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002 Interaction Between
the Fisheries and the
Oil and Gas
Industry off the East
Coast of Canada

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IDENTIFICATION AND PREDICTION OF INTERACTION BETWEEN
THE FISHERIES AND THE OIL AND GAS INDUSTRY OFF
THE EAST COAST OF CANADA

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The co-operation of those in industry and government who provided the basic information used to prepare the maps was greatly appreciated and they are listed in Appendix 3.

The author takes full responsibility for errors and omissions.

SUMMARY

Oil and gas industry operations on Canada's east coast take place in waters that have supported a fishing industry for centuries. The potential for conflict between these industries on the Scotian Shelf and the Grand Banks of Newfoundland takes three forms: competition for ocean space, interference with vessel operations arising from gear and equipment conflicts, and damage to bottom-founded structures.

This report sets out a procedure for identifying and predicting operational interaction between the industries. It involves compiling data on the location and timing of activities planned by both industries and depicting that activity on base maps. The maps are intended for both industrial and government use as an aid in planning offshore operations and in resolving potential conflicts. Sample maps based on 1982 data are included.

RÉSUMÉ

Les opérations de l'industrie pétrolière sur la côte est canadienne se déroulent dans des eaux qui, pendant plusieurs siècles, ont supporté l'industrie de la pêche. Les conflits pouvant résulter des interactions entre ces deux industries prennent trois formes: compétition pour l'espace marin, interférence avec les opérations des bateaux occasionnée par l'entrée en conflit des équipements utilisés par les deux industries, et dommages causés aux constructions établies sur le fond marin.

Ce rapport décrit une procédure pour l'identification et la prédiction des interactions opérationnelles entre l'industrie pétrolière et l'industrie de la pêche. Cette procédure nécessite d'abord à compiler les données sur la location et le déroulement des activités et à transcrire ensuite ces données sur différentes cartes à partir de cartes de base. Ces cartes sont destinées à aider l'industrie et le gouvernement dans la planification des opérations offshore et dans la résolution de conflits qui pourraient survenir. Ci-inclus exemple de ces cartes, construit à partir de données pour l'année 1982.

INTRODUCTION

In 1979, two hydrocarbon discoveries of possible commercial significance were made: the Hibernia oil field on the Grand Banks of Newfoundland and the Venture gas field on Sable Island Bank. Since these discoveries, there has been a substantial increase in offshore activity, particularly exploratory drilling. This activity has led to further discoveries that may also prove to be of commercial proportions.

Oil and gas industry operations on the east coast take place in waters that have supported a fishing industry for centuries. Although the industries have enjoyed a relatively trouble-free co-existence over the past 20 years, the level of interaction between them is expected to increase with increasing hydrocarbon activity. Among the types of operational interaction that may be anticipated are:

- competition for ocean space
- interference with the operation of vessels arising from conflicts of gear and equipment
- damage to bottom-founded structures (e.g., well-heads and pipelines) from trawler and dragger operations
- damage to fishing gear from debris on the ocean floor
- competition for harbour space
- competition for personnel for marine occupations.

This report deals with the first three types of interaction. The report is divided into four parts. The main elements of the procedure to identify potential interaction are set out in part one. These include the general method of data collection and transcription, the form proposed for depicting interaction, reporting frequency, and relevant data. The second part provides an outline of data sources and the steps involved in preparing data for depiction on base maps. The steps in the procedure are summarized in part three, while part four contains a discussion of some of the practical issues that would be encountered in implementing the procedure.

THE PROCEDURE

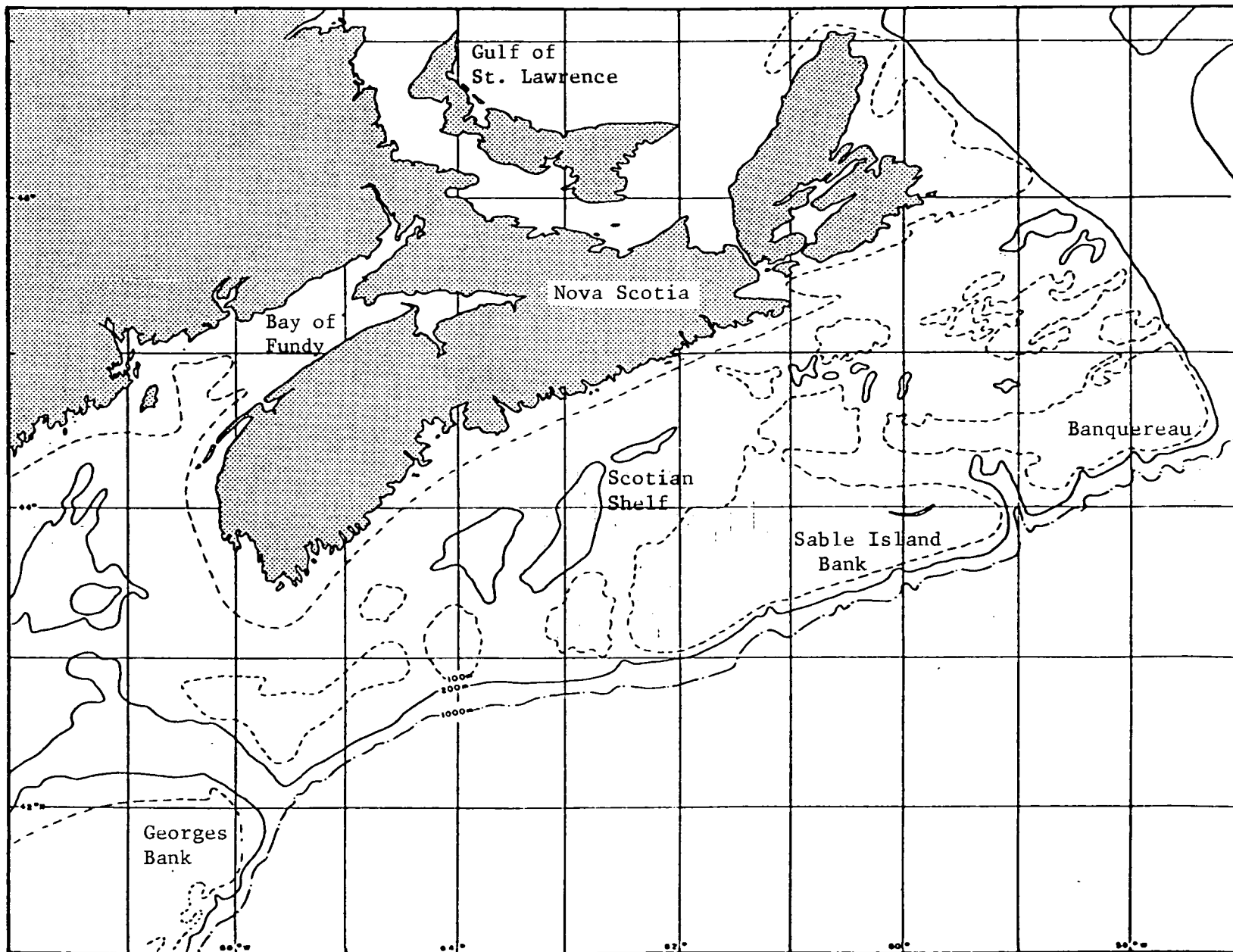
METHOD

The procedure involves three main steps: first, the routine collection, interpretation, and preparation of data on the fisheries and on the oil and gas industry; secondly, the incorporation of data onto base maps; and thirdly, the dissemination of maps to interested parties.

A manual rather than computer-assisted procedure for transcription of data onto maps is suggested at this stage for two reasons. First, the volume of data to be transcribed at any time is not likely to be large; and secondly, much of the information would be provided in a form that does not lend itself to efficient transcription using electronic means.

FORM

Examples of the type of base maps recommended for use are shown as Figures 1 and 2. The maps are of conventional size (8 1/2 x 11 in.) allowing for easy reference and for convenient storage. They incorporate reference points in common use by mariners and by planners, i.e., degrees latitude and longitude, outlines of fishing banks, and 100 m, 200 m and 1,000 m contours. The maps cover the major areas of fishing and oil and gas activity, and their relatively large scale is considered appropriate given the current level of oil and gas activity. Smaller-scale maps should be considered if activity intensifies.



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Figure 1. Base map of Scotian Shelf

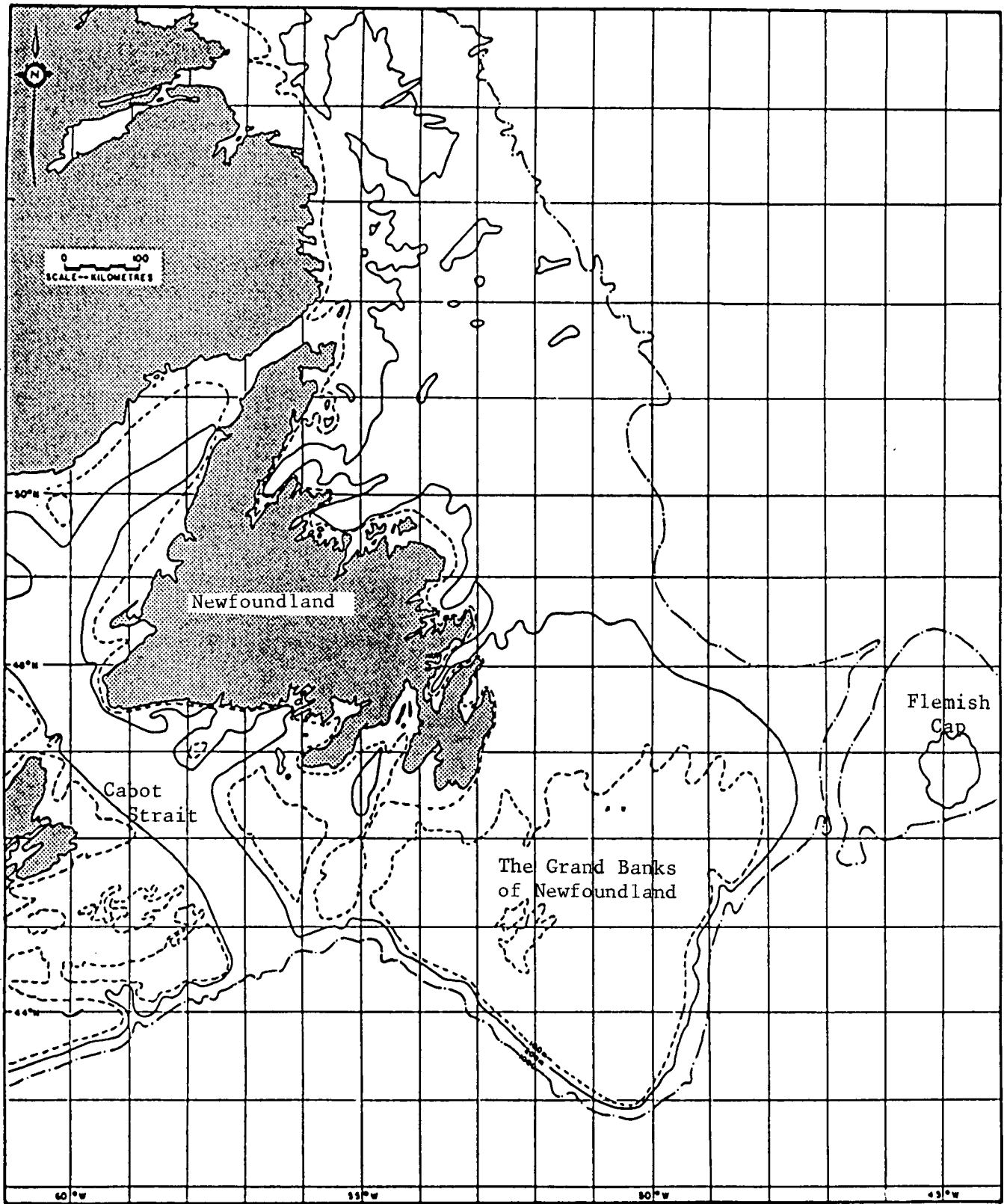


Figure 2. Base map of the Grand Banks of Newfoundland

REPORTING FREQUENCY

The procedure requires the regular production of a set of maps covering a rolling 12-month period. At the outset, for each area under consideration, 12 maps will be produced (a set) covering anticipated activities for each of the next 12 months. The rolling 12-month reporting format will facilitate long-range planning. Meanwhile, the information contained on all maps will be updated as required each month, which will ensure that current information is available for more immediate planning.

Once the procedure has been in place for a year or so, the frequency of reporting might be reduced to keep to a minimum the resources devoted to map production. From a fisheries perspective, this would not be a problem because fishing patterns change little from month to month during the winter and summer seasons. The main limiting factor lies on the oil and gas side. Officially, the minimum notification periods for advising Canada Oil and Gas Lands Administration (COGLA) of the commencement of first seismic and then drilling activities are 45 and 60 days, respectively. At best, then, under existing regulations the reporting frequency could be reduced to 45 days. Although this may not appear to be a significant reduction, given the time required to compile, interpret, and incorporate data on base maps, any reduction in reporting frequency is likely to improve the predictive quality of the procedure.

RELEVANT DATA

Fishing Activity

Inshore Fishery. Oil and gas activity on the east coast has not been confined to offshore waters and may not be in the future. Seismic work and drilling have been carried out in inshore waters, the Gulf of St. Lawrence, and in the Bay of Fundy. Also, oil and gas industry traffic (such as supply and seismic vessels and rigs) plying to and from ports on the east coast must pass through inshore waters. These considerations provide ample justification for including inshore fishing activity on the maps, although the potential for interaction may be relatively low in the latter case because recognized shipping lanes are used.

The sample maps accompanying this report depict inshore fishing activity by season, gear type, and relative intensity. The depiction is of a general nature, i.e., it is not based on a detailed examination of particular activities in particular areas. This approach is intended to alert mariners to expect some fishing activity in inshore areas during the traditional inshore season (April to October in most areas). By incorporating general information, the maps avoid leaving the impression that more is known about the specific location and timing of various types of inshore operations than is the case, with the exception of the lobster fishery.

Domestic Offshore Fisheries. The sample maps accompanying this report depict offshore fishing activity in four ways:

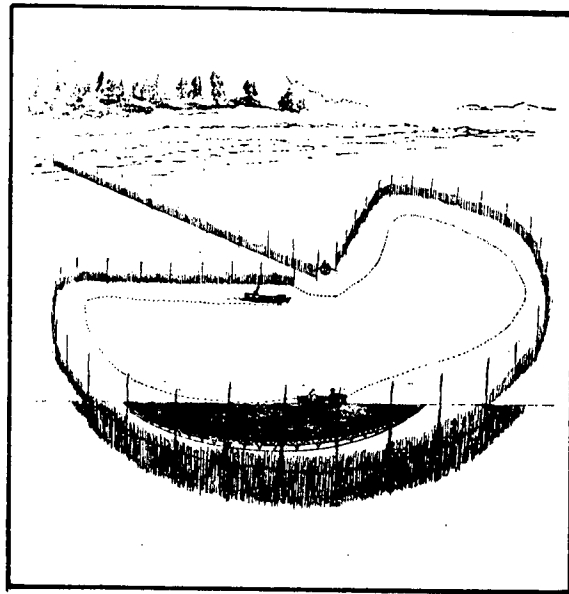
- i) areas where fishing is unlikely to occur because of sea bed conditions, lack of resources, etc.);
- ii) areas where light fishing activity can be expected (0-9 vessels);
- iii) areas where moderate fishing activity can be expected (10-19 vessels); and,
- iv) areas where intensive fishing activity can be expected (20 or more vessels).

Discussions with representatives of the fishing industry indicate that areas (i) and (iv) can be identified fairly readily, although the timing and location of intensive fishing activity effort may vary from year to year depending on market and resource conditions. Areas of light and moderate fishing activity are essentially residual categories.

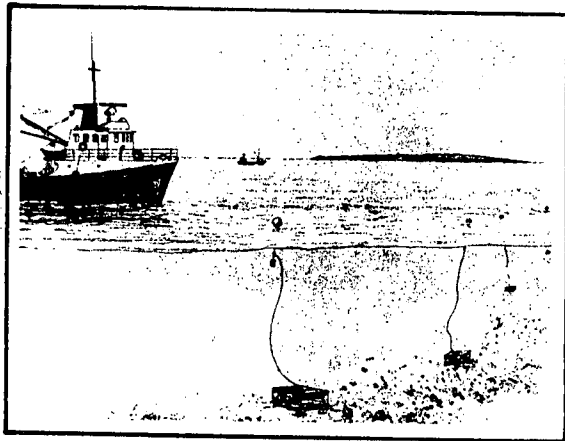
Areas of light, moderate, and intensive fishing activity can be defined on an ongoing basis through consultation with the fishing industry and the Department of Fisheries and Oceans (DFO). This information is depicted on the base maps each month. A distinction is drawn between fixed (F), mobile (M), and combined fixed and mobile (F/M) gear in depicting the areas and intensity of effort. Fixed gear (Figure 3) refers to stationary equipment which fishes passively, i.e., does not rely on the motion of the vessel to catch fish. Lobster and crab traps, gill nets, weirs, and longline sets fall into this category. Mobile gear (Figure 4) refers to equipment that fishes actively, i.e., relies on the motion of the vessel or the gear to catch fish. The predominant forms of mobile gear on the east coast are the otter trawl (used primarily to harvest groundfish); the dredge (used to harvest scallops); and the various types of seines.



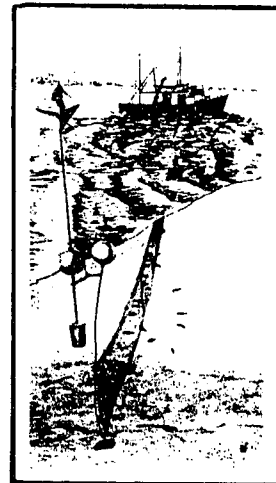
Inshore
Lobster
Trap



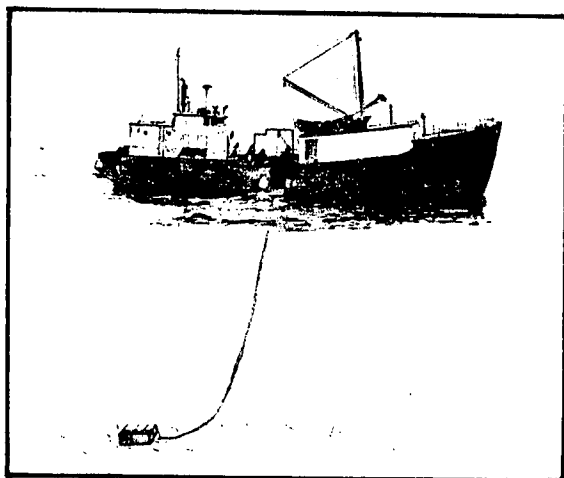
Weir



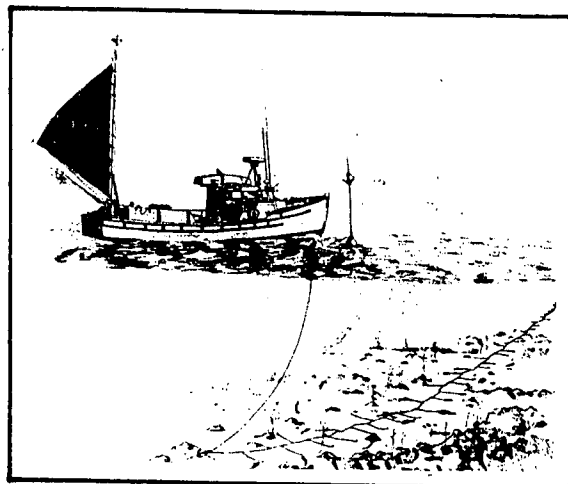
Crab
Trap



Gill
Net

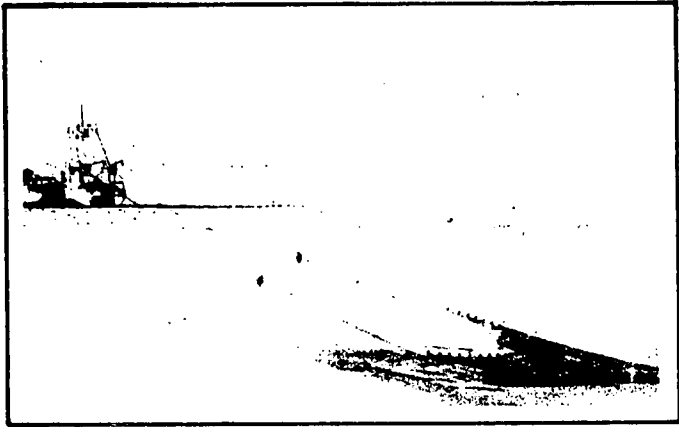


Offshore Lobster

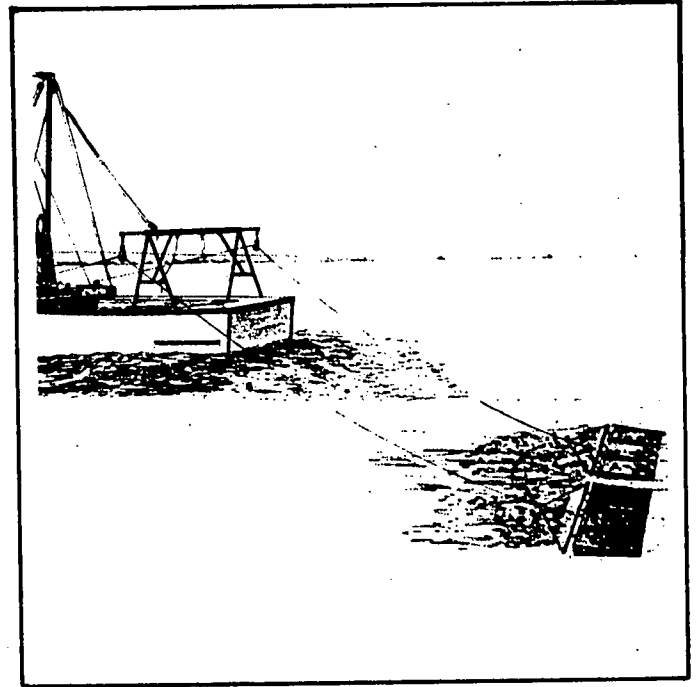


Longline

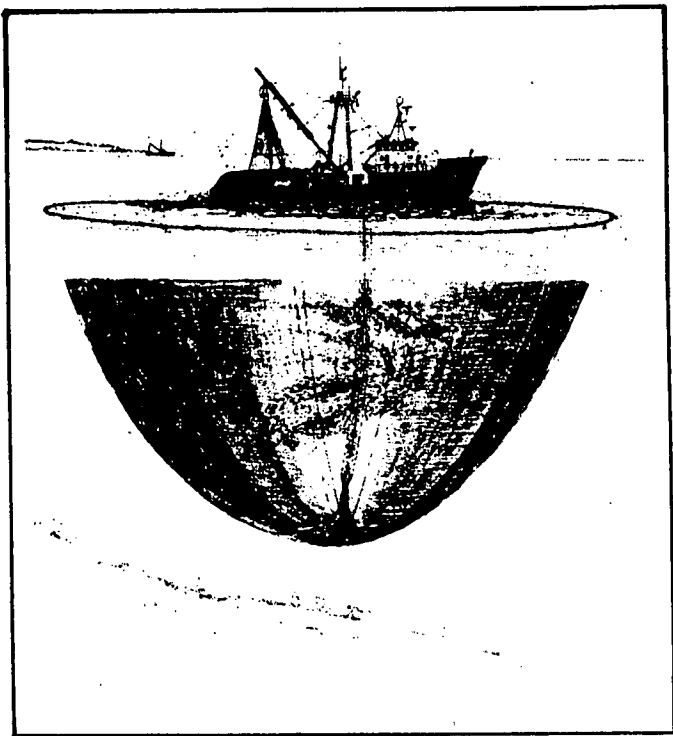
Figure 3. Types of fixed gear



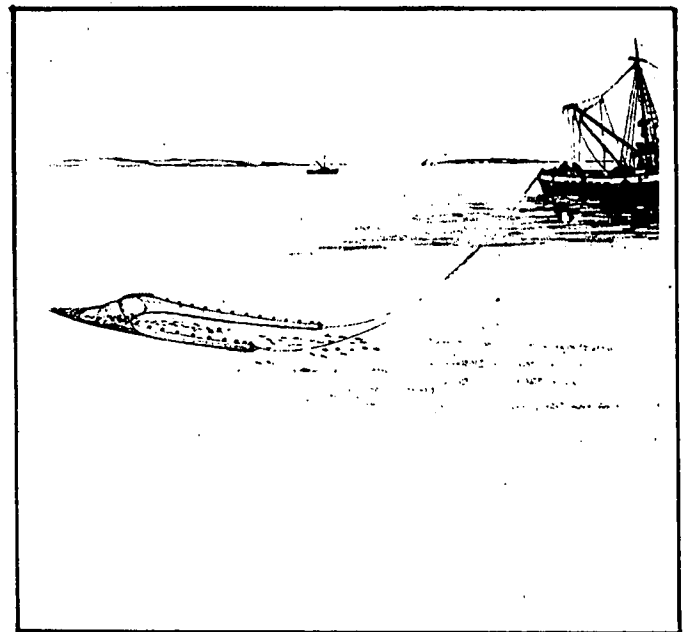
Otter Trawling



Inshore Scallop Dragger



Purse Seining



Danish/Scottish Seining

Figure 4. Types of mobile gear

Foreign Offshore Fisheries. Through bilateral agreements, the distant-water fishing fleets of several nations are permitted to fish within Canada's 200-mile zone. At peak times, as many as 200-250 foreign vessels may be active on the Grand Banks and Scotian Shelf (Northwest Atlantic Fisheries Organization (NAFO) subareas 2, 3, and 4). Because these vessels add significantly to the number of domestic vessels in the fishery, this mapping procedure must consider their contribution to overall fishing effort.

Although foreign vessels are typically larger than Canadian vessels, with few exceptions they use the same gear (trawl). Accordingly, there appears to be no need to distinguish foreign from domestic effort on the maps. One exception involves the use of floating longlines by the Japanese to harvest tuna and swordfish along the edge of the Scotian Shelf in NAFO divisions 4X and 4W. Because this gear presents a particular hazard to vessels, its use should perhaps be noted on the maps.

Regulatory Information. Although the fisheries are substantially regulated, only a few regulations having a direct bearing on activity are relevant in the context of this mapping procedure. These regulations are ones that influence the location and intensity of effort, the principal among them being area closures. Vessels tend to cluster on the perimeter of closed areas, a phenomenon which is depicted on the sample maps (Appendix 1).

Research Activity. Where a research program of sufficient scope or intensity to present a hazard to shipping

is planned, the proposed location and characteristics of research equipment should be depicted and described.

Oil and Gas Activity

Rig Operations. Included on the sample maps (Appendix 1) are the location and movement of rigs. Points of departure and destination and the course of the rig while *en route* are shown. The information covers movements into, within, and from Canadian waters. Rig locations while drilling are specified and wells and rigs are identified by name. The location of suspended wells is also depicted.

Seismic. The maps should show the proposed areas of seismic operation, approximate commencement dates, and, if possible, the direction of tows. Given the nature of these operations, it is important that information be as specific as possible.

Supply Vessels. Proposed routes for supply vessels should be depicted together with the frequency of trips, if there is sufficient space on the maps. Supply vessels usually visit a rig once every three to four days.

Research Activity. Where a research program of sufficient scope or intensity to present a hazard to fishing or shipping is planned, the proposed location and characteristics of research equipment should be depicted and described.

Development Activities. Should a field be brought into production, detailed information covering offshore

development activities would be depicted. Of particular interest would be bottom-founded structures such as pipelines, well heads, and guideposts.

Pictorial Glossary

The maps should be accompanied by a pictorial glossary of the terms and activities depicted on the maps. This glossary would contain line drawings and descriptive text for:

- typical fishing vessels
- types of fixed and mobile gear
- drilling rigs (jack-up, semi-submersible, and drill ships) showing anchor patterns and exclusion zones
- seismic vessels and methods of operations
- supply vessels and vessel operations including stand-by.

The glossary should meet two criteria: first, it should contain sufficient information to acquaint the reader with the technology and operations in the respective industries; and secondly, it should do so in as little space as possible. For ease of reference, consideration should be given to printing this information on the reverse side of the maps. Production of this proposed glossary was beyond the scope of this study.

DATA SOURCES AND DATA PREPARATION

Successful implementation of the procedure is highly dependent on the degree of co-operation received from key sources of information within government and industry.

FISHING INDUSTRY

Inshore Fisheries

The level of effort that is devoted to developing the information to be incorporated depends on the priority assigned to inshore fishing activity. If the scope for operational interaction is minimal due to the location or timing of oil and gas activity, then inshore fishing need be depicted in general terms only. The message being conveyed is that mariners can expect to encounter fixed gear and an indeterminate number of vessels. The maps would be sensitive to seasonal variations in effort and to gear used. The information necessary to depict fishing effort at this level of detail can be obtained from personnel in the Department of Fisheries and Oceans (DFO).

The department is divided into three regions on the east coast; Scotia-Fundy, Newfoundland, and Gulf. Contact would have to be made separately with personnel in each region (Appendix 2).

If, on the other hand, the scope for operational interaction were deemed to be significant, an in-depth study

of the inshore fishery would be required.¹ Generally, DFO does not have good records of catch and effort by inshore vessels (those under 13.7 m in the Scotia-Fundy Region and under 10.7 m in the Newfoundland Region). Moreover, it would be impractical to try to contact directly the thousands of small vessel owners to obtain this information. Under these circumstances, the necessary information could only be developed through direct contact with fisheries officials in the relevant areas.

The approach most likely to achieve useful results would involve circulating relatively small-scale maps among officials and asking that typical activities by month for their area be depicted. This information would then be added to the base maps, although to do the data justice, the base maps would have to be drawn to a smaller scale, or at the very least, have the relevant portion added at a smaller scale. Detailed studies of this type have been done; for example, those prepared in conjunction with the planning for a southern terminal for the Arctic Pilot Project.

Federal fisheries officials at the district level report to area managers who in turn report to the Director of Operations in their respective regions. Because a detailed study of the inshore fishery would require co-operation at senior levels, the first step in the process would be to

¹ The study of fishing activity at this level of detail is normally carried out for the preparation of contingency plans. The mapping procedure outlined in this report is intended to serve a general planning purpose. It is not a substitute for the detailed, site-specific analysis that forms the basis for contingency plans.

contact the Director of Operations in each region to outline the object of the exercise and to reach agreement on the most expeditious approach for gathering the information. The Directors of Operations can be contacted at the addresses and telephone numbers listed in Appendix 2.

Domestic Offshore Fishery

The offshore fishery on the east coast involves about 275 company-owned vessels and about 225 vessels owned by fishermen. A small proportion of the nearshore fleet of about 4,500 vessels is also active in offshore waters, though effort is confined to the summer months.

To depict the location, timing, and level of effort (number of vessels) in offshore waters with sufficient accuracy, complementary information is required from two sources: the industry and DFO. The information falls into two categories: historic effort and planned effort.

Historic patterns of effort offer perhaps the best guide to the location and intensity of future fishing activity in offshore areas. The industry is able to provide detailed information with respect to the location and timing of effort based on the experience of an individual company. DFO is able to provide detailed information with respect to the intensity and timing of effort, with location specified at a more general level. By combining the information, a reasonably accurate picture is obtainable of the timing and intensity of effort by location.

The best method for obtaining company information is to circulate the base maps with the request that fleet superintendents/managers depict, as specifically as possible, vessel locations by month. A separate set of 12 maps should be included for each major species fished by each of the companies contacted. To assist in the subsequent interpretation of the information received, consideration should be given to incorporating in the base maps the statistical unit areas used by DFO. Base maps with unit areas are shown in Figures 5 and 6. An example of the type of information likely to be received from the companies is provided in Figure 7. Note that this information cuts across unit areas.

DFO will be able to provide effort data by unit area by month. The specific information to be requested is:

- the number of different vessels
- the number of trips
- the number of days fished by month, by gear type (fixed, mobile), and by unit area¹

An example of the form in which the data will be provided is shown in Table 1. It should be noted that these data have an upward bias in terms of the number of vessels

¹ These data are collected at dockside directly from vessel captains by DFO's Operations Branch and form part of the Department's comprehensive data base on catch and effort. Less detailed and less comprehensive information on effort is also available from the Department's FLASH system. Because of the under coverage of domestic activity by the FLASH system, its use in this mapping procedure is not recommended.

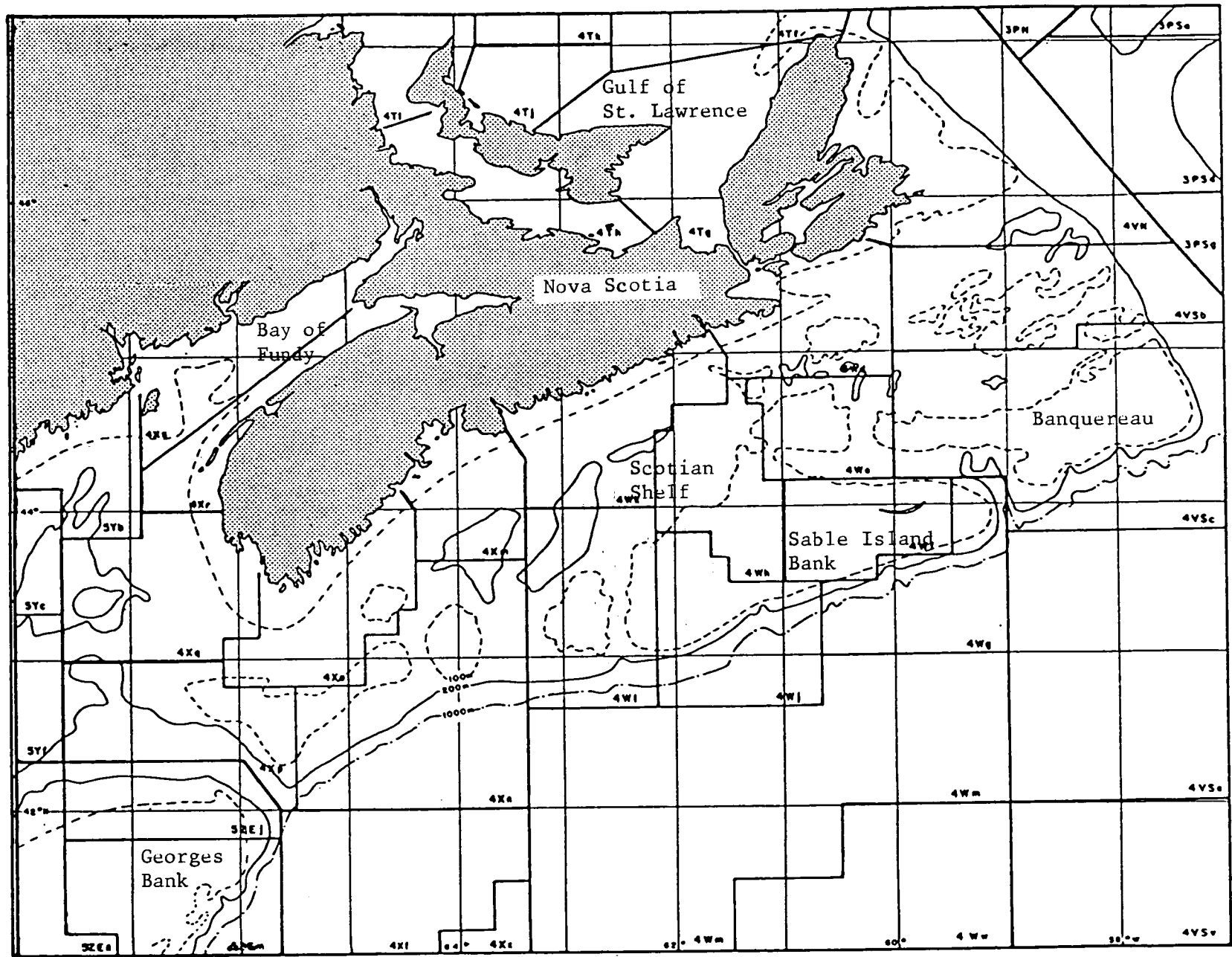


Figure 5. Base map of Scotian Shelf showing statistical unit areas

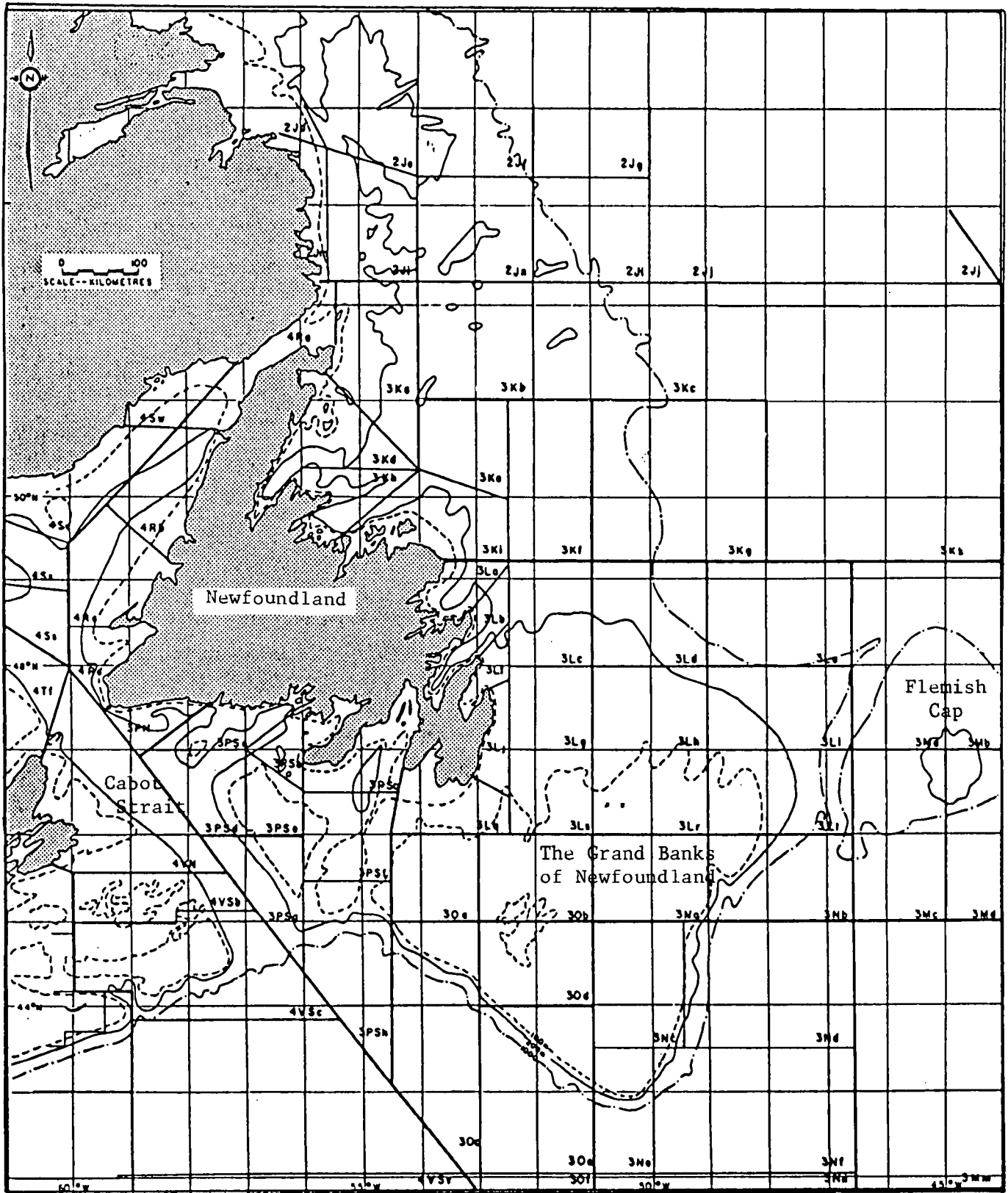


Figure 6. Base map of the Grand Banks of Newfoundland showing statistical unit areas

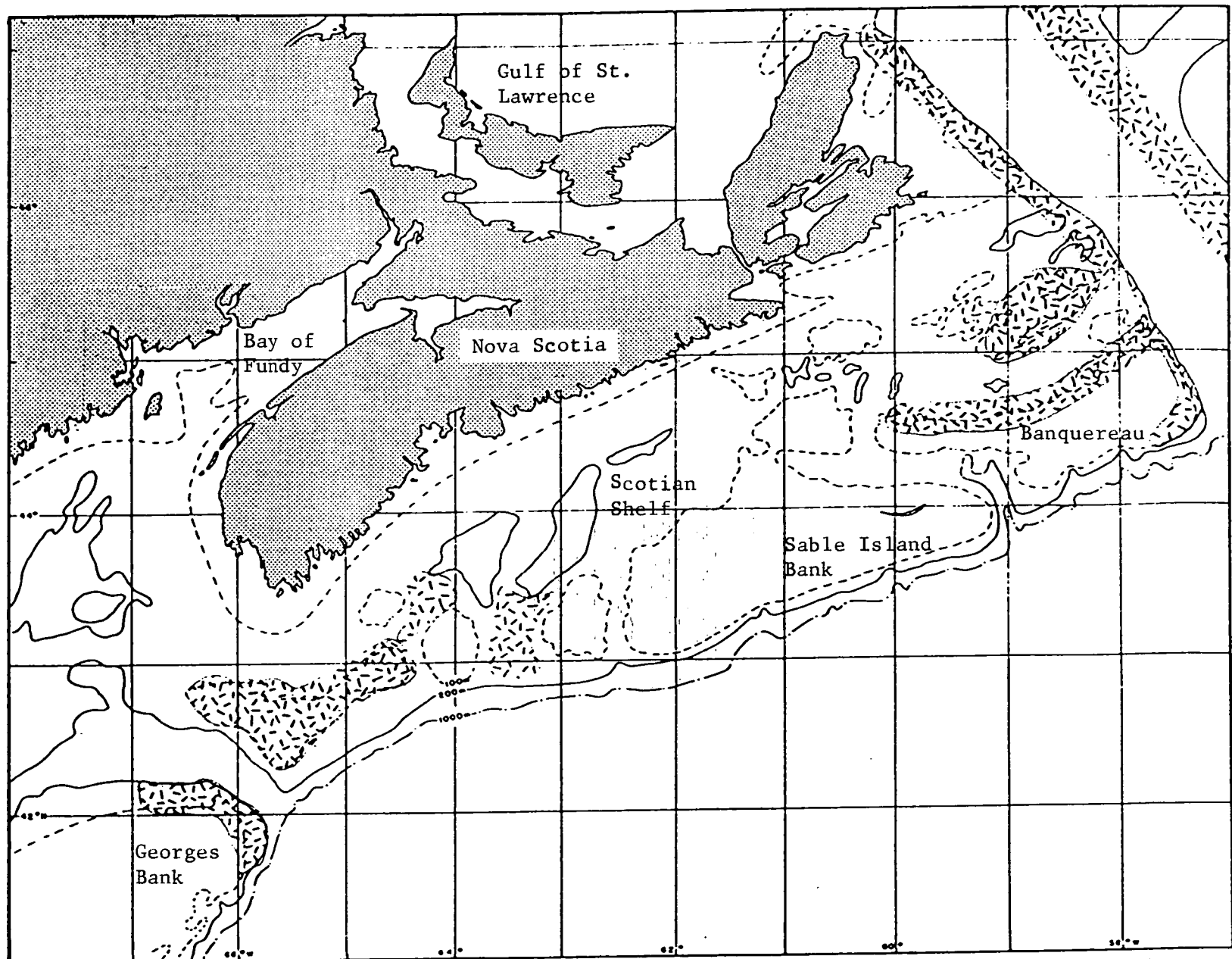


Figure 7. Location of offshore effort on Scotian Shelf for January
(source: H.B. Nickerson and sons Ltd., February 1984)

TABLE 1

Typical unit area effort data showing
numbers of vessels by month, January 1982

Area	Month	Gear Type	No. of Vessels	No. of Trips	No. of Days Fished
4VC	01	Fixed	1	.2	2
		Mobile	11	9.9	64
	02	Fixed	3	1.7	16
		Mobile	20	12.9	89
	03	Fixed	3	2.5	27
		Mobile	27	35.0	168
	04	Fixed	8	6.5	54
		Mobile	42	38.2	249
	05	Fixed	26	40.3	187
		Mobile	47	55.6	387
	06	Fixed	27	33.1	187
		Mobile	54	59.5	269
	07	Fixed	22	31.7	129
		Mobile	56	74.3	349
	08	Fixed	23	31.6	118
		Mobile	38	38.9	199
	09	Fixed	18	20.3	88
		Mobile	25	26.5	157
	10	Fixed	13	9.7	88
		Mobile	33	31.3	188
	11	Fixed	6	4.8	35
		Mobile	40	46.7	315
	12	Fixed	2	2.3	24
		Mobile	36	29.7	164
Area Total			581	643.2	3,553

Source: DFO, Statistics Branch, Halifax, 1984.

because it is unlikely that the effort of all vessels in a given month is coincident. Although it is possible to calculate the average number of vessels by unit area by month, this in turn may introduce a downward bias. Given the object of the exercise, it is probably safer to be conservative and use the upwardly biased figures.

The major problem with the information on DFO unit areas is that effort is averaged over a very wide area. Taken alone, there is no way (in most cases) to be specific about where in a unit area effort may be concentrated. Thus, the more location-specific information obtained from the companies is of use. By simply inspecting the effort maps obtained from the companies, it is possible to refine the DFO unit area information. In the examples given (see Figure 7 and Table 1), it is clear that effort in 4VSc is not spread over the whole unit area, but is confined to the northern and eastern edges of Banquereau.

This mapping procedure is intended to have a predictive quality with respect to both fishing and oil and gas activities. Until the inception of enterprise allocations in 1981, long-range planning of fleet deployment by the companies was difficult, at best. Allocations are entitlements to specific volumes of particular species in well-defined areas (NAFO divisions). Ten companies receive these allocations, which are effective for a calendar year. The allocations form the basis for fleet deployment plans which most companies develop in late fall. These plans indicate the level of effort by month that is expected to be committed to each NAFO division for which allocations are received. The precise location of effort within these

relatively large areas (Figure 8) is not known in advance as this decision is left to the skipper of the vessel.

To use the deployment plans effectively, the information must be used in conjunction with that on the historic effort already outlined. The deployment plan indicates where in a specific NAFO division the company expects to fish in any given month. The historic information on the company in relation to the DFO unit area indicates where within each division that effort is likely to take place. Both types of information are necessary.

With respect to the deployment plans, two points should be noted. First, the plans are not based solely on where the fish are, but are based largely on the companies' product requirements as dictated by market conditions. As markets change over the course of a year, fleet deployment may also change. Consequently, effort should be made through regular (monthly) consultation with the companies to ensure that the maps continue to reflect planned activities. Secondly, the deployment plans are based on market conditions and reflect each company's reading of the market. Because they operate as competitors, the major companies can be expected to be reluctant to release detailed plans. Fortunately, detailed plans, i.e., plans that set out species information, are not required. It is sufficient for this procedure that planned effort be specified simply in terms of number of vessels, by division, by month.

The maps accompanying this report were derived using the data outlined above. The number of companies contacted was limited and the data obtained from DFO covered only one year, 1982. When implementing the procedure it

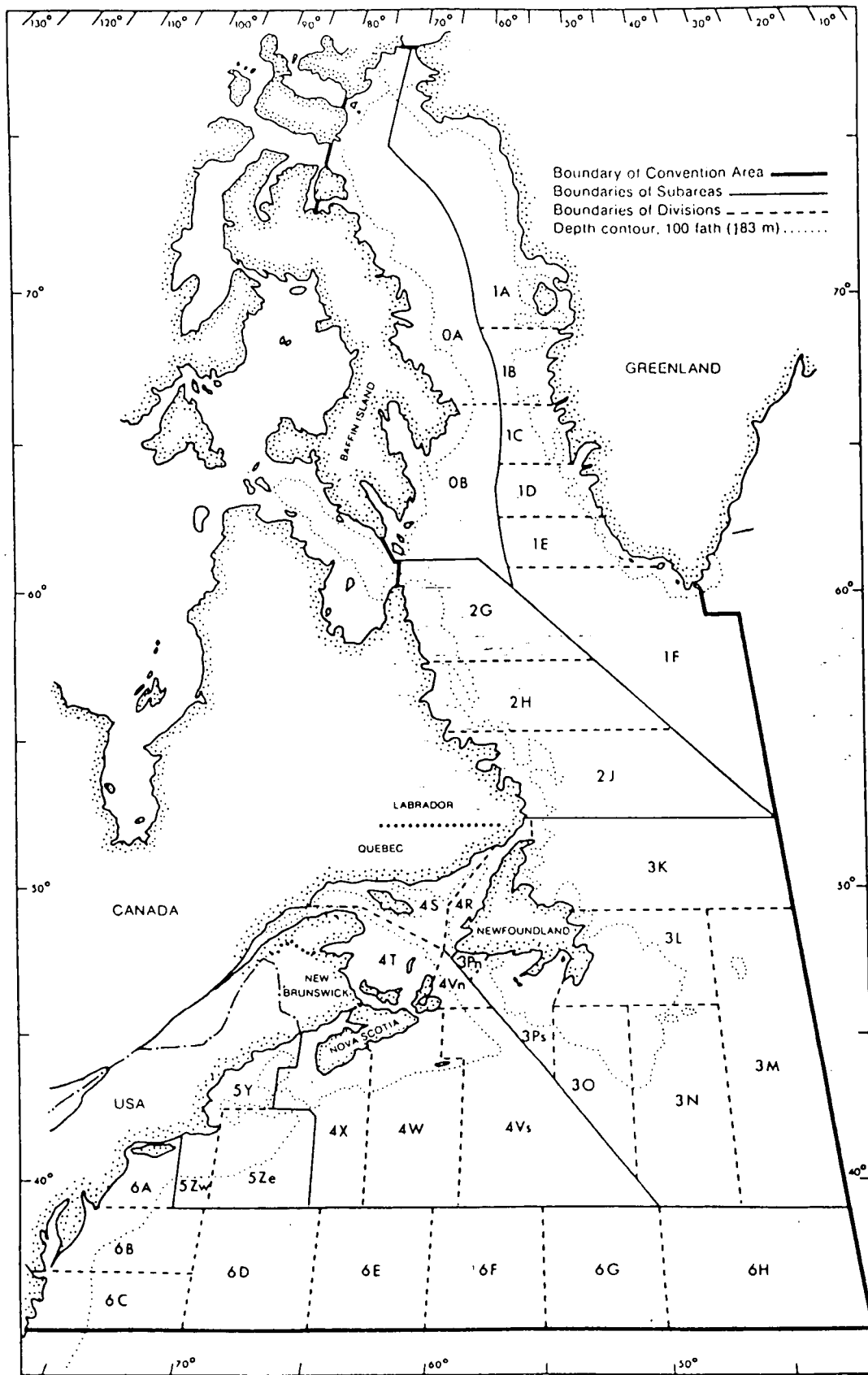


Figure 8. NAFO subareas and divisions

would be advisable to contact all companies who receive enterprise allocations (both for plans and the location of effort historically) and to complement this information with unit area data for at least three years (1981-1983).

Co-operation of two companies, Fishery Products International, Ltd. and National Sea Products, Ltd. is considered essential because they control a substantial proportion of the offshore fleet and receive the bulk of enterprise allocations. Given the assistance that these companies provided in the course of developing this procedure, it seems reasonable to assume that their continued co-operation will be forthcoming (Appendix 2). This is important not only in its own right, but because the location of effort in the offshore sector does not vary significantly within NAFO divisions. Thus, in the absence of complete co-operation from all companies, the information received from the key companies can be generalized with confidence. The names of other relevant companies can be obtained from the Operations Branch of DFO (see Appendix 2). The relevant contacts in DFO for statistical information are listed in Appendix 2.

Once the data have been assembled and transcribed, the maps should be circulated to industry and government officials for review before printing and general distribution.

Foreign Offshore Fishing

Predictions of the location, timing, and level of foreign effort are dependent on information related to annual allocations and on historic fishing patterns.

Foreign licenses are negotiated during January and February each year. The licenses indicate the fish allocation by NAFO division and the number of days the nation is allowed on the fishing grounds in question. Licenses do not specify the level of effort (i.e., number of vessels). This decision is left up to each country and, thus, the level is not known with certainty until application is made to enter Canadian waters and to commence fishing. Although officially a minimum of 30 days notice is required before a nation may commence fishing, applications are frequently approved on shorter notice.

The inability of the system to generate timely information on effort is not a serious defect. DFO officials indicate the effort tends not to vary significantly from year to year for a given allocation. The location and timing of foreign effort also vary little for a given allocation. For these reasons, historic data coupled with preliminary allocation information provide a good basis for predicting effort.

High-quality data on historic effort are readily available from DFO's FLASH system, which provides coverage in the range of 65-70 per cent. The specific information to be requested is: for each vessel, vessel locations (latitude and longitude) by month. Normally several pairs of co-ordinates will be reported for each vessel during each

month that the vessel fishes. To facilitate relating historic information to annual allocations, the information should be ordered by month and by country. It should be noted that research staff in the Newfoundland Region have prepared maps of monthly effort by foreign fleets on the Grand Banks covering each of the past five years.¹ Similar maps are not available for the Scotian Shelf.

An example of a typical computer printout of the type of information required is provided in Table 2. The depiction of these data for a full month for all effort on the Scotian Shelf is shown in Figure 9. As noted earlier, these data would be combined with domestic effort data when producing comprehensive maps. To ensure that the maps continue to incorporate accurate data as the year progresses, regular contact should be maintained with DFO officials.²

¹ Maps of the Grand Banks are available from:

David Kulka
Fisheries Research Branch
Department of Fisheries and Oceans
P.O. Box 5667
St. John's, Newfoundland
A1C 5X1

² The data related to foreign effort, both historic and current, are available from:

Senior Advisor, International Surveillance
Resource Allocation Division
Fisheries Operations Branch
P.O. Box 550
Halifax, Nova Scotia
Telephone: (902) 426-5952

TABLE 2

Typical foreign effort data showing vessel locations by month, June 1982

Foreign Positions - June 1982							
84/02/06							
Country	Sideno	Replat	Replong	Country	Sideno	Replat	Replong
		44.067	49.833			42.967	62.283
		44.067	50.017			42.983	61.850
		44.450	49.333			43.033	61.417
		44.467	49.383			43.367	60.667
		44.517	49.383		EB-0564		
	VI-5-9479	43.817	50.517			42.850	62.350
		43.817	50.517			42.857	62.233
		43.950	50.200			42.883	62.367
		44.067	50.017			42.917	62.000
		44.200	49.783			42.983	61.850
		44.417	49.567		KB-0270	42.833	62.700
		44.717	49.533			42.917	62.000
	VI-5-9514	43.817	50.517			42.948	62.000
		43.817	50.517			42.950	62.017
		43.950	50.200			42.950	62.083
		44.067	50.017			43.000	61.867
		44.200	49.817			43.450	60.533
		44.417	49.567			43.533	51.417
		44.717	49.533		KB-0278	40.700	63.233
USA	606397	42.017	67.350			42.950	62.083
	615476	42.017	67.350			42.967	62.100
USSR	AB-0438	48.083	45.350			42.983	61.850
	AB-0444	48.133	45.267			43.350	60.633
	EB-0436	41.333	61.750			43.400	60.533
		42.900	62.400			43.533	62.683
		42.917	62.000		KB-0321	44.033	49.350
		42.950	62.400		KB-1257	43.533	49.400
		42.967	62.083			47.867	47.233
		42.967	62.283		KT-0201	42.500	55.633
		42.967	62.450		LB-0473	42.783	61.017
		42.983	61.700			42.917	62.000
		42.983	61.850			42.950	62.117
		42.983	62.467			42.967	62.500
		43.000	61.417			42.983	61.850
		43.000	61.583			43.267	61.167
		43.000	61.633			46.033	46.150
		43.083	61.483			46.033	46.150
		43.100	61.467		LB-0561	41.267	57.117
	EB-0536	42.800	62.867			42.800	62.867
		42.900	62.550			42.883	62.317
		42.917	62.000			42.917	62.000
		42.950	62.217			42.933	62.333
		42.967	61.750			42.940	62.302
		42.983	61.717			42.983	62.467
		42.983	61.050			43.050	61.417
		43.017	61.883		LH-0513	42.500	55.583
		43.333	60.500			43.133	62.000
		48.083	45.350		LT-0221	42.500	55.583
		48.083	45.350			42.800	62.867
	EB-0555	42.833	62.583			42.883	63.000
		42.883	62.617			44.050	63.683
					MB-0011	48.000	44.767
		42.917	62.000		MB-0012	43.700	51.367

Source: DFO, Operations Branch, FLASH System, Halifax, 1984.

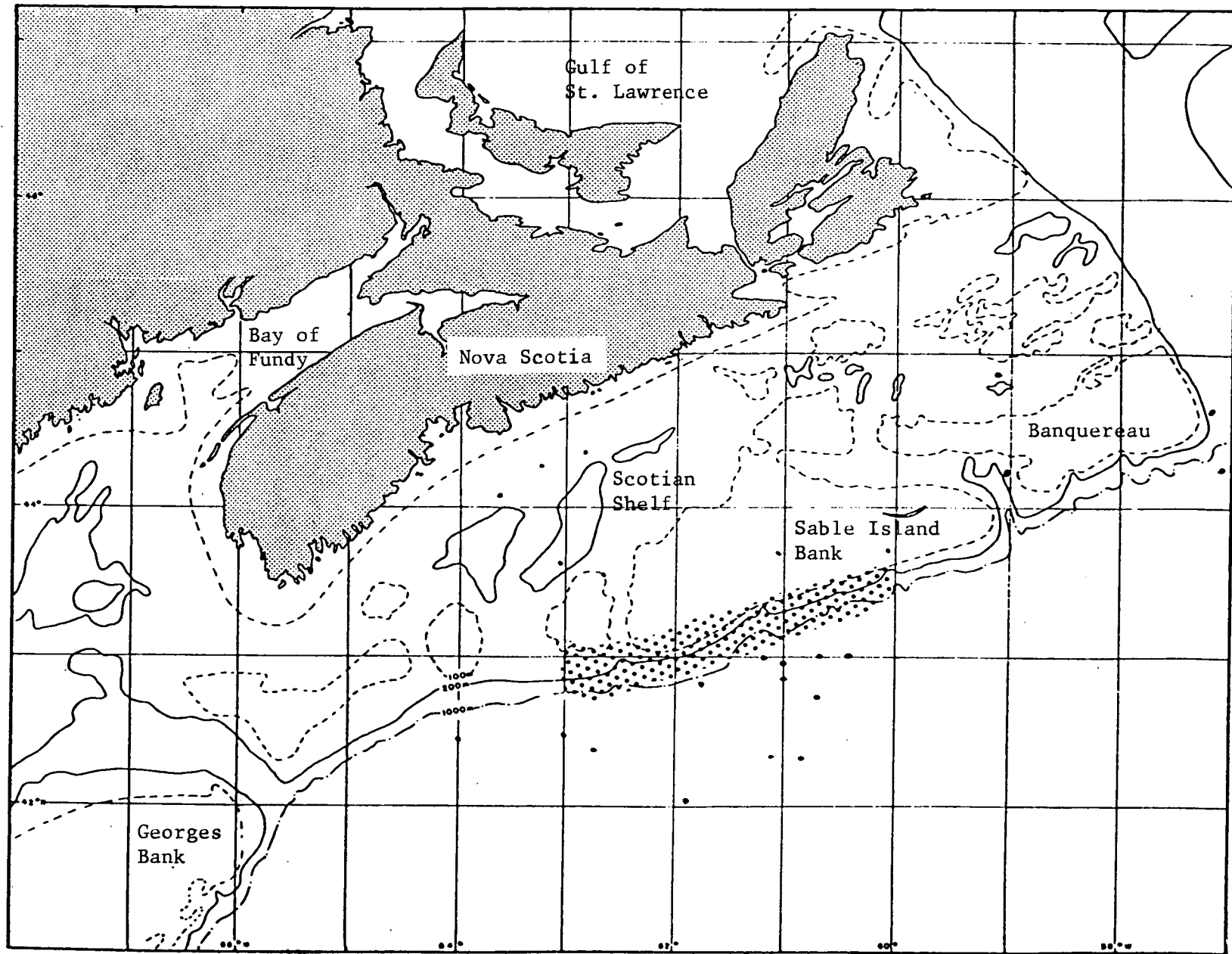


Figure 9. Location of foreign effort on Scotian Shelf, June 1982
(source: DFO, Operations Branch, FLASH system, Halifax, 1984)

Research Activity

Relevant contacts for information related to the nature and scope of fisheries research programs on the east coast are set out in Appendix 2.

OIL AND GAS INDUSTRY ACTIVITY

All information pertaining to oil and gas industry operations can be made available by COGLA. As the sample maps in Appendix 1 indicate, depicting activities of the oil and gas industry is a relatively straightforward matter, which is important because the lead times available to incorporate data or to make changes can be relatively short. As long as the minimum notification periods are adhered to, however, the maps will give an accurate depiction of the timing, duration, and location of activity.

The projection period for oil and gas operations will be shorter than that for fisheries because of the nature of the oil and gas operations. The longest operation during exploration is drilling, where typical wells may take up to 250 days to complete. For this reason, the maps will include oil and gas activity for a maximum period of seven to eight months into the future. This projection should not be considered a shortcoming in the procedure, since for long-range planning purposes it is the fisheries information that is arguably of greater importance.

SUMMARY OF PROCEDURE STEPS

The steps in the procedure are summarized together with an estimate of the elapsed time to complete each step. Figure 10 shows the relationship in time among the various steps. As shown, the annual cycle of procedure steps commences in November as the offshore fishing interests complete their fleet deployment plans.¹ Given the estimated elapsed time to complete all steps in the procedure, the first series of maps should be available for distribution by the end of January. For the balance of the year, only monthly up-dates would be required. The level of effort required to revise the maps for the second year would depend mainly on the extent to which the patterns of domestic and foreign offshore effort were expected to change.

Step 1. Determine Coverage Area

- contact COGLA to determine the location and intensity of oil and gas activity (allow one week).

Step 2. Prepare Base Maps

- select appropriate map scale;
- prepare maps showing important physical features and reference points (allow one to two weeks).

¹ The cycle itself is not tied to the specific months shown, but could commence at any time.

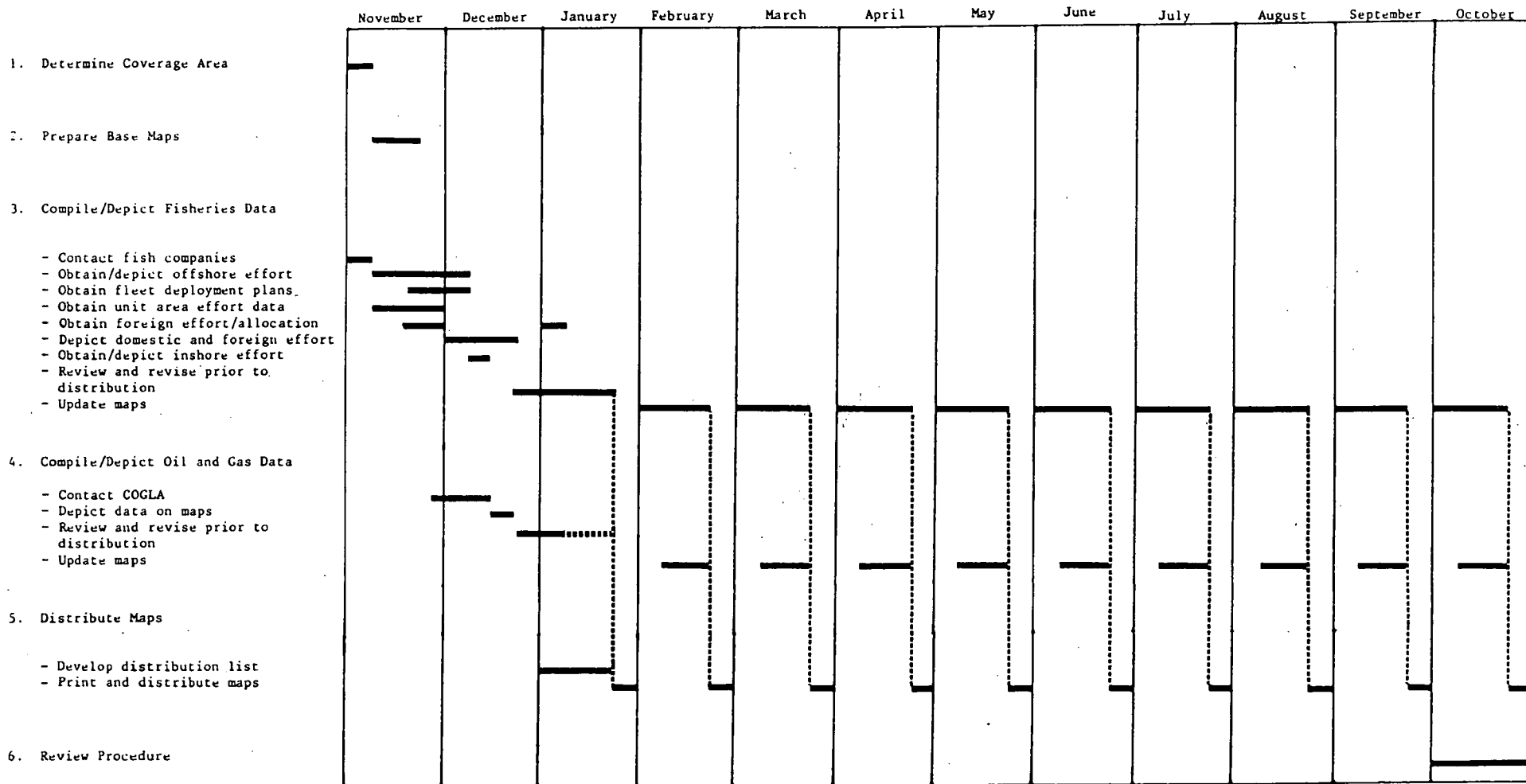


Figure 10.. Map production cycle showing relationship in time among procedure steps

Step 3. Compile and Depict Fisheries Data

- contact offshore fishing interests in early fall to explain objectives of procedure, and provide copies of sample maps;
- request that respective company fleet superintendents depict on monthly base maps location of their effort (allow three to four weeks);
- request fleet deployment plans recognizing there may be some resistance and ensuring confidentiality (allow two to three weeks);
- request from each DFO Statistics Division regional office data on effort by gear type (fixed, mobile) by unit area by month for the previous 36 months, and combine information by unit area (allow three to four weeks);
- request information on foreign allocations and historic effort from DFO Operations Branch (Foreign Surveillance) in Halifax. Initial contact should be made in November for historic data, allocation and preliminary effort information should be requested in January, and there should be follow-up throughout the year (allow one to two weeks);
- depict fishing effort by level of intensity by area using the unit area data from DFO in combination with information supplied by the companies, and add foreign effort to domestic effort (allow two to three weeks);
- include on maps general information regarding the intensity and timing of inshore effort and pay specific attention to seasonal lobster fishery (allow one week);
- submit completed maps to DFO Operations Branch officials and to companies for review and revise as necessary prior to printing and general distribution (allow three to four weeks);
- update maps as required through monthly contact with industry and DFO (allow two to three weeks each month).

Step 4. Compile and Depict Oil and Gas Data

- contact COGLA and request the location and timing of drilling, seismic operations, research activity, and development work. Identify wells and rigs by name and indicate type of rig (semi-submersible (SS), jack-up (JU), drill ship (DS)) (allow one to two weeks);
- depict activity on maps (allow one week);
- submit completed maps to COGLA for review and revise as necessary prior to printing and distribution (allow one to two weeks);
- update maps as required through regular consultation with COGLA (allow one to two weeks each month).

Step 5. Distribute Maps to Users

- develop a distribution list through contact with interested parties in fishing and oil and gas industries (allow two to three weeks);
- print and distribute up-dated set of maps at month end (allow one week).

Step 6. Review Procedure

- after a year or so, the procedure should be reviewed to determine whether modifications are required or desired: for example, map scales might be adjusted, the reporting frequency changed, or the approach to depicting information modified.

IMPLEMENTING THE PROCEDURE

ISSUES

The data requirements, data sources, and steps required to produce the maps are set out in the foregoing sections. The maps contained in Appendix 1 demonstrate that the procedure is practicable. There remain three outstanding issues:

- What will be the cost of implementing the procedure?
- What factors should be considered in determining who should bear responsibility for on-going production of the maps?
- Is production of the maps worthwhile?

In this section, the first two questions are discussed briefly, but discussion of the third lies beyond the scope of this study.

COST OF IMPLEMENTATION

The procedure is divided into two main parts: data collection and preparation; and map production and distribution. Each part requires specialized skills. These skills are unlikely to be possessed by the same person. Implementation of the procedure is therefore likely to involve at least two people directly, and several others, indirectly. The primary cost is for personnel time, whereas secondary costs are for materials, printing, and distribution.

The level of effort required to produce the maps in the first year is estimated at about 130 person-days. This estimate covers only those directly involved in map production. Data collection and preparation is expected to account for 75 days, with 30 days spent on production of the initial maps and 45 days spent on up-dating the maps during the year. The graphics and production component is expected to take 55 days, with 30 days spent on initial map production and 25 days spent on up-dating during the year. In the second and in subsequent years, the level of effort is expected to drop to between 60 and 90 days.

The level of effort required of those indirectly involved (i.e., those in industry and government who would supply basic data) is difficult to estimate with precision, but is not expected to be high. In some instances the information is already available, and it is just a matter of supplying it to another user. In other instances, for example information extracted from the DFO data base, the major effort lies in writing the program to extract the data. Once written, the secondary cost for each additional run is negligible. In the case of third-party costs, it is important not to overlook the fact that there is a quid pro quo, namely, the maps.

The primary cost associated with direct effort depends on who implements the procedure. If the work is assigned to individuals already employed in government or industry the cost is likely to fall within the \$16,000 range during the first year. This estimate assumes salaries of \$30,000 for the analyst and \$25,000 for the graphic artist.

If the work is assigned to a consultant the cost is likely to fall within the \$39,000 range, assuming an average per diem of \$300.

The estimated secondary cost of materials, printing, and distribution is dependent on the number of copies made (Table 3).

TABLE 3

Estimated Annual Cost of Map Production

Number of sets per month ^a	250	500	1,000
	Cost (\$)		
Materials	100	100	100
Printing ^b	2,160	3,600	5,760
Distribution ^c	960	1,920	3,840
Total	3,220	5,620	9,700
Cost per set ^d	1.07	9.4	.81

Notes: ^a Assumes 12 pages per set each month.

^b Assumes printing costs decline from 6 cents per page for 250 copies, to 4 cents per page for 1,000 copies.

^c Assumes 32 cents postage per set of maps per month.

^d Based on an annual requirement of 12 sets.

In conclusion, the estimated cost could range from about \$19,000 to \$49,000 in the first year, depending not only on who was assigned responsibility for map production but also on the number of copies to be produced each month.

RESPONSIBILITY FOR MAP PRODUCTION

Among the many considerations that might be important in determining to whom responsibility for ongoing map production is assigned, five stand out as essential:

- there is a need to be familiar with fisheries and oil and gas operations;
- there is a need to be familiar with the reporting systems and data bases of the respective industries, particularly the fishery, because most of the effort in preparing maps is associated with fisheries data;
- a strong case can be made for the need to be independent of any particular interest in either industry because the procedure involves the collection and use of proprietary (and possibly confidential) information;
- there is a need to maintain flexibility with respect to the level of effort required to produce the maps, because from time to time more or less intensive effort may be needed; and,
- there is a need to keep costs to a minimum, but not at the expense of continued production of high-quality maps.

The first two considerations leave open the assignment of responsibility to persons within government, the respective industries, or an outside organization (e.g., a university research institute or a consulting company). If immediate implementation is desirable, then familiarity with fisheries is essential.

The third consideration would appear to preclude assignment of responsibility to industry and possibly to

government given the sensitivity of private fishing interests to sharing information relating to planned activity with government. This point could easily be checked with the companies from whom deployment plans are sought. The oil and gas industry is required to file planned activity with government in any event, so the concern over confidentiality would not be a bar to government involvement in this case.

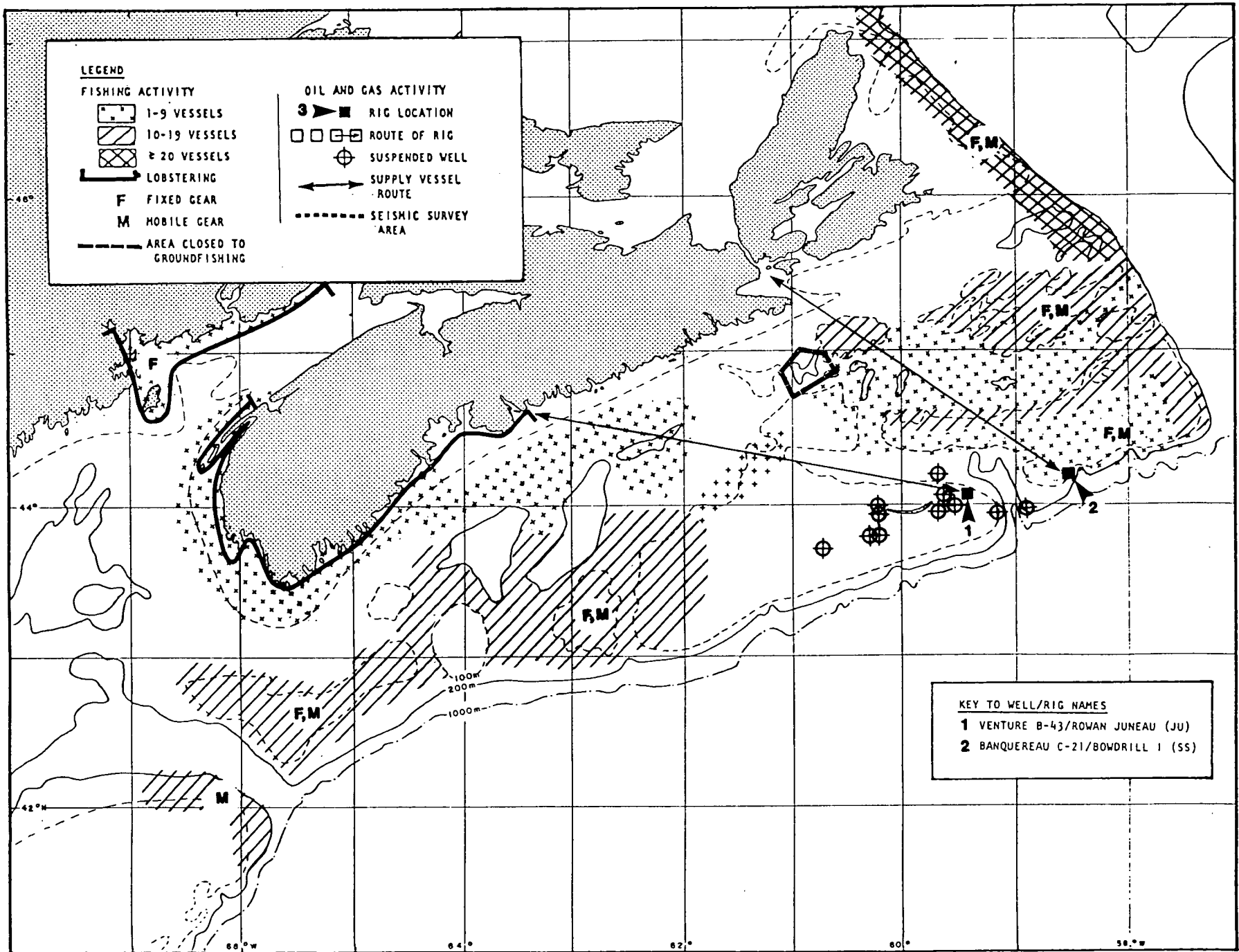
From the previous discussion of costs, it is clear that less than half a person-year is likely to be required to produce the maps initially, and that this level of effort is likely to decline over time. If the work were to be assigned to government or industry, it would form only part of the function of the person or persons involved. In itself, this level of involvement may not be a problem, but, as pointed out in the fourth consideration, some flexibility is desirable because offshore activity may change, thus altering the proportion of the individuals' time devoted to map production. This concern may militate against assignment of responsibility to industry or government because they may not be able to expand and contract staff at short notice.

Cost is a vital consideration. The cost estimates leave little doubt that, other things being equal, assigning the responsibility to government or industry would be less costly than contracting the work to a third party.

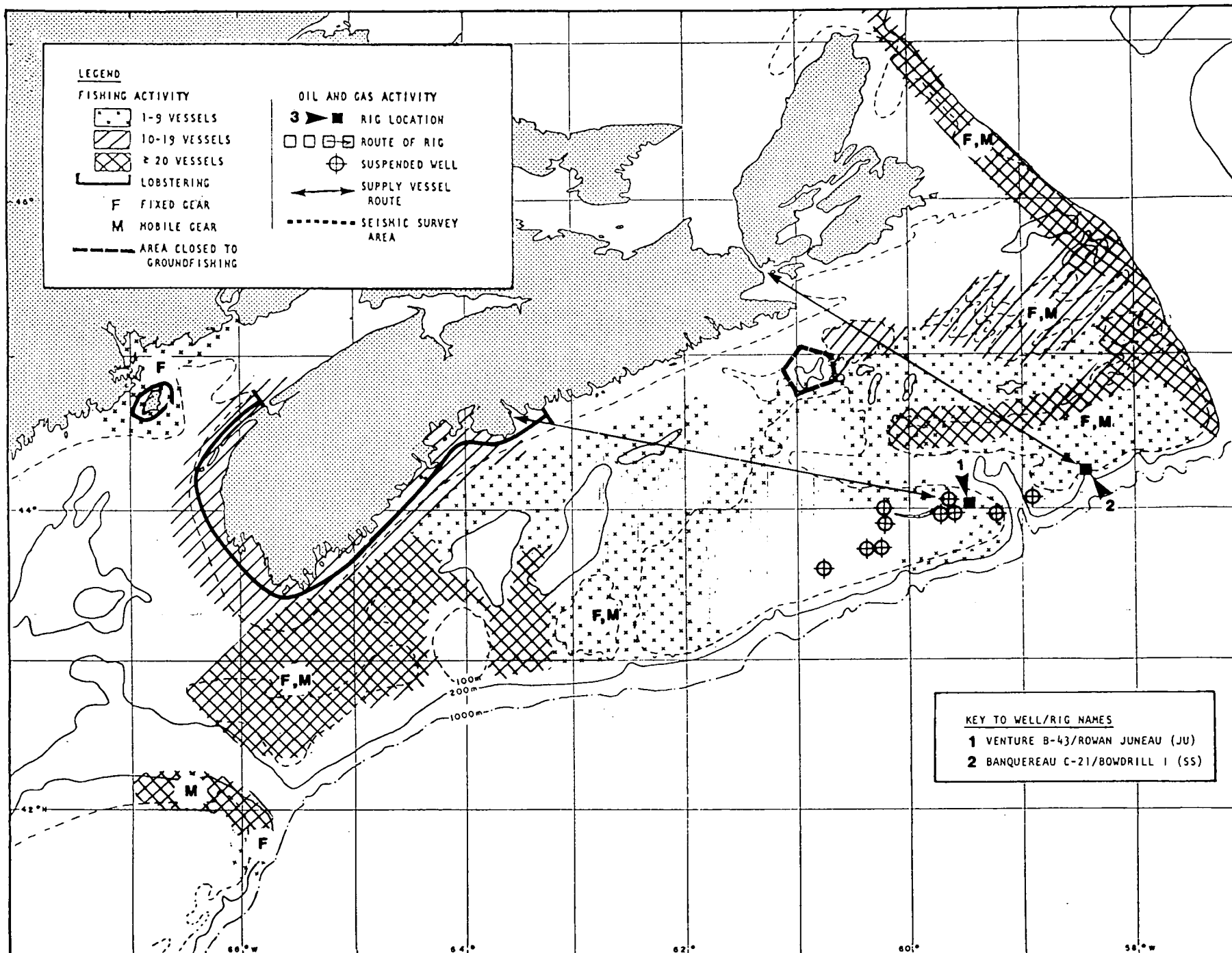
APPENDIX 1

Monthly Maps Showing Fishing
and Oil and Gas Industry Activity
on the Scotian Shelf and the Grand Banks
1982

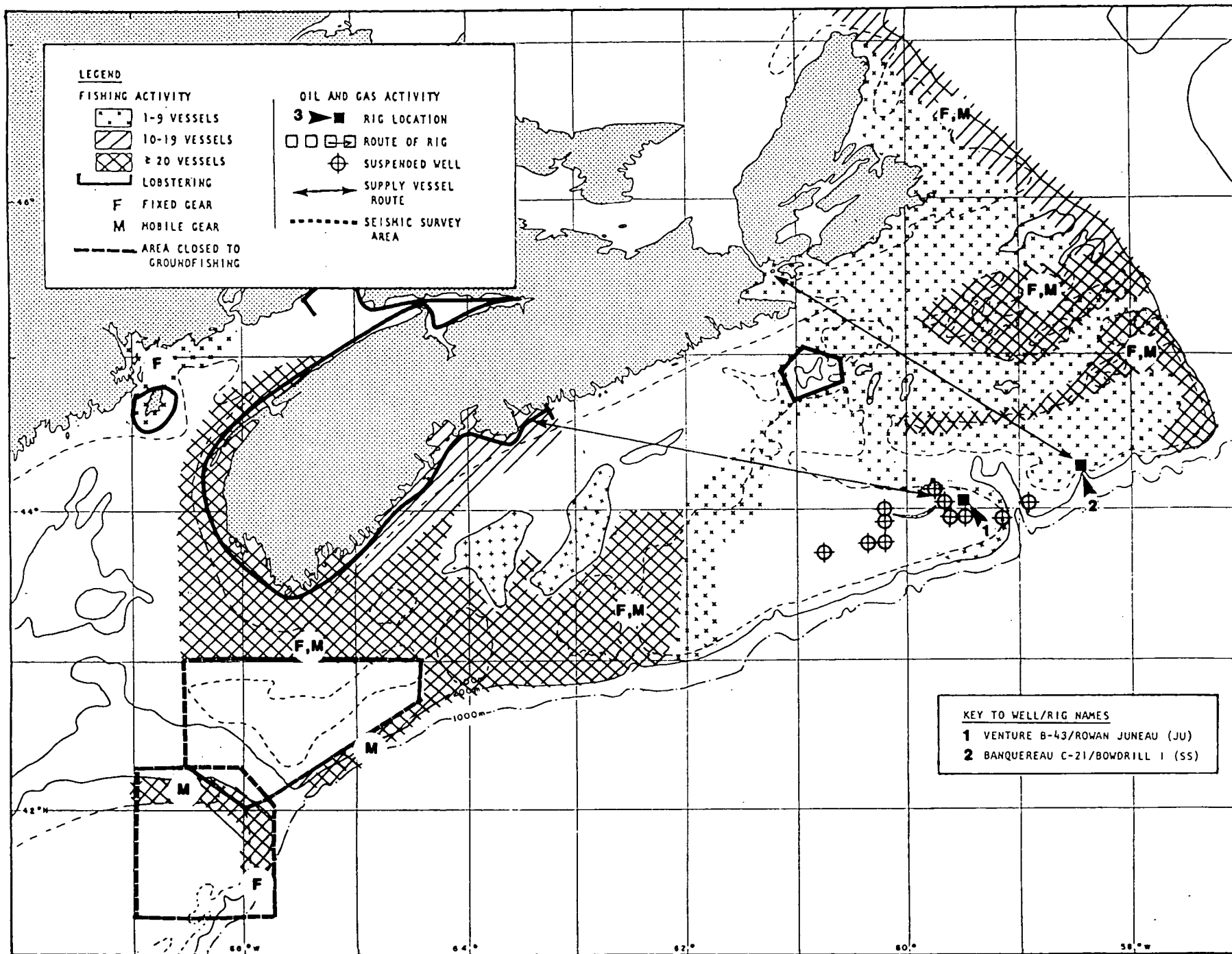
Scotian Shelf



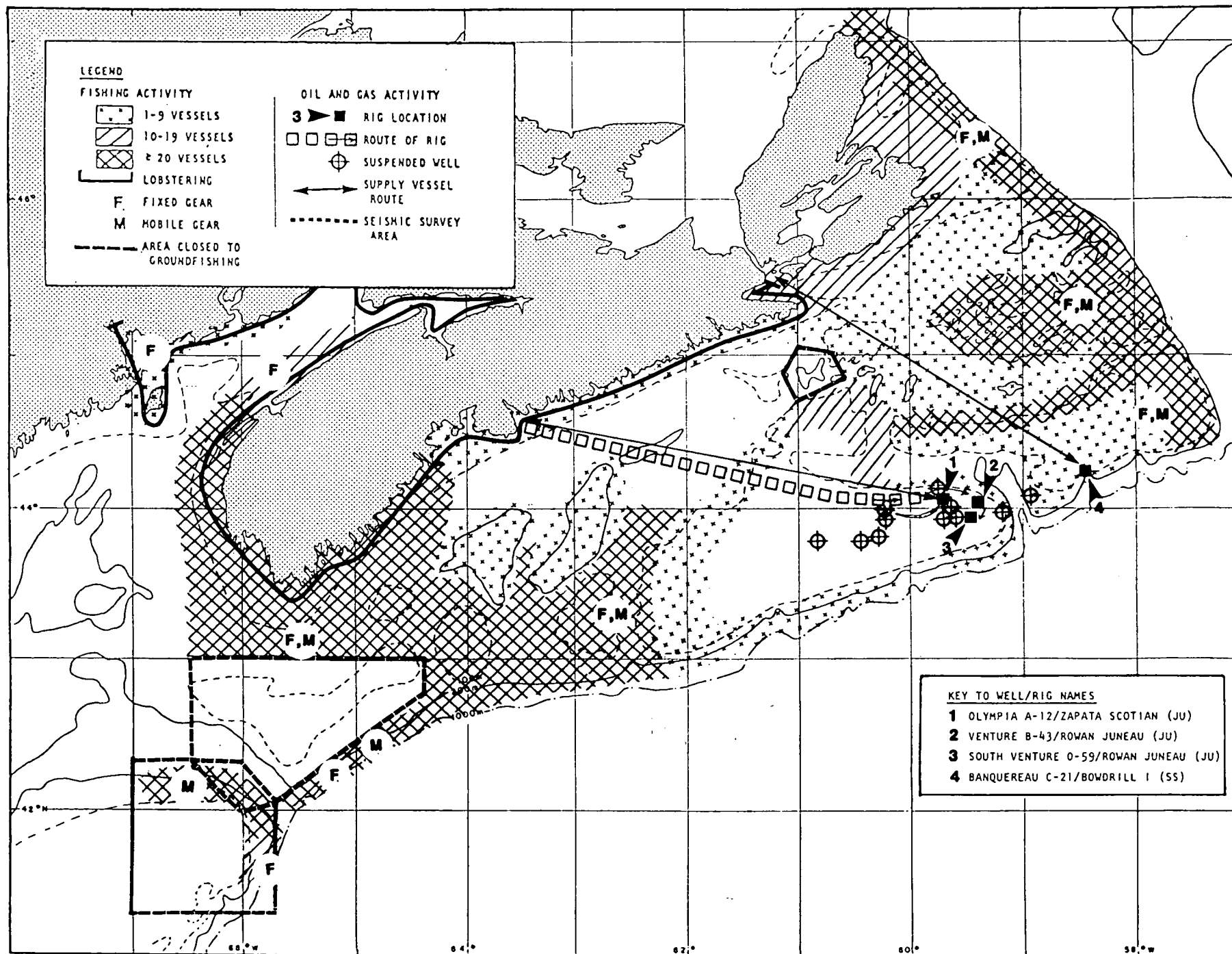
JANUARY 1982



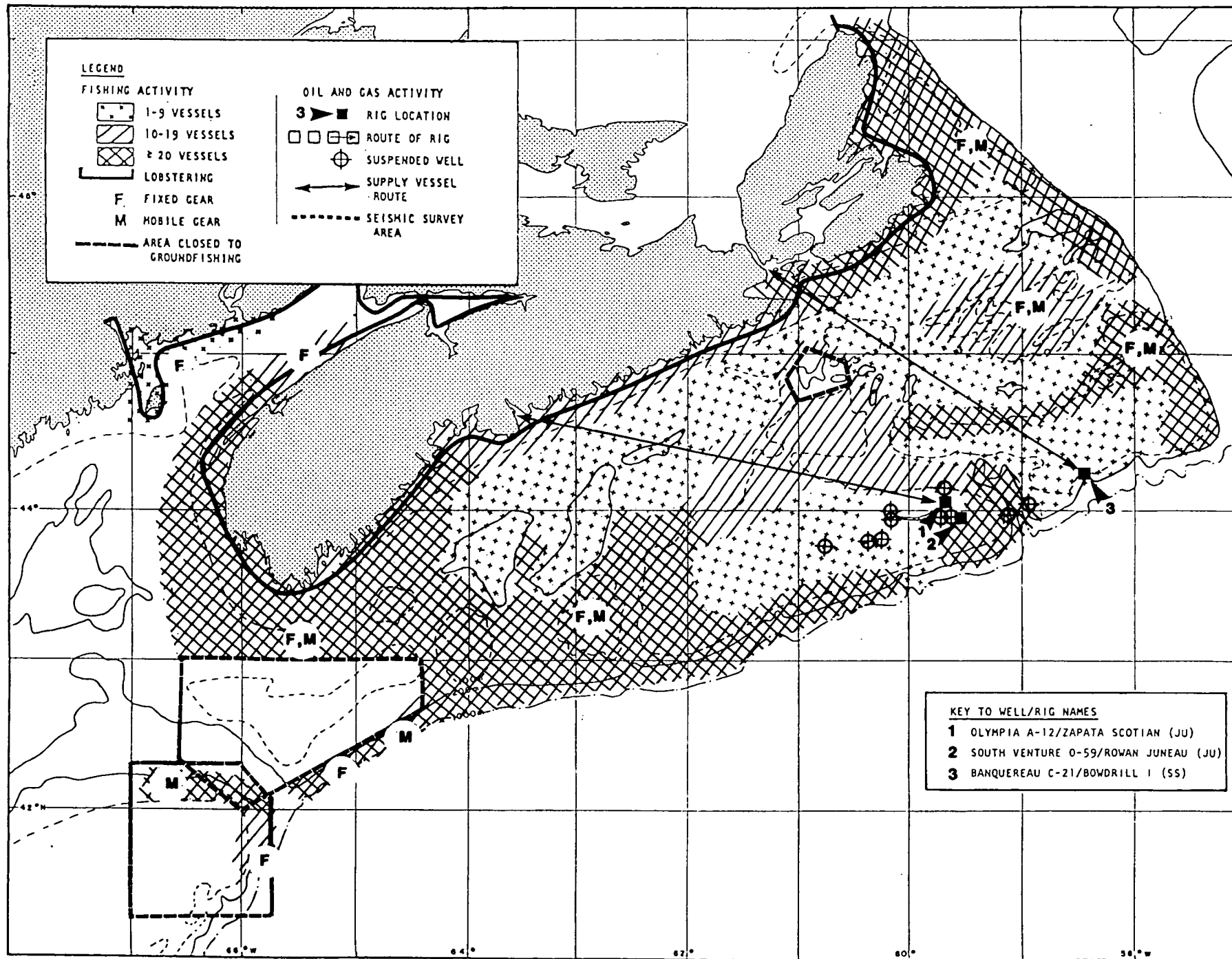
FEBRUARY 1982



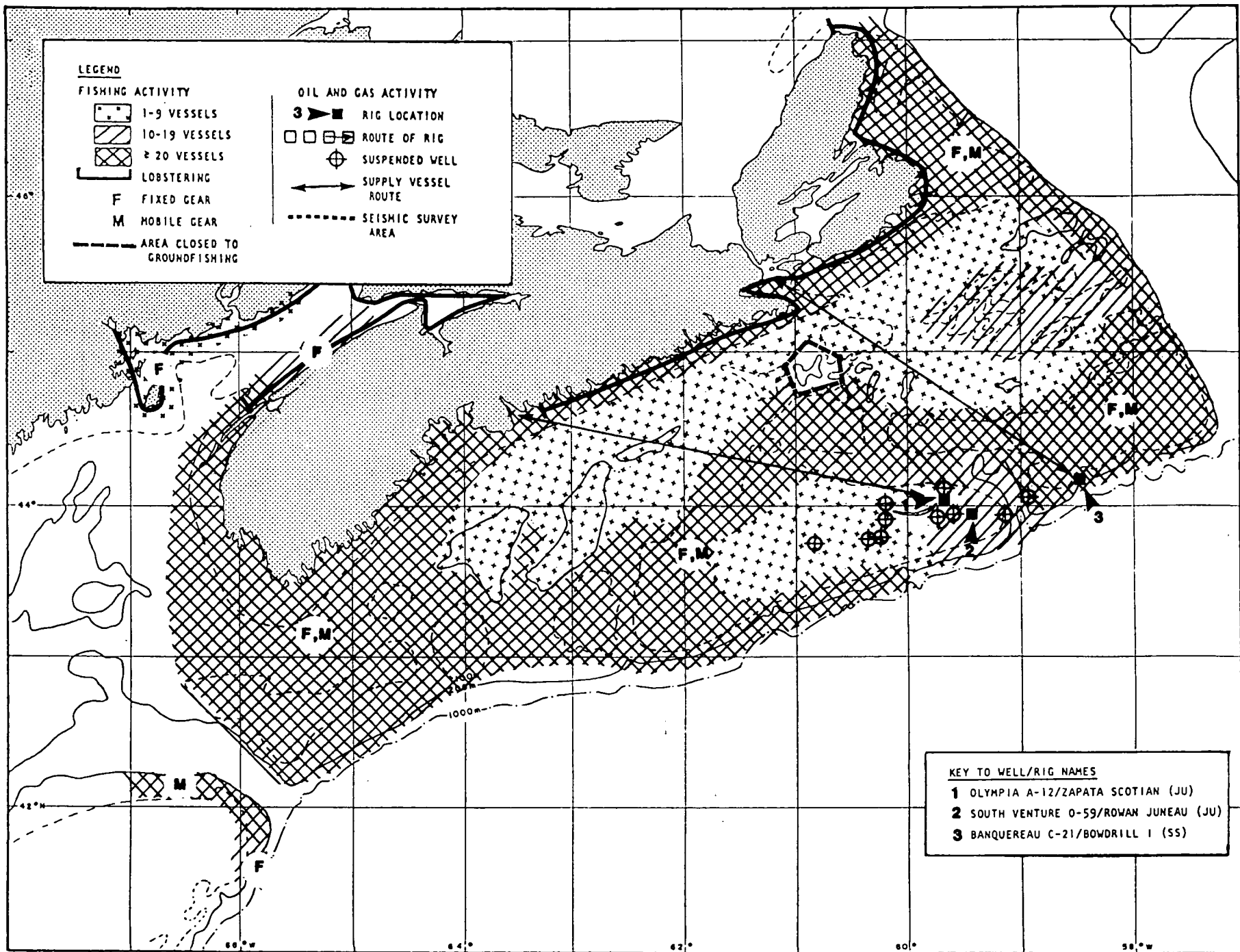
MARCH 1982



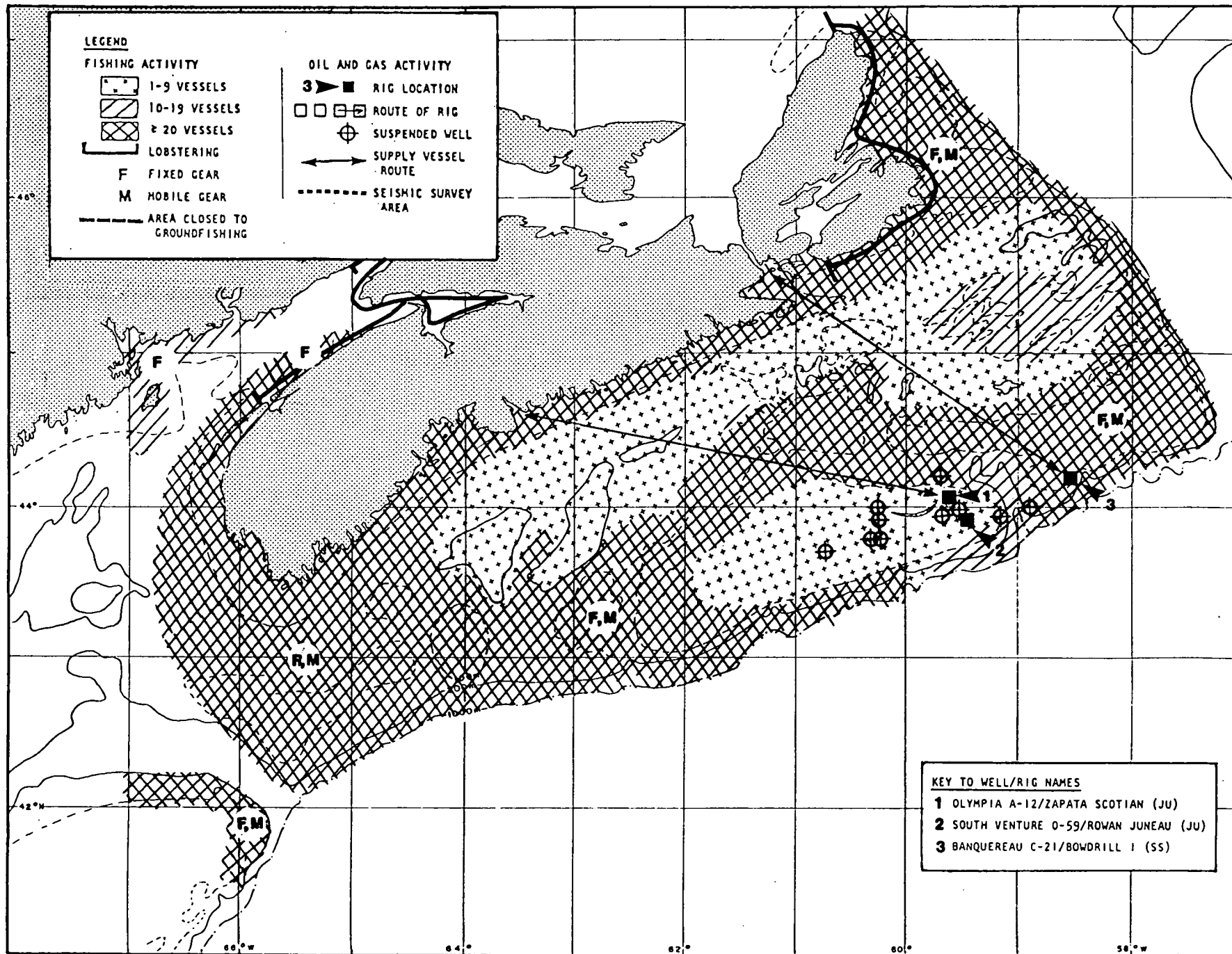
APRIL 1982



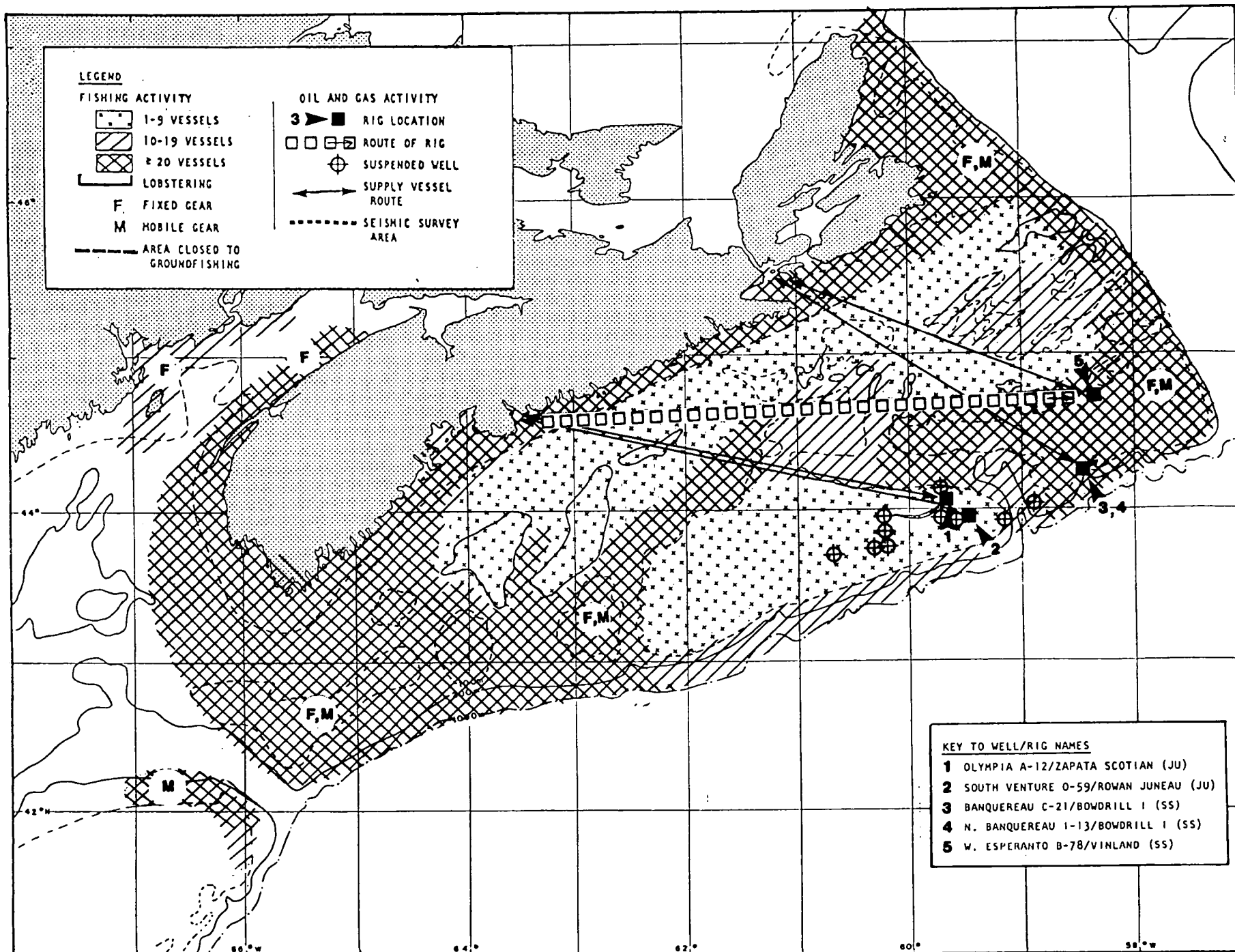
MAY 1982



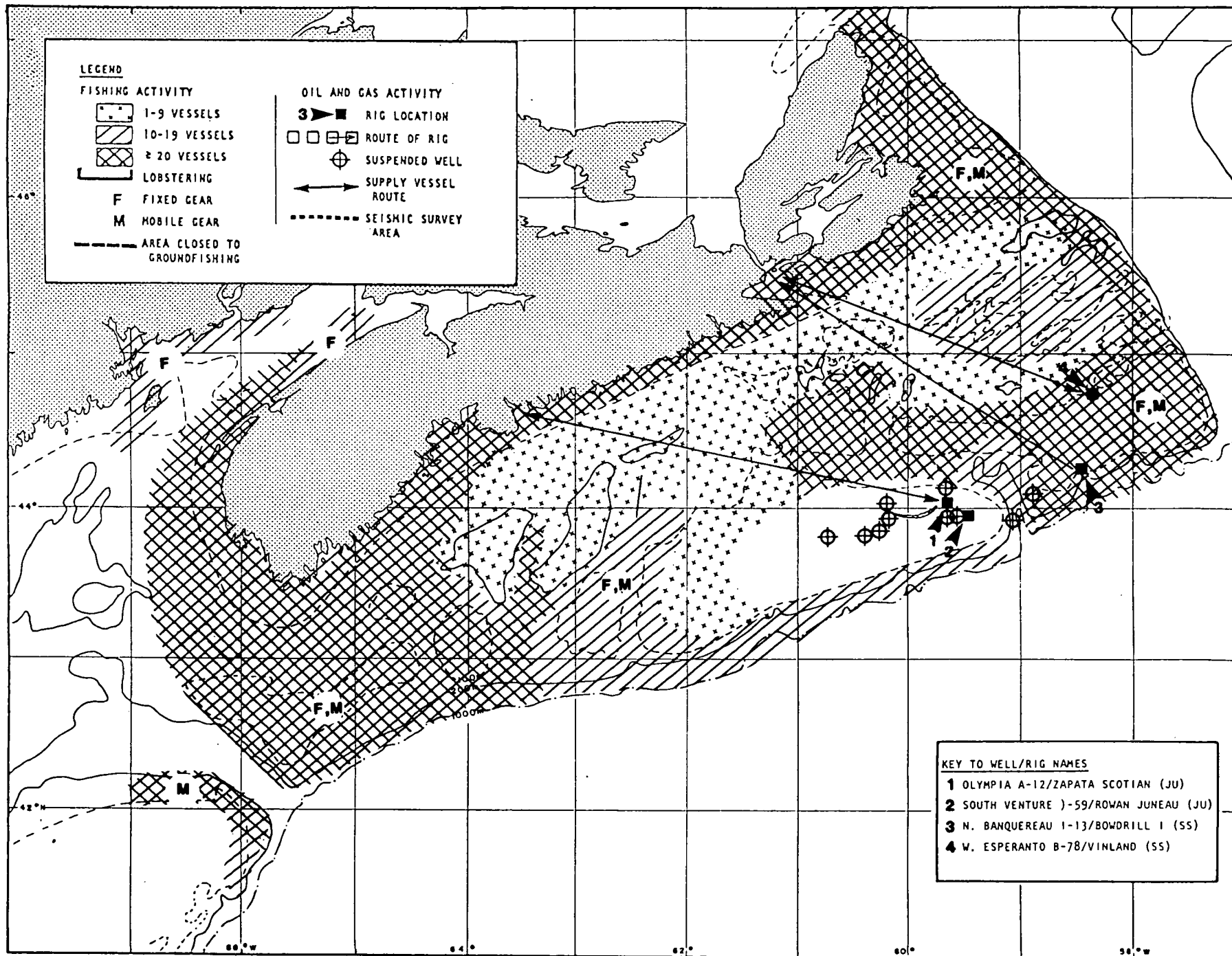
JUNE 1982



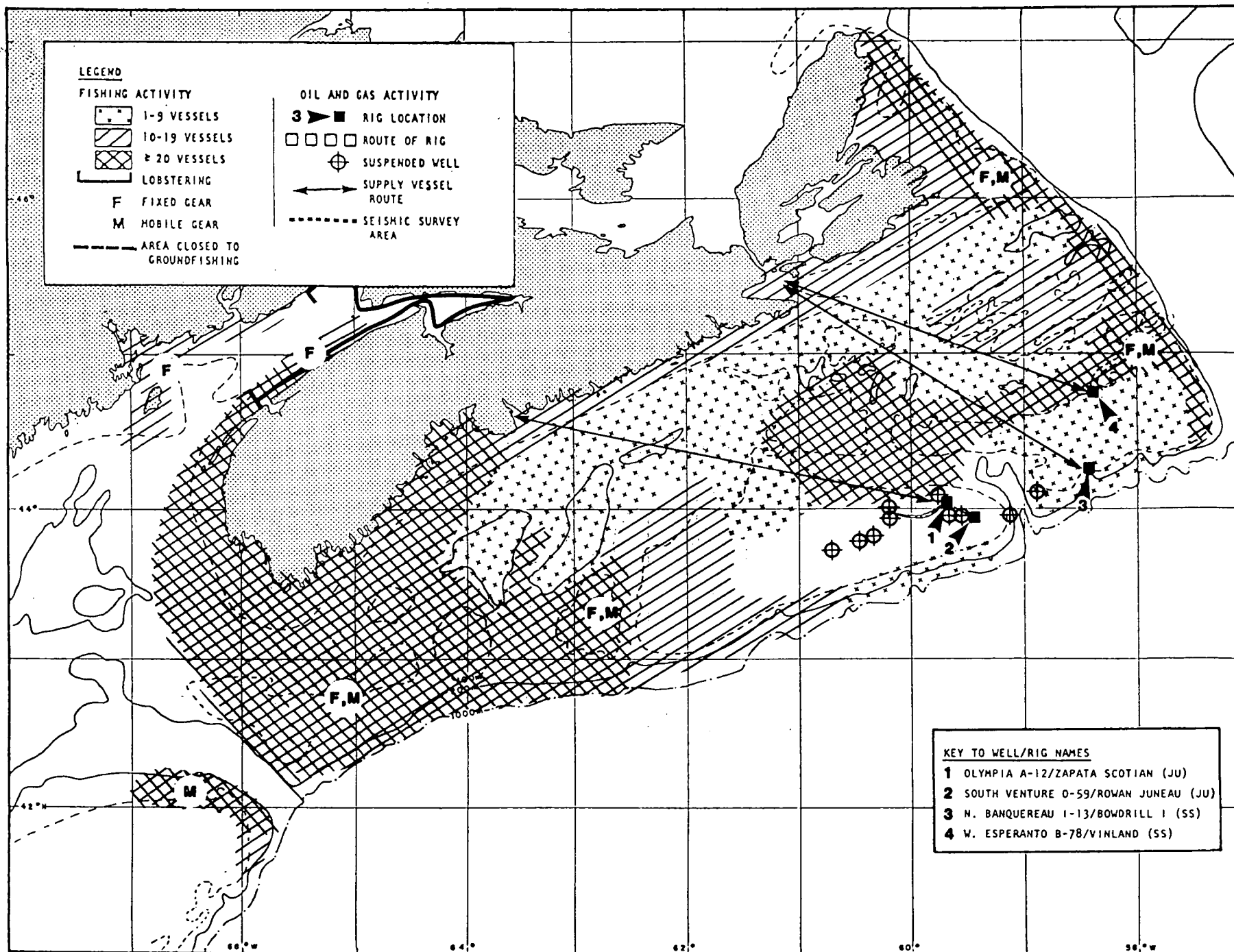
JULY 1982



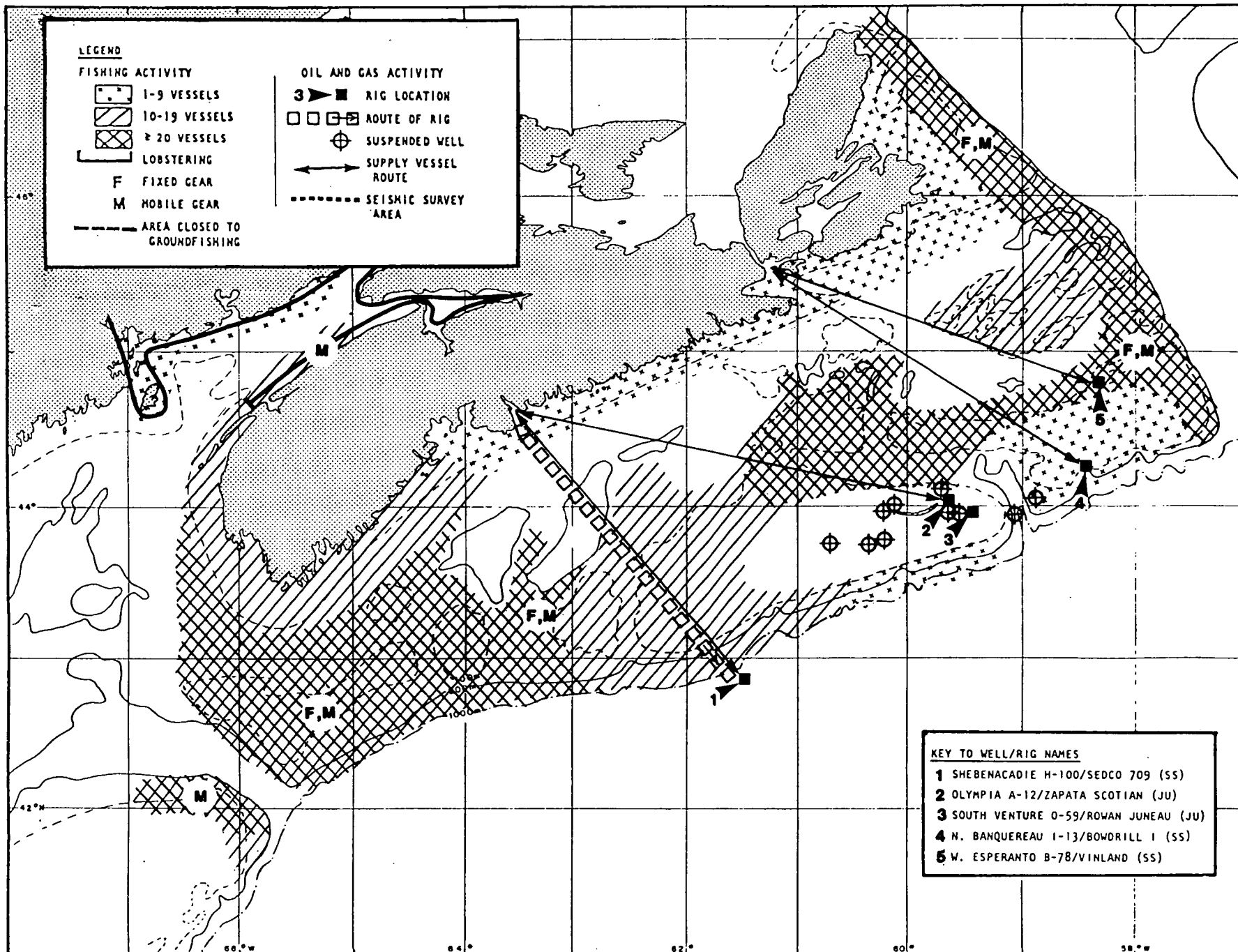
AUGUST 1982



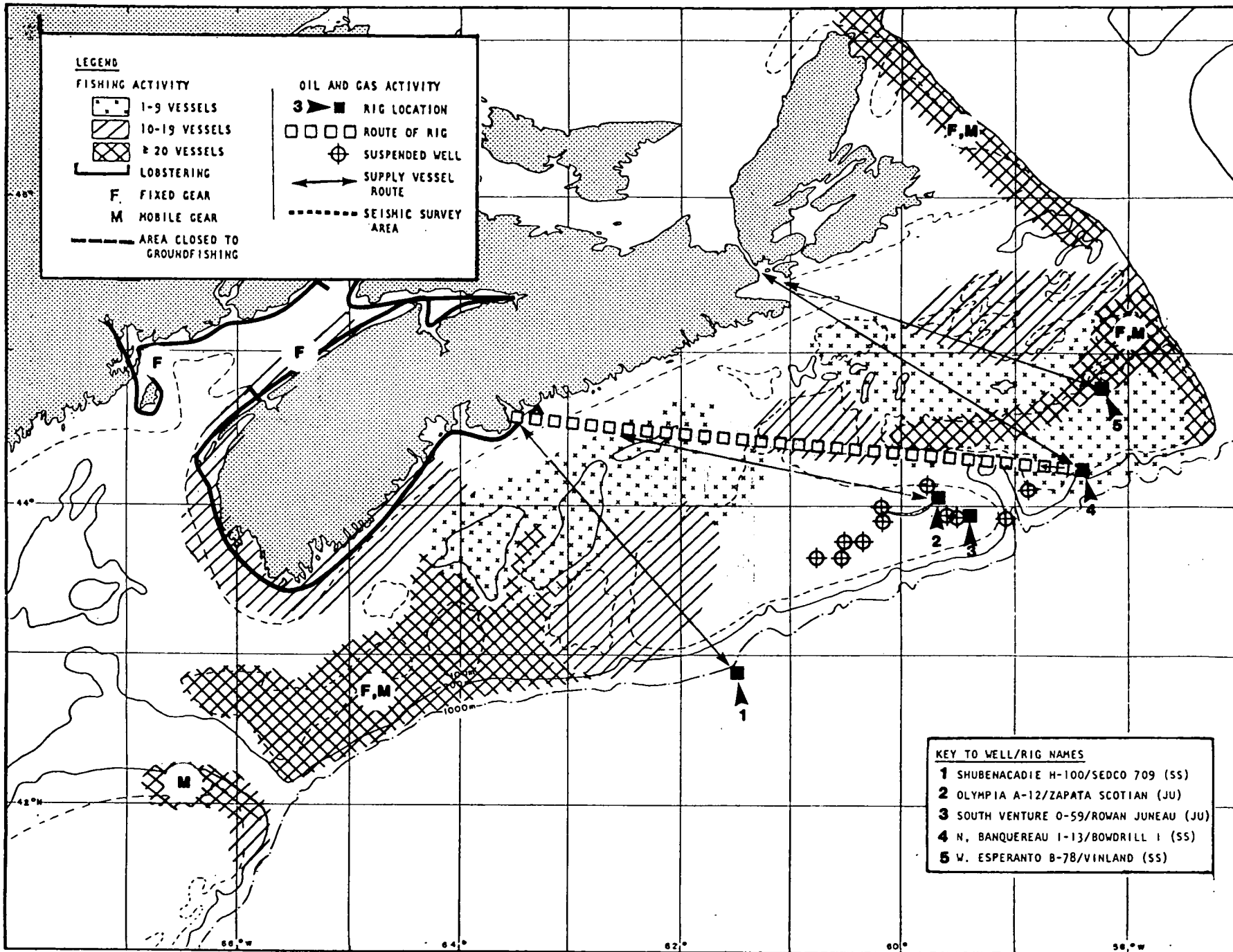
SEPTEMBER 1982



OCTOBER 1982

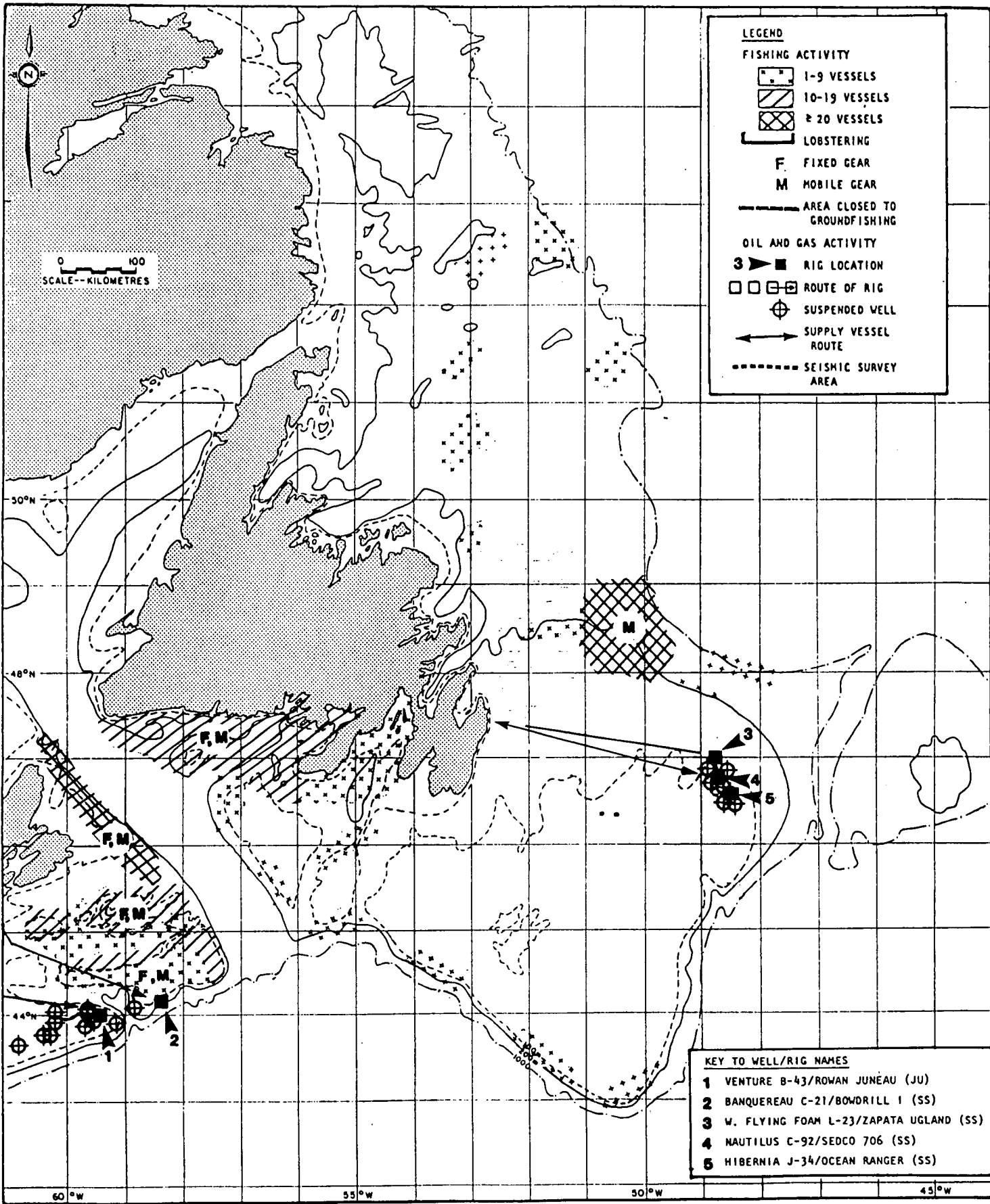


NOVEMBER 1982

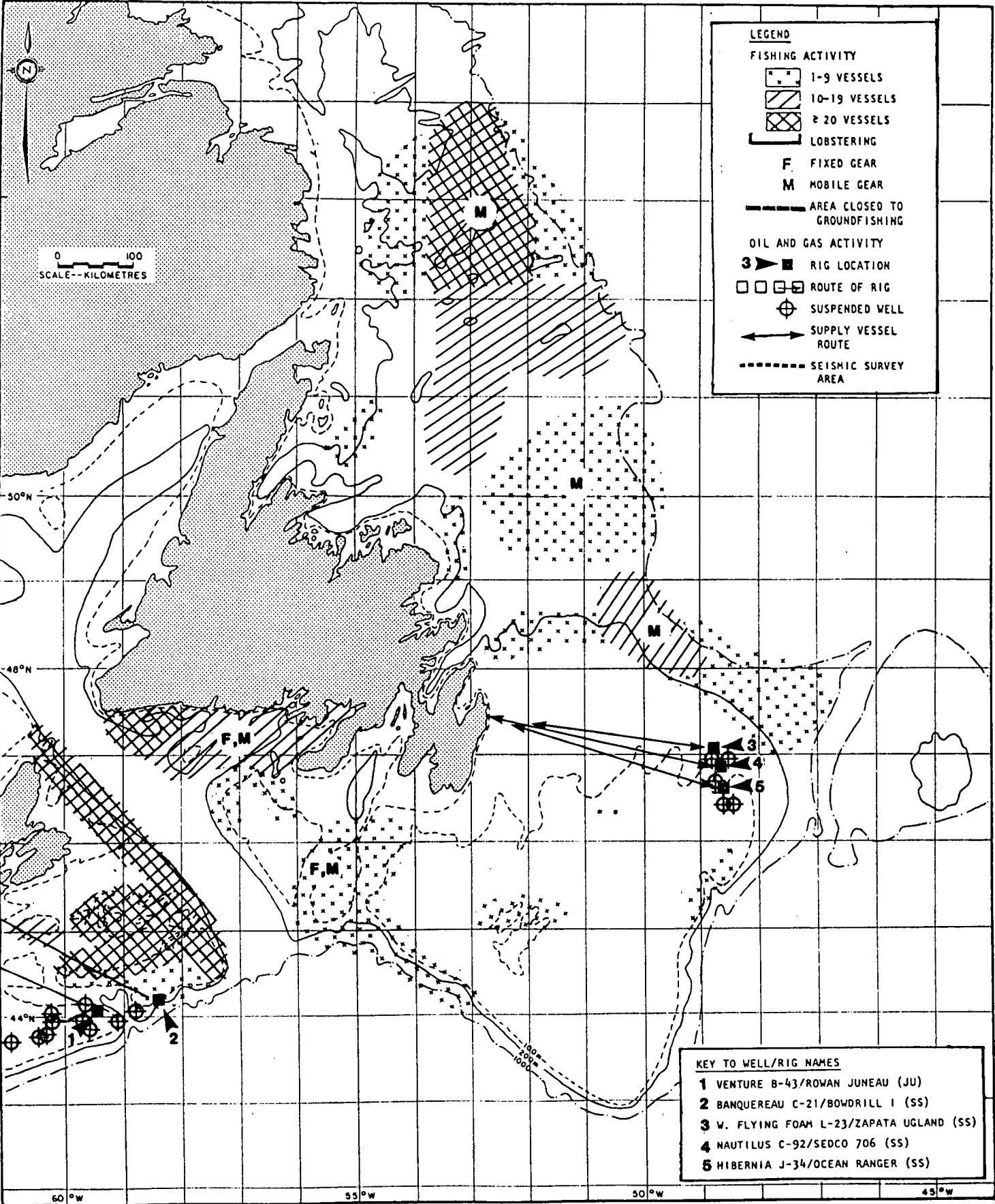


DECEMBER 1982

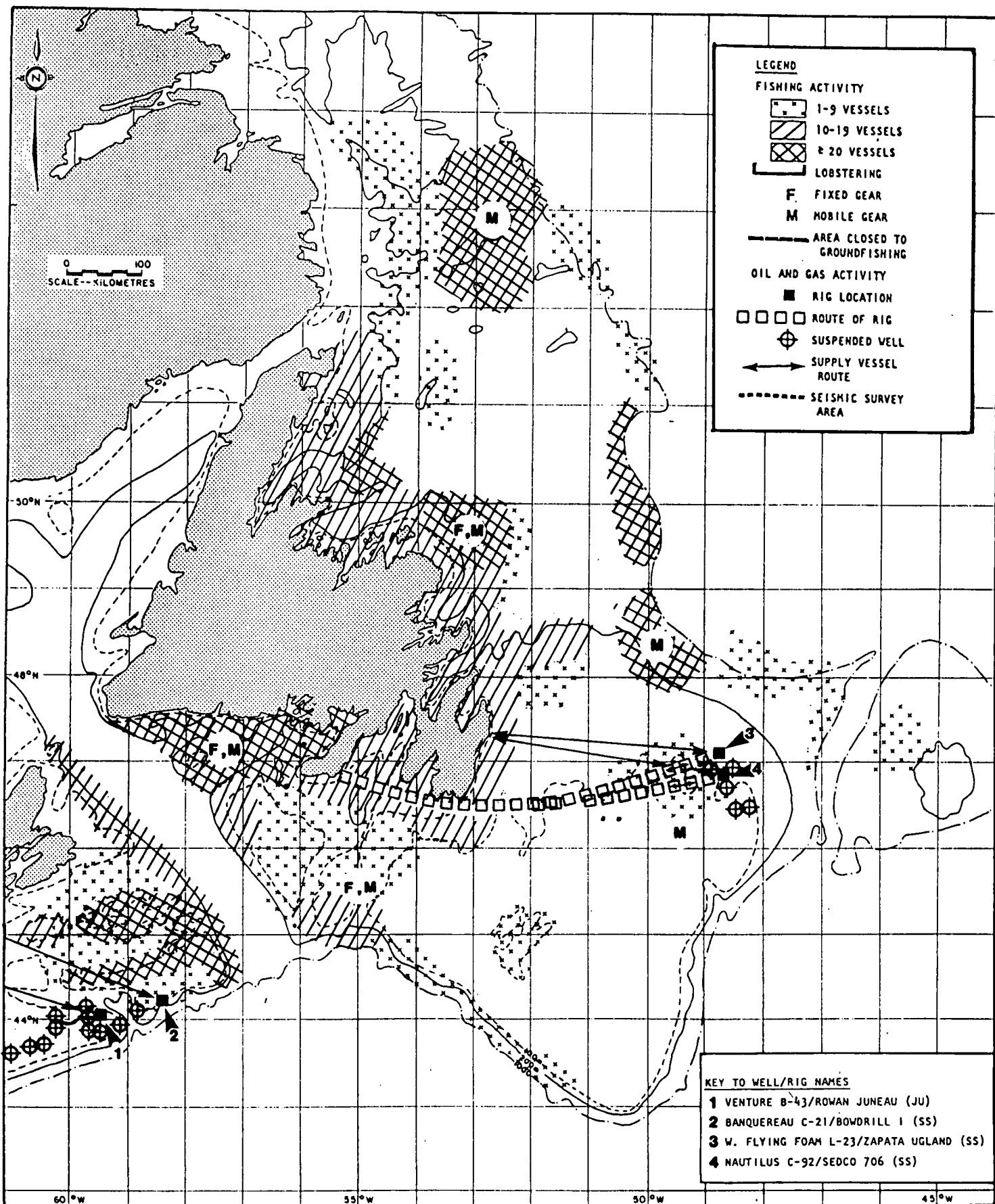
The Grand Banks



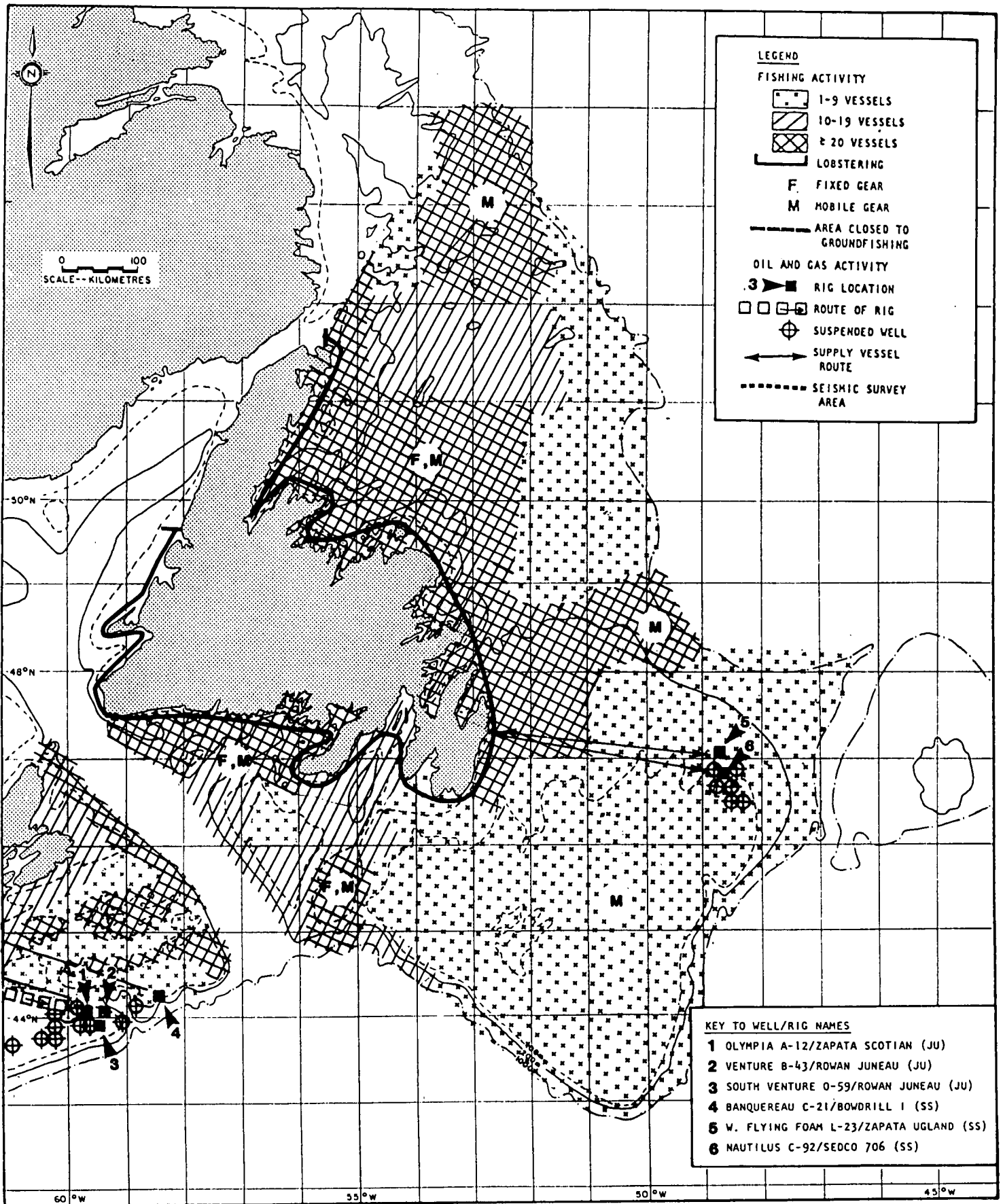
JANUARY 1982



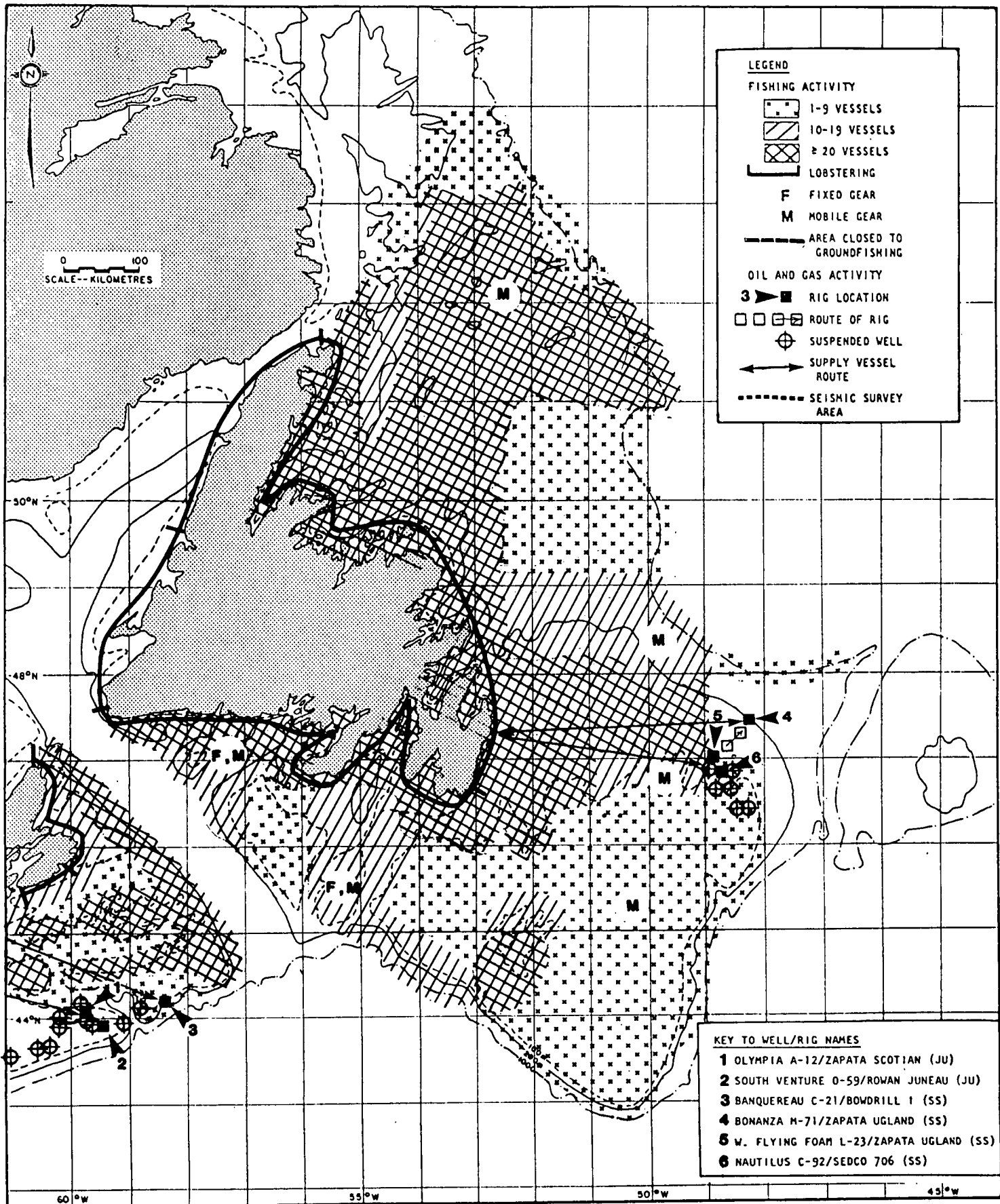
FEBRUARY 1982



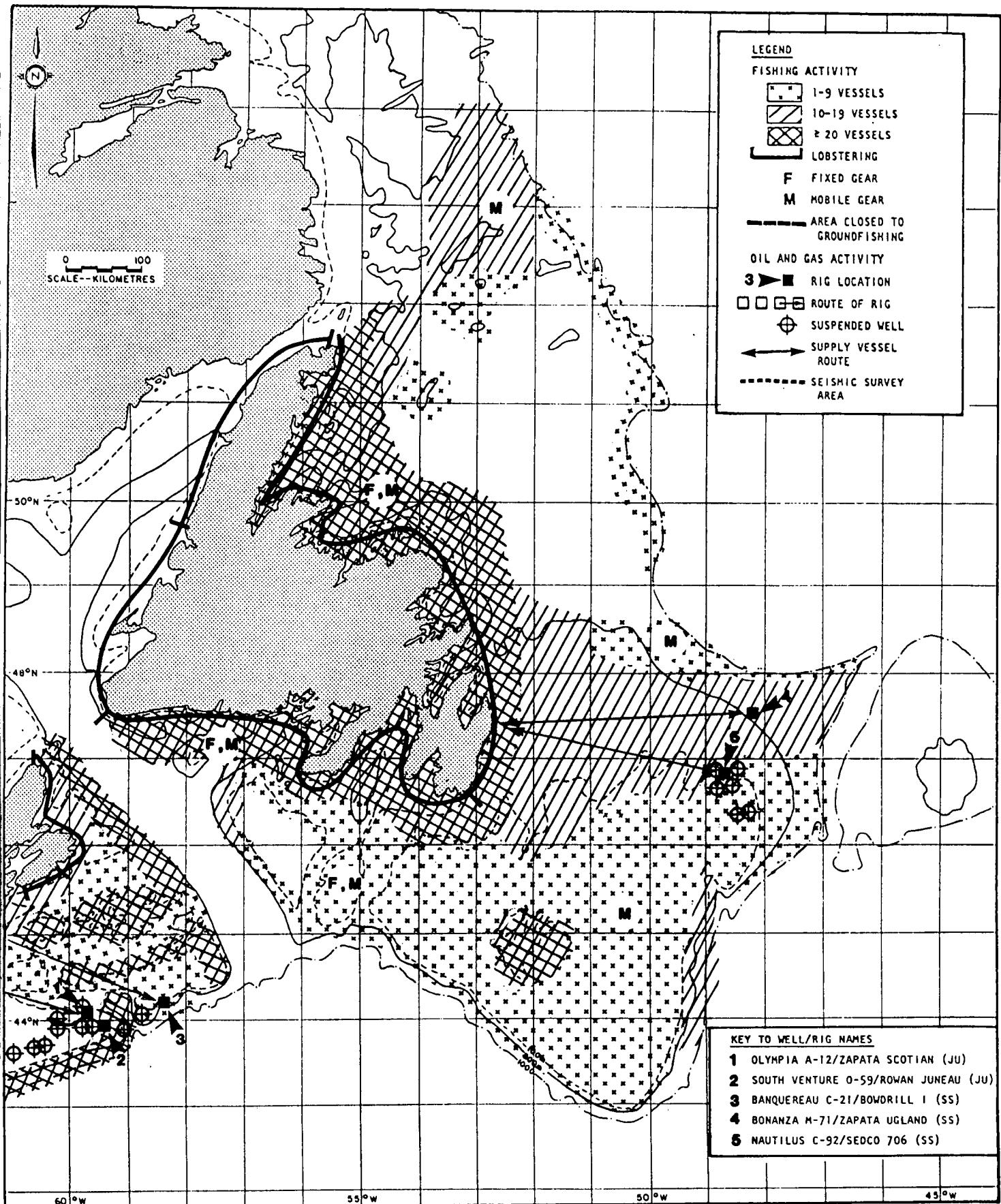
MARCH 1982



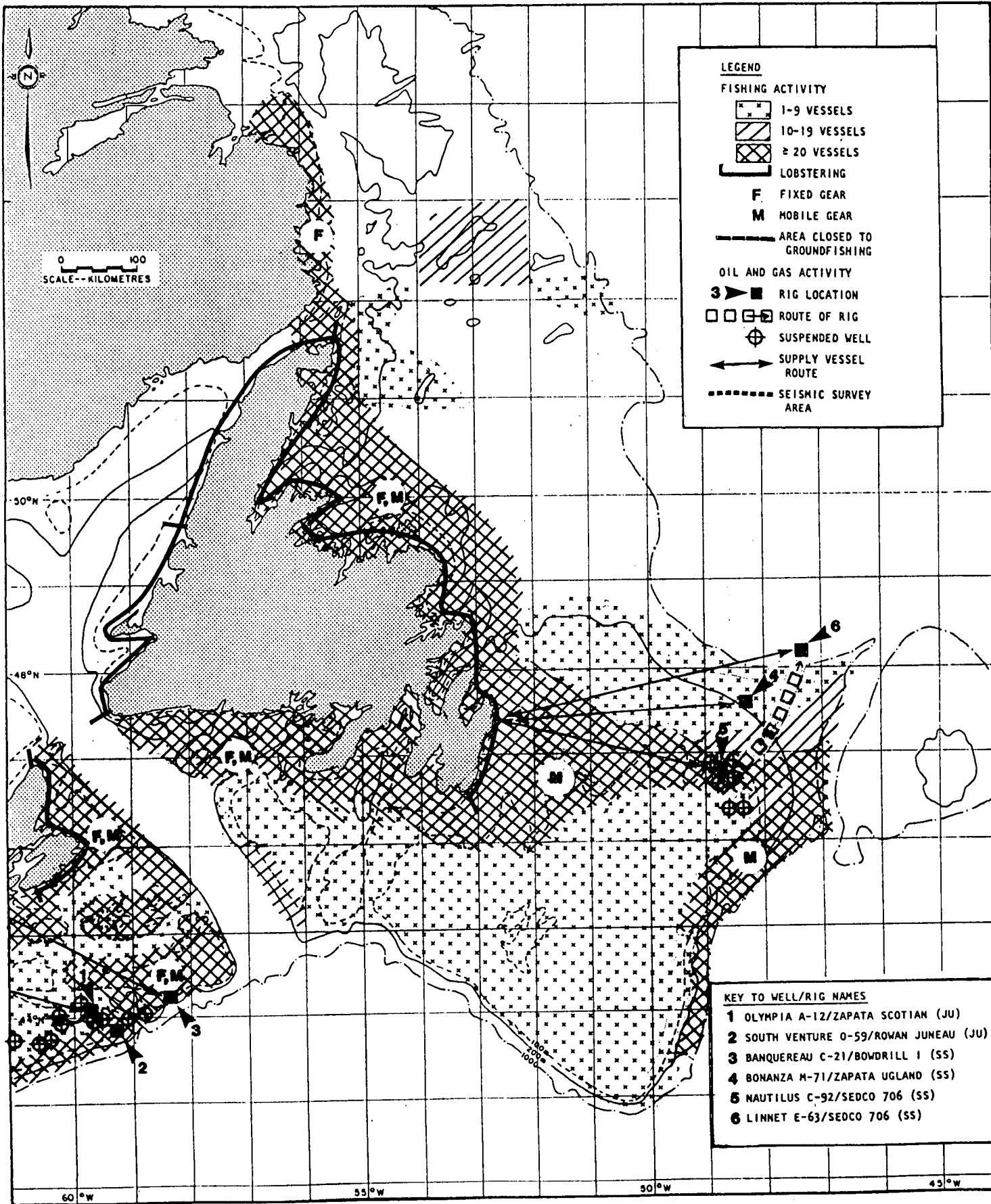
APRIL 1982



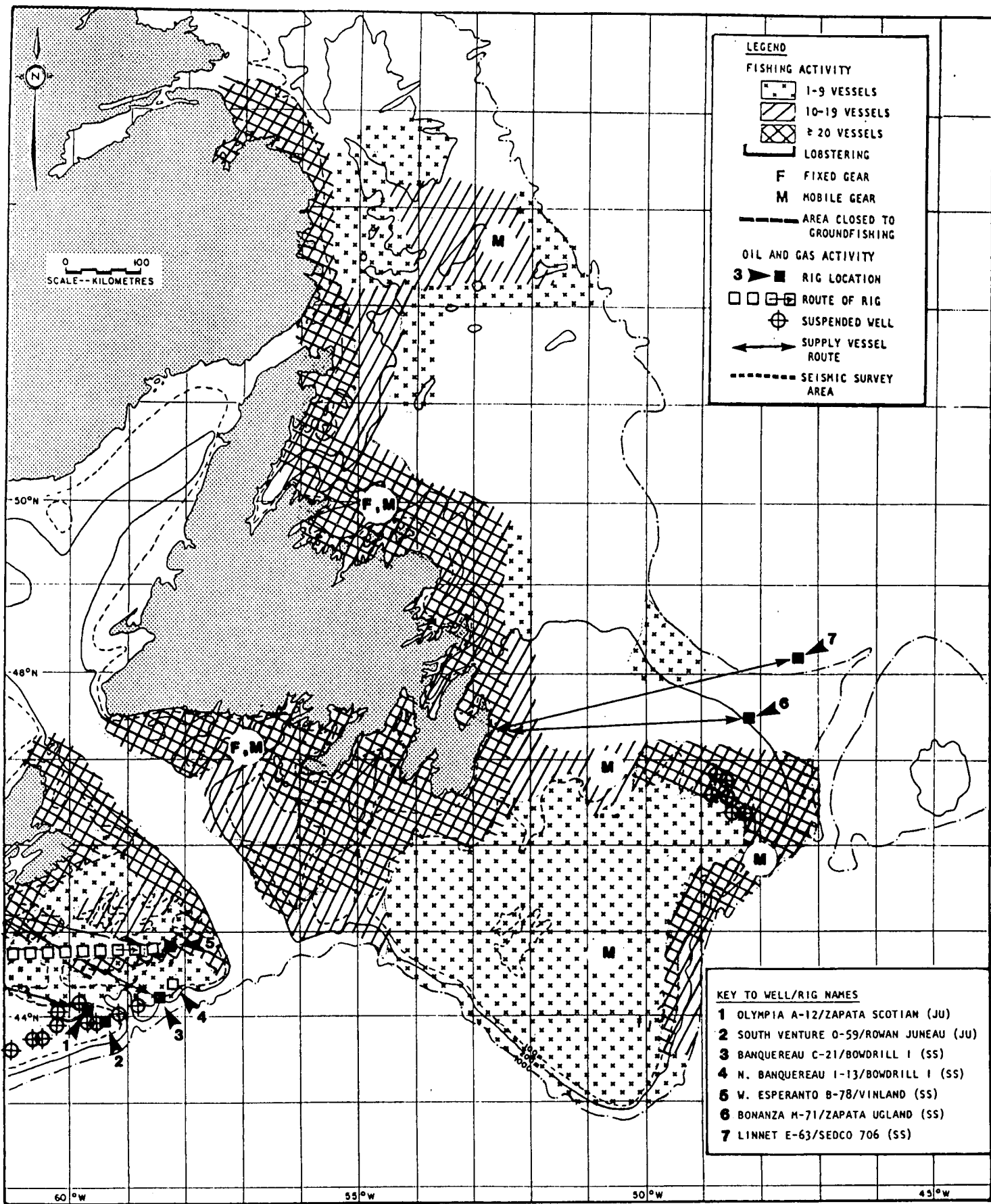
MAY, 1982



JUNE 1982



JULY 1982



LEGEND

FISHING ACTIVITY

- 1-9 VESSELS
- 10-19 VESSELS
- ≥ 20 VESSELS

LOBSTERING

- F** FIXED GEAR
- M** MOBILE GEAR

AREA CLOSED TO GROUND FISHING

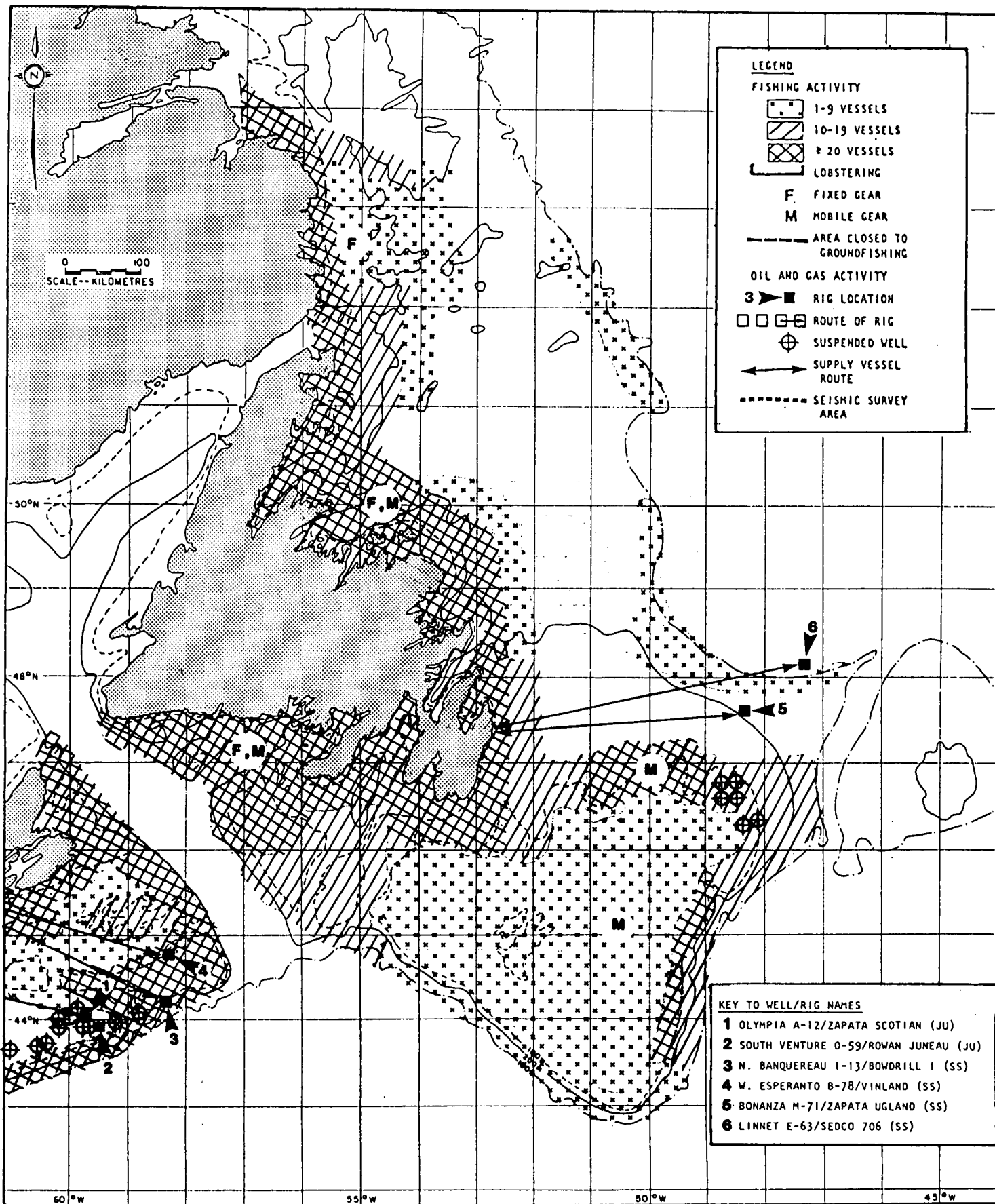
OIL AND GAS ACTIVITY

- 3** RIG LOCATION
- ROUTE OF RIG
- SUSPENDED WELL
- SUPPLY VESSEL ROUTE
- SEISMIC SURVEY AREA

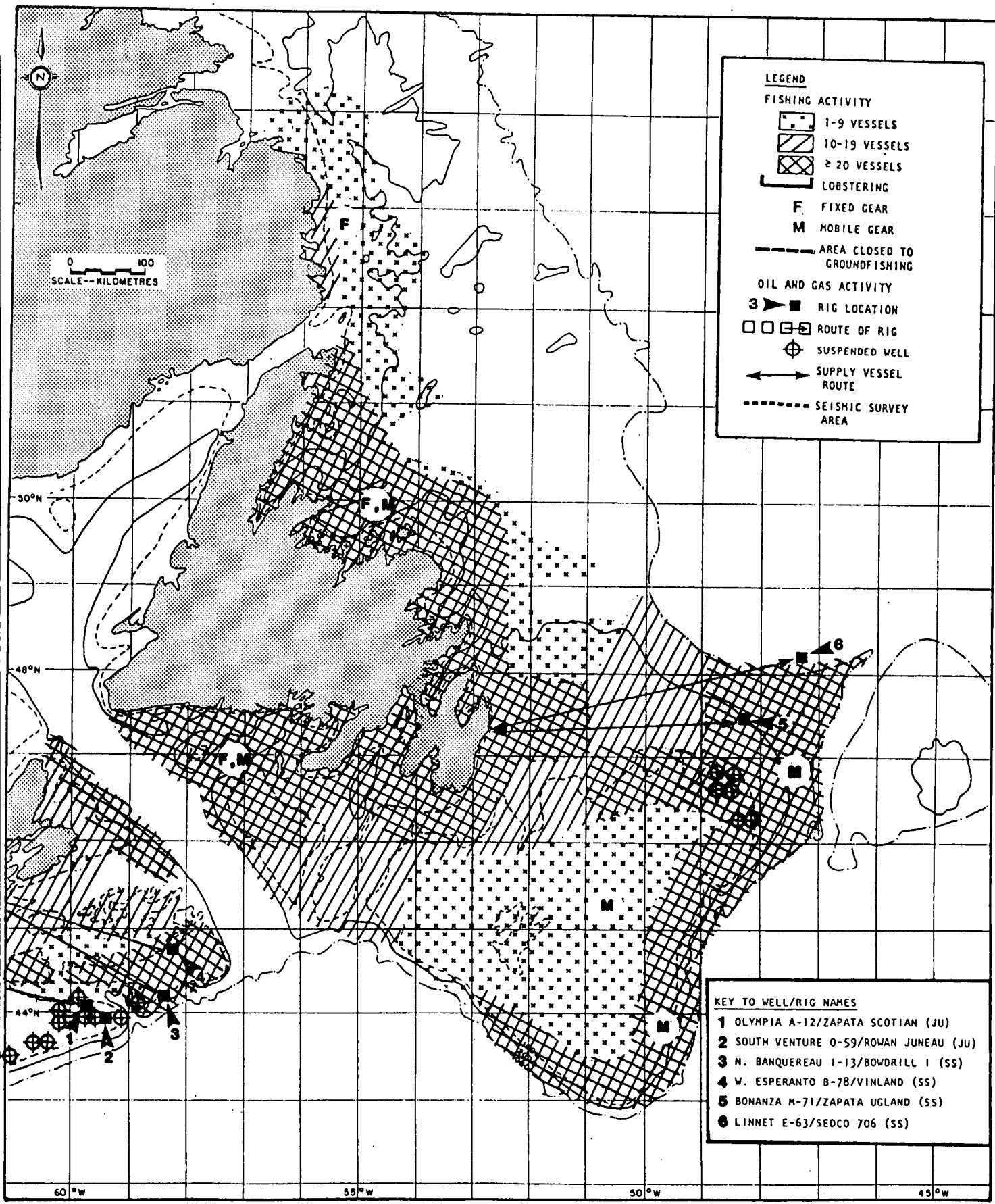
KEY TO WELL/RIG NAMES

- 1 OLYMPIA A-12/ZAPATA SCOTIAM (JU)
- 2 SOUTH VENTURE 0-59/ROWAN JUNEAU (JU)
- 3 BANQUEREAU C-21/BOWDRILL 1 (SS)
- 4 N. BANQUEREAU 1-13/BOWDRILL 1 (SS)
- 5 W. ESPERANTO B-78/VINLAND (SS)
- 6 BONANZA M-71/ZAPATA UGLAND (SS)
- 7 LINNET E-63/SEDCO 706 (SS)

AUGUST 1982



SEPTEMBER 1982



LEGEND

FISHING ACTIVITY

- 1-9 VESSELS
- 10-19 VESSELS
- ≥ 20 VESSELS
- LOBSTERING
- F** FIXED GEAR
- M** MOBILE GEAR
- AREA CLOSED TO GROUND FISHING

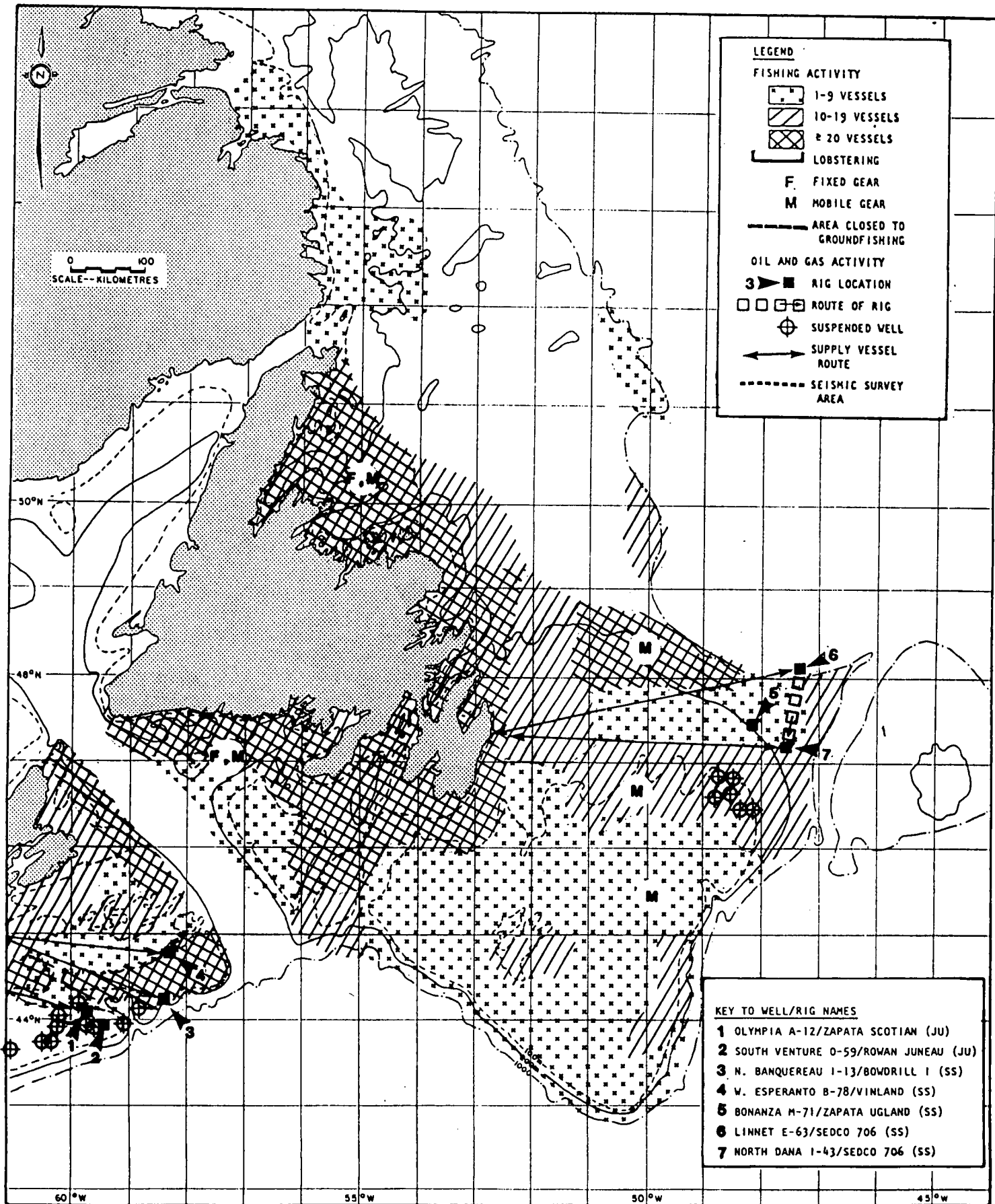
OIL AND GAS ACTIVITY

- 3** RIG LOCATION
- ROUTE OF RIG
- SUSPENDED WELL
- SUPPLY VESSEL ROUTE
- SEISMIC SURVEY AREA

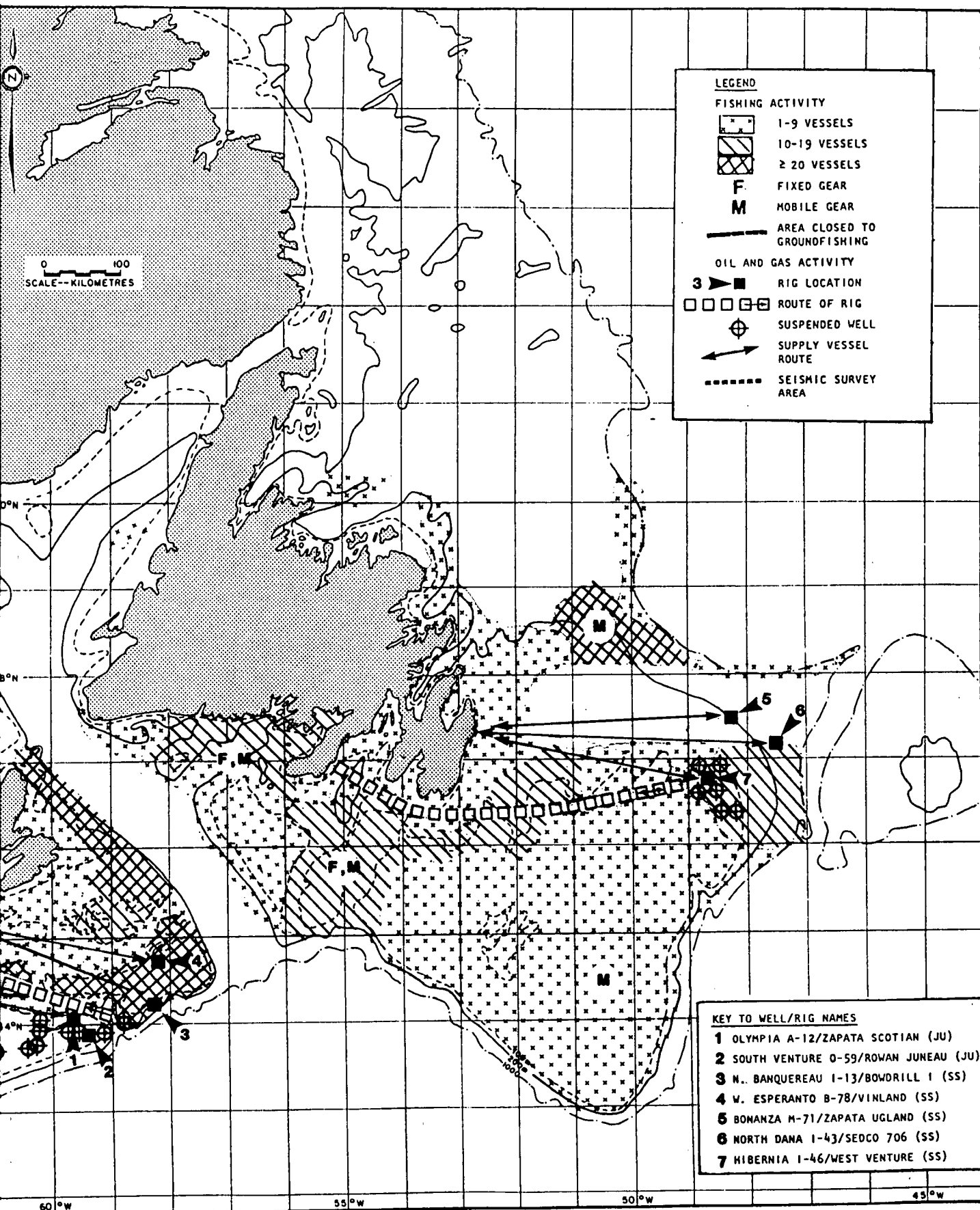
KEY TO WELL/RIG NAMES

- 1** OLYMPIA A-12/ZAPATA SCOTIAN (JU)
- 2** SOUTH VENTURE 0-59/ROWAN JUNEAU (JU)
- 3** N. BANQUEREAU 1-13/BOWDRILL 1 (SS)
- 4** W. ESPERANTO B-78/VINLAND (SS)
- 5** BONANZA M-71/ZAPATA UGLAND (SS)
- 6** LINNET E-63/SEDCO 706 (SS)

OCTOBER 1982



NOVEMBER 1982



LEGEND

FISHING ACTIVITY

- 1-9 VESSELS
- 10-19 VESSELS
- ≥ 20 VESSELS
- F** FIXED GEAR
- M** MOBILE GEAR
- AREA CLOSED TO GROUND FISHING

OIL AND GAS ACTIVITY

- 3** RIG LOCATION
- ROUTE OF RIG
- SUSPENDED WELL
- SUPPLY VESSEL ROUTE
- SEISMIC SURVEY AREA

0 100
SCALE--KILOMETRES

KEY TO WELL/RIG NAMES

- 1** OLYMPIA A-12/ZAPATA SCOTIAN (JU)
- 2** SOUTH VENTURE 0-59/ROWAN JUNEAU (JU)
- 3** N. BANQUEREAU 1-13/BOWDRILL 1 (SS)
- 4** W. ESPERANTO B-78/VINLAND (SS)
- 5** BONANZA M-71/ZAPATA UGLAND (SS)
- 6** NORTH DANA 1-43/SEDCO 706 (SS)
- 7** HIBERNIA 1-46/WEST VENTURE (SS)

APPENDIX 2

List of Contact People in the Fishing Industry,
in DFO, and in COGLA

DFO contact personnel for inshore data:

Scotia-Fundy Region: Senior Advisor, Groundfish
Resource Allocation Division
Fisheries Operations Branch
P.O. Box 550
Halifax, Nova Scotia
B3J 1V8
Telephone: (902) 426-5952

Newfoundland Region: Senior Advisor, Groundfish
Resource Allocation Division
Fisheries Operations Branch
P.O. Box 5667
St. John's, Newfoundland
A1C 5X1
Telephone: (709) 772-4594

Gulf Region: Senior Advisor, Groundfish
Resource Allocation Division
Fisheries Operations Branch
P.O. Box 5030
Moncton, New Brunswick
E1L 9B6
Telephone: (506) 758-9044

Fishing Industry contact personnel:

Lester G. Riche
Vice-President, Development
Fishery Products International, Ltd.
70 O'Leary Avenue
S. John's, Newfoundland
A1C 5L1
Telephone: (709) 754-0430

David R. Bollivar
Manager, Fleet Services and Strategy
National Sea Products, Ltd.
P.O. Box 2130
Halifax, Nova Scotia
B3J 3B7
Telephone: (902) 422-9381

DFO contact personnel in charge of statistical information:

Scotia-Fundy Region: Statistical Officer
Statistics and Systems Branch
1469 Hollis Street
Halifax, Nova Scotia
B3J 1V8
Telephone: (902) 426-6240

Newfoundland Region: Statistical Officer
Statistics and Systems Branch
P.O. Box 5667
St. John's, Newfoundland
A1C 5X1
Telephone: (709) 772-4480

Gulf Region: Data Requests are handled by the
Scotia-Fundy Regional office until
the Gulf Region becomes fully
operational.

DFO contact personnel in charge of research:

Scotia-Fundy Region: The Director of Research
Fisheries Research Branch
Department of Fisheries and Oceans
P.O. Box 550
Halifax, Nova Scotia
B3J 2S7
Telephone: (902) 426-3130

Newfoundland Region: The Director of Research
Fisheries Research Branch
Department of Fisheries and Oceans
P.O. Box 5667
St. John's, Newfoundland
A1C 5X1
Telephone: (709) 772-2027

COGLA contact personnel for oil and gas industry data:

Director General, Nova Scotia
COGLA
2000 Barrington Street, Suite 102
Halifax, Nova Scotia
B3J 3K1
Telephone: (902) 426-8570

Director General, Newfoundland
COGLA
140 Water Street
St. John's, Newfoundland
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APPENDIX 3

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