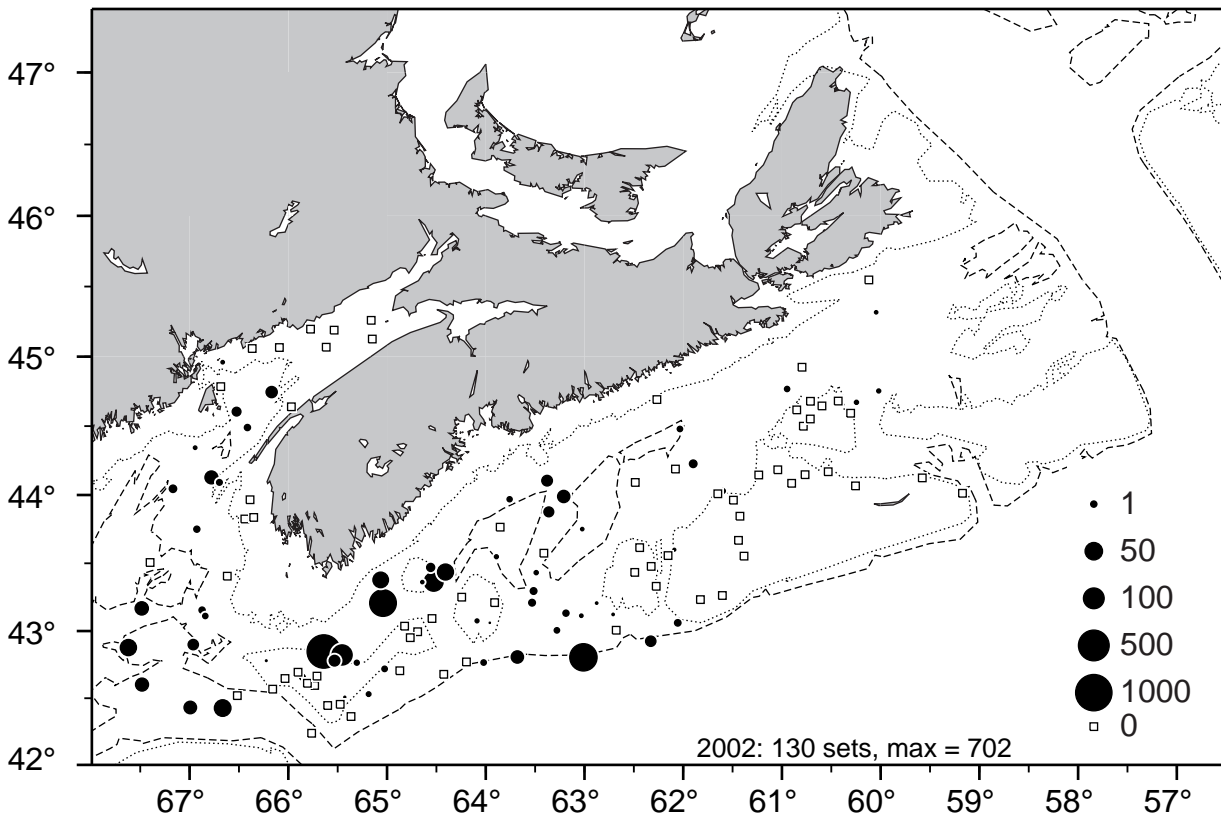


Fig. 32. Unit3 Redfish Biomass (kg/tow) from the 2002 SUMMER Groundfish Survey.

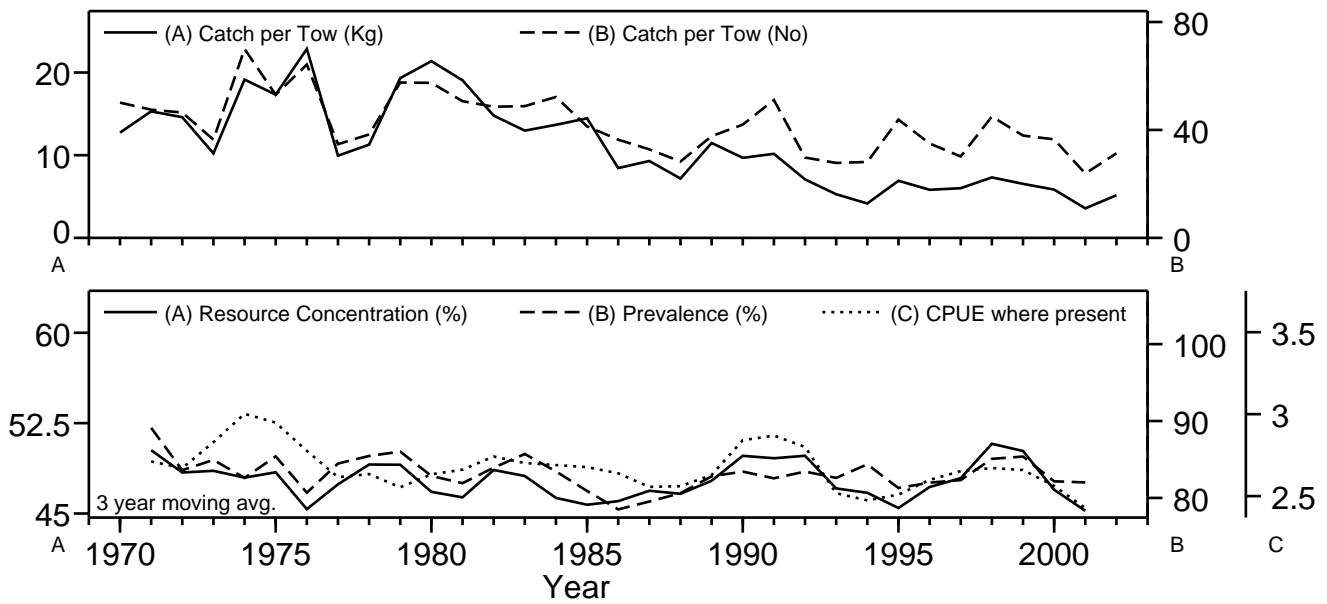


Fig. 33. 4VW American Plaice stratified mean weight caught per tow, stratified mean number caught per tow, resource concentration, prevalence and CPUE where present (log number/tow) from the SUMMER Groundfish surveys.

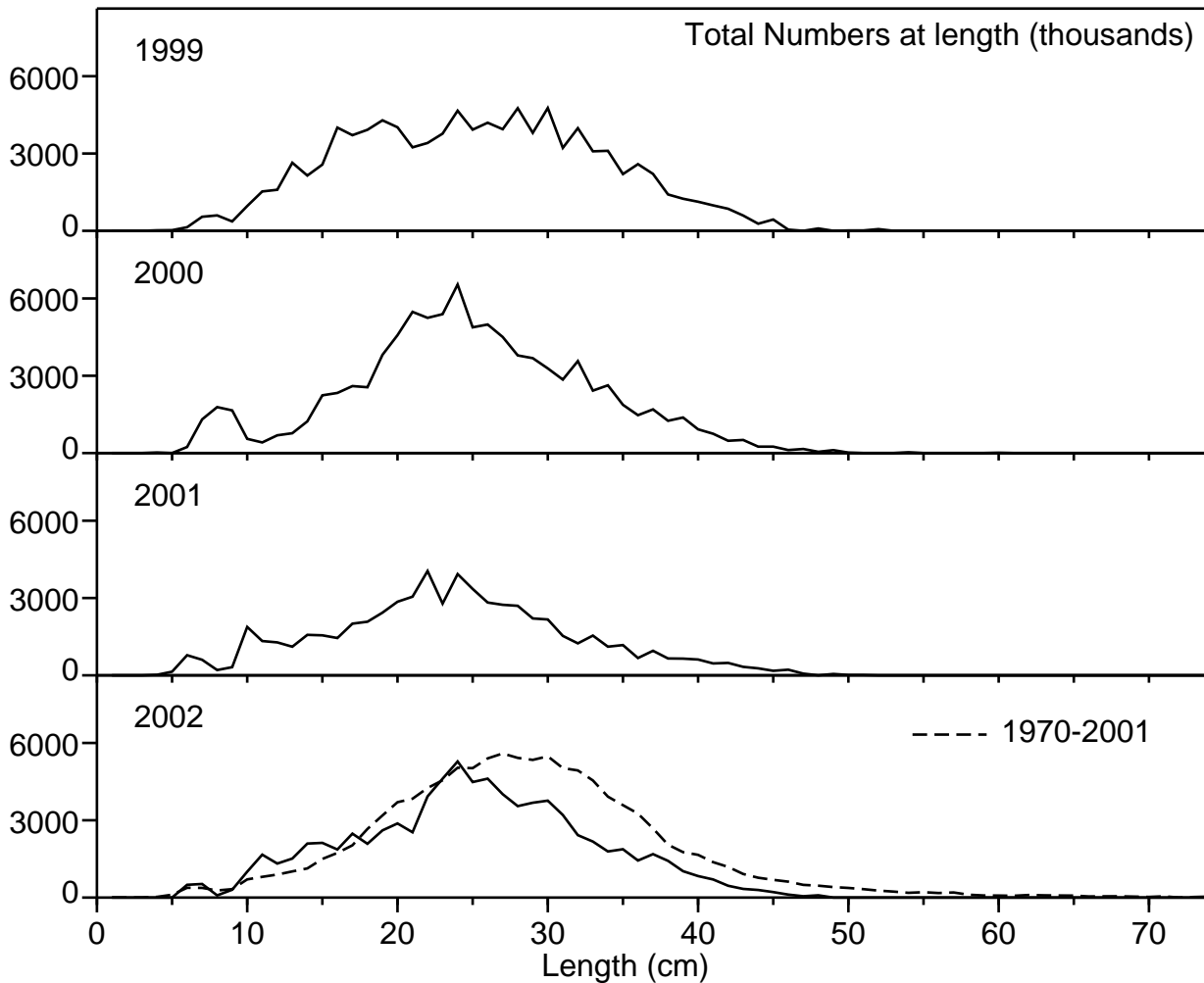


Fig. 34. 4VW American Plaice length frequency distribution from the SUMMER Groundfish surveys.

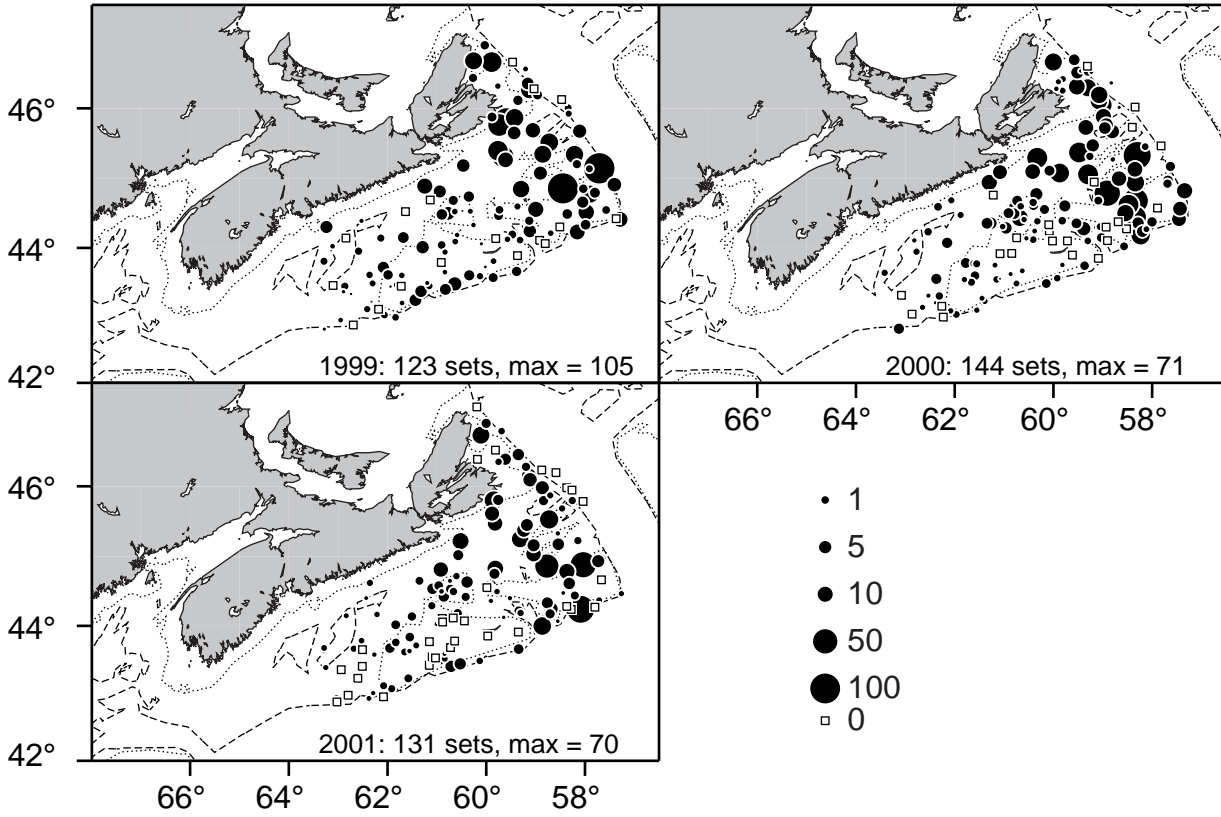


Fig. 35. 4VW American Plaice Biomass (kg/tow) from the 1999-2001 SUMMER Groundfish Surveys.

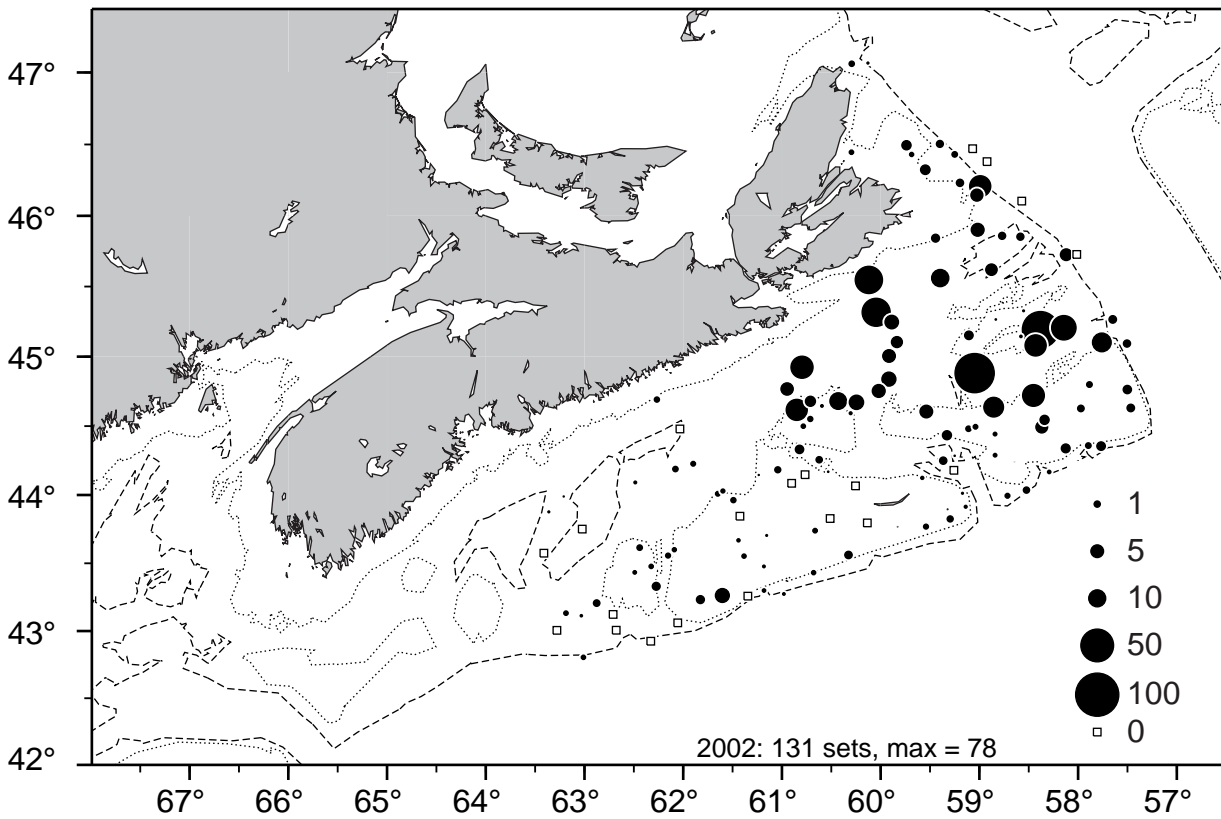


Fig. 36. 4VW American Plaice Biomass (kg/tow) from the 2002 SUMMER Groundfish Survey.

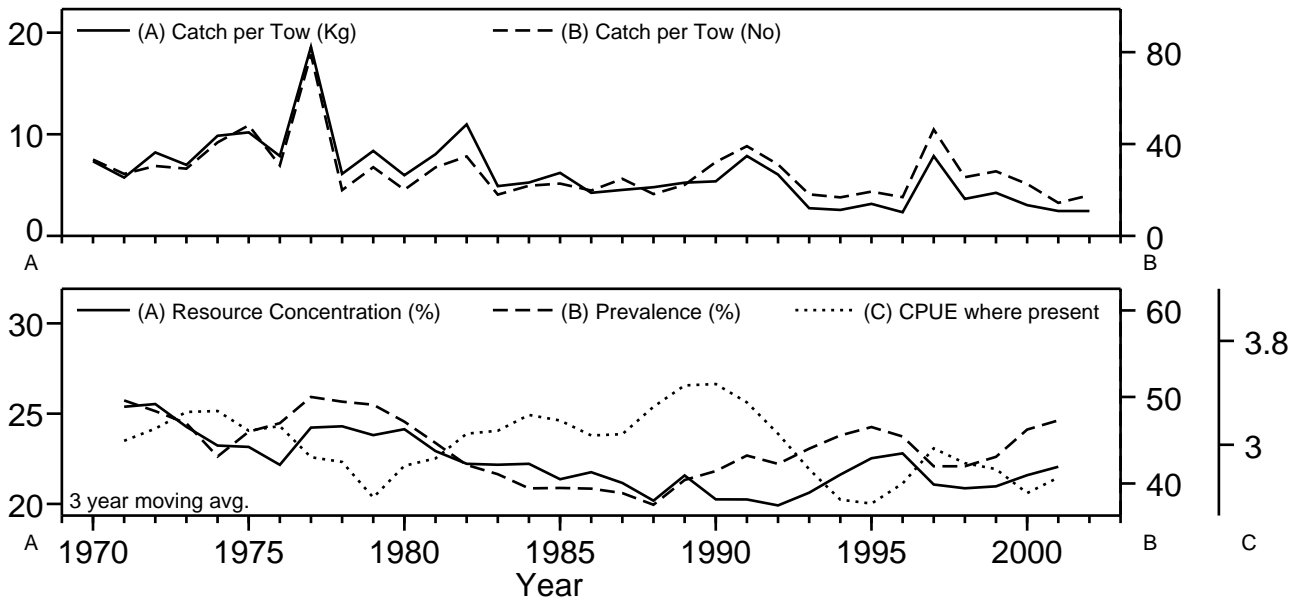


Fig. 37. 4VW Yellowtail Flounder stratified mean weight caught per tow, stratified mean number caught per tow, resource concentration, prevalence and CPUE where present (log number/tow) from the SUMMER Groundfish surveys.

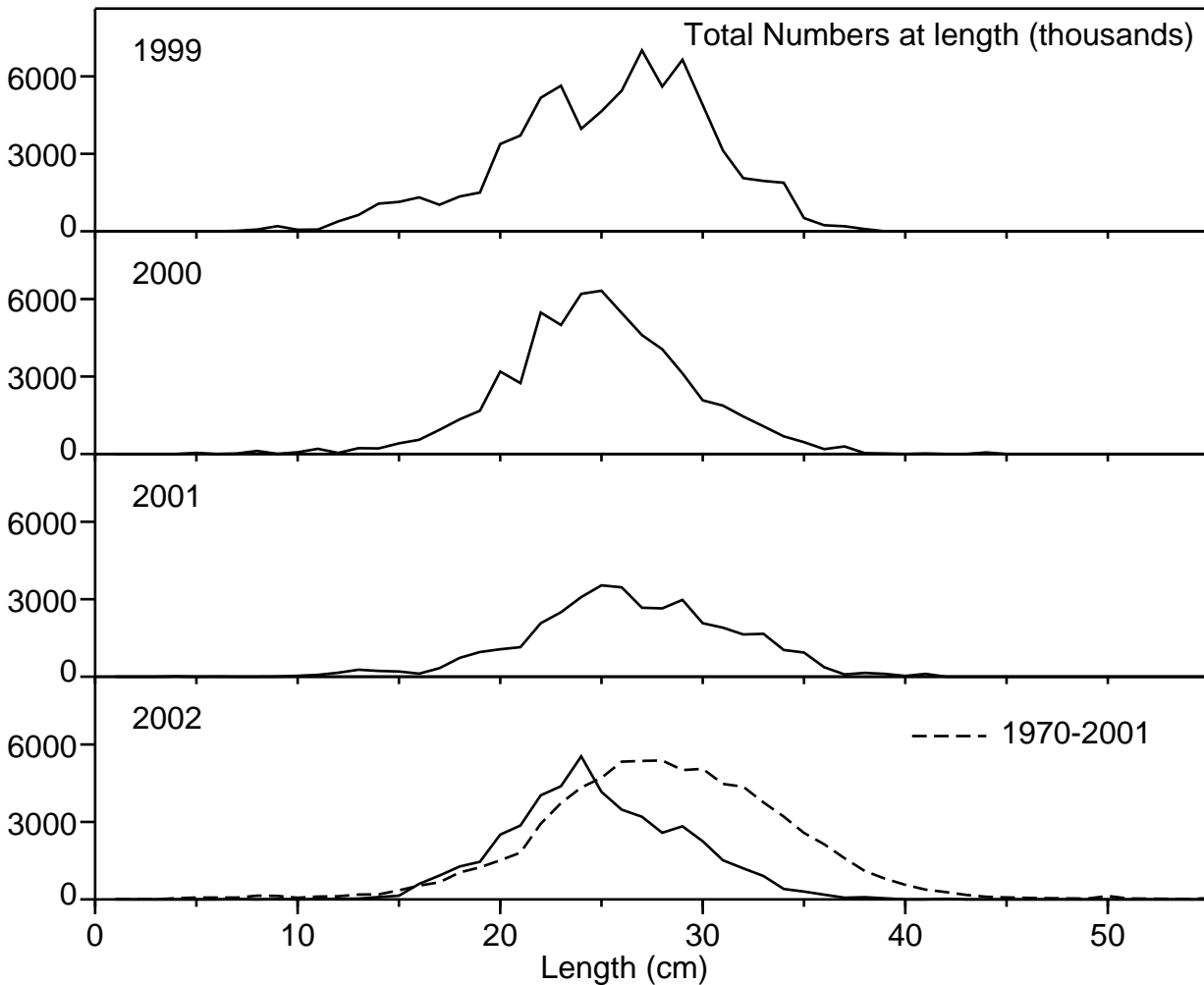


Fig. 38. 4VW Yellowtail Flounder length frequency distribution from the SUMMER Groundfish surveys.

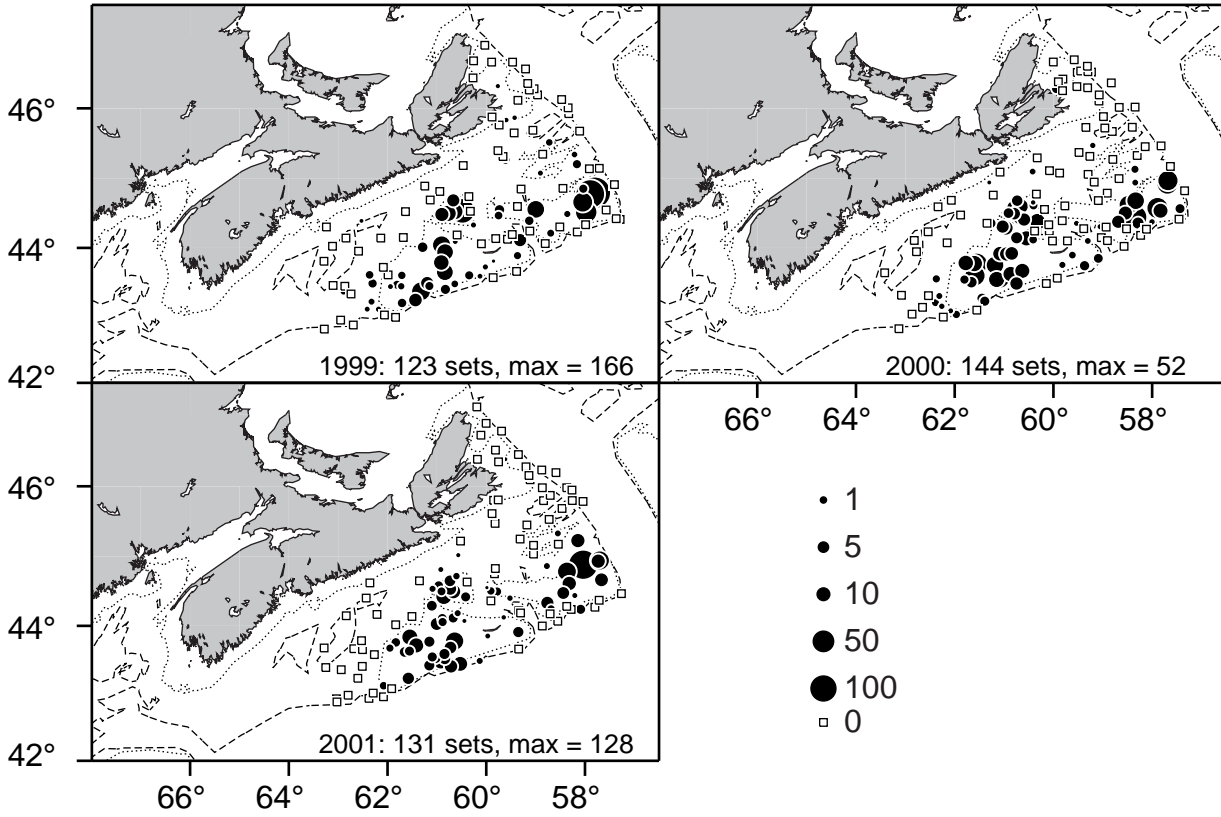


Fig. 39. 4VW Yellowtail Flounder Biomass (kg/tow) from the 1999-2001 SUMMER Groundfish Surveys.

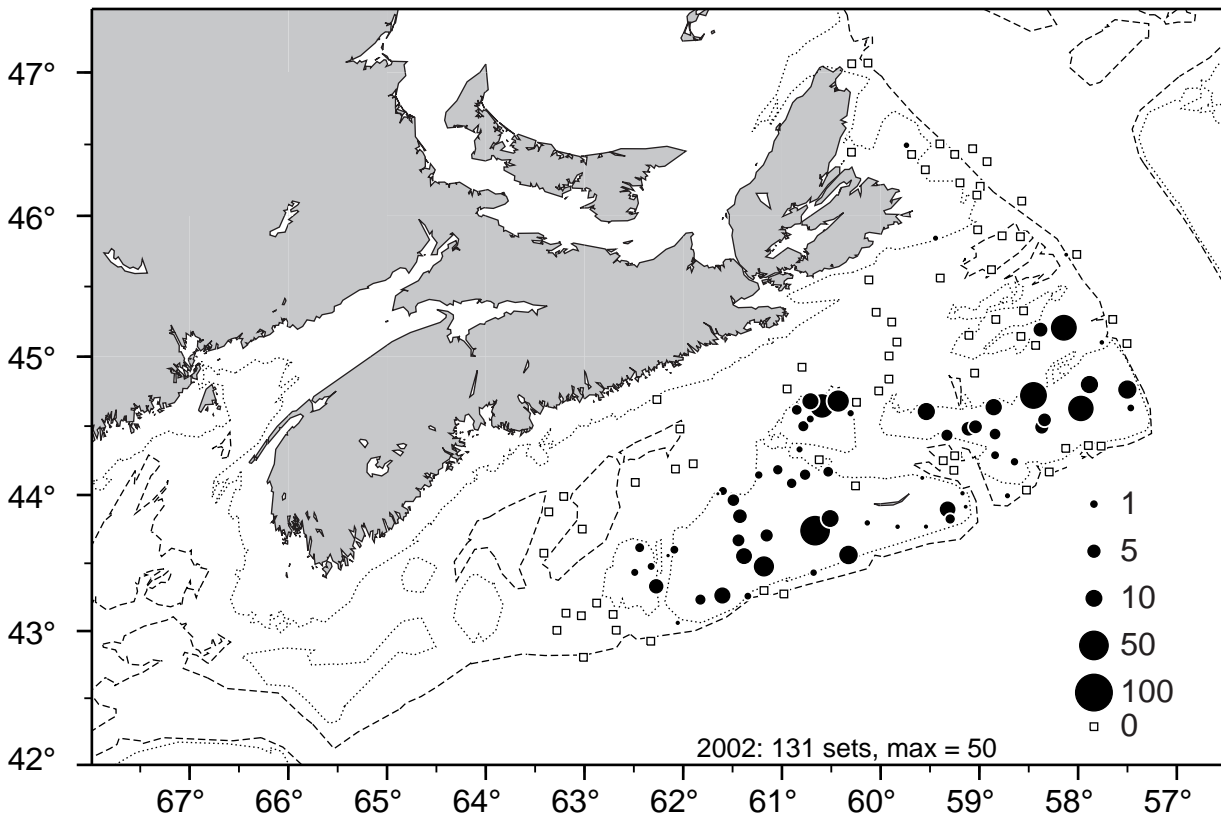


Fig. 40. 4VW Yellowtail Flounder Biomass (kg/tow) from the 2002 SUMMER Groundfish Survey.

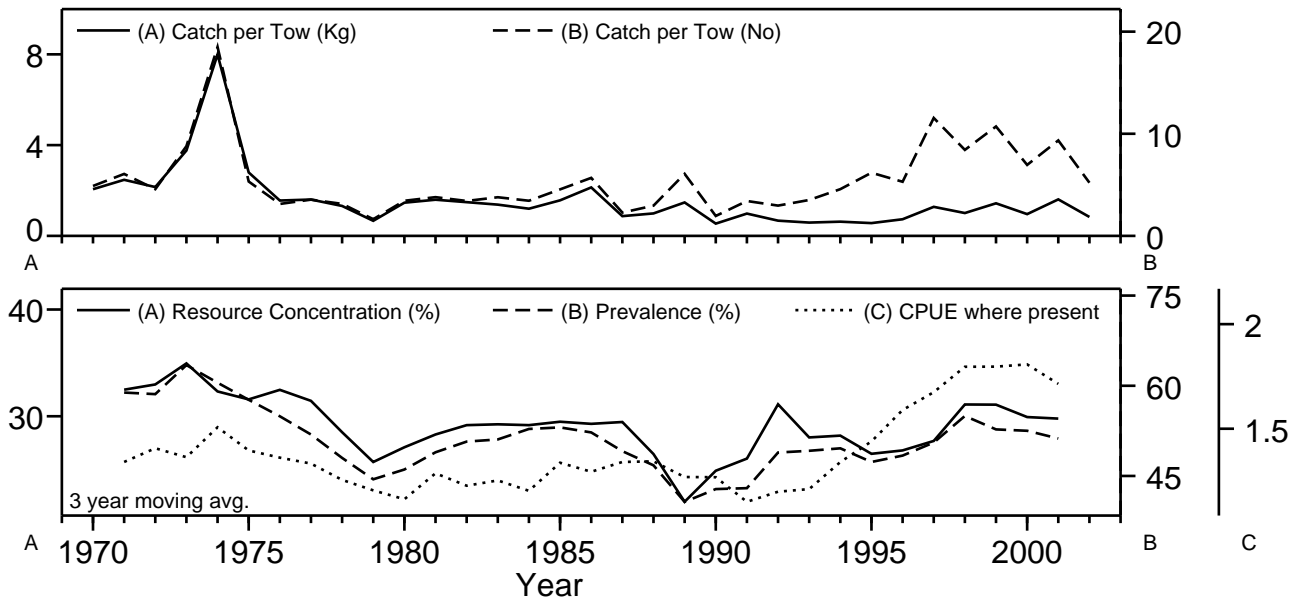


Fig. 41. 4VW Witch Flounder stratified mean weight caught per tow, stratified mean number caught per tow, resource concentration, prevalence and CPUE where present (log number/tow) from the SUMMER Groundfish surveys.

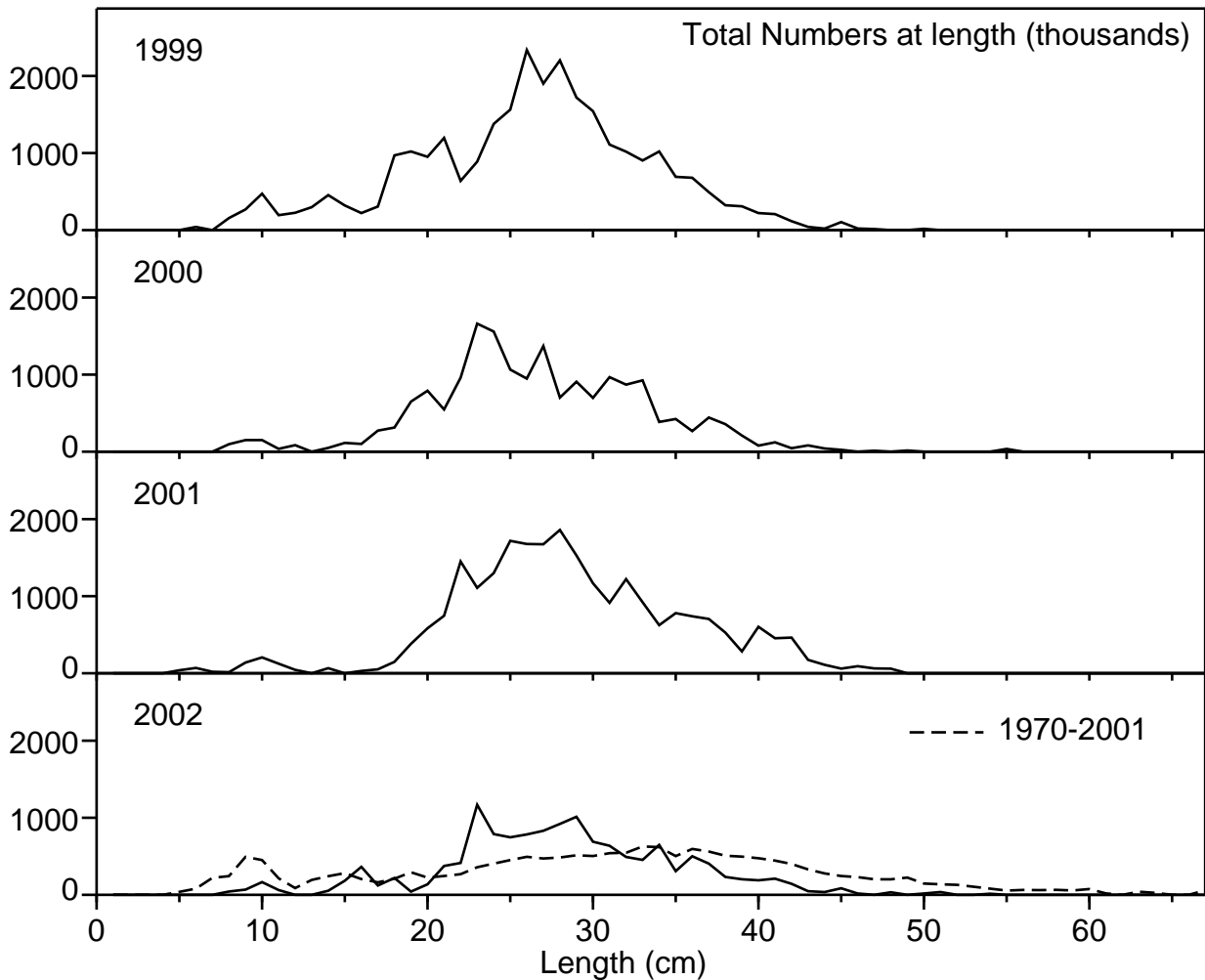


Fig. 42. 4VW Witch Flounder length frequency distribution from the SUMMER Groundfish surveys.

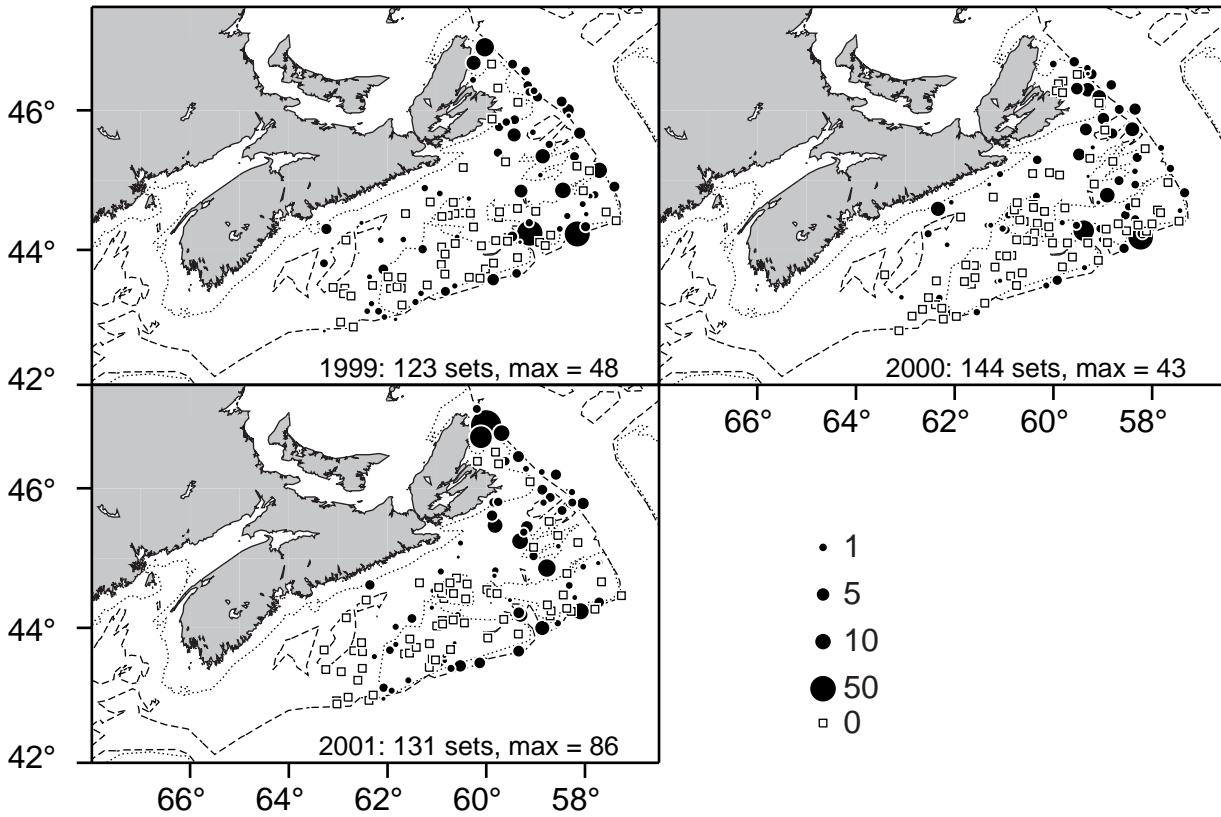


Fig. 43. 4VW Witch Flounder Biomass (kg/tow) from the 1999-2001 SUMMER Groundfish Surveys.

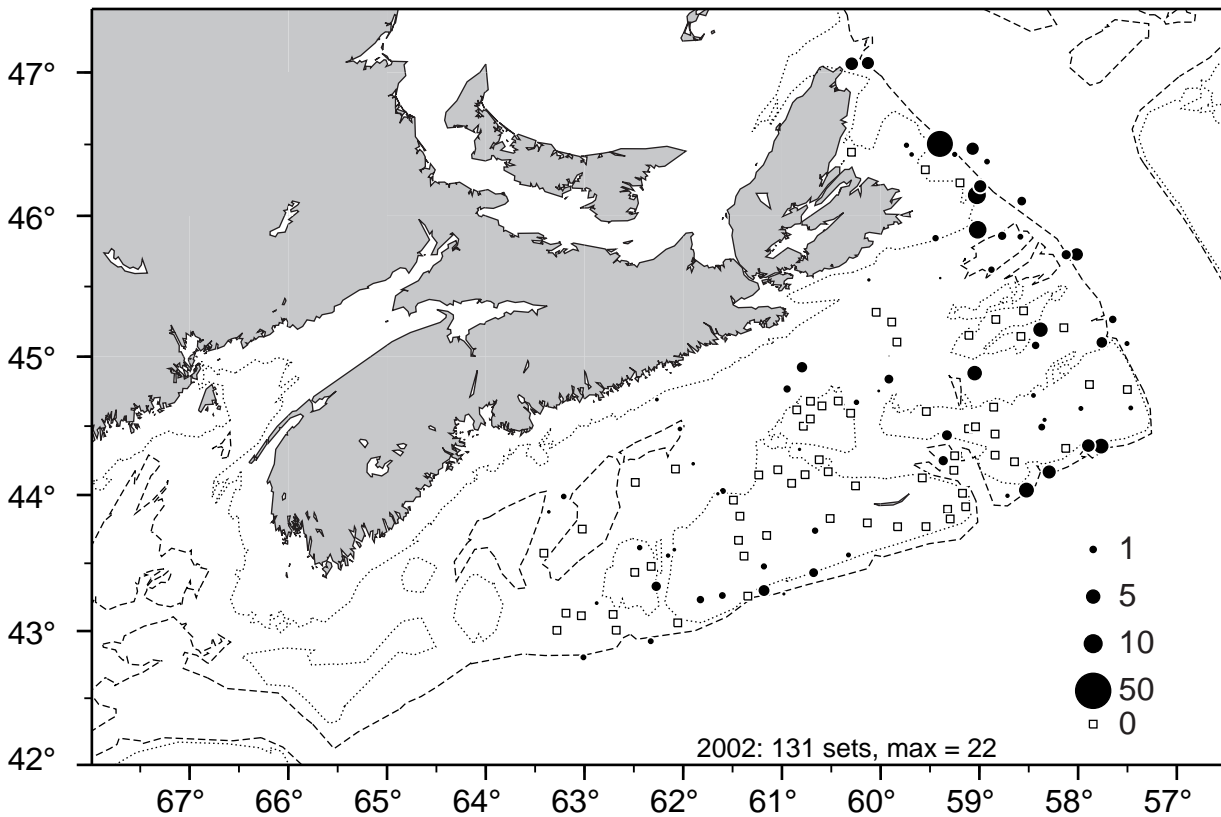


Fig. 44. 4VW Witch Flounder Biomass (kg/tow) from the 2002 SUMMER Groundfish Survey.

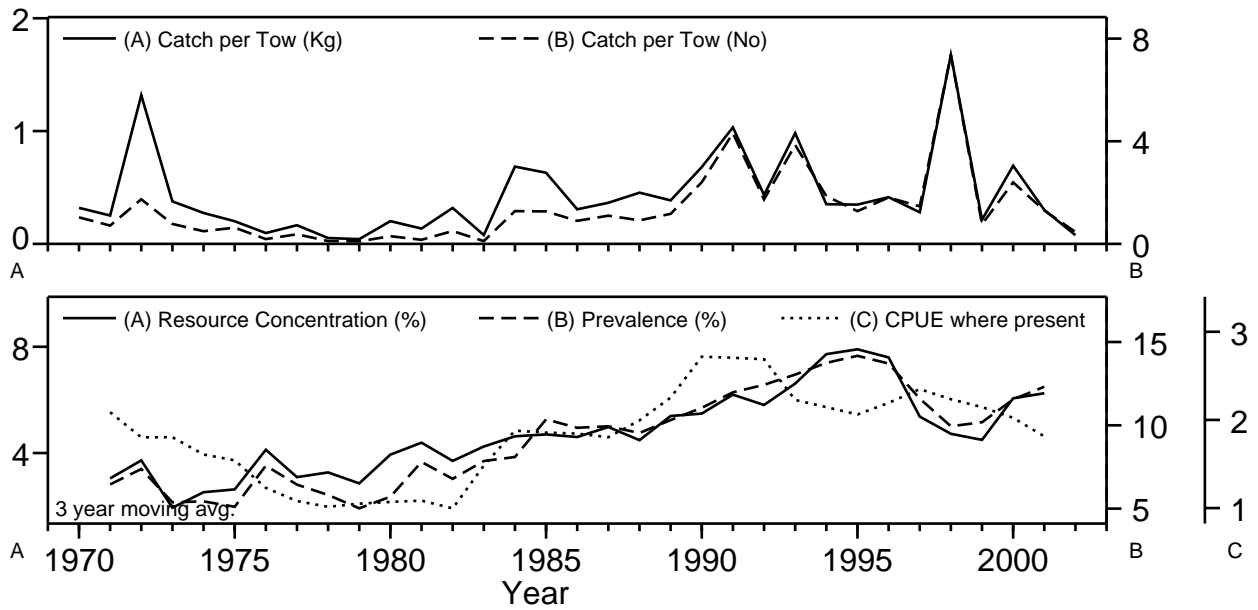


Fig. 45. 4VW Winter Flounder stratified mean weight caught per tow, stratified mean number caught per tow, resource concentration, prevalence and CPUE where present (log number/tow) from the SUMMER Groundfish surveys.

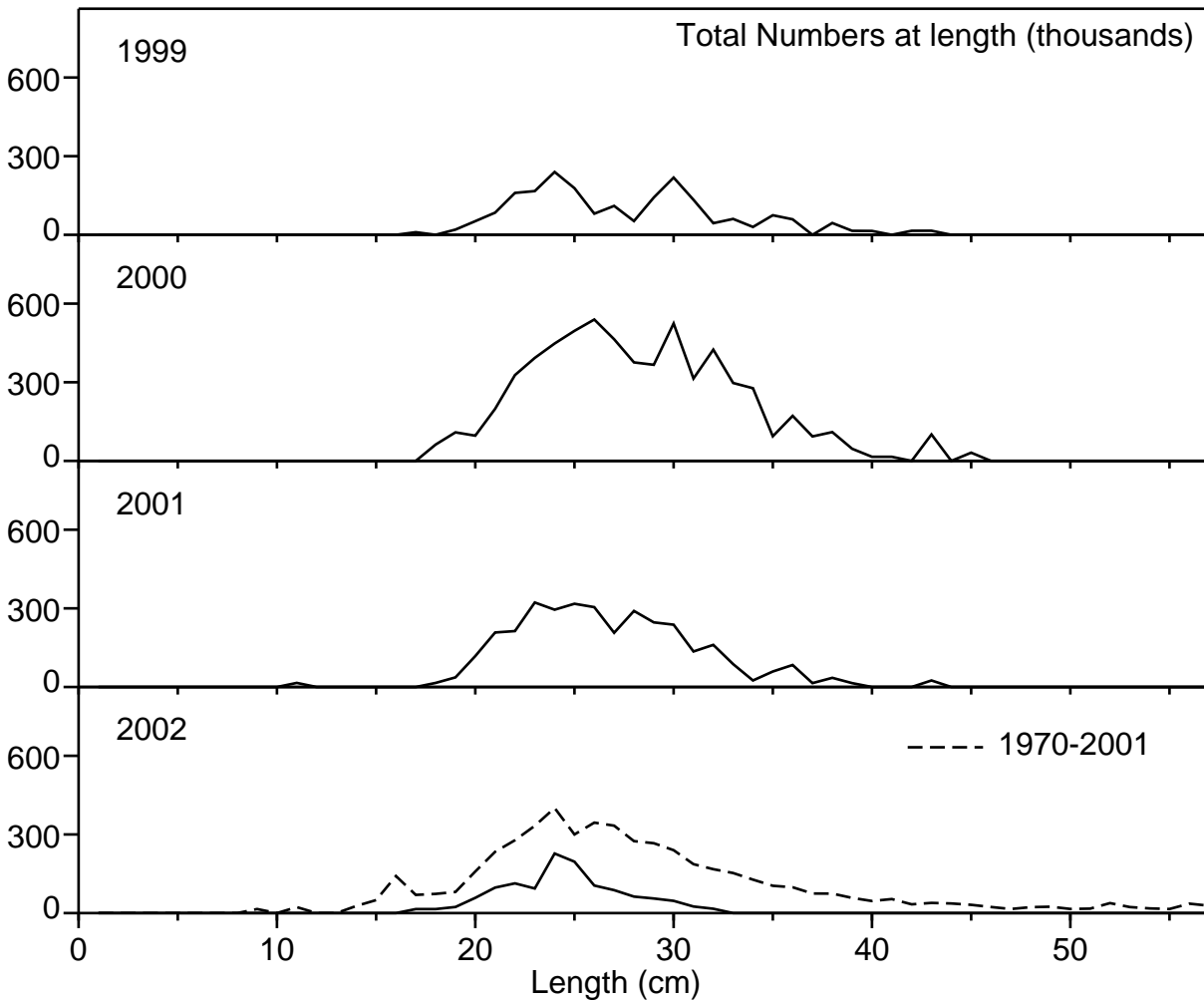


Fig. 46. 4VW Winter Flounder length frequency distribution from the SUMMER Groundfish surveys.

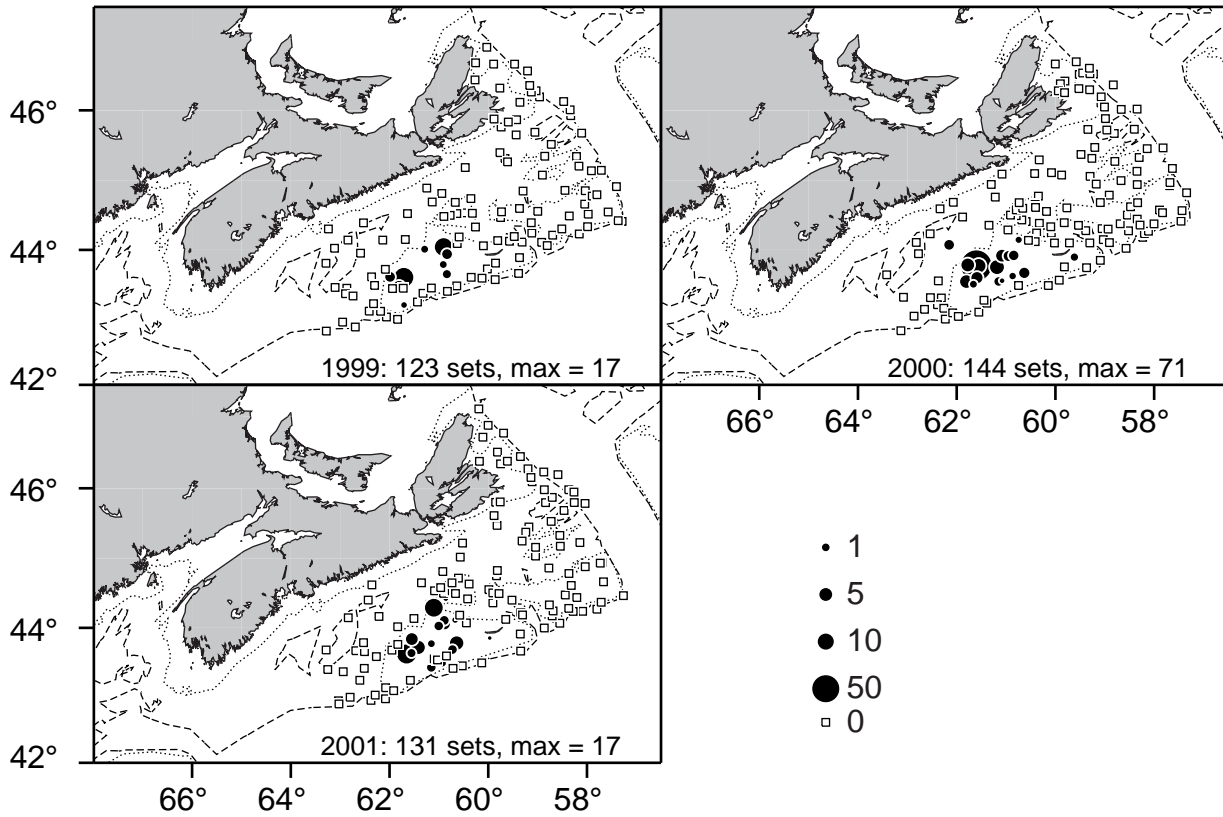


Fig. 47. 4VW Winter Flounder Biomass (kg/tow) from the 1999-2001 SUMMER Groundfish Surveys.

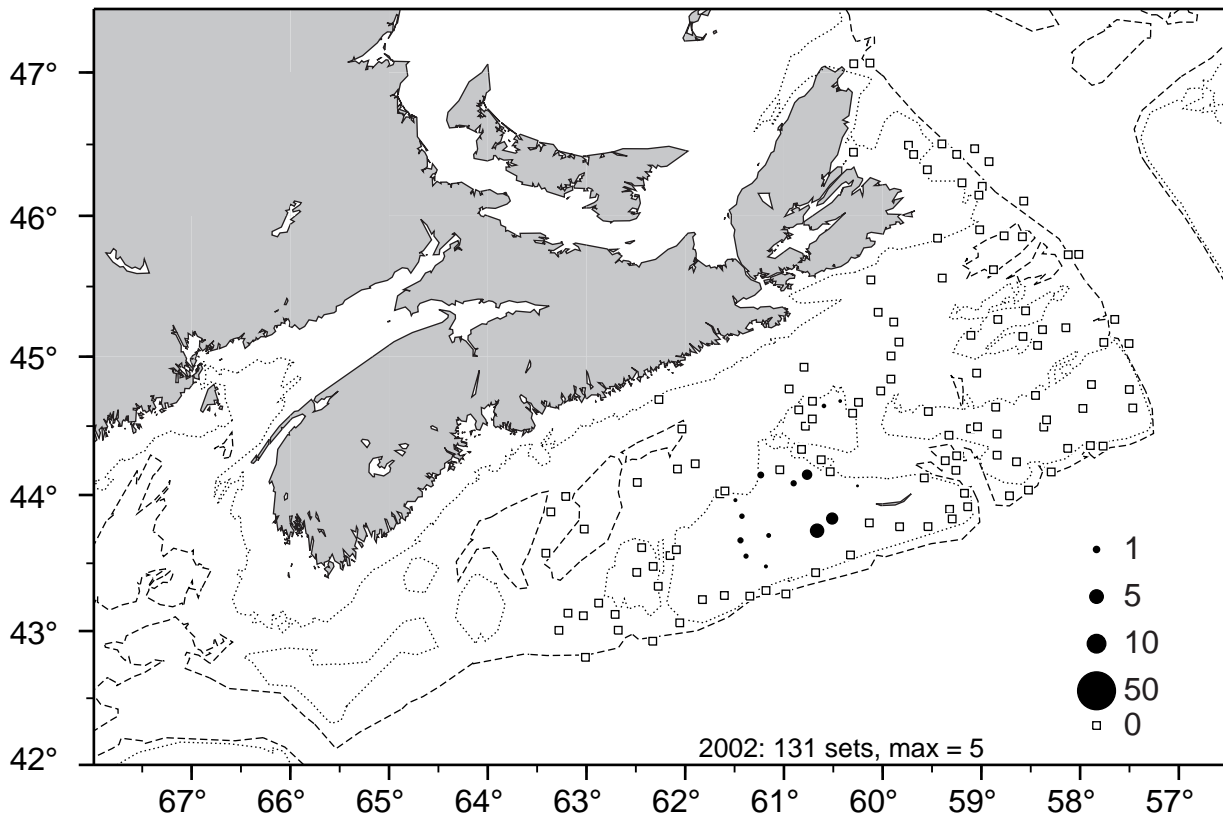


Fig. 48. 4VW Winter Flounder Biomass (kg/tow) from the 2002 SUMMER Groundfish Survey.

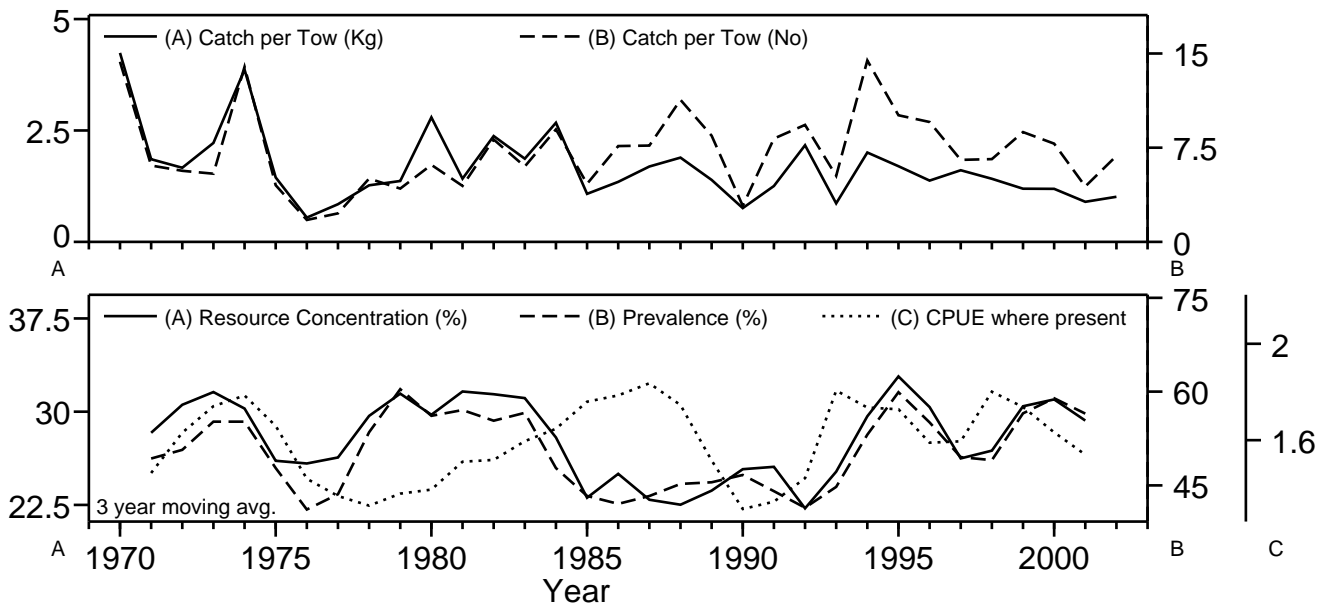


Fig. 49. 4X American Plaice stratified mean weight caught per tow, stratified mean number caught per tow, resource concentration, prevalence and CPUE where present (log number/tow) from the SUMMER Groundfish surveys.

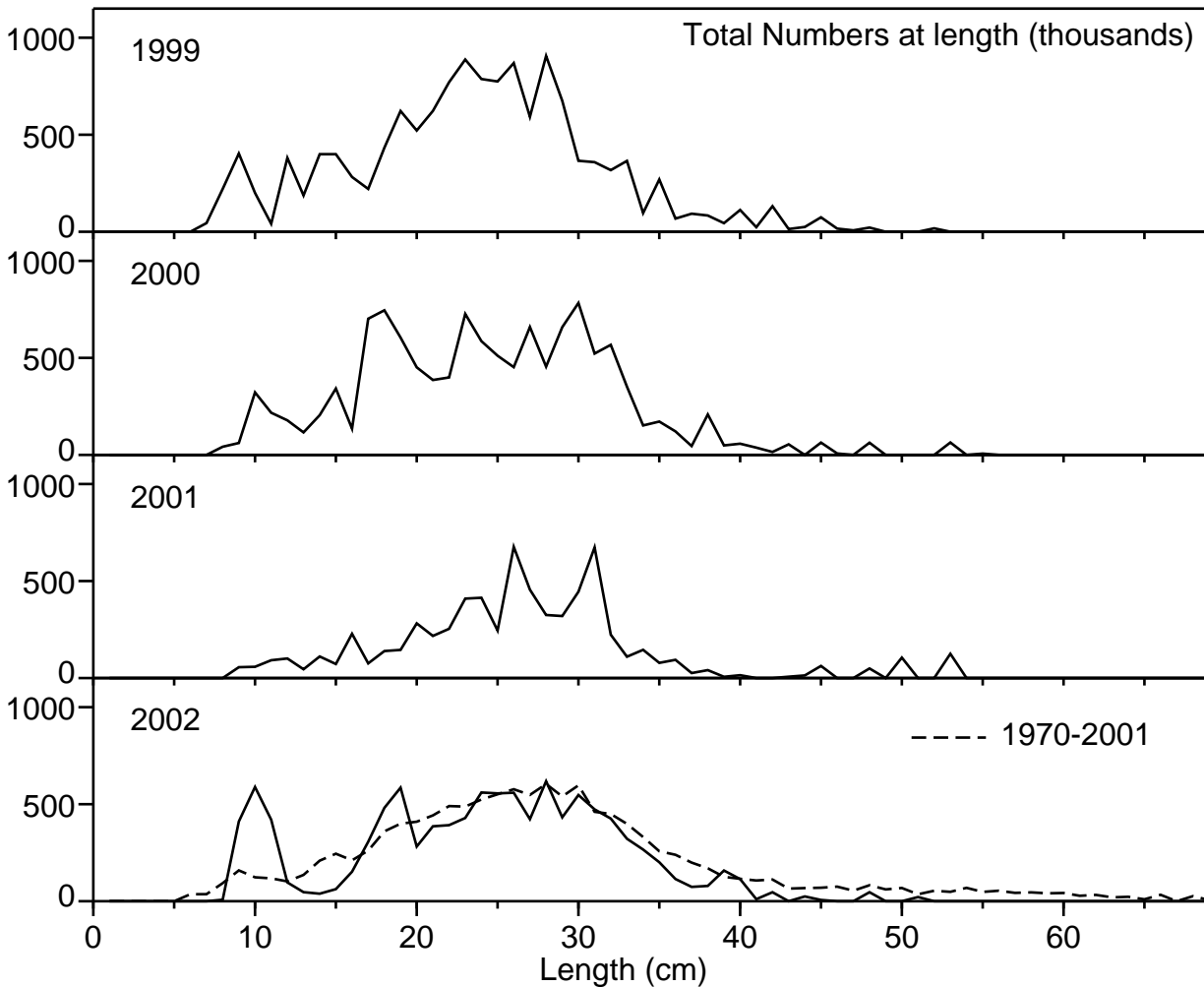


Fig. 50. 4X American Plaice length frequency distribution from the SUMMER Groundfish surveys.

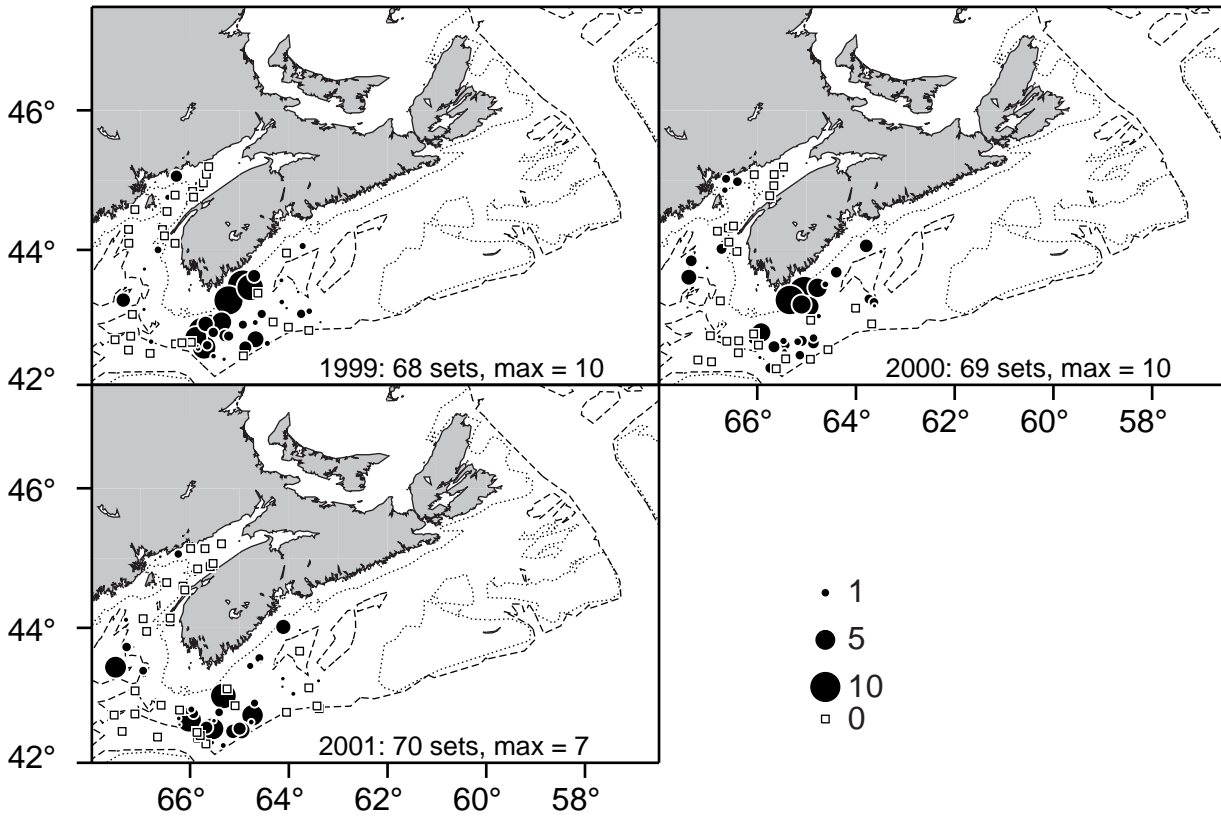


Fig. 51. 4X American Plaice Biomass (kg/tow) from the 1999-2001 SUMMER Groundfish Surveys.

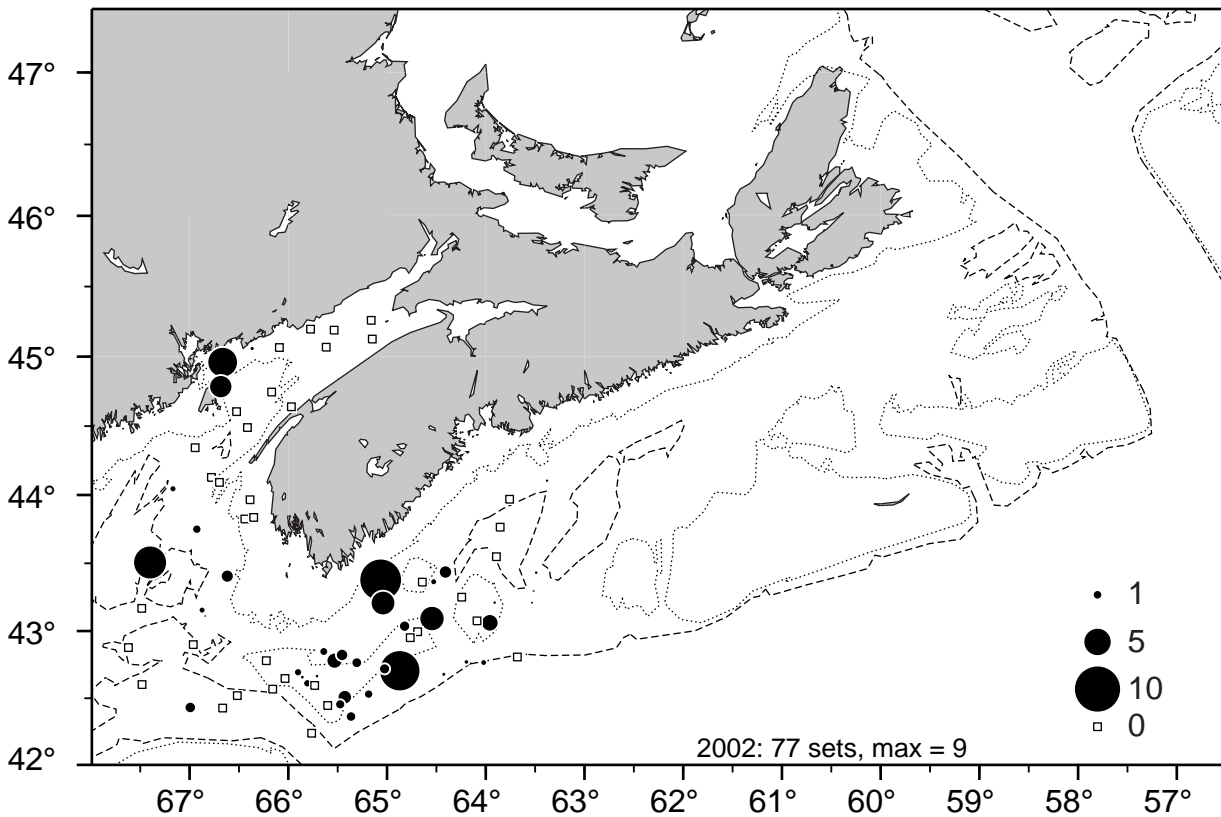


Fig. 52. 4X American Plaice Biomass (kg/tow) from the 2002 SUMMER Groundfish Survey.

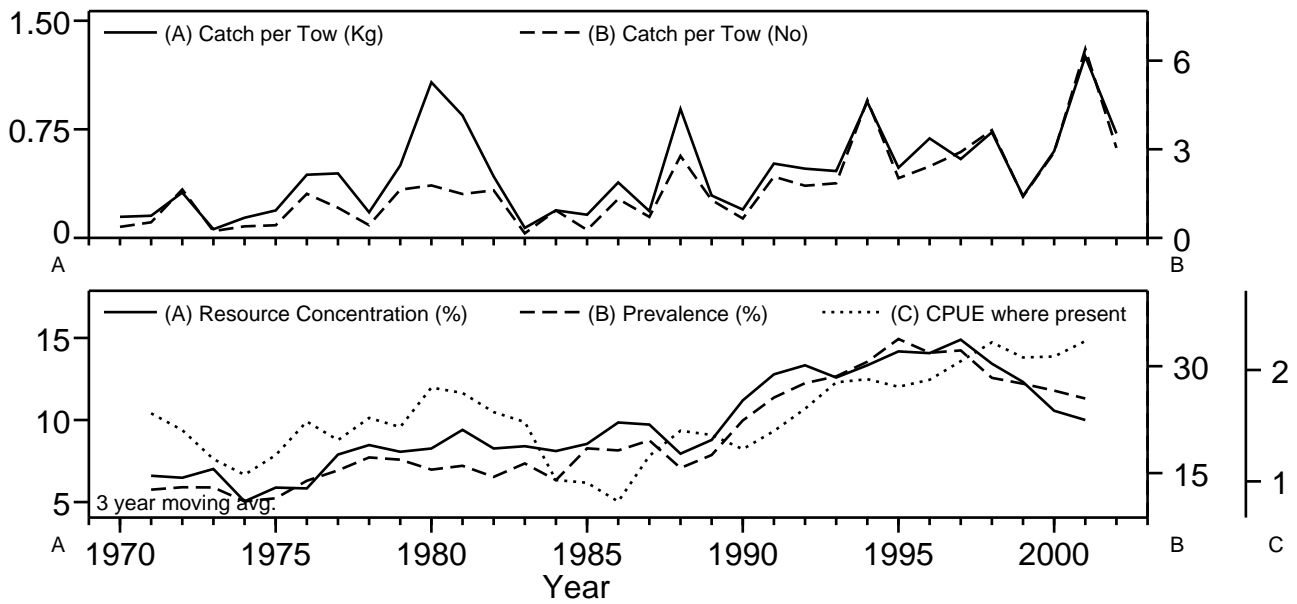


Fig. 53. 4X Yellowtail Flounder stratified mean weight caught per tow, stratified mean number caught per tow, resource concentration, prevalence and CPUE where present (log number/tow) from the SUMMER Groundfish surveys.

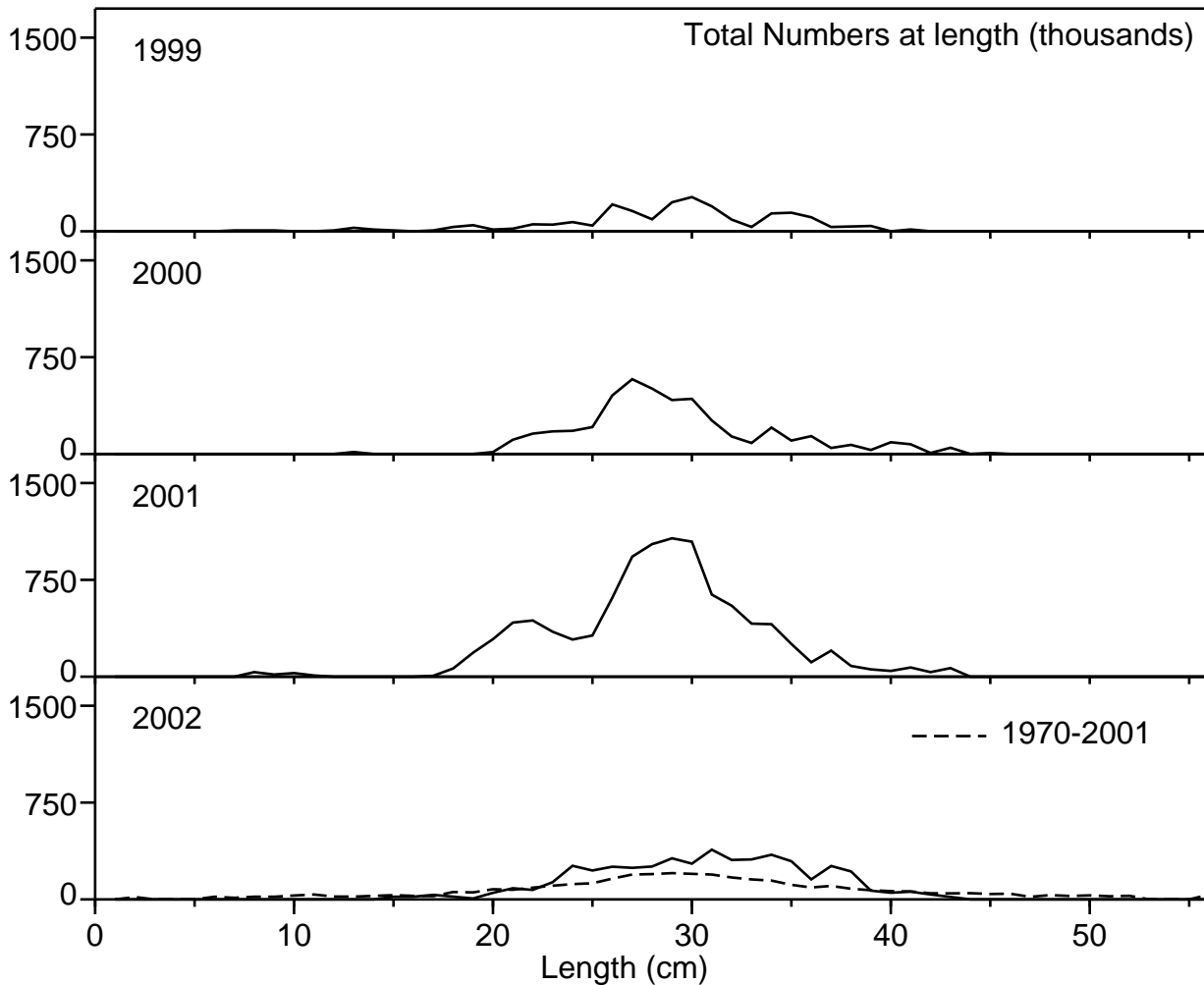


Fig. 54. 4X Yellowtail Flounder length frequency distribution from the SUMMER Groundfish surveys.

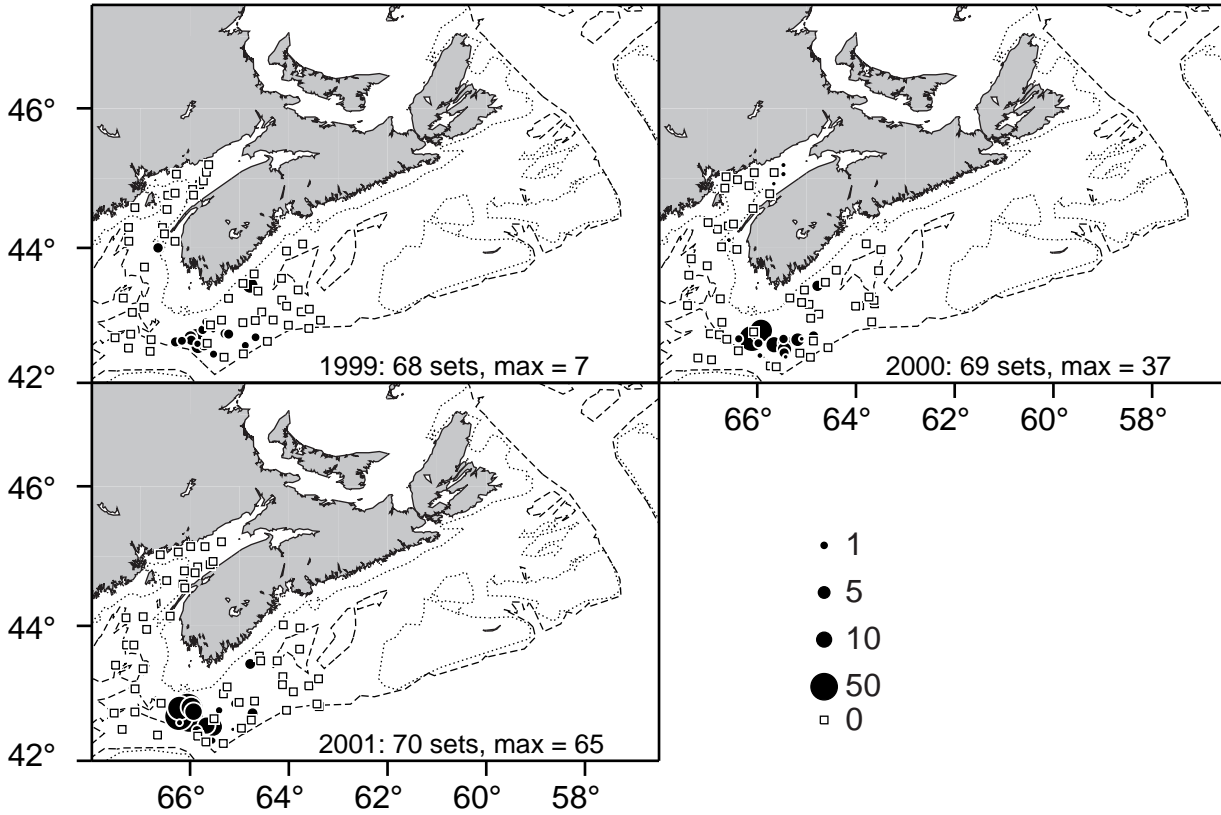


Fig. 55. 4X Yellowtail Flounder Biomass (kg/tow) from the 1999-2001 SUMMER Groundfish Surveys.

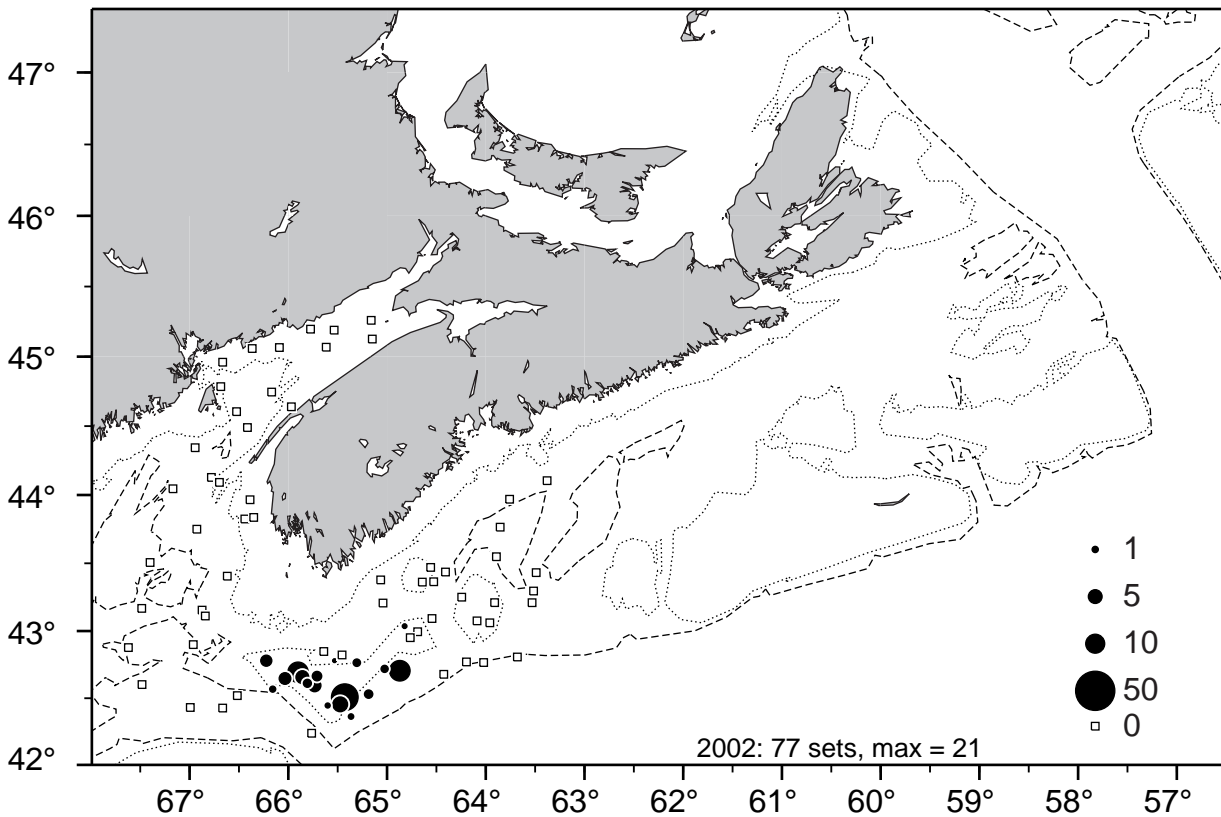


Fig. 56. 4X Yellowtail Flounder Biomass (kg/tow) from the 2002 SUMMER Groundfish Survey.

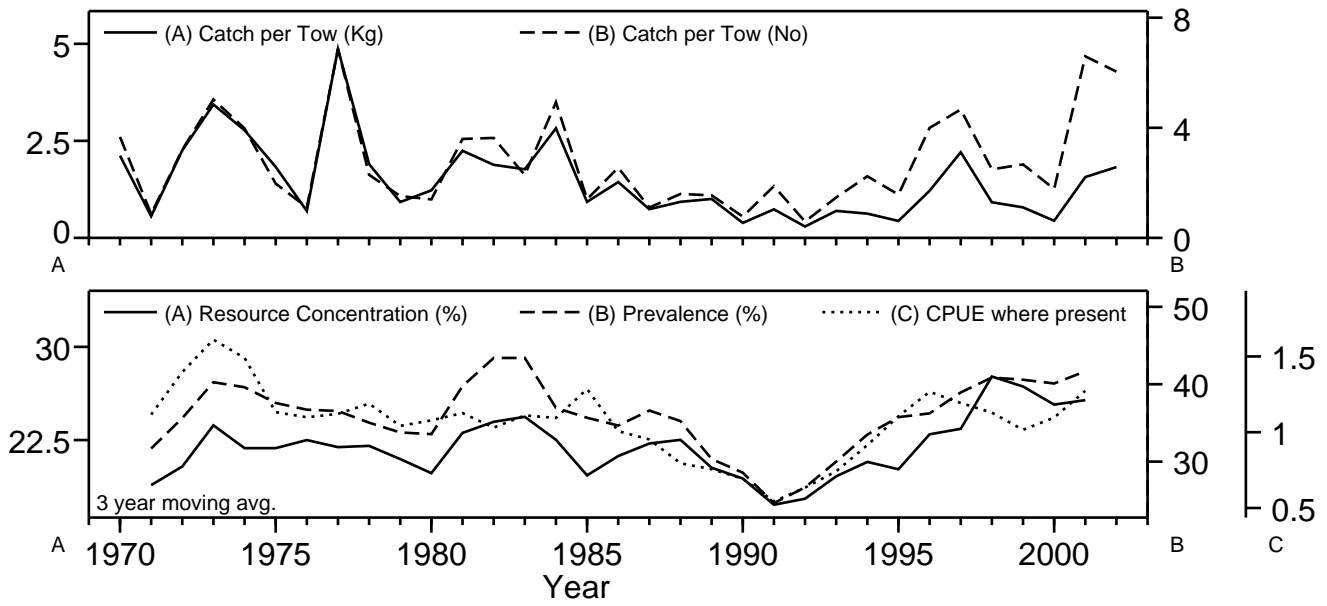


Fig. 57. 4X Witch Flounder stratified mean weight caught per tow, stratified mean number caught per tow, resource concentration, prevalence and CPUE where present (log number/tow) from the SUMMER Groundfish surveys.

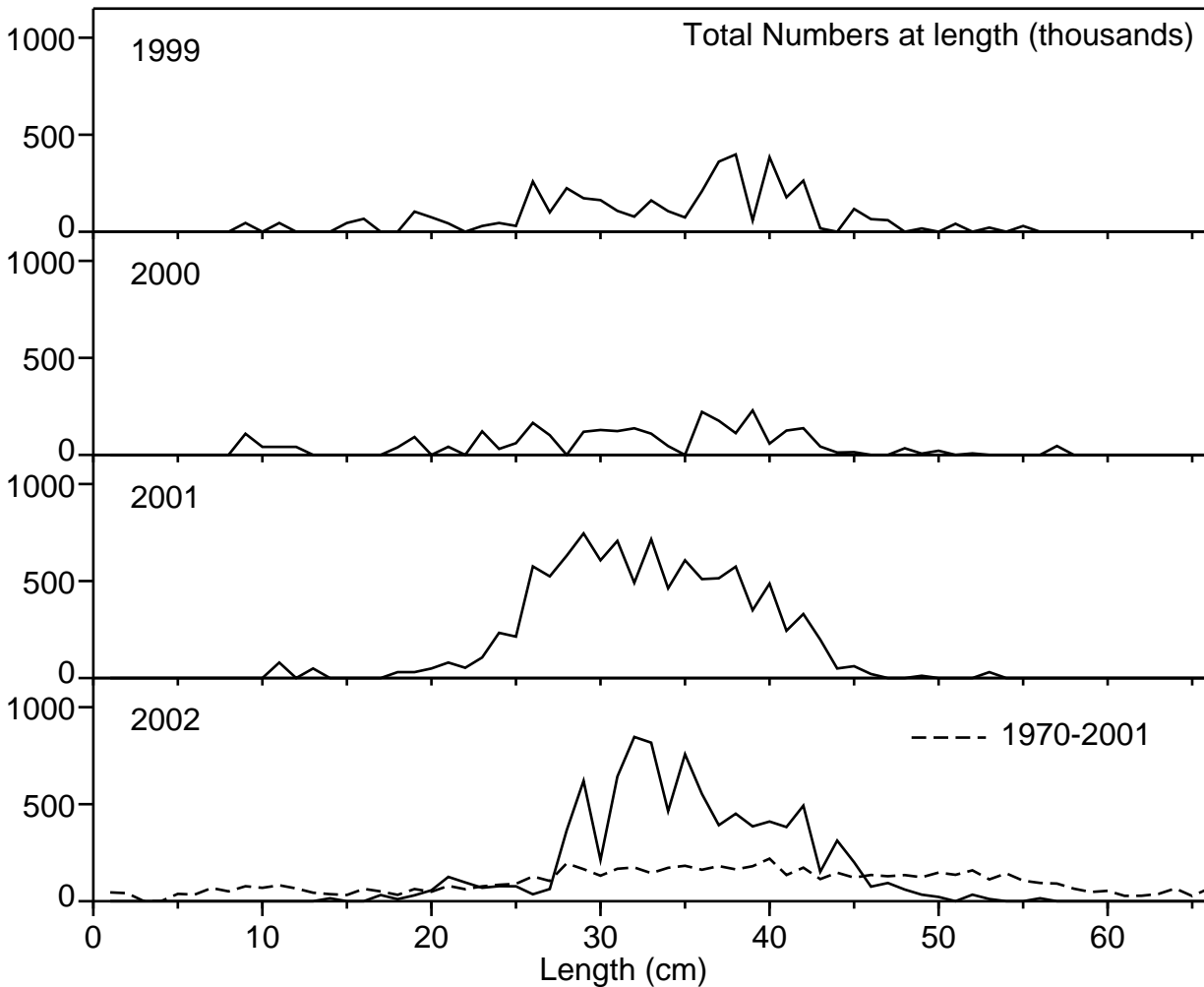


Fig. 58. 4X Witch Flounder length frequency distribution from the SUMMER Groundfish surveys.

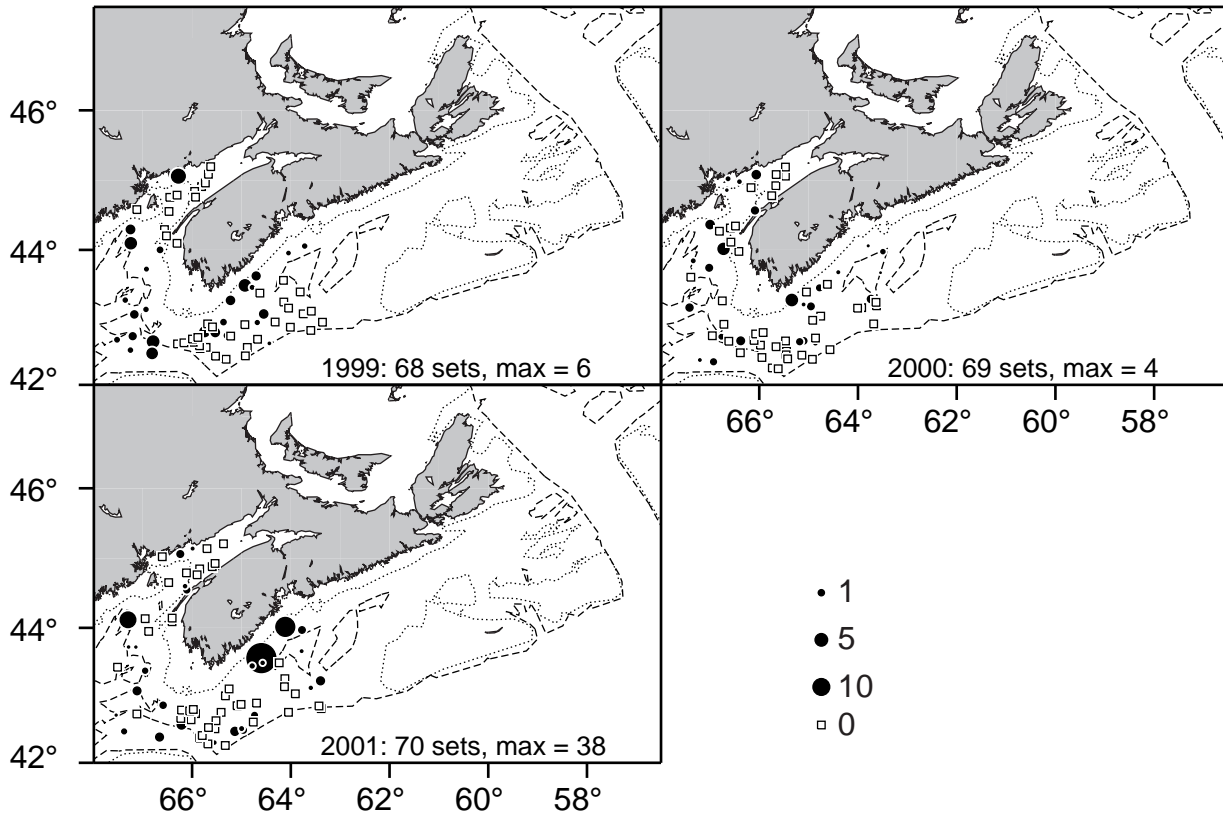


Fig. 59. 4X Witch Flounder Biomass (kg/tow) from the 1999-2001 SUMMER Groundfish Surveys.

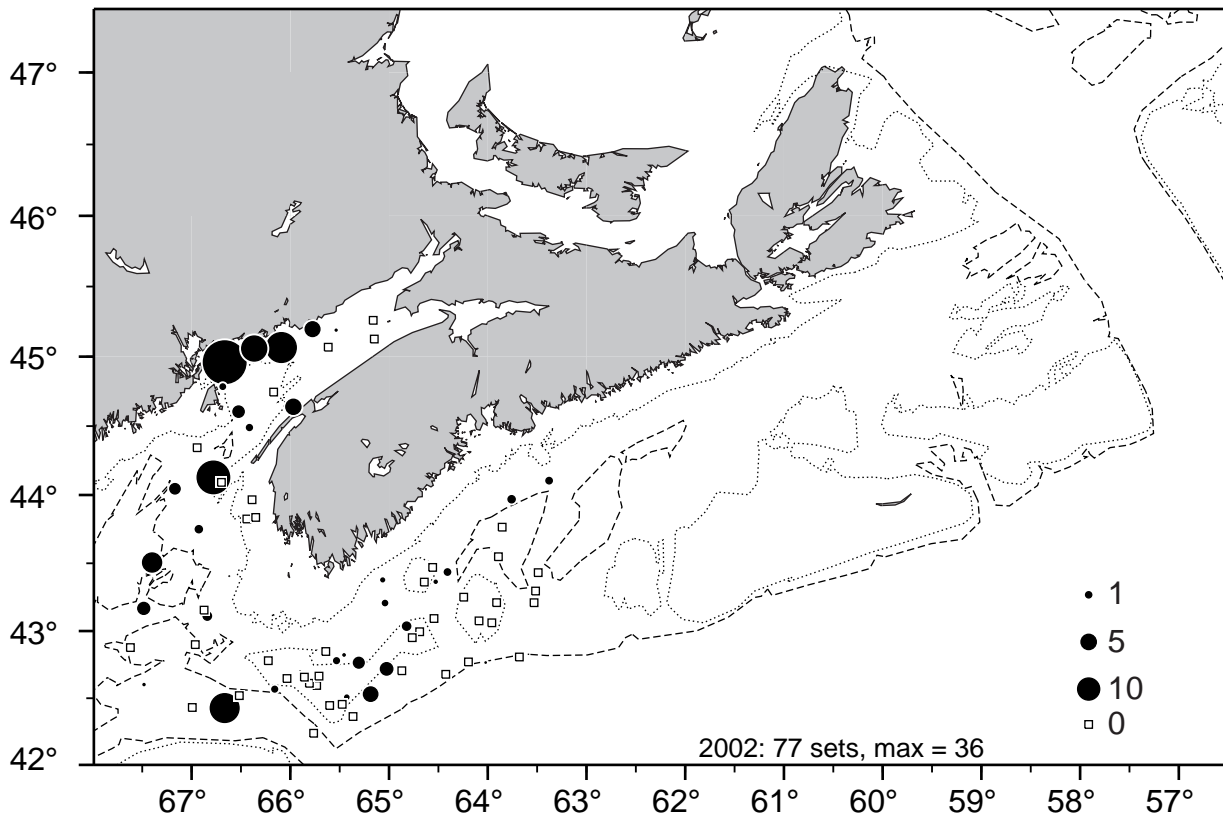


Fig. 60. 4X Witch Flounder Biomass (kg/tow) from the 2002 SUMMER Groundfish Survey.

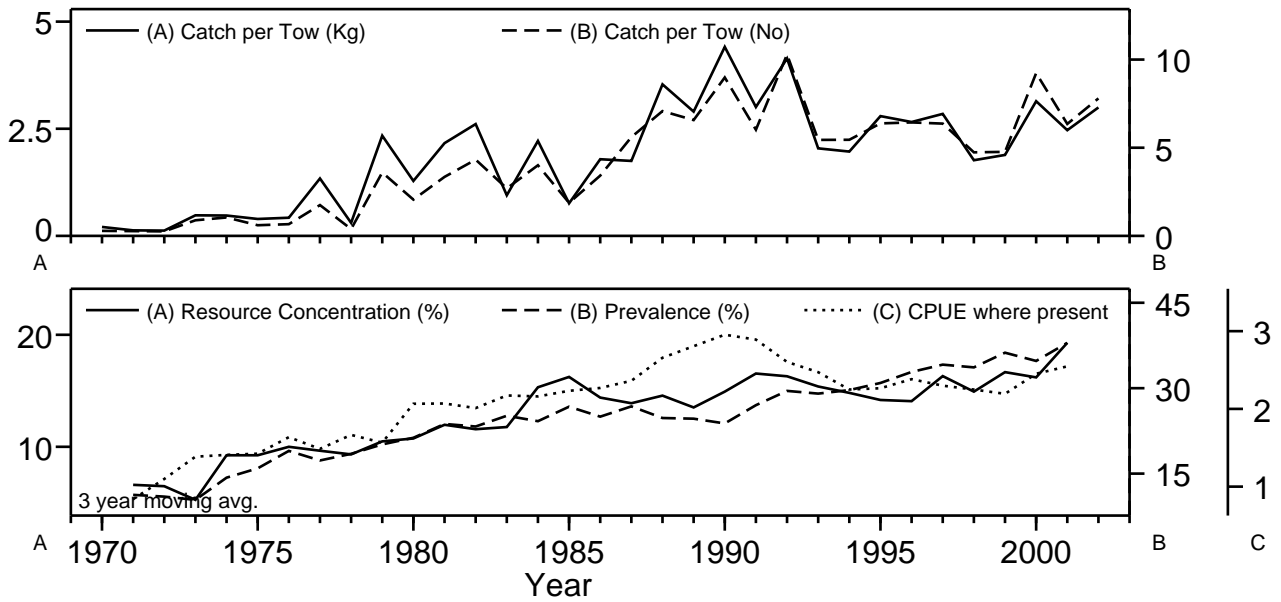


Fig. 61. 4X Winter Flounder stratified mean weight caught per tow, stratified mean number caught per tow, resource concentration, prevalence and CPUE where present (log number/tow) from the SUMMER Groundfish surveys.

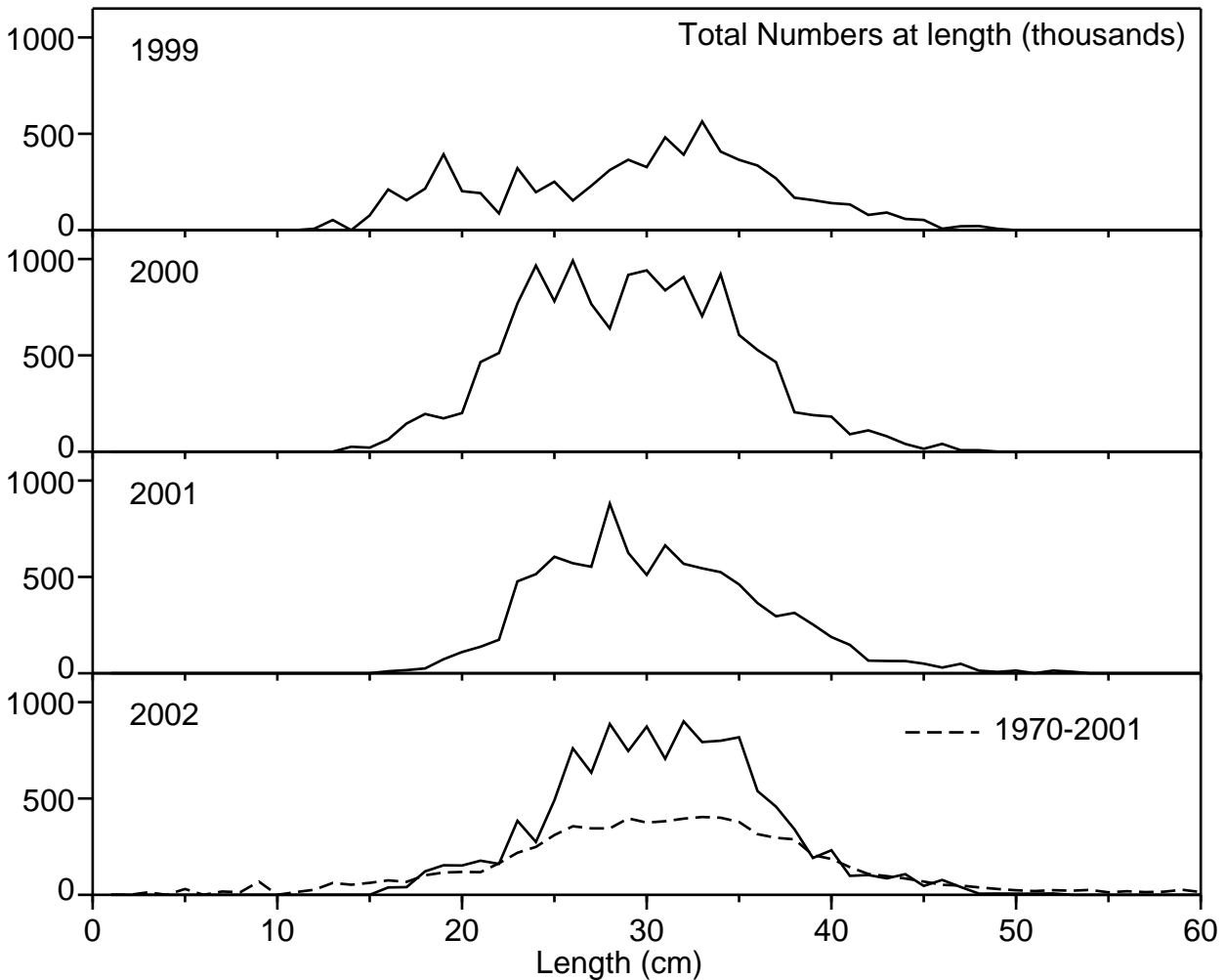


Fig. 62. 4X Winter Flounder length frequency distribution from the SUMMER Groundfish surveys.

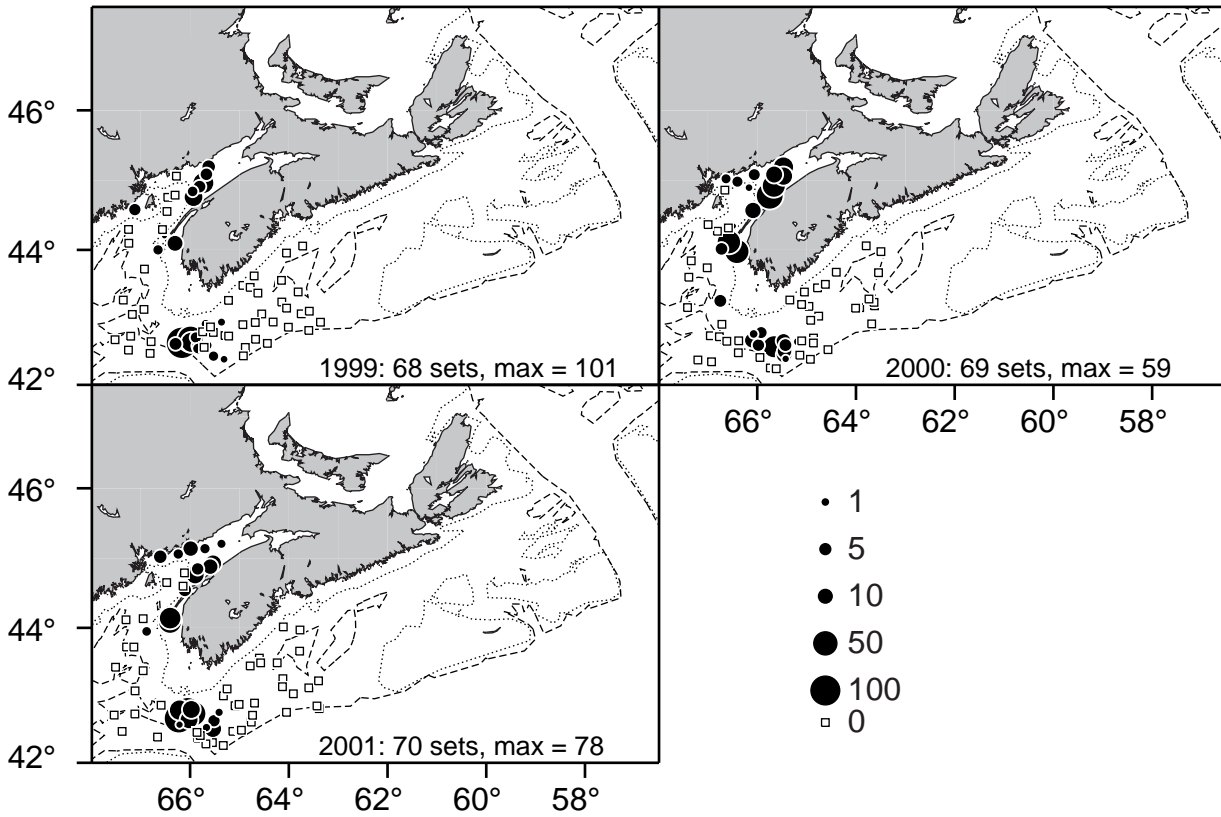


Fig. 63. 4X Winter Flounder Biomass (kg/tow) from the 1999-2001 SUMMER Groundfish Surveys.

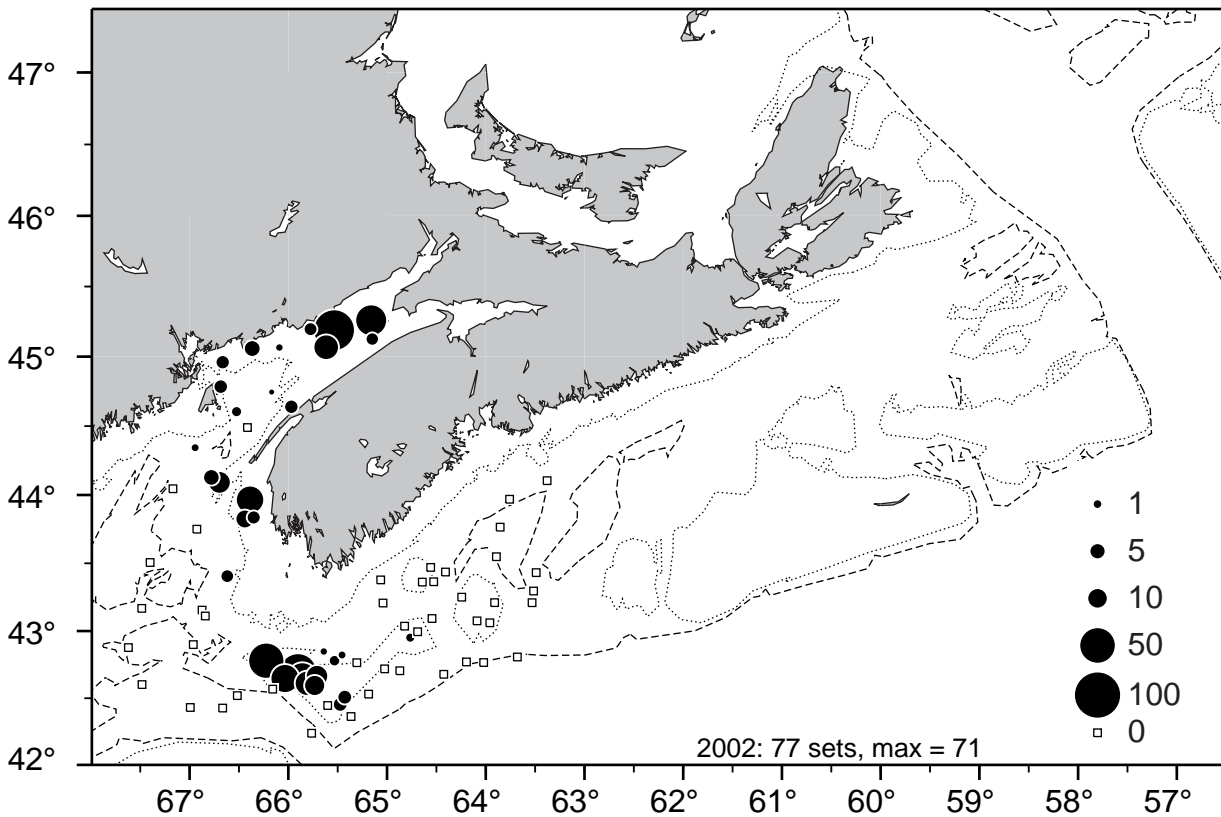


Fig. 64. 4X Winter Flounder Biomass (kg/tow) from the 2002 SUMMER Groundfish Survey.

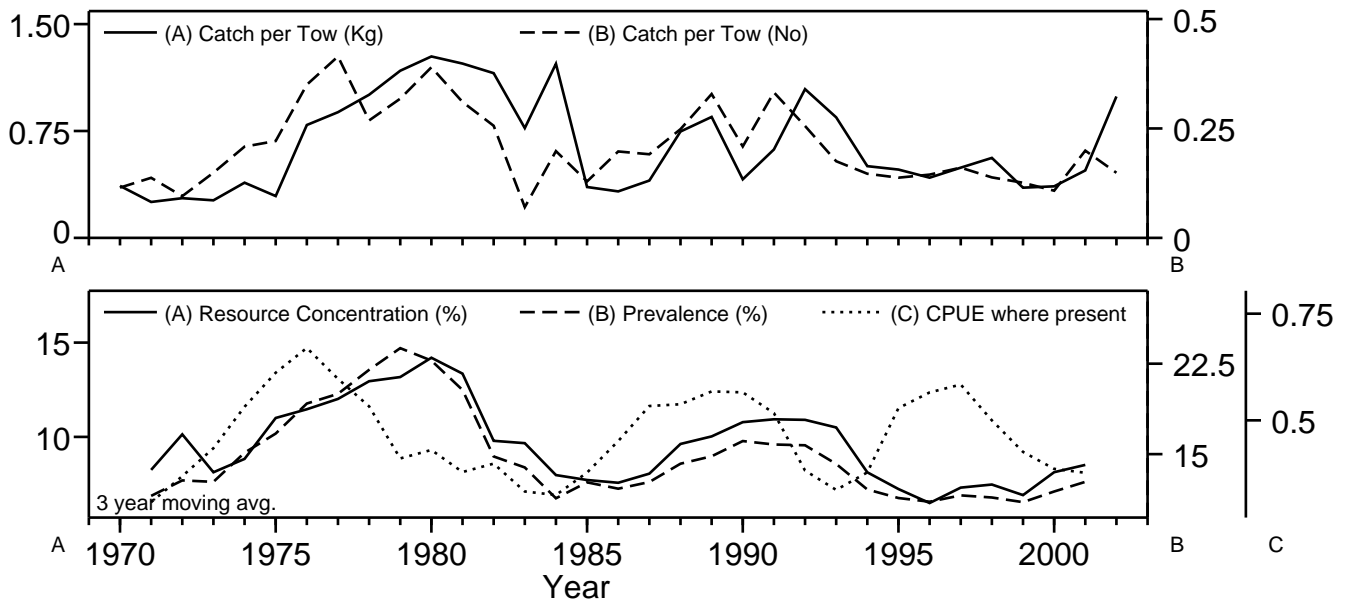


Fig. 65. 4VWX Halibut stratified mean weight caught per tow, stratified mean number caught per tow, resource concentration, prevalence and CPUE where present (log number/tow) from the SUMMER Groundfish surveys.

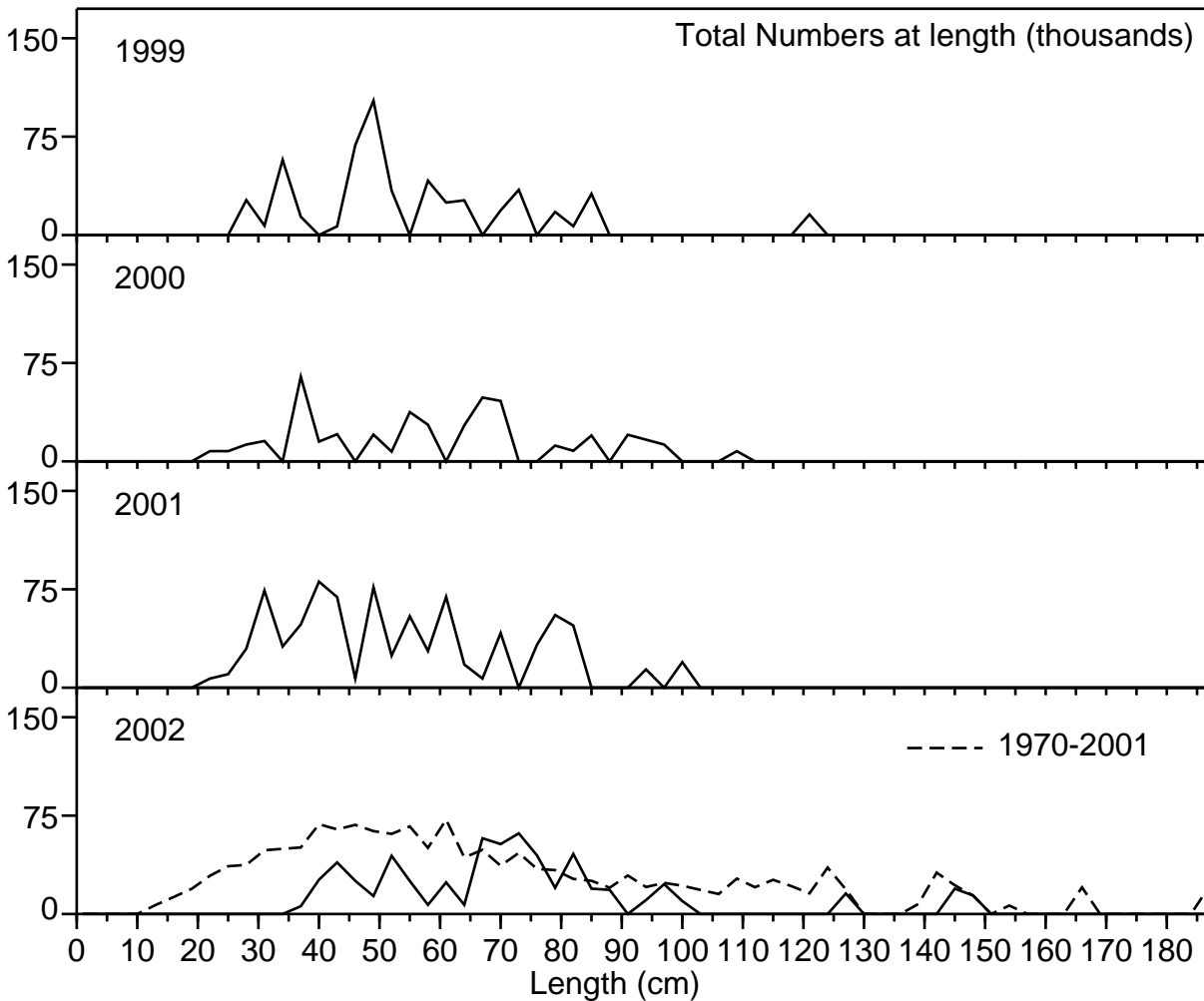


Fig. 66. 4VWX Halibut length frequency distribution from the SUMMER Groundfish surveys.

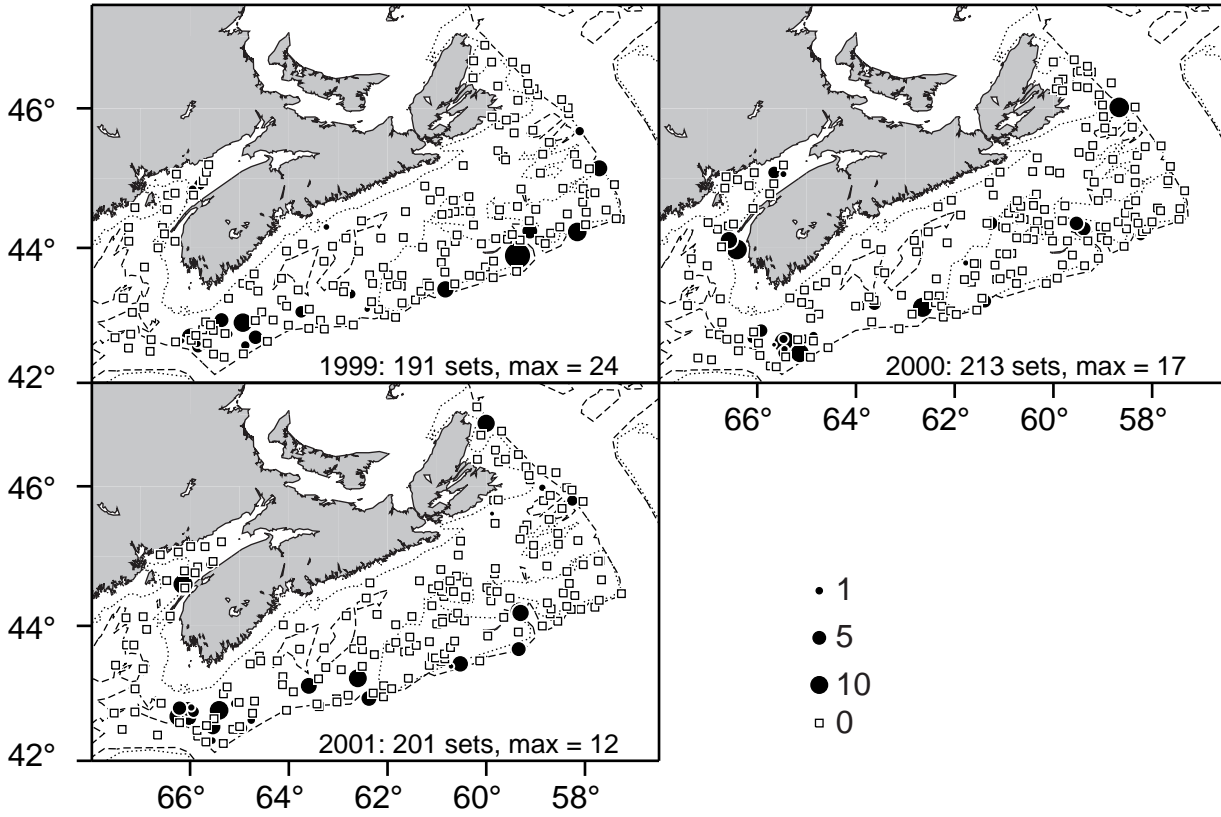


Fig. 67. 4VWX Halibut Biomass (kg/tow) from the 1999-2001 SUMMER Groundfish Surveys.

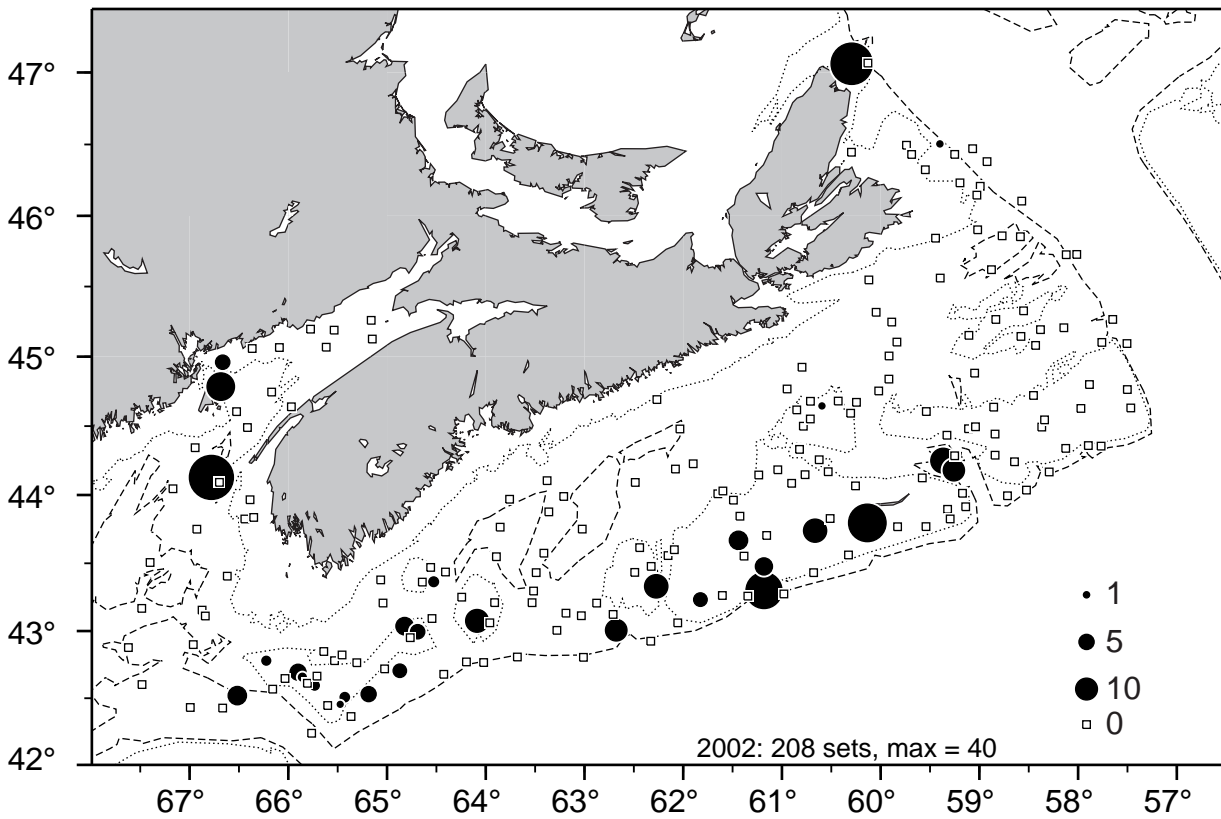


Fig. 68. 4VWX Halibut Biomass (kg/tow) from the 2002 SUMMER Groundfish Survey.

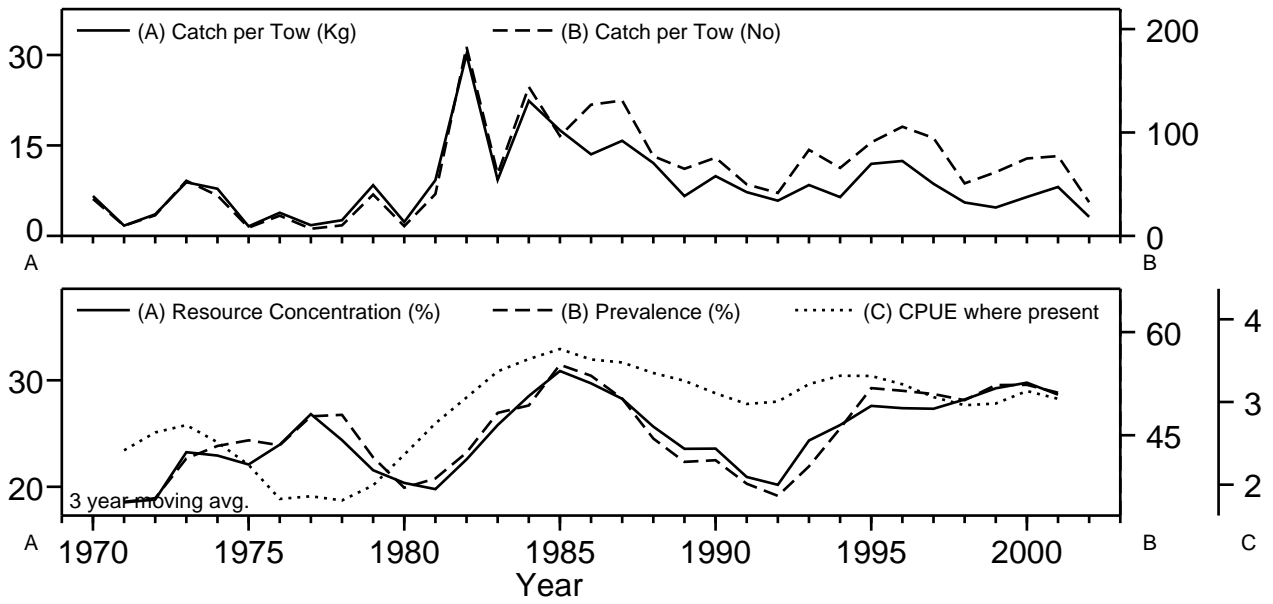


Fig. 69. 4VWX-484/495 Silver Hake stratified mean weight caught per tow, stratified mean number caught per tow, resource concentration, prevalence and CPUE where present (log number/tow) from the SUMMER Groundfish surveys.

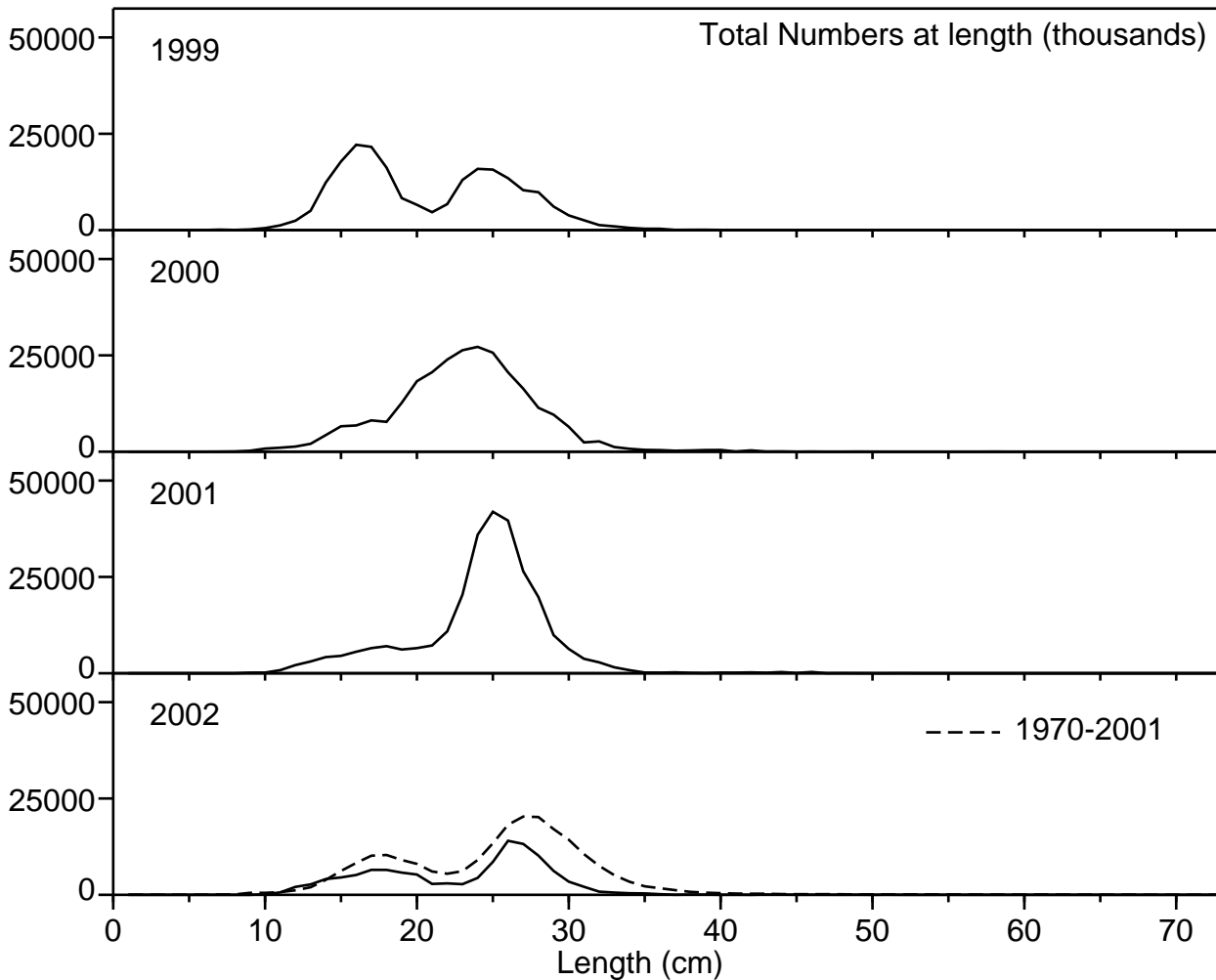


Fig. 70. 4VWX-484/495 Silver Hake length frequency distribution from the SUMMER Groundfish surveys.

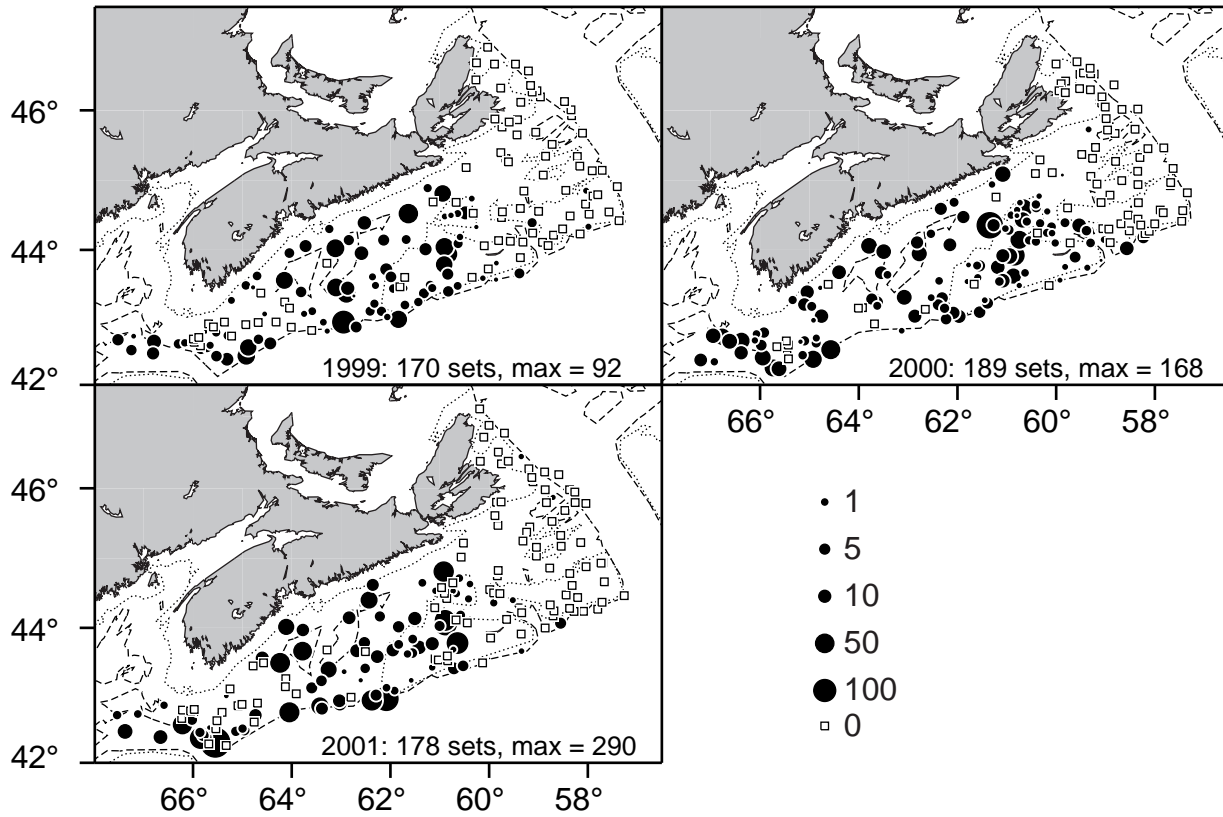


Fig. 71. 4VWX-484/495 Silver Hake Biomass (kg/tow) from the 1999-2001 SUMMER Groundfish Surveys.

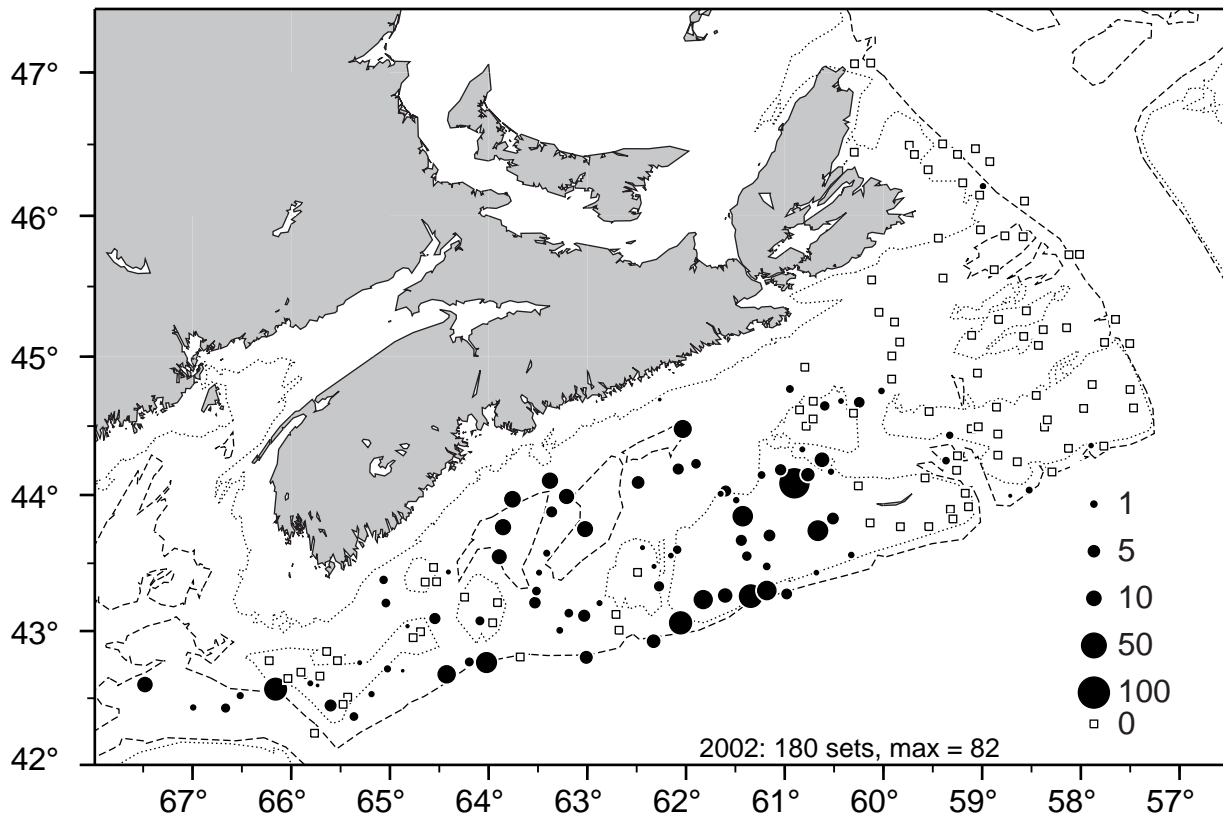


Fig. 72. 4VWX-484/495 Silver Hake Biomass (kg/tow) from the 2002 SUMMER Groundfish Survey.

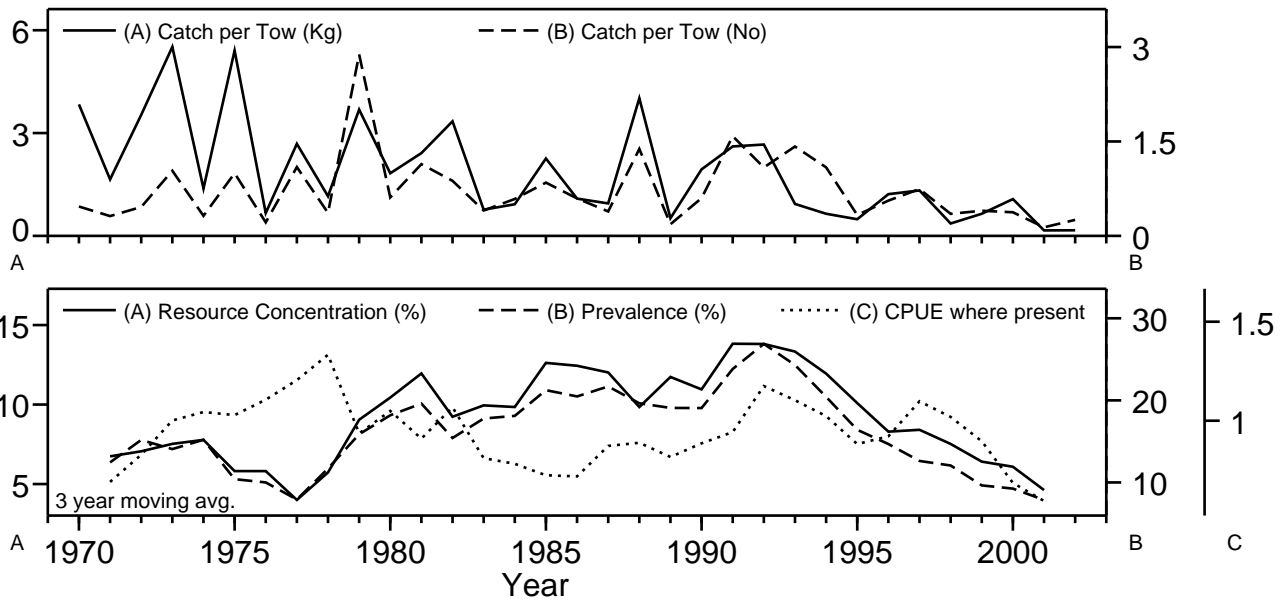


Fig. 73. 4VsW Winter Skate stratified mean weight caught per tow, stratified mean number caught per tow, resource concentration, prevalence and CPUE where present (log number/tow) from the SUMMER Groundfish surveys.

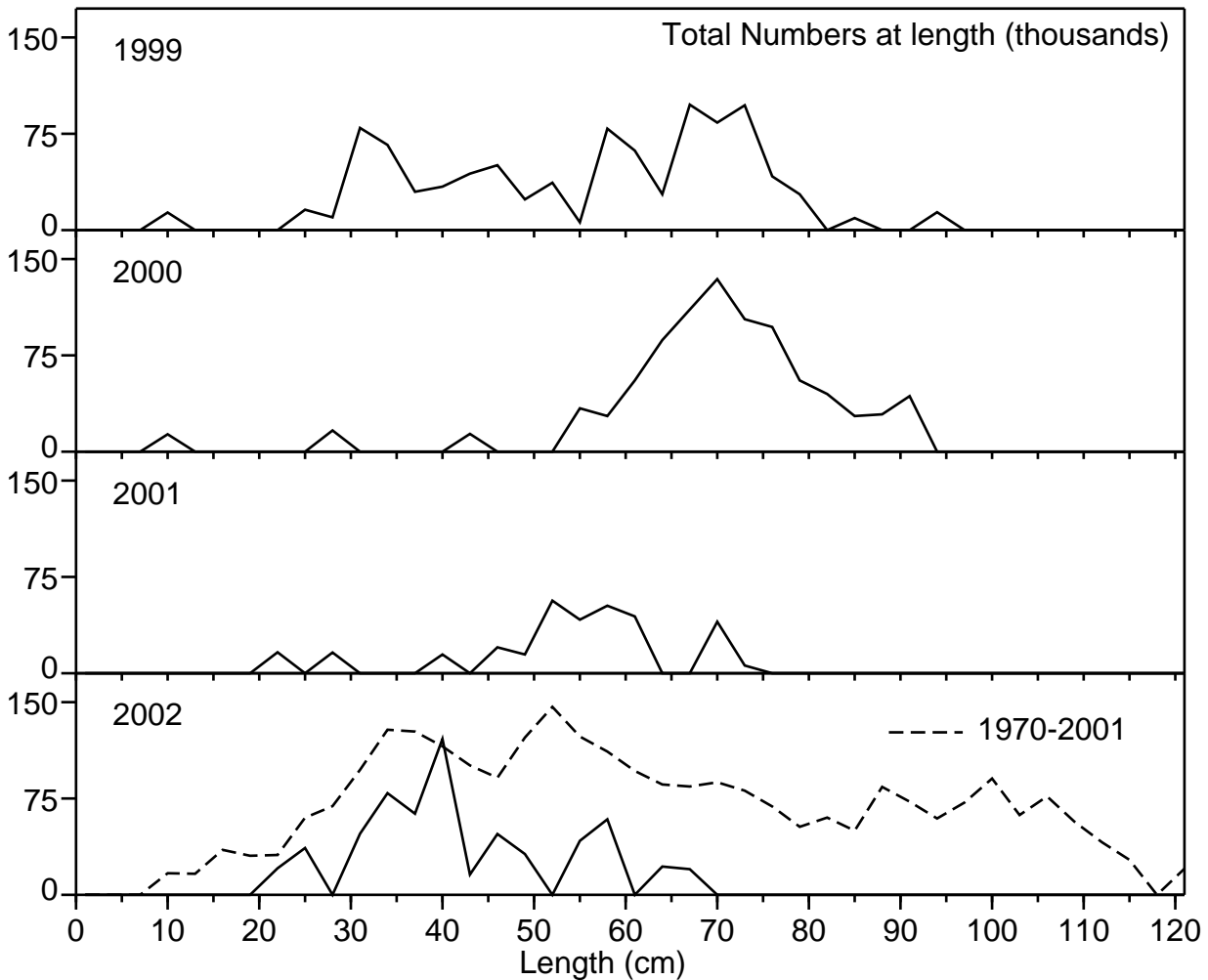


Fig. 74. 4VsW Winter Skate length frequency distribution from the SUMMER Groundfish surveys.

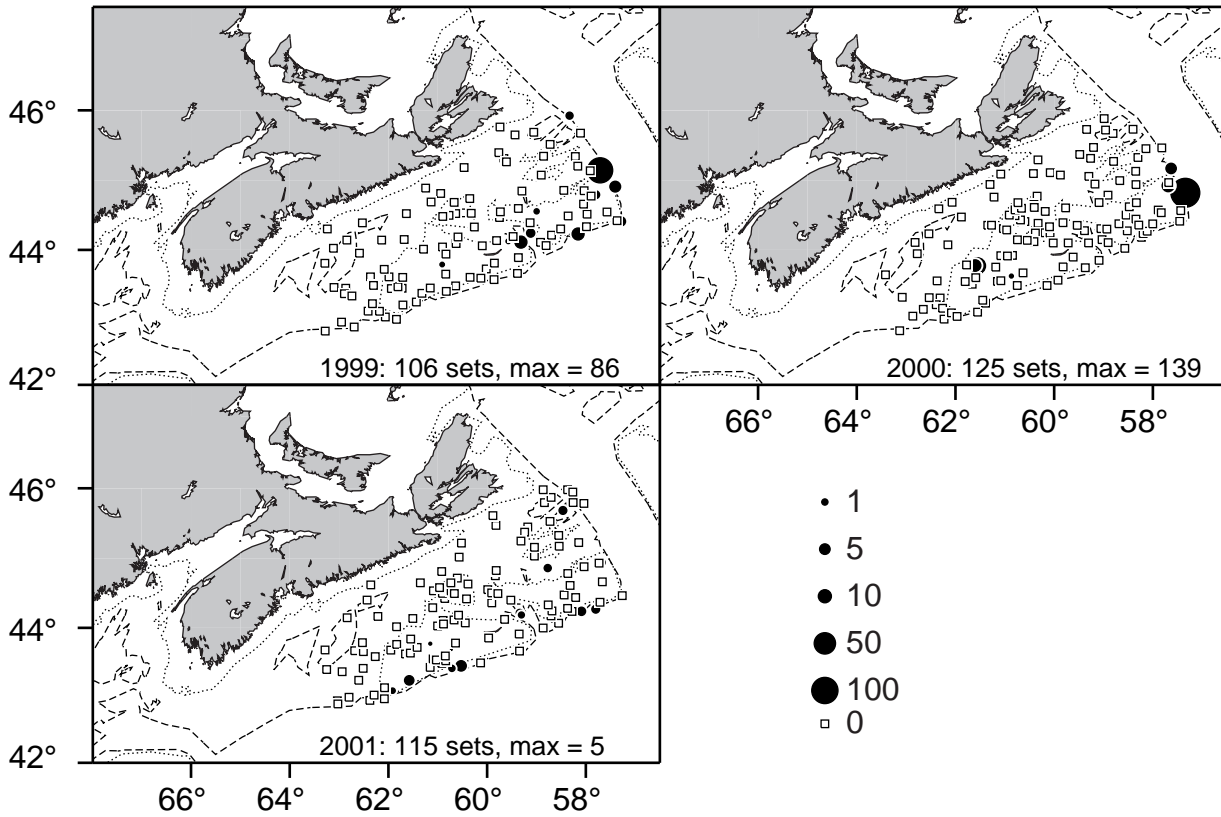


Fig. 75. 4VsW Winter Skate Biomass (kg/tow) from the 1999-2001 SUMMER Groundfish Surveys.

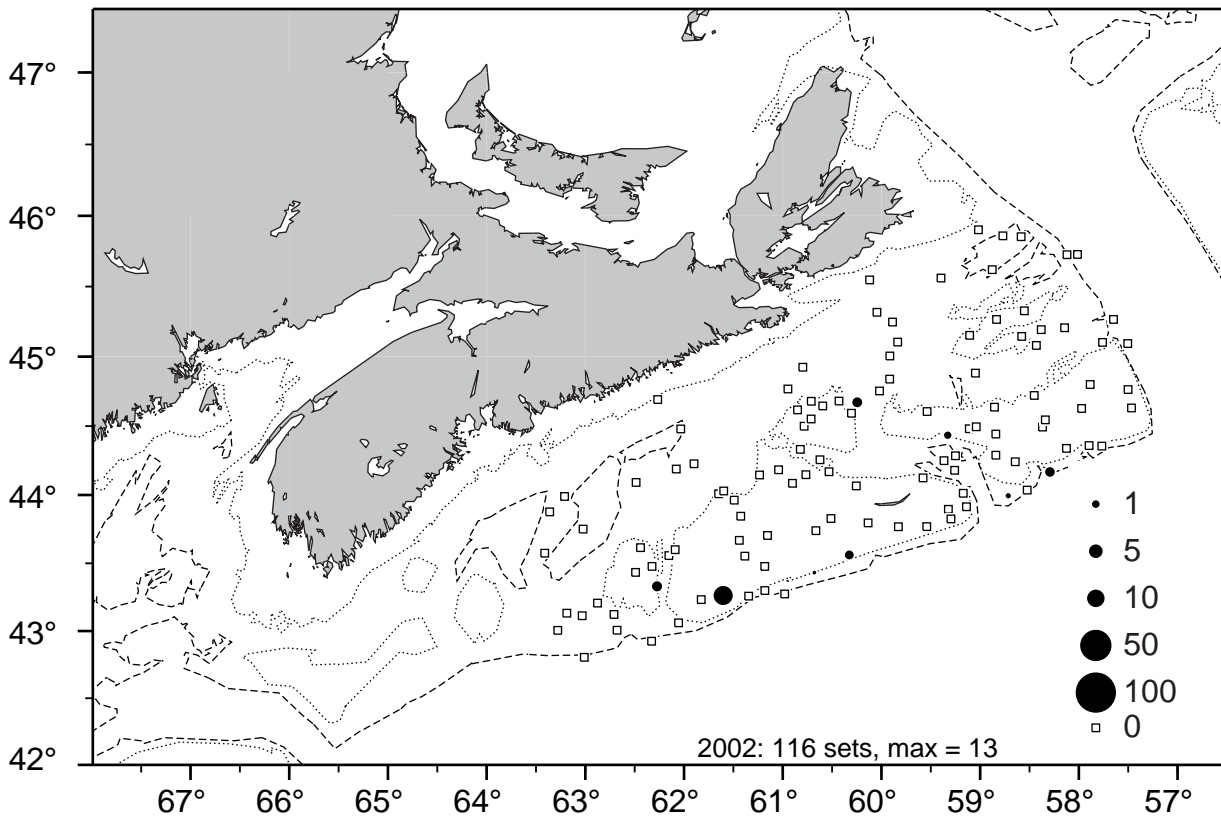


Fig. 76. 4VsW Winter Skate Biomass (kg/tow) from the 2002 SUMMER Groundfish Survey.

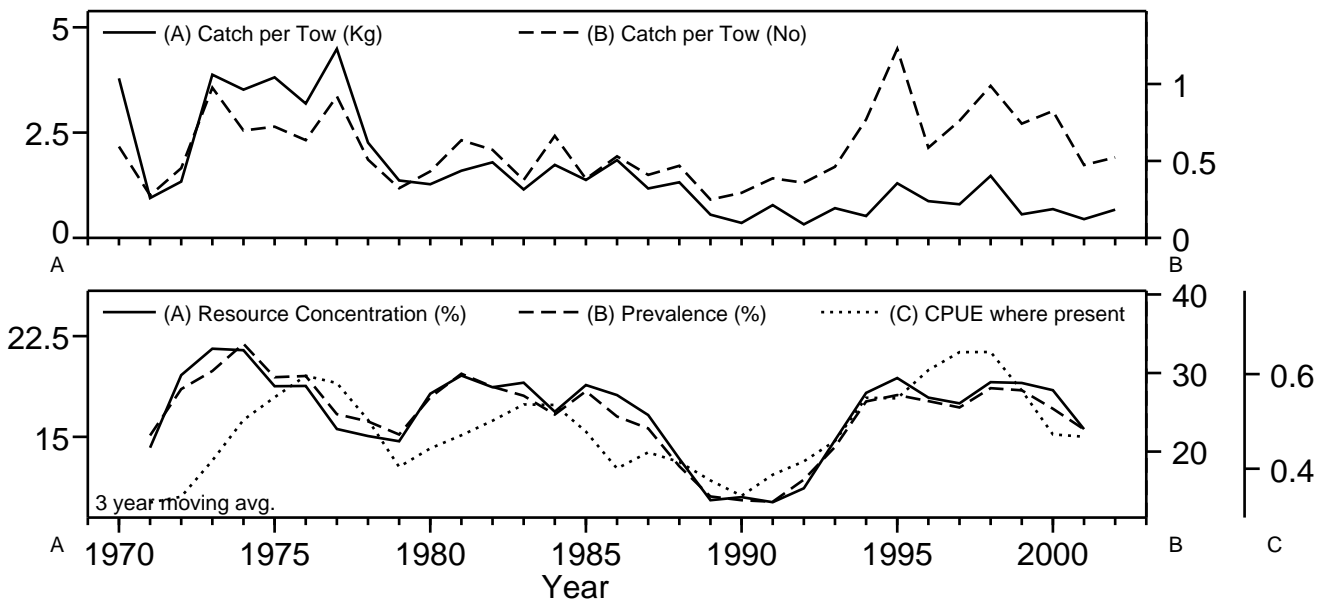


Fig. 77. 4VWX Monkfish stratified mean weight caught per tow, stratified mean number caught per tow, resource concentration, prevalence and CPUE where present (log number/tow) from the SUMMER Groundfish surveys.

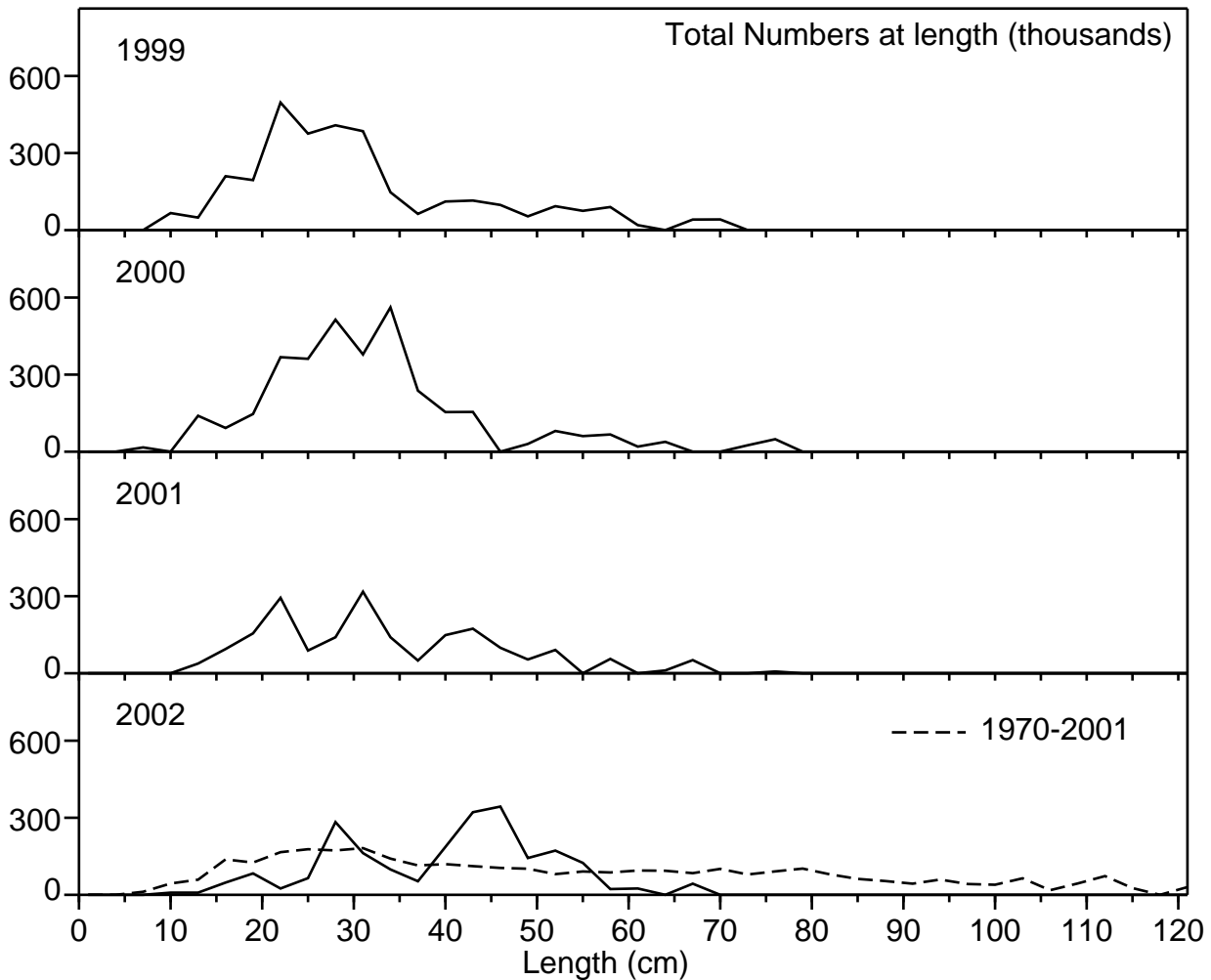


Fig. 78. 4VWX Monkfish length frequency distribution from the SUMMER Groundfish surveys.

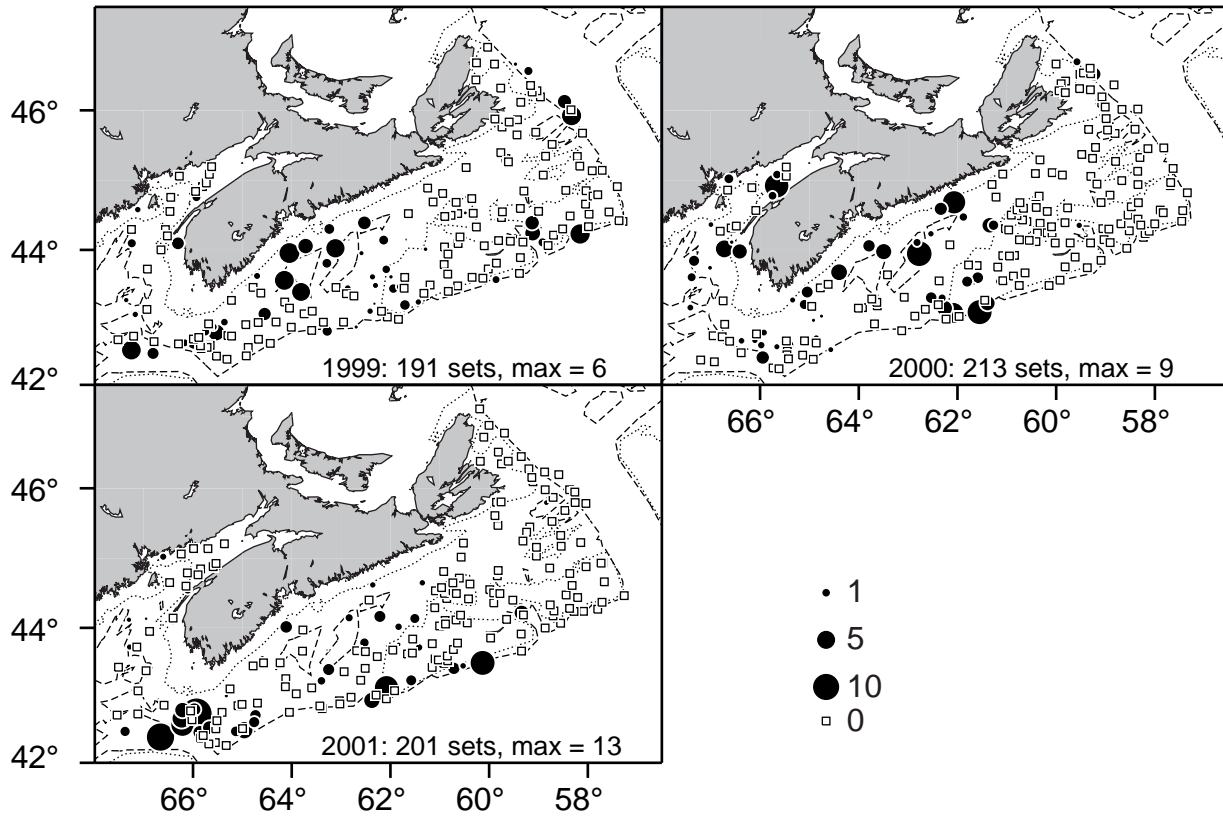


Fig. 79. 4VWX Monkfish Biomass (kg/tow) from the 1999-2001 SUMMER Groundfish Surveys.

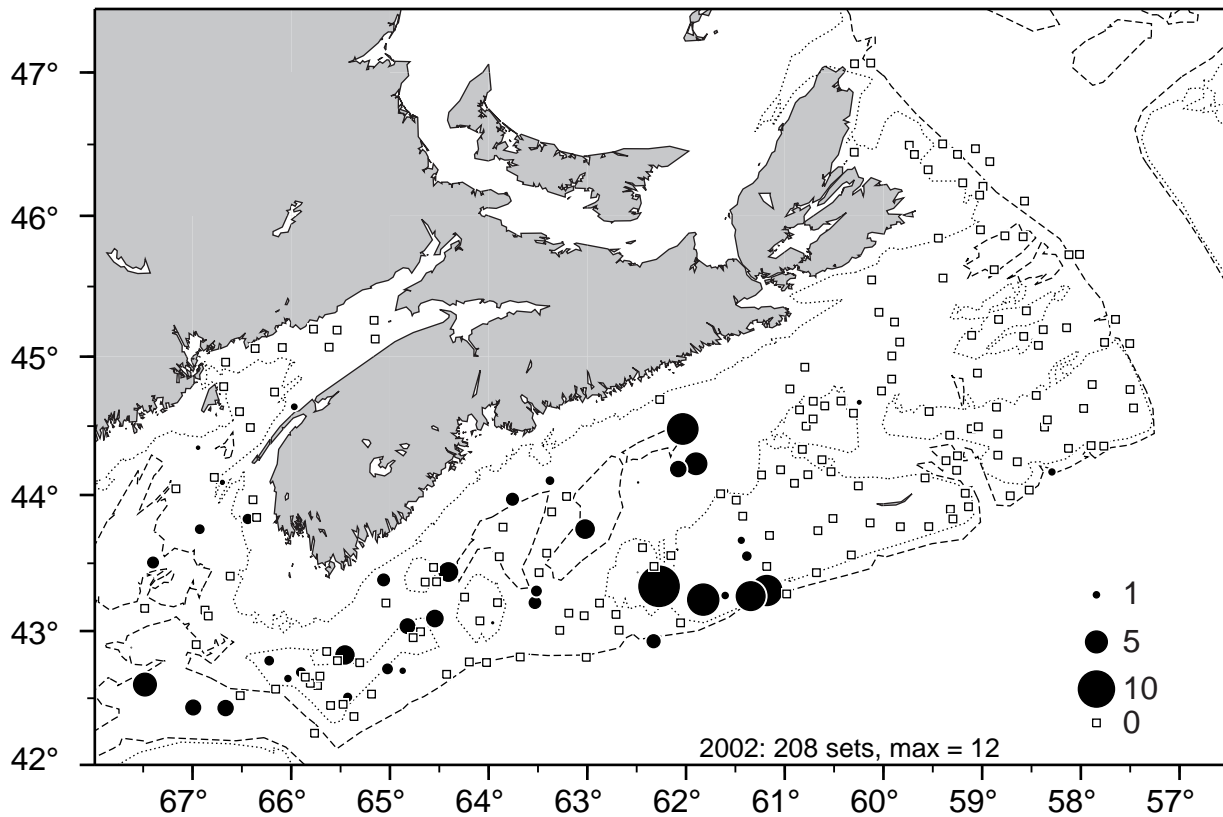


Fig. 80. 4VWX Monkfish Biomass (kg/tow) from the 2002 SUMMER Groundfish Survey.

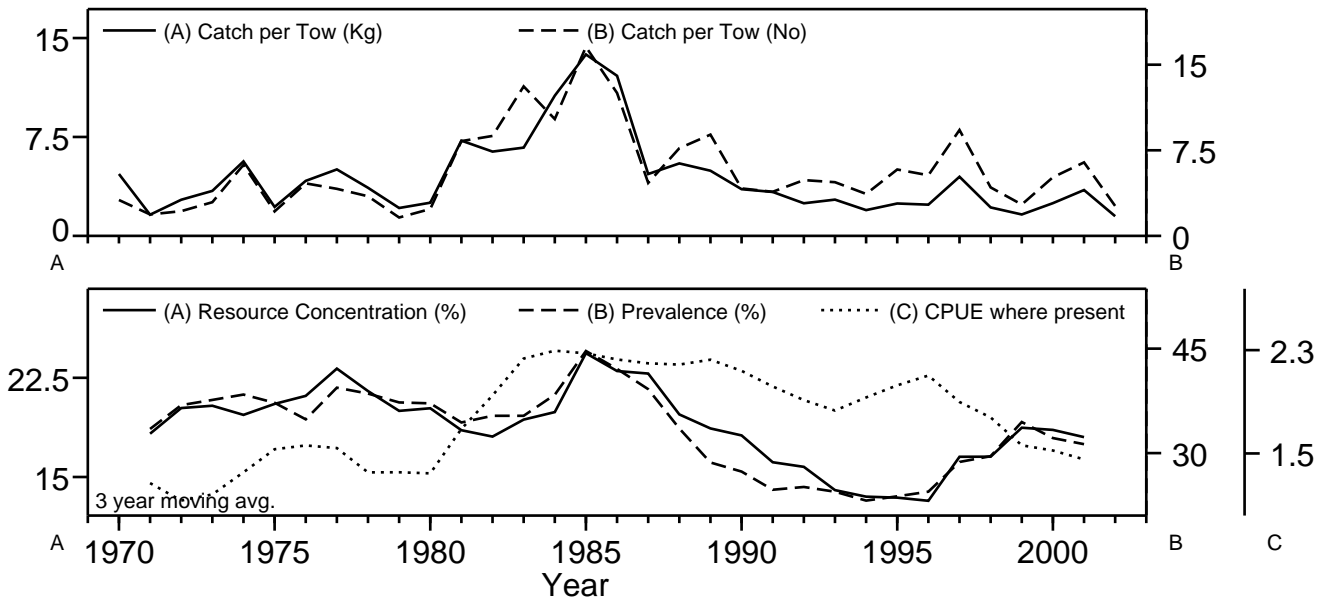


Fig. 81. 4VW White Hake stratified mean weight caught per tow, stratified mean number caught per tow, resource concentration, prevalence and CPUE where present (log number/tow) from the SUMMER Groundfish surveys.

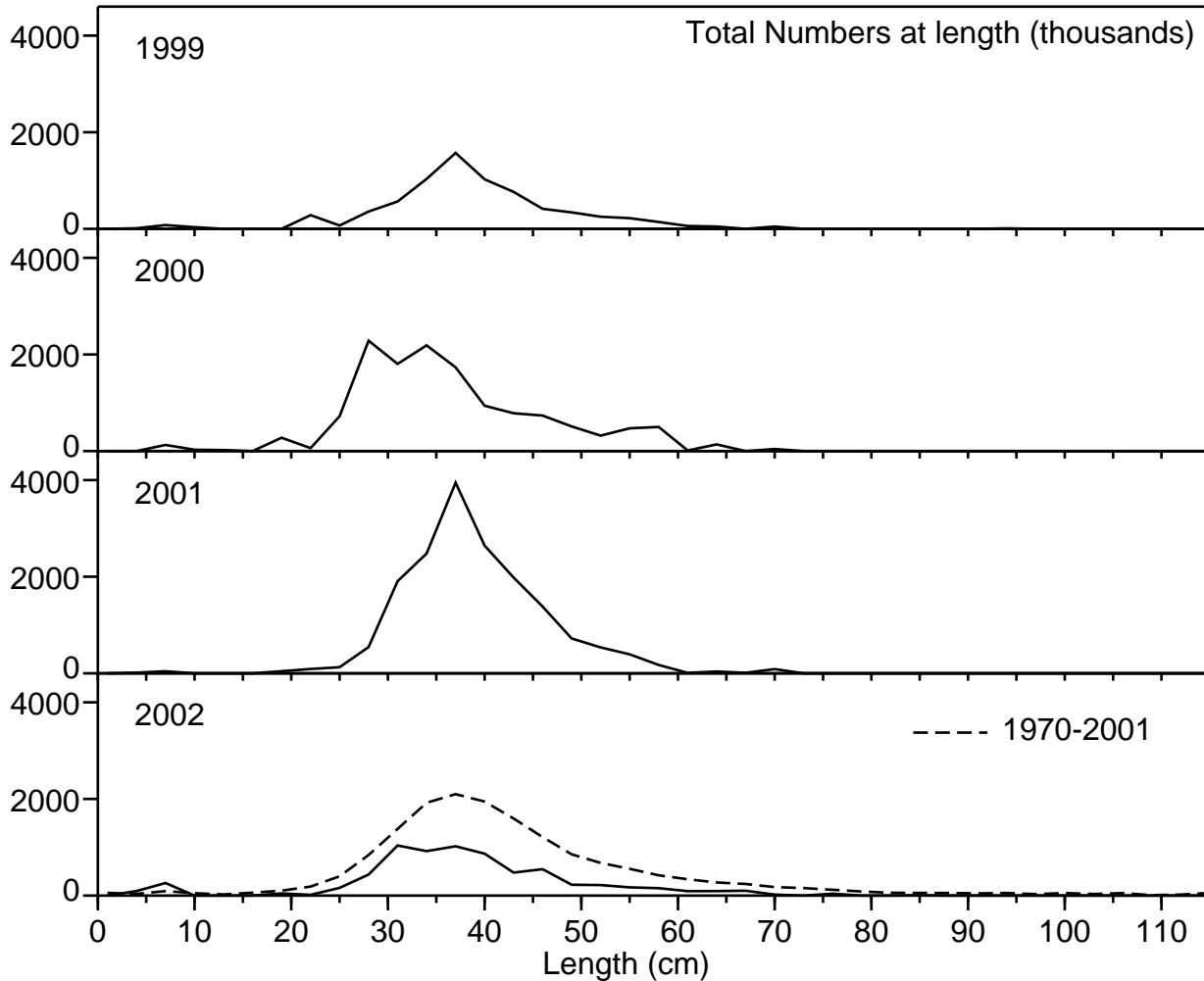


Fig. 82. 4VW White Hake length frequency distribution from the SUMMER Groundfish surveys.

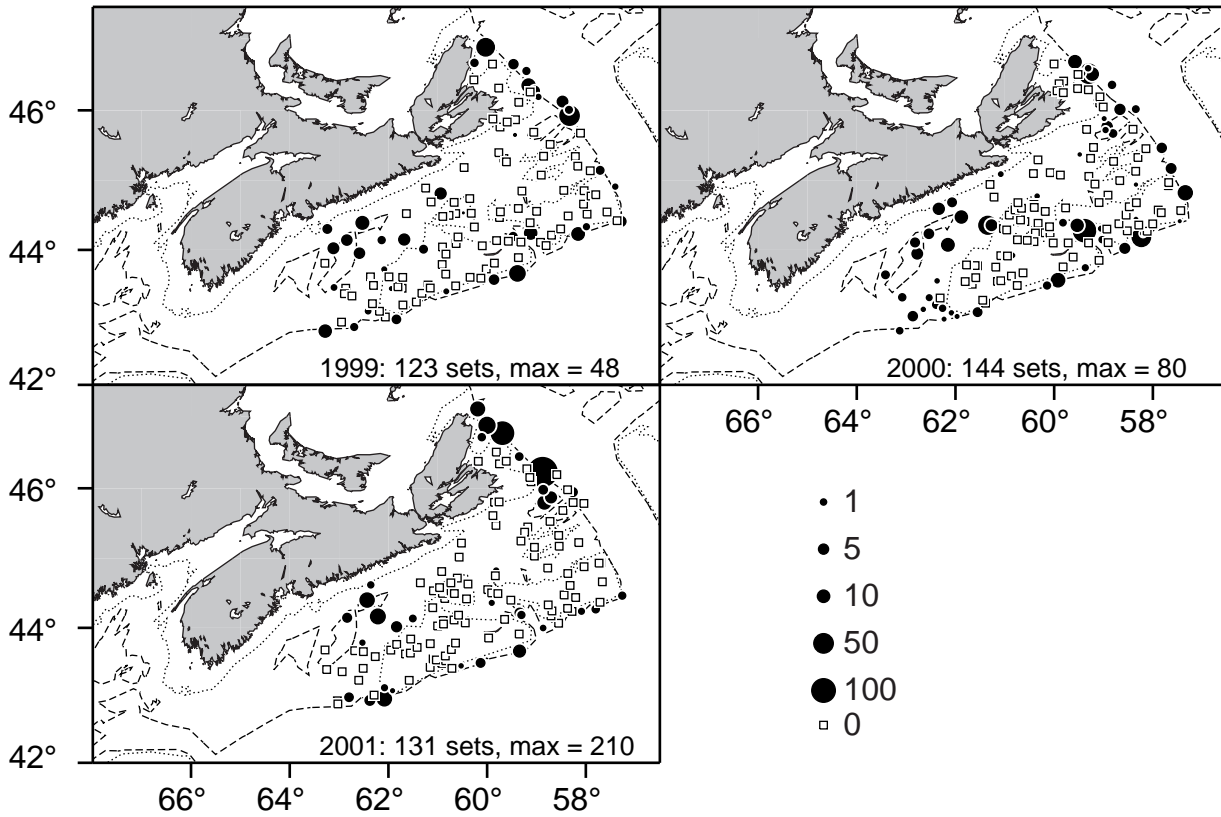


Fig. 83. 4VW White Hake Biomass (kg/tow) from the 1999-2001 SUMMER Groundfish Surveys.

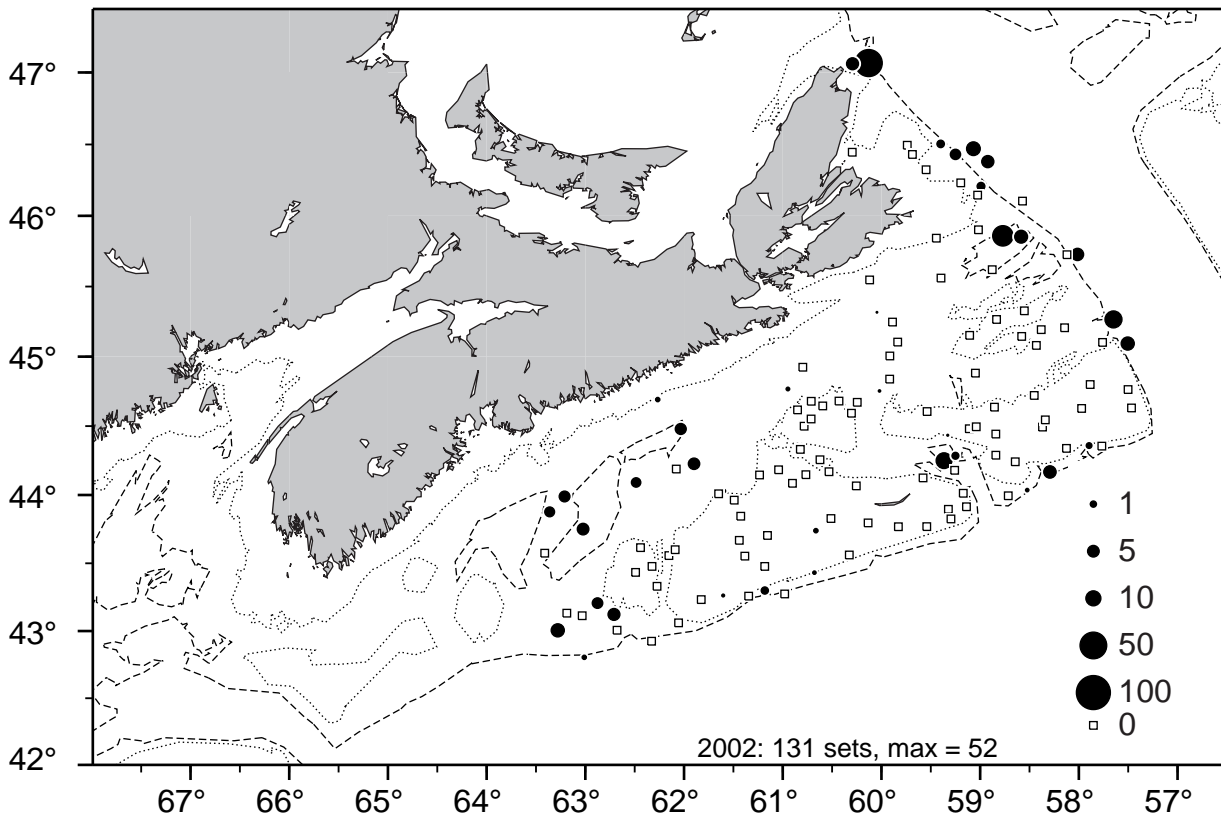


Fig. 84. 4VW White Hake Biomass (kg/tow) from the 2002 SUMMER Groundfish Survey.

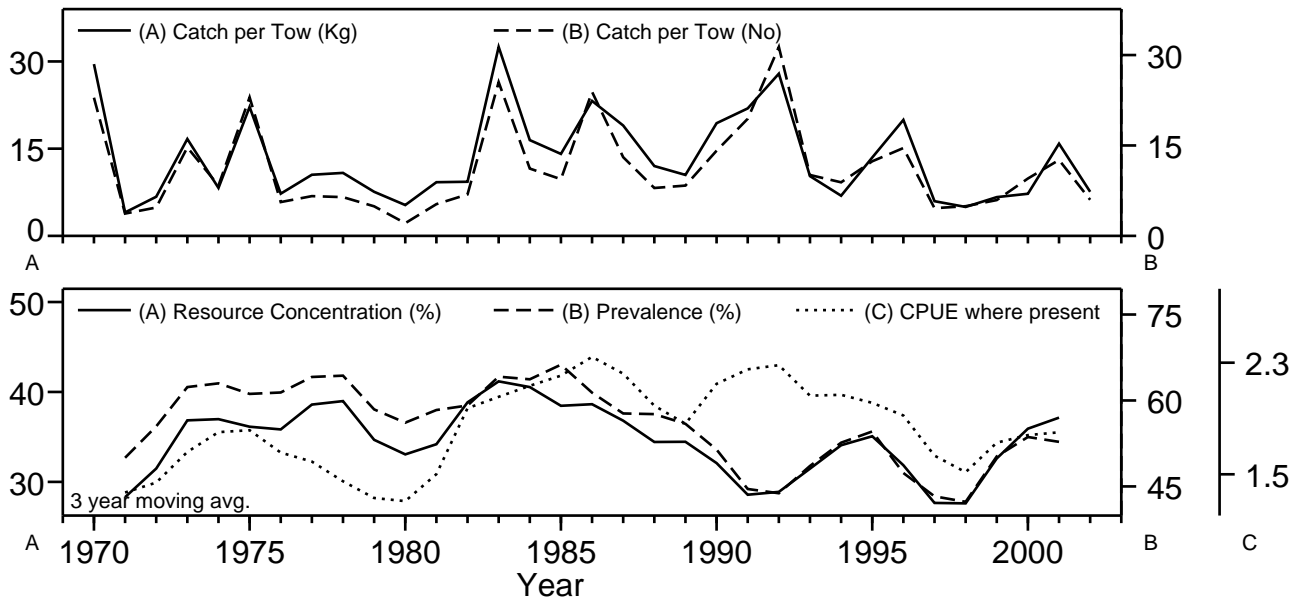


Fig. 85. 4X White Hake stratified mean weight caught per tow, stratified mean number caught per tow, resource concentration, prevalence and CPUE where present (log number/tow) from the SUMMER Groundfish surveys.

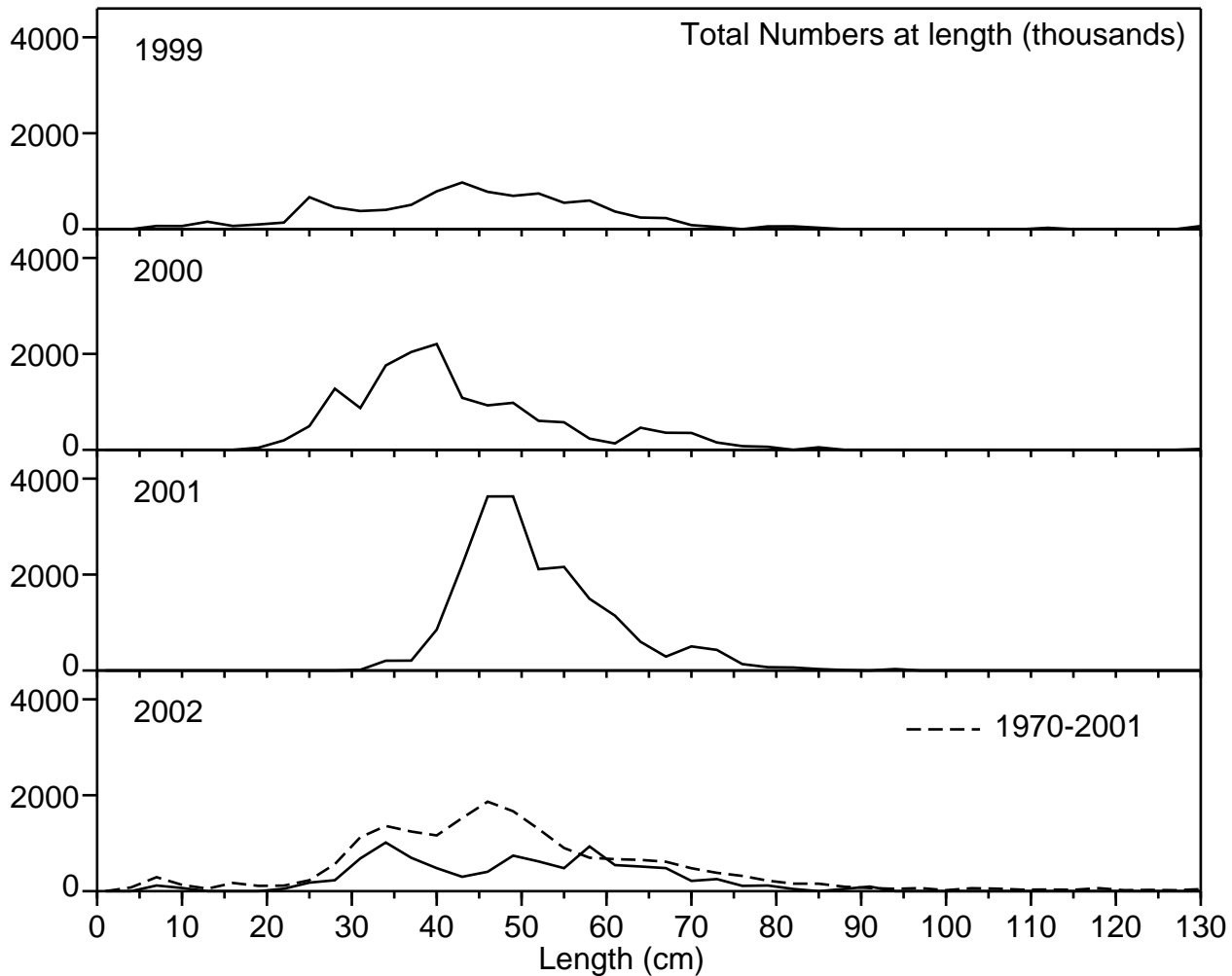


Fig. 86. 4X White Hake length frequency distribution from the SUMMER Groundfish surveys.

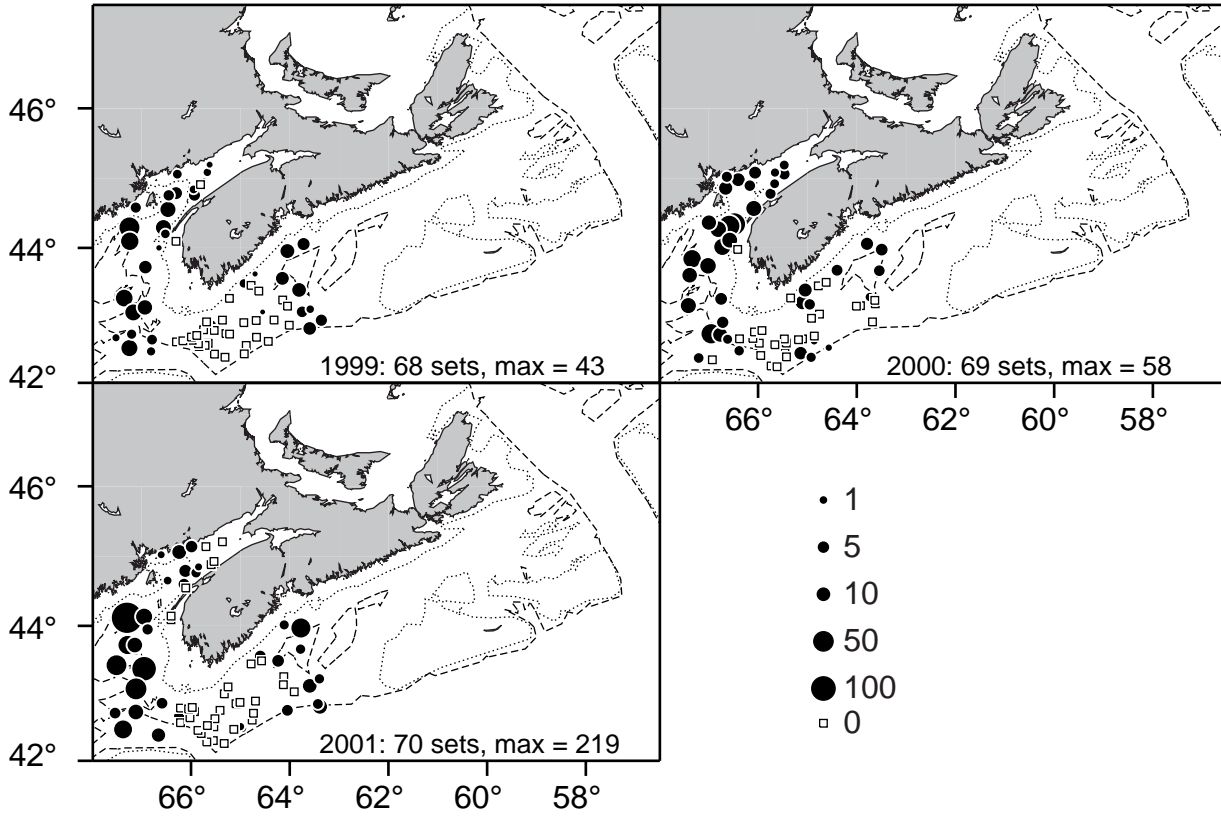


Fig. 87. 4X White Hake Biomass (kg/tow) from the 1999-2001 SUMMER Groundfish Surveys.

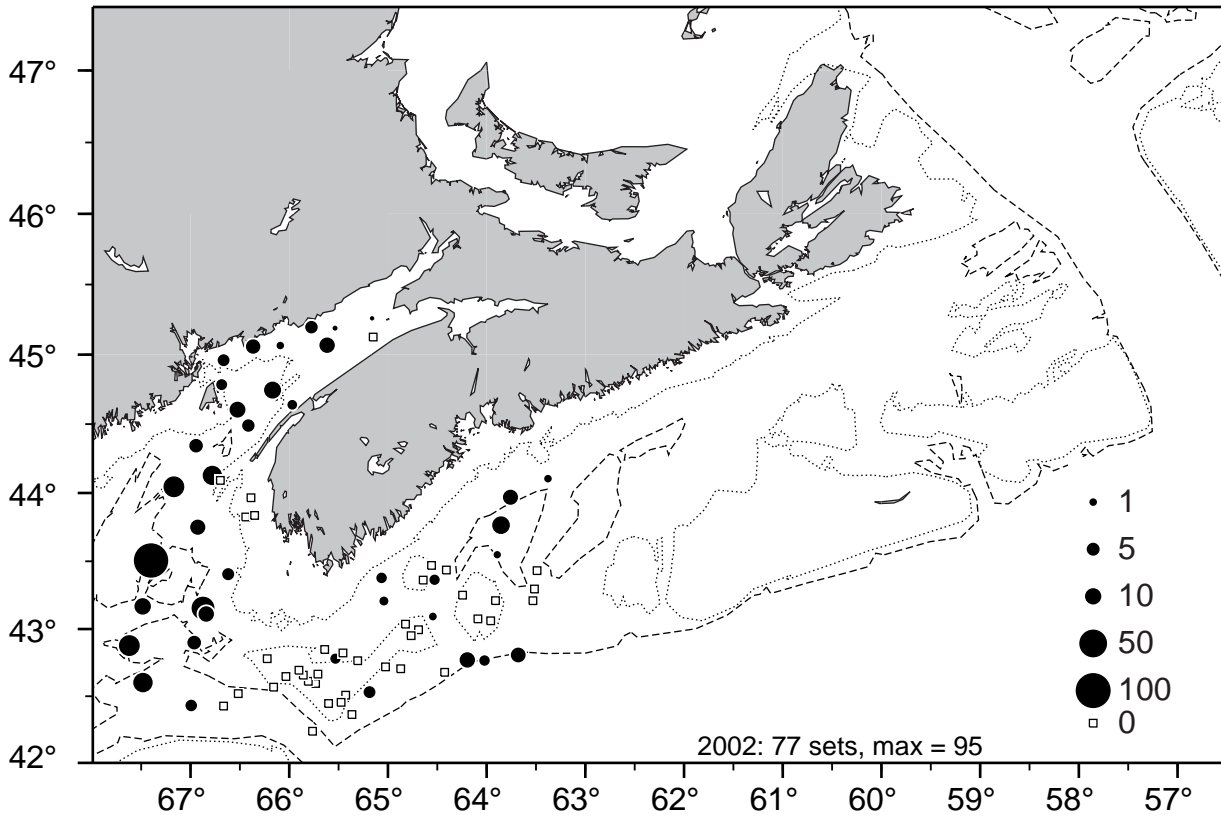


Fig. 88. 4X White Hake Biomass (kg/tow) from the 2002 SUMMER Groundfish Survey.

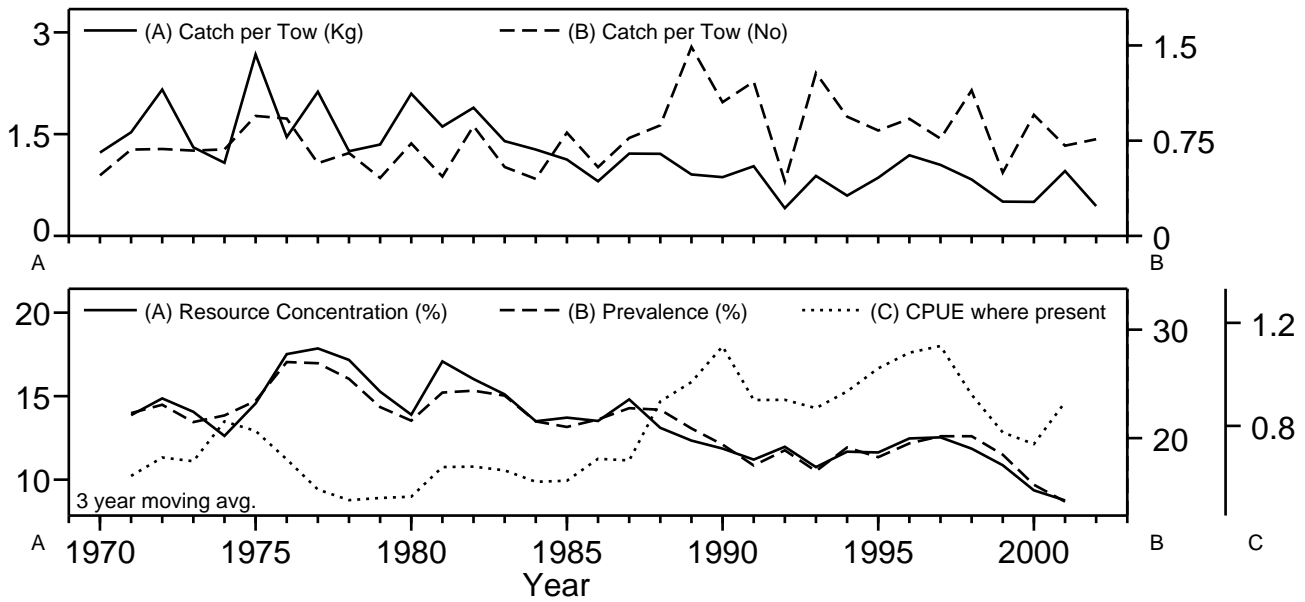


Fig. 89. 4VWX Striped Atlantic Wolffish stratified mean weight caught per tow, stratified mean number caught per tow, resource concentration, prevalence and CPUE where present (log number/tow) from the SUMMER Groundfish surveys.

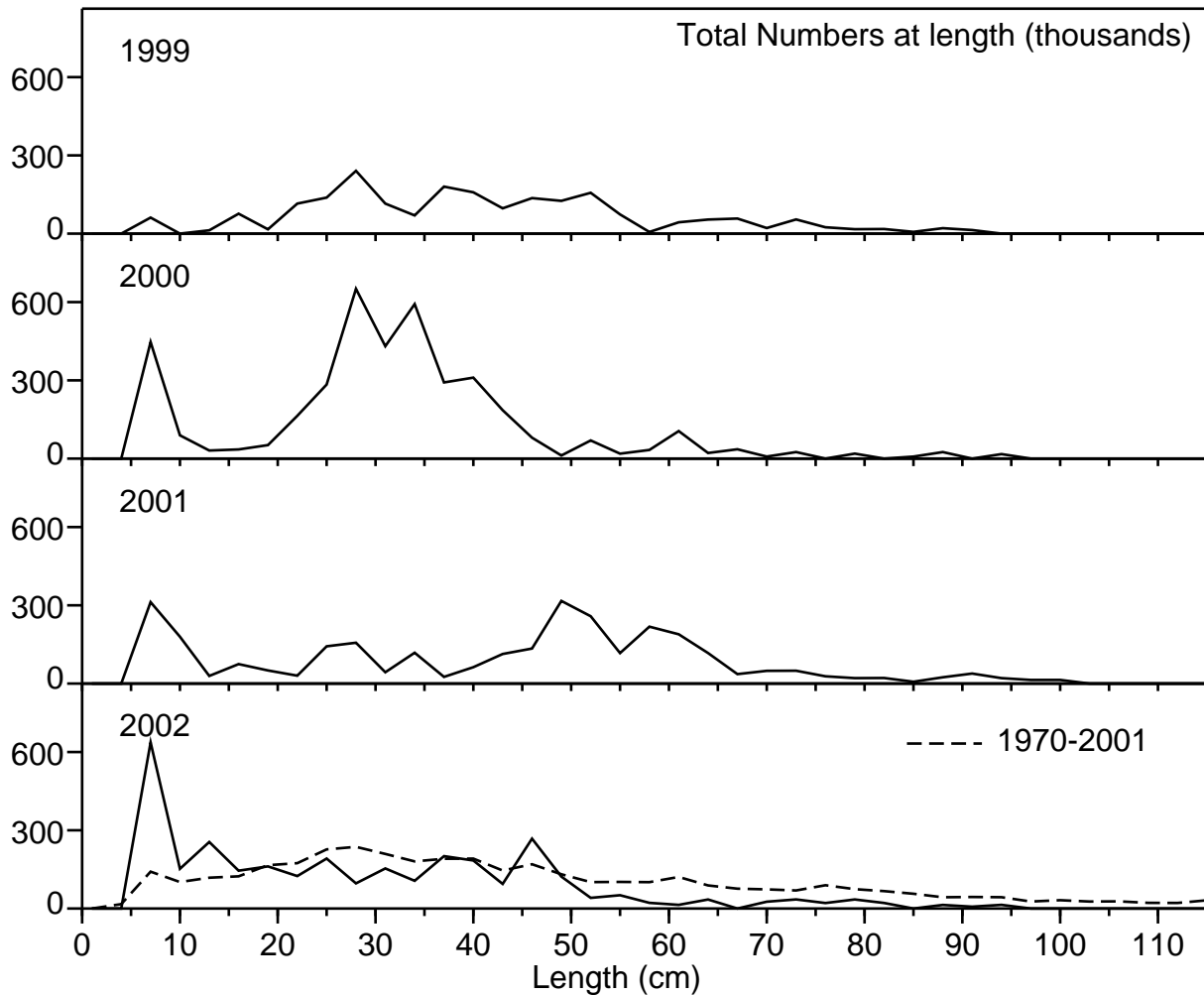


Fig. 90. 4VWX Striped Atlantic Wolffish length frequency distribution from the SUMMER Groundfish surveys.

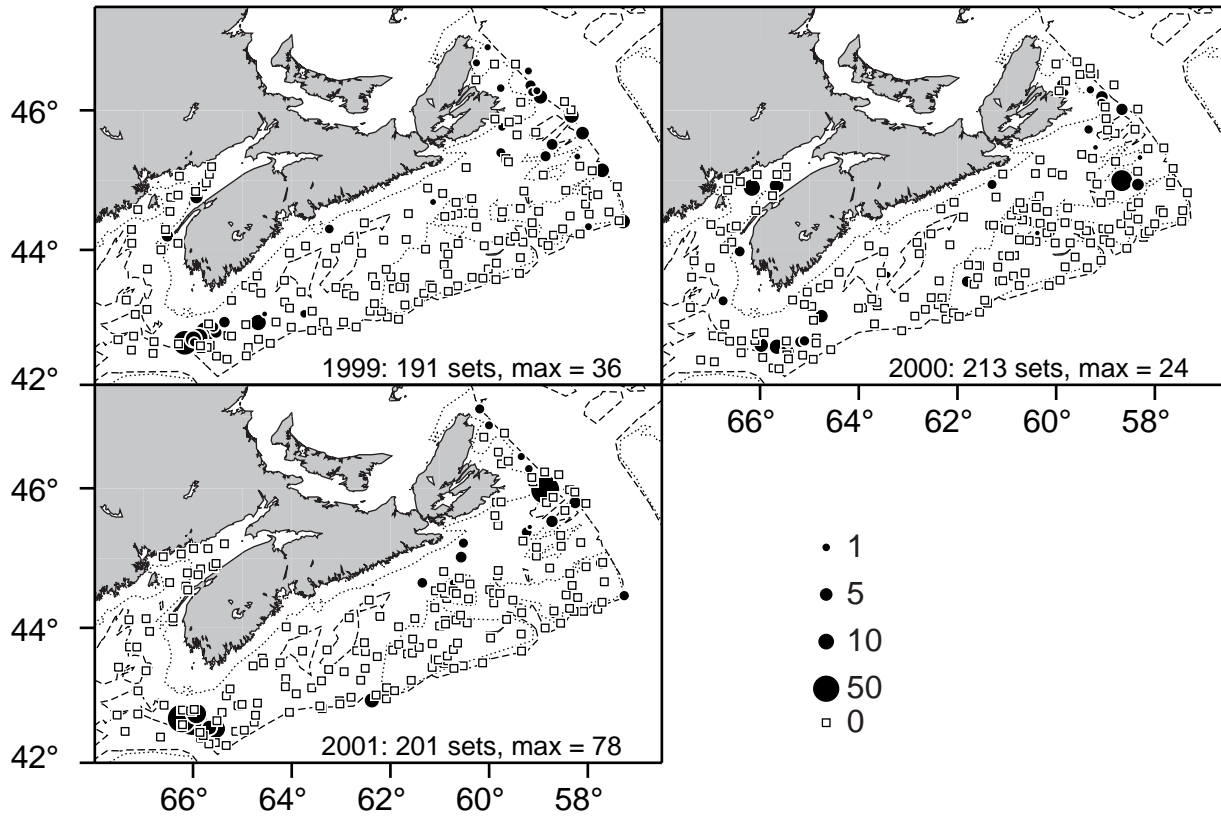


Fig. 91. 4VWX Striped Atlantic Wolffish Biomass (kg/tow) from the 1999-2001 SUMMER Groundfish Surveys.

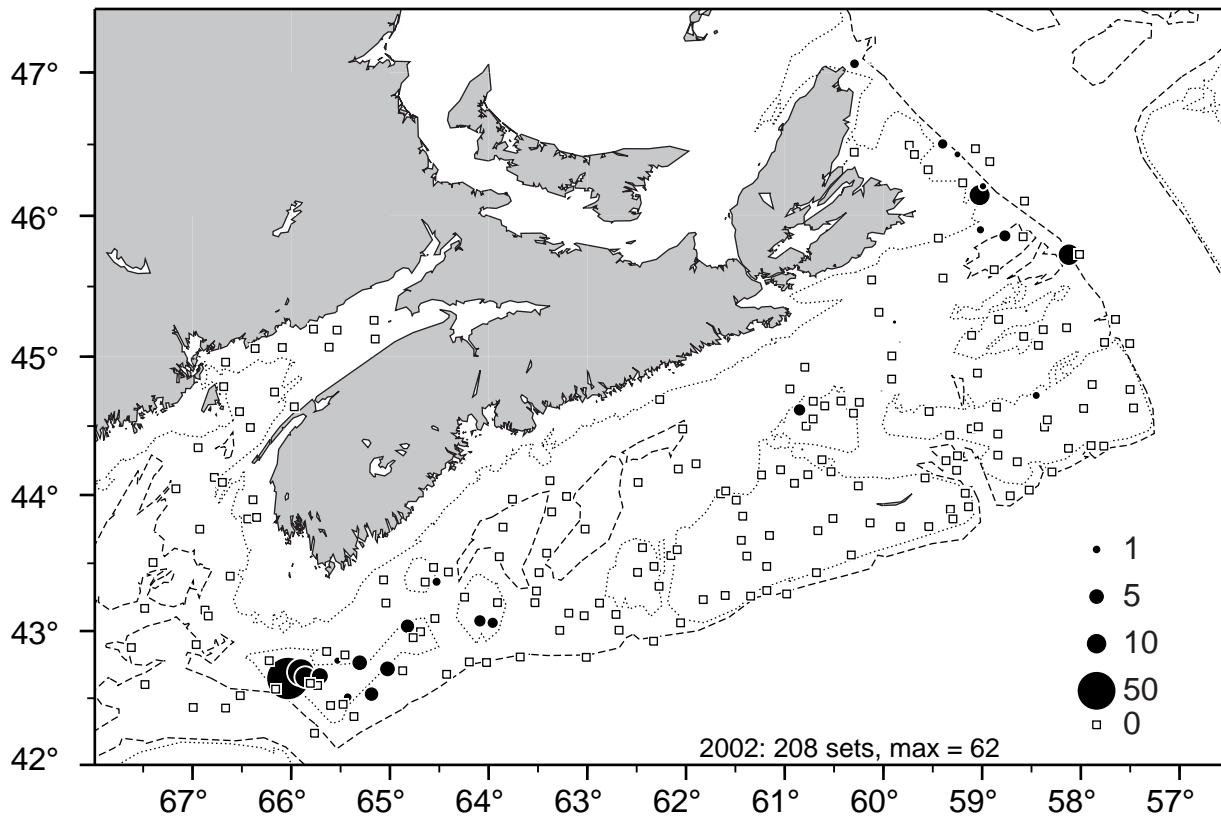


Fig. 92. 4VWX Striped Atlantic Wolffish Biomass (kg/tow) from the 2002 SUMMER Groundfish Survey.

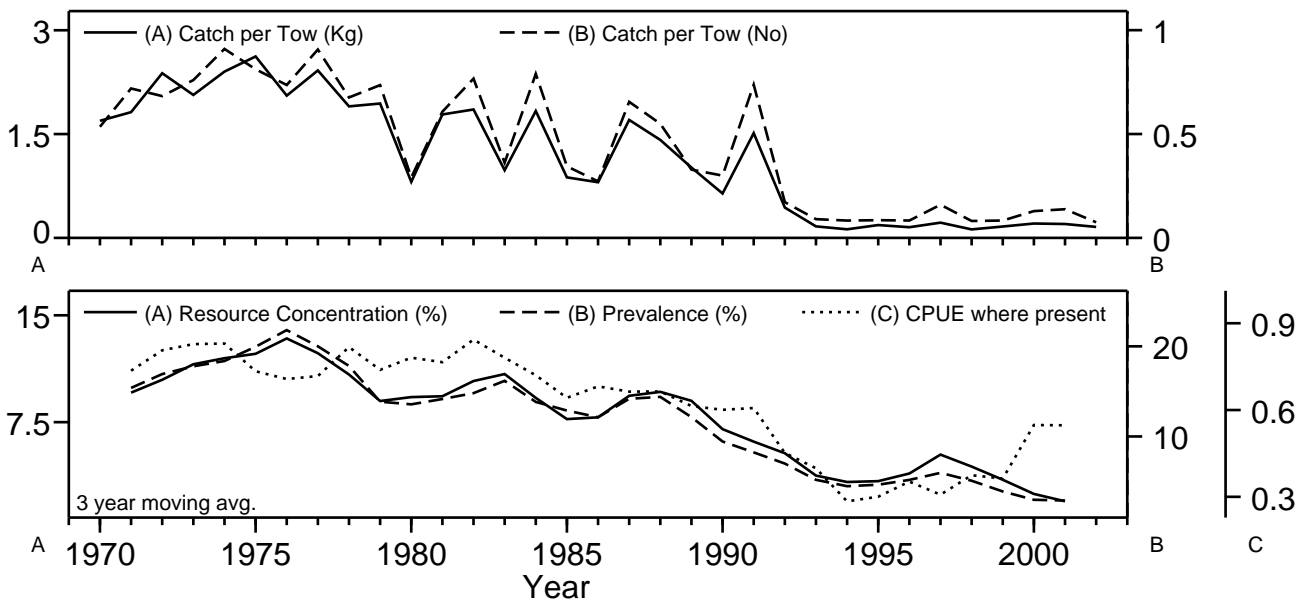


Fig. 93. 4VWX Cusk stratified mean weight caught per tow, stratified mean number caught per tow, resource concentration, prevalence and CPUE where present (log number/tow) from the SUMMER Groundfish surveys.

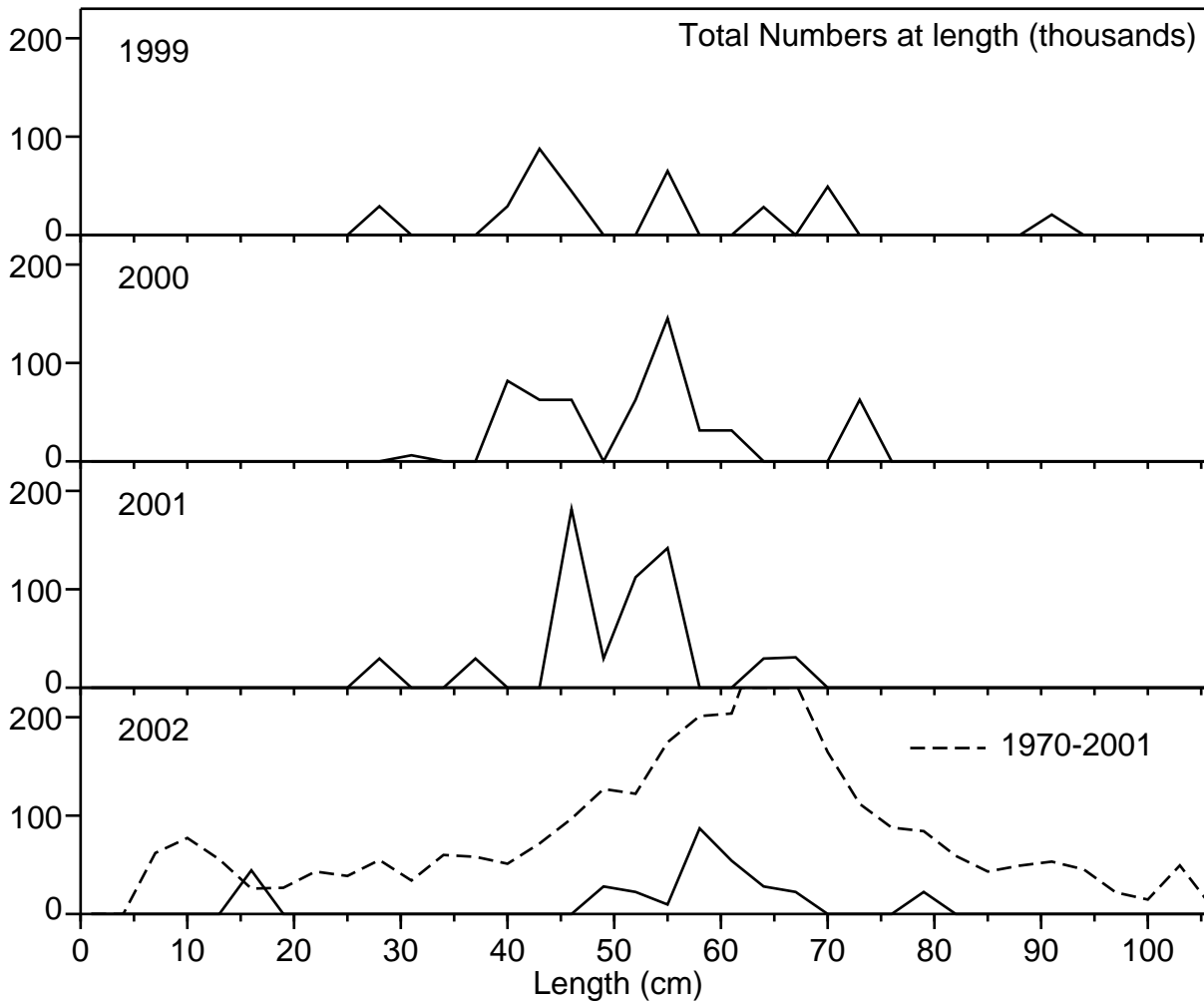


Fig. 94. 4VWX Cusk length frequency distribution from the SUMMER Groundfish surveys.

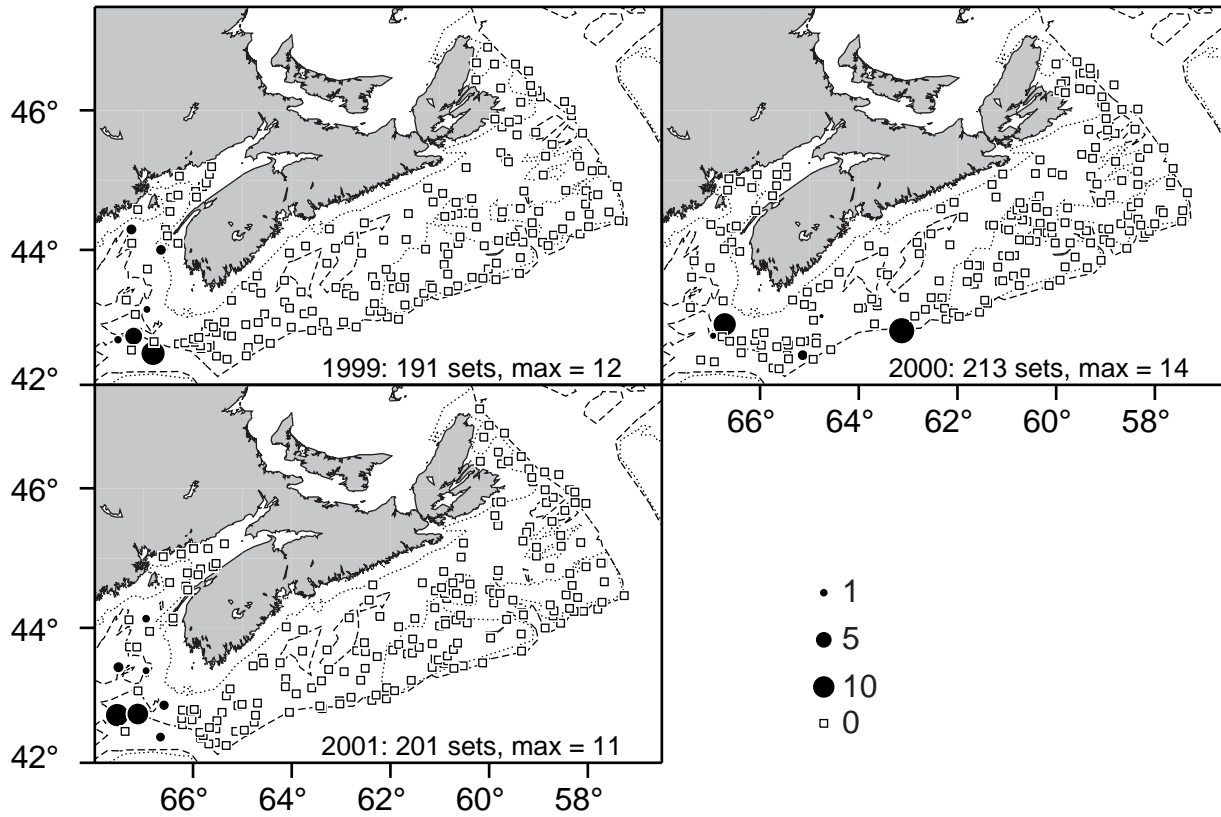


Fig. 95. 4VWX Cusk Biomass (kg/tow) from the 1999-2001 SUMMER Groundfish Surveys.

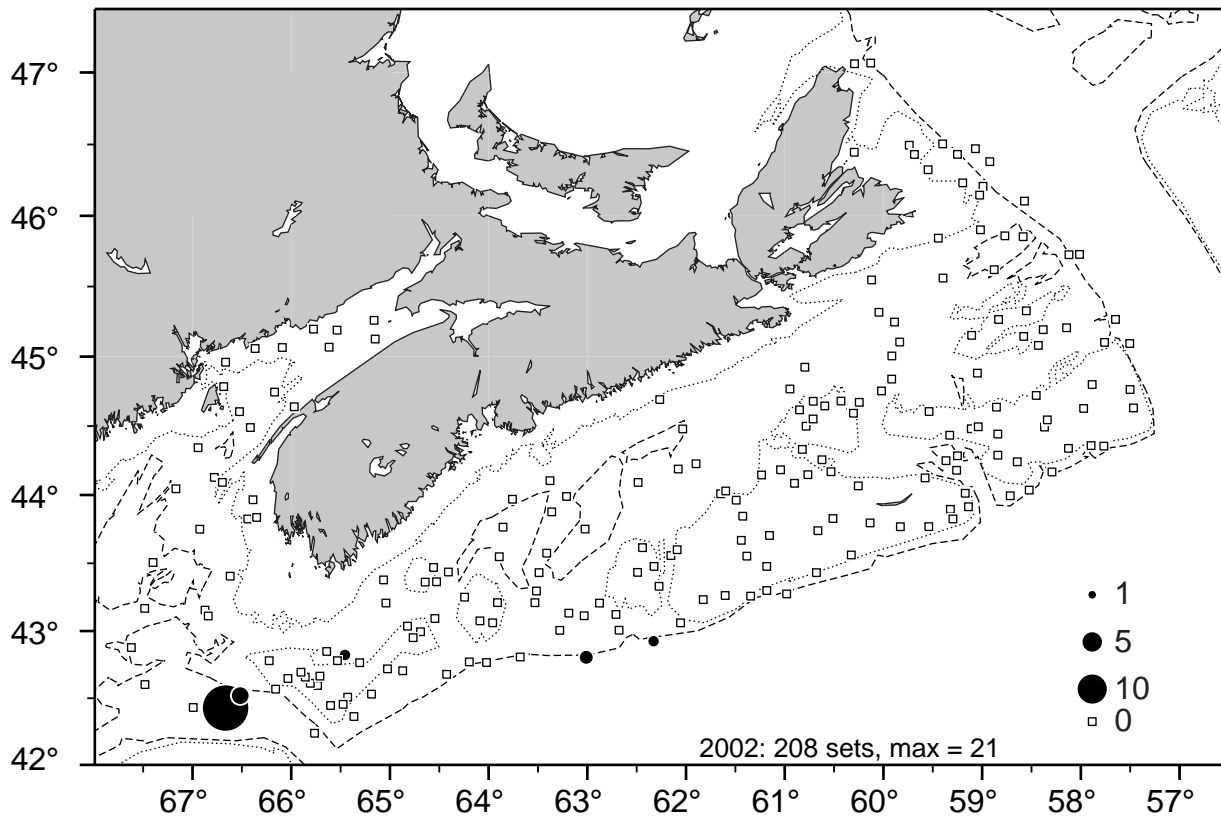


Fig. 96. 4VWX Cusk Biomass (kg/tow) from the 2002 SUMMER Groundfish Survey.

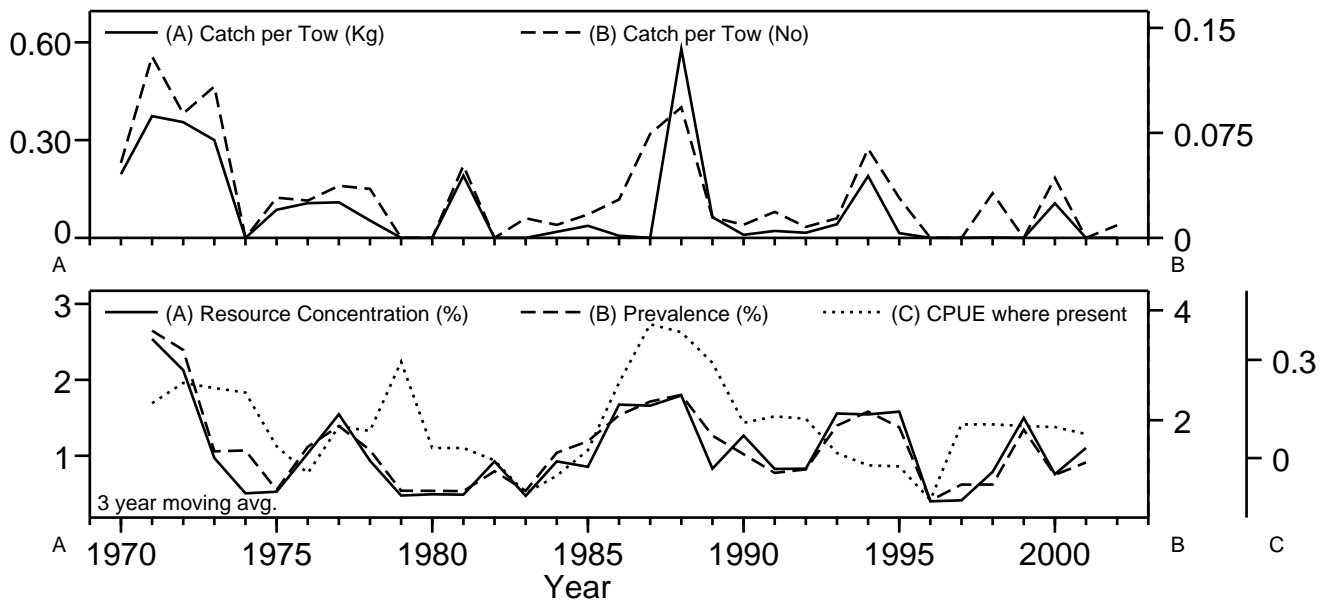


Fig. 97. 4VW Lumpfish stratified mean weight caught per tow, stratified mean number caught per tow, resource concentration, prevalence and CPUE where present (log number/tow) from the SUMMER Groundfish surveys.

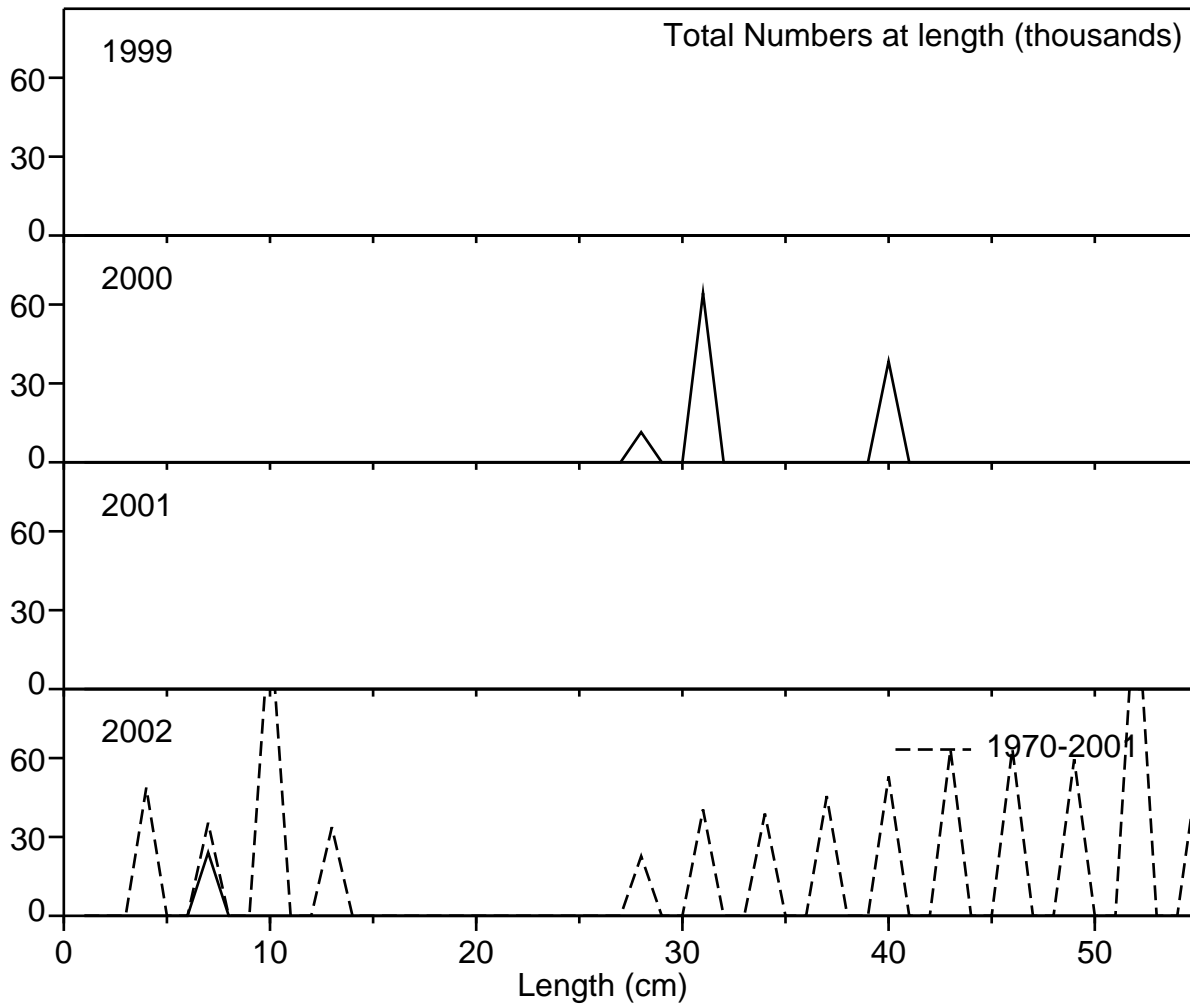


Fig. 98. 4VW Lumpfish length frequency distribution from the SUMMER Groundfish surveys.

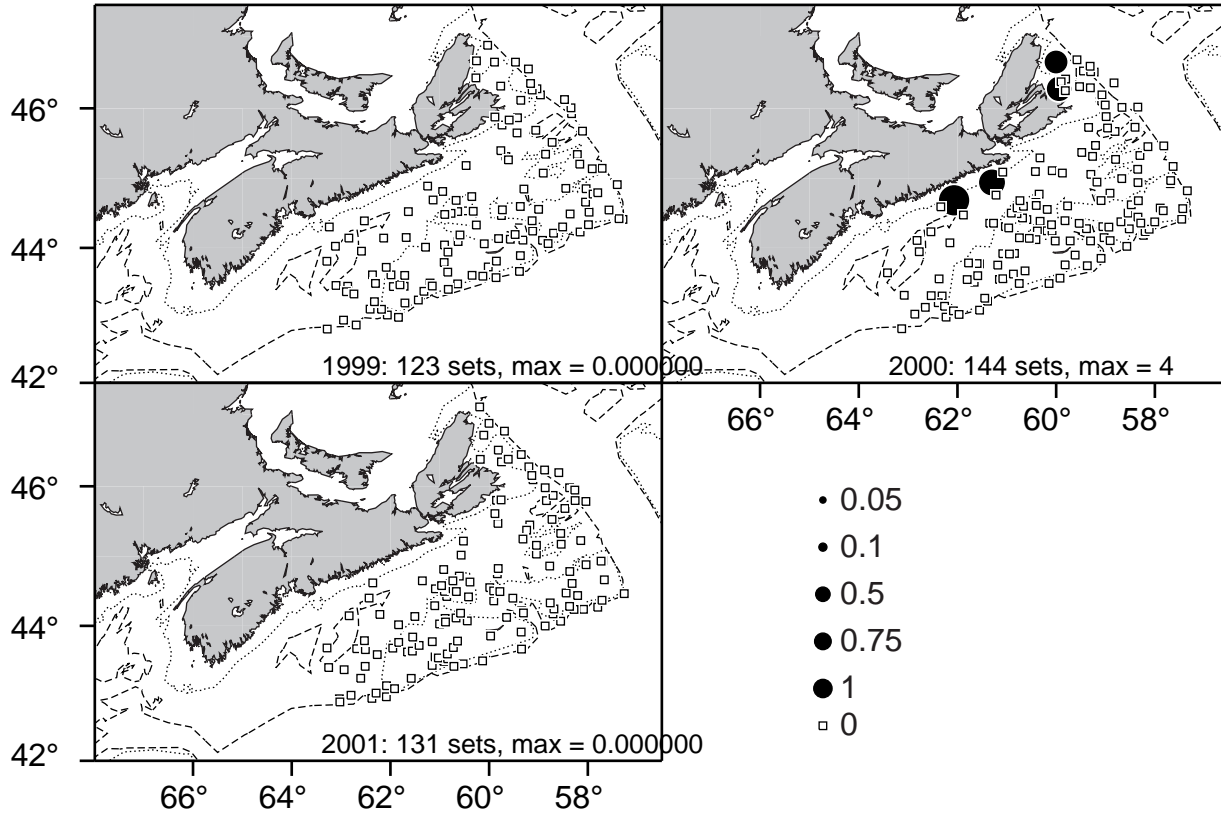


Fig. 99. 4VW Lumpfish Biomass (kg/tow) from the 1999-2001 SUMMER Groundfish Surveys.

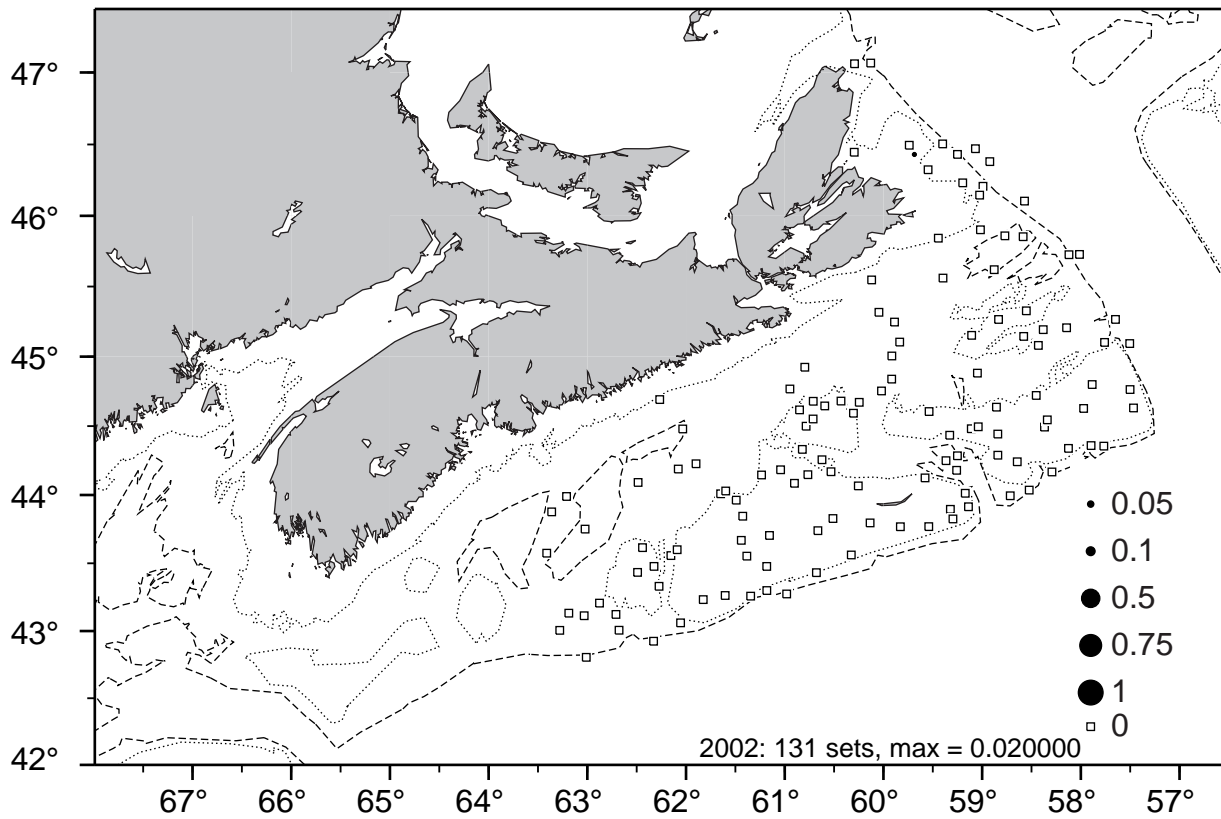


Fig. 100. 4VW Lumpfish Biomass (kg/tow) from the 2002 SUMMER Groundfish Survey.

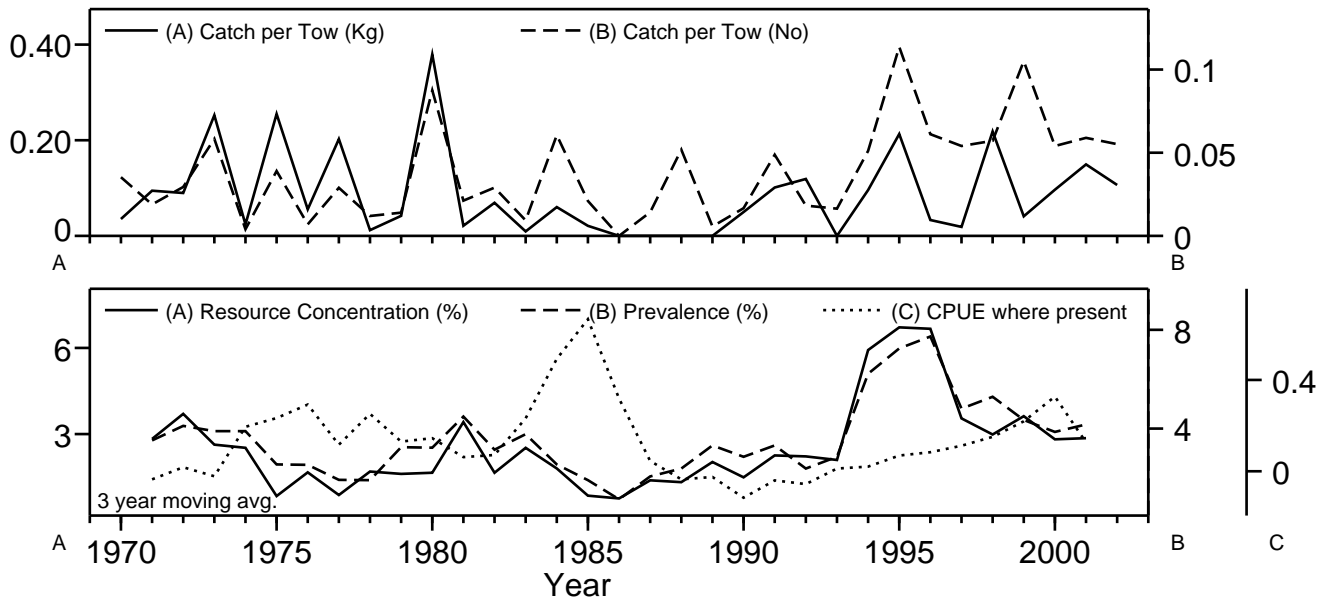


Fig. 101. 4X Lumpfish stratified mean weight caught per tow, stratified mean number caught per tow, resource concentration, prevalence and CPUE where present (log number/tow) from the SUMMER Groundfish surveys.

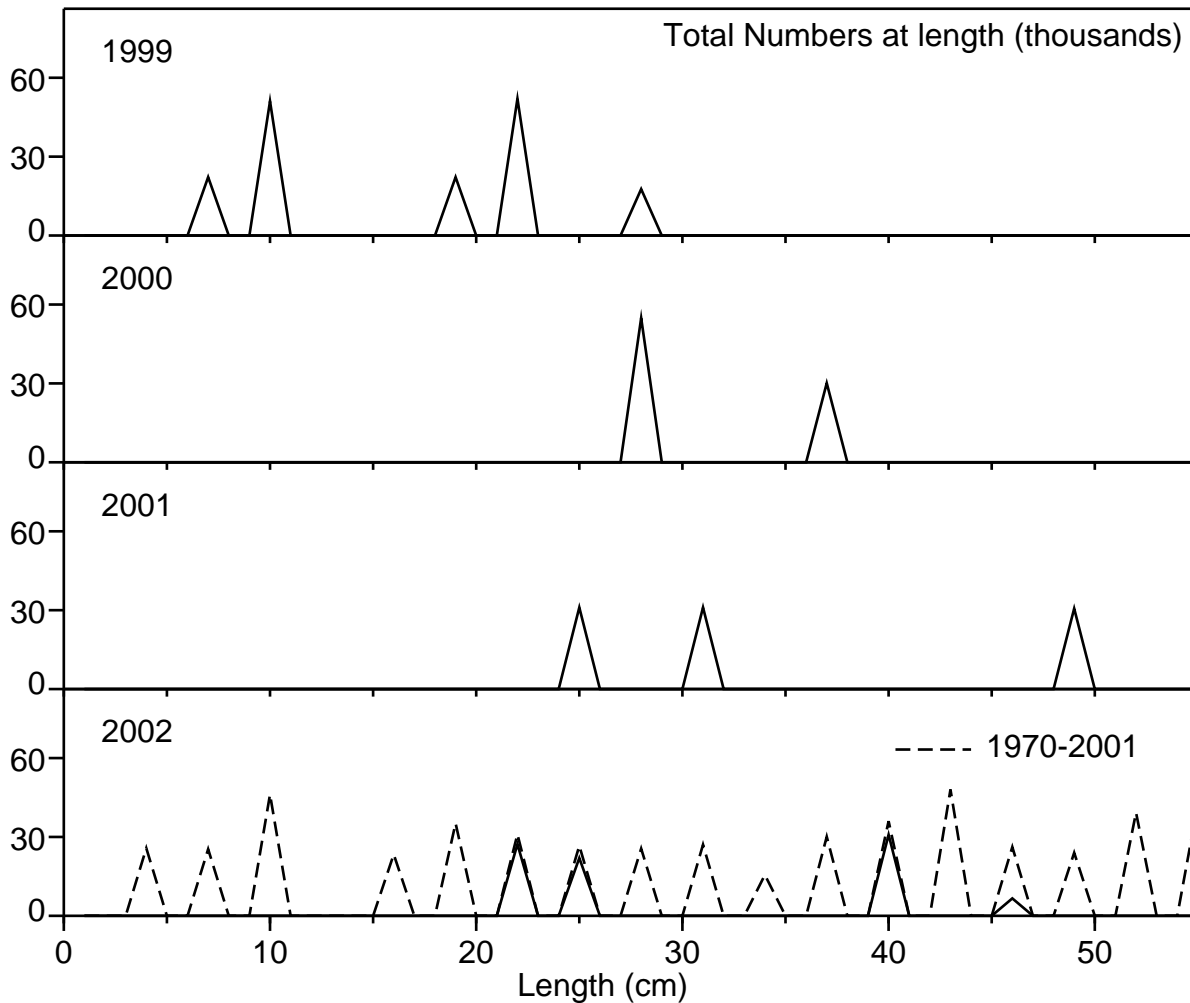


Fig. 102. 4X Lumpfish length frequency distribution from the SUMMER Groundfish surveys.

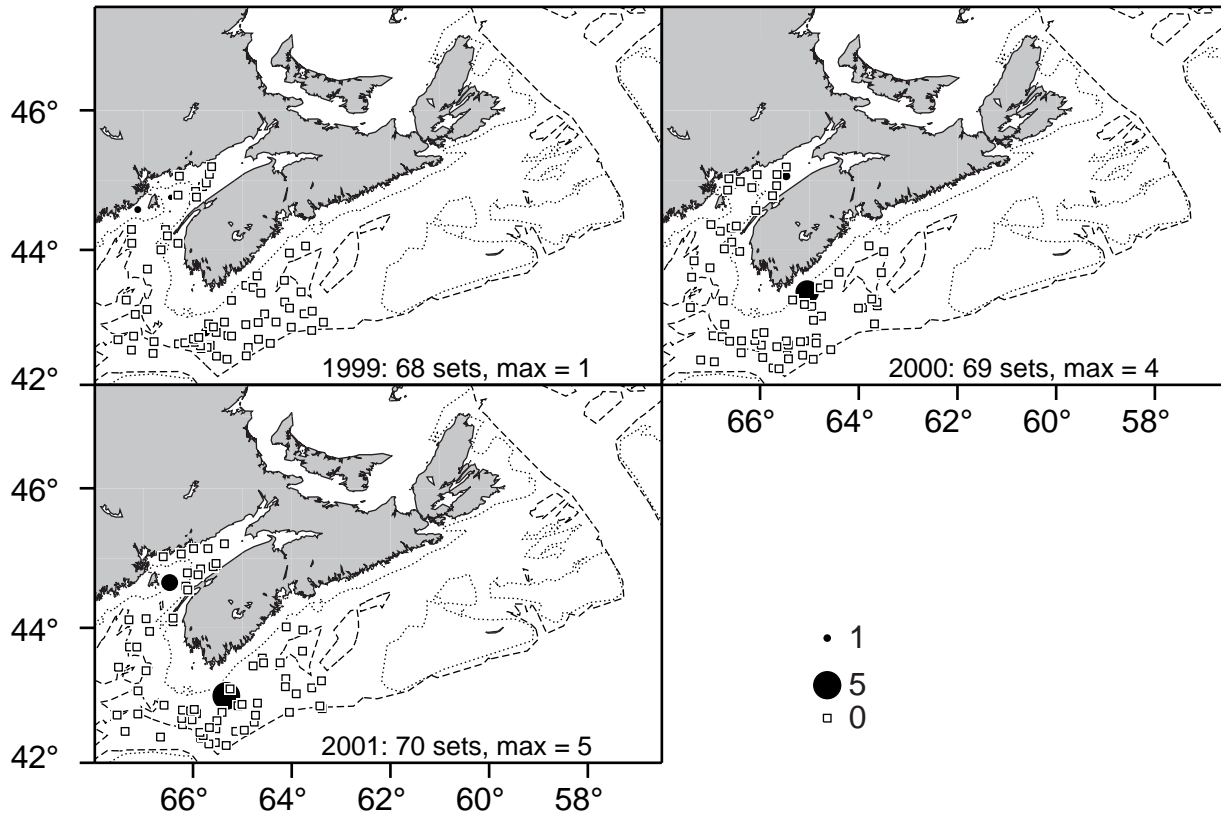


Fig. 103. 4X Lumpfish Biomass (kg/tow) from the 1999-2001 SUMMER Groundfish Surveys.

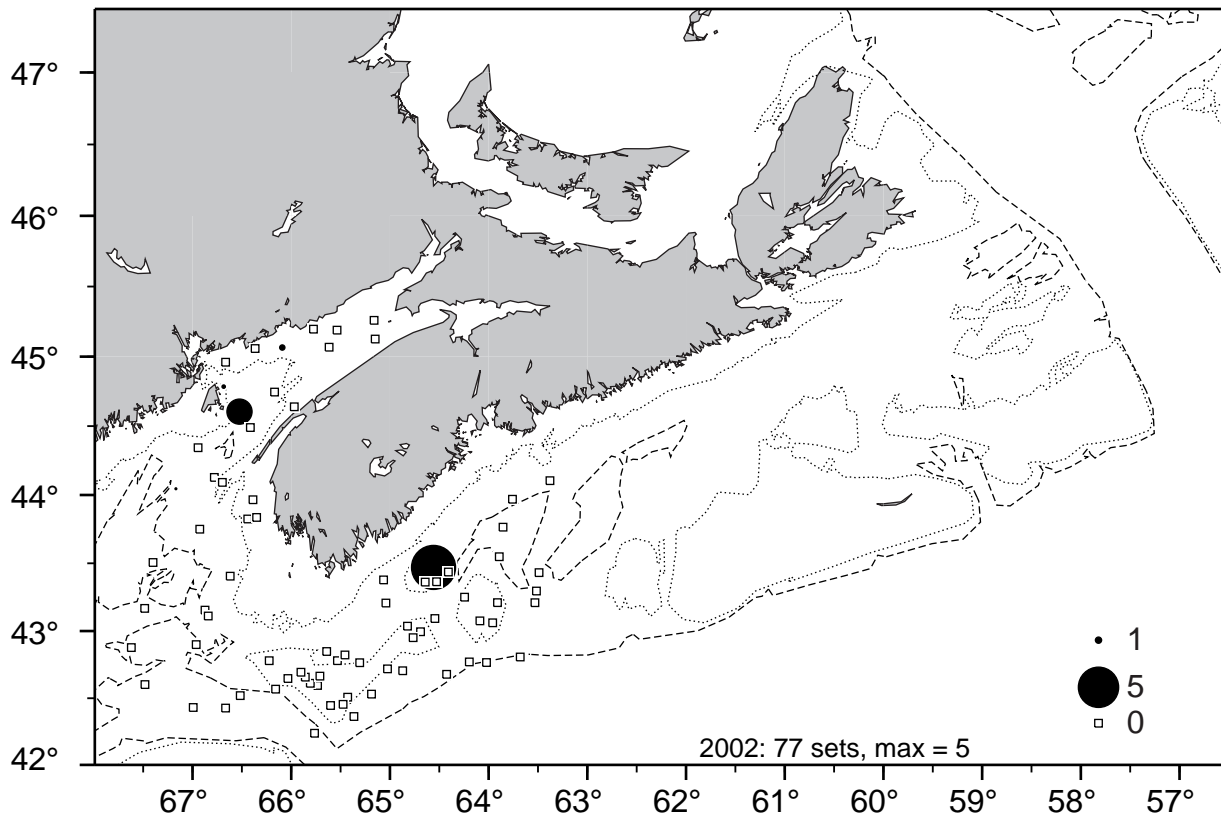


Fig. 104. 4X Lumpfish Biomass (kg/tow) from the 2002 SUMMER Groundfish Survey.

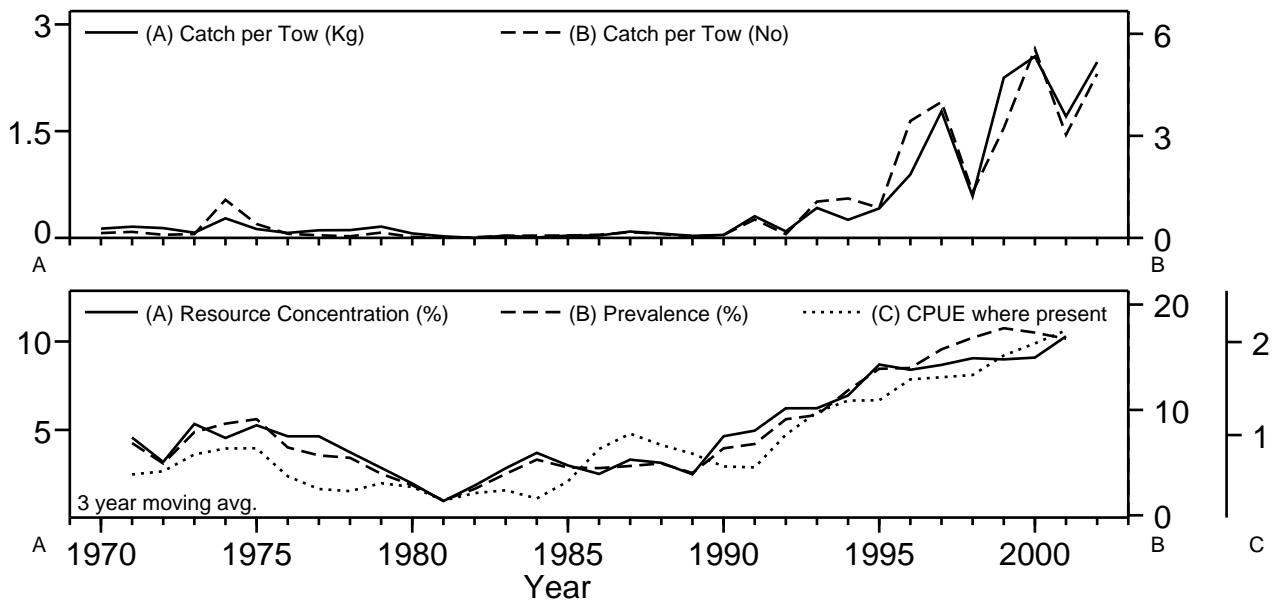


Fig. 105. 4VW Turbot stratified mean weight caught per tow, stratified mean number caught per tow, resource concentration, prevalence and CPUE where present (log number/tow) from the SUMMER Groundfish surveys.

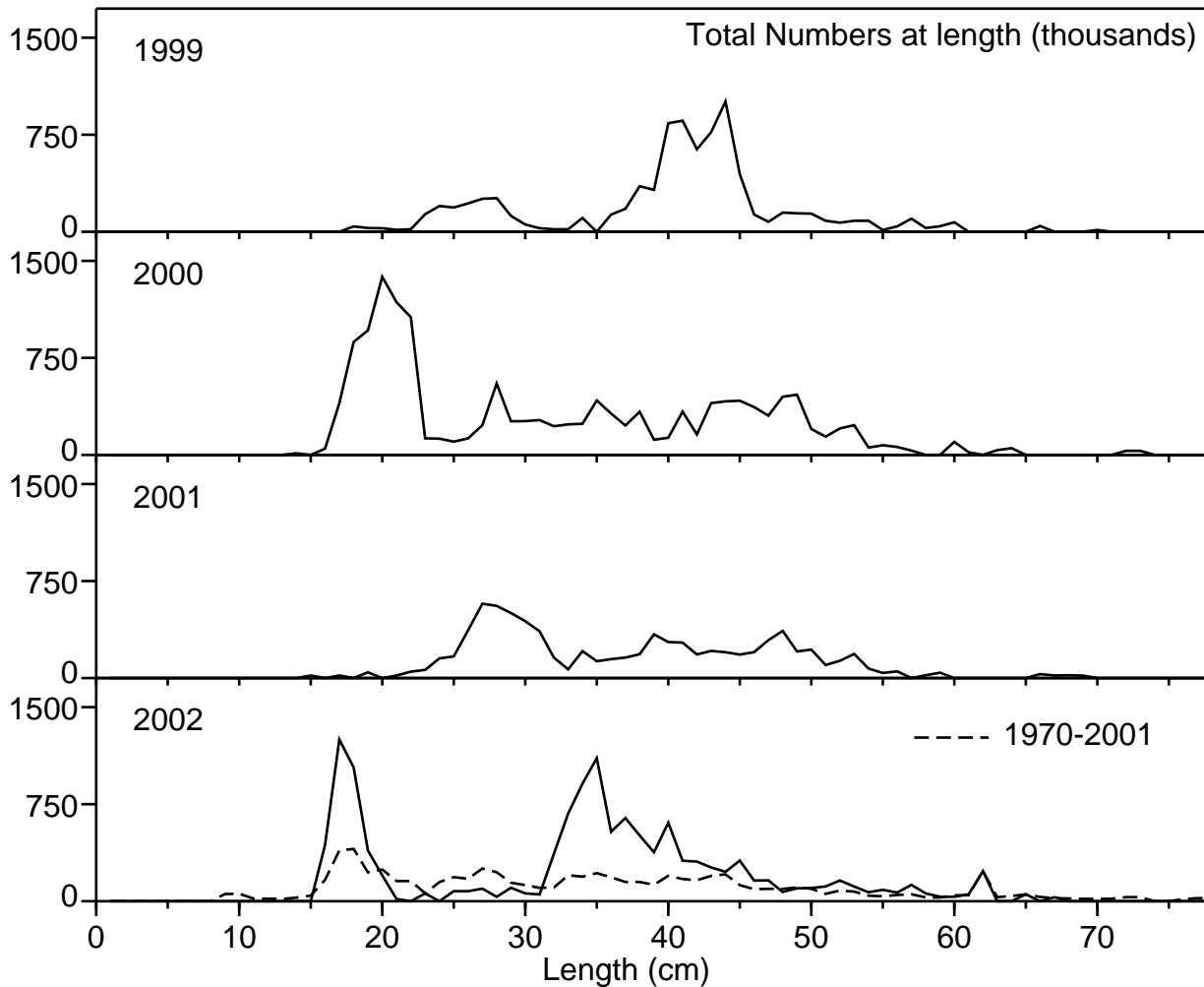


Fig. 106. 4VW Turbot length frequency distribution from the SUMMER Groundfish surveys.

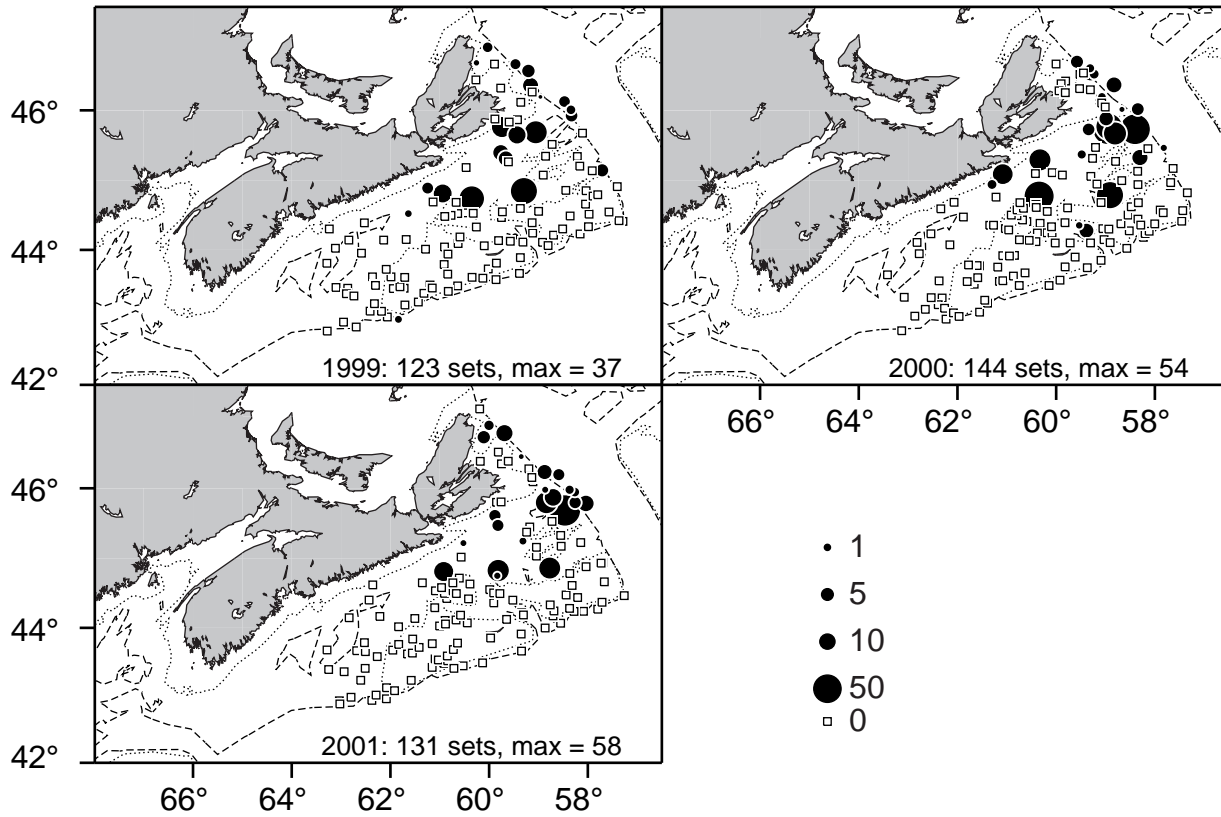


Fig. 107. 4VW Turbot Biomass (kg/tow) from the 1999-2001 SUMMER Groundfish Surveys.

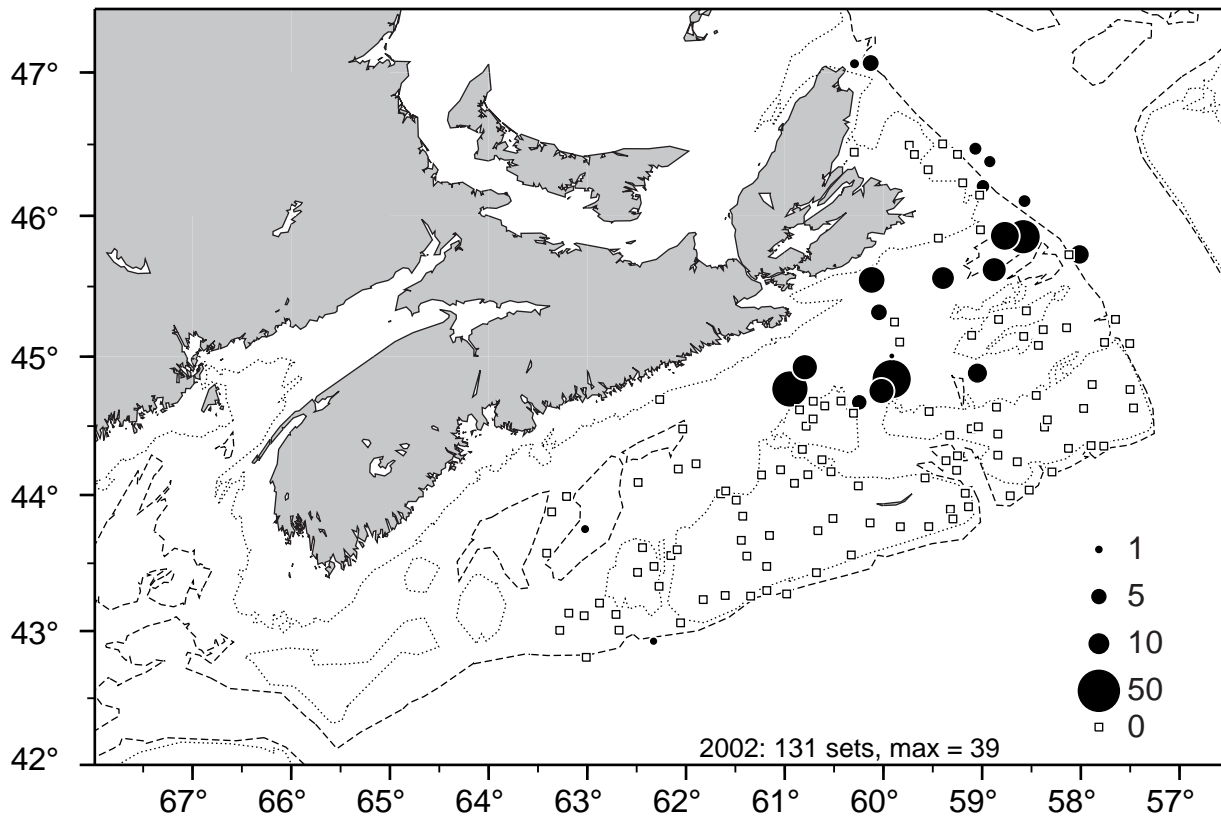


Fig. 108. 4VW Turbot Biomass (kg/tow) from the 2002 SUMMER Groundfish Survey.

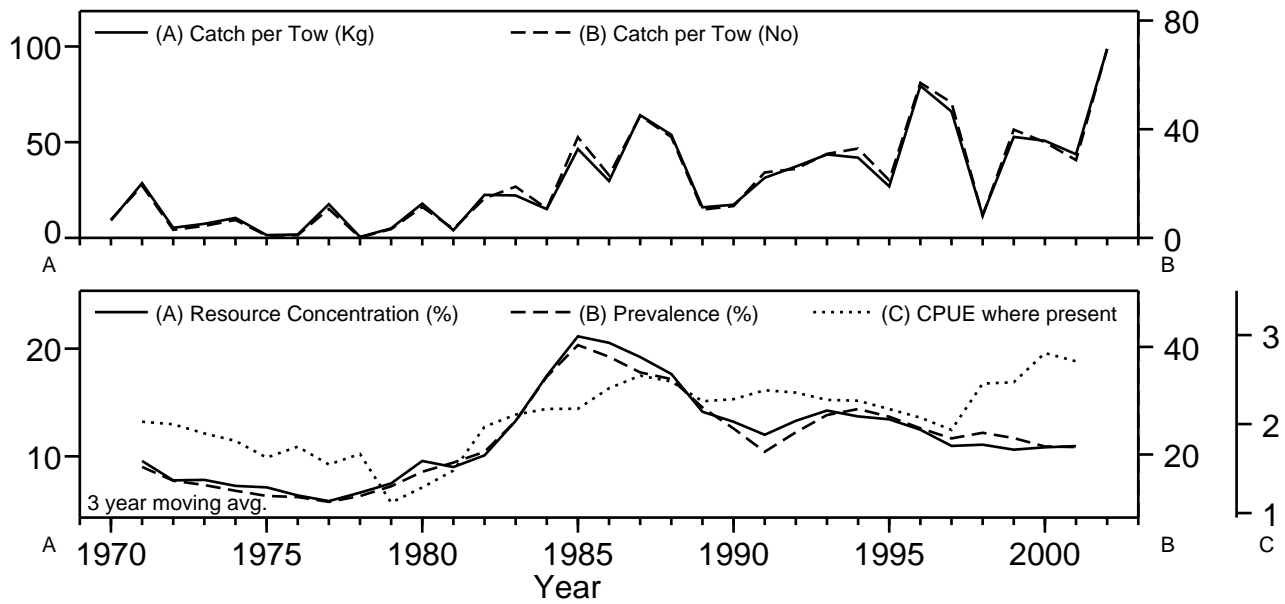


Fig. 109. 4VWX Spiny Dogfish stratified mean weight caught per tow, stratified mean number caught per tow, resource concentration, prevalence and CPUE where present (log number/tow) from the SUMMER Groundfish surveys.

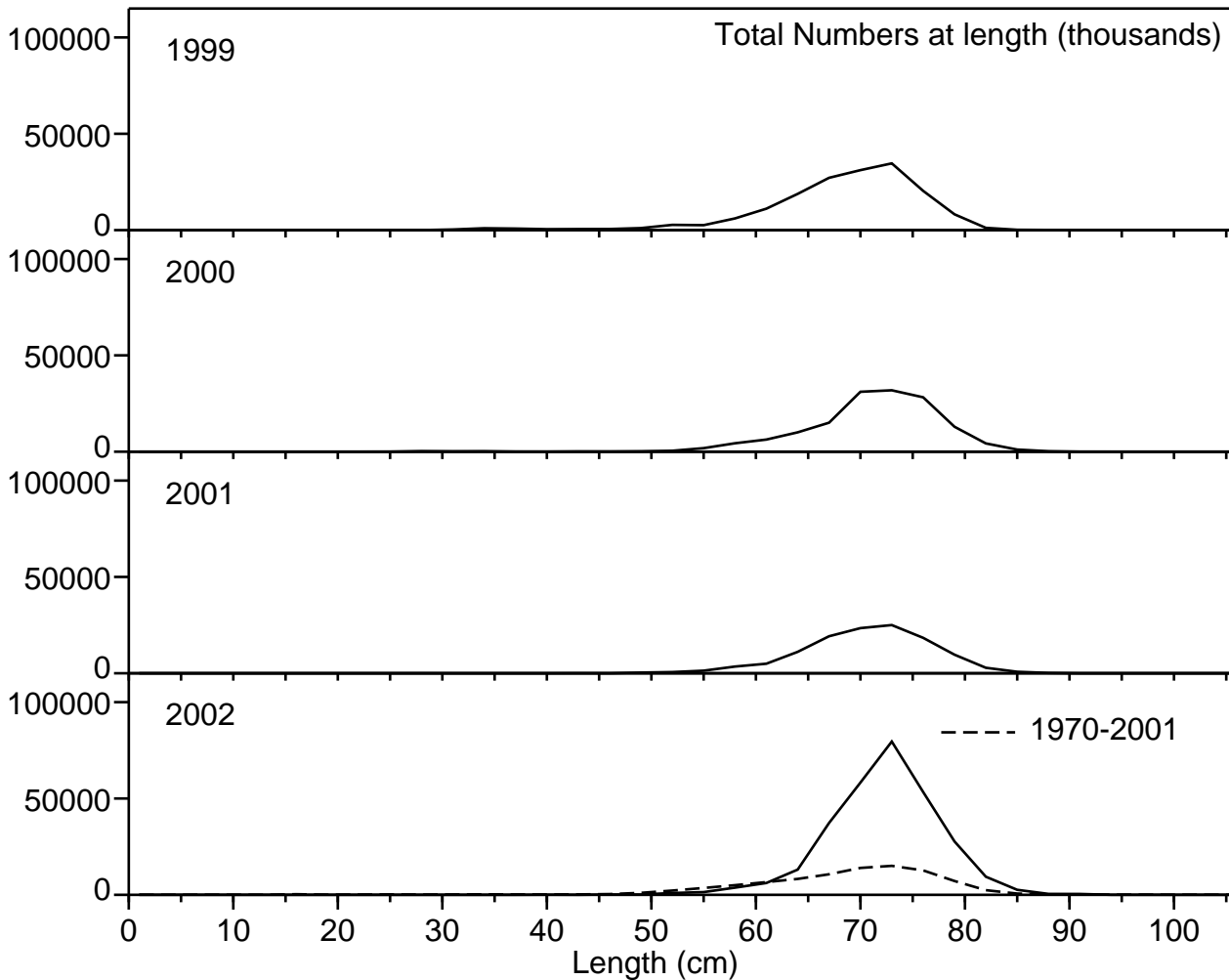


Fig. 110. 4VWX Spiny Dogfish length frequency distribution from the SUMMER Groundfish surveys.

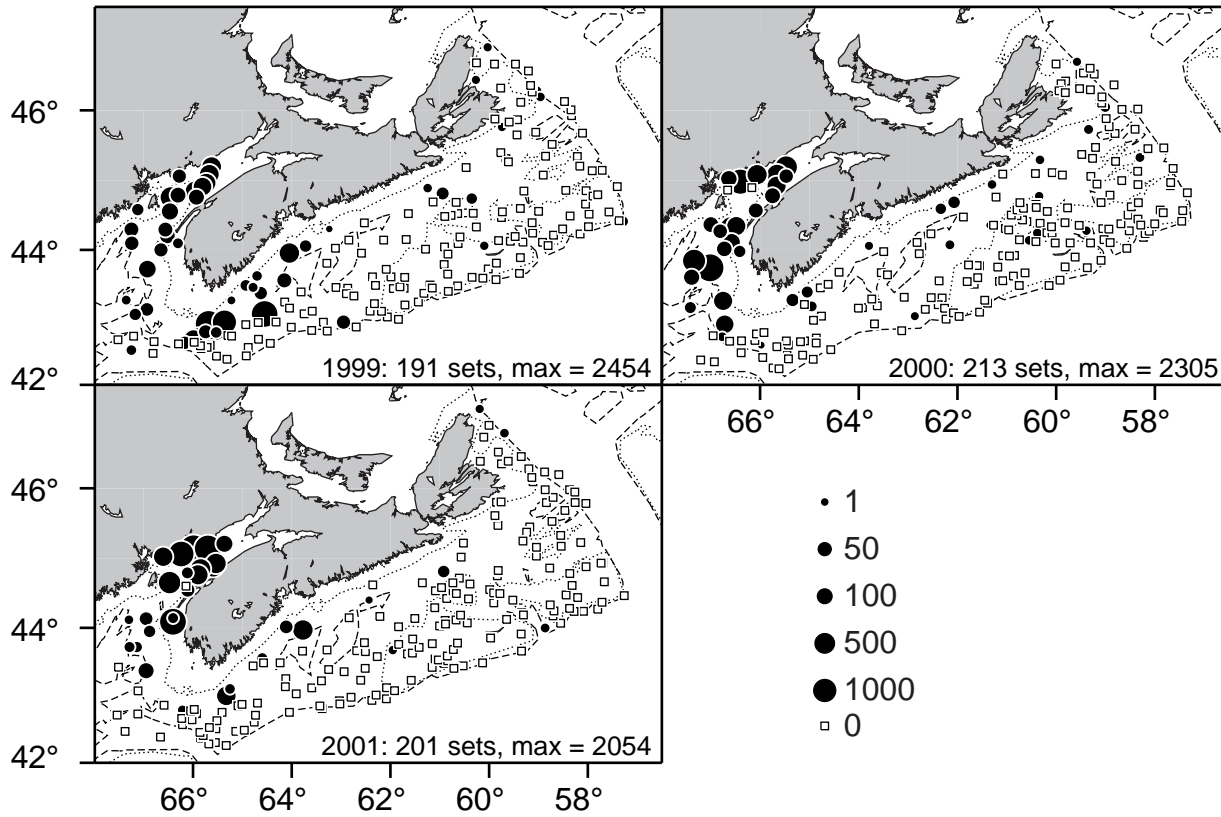


Fig. 111. 4VWX Spiny Dogfish Biomass (kg/tow) from the 1999-2001 SUMMER Groundfish Surveys.

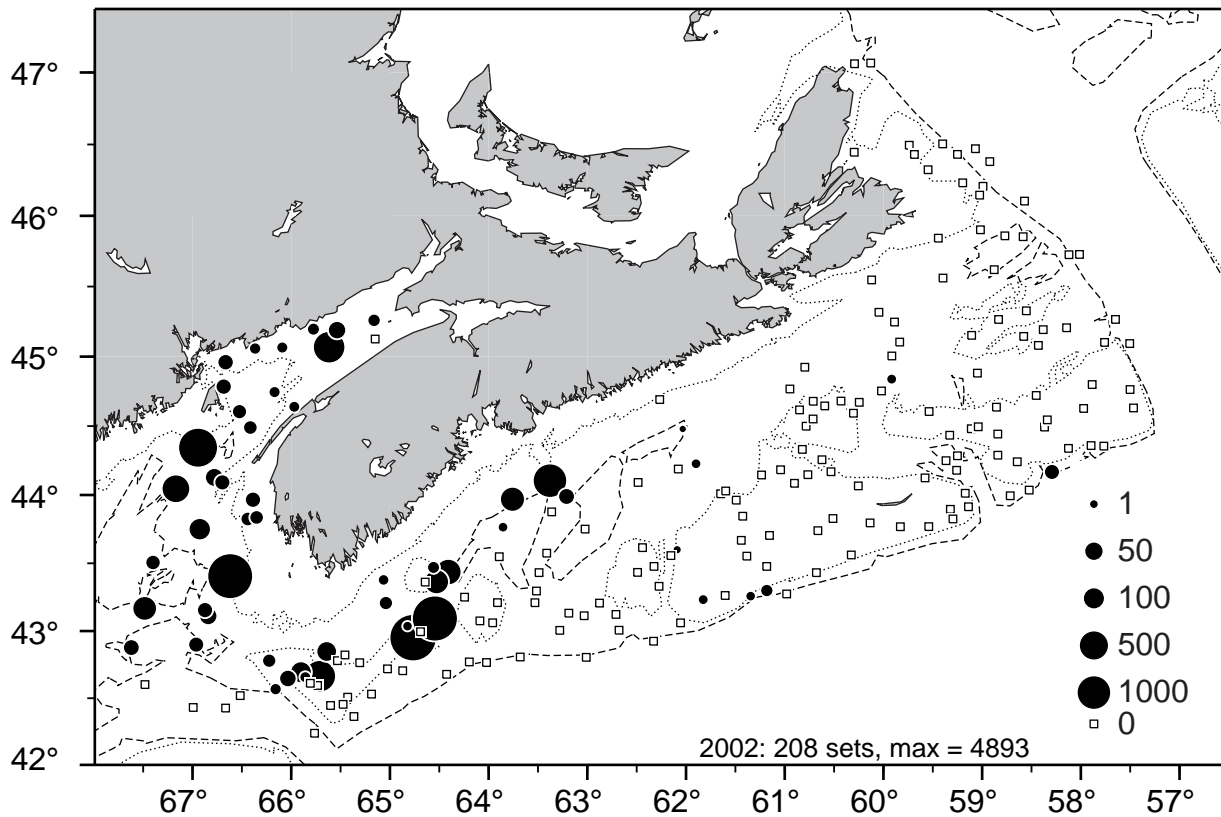


Fig. 112. 4VWX Spiny Dogfish Biomass (kg/tow) from the 2002 SUMMER Groundfish Survey.