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A brief history of scallop fishing in Scallop Fishing Area 29 and an evaluation of a fishery in 2002

Court historique de la pêche au pétoncle dans la zone de pêche du pétoncle 29 et évaluation de la pêche en 2002

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Abstract

Scallop Fishing Area (SFA29) in the context of this report encompasses the area south of latitude 43° 40′ N continuing east from Scallop Production Area 3 (Brier Island and Lurcher Shoal area) to longitude 65° 30′ W. Scallop fishing in this general area has been allowed in a limited manner for the Full Bay Fleet only in recent years. In 2001, the Full Bay Fleet was granted expanded access within this area, landing 400 t (meats). Licence holders from adjacent areas (east of Baccaro) have requested access to the area in 2002. Discussions prior to the opening of the fishery in 2002 raised questions about previous scientific advice to close some of this area to protect scallop broodstock and the current status of the scallop stock. Previous work on broodstock areas was reviewed here and data from the 2001 fishery was evaluated to determine stock status. Resource Allocation has recommended a TAC of 800 t for the 2002 season. This catch level was estimated to result in a fishing mortality that does not exceed those for the other scallop stocks in the Bay of Fundy or Georges Bank.

Résumé

Dans le contexte du présent rapport, la zone de pêche du pétoncle 29 couvre la région au sud de 43° 40′ de latitude Nord qui s'étend vers l'est de la zone de production de pétoncles 3 (la région de l'île Brier et du haut-fond Lurcher) jusqu'à 65° 30′ de longitude Ouest. Ce n'est que depuis quelques années, qu'une pêche du pétoncle à privilèges limités a été permise dans cette zone, pour la flotille ayant accès à l'ensemble de la baie. En 2001, on a permis un accès accru de cette flottille à la pêche dans cette zone, et la flottille a débarqué 400 t de chairs de pétoncles. Titulaires de permis de zone de pêche adjacente (est de Baccaro) ont demandé d'avoir accès à cette zone en 2002. Au cours des discussions qui ont précédé la saison de pêche 2002, on a remis en question l'état actuel du stock et la recommandation faite par les scientifiques visant à interdire la pêche dans une portion de la zone afin de protéger le stock de géniteurs. Dans cette étude, nous avons examiné les travaux antérieurs sur les zones de stocks de géniteurs et évalué les données de la pêche 2001 afin d'établir l'état du stock. La Direction de la répartition des ressources a recommandé un TAC de 800 t pour 2002. Selon les estimations, ce niveau de prises n'engendrera pas un taux de mortalité par pêche supérieur à celui des autres stocks de pétoncle de la baie de Fundy ou du banc George.

Introduction

Scallop Fishing Area (SFA) 29 encompasses a very large inshore area, from south of Yarmouth to Cape Breton. Scallop licenses for this area usually refer to the inshore fishery east of Baccaro (East of longitude 65°30′ W) mainly made up of small inshore lobster vessels fishing near shore. In the context of this report, SFA 29 refers to the area south of latitude 43°40′ N continuing east from SPA 3 to longitude 65°30′ W (Fig. 1). This definition was only formerly developed in 2001 and previously, discussions about the area fished for scallops by the Full Bay scallop fleet mainly referred to the western and northern parts of the area identified as SFA 29 in Fig. 1. Over the last 15 years, the only scallop fishing in the area has been conducted by the Full Bay fleet which normally fishes in the Bay of Fundy and Approaches north of 43°40′ N. In recent years, fishing in the SFA 29 area had been allowed for the Full Bay fleet contingent on having observers onboard some of the vessels but there have been reports of and charges against vessels illegally fishing south and east of SFA 29, and no access was allowed by the department to SFA 29 in 1999 and 2000. Access was also denied due to the Auditor General of Canada's report in 1999 which criticised the Department of Fisheries and Oceans for allowing fishing in an area where closure had been recommended to protect scallop broodstock.

In 2000, all Full Bay scallop vessels were required to have electronic monitoring devices (black boxes) installed to monitor the vessels activity. An exploratory fishing season was initiated in SFA 29, as defined in Fig. 1, for the summer of 2001 with a post-season industry funded survey to follow.

Discussions on opening SFA 29 in 2002 have raised questions on the status of this area as a closed area for broodstock protection and the extent of recent fishing in this area. This report summarizes the broodstock information from Kenchington and Lundy (1996) and other sources as well as information on the recent fishery which is mainly available in Smith and Lundy (2002).

Broodstock Areas

The issue of broodstock areas for scallops was addressed in a 1995 Invertebrate Working Group (IWG) meeting of the DFO RAP because of concerns about recruitment overfishing of scallops. In particular, there were concerns raised about maintaining an adequate density of the spawning stock so that the actual physical process of egg fertilization would be assured. This meeting recommended that "…a portion (20 percent) of each scallop bed be closed to all forms of dragger fishing for a minimum of 10 years, in order to protect a portion of the breeding population." (Kenchington and Lundy 1996). This meeting also recommended based on a departmental survey conducted in 1992 (see Fig. 2), that a 10-mile band through German Bank bed be maintained as a refugium for broodstock for the German Bank/Lurcher Shoal/Brier Island system. Presentation of this proposal to inshore (Full Bay) and offshore fleet sectors drew very little support. A workshop on Broodstock Protection areas was held at the Halifax Lab later in 1995 to deal with some of the questions raised by industry.

At this same time the inshore Full Bay fleet was interested in fishing in SFA 29 which had been off-limits since the establishment in 1986 of separate fishing grounds for the inshore fleet and offshore fleet, north and south of latitude 43°40′ N, respectively. Negotiations between lobster fishermen in the overlapping Lobster Fishing Area (LFA) 34 and the Atlantic Coast Scallop Fishermen's Association had been conducted to deal with possible gear conflicts. Concerns from Science

Branch staff about the relationship between this area and neighbouring German Bank with respect to the broodstock protection issue lead to SFA 29 being included in studies for the workshop.

The following four questions were formulated during the workshop and Science staff were asked to conduct further work to address these questions.

1. What evidence is there that the scallops on German Bank influence the recruitment on Lurcher Shoal or Brier Island Ledge?

2. Do the scallops on German Bank regularly reproduce at all, or is the gonad resorbed?

3. Are there enough scallops in this area to warrant protection?

4. Would SFA 29 be a better broodstock protection area than German Bank?

A survey using the J.L. Hart was conducted in a 10 mile $\times$ 10 mile area on German Bank adjacent to 43°40′N latitude and of the northwestern portion of SFA 29 on September 5 and 6, 1995 (Fig. 3). Information from this survey and other data provided the following answers to the above questions (Kenchington and Lundy 1996).

1. The only biological evidence for these areas being part of a single "system" is the similarity in timing of recruitment pulses. In 1992, large numbers of pre-recruit scallops were found on Brier Island, Lurcher Shoal and the surveyed portions of German and SFA 29. This pulse was not seen off Digby, i.e., it was not a Bay-wide phenomenon as seen for the 1985 and 1986 year-classes.

2. It would appear that the scallops on German Bank, even in the deeper water, do spawn, as the mean [GSI] values for the population are well above those reported for the spawned out state [elsewhere].

3. The density critical for recruitment success is not well documented. There were an average of 19 scallops per 120 m^2 during the 1992 survey which occurred before any heavy fishing in this area. In the 1995 survey densities on German Bank were 4 scallops per 120 m^2. These densities exceed the critical level of 1 scallop per 120 m^2 determined for a similar albeit tropical species *Amusium balloti*.

4. German Bank area is more suitable as a broodstock protection area for areas upstream, than SFA 29, excepting the westerly portions of this [latter] area.

Kenchington and Lundy (1996) stated that their analyses supported the 1995 IWG recommendation for a broodstock protection area on the northern portion of German Bank and SFA 29. It appears that this recommendation had been presented at the Inshore Scallop Advisory Committee (ISAC) meeting held in January 1996 and the minutes also referred to a 12 mile area around the 43°40′ line as a broodstock protection area in addition to SFA 29. There was no indication in the minutes of what was concluded. The minutes from the December 1995 Offshore Scallop Advisory Committee (OSAC) meeting has a general statement that "OSAC does not support the implementation of broodstock closures for offshore areas in 1996." Greg Stevens (DFO, Resource Allocation.

Email to S. Smith 16 August, 1999) has confirmed that this point refers to the proposal to close parts of German Bank.

In the DFO Atlantic Fisheries Proceedings (96/03, 15–19 April 1996), discussion of a closed area for broodstock protection mainly focussed on SFA 29 with the suggestion that this closure could be extended across the top of German Bank.

The decision to open SFA 29 to fishing in 1996 was met with resistance by Science Branch and led to memoes and conference calls between science staff and Dr. Doubleday (Director of Science Branch in Ottawa). In his memo (dated 23 July 1996) to W. Doubleday, R. O'Boyle (Co-ordinator, RAP, Maritimes Region) states that "The oceanography of the area indicates that scallops produced in SFA 29 will directly influence the German Bank beds, and somewhat less so those of Brier Island and Lurcher Shoals. Given the possibility for recruitment overfishing in the fished beds, it is still advised that SFA 29 remain closed as a broodstock area for the other beds." In the end, the opening was a Fisheries Management Branch decision but science staff did provide meat count and minimum shell size specifications for the fishery. The 1999 Auditor General's report quoted an abridged version of these statements as the official Science recommendation for this area. That report stated "Given the possibility for recruitment overfishing in the fished beds, it is preferred that SFA 29 (West of Baccaro Bank) remain closed as a broodstock area for other beds.". The Auditor General referred to SFA 29 as "No Man's Land" and stated that the Department's decision to allow fishing in this area was inconsistent with the Department's commitment to a precautionary approach to fisheries management (Office of the Auditor General 1999).

So the investigation of broodstock areas had initially focussed on German Bank as a source of spawn for Brier/Lurcher. A small portion of the adjacent SFA 29 had been added due to the interest of the Full Bay Fishermen to have access there. Some of these fishermen stated that they fished in SFA 29 prior to the establishment of the 43°40′N line in 1986. Apparently, neither the inshore nor the offshore fishermen supported the closure of areas around the 43°40′N line (including German Bank). The Auditor General's report then shows that a broodstock area came to be identified solely as SFA 29 with the idea that this area was a source of spawn for German Bank and "other beds".

1996 to 1998 Fishery

The Full Bay fleet had access to the SFA 29 area from 1996 to 1998. Fishing during the first two years mainly concentrated on the western portion of the area as defined in Fig. 1 (Figs. 4 and 5). Landings reported from the Full Bay logbooks were 74 t and 87 t, respectively. In 1998, the fishery expanded to the east within the SFA 29 area (Fig. 6) and 66 t landings were reported in the logs.

Problems with suspected illegal fishing of Full Bay scallops vessels licensed to fish in SFA 29 actually fishing on German and Brown's as well as the criticism by the Auditor General of the Department allowing access to this area resulted in the area being closed in 1999 and 2000.

Recent Fishery

In 2000, the Full Bay Fleet proposed that an exploratory survey using 5 commercial vessels be authorized in SFA 29. Science staff believed that a smaller scale survey was in order. The annual

2000 scallop stock assessment survey of nearby Scallop Production Area 3 was completed before the allocated ship time for the J. L. Hart was used. The remaining ship time was used to collect some preliminary data in the SFA 29 area to confirm reports of high scallop densities (Fig. 7). The survey was designed to be exploratory and not provide abundance estimates. The data from the survey were presented to the Inshore Scallop Advisory Committee in the spring of 2001. Survey catch rates were very high relative to adjacent areas and the commercial potential was judged to be significant. At the meeting the industry was given maps indicating the areas of high catch rates from the survey.

As this area overlaps much of LFA 34, the most productive lobster area in the Maritimes Region, there were concerns expressed about lobster bycatch. During the August 2000 survey there was a significant bycatch of lobsters and most were soft-shelled animals. From our 22 years experience conducting scallop surveys it is apparent that when lobsters are moulting there is an increased incidence of bycatch due to the lobsters inability to escape the scallop gear. Given the results of the preliminary assessment of the area, Resource Allocation Branch recommended a limited fishery pending consultation with the lobster industry. The recommendation from Science was "…if scallop fishing in this area is approved it should be conducted as soon as possible i.e., June 1, 2001 and that industry be required to conduct a post-season scientific survey of this stock".

The lobster industry was consulted by the Full Bay Scallop Association to obtain their agreement for scallop fishing in this area. The lobster industry did not object to a scallop a fishery as long as lobster bycatch was monitored. A 200 t scallop fishery was initiated with the condition that each vessel take an observer for one trip to monitor the lobster bycatch and record scallop shell height frequencies. The scallop industry targeted high catch rate areas from the 2000 survey maps and caught the 200 t TAC by late July at which time they requested additional TAC. The observer data showed that the bycatch of lobster was not significant and again the Full Bay Scallop Association approached the LFA 34 lobster Association to discuss additional scallop fishing in the area. Given the low lobster bycatch, the scallop industry was allocated a further 200 t. The season ended Aug 31, 2001 with the quota being caught.

In September 2001, a stock survey of SFA 29 was conducted aboard the commercial scallop dragger "Julie Ann Joan", owned and operated by Captain Kevin Ross. A joint project agreement was set up prior to this work for industry to cover Science expenses and an allocation to industry of 2 t of catch to cover vessel expenses. The survey covered an approximate area of 600 sq. miles (Fig. 8).

Details of the 2001 fishery and survey are discussed in Smith and Lundy (2002). The areas fished in 2001 differed from those in the 1996–1998 fishery with over 77% coming from the southern portion of the area (Fig. 9). Most of the area fished in 2001 was not surveyed in 1992 or 1995 when the broodstock question was being considered.

The coverage by the Julie Ann Joan survey was the most extensive we have had of this area. The survey detected sizable concentrations of pre-recruits (Fig. 10) and recruits (Fig. 11) in the southern area not covered by the J. L. Hart in 2000. Concentrations of fully recruited scallops were also extensive in the southern area as well as in the north where they were found in the previous year by the Hart survey (Fig. 12). The mean number-per-tow for fully-recruited scallops in 2001 was more than twice that recorded for the nearby Lurcher Shoal area. The mean number-per-tow for the smaller sizes was well within the ranges of those observed in SPA 3. However, the spatial

distribution for these size ranges are more restricted than that for the fully recruited scallops and densities are much higher in the southern area.

The shell height frequency for 2001 indicates that there may be a sizable year-class peaking at 32.5 mm which may recruit to the fishery in two to three years (Fig. 13). More work will need to be done on the growth rates in this area. In the meantime it looks like the fishery will be mainly cropping down the standing biomass of scallops with shell heights greater than 110 mm.

A total of 185 lobsters were caught in the survey. However, lobsters only occurred in 50 of the 125 tows (Fig. 14). No lobsters were caught in the survey tows in the southern portion of the area east of Seal Island where the major part of the fishery occurred (see Fig. 9). The carapace condition of the lobsters was a mixture of hard and soft shell.

Comments on Stock Status

With only one year of survey and fishery information we cannot provide absolute estimates of population biomass, only relative estimates. We do not know very much about the spatial or temporal patterns of growth for scallops in this area. There has been no work on the recruitment dynamics in the area or the relationship between scallops in all of SFA 29 and adjacent areas.

We may be able to provide a preliminary evaluation of the impact of 800 t catch, suggested by Resource Allocation Branch, on the population by relating catch rate and area fished in SFA 29 in 2001 to an area where we have much more information such as SPA 4. The Full Bay fleet boats that fished in SFA 29 in 2001 also fish in SPA 4.

The total catch for the Full Bay fleet for SPA 4 for 1 October 2001 to 10 May 2002 (end of season) was 594 t. This area is exclusively fished by this fleet and this catch came from an area of 49.5 sq. nm. On an area basis this catch comes to 12 t per sq. nm. This catch represents an estimated fishing mortality of 0.26 before recruitment is taken into account. Catch rates averaged 63.22 kg/h over the whole season with the catch rate being more than two and half times higher at the end of the season than it was at the beginning. This increasing trend in catch rate reflected strong incoming recruitment over the winter and therefore the end of season fishing mortality was probably lower than 0.26.

We have defined five subareas in SFA 29 (Fig. 15) based upon areas of similar densities of commercial size scallops from the survey (Fig. 12). These subareas were defined to offer options for the distribution of fishing effort and catch in the 2002 fishery. In the 2001 fishery in SFA 29, 394 t was landed with 77.5% or 305 t coming from the high density areas in area C. This area works out to be 82.5 sq. nm with 4 t per sq. nm. Catch rates averaged 109.6 kg/h and were 15% higher at the end of the season than at the beginning. The end of season research/industry survey still showed very large aggregations in area C and in other areas of SFA 29.

A catch of 800 t out of area C alone, would represent 9.7 t per square nm. This is still lower than the level per sq. nm we had recommended for the SPA 4 in 2001/2002. Given that catch rates in SFA 29 were 1.8 times that observed for SPA 4 in 2001/2002, we can assume that biomass per unit area of scallops is higher in area C of SFA 29 than in SPA 4. Therefore it is safe to assume that the exploitation rate in area C of SFA 29 is lower than in SPA 4. These calculations pertain to area C only. Having the fishery occur in areas A and B as well and limiting catches to 100, 200 and 500 t for A, B and C, respectively, will again result in a lower overall exploitation rate than what we have recommended for SPA 4.

A TAC of 800 t for SFA 29 in 2002 is estimated to generate a fishing mortality that does not exceed those for the other scallop stocks in the Bay of Fundy or Georges Bank. However, the catch that would be sustainable in SFA 29 cannot yet be determined.

Acknowledgements

We thank Captain Kevin Ross and the crew of the FV Julie Ann Joan for their contributions to a very successful survey of Scallop Fishing Area 29 in 2001.

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Smith, S. J. and Lundy, M. J. 2002. Scallop Production Area 3 and Scallop Fishing Area 29: Stock status and forecast. Canadian Science Advisory Secretariat Research Document. **2002/017:** 78 pp.

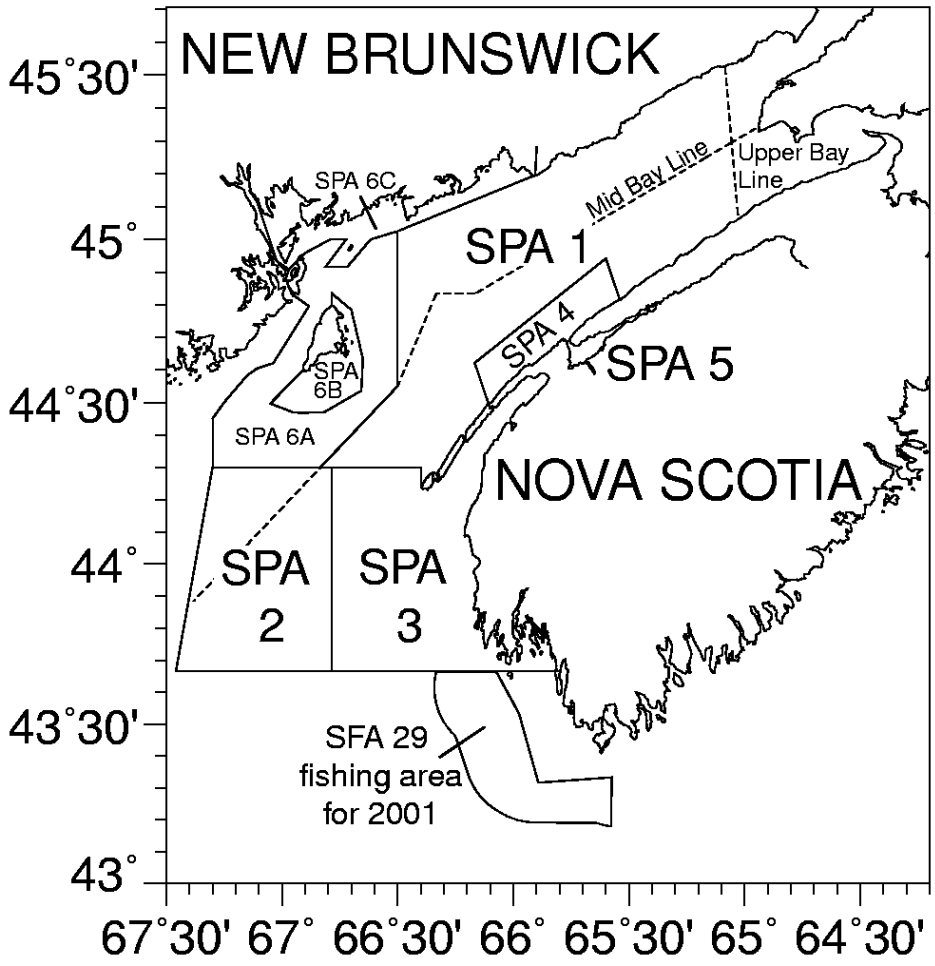

Fig. 1. Scallop Production Areas (SPA) in the Bay of Fundy. The boundaries of the SPA's were established 1 January 1997. In 1999, the number of SPA's was reduced from 7 to 6 (St. Mary's Bay (SPA 7) was combined with Brier Island/Lurcher Shoal (SPA 3)). The area labelled SFA 29 fishing area was that portion of the larger scallop fishing area that was open to fishing by the Full Bay scallop fleet in 2001.

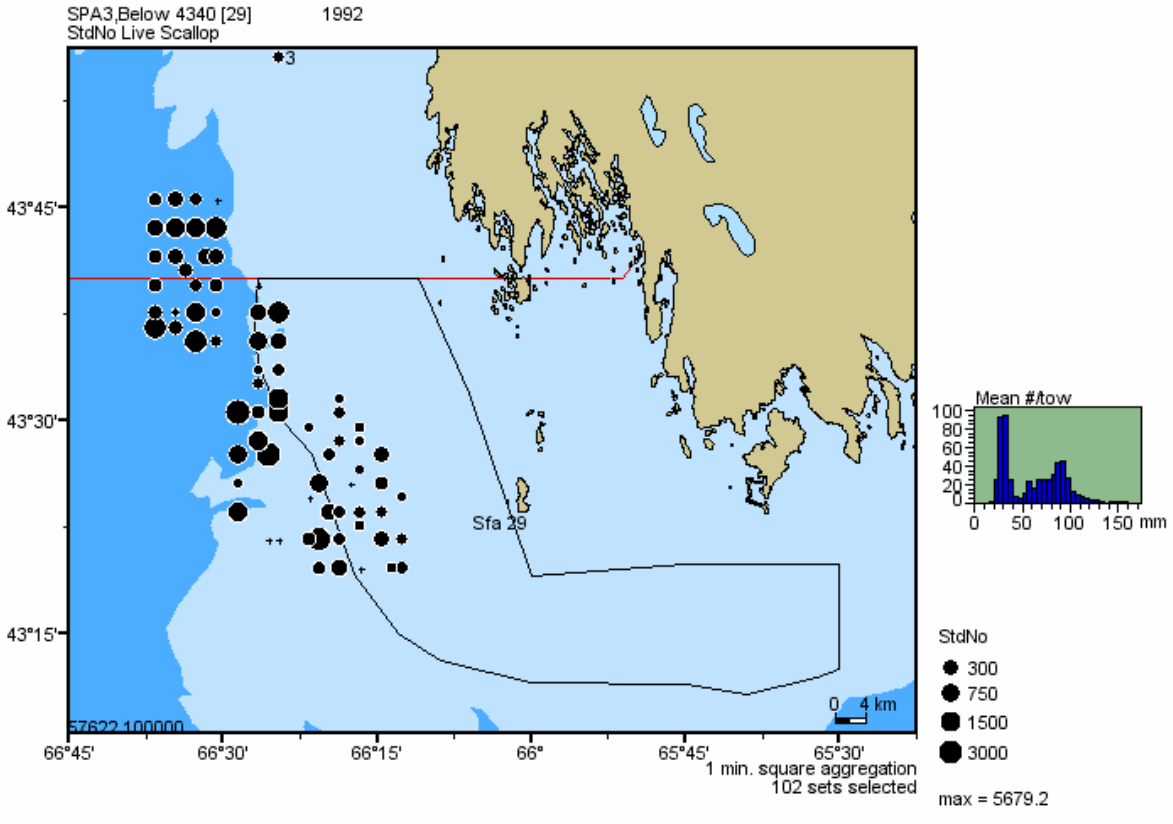

Fig. 2. Catches and tow locations for research vessel survey of SFA 29 and German Bank, August 1992.

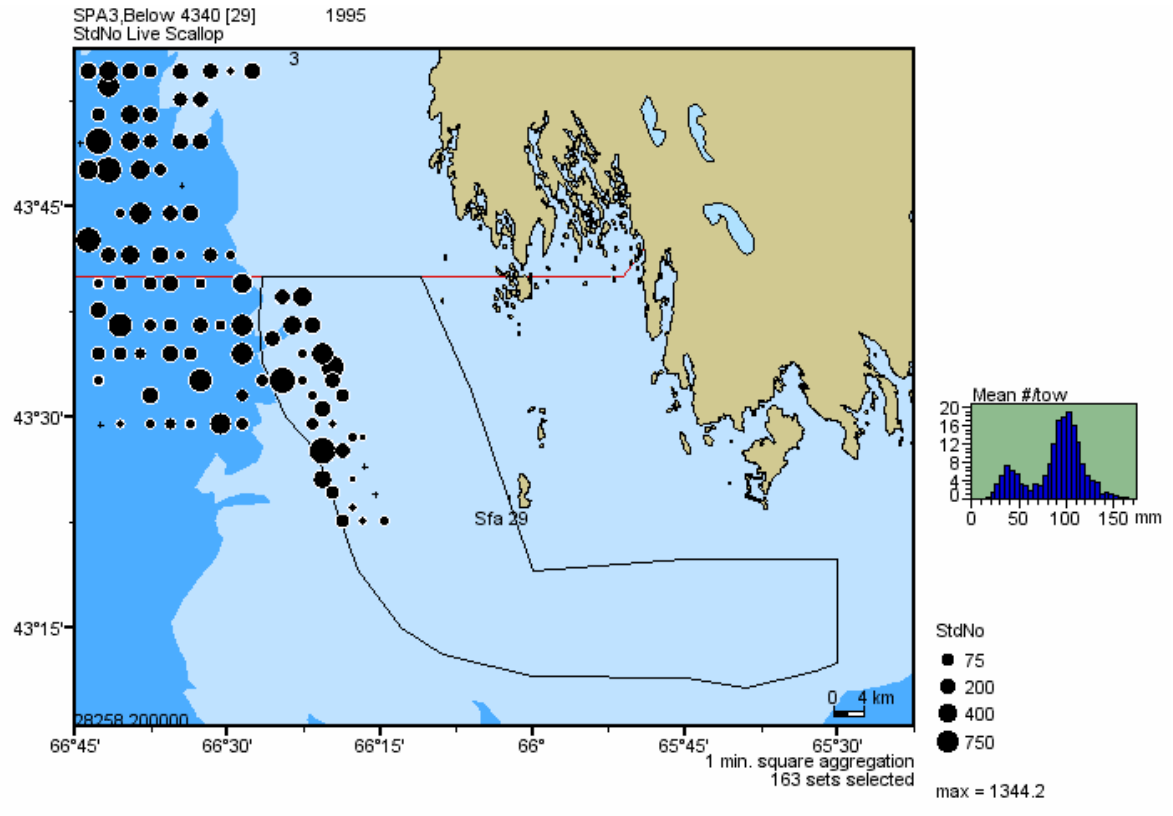

Fig. 3. Catches and tow locations for research vessel survey of SFA 29 and German Bank, September 1995.

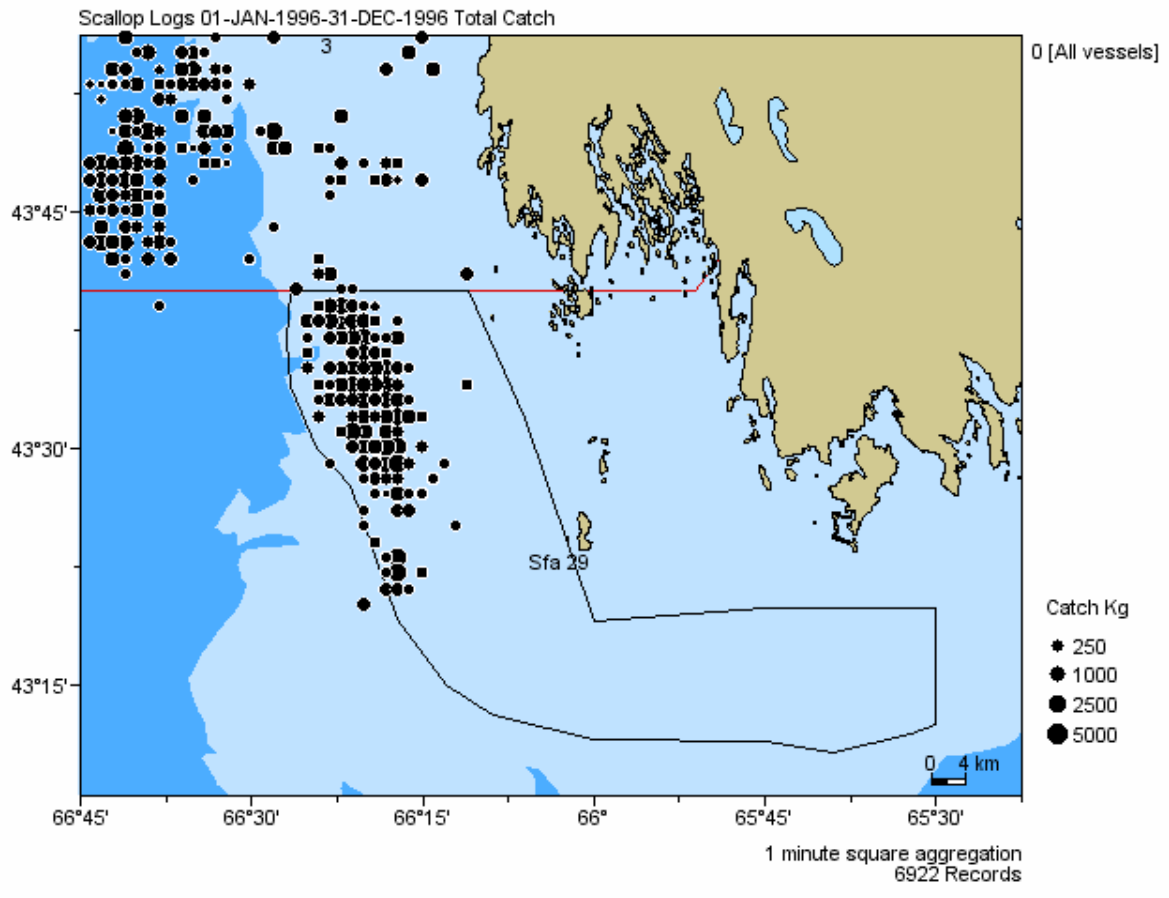

Fig. 4. Location of commercial catches from fishing logs of the Full Bay scallop fleet in 1996.

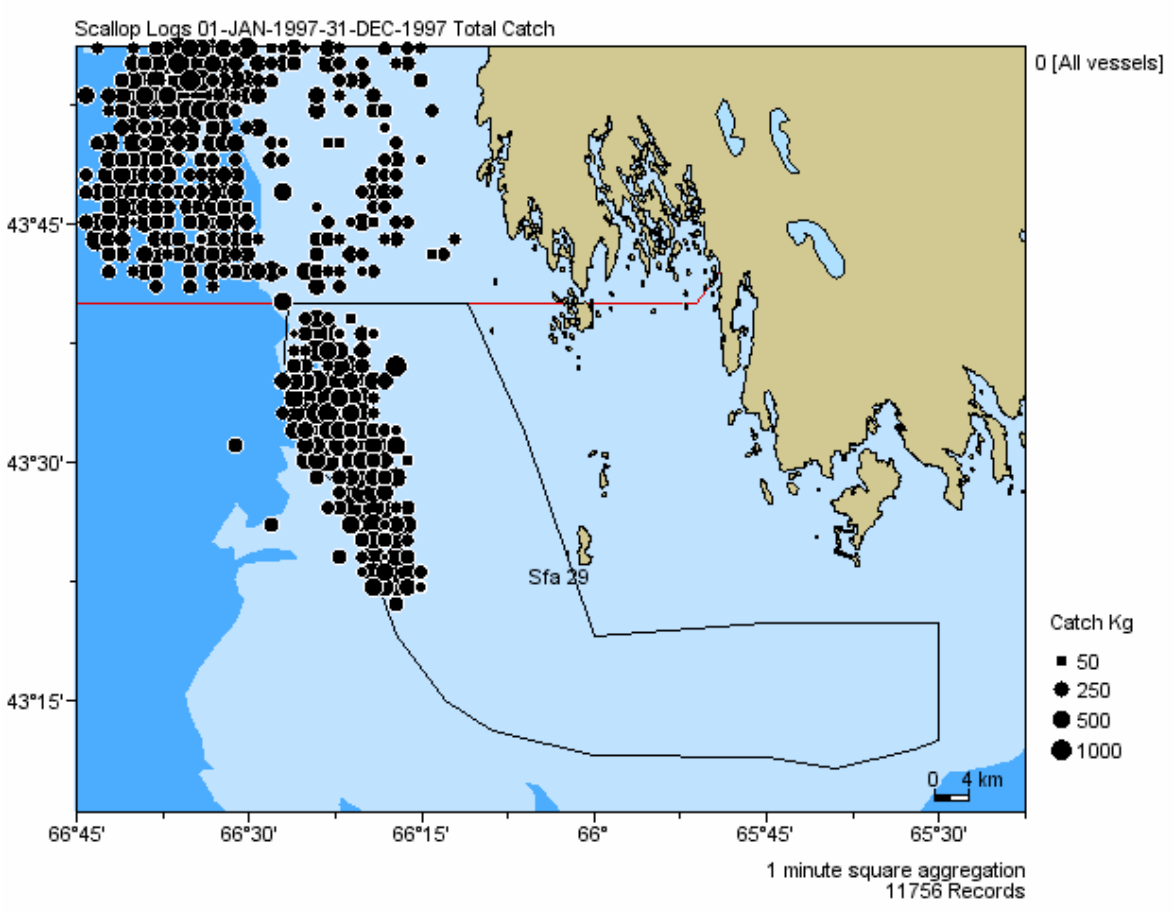

Fig. 5. Location of commercial catches from fishing logs of the Full Bay scallop fleet in 1997.

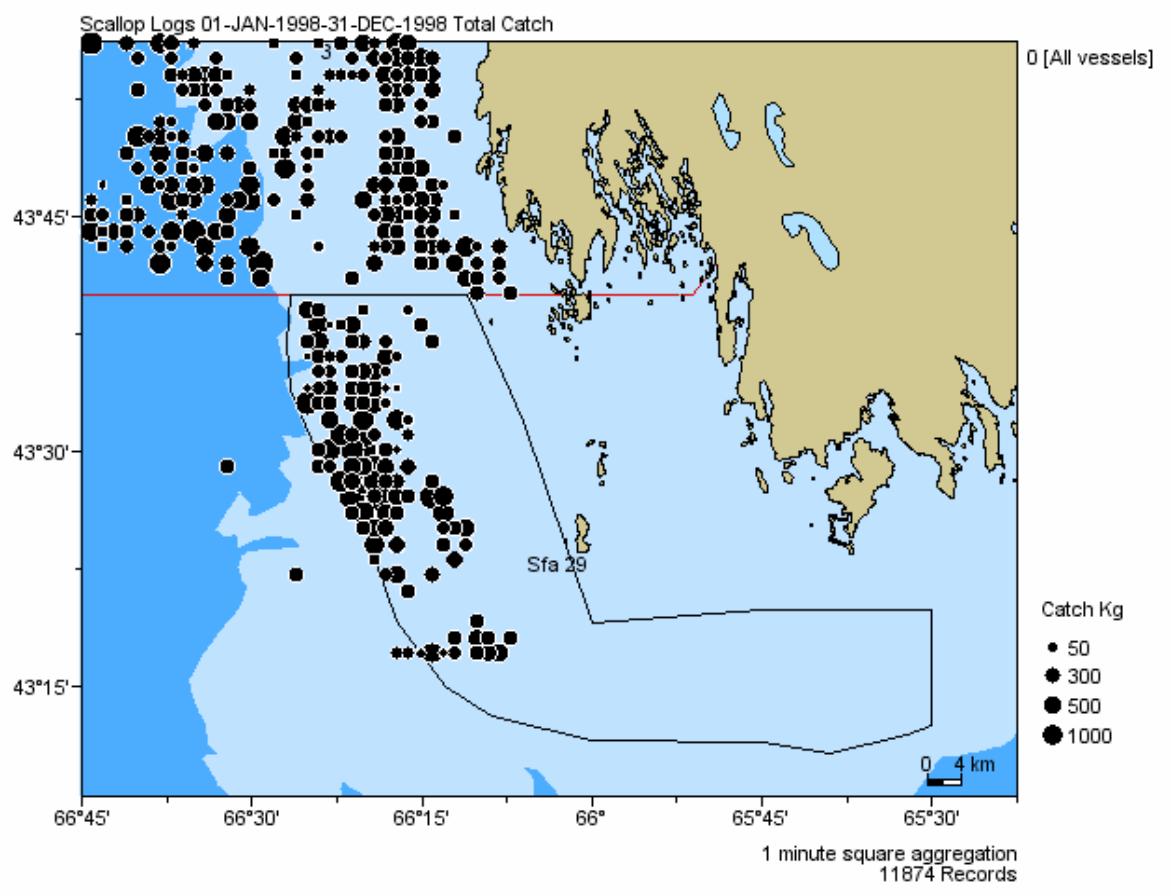

Fig. 6. Location of commercial catches from fishing logs of the Full Bay scallop fleet in 1998.

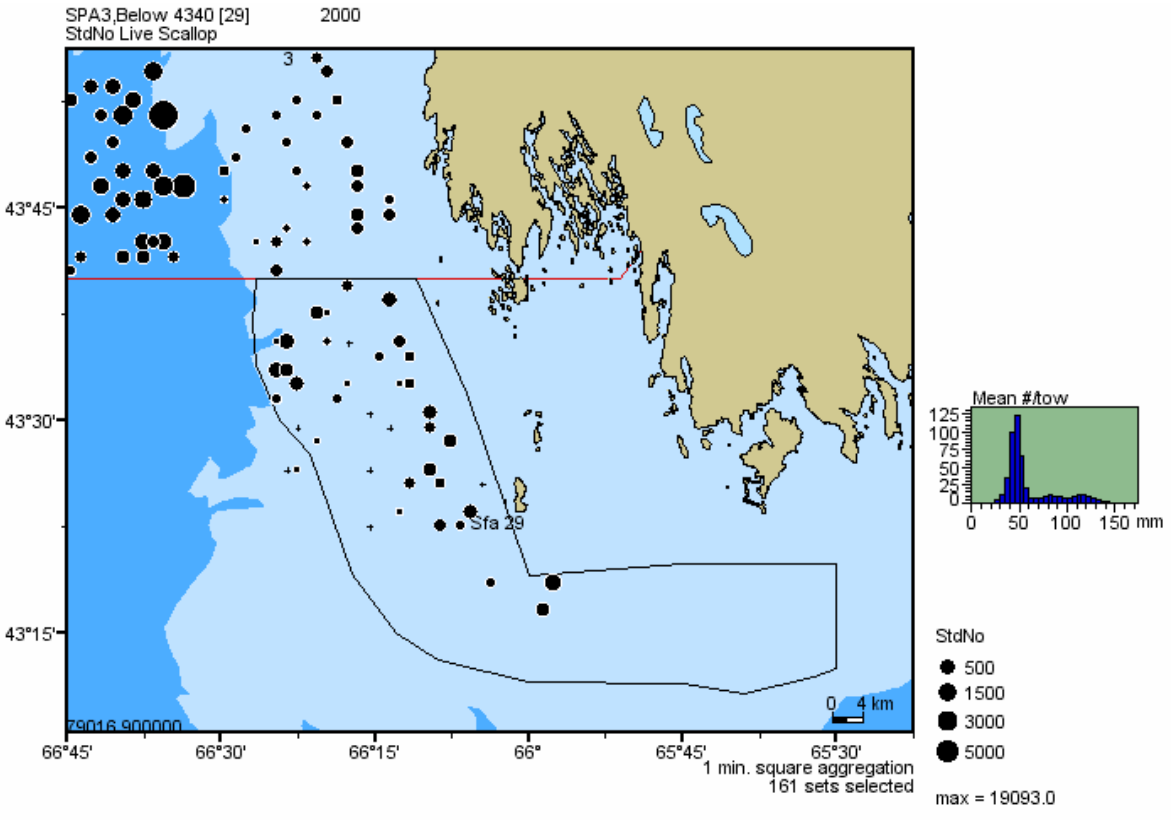

Fig. 7. Catches and tow locations for research vessel survey of SFA 29, August 2000.

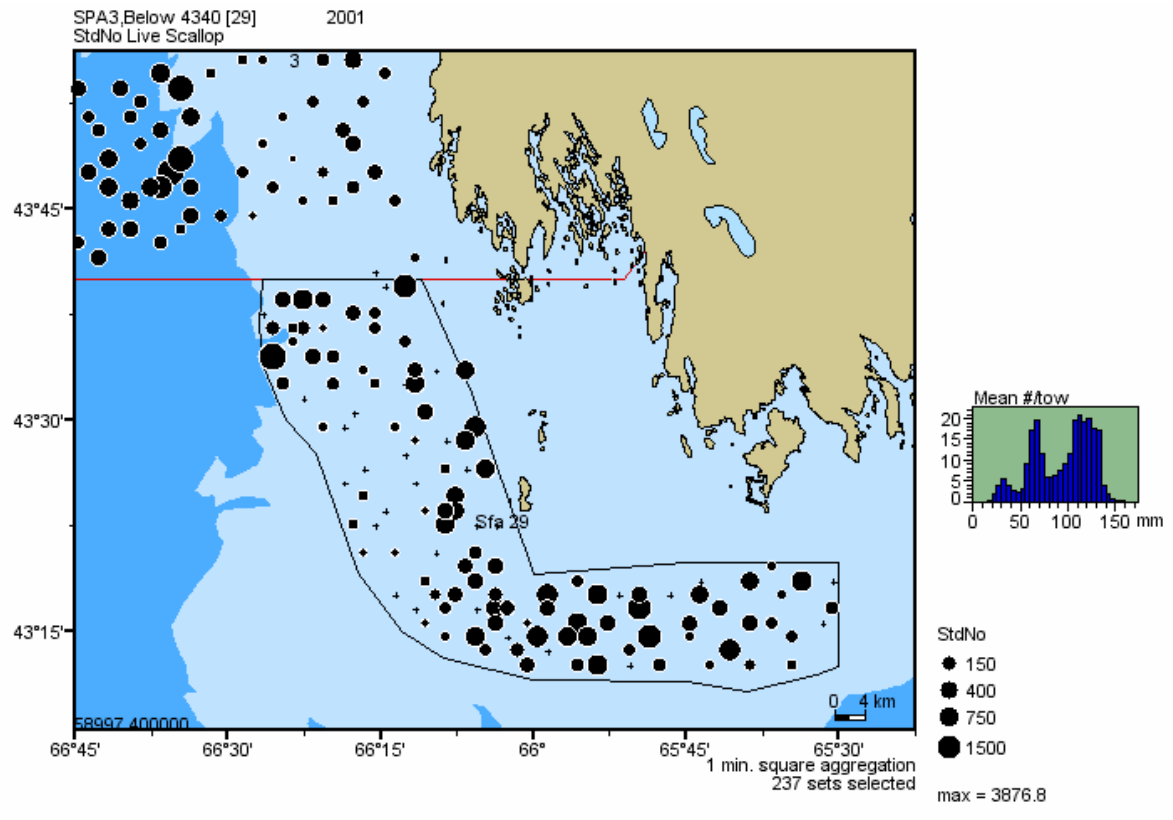

Fig. 8. Catches and tow locations for joint industry/DFO survey of SFA 29, September 2001.

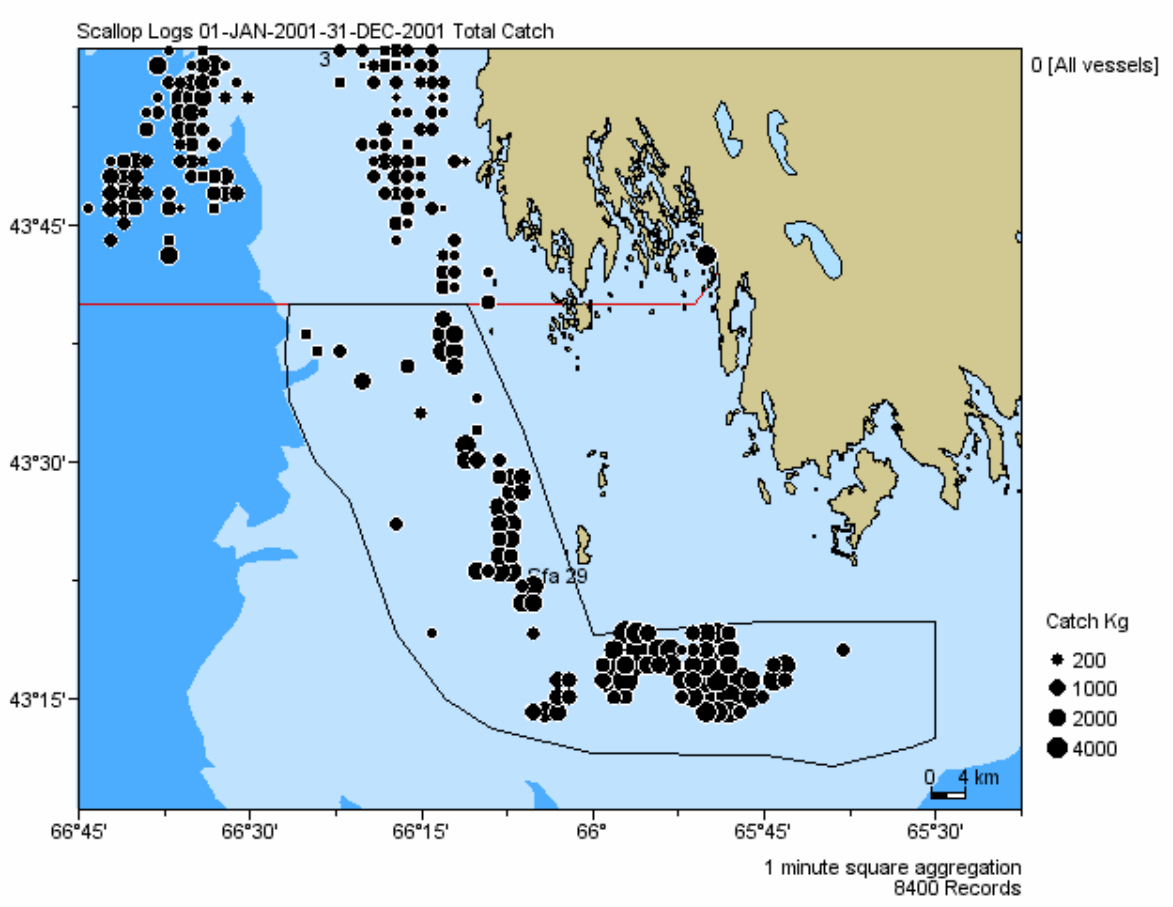

Fig. 9. Location of commercial catches from fishing logs of the Full Bay scallop fleet in 2001.

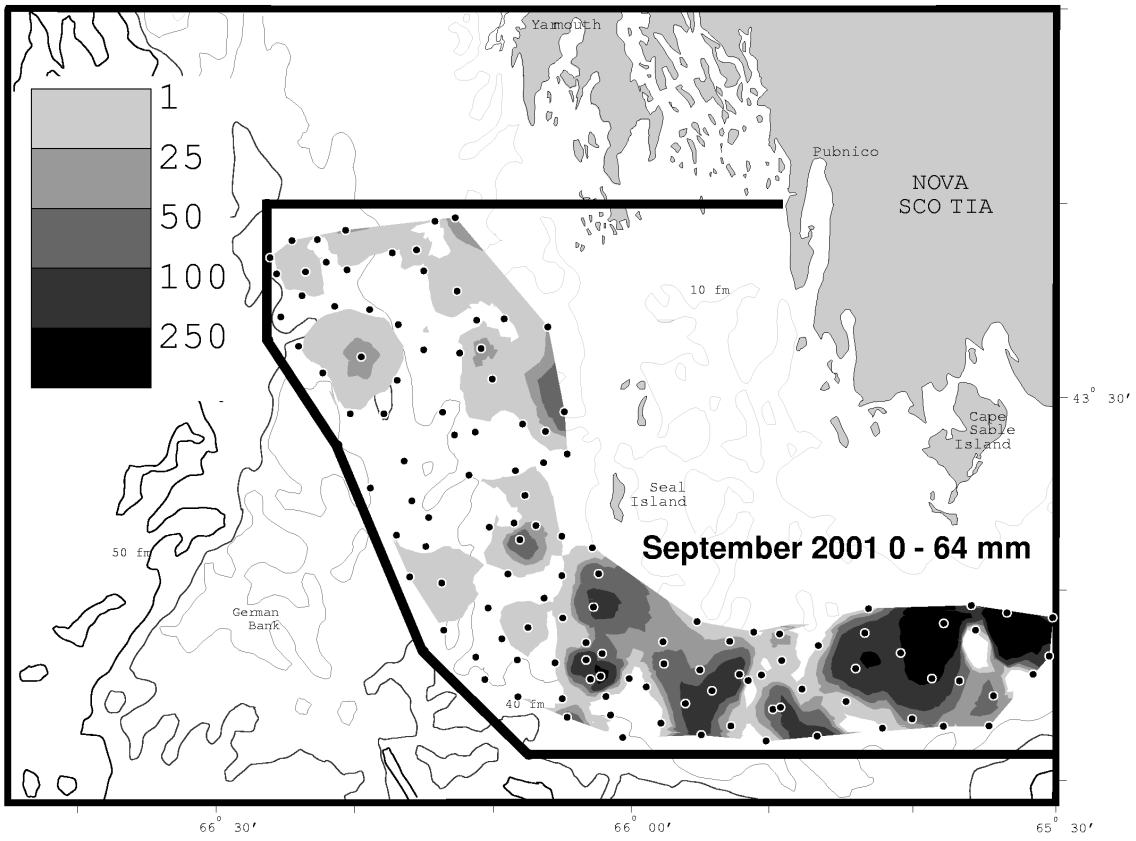

Fig. 10. Spatial distribution of scallops for shell heights less than 65 mm caught during the 2001 joint industry/DFO survey with the Julie Ann Joan in Scallop Fishing Area 29. Darkening shades of grey within isopleths refer to increasing numbers of scallops per standard tow. Dots depict tow locations.

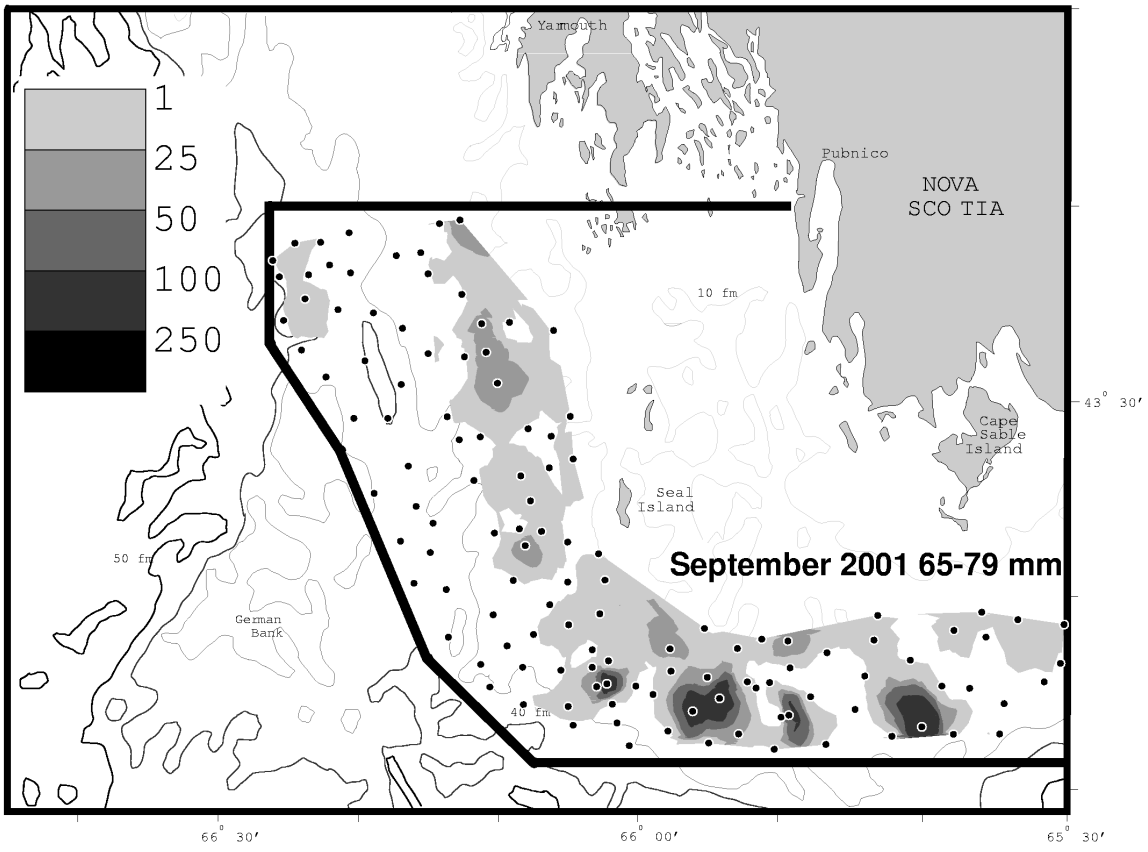

Fig. 11. Spatial distribution of scallops for shell heights betweem 65 and 80 mm caught during the 2001 joint industry/DFO survey with the Julie Ann Joan in Scallop Fishing Area 29. Darkening shades of grey within isopleths refer to increasing numbers of scallops per standard tow. Dots depict tow locations.

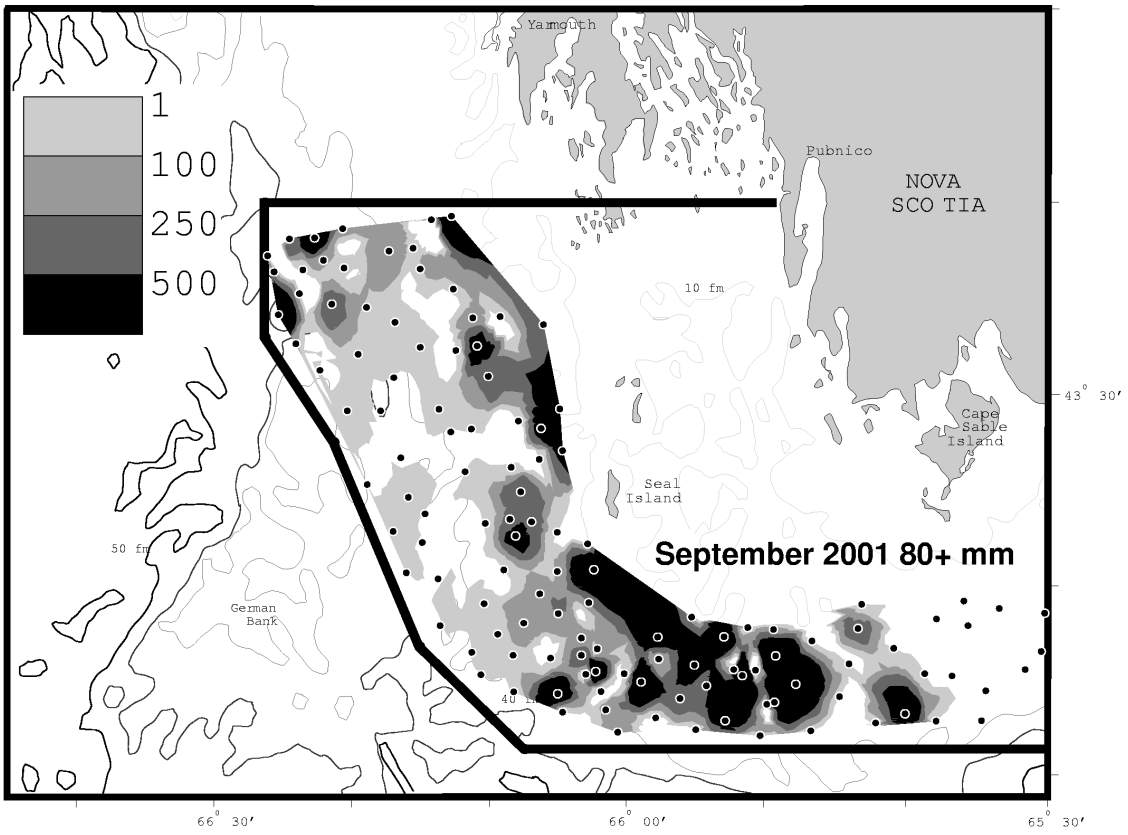

Fig. 12. Spatial distribution of scallops for shell heights greater than 80 mm caught during the 2001 joint industry/DFO survey with the Julie Ann Joan in Scallop Fishing Area 29. Darkening shades of grey within isopleths refer to increasing numbers of scallops per standard tow. Dots depict tow locations.

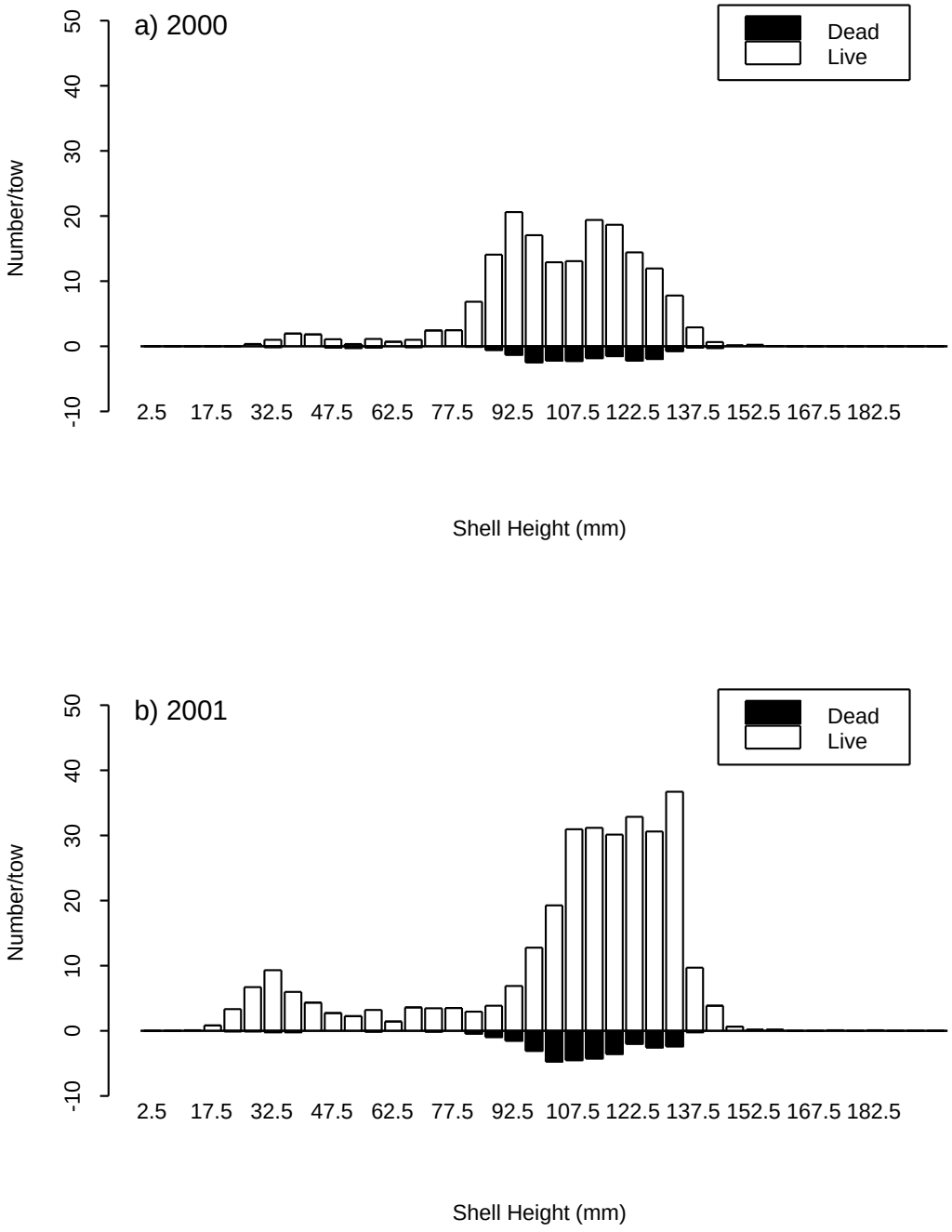

Fig. 13. Comparison of shell height frequencies from the 2000 and 2001 survey of Scallop Fishing Area 29. Note that the coverage of the area was more extensive in 2001 than in 2000. Shell height frequencies for live and dead (clappers) are shown for each year.

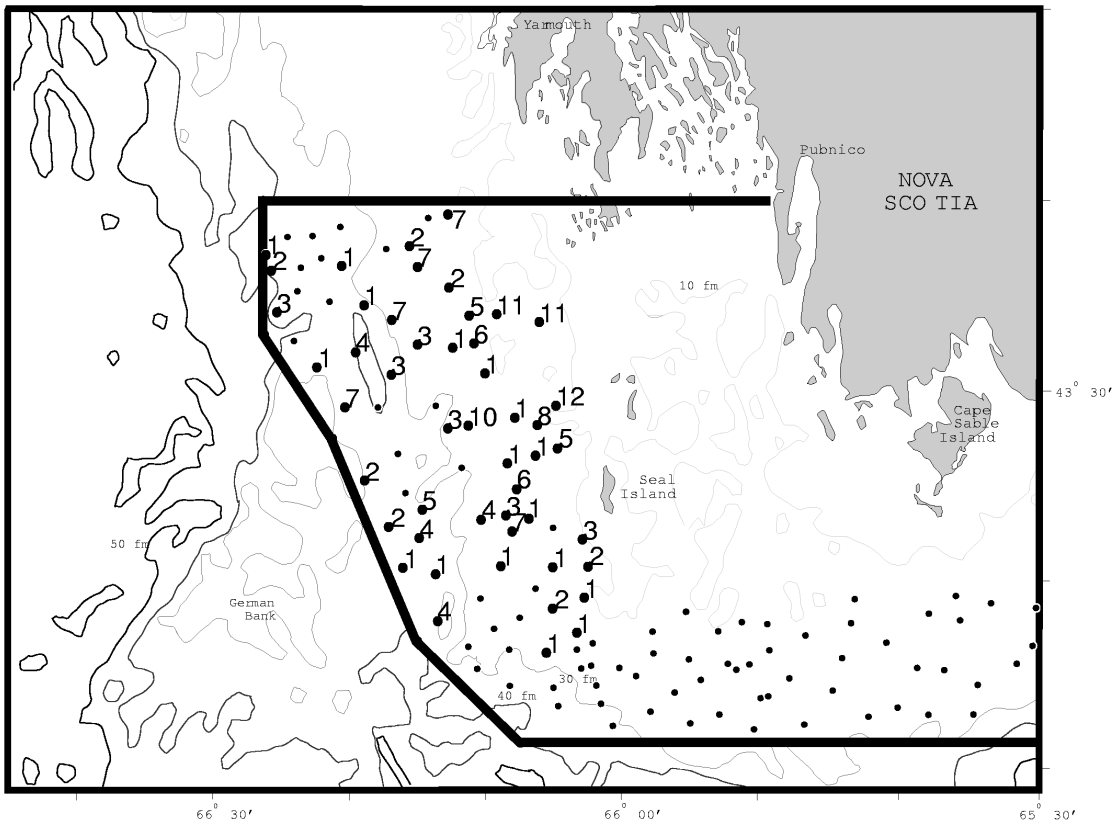

Fig. 14. Location and catch of lobsters during the 2001 research survey of Scallop Fishing Area 29. The number of lobsters caught are given by the tow locations.

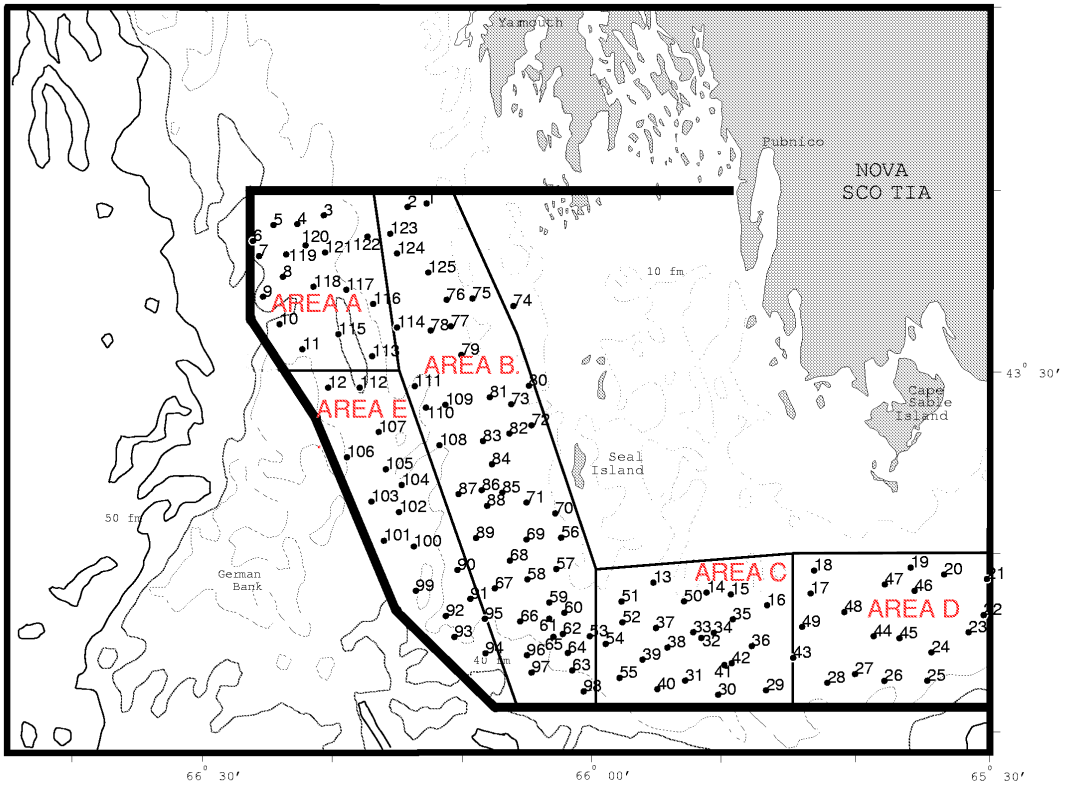

Fig. 15. Five subareas for distribution of future fishing effort defined Scallop Fishing Area 29 with respect to similar densities of commercial size scallops from the 2001 survey (see Fig. 12). Numbered positions refer to the location of tows during the 2001 joint industry/DFO survey.