information is supplemented by the information provided in the FFAW survey of (primarily) those fishing from vessels under 35 feet length over all (LOA).

The main analysis of harvesting activities describes fish caught within the waters of fisheries management unit UA 3PSc (see Figure 5.1). This management and data area encompasses all of Placentia Bay, and includes species harvested from 3PSc – wherever they were landed or processed. Thus catches by fishers who are not based in Placentia Bay are included while catches made by Placentia Bay-based vessels are excluded if they were harvested beyond the 3PSc area. For example, some of the larger (>35 foot) vessels based in the area take a portion of their annual catch on fishing grounds farther offshore, such as St. Pierre Bank, whereas catches by fishers based in other areas of the province, e.g., in Fortune Bay, are included in the analysis if taken within 3PSc.

The calculation of the value of the fisheries is much more complex. In addition to variability that results from changes in the quantity of harvest from year to year (whether due to natural variability or changing quotas), prices also vary from year to year and even within the fishing season, driven primarily by market conditions, which in turn are determined by supply and demand, currency exchange rates and other market factors. Quality issues also affect the prices paid for many species. Consequently, most of the analysis provided in this section involves quantity of harvests (tonnes of fish landed), which is directly comparable from year to year.

Other data sources include fisheries management plans and data tables (e.g., fishing enterprises) provided by DFO. Information on Aquaculture was provided by the DFA, including its AguaGIS.com database, and from individual aquacultural licence holders consulted for this analysis in November 2006 and again in April 2007.

5.2 Consultations

Relevant DFO and DFA managers and existing aquaculture licence holders were contacted to obtain current information on the area's fisheries and aquaculture sector activities. Appendix A provides a list of organizations and persons consulted for the purpose of this assessment.

In addition, NLRC held introductory meetings with fishers in communities throughout the Study Area and worked with FFAW Placentia Bay Sub-Committee, following its formation in January 2007. NLRC has also participated regularly in Placentia Bay Traffic Committee meetings and briefed the Placentia Bay Integrated Management Committee on the Project and the assessment work.

5.3 Existing Environment

5.3.1 Commercial Fisheries

This section presents a detailed review of the commercial fisheries harvesting environment in the Placentia Bay study area. Topics addressed include the historical context, species harvested, monthly distributions of fishing activities, fishing gears used, and geographic location of fishing activities where that information is available.

Historical Context, 1980s to the Present

Drastic changes occurred in the Placentia Bay commercial fisheries in the early 1990s, when fisheries moratoria were imposed because of declining groundfish stocks. For example, within 3PSc for the period 1984 to 1990, 74 per cent of the catch by quantity was cod while snow crab made up just 3 per cent; during 1994 to1995, immediately after the moratoria were imposed, cod made up only 6 per cent of the harvest and snow crab catches increased to 24 per cent. In terms of value, cod accounted for nearly 60 per cent of the value of the 3PSc harvest (1984 to1992), but only a negligible amount in 1994 to1995 (see Figure 5.2).

Between the landings highpoint in 1986 and the 1995 harvest, the quantity of biomass taken from Placentia Bay declined from more than 19,000 tonnes to under 3,000 tonnes, a drop of 85 per cent. However, the landed value of the 3PSc fishery did not experience a similar decline owing to the changed composition of the catch, made up – in 1995 – primarily of high-priced species such as lobster, snow crab and lumpfish roe. In that year, the value of the fishery was only 8 per cent lower than in 1986 ($9,740,000 compared to $10,634,000). Value continued to rise after 1995, until, by 2002 the harvest from 3PSc was worth more than $18 million, nearly 180 per cent of the value of the harvest in 1986, the year that the peak quantity was harvested over this timeframe. Even with weaker prices in recent years, snow crab is still a very valuable species in this area.

A limited cod fishery was reinstated in 3PSc in 1997 under a strict management regime, and during 2000 to 2002 cod again accounted for nearly 60 per cent of the harvest by quantity, though in recent years quotas have been reduced once more. The following graphs show the changes in the quantity of the harvest from 3PSc over the last 20 years (1987 to 2006). Figure 5.3 shows the overall quantity harvested (all species), Figure 5.4 shows groundfish harvests (mainly cod), and Figure 5.5 shows all other species (mainly shellfish and herring) over this period.

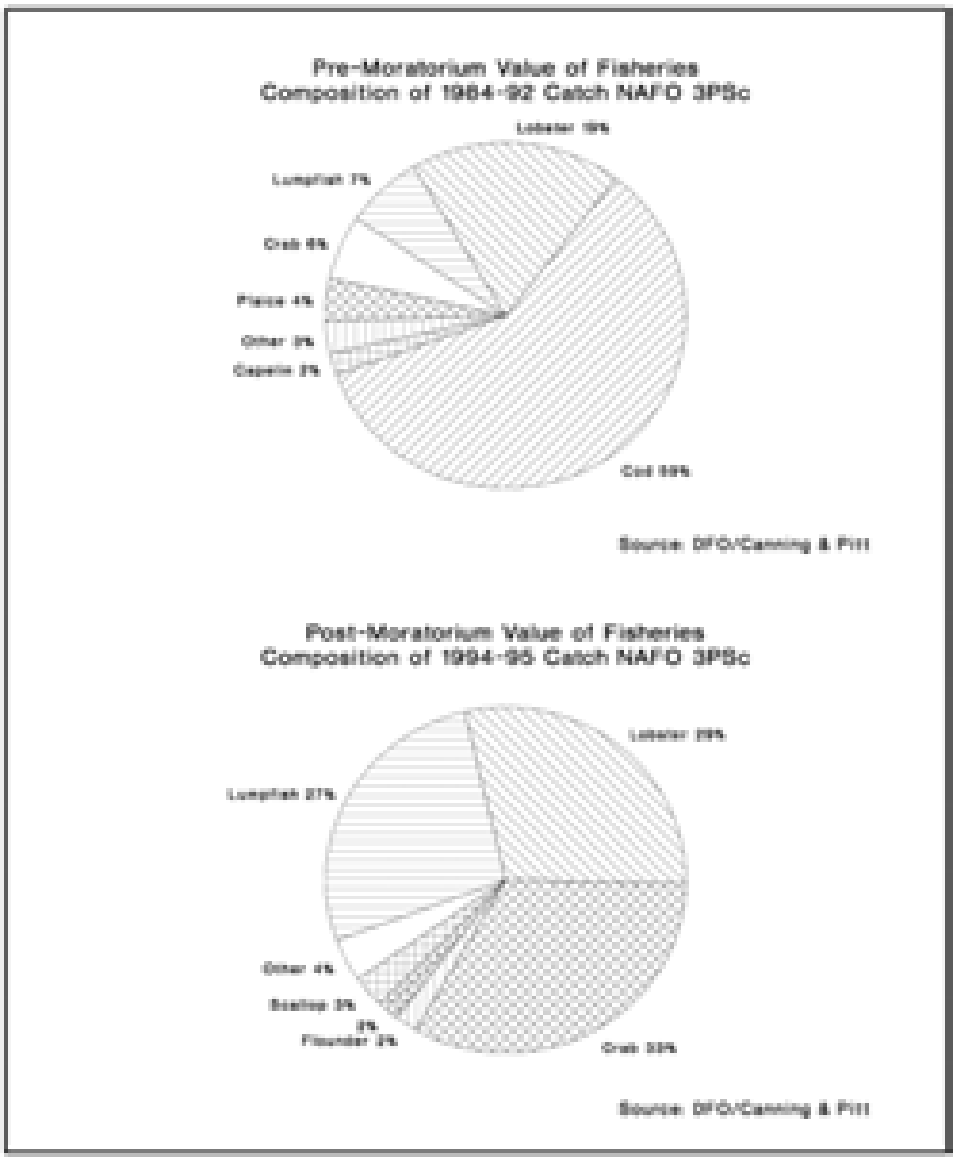

Figure 5.2 Value of Fisheries, 3PSc

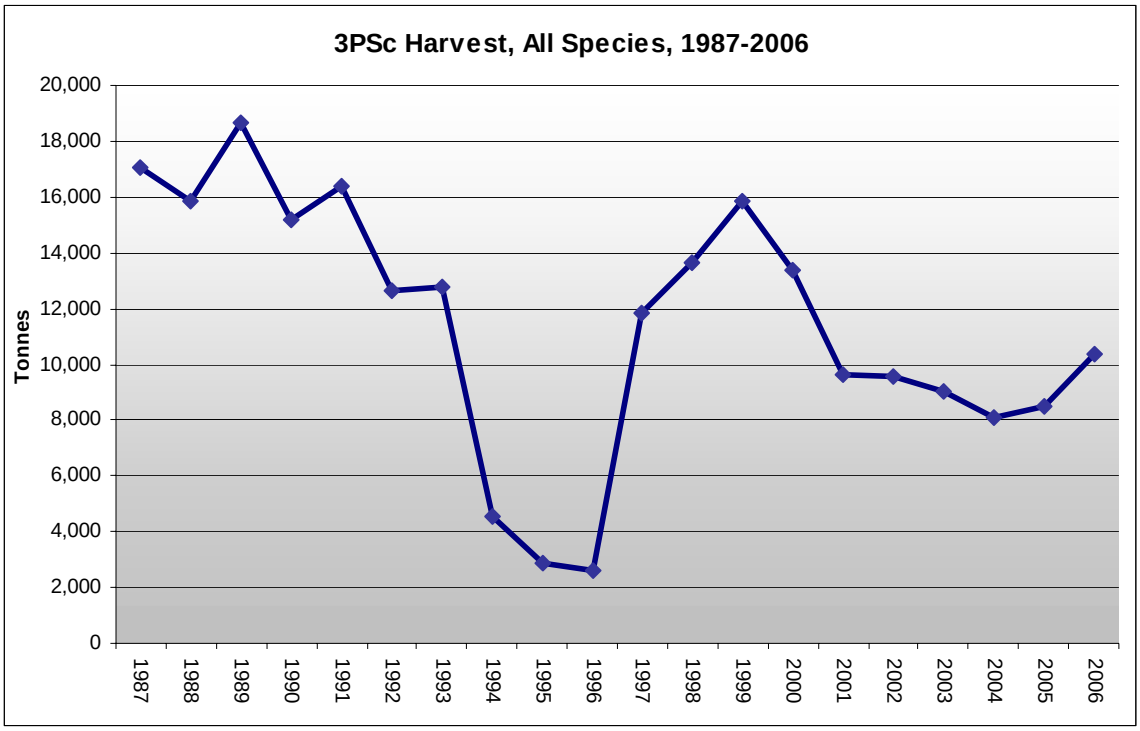

Figure 5.3 3PSc Harvest, All Species, 1987-2006

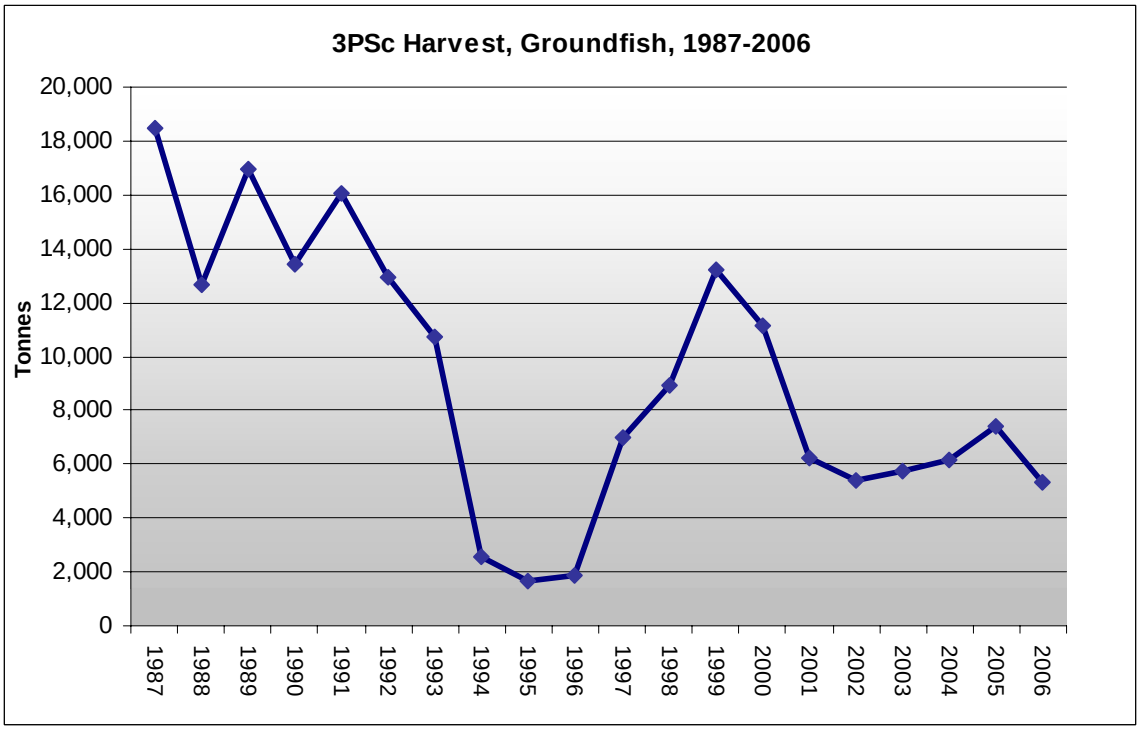

Figure 5.4 3PSc Harvest, Groundfish, 1987-2006

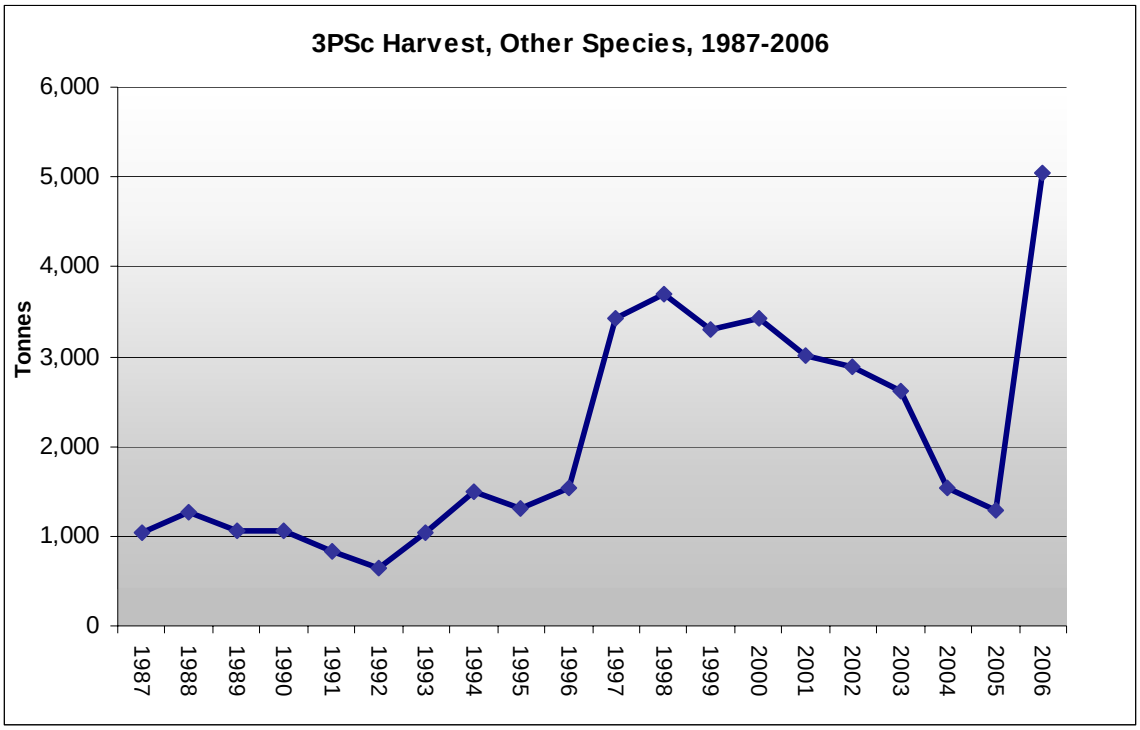

Figure 5.5 3PSc Harvest, Other Species, 1987- 2006

The notable increase in 2006 for non-groundfish species is owing to greatly increased whelk harvesting recorded in the DFO dataset for that year. However, DFO managers report that relatively few fishers are harvesting whelk directly within Placentia Bay, and were not aware of any catch locations within the study area. They suggest that most of this species catch is made in areas beyond 3PSc, e.g., in the St. Pierre Banks area (M. Eddy, pers comm., April 2007; R. Smith, pers comm., May 2007). However, some 60 records in the 3PSc data locate whelk harvesting in Placentia Bay, and the gear type associated with all the 3PSc whelk records (pot) is correct for this species.

Since the mid-1990s, the fisheries and fisheries management and licencing regimes in Placentia Bay have continued to evolve. Most significantly, a fish harvesting rationalization strategy was implemented in the province to reduce the number of participants in the harvesting sector, and a professionalization process was introduced which prescribed specific levels of experience and training required to be a professional fish harvester. Along with this system, DFO introduced the "core" harvesting enterprise designation, with restrictions on harvesting by those who are not part of such an enterprise.

The following sections provide more information on key aspects of present-day Placentia Bay fisheries.

Current Harvesting

Data taken from 3PSc landings information for the years 2003 – 2006 show that cod is still by far the most important species harvested in the area. Snow crab, herring and lumpfish (roe fishery) make up most of the remainder of the harvest. A summary of percentage of the catch for the top few species is shown in Table 5.1, the full harvesting information is in Appendix C. Although lobster makes up a small percentage of the harvest, the value is of much greater significance to harvesters.

Table 5.1 3PSc Harvest, 2003— 2006 Main Species

Species	2003 % of Total	2004 % of Total	2005 % of Total	2006 % of Total
Cod	53.4	57.0	59.1	43.2
Snow crab	24.7	15.4	7.5	5.7
Herring	11.7	11.5	3.3	8.4
Lumpfish	1.4	7.5	4.9	4.1
Scallop	2.0	--	1.4	5.2

In 2006, the Individual Quotas (IQs) for various Placentia Bay-based fishers, by vessel size, was as follows:

- < 25' 14,350 lbs / 6.51 tonnes (round weight)
- 25'- 34'11" 23,000 lbs / 10.43 tonnes (round weight)
- 35'- 65' 38,700 lbs / 17.55 tonnes (round weight)

The overall 2007 3PS snow crab quota is 4,065 tonnes, while the quota for Placentia Bay itself (3PSc, Figure 5.1) is 975 tonnes: 450 tonnes for Inner Placentia Bay, and 525 tonnes for Outer Placentia Bay. The IQs are as follows:

For small boat (< 35') fishers

- in Inner Placentia Bay 5,040 lbs / 2.29 tonnes
- in Outer Placentia Bay 6,740 lbs / 3.06 tonnes

Placentia Bay-based crab fishers holding Supplementary licences had an overall IQ of about 65,000 pounds but do not fish within 3PSc.

In terms of economic value, the area's commercial fishers usually depend on three high-value species – lobster, snow crab and cod – for the bulk of their annual fishing income.

While lobster accounts for only a small percentage by weight of the annual catch, given its high value this species remains very important to many study area fishers, and tends to be fished quite close to shore. The herring fishery, although important (especially as bait), does not have the direct economic value of the other three fisheries.

Harvest information and recent values for the harvest specifically for ports near the proposed refinery site are provided below.

Seasonality

Some harvesting is conducted year-round, as it was in the pre-moratorium (1984-1992) period, though in recent years it has been much less evenly distributed throughout the months (see Figure 5.6). Since 1996, the peak harvesting months have been June and July, but there has also been a fairly strong fishery in the late fall (for cod) as indicated in the graph.

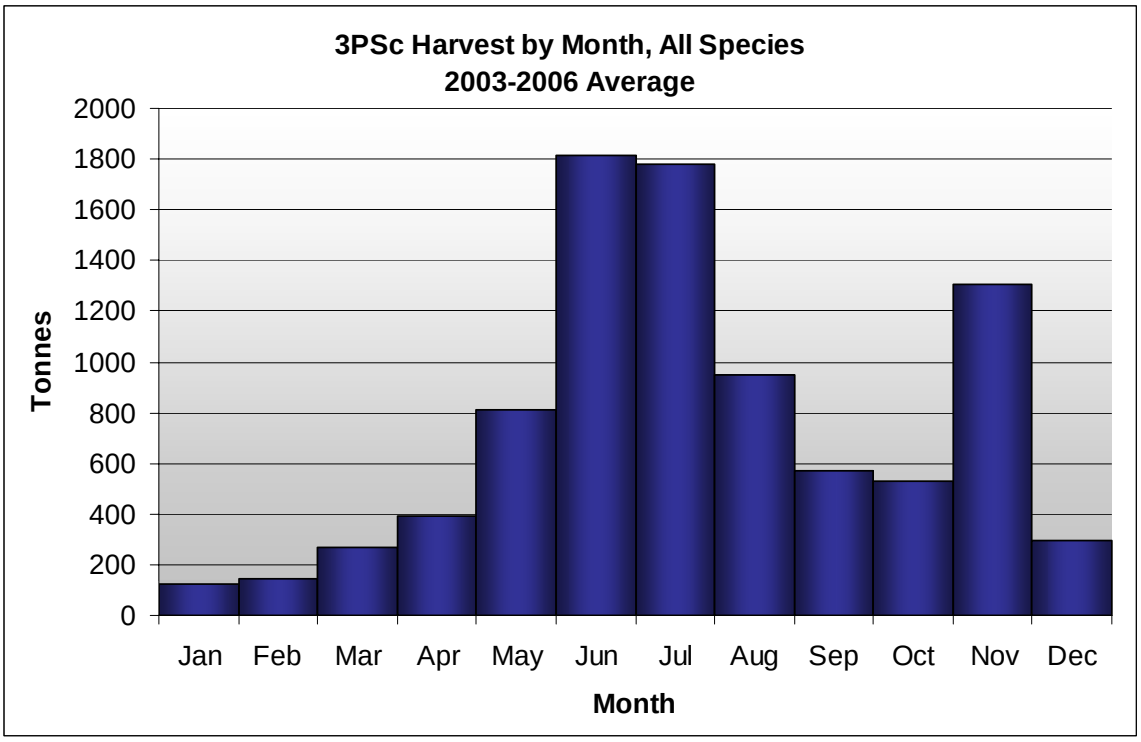

Figure 5.6 3PSc Harvest by Month, All Species

The following graphs show the timing of the 2003-2006 harvests for selected Placentia Bay species.

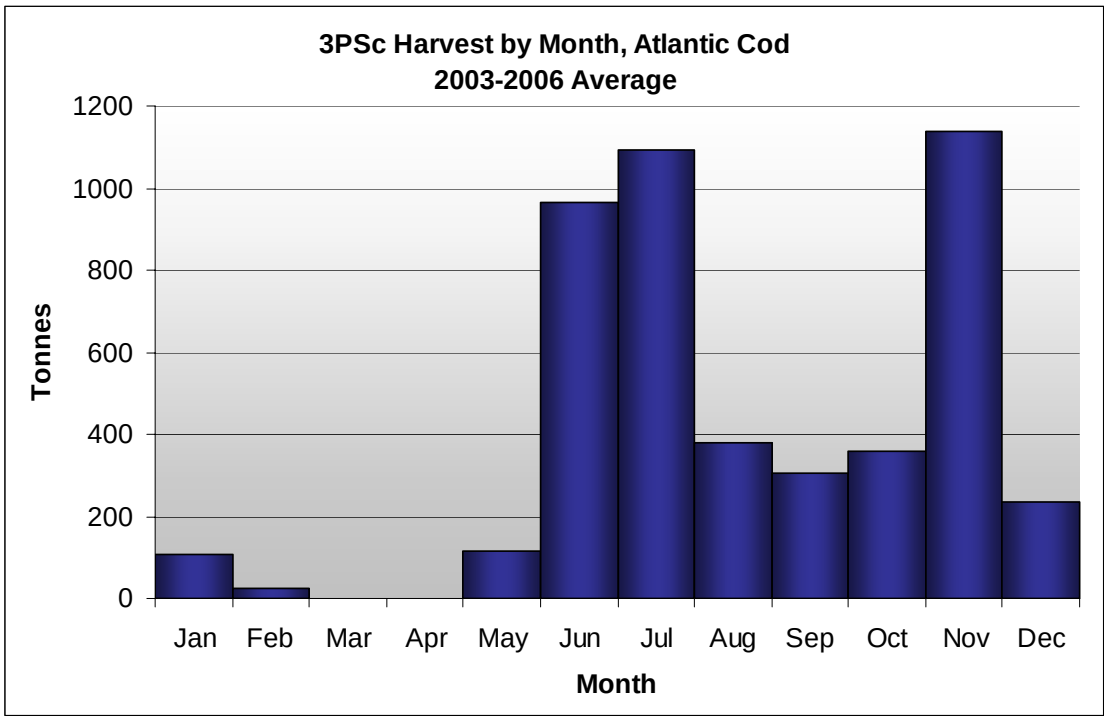

Figure 5.7 3PSc Harvest by Month, Atlantic Cod

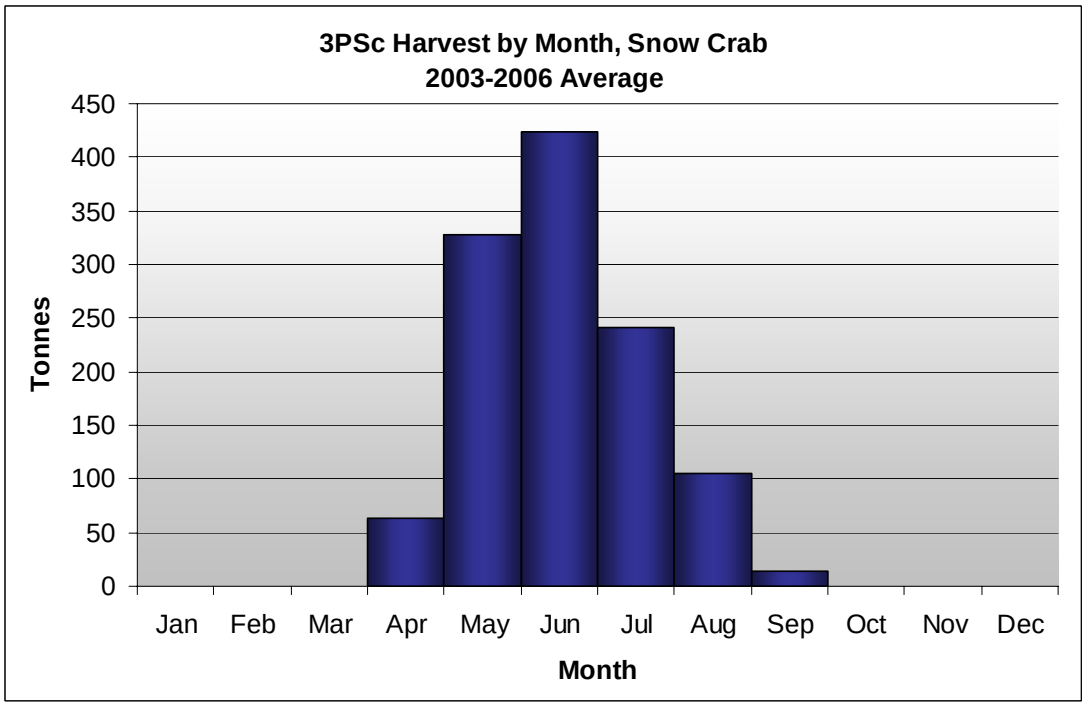

Figure 5.8 3PSc Harvest by Month, Snow Crab

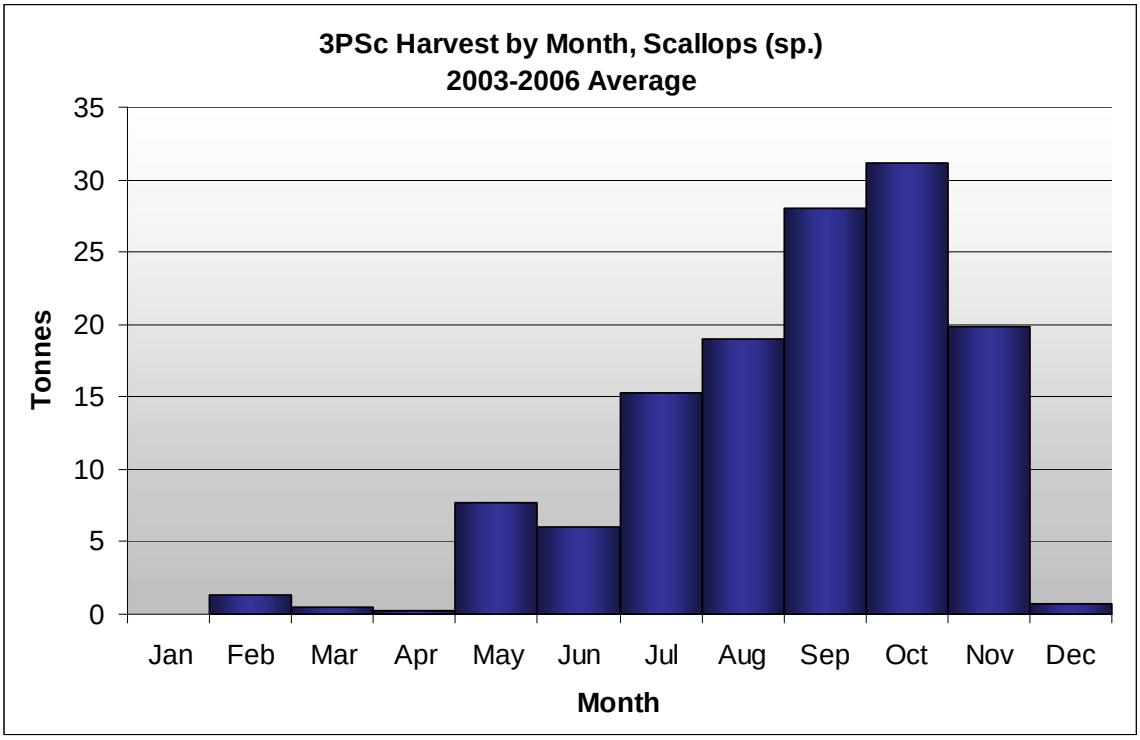

Figure 5.9 3PSc Harvest by Month, Scallops

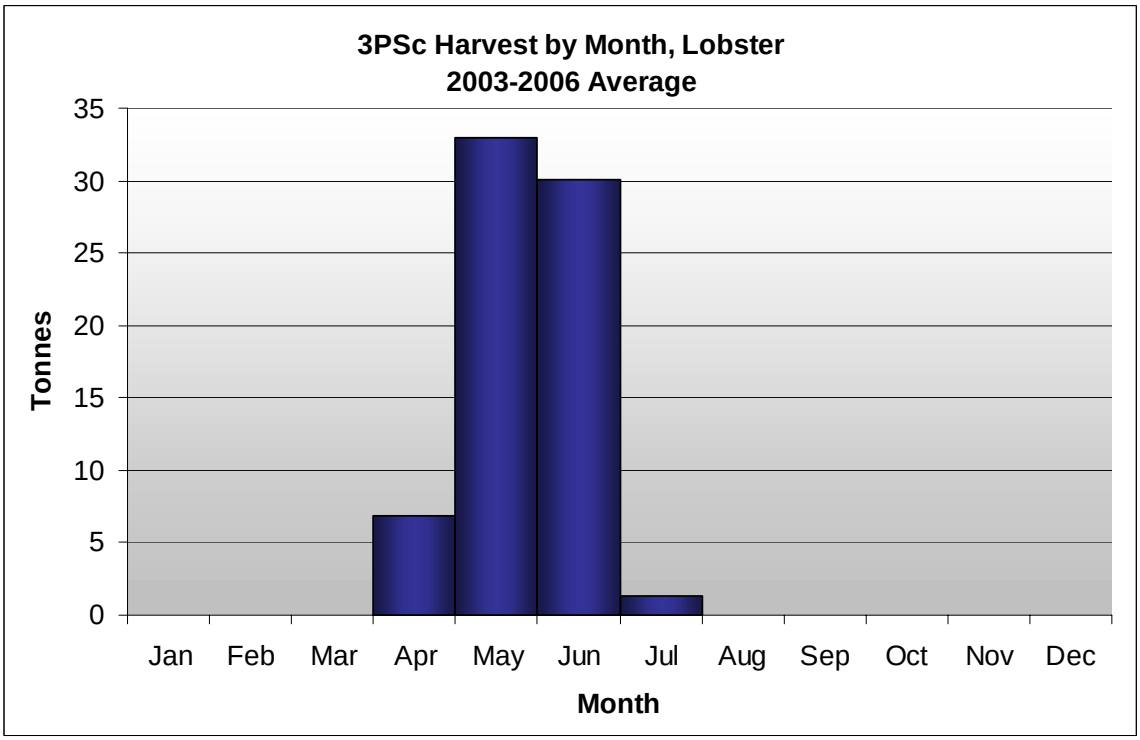

Figure 5.10 3PSc Harvest by Month, Lobster

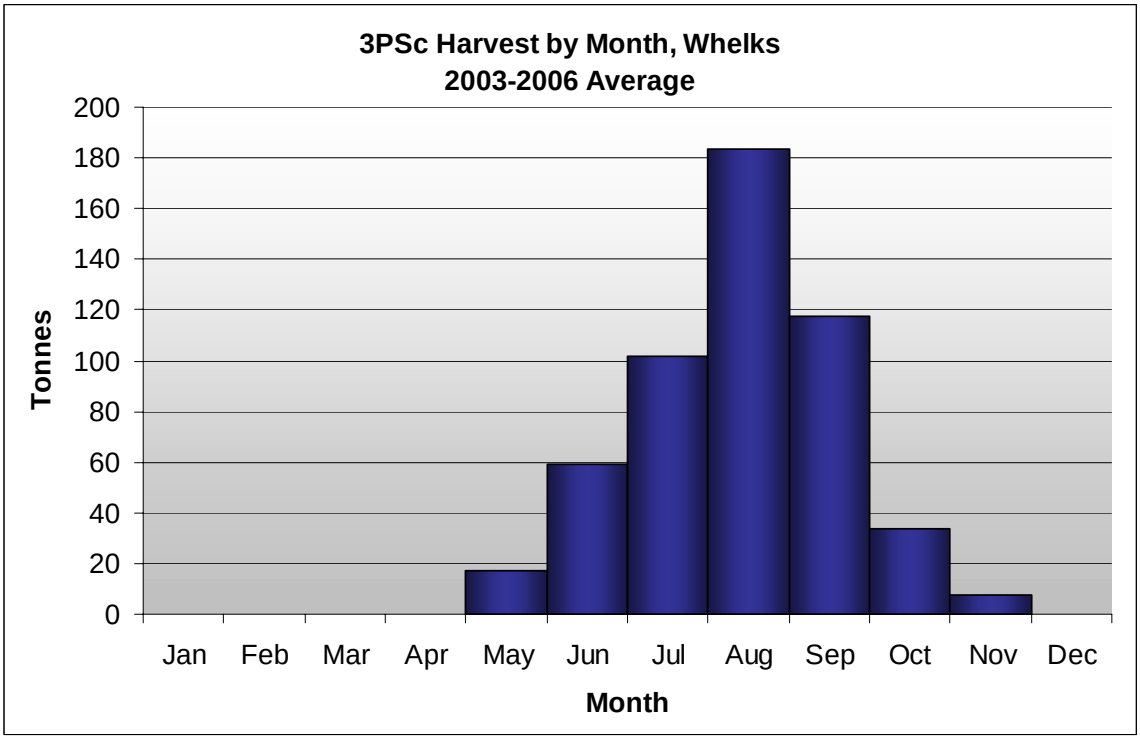

Figure 5.11 3PSc Harvest by Month, Whelks

Harvesting Locations

The following maps show the locations recorded in the DFO georeferenced dataset for all species, 2003-2006, aggregated, and then for selected species (Atlantic cod, snow crab and scallop). As noted above, however, this represents only a small sub-set of the 3PSc harvest. Some species (for example, lobster) are not represented at all in the georeferenced data. The Placentia Bay Traffic lanes (Vessel Traffic Separation Scheme or VTSS) are also shown on these maps.

The maps for cod, snow crab, scallop and lobster fishing grounds, based on information from harvesters, are also presented. This information came primarily from fishers with vessels under 35 feet in length and their information would not be captured by the DFO dataset. The report from FFAW (main text) is provided in Appendix C and additional maps of finishing grounds for other species are included in the Map and Drawings Folio.

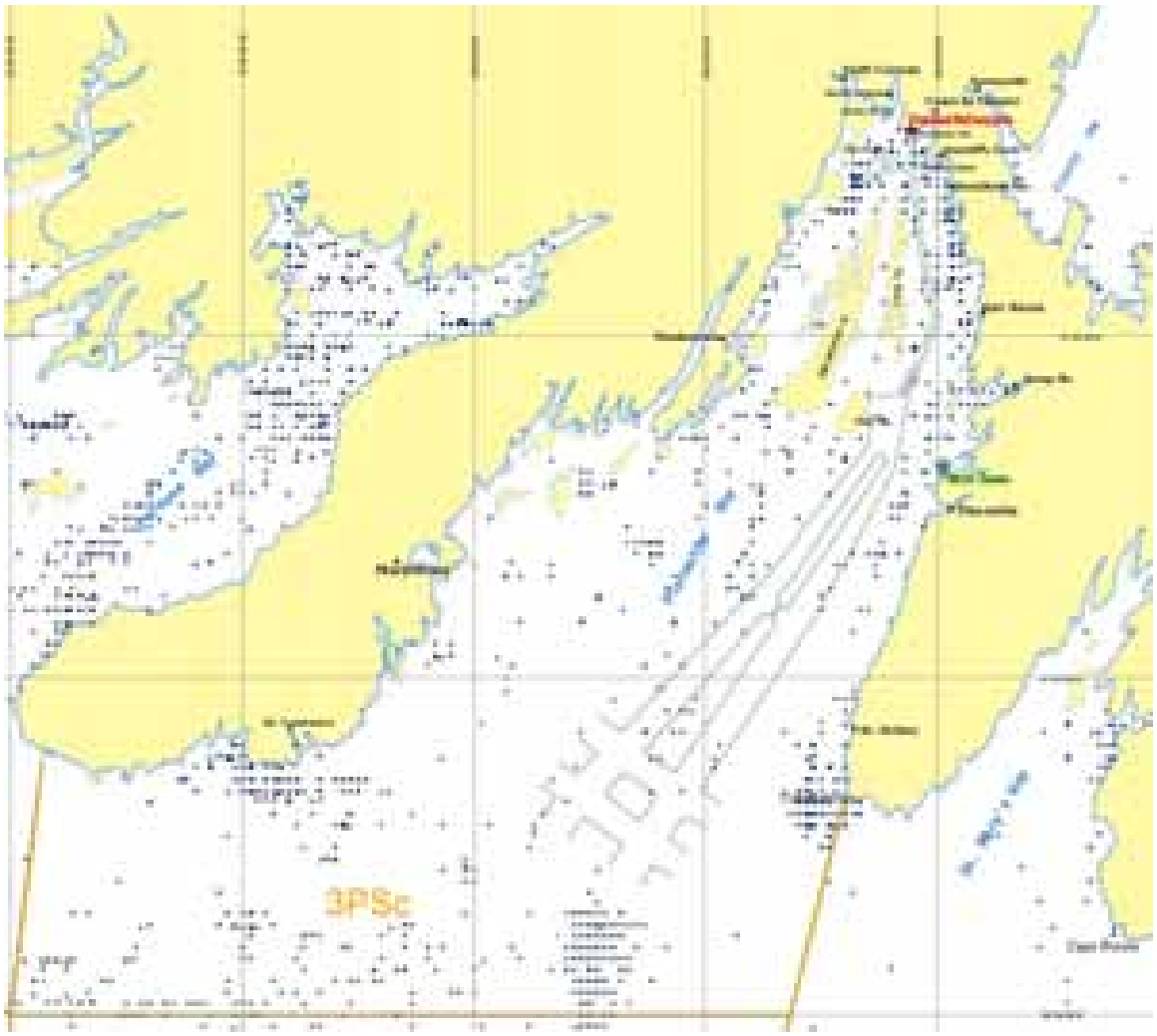

Figure 5.12 2003-2006 Recorded Fishing Locations, All Months, All Species, Aggregated

Source DFO

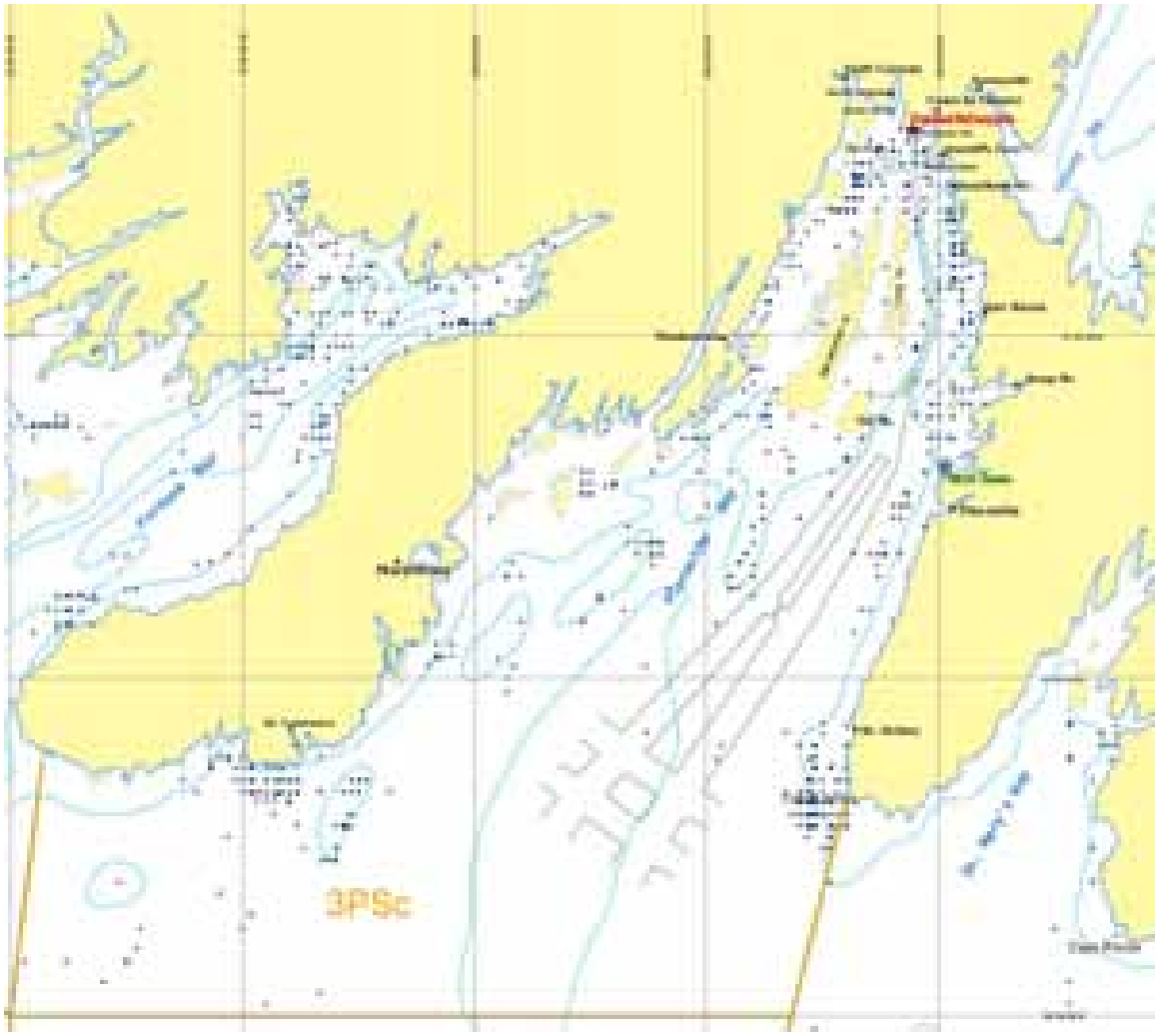

Figure 5.13 2003-2006 Recorded Fishing Locations, All Months, Atlantic Cod, Aggregated

Source DFO

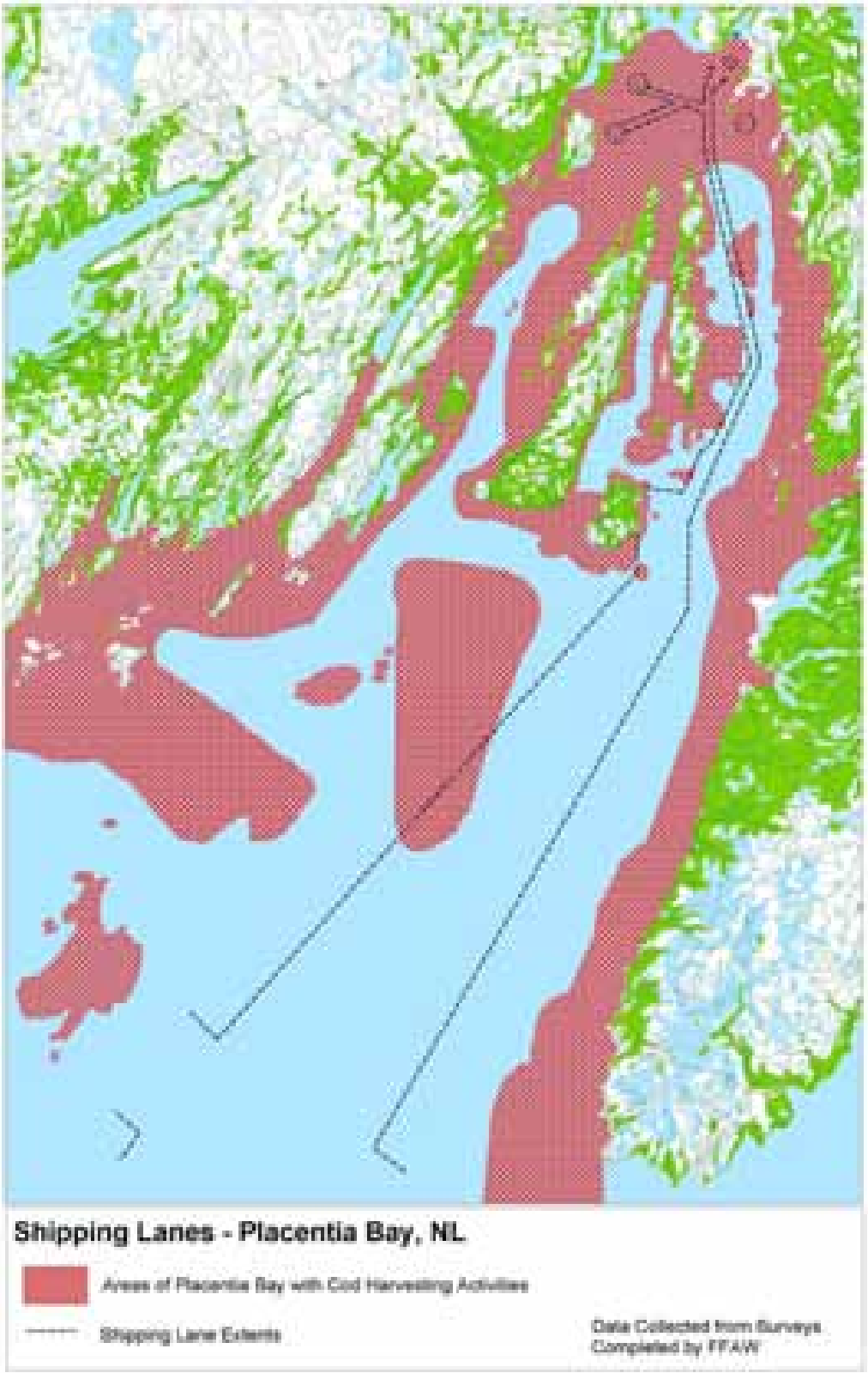

Figure 5.14 Cod Harvesting Locations, Placentia Bay, NL (FFAW)

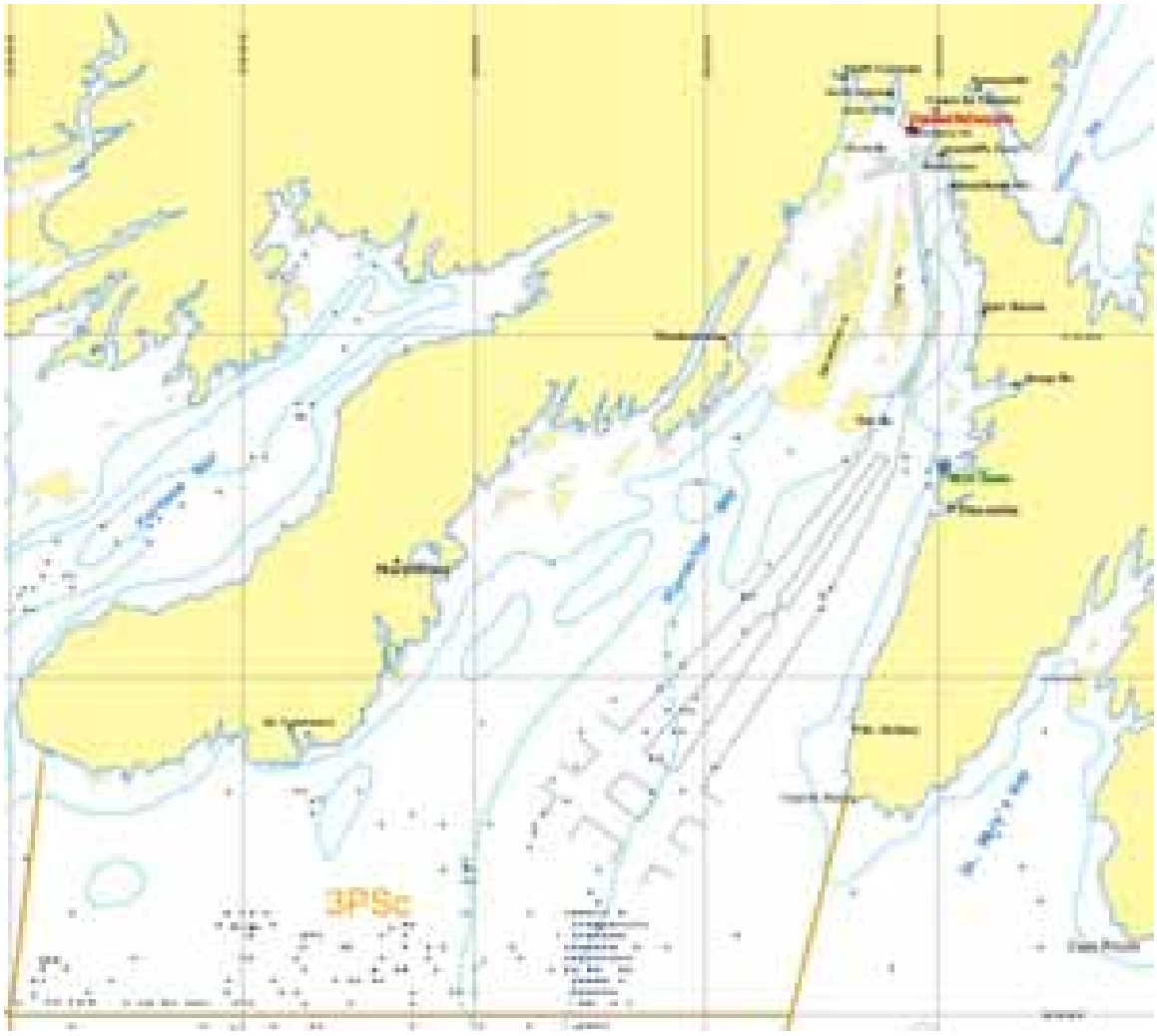

Figure 5.15 2003-2006 Recorded Fishing Locations, All Months, Snow Crab, Aggregated

Source DFO

Figure 5.16 Crab Harvesting Locations, Placentia Bay (FFAW)

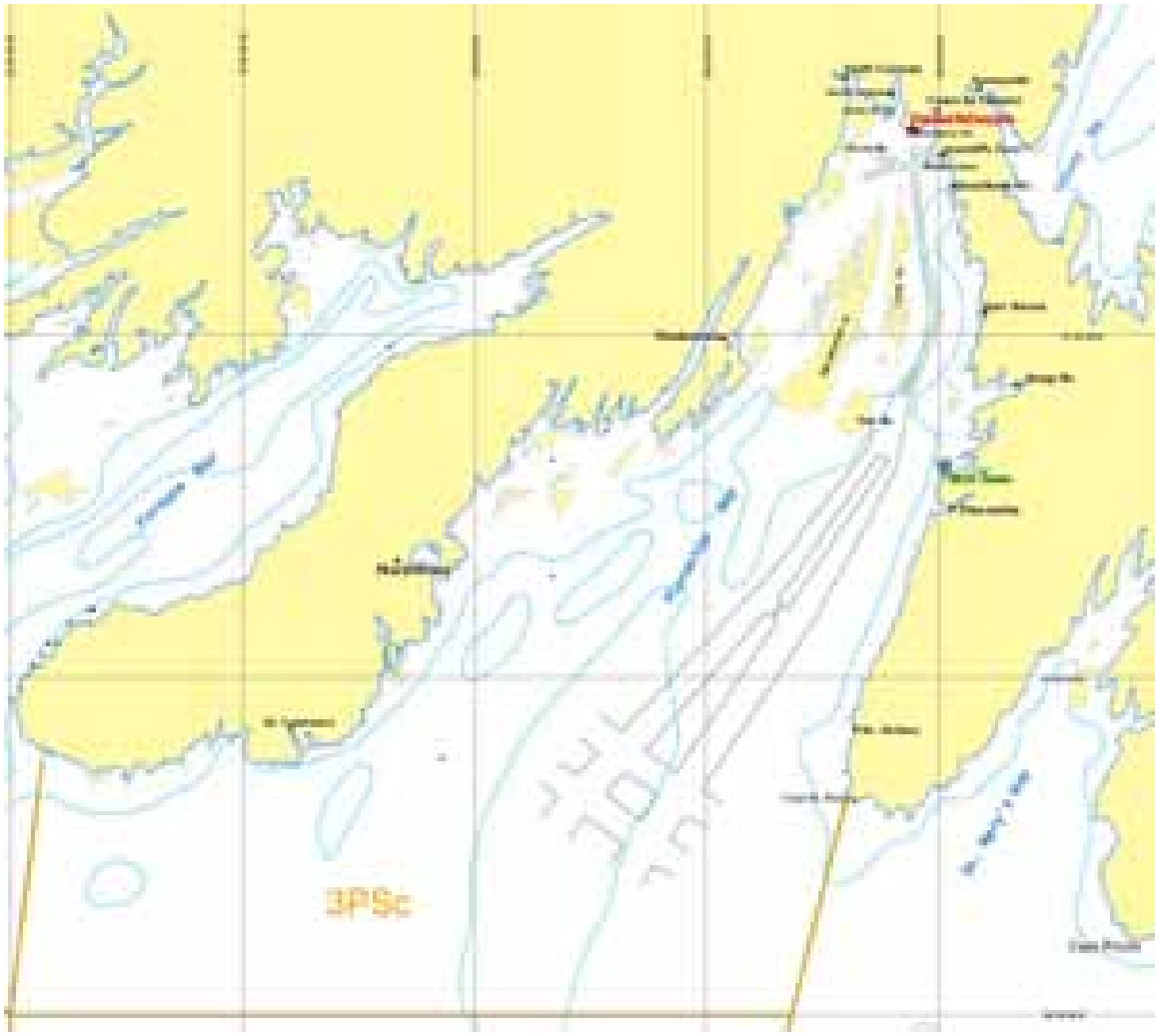

Figure 5.17 2003-2006 Recorded Fishing Locations, All Months, Scallops, Aggregated

Source DFO

Figure 5.18 2003-2006 Recorded Fishing Locations, All Months, Scallops, Aggregated

Fishing Gear

In many cases the fishing gear used is specific to the species harvested: pots for snow crab, scallop drags for scallops, diving for sea urchins. Cod is harvested using several gear types, but primarily it is harvested with gillnets in this area. Table 5.2 shows the quantity of the harvest by each gear type for the 2003-2006 periods.

Table 5.2 3PS Harvest by Gear Type, 2003-2006 Average

Gear	Tonnes	% of Total
Stern otter trawl	79.8	0.9%
Beach and bar seine*	32.6	0.4%
Tuck seine	22.3	0.2%
Purse seine	666.4	7.4%
Gillnets (set)*	5,265.6	58.5%
Longlines*	331.1	3.7%
Handlines*	246.5	2.7%
Trap*	110.5	1.2%
Pot*	1,764.5	19.6%
Dredge / drag	401.7	4.5%
Diving	28.5	0.3%
Hagfish barrel*	45.2	0.5%
Other	4.7	0.1%
Total (Average)	8,994.6	100.0%

Note:
* Fixed gear

The locations of the subset of georeferenced fixed and mobile gear fisheries are shown on the following maps (Figures 5.19 and 5.20). In general, industrial activities and vessel traffic have a greater potential to conflict with fixed gear fisheries than with mobile gear.

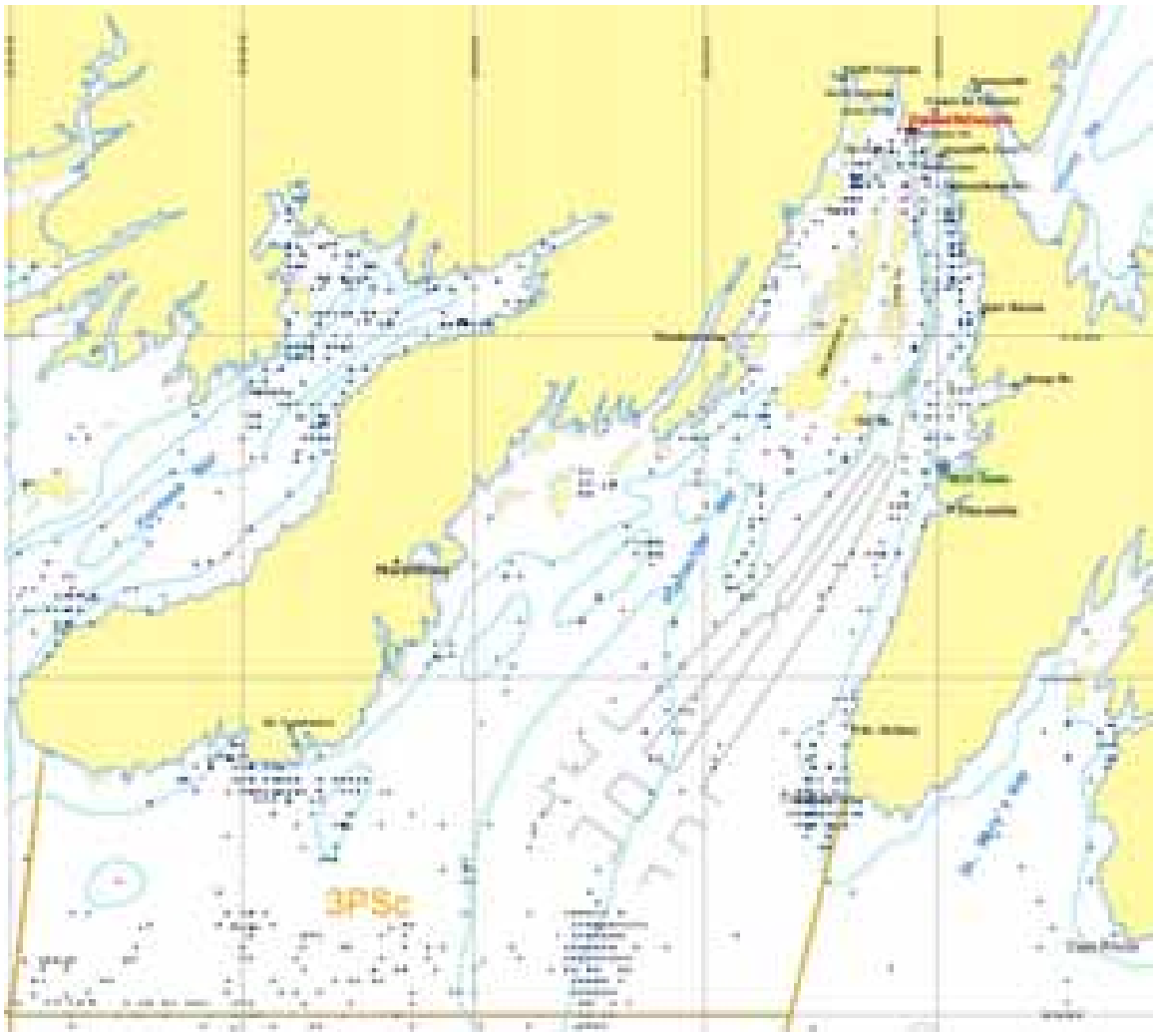

Figure 5.19 2003-2006 Recorded Fishing Locations, All Months, Fixed Gear, Aggregated

Source: DFO

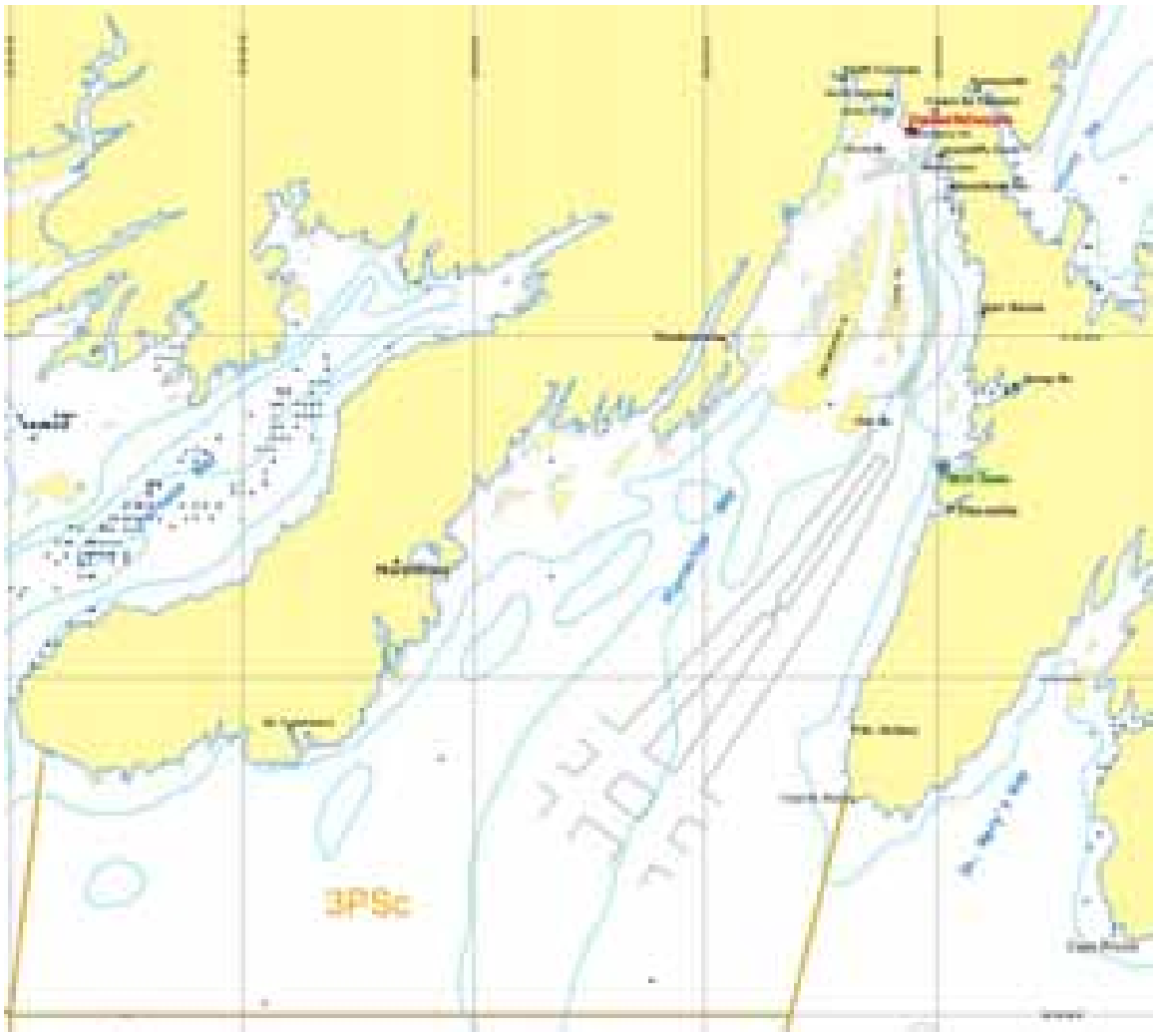

Figure 5.20 2003-2006 Recorded Fishing Locations, All Months, Mobile Gear, Aggregated

Source: DFO

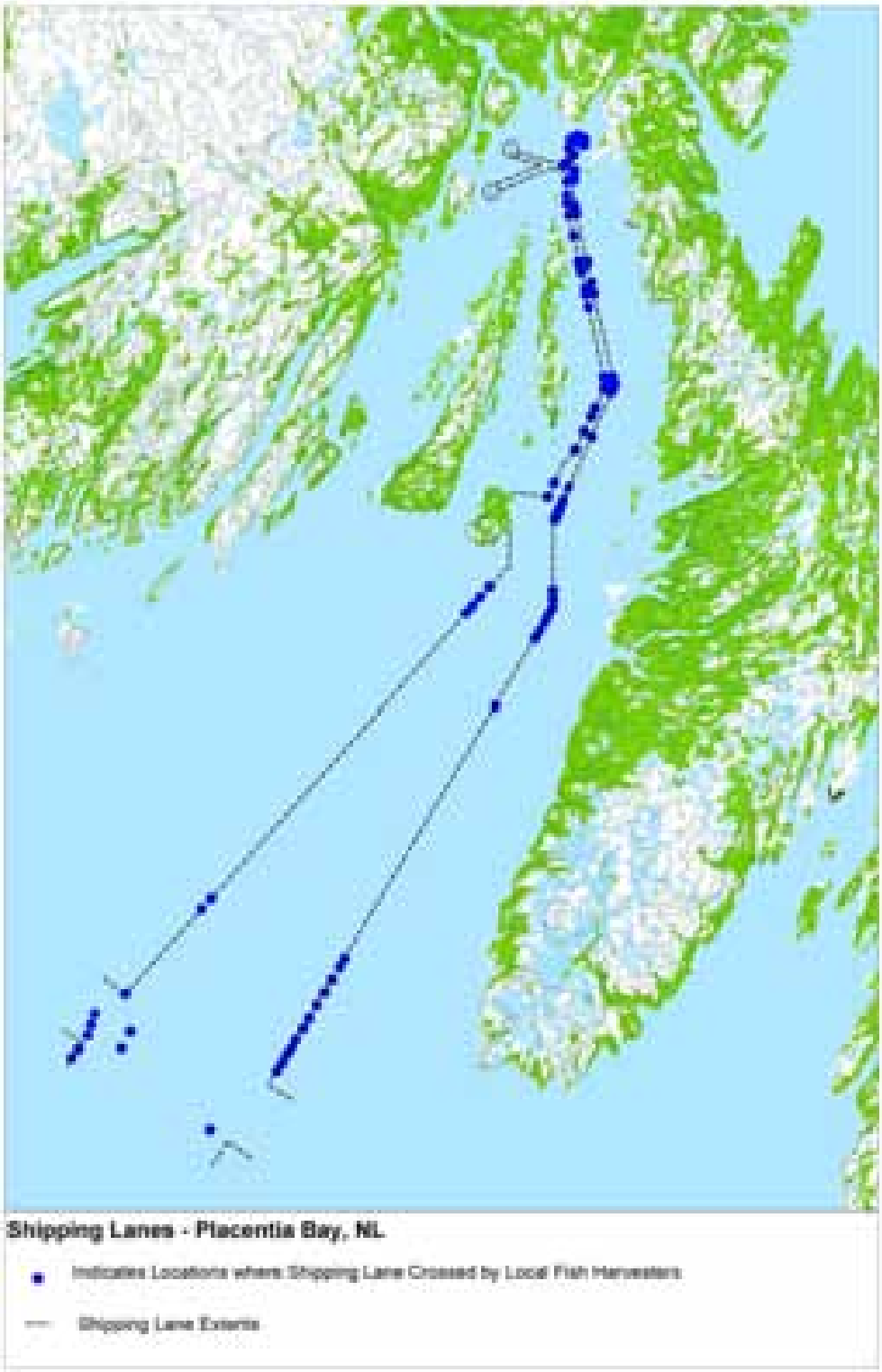

Figure 5.21 Shipping Lanes – Placentia Bay, NL

Fishing Enterprises and Fishing Licences

There are 477 core fishing enterprises in Placentia Bay (DFO's Fishing Area 10) and 51 non-core enterprises. A core fishing enterprise is a commercial fishing enterprise holding key species licenses, under a system established by DFO in 1996. A non-core enterprises is one that holds other (perhaps single) species licenses.

The majority of the core enterprises are less than 35 foot LOA, i.e., 379 enterprises are less than 35 feet in length' and 98 are in the 35 – 64 foot LOA category. All (51) of the non-core enterprises are less than 35 feet.

The number of license held by both core and non-core enterprises are shown in Table 5.5. The table also includes the 304 recreational licenses. More detail is provided in Appendix D.

Table 5.3 Core, Non-core and Recreational Licences, Placentia Bay (2003)

Species	Total Licences
Bait	371
Capelin Fg	100
Capelin Ps	1
Eel	6
Groundfish Fg	518
Herring Fg	124
Herring Ps	10
Lobster	345
Mackerel Fg	105
Mackerel Ps	8
Salmon Atlantic	5
Scallop	225
Scallop Recreational	265
Seal	53
Seal Personal Use	42
Snow Crab Inshore	401
Snow Crab Supplementary	68
Squid	245
Tuna Bluefin	4
Whelk	86
Total	2,982

5.3.2 Vessel Traffic Lanes: Conflict with Fish Harvesting

During meetings between fishers and NLRC, many fishers spoke of the ongoing effects of the vessel traffic lane on fishing activities and their concern that the increase in tanker traffic associated with the refinery project would make fishing even more difficult, even, some suggested, impossible. Fishers also made the point that they have been raising this concern for years. In recognition of the potential conflicts among marine users in Placentia Bay, several years ago the Placentia Bay Traffic Committee was established. Chaired by CCG, the

Committee continues to provide a useful forum for marine users to identify, discuss and, where possible, resolve various traffic-related issues.

History of the Traffic Lane

The vessel traffic management system was established several decades ago, shortly after the existing refinery was commissioned in the late 1960s. At that time, fishers were consulted regarding the most appropriate route for the traffic lane. The current route was selected primarily for its deep water but also because, at the time, there were very few fishing activities in this part of Placentia Bay: at that time, the fishery focused on cod, mainly in inshore areas and there was no fishery for snow crab.

The present vessel traffic lane is formally referred to in the Canada Shipping Act Regulations as the Vessel Traffic Services Zone. Guidelines in Rule 10 in the associated Collision Regulations govern all vessel activities in a Vessel Traffic Services Zone and/or the relevant Traffic Separation Schemes. This document will typically use vessel traffic lanes or VTSS to refer to the system.

The federal government is responsible for establishing, monitoring and enforcing marine traffic and vessel regulations and procedures. Transport Canada has stated that the Placentia Bay vessel management system is not a significantly busy marine traffic zone compared to other vessel traffic management systems in Canada and elsewhere in the world and that it has ample capacity to accommodate the expected increase in traffic in Placentia Bay (associated with the refinery and other potential projects presently under assessment).

The VTSS is managed through the Placentia Marine Communications and Vessel Services Centre. Placentia MCTS, called Placentia Traffic, tracks, monitors and regulates tanker and other commercial traffic movements in the Bay. The Centre also monitors any fishing vessels that are detected on radar at the Centre or that report in on VHF radio.

In the present vessel traffic management system, all commercial vessels over 20 m LOA (Length Overall) are required to call in to the Traffic Centre. However, only fishing vessels over 24 m LOA must call in and be a part of the traffic system.

The vast majority of the vessels in the Placentia Bay fishery are less than 24 m and, as such, are not required to participate in the vessel traffic management system. In discussions between fishers and NLRC, many if not most indicated that they did not use the MCTS centre services.

For example, the Fish, Food and Allied Workers of the Canadian Auto Workers (FFAW) survey found that while most (more than 80%) of the fishers surveyed have VHF radios on board, only about 44% called in to the Marine Communication Traffic Services Centre for information before crossing or working in the lanes. Survey participants also indicated that only about 30 % kept a listening watch while in or near the lanes. Only 24% of those surveyed have radar and, even

then, in meetings with NLRC, it was pointed out that an ongoing radar watch was not practical while deploying or hauling gear.

Snow Crab Fishery

As the nature of the fishery changed following the moratorium, the snow crab fishery was established (starting in about 1996) and is now one of the most economically important in Placentia Bay. Snow crab grounds are in deep water and information from fishers show that the harvesting area for crab extends throughout much of the traffic lanes (Figures 5.15 and 5.16).

The crab fishery is an individual quota-based fishery and the allowed season is very short, leading to a concentration of effort and congestion on good crab fishing grounds. The crab season is shown in Figure 5.8 and the significant economic contribution in Table 5.1.

Extent of Interference

The actual extent of conflict between vessel traffic and crab fishing in use of the area in and around the traffic lanes has not been documented. The map prepared from fishers' information suggests that there may be considerable overlap between crab grounds and the vessel traffic lanes and this was supported by anecdotal information provided during meetings between fishers and NLRC. Fishers described many incidents of close-calls or near-misses with tankers during crab fishing as well as incidents of damaged or lost gear. In most if not all cases, the incident was not reported to Placentia Traffic.

The MCTS Centre records all reported incidents as Marine Occurrence Reports. Such incidents include such situations as disabled vessels, overdue vessels reports, pollution, vessel defects and close-quarters events. During the past five years, the Centre has filed 1 351 reports (Placentia Bay Traffic Committee, April 4, 2007 meeting minutes). Only three incidents reported (out of 1 351) were close-call situations, and two of these were in Placentia Bay. In meetings with NLRC, fishers stated that typically near misses were not reported. Without this information, the official record may not be an accurate representation of the actual situation.

The FFAW survey indicates that two thirds of fishers interviewed stated they have been effectively displaced from some of their fishing grounds by tanker traffic (both in the traffic lane and in areas designated as anchorages). The concerns are personal safety, having enough time to set or haul gear and gear loss or damage.

As stated earlier, one of the criteria in selection of the vessel traffic lane route was deep water. Crab grounds are also located in deep water, with the best grounds usually at a depth of 200 m or more. While deep water alone does not necessarily indicate good crab grounds, the percentage of deep water in Placentia Bay taken up by the VTSS was calculated as a potential tool in understanding the extent of interference and overlap between the crab fishery and the traffic lanes.

The VTSS occupies about 11 % of the total marine area of Placentia Bay, i.e. 2 684 sq km of the almost 24 000 sq km of marine area. Most of this area is south of Red Island. Of specific interest to the situation with snow crab are areas of the seabed that are located deeper than 200 m: there are about 4 463 sq km of seabed area covered by water deeper than 200 m (or 19 % of the Bay). The VTSS lanes occupy almost 29 % of all the water in Placentia Bay that is deeper than 200 m.

In the outer Bay, the deep water is concentrated in the western part of the VTSS and also farther west and south of the lane. Figure 5.15 based on DFO geo-referenced data shows a concentration of crab effort at the entrance to the VTSS and the FFAW data indicate grounds extending to the west and south, more or less following the deep water(Figure 5.16).

In the inner Bay, the traffic lanes occupy almost 40 % of the crab grounds, that is, water deeper than 200 m. While there are other areas of deep water (potential crab grounds) to the west of Merasheen and Long Island, many of the fishers who typically fish crab in or near the lanes do so due to preference or because it is impractical (or too costly or unsafe) to travel from their home ports to these more distant grounds. This may be especially the case for fishers operating vessels less than 35 feet in length (e.g., 26-foot speedboats).

Crossing the Traffic Lanes

Fishers also spoke of concerns for their safety while crossing the traffic lanes. The survey by the FFAW on behalf of the Refinery Project found that fewer than half of the survey respondents contacted Placentia Traffic prior to crossing the lanes and fewer yet monitored traffic continuously by radio or radar while in the lanes, in some cases for practical operational reasons.

The survey also collected information to determine if there are specific areas where vessels cross the traffic lanes with a view to being able to advise tankers travelling through the Bay of crossing areas. The information collected is shown in Figure 5.21 and suggests that additional effort into collecting this information might provide a useful basis for such a notice.

NLRC Role

In meetings with NLRC and in the discussions with FFAW while developing the fishing activity maps, fishers indicate that fishing (in particular for crab) takes place in and near the traffic lane and that, even with existing levels of traffic, they have serious concerns about personal safety, gear loss and damage and also their ability to deploy and haul gear safely and effectively. NLRC acknowledges that the vessel traffic associated with the proposed Refinery will exacerbate the situation already faced by fishers in association with the traffic lane.

If the Project is approved, site preparation and construction of the Refinery will take about three years to complete with the Refinery operational in 2011. During this time, NLRC will continue to

work diligently and openly with area fishers and the FFAW to find ways to maximize the possibilities for the safety and effectiveness of fishing activity.

In the immediate area around the Refinery's marine terminal, NLRC will work directly with fishers who have traditionally used this area to develop communication and operational protocols, gear and vessel damage policies and compensation arrangements.

NLRC will be considering its own vessel traffic during a detailed scrutiny in the TERMPOL Review process. However, outside the immediate area of the Marine Terminal, NLRC is only one member of the multi-user marine community of Placentia Bay. NLRC will also continue to participate on the Placentia Bay Traffic Committee, the established forum for marine users of Placentia Bay.

Placentia Bay Traffic Committee

As mentioned earlier in the section, the Placentia Bay Traffic Committee provides an effective forum for addressing marine traffic issues with a focus on quick action to resolve potential or actual conflicts and issues.

Over the years, the Committee has addressed traffic-related issues through a combination of voluntary policies and procedures and monitoring implementations of regulations. Membership is open to all marine users of the Bay. The industrial operations that are or would be adding tanker traffic to the Bay (the existing refinery, the crude oil transshipment terminal, the proposed refinery and proposed LNG transshipment terminal) participate on the Committee as do key agencies involved in regulation, monitoring and management of the VTSS.

FFAW Placentia Bay Sub-committee

The level of tanker traffic in Placentia Bay has been steadily increasing over the past several years and, at present, there are three potential new industrial projects proposed for the bottom (north end) of the Bay which could more than double the number of vessels currently using the traffic lanes. In response to concerns of fishers, the FFAW-established a specific senior level sub-committee to monitor the projects and work with the project proponents.

NLRC has met on several occasions with the Sub-committee and Sub-committee member have facilitated introductory meetings between the fishers and NLRC. The Sub-committee provides a valuable sounding board for NLRC and an important entry point for consultation with area fishers. The Sub-committee provided management and advice during the surveys of harvesters to develop the fishing activity maps and data on existing effects of the traffic lane on commercial fishing.

5.3.3 Fish Harvesting in the Refinery Area

Since so little of the catch data is specifically geo-referenced and indicated on the preceding maps, the following analysis was undertaken to provide a better indication of the locality of fishing effort. This looks particularly at fisheries activities in the general vicinity of the proposed refinery site, particularly near the proposed marine facilities. This analysis considers, for 2003-2006, the quantity of the harvest from the waters of 3PSc, (1) by the recorded Statistical Section (SS) of the fishing vessel's homeport, and (2) by the Statistical Section of the port where the catch was landed (port of landing).[10]

The DFO datasets indicate fishing vessel homeport SS for about 61 percent of the 2003–2006 catch (by quantity) harvested in UA 3PSc. Of this subset, more than 97 percent (by weight) is harvested by vessels registered in ports in Placentia Bay (i.e., ports within SS 29 – 32, indicated on the following map, Figure 5.22. Figure 5.23 compares the quantity of the harvest in 2003-2006 for the different Placentia Bay Statistical Sections (SS 29-32) and those immediately adjacent to Placentia Bay (SS 28 and 33).

[10] DFO Newfoundland and Labrador Region does not disclose the specific homeport or port of landings for confidentiality reasons.

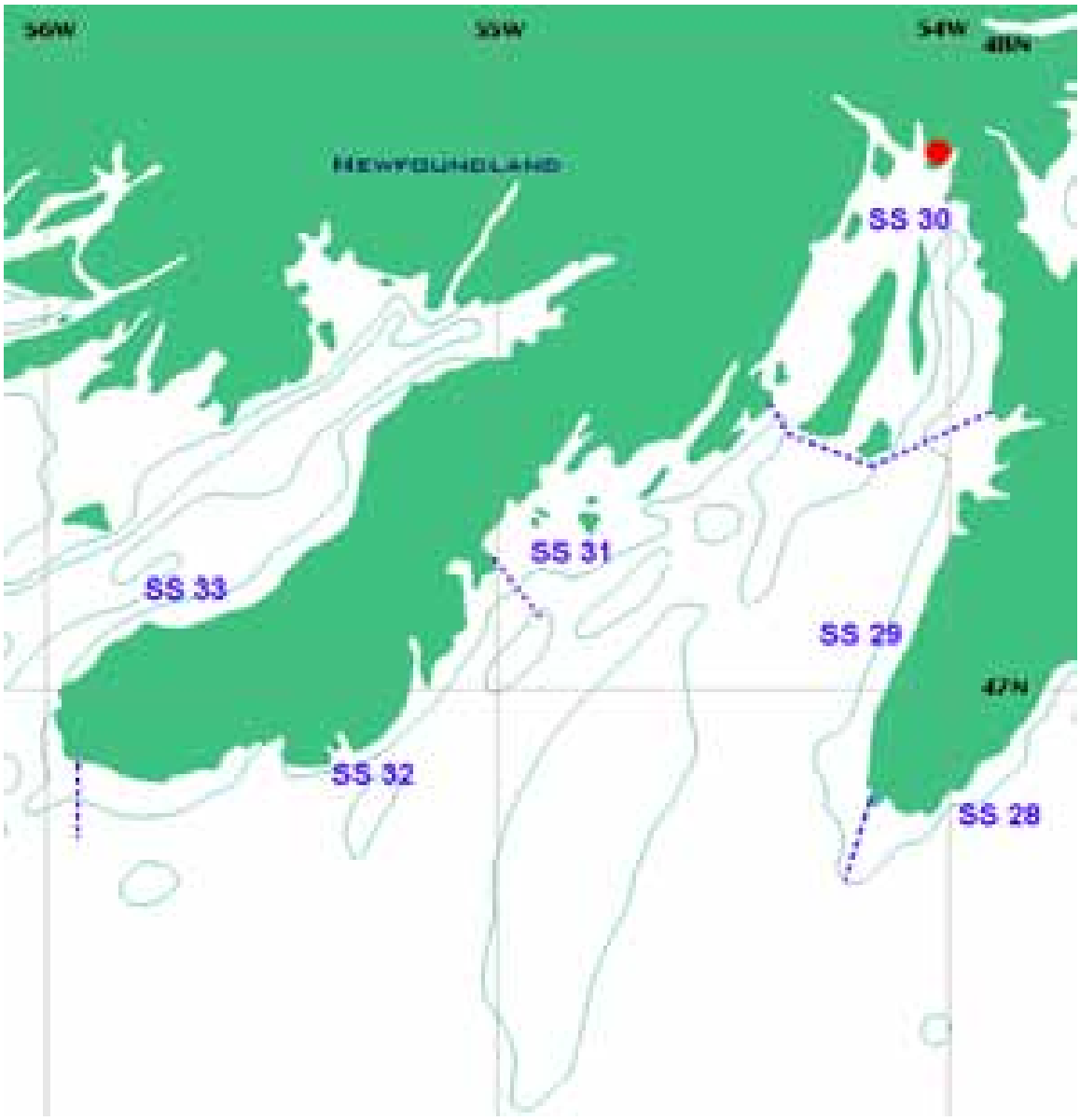

Figure 5.22 Placentia Bay and Area, Location of Statistical Sections

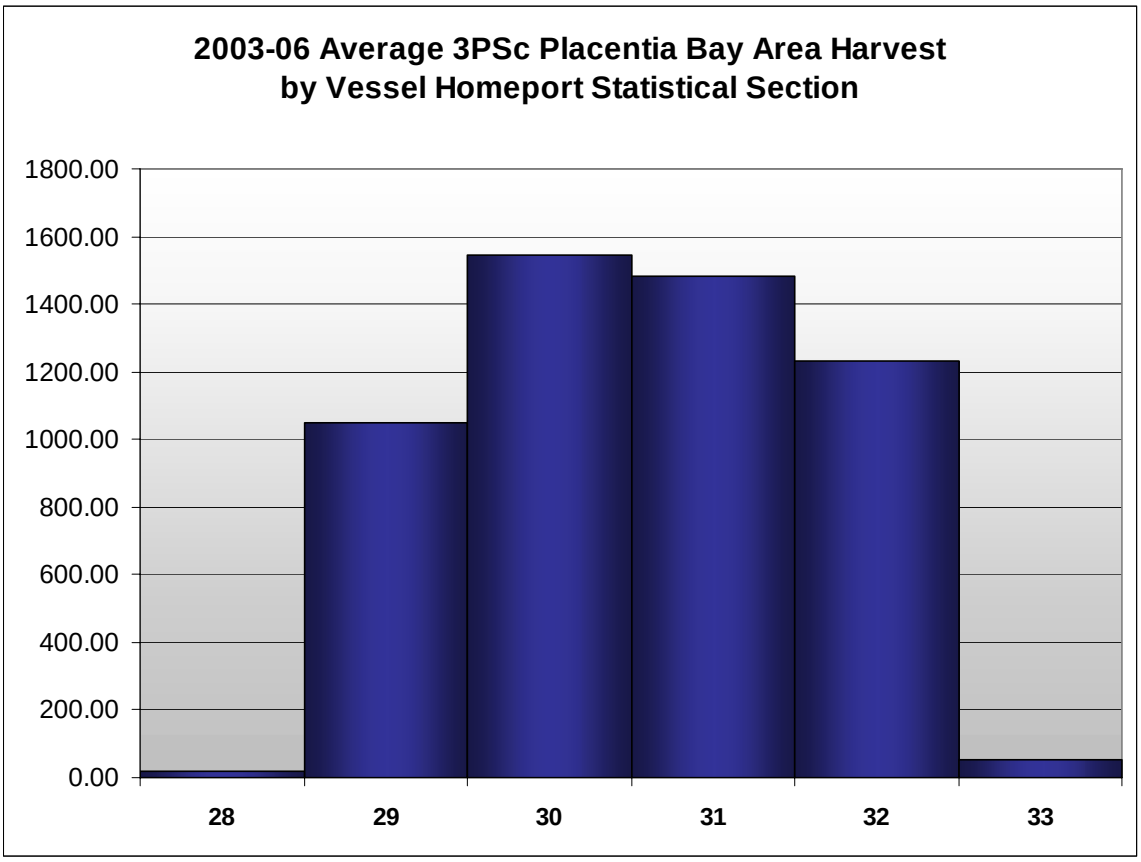

Figure 5.23 2003-2006 Placentia Bay Harvest by Vessel Homeport Statistical Section

Source
DFO

The SS of the port of landing of the harvest (i.e., where it is brought to port and off-loaded) is indicated for 100 percent of the 3PSc catch. These locations range more broadly, indicating that the Placentia Bay harvest is landed in many ports around the Island of Newfoundland and in Nova Scotia. For 2003-2006, though, 87 percent of the harvest was landed in Placentia Bay ports (though this does not mean it was processed there). Figure 5.24 compares the quantity of the harvest landed in 2003-2006 in the Placentia Bay Statistical Sections (SS 29-32) and those immediately adjacent to Placentia Bay (SS 28 and 33).

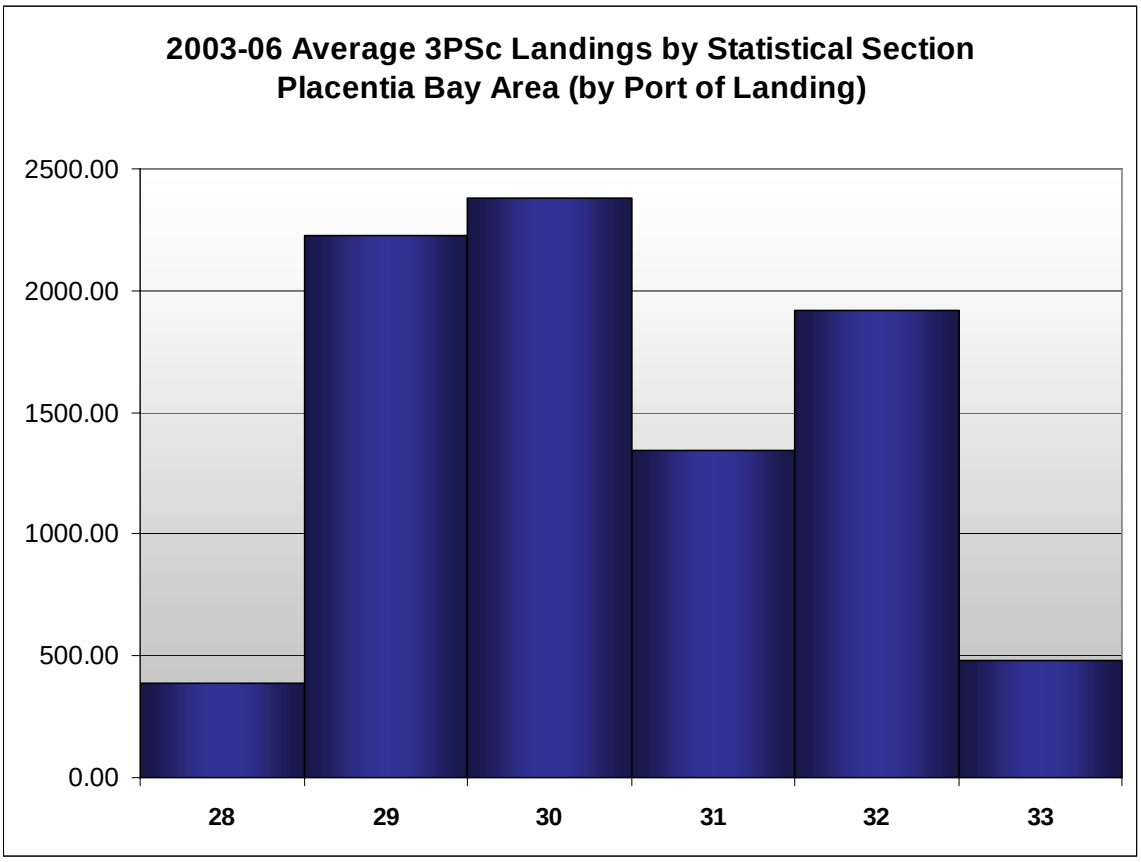

Figure 5.24 2003-06 Placentia Bay Harvest, All Species, by Statistical Section of Landing

Source DFO

Refinery Area

As Figure 5.23 indicates, boats from SS 30, which contains the proposed refinery site, recorded the greatest proportion of the recent Placentia Bay harvest. Figure 5.24 shows that SS 30 ports also received close to the greatest proportion of the bay's landings that year.

Tables 5.4 and 5.5 show the quantity and value of the harvest by species in 2003-2006 (averaged) for vessels reported as based in SS 30 homeports, and the quantity and value of the 3PSc harvest landed in SS 30 ports. (Values are calculated based on the average annual quantities of landings for 2003-2006, applying recent prices. Specifically, these prices are the average landed amounts paid to harvesters in 2006, averaged over all months, for relevant species within the Newfoundland and Labrador Region[11]).

[11] See http://www.nfl.dfo-mpo.gc.ca/publications/reports_rapports/Land_All_2006.htm

Table 5.4 3PSc Recorded Harvest by Vessels from SS 30 Ports (2003-2006 Averages)

Species	Tonnes	Value
Atlantic Cod	1,108.1	$1,280,342
American Plaice	30.4	$21,214
Winter Flounder	7.5	$3,108
Skate	5.2	$1,508
Herring	26.4	$5,388
Capelin	22.7	$6,378
Sea Scallops	4.5	$7,561
Whelks	22.5	$22,149
Lobster	43.4	$478,592
Snow Crab	248.5	$529,609
Lumpfish Roe	21.1	$41,951
Other	6.8	$8,554
Total	1,540.4	$2,397,800

Table 5.5 3PSc Harvest Landed in SS 30 Ports (2003-2006 Averages)

Species	Tonnes	Value
Atlantic Cod	1,608.4	$1,858,421
American Plaice	49.3	$34,406
Winter Flounder	17.6	$7,238
Skate	7.2	$2,078
Herring	349.2	$71,237
Capelin	56.2	$15,822
Sea Scallops	10.1	$17,076
Sea Urchins	19.5	$25,947
Lobster	46.2	$509,117
Snow Crab	184.1	$392,454
Lumpfish Roe	16.9	$33,470
Other	13.0	$16,351
Total	2,364.8	$2,983,616

In the ports between Southern Harbour and Garden Cove (in the general vicinity of the proposed refinery location), there are 92 Core fishing enterprises (based on 2003 records). Of these, nearly 80 percent use vessels less than 35 feet in length. In general, these smaller fishing boats tend to fish closer to shore than the larger boats and closer to their home ports and/or ports of landing.

This suggests that – despite the gaps in the mapped georeferenced data – the inshore areas in the general vicinity of the proposed refinery site (i.e., inner Placentia Bay) are likely very busy

with small boat harvesting activities, such as lobster, cod and herring fishing, and these fishers are responsible for harvesting a significant part of the 3PSc resource.

In particular, the lobster fishery (which is 0 percent georeferenced) is known to occur relatively close to the fishers' home wharves, along rocky shorelines and nearshore islands, using small boats (Figure 5.22). This fishery – while making up less than 1 percent of the overall 3PSc harvest by quantity in 2003-2005 – accounted for almost 7 percent of the value of the bay's harvest. Within SS 30 ports, lobster represented more than 19 percent of the value of their catch.

Figure 5.25 Lobster Harvesting Locations Near the Project Site

5.3.4 Placentia Bay Aquaculture

Development of Placentia Bay Aquaculture Activities (1997-2007)

To date, the majority of the aquaculture development and investment activities in southern Newfoundland have been concentrated in the Bay d'Espoir and Fortune Bay areas. In 2000, the province's aquaculture Strategic Plan noted "The Newfoundland salmonid industry is located in Bay d'Espoir, the only area of the province that is suitable for the growing of steelhead trout and salmon." (Burke Consulting, 2007) However, DFA aquaculture managers now believe that Placentia Bay has many of the desirable characteristics of Bay d'Espoir. As such, they are

confident that Placentia Bay has significant growth opportunities, including possibilities for the development of salmonid farming, as well as further expansion of existing cod and mussel operations.

The development of aquaculture resources in Placentia Bay has been under way since the mid-1990s. In 1997 there were seven active aquaculture operations and several applications to investigate and/or develop additional sites. (Two sea urchin sites were later approved but by 2003 these were no longer active. A cod hatchery was established in Placentia Bay in the early 1990s but was destroyed by fire.)

During 2000-2003, DFA reported a relatively significant level of expansion in the Placentia Bay aquaculture sector and a considerable interest in the development of new mussel and cod farming sites, particularly on the Burin Peninsula side of the bay and around Merasheen Island. During this period, DFA deployed thermographs in numerous locations to monitor water temperatures in order to assess whether such areas might be suitable for aquaculture.

By 2003 there were 15 approved aquaculture operations, including six blue mussel sites and nine cod grow-out facilities.[12] At that point, most of these aquaculture sites were still at a "developmental" stage, i.e., they had product in the water but no significant amount of commercial sales. In 2004, DFA reported that only four operators were selling their product on a commercial basis.[13] Nevertheless, based on discussions with DFA experts and 2004 production and sales data obtained from selected aquaculture enterprises, the annual value of aquaculture production (after primary processing) in Placentia Bay was estimated at $500,000. (Canning and Pitt Associates, 2005)

In 2006 a detailed analysis of aquaculture operations in Placentia Bay was undertaken as part of a larger comprehensive study of oil spill risk assessment within the South Coast – Eastern Avalon region prepared for Transport Canada. (Canning and Pitt Associates, 2007) This study, based on data obtained from detailed consultations with industry participants as well as DFA experts, calculated current (2006-2007) mussel production levels in Placentia Bay at 3.5 million pounds with a primary product value (before processing) of $1.4 million. These data were based on current production levels at the five commercially-active mussel farming sites within the Placentia Bay study area.

[12] As of 2004, there were still no full-cycle ("egg to plate") cod aquaculture operations in the province, and all cod enterprises are thus "grow-out" facilities. However, current production of farmed cod is limited because of restrictions on taking wild cod for any purpose (DFA managers, pers comms., 2004)

[13] These included a cod farming facility on Jerseyman Island, two blue mussel farms at Crawley Island/St. Croix Bay and another mussel operation on Merasheen Island.

The annual value of aquaculture production within Placentia Bay is still relatively small compared to other areas where fish farming has been under development for a much longer period. For example, the study prepared for Transport Canada estimated that, in 2007, salmonid production in the Bay d'Espoir-Fortune Bay region will be about 6,500 tonnes with a primary product value of $34.5 million. By 2008, production levels in that region are expected to more than double, to 14,700 tonnes, which, at current product market values ($5,315 per tonne) would be worth an estimated $78 million.

Placentia Bay Aquaculture Sites and Activities (2007)

According to the most recent (April 2007) DFA data there are currently 13 licensed aquaculture operations within Placentia Bay. DFA managers report that, if an aquaculture site is licensed, it is deemed to be "active", even though it may not be at the commercial production stage, i.e., currently selling its product. It was also noted that, although their licences have been renewed annually, most of the Atlantic cod operations have had little or no activity over the past several years due to moratoria. Further, most of the area's cod sites are classed as "developmental" licences (for reasons related to the original intent of the cod grow-out sector and associated land tenure issues). DFA managers also note that even "developmental" mussel licences are considered active since these operations have gear deployed in the water, and hence "aquaculture" is being conducted (T. Budgell, pers comm., August 2006). Applications for another eight sites are awaiting DFA approval. DFA notes that there is no guarantee that all of these applications will receive final approval (T. Budgell, pers comm., August 2006 and April 2007).Currently licensed sites include five mussel farming operations and eight Atlantic cod grow-out sites.

Figure 5-26 shows the geographic location of existing aquacultural sites in Placentia Bay, and Table 5.6 provides relevant, more detailed information on these mussel and cod farming operations.

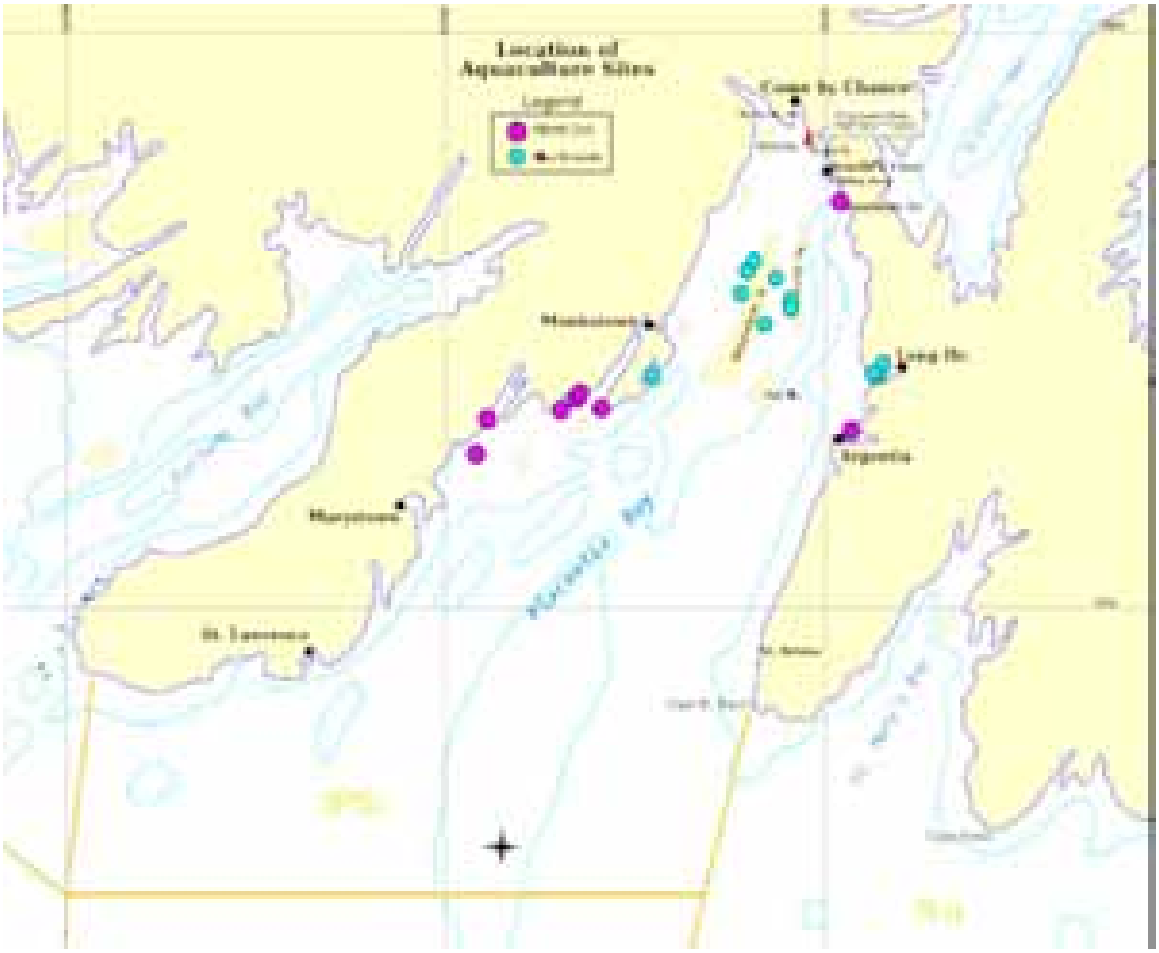

Figure 5.26 Existing Aquaculture Sites in Placentia Bay (2007)

Other Inactive/Abandoned Aquaculture Sites

In addition to the sites that DFA has currently approved, during the past decade or so aquacultural activities have been investigated, approved and developed at various other locations within Placentia Bay. While none of these older aquaculture sites are active or under development, some of these farming locations may be re-activated at some point in the future. Previously active or licensed aqauculture sites within the study area are shown below, and may give some indication of the potential for a more widespread development of the area's aquaculture sector in the future.[14]

Previous aquaculture sites (number) and species activities were located at the following sites:

[14] Information on these sites was obtained from DFA licence files (2003/2004), AquaGIS.com data, and Todd Budgell, pers comm., August 2006.

Blue Mussels

- Bar Haven (3)
- Gulch Head
- Cross Island

Atlantic Cod

- Fox Cove
- Jigging Cove (near Monkstown)
- Spanish Room Point
- Petite Forte Harbour (2)
- Muddy Hole, Sound Island
- Chambers Island (3)
- Isle Valen (3)

Salmon

- Northeast Nonsuch Arm
- Boat Harbour

Sea Urchins

- Cooper Island

Current Status of Aquacultural Production Activities in Placentia Bay

Consultations with all operators involved in the Placentia Bay aquaculture sector were undertaken (in November 2006 and April 2007) to obtain further information about the current status of these farming operations, including their current production levels, future plans and any concerns related to the proposed Refinery at Southern Head.

The following table presents an overview of recent activity levels, current licence status and economic output of DFA approved aquaculture sites. This table updates baseline information obtained from DFA based on consultations with industry participants. (Appendix A provides a list of all industry participants and agency managers consulted for this report.)

Table 5.6 Current Activity Status of Placentia Bay Aquaculture Sites (April 2007)

Company/Operator	Location	Species	Current Status
Keating, Joseph (Baie Sea Farms)	Crawley Island, Long Harbour	Blue Mussels	Operation has had commercial sales for the last 5 years or more; owner has plans to expand production from current levels
Keating, Joseph (Baie Sea Farms)	Crawley Island	Blue Mussels	Operation has had commercial sales for the last 5 years or more; operator has plans to expand production from current levels

Company/Operator	Location	Species	Current Status
Keating, Joseph (Baie Sea Farms)	St. Croix Bay	Blue Mussels	Operation has had commercial sales for the last 5 years or more; operator has plans to expand production from current levels
Warren, Christopher J.	Big South West Cove, Merasheen Island	Blue Mussels	Operation has had commercial sales for the last 5 years or more; operator has applied to DFA for site expansion, expects to increase production of mussels
Warren, Christopher J.	Merasheen Island	Blue Mussels	Operation has had commercial sales for the last 5 years or more; operator has applied to DFA to add oyster farming activities to the site
Hollett, Mervin	Port Royal Arm	Blue Mussels	Licence status/approval is uncertain pending DFO review of objections from scallop fisher(s) operating near the site; no commercial sales to date; operator hopes to begin mussel farming in 2007 or 2008 if DFA/DFO approvals are obtained; if so, operator anticipates commercial sales of 400-500,000 pounds in 4-5 years
Leonard, Peter	Southern Harbour	Atlantic Cod	Licence has been renewed but no commercial sales to date; operation presently inactive, no equipment on-site; operations may resume pending DFO allocation of cod for grow-out; potential for commercial sales will depend on the same factors that have affected growth of other PB cod grow-out operations (availability of growing stock, feed supply and market conditions)
Norman, Bernard	Jerseyman Island	Atlantic Cod	Licence has been renewed, but operation is currently inactive, no commercial sales to date; equipment (four Polar cages) still on-site; operator hopes to begin farming steelhead trout in 2008
Pomeroy, Donald A. and Barry, John Jr.	Petite Forte Harbour	Atlantic Cod	Licence status is uncertain and operator is awaiting word from DFA and NWPA application renewal; no equipment presently on-site; operator may renew cod farming if approvals are forthcoming
Jones, Ambrose	Petite Forte	Atlantic Cod	Licence status uncertain; operator reported commercial sales for two or three years, but ceased cod farming activities in 2004; owner not sure if operations will resume in future
Merasheen Mussel Farms Inc.	Barren Island	Blue Mussels	Awaiting DFA approval
Merasheen Mussel Farms Inc.	Jean de Gaunt Island	Blue Mussels	Awaiting DFA approval
Merasheen Mussel Farms Inc.	Presque Harbour	Blue Mussels	Awaiting DFA approval
Merasheen Mussel Farms Inc.	Rose au Rue	Blue Mussels	Awaiting DFA approval
Merasheen Mussel Farms Inc.	Dog Harbour	Blue Mussels	Awaiting DFA approval
Merasheen Mussel Farms Inc.	Merasheen Island	Oyster	Awaiting DFA approval; operator has applied to add oyster activities to existing

Company/Operator	Location	Species	Current Status
			mussel operations at this site
Warren, Christopher	Big South West (Expansion)	Blue Mussels	Awaiting DFA approval (expansion of existing site already licensed by DFA)
Moulton, Clayton	Flat Island Harbour	Atlantic Cod	DFA licence has lapsed; site was commercially active for only one year (2001-2002)
Pevie, Joseph and Pearson, Christopher	Woody Island	Atlantic Cod	No commercial sales since 2001; licence lapsed in 2006
Pomeroy, Donald A. and Barry, John Jr.	Gaultoin's Cove (near Great Paradise)	Atlantic Cod	Operator reports that DFA licence for this site has probably lapsed; last commercial sales were in 2003
Sapphire Sea Farms Ltd.	Dunville	Atlantic Cod	DFA reports that site licence lapsed several years ago

Source:
DFA, Newfoundland and Labrador (DFA Grand Falls, April 2007); Canning and Pitt, Inc. industry consultations November 2006 and April 2007

As indicated in the above table, although there are some 13 DFA-licensed aquaculture sites within the study area, only five of these are presently in commercial production. All of the commercially-active operations are engaged in mussel farming; the remaining sites – all of which are licensed for Atlantic cod – are currently not in production, and several of these operations have not renewed their licences. As indicated in Table 5.6, applications for an additional eight sites are being reviewed by DFA; all of these applications are for mussel farming, with one exception (i.e., one firm has applied to add oyster farming activities to its existing mussel farming site on Merasheen Island).

None of the existing Atlantic cod grow-out operations are in commercial production and most have not had product sales for the past 3-4 years (J. Pevie and A. Walsh, pers comms., November 2006; A. Jones, D. Pomeroy, M. Hollett, P. Leonard, B. Norman and C. Moulton, pers comms., November 2006 and April 2007).

Licences for three of the cod sites (at Flat Island Harbour, Woody Island and Gaultoin's Cove) have either lapsed or have not been renewed. The licence status of two other cod farming sites is "uncertain", while the operator of another currently-licensed cod site (at Jerseyman Island) is considering switching to steelhead trout in 2008.

Consultations with licence holders indicate that cod farming has not proven to be economically feasible, and only one operator anticipates resuming his cod farming activities in the next year or two. Cod farmers report that a combination of factors – availability of growing stock, feed supply and costs and market conditions – have made it very difficult to produce and sell farmed cod on an economic basis. One or two operators remain optimistic that a special allocation of cod from DFO for grow-out stock might allow them to re-enter the aquaculture sector within the next few years.

In contrast, Placentia Bay mussel farmers are relatively optimistic about the potential for their sector, and both of the current operations have plans to expand their production levels (J. Keating, pers comm., November 2006; C. Warren, pers comm., November 2006). As indicated in Table 5.6, DFA is now considering applications from one firm to develop five new mussel farming sites, and that applicant says he expects to have marketable product available in about two years. The owner of that company has also applied to expand his existing mussel farming operation at Big South West (on the west side of Merasheen Island).

Within the past year or so, Cook Aquaculture has expressed some interest in developing new cod and salmonid farming operations in Placentia Bay. However, company managers indicated that they are still in the process of collecting preliminary data and exploring potential sites and thus, the company has no specific investment plans at this point (N. Halse, pers comm., April 2007).

Of the five commercially-active mussel farms in Placentia Bay, three are situated near Crawley Island in Long Harbour and the other in St. Croix Bay; these three sites have been under active development since the late 1980s. The remaining two mussel-producing sites are located in the central islands area of the bay; one is situated at Big South West on the west side of Merasheen Island and the other is on the east side of this island, just north of Dog Harbour, in the central channel between Merasheen Island and Long Island.

These five commercially-active mussel farming operations range in size from 3.5 hectares to 150 hectares and, together, have a 2006-2007 production capacity of about 3.5 million pounds of marketable product. Their harvesting/sales season is from November to May-June, though one enterprise anticipates that most of its 2007 sales will take place during the January-April period. Total investment (all five sites) in production equipment and gear (ropes, buoys and collector socks, but excluding harvesting vessels) is estimated at about $1.2 million; based on the total area under production, this investment averages about $3,478 per hectare.

5.3.5 Fish Processing

Locations

The locations of fish processing plants in the Placentia Bay and adjacent areas for 2006 are shown in Fig. 5-27, based on DFA (2007). The second map (Fig. 5-28) shows locations in 2004 in Placentia Bay and the South Coast by plant classification, based on Dunne (2004). However, the ownership and operation of some plants in this area (and other areas) are in transition, and their future structure and numbers are not settled.

Figure 5.27 Placentia Bay Fish Processing Plant Locations 2006.

Source: DFA, 2007

Figure 5.28 Southern Newfoundland Fish Processing Licence Locations by Category (Dec. 2004)

Source: Dunne, 2004

Many of the existing processing plants in Placentia Bay have received significant portions of their raw material inputs from fishing enterprises and suppliers from fishing areas beyond UA

3PSc. For example, FPI's major Marystown facility has traditionally obtained >90 percent of its fish inputs (primarily flatfish species) from offshore sources, in fishing areas beyond Placentia Bay, and some from outside the DFO Region.

On the other hand, some of the fish harvested from 3PSc goes to plants outside Placentia Bay for processing, even if it is landed there.

Processing Value

Most of the species sold to various processors and buyers are subsequently processed into a variety of final products and sold into various markets, at prices that vary according to product type and mix, quality, exchange rates, market demand, and so on. Depending on its particular production costs, overhead structure, desired profit margin, etc., a processing firm may be able to sell its final output for a higher price compared to another operator, or at a higher profit margin. Also, large quantities of lobster are purchased directly from fishers and then resold without ever being "processed." Hence, a significant portion of the final value of several species is not captured in local plant production figures.

There is no reliable way to establish the final, or export, value of all of the fish caught in 3PSc. Some portion – or all – of most species sold to processors and buyers are subsequently processed into a variety of final products and sold into various markets, at prices that vary according to product type and mix, exchange rates, market demand, quality and so on. Depending on production costs, overhead structure, desired profit margin, and other factors, a processing firm may be able to sell its final output for a higher price than another operator, or at a higher profit margin than another processor.

Provincially, DFA calculates the value of fish after processing by applying average market prices to the quantity for the species; however, this excludes the value added through secondary processing.

A rough estimate of the value can be derived by assuming that primary processing adds an additional 65.26 percent of the landed value. This is based on recent average provincial-level data for landings and processing values for all species. Thus for 3PSc fish harvested by SS 30-based vessels, averaged over the past four years, the additional value added by processing (wherever it is eventually landed and processed) would be in the order of $1,564,804 (65.26 percent of $2,397,800), for a total of $3,962,604. Since not all landings data are linked to specific home ports, discussed above, the actual value would likely be higher.

5.4 Project Effects and Mitigation

5.4.1 Background

Commercial fish harvesting activities occur in the Southern Head area and extend throughout Placentia Bay.

NLRC, in conjunction with the Fish, Food and Allied Workers Union, had an initial round of discussions with Placentia Bay fishers in early 2007, meeting with them in communities around the Bay. Fishers identified several existing and on-going issues and concerns already faced by harvesters in Placentia Bay: safety, especially in association with the vessel traffic lane and the resulting displacement from traditional fishing grounds; risk of an oil spill; and gear loss and damage. The fishers need the EIS to address the potential increased effect of the Refinery project relative to these concerns.

In order to have a thorough understanding of commercial fish harvesting in Placentia Bay, NLRC has sought to have it described from the points of view of fisheries management as well as from the fishers themselves. Both viewpoints are presented in the preceding description of the existing fisheries environment and are considered in the effects assessment.

For commercial fisheries, the issues considered here are the process of accessing and returning from fishing grounds, the use of the grounds, the deployment and integrity of fishing gear and related equipment, the success of the harvesting activities (catch rates) and the marketability of the fish to buyers.

Commercial fishing activities occur throughout the bay, and at different times throughout the year. Some of these activities are associated with local nearshore habitat (e.g. lobster harvesting) and others are more generally fished throughout the bay, much farther from shore.

Fishing grounds in the immediate Project area are used for the harvest of a variety of species, primarily lobster, lumpfish, cod, capelin, blackback flounder, scallop and sea urchins. Quantities of mackerel, herring and squid have also been taken in this area (based on research undertaken by the FFAW). The IPA is fished during most of the year, with the possible exception of March; however, fishing activities vary throughout the course of the season depending on the species being harvested.

Fishers report that the IPA is particularly important for four main species: lobster, cod, sea urchin and scallop. The majority of the fishers actively using these grounds are from five communities: Come by Chance, North Harbour, Garden Cove, Arnold's Cove and Southern Harbour. Seventy-two < 35' Core Enterprises are based in these five communities. Not all of these fishing enterprises have established harvesting activities and fishing grounds in the IPA.

For aquaculture operators, this assessment considers the condition and integrity of aquaculture gear, facilities and related equipment; the ability to seed, tend and harvest the stock; the marketability of the fish to upstream buyers; and the future economic viability of the operation.

Aquaculture operations have tended to concentrate in the more sheltered areas of northern Placentia Bay, where blue mussel farming is undertaken. There are currently no aquaculture operations in the IPA.

For fish processors, the chief aspect considered is "security of supply" of raw materials for processing and sale to mid-and-downstream buyers. Fish processing, while located in some communities around the bay, often rely on raw materials from more distant waters beyond 3PSc.

The following Interaction Matrices identify Project activities (Construction and Operations Phases) that could interact with the commercial fisheries VEC, presented in terms of fisheries (i.e. harvesting), aquaculture and processing. The interaction matrices make no assumptions about the potential effects of the interactions but provide the focus for the effects assessment (Table 5.7).

Table 5.7 Interactions Matrix – Routine Activities, Construction Phase

Environmental Considerations		**Project Activities**	**Valued Ecosystem Components**		
Key to Interaction Rating: 0 No interaction Y Potential interaction			**Commercial Fisheries**		
			Harvesting	Aquaculture	Processing
CONSTRUCTION					
Effect	**Pathway**	**Activity**			
Lost fishing grounds	Construction activity around Project site and related safety zones	Marine terminal	Y	0	Y
		Intake	Y	0	Y
		Outfall	Y	0	Y
Gear damage	Vessel traffic	Construction and support vessels	Y	0	Y
	Debris and siltation	Construction activities	Y	Y	Y
Fish scaring (reduced "catchability")	Noise	Pile driving, underwater drilling, other construction	Y	0	Y
		Vessels	Y	0	Y
Interference / lost opportunity	Vessel traffic; deviation around construction zones	Inshore wharf and causeway construction	Y	0	Y
		Offshore berthing facilities			

In the following sections, potential effects during construction and operations are discussed, feasible and appropriate mitigations are identified, and the residual effects of the activity (after mitigation) are assessed. Table 5.8 (Construction) and Table 5.9 (Operations) summarize the effects assessments, and provide the determination of significance of residual effects after mitigations are applied.

5.4.2 Construction Phase (Marine Terminal)

Before the start of marine construction activities, NLRC will establish a Construction Safety Zone (CSZ) of approximately 500m x 1000m in the Come by Chance Point nearshore area. This exclusion zone will encompass the marine area in which the construction dock/tug berth, and later the jetty, will be built. For safety and security purposes, and also to allow marine construction activities to take place in an efficient and timely manner, the CSZ will be closed to all fishing activities and fishing vessel transits, at least until the Construction Dock is operational, expected to be September 2009. Part of the CSZ will sty in place until completion of the jetty at the end of 2010.

In addition, two other CSZs will be established for the installation of the seawater intake at Holletts Cove and for the outfall pipe off Southern Head. Both of these components will be installed at the same time. The safety zone for the intake pipe will be approximately 100m x 1000m, and the zone for the outfall will be approximately 100 m x 250 m. Fishers will have to avoid both of these marine construction areas during the three months or so they will take to install.

At any given time, there would likely be no more than six vessels operating concurrently on the marine wharf. The noise from ships associated with construction is not expected to be different from those usually associated with other vessels in the bay, such as fishing boats and other marine industries.

While the fish and shellfish habitat in the Project area is not unique, mapping of fish harvesting locations by fishers indicate that some fishing is conducted in the Project construction areas. The same fisheries are conducted in many other localities that will not be affected.

All construction activities will be carried out in accordance with the EPP for construction and in compliance with all applicable permits (for example: *Navigable Waters Protection Act*, DFO HADD and DOEC Alteration to a Body of Water permit.)

Project Effects: Commercial Fish Harvesting

Lost Fishing Grounds

Issues: The temporary exclusion of fishing from within the marine construction area “footprint” because of activity levels area around the jetty construction and the construction of the intake

and outfall facilities will represent the temporary loss of harvestable grounds used by some fishers.

Gear Damage

Issues: Construction-related vessels could transit through and damage fixed fishing gear. (Mobile gear should not be an issue as fishing vessels and Project vessels should be aware of each other.) Debris from construction might float into fixed gear and damage it. This could have an adverse effect on fisheries.

Fish Scaring

Issues: Marine construction activities will create sound in and near the water, in particular pile driving and installation of rock anchors. Very loud noise in the marine environment can scare fish (particularly finfish) away from their usual grounds, or make them less "catchable". Similar effects are not usually documented for benthic invertebrates (such as lobster and crab); see for instance Christian et al (2003); Parry and Gason (2006).

Interference / Lost Opportunity

Issues: Construction-related vessels could cause interference with fishing boat transits en route to or from fishing grounds along the shoreline within the IPA. There could be increased safety risks for fishers in the vicinity of Come by Chance Point/Holletts Cove, or elsewhere near the construction site. Avoiding the area of activity could require longer transit times to fishing grounds and increased expenses.

Mitigation: Commercial Fish Harvesting

Loss of Fishing Grounds

Design and Location of Marine Components. The consultation process for this Assessment led to changes in Project plans designed to minimize the area of fishing grounds affected by the construction (and operational) footprint. As a specific fisheries-related mitigation NLRC re-configured the design and position of its marine facilities and infrastructure in order to avoid encroachment on locally-important cod grounds to the south of Come by Chance Point.

Fisheries Liaison Committee. Before the start of construction activities, following Project approval, NLRC will establish a Fisheries Liaison Committee (FLC) to facilitate and formalize its ongoing fisheries-industry consultation process. The FLC will be mandated to advise NLRC on all aspects of the marine facilities construction phase as they relate to fisheries operations. This will help to ensure that potential negative effects are addressed and minimized to the extent that this is possible. The FLC would include representatives of the FFAW as well as individual area fishers and aquaculture operators.

Fisheries Liaison Manager. NLRC will employ the services of a full-time, dedicated Fisheries Liaison Manager (FLM) to develop, maintain and facilitate a close working relationship between NLRC, and its sub-contractors, and all fishers who might be affected by the Project's marine construction activities.

Construction Safety Zones. The CSZs will be established in consultation with the FLC and will remain in place until 2010. The CSZ will be clearly marked with buoys. To reduce the impacts of construction on fishing activities, NLRC will allow as much use of the construction area as possible (within the constraints of safety) for normal fishing activities. For instance, once the Construction Dock/Tug Berth facility is operational, this portion of the CSZ will cease to be an exclusion zone and fishers will be permitted to fish in the area again.

Timing of Activities. NLRC will also consult with the FLC and other fishers concerning the best timing for intake and outfall construction activities. It is anticipated that intake and outfall installation operations would be scheduled during a three-month period when harvesting activities and spawning in those areas are at minimum levels.

Fisheries Interference Compensation Program. NLRC will establish a Fisheries Interference Compensation Program (FICP) to compensate fishers for actual economic loss due to the temporary exclusion of or interference with fish harvesting activities and lost fishing opportunity within the CSZ during construction. The principles and components of the FCIP will be similar to fisheries compensation programs that have been established for other marine construction projects in Atlantic Canada.

Gear Damage

Mutual Avoidance of Activities / Vessel Management. The establishment of the CSZs will reduce likelihood of conflict. Communications (in both directions between fishers and Project) will be facilitated through the FLC and FLM.

Control and Containment of Debris. Appropriate precautions will be taken during construction to prevent the escape of debris from onshore and marine sites. The EPP will specifically include safeguards to eliminate such impacts.

Fishing Gear and Vessel Damage Compensation Program. NLRC will establish a Fishing Gear and Vessel Damage Compensation Program (FGVDCP) to cover any damage to fishing gear, equipment or vessel, resulting from an incident involving contact with any Project vessel or debris. The program will also cover catch lost directly as a result of the damage or loss.

The NLRC program will be similar to those currently operating within the Province's offshore area. The Program will provide fair and timely compensation to fishers who may sustain damage that occurs as a result of Project-related activities of NLRC, or its contractors.

Fish Scaring

Selection of Equipment. Pile driving will be conducted using equipment suitable for depth and substrate type at the location. Every effort will be made to design a system and select equipment to minimize excessive noise in the marine environment. In general, such effects, if seen at all, would be expected to be short-lived and reversed fairly quickly.

Construction Safety Zones. Since the construction noise will be connected with activities within the CSZ, there will be a sound attenuation buffer between activities and active fishing.

Timing. As noted above, NLRC will consult with the FLC and other fishers concerning the best timing for intake and outfall construction activities, aiming at a period when harvesting activities in those areas are at minimum levels.

Interference/Lost Opportunity

Construction Safety Zones. The CSZs will be established so as to contain most of the marine activity associated with construction. There should be relatively little traffic outside these areas. This will also provide a level of certainty to fishers planning transits.

Timing. As noted, work on the intake and outfall sites will be scheduled when harvesting activities in those areas are at minimum levels.

Vessel Traffic Management Plan. Prior to the start of marine construction activities, NLRC will consult with its FLC to discuss and agree an appropriate Vessel Traffic Management Plan (VTMP) for the safe and efficient operation of Project construction-related marine traffic and fishing vessel operations in the vicinity of the IPA, and in other areas of Placentia Bay where Project vessels might be operating during this phase.

The VTMP will document information about all fish harvesting operations and fishing vessel transit activities in the IPA and establish protocols and procedures to ensure that construction-related vessel traffic avoids or minimizes potential interference with established fishing operations.

NLRC's VTMP would be similar in scope and content to vessel management plans developed for other marine construction projects in the area, such as those prepared in the 1990s for the Hibernia GBS construction project at Bull Arm, Trinity Bay, and for the Newfoundland Transshipment Terminal at Whiffen Head.

Project Effects: Aquaculture

For the Aquaculture VEC, the only potential interaction anticipated is through construction-related debris and siltation escaping from the site and causing damage to aquaculture gear, infrastructure or water quality. Since there are no aquaculture sites within the IPA, no grounds will be occupied, and no vessel traffic will transit through the sites. The distance between

Project construction activities and the closest aquaculture operation (approximately 25 km) will ensure that sound will not be an issue.

Gear Damage

Issues. If construction-related debris escapes from the site, it has the potential to cause damage to aquaculture gear or infrastructure.

Project Mitigations: Aquaculture

Gear damage

Control and Containment of Debris. Appropriate precautions will be taken during construction to prevent the escape of debris from onshore and marine sites.

Fishing Gear and Vessel Damage Compensation Program. As described above, NLRC will establish a Fishing Gear and Vessel Damage Compensation Program (FGVDCP). This will include aquaculture equipment and infrastructure, and the value of any harvest lost as a direct result of the damage.

Project Effects: Processing

Issues. Each of the factors discussed above for commercial fisheries has a potential to affect fish processors by reducing the amount of raw materials (fish harvest) available to processing plants. However, as described previously, for most plants none, or only a small part, of the raw material comes from the construction area.

Project Mitigations: Processing

None required beyond those applied to fish harvesting.

5.4.3 Residual Effects: Commercial Fisheries, Aquaculture and Processing

Summary Chart

Table 5.8 Socio-Economic Effects Assessment and Significance of Residual Effects (Construction - Marine)

Valued Environmental Component: Commercial Fisheries												
Effect / Activity	Positive or Adverse	Mitigation	Evaluation Criteria for Assessing Environmental Effects						Certainty	Mitigation Success	Significance
			Magnitude	Extent	Frequency	Duration	Reversibility	Confidence			
Commercial Fisheries											
Lost fishing grounds (construction activity around Project site and related safety zones)	A	Design and location of marine components; FLC; FLM; CSZs; interference compensation	N	L	C	S	R	H	H	H	NS
Gear damage (vessel traffic; debris)	A	CSZs / vessel management; debris containment; gear compensation	N	L	R	S	R	H	M	H	NS
Fish scaring - reduced "catchability" (noise)	A	Design and location; CSZs; timing	N	L	R	S	R	H	L	H	NS
Interference / lost opportunity (vessel traffic; deviation around construction zones)	A	CSZ; transport of materials. timing. VTMP	N	L	I	S	R	H	M	H	NS
Aquaculture											
Lost fishing grounds (construction activity around Project site and related safety zones)	N	None required	-	-	-	-	-	-	-	-	NS
Gear damage (vessel traffic; debris)	A	Debris containment; gear compensation	N	L	R	S	R	H	L	H	NS
Fish scaring - reduced "catchability" (noise)	N	None required	-	-	-	-	-	-	-	-	NS
Interference / lost opportunity (vessel traffic; deviation around construction zones)	N	None required	-	-	-	-	-	-	-	-	NS
Processing											

Valued Environmental Component: Commercial Fisheries											
Effect / Activity	Positive or Adverse	Mitigation	Evaluation Criteria for Assessing Environmental Effects						Certainty	Mitigation Success	Significance
			Magnitude	Extent	Frequency	Duration	Reversibility	Confidence			
Lost fishing grounds (construction activity around Project site and related safety zones)	N	None required	-	-	-	-	-	-	-	-	NS
Gear damage (vessel traffic; debris)	N	None required	-	-	-	-	-	-	-	-	NS
Fish scaring - reduced "catchability" (noise)	N	None required	-	-	-	-	-	-	-	-	NS
Interference / lost opportunity (vessel traffic; deviation around construction zones)	N	None required	-	-	-	-	-	-	-	-	NS

Commercial Fisheries Assessment Summary

Lost Fishing Grounds

With the described mitigations in place, the magnitude of the effects on the commercial fisheries of lost fishing grounds because of construction activity around the Project site and related safety zones would be negligible although there will be some closed area throughout the construction period. The overall effects will be not significant.

Gear Damage

With the described mitigations in place, the magnitude of the effects on the commercial fisheries of gear damage because of construction activity would be negligible and the frequency rare. The overall effects will be not significant.

Fish Scaring

Effects on catch rates, to the extent that economic impacts would occur, are not expected from sound generated by Project activities. Given this, and with mitigations in place, the magnitude of the effects on the commercial fisheries of construction noise would be negligible and the frequency intermittent.

Interference/Lost Opportunity

Construction activities will be continuous in some marine areas during the marine construction phase. However, with the various mitigations in place and additional planning and communications the magnitude of the effects on the commercial fisheries would be negligible.

Aquaculture

With the described mitigations in place, the magnitude of the effects on aquaculture operators because of construction activity would be negligible and the frequency rare.

Processing

The only way the Project could affect plant operations is through a negative effect on the fisheries. Since the assessments conducted for commercial fisheries concludes that impacts from construction on harvesting success will be not significant, the impacts on plants will also be not significant.

5.4.4 Operations Phase (Marine Terminal)

During the project's operational phase, permanent marine facilities (wharf, tug basin and jetty) will occupy an area 800 m long along the shoreline and extending out a distance of about 400 m from the shoreline just north of Come by Chance Point. This area is deemed to be the Operations Phase Marine Terminal (MT).

NLRC meetings with local fishers indicate that the MT area is fished primarily for lobster by seven or eight fishing enterprises. FFAW research indicates that quantities of other species – capelin, scallop, blackback flounder, lumpfish, herring and mackerel – are also occasionally harvested in the vicinity of the MT.

As a result of early consultation with area fishers, the marine facilities have been re-aligned from the original design to accommodate fishers' requests for continued access to an important cod fishing grounds.

Consultation with one of the very few sea urchin harvesters in the bay indicates that the MT is not a desirable location for this species because of the siltation from several rivers flowing into the nearshore area in the vicinity of Come by Chance Point. Established sea urchin harvesting activities (from November to March) in seabed areas close to shore in Holletts Cove would not be affected by the presence of the intake and outfall installations. These urchins are taken relatively close to shore in this cove in water depths of 10 m and less.

Other marine facilities include the intake and outfall pipes. When installed, the seawater intake pipe will extend out 985 m from the shoreline at Holletts Cove and the intake end will be at a depth of 18 m. The outfall will extend 405 m from the shoreline at Southern Head to a depth of about 15 m. These facilities will be partially trenched and buried, then will lie in the shallower tidal zone (up to 5 m contour) on the seabed along most of their route.

The effluents will be treated before being discharged into the marine environment. As shown in Volume 3, the zone of influence of the effluent discharge outfall is limited to less than 100 m radius from the outfall.

It is expected that there will be an average of 17 vessel movements a week associated with refinery operations. This includes inbound and outbound bulk crude oil and refined product tankers; there will be many additional movements by tug, pilot and support vessels.

When circumstances require, some tankers may need to hold at anchorages within the bay. However, these vessels will use existing anchorages and no new anchorage locations will be required for this project. The primary sites would be AA, BB, CC, DD (CHS Marine Chart 4839).

Placentia Bay is within the Placentia Bay Vessel Traffic Services (VTS) Zone, and all ships 20 metres or more in length are managed under Vessel Traffic Services Zones Regulations under the Canadian Shipping Act, as administered in the area by the Canadian Coast Guard (CCG). CCG maintains a Marine Communications and Traffic Services facility in Argentia, Placentia Bay. Participation in the Placentia Bay VTS system will be mandatory for all tankers arriving or departing from the Marine Terminal.

Placentia Bay also has an established Vessel Traffic Separation Scheme (VTSS). It extends from the southern limit of Placentia Bay to just north of Red Island. A two-way route exists for traffic between Red Island and the Head of Placentia Bay. Tankers approaching and departing from the Marine Terminal will use these traffic schemes at all times, unless an emergency situation requires them to do otherwise. Consultations with Transport Canada and the Canadian Coast Guard indicate that the VTSS has sufficient capacity to accommodate anticipated refinery-related traffic levels.

Mapping of current harvesting locations by fishers indicate that the VTSS lanes are frequently and successfully harvested by area fishers, particularly for snow crab. In discussion with NLRC and in a survey by FFAW for the Project, fishers indicate the traffic lanes (and traffic) has and is affecting their fishing activity.

The interaction matrix in Table 5.9 below identifies interactions between the fishing industry and the marine terminal during operations. While the design life of the Project is 25 years, it is expected that the facilities will operate for a much longer time period, with re-fit, upgrading, expansion as long as it remains economically viable.

Table 5.9 Interactions Matrix - Routine Activities, Operations Phase

Environmental Considerations		Project Activities	Valued Ecosystem Components		
Key to Interaction Rating: 0 No interaction Y Potential interaction			**Commercial Fisheries**		
			Commercial	Aquaculture	Processing
Operations					
Effect	**Pathway**	**Activity**			
Lost fishing grounds	Permanent marine facilities	Marine terminal	y	0	y
		Intake	y	0	y
		Outfall	y	0	y
		Anchorages	y	0	y
Gear damage	Vessel traffic	Tugs and other support	y	0	y
		Tankers	y	0	y
Fish scaring (reduced "catchability")	Noise	Vessels	y	0	y
Interference / lost opportunity	Vessel traffic / vessels; deviation	Traffic lane	y	0	y
		Local traffic			
		Anchorages	y	0	y

Project Effects: Commercial Fish Harvesting

Lost Fishing Grounds

Issues. Fishing will not be possible on the grounds occupied by the new construction, and harvesting operations using heavy gear (e.g. scallop dredges) will not be permitted over the intake and outfall pipe routes in order to avoid damage to the facilities. Any vessels using heavy anchors would also be asked not to set their anchors in the general vicinity of these latter installations.

Gear Damage

Issues. Refinery shipping, including tugs and other support vessels could transit through and damage fixed fishing gear. (Mobile gear is not expected to be an issue as fishing vessels and Project vessels should be aware of each other.) This could have an adverse effect on commercial fisheries.

Fish Scaring

Issues. Concern that noise from Project-related shipping will scare finfish from harvesting areas and fishing gear. This would not be expected to be the case for benthic invertebrates including such as lobster and crab, as discussed in the Construction Phase assessment.

Interference / Lost Opportunity

Issues. Tankers and bulk carrier vessels will enter and leave Placentia Bay via the designated traffic lanes (VTSS), assisted by tugs within the lanes and when docking at, or departing from, the Terminal area. Because of the presence of the permanent Marine Terminal facilities, some fishers will also have to deviate slightly when transiting the shoreline. Some of the tankers may occasionally transit to and hold at anchorages within the Bay.

Mitigation

Lost Fishing Grounds

No Net Habitat Loss. The Project's habitat "no net loss" program will enhance existing lobster and scallop habitat in portions of the MT area. NLRC will consult area fishers for advice regarding the most appropriate location for its habitat enhancement initiative.

Design and Location of Permanent Marine Components. As described in the assessment for the Construction Phase, Project plans were designed in consultations with fishing industry.

Use of Existing Anchorages. Existing anchorages will be used and no new sites created. Displacement effects from fishing grounds within designated anchorages will also be minimal because the jetty will have the capacity to handle several tankers at any one time, and the refinery will employ a "just in time" approach for the delivery of its crude oil supplies and finished product. Hence, loading and unloading delays will be at a minimum.

Access to Terminal Area. The amount of fishable seabed area lost to permanent project facilities will be kept to a minimum. Once the marine wharf is completed (expected late fall 2009), established lobster grounds around the marine wharf may be re-opened to fishing, possibly by the start of the following (2010) lobster season.

Intake/Outfall Restricted Area. Through its FLC (described below), NLRC will ensure that all fishers are fully aware of the location and routes of the intake and outflow installations where heavy fishing gear and anchors will not be permitted. Their end points will be marked with buoys at the surface.

Fisheries Loss of Access (LOA) Compensation Program. Prior to beginning refinery operations, NLRC and its FLC, in consultation with the FFAW, will establish a Fisheries LOA Compensation Program to compensate fishers for actual economic loss caused by the presence of permanent facilities on established fishing grounds within the Project's Marine Terminal area.

Gear Damage

Avoidance / Vessel Management. NLRC will establish a voluntary traffic management scheme (VTMS) to manage vessel traffic to and from the Marine Terminal and to designate an appropriate route to be followed by all incoming and outgoing Project vessels. (See under Interference/Lost Opportunity.) This will be developed in consultation with fishing interests. Certainty about routing will allow fixed gear fishing in areas outside the traffic lanes with reduced likelihood of gear conflicts.

Marine Terminal Gear Compensation Program. NLRC will establish a program to compensate fishers who sustain gear damage or loss within portions of the Marine Terminal area where NLRC has agreed they may continue fishing.

VTMS Gear and Vessel Damage Program. NLRC will establish a VTMS area gear and vessel damage program to compensate any fisher that suffers gear damage or loss because a Project vessel did not follow the agreed VTMS route and operating procedures.

Fish Scaring

None required. The containment of refinery vessel traffic within agreed routes away from fishing will reduce or eliminate the potential for overlap of activities.

Interference/Lost Opportunity

Fisheries Liaison Committee. NLRC will establish a Fisheries Liaison Committee (FLC), prior to initiation of the Construction Phase, to facilitate and maintain ongoing consultations and communications with fisheries participants about vessel traffic and other marine issues. In addition to individual area fishers and aquaculture operators, the FLC would also include representatives of the FFAW.

Fisheries Liaison Manager. NLRC will employ the services of a full-time, dedicated Fisheries Liaison Manager (FLM) to develop, maintain and facilitate a close, ongoing working relationship between NLRC and all Placentia Bay fisheries participants during Project operations. A chief part of the Managers job will be to work with the Marine Traffic Manager (described below) to help minimize interference with fisheries activities.

Use of VTSS and TSS. All refinery-related marine traffic (greater than 20 m) will participate in the VTS Zone and follow Zone regulations. When in the areas serviced by the TSS, all vessels will remain within these lanes to minimize the areas of potential interference. The locations of these lanes are well known to fish harvesters.

Anchorages. As discussed above, operational procedures (e.g. “just-in-time” product delivery procedures) and facilities design will allow minimum use of existing anchorage areas by Project vessels (tankers).

Voluntary Traffic Management Scheme (Entrance to Come by Chance Bay). NLRC will also establish and implement a Voluntary Traffic Management Scheme (VTMS) to manage project-related vessel traffic in the marine area between the north end of the existing designated VTSS and its marine facilities (wharf and jetty) at Come by Chance Point.

Marine Traffic Manager. NLRC's Marine Traffic Manager, in conjunction with the FLM, will oversee and manage interactions between project vessels and fishing vessel traffic operating in the refinery VTMS, and to maintain communications between NLRC marine operations and fishing vessel operators designed to minimize interactions and interference.

Aquaculture: Commercial Fish Harvesting

Issues. Considering the location of activities vis a vis present aquaculture operations, no potential interactions are expected as a result of routine operation of the refinery. There are no aquaculture sites within the IPA or near routes to be used by refinery-related vessels. The closest aquaculture operation is approximately 25 km from the marine facilities.

Processing: Commercial Fish Harvesting

Issues. As discussed in the Construction Phase assessment, while the factors discussed for commercial fisheries have some potential to affect fish processors by reducing the amount of raw materials (fish harvest) available to processing plants, as described in Section 5.3, for most plants none or only a small part of the harvest comes from the Marine Terminal area. Some of the raw materials utilized by fish processing plants come from the Project's area of operations, e.g. crab harvested in the VTSS area. Project vessel activities in the VTSS would not affect crab harvesting levels in that zone.

Mitigations: Commercial Fish Harvesting

None required beyond those applied to fish harvesting.

5.4.5 Residual Effects Operations: Commercial Fisheries, Aquaculture and Processing

Summary Chart

Table 5.10 Socio-Economic Effects Assessment and Significance of Residual Effects (Operations - Marine)

Valued Environmental Component: Commercial Fisheries												
Effect / Activity	Positive or Adverse	Mitigation	Evaluation Criteria for Assessing Environmental Effects						Certainty	Mitigation Success	Significance
			Magnitude	Extent	Frequency	Duration	Reversibility	Confidence			
Wild Fisheries											
Lost fishing grounds (permanent marine facilities)	A	No net habitat loss; design and location of components (inc. use of existing anchorages); access to terminal area; information communications about restricted areas; fisheries LOA compensation.	N	L	C	L	R	H	H	H	NS
Gear damage (vessel traffic)	A	Avoidance / vessel management. marine terminal and VTMS compensation programs	N	L	R	L	R	H	L	H	NS
Fish scaring - reduced “catchability” (noise from vessel operations)	A	None required (vessels will stay in routes)	N	L	R	L	R	H	L	H	NS
Interference / lost opportunity (vessel traffic; incl. Traffic lanes)	A	FLC; FLM; use of VTS and TSS; VTMS (Entrance to Come by Chance Bay); Marine Traffic Manager	N	L	C	L	R	H	M	H	NS

Lost Fishing Grounds

Assessment. With the described mitigations in place, the magnitude of the effects on the commercial fisheries of lost fishing grounds because of the presence of the permanent Project facilities would be negligible though there will be some permanent loss of former grounds. The overall effects will be not significant. Details of the factors of this assessment are provided in Table 5.10.

Gear Damage

Assessment. With the described mitigations in place, the magnitude of the effects on the commercial fisheries of gear damage because of operational activity would be negligible and the frequency rare. The overall effects will be not significant.

Fish Scaring

Assessment. The noise from ships associated with operations are not expected to be different from those usually associated with other vessels in the bay, such as fishing boats and other marine industries. Research studies have not documented any measurable reductions in fishing success due to vessel noise.

Given this, the magnitude of the effects on the commercial fisheries of construction noise would be negligible and the frequency intermittent. The overall effects will be not significant.

Interference/Lost Opportunity

Assessment. Construction activities will be continuous in some marine areas during the marine operations phase. However, with the various mitigations in place and additional planning and communications the magnitude of the effects on the commercial fisheries would be negligible. The overall effects will be not significant.

Aquaculture

Assessment. Considering the lack of potential interactions, the magnitude of the effects on aquaculture operators because of routine refinery operations would be negligible and the overall effects will be not significant.

Processing

Assessment. The only way the operation of the refinery's marine facilities could affect fish processing operations is through a negative effect on the fisheries. Since the assessments conducted for commercial fisheries conclude that impacts from operations on harvesting success will be not significant, the impacts on plants will also be not significant.

5.4.6 Accidental Events: Oil Spill

Accidental events (specifically, oil spills or other accidental hydrocarbon releases into the marine environment) may affect the various components of the commercial fisheries VEC in Placentia Bay in very different ways. However, for each of commercial fish harvesters, aquaculturalists and fish processors, the effects relate generally to loss of access to the resource, lost opportunity, increased operating expenses, damage to gear and equipment, and potential market impacts.

Both the type and level of impacts will depend on the many variables involved in any actual spill event. These include:

- The location of the spill – whether the point of release occurs at the Marine Terminal jetty, at an anchorage, or at any specific location along the route of the VTSS within Placentia Bay. For instance, a release near the mouth of the bay will affect different commercial resources and economic interests than one in the northern part of the bay, or from the Marine Terminal.
- The source of the release – whether from the refinery or from a tanker.
- The type of hydrocarbon released – whether crude or refined products
- The size of the spill: more than any other single factor, this would determine the extent of the effects on the range of fisheries VECs in Placentia Bay.
- The time of year as fisheries vary in terms of location, species and gear.
- The weather at the time of the spill and during countermeasures
- Success of initial mitigative efforts – effectiveness, duration and completeness of at-sea or shoreline clean-up efforts. This includes how quickly the oil can be contained, the spill "footprint" that results, and whether it can be kept from reaching shore.
- The characteristics of the areas affected.

Depending on the level and extent of the shoreline impacted, the greatest effects (on a per-enterprise basis) may be felt by the aquaculture sector. For a spill that is retained or cleaned up at sea, the commercial fisheries would be more likely to be affected. Under any scenario, the fish processing sector would likely be the least affected since much of its raw materials come from waters beyond Placentia Bay.

Even without actual resource damage (i.e. to the fish stocks), economic impacts might nevertheless occur if a spill resulted in a negative effect on the marketability of fish products or lower prices based on market perception. It would only be possible to quantify such effects by monitoring the market situation after a spill occurred.

Exactly when a spill might occur over the life of the Project would also be a very important factor in its economic consequences. If the spill were to occur, for instance, twenty or thirty years in the future, the species of interest, seasons and conservation measures in place might be very different. Currently underutilized species may have new and lucrative markets. The

aquaculture sector may have expanded into many new areas with many new species in production.

Considering that any actual spill event will involve some unique combination of all of these factors and variables, it is not useful, or possible, to predict with any level of confidence what the actual economic consequences might be. These costs can only be known after the fact, when all the claims have been received and economic damage has been assessed.

The following sections consider the potential and differential economic impacts on fish harvesters, aquaculture operators and processors in more detail.

Effects

Commercial Fish Harvesting

The chief effect that would be expected on most fishing activity, particularly in areas beyond the coastline, would result from temporary loss of access to certain marine areas (i.e. closed or "off limits" zones) because of the presence of spilled oil or spill clean-up activities.

The effects would be largely dependent on whether the closed area coincided with active fishing grounds, and whether or not there were alternative harvesting locations available. For instance, as the harvesting location maps indicate, for some species, such as snow crab, lumpfish or sea urchins, fishing can occur throughout large parts of the bay or along extensive coastal areas. As such, unless the spill was very large, there might be adequate alternative grounds available.

Such closures would likely continue as long as a slick persisted, or while there were measurable hydrocarbons in the water. The extent of the economic impact would also be affected by the time the spill occurred within the fishing season, and where the fisher was in terms of harvesting his/her quota (in quota fisheries, such as snow crab). Depending on the duration and persistence of a spill, a substantial portion of the fishing season might be lost, or only a small part.

Even if the spill did not prevent access to a particular area, there might be an economic effect if the spill increased the time it took fishers to go around an affected zone in order to reach their fishing grounds. The same delays might result from having to fish on alternative fishing grounds. These activities might result in increased costs and decreased fishing efficiency, and/or lost opportunity to pursue other fisheries.

If inshore or shoreline areas of Placentia Bay were involved, the lobster fishery and the bar seine herring fishery might be affected for a relatively longer time, until the oil was cleaned up. The same would be the case for squid and mackerel fisheries, as indicated by the location of important grounds on the harvesting maps. Capelin and blackback flounder harvesting areas, which are focused on the eastern side of the bottom of the bay nearer the refinery location would also be vulnerable.

Costs related to gear cleaning or replacement might also be incurred, particularly for fixed gear, as well as for vessels and coastal infrastructure, e.g., wharves.

As noted above, economic effects might also result if market confidence is lost. If there were a perception in the marketplace after a spill that fish from the area were of an inferior quality, lower prices could result or buyers could be lost, even in the absence of actual physical effects. Such perceptions might be hard to overcome, and could persist long after the spill. These economic effects are difficult to predict, since the actual (physical) impacts of the spill might have little to do with the consequential economic effects resulting from negative market.

Aquaculture

Most of the causes and economic effects for fisheries would also apply to fish farming. The chief difference is that – if a spill reached an aquaculture site – there would be no alternative area, and the spill would likely shut down the entire operation. The operation's gear and equipment would likely be oiled, including shore facilities such as docks and holding facilities.

Market perceptions and buyer impacts might be more significant for an aquaculture operation (or for the entire aquaculture production area perceived to be affected) than a fishery, since fish farming operations are associated strongly with a specific geographical location. In certain situations, e.g. hydrocarbons from a spill becoming incorporated into nearshore and inter-tidal sediments, an aquaculture operation might have to abandon its location and re-establish elsewhere at a substantial cost (expenses as well as lost time and opportunity).

Fish Processing

Impacts on fish plants (whether processing wild or farmed fish) are most likely to be economic as to operational (e.g. water intake affected by oil contamination) and result from effect on the supply of raw material (fish) that the plant processes rather than the spill's proximity to the processing facility.

The types of economic effects in these cases would be direct loss of income from sales and potentially loss of buyers. There might also be an impact on market confidence in the processor's ability to ensure continuity of supply. Plant workers would likely be laid off in these cases.

Mitigation

The best mitigation in the case of oil spill is prevention. Strict regulations and international standards must be implemented by the shipping companies. Adequate emergency response capabilities and close working relationships with all stakeholders must be in place.

Any such economic effects described above (such as those caused by loss of access, gear damage, stock damage, increased expenses or changes in marketability or market value) could

be considered significant to commercial fisheries and aquaculture operators. However, the availability and use of economic compensation would reduce the potential impact to not significant.

There are several international conventions that provide for compensation for oil spill related costs and damage resulting from a tanker spill. Canada participates in these as well as providing an additional source of compensation for ship-sourced oil pollution (Table 5.11).

Table 5.11 Tiered Compensation for Oil Spills in Canadian Waters.

Tier	Compensation Available
Tier 1	Establishes, through the 1992 Civil Liability Convention, a strict liability regime for the shipowner for damage caused by persistent oil, subject to specific limits based on the tonnage of the ship. The maximum compensation available is $180 million or 90 million SDRs for the largest ship.
Tier 2	The International Oil Pollution Compensation Fund has a maximum limit of $405 million or 203 million SDRs, inclusive of any amount payable by the shipowner under Tier I.
Tier 3	Canada's SSOPF, which has an additional $140 million available for claims that occur in Canada and that exceed Tier I/II compensation. The SSOPF also pays Canada's contribution to the IOPC Fund.
Total	Approximately $545 Million per incident

A specific source of compensation and clean-up costs for spills of persistent oils (crude oil and heavy refined products) from tankers is the International Oil Pollution Compensation Fund.

It consists of two main components, the 1992 Civil Liability Convention, which governs the liability of shipowners for oil pollution damage, and the 1992 Fund Convention, which supplements the 1992 Civil Liability Convention. The former sets out the principle of strict liability for shipowners and creates a system of compulsory liability insurance; the latter establishes a regime for compensating affected parties when the compensation under the applicable Civil Liability Convention is inadequate.

Liability under the Civil Liability Convention is structured as follows (amounts in 2007 US dollars):

- for a ship not exceeding 5,000 units of gross tonnage, US $7 million;
- for a ship with a tonnage between 5,000 and 140,000 units of tonnage, US $7 million plus US$954 for each additional unit of tonnage; and
- for a ship of 140,000 units of tonnage or over, US $136 million.

The 1992 Fund Convention, which provides supplementary payment if the Civil Liability funds are not adequate, offers a further US$ 307 million. In addition, for claims that occur in Canada and exceed the other two funds allowance, the Ship-Source Oil Pollution Fund can provide up to an additional $ 140 million.

Economic losses in the fisheries sector include loss of earnings by owners of property contaminated by oil (consequential loss), for example oiled fishing gear. There is also compensation for pure economic loss.

The basic principles of these programs aim at compensating fisheries participants in a fair and timely manner for all actual loss with the intention of leaving them in no worse or better position than before the losses occurred. These principles will be important components of NLRC's policy and response in the event that a spill occurs and results in economic consequences for fish harvesters, aquaculture operators or processors. This will ensure that any actual loss to the fisheries industry resulting from any oil spill is fully and adequately addressed.

5.4.7 Monitoring and Follow-Up

Monitoring and follow up of the effectiveness of day to day practical implementation of mitigation measures will be the responsibility of the Fisheries Liaison Manager (FLM). The FLM would provide regular reports to NLRC at site and to the Fisheries Liaison Committee. It is anticipated that the FLM would participate in the Placentia Bay Traffic Committee. It is also anticipated that direct communication would continue between NLRC and the FFAW Placentia Bay Sub-committee and that both of these groups would participate on the Placentia Bay Traffic Committee.

NLRC will ensure that information about their plans and activities will be provided to the Placentia Bay Integrated Planning Committee and will be available to work with this forum. This forum may be the most effective in ensuring communication with aquaculture activities.

NLRC also intends to have a multi-faceted environmental effects monitoring program in place which will include sampling fish and shellfish to ensure the refinery operations do not affect quality. In the event of a spill, NLRC will implement a pre-planned sampling program in collaboration with DFO and the refinery Fisheries Liaison Committee.

It is expected that DFO's regulation based monitoring will continue and statistics, such as those used in this assessment will continue to be available for monitoring purposes.

6.0 HEALTH AND COMMUNITY SERVICES

An important aspect of the understanding of the environment in which the Project would take place is the health and well-being of Study Area residents. The Health Research Unit (HRU) was contracted to prepare a community health profile.

The HRU took a holistic view of the request and addressed not only the standard indicators of illness and mortality but also the determinants of health as defined by the Public Health Agency Canada, 2003. As such, the profile includes information on demographics, social infrastructure (health and social services availability, access, satisfaction), employment and income, and lifestyle, addressing physical and mental health.

6.1 Community Health Profile

The study area for the profile included communities within a 50 km radius, Clarenville, the bottom of the Bonavista Peninsula, the area immediately adjacent to the proposed refinery site on the Burin Peninsula, and Random Island. This approximates the area included in the NLRC air quality study and provides for a larger statistical basis for the analysis. The Study Area's information is compared to the rest of the Eastern Health region, the province and Canada.

The full report has been provided as a background document to the Environmental Assessment and is available at council offices and the Project Information Centre. The key points are summarized in this section.

6.1.1 Determinants of Health

The availability of health and social resources in a community is one of the "determinants of health" for that community. The availability and capacity of health care and social support agencies, infrastructure and services are described later in this Section.

Age distribution of the population is also a determinant of health: data indicate that the area population is slightly older than other areas considered.

Employment and income (and income adequacy) are also key determinants of health. Table 6.1 shows the employment status for the area in comparison with the rest of the Eastern Health region and the rest of the island portion of the province. The area has the highest unemployment rate for young people ages 15 to 24 years, and for the age group 25 years and older, the rate of unemployment is three times that for Canada (Table 6.2). However, the area also has the highest percentage of self-employment, fewer households were in the two lowest levels of income adequacy, and a greater percentage of the residents had diplomas or certificates in trades.

Table 6.1 Employment Status

Location	Study Area	Eastern Health	Island Portion of Province
	Percent of Respondents		
Self-employed	8.0	6.0	5.6
Employed by company/organization	37.8	41.5	38.7
Not employed for pay	25.5	25.1	28.0
Retired	21.5	20.7	21.5
Student	7.3	6.6	6.2
Total sampled	278	3,957	7,932

Source:
Newfoundland Adult and Community Health Survey, 2001, Newfoundland and Labrador Statistics Agency

Table 6.2 Unemployment Rate (%), both sexes

Location	Study Area	Eastern Health	Province	Canada
	Unemployment Rate (%), both Sexes			
Age 15-24	37.1	29.0	33.1	13.7
Age 25+	17.3	15.1	19.9	6.2

Source:
Statistics Canada, Table 95F0495XCB01001-NFLDLAB-TNL: Profile for Canada, Provinces, Territories, Census Divisions and Census Subdivisions, 2001 Census.

6.1.2 Self Reported Health Status

Personal health practices influence the health status of the individual and the community. The data from the area indicate that the incidences of smoking and drinking alcohol were slightly lower than the other areas of the province but that the level of exercise was also lower, resulting in a higher occurrence of high Body Mass Index (overweight).

Health status can be measured by a number of indicators including self-reported health or emotional status, number or types of chronic conditions and level of disability. The HRU report also includes satisfaction with medical care, daily levels of stress and financial circumstances as all these can have an effect on a person's reported health and well being.

In general, over 63 percent of area residents rated their physical health as either "excellent" or "very good". Area residents were less satisfied with their level of medical care than other areas. Chronic conditions most frequently reported include arthritis and rheumatism, recurring backaches, allergies, and high blood pressure at levels comparable to other areas. Allergies are less frequent.

Over 90 per cent of area residents indicated their mental health as "excellent" or "good." One of the major stressors in daily life is coping with finances and a higher percentage of area residents (compared to the other areas of the Island) reported that they felt "very good" or "good" about their finances and that they were either "better off" or "about the same" relative to five years earlier. (Note: these data are from a 2001 survey as the most recent information.)

6.1.3 Illness and Mortality

Morbidity (acute care hospital separation) and mortality (death) rates are indicators of the general health of a population.

The top two major cases of death in the area, Eastern Health region, the province and Canada, were diseases of the circulatory system and cancer.

Mortality rates were similar across the areas being compared with a few exceptions: females had the lowest mortality rate for cancers or diseases of the respiratory or nervous system, but the highest for diseases of the endocrine, nutritional, metabolic and immune systems; males had the lowest mortality rate for diseases of the endocrine, nutritional, metabolic and immune systems (Table 6.3).

Table 6.3 Cause Specific Death Rates, All Ages, 1999-2003 (Deaths/1,000 Population)

Location	Study Area		Eastern Health		Province		Canada	
Sex	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**
Infectious & Parasitic Diseases	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1
All Malignant Neoplasms	2.7	1.6	2.6	2.0	2.6	1.9	2.2	1.9
Endocrine, Nutritional, Metabolic & Immune	0.2	0.6	0.4	0.4	0.4	0.5	0.3	0.3
Diseases of the Nervous System	0.3	0.2	0.4	0.5	0.3	0.4	0.3	0.4
Diseases of the Circulatory System	3.3	2.6	3.3	3.0	3.3	2.9	2.5	2.4
Diseases of the Respiratory System	0.6	0.3	0.7	0.5	0.7	0.5	0.6	0.6
Diseases of the Digestive System	0.1	0.3	0.2	0.2	0.2	0.2	0.3	0.3
Disease of the Genitourinary System	0.1	0.2	0.2	0.2	0.2	0.2	0.1	0.1
Injury and Poisoning	0.4	0.1	0.4	0.2	0.5	0.2	0.6	0.3

Sources:
Statistics Canada, Annual Mortality File, 1999-2003
Statistics Canada, Canadian Vital Statistics, Death Database, 2000-2003
Statistics Canada, Causes of Death, Shelf Tables, 1999
Population Estimates for Census Subdivisions (based on 2001 Census), Statistics Canada
Statistics Canada, Demography Division, 2001

Morbidity is based on hospitalizations for various causes, including clinical data collected on all acute and surgical daycare patients. The HRU report centred on acute care – a focus of the EIS Guidelines. The top three causes of hospitalization (excluding pregnancy and childbirth) for all areas were diseases of the circulatory, digestive and respiratory systems (Table 6.4). The incidence of hospitalization (for all causes) was lowest for the Study Area residents.

Table 6.4 Acute Care Hospital Separations by Cause, 1999-2000 – 2003-2004[1]

Area of Residence	Study Area		Eastern RIHA		Province		Canada[2]	
Sex	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**
Infectious & Parasitic Diseases	58.5	69.7	129.5	127.4	126.0	126.2	147	145
All Malignant Neoplasms	377.7	375.7	583.8	517.7	622.9	535.7	563	537

Area of Residence	Study Area		Eastern RIHA		Province		Canada[2]	
Sex	M	F	M	F	M	F	M	F
Endocrine, Nutritional, Metabolic Diseases and Immunity Disorders	107.2	166.7	287.1	307.7	293.7	334.8	190	231
Diseases of Blood and Blood-Forming Organs	85.3	92.1	110.6	137.9	123.6	140.5	74	89
Mental Disorders	177.9	181.6	643.2	579.9	643.0	613.7	496	574
Diseases of the Nervous System and Sense Organs	112.1	104.5	173.6	174.9	203.0	209.2	188	201
Diseases of the Circulatory System	1464.6	995.3	1831.0	1342.8	1996.4	1484.9	1656	1249
Diseases of the Respiratory System	584.9	522.5	1074.3	928.9	1215.9	1049.4	884	780
Diseases of the Digestive System	757.9	719.1	1082.8	1194.0	1238.1	1417.8	1016	1070
Diseases of the Genitourinary System	202.3	507.6	385.9	927.9	474.1	1000.4	397	743
Diseases of the Skin and Subcutaneous Tissue	56.0	67.2	120.4	115.9	144.7	134.8	107	95
Diseases of the Musculoskeletal System and Connective Tissue	292.4	236.4	356.0	364.4	406.7	420.2	389	449
Congenital Anomalies	56.0	27.4	63.8	40.7	69.0	46.4	57	44
Injury and Poisoning (nature)	382.6	303.6	708.4	632.0	830.7	706.4	835	744
Pregnancy and Childbirth	0	1,109.7	0	2,210.6	0	2,202.7	0	2,555

Source:

Clinical Database Management System 1999/00 to 2003/04; Canadian rates are from the Canadian Institute for Health Information online report Hospital Morbidity Tabular Reports 2000-2001 available at http://secure.cihi.ca/cihiweb/products/Hospital Morbidity TabularReports2000-2001.pdf

1 Based on the most responsible diagnosis. (Separations per 100,000 Population. Five-year average)

2 Rates are for fiscal year 2000-01

6.1.4 Health and Air Quality

Certain diseases of the respiratory system are more likely to be aggravated by emissions from refineries. Those of particular concern are Chronic Obstructive Pulmonary Disease (COPD) and asthma. Table 6.5 shows that over the years 1999 to 2004 the Study Area had lower rates of hospitalization for COPD and asthma than Eastern Health region, the province or Canada. Rates for bronchitis and emphysema (a subgroup within COPD) in the area show similar values for males, but lower for females, when compared to Eastern Health region, the province or Canada.

Table 6.5 Acute Care Hospital Separations for Diseases of the Respiratory System, 1999-2000 – 2003-04[1]

Area of Residence	Study Area		Eastern RIHA		Province		Canada[2]	
Sex	M	F	M	F	M	F	M	F
All Respiratory Diseases	584.9	522.5	1074.3	928.9	1215.9	1049.4	884	780

Area of Residence	Study Area		Eastern RIHA		Province		Canada[2]	
Sex	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**
Chronic Obstructive Pulmonary Disease (COPD)	160.8	129.4	295.1	233.7	336.9	237.6	288	275
Bronchitis and Emphysema	21.9	5.0	20.3	19.4	26.7	25.3	111	102
Asthma	43.9	77.1	84.9	110.7	98.3	110.2	98	103
Other respiratory	404.5	350.8	728.7	634.3	823.2	747.9	595	505

Source:

Clinical Database Management System 1999-2000 to 2003-04; Canadian rates are from the Canadian Institute for Health Information online report *Hospital Morbidity Tabular Reports 2000-2001* available at http://secure.cihi.ca/cihiweb/products/HospitalMorbidityTabularReports2000-2001.pdf

[1] Based on the most responsible diagnosis (Separations per 100,000 Population. Five-year average)

[2] Rates are for fiscal year 2000-01

It is known that certain refinery emissions can be a health concern. The emissions of particular interest for the proposed refinery are: sulphur dioxide, nitrogen oxides, volatile organic compounds, particulate matter, and carbon monoxide. As a group they are referred to as ”criteria air contaminants” and on their release into the atmosphere, where they react with other pollutants, they can cause smog and acid rain.

Health Canada states that:

> *“The elderly, people with existing respiratory and cardiovascular problems, and children are particularly vulnerable. Health effects caused by air pollutants may range from subtle physiological changes to difficulty breathing, wheezing, coughing, and aggravation of existing respiratory and cardiac conditions. These effects can result in increased medication use, increased doctor or emergency room visits, more hospital admissions and even premature death. Children are often at increased risk from exposure to toxic substances because they are not fully developed and can be more susceptible to injury. Greater air intake relative to body weight, compared with adults, also increases a child's potential for excessive exposure to air pollution.”* (Health Canada, 2007)

Sulphur and nitrogen dioxides, along with their transformation products on reaction with elements in the air, can cause or exacerbate diseases of the respiratory system such as chronic obstructive pulmonary disease (COPD) and asthma. Studies have shown that exposure to poor air quality, particularly when combined with exercise, may aggravate COPD or asthma and lead to an increase in the number of emergency room visits and hospitalizations for these diseases.

Cardiac diseases can also be exacerbated by pollution, directly or indirectly by the worsening of other systems, e.g., respiratory diseases.

Many volatile organic compounds (VOCs) are suspected of having toxic effects on people. Benzene has been suggested as a possible problematic VOC for the proposed refinery. It is known to be a carcinogenic compound.

Our analysis of the data available for the chosen time frame shows that self-reported asthma was slightly increased in both the Eastern Health region and the province, but allergies (of any kind) were slightly reduced (Table 6.5) compared to the Study Area. Hospitalizations for COPD and asthma were lower in the Study Area than in either the Eastern Health region or the province.

Given the association between emissions and cardiac and respiratory diseases, morbidity and mortality data for these diseases should be monitored, particularly for children and older residents in the area. Caution should be exercised in the collection and reporting of these data because of the small numbers involved, and all rate calculations should be averaged over several years.

6.1.5 HRU Report Conclusions

Overall, for most indicators included in this report, the study area did not show any large discrepancies when compared to the Eastern Health region and the province. However, the area was marginally older, which might account for it being slightly better off financially; it had fewer smokers, lower stress levels, and fewer hospitalizations for mental disorders. On the other hand, the area had a higher rate of unemployment in the 15-24 age group and more adults who had not completed high school certification. It also had more adults above the recommended BMI value and more reporting a non-active lifestyle.

The variation in hospitalization rates between the area and the other areas was considerable in some cases, but it must be remembered that the population was relatively small (16,000) and minor deviations in the number of hospitalizations for any cause can make a noticeable difference in rates when quoted for a 100,000 population catchment, as is the convention.

Since conditions reported here are those that prevailed at the time of the reviewed studies, changes in the population may affect the current health status of the residents in the area.

When the refinery is built and in operation it will be important to monitor the health status of the local population, particularly in relation to health problems that may either develop or be exacerbated by refinery emissions. These are known to affect those with existing respiratory and cardiovascular problems and those who spend more of their time outdoors – either for work or leisure.

6.1.6 Human Health Risk Assessment

Through the work done for NLRC by the Health Research Unit at Memorial University, a baseline health profile of communities in the project area has been established (HRU, June

2007 in the Socio-economic Component Study). As well, in consultation with the Department of Environment and Conservation, NLRC has modelled the dispersion of air emissions from the proposed new crude oil refinery at Southern Head. While the dispersion modelling showed that all emissions are below, even well below, regulated limits, NLRC has also undertaken a human health risk assessment for the area through SENES Consultants Limited.

The human health assessment is an evaluation of the potential health effects from the substances emitted to the air from the refinery on people who may use the adjacent area for recreational purposes and residents in the nearby communities. No pathways of potential exposure other than air have been identified.

The evaluation is based on the fact that Southern Head is a greenfield site, although there is considerable industrial infrastructure nearby in this area of Placentia Bay. The proposed refinery will consist of process facilities, a marine terminal, storage tanks and an access road and utilities. The primary product of the proposed refinery will be gasoline, kerosene / jet fuel, ultra-low sulphur diesel and refining by-products.

Methodology

The methodology used in assessing human health risks followed guidelines outlined by various regulatory agencies including Environment Canada, Health Canada, the Canadian Council of Ministers of the Environment (CCME), and the United States Environmental Protection Agency. Results are expressed in terms of hazard quotients and cancer risk levels. The hazard quotient is defined as the ratio of exposure to a toxicity reference value. In general, regulatory agencies concur that a hazard quotient below 0.2 for the air exposure pathway or an incremental cancer risk level equal to or less than one-in-a-million (<1 x 10-6), is not significant. Risk levels below these regulatory limits were interpreted as reflecting no significant adverse health effect.

The possibility of short-term (1 hour) health outcomes was assessed based on exposures that would occur from predicted air concentrations of gaseous air pollutants at the maximum concentration location off the site (including the property boundary). The potential for health effects from longer term exposure (8 hour and 24 hour and annual) was assessed at the nearby communities. Cautious estimates (i.e. likely over-estimates) of exposure were used in the assessment to ensure that risks were not underestimated.

The chemicals of concern identified were gaseous air pollutants (carbon monoxide, nitrogen oxides and sulphur dioxide), volatile organic compounds (VOCs), petroleum hydrocarbon (PHC), polycyclic aromatic hydrocarbons (PAHs), and particulate matter. (A description of these chemicals is provided in Volume 3 Biophysical Assessment, Section 3.2 Air Quality.)

The pathways considered included exposure through inhalation and ingestion of chemical off-site through direct deposition to vegetation or deposition into the soil and uptake by vegetation, such as berries. Effects on two sets of receptors were considered: recreational site users, and

residential receptors. Both sets of receptors included adults and toddlers and the residents set also considered infants. The communities included in the assessment were Arnold's Cove, Come By Chance, North Harbour, Sunnyside and Southern Harbour.

The pathways considered are shown below:

- Inhalation of Air: The emissions from the proposed refinery will result in the direct exposure of the human population as the plume impinges down onto the ground level. Human receptors will therefore inhale both gaseous and particle-borne chemicals while outdoors. For the residential receptor it was assumed that the indoor environment was the same as the outdoor.
- Inhalation of Soils and Dusts: Human exposure may occur through inhalation of soils and dusts outdoors as the gaseous and particle-borne chemicals emitted from the proposed refinery are deposited onto soils and surfaces. The rate of this deposition is a function of the local meteorological conditions such as wind speed and precipitation rates.
- Ingestion of Soil: Chemicals emitted from the proposed refinery can be deposited on soil and can be ingested by human receptors outdoors during playing and gardening activities. The toddler receptor is generally the most exposed receptor since they ingest the most amount of soil.
- Ingestion of Locally Grown Vegetation: As chemicals emitted from the proposed refinery are deposited from air-borne emissions, they may contact leaves and fruit of locally grown (backyard gardens) vegetation, where they may remain on the surface or may be absorbed into the plant. Based on information collected in Ontario (MOE 2001), approximately 7.5 % of the vegetable intake of an Ontario resident is from backyard gardens. As discussed, this was considered conservative based upon a literature available. Deposition of chemicals onto the soil may also result in accumulation in plants via root uptake. Humans are exposed to these chemicals by eating the produce from their backyard gardens.
- Ingestion of Locally Grown Berries: Similar to the locally grown vegetables, chemicals emitted from the proposed refinery are deposited from air-borne emissions, they may contact leaves and fruit of wild berries, where they may remain on the surface or may be absorbed into the plant. It was conservatively assumed that 100% of the daily ingestion of berries is from the adjacent site for the recreational / visitor. Deposition of chemicals onto the soil may also result in accumulation in plants via root uptake. Humans are exposed to these chemicals by eating the produce from their backyard gardens.
- Ingestion of Breast Milk: It is assumed that infants may be present in residences around the proposed refinery and would therefore be exposed to chemicals via the breast milk of their mothers. It is assumed that mothers are exposed to the COC via the consumption of locally grown vegetation as well as the inhalation of air, soils and dust. This exposure pathway was only assessed for COC with a log octanol-water partition coefficient (log Kow) greater than 3, which are generally considered lipophilic. PAHs fall into this category and are assessed at the various communities surrounding the proposed refinery.
- Dermal Exposure to Soils and Dusts: Dermal exposure by receptors may occur through direct dermal contact with air-borne chemicals and/or soil and dust on which chemicals have been deposited. In this assessment the incremental soil

concentrations were so low that his pathway would be insignificant and thus, is not assessed further.

Short-term Effects

The short term health effects related to gaseous air pollutants were compared to established health-based values from the World Health Organization that were derived based on immediate effects on respiratory health. The short-term (e.g., respiratory health effects) and long-term health risk associated with exposure to the gaseous air pollutants was assessed based on using a hazard quotient value of 1 since background exposures were taken into account.

Based on the conservative nature of the emission estimates, the expected limited exposure to elevated short-term conditions and the protective nature of the Toxicity Reference Value (TRV), it is expected that the potential for a human health effect from short-term exposure is considered to be low. However, the short-term maximum concentration off-site for NO_2 and SO_2 is above the health based criteria at some locations over water and will be further assessed during future modeling for the site.

Long-term Effects

The chronic exposure to NO_2, CO and $PM_{2.5}$ are well below health-based guidelines and therefore not expected to be a concern.

SO_2 concentrations are expected to remain below the WHO interim guideline and be similar those recently experienced in this area.

The cancer risk values for long-term exposure to carcinogenic chemicals, VOCs and PAHs are all below the negligible risk level of one-in-a-hundred thousand (1 x 10-5).

Additionally, hazard quotients for non-carcinogenic chemicals (predicted exposure dose¸ chronic toxicity reference value) associated with the non-carcinogenic chemicals, VOCs, PHCs and PAHs are all well below 0.2. Therefore, it was concluded that no measurable adverse health effects would be expected to occur in the vicinity of the proposed refinery.

Conclusion

In summary, exposure to contaminants such as PAHs and VOCs that would be released from the proposed refinery are not expected to have an adverse effect on people that may use the neighbouring area for recreational purposes or reside in the nearby communities.

Predicted concentrations of gaseous air pollutants and particulate matter from the proposed refinery will incrementally add to existing air quality levels. However, the increment will be small, or of limited duration and extent and will, with the exception of SO_2, be generally within the natural variation of existing levels. Therefore, it is not expected that any additional measurable health effects will be experienced in the area.

Based on levels of SO_2 already existing in the communities, there is a potential for health effects from exposure to SO_2. However, the HRU health status review of the community did not reveal any significant differences in respiratory ailments (these are the endpoint of concern for SO_2 exposure)from other populations, and, while the NLRC would add to the SO_2, it is not expected that there would be a significant change in the health in the communities. However, NLRC will monitor not only air quality but specific health effects as part of it effects monitoring program. As well, it is expected that when the actual equipment for the refinery is selected using best available technology that the emissions will decrease, including potentially SO_2.

The risks have been deliberately over-estimated as a result of the assumptions made about exposure (which were generally cautious) and used in this assessment. The overall conclusion of the assessment is that there will be no incremental measurable adverse effects on the humans from the operation of the proposed refinery.

6.2 Infrastructure and Services

6.2.1 Existing Environment

Overview of Capacity

The largest of the four Regional Integrated Health Authorities responsible for health care in the Province, Eastern Health services communities from St. John's to Port Blandford, including all communities in the Study Area. Eastern Health services a population of more than 290,000 and employs over 12,000 health care and support workers (Eastern Health, 2007). There are a number of health care facilities in the area including one hospital in Clarenville, several health care centres and other facilities. Within the Study Area there are a total of 91 acute care beds, 8 critical care beds, 185 long-term care beds and 9 holding beds.

Two recent community health needs assessment studies have been undertaken in the region: one on the Burin Peninsula and the other on the Southern Avalon (Eastern Health, 2006 and 2007). The Burin Peninsula study was based on 2004 figures. At that time, the Burin Peninsula had 63.3 specialists per 100,000 people compared with the Province's rate of 71 and the Canada average of 91. Burin had 75.9 general practitioners per 100,000 people compared with the Province's rate of 121 and the Canadian average of 98. The Southern Avalon had 73.82 general practitioners per 100,000 people compared with the provincial and national averages of 99 and 97 respectively (2006 data). Occupancy levels at medical care facilities increased slightly from 2002-2005 to 87% for medicine/surgery, 42% for obstetrics/gynecology and 46% for intensive care. Thus, the Study Area has fewer specialists and general practitioners than the provincial and national average, but capacity exists to treat new patients.

Nurse/patient and physician/patient ratios are other measures of capacity. The Health Canada Annual Report 2005-2006 indicates that there are 1.9 physicians for every 1,000 people in Newfoundland and Labrador, which compares favourably with 2.1 per 1,000 nationally. This is

due, in part, to the number of doctors located in urban areas such as St. John's. A recently released socio-economic study in the region indicates that a high nurse/population ratio (1:215) and an even higher physician/population ratio (1:4,508 maximum in a range) exist and suggests that general practitioners or family doctors may be most impacted by in-migration of large project workers (Jacques Whitford Limited, 2007).

Many job opportunities are available for heath care workers (mainly for nurses and physicians) in the region.

As is the case throughout the Province, it is becoming increasingly difficult to attract medical professionals to the rural areas of this Province and as the population grows older and increasingly declines due to out-migration and a lower birthrate, this situation will become exacerbated. For example, despite a declining population in the Study Area, the current acute care providers are operating at full capacity, in part because they are dealing with an older population and their attendant needs. However, it is also becoming increasingly challenging to attract acute care givers to rural populations. that lack the funding, medical, social and cultural facilities and staff to retain them.

Public Health and Acute Care Systems

Hospitals in Project Area

Eastern Health serves communities from St. John's to Port Blandford, including all communities in the Study Area. Eastern Health services a population of more than 290,000 and employs over 12,000 health care and support workers (Eastern Health, 2007).

The Dr. G. B. Cross Memorial Hospital in Clarenville, which serves the Study Area, has 47 acute care beds, 14 long-term care beds (Sunshine Manor) and two respite care beds. Construction has begun on a new 44-bed long-term care facility with a planned opening date of 2008 (H. LeDrew, pers. comm.). Services include: anesthesia, chemotherapy, diabetes education, family practice, general surgery, gynecology, ICU/cardiac, internal medicine, laboratory, long-term care, mammography, nursing, rehabilitation, CT services, nutritional services, obstetrics, occupational therapy, palliative care, pastoral care, pathology, pediatrics, pharmacy, phototherapy, psychiatry, physiotherapy, pedology, recreation therapy, respiratory therapy, social work, speech language pathology, ultrasonography, visiting specialty clinics and 24-hour emergency services. The full complement for the hospital is 22 doctors, although currently they have 17.

Community Health Centres

The Dr. William H. Newhook Community Health Centre is located in Whitbourne and is used as a teaching facility for Memorial University's Faculty of Medicine. The facility maintains three observation/holding beds and a full range of services including diagnostic, environmental,

outreach programs, visiting disciplines in audiology, dietetics, and occupational therapy, and 24-hour emergency services. The facility does not admit patients, transferring them to St. John's if needed.

The Placentia Health Centre maintains 10 acute care beds, 75 nursing home beds, two respite care beds and 40 independent living units. This facility also offers a full range of services including in-patient and out-patient medical care. Routine laboratory and radiology services are available on-site. Allied health services, such as clinical nutrition, occupational therapy, physiotherapy, speech language pathology, respiratory therapy and social work are shared with Lions Manor Nursing Home and other sites (Eastern Health 2007). In Marystown, the Burin Health Care Centre offers acute care services in family practice, 24-hour emergency services, general surgery, obstetrics, pediatrics, psychiatry, gynecology, ICU, internal medicine, chemotherapy, diabetes education, physiotherapy, phototherapy, occupational therapy, speech language pathology, diagnostic services including laboratory, radiology, CT scan, ultrasound, mammography, bone density, stress testing, EKG, nutritional services, clinical dietetics, palliative care, pharmacy, social work, respiratory therapy, nursing, pastoral care and visiting specialty clinics. There are 42 beds in the facility with 16 doctors on staff and approximately 85 nurses (T. Keating, pers. comm.).

Public Health Nurses

Other communities in the Study Area have community health offices and residents must travel to the larger health care centres for treatment. Public health nurses working at community health offices provide a number of services including continuing care, home care, public health nursing, and international travel health clinics. Public health nurses in Clarenville and Come By Chance are busy and there is a request through the Federal "Basket of Services" program for an additional three nurses in this area to provide home and therapeutic services so that hospital stays are shortened and to reduce hospital admittance (J. Pickett, pers. comm.).

Health Care Facilities in St. John's

St. John's has some of the largest hospitals in the province (General Hospital and Janeway Children's Health and Rehabilitation Centre at the Health Sciences Centre, St. Clare's Mercy Hospital, the Waterford Hospital and the L. A. Miller Centre) providing a mix of tertiary and secondary care services. Depending on the nature of the illness or accident, these hospitals are equipped or have access to almost any type of specialists and major equipment. The Janeway operates 53 acute care and 25 critical care beds, the General Hospital has 312 acute care and 32 critical care beds, while St. Clare's has 188 acute care and 16 critical care beds (Eastern Health, 2007). There are also numerous specialist centres such as the Dr. H. Bliss Murphy Cancer Centre, the L. A. Miller Centre for long-term treatment and the Waterford Hospital for individuals with mental health issues.

International health services are provided through international travel clinics at Community Health Care offices. There are private travel clinics in St. John's (Jacques Whitford, 2007). Clinics offer services in travel health counselling, immunizations and disease testing and are located at community health offices in Burin, Come By Chance, Clarenville, Holyrood, Placentia and Whitbourne (Eastern Health, 2007).

Community and Family Social Services

Community and family social services are offered in the Study Area by Eastern Health, addressing issues such as family violence, addictions, youth protection, child welfare, persons with disabilities, mental health issues, seniors issues, and persons with special needs. Service delivery in the Study Area is summarized in Table 6.6.

Table 6.6 Community Services, Programs and Capacity in the Study Area

Service	Location Offered	Service Details
Health Promotion and Protection	Clarenville Holyrood Whitbourne	Heart health e.g. active living, smoking and healthy eating Substance abuse prevention Mental health promotion Reproductive health Parent and child health
Community Health Nursing	Bay Roberts Burin Clarenville Come By Chance Holyrood Placentia Whitbourne	Support health promotion and protection programs, school aged children and adult immunizations, and Communicable Disease Control and follow-up
Mental Health Services	Clarenville, Placentia and Marystown	Treatment/intervention, mental health promotion, partnerships with other service providers (RCMP, hospitals, schools, etc.). There are 90 acute care and 131 tertiary care beds in Eastern Newfoundland (including St. John's).
Addictions Services	Bay Roberts (1 staff) Burin/Marystown (1 staff) Clarenville (2 staff) Holyrood (1 staff) Whitbourne (1 staff)	Alcohol, drug and gambling prevention and treatment
Community Support Program	All Study Area Communities (on-line intake form or through Health and Community Services offices)	Placement and assessment for seniors, people with physical disabilities, personal care homes, long-term care facilities; Home support Special assistance programs Facility based respite Rehabilitation services Alternate Family Care Home Program Referrals for the Provincial Home Repair Program

Service	Location Offered	Service Details
Child Care and Intervention Services	Not listed	Child care services (licensing, monitoring and support of licensed child care options in the region); Community Behavioural Services Program is a community based behavioural support and training program; Direct Home Services Program is a family centered, home based, early intervention program with a focus on child outcomes
Child, Youth and Family Services	Bay Roberts Burin/Marystown Clarenville Holyrood Placentia Whitbourne	Child, Youth and Family Services (CYFS) program responds to referrals of child maltreatment, assess risk and provide protective intervention services; The Adoptions program; The Community Corrections Program

Wellness Coalitions

Eastern Health supports the work of two wellness coalitions, one of which, the Eastern Regional Wellness Coalition, is active in the Study Area. This organization of community, government and non-government groups and agencies promotes wellness, improved health and well-being through the following programs: healthy eating, physical activity, tobacco control, injury prevention, mental health promotion, child and youth development, environmental health, and health protection.

Provincial Income Support and Employment Services Program

An income support program provided through the provincial Department of Human Resources, Labour and Employment offers income support for eligible individuals and families to meet basic needs such as food, clothing and shelter. Services are provided through four provincial districts. The Study Area lies within the Avalon and Central Districts and offices are located in Placentia, Marystown and Clarenville.

The Placentia office is in the Avalon District; it has a service focus on employment services and has one client service officer and an administrative assistant. A career development Specialist travels to the Placentia office from Harbour Grace to provide career-counselling services. The office serves approximately 300 cases per year and has 30-40 longer term, active cases at any given time.

Delivery of income support services in the Central District has changed since November 2006. Clarenville's office employs 12 staff members (all full-time), and processes approximately 400 applications per month. They also provide career, employment and youth services from this office.

In Marystown, the office provides work income supplements for the entire province as of November 2006. This service provides extra income for basic needs for clients who have some

work (part-time, casual) and require assistance. The office employs 17 client service officers and has handled approximately 800 clients since November 2006, with potential increases expected due to changing over of the work income supplement services to this location from other offices, by August 2007. Career, employment and youth services are provided from this office as well as the fisheries adjustment strategy to deal with fish plant closures in the region (R. Turner, pers. comm.). Information on income and employment insurance rates is provided in Section 4.1.

Federal Income Support and Employment Counselling Services

Service Canada, operated by Human Resources and Social Development Canada, offers federal income support services including employment insurance (EI) benefits. The provincial income support program and Service Canada work in combination to provide range of income support, employment and career-counselling services for individuals, organizations and businesses. Service Canada offices are located in Clarenville, Marystown and Placentia and can also be accessed by telephone or by Internet. Services include:

- **Individual Services:** Identification cards (pleasure craft licensing; passport office receiving agent) and training and learning (apprenticeship incentive grant)
- **Organization services:** Partnership initiatives and funding programs
- **Business services:** Human resources management (hiring foreign workers; record of employment; wage subsidies) and labour market information.

6.2.2 Project Effects

The Project will have some effects on the Study Area's health and community services and other social services administered by provincial agencies but these are expected to be at a minimum largely due to the fact that the service systems are designed and resourced, with some limited exceptions, to deal with a larger population base. If, and when, the demand for these services increases it is expected that the public agencies concerned will seek the additional resources from the provincial government.

Public Health and Acute Care Systems

The Project has the potential to directly impact the health care system with an influx of workers, particularly during construction when pre-service medicals will be required. Project-related accidents could put some stresses on the system in both the short-term and over the long-term. Potential indirect effects are felt through relocation of families into the area who will require access to a full range of acute, primary, public health and other paramedical services in the region.

Community and Family Social Services

There are positive and negative effects associated with the Project. A positive effect will be increased employment in the Study Area. On the other hand, in some cases, increased incomes result in dysfunctional spending patterns (e.g., alcohol, drugs and gambling) that could place pressures on family, community and health system resources. Overall, an increase in population in the Study Area will lead to some additional demand on community and family social services.

6.2.3 Mitigation Measures

Public Health and Acute Care Systems

The NLRC holds the health and safety of its employees as one of its key core values, and to mitigate adverse effects on the health care system, the company will:

- Prepare and implement a Health, Safety and Environmental Management System (HSEMS) to prevent the need for emergency health services;
- Employ on-site medical practitioners at the Project site and the work camp;
- Encourage pre-employment medicals to be conducted in the employee's home community, rather than in the Study Area;
- Consider conducting pre-service medicals on the Project site; and
- Advise Eastern Health about the recruitment schedule well in advance.

Community and Family Social Services

To help increase the positive effect of increased wages and family stability, NLRC will:

- Encourage those individuals currently working away from home to return for competitive wages, benefits and long-term employment (Operations);
- Offer a positive work environment and a corporate culture that supports family life and enhances quality of life in the community; and
- Lead the development of a regional industry-community service agency committee that will discuss common issues and collaborate on initiatives that will enhance or mitigate issues.

To help mitigate any negative social effects, NLRC will:

- Implement employee assistance programs;
- Refer employees to existing social services programs offered in the region;
- Implement a Health, Safety and Environmental Management System which will promote healthy living practices and prevention – lessening the need to seek these services in the community; and
- Share Project plans with local social service agencies regarding the anticipated number of employees and families re-locating or returning to the Study Area so that they are able to plan service provision accordingly.

6.2.4 Residual Effects

Summary Chart

Table 6.7 provides a summary of the residual effects.

Table 6.7 Residual Effects on Public Health and Acute Care Systems & Community and Family Services

Social Services VEC	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Level of Confidence	Certainty	Mitigation Or Enhancement Success	Significance
Public Health and Acute Care Systems (Construction)	Adverse	Low	Regional	Short to Medium-Term	Continuous	Yes	Medium	Medium	Moderate	Moderate
Public Health and Acute Care Systems (Operations)	Adverse	Low	Regional	Short to Medium-Term	Continuous	Yes	Medium	Medium	Moderate	Moderate
Community and Family Social Services (Construction)	Adverse	Low	Regional	Short to Medium-Term	Continuous	Yes	Medium	Medium	Moderate	Moderate
Community and Family Social Services (Operations)	Neutral	Low	Regional	Short-Term	Continuous	Yes	Medium	Medium	High	Moderate

Construction

Public Health and Acute Care Systems

Project effects on the health care system will be primarily addressed through the preparation and implementation of the mitigation measures discussed above. However, because of the number of workers in the area, there could be some short-term stresses on the health care system until Eastern Health can respond.

The residual project effect on health care is therefore considered adverse since it places more stress on an already overburdened system, is low in magnitude, is regional and short-to-medium term. Frequency of the effect is continuous until it can be mitigated through increases in staff and service capacities. The effect is reversible, and the level of confidence in this assessment is medium, with a medium certainty of occurrence. The mitigation success is considered moderately effective since certain types of health care for an increased population of workers and their families will not be provided by NLRC. The significance of the effect is moderate.

Community and Family Social Services

Many of the project effects can be mitigated through the measures described above; however, an increase in population in the Study Area will mean that more services are required. This effect lessens over time as the construction period wanes. The residual effect on social services is therefore adverse, low, and is regional in geographic extent. Duration of the effect is short-medium term, and the frequency is continuous. The effect is reversible, and the level of confidence in this assessment is medium, with certainty of the effect also being medium. The mitigation and enhancement success are moderately effective and the significance of the effect is moderate.

Operations

Public Health and Acute Care Systems

Project effects on the health care system will be primarily addressed through the preparation and implementation of the mitigation measures discussed previously. However, because of the number of workers in the area, there could be some short-term stresses on the health care system until Eastern Health can respond. The indirect effect of a few families moving into the area will occur over a longer period of time and, while this could pose a short-term negative effect it will likely be mitigated over time through planning for health care system growth.

The residual project effect on health care is therefore considered adverse since it places more stress on the system, is low in magnitude, is regional, and short – medium term. Frequency of the effect is continuous until it can be mitigated through increases in staff and service

capacities. The effect is reversible, and the level of confidence in this assessment is medium, with a medium certainty of occurrence. The mitigation success is considered moderately effective since certain types of health care for an increased population of workers and their families will not be provided by NLRC. The significance of the effect is moderate.

Community and Family Social Services

Many of the Project effects can be mitigated through the measures described previously; however, an increase in population in the Study Area will mean that more services are required. This effect lessens over time as operations workers settle into the communities and social services providers assess needs and implement plans to respond to these needs. With steady employment and income as well as more stable communities as a result of the Project, some of the stresses on the community and family services system will decrease. The residual effect on social services is therefore neutral, low, and is regional in geographic extent. Duration of the effect is short-term, and the frequency is continuous. The effect is reversible, and the level of confidence in this assessment is medium, with certainty of the effect also being medium. The mitigation and enhancement success are effective and the significance of the effect is moderate.

Monitoring and Follow-Up

NLRC will implement a monitoring and follow-up program as described below.

Public Health and Acute Care Systems

In coordination with Eastern Health, NLRC will monitor for any increased demand for services that are directly attributable to the Project.

Community and Family Social Services

In coordination with Eastern Health, NLRC will monitor for any increased demand for services.

7.0 HOUSING

7.1 Existing Environment

7.1.1 Housing Stock

Table 7.1 shows data for occupied private dwellings in the Study Area including the total number of dwellings, owned and rented dwellings, average value of dwellings and average gross monthly rents. The data show trends from the 1996 and 2001 Census data. Census 2006 housing data was not available.

Only Clarenville had an increase in the number of occupied dwellings in this period. The decrease in occupied dwellings was greatest in the other three larger centres, Marystown, Placentia and Arnold's Cove. In all cases the number of dwellings owned was more than the number rented. The number of owned dwellings increased in Arnold's Cove, Clarenville and Come By Chance but decreased in all other Study Area communities. Rentals increased in Clarenville in Garden Cove, North Harbour and Swift Current but dropped in all other Study Area communities. Average housing values rose in all Study Area communities with the exception of Placentia.

Table 7.1 Occupied Private Dwelling Characteristics

Community	Total # of Occupied Dwellings		Owned Dwellings		Rented Dwellings		Average Value ($)		Ave Gross Monthly Rent ($)	
	1996	2001	1996	2001	1996	2001	1996	2001	1996	2001
Arnold's Cove	385	355	310	315	75	40	52,762	64,848	444	374
Clarenville	1,850	1,895	1,240	1,245	610	650	85,717	96,714	494	506
Come By Chance	95	95	80	85	15	10	51,871	48,946	534	--
Div 2, Subd K (Garden Cove, North Harbour and Swift Current)	265	265	255	240	10	20	40,790	44,842	135	477
Div 1, Subd A (Goobies, Sunnyside, Southern Harbour, Little Harbour East)	325	305	295	285	25	20	46,227	54,061	--	293
Marystown	2,125	2,075	1,505	1,495	615	585	68,572	71,766	508	474
Placentia	1,675	1,625	1,320	1,275	360	345	91,418	54,161	447	442
Study Area	6,720	6,615	5,005	4,940	1,710	1,670	62,480	62,191	427	367

Community	Total # of Occupied Dwellings		Owned Dwellings		Rented Dwellings		Average Value ($)		Ave Gross Monthly Rent ($)	
Province	185,500	189,040	143,060	147,750	42,360	41,170	70,835	76,283	497	513

Source:
Statistics Canada 1996, 2001
Newfoundland and Labrador Community Accounts

7.1.2 Housing Market Activity

Provincially, a drop of 9 per cent in housing starts occurred in the year 2006-2007. In this period, a 59 percent decline in single-detached housing starts occurred and an increase of 64 percent in all other housing types (CMHC, 2007). Housing starts, sales and average selling prices in the Study Area from 2002 to 2006 are shown in the Socio-Economic Component Study, Newfoundland and Labrador Refinery Project. Clarenville, Marystown and, to a lesser extent, Arnold's Cove, are the only communities in the Study Area where residential construction activity has been recently occurring (R. Dalton, pers. comm.). Two new subdivisions are being constructed in Clarenville, with a third planned to begin in the spring of 2007. Lots with 60-70 foot frontage in Clarenville are selling for $40,000 – $45,000. Selling prices range from $8,000 in Southern Harbour (2004) to $115,000 in Clarenville (2006). Housing prices in the communities of the Study Area have not increased during the past year. Housing sale activities in the Study Area are low as owners appear to be taking a "wait and see" approach regarding the Project. During construction of Hibernia some people bought houses in nearby communities so that they could benefit from rising house prices while others moved to secondary (cottages) homes so they could rent their primary residences during construction periods. Housing prices in Clarenville are comparable to those available in St. John's.

7.1.3 Rental and Low-Income Accommodations

Rental rates in the Study Area are detailed in the Socio-Economic Component Study, Newfoundland and Labrador Refinery Project, that accompanies this report. Apartments are available in Marystown and Placentia. The Canada Mortgage and Housing Corporation does not keep statistics on rental rates for communities in the Study Area.

Low-income housing in the Study Area is provided by Newfoundland and Labrador Housing Corporation (NLHC). Currently, 29 low income rental units exist in Clarenville, one in Shoal Harbour, nine in Arnold's Cove, four in Goobies, one in Sunnyside and two in Come By Chance most occupied by long-term tenants. Rent is based on income levels, ranging from 25-30 percent of tenant income (N. Feltham, pers. comm.).

NLHC also has rental units in five communities on the Burin Peninsula: St. Lawrence, Fortune, Grand Bank, Burin and Marystown. There are 319 units with 110 current vacancies. In the

region, NLHC operates three seniors' cottage complexes (totalling 26 units) and finances three additional seniors' homes (totaling 24 units). The cottages operate at 100 per cent capacity and rent is based on 30 per cent of net family income.

In Placentia, NLHC has 55 rental units. No vacancies exist; however, two units are available further south (outside Study Area) (S. Rockwell, pers. comm.).

7.1.4 Temporary Accommodations

Temporary accommodations include hotels, bed and breakfasts, work camps, boarding houses, shelter and campsites. The Study Area contains seven hotels with 335 rooms, 19 B&Bs with 60 to 75 rooms, three resorts, two boarding houses with eight rooms, and over 350 campsites. There are no shelters for the homeless in the Study Area (A. Cook, pers. comm.); one women's shelter is located in Marystown. There are four privately run personal care homes in the Study Area – two in Clarenville, one in Arnold's Cove and one in Marystown. More detailed information on accommodations is provided in the Socio-Economic Component Study, Newfoundland and Labrador Refinery Project.

Occupancy rates for the Study Area were provided by the Department of Tourism, Culture & Recreation (Figure 7.1 and Figure 7.2). Figure 7.1 shows that occupancies in the Study Area increase in the summer peak months (June – September) to a maximum of 67 per cent. The data also show that occupancy rates are higher for the Southern Head communities in the peak period compared to Placentia and Marystown. In the off-peak periods, Placentia has the lowest occupancy rates, followed by Marystown and Southern Head.

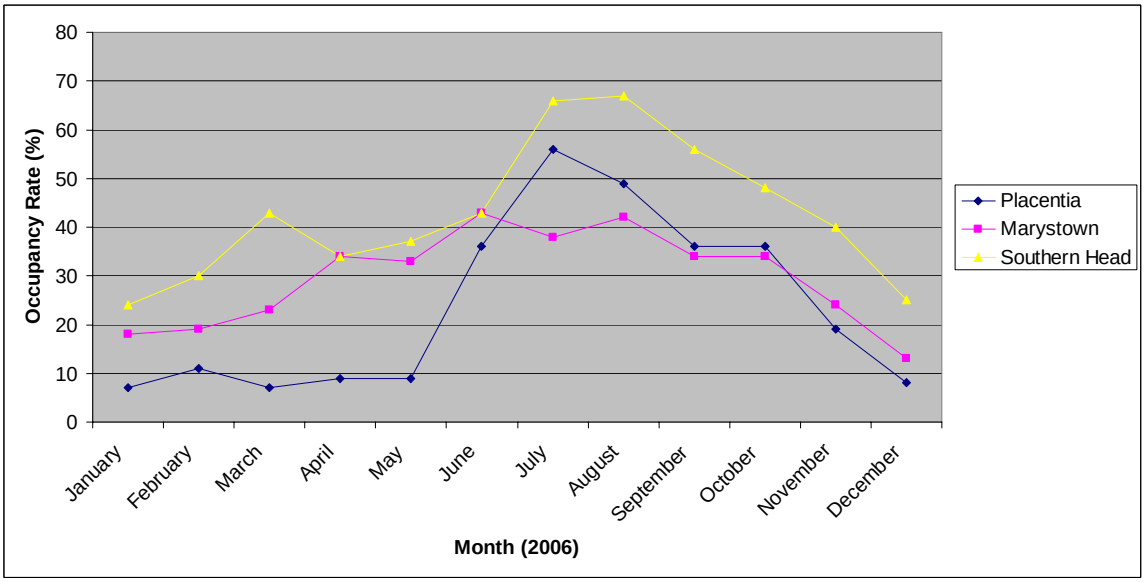

Figure 7.1 Occupancy Rates for Primary Study Area by Month in 2006

Source: Newfoundland and Labrador, Department of Tourism, Culture & Recreation; AMEC Interpretation

Figure 3.2 shows overall occupancy in peak periods (June – September) for 2003 – 2006. The data show a steady decline in overall occupancy in the peak period for Southern Head communities between 2003 and 2006; an increase in Marystown between 2003 and 2005 with a drop in 2006 that may be attributed to lower reporting rates for 2006. Peak period occupancies have remained steady in Placentia, with a slight increase in 2006.

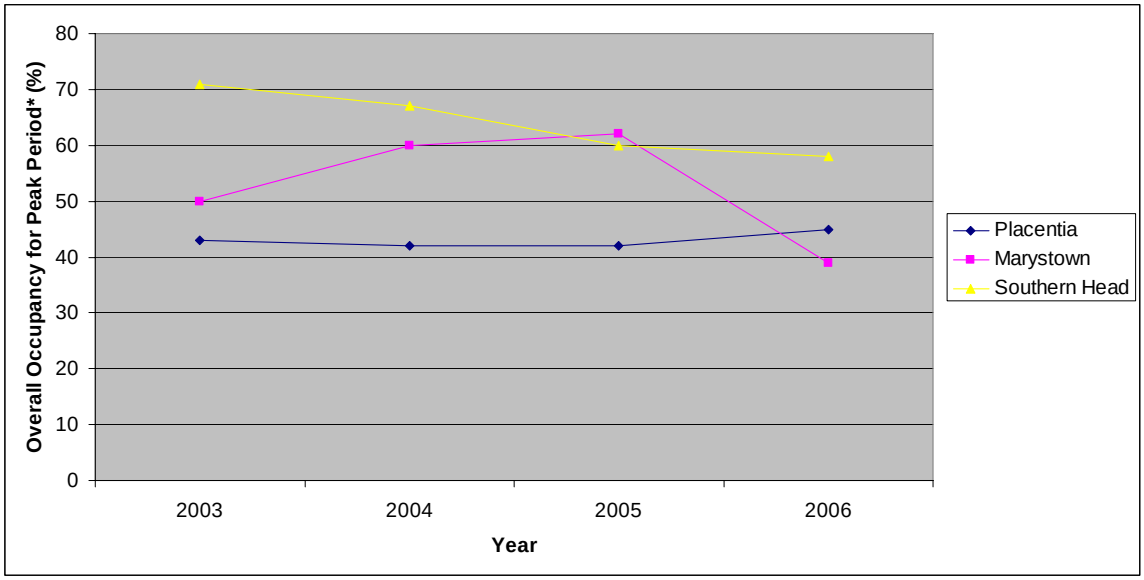

Figure 7.2 Overall Occupancy Rates for Peak Period (2003 – 2006)

Notes:
Peak Period is June – September
Source: Newfoundland and Labrador, Department of Tourism, Culture & Recreation; AMEC Interpretation

Roadside Camping

The EIS Guidelines require that the Proponent address roadside camping: during the initial work at the Bull Arm site, some site workers set up temporary roadside 'residences' such as campers or trailers. There are no laws against camping on crown land in the province and nothing can be legally done to prevent it. However, the Department of Transportation and Works has the right to remove any vehicles, including campers, that obstruct general road maintenance and/or interferes with public safety.

7.2 Project Effects

The Project has the potential to affect housing in the Study Area by:

- Increasing demand for temporary and permanent housing, which has a positive effect on the housing industry and increases the municipal tax base, but a negative effect if housing availability cannot meet demands in the short term, leading to illegal camping; and

- Increasing costs for housing which has a positive effect on the real estate industry but a potentially negative effect in increasing property taxes for existing residents.

During a recent major fabrication project at Bull Arm (for the Terra Nova Project), a workforce of 1,500 was accommodated without the use of a workcamp, through a combination of local housing and commuting.

7.3 Mitigation Measures

These effects will be mitigated and enhanced by NLRC through the following measures:

- Accommodate approximately half of the construction workforce (1,500 workers) at the Bull Arm work camp; the rest will likely commute;
- Encourage union agreement incentives to stay at the work camp and commute to the work site;
- Continue to compile and maintain a database of available housing and accommodations and ensure it is provided to all potential workers;
- Publicize housing demand and supply so that the cost of housing is not unnecessarily increased and housing and real estate industries can respond appropriately;
- Encourage workers to commute to the Project site from the Study Area during construction or move into the Study Area during operations);
- Support RCMP enforcement of illegal camping and squatting in local communities by advising all workers; and
- Consult with municipalities about project plans and schedules for accommodation needs.

7.4 Residual Effects

Table 6.8 provides a summary of the residual effects on housing and accommodations.

7.4.1 Construction

Overall negative Project effects during construction can be mitigated through encouraging work camp use and commuting. The residual effects are therefore characterized as positive, high, local and long-term. The effect is continuous throughout the construction phase, is reversible since the work camp can be decommissioned following construction if not required for Project maintenance shut-downs. The levels of confidence in and certainty of this assessment are high, with moderately effective enhancement success, i.e., there will be a measurable change in housing supply and demand but no permanent negative effect (effects will lessen as people become absorbed into the communities). Significance of the effect will be moderate.

7.4.2 Operations

The residual effects of the project are characterized as positive, high, local and long-term because people will have confidence in the economy and buy, build or renovate houses. The

effect is continuous throughout the life of the project, which is reversible since people can sell their house during decommissioning. The level of confidence in and certainty of this assessment is high, with moderately effective enhancement success, i.e., there will be a measurable change in housing supply and demand but no permanent negative effect (effects will lessen as people become absorbed into the communities). Since housing starts are a key indicator of an economy, significance of this effect will be moderate.

7.5 Monitoring and Follow-Up

NLRC will consult with their employees, municipalities, NLHC, CMHC and local builders and landlords regarding the status of housing supply and housing-related issues.

Table 7.2 Residual Effects on Housing and Accommodation

Social Services VEC	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Level of Confidence	Certainty	Mitigation Or Enhancement Success	Significance
Housing and Accommodation (Construction)	Positive	High	Local	Long-Term	Continuous	Yes	High	High	Moderate	Moderate
Housing and Accommodation (Operations)	Positive	High	Local	Long-Term	Continuous	Yes	High	High	Moderate	Moderate

8.0 EDUCATION AND TRAINING

8.1 Existing Environment

The Eastern School District administers the primary, elementary and secondary education system in the Study Area. It is the largest of the five school boards in the province, and manages 122 schools with approximately 44,000 students and 3,000 teaching and support staff.

8.1.1 Childcare Centres

As of 2003, nine childcare centres were located in the eastern region (excluding the St. John's CMA) with a total enrolment of 224, averaging 25 per establishment (Auditor General's Report, 2003). In the Study Area four licensed childcare centres exist: one each in Placentia and Marystown, and two in Clarenville (Health and Community Services, 2007).

Childcare centre capacity in Placentia is 16 children. Currently, 26 children are registered at the centre on a part-time basis (half attend in the morning and the other half in the afternoon) with two staff members (Jacques Whitford, 2007). In Clarenville, Early Discoveries Preschool / Daycare has capacity for 19 children with two teachers. Currently 7-12 students register daily (C. Pike, pers. comm.). Toddlers Corner Daycare in Clarenville has capacity for 23 children, with three teachers; 18 or 19 children attend. (L. Peddle, pers. comm.). In Marystown, Explore and Discover Childcare Centre has capacity for 57 children and six or seven teachers. The centre is operating at capacity (A. Murphy, pers. comm.).

8.1.2 Primary, Elementary and Secondary Schools

The data compiled for the fourteen schools in the Study Area for the years 2001 to 2007 show a slight, steady decline in enrolment with the exception of the schools in Clarenville that show relatively stable enrolments (Refer to data in Socio-Economic Component Study, Newfoundland and Labrador Refinery Project).

With respect to school capacities in the Employment Catchment Area, the data show that, without exception, capacity exists for more students in each school in the Study Area. Cumulatively, additional capacity exists for 2,533 students in Study Area communities. As is the case throughout the province, with a substantial decrease in school enrolment due to out-migration and declining birth rate, a rationalization of schools has occurred and will continue to occur. This is also true for the Study Area.

Student/Teacher Ratios

Student/teacher ratios are available for economic zones within the province and are depicted in Table 8.1. Zone 15 (Discovery Regional Development Zone) encompasses the north end of

Placentia Bay including Clarenville, Zone 16 (Schooner Regional Development Corporation) encompasses the Burin Peninsula and Zone 18 (Avalon Gateway Regional Economic Development Inc.) encompasses the Avalon Peninsula. Although teacher allocations are closely tied to student enrolment, the number of students per teacher declined between 1997 and 2006 in all economic zones and shows a consistent trend compared to the provincial average (Table 8.1).

Table 8.1 Student/Teacher Ratio by School Year

Economic Zone	Student/Teacher Ratio by School Year								
	97-98	98-99	99-00	00-01	01-02	02-03	03-04	04-05	05-06
15	14.3	13.9	13.6	13.1	12.6	12.8	12.7	12.6	13.1
16	14.5	14.4	13.9	13.5	12.4	12.7	12.9	12.6	12.9
18	15.4	14.7	14.6	13.8	13.0	12.8	13.0	12.5	12.0
Provincial Average	15.1	15.0	14.7	14.2	13.6	13.9	13.7	13.9	14.1

Future plans for schools in Placentia include the closure of St. Edward's School in June 2009. Renovations will be made to St. Anne's Academy, which will become a K-6 school for Placentia/Dunville area and a new grade 7-L4 school will be constructed. This school will replace Laval High School and will open no earlier than September 2009 (S. Dale, pers. comm.). Voisey's Bay Nickel Company (VBNC) is contributing funds for school construction. The new high school will provide courses in skilled trades, home economics and computer science, and will have a gymnasium, a fitness centre, a library and a challenging needs suite (Newfoundland and Labrador Department of Natural Resources, 2006 in Jacques Whitford, 2007).

Clarenville Primary School will close in the near future when an extension is built on Clarenville Middle School. Balbo Elementary School will be reconfigured to a K-3 school for the entire feeder system and Clarenville Middle School (with extension) will be a grade 4-8 school for the entire feeder system (S. Dale, pers. comm.).

In Marystown, Pearce Junior High will close in June 2009 and Donald C. Jamieson Academy will become a grade K-8 school for the students in the Salt Pond area. Marystown Central High will become a grade 8-L4 school (S. Dale, pers. comm.).

8.1.3 Post Secondary Education Institutions

Within the province there is one university, Memorial University of Newfoundland (MUN); one public college, College of the North Atlantic (CNA), and 32 private training institutions (Department of Education, 2007). CNA Campuses within the Employment Catchment Area are located in Burin, Clarenville, Placentia, Seal Cove and St. John's. Keyin Tech is located in Clarenville and Marystown. A more detailed description about CNA and training in the Study

Area are contained in the Socio-Economic Component Study, Newfoundland and Labrador Refinery Project.

MUN is the largest university in Atlantic Canada. It operates two campuses in St. John's, one in Corner Brook, one in Saint-Pierre and one in Harlow, England. There are no MUN campuses in the Study Area; however, many of the residents attend the university completing programs including science, arts, engineering, business, education, nursing, pharmacy and medicine.

Enrolment at the university has increased during the past 10 years, with a current student population of over 17,500. The largest area of student population growth has been in graduate studies (Jacques Whitford, 2007).

The following sections focus on relevant programs offered by Memorial University, CNA campuses closest to the Project and by relevant private colleges.

- MUN offers several programs that are specifically related to the oil and gas sector. These include engineering (bachelor's, master's and PhD levels), business (bachelor's and master's levels), oil and gas studies (master's level), and several science programs (bachelor's, master's and PhD levels). While the focus of the engineering faculty has been previously on offshore and oil gas, the new programs in process engineering and offshore safety are particularly relevant to oil refinery related work and research.

  MUN has made significant contributions to the oil and gas sector in the area of applied research with the PanAtlantic Petroleum Systems Consortium (PPSC) and the Centre for Marine Compressed Natural Gas (MUN, 2007). MUN is also home to several Canadian Research Chairs, and places an emphasis on subjects such as petroleum geoscience/geotechnology, environmental science, natural resource sustainability and community development and petroleum reservoir engineering and characterization (MUN, 2007).

  Table 8.2 shows Memorial's capacity specifically related to the oil and gas sector.

Table 8.2 Memorial University of Newfoundland's Oil and Gas Related Programs, Faculties and Facilities

Type	
Faculty	50 including 19 new faculty and several research chairs
Facilities	Harsh Environment Bridge Simulator – Marine Institute
	Centre for Marine Compressed Natural Gas
	Landmark Graphics Visualization Laboratory
	Schlumberger Data Centre
	Inco Innovation Centre – mining and oil and gas focus
Programs	Advanced Diploma in Engineering
	Masters and PhD in Engineering
	Bachelors in Process Engineering
	Masters and PhD in Process Engineering
	Diploma in Marine Safety
	Diploma in Remotely Operated Vehicles
Executive MBA	Oil and Gas
	Maritime Management
Research foci	Offshore Safety
	Underwater Vehicles
	Engineering of Production Systems
Students	100+ in oil and gas operations

- CNA is one of the largest post-secondary educational and skills training centres in Atlantic Canada and the only public college in the province, offering nearly 100 full-time and 300 part-time programs to approximately 20,000 students each year. Programs include academics, applied arts, business studies, health sciences, engineering technology, industrial trades, information technology and tourism and natural resources. Enrolment at the college has increased by 100 people each year since 2001 (D. Hanrahan, pers. comm.).

  Within the larger Employment Catchment Area, CNA has campuses in Clarenville, Placentia, Bonavista, Burin, Carbonear, Seal Cove and St. John's. Details on the programs offered at these facilities is presented in the Socio-Economic Component Study, Newfoundland and Labrador Refinery Project.

  Typically, when CNA delivers training in core skill trades such as a millwright, scaffolder, machinist, welder, pipefitter, etc., courses run at full capacity. Facilities would not be able to absorb any increases in demand under current operations but would have to respond by increasing the number of seats. It should be noted that CNA campuses are primary areas for employers outside of the province to recruit and it is not unusual for the schools to see a significant percentage of new graduates lured from the province as soon as their training is complete. Local employers in need of skilled labour will need to compete by engaging in similar aggressive recruiting efforts. All campuses indicated that if industry were to increase its demand for skilled trades and work with CNA to focus on delivering incremental programs for same, they would respond very quickly, sometimes in as little as a week.

- Private Colleges – In the province there are 32 private institutions offering a wide rage of programs from office administration to heavy equipment operation (Jacques Whitford, 2007).

  Within the study area, there are two Keyin College campuses, one located in Clarenville and the other in Marystown. Courses in both locations are focused on business management and administrative courses; there is no programming in skilled trades. Keyin also provides a course in Occupational Health and Safety at their Grand Falls–Windsor Campus. Centrac College offers a wide range of business, trades and technology programs, including skilled trades, at Marystown. Refer to Socio-Economic Component Study, Newfoundland and Labrador Refinery Project for an outline of private training programs throughout the province.

8.2 Project Effects

This section addresses the potential effects of the Project on the education and daycare systems with emphasis on education and training of workers of the Employment Catchment Area.

Generally, the labour force in the project region is considered to be highly skilled as a result of other large industrial projects that have been undertaken in the area; however, the recent absence or delays in developing large-scale projects in Placentia Bay has resulted in out-migration of workers and their families. The Refinery Project will require approximately 3,000 workers during the peak construction phase and 750 during the operations phase. The skills of these workers will range from very experienced to new entrants – depending on the task. In each case, clear demonstration of literacy and completed technical training will be essential. Prerequisites for almost all construction jobs are Grade 10 plus technical training such as an apprenticeship, or a high school diploma, plus specialty post-secondary training

There are two major potential effects of the project on education and training. They are effects on educational attainment including completion of high school, trades and other post-secondary training, and resources on literacy, education and training institutions to respond to demand for more services.

During construction it is not anticipated that a significant number of workers (male or female) will re-locate permanently to the Study Area with their families and therefore during this period, there will be no significant effect on the education system. However, throughout the operations phase some workers are expected to relocate into Study Area communities with their families, increasing demand for childcare and classroom space in Study Area primary schools. In addition, with increased demand for labour, women are more likely to enter the workforce, which will drive up childcare demand in the region. While increased demands for primary school student spaces can easily be accommodated in the school system, increased demands for childcare spaces will likely outstrip current supply. In the medium-term this will likely result in new childcare centres opening up in the Study Area to meet demand, but in the short-term,

when there are not enough spaces, additional demands will have to be met by family members (grandparents, older siblings) and could limit the ability of women to enter the labour force.

With the overall increase in population in the region, there is greater potential for higher student enrolment in post-secondary institutions including CNA, private colleges and MUN. The latter effect will take more years to become evident, depending on the ages of the children. If older workers with older children return to the province, then their children have the potential to enter post-secondary schools much sooner than those of younger families. While MUN has capacity to accept more students, CNA, which is short of classroom space and instructors, will have more challenges in accommodating new students.

Early childhood facilities (daycare) located in Placentia, Marystown and Clarenville have room for a few additional children, with the exception of the largest daycare of the four in Marystown, which is operating at capacity. Enrolments in primary schools in the Study Area have been declining for the past five years, with the exception of those in Clarenville, which has had steady enrolment over this period. Cumulatively, additional capacity exists for 2,533 students in Study Area communities. As is the case throughout the province, with a substantial decrease in school enrolment due to out-migration and declining birth rate, a rationalization of schools has occurred and will continue to occur.

8.3 Mitigation Measures

The Skills Task Force (Government of Newfoundland and Labrador, March 2007) has identified several issues respecting the provincial pool of skilled labour, noting that there are many workers in the province who have skills that could lead to certification in their field and provide employment; however, many do not proceed through the certification process. Reasons include not being able to secure sufficient work hours, the time and costs associated with further required skill development, access to additional training, difficulty in finding a mentor journeyman and the difficulty with writing the final certification exam. There are also other workers who may not have formal credentials but have ample experience to qualify for specific work.

There are a number of human resource strategies that NLRC can support and participate in to ensure the local labour pool has the required skills, certifications and/or other criteria, but they cannot be implemented by NLRC, alone. The unions, post-secondary educational institutions and government must work in partnership to coordinate a comprehensive strategy and execution plan.

NLRC will undertake specific mitigation measures to manage education and training needs. It will:

General:

- Prepare and implement a Project orientation training strategy to encourage and promote completion of secondary school. The strategy should include:
  - Attendance at local career fairs;
  - Supporting pre-employment training programs;
  - Development of a summer student employment program;
  - Providing post-secondary scholarships to outstanding high school students in the Study Area who demonstrate interest in trades for which a critical shortage exists;
  - Providing resource materials to primary and secondary high schools and libraries; and
  - Publicizing successful trades role models.
- Will work with post-secondary institutions and through other government programs to establish opportunities for supplemental educational opportunities, to boost Study Area literacy, based on project needs.

Secondary Schools:

- Continue with ongoing initiatives and school programs to encourage students at the secondary school level to pursue trade occupations for which a demand exists;
- Focus on encouraging women to pursue a trades occupation because, to date, they have been underemployed in the trades and they will represent the best new future source of job entrants in a market for which there is a strong skill shortage; and
- Continue to participate in school programs that encourage students to pursue occupations in required skilled trades.

Post-secondary Institutions:

- Provide post-secondary institutions as soon as possible with a list of required skills and certifications for both the construction and operation phases;
- Identify skill shortages and work with post-secondary institutions to ensure that programs are developed to address those shortages (e.g., process engineers, painters, equipment operators, operating engineers, insulators);
- Establish partnerships with post-secondary institutions to increase capacity, particularly in critical skills through offering of scholarships, apprenticeship training, co-op work-term experiences, corporate donations, graduate employment, and knowledge transfer and equipment donations;
- Work with CNA and private colleges to identify opportunities to leverage purchasing and training opportunities concurrently; and
- Work with post-secondary institutions on an ongoing basis to develop and implement an on- and off-site training plan in sufficient time for these institutions to meet the demand.

Apprenticeship Training:

- Work with government and unions to help identify strategies to streamline the process of certification;

- Work with unions and governments to establish strategies to support apprentices to obtain the number of work hours they need for the certification process;
- Work with unions to help individuals within post-secondary institutions to expedite certification through traditional apprenticeships, trade qualifiers, internships and direct entry;
- Work with unions to consider allowing journeypersons to mentor more than one apprentice;
- Consider providing in-house and/or mobile opportunities for apprentices to undertake mandatory skills development;
- Provide sufficient flexibility to workers that will enable them to take the necessary leaves to complete their skills training;
- Consider providing financial supports to employees that undertake training related to their occupational and work requirements;
- Work with other stakeholders to establish counselling, assistance and other strategies to better prepare workers for journeyperson exams; the goal should be to increase success rates on initial writing of same;
- Provide support for counselling for certification exams to apprentices prior to their writing;
- Work with unions to establish flexible work schedules and provide flexible leave allowances that will enable apprentices to complete their training to secure journeyman status;
- Consider options to help apprentices undertake additional training on or near site;
- Consider providing financial incentives to apprentices who complete their certification so as to minimize impact of reduced income associated with additional training required for their certification;
- Work with other stakeholders to identify strategies and opportunities to assist workers in obtaining the number of hours required for certification, including such strategies as permitting journeymen to supervise more than one apprentice; and
- Work with other stakeholders to consider a mechanism by which workers with appropriate skills can be assessed and their skills recognize.

Diversity:

- Develop strategies; including scholarships and awards in areas of math and science, to engage more women in skilled trades.
- Help to build community capacity by encouraging all members to continuous life-long education in order to take advantage of direct and indirect refinery–related work opportunities

On-site training:

- Work with CNA and private colleges to establish on-site training programs prior to and during the construction and operations phases.

- Work with post-secondary institutions and the provincial government to ensure ready access to basic training in literacy and numeric skills that will enable workers to increase their core capabilities; and
- Place experienced workers in leadership positions to ensure productivity and quality standards.

To help mitigate any potentially adverse effects of increased demands upon CNA and private colleges, NLRC will:

- Share Project labour needs with post-secondary institutions so that instructor recruitment may occur at the appropriate time;
- Consider partnerships with post-secondary training institutions to offer training spaces; and
- Offer scholarships and apprenticeships to students from Study Area communities so that they will be encouraged to enrol in post-secondary education and be a part of a skilled labour force, enhancing the effect in the region over the longer term.

To help mitigate any potentially adverse effects to early childhood education and childcare demands by workers, NLRC will:

- Maintain a family-friendly workplace in which allowances will be made for family emergencies; and
- Monitor the need for daycare as a direct result of the Project;
- Provide support to daycare centres servicing project personnel.

NLRC has no set plans to enhance the positive effect of increased primary, elementary and secondary school enrolment in the study area.

8.4 Residual Effects

Table 8.3 provides a summary of residual effects of workforce training.

8.4.1 Construction

A number of positive residual effects will occur as a result of the construction of the refinery due to NLRC's emphasis on supporting skills training related to the proposed project. These effects include:

- Helping to build community capacity by responding to demand for increased training;
- Actively helping a future workforce to understand how to prepare for participation in a large industrial unionized job site;
- Contributing to the enhancement of the province's overall competitiveness to attract new projects by actively participating in initiatives to train a future workforce; and
- Encouraging women to become engaged in skilled trades occupations.

As a result of this Project and the mitigation measures that will be put in place, the effect on education and training will be positive and the magnitude will be high because of the increased training capacity within the province and the increased trained workforce with “in-demand” skills. The geographic extent will be regionally specific as the Employment Catchment Area is the primary focus for increased training effort followed by the province. The duration will be long-term in that training does not disappear once provided to an individual. The frequency will be intermittent as long-term training programs will be required prior to construction and short-term scheduled training programs will be required during construction to meet a particular situation.

Table 8.3 Workforce Training

Social Services VEC	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Level of Confidence	Certainty	Mitigation Or Enhancement Success	Significance
Education and Training (Preschool) (Construction)	Adverse	Low	Regional	Short-Term	Continuous	Yes	High	High	Moderate	Moderate
Education and Training (Preschool) (Operations)	Adverse	Medium	Regional	Short-Term	Continuous	Yes	High	High	Moderate	Moderate
Education and Training (Primary School) (Construction)	Neutral	Low	Regional	Medium-Term	Continuous	NA	High	High	NA	Moderate
Education and Training (Primary School) (Operations)	Positive	Medium	Regional	Long-Term	Continuous	NA	High	High	NA	Moderate
Education and Training (Post-Secondary) (Construction)	Positive	High	Regional-Provincial	Short-Term	Intermittent	Yes	High	High	Moderate	Moderate
Education and Training (Post-Secondary) (Operations)	Positive	Low	Regional-Provincial	Short-Term	Intermittent	Yes	High	High	Moderate	Moderate

Reversibility is not desirable and, therefore, is not assessed. Level of confidence in the need and type of training is high since a thorough skills gap assessment has been undertaken. The certainty that a skills gap will occur has a high probability, based on the province's skills gap assessment, extensive discussions with the unions and well-documented labour shortages throughout Atlantic Canada and Canada in general. Enhancement measures can be highly successful if the post-secondary institutions, the unions and the Project rise to the challenge of meeting the demand for certificated training. The significance of having a trained workforce is high in that a significant portion of our upcoming workforce will be able to meet the serious training challenges facing this province in particular and Canada in general.

8.4.2 Construction

A number of positive residual effects will occur as a result of the construction of the refinery due to NLRC's emphasis on supporting skills training related to the proposed project. These effects include:

- Helping to build community capacity by responding to demand for increased training;
- Actively helping a future workforce to understand how to prepare for participation in a large industrial unionized job site;
- Contributing to the enhancement of the province's overall competitiveness to attract new projects by actively participating in initiatives to train a future workforce; and
- Encouraging women to become engaged in skilled trades occupations.

As a result of this Project and the mitigation measures that will be put in place, the effect on education and training will be positive and the magnitude will be high because of the increased training capacity within the province and the increased trained workforce with "in-demand" skills. The geographic extent will be regionally specific as the Employment Catchment Area is the primary focus for increased training effort followed by the province. The duration will be long-term in that training does not disappear once provided to an individual. The frequency will be intermittent as long-term training programs will be required prior to construction and short-term scheduled training programs will be required during construction to meet a particular situation. Reversibility is not desirable and, therefore, is not assessed. Level of confidence in the need and type of training is high since a thorough skills gap assessment has been undertaken. The certainty that a skills gap will occur has a high probability, based on the province's skills gap assessment, extensive discussions with the unions and well-documented labour shortages throughout Atlantic Canada and Canada in general. Enhancement measures can be highly successful if the post-secondary institutions, the unions and the Project rise to the challenge of meeting the demand for certificated training. The significance of having a trained workforce is high in that a significant portion of our upcoming workforce will be able to meet the serious training challenges facing this province in particular and Canada in general.

During construction there could be some effect on early childhood education if women in trades become involved in the Project. The geographic extent of the effect will be on regional daycares, and the duration will be short-term. Frequency of the effect will be continuous (within this short-term) since workers will be mainly full-time employees. The effect is reversible once additional daycare spaces are established. The level of confidence in this assessment is high, with high certainty of probability. Mitigation success will be moderately effective, particularly if, through monitoring, some financial support for daycare is provided by the company where acute need exists. The significance of the effect is moderate.

The residual effect of the Project on primary schools is neutral since few families will relocate to the Employment Catchment Area. The effect is low; the geographic extent is regional, and medium-term in duration. Frequency of the effect is continuous. Reversibility of this positive effect is not desired and not assessed. The level of confidence in this assessment is high and certainty is also high. Since no enhancements to this effect are proposed at this time, it cannot be assessed. Significance of the effect is moderate.

It is anticipated that the effect to post-secondary schools could be adverse and high in magnitude in the short-term until capacity issues have been resolved and then return to a stable condition once more space and instructors are secured to meet the new demands. The geographic extent of the effect will be regional and provincial. Frequency will be intermittent until capacity issues are resolved and the effect is reversible. The level of confidence in this assessment is high, with high certainty of occurrence. Mitigation success is moderate, as is overall significance of the effect.

8.4.3 Operations

A number of positive residual effects will occur as a result of concentration on upgrading training and skills related to the proposed project. These effects include:

- Contributing to the enhancement of the province's overall competitiveness to attract new projects by actively participating in initiatives to train a future workforce;
- Encouraging women to become engaged in skilled trades occupations; and
- Providing additional technical training/transfer expertise that positions the employees to compete worldwide, through commitment to:
    - Core health, safety, environment and social responsibilities;
    - State-of-the-art technical expertise;
    - ISO 9001, 2000-compliant standards; and
    - Engineers and technicians who learn to operate and maintain complex equipment.

As a result of this Project and the mitigation measures that will be put in place, the effect on education and training will be positive and the magnitude will be high because of the increased training capacity within the province and the increased trained workforce with "in-demand" skills.

The geographic extent will be regionally specific as the Employment Catchment Area is the primary focus for increased training effort, followed by the province. The duration will be long-term in that training will be required throughout the life of the project because such a large workforce results in many people retiring or moving to other jobs. The frequency will be both continuous and intermittent as training programs will need to be ongoing to supply such a large project, but short-term training could occur intermittently during any given year to meet a particular situation. Reversibility is not desired and, therefore, is not assessed. Level of confidence in the need and type of training is high. The certainty that a skills gap will occur is a high probability based on the province's skills gap assessment, information provided by the unions and well-documented labour shortages throughout Atlantic Canada and Canada in general. Enhancement measures can be highly successful if post-secondary institutions, unions and the Project rise to the challenge of meeting the demand for certificated training. The significance of having a trained workforce is high in that, if the training challenge is addressed, a significant portion of our upcoming workforce will be able to meet the serious challenges facing this province in particular and Canada in general.

The effect of the Project on childcare/early childhood education during operations is considered adverse since demand could outstrip supply in the short-term, especially if two parents become employed directly or indirectly as a result of the Project, and medium in magnitude. The geographic extent of the effect will be on regional daycares, and the duration will be short-term. Frequency of the effect will be continuous (within this short-term) since workers will be mainly full-time employees. The effect is reversible once additional daycare spaces are established. The level of confidence in this assessment is high, with high certainty of probability. Mitigation success will be moderately effective, particularly if, through monitoring, some daycare support is provided by the company in critical situations. The significance of the effect is moderate.

The residual effect of the Project on primary, elementary and secondary schools is positive since it reduces the need for school closures through increased enrolments in home communities. The effect is medium in magnitude, since some new families might relocate to the region, some of whom will have school-aged children. The geographic extent of the effect is regional, and long-term in duration. Frequency of the effect is continuous. Reversibility of this positive effect is not desired and not assessed. The level of confidence in this assessment is high and certainty is also high. Since no enhancements to this effect are proposed at this time, it cannot be assessed. Significance of the effect is moderate.

It is anticipated that the effect on post-secondary schools will be positive and low in magnitude in the short-term, until capacity issues have been resolved, and then will return to a stable condition once more space and instructors are secured, particularly at CNA and private colleges, to meet the new demands. The geographic extent of the effect will be regional and provincial. Frequency will be intermittent until capacity issues are resolved and the effect is reversible. The level of confidence in this assessment is high, with high certainty of occurrence. Mitigation success is moderate as is overall significance of the effect.

9.0 LAND USE AND MUNICIPAL PLANNING

9.1 Existing Environment

Historic resource assessment, anecdotal information and observations by field crews doing a range of surveys at the Southern Head site indicate that there has been, both historically and in recent times, limited use of the proposed refinery ”footprint” area.

At present there is no road access onto Southern Head peninsula. The peninsula is accessible by boat with occasional areas for easy landing by small boats. A few trails lead into the interior of the peninsula, such as that in the vicinity of Watson’s Brook, a salmon river. The only structure on the peninsula (recent or historic) is an old cabin at the mouth of the brook.

While the islands of Placentia Bay are not within the immediate Study Area, their renewed and increasing, for recreation and in relation to the commercial fisheries, is of interest.

The section describes traditional and current uses of Southern Head and the nearby area, including the role of municipal planning.

9.1.1 Crown Land

The bulk of the Study Area is sparsely populated Crown land with communities located almost exclusively along the coastline and highway systems.

Use of Crown land is regulated by the Department of Environment and Conservation under the authority of The Lands Act (1991). The Department “. . . makes land available for industry, settlement, recreational and conservation needs in an environmentally safe manner compatible with adjoining land uses . . . ” and processes approximately 3,000 land tenure applications per year (Department of Environment and Conservation, Lands Division, Government of Newfoundland and Labrador).

During the feasibility study and environmental assessment phases in support of the Project, the Crown lands in the area were frozen to allow for the assessment process to provide the necessary consideration of the proposed use.

9.1.2 Protected Areas

There are a few provincially protected areas including three provincial park reserves: Bellevue Beach (on the Isthmus of Avalon, near Bellevue); Fitzgerald’s Pond (near Dunville); and Jack’s Pond (near Arnold’s Cove). These park reserves protect places with significant natural features and have no day use or camping facilities.

Cape St. Mary's, one of six seabird ecological reserves protected by the Newfoundland and Labrador Parks and Natural Areas Division, was established as a reserve in 1983. Located on the southeast corner of Placentia Bay, it is one of the largest and most accessible seabird reserves in the world, being home to 24,000 northern gannet, 20,000 black-legged kittiwake, 20,000 common murre and 2,000 thick-billed murre during breeding season. Other birds nesting at Cape St. Mary's include: more than 100 pairs of razorbill, more than 60 pairs of black guillemot, plus double-crested and great cormorant, and northern fulmar.

Cape St. Mary's is located within the Eastern Hyper-oceanic Barrens eco-region, which is one of the world's most southerly expanses of sub-Arctic tundra. There are few trees; the landscape, consists mostly of mosses, lichens, alpine wildflowers and low-growing shrubs (Department of Environment and Conservation, Government of Newfoundland and Labrador).

The provincial Bay du Nord Wilderness Reserve is located northwest of Placentia Bay. Entrance to the reserve is managed by the provincial government with commercial operator, educational tour or scientific research permits. There are no facilities, amenities, trail markers or public buildings. The Reserve provides excellent opportunities for kayaking, wilderness camping, hunting, fishing, and wildlife observation. It is home to the 15,000-member Middle Range Caribou herd and is the largest Canada goose habitat in the Province.

Gooseberry Cove is one of six Natural and Scenic Attractions protected by the Department of Environment and Conservation in the province. These attractions protect areas with significant natural features and/or with special high quality scenic attributes. They are located close to highways on scenic routes, so as to offer the travelling public a place to rest and provide day use access. Gooseberry Cove, located south of Placentia in Placentia Bay, is an attractive sandy beach with a grassy area ideal for picnicking. High wave activity restricts swimming; however, picnic sites and pit toilets are available (Department. of Environment and Conservation, Government of Newfoundland and Labrador).

9.1.3 Forestry

The land of the Isthmus of Avalon, including the Study Area, is classified as part of the Maritime Barrens Ecoregion, Southeastern Barrens Subregion. Vegetation generally consists of somewhat stunted, almost pure stands of Balsam Fir. Good forest growth is localized in a few protected valleys. There are also good stands of yellow birch (Department of Natural Resources, 2007).

All timber in the Study Area is Crown-owned, except for an area south of Southern Harbour that is leased by Abitibi-Price. The Department of Natural Resources defines a "productive" forest as one that produces at least 35 cubic metres per hectare (m^3/ha) at rotation. In the Study Area no productive forests have been identified; the nearest is a small location west of Swift Current (Department of Natural Resources, 2007).

9.1.4 Agriculture

With a growing interest in agriculture and an increase in the number of older people in the province – including the Isthmus area – there is increasing interest in growing flowers and vegetables as well as raising livestock on a small commercial and hobby basis.

One of the largest fox farms in North America is located in North Harbour. This farm consists of three fox units that combined have 450 breeder females and 100 males. There are plans to double operations at the farms over the next five years (M. Wiseman, pers. comm.).

Several other fur and sheep farms are located near Cape St. Mary's. Other farms are located within Zone 18 (east side of Placentia Bay) including dairy, sheep, beef, medicinal root, root, hay and crop, greenhouse-floral, fox, cattle, emu, ostrich and Christmas tree. Sheep farming represents 43.2 percent of the farming activity within Zone 18 (Avalon Gateway Regional Economic Development Inc., 2006).

Some distance from Placentia Bay, but within the Employment Catchment Area, Markland is one of the primary agriculture areas in this province (Cormack and Lethbridge are two of the others) established for ex-servicemen and other interested parties during Commission of Government in the 1930s. The area has a number of farms, including some involved in experimental crops. The well-known Rodrigues Winery, located in the former Markland Hospital, produces more than 300,000 cases of berry-based wine a year for sale in provincial, Canadian and international markets.

9.1.5 Quarries

The Newfoundland and Labrador Department of Natural Resources maintains a database of quarry permits issued throughout the province. Their database, updated in March 2007, listed 68 quarry permits issued in the Study Area for 2007. In 2005, these quarries produced 138,258 cubic metres and 123,646 cubic metres in 2006 (F. Kirby, pers. comm.). Production is often in response to local contracts such as highway maintenance and therefore varies from year to year (F. Kirby, pers. comm).

9.1.6 Tourism and Recreation

Overview

The top priority influencers in attracting visitors to this province are regional and provincial packages; tours and key natural attractions; and selected ecological reserves, including Cape St. Mary's Ecological Reserve, where the third largest nesting colony of gannets in North America is located.

The Cape Shore drive from Argentia to Cape St. Mary's is rated as a tier-two destination area (i.e. it has some, though not sufficient critical mass, of anchor attractions, secondary attractions

and/or service, but has the potential to rate well on the criteria if some identifiable and feasible things can be done to enhance their rating; it is considered a priority themed touring route (Department of Tourism, 2004). Argentia/Placentia has been designated as a service centre/hub and gateway and is rated as a two-star attraction by the Michelin guide, (i.e., "worth a detour").

For the most part, the Isthmus of Avalon is considered a drive-through tourism area, although it offers a number of individual short-term attractions and recreational opportunities to both visitors and residents – including Sunnyside's hiking trail, Lookout Point and Museum, Arnold's Cove Look Out Point, walking trail, Big Pond Bird Sanctuary and a privately owned park, Putt and Paddle Park located 3 kms outside the community. Piper's Hole River Park, located near Swift Current, is a privately operated recreation area and the four-star Kilmory Resort is located in Swift Current. Woody Island Resort is a popular Placentia Bay destination and two CCG approved tour boats operate out of Garden Cove. Clarenville is a service hub and gateway to the increasingly popular tourism destination of the Bonavista Peninsula. Winter recreation is focused on the White Hills ski resort just west of Clarenville, as well as the numerous cross-country trails and skidoo trails in the vicinity of Clarenville.

The Burin Peninsula is well known for its scenic beauty and cultural attractions. Visitors can enjoy whale and bird watching as well as many lighthouses and museums. Tourists come to this area for the scenic beauty and cultural significance. There is no one large tourist attraction in the area, but many smaller interest pieces. The tip of the Burin Peninsula is also the ferry access point to Saint Pierre et Miquelon, the last French colony in North America.

Outdoor Activities

The greater Placentia Bay area is of interest to both tourists and residents alike for recreational opportunities including pleasure cruising, sea kayaking, cruising/remote island stay experiences, bird watching, national historic sites and provincial parks.

Large game (moose and caribou) hunting is a popular activity in the Study Area. Licences are issued by a draw, with efforts taken to ensure hunters receive licences near their community of residence (Jacques Whitford Ltd., 2007). Hunting takes place annually from September to December, with licences usually issued for one animal kill.

The Study Area consists of these Moose Management Areas: 28 (Black River), 30 (Burin Pen. Knee), 31 (Placentia), 38 (Burin Pen. Foot), 44 (Bellevue), and 47 (Random Island). During the 2006 hunting season 1,530 licenses were issued for moose, which was 70 licences fewer than in the previous year. The Caribou Management Areas within the Study Area are areas 70 (Merasheen Island) and 64 (Middle Ridge). Areas 73 (Burin Knee) and 74 (Burin Foot) were closed for the 2006 season. Area 64 is quite large, extending west from Clarenville to Gander and South to Harbour Breton with only a small portion of the Study Area under its jurisdiction. In Area 64, there were 1,100 licenses issued in 2006, a decrease of 100 licences from the

previous year. In area 70, there were 25 licences issued, the same as in the previous year (Newfoundland and Labrador Hunting and Trapping Guide, 2006)

Salmon fishing in the province is managed by the federal Department of Fisheries and Oceans and is a popular pastime for many people. In 2004, more than 15,500 salmon licences were sold in the province, with licence holders being able to fish on all rivers in Newfoundland and Labrador (Jacques Whitford, 2007). Three salmon rivers are located on Southern Head: Watson's Brook, Come By Chance River and North Harbour River. Table 9.1 shows the river, the reported rod days for each river and the total catch for years 2005 and 2006.

Table 9.1 Salmon Fishing Activity on Southern Head, 2005 and 2006

River	Rod Days		Total Catch	
	2005	2006	2005	2006
Watson's Brook	5	0	0	0
Come By Chance River	423	187	123	29
North Harbour River	375	147	18	18
Total	803	334	141	47

Source:
Department of Fisheries and Oceans, 2007

There is little to no activity on Watson's Brook as it is difficult to access and traditionally yields low catches. Reported rod days[15] on the Come By Chance and North Harbour Rivers decreased in 2006. Recent decreases in angling activity are attributed to increased regulations and fewer people wishing to participate (J. McCarthy, pers. comm.).

There is no licensing required to fish trout in Newfoundland and Labrador. The province has one of the highest resident participation rates for the activity in Canada (Jacques Whitford Limited, 2007).

Trapping in the province is regulated by the Department of Environment and Conservation. Following successful completion of a trapper education course offered by the Newfoundland and Labrador Trappers Association, any resident can apply to the province's Wildlife Division for a beaver trapline licence or a general trapper's licence. On the Island of Newfoundland, beaver can be trapped only within a specific registered trapline area. A general trapper's licence allows the licence holder to trap all other furbearing species anywhere in the province, subject to season dates and any existing trapping regulations.

There are 4,000 persons trained and eligible to trap in the province. Of that number 2,500 obtain a licence in any given year. There are 600 beaver trappers holding registered traplines on the

[15] Reported rod days are from voluntary angler reporting. Many do not report, so these are minimum numbers.

Island of Newfoundland. On the Burin Peninsula north to Clarenville there are currently 44 beaver traplines. From Come By Chance south down the western portion of the Avalon Peninsula to Cape St Mary's there are a further 18 beaver traplines. The number of general trappers in the Study Area is unknown.

During the 2006-07 hunting season the lynx harvest in the Study Area (Avalon and Burin Peninsulas) was closed because of a naturally occurring low point in their population cycle. This harvest season will re-open when populations rebound in response to naturally occurring increases in the snowshoe hare population, usually within two to three years. The shoreline area around Big Pond near Arnold's Cove is closed to shooting, snaring and trapping as part of a waterfowl and recreational area (J. Sharpe, pers. comm.).

Several trailer and private parks exist in the Study Area including Putt-N-Paddle near Arnold's Cove, Golden Sands Trailer Park at Marystown and the Bellevue Beach Trailer Park at Bellevue Beach.

Municipal Sports Facilities

The Study Area has several sports fields and playgrounds are designated for public use. There are also three sports arenas and three swimming pools. Placentia's Unity PARC Arena is a multi-purpose sports centre offering hockey, skating and curling facilities to the surrounding area. In Marystown, the Ville Marie Swimming Pool offers swimming lessons and recreational swimming from May to September. The Marystown Arena is a multi-purpose year-round facility offering hockey, figure skating, curling, and a host of community and fundraising events. The Clarenville Stadium offers hockey, figure skating, curling and many other community events. Plans are under way for the construction of a new multi-purpose sport facility in Clarenville to be completed by Fall 2008. Swimming pools are located in Clarenville and at the Bull Arm Fabrication site.

Hunting, Fishing, Berry Picking

During the consultations by NLRC, several residents from North Harbour indicated that they successfully hunt moose on Southern Head. The area has also been described as a good duck and geese hunting location and the North Harbour and Come By Chance river systems are known for their good salmon pools. During meetings in North Harbour, residents indicated that picking bakeapples and blueberries on Southern Head is a traditional activity. Hiking on Southern Head is focused on task-specific activities (hunting, fishing, berry picking, etc.) rather than experiential hiking (e.g., hiking for pure enjoyment of the scenery). A recreational boating club located in Come By Chance maintains a small-craft wharf.

The Islands in Upper Placentia Bay

The islands of Placentia Bay are home to more than 250 licensed cabins and many more unlicensed cabins (K. O'Driscoll, pers. comm.). Despite being resettled up to 40 years ago, the islands continue to be a hub of recreational and fishing activity during spring, summer and fall (K. Tulk, pers. comm.). The three most populated are Long Island, Woody Island and Merasheen Island. Approximately 65 cabins are located on Long Island, 70 on Woody Island and 50 on Merasheen Island (I. Eaton, K. Tulk and L. Pomeroy, pers. comm.).

During resettlement, the Government of Newfoundland and Labrador was to take ownership of the resettled land; however, in many cases this did not occur, resulting in much private land remaining in the hands of former island residents. This has inhibited government's ability to track cabin usage (K. Tulk, pers. comm.). Estimates from government and cabin owners place total cabins on the islands at about 400. This number does not include the western mainland side of the bay, which was also resettled; it is accessible only by boat and has many cabins (L. Pomeroy, pers. comm.).

On any summer day, upwards of 200 boats can be found cruising around the bay, stopping at any of its 365 islands. Most of the cabin owners live on the Avalon Peninsula and use, primarily, Swift Current as their starting point, and to a lesser degree, Arnold's Cove and Garden Cove (I. Eaton, pers. comm.). Many people who stay on the islands use their cabins and houses as a centre for recreation and also as part of the infrastructure for participating in commercial fishing activities.

9.1.7 Land Use and Municipal Planning

There are 279 incorporated municipalities and 180 local service districts representing approximately 96 percent of the population in the province. There are also 137 unincorporated communities (Department of Municipal Affairs Annual Report, 2003-04).

Rural and urban communities must comply with provisions stipulated in *The Rural and Urban Planning Act (2000)*, as administered by the Department of Municipal Affairs. Municipal councils are responsible for the preparation and implementation of municipal plans and associated development regulations.

Some municipalities in the Study Area, including: Arnold's Cove, Come By Chance, Southern Harbour, Clarenville, Marystown and Placentia, have prepared Municipal Plans to guide their development. Sunnyside is preparing a municipal plan. Newfoundland and Labrador does not have a rural county system, and so not all areas are bounded by municipal plans. This is the case for the remaining portions of the Study Area (E. Mitchell, pers. comm.).

Smaller communities such as Garden Cove and Little Harbour East are considered Local Service Districts and are not incorporated as municipalities. Local Service Districts do not have

the authority under the Municipalities Act to prepare municipal plans (C. Davis, pers. comm.) and therefore have limited authority to deliver basic services such as sewer, water and local road maintenance.

In the Study Area, all communities with municipal plans have made zoning provisions for future residential land uses. Some areas are serviced, making them more easily and quickly developed. Many of the older municipal plans make specific reference to availability of rural lands for temporary housing for the Hibernia labour force, which may be also applicable to other oil and gas developments in the region. Some municipal plans also designate areas for future industrial use.

The Town of Come By Chance has requested that the Minister of Municipal Affairs approve an expansion of their town boundaries to encompass the Project site at Southern Head. A decision on this request has not been made and requires further information from the Town, consultation with other provincial departments, a lengthy public process, and Cabinet approval. Whether or not the boundaries are expanded, it is typical that industry proponents negotiate tax agreements with neighbouring municipalities (E. Mitchell, pers. comm.). An amendment to the town's municipal plan is going through the formal review and consultation process to allow for the development of some of the proposed refinery infrastructure (access road and marine terminal).

Arnold's Cove, has no plan to revise the 1992 Municipal Plan; instead, it will be amended when necessary to accommodate changes to land use (W. Slade, pers. comm.). The town is considering an amendment to accommodate the LNG Transshipment Terminal. For this amendment, the land use will change from rural use to industrial zoning (C. Davis, pers. comm.).

9.1.8 Protected Road Zoning

In the case of some provincial highways, adjacent land use is regulated by the Department of Municipal Affairs through the Protected Road Zoning Regulations (1979).

The Protected Road Zoning Regulations identify eight urban and rural land use zones within a specified distance of the highway centre line. Distances vary depending on whether the road is within or outside of a municipal boundary. Distances regulated in areas outside a municipal boundary are 400 m from the highway centre line.

The regulations restrict sporadic development along the highway, restrict highway access, ensure that developments do not detract from roadside amenities; they control advertisement placement, prevent development that may pose health and safety hazards, ensure developments are located to provide assistance to travellers, ensure standards of construction and permit in the orderly and aesthetic development of the community and roadside services. They provide development standards for access roads, buildings, advertisements, construction standards, service stations and the like within the zones.

A highway must be designated a “protected” highway for these regulations to apply. In the Study Area, the Trans-Canada Highway and Highway 210 (Burin Peninsula Highway) are protected. In the general Study Area, the Burin Peninsula Highway is guided by a specific land use plan entitled: *The Burin Peninsula Highway Zoning Plan* (1990).

9.2 Project Effects

9.2.1 Protected Areas

There are no federal parks and only a few provincially protected park reserves in relatively close proximity to the Project site. Also within driving distance are Cape St. Mary’s Ecological Reserve and Gooseberry Cove day use area.

Potential effects from the Project would be overuse and overcrowding of protected areas by Project workers, particularly during the two-year construction period when there will be 3,000 workers in the area.

9.2.2 Forestry

There are no productive forest resources in the immediate vicinity of the project site.

Project specific effects to forestry resources are limited to clearing non-productive stands of wood from the project site and for access roadway construction.

9.2.3 Agriculture

The fox farm at North Harbour is the only significant agricultural operation in the Study Area.

There is concern with the effects of noise and light emissions and general disturbances associated with the project on the production and viability of the farm operation. These potential effects are most likely to be felt during construction, when there are more intense noise emissions, but also during operations when noise, light and air emissions may have an effect.

9.2.4 Quarries

The Newfoundland and Labrador Department of Natural Resources database listed 68 quarry permits for the Study Area in 2007. Production at these quarries is often in response to local contracts such as highway maintenance and therefore varies from year to year.

The Project will require aggregates during construction for roads and plant site development and maintenance. It is anticipated that all of the aggregate needed will be available on site. New borrow pits may be required for access road construction.

9.2.5 Tourism and Recreation

During construction the number of workers in the area has the potential to increase use of park and wilderness areas and indoor sports facilities. Positive effects include increased business for local wilderness outfitters, camp operators, owners of holiday accommodations and others employed in the tourism industry. The negative effect is that these areas are "loved to death" as increased use degrades the conditions of the parks and sports infrastructure, leading to increased tax and maintenance burdens on private and public park/recreation facility owners.

During the operations phase, these effects may also be felt but to a lesser extent. Public and private owners/operators of tourism businesses and recreation facilities will experience an increase in use, but since operations workers are more likely than construction workers to reside in the Study Area communities, they will also be contributing to the tax base. There will likely be a more sustained, less-intense use of privately owned/operated tourist and recreation facilities by workers, their families and visitors who will buoy up this sector of the economy over the long term. Increased family participation in local sports organizations can strengthen recreational teams and community leadership, both of which contribute to quality of life. Tourism opportunities will also arise as the refinery can become a tourist attraction in and of itself, and tourists may combine seeing the refinery with participation in cultural and recreational opportunities within the Study Area.

9.2.6 Traditional Use of Placentia Bay

Traditional resource use of Southern Head and other areas in upper Placentia Bay include hunting, camping, boating, and berry picking.

Access roads to the Project site on Southern Head is expected to increase accessibility to the area for traditional activities, but this could have a negative effect of providing access to more uses of these natural resources, which potentially leads to resource competition (many hunters vying for the same moose). In addition, the plant site will remove parts of Southern Head from traditional use and could detract from the aesthetics of the area. Depending on the perspectives of traditional users and locations of primary areas of use, this may deter or limit traditional uses or displace uses to other regions. The exact locations of traditional activities (berry patches, camping areas) and the intensity of use of Southern Head, in comparison with other traditional use areas is not known.

9.2.7 Land Use and Municipal Planning

Some of the communities in the Study Area have completed municipal plans that guide development of various land uses in the community. Similarly, development along highways in the Study Area including the Burin Highway (210) and the Trans-Canada Highway are guided by the Protected Roadway Regulations or Plans.

The proposed access road from the TCH and the area for the marine terminal fall within the municipal boundary of the Town of Come By Chance. The rest of the Southern Head area is Crown land. A marine terminal is not a use contemplated in the present Municipal Plan. The Town of Come By Chance is going through the required process to amend the Municipal Plan to be able to approve the marine terminal and the access road from the TCH. NLRC participated in the town's public consultation process.

9.3 Mitigation Measures

9.3.1 Protected Areas

To mitigate any potential adverse effects, Newfoundland and Labrador Refinery will:

- incorporate recreational facilities and park space in the work camp to limit visits to protected areas.

No day use or camping is allowed in park reserves. Access to the Wilderness Reserve is by permit only as issued by the Provincial Government and is therefore controlled. Visits to these sites from Project workers will likely occur, but protection of the sites from overcrowding and use is regulated by the Provincial Government.

9.3.2 Forestry

Once project road access routes are confirmed, Newfoundland and Labrador Refinery will mitigate any adverse effects by:

- Reviewing project clearing locations with the Department of Natural Resources to ensure there is no wastage of productive forest resources and that clearing occurs in timelines not harmful to wildlife (i.e., during bird nesting); and
- Discussing needs and interests in any wood salvage with the local communities and make arrangements to distribute as appropriate.

9.3.3 Agriculture

The Newfoundland and Labrador Refinery is committed to being a good neighbour and mitigating noise and air emissions from the Project. Newfoundland and Labrador Refinery will mitigate adverse effects by:

- Employing the best available technologies to reduce air and noise emissions;
- Facilitating communication about Project effects and mitigations amongst area stakeholders through formation and participation in a multi-stakeholder Air Quality committee;
- Encouraging participation in this committee by the owner/operator of the fox farm
- Consulting with the owner and other area stakeholders regarding air quality and noise effects; and

- Participating in the local Integrated Management Planning Committee to address local issues and concerns.

9.3.4 Quarries

The total local supply can meet Project demands for aggregates and helps to sustain this sector during the life of the Project. Newfoundland and Labrador Refinery is committed to using local goods and services when possible and will communicate their needs and tendering requirements to local suppliers following Project approvals.

9.3.5 Tourism and Recreation

During the construction phase, NLRC will do the following to decrease negative effects on tourism and recreation in the region:

- Provide information on environmental sensitivities and stewardship in the area; and
- Encourage use of recreation facilities offered at the work camp.

During the operations period, the overall, long-term effect is positive and NLRC has no plans to enhance this effect.

9.3.6 Traditional Use of Placentia Bay

Newfoundland and Labrador Refinery will mitigate adverse effects by:

- Discussing the importance of traditional uses with area residents and consider their suggested mitigation measures;
- Fencing off the plant site to ensure the safety of traditional users on Southern Head. Maintaining access roads to the plant site; and
- Not limiting traditional uses on Southern Head outside of the plant site
- Enhancing of Watson's Brook through fish habitat compensation and access to the area; and
- Increasing natural resource stewardship through support ot local stewardship groups, such as the newly formed Salmon Stewardship community group.

In addition, resource conservation measures and management efforts will continue to be implemented by the Provincial Government to address resource competition issues.

9.3.7 Land Use and Municipal Planning

Recognizing that all the communities within the Study Area will receive the benefits and adverse impacts of the project, the Company will work through the various committees (e.g. Placentia Bay Integrated Management Planning Committee) to ensure that the positive impacts are enhanced and the negative impacts are mitigated.

A particular concern noted in the EIS Guidelines is the potential for roadside camping during the construction phase, as was the case during previous major construction projects at Bull Arm. Municipalities can address this within their own boundaries. The potential for addressing this under the Protected Roadway Regulations will be reviewed as the project progresses.

9.4 Residual Effects

Table 9.2 provides a summary of the impact assessment of residual project effects on land use and municipal planning. Residual effects on natural resource use overall are neutral (forestry, protected areas and traditional use of upper Placentia Bay) either due to the project not overlapping with a particular use or in the case of traditional uses, due to the effectiveness of mitigation measures and the relatively small amount of land base removed from use. There is a potential for adverse residual effects to the fox farm, which will need to be monitored and further assessed. The residual effect to quarries and to municipal planning is positive since it will contribute to long-term activity and planning. The residual effects on tourism and recreation are also expected to be positive and of moderate significance.

9.4.1 Protected Areas

It is expected that residual Project effects are neutral, with negligible effects. The geographic extent is local, confined to protected areas, and short-term in duration (most visits could occur during construction when there is a higher number of workers and thus potential visitors). Frequency is intermittent, during summer and fall weekends or off-shift hours. The effect is reversible and the level of confidence in the rating is medium. The certainty of the effect is also medium and mitigation success is considered highly effective since management protocols are in place for protecting these areas. The significance of the effect is considered minor.

9.4.2 Forestry

The project effects on forestry are neutral in direction, negligible in magnitude, local in extent, of long-term in duration (no productive forests are there now, nor will there be in the longer term), rare in frequency, and reversible once the Project is decommissioned. The level of confidence and certainty of prediction is medium since no direct consultation with the Department of Natural Resources has occurred on this issue and the final roadway alignments have not been determined. Mitigation success is expected to be highly effective since forests re-generate following decommissioning.

Table 9.2: Summary of Residual Effects on Land Use and Municipal Planning

Natural Resource Use VSEC	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Level of Confidence	Certainty	Mitigation Or Enhancement Success	Significance
Forestry	Neutral	Low	Local	Long-term	Rare	Yes	Medium	Medium	Highly effective	Insignificant
Agriculture	Adverse	Low	Local	Long-term	Seasonal or intermittent	Yes	Medium	Medium	Moderately effective	Minor
Protected Areas	Neutral	Negligible	Local	Short-term	Intermittent	Yes	Medium	Medium	Highly effective	Minor
Traditional use of upper Placentia Bay	Neutral	Low-moderate	Local	Long-term	Seasonal or intermittent	Yes	Medium	Medium	Moderately effective	Minor
Quarries	Positive	High	Regional	Long-term	Continuous (construction) and Intermittent (operations)	NA or No	Medium	Medium	NA	Minor
Tourism & Recreation (Construction)	Adverse	Low	Local	Short-term	Intermittent	Yes	Medium	Medium	Moderate	Minor
Tourism & Recreation (Operations)	Positive	Low	Regional	Long-term	Continuous	NA	High	High	NA	Moderate
Municipal Planning	Positive	High	Local	Long-term	Continuous	NA	High	High	High	Significant

9.4.3 Agriculture

Once mitigation measures are incorporated, the residual effect of the Project still has the potential to be adverse, but is low in magnitude since residual effects will be communicated and mitigated. The geographic extent of the effect will be local at the fox farm, long-term since effects may be felt for the duration of the Project (although lessening with mitigation efforts over time). Frequency of the effects will be seasonal (or intermittent, since they will be most noticeable during breeding seasons) and reversible. The level of confidence in this assessment is medium since true effects will not be known until the Project is underway, with a medium probability of the effect occurring. Mitigation success is considered moderately effective since there is potential for fox farm effects, but with mitigation could result in no permanent impact. The significance of the effect is minor, since low-level effects may be distinguishable but are limited in geographic extent to only the fox farm rather than to many agricultural operations in the area.

9.4.4 Quarries

The residual Project specific effects on quarries is positive in direction and high in magnitude since Project demands will help sustain the sector over the next 30 years. Geographic extent is likely to be regional, and long-term in duration. Frequency of the effect will depend on the phases of the Project with continuous effects during construction and intermittent effects during operations. The effect is positive and therefore reversibility not assessed. However since aggregate resources are finite, their extraction is not reversible. The level of confidence in this rating is medium since there are no data indicating total supply of aggregate for the region or the province. Certainty of the effect is also medium. Mitigation success is not applicable to this situation, since the Project effect is positive to the sector and enhancements to the effect will be implemented. Significance of the effect is considered minor.

9.4.5 Tourism and Recreation

Construction

During the construction period there will be adverse residual effects on recreation and tourism through intense, short-term use. These effects are considered low in magnitude, local in geographic extent and short-term in duration. Frequency of the effect will be intermittent with various uses, and seasons. The effect is reversible following the construction period. The level of confidence in this rating is moderate and the probability of occurrence is also moderate. Mitigation success is moderate, and significance of the effect is considered minor.

Operations

During operations, there will be a positive residual effect with the increase in regional population providing long-term stability to recreation programs and the tourism industry. The effect is low

and regional, with long-term duration. Frequency of the effect is continuous over the life of the project. Reversibility was not assessed. The level of confidence in this rating is high, with high probability of occurrence. Enhancement measures are not being implemented and therefore not assessed. Significance of the effect is moderate.

9.4.6 Traditional Use of Placentia Bay

The Residual Project effect is considered neutral (adverse due to removal of a small area for uses, but positive due to increased access for use). The effect is considered low to moderate in magnitude, local, and long-term in duration. Frequency of the effect is seasonal during traditional harvesting periods and is reversible. The level of confidence in the assessment is medium, as is certainty of effect. Mitigation success is considered moderately effective and overall significance considered minor.

9.4.7 Land Use and Municipal Planning

The direction of the effect is positive and the magnitude is high as it will have a measurable and sustained effect. The geographic extent is local, duration is long term and frequency is continuous. In theory the effects are reversible as there is a requirement to decommission and rehabilitate the project site. The information is accurate and the need for an access road is firm, so there is a high level of probability. Mitigation through amendment of the Come By Chance Municipal Plan and ongoing communication between area communities and project can be considered highly effective. The effect is considered significant.

9.4.8 Residual Effects of Tourism and Recreation on Social Services

Table 9.3 presents the residual effects on Tourism and Recreation on social services VEC.

9.5 Monitoring and Follow-Up

9.5.1 Protected Areas

On-going consultation with Provincial government agencies regarding park use is recommended through participation in the Integrated Management Planning committee and through individual meetings with park officials.

9.5.2 Forestry

No monitoring is recommended for forestry resources in the immediate project area.

9.5.3 Agriculture

Monitoring air and noise emissions at the fox farm site is recommended to monitor changes in ambient levels due to the Project.

9.5.4 Quarries

Through the permitting process, the Proponent must report on the quarry usage on an annual basis and royalties paid on quantities used.

9.5.5 Tourism and Recreation

The NL Refinery will not actively monitor these effects, but rather respond to comments of concern regarding recreation and/or tourism issues as they arise.

9.5.6 Traditional Use of Placentia Bay

Consultation with traditional users in the area through on-going consultation activities will help to identify and determine appropriate mitigation measures for effects caused by the Project to traditional uses.

9.5.7 Land Use and Municipal Planning

NLRC will continue to maintain close communication with the councils and staff of neighbouring communities.

Table 9.3 Residual Effects on Tourism and Recreation

Social Services VEC	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Level of Confidence	Certainty	Mitigation Or Enhancement Success	Significance
Housing and Accommodation (Construction)	Positive	High	Local	Long-Term	Continuous	Yes	High	High	Moderate	Moderate
Housing and Accommodation (Operations)	Positive	High	Local	Long-Term	Continuous	Yes	High	High	Moderate	Moderate
Public Health and Acute Care Systems (Construction)	Adverse	Low	Regional	Short to Medium-Term	Continuous	Yes	Medium	Medium	Moderate	Moderate
Public Health and Acute Care Systems (Operations)	Adverse	Low	Regional	Short to Medium-Term	Continuous	Yes	Medium	Medium	Moderate	Moderate
Community and Family Social Services (Construction)	Adverse	Low	Regional	Short to Medium-Term	Continuous	Yes	Medium	Medium	Moderate	Moderate
Community and Family Social Services (Operations)	Neutral	Low	Regional	Short-Term	Continuous	Yes	Medium	Medium	High	Moderate
Education and Training (Preschool) (Construction)	Adverse	Low	Regional	Short-Term	Continuous	Yes	High	High	Moderate	Moderate
Education and Training (Preschool) (Operations)	Adverse	Medium	Regional	Short-Term	Continuous	Yes	High	High	Moderate	Moderate

10.0 PHYSICAL INFRASTRUCTURE

10.1 Existing Environment

10.1.1 Ground Transportation

Ground transportation infrastructure is focused on the highway system as no railway exists on the Island of Newfoundland. Route 1, the Trans-Canada Highway, is the main artery connecting the feeder roads to the communities on the Isthmus. The feeder roads connecting Garden Cove, North Harbour, Come By Chance, Sunnyside, Arnold's Cove, Southern Harbour, Little Harbour East and Clarenville are maintained by the Department of Transportation and Works. Each municipality is responsible for maintenance of its local roads. Goobies and Swift Current are located on Highway Route 210, which is maintained by the department. The department classifies roadways based on their function in a scale ranging from access to mobility, and separates roads along this scale based on differences in traffic service and land service, design features, and operational needs associated primarily with adjacent land use. Details on the department's maintenance program are included in the Socio-economic Component Study.

A grade-separated interchange is recommended in the provincial long-range plans for the Trans-Canada and Come By Chance highway access intersection. Traffic volumes resulting from the Project may accelerate the development schedule for interchange construction (G. Gosse, pers. comm.).

Average annual daily traffic counts are provided in Table 10.1 and increased approximately 2 percent per year in the period between 2004 and 2006. This increase is based on annual increases in registered vehicles (J. Morrissey, pers. comm.).

Table 10.1 Average Annual Daily Traffic Counts

Highway	Average Annual Daily Traffic Counts†	
	2004	2006*
Route 100, Argentia Access Road (exiting toward Dunville/Placentia)	1,619	1,684
Route 100, Argentia Access Road (on TCH at intersection)	12,435	12,932
Southern Harbour Access Road (to S. Harbour)	674	701
Southern Harbour Access Road (on TCH†† at intersection)	10,695	11,123
TCH at Arnold's Cove (to Arnold's Cove)	2,084	2,167
Trans-Canada Highway at Arnold's Cove (on TCH at intersection)	11,167	11,614
TCH at Sunnyside and Come By Chance Roads (on TCH)	10,030	10,431
TCH at Sunnyside and Come By	1,329	1,382

Highway	Average Annual Daily Traffic Counts†	
	2004	2006*
Chance Roads (on access roads)		
Route 210 Burin Peninsula Highway (on TCH)	11,061	11,503
Route 210 Burin Peninsula Highway (to Goobies)	1,855	1,929
TCH at 230A Manitoba Drive (Clarenville) on TCH	6,168	6,415
TCH at 230A Manitoba Drive (Clarenville) access to Clarenville	3,299	3,431

Notes:
*Estimated traffic counts based on 2% annual increase (J. Morrissey, pers. comm. and Jacques Whitford, 2007)
† Total manual count
†† Trans-Canada Highway
Source:
Newfoundland and Labrador Department of Transportation and Works

Several hiking, all-terrain vehicle and snowmobile trail systems are located in the Study Area. The Newfoundland Trailway runs along the old railway route and is the only “long distance” trail in the Study Area. Most other communities have shorter walking trails, geared toward tourism and local recreational uses.

DRL Coachlines operates a daily bus service along the entire Trans-Canada Highway on the Island of Newfoundland from St. John’s to Port-aux-Basques, with scheduled stops at Whitbourne, Goobies and Clarenville. Other private transportation companies that serve the Isthmus include Marsh’s Taxi, which operates between St. John’s and Bonavista, with stops in Whitbourne and Clarenville, and Newhook’s Taxi, operating between St. John’s and Placentia (and Argentia in the summer when the interprovincial ferry is running), makes a stop in Whitbourne. Riverside Taxi in Arnold’s Cove transports crews from oil tankers docked at Whiffen Head terminal. Two taxi companies operate in Clarenville with a combined total of eight or nine cars. No public transit services are offered in the Study Area.

Several couriers based in St. John’s deliver to the Study Area. Larger national/international companies such as Purolator, UPS, Fedex, Dynamex and Sameday have a presence throughout the province and deliver internationally. From the Study Area, packages can be sent via these couriers or by using local bus and taxi companies.

10.1.2 Marine Transportation

Within Placentia Bay there are several major harbours capable of accommodating large ocean-going vessels such as oil tankers, ferries, cruise ships, container and bulk carriers, general cargo vessels, Canadian Coast Guard (CCG) boats, and naval and fishing vessels. The main ports are Come by Chance, Argentia, Burin, Cow Head, Marystown and Whiffen Head. There are also 44 small-craft harbours, two of which are maintained by Transport Canada, and the rest by the federal Department of Fisheries and Oceans (DFO). Small craft harbours are operated in

Arnold's Cove, Little Harbour East, Garden Cove, Marystown (Little Bay), North Harbour, Placentia and Southern Harbour (www.smartbay.ca; accessed April 9, 2007). Larger vessels use the eastern channel of Placentia Bay to travel to and from Come By Chance and Whiffen Head.

In some Placentia Bay ports (i.e., Come By Chance and Whiffen Head), pilotage is required and all tankers or vessels must pay a fee for the service. The service is provided by the Atlantic Pilotage Authority (APA), and employs two pilot vessels and eight harbour pilots. A "Pilot Boarding Station" (PBS) is located at Red Island, where vessels carrying oil must be boarded by the pilots and then accompanied into port. Additionally, at Come By Chance and Whiffen Head, the two mandatory ports, purpose-built tugs help oil tankers discharge or load product. The CCG is responsible for vessel traffic management in Placentia Bay and has a Marine Communications and Traffic Services facility in Argentia that maintains a voluntary traffic management system.

Due to its importance in the oil and gas and fisheries/aquaculture industries and associated increases in vessel traffic, APA and CCG have increased their services In Placentia Bay over the past few years. In 2001, for example, monitored vessel traffic in the area totalled 6,906, and by 2003 the count had increased to 9,009. Oil tanker traffic increased by 136 per cent during this period, from 570 to 1,345 movements (S. Canning, pers. comm.). Table 10.2 provides volumes and types of marine vessel traffic in Placentia Bay from April 2004 to March 2005.

Table 10.2 Placentia Bay Vessel Movements (April 2004 to March 2005)

Vessel Type	Inbound	Outbound	Transit	In-Zone	Out-Zone	Total
Tanker <50,000 DWT	133	141	24	66	0	364
Tanker >50,000 DWT	352	355	12	193	0	912
Chemical Tanker	27	20	6	9	0	62
General Cargo	28	30	32	14	0	104
Bulk Cargo	6	6	14	0	0	26
Container	52	52	268	19	1	392
Tug	11	11	8	2,016	0	2,046
Tug with Tow	14	13	10	2	0	39
Government	46	48	18	119	0	231
Fishing	128	131	5	29	0	293
Passenger	2	1	5	0	0	8
Other (recreation and fishing vessels >20m)	3	2	5	1,286	0	1,296
Vessels < 20m	0	16	18	978	0	1,012
Sub-total Movements	802	826	425	4,731	1	6,785
Ferry	39	42	9	1,411	0	1,501
Total Movements	841	868	434	6,142	1	8,286

Notes:
Vessel movements are categorized as follows:
Inbound: A vessel entering the Vessel Traffic Services (VTS) Zone
Outbound: A vessel leaving the VTS Zone

Transit: No arrival or departure port within the zone
In-Zone: A vessel movement that begins and ends within the VTS Zone (within Placentia Bay)
Out-Zone: A vessel participating in VTS but which is not within the VTS Zone of responsibility
Source:
Transport Canada, 2006 – Public Consultation for Transport Canada oil spill risk assessment South Coast

Marine Atlantic, a federal Crown Corporation, operates a ferry service between the Island of Newfoundland and Nova Scotia. The two Newfoundland terminals are located in Port-aux-Basques and Argentia, the latter located near the site of the former Argentia Naval Base. Service is provided three days per week between Argentia and North Sydney, Nova Scotia, from mid-June to late September each year. At its peak, Marine Atlantic employs about 1,200 people at its three terminals (Argentia, Port-aux-asques and North Sydney). The ferry takes approximately 14 hours to travel between Argentia and North Sydney (Marine Atlantic, 2006). There were 80 crossings of this route in each of 2005 and 2006, although the number of passenger vehicles decreased in this period by 3.9 per cent (Newfoundland and Labrador Department of Tourism, Culture and Recreation, 2007 in Jacques Whitford, 2007).

Provincial ferry service in Placentia Bay is offered from South East Bight to Petite Forte, on the west side of the bay. The ferry operates six days a week (Tuesday being the layday) year-round and has 2 to 4 departures per day (Department of Transportation and Works, 2007).

10.1.3 Air Transportation

There are no airports in the Study Area; however, two privately owned airstrips operate in Clarenville and Winterland to service private aircraft and less often, medical planes and firefighting water bombers (D. Shea, pers. comm.).

St. John's International Airport is closest to the Study Area Most non-resident visitors (80 per cent) to the province enter through the airport and passenger volumes have increased 35 percent from 2002 to 2005. The St. John's International Airport Authority, which manages the airport, predicts a further 20 per cent increase in passenger traffic in the next five years (St. John's International Airport, 2005 in Jacques Whitford, 2007). The passenger terminal was upgraded in 2003 and the Cougar Heliport Terminal was completed in 1997. Two cargo terminals, one for Air Canada and the second for general aviation, are located on-site. The airport has a capital projects plan that will spend $36.5 million in upgrades to airport infrastructure and facilities between 2006 and 2007, with $20 million of the total to be spent in 2007. Carriers using the airport include Air Canada, Air Canada Jazz, WestJet, Provincial Airlines, Air Labrador, Continental, Air Saint-Pierre, Astraeus Airlines, Sun Wing and Air Transat (J. Bennett, pers. comm.).

10.1.4 Public Utilities

Waste Management Systems

Communities in the Study Area use waste management sites located in North Harbour, Sunnyside, Southern Harbour, Chance Cove, Clarenville, Marystown and Placentia. Table 10.3 lists waste management facilities used in the Study Area and their capacities, if available.

Table 10.3 Waste Management in the Study Area

Waste Management site	Community Served	Capacity	Notes/Other
Southern Harbour	Arnold's Cove Southern Harbour	NA*	Town uses a 33-tonne compacter and makes two trips per week
Clarenville	Clarenville	–10-year life span at a 10,000 cubic metres/year	Traditional style dump, could expand if approved by the provincial government
Sunnyside	Come By Chance Sunnyside	NA*	
North Harbour	Garden Cove Goobies Swift Current North Harbour	NA*	– Dump will close in the near future with waste being diverted to St. John's
Marystown	Marystown	Limited (without burning the site will soon be full) Future capacity of the regional waste management site has yet to be determined	– Burn when permitted to burn and bury during non-burning seasons.
Placentia	Placentia	NA*	-

Notes:

*All waste management landfill sites serving the Study Area communities are not lined, and therefore could be expanded if needed. The Government of Newfoundland and Labrador has committed to ending all burning of garbage on the Avalon by 2007, and implementing an Avalon waste management initiative, which would see all garbage in the study area diverted to St. John's (C. Riggs, 2007 pers. comm.).

Source:

Community Leaders, pers. comm.; C. Riggs, pers. comm.

No disposal sites for hazardous waste exist in Newfoundland and Labrador (D. Maddox, pers. comm.).

Within the province, there are 38 green depots, of which three are in the Study Area. The green depots in Clarenville, Dunville and Marystown are privately run businesses that generate revenue through collection, sorting and shipment of recyclable beverage containers.

No wastewater treatment exists in the Study Area, as is the case for 80 percent of Newfoundland and Labrador communities. As is typical in coastal communities, sewer pipe systems drain directly into the habours and the bay (C. Riggs, pers. comm., 2007). The

exception is Goobies, where residents use private septic systems (W. Goobie, pers. comm.). The cost for connection to a sewage system varies by community; in Arnold's Cove it is $48/year for residences and businesses.

There is no waste treatment in the Study Area. All sewer systems in the area are aged and will soon have to be upgraded (C. Riggs, pers. comm.) One exception is the reed-bed engineered wetland sewage treatment pilot project in Marystown. This project has 30 homes participating in using plants to treat sewage (P. Power, pers. comm.).

Communities in the Study Area have begun to hold meetings regarding their waste management future. If an agreement can be reached among all Conception Bay communities, they will use Robin Hood Bay near St. John's as their landfill site. Communities on the east side of Placentia Bay are also beginning to hold discussions on a regional waste management system; however, they have yet to formalize any plans (Municipal Managers, pers. comm.).

Potable Water Systems

Most towns within the Study Area provide drinking water to residents. Homes and businesses in Come By Chance, Southern Harbour and Arnold's Cove are connected to their town's drinking water system, while Sunnyside is in the process of connecting all homes to its service, with about 75 percent completed to date. The rate charged for this service varies by community; in Arnold's Cove, for example, water for residential use is $144/year and for commercial use is $240/year. All communities believe they have sufficient supply for now and into the future.

The departments of Government Services and Health and Community Services jointly monitor water quality in public water supplies in the province. Regular sampling by environmental health officers occurs throughout the province. Boil water orders are issued when tests show higher than accepted levels of coliforms (bacteria) or if there are deficiencies in chlorination. Table 10.4 shows in which Study Area communities boil water orders have been issued.

Table 10.4 Incidences of Boil Water Orders in Study Area

Community	Date of Boil Water Order Issue	Reason
Little Harbour East	January 1996	No chlorination
Harbour Mile; Little Harbour East	November 2003	No disinfection system in water supply; coliforms detected and confirmed
North Harbour	June 2000 (Communal well)	No chlorination
	January 1996 (Grandfather's Pond)	No chlorination
Swift Current	April 1999 (Drilled well)	No chlorination
	April 1999 (Black Duck Pond)	No chlorination

Source: Department of Environment and Conservation, 2007

For communities on either side of Southern Head, Come By Chance and North Harbour, the water supply system varies. Come By Chance is in the process of developing a water treatment plant. The development plan includes allocations for future developments and water needs and

the plant will be completed in the near future. Water quality in North Harbour is poor. The town supply comes from two surface sites and one well site, and has been on a boil order for the last 10 years. There is no chlorine treatment in the community, resulting in continued boil orders (R. Goulding, pers. comm.). In summary, sufficient water exists for any development growth, but potable water is of questionable quality.

Electricity

All electricity in the Study Area is provided by Newfoundland Power. The electricity comes from hydro generation in Bay d'Espoir and, during peak consumption, from the Holyrood Generating Station. The only exception is the North Atlantic Refinery, which receives power from a direct feed from Newfoundland and Labrador Hydro through the Sunnyside substation (C. Costello, pers. comm.).

Newfoundland Power and Newfoundland and Labrador Hydro produce electrical power to respond to demand. Newfoundland and Labrador Hydro have committed to the Proponent that the required power will be available.

10.2 Project Effects

10.2.1 Ground Transportation

During construction, the Project could generate upwards of 1,500 additional commuters, which will increase annual average daily traffic counts on Highway 210 and the Trans-Canada Highway. This effect is increased since there will be a subsidy provided to commuters if they live within 100 km of the Project site. The intersection between the Trans-Canada Highway and Come By Chance/Sunnyside will also receive additional traffic because of people commuting from these communities. Access to the Project site from the Trans-Canada Highway will be from a new access road built approximately.75 km north of the current Come By Chance/Sunnyside interchange, so no additional effects on local roads within Come By Chance is anticipated other than by local commuters. Access to the Project site from Highway 210 will be approximately .5 km east of the access road to Goose Cove and North Harbour so no additional site traffic from the Burin Peninsula will occur on the Trans-Canada Highway. Increased traffic also has the potential to increase the number of traffic accidents which will, in-turn, increase demand for highway upgrades.

10.2.2 Marine Transportation

The Project has the potential to affect marine passenger and freight traffic through increasing the volume of marine vessels and movements within Placentia Bay. This has the potential for increased accidents, particularly during the summer season when passenger services between Newfoundland and Nova Scotia are operating.

10.2.3 Air Transportation

The Project will increase the number of passengers at the St. John's International Airport, in the short-term during construction when workers return to the province for work opportunities. A wide range of air passenger carriers and upgrades are planned at the airport in the next few years, so no effects are anticipated for air transportation infrastructure. Following construction, there may be a decrease in the amount of commuter passenger traffic through the airport as there is less need to travel out of province for employment.

10.2.4 Public Utilities

The Project requires water for various refining processes (cooling, process, boiler feed) and for firefighting. Project water needs will be met during construction by building settling ponds to collect rainwater (See Volume 2) and by trucking in potable water for drinking. During operations a desalinization plant will be built on-site, using waste heat from the refining process. Potable water may also be supplied by a separate treatment system built on-site to bring water to the higher standards required for drinking. The Project will therefore have no effect on existing municipal water supply systems.

The wasterwater produced by the Project will be treated by a wasterwater treatment plant to be built on-site, and discharges of treated wasterwater and storm water to Placentia Bay will be through a new pipe and outfall system. Wasterwater will be treated to regulatory required standards, which includes secondary, and in some cases, tertiary treatment methods. The Project will have no effect on existing municipal wasterwater sewer systems.

Solid waste produced from the Project will be removed from the site by accredited contractors and transported to existing landfills at Southern Harbour and Sunnyside. A Waste Management Plan that will ensure waste segregation, reduction, reuse, and recycling. Overall solid waste production is not expected to be significant, although volumes will be increased compared to existing volumes produced in the region.

The Project will require an uninterrupted supply of 170 MW of power for the first phase. Power will be supplied through Newfoundland and Labrador Hydro through excess capacity on the inter-provincial grid or through construction of a new electrical generation supply. The Project will have the effect of using all additional electrical power capacity for the region and thereby drive the need for additional power generation.

10.2.5 Telecommunications

The Project will make use of existing telecommunications services in the area and will increase demands for high-speed Internet in the Come By Chance area, since this level of service will be required for Project operations.

10.3 Mitigation Measures

10.3.1 Ground, Air and Marine Transportation

To lessen the effects of the project on highway infrastructure, marine passenger and freight traffic and the airport, NLRC will:

- Ensure that two new access roads – one from the Trans-Canada Highway to the refinery site and one from the site to the Burin Peninsula Highway (Route 210) will be built as soon as posible to minimize highway traffic and maximize safety;
- Ensure that transport truck deliveries from St. John's and Bull Arm occur during off-peak traffic hours;
- Commit that the project will not be shipping refined product by road transport;
- Ensure that large fabricated products at Marystown and Cow Head or other marine fabrication yards are delivered by marine transport;
- Share information on expected traffic (car and freight) increases with the Department of Transportation and Works so that additional highway upgrade requirements are budgeted and scheduled;
- Encourage worker commuter car-pooling;
- Use bus transportation from the Bull Arm work camp to the work site;
- Provide marine vessel volumes and schedules to marine management operators responsible for traffic movement in the bay;
- Participate in and encourage other traffic to participate in SmartBay and the Placentia Bay Traffic Committee;
- Participate in the Placentia Bay Integrated Management Plan Committee; and
- Provide to the St. John's International Airport Authority the number of workers that are anticipated for construction and operations and estimates on how many might be returning to the province via air transportation, as air traffic volumes are know.

10.3.2 Public Utilities

To reduce or eliminate effects on public utilities in the region, NLRC will:

- Implement a Waste Management Plan that includes solid waste segregation, recycling, reuse, reduction and recycling;
- Support the development of a regional solid waste management system;
- Work with accredited waste contractors;
- Build and use a rainwater surface pond during construction and a desalinization plant using seawater for refinery processes during operations;
- Build and use a wasterwater treatment plant and piping system for discharges;
- Employ closed loop industrial systems to minimize waste – such as using waste heat in the desalinization process; and
- Investigate opportunities for co-generation on site during detailed engineering.

10.3.3 Telecommunications

No mitigation or enhancement measures are considered at this time.

10.4 Residual Effects

The residual effect of the Project on the physical infrastructure in the Study Area is insignificant given the mitigation measures to be put in place. It is yet to be determined how NL Hydro will source the electrical power supply to the refinery; in any event, a new transmission line(s) will be built.

Table 10.5 provides a summary of the residual effects on physical infrastructure.

10.4.1 Construction

Ground, Air and Marine Transportation

The construction of a new site access road on the Trans-Canada Highway just north of Come by Chance and a new site access road on the Burin Peninsula Highway (Highway 210) is considered a positive residual effect: increased safety will occur as a result of the Trans-Canada access road, and the route 210 access road will significantly shorten the commuting distance for workers and equipment from the Marystown area and decrease the volume of traffic on the Trans-Canada Highway.

Nonetheless, the anticipated residual effect of the Project will be to increase traffic volumes and potentially provide the impetus for highway and intersection upgrades to occur sooner (either due to increased traffic, increased traffic accidents, or both). The short-term effect (during construction) is therefore considered adverse, low, and local. Frequency of the effect is intermittent since most of the effects will be measurable during peak commuter hours and is reversible. The level of confidence in this effect is high, with high certainty of occurrence. Mitigation success is considered moderate, particularly if the Project drives the upgrading of local roadways, which results in a positive effect. The significance of the effect is considered moderate.

Table 10.5 Physical Infrastructure

Physical Infrastructure VEC	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Level of Confidence	Certainty	Mitigation Or Enhancement Success	Significance
Increase traffic volumes (Construction)	Adverse	Low	Local	Short-Term	Intermittent	Yes	High	High	Moderate	Moderate
Increase traffic volumes (Operations)	Adverse	Low	Local	Long-Term	Intermittent	Yes	High	High	Moderate	Moderate
Marine passenger and freight traffic (Construction)	Adverse	Low	Local	Long-Term	Rare	Yes	Medium	Low	Moderate	Minor
Marine passenger and freight traffic (Operations)	Adverse	Low	Local	Long-Term	Rare	Yes	Medium	Low	Moderate	Minor
Solid Waste (Construction)	Adverse	Low	Local	Short-Term	Intermittent	Yes	Medium	Medium	Moderate	Minor
Solid Waste (Operations)	Adverse	Low	Local	Short-Term	Intermittent	Yes	Medium	Medium	Moderate	Minor
Power Supply (Construction)	Neutral	Low – Medium	Regional-Provincial	Medium-Term	Intermittent	Yes	Medium	Medium	Moderate-High	Minor
Power Supply (Operations)	Neutral	Low – Medium	Regional-Provincial	Medium-Term	Continuous	Yes	Medium	Medium	High	Moderate

Residual project effects to marine passenger and freight traffic will be adverse, and low and local within Placentia Bay. The duration of the effect is long-term and the frequency of effect will be rare. The effect is reversible following project decommissioning and the level of confidence in this rating is moderate, with low probability of occurrence. Mitigation enhancement is expected to be moderate – with minor significance.

Public Utilities

Through employment of the mitigation measures, the Project will have no residual effects on water and wasterwater supply and infrastructure in the area. There will be residual effects to solid waste management and to power supplies in the region.

Solid waste effect will be adverse, but low and local in geographic extent. The duration of the effect will be short-term – until a regional waste management system is put in place – and is intermittent. The effect is reversible and the level of confidence in this assessment is medium as is the certainty of occurrence. Mitigation enhancement is considered moderately effective since some of the waste stream will be diverted through the Waste Management Plan. Significance of the effect is minor.

The effect on power supply will be neutral as there is existing supply in the system. Temporary transmission lines will be run.

Telecommunications

No residual effect.

10.4.2 Operations

Ground, Air and Marine Transportation

The construction of a new site access road on the Trans-Canada Highway near Sunnyside and a new site access road on the Burin Peninsula Highway (Highway 210) is considered a positive residual effect in that increased safety will occur as a result of the Trans-Canada site access road and the Burin Peninsula access road will significantly shorten the commuting distance for workers and decrease the volume of traffic on the Trans- Canada highway.

Nonetheless, the anticipated residual effect will be to increase overall traffic volumes. The short-term effect is therefore considered adverse, low, and local. Frequency of the effect is intermittent since most of the effects will be measurable during peak commuter hours and is reversible. The level of confidence in this effect is high, with high certainty of occurrence. Mitigation success is considered moderate, particularly if the Project drives the upgrading of local roadways, which results in a positive effect. The significance of the effect is considered moderate.

Residual project effects to marine passenger and freight traffic will be adverse, and low and local within Placentia Bay. The duration of the effect is long-term and the frequency of effect will be rare. The effect is reversible following decommissioning and the level of confidence in this rating is moderate, with low probability of occurrence. Mitigation enhancement is expected to be moderate with minor significance.

Public Utilities

Through employment of the mitigation measures, the Project will have no residual effects on water and wasterwater supply and infrastructure in the area. There will be residual effects to solid waste management systems in the region.Solid waste effect will be adverse, but low and local in geographic extent. The duration of the effect will be short-term until a regional waste management system is put in place and is intermittent. The effect is reversible and the level of confidence in this assessment is medium as is the certainty of occurrence. Mitigation enhancement is considered moderately effective since some of the waste stream will be diverted through NLRC's Waste Management Plan. Significance of the effect is minor.

The effect on power supply will be adverse moving to neutral, and depending on excess capacity in the system or the speed with which new capacity can be generated, it is expected to be low to medium in magnitude. The geographic extent will be regional and provincial. Duration of the effect is medium-term and frequency will be continuous. The effect is reversible and the level of confidence in this rating is medium with medium certainty of occurrence. Mitigation success will be moderately effective or highly effective with provision of power by Newfoundland and Labrador Hydro. Significance of the effect is moderate.

Telecommunications

No residual effect.

10.5 Monitoring and Follow-Up

10.5.1 Ground, Air and Marine Transportation

NLRC will continue to consult the provincial government to monitor transportation effects. Additional assessment may be required.

10.5.2 Public Utilities

NLRC will monitor water in marine and freshwater (groundwater) sources to determine effects on supply and the natural environment. NLRC will monitor solid waste volumes and support the regional waste management system development process. NLRC will monitor power demands and communicate peak periods to NL Hydro.

10.5.3 Telecommunications

No monitoring of the effect is recommended.

11.0 EMERGENCY SERVICES INFRASTRUCTURE

11.1 Existing Environment

11.1.1 Policing and Crime Rates

The Study Area is policed by the Royal Canada Mounted Police (RCMP) which is headquartered in St. John's, and has regional detachments. The Clarenville detachment is responsible for the Clarenville to Bonavista district. The Placentia detachment covers the Placentia to Whitbourne district, and the Burin detachment covers the Burin Peninsula. The Clarenville detachment includes a highway unit and employs 14 officers. The Placentia detachment employs 7 officers, while the Burin detachment has 22 officers as well as 5 federal offence officers. Specialist unit resources include general investigation section members, polygraph, forensic identification, dog section and community policing (J. Taylor, pers. comm.).

Figure 11.1 shows reported and actual crimes for the police districts that overlap the Study Area. The data show that property crimes are higher than personal and other types of offences in all districts. Refer to Socio-Economic Component Study, Newfoundland and Labrador Refinery Project for further information.

11.1.2 Search and Rescue (SAR)

The National Search and Rescue Secretariat maintains a directory of Canadian Search and Rescue (SAR) organizations. In Newfoundland and Labrador, the directory covers four regions. Region 4 covers the Study Area and includes 24 SAR organizations with ground, marine or air SAR capabilities. Of the 24 SAR teams in the area, three are responsible for Placentia Bay: the Triple Bay Eagles, based in Clarenville with 36 members, the Burin Peninsula Ground Search and Rescue Team, based in Marystown with 35 members, and the Avalon North Wolverines Search and Rescue Team, based in Bay Roberts. Ground search and rescue activities are usually coordinated by the RCMP, with the help of local SAR organizations. SAR volunteers are trained and certified by the RCMP in several disciplines including map reading, compass usage, first aid, CPR, reduced light searches and various SAR techniques (e.g., cold water rescues) (Jacques Whitford, 2007).

Within Placentia Bay, the Civil Air Search and Rescue Association (CASARA) and Canadian Coast Guard (CCG) also help with SAR activities. CASARA with headquarters in Gander, Stephenville and St. John's, has a mandate to assist federal SAR forces in the province as well as to promote aviation safety. The 125 volunteer members are trained in aviation safety, spotting techniques, map reading and other SAR techniques (National Search and Rescue Secretariat, 2007). The CCG has three monitoring stations in Placentia Bay, designed to track vessel movements and can be used to help coordinate SAR activities (Canadian Coast Guard, 2007).

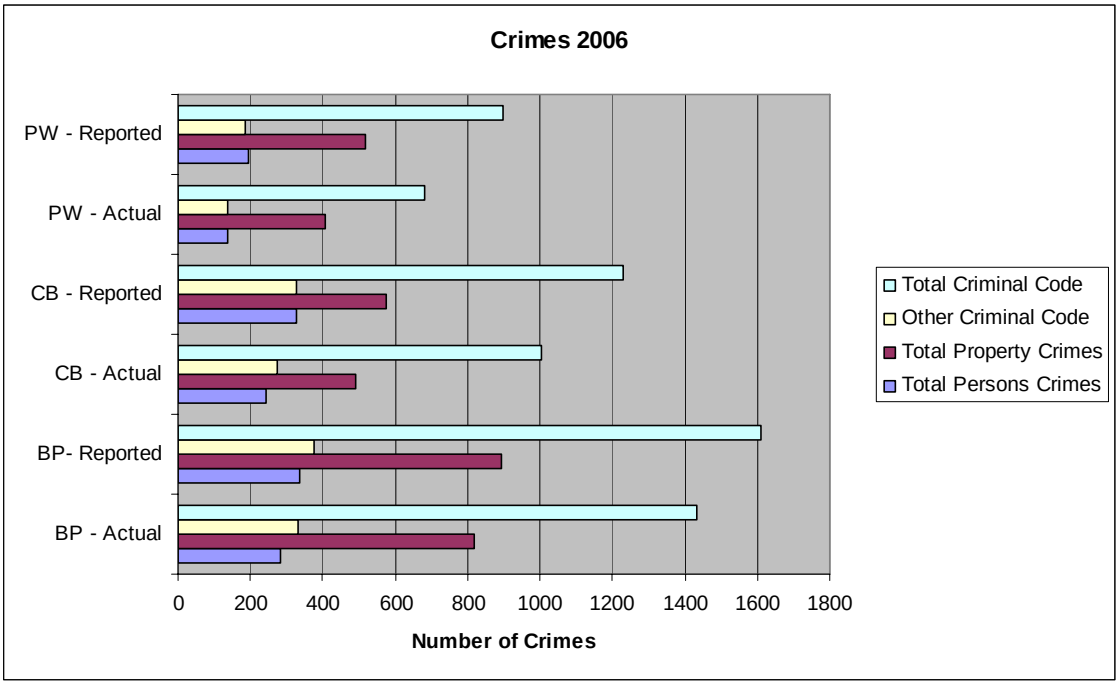

Figure 11.1 Reported and Actual Crimes in Reported and Actual Crimes in Placentia Whitbourne, Clarenville Bonavista and Burin Peninsula Police Districts (2006)

Source:
RCMP, 2007; AMEC Interpretation
Notes:
PW = Placentia Whitbourne District
CB = Clarenville Bonavista District
BP = Burin Peninsula District
Numbers represent district workload only. They do not include specialized unit files.
Numbers do not include general investigation section files or criminal code traffic offences.
Actual numbers reflect actual crimes and are a better indicator of crime trends.
Reported numbers reflect reported offences and are a more accurate representation of workload.

In the case of a major emergency in the area, the Newfoundland and Labrador Emergency Measures Organization (NLEMO) would assist. NLEMO coordinates the use of provincial government resources in support of land, marine and air searches. They determine the availability of support services and then act as a liaison between the authorities and providers of the resources and services. All volunteer SAR groups in the province must be registered with NLEMO, which has its own 12-member Provincial Emergency Response Team consisting of eight volunteers and four regional engineers (NLEMO, 2007).

Table 11-1 SAR Organizations in the Primary Study Areas

SAR Organization located in Eastern Newfoundland	Location	Staff/Volunteers	Services G (Ground), M (Marine), A (Air)
Avalon North Wolverines Search and Rescue Team	Bay Roberts	NA	G, M
Burin Peninsula Ground Search and Rescue Team	Marystown	35	G, M
Canadian Coast Guard	St. John's	NA	M
Canadian Coast Guard Auxiliary	St. John's	NA	M
Canadian Coast Guard National Council	Burin Bay Arm	NA	M
Central Avalon Ground Search and Rescue Unit	Holyrood	50	G
Civil Air Search and Rescue Association – Newfoundland	Mount Pearl	125	A, G, M
Dept. of Canadian Heritage – Parks Canada Eastern Newfoundland Field Unit	St. John's	8	G
Lifesaving Society – NL Branch	St. John's	NA	M
Marine Institute – Offshore Survival Centre	St. John's	Training facility	M
Marine Rescue Sub-centre	St. John's	NA	M
Newfoundland and Labrador Emergency Measures Organization (NLEMO)	St. John's (Dept. of Municipal and Provincial Affairs, all other volunteer SAR agencies must register with NLEMO)	12	A, G, M
Newfoundland and Labrador Sailing Association	St. John's	NA	M
Newfoundland and Labrador Search and Rescue Association	Paradise	27 teams across the province with 900+ volunteers	A, G, M
Newfoundland and Labrador Wildlife Federation	St. John's	NA	G
Newfoundland Canoe Association	St. John's	NA	M
Newfoundland Safety Council	St. John's	NA	G
Red Indian Lake Ground Search and Rescue Team Inc.	Buchans	36	G
Royal Canadian Mounted Police (RCMP)	St. John's	NA	A, G, M
St. John Ambulance – Newfoundland Council	St. John's	NA	G
Triple Bay Eagles Ground Search and Rescue Team	Clarenville	36	G, M

Source: National Search and Rescue Secretariat, 2007

11.1.3 Fire Safety

As is the case in other rural Newfoundland and Labrador communities, households and businesses in the Study Area receive fire protection services through volunteer fire departments. Come By Chance, Sunnyside and Southern Harbour have volunteer fire departments. Additionally, an industrial fire department is located at the North Atlantic Refinery near Come By Chance. Table 12-2 provides details of municipal fire departments staffing and equipment.

Fire services and fire protection of natural areas are provided through the provincial Department of Natural Resources. One of the duties of conservation officers throughout the province is to respond to emergency fire situations. A district office is located in Clarenville with a satellite office located in Whitbourne.

Table 11-2 Municipal Fire Departments, Staff and Equipment

Town/Company	Number of Volunteer Firefighters	Equipment	Approximate Number of Annual Responses
Arnold's Cove	33	-1 fire truck -940 gal pumper -1 emergency response vehicle	15
Come By Chance	13	-fire truck -fire van	2
Placentia	35	-3 pumper trucks -1 rescue van -jaws of life -foam system	26
Southern Harbour	28	-pumper truck -truck	4
Sunnyside	25	-pumper truck -rescue truck	10
North Atlantic Refinery	Trained staff on each shift	-foam wagon -hazmat -2 fire trucks	15-20
Clarenville	-1 full-time paid chief -30 volunteers	-3 – 500 gallon pumper trucks, -1,800 gallon tanker truck -equipment truck -pick up truck -jaws of life -foam capacity -radio system -breathing apprentices -air compressor -5-inch high volume supply hose	50
Swift Current	14	-NA	NA
North Harbour	12	-NA	NA
Garden Cove	10	-NA	NA
Marystown	25	-3 pumper trucks -2 rescue vehicles	NA

Town/Company	Number of Volunteer Firefighters	Equipment	Approximate Number of Annual Responses
		-1 pickup truck	
Burin	25	-2 pumper trucks -1 emergency van	NA

Source:
Jacques Whitford, 2007; and Community Leaders and Fire Chiefs, pers. comm.

11.1.4 Ambulance

Throughout the province 63 ambulances operate from 82 locations Table 11- 33 provides details of ambulance services in the Study Area. There are 21 ambulances, responding to 3,698 calls per year with 83 full-time and seven part-time personnel. Call volumes have increased over recent years with the elderly using this service more often than others. In 2006-07, 55 percent of all ambulance transports were for patients over 65 years (Jacques Whitford, 2007).

Table 11- 3 Ambulance Services in the Study Area

Operator	Location	Vehicles Maintained	Approximate Annual Call Volume	Approximate # of Personnel
Fewer's	Clarenville	7	1,663	43
Smith's	Whitbourne	4	600	16
Power's	Placentia	3	600	13
Marystown	Marystown/Burin	4	835	6 FT; 3-4 PT
Collins	Marystown/Burin	3	NA	5 FT; 3 PT
Total		21	3,698	83 FT; 7 PT

Source:
Jacques Whitford, 2007; and Ambulance Operators, pers. comm.

Air ambulance services are available throughout the province 24-hours a day, 365 days a year. Approximately 880 air ambulance medical evacuations occur annually. Two fixed-wing air ambulances – one in Labrador and another in St. Anthony – serve Labrador and the Northern Peninsula, and a third based in St. John's, serves the remainder of the province, including the Study Area, and backs up the other aircraft. Five helicopters operating under a long-term government contract serve the province's medevac needs as well (Department of Health and Community Services, 2007).

11.1.5 Community Emergency Response Planning

Community emergency response plans are not mandatory in the province. NLEMO encourages and assists communities in developing such plans.

Within the Study Area several communities have their own emergency response plans that formalize the procedure following an emergency, including responsibilities of individuals and organizations. Table 11-4 lists the communities that have response plans. Sunnyside is in the process of preparing an emergency response plan. Emergency response plans are not in place

for the communities of Southern Harbour, Swift Current, Garden Cove and Little Harbour East. Emergency Response Plans are approved by municipal council and typically include:

- Authority to prepare the Emergency Response Plan, initiate or terminate a state of emergency for the community;
- A list of plan maintenance and reviews/approvals plus a distribution list;
- Responsibilities of all agencies that might be involved, including RCMP, town council, fire department, provincial government agencies, etc.;
- Types of emergencies/hazards, their potential effects, potential actions and special equipment required for response;
- Availability of local equipment, personnel (with skills such as nursing, diving, etc.), venues and facilities available;
- Definition of terms;
- Involvement and authorities of provincial and federal government agencies;
- Emergency operations centre location and an alternate;
- Mutual aid agreements or memorandums of understanding with other municipalities, industries or organizations; and
- Lists of telephone numbers and contacts.

Table 11-4 provides a summary of the potential emergencies or hazards related to oil refining in the Emergency Response Plans for Arnold's Cove, Come By Chance, North Harbour, Clarenville, Placentia and Marystown.

Table 11-4 Community Response Plan Components Summary

Community	Oil Refinery-Related Emergencies Covered in Plan	Summary Details
Arnold's Cove	Peace Time Disaster including: - Oil Spills, - Refinery Accidents - Marine Disaster Dangerous Goods including: Spills, Explosions, contamination	Lists possible effects including: disruption of traffic and community; damage to property, injury and loss of life, evacuation of homes. Provides response tasks and agency responsible for each. Lists major concerns including: casualties, death, traffic disruption, explosion and fire, etc. Provides response tasks and agency responsible for each. Provides a list of emergency response equipment

Community	Oil Refinery-Related Emergencies Covered in Plan	Summary Details
Come By Chance	Industrial Emergency: - Fire and explosions - Toxic release to the atmosphere - Spill of toxic material on land or on water - Accident involving dangerous goods on the highway - Any other catastrophic event with potential to affect the community or citizens	Includes roles and responsibilities of all individuals and agencies involved (Fire Chief, Mayor, Council, Town Manager, etc.), notification procedures including citizen evacuation if needed, request assistance from NARL for gas testing, requests for environmental response assistance from the Office of the Fire Commissioner, reference to contact list for other services. Provides location of emergency command centre, evacuation and security procedures.
North Harbour	A resource guide was prepared in March 2006 by One Ocean and the Marine Institute for the community to consider in preparing an Emergency Response Plan. The guide offered suggestions on oil spill emergencies.	Resource guide documents local emergency services resource agencies, equipment, and their contact numbers and their distance from North Harbour. It also documents sensitive areas, oil spill responder agencies and their roles. Provides information on training of fisheries workers in oil spill countermeasures
Clarenville	Does not contain specific procedures for a refinery emergency. Focuses on potential emergencies within town boundaries and forest fires in the surrounding area.	Provides residents and town officials with a general guideline to an expected initial response to an emergency. Provides an overview of the responsibilities for the town staff.
Placentia	Emergency Response Plan is currently being revised and will be available to the public in June 2007. There are no oil refinery related emergencies covered in the draft of the plan to date.	NA
Marystown	Operational procedures for major fire, dangerous goods and transportation water-at sea or adjacent to land. Procedures document rates the probability of a hazardous materials incident in the municipality to be moderate.	Includes major possible effects of the disasters, potential actions at the scene with agencies responsible for each, equipment available and the source.

11.1.6 Mutual Aid

While no formal mutual aid agreements are documented for the Study Area, a general understanding and "agreement" occurs amongst the communities that in the event of an emergency each municipality will help one another.

Arnold's Cove has an agreement with the North Atlantic Refinery and Southern Harbour (W. Slade, pers. comm.). Come By Chance has an agreement with the North Atlantic Refinery, Arnold's Cove and Sunnyside (W. Coffin, pers. comm.). Southern Harbour has an agreement with Arnold's Cove and noted that all the fire departments in the area support each other (B. Power, pers. comm.). Sunnyside has an agreement with Come By Chance (N. Read, pers. comm.). Garden Cove has a reciprocal agreement for aid with Swift Current and North Harbour (D. Brinston, pers. comm.). Marystown has no formal mutual aid agreements, but in the event of an emergency, it would be helped out by Burin (P. Power, pers. comm.). Goobies relies on Sunnyside and Come By Chance for emergency services (W. Goobie, pers. comm.). Emergency personnel from the region will help when accidents occur on the Trans-Canada Highway.

11.1.7 Marine Emergency Services

The Canadian Coast Guard (CCG) is responsible for maritime search and rescue. The Maritime Rescue Sub-Centre in St. John's responds to approximately 500 incidents involving 2,900 people per year. In areas outside the St. John's region, services are augmented by the Canadian Coast Guard Auxilliary, who have 1,000 volunteer members and 460 vessels (Jacques Whitford, 2007).

CCG operates several Marine Communications and Traffic Services Centres in the province, including one at Argentia/Placentia in Placentia Bay. These centres monitor vessel traffic in specific areas to ensure information concerning relevant local situations is available to all mariners. Placentia Traffic's zone includes the approaches to the Bay and all of Placentia Bay, including the vessel traffic management system in the bay.

The Eastern Canada Response Corporation (ECRC) provides marine oil spill response services when requested by the responsible party, Canadian Coast Guard or any other government lead agency. ECRC is a private management company owned by several major Canadian oil companies and will provide action plans, equipment, resources and operational management of oil spill cleanup activities under contract.

ECRC has an office in Mount Pearl (near St. John's) with four staff members and within the province has access to a 120-member team of dedicated spill responders (P. Nippard, pers. comm.). ECRC operates a 24-hour emergency number that activates a call-out response process. Mutual support contracts allow 540 additional spill responders and equipment to be called upon when needed. ECRC has mutual aid agreements with the Atlantic Emergency

Response Team (ALERT) in St. John NB and with Point Tupper Marine Services (PTMS) in Point Tupper NS in Atlantic Canada. ECRCs capabilities are reviewed and assessed on a regular basis by Coast Guard.

11.2 Project Effects

The law enforcement services in the Study Area are provided by the RCMP. Additional resources may be required to address Project effects due to an increased mobile population during the peak construction period and increased highway commercial and personal vehicular traffic. Emergency services will also be affected, again due to increased population and highway traffic, and additional commercial and recreational marine traffic in Placentia Bay. The major oil spill response company, ECRC, seems confident that oil spills and environmental cleanups can be addressed adequately in Placentia Bay.

11.2.1 Policing

The Project can affect policing in the Study Area by increasing demands for these services either directly through work camp/worker-related disturbance, increased vehicle accidents and increased potential for terrorist attacks.

11.2.2 Firefighting

The Project can enhance fire safety in the region by introducing risk management systems associated with oil refinery-related fires and potential for fires to spread to the surrounding environment (homes, forests, wharf). This, in turn, will put additional demands on volunteer fire departments and those industries or organizations with which the NLRC has mutual aid agreements. There is the potential effect on the health and safety of workers and residents of surrounding communities if there is insufficient response capacity.

11.2.3 Search and Rescue (SAR)

The Project can affect Search and Rescue organizations through an increased potential for search and rescue incidents, and accidents related to the project (e.g., marine vessel accidents) and worker activity in their off-hours recreational activities.

11.3 Mitigation Measures

11.3.1 Security and Safety

To address security and safety issues, NLRC will:

- Discuss Project plans and schedules including security arrangements, work rotation schedules and traffic flow and volumes with the RCMP for the construction and operation phases;

- Develop a health and safety plan for the Project that will identify and address through implementation any potential security issues;
- Provide 24-7 security on-site and at the work camp;
- Prohibit any unregistered individuals from entering company property, including the work camp site; and
- Enforce a zero tolerance drug and alcohol use policy and Code of Ethics, minimizing substance abuse and related safety accidents and detering related criminal activities.

11.3.2 Traffic-Related Incidents

To address ground traffic-related incidents, NLRC will:

- Work with the Department of Transportation and Works and the RCMP to minimize traffic disturbances and safety-related issues related to large-haul trucks to and from fabrication sites during construction by using marine routes where possible, as well as non-peak highway traffic periods;
- Ensure that all employees and contractors comply with regulations and standards for road use and safety; and
- Use buses to transport workers and encourage worker car-pooling to mitigate large increases in traffic volumes during construction.

11.3.3 Firefighting

While the potential for firefighting demands are increased at the refinery site and in the communities where the workers and their families reside, there is a corresponding increase in the population from which volunteer firefighters can be recruited along with increase in mutual aid and equipment. To enhance this effect, NLRC will:

- Implement the company's Social Investment Policy, which will entertain proposals to support community capacity building including sharing and training of community response organizations;
- Help train local firefighters;
- Manage rotation schedules, where possible, to ensure that an adequate number of volunteer firefighters are in each community at one time under normal operating conditions or ensure that a mutual aid agreement is in place;
- Develop the company Emergency Response Plans with inputs from the NLEMO including the Fire Commissioner's Office to meet provincial standards.

11.3.4 Ambulance Services

Project effects on ambulance services will be mitigated by having an ambulance on standby at the refinery site and work camp at all times. A helipad will be located on the refinery site to assist in transporting casualties to the nearest hospital.

11.3.5 Search and Rescue

To address and enhance search and rescue effects, NLRC will:

- Put in place mutual aid agreements with neighbouring industries, municipalities and other responding organizations;
- Document mutual aid arrangements in the company's Emergency Response Plan; and
- Participate in the various Placentia Bay marine safety organizations.

To mitigate local emergency situations, NLRC is committed to:

- Operate as part of the broader community and provide assistance in emergency situations when it does not jeopardize the safety of its own employees or the Project itself; and
- Participate in and support regional groups including SmartBay, Placentia Bay Traffic Committee, Placentia Bay Fishers Sub-Committee, Placentia Bay Integrated Management Committee, Arnold's Cove Area Chamber of Commerce and Regional Advisory Council on Oil Spill Response.

11.4 Residual Effects

Overall, the Project's residual effect on emergency services will be insignificant, recognizing that any security and safety-related incidents resulting from the Project along with any additional resource requirements can be mitigated effectively. Certain community and regional resources will be enhanced by NLRC's participation in mutual aid agreements.

Summary

Table 11.5 provides a summary of the residual effects on emergency services infrastructure.

Table 11-5 Emergency Services Infrastructure

Emergency Services Infrastructure VEC	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Level of Confidence	Certainty	Mitigation Or Enhancement Success	Significance
Firefighting (Construction)	Positive	High	Regional	Long-Term	Continuous	Yes	High	High	NA	High
Search and Rescue (Construction)	Adverse	Low	Regional	Medium-Term	Continuous	Yes	High	High	Moderate	Moderate

11.4.1 Construction

Policing

There are both positive and negative residual effects to policing and emergency services related to the Project. NLRC can only help deter criminal activities through company policies, and with an overall increase in population and industrial (and related) activity in the region, there will be a corresponding increase in the potential for more crime, traffic (marine and roadway) accidents, and situations requiring police services.

Firefighting

Positive residual Project effects to firefighting are greater regional capacity through an increase in the number of people available to respond, company-provided training, and NLRC's participation in mutual aid agreements and regional safety initiatives and organizations. The residual effect on firefighting and mutual aid is positive, high in magnitude since there is a measurable and sustained effect to these types of services. The effects are regional in geographic extent, long-term in duration and continuous. The effect is reversible although this will not likely be desired since it improves conditions and capacity in the region. The level of confidence in this assessment is high with high certainty of occurring. Mitigation success is not applicable since the residual effect is positive. Overall significance of the effect is significant.

Air and Ground Ambulance Services

Potential effects to air and ground ambulance services are mitigated through provision of dedicated ambulance and helipad services on-site and at the work camp. There is no residual effect on these services.

Search and Rescue

The effect to RCMP, SAR organizations, and marine safety organizations will be adverse and low in magnitude since the effect will be most pronounced during construction when more workers are in the region and levelling off once operations workforce is in place and organizations can adjust to more constant population levels and demands over time. The geographic extent of the effect is regional, and is medium-term in duration. Frequency of the effect is continuous, and reversible. The level of confidence in the assessment is high, with high certainty that the effect will occur. Mitigation success will be moderately effective since no permanent negative effects will be felt once the RCMP and other emergency response organizations are able to adjust to constant workforce conditions during operations. The significance of the effect is moderate.

11.4.2 Operations

The same residual effects will occur generally for operations as for construction for all aspects of emergency services but not at the same intensity as the worker population levels-off.

11.5 Monitoring and Follow-Up

In coordination with the RCMP, statistics will be kept on all Project-related incidences that result in notifying the RCMP. Statistics will also be kept on any fire or search and rescue operations related to the Project

12.0 HISTORIC RESOURCES

12.1 Existing Environment

Several significant historic sites are located in Placentia Bay, most notably Castle Hill National Historic Site and The Atlantic Charter Site Monument Historic. The Castle Hill site protects the remains of fortifications built by the French and English in 17th and 18th centuries. North of Placentia is Ship Harbour, where the Atlantic Charter Monument is located, commemorating the drafting of the Atlantic Charter in 1941 by British Prime Minster Sir Winston Churchill and United States President Franklin Roosevelt.

As well as promoting appreciation of the historic resources, the Provincial Archaeology Office (PAO), as a regulatory agency, also identifies and protects those resources. As part of the approval process for geotechnical surveys at the proposed Refinery site at Southern Head, an accredited archaeology survey was completed and reviewed by the PAO. Historic Resources Assessment research and site investigations were done in fall 2006 and spring 2007 by Anvil Consulting. (See Socio-Economic Component Study for details.)

12.1.1 Historic Resources Assessment

There are two known archaeological sites close to the proposed access road from the Come By Chance area to the Project Area. One contained some materials thought to be associated with a pre-contact Aboriginal presence (Gilbert and Reynolds 1990).

In October 2006, the field component of the Stage 1 Assessment focussed on key locations identified by the PAO for investigation. Included were two sections of the access road, a proposed bridge crossing on the Come by Chance River, the project area from Holletts Cove (including Holletts Cove Shoreline) to the proposed marine wharf and jetty at Doughboy Cove, the refinery footprint, and part of a transmission line corridor.

In early 2007, Project plans were updated to include a western access road from Highway 210 to the refinery site at Southern Head, which would involve construction of a bridge across the North Harbour River approximately 900 m upstream of the mouth. As well, the jetty was realigned to occupy shoreline that had not been surveyed in 2006.

Subsequent to a review of the revised plans, the PAO required additional field research at three locations: the shoreline at Doughboy Cove where it is proposed the jetty be constructed; the site of the garden remains identified in the 2006 surveys, situated on the west side of Doughboy Cove; and both sides of North Harbour River, from the mouth upstream to the proposed bridge crossing. The PAO also requested that the shoreline of North Harbour adjacent to the river mouth be assessed; however, the exact distance on either side of the river was not specified.

Methodology is described in detail in the Historic Resources Component Study (NLRC, 2007) and is in accordance with provincial guidelines (Government of Newfoundland and Labrador 1992). The objectives of the Stage 1 Assessment were to identify and assess historic resources potential or sensitivity and recommend the appropriate methodology and scope for further detailed impact studies, if indicated. In the Stage 2 Assessment, the primary objective was to determine, through additional shovel testing and surface inspection, if other remains (such as a dwelling or outbuildings) are present on the site associated with the vegetable garden identified in 2006 (Anvil Consulting 2006).The number and general location of all test pits was recorded and photographs taken: this data is provided to the PAO.

12.1.2 Wharf and Jetty Area

The Stage 1 Assessment did not identify any materials of historic significance within the project area. However, outside but close to the Project site, the 2006 surveys identified the remains of two vegetable gardens of possible 19th century origin in Hollett's Cove and in Doughboy Cove.

PAO advised that if any project infrastructure should need to be advanced closer to the shoreline of Come By Chance Harbour (where two archaeological sites are located and where others might be found), or closer to Hollett's Cove or Doughboy Cove where the two historic gardens are situated, a review of project details, and possibly further assessment, should be completed prior to ground disturbance. This led to the May 2007 field program for Stage 1 and Stage 2 Assessments.

The wharf and jetty area is situated northeast of Come By Chance Point in Doughboy Cove and extends northeast along the shoreline for approximately 360 m (see site drawing in Preface and Figure 12.1). Testing throughout this area uncovered no materials of historic significance and the potential for any such findings is low, because topographic conditions make the area unsuitable for human occupation.

The section of shoreline selected for construction of the jetty is extremely steep-sided and rocky with several pockets of narrow beach at its base. With the exception of the small clearing at Doughboy Cove where the vegetable garden was situated, the topography of the shoreline is such that at the upper edge of the narrow beaches the cliff rises steeply for approximately 10 m, with virtually no open and level ground beyond the inter-tidal zone that could conceivably be occupied.

The second garden area identified in 2006 is situated on the west side of Doughboy Cove in a raised and level meadow approximately 8 m above the high-water line (Figure 12.1). The site consists of a number of raised vegetable beds in an approximately 10 m x 6 m clearing overlooking a narrow beach. Intensive testing in the vegetable beds and the surrounding wooded area did not identify materials or structural remains, other than two fragments of clear bottle glass, one of which dates to the early 20th century. It appears that the site was used

exclusively for small-scale vegetable production, with no associated accommodations or outbuildings.

12.1.3 North Harbour River

Areas around and upstream of the mouth of North Harbour River were also examined in a Stage 1 Assessment. The area included both sides of North Harbour River, from the mouth upstream approximately 900 m to where the bridge on the access road to the refinery will be constructed (Figure 12.1). In all locations, even at the crossing, the riverbanks are extremely steep-sided and high, with few, if any, locations suitable for human occupation. As well, the section of the river assessed is relatively shallow and rocky, particularly at the mouth where there are large concentrations of boulders and small cobble islands. As a result of these conditions, travel by boat or canoe would be extremely difficult, especially during the times of year when the water is low. Due to the conditions described, and the lack of findings at the bridge crossing, it appears that the historic potential of this section of river is low.

The shoreline of North Harbour, on both sides of the river mouth, was surveyed. On the east side, at approximately 130 m from the mouth, shovel testing uncovered what appear to be early 20th century remains, situated on a well-defined, dry terrace above the beach. The pattern of vegetation and topography suggest that the terrace was farmed, and, based on the quantity and range of artifacts unearthed, may have been occupied over an extended period of time.

With the site's proximity to the river (where fresh water and an abundant supply of fish would have been available), its sheltered location and the presence of a pebble beach on which small craft could have been landed and deployed, there is a high probability that other, older historic remains are present. It is possible that the terrace was also used by Aboriginal people prior to occupation by Europeans. Because of the location of the site (shoreline on the west side of North Harbour River), no direct Project interactions are anticipated.

A second historic site was identified approximately 800 m to the south of the river mouth on the west side. This is outside of the area expected to be affected by the Project, as the access road to the refinery will be situated at least 350 m to the east. The site is on an open, sandy point of land, called Caplin Cove on the current 1:50,000 topographic mapping and referred to as Frenchman's Nook (Figure 12.1) by local residents.

Local information suggests that in the early part of the 20th century (and possibly earlier) there was a large sawmill on the sandy flat, owned and operated by a French-speaking individual or family (D. Slade: personal communication).

Figure 12.1 Refinery Layout and Historic Resources Layout

12.1.4 Trans-Canada Highway Access Road

One other location identified as significant is situated to the east of the Trans-Canada Highway, northwest of Sunnyside. The site, at one time consisting of two buildings constructed as a trans-Atlantic cable station, was apparently used briefly during the 1850s. The site is well away from the location for the proposed interchange.

12.2 Project Effects

Construction and operation of Project facilities would disturb the areas where evidence of previous gardens exists. However, following review and consideration of the Stage 1 and Stage 2 Historic Resource Assessments, the Provincial Archaeology Office has concluded that the sites do not require further research or assessment, and construction in the areas may proceed. This can be considered as no effect. The situation remains the same though construction and operations.

12.3 Mitigation Measures

The PAO operates under the Historic Resources Act. In 1992 it issued a guidance document, Historic Resources Assessment and Impact Management Summary. In the event that mitigation is necessary for a historic resource, the document specifies the measures to be taken. In the case of the proposed Refinery project, no mitigation is required.

12.4 Residual Effects

There is no residual effect.

After review of the Stage 1 and Stage 2 Historic Resources Assessments, the PAO determined that the identified sites did not need additional research and that construction could proceed: hence the direction is neutral, the magnitude is negligible and the geographic extent is considered local. Duration and frequency were not applicable. Although the sites will be disturbed and hence not reversible, the action has regulatory approval with no mitigation necessary: this also provides a high level of confidence and certainty. It is determined that the effect is insignificant.

12.5 Monitoring and Follow-Up

No monitoring or follow-up is required. However, the Refinery site Environmental Protection Plan will clearly indicate that in the event of discovery of a historic or precontact artifact or archaeological site during any phase of the Project, all work in the immediate area of the find will cease and will resume only when approval has been received from the PAO.

13.0 CUMULATIVE EFFECTS ASSESSMENT

13.1 The Guidelines

Although a cumulative effects assessment (CEA) is not prescribed within the Newfoundland and Labrador Environmental Protection Act, it is typically included in Environmental Impact Statement guidelines for EAs conducted under the provincial legislation, and it is required with all federal EAs. Within the Newfoundland and Labrador Refinery Project Environmental Impact Statement/Comprehensive Study Report, it is requested that "any cumulative effects on valued ecosystem components that are likely to result from the Project in combination with other projects or activities that have been or will be carried out (e.g., other industrial activity in Placentia Bay) will be discussed in the EIS." Specifically the Guidelines asked Newfoundland and Labrador Refinery to look at "North Atlantic Refining, NTL Transshipment Facility, as well as the LNG Transshipment Facility, the VBNC Long Harbour Commercial Plant and potential aquaculture sites."

In addressing cumulative environmental effects, the guidelines asked NLRC to consider the following:

- Temporal and spatial boundaries;
- Interactions among the Project's environmental effects;
- Interactions between the Project's environmental effects and those of existing projects and activities; and
- Mitigation measures employed toward a no-net-loss or net-gain outcome.

The guidelines are more directly related to the biophysical environmental than the human environment, but, nonetheless, the first three elements are applicable to socio-economic cumulative effects and the last element is also applicable in terms of employing mitigation measures, but with an intended outcome of net gain if possible.

13.2 Methodology

The Guidelines do not provide a guide for treatment of cumulative effects. The Canadian Environmental Assessment Agency provides cumulative effects guidelines and practices that are recognized by the provincial government and will be followed for this assessment.

The Operational Policy for Addressing Cumulative Environmental Effects under CEAA (CEA Agency 1999) was issued by CEAA to provide clarification and guidance to RAs on how cumulative environmental effects should be considered in EAs conducted under CEAA. Under this policy, the CEA Agency endorses the *Cumulative Effects Assessment Practitioners Guide* (CEA Agency 1999) and the *Reference Guide for the Canadian Environmental Assessment Act: Addressing Cumulative Environmental Effects (2004)*.

The Practitioners Guide offers a “best practice” perspective on CEA with emphasis on the assessment of cumulative biophysical effects, but suggests that CEAA can extend beyond changes to the biophysical environmental and include, for example, effects on changes to socio-economic conditions.

The Operational Policy and guidance documents place emphasis on how far back to consider past projects. According to the Practitioners Guide, the past ideally begins before the environmental effects associated with the action under assessment. In practice, past actions often become part of the existing baseline conditions, as is the case this assessment. (e.g., effects of large-scale projects in Placentia Bay and their closures are discussed in the baseline document).

A general practice for assessing cumulative effects is that they:

- Have a reasonable possibility of occurring;
- Have been registered with either the Department of Environment and Conservation and/ or CEAA; and
- Should reflect the most likely future scenarios.

The Practitioners Guide also addresses induced actions, which are projects and activities that may occur if the action under assessment is approved. They usually have no direct relationship with the project being assessed, but represent the growth-inducing potential of an action (CEAA, 1999). Such a socio-economic induced cumulative effect could be increased demand for housing in Clarenville, Marystown and Placentia caused by economic growth as a result of a number of large-scale projects developing concurrently.

In addressing the cumulative effects, this section will:

- Follow the Guidelines for the Environmental Impact Statement/Comprehensive Study Report for the Project and CEAA’s cumulative best practices;
- Assess measurable socio-economic effects of the Project;
- Assess socio-economic effects that interact cumulatively with the socio-economic effects from other projects or activities;
- Assess other projects or activities that will be carried out and are not hypothetical; and
- Indicate where the responsibility lies to manage environmental effects (e.g., through participation in regional planning efforts such as the Placentia Bay Integrated Management Planning Committee).

After reviewing a number of other projects in which cumulative effects were discussed, the following structure for assessment is being applied for the EIS socio-economic component:

- Identification of VECs;
- Definition of the spatial and temporal boundaries for the CEA;

- Project inclusion list;
- Predicted cumulative effects;
- Cumulative effects management;
- Characterization of cumulative effects; and
- Monitoring and follow-up.

13.2.1 Identification of VECs

The assessment of cumulative effects is conducted individually for each of the VECs using the same approach as the assessment for the project-related socio-economic effects. However, due to limited specific information on other scoped projects and activities to be considered in the CEA, the ability to predict and describe the cumulative effects in the same way that direct effects are addressed is less certain. Instead, the assessment is largely qualitative in nature, based on knowledge of other projects and expert opinion, and more conservative in predictions except where trend data is available to support quantitative analysis (e.g., provincial *Skills Task Force Report*). Specifically, for this assessment, cumulative effects are predicted to occur within the following major VECs: the economy, education and training, employment and business, health and community services, housing, physical infrastructure, social services infrastructure, emergency services infrastructure, and land use, as a result of several large-scale projects occurring simultaneously within Placentia Bay.

13.2.2 Spatial and Temporal Boundaries

In order to focus the assessment, spatial and temporal boundaries have been clearly defined. The focus is on major existing or planned projects within Placentia Bay. Existing projects have been incorporated into the socio-economic component document, however, the vessel traffic associated with the existing refinery and or/transshipment terminal is addressed in the discussion of commercial fisheries. Future projects are addressed in this CEA where appropriate. The time frame is defined for those projects that have either been registered (e.g., the LNG Plant at Grassy Point, the VBNC nickel processing plant) or have a reasonable chance of occurring (e.g., increased shipbuilding activity at the Kiewit Offshore Services, Marystown) within the time frame of this Project. Several projects outside Placentia Bay are discussed (e.g., Lower Churchill River Hydro Generation project and the Continental Stone Quarry in Belleoram) because they are large and have a likelihood of occurring at approximately the same time as the Project and, therefore, could have a cumulative effect on labour and training, and to a lesser degree, business development and procurement. Other projects (not yet registered with the provincial or federal assessment agencies) that could occur within the same time frame are listed but not discussed in detail (e.g., Aurora Energy).

13.2.3 Project Inclusion List Selection

In the Placentia Bay region, several currently operating and reasonably foreseeable future project developments are identified which effects overlap with those residual effects of the Project. They have been included for assessment because it is required as a result of the Guidelines, but also because of public consultations, issues scoping and the judgement of the company and its consultants. The proposed projects together with the Project could cause changes to the six socio-economic VECs if they proceed within the same time frame.

13.2.4 Predicted Cumulative Effects

This assessment is based on the socio-economic assessment of the Project's effects by assessing the interaction between residual (both positive and adverse) Project socio-economic effects (after project mitigation) and similar environmental effects of other projects or activities included in the Project Inclusion List for the construction and operations phases. In situations where construction and operations effects are similar, the discussion is combined.

13.2.5 Cumulative Effects Management

In those cases where the assessment identifies the potential for adverse cumulative effects, economically and technically feasible effects management measures are provided for construction and operations. In situations where construction and operations cumulative effects management are similar, the discussion is combined. In most cases, management lies with several projects and authorities and in most cases will be regionally oriented.

In general it is assumed that:

- Other projects and activities will be subject to appropriate planning and management;
- Other projects and activities will be subject to the appropriate government regulatory requirements;
- Relevant government agencies will have adequate resources to effectively carry out their mandate with respect to environmental assessment and management; and
- Adherence to existing regulatory requirements will not measurably change.

13.2.6 Characterization of Cumulative Effects

Determination of significance is of central importance for decision making under CEAA. The significance of residual adverse cumulative effects has been determined using the same criteria for determining the significance of residual Project socio-economic effects (e.g., direction, magnitude, geographic extent, duration, frequency, reversibility, level of confidence, certainty, mitigation success, and significance). Residual positive cumulative effects have also been identified following the development of mitigation measures.

13.2.7 Monitoring and Follow-up

The objective of follow-up activities is to verify the accuracy of cumulative effect predictions and the effectiveness of mitigation. Monitoring of cumulative effects may or may not need to be undertaken in addition to monitoring of project-specific socio-economic effects. Monitoring would not be the sole responsibility of NLRC but should be developed and implemented by federal and provincial authorities and/or in consultation with Study Area stakeholders.

13.3 Project Inclusion List

Projects that may have a combined effect on the six socio-economic VECs include existing and proposed projects. The following provides a description of these projects.

13.3.1 Existing Projects

Table 13.1 provides details about two major existing projects within Placentia Bay that have been discussed both in the baseline and impact assessment sections. The table is followed by a description of each project.

Table 13.1 Socio-Economic Cumulative Effects Assessment Existing Project Inclusion List

Project (Existing in Placentia Bay)	Timeline		Employment		Total Investment	Status	Notes
	Construction	Operation	Construction	Operation			
Newfoundland Transshipment Terminal (Whiffen Head)	NA	NA	NA	95 including tankers	NA	Operational	Expected to handle 239 vessels and 110 shuttles in 2007
North Atlantic Refinery (Come By Chance)	NA	NA	NA	700	$600 million over last 12 years	Operational	Produces 115,000 barrels of oil a day

Newfoundland Transshipment Terminal (Whiffen Head) was constructed in three phases between 1997 and 2002. There are 69 employees on-site, six off-site and 20 maintaining the tugboats. The facility is expected to handle 239 vessels in 2007, servicing all three offshore oil fields. The terminal handles Hibernia and Terra Nova crude oil, is equipped with two berths accommodating 35,000-159,000 DWT, six crude oil storage tanks, each with 500,000 BBL working capacity and an intricate interconnecting pipeline and support structure. The oil is transferred from the offshore oil fields to the facility for storage, later being transferred to large bulk carriers for transport to refineries elsewhere. The company anticipates that its Transshipment Terminal will be a regional facility and will provide storage for other fields as they are brought into production.

North Atlantic Refinery (Come By Chance) is a 115,000 barrel-a-day refinery that employs 700 highly skilled workers. The refinery produces low-sulphur, clean fuels from lower-cost Middle Eastern, Russian, and Venezuelan sour crude. Over the past 12 years the company has invested $600 million the refinery, and it has been named one of Canada's top 100 employers for the past two years (North Atlantic, 2007). It was recently sold to Harvest Energy Trust of Calgary, Alberta, Canada.

13.3.2 Proposed Projects

Table 13.2 lists two proposed large-scale projects in Placentia Bay as well as proposed activities at the Kiewit Offshore Services, Marystown, each of which could place significant demand on labour, training and business as well as infrastructure and some aspects of land use, if they proceed concurrently with the Project.

Table 13.2 Socio-Economic Cumulative Effects Assessment Proposed Project Inclusion List

Project (Proposed in Placentia Bay)	Timeline		Employment		Total Invest-ment	Status	Notes
	Construction	Operation	Construction	Operation			
LNG at Grassy Point (Arnold's Cove)	2007-2009	2010-2060	375	164	$500+ million	EIS	
VBNC Smelter (Long Harbour)	2008-2011	2011-2026	3,000	400 (Hydromet Plant) or 350 (Matte Plant)	N/A	EIS	120 currently employed at demonstration plant
Kiewit Offshore Services Marystown Shipyard (Marystown)	JSS and various projects		-Currently 200 – estimated on average 600 over the next 9 years.		$2.5 billion	Proposal	Various other projects include 2 Ro ferries for NL, PWGS mid-shore patrol vessels, 3 anchor handling tugs
NLRC (Southern Head)	2008-2011	2011-onward for 25+ years	3,000	750	$4.6 billion	EIS	
Total	NA	NA	approximately 7,000	approximately 1,300	$8.6 billion	NA	NA

LNG at Grassy Point (Arnold's Cove) will employ approximately 300-500 workers during construction and 175 during an operating period of up to 50 years (M. Turner, pers. comm.). Project construction will include three jetties with berthing capability for LNG tankers up to

265,000 m3, a tugboat basin and eight LNG storage tanks. The purpose of the terminal will be to provide LNG transshipment and storage services for Canadian and northeastern United States LNG importers and providers (Newfoundland LNG Ltd, 2007).

Voisey's Bay Nickel Company Commercial Processing Plant (Long Harbour) is using a demonstration plant at Argentia to test the technology and the feasibility of constructing a hydrometallurgical processing plant in Placentia Bay. The plant will process 50,000 tonnes of finished nickel annually as well as associated copper and cobalt products. Should this commercial facility proceed either as hydrometallurgy processing plant or as a matte processing plant, it is expected to support a peak of 1,000 jobs during construction and approximately 400 jobs annually during operations. Construction is scheduled to begin in spring of 2008 and be completed by summer of 2011. Operations will occur between fall 2011 and fall 2026. Rehabilitation closing will occur between 2026-2031.

The **Kiewit Offshore Services (Marystown)** is one of two shipyards remaining in the competition for the $2.5 billion Joint Support Ships (JSS) contract with the Department of National Defence. The contract will see the construction of three navy vessels, with peak employment forecast at 600-700 workers for the nine-year project (delivery of first vessel in 2012; the last in 2016). The shipyard is also in the running to construct two ro-ro provincial ferries, two anchor tugs to undertake fabrication work for Husky's White Rose project, and fabrication for Voisey's Bay project (P. Power, R. Hogg, pers. comm.)

Other potential projects, not in Placentia Bay, include the Continental Stone Quarry, Lower Churchill River Hydro-Electric Project, Bloom Lake Iron Ore Project, Aurora Energy Uranium Project, Rambler Metals and Mining Copper-Gold Project, and the development of the Hebron oil field. These projects are considered in the assessment of cumulative effects on the economy, labour force and business.

13.4 Effects Assessment

13.4.1 Population Change

The following sections assess the cumulative effects of the proposed Placentia Bay projects, taking into account other projects proposed for the province. This combination could change the population, economy, education and training, physical infrastructure, social services infrastructure, emergency services infrastructure and land use, primarily in the Study Area.

Predicted Cumulative Effects

Construction

With the exception of some major service centres, the population in rural Newfoundland and Labrador communities has been decreasing response to declines in key industries (e.g., fishing, forestry), the conclusion of a number of large-scale construction projects (e.g., Terra Nova,

White Rose) and the resulting reduction in employment opportunities. Rural populations are also aging as patterns of out-migration lure young people of working age to other areas. This reduction in population has compromised the economic longevity of many rural communities and changed the traditional patterns of rural life in the province.

Assuming that some of the proposed projects for the Placentia Bay region will proceed, it is anticipated that some, perhaps many, Newfoundland and Labrador residents will return to the province for work. Typically, younger workers and those who have settled in other areas, perhaps with their families, are less likely to return to the province, especially if the nature of the work is short-term. Workers who have left family behind in heading west, workers who are older with more solid provincial roots and those who may be nearing retirement years are most likely to return. Unionized workers who will qualify for priority in securing longer-term employment may also return. Labour demands that cannot be addressed through the provincial workforce may foster temporary unionized in-migration of workers from other provinces and other countries, depending on the competitiveness of the wage rates.

For the most part, returning Newfoundland and Labrador residents will be those individuals who technically never left (i.e., they still have residences and pay taxes) and, thus, will not affect the population of the region. But some key project personnel will move to the service areas and some people who moved away will return home hoping that the three-year construction period will turn into longer-term operations jobs.

The most important question is: “How many people who actually moved away will return permanently?” Anecdotal and prevailing common sense suggests that not many will, in the short-term. They are more likely to return to the province temporarily, stay in work camps or with relatives, and take a wait-and-see attitude until the operations phase. If they get permanent competitive paying jobs, they will most likely move back home with their families.

Given that the number of temporary construction jobs in the Placentia Bay region, if all projects proceed, is expected to peak at approximately 7,000, and assuming that approximately half of the workers will be from the region (either already resident or returnees to existing homes), it is anticipated that approximately half of the remaining workforce (approximately 3,000) would come from other parts of the Island, other parts of Canada and internationally and be housed in the work camp. The rest of the required workforce is anticipated to be from other parts of Canada and internationally and will also be housed in the work camp. This significant number of construction workers and the actual construction-sites themselves will result in additional indirect and induced jobs created in the supply of goods and services, and in residential and non-residential construction.

For each direct construction job created, another 2.15 indirect and/or induced jobs are also created, not necessarily all located in the Placentia Bay region (J. Abbott, pers.comm). The sheer number of direct and indirect construction jobs could result in people moving into the

larger centres, particularly St. John's and Clarenville, to pursue business opportunities for both the direct construction and operations phases (hotels, restaurants, maintenance and repair, catering, waste handling, marine services, etc.). There is no method of accurately predicting the number of spin-off jobs and influx people who might move into the area, but it could be in the range of several thousand.

Operations

The permanent populations in the service centres and, to a lesser degree, the smaller communities are expected to begin building up during the last year of the construction phase as people begin to be hired for long-term operations jobs. Key commercial hubs within the project areas – Clarenville, Marystown, and Placentia, and to a lesser degree the Conception Bay South-Mount Pearl-St. John's area – are expected to realize the highest levels of population growth as residents gravitate to communities that offer increased levels health care, schooling, secondary employment for other family members, and recreational activities. Traditionally the provincial workforce is highly mobile and will not be compromised by the distance they must commute.

A number of direct and induced spin-off jobs will be created during the operations phase, though not necessarily in the Placentia Bay region or the Province. For each direct job created during the operations phase, another 1.9 jobs are created in the provincial economy.

Increases in community population may be a challenge in terms of ensuring that the housing, recreational, health and other infrastructure can absorb the increase in population without increasing cost of living in the area. For example, housing will be a major requirement and this could result in increased housing prices. A strain on the social network might also compromise the overall quality of life. However, the increased economic activity, incomes and economic self sufficiency among the population is expected to generate positive impacts that will more than mitigate negative effects.

Given that the number of permanent jobs is expected to be approximately 1,300 and assuming that approximately 50 percent will be from the area, including returning Newfoundlanders and Labradorians, it is anticipated that approximately 650 people would move into the Study Area, but some of these could commute from St. John's. Thus, it could be reasonable to assume approximately 200 people might move into the Study Area as a result of indirect business opportunities and another 500 or so as a result of direct operations employment. This is based on reasonable expectations and not on any quantitative data.

Cumulative Effects Management

Construction and Operations

Efforts will need to be taken to ensure that community infrastructure will support the anticipated increase in population. The most immediate issue will be the need for appropriate housing for a wide range of workers and families, and this needs to be addressed by the project proponents and local government prior to start-up. Housing is addressed in Section 7 of this document.

Other issues that will need to be addressed are the adequacy of health care, training and recreation infrastructure, as well as access to other amenities workers will expect. Each of these issues is addressed in the following sections.

Characterization of Cumulative Effects

Construction

The cumulative effects of the population increases can be negative and/or positive, are predicted to be medium in magnitude with a local and regional geographic reach. Duration of the impacts will be medium-term (5-7 years) and frequency of the effects will be continuous until such time as construction is completed and the projects shift to operations; at this stage the effects of population growth will be reversible. The level of confidence assigned to this prediction is medium since a population increase will occur, but the degree to which it will occur is unknown. Mitigation efforts to reduce negative impacts will require project proponents, local and provincial governments and other stakeholders to work collectively to ensure infrastructure and services meet population needs. Certainty of this effect is high, mitigation success if implemented could be moderately effective, and the overall effect is moderate.

Operations

The cumulative effects of the population increases can be negative and/or positive, are predicted to be medium in magnitude with a local and regional geographic reach. Duration of the impacts will be long-term and frequency of the effects will be continuous. Since reversibility is not a desirous state, it is not assessed. The level of confidence assigned to this prediction is medium and with high certainty that effects will occur. Mitigative efforts to reduce negative impacts will require project proponents, local and provincial governments and other stakeholders to work collectively to ensure infrastructure and services will meet population needs. Mitigation success is considered moderately effective and the overall significance of the effect is moderate.

Monitoring and Follow-Up

As the 2006 census was done prior to pre-construction, the 2011 Census will provide a good indicator of demographic shifts. During the intervening years, communities can monitor

demographic change themselves or through the Placentia Bay Integrated Management Committee.

13.4.2 Labour

Predicted Cumulative Effect

Construction

In 2006 the provincial government commissioned the Skills Task Force (STF) to consider the future demand for skilled tradespeople in the province and the ability of the workforce to respond to these demands (*All the Skills to Succeed*, March 2007). The STF also considered the cumulative demand for labour that would be generated as a result of large-scale industrial projects, both for those already in operation (Hibernia, Terra Nova, White Rose oil field and IOC mining operations) and new projects well-advanced in their planning stage (e.g., Voisey's Bay Nickel Company, the development of the Hebron oil field and the Lower Churchill River Hydroelectric Project). The STF report assessed three scenarios. The second scenario included the proposed refinery and its demand for labour.

The vast majority of labour associated with large industrial projects occurs during the construction phase. As can be seen from Table 13.2, if all major projects in Placentia Bay proceed during the same time period (2008-2010 or 2011), the peak demand for all construction jobs will be about 7,000. During the operational stages labour demands and range of skills required will decline; labour demand will be about 1,300 beginning in 2009 and increasing until 2011. If Kiewit Offshore Services, Marystown Shipyard, wins the award for the construction of three navy vessels, their construction period will last until approximately 2018.

If these projects proceed concurrently significant labour shortages are likely to occur particularly for skilled trades since all projects will be competing for the same labour pool. There are not enough work in the province to proceed with all of these projects at the same time.

If the projects proposed elsewhere within the province proceed during the same timeframe (e.g., Lower Churchill River Hydro Electric Project and the Continental Stone quarry at Belleoram), the demand for construction jobs at peak employment could exceed 10,000. Not taken into consideration are other mining projects with a likelihood of proceeding through the environmental assessment stage (e.g., Aurora Energy) and some of the smaller mining operations in central Newfoundland (e.g., Rambler Metals).

Based on project schedules, peak labour demands for identified occupation groups, new graduates in each of the occupations between 2007 and 2011, retirements/deaths and absence of any consideration for out-migration, the Skills Task Force developed estimated shortages in specific occupations between 2006 and peak labour demand. This analysis indicates that the province will experience significant labour shortages in Welders and related machine operators,

Truck drivers, Carpenters, Ironworkers, Industrial electricians, Civil engineers, Electricians, Concrete finishers, Plumbers and Drillers and blasters.

Deficiencies are also expected to occur in other occupations including accountants, financial auditors, petroleum process operators and several engineering fields (*All the Skills to Succeed*, March 2007, pp. 21-22).

A number of factors will collectively cause these labour deficiencies, including:

- Unprecedented industrial development in the province;
- Significant out-migration in recent years to other provinces, most notably Alberta;
- Aggressive national recruitment programs by many other provinces and companies outside of this province;
- High demand for labour in Alberta for the same occupations as those needed by our Province, causing significant skilled trades shortages in the coming years throughout Canada;
- Between 2005 and 2014, the retirement of approximately 2,972 construction workers who will need to be replaced (Cardozo, 2006);
- A certification process that compromises the opportunity for individuals to becoming apprentices or journeymen, resulting in apprentices leaving the province for a larger job market so that they can become certified or find meaningful work without their certification;
- Low literacy and numeracy levels;
- Lack of state-of-the-art skills for large industrial projects due to skilled tradespeople leaving the province; and
- Lack of women in skilled trades occupations (less than 1 percent).

This competition for labour is not expected to ease. In fact, it will likely intensify as other provinces also advance industrial development projects, incur labour deficiencies and launch aggressive recruitment campaigns. In this environment, wage rates and other non-wage benefits – signing bonus, housing supports, community supports, flexibility in work, educational supports and even the employer's reputation as an employer – will all become competitive factors in recruitment.

If the labour demand cannot be filled by workers who live in the province or who will be returning from other areas of the country, skilled and unskilled workers will have to be brought in from other parts of Canada and other countries, if they can be found. Another outcome could be that some of these projects may not proceed within the given time frame if labour cannot support construction.

The reduced demand for labour, once concurrent projects end construction phases, could create another challenge. Large layoffs of project labour from multiple projects could be high, particularly if multiple projects have established dedicated pools of workers. If all projects were

to conclude construction at approximately the same time, the number of people who would find themselves without work could be as high as 5,000 – unless some find work during the operations phase. Nonetheless, these workers would likely have to migrate to other economies if there was insufficient work to support them in the province. This, in turn, would create a classic boom-bust situation and have an adverse impact on local, regional and provincial economies.

Operations

During the operations stage of the projects, the demand for labour declines somewhat, but still remains high, at an estimated 1,300 – not including Kiewit Offshore Services, Marystown. It is anticipated that the construction phase will have established a reasonable labour pool and many of the workers in the construction phase may be able to fill some of the positions. The projects will also have had sufficient time to recruit workers needed for operations, but this still could be a challenge given the competitive demand for labour nationally.

Cumulative Effects Management

Construction

In terms of securing the required labour pool for the proposed projects, this project alone cannot mitigate against labour shortages. This EIS does not have the authority or mandate to mitigate cumulative effects for VECs, but it can be used as a planning tool to support other groups and government departments in their planning and management exercises. Some of the cumulative effects management measures include:

- Changing the process of qualifying workers for journeyman status and providing supports to enhance the completion rate of apprenticeship, thereby increasing the labour pool and making it ready for large industrial projects;
- Extending the mandate of the Skills Task Force to develop a comprehensive provincial strategy to advance the provincial labour pool. Key strategies could include:
    - recruiting out-migrants back to the province;
    - promoting careers in skilled trades;
    - improving skills counselling in schools;
    - increasing educational opportunities for people interested in a career in skilled trades;
    - helping to modify the process for journeyperson certification;
    - developing alternative approaches to deliver education/skills upgrading opportunities;
    - retaining and retraining older workers;
    - accelerating women's programs in trades;

- providing opportunities for workers to remain in their communities while undertaking skill upgrades should also be targeted; and
- establishing programs/incentives and accelerated programs to increase the number of women who enter into skilled trades positions as an effective solution to predicted labour shortages.

A key but problematic solution for managing labour demand for the projects would be that, through either planning or unforeseen project delays, schedules would effectively result in sequential staging of the projects. Projects would not have to compete for the same labour pool, but could effectively share that labour pool through project timing for work components. With this approach, the work secured by the local labour pool could range over a longer period of time as workers move from one project to the next. As well, the prospect of layoffs would be deferred and the numbers of workers who might be displaced would be reduced.

Operations

Most of the key strategies applicable to the construction phase also apply to the operations phase.

Characterization of Cumulative Effects

Construction

During construction periods, the cumulative effect on labour is expected to be positive and of high magnitude, and the geographic impacts will be local, regional and provincial. Regions most affected will be the Burin, Bonavista and Avalon Peninsulas. The duration of the impacts will vary with project stages and is predicted to be medium-term for construction phases. Frequency will be continuous during construction and there will be no desire to reverse the impacts if labour supply was matched with demand. The level confidence assigned to this prediction is medium to high; the certainty of the effect is also medium to high. Mitigation success is considered moderately effective if implemented, and the effect is considered significant.

The cumulative impact of large-scale layoffs among several projects would have a high magnitude, adverse impact on local, regional and provincial economies. Without confirming project schedules, the impact is difficult to predict. If, however, the projects proceed, concurrently, layoffs will be high and many workers displaced, possibly triggering a wave of out-migration. This effect would occur intermittently and could range from medium- to long-term, and the stability of the provincial economy would require reversal. The level of confidence assigned to this prediction is medium to high; the certainty of the effect is also medium to high. If schedules are staggered to mitigate this effect, then the success of mitigation could be high. This effect is considered significant.

Operations

During operations, the cumulative demand for labour will be reduced. The adjusted levels of employment will still be significant to the local and regional economies and are predicted to have continuous, positive medium magnitude effects. The duration of these impacts will be medium- to long-term, depending on the project. There is no desire for these effects to be reversed. The level of confidence assigned to this prediction is medium to high; the certainty of the effect is also medium to high. Mitigation success is considered highly effective.

Monitoring and Follow-Up

Individual companies will track and monitor their employment statistics. The Government of Newfoundland and Labrador will also monitor employment statistics through its Department of Human Resources, Labour and Employment.

13.4.3 Business

Predicted Cumulative Effects

Construction

As outlined in Table 13.2, a number of projects will occur within the Placentia Bay region concurrent with the Refinery Project. The total cost of construction for all projects over their lifespan is estimated at $8.6 billion; annual operating expenditures are not available. Not all of these expenditures will occur within the province, but the cumulative opportunities for local businesses presented by these projects will be significant, especially through the construction phases when sourcing is at its highest. Businesses that do not directly provide goods and services to the projects, will also benefit directly from increased incomes and spending by workers and their families along with indirect spending during the construction phase.

As projects proceed, businesses can experience the following effects:

- Demand for goods and services from multiple projects will provide greater certainty for businesses in expanding their operations as opposed to a single project and will also offer the opportunity to recover investments at a faster rate;
- Multiple projects will enable businesses to increase their purchasing power, secure better pricing, realize improved efficiencies within their own operations and generally reduce their overall costs relative to sales;
- Local businesses will have opportunities to partner with larger-scale operations as a tool in building their capacity and realizing increased success in procurement; and
- The minimum standards for the provision of goods and services in terms of quality, delivery and reliability will develop the ability of businesses to compete in the global marketplace.

History shows that St. John's, Mount Pearl and Paradise firms, and select firms elsewhere in the province, are successful in securing a significant portion of industrial development project expenditures made in the province. For example, the Canada – Newfoundland and Labrador

Offshore Petroleum Board estimates that approximately 27 percent of the development phase expenditures for the Terra Nova project and 47 percent of the Hibernia project were captured in the province. Provincial businesses are expected to capture about 33 percent of their construction expenditures on the White Rose project (Government of Canada, October 2006; Petroleum Research Atlantic Canada, November 2003).

The construction phases generally provide most of the procurement opportunities for local businesses and they tend to be concentrated in the following areas engineering, construction and construction services, catering, suppliers of industrial goods and services, fabrication facilities (small-scale), excavation and site development, communications firms, service sectors and transportation services.

If construction proceeds concurrently on a number of projects, businesses will be affected somewhat differently. Certainly, the effects listed above would occur and some businesses would undoubtedly realize significant benefits; furthermore, the capacity that businesses develop in responding to initial projects will enhance their ability to meet procurement needs during the operations phase and on subsequent projects.

There is also the risk, however, that procurement demands will be so high that local and provincial firms may not have the capacity to respond. This may force project proponents to increase their sourcing from outside the province, thereby minimizing associated opportunities for local businesses. This would reduce the potential benefits to the provincial economy.

Companies also face the risk of not being able to fulfill large and long lead-time items because of the high demand for such items both within Canada and worldwide, which is compounded by labour shortages to produce these items.

Significant impacts associated with the conclusion of the construction phase could occur. There will be a significant reduction in labour requirements, resulting in reduced household incomes, which in turn could adversely affect local businesses that rely on the general public for sales. Businesses supplying goods and services may also realize a significant decline in sales. In this regard, there is a risk that economies will experience negative effects as they transition from “boom” to “bust” ” scenarios.

Operations

The same effects as described for the construction phase would also occur, but with less outsourcing. It is difficult to identify what components of operational expenditures will be captured by businesses in the area; however, local services may be contracted for housekeeping, catering, maintenance and repair, marine services, transportation, communications, and professional services, to name a few. Fabrication yards will be kept busy with maintenance and repair and indirect businesses such as hotels, restaurants, and personal services will pick up the seasonal slack previously experienced before these projects were developed.

Cumulative Effects Management

Construction

Efforts should be taken to maximize the potential cumulative business effects for the Placentia Bay region created by multiple projects proceeding concurrently and ensure that local businesses are prepared to compete for identified contracts. The development of appropriate strategies cannot be completed by project proponents alone; all stakeholders must be engaged. In order to maximize local benefits, a procurement strategy should be developed by project personnel that could include, at a minimum, the following:

- Establishing targets for the procurement of goods and services within the project area;
- Identifying the types of common goods and services that might be sourced locally and provincially;
- Identifying opportunities for joint ventures;
- Providing supports to local businesses to ensure they understand the bidding process as well as the criteria used for judging bids;
- Working with local companies to identify potential impediments to successful bidding; and
- Ensuring that tender calls reflect the capabilities of local business.

Local governments, chambers of commerce, industry associations (e.g., NEIA, NOIA), government departments (e.g., INTRD) and local economic development groups within the Study Area should also work collectively to develop and execute strategies that will assist local businesses in competing for project-related work. These strategies could include:

- Disseminating procurement information and helping businesses to respond effectively to bid process;
- Working with local businesses to provide counselling on issues such as adjusting their operations to meet large-scale project needs, increasing their efficiencies, developing their infrastructure and other issues;

- Providing a matching service to help businesses find potential joint venture partners to enhance their capabilities and capacity;
- Identifying gaps within the local business community where local sourcing provides an opportunity for development; and
- Identifying the work protocols that suppliers will be expected to follow within a unionized environment and working with businesses to develop approaches that will complement such protocols.

When the construction phase ceases for these projects, a significant decrease in business activities could occur. It is difficult to predict to what extent this may happen, but advanced planning should occur to minimize the boom-bust effects and to ensure contacts and contracts made during the construction phase are extended to the operations phase where appropriate.

Operations

In this phase fewer opportunities will exist for procuring supplies and services than during the construction phase. So, local and provincial businesses should acquaint themselves with the types of goods and services that will be required on an ongoing basis. Business groups, governments and companies have a role to play in identifying these types of goods and services.

Characterization of Cumulative Effects

Construction

Should multiple large-scale projects proceed concurrently as anticipated, the cumulative effects for businesses will be positive and significant. The level of effects will depend on the projects' schedules in relation to each other and whether declines in procurement are staggered or occur concurrently. Effects will be short- to medium-term. Effects will be local and regional and are predicted to be high. Frequency of the effects will reflect the construction schedules of the projects. Reversibility of the effect is not desired and therefore is not assessed. The level of confidence in the predictions is medium and the certainty of effect is also medium to high. Enhancement success, if implemented, could be highly effective.

Operations

During operations the requirement for outsourcing of goods and services generally declines; however, demand for these services (depending on what services are still required in the operations phase) would still be significantly higher than if the projects had not proceeded. Some businesses relying on the general public will also experience a decline in sales reflecting the decline in employment, but within the Study Area people will feel secure in long-term jobs and will increase their spending on discretionary items. Cumulative effects on business will have positive or negative impacts based on project schedule and goods required, positive if projects are staggered and negative if procurement for all projects proceeds concurrently and

concludes. Effects are expected to be medium-term in duration, local and regional, and are predicted to be moderate to high after the construction phases. Frequency of effects after construction will be continuous pending new projects. The level of confidence in the predictions is medium to high and the certainty of effect is also medium to high. If all mitigation measures are implemented, then mitigation success could be highly effective.

Monitoring and Follow-up

As part of a socio-economic commitment to monitoring of projects in the Placentia Bay region, companies should compile data regarding specific supplier development initiatives and the level of participation in these initiatives. They should also provide full disclosure of their tendering practices, evaluation criteria and the merits of individual contracts awarded. They should also compile annual statistics on the number, life-span and value of contracts that have been secured by local and provincial businesses. Companies should also work with relevant provincial government departments in reporting these numbers and their value to the local, regional and provincial economy.

13.4.4 Summary of Cumulative Effects on Population and Economy

If significant numbers of Newfoundland and Labrador residents living elsewhere can be recruited to return to the province to work during the construction phase of the proposed Placentia Bay projects, the impacts to population, employment and business are manageable. If they do not return and workers need to be imported, a different impact on the economy and related services will occur in housing, as needs will increase, and in local spending, as a certain portion of wages will leave the province.

Assuming that many out-migrants return to obtain employment during the operations phase, and/or if construction schedules can be staggered over a longer time period, then the impact on labour and business opportunities is manageable and positive.

Table 13.3 provides a summary of all cumulative effects on population and the economy.

Table 13.3 Summaries of Cumulative Effects on Population and the Economy

Socio-Economic VEC	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Level of Confidence	Certainty	Mitigation Or Enhancement Success	Significance
Population (Construction)	Negative and/or Positive	Medium	Local, Regional	Medium-term	Continuous	Yes	Medium	High	Moderate	Moderate
Population (Operations)	Negative and/or Positive	Medium	Local, Regional	Long-term	Continuous	NA	Medium	High	Moderate	Moderate
Labour Supply & Demand (Construction)	Positive	High	Local, Regional, Provincial	Medium-term	Continuous	NA	Medium-High	Medium-High	Moderate	Significant
Labour Supply & Demand (Operations)	Positive	Medium	Local, Regional	Medium to Long-term	Continuous	NA	Medium-High	Medium-High	High	Significant
Labour Supply & Demand (Large Scale Layoffs Post-Construction)	Adverse	High	Local, Regional, Provincial	Medium to Long-term	Intermittent	Yes	Medium-High	Medium-High	Low	Significant
Business (Construction)	Positive	High	Local, Regional	Short to Medium-term	Will be concentrated in construction phases and stabilizing thereafter	NA	Medium	Medium-High	High	Significant
Business (Operations)	Positive or Negative	Moderate-High	Local, Regional	Medium-term	Continuous	NA	Medium-High	Medium-High	High	Significant

13.4.5 Commercial Fisheries, Aquaculture and Processing

Predicted Cumulative Effects

The discussion of cumulative effects focuses on commercial fish harvesting. The cumulative effects of the proposed new projects in combination with existing operations will be particularly noticeable in inner Placentia Bay, within the vessel traffic lane. However, maps of fishing activity indicate that crab fishers harvesting this species in the outer portion of the Bay – for example in the approaches to the traffic lane between 46 30 N and 46 45 N – will also be affected by increased traffic. Aquaculture operations are not located in the areas of increased traffic. Similarly, the processing sector should not be affected by the cumulative operations effects considered.

Construction

Construction activities for the three new projects in inner Placentia Bay (the refinery, the LNG transhipment terminal and the nickel processing plant) are scheduled for the same general time period, from 2008 to 2011. This anticipated level of large vessel activity will result in increased traffic movements within, and throughout, the existing Traffic Separation Scheme. The result could be higher levels of fisheries interference than fishers say they are experiencing even with the present levels of traffic.

During the two or three years before operations begin, it is important that all marine users use this time to address existing issues and begin planning ways to resolve or mitigate the identified concerns and issues associated with operations.

Two forums are available to assist in these discussions: the Placentia Bay Traffic Committee chaired by CCG; and the Placentia Bay Integrated Management Committee.

Also during this pre-operations planning period, SmartBay will become more well-established, and mariners will no doubt be making more widespread and effective use of these SmartBay "real-time" data and marine communications technologies.

The pre-operations time period also provides an opportunity to collect information to confirm various operational interactions, such as the extent of near-misses and close-quarters situations.

Operations

All three new projects and the two major existing operations will have vessels travelling to and from their facilities. The number of vessels using the traffic lanes could more than double the current levels, depending on final operational plans. North Atlantic Refinery receives approximately 325 vessels and NTL approximately 350, for a total of 675 in a year. In a given

year the proposed LNG terminal will receive from 104 to 400 vessels (in approximately 10 years time); the VBNC plant will have 30 and the NLRC Refinery between 400 and 450. The total annual traffic associated with these five projects would be between 1,205 and 1,555.

In spite of best efforts at planning and scheduling, there may be additional use of designated anchorages. A study completed through the Placentia Bay Traffic Committee recommended that no new anchorages be created in inner Placentia Bay. Fishers have reported loss of fishing grounds within some of the existing anchorages, as well as additional interference caused by anchored vessels.

While Construction Safety Zones around new marine facilities will eventually be eliminated, there will continue to be limited areas around each of the new marine jetties where manoeuvring tankers (or cargo vessels) will restrict the presence of fishing vessel and gear. In discussion with fishers, the point was often made that any activity that causes fishers to be displaced from fishing grounds that he or she typically uses, causes a ripple effect, meaning that additional fishers may also be displaced.

There may be traffic congestion at the mouth of Come By Chance Bay with potentially four large marine terminals operating: all of the additional vessel traffic will use this area. The Placentia Bay Traffic Separation Scheme terminates at this point. All of the additional traffic entering Come By Chance Bay will have travelled the entire length of Placentia Bay via the TSS/VTSS.

The increase in number of vessels also increases the potential for gear loss or damage.

Cumulative Effects Management

To date in Placentia Bay, the system managers and the protocols used by the existing refinery and the crude oil transhipment terminal have been successful in ensuring safe passage of vessels. Transport Canada and CCG are confident that the Placentia Bay traffic management system can accommodate the increased vessel traffic that would result from the proposed new projects in combination with existing operations.

NLRC believes that it is essential that all marine users in Placentia Bay participate in the traffic system. At present, the great majority of Placentia Bay fishing vessels are not required and do not participate in the system.

NLRC recommends that the projected increase in vessel traffic be a catalyst for an all-user review of Placentia Bay traffic management.

One of the prime objectives of the review is to improve and enhance the operating environment of the vessel traffic management system so that all marine users are participants. This would create a much safer, more secure and efficient working environment that will not impede the fishery.

The policy objectives, principles and key components of an enhanced management system will need to be developed jointly and co-operatively. NLRC will commit resources to this process, and will encourage participation.

The Placentia Bay Traffic Committee is the obvious forum for initiation of this important initiative. This multi-stakeholder group is already recognized for communicating, discussing and resolving the area's traffic management issues, fisheries industry concerns, user-group conflicts and day-to-day operational issues. NLRC believes this Committee has the mandate, expertise and experience to lead and oversee this new initiative, and is fully committed to supporting this forum in future.

NLRC anticipates as one of the outcomes a *Placentia Bay Marine Code of Practice,* which will provide a new policy framework for planning, co-ordinating, managing and monitoring vessel interactions within the Bay that reflects the current situation and the projected changes to marine traffic in the Bay. It would address day-to-day activities as well as emergencies and would connect all marine users.

Considering the concerns of Placentia Bay fishers discussed and assessed above, one of the fundamental goals of the new *Code* and management system would be vessel management policies, protocols, procedures and guidelines designed (jointly) to guarantee, enhance and foster a safe, secure and efficient working environment for all fishing enterprises operating within the Placentia Bay Traffic Management Zone. NLRC is fully committed to making this a reality for all participants who rely on fishing grounds within the traffic management zone.

During discussions between NLRC and fishers, fishers have suggested a number of actions to address their concerns, including speed limits in the Bay, earlier boarding by pilots, a fisheries watch on tankers, buy-out of fishing enterprises. Other marine users may have additional suggestions and recommendations for various aspects of the traffic management system: for example, pilots have suggested that due to the size of the designated anchorages, they may be able to accommodate as many as three vessels per anchorage.

The Code could also address fishers' concerns about their safety and security when crossing the traffic lane en route to and from their fishing grounds. For example, these protocols could establish formal traffic lane crossing routes or fishing vessel hail-in measures/procedures. NLRC is also strongly committed to industry-wide initiatives that would encourage fishing operators to adopt new AIS vessel communications technologies and monitoring procedures.

Closer to the refinery site, NLRC will work closely with other industries and project proponents to establish a marine Vessel Traffic Management Plan (VTMP) specifically for the marine area between the north end of the existing traffic lane and the entrance to Come by Chance Bay. This plan would establish traffic management procedures and protocols, and other measures

designed to minimize traffic interactions. This VTMP would ensure that that tankers, tugs, etc., followed agreed route(s) to their respective Marine Terminals.

Over the long term, NLRC will also work with Placentia Bay fishers and FFAW representatives, other industry user groups (NAR, NTL, NL LNG and VBNC), regulatory agencies (e.g. CCG, DFO and Transport Canada), and with managers of SmartBay, to develop and encourage a wide range of mitigative measures, research initiatives, or technology investment projects designed to enhance, improve the area's marine operating environment.

Characterization of Cumulative Effects

An initial increase in the vessel traffic that is already causing concern will be adverse but as measures are taken to address the situation, it will change to positive. Magnitude is medium as it will measurable and will have effect at both the local and regional level. Duration is long term and frequency is continuous . The effect is reversible as the resulting changes will lead to an improved working environment. The confidence and certainty are high. Mitigation will lead to enhancement of the working environment and is considered highly effective. The effect is significant and positive with a new management framework in place for marine users.

Monitoring and Follow-up

Monitoring and follow-up will through the Placentia Bay Traffic Committee; statistics from the Placentia Marine Communications and Traffic Services centre; and regulatory agencies as well as, in NLRC's case , through the Refinery Fisheries Liaison Officer.

The geo-referenced fishing activity obtained from DFO for the Refinery EA was very useful in determining potential effects. More complete geo-referenced datasets would be useful to bay-wide efforts to predict and monitor and manage potential interactions among Bay marine users (Table 13.4).

Table 13.4 Cumulative Effects on Commercial Fisheries

VEC	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Level of Confidence	Certainty	Mitigation	Significance
Commercial Fisheries	Adverse, changing to positive	Medium	Local and regional	Long term	Continuous	Yes	High	High	High	Significant

13.4.6 Health and Community Services

Predicted Cumulative Effects

Construction

The predicted cumulative effect on the health and community care services in the region is expected to cause significant periodic demands on all aspects of the current system. During the construction phase, an increase will occur for pre-service medicals, care for project-related accidents and general health care maintenance for all construction workers regardless of where they live. However, as a result of well-paying jobs, many of which will lead to permanent employment, a positive effect on mental health will occur for some regional residents, many of whom have experienced the negatives of seasonal, low-pay, or even no employment.

Increases in the numbers of workers in the region will place additional demands on community health and family services agencies to address a variety of issues including substance abuse and addictive behaviour, family abuse and money management issues. Although current staff can now meet existing demands for their services, given the large number of construction workers expected in the area, an increased demand on social services is anticipated that will necessitate an increase in staff.

Operations

The demand for health and community care services is alleviated slightly over time when construction is completed and the operations workforce, many of which live in the area, is in place. Further, as a result of stable well-paying jobs, a positive effect on mental health will occur for some regional residents.

Since many of the workers will be from the regional area, and will be employed full-time at well-paying jobs, there should be a decrease in the need for community health and family social services from the construction phase since issues related to unemployment and low incomes will be addressed. Given the high level of employment in the area, some stresses could be experienced by individuals on fixed income due to wage disparities and increased cost of living.

Cumulative Effects Management

Construction

The negative effect of increased pressure on the health and community care system will need to be managed by the project proponents in coordination with Eastern Health. To meet demands, it will be necessary for each project proponent to:

- Employ its own health care staff to conduct routine, preventative maintenance health initiatives;

- Ensure that health care services for commuters are obtained in their home communities, rather in those closer to the project site;
- Share, on a regular basis, project plans and schedules with Eastern Health so that levels of service can be addressed for acute health care, hospital infrastructure, mental and public health services (i.e., those services that may not be provided by each company); and
- Implement preventive health and safety programs and initiatives to encourage healthy living practices and reduce the risks of (preventable) accidents and diseases.

To manage cumulative effects NLRC will promote the development of a regional industry-community service agency committee that will discuss common issues and collaborate on initiatives for enhancement or mitigation. All project proponents will be required to prepare and implement employee heath and safety plans, which promote healthy living practices and prevention, thereby lessening the need to seek social services in the community.

Operations

Since many of the employees at these large projects will be from the regional area, there will be a limited increase in demand for services. However, any increase in services places a demand on the current system and, the cumulative effects suggested for construction will need to be carried over into the operations phase.

The same approach to cumulative effects management suggested for the construction phase also applies to the operations phase.

Characterization of Cumulative Effects

Construction

The residual project effect on health and community care services is considered potentially adverse since it places more short-term demands on the current system, medium in magnitude since these stresses will be mitigated over time, regional, and medium-term. Frequency of the effect is continuous until it can be mitigated through increases in staff and service capacities. The effect is reversible, and the level of confidence in this assessment is high, with a high certainty of occurrence. The mitigation success is considered moderately effective since certain types of health care for an increased population of workers and their families cannot be provided by the projects. The significance of the effect is moderate.

An increase in population in the region will mean that more services are required. The cumulative effect on community health and family social services is therefore adverse, low, and regional in geographic extent. Duration of the effect is short- to medium-term, and the frequency is continuous until the new population settles into community life. The effect is reversible, and the level of confidence in this assessment is medium, with certainty of the effect also being medium. The mitigation and enhancement success are moderately effective and the significance of the effect is moderate.

Operations

The residual project effect on health and community care services is considered adverse since it places more ongoing demands on the system, medium in magnitude since these stresses will be mitigated over time, regional, and medium-term. Frequency of the effect is continuous until it can be mitigated through increases in staff and service. The effect is reversible, and the level of confidence in this assessment is high, with a high certainty of occurrence. The mitigation success is considered moderately effective since certain types of health care cannot be provided by the projects. The significance of the effect is moderate.

An increase in population in the region will mean more demand for services. This effect lessens over time as the construction period wanes, as families settle into the communities and social services providers assess needs and implement plans to respond to these needs. The cumulative effect on social services is, therefore, neutral and low, and is regional in geographic extent. Duration of the effect is long-term, and the frequency is continuous. The effect is reversible, and the level of confidence in this assessment is medium, with certainty of the effect also being medium. The mitigation and enhancement success are moderately effective and the significance of the effect is moderate.

Monitoring and Follow-Up

Eastern Health will monitor the number of visits and the type of services provided to project personnel. Discussions between Eastern Health and the various projects will need to occur on an ongoing basis regarding general and specialized medical services. As part of its commitment, NLRC will promote a regional industry-health and community service agency committee that will discuss common issues and collaborate on initiatives for enhancement or mitigation.

Eastern Health and the Department of Human Resources, Labour and Employment will monitor the number of referrals and visits to its services and programs. Any issue related to an increase or decrease in demand, particularly for a specialized service, will be discussed with the projects at the interagency/projects level.

13.4.7 Summary of Cumulative Effects on Health and Community Services

The cumulative effects on health and acute care services and community services are assessed as moderate during both construction and operations. One of the challenges noted in the existing environment description for health care services is the difficulty in attracting medical professionals to rural areas. With the presence of additional families and well paid workforce in the area, it can be anticipated that there will be an increase in social, cultural and recreational amenities as well. There may also be opportunities for industry support for specific medical services, equipment or research.

Table 13.5 Cumulative Effects – Summary Table

Infrastructure and Services VEC	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Level of Confidence	Certainty	Mitigation Or Enhancement Success	Significance
Health and Community Services (Construction & Operations)	Adverse	Medium	Regional	Medium- term	Continuous	Yes	High	High	Moderate	Moderate
Community and Family Social Services (Construction)	Adverse	Low	Regional	Short – medium term	Continuous	Yes	Medium	Medium	Moderate	Moderate
Community and Family Social Services (Operations)	Neutral	Low	Regional	Long-term	Continuous	Yes	Medium	Medium	Moderate	Moderate

13.4.8 Housing and Accommodation

Predicted Cumulative Effects

Construction

Because the construction phase is temporary, and because many of the workers will be returning to their homes or living in work camps, they will not directly put a demand on housing. However, a number of indirect and induced jobs will occur within the Placentia Bay region as a result of construction activities and these people may want housing, particularly in the service communities.

As has happened in the past, notably at Clarenville, houses will be built or renovated on speculation in anticipation of the construction phase, but unlike the Hibernia and Terra Nova construction projects, permanent jobs will be created in the Placentia Bay region during the operations phase that will provide "take-up" on these houses. Also, it can be expected that many workers will renovate and construct their own homes.

The cumulative effects on the housing industry, therefore, will be to increase the number of housing units in these service centres (Clarenville, Marystown, Placentia, and to a lesser degree, St. John's) and revitalize the flat housing market in the smaller communities within commuting distance of the projects, based on promised long-term economic growth. In these areas housing prices are likely to rise (e.g., in 1989, with Hibernia coming on stream, an approximate 20 percent increase in housing prices occurred in St. John's before self-correcting, pers. comm, Lifestyle GMAC Real Estate, 2007) and longer house completion times will occur primarily in the larger centres because of the shortage of tradespeople. An increase in house prices will inevitably be a corresponding increase in property taxes. Temporary accommodations during the construction phase will be full and the Bull Arm work camp and other work camps will be built to meet workforce needs. This may spur on development of other private work camp sites, apartments or sub-divisions in the region. There is sufficient land zoned within many communities to build temporary work camp accommodations, new sub-divisions or individual new houses.

Not-for-profit housing may also experience an increase in demand during this period if housing costs increase and there is displacement of low-income families from their existing homes or communities.

Most B&B's and hotels within the Placentia Bay region have excess capacity during the tourist off-season; these can be used for the increase in "business" tourists (e.g., temporary project-related personnel such as sales, maintenance and repair people).

Operations

Many of the full-time workers at the project sites will be from the Placentia Bay region and will already have housing. However, some new workers and their families will move into the area, particularly to service centres with educational, health, training, shopping, recreation and cultural services. As well, with the promise of long-term jobs and resulting economic growth within the region, many of the residents will renovate existing homes, buy new existing homes or build new homes. Sufficient land exists in the region to accommodate several hundred new homes.

Cumulative Effects Management

Construction

Effects can be managed through:

- Participation in the Integrated Management Planning Committee;
- Direct and ongoing consultation about housing needs with industry, the area municipalities and NLHC;
- Negotiating union agreements that encourage use of work camps and commuting; and
- Compilation and maintenance of a housing and accommodations database for the area.

Operations

The same cumulative effects management recommendations suggested for the construction phase also apply to the operations phase except that work camps will no longer be needed.

Characterization of Cumulative Effects

Construction

Overall negative cumulative effects can be mitigated through encouraging work camp use and commuting as well as housing that can be transitioned from construction into the operations phase. The residual effects are therefore characterized as positive, high, regional and long-term. The effect is continuous throughout the life of the project, is reversible since the work camps can be decommissioned following construction and if not required for maintenance shut-downs. The level of confidence in and certainty of this assessment are high, with moderately effective enhancement success, i.e., there will be a measurable change in housing supply and demand but no permanent negative effect (effects will lessen as people become absorbed into the communities). Significance of the effect will be moderate.

Operations

There will be long-term positive effects of boosting housing markets for operations workers as they become absorbed into the region and as workers already residing in the region decide to renovate, or build homes. The residual effects are therefore characterized as positive, high, regional and long-term. The effect is continuous throughout the life of the project. The level of confidence in and certainty of this assessment are high, with moderately effective enhancement success, i.e., there will be a measurable change in housing supply and demand but no permanent negative effect (effects will lessen as people become absorbed into the communities). Significance of the effect will be moderate to high.

Monitoring and Follow-up

Municipalities will need to be informed of projected housing demands for all projects during both phases. Real estate companies and municipalities regularly monitor housing starts.

Summary of Cumulative Effects on Housing and Accommodation

The overall effects on housing and accommodation are positive. During the construction phase the short-term peaks in housing needs will be managed through commuting and work camps. Communities in the area have learned from previous experience and have modified municipal plans to accommodate this effect.

Table 13.6 Cumulative Effects – Summary Table

Infrastructure and Services VEC	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Level of Confidence	Certainty	Mitigation Or Enhancement Success	Significance
Housing and Accommodations (Construction)	Positive	High	Regional	Long-term	Continuous	Yes	High	High	Moderate	Moderate
Housing and Accommodations (Operations)	Positive	High	Regional	Long-term	Continuous	NA	High	High	Moderate	Moderate

13.4.9 Education and Training

Predicted Cumulative Effects

Construction

It is not anticipated that large numbers of workers (male or female) will re-locate permanently to the Study Area with their families during this phase. However, it is expected that some NL residents living elsewhere will return home, some of them with their families. Since there is excess primary and secondary school capacity in the region, the cumulative effect on the primary and secondary school system will be minimal.

A significant method of meeting the cumulative labour demand is the increased participation of women. If efforts to encourage women to participate in the labour force are successful, childcare demands will likely outstrip current supply. In the medium-term this will likely spur on additional childcare facilities to open up, but in the short-term, when there are not enough spaces, additional demands may need to be met by family members (grandparents, older siblings) or else it could limit the ability of women to enter the labour force.

CNA is the primary delivery agent in the province for skilled trades. It has been engaged in the provincial government's efforts to address deficiencies by providing skilled trades to meet the anticipated demands. Currently, the vast majority of CNA training in skilled trades is operating at capacity, with 10 being the minimum enrolment and 15 being an average. Sometimes enrolment increases to 20 if capabilities allow. CNA's ability to ramp up its delivery of courses depends on its ability to secure skilled instructors, funding, equipment and infrastructure. To date, this has not been a constraint. In some instances, new courses for established curriculum have been established within weeks.

Relevant courses for the proposed projects in the Placentia Bay region are available at most of CNA campuses. However, the capacity is about 20 students per course. If a majority of students want to take relevant courses and apply for apprenticeship training, current capacity is insufficient.

Private colleges (e.g., Keyin College in Clarenville, Carbonear and Marystown) are also preparing to meet the demand and are instituting long- and short-term courses for tradespeople.

CNA and private college officials are in early-stage discussions with some of the projects regarding their skill/labour requirements, notably the skilled tradespeople that will be required for construction (Arthur Leung, May 18 2007; Roland Butler, June 2007). Project personnel are also informing Memorial University and private colleges of anticipated labour demands.

The challenge for provincial post-secondary educational institutions is to ramp up sufficiently to meet several large projects when they currently do not produce enough tradespeople to service

even one of the proposed projects. It also raises budgetary issues around developing a workforce to respond to all projects concurrently, knowing that job opportunities in the Province could decline significantly following the construction phase.

The various educational institutions, particularly CNA and private colleges, may experience budgetary and infrastructure challenges. In particular, recruitment of instructors and funding for state-of-the-art equipment may become problematic.

Operations

As projects start their operations phases, some workers will relocate to the area with their families, increasing demand for childcare and primary school spaces, in particular those in larger towns (Marystown, Clarenville and Placentia). If efforts to encourage women to participate in the labour force are successful, there will be increased childcare demands that hopefully will have been met during the construction phase.

A different set of skills is generally required in the operations phase and the demand for skilled tradespeople will be reduced. Post-secondary education institutions will need to look to the long-term for the skills required by the projects and to adjust and expand their programs accordingly.

The effect on Memorial University (MUN) will take more years to become evident depending on the ages of the children of operation workers. If older workers with older children return to the province, then their children have the potential to enter post-secondary schools sooner than would children of younger families. In the long-term, increased student enrolment in post-secondary institutions will help to sustain the required workforce for regional projects.

Cumulative Effects Management

Construction

Project proponents will need to consider the effect of child-care services on women's participation in the workforce. If this is a tipping point to participation, and there is a lack of childcare spaces, then proponents will need to work together with other institutions to address this barrier. This will require further assessment.

Strategies to address training issues cannot be approached independently by Newfoundland and Labrador Refinery or other project proponents. In some respect the larger issue needs to be addressed in the context of government's public policies. As well, all stakeholders – project proponents, unions, post-secondary educational institutions and government – will need to work together to coordinate a comprehensive strategy and execution plan that addresses cumulative demand, supply, scheduling and training. Attracting more young people (and women in particular) into trades training, a speedier certification process, faster course delivery – all are part of the process. Projects will need to help by specifying for educational institutions the skills

required, the time-frame, the type of equipment needed, and the type of long-term/short-term, onsite/off-site training required. Companies can also help address the training crunch by providing equipment, scholarships, research chairs and educational partnerships. Training will need to be a top priority of governments, educational institutions, unions and companies over the next few years.

Operations

Project proponents will need to consider the effect of child-care services on women's participation in the workforce. If the demand is not met during the construction phase, then the participation of women in these projects will be severely limited and an important source of labour will not be tapped. Proponents and community groups will need to work together to address this barrier.

There will be a positive effect on primary and secondary school enrolments as excess school capacity will be filled, but the Eastern School Board will need to ensure that teachers and infrastructure upgrades are in place to meet the anticipated demand. Projects in the area can enhance this by supporting school initiatives.

Characterization of Cumulative Effects

Construction

There will be an effect on early childhood education if women are to become involved in this phase of the project. The cumulative effect on childcare/early childhood education during construction is considered adverse since demand will outstrip supply in the short-term; medium in magnitude since there is a potential for women with children to participate in the workforce. The geographic extent of the effect will be on regional childcare centres, and the duration will be short-term. Frequency of the effect will be continuous (within this short-term) since workers will be mainly full-time employees. The effect is reversible once daycare spaces are established. The level of confidence in this assessment is high, with high certainty of probability. Mitigation success will be moderately effective, particularly if, through monitoring, a daycare is provided by project proponents. The significance of the effect is moderate.

The residual cumulative effect of several projects on primary and secondary schools is positive if some NL families living elsewhere return to the Study Area, since it reduces the possibility of school closures, increases the variety of programming through increased enrolments thus increasing the number and variety of teachers. The effect is low in magnitude and the geographic extent of the effect is regional, and long-term in duration. Frequency of the effect is continuous. Reversibility of this positive effect is not desired and not assessed. The level of confidence in this assessment is high and certainty is also high. Since no enhancements to this effect are proposed at this time, it cannot be assessed. Significance of the effect is moderate.

On post-secondary education and training the cumulative effect is positive in that there is an increased need to train more workers, but negative in that, without significant efforts to meet demands, training needs may not be met in a timely way. Training initiatives to advance the certification for skilled tradespeople, efforts to draw more women into skilled trades' occupations, and other targeted training efforts can have a significant impact on having a ready workforce for the planned projects. Training initiatives will need to be ongoing prior to and during the early stages of construction. The magnitude of effects of such training is predicted to be medium to high and the geographic reach will be local, regional and provincial. Frequency of the effect will be long-term and continuous since training will be a continued requirement to meet project needs. Once programs are in place, reversibility would not be desired, albeit training initiatives may need to be downsized or changed to meet current demands. The level of confidence assigned to this prediction is medium to high and the certainty of the potential effect is medium. Mitigative success can be potentially highly effective.

Operations

The same characterization of cumulative effects applies to the operations phase but to a lesser intensity.

Monitoring and Follow-Up

The Government of Newfoundland and Labrador will monitor training statistics through the Department of Education. Monitoring of childcare needs will need to be done by a group of HR company representatives; all communities within Placentia Bay will probably have employees working at each of the large-scale projects. The Department of Education through the Eastern School Board, will track and monitor school enrolments. Post-secondary education institutions track and monitor their enrolments.

Summary

If NL residents living elsewhere do not return home in sufficient numbers and the number of young and/or female workers who become trained is low, then the potential significant impact on the economy will be moderated.

If the provincial government and project proponents do not work together to ensure that training institutions have the necessary instructors, equipment, funding and infrastructure, then the potential positive effect on training will be moderated. However, if issues related to capacity can be solved, then the full and positive effect on training will occur and the province will gain a positive reputation for being able to train a workforce to meet a high level of industrial demand.

Table 13.7 shows the cumulative effects of projects in the Placentia Bay region education and training.

Table 13.7 Summary of Cumulative Effects on Education and Training

Socio-Economic VEC	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Level of Confidence	Certainty	Mitigation Or Enhancement Success	Significance
Education – early childhood (Construction and Operations)	Adverse	Medium	Regional	Short-term	Continuous	Yes	High	High	Moderate	Moderate
Education – primary and secondary (Construction and Operations)	Positive	Low	Regional	Long-term	Continuous	NA	High	High	NA	Moderate
Post Secondary Education and Training (Construction & Operations)	Positive and negative	Medium-High	Local, Regional, Provincial	Long-term	Continuous	NA	Medium-High	Medium	High	Significant

13.4.10 Land Use –Municipal Planning

Predicted Cumulative Effects

Construction

During impact assessments, municipal plans are reviewed to determine community capacities and land use policy for growth that may result from increasing developments. In Placentia Bay, many of the communities have prepared municipal plans and show capacity for residential, commercial and industrial growth.

During the construction phases (assuming they will occur concurrently), half the workforce is assumed to be resident in the region or returning to existing homes in the region. The other half will be housed in work camps. This poses no additional strain on existing plans since sites have been identified and there will be little in the way of actual housing. However, indirect or induced jobs are predicted to be created which may put additional strain on, or fill up, developable areas in larger urban centres (St. John's, Clarenville) and keep municipal staff busy issuing development permits and preparing statutory plan amendments if needed.

Operations

With an anticipated population there will be a corresponding demand for additional housing, commercial and industrial land uses. While in many cases these land uses can be accommodated within existing municipal plans, there is an increased likelihood of plan amendments, and development permits. While this may spur on smaller communities to prepare municipal plans, communities with limited municipal staff will feel the strain of trying to meet needs in a timely fashion. There may also be requirements for municipalities to participate in resolution of regional land management issues, further exacerbating potential capacity issues.

Cumulative Effects Management

Construction

Each community must determine if strains on municipal staff are unacceptable and discuss the needs with their Council and the provincial Department of Municipal Affairs.

Operations

In addition to discussing capacity issues with the Department of Municipal Affairs, project proponents may need to consider supporting stakeholders (municipalities in particular) with limited capacity to participate in regional planning and mitigation initiatives.

Characterization of Cumulative Effects

Construction

The cumulative effect on municipal planning is likely to be positive since it represents community growth and development, which is often desired, and negative since it potentially places strain on municipal staff to respond to growth-related needs. The magnitude of the effect is medium, and regional. The duration of the effect is medium-term and is continuous over this time frame. The effect is reversible with added staff to address capacity issues. The level of confidence in this assessment is medium, the medium certainty of occurring. Mitigation success is highly effective if measures lead to additional staff in communities where they are needed. The effect is considered moderately significant.

Operations

Characterization of effects for operations is the same as for construction but with a lower intensity.

Monitoring and Follow-up

No formal monitoring is considered necessary. Individual projects will maintain contact with municipalities in their area. Active liaison can be continued through a number of regional associations and the Newfoundland and Labrador Federation of Municipalities.

13.4.11 Land Use - Forestry

Predicted Cumulative Effects

Construction

Current and proposed projects in the region are not located in productive forest areas. The only productive forest stand is located west of Swift Current, where no projects are planned.

Operations

The same effects as for the construction phase.

Table 13.8 Cumulative Effects – Summary Table

Infrastructure and Services VEC	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Level of Confidence	Certainty	Mitigation Or Enhancement Success	Significance
Municipal Planning (Construction & Operations)	Positive and Negative	Medium	Regional	Medium-term	Continuous	Yes	Medium	Medium	High	Moderate

Cumulative Effects Management

Construction

Should it be required, participation of regional stakeholders and industries in the Placentia Bay Integrated Management Planning Committee could help to identify areas where land uses can be shared or integrated for multiple purposes, thereby reducing the need to remove productive forest in other areas.

Operations

The same cumulative management approach used for the construction phase would also apply to the operations phase.

Characterization of Cumulative Effects

Construction

The cumulative residual effect of project activities in the region on forestry for both the construction phases is therefore neutral, negligible, local, long-term, rare and reversible. Level of confidence in this assessment is high due to lack of productive forest stands in areas where projects are proposed or operating and project footprints relative to Forest Management Areas tend to be small. Certainty of the neutral effect is high. Mitigation success is highly effective since forest conditions (productive or not) will return to baseline conditions following project decommissioning. It is anticipated that this will have an insignificant effect in the region.

Operations

The same characterization of cumulative effects used for the construction phase would also apply to the operations phase.

Monitoring and Follow-Up

As there are no residual adverse cumulative effects, there is no need for monitoring or follow-up.

13.4.12 Land Use - Agriculture

Predicted Cumulative Effects

Construction

Agriculture is limited to a few small commercial or hobby farms on the Isthmus. Potential effects include effects of air emissions on soil capability and effects to quality of crops. For further information on these effects, refer to cumulative effects section for air emissions.

There is concern with the effects of noise and light emissions and general disturbance on a large fox farm near North Harbour. However, given the distance of these projects from the fox farm, it is unlikely that these activities, other than perhaps the refinery project, will disturb the farm.

Operations

The same predicted cumulative effects would most likely occur during the operations phase as during the construction phase.

Cumulative Effects Management

Construction

NLRC has formed a multi-stakeholder air quality group and participates in the Integrated Management Planning Committee for Placentia Bay. These are two forums in which concerns with air, soil and agricultural production can be heard from local stakeholders and where mitigation measures can be discussed. NLRC will use the best available technologies to limit air emissions and, through participation in these multi-stakeholder forums, will encourage other industries that emit pollutants to do the same.

Operations

The same cumulative effects management recommendations would apply to the operations phase as to the construction phase.

Characterization of Cumulative Effects

Construction

The cumulative residual effect on agriculture in the region is expected to be neutral to adverse, low in magnitude due to the relatively low number of agricultural activities in the region, and local in geographic extent. Duration of the effect is considered long-term since effects may be felt for the duration of the projects (although lessening with mitigation efforts over time). Frequency is intermittent and may depend on wind direction, cumulative levels of pollutants, and

seasonal harvesting patterns. The effect is reversible, and the level of confidence in the assessment and certainty of the effect is medium. Mitigation success is moderately effective depending on willingness and effectiveness of mitigation measures and significance in the effect is minor.

Operations

The same characterization of cumulative effects would apply to the operations phase as to the construction phase.

Monitoring and Follow-Up

Through the multi-stakeholder Air Quality Study Group and the Placentia Bay Integrated Management Committee opportunities exist for monitoring of air quality and soil quality as well as noise and light levels should it be required.

13.4.13 Land Use - Protected Areas

Predicted Cumulative Effects

Construction

There are no federal parks and only a few provincially protected areas in the Placentia Bay region, including three provincial park reserves: Bay du Nord Wilderness Reserve, Cape St. Mary's Ecological Reserve, and Gooseberry Cove day-use area. Potential effects would be overuse and overcrowding of protected areas, particularly if construction periods overlap. It is not known whether other projects will accommodate worker recreational needs. While not all workers will want or be able to visit protected areas at the same time, the potential for a large workforce to be living in the region may increase interest in local attractions and the need for recreational experiences.

Operations

During this phase far fewer people will be employed in the area and those that are most likely will already reside in the Placentia Bay region. Therefore, the cumulative effect on parks and protected areas will be minimal.

Cumulative Effects Management

Construction

In Park Reserves no day use or camping is allowed. Access to the controlled Wilderness Reserve is by permit only as by permits issued by the Provincial Government. It will be a provincial responsibility to monitor unregulated park uses. Initiatives such as the Integrated Management Planning Committee will also help identify ways to mitigate potential effects.

Operations

The same cumulative effects management as suggested for construction would also apply to operations.

Characterization of Cumulative Effects

Construction

It is expected that cumulative residual effects will be neutral, with negligible effects. The geographic extent is local, confined to protected areas, and short-term in duration. Frequency is intermittent. The effect is reversible and the level of confidence in the rating is medium. The certainty of the effect is also medium and mitigation success is considered highly effective since management protocols are in place for protecting these areas. The significance of the effect is considered minor.

Operations

The same cumulative effects as identified for the construction phase are anticipated.

Monitoring and Follow-Up

Some of these sites have on-site administrators who monitor increased use (e.g., Cape St, Mary's); other sites may need to be enhanced and patrols increased to reduce adverse use.

13.4.14 Land Use - Tourism and Recreation

Predicted Cumulative Effects

Construction

Cumulative effects on the tourism and recreation facilities are similar to those assessed for the residual project specific effects. The effect, however, is intensified since construction and operation periods overlap. During construction the number of workers in the area may increase use of park and wilderness areas and indoor/outdoor sports facilities. This could have both positive and negative effects. Positive effects include increased business for local wilderness outfitters, camp operators, owners of holiday accommodations and others employed in the tourism industry. The negative effect is that these areas are "loved to death" as increased use diminishes conditions, leading to increased tax and maintenance burdens on private and public park/recreation facility owners.

The public may become interested in touring the construction-sites of these large-scale projects, thereby increasing the possibilities of traffic and occasionally some accidents.

Operations

During the operations phase, these effects may also be felt but to a lesser extent. Public and private owners/operators of tourism businesses and recreation facilities will experience an increase in use, but since operations workers are more likely than construction workers to reside in Placentia Bay communities, they will also be contributing to the tax base from which public funds for maintenance will be drawn. There will likely be a more sustained, less intense use of privately owned/operated tourist and recreation facilities. This could result in additional recreation and tourism operators and strengthen this sector of the economy over the long term. Increased family participation in local sports and recreation organizations will strengthen local teams and leadership, enhancing the quality of life in each community.

The public may become interested in touring some of these large-scale projects, causing increased traffic and potentially some accidents.

Cumulative Effects Management

Construction

Cumulative effects can be enhanced by having recreation facilities at work camp sites. Since many of the workers may be housed at Bull Arm, an opportunity exists for several projects to coordinate the provision of first-class recreational facilities. Construction workers who commute should be encouraged to use recreation facilities in their home communities. The companies can also work with local municipalities and tourism operators to provide a safe industrial tourism experience for visitors interested in seeing construction of some of these sites – as was the case during the construction of the Hibernia Platform.

Operations

As workers settle into their surroundings and look for opportunities to participate in recreational activities, they will have opportunities to strengthen existing volunteer activities. Because of the natural attractions of Placentia Bay, and with increased economic stability in the area, there will be opportunities for new tourism activities, infrastructure and businesses.

Characterization of Cumulative Effects

Construction

During the construction period there will be adverse cumulative effect on recreation and tourism through intense short-term use. These effects are considered medium in magnitude, regional in geographic extent and short-term in duration. Frequency of the effect will be intermittent with changing uses and seasons. The effect is reversible following the construction period, the level of confidence is medium, and the probability of occurrence is also medium. Mitigation success is moderate and significance of the effect is considered moderate to low

Operations

During operations, there will be a positive residual effect with the increase in regional population providing long-term stability to recreation programs and the tourism industry. The effect is medium, and is regional, with long-term duration. Frequency of the effect is continuous over the life of the project. Reversibility was not assessed. The level of confidence in this rating is high with high probability of occurrence. Enhancement measures are not being implemented and therefore not assessed. The effect is significant.

Table 13.9 Cumulative Effects – Summary Table

Infrastructure and Services VEC	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Level of Confidence	Certainty	Mitigation Or Enhancement Success	Significance
Tourism, Culture and Recreation (Construction)	Adverse	Medium	Regional	Short-term	Intermittent	Yes	Medium	Medium	Moderate	Moderate
Tourism, Culture and Recreation (Operations)	Positive	Medium	Regional	Long-term	Continuous	NA	High	High	NA	Significant

13.4.15 Land Use - Traditional Use of Upper Placentia Bay

Predicted Cumulative Effects

Construction

Upper Placentia Bay is a popular boating and recreation area. Many residents of the Avalon Peninsula and former residents of the islands spending week-ends and vacations on the bay and at their island cabins. Residents also use the bay for recreational boating and to participate in many on-land activities such as small game hunting, wood-cutting, berry-picking, plant harvesting, walking, picnicking and camping. With an increased workforce in the region, particularly in the construction period, residual cumulative effects could include:

- Larger population base that may participate in traditional activities such as hunting, fishing, trapping, plant harvesting;
- Greater access to traditional use areas through construction of roads to plant sites;
- Greater competition for natural resources available for traditional uses; and
- Loss of land areas where traditional activities had been undertaken.

Operations

If all or some of the projects proceed, the workforce will be about a quarter smaller than during the construction phase – with the exception of Kiewit Offshore Services, which does not have an operations phase. It is anticipated that the majority of the operations employees will come from the Placentia Bay region and minimal amounts of new pressure will be placed on existing traditional lands. However, for residents with stable, well-paying jobs, ownership of recreational vehicles (e.g., boats, all terrain vehicles, snowmobiles) will increase, which likely will place pressure of a different nature on traditional lands.

Cumulative Effects Management

Construction

Traditional users will need a venue to voice concerns to the broader community and this could be done through participation or communications with the Placentia Bay Integrated Management Planning Committee in the Bay.

Operations

The cumulative effects management as suggested for the construction phase would also apply to the operations phase. However, the increase in motorized vehicles on sensitive and protected lands will need to be monitored, as will increased recreational boating in Placentia Bay.

Characterization of Cumulative Effects

Cumulative effects are considered neutral to adverse (due to potential for resource competition). The effect is considered low to moderate in magnitude, local and long-term in duration. Frequency of the effect is seasonal during traditional harvesting periods and is reversible. The level of confidence in the assessment is medium and certainty of effect also medium. Mitigation success is considered moderately effective and overall significance considered minor.

Operations

The same characterization of cumulative effects as suggested for the construction phase would also apply to the operations phase.

Monitoring and Follow-up

If concerns are voiced to the Placentia Bay Integrated Management Committee that traditional lands area are becoming overused, or if there are issues of boating safety in Placentia Bay, the committee would be in a good position to institute monitoring programs.

13.4.16 Land Use - Quarries

Predicted Cumulative Effect

Construction

Many aggregate quarry permits are issued annually in this region. Sufficient capacity of aggregate exists within the region to meet the specifications of all projects, road building and maintenance, and other requirements. Regionally produced goods are more economic than those produced elsewhere and regional suppliers are likely to benefit from this demand.

Operations

During operations far less aggregate is required than during the construction phase. Sufficient quantities of aggregate exist within the region to meet any operational needs of the proposed projects.

Cumulative Effects Management

Construction

Sufficient aggregate exists with the Placentia Bay region to service the construction, road and other needs. Therefore, no cumulative effects management is proposed.

Operations

No cumulative effects management is proposed for the same reason as suggested in the construction phase.

Characterization of Cumulative Effects

Construction

The cumulative effect on aggregate is positive in direction and high in magnitude since regional demands will help sustain the sector over the next several decades. Geographic extent is likely to be regional, and long-term in duration. Frequency of the effect is expected to be continuous. The effect is not reversible since the supply of aggregates is finite. The level of confidence in this rating is high, and certainty is high. Mitigation success is not applicable to this situation, since the effect is positive to the sector and enhanced through local procurement policies. Significance of the effect is considered moderate.

Operations

The same characterization of cumulative effects suggested for the construction phase also applies to the operations phase.

Summary of Cumulative Effects on Land Use

With the exception of traditional uses, agriculture, and aggregates, the cumulative effect will be negligible because these projects are located away from protected areas and areas used for forestry. Overall cumulative effects on traditional use and agriculture have the potential to be negative due to removal of land base, competition from other users and, for agriculture, air, noise and light emissions. The cumulative effect on aggregates will be positive since projects will drive up demand for these products and help to sustain the industry in the long-term.

Tourism and recreation demands will likely increase with more people and more disposable income. One area where there may be a noticeable change is recreational boating. With the additional marine traffic awareness and education will be necessary.

Table 13.10 shows the cumulative effects on land use.

Table 13.10 Summary of Cumulative Effects on Land Use

Land Use VEC	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Level of Confidence	Certainty	Mitigation Or Enhancement Success	Significance
Forestry (Construction & Operations)	Neutral	Negligible	Local	Long-term	Rare	Yes	High	High	Highly effective	Negligible
Agriculture (Construction & Operations)	Neutral to Adverse	Low	Local	Long-term	Intermittent	Yes	Medium	Medium	Moderately effective	Minor
Protected Areas (Construction & Operations)	Neutral	Negligible	Local	Short-term	Intermittent	Yes	Medium	Medium	Highly effective	Minor
Traditional use of upper Placentia Bay (Construction & Operations)	Neutral to Adverse	Low-moderate	Local	Long-term	Seasonal	Yes	Medium	Medium	Moderately effective	Minor
Aggregates (Construction & Operations)	Positive	High	Regional	Long-term	Continuous	No	High	High	NA	Moderate

13.4.17 Physical Infrastructure - Transportation

Predicted Cumulative Effects

Construction

Projects will generate additional commuter and construction-related highway traffic, which will increase average daily traffic counts on Highway 210 and the Trans-Canada Highway. This effect is intensified if subsidized commuting is encouraged to mitigate other negative social effects (i.e., on housing availability). The effect will provide impetus for the provincial government to upgrade highways and will increase the incidence of highway accidents. The projects will also generate increased trucking of freight (and in some instances large fabricated pieces) to project sites.

An increase in ground transportation can be met by the expansion of existing services.

Many of the large components will come from fabrication yards by marine transport. This will increase traffic in the bay during the three-year construction period if the projects are not staggered.

There will be an increase in the number of passengers at the St. John's International Airport when workers return to the Province for work. Airport traffic will also increase somewhat as suppliers and vendors visit the region. There is a wide range of air passenger carriers and upgrades planned in the next few years; therefore, no additional effects are anticipated for air transportation infrastructure. Following construction, there may be an increase in the amount of passenger traffic through the airport if workers do not find other sources of employment locally and need to out-migrate again in search of work.

Operations

Issues related to commuting and special transports for maintenance and upgrade equipment and components will remain the same except that they will be fewer in number.

Between 600 and 800 commercial vessels enter Placentia Bay each year, with forecasts of 430-450 travelling to North Atlantic refinery and Whiffen Head in 2007. If all projects go ahead, there could be 1,100-1,200 vessels entering the head of Placentia Bay per year (Aidan Woodman – Canadian Maritime Agency Limited). Thus far, the only other proponent to identify vessel numbers is LNG, which estimates 104 per year during the first two years and 400 per year afterward (Mark Turner – LNG). The cumulative effect is increased risk of accidents – particularly during the summer season when passenger services between Newfoundland and Nova Scotia are operating. There will be an increased demand for marine freight traffic to service industry, leading to increased risks of vessel accidents and congestion.

Families will have increased disposable incomes, which they may use for tourist travel to other parts of North America or the world, accessed through airlines.

Cumulative Effects Management

Construction

Through the Placentia Bay Integrated Management Plan Committee consideration should be given to mitigating potential cumulative transportation effects by:

- Encouraging the establishment of commuter park-and-ride sites;
- Establishing a commuter bus service from those sites, from work camps and from communities; and
- Providing estimated traffic numbers and special transports (for construction-related equipment and components) to local RCMP detachments.

Potential cumulative effects caused by marine vessel traffic and accidents can be mitigated through participation in SmartBay and the Placentia Bay Integrated Management Plan Committee to identify risks and agree on mitigations.

So that air passenger services are able to meet demands, particularly in the overlapping construction period, proponents will need to communicate project schedules to the St. John's International Airport Authority. Additional passenger services may be warranted.

Operations

The same approach to cumulative effects management for the construction phase also applies to the operation phase – except that work camps will not be in place.

Characterization of Cumulative Effects

Construction

The anticipated cumulative effect will be an increase in traffic volumes, which will provide the impetus for highway and intersection upgrades (either due to increased traffic, increased traffic accidents, or both). The short-term effect is considered adverse, medium, and regional. Frequency of the effect is intermittent since most of the effects will be measurable during peak commuter hours, and it is reversible. Confidence in this effect is high, with high certainty of occurrence. Mitigation success is moderate, particularly if traffic volumes result in upgrades to regional roadways –generally considered positive. The significance of the effect is moderate.

Residual effects on marine passenger and freight traffic will be adverse, and high and local within Placentia Bay. The duration is long-term and the frequency of effect will be rare. The effect is reversible and the level of confidence is medium, with low probability of occurrence. Mitigation enhancement is expected to be moderate, with moderate significance.

Residual cumulative effects on air traffic are considered positive, medium and regional. The duration of the effect is short-term and the frequency will be intermittent. There is no need for the effect to be reversible and the level of confidence in this rating is medium, with a medium probably of occurrence. Mitigation enhancement is expected to be low with low significance.

Operations

There will be a decrease in traffic volumes during this phase, but still an increase compared with the base case, which may necessitate more upgrades in the long term. The long-term effect is, therefore, considered adverse, low, and regional. Frequency is intermittent since most of the effects will be measurable during peak commuter hours and is reversible. The level of confidence is high, with high certainty of occurrence. Mitigation success is considered moderate, particularly if traffic volumes result in upgrades to regional roadways – generally considered positive. The significance is moderate.

Residual cumulative project effects to marine passenger and freight traffic will be adverse, and high and local within Placentia Bay. The duration is long-term and the frequency will be rare. The effect is reversible and the level of confidence in this rating is medium, with low probability of occurrence. Mitigation enhancement is expected to be moderate, with moderate significance.

Residual cumulative effects on air traffic are considered positive, medium and regional (St. John's). The duration is short-term and the frequency will be intermittent. Reversibility is not desirable and the level of confidence in this rating is medium, with a medium probably of occurrence. Mitigation enhancement is expected to be low, with low significance.

13.4.18 Physical Infrastructure - Waste and Wasterwater

Predicted Cumulative Effects

Construction

Solid waste is to be handled by area contractors and disposed in appropriate landfills. In most cases, total volumes of waste materials are not provided and all projects will make efforts to reduce, reuse and recycle. Waste generated on-site will be collected, stored and disposed of at approved facilities. Materials such as paper, wood, scrap steel, metals and tires are generally offered for recycling. More residential and commercial waste will be generated by the rising population. The overall effect will be increased demand for landfill capacity and solid waste contractors/haulers. The demands will likely provide more pressure for the development of the regional waste management system currently being considered. There may also be an increased demand for recycling haulers, facilities and markets in the region and in the province.

Wasterwater will be handled through wasterwater treatment systems. No anticipated additional demands will be placed on municipal sewage infrastructure by the projects; however, additional demands will be placed indirectly on municipal systems as more residents move into the area.

Operations

The same predicted cumulative effects are anticipated to occur during the operations phase as during the construction phase.

Cumulative Effects Management

Construction

Many project proponents are considering individual sources and settling ponds for their temporary non-potable water supply. Since they will not be using any municipal water supply and cannot hook up their systems to each other, this is not considered a residual effect.

Project proponents should support the development of a regional waste management system to reduce the volumes transferred to local landfills. The regional waste management system should also evaluate the number of accredited waste contractors to determine if additional capacity will be required. Similarly, the new regional system should consider handling the full range of wastes from hazardous to recycled materials.

Operations

Project proponents will not have a direct effect on municipal sewer systems. However, indirect effects from new residents will place additional demands on these systems. Taxes generated from residents and new businesses should be used to support infrastructure upgrades.

Characterization of Cumulative Effects

Construction

Cumulative effects to the waste management systems are adverse with medium magnitude, since demands on the current landfill capacities will likely provide the impetus to develop a regional waste management system. Geographic extent is regional, with medium-term duration. Frequency is continuous and reversible. The level of confidence in this assessment is medium with medium probability of occurrence. Mitigation success will be moderate and overall significance is moderate.

Cumulative effects on municipal wasterwater systems will be adverse, since there will be additional demands through population increases on aging systems, and medium in magnitude. The geographic extent of the effect is regional with medium-term, continuous duration until sewer systems can be upgraded. The effect is reversible. There is a medium level of confidence in this assessment with medium certainty of effect. Mitigation will be moderately effective with minor significance.

13.4.19 Physical Infrastructure - Utilities

Predicted Cumulative Effects

Construction

Water requirements and potential supply sources are provided in Table 13.10 for regional proposed projects. The data show that water will be drawn from a variety of sources from ground and surface supplies of fresh water to seawater through desalinization. There will also be additional demands for potable water.

Table 13.11 Water Requirements and Supply for Regional Proposed Projects

Project	Amount Required	Water Source Considered/Used Currently
LNG Transshipment Terminal (Grassy Point)	Bottled or well water for construction phase; 24,000 gpm during Stage 2; 48,000 gpm during Stage 3.	Seawater or nearby surface freshwater being evaluated
VBNC Commercial Processing Plant (Long Harbour)	3,700,000 m3/y (matte) or 5,000,000 m3/y (hydromet) Requirements are for operations phase.	Rattling Brook Big Pond
Newfoundland Transshipment Terminal (Whiffen Head)	NA	NA
Kiewit Offshore Services Marystown Shipyard	NA	NA
Newfoundland and Labrador Refinery Project	Demands determined in design phase	Desalinization plant
Continental Stone crushed rock export quarry, Belleoram	All water releases will meet the regulatory requirements of the *Environmental Control (Water and Sewage) Regulations* and provincial permits.	Water treatment facility on-site
Lower Churchill River Hydro-electric Generation Project, Labrador	Gull Island will be operated at a full supply level of 125 m asl Muskrat Falls will be operated at a full supply level of approximately 39 m asl.	Churchill River

Notes:
Information for some projects is not available.
Unless otherwise noted, data for construction and operations phases were not available for all projects.
Source:
Government of Newfoundland and Labrador.

Table 13.11 shows electrical power requirements where available. The expectation is that supply will be available from Newfoundland and Labrador Hydro through spare capacity in the provincial grid; however, some projects have recognized that additional power may need to be generated on-site. There will be more demands for residential power.

Table 13.12 Power Requirements and Supply for Regional Proposed Projects

Project	Peak Power Requirements	Power Source
LNG Transshipment Terminal (Grassy Point)	150 kW (Stage 1) 40 – 60 mW (Stage 2) 60-96 mW (Stage 3)	Local power grid via overhead transmission line or on-site power generator
VBNC Commercial Processing Plant (Long Harbour)	67 mW (hydromet) or 55 mW (matte) Requirements for operations phase	Newfoundland and Labrador Hydro via existing substation at Long Harbour
Newfoundland Transshipment Terminal (Whiffen Head)	NA	NA
Kiewit Offshore Services Marystown Shipyard	NA	NA
Newfoundland and Labrador Refinery Project	170 mW	Newfoundland and Labrador Hydro or construction of new electrical generator
Continental Stone crushed rock export quarry, Belleoram	NA	On-site power generating station
Lower Churchill River Hydro-electric Generation Project, Labrador	NA	Electricity requirements during construction will be obtained from a local substation, which will be connected to the existing 138 kV transmission line on the north side of the Churchill River. Diesel back-up generators will also be used.

Notes:
Information for some projects is not available.
Unless otherwise noted, data for construction and operations phases were not available for all projects.
Source:
Government of Newfoundland and Labrador.

Operations

Data on the power requirements during operations were not available for all projects. Where the data were available (LNG Transshipment Terminal and the VBNC Commercial Processing Plant), it was included in Table 13.11. Generally, as projects proceed from construction to operations, requirements increase for electrical power and water, as they will for the additional households, businesses and any enhanced activities.

Cumulative Effects Management

Construction

The project proponents are considering individual sources and settling ponds for their temporary water supply and desalinization plants for their permanent water supply. Many communities in the region have unreliable potable water supplies and would benefit from connections to a regional treatment facility. Since project proponents will not be using municipal water supplies

and no connections with municipal systems are being considered, there are no anticipated cumulative effects (positive or negative).

Once definitive power needs are identified, Newfoundland and Labrador Hydro will confirm their capacity and any source of new electrical power. The province is actively addressing energy resources and infrastructure in the province as it develops a Provincial Energy Plan. The recently-created Provincial Energy Corporation is investigating energy sources ranging from wind power to development of the Lower Churchill River.

Likewise, some of the offshore petroleum operators and Memorial University are investigating commercial production and transportation of offshore natural gas. The Refinery will design its facilities to be readily adaptable.

Operations

Management of cumulative effects in the operations phase is generally the same as it is for the construction phase.

Characterization of Cumulative Effects

Construction

Cumulative effects to water supply will depend on the sources. Use of surface or groundwater may have a local adverse effect, but it is not known if this will affect supply in the region. These projects are at different locations; each has its own water supply and are not dependent on regional or municipal water supply. If regional water supply systems can be put in place for industrial (and where appropriate and needed, municipal) users, then the overall effect will be positive since it makes effective use of resources, (building one rather than several facilities) and increasing quality of potable water. Magnitude of the effect will be medium, with regional geographic extent. Duration is long-term with continuous frequency. The effect is positive so reversibility is not considered. The level of confidence in the assessment is low based on the available information, with medium certainty of occurrence. Enhancement success is not known because the feasibility of a regional system has not been considered. Significance of the effect is moderate.

Operations

Cumulative effect during operations is similar to that of the construction phase. All issues will have to be addressed upfront to provide water to the projects and the adjacent communities.

13.4.20 Physical Infrastructure - Communications

Predicted Cumulative Effects

Construction

Overall effects of industrial activities and growing population will increase the demand for all types of communications services in the region. This could include the construction of more satellite and cellular phone towers in the region.

Operations

There is not expected to be an increase in demand for communications from the construction to operations phases other than upgrades and maintenance.

Cumulative Effects Management

Construction

To manage the negative (esthetics) effects of increased communications infrastructure, project proponents may consider placing this type of infrastructure on their project site. The communications industry will need to assess demand and provide infrastructure as needed.

Operations

The same suggestions for cumulative effects management for the construction phase are also recommended for the operations phase.

Characterization of Cumulative Effects

Construction

Cumulatively there could be more demand for high-speed Internet and cellular telephone coverage, enhancing communications overall. The cumulative effect is therefore considered positive, medium in magnitude, regional and long-term. Frequency is continuous. Reversibility is not assessed. Level of confidence and the probability of occurrence are high. Enhancement measures are considered moderately effective and the level of significance is moderate.

Operations

The characterization of cumulative effects for the construction phase also applies to the operations phase.

13.4.21 Physical Infrastructure - Summary

Construction

Because many of the proposed projects have overlapping construction periods, cumulative effects to infrastructure and services in this short period is intense and, for the most part, adverse. This is mainly due to the sheer number of workers who will be resident in the near future, which, for those providing services and planning for infrastructure upgrades, does not give sufficient time for response. To mitigate this effect the industrial community must continue to consult with service providers and municipal and provincial government agencies to monitor the effect and collaborate on mitigation measures. If the industrial proponents can partner with each other and service providers for services such as public utilities, communications, ground and marine transportation, this effect can be better managed.

Operations

During the operations periods (which also overlap), there will be an overall increase in population. While there will be some growing pains during the initial years, the longer-term effect is generally considered positive and contributes to quality of life as governments increase the tax base from which infrastructure and service provision is funded. The result will be upgrades to infrastructure (roads, water treatment, wasterwater and solid waste management) to meet the demands of the growing population.

Table 13.12 provides a summary of the cumulative effects to physical infrastructure.

Table 13.13 Summary of Cumulative Effects to Physical Infrastructure

Infrastructure and Services VEC	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Level of Confidence	Certainty	Mitigation Or Enhancement Success	Significance
Transportation – road (Construction & Operations)	Adverse	Medium (Construction) Low (Operations)	Regional	Short-term (Construction) Long-term (Operations)	Intermittent	Yes	High	High	Moderate	Moderate
Transportation – marine passenger	Adverse	High	Local	Long-term	Rare	Yes	Medium	Low	Moderate	Moderate
Transportation – air traffic (Construction & Operations)	Positive	Medium	Regional	Short-term	Intermittent	NA	Medium	Medium	Low	Low
Utilities – solid waste (Construction & Operations)	Adverse	Medium	Regional	Medium-term	Continuous	Yes	Medium	Medium	Moderate	Moderate
Utilities – Wasterwater (Construction & Operations)	Adverse	Medium	Regional	Medium-term	Continuous	Yes	Medium	Medium	Moderate	Minor
Utilities – Water (Construction & Operations)	Positive	Medium	Regional	Long-term	Continuous	NA	Low	Medium	NA	Moderate
Communications (Construction & Operations)	Positive	Medium	Regional	Long-term	Continuous	NA	High	High	Moderate	Moderate

13.4.22 Emergency Services Infrastructure

Predicted Cumulative Effects

Construction

A potential exists for an increased demand for police and emergency services directly through work camp/worker-related disturbances, increased vehicle accidents, accidents related to the projects themselves, collisions in Placentia Bay with the potential for oil spills, and increased potential for terrorist attacks.

Projects can affect Search and Rescue organizations through increased potential for search and rescue missions and accidents related to the projects.

There will be increased demands placed on volunteer fire departments and those industries or organizations with which the projects have mutual aid agreements, and and increased risk to the health and safety of workers and residents if there is insufficient response capacity.

However, there will be a net positive residual effect in that increased facilities and capabilities (e.g., increased training, state-of-the-art equipment, trained personnel and regional safety organizations) will exist to respond to community events and accidents.

Operations

Similar effects will occur during the operations phase as during the construction phase.

Cumulative Effects Management

Construction

Each project is required to submit an Emergency Response Plan for their operations. Provided that each project proponent is well-prepared with trained personnel and equipment for emergencies, then the overall response capacity will be enhanced. Many communities have their own Emergency Response Plans and those that do not will be encouraged to complete them. Through broad participation in the Integrated Management Planning Committee, mutual aid agreements can be struck to further enhance emergency response capacity. Good and effective coordination of mutual aid agreements among the projects and communities will be needed.

The RCMP will need to be kept informed of any plans, for increases in traffic and oversized loads as well as camp and project security measures, illegal activities, accidents and emergencies. The RCMP will call in staff from other detachments in case of a severe emergency.

Traffic accidents may be reduced through partnering initiatives such as carpooling and "park and ride"; safety training through the worksite including defensive driving; reducing work hours and thereby avoid impaired driving and requiring work camp residents to use buses to travel to the worksite.

Operations

Similar cumulative effects management approaches are recommended for the operations phase as for construction except that work camps will no longer be used.

Characterization of Cumulative Effects

Construction

A negative effect will be the large number of construction workers who will place a strain on policing services. The cumulative effect will be adverse and low in magnitude since the effect will be most pronounced during construction when more workers are in the region; it will level off once operations workforce is in place and organizations will adjust to more constant population levels and demands. The geographic extent is regional, and is medium-term in duration. Frequency of the effect is continuous, and reversible. The level of confidence in the assessment is high, with high certainty that the effect will occur. Mitigation success will be moderately effective since no permanent negative effects will be felt once the RCMP and other emergency response organizations are able to adjust to constant workforce conditions during operations. The significance of the effect is moderate.

A corresponding positive effect is that, while there is greater potential for emergencies, there will be a corresponding increase in regional response capacity. The cumulative effect on firefighting, SAR and ambulance is, therefore, predicted to be positive and high in magnitude since there will be a measurable and sustained effect to these types of services. The effects are regional in geographic extent, long-term in duration and continuous. Reversibility is not desired and thus not assessed. The level of confidence is high, with high certainty of occurring. Mitigation success is not applicable since the residual effect is positive. Overall importance of the effect is significant.

Operations

The cumulative effect will be neutral and low in magnitude since there will be a levelling-off of the workforce and organizations will adjust to more constant population levels and demands. The geographic extent of the effect is regional, and is long-term in duration. Frequency of the effect is continuous, and reversible. The level of confidence in the assessment is high, with medium certainty that the effect will occur. Mitigation success will be moderately effective since no permanent negative effects will be felt once the RCMP and other emergency response

organizations are able to adjust to constant workforce conditions during operations. The significance of the effect is moderate.

Monitoring and Follow-up

The RCMP keeps regional statistics on types of infractions and accidents that occur. Several emergency response organizations are already in place (e.g., regional council on Oil Spill Response, PB Traffic Committee) an individual communities have their own response plans that can monitor demand and supply issues.

Summary of Effects on Emergency Services Infrastructure

Construction

Unlike physical and social services infrastructure, cumulative effects to emergency services infrastructure is not likely to be intense or adverse unless a severe accident occurs – such as an oil spill or a fire. With the possibility of so many projects proceeding simultaneously, the risk factor increases, but with ongoing consultation the risk factor can be managed. If the industrial proponents can partner with each other and with service providers for necessities such as firefighting, search and rescue, oil spill recovery operations and ambulance services, this effect can be better managed and communities will see increased services. This approach is preferred over providing these services as individual entities, since it will result in greater efficiencies, less competition for scarce personnel and resources, less stress on community volunteers and leaders, and a greater sense of community.

Operations

During the operations periods (which also overlap), there will be an overall increase in population. While there will be some growing pains during the initial years, the longer-term effect is generally considered positive and contributes to quality of life as governments increase the tax base from which infrastructure and service provision is funded. The result will be increased service provision (more firefighting, search and rescue, oil spill recovery operations and ambulance services) to meet the demands of the growing population. Communities will be stronger thanks to the larger population from which volunteers and community leaders may be drawn, and to the initiatives of the proponents (e.g., free firefighting training).

Table 13.13 provides a summary of the cumulative effects on emergency services infrastructure.

Table 13.14 Summary of the Cumulative Effects on Emergency Services Infrastructure

Infrastructure and Services VEC	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Level of Confidence	Certainty	Mitigation Or Enhancement Success	Significance
Police, Services (Construction)	Adverse	Low	Regional	Medium-term	Continuous	Yes	High	High	Moderate	Moderate
SAR, Firefighting, Ambulance and Mutual Aid (Construction)	Positive	High	Regional	Long-term	Continuous	NA	High	High	NA	Significant
Emergency Services (Operations)	Neutral	Low	Regional	Long-term	Continuous	Yes	High	Medium	Moderate	Moderate

14.0 DECOMMISSIONING

The design life of the refinery is 25 years, but with re-fit, upgrading, and expansion, the operating life of the refinery will more likely be 50 years or longer. Given this time frame, it is difficult to predict with any certainty the effect decommissioning will have on many of the socio-economic VECs. However, some general trends can be anticipated based on past experience of other large scale industrial closures as well as taking into consideration other industries operating or planning to operate in the Placentia Bay region at that time that could absorb some of the "shock" factor of the decommissioning. Table 14.1 lists each of the VECs and associated issues requiring consideration in decommissioning as required by the June 18, 2007 guidelines.

Table 14.1 Decommissioning Effects on Each VEC

VEC	Issue	Significance
The Economy	Withdrawal of $350 million (2007CD) annually from the economy as well as capital equipment upgrades. Approximate cost to decommission the plant and oil storage tanks, sale of re-usable machinery, equipment and plant assets and returning the site to pre-existing use condition is estimated at $45-50 million, offsetting the $350 million annual operating budget by approximately 13% for several years after decommissioning.	The decommissioning of an operation of this size would be significant and adverse on the economy. The extent of the impact, however, will depend on the level of local procurement, the overall reliance of local businesses on the project, whether other projects have been established in the area and the overall health of the local economy.
Employment and Business	If other employment opportunities are not found in the Study Area or the province as a whole, those skilled workers who are not close to retirement age at the refinery would be faced once again with leaving the province and contributing to out-migration. Because of the size of the refinery and its demand for many direct and indirect goods and services (e.g. maintenance, supplies, marine service, trucking, transport, catering, accommodations, engineering, copier services, equipment rentals, restaurants), particularly within the local Study Area, business downsizing and closures could occur throughout the Study Area Decommissioning of a refinery including environmental clean-ups will provide jobs for a short time period. If sufficient planning is done to start clean-up immediately after decommissioning, some former plant workers will have jobs for several succeeding years. Environmental companies will benefit from the decommissioning phase.	The decommissioning of an operation of this size would be significant and adverse on employment and business based on decommissioning of other operations of a similar size (e.g., Stephenville paper mill was less than half the size of the proposed Refinery (300 full and part-time versus 750) when it closed in 2006).

VEC	Issue	Significance
Commercial Fisheries and Aquaculture	With decommissioning of the refinery, less marine traffic would use Placentia Bay with fewer opportunities for disruption to the fisheries. On the other hand, it could negatively affect the level of marine services provided to the bay.	The decommissioning would be of medium positive significance on fisheries and aquaculture and of low negative significance to the provision of marine services within Placentia Bay
Community Health and Services	Depending on where former workers at the refinery choose to live after the refinery closes, there could be less demand for public health and acute care services, but increased short-term demand for community and family social services if individuals and families require employment insurance and/or counseling to address issues related to job loss (mental health, addictions counseling due to excess spare time, budgetary issues related to decrease in income). Depending of whether employees or businesses remain or move from the Study Area, the housing and/or commercial market could experience a down turn. Short-term housing (e.g., hotels) would experience a down turn.	The decommissioning of the refinery would be of low to medium significance on community health and services and medium to high on housing including short-term accommodations
Education and Training	If families move away from the Study Area day-care, primary and secondary school capacity would increase. If families stay in the Study Area and do not find other employment, one member of the family could stay home and provide day-care. Post-secondary institutions that provided ongoing short-term training would experience a loss in income. Education and training capacity in general would be less affected because post-secondary institutions train for a larger market. If partnerships had been developed between the refinery and any educational institutions, those institutions would experience a financial loss.	The decommissioning would be of low to medium significance on primary and secondary education within the Study Area if many of the families moved from the Study Area. The decommissioning would be of low to medium significance on post secondary institutions; medium for short-term training and partnerships and low for general training.
Tourism and Recreation	Use of restaurants would decline; community activities such as participation in community sports or volunteer events would also diminish, particularly if families moved away. Less pressure would be exerted on hunting and fishing if families moved away. However, if families remained and did not find employment, more pressure could be exerted on hunting and fishing because of increased leisure time.	The decommissioning of the refinery would be of low to medium significance on tourism and recreation: medium on businesses and low on land use.
Land use and Municipal Planning	Decommissioning would have little effect on land use and municipal planning except that if families remained in the Study Area and did not find employment, more pressure could exerted on hunting and fishing because of increased leisure time.	The decommissioning would be of none to low significance on land use and municipal planning

VEC	Issue	Significance
Physical Infrastructure	Physical infrastructure will not be greatly affected except that there will be less traffic, less wear and tear on the roads, less marine traffic, less risk of oil spills and accidents, and less demand for power which could result in excess power for the province.	The decommissioning of any large –scale operation will be positive on ground transportation as the wear and tear of roads will decrease due to large volumes of goods and people no longer using the roads. It will also be positive for marine transportation as there will be less traffic in Placentia Bay, but decommissioning could also cause some people to lose their Placentia Bay marine related jobs due to a major decrease in marine traffic. The effect on air transportation will be neutral and it will be positive on public utilities because there will be less use and neutral on telecommunications.
Emergency Services Infrastructure	There will be less demand for emergency services infrastructure during decommissioning as there will be fewer people on the road and at sea and less risk of fire and and/or oil spills. However, the refinery would have been a major contributor to training and emergency services which could result in either increased costs to other emergency service providers or a decrease in effectiveness. Company training will result in a well trained volunteer fire fighting and rescue personnel.	The decommissioning of the refinery will have a positive significance on demand for emergency services, but less positive on long-term supply of trained personnel.
Historic Resources	The decommissioning of the refinery will not have any effect on the historic resources.	The decommissioning of the refinery will be of none to low significance on historic sites

15.0 SOCIO-ECONOMIC MANAGEMENT PLAN

15.1 Introduction

NLRC is committed to monitoring and managing, to the highest possible degree the socio-economic impacts of the refinery project. As the EIS indicates, there will be significant positive economic benefits and some minor to moderate adverse impacts on some systems.

NLRC recognizes that, in the absence of a social-economic management regime including advance planning and mitigation measures, the project could produce costs that exceed benefits for some local communities, primarily during the construction phase. The proponent wishes to identify any adverse effects early on so as to be able to reduce those that are undesirable and to enhance those that can be beneficial. The proponent can only achieve this objective by having a plan and a process in place to identify the potential impacts, the mitigation measures, a monitoring and reporting system and a process to make changes during each phase of the project. A cornerstone of this approach is a formal mechanism of ongoing consultation by the proponent with all relevant stakeholders.

15.2 The Socio-Economic Management Plan

For this project, NLRC has developed a preliminary socio-economic management plan based primarily on the EIS report that contains a comprehensive analysis of the potential social and economic impacts of the refinery on the local communities, the Study Area, the Employment Catchment Area and the province. The plan is preliminary as it has to be regularly updated as the project proceeds from the planning stage through to de-commissioning. During and after each phase, the plan will be reviewed and updated.

The Plan is developed based on six ongoing activities.

Activity I Identification or Forecast of Impacts

The EIS report contains a series of potential social and economic impacts for each major phase of the project. These impacts will be listed by category and subcategory (e.g., category: social; sub-category: health and community services) and presented in order of priority in terms of their significance.

NLRC will engage in an ongoing process of validating the potential impacts and their significance with external consultants, researchers, industry representatives, community leaders, public sector bodies, government officials and with its own resources.

Activity II Identification of Mitigation Measures

The EIS report contains a series of mitigation measures for each socio-economic impact, with an emphasis on those areas that may have an adverse impact. These measures will be correlated to the prioritized and categorized list of potential social and economic impacts. The proponent will continue to validate the measures and quantify the investments for implementation, recognizing that many of these can only be addressed by or in conjunction with third parties. NLRC will rely on external consultants, researchers, industry representatives, community leaders, public sector bodies, government officials and its own resources to validate and quantify the associated investments for the mitigation measures.

Activity III Integrating the Mitigation Measures with Project Development

A critical activity of socio-economic management planning is to ensure that the mitigation measures are identified and implemented as early as possible in the life of the project – from pre-construction to de-commissioning. Ideally, this will require adequate lead time(s). At all stages of the project the appropriate mitigation measures will be finalized and implemented within an appropriate timeframe by NLRC (and/or brought to the attention of third parties for their action) to ensure minimal adverse impact – and to encourage a positive impact.

Activity IV Monitoring, Reporting, Re-Assessment

NLRC will ensure that the project is continually monitored for its impact among other social and economic areas, such as local municipal services, provincial public services, housing, training, employment and procurement from local businesses.

For each potential social and economic impact during each major phase of the project, the proponent will monitor the actual impact and the result of the related mitigation measure. The proponent will engage in an ongoing process of consulting with external consultants, researchers, industry representatives, community leaders, public sector bodies and government officials as well as using its own resources to monitor and verify the results.

NLRC will provide an annual report to the communities in the Study Area on the results of the monitoring activity along with any new mitigation measures and changes (planned and/or implemented) in the project.

Activity V Ongoing Involvement of Public and Stakeholders

NLRC recognizes that the project is of particular and significant interest from a socio-economic perspective for all Study Area residents, businesses, municipal leaders and public sector agencies. NLRC believes that they should be continuously consulted and their views incorporated in the planning, development and operation of the project. NLRC has demonstrated a keen interest in ensuring that those most affected by the project have sufficient information to participate in ongoing consultations on the project and in the environmental assessment process. NLRC will continue with this approach as part of the socio-economic management planning process.

NLRC will establish a Community Liaison Committee with representatives from the local municipalities, local businesses and public agencies to advise on the potential socio-economic impacts, related mitigation measures and other activities to ensure that the project maximizes the positive socio-economic impacts for the Study Area. The primary activity of the committee will be to advise NLRC on an ongoing basis in the Monitoring, Reporting and Re-assessment activity as described above.

Activity VI Refinery Project Socio-Economic Impact Assessment Office

To ensure that the socio-economic management plan and the planning effort are undertaken in a timely and effective manner, NLRC will establish and maintain a socio-economic impact assessment office for the life of the project. The office will be responsible for undertaking and/or co-ordinating the five key activities described above.

15.3 Conclusion

The design and implementation of a socio-economic management plan does not have to be complex to be effective. The more important aspect is how it is communicated and how it involves the community. In this case, NLRC believes that by being transparent during each step of the project it can minimize the potential for adverse impacts and maximize positive impact for the Study Area, the Employment Catchment Area and the province as a whole. The plan calls for ongoing involvement of the project's many stakeholders in all its critical activities. Its other key feature is that when it is fully designed and executed the plan will routinely integrate mitigation measures with project implementation to make it a truly iterative project to achieve a highly positive socio-economic impact overall for the Study Area.

16.0 CONCLUSION

Placentia Bay is ice free, has deep harbours and is located near the offshore oil and gas reserves off Newfoundland's southeast coast, the fishing grounds of the Grand Banks and is also adjacent to international shipping lanes. As a result the Bay has long been a location for significant industrial activity (e.g. Marystown Shipyard, ERCO phosphorus plant, a US Naval Base, Come By Chance Oil refinery, Newfoundland Transshipment Terminal, large fish plants and offshore fishing fleets). This activity has developed and been supported by a skilled and well-trained workforce based in the many communities surrounding the Bay as well as in nearby Trinity Bay and on the Avalon Peninsula.

NLRC has consulted extensively with the local communities: this effort is described in Volume 5 Public Consultations. These consultations have shown that the proposed refinery would be a welcome addition to the Placentia Bay community. Participants in open house meetings have indicated that their top two interests are local employment and local benefits.Information and experience gained from previous major projects at the Bull Arm site has enabled communities to plan and manage the short term effects on housing, infrastructure and training. The difference with the refinery is that with its long term presence in the area, long term solutions can be implemented, such as a new intersection that will serve the communities of Come By Chance and Sunnyside as well as the new refinery.

Significant new industrial activity is now on the horizon for Placentia Bay including increased activity at the Kiewit Offshore Services (Marystown Shipyard and nearby Cow Head fabrication facility), the Voisey's Bay Nickel Processing Plant at Long Harbour, a LNG plant at Grassy Point near Arnold's Cove and the Newfoundland and Labrador Refinery at Southern Head.

As part of the federal and provincial regulatory environmental assessment of the refinery, an environmental impact assessment of the proposed Refinery has been prepared. Volume 4 of that assessment, the Socio-economic Assessment, has carefully documented the existing socio-economic conditions in the communities nearest the proposed refinery as well as employment and business conditions in some of the major service centres within 100 km of the proposed refinery.

This Volume also assessed the changes, both positive and negative, in human populations, communities and social infrastructure that could occur as a result of the development of the refinery, both during the construction and operating stages and, to a lesser degree, during decommissioning. The measures proposed by NLRC to enhance the positive effects of the project and minimize the negative effects are based on maintaining or enhancing the way of life of the Study Area while at the same time operating a world class, state of the industry crude oil refinery.

During the past several years, as a result of market volatility and/or depleted resources (e.g. fish, forestry, oil and gas) many Newfoundlanders have out-migrated to other areas of Canada where the economic conditions are better and offer more opportunity for employment.

The proposed Refinery Project will provide significant new employment, both direct and indirect, in the Study Area. In turn, these effects will promote economic growth, in the Study Area and in the province.

The ability to benefit from this increase in economic growth and local business opportunities in the Study Area will depend, in part, upon the availability of skilled labour and NLRC's success in attracting labour (back) to the region. The company is committed to working with all partners (unions, business groups, government, and training institutions) to recruit, retain and train workers as well as to attract and enhance businesses in the Study Area and the province.

NLRC believes that a part of this success will be a desire for quality of life factors such as proximity to family, a return to a traditional maritime culture, small community living and affordability of living expenses that will help drive this change. As such, NLRC is committed to ensuring that mechanisms are in place to proactively coordinate project interactions with fisheries, agriculture and traditional land uses. Traditional recreational activities and access to the area's natural resources contributes to a high quality of life in the region.

The Placentia Bay commercial fishery is active throughout the Bay. NLRC has worked closely with area fishers and with the FFAW during preparation of the assessment of the proposed new refinery. These discussions and the issues and potential approaches to resolution have been presented in Section 5 of this document. NLRC will continue to work the fishers and will have an full-time Fisheries Liaison Manager in place during all phases of the project. In addition, NLRC will continue to address marine traffic related issues through existing established forums such as the Placentia Bay Traffic Committee and the FFAW's Placentia Bay Sub-committee which includes harvesters' representatives from all around Placentia Bay. The assessment has shown that there will not be effects from the project on aquaculture or the processing operations in Placentia Bay.

A wide range of social services and infrastructure is provided to residents in the Study Area. Presently, some service providers are struggling to meet increased demands, others are experiencing flat growth, and others are downsizing due to lack of demand. For example, due to the age of the population and the challenges in recruiting and retaining personnel for medical services in rural areas, there are increased demands on existing personnel for these services. On the other hand, the housing market in the Study Area, with the exception of Clarenville, is flat.

NLRC recognises that one of the impacts of the Project could be on the availability of housing during the construction phase of the project. Their intent is to mitigate this potential effect

through providing the necessary short-term accommodation in a work camp at Bull Arm. NLRC will also work with nearby municipalities to provide advance notice of labour demands and ensure adequate residential land is available.

As a result of out-migration, particularly among individuals of child bearing age, a steady decline in primary and secondary school enrolments has led to school closures in the Study Area. Project related population increases and overall stability in the region will help keep schools open and limit the need for children to travel long distances for schooling as well as create new opportunities for new child care services.

The demand and possible response for training for the Project may tax the current capacity of local training institutions in the short-term, but in the long-term will add to the Province's reputation as a training ground for skilled workers. Again, the company is committed to working with all partners and in this case to ensure that proactive and timely information, educational and community support systems, pre-employment programs, employee benefit programs and housing programs are in place.

While municipal services such as waste and wastewater management, drinking water supply, power and communications do not capacity issues, there is room for enhancement to accommodate an increased population. For example, some communities have experienced boil water orders in past years and not all communities in the Study Area have prepared Emergency Response Plans. Of those that have Plans, not all have addressed responses to the possibility of potential oil refinery-related accidents. To help meet existing and current demands, NLRC will help ensure that local firefighting training, search and rescue, ambulance and emergency response plans and capacity are enhanced. The company will also work closely with the Department of Transportation and Works and the RCMP to ensure that project-related traffic (commercial and personal) is well managed to minimize accidents and plan for highway improvements.

In summary, the Placentia Bay region is at a cross road: at the same time it is poised for strong economic growth as a result of the refinery and other projects, many people are currently leaving for jobs elsewhere in Canada. The Refinery Project can assist in reversing this trend. The Project will provide employment and business opportunities in the Placentia Bay region and throughout the province.

The project will bring increased support to the physical, social, health, communications and emergency infrastructure; further development of training and education institutes; growth in the business and labour capacity; and enhanced management of the Placentia Bay marine environment.

The assessment has determined that the socio-economic impact of the Refinery Project can be a significant positive contribution to the Study Area and to the province as a whole.

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18.0 GLOSSARY OF TERMS

Term	Definition
Air Quality Study Group	A study group to determine and address the air quality concerns of citizens of communities surrounding the project area.
Apprenticeship Training	A concentrated and deliberate effort to qualify workers in skilled trades.
Baseline Study	The study of all pre-project aspects of a community or area.
Cumulative Effects	Impacts that result from the impacts of a proposed development in combination with other past, present or reasonably foreseeable future developments.
Direct effects	Specific effects as a direct result of the Project. These include direct jobs with the proponent at the Project site, plus impacts on industries (firms) which expand production to satisfy increased demand by the project proponent.
Diversified Workforce	The availability of many workers, with varied skills and training to meet all requirements of a project. Diversity includes alternative lifestyles, age, sex, religion, socio-economic status, and ability.
Economic Impact Assessment	Study of the economic impact of the Project on the economy of Newfoundland and Labrador.
Employment Catchment Area	The area from which people would travel to work on the proposed project.
Environmental Impact Assessment	The study of the likely influence a project may have on the environment. The aim is to eliminate or reduce a project's potential impact on the environment before a project begins. The EIA addresses concerns of the biological, physical and human environment.
Indirect effects	Indirect jobs with the proponent's contractors, plus the rippled effect throughout the economy as the firms directly affected by the proponent expand production and purchase additional required inputs from other firms.
Induced effects	The spending and re-spending of income by workers associated with

Term	Definition
	the Project, which increases demand for other goods and services in the economy and gives rise to additional jobs.
Input/Output (I/O) Model	A formula used in economics to predict the changes caused by, in this case, an industry on other industries, the environment and local residents.
Labradorian	A native or inhabitant of Labrador.
Mitigation	The lessening of potential effects.
Newfoundland and Labrador (NL)	The most easterly province in Canada consisting of the Island of Newfoundland and the mainland area of Labrador. NL is used when referring to the entire province, Newfoundland when referring to the island portion and Labrador when referring to the mainland portion.
Newfoundlander	A native or inhabitant of Newfoundland.
Outport Newfoundland and Labrador	Traditionally small communities located on the coastline of Newfoundland and Labrador.
Placentia Bay Fishers Sub-Committee	Sub-Committee to deal with issues facing fishers in Placentia Bay.
Placentia Bay Integrated Management Planning Committee	A committee with a mandate to help maintain the ocean and coastal waters of Placentia Bay.
Placentia Bay Traffic Committee	Provides a forum where all the marine users of Placentia Bay can discuss issues surrounding vessel movements and traffic within Placentia Bay and come to reasonable solutions.
Primary Study Area	The area within 100 km of the proposed project. Includes the communities that have the potential to be most affected by the Project.
Project-Specific Impacts	Potential affects to the area or the people of the area that are a direct result of the Project.
Provincial Labour Demand	The level of need for workers of specific qualifications in the province.

Term	Definition
Public Consultation	A process of engaging affected people and other interested parties (stakeholders) in open dialogue through which a range of views and concerns can be expressed in order to inform decision-making and help build consensus.
Qualitative information	Information that is based on personal accounts.
Quantitative information	Information that is based on numbers.
Regional Advisory Council on Oil Spill Response	A council to advise on an adequate level of oil spill preparedness and response in the region
Residual Effects	The remaining / long-term impact of a project.
Service Centre	A community, or group of communities, that supply the surrounding area with services – such as grocery stores, gas stations, health care, etc.
Socio-Economic Impact Assessment	Assessment of the likely influence a project may have on the social and economic well-being of a region.
Socio-Economic Setting	The values and economic status of an area, all contributing to their overall Quality of Life.
Stakeholder	A person or group who have an interest or investment in a project.
Sustainable development	Development that can be sustained over time with little or no effect on natural, financial and mental environments. In other words, the project must be environmentally, economically and culturally sustainable.
Terms of Reference	A document that describes the purpose and structure of a project. The Terms of Reference indicate the information that is required in the EIA.
Valued Socio-Economic Components	Aspects of community life that are seen as important and valuable to locals.

Appendix A
Agencies and Persons Consulted

Agencies and Groups Consulted	
Provincial Departments and Agencies	Environment and Conservation - R. Goulding - D. Maddox - J. Sharpe Natural Resources - Fred Kirby Municipal Affairs - Cory Davis - Elaine Mitchell Newfoundland Statistics Agency - Alton Hollett Fisheries and Aquaculture - Mike Warren, Executive Director, Policy and Planning - Todd Budgell, Manager of Aquaculture Licensing and Inspections - Elizabeth Barlow, Salmonid Aquaculturalist - Claudette Laing, Aquaculture Licensing Administrator Transportation and Works - Don Brennan - John Morrissey, Manager of Highway Design and Traffic Engineering - Doug Shea - Paul Goodman - Gary Gosse Business Human Resources, Labour and Employment - Candace Ennis-Williams - Pam Toope - Robert Turner - Roxy Wheaton Education - Kerry Pope, Manager of Evaluation and Research - Stephen Dale, Eastern School District Innovation, Trade and Rural Development Women's Policy Office GIS Analysis - Keith O'Driscoll

Agencies and Groups Consulted	
	Rural Secretariat Health and Community Services - Arleen Cook, Eastern Health - John Pickett, Eastern Health, Community Health and Nursing Services - Diana Reed, Placentia Health Centre - Evelyn Tilley, Eastern Health, Mental Health Manager - Barb Griffiths, Eastern Health - Theresa Keating, Eastern Health, Administrative Assistant - Edina Mullins, Eastern Health - Holly LeDrew, Dr. C.B. Gross Memorial Hospital
Federal Departments and Agencies	Canadian Environmental Assessment Agency Transport Canada Fisheries and Oceans - Max Eddy, Fisheries Officer, Arnold's Cove - Robin Smith, Acting Chief Resource Management, Grand Bank Environment Royal Canadian Mounted Police (RCMP) - J. Taylor Atlantic Canada Opportunities Agency (ACOA)
Project Area Communities' Council representatives	Swift Current North Harbour Placentia Bay - Vivian Rose, Teacher/Placentia Bay Islands Cabin Owner Garden Cove - Donald Brinston, Chair Local Service District Goobies - William Goobie, Chair Local Service District Sunnyside - Noreen Read Come By Chance - Wendy Coffin

Agencies and Groups Consulted	
	Arnold's Cove - Herb Brett, Deputy Mayor, President Chamber of Commerce - Wayne Slade Southern Harbour - Bernadette Power Little Harbour - Betty Gilbert, Resident of Little Harbour East
Study Area Communities' Council representatives	St. Lawrence Marystown - Petrina Power - Linda Short, Marystown Burin Area Chamber of Commerce Clarenville - Michele Fry, Area Chamber of Commerce Isthmus Joint Council
Study Area Economic Development Associations	Arnold's Cove Chamber of Commerce Argentia Chamber of Commerce Schooner Regional Economic Development Board Avalon Gateway Economic Development Corporation Discovery Economic Development Board
Schools and Colleges	Tricentia Academy Fatima Academy Laval High School Crescent Collegiate/Blaketown College of The North Atlantic (Placentia, Marystown, Clarenville, St. John's…) - Maisie Caines, Clarenville Campus - Darrel Clarke, Placentia Campus - Mike Graham, Burin Campus - D. Hanrahan - Arthur Leung - Gary Myrden, Carbonear Campus - Wanda Petten, Seal Cove Campus - Paul Tilley, Clarenville Campus - Robin Walters, Seal Cove Campus Keyin College
Associated Industry and Business	Newfoundland Transhipment Limited

Agencies and Groups Consulted	
	SNC Lavalin - Nick Gillis - Kaylen Hill Chevron - Tim Murphy Husky Energy - Ron Ledrew, St. John's Office Newfoundland and Labrador Federation of Agriculture - Merv Wiseman, President Newfoundland and Labrador Hydro - Kim Petley Newfoundland and Labrador Housing Corporation - Norm Feltham, Gander Regional Manager - Sid Rockwell, Housing Officer - Dave Whelan, Marystown Regional Manager Professional Engineers and Geoscientists of Newfoundland and Labrador - Mark Fuher Marystown Ambulance - Trudy Fiander Newfoundland and Labrador Building and Construction Trades Council - Elizabeth Harding Labourers International Union of North America - Deane Hennessey Professional Engineers and Geoscientists of Newfoundland and Labrador - Derek Myers North Atlantic Refining AMEC Earth and Environmental - C. Riggs, St. John's - J. McCarthy, St. John's Battlefield Equipment Rentals - Vince Ryan, The Cat Rental Store, Come By Chance Icewater Seafoods Ltd. Peter Kiewit Sons Company Eastern Canada Response Corporation (ECRC) - Paul Nippard

Agencies and Groups Consulted	
	Placentia Bay Aquaculture Operators (2006 and 2007) - Ambrose Jones, Petite Forte - Peter Leonard, Southern Harbour - Bernard Norman, Rushoon - Mervin Hollett, Arnold's Cove - Don Pomeroy, Placentia - Andrew Walsh, St. John's - Joseph Pevie, Arnold's Cove - Clayton Moulton, Red Harbour - Joseph Keating, Holyrood - Christopher Warren, Arnold's Cove Cook Aquaculture - Nell Halse, Director of Communications - Robert Sweeney, Consultant, St. Stephen NB Bull Arm Site Corp. - Brad Kendell
Stakeholder Groups	Fish, Food and Allied Workers (FFAW) One Ocean Women in Resource Development Committee
Committees and Councils	Placentia Bay Traffic Committee Placentia Bay Integrated Management Planning Committee Regional Advisory Council on Oil Spill Response (RAC) Natural History Society "Skills Task Force"
Other	Operating Engineers Local 904 - Maureen Au
	Canadian Maritime Agency Ltd. - Aiden Wadden - Aidan Woodman
	Newfoundland and Labrador Building and Construction Trades Council - Dave Wade Boilersmakers' Local 203 - Tom Walsh AMEIL Constructors Ltd. - Sandra Benson ES Fox Ltd. - John Bisson

Agencies and Groups Consulted	
	Teamsters Union, Local 855 - David Pierce Newfoundland and Labrador Chiropractic Association - Dr. R. Bryans - Dr. K. Cassell Canning and Pitt Associates Inc. - Strat Canning Collins Ambulance Service - Judy Collins Carpenters Local 579; Millwright Local 1081 - Gus Doyle Employment Services - John Hooper, Marystown-Burin Woody Island Resort - L. Pomeroy Child Care Services - Amanda Murphy, Explore and Discover Child Care Centre - Lori Peddle, Toddler's Corner Day Care - Christine Pike, Early Discoveries Preschool/Daycare Protective Gear Services Ltd. - Judy Merrigan United Association, Local 740 - Calvin Jones International Union of Elevator Constructors Local 125 - Glen Jones Remax - Reta Dalton, Clarenville Parson's Trucking - Kevin Parsons, Southern Harbour United Rentals - Todd Baker Liquid Natural Gas (LNG) - Mark Turner Clarenville Rentals Ltd. - Mark Tucker Historiens - Ken Tulk

Agencies and Groups Consulted	
	St. John's International Airport - Joe Bennett, Director of Marketing and Community Relations Hebron - Ron Newhook

Appendix B

Survey of Trades Unions, AMEC, April 2007

Union Surveys

Results of Union Survey respecting Availability of Skilled Trades and Labour
April 2007

#1 - How many members are registered with your union and residing in the province for each of the following occupations?

	MALE	FEMALE
Pipe fitter	650 220 Apprenticeship	
Millwright	360	1
Labourer	740	60
Electrician	800	8
Equipment Operator	120	12
Operating Engineers	1000	100
Pipe Welder	280	
Insulator	162	3
Painter	107	1
Boilermaker	480	06
Carpenter	1253	17
Ironmaker	205	5
Sheetmetal Worker	94	1
Welder-Structural	195	10
Concrete Finisher	272	19

#2 - What is the minimum level of qualifications / training required for members in the following occupations?

	MALE	FEMALE
Pipe fitter	-	-
Millwright	Pre-employment program & registered with the Gov't.	
Labourer	N/A	N/A
Electrician	-	-
Equipment Operator	Class 3 Drivers Licence	
Operating Engineers	Hold Journey Person certificate or 10 years experience; must be registered apprentice	
Welder, High Pressure-F3F4 Tickets	150 welders with CWB – 100 have addition high pressure or T.I.G Tickets	
Insulator	-	-
Painter	Pre-employment Course and 5400 hours Trade Qualifier.	
Boilermaker-Rigger Fitter-Inter-Prov	Red Seal 130	
Carpenter	Pre-employment program/registered apprentices with Gov't	
Ironmaker	Journey Person 7200 Hrs	
Sheetmetal Worker	Provincial License	
Welder-Structural*	CWB T-Class: 150 CWB S-CLSS	CWBS-CLASS14
Concrete Finisher	Journey Person, Registered Apprentice	

#3 - How many members in each of the occupations are known to be employed / unemployed within the province?

	MALE		FEMALE	
	Employed	**Unemployed**	**Employed**	**Unemployed**
Pipe fitter	**-**	**-**	-	**-**
Millwright	4	357	-	-
Labourer	50	690	0	60
Electrician	70	730	0	8
Equipment Operator	50	70	0	12
Operating Engineers	200	800	6	94
Pipe Welder	-	-	-	
Insulator	37	99	1	1
Painter	39	68	1	2
Boilermaker	5%	95%		100%
Carpenter	30	1223	6	9
Ironmaker	14	190	0	10
Sheetmetal Worker	14	80	-	1
Welder-Structural	-	-	-	
Concrete Finisher	50	222	0	19

#4 - How many employed / unemployed members located in other areas of the province would

likely commute or migrate for work on the project?

	MALE		FEMALE	
	Employed	**Unemployed**	**Employed**	**Unemployed**
Pipe fitter		250		
Millwright		Most All		
Labourer		90%		
Electrician	70	730	0	8
Equipment Operator	40	30	0	12
Operating Engineers		Unknown		
Pipe Welder				
Insulator		Unknown		
Painter	107		3	
Boilermaker		99%		99%
Carpenter	Our inquiries indicate all members travelling will relocate to where job is.			
Ironmaker		All		
Sheetmetal Worker		90		1
Welder-Structural		All		
Concrete Finisher		90%		

#5 - How many members in each of the occupations are known to have relocated outside of the province for work? What percentage is likely to return if work becomes available?

	MALE	FEMALE
Pipe fitter	-	-
Millwright	Travel as needed on shutdowns and will return when work starts.	
Labourer	150	10
Electrician	-	-
Equipment Operator	25	0
Operating Engineers	None of our members have actually relocated. We do have some who are currently working on permit outside the province while waiting for work to start here.	
Pipe Welder	-	-
Insulator	28	1
Painter	90	10
Boilermaker	No permanent relocation – very transient group	
Carpenter	Very few have relocated. All are travelling as needed and will return when work starts provided wages and benefits.	
Ironmaker	20	0
Sheetmetal Worker	25	0
Welder-Structural	5	0
Concrete Finisher	None have relocated	

#6 - How many members located outside the province would likely migrate to the province for work on the project?

	MALE	FEMALE
Pipe fitter	-	-
Millwright	All Current	
Labourer	All	All
Electrician	-	-
Equipment Operator	20	0
Operating Engineers	All members who are working on permit outside this province will return when work becomes available.	
Pipe Welder	-	-
Insulator	-	--
Painter	72	8
Boilermaker	N/A	-
Carpenter	All current members would return	
Ironmaker	-	-
Sheetmetal Worker	25	-
Welder-Structural	Almost All	
Concrete Finisher	N/A	N/A

#7 - How does someone get to be an apprentice?

	MALE	FEMALE
Pipe fitter	-	-
Millwright	Pre-employment + work experience	
Labourer	N/A	N/A
Electrician	-	-
Equipment Operator	N/A	N/A
Operating Engineers	Must successfully complete a 24 week registered apprenticeship program.	
Pipe Welder	9 Month Welding Course	
Insulator	-	-
Painter	Pre-employment course – gain employment with Bona Fide Contactor then become indentured.	
Boilermaker	Grade 12	
Carpenter	Complete 9 month pre-employment or regular trade work hours with Gov't	
Ironmaker	12 Month Course	
Sheetmetal Worker	12 Month Course	
	Must register with Dept of Education - Industrial Training	
Welder-Structural	9 Month Course	
Concrete Finisher	Pre-employment Course or prior work as a Trade helper	

#8 - If applicable, how long does apprenticeship take in the following occupations?

	MALE	FEMALE
Pipe fitter	-	-

Millwright	7200 hours plus schooling (approx. 5 years)
Labourer	N/A
Electrician	-
Equipment Operator	N/A
Operating Engineers	5400 hours
Pipe Welder, Welder Pressure	5600 hours for tickets
Insulator	8000 hours
Painter	Pre-employment course then 5,400 relevant hours or 7200 hours with all required competencies
Boilermaker	5600 hours plus pass apprentice tickets and Red Seal
Carpenter	Approx 5 years to complete in school and work experience
Ironmaker	12 Month Course
Sheetmetal Worker	4 Years
Welder-Structural	9 Month Course / 5600 hours plus pass appropriate tickets
Concrete Finisher	3-4 years

#9 - How many persons are currently engaged in apprenticeship programs?

	MALE	**FEMALE**
Pipe fitter	-	-
Millwright	120 Registered apprentices 26 pre-employment program	
Labourer	N/A	N/A
Electrician	250	7
Equipment Operator	0	0
Operating Engineers	180	20
Welder	12	0
Insulator	-	-
Painter	3	0
Boilermaker	12	0
Carpenter	302 Registered Apprentices 37 1st years, 12 pre-employment	
Ironmaker	13	2
Sheetmetal Worker	16	1
Welder-Structural	0	0
Concrete Finisher	15	1

#10 - Does the union anticipate that labour demands from other projects in the area ands/or the province will interfere with the ability to secure labour for this project?

	MALE	**FEMALE**
Pipe fitter	-	-
Millwright	No	No

Labourer	No	No
Electrician	No	No
Equipment Operator	No	No
Operating Engineers	No	No
Welder/Pressure	No	No
Insulator	No	No
Painter	Other projects in area will attract more interest and more applicants.	
Boilermaker	No	No
Carpenter	No if wages and benefits are sufficient.	
Ironmaker	Yes	
Sheetmetal Worker	No, Not according to the projection for Sheet metal Workers by N.L.R. Employers Assoc.	
Welder-Structural	Yes	
Concrete Finisher	No	

#11 - Are there any specific occupational gaps anticipated by the union that would affect the project?

	MALE	**FEMALE**
Pipe fitter	-	-
Millwright	Maybe technology changes	
Labourer	No	No
Electrician	No	No
Equipment Operator	No	No
Operating Engineers	No	No
Welder/Pressure	No	No
Insulator	No	No
Painter	It is possible that occupational gaps will present themselves due to Technological change and new products but will but affect the project.	
Boilermaker	No	No
Carpenter		
Ironmaker	Heavy formwork training would be needed based upon employer's requirements	
Sheetmetal Worker	No	No
Welder-Structural	No	No
Concrete Finisher	Yes	Yes

#12 - Are there strategies the union will pursue to address and overcome these gaps and/or labour shortages? If yes, what are these strategies?

	MALE	**FEMALE**
Pipe fitter	-	-
Millwright	We currently have plans to start a heavy formwork program which will focus on the specific type of formwork needed for this project.	

Labourer	-	-
Electrician	N/A	N/A
Equipment Operator	Recruitment	
Operating Engineers	We don't foresee any gaps. If necessary we will bring in qualified members from other locals.	
Welder/Pressure	Accelerate Apprenticeship Intake	
Insulator	-	-
Painter	Gaps and shortages will be addressed by manufacturer. Supplied training or by union resources.	
Boilermaker	Take Other Qualified	
Carpenter	We currently have plans to start a heavy formwork program which will focus on the specific type of formwork needed for this project.	
Ironmaker	Yes-Recruit	
Sheetmetal Worker	Qualified workers from neighbouring provinces would be readily available	
Welder-Structural	Yes-Recruit	
Concrete Finisher	Yes	Yes

#13 - What are the normal leads time required to address occupational gaps and/or labour shortages?

	MALE	FEMALE
Pipe fitter	-	-
Millwright	-	-
Construction Management	-	-
Labourer	-	-
Electrician	-	-
Equipment Operator	1 Week	
Operating Engineers	If any gaps or shortages occur, they can be resolved within 7 days.	
Pipe Welder	-	-
Insulator	-	-
Painter	Lead times are necessary and can be identified in conjunction with detailed scope of work/work description and construction schedule.	
Boilermaker	About 8 weeks	
Carpenter		
Ironmaker		
Sheetmetal Worker	3-4 days	
Welder-Structural		
Concrete Finisher	1-3 years	

#14 - Will the union participate in any specific strategies to maximize local employment benefits?

Pipe fitter	**--**
Millwright	Yes-Has/Will offer membership in the area to local people.
Labourer	Yes
Electrician	Yes
Equipment Operator	Yes
Operating Engineers	First opportunities will go to qualified Union members.
Pipe Welder	--
Insulator	Will recruit locally as is required
Painter	Yes, if people are qualified
Boilermaker	Yes. Will seek apprentices from local area as well as people partially training from local area and upgrade them
Carpenter	Yes-Has/Will offer membership in the area to local people.
Ironmaker	--
Sheetmetal Worker	Yes
Welder-Structural	Yes, if they meet qualifications
Concrete Finisher	Policy is to supply local members where work is taking place

#15 - Have partnerships been formed with any post-secondary institutions for "just in time

training"? If yes, Please describe.	
Pipe fitter	-
Millwright	Currently provides their own training
Labourer	N/A
Electrician	Developing a proposal for College of North Atlantic for training partnership
Equipment Operator	No
Operating Engineers	Operating Engineers have their own training college; They are constantly training new people as well as upgrading the skills of existing members
Pipe Welder	-
Insulator	Currently pursuing avenues for recruitment and training
Painter	Have had discussions with College of North Atlantic to provide training if there is sufficient demand
Boilermaker	Local 203 owns the Boilermakers Industrial training Center, Inc and can initiate training almost immediately
Carpenter	Currently provides their own training
Ironmaker	-
Sheetmetal Worker	No, but could if necessary
Welder-Structural	No
Concrete Finisher	Union owns the BAC Masonry College and are currently training bricklayers. Currently preparing an application to the Apprenticeship Board to have Concrete Finisher designated for apprenticeship training in the province

#16 - Can these "training partnerships" address occupational gaps? Please identify.

Pipe fitter	-
Millwright	Yes – working with WRDC to promote and provide training to women
Labourer	N/A
Electrician	No gaps exist
Equipment Operator	N/A
Operating Engineers	Have a steady influx of people through Operating Engineers College
Pipe Welder	-
Insulator	No gaps currently anticipated
Painter	Any gaps will be addressed through training
Boilermaker	-
Carpenter	Yes – working with WRDC to promote and provide training to women
Ironmaker	Yes. In areas such as welding they can quickly upgrade someone to a higher level. Current stock is of high calibre
Sheetmetal Worker	Yes, If contractors know a certain skills would be needed and advise union, skills would be attained
Welder-Structural	Don't Know
Concrete Finisher	Yes

Responses:

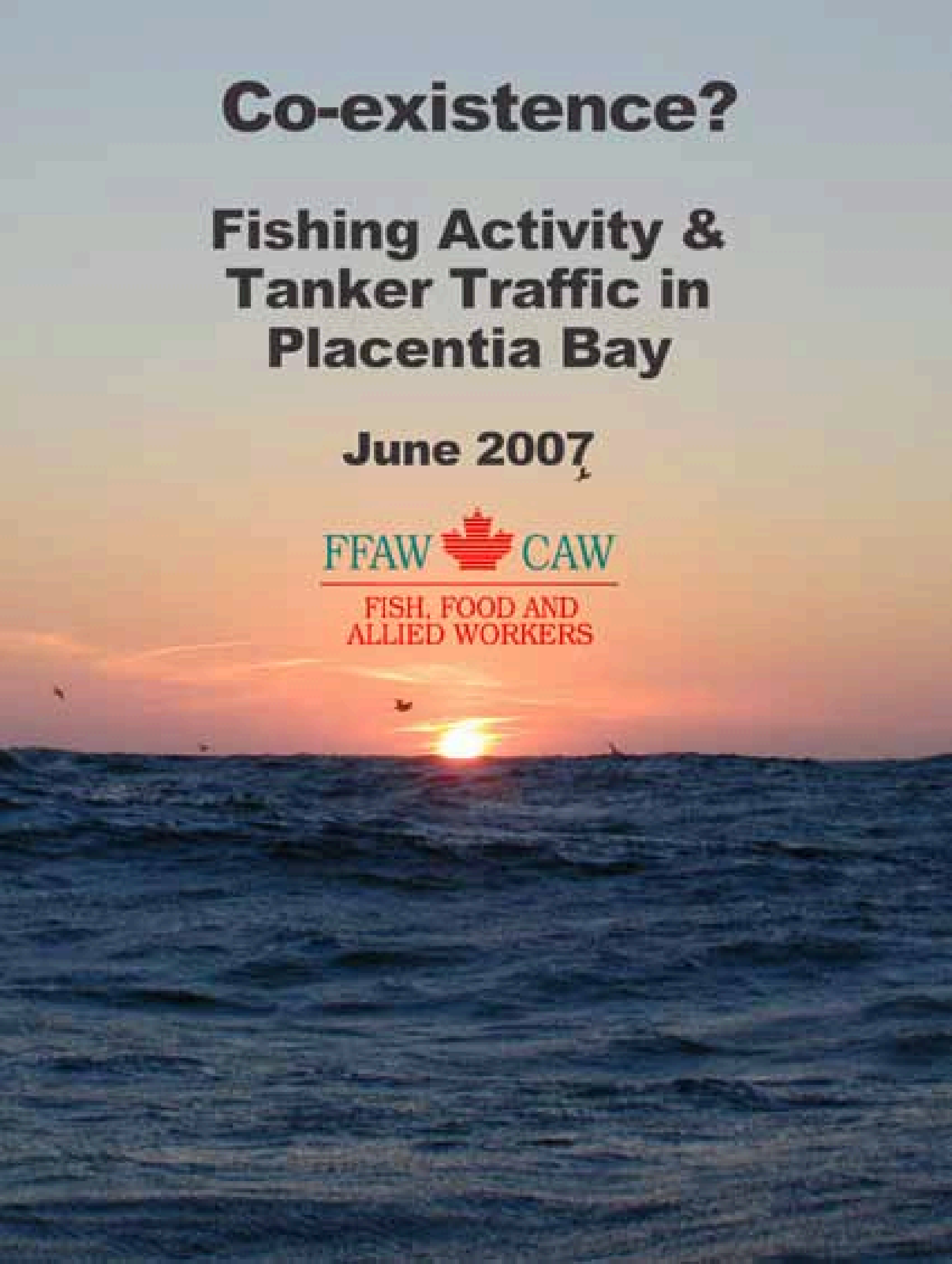
Boilermakers Local 203
Carpenters local 579
International Union of Bricklayers and Allied Craft Persons, Local 01
IBEW 2330
Insulators Local 137
Iron Workers Local 764
Labourers Local 1208
Ironmaker and Welder-Structural
Operating Engineers L 904
Millwrights Local 1081
Painters, Local 1984
Sheet Metal Workers Local 512
Teamsters Union Local 855
United Association of Journeymen and Apprentice

Appendix C
FFAW Publication: Co-existence? Fishing Activity and Tanker Traffic in Placentia Bay, June 2007

Co-existence?

Fishing Activity & Tanker Traffic in Placentia Bay

June 2007



FFAW CAW

FISH, FOOD AND ALLIED WORKERS

Fish Harvesting Activity in Placentia Bay – Work Report

Introduction

As part of the environmental assessment process for the proposed crude oil refinery at Southern Head, Placentia Bay, the Newfoundland and Labrador Refining Corporation (NLRC) wanted to gain an understanding of current fish harvesting activities. The Fish, Food and Allied Workers (FFAW/CAW), which represents all fish harvesters and processing workers throughout Placentia Bay, was contracted to collect and document that information. This report, in addition to the digital resource charts and traffic lane crossings chart, is the culmination of that work.

Formed in 1971, the FFAW/CAW represents over 20,000 women and men in Newfoundland and Labrador, most of who are employed in the fishing industry. A large part of our mandate is ensuring the interests of our members are represented with respect to fisheries management, science, conservation issues, and other developments that have the potential to impact fisheries. Harvesters have developed a sense of stewardship for fish resources and participate in management of their resources with a sense of accountability. Given our members make their living from the ocean, they have a great interest in potential impacts of the proposed refinery project on the marine environment.

Placentia Bay is a large, biologically productive Bay that supports a diverse range of marine species and as a result sustains a valuable commercial fishery. In 2002, more than 14,000 t of fish and shellfish were harvested from Placentia Bay, including snow crab, scallop, capelin, lobster, cod, herring and lumpfish. These and other fisheries support over 1,000 harvesters (over 500 enterprises plus crew) and more than 1,300 plant workers, making the fishery the largest employer in Placentia Bay.

Placentia Bay attracts interest for industrial development because of its geographical location, deep waters, shelter and it is ice-free year round. The area is already home to an oil refinery, crude oil transhipment terminal and large marine ferry terminal. Proposed projects for the Bay consist of a large oil refinery, a liquefied natural gas terminal and a nickel processing plant. Of course, all of this development means a severe increase in shipping traffic into Placentia Bay.

The impetus for this work being completed was fish harvester concern surrounding existing and potentially increased tanker activity in the already-busy Bay. Harvesters in the inner portion of the Bay (Swift Current to Fair Haven) were concerned about the loss of fishing grounds from increased traffic and additional infrastructure related to new operators. Harvesters in the outer portion of the Bay were concerned about the ongoing North – South movements of tankers in the traffic lanes compared to fishing-related East – West travel. There is a level of concern throughout the Bay about the potential for increased traffic.

The purpose of this project was to further investigate those concerns (i.e., tanker – fishing vessel interaction and loss of fishing grounds), and document current fishing activity. This information was collected by conducting interviews with fish harvesters in all fleet categories throughout Placentia Bay, and was captured in two formats: 1) data collection sheets, which provided information on vessels, fisheries, and tanker – fishing interaction, and 2) nautical charts, through which harvesters identified fishing activity by species. Harvesters are the only source of information for most fisheries in Placentia Bay as Fisheries and Oceans Canada (DFO) only collects data on a limited number of species. Logbooks with fishing locations are only required for snow crab.

Methods and Materials

Data was collected from fish harvesters through community meetings and one-on-one interviews. While input was sought from all harvesters throughout the Bay (Point May to St. Bride's) and included all fleet sectors (i.e., mobile gear and fixed gear fleets, and all vessel sizes), there was a focus on communities where the potential impact was deemed to be greatest, i.e., within the confined inner portion of Placentia Bay, called the Immediate Project Area (see Figure 1 for a map of Placentia Bay). In the remainder of the Bay, the number of harvesters interviewed and the number of meetings held was determined with input from the Placentia Bay Sub-Committee.

Figure 1: Map of Placentia Bay (www.smartbay.ca/weather/weatherMap1.gif)

For this project there was no sampling protocol implemented and therefore the number and distribution of harvesters interviewed only reflects those who were available and willing to participate. To advise harvesters of community meetings the interviewer contacted a key harvester, usually a member of the Placentia Bay Sub-Committee, in the community, and then that harvester contacted others in the community. The meetings

were usually held with up to 16 harvesters in the local community centre. On a few occasions where individual harvesters could not attend community meetings the interviewer conducted one-on-one interviews. Meetings sometimes encompassed several communities.

During the meeting the interviewer gave a brief overview of the project, why information was being collected, and how it was going to be used. The data sheets (see Appendix A) were explained and distributed to all in attendance (in some cases harvesters took extra sheets to pass to harvesters who could not attend; those sheets were later faxed to the interviewer), and there were two sample data sheets harvesters could use for reference. These data sheets were used to collect information on the enterprise and vessel, species fished, and tanker – fishing interaction. Harvesters were not asked to include their name on the data sheets, so all information collected is confidential and cannot be linked to an individual harvester.

In addition to completing the data sheets, harvesters also identified fishing areas by species using nautical charts of Placentia Bay supplied by the interviewer. The interviewer used a series of nautical charts (LC 4839, LC 4617, LC 4615, LC 4016) for each of seven (7) species or groups of species (i.e., pelagic species, ground fish species). For example, lobster had a set of nautical charts that covered all of Placentia Bay. Harvesters then pointed out their fishing areas on the charts and the interviewer shaded in those areas using a marker that was colour specific for each species. As the interviewer completed meetings throughout the Bay the charts were filled-in.

Once all interviews were completed the data sheets were entered into a MS Access database created by the FFAW/CAW for this project and the nautical charts were submitted to SNC-Lavalin for entry into a GIS program to generate a set of digital maps of fishing activity.

Results

During April and May 2007, 16 community meetings were held throughout Placentia Bay and resulted in 114 data sheets and fishing location information on 12 species or groups of species (cod, other groundfish, snow crab, lobster, lumpfish, scallop, squid, mackerel, herring, capelin, whelk and sea urchins). Within the 16 meetings, 24 homeports were identified.

The following table summarizes the information that was garnered through the data sheets:

Placentia Bay Summary Tables

While there were 16 community and individual meetings, a number of those meetings encompassed several communities. Table 1 below lists the 24 homeports of those harvesters that completed data sheets and the number of data sheets completed from that community.

Table 1: Total number of harvesters interviewed and number by homeport.

No. of Harvesters Interviewed	**114**		
No. of Homeports	**24**		
Arnold's Cove	*5 (24)*	*Merasheen*	*3 (6)*
Baine Harbour	*11 (11)*	*Mt. Arlington Heights*	*2 (3)*
Burin	*2 (26)*	*North Harbour*	*8 (15)*
Come-by-Chance	*2 (4)*	*Petite Forte*	*4 (20)*
Fair Haven	*6 (17)*	*Placentia*	*7 (24)*
Fox Harbour	*2 (10)*	*Port aux Gaul*	*1 (10)*
Garden Cove	*4 (7)*	*Point May*	*1 (8)*
Jerseyside	*3 (4)*	*Red Harbour*	*1 (17)*
Lamaline	*2 (19)*	*South East Bight*	*16 (26)*
Little Harbour East	*7 (21)*	*Southern Harbour*	*7 (50)*
Long Harbour	*2 (4)*	*St. Bride's*	*16 (40)*
Lord's Cove	*1 (16)*	*Swift Current*	*1 (1)*

* The number in ( ) is the total number of core and non-core enterprises in that community based on 2003 DFO data.

As can be seen in Table 2 below, most of those harvesters interviewed fish from vessels less than 35 ft, which range from open speed boats to 34'11'' longliners. It was difficult to engage owners of larger vessels as their fishing season was already underway and their fishing trips generally last several days.

Table 2: Vessel size distribution of harvesters interviewed.

Vessel Length (ft)	Number of Harvesters
<35 ft	*94*
35-45 ft	*18*
45-55 ft	*2*
55-65 ft	*0*
>65 ft	*0*

As can be seen from Table 3 below, most vessels in Placentia Bay operate with two or three crewmembers, however there are some vessels, particularly open speedboats, with just one person onboard.

Table 3: Number of crewmembers per vessel of those harvesters interviewed.

Number of Crew	Number of Harvesters
1	*12*
2	*51*
3	*31*
4	*15*
5	*5*

On-board technology, such as radar and communication equipment, is important as it can help fishing vessels detect and communicate with approaching tankers. As can be seen in Table 4 below, almost all vessels are equipped with a VHF radio, most vessels have GPS, and just over half of harvesters interviewed have radar on their vessel.

Table 4: Onboard navigation and communication equipment of those harvesters interviewed.

Onboard Navigation and Communication Equipment	Number of Harvesters
VHF	*91*
GPS	*77*
Radar	*62*
Cell Phone	*39*
Sounder	*28*

With 500 fishing enterprises, an oil refinery, a crude oil transhipment terminal, and large marine ferry terminal, Placentia Bay is quite busy and oftentimes space is at a premium. Table 5 shows the proportion of those harvesters interviewed that feel they have been displaced as a result of above-listed projects. The 67% of harvesters that have been displaced believe their fishing effort has been restricted in terms of season, length of time that can be spent on the gear, and that their fishing grounds are no longer accessible. Many harvesters commented that tanker traffic in and out of the Bay affects their crab fishing effort, while tankers at anchorage affects cod fishing. In addition, a number of harvesters indicated they have been displaced as other harvesters who were forced to move their gear start fishing on their traditional ground.

Table 5: Number and percentage of harvesters that believe they have been displaced because of current projects in Placentia Bay.

Have you been displaced because of current projects?	Number of Harvesters
Yes	*76 (67%)*
No	*38 (33%)*

As seen in Table 6, 67% of harvesters have experienced gear loss. During interviews harvesters mostly reported losing buoys and moorings, with some reporting losing crab pots.

Table 6: Number and percentage of harvesters that reported experiencing gear loss.

Have you experienced any gear loss?	Number of Harvesters
Yes	76 *(67%)*
No	38 *(33%)*

Safety, risk of pollution and concerns about collisions at-sea were major issues raised by harvesters during community meetings. Numbers of "close calls" available through Marine Communications and Traffic Services (MCTS) ("Placentia Traffic") are quite low, but as Table 7 shows, 64 % of harvesters have had "close call", with 22% of those incidents were reported. Therefore, the low number of "close calls" available through MCTS is a function of a low reporting rate rather than low incident rate.

Table 7: Number of "close call" experienced by harvesters interviewed.

Have you had "close calls" with tankers?	Number of Harvesters
Yes	73 *(64%)*
No	41 *(36%)*

Table 8 below lists the traffic lane crossing points as supplied by harvesters, and in conjunction with the traffic lane crossings chart clearly shows some points experience more East – West travel than others. Harvesters fish crab in the deep water of the traffic lane, but because harvesters are licensed to fish throughout the Bay they also traverse the Bay and traffic lanes enroute to other fishing grounds. For example, a harvester in Southern Harbour might fish cod off St. Bride's. Because of their proximity to the traffic lanes, harvesters in some communities in the bottom of the Bay, such as Little Harbour

East, Southern Harbour and North Harbour, are crossing the traffic lanes essentially every time they leave port.

Table 8: List of "points of entry" for fishing vessels into the traffic lanes.

What is your point of entry at the traffic lanes?	Number of Harvesters		
Arnold's Cove	*3*	*Red Island*	*3*
Come-by-Chance	*9*	*Red Island Shoal*	*1*
Big Shoal	*3*	*Iron Skull Rock*	*1*
Bread Island	*1*	*Rowlands Rock*	*3*
Bordeau Bank	*2*	*South East Bight*	*2*
Bottom of Bay	*1*	*St. Bride's*	*11*
Oderin Bank	*1*	*Various*	*5*
St. Lawrence	*4*	*Virgin*	*1*
Buffet Head	*1*	*Fox Island*	*1*
Buffett Island	*5*	*Woody Island*	*1*
Coombs Rock	*2*	*Bar Haven*	*1*
Burin	*1*	*Call-in point #7*	*2*
Haystack	*4*	*Call-in point #8*	*2*
Fair Haven	*3*	*Call-in point #9*	*2*
Head of Bay	*1*	*Call-in point #6*	*2*
Long Island	*5*	*Call-in point 1A*	*1*
Merasheen Bank	*3*	*Call-in point 1B*	*2*
Placentia	*10*	*Call-in point 3B*	*1*
Little Harbour	*1*	*Call-in point 4A*	*1*
Long Harbour	*1*	*Call-in point 4B*	*2*

The following table (Table 9) lists the various precautions harvesters take when operating in or passing through traffic lanes. During community meetings harvesters noted that foggy weather presents the biggest challenge for safety, especially for vessels without radar. Most harvesters stated that they call either Placentia or Argentia traffic centre for information on tanker traffic or movements.

Table 9: Precautions taken by harvesters in Placentia Bay when operating in, or crossing, traffic lanes.

What precautions do you take crossing traffic lanes?	Number of harvesters		
Call Placentia/Argentia traffic	*54*	*Everything possible*	*2*
		Call other boats	*1*
Listen to radio	*35*	*Communication*	*1*
Radar watch	*28*	*Phone*	*1*
Visual watch	*14*	*Avoid lanes*	*1*
Wait for clear lane	*5*	*Call in location*	*1*

Tables 10, 11, and 12 below all address the issue of tankers at, or enroute, to anchorages and how they affect fishing effort. Harvesters felt the movement of tankers while at the anchorages restricted access to fishing grounds and limited the amount of time that could be spent at gear. Harvesters also commented that there is more of a risk of gear loss around anchorages than in traffic lanes.

Table 10: Issues with tankers at anchorage.

Do you have issues with existing anchorages?	Number of Harvesters
Yes	66 *(58%)*
No	48 *(42%)*

Table 11: Interaction with tankers enroute to anchorage.

Do you interact with tankers enroute to anchorages?	Number of Harvesters
Yes	75 *(66%)*
No	39 *(34%)*

Table 12: Effect of tankers at anchorage on fishing effort.

Do tankers at anchorage affect your fishing effort?	Number of Harvesters
Yes	77 *(68%)*
No	37 *(32%)*

Species Information

Data on targeted species, gear type and amount, and fishing season was also collected during this project. Figure 2 graphically represents fishing season by species and clearly shows that May and June are very active months, with fishing taking place for all species. The following section contains specific details for each fishery.

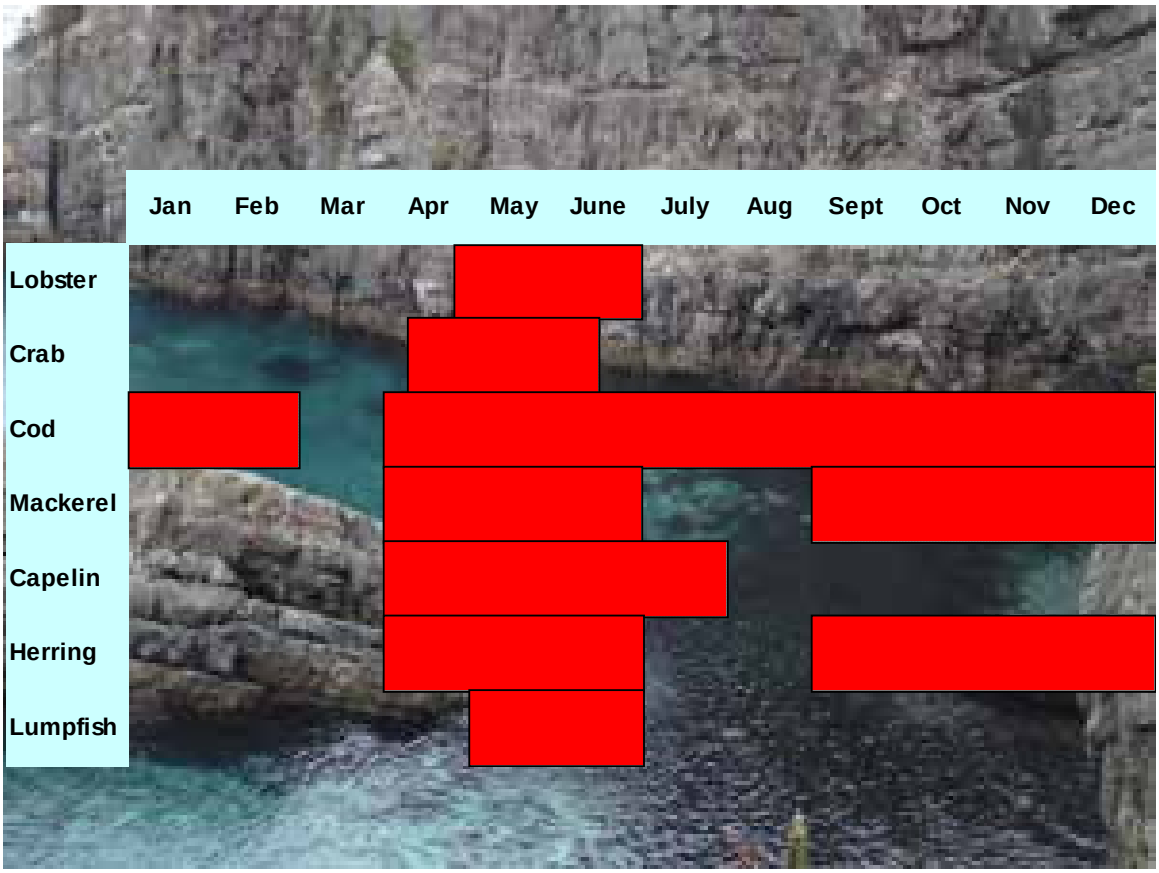


Figure 1: Graphical representation of fishing season by species.

Targeted Species: Snow Crab
Gear Type: Pots
Gear Amount: 150-Inshore/300-Offshore
Season Fished: April to Mid-June

Snow crab is fished using cone-shaped pots, generally with 5 ½" mesh. Crab pots are set in fleets of 20-75 pots per string, with pots spaced 17-25 fathoms apart on the groundlines apart. Snow crab are found in deeper waters from 30-200 fathoms, and are commonly found in shallower waters in Placentia Bay. Crab pots are baited with squid, mackerel and herring and traditionally left to fish for several days before being hauled. In the past, snow crab were harvested into August and September, but to avoid soft-shelled crab and reduce mortality, the season has been shortened.

Targeted Species: Lobster
Gear Type: Pots/Traps
Gear Amount: 200
Season Fished: Mid–April to End of June

Lobster is harvested using pots/traps in inshore area, usually along the shorelines in waters less than 30 fathoms. Lobster pots are hauled every day during the season.

Pots/traps can be traditional, curved wooden or the larger metal framed type. They are sunk to the bottom using weights and marked with a single buoy. Many harvesters in Placentia Bay leave their home-port to stay on the many Islands throughout the Bay while fishing lobster. Often, these islands are the communities they have resettled from.

Targeted Species: Cod
Gear Type: Gillnets/Longlines/Handlines
Gear Amount: 20 nets-Inshore/40 nets-Offshore
Season Fished: May-February

Cod is predominately fished using gillnets in Placentia Bay (94% of harvesters interviewed use gillnets). Nets are 50 fathoms long and are mostly set in short fleets, anchored/ weighted at each end and are hauled on a daily basis. Gillnets are usually 5 ½" mesh and sometimes up to 7". Otherwise, harvesters use hooks on longlines and handlines. Longlines usually are set for short periods with baited hooks. Cod is harvested throughout the Bay at different times of year, but mainly in summer and fall months.

Targeted Species: Lumpfish
Gear Type: Gillnets
Gear Amount: 50 nets
Season Fished: May-June

Lumpfish are harvested for their roe (spawn). These fish are caught in a similar style as other groundfish, using larger mesh size gillnets-10 ½". The lump fishery has various opening and closing dates in different areas, from year to year. However, the fishery usually takes place for 2-3 weeks, with nets hauled on a daily basis.

Targeted Species: Scallop
Gear Type: Dragnets/Dredges
Gear Amount: Varies
Season Fished: August-March

Scallops, another shellfish, are harvested from towing of scallop rakes, dredges or nets along ocean floor. This mobile gear is towed for a short period of time and retrieved to separate scallops from rocks, etc. The scallop meat is removed, or "schucked," from the shell onboard the vessel. This fishery exists almost year around, except during the lobster fishing and spawning season.

Targeted Species: Herring
Gear Type: Gillnets/Seines/Traps
Gear Amount: Bait-2 Nets/Commercial-10 Nets
Season Fished: March-End June/ September-December

Herring is a pelagic species that is very migratory throughout Placentia Bay. Herring are harvested with both mobile and fixed gear. Gillnets are set near the surface, sunken 1 fathom underwater, to avoid catching salmon. Herring are harvested in much larger

quantities in larger vessels using seines to surround schools of herring, capture and winch them aboard. Herring are often misrepresented in value to the fishery, as they are vital to individual harvesters in economic savings for bait.

Targeted Species: Mackerel
Gear Type: Seines/Traps/Handlines
Gear Amount: Varies
Season Fished: March-End June/ September-December

Mackerel, another pelagic, are extremely migratory throughout Placentia Bay, and are harvested with both mobile and fixed gear. Mackerel are harvested with large traps and seines. In addition to commercial landings, Mackerel are also integral to harvesters throughout the Bay as a strong source of bait for shellfish pots.

The nautical charts that were used by harvesters to depict fishing areas were submitted to SNC-Lavalin for digital mapping. These maps represent current fishing areas and do not illustrate fishing areas as they were five years ago, or how they may look five years from now. Fishing patterns could change drastically in years to come as currently underutilized species gain importance, the marine environment changes, and market conditions fluctuate.

Comments

The data sheets contained a section for harvesters to provide comments, and many harvesters took advantage of that opportunity. Some comments have been included in previous sections of this report, and below are some direct quotes that capture many of the concerns expressed by harvesters:

- Additional activity will result in lost fishing grounds and "*it will be impossible to fish in this area anymore*."
- "*It is getting more and more difficult to make a living fishing because our fishing grounds are being taken*."
- "*It is an accident waiting to happen. 400 – 500 small boats trying to get around in foggy, stormy weather with all these tankers going in and out the Bay*."
- "*We are going to be greatly affected financially by any proposed refinery*."
- "*Fishing and tankers are very dangerous. It's only a matter of time and there will be an accident*."
- "*Tankers should reduce speed on entering the Bay and maintain radio contact with any and all vessels in traffic lanes*."

Discussion

The consultations and meetings for fisheries data collection was an effective method of engaging and documenting general fishing information. The FFAW/CAW was successful in interviewing approximately 20% of enterprise owners in the Bay. This was above expectations in terms of turn out, as several fisheries were commencing at the same time. The larger vessel enterprise owners (over 45 ft) were a challenge to engage, as these enterprises have fishing trips of several days and were difficult to target.

The potential for information gaps exists as a result of the temporal constraints on this type of project. Therefore, the material collected and digital maps may need to be revisited to cover all activities. Some of these gaps consist of information regarding the mobile gear fleets for scallop, squid and especially pelagics (i.e., herring, mackerel and capelin). These are intensively migratory species, as harvesters navigate the entire Bay to participate in these fisheries. Obviously, this information would be challenging to adequately demonstrate on maps. It is important to understand the migration of these species throughout the whole Bay and the fishing effort that follows.

The fishery in Placentia Bay has changed dramatically over the years. Until the early 1990's, the fishery depended upon, and revolved around codfish. There have been numerous changes to the fishery since the moratorium on cod, although that species has continued to be one of the most important species to harvesters. The fishery has become much more sustainable through responsible management and conservation measures, stewardship initiatives and an overall sense of ownership towards fish stocks. Many harvesters have expanded their fishing efforts to include species such as, capelin, black-back flounder, winter flounder, rock crab and toad crab. Various new, emerging species harvested include: whelk, sea urchins, sea cucumber, hagfish, etc.

Many species are quite cyclical in nature due to a number of factors: available fish stocks, biological, environmental, seasonal, market conditions and variances in prices. Harvesters focus their fishing efforts on different targeted species from year to year, in direct relation to abundance and the prices paid for a particular year. For example, in a year with high lumpfish prices and abundance, harvesters may heavily fish that species for as long as the commercial season permits, while giving other species less priority for the time period.

This collaborative effort was executed through organisation and logistical support of key FFAW members in various communities, and in particular our Placentia Bay Sub-Committee. This group was formed early in 2007 to meet and openly discuss issues and concerns with expansion of several industries in the Bay. These representatives are responsible for communicating updates and feedback, from proponents and existing projects, to harvesters in their communities.

The Placentia Bay Sub-Committee was initiated through positive interaction and communication with the proponents of a new refinery, Newfoundland and Labrador Refining Corporation. This proponent, and their team of consultants have hosted direct,

open-forum consultations with harvesters in all areas of the Bay. The expertise and traditional knowledge that fishers possess is invaluable and can only be collected and quantified through direct interaction. Fish harvester involvement is pertinent to achieve an effective and fully informed consultation process.

Appendix A

Sample Data Sheet

DATA COLLECTION SHEET - PLACENTIA BAY					
Please Print	***Date***				
Home Port					
Vessel Length (ft)					
Navigation and Communication Equipment					
Crew Size					
Targeted Species					
Gear Type and Amount					
Season Fished (Months)					
Displacement (resulting from existing projects)					
Have you been displaced because of current projects?					
Have you experienced any gear loss?					
Have you had "close-calls" with tankers?					
Do you report these incidents?					
Do you Cross the Traffic Lanes (# times/week)?					
What is your Point of Entry at the Traffic Lanes?					
What precautions do you take?					
Do you have issues with existing anchorages?					
Do you interact with tankers enroute to anchorages?					
Do tankers at anchorage affect your fishing effort?					
Comments					

Appendix D
Number of Core and Non-Core Enterprises and Vessel Size, Placentia Bay (2003 Data)

Table D-1 Number of Core Enterprises and Vessel Size, Placentia Bay (2003 Data)

Home Port	<35 ft	35-64 ft	Total
St. Bride's	30	10	40
Patrick's Cove	1		1
Placentia (including Southeast)	10	11	21
Dunville	5		5
Jerseyside	2	1	3
Freshwater	1		1
Fox Harbour	5	3	8
Ship Harbour	6	1	7
Long Harbour	2	1	3
Mt. Arlington Heights	2		2
Fair Haven	13	1	14
Little Harbour East	12	5	17
Southern Harbour	28	16	44
Arnold's Cove	21	3	24
Come By Chance	4		4
North Harbour	13	1	14
Garden Cove	6		6
Swift Current	2	1	3
Prowseton & Sand Hr. (Vacated)	4	1	5
Davis Cove (Vacated)	6	1	7
Old Cove-Woody Island (Vacated)	1		1
Bar Haven (Vacated)	2		2
Haystack (Vacated)	1		1
Red Island (Vacated)	4		4
Brewley (Vacated)	1		1
Merasheen (Vacated)	5		5
Tack's Beach (Vacated)	2		2
Isle Au Valen (Vacated)	3		3
Little Paradise (Vacated)	2	2	4
Great Paradise (Vacated)	2		2
South East Bight	23	2	25
Monkstown	5	1	6
Petite Forte	17	3	20
Port Ann (Vacated)	1		1
Boat Hr (including Brookside)	8		8
Parkers Cove	11		11
Baine Harbour	8	3	11
Rushoon	2	1	3
Oderin (Vacated)	2		2
Red Harbour	16	1	17
Jean De Baie	1		1
Rock Harbour	1		1
Little Bay		1	1
Beau Bois	1		1
Fox Cove (near Burin)	1		1
Port Au Bras	1	1	2

Home Port	<35 ft	35-64 ft	Total
Burin	17	7	24
Little St. Lawrence	1		1
St. Lawrence	9	7	16
Lawn	10	11	21
Lord's Cove	13	1	14
Point Au Gal	10		10
Lamaline	17	1	18
Point May	8		8
Total	**379**	**98**	**477**

Table D-2 Number of Non-core Enterprises and Vessel Size, Placentia Bay (2003 Data)

Home Port	<35 ft	35-64 ft	Total
Placentia (including Southeast)	3		3
Jerseyside	1		1
Freshwater	2		2
Fox Harbour	2		2
Ship Harbour	1		1
Long Harbour	1		1
Mt. Arlington Heights	1		1
Fair Haven	3		3
Little Harbour East	4		4
Southern Harbour	6		6
North Harbour	2		2
Garden Cove	2		2
Swift Current	1		1
Red Island (Vacated)	1		1
Merasheen (Vacated)	1		1
South East Bight	1		1
Monkstown	1		1
Boat Hr (including Brookside)	2		2
Parkers Cove	1		1
Burin	2		2
Little St. Lawrence	2		2
St. Lawrence	4		4
Lawn	4		4
Lord's Cove	2		2
Lamaline	1		1
Total	**51**		**51**

Table D-3 Number of Core and *Non-core Enterprises and Vessel Size, Placentia Bay (2003)

Home Port	<35 ft	35-64 ft	Total
St. Bride's	30	10	40
Patrick's Cove	1		1
Placentia (including Southeast)	13	11	24
Dunville	5		5
Jerseyside	3	1	4
Freshwater	3		3
Fox Harbour	7	3	10
Ship Harbour	7	1	8
Long Harbour	3	1	4
Mt. Arlington Heights	3		3
Fair Haven	16	1	17
Little Harbour East	16	5	21
Southern Harbour	34	16	50
Arnold's Cove	21	3	24
Come By Chance	4		4
North Harbour	15	1	16
Garden Cove	8		8
Swift Current	3	1	4
Prowseton & Sand Hr. (Vacated)	4	1	5
Davis Cove (Vacated)	6	1	7
Old Cove-Woody Island (Vacated	1		1
Bar Haven (Vacated)	2		2
Haystack (Vacated)	1		1
Red Island (Vacated)	5		5
Brewley (Vacated)	1		1
Merasheen (Vacated)	6		6
Tack's Beach (Vacated)	2		2
Isle Au Valen (Vacated)	3		3
Little Paradise (Vacated)	2	2	4
Great Paradise (Vacated)	2		2
South East Bight	24	2	26
Monkstown	6	1	7
Petite Forte	17	3	20
Port Ann (Vacated)	1		1
Boat Hr (including Brookside)	10		10
Parkers Cove	12		12
Baine Harbour	8	3	11
Rushoon	2	1	3
Oderin (Vacated)	2		2
Red Harbour	16	1	17
Jean De Baie	1		1
Rock Harbour	1		1
Little Bay		1	1
Beau Bois	1		1

Home Port	<35 ft	35-64 ft	Total
Fox Cove (near Burin)	1		1
Port Au Bras	1	1	2
Burin	19	7	26
Little St. Lawrence	3		3
St. Lawrence	13	7	20
Lawn	14	11	25
Lord's Cove	15	1	16
Point Au Gal	10		10
Lamaline	18	1	19
Point May	8		8
Total	**430**	**98**	**528**