

Supplementary Report

Marine Fisheries in the Strait of Belle Isle

Previous (2001) Review of Fishing Activity in the Strait of Belle Isle

(Provided as additional background information)

January 8, 2001

JWEL PROJECT NO. 1208

**MARINE FISHERIES STUDY
IN THE STRAIT OF BELLE ISLE
(LHP 98-13)**

PREPARED FOR

**NEWFOUNDLAND AND LABRADOR HYDRO
LABRADOR HYDRO PROJECT
500 COLUMBUS DRIVE
P. O. BOX 12400
ST. JOHN'S, NEWFOUNDLAND
A1A 2X8**

PREPARED BY

**JACQUES WHITFORD ENVIRONMENT LIMITED
607 TORBAY ROAD
ST. JOHN'S, NEWFOUNDLAND
A1A 4Y6**

**Tel: (709) 576-1458
Fax: (709) 576-2126**

January 8, 2001

EXECUTIVE SUMMARY

The purpose of the marine fisheries study is to describe fishing activity in the area of the submarine cable crossing of the Strait of Belle Isle being proposed in relation to the Churchill River Power Project (CRPP). The construction and operations phases of the project may affect fishing activity in the area, and the results of this study facilitate the identification of potential interactions between the development and fishing activity. This information may be used in project planning, and for future environmental assessment and follow-up monitoring, if required.

The study area encompasses Unit Area 4Ra and the ports in the adjacent Department of Fisheries and Oceans (DFO) Statistical Sections on both sides of the Strait of Belle Isle. The study involved:

- a review of existing information regarding fishing in the Strait of Belle Isle and potential interactions between the project and these fisheries;
- an on-board survey to collect data on scallop resources and harvests in the area; and
- a series of meetings and interviews with area fishers to collect additional information regarding the nature and distribution of fishing activity in the area, as well as identify fishers' concerns regarding the project.

Recent years have seen noticeable changes to the Strait of Belle Isle fishery. While cod previously accounted for the majority of fish landings in the area by quantity and value, lobster and scallop are presently the most important species harvested. There has also been considerable diversification in the fishery, with various new or previously underused species such as sea urchins, crab and shrimp, now being fished more intensively by area fishers. Pre-moratorium years saw a measurable decrease in area fish landings, and since the closure of the groundfishery in the early 1990s, landings have shown a slow recovery as a result of this diversification. The overall landed value of the area's catch has remained relatively stable over the past decade.

Fishing in the area generally takes place during open water between May and November, with the majority of the catch in the study area being taken by small vessels fishing relatively close to their home communities. Specific information regarding the spatial and temporal distribution of the various fisheries in the study area is presented throughout the report.

Total scallop size-length frequency, clucker frequencies, catch per unit of effort (CPUE) values (measured in kilograms/tow), catch rate ranges, scallop density distribution information and by-catch frequencies are provided from the Observer Program data.

Specific issues identified during fisher interviews in relation to project construction include: interference with scallop and lobster harvesting, as well as other existing and potential fisheries; safety concerns; the temporary loss of income due to decreased accessibility of fishing grounds; the effects of siltation/sediment on marine resources, particularly scallops; and the potential effect of blasting on commercial fish species and larvae.

Specific issues identified during fisher interviews in relation to the operations phase of the project include: the potential long-term effect of siltation on fish and fish habitat; damage to fishing gear due to rock deposits on the seabed as a result of blasting; potential damage to fishing gear if it becomes entangled in the cable, or *vice versa*; changes to established fishing patterns as a result of the project; and the potential effects of electromagnetic fields on fish. Each of the alternative routes are evaluated based upon these potential issues.

The report concludes with an evaluation of the various study components. The information contained within this report will provide a sound basis for decision-making throughout the initial project planning phase.

TABLE OF CONTENTS

Page No.

EXECUTIVE SUMMARY	i
1 INTRODUCTION	1
1.1 Churchill River Power Project.....	1
1.2 Marine Fisheries Study.....	1
2 STUDY TEAM.....	2
2.1 Jacques Whitford Environment Limited.....	2
2.2 Canning and Pitt Associates Inc.	4
2.3 Seawatch Inc.	6
3 PURPOSE AND OBJECTIVES.....	8
4 STUDY AREA	9
4.1 Data Boundaries	9
4.2 Study Boundaries.....	13
5 METHODS.....	15
5.1 Literature Review	15
5.2 Landing Statistics Analysis.....	15
5.3 On-Board Survey.....	16
5.4 Fishing Industry Consultation.....	16
5.5 Data Management.....	17
6 RESULTS.....	18
6.1 Current Fisheries.....	18
6.1.1 Unit Area 4Ra	18
6.1.2 Statistical Sections 49 and 50	21
6.2 Key Fisheries	29
6.2.1 Lobster	29
6.2.2 Scallops.....	29
6.2.3 Lumpfish.....	33
6.2.4 Herring	35
6.2.5 Cod.....	35
6.2.6 Aquaculture.....	39
6.3 Fisheries Concerns and Issues	39
6.4 On-Board Survey.....	46
6.4.1 Catch Per Unit Effort	46
6.4.2 Length Frequency Distribution and Mortality Estimates	49
6.4.3 By-catch Frequencies	51
6.4.4 Mapping of Tows and Estimates of Density Distribution.....	53
6.4.5 Summary.....	53
7 CONCLUSIONS.....	56
8 LITERATURE CITED	58

LIST OF APPENDICES

Appendix A	Literature Reviewed by Study Team
Appendix B	On-Board Survey Data
Appendix C	Fishing Industry Consultation Summaries
Appendix D	Information Sheet Used During Fishing Industry Consultation

LIST OF FIGURES

Page No.

Figure 4.1	NAFO Divisions	10
Figure 4.2	NAFO Unit Areas and Statistical Sections	11
Figure 4.3	Communities	12
Figure 4.4	Labrador Hydro Project 1998 Study Area for Marine Fisheries	14
Figure 6.1	4Ra Fisheries Composition by Weight and Value, 1990 (Pre-Moratorium) and 1997 (Moratorium).....	19
Figure 6.2	4Ra Fisheries Composition by Weight and Value, 1984 to 1997	20
Figure 6.3	Catch per Month from 4Ra by Quantity and Value, 1997	22
Figure 6.4	Vessel Size and Catch from 4Ra by Quantity and Value, 1997.....	23
Figure 6.5	Home Port of Vessel Fishing and Location of Catch Landing in 4Ra by Value of Catch, 1997	25
Figure 6.6	Lobster Catch from 4Ra by Quantity and Value, 1984-1997.....	30
Figure 6.7	Scallop Catch from 4Ra by Quantity and Value, 1984-1997.....	31
Figure 6.8	Lumpfish Catch from 4Ra by Quantity and Value, 1984-1997	34
Figure 6.9	Herring Catches from 4Ra by Quantity and Value, 1984-1997	36
Figure 6.10	Cod Catch from 4Ra by Quantity and Value, 1984-1997	37
Figure 6.11	Average CPUE of Scallops for All Vessels Per Day from July 21 to August 1, 1998	48
Figure 6.12	Scallop Length Frequency Histogram 1998.....	50
Figure 6.13	By-catch Frequency Summary	52
Figure 6.14	1998 Marine Fisheries Tows in the Strait of Belle Isle.....	54
Figure 6.15	Weight of Live Scallops per Trawl in the Strait of Belle Isle.....	55

LIST OF TABLES

Table 2.1	Study Team - Marine Fisheries Study in the Strait of Belle Isle.....	2
Table 6.1	Strait of Belle Isle Fishing Home Ports	24
Table 6.2	Catch by Vessels with Home Ports in SSs 49 and 50	26
Table 6.3	Scallop Draggers Using Project Area, 1998*	32
Table 6.4	Results of the Consultation Process.....	41
Table 6.5	Rankings of Potential Routes.....	44
Table 6.6	Summary of Survey Schedule.....	46
Table 6.7	Average Individual Vessel CPUE.....	47
Table 6.8	DFO Stock Status Data	49

LIST OF MAPS

Map 1	Project Area Fisheries Utilization: Lobster, Scallop and Cod	27
Map 2	Project Area Fisheries Utilization: Herring, Lumpfish, Urchin and Capelin.....	28

1 INTRODUCTION

1.1 Churchill River Power Project

Please note that the Project name and description information contained in this report have changed considerably since this original Marine Fisheries Study was completed in 2001.

Although the general study area and overall results of this study remain useful and relevant for the current **Labrador-Island Transmission Link** and its environmental assessment, the EIS and associated Marine Fisheries (2010) study should be consulted for a more up to date information on the Project itself.

1.2 Marine Fisheries Study

There is a long and rich history of marine resource use in the Strait of Belle Isle. Economic activity in the region has traditionally been characterized by a dependence on the inshore fishery. For generations, local residents have derived their livelihood from the exploitation of these marine resources. While in the past this fishery was based primarily on the harvesting of cod, recent years have seen an increase in the importance of the lobster, scallop, and herring fisheries, and expansion in previously underused species, such as sea urchins and crab.

The installation of a submarine cable crossing the Strait of Belle Isle may affect fishing activity in the cable corridor area. Accordingly, LHP identified the need for a marine fisheries study in the Strait of Belle Isle to address issues associated with the installation of the proposed submarine cable.

2 STUDY TEAM

The Marine Fisheries Study in the Strait of Belle Isle was conducted by Jacques Whitford Environment Limited (JWEL) in association with Canning & Pitt Associates Inc. and Seawatch Inc. (Table 2.1). Study team members included corporate and project managers, scientific advisors, project component managers, scientists and technical personnel. All team members have in-depth knowledge and experience in their fields of expertise and a broad general knowledge of the work conducted by other experts in related fields. The proportion of team members residing in Newfoundland and Labrador is approximately 98%. Brief biographical statements, highlighting project roles and responsibilities and relevant education and employment experience, are provided in Section 2.1.

Table 2.1 Study Team - Marine Fisheries Study in the Strait of Belle Isle

Participant	Role	Affiliation
Don Maynard	Project Manager	JWEL - PEI
Narcissus Walsh	Assistant Project Manager	JWEL - St. John's
Doug Rimmer	On-board Survey Data Analysis	JWEL - PEI
Ellen Tracy	Technical Reviewer	JWEL - St. John's
Steve Bonnell	Report Production	JWEL - St. John's
Karen Roberts	Report Production	JWEL - St. John's
Stephanie Barnes	Report Production	JWEL - St. John's
Stratford Canning	Project Manager	Canning & Pitt
Robert Pitt	Manager - Fisheries Data Analysis	Canning & Pitt
Mary Bishop	Resource Utilization Research and Analysis	Canning & Pitt
Cheslie Rose	Manager - On-board Survey	Seawatch
Edward Dawe	Observer	Seawatch
James Dalton	Observer	Seawatch
Alexander Bungay	Observer	Seawatch

2.1 Jacques Whitford Environment Limited

JWEL has conducted environmental consulting in Newfoundland and Labrador since 1985. JWEL has experienced management, scientific and support staff with extensive field experience in the province. Through its ongoing encouragement and support of employee training, JWEL demonstrates its commitment to continuous improvement in management, scientific and technical capabilities.

Donald Maynard, M.Sc., is a marine ecologist with JWEL in Charlottetown, PEI. As a senior advisor, Mr. Maynard served as the project manager and was available to the project in overseeing critical components and throughout the preparation of the final report.

Mr. Maynard has considerable experience in field research and assessment of marine communities and habitat. He spent 13 years with the Department of Fisheries and Oceans (DFO) conducting field research programs on fishery-related studies including lobster, scallops, irish moss and benthic communities in the Atlantic provinces, as well as fiord systems on Newfoundland's west coast and in the Strait of Belle Isle.

Narcissus Walsh, B.Sc., B.Ed., Graduate Diploma; Aquaculture is JWEL's Supervisor of Field and Technical Services in St. John's. Mr. Walsh served as assistant project manager for coordination of the field programs, reporting and daily program monitoring. In addition, Mr. Walsh coordinated the preparation of the final report.

Mr. Walsh has extensive experience in the planning and supervision of marine field programs and has conducted programs at Voisey's Bay, Hawkes Bay, Long Harbour, and Cow Head; the Hibernia Construction site at Bull Arm, Hope Brook Gold; and St. John's Harbour. His recent experience includes work as environmental advisor at the Newfoundland Transshipment site and as field party leader for baseline characterization work completed at the offshore site of the Terra Nova oilfield.

Doug Rimmer, B.Sc., is a biologist with JWEL in Charlottetown, PEI. He was responsible for data analysis for the on-board survey conducted by Seawatch Inc.

Mr. Rimmer has been responsible for analysis and report preparation of the \$5M, 5-year Marine Environmental Effects Monitoring (MEEM) program for the Confederation Bridge, Northumberland Strait Crossing Project. Components of the program include: chemical and physical oceanography, benthic habitat and communities, and phytoplankton monitoring. Of specific relevance, Mr. Rimmer was in charge of developing and running spreadsheet and data entry programs for the lobster and scallop at sea monitoring program associated with the fisheries resource monitoring program with the Confederation Bridge program. In this capacity, he received the data, supervised data entry, QA/QC of data entry, data analysis and data presentation in report format. Mr. Rimmer also provided consultation for data analysis and CTD use as well as for the interpretation of 1996 MEEM data.

Ellen Tracy, B.Sc., is an Environmental Scientist with JWEL's St. John's office. Ms. Tracy provided senior review of the report.

Ms. Tracy is a marine biologist with several years experience in project management. She was part of Jacques-Rescan Joint Venture Ltd., that managed the production of the Voisey's Bay Mine/Mill Environmental Impact Statement and oversaw the management of the baseline studies conducted to support that Environmental Impact Statement. In addition, Ms. Tracy has participated in several benthic studies, including the MEEM program for the Northumberland Strait Crossing Project (Confederation Bridge).

Steve J. Bonnell, M.A., is an Environmental Scientist with JWEL's St. John's office. He participated in the literature review and in the production of the draft and final reports.

Mr. Bonnell has a background in biogeography, with a focus on environmental assessment and resource planning. His research interests include the potential effects of development projects, programs and policies on natural resource use. Prior to joining JWEL, he served as an Environmental Assessment Officer with Public Works and Government Services Canada, assessing the potential effects of marine projects on marine resources and fishing activity. Mr. Bonnell participated in the completion of the Voisey's Bay Mine/Mill Development Environmental Impact Statement and associated studies, and has also held term positions with the Western Newfoundland Model Forest Inc. and the Canadian Forest Service.

Karen Roberts, M.E.Des. (Planning), is an Environmental Planner with a Master of Environmental Design (Planning) degree from the University of Calgary. Ms. Roberts was responsible for managing the draft report production. Ms. Roberts experience includes socio-economic research, inventories and assessments, environmental assessments and public consultation. She has participated in and/or managed a variety of environmental assessment projects in Newfoundland and Labrador. Ms. Roberts was a member of the socio-economic assessment teams for the Voisey's Bay Mine/Mill and Smelter/Refinery Projects. Recently, she managed the environmental assessment for the Trans Labrador Highway (Red Bay to Cartwright).

Stephanie Barnes, MES, is an Environmental Scientist with JWEL in St. John's. She assisted in preparation of the draft report. Ms. Barnes has a strong academic background in natural resource planning with a focus on marine conservation and public participation. During a secondment to Voisey's Bay, she participated in the preparation for the Panel Hearings. She has held term employment with the Department of Environment and Labour as Project Coordinator for an insecticide monitoring program as well as with the Newfoundland and Labrador Conservation Corps as Regional Supervisor of environmental projects.

2.2 Canning and Pitt Associates Inc.

Canning & Pitt Associates Inc. is an economic assessment, planning and management consulting firm with extensive experience in such areas as strategic planning, fisheries liaison for major marine projects, managing fisheries interactions, public consultation, socio-economic effects analysis, land use planning and data management. The firm has worked on major projects throughout Atlantic Canada, Scotland, Russia and in other jurisdictions for municipal, federal, provincial and private sector clients.

Stratford Canning, B.Sc.F. (University of New Brunswick), **D.T.R.P** (Glasgow University), president and partner of Canning & Pitt Associates Inc., has been a principle investigator for a large number of economic and planning studies since 1980, including policy studies, environmental assessments, development plans and analysis of local, regional and provincial development issues. He was Project Manager for the Canning & Pitt components of the marine fisheries study, organized and lead the fishing industry consultation, and prepared relevant sections of the final report.

During the 1970s, Mr. Canning worked for the Newfoundland government and later taught development studies at Memorial University. He has been a professional consultant since 1980, acting as Project Manager for numerous fisheries resource planning and environmental effects studies, and as principal investigator for a wide variety of economic development projects in Newfoundland, Scotland and elsewhere.

Since 1974, he has been involved in several major reports pertaining to the fisheries in Canada and Scotland, including the Story and Alexander Report (1974), the Levelton Report (1979) and (as co-author) a 1993 report on licensing, access and allocation policies for the Task Force on Incomes and Adjustment in the Atlantic Fisheries. Since 1980, he has been principal investigator for many fisheries studies, including among other an analysis of the Northern cod fishery (1980), a long-term aquaculture strategy (1989/90) for the Government of Newfoundland, and a comprehensive assessment of the long-term effects of the Hibernia oilfield development on the Newfoundland fishing industry. He has frequently been involved in organizing, conducting and/or facilitating focus groups, community meetings, consultations, conferences and workshops.

Robert Pitt, B.A., B.Sc. (Memorial University), **M.A.** (Queen's University at Kingston), vice-president and partner of Canning & Pitt Associates Inc., has academic training in the physical and social sciences and the arts. He managed the analysis of fisheries data for the study area, participated in the fishing industry consultation and prepared relevant sections of the final report.

Mr. Pitt has extensive professional experience in socio-economic research, statistical analysis, program design and project management, education, computer systems and publishing. He has written more than a hundred articles for local, national and international magazines, journals and books, for general audiences, business, government, scholars and technical professionals. He has worked on more than 30 Atlantic area fisheries studies, in such areas as fisheries policy, economics and resource utilization.

A specialist in computer database design and management, he developed Canning & Pitt's database systems to analyze fisheries-related data. The firm has been hired several times by DFO, for instance, to restructure and augment their data for government use in digital resource mapping. He also has extensive experience in computer systems integration, telecommunications (including computer networks and television), and data interpretation.

Mary D. Bishop, B.Sc. (Hon) (Dalhousie University), **M.U.R.P.** (Technical University of Nova Scotia), Member of the Canadian Institute of Planners, is a Senior Associate with Canning & Pitt Associates, Inc. She completed research and resource utilization analysis based on the consultations conducted in home ports on both sides of the Strait of Belle Isle.

Ms. Bishop has academic training in land use planning, communications, public participation processes, ecology, statistics and chemistry, as well as professional experience in municipal planning, environmental assessment, rural planning, tourism and socio-economic development research, and with government regulatory processes and agencies in both Newfoundland and Nova Scotia.

As a private-sector consultant, a Senior Planner with the Government of Newfoundland and Labrador, and an environmental biologist, she has been involved in research, policy planning and decision-making in several key areas of Newfoundland's economic development since 1985. Her areas of expertise include environmental assessment and review, tourism and recreational development, the hospitality industry, economic feasibility studies and Geographic Information Systems (GIS).

Ms. Bishop has also been involved with providing fishing industry/safety co-ordination for offshore/nearshore oil exploration surveys in Bay St. George, Port au Port Bay and Bay of Islands, and in the Strait of Canso for the Sable Offshore Energy Project. These projects involved compensation planning and fisheries consultation. She has also provided public consultation and liaison, permitting and media relations services for oil and mineral exploration companies on the west coast of Newfoundland.

2.3 Seawatch Inc.

Seawatch Inc. is a newly incorporated company that includes all the operations of the Seawatch Division of Beothuk Data Systems Ltd. Since 1980, the firm has provided 200,000 seadays of observer services. Seawatch has a corps of 65 DFO-certified Fisheries Observers, with an average of eight years and 1,000 seadays experience. In 1984, Seawatch developed a monitoring program for coastal and inland waters for DFO. Seawatch has implemented this monitoring program for DFO in the Newfoundland Region since 1985. The service has also been provided for the Scotia Fundy Region for several years during this period.

Seawatch has extensive experience in training observers, guardians and technicians in fulfilment of delivery mandates. Since 1980, Seawatch has designed and delivered numerous training programs in both the Newfoundland and Scotia Fundy Regions and have trained more than 150 observers. Seawatch has also been involved in training observers for the Baltic States and Northwest Atlantic Fisheries Organization (NAFO) members.

Cheslie Rose is the Chief Operating Officer and Vice President of Field Operations for Seawatch Inc. He was responsible for managing and coordinating the on-board survey field component of the marine fisheries study. Mr. Rose has been directly responsible for contract delivery of The Observer Program since 1984. During his tenure, the program has evolved into the well established and widely recognized professional organization it is today.

Edward Dawe of Port de Grave has worked as an observer since 1980 and has accumulated over 1700 seadays. He is trained to Canadian General Standards Board (CGSB) national standards and is experienced in fisheries and scientific data collection techniques. Mr. Dawe has participated in more than a dozen projects with DFO including gear selectivity studies and crab, scallop and groundfish surveys. He has also been deployed on offshore clam and scallop vessels.

James Dalton of St. Joseph's, St. Mary's Bay, has worked as a Fishery Observer since 1988 and during that time has accumulated approximately 900 seadays of activity. He is trained to CGSB national standards and is certified by DFO. Mr. Dalton is experienced in fisheries and scientific data collection methodology. He has participated in a number of scallop vessel deployments in four separate projects for DFO, including gear selectivity studies.

Alexander Bungay of Grand Bank has worked as an Fishery Observer since 1988. Mr. Bungay has accumulated almost 1,200 seadays of activity since joining Seawatch. He has been deployed on practically every fishery and vessel type in Newfoundland. He has participated in a number of experimental fisheries and has coordinated the data reporting of other observers in the 3O Russian capelin fishery. Mr. Bungay is also trained to CGSB national standards and is certified by DFO.

3 PURPOSE AND OBJECTIVES

The purpose of this study is to describe current information on the types of fisheries pursued and catch per unit effort (CPUE) in the area of the Strait of Belle Isle that may be affected by the Churchill River Power Project (CRPP). The primary objective is to determine current fisheries resources in the area as observed from operating fisheries in the Strait of Belle Isle prior to the proposed development. The specific objectives are to:

- determine the CPUE baseline conditions for study area scallop resources (for the 1998 season) as observed on commercial vessels;
- document any other potential commercial (e.g., lobster, salmon), aboriginal or recreational fisheries in the study area observed in 1998;
- plot data collected from the consultation process on a port-by-port basis to indicate the species distribution within the study area;
- summarize the findings of the consultation process and DFO landing statistics for the study area;
- review relevant literature on commercial fisheries use in the Strait of Belle Isle, including studies undertaken for previous assessments of hydroelectric development projects;
- establish a retrospective baseline, drawing on digital data obtained from government departments and previous research (dating from 1984), which identifies key species, historic catch levels, seasonality, vessel types and gear used; and
- identify marine fisheries resources that may need to be included in any ongoing, or future, monitoring programs.

This information may be considered in project planning and for future environmental assessment of the Project, and it will establish baseline conditions for follow-up monitoring and any necessary agreements with fishers, if required.

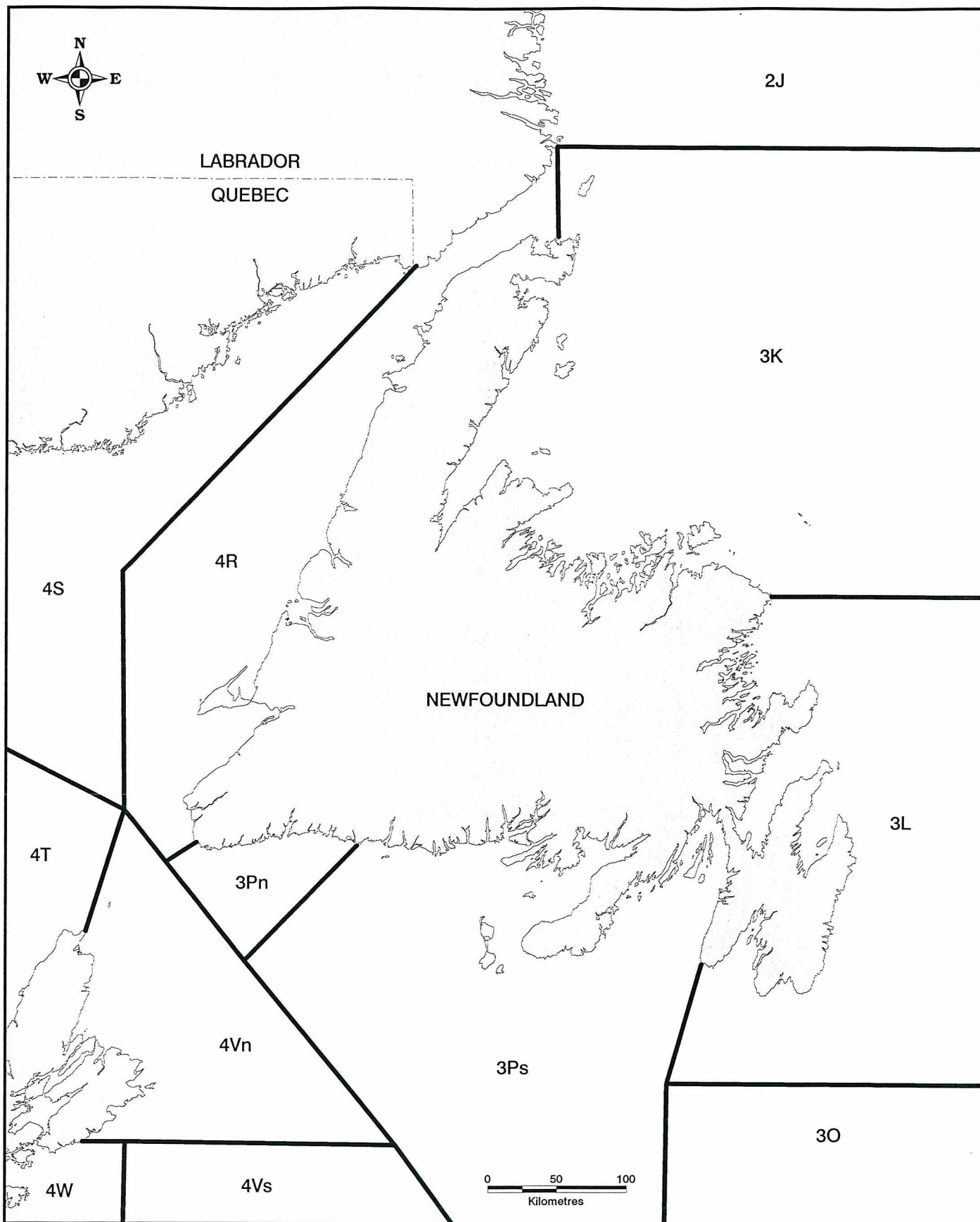
4 STUDY AREA

4.1 Data Boundaries

This report refers to several different fisheries management and reporting areas which define the boundaries of the statistical data used to analyze commercial fishing activities:

- **NAFO Divisions.** Large marine fisheries management areas (defined by NAFO). The Strait of Belle Isle is part of NAFO Division 4R (Figure 4.1).
- **Unit Area (UA).** A sub-unit of a NAFO Division, defined by NAFO and DFO for gathering fisheries statistics and to assist in the management of Canada's fishery resources. The Strait of Belle Isle is contained within NAFO UA 4Ra (Figure 4.2).
- **Statistical Section (SS).** A DFO statistical reporting area, used for organizing landings information (Figure 4.2). These are land locations and refer to ports and/or onshore buying stations. The SSs adjacent to the project area in the Strait of Belle Isle are SS 49 in Newfoundland and SS 50 in Labrador. These SSs include all ports between Ferolle Point and Cape Norman on the Island and between the Quebec border and Red Bay in Labrador.
- **Home Port.** These are the registered ports of the vessel harvesting the catch reported in the DFO statistics. Some species (e.g., lobster) are usually caught near the fisher's home port, while others (e.g., scallops) may be caught some distance from home. Also, crews in smaller vessels (e.g., those less than 35 feet (10.7 m) in length), such as most of those operating in the study area, tend to stay much closer to their home ports and land their fish close to these ports as well.
- **Landing Port.** These are the ports where the vessels land the catch. Most species caught by the small-boat fishery are landed in or near the fisher's home port, usually at the location of the nearest buyer or (if required) at the location of a dockside monitor. Larger vessels travelling some distance to catch fish often land their catch (e.g., scallops or shrimp) nearer to the fishing grounds where there is a buyer for that product, or where they can rendezvous with a buyer's agent.

Figure 4.3 illustrates the various communities which are referenced in the report.

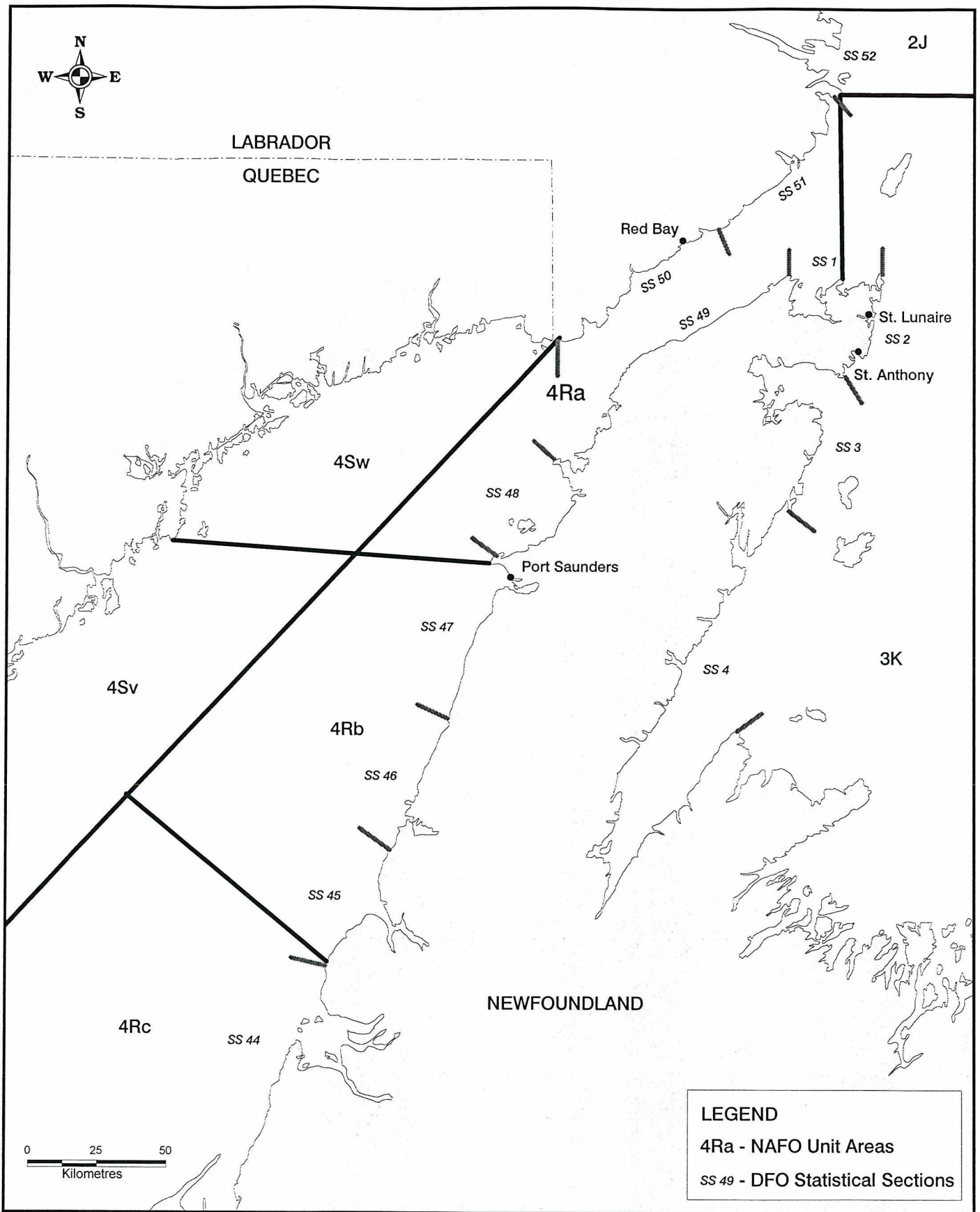


1205-30.WOF.08.JAN01



**Jacques Whitford
Environment Limited**
Environmental Scientists
Consulting Engineers

FIGURE 4.1
NAFO DIVISIONS



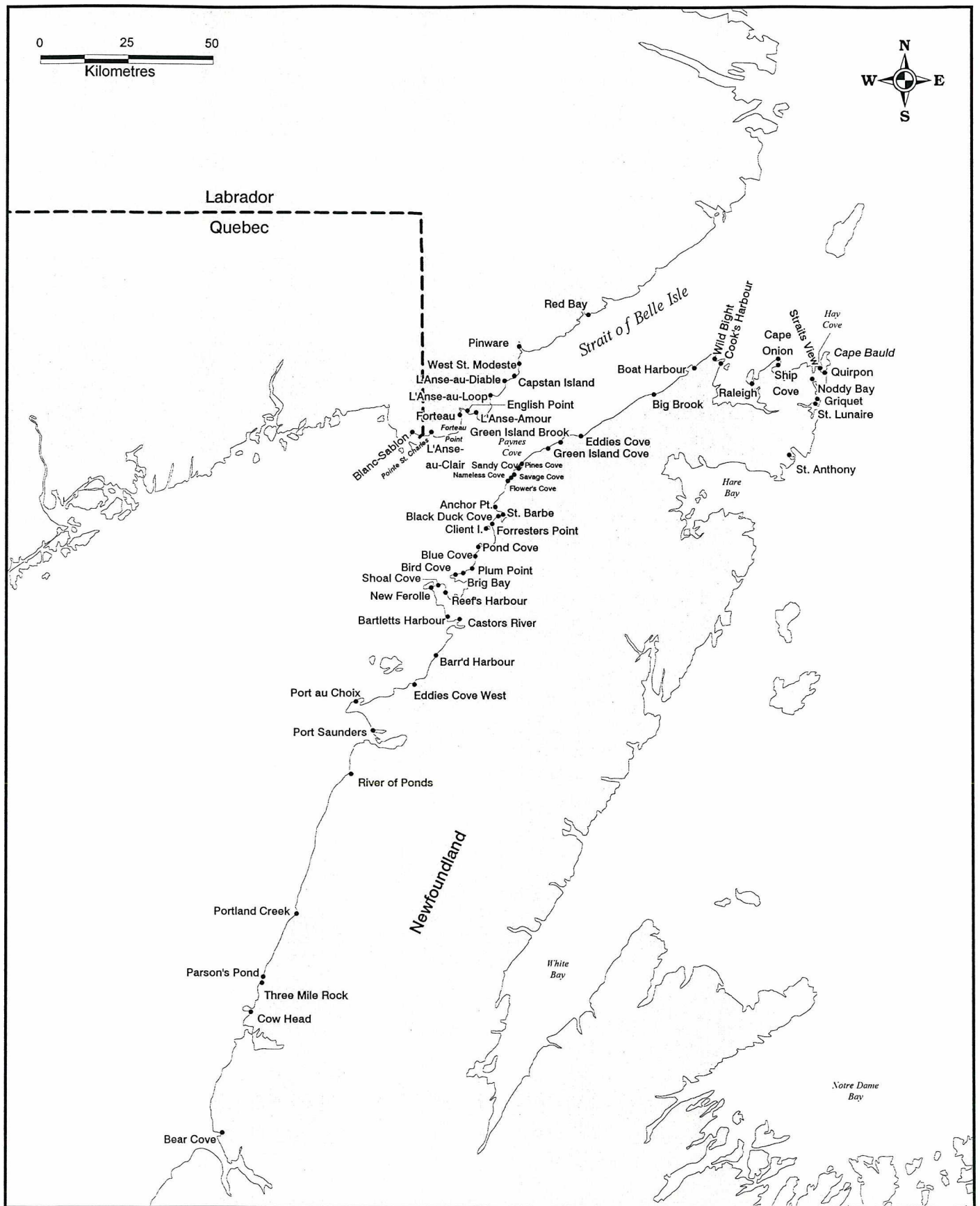
1208-31.WOR.08JAN01



**Jacques Whitford
Environment Limited**
Environmental Scientists
Consulting Engineers

FIGURE 4.2

**NAFO UNIT AREAS AND
STATISTICAL SECTIONS**



1208-32 WOF 06JAN01



**Jacques Whitford
Environment Limited**
Environmental Scientists
Consulting Engineers

FIGURE 4.3
COMMUNITIES

4.2 Study Boundaries

In this report, UA 4Ra (Figure 4.2) and the ports in the adjacent SSs (Figure 4.3) on both sides of the Strait of Belle Isle make up the study area (Figure 4.4). This area is wider than boundaries originally indicated in the proposal because fishers from several communities on the Great Northern Peninsula and the south coast of Labrador fish in the project area for different species. Consequently, this study includes an analysis of the fisheries and consultations with fishers in a much wider area which includes fishing communities from the Quebec border to Red Bay in Labrador, and from Port Saunders to St. Lunaire in Newfoundland (SSs 1, 2, 47, 48, 49 and 50).

The statistical analysis describes the fisheries conducted in NAFO UA 4Ra (Figures 4.2 and 4.3). It analyzes fishing by all vessels harvesting resources in this UA and by vessels from home ports in the Strait of Belle Isle nearest the project area (in SSs 49 and 50).

Although the data sets do not fix the location of the catch more precisely than the NAFO UA, most vessels based in the study area are small (less than 35 feet (10.7 m)) and tend to harvest their catch close to their home communities. One exception to this is the scallop fishery, which employs larger (generally 45 feet (13.7 m) or more) vessels using towed, mobile gear (i.e., scallop dredges (buckets or rakes)).

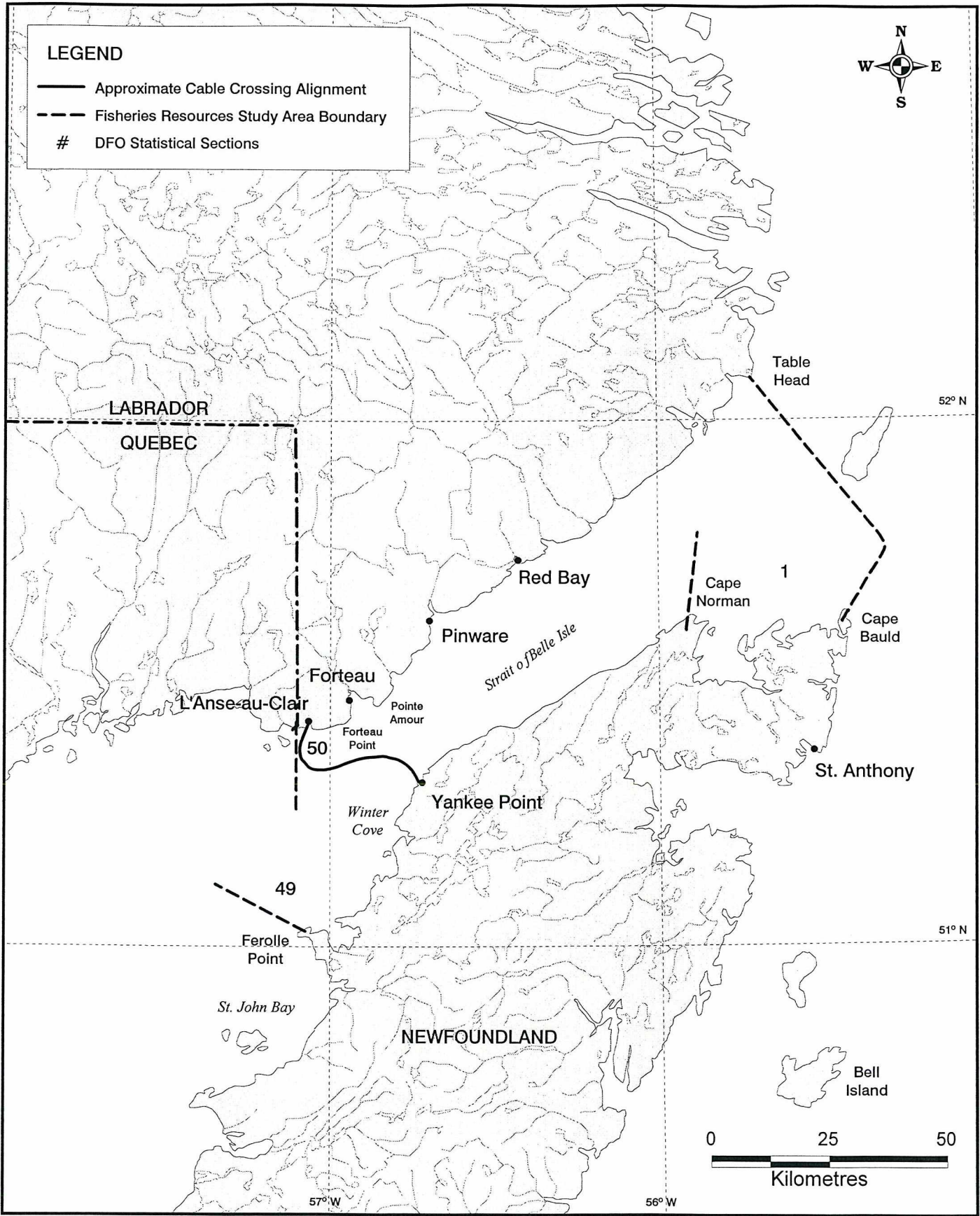


FIGURE 4.4

**LABRADOR HYDRO PROJECT 1998
STUDY AREA FOR MARINE FISHERIES**



**Jacques Whitford
Environment Limited**
Environmental Scientists
Consulting Engineers

5 METHODS

This study focuses on commercial fisheries in the area of the proposed submarine hydroelectric cable routes. It describes active fisheries, discusses potential fisheries interactions, and documents fishing industry concerns.

The study involved:

- reviewing past research and literature;
- analyzing historical (1984 to 1997) catch data and other information (e.g., DFO licensing data) related to the area's commercial fisheries;
- conducting a survey on-board fishing vessels; and
- conducting a fishing industry consultation exercise, including meetings with representatives of area fisher associations, and interviews with individual fishers.

5.1 Literature Review

The study team undertook a literature search to identify literature or data of relevance to this study (Appendix A). This included a review of several previous reports or assessments dealing with commercial fisheries use in the Strait of Belle Isle, as well as a search for any research studies pertaining to potential interactions between fisheries activities and hydroelectric power corridors. The study team also contacted experts familiar with the Northumberland Strait area to ascertain the availability of any data pertaining to fishing gear and power cable conflicts, especially those involving mobile gear such as scallop rakes.

5.2 Landing Statistics Analysis

A time-series baseline analysis of the area's fisheries was undertaken which covered both the pre- and post-groundfish moratorium periods. This identified key species, historic catch levels, seasonality, vessel types and gear used, and documented the changes which have occurred with regard to key species over the past 15 years. This information (in combination with the information gathered from area fishers) identifies marine fisheries resources that may be affected by the project.

The data analysis is based on digital time-series data obtained from DFO which record the quantity, value and general location (i.e., the NAFO UA of catch) of the commercial harvest landed in Newfoundland and Labrador.¹ The analysis covers the period from 1984 to 1997.

¹ Catch landed in other DFO regions (e.g., Quebec) are not included; however, landings by vessels with home ports in other regions are captured if the catch was landed in Newfoundland and Labrador.

5.3 On-Board Survey

The field program was coordinated from JWEL's St. John's office, with associate companies operating independently in the conduct of their specific tasks. JWEL was advised of all scheduling and liaised directly with the client on related issues and in the provision of daily/weekly summary reports as requested by LHP.

Seawatch Inc. collected data for calculating scallop CPUE in the study area. The data was collected over a 20-day period during the fishing season, between June and August 1998. Observers were stationed on-board commercial scallop fishing vessels. Data collection methods (i.e., location of start and stop of tow, shell height of live and dead scallops and by-catch information) followed Naidu et al. (1997).

Any groundfish caught as by-catch were noted by species name and number. All tow locations and length were geo-referenced using differential global positioning system (DGPS) equipment and procedures. To meet the requirements of this work scope, the vessel navigation system (Loran-C or non-corrected global positioning system (GPS) system) was used because vessel start and stop positions are typically not defined more precisely than ± 100 m.

Observer placements were coordinated with area fishers. JWEL tabulated the scallop data in electronic format and analyzed the data to produce:

- daily dead scallop (cluckers) ratios;
- daily shell height-size frequency distributions for dead (cluckers) and live scallops;
- figures showing the geo-referred locations of each tow start and stop for each day;
- standardized scallop densities per metre squared swept for each tow; and
- standardized CPUE (numbers) of scallops per hours towed.

Seasonal summaries of the daily information were compiled. Data summaries are provided in Appendix B.

5.4 Fishing Industry Consultation

A series of meetings and interviews was conducted with representatives of area fisher associations and individual industry participants in major landing ports in the study area. The timing of the consultation avoided the most intensive fishing season (June to August) to ensure good attendance at meetings. Meetings were strategically located in Newfoundland and Labrador ports to ensure easy access by any fisher from any port in the study area who wished to attend the meetings. During this consultation process, fishers were informed of anticipated marine project activities and consulted to determine current commercial species, past fishing practices for groundfish now under moratorium, the location of fishing grounds for each species, and other traditional knowledge information related to the predicted zone of influence. Fishers' concerns and other observations were recorded, as were suggestions for minimizing conflicts or interference with fishing

activities. The results of the consultations are discussed in Section 6.3. Summaries of the consultations are provided in Appendix C and the information sheet used is provided in Appendix D.

In addition to collecting relevant baseline and other information, these meetings provided an opportunity to discuss potential project activities, fisher concerns and general suggestions for minimizing any conflicts/interference with established fishing activities for key species and fisheries that may be affected by project activities. It was also an important step towards establishing trust and a spirit of mutual co-operation for the Project's development phase.

5.5 Data Management

JWEL met with LHP's Environmental Management Team, prior to field mobilization, to finalize data management requirements for the study. JWEL kept study records in the format prescribed by LHP's Environmental Management Team.

JWEL followed its established data management procedures, as long as these procedures were compatible with the data management requirements as prescribed by the LHP's Environmental Management Team. Data management at JWEL involves a number of systematic processes and protocols that were designed to provide a framework for providing quality environmental data with a high degree of credibility.

JWEL has developed and implemented a QA/QC procedure for data management which has been successfully applied to large baseline characterization programs such as those conducted for the Voisey's Bay mine/mill and smelter, and the Terra Nova project. This system provides a highly efficient method of managing large data sets and ensures the highest data quality.

Quality management is an essential element of project management ensuring an acceptable level of quality and that the level of quality is adequately documented. JWEL has established documented procedures which provide the client with assurance of quality management and results in the collection of acceptable data which fulfill project objectives. A Quality Management Plan (QMP) is essential for obtaining quality data and it depends upon a well developed organizational structure in which individuals have clearly defined roles, data reporting channels, and corrective action authority is well defined and identified.

6 RESULTS

6.1 Current Fisheries

6.1.1 Unit Area 4Ra

The closure of most of the groundfisheries in NAFO Division 4R in 1993 brought significant changes to the Strait of Belle Isle fisheries. Cod, which had been the mainstay of the area's fisheries in previous decades, has now been supplanted by lobster and scallops as the most important fisheries, by value, amongst those fishers who remain in the industry. In addition, a number of other fisheries for new or previously underused species, such as urchins, crab and shrimp (in waters off northern Labrador), are now being fished more intensively to make up for the loss of traditional resources. This diversification has meant new fishing patterns and the exploration of new grounds.

Before 1994 (1984 to 1993), cod averaged 72% of landings by quantity and 54% by value. Other key species were lobster (averaging 20% by value) and scallops (13% by value). In the period since 1994 (1995 to 1997 average), lobster has become the most important species (43% by value), followed by scallops (27%), and herring and crab (both 5% by value), though herring has made up the bulk of the catch (on average 44% by weight). The composition of the 4Ra fisheries by quantity and value in 1990 (pre-moratorium) and 1997 (moratorium) is shown in Figure 6.1.

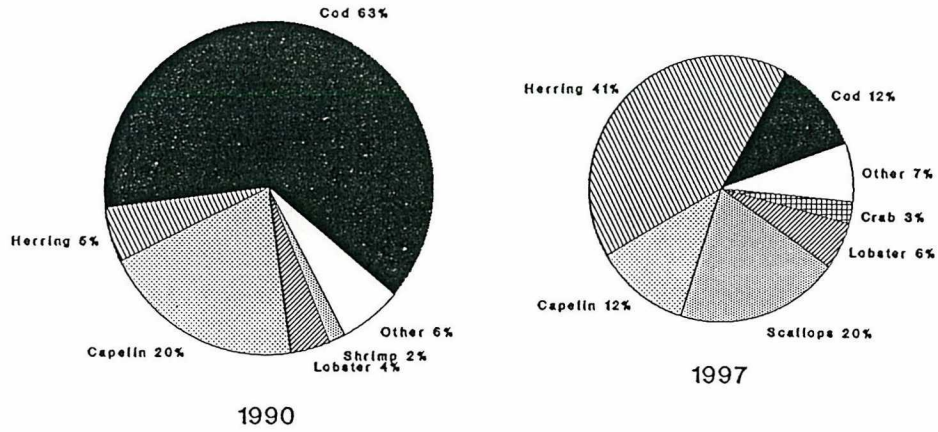
There had been a significant decline in the quantity of UA 4Ra fish landings even before the moratorium, from a high of 23,000 to 25,000 tonnes per year in the mid-1980s to a low of approximately 8,500 tonnes in 1993. This was due primarily to the decline in cod landings. In 1994, the year the groundfishery was closed, the total catch was only 4,000 tonnes. Since then there has been a slow recovery, as a result of new and/or expanded fisheries for other species.

However, owing to increasing prices for some species and the exploitation of more valuable species in recent years, the overall landed value of the catch has been relatively stable since 1988, averaging between \$7,000,000 and \$9,000,000 per year over the past decade.

In 1997 and 1998, a limited cod fishery was permitted and some fishers in the study area are hopeful that a more sustained and substantial annual cod fishery will be reinstated within the next few years.

The changes which occurred in the quantity and value of the fisheries in 4Ra from 1984 to 1997 are illustrated in Figure 6.2.

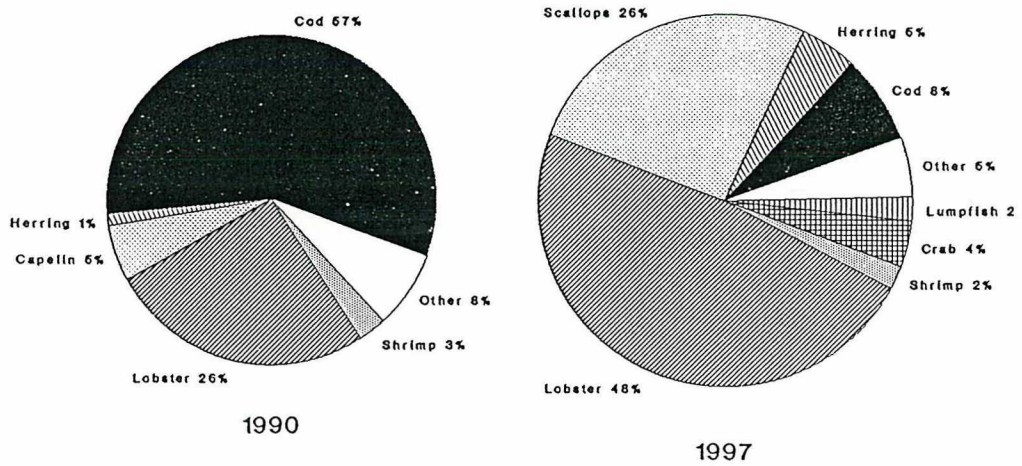
Strait of Belle Isle Fisheries
Composition of Catch from 4Ra by Weight
Tonnes



(Catch landed in Nfld/Labrador)

Canning & Pitt 1998

Strait of Belle Isle Fisheries
Composition of Catch from 4Ra by Value
\$



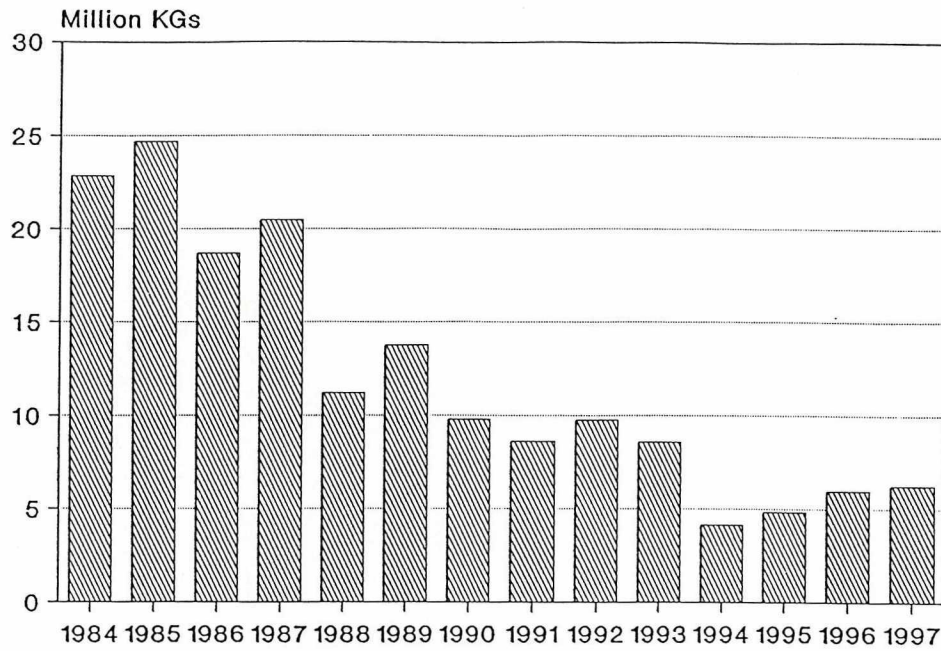
(Catch landed in Nfld/Labrador)

Canning & Pitt 1998

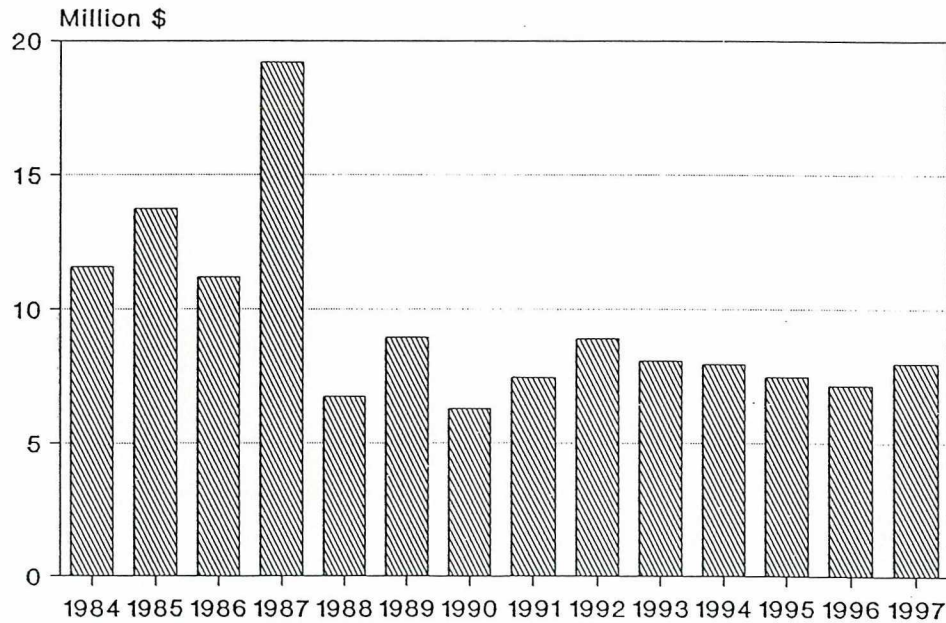
Figure 6.1

**4RA FISHERIES COMPOSITION BY WEIGHT AND VALUE,
 1990 (PRE-MORATORIUM) AND 1997 (MORATORIUM)**

Strait of Belle Isle Fisheries
Catch from 4Ra by Weight 1984-97



Strait of Belle Isle Fisheries
Catch from 4Ra by Value 1984-97



(Catch landed in Nfld/Labrador)

Canning & Pitt 1998

1208-3.CDR 19NOV98 (C&P)

Figure 6.2

**4RA FISHERIES COMPOSITION BY WEIGHT AND VALUE,
1984 TO 1997**

6.1.2 Statistical Sections 49 and 50

The catch by vessels based in the Strait of Belle Isle (from the waters of 4Ra) has undergone similar changes. In 1990 for example, 56% of the value of the catch was cod and 30% was lobster, for a total value of about \$3,000,000. In 1997 the value of the catch was 41% lobster, 39% scallops and 9% cod, with a total value of \$4,800,000.

Over the same period, the number of commercial species harvested increased – from 18 (1990) to 29 (1997) – reflecting the more diverse moratorium-period fisheries.

It should be noted, however, that the statistics cited in this report likely underestimate the catch by Labrador-based fishers (in SS 50) since they report selling a significant portion of their catch (e.g., shrimp, scallops, cod and herring) to Quebec buyers, which is recorded in the DFO Quebec Region data.

6.1.2.1 Seasonality

Both before and since the moratorium, fishing in 4Ra has been concentrated almost exclusively between May and November, with June being the peak month in terms of the value of the catch and July the top month in terms of the quantity of the harvest (Figure 6.3). The same pattern holds true for fishers based in SSs 49 and 50, fishing in 4Ra.

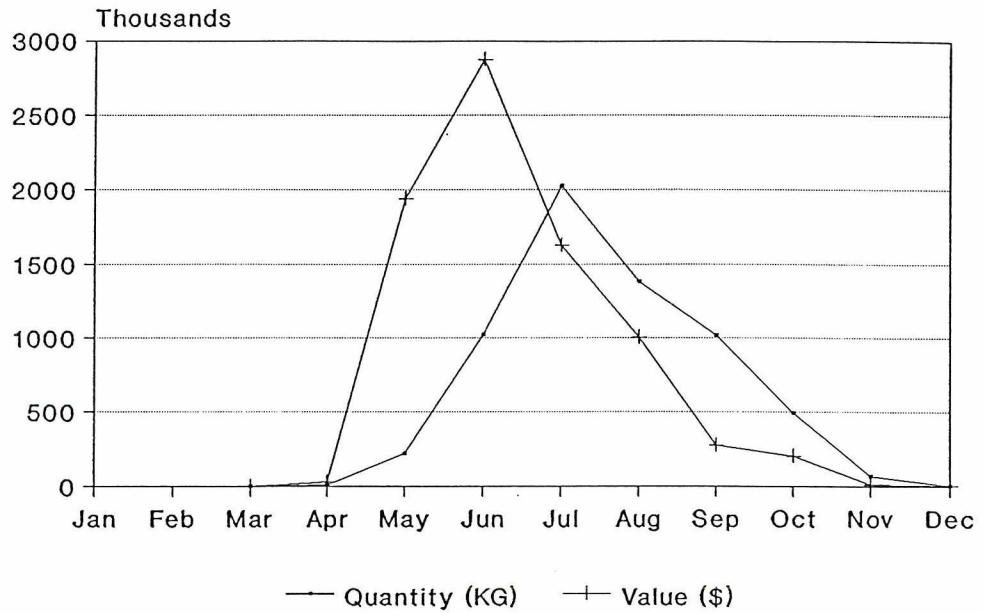
6.1.2.2 Fishing Vessels

DFO reports that there are 251 fishing vessels registered in communities within the project area². Most (218) are small boats, less than 35 feet (10.7 m) in length. Many of the larger vessels (33 larger than 35 feet (10.7 m)) now fish for species (such as shrimp and crab) in areas well beyond UA 4Ra.

In 1997, 69% by quantity and 76% by value of the catch from 4Ra was taken in vessels less than 35 feet (10.7 m) in length, and 24% by quantity and 16% by value were taken by vessels 35 to 45 feet (10.7 to 13.7 m). For vessels from ports in SSs 49 and 50, 75% and 76% of the catch from 4Ra by quantity and value, respectively, was by vessels under 35 feet (10.7 m) (Figure 6.4).

² These data are for the ten or so communities between Anchor Point and Savage Cove on the Island, and between L'Anse au Clair and Pointe Amour in the Labrador side, for the year 1995, the last year for which DFO has published statistics on the number of vessels by size class. Given the changes which have taken place in the fisheries, including the buy-out of many fishers or the voluntary exit of others, these data likely overestimate the number of vessels actively involved in these communities.

Strait of Belle Isle Fisheries
Catch by Month from 4Ra, 1997



(Catch landed in Newfoundland/Labrador)

Canning & Pitt 1998

Figure 6.3

**CATCH PER MONTH FROM 4RA
BY QUANTITY AND VALUE, 1997**

Strait of Belle Isle Fisheries, 1997
Vessel Size and Catch from 4Ra

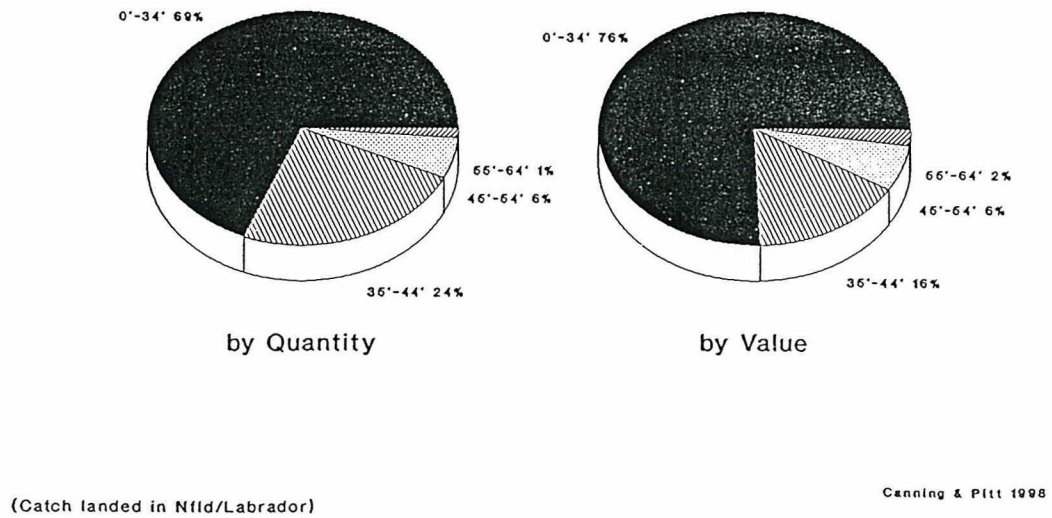


Figure 6.4

**VESSEL SIZE AND CATCH BY 4RA
BY QUANTITY AND VALUE, 1997**

6.1.2.3 Fisheries Participants

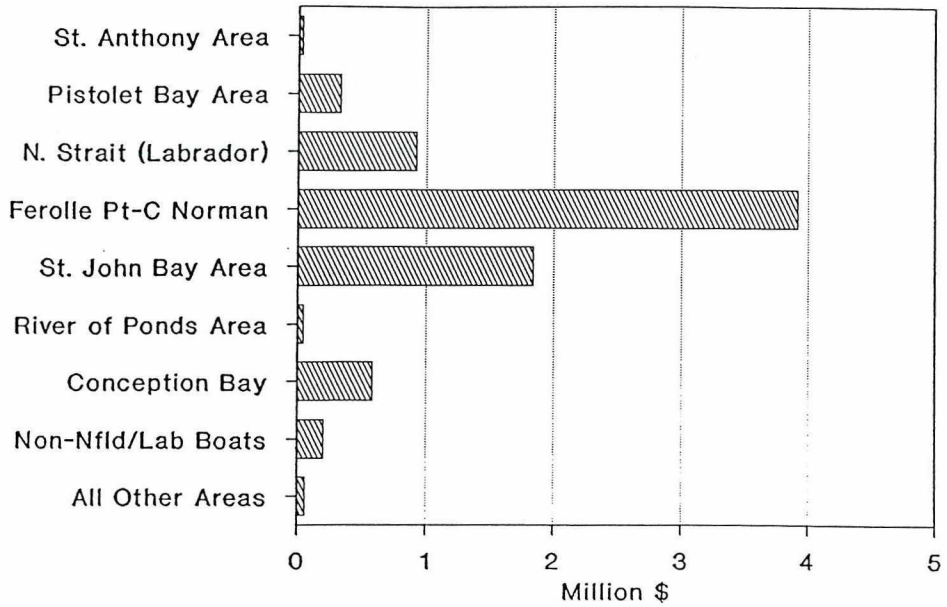
Fishers based in home ports adjacent to UA 4Ra (SSs 1, 48, 49, 50 and 51) accounted for the greatest part of the catch from those waters in 1997 (95% by weight and 90% by value), with the remaining vessels coming from ports as far away as Conception Bay. Virtually all of this catch is landed in this area as well (Figure 6.5).

Fishers based in SSs 49 and 50 accounted for 65% by quantity and 61% by value of the 4Ra catch in that year. According to DFO records, within these two SSs there were 33 fishing communities (registered home ports) with recorded catches in 1997: 9 in Labrador and 24 in Newfoundland (Table 6.1). Nearly 12% by value was caught by Labrador-based (SS 50) fishers and 49% by Newfoundland (SS 49) fishers (Table 6.2).

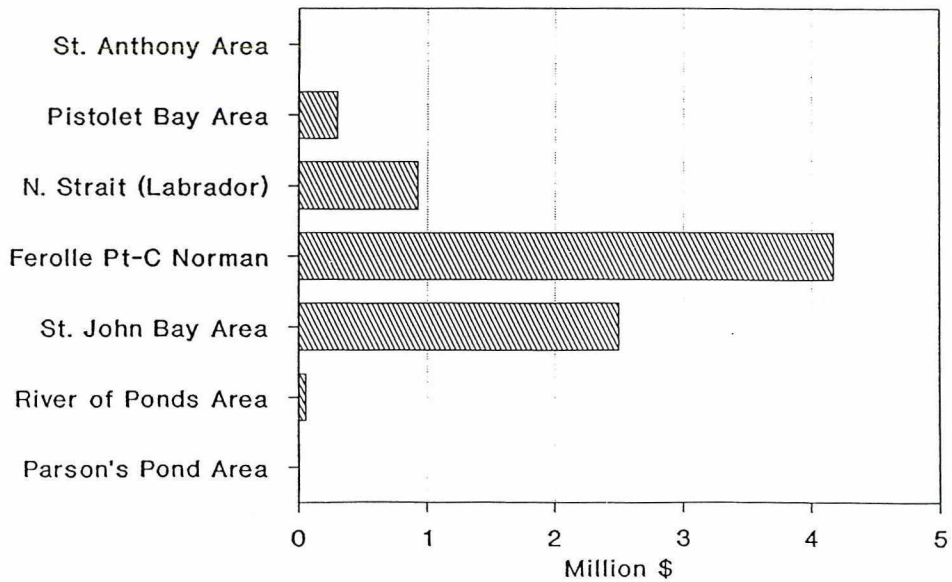
Table 6.1 Strait of Belle Isle Fishing Home Ports

Newfoundland (SS 49)		Labrador (SS 50)
New Ferolle	Anchor Point	L'Anse au Clair
Shoal Cove West	Bear Cove	Forteau
Reef's Harbour	Flowers Cove	English Point
Bird Cove	Nameless Cove	L'Anse Amour
Brig Bay	Savage Cove	L'Anse au Loup
Plum Point	Sandy Cove	Capstan Island
Blue Cove	Shoal Cove East	West St. Modeste
Pond Cove	Paynes Cove	Pinware
Current Island	Green Island Cove	Red Bay
Forrester's Point	Green Island Brook	
Black Duck Cove	Eddies Cove East	
St. Barbe	Big Brook	

Strait of Belle Isle Fisheries, 1997
Home Port of Vessel Fishing in 4Ra
 (by value of catch)



Strait of Belle Isle Fisheries, 1997
Where Catch is Landed, Catch from 4Ra
 (by value of catch)



(Catch landed in Nfld/Labrador)

Canning & Pitt 1998

1208-6-CDR 19NOV98 (C&P)

Figure 6.5

**HOME PORT OF VESSEL FISHING AND LOCATION OF
 CATCH LANDING IN 4Ra BY VALUE OF CATCH, 1997**

Table 6.2 Catch by Vessels with Home Ports in SSs 49 and 50

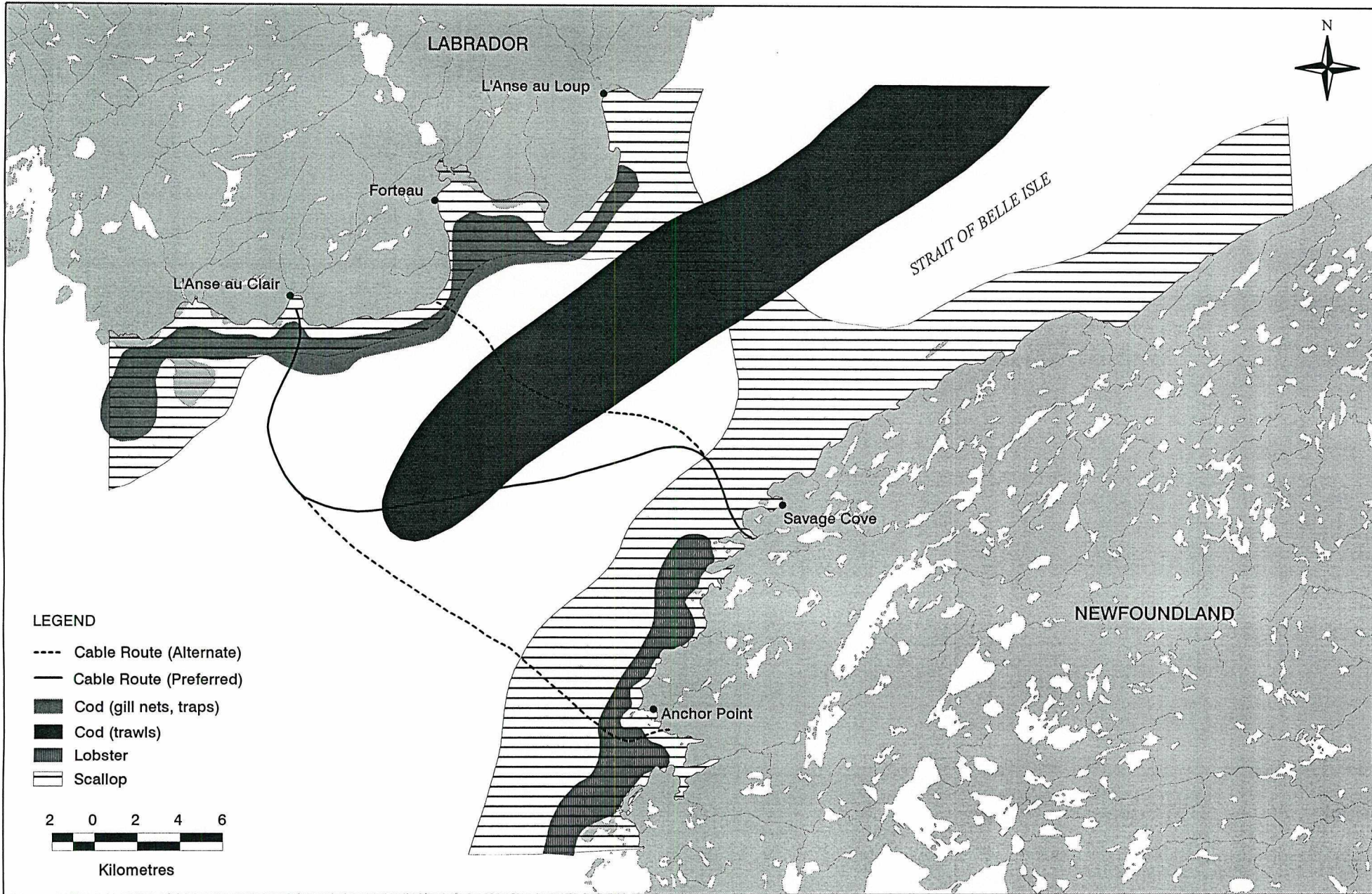
Year	Caught within UA 4Ra		Total Catch, All UAs		% Caught Within UA 4Ra	
	Quantity (KG)	Value (\$)	Quantity (KG)	Value (\$)	By Quant.	By Value
1984	7,188,235	3,433,877	19,294,886	8,212,029	37.3%	41.8%
1985	7,559,658	3,900,804	13,271,001	6,234,098	57.0%	62.6%
1986	7,237,109	4,716,995	17,090,811	9,771,982	42.3%	48.3%
1987	8,974,609	8,983,622	17,676,219	16,561,533	50.8%	54.2%
1988	5,288,242	3,164,580	15,920,742	9,349,672	33.2%	33.8%
1989	6,951,743	3,859,208	18,221,928	9,497,735	38.2%	40.6%
1990	5,011,812	3,020,594	13,658,042	8,329,523	36.7%	36.3%
1991	5,008,048	4,221,073	13,187,972	10,161,137	38.0%	41.5%
1992	6,800,891	5,884,421	15,279,695	11,072,172	44.5%	53.1%
1993	5,799,949	5,544,234	12,899,518	9,872,145	45.0%	56.2%
1994	2,650,706	4,741,360	7,669,751	9,413,773	34.6%	50.4%
1995	2,542,665	4,151,300	6,118,519	12,851,352	41.6%	32.3%
1996	3,317,075	4,079,028	6,553,892	9,198,237	50.6%	44.3%
1997	4,038,921	4,834,570	8,972,540	13,960,160	45.0%	34.6%

DFO records for 1995 (the latest year for which published data are available) indicate that there were more than 1,729 fishers (full-time and part-time) and approximately 940 fishing vessels registered in all of SSs 49 and 50.

6.1.2.4 Fishing Locations

Although most small-boat fishers in SSs 49 and 50 home ports fish close to their home communities, larger vessels often travel to more distant waters to harvest their catch. On average, since 1984, 57% by weight and 55% by value of the catch by these vessels has been taken in UAs other than 4Ra (Table 6.2), most notably (in 1997) from 4Rb in the Gulf to the south, from 2Jn off the coast of Labrador, and from 3Kb east of St. Anthony (Figure 4.1). In 1997, this catch was primarily shrimp which was mostly taken in vessels greater than 45 feet (13.7 m).

The principal species fisheries which occur within the Strait of Belle Isle and the Project Area are scallop, lobster, lumpfish, herring and, before the moratorium, cod. These and other fisheries conducted in the Project Area are shown on Maps 1 and 2, based on information provided by area fishers.



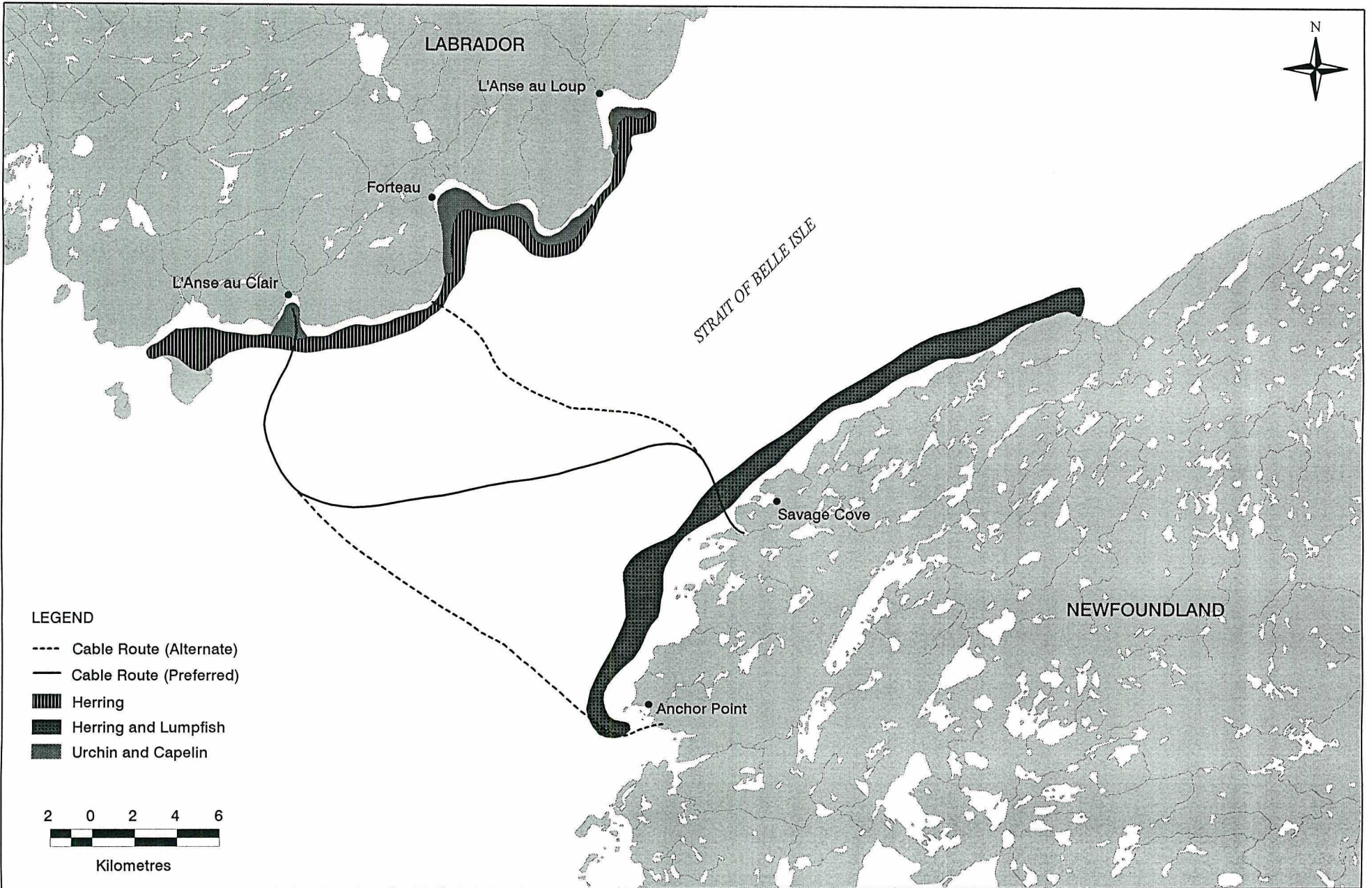
MAP 1

**PROJECT AREA FISHERIES UTILIZATION
LOBSTER, SCALLOP AND COD**



**Jacques Whitford
Environment Limited**

Environmental Scientists
Consulting Engineers



MAP 2

PROJECT AREA FISHERIES UTILIZATION
HERRING, LUMPFISH, URCHIN AND CAPELIN



**Jacques Whitford
Environment Limited**

Environmental Scientists
Consulting Engineers

6.2 Key Fisheries

The following species, harvested within UA 4Ra, are discussed separately either because they are significant commercial species harvested within the project area or because they pose a particular potential for project interaction.

6.2.1 Lobster

Lobster is harvested on rocky grounds throughout the Newfoundland side of the Strait of Belle Isle and is presently the most important species by value harvested in the study area. The usual season is from mid-May to mid-July each year.

Although the quantity of the catch has been fairly stable since 1984, the value of the harvest has been increasing because of higher prices (Figure 6.6). This is also the case for fishers in SS 49 where it is the mainstay of their 4Ra fisheries. However, lobster is not harvested by fishers from communities on the Labrador side of the Strait (SS 50) because there is no suitable habitat for this species in that area.

Lobster gear consists of baited traps anchored to the sea bed. Each licensed fisher is permitted 300 traps, and all are hauled each day, weather permitting. The general practice is to set traps along the shore line and islands, usually in water depths less than 36 m (20 fathoms).

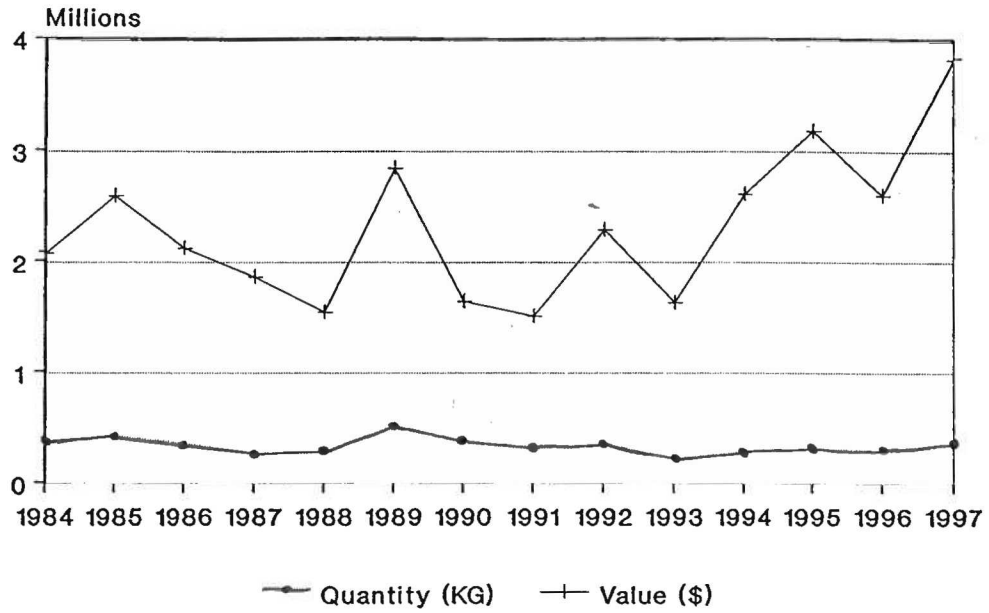
Lobster fishers tend to fish quite close to their home ports and do not range more than a few kilometres. Consequently, only fishers from communities between St. Barbe and Savage Cove have tended to fish lobster within the project area. These fishers report that there is no lobster ground in the project area around Yankee Point. However, nearshore areas off Winter Cove (a short distance from the community of St. Barbe and the landfall site of the alternate route) (Figure 4.1) are said to be prime lobster grounds.

6.2.2 Scallops

The UA 4Ra scallop landings since 1984 are shown in Figure 6.7. This fishery has been increasing in value since the early 1990s and is second only to lobster in importance. For fishers on the Labrador side of the Strait, it is by far the most important species, making up 65% (by value) of their total SS 50 catch from 4Ra in 1997.

Fishers noted that when cod were more abundant, many fishers did not bother to harvest scallop even if they had a license for this species. However, since the moratorium, many fishers have become much more dependent on scallops.

Strait of Belle Isle Fisheries
Lobster Catch from 4Ra, 1984-97



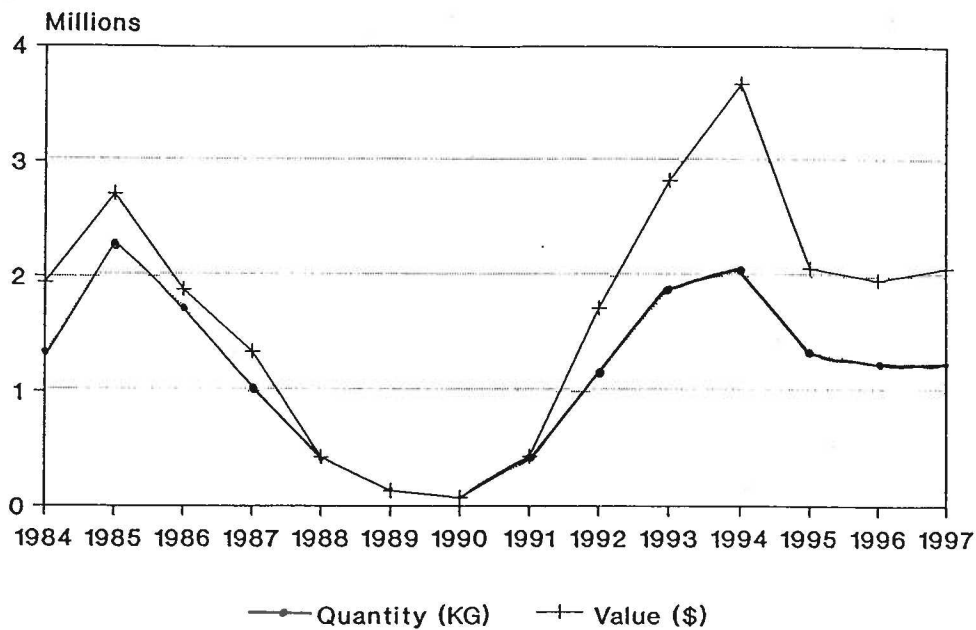
(Catch landed in Newfoundland/Labrador)

Canning & Pitt 1998

1208-7.CDR.19NOV98 (C&P)

Figure 6.6
LOBSTER CATCH FROM 4RA BY QUANTITY AND VALUE,
1984 TO 1997

Strait of Belle Isle Fisheries
Scallop Catch from 4Ra, 1984-97



1208-8.CDR 19NOV98 (C&P)

Figure 6.7
SCALLOP CATCH FROM 4RA BY QUANTITY AND VALUE,
1984 TO 1997

There are currently 40 active scallop licences in northern Newfoundland and Labrador ports which fish within the study area (Table 6.3).

Table 6.3 Scallop Draggers Using Project Area, 1998*

Home Port	Number of Vessels
Labrador	12
Savage Cove	1
Brig Bay	1
Forrester's Point	3
Cook's Harbour	4
Plum Point	1
St. Anthony	1
Black Duck Cove	3
Big Brook	1
Anchor Point	2
Green Island Cove	4
Flowers Cove	3
Green Island Brook	1
Raleigh	1
Bird Cove	1
Castor River South	1
* Scallop licensees active in 1998 who are likely to have fished in the project area at some point during the year.	

Scallops are harvested using specially rigged draggers, most between 35 and 45 feet (10.7 and 13.7 m) in length, typically powered by 300 HP motors, though some are larger and more powerful (e.g., vessels up to 55 feet (16.8 m) in length, equipped with 600-700 HP engines). According to fishers, most of these larger boats were formerly part of the NAFO Division 4R/4S (Figure 4.1) otter trawl fleet which, since the moratorium, have focused on alternative species such as scallops. However, fishers reported that, in the last few years, most of these vessels are pursuing northern shrimp as their primary species. As noted above, shrimp are currently harvested well to the north of the study area, off the Labrador Coast.

The scallop gear used in the area consists of heavy dredges towed behind the vessel, usually consisting of two 6-foot (1.8 m) rakes (or buckets) each weighing approximately 1,200 to 1,500 pounds (450 to 680 kg).³ Scallop draggers are restricted to a maximum dredge length of 13 feet (4 m).

³ Scallop draggers are restricted to a maximum bucket length of 13 feet (4 m). Fishers indicated that the ideal gear for a typical, 300 HP dragger is two five-foot (1.5 m) buckets.

In this area scallops are found on grounds less than 45 m (25 fathoms) though, in general, the best grounds are in deeper (greater than 55 m (30 fathoms)) areas where the bottom consists of rock and gravel. The normal fishing pattern is to tow the gear parallel to the shore line (i.e., on a southwesterly or northeasterly heading). The gear is typically towed for about 1.2 to 1.6 km before it is pulled in and unloaded. Scallop fishers noted that most draggers will fish along the same path for a day or two at a time if they continue to get a good catch and suggested that the dredges may dig a trench, possibly a metre deep, into the seabed.

The fishery continues throughout the scallop season, usually from the beginning of June until the end of August, or until the quota is taken. In 1998, the fishery began on June 1 and closed on September 13. However, fishers report that before the moratorium, scallop fishing did not usually start until the fall, after the cod fishery was over and the boats had been re-rigged for scallop dragging.

In 1998, the total allowable catch (TAC) was 1,100 tonnes, down from a 2,100 tonnes in 1994. Each licence holder was allowed an equal share of the overall quota and were also subject to weekly catch limits.

Fishers from many communities throughout the Strait drag, or have dragged, for scallops within the waters of the project area. The area southwest of a line between Forteau and Yankee Point is said to contain some of the best scallop grounds in the Strait by most fishers on both sides of the study area.

In the past, vessels also fished scallops to the north of the cable corridor area, on grounds from Big Brook northeast to Red Bay. However, in the past few years, most of the scallop harvest has been concentrated in the project area. It was noted that northeast of this area suitable scallop grounds are not found until about Red Bay. During the consultations, scallop fishers throughout the Strait indicated that each of the proposed routes would pass through their prime scallop (and cod) harvesting areas and they would prefer a route between Pointe Amour and Yankee Point which would avoid nearly all the productive fishing grounds.

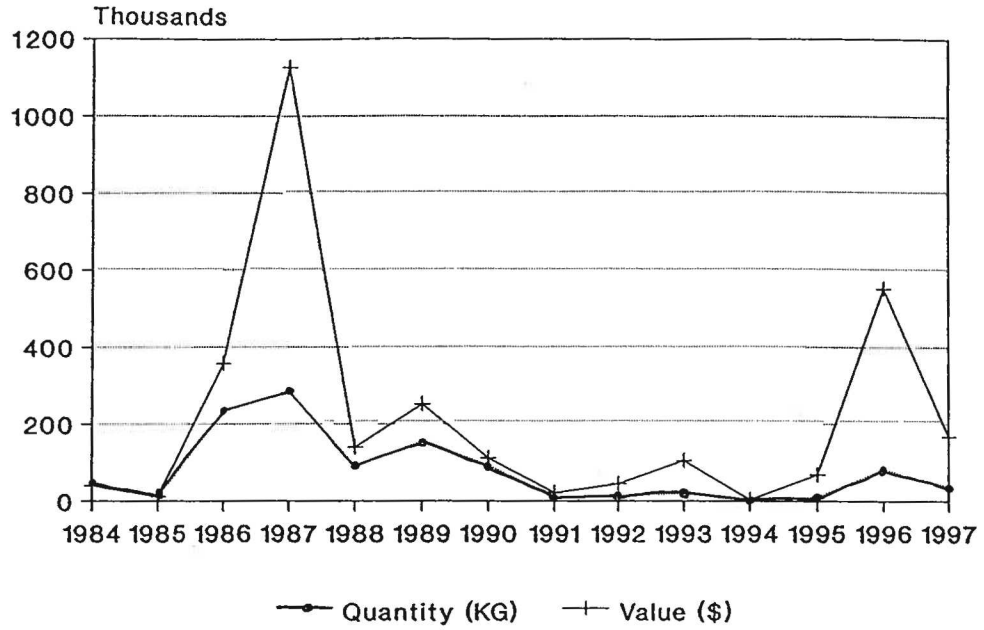
Fishers noted that for the last five years, all scallop vessel operators have been required to record the latitude and longitude of where they fish. However, most operators record the position of the general area fished on a given day only, rather than the specific longitude/latitude of the starting and ending points of each tow.

6.2.3 Lumpfish

For some fishers in the Strait of Belle Isle, the lumpfish roe fishery has been very important in recent years, though there has been a general decline in abundance over the past decade (Figure 6.8).

Lumpfish nets are set near to shore usually in the same grounds used for lobster. The typical season for this species is May to the end of July.

Strait of Belle Isle Fisheries
Lumpfish Catch from 4Ra, 1984-97



1208-9.CDR 19NOV88 (C&P)

Figure 6.8
LUMPFISH CATCH FROM 4RA BY QUANTITY AND VALUE,
1984 TO 1997

Fishers identified Yankee Point as a good lumpfish area, even though it is not a particularly good lobster fishing area. Other fishers noted that there was also lumpfishing off Winter Cove. It is harvested in these locations primarily by fishers from the local area but fishers from farther east sometimes transport their vessels to grounds to the southwest, some as far as Burgeo, to harvest lumpfish. Very little lumpfish is harvested on the Labrador side of the Strait.

6.2.4 Herring

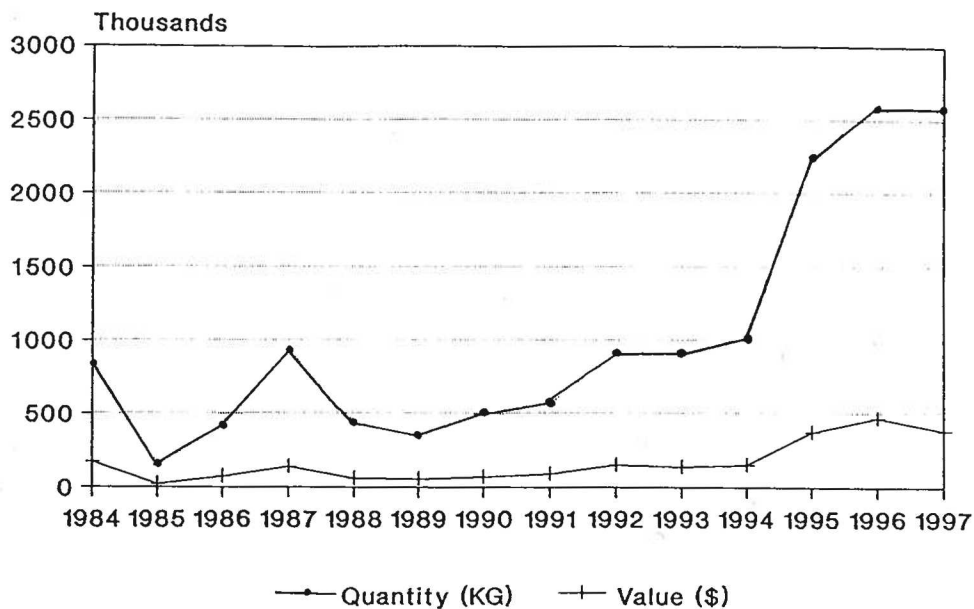
This species is not of great commercial value but is caught in significant quantities by most area fishers, some for sale and some for bait for the crab, cod and lobster fisheries (as is mackerel in smaller quantities). Herring landings have been increasing since the early 1990s (Figure 6.9). Herring are harvested from April to December, primarily with gillnets, although smaller quantities are taken in mobile seines and traps. These gillnets are set near the shore in most areas along the coast in depths less than 18 to 36 m (10 to 20 fathoms). Some local fishers have also been known to travel to distant ports to harvest this species.

Fishers report that although herring fishing occurs off Yankee Point, in general it is more abundant (on the Newfoundland side) to the north in the area between Flowers Cove and Green Island Brook. On the Labrador shore, fishers report herring fishing from Point Ste. Charles to L'Anse au Clair and to the east of that community towards Forteau Point.

6.2.5 Cod

Before 1994, cod was the principal fishery in 4Ra and the Strait of Belle Isle, making up, on average, 72% of all landings by quantity and 54% by value. Since the closure of this fishery in 1994, cod has only been fished in any significant quantity in 1997 and 1998, when a limited and carefully-monitored fishery was permitted (Figure 6.10). Nevertheless, it is not impossible that a full-scale cod fishery will resume by 2003. Before the moratorium, most (70%) of the cod taken in 4Ra was harvested using mobile otter trawls; smaller quantities were caught with gillnets (15%) and with longlines (9%). In 1997, most (73%) was caught using longlines, with smaller quantities taken in gillnets (15%) and baited hand lines (11%), reflecting the structure of the quotas that year.

Strait of Belle Isle Fisheries
Herring Catch from 4Ra, 1984-97



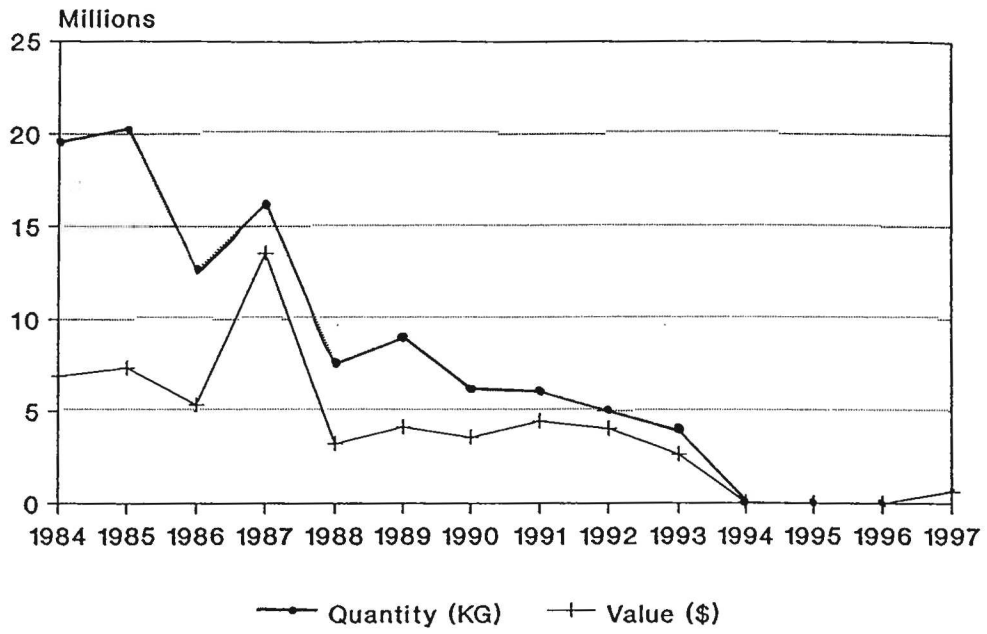
(Catch landed in Nfld/Labrador)

Canning & Pitt 1998

1208-10.CDR 19NOV98 (C&P)

Figure 6.9
HERRING CATCHES FROM 4RA BY QUANTITY AND VALUE,
1984 TO 1997

Strait of Belle Isle Fisheries
Cod Catch from 4Ra, 1984-97



1208-11.CDR 19NOV98 (C&P)

Figure 6.10
COD CATCH FROM 4RA BY QUANTITY AND VALUE,
1984 TO 1997

Otter trawls can weigh up to 5,000 pounds (2,250 kg) and are dragged over the seabed; they consist of two 1,200 to 1,500 pound (450 to 680 kg) "doors" which keep the trawl nets open and ensure that the trawl fishes close to the bottom. The typical tow length for cod otter trawls is approximately 5 km. Fishers believe this gear may have a more significant effect on the seabed than scallop dredges, sometimes scouring the bottom to depths of a metre or more. Fishers suggest that this gear could pose a greater threat to the power cable than scallop dredges.

Gillnets and longlines (also known as baited trawls) are fixed gears typically anchored to the seabed.

Cod was harvested extensively throughout most parts of the Strait in the same areas where the scallop fishery is now concentrated. Areas off both Forteau Point and Flower's Cove, as well as areas farther out into the Strait between Eddies Cove East and Cape Bauld, were identified as prime fishing grounds for vessels in the otter trawl fleet. (Some fishers noted that past attempts to harvest cod off Pointe Amour met with little success as the bottom conditions are unsuitable.) Fishers report that before the moratorium the project area was a productive region, especially for otter trawlers.

Labrador-based fishers report that cod has also been harvested with various fixed gears in most parts of L'Anse au Clair Bay and from there out into the Strait for a distance of about 10 km. In the past, cod traps were also set relatively close to shore in approximately 14 to 16 m (8 to 9 fathoms) of water. Handlines and nets were used to harvest cod in nearshore locations between Blanc Sablon as far east as Schooner Cove, just east of L'Anse au Loup. This species has also been taken with baited trawls (i.e., longlines) in a relatively large fishing area several kilometres east from L'Anse au Clair as far as the community of Pinware.

In addition, it was a common practice along much of the coast on the Newfoundland side of the Strait for some small-boat fishers to transport their vessels to grounds to the west, often as far as Cow Head, to harvest cod and other species.

If Gulf cod resources return to their previous levels, local fishers say they intend to resume their former harvesting patterns and pursue this species on their traditional grounds throughout all parts of the Strait, including those within the project area.

In 1997 and 1998, most of the cod harvested in the project area was caught with handlines on grounds relatively close to shore, near the fishers' home ports, as shown on Map 1.

Several fishers in the Strait are also involved in the sentinel cod fishery but none have been active directly within the project area.

6.2.6 Aquaculture

At present, there are no aquacultural operations within the project area and the consultants are not aware of any current plans to develop such activities. The closest aquaculture site is a mussel farming operation in the Noddy Bay area, in the northern end of the study area.

6.3 Fisheries Concerns and Issues

As discussed in Section 5.4, a series of meetings and interviews was conducted with representatives of area fisher associations and individual industry participants in major landing ports in the study area. The objective of this consultation process was to inform fishers of anticipated marine project activities, and to obtain additional information on current commercial species, past fishing practices for groundfish now under moratorium, the location of fishing grounds for each species, and other traditional knowledge related to the predicted zone of influence. In addition, the sessions provided an opportunity for fishers to raise any concerns that they might have, and to suggest measures for minimizing any conflicts or interference with fishing activities.

In September – October 1998, meetings took place in the Cook's Harbour, Straitsview, Flower's Cove, L'Anse au Clair, L'Anse au Loup, and Red Bay areas. The meetings were arranged, in advance (2-3 weeks), through telephone contacts with Chairpersons of the relevant community/area-based Fisher Committees. Calls were also made to Vice-Chairs and/or individual fishers to inform them of the proposed meetings, the issues to be discussed and the planned meeting venue (usually a community hall and/or regular fisher meeting place). Committee Chairs agreed to telephone/contact fishers in their community or area and ask them to attend the meeting. In most cases, fisher consultations were organized on an area basis. An appropriate central location was established in consultation with the fisheries representatives, and fishers from the surrounding/nearby communities travelled by car to the meeting venue. The number of fishers attending each meeting ranged from one (in Cook's Harbour) to about 12 (i.e., in L'Anse au Clair and L'Anse au Loop). With a few exceptions, the turn out was representative of area fisheries interests. In total, about 35-40 fishers attended the meetings. In addition, approximately 15 other fishers were contacted by telephone prior to the field research, during the time the consultants were in the area or through follow-up calls after the area-level meetings were completed.

Project information was presented to attendees primarily through the information sheet. The consultants also utilized various graphs and data sheets and maps which summarized various catch and effort data, and known locations of fishing grounds, on both a community and area basis. These materials were prepared beforehand, though some of the maps were developed during the consultation process. These materials were used to present and discuss project information, with respect to the locations of fishing activities along or in the vicinity of proposed project activities, such as the possible cable crossing routes and landfalls. The general format of the meetings was as follows:

- an introduction of the consultants, noting the purpose of the meeting and the fisheries information they hoped to obtain;
- a general description of the proposed project activities (using the information sheets and other project-related information);
- a presentation by the consultants on the area's fisheries (for ground truthing, and to make sure that new, emerging fisheries had not been missed). This consisted of information drawn from DFO catch and effort data series at the community and regional (SS) level using graphs, tables and species data, and information on licence regimes, seasons, etc. collected from DFO managers;
- fishers offered comments on, and additions to, the data presentation. This information was recorded by the consultants;
- fishers were then asked to discuss their concerns about proposed project activities, and to raise further questions about specific aspects of the project (i.e., preferred cable route options, landfall issues, technical data concerning the cables, bottom fishing in the potential cable areas, etc.);
- when fishers had finished their questions, the consultants asked the fishers to indicate on large scale charts (provided by the consultants) their usual fishing locations, vessel activity patterns, etc. This information was recorded on both the large and smaller scale marine charts, and was reviewed when all of the data had been presented; and
- fishers were thanked for their attendance and invited to contact the consultants if they had any further questions or issues. Extra copies of the information sheet were left, usually with the Committee Chairperson for distribution to other local fishers who had not been able to attend the meeting.

Consultations also took place in the Plum Point and Port au Choix areas during that period. In the Plum Point area, the consultants organized a day-long 'open house' in a large room in the local motel, and invited fishers in the area to drop in at a convenient time during the day and evening. Since only a few fishers were able to attend, the consultants subsequently met on an individual basis with various fishers at their residences. In the Port au Choix area, since many fishers were still actively fishing, it was not possible to assemble a group in one location. Consequently, the consultants identified several key fishers and took the project information to their residences, leaving behind additional copies of information sheets with Committee Chairpersons, or well-known fishers, for them to distribute to others in the community/area. Summaries of the consultations are provided in Appendix C and the information sheet used during the sessions is provided in Appendix D.

The following section and Table 6.4 describes the key issues, concerns and questions raised by study area fishing industry participants during the consultation process.

Table 6.4 Results of the Consultation Process

Meeting	Area Represented (SS)	Key Fisheries	Summary of Issues & Concerns
Cook's Harbour Area Meeting (September 13, 1998)	Cook's Harbour, Wild Bight (in SS 1), and North Boat Harbour (SS 49).	lobster, scallop, shrimp and lumpfish	It is expected that the proposed power cable will have little or no effect on fishers in this area, except for locally-based scallop vessels which might be fishing that species within the proposed route.
Straitsview Area Meeting (September 13, 1998)	Raleigh, Ship Cove/Cape Onion, Hay Cove and Straitsview (SS 1), and Noddy Bay, Quirpon, Griquet and St. Lunaire (SS 2).	herring, capelin, scallop, lobster and lumpfish	<p>Project activities would have little or no effect on locally-based fisheries. However, power cable construction activities could affect scallop fishers from this area if these operations took place during the scallop season.</p> <p>If the cod fishery returns to past levels, project activities might interfere with their cod fishing activities in or near the cable route.</p>
Flower's Cove Meeting (September 14, 1998)	Anchor Point, Flower's Cove, Nameless Cove, Savage Cove, Shoal Cove East, Sandy Cove, Pines Cove, Green Island Cove, Green Island Brook and Eddies Cove East (all in SS 49)	scallop, lobster, cod and lumpfish	<p>Most of project-related effects would be those generated by construction (trenching and burying of the cables) of the submarine power cable. Thus, except for some potential interference with several site-specific, nearshore fishing activities, most of the project-related effects would be on the larger cod and scallop vessels using mobile/towed gear.</p> <p>During construction activities, the most significant effect would be on scallop fishing activities. All three alternative routes would cross through the main scallop fishing area, and thus could affect many scallop fishers from this part of the Project Area.</p> <p>Construction activities might also temporarily interfere with or disrupt any mobile or fixed gear cod fishing activities within, or near, the cable route.</p> <p>Construction activities might also affect several inshore/nearshore fixed-gear fishing activities, or alter the fisheries habitat, in the vicinity of the cable landfall. These effects might be either temporary (during construction) or long-term (as a result of the placement of permanent facilities).</p>
L'Anse au Clair Area Meeting (October 19, 1998)	L'Anse au Clair, Forteau/English Point (all in SS 50).	scallop and cod	During construction, the most significant effect would be on scallop fishing activities, and on any mobile-gear fisheries for cod (if they resume before the project begins). All three

Meeting	Area Represented (SS)	Key Fisheries	Summary of Issues & Concerns
			<p>alternative routes would cross through the main scallop fishing area used by these fishers.</p> <p>A route originating at L'Anse au Clair – and ending at either Winter Cove or Yankee Point – could interfere with several other established fixed-gear fisheries by locally-based vessels. During construction activities, there would likely be fisheries for such species as herring, capelin and urchins in various nearshore grounds in the vicinity of the cable route. At present, these species are harvested in most parts of L'Anse au Clair Bay and from there out into the Strait for a distance of about 10 km, on either side of the proposed route originating at this community.</p> <p>Fishers are concerned that ongoing scallop dragging operations could dig trenches in the sea bed and expose parts of the cable.</p>
L'Anse au Loup Area Meeting (October 19, 1998)	L'Anse au Loup, Pinware, Capstan Island, West St. Modeste and L'Anse Amour (all in SS 50).	scallop and cod	<p>Corridor trenching and cable burying operations could affect established mobile-gear fishing activities for cod and scallop, and may also disrupt some fixed-gear fisheries in the general vicinity of Forteau. All three alternative power corridor routes would cross through their main scallop fishing area.</p> <p>Construction activities (blasting, trenching and rubble) might change their established fishing patterns. If so, they might have to "re-learn" where the bottom is safe to fish.</p> <p>The Forteau to Yankee Point route would be the best alternative since it would have the least effect on scallop activities.</p>
Red Bay Area Meeting (October 20, 1998)	Red Bay (SS 50)	scallop, herring, lumpfish, cod and squid	<p>Although fishers feel that the proposed power cable corridor will have little or no effect on most fishers in this area, there was some concern that the project could affect one local scallop vessel and some traditional cod fishing activities if some Red Bay fishers resume their practice of harvesting cod in established handlining grounds for this species near the community of L'Anse au Clair.</p>
Plum Point Area Consultations (September / October 1998)	St. Barbe, Black Duck Cove, Forrester's Point, Current Island, Pond Cove, Blue Cove, Plum Point, Brig Bay, Bird Cove, Shoal Cove, New Ferolle, Reef's Harbour (SS 49), and Bartlett's Harbour and Castor's River (SS 48)	lobster, scallop and lumpfish	<p>The proposed power cable will have little or no effect on most fishers in this area since most of the community-based fishing activities take place near fishers' home ports well away from the Project Area.</p>

Meeting	Area Represented (SS)	Key Fisheries	Summary of Issues & Concerns
Port au Choix Area, (September / October 1998)	Barr'd Harbour, Eddies Cove West, Port au Choix (SS 48) and Port Saunders (SS 47)	lobster, shrimp, cod, turbot, crab and herring	<p>Fishers expect that the proposed power cable will have little or no effect on most fishers in this area. Most of the community-based fishing activities take place near fishers' home ports well away from the Project Area.</p> <p>A possible exception is the potential for some disturbance to the 8-9 scallop vessels from this area which would likely fish this species, along with other study area vessels, within the Project Area. There might also be some temporary interference with any mobile-gear fisheries for cod if they resume before the project begins. All three alternative routes would cross through the main scallop fishing area currently used by these fishers, as well as through some of the traditional otter trawling grounds which larger vessels have used in previous years.</p>

Construction Issues. Fishers are concerned that marine activities associated with trenching and blasting activities along the cable route may affect fishing gear or fishing vessels in the immediate vicinity. Such interactions could reduce the efficiency of fishing activities, or result in the exclusion of some fishing activities during the construction period. Specific concerns raised include the following:

- Fishers were concerned with conflicts between the timing of construction activities and their fisheries; they would prefer that construction take place in the fall, e.g. September – November, thereby avoiding conflict with most commercial fisheries.
- Fishers noted that all three of the proposed power corridor/cable crossing routes pass through fishing grounds, and in particular "prime" scallop grounds, presently used by most, if not all, Straits-based scallop fishers. Unless scheduled outside of the scallop season, project construction activities and associated vessel traffic might interfere with many scallop fishers. More specifically, they noted that:
 - the L'Anse au Clair - Yankee Point alternative would be the most problematic route since, according to local scallop fishers, their best grounds are located in this part of the proposed cable corridor.
 - a route terminating in Winter Cove would interfere with lobster activities there if construction occurred during the lobster season. (The Winter Cove area is considered to be very good ground for this species.)
 - other local inshore/nearshore fixed-gear fishing activities in the vicinity of the cable landfall might also be interfered with, especially a route originating at L'Anse au Clair and ending at either Winter Cove or Yankee Point. During construction activities, there would likely be fisheries for such species as herring, capelin and urchins in various nearshore grounds in the vicinity of the corridor.

- Fishers from several communities voiced the opinion that a cable routing to the north of the existing routes, from Pointe Amour to Yankee Point, would be better than any of those now proposed. Of the three routes currently proposed, the Forteau to Yankee Point route was clearly identified as the best. Fishers were most concerned with the portion of the preferred alternative which runs to the northeast along the Newfoundland Trough since this is the most active dragging area.

Table 6.5 shows how area fishers rank potential routings.

Table 6.5 Rankings of Potential Routes

Potential Routes	Yankee Point	Winter Cove
Pointe Amour	1	--
Forteau Point	2	--
L'Anse au Clair	3	4

Ranking: 1 = most acceptable, 4 = least acceptable

- Fishers noted that if a L'Anse au Clair to Yankee Point route is selected, it may be necessary for some fishers to relocate fishing gear away from this area during the construction activities. However, if sufficient suitable alternative grounds are not available, they feel that it may be necessary to establish a program to compensate them for any actual economic losses which result.
- If Gulf cod resources improve enough to justify a significant commercial cod fishery, fishers were concerned that project construction activities might temporarily interfere with or disrupt any mobile or fixed-gear cod fishing activities within, or near, the route of the corridor.
- Fishers were concerned about safety risks posed by construction activities, and also about consequent loss of income if these activities resulted in a temporary loss of access to their fishing grounds.
- Fishers were anxious that a good project-fishing industry communications plan be developed in advance of construction activities, to identify key contacts, safety procedures during construction and communications protocols on the water, and to inform construction personnel about the nature and extent of fishing activities in the Project Area.
- Fishers expressed concern about the need for establishing, before construction begins, a mechanism to compensate them swiftly in case their fishing gear and/or vessels are damaged by project debris or other project-related activities.
- Fishers raised concerns about the effects of siltation / sediment transport, particularly on scallop resources.

- Fishers also raised concerns about the effects of blasting on commercial species and fish larvae.

Post-Construction (Operational) Issues. Fishers were also concerned about effects resulting from the continuing presence of the power cables on the seabed and longer-term effects of the construction activities. Specific issues raised during the consultations included the following:

- Fishers were concerned about potential long-term effects on, or loss of, fisheries habitat caused by siltation generated by dredging/trenching operations and the presence of the trench, side-cast debris and mattresses. If these activities resulted in a significant disturbance of the seabed or seabed materials, there might be effects on fisheries resources and/or fish harvesting operations, and it might be necessary to implement seabed restoration or habitat creation measures.
- Fishers were concerned that blasting operations might leave quantities of rocks and rubble on the seabed and thus cause long-term effects such as ongoing damage to mobile gears (e.g., torn otter trawls or broken scallop rakes), or *de facto* loss of access because of the risk of fishing in these areas.
- Fishers felt that it might be necessary to maintain a gear and vessel damage compensation mechanism after construction activities are completed to address any ongoing damage incidents to fishing gear and/or vessels caused by debris and rubble.
- Fishers were concerned that ongoing scallop dredging or cod trawling operations could dig trenches in the seabed in the project area and thereby expose portions of the cable. As a result, scallop rakes (or otter trawls) might become entangled in, and possibly damage, the power cables and/or the fishing gear. (Fishers noted that fishing gear sometimes gets hooked on the trans-Atlantic cable located farther to the north.) They were also concerned about potential harm to themselves as well as their liability for causing damage to the cables. If this resulted in safety concerns, fishers might stop dragging in the area and suffer *de facto* loss of access to the resources.
- Fishers suggested that in heavily-used scallop grounds, the cable might need to be buried deeper than 0.6 m (2 feet), and noted that the sandy, shell-covered bottom should not be included as part of the seabed substrate in calculating and achieving an appropriate burial depth.
- Fishers noted that they have spent 20 years understanding which parts of the seabed are fishable. Construction activities (especially blasting and trenching) might change their established fishing patterns. If so, they might have to "re-learn" where the bottom is productive and safe to fish.
- Fishers also had concerns about the potential for negative physical effects on fish, particularly on lobster, caused by the electrical current passing through the cables, i.e., from electromagnetic fields.

6.4 On-Board Survey

The on-board survey was conducted by Seawatch for the marine fisheries study. The scallop data were entered into spreadsheets for data analysis by JWEL. The raw data for the scallop survey is attached as Appendix B.

The on-board commercial scallop fishery survey was conducted by Seawatch Inc. during the period of July 21 to August 1, 1998. Sampling was conducted on board the following NAFO Division 4R (Unit 401) fishing vessels: "Crystal&Paul"; "Dredge's Venture"; "Valley Breeze"; "Max Maxine"; "Admiral Point"; "Jason&Jamie"; "Labrador Coast"; and the "Cape Fisher". The vessel details (i.e., CFV #, horsepower, tonnage, number of rakes) are presented with the survey dates and individual tow information in Appendix B. Hereinafter, the survey dates are referred to as day of survey as per Table 6.6.

Subsequent analyses of the survey data has produced the following categories of information: CPUE; scallop length frequency distribution; mortality estimates (clucker ratios); tow mapping and density distribution; and by-catch frequencies.

Table 6.6 Summary of Survey Schedule

Day of Survey	Date	Vessels Surveyed
1	35996	"Crystal&Paul", "Cape Fisher"
2	35997	"Crystal&Paul", "Valley Breeze", "Cape Fisher"
3	35998	"Max Maxine"
4	35999	"Crystal&Paul", "Max Maxine", "Cape Fisher"
5	36002	"Crystal&Paul", "Admiral Point", "Cape Fisher"
6	36003	"Crystal&Paul", "Jason&Jamie", "Cape Fisher"
7	36004	"Dredge's Venture", "Labrador Coast", "Cape Fisher"
8	36006	"Cape Fisher"
9	36007	"Dredge's Venture", "Cape Fisher"

6.4.1 Catch Per Unit Effort

In 1998, the scallop fishery began on June 1 and closed on September 13, with a TAC quota of 1,100 tonnes. Each license holder is allowed an equal share of the TAC with weekly catch limits in effect through the season.

The scallop gear used in the area consists of heavy dredges towed behind the vessel, usually consisting of two six-foot rakes (or buckets) each weighing approximately 1,200 to 1,500 pounds (450 to 680 kg). Scallop draggers are restricted to a maximum dredge length of approximately 13 feet (4 m). The normal fishing pattern is to tow the gear parallel to the shore line (i.e., on a southwesterly or northeasterly heading). The gear is typically towed for about 1.2 to 1.6 km before it is pulled in and unloaded.

During the general fishing procedure, the dredge buckets were dumped on a table where all scallops were collected in baskets for processing. These baskets were then weighed (kg) on deck. The sampler then weighed all broken scallops, cluckers (i.e., a dead, empty scallop with both halves of its shell still attached at the hinge), shells, and debris in the basket, and subtracted this weight from the total basket weight to obtain scallop round weight. Care was taken to ensure that the round weight was only the weight of live scallops.

The CPUE results have been calculated using round weight data recorded for all scallops from each tow sampled (see Appendix B). These data are presented in both graphical and tabular formats with CPUE expressed as round weight (kg) catches per tow (tows non-standardized - see below). Basic statistics have been calculated for weight ranges and average catch sizes.

It was noted during the on-board observations survey that the length of time per tow varied with the tide direction relative to the direction of the tow. This was consistent with information provided by vessel Captains that sets were generally longer towing against the tide to cover the approximate same area as tows conducted with the tide. This information on variance of towing times was not considered in the CPUE per tow calculations. However, the density distribution estimates presented in Section 6.4.3 are standardized to round weight of scallops per area (m²) swept by the dredge rakes. Appendix B provides the detailed per tow information which includes the start and end coordinates of each tow and the length of time of each tow set.

The CPUE for individual vessels per day ranged from a low of 18.778 kg/tow on survey day 3 (“Max Maxine”) to a high of 39.0 kg/tow on day 7 (“Cape Fisher”). The average CPUEs including all days sampled for each vessel surveyed are presented in Table 6.7. The average CPUE for the entire data set combined was 31.57 kg/tow. These data have not been standardized and are presented as derived directly from the actual catch per number of tows for each vessel. Appendix B provides tow specific information.

Table 6.7 Average Individual Vessel CPUE

Vessel	CPUE (kg/tow)	Vessel	CPUE (kg/tow)
“Crystal&Paul”	31.12	“Admiral Point”	32.47
“Dredge’s Venture”	34.76	“Jason&Jamie”	32.25
“Valley Breeze”	36.92	“Labrador Coast”	25.79
“Max Maxine”	21.11	“Cape Fisher”	33.53

The data was also grouped into total CPUE per day by combining the data from all of the vessels sampled on each day of the survey. The combined CPUE for all vessels surveyed each day ranged from a low of 18.78 kg/tow on day 3 to a high of 35.30 kg/tow on day 2. Figure 6.11 displays the average CPUE for all vessels combined for each day of the survey.

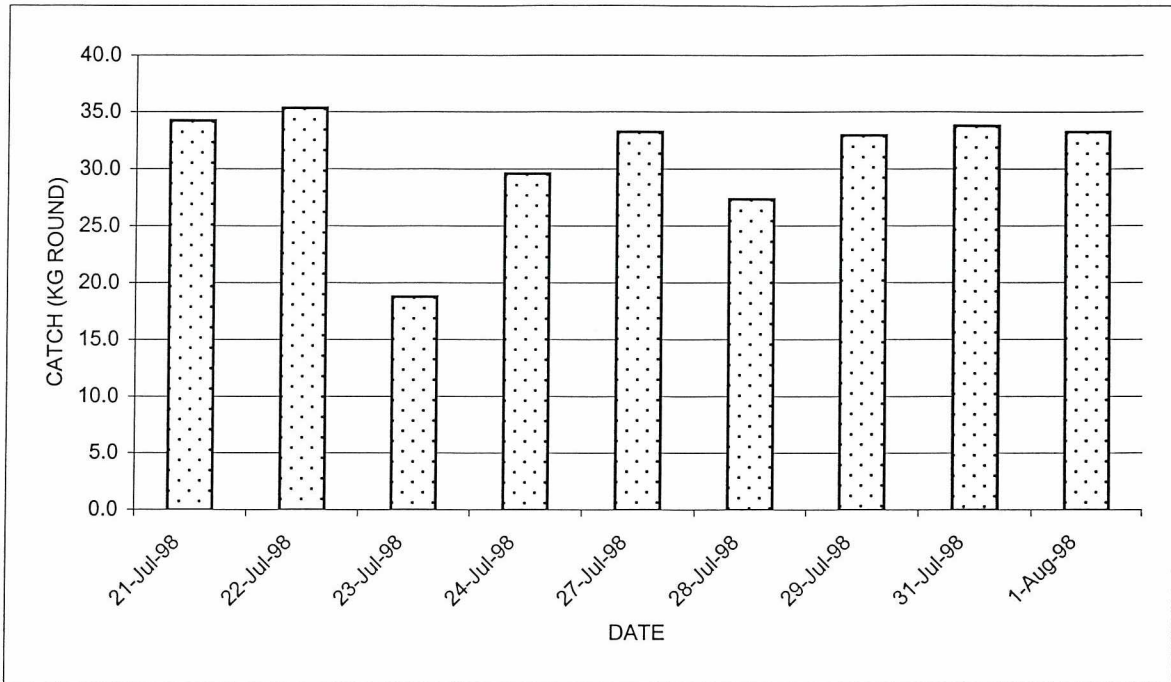


Figure 6.11 Catch per Unit Effort (CPUE) of Scallops from July 21 to August 1, 1998

The current CPUE results (average of 31.57 kg/tow) are generally within the ranges of previous DFO scallop stock status data for this region (DFO 1997) which are listed as season averages of 35, 29 and 32 kg/tow in 1994, 1995 and 1996, respectively. Naidu et al. (1997) further breakdown the stock status data into monthly (1994, 1995 and 1996) and weekly non-standardized (1996) data sets. The previous data from these reports (converted to kg from pounds [$\times 0.4536$]) and corresponding to the approximate time of year for the current survey is presented in Table 6.8. The current 1998 CPUE survey average (31.57 kg/tow) is slightly less than the 1996 data for the same period.

Table 6.8 DFO Stock Status Data

Year	Time Period	CPUE (kg/tow)
1994	July	35.38
	August	28.58
1995	July	28.58
	August	29.94
1996	July	32.21
	August	36.74
1996	July 15 - 21	30.3
	July 22 - 28	32.7
	July 29 - August 4	33.57
<i>1998 (current survey)</i>	<i>July 21 - August 1</i>	<i>31.57</i>

Source: Naidu et. al. 1997

6.4.2 Length Frequency Distribution and Mortality Estimates

The sampling was conducted with scallops selected randomly from the buckets of the dredge on all tows surveyed. The buckets were dumped on a table where all scallops were collected in baskets for processing. For sampling collection the scallops were picked from different sections of the table and generally were excellent random samples representative of the size distribution observed. Measuring of the scallops was performed with a DFO approved measuring board. The scallop length frequencies category consists of the size-length frequency data of live scallops and cluckers (dead scallops with valves still attached). The scallop length frequency histogram is presented as Figure 6.12. It should be noted that due to safety considerations regarding available deck space for sampling on the "Cape Fisher", the observer was able to measure one bucket sample only of scallops for length frequency data (round weight was recorded for all tows).

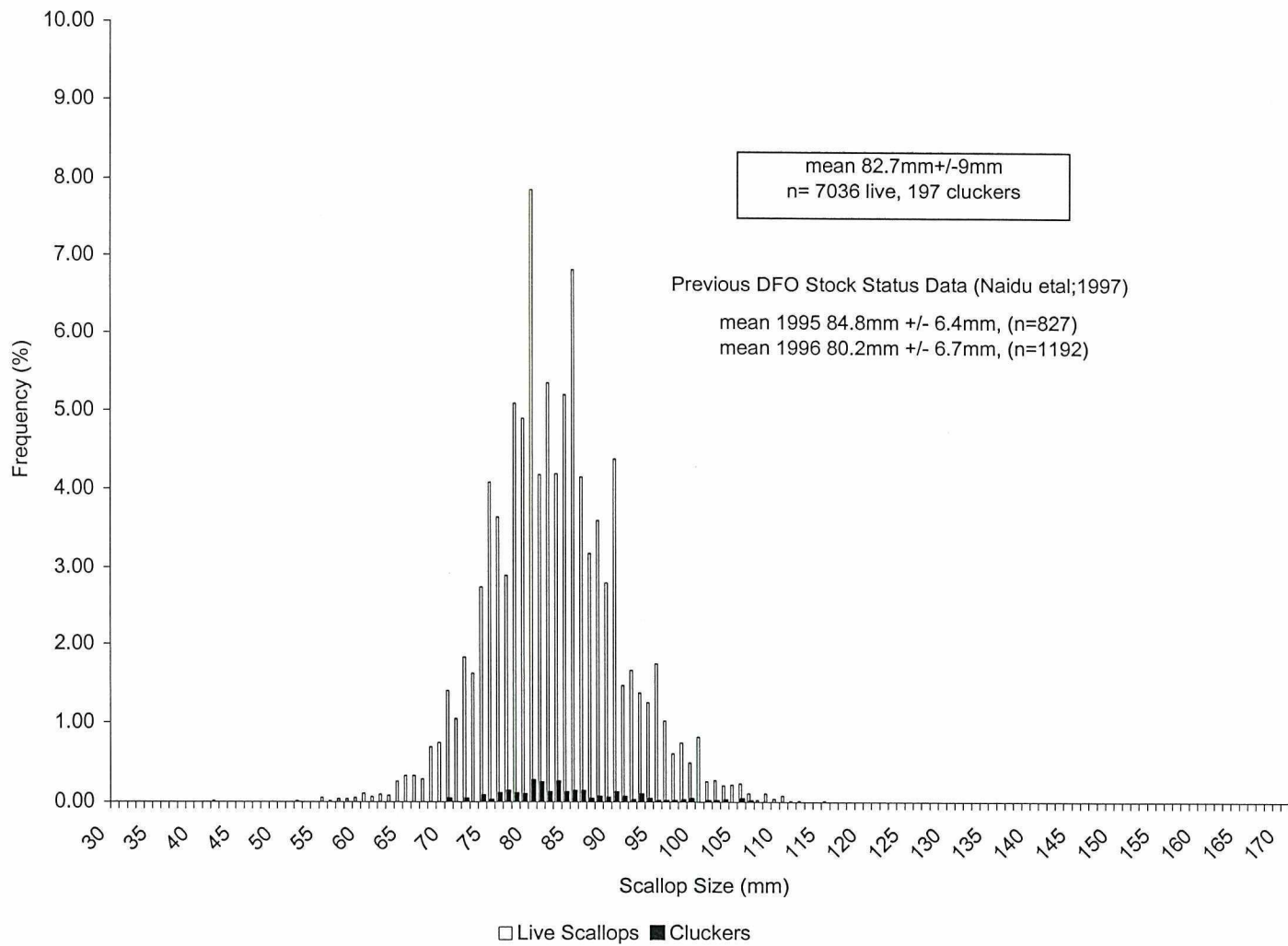


Figure 6.12 Scallop Length Frequency Histogram 1998

The current 1998 survey produced an approximate bell shaped histogram with an average size length of 82.6 mm (n = 7,036). A comparison of scallop length frequency data from commercial fishery data in this region (Naidu, et al. 1997) showed a general shift decrease in size distribution from 1995 (average 84.8 mm, n = 827) to 1996 (80.2 mm, n = 1,192) (see also Figure 6.12).

The presence of cluckers is an accepted measure of a natural mortality index (Dickie 1955; Naidu 1988) and such data has been historically collected for scallop surveys in Abegweit Passage (Worms et al. 1986). The clucker ratio provides an estimate of the mortality of the sea scallop population by relating the number of cluckers to the number of live scallops in the population (Dickie 1955). Merrill and Posgay (1964) found that this estimate is dependent, among other things, on the accuracy of estimating the length of time the valves hold together, which has been estimated to be up to 2 to 2.5 years.

The current survey results indicate a clucker ratio of 0.028. Although no previous specific clucker information is available from the Strait region, the DFO Icelandic scallop stock status report (1997) suggests that natural mortality in the Grand Banks region is in the order of 0.13 to 0.19. DFO (1997) notes that this range is higher than the pre-exploitation average (estimated at 0.05), with the elevation due possibly to gear related mortality. The mortality estimate (clucker ratio) observed in the current survey data is relatively low compared to the DFO Grand Banks mortality estimates.

6.4.3 By-catch Frequencies

The detailed observations and weight recordings of by-catch information for each tow are presented in the field data sheets in Appendix B. The summary of by-catch species observed during the program are presented below in order of highest abundance by kg weight. This information is summarized graphically with percent proportion of by-catch recorded per species in Figure 6.13.

By-catch species observed are presented below in order of descending abundance:

- sea urchins (*Strongylocentrotus droebachiensis*);
- toad crabs (*Hyas araneus*);
- snow crabs (*Chionoecetes opilio*);
- spider crabs (*Libinia emarginata*);
- starfish (*Crossaster sp.*, *Leptasterias sp.*, *Asterias sp.*);
- American plaice (*Hippoglossoides platessoides*);
- Atlantic cod (*Gadus morhua*); and
- squid (*Illex illecebrosus*).

Other species which were noted but not recorded by weight consisted of: sand dollars (*Echinarachnius parma*); whelk *sp.*; clam *sp.*; and halibut (*Hippoglossus hippoglossus*).

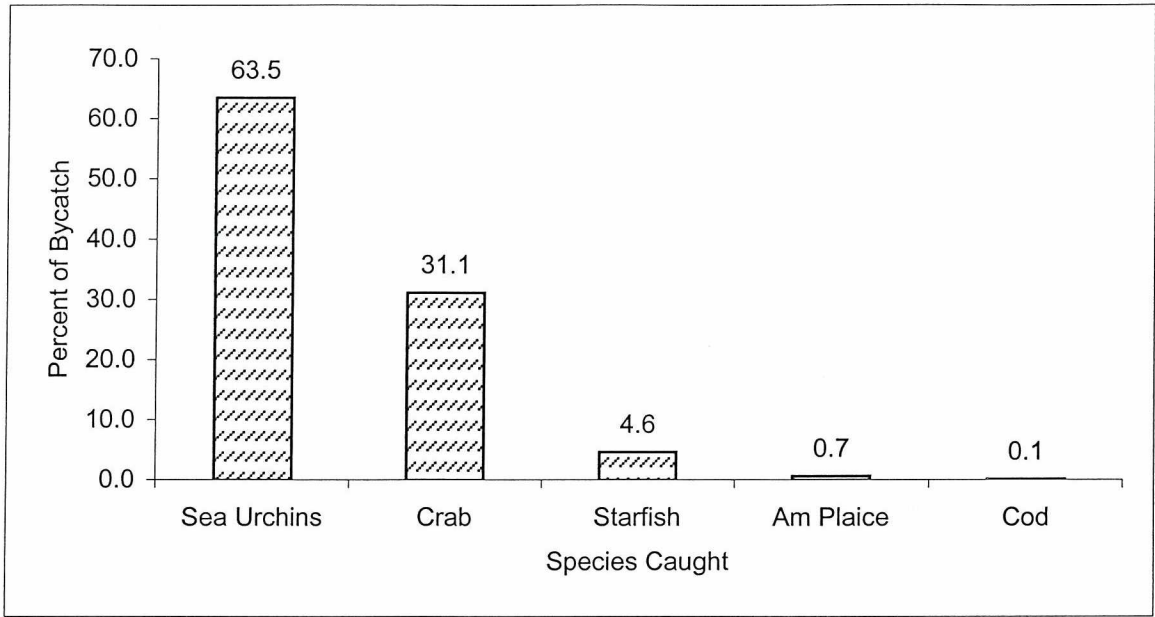


Figure 6.13 Bycatch Frequency Summary

The average recorded by-catch weight per tow was 14.8 kg as based on the data from the total of 476 tows sampled during the survey (total by-catch of 7035 kg). By percent proportion of total by-catch weight recorded, the by-catch species composition was comprised predominantly of sea urchins (63.5 %) and crab species (31.2 %). Crab species included those listed above and consisted predominantly of toad and snow crabs.

6.4.4 Mapping of Tows and Estimates of Density Distribution

The areas swept, based on tow start and end coordinates, are provided in Figure 6.14.

For each tow surveyed, where total scallop weight was recorded, information on estimates of scallop density (by round weight) on the bottom have been derived. The length of each respective tow (start and end coordinates) multiplied by the width of the dredge rakes yields the approximate area of the bottom swept during the tow. The total weight of scallops divided by the area of the respective tow produces an estimate of the density in round weight per m² of bottom swept by the dredge rakes. Scallop draggers are restricted to a maximum dredge length of 4 m, however, the actual length of each dredge was measured for subsequent calculations. Appendix B contains the details of each tow including start and end coordinates and length of the dredge buckets.

The weight per tow (bottom areas swept) provides an indication of the scallop density distribution within the survey area and is illustrated in Figure 6.15.

6.4.5 Summary

JWEL and Seawatch Inc. successfully conducted an on-board commercial scallop fishery survey in NAFO Division 4R (Unit 401) during the period of July 21 to August 1, 1998. Subsequent analyses of the survey data produced information on CPUE; scallop length frequency distribution; mortality estimates (clucker ratios); tow mapping and density distribution (pending digital mapping); and by-catch frequencies. In general, the data collected is comparable and within the ranges of scallop stock status data collected in this region by DFO in 1994, 1995 and 1996.

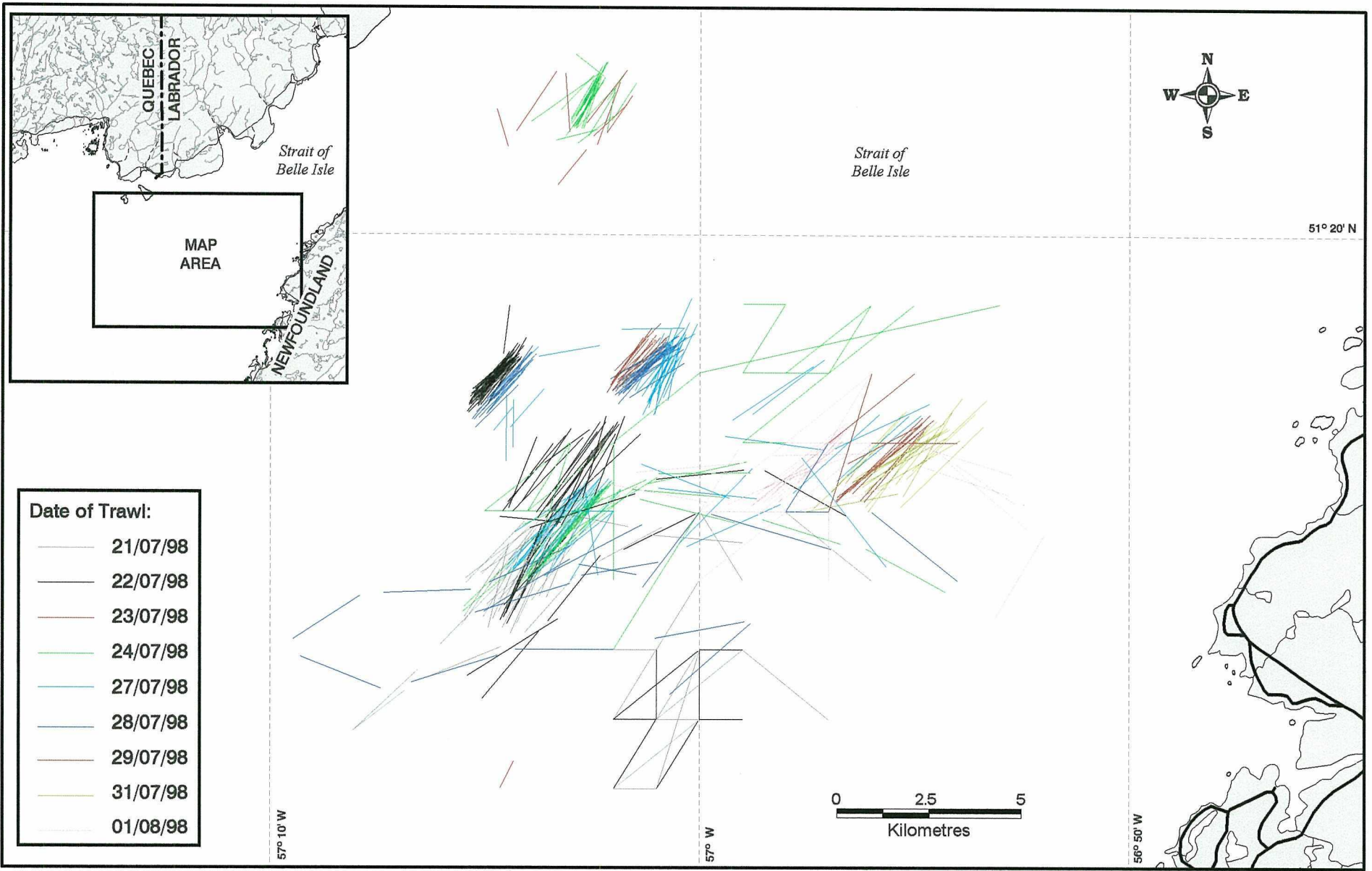


FIGURE 6.14

**1998 MARINE FISHERIES TOWS IN THE STRAIT OF BELLE ISLE
CHURCHILL RIVER POWER PROJECT**



**Jacques Whitford
Environment Limited**
Environmental Scientists
Consulting Engineers

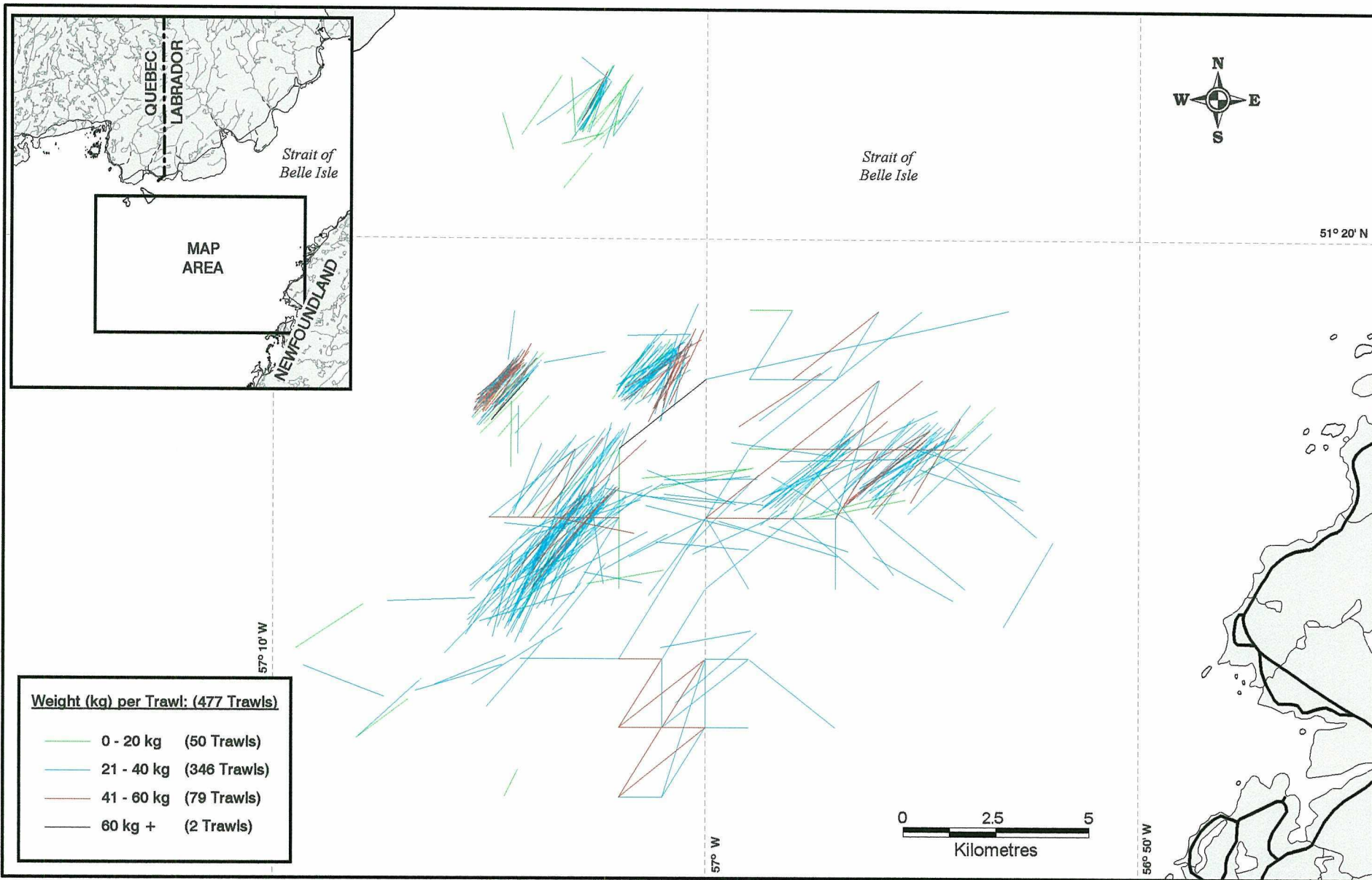


FIGURE 6.15

WEIGHT OF LIVE SCALLOPS PER TRAWL IN THE STRAIT OF BELLE ISLE
CHURCHILL RIVER POWER PROJECT



**Jacques Whitford
Environment Limited**
Environmental Scientists
Consulting Engineers

7 CONCLUSIONS

This section provides an overview of the study elements with a particular emphasis on the relevance of the information gathered. This section does not attempt to summarize the data collected as this is done very effectively in the various report sections.

This work was comprised of a fishing industry consultation exercise, analysis of DFO fisheries data, an on-board survey of scallop fishing vessels, and a literature review.

The fishing industry consultation comprised the largest single work element and represents a considerable effort to gather and organize information from the study area and to relate that information to the proposed project. The result of the consultation provides clear and current indication of the various species pursued by the study area fishers; the temporal and geographical elements of those fisheries; and potential interactions with the project. The uncertainty regarding the eventual cable routing and lack of detailed construction information limited the ability to focus on particular locations or particular fish species. The information which has been collected is suitable as the basis for planning and for consideration in preliminary decision-making on cable routes.

The analysis of DFO data completed as part of this study provides current information on the nature of the fishery within the study area. The information derived from this data analysis provides the basis for a description of the nature of the fishery including such elements as: species fished; numbers of fishers; origin of vessels fishing the area; seasonality of the various fisheries; and landed value for individual species and for all species in the study area. This information is useful in characterizing the area fishery and provides a setting for assessment of potential interactions with the proposed project.

The review of existing literature relating to fisheries and related activities in the area served to confirm the types of fisheries utilization and the potential issues identified in the consultation process. It also confirmed the impressions of the study team that the more focused information gathering, completed in this study, is of greater benefit. Much of the literature reviewed predates the groundfish moratorium of the early 1990s and the geographical areas examined in the studies were often inconsistent with the study area upon which this work focused. As a result of the significant post-moratorium changes to the area's fishing industry, the information given in existing studies did not reflect or forecast current industry conditions. As noted above, the analysis of information from DFO's database provided much more pertinent and timely information regarding the area's fisheries. The information obtained through the consultation process supplemented this data analysis by providing information regarding the nature, as well as the spatial and temporal distribution of fishing activity. Of particular value was the early identification of issues by area fishers that are summarized in Table 6.4.

This study provides useful information regarding fishing activity in the study area within the Strait of Belle Isle which may be considered in project planning and in future environmental assessment and follow-up monitoring, if required.

8 LITERATURE CITED

- DFO (Department of Fisheries and Oceans). 1997. Stock Status Report – Iceland Scallop: Grand Banks of Newfoundland (NAFO Division 3LM) and the Strait of Belle Isle (NAFO Division 4R). St. John's, NF: DFO.
- Dickie, L.M. 1955. Fluctuations in Abundance of the Giant Scallop in the Digby Area of the Bay of Fundy. *J. Fish. Res. Bd. Canada* 12(6): 797-857.
- Merril, A.S. and J.A. Posgay. 1964. Estimating the Natural Mortality Rate of the Sea Scallop (*Placopecten magellanicus*). *ICNAF Res. Bull.*, 1: 88-99.
- Naidu, K.S. 1988. Estimated Mortality Rates in the Iceland Scallop (*Chlamys islandica*). (O.F. Mutler) *J. Shellfish Res.*, 70: 61-71.
- Naidu, K.S., F.M. Cahill, P.J. Veitch and E.M. Seward. 1997. Synopsis of the 1996 Fishery for Iceland Scallop in NAFO Div. 4R (Strait of Belle Isle). Atlantic Fisheries Research Document 97/06. Dartmouth, NS: Department of Fisheries and Oceans.
- Worms, J. and L.A. Davidson. 1986. The Variability of Southern Gulf of St. Lawrence Sea Scallop Meat Weight - Shell Height Relationships and Its Implications for Resource Management. *Ices C.M.* 1986/K: Shellfish Committee. 33 pp.

APPENDIX A

Literature Reviewed by Study Team

- Anonymous. 1993. Analysis of fisheries activities and demographic indicators for coastline sensitivity mapping in preparation for petroleum exploration activities. Sensitivity Atlas for offshore and western Newfoundland. Prepared for the Environmental Studies Revolving Fund.
- ARCO Co. Ltd. 1979. Regional Overview of the Labrador Straits Communities. Prepared by ARCO Company Limited in association with Terpstra Engineering Limited. St. John's, NF.
- BEAK Consultants. 1980. Socio-Economic Study - Transmission. A Report for the Lower Churchill Development Corporation. St. John's, NF.: Lower Churchill Development Corporation.
- Candow, D. 1981. Line Fishing Development, Labrador-Straits 1980. St. John's, Nfld.: Fishing Operations Unit, Development Branch, Department of Fisheries.
- Canning & Pitt Associates. 1991. Analysis of Fisheries Utilization Activities on the West Coast of Newfoundland in Preparation for Summer Seismic Surveys in Nearshore Coastal Waters. Report prepared for Mobil Oil Canada Properties, BHP Petroleum (Canada) Inc, Labrador Mining & Exploration Company Limited and Hunt Oil Company.
- Canning & Pitt Associates. 1992. Assessment of the Fisheries Downturn on the Great Northern Peninsula. Report prepared for the Great Northern Peninsula Central and Nortip Community Futures Committees. St. John's, NF.
- Department of Fisheries. 1982. The Development and Resource Base of the Scallop Fishery in Newfoundland. Data Report Series No. 7. St. John's, NF.: Fishing Operations Unit, Development Branch, Department of Fisheries, Government of Newfoundland.
- DFO (Department of Fisheries and Oceans). 1997. Stock Status Report – Iceland Scallop: Grand Banks of Newfoundland (NAFO Division 3LM) and the Strait of Belle Isle (NAFO Division 4R). St. John's, NF: DFO.
- Dickie, L.M. 1955. Fluctuations in Abundance of the Giant Scallop in the Digby Area of the Bay of Fundy. J. Fish. Res. Bd. Canada 12(6): 797-857.
- Environmental Advisory Committee on Newfoundland and Labrador Marine Transportation. 1989. Potential Issues Associated with Shipping Oil and Gas Through the Labrador Sea and Strait of Belle Isle. St. John's, Nfld.: Environmental Advisory Committee on Newfoundland and Labrador Marine Transportation.
- Felt, L.F. and P.R. Sinclair (eds.). 1995. Living on the Edge: The Great Northern Peninsula of Newfoundland. Newfoundland Social and Economic Paper No. 21. St. John's, NF.: Institute of Social and Economic Research, Memorial University of Newfoundland.
- Gillis, G.G. 1984. Influence of Scallop Rakes on Submarine Pipelines. Report prepared for Mobil Oil Canada Ltd.
- Hodgson, D. 1990. Fishing Communities in Labrador and the Great Northern Peninsula of Newfoundland North of 50°. Economic and Commercial Analysis Report No. 82. Ottawa, ON.: Communications Directorate, Department of Fisheries and Oceans.

- House, J. D. 1988. Inshore fisheries development on the Great Northern Peninsula : Some basic principles. Notes for an address to the fisheries conference of the Great Northern Peninsula Development Corporation, Plum Point, December 2, 1988.
- Jeffers, G. W. 1931. Observations on the Cod-Fishery in the Strait of Belle Isle. Fisheries Research Board of Canada Bulletin. Toronto, ON. Biological Board of Canada.
- May, A.W. 1968. Biological Data on Cod From the Summer Fishery on the North Shore, Strait of Belle Isle. Fisheries Research Board of Canada Technical Report No. 27. St. John's, NF: Fisheries Research Board of Canada.
- Merril, A.S. and J.A. Posgay. 1964. Estimating the Natural Mortality Rate of the Sea Scallop (*Placopecten magellanicus*). ICNAF Res. Bull., 1: 88-99.
- Naidu, K.S. and S.J. Smith. 1982. A Two-Dimensional Systematic Survey of the Iceland Scallop, *Chlamys islandica*, in the Strait of Belle Isle. CAFSAC Research Document 82/4. Dartmouth, NS.: CAFSAC.
- Naidu, K.S. 1988. Estimated Mortality Rates in the Iceland Scallop (*Chlamys islandica*). (O.F. Mutler) J. Shellfish Res., 70: 61-71.
- Naidu, K.S, F.M. Cahill and E.M. Seward. 1996. Abundance of Iceland Scallops in NAFO Div. 4R (Strait of Belle Isle) Declines Further in 1995. Atlantic Fisheries Research Document 96/49. Dartmouth, NS: Department of Fisheries and Oceans.
- Naidu, K.S., F.M. Cahill, P.J. Veitch and E.M. Seward. 1997. Synopsis of the 1996 Fishery for Iceland Scallop in NAFO Div. 4R (Strait of Belle Isle). Atlantic Fisheries Research Document 97/06. Dartmouth, NS: Department of Fisheries and Oceans.
- Newlantic Group. 1988. An Assessment of Opportunities for Further Processing of Cod on the Great Northern Peninsula. Submitted to the Great Northern Peninsula Development Corporation. Plum Point, NF: Great Northern Peninsula Development Corporation.
- NORDCO Ltd. 1982. Transportation and Distribution Requirements of the Inshore Fishery on the Labrador Coast. Volumes I and II. Report prepared for the Department of Fisheries and Oceans and the Department of Regional Economic Expansion.
- NORDCO Ltd. 1984. Analysis of the Potential for Interactions Between Fishing Gear and the Power Cable in the Strait of Belle Isle. St. John's, NF: Lower Churchill Development Corporation.
- Nordic Economic Development Corporation. 1997. Strategic Economic Plan, Zone 6. Towards 2000: Planning Together for a Better Tomorrow. St. Anthony, NF: Nordic Economic Development Corporation.
- Northern Zone Regional Development Associations. 1992. A Position Paper on the Serious Unemployment Situation on the Great Northern Peninsula. Gander, NF: Newfoundland & Labrador Rural Development Council.

- Palmer, C.T. 1992. The Northwest Newfoundland Fishery Crisis: Formal and Informal Management Options in the Wake of the Northern Cod Moratorium. ISER Report No. 6. St. John's, NF: Institute of Social and Economic Research, Memorial University of Newfoundland.
- Palmer, C. and P. Sinclair. 1997. When the Fish are Gone: Ecological Disaster and Fishers in Northwest Newfoundland. Halifax, NS: Fernwood Publishing.
- Red Ochre Regional Board Inc. 1997. Building Our Future Together: Economic Zone 7 (Trout River to St. Barbe) Strategic Economic Plan, 1997-2001.
- Simms, D.A. 1987. "From the Ground Up" : A Discussion Paper Towards Evolving a Northern Peninsula Fisheries Development Strategy. Prepared for the Northern Zone Development Associations.
- St. Barbe Coast Herring Fishermen's Committee. 1975. A Brief to the Government of Canada and the Government of Newfoundland and Labrador Regarding the Crisis in the Herring Fishery on the St. Barbe Coast and the Labrador Straits. St. Barbe, NF: St. Barbe Coast Herring Fishermen's Committee.
- Thornton, P.A. 1979. Dynamic Equilibrium: Settlement, Population and Ecology in the Strait of Belle Isle, Newfoundland, 1840-1940. Ph.D Thesis, University of Aberdeen.
- Whalen, D. J. 1990. Just One Interloper After Another: An Unabridged, Unofficial, Unauthorized History of the Labrador Straits. Forteau, Labrador: Labrador Straits Development Corporation.
- Wilton, G. 1981. Exploratory Fishing for Scallops in Selected Areas from Bonne Bay to the Strait of Belle Isle During 1980. St. John's, NF: Fishing Operations Unit, Development Branch, Department of Fisheries.
-
- Worms, J. and L.A. Davidson. 1986. The Variability of Southern Gulf of St. Lawrence Sea Scallop Meat Weight - Shell Height Relationships and Its Implications for Resource Management. Ices C.M. 1986/K: Shellfish Committee. 33 pp.

APPENDIX B

On-Board Survey Data

The original (January 2001) version of this report included the original raw data sheets from the 1998 on-board surveys in this Appendix B. In the interests of efficiency and brevity, however, these numerous and detailed data sheets have not been included and reproduced here for this Component Study.

APPENDIX C

Fishing Industry Consultation Summaries

COMMUNITY	MEETING DATE
Cook's Harbour Area Meeting	September 13, 1998
Straitsview Area Meeting	September 13, 1998
Flower's Cove Meeting	September 14, 1998
L'Anse au Clair Area Meeting	October 19, 1998
L'Anse au Loup Area Meeting	October 19, 1998
Red Bay Area Meeting	October 20, 1998
Plum Point Area Consultations	September / October 1998
Port au Choix Area Consultations	September / October 1998

Cook's Harbour Area Meeting (September 13, 1998)

Fishing communities. Fishers attending the Cook's Harbour meeting represented fishers from the following communities: Cook's Harbour, Wild Bight (in SS 1), and North Boat Harbour (SS 49).

Overview of fishing activities and grounds. In this area, the most important species are lobster, scallop, shrimp and lumpfish. In the past, relatively large quantities of herring have also been harvested however, although this species is still very abundant, in recent years sales have been low because of a lack of buyers.

In general, there is a clear separation between the grounds used by small versus larger vessels. Smaller boats take most of their catch in local fishing grounds relatively close to shore, while the larger vessels fish farther out into the Strait, or at other locations even farther from their home port. According to local fishers, small-boat activities occur relatively close to shore because of strong tides and rough water in this part of the Strait, particularly in the area outside the mouth of Pistolet Bay.

Consequently, most of the catch for such species as lobster, capelin, herring, mackerel and lumpfish comes from within Pistolet Bay, and the traditional cod trap grounds are close to shore along the coastline between Cook's Harbour west to Boat Harbour. However, cod may also be taken with gillnets on grounds several kilometres off Cape Norman and east towards Belle Isle. In addition, as is the common practice along much of the coast, some small-boat fishers may also transport their vessels and gear (via trailers) to inshore/nearshore grounds to the southwest, as far as Cow Head, to harvest cod or lumpfish.

There are no suitable shrimp grounds in this area. Larger vessels involved in the shrimp fishery harvest their catch either in the Port aux Choix area or on grounds to the north in 2J, off the Labrador coast. Scallop fishers exploit grounds farther from shore (6 to 8 km from the coast) in the area between Cape Norman and Belle Isle. However, while there are relatively large scallops in this area, they are not as plentiful compared to other areas in the Strait. Thus many scallop fishers often travel farther to the west to drag in the area of the proposed cable crossing.

Concerns about the proposed cable:

- Fishers attending the Cook's Harbour meeting did not have any specific questions or concerns about the proposed power corridor. The general view was that it would have no effect on local fishing activities, except for some scallop draggers.

Summary:

- It is expected that the proposed power cable will have little or no effect on fishers in this area, except for locally-based scallop vessels which might be fishing that species within the proposed route.

Straitsview Area Meeting (September 13, 1998)

Fishing communities. Fishers attending the Straitsview meeting represented fishers from the following communities: Raleigh, Ship Cove/Cape Onion, Hay Cove and Straitsview (SS 1), and Noddy Bay, Quirpon, Griquet and St. Lunaire (SS 2).

Overview of fishing activities in the Straitsview area. Though catch levels vary from one community to another, in general fishers in this area depend on five species: herring, capelin, scallop, lobster and lumpfish. With the exception of scallop, most of these species are caught in grounds near the area's home ports. However, as is the case in most fishing communities along the northern portion of the Great Northern Peninsula, some fishers have adopted a strategy of fishing in "distant" locations, well away from their communities, such as in the Port aux Choix area, in Bay St. George, or sometimes as far as Port aux Basques. Species pursued in these "distant grounds" include lumpfish, herring, turbot and, in past years, cod.

Fishers also said that DFO's historical data do not adequately represent their past levels of fishing activity. They noted, for example, that for several reasons some fishers did not accurately report their catches during the period 1984 to 1987. In addition, they noted that the DFO statistics for this area may include data on catches made in NAFO Division 3K (See Map 1).

The following sections describe in more detail local fisheries activities and specific fishing grounds for various species.

Herring and mackerel. In the past herring have been taken in relatively large quantities by local vessels, but the amount harvested in the last two or three years has been less because of lower prices. This species is generally taken on local grounds, close to a fisher's home port, using nets and traps. This gear is set all along the coast, as far south as St. John's Bay (i.e., as part of the "distant" fishery). Mackerel are taken in nets, usually in the same grounds as cod.

Cod. Prior to the moratorium, most fishers from this area fished cod as their primary species, but cod catches have been very low in recent years (e.g., DFO records for 1997 show a total area catch of just over 1.6 tonnes). At present, several area fishers are also involved in the sentinel cod fishery.

Fishers in the Straitsview area stated that, in recent years, cod have not migrated in large numbers into their area. They believe that this is due to the detrimental effects on cod fish habitat, and bottom conditions, from scallop dragging activities to the south. They note that, prior to the moratorium, the scallop fishery in the Strait did not usually start until September, after the cod season was over, and thus did not interfere with cod migration patterns to the same extent. It was noted that, in the past, when cod were more abundant, many fishers did not bother to harvest scallop, even if they had a licence for this species. However, since the moratorium, many fishers have become much more dependent on scallop, as well as on other species, such as lobster.

In the past, fishers from this area have harvested cod on suitable grounds close to their home ports and more extensively in areas on both sides of the Strait or along the Quebec North shore. Local fishers have also harvested this species using cod traps as far south as Rocky Harbour. This species is traditionally taken with a variety of fixed gears, including traps, gillnets, hook and line, jigger and trawls.

If Gulf cod resources return to their previous levels, local fishers would resume their former harvesting patterns and pursue this species on their traditional grounds throughout all parts of the Strait.

Capelin. This species is harvested in suitable grounds along the shoreline from Cape Bauld to Cape Gregory. Bar seines and/or traps are generally set close to shore, usually in water less than 18 m (10 fathoms).

Scallops. In the past, local vessels have harvested this species throughout the entire Strait area (i.e., on suitable grounds between Belle Isle as far south as Anchor Point). Though there are five scallop licences in this area, in recent years only one local vessel has been actively involved in this fishery.

Though scallop may be found on grounds in water less than 45 m (25 fathoms), in general the best grounds are in deeper (55 m or 30 fathoms) areas where the bottom consists of rock and gravel. The normal fishing pattern is to tow the gear parallel to the shore.

Other species. Several other fisheries are pursued in the Straitsview area. Lobster are not generally found east of Raleigh. The usual season for this species is from 15 May to 17 July. Pots are set on suitable grounds close to the shore and fishers in this area are permitted to fish 300 traps each.

Small quantities of flounder are harvested with nets generally set in the same grounds used for cod. Lumpfish are taken with nets set in relatively shallow water (less than 55 m (30 fathoms) along the coast, from Cape Bauld as far south as Burgeo (as part of the "distant" fisheries). Whelk, a relatively new, "experimental" fishery, are harvested with pots in grounds close to shore in 9 to 11 m (5 to 6 fathom) water. An individual fisher might use up to 400 whelk pots. This gear may be purchased or constructed locally, using a "modified" five-gallon plastic bucket.

Sea urchins are not harvested to any extent in this area, though several fishers are presently considering getting into this fishery. There is no significant local fishery for squid. However, when it is available, this species is generally taken with jiggers. None of the fishers in this area have crab licences.⁴

Concerns about the proposed cable

- Fishers wanted to know if the electrical current in the cable would have any negative physical effects on fish, particularly on lobster.
- They were also concerned about the potential effects on fishing activities, water quality and bottom conditions from siltation generated by dredging/trenching operations. This issue was raised in connection with their general view that scallop dragging to the south has affected sea-bed areas and, as a result, has altered the migration patterns of cod.

⁴ Fishers noted in passing that their area is the only one in the entire Province where local fishers do not have licences, or quotas, for this species, even though there are crab resources close by, in NAFO Division 3K, which might be made available to them.

Summary:

- Consultations with fishers in this area indicate that project activities would have little or no effect on locally-based fisheries. However, power cable construction activities could affect scallop fishers from this area if these operations took place during the scallop season.
- If the cod fishery returns to past levels, fishers in this area may also resume their practice of harvesting this species throughout the Strait. If this is the case, project activities might interfere with their cod fishing activities in or near the cable route.
- Fishers suggested that, if the project proceeds, construction activities should take place in the fall (e.g., between September to December) when there is little, if any, fishing activity. This would avoid most potential for conflicts or interference.

Flower's Cove Meeting (September 14, 1998)

Fishing communities. Fisheries participants attending the Flower's Cove meeting represented fishers from the following communities: Anchor Point, Flower's Cove, Nameless Cove, Savage Cove, Shoal Cove East, Sandy Cove, Pines Cove, Green Island Cove, Green Island Brook and Eddies Cove East. (Note: The study team also hand-delivered additional copies of the information package to other area fishers who were not able to attend this meeting. Fisher representatives attending the Flower's Cove meeting also agreed to provide this information to fishers in other communities).

Overview of fishing activities (Eddies Cove – Flower's Cove – to Anchor Point). In this area, the main fishing season is from mid-May/early June to mid-October, even though the Strait does not usually freeze over until January.

The most important economic species in this area are scallops, lobster, cod and lumpfish. Though relatively large quantities of herring and mackerel are taken, these species are not as important economically and, though some vessels depend on shrimp and crab, these species are not harvested in the project area. (All of the shrimp, and some of the crab, harvested by local vessels is caught in the southern portion of UA 4Ra, primarily in areas below Port aux Choix, in deeper water where the bottom is sandy. Other vessels catch crab off Mary's Harbour.)

Scallops. The usual scallop fishing season is from June 1 to the last of August, or until the TAC/quota is taken.⁵ In 1998, the overall TAC was 1,100 tonnes (down from 2,100 tonnes in 1994), and each licence holder had an equal share of the overall quota. Vessels were also subject to weekly catch limits.

In this area (as is the case in most other parts of the study area) most scallop draggers are 35 to 45 foot (10.7 to 13.7 m) vessels typically powered by 300 HP motors, though some are larger, more powerful vessels (e.g., boats up to 55 feet (16.8 m) in length equipped with 600 - 700 HP engines).⁶

Scallop gear consists of two 6-foot (1.8 m) rakes (or buckets) each weighing about 1,200 to 1,500 pounds (450 to 680 kg). Scallop fishers noted that most draggers frequently fish along the same path for a day or two at a time, if they continue getting a good catch and, as such, they say it is possible that the rakes/buckets may be digging a trench (possibly 1 m (3 feet) deep) into the substrate of the sea-bed. (It was suggested that otter trawl gear operated by a more powerful, larger vessels might dig an even deeper trench.)

Scallop vessels from Flower's Cove to Anchor Point area (and from other locations such as Cook's Harbour, etc.) drag for scallops in the deeper part of the Strait, but it was noted that any part of the Strait is "fishable" if scallops are found.

⁵ In 1998, the scallop fishery commenced on June 1 and closed on September 13.

⁶ According to local fishers, most of these larger boats were formerly part of the 4RS otter trawl fleet which, since the moratorium, have had to focus on alternative species (e.g., scallop). However, fishers said that, in the last few years, most of these vessels have switched to northern shrimp as their preferred species. These particular shrimp resources are currently harvested well to the north of the study area, off the Labrador Coast.

In the past, local scallop vessels have fished this species to the north of their area (e.g., on grounds between Big Brook over to Red Bay). However, in the past few years, most of the scallop harvest has been concentrated below (south of) a line from Yankee Point across the Strait to about Forteau, and this area is considered the "prime" scallop fishing area by most fishers, on both sides of the study area.

It was noted that suitable scallop grounds north/east of this imaginary line are not found until about Red Bay. Thus fishers at this meeting said that, if they fish above the Forteau-Yankee Point line, they generally have to travel well to the north (i.e., to grounds closer to Belle Isle) before scallop are abundant enough to be harvested in sufficient quantities to make it worth their while.⁷

Fishers noted that for the last five years all scallop vessel operators have been required to record the latitude and longitude of where they fish. However, most operators record the position of the general area fished on a given day only, rather than the specific long/lat of the starting-ending point of each tow.⁸

Lobster. In this area of the Labrador Strait, the lobster season is from mid-May to about July 10. This species is harvested at suitable locations all along the shoreline, usually in water less than 36 m (20 fathoms). There is no lobster ground in the area of the proposed cable landfall at Yankee Point. However, nearshore areas off Winter Cove (a short distance from the community of St. Barbe, and the landfall of another route alternative) are said to be prime lobster grounds.

Cod. At present cod may only be harvested with hook and line gear, though in previous years fishers used a wide range of gears (e.g., nets, otter trawls). Cod were harvested extensively throughout most parts of the Strait in the same areas where the scallop fishery is now concentrated. Areas off both Forteau Point and Flower's Cove, as well as areas farther out into the Strait between Eddies Cove East and Cape Bauld, were identified as prime otter trawling grounds. (It was also noted that, in the past, attempts to harvest cod off Pointe Amour met with little success as the bottom conditions are not suitable for this species.)

Otter trawl gear, which uses two 1,200 to 1,500 pound (450 to 680 kg) "doors" (to keep the trawl open and fishing close to the bottom), can weigh up to 6,000 pounds (2,250 kg), and fishers believe this gear may have a more significant effect on the sea bed compared to scallop gear.

⁷ At the Flower's Cove meeting, the study team discussed the peculiar pattern of fisheries resource distribution/abundance north of this "imaginary line" in some detail with fishers, especially since they had indicated that all three of the proposed routes would pass through their "prime" scallop and cod (at least in the past) harvesting areas. (This topic was also worth pursuing in light of comments from other fishers based in communities to the east of this line that, since the moratorium, they have seen very few cod in their area. They have blamed this on the scallop draggers, which they say have severely damaged the sea-bed habitat in the area to the west of the imaginary line, thereby altering the traditional migration patterns of Gulf cod.) When these issues were raised with fishers attending the Flower's Cove meeting, one long-standing fisher said that scallop dragging had nothing to do with the fact that Gulf cod were now less abundant in areas to the east. He further noted that, in his experience over the last 30 years, neither cod nor scallops have ever been found in abundance west of the line between Forteau and Yankee Point, even though local fishers have tried "time and time again" to fish both species in this part of the Labrador Strait. Considering this traditional knowledge, he and other fishers have concluded that, for one reason or another, this is a "non-productive" habitat, and another fisher surmised that there appears to be a "gateway" of some kind that seems to prevent either scallop or cod from inhabiting sea-bed areas east of this zone. In short, these fishers do not believe there is a connection whatsoever between the scarcity of cod to the east of the Forteau-Yankee Point line and increase in scallop fishing effort since the closure of the Gulf cod fishery. More important, for this study at least, is that this information supports the case fishers argued that the proposed power corridor runs directly through their prime scallop fishing area.

⁸ Nevertheless, it might be useful to obtain these data for any future, more detailed assessment of project impacts, or as a basis for calculating any "interference compensation" that might be required, etc.

Fishers noted however that, when the Gulf cod resources improve, some or all of these larger vessels may resume their "established" otter trawling activities in the Labrador Straits, in the area of the proposed power corridor.⁹ If so, fishers suggested, these vessels could pose more of a threat to a power cable, even if it was buried to the depths currently proposed.

Lumpfish. As a general rule, lumpfish gear is set in the same grounds used for lobster. Yankee Point was identified as a relatively good lumpfish area, even though it is not a particularly good lobster fishing area.

Other species. Herring are harvested relatively close to shore, in depths less than 45 m (20 fathoms) and, in general, are more abundant in the area between Flowers Cove and Green Island Brook. Herring nets are placed right off Yankee Point close to the proposed cable landfall.

Mackerel are not very abundant in the area; if they are taken, it is generally in deeper water than herring. Fishers also noted that there has been no significant capelin fishery in this area for the past three years or so. (In 1997, Green Island Brook was the only community that had a recorded catch, 2.3 tonnes, of this species.)

Concerns about the Proposed Cable

- The sandy, shell-covered bottom should not be included as part of the sea-bed substrate in considering the appropriate the depth to which the cable will be buried.
- Fishers would prefer a tunnel under the Strait.
- It was also noted, if the L'Anse au Clair–Winter Cove route was chosen, cable construction activities could interfere with the operation of the ferry. In addition, they would probably interfere with local lobster fishing activities, said to be prime grounds for this species, in the vicinity of Winter Cove, whereas there is very little, if any, lobster fishing in the area near the Yankee Point cable landfall.
- Fishers noted that all three of the proposed power corridor/cable crossing routes pass through "prime" scallop grounds presently used by local fishers and by other Straits-based scallop vessels. Unless they were scheduled outside of the scallop season, corridor construction activities would interfere with the scallop fisheries.
- The L'Anse au Clair–Winter Cove alternative would not be a preferred route since, according to local fishers, the best scallop grounds are located in this part of the proposed corridor. In addition, this route would likely interfere with or temporarily disturb nearshore lobster activities at Winter Cove.

Summary:

- Most of the potential fisheries-related effects of the project would be those generated by construction (trenching and burying of the cables) of the submarine power cable. Thus, except for some potential interference with several site-specific, nearshore fishing activities, most of the project-related effects would be on the larger cod and scallop vessels using mobile/towed gear.

⁹ Though there is no guarantee that these vessels will resume their former practices. DFO management policy might not allow highly efficient otter trawl gear to be used in a future, re-opened Gulf cod fishery .

- During construction operations, the most important effect would be on scallop fishing activities. All three alternative routes would cross through the main scallop fishing area, and thus could affect many study area scallop fishers.
- A L'Anse au Clair-Winter Cove route would probably have the greatest effect, since there are relatively productive lobster grounds at the latter site, while a Forteau-Yankee Point route might have the lowest effect, because it would be the shortest route across the Strait and thus would take less time to construct. As such, scallop fishers in the Anchor Point - Flower's Cove area identified this route as their "preferred" alternative.
- However, fishers would prefer a route between Pointe Amour and Yankee Point since this would avoid potential conflicts with scallop dragging in their "prime" grounds.
- In general, Yankee Point would be their preferred Newfoundland landfall location because construction activities would likely have only a minimum interference with established fishing activities. Except for some lumpfish fishing, there are no other major harvesting activities in the immediate nearshore area at this proposed landfall site.
- If the cables are buried to an adequate depth, there should not be any effects during the operation stage of the project. However, fishers expressed some concern that, over time, ongoing scallop dragging or otter trawling might uncover portions of the buried cables. As a result, some gear might become entangled in, and very likely damage, the power cables.
- If Gulf cod resources improve enough to justify a significant commercial cod fishery, project construction activities might also temporarily interfere with or disrupt any mobile or fixed gear cod fishing activities within, or near, the cable route.
- Project construction activities might also affect several inshore/nearshore fixed-gear fishing activities, or alter the fisheries habitat, in the vicinity of the cable landfall. These effects might be either temporary (during construction) or long-term (as a result of the placement of permanent facilities).
- Fishers noted that, if cable construction activities took place after about October 15 and before the ice season, they would have very little effect on/interference with their fishing activities.
- Project construction activities would not interfere with either shrimp or crab fisheries because both of these species are harvested in deeper water well to the south and/or north of the project area.

L'Anse au Clair Area Meeting (October 19, 1998)

Fishing communities. Fishers attending the L'Anse au Clair meeting represented fishers from the following communities: L'Anse au Clair and Forteau/English Point (all in SS 50).

Overview of fishing activities. In nearly all respects, fisheries harvesting operations and vessel activity patterns in this area are the same as those found in nearby communities (e.g., ports in the L'Anse au Loup area). As such, the two most important fisheries in this area are scallop and cod, though the latter is not as significant as it was several years ago. Relatively large quantities of herring and capelin are also harvested, but these species are not a significant component of local fishing incomes.

Scallops. The scallop fishery usually begins on the first Monday in June and continues until the quota is taken, usually in 9 to 11 weeks. Though local vessels may, and do, fish anywhere in the Strait, that is, all of 4Ra, most of the local vessels tend to concentrate below the Forteau-Yankee Point line (along with most other scallop draggers in the Strait). Fishers at the L'Anse au Clair meeting thus confirmed what others had said, namely that scallop are less abundant above this line.

Fishers at this meeting also noted the fact that there are very few scallops taken in a band of the seabed between Pointe Amour and Yankee Point. However, it is not known whether this is due to the fact that these particular grounds are a less-productive, or because fishers have not chosen to fish there. Fishers at other study area meetings believe that scallop are less abundant in this area, while others noted that most vessels choose not to fish there because of the tides in this specific part of the Strait are relatively strong. The Pointe Amour-Yankee Point line is the narrowest part of the Strait and the tide/current from the north generally runs at 9-10 knots. This current, fishers note, makes it a more difficult place to manoeuvre their vessels. Others say that the tides may have some effect on the scallop beds (i.e., they may be preventing scallop from migrating into, and beyond, this area, or else tending to carry them to calmer water and grounds to the south). Fishers noted, for example, that scallop are generally more abundant, and easier to drag, in the general area between Blanc Sablon and St. Barbe, where the Strait is much wider.

Scallop may be caught in shallow or deep water, and local draggers fish any suitable area from L'Anse au Clair south and east to the boundary of the scallop fishing area set aside for Quebec vessels. (Quebec scallop vessels are not permitted to fish in 4Ra, and their scallop dragging activities are all within 4Sw – SFA 14a.) Local vessels may also drag for scallop in suitable grounds between Forteau as far north as Red Bay.

According to local fishers, vessels tend to congregate together in any area where the scallop are first found. As a general practice, they will continue to fish this area until there are no more resources and then move on to another location repeating the same procedure. (For this reason, fishers noted, many operators often do not record the precise longitude and latitude of their catch in the logbooks (in case another fisher might inadvertently discover where a particularly good catch was made).¹⁰

¹⁰ As such, the geo-referenced catch data fishers have to provide to DFO may not be totally accurate. Many operators sometimes record the location of the beginning of a tow some distance away from where they actually started. However, in general, these data may still give a good indication of the general locations where scallop dragging occurs.

Cod. Cod may be taken with both mobile (otter trawls) and fixed gear (traps, trawls, nets and handlines). Otter trawling grounds are in the same general areas used for scallop dragging. Cod traps may be set relatively close to shore in 13 to 15 m (7 to 8 fathoms) of water. Handlines and nets are used to harvest cod in nearshore locations between Blanc Sablon as far east as Schooner Cove (just east of L'Anse au Loup). This species has also been taken with baited trawls (i.e., longlines) in a relatively large fishing area several kilometres from the shore which extends east from L'Anse au Clair as far as the community of Pinware.

Herring and capelin. As noted above, there are only two other species, herring and capelin, taken in any significant quantities by fishers in this area. Herring is caught for both food and bait. The Labrador Fishermen's Union Shrimp Company buys this species as bait for crab fishers operating off Mary's Harbour. Herring nets are set close to shore, generally in water 18 to 27 m (10 to 15 fathoms) deep, in suitable areas between Point Ste. Charles and L'Anse au Clair, and to the east of that community towards Forteau Point, while the traditional capelin grounds (traps and seines) are near the shore along both sides of L'Anse au Clair Bay.

Other species. According to local fishers lumpfish have never been very abundant on this side of the Strait and lobsters are extremely rare. One local fisher has a crab licence, but fishes this species well outside the project area, in the southern portion of 4Ra. There is no record of any shrimp catches in recent years and, although squid sometimes appear in the area, there has never been a commercial fishery for this species. There is some local interest in whelk, and one fisher has recently become involved in the harvest of sea urchins. The latter species is being explored at several shoreline locations, including areas within L'Anse au Clair and Forteau Bays, and along the shore between L'Anse au Diable and West St. Modeste.

Concerns about the Proposed Cable:

- All three of the proposed alternatives would pass through their best scallop grounds.
- They feel there may be a potential for the operating cables to harm fish (e.g., through electromagnetic emanations).
- Fishing gear operations or currents may uncover or expose part of the cable and thereby pose a safety problem or a gear conflict.
- There was also a concern that local communities would not be able to access some of the power from the line going to the Island.

Summary:

- During construction operations, the most important effect would be on scallop fishing activities, and on any mobile-gear fisheries for cod (if they resume before the project begins). All three alternative routes would cross through the main scallop fishing area used by these fishers.

- A cable route originating at L'Anse au Clair and ending at either Winter Cove or Yankee Point – could interfere with several other established fixed-gear fisheries by locally-based vessels. During construction activities, there would likely be fisheries for such species as herring, capelin and urchins in various nearshore grounds in the vicinity of the cable route. At present, these species are harvested in most parts of L'Anse au Clair Bay and from there out into the Strait for a distance of about 10 km, on either side of the proposed route originating at this community.
- Fishers are concerned that ongoing scallop dragging operations could dig trenches in the sea bed and expose parts of the cable. Thus some fishers felt that, in heavily-used scallop fishing grounds, the cable might need to be buried deeper than 0.6m (2 feet).
- Fishers in this area would much prefer to see the power cable laid between Pointe Amour and Yankee Point because it would be safer, and because most of that route would pass through a relatively less-productive scallop area.

L'Anse au Loup Area Meeting (October 19, 1998)

Fishing communities. Fishers attending the L'Anse au Loup meeting represented fishers from the following communities: L'Anse au Loup, Pinware, Capstan Island, West St. Modeste and L'Anse Amour (all in SS 50).

Overview of fishing activities. In this part of the study area, the two main fisheries are scallop and cod (though the latter is not currently harvested to the extent that it was in the past).

Scallop and cod. These two species are caught in roughly the same area, using both mobile (scallop dredges and otter trawls) and fixed (e.g., gillnets, trawls) gear. Scallop licences are distributed among all communities in the area except for Pinware (though one or two fishers may land their scallop catch in this community).

According to DFO, a total of 12 vessels from the Labrador side of the Strait were actively involved in the 1998 scallop fishery. However, fishers at the L'Anse au Loup meeting said that, during the past season, up to 25 scallop draggers were operating on scallop grounds on this side of the Strait.

As a general rule/practice, scallop gear is towed for about three-quarters of a mile up to one mile before it is hauled in and unloaded; whereas the typical tow length for cod otter trawls is about three miles. Fishers believe that scallop gear can often dig down into the sea bed to a depth of 0.6 m (2 feet). (They also noted that, in a typical tow of approximately 2 km, the gear may often take up a tonne of material, including relatively large rocks.)

Though some grounds are better than others, scallops may be fished anywhere in the Strait. While most of the harvesting activities are concentrated in the deeper portions of the Strait, fishers say that water depth is not the determining factor. Thus, vessels often harvest scallops in shallow-water grounds relatively close to shore, if the bottom conditions are suitable.

Cod may also be harvested with fixed gear (gillnets and trawls) as far west as the Quebec border, in the same grounds where vessels from the L' Anse au Clair area also fish this species. In the L'Anse au Loup area, gillnets and trawls may be set relatively close to shore, in 25 m (14 fathoms) of water and, from these locations, out into deeper water in the Strait.

Fishers are relatively optimistic about the future prospects for the Gulf cod fishery and fully expect that by the time the project begins (in 2003), they will be fishing this species at levels comparable to those of several years ago.

Other species. Other species harvested by local vessels include lumpfish (in small amounts), whelk, capelin, herring and sea urchins. As a general practice, herring, urchins and lumpfish are usually harvested within approximately 1 km from the shore. Whelk are generally found close to shore (i.e., less than 2 km) and in coves and bays. Both the whelk and sea urchin are relatively new, "emerging", fisheries. Most of the 1998 urchin catch was bought by the Labrador Fishermen's Union Shrimp Company¹¹ and was processed at Red Bay, while most of the whelk catch was bought by Quebec buyers. (In general, fishers in this area

¹¹ The Labrador Fishermen's Union Shrimp Company has a new, very modern processing facility in L'Anse au Loup.

sell a significant portion of their catch (e.g., shrimp, scallops, cod and herring) to Quebec buyers or processors. The amount of product sold in this market will tend to vary depending on the prices offered.

According to local fishers, lobster are extremely rare in the area and, as such, there are no local licences for this species. However, although both snow crab and rock crab are also relatively scarce, approximately eight fishers in the area hold supplementary licences or temporary permits for these species. In 1997, one fisher set some crab pots on grounds off L'Anse au Clair and caught a small quantity of crab, but another licence holder fishes this species off Rocky Harbour. The two supplementary licence holders use crab grounds farther north, off Mary's Harbour, and land all of their catch in that community.

Fishing grounds. Fishing grounds used by fishers in the L'Anse au Loup - Pinware area, as generally described in the previous section, are shown on Map 1 and 2.

Concerns about the proposed cable:

- Blasting/trenching operations may leave quantities of rocks and rubble on the sea bed and thus cause ongoing, long-term effects such as damage to mobile gears (e.g., torn otter trawls or broken scallop rakes).
- Scallop dragging operations might uncover part of the power cable. (Fishers noted that fishing gear sometimes gets hooked on the trans-Atlantic cable located farther to the north.) They are concerned about potential harm to fishers, damage to gear and the liability of fishers for any damage to the cables.
- They are also concerned that cable construction operations might interfere with scallop and other fisheries in the Strait and that this might result in a loss of income.

Summary:

- Area fishers feel that corridor trenching and cable burying operations would have an effect on established mobile-gear fishing activities for cod and scallop, and may also disrupt some fixed-gear fisheries in the general vicinity of Forteau. As is the case for other fishers along this part of the Labrador coast, all three alternative power corridor routes would cross through their main scallop fishing area.
- Fishers say they cannot be expected to stop fishing during construction of the corridor without adequate compensation.
- Fishers noted that they have spent 20 years figuring out which parts of the sea bed are fishable. Construction activities (blasting, trenching and rubble) might change their established fishing patterns. If so, they might have to "re-learn" where the bottom is safe to fish.

- Fishers said that, from their perspective, the Forteau to Yankee Point route would be the best alternative, mainly because it would have the least effect on scallop activities (because it would take up a smaller portion of the sea bed). This particular route would probably interfere with some fixed-gear fisheries in the vicinity of Forteau, but it would be less disruptive of established nearshore fixed-gear fisheries than a route originating from L'Anse au Clair.
- For the same reasons noted by other fishers on this side of the Strait they, too, would prefer to see the power corridor developed between Pointe Amour and Yankee Point.

Red Bay Area Meeting (October 20, 1998)

Fishing communities. Red Bay (SS 50) is the only fishing community in this area of the Labrador Straits.

Overview of fishing activities and grounds. With the exception of scallop fisheries, all of the fishing activities of Red Bay presently take place on grounds close to the community. The main economic species are herring, lumpfish, cod and squid. According to the Chairperson of the Fishers' Committee, in the past some local vessels also harvested cod in the project area. These involved fixed-gear activities (hand lines) in suitable grounds close to L'Anse au Clair, in the same areas used by fishers from that community.

There is only one scallop licence holder in Red Bay. According to DFO records, that operator is not presently an active participant in the current fishery. There is no record of any scallop catch in this community for 1997.

Concerns about the proposed cable:

- Construction-period and post-construction effects on one locally-based scallop vessel which might pursue that fishery in the vicinity of any of the proposed corridor routes.
- There might also be some effect on cod fishing by local vessels using established handling grounds off L'Anse au Clair.

Summary:

- Fishers feel that the proposed power cable corridor will have little or no effect on most fishers in this area since most if not all of the local fixed-gear fishing activities take place close to the community.
- There is some concern that the project could affect one local scallop vessel and some traditional cod fishing activities if some Red Bay fishers resume their practice of harvesting cod in established handling grounds for this species near the community of L'Anse au Clair.

Plum Point Area Consultations (September / October 1998)

Fishing communities. The area includes the communities of St. Barbe, Black Duck Cove, Forrester's Point, Current Island, Pond Cove, Blue Cove, Plum Point, Brig Bay, Bird Cove, Shoal Cove, New Ferolle, Reef's Harbour (SS 49), and Bartlett's Harbour and Castor's River (SS 48).

Overview of fishing activities and grounds. Though a diverse range of species are harvested by fishers in this area, the main economic species are lobster, scallop and lumpfish and, to a lesser extent, cod and herring. With the exception of scallop dragging, most of these are traditional inshore fisheries which take place close to fishers' home ports, using a variety of fixed-gears such as handlines, nets and traps.

Scallop fishers are based in several communities (Castor's River, Brig Bay, Plum Point, Black Duck Cove and Forrester's Point). Consultations with one scallop fisher in Brig Bay indicated that the larger vessels harvest this species in the vicinity of the proposed cable route in the same areas used by draggers based in other communities farther north, and on the Labrador side of the Strait. In mid-September, some of the larger scallop vessels which had completed their scallop activities had moved on to the northern shrimp fishery off the Labrador Coast, some 260 to 290 km north of Raleigh.

In St. Barbe, the main species are lobster and cod, most of which are taken near the community. According to fishers in nearby communities, the nearshore area in the vicinity of Winter Cove, the proposed landfall of the L'Anse au Clair-Winter Cove corridor route, is said to be a prime lobster ground.

The Chairperson of the Blue Cove Fisher's Committee said that most, if not all of the inshore, small-boat fixed-gear fisheries from that community usually occurred in the area between Forrester's Point and New Ferolle. In the Reef's Harbour area, the smaller vessels catch most of their species near the community, however, in mid-September, two larger vessels from that port were fishing shrimp south of Port au Choix as well as herring (using purse seines) in the Bay of Islands.

Concerns about the proposed cable:

- Potential effects on scallop draggers from the area using the corridor.

Summary:

- Fishers expect no effect on local fisheries, with the exception of scallop draggers fishing in the power corridor.

Port au Choix Area Consultations (September / October 1998)

Fishing communities. This area includes the communities of Barr'd Harbour, Eddies Cove West, Port au Choix (SS 48) and Port Saunders (SS 47).

Overview of fishing activities and grounds. The fishery in this area is dominated by the activities of vessels based in Port au Choix and Port Saunders. Local vessels catch a diverse range of species, however, the principal economic species are lobster, shrimp, cod, turbot, crab and herring. In general, the smaller vessels are involved in the fixed-gear fisheries (e.g., lobster and cod) while the larger vessels concentrate on shrimp, crab and cod, among other species. In nearby communities, such as Eddies Cove West and Barr'd Harbour, most of the catch is made by smaller vessels using various fixed gears to harvest lobster, herring and cod. In 1998, none of the vessels in this area were licensed to fish scallops. (At present, there are no scallop fishers in communities south of Castor's River.)

The Chairperson of the Committee that represents small-boat fishers (including those less than 44 feet (13.4 m) in the Port au Choix area said that most of their vessels catch the bulk of their resources in the Port au Choix area. It was noted, however, that in the past some of the larger vessels (e.g., otter trawlers) fished cod in the vicinity of the proposed power corridor.

Most of the larger (55 to 65 feet (16.8 to 19.8 m)) vessels based in Port au Choix and Port Saunders are from the mobile-gear (otter trawl) fleet which, in the past, dominated the region's fisheries and concentrated primarily on shrimp and cod resources in the Gulf. At present, many of the remaining vessels in this older fleet are engaged in the harvest of shrimp, and currently land the bulk of their catch at the new FPI shrimp processing plant in Port au Choix. Interviews with operators of these vessels confirmed that, except for cod, most of the vessels did not fish in the Project Area.

The Chairman of the Committee representing small-boat fisher in the Eddies Cove West area said that fishers from that community set most of their gear in St. John Bay and generally do not fish farther north than New Ferolle and no farther south than Port au Choix. However, these some of these vessels are equipped with mobile gear and may occasionally fish capelin, herring or mackerel south of Port au Choix. As of mid-September, some local fishers were still fishing herring in the Castor's River area, while another fisher was still involved in the sentinel cod fishery near his home community.

The Chairperson of the Eddies Cove West Committee also noted that there were quite a few vessels from other Great Northern Peninsula fishing communities currently (mid-September 1998) fishing in their local waters. (These "outside" vessels are part of the "distance" fisheries of many small-boat fishers in the northern portion of the Peninsula, as discussed in an earlier section of this report.)

Concerns about the proposed cable:

- Concerns about potential effects are limited to possible interference with scallop draggers and otter trawlers from the area which, in the past, have used fishing grounds in or near the proposed power corridor.

Summary:

- Fishers expect that the proposed power cable will have little or no effect on most fishers in this area. Most of the community-based fishing activities take place near fishers' home ports well away from the project area.
- A possible exception is the potential for some disturbance to the 8 to 9 scallop vessels which would likely fish this species, along with other area vessels, within the project area. There might also be some temporary interference with any mobile-gear fisheries for cod if they resume before the project begins. All three alternative routes would cross through the main scallop fishing area currently used by these fishers, as well as through some of the traditional otter trawling grounds which larger vessels have used in previous years.

APPENDIX D

**Information Sheet Used
During Fishing Industry Consultation**

Churchill River Hydro Project

Strait of Belle Isle Submarine Cable Crossing

The Project. The proposed Labrador Hydro Project involves the development of up to 4,000 Megawatts of new power from the Churchill River system. This would involve expansion of the existing Churchill Falls project, a new development at Gull Island and possibly one at Muskrat Falls. Part of this power would be transmitted from Gull Island to the Avalon Peninsula, crossing the Strait of Belle Isle by submarine cable.

Location. Although the project is still looking at several possible crossing routes (between L'Anse au Clair and Forteau Point in Labrador, and between Yankee Point and Winter Cove on the Island), the most likely is from L'Anse au Clair to Yankee Point, a distance of 38 km. The maximum depth of this crossing is 110 metres. (See map on reverse.)

Submarine Cables. The power line will likely consist of 3 separate submarine cables, spaced about 500 metres apart. The power is converted to DC before it is transmitted; one cable will carry positive current, the other negative. The third is a spare. The cables are about 5" in diameter, and will have protective coatings including a layer of armour wire.

Protecting the Cables. The cables will be buried in separate trenches under the Strait for protection from icebergs, shore ice, wave action and fishing operations. In areas where the sea is less than 70 m deep the cable will be buried to a depth of 2 m to protect it from icebergs. (Icebergs deeper than this ground before reaching the proposed crossing area.) On the Labrador side, this means the cable will be buried under 2 m of material for the first 9 km; on the Newfoundland side this will extend out about 3 km. In deeper areas, the cables will be buried (or covered with cement) to a depth of 0.6 m, mainly to protect them from fishing gear. Additional protection from large ships' anchors is not necessary since they do not anchor in the Strait, except in emergencies.

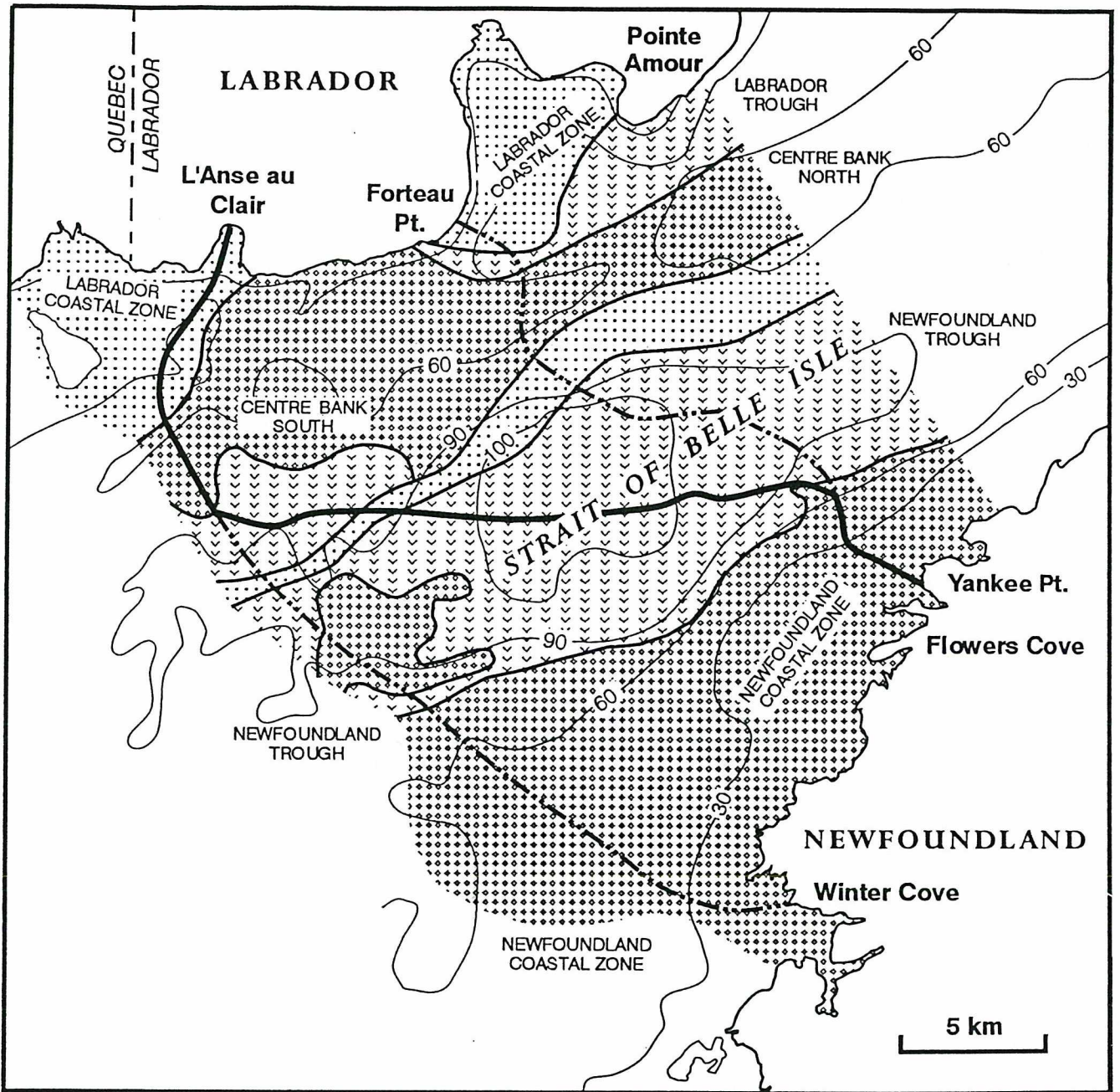
Construction. It is possible that marine construction activities could start as early as January 2003. The exact time of the year is not yet known, but it will not take place during the winter. The cables would be laid in three one-day operations, if the weather is suitable. Burying the cable (e.g. by trenching or tunnelling) could take several months.

Burying the cable will likely involve ploughing or water jetting the bottom materials (stones and sand) after the cable is put down. Trenching at Yankee Point and near L'Anse au Clair may require drilling and blasting.

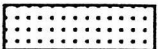






The cable laying operation would involve the cable ship and support vessels, while the burying operation would probably involve the burying vessel, tugs and support vessels. Construction would probably begin on the Island and go across the Strait to Labrador.

Information has been collected on the currents and geology of the sea floor in the area, and computer models are being run to determine any sea floor disturbances that might occur during construction.

Fishing. During construction, it will probably be necessary to restrict fishing activities in a safety zone around certain activities. Once the cables are in place, there should be no interference with fishing, since they will be designed to withstand drags and boards.



LEGEND

- 
SAND, SAND WAVES AND DUNES IN SHALLOW WATERS AND STREAMERS IN DEEPER WATER.
- 
DIAMICT (BOULDER) RIDGES, GENERALLY EXPOSED, IN PLACES BURIED.
- 
BEDROCK EDDIES COVE. FORTEAU AND HAWKE BAY FORMATIONS EXPOSED OR WITH THIN SEDIMENT COVER.
- 
GEOLOGICAL CONTACT. (DEFINES WHERE THE GEOLOGY CHANGES)
- 
PREFERRED ROUTE
- 
ALTERNATE ROUTE.
- 
BATHYMETRIC CONTOUR (30m INTERVAL).