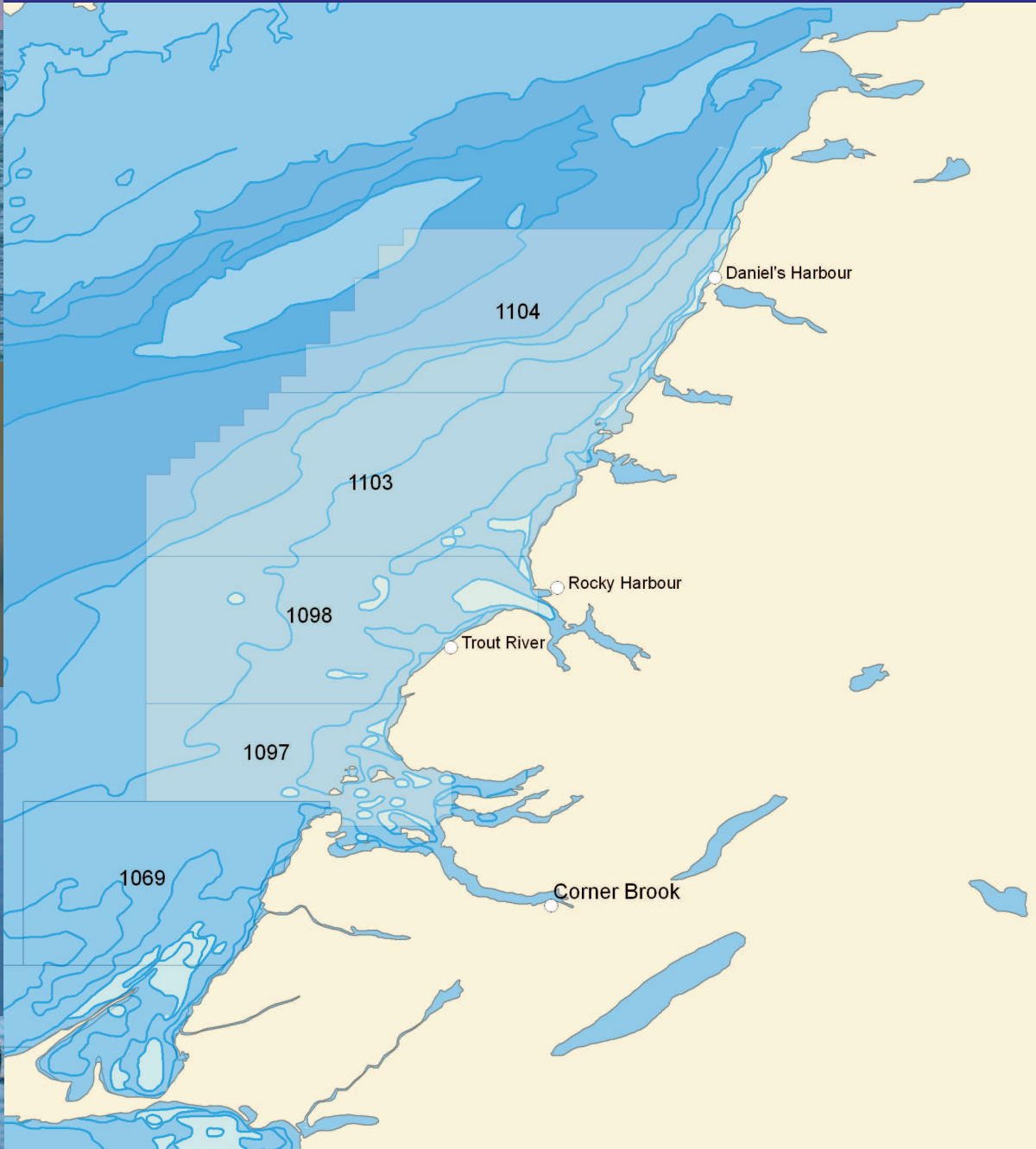


ADDENDUM TO ENVIRONMENTAL ASSESSMENT OF GEOPHYSICAL SURVEYS FOR EXPLORATION LICENCES 1097, 1098, 1103 AND 1104 WESTERN NEWFOUNDLAND



Prepared For: Canada-Newfoundland and Labrador Offshore Petroleum Board

Prepared By:



Geophysical Service Incorporated
Calgary, Alberta and Houston, Texas



**CONESTOGA-ROVERS
& ASSOCIATES**



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1.0 INTRODUCTION

The report is an addendum to the environmental assessment (EA) report prepared for NWest Energy Inc. (NWest) in response to comments provided by the Canada-Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB).

Between the submission of the EA report and the receipt of C-NLOPB and stakeholder comments, the project Operator has changed from NWest to Geophysical Service Inc. (GSI), and they are now the project proponent due to a revised commercial means of data transaction.

1.1 Proponent Information

GSI is a fully integrated geophysical service company providing exclusive and non-exclusive 2D and 3D marine seismic, gravity, and magnetic data for offshore Canada and around the world. GSI also provides state of the art seismic data processing, depth imaging, and reservoir services. GSI's head office is located in Calgary, Alberta, with additional offices located in Houston, Texas, and Windsor, Nova Scotia. GSI has operated in waters of Atlantic Canada, has submitted EAs as Operator or provided services to other Operators, and thus is familiar with the regulations and mitigation measures to ensure a safe working environment with minimal effects.

GSI is committed to conservation of the marine environment and compliance with applicable regulations. GSI has extensive experience in applying *low impact* seismic techniques and environmental impact mitigation measures such as:

- avoiding sensitive areas and times
- marine mammal and sea turtle monitoring, including the use of a passive marine cetacean detection system
- energy source array ramp up (soft start) procedures to alert marine mammals, fish and other species

GSI recognizes that environmental management is of equal priority with health, safety and all primary business objectives. Their goal is continuous improvement of corporate practices and environmental performance, taking into account legislation, industry codes of practice, technical developments, consumer needs and community expectations.

Proponent contact information is as follows:

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2.0 EA CHANGES

The seismic survey area has been altered by GSI to a slightly narrower survey area, but in the same area as chosen by NWest. Revised Figure 2.1 compares the original survey area chosen by NWest and the revised GSI survey area.

Since the submission of the EA, GSI developed the orientation of data acquisition to running lines in a southwest to northeast direction. Therefore, no line changes will be made in a shoreward direction. Revised Figure 4.1 shows the proposed active Project area.

As GSI is only conducting the seismic surveys, no drilling activities are required for further consideration. NWest will submit an EA for exploration drilling that will consider effects from well site and vertical seismic profile surveys.

3.0 ORGANIZATION OF ADDENDUM

GSI's responses follow comments provided by the C-NLOPB, in the order provided.

4.0 GENERAL COMMENTS

Throughout early discussions, the FFAW provided advice on the timing of seismic programs to aid in conflict avoidance for all parties. The FFAW had meetings and conversations with leaders in the various fishing fleets in the area to compromise on the “most ideal” timing for this Program. The timing agreed upon was in the fall season, due to concerns of sensitive spawning and migration patterns of various species, and presence of fishing gear in the area. Timing of such a program is paramount, especially on the West Coast, where there is such a diverse fishery. However, fish harvesters were given the understanding that is seismic program would be brief, “12 days”, to be precise. The EA portrays a 20-30 day program, with the potential to be up to 75 days. This change in temporal boundaries of the project was not communicated to the FFAW, or the fish harvesters. This expansion of overall length of the program causes concern for fish activity and sensitive areas and periods for various species.

During fisher consultations, NWest does not recall describing the seismic program as a 12 day effort to the representatives of FFAW. Such a brief program is not possible, as well, from the many consultations with other Operators, the FFAW would be aware that seismic acquisition programs take considerably longer. The EA report states that the seismic program occurring between May and October in 2008, which encompasses the 75 day period, is the most conservative case schedule-wise.

The choice of seismic company was not determined at the time of EA report submission, thus the range in the time schedule for the program was provided which depended on the size and subsequent capability of the survey vessel, as discussed on Page 8 of the EA.

5.0 SPECIFIC COMMENTS

Page 13, Section 2.34 and Page 14, Section 2.35 – What is the timing of wellsite and VSP surveys. The timing was provided for 3-D and 2-D Seismic Surveys.

The Operators have changed from NWest to GSI due to change in data acquisition. Therefore, GSI will not be conducting drilling-related activities and thus, wellsite surveys and vertical seismic profiles are no longer in the scope of work. The scope of work consists only of 2-D and or 3-D seismic data collection.

Page 31, Figure 4.1 - According to this figure, the project area with the 10 km buffer required for line change, will result in the vessel entering nearshore shallow areas where the inshore lobster fishery occurs. It will also overlap the North Head Lobster nursery area (page 96), which is presently closed to fishing for conservation purposes. Given the closeness of this survey to the North Head area, it is likely that timing restrictions may be placed on the survey. The Western SEA highlights the North Head Lobster Area and Trout River.

Mitigations, to avoid this area during sensitive time periods (June-July when larvae are most abundant in the water column or during moulting) and to ensure that the seismic sound source is minimized when transiting this area, are strongly recommended.

The survey is intended to be undertaken from August to October as stated throughout the report. Due to Operator change and its effect on the CEAA process, the program start date for 2008 is now mid-September. The sensitive time for lobster larvae is June-July as stated, therefore there is no temporal overlap with the first survey in 2008. A discussion on effects (\leq five metres) and mitigation to eggs and larvae, with several literature references, are provided on pages 149 to 151 of the EA.

Page 33, Table 4.3; Page 60, Section 5.2 - Valued Environmental Component - As per the Canadian Environmental Assessment Act (CEAA), the term "Valued Ecosystem Component" is used for the acronym VEC.

Both Valued Ecosystem Component and Valued Environmental Component are used by CEAA. Section 4.0 describes the assessment methodology which is in keeping with the Act.

Page 42, Section 5.1.5 Meteorology and Climate - The report relies on the SEA 2005 for their description of winds, waves, and visibility. They used wind and wave hindcast data from a grid point off the Port aux Port Peninsula, as the SEA had done, although their area of interest is further to the NE. Since the SEA was prepared the MSC50 hindcast data set has become available

(contact Atlantic Climate Centre). The MSC50 has wind and wave hindcast information at a higher resolution of 0.1 degree or about 11 km. It would probably be advisable to look at that.

It would have been preferable to see presentation of some coastal station data for winds, and mention that the AES40 winds are considered representative of one-hour averages at 10 m (standard observations are 10 minute means or less, and include a gust). No mention of local effects near the coast.

Section 5.1.5.3 on Visibility and Fog omits mention of the low visibility in winter due to snow streamers, and says best shipping and flying weather is between Dec through June. This is contrary to the information presented in the SEA Fig 2.16.

It was advised to use the Strategic Environmental Assessment (SEA) document for background material to the greatest extent reasonable – the purpose for which it was intended. Project within the bounds of the SEA would use that information. The AES-40 data in this review of the SEA contains 49 years of data which is still applicable to this EA report and the many assessments before it that were considered acceptable, including the Port-au-Port projects. The cost to revisit this area using MSC50 data is considerable for such a broad discussion of wind and waves. The resolution of the MSC50 data is better; however, this section describes climate at a high level of wind direction and how strong they are in annual quarters. For operational purposes, the seismic vessel must have detailed meteorological data. The MSC50 data will be used to describe wind and waves for the environmental assessment of exploration drilling. This is particularly important to get better resolution data for modeling of drill waste discharges and potential spill scenarios.

The seismic vessel will not be operating in the winter months. Aviation service is not a component of the vessel's operation.

Page 53, Section 5.1.6.2 Waves - *This section states that storms most often occur between late-August and October. Perhaps they are referring to tropical cyclones although that was not stated. In fact winter storms produce high winds and waves more often than tropical cyclones. The word southeast in the last sentence of the first paragraph in 5.1.6.2 should have been southwest, and as in the SEA, the sentence should indicate that SW to NE is referred to in a clockwise sense, for the directions from which swell would come.*

Hurricane strength storms is the reference to that period.

Southwest is the correct direction.

Page 54, Section 5.1.6.5 – *It is stated that future geophysical survey activity after 2008 could take place anytime, depending on the situation at hand. It was previously stated that seismic surveys would occur between May to December. Please clarify the scope.*

It is stated throughout the report that the seismic surveys could take place between May and December. Specific dates depend on survey area location relative to commercial fisheries, other marine surveys, survey vessel availability and weather conditions.

Page 55, Figure 5.12 – *Current Meters are included in the legend but not identified on the figure.*

Locations of current meters have been added on a revised Figure 5.12.

Page 68, Section 5.2.2 Marine and Migratory Birds - Coastal Waterfowl. *It should be noted that the Harlequin Duck is listed as a species of special concern, not a species of concern.*

Comment noted.

Page 72, Para. 5 – *“In 2002, a new zone was established in 4R to protect the spawning stock.” A figure showing the location of this zone in relation to the project area should be provided for comparison purposes.*

Location of cod spawning area is shown on Figure 5.21 in Section 5.2.8 Sensitive Areas.

Page 73, Para. 4 – *A reference should be provided for the information on white hake.*

DFO. 2002. White Hake in the Southern Gulf of St. Lawrence. Stock Status Report A3-12 (2002).

DFO. 2006. Underwater World. White Hake.

Page 83, Para. 6 – *The reference made by fishers, during consultations, to the North Head lobster nursery area (LFA 13B) reinforces the need to apply mitigations to avoid this area during sensitive times and ensure that the seismic sound source is minimized when transiting this area.*

Comment noted. The commitment has been throughout the EA report and to the FFAW, to hold consultations with respect to any survey areas in the future will be undertaken to avoid spatial conflicts with use of the ocean.

Page 90, Section 5.2.7 Species at Risk - In the section on Ivory Gull, its status is, as a species of special concern on Schedule 1 of the Species at Risk Act should be noted. It should also be noted that the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) has listed the Ivory Gull as endangered.

It is noted that the Ivory Gull (*Pagophila eburnea*) is listed as 'special concern' on Schedule 1 of SARA. Status re-examined and designated endangered in April 2006. The last assessment was based on an update status report. It is listed as vulnerable under the Newfoundland and Labrador provincial listings. This project will not interact with this species critical habitat requirements in the Arctic and its presence is incidental at best, therefore, not focusing on this species was intentional so as not to raise flags where not warranted.

Page 124, Para. 1 - There was also a moratorium during the years 1994 to 1996.

The cod fishery was under moratorium from 1994 to 1996 (Canadian Science Advisory Secretariat Science Advisory Report 2007/003) as noted on page 97. The 2003 moratorium is also mentioned.

The analysis of commercial catch is only from 2004 to 2007, as requested. The SEA provides a more historical discussion.

Page 124, Para. 1 - To clarify, the cod fishery in this area is nearshore, not offshore (gillnets and longlines). The stratified random surveys (DFO-R/V survey, sentinel survey) cover all depths deeper than 40 m (sentinel) and 100 m (DFO-R/V) in the Gulf.

Comment noted. Figures 5.37 and 5.39 in the EA report illustrate the DFO catch effort data on groundfish. Figures 5.37a and 5.39a have been included in this addendum report that tease out the cod catch locations that show fishing is both inshore and offshore.

Page 124, Figure 5.43 - The data source is missing and should be provided.

The data sources for all the harvest effort graphics are noted in the associated maps, Fisheries and Oceans 2007. These data are catch data provided by DFO from their GIS database – as referenced. The harvest data are presented in three formats: tabular (Table 5.6), maps and bar charts.

Page 124, Sentinel Surveys - These are not surveys per se; sampling is carried out while undertaking commercial fishing. Also, the figure number referenced in this section (Figure 5.45) is incorrect; it should be Figure 5.44.

Fisheries and Oceans documents refers to these routine studies as surveys.

A typographical error - Figure 5.45 reference in the text should be Figure 5.44.

Sentinel Surveys

Fishers participate in a mobile gear sentinel survey and a fixed gear sentinel survey for groundfish. The mobile gear sentinel survey is conducted annually in July by nine trawlers (five trawlers from Newfoundland and four trawlers from Quebec). Each vessel conducts 30 tows for 30 minutes (Jason Spingle, FFAW, pers. comm. Dec 2007 and July 2008).

The fixed gear sentinel survey involves data collection by the inshore longline and gill net fisheries in the 4R entire NAFO area. This survey is undertaken from late May through to October, with most catches occurring from June to August (Jason Spingle, FFAW, pers. comm. Dec 2007 and July 2008).

Page 125, Research Vessel Surveys - This section is confusing as it discusses a mixture of DFO groundfish research surveys, fixed gear sentinel surveys, and mobile gear sentinel surveys. These should be separated. For clarity, DFO suggests placing the fixed gear sentinel text in section 5.3.2.1 Sentinel Surveys and renaming it: Fixed Gear Sentinel.

DFO's scientific surveys for groundfish are conducted in August on an annual basis; however, the 2008 survey is being undertaken in July. Therefore, it is important to contact DFO - Maurice Lamontagne Institute, Mont-Joli to discuss DFO RV vessels in the NAFO 4R area during the seismic survey. The DFO Coordinator is Charlie Cyr (418-775-0628). These surveys involve government trawl vessels. DFO at the Maurice Lamontagne Institute is responsible for these surveys. The primary objective of these surveys is to collect data for groundfish and shrimp stock assessments. Sampling protocol asks for the maximum of information to be taken on catches. Since data are available for the 1990 to the present period, scientists using these data must take into account that the sampling protocol was at first oriented toward gathering information on commercial species. This must be kept in mind for data interpretation; particularly for pelagics and crustaceans other than shrimp. The survey design is random stratified by depth with trawl duration of 15 minutes (D. Bernier, DFO, QC).

Page 125, Research Vessel Surveys - The DFO Groundfish Research Survey (referenced in the first two sentences of the paragraph) is completely independent of commercial activities and should not appear in the section 5.3.2 Commercial Fishery Surveys. The information provided does not outline the purpose of this specific survey (i.e., where it is carried out, the species being studied, etc.). In fact, the information provided is insufficient to adequately evaluate the actual impacts of the project on DFO groundfish research surveys.

See response above.

Page 125, Research Vessel Surveys - Please note that there is also a Fisheries Science Collaborative Program (FSCP) crab survey in 4R, which is conducted jointly with industry and DFO. These are fixed-gear crab pot locations and the gear is generally set for a 24 hour period. Each management area is usually completed within 4 days. Although the survey time is variable, it generally takes place within the period Sept. 1 – Oct. 15 for any given year. Maps showing the set locations are attached for your information.

Snow crab survey information is provided in Section 5.3.2.4. GSI will communicate in advance with FFAW and DFO on seismic survey schedules and their location relative to the crab survey locations over those 4 days to ensure there is no spatial overlap issues. The chase vessel will assist with any at-sea issues and provide communications with fisher vessels during the survey. A Fisheries Liaison Officer from FFAW will provide onboard communications, as expected. Snow crab survey locations were provided by Fisheries and Oceans through the CNLOPB. A map of crab survey locations is attached (D. Standbury, DFO, NL).

Page 126, Figure 5.45 - There may be a problem with manipulation/conversion of fishing tow data, possibly during conversion from minutes to fraction of degrees, as they appear as five separate horizontal bands in 4R. It should reflect a continuous sampling area.

The problem identified was due to erroneous conversion of some data points from the format provided by DFO to decimal degrees. This has been rectified and is reflected in the revised Figure 5.45.

Page 127, Snow Crab Survey - It would be beneficial to plot fishing positions of the snow crab survey similar to the previous map (Figure 5.45).

Snow crab survey locations were provided by Fisheries and Oceans through the CNLOPB (R. Stead and D. Standbury, DFO, NL). A new figure is provided.

The crab surveys are conducted by fishers with the set locations determined by DFO. This is a pot survey. This survey has been conducted for the last five years and is carried out in September for the most part. The number of sets has varied over the years depending on the participation of fishers. In 2003 there were 158 stations occupied. In 2007, 69 stations were fished.

DFO's RV multispecies survey gear (Campellen trawl) catches crab fairly efficiently and is used to provide an index for some of the east coast stock areas. There are no multispecies survey data from NAFO 4R. The only data available are from observers on commercial vessels and the post-season survey. Commercial catches are at historic lows in this area (R. Stead, DFO, NL, pers.comm. 2008).

***Page 127, Halibut Tagging** - The size of juvenile fish (less than 81 cm) being tagged should be provided as well as the minimum legal size of capture. In addition, since 2007, there has also been a tagging program for commercial size halibut.*

This information was provided by a FFAW representative on the west coast. The section provides information about other vessels in the area that may result in user conflicts of ocean space more so than the details of the survey/sampling.

***Page 127, Halibut Tagging** - It would be beneficial to plot tagging position sites as well as the number of fishermen involved in the project and the number of halibut tagged at each site. The time of year when tagging activities were undertaken and the scientific rationale for the tagging program, etc., should also be provided.*

The halibut tagging effort is undertaken by nine fishers during the commercial groundfish fishery – there is no specific separate survey for this effort. The surveys are conducted all over NAFO area 4R, primarily inshore, in July and August. About 2000 fish were caught in total; between one to 300 fish per site. The rationale for the tagging program is to monitor growth, migration patterns, commercial exploitation and potential of stock mixing (J. Spingle, FFAW, pers. comm., 2008).

***Page 127, Halibut Tagging** - The meaning/intent of the last sentence is uncertain. This section should be revisited and updated accordingly.*

The halibut tagging program is undertaken concurrently with the commercial groundfish fishery; therefore, there are no other boats or specific dates to account for beyond the commercial fishing, sentinel surveys or DFO RV surveys described in this section.

Page 127, Cod Reproductive Survey - The first sentence should be re-worded to read, "Two otter trawlers must perform fishing tows to conduct...."

Comment noted.

The objective of the cod reproductive survey is to conduct a grid survey of 50 stations, using two trawlers, in the spring to assess the maturity and condition of 3Pn and 4Rs NAFO area cod and to collect gonad samples to evaluate fecundity and egg production of the stock. Each trawler will be doing 25 stations in the first three weeks of May. The survey is scheduled for May 5th to May 20th (J. Spingle, FFAW, pers. comm. 2008). A new figure has been created to show these survey areas.

Standard tow

The tow positions are provided by DFO. The bottom tows are done at 2.5 knots for a duration of 30 minutes. Gear used is the standard sentinel rock hopper 300 with a liner.

Scientific complementary tows

At the end of the survey, if not enough cod have been found to fill scientific requirements, two additional "scientific complementary" tows will be allowed for each boat. The position of those tows will be decided by the FFAW technician and the skipper aboard the boat. These sets of maximum duration of 30 minutes, will be performed to collect cod for gonad samples and maturity determination. Other species measured include turbot, halibut and redfish. All other protocols will be done during those sets.

Page 127, Aquaculture - According to Figure 5.46, there are two blue mussel sites: one at Goose Arm in the Bay of Islands and another at Piccadilly Head on the northern side of the Port au Port Peninsula. This should be revisited and revised.

The aquaculture data presented was gleaned from the map on the NL Fisheries and Aquaculture website (www.fishaq.gov.nl.ca/aquaculture/pdf/aqua_sites.pdf) titled "Locations of Aquaculture Sites" (NL 2005) and per the "Western Newfoundland and Labrador Offshore Area Strategic Environmental Assessment (SEA)" (LGL Dec 2005, Sec. 3.4.5). This was confirmed by William Goosney, NLFA (pers. comm. 2007) that there were no changes to that information. As of July 2008, these aquaculture sites are still depicted. However, discussion with L. House of Newfoundland and Labrador Fisheries and Aquaculture (NLFA) clarified that only three sites are located in Picadilly Bay and consist of two blue mussel and one giant scallop farms all owned by one operator. (pers. com. Leonard House, Development Officer, NLFA, 2008). To add further to the discussion, Mr. House stated that the Goose Arm sites have been closed and cleaned

up, NLFA has taken over and ceased operations of the cod farms at Bonne Bay and the salmon site at Daniel's Harbour is a land-based operation.

***Page 127, Aquaculture** – The blue mussel farm identified in Goose Arm and the three Atlantic cod sites identified in Bonne Bay are not currently active. The Atlantic salmon farm identified in Daniel's Harbour is a land-based salmon hatchery.*

See above response. There are no aquaculture sites in the four petroleum lease areas.

***Page 127, Marine Traffic** – It is important to note that vessels may move outside these shipping lanes when ice is present. There are also a lot of local vessels that do not travel towards the Great Lakes in the Gulf. It is worth mentioning that many small fishing boats do not have Vessel Monitoring Systems (VMS). This section should be revisited and updated accordingly.*

Transport Canada was consulted and information provided on coastal traffic was vague as there are no specific routes. In order to protect the tow cables, the seismic vessel will not be in the area if ice is present. One of the most important roles of the chase vessel is to communicate with vessels that are in the path of the seismic vessel to avoid conflicts.

***Page 132, Section 6.1 Marine Birds and Migratory Birds** - In this section, it could be noted that the ramping up procedures used for marine mammals will also likely aid in reducing any effects on marine birds near the vessel during the survey.*

The literature indicates there is no measurable effect on marine birds. No mitigation specific to seabirds is required under the Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment. If birds are within the 500 m safety zone in the presence of marine mammals and sea turtles then perhaps there may be some benefit. However, as some seabirds are attracted to vessels opportunistically, vessel operations will not wait until they depart the area before ramping up. Such practice would hamper the entire program.

***Page 133, Section 6.1.2 Potential Interactions and Issues** - In this section, it is noted that coastal and marine birds could be affected by a spill due to an accident involving the survey vessel. CWS is also concerned about the potential for dielectric oil to be released from the streamer, and this should be added to this section. Every effort should be taken to ensure that no oil leaks occur and that a contingency plan in case of oil leaks is prepared. If dielectric oil is dispersible, then supplies of dispersants with application machinery should be available and an approved dispersant application plan should be put into place prior to any seismic activities.*

Coastal and marine birds could also be affected by a spill from any vessel (fishing, commercial and DFO research) at sea. The single seismic vessel does not increase the risk to coastal and seabird populations as discussed in the EA report.

Dielectric oil is a large class of products. The term dielectric implies an electrical purpose and this word is not used in the report. Fluids used in streamers (can be light oils or kerosene) is used for floatation purposes only. There are no records of streamer spills in the C-NLOPB files which have been kept since 1997. There were five incidents of streamer spills off Nova Scotia, all in 2003. All spills of streamer fluid were less than 1 m³ and ranged from 0.02 to 0.57 m³.

At the time of submission, NWest had not chosen a seismic contractor, and preferred to use solid streamers and made the commitment to use such streamers in the EA report. GSI will use non-solid streamers with an Isopar M fluid. This fluid is kerosene and is used as a dispersant on crude oil spills. GSI has increased the thickness of the streamer skin to further reduce the possibility of a leak or spill, with a wall thickness 12% thicker than that of the original manufacturer. The vessel is required to carry a "Shipboard Oil Pollution Emergency Plan" pursuant to MARPOL 73/78. The Plan contains a description of procedures and checklists, which govern operations involving hydrocarbons. Adherence to this plan should prevent unintended operational releases. Effects due to accidental spills associated with the proposed operation therefore are considered, overall, to be detectable if they occur, negligible, but neither significant nor likely.

Page 138, Section 6.1.6 Monitoring and Follow-up - It is stated that the proponent will have an Environmental Observer on board to monitor marine birds. This section indicates that the protocol followed is a version from 2005. Appendix C contains the most recent version of the protocols from 2006. The wording in Section 6.1.6 should be changed to reflect this. These protocols are a work in progress and we would appreciate feedback from the observers using them in the field. A guide sheet to the pelagic seabirds of Atlantic Canada is available through CWS in Mount Pearl. A report of the seabird monitoring program, together with any recommended changes, is to be submitted to CWS on a yearly basis.

There was some difficulty in obtaining the 2006 version, which was received late and the text was not corrected at that time. GSI will follow the CWS's Standardized Protocols For Pelagic Seabirds Surveys From Moving and Stationary Platforms for the Hydrocarbon Industry: Interim Protocol – June 2006 (Appendix C).

GSI will ensure that CWS is provided field data collection with respect to marine birds at the completion of the seismic survey. These marine bird data reports will be provided following this survey and any other subsequent seismic surveys.

***Page 140, Para. 1** - For future surveys (between May-December until 2015), in addition to consultations with fishers, the proponent should also contact DFO in order to establish an appropriate seismic survey window to minimize conflicts with commercial fisheries and DFO sentinel and research vessel surveys.*

As committed throughout the EA report, GSI will consult with the fishers (FFAW) in the fall of the preceding year prior to any survey. DFO coordinators in Newfoundland and Quebec will be given the same respect to ensure that there is minimal vessel interference.

***Page 141, Physical Effects** – To follow are a couple of examples, which reinforce the problem of apparent selective interpretation of literature and viewpoint. On Page 150, it states that in a preliminary study carried out by Christian et al. (2003) on the effects of seismic on snow crab eggs, a 1.6% mortality was noted. This seems somewhat trivial; however, mortality was not the important point in this instance. The omission was the concept of major differences in egg development rate, demonstrating that it could be an important endpoint to consider in a more comprehensive study. It was noted (page 146) in a study by Payne et al. (2007), in which some sub-lethal effects were noted in lobster, that the animals were exposed at a few meters. This may seem somewhat irrelevant for the non-expert, since in the real world, distances are known to be much greater. The important omission in this instance was not including the measured pressure levels where some sub-lethal effects were observed at levels that were relatively low but could, depending on gun size, reach hundreds of meters in the water column.*

Comment noted.

***Page 146** – It is mentioned that tank exposures have constraints. Other references, which were not included, have noted that the tank approach is the only economical and practical way of obtaining an understanding of dose-exposure relationships. Perhaps unknown to the authors is the importance of tank experiments, which at a very low cost have demonstrated little effect on snow crab; the species expected to be in high abundance within the area to be surveyed. If any significant effects had been observed in the tank experiments, policy recommendations could have been markedly different.*

Comment noted.

Page 154 - Regarding monitoring for effects on fish and shellfish, a strong case cannot be made at this time for monitoring effects on snow crab or other non-commercial species, which may be present in the area. An important consideration in this regard is the relatively deep water in the area. However, this could change if new information on effects become available or the surveys are extended into shallow lobster habitat. Therefore, DFO requests that the program be reviewed on an annual basis throughout the expected timeframe of the seismic program.

References:

Christian, J.R., Mathieu, A., Thompson, D.H., White, D., and Buchanan, R. 2003. Effect of seismic energy on snow crab (*Chionoecetes opilio*). Environmental Research Funds Project No.144. Calgary. 106p.

Payne, J.F., Andrews, C.A., Fancey, L.L. Cook, A.L., and Christian, J.R. 2007. Pilot study on the effect of seismic air gun noise on lobster (*Homarus americanus*). Can. Tech. Rep. Fish. Aquat. Sci. 2712: v + 46.

See comment on page 146 above which contradicts this comment. There is no intent to extend seismic surveys in these four leases to inshore waters. The areas of interest are further offshore. DFO will be consulted regarding future seismic programs.

Page 152, Para. 1 and Page 177, Para. 3 - The statement that accidental spills will not occur because solid streamers will be used is not entirely consistent with the statement on page 22, that a vessel using solid streamer technology is preferred. Please revisit and clarify.

At the time of submission, NWest had not chosen a seismic contractor, and preferred to use solid streamers and made the commitment to use such streamers in the EA report. GSI will use non-solid streamers with an Isopar M fluid. This fluid is kerosene and is used as a dispersant on crude oil spills. GSI has increased the thickness of the streamer skin to further reduce the possibility of a leak or spill, with a wall thickness 12% thicker than that of the original manufacturer. The vessel is required to carry a "Shipboard Oil Pollution Emergency Plan" pursuant to MARPOL 73/78. The Plan contains a description of procedures and checklists, which govern operations involving hydrocarbons. Adherence to this plan should prevent unintended operational releases. Effects due to accidental spills associated with the proposed operation therefore are considered, overall, to be detectable if they occur, negligible, but neither significant nor likely.

Page 159, Bullet 4 - Reference is made to using a qualified Marine Mammal Observer; however, the last paragraph indicates that a trained Environmental Observer will watch for marine

mammals. Such monitoring should be conducted using a set of consensual guidelines with the object of providing the best possible data, disseminated to the most researchers (e.g., DFO, CWS, MUN). Results of this monitoring should be made available in digital format, preferably.

The FFAW has been providing trained Fisheries Liaison Observers to the petroleum industry for observer and communication duties. These individuals also act as Environmental Observers to provide information on marine mammals, sea turtles and seabirds using protocols and on forms approved and provided by CWS and DFO. All marine life data will be provided to these two agencies following the seismic survey.

Page 159, Bullet 8 - *During line changes, reduction to a single energy source is preferred over complete shut down, especially as ramp up/soft start will not be required, as stated. This is a common mitigation for marine mammals, sea turtles and fish and should be employed during this program.*

Single energy source reduction in the air sources will be effected during the line changes. The lines will orientate southwest to northeast, therefore the area of effect beyond the survey area is reduced compared to the area shown in the EIA report.

Page 160, Para 1 - *DFO agrees with the mitigation measure proposed during line changes that the seismic array be powered down to a single air source to warn marine mammals of the presence of the seismic vessel.*

Comment noted.

Page 176, Para. 5; Page 177, Para. 6; Page 178, Para. 4; Page 180 Table 6.6 - *See previous comment regarding use of dedicated Marine Mammal Observers vs. Environmental Observers.*

The FFAW has been providing trained Fisheries Liaison Observers to the petroleum industry for observer and communication duties. These individuals also act as Environmental Observers to provide information on marine mammals, sea turtles and seabirds using protocols and on forms approved and provided by CWS and DFO. All data will be provided to these two agencies following the seismic survey.

Page 177, Para. 6 - *"If a concentration of marine mammals is observed in a particular area, the survey can shift to another part of the survey area until the concentration has moved away." Is this mitigation an actual commitment by the operator? If this is the case, the wording should be changed to "will shift," otherwise the statement has no merit and should be removed from the text.*

The mitigations state that shut down of the seismic array will occur immediately when a whale is observed to be in the safety zone if that whale is listed as a species of concern, endangered or threatened on SARA or is listed as a species of special concern for which there could be significant adverse effects.

***Page 178, Para. 1** - Although the probability of vessel collisions with endangered species is considered low, the potential for ship strikes by the seismic source, guard, or any support vessels will certainly exist. Please note there are several cases of large whale ship strikes with the ferries between Cape Breton and Port aux Basques, so not all marine mammals avoid vessels successfully. The endangered blue whale is sighted regularly in the proposed operations area so ship strikes remain a concern and necessitate extreme vigilance by the operators. This cannot be overstated.*

Comment noted. There has been no reports of whale strikes by seismic vessels in Atlantic Canada.

***Page 178, Para. 4** - The last two sentences of this paragraph should be edited to include observations of sea turtles or marine mammals.*

Comment noted. This mitigation applies equally to sea turtles.

***Page 180, Table 6.6** - DFO requests that it be notified if dead or distressed marine mammals or sea turtles are spotted and particularly in the event that sea turtles or mammals are injured or killed by project activities.*

DFO will be contacted on the sighting of dead and or injured marine mammals, sea turtles and or seabirds. DFO will be notified if GSI is responsible for the harm to marine mammals, sea turtles and or seabirds.

***Page 183, Para.2** - The North Head lobster nursery area is not well beyond the influence of physical harm to lobster larvae from the Project, as stated. The proponent should make every effort to avoid this area (which may overlap during line changes) during the most sensitive time periods for this life stage.*

The 2008 survey is intended to be undertaken from August to October as stated throughout the report. The sensitive time for lobster larvae is June-July as stated, therefore there is no temporal overlap with the first survey area. A discussion on effects (\leq five metres) and mitigation to eggs and larvae, with several literature references, are provided on pages 149 to 151. The commitment was made throughout the EA report,

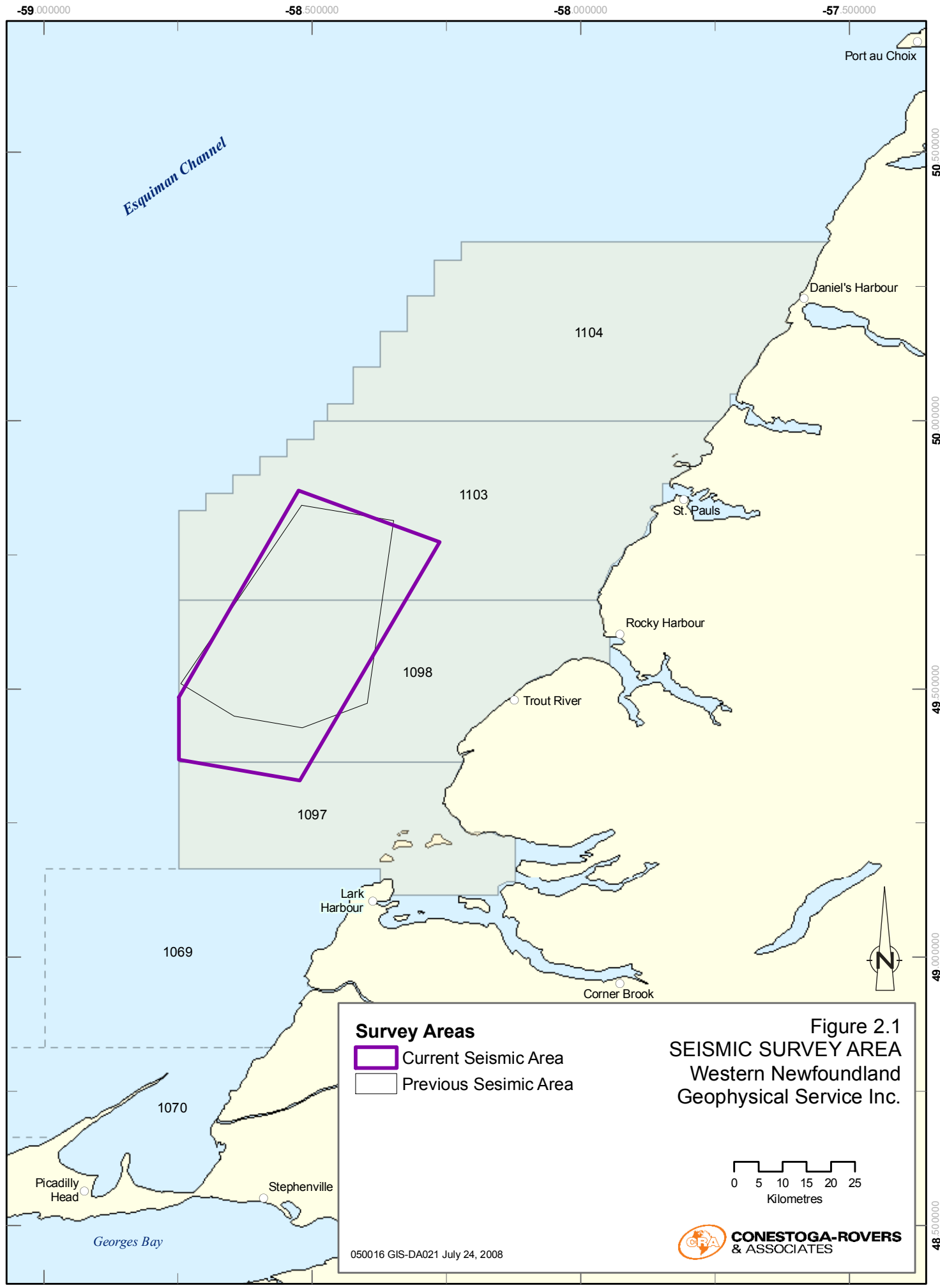
that any future surveys will involve discussions with fishers and regulatory agencies with respect to location and timing of subsequent surveys.

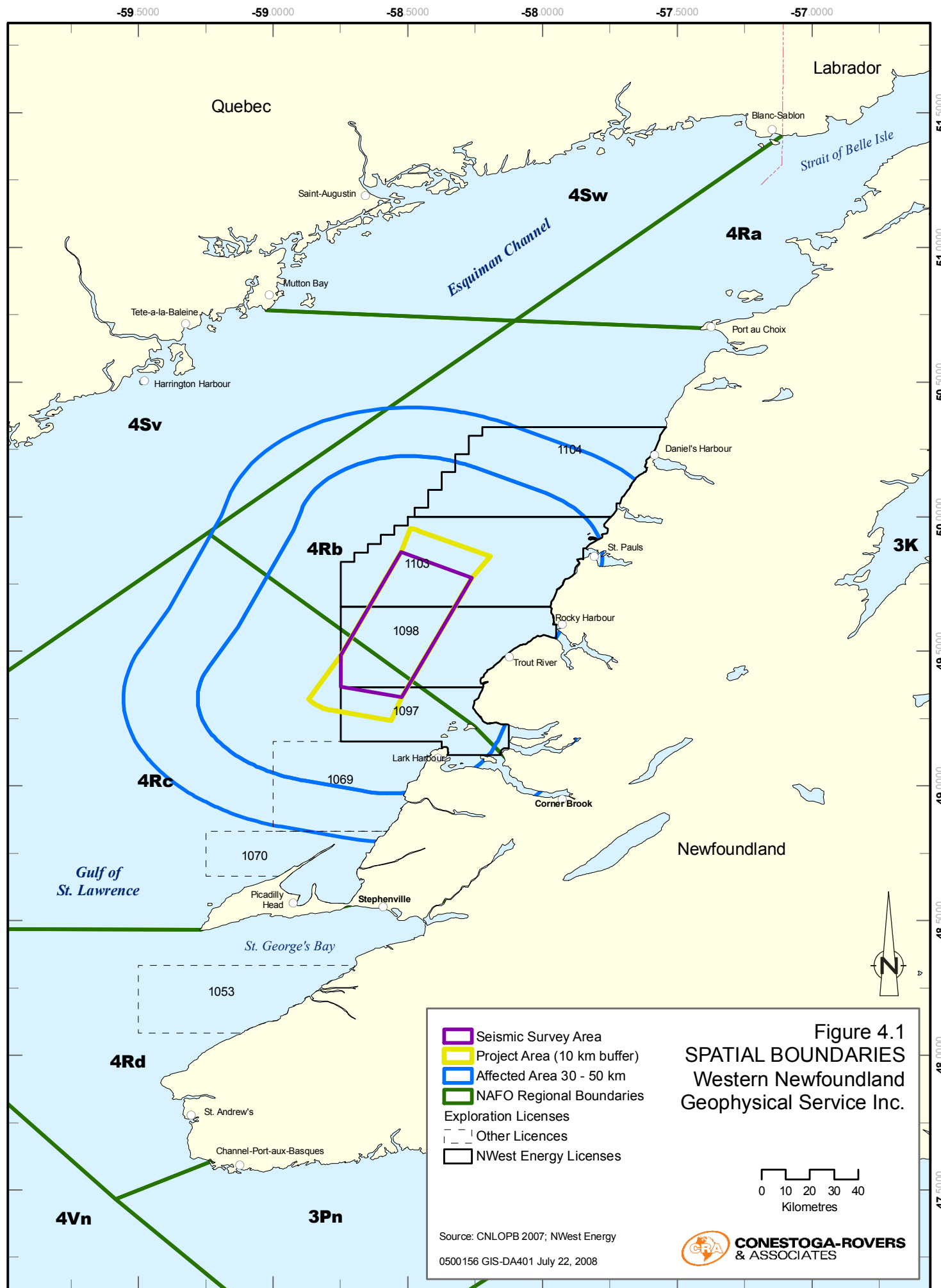
Information from GSI on line changes and survey orientation eliminates the requirement for line changes in the east-west direction. There will be minimal, if any, vessel and survey excursions towards inshore waters for the 2008 survey.

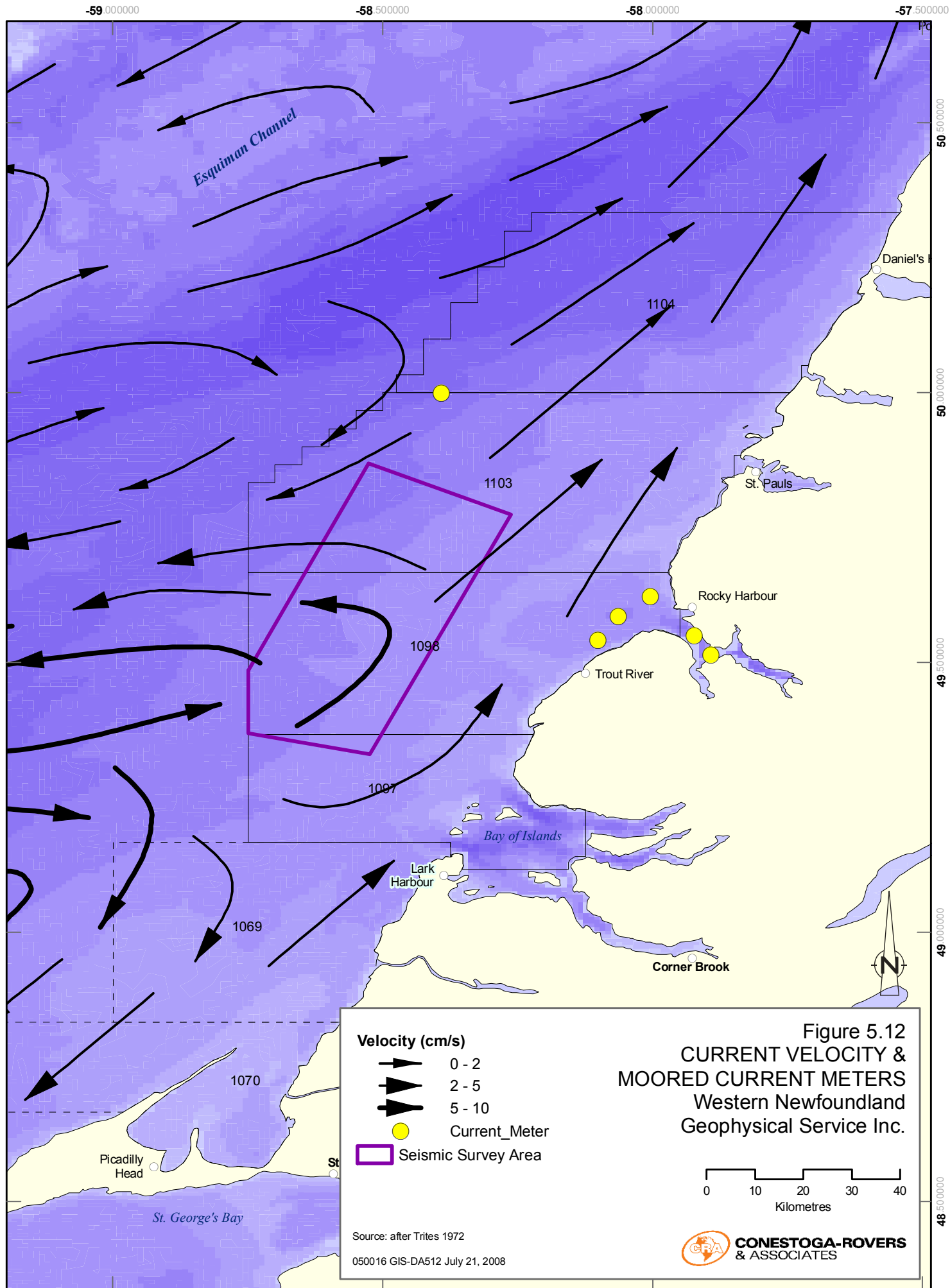
Page 188, Para.2; Page 190, Para. 3; Page 192, Table 6.8; Page 198, Table 9.2 - Previous coordination between offshore oil and gas operators and DFO has proved to successfully mitigate the potential for overlap between offshore oil and gas activities and DFO/Industry research surveys. To prevent gear conflicts and minimize disruption of natural fish behavior and/or distribution prior to and during research surveys, DFO-NL Region has requested that seismic operators maintain a buffer of 30-40 km around research survey set locations for 7-10 days prior to arrival of DFO research vessels. It is requested that the Department be notified of survey locations and project timing as soon as they are known.

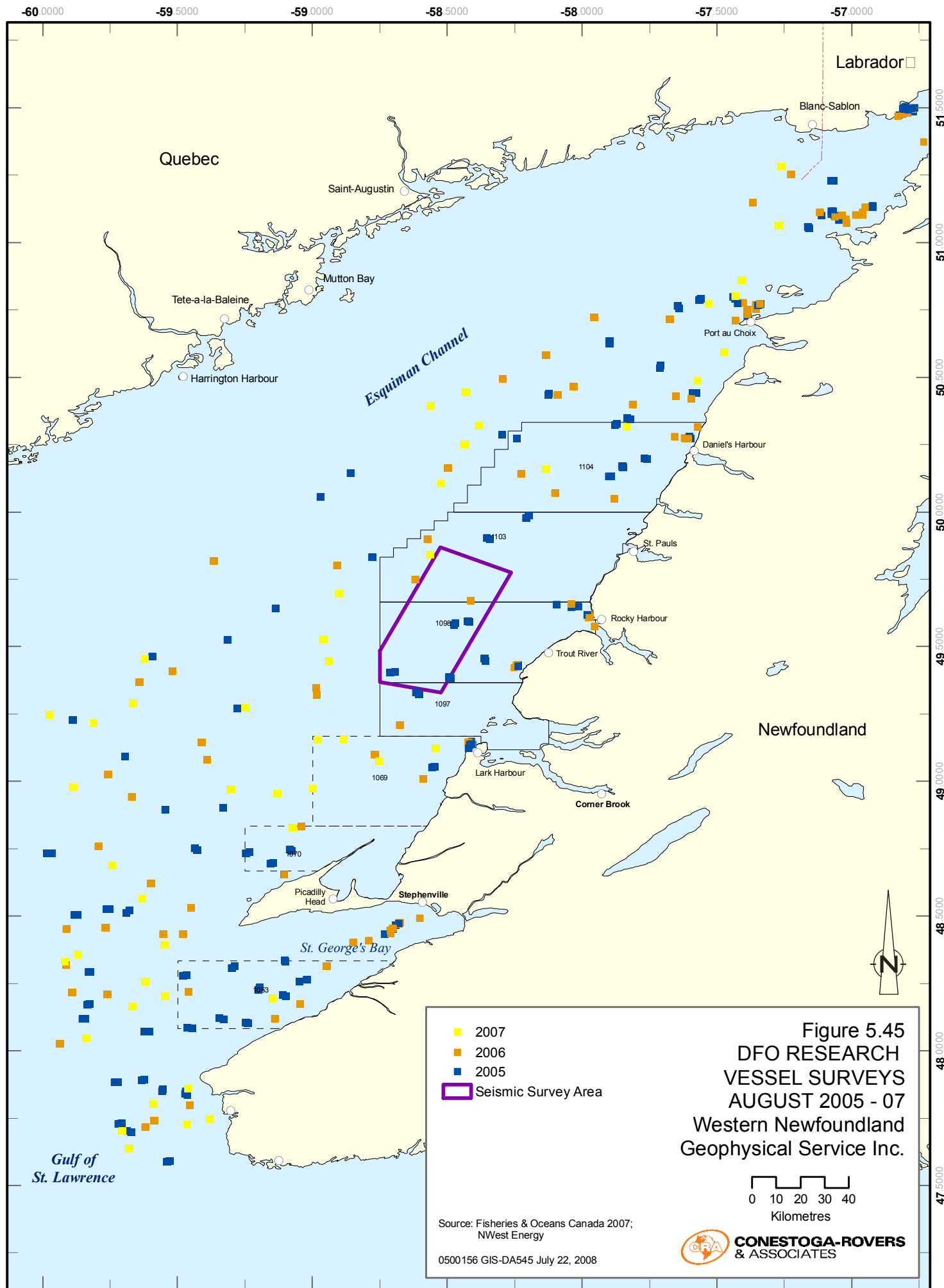
GSI will communicate with DFO Coordinators in Newfoundland and Quebec prior to any surveys to avoid at sea conflicts.

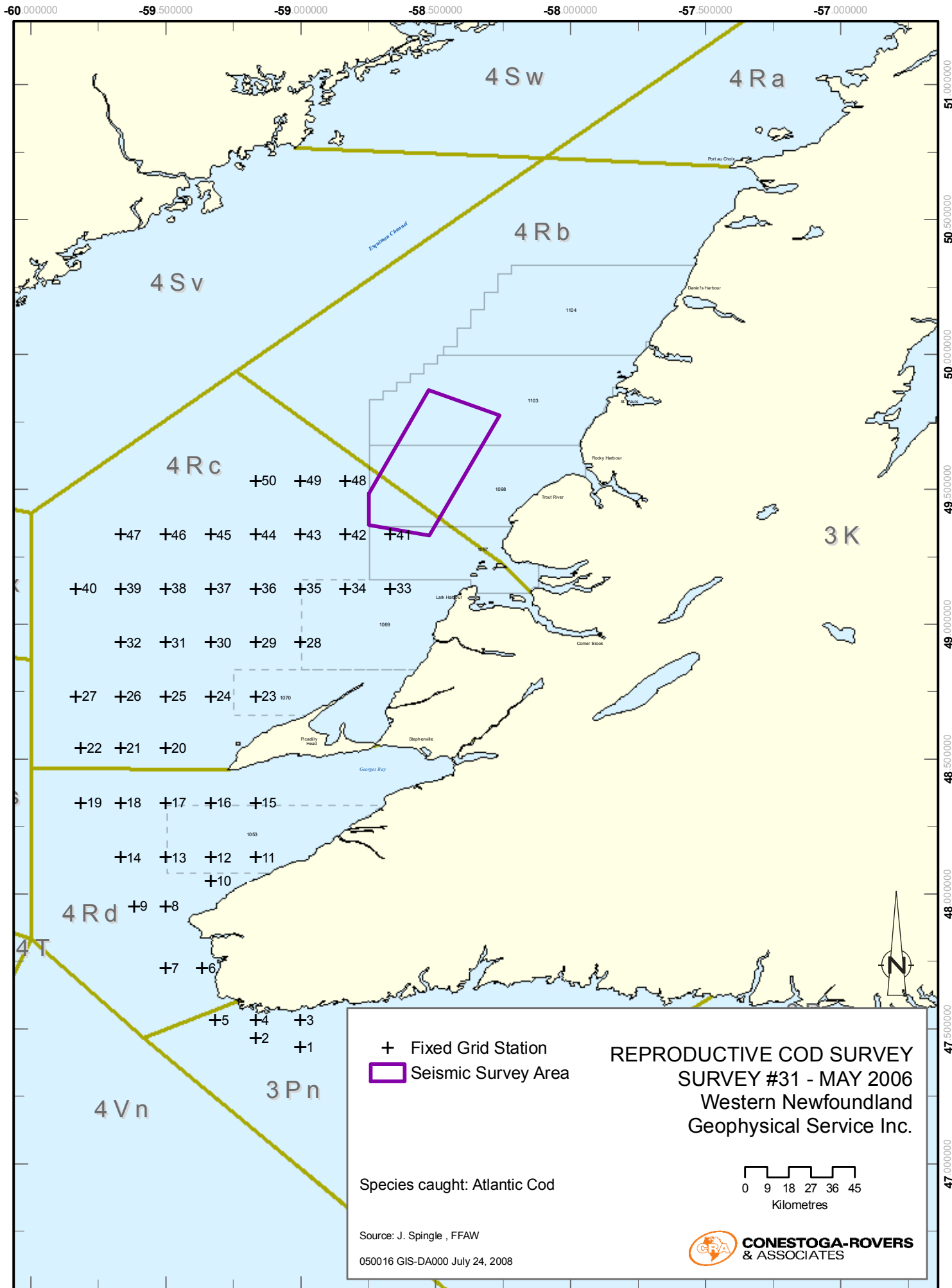
APPENDIX A
REVISED FIGURES







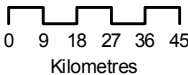




- + Fixed Grid Station
- Seismic Survey Area

REPRODUCTIVE COD SURVEY
SURVEY #31 - MAY 2006
Western Newfoundland
Geophysical Service Inc.

Species caught: Atlantic Cod



Source: J. Spingle , FFAW
050016 GIS-DA000 July 24, 2008



