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VESSEL REPLACEMENT STRATEGY

FINAL REPORT

March, 2006

Submitted to:

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BMT DOCUMENT QUALITY CONTROL DATA SHEET

REPORT: Vessel Replacement Strategy

DATE: March, 2006

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EXECUTIVE SUMMARY

BMT Fleet Technology Limited has been engaged by the Department of Transportation and Works of the Government of Newfoundland and Labrador to conduct an analysis of various aspects of a vessel replacement strategy for the ferry services around the island of Newfoundland. This has included both services operated by the Province and those provided by private sector contractors. There is a general perception that the current ferry services are sub-standard; in terms of the overall quality of the vessels, their reliability, and their levels of service that they provide.

BMT's scope of work included:

- Surveys and life expectancy assessments for the vessels now in service (government owned vessels only);
- Level of service analyses, including projections into future years based on demographic and economic analyses;
- Identification of future fleet requirements;
- Sourcing of replacement vessels, considering both used vessels and newbuilding;
- Assessing service delivery models, including both private and public sector approaches.

Only the Newfoundland island services have been addressed. The whole transportation system in Labrador is currently undergoing a significant transformation with the construction of the Trans Labrador Highway. It is understood the Department will be addressing the future of transportation in Labrador through a comprehensive Labrador Transportation Strategy.

The vessel surveys confirmed that the ferry fleet contains many vessels in urgent need of replacement. These are all in excess of 30 years of age, and will require increasingly expensive maintenance to provide diminishing levels of service reliability. The smaller set of newer ferries can be expected to provide at least 10 more years of adequate service, subject to receiving normal levels of upkeep and maintenance.

The levels of service currently provided on the Newfoundland routes are, in general, reasonably well matched to the needs of the communities they serve. Overall utilization levels are quite low, and in some cases indicate that service frequencies could be reduced. This would assist in reducing crew workload and allowing more time for planned maintenance activities. Population levels in most of the island and coastal communities are declining, in some cases quite rapidly. To date, the levels of ferry utilization have not declined as rapidly, but if current population trends continue ferry utilization can also be expected to fall. This has been taken into account in identifying the recommended capacities for replacement ferries.

Some recommendations have been made for changes to the current ferry routes. The Province has conducted extensive studies of Routes E and F, to Long Island and Little Bay Islands, to explore building new roads and causeways in this area. BMT's assessment is that the most cost-effective way of providing adequate future services will be to combine the routes and build a new mainland road and jetty. This will reduce the Long Island service, but improve the Little Bay Island service, and will save millions of dollars over the short and medium term future compared with the status quo or other options.

BMT has also recommended substantial modifications to the South Coast services, which are currently mainly passenger-only and provided by private contractors. Our assessment is that tourism and other economic development could be assisted by providing a more integrated service, capable of taking both passengers and vehicles. The total number of vessels involved could be potentially by reduced by one.

Taking the condition of the current fleet and the proposed new service delivery approaches into account, BMT has recommended a fleet renewal program for 8-9 vessels, of which five would be small, two or three medium and one large (in the context of current vessel sizes). We have explored the availability of used vessels on the local and international vessels, and have concluded that very few suitable candidates are on the market or are likely to be so in the foreseeable future. Older vessels will require large investments to be brought into compliance with Canadian regulatory requirements, and most newer vessels currently command prices similar to newbuildings.

Vessels of the size and complexity required could be constructed by shipyards in Newfoundland or elsewhere in Eastern Canada at prices reasonably competitive with overseas suppliers; especially if the build program is structured to provide a steady flow of work. A set of concept designs were developed to a point where these could be costed at a budgetary level, resulting in a total cost estimate in the order of $90 million for eight new vessels. Approximately half of this cost is represented by labour, and so the program could potentially generate or maintain a significant level of skilled employment within the province.

The running costs for the renewed fleet will be somewhat lower than that of the vessels being replaced; with reduced repair, fuel, and (overall) crewing costs. More than balancing this, the overall budget for the ferry services will have to include the direct or amortized cost of vessel acquisition however, this is financed or managed. The outcome will be a higher total annualized cost than the roughly $22 million now reported for the island services, potentially in the order of $30 million. The current level of revenues for all services is only around $1/10^{th}$ of the cost, at somewhat over $2 million annually. It seems improbable that fare levels could be increased dramatically to cover a higher percentage of costs; and the fare structure should probably be regarded as a traffic management tool as much as a revenue stream.

The study of service delivery models concluded that all the Newfoundland services should be delivered by a single service provider, in order to minimize the total number of regular and swing vessels required and for maximum efficiency in support functions. Whether the services should be provided by a private or public sector organization is a complex issue. BMT recommends a model similar to that now used by British Columbia Ferry Services, which is effectively a not-for-profit private corporation operated under a provincial regulator and a set of contractual agreements and requirements. We have identified key staffing requirements for such an organization, and also the areas in which transition planning will be required to move ahead from the current mixed public/private system. We have also recommended that any organization selected should move immediately to implement a formal safety management system based on the International Safety Management Code (ISM), as current operating practices have significant deficiencies.

A Five Year Plan for the renewal of the ferry system should include the following components, roughly in the sequence in which they should be undertaken:

- Verify current traffic levels on certain key routes, notably Bell Island and Fogo Island;
- Consult with the local communities that will be affected by the recommended changes to service delivery;
- Develop full technical requirements for the (three) new vessel classes identified in the report;
- Develop a new organizational structure for the ferry service, along the lines recommended in the report;
- Contract for the construction of the new vessels as series of ships, working towards a phased delivery and phase-out of the older ships; and
- Undertake terminal repairs and upgrades to improve service and safety levels.

The total cash flow requirements of the capital program over this period will be of the order of $85 million. However, this could be financed to reduce annual funding requirements as outlined above.

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1. INTRODUCTION

1.1 Scope

This draft final report presents the work undertaken under the Vessel Replacement Strategy project. The scope of this project has included the following tasks:

- Condition assessments of the provincially-owned vessels used on the Newfoundland services;
- Analysis of the level of services currently provided, and projections of future requirements based on demographic and economic factors;
- Analysis of service delivery options for all the Newfoundland services, taking both public and private sector models into account;
- Assessment of the availability of used vessels capable of meeting future fleet requirements
- Assessment of newbuild options to meet future fleet requirements;
- Financing options for fleet renewal;
- Identification of other important considerations affecting vessel replacement.

The scope of the project has been restricted to the Newfoundland services; i.e., the Labrador routes have not been analyzed. A partial exception is that the *Sir Robert Bond* has been surveyed and its life expectancy assessed. These results are presented in a separate report.

The whole transportation system in Labrador is currently undergoing a significant transformation with the construction of the Trans Labrador Highway. It is understood the Department will be addressing the future of transportation in Labrador through a comprehensive Labrador Transportation Strategy.

The results presented herein could not have been developed without the close cooperation of Department staff, including both office and field personnel. The members of the project team wish to express their thanks and appreciation to all of those involved.

1.2 Background – Current Ferry Fleet

A list of government-owned vessels with their particulars is presented in Table 1.1 below.

The *Northern Ranger* and *Sir Robert Bond* are used on the Labrador Services and will not be discussed further in this report.

In addition to the government-owned vessels, five privately-owned vessels provide services along the South Coast of Newfoundland. These vessels are listed in Table 1.2.

Table 1.1: Ferries Owned by Government of Newfoundland and Labrador

Vessel	Gross Tonnage [t]	Length [m]	Draft [m]	Power [BHP]	Fuel [L/hr]	Veh.	Pass.	Built	Crew
Capt. Earl W. Winsor	1772	75	3.65	3200	450	60	200	1972	15
Nonia	933	49.8	3.1	2100	400	24	120	1986	12
Flanders	1034	54	2.95	2680	520	36	240	1990	11
Beaumont Hamel	831	53	2.4	2700	463	33	180	1985	8
Gallipoli	611	47	2.5	2040	373	20	100	1986	7
Hamilton Sound	387	41.5	1.9	760	135	26	80	1968	6
Sound of Islay	280	43.2	1.7	720	135	15	49	1968	5
Inch Arran	261	33.5	2.1	600	135	16	40	1963	6
Island Joiner	147	25.2	2.4	360	115	8	40	1973	4

Table 1.2: Ferries Operated on Behalf of the Government of Newfoundland and Labrador

Vessel	Gross Tonnage [t]	Length [m]	Draft [m]	Power [BHP]	Pass.	Built	Crew	Ownership
Winchester	384	36	4	1340	40	1969	4	Ray Berkshire
Terra Nova	262	35.1	2.5	700	40	1962	4	Puddister Trading
Marine Voyager	237	29.2	2.6	800	40	1964	4	Puddister Trading
Northern Seal	208	29.1	2.7	900	40	1979	4	Norcon Marine
Marine Coaster	140	29	2.1	1200	40	1963	4	Puddister Trading

It can be seen from these two tables that the majority of the vessels providing ferry services around Newfoundland are elderly. Only two are less than 20 years old, and several are over 40 years old. Typically, vessels more than 25-30 years old are unreliable and expensive to maintain. International and Canadian statistics also show that they are more likely to be involved in accidents, and the consequences of such accidents are more likely to be serious. For all of these reasons, fleet renewal has been identified as a priority by the provincial government.

2. VESSEL SURVEYS

2.1 Overview

In order to assess the remaining economic life expectancy of the existing fleet, and priorities for replacement, a set of vessel surveys has been undertaken. It was initially agreed with the Department that BMT would undertake condition surveys of eight provincially-owned vessels, covering:

- *Captain Earl W. Winsor;*
- *Beaumont Hamel**
- *Flanders**
- *Gallipoli**
- *Sound of Islay*
- *Hamilton Sound*
- *Island Joiner*
- *Inch Arran*

The scope of work was subsequently extended to cover two other vessels:

- *Nonia**
- *Sir Robert Bond*

Four vessels, identified above by asterisks (e.g., *Beaumont Hamel**) were surveyed while in service, while the others were surveyed while in dock for routine or emergency maintenance. The survey on the *Sir Robert Bond* was also undertaken while the ship was alongside. In-service surveys have advantages in terms of ability to observe the performance of systems and of the vessel as a whole. Dock surveys improve access to the underwater hull and to some internal compartments, but offer less opportunity to check machinery functionality.

The work was undertaken by BMT and subcontractor staff, with additional support from the Department and from the ships' crews. In general, all ships' crews were very cooperative in facilitating access, highlighting issues, and providing supplementary data.

Detailed survey reports for each ship are provided as Appendix A to this report. Each report consists of an overall condition assessment, compartment survey sheets, and a selection of photographs taken during the surveys.

Supplementary data was also collected, including maintenance data held by Department and ship staff, and records of inspections and certificates held by Transport Canada's regional staff. This information has been fed into the overall condition assessments.

In general, most of the ferries surveyed are in a condition appropriate for their age. There is a notable distinction between the newer vessels and those that are over 30 years old, particularly in the frequency of machinery failures. Since there are many commonalities within each of the two groups the findings applicable to groups as a whole are presented in the next two sections, followed by the observations found common across the fleet.

The privately-operated vessels under contract to the government were not surveyed, but discussions were held with the operators of several of these ferries. All of the vessels are at or over 40 years of age, and are expected to have similar age-related problems to those of the provincially-owned fleet.

2.2 Newer Vessels

The newer vessels, currently less than 20 years old, comprise the *Flanders, Gallipoli, Beaumont Hamel* and *Nonia.* These vessels are in a moderately good overall condition. Hulls are in good shape with minimal steel wastage found, if any. There are the areas that need attention, however. Localized coating damage has been found at the bottom plating, mostly in peak and machinery spaces. There are no signs of significant corrosion yet.

Machinery is mostly in a good or acceptable condition. Some of the original systems have even been improved based on the crews' initiatives. Many of the major equipment, such as the main engines or the generators, have been overhauled recently.

These vessels are relatively new only in comparison to the rest of the fleet. Although they may still be considered capable of providing an additional 10-15 years of service, regular daily maintenance and equipment overhauls as needed or as recommended by manufacturers will most probably be insufficient to provide trouble-free service. More substantial replacements will be needed to improve reliability as equipment ages and to reduce the problems associated with providing spare parts for obsolete equipment.

One of the problems which can be expected in the future is with corrosion. The coating on these vessels is still mostly in good condition but it seems that damaged areas are not repaired quickly. There are also some areas which look as being neglected for some time. Figure 2.1 shows bottom plating corrosion in cofferdam on *Flanders* and the forward engine room bulkhead on *Beaumont Hamel* is shown in Figure 2.2.

Figure 2.1: *Flanders* – Cofferdam Bottom Plating

Figure 2.2: *Beaumont Hamel* – Fwd ER Bulkhead

The *Nonia* has 50 Hz electrical system and considerable amounts of eastern European equipment. Spare parts will most probably be difficult to obtain in the future. Another issue noted on the vessel is that maneuvering capabilities are insufficient after the removal of the bow thruster. This has been recognized by the Department, and a new thruster is scheduled to be installed. Modifications will also be made to the ramps, which at present are not satisfactory. The *Nonia* requires a large crew, with associated high operating costs. Refits of equipment (such as lifesaving arrangements) could reduce crewing levels but would incur additional costs up-front.

Several of the vessels have operational issues ranging from poor seakeeping performance to austere accommodation and public areas. Recommendations have been included in the survey reports for measures which could improve such issues at reasonable cost.

2.3 Older Vessels

The remainder of the fleet comprises vessels over 30 years of age, and all of these vessels have one or more major areas of concern.

The rate of equipment failures in certain vessels is quite high and keeping the machinery running on all of the older vessels takes considerable crew effort. Given the limited resources available, this does not leave much of the crew's time for general upkeep, including coating renewals. Many of the repairs needed to prevent further spread of corrosion are outside crew's capabilities.

Figure 2.3: *Hamilton Sound* – Deck Corrosion

Figure 2.3 shows an example of deck corrosion onboard *Hamilton Sound*. The problem cannot be solved by new coating only; steel renewals are necessary and the extent of these would be substantial on this and other older vessels.

It was indicated by the crew that the refits cover only the most urgent repairs and those necessary to satisfy regulatory compliance. Less urgent work is sometimes postponed in order to bring vessels back into service as quickly as possible. This will only accelerate the rate of failures in the future.

2.4 Maintenance Issues

Many of the ferries have equipment that is discontinued, and in many cases manufacturers are no longer in business. Local availability of spare parts and support services is poor, which further prolongs the downtime and repair and refit periods. Obsolescence problems in some cases can only be solved by installing new equipment or expensively manufacturing replacements for nominally inexpensive parts.

Regular maintenance and refits are funded from separate budgets. Some of the issues identified by the crews, such as poor astern visibility from the *Flanders'* bridge, easily solvable by adding a CCTV system (see also below), have not been addressed to date because it is not clear which fund should cover the cost of installing the cameras and monitors.

2.5 Regulatory Compliance Issues

All ferries currently in service comply with the current regulations as indicated by certificates issued by Transport Canada (TC). Although the Department has indicated that TC's interpretations have been becoming more stringent in recent years, the regulations also evolve over time and may require the vessels to be modified to stay compliant.

One of the TC regulations requires that all Halon firefighting systems be removed from existing ships by 2010. If such a system needs recharging before 2009, it has to be removed one year after the intervention. Three of the NL ferries utilize Halon systems that will need replacement. Unfortunately, this is not a simple intervention as none of the currently available systems utilizes the same storage space. Apart from the equipment replacement, the solution will also involve significant extension of the firefighting medium storage compartments.

New damage stability standards are being proposed for all Canadian passenger vessels, and are scheduled for implementation between 2006 and 2012. This study did not conduct stability analyses of the existing fleet, but based on other work we consider it probable that none of the vessels constructed prior to 1990 are likely to comply with the new requirements. The extent of modifications needed to upgrade the ships will be vessel-specific; but is likely to be most expensive (in relative terms) for the smaller and older vessels

All surveyed vessels carry open, unpowered lifeboats. While this meets current TC requirements for Home Trade III vessels, it does not seem suitable for winter conditions normally encountered around Newfoundland and Labrador.

Another example of compliance with TC but otherwise questionable features, is the freeing ports on some of the surveyed vessels which do not work well (or at all) in very cold weather. Flap closures on freeing ports are prone to being blocked by ice in which case their functionality becomes compromised. Subsequent water and ice accumulation on the vehicle deck can represent a significant safety hazard.

It should be understood that Transport Canada considers compliance with its regulations and standards to be necessary but not sufficient to provide for safe operation. The ultimate responsibility for safety rests with the Owner (in this case the Department), who should take proper account of the nature of the service in establishing his or her own safety standards. For international shipping this principal is formalized through the International Safety Management (ISM) Code, which requires owners and operators to consider best practices in developing their safety management systems. TC has not yet implemented this requirement for domestic shipping, but have encouraged ferry (and other) operators to do so on a voluntary basis.

Under the current Canada Shipping Act (CSA), many older vessels are 'grandfathered'; i.e. they are exempted from current requirements, and are still certified against standards that would no longer be accepted for new vessels. Under the forthcoming CSA 2001, this type of exemption will become strictly time-limited, and older vessels will be required to be retired or upgraded. The older Newfoundland ferries are likely to have considerable problems in complying with new standards for stability, fire protection, and other features resulting from this new approach.

2.6 Other Issues

Some of the surveyed vessels' suitability for the service may be questioned. *Gallipoli* and *Beaumont Hamel*, as an example, have large flat horizontal surfaces at the aft bottom parts which make them behave poorly in rough seas. The *Gallipoli* also has poor seakeeping performance, and has a hull form that would be difficult to modify to improve this situation.

Crew's accommodations are austere at best. Two or even four crew members usually share very small cabins, an arrangement which is far from modern standards. Accommodating mixed gender crews presents even more of a challenge as sanitary spaces are impossible to separate and the number of bunks in cabins does not allow for any flexibility in female to male crew ratio.

2.7 Priorities for Replacement

Decisions on when to replace any ageing vessels can be based on many factors, including overall economics, reliability and safety.

Once the anticipated refit and repair costs for an existing vessel approach or exceed the amortized costs for a replacement vessel, it is fairly obviously inappropriate to continue with the older ship. In addition, if there are other economies to be gained by using a new vessel (e.g., reduced fuel or crew costs) this will also influence the balance point. Based purely on data readily available from the Department, it is not possible to justify any vessel renewals purely on economic grounds; as the reported annualized maintenance, refit and operating costs for the

existing ships are still below the probable amortized and operating costs for new vessels. However, it should also be noted that:

(a) crew wages (regular and overtime) dedicated to repair and maintenance are not captured by current management information systems; and
(b) costs associated with redeployments to cover for vessel downtime are also difficult to extract.

Item (b) is part of the cost of poor reliability; another part is the impact on the customers. Service downtime due to breakdowns appears to be increasingly unacceptable, and is part of the reason why the Department owns more vessels than would be necessary for a more modern fleet.

Safety levels (both for safety of life and for environmental protection) are also impacted directly by poor reliability; particularly in older vessels built to lower standards for redundancy than are required for new construction. There are also a number of specific safety issues identified during the vessel surveys, and noted in Appendix A, that have been factored into our initial recommendations for fleet renewal.

In general, we consider that all vessels now over 30 years old should be replaced within the next five years for reasons of operational reliability, maintenance cost and effort, and risk. Within this subset of the fleet, the order in which vessels are replaced should take the relative significance of these factors into account.

Capt. Earl Windsor is not the oldest vessel in fleet and its hull and machinery are not in the worst condition, however, refit costs are already extremely high. Major structural repairs are anticipated if the vessel is to remain in service beyond the next few years and the machinery and equipment is becoming progressively more difficult and costly to maintain in good order, as evidenced by the most recent refit costs. There is also a significant issue with the asbestos insulation onboard, which has and is being replaced on a gradual basis at each refit. The remaining asbestos has been coated but, while this may be adequate in the short term, the cost of removing all the asbestos insulation in 3 to 5 years time, coupled with the downtime of the vessel, would likely exceed its residual value. It is recommended that *Capt. Earl Windsor*'s replacement be considered a priority.

The *Hamilton Sound* is also a candidate for early replacement. The vessel was considered a top priority for replacement in 2003, for good reasons. The condition survey reveals that there is significant corrosion in hull plating and engine room piping. Numerous machinery items are obsolete and difficult to support. Overall reliability is low and operating costs are high. Several years of service may be achieved but steel renewals and equipment replacement will probably be necessary. This vessel is highly unlikely to comply with forthcoming Transport Canada requirements for damage stability for passenger vessels, as noted in Section 2.5.

Apart from widespread corrosion, the *Island Joiner* has many problems with the machinery. Stern tube problems have been frequent, although these have been resolved by the most recent refit. The machinery includes obsolete and very difficult to maintain pieces of equipment, such as the 1976 vintage 50 Hz generator. For these reasons, the *Island Joiner* is recommended for replacement before some older vessels in fleet. As with *Hamilton Sound*, several more years of service could be achieved but it may require significant and costly upgrades. Also, in case of generator failure, the vessel may be out of service for quite a long time before spare parts are obtained.

Both of the other old provincially owned island vessels (*Inch Arran* and *Sound of Islay*) are in somewhat better overall condition, having undergone large and costly amounts of steelwork repairs, but in both cases there is a high risk of major machinery failure. As new vessels become available, the older vessels can be relegated to swing duties prior to their own replacement.

Vessel acquisition is discussed in subsequent sections of this report. Our survey of the used vessel market indicates that buying existing vessels to replace some or all of the current fleet is unlikely to be viable, and that new vessels will need to be constructed. This will involve significant lead time, and so even the highest priority vessels are likely to remain in service for several years to come.

3. DEMOGRAPHICS AND LEVEL OF SERVICE ANALYSIS

BMT Fleet Technology has drawn on extensive data provided by the government to develop a picture of the current status of the Island services, issues associated with service quality and reliability, and demographic and economic trends that may influence future service demands. The services taken into consideration initially included only the routes serviced by government owned and operated ferries. This scope has subsequently been extended to cover those operated by contractors on behalf of the province.

The locations of the Island services are shown on the map at Figure 3.1. As previously noted, the scope of the project has been limited to the Island routes; A-F and K-P.

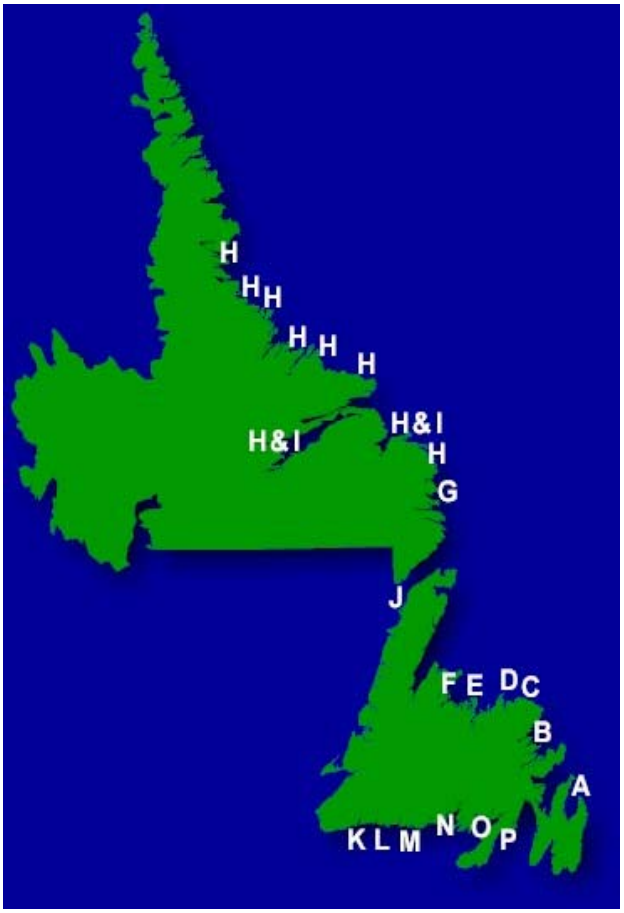

Figure 3.1: Provincial Ferry Routes in Newfoundland & Labrador

3.1 Demographic Trends

In order to develop recommendations for levels of ferry service that will stay valid in the medium and longer term, it is necessary to analyze the population demographics for each of the areas now being provided with ferry service, and to predict future population levels. It has been assumed that forecasting to the year 2016 provides an adequate forecasting window; and any predictions beyond this point will become increasingly uncertain.

Newfoundland and Labrador census data[1] was obtained for census years 1971 and 1981 to 2001. Data was then separated and compiled for each town or region serviced by each ferry route. It should be noted in the compiled census data that 1976 data is missing. This information was not provided from the department. Census data from 1971 was omitted from trend determination and forecasting due to differences between 1971 census zoning and what is currently used.[2]

The details of the methodology used to project future populations are described in detail below for Bell Island. This information is repeated in Appendix B, which provides full background information for all of the island routes. The text below summarizes the outcomes. It should be appreciated that population projections are subject to increasing uncertainty as they project further into the future, and actual outcomes could be influenced by many factors.

3.1.1 Route A: Bell Island – Portugal Cove

Table 3.1 presents recent population data for Bell Island.

Table 3.1: Compiled Census Data for Bell Island

Route	Geography	Census Yr.	SGC	Total	Migration Rate (%)
A	Wabana	1971	1001494	5,421	-
	Wabana	1981	1001494	4,254	21.5%
	Wabana	1986	1001494	4,060	4.6%
	Wabana	1991	1001494	3,605	11.2%
	Wabana	1996	1001494	3,135	13.0%
	Wabana	2001	1001494	2,680	14.5%

Projections are also based on the following assumptions:

1. There have been no major changes in terms of economic or business on the island during these years, nor are there any immediate plans to install any known major revenue generating facility on the island;
2. Service levels and fares will continue to allow local residents to travel to and from the island to work in St. John's. This has established Bell Island as a bedroom community for St. John's.

[1] Newfoundland Statistics Agency: Population by Community, Age, Group and Sex – Newfoundland & Labrador [1971 – 2001]

[2] "**BF0302 Census Consolidated Subdivisions – Newfoundland**": Newfoundland & Labrador Department of Finance, Economic & Statistics Branch

The method utilized starts with the 2001 census data, shifting it accordingly by census period (5-year shifts) and adjusting the population using the Total Migration Rate.

- Total Migration Rate – Refers to the residual of population, births and deaths. It is also known as residual net-migration and is calculated as:

- Residual Net-Migration = Population Migration + Deaths - Births

The percent of change in total population or Total Migration Rate for Bell Island from 1996 to 2001 is -14.5%. A secondary statistics source for Newfoundland and Labrador was located on the website www.communityaccounts.ca[3] which also defines the difference in census year populations in the same manner. Past Total Migration Rates show a constant increase of 1-2% over the last three census periods (10 years). Assuming this trend holds true, the Total Migration Rate for 2001 to 2005 census period will be 15-16%, and so on for further census years. However, for the purpose of this analysis it has been assumed that the Total Migration Rate will stabilize at the most recent level of -14.5%.

The Total Migration Rate of -14.5% is an average for the entire population. The rate will vary per age group, but due to sample size, availability and quality of data, the Total Migration Rate is applied to all age groups. This allows for an approximation of future numbers of people in each specific age group in the community and for the community as a whole.

The next step was to estimate births to populate the future age group 0-4. This was done by finding the relation of number of births to total number of women between the ages of 15-49, using previous census data extrapolated through trends in the data, as shown in Table 3.2. The steps used to predict the number of children for Bell Island in 2006 (and for subsequent years) is thus as follows:

1. Calculate the ratio of number of births[4] to total number of women between the ages of 15-49 for the census division which encompasses the community (i.e., Division No.1 for Wabana). Census division No.1 in 2001 gives ratios of 4.69%, 3.88% and 3.44% for years 1991, 1996 and 2001 respectively.
2. The trend line shows a decrease in births-to-women ratio by -14.3% from census year to census year (5-year period). Assuming this decrease will continue, the predicted birth-to women ratio for 2006 will be 2.95% (see Table 3.3).
3. The total number of women of age 15-49 predicted to be living on Bell Island in 2006 is 547. Multiplying 547 women by the birth-to-women rate for 2006 gives an approximate number of births of 16 for the year 2006. This value is assumed to be approximately the same for all years in a given census period. Thus the total number of children age 0-4 will be 80 (= 16 births per year * 5 years).

[3] Community accounts is an internet-based data retrieval and exchange system established by a multiple entity community formed by the Newfoundland Social Advisory Committee (SPAC).

[4] "Table 051-0035: Components of population growth, census divisions/census metropolitan areas; Division 1, Newfoundland and Labrador; Births (Persons)"; Stats Canada, Legend v21617944

The total predicted population for Bell Island for year 2006 is 2,380.

A check of the population prediction model was conducted. This was done by using 1996 data to predict the population in 2001, and the prediction was compared to the actual number of people living in Bell Island as recorded. The predictions slightly overpredict the total population (due to the increase in total migration rate), but underpredict the actual number in the 0-4 cohort at 102 compared to an actual 109 (higher birth rate on Bell Island than in Division 1 as a whole). However, the accuracy was considered adequate to the needs of the project.

The methodology has been used to project future population out to 2016, with a resulting forecast of approximately 1,850 people. A year-by-year projection is provided in Figure 3.2, based on data from Table 3.3. Figure 3.3 shows the predicted age breakdowns as a percentage. The results show that the under 20 population will decrease while the over 65 age will increase. This is supported by past data which shows younger people moving off the island for education or work opportunities.

Table 3.2: Actual and Forecast Births

Birth Rate					
Geography	SGC	Year	# Births	# Women (Age 15-49)	Ratio of births to women (Age 15-49)
Division No. 1	1001	1991	3,369	71,840	4.69%
		1996	2,783	71,725	3.88%
		2001	2,311	67,105	3.44%
		2006			**2.95%**
		2011			**2.53%**
		2016			**2.17%**

Table 3.3: Current and Forecast Population, Bell Island

A - Female Population Info. Used to Determine Birth Rates — Total Migration Rate = -14.5%

Year	Geography	SGC	Female Total	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65+
2001	Wabana	1001494	1,380	50	75	105	125	60	60	80	100	110	100	115	80	85	235
2006	Wabana (adj.)	1001495			43	64	90	107	51	51	68	85	94	85	98	68	274
2011	Wabana (adj.)	1001496				37	55	77	91	44	44	58	73	80	73	84	289
2016	Wabana (adj.)	1001497					31	47	66	78	37	37	50	62	69	62	315

B - Total Population Break Down

Year	Geography	SGC	Total - Age	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65+
2001	Wabana	1001494	2,680	110	155	225	255	125	110	155	195	205	215	225	150	155	565
2006	Wabana (adj.)	1001495	2,380	81	94	133	192	218	107	94	133	167	175	184	192	128	611
2011	Wabana (adj.)	1001496	2,091	56	69	80	113	164	186	91	80	113	143	150	157	164	687
2016	Wabana (adj.)	1001497	1,819	38	48	59	69	97	141	159	78	69	97	122	128	134	715

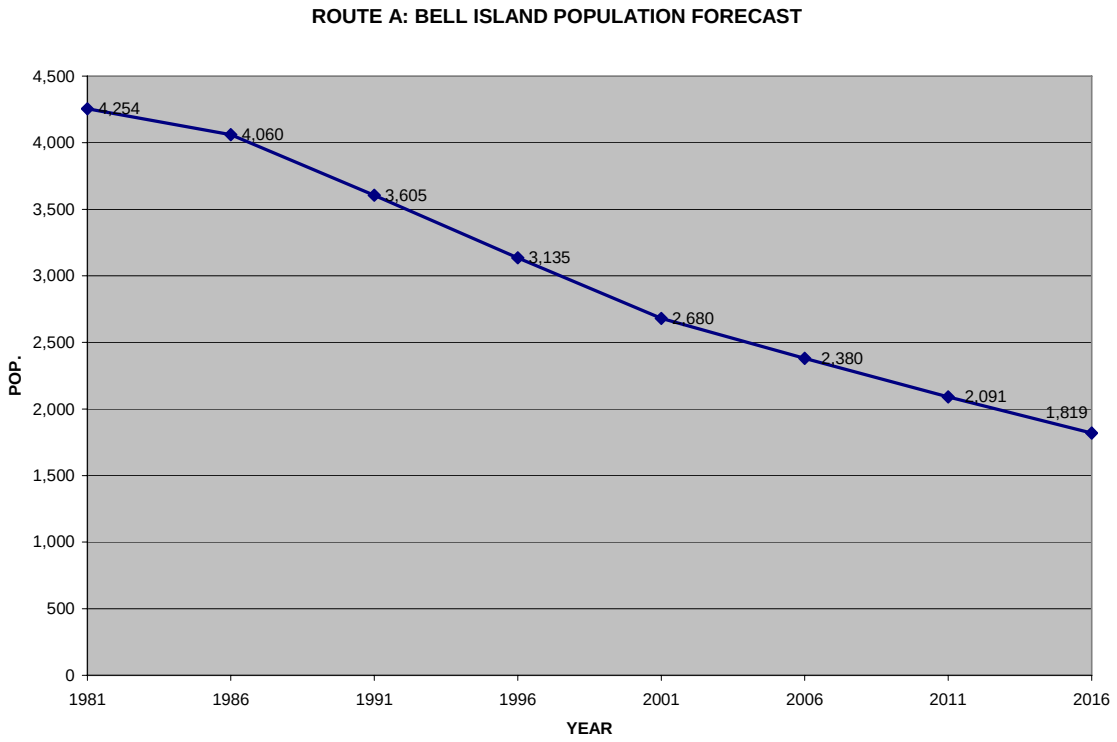

Figure 3.2: Bell Island Population Projection to 2016

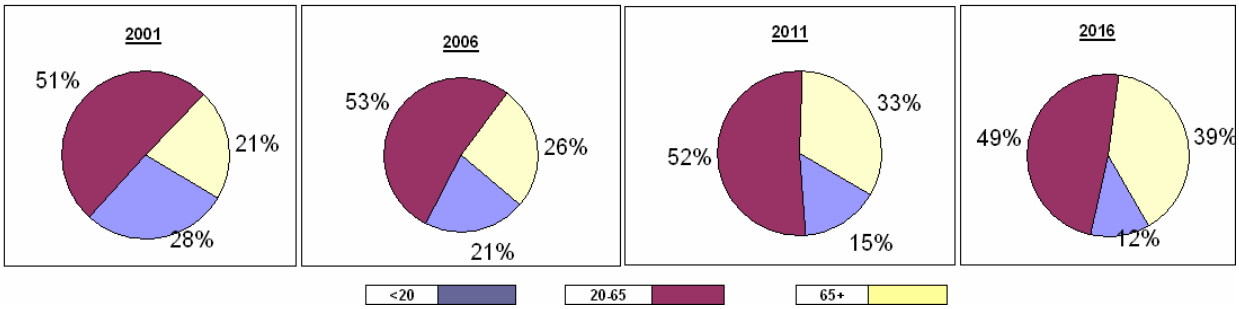

Figure 3.3: Bell Island Population Projection Age Percentages to 2016

3.1.2 Route B: St. Brendan's – Burnside

Route B demographics will focus on the Stats Canada census town of St. Brendan's (SGC 1007048). Table 3.4 presents recent population data for St. Brendan's.

Table 3.4: Compiled Census Data for St. Brendan's

Route	Geography	Census Yr.	SGC	Total	Total Migration Rate (%)
B	St. Brendan's	1971	1007048	666	-
	St. Brendan's	1981	1007048	468	-29.7%
	St. Brendan's	1986	1007048	435	-7.1%
	St. Brendan's	1991	1007048	380	-12.6%
	St. Brendan's	1996	1007048	320	-15.8%
	St. Brendan's	2001	1007048	250	-21.9%

Projections for St. Brendan's are based on the assumption that there has been no major change in terms of new economic developments or business to the island, nor are there any current plans for the immediate future.

The methodology described in Section 3.1.1 has been applied to develop population forecasts. The results for future forecasted population year by year are shown in Table 3.5 and yield a population of 160 people in 2016.

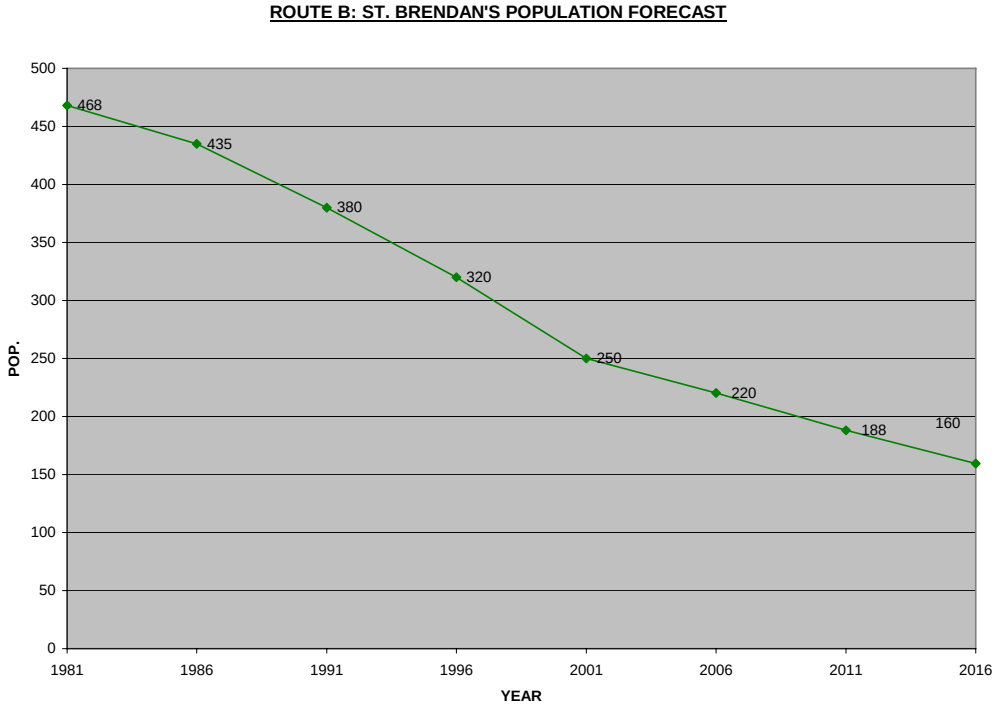

Figure 3.4: St. Brendan's Population Forecast to 2016

3.1.3 Route C: Fogo Island - Farewell

Fogo Island is made up of the following communities:

- Fogo Island Region (SGC 1008020)
- Fogo (Town) (SGC 1008021)
- Joe Batt's Arm, Barr'd Island and Shoal Bay (SGC 1008022)
- Tilting (SGC 1008023)
- Seldom and Little Seldom (SGC 1008025)

Table 3.5 presents recent combined population data for the combined communities of Fogo Island.

Table 3.5: Compiled Census Data for Fogo Island

Route	Geography	Census Yr.	SGC	Total	Total Migration Rate (%)
C	FOGO ISLAND	1971	1008020 / 1008021 / 1008022 / 1008023 / 1008025	-	-
		1981		4,028	-
		1986		4,210	4.5%
		1991		3,920	-6.9%
		1996		3,575	-8.8%
		2001		3,015	-15.7%

The island has a crab processing plant which is the major source for economic development on the island. The plant employs a maximum of 500 employees during peak season. Currently there are no plans to expand the plant or develop any other major economic business on the island. The result is a declining population which will have a forecasted population of 2,274 people in 2016, as indicated in Figure 3.5.

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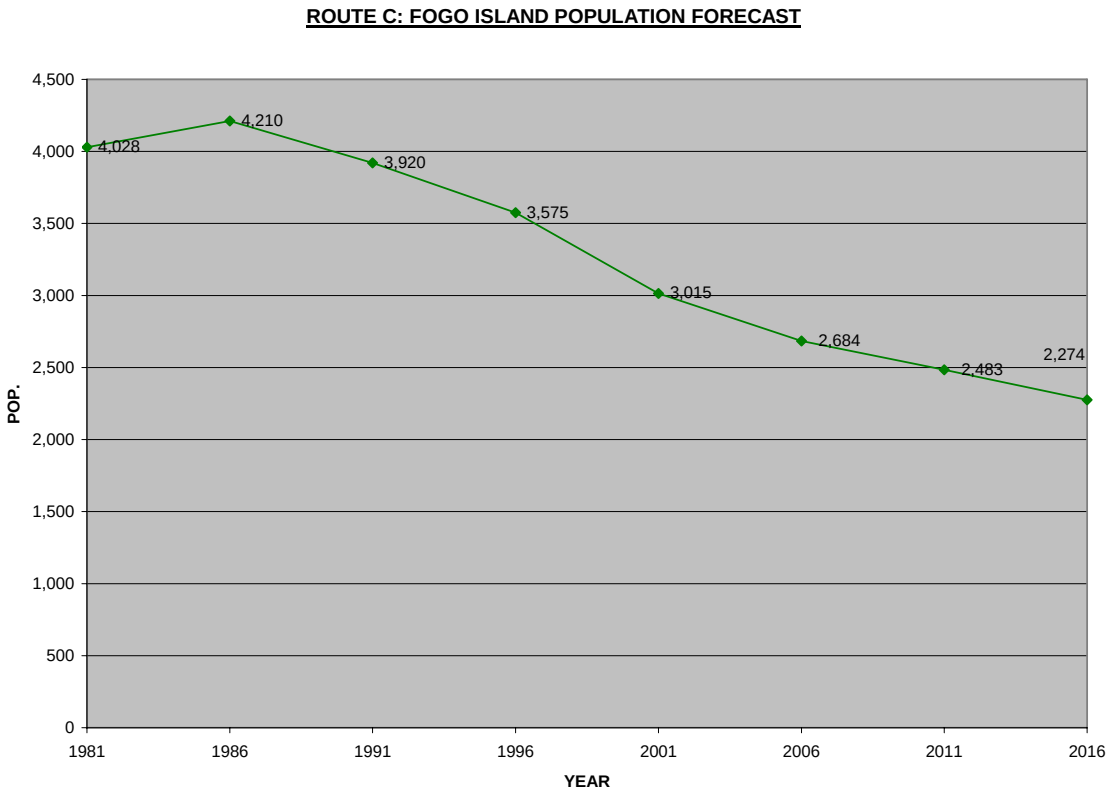


Figure 3.5: Fogo Island Population Forecast to 2016

3.1.4 Route D: Change Island – Farewell

Route D demographics focus on the population of Change Island (SGC 1008024). Table 3.6 presents recent population data for Change Islands.

Table 3.6: Compiled Census Data for Change Island

Route	Geography	Census Yr.	SGC	Total	Annual Diff. Rate (%)
D	Change Islands	1971	1008024	609	-
		1981	1008024	580	-4.8%
		1986	1008024	565	-2.6%
		1991	1008024	525	-7.1%
		1996	1008024	460	-12.4%
		2001	1008024	360	-21.7%

Currently there are no major economic developments on the island and there are known plans to develop any major industry on the island. The result is a declining population which will have a forecasted population of 258 people in 2016, as shown in Figure 3.5.

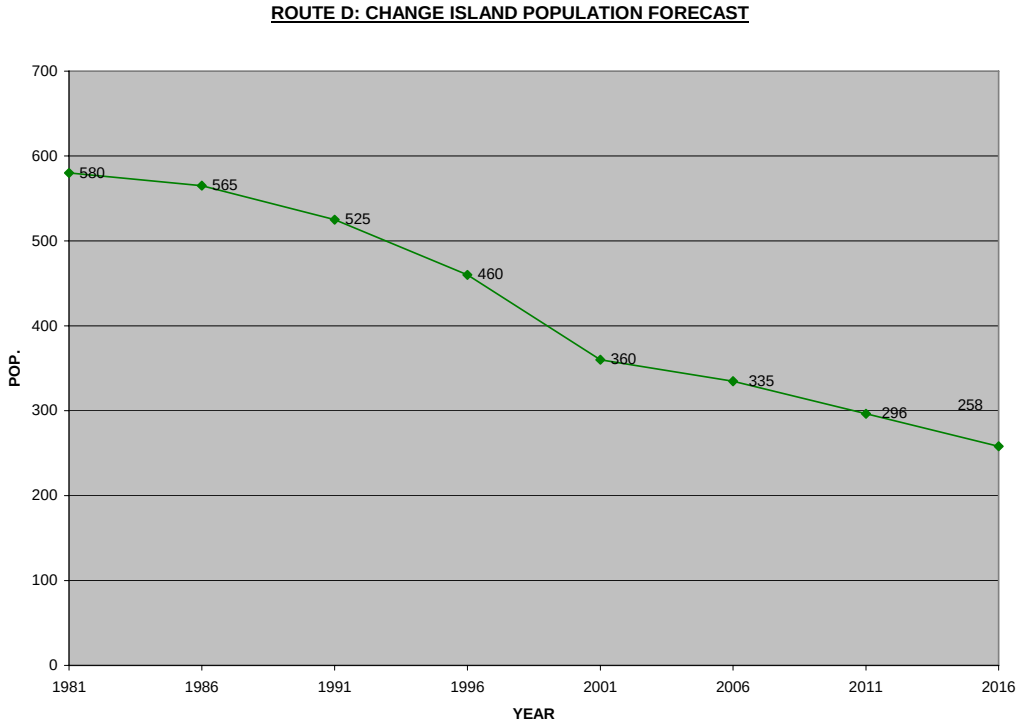


Figure 3.5: Change Island Population Forecast to 2016

3.1.5 Route E: Long Island – Pilley's Island

Route E demographics focus on the population of Long Island (SGC 1008056). Table 3.7 presents recent population data for Long Island.

Table 3.7: Compiled Census Data for Long Island

Route	Geography	Census Yr.	SGC	Total	Annual Diff. Rate (%)
E	Lushes Bight-Beaumont-Beaumont North	1971	1008056	553	-
		1981	1008056	491	-11.2%
		1986	1008056	465	-5.3%
		1991	1008056	395	-15.1%
		1996	1008056	345	-12.7%
		2001	1008056	305	-11.6%

Currently there are no major economic developments on the island and there are no known plans to develop any major industry on the island. The result is a declining population which will have a forecasted population of 227 people in 2016, as shown in Figure 3.6.

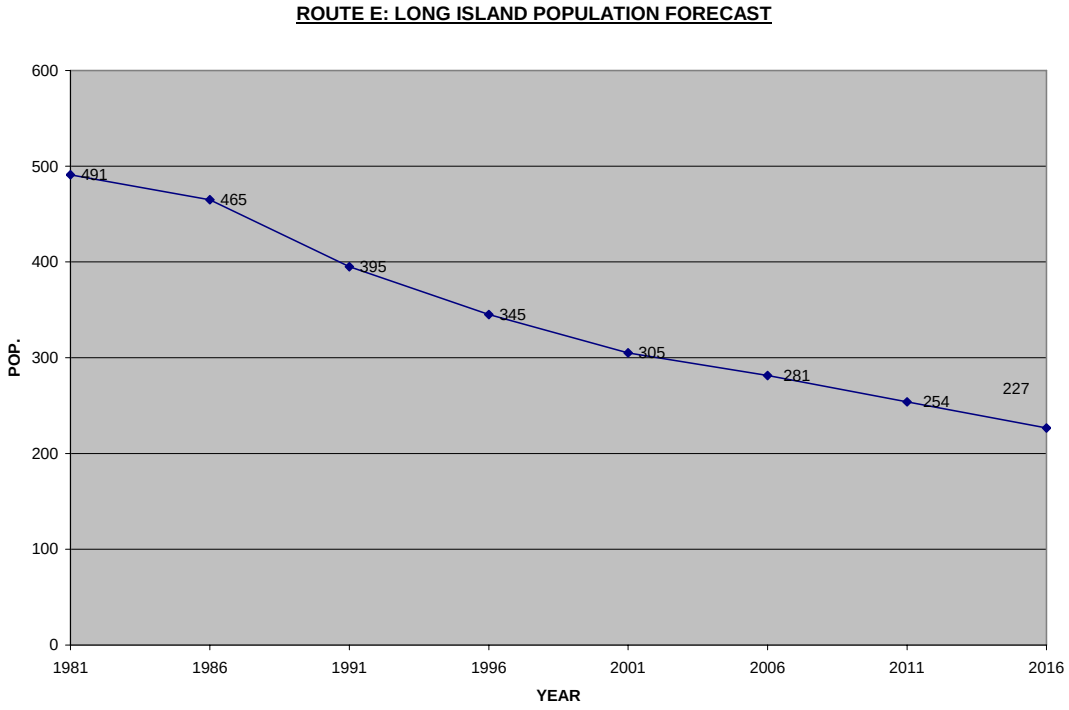


Figure 3.6: Long Island Population Projection to 2016

3.1.6 Route F: Little Bay Islands – Shoal Arm

Route F demographics focus on the population of Little Bay Islands (SGC 1008064). Table 3.8 presents recent population data for the Island.

Table 3.8: Compiled Census Data for Little Bay Island

Route	Geography	Census Yr.	SGC	Total	Total Migration Rate (%)
F	Little Bay Is.	1971	1008064	394	-
	Little Bay Is.	1981	1008064	407	3.3%
	Little Bay Is.	1986	1008064	375	-7.9%
	Little Bay Is.	1991	1008064	265	-29.3%
	Little Bay Is.	1996	1008064	240	-9.4%
	Little Bay Is.	2001	1008064	175	-27.1%

Currently there are no major economic developments on the island and there are no known plans to develop any major industry on the island. The result is a declining population which will have a forecasted population of 83 people in 2016, as shown in Figure 3.7. The forecasted population up to year 2016 is based on population breakdown is shown in Table 3.14.

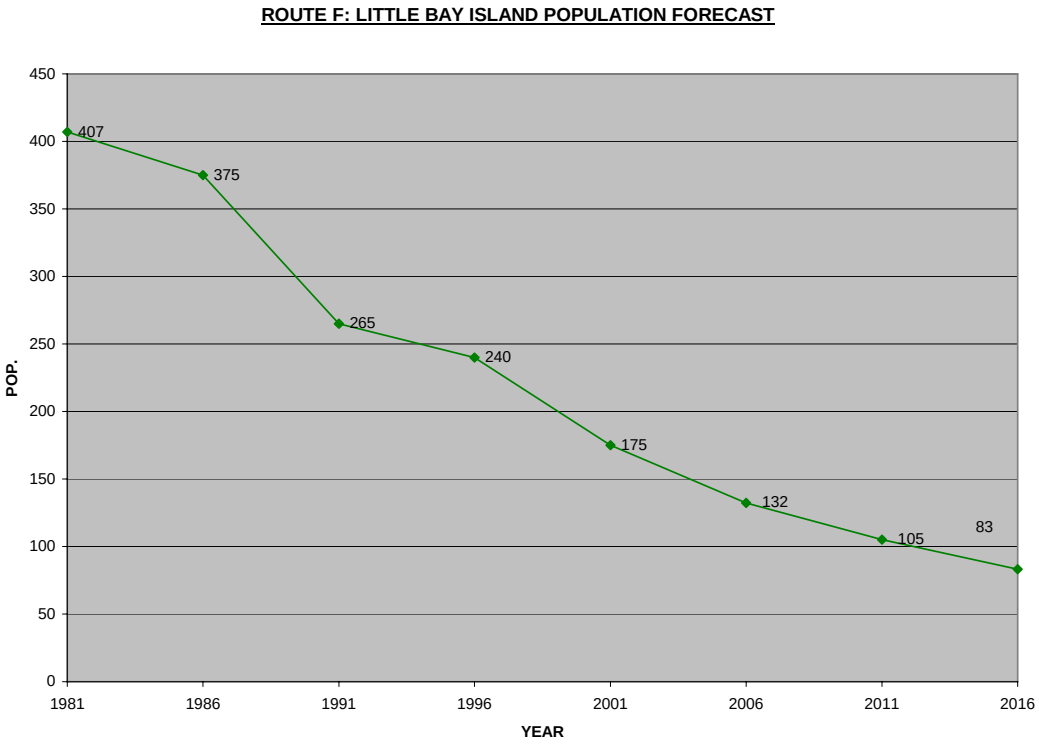


Figure 3.7: Little Bay Islands Population Projection to 2016

3.1.7 Route K: Lapoile – Grand Bruit – Rose Blanche – Burgeo

Route K demographics are made up of the following communities and areas:

- Burgeo (SGC 1003028)
- Grand Bruit [Stats Canada/Newfoundland and Labrador Census Division No.3, Sub-Division I (SGC 1003038)]
- La Poile [Stats Canada/Newfoundland and Labrador Census Division No.3, Sub-Division I (SGC 1003038)
- Diamond Cove and Petites Stats Canada Newfoundland and Labrador Census Division No.3, Sub-Division J (SGC 1003042)
- Rose Blanche – Harbour le Cou (SGC 1003045)

Table 3.9 presents recent population data for the entire route. The majority of the combined population is centred in the town of Burgeo.

Table 3.9: Compiled Census Data for South Coast Communities along Route K

Route	Geography	Census Yr.	SGC	Total	Total Migration Rate (%)
K	SOUTH COAST	1971	1003028 / 1003038 / 1003042 / 1003045	-	-
		1981		3,983	-
		1986		4,040	1.4%
		1991		3,765	-6.8%
		1996		3,290	-12.6%
		2001		2,750	-16.4%

Currently, there are no major economic developments in these communities nor are there any known plans to develop any major industry in these communities. Projections show a declining population which will have a forecasted population of 2,022 people in 2016, as shown in Figure 3.8.

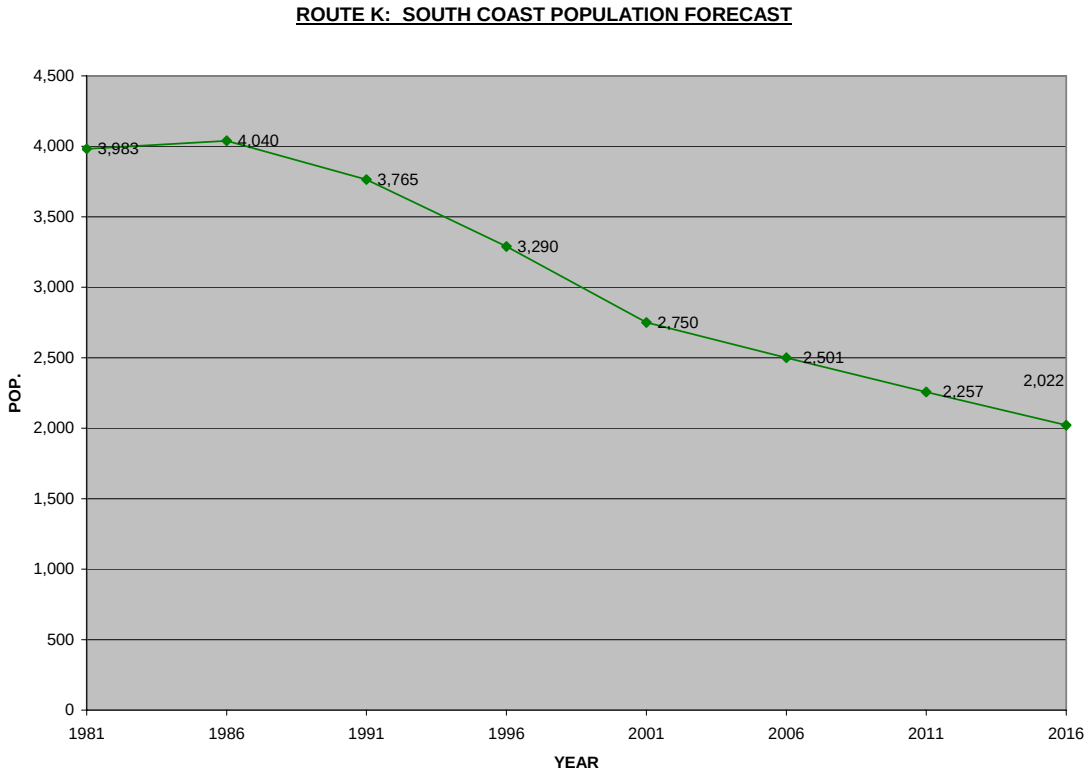


Figure 3.8: South Coast along Route K Population Projection to 2016

3.1.8 Route L: Ramea – Burgeo – Grey River

Route L demographics are made up of the following communities and areas:

- Burgeo (SGC 1003028)
- Grey River [Stats Canada/Newfoundland and Labrador Census Division No.3, Sub-Division F (SGC 1003024)]
- Ramea (SGC 1003026)

Table 3.10 presents recent population data for the entire route. Burgeo is also served by ferries operating on routes K and M and Grey River is also served by the ferry on route M.

Table 3.10: Compiled Census Data for South Coast along Route L

Route	Geography	Census Yr.	SGC	Total	Total Migration Rate (%)
L	SOUTH COAST	1971	1003024 / 1003026 / 1003028	-	-
		1981		4,124	-
		1986		4,190	1.6%
		1991		3,805	-9.2%
		1996		3,365	-11.6%
		2001		2,715	-19.3%

There is a fish processing plant in Ramea, but there are no known plans to develop any additional major industry in these communities. Projections indicate a declining population which will have a forecasted population of 1903 people in 2016, as shown in Figure 3.9.

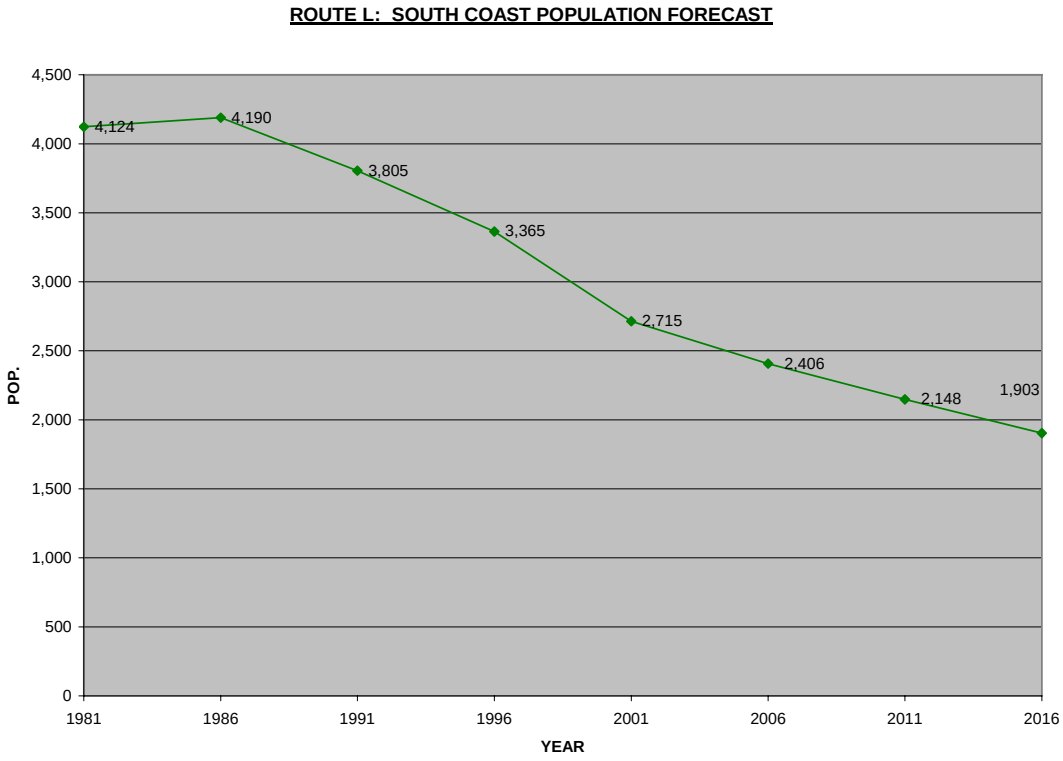


Figure 3.9: South Coast along Route L Population Projection to 2016

3.1.9 Route M: Grey River – Francois – Burgeo – McCallum - Hermitage

Route M demographics are made up of the following communities and areas:

- Hermitage (SGC 1003011)
- McCallum[5]
- Francois [Stats Canada/Newfoundland and Labrador Census Division No.3, Sub-Division E (SGC 1003021)]
- Grey River [Stats Canada/Newfoundland and Labrador Census Division No.3, Sub-Division F (SGC 1003024)]
- Burgeo (SGC 1003028)

Individual statistics for McCallum were only available for census years 1996 and 2001.

Table 3.11 presents recent population data for the entire route.

[5] www.communityaccounts.ca

Table 3.11: Compiled Census Data for South Coast along Route M

Route	Geography	Census Yr.	SGC	Total	Total Migration Rate (%)
M	SOUTH COAST (ROUTE M)	1971	10030311 / 1003021 / 1003024 / 1003028 and McCallum	-	-
		1981		3,820	-
		1986		3,850	0.8%
		1991		3,525	-8.4%
		1996		3,150	-10.6%
		2001		2,730	-13.3%

Currently there are no major economic developments in these communities nor are there any known plans to develop any major industry in these communities. Projections indicate a declining population which will have a forecasted population of 2,187 people in 2016, as shown in Figure 3.10.

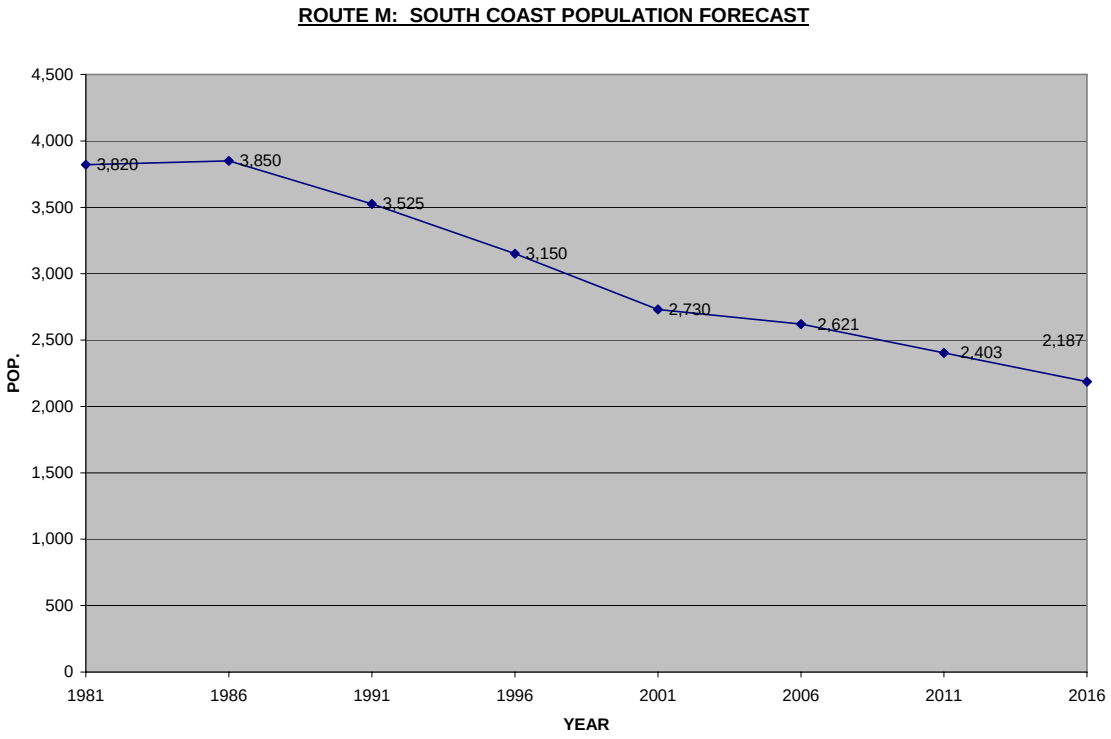


Figure 3.10: South Coast along Route M Population Projection to 2016

3.1.10 Route N: Gaultois – Hermitage- McCallum

Route N demographics are made up of the following communities and areas:

- Hermitage (SGC 1003011)
- McCallum
- Gaultois (SGC 1003012)

Individual statistics for McCallum were only available for census years 1996 and 2001.

Table 3.12 presents recent population data for the entire route. The majority of the population is centered in the town of Hermitage.

Table 3.12: Compiled Census Data for South Coast along Route N

Route	Geography	Census Yr.	SGC	Total	Total Migration Rate (%)
N	SOUTH COAST	1971	1003011 / 1003012 and McCallum	-	-
		1981		1,612	-
		1986		1,590	-1.4%
		1991		1,430	-10.1%
		1996		1,250	-12.6%
		2001		1,065	-14.8%

Currently there are no major economic developments in these communities nor are there any known plans to develop any major industry in these communities. Projections indicate a declining population which will have a forecasted population of 780 people in 2016, as shown in Figure 3.11.

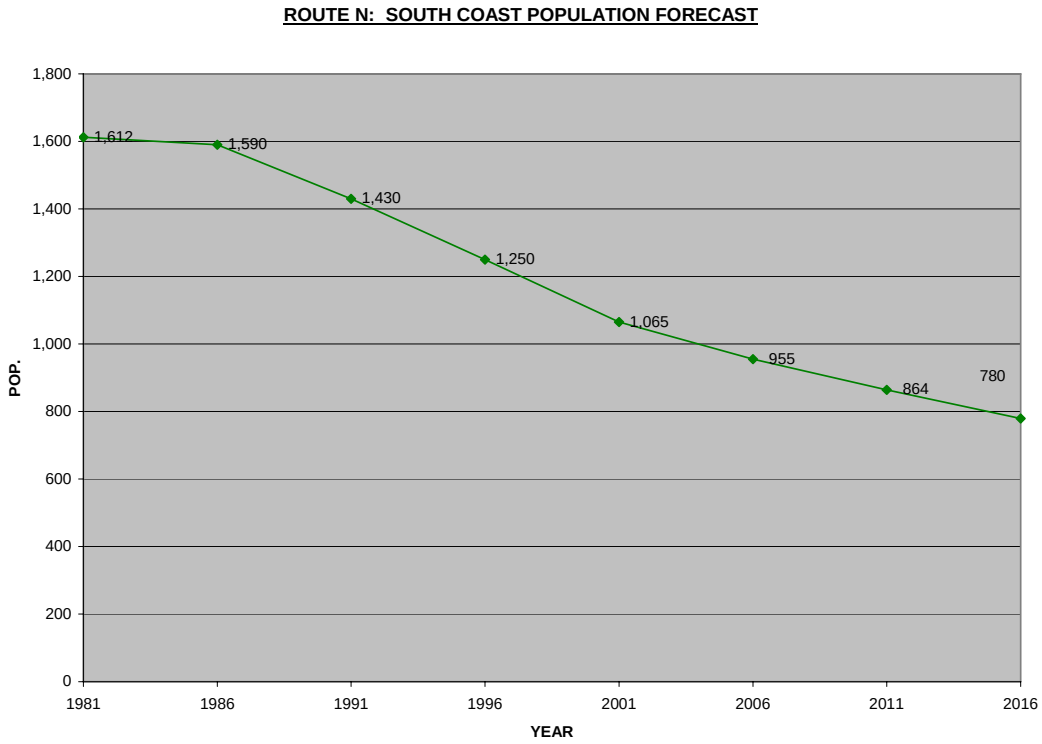


Figure 3.11: South Coast along Route N Population Projection to 2016

3.1.11 Route O: Rencontre - Bay L'Argent – Pool's Cove

Route O demographics are made up of the following communities and areas:

- Bay L'Argent (SGC 1002027)
- Rencontre East (SGC 1003002)
- Pool's Cove (SGC 1003005)

Table 3.13 presents recent population data for the entire route.

Table 3.13: Compiled Census Data for South Coast along Route O

Route	Geography	Census Yr.	SGC	Total	Total Migration Rate (%)
O	SOUTH COAST	1971	1002027 / 1003002 / 1003005	-	-
		1981		957	-
		1986		965	0.8%
		1991		865	-10.4%
		1996		830	-4.0%
		2001		725	-12.7%

Currently there are no major economic developments in these communities nor are there any known plans to develop any major industry in these communities. Projections indicate a declining population which will have a forecasted population of 616 people in 2016, as shown in Figure 3.12.

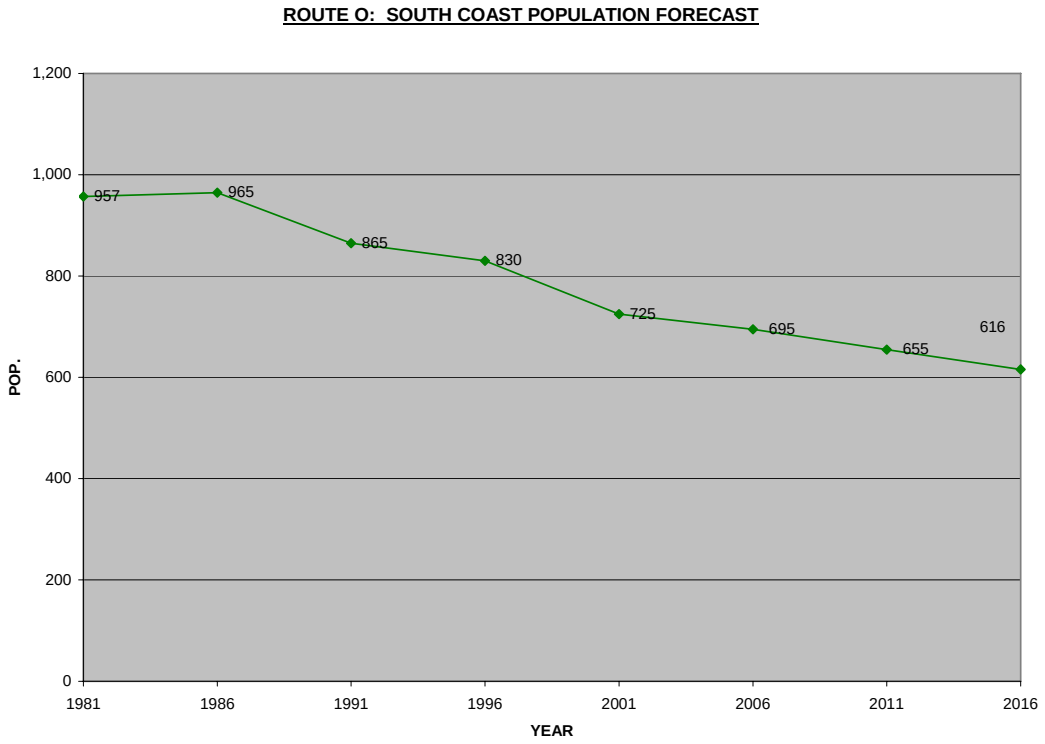


Figure 3.12: South Coast along Route O Population Projection to 2016

3.1.12 Route P: South East Bight – Petite Fort

Route P exclusively services the town of South East Bight. Unfortunately, extended statistics for this town were not available. In lieu of this, statistics for the census Sub-division were used to determine migration trends. Census Sub-division data provides a broader picture of the area over a longer timeframe. Town statistics were available for recent years. These statistics indicate that the population of South East Bight comprises approximately 18% of the Sub-division. The population of South East Bight was 133 persons in 1996 and 135 persons in 2001. This represents a 1.5 % growth, but the sample size is too small to derive trends from this data alone.

Table 3.14 presents recent population data for the sub-division.

Table 3.14: Compiled Census Data for Community of Southeast Bight and Surrounding Area

Route	Geography	Census Yr.	SGC	Total	Total Migration Rate (%)
P	Div.2 Sub. Div. C	1971	1002031	-	-
	Div.2 Sub. Div. C	1981	1002031	804	-
	Div.2 Sub. Div. C	1986	1002031	825	2.6%
	Div.2 Sub. Div. C	1991	1002031	840	1.8%
	Div.2 Sub. Div. C	1996	1002031	805	-4.2%
	Div.2 Sub. Div. C	2001	1002031	760	-5.6%

Currently there are no major economic developments in the community nor are there any known plans to develop any major industry in these communities. Projections indicate a declining population with a forecasted population of 726 people in 2016, as shown in Figure 3.13. It can be assumed that South East Bight's share of the overall population will remain reasonably constant.

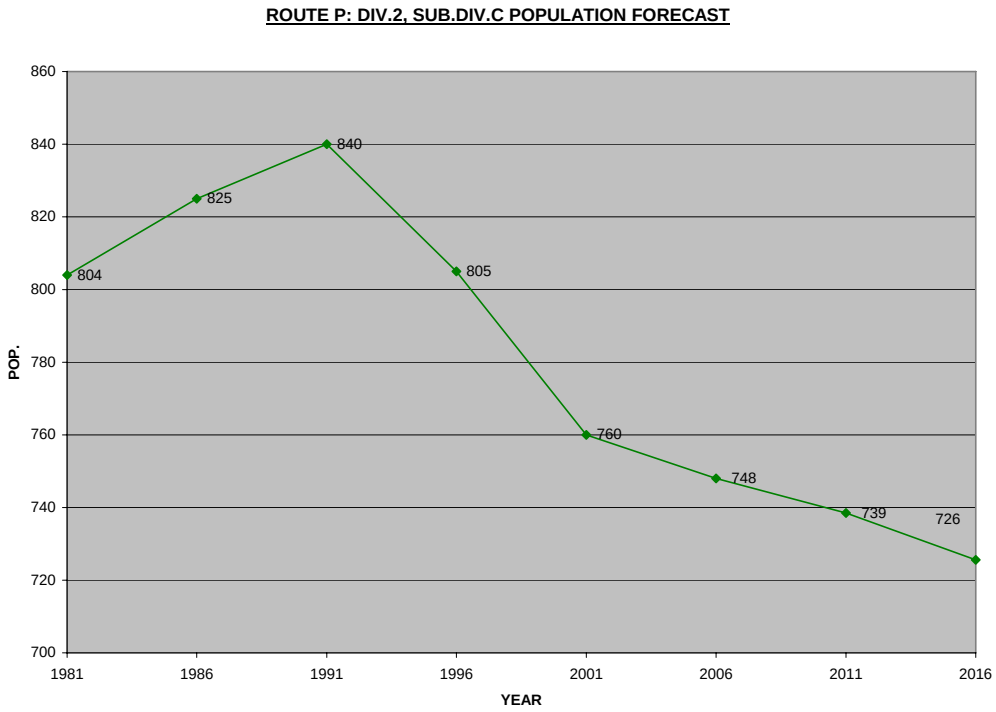


Figure 3.13: Area of South East Bight Population Projection to 2016

3.1.13 Summary

As can be seen from the recent statistics and the projections presented above, the 'base case' for the future must assume that the populations served by all of the island services will continue to decline. The rate of decline may be modified by local economic factors or by technological changes such as improved telecommunications. However, there are no pressing arguments suggesting a repopulation of any of the communities.

Maintaining the current levels of use of the ferry services, or any growth in traffic will therefore come as a result of other factors, such as:

- increases in the level of use of the service by local inhabitants (e.g., more commuters from Bell Island);
- increases in tourism;
- increases in the volume/frequency of delivery or export of goods.

The quality and reliability of the ferry service can itself influence all of these, notably the commuter and tourist traffic. This will be discussed further in subsequent sections.

3.2 Level of Service Analysis

The number of residents serviced by a ferry is a major determinant of the levels of usage on a route, but numerous other factors will also apply. Therefore, it is necessary to anchor any future projections in an understanding of current levels of service and service utilization.

3.2.1 Data Sources and Issues

BMT has obtained such data as is available from the Department and from other sources to support this work. This includes traffic and revenue data. Unfortunately, both data sets have significant gaps and internal and external inconsistencies. As examples, traffic data was provided by Newfoundland and Labrador Department of Transportation and Works, Marine Division (DTW). The data was submitted as a combination of both hard copies and electronic spreadsheets, including the following information:

- Number of passengers;
- Number of passenger vehicles;
- Number of commercial vehicles;
- Total vehicle equivalents[6];
- Round trips scheduled;
- Round trips completed;
- Charters and emergencies;
- Number of trips with vehicles not accommodated;
- Number of vehicles not accommodated;
- Number of vehicles ferry could accommodate;
- % deck usage;
- Number of days not operating; and
- Revenue

While good data is available for the period prior to 1998, more recent data is almost completely lacking. Prior to the 1998[7] fiscal year (herein referred to as 1998) information was tabulated and collected by hand on the ferries and sent to DTW[8] monthly. The data was then compiled and saved (both electronically and as a hard copy). In 1997, DTW made the decision to input data into an electronic format on-site and then submit to DTW monthly. For unknown reasons, the system was not integrated into ferry operations effectively, resulting in gaps in the statistics. In November 2004, DTW made the decision to move back to recording data by hand. Post November 2004 data is available for the majority of the routes. Recent monthly data is still not available for the Bell Island – Portugal Cove route.

[6] 1 car = 1 vehicle equivalent unit. 1 commercial vehicle = 3 vehicle equivalent units.

[7] 1998 fiscal year = Apr. 1,1998 to Mar. 31,1999

[8] Newfoundland & Labrador Department of Transportation & Works

In order to address the 'gap' period, data on monthly revenues was obtained from the Department of Finance. However, when attempts were made to correlate this data with DTW information for periods when records do exist, a number of discrepancies were identified. It has not been possible to identify the source of such discrepancies, nor to identify which (if any) data source is more reliable. Therefore, all values derived and discussed below should be treated with some degree of caution.

3.2.2 Route A: Bell Island – Portugal Cove

In order to fill the data gaps noted above for Route A to Bell Island, it has been necessary to use the relatively coarse annual total vehicle traffic data obtained from the Annual Financial/Statistical Report 2004/2005[9]. It should be noted that DTW cautioned against relying on even this data as they could not place any significant level of confidence in it.

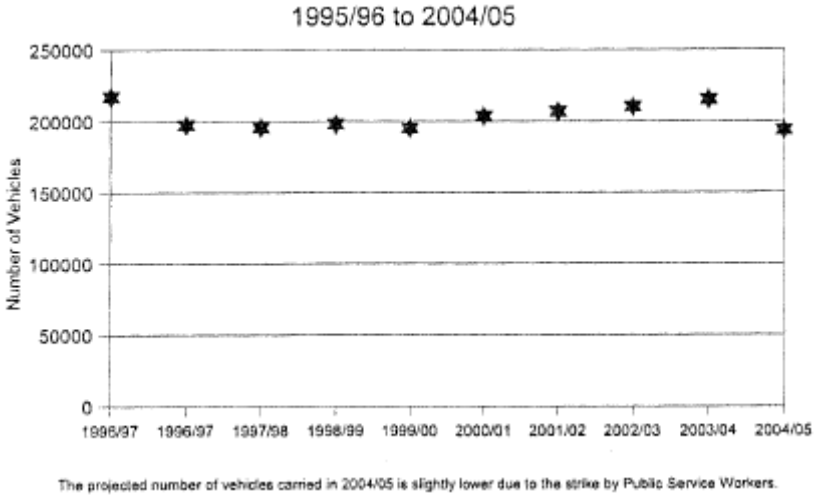


Figure 3.14: Bell Island – Portugal Cove Ferry Service Total Vehicles

Figure 3.14 shows a relatively consistent traffic level of approximately 200,000 vehicles per fiscal year, even though the local population is declining, as discussed in section 3.1. Balancing trends may be an increase in commuter traffic, as the island becomes part of the Greater St. John's economic area, and an increase in summer tourism. Each type of traffic will influence the current and future level of service requirement, and so further analysis of traffic patterns has been undertaken.

[9] Government of Newfoundland & Labrador, Department of Transportation and Works; "**ANNUAL REPORT: Financial & Statistical Information Marine Services Division**"; April 1, 2004 – March 31, 2005.

Figure 3.15: Route A, Portugal Cove to Bell Island

A diagram of Route A is provided in Figure 3.15. The current ferries service the communities of Bell Island having a route distance of 5 km and transit time of approximately 20 minutes. The *M/V Flanders* came into service in the early 1990's and has a vehicle capacity of 36 cars. The *M/V Beaumont Hamel* entered into permanent service on the route in 2002/2003 and has a vehicle capacity of 34 cars. The two vessels provide a daily service against the same schedule year round. This schedule can be represented by Figure 3.16, which presents the hourly car-carrying capacity provided by either one or two vessels making varying numbers of runs.

Using current vessel capacities and assuming that 200,000 vehicles per year is reasonably accurate, there is an average route vehicle utilization rate of approximately 40%. This is based on:

- Current ferry schedule, effective January 26, 2004;
- Runs at 11:10 pm and 12:10 am are only undertaken on Friday and Saturday;
- Daily combined vehicle equivalent unit capacity of 1400 vehicles;
- 29 days of operation per month. This allows for 1-2 days per month for mechanical problems or weather issues; and
- Above assumptions equal a yearly route capacity of approximately 500,000 vehicle equivalent units.

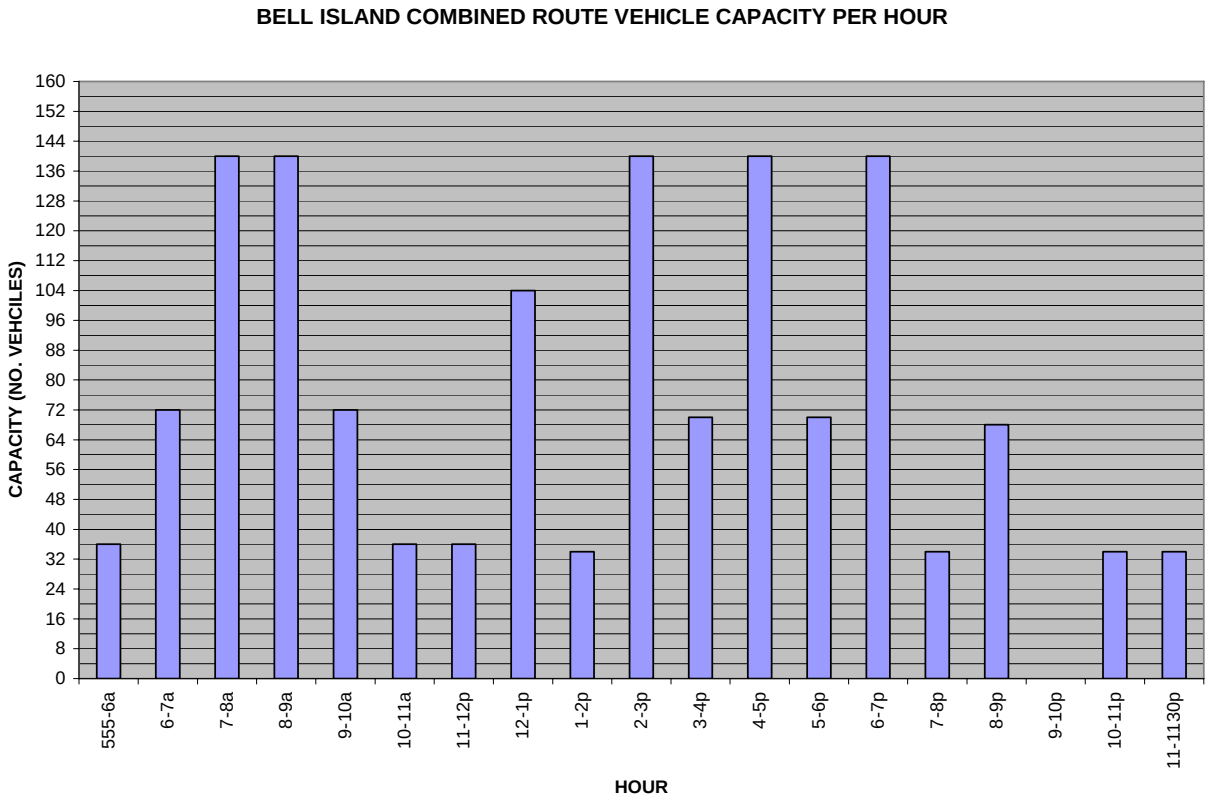


Figure 3.16: Bell Island Hourly Vehicle Capacity

Two demand peaks can be seen in the service pattern corresponding to a relatively brief morning rush hour and a more drawn-out afternoon equivalent. Therefore, the morning rush hour appears to be the main determinant of the total ferry carrying capacity. During this study, vehicle counts were taken on several days, and the service level provided by the *Flanders* and *Nonia* (while the *Beaumont Hamel* was in use at Fogo) was adequate to meet rush hour demand; however, this was for fall/winter rather than peak summer traffic. A further study of actual utilization during this peak period should be undertaken to assess this requirement more accurately.

In addition to the hourly variability of usage, there is known to be a strong seasonal variability due to tourism and (on some routes) other economic factors, e.g., seasonal fisheries. The lack of recent reliable monthly or daily data is a major drawback in analyzing these trends, but it has been assumed that 1990's data is at least indicative of the current situation. Figure 3.17 shows traffic patterns for Bell Island (Route A). This shows peak summer demand at approximately twice the winter traffic. During this period, the level of service provided was quite different, with a single vessel in the winter and two in summer. We would expect that current traffic trends would show less variability, due to the increasing importance of the commuter element of the traffic.

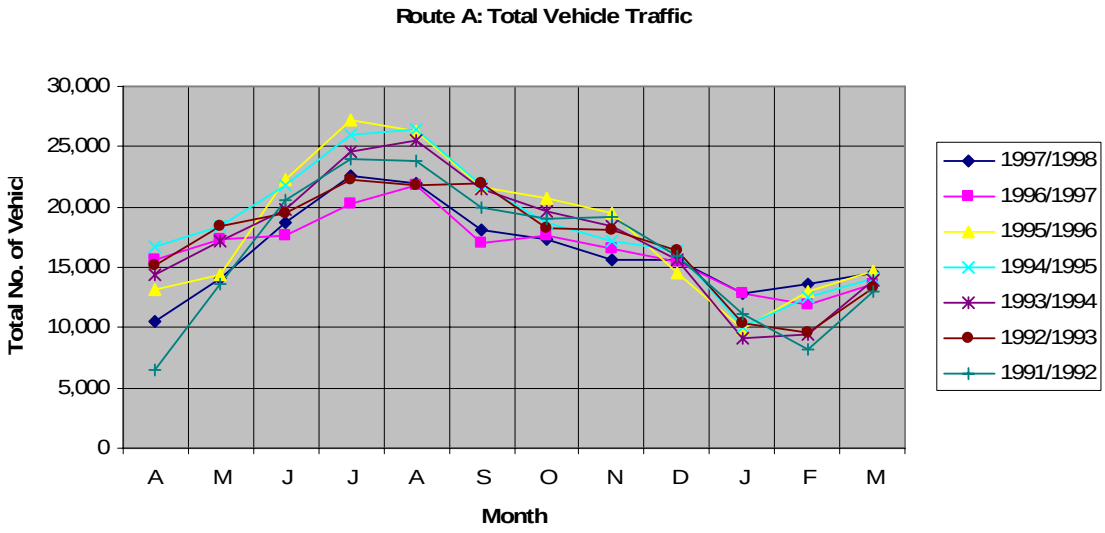


Figure 3.17: Seasonal Variability on Bell Island Route (1990's data)

3.2.3 Route B: St. Brendan's

Figure 3.18: Route B, St Brendan's to Burnside

A diagram of Route B is provided is Figure 3.18. The route distance is approximately 13 km and the transit time is approximately an hour. Historically, the M/V *Green Bay Transport* came into service on this route in the late 1960's, with a capacity of approximately 40 passengers and six (6) vehicles. Almost all the available traffic data is based on this vessel, which was phased out (and sold) in 2005. Other vessels including the *Sound of Islay* and *Hamilton Sound* have been providing service over the last year.

Figure 3.19 shows an annual comparison of data, before and after the missing period of traffic data from 1998 to 2002. The graph shows a nearly consistent increase in both revenue and traffic from 1992 to 1998. Revenue levels continued to increase until 1999, then declined and remained stable in more recent years. Traffic levels also appeared to remain fairly stable from 1997 to 2004. There is an inconsistency between traffic and revenue data, given that fares have been increased over recent years. The decline in population over the same period would support a picture of declining traffic but constant revenue.

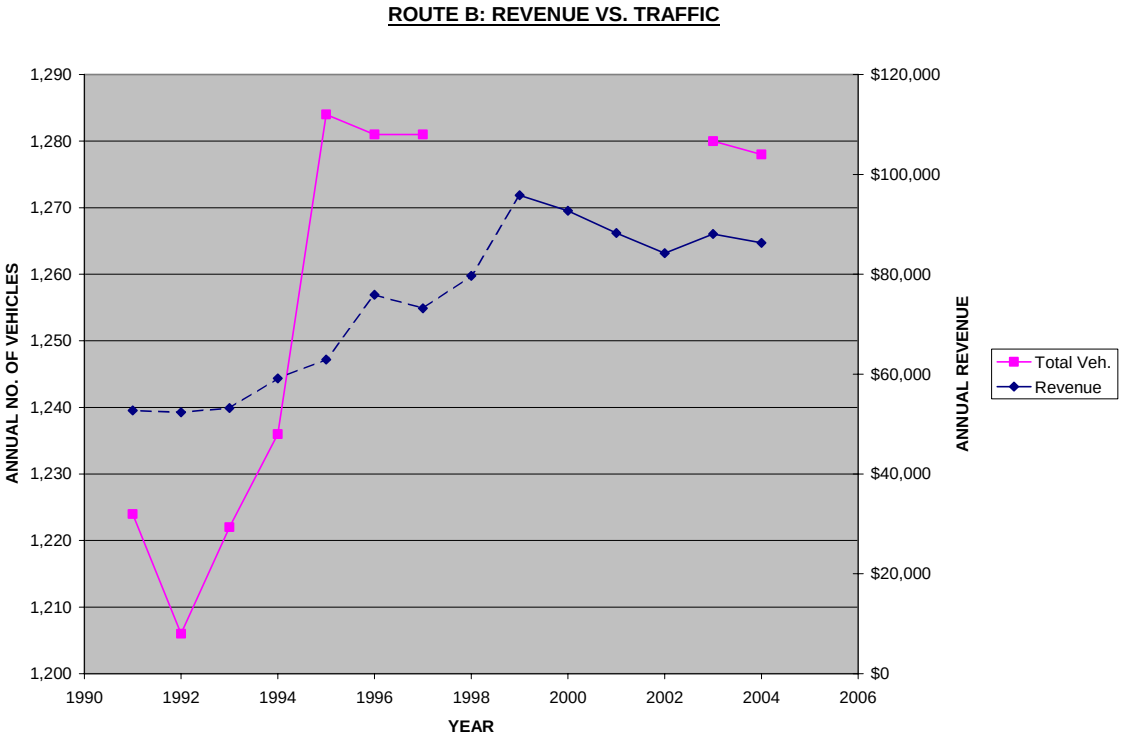


Figure 3.19: Annual Revenue and Traffic Comparison

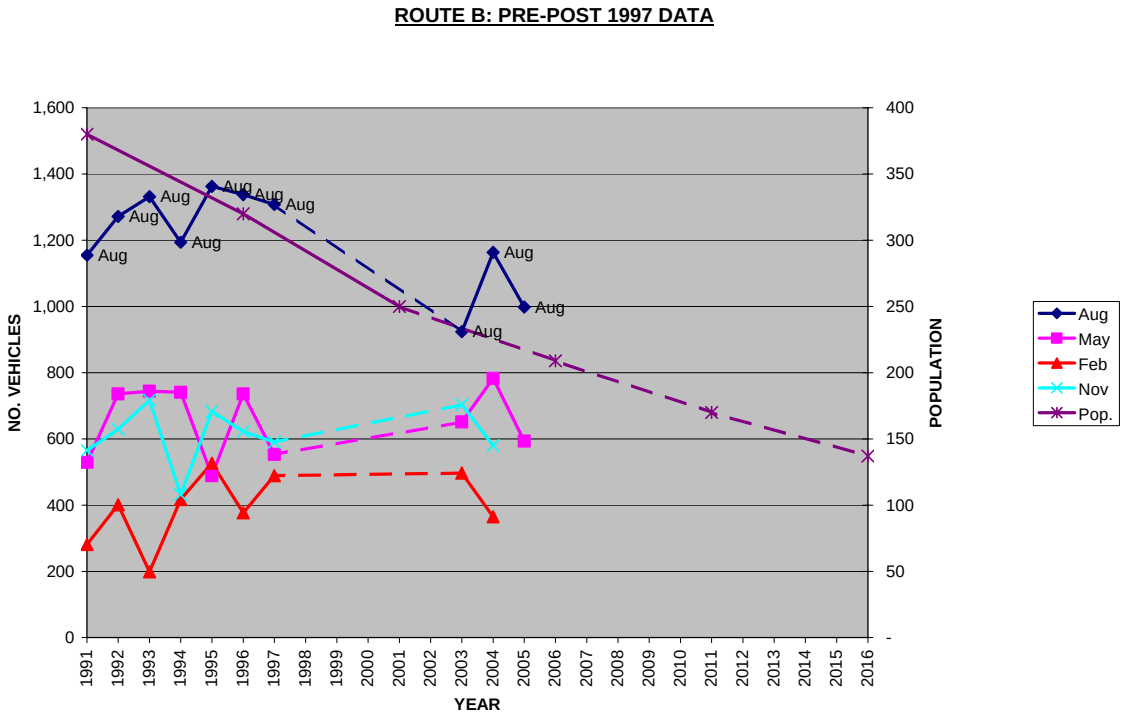


Figure 3.20: Traffic and Population Comparison (Monthly)

Figure 3.21 and Figure 3.22 show the hourly vessel vehicle capacity for a given day in each season respectively. Using the seasonal traffic levels, the vessel utilization rate for the *Green Bay Transport* was approximately 68% during the summer (June 15- Sept 15) and approximately 46% (Sept 16 – June 14) during the reduced winter operating schedule. The larger vessels now in use maintain the same service, and would show much lower utilization rates.

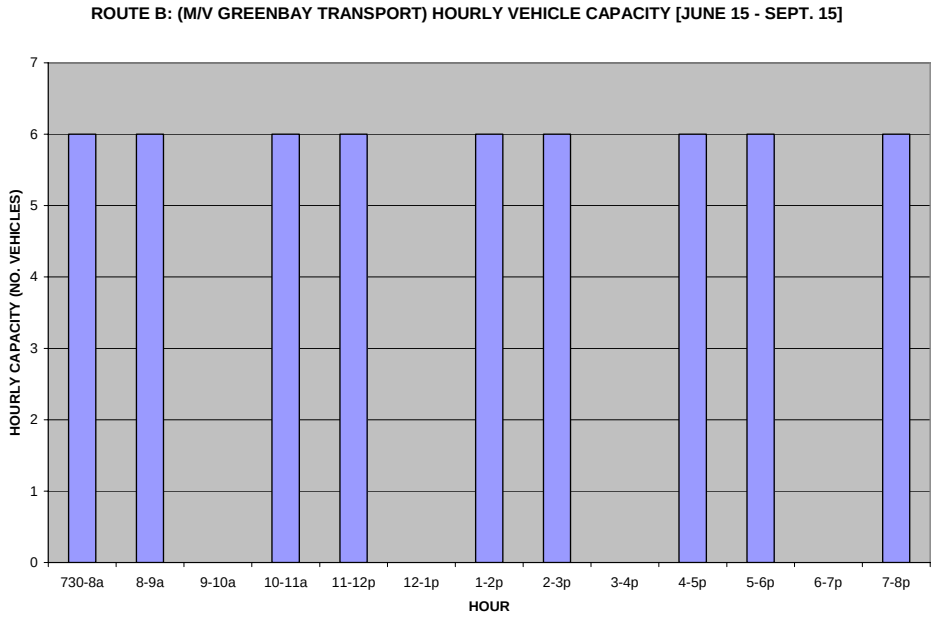


Figure 3.21: Route B (M/V Green Bay Transport) Hourly Vehicle Capacity (Summer Schedule)

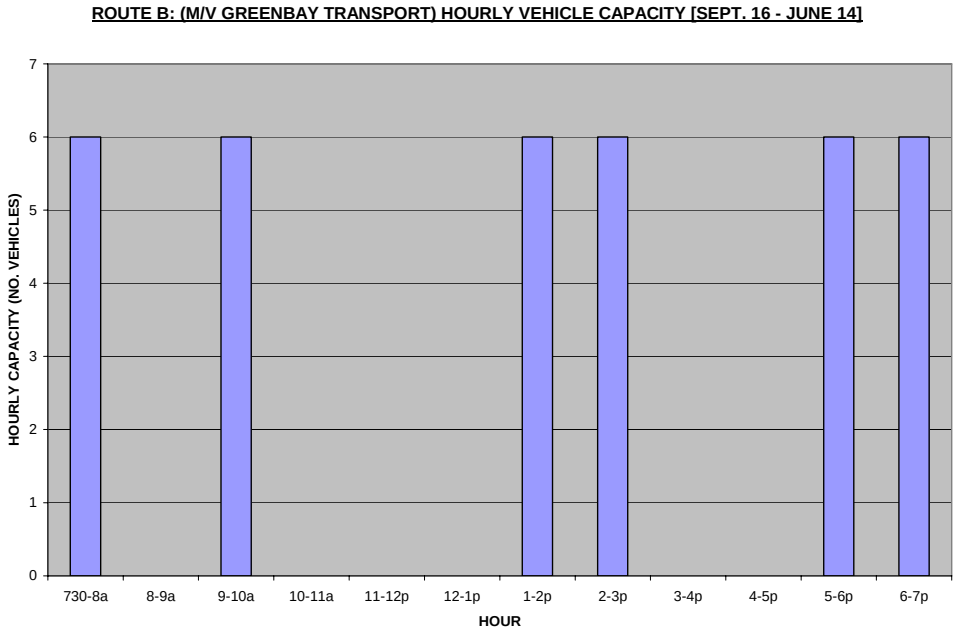


Figure 3.22: Route B (M/V Green Bay Transport) Hourly Vehicle Capacity (Winter Schedule)

3.2.4 Route C: Farewell to Fogo Island, and Route D: Farewell to Change Island

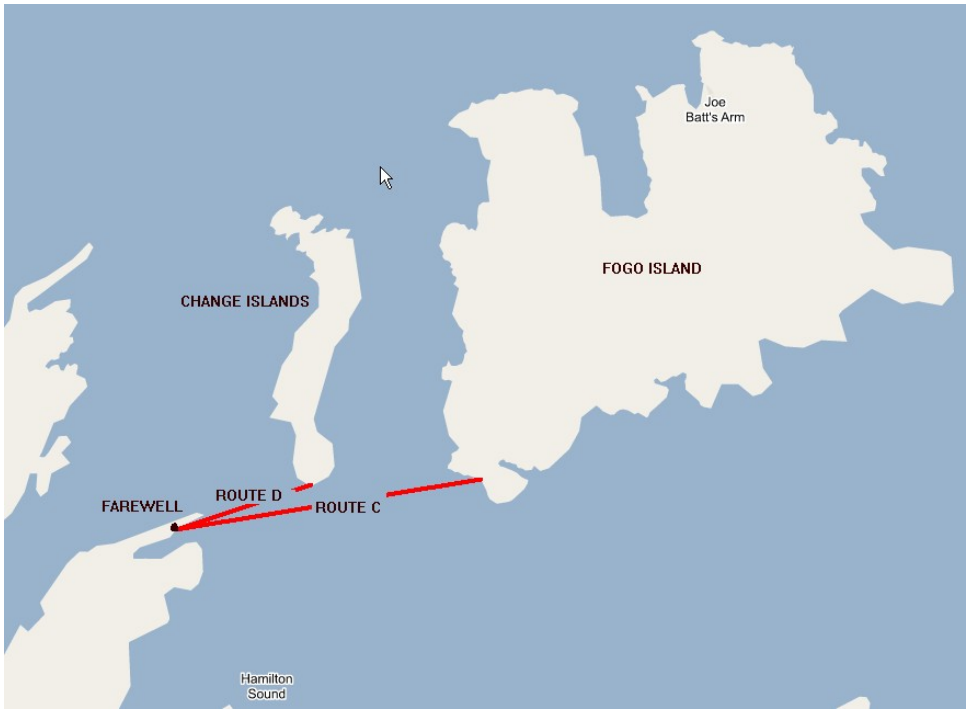


Figure 3.23: Route C Farewell to Fogo Island; Route D Farewell to Change Island

A diagram for Route C, to Fogo Island, and Route D, to Change Island is shown in Figure 3.23. The current ferry providing both of these service routes is the M/V Capt. Earl W. Winsor, which has a vehicle capacity of 60, and a passenger capacity of 200. This vessel has route distances of:

- 13 km to Fogo Island, with a transit time of 45 minutes.(Route C);
- five (5) km to Change Island with a transit time of approximately 20 minutes.(Route D)

Some sailings serve both Change and Fogo Islands, with a four point itinerary. It is not generally possible from the data available to discriminate between traffic carried on routes C, D, and the combined service, and so all are considered together.

Figure 3.24 indicates that over the period from 1999-2004, revenue levels remained fairly stable. The revenue spike for the 2002 year is considered likely to be erroneous. Given that fares have been increasing, the revenue figures are reasonably consistent with the traffic data shown in Figures 3.25 and 3.26, which show declines in traffic roughly proportional to the reducing population.

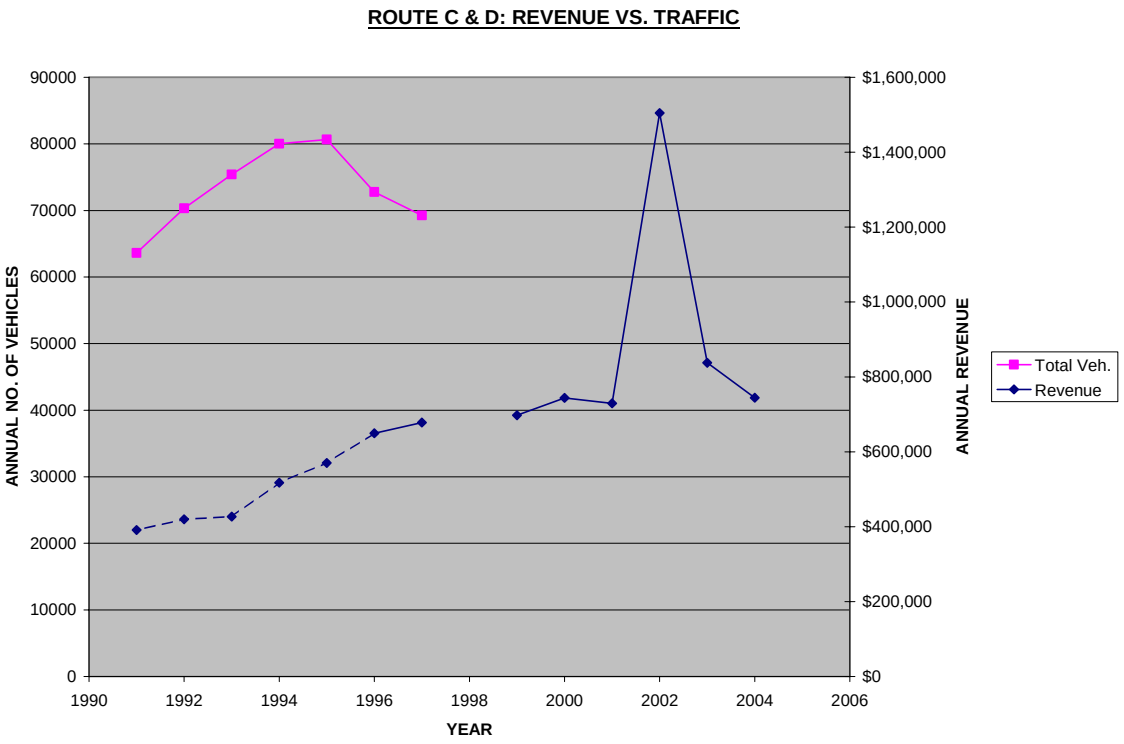


Figure 3.24: Annual Traffic and Revenue Trend Comparison (Routes C & D)

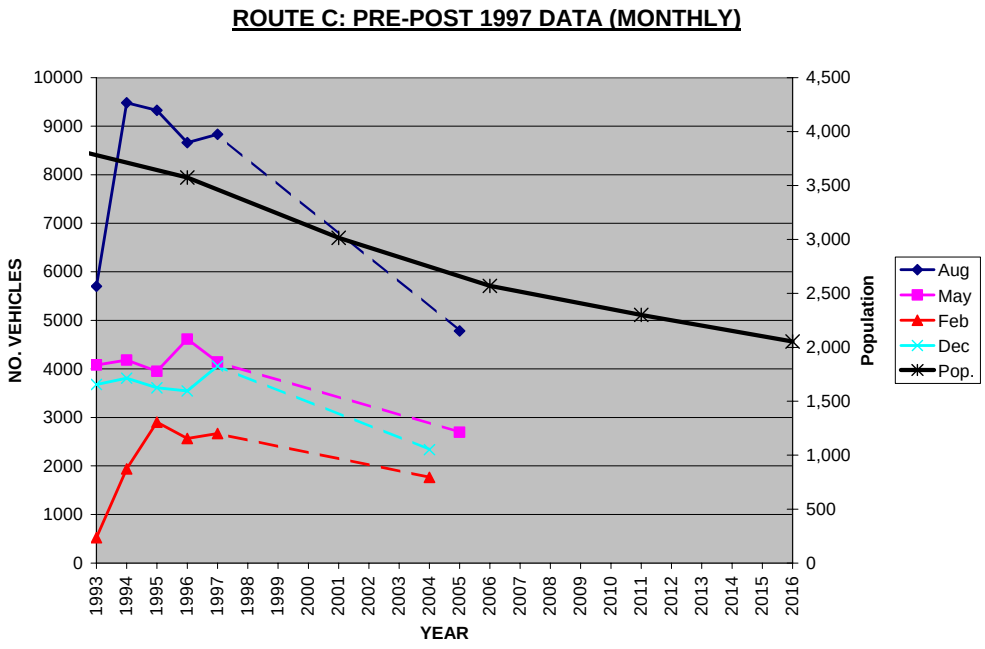


Figure 3.25: Traffic and Population Trend Comparison (Route C)

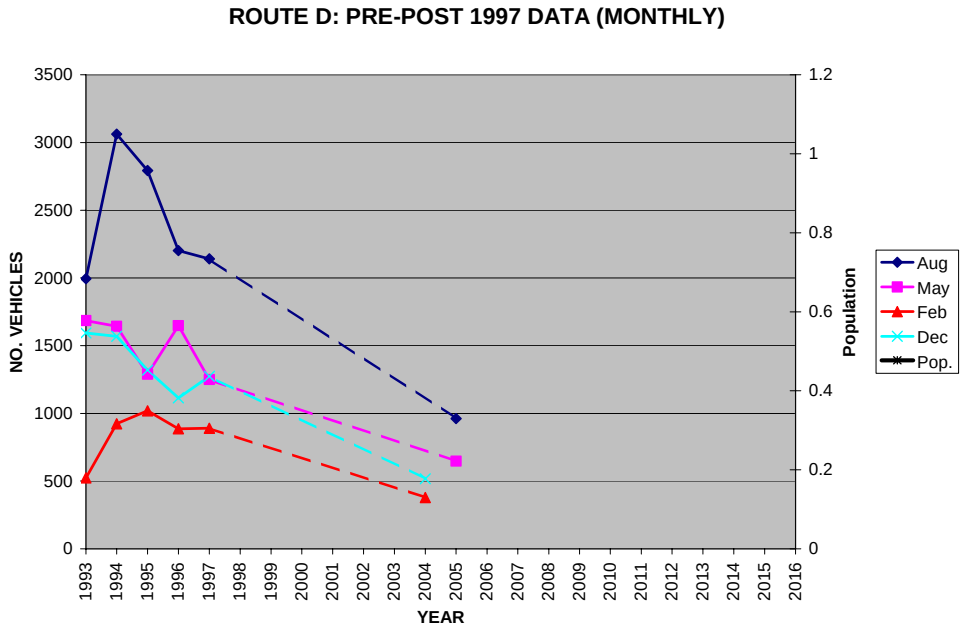


Figure 3.26: Traffic and Population Trend Comparison (Route D)

Route C and Route D both show a strong seasonal variability, possibility due to tourism and seasonal work (e.g., in the crab plant on Fogo Island).

The service schedule and hourly vehicle capacities for each service are shown in Figures 3.27 to 3.29. The summer and winter services to Fogo Island differ, the Change Island service is the same year-round. Where a sailing provides the four-point service, the vessel capacity is assumed to be split between the Route C and D services. Based on the data and these assumptions:

- Route C, to Fogo Island has a summer utilization rate of 36% and a winter rate of 20%.
- Route D utilization rates are 12% and 6% for summer and winter respectively.

We have been cautioned by department staff that the traffic data for this route is particularly suspect, and may underestimate actual utilization by a significant amount. The trend data appears to be reasonably consistent with other services and with expectations based on demographics. However, it would be preferable on this and other routes to have more reliable data as a basis for future level of service recommendations.

During the period of the study the *Beaumont Hamel* was used as a replacement for the *Winsor* from late October to late January, and detailed traffic data was obtained for this period. The monthly traffic totals on both routes were similar to the values shown in Figures 3.25 and 3.26. Records show that a significant number of vehicles were left behind on a number of occasions when the 33 car vessel replaces the 60 car vessel.

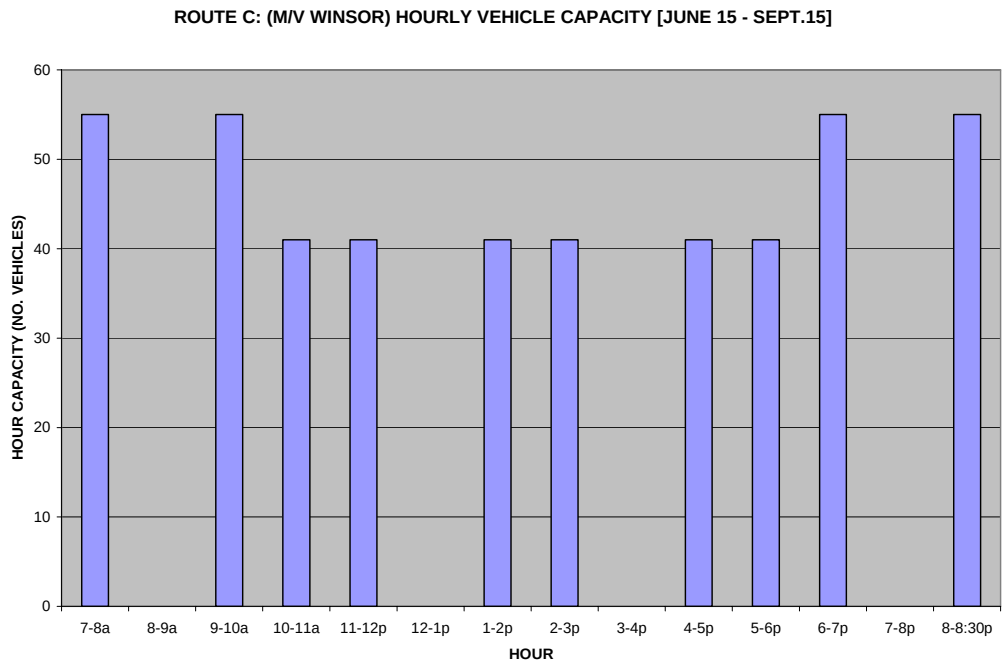


Figure 3.27: Route C (M/V Winsor) Hourly Vehicle Capacity (Summer)

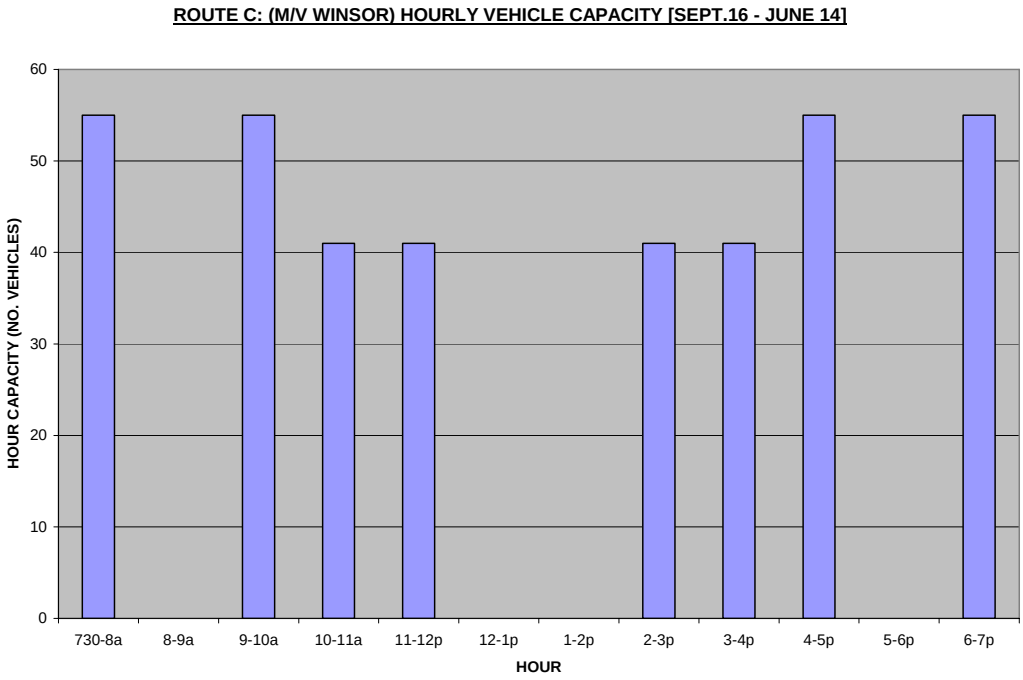


Figure 3.28: Route C (M/V Winsor) Hourly Vehicle Capacity (Winter)

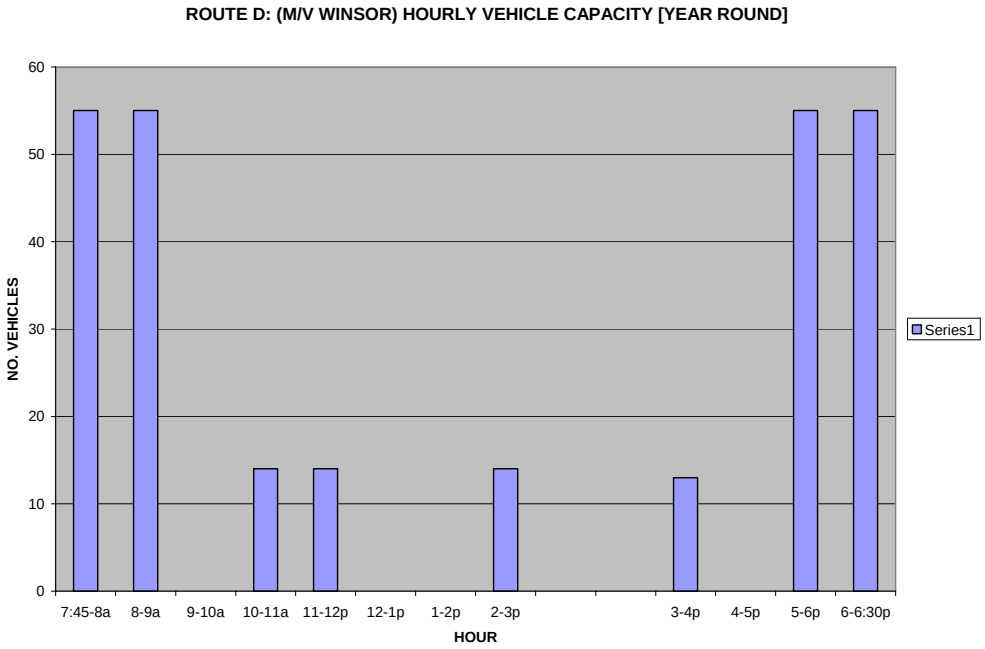


Figure 3.29: Route D (M/V Winsor) Hourly Vehicle Capacity(Year Round)

3.2.5 Route E: Long Island

Currently the ferry *M/V Island Joiner* operates year round servicing route E between Pilley's Island and Long Island. The run is approximately 0.5 km and has a travel time of five minutes. A map of the route traveled can be seen in Figure 3.30. The *M/V Island Joiner* has capacities for eight cars and 40 people.

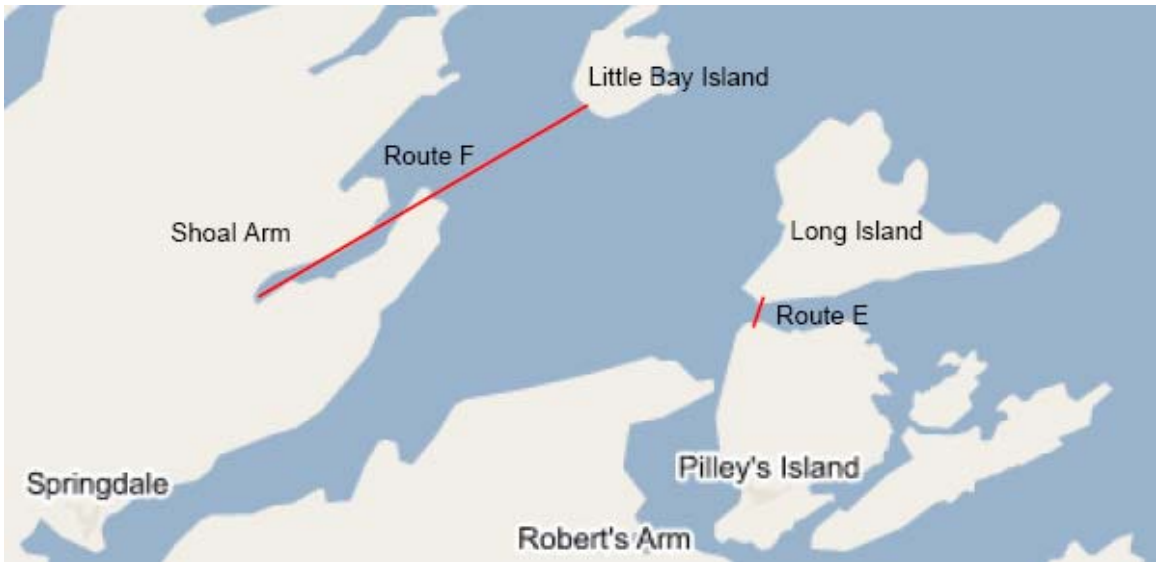


Figure 3.30: Route E is 0.5 km

As with all traffic data obtained from the department, there is a gap in the data from 1998 until November 2004. Since November 2004, eight months of data has been collected although data for three of those months is fragmentary.

Figure 3.31 shows a comparison of data both before and after the missing data period from 1997 to November 2004. The graphs show there is consistent increase in traffic for plotted months annually up to 1995 at which point there is a decrease, possibly due to an increase in fares (see below). As there is only a single data point for each curve after 1997, there is some uncertainty in trend lines. However, it can be seen that:

1. Traffic continues to increases with the onset of tourist season (July – September). The most recent data suggests an upper limit of 2,000 vehicles per month;
2. The graph indicates that winter traffic has increased, and assuming this trend continues an approximation for future traffic levels would be approximately 1,400 vehicles per month.

Indicated revenue increases since 1997 are due to a net increase in year round traffic combined with an overall rate increase of 0.75% for vehicles and 24% for commuters since 1997 (to 2005). Rate increases prior to 1997 were controlled by a fixed flat rate increase of $0.75 from 1995 to 1997.

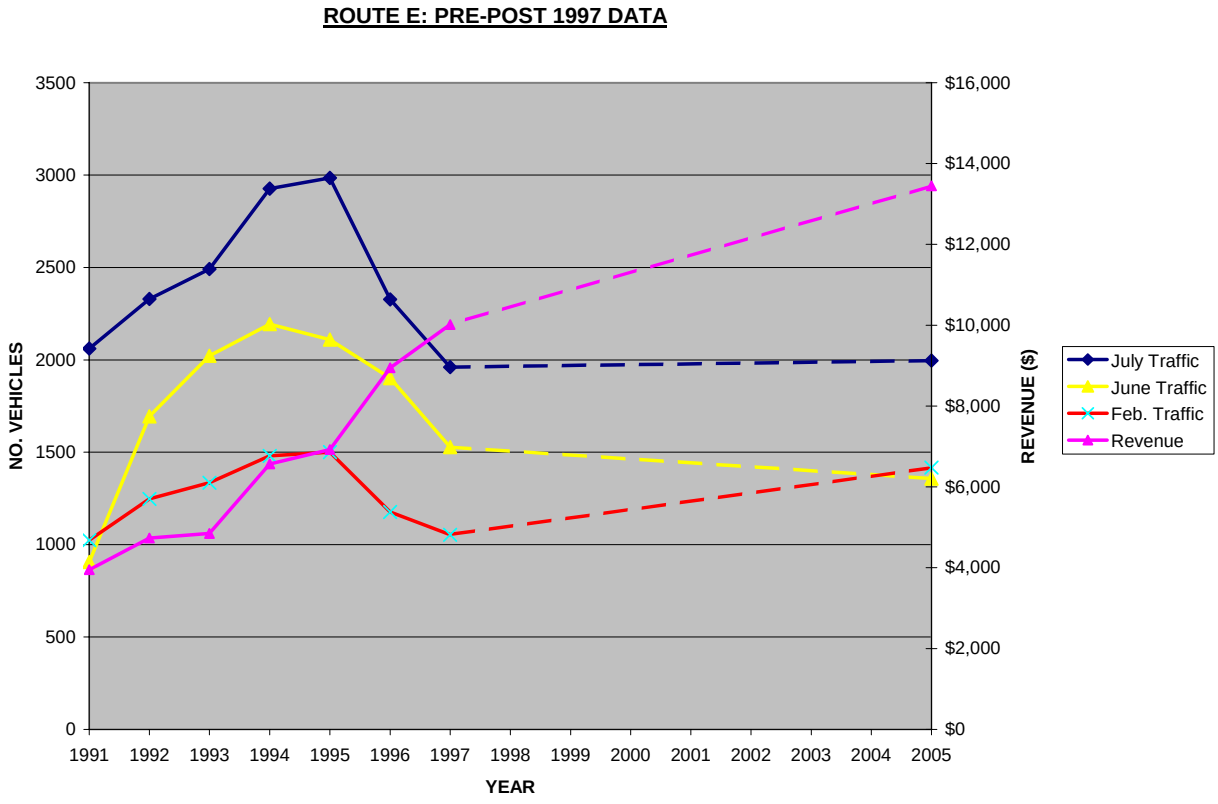


Figure 3.31: Traffic and Revenue Trend Comparison

Using the assumed seasonal traffic levels, the current vessel utilization rate is 29% during the winter operating schedule (Sept. 16 to June 14) and 34% during the summer operating schedule (June 15 to Sept. 15). The current vessel utilization based on time operating to total time available, during a given work day, is 36% during the winter season and 40% during the summer season. This is based on:

- Current ferry schedule, effective November 2005;
- Tuesdays omit six (6) runs from the normal daily schedule;
- Total daily vehicle capacity available is 208 vehicle equivalent units in the summer and 176 vehicle equivalent units in the winter;
- 30 days of operation per month; and
- Assume one hour off per meal.

Figures 3.32 and 3.33 show the hourly vessel vehicle capacity for a given day in each season respectively.

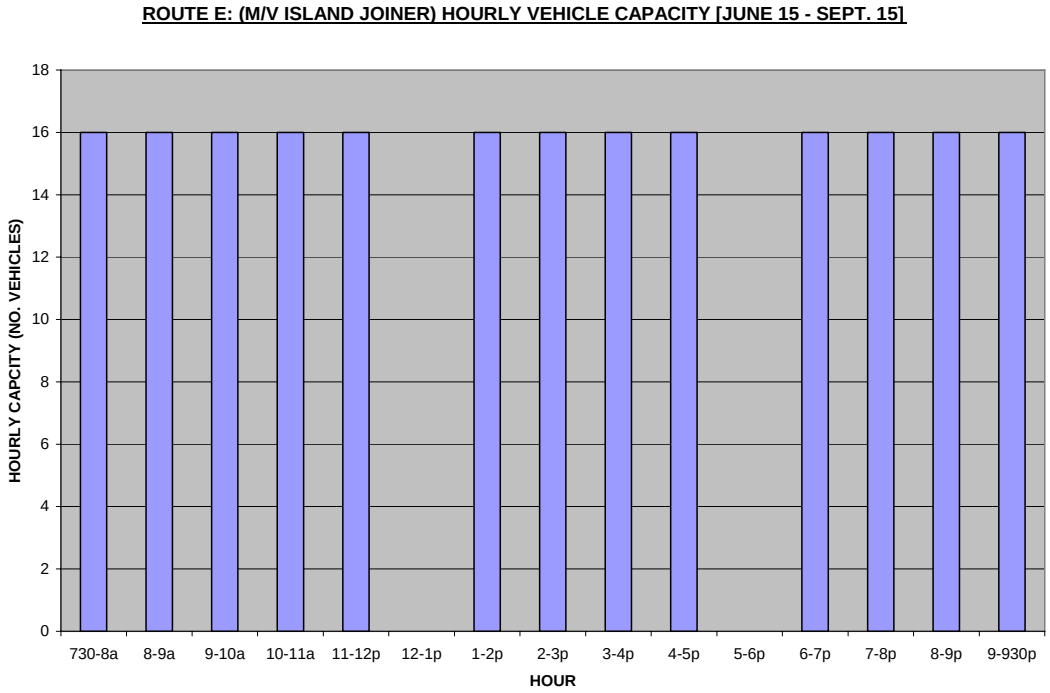


Figure 3.32: Route E (M/V Island Joiner) Hourly Vehicle Capacity (Summer Schedule)

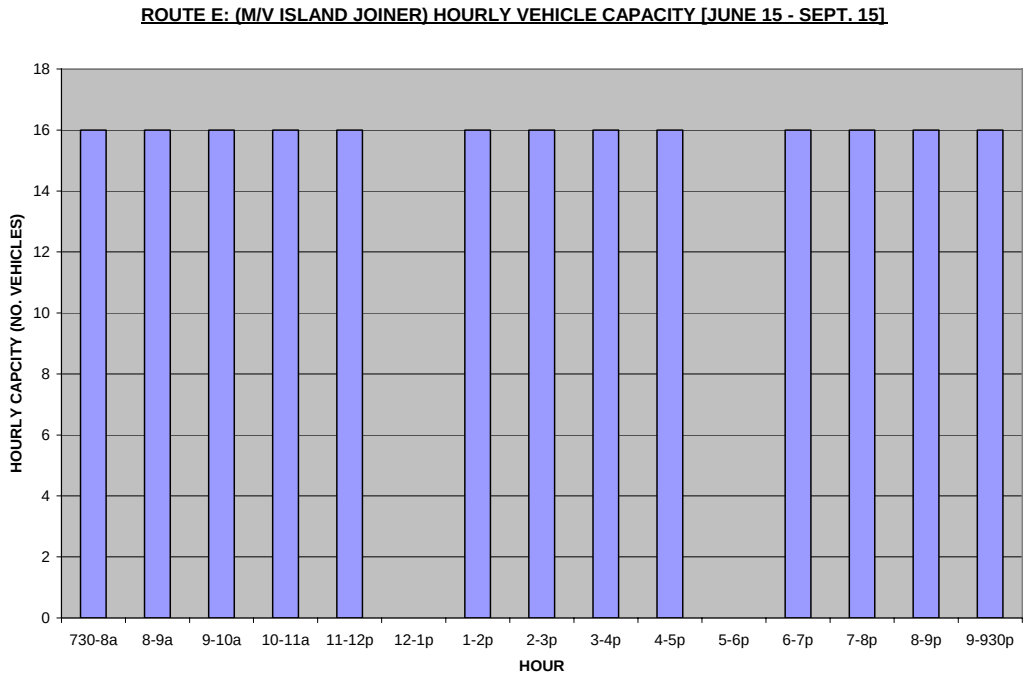


Figure 3.33: Route E (M/V Island Joiner) Hourly Vehicle Capacity (Winter Schedule)

3.2.6 Route F: Little Bay Island

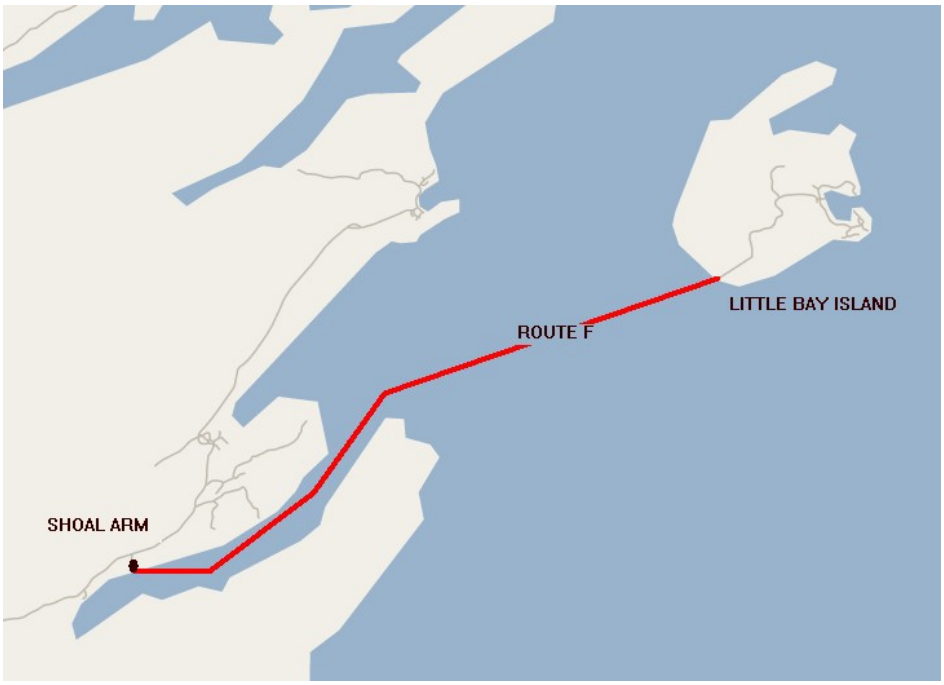


Figure 3.34 : Route F Shoal Arm to Little Bay Island

Figure 3.34 illustrates Route F, a daily route operating all year round, with increased runs during spring and summer. The current ferry service is offered by the M/V *Inch Arran* with a route distance of 11 km and a transit time of approximately 45 minutes. This vessel came into service on this run in the early 1980's and has a vehicle and passenger capacity of 16, and 49 respectively.

Population and basic vehicle utilization rates appear to have been declining somewhat since 1994 as shown below in Figure 3.35. However, due to increasing ferry rates and possibly to the increased utilization of the service by the local fish plants, revenue has actually increased.

Using seasonal traffic levels, the current vessel utilization rate is approximately 28% during the summer (June 15-Sept 15) and approximately 19% during the winter operating schedule (Sept 16- June 14).

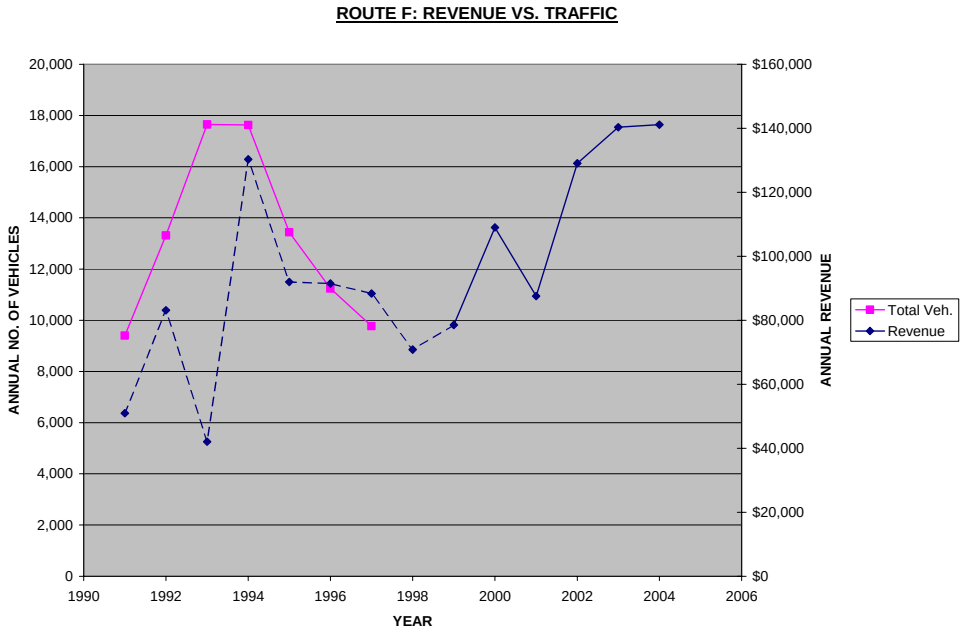


Figure 3.35: Revenue and Traffic Trend Comparison (Annual)

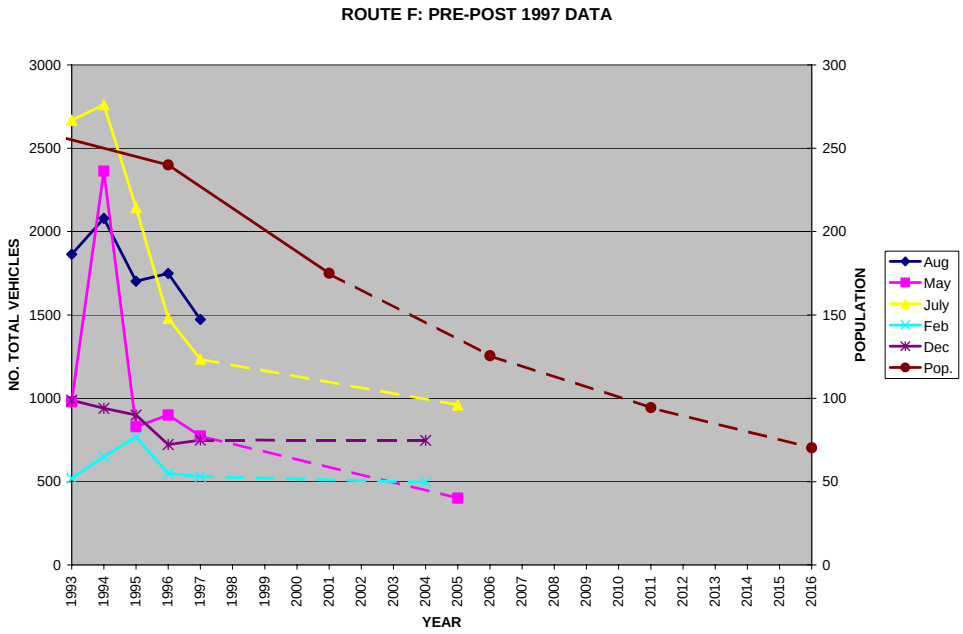


Figure 3.36: Vehicle and Population Trend Comparison (Annual)

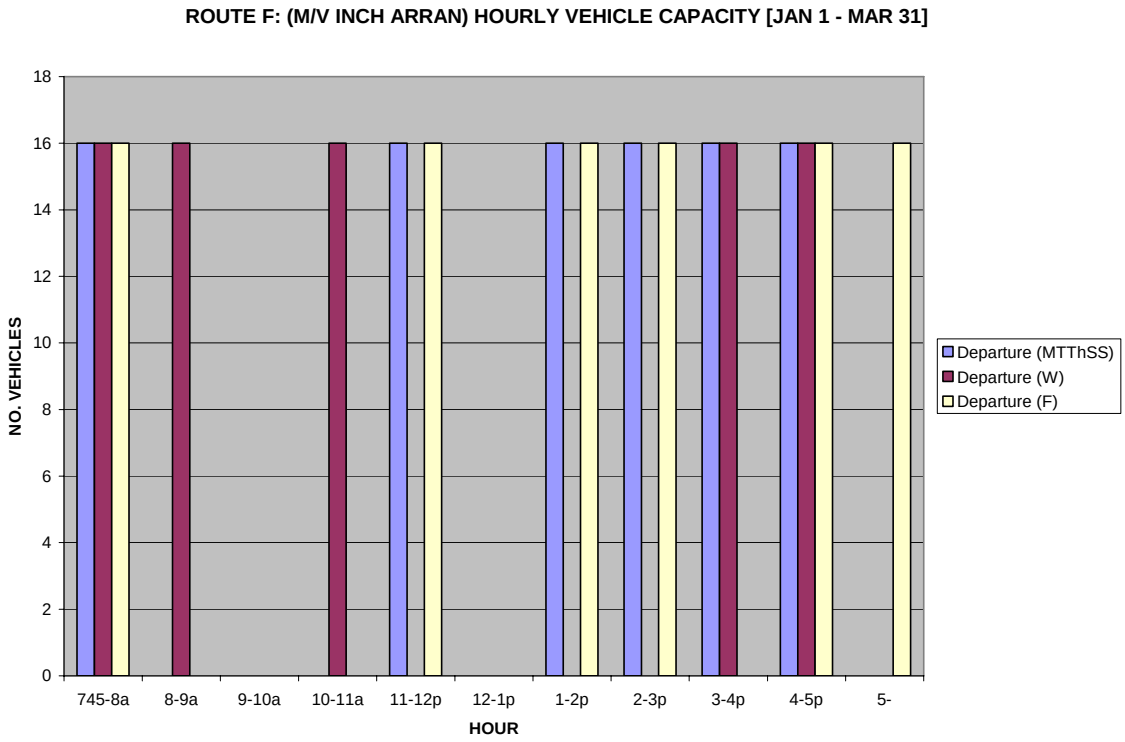


Figure 3.37: Route F M/V *Inch Arran* Hourly Capacity (Winter)

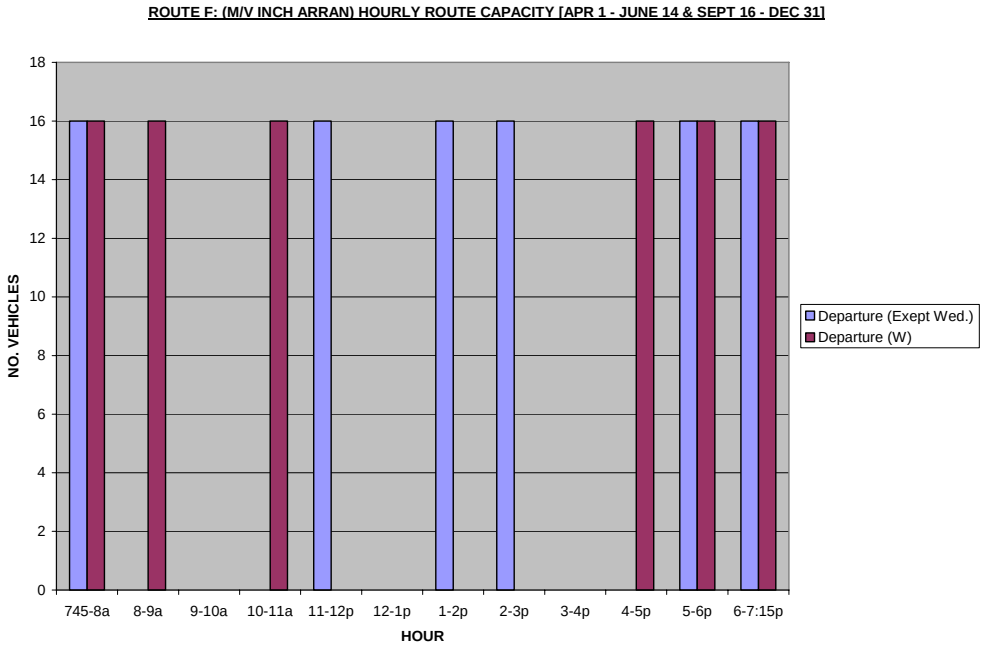


Figure 3.38: Route F M/V *Inch Arran* Hourly Capacity (Spring and Fall)

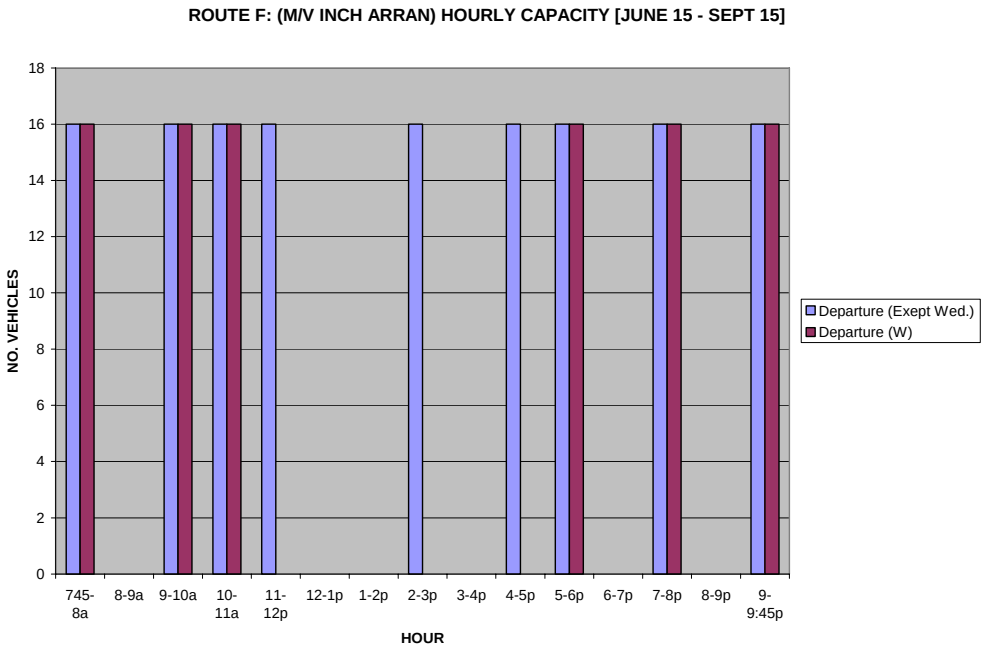


Figure 3.39: Route F M/V *Inch Arran* Hourly Capacity (Summer)

3.2.7 Route K: Lapoile – Grand Bruit – Rose Blanche – Burgeo

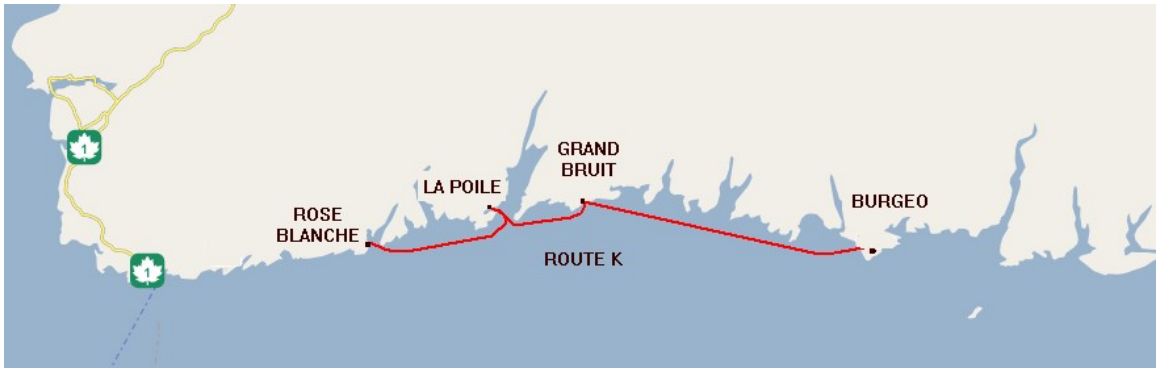


Figure 3.40: Route K: Lapoile – Grand Bruit – Rose Blanche - Burgeo

A diagram of Route K is provided above in Figure 3.40. The current ferry serving this route, M/V *Marine Coaster,* is privately owned and operated. Route distances and transit times are:

- Lapoile to Grand Bruit – 16km with a transit time of one (1) hour.
- Lapoile to Rose Blanche - 23km with a transit time of one (1) hour and thirty (30) minutes.
- Grand Bruit to Burgeo – 54 km with a transit time of three (3) hours.

The M/V *Marine Coaster* is a passenger/freight vessel capable of holding 40 passengers. This vessel operates six (6) days a week, having Thursday as a layday for repairs, all year round. Voyages to and from Burgeo are made on Tuesdays while voyages to and from Rose Blanche are made the remaining five (5) days of the week.

There is very limited traffic data for this route, and the revenue data shows apparent wide fluctuations. Therefore, it is inadvisable to project traffic trends with any degree of reliability. Based on the overall picture for most ferry services, it is likely that fare increases are balancing declining use due to population reductions.

The average utilization rates for the different services along this route are calculated as 15% and 5% in the summer and winter respectively.

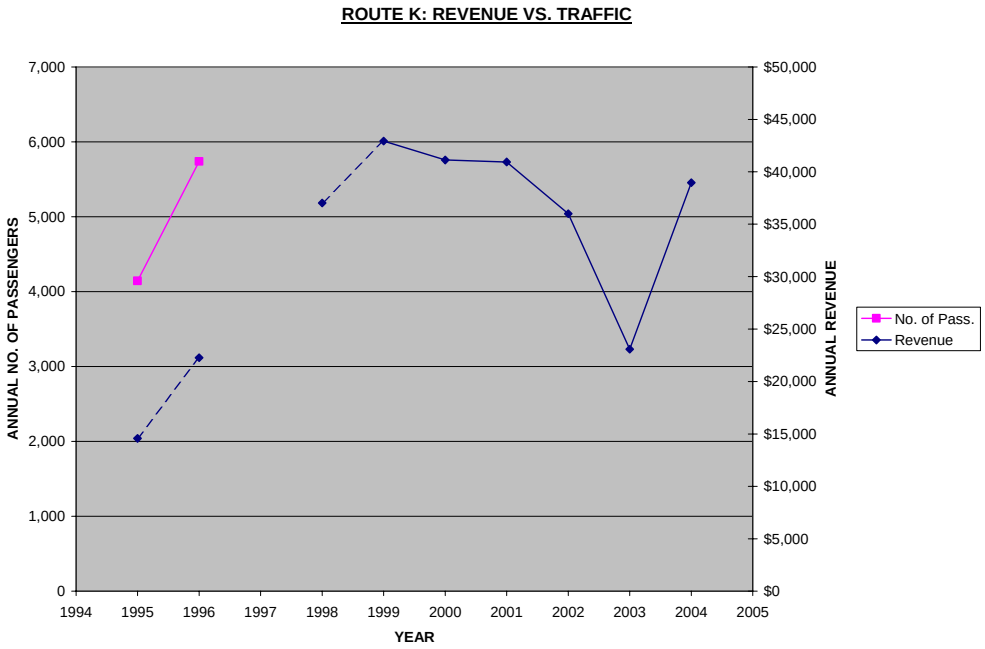


Figure 3.41: Revenue and Traffic Trend Comparison (Annually)

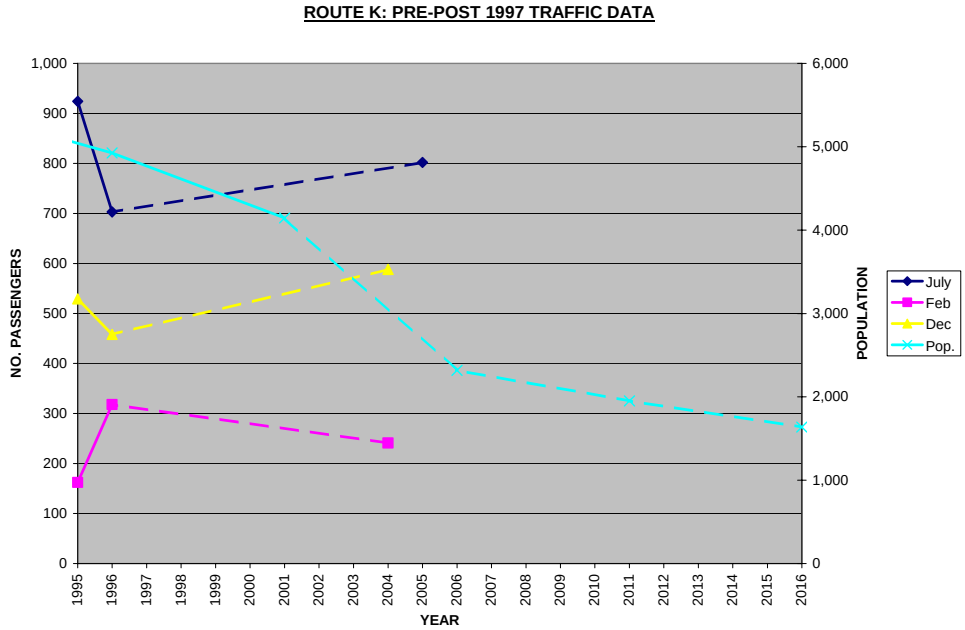


Figure 3.42: Passenger and Population Trend Comparison (Monthly)

3.2.8 Route L: Ramea – Burgeo – Gray River – Burgeo

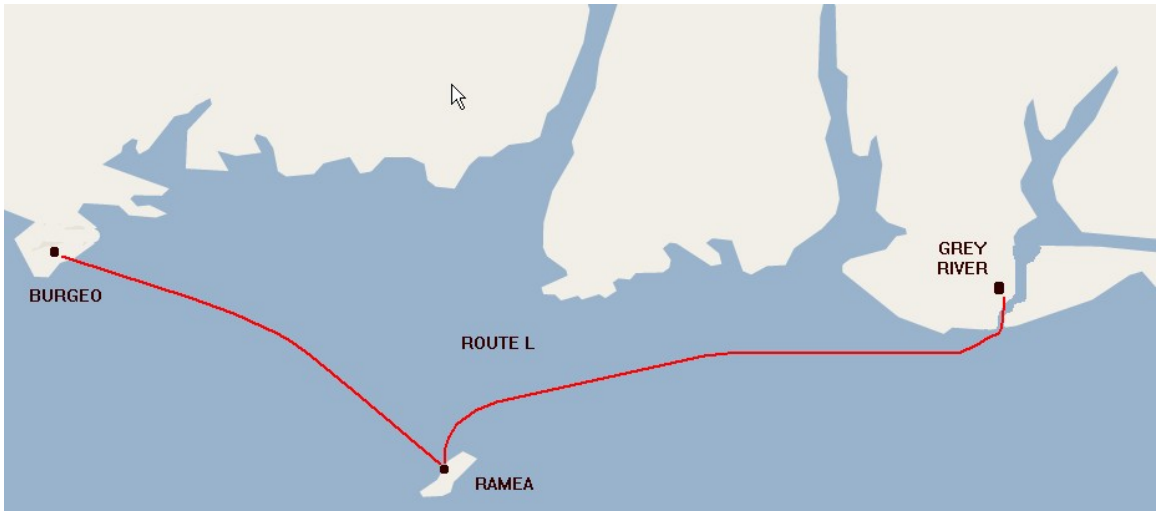


Figure 3.43: Route L: Ramea – Burgeo- Gray River – Burgeo

Figure 3.43 shows Route L, which is served by the provincially owned and operated M/V *Gallipoli*, a vessel with capacities of 20 vehicles and 100 passengers. Route L services include:

- Ramea to Burgeo with a distance of 19 km, and a transit time of 19 minutes (multiple daily services); and
- Ramea to Gray River with a distance of 31 km, and a transit time of one (1) hour and twenty (20) minutes (services on two days of the week only).

Figure 3.44 indicates that revenues for the route have remained reasonably constant, which would imply some reduction in traffic (as fares have risen). This is not immediately obvious from the (partial) traffic data in Figure 3.45, but would be consistent with the picture on other routes.

Summer and winter schedules are similar, with slightly more sailings under the summer schedule. Traffic levels are significantly higher during the summer. As a result, ferry utilization during the summer is calculated to be approximately 19%, and approximately 10% during the winter.

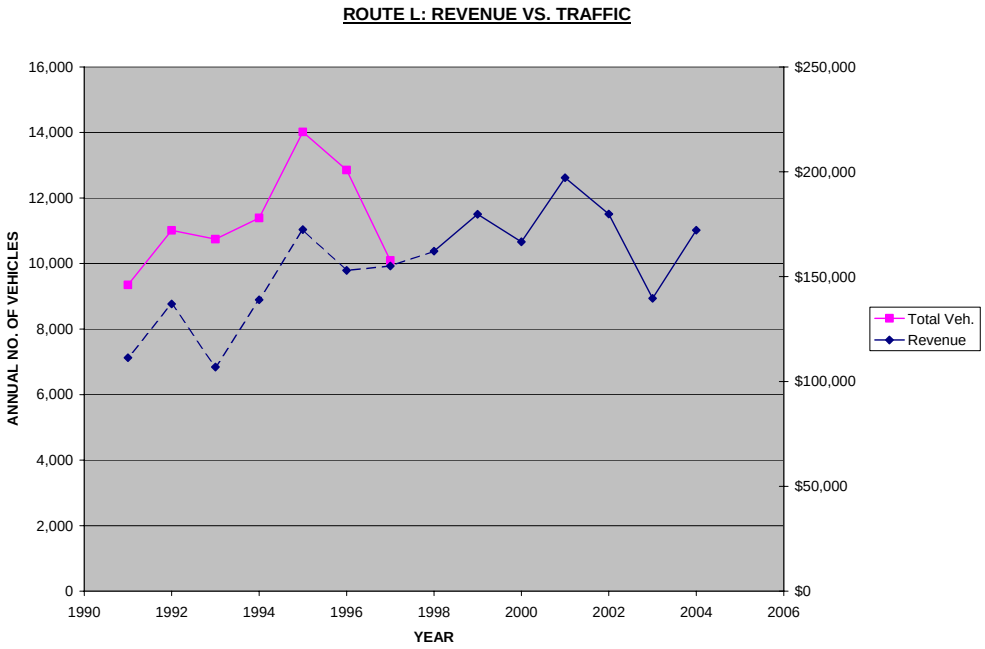


Figure 3.44: Revenue and Traffic Trend Comparison

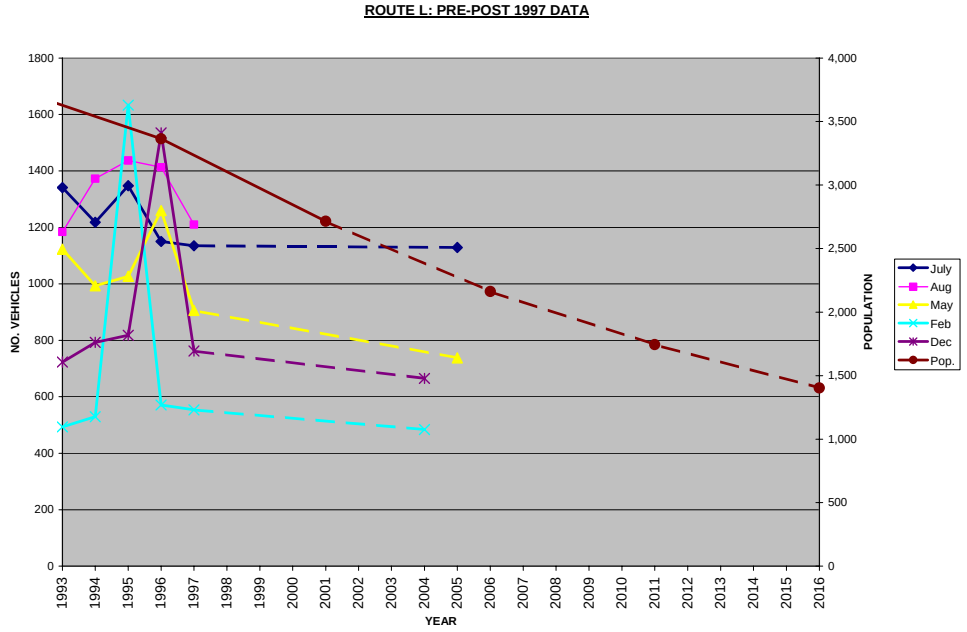


Figure 3.45: Traffic and Population Trend Comparison (Monthly)

3.2.9 Route M - Gray River – Francois – Burgeo – McCallum – Hermitage

Figure 3.46: Route M: Gray River-Francois – Burgeo – McCallum – Hermitage

The ferry service on Route M, illustrated in Figure 3.46, is provided by the privately owned and operated M/V *Marine Voyager*. There are a set of routes comprising Route M, including:

- Gray River to Francois with a distance of 36 km, and a transit time of two (2) hours;
- Grey River to Burgeo with a distance of 49 km, and a transit time of two hours (2) and thirty (30) minutes;
- Francois to McCallan with a distance of 40 km, and a transit time of two (2) hours and thirty (30) minutes; and
- McCallum to Hermitage with a distance of 32 km, and a transit time of one (1) hour and fifty (50) minutes.

The vessel makes daily sailings with the exception of laydays on the first, fourth, and fifth (when applicable) Tuesday of each month.

There is very limited traffic data for this route, and both traffic and revenue data show apparent wide fluctuations. Therefore, it is inadvisable to project traffic trends with any degree of reliability. Based on the overall picture for most ferry services, it is likely that fare increases are balancing declining use due to population reductions.

The utilization rate of the M/V *Marine Voyager*, averaged over the various services, is approximately 8%.

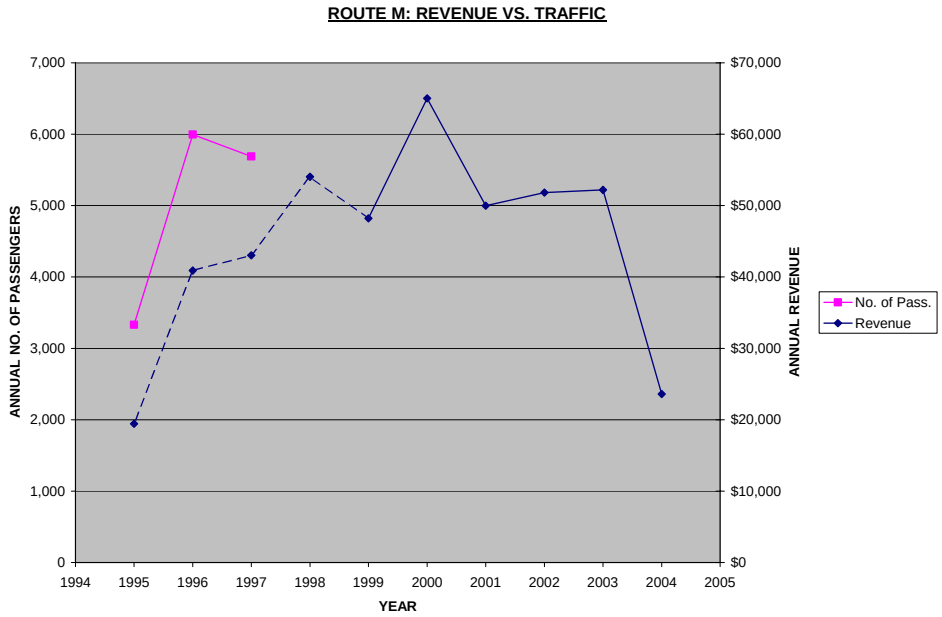


Figure 3.47: Revenue and Traffic Trend Comparison

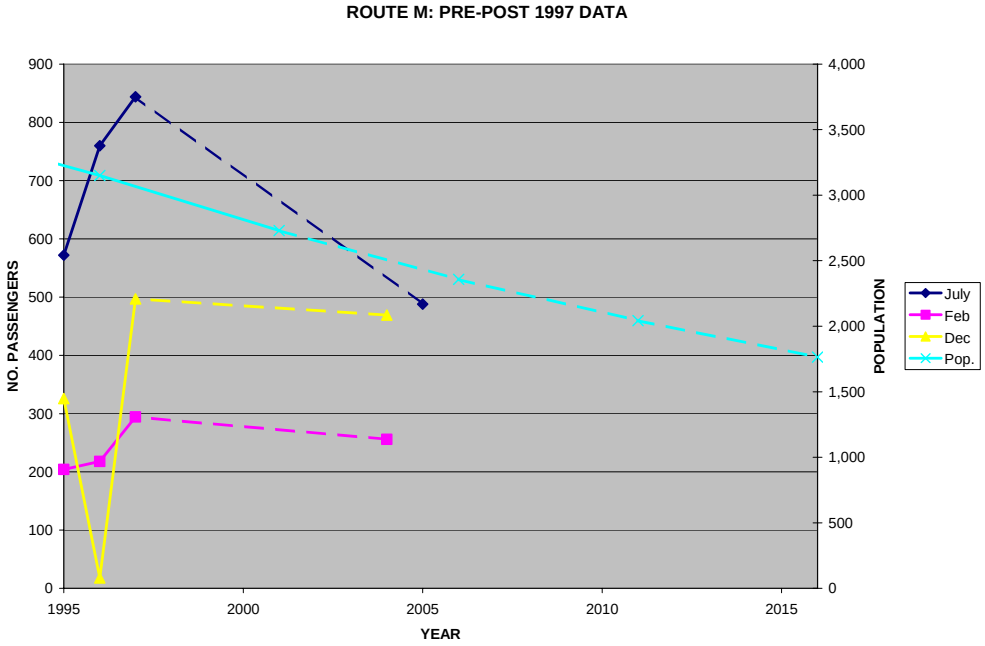


Figure 3.48: Passenger and Population Trend Comparison (Monthly)

3.2.10 Route N – Gaultois – Hermitage – McCallum

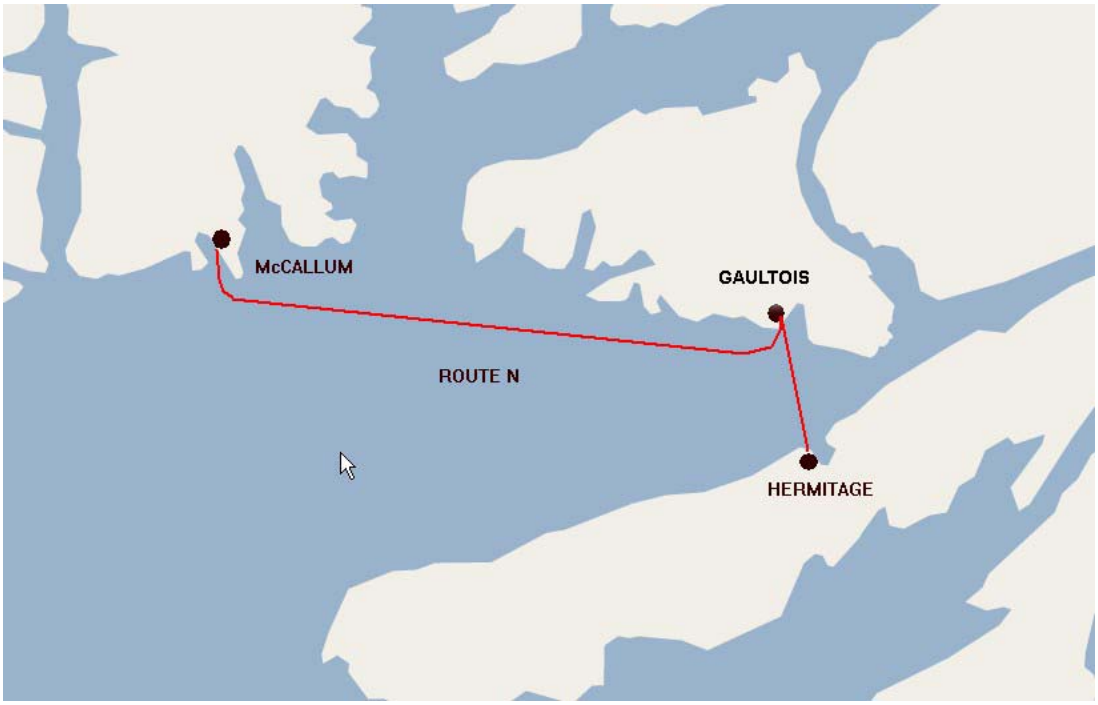


Figure 3.49: Route N: Gaultois – Hermitage – McCallum

Route N is shown in Figure 3.49. The route is served by the privately owned and operated M/V *Terra Nova*, which is a passenger/freight ferry with a forty (40) passenger capacity. The various services on Route N include:

- Gaultois to Hermitage having a transit time of approximately twenty (20) minutes (multiple services daily, except Tuesday);
- Gaultois to McCallum having a transit time of approximately one (1) hour and thirty (30) minutes (Friday and Sunday only); and
- McCallum to Hermitage having a transit time of approximately one (1) hour and thirty (30) minutes (daily except Tuesday and Thursday).

There limited traffic data for this route indicates that traffic levels have been declining approximately in proportion to populations served. Seasonal fluctuations in traffic levels lead to utilization rates of approximately 13% in the summer, and 8% in the winter.

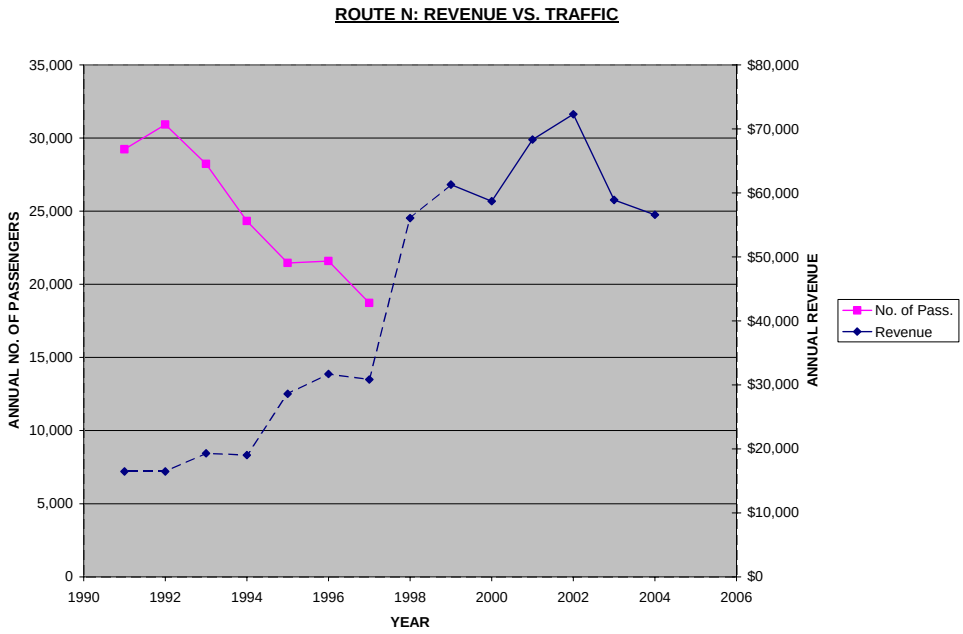


Figure 3.50: Revenue and Traffic Trend Comparison (Annually)

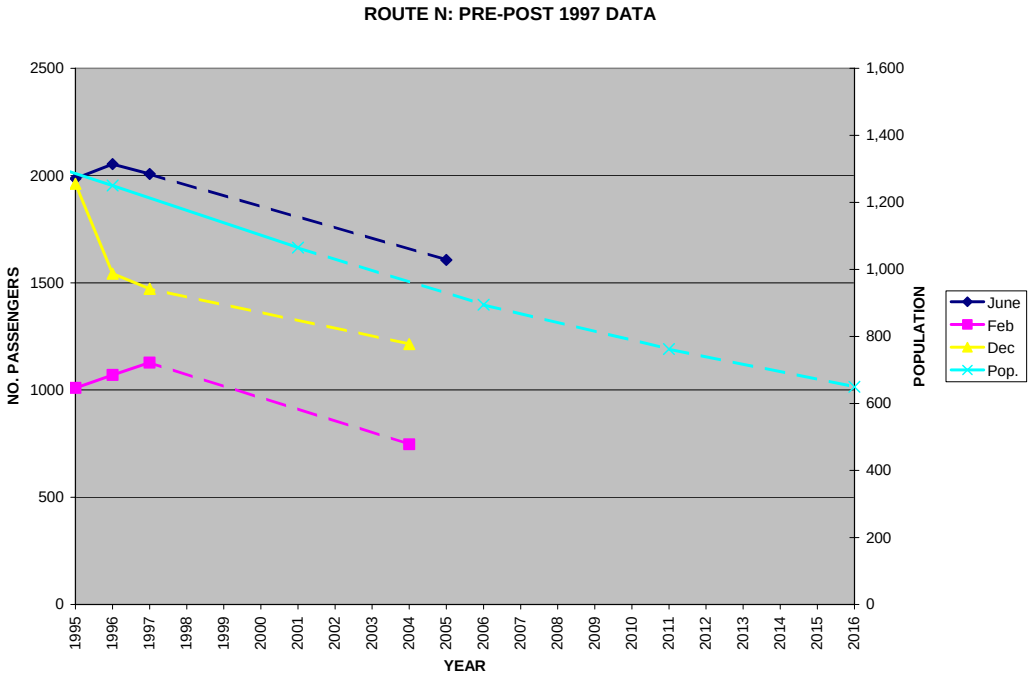


Figure 3.51: Passenger and Population Trend Comparison

3.2.11 Route 0 – Rencontre Bay – L'Argent – Pool's Cove

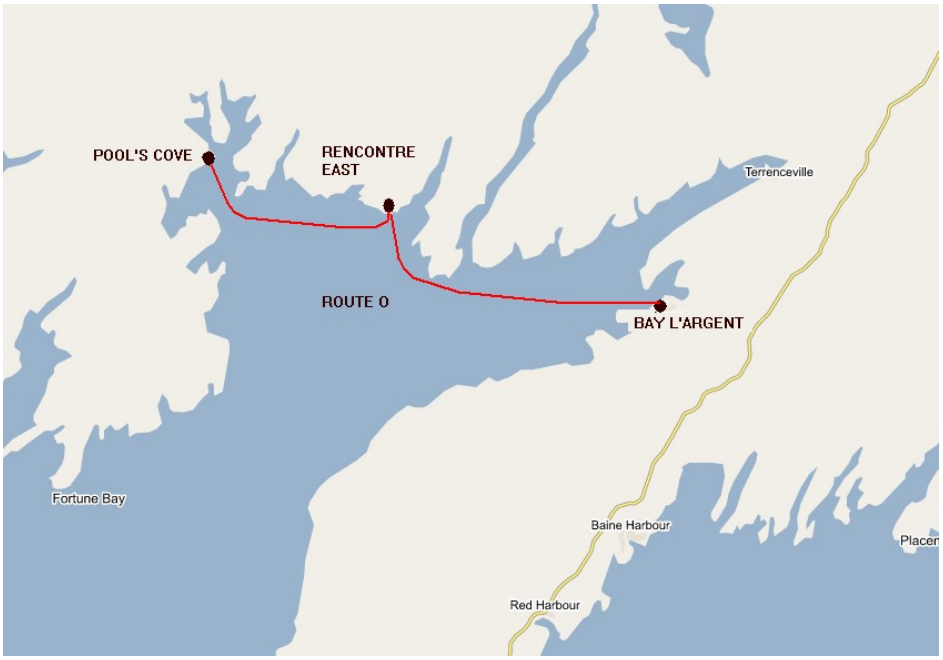


Figure 3.52: Route O: Rencontre Bay – L'Argent – Pool's Cove

Figure 3.52 above shows Route O. The current ferry servicing these communities is the privately owner and operated M/V *Northern Seal*, which is a passenger/freight vessel capable of carrying 40 passengers. Route 0 includes two separate services:

- Recontre - Bay L'Argent which has a transit time of approximately one (1) hour and forty five (45) minutes; and
- Recontre - Pool's Cove which has a transit time of approximately one (1) hour and fifteen (15) minutes.

One or two sailings are made daily on each route with the exception of maintenance laydays.

Figure 3.53 presents revenue data for this route, which is relatively stable over recent years. There is no recent traffic data available, but the revenues are consistent with declining use in line with declining population. It is also not possible to establish vessel utilization from the information available.

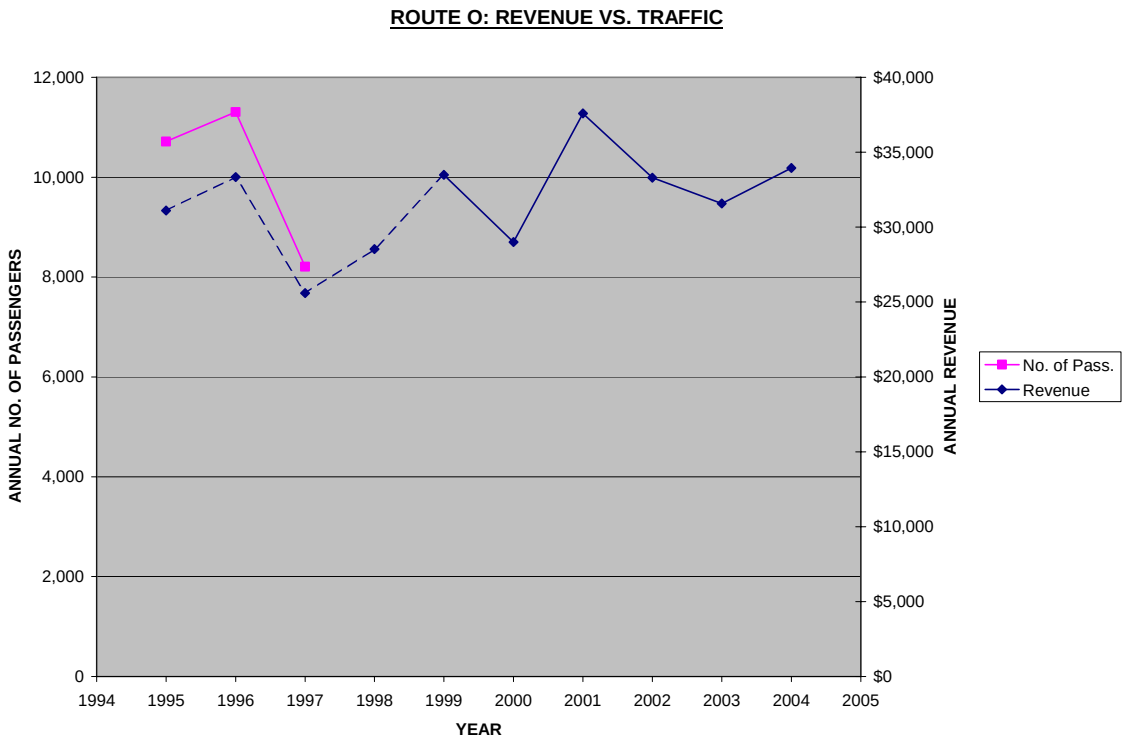


Figure 3.53: Revenue and Traffic Trend Comparison

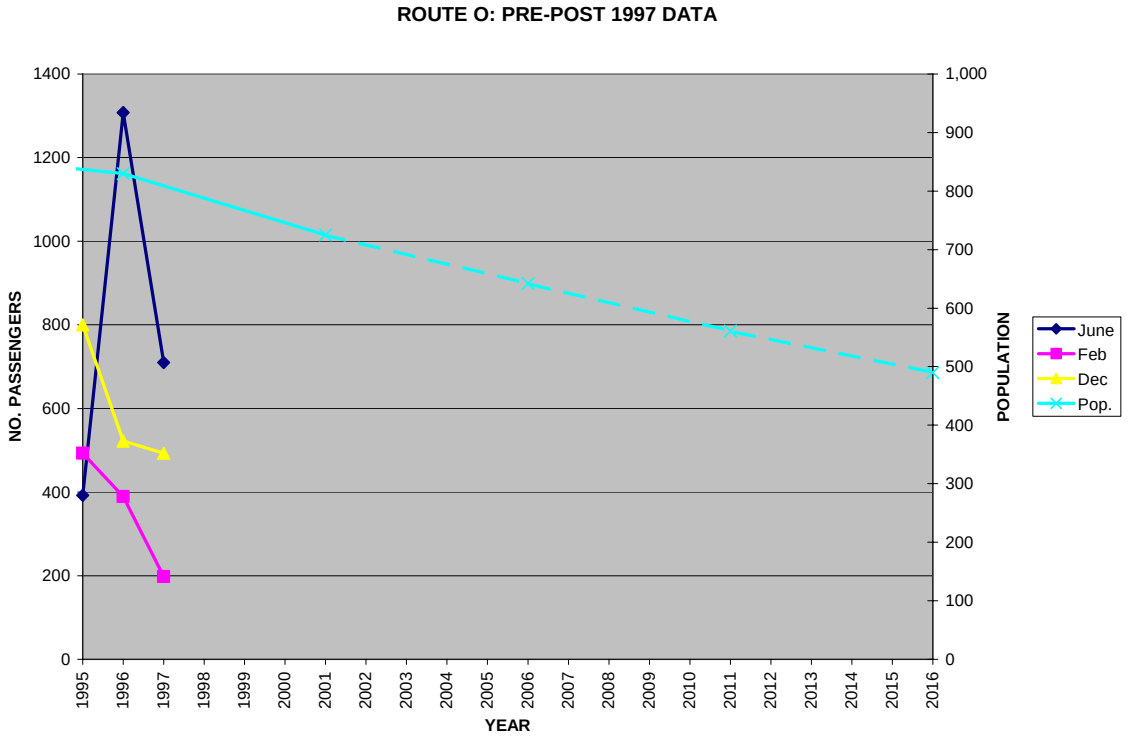


Figure 3.54: Passenger and Population Trend Comparison

3.2.12 Route P South East Bight – Petite Forte

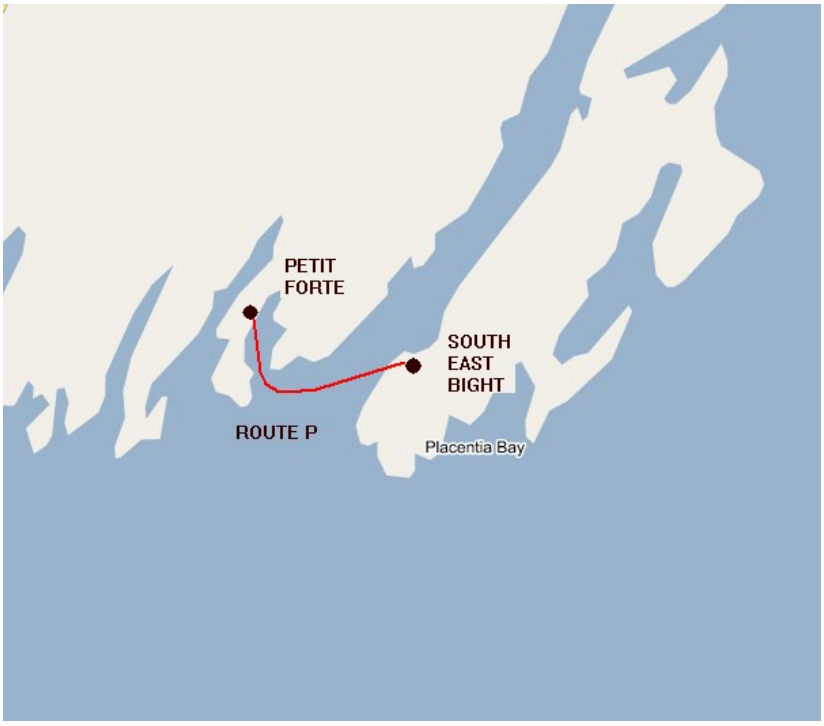


Figure 3.55: Route P: South East Bight – Petite Forte

Route P is shown in Figure 3.55. The privately owned and operated M/V *Winchester* services this 8.5km route, which has a transit time of approximately 25 minutes. Between two and four round trips are made daily, except for Tuesday (layday).

The service provider abandoned the route in 2004 due to financial difficulties, and a number of temporary measures were adopted in order to maintain the service. Recent revenue numbers are thus considered suspect. This, plus the lack of reliable traffic data, makes it difficult to draw any conclusions regarding trends in traffic or vessel utilization rates.

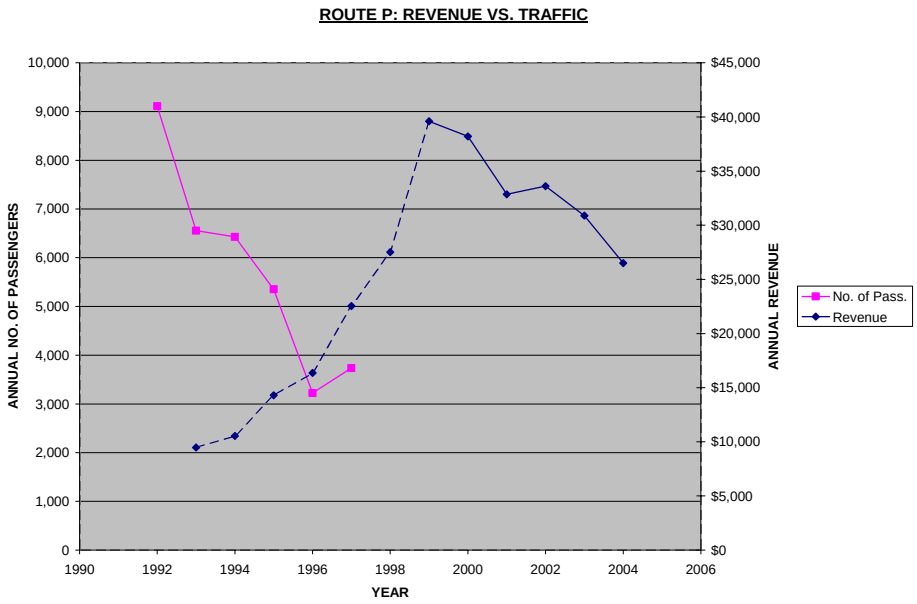


Figure 3.56: Revenue and Traffic Trend Comparison (Annually)

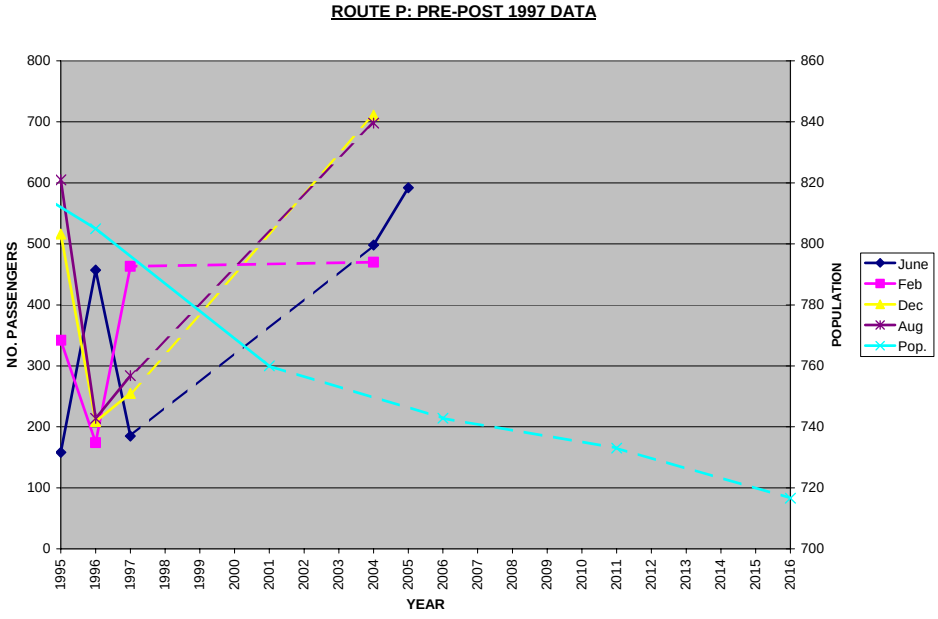


Figure 3.57: Population and Passenger Trend Comparison

3.3 Level of Service Comparisons

A further element of this study has been to compare the levels of ferry service provided to communities in Newfoundland and Labrador with those for other remote and island communities in Canada and elsewhere. The services reviewed are summarized in Table 3.15.

Table 3.15: Service Comparisons

Service	Distance (km)	Frequency (peak)	Population Served	Notes
Domestic				
Bowen	6	60 minute intervals	3,500	Considerable commuter traffic to Vancouver
Salt Spring	9	120 minute intervals	13,000	Mix of commuter/resident traffic and summer tourism
Gabriola	7	60 minute intervals	4,500	Mix of commuter/resident traffic
Grand Manan	30	120 minute intervals		Resident/tourist traffic
International				
Shetland Islands (Mainland to Yell)	5	15 to 60 minute intervals	1,000	Resident/tourist traffic
Shetland Island (Mainland to Bressay)	2	40 to 60 minute intervals	350	Resident/tourist traffic
Norway (Molde-Sekken)	50	15 to 120 minute intervals/8 times daily	150	Service from main road and airport to/from small island
Norway (Hundeivika-Festoya)	20	20 to 70 minute intervals/15 times a day	690	Peninsula, no main road, connecting to main road across bay
Norway (Halsa-Kanestraum	20	60 to 90 minute intervals	1,700	Main road connection

By comparing these other services with those around Newfoundland and Labrador, it can be seen that the Newfoundland services are comparable to those for similar types of service elsewhere. This applies to both to the Bell Island commuter service and also to the community services to both the large and smaller islands around the coast.

The population and economies of a number of the islands covered in Table 3.15 are growing, demonstrating that their levels of ferry service are not a barrier to growth.

3.4 Future Levels of Service

Based on the analyses reported above, it can be concluded that, on most of the routes around Newfoundland, the scheduled level of service is more than adequate to the current needs of the communities. This applies both to the capacities of the vessels operating on each route and to the service frequency.

The sections above have presented data for vessel utilization, which is a partial indication of mismatch, but may disguise other factors. The data made available to BMT is essentially monthly summaries, which can disguise periods of peak utilization. On some services there may be commuter peaks in the morning and evening, and little or no utilization for much of the day. Even on the majority of runs that are not used by commuters, there can be pressure on the first runs in the morning or the last evening sailings. However, on commuter runs it is essential that the peak capacity is reasonably well matched to peak demand, as the users themselves have little flexibility in their schedules. On non-commuter services there may be somewhat more potential to even out highly variable vessel loads by using pricing or reservation systems to encourage users to spread out their timing. It is not possible to apply firm rules to appropriate utilization levels for ships on either commuter or 'highway' services due to the wide range of factors that can apply. As an indicative guideline, a commuter service is unlikely to be popular if more than 5-10% of the users are forced to wait for more than 30 minutes to use the vessel. For a non-commuter service, a target can be to achieve greater than 50% overall utilization. These indicators can be used in considering vessel size, vessel number, and frequency of sailing.

There are issues of service reliability due to the condition of the majority of the ships, the general lack of routine maintenance, and in some cases, due to operational limitations (wind, wave, and ice). These issues could be addressed by a combination of measures:

- Replacing older vessels with new;
- Optimizing new vessel designs to the needs of the Newfoundland services;
- Scheduling additional maintenance time within the normal schedules; and
- Developing a planned maintenance program for the fleet as a whole.

These measures are discussed in more detail throughout the report.

There are several routes around the island where the current normal level of service appears to be significantly mismatched to the current or potential future demand. This is highlighted in the discussion below.

Almost all of the communities served by the ferry fleet have declining and aging populations. There appears to be some potential for economic development to stabilize this situation in a number of the larger centres, including Bell Island, Fogo, and Ramea. There may also be an underexploited potential for additional tourism in various areas, particularly along the South Coast. As an example, a position paper developed by the Coast of Bays Corporation was sent to the project team and has been included as Annex A to this report. Many of the arguments it presents could be applied to the South Coast communities in general.

For the smaller island communities, however, the user base for the ferry fleet will almost certainly continue to diminish. This should be taken into account in developing recommendations for future levels of service, and in sizing the vessels that will be required.

3.4.1 Route A: Bell Island

The vessel capacity currently serving Bell Island is considered to be reasonably well matched to the peak demand of the route, which is driven principally by commuter demand. BMT team members spent several days observing traffic levels on the route, and though this was for winter rather than summer service demands, the level of spare capacity seemed reasonable for a year-round basis. It could be argued that the capacity would be delivered more economically by a single larger vessel, as is done on several of the other commuter runs studied in Section 3.3. However, the local residents have made it plain that this approach would lead to strong objections. Also, the overall "optimum" fleet mix of ship numbers and sizes arising from this study (see Section 3.5) is better suited to a number of vessels of roughly 40-car capacity rather than to anything larger.

The issues of service reliability on this route can be addressed by improving the performance of the existing ships on the run and, in the longer term, by vessel replacement. Neither the *Beaumont Hamel* nor, more particularly, the *Flanders* should be near the top of any lists for replacement, but their current maintenance management routines should be improved. This should include adjusting their current operating schedules to provide more time for routine maintenance.

The current swing vessel for the service, the *Nonia*, still has a significant number of operational deficiencies that should be resolved for short and medium term requirements. In the longer term, as discussed in Section 3.5, it is questionable as to whether a 40-car swing vessel should be provided, or whether a smaller vessel is adequate for Bell Island and for other needs. The *Nonia* was in use during part of the period observed by BMT (see above) and she plus the *Flanders* were able to cope with the winter traffic levels.

3.4.2 Route B: St. Brendan's

The service provided by the now-retired *Green Bay Transport* was marginally adequate to the route, leading to a high number of trips not completed and vehicles not accommodated.

The current and projected future population of the island does not justify a significantly larger vessel, but this relatively demanding route does require a vessel with reasonable seakeeping and ice transit capability. As such, it is recommended that a vessel larger and more powerful than the *Green Bay Transport* should be the basic asset on this route.

3.4.3 Routes C and D: Fogo Island and Change Island

These routes are currently served by the *Capt. Earl Winsor*, which is the largest vessel in the current fleet. Its current level of utilization on this route is less than 40%; which, given the nature of the service, is quite inefficient. When a replacement vessel is used (as currently with the *Beaumont Hamel*) the level of service appears to be adequate, though there are some issues due to the capabilities and reliability of the replacement ship(s).

As noted in Section 2, the *Winsor* is recommended for early replacement. In order to provide greater commonality within the future fleet (see Section 3.5) it would be desirable to acquire a new vessel of approximately 40-car capacity to serve the Fogo route. Department staff has recommended that final decisions on size/capacity should be based on collecting additional data for current levels of utilization, and we concur fully with this suggestion. As noted earlier, while the 33 car *Beaumont Hamel* was in use on the routes a significant number of vehicles were left behind on several occasions, indicating that this much smaller ship would not be adequate. However, part of the problem may be that the *Beaumont Hamel* can only carry 3 tractor trailers as opposed to the *Winsor*'s 7. Also, the *Beaumont Hamel* almost never reaches a 33 vehicle capacity, indicating that this may be more of a notional than a real number. A new vessel with a 40/6 car/tractor trailer configuration would be considerably more satisfactory.

This single 40-car equivalent vessel should have the capacity to maintain the current 3/4 point service to both Change and Fogo Islands over most of the year. It is possible that future increases in tourism coupled with fish plant truck traffic would require additional capacity over the summer months. We consider that the most efficient way of servicing this peak would be to bring a smaller vessel onto the Change Island route, to allow the 40-car vessel to increase the service frequency for Fogo. Traffic peaks could also be managed more efficiently by the use of differential pricing or by a reservation system (see Section 6.4).

3.4.4 Routes E and F: Long Island and Little Bay Islands

The vessels now in use on these services are both in need of replacement over the reasonably short term future. On the current services, both the Long Island ferry *Island Joiner* (8 cars) and the Little Bay *Inch Arran* (16 cars) are underutilized.

There appears to be several possible options for the future of these services. Replacing the existing vessels with similar ships would perpetuate the current, highly uneconomic level of service. Using smaller vessels is not very viable, as the nature of the environment and traffic requires a certain minimum size to transport a range of vehicles and to cope with winter ice conditions. Also, the ability to handle tractor trailers reduces rapidly with vessel size.

Preferred options would therefore be to combine the current services into a 3- or 4-point service, or to do away with the Long Island service altogether by building a causeway from Pilley's Island to Long Island. For the combined service, the existing main island terminals could continue to be used, or a new shore terminal could be built at Hall's Bay Head. This would shorten the voyage length for Little Bay Islands considerably, and would reduce the increase in voyage length for Long Island.

The Department has conducted several in-depth studies of possible options for these routes, and the background information quoted below is largely drawn from this work. However, the context for this and the earlier studies has not been the same, and the overall recommendations are therefore also somewhat different.

The cost of the Long Island causeway/bridge option has been estimated as between $20-30 million, $26 million being the Department's (2004) base case number. This is considerably more than the cost of a replacement vessel either for Long Island alone or for a combined Long Island/Little Bay Island newbuild (see Section 5 for details). It should also be recognized that building the causeway will not remove the requirement to acquire a new vessel for Little Bay Island, and the additional costs incurred. There would, however, be (relatively) very low upkeep and operating costs for Long Island once the causeway was built. The Department developed reasonably detailed financial projections for various future options in order to determine their relative costs, and concluded that over a 20 year period the causeway option would have a total cost (net present value) between $2 and $6.5 million less than the cost of a straight replacement of both existing vessels with essentially identical newbuilds.

The 3- or 4-point service linking both islands with a new terminal at Halls Bay Head (estimated road/wharf construction cost $4 million) would appear to be the most rational option for these services. A vessel somewhat more capable than the *Inch Arran* could provide an equivalent hourly capacity to both existing services at slightly more than half the current combined operating cost, and with considerably greater service reliability. The Department's analysis indicated that this option would have a 20 year cost (net present value) of between $12 and 20 million less than the causeway option; and still less than the 'status quo' vessel replacement. BMT's own estimates for newbuild vessel costs are similar to those produced by the Department (see Section 5), and we consider the overall cost comparisons to be reasonable and realistic.

The single larger vessel, 3- or 4-point option from Halls Bay Head would provide enhanced service to Little Bay Islands. The existing 6 sailings/day could be maintained or increased, with a more capable vessel and a shorter crossing time. More commercial vehicles could be carried, and this could help promote future expansion of fish plant operations. On the other hand, it is acknowledged that this option will generate adverse reaction on Long Island due to the reduced service convenience. A detailed plan for service delivery, including fares and oher economic aspects should be developed and discussed with the local communities in order to mitigate the concerns that are likely to be raised.

3.4.5 Routes K – N: Western South Coast Services

The current South Coast services include those provided by the provincially-owned *Gallipoli* and the remainder provided by the small, privately operated ships. They have been considered together here to highlight how a more radical revision to current service levels might be accomplished.

Traffic statistics indicate that none of the routes is under-serviced. The *Gallipoli* runs overall at a small fraction of capacity, and the other services are also poorly utilized. However, none of these services is currently set up in a way that promotes economic development, notably (but not exclusively) tourism. Travelling the length of the South Coast requires complex planning, takes the better part of a week, and is only an option for backpackers. Service reliability issues also increase the risk of being stranded or of having to backtrack if connections are missed. The very limited cargo/vehicle capacity of any of the private sector vessels is a barrier to other types of development in the South Coast communities.

An alternative service delivery model is suggested by the 'Hurtigruten' routes along the coast of Norway, in which several vessels run the considerable length of the country, maintaining a regular schedule at each port. The ships serve both local needs and also an increasing volume of tourism. On a smaller scale, this approach could be replicated on the South Coast of Newfoundland. At the western end of the system, there is reasonably convenient road access to the major ferry ports at Port aux Basques. Adding similar capability to Route O (see section 3.4.6) would shorten the eastern link to Argentia. All of the ports along the route could benefit from better access.

A minimum of two vessels would be required to provide a daily call at each port. The size/capability required is discussed in more detail at Section A, but should be sufficient to offer a reasonable level of comfort to passengers and in the order of 6-car equivalent space and deadweight.

The *Gallipoli* is not well adapted to longer voyages, or for redeployment to routes with more severe ice conditions. However, she has a relatively long remaining life expectancy. Over the short-medium term future she can continue to provide service on Route L and potentially to the adjacent communities.

An issue for any substantive change to the service patterns along the South Coast is the mix of contractual arrangements now in place; some of which have recently been renewed. Once new vessels are available to provide an alternative service, it will be necessary to renegotiate contract terms. As BMT is not familiar with the details of the relevant contracts, we cannot project the likely costs that will be associated with renegotiation.

A further issue is that a number of the existing outport wharves are not suited to vehicle Ro-Ro loading or offloading – see for example Figure 3.58 for the Gallipoli at Grey River. Some additional investment would be required to provide this. The scope of the current study has not included detailed analysis of shore infrastructure, but discussions with various interested parties (PWGSC, local communities) has suggested that a typical cost per port would be in the order of $1 million. Not all ports along the route would need or justify this investment.

Figure 3.58: Offload at Grey River

3.4.6 Route O: Rencontre/Pools Cove

This is also currently a passenger only service, but somewhat similar arguments apply to the Western South Coast. The lack of vehicle capacity is a major barrier to tourism development. There is road access to both ends of the route, but the lack of vehicle or significant cargo carrying capacity reduces the extent to which the economies of the Burin peninsula and Fortune Bay can be integrated.

A similar vessel to the new small passenger/vehicle ferries discussed for Routes K-N; i.e., six (6) cars and 40 passengers would provide a significantly enhanced level of service to address current shortcomings. Again, contractual and shore infrastructure issues will need to be addressed.

3.4.7 Route P: South East Bight/Petite Forte

This route is somewhat different form the other South Coast routes, as it does not form part of the same natural tourist itinerary. Any case for a change to the current level of service therefore has to be based on local economic and social factors.

Having said this, the existing vessel serving the route is very old and is likely to require replacement at an early date as a result of conditions and of forthcoming regulatory changes. Whether a replacement vessel should be made common/interchangeable with the other South Coast routes, or replicate the current capability will depend on the overall fleet renewal strategy, which is discussed in more depth below.

3.5 Future Fleet Requirements

The vessels now serving the island routes, including both the provincial and private vessels, are grouped by size/capacity in Table 3.16. The fleet is highly diverse, but in approximate and relative terms, it includes one large ferry, two large/medium, three medium, two small/medium, one small vehicle, and five small passenger vessels. There are twelve vessels in regular use, and two swing vessels; a percentage that does not always achieve adequate coverage due to the poor reliability of the current fleet. Two of the large/medium and one or two of the medium ferries can be expected to stay in service for more than the next ten years. The others are in more urgent need of replacement.

Table 3.16: Fleet Summary – Size and Life Expectancy

Vessel	Size (Pass/Vehicle Capacity	Life Expectancy (yrs)
Capt Earl Winsor	55/200	<5
Flanders	36.240	>10
Beaumont Hamel	34/180	>10
Hamilton Sound	26/75	<5
Nonia	24/80	>10*
Gallipoli	20/100	>10
Inch Arran	16/49	<5
Sound of Islay	15/49	<5
Island Joiner	8/49	<5
Northern Seal	0/40	Short**
Marine Coaster	0/40	Short**
Marine Voyager	0/40	Short**
Winchester	0.40	Short**
Terra Nova	0/40	Short**

* if further upgraded

** no surveys undertaken; assessment based on age and regulatory issues

In the event that existing vessels are replaced on a one-to-one basis, there is a need to acquire up to 10 new vessels of various sizes over the short term (approx five (5) years). This requirement could be reduced by changing the service delivery pattern, as discussed above.

The future level of service analyses concluded that a somewhat smaller fleet of 10-11 vessels could be used to service a somewhat different route structure, the 11th vessel being potentially required for summer service on the Fogo/Change Island services. Their optimum sizes are as shown in Table 3.17. There will be a continuing need for 1-2 swing vessels to cover refit and emergency repair periods. Provided that refits are coordinated and scheduled for the winter months, the Change Island summer ferry plus one other should offer adequate swing coverage.

Table 3.17: Future Fleet Summary

Route	Optimum Vessel Size
A: Bell Island	**2*Medium/Large**
B: St. Brendan's	1*Small/Medium
C/D: Fogo/Change Island	1*Medium/Large + 1 Small (summer)
E/F: Long Island/Little Bay Island	1*Small/Medium
L: Ramea	**1*Medium**
K-N: Western South Coast	2*Small
O: Rencontre-Pools Cover	1*Small
P: South East Bight/Petite Forte	1*Small or Passenger Only
Swing	***1*Medium*** + 1*Small (shared with Route D)

Existing vessels with longer life expectancies are shown in bold in Table 3.17. As there is some uncertainty over the longer term viability of the *Nonia* due to her high operating costs (both fuel and crew) she is included as bold/italics. The table helps to highlight a need for the following 8/9 new vessels:

- One medium/large (*Flanders* equivalent)
- One medium (*Hamilton Sound, Nonia*)
- Two small/medium (*Sound of Islay, Inch Arran*)
- Four small (*Island Joiner*)
- One small passenger only (*Winchester*)

It should be noted that the examples of equivalent existing vessels quoted are only intended to illustrate approximate size. New vessels would be expected to have significant differences from the old ferries. For example, the small ferries for the South Coast need to place an emphasis on seakeeping, which is less important for the Northern island services.

In the event that some or all of these vessels are acquired as used tonnage, it is probable that most of the new ships will be unique, as is the case with the current fleet. Used vessel options are discussed in more detail in Section 4. If some or all of the new vessels are newbuilds, then there will be significant advantage in acquisition and maintenance cost if they are built as classes of ship, and with maximum commonality of systems and equipment between classes. In this case, it would be advisable to focus on two classes; a small/medium ferry design of which 2-3 would be built; and a small ferry, with 4-5 units depending on whether the Route P vessel is made common with the others. The urgent medium/large requirement could potentially be a stretched version of the medium design. New vessel options are discussed again at Section 5.

4. AVAILABILITY OF USED TONNAGE

Two approaches have been used to assess the potential availability of suitably used vessels to replace some (or all) of the ferries that are now at, or approaching, the end of their useful lives. A study of the general market has been undertaken, using the Fairplay/Lloyds List World Shipping Directory and Fairplay newbuilding listings. This has been complemented and calibrated by approaching a major international shipbroker (Denholm Coates) specializing in ferry sales, to identify any suitable vessels that are currently available.

Two important considerations apply to any importation of new tonnage:

1. unless the vessel comes from a NAFTA country (or another applicable free trade area) a 25% duty will be payable on the purchase price; and
2. the vessel will be treated as a "new ship" under Transport Canada regulations, and may require extensive and expensive modifications to be brought into compliance.

These factors can result in used vessels being unexpectedly costly, unless the ship in question is a bargain in initial purchase price and has been built initially to current SOLAS or equivalent standards.

4.1 Overall Market

Figure 4.1 captures the overall world ferry fleet in the size range up to 100 m in length, by vessel age. This provides a general picture of the number of vessels that are built annually, and also of the overall population that could be drawn on in procuring used vessels for an alternative service such as the Newfoundland and Labrador ferries. The sample has been restricted to vessels built subsequent to 1990, as this represents a significant break point under SOLAS regulatory requirements. It is highly unlikely that any pre-1990 vessel could be imported to Canada without major and expensive modifications.

This overall survey shows that there is a fairly constant newbuild rate for vessels in the size range of interest. The 2005 data shows both vessels that have entered service by mid-year, and also those under construction at that point. Typically, vessels in this size range require a year or less to build, and so the contracts now in place do not allow much extrapolation for deliveries beyond 2006. However, there does not appear to be any upswing in vessel orders, and in fact the opposite may be true. The recent spike in shipbuilding costs due to material costs and supply constraints (see also Section 5) may be leading some owners to delay replacement programs until the market stabilizes. In turn, this may reduce the number of second-hand vessels available for sale, and increase their cost.

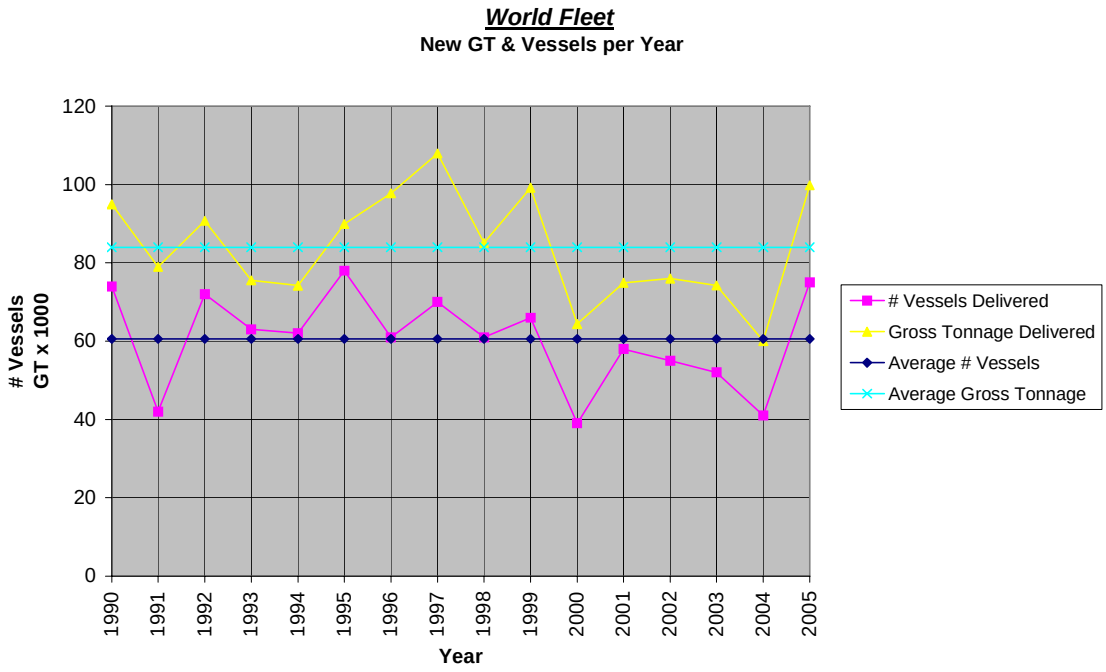


Figure 4.1: Overall World Ferry Fleet

Not all vessels in the world fleet are even potentially suitable for NL services, which are distinguished by harsh environmental conditions, and by seasonal ice on many routes. Therefore, a more focused analysis has been undertaken to identify ferries known to have ice strengthening and other ferries that operate in demanding conditions. The country of registry has been used as a proxy for knowledge of environment, so vessels from Norway, the UK, the Baltic countries, Russia and a few other Northern countries have been captured in this search. The results are summarized in Figure 4.2. This shows a much smaller pool of potentially used vessels, and similar trends to those in the overall population.

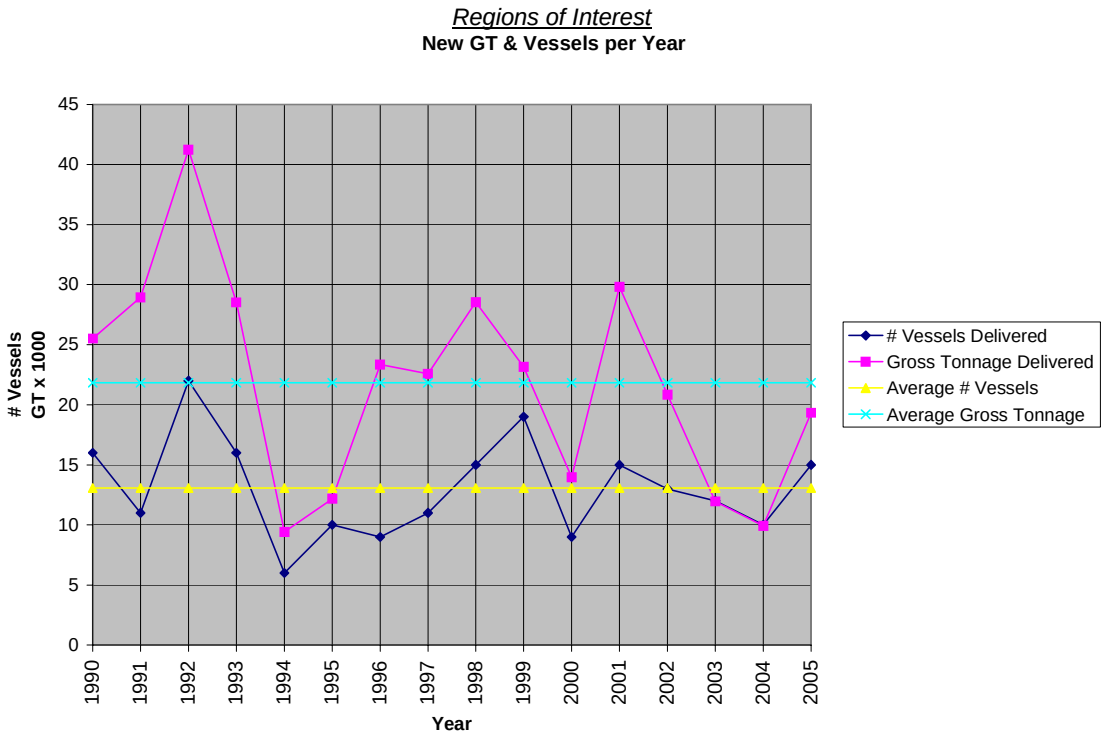


Figure 4.2: Regions of Interest

Figure 4.3 presents an alternative view of the data on vessels of potential interest, showing size range by year. This indicates that (as expected) the smallest vessels, below 20m in length, do not tend to be captured by global statistics, as they are intended and designed for local use. This will also apply to many vessels in the 20-40 m size range, such as those intended for inland waters use.

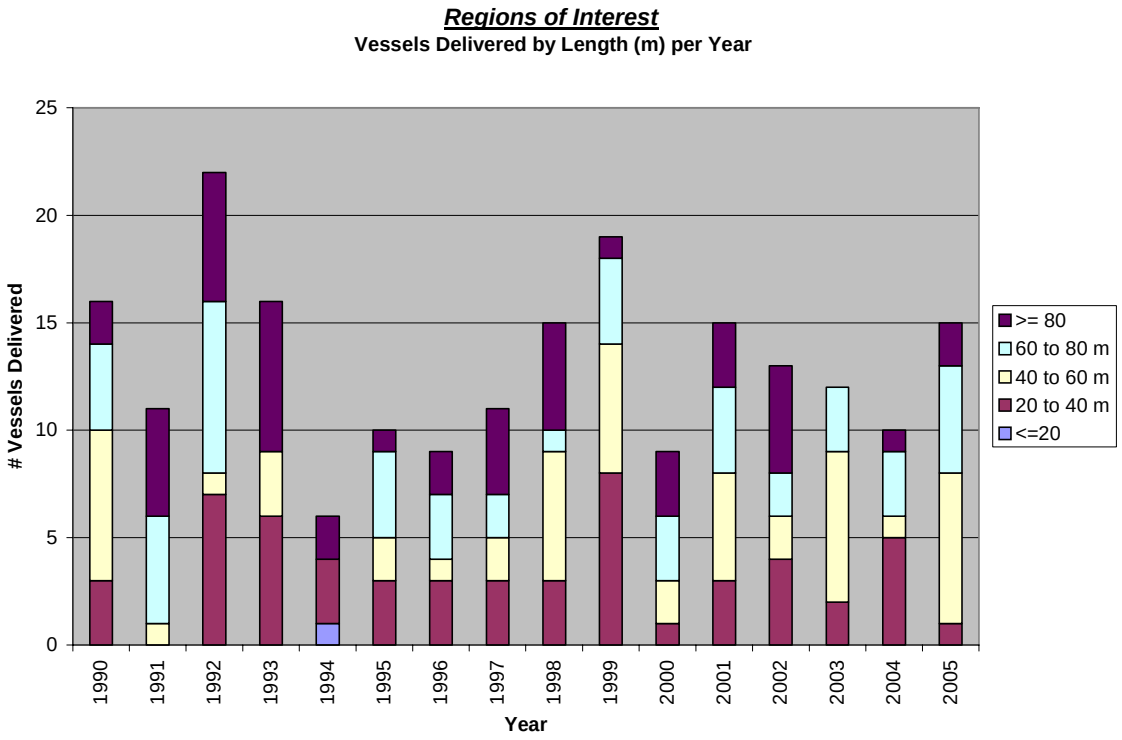


Figure 4.3: Vessel Availability Size and Date

4.2 Shipbroker Survey

The firm of Denholm Coates Ltd. of London, an old and well-established brokerage firm that specializes in the location and supply of ferries on a world wide basis, was appointed to conduct an initial survey. A set of parameters for their search was provided, with the primary parameter being that any vessels so sourced would be a maximum of 15 years old. The search results were disappointing in that only three vessels in the larger class, similar in size to the *Capt. Earl Winsor*, were located.

The *Vikingen* and her similar sisters were built in 1992-94, and shown in Figure 4.4. They have bow and stern propellers, driven by a single main engine, and a 76-car capacity.

Figure 4.4: *Vikingen* Class

These ships would require moderately extensive modifications, notably ice strengthening of the hull, propulsion systems, and steering gear to be suitable for service in NL waters. A copy of Denholm report forms Annex B to this document.

4.2 Additional Information

As a result of contacts with the Bell Island user group, BMT has received a substantial amount of material on other ferry vessels currently for sale, including the sister ship to the *Nonia*, the *Harilaid*, currently available for in the order of $0.5 million. Neither this nor any of the other vessels is well-suited to the requirements developed in Section 3.5. for reasons of age, size, capability, configuration, or combinations thereof.

5. NEWBUILD OPTIONS

If there are no suitable used vessels available to replace the existing ferries now at or rapidly approaching the end of their useful lives, then it will be necessary to build new. This applies irrespective of the service delivery model that the Province wishes to use, although the costs and political issues involved in government versus industry newbuild will be somewhat different, as outlined later in the report.

This analysis of newbuild options has been developed around the revised level of service proposed in Section 3.4, and the resulting vessel requirements presented in Section 3.5; i.e.:

- One medium/large (*Flanders* equivalent)
- Two-three medium (*Hamilton Sound, Nonia*)
- Four-five small (*Island Joiner*)

Conceptual designs have been developed for each of these classes, with the single medium/large vessel being considered a possible stretched version of the medium design in order to reduce overall construction and future maintenance costs. Requirements and cost estimates for the newbuilds are outlined below.

5.1 Design Requirements

Outline requirements have been generated for each class of ship. This has been done to assist in the development of design concepts, which is necessary for the preparation of realistic cost estimates. It should be understood that neither the requirements nor the concept designs are anything other than outlines in preliminary form. A much more detailed set of operational and technical requirements will be needed to form the basis for a formal acquisition process.

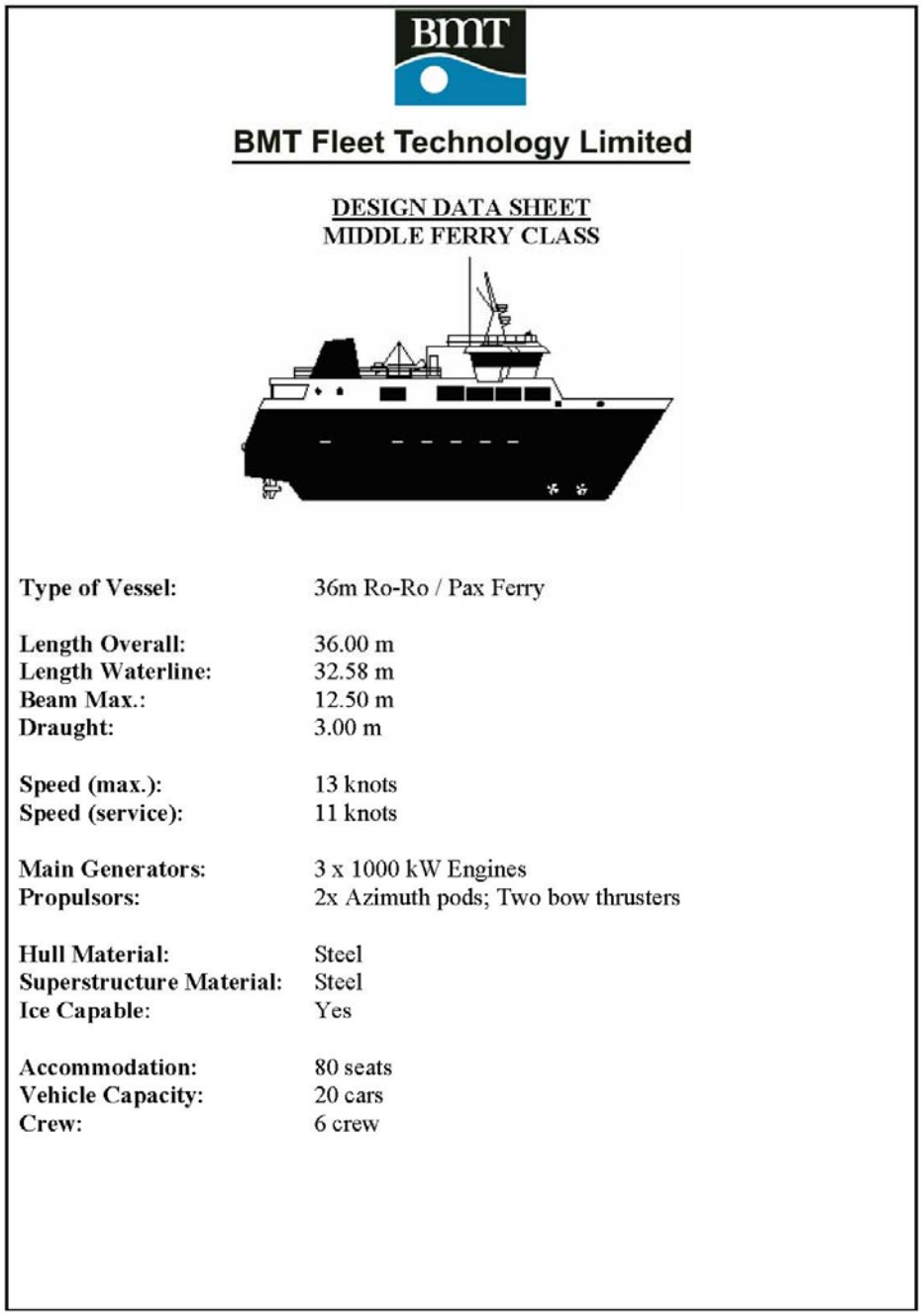
5.1.1 Medium Ferry

This notional design is illustrated in the design data sheet at Figure 5.1.

The hull is ice strengthened, and a double hull provides resistance to ice or other damage. The hull form is balanced between open water and ice capability.

Overall power requirements are dictated by ice capability. Power is provided by three electric generators, which supply two electro-mechanical azimuthing propulsors at the stern (1 MW each), two bow thrusters (3-400 kW total), and ship service power supplies. As any combination of generators can be used to supply power, one can be offline for routine maintenance without disrupting service.

The semi-enclosed Ro-through vehicle deck has a clear height of 5 m to accommodate tractor trailers. There are clamshell doors and a ramp forward, and a ramp aft. The superstructure block includes a passenger lounge and accommodations for six crew. A wheelhouse and boat deck is one level above.



BMT Fleet Technology Limited

DESIGN DATA SHEET
MIDDLE FERRY CLASS

Type of Vessel:	36m Ro-Ro / Pax Ferry
Length Overall:	36.00 m
Length Waterline:	32.58 m
Beam Max.:	12.50 m
Draught:	3.00 m
Speed (max.):	13 knots
Speed (service):	11 knots
Main Generators:	3 x 1000 kW Engines
Propulsors:	2x Azimuth pods; Two bow thrusters
Hull Material:	Steel
Superstructure Material:	Steel
Ice Capable:	Yes
Accommodation:	80 seats
Vehicle Capacity:	20 cars
Crew:	6 crew

Figure 5.1: Medium Ferry Concept

The vessel is designed to meet all current and projected safety and pollution control requirements.

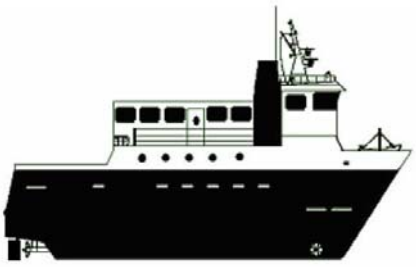
Onboard catering is provided by vending machines, although a small concession stand could be provided for sale of snacks and souvenirs.

5.1.2 Small Ferry

This notional design is illustrated in the design data sheet at Figure 5.2.

BMT Fleet Technology Limited

DESIGN DATA SHEET
SMALL FERRY CLASS



Type of Vessel:	24m Ro-Ro / Pax Ferry
Length Overall:	24.00 m
Length Waterline:	21.72 m
Beam Max.:	6.50 m
Draught:	2.00 m
Speed (max.):	11 knots
Speed (service):	9.5 knots
Main Generators:	2 x 500 kW Engines
Propulsors:	Single propeller with CP; Single bow thruster
Hull Material:	Steel
Superstructure Material:	Steel
Ice Capable:	No
Accommodation:	40 seats
Vehicle Capacity:	6 cars
Crew:	4 crew

Figure 5.2: Small Ferry Concept

The hull is not ice strengthened, but is designed to be rugged and robust. The hull form is optimized for seakeeping performance along some of the exposed South Coast routes.

Power is provided by two main engines driving a single controllable pitch propeller. A shaft generator supplies electrical loads including a single bow thruster (150-200 kW), and ship service power supplies. There is also a ship service generator set (100kW).

The semi-enclosed vehicle deck has an open area towards the stern to carry vehicles over 2 m high; lower vehicles (cars and vans) can fit below the superstructure. There is a single ramp aft, and a turntable is fitted into the vehicle deck to prevent the need for vehicles to reverse on or off the vessel. The superstructure block includes a 40 passenger lounge. The crew of four is not accommodated on board, but does have a small lounge forward. The wheelhouse is slightly raised for good all-around visibility.

The vessel is designed to meet all current and projected safety and pollution control requirements.

5.1.3 Medium/Large Ferry

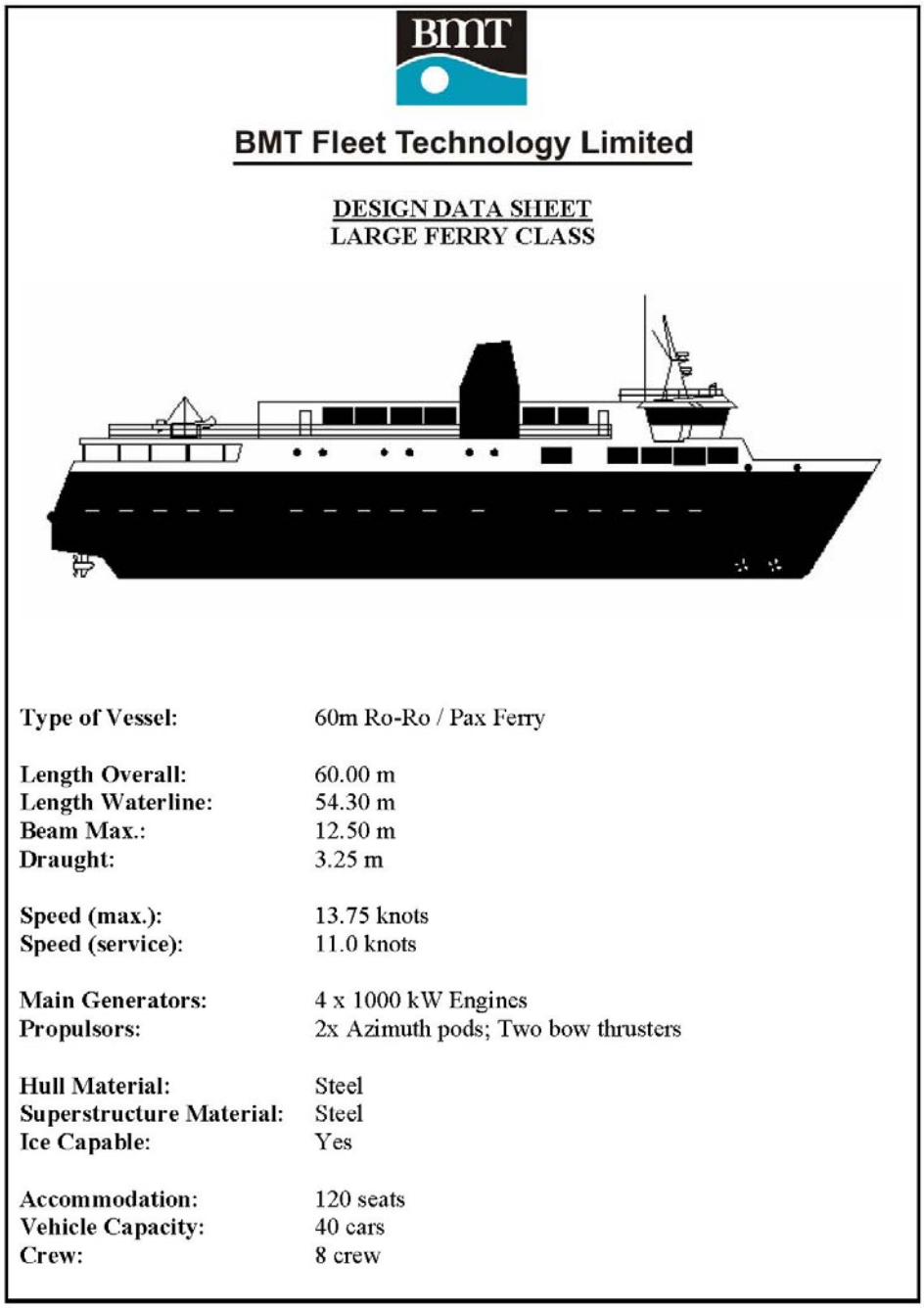
This notional design is illustrated in the design data sheet at Figure 5.3.

The hull is derived from the medium ferry by adding an extra length of parallel midbody. This provides a level of commonality between many aspects of the two designs, potentially reducing construction cost.

The powering arrangements use four (4) rather than three (3) of the same generator sets used in the medium ferry; they will now be in two machinery spaces rather than a single engine room. The azimuthing propulsors are increased to 1.25 MW each. The bow thruster size may be retained or increased; some berthing analysis will be required to finalize sizing.

The semi-enclosed Ro-through vehicle deck is an extended version of the medium ferry. The longer hull allows a wide range of possible configurations for the superstructure block, depending on the level of amenities it is decide to provide. The entire superstructure block is raised by one level to provide a full width lounge above the overheight vehicle deck. The number of passengers is somewhat nominal, as there is considerable space available. However, if the vessel is designed for a large number of passengers there will be tendency for crew number to increase to address regulatory (safety) issues.

As with the other designs, the vessel is designed to meet all current and projected safety and pollution control requirements.



BMT Fleet Technology Limited

DESIGN DATA SHEET
LARGE FERRY CLASS

Type of Vessel:	60m Ro-Ro / Pax Ferry
Length Overall:	60.00 m
Length Waterline:	54.30 m
Beam Max.:	12.50 m
Draught:	3.25 m
Speed (max.):	13.75 knots
Speed (service):	11.0 knots
Main Generators:	4 x 1000 kW Engines
Propulsors:	2x Azimuth pods; Two bow thrusters
Hull Material:	Steel
Superstructure Material:	Steel
Ice Capable:	Yes
Accommodation:	120 seats
Vehicle Capacity:	40 cars
Crew:	8 crew

Figure 5.3: Medium/Large Ferry Concept

5.2 Construction Costs

Construction cost estimates have been developed for each of the three designs, and for a notional fleet renewal program including one large/medium, two medium, and five small ferries.

The costings have been built up from material cost estimates for six categories (weight goups) for materials and equipment procurement, ranging from steel to electronics. Large items have been assessed individually, using BMT's extensive database of equipment costs. Smaller items (outfit and furnishings, distributed systems) are costed based on the weight of each category, using representative values and costing coefficients for similar designs. Allowances are made for initial spares provisioning and for other materials costs on the project.

Labour cost estimates are also developed by weight group category, with labour productivity adjusted for the relative complexity of each area of the ship. For example, although the propulsion plant for the small ferry is much smaller than that for the medium ferry, its installation will be proportionately more complex. This is due in part to the tighter working spaces, and also to the fact that a mechanical transmission system needs more careful alignment than an electrical one. The productivity values have been calibrated against recent Canadian data from a range of sources; none of which unfortunately are for new construction in Newfoundland, as there has been none. However, the yards in Clarenville and Marystown have been provided with the design datasheets and asked to provide, in confidence, their own indicative cost numbers.

Tables 5.1 to 5.4 below summarize the cost estimates for the individual vessels and for an overall fleet renewal program building two sets of (a) small, and (b) medium and large ferries. An overall contingency of 10% has been added to the shipyard costs, and a further allowance is included for client project costs, including requirement development, contracting, oversight, etc. The design cost for each class is fixed, but other costs are more or less variable depending on project duration.

Table 5.1: Large Ferry Cost Estimate

	40 Car/120 PAX	
EWBS	Labour Cost	Material Cost
WBS 100 - Structure	$ 3,016,530	$ 598,320
WBS 200 - Propulsion	$ 536,250	$ 5,000,000
WBS 300 - Electrical	$ 703,828	$ 731,250
WBS 400 - Navigation and Ctrls	$ 550,000	$ 600,000
WBS 500 - Auxiliary Systems	$ 1,394,250	$ 1,267,500
WBS 600 - Outfit & Furnishings	$ 1,337,738	$ 1,264,770
Sub-Total (WBS 100 - 600)	$ 7,538,596	$ 9,461,840
800 Integration/Engineering	$ 590,272	
900 Ship Assembly and Support	$ 1,742,528	
Total Labour & Material	$ 19,333,236	
Lead Ship Contingency (15%)	$ 2,899,985	
Profit (10%)	$ 1,933,324	
Vessel Cost	$ 24,166,545	
Project & Management Costs Single Ship	$ 1,566,663	
Sailaway Cost	$ 25,733,208	

Table 5.2: Medium Ferry Cost Estimate

EWBS	20 Car/80 PAX Labour Cost	Material Cost
WBS 100 - Structure	$ 2,384,300	$ 367,042
WBS 200 - Propulsion	$ 460,625	$ 3,750,000
WBS 300 - Electrical	$ 644,875	$ 520,000
WBS 400 - Navigation and Ctrls	$ 531,490	$ 579,808
WBS 500 - Auxiliary Systems	$ 1,197,625	$ 845,000
WBS 600 - Outfit & Furnishings	$ 807,632	$ 592,628
Sub-Total (WBS 100 - 600)	$ 6,026,547	$ 6,654,478
800 Integration/Engineering	$ 471,879	
900 Ship Assembly and Support	$ 1,357,913	
Total Labour & Material	$ 14,510,816	
Lead Ship Contingency (15%)	$ 2,176,622	
Profit (10%)	$ 1,451,082	
Vessel Cost	$ 18,138,520	
Project & Management Costs Single Ship	$ 1,325,542	
Sailaway Cost	$ 19,464,062	

Table 5.3: Small Ferry Cost Estimate

EWBS	6 Car/40 PAX Labour Cost	Material Cost
WBS 100 - Structure	$ 801,117	$ 103,284
WBS 200 - Propulsion	$ 84,615	$ 1,000,000
WBS 300 - Electrical	$ 148,077	$ 100,000
WBS 400 - Navigation and Ctrls	$ 211,538	$ 230,769
WBS 500 - Auxiliary Systems	$ 220,000	$ 130,000
WBS 600 - Outfit & Furnishings	$ 295,208	$ 181,419
Sub-Total (WBS 100 - 600)	$ 1,760,555	$ 1,745,472
800 Integration/Engineering	$ 137,851	
900 Ship Assembly and Support	$ 389,029	
Total Labour & Material	$ 4,032,908	
Lead Ship Contingency (15%)	$ 604,936	
Profit (10%)	$ 403,291	
Vessel Cost	$ 5,041,135	
Project & Management Costs Single Ship	$ 801,647	
Sailaway Cost	$ 5,842,782	

In addition to the vessel costs, this renewal project may incur additional costs for upgraded shore facilities, and (potentially) for contractual renegotiation with current service providers.

5.2.1 Construction Options

In order to incorporate all the features required to service each route, as well as keep design costs to a minimum, it would be prudent to have the design(s) completed by one marine consultant, rather than each individual shipyard. Working drawings may also be treated in the same manner, again saving the cost if several shipyards are chosen to complete the work.

The most economical way to have the ships constructed would be to invite tenders from reputable shipyards world wide, when it would be found that the yards in Japan, Korea and China would be the most competitive. However, the 25% duty payable and the high delivery costs, relatively more so in the case of the smaller vessels, would make Canadian prices competitive.

The cost estimates contained in Tables 5.1 and 5.2 are based on data available for shipyards in Canada having modern equipment such as steel panel lines for cutting and fabrication and equipped with state of the art fitting-out facilities. It is expected that the prices at smaller yards, especially those in NL, would be around 10 % - 15% higher; unless these yards make new investments in facilities and equipment. The price for the small ferry, in Table 5.3, is expected to be very similar for build in NL or elsewhere in Eastern Canada, as the more modest facility requirements can be matched by several local yards.

As shown in Table 5.4 “Program Costs”, building repeat vessels can result in cost savings. However this can only be expected to apply if the vessels are built as a series run in one shipyard. The benefits of a learning curve are diminished if there are gaps between each build and are non-existent if individual ships in a series are all built at different yards. Spreading the work around thus has substantial direct costs. The indirect costs can be event higher. A stable, multi-year program can provide yards with a better base from which to market to other clients, and to invest in training and facilities, creating a larger and more sustainable overall industry.

Table 5.4: Program Costs

	VESSEL TYPE	*BEST CANADIAN PRICE*	*NEWFOUNDLAND & LABRADOR PRICE SINGLE YARD*	*NEWFOUNDLAND& LABRADOR PRICE MULTIPLE YARDS*
MEDIUM/LARGE VESSELS				
1	40 CAR/120 PAX	$24,166,545	$26,800,700	$26,800,700
2	20 CAR/80 PAX	$15,855,641	$17,583,900	(1) $20,115,620
3	20 CAR/80 PAX	$15,326,033	$16,996,570	(1) $17,500,590
Project Management Costs		$3,129,432	$3,468,040	$3,639,560
Total Project Costs		**$58,488,652**	**$64,849,210**	**$68,056,470**

SMALL VESSELS				
1	6CAR/40PAX	$5,041,135	$5,590,620	(2) $5,590,620
2	6CAR/40PAX	$4,382,270	$4,859,940	(2) $4,859,940
3	6CAR/40PAX	$4,240,486	$4,702,700	(3) $5,590,620
4	6CAR/40PAX	$4,176,471	$4,631,710	(3) $4,859,940
5	6CAR/40PAX	$4,119,089	$4,568,070	$5,590,620
Project Management Costs		$1,162,139	$1,403,330	$1,496,780
Total Project Costs		**$23,121,589**	**$25,756,370**	**$27,988,520**

TOTAL PROGRAM	***$81,599,241***	**$90,605,580**	**$96,044,990**

(1) (2) (3) – Repeat vessels at same yard.

In summary, the estimated best prices for the set of vessels that are priorities for replacement are:

- Central – Eastern Canada $81,599,241
- NL – Single/Two Yards $90,605,580
- NL – Three or More Yards $96,044,990

These should be taken as budgetary figures only, and revised estimates should be generated once more detailed vessel requirements have been formulated and agreed.

The apparent price gap between NL and other potential Canadian builders might be reduced depending on the approach taken to construction supervision and other project costs, but would only be closed if one or more NL facilities is upgraded by investment in new facilities. There is an equal risk that the price gap could increase if only NL yards are allowed to bid on a program, as there would be limited competition, especially for the larger vessels. The Department considers this lack of competition is already an issue for some of its refit and repair work.

The approximately $90 - $96 million cost for the eight replacement vessels includes materials and equipment not available in the province, although local agencies and representatives will see some return. However, the provincial economy will benefit in the order of $40-$45 million in direct shipyard workers wages. Indirectly this work will provide additional jobs; ratios of 2: or 3:1 are frequently used to indicate the multiplier effect of manufacturing employment on indirect and induced employment.. As noted above a stable, multi-year newbuild program may help the yards involved to generate additional business opportunities, as it will improve their productivity and allow them to demonstrate proven capabilities to other clients.

A “provincially built” policy will provide the established yards with much needed work and may also provide work in depressed areas not traditionally known for shipbuilding. Obviously there are size and capacity limitations to be considered. Whereas Peter Kiewit Sons could build all the vessels at its Marystown facility, yards such as the Clarenville Dockyard, Glovertown Shipyard and Dawes Welding in Harbour Grace will be limited to the smaller vessels. Simple design and construction methods would allow the building to take place in non-traditional, sites, such as Stephenville, where there is a suitable vacant and covered site next to the water. There is at least one precedent for this type of venture where, in 2004, a St. John’s company fabricated 3,000 tonnes of steel in a vacant building in Argentia for the Voisey’s Bay Mill in Labrador.

To compensate for the lack of modern equipment in the smaller yards, and keep the costs to a minimum, the steel hull could be provided in the form of kits containing cut, shaped and numbered piece parts to be assembled and welded on site. Typically, these kits would be provided by a shipyard with CAD/CAM and panel line capabilities such as that located in St. Catherines, Ontario, or in various yards in Western Europe. Whilst ship kits would enable those yards with limited plate preparation to participate, provincial content would be reduced proportionately. However, developing designs suited to this type of approach might mitigate the ‘lack of competition’ issue noted above.

Most of the Newfoundland yards would require some investment in machinery and equipment to pursue this work. It is expected that carrying out the work at a “brown-field” site (such as Stephenville) would require more investment than upgrading an existing yard.

6. FINANCING OPTIONS AND ISSUES

6.1 Financing

Two forms of financing have been considered under this study – how replacement vessels might be acquired in the short to medium term, and how the overall ferry system should be funded and financed over the medium and longer term.

The range and attractiveness of financing options for fleet renewal will vary somewhat depending on whether the vessels are newbuilds or secondhand tonnage, government or private sector owned, and Canadian or foreign built.

It is assumed that any direct government procurement will have the least flexibility both in developing financing arrangements and in accounting for total costs and cash flow. While a provincial government department (or provincial Crown Corporation) can be eligible to benefit from the federal shipbuilding Structured Financing Facility[10], it is unlikely to be able to derive any benefit from the Accelerated Capital Cost allowance which is also available to organizations with a suitable tax structure. Both mechanisms are only available to support Canadian newbuildings, and would be factored into other financing arrangements.

Many larger international shipbuilding companies can offer their own financing arrangements for newbuild projects; either from in-house resources or from national subsidy/assistance programs. This can avoid the need for the owner to pay any amount until delivery of the ship, and can also provide more favourable terms than those available from traditional lenders. It is difficult to predict the availability of such arrangements in advance, and overseas build is understood not to be the preferred option for NL ferry renewal. No Canadian shipyard is likely to offer a turnkey financing package, although some larger Canadian industrial groups (with and without shipyard interests) could do so.

Larger suppliers (e.g., engine/propulsion system) can also assist in financing their components of a newbuild (or conversion); though this can result in trade-off of first cost and through-life expense, and so has to be considered carefully.

For a commercial owner/operator, two normal financing mechanisms are term loans and bond issues; the latter being more popular for semi-private organizations (BC Ferries being a recent bond issuer). Issuing bonds for large capital purchases is also an option for public sector entities but generally works better for larger projects. In the case of Newfoundland and Labrador, if a bond issue was used to raise all the moneys required in 2006, the Government would be paying interest on amounts before they were actually required by the build schedule. So in this case bonds may be a little cumbersome given the amount and the timeframe.

A few cash-rich companies will self-finance, but there are few Canadian operators who have used this approach in recent years. Many operators actually charter much of their tonnage from third parties, and leasing arrangements are also commonly utilized.

[10] http://strategis.ic.gc.ca/epic/internet/insim-cnmi.nsf/en/uv00003e.html

Whatever the mechanism, a key element is the term of the arrangement and the underlying security. Therefore, most newbuilding is either tied to mature markets in which future demand and ship employability can be forecast, or to long term operating contracts. This is particularly true for relatively specialized ships such as the types of ferry used around Newfoundland, where the market for a used vessel is small and a residual value at the end of any time period can be difficult to estimate. Therefore, an operator will try to amortize most (or all) of the cost of a vessel over the known term of a contract, for which reason a 5-year contract cost will normally be much more expensive than a ten (or longer) year arrangement. This will be an important consideration in any potential contracting out of ferry services.

In order to estimate the most probable annualized requirements of the fleet renewal program outlined at Section 5, we have included the following assumptions:

1. Newbuild costs in the order of $90 m;
2. Amortization (or similar financing structure) over a 15 year period, at a rate in the range of 7%
3. SFF (or equivalent) support to reduce amounts payable by 10-15%.

This yields an annual cost of approximately $9 m/year once the full financing package is required, with a build-up to this point as the vessel acquisition proceeds.

For an ongoing renewal program covering all the island ferry services on a continuing and sustainable basis, cost provision should be made for new vessels and major refits. The total replacement value of the 'ideal' fleet is probably in the range of $150-175 million. Ships should provide an average reliable life expectancy of 25-30 years, given proper maintenance and one mid-life refit at 15-20% of newbuild cost. An annualized capital plan of $7-10 million would therefore be needed to maintain the asset base without major fluctuations.

Once the vessel renewal program starts to deliver new ferries, there will be some level of cost reduction for operating and maintenance costs; and these may be increased in he event that a new service delivery model is adopted (see section 7). However, such savings are likely to be small in comparison with the increases related to capital expenditures, as discussed below.

6.2 Operating Costs

A limited evaluation of current and future operating costs has been undertaken, based in part on information included in the Marine Services Division's most recent annual report.[11] This provided summary information for the government owned and operated services as shown in Table 6.1. In addition, expenditures for the contracted services on the South Coast routes totaled $2.8 million, with total revenues of approximately $180,000.

[11] Annual Report – Financial and Statistical Information; April 1, 2004 – March 31, 2005

The main components of operating costs are crew, fuel, and maintenance. Crew salaries for the government operated island services in 2004/5 were just under $10 m; and would have been somewhat higher but for the effects of a 27 day strike. Crew costs for the privately operated services are rolled into the overall contract cost, but are believed to represent in the order of 60% of total cost for several current contracts. Fuel costs for all services are borne directly by the government, and totaled approximately $3.75 m for 2004/5; a number that will have increased considerably for the current financial year due to the escalation in diesel costs. Maintenance and refit costs for the government vessels are shown in the reference document at a total of just over $5 million, somewhat below the most recent five year average of around $5.5 million. How the remaining components of overall vessel operating costs are allocated in unclear from the data readily available.

Ferry Route		Annual Operating Cost	Annual Revenue	Subsidy Per Person
Bell Island - Flanders		$2,742,393	$261,396	
Bell Island - Beaumont Ham		$2,350,370	$457,908	
Total Bell Island		$5,092,764	$719,304	$ 1,422.26
Ramea		$1,739,519	$152,236	$ 2,174.36
St Brendan's - Greenbay Tran.		$954,223	$95,899	$ 3,433.29
Little Bay Isl. - Inch Arran		$1,032,141	$112,312	$ 4,717.07
Long Island - Island Joiner		$672,841	$101,107	$ 1,844.30
Fogo Island - Capt Earle Win.		$3,472,979	$760,267	$ 797.86
Swing Vessels				
Hamilton Sound		$1,092,799	$106,238	
Sound of Islay		$684,360	n/ a	
Refit Costs		$3,841,192		
Administration		$887,612		
Nonia		$710,572		
Totals		**$20,181,002**	**$2,047,364**	

Note: Subsidy per person is based on 2001 census statistics for population of community served by the ferry

The vessels recommended for replacement consumed over $2 million of the total fuel bill for 2004/5. New vessels with modern machinery would be expected to have 20-30% superior fuel consumption, and would be expected to represent a cost saving in the order of $0.5 million annually at previous fuel prices, or rather more at current rates. Changes to service levels will naturally affect these values.

Maintenance costs (including refits) for new vessels are also expected to be significantly lower than those for older vessels, but several factors make it difficult to estimate potential cost savings. As examples, much current routine (and some refit) work is undertaken by ships' crews, often at overtime rates. Maintenance activities on the contracted services are buried in overall contract costs. It is realistic to assume that the potential maintenance savings from the recommended renewal program would be in the order of $1 million annually.

The potential effect of fleet renewal on crew costs is even more difficult to estimate. A comparison of the total numbers of crew required by the vessels outlined in Section 5 against those currently carried shows approximately a 10% reduction in overall numbers for all island services. In large part this is due to combining some existing services, with some additional benefits from adopting modern safety systems and equipment with lower required manning levels. Future crewing costs will also be strongly influenced by collective agreements and other issues associated with the selected form of service delivery, as discussed at Section 7. However, it is realistic to assume a further saving in operating cost in the order of $1 million annually.

Against these potential cost savings, it should be noted that the government owned and operated services are currently self-insured. This results in an apparent cost saving, but disguises potential liability issues. Under most service delivery models (see below) it will be necessary to make provision for insurance costs, which in today's climate can be substantial. It is recommended that the government explore insurance issues with a specialized provider to explore both cost and liability issues.

The administrative costs shown in Table 6.1 are believed to cover some but not all of the Department's costs, as the ferry services are administered in part by regional organizations that cover all modes of transportation. Section 7 discusses organizational structures for alternative service delivery approaches, and provides administrative cost estimates for one recommended option.

6.3 Shoreside Facilities

BMT has not conducted a detailed assessment of shoreside facilities under this project, but visits to the majority of the ferry terminals have highlighted the need to consider upgrades to many of the existing wharves, docks, dolphins and other items. In many cases, securing arrangements (bollards, etc) are in poor condition. The condition of retaining walls and lack of fendering also presents hazards for docking operations and for periods spent alongside.

It is strongly recommended that the overall program for ferry service renewal includes an adequate allowance for shore facility upgrades. A first step in this process should be to engage a suitable civil/coastal engineering consultant to review current arrangements and to present options for improvements. As noted earlier, we have made an initial estimate of the probable costs for shoreside improvements, which includes the following:

1. Cost of new road/terminal associated with combining Routes E and F: $4-6 m (based on province's estimates)
2. Cost of upgrades to South Coast wharves: $5 m (budgetary only)
3. Cost of repairs and upgrades, Routes A, C: $6-8 m (budgetary only)
4. Possible upgrades to stores/maintenance facilities: $1 m

This provides an overall total in the order of $15-20 m that should be included in overall budgeting for the ferry services.

6.4 Cost Recovery

As shown in Section 6.1, the current level of cost recovery for the island services is in the order of 10%. This level will fall as fleet renewal costs are incurred, and as service utilization drops with declining populations. A doubling of fares would increase cost recovery only to 20%, and would incur considerable protests from those affected. At the other extreme, removing fares altogether would cost the province (as provider or subsidizer) an additional $2 million on an overall budget in the order of $20-25 million.

In this situation, it is difficult to recommend an 'ideal' approach to cost recovery. Some level of user fee is generally advisable, to prevent frivolous use of the service. Differentiated fares could be used to help smooth traffic patterns; for example to discourage trucks at peak commuter hours. Tourist traffic could also pay a premium over – as a simple example – vehicles with Newfoundland and Labrador license plates. The lack of detailed traffic data is a barrier to conducting detailed option analysis of different cost recovery strategies.

7. SERVICE DELIVERY OPTION ANALYSIS

7.1 Service Models

BMT has initiated a review of a set of service delivery options that could be utilized for the island services, encompassing the following:

- Government owned and operated – the current model for the majority of the island services;
- Government owned, contractor operated – used on Labrador but not Island routes;
- Contractor owned and operated – as applied on a number of the South Coast services; and
- Other variants, as summarized in Table 7.1

Table 7.1: Potential Service Delivery Options

Owner	**Operator**		
NL Government	A) NL Govt	B) Commercial	C) Mix of two
Commercial	D) NL Govt	E) Commercial	F) Mix of two
Mix of two	G) NL Govt	H) Commercial	I) Mix of two

The current overall situation for Newfoundland and Labrador ferry services corresponds to Option I above; i.e., ownership is a mix of government and commercial, and the operations are likewise split between public and private sector. For the Island services, the South Coast is run as Option E (excepting Burgeo-Ramea) and the remainder as Option A.

Government ownership is considered to encompass both direct control, as exercised at present, and also the Crown Corporation model in which the relationship is somewhat more at arms length. Likewise, commercial options are considered to include both 'for profit' and 'not for profit' corporations; the latter being the model currently used in British Columbia by B.C. Ferries. As this model is somewhat unusual, it is outlined below in somewhat more depth. The relative advantages and disadvantages of each of the service delivery options are then discussed in more detail in Section 7.2.

7.1.1 B.C. Ferry Services Inc.

British Columbia operates one of the world's largest ferry fleets with 35 vessels serving 47 ports and terminals. Until April 2003, BC Ferries was operated as a Crown Corporation. In 2003 the Province of British Columbia established the independent no-share capital corporation known as the BC Ferry Authority which governs and holds the single voting share in BC Ferries. The Authority appoints BC Ferries' Board of Directors, and has entered into a 60-year contract with the Province to provide ferry services as specified in the Coastal Ferry Services contract. BC Ferries is therefore a sole source contractor to the Province.

An independent Regulator (or Commissioner) has been appointed to monitor adherence to this contract. This regulator is independent of the BC Government. One of the aspects of the Regulator's jobs is to ensure that fares are reasonable, that increases are controlled and justified, and that the service delivery remains competitive.

The business model for BC Ferries is somewhat unusual. The Corporation:

- carries its assets on its books as does any other corporation;
- pays no taxes;
- has long term leases on terminals;
- but owns the leasehold improvement it makes;
- assumed a massive debt from the Province when it started; and
- has financed this debt now through normal business channels.

The company receives service fees from the Province to support non-viable routes, and these are negotiable every four years. This system allows both sides to know their commitment for that period. It also receives some Federal funding. In return, the company has an obligation to continue routes that are not viable – routes to remote communities. The company must give at least two (2) years' notice to terminate such routes.

Ferry services can be provided by other operators. BC Ferries does not have a monopoly on the services, nor can they use supporting fees for "Social" routes to undercut private operators on profitable routes.

While BC Ferries is the sole source contractor for the Ferry services on behalf of the Province, it has an obligation under the contract to seek alternative service providers on its designated routes where such action would reduce costs. In other words, it can subcontract other providers for routes if this is more economical.

Recently (and controversially) the corporation displayed its ability to make business decisions without being driven by political influences when it went world-wide with bids for new large (350 Auto Equivalent – AEQ) vessels, and contracted with a German Shipyard who offered the lowest risk, best price, delivery and financing agreement. At the same time, it is clearly in the corporation's interest to foster a strong local shipbuilding and repair capability to maintain their vessels. Smaller vessels are also more likely to be constructed locally, as with the current 125 AEQ class.

For both newbuild and major refit, such a corporation can take advantage of the Structured Finance Facility (SFF). However, since it pays no taxes, the Accelerated Capital Cost Allowance does not apply. The Corporation is also free to lease as well as purchase vessels if this makes more economic and business sense.

7.2 Current Service Delivery Issues

Any future service delivery approach will need to address a number of issues that have been identified during the project to date which are currently the cause of safety hazards, operational inefficiencies, and poor morale.

7.2.1 Safety

It should be stated up front that one of the major reasons that there has been no serious accident to date is the quality of the crews currently employed. Ferry systems operate around the world but very few operate in conditions as severe as those encountered around Newfoundland. The Bell Island and South Coast Services are operated while being fully exposed to the rigors of the North Atlantic which can be extraordinarily severe in the winter months, and the Northern routes are all required to operate in sea ice to some degree. Operating any ferry system is challenging but to do so reliably in the weather conditions prevalent in Newfoundland presents challenges that few mariners ever encounter.

As discussed at Section 2, the International Maritime Organization's ISM Code is the cornerstone of all shipping operations on an international basis and is the marine equivalent of ISO 9000. The implementation of ISM ensures that there is an auditable safety system in place and also a planned maintenance system that will greatly reduce or possibly even eliminate unforeseen stoppages. This system should be implemented as part of any new service delivery model, or as soon as possible under the current model. There are a number of safety issues currently outstanding as well as a number of standard safety procedures that are not being implemented, examples of which include:

1. It was noted that in all of the routes to some degree, but on the Bell Island route in particular, the passengers remain in their vehicles. This practice should be strongly discouraged, particularly on all the 'semi-enclosed' vessels. This may require some changes to vehicle loading practices; but the inherent risk in leaving passengers in their car on the vehicle deck is high. This issue is recognized by IMO and the SOLAS convention and regulations to ban this practice are currently under scrutiny by Ships Safety, particularly in light of recent fires on the *Joseph and Clara Smallwood* and on BC Ferries.

2. During a review of the operations of the *Nonia*, it was noted that the crews were working a 17.5 hour day. Maintaining this kind of work schedule over a number of days exacts a physical toll on the master and crew. If the department wishes to maintain the current schedule then the crew functions should be adjusted to allow adequate rest periods.

3. The *Beaumont Hamel* was noted sailing a number of times prior to the bow visor being closed (see Figure 7.1). It would only take one good size sea over the bow to render the vessel unstable. Sailing in this condition was the reason for the sinking of the *Herald of Free Enterprise* some years ago.

Figure 7.1: Safety Issue

4. The Department should establish minimum weather conditions for sailing. An established minimum that is company policy removes the onus from both the master and the organization and reduces pressure to maintain schedules in unsafe conditions.

5. The current non-smoking policy is not working, and, in fact, is dangerous in that it forces the smokers to sneak cigarettes where they think that they cannot be seen. It should be remembered that these vessels are home to the crews for long periods. Coast Guard has implemented a more workable set of policies and provides smoking rooms on its vessels.
6. The current collective agreements call for "bumping" of crew members with lower seniority whenever there are layoffs during refit or other periods. This practice results in personnel being reassigned to vessels of which they have little or no knowledge with little or no notice. This is counterproductive both for safety and for maintenance.

7. Other conditions/equipment safety issues have been noted in the vessel surveys and some are highlighted at Section 2.

As noted earlier, basic compliance with certification requirements is not considered by Transport Canada or by most major operators to be sufficient to guarantee acceptable safety levels. ISM certification requires a pro-active approach and a philosophy of continuous improvement.

7.2.2 Operational Inefficiency

The current schedules preclude much routine maintenance work, contributing to problems associated with breakdowns and consequent service interruption. Other maintenance issues have been outlined at Section 2.

A review of collective agreements makes it apparent that these are based on a civil service contract for an office environment and there will need to be some substantial changes made to make them more functional in a marine environment. The way overtime is calculated together with the ferry schedules makes it very expensive for the owner; the "bumping" arrangement for crews leads to poor productivity at all levels of the operation and the anecdotal evidence from the officers is that there is apparently no means of maintaining crew discipline under the current agreements. If the workplace environment is to be governed by a collective agreement, then other models should be explored.

Collective agreement issues, a lack of formalized training, career development plans and other administrative issues are also a cause of poor morale, and contribute to a number of safety issues.

7.2.3 Third Party Services

The South Coast services other than Route L are currently delivered by private companies using small and elderly vessels, as described earlier. Discussions with a number of these operators confirm that the principal criterion for contractor selection is low price, with no weighting for quality or experience, and a relatively short guaranteed contract duration. This forces potential contractors to offer vessels that have essentially no residual value, where the contract does not have to cover any element of vessel amortization. It also discourages the use of quality crews.

The current regulatory requirements for small vessels carrying fewer than 50 passengers are based more on seasonal tour boats than on all-year ferry services in a harsh environment; and do not constitute a significant safeguard against poor safety standards. Thus, there is a very low level of safety audit of these services either by the provincial or federal governments.

There is no incentive for any fleet renewal by current or potential private sector operators due to the combination of low pricing, short term contracts, and uncertainty over the future of some of the South Coast communities and operations. For these reasons, continuance of current service arrangements is unlikely to be sustainable over anything beyond the short term. In the near

future, the implementation of new standards under the CSA 2001 regulatory reform initiative is likely to have major operational and cost implications for some of the current vessels (though this cannot be confirmed without inspection of the vessels and their documentation). Transition to a new service delivery model for the South Coast therefore also needs urgent attention.

7.3 Relative Advantages

7.3.1 Overview

In considering which of the service delivery options outlined at Section 7.1 should be adopted by the Government of Newfoundland and Labrador to meet ongoing requirements, various factors need to be taken into account; and the relative advantages and disadvantages of each option need to be assessed against each factor.

The single most important issue for the Province is likely to be the total ongoing cost of providing the ferry services, which itself is comprised of the cost of acquiring vessels for fleet renewal (now and in the future); operating costs, including crew, fuel and maintenance costs; and infrastructure costs such as terminal repairs and upgrades. As discussed in Section 3, this is partially offset by revenues, though all the services are highly subsidized.

A second important set of factors is socio-political in nature. These include the role of the ferry services in supporting both the local communities and the broader provincial economy; the latter including ship repair and construction, and general tourism.

Other factors to be considered include the stability and sustainability of any service delivery option. There is a need to ensure that any model can be self-perpetuating over a substantial future timeframe, providing (for example) for future ship procurement, major refits, etc. This safety and operational issues discussed at Section 7.2 also need to be addressed.

A non-trivial challenge in any scenario that involves change from current service delivery options is the transition from one model to the other, which may incur a wide range of personnel and contractual challenges. As an example, when BC Ferries was restructured in its present form, there was an on-going dispute between the BC Ferry and Marine Workers Union and the Province. This dispute was not resolved prior to the restructuring and thus the new entity started with a major problem on its hands.

7.3.2 Single vs. Multiple Service Providers

For a set of ferry services such as those around Newfoundland, it appears most advantageous for a single organization to control and operate the entire ferry fleet. This has the following cost and operational advantages:

- Vessels can be built/outfitted with equipment commonality, reducing maintenance/spares cost, crew training requirements, etc;
- The number of swing vessels required can be minimized by overall scheduling of refit and maintenance periods, and by ensuring interoperability when vessels are designed/acquired;

- Ongoing fleet renewal can be coordinated to avoid problems such as mass obsolescence and vessel unavailability; and to take advantage of series procurements;
- Some economies of scale can be realized in the set-up of the organizational structures.

The actual ownership of the vessels is of secondary importance; in that lease or bareboat charter arrangements can be equivalent to outright ownership and may offer some financial benefits. However, the length of any lease or charter must be sufficient to remove any unnecessary risk premium from the cost.

7.3.3 Public and Private Sector Models

The relative merits of government and private sector models for service delivery are always somewhat controversial. Canadian experience indicates that direct government control (federal or provincial) of ferry operations tends to lead to unstable funding environments, in which maintenance and fleet renewal are driven by electoral cycles and more general economic pressures. This leads to poor service quality and – averaged over time – to higher overall costs. In addition, public sector union agreements are not typically appropriate to the specialized needs of ship operation, as they are tailored to large bargaining units and broad collective agreements. It may also be difficult for government to recognize and manage risk and liability issues, since governments are normally self-insured. There is this no third-party review of safety practices and issues, which can lead to their neglect (as noted in section 7.2). On the other hand, direct political control can ensure that procurement of goods and services is tailored to further goals such as regional development.

The Crown Corporation model can be used to limit the disadvantages of government interference and conflicting priorities. However, Canadian experience suggests that Crown Corporation decision making itself still tends to be highly politicized, in areas ranging from staff selection to investment decisions.

At the other extreme, a fully commercial organization will aim to maximize profit, and in a monopoly situation this will require regulation to protect the public consumer interest. In a situation such as the Newfoundland ferries, where the bulk of funding is likely to continue to come from government subsidy, there is likely to be public resistance to an operator having any significant level of profit, especially if control of the organization is from outside the Province. It would be necessary to demonstrate that the operator was able to achieve compelling levels of improvement in cost or quality of service to counter this perception.

A model such as BC Ferries can mitigate the problems of the pure commercial approach by establishing a not-for-profit organization with a commercial decision-making structure; and building oversight and regulation into the structure of the Board and contractual arrangements. The BC model is not considered to be perfect either as applied in British Columbia or as directly applicable to Newfoundland and Labrador. There are potential improvements in areas such as ownership of assets and accountability for performance. However, it is recommended that the Government of Newfoundland and Labrador give serious consideration to a similar model.

7.3.4 Asset Acquisition and Ownership

A commercial operator will fund new vessel construction out of a mix of retained earnings from ongoing operations and projected revenues for the new ship. In a subsidized operation, there are unlikely to be significant retained earnings, or any opportunity to amortize newbuild costs against increases in fares. Therefore, new vessel construction is likely to require dedicated 'lump sum' funding from the Province under any service delivery model; and this may actually maximize the ability of the Province to cost-share with the Federal government under most circumstances.

To reduce the possibility that future political considerations will lead to difficulties in obtaining construction (or major refit) funding as and when required, there need to be fairly firm contractual arrangements and requirements binding the government and the service provider. These would establish, in advance, realistic expectations for vessel and shore facility life expectancy, allowing for a proper planning cycle. Having an arms-length relationship between the two parties will prevent either side from neglecting to fulfill their contractual requirements.

There may be advantages in having the Province retain ownership (or control) of the major physical assets such as vessels and any dedicated shore terminals. The ultimate sanction for poor performance by the service provider is to replace the organization, which is very difficult to do if the organization has rights in some or all of these assets. The government-owned, contractor-operated (GOCO) model can mitigate this problem. A version of this approach is used in Scotland, where Caledonian MacBrayne bareboat charters its vessels from a 'company' directly controlled by the Scottish Executive. The service delivery provision is currently being recompeted.

7.3.5 Organizational Structure

An organizational structure for a dedicated ferry service operation would be similar under either a private or public sector arrangement, though certain functional areas could be handled differently under the two options. A basic private sector oriented model is shown at Figure 7.2.

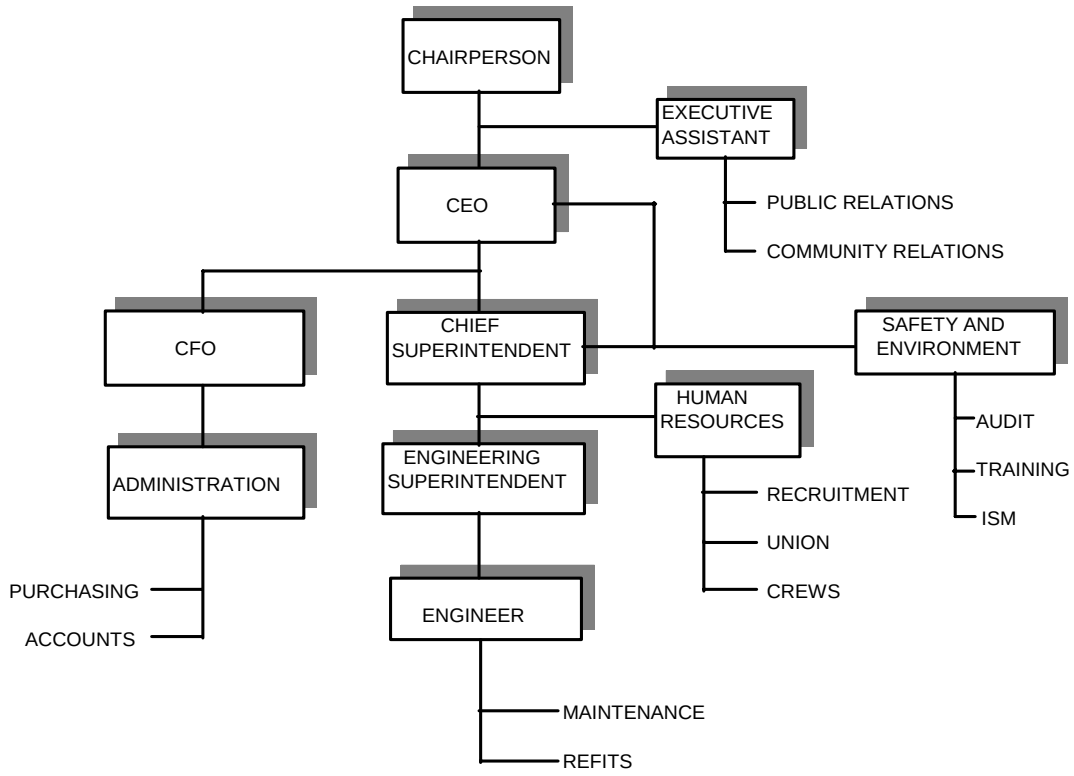


Figure 7.2: New Organizational Structure

Position requirements/characteristics for key personnel are outlined below.

1. **Chairman** - The ideal candidate for this position will be someone who is intimately familiar with all aspects of the government's involvement with the existing Ferry Service and will in all probability be drawn from the existing senior Ferry Service staff.

2. **Chief Executive Officer (CEO)** – The initial Chief Executive Officer will be the key 'change agent' for transition. As such, he or she is likely to be a short term (3-5 year maximum) employee or consultant. The type of person who is good at setting up companies is very rarely the best person to carry on with the operations once the company is established. For the venture to succeed, this person must have extensive marine management experience coupled with operational expertise if at all possible, have spent time in an ownership position. Previous experience with marine start ups would be advantageous and, if at all possible, the individual will either be a native Newfoundlander or at least have had extensive experience working with Newfoundland crews. The CEO will manage all aspects of the company's activities including the superintendents department, finance and administration, human resources and public relations and report to either a chairman or to the Board.

3. **Finance and Administration Manager** – This person will preferably be a CA drawn from a major accounting house and be responsible for all accounting, administration and legal matters and report directly to the CFO.

4. **Chief Marine Superintendent** – An ex-Master with ferry experience who will direct regulatory compliance, scheduling, safety and personnel and will have under his direct charge a compliance officer, personnel manager, training manager and purchasing manager.

5. **Engineering Superintendent** – Ex-Chief Engineer with ferry experience. Would be in charge of the planned maintenance, all mechanical repairs and refits and have under his direct charge the junior engineering superintendent and all technical staff.

6. **Safety Superintendent** – preferably a mariner with experience in the implementation and operation of an ISM and ISO-compliant system in a fleet operation.

Ideally, the superintendents' positions should be filled from within the existing ranks of the ferry service so that there is operational continuity at all times. The management team should be kept as small as practicable with any additional technical services being contracted in as necessary.

The administrative costs for the organization as described above have been estimated to provide some level of comparison with current administrative costs, as summarized at Section 6.2. Table 7.2 indicates that the total administrative cost would be approximately $1.5 million annually, as opposed to approximately $0.9 million as recorded now. We expect that the actual differential between the two approaches would be lower than this, as some current costs may be buried within overall Departmental accounts.

Table 7.2: Administrative Costs, New Model

	Salary ($k)
Chairman	100
Chief Executive Officer	250
Finance and Administration Manager	150
Chief Marine Superintendent	100
Senior Engineering Supt	90
Junior Engineering Supt	80
Safety Superintendent	70
Office Administrator	50
Purchasing manager	55
Filing Clerks x 2	60
Receptionist	25
Total salaries	1030
Overhead @ 50%	515
Total Administration cost	**1545**

This last recommendation applies particularly to legal services which should be contracted from an outside firm that currently has an active Admiralty practice. Obtaining legal advice in this fashion will be of great assistance when contracting out and will obviate some of the current contracts that are costing the government some fairly large sums of money. There should also be a comprehensive review of contracting services with a view to prequalifying all future subcontractors to minimum fiscal, equipment and operating standards.

7.3.6 Transition Arrangements

Some of the issues that would be involved in transition from the current service delivery structure to a new model have been noted above. These include:

- Engaging a "change agent" as interim CEO to commence planning activities;
- Initiating dialogue with the public service unions to develop flexible and efficient labour models;
- Initiating work towards the new construction program for fleet renewal.
- Analyzing how the expiry dates for current private sector service contracts could be integrated with future planning.

In addition, we foresee a need for additional public consultation to present and explain the approach that will be taken, and its implications (where there will be any) for the level and cost of services.

8. CONCLUSIONS AND RECOMMENDATIONS

8.1 Conclusions

This project has surveyed the current provincially-owned ferry fleet operating on Newfoundland island services, and has identified a set of priorities for vessel phase-out. As might be expected, these correlate very strongly with vessel age. Those vessels now 30 years or more in age are relatively inefficient and unreliable, and further increases in the costs of maintaining them in an operable condition are probable. The newer ferries – *Flanders, Beaumont Hamel, Gallipoli* and (with some caveats) *Nonia* can all be expected to provide at least another 10 years of service life before facing the same challenges of obsolescence and poor condition. The privately owned vessel on the South Coast were not surveyed, but are considered likely to face the same age-related challenges as the provincial ferries.

The communities served by the ferries are all experiencing population declines as younger people migrate and the remaining population ages. Local considerations affect the relative rates of decline, but there are no obvious reasons to expect a reversal. The local populations are the primary users of the ferry services, and so levels of service utilization are likely to continue to fall. Seasonally, there may be some potential to offset this by promoting tourist traffic, particularly on some of the South Coast services, if these are reconfigured with tourism in mind.

While lower levels of utilization imply smaller ferries (or less frequent service) the environmental conditions around Newfoundland – ice, wind, and waves – mean that vessels require a reasonable level of performance, and thus size, to provide acceptable service reliability. These considerations have been factored into the development of a proposed fleet renewal program that could see the 14 existing ferries on these services (including 'swing' vessels) reduced to 12, with an appropriate mix of sizes. Eight or nine of these would be new, and the others retained from the existing fleet. Some services would be combined or reconfigured to increase utilization and provide operational efficiencies.

The availability of suitable used vessels on the international market has been explored, but few if any appropriate vessels are available currently or likely to become so in the near future. There will thus be a need for newbuildings to achieve the fleet renewal program. Some conceptual designs have been developed to illustrate the required characteristics, and to permit reasonable estimates to be made of cost. The overall short/medium term fleet renewal program would cost in the order of $80-90 million, depending on how and where the vessels are acquired. Although shoreside infrastructure was not investigated extensively in the project, it was noted that many of the docks and other facilities are also in need of repair or upgrades. It is recommended that ferry service renewal budgets allow for some expected costs in this area.

The costs of this program could be financed in various ways to take advantage of federal government incentives and/or other models. Subject to suitable contractual arrangements, capital investments could be amortized over periods of up to 15 years, providing an annualized cost for fleet renewal in the $10 million range. The new ferry fleet would show some operational economies over the existing services, due to lower fuel, maintenance and (potentially) crewing

costs. However, the overall annualized cost of providing the ferry service is likely to increase if the costs of the new construction program (annualized or amortized) are included. How or if any of the increased costs could be recovered by increases in fares will require additional consideration.

The current service delivery models used around Newfoundland include both public and private sector services. There are considerable quality and safety drawbacks to the current system, which should be addressed going forward.

8.2 Recommendations

8.2.1 General

The provincial government should take immediate steps to phase out a number of the existing provincially-owned ferries, and should consider replacement of the privately owned South Coast vessels in the overall plan. It is likely to take several years to bring new vessels into service, and any delays will increase the period over which elderly and inefficient ferries will incur increasing cost to remain serviceable.

Replacement vessels should be newbuilds, as appropriate used vessels are not available on the second-hand market. These new ships should be designed for potential build and maintenance within the province, to maximize the spin-off benefits from this substantial investment. A sub-objective of the overall investment strategy could be to ensure that ongoing newbuild, refit and repair work can be contracted on a competitive basis; i.e. ensuring at least two sources of supply for all such projects.

The province should move to set up a new single service provider for the Newfoundland services, in order to gain operational efficiencies and to provide a more integrated service. It is recommended that the province investigate a model similar to that adopted in British Columbia, which is essentially a not-for-profit private sector organization that avoids most of the drawbacks of both purely public and purely private sector models.

Some existing services should be revisited, in order to realize substantial economies in service delivery and to provide a higher quality and reliability of service delivery. For some communities, enhancing the current services may help to generate additional economic activity and address the ongoing decline in local populations.

Measures should be taken to address some operational issues identified during the study which are currently having adverse effects on the morale of the ferry workforce and, potentially, on the safety of the traveling public. Measures that should be considered include the implementation of an International Safety Management (ISM) compliant safety system, and revisions to the current collective agreements.

Groups, organizations and communities who will be impacted by these summary recommendations and by others discussed within this report should be involved in consultations on how any new arrangements will be implemented. BMT has been contacted during the study by a wide range of stakeholders. While the recommendations presented herein are those of the project team, they have been informed by and benefited from the valuable input received from many quarters.

8.2.2 Implementation

The Provincial government should allocate sufficient funds to move ahead with the recommendations presented above. Over the next five year period it will be necessary to budget for the set-up of a new organization, the development of new vessel designs, and the acquisition of a number of the new ships themselves. As noted earlier, there will be significant lead times involved in several aspects of the program; including the phase-out of existing contracted services arrangements, some of which have only recently been renewed. Therefore, the bulk of the costs of fleet renewal will be borne in years 3-6 (or 7) of the program. It might be possible to undertake some of the shoreside infrastructure work outlined at Section 6.3 within the first three years of the program in order to even out overall cash flows somewhat.

A possible timeline for the implementation of the renewed system is shown in Figure 8.1. Over the 5 year period commencing April 2006, the three larger and three of the smaller new ferries would be delivered; and much of the shoreside work would be undertaken. As discussed earlier, the capital expenditures could be financed to reduce the annual funding requirement from the peak of $25 million/year as shown to approximately $9 million, depending on the approach taken. Over the same period, annual operating expenses would gradually fall as the newer and more efficient vessel enter service and the need for expensive refits declines.

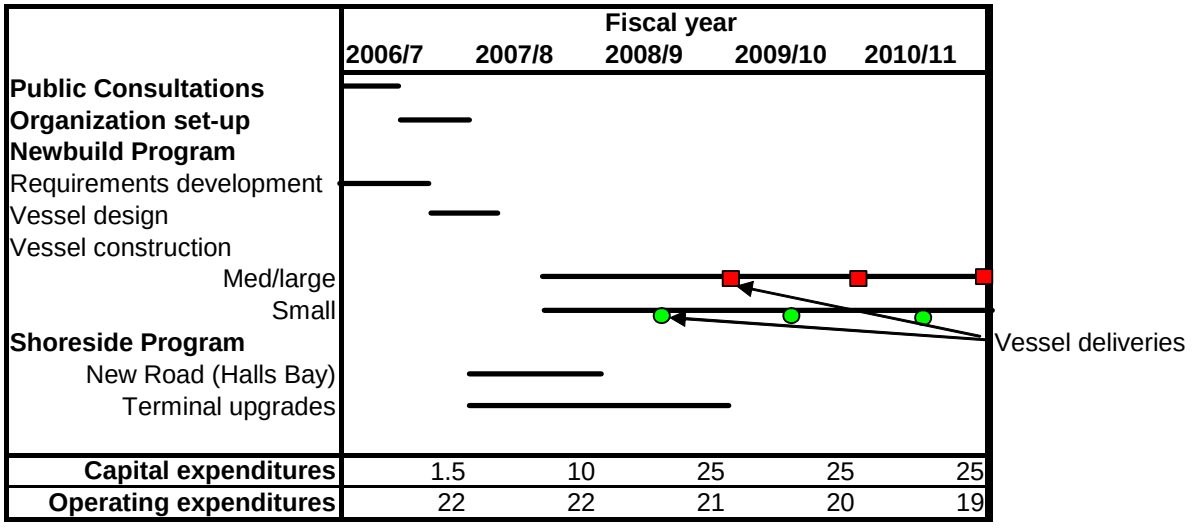


Figure 8.1: Implementation Schedule

The new vessels are designed to be easily interchangeable, and so the issue of which vessels are replaced first can be deferred until the new ships start to become available; barring major breakdowns or accidents in the interim. *The Island Joiner, Inch Arran, Hamilton Sound, Sound of Islay, Capt. Earl Winsor* and all of the contract services vessels are all candidates for replacement within this five year period. Logically, a new vessel should replace the Long Island/Little Bay Island vessels as soon as the road and terminal work is undertaken; and new vessels will be required on the South Coast once current contracts come to an end.

ANNEX A

FERRY SERVICE POSITION PAPER

Ferry Service in the Coast of Bays

Submitted to:
Mr. Tony Barclay, P.Eng.
Earle Barclay & Company Limited
25 Kenmount Road
St. John's, NL
A1C 5R6

Submitted by:
Coast of Bays Corporation
P.O. Box 310
St. Alban's, NL
A0H 2E0

Contact: Tracey Perry, Executive Director
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Telephone: 709-538-3552
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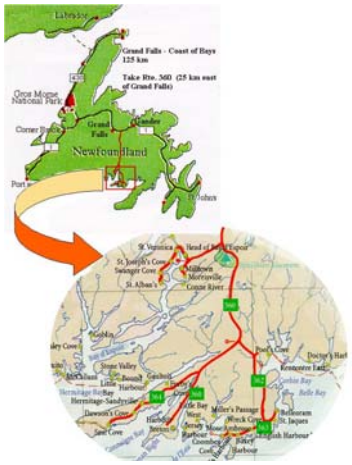
January 4, 2006

Proponent



The proponent for this proposal is the Coast of Bays Corporation, one of twenty regional economic development boards in the province with a mandate to create a climate for economic growth. The Coast of Bays region of the province is located on the south coast and extends from McCallum in the west to Rencontre East in Fortune Bay and includes the communities in the Bay D'Espoir estuary.

The economy of the Coast of Bays region has been based on the traditional fishery for centuries and it still provides a living for many in our coastal communities. Since 1985, the aquaculture industry has grown and spread throughout the region which now produces 100% of the provinces aquaculture-produced Atlantic Salmon and Steelhead Trout. Cod is being studied as the next species to be farmed in the region. The Coast of Bays is the site of the largest hydroelectric generating station on the insular part of the province which provides a significant impetus to the economy through employment opportunities and its indirect effect on local businesses. This part of the province holds great potential for tourism growth and this sector has been identified by the Corporation as a priority to be developed.

Background

In May of 2005, the Coast of Bays Arts and Exploration Centre was opened to serve as a gateway to region and to introduce the visitor to the culture and heritage of the region. The Centre will act as a catalyst to grow the tourism sector by promoting the region on the provincial, national and international stage by highlighting our unique cultural and natural heritage.

A significant part of this culture is alive in the isolated, remote communities of the region. There, the people are friendly and traditions from bygone days are still carried on and passed on to the younger generations. However, to experience this lifestyle one must travel by ferry from a nearby port. In the Coast of Bays region, there are three provincial ferry routes being frequented by travelers to our region – the Bay L'Argent, Rencontre East and Pool's Cove route; the Hermitage, Gaultois and McCallum route; and the western route to Francois, Grey River and Burgeo.

People take these ferries to experience life in the outports, to admire the breathtaking panoramic vistas of our rugged coastline and to admire marine and coastal wildlife in their natural domain. This provides inspiration for artists, dancers and writers and an appreciation of the delicate balance of nature while providing relaxation, enjoyment and rejuvenation. This is the tourism product we have yet to package and market and a key component of this is the transportation system to bring the consumer to the product.

Currently, tourists wishing to drive to the region must enter and exit by the same route – the Bay D'Espoir Highway. Studies have shown that this is not a preferred method of travel by visitors. Travelers in a new land want to be continuously learning and seeing something new. Backtracking causes boredom and causes the trip to become a chore rather than an enjoyable experience.

Over the past three years, through visitor tracking by summer students at tourism centers in Central and in the region, we have noted a 400% increase in visitors to the region during the summer months. Many have reported that the Coast of Bays is the last place they have left to explore and the main reason for this has been the distance off the main highway coupled with the "backtrack" factor.

Proposal

With the province studying the ferry system and planning for the future, it presents an opportunity for both the Coast of Bays region and the province to set in motion a plan for both to benefit economically. The Coast of Bays Corporation is proposing the implementation of a roll on-roll off (ro-ro) service across Fortune Bay capable of carrying approximately 10 vehicles. The addition of this service would provide a loop allowing visitors, and residents, in the eastern part of the province to travel the Burin peninsula, take the ferry to the Coast of Bays to explore its treasures, on to Central and then return home. People approaching from the west could have the same experience in reverse. The provincial transportation system would be greatly enhanced from a tourism perspective.

In addition to the tourism sector, this service would also benefit the people of the Coast of Bays by providing them with a more direct, shorter travel time to St. John's, the Avalon and the Burin Peninsulas. For the business community, this could mean substantial savings in transportation costs for products going to markets and materials being imported to the region.

For the aquaculture and fishing industries, a reduced cost of transportation for products means an increased bottom line resulting in possible business expansion, diversification and employment opportunities.

While we realize that this must be an economical model, we are confident that a fare scheme can be devised to make the service economical and sustainable and yet provide an improved service to the people in the isolated communities.

ANNEX B

DENHOLM REPORT

DENHOLM COATES & COMPANY LIMITED
Registered Office
Gun House
1 Artillery Passage
London E1 7LJ
Telephone: (0)20 7426 3388
Fax: (0)870 889 5120
Email: chartering@denholm-coates.co.uk

2nd November 2005

Captain Richard A. Spellacy
INAMINKA MARINE LTD.
130 LeMarchant Road, Suite #301
St. Johns, Newfoundland, A1C 2H2

Dear Captain Spellacy,
NEWFOUNDLAND GOVERNMENT MARITIME SERVICES

I confirm my instructions to seek either second hand ferries being of up to 15 years of age at time of delivery, or newbuilding contracted hulls of the following specification for delivery during the next 18 months:

Ferry replacement number 1
Max 70 / min 40 cars and length overall about 75 m and beam about 18 m, air draft on car deck about 4.5 m with draft 3.5/4 m with day passenger capacity up to 250

Ferry replacement number 2
Max 15 cars and length overall LOA 35 m and beam to be agreed, air draft on car deck abt 4.5 m, with draft 3.5/4m with day passenger capacity 40

Having been invited to participate in the procurement of both classes of ferry, I have to say that for delivery 2006/2007 I am unable to confirm that we have firm offers however the best I have been able to state is the following:

Ferry replacement number 1
m.v. Vikingen 1992 and m.v. Sunnhordland 1993 Double ended with forward and stern doors opening upwards, Loa 84.00 m, Lbp 75.40 m, Beam 15.50 m, airdraft from maindeck to underside of accommodation 5.5 m, 76 cars, 399 passengers, 2 controllable pitch propellers, They are drydocked yearly. Horsepower

Basically the ferries are identical but with small differences - the car deck of "Sunnhordland" is completely enclosed and she also has a 'winter garden' type (outdoor area on the top passenger deck), however the "Vikingen" is without these features as I saw for myself when I went on her last Wednesday

Vikingen engine:

1 x Wartsila Wickmann, WX 28 V8 2830 HK 2080 KW 600 rpm (main engine power 2830 hp equaling 2080 kw)
2 x. Volda gear, ACG 600 S.
2 x. shaftlines with CPP propellers from Wartsila Wichmann Propulsion. (One each end, i.e. double ended ferry)

1

Registered in England and Wales Number 987280

Sunnhordland engine:

1 x Rolls Royce (Ulstein) Bergen Diesel, BRM-6.
2 x Volda gear, EACG 600 F.
2 x shaftlines with CPP propellers from Rolls Royce Ulstein Propellers,
Type: 750/4-SFF.

I believe we may be able to talk on the basis of 1 of these vessels in Sellers' option

Privately, I reckon the price levels would be in the region of say usd 9.5 mill each

All details given in good faith but without guarantee

Ferry replacement number 2

I have found great difficulty in procuring either newbuildings or 2nd hand ferries to conform to the specification. The only suggestion is that I have arrangements in hand to seek an arrangement with a British shipbuilder, with immense knowledge of building double ended ferries, to sell the Technology to a Canadian Shipyard, such terms of contract to be negotiated.

Summary
Knowing that your Principals are looking to replace double ended ferries during the beginning 2007, I have to state that there are, potentially, ferries of the specification of 1 and 2 which are presently engaged in their own trades. However, having spent a lot of time on this project, I note that this sector of the maritime world could be involved in big changes during the 18 months, be it from a political point of view as well as from a redundant ferry service point of view, by reason of building bridges etc.

Therefore I would ask your Principals to bear in minds that Denholm Coates & Co Ltd is in the prime role of monitoring the availability of the two classes of ferries and would ask that when a decision is taken that faith is placed in our Company to procure the most cost effective and suitable ferries.

I have had a lot of commercial dealings in the Eastern part of Canada, and I would therefore be very pleased to meet with you and your Principals in St John's during the next few months to discuss future plans for the replacement of tonnage.

I would add that I place the highest priority in confidentiality and would therefore want to maintain this attitude, when approaching potential Sellers / Shipbuilders.

Yours sincerely

Roger Seymour
Managing Director

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