TP 14876E

Study on Potential Hub-and-Spoke Container Transhipment Operations in Eastern Canada for Marine Movements of Freight (Short Sea Shipping)

Final Discussion Report

Prepared for:

Transport Canada

by:

CPCS Transcom Limited

December 2008

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Notices

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Since some of the accepted measures in the industry are imperial, metric measures are not always used in this report.

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16. Abstract

The objectives of this study were to:

- Improve the understanding of existing container hub-and-spoke operations and the factors contributing to their success
- Situate regional short sea shipping movements in the international hub-and-spoke container context
- Identify and evaluate the success of existing and potential future short sea shipping initiatives on the East Coast of Canada, including opportunities at the design stage of freight movements
- Gauge the advantages, disadvantages, and perceptions of short sea shipping on the East Coast of Canada

The study was developed in two phases. The first took a broad look at past and present; domestic and international experience with hub-and-spoke and regional short sea services; and the eastern Canadian context. In Phase II an objective, systematic approach was taken to analyse hub-and-spoke and regional short sea opportunities.

The analysis showed that there is potential for hub-and-spoke feeder service and new regional short sea shipping services in eastern Canada, both in terms of traffic potential and competitive transport costs on certain routes. With the right public support programs and investments, the development of the feeder and regional short sea sectors can play a more important role in the movement of freight in eastern Canada and in the optimization of the Atlantic and Continental Gateways.

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16. Résumé

La présente étude poursuivait les objectifs suivants :

- Mieux comprendre les réseaux existants de transport de conteneurs selon une structure en étoile (*hub-and-spoke*), et les facteurs qui contribuent à leur succès
- Situer le transport maritime régional à courte distance dans le contexte international du transport de conteneurs selon une structure en étoile
- Recenser et évaluer les initiatives en cours et les projets éventuels de transport maritime à courte distance sur la côte est du Canada, y compris les possibilités d'appliquer ce concept dès l'étape de la planification du transport
- Mesurer les avantages, les inconvénients et les perceptions associés au transport maritime à courte distance sur la côte est du Canada

L'étude a été réalisée en deux phases. La première a consisté à jeter un large regard sur l'expérience passée et actuelle, au Canada et à l'étranger, de services de transport maritime à structure en étoile et régional à courte distance, et sur la situation à cet égard dans l'est du Canada. Au cours de la deuxième phase, les chercheurs ont adopté une démarche objective et systématique pour analyser les occasions de mettre en place des services de transport maritime à structure en étoile et régional à courte distance.

L'analyse a révélé un potentiel pour un service de collecte à structure en étoile et de nouveaux services de transport maritime régional à courte distance dans l'est du Canada. Ce potentiel s'explique à la fois par le volume de trafic prévu et par les coûts concurrentiels qui pourraient être pratiqués sur certaines liaisons. Soutenu par des programmes d'appui et des investissements publics bien pensés, le développement des secteurs de collecte et de transport maritime régional à courte distance peut renforcer le rôle de ceux-ci dans le transport du fret dans l'est du Canada, et dans l'optimisation de la Porte d'entrée de l'Atlantique et de la Porte continentale.

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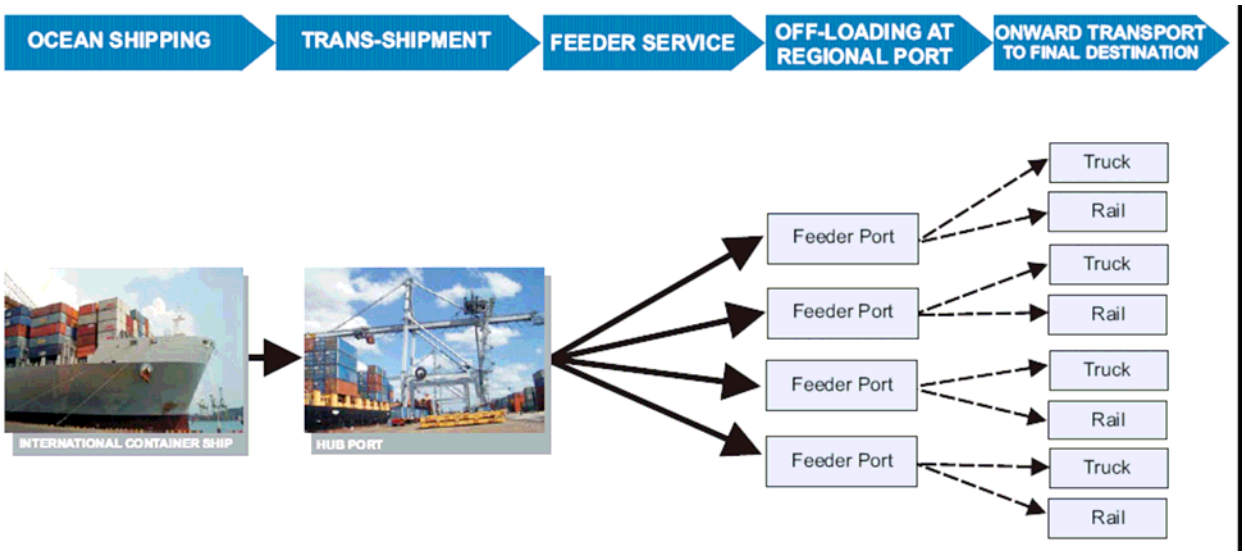
Executive Summary

The hub-and-spoke transport concept originated with Federal Express's courier service operated out of Memphis and was then adopted by passenger airlines. Under a hub-and-spoke transport arrangement, parcels, freight, and/or persons are transported to a central "hub" facility, then onward to interacting nodes via a network of "spokes". The shipping industry has also seen the emergence of massive hub ports at a variety of locales around the world, serving smaller regional "feeder" ports, particularly in the context of container shipping.

The hub-and-spoke transport concept is predicated on transhipment of commodities (from one marine vessel to another) and "feedering" of commodities via marine transport to other regional ports. Figure ES-1 provides an overview of the marine hub-and-spoke concept.

Figure ES-1: Maritime Hub-and-Spoke Transport



Source: Graphic developed by CPCS

Hub-and-spoke feeder service is different from a "regional short sea" service in terms of markets served, routes, and operations. Table ES-1 summarizes some of the key characteristics differentiating the two services.

Table ES-1: Distinction between Feeder and Regional Short Sea Services

Characteristics	Feeder Services	Regional Short Sea Services
Market served	Feeder cargo (arriving via mother ship)	Regional or inter-company cargo
Service anchored to	Mainline ship calls	Fixed schedule
Origination of service	Transhipped to/from mother ship	Region of cargo or hinterland
Type of cargo	Containers	Container, Ro-Ro, break-bulk
Typical service	Port to port	End-End, Quay-Quay, Door-door
Route/network	Link to "hub" port	May/may not be linked to hub
Competes with	Direct call, common use vs. dedicated	Road and rail transport

Although the present study is focused on *hub & spoke container transhipment operations in eastern Canada*, regional short sea is also addressed, though separately.

Hub-and-Spoke Feeder Services

There are several examples of successful international hub-and-spoke feeder services, including the "classic" hub-and-spoke network, such as the Port of Hamburg, which serves as a hub for traffic destined to the Baltic (as well as a gateway to mainland Europe); and the "pure" transhipment hub, such as Gioia Tauro in Italy, which has a transhipment incidence of over 95 percent with little or no gateway business. These and other international examples of hub-and-spoke networks and related services are profiled in the report and supporting Working Papers.

There have been few successful hub-and-spoke operations in eastern Canada, for a variety of reasons that are addressed in the report. An example of a regional hub is the Port of Halifax. Various services have operated feeder service using Halifax as a hub (with varying degrees of success).

Drawing on international examples, as well as lessons from the Canadian experience, a number of key success factors for the development of hub-and-spoke networks and related feeder services were identified:

- A critical mass of feeder traffic from/to a hub (consistency and reliability of volumes)
- Reliable, year-round access to feeder routes that serve key markets
- Competitive advantage of sea routes relative to alternative rail and road routes
- Low transhipment and handling fees at hub and feeder ports
- A regulatory environment that is conducive to investment in marine transport

Ultimately, the success of a hub-and-spoke network is contingent upon the commercial viability of the individual feeder services operating between hub and end markets. In some cases, where feeder service start-up risks are high or cost-prohibitive, support programs, such as the European Marco Polo Program (discussed in the report) or others, such as recent investment support for short sea-related infrastructure in British Columbia, can act as a catalyst to promote the development of new feeder services.

Regional Short Sea Services

Regional short sea shipping is characterized by the movement of regional cargo (as opposed to transshipped, feeder cargo) by sea between two regional points. Such services are typically predicated on precise schedules and often provide service from door to door (rather than port to port, as with feeder service). Regional short sea service can also cater to inter-company or industry supply chain-related movements.

There are several international as well as eastern Canadian examples of successful regional short sea services. In the Baltic, for example, the Danish company Det Forenede Dampskibs-Selskab offers both regional short sea door-door container services, and Roll-on / Roll-off (Ro-Ro) network services. In eastern Canada, Oceanex is the best known example, providing regional short sea services (as well as feeder services) for the movement of containers between Montréal and St. John's and between Halifax and St. John's. (It should be noted that the Oceanex service combines regional short sea and feeder services, as defined in this report). Examples of "industrial" applications of regional short sea services include the McKeil Marine's tug-and-barge service between Sept-Îles and Trois-Rivières for the movement of aluminum

ingots for one customer, Alouette. Another example is the Relais Nordik service, connecting Rimouski with 12 ports and communities along the north shore of the St. Lawrence River up to Blanc-Sablon. These, and other regional short sea services, are discussed in the report.

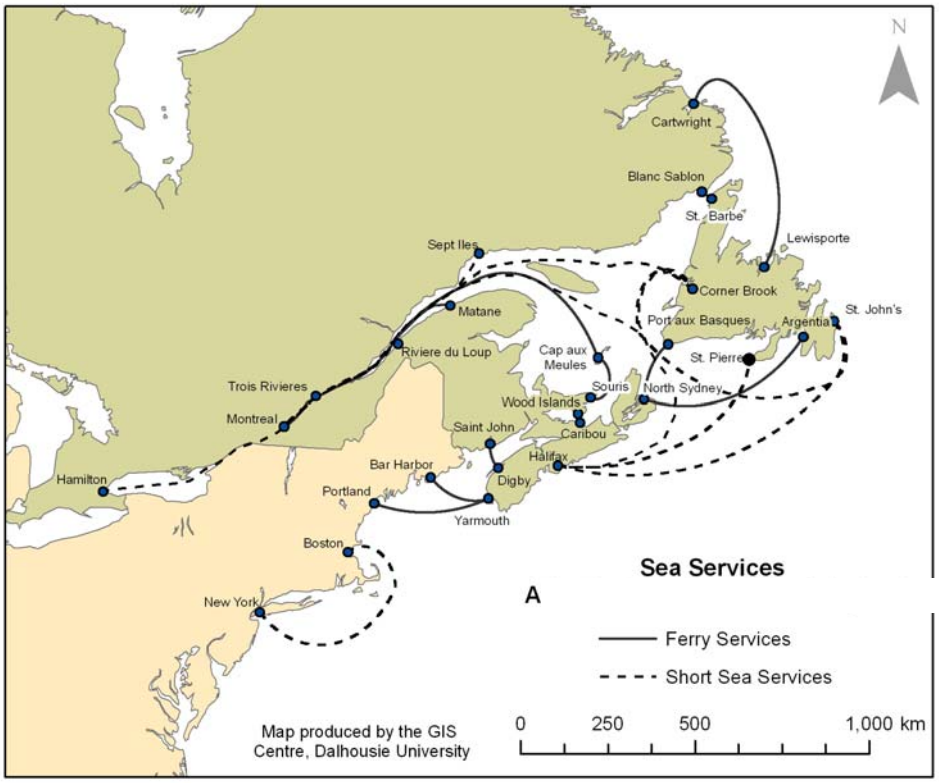
Unlike feeder service, the viability of a regional short sea service is not tied to the success of a transhipment hub, or shipping line calls. Nevertheless, many other factors that make regional short sea shipping viable are similar to those for feeder services.

As with feeder service, the viability of a regional short sea service ultimately depends on whether the service is commercially attractive from the perspective of a potential private sector operator. Where short sea service has potential, infrastructure or other financial support programs can help promote the development of regional short sea services. In Quebec, for example, the provincial government provided financial support for the development of regional short sea services for the transport of wood chips by barge between Forestville and Trois-Rivières for Kruger Paper. This resulted in the removal of over 18,000 heavy trucks per year from Route 138 and Highway 40, as well as in the greater municipality of Trois-Rivières. This service met its demise with the closure of the paper mill in Trois-Rivières.

Eastern Canadian Experience with Hub-and-Spoke Feeder and Regional Short Sea Shipping

Figure ES-2 presents all short sea and ferry services in Eastern Canada as of September 2008. Each major feeder, regional short sea, and ferry service is discussed in this report.

Figure ES-2: Eastern Canadian Short Sea Services



Eastern Canada's experience with hub-and-spoke feeder operations has largely been unsuccessful (regional short sea services have been somewhat more successful, as evidenced by the fact that such services exist in eastern Canada). Virtually all eastern Canadian hub-and-spoke feeder services have failed or otherwise stopped operating. The main reason has been a lack of critical mass of transhipment traffic at potential hubs. The underlying reasons for this lack of critical mass stem from both the buy-side and the supply-side of feeder services, creating a "Catch 22" situation. Simply, the problem can be summarized as follows:

Shippers and shipping lines are unwilling to commit traffic to feeder or regional short sea services until such services are proven. Conversely, potential short sea operators are unwilling to take the very significant risks inherent in developing feeder or short sea services until traffic is proven.

Advantages, Disadvantages, and Perceptions of Hub-and-Spoke Transport and Regional Short Sea Shipping in Eastern Canada

More than 30 stakeholders were contacted as part of this study.[1] Of these, 15 provided input. The following discussion draws on this stakeholder input, as well as the project team's review of feeder and regional short sea experiences internationally and in eastern Canada, and previous studies pertaining to same.

The advantages of hub-and-spoke and regional short sea operations include the following:

- Lower transport costs per tonne/kilometre than road transport[2]
- Additional (or better utilization of) transport capacity, particularly where competing road transport experiences capacity constraints
- Feeders offer wider market coverage for a gateway
- Feeders can offer container service to markets not big enough to be served by direct call
- Less long-haul trucking required (in the case of regional short sea services), and related wear and tear on roads
- Lower environmental impacts and social costs

The disadvantages for hub-and-spoke and regional short sea shipping include the following:

- Longer transport times by virtue of the speed of sea transport relative to road and rail
- Seasonality of the St. Lawrence Seaway between Montreal and the Great Lakes which closes this sea route during the winter months
- Transhipment and double handling costs
- Generally not competitive with rail transport
- Perceived as unreliable by many shippers and shipping lines
- Delays of mainline vessels can affect feeder schedules
- Labour costs and related restrictions at unionized ports

It should also be noted that the current regulatory structure (including cabotage restrictions, duties and other charges on imported vessels, modal inequities, the United States (US) Jones

[1] Stakeholders were identified in collaboration with Transport Canada
[2] This does not take into account the cost of transhipment double handing, etc.

Act and Harbor Maintenance Tax, etc.) makes new entry into feeder or regional short sea services extremely costly and risky. Stakeholders interviewed as part of this study indicated that regulatory issues are the most significant hindrances to the development of feeder and regional short sea services in eastern Canada.

Table ES-2 presents the perceptions of participating shippers, shipping lines, and port/terminal operators vis-à-vis feeder and regional short sea services in eastern Canada. These perceptions, based on results of the stakeholder surveys, do not necessarily reflect the views of all shippers, shipping lines, and port/terminal operators, though empirical and anecdotal evidence, as well as the results of previous studies, suggest that these views are shared by the majority of participants in each stakeholder group.

Table ES-2: Needs and Concerns of Shippers, Shipping Lines, and Port/Terminal Operators

Shippers

Transport / Supply Chain Needs	Concerns
o Reliable, time-sensitive service o Maintain supply chain integrity 12 months a year o Transit time must be comparable and rates more than competitive o Short cycle times between a central Canadian distribution centre and Maritime stores o Delivery schedules must be integrated into existing or planned distribution channels	o Short sea perceived as "slow and unreliable" o Seasonality of transport between Montreal and Great Lakes problematic o Increased lead time required (particularly issue for high-value containerized goods, which increases overall inventory costs) o Past experience of failure makes shippers reluctant to switch o Short sea shipping cannot fill need for short cycle times

Shipping Lines

Operating Needs	Concerns
o Sufficient critical mass of traffic (preferably locked in over long term) o Service must provide acceptable commercial returns and be economically viable from start-up o Need for start-up capital o Must be able to offer significant door-to-door cost advantage relative to road and rail to be competitive o More opportunity for competitiveness if railways at capacity (which is not the case in eastern Canada)	o Import duty on foreign-built vessels makes it difficult to recoup investment costs, means high start-up risk o Cabotage rules make it difficult to quickly respond to the market (cannot charter vessels) o High stevedoring costs in the St. Lawrence and other ports in the Great Lakes o Closure of St. Lawrence Seaway in winter o Lack of suitable Canadian flag vessels, lack of second-hand vessels o Subsidized competing modes (roads) o Past experience of failures

Port/Terminal Operators

Needs	Concerns
o Critical mass of transhipment traffic o Obtaining container volume commitments from shipping lines o Need for increased storage capacity at terminals to accommodate transhipment volumes o Need for start-up capital o Improved local distribution requirements and related infrastructure	o The largest markets on the east coast are already serviced by large vessels directly o The large inland destinations in the Great Lakes have ice issues in winter months o Start-up capital needs represent a barrier to entry o Regulations are impediments to feeder services

The principal noted benefit of short sea service for port and terminal operators is the potential to increase traffic throughput at the port/terminal.

Drawing on the above, the project team looked at opportunities for new feeder and regional short sea shipping, as well as catalyst action options that could promote the development of these services. This is discussed in Part II of the report, and summarized in the following sections.

Assessment of Opportunities for Hub-and-Spoke Operations and Short Sea Shipping Initiatives in Eastern Canada

More than 40 potential hub-and-spoke and regional short sea routes in eastern Canada were considered. The full list of routes considered is provided in the report.

A simple set of criteria (see Table ES-3) was used to short-list the hub-and-spoke options that represent the greatest probabilities for success, based on what were identified as key success factors for the development of feeder services. A similar set of criteria was used to short-list regional short sea routes.

Table ES-3: Hub-and-Spoke Options Short-Listing Criteria

No.	Criteria	Yes/No
1	Is there a critical mass of containers currently moving overland (rail/road) from the hub port to the destination(s)?	
2	Do the related commodities likely lend themselves to movement by short sea (non-perishable, non time-sensitive, low-medium value by weight)?	
3	Is the shipping hub-spoke route open year round?	
4	Given the nature of the hub-spoke route and the cost structure of competing transport modes along that same route, is short sea or feeder service likely to have a competitive advantage (in terms of cost, or otherwise)?	
5	Are there any regulatory or structural reasons that would preclude the feasibility of the hub-spoke route?	

Of the short-listed hub-and-spoke feeder and regional short sea options, those shown in Figure ES-3 were considered for initial feasibility study.[3,4]

[3] A more detailed analysis, including site visits, stakeholder consultations, technical requirements assessments, detailed financial modelling, etc. would be necessary to reach definitive answers on route/service feasibility. Such detailed analyses, however, are outside the scope of this study.
[4] For reasons outlined in the report, feeder and regional short sea options into Ontario and the Great Lakes did not meet the short-listing criteria, and so are not considered further in this study.

Figure ES-5: Feeder and Regional Short Sea Routes Selected for Initial Feasibility Study

Hub-and-Spoke Feeder Routes	Regional Short Sea Routes
• Montréal-Sept-Îles (Containers) • Halifax-Sept-Îles-Corner Brook-Souris (Containers) • Halifax-Bermuda (Containers) • Halifax-Portland/Boston (Containers)	• Belledune-Argentia (large Ro-Ro) • Yarmouth-Boston/Portland (large Ro-Ro)
	

The method used for the feasibility analysis was based on an assessment of two key questions:

1. Is there enough traffic to justify service on the particular route?
2. Would this service be at a cost advantage relative to competing modes (i.e. truck transport)?

To answer the first question, the project team assessed traffic flow scenarios with the aim of determining whether sufficient traffic justified a new feeder or regional short sea service on that route. Opportunities for the use of empty containers were also considered.

To answer the second question, the project team modelled breakeven costs per unit of traffic (containers, Ro-Ro trailers) using a number of vessel-type, capacity and seasonal scenarios, and compared these to truck costs serving the same routes. A full discussion of assumptions and scenarios is included in the report.

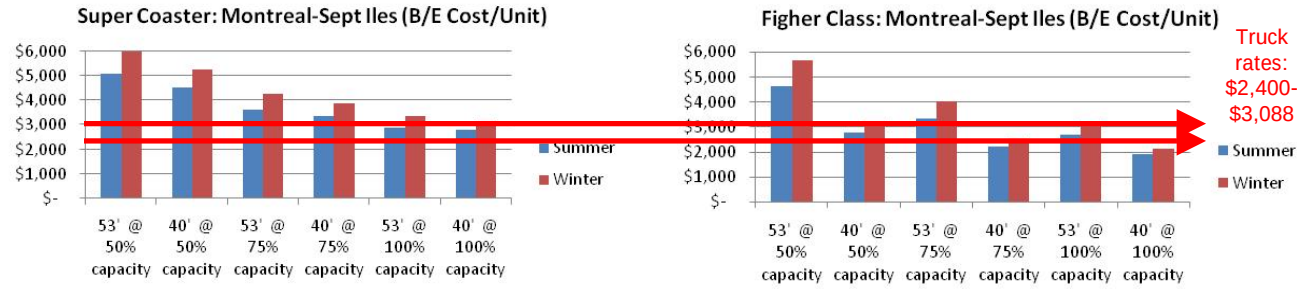
The results of the feasibility analysis are outlined by route below.

Montréal – Sept-Îles Feeder Service

It is expected that there is sufficient container traffic moving between Montréal and Sept-Îles to justify a feeder service, particularly with a smaller type vessel. There is significantly more traffic potential when serving Quebec City,[5] Port Cartier and Sept-Îles on a string to/from Montréal.

At full capacity, feeder service between Montréal and Sept-Îles appears to be cost-competitive though not overwhelmingly so, as denoted in Figure ES-4.

Figure ES-4: Per Unit Breakeven Cost for Montreal-Sept-Îles Feeder Service



The horizontal lines in Figure ES-6 show the approximate range of competing truck rates serving the same route.

Whether a feeder service between Montréal and Sept-Îles can indeed be provided on a commercial basis depends on the approach taken by a potential private operator and the ability to capture near full vessel capacity.

Halifax – Sept-Îles – Corner Brook – Souris Feeder Service

A feeder services along the Halifax – Sept-Îles – Corner Brook – Souris route appears to be justifiable from a potential traffic and competitiveness standpoint, although additional work should be done to ascertain competitiveness vis-à-vis trucking costs from Souris and Corner Brook, and to affirm volumes being shipped from Prince Edward Island to overseas markets accessible with Halifax mainline carriers.

Halifax – Boston Feeder Service

From a traffic volume perspective, there is sufficient overseas container traffic moving into and out of the Boston/Portland market to justify a feeder service, provided that shipping lines calling at Halifax commit traffic to this service.

Considering the addition of lift costs at both Halifax and Boston, it does not appear that this service can offer a competitive rate, and the business results of all of the previous operators of the service tend to support this conclusion. With only six or seven major deep sea lines currently serving Halifax, there may no longer be sufficient critical mass to support such a service, in any case, unless carriers committed significant volumes to it.

[5] The short distance between Montréal and Quebec City may preclude service between these two ports.

Halifax – Bermuda Feeder Service

Though the cost of a feeder service from Halifax to Bermuda could be cost-competitive, it would have to compete with similar services via New Jersey ports. If a regional cargo component could be found, this would help the viability. At present, however, traffic potential is not known.

Belledune – Argentia Ro-Ro Service

There is no present traffic between Belledune and Argentia, and the Newfoundland market of some 150,000 units is already largely served by Oceanex and Marine Atlantic Inc.

The service could be competitive if the cargo were generated at either the Newfoundland end (Argentia) for transport to Gaspé or New Brunswick or the reverse. When trucking costs from Montréal to Belledune and Argentia to St. John's are added to shipping costs, the result is not as promising.

Yarmouth – Boston/Portland Ro-Ro Service

There have been a number of ferry services operating from Yarmouth to New England. All of these have been Ro-Pax vessels that carry both tractors and trailers along with drivers (a high-speed vessel currently sails on the route but does not carry trucks). The additional cost associated with Ro-Pax service as compared to straight Ro-Ro appears to be high enough to make such a service unviable. In order to operate on a Ro-Ro basis, trucking companies or shippers in Nova Scotia would need to establish operations in the US to effect local deliveries, as most Ro-Ro's are only licensed to carry 12 passengers.

It must be stated, as well, that such a Ro-Ro service would have an impact on the already struggling ferry service between Digby and Saint John.

As a sole destination, it is not expected that Portland would represent enough traffic to justify a new service. The choice of Portland as an alternative port to Boston could be a viable alternative.

Promoting Feeder and Regional Short Sea Shipping in Eastern Canada

The feeder and regional short sea routes assessed as part of this study suggest that feeder and regional short sea services have potential in eastern Canada –from both a traffic and cost/competitiveness perspective. However, the fact that few private operators have successfully capitalized on these opportunities suggests issues with the enabling environment for commercial feeder or regional short sea operations.

Of particular note, start-up costs (fixed costs in particular) are extremely high in the eastern Canadian context and are often "sunk costs" once incurred. This implies high risk for any investor contemplating setting up a feeder or regional short sea service, particularly if there is no prior traffic commitment.

The project team explored a number of Government of Canada catalyst action options that could help mitigate the upfront risk of new short sea services and in turn promote the

development of this sector. The aim of catalyst actions is to create the enabling conditions for the private sector to take the lead in developing new services, in a way that will also achieve the Government of Canada's social, environmental, and economic objectives.

Key principles that could guide the selection and further development of catalyst actions and protect the Government of Canada's interests include the following:

- Any private sector support program should be implemented via a call for proposals. The private sector should see the opportunity and develop it. Competition for funding should also help maximize the value of any funding provided.
- Any program should be a matching dollar program. There is no incentive for a private entity to get it right without a financial stake in the activity.
- The funding proposal must demonstrate that service offerings will meet the market requirements of cargo interests, as well as achieve social, environmental and economic ends (modal shift, reduction in greenhouse gas emissions, etc.)
- Geographic scope limits (e.g. in line with broader strategic objectives – Atlantic Gateway) are also suggested as they de-politicize the decision process.

It should be noted that the economic slowdown that has beset the North American economy will make it more difficult to find financing for short sea operations. It will also tend to reduce cargo growth and reduce the critical mass of volume available for feeder services emanating from ports such as Halifax. On the other hand, if a short sea or feeder service can demonstrate significant cost reductions over competing modes, then shippers (and shipping lines) may give alternative routings some consideration. Competition from other modes may nevertheless increase, given the drop in traffic demand.

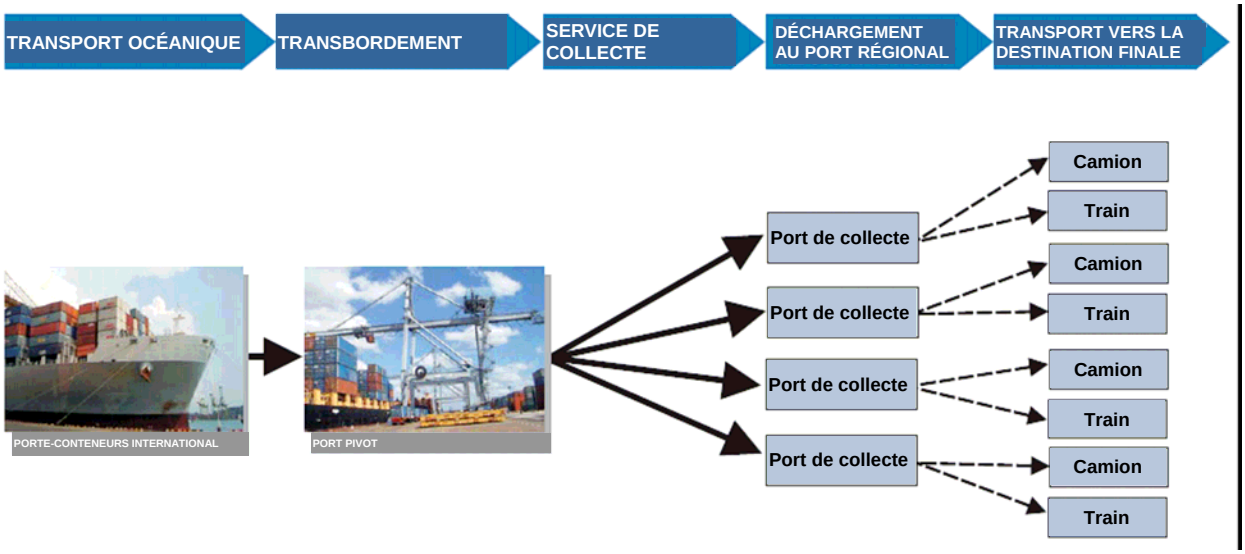
In conclusion, there is potential for hub-and-spoke feeder service and new regional short sea shipping services in eastern Canada, both in terms of traffic potential and competitive transport costs on certain routes. Since the private sector has been slow to develop new services, largely for reasons of up-front risk, more could be done to promote these services through catalyst actions that address issues around start-up risk. With the right support programs and investments the development of the feeder and regional short sea sectors can play a more important role in the movement of freight in eastern Canada and in the optimization of the Atlantic and Continental Gateways.

Sommaire

C'est le service de messagerie de Federal Express, exploité à partir de Memphis, qui est à l'origine du concept de structure en étoile (*hub-and-spoke*), qui s'est étendu par la suite aux compagnies aériennes. Dans une structure en étoile, les colis, les marchandises et/ou les personnes sont amenés à un « pivot » central, d'où ils rayonnent vers un réseau de « satellites ». L'industrie du transport a aussi assisté, partout dans le monde, à l'émergence de grands ports pivots, qui desservent de petits ports régionaux « de collecte », particulièrement pour le transport par conteneurs.

Le concept de structure en étoile, c'est le transbordement de marchandises (d'un navire à un autre) et la « distribution » de ces marchandises, par transport maritime, vers d'autres ports régionaux. La figure ES-1 donne un aperçu du concept de structure en étoile appliqué au transport maritime.

Figure ES-1 : Transport maritime à structure en étoile



Source : CPCS

Un service de collecte à structure en étoile diffère d'un service « régional à courte distance » : les marchés, les trajets et les activités ne sont pas les mêmes. Le tableau ES-1 résume les principales différences entre les deux services.

Tableau ES-1 : Différences entre un service de collecte et un service régional à courte distance

Caractéristiques	Service de collecte	Service régional courte distance
Marché desservi (fret)	Fret arrivé à bord d'un navire-mère	Fret régional ou inter-compagnie
Horaire	Selon les escales des grands navires de ligne	Horaire fixe
Source de la demande de service	Transbordement au/du navire-mère	Région d'origine du fret ou arrière-pays
Type de fret	Conteneurs	Conteneurs, remorques, marchandises diverses
Type de service	De port à port	De bout en bout, de quai à quai, de porte à porte
Liaison/réseau	Lien avec le port « pivot »	Lien (ou non) avec le port « pivot »
Concurrents	Navire-mère (chargement/déchargement direct), utilisation courante *vs* spéciale	Transport routier et transport ferroviaire

La présente étude porte essentiellement sur *les opérations de transbordement de conteneurs dans les ports de l'est du Canada*. Le transport maritime régional à courte distance est aussi abordé, mais séparément.

Services de collecte à structure en étoile

On peut citer plusieurs exemples de réussite parmi les services de collecte internationaux à structure en étoile, dont le réseau à structure en étoile « classique » représenté par le Port de Hambourg, qui sert de plaque tournante pour le trafic destiné aux ports de la mer Baltique (et de porte d'entrée pour l'Europe continentale), et le carrefour de transbordement « pur », comme le port de Gioia Tauro, en Italie, où le transbordement de conteneurs compte pour plus de 95 p. 100 des activités, et qui ne sert que très peu ou jamais de porte d'entrée. Ces exemples, et d'autres exemples internationaux de réseaux à structure en étoile et de services connexes, sont décrits dans le rapport et dans les documents de travail qui l'accompagnent.

Peu de réseaux à structure en étoile ont connu le succès dans l'est du Canada. Cela, pour diverses raisons qui sont évoquées dans le rapport. Le port d'Halifax représente un port pivot régional. Divers services de collecte ont été mis sur pied, qui utilisaient le port d'Halifax comme port pivot (ceux-ci ont remporté plus ou moins de succès).

Les exemples observés à l'étranger et les enseignements tirés de l'expérience canadienne ont permis de déterminer un certain nombre de grands facteurs de succès pour la mise en place de réseaux à structure en étoile et des services de collecte connexes :

- volume critique de trafic de collecte depuis/vers un port pivot (volumes réguliers et fiables);
- accès fiable, à longueur d'année, aux trajets de collecte qui desservent les marchés clés;
- avantage concurrentiel des liaisons maritimes par rapport aux liaisons ferroviaires et routières;
- faibles tarifs de transbordement et de manutention au port pivot et aux ports satellites;
- environnement réglementaire propice aux investissements dans le transport maritime.

En définitive, le succès d'un réseau à structure en étoile dépend de la viabilité commerciale de chacun des services de collecte qui font la navette entre le port pivot et les ports satellites. Parfois, lorsque les risques ou les coûts liés au démarrage du service de collecte sont élevés, des programmes d'aide, comme le Programme Marco Polo, en Europe (présenté dans le rapport) ou d'autres initiatives, comme le programme de soutien à l'investissement dans les infrastructures de transport maritime à courte distance, en Colombie-Britannique, peuvent servir de catalyseurs pour la mise en place de nouveaux services de collecte.

Services régionaux à courte distance

Le transport régional à courte distance se caractérise par le transport de marchandises régionales (par opposition à des marchandises transbordées, collectées) entre deux points régionaux. Ces services sont habituellement assurés selon des horaires déterminés, et les marchandises sont souvent acheminées de porte à porte (plutôt que de port à port, comme avec le service de collecte). Le service régional à courte distance peut aussi assurer les

mouvements inter-compagnie ou les mouvements liés aux chaînes d'approvisionnement industrielles.

Il existe plusieurs exemples de réussite parmi les services de transport maritime régionaux à courte distance, à l'étranger et dans l'est du Canada. Ainsi, dans la Baltique, l'entreprise danoise Det Forenede Dampskibs-Selskab offre à la fois des services régionaux à courte distance pour le transport porte à porte de conteneurs, et des services de réseaux rouliers (RO-RO). Dans l'est du Canada, Océanex est l'exemple le plus connu : la compagnie assure le transport régional à courte distance (ainsi que les services de collecte) de conteneurs entre Montréal et St. John's, et entre Halifax et St. John's. (Il est à noter qu'Océanex combine le transport régional à courte distance et le service de collecte tels que définis dans le présent rapport). Du côté des applications « industrielles » du transport régional à courte distance, on citera le service chaland-remorqueur de McKeil Marine, qui transporte des lingots d'aluminium entre Sept-Îles et Trois-Rivières pour le compte d'un client, Alouette. Le Relais Nordik est un autre exemple : ce navire effectue la liaison entre Rimouski et 12 ports et collectivités le long de la Côte-Nord du Saint-Laurent, jusqu'à Blanc-Sablon. Le rapport présente en détail ces services de transport régional à courte distance, et d'autres.

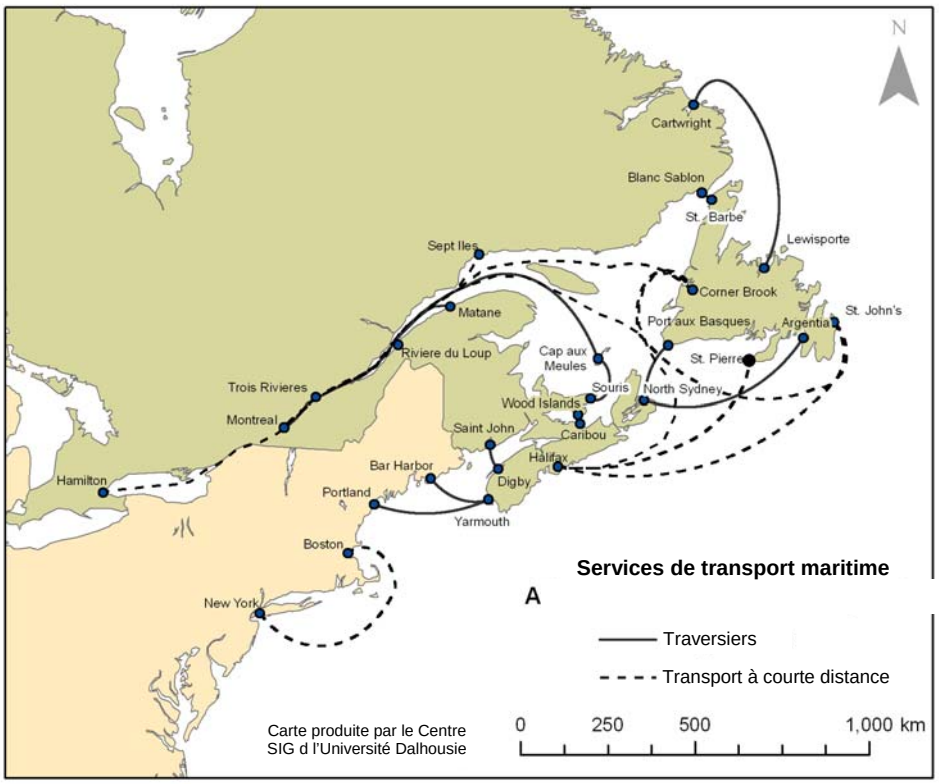
Contrairement au service de collecte, la viabilité d'un service de transport maritime à courte distance ne dépend pas du niveau d'activité d'un centre de transbordement, ni des escales de navires de ligne. Mais hormis ceux-là, beaucoup des facteurs qui garantissent la viabilité d'un service de transport à courte distance garantissent aussi celle des services de collecte.

Ainsi, comme pour le service de collecte, la viabilité d'un service de transport régional à courte distance dépend, en définitive, de l'attrait commercial exercé par le service sur un client potentiel du secteur privé. Là où les perspectives sont favorables, des programmes d'infrastructure ou d'autres programmes d'aide financière peuvent promouvoir la mise en place de services de transport à courte distance. Au Québec, par exemple, le gouvernement provincial a financé le développement de services régionaux de transport maritime à courte distance pour le transport par barge de copeaux de bois entre Forestville et la papetière Kruger inc, à Trois-Rivières. Cela a entraîné le retrait de plus de 18 000 camions lourds par année de la route 138 et de l'autoroute 40, et dans la grande région de Trois-Rivières. Ce service a été aboli à la fermeture de l'usine à papier de Trois-Rivières.

Expérience de l'est du Canada en matière de réseaux de collecte à structure en étoile et de services de transport maritime régional à courte distance

La figure ES-2 présente tous les services de transport à courte distance et les liaisons par traversier offerts dans l'est du Canada en septembre 2008. Chaque grand service de collecte, service de transport régional à courte distance et service de traversier est décrit dans le rapport.

Figure ES-2 : Services de transport à courte distance dans l'est du Canada



Les services de collecte à structure en étoile mis en place dans l'est du Canada se sont révélés des expériences peu concluantes; presque tous ont connu l'échec ou une fin prématurée (les services de transport maritime régional à courte distance ont remporté plus de succès : de fait, ces services existent encore dans l'est du Canada). La raison principale de ces échecs a été l'absence d'un volume critique de trafic de transbordement aux ports pivots. Et cette absence de volume critique, qui tient tant aux destinataires qu'aux expéditeurs, crée une situation sans issue. En termes simples, le problème peut être énoncé comme suit :

Les expéditeurs et les lignes de navigation sont réticents à s'engager à fournir un certain volume de trafic aux services de collecte ou de transport régional à courte distance avant que ces services aient fait leurs preuves. À l'inverse, les exploitants potentiels de services à courte distance sont réticents à prendre les risques élevés inhérents à la mise en place de services de collecte ou de transport à courte distance à moins de pouvoir compter sur un volume de trafic garanti.

Avantages, inconvénients et perceptions associés au transport à structure en étoile et au transport maritime régional à courte distance dans l'est du Canada

Plus de 30 intervenants ont été contactés dans le cadre de la présente étude[1]. De ce nombre, 15 ont bien voulu exprimer leur commentaires. Les paragraphes ci-après résument ces

[1] Transports Canada a collaboré au choix des intervenants

commentaires. Ils présentent aussi les résultats d'une recherche documentaire, effectuée par l'équipe de projet, portant sur les expériences de services de collecte et de transport à courte distance, à l'étranger et dans l'est du Canada, et sur des études antérieures sur le même sujet.

Avantages associés aux réseaux à structure en étoile et au transport maritime à courte distance :

- Coûts de transport plus faibles par tonne/kilomètre que pour le transport routier[2]
- Capacité de transport accrue (ou mieux utilisée), notamment dans les régions où la capacité du transport routier est limitée
- Les navires collecteurs couvrent un marché plus vaste à partir d'une porte d'entrée
- Les navires collecteurs rendent le service de conteneurs accessible aux marchés trop restreints pour être desservis directement par les gros porte-conteneurs
- Réduction des longs trajets par camion (dans le cas du transport maritime régional à courte distance), et de l'usure des chaussées
- Diminution des impacts sur l'environnement et des coûts sociaux

Inconvénients associés aux réseaux à structure en étoile et au transport maritime à courte distance :

- Temps de transport plus long en raison de la lenteur des navires par rapport aux camions et aux trains
- Fermeture de la Voie maritime du Saint-Laurent entre Montréal et les Grands Lacs pendant l'hiver
- Coûts du transbordement et de la double manutention
- La concurrence du transport ferroviaire est généralement difficile à soutenir
- Perçus comme non fiables par de nombreux expéditeurs et lignes de navigation
- Les retards des grands navires de ligne perturbent les horaires des navires collecteurs
- Coût de la main-d'œuvre et autres restrictions, aux ports syndiqués

Il convient en outre de noter que la structure réglementaire actuelle (en particulier les restrictions concernant le cabotage, les droits et autres frais exigibles pour les navires importés, les inégalités modales, la *Jones Act* et la Harbor Maintenance Tax, aux États-Unis, etc.) fait que les risques et les coûts liés au démarrage de services de transport maritime à structure en étoile ou à courte distance sont extrêmement élevés. Selon les intervenants interrogés au cours de l'étude, la réglementation représente l'obstacle le plus important au développement de services de transport maritime à structure en étoile ou à courte distance dans l'est du Canada.

Le tableau ES-2 présente les perceptions des expéditeurs, des lignes de navigation et des exploitants de ports/terminaux à l'égard des réseaux à structure en étoile ou des services de transport à courte distance dans l'est du Canada. Ces perceptions sont tirées des réponses au sondage fait auprès des intervenants. Elles ne reflètent pas nécessairement les opinions de tous les expéditeurs, de toutes les lignes de navigation ni de tous les exploitants de ports/terminaux. Toutefois, des faits empiriques, des anecdotes, de même que les résultats d'études antérieures laissent penser que ces points de vue sont partagés par la majorité des intervenants de chaque groupe.

[2] Compte non tenu du coût de la double manutention liée au transbordement, etc.

Tableau ES-2 : Besoins et préoccupations des expéditeurs, des lignes de navigation et des exploitants de ports/terminaux

Expéditeurs

Besoins – Transport / chaîne d'approvisionnement	Préoccupations
o Service fiable, qui respecte les délais de livraison o Intégrité de la chaîne d'approvisionnement, 12 mois par année o Temps de transit comparable à celui des autres modes, et tarifs plus que concurrentiels o Courts temps de cycle entre un centre de distribution canadien et les entrepôts des Maritimes o Horaires de livraison conçus en fonction des canaux de distribution existants ou prévus	o Perception du transport maritime à courte distance comme étant « lent et non fiable » o Caractère saisonnier du transport entre Montréal et les Grands Lacs o Délai d'approvisionnement plus long (particulièrement ennuyeux dans le cas du fret conteneurisé de grande valeur, en raison du coût élevé des stocks) o Les échecs passés rendent les expéditeurs réticents à se tourner vers le transport maritime o Le transport maritime à courte distance est peu compatible avec des temps de cycle courts

Lignes de navigation

Besoins liés à l'exploitation	Préoccupations
o Volume de trafic suffisant (avec, de préférence, des engagements à long terme) o Service générant des revenus acceptables, et économiquement viable dès le début o Capitaux de démarrage o Coûts de porte à porte significativement inférieurs à ceux du transport routier et du transport ferroviaire (facteur nécessaire pour la compétitivité) o Compétitivité - plus facile à atteindre si les chemins de fer sont utilisés à leur pleine capacité (tel n'est pas le cas dans l'est du Canada)	o En raison des droits d'importation dont sont grevés les navires construits à l'étranger, les coûts d'investissement sont difficiles à récupérer, ce qui accentue les risques liés au démarrage o Les règles sur le cabotage empêchent de réagir rapidement à la demande (interdiction d'affréter des navires) o Coûts de manutention élevés dans les ports du Saint-Laurent et dans les autres ports des Grands Lacs o Fermeture de la Voie maritime du Saint-Laurent en hiver o Rareté des navires immatriculés au Canada et rareté des navires d'occasion o Modes concurrents subventionnés (réseau routier) o Échecs passés

Exploitants de ports/terminaux

Besoins	Préoccupations
o Volume critique de trafic de transbordement o Engagements de la part des lignes de navigation (en volumes de conteneurs) o Capacité d'entreposage plus grande aux terminaux, pour les volumes de transbordement o Capitaux de démarrage o Meilleure distribution locale et meilleure infrastructure connexe	o Les plus gros marchés de la côte est sont déjà desservis directement par de gros navires o La présence de glace complique l'accès aux grandes destinations intérieures des Grands Lacs en hiver o Les besoins de capitaux de démarrage représentent une barrière à l'entrée o La réglementation pose des obstacles aux services de collecte

Il a été noté que le principal avantage du transport maritime à courte distance pour les exploitants de ports et de terminaux est la possibilité d'augmenter le débit de traitement des conteneurs à leur port/terminal.

Se fondant sur ce qui précède, l'équipe de projet s'est penchée sur les débouchés pour de nouveaux services maritimes de collecte et de transport régional à courte distance, ainsi que sur les mesures à prendre pour promouvoir l'essor de ces services. La partie II du rapport traite de ces questions. Un résumé est offert ci-après.

Évaluation des débouchés pour des réseaux à structure en étoile et des services de transport maritime à courte distance dans l'est du Canada

Plus de 40 liaisons maritimes possibles, à structure en étoile et à courte distance, dans l'est du Canada ont été étudiées. Le rapport contient la liste complète de ces liaisons.

Quelques critères (voir le tableau ES-3) ont été utilisés pour établir une liste restreinte des « structures en étoile » offrant les meilleures chances de succès, selon les facteurs désignés comme importants pour la mise en place de services de collecte. Des critères semblables ont servi à établir une liste restreinte de liaisons régionales à courte distance.

Tableau ES-3 : Critères pour établir la liste des « structures en étoile » possibles

N°	Critères	Oui / Non
1	Existe-t-il actuellement un volume critique de conteneurs acheminés par transport terrestre (train/camion) du port pivot à la (aux) destination(s)?	
2	Les marchandises transportées se prêtent-elles au transport maritime à courte distance (non-périssables, à délai de livraison non critique, valeur au poids de faible à moyenne)?	
3	La voie de navigation entre le port pivot et le port satellite est-elle ouverte à longueur d'année?	
4	Étant donné la nature de la voie de navigation qui relie le port pivot au port satellite, et la structure de coûts des modes de transport concurrents assurant la même liaison, le service à courte distance ou de collecte est-il susceptible d'avoir un avantage concurrentiel (sur le plan des coûts ou sur un autre plan)?	
5	Existe-t-il des raisons réglementaires ou structurelles susceptibles d'empêcher la mise en place de la liaison entre le port pivot et le port satellite?	

Parmi les liaisons retenues pour les structures en étoile et le transport régional à courte distance, certaines ont été utilisées pour la première étude de faisabilité[3,4]. Leur liste est présentée à la figure ES-3.

[3] Une analyse approfondie, y compris des visites sur place, des consultations avec les intervenants, des évaluations des exigences techniques, des modèles financiers détaillés, etc. serait nécessaire pour apporter des réponses définitives concernant la faisabilité des liaisons/du service. Une telle analyse approfondie dépasse toutefois la portée de la présente étude.

[4] Pour des motifs expliqués dans le rapport, les trajets de collecte et de transport à courte distance vers l'Ontario et les Grands Lacs ne répondaient pas aux critères. La présente étude ne s'y est donc pas intéressée plus avant.

Figure ES-3 : Liaisons pour services de collecte et de transport régional à courte distance utilisées pour une première étude de faisabilité

Liaisons - Services de collecte (structure en étoile)	Liaisons - Transport régional à courte distance
• Montréal – Sept-Îles (conteneurs) • Halifax – Sept-Îles – Corner Brook – Souris (conteneurs) • Halifax – Bermudes (conteneurs) • Halifax-Portland/Boston (conteneurs)	• Belledune – Argentia (grands navires rouliers) • Yarmouth – Boston/Portland (grands navires rouliers)

L'étude de faisabilité consistait à répondre à deux questions :

1. Le trafic est-il suffisant pour justifier la liaison?
2. Le coût du service serait-il avantageux par rapport à celui des modes de transport concurrents (c.-à-d. le transport routier)?

Pour répondre à la première question, l'équipe de projet a examiné des scénarios de volume de trafic pour déterminer si le trafic est suffisant pour justifier un nouveau service de collecte ou de transport à courte distance sur le trajet en question. Les possibilités d'utiliser des conteneurs vides ont aussi été prises en compte.

Pour répondre à la deuxième question, l'équipe de projet a modélisé les coûts correspondant au seuil de rentabilité par unité de trafic (conteneurs, remorques) en faisant varier les types de navires, les pourcentages de capacité et les saisons, et ont comparé ces coûts à ceux des camions assurant les mêmes liaisons. Le rapport discute en détail ces hypothèses et scénarios.

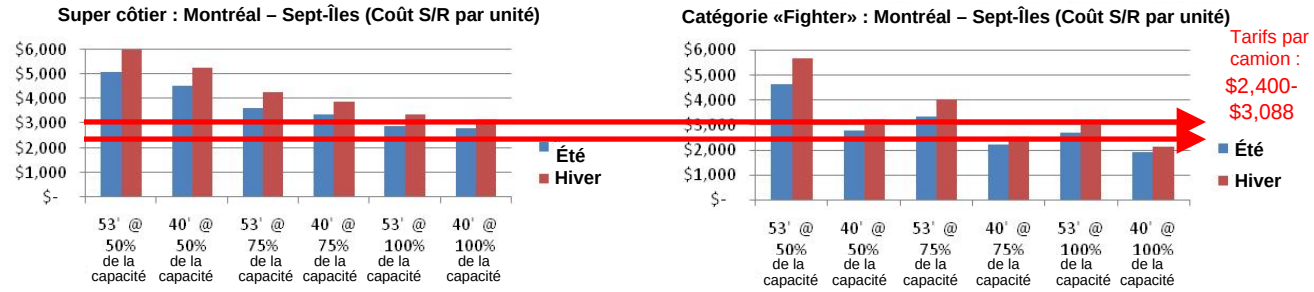
Les résultats de l'étude de faisabilité sont donnés ci-après, par liaison.

Service de collecte Montréal – Sept-Îles

Le trafic de conteneurs entre Montréal et Sept-Îles devrait être suffisant pour justifier un service de collecte, surtout s'il était assuré par un petit navire. Le trafic potentiel augmente beaucoup lorsque l'on dessert Québec[5], Port-Cartier et Sept-Îles, à destination/en partance de Montréal.

Un service de collecte exploité à pleine capacité entre Montréal et Sept-Îles semble être concurrentiel sur le plan des coûts, mais pas beaucoup, comme le montre la figure ES-4.

Figure ES-4 : Coût correspondant au seuil de rentabilité par unité, pour un service de collecte entre Montréal et Sept-Îles



Les lignes horizontales, à la figure ES-4, indiquent la fourchette des tarifs approximatifs des camions effectuant le même trajet.

À savoir si un service de collecte entre Montréal et Sept-Îles peut effectivement être offert et être rentable, cela dépend de l'approche adoptée par un exploitant potentiel du secteur privé, et de la possibilité d'exploiter les navires à leur quasi-capacité.

Service de collecte Halifax – Sept-Îles – Corner Brook – Souris

Un service de collecte le long du trajet Halifax – Sept-Îles – Corner Brook – Souris semble justifiable du point de vue du trafic potentiel et de la compétitivité. D'autres travaux s'imposent toutefois pour confirmer la compétitivité du transport maritime par rapport au transport routier entre Souris et Corner Brook, et pour confirmer l'accessibilité aux principaux transporteurs d'Halifax des volumes expédiés de l'Île-du-Prince-Édouard vers les marchés outre-mer.

Service de collecte Halifax – Boston

Du point de vue du volume, le trafic de conteneurs entre les destinations outre-mer et le marché de Boston/Portland est suffisant pour justifier un service de collecte, à condition que les lignes de navigation qui s'arrêtent à Halifax s'engagent à céder du trafic à ce service.

Compte tenu de l'ajout de coûts de manutention verticale, tant à Halifax qu'à Boston, il ne semble pas que ce service puisse être offert à des taux concurrentiels, et les résultats d'exploitation obtenus antérieurement tendent à appuyer cette conclusion. Quoi qu'il en soit, Halifax étant actuellement desservie par seulement six ou sept grandes lignes de navigation

[5] La proximité de Montréal et de Québec pourrait rendre le service non rentable entre ces deux ports.

océanique, la masse critique n'est probablement plus suffisante pour soutenir un tel service, à moins que les transporteurs s'engagent à lui céder des volumes de trafic importants.

Service de collecte Halifax – Bermudes

Le coût d'un service de collecte entre Halifax et les Bermudes peut certes être concurrentiel sur le plan des coûts, mais cela ne suffit pas : le service devrait aussi soutenir la concurrence d'autres services semblables assurés depuis les ports du New Jersey. Si une composante de fret régional pouvait se greffer au service de collecte, cela favoriserait sa viabilité. Mais pour l'instant, le trafic potentiel demeure une inconnue.

Service roulier Belledune – Argentia

Il n'existe actuellement aucun trafic entre Belledune et Argentia, et le marché de Terre-Neuve, de quelque 150 000 unités, est déjà largement desservi par Océanex et Marine Atlantic Inc.

Le service pourrait être concurrentiel si les marchandises étaient chargées à Terre-Neuve (Argentia) pour être transportées à Gaspé ou au Nouveau-Brunswick, ou l'inverse. Mais lorsque l'on ajoute aux coûts du transport maritime les coûts de transport par camion de Montréal à Belledune et d'Argentia à St. John's, le tableau est moins reluisant.

Service roulier Yarmouth – Boston/Portland

Plusieurs services de traversiers sont exploités au départ de Yarmouth vers la Nouvelle-Angleterre. Dans tous les cas, il s'agit de navires rouliers et à passagers, qui transportent des ensembles tracteur-remorque et des véhicules et leurs occupants (un navire grande vitesse assure actuellement la liaison, mais ne transporte pas de camions). Le coût supplémentaire associé au service roulier-passagers comparativement au service strictement roulier semble assez élevé pour rendre un tel service non viable. Pour exploiter un service roulier, les entreprises de camionnage ou les compagnies maritimes de Nouvelle-Écosse devraient s'établir aux États-Unis pour y faire des livraisons locales, car la plupart des navires rouliers sont autorisés à transporter un maximum de 12 passagers.

Il est important d'ajouter qu'un tel service roulier aurait un impact sur le service de traversiers déjà en difficulté entre Digby et Saint John.

En tant que destination unique, il est peu probable que Portland représente suffisamment de trafic pour justifier un nouveau service. Le choix de Portland pour remplacer le port de Boston pourrait être une solution viable.

Promotion du transport maritime de collecte et régional à courte distance dans l'est du Canada

Selon les liaisons susceptibles d'être desservies par un service de collecte et un service régional à courte distance évaluées dans le cadre de la présente étude, ces types de services présentent du potentiel dans l'est du Canada – tant du point de vue du volume de trafic que de la compétitivité sur le plan des coûts. Toutefois, le fait que peu d'exploitants privés aient connu le

succès fait douter que l'environnement soit favorable à des services commerciaux de collecte et de transport régional à courte distance.

Il convient particulièrement de noter que les coûts de démarrage (en particulier les coûts fixes) sont extrêmement élevés dans l'est du Canada, et qu'il sont souvent des « coûts irrécupérables ». Cela signifie un risque élevé pour tout investisseur qui envisagerait de mettre en place un service de collecte ou un service régional à courte distance, en particulier sans avoir obtenu d'engagement quant au volume de trafic.

L'équipe de projet a exploré un certain nombre de mesures incitatives que pourrait prendre le gouvernement du Canada pour atténuer les risques liés au démarrage de nouveaux services à courte distance, et ainsi promouvoir l'essor de ce secteur. Le but des mesures incitatives est de créer des conditions qui encourageraient le secteur privé à organiser de nouveaux services, d'une manière qui soit compatible avec les objectifs sociaux, environnementaux et économiques du gouvernement du Canada'.

Voici quelques grands principes qui pourraient guider le choix et l'élaboration de mesures incitatives, tout en protégeant les intérêts du gouvernement du Canada.

- Tout programme d'appui au secteur privé devrait être mis en œuvre au moyen d'un appel de propositions. Il reviendrait au secteur privé de repérer le débouché et de l'exploiter. La concurrence pour l'obtention du financement devrait aussi contribuer à maximiser la valeur de tout financement accordé.
- Tout programme devrait être axé sur des fonds de contrepartie. Sans enjeu financier, rien n'incite un organisme privé à faire les choses correctement s'il n'y a pas
- La proposition de financement doit démontrer que les offres de service répondront aux besoins commerciaux des expéditeurs de fret, et contribueront aux objectifs sociaux, environnementaux et économiques (transfert modal, réduction des gaz à effet de serre, etc.)
- Il est bon, également, de limiter la portée géographique des services (p. ex., en fonction de vastes objectifs stratégiques – Porte d'entrée de l'Atlantique) afin de dépolitiser le processus de prise de décision.

Il faut noter qu'en raison du ralentissement économique qui frappe l'Amérique du Nord, il sera plus difficile de trouver du financement pour les activités de transport à courte distance. Cette conjoncture ralentira également la croissance du volume de fret et diminuera les volumes disponibles pour les services de collecte au départ de ports comme Halifax. Par contre, si un service à courte distance ou de collecte peut démontrer qu'il génère d'importantes réductions de coûts par rapport aux modes concurrents, les expéditeurs (et les lignes de navigation) pourront envisager d'acheminer autrement leurs marchandises. Il reste que la chute de la demande risque d'intensifier la concurrence livrée par les autres modes.

En conclusion, il existe un potentiel pour le service de collecte à structure en étoile et pour de nouveaux services de transport régional à courte distance dans l'est du Canada, autant du point de vue du volume de trafic que des coûts de transport sur certains trajets. Comme le secteur privé a été lent à mettre en place de nouveaux services, notamment en raison des risques liés aux coûts de démarrage, il serait bon de promouvoir davantage ces services en prenant des mesures incitatives destinées à atténuer ces risques. Soutenu par des programmes d'appui et

des investissements suffisants, le développement des secteurs de collecte et de transport maritime régional à courte distance peut renforcer le rôle de ceux-ci dans le transport du fret dans l'est du Canada, et dans l'optimisation de la Porte d'entrée de l'Atlantique et de la Porte continentale.

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Annexes

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Acronyms / Abbreviations

ACL	Atlantic Container Line
AIMS	Atlantic Institute for Market Studies
BC	British Columbia
B/E	Breakeven
CAD	Canadian Dollar
CEO	Chief Executive Officer
CMA/CGM	Compagnie Maritime D'Affrêtement and Compagnie Générale Maritime
CN	Canadian National Railway
COGEMA	Compagnie de gestion de Matane inc.
CP	Canadian Pacific Railway
CPCS	CPCS Transcom Limited
CRSA	Canadian Retail Shipper's Association
CSL	Canada Steamship Lines
CT	Connecticut
CTA	Canadian Transportation Agency
CTMA	CTMA Group
DFDS	Det Forenede Dampskibs-Selskab
DOT	Department of Transport
EFTA	European Free Trade Association
EU	European Union
EX	Export
FERIC	Forest Research Institute of Canada
FEU	Forty-foot Equivalent Unit
FIO	Free In, Out
FIOS	Free In, Out, Stowed
FL	Florida
FROB	Foreign Cargo Remaining On Board
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GI	Global Insight
GLFL	Great Lakes Feeder Line
GLSLS	Great Lakes/St. Lawrence Seaway
HMT	Harbour Maintenance Tax
IFO	Intermediate Fuel Oil
IL	Illinois
ILA	International Longshoremen's Association
IM	Import
km	Kilometre
Lo-Lo	Lift-on / Lift-off
m^2	Square metre
MA	Massachusetts
MAI	Marine Atlantic Inc.
ME	Maine
MGO	Marine Gas Oil
MSC	Mediterranean Shipping Company
MTQ	Transports Québec

N	No
N/A	Not Applicable
NB	New Brunswick
NC	North Carolina
NH	New Hampshire
NJ	New Jersey
NL	Newfoundland and Labrador
NS	Nova Scotia
NSCSA	National Shipping Company of Saudi Arabia
NY	New York
NYK	Nippon Yusen Kaisha
O/D	Origin / Destination
ON	Ontario
OOCL	Orient Overseas Container Line
PA	Pennsylvania
PEI	Prince Edward Island
QC	Quebec
ROC	Return on Capital
Ro-Ro	Roll-on / Roll-off
Ro-Pax	Roll-On-Roll-Off-Passenger-ship/ferry
SCOOP	Short Sea Cooperative Program
STQ	Société des Traversiers du Québec
RFP	Request for Proposal
T	Total
TBD	To Be Determined
TEU	Twenty-foot Equivalent Unit
UK	United Kingdom
US	United States (of America)
USD	United States Dollar
USEC	United Stated East Coast
USVI	United States Virgin Islands
VA	Virginia
Y	Yes

1 Introduction

1.1 Background

In line with the Government of Canada's priority on strategic gateways and corridors, Transport Canada has commissioned a study to assess the potential for hub-and-spoke container transhipment operations in eastern Canada and associated marine movements of freight (short sea shipping) into the St. Lawrence River and the Great Lakes basin or into the United States (US).

CPCS Transcom Limited (CPCS) was retained by Transport Canada to conduct this study.

1.2 Objective

The stated objectives[1] of this study are as follows:

- Improve the understanding of existing container hub-and-spoke operations and the factors contributing to their success
- Situate regional short sea shipping movements in the international hub-and-spoke container context
- Identify and evaluate the success of existing and potential future short sea shipping initiatives on the East Coast of Canada, including opportunities at the design stage of freight movements
- Gauge the advantages, disadvantages and perceptions of short sea shipping on the East Coast of Canada
- Identify opportunities for the use of empty containers

The results of this study, once validated with key stakeholders, will feed into the discussion on the Atlantic Gateway and/or Ontario-Quebec Continental Gateway and Trade Corridor.

1.3 Methodology and Approach

To address the objectives of the study, the team drew on a combination of previous studies, stakeholder consultations, external data provided by Transport Canada and Global Insight (GI), and in-house industry experience.

The study was developed in two phases. The first took a broad look at past and present, as well as domestic and international experience with hub-and-spoke and regional short sea services, to draw out key success factors, and related issues. This first part of the study also looked specifically at the eastern Canadian context. Notable successes and issues, as well as the related relevance to this study, were identified. A number of working papers (described below) were developed as part of this first part of the study.

[1] As stated in the Terms of Reference for the Study.

The second part of the study, informed by the first, sought to assess opportunities for hub-and-spoke feeder and regional short sea operations in eastern Canada. The focus of feeder services is on container and Roll-on / Roll-off (Ro-Ro) cargo, whereas all cargo types (container, Ro-Ro, bulk, break-bulk) were considered for potential regional short sea.

The analysis in part II takes an objective, systematic approach to analysing hub-and-spoke and regional short sea opportunities. Traffic flows are assessed both in terms of current movements, by commodity and mode, and different scenarios, including the potential for modal shifts to short sea. The use of empty containers was also assessed. Business opportunities for feeder and regional short sea services were approached from a private sector perspective, that is, with a focus on commercial feasibility. A selection of feeder and regional short sea routes showing potentials were assessed in more detail, looking specifically at service costs and competitive position relative to competing transport modes. Lastly, the team developed and tested a series of options to promote the development of feeder and regional short sea services in eastern Canada.

1.4 Background Working Papers

This Final Report is informed by four Working Papers developed by the CPCS Team in the context of this study:

- **Working Paper on the Literature Review**, which provides an overview of relevant reports and studies on short sea shipping in eastern Canada of relevance to this project (see list of studies reviewed in Annex A).
- **Working Paper on Review of Hub & Spoke Operations and Short Sea Shipping**, which reviews hub-and-spoke operations and short sea shipping in eastern Canada and elsewhere around the world and outlines useful lessons on the key issues and success factors of relevance to this study.
- **Working Paper on Port Issues**, which reviews the characteristics of selected ports on the North American eastern seaboard that may be involved in short sea shipping, as far as can be ascertained the liner services calling at these ports, and to compare efficiencies of eastern Canadian ports with those of what may be considered as “hub ports”.
- **Working Paper on Regulatory Issues**, which outlines both domestic and international policies and regulations that have influence on the potential for short sea shipping development in eastern Canada.

These Working Papers represent key analytical building blocks for this study. However, only the most salient findings from these Working Papers are included in this Report. The Working Papers nevertheless provide a reference where background or additional information might be sought.

1.5 Organization of this Report

This Final Report is organized in two major parts, as follows:

Part I: Conditions for Success of Hub-and-Spoke Operations and Short Sea Shipping and the Eastern Canadian Experience

This first part sets the background and framework for this study. It defines and distinguishes key concepts of relevance to hub-and-spoke operations and regional short sea shipping. Drawing on international experience, it also presents some of the key success factors for hub-and-spoke operations and regional short sea shipping. Lastly, Part I assesses the eastern Canadian experience with respect to hub-and-spoke operations and regional short sea shipping and identifies some of the constraints hindering the development of these sectors in the region.

Part II: Assessment of Opportunities for Hub-and-Spoke Operations and Short Sea Shipping Initiatives in Eastern Canada

This second part is forward looking, drawing on the lessons from Part I to identify and evaluate hub-and-spoke and regional short sea shipping opportunities in eastern Canada, including opportunities at the design stage of freight movements. Part II looks specifically at the traffic flows and business opportunities for hub-and-spoke feeder operations and regional short sea shipping, along with a number of route options. A more detailed feasibility study is also included for a selection of feeder and regional short sea routes. Finally, Part II outlines a number of options and recommendations for promoting the development of hub-and-spoke feeder and regional short sea services in eastern Canada.

Part I:

Conditions for Success of Hub-and-Spoke Operations and Regional Short Sea Shipping and the Eastern Canadian Experience

2 Hub-and-Spoke Transport

2.1 What is the Hub-and-Spoke Transportation Concept?

The hub-and-spoke transport concept originated with Fedex's courier service operated out of Memphis, and was then adopted by passenger airlines. Under a hub-and-spoke transport arrangement, parcels, freight and/or persons are transported to a central "hub" facility, then onwards to interacting nodes via a network of "spokes". The shipping industry has also seen the emergence of massive hub ports at a variety of locations around the world, serving smaller regional "feeder" ports, particularly in the context of container shipping.

2.1.1 Key Attributes of a Marine Hub-and-Spoke Network[2]

As the name suggests, a marine hub-and-spoke network consists of a central "hub" port, and a series of "spokes" serving regional "feeder" ports. Accordingly, commodities are transported via hubs, to feeder ports, and onwards to their final destinations, or vice versa.

Hub
Without a hub, or series of hubs, there is no hub-and-spoke network. A "hub port" is one where commodities, arriving on large vessels (typically 4000+TEU (Twenty-food Equivalent Unit) container vessels), are transhipped for onward shipping via smaller vessels to various destination ports. Sometimes, also, cargo is transhipped or "relayed" to other mainline services using similar-sized vessels, at a hub. International examples of hub ports include Singapore, Algeciras, and Freeport where in each case, there is significant such transhipment activity.[3] Annex B provides a list of some of the most significant global transhipment hubs. A parallel example from the air sector would be Amsterdam's Schipol or Chicago's O'Hare international airports, where passengers arrive via large commercial aircraft, and often connect to other destinations serviced only via smaller aircraft.

Hub vs. Gateway Ports
A distinction should be made between hub and gateway ports. A hub often has a relatively small local cargo base, is located close to main shipping routes and features feeder service(s) to other ports. Gateway ports, on the other hand, tend to have a local or captive market and also focus on intermodal connections and gate activity. A port can be both a hub and gateway port, though in these cases, gateway activities are generally considered of most importance to ports given the higher volume of gateway vs. hub traffic handled. Nevertheless, the point remains that gateway and hub ports are not mutually exclusive.

In the Canadian context, Montreal is clearly a gateway or, historically, an entrepôt, but perhaps not a hub, because it is on only one major trade lane, the North Atlantic. By the definition above, by virtue of its transhipment services to several markets and location just off the great

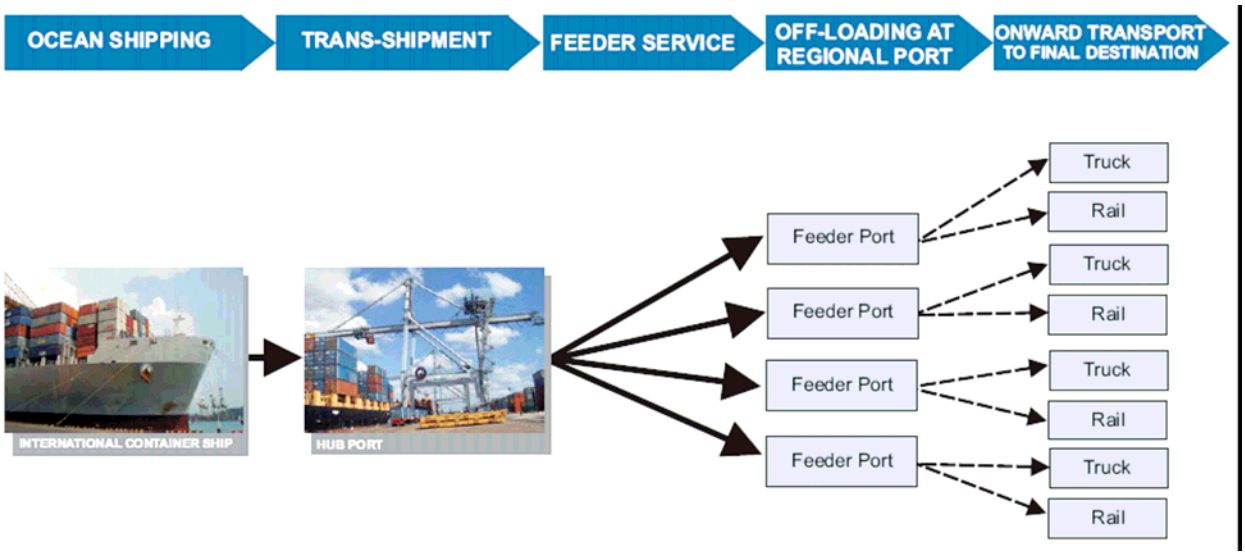
[2] This study is focused on *hub-and-spoke container transhipment operations in eastern Canada for marine movements of freight.* The short sea shipping concept, though different from pure hub-and-spoke, is also addressed in this study, along with related opportunities for eastern Canada.
[3] Transhipment is the transfer of cargo from one marine vessel to another for onward shipping, described in more detail in Section 2.1.2.

circle route, Halifax is both a gateway (to key hinterland markets) and a hub, despite not having a large population or manufacturing base (or cargo base, compared with Montreal).[4]

Spokes

A gateway hub will have "spokes" connecting the hub to regional markets, most not served directly by large ocean going vessels. Spokes are also known as "feeder routes", in that they feed regional markets, from a hub, or vice versa. The concept of a feeder route differs from a stand-alone regional short sea route, as will be discussed in a later section.

Figure 2.1: Maritime Hub-and-Spoke Transport



Source: Graphic Developed by CPCS

2.1.2 Transhipment and Feedering as Central to Hub-and-Spoke Transport

The hub-and-spoke transport concept is predicated on transhipment of commodities (from one marine vessel to another) and "feedering" of commodities via marine transport to other regional ports. Both concepts are defined below.

Transhipment

Transhipment involves the movement of commodities from one marine vessel to another. Most hub-and-spoke operations relate to the transhipment of containers at "hub" ports and their transit to the end of various "spokes". In 2006, of 441,800,000 TEUs handled globally, 115,100,000, or 26.1 percent was transhipped at a transhipment hub or a gateway port.[5] While transhipment involves a move between two sea-going ships, there are at least four types of transhipment activity:

[4] See James Frost, "Shipping Out: The Development of a Gateway Hub at the Port of Halifax, Atlantic Institute for Market Studies, April 2006; Stephen Kymlicka, "Halifax is Different: Ports to the Future, Atlantic Institute for Market Studies, September 2008.

[5] Drewry data cited in "Feedering & Transhipment", Dynamar BV, September, 2007, p. 25.

1) **Transit**: cargo moves from a deep sea vessel onto a barge for furtherance inland
2) **Interlining**: involves transhipment between two or more services operated by the same carrier or alliance
3) **Relay**: transhipment from an east-west routing onto a north-south routing at a hub such as Algeciras in the Mediterranean
4) **Feedering**: involves transhipment from a mainline vessel onto a "feeder" vessel (at a hub port) to ports that are too small or lack enough volume to be served by a mainline service (e.g. most ports in the Baltic fit this latter category)

Feedering is the most common transhipment activity and has the most relevance to this study because it represents the purest form of the hub-and-spoke concept. The feedering concept is explored in more detail below.

Feedering
Feedering involves the movement of commodities (typically containers) from a hub port to a regional feeder port via marine transport, or vice versa.

There are two types of feeder service:[6]

1) **Common user services** are provided by independent, third-party carriers that serve a number of clients. Some also carry regional cargo as well, usually starting by making use of empty containers being repositioned. Some regional carriers also carry feeder cargo. (Newfoundland-based Oceanex fits into this category).
2) **Dedicated feeder services** are operated by the mainline carriers themselves (e.g. Maersk, Orient Overseas Container Line (OOCL), Mediterranean Shipping Company (MSC), CMA/CGM). These types of service can serve as an alternative to a direct call by a large vessel or result from volumes on a common user service growing to the point of justifying a dedicated feeder service.

There can also be joint services between common user and dedicated feeder operators. One benefit of both types of feeder service is that they create access to new markets not necessarily serviced by direct calls.

Feeder Ships

The sizes of feeder ships vary, but they typically carry less than 1,500 TEUs. Average sizes can range from 510 TEU in the Middle East to 920 TEU in the Indian sub-Continent. Dedicated feeders range from 980 TEU in the Middle East to 1,470 TEU in Africa. In North Europe, the average is 620 TEU for common carriers and 1,060 TEU for dedicated vessels. Typical speeds for a feeder-type vessel are 15.5 knots. It is important to note that the time savings with faster vessels often does not justify the additional fuel costs resulting from faster speeds.

Structure of Feeder Industry

Most feeder operators charter rather than own their vessels. This allows for maximum flexibility and effective capacity utilization since vessels can easily be downsized or upsized according to market conditions. Where cabotage is not an issue, this is easily done because vessels are "traded" on an open market and are readily available. In Canada, cabotage restrictions hinder this type of flexibility, as will be explored later in this report.

[6] "Transhipment and Feedering", Dynamar B.V., September 2007.

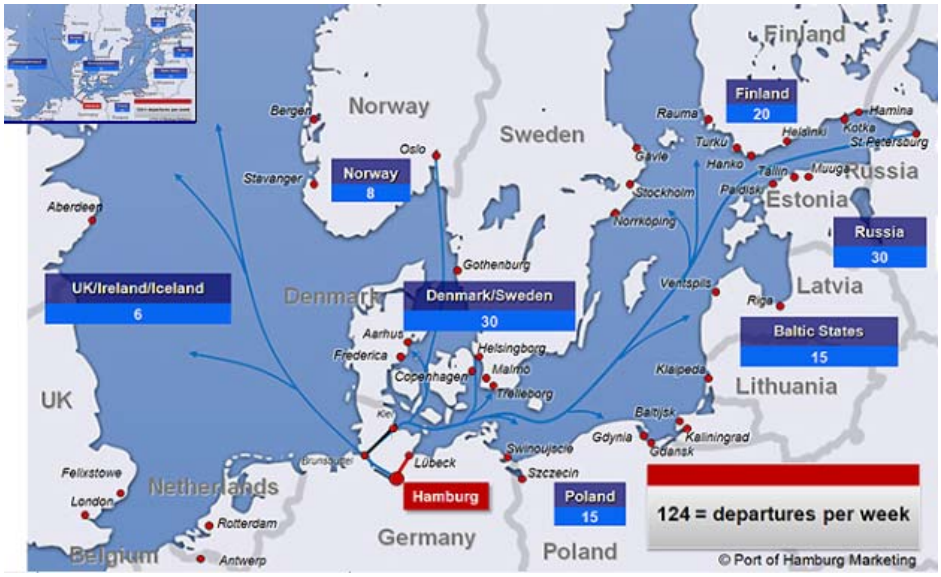
2.2 International and Domestic Examples of Hub-and-Spoke Networks

2.2.1 International Hub-and-Spoke Networks

There are extensive international examples of hub-and-spoke networks. Indeed, North Europe, the Mediterranean, the Far East, as well as the Indian sub-continent, South East Asia, the Middle East and the Caribbean all have established hub-and-spoke networks. Different examples of hub-and-spoke configurations and related services are provided below.

"Classic" Hub-and-Spoke Network
An international example of a classic hub-and-spoke network is the Port of Hamburg. Of the 9.89 million TEUs handled in 2007, one-third was transhipment, largely serving markets in the Baltic via feeder spokes, as depicted in Figure 2.2.

Figure 2.2: Weekly Short Sea Services from Port of Hamburg



Other international configurations of hub-and-spoke transport include:

- ***Pure Transhipment Hubs***: "Pure" hubs are ports with a transhipment incidence of over 80 percent. In the Mediterranean, pure transhipment hubs are with little or no gateway business. The best example may be the Medcenter Container Terminal in Gioia Tauro, located on the tip of mainland Italy. It has a transhipment incidence of over 95 percent.
- ***Pure Feeder Service***: Unifeeder is an example of an operator providing both feeder and door-to-door short sea services, although 90 percent of its volume is purely feeder cargo.

- ***Other Combination Services/Networks***: The Irish Continental Group operates a mix of container feeder, short sea and ferry services.

Examples of Successful International Feeder Services

There are several examples of successful international feeder ports. The port of Kotka in Finland, for example, is the end of a spoke for many feeder routes. The port has 19 feeder calls per week and 13 Ro-Ro vessel calls, connecting it to hubs and markets in the Netherlands, Belgium, Germany, Russia, the United Kingdom (UK) and Spain. In 2001, it handled 200,000 TEUs of feeder cargo; in 2008, it is expected to reach 700,000 TEUs. Likewise, in 2004, it handled 37,500 autos and in 2007, handled almost 350,000. This growth is due to its proximity to the fast-growing Russian market.

An example of a successful feeder operator is Team Lines, which operates 35 chartered vessels from four major hubs, with Hamburg and Bremerhaven being the main ones. From those two ports, they operate to ports in the UK, Scandinavia, the eastern Baltic states (Estonia, Latvia and Lithuania), Poland and Russia. From Rotterdam and Antwerp, they operate to France, Portugal, Spain and the UK. It operates on a weekly, fixed-day basis or more frequently.

The success of these and other international feeder services is predicated on the commercial viability of the routes that they serve. In most cases, the enabling conditions noted in Section 2.3 are in place.

2.2.2 Domestic Hub-and-Spoke Networks

There have been few successful hub-and-spoke operations in eastern Canada for a variety of reasons to be addressed later in this report. An example of a regional hub is the Port of Halifax. Various companies have operated feeder service using Halifax as a hub (with varying degrees of success). Most recently was the Halifax – Boston – Portland feeder service operated by the Icelandic shipping company, Eimskip.[7] This service met its demise earlier in 2008, for reasons that will be explored later in this report.

The history of the Halifax-New England service is illustrative of a number of key issues impacting feeder operations: 1) the need for well-capitalized and well-managed operations; 2) the need for mainline operator commitment and support; 3) the need for low cargo-handling costs at the hub and feeder ports; and 4) the vulnerability of a common user operation to changes in deep sea carrier routings.

Other services moving a combination of “feeder cargo” and regional short sea cargo include:

- Halifax – St. Pierre Service (Operated by Sea Transit until October 2008)
- Halifax – St. John’s (Operated by Oceanex)
- Montreal – St. John’s and Corner Brook and (Operated by Oceanex)
- Montreal – Freeport (operated by MSC)

[7] Note: Eimskip still operates a mainline service from Rekjavik to Argentia and Halifax, en route to Everett, MA, and Richmond, VA.

Great Lakes Feeder Line (GLFL) has been attempting to start a service between Halifax and Montreal and as of October 2008 and has made one sailing. The vessel is now reportedly operating between Halifax and St. Pierre.

The ports of Montreal and St. John's have played and continue to play an important role in short sea shipping in Canada, as will be later discussed, though related services cannot be characterized as "pure" hub-and-spoke feeder transport as defined above since services to and from these ports carry a combination of cargoes, including feeder, domestic short sea, trailers and autos.

2.3 Hub-and-Spoke Transport: Key Success Factors

2.3.1 What Makes a Good Hub?

As with gateways, hubs can only develop where shipping lines call. Without the critical mass of volume resulting from shipping line calls, there is no opportunity to develop a hub. As such, potential hubs must first be assessed from the perspective of shipping lines. Secondly, a good hub candidate must also be well placed to lend itself to feeder services (without spokes, a hub is irrelevant). Accordingly, a good hub port candidate must provide a combination of the following attributes (in no particular order):[8]

- Location on main east-west or north-south shipping routes
- Minimal deviation from main shipping routes
- Distance savers compared with direct services
- A location within easy access of feeder ports
- Situated on the coast with easy approach from open sea and deep fairways
- Ample berthing facilities capable of handling post-Panamax vessels
- High productivity and low handling costs
- Ability to serve large number of markets
- 24/7 operations
- Absence of cabotage restrictions, which could otherwise limit viability of feeder services

Driven by the business interests of shipping lines, hubs are more likely to develop and succeed where the above conditions are in place. Attempts to develop hubs where these conditions are absent (in whole or in part) are likely to prove problematic and unsustainable.

Risks of Losing "Hub Status"
As noted, shipping lines tend to call where their business interests are maximized. Typically, market demand is one of the main gravitational forces attracting shipping lines to a port, provided this same market cannot be served more cheaply using an alternative port. With pure transhipment traffic, it is often less the end market that determines the hub of preference for shipping lines, but the rates and service at the hub.

The significance is that it is more difficult to "capture and hold" shipping line calls for hub traffic than for gateway traffic. The risks in developing a hub for strictly transhipment cargo (such as Gioia Tauro, Malta, Cagliari and Port Said) are illustrated by the frequent movement of carriers

[8] "Transhipment and Feedering", Dynamar B.V., September 2007.

and alliances between various hubs in the Mediterranean. This behaviour is largely driven by rates and service. It leaves the operators of pure transhipment hubs and related feeder services very vulnerable.

In the eastern Canadian context, this would suggest a greater risk for developing a pure transhipment hub where a port does not also act as a gateway. It should also be noted that where a gateway already exists, the presence or the development of a feeder network can strengthen the gateway's position vis-à-vis its hinterland by providing alternative and additional links to the hinterland. An example of this would be the several iterations of a Halifax-New England feeder, which expanded Halifax's hinterland to include the lucrative New England market.

2.3.2 What Makes a Good Spoke?

A good spoke must be a commercially viable spoke. Factors that encourage the viability of feeder services on a particular spoke include:

- A critical mass of feeder traffic from/to a hub; consistency and reliability of volumes
- Reliable, year-round access to feeder routes that serve key markets
- Competitive advantage of sea route relative to alternative rail and road routes
- Low transhipment and handling fees at hub and feeder ports
- A regulatory environment that is conducive to investment in marine transport

The above factors are merely enabling conditions; they do not in themselves make feeder service viable or a "good" spoke. Ultimately, it is the feeder operator and its mainline customer that can justify the viability of sea transport along a particular spoke. The feeder operator must be able to provide this service on a commercial basis, which is simply a function of revenues vs. costs. If the overall revenue potential is insufficient to justify feeder service, then the spoke will not be viable (unless support is provided to help make it so). The commercial viability of feeder services and related enabling factors are explored in greater detail in a later section.

2.4 Promotion of Feeder Short Sea Shipping

2.4.1 International Examples

The best known program to promote the development of commercial short sea shipping (feeder and regional short sea services) is the "Marc Polo" program of the European Union (EU).[9] This and related programs provide up-front support grants (for qualifying proposals) that will lead to the development of short sea activities. There are five key "actions" that are supported under the Marco Polo program umbrella and are as follows:

- **Modal shift actions**: start-up aid for new services in the non-road freight market (maximum aid level is 30 percent of eligible costs);

[9] The consultants are aware that the Marco Polo program is more wide ranging and applies to more types of short sea operations than pure feeder or regional short sea services. It can also apply to regional bulk shipping, intermodal transportation and catalyst actions, such as taxation measures, which are intended to remove vehicles from roadways. Some of these are described in Annex C.

- **Catalyst actions**: grants for viable non-road freight services (maximum aid level is 35 percent of eligible costs);
- **Common learning actions**: support for initiatives that improve cooperation and the sharing of know-how in an increasingly complex transport and logistics industry (costs can be reimbursed up to 50 percent);
- **Motorways to the sea actions**: aid to shift freight from road to short sea shipping or a combination of short sea shipping with other modes of transport (subsidy rate can be up to 35 percent of eligible costs);
- **Traffic avoidance actions**: aid to integrate transport into production logistics to avoid a large percentage of freight transport by road (subsidy rate can be up to 35 percent of eligible costs).[10]

A more detailed overview of the above five program and funding mechanisms is provided in Annex C.

The 2003 Marco Polo program was a €75-million program, which was distributed to 14 projects up to the end of 2006. The Marco Polo II is a follow-up program with a budget of €400 million to run to 2013 and now includes the European Free Trade Association (EFTA) countries, Russia, Belarus, Ukraine, and the Balkans. The 2008 call for proposals was closed in April 2008[11] (applications were open to private sector operators, among others). A selection of new services funded by the Marco Polo program and related funding amounts is provided in Annex C.

Whether these investments would have been made by the private sector without government support has long been debated in Europe. Some concerns have been expressed that the program distorts the market and that if sufficient demand is present, investments will be made by a very dynamic private sector which operated short sea services throughout northern Europe long before such a program was in place.[12] Experience in the Mediterranean has shown that, however, that the market can be encouraged with certain catalyst actions. The Marco Polo and Motorways of the Sea programs are examples of the types of programs that might be considered in the Canadian context.

Of particular importance to understanding the European approach is the concept that the funding for short sea shipping such as the Marco Polo program is driven by the desire to remove trucks from congested freight corridors and address environmental issues.

2.4.2 Domestic Examples

There have been no notable recent initiatives to support the development of “hub & spoke feeder services” in eastern Canada, although Quebec (QC) has had two programs to promote modal shift for industrial short sea shipment applications.

[10] http://ec.europa.eu/transport/maritime/sss/doc/2005_07_14_community_financing_en.pdf, last accessed on October 10, 2008.
[11] http://ec.europa.eu/transport/marcopolo/calls/2008docs_en.htm, last accessed November 17th, 2008.
[12] Magnus Enrenberg, “Road to Sea – but only with a little help from your friends”, *Cruise and Ferry Info*, July 2005; Klas Brogren, “Case Study: Motorways off the Seas”, Shippax Market Report, 2007.

Also, in September 2008, the federal government announced that it would invest a total of up to $20.9 million in five short sea shipping initiatives in the British Columbia (BC) Lower Mainland. Following a call for proposals, specific initiatives receiving funding include:[13]

- Fraser River Shuttle (up to $5 million contribution to Coast 2000 Terminals)
- Deltaport Shortsea Berth (up to $2.35 million contribution to TSI Terminal Systems)
- Vanterm Shortsea Berth (up to $1.95 million contribution to TSI Terminal Systems)
- Mountain View Apex Container Terminal (up to $7 million contribution to Seaspan International)
- Southern Railway of BC Rail Barge Ramp (up to $4.6 million contribution to Southern Railway of BC)

These projects call for the development of specialized facilities such as docks, ramps, and fixed-crane infrastructure that would facilitate short sea shipping of a variety of cargos (including containers, railcars, and break-bulk cargos). The private sector service provider will match the federal funding.

These complementary projects will form an integrated short sea shipping network that could potentially carry up to approximately 120,000 Forty Foot Equivalent units per year. Collectively, these short sea shipping projects could potentially reduce the number of trucks on the road by 650 per day.

Whether these projects will lead to sustained short sea shipping services provided by the private sector remains to be seen.

It should be noted that the conditions in BC are very different from those in eastern Canada. The most important difference is that there are major capacity issues for the movement of freight on the Lower Mainland, whereas there is generally significant excess capacity in eastern Canada. The above-noted infrastructure projects will help promote the use of short sea to increase capacity by better utilizing West Coast transport assets. In eastern Canada, key issues to the development of the short sea sector relate not so much to infrastructure or capacity limitations, but rather to commercial issues, as will be discussed in more detail below.

2.5 Necessary Conditions for Development of Hub-and-Spoke Networks

The success of a hub is inextricably linked with the success of feeder services emanating from the same hub.

The success of a hub is contingent on a critical mass of feeder cargo that can be cost-effectively transhipped at hub ports and transported via feeders to other regional markets not served directly by major shipping lines. Without critical mass, there is no hub, without a hub, there is no hub-and-spoke network. Critical mass for hub-and-spoke transport, in turn, is driven by shipping lines. In Section 2.3.1, some of the factors attracting shipping lines to hub ports are

[13] http://www.tc.gc.ca/mediaroom/releases/nat/2008/08-h215e.htm, last accessed on November 19th, 2008.

discussed. One of the important factors is proximity of the hub to major shipping lanes, requiring little deviation, thereby leading to time savings and lower costs for shipping lines.

Equally important is the commercial viability of feeder services linking the hub to other regional markets. Key enabling conditions for commercial viability are a critical mass of feeder traffic from/to a hub with consistency and reliability of volumes, the competitive advantage of the sea route relative to alternative rail and road routes, and flexibility to “right-size” ships to respond to the market.

3 Regional Short Sea Shipping

3.1 Key Attributes of Regional Short Sea Shipping

Regional short sea shipping is characterized by the movement of regional cargo by sea between two regional points. Such services are typically predicated on precise schedules, often providing service from door to door.

Figure 3.1: Regional Short Sea Shipping Transport[14]

3.2 How Does Regional Short Sea Shipping Differ from Hub-and-Spoke Feeder Service?

It is important to distinguish regional short sea shipping operations from hub-and-spoke feeder services. Though regional short sea services may resemble feeder services, they are in fact **two different concepts**, differing in terms of markets served, routes, and operations:

- First, regional short sea services, unlike feeder services, are not predicated on traffic from deep sea shipping lines.
- Second, unlike feeder cargo, regional short sea cargo is not transhipped.
- Third, regional short sea services may or may not be linked to a main hub, where deep sea shipping lines call.
- Fourth, regional short sea operations are typically predicated on precise schedules, whereas hub-and-spoke feeder services tend to be built around mainline ship calls and thus have to be fairly flexible to accommodate delays to large vessels.
- Fifth, many short sea operations provide door-to-door transport services (e.g. from pulp mill to newspaper factory) whereas hub-and-spoke feeder services generally operate port-port (although there are some international examples of door-to-door hub and spoke transport, particularly in Europe).

Another key distinction is that short sea services sometimes have to compete with trucks/trailers and rail service, which provide frequent and reliable service (particularly for movement of high-value intermodal traffic).

There are examples, particularly in Europe, where feeder operators have attempted to move into the short sea market, though with mixed success. The simultaneous operations of hub-and-spoke feeders and short sea services are in many ways incompatible given the different scheduling implications.[15]

[14] Figure taken from "Four Corridor Case Studies of Short Sea Shipping Services", prepared by GI, for the US Department of Transport (DOT), August 2006.
[15] "Transhipment and Feedering", Dynamar B.V., September 2007.

For the purposes of this study, hub-and-spoke and regional short sea operations are addressed separately. Table 3.2 summarizes some of the key characteristics differentiating the two services.

Figure 3.2: Distinction between Feeder and Regional Short Sea Services

Characteristics	Feeder Services	Regional Short Sea Services
Market served	Feeder cargo (arriving via mother ship)	Regional or inter-company cargo
Service anchored to	Mainline ship calls	Fixed schedule
Origination of service	Transhipped to/from mother ship	Region of cargo or hinterland
Type of cargo	Containers	Container, Ro-Ro, break-bulk
Typical service	Port to port	End-End, Quay-Quay, Door-door
Route/network	Link to “hub” port	May/may not be linked to hub
Competes with	Direct call, common use vs. dedicated	Road and rail transport

Accordingly, for the purposes of this study, we focus on container cargo for hub-and-spoke operations and all cargo (container, Ro-Ro, break-bulk and bulk) for regional short sea services.

3.3 International and Domestic Examples of Regional Short Sea Shipping

There are numerous examples of regional short sea shipping operations, both internationally and in Canada. A unique type of short sea shipping is an “industrial” shipping operation, which can comprise an internal company supply chain solution, moving product via short sea from plant to distribution facility, from mining port to processing plant, etc. Other configurations/concepts could include refined petroleum moving from a refinery to tank farms in local markets, or bulk grain moving from an elevator to a smaller, local market.

3.3.1 International Short Sea Services

There are many international examples of short sea services (as separate from hub-and-spoke operations, though as discussed above, some operators provide both hub-and-spoke feeder services as well as regional short sea services).

In the Baltic, for example, Det Forenede Dampskibs-Selskab (DFDS) has a substantial short sea door-door container service network, separate from its Ro-Ro network service. The separation of container and Ro-Ro services is significant, as cargo types are not mixed, and in many cases, they do not call at the same ports. DFDS also carries cargo on a quay-quay basis.

Another example would be the service provided by Coblefret, a Belgian shipping company that specializes in short sea shipping and bulk shipping through “freight contracts with industrial and mineral groups”. UN RoRo is another interesting example. This service was developed by 12 Turkish trucking companies, in response to the 1990s-era conflict in the Balkans and the need to avoid driving through that region. A similar example in the context of this study would be if several trucking companies joined forces to start a short sea service in a particular lane that would provide savings, more reliable service and an investment opportunity.

3.3.2 Eastern Canadian Examples of Successful Short Sea Services

In eastern Canada, there are several examples of regional short sea services.

McKeil Marine operates what could be described as an "industrial" short sea service dedicated to the needs of one particular customer Alouette, carrying aluminum ingots. The company operates a purpose-built tug-and-barge between Sept-Îles and Trois-Rivières.

The best and most successful example of short sea shipping in Canada is Oceanex (though Oceanex carries a mix of feeder and regional cargo). Oceanex presently operates between Montreal and St. John's and between Halifax and St. John's.

Also using the Saint Lawrence River, the subsidiary of Groupe Desgagnes, Relais Nordik, carries passengers and cargo from Rimouski on the south shore, connecting 12 ports and communities along the north shore as far as Blanc-Sablon. The vessel used is the *Nordik Express*, which is a converted offshore supply boat that is equipped to carry containers. This vessel will be replaced by a new 95 m vessel under construction in Croatia. This new ship will have capacity for 381 passengers and 125 TEUs.[16]

As outlined in section 2.2.2, a number of operators in eastern Canada provide a mix of regional short sea and feeder services:

The above list of international and domestic examples of regional short sea shipping is not meant to be exhaustive, but does provide an overview of examples of different types of regional short sea services.[17]

3.4 Regional Short Sea Shipping: Key Success Factors

3.4.1 What Makes a Regional Short Sea Service Viable?

As discussed in Section 2.2, regional short sea shipping is a different concept from hub-and-spoke feeder service in that regional short sea service serves regional traffic, rather than feeder traffic generated by mainline shipping calls and transhipment activity. In this respect, the viability of a regional short sea service is not tied to the success of a transhipment hub.

Nevertheless, many other factors that make regional short sea shipping viable are similar to those for feeder services. Some of the key factors that encourage the viability of short sea shipping services include:

- Competitive advantage of the sea route relative to alternative rail and road routes
- A critical mass of traffic; consistency and reliability of volumes
- Reliable, year-round access to short sea route(s)
- Low handling fees at origin and destination ports
- A regulatory environment that is conducive to marine transport

[16] *Cruise and Ferry Info*, December 2008; www.wartsila.com.
[17] More examples of both regional short sea and feeder services are provided in the CPCS Working Paper on Hub & Spoke Operations and Short Sea Shipping.

As with feeder services, the above factors are merely enabling conditions; they do not in themselves make short sea shipping viable. As with feeder service, the viability of a regional short sea service will ultimately depend on whether the service is commercially attractive from the perspective of the operator, and whether it suits the needs of the shipper.

3.4.2 Eastern Canadian Initiatives to Promote Regional Short Sea Shipping

The Government of Quebec has established two programs to support the development of short sea shipping (no distinction made between feeder and regional short sea services):[18]

- Programme d'aide en transport maritime (2001-2005)
- Programme d'aide à l'intégration modale (2006-2010)

Examples of initiatives funded under these programmes include the following:[19]

- Financial support for development of regional short sea services for transport of wood chips by barge between Forestville and Trois-Rivières for Kruger.[20] This had resulted in the removal of over 18,000 heavy trucks per year from Route 138 and Highway 40, as well as in the greater municipality of Trois-Rivières.
- Financial support for development of regional short sea services for transport of aluminum by barge between Sept-Îles and Trois-Rivières for Alouette (service provided by McKeil Marine). This has had the effect of removing 15,000 heavy trucks per year from Route 138 and Highway 40.
- Financial support for the feasibility study for barge transport of wood chips for Kruger.
- Financial support for the feasibility study for marine transport link between the port of Gros-Cacouna and the North Shore of the Saint Lawrence River.

The Ministry of Transport of Quebec is also an active participant in the Roundtable on short sea shipping. The **Québec Short Sea Shipping Roundtable**, was created in 2004 by the St. Lawrence Ship operators following the recommendation of the Marine Industry Forum to provide government and industry with a tool to share expertise on the development of short sea shipping in the region.

3.5 Necessary Conditions for Development of Regional Short Sea Shipping

Unlike for hub-and-spoke operations, the success of a regional short sea service is independent of the success of a hub. It is not dependent on shipping line calls or on transhipment traffic.

[18] http://www.mtq.gouv.qc.ca/portal/page/portal/entreprises/transport_maritime/courte_distance#action, last accessed on November 19th, 2008
[19] Total contributions to these projects are not known.
[20] This service met its demise with the closure of the paper mill in Trois-Rivières

Rather, the success of regional short sea services is contingent on minimum, regular, committed traffic, be it from shippers, internal company supply chains, or otherwise. Other key factors necessary for the success of regional short sea shipping include:

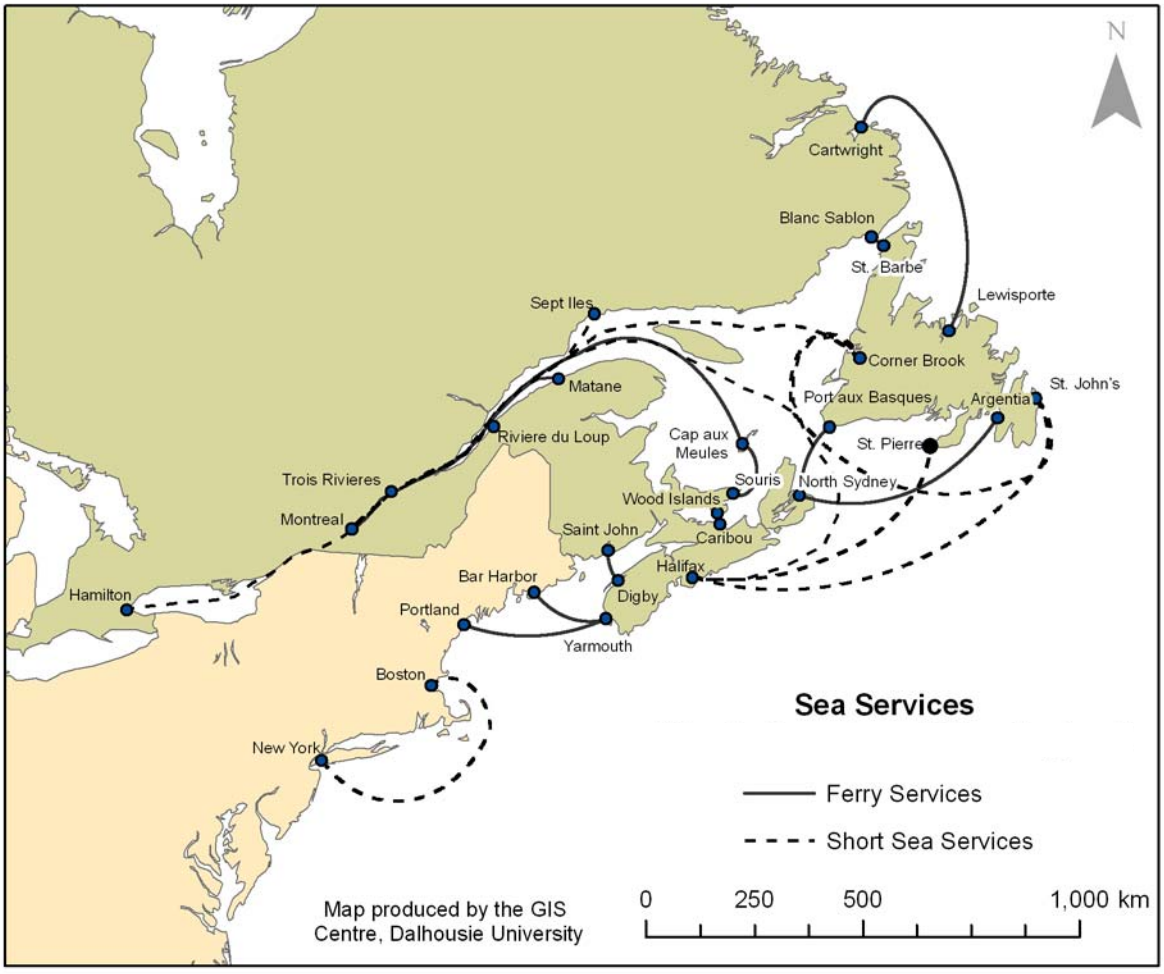
- Competitive advantage of sea route relative to alternative rail and road routes
- Reliable, year-round access to short sea route(s)
- Low handling fees at origin and destination ports
- Whether the short sea operation is a container, Ro-Ro or industrial shipping application, it is important, if not critical, to find a base cargo to provide at least breakeven volumes to start. Ideally, these contracts should be for long-term periods rather than for “spot cargo”
- Support programs, such as those noted in QC, may also help promote the development of regional short sea services, where initial start-up risks are to high for the private sector to take on alone
- Access to suitable vessels is critical, as is the ability to “right-size” as the service develops

Ultimately, the success of a service will hinge on the commercial viability of that service.

4 Hub-and-Spoke Operations and Short Sea Services in Eastern Canada

Figure 4.1 presents all short sea and ferry services in Eastern Canada as of September 2008. The Eastern Canadian experience with hub-and-spoke feeder service, regional short sea service, and ferry service, are described in more detail in the following sections.

Figure 4.1: Eastern Canadian Short Sea Services



4.1 Eastern Canadian Hub-and-Spoke Operations

4.1.1 Past and Present Eastern Canadian Feeder Services

The following is an overview of recent and existing eastern Canadian feeder services.

Halifax – New England Feeder Service

There have been at least seven iterations of a Halifax – New England container feeder service since the late 1970s. These have included:

- Maritime Coastal Containers Ltd.
- Zim Container Service
- Hapag Lloyd (Yankee Clipper)
- UM Shipping Ltd.
- SPM Ro-Ro
- Halship Ltd.
- Eimskip

All but the Hapag Lloyd and Zim services were operated on a common user basis. The most long-lived were the Hapag Lloyd service, the SPM service and the UM Shipping service.

At one point in the 1970s, Maritime Coastal Containers operated two small 225-275 TEU vessels between Halifax and Boston and between Halifax and Philadelphia. They operated on a common user basis, serving all the major lines calling at Halifax. The service was withdrawn after the company accepted several short-term voyage charters and two of its customers decided to establish their own in-house feeders.

The Hapag Lloyd and Zim services were operated by major container lines to serve their own purpose. Hapag Lloyd operated its own feeder from the late 1970s until well into the 1990s. It was a 125 TEU vessel, which called at Portsmouth, New Hampshire (NH) and Boston, Massachusetts (MA). It was withdrawn when charter costs increased to the point where the cost of the vessel could not be offset by higher rates in the markets it served. The Zim service was withdrawn in the early 1980s.

The UM service was initially built around the mother ship call of the Tricon (OOCL-NOL-K Line) round-the-world service, which called at Halifax every Wednesday. The schedule was later adjusted to accommodate a new service to Halifax by Maersk Line, which required a late Wednesday departure to ensure a Friday arrival in Boston. At its peak, the service operated a 296 TEU vessel and carried the cargo of 15 shipping lines in Halifax – all except Hapag Lloyd, which still operated its Yankee Clipper to Portsmouth NH and Boston MA. The UM service experienced cash flow problems in the first 18 months of operation and eventually lost the business of the Tricon service when it changed vessel rotations to favour Pacific coast calls. It also lost Maersk Line when that line entered a slot charter with Sea-land and P&O Nedlloyd and began to serve Boston on a direct call basis. This service demonstrates three issues relating to establishing short sea feeder operations: 1) capitalization; 2) scheduling flexibility; and 3) vulnerability to direct calls. It started with a 431 TEU vessel, switched to a 254 TEU ship and finally settled on a 296 TEU vessel, all in the space of 18 months. This demonstrates the

benefits and inherent flexibility of operating on a non-cabotage trade, i.e. no restrictions on vessels operating between Canada and the US, other than that they must meet ship safety standards. They are not restricted as to flag, country of build, ownership or nationality of crew.

The SPM service to Boston commenced after about a 5-year hiatus. It used the same vessel that plied between Halifax and St. Pierre, and thus was able to share vessel costs and administrative costs with another service, saving considerable expense. It also meant that the vessel was always in use, unlike the case of the UM service, where it was idle for at least two days per week. Initially, the service was operated with the 296 TEU *Christina C*. This vessel was replaced by a 376 TEU Romanian-built newbuilding called *Shamrock*. The service did well until 2006, when it experienced cash flow problems and was petitioned into bankruptcy. The vessel was subsequently sold at an auction to Clarke Inc. and is now chartered to Tropical Shipping in the Caribbean.

The SPM Ro-Ro service was replaced in 2007 by a company called Halship, a 50:50 joint venture between the Icelandic company Eimskip and the former operator of SPM Ro-Ro. The service commenced with a 572 TEU vessel, but customer uptake was slow and the Icelandic partner petitioned it into receivership in summer 2007. Eimskip itself briefly reprised the service in August 2007, but volumes were slow to materialize, and the service was withdrawn in early January 2008, as Eimskip was also absorbing its $1 billion purchase of Atlas Cold Storage and Versacold.

Halifax – St. Pierre Feeder Service

The feeder service operating between Halifax and St. Pierre was established in the early 1980s, after many years of operating from Sydney. The reason it was shifted to Halifax was that it could access international cargo that could be transhipped directly from deep sea carriers within the port, rather than having the cargo trucked from Halifax to Sydney. The service is basically operated under contract to the French government. It was operated for many years by the Paturel family until 2003, when it was taken over by Sea Transit. In recent days, as of mid-October 2008, it appears that a new contractor will take over the service. The service has been operated by the 221 TEU Fort Ross, on a weekly schedule.

Eimskip

As noted above, Eimskip briefly operated a Halifax-New England feeder service. It now operates its mainline service that connects Reykjavik with Argentia, NL, Halifax, NS, Everett, MA, and Richmond, Virginia (VA). Because it is subject to the Canadian Transportation Agency (CTA) coasting trade regulations, it cannot carry cargo between Argentia and Halifax, but it can carry intercoastal (short sea) cargo between Argentia and Everett, which is close to Boston. Likewise, because of the Jones Act (described later), it is not able to carry cargo on an intercoastal basis between Everett and Richmond. Two geared vessels of 645 and 712 TEUs are used to provide the service, which connects with the many services Eimskip provides in Europe. This service has operated for many years and recently switched from Shelburne, NS to Halifax. Much of its cargo base is predicated on the carriage of US military cargo to Reykjavík. The Newfoundland and Nova Scotia (NS), as well as the MA port calls are predicated on the carriage of seafood, sometimes in both directions, as Iceland has a very healthy and sophisticated seafood industry. The loss of the Halifax-New England feeder was probably related to slow uptake on the part of

deep sea shipping lines, as well as the absorption of Atlas Cold Storage and VersaCold by the parent company a short time before the service was inaugurated, which consumed both time an resources.

Tropical Shipping

In 2000, Kent Line, owned by the Irving Group of Saint John, sold its container division to Tropical Shipping of West Palm Beach, FL, which operates a myriad of services around hubs in West Palm Beach and St. Thomas, the United States Virgin Islands (USVI). It is arguable as to whether its service constitutes a deep sea or short sea service from Canada; however, the company offers a four-day service from Saint John to West Palm Beach, Florida (FL) and 37 other destinations in the Caribbean on a weekly basis, using two vessels, *Tropic Canada* and *Tropic Atlantic*, both of 1,174 TEUs. It also operates a consolidation warehouse in Moncton, New Brunswick (NB), for cargoes originating in NS and Prince Edward Island (PEI).

Tropical Shipping, owned by Nicor Inc., an energy company based in Illinois (IL), is currently the only container line providing regular service to the port of Saint John. Cargo is relayed at its two main hubs, West Palm Beach and St. Thomas. Theoretically, Tropical could provide short sea service between NB and FL. As of 2007, Saint John's container volumes, which are mostly Tropical's, have increased, from 259,000 tonnes to 277,000 tonnes. TEU volumes are around 50,000, which indicates most of the traffic is southbound.

Atlantic Container Line (ACL)

Atlantic Container Line (ACL) operates 5x 3,000 TEU Ro-Ro container ships between Europe, Halifax and the US East Coast on a weekly schedule in both directions. At one point in the 1980s, the company carried two types of short sea cargo. It had interline arrangements with several shipping lines that solicited cargo in Atlantic Canada, notably Bermuda Container Line and certain Japanese carriers, which was transhipped to feeder or mainline vessels in New York (NY). ACL also carried some local maritime cargo destined for NY and points south. Even though the vessels have capacity between Halifax and NY, since they double-call at Halifax, it ceased these operations as they were too time-consuming for ACL personnel were and expensive relative to the revenue they generated. ACL was sold to the Grimaldi Group and reorganized in the early 1990s, and the mainline service became their exclusive focus.

Great Lakes Feeder Line (GLFL)

Great Lakes Feeder Line (GLFL) was established in 2007 by the former Director of Business Development of the St. Lawrence Seaway Management Corp. The company has purchased the *Dutch Runner*, a German-built feeder vessel, on which it has paid the required 25-percent duty. It is attempting to establish a "European-style" feeder service between Halifax and the Great Lakes. Rates from Halifax to Montreal are advertised as $375 per TEU on basis FIOS (Free In, Out, Stowed), which means stevedoring and terminal handling charges are added to this charge. The service is meant to provide a competitive alternative to rail, but if stevedoring is added at both ends, it will be difficult, as it will add at least $300-$400 to the cost. Thus far, as of this writing (December 2008), it has made one voyage to carry a handful of containers and some project cargo. Immediately afterwards, the company accepted a spot charter to take some cargo to the Canadian north. As of mid-December, the vessel is operating between

Halifax and St. Pierre under requisition by the French government pending the tendering of the service in March 2009.

Mediterranean Shipping Company (MSC)

Mediterranean Shipping Company (MSC) operates a feeder link between Freeport and Montreal, using two ice-strengthened vessels. This service, in effect, connects Montreal with Far East, South America, Caribbean and even Mediterranean markets. That is why trade statistics now show Montreal participating in trades with other than North Europe. This service is able to take advantage of carrying cargo from a variety of intersecting markets, on a foreign flag vessel, similar to the situation vis à vis Halifax-Boston. MSC has operated the service with little fanfare, and so far there have been no imitators. Volumes are not known at this time.

4.2 Eastern Canadian Short Sea Shipping Operations

4.2.1 Past and Present Eastern Canadian Short Sea Services

Oceanex

The best and most successful example of short sea shipping in Canada is Oceanex. The company is the product of several amalgamations over many years. After operating as an income trust since 1997, the company was sold in late 2007 to South Coast Partners Inc., led by Capt. Sid Hynes of St. John's, NL. The sale value was $165M, much of which was provided by three equity firms, South Coast Partners, OPTrust Private Markets Group, and Terma Capital Partners Ltd.

Oceanex presently operates three vessels: the 1,004 TEU *Avalon*, and 600 TEU *Cabot* between Montreal and St. John's and the 1,200 TEU *Sanderling* between Halifax and St. John's. Volumes carried by Oceanex between 2001 and 2005 are as follows:

Figure 4.2: Oceanex Volume, 2001-05 (TEUs)

Year	TEUs
2005	78,887
2004	76,037
2003	73,148
2002	70,202
2001	66,830

Source: Oceanex Annual Reports

The service carries a mix of cargo catering to a number of distinct markets. These include autos, trailers, intermodal containers, international transhipment containers and domestic cargo.

Avalon is one of the most innovative vessels of its kind in the world. It is designed to carry a mix of 20' and 40' international marine containers and 53' domestic containers, which many of

its customers have been purchasing and which lends itself to full intermodality between sea, rail and road.

Since the purchase by Capt. Hynes, the service has been undergoing some tweaking, and the company has invested in three new shore-side cranes, two at St. John's and one at Corner Brook. One change will see the *Sanderling* dropping its return voyage to Halifax via Corner Brook in favour of providing three times per two week sailings to and from Halifax. Likewise, the *Avalon* will return to Montreal via Corner Brook.

As both the *Sanderling* and *Cabot* are aging, the company has been examining the potential to build new vessels. Whether these new vessels are Lift-on / Lift-off (Lo-Lo) or Ro-Ro remains to be determined.

McKeil Marine

McKeil Marine of Hamilton is an industry leader in the transportation of project cargo on the Great Lakes. The company has a barge fleet of 60 units, ranging in size from 500-18,000 deadweight tonnage (dwt). It has 25 tugs ranging in size from 1,000 brake horse power (bhp) to 6,000 bhp. A number of tugs are ice-reinforced to provide ice-breaking and ice escort service. The company is a pioneer in Canadian short sea service, carrying aluminum ingots for Alouette, with a purpose-built tug-and-barge between Sept-Îles and Trois-Rivières.

The perceived benefit of this short sea operation is the modal shift of 250,000 tonnes (or 15,000 truckloads) off crowded highways and onto un-crowded waterways.

Canada Steamship Lines (CSL)

Canada Steamship Lines (CSL) operates its fleet of domestic self-unloading bulk ships in a manner that resembles short sea shipping, although not hub-and-spoke per se. It is headquartered in Montreal and has offices in Halifax, Burlington (ON), and Winnipeg (as well as several locations worldwide). CSL controls or owns the largest fleet of self-unloaders in the world and annually handles 30m tonnes of bulk cargo movements. The company owns 10 self-unloaders and four gearless bulkers and has an additional four ex-Fednav vessels that are being introduced into its fleet. It also has two full ocean-class bulkers and five Nova Scotia-class vessels, of which two are bulkers and three are self-unloaders. Domestically, CSL handles cargo between Atlantic Canada and St. Lawrence ports. Domestic cargoes, including those carried in the Great Lakes, include iron ore, grain, limestone, cement, gypsum and salt.

Canarctic

Canarctic Shipping, a subsidiary of Fednav, operates from St. Lawrence ports to the Canadian Arctic and Labrador. Vessels include the *M.V. Umiak*, which carries nickel between Voisey's Bay and southern Canada.

Groupe Desgagnes

Groupes Desgagnes operates in the St. Lawrence-the Great Lakes and the Canadian Arctic with dry cargo vessels, carrying bulk products, heavy-lift cargoes, containers and general cargo. Again, whether any of this activity, besides their Relais Nordik subsidiary (discussed below), fits the definition of short sea shipping can be debated. Desgagnes operates 16 vessels and has 800 employees and annual turnover of approximately $160 million. It has seven subsidiary companies, including:

- Desgagnes Transarctik Inc.
- Petro-Nav
- Relais Nordik
- Transport Desgages Inc.
- Service Desgagnes Inc.
- Navigation Desgagnes Inc.
- Tessier Ltée

Petro-Nav Inc. operates petroleum / chemical tankers on the Great Lakes, St. Lawrence and in the Canadian Arctic. Its vessels carry crude oil, refined oil, petroleum, chemicals and asphalt. The Petro-Nav Group has 12 vessels and one barge, with total deadweight tonnage ranging from 1,350 to 17,850 tonnes. Average annual volume shipped is 3.5 million tonnes, over a wide range of ports in eastern North America.

Navigation Desgagnes markets and charters vessels carrying dry goods and general cargo in the St. Lawrence / Great Lakes and Seaway region. Cargoes include:

- Grain, salt, cement
- Coal, steel, pig iron
- Containers, heavy machinery
- Project cargo
- Paper, pulp, lumber
- Aluminum

Desgagnes Transarctik operates from the St. Lawrence / Great Lakes region into the eastern Arctic.

Groupe Desgagnes is in the process of renewing its fleet. In the past year, Groupe Desgagnes has taken delivery of three new vessels, two of which were newly built in China. A third vessel, *Sarah Desgagnes*, was built in Turkey in 2007 and purchased by Desgagnes in June 2008. On December 5 2008, it was announced that Petro-Nav had acquired three previously chartered double-hulled tankers owned by Rigel Shipping of Shediac, NB. The vessels will continue to be mamanged by Rigel until April 2009.

Relais Nordik

Relais Nordik operates the *Nordik Express*, a passenger / cargo vessel from Rimouski on the south shore of the St. Lawrence across to 12 communities on the north shore of the Gulf of St. Lawrence and Straits of Belle Isle, as far as Blanc-Sablon. The vessel is a converted offshore

supply boat, of 1,619 dwt., 69.69m loa, and 200-passenger capacity, equipped to carry some autos and container / general cargo.

Figure 4.3: Relais Nordik Ports of Call

Source: www.desgagnes.com

Compagnie de gestion de Matane Inc. (Cogema)

COGEMA provides a shuttle service on the St. Lawrence between Matane and Baie Comeau, and other ports on the north shore, on inducement or when required. The vessel has a capacity of 25 rail cars and connects with two railway lines on either side of the River. In 2007, the ferry carried 12 locomotives in two separate shipments across to Baie Comeau for Iron Ore Company of Canada. Along with three short lines in QC and NB, COGEMA was recently acquired by Canadian National Railway (CN) as part of its purchase of la Société des chemins de fer du Québec.

Kruger Paper

Since April 2005, Groupe Océan has been shipping wood chips by tug and barge from Forestville, on the north shore of the St. Lawrence to Kruger Paper's mill in Trois-Rivières. The benefit is seen as using the St. Lawrence River instead of Route 138. This service was terminated with the closure of the Kruger Paper mill in Trois-Rivières.

4.3 Ferry Services

It is recognized that ferry services fall within the purview of Ferry Policy and Programs at Transport Canada. Nonetheless, there are elements of short sea shipping encompassed by the operations of regional ferry services, some of which have been privatised and some of which are subsidized by government. It should be noted that most ferry services in Canada are

subsidized, which allows them to maintain operations, despite not being commercially viable on their own.

Marine Atlantic Inc. (MAI)

Marine Atlantic Inc. (MAI), the federal Crown Corporation, provides a constitutionally mandated ferry service between Newfoundland and NS, catering to passengers and the trucking industry, on two routes between North Sydney and Port Aux Basques as well as seasonally between North Sydney and Argentia.

In the past five years, with improving economic conditions in Newfoundland and Labrador (NL), MAI has handled the following volumes of commercial traffic, including straight trucks, drop trailers and tractor trailers:

Figure 4.4: Marine Atlantic Volume, 2001-05 (commercial vehicles)

Year	Units
2006	88,066
2005	86,605
2004	85,769
2003	81,169
2002	79,092

Source: Marine Atlantic Inc. Annual Reports

This volume is approximately one-half of NL's commercial vehicle traffic. The other half is handled by Oceanex, as discussed above. Cargo moves onto the Island via Port aux Basques and is trucked across to markets between the ferry terminal and St. John's, with about 70 percent destined to the Avalon Peninsula. Trucks return to Port aux Basques, picking up whatever backhaul is available, usually forest products or seafood. Some of this cargo is then transloaded at warehouses in Dartmouth, NS, and transferred into containers for export. Other cargo moves directly to markets in central Canada or the US

The 2004 Marine Atlantic Advisory Report recommended several changes to the service, which could impact on the commercial traffic in the future. On behalf of Transport Canada, MariNova undertook a study that examined one recommendation in particular, a move to discontinuing drop trailer service in favour of 100 percent "live" loads (tractor + trailer + driver). It was determined that this would have a severe detrimental effect on the movement of goods to and from the Island and the overall Newfoundland supply chain, so the initiative was not implemented. There has not, however, been any discussion as to the *best* way to handle drop trailer cargo. MAI is known to favour carrying all commercial traffic on the same vessels, such as Ro-Ro-Passenger-ships (Ro-Paxes), but some of this cargo could potentially be handled by private sector contractors using pure Ro-Ro vessels.[21] Alternatively, MAI itself could operate a combination of Ro-Paxes carrying "live" traffic and Ro-Ro vessels carrying just drop trailers.

MAI's fleet renewal program envisioned a seven-vessel fleet, including refurbishing the existing superferries and building two new Ro-Paxes at a cost of approximately $1 billion. One new Ro-

[21] Ro-Ro vessels are ferries designed to carry wheeled cargo such as automobiles, trucks, semi-trailer trucks, trailers or railroad cars.

Pax was supposed to be delivered by 2008 but has not been ordered as yet, although a second-hand one will arrive by end-2008. It is understood that this whole program is presently being reviewed within both Transport Canada and MAI itself.

Northumberland Ferries (Wood Islands-Caribou)

Ferry service between Wood islands, PEI and Caribou, NS, was established in the 1930s. Until 1997, there was also a ferry service between Borden, PEI and Cape Tormentine, NB, but it was replaced by the Confederation Bridge. Service between PEI and NS is now provided on a seasonal (May-December) basis with two vessels, *Confederation* and *Holiday Island*, and is subsidized by the federal government.

The service provides an important link between eastern PEI and northeastern NS and Newfoundland (via the TransCanada Highway and MAI). Primary commodities handled include aggregates, seafood, lime, soy and potatoes. Some shippers use the service to move their cargo to Halifax, to connect with shipping lines calling at the Port of Halifax. Commercial vehicle volumes have generally declined since the advent of the Confederation Bridge, but the service is generally considered to be an important link, with significant economic impact, for both eastern PEI and northeastern NS.

Bay Ferries (Saint John-Digby)

A very good example of a ferry service having a short sea element is the service between NS and NB. While predicated on a mix of passenger, auto, tractor trailer and drop trailer business, it is an important link for exporters of seafood and other commodities shipping to US markets.

In 1997 Bay Ferries Ltd. assumed the operation of the ferry service in response to a privatization/request for proposal (RFP) process by the Government of Canada to take over the existing ferry services of the Bay of Fundy (which included service between Yarmouth and Bar Harbor). An operating subsidy was paid for the first three years and a capital subsidy for five years. In 1998, Bay Ferries replaced the aging Bluenose ferry on the Yarmouth-Bar Harbor run, with a high-speed Incat ferry, which it financed itself. That vessel was replaced by a larger version and now runs between Yarmouth and both Bar Harbor and Portland, Maine (ME).

Historically, the Digby-Saint John ferry served a catchment area that encompassed the whole southwestern part of the Province, from Windsor in the Annapolis Valley, and from Lunenburg on the South Shore. Exports carried by truckers typically have included fish, seafood, meat products, lumber, newsprint, wood chips, tires, and furniture. Imports have included groceries, waste paper, manufactured goods, and retail items. Even though new highways throughout all three Maritime Provinces have made the road alternative increasingly competitive, the new operator had successfully withstood the competition until recently. With new highway developments, the catchment area for the service has shrunk. Taking the ferry saves a trucker in Yarmouth, NS, over 620 kilometres (km) of driving and 6.5 hours behind the wheel. At its peak in 2000, over 28,000 trucks were carried on the ferry and *did not* use the highway between Digby and Saint John, which is an objective of most short sea initiatives.

This ferry service has been the subject of at least three studies[22] in the past two years, as the service has been caught in a cost-revenue squeeze brought on by increased fuel prices and declining passenger and commercial vehicle revenues, and the operator has threatened to withdraw the service. The result is a new agreement between the federal government and the governments of NS and NB to provide the service with $15 million over two years, to effectively keep the service running to 31 January 2011.

Societe des Traversiers du Quebec (STQ)

Societe des Traversiers du Quebec (STQ) operates several ferries across the St. Lawrence, which have a short sea component.

The services operated by STQ include:

- Baie St. Catherine – Tadoussac (1 nm)
- Iles aux Coudres – St. Joseph de la Rive (2 nm)
- Iles aux Grues – Montmagny (4 nm)
- Levis – Quebec (1 nm)
- Matane – Baie Comeau – Godbout (34 nm)
- Saint-Siméon – Rivière-du-Loup (14 nm)
- Sorel – St. Ignace de Loyola (1 nm)

The services below are of longest duration (over 4 nautical miles).

Matane – Godbout – Baie Comeau

This service operates with two vessels, the 600-passenger, 125-auto capacity *Camille Marcoux* and the 400-passenger, 70-auto capacity *Felix-Antoine Savard*.

Traffic levels for the past two years have been as follows:

Figure 4.5: Matane – Godbout-Baie Comeau Traffic

Year	Passengers	Vehicles	Autos	Trucks
2007	221,010	110,930	92,748	8,486
2006	221,468	113,698	n/a	n/a

[22] Belleclaire Consulting, Geoplan Opus, MariNova Consulting, "The Digby-Saint John Ferry Service – Impacts and Options", ACOA, August 2006; Opus International and MariNova Consulting, "Digby-Saint John Ferry Service: Traffic and Socio-economic Analysis, 2007; Mariport Group, "Digby to Saint John Ferry: Impact Study, July 2007.

Saint-Siméon-Rivière-du-Loup

This service is operated with the 500- passenger, 100-auto capacity *Trans-Saint-Laurent* ferry.

Figure 4.6: St. Simeon – Rivière du Loup Traffic

Year	Passengers	Vehicles	Autos	Trucks
2007	175,841	79,189	68,854	2,969
2006	179,885	80,125	n/a	n/a

CTMA Group (Magdalen Islands)

CTMA Group (CTMA) operates ferry services to the Magdalen Islands from both Montreal and Souris, PEI. The service to PEI started in 1971, first with the vessel *Manic*, then *Lucy Maud Montgomery*, and now *Madeleine*.

CTMA actually operates three vessels; *Voyageur* and *Vacancier* to Montreal and *Madeleine* to Souris. The service to Montreal carries freight only using Voyageur. *Vacancier* sails to Montreal via Matane, Quebec City with a stop in Chandler, QC.

The Souris vessel operates ten months per year between April and January, but will be operated year round as of 2008-09. The "new" vessel acquired in 1997 resulted in significant increases in traffic, which now amounts to 105,000 passengers, 38,000 automobiles and 4,200 commercial vehicles. The vessel has capacity for 800 passengers and 258 automobiles.

Since the introduction of the "new" vessel in 1997, traffic peaked in 2003 and has settled down to a level well above that experienced with the previous vessel. It is summarized below.

Figure 4.7: Souris – Cap-aux-Meules Ferry Traffic, 2006-07

Year	Passengers	Autos	Trucks
2007	105,045	32,533	4,390
2006	105,107	32,726	4,271

CTMA's service between Montreal and Cap-aux-Meules carried the following traffic:

Figure 4.8: Montreal-Cap-aux-Meules ferry traffic, 2006-07

Year	Passengers	Autos	Trucks
2007	9,963	1,336	1,050
2006	11,494	1,293	1,100

Labrador

Labrador marine service is managed by a private operator (Labrador Marine Inc., a member of the Woodward Group of Companies) on behalf of the Newfoundland and Labrador Department of Transportation and Works. The MV *Sir Robert Bond* operates from Lewisporte to Cartwright and Happy Valley-Goose Bay, carrying freight and passengers along with automobiles. The MV *Astron* carries freight from Cartwright and Happy Valley-Goose Bay to isolated communities while the Northern Ranger provides passenger and limited freight service from Happy Valley-Goose Bay to northern communities. The MV *Apollo* offers a ferry service carrying automobiles, freight and passengers between St. Barbe, NL and Blanc-Sablon, across the Labrador Straits. With the completion of the Trans Labrador highway to Cartwright the Straits ferry has assumed a larger role.

Ferry traffic between St. Barbe and Blanc-Sablon was as follows:

Figure 4.9: St. Barbe – Blanc-Sablon Ferry Traffic, 2006-07

Year	Passengers	Autos	Trucks
2007	63,420	n/a	n/a
2006	62,733	n/a	163

4.4 Advantages, Disadvantages and Perceptions of Hub-and-Spoke Transport and Short Sea Shipping in Eastern Canada

The following provides and overview of the advantages, disadvantages and perceptions of feeder and regional short sea shipping in eastern Canada. Where relevant, stakeholder input has also been included.

4.4.1 Advantages of Hub-and-Spoke Operations and Short Sea Shipping

The advantages of hub-and-spoke operations have long been discussed. Indeed, there is a considerable body of literature and promotional material extolling the virtues of short sea shipping, as well as analysing some of the issues relating to "switching" modes.[23] Examples of advantages include:

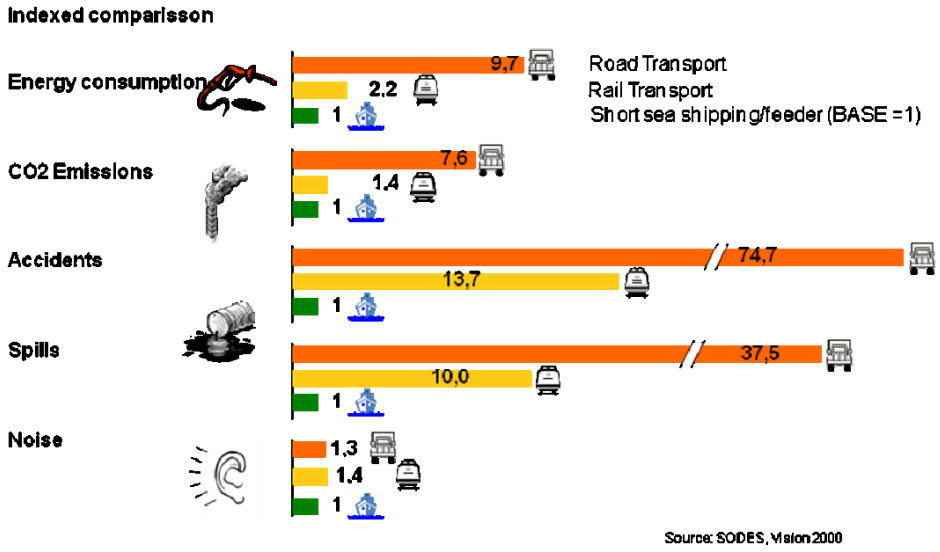
- Lower transport costs per tonne/km than road or rail transport[24]
- Additional (or better utilization of) transport capacity, particularly where competing road and rail transport experience capacity constraints (and waterways are currently under-utilised)
- Feeders offer wider market coverage for a gateway

[23] See www.shortsea.nl; "The Public Benefits of the Short-Sea Intermodal System, The Short Sea Cooperative Program (SCOOP), November 2004; Brooks and Trifts, "Short sea shipping in North America: understanding the requirements of Atlantic Canadian shippers", Maritime Policy & Management, April 2008, Vol. 35, no. 2, 145-158.

[24] This does not take into account the cost of transhipment double handing, etc.

- Feeders can offer container service to markets not big enough to be served by direct call
- Less long-haul trucking required (in the case of regional short sea services), and related wear and tear on roads
- Lower environmental impacts and social costs, as depicted in Figure 4.10

Figure 4.10: Environmental Impacts Feeder and Short Sea Shipping vs. Other Modes[25]



The Short Sea Shipping Cooperative in the US has articulated the potential benefits of developing a short sea shipping intermodal system:

- Relieving congestion on busy coastal highways, which can postpone the need to build new highways
- Relieving traffic density on some congested rail segments
- Reducing environmental impact of trucking (greenhouse gas (GHG), etc.)
- Introducing a new transportation component to the North American intermodal network
- Creating opportunities for ship-owning and shipbuilding industries.[26]

Many of these same benefits could apply in the eastern Canadian context, although the issue of congestion is really only present along the Quebec City – Windsor corridor, in the Montreal and Golden Horseshoe around Toronto. The wide dispersal of population and huge geographic area in the study area means a wholly different context is present.

4.4.2 Disadvantages of Hub-and-Spoke Operations and Short Sea Shipping

The disadvantages for hub-and-spoke and short sea shipping include the following:

- Longer transport times, by virtue of the relative speed of marine vs. rail and road transport. For example, one shipper estimated the additional time to move containers

[25] Graphic reproduced with permission from the Port of Montreal.
[26] "The Public Benefits of the Short-Sea Intermodal System", SCOOP, November 2004.

from Halifax to Montreal and Toronto by sea relative to rail to be three and five days, respectively.
- Seasonality of the St. Lawrence Seaway between Montreal and the Great Lakes, which closes this sea route for 2 to 3 months
- Transhipment and double-handling costs
- Perceived by many shippers as unreliable
- Delays of mainline vessels can impact on feeder schedules
- Feeder vessels take up space at deep sea berths; they can cause operational issues at terminals if dedicated berths not available
- Regulatory impediments, as described below
- Not competitive relative to rail transport
- Labour issues can make short sea less competitive

Regulatory Impediments to the Development of Hub-and-Spoke and Short Sea Services in Eastern Canada

A number of national regulatory issues hinder the development of hub-and-spoke and regional short sea shipping operations in Canada:

- **Cabotage**[27] **restrictions**: Sea service between any two points within Canada is restricted to Canadian-registered vessels.[28]
- **Duties and other charges on the import of vessels**: The import of vessels to Canada from countries with which Canada does not have a free trade agreement is subject to a lump sum duty of 25 percent of the total value of the vessel (or 1/120th of the total ship value per month, for 10 years, subject to the approval of the CTA (Coasting Trade License)).[29]
- **Modal inequities**: Short sea operations are subject to "way" charges (one example being pilotage and another being marine services fees), to which competing modes (e.g. road, rail) are not subject.
- **US Harbour Maintenance Tax (HMT) and Cabotage Legislation**: HMT is an *ad valorem* tax on commercial goods and cruise ships, set at 0.125 percent and applied at specified ports. US Cabotage Legislation ("Jones Act") requires that vessels carrying cargo between two US ports must be US-built, registered and crewed.

The implications of the above for feeder and regional short sea sectors in Canada include the following:

- **Increase risk of market entry**: Cabotage restrictions and duties on the purchase of non-Canadian vessels significantly increases feeder and regional short sea start-up costs. These costs are sunk and thus not recoverable in the event the service is unsuccessful.

[27] In its simplest form, cabotage is defined as the movement of goods or passengers between two ports or places within the same nation. It is called coasting trade in Canada.
[28] If a suitable Canadian vessel is not available, a Coasting Trade license can be granted to foreign registered ship. This license must be renewed annually
[29] Approval of a Coasting Trade License by CTA (which must be provided annually) is contingent on there being no other ship in the Canadian fleet meeting the physical characteristics and functions of the ship for which a Coasting Trade License is sought.

- **Limit ability to respond to market**: In areas of the world with a thriving short sea sector, operators typically charter, rather than purchase, ships. This provides the ability to change ships to better respond to the market and to limit market entry risk given the implicit lower capital costs.
- **Limit availability of ships for feeder and regional short sea services**: At present, there are only two container ships in the Canadian fleet that are appropriate for feeder services. These are the 110 TEU *Astron* owned by Woodwards of NL and the 221 TEU *Dutch Runner*, owned by GLFL. Clarke Inc. also owns the foreign flag 376 TEU *Shamrock*, which operated between Halifax and both St. Pierre and New England until 2004. The fleet of ships for regional short sea services is also limited and aging. Besides the vessels owned by Oceanex, there is another large (90 trailer capacity) Ro-Ro owned by MAI, *Atlantic Freighter*, as well as the 40 trailer capacity *Camilla Desgagnes*, owned by Groupe Desgagnes, which could be suitable for regional short sea service. The above-noted regulations discourage the purchase of suitable new ships.
- **Limit market**: US cabotage and Jones Act legislation restricts the ability of Canadian feeder or regional short sea operators from serving more than one US port per trip.

In short, it is the consultant's opinion that the current regulatory structure makes new entry into feeder or regional short sea services extremely costly and risky. Stakeholders interviewed as part of this study indicated that these are the most significant hindrances to the development of feeder and regional short sea services in eastern Canada.[30]

Short Sea Not Competitive with Rail Transport

Rail presents significant competition to both feeder and regional short sea services in eastern Canada. In both cases, there are often rail spurs either on the international container terminal or at the industrial facility where potential short sea cargo is generated. The same is often true at the destination, so that a rail service can offer 'to the door service' without the need for double handling of cargo or containers or of drayage.

Labour Issues and Competitive Implications

Most major ports in Canada are operated within the Canada Industrial Relations Board-designated areas of 'Geographic Certification' for purposes of longshoring activities. This means that in most ports in eastern Canada all longshoring and stevedoring activities are governed by collective agreements negotiated with a union, typically the International Longshoremen's Association (ILA) for the loading and discharging of ships within a particular port. Though this issue is outside the scope of this study, it is important to note that some of these collective agreements are extremely restrictive with regard to minimum gang size, minimum notice period, minimum call out, cancellation, overtime premium and numerous other conditions. The result of this situation is that the handling of small quantities of cargo, 20-40 containers for example, can become expensive compared to other modes of transportation not faced with the same labour restrictions.

[30] A more detailed discussion of regulatory constraints and related impacts on Canadian hub-and-spoke and regional short sea service is outlined in Working Paper 5, *Regulatory Issues Relevant to Short Sea Shipping.*

4.4.3 Perceptions of Hub-and-Spoke Operations and Short Sea Shipping

Over 30 stakeholders were contacted to provide input into this study. Of these, 15 provided input on the perceived advantages, disadvantages and opportunities of hub-and-spoke operations and short sea shipping in eastern Canada.[31] The list of stakeholders is provided in Annex D. The questionnaire used to solicit input is provided in Annex E. The perceptions of each stakeholder group with regards to feeder and short sea shipping are summarized below.

Shippers
Three major shippers responded to the questionnaire, each importing significant volumes of containerised cargo, via eastern Canada. Their transport needs and concerns with respect to feeder services are as follows:

Transport / Supply Chain Needs	Concerns with Feeder Service
o Reliable, time sensitive service o Maintain supply chain integrity 12 months a year o Transit time would have to be comparable and rates more than competitive o Short cycle times between a central Canadian distribution centres and Maritime stores o Delivery schedules, must be integrated into existing or planned distribution channels	o Short sea perceived as “slow and unreliable” o Seasonality of transport between Montreal and Great Lakes problematic o Increased lead time required (particularly issue for high value containerised goods, which increases overall inventory costs) o Past experience of failure makes shippers reluctant to switch o Short sea shipping cannot fill need for short cycle times

The only noted perceived advantage was the possible cost savings from short sea services relative to other modes. It was noted that feeder services in eastern Canada may be better suited for lower value, non-time sensitive cargo, provided that transport costs are significantly more competitive than road and rail transport (container cargo typically does not fall into this category). General merchandise retailers may be most likely to switch to feeder services as their product can withstand longer shipping lead times. The potential to use empty marine containers to ship product eastbound to Atlantic Canada from the Toronto market was also noted, although the closure of the St. Lawrence Seaway in winter was perceived as a major challenge.

Shipping Lines
Three shipping lines provided input to this study. Of these, none indicated that they were currently using feeder or regional short sea shipping services. Their needs and concerns with respect to feeder and regional short sea services are summarized in the table below:

[31] The study team followed up at least twice and in some cases three or four time with non-responding stakeholders.

Operating Needs	Concerns
o Sufficient critical mass of traffic (preferably locked in over long term) o Service must provide acceptable commercial returns and be economically viable from start-up o Need for start-up capital o Must be able to offer significant door-to-door cost advantage relative to road and rail to be competitive o More opportunity for competitiveness if railways at capacity (which isn't the case in eastern Canada)	o Import duty on foreign-built vessels makes it difficult to recoup investment costs o Cabotage rules make it difficult to quickly respond to the market (can't charter vessels) o High stevedoring costs in the St. Lawrence and other ports in the Great Lakes o Closure of St. Lawrence Seaway in winter o Lack of suitable Canadian flag vessels, lack of second hand vessels o Subsidized competing modes (roads) o Past experience of failures

Shipping lines had mixed views on the potential of hub-and-spoke feeder services. The only noted perceived advantage was the possible cost savings from short sea services relative to other modes. One indicated no potential, especially if containers alone were contemplated. Others indicated potential for cross-lakes and east-west movement of containers, particularly moving into and out of the Great Lakes region, on an axis stretching from Montreal, Quebec City, Sept-Îles, Canso and Sydney. They also see potential to move trailers on Ro-Ro vessels, which are currently crossing at border points. This would alleviate congestion on highway crossings. There is a perceived lack of port infrastructure in the Lakes, however, to support such services.

Port Authorities and Terminal Operators

Five eastern Canadian port authorities and one terminal operator responded to the questionnaire. Needs and concerns with respect to feeder and short sea services are summarized below.

Needs	Concerns
o Critical mass of transhipment traffic o Obtaining container volume commitments from shipping lines o Need for increased storage capacity at terminals to accommodate transhipment volumes o Need for start-up capital o Improved local distribution requirements and related infrastructure	o The largest markets on the east coast are already serviced by large vessels directly o The large inland destinations in the Great Lakes have ice issues in winter months o Start-up capital needs represents barrier to entry o Regulations are impediments to feeder services

The terminal operator that responded indicated that the major benefit from serving short sea services is the additional traffic that this would generate.

It was nevertheless indicated that because of Jones Act considerations, the only port that makes sense to develop as a hub is Halifax for cargo destined to New England. Other respondents cited other opportunities worthy of further investigation, including:

- All container cargoes and Ro-Ro cargoes transhipping between Newfoundland and international markets as well as domestic cargoes between the mainland and Newfoundland
- Container cargoes between the US Northeast and overseas markets directly serviced by carriers calling at the Port of Halifax
- Container cargoes transhipping between points offshore to Canada, such as Iceland and Greenland, hubbing through Halifax to reach the Caribbean, Central and South America.
- There is some potential in certain market segments to service ports along the St. Lawrence River, the Seaway and the Great Lakes via short sea from Halifax (e.g. over dimensional cargoes, very heavy 20' containers, etc.) including the US side of the Great Lakes.

4.5 Lessons Learned from Eastern Canadian Hub-and-Spoke Operations and Regional Short Sea Shipping

Eastern Canada's experience with hub-and-spoke feeder operations has largely been unsuccessful. Virtually all eastern Canadian hub-and-spoke feeder services have failed or otherwise stopped serving this market. The main reason has been a **lack of critical mass** of transhipment traffic at potential hubs (Halifax and St. John's). The underlying reasons for this lack of critical mass stem from both the buy-side and supply-side of feeder services, as summarized below.

4.5.1 Reasons for Poor Up-take from Buy-Side (Shipping Lines, Shippers)

A number of factors can be cited for the limited acceptance of feeder and regional short sea services by shippers. The most significant factors, derived from stakeholder consultations, the literature, and analysis of business opportunities and conditions, can be summarized as follows:

- Feeder and regional short sea services are generally slower than rail and road transport alternatives. This makes feeder and regional short sea service less appropriate for the movement of time-sensitive and high-value containerised cargo. In particular, longer transport times often translate to increased inventory costs for shippers and increase supply chain risk, making feeder and regional short sea operations significantly less attractive for the movement of time-sensitive and high-value containerised cargo.
- For traffic moving from the East Coast to the Great Lakes, the seasonality of transport along the St. Lawrence Seaway is a major impediment to switching to feeder and short sea services. Shippers generally prefer reliable, long-term transport contracts (and they often benefit from longer-term arrangements with transporters). The closure of the Seaway during 2 to 3 months would not only require shippers to shift modes, but it may also hinder their ability to lock in preferential rates with road or rail transport providers for the winter months.
- Though it is widely held that the per TEU/km or per tonne/km is lower for short sea services than alternative road and rail transport, it is unclear if the all-in total logistics costs, including inventory costs, is low enough to justify a switch from road or rail to feeder or short sea service.

- One of the most "natural" feeder routes, Halifax-New England, has seen considerable instability and failure over the past 25-30 years, such that would-be operators and users are now reluctant to invest in, or use this routing.
- The reality is that there is currently no pure hub-and-spoke feeder service in eastern Canada and that few regional short sea services are serving the key markets along the St. Lawrence Seaway, the Great Lakes, and the eastern US. As a result, there is little by way of short sea service to offer to shippers in eastern Canada, other than to and from Newfoundland, as well as St. Pierre et Miquelon. Given the importance of supply chains, most shippers are unlikely to want to switch to feeder or regional short sea services until such services are proven.

4.5.2 Reasons for Poor Up-take by Supply-Side (Operators, Ports, etc)

A number of reasons are attributed to the limited up-take of feeder and regional short sea services by the supply side. The most significant factors can be summarized as follows:

- The risks of starting up a feeder or regional short sea service are very onerous. Initial start-up costs are very high, due in particular to duty on import of new ships. These costs are incurred before traffic is locked in (which may, or may not follow). Compounding this risk is that the duty on imported ships is a sunk cost; if the operator decides to get out of the market, they will not be able to recover this initial cost.
- In Canada, only ships that are Canadian-registered, and on which all applicable duties have been paid, have unrestricted access to engaging in coasting trade activities. This can prevent Canadian feeder and regional short sea operators from chartering vessels to best respond to the market (which is typically what happens in successful feeder markets internationally).[32] Coasting Trade Licenses (where approved by the CTA) may spread the capital requirements related to the 25-percent duty, however, as these licenses are granted on an annual basis only, the risk remains that an operators may have to pay the remaining duty as a lump sum, should CTA not approve licenses at a later date.
- Lack of suitable Canadian flag vessels, lack of second hand vessels.
- Seasonality of transport up the St. Lawrence limits feeder and regional short sea service to 10 months of the year-as a maximum. It is very difficult to operate a business when a capital asset cannot be used all year round.
- US Regulations (e.g. Jones Act) preventing service to multiple US ports in a string, limits market opportunities
- Long-term rail transport contracts in eastern Canada often prevent a rapid modal shift to sea transportation.
- In the case of Canada/US feeder operations, where barriers to entry are fewer and foreign flag vessels can be employed, there is a reluctance of deep sea shipping lines to commit to volume levels until the operator has proven itself, which can take several months and result in significant losses incurred.
- The failure of several other feeder and regional short sea services in eastern Canada is not particularly inspiring for other would-be operators (or customers).

[32] A Coasting Trade licence can be issues to a foreign registered vessel if no suitable Canadian vessel is available. This license must be renewed annually.

4.5.3 Summary of Lessons Learned

The biggest problem facing the eastern Canadian feeder and short sea sector is a lack of critical mass of transhipment and regional short sea traffic. This, however, is but a symptom for a number of underlying buy-side and supply-side causes (as noted above). Unless the underlying issues are addressed, the feeder and regional short sea shipping operations in eastern Canada will continue to be caught in a "Catch 22" situation, whereby would-be feeder and regional short sea operators are unlikely to make the initial investments to provide service where demand is unknown or uncommitted, and shippers are unlikely to switch to feeder or regional short sea until this service is proven.

The aim and next steps of this study will be to assess opportunities to best address underlying issues hindering the development of eastern Canadian feeder and regional short sea services. A framework will be developed to assess the routes with the most potential for hub-and-spoke container operations or regional short sea services.

Part II:

Assessment of Opportunities for Hub-and-Spoke Operations and Regional Short Sea Shipping Initiatives in Eastern Canada

5 Hub-and-Spoke and Feeder Services Options

This section seeks to identify potential eastern Canadian hub-and spoke opportunities. Options for regional short sea shipping routes and business opportunities and feasibility assessments for selected routes are presented in the following chapters.

5.1 Selection of Eastern Canadian Hub Candidates

In line with the key success factors for hubs identified in Section 2.3.1, six basic criteria were used to identify potential hubs in eastern Canada. These criteria are as follows:

- Location near international shipping route(s), or currently handling container traffic
- Regular container shipping line calls (mother ships), or potential for same
- Currently handles, or potential to handle, significant volumes of container cargo[33]
- Location within easy access of feeder ports (eastern Canada, eastern US, Great Lakes)
- Easy approach from open sea and deep fairways
- Ample berthing facilities capable of handling large container vessels

Accordingly, we have identified the following ports in eastern Canada as meeting these criteria (some more loosely than others) and thus being worthy of some consideration as potential hub ports:

- Halifax
- Montreal
- St. John's
- Saint John
- Quebec City
- Sept-Îles
- Melford (potential, if/when built)

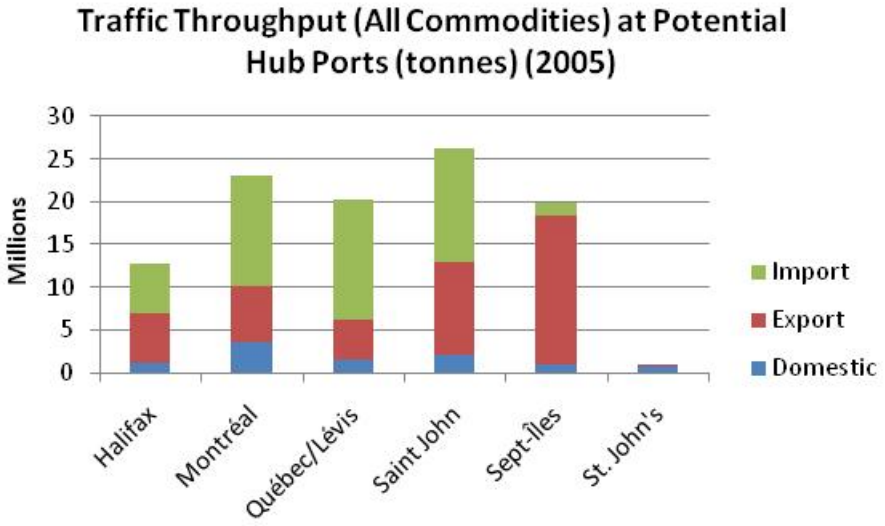
A profile of each hub candidate is presented in the following sections.

5.2 Overview of Traffic through Hub Port Candidates

Figures 5.1 and 5.2 provide an overview of domestic, import and export traffic through hub port candidates for all commodities, and container traffic. At the time of writing, traffic data (2005) is the latest available from Transport Canada.[34]

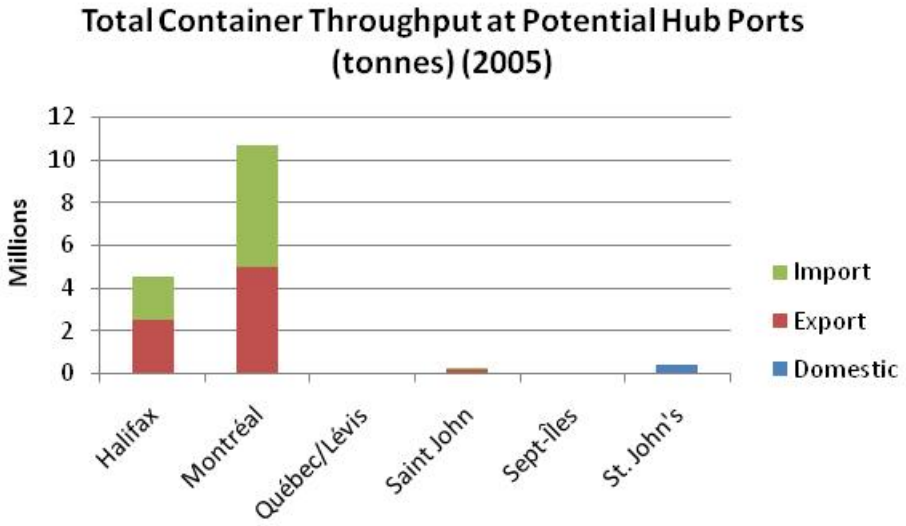
[33] As noted earlier in this report, feeder service lends itself best to the movement of containerized cargo. As such, the focus of this section is on hub-and-spoke transhipment / feedering of container traffic.
[34] Transport Canada confirmed that 2006 data was not yet available, December 12, 2008.

Figure 5.1: Total Throughput (All Commodities) at Potential Hub Ports



Source: Derived from Transport Canada Marine Data, 2005

Figure 5.2: Total Container Throughput at Potential Hub Ports



Source: Derived from Transport Canada Marine Data, 2005

As evident from Figures 5.1 and 5.2, Halifax and Montreal are by far the two main container ports in eastern Canada. St. John's and Saint John also currently handle containers, although in much smaller volumes.

5.2.1 Port of Halifax

The Port of Halifax is the largest container port in Atlantic Canada (and the third largest in Canada). The port is one of the world's largest and deepest natural harbours, and with about ten direct liner services plays a key role in linking the region, Canada, and North America to world markets.

Its geographic position (on the great circle route from Europe to US East Coast) provides easy access for shipping lines and its relatively long inland haul requirements potentially allows short sea alternatives to be competitive with rail and truck to certain destinations. Halifax can accept the largest ships operating on all trade lanes and has ample berth and handling capacity for short sea shipping services. With its direct liner services as well as transhipment and feeder services, the Port of Halifax plays a vital role in serving local and world markets.

The port's operations include 14 different terminals and wharves that provide container, bulk, break-bulk, and Ro-Ro cargo handling, and integrated services for a wide range of users. The port has two purpose-built container terminals and two others that can handle containers using mobile cranes. A full profile of the Port of Halifax's facilities is provided in Annex F. It should be noted that the Port of Halifax is served by a Class 1 railway – CN, which provides service eastward to key inland markets in ON, QC and the North American Heartland.

The Port of Halifax has been the most active in eastern Canada in terms of feeder services, and such services exist to Newfoundland and St. Pierre Miquelon and until recently, another one was operating to Boston and Portland.

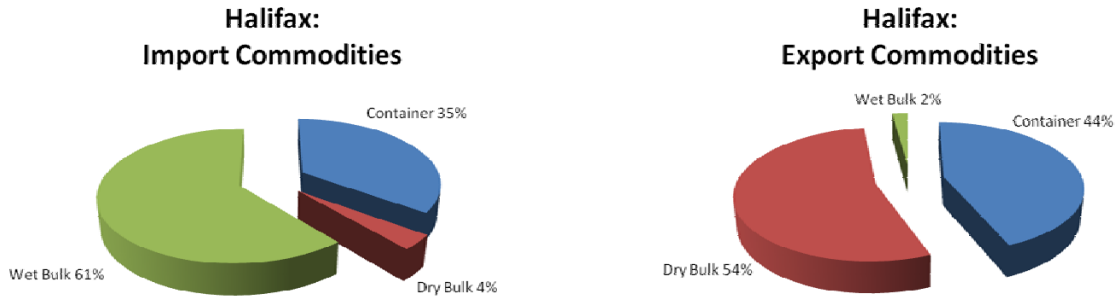
Traffic Profile

The Port of Halifax handles approximately 14.2 million metric tonnes of cargo in 2006.

The largest import by volume is crude oil, followed by containers. Halifax is also a major distribution point for imported automobiles, which are processed at Autoport for shipment throughout Canada.

The breakdown of imports and exports by commodities are provided in Figure 5.3.

Figure 5.3: Traffic Profile through the Port of Halifax



Source: Graphs derived from GI marine data for Atlantic Canada, October, 2008

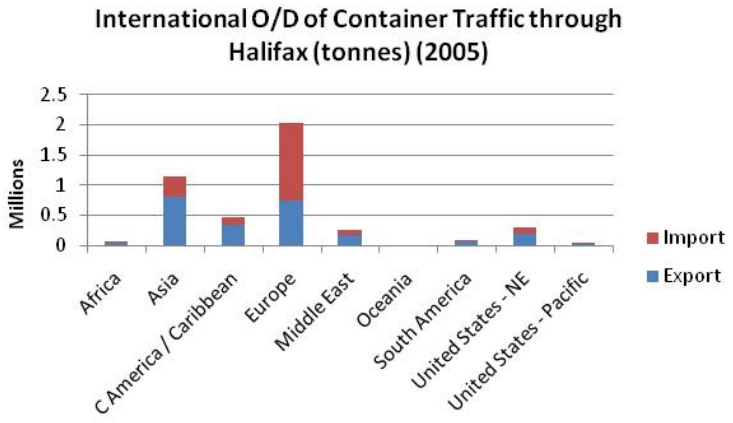
The Port of Halifax is the primary Atlantic Canadian gateway for the movement of container traffic, handling about 90 percent of all imports and 80 percent of exports (mostly from/to Europe).[35] In 2005, the Port of Halifax handled 550,000 TEUs of containerized cargo. Volumes handled by the Port of Halifax have since dropped to about 400,000 TEUs. It is possible that volumes of containers through Halifax will continue to decline, for a number of reasons,

[35] The balance of container traffic through the Atlantic Gateway moves through the ports of Saint John, St. John's (via Oceanex's short sea service from Halifax or Montreal), Argentia, and in some cases other smaller ports.

including the decrease in rail service to the port, which makes this port less competitive relative to others on the eastern US in serving the North American Heartland.[36] The following provides an overview of the mix of cargo moving in containers through the Port of Halifax.

The international origin and destination of containers imports/exports through the Port of Halifax is largely Europe, as depicted in Figure 5.4.

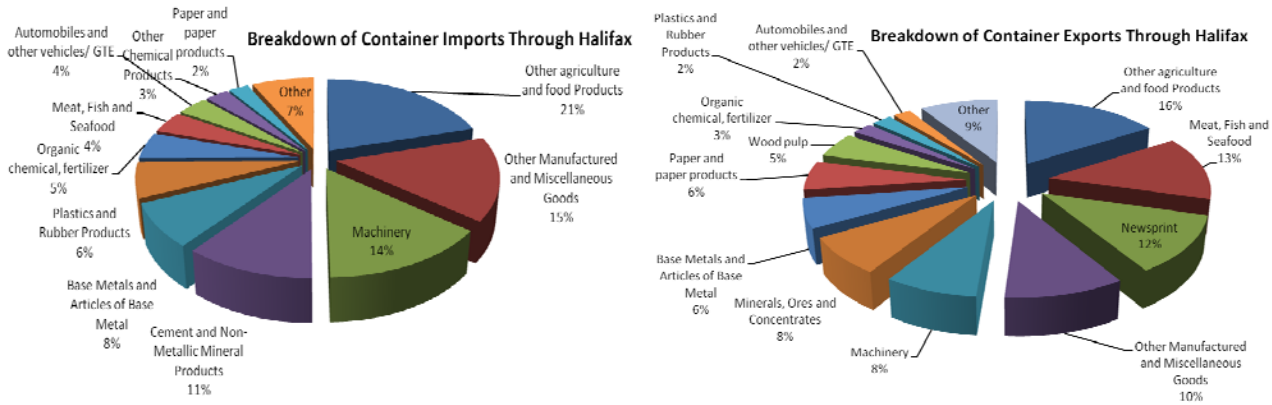
Figure 5.4: International O/D of Container Traffic through Halifax.



Source: Derived from Transport Canada Marine Data, 2005

The makeup of container traffic through the Port of Halifax is varied, as depicted in Figure 5.5. Containerized commodities that best lend themselves to hub-and-spoke feeder services are relatively low-value, non-perishable or time-sensitive goods.

Figure 5.5: Make up of Containerized Imports/Exports by Volume (2006)



Source: Graphs derived from GI marine data for Atlantic Canada, October, 2008

[36] For a more detailed analysis of the Port of Halifax, and reasons for the decrease in traffic in recent years, refer to the North American Heartland Infrastructure Requirements study, being undertaken for Transport Canada

The majority of container imports arriving at Halifax are destined to key inland markets including ON, QC, and elsewhere in the North American Heartland. Key container exports through Halifax largely originate from these same markets, as well as Atlantic Canada.

It is unlikely that traffic currently moving by rail would be diverted to feeder short sea service, given the inherent competitiveness of rail transport and the seasonality of the St. Lawrence Seaway. The traffic that represents the greatest likelihood of shifting to feeder service is that currently moving to/from inland markets by truck that could otherwise be served by sea (i.e. with water access).

Liner Service
Liner services serving the Port of Halifax are more or less exclusively devoted to containers, although one container service calling at the port's container terminals carries Ro-Ro cargo as well. At present, this applies more to the Fairview Cove Terminal than the South End Terminal, although a change in carrier at either terminal could change that tendency. Both terminals are equally equipped to handle container and Ro-Ro cargoes.

The liner container carriers currently serving the port are:

- ACL (weekly east and west bound)
- Hapag-Lloyd (twice weekly east and west bound)
- NYK Line (same as Hapag)
- OOCL (same as Hapag)
- Eimskip (mainline service) (bi-monthly east and west bound)
- Wallenius-Wilhelmsen Lines (monthly)
- Hamburg Sud (weekly)
- Melfi Marine (monthly)
- Nirint Shipping (monthly)
- Zim Israel Container Lines (Zim) (weekly east and west bound)
- Oceanex (3x every two weeks)

Many of the carriers that call at the Port of Halifax are discharging import cargo at Halifax in order to lighten their vessel prior to calling the Port of NY/New Jersey (NJ) (and the reverse). To carry short sea cargo between Halifax and NY could become an operational impediment. There are also issues with the 24-hour rule, reporting of Foreign Cargo Remaining On Board (FROB) to US Customs and Border Protection that may be an obstacle to handling short sea shipments in this manner.

5.2.2 Port of Montreal

The Port of Montreal is by far the most important gateway port in eastern Canada and presently acts as the short sea hub for the Oceanex service to Newfoundland and through MSC, services to global markets via a hub at Freeport. The port is served by 2 class 1 railways (CN and Canadian Pacific (CP)) and its own short line (100km of railways in the port).

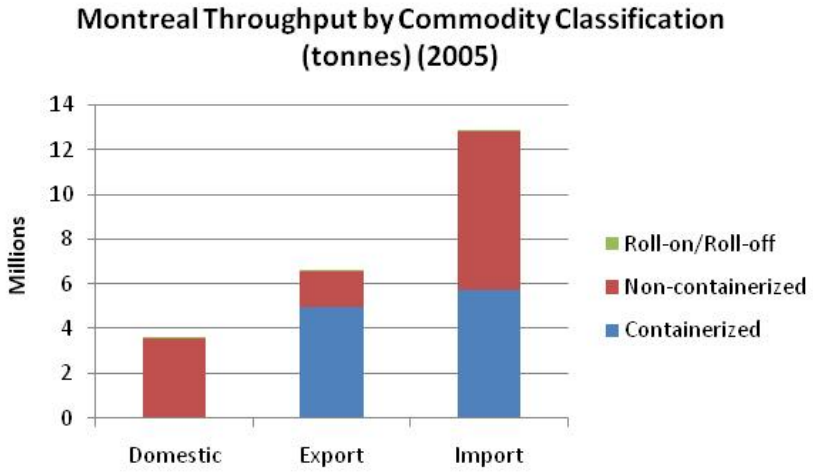
Its proximity to ports in the Great Lakes would make it difficult for a short sea service to compete with the existing rail and trucking services already available to Canadian and US Midwest destinations. (Indeed, at the outset of containerization in the 1970s, there were

feeder services as far as Chicago, but they were soon usurped by rail). Ships are limited by draft restrictions (11.3 metres datum) in the St Lawrence, but specially designed 4,300 TEU ships are being used on some services into the port.

Traffic Profile

Montreal has a mix of containerized, non-containerized (bulk/break-bulk) and Ro-Ro cargo (minimal, much less than 1% of total throughput), as depicted in Figure 5.6:

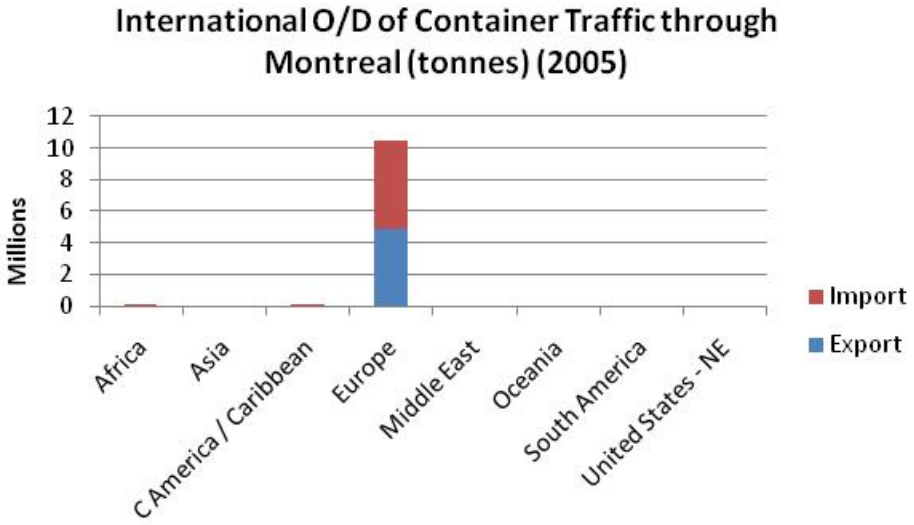
Figure 5.6: Traffic Throughput at the Port of Montreal, by Commodity Classification



Source: Derived from Transport Canada Marine Data, 2005

Almost all Montreal's 1.4 million TEUs of container volume originates from or is destined to Europe, as depicted in Figure 5.7.

Figure 5.7: International O/D of Container Traffic through Montreal



Source: Derived from Transport Canada Marine Data, 2005

The modal split of traffic to/from the Port of Montreal is about 40 percent road, 60 percent rail. Roughly 60 percent of traffic originates from and is destined to markets in ON and in QC, with QC having a larger share of this traffic. The balance of traffic moves from/to the US (approximately 30 percent US Midwest and 10 percent other US). The flow of traffic north/east of Montreal and to the North Shore is not expected to be very significant.

Liner Service
For the purposes of this study, we have considered only container liner services calling at the Port of Montreal, although container vessels calling at the port's container terminals may carry Ro-Ro cargo as well.

The major container lines currently serving the port are:

- Hapag Lloyd (3x per week)
- NYK Line (1x per week)
- OOCL (3x per week, coordinated service with Hapaq)
- Maersk Line (1x per week)
- MSC (4x per week)
- Senator Lines (1x per week (with MSC))

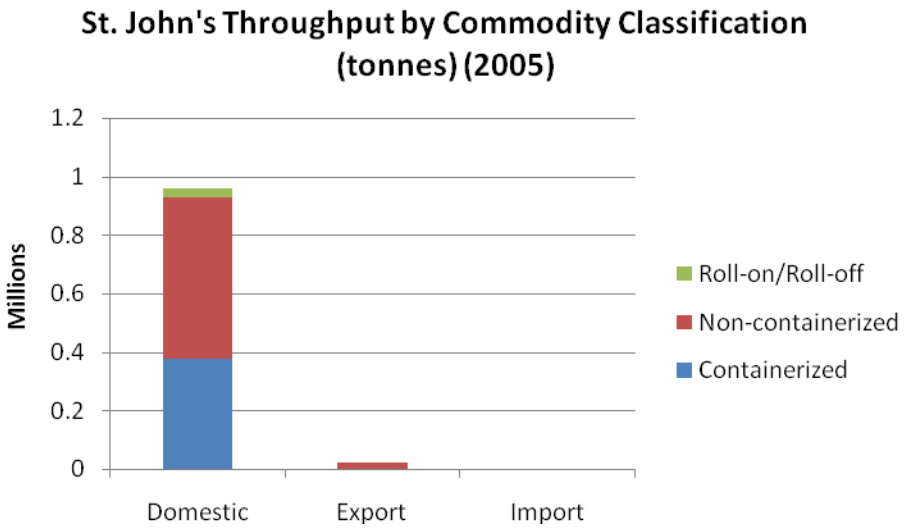
5.2.3 Port of St. John's

Major facilities in the Port of St. John's include the Oceanex terminal, the Harvey offshore oil and gas supply base, Pier 17, and Newdock, which is a shipbuilding and ship repair facility. Irving oil also has a tank farm in the port. A full profile of the Port of St. John's facilities is provided in Annex F.

Traffic Profile
In 2007, the Port of St. John's handled 1,483,486 tonnes of cargo, including over 117,000 TEUs of containerized cargo. The port is also the largest fish-handling port in NL.

St. John's is a domestic port, with 98 percent of its cargo coming from Halifax and Montreal. Of this, about 65 percent is Oceanex domestic cargo, with the rest being a combination of truck trailers, CN Intermodal, autos, and material being shipped to and from the offshore oil rigs. Figure 5.8 provides an overview of traffic through St. John's.

Figure 5.8: Traffic Throughput at the Port of St. John's, by Commodity Classification



Source: Derived from Transport Canada Marine Data, 2005

Oceanex presently operates three vessels, two older Ro-Ro's and one new container ship that is capable of carrying 53-foot containers. The company is mostly involved in domestic short sea shipping, but handles some exports that are transhipped via Halifax or Montreal. In 2007, the last year prior to being sold, the company handled about 55,000 TEUs in each direction.

The company's terminal at St. John's is now operating at 90 percent capacity. In terms of expanding this capacity, they will most likely stack containers higher than they do at present before they would create more land by filling in the harbour. This will require new container handling equipment

Liner Service
The Port of St. John's had a direct international service operated by the Icelandic carrier Samskip in 1990s, but when its competitor Eimskip began to call at Argentia, they decided to share space on Eimskip ships and no longer call St. John's.

The only regular shipping service to and from St. John's is provided by Oceanex, with two services, one to Montreal (twice weekly) and one to Halifax (3x per two weeks).

5.2.4 Port of Saint John

The Port of Saint John is the largest seaport in the Province of NB and is one of the top four in Canada (depending on criteria used). The Saint John Port Authority is responsible for administering the port, which has several facilities including a forest products terminal, container terminal, potash terminal and cruise terminal as well as a number of common-user facilities. The port has the capacity for further expansion of existing facilities. The oil terminals are privately owned and operated, as is the ferry service to NS.

The Port of Saint John is not ideally positioned for the liner services going to the US East Coast from Europe, but its local market is actually larger than Halifax's. It is also closer to possible

short sea destinations (alternative modes more competitive), but its development as a short sea hub is not likely in the short term. Rather, it could develop as a spoke for short sea services to and from US hubs.

Saint John also serves as a gateway for containers, largely arriving from the Caribbean via the marine service provided by Tropical Shipping. However, at 50,000 TEUs per annum, as of 2007, volumes of container imports through Saint John are not large. Most container exports arrive at the port by truck from regional and inland markets.

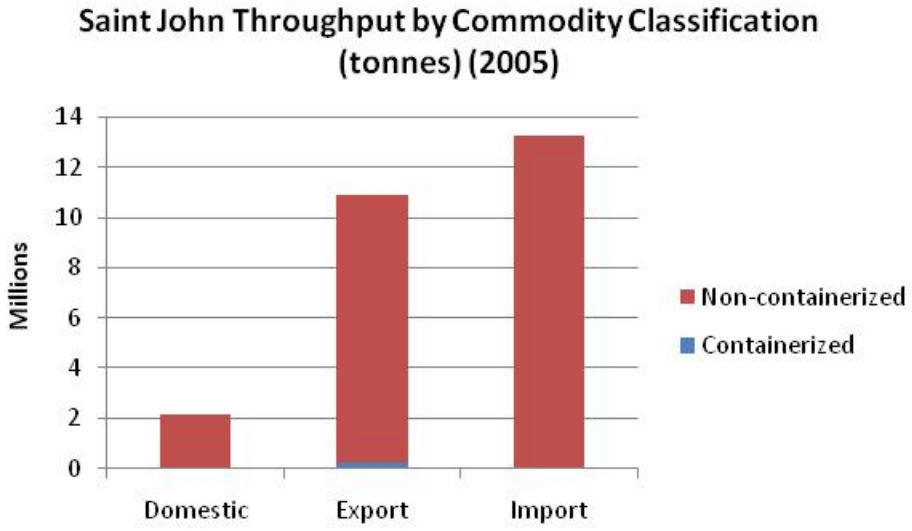
A full profile of the Port of Saint John's facilities is provided in Annex F.

Traffic Profile

The Port of Saint John handles about 27 million metric tonnes of cargo annually, including roughly 50,000 TEUs of container cargo. The port handles bulk, break bulk, forest products, project cargo and containers. Petroleum products account for 90 percent of the tonnage handled at the port. In 2007, it handled 12.2 million tonnes of crude oil imports from international and Canadian markets, as well as 1.5 million tonnes of refined fuel inflows from international markets. The port also handled 11.1 million tonnes of refined fuel exports to international and Canadian markets.

Figure 5.9 provides an overview of traffic handled by the Port of Saint John, by commodity classification.

Figure 5.9: Traffic Throughput at the Port of Saint John, by Commodity Classification



Source: Derived from Transport Canada Marine Data, 2005

The approximate breakdown of imports and exports by commodities are provided in Figure 5.10.

Figure 5.10: Traffic Profile through the Port of Saint John

Source: Graphs derived from GI marine data for Atlantic Canada, October, 2008

Liner Service

For the purposes of this study, we have considered only liner services calling at the Port of Saint John. Container vessels calling at the port's container terminal may carry Ro-Ro and break bulk cargo as well. Break bulk vessels calling at Forterm also carry containers.

The liner carriers currently serving the port are:

- Kent Line International (break bulk)
- Tropical Shipping (containers)
- Star Shipping (break bulk)
- National Shipping Company of Saudi Arabia (NSCSA) (Ro-Ro, break bulk, container)
- Swire Shipping (break bulk, container)

Kent Line is based in Saint John, but does little business at the Port of Saint John. It is owned by the Irving Group and trades worldwide.

The company once carried containers but is no longer in that business, having sold this division to Tropical Shipping, of West Palm Beach, FL. It also once specialized in forest products, but many regional mills have closed, and it has had to look for other commodities.

The company now has a fleet of chartered general cargo and bulk ships of 6,800-12,000 tonnes. It carries project cargoes and operates on semi-liner basis, on the following routes:

- Saint John to Brazil and back – general cargo
- US Gulf, US East Coast, East Coast Canada – Caribbean and Brazil

To simplify their operation, they just operate on a port-to-port basis, with no intermodal service.

The company's cargo base consists of steel, forest products, and shipper-owned containers. Like many other carriers, their ships are basically sailing full and have no capacity at the present time.

5.2.5 Melford Container Terminal (Future)

Melford International Terminals is proposing to build a 315-acre container terminal on an Industrial Reserve located on the Strait of Canso. The $325-million project is being designed with an initial operating capacity of 1.0 million TEUs, with phase 1 scheduled for completion in 2011.

While the development of this greenfield site is still uncertain, the geographic position for short sea services from Melford could be favourable. It is closer (by sea) to Newfoundland, St-Lawrence and the Great Lake destinations than either Halifax or Saint John. It is also seven hours closer to the Straits of Gibraltar than Halifax.

A presentation made to the Highway H2O Conference in 2007 suggests that the promoters are optimistic that the terminal will serve a mix of gateway and feeder markets. At that conference, they specifically spoke about opportunities for developing short sea shipping and feeders between Melford and the Great Lakes. In the meantime, they have met with stakeholders in a host of Great Lakes ports, including two Seaway authorities, Hamilton, Cleveland, Toledo, Duluth and Chicago. The project's Environmental Assessment seems to indicate that with 8,000 lifts per ship call, it will serve markets on the US East Coast by feeder and rail.

Traffic Profile
There is no container or Ro-Ro traffic moving to Melford at present given that has not yet been developed. The initial operating capacity will be 1.0 million TEUs.

The Strait of Canso is presently a major bulk port and handles about 35 percent of Atlantic Gateway tonnage. It offers available industrial land for development and a deep-water, ice-free, protected port with rail, unencumbered by urban development. It is considered to be ideal for greenfield opportunities.

5.3 Quebec City and Sept-Îles – Transhipment and Niche Opportunities

The Ports of Quebec City and Sept-Îles currently do not handle container traffic, nor do these ports serve as hubs at present, for traffic destined to other markets. Nevertheless, they may have a function as transhipment ports.

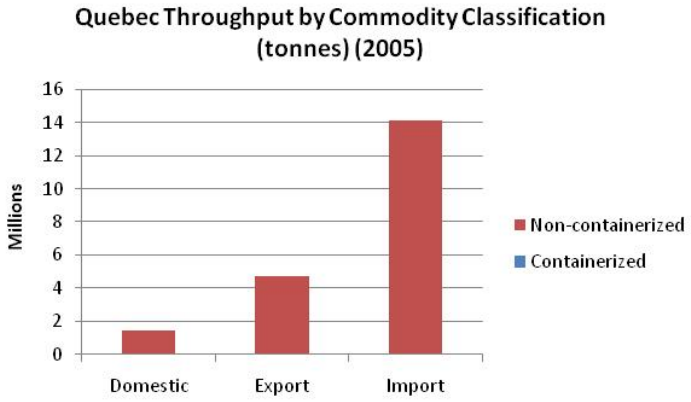
The water levels to Montreal limit ship size and/or the carrying capacity of ships on services to Montreal. Ports such as Quebec City and Sept-Îles, which can accept the largest of ships, could be complementary to Montreal services in allowing full ships crossing the ocean to offload the necessary amount of cargo to meet the draught restrictions for the final leg to Montreal. Both are en-route, have deep water and are well-established ports.

5.3.1 Quebec City

The port of Quebec City would not necessarily require a short sea service to act as a lightening port for ships calling Montreal as both CN can provide service to the port; however if such a service existed, it could be used as an alternative to other modes available. As a medium-sized city, Quebec City would have a consumer market for international goods that could be shipped direct to Quebec City. A full profile of the Port of Quebec City's facilities is provided in Annex F.

An overview of traffic currently handled by the Port of Quebec City is provided in Figure 5.11.

Figure 5.11: Traffic Throughput at the Port of Quebec City, by Commodity Classification



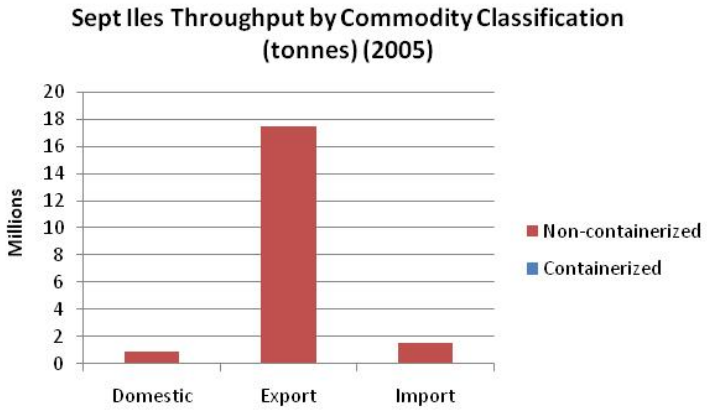
Source: Derived from Transport Canada Marine Data, 2005

5.3.2 Sept-Îles

The Port of Sept-Îles would require some sort of a short sea service to act as a lightening port, and its local cargo both domestic (primarily inbound) and international (primarily outbound) could make use of the same short sea service. Local cargo is presently brought in by truck, and export of aluminum ingots is via a specialized break bulk short sea service to Trois Rivières. A full profile of the Port of Sept-Îles' facilities is provided in Annex F.

An overview of traffic currently handled by the Port of Quebec is provided in Figure 5.12. The largest share of these exports is related to exports from Iron Ore Canada.

Figure 5.12: Traffic Throughput at the Port of Sept-Îles, by Commodity Classification



Source: Derived from Transport Canada Marine Data, 2005

5.4 Selection of Eastern Canadian Spoke Candidates

A number of ports have some potential to be feeder ports from the hubs noted in Section 5.1. These feeder ports either have a need for some form of short sea service because they are not accessible overland or short sea is considered a possible alternative to overland transportation and must compete with the alternative routings. The potential feeder ports that could be served by eastern Canadian hubs may include:

- Argentia
- Belledune
- Corner Brook
- St. Pierre et Miquelon
- Sept-Îles
- Trois Rivieres
- Oshawa / Toronto
- Hamilton ON
- Cleveland-Detroit region
- Chicago region
- Hamilton, Bermuda
- Boston
- Portland, ME
- New London / Bridgeport
- Philadelphia / Camden
- Puerto Rico

For each hub port candidate, we have listed a number of spoke/feeder destination ports (and routes) that could, in theory, support feeder service.[37] Accordingly, Figure 5.13 provides a long list of potential hub-spoke combination options.

[37] Detailed analysis as to suitability and feasibility of spoke will be considered in a later section.

Figure 5.13: Hub-and-Spoke Combination Options

Hub	Spoke/Feeder Destination Ports
Port of Halifax	**Eastern Canada** Argentia-St. Pierre Miquelon Belledune Corner Brook-Sept-Îles-Souris Quebec City-Trois-Rivieres-Montreal Oshawa-Toronto-Hamilton **Eastern US** Philadelphia Portland-Boston New London-Bridgeport Cleveland-Detroit-Chicago (via Great Lakes) **Non US** Freeport Hamilton Bermuda
Port of Montreal	**Eastern Canada** St. John's-Corner Brook Sept-Îles Oshawa-Toronto-Hamilton **US** Cleveland-Detroit-Chicago (via Great Lakes) **Non US** Freeport
Port of St. John's	**Eastern Canada** Corner Brook-Montreal Halifax Labrador-Canadian North **US** Portland-Boston
Port of Saint John	**US** New York-Philadelphia **Non US** Puerto Rico St. Thomas, USVI
Quebec	**Eastern Canada** St. John's-Corner Brook Port Cartier-Sept-Îles Oshawa-Toronto-Hamilton **US** Cleveland-Detroit-Chicago (via Great Lakes) **Non-US** Freeport
Sept-Îles	**Eastern Canada** St. John's-Corner Brook PEI-Halifax Port Cartier-Quebec City Oshawa-Toronto-Hamilton **US** Cleveland-Detroit-Chicago (via Great Lakes)
Melford	Same as markets as Halifax

Profiles for each of the above hub and feeder ports are provided in Figure 5.14. More detailed port profiles for each of the above hub or feeder ports are provided in Annex F.

Figure 5.14: Profiles for Potential Hub and Feeder Ports Served by Eastern Canadian Hubs

Category	Port	Local Market Size (potential)	Access Draught	Benefit	Competition to Short Sea Service	Handling Equipment (or expected choice of)		Estimated Crane Productivity (lifts/h)
						Cranes	Shore	
Hub Ports	Montreal	Large	Restricted	Niche	Rail	Gantry	RTG	25
	Halifax	Medium	Unrestricted	Alternative	Rail	Gantry	RTG	25
	St. John's	Small			Road/Ferry	Gantry		25
	Saint John	Small	Restricted	Alternative	Rail	Gantry	Top Handlers	25
	Greenfield	None	Unrestricted	Alternative	Rail	Modern	TBD	30
Hub-Port/ Transhipment	Sept-Îles	Small	Unrestricted	Niche	Road	Harbour/Gantry	Top Handlers	20/25
	Quebec	Medium	Tidal Restriction	Niche/Direct Service	Rail	Gantry	RTGs	25
Fed Ports	St-John's	Medium	N/A	Need	Road/Ferry	Harbour	Top Handlers	22
	Argentia	Small	N/A	Alternative	Road/Ferry	Harbour/Gantry	Top Handlers	20/25
	Corner Brook	Small	N/A	Need	Road/Ferry	Harbour	Top Handlers	20
	St Pierre Miquelon	Tiny	N/A	Need	Air	Ship's gear	Top Handlers	12
	Isolated communities	Tiny	N/A	Need	Air	Ship's gear	None	10
	Trois Rivieres	Small	N/A	Niche	Rail	Harbour	Top Handlers	20
	Toronto	Large	N/A	Alternative	Rail	Harbour	Top Handlers	20
	Hamilton Ont	Large	N/A	Alternative	Rail	Harbour/Gantry	RTGs	20/25
	Cleveland-Detroit region	Large	N/A	Alternative	Rail/US ports	Harbour/Gantry	RTGs	20/25
	Chicago region	Large	N/A	Alternative	Rail/US ports	Harbour/Gantry	RTGs	20/25
	Hamilton Bermuda	Medium	N/A	Alternative	US Ports	Mobile	Top Handlers	15/20
	Puerto Rico	Large	N/A	Alternative	US Short Sea	Gantry	RTGs	25
	Boston	Large	N/A	Alternative	US Short Sea	Gantry	RTGs	22
	Portland, ME	Medium	N/A	Alternative	Road/Ferry	Ships gear	Top Handlers	15

5.4.1 Selection of Hub-and-Spoke Options for Further Consideration

The scope of the present study does not allow for feasibility analysis of all hub-and-spoke combinations noted in Figure 5.14. Nevertheless, we have developed simple criteria to short-list the hub-and-spoke options that represent the greatest probabilities for success. We will, in a later section, conduct feasibility analyses on a selection of the short-listed hub-and-spoke options that best respond to these criteria.

Figure 5.15: Hub-and-Spoke Options Short-listing Criteria

No.	Criteria	Yes/No
1	Is there a critical mass of container or Ro-Ro traffic currently moving overland (rail/road) from the hub port to the destination(s)?	
2	Do the related commodities likely lend themselves to movement by short sea (non-perishable, non time sensitive, low-medium value by weight)?	
3	Is the shipping hub-spoke route open year round?	
4	Given the nature of the hub-spoke route, and the cost structure of competing transport modes along that same route, is short sea or feeder service likely to have a competitive advantage (in terms of cost, or otherwise)?	
5	Are there any regulatory or structural reasons that would preclude the feasibility of the hub-spoke route?	

5.4.2 Feeder Services with Highest Probability of Success

Each hub-and-spoke option noted in Figure 5.14 was subjected to the above criteria. This analysis included an overview of current traffic flows, covered in a later section. The results of the options screening, using the above criteria, is presented in Annex G.

Based on this analysis, the following feeder routes were deemed to be the candidates most worthy of further consideration:

Figure 5.16: Hub-and-Spoke Options – Shortlist

Hub	Spoke/Feeder Destination Ports	Short-listed?	Selected for Feasibility Analysis	Comments
Halifax	Corner Brook-Sept-Îles-Souris	Y	Y	
	Philadelphia / Camden	Y	N	
	Portland/Boston	Y	Y	
	Hamilton Bermuda	Y	Y	Traffic unknown
Montreal	Quebec City- Port Cartier-Sept-Îles	Y	Y	
	Freeport	Y	N	
St. John's	Corner Brook-Montreal	Y	N*	
	Halifax	Y	N*	
Saint John	New York	Y	N	
Sept-Îles	PEI-Halifax	Y	Y	Considered as part of Halifax-Sept-Îles-Corner Brook string
	Port Cartier-Quebec City	Y	Y	Considered as part of longer string from Montreal
Melford	Melford could theoretically serve as a hub for the same markets as the Port of Halifax	Y	N	Melford hub would compete directly with Halifax hub

*Short sea already provided by Oceanex along this route.

5.4.3 Note on Service to Ontario/Great Lakes

As per the short-listing evaluation in Annex G, feeder options to ON and the Great Lakes were rejected as they failed to meet two of the requirements in the Hub-and-Spoke Options Short-listing Criteria, for reasons discussed below.

Hub-and-spoke route not open year round (Criterion 3): The St. Lawrence Seaway, the only waterway between Montreal and Ontario/Great Lakes, is not open year round, due to freezing and ice in the winter months (typically late December-early March). Ice breaking in this corridor is not feasible due to the system of locks at St. Lambert, Cote St. Catherine, Beauharnois, Eisenhower, Snell and Iroquois, which preclude this possibility.[38]

Since shipping lines, shippers and freight forwarders typically depend on reliable year round transportation options, for reasons discussed earlier, the closure of the St. Lawrence Seaway for approximately 2-3 months of the year means that this is not a viable feeder route.

The results of the recent feasibility study of short sea service from Halifax-Hamilton support this finding.[39]

Cost structure of competing modes (Criterion 4): Major container markets in ON and the Great Lakes are already largely served by rail transport. Indeed, over 75 percent of import and export containers arriving at the Port of Halifax move to/from key inland markets (including ON, Michigan, IL, etc) by rail. As earlier discussed, the costs of rail transport largely preclude competition from the short sea sector. The competitive position of short sea is further weakened by pilotage costs up the St. Lawrence to ON and Great Lakes markets, which can exceed $32,000 per round trip.

[38] For detail on locks, see: http://www.greatlakes-seaway.com/en/commercial/index.html.
[39] MariNova & Partners, “Short Sea Shipping Market Study (Halifax-Hamilton Short Sea Study)”, 2005.

6 Regional Short Sea Service Options

This section seeks to identify potential eastern Canadian regional short sea service opportunities. We do not go as far as presenting the feasibility analysis of regional short sea shipping routes.

6.1 Selection of Eastern Canadian Regional Short Sea Candidates

A number of ports have some potential to be regional short sea ports. These ports either have a need for some form of short sea service because they are not accessible overland or because short sea is considered a possible alternative to overland transportation and must compete with the alternative routings. The potential regional short sea routes that could be served by eastern Canadian regional short sea service providers are as follows:

Figure 6.1: Regional Short Sea Combination Options

Origin / Destination	Origin / Destination
Belledune	Argentia
Argentia	Halifax or Strait of Canso
Montreal	Great Lakes
Montreal	North Shore – Corner Brook
Quebec City	Sept-Îles-Port Cartier
Quebec City	North Shore - Corner Brook
Sept-Îles	Corner Brook Halifax
Saint John	US East Coast
Yarmouth	Portland-Boston (Ro-Ro)
Sydney	Newfoundland (drop trailers)
Saguenay	St. Lawrence ports
St. John's	Labrador & north

6.1.1 Regional Short Sea Services with Highest Probability of Success

Each regional short sea option noted in Figure 6.1 was subjected to the criteria in Figure 6.2 below. This analysis included an overview of current traffic flows, covered in a later section. The results of the options screening, using the above criteria, is presented in Annex H.

Figure 6.2: Regional Short Sea Options Shortlisting Criteria

No.	Criteria	Yes / No
1	Is there a critical mass of traffic (container, Ro-Ro, break-bulk or bulk) currently moving overland (rail/road) along the regional short sea route?	
2	Do the related commodities likely lend themselves to movement by short sea?	
3	Is the regional short sea route open year round?	
4	Is the regional short sea service likely to offer a competitive advantage (in terms of cost, or otherwise)?	
5	Are there any regulatory or structural reasons that would preclude the feasibility of regional short sea service on the route?	

Based on this analysis, the following feeder routes were deemed to be the candidates most worthy of further consideration:

Figure 6.3: Regional Short Sea Combination Options – Shortlist

Origin / Destination	Origin / Destination	Short-listed?	Selected for Feasibility Analysis	Comments
Montreal	North Shore - Corner Brook	Y	Y	Excluded Corner Brook
Quebec City	Sept-Îles-Port Cartier	Y	N	QC not a hub
Sept-Îles	Corner Brook-Halifax	Y	Y	Included PEI
Belledune	Argentia (Ro-Ro)	Y	Y	
Yarmouth	Portland/Boston (Ro-Ro)	Y	Y	

Regional short sea services up the St. Lawrence to ON and the Great Lakes have been short-listed for the same reasons noted above in Section 5.4.3.

7 Business Opportunities Assessment

The business opportunity for hub-and-spoke and regional short sea services is largely a function of the market that it can serve. Given that potential traffic is the key "business opportunity" for hub-and-spoke feeder and regional short sea shipping, this section assesses current traffic flows between the identified feeder and regional short sea routes, as well as opportunities related to the use of empty containers. Future / potential flows are assessed in the following section, relating specifically to the feeder and regional short sea routes identified for further consideration, according to various scenarios.

Note: current traffic flows were derived from a number of different sources, including Transport Canada marine data, data derived from the GI National Commodity Flow study (as of November 14th, 2008), [40] *National Roadside Survey Data, and other sources. Due to issues of consistency and missing data, our team has made the best assumptions possible as to how to best develop flow data. It is recognized that traffic flow data may not be 100 percent accurate. Nevertheless, what is important for the purposes of this study is not the actual flow data, but rather the information on whether there is sufficient traffic that could potentially be diverted to feeder or regional short sea services.*

7.1 Traffic Flow Assessment

7.1.1 Hub-and-Spoke Feeder Services

For each of the hub-and-spoke combination options, current traffic level was assessed to the extent possible with the available data. Figures 7.1 to 7.4 summarize the current traffic for each hub. Each table indicates the total volumes of containerized imports and exports handled by the hub, the volumes of imports received by the hub that are further transported to the end markets that would be served by the different spoke options contemplated. The volumes include those transported by rail, truck and water.

Figures 7.1 to 7.4 present current container traffic flows to/from the noted potential hubs and related spokes.

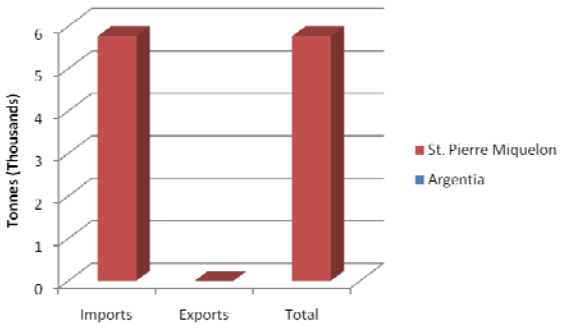
[40] At the time of writing, the National Commodity Flow study is still underway. Though the 2006 base year for this study has limitations, traffic flow data for eastern Canada is considered to be reasonably accurate for the purposes of assessing whether there is sufficient traffic on key feeder and short sea routes to warrant a service.

Figure 7.1: Current Container Flows between Halifax and Markets at End of Identified Spokes

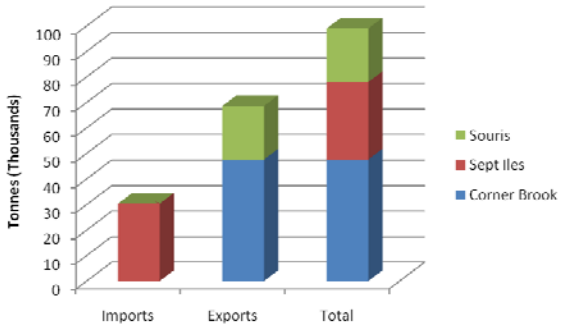
Halifax
Imports: 1,945 Exports: 2,515 Total: 4,459 (Values in '000 tonnes)

Eastern Canada

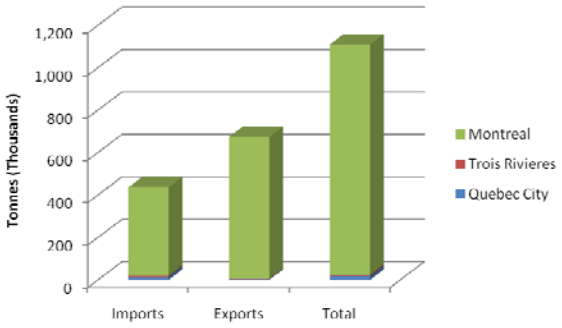
Halifax – Argentia – St. Pierre – Miquelon



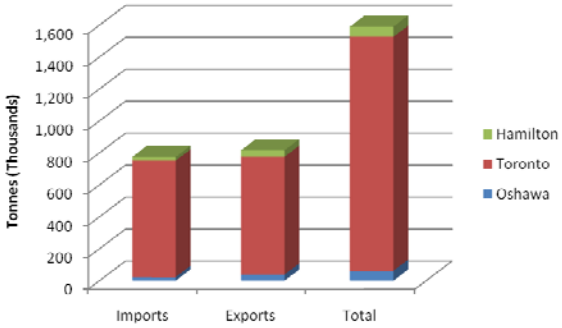
Halifax – Corner Brook – Sept Iles – Souris



Halifax – Quebec City – Trois Rivieres – Montreal

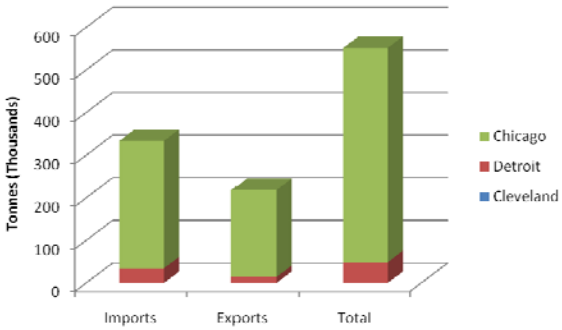


Halifax – Oshawa – Toronto – Hamilton

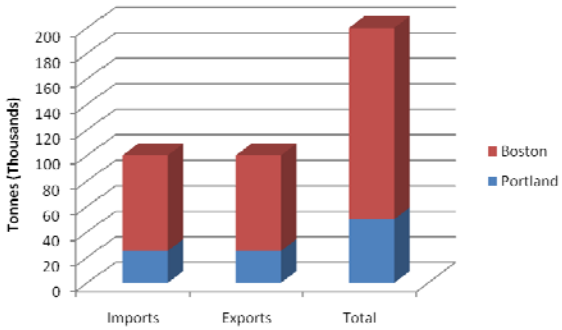


Eastern US

Halifax – Cleveland – Detroit – Chicago



Halifax – Portland – Boston



Non-US

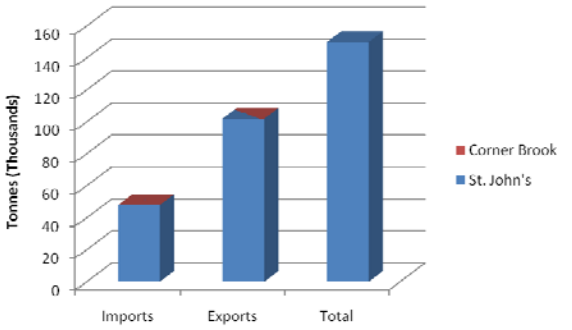
Halifax – New London - Bridgeport	Halifax – New London - Bridgeport
None / Negligible	None / Negligible

Figure 7.2: Traffic Flows between Montreal and Markets at End of Identified Spokes (2006)

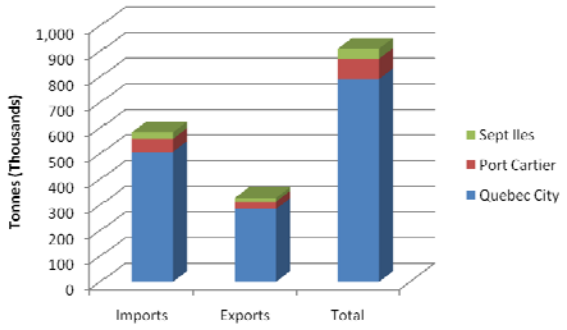
Montreal
Imports: 8,007 Exports: 6,396 Total: 14,402 (Values in '000 tonnes)

Eastern Canada

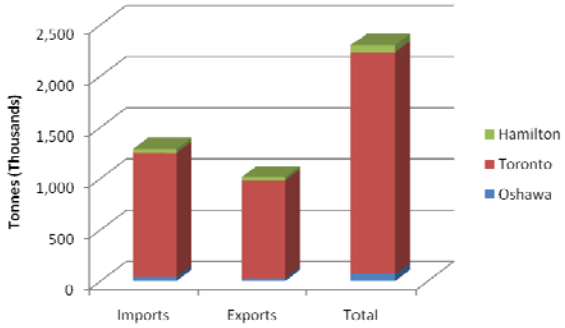
Montreal – St. John's – Corner Brook



Montreal – Quebec City – Port Cartier – Sept Iles

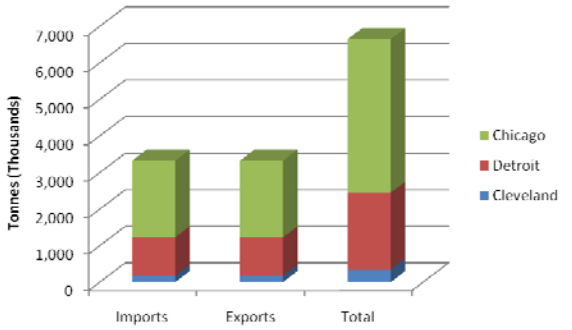


Montreal – Oshawa – Toronto – Hamilton



US

Montreal – Cleveland – Detroit – Chicago



Non-US

Montreal – Freeport

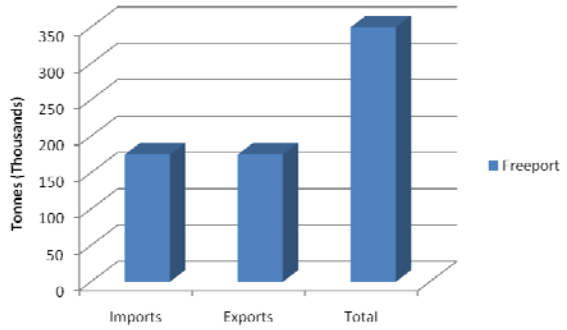
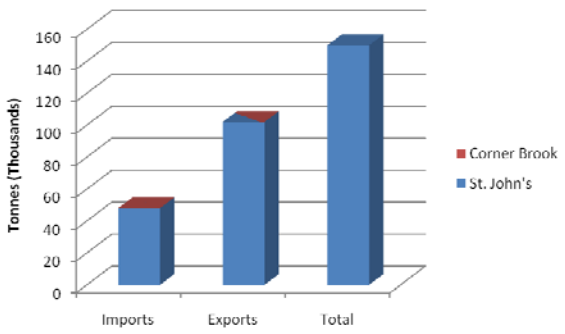


Figure 7.3: Traffic Flows between St. John's and Markets at End of Identified Spokes (2006)

<table>
<tr><th colspan="2">St. John's
Imports: 80 Exports: 170 Total: 250 (Values in '000 tonnes)</th></tr>
<tr><th colspan="2">Eastern Canada</th></tr>
<tr><td>St. John's – Corner Brook – Montreal
 
</td><td>St. John's – Halifax

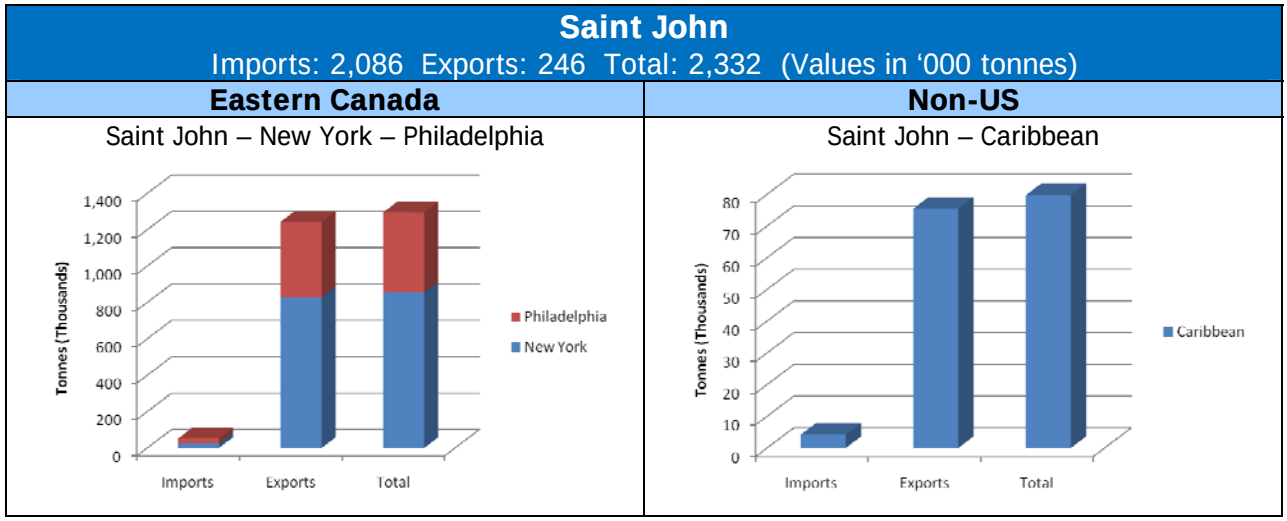
Negligible</td></tr>
<tr><td colspan="2">St. John's – Labrador – Canadian North

Negligible</td></tr>
<tr><th colspan="2">US</th></tr>
<tr><td colspan="2">St. John's – Portland – Boston

Negligible</td></tr>
</table>

For Saint John, it should be noted that the traffic volumes indicate the general exports from and imports to Saint John to/from these identified ports, which is not the same as the hub-and-spoke concept used for the three other hubs. The shipment between Saint John and the identified ports are generally carrying the goods from NB to be consumed in the US and Carribbean or vice versa. For this reason, to assess the further potential, the current traffic presented in Figure 7.4 includes the existing truck traffic carrying exports from and imports to NB to/from the US.

Figure 7.4: Traffic Flows between Saint John and Markets at End of Identified Spokes (2006)



7.1.2 Regional Short Sea Services

For each regional short sea route option considered, current traffic level was assessed to the extent possible with the available data. The volumes include those transported by truck and water. Rail traffic was excluded as these volumes are expected to be captured by the railways, with no possibility of diversion to short sea given the competitive position of rail transport.

Figure 7.5: Traffic Flows – Regional Short Sea Route Options (Volumes in '000 tonnes) (2006)

Origin	Destination	Marine		Truck		Total
		Total	o/w Petro and related products	Total	o/w Petro and related products	
Belledune	Argentia	0	0	135	0	135
Argentia	Halifax / Strait of Canso	32	2	270	0	302
Montreal	Great Lakes	409	366	5,296	147	5,705
Montreal	North Shore - Cornerbrook	19	19	83	2	102
Sept Iles	Cornerbrook - Halifax	0	0	41	0	41
Saint John	US East Coast	9,227	8,220	2,053	13	11,280
Yarmouth	Portland	50	0	28	0	78
Yarmouth	Boston	253	0	62	0	315
Sydney	Newfoundland	112	0	184	0	296
Saguenay	St. Lawrence Ports	0	0	0	0	0
St. John's	Labrador & North	0	0	885	279	885

* Petro and related products include: crude petroleum, LPG and other petroleum products, and other fuel.

Figure 7.6: Traffic Flows – Regional Short Sea Route Options (Volumes in '000 tonnes) (2006)

Origin	Destination	Marine		Truck		Total
		Total	o/w Petro and related products	Total	o/w Petro and related products	
Argentia	Belledune	0	0	76	0	76
Halifax / Strait of Canso	Argentia	299	187	184	0	484
Great Lakes	Montreal	728	222	7,698	386	8,427
North Shore - Cornerbrook	Montreal	0	0	33	0	33
Cornerbrook - Halifax	Sept Iles	372	144	11	0	383
US East Coast	Saint John	96	89	698	0	795
Portland	Yarmouth	0	0	25	0	25
Boston	Yarmouth	0	0	46	0	46
Newfoundland	Sydney	34	4	270	0	305
St. Lawrence Ports	Saguenay	0	0	0	0	0
Labrador & North	St. John's	1	0	885	279	886

* Petro and related products include: crude petroleum, LPG and other petroleum products, and other fuel.

7.1.3 Opportunities for Use of Empty Containers

Since trading first began, empty repositioning of the conveyance has been a cost of doing business, and the carriers that can minimize their repositioning costs by balancing their traffic flows have a big advantage over those that must reposition empty equipment.

Whether ships, railcars or trucks are used for transportation, they must get back to their starting point to begin the next transportation cycle. Containers have allowed the various modern transportation modes to be compatible on an intermodal basis, and handling costs to be minimised, but container moves also need be balanced.

For one-way traffic with no backhaul, whether by truck, rail or ship, the cost to reposition the equipment can often be almost as much as the cost of providing the fronthaul. Some incremental costs can be incurred because of the backhaul being loaded (fuel, tire wear, etc.), but the incremental cost of a loaded versus empty backhaul is generally very small compared to the cost of the round trip.

To further emphasize this point, if a carrier has a 20 percent operating margin on one-way traffic, the margin available to the carrier of a combined front and backhaul, even at 70 percent of the fronthaul rate for the backhaul, is four times that of one-way traffic. Alternatively, the rates could be reduced by 35 percent at the same margin for the carrier in a highly competitive environment if there was sufficient cargo to balance all freight moves. A simplified revenue cost comparison in Figure 7.7 illustrates the importance of balancing freight.

Figure 7.7: One-Way vs Two-Way Traffic

Item	One Way Traffic	Two-Way Traffic	
		Same Rate	Same Margin
Revenue Front-Haul	100	100	65
Revenue Back-Haul	N/A	70	45.5
Cost of One-Way Trip	80	80	80
Xtra Operating Cost of Back-Haul	N/A	10	10
Operating Margin	20	80	20.5

Table 7.7 applies to a backhaul that is entirely compatible with the conveyance or container used for the fronthaul, which is often not the case, but the difference is such that even less than optimal balancing of moves can be attractive.

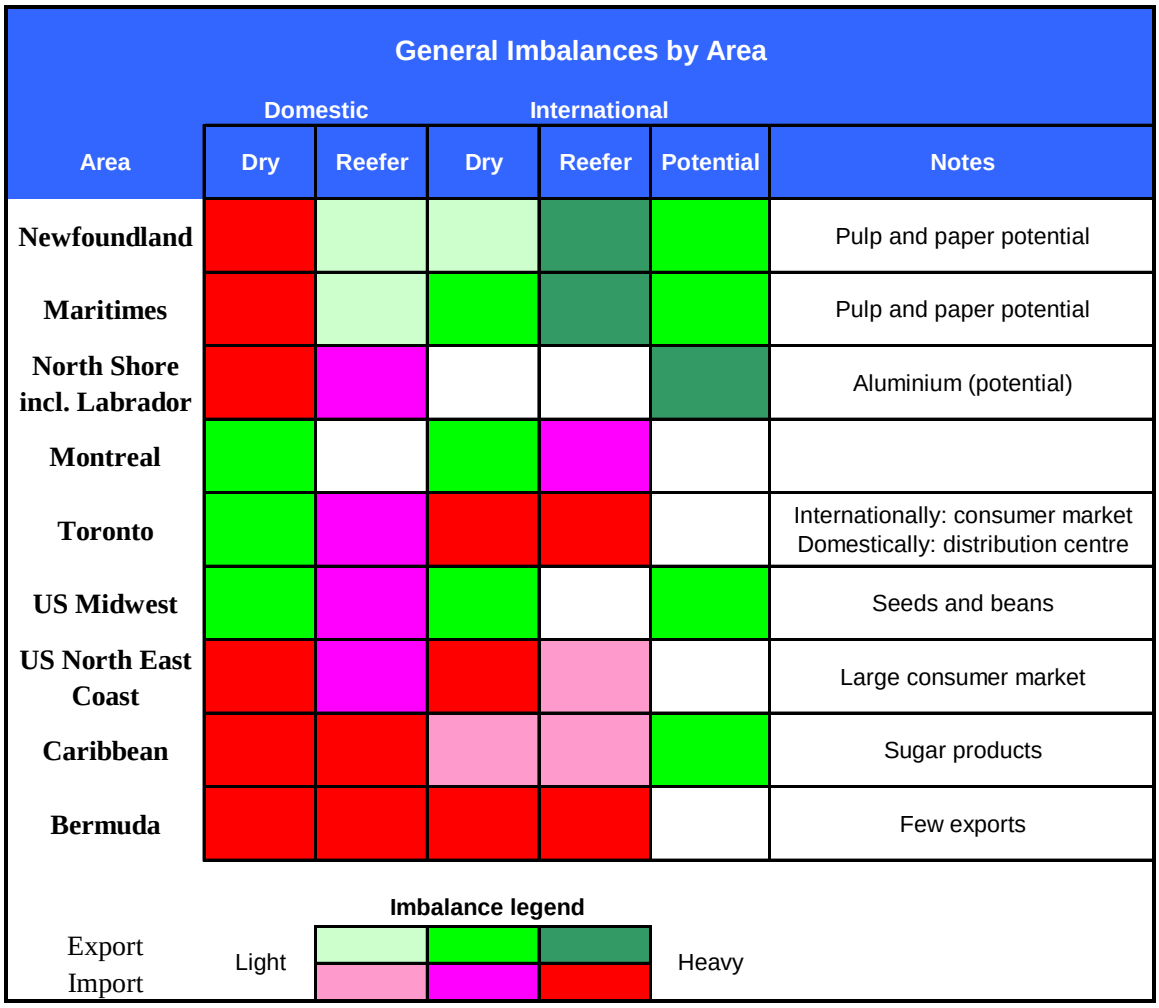
Some innovative ways of balancing transportation equipment have been very successful; many of them are based on combining domestic and international freight traffic elements that are imbalanced in the opposite directions. For example, the transfer of international cargo from international containers to domestic containers in Vancouver (and Halifax) allows carriers to use the backhaul of domestic containers (and railcars) to carry international freight and avoid the round trip for the international containers (and railcars) used previously.

On the east coast, trucking companies have resorted to triangulation as a means of minimising backhaul; they carry freight in a domestic lane from the Toronto area to the Maritimes, export cargo from the Maritimes to the New England States, and import cargo from New England back to the Toronto area.

The first step in identifying opportunities for empty containers is to understand the existing imbalances. Certain transportation nodes or areas (such as NY) are traditionally imbalanced for various types of cargo. The following types of cargo are considered in Figure 7.8: international (containers dry van), international temperature controlled, domestic containers (dry vans, trucks and containers), domestic temperature controlled, and containerisable cargo not presently carried in containers but that could be, both dry van and temperature controlled.

The chart is also limited to the following areas: Newfoundland, Maritimes, QC North Shore (including Labrador), Montreal, Toronto, US Midwest, US East Coast (including NY), Caribbean and Bermuda. In this context, domestic refers to cargo to and from Canada. A more thorough evaluation of the actual traffic and the consideration of a number of variables such as lot size, frequency, transit time, infrastructure, equipment, costs, market, labour etc. is necessary to select the best opportunities, but the general tendencies shown in the table provide some idea of where the use of empty containers would seem to make sense.

Figure 7.8: Imbalances for Selected Areas



One can see from Figure 7.8 that domestic dry cargo from Toronto to the Maritimes would tend to improve the general imbalances if this freight was carried in international containers. Conversely, domestic containers could be used to move international freight to Toronto from the Maritimes.

Some other opportunities worth investigating include:

- Use of international reefers from Toronto to Newfoundland for temperature-sensitive cargoes
- Use of empty dry van domestic containers to transport cargo between Newfoundland and North Shore/Labrador
- Use of international containers for the export of aluminum
- Distribution centres in Halifax for international cargo for Atlantic Canada market

These are but a few of the opportunities to benefit from the present empty container imbalances. Some, such as transloading import containers in Halifax, are already being pursued while others still need to overcome some obstacles.

There are a number of barriers to the opportunities that seem apparent from the chart:

- The types of equipment are different. Trucks and domestic containers tend to be 53' pallet-wide and the domestic market is geared towards the use of this type of equipment. Using international containers is thus somewhat less efficient.
- Some products can damage containers and some shipping lines will not allow their containers to be used for domestic freight (this is particularly true of reefer containers).
- Containers are generally owned by shipping lines, and the use of the empty container is restricted by the requirement for the positioning for the purpose of generating an export container (for the line in question).
- Domestic and international transportation tend to be two very separate businesses, and little communication exists between the two. Domestic transportation is driven mainly by service while international is more cost-sensitive.
- Not all areas use the same degree of containerisation. Toronto, Montreal, St John's and Halifax are predominantly containerised (cargo is generally transported in containers); however other areas such as Quebec City, the North Shore etc. still rely mostly on truck trailers for their transportation needs, and containerisation is still the exception rather than the rule.

8 Feasibility of Selected Routes

This section provides an initial analysis of the feasibility of a selection of routes.[41] All the analyses for costs are done in Canadian dollars (CAD), unless otherwise indicated.

8.1 Selected Routes

Four hub-and-spoke feeder routes and three regional short sea routes were selected for further consideration and feasibility analysis. These are:

Hub-and-Spoke Feeder Routes

- Montreal – Sept-Îles (Containers)
- Halifax – Sept-Îles – Corner Brook – Souris (Containers)
- Halifax – Bermuda (Containers)
- Halifax – Portland/Boston (Containers)

Figure 8.1: Feeder Routes Selected for Feasibility Study

[41] The method used for feasibility analysis was based on an assessment of two key questions: a) is there enough traffic that justify service on the particular route, and b) would this service be at a cost advantage relative to competing modes (i.e. truck transport). A more detailed analysis, including site visits, stakeholder consultations, technical requirements assessments, detailed financial modeling, etc. would be necessary to reach definitive answers on route/service feasibility. Such detailed analyses, however, are outside the scope of this study.

Regional Short Sea Routes

- Belledune – Argentia (large Ro-Ro)
- Yarmouth – Portland (large Ro-Ro)
- Yarmouth – Boston (large Ro-Ro)

Figure 8.2: Regional Short Sea (Ro-Ro) Routes Selected for Feasibility Study

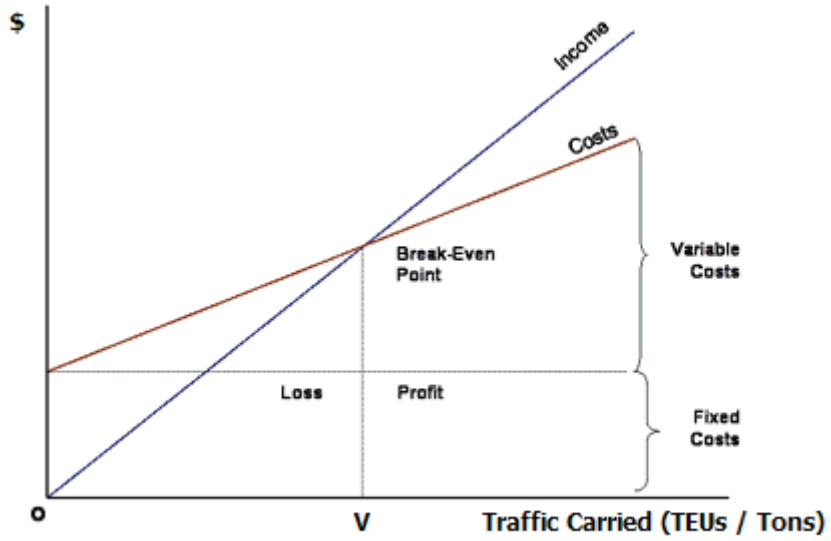
These particular routes were selected for a number of reasons. First, each of them satisfied the screening criteria noted in Figure 6.2. Second, they provide useful case studies for alternative services in terms of markets served. Third, based on our own resources and industry knowledge, the study team was able to obtain cost information with respect to short sea shipping relative to competing modes serving the same markets.

8.2 Breakeven Analysis

Before assessing the feasibility of each route, it is useful to review a few key concepts relating to feasibility analysis.

Whether assessing the commercial viability of hub-and-spoke feeder services or regional short sea services, the theory behind the breakeven analysis is the same. Simply, the breakeven point is achieved once revenues from cargo moved exceed total fixed and variable costs as depicted in Figure 8.3.

Figure 8.3: Breakeven Analysis



Since achieving or exceeding the breakeven point is a function of both total revenue generated from providing services and total cost of providing the service, it is useful to review the drivers of both revenue and cost.

Revenue is a function of traffic carried and the tariff charged. For total revenues to exceed the breakeven point, there must be: a) sufficient traffic to justify the service; and b) tariffs must be both competitive with other modes of transport and set so as to cover total costs (both fixed and variable) on a per unit basis.

Cost of providing the service, in turn, is a function of both fixed and variable costs. In the case of feeder and regional short sea shipping, fixed and variable costs include the following:

Fixed Costs[42]

Sunk Fixed Costs (Irrespective of number of voyages)

- Vessel purchase costs (including all duties and taxes) or vessel charter costs
- Administration costs (office staff)

Fixed Costs per Voyage

- Harbour dues, berthage charges, pilotage costs
- Fuel costs (note: fuel costs largely fixed per voyage)
- Operating costs (crew costs, etc.)
- Ice breaking costs (winter)

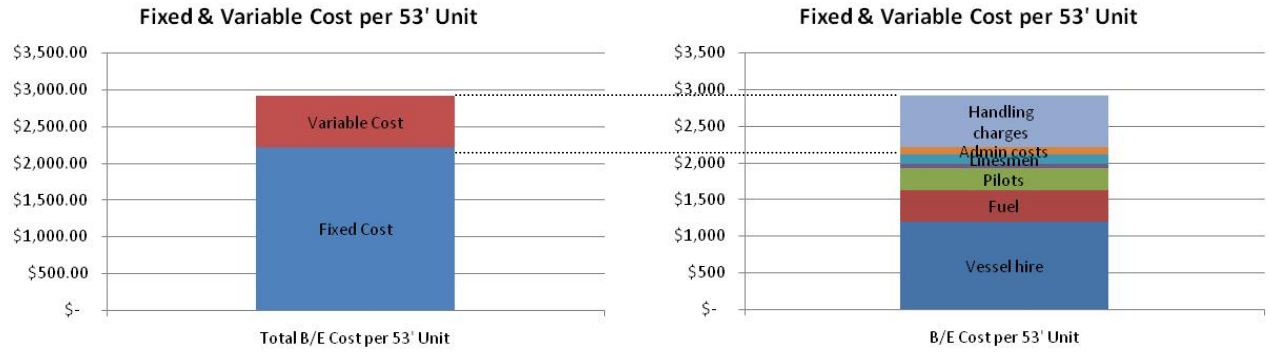
Variable Costs[43]

- Stevedoring costs (loading and unloading ships)

In hub-and-spoke feeder and regional short sea operations, fixed costs are generally much more significant than variable costs (particularly if new vessels are purchased and retrofitted to suit Canadian regulations – in this case, these costs are largely "sunk costs").[44] This implies high risk for any investor contemplating setting up a feeder or regional short sea service.

The figure bellow provides an example of the approximate fixed and variable costs, per 53' container moved by short sea aboard a Super Coaster-type vessel between Montreal and Sept-Îles (assuming fully utilized ship capacity, round trip costs during the summer (no ice-breaking)).

Figure 8.4: Fixed and Variable Cost per 53' Intermodal Container for Service between Montreal and Sept-Îles



[42] Fixed costs are those that are incurred, irrespective of the volume of traffic carried.
[43] Variable costs are expenses that change in proportion to the volume of traffic carried.
[44] Sunk costs are costs that cannot be recovered once they have been incurred. Duty paid on the import of a foreign vessel, costs relating to retrofitting the vessel to meet Canadian requirements, etc. are all sunk costs, as these cannot be recovered if the vessel is resold on the international market.

8.2.1 Commercially Viable Tariff

Provided there is sufficient traffic to justify a service, tariffs must be set at or over the breakeven costs per unit carried (i.e. the total fixed and variable cost / number of units carried) AND below the cost offered by competing modes, less a discount for other door-to-door costs that must be incurred when using feeder or regional short sea services (we have assumed a cost of $250 for local delivery).

Where breakeven per unit cost exceeds that of truck transport (factoring other door-to-door costs), the service will not be commercially viable.

8.3 Options, Assumptions and Scenarios

For the purposes of assessing the feasibility of the selected feeder and regional short sea routes, we have considered a number of options, developed assumptions, and tested different scenarios. Specifically, options, assumptions and scenarios pertain to the following:

- Trades considered
- Potential traffic
- Types of vessels
- Types of containers
- Handling costs
- Competing truck tariffs
- Utilized capacities

Each of these items is described in more detail below.

8.3.1 Trades Considered

For selected feeder routes, only container trades have been considered, as feeder services best lend themselves to the movement of containers, as previously discussed. For regional short sea services, the analysis is focused on Ro-Ro services.

Bulk dry or bulk liquids / tanker trades have not been considered in this feasibility analysis. A mature market exists in both of these trades in eastern Canada (e.g. for shipping of crude petroleum, aluminum, wood chips, etc.), as examples earlier in this report demonstrate.

8.3.2 Potential Traffic

Potential traffic estimates were developed using the current traffic by mode, potential modal shift, potential generated traffic, and Gross Domestic Products (GDP) growth rates for the years up to 2030. The base year is 2008, and the 2008 traffic was estimated for each hub-and-spoke combination as the sum of:

- The container traffic moved by ships
- Modal shift from the current truck traffic
- Generated traffic

The related assumptions are as follows:

- Where there are already marine shipments on the route, they will continue to be transported by marine vessel
- Where there are existing truck traffic on the route, assuming that the marine shipping services are competitive, there will be a level of modal shift from the trucks to marine transport
- With new and/or improved service, there will be a level of generated traffic.

The BASE CASE generated traffic for the first year was estimated with the assumption that a 321 TEU ship would provide one service per direction per week with about 50 percent of its capacity utilized for the first six months, then 75 percent, from months 7-12. This yields a total one-way tonnage of 24,000 tonnes.

For the base year estimates, annual projected GDP growth rates were applied to come up with the traffic projections for 2030.

The estimates were carried out for three scenarios: BASE CASE (expected), LOW (pessimistic), and HIGH (optimistic). The related assumptions are summarized in Tables 8.5, 8.6 and 8.7:

Figure 8.5: Modal Shift Scenarios from Trucks

Scenario	% Shift
LOW	5.0%
BASE	15.0%
HIGH	30.0%

Figure 8.6: Generated Traffic

Scenario	('000 tonnes)
LOW	19
BASE	24
HIGH	29

Figure 8.7: GDP Annual Growth Rates

Scenario	2009	2010	2011	2012	2013-2030
LOW	2.2%	2.5%	2.2%	2.1%	2.0%
BASE	2.7%	3.1%	2.7%	2.6%	2.5%
HIGH	3.2%	3.7%	3.2%	3.1%	3.0%

* Source: for 2009-2013 BASE CASE, IMF.

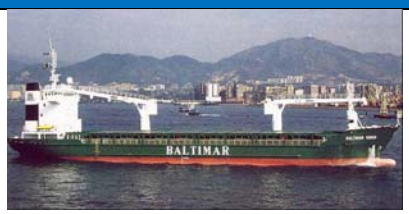
8.3.3 Types of Vessels

The recommended vessel is a multi-purpose vessel container ship fitted with both 'tween' decks and ship's gear so as to be able to self load and discharge and to offer most flexibility for handling various types of cargo.[45]

On some potential routes, the description of the service may cross over between feeder and regional short sea with various goods moving in one direction on a route and local products moving in the other, either in containers or as break bulk cargo. There may also be some blurring of the feeder / regional short sea distinction as the cargo being moved from some ports may not originate from an international scheduled service as would be the classic case for feeder service, but may instead be generated inside of Canada, containerised and then shipped to another part of Canada. The nature of the marine trades in eastern Canada is such that there tends to be heavy flows of particular cargoes in one direction, with very little travelling in the other, as discussed in the earlier section on empty containers. Any prudent ship owner will seek to increase his/her margin by carrying whatever backhaul cargo may be available that is suitable to the type of vessel. This in turn leads us to propose multi-purpose rather than cargo-specific vessel designs.

Three vessel types were considered for the purposes of the feasibility analysis of the selected routes. Descriptions of these vessel types are provided in Figure 8.8. A more detailed set of related assumptions is provided in Annex I.

Figure 8.8: Vessel Types to be used in Feasibility Analysis of Different Routes

Vessel Type	Cost (CAD) (excl duty, reconfiguration, debt service, etc.)	Capacity	Image
Super Coaster (154 TEU@14t) Geared 91m x 14.7m x 7m	$8,500,000 (Vessel cost estimates were ascertained through discussion with a number of ship brokers)	37 53' containers 70 40' containers	
Fighter (321 TEU@14t) Geared 101m x 18.8m x 9.3 m	$12,000,000 (Vessel cost estimates were ascertained through discussion with a number of ship brokers)	44 53' containers 150 40' containers	

[45] With the exception of Halifax – Boston where full service container terminals are available at both ends of the service, there is likely to be little difference between the type of vessel necessary to provide both feeder and regional short sea services for the routes selected for feasibility analysis.

Vessel Type	Cost (CAD) (excl duty, reconfiguration, debt service, etc.)	Capacity	Image
Finnmaster 162m x 26.6m x 13.8m	$27,000,000 (actual purchase price in February 2008 transaction)	100 53' trailers	

It should be emphasized that geared vessels (i.e. vessels with onboard cranes) were recommended for container feeder services for a number of reasons. First, it is cheaper to equip vessels with cranes than to purchase landside mobile or fixed cranes (limiting the upfront start-up cost to provide feeder or regional short sea service). Second, geared ships provide operators with the flexibility to serve different routes, as market opportunities change (limiting risk associated with serving a single route served by landside cranes).

8.3.4 Types of Containers

For the purposes of the feasibility analysis of the selected feeder routes, we have considered both standard 40' international containers, as well as North American 53' intermodal containers. In the case of service to Bermuda, we have also looked at 20' containers given that Bermuda currently only handles this size of container. A detailed discussion of the differences between these containers in terms of shipping requirements, capacity, etc., is provided in Annex I.

For selected regional short sea routes (Ro-Ro), we have only assessed the feasibility of moving 53' units, given that this service is predicated on use of units that can compete with trailers. There may also be some potential to use empty 40' international containers if feeder traffic materializes, and empties would need to be moved back to the hub port if not filled with export cargo. This is a common practice in Europe and has allowed feeder operators to participate in the regional short sea sector, taking advantage of their networks.

8.3.5 Operating and Fuel Costs

Operating cost estimates used in the feasibility analysis are derived through a combination of the team's experience (note that two members of the team have operated short sea services in the past) as well as through discussions with experienced ship managers. Fuel consumption and related costs were estimated using vessel specification consumptions rates and actual fuel rates, quoted by Imperial Oil on November 13, 2008.

A more detailed set of operating cost assumptions is provided in Annex I.

8.3.6 Handling Costs

Where available, we have used actual stevedoring rates. Where not available, we have assumed that the cost to handle a single container on a terminal, either loading to or discharging from a vessel will have a base rate of $150-$200 per unit per move. In non-unionised ports or ports

without a major container terminal where ship's gear is used to discharge, the per unit handling charge is likely to be between $100-$150 per container, so we may assume for purposes of calculation that the cost of loading a container onto a ship at one end of a voyage in Canada and discharging it at the other will be approximately $300-$350. Discussions with local stevedores indicate that this is a reasonable estimate. In our analysis, we have erred on the conservative side and used the higher number.

8.3.7 Competing Truck Tariffs

Comparative truck transport cost estimates are based on the 2008 Transport Canada study, *Operating Costs of Trucking and Surface Intermodal Transportation in Canada*,[46] which indicates that a typical vehicle would be a five-axle van trailer unit doing 160,000 km per annum with a five-percent profit margin. The estimated cost to run this vehicle in 2007 was $1.80/km. This finding is consistent with a 2005 study, *Operating Costs of Trucks in Canada*,[47] which, if revised to account for changing costs since then (inflation and changes in fuel costs), the estimated truck costs are also estimated to be $1.80/km.

We have also consulted with truck transport operators to obtain actual quotations for specific routes, though quotes have been difficult to obtain for reasons of commercial confidentiality. We have indicated actual quotes in the cases where they were provided. However, we note that truck transport quotes can vary greatly, hence our general reliance on the approximate truck cost of $1.80/km.

For the purpose of our analysis, comparative truck costs are assessed on a round-trip basis, as truck transport quotes are usually provided on this basis.

In comparing truck transport costs with feeder or regional short sea alternatives, it should be noted that most feeder or regional short sea services are subject to additional local costs from end ports to ultimate destinations (usually moving by truck). In the case of feeder service, such costs would only be incurred at one end. In the case of regional short sea, local transport costs would be incurred at both ends – to/from origin and destination ports (unless a particular shipper or customer is located at or near the port site). For the purposes of our analysis, we have estimated local truck transport costs to be in the order of $250. Actual costs would depend on the exact origin and/or destination of the cargo being shipped.

8.3.8 Utilized Capacity Scenarios

It is assumed that the new feeder or regional short sea services will not start at 100 percent capacity. For this reason, we have considered three alternative capacity utilization scenarios (50 percent, 75 percent and 100 percent) for each selected feeder and regional short sea service. Figure 8.9 provides a summary of the different utilization scenarios used in assessing the feasibility of the selected feeder or regional short sea routes, by vessel type.

[46] "*Operating Costs of Trucking and Surface Intermoal Transportation in Canada*", prepared by Ray Barton Associates, in association with Logistics Solution Builders, Inc. and Research and Traffic Group, submitted March 31, 2008.
[47] See "Operating Costs of Trucks in Canada", 2005 and Ray Barton & Associates, "Estimation of Costs of heavy Vehicle Use per Vehicle-Kilometre in Canada", Transport Canada, December 2006.

Figure 8.9: Vessel Capacity Utilization Scenarios

	Capacity		50% Utilization		75% Utilization		100% Utilization	
Vessel	**53'**	**40'**	**53'**	**40'**	**53'**	**40'**	**53'**	**40'**
Super Coaster	37	70	19	35	28	53	37	70
Fighter Class	44	150	22	75	33	113	44	150
Finnmaster	100	N/A	50	N/A	75	N/A	100	N/A

It should be noted that 53' container capacities on most vessels are disproportionately below that for 40' containers. This is due to configuration of the proposed vessel types, which were predominantly designed for 40' containers. An explanation of 53' vs. 40' container capacities is provided in Annex I.

8.4 Feasibility Analysis of Selected Hub-and-Spoke Feeder Routes

The following section outlines the results of the feasibility analysis for each of the selected hub and spoke feeder routes. For each selected feeder route, we assess:

- Potential container traffic that could foreseeably be captured by feeder service along that route and whether this is expected to justify a commercial feeder service
- Fixed and variable costs of the feeder service by vessel types, summer/winter, as appropriate (full related assumptions are provided in Annex I)
- Per unit breakeven costs for feeder services (40' and 53' containers, and 20' containers for services to Bermuda), according to different capacity utilization scenarios, as outlined in the previous section
- Comparative truck costs serving the same market

Based on these analytical components, we put forth our conclusions as to whether a feeder service is feasible along the particular route.

8.4.1 Montreal – Sept-Îles

Traffic Potential

Using the traffic scenarios and assumptions in Section 8.3, we have assessed container traffic potential between Montreal and Sept-Îles, as well as along a longer string, Montreal – Quebec City – Port Cartier – Sept-Îles. The related traffic scenarios are presented in Figures 8.10 and 8.11.

Figure 8.10: Traffic Potential between Montreal and Sept-Îles

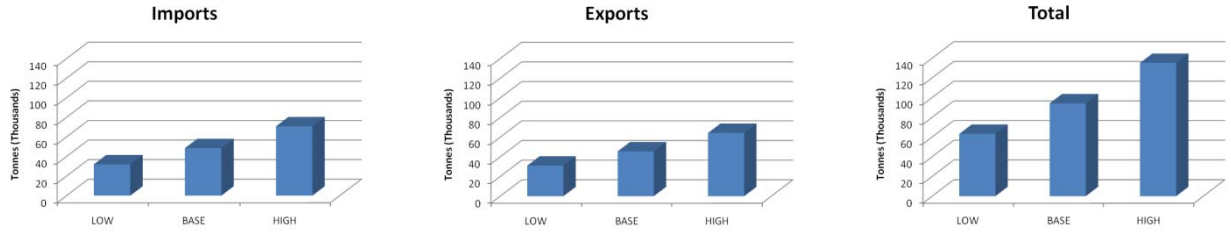
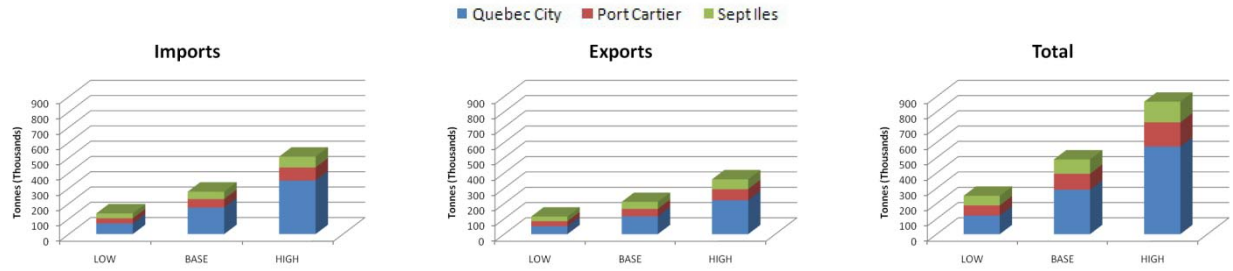


Figure 8.11: Traffic Potential along Montreal – Quebec City – Port Cartier – Sept-Îles Route



Based on the above, we expect the range of potential feeder traffic between Montreal and Sept-Îles to be in the order of 80,000 tonnes per year under the Base Case, which translates to approximately 4,000 Forty-Foot Equivalent Units (FEUs) per year, or 76 FEUs per trip (assuming 52 trips per year). This is expected to represent sufficient traffic to justify a service along the Montreal-Sept-Îles route using a Fighter class ship.

For the extended feeder string, linking Montreal to Quebec City, Port Cartier and Sept-Îles, potential feeder traffic could be in the order of 400,000 tonnes per year under the Base Case, which translates to approximately 20,000 FEUs per year, or 384 FEUs per trip (assuming 52 trips per year). With a significant share of the market, this could represent sufficient traffic to justify a service along this route.

Feeder Service Costs

The total fixed and variable costs for round trip feeder service from Montreal to Sept-Îles are expected to be as follows:

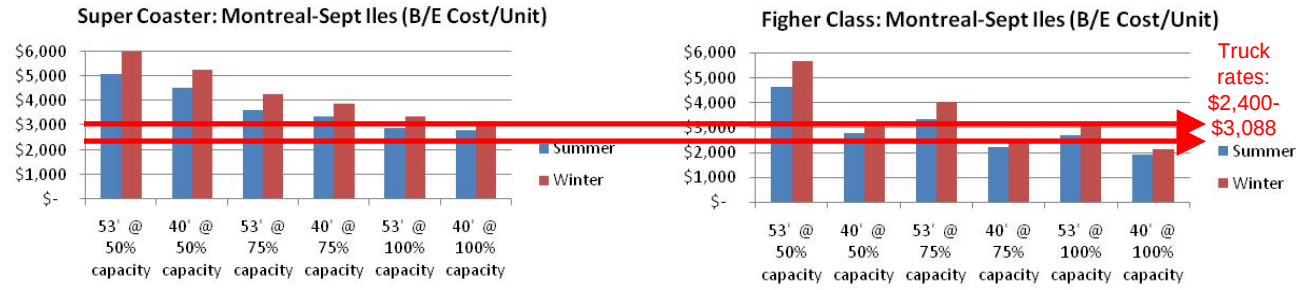
Figure 8.12: Fixed and Variable Costs for Feeder Service along Montreal–Sept-Îles Route

Time Calculation for Cycle	Super Coaster		Fighter Class	
Season	*Summer*	*Winter*	*Summer*	*Winter*
Distance (miles)	826	826	826	826
Speed (knots)	12	10	14	11
Steaming time (days)	2.9	3.5	2	3.1
Port time (days)	1.3	1.3	1	1.5
Approaches (days)	0.3	0.3	0	0.3
Round trip time (days)	4.4	5.1	4	4.9
Fixed Costs per Voyage				
Vessel hire	$ 45,365	$ 51,854	$ 50,761	$ 62,053
Fuel	$ 15,968	$ 18,377	$ 15,968	$ 18,377
Pilots	$ 11,198	$ 13,270	$ 11,198	$ 13,270
Ice Breaking*	$-	$ 6,200	$-	$ 6,200
Port Costs	$ 2,000	$ 2,000	$ 2,000	$ 2,000
Linesmen	$ 5,000	$ 5,000	$ 5,000	$ 5,000
Admin costs	$ 3,621	$ 4,139	$ 3,286	$ 4,016
Total Fixed Voyage Cost	$ 83,152	$100,840	$ 88,213	$110,917
Variable Costs per Box				
Handling charges / box (4 moves)	$700	$700	$700	$700

Breakeven Costs

The per-unit breakeven cost for 53' and 40' containers under different vessel and capacity utilization scenarios is provided in Figure 8.13.[48]

Figure 8.13: Per Unit Breakeven Cost for Montreal–Sept-Îles Feeder Service



The horizontal lines in Figure 8.13 show the approximate range of competing truck rates serving the same route.

Using a Super Coaster vessel with a nominal capacity of 37 x 53' units and a box handling cost of $350 per direction, the round trip cost per unit is $2,906 (assuming full capacity, during the

[48] Note: for ease of comparing 20' and 40' container unit break-even costs, we have converted 40' container break-even costs to 53' container capacity, assuming that 40' containers hold approximately 67% of 53' container capacities. Accordingly, 40' container break-even costs have been divided by 67% here and throughout the feasibility analysis for all selected routes.

summer). It should be noted, however, that a considerable amount of vessel capacity is lost in the use of these units.

If 40' international units were used, the unit cost would be about $1,866 per unit per round trip, but with a capacity of approximately 67 percent of that of a 53' container then, an equivalent round trip cost of approximately $2,784 would apply.

Costs developed using a Fighter Class vessel with a nominal capacity of 44 x 53' units and a box handling cost of $350 per direction would yield a per unit breakeven cost of $2,664. If customers can be persuaded to accept cargo in 40' units, then a significant increase in vessel capacity can be achieved. This in turn reduces the round trip container cost to $1,276 and offers a cost of $1,905 for an equivalent amount of cargo as might be carried in a 53' unit.

Comparative Truck Costs

At a distance of 858 km from Montreal to Sept-Îles and on the basis of $1.80 per km, a truckload (40' or 53' container on trailer) from Montreal to Sept-Îles should cost approximately $1,544 per direction or $3,088 per round trip.

We have had rates indicated by a trucking contractor in QC of $1,900 plus 25 percent fuel premium per trip for a total of $2,375, and $1,750 plus 31 percent surcharge, or $2,311.

Conclusion

It is expected that there is sufficient container traffic moving between Montreal and Sept-Îles to justify a feeder service, particularly with a smaller type vessel. There is significantly more traffic potential when serving Quebec City,[49] Port Cartier and Sept-Îles on a string to/from Montreal.

At full capacity, feeder service between Montreal and Sept-Îles appears to be cost competitive though not overwhelmingly so, given some of the truck quotes obtained, and when factoring in additional local transport costs to move goods from destination ports to the final destinations and vice versa. For regional short sea cargo, truckers may be persuaded that using a short sea service will cost them less.

Whether a feeder service between Montreal and Sept-Îles can indeed be provided on a commercial basis will depend on the approach taken by a potential private operator and the ability to capture near full vessel capacity.

Suffice it to say that service on this route has potential and could be worthy of further investigation.

8.4.2 Halifax – Sept-Îles – Corner Brook – Souris

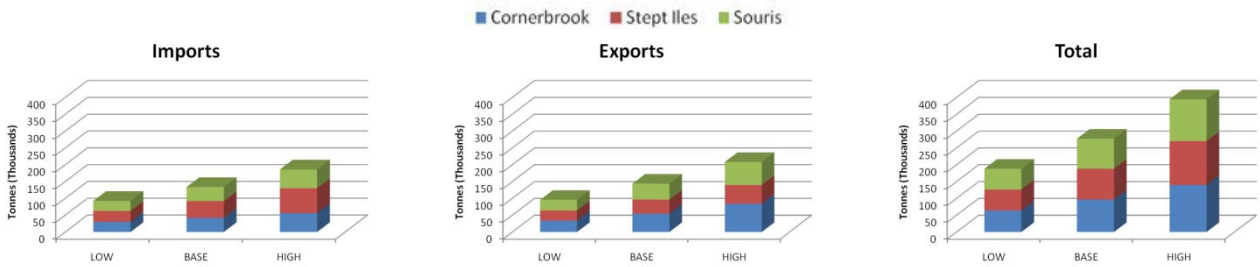
Traffic Potential

We have not established cargo volumes for trade between Halifax, Corner Brook, Sept-Îles and PEI. It is assumed, based on the experience of the consultant, that approximate volumes would be Corner Brook 30 percent, Sept-Îles 50 percent, and PEI 20 percent.

[49] The short distance between Montreal and Quebec City may preclude service between these two ports.

According to the noted traffic scenarios, expected traffic along this feeder route is expected to be as follows:

Figure 8.14: Traffic Potential along Halifax–Sept-Îles–Corner Brook–Souris Route



Based on the above, we expect the range of potential feeder traffic along the Halifax – Sept-Îles – Corner Brook – Souris feeder route to be in the order of 250,000 tonnes per year under the Base Case, which translates to approximately 12,500 FEUs per year, or 240 FEUs per trip (assuming 52 trips per year). This is sufficient traffic to justify a service along this route.

Feeder Service Costs

The total fixed and variable costs for a round trip feeder service along the Halifax – Sept-Îles – Corner Brook – Souris route are expected to be as follows:

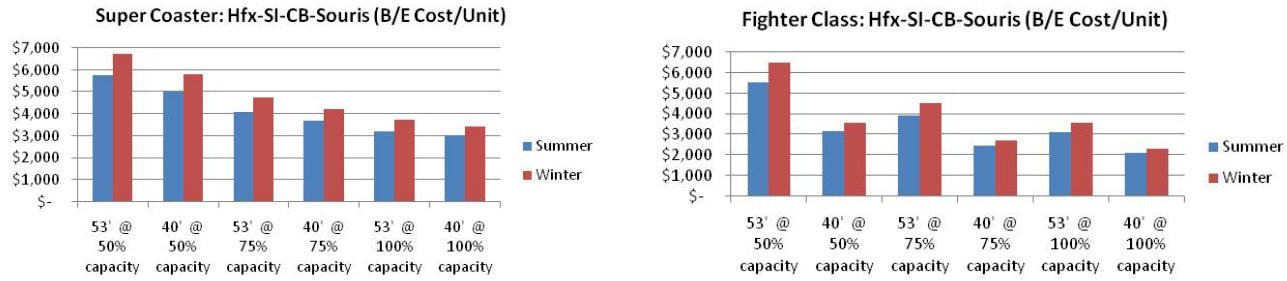
Figure 8.15: Fixed and Variable Costs for Feeder Service along Halifax–Sept-Îles–Corner Brook–Souris Route

Time Calculation for Cycle	Super Coaster		Fighter Class	
Season	*Summer*	*Winter*	*Summer*	*Winter*
Distance (miles)	1270	1270	1270	1270
Speed (knots)	12	10	12	10
Steaming time (days)	4.4	5.3	4	5.3
Port time (days)	1.0	1.0	1	1
Approaches (days)	0.3	0.3	0	0.3
Round trip time (days)	5.7	6.5	6	6.5
Fixed Costs per Voyage				
Vessel hire	$58,528	$66,742	$72,185	$82,316
Fuel	$22,169	$25,865	$22,169	$25,865
Pilots	$3,160	$3,160	$3,160	$3,160
Ice Breaking*	$ -	$6,200	$ -	$6,200
Port Costs	$2,000	$2,000	$2,000	$2,000
Linesmen	$5,000	$5,000	$5,000	$5,000
Admin costs	$4,672	$5,328	$4,672	$5,328
Total Fixed Voyage Cost	$95,529	$114,295	$109,186	$129,869
Variable Costs per Box				
Handling charges / box (4 moves)	$700	$700	$700	$700

Breakeven Costs

The per-unit breakeven cost for 53' and 40' containers under different vessel and capacity utilization scenarios is provided in Figure 8.16.

Figure 8.16: Per Unit Breakeven Cost for Halifax–Sept-Îles–Corner Brook–Souris Service



Using a Super Coaster vessel with a nominal capacity of 37 x 53' units and a box handling cost of $350 per direction, the round trip cost per unit is $3,228 (assuming full capacity, during the summer).

Using the same assumptions, if 40' international units were used, the unit cost would be about $2,036 per unit per round trip, but with a capacity of approximately 67 percent of that of a 53' container then, an equivalent round trip cost of approximately $3,039 would be generated.

Costs developed using a Fighter Class vessel with a nominal capacity of 44 x 53' units and a box handling cost of $350 per direction would yield a per unit breakeven cost of $3,123. As in the previous example, if customers can be persuaded to accept cargo in 40' units, then a significant increase in vessel capacity can be achieved. This in turn reduces the round trip container cost to $1,441 and offers a cost of $2,105 for an equivalent amount of cargo as might be carried in a 53' unit, which is very competitive with trucking *costs* (not rates).

Comparative Trucking Costs to Halifax

Current trucking costs are approximately as follows:

Halifax – PEI (Souris): $954-$1,454 return ($ 800 quoted + fuel surcharge)
Halifax – Corner Brook: ($2,880 + $918 ferry + driver two ways) = $3,798 return
Halifax – Sept-Îles N/A

Given that an operator might be facing competition from containers traded to Montreal and trucked at approximately $2,030 per round trip, then this level should be achievable if cargo volume can be generated.

Cargo to and from PEI is problematic. Quoted one-way rates in 2005 were $750 to $950 per 53' trailer, and more recently, $800. The distance from Souris to Halifax is either 265 km or 404 km, depending on whether the ferry from Wood Islands to Caribou, or Confederation Bridge is used (as well as the season). At $1.80/km, the cost (excluding ferry or bridge tolls) is either $954 or $1,454 return. Once handling charges of $700 ($350 per direction) are taken into account, there is either $254 or $754 to contribute to the operation of the vessel – this situation is exacerbated if 53' containers are considered.

Corner Brook is an interesting case, especially if compared with the cost of trucking and the MAI ferry. However, most cargo moving from Corner Brook is moving on a backhaul basis, with trucks that have delivered cargo to St. John's. At $2,105 for a 40' or $3,023 for a 53' round trip, the option we have presented appears competitive with a $3,798 truck and ferry round trip cost, provided decent vessel capacity utilizations can be achieved.

Conclusion

This route has some potential, although additional work should be done to ascertain competitiveness vis-à-vis trucking costs from Souris and Corner Brook and affirm volumes being shipped from PEI to overseas markets accessible with Halifax mainline carriers.

8.4.3 Halifax – New England

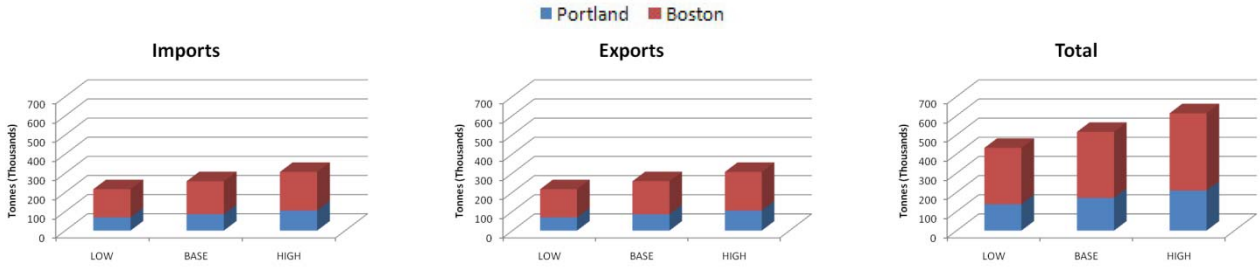
As discussed above, there have been at least five previous iterations of common user Halifax–New England feeders and at least two dedicated feeders serving this market.

Traffic Potential

The New England market is one of the highest-value import markets in the US, given its comparatively high GDP per capita.

According to the noted traffic scenarios, expected traffic along this feeder route is expected to be as follows:

Figure 8.17: Traffic Potential along Halifax–New England Feeder Route



Previous research for potential feeder traffic along the Halifax–New England feeder was estimated at 450,000-600,000 TEUs.[50] About 225,000 TEUs of cargo moves into New England by direct service, and the rest by feeder from NY and over the road. At its peak in 2004, the service operated by SPM Ro-Ro carried about 300 TEUs in each direction per week, or about 30,000 TEUs per annum. The total New England market translates to approximately 4,326 FEUs per week. This would obviously be sufficient traffic to justify a service along this route, however much of it already moves on a direct call basis and via tug and barge via NY.

Feeder Service Costs

The total fixed and variable costs for a round trip feeder service between Halifax and Boston are expected to be as follows:

[50] James D. Frost, "The Development of a Gateway Hub at the Port of Halifax", Saint Mary's University, MBA thesis, 2002.

Figure 8.18: Fixed and Variable Costs for Feeder Service from Halifax–Boston

Time Calculation for Cycle	Super Coaster	Fighter
Season	*Year Round*	*Year Round*
Distance (miles)	744	744
Speed (knots)	12	12
Steaming time (days)	3	3
Port time (days)	3	3
Approaches (days)	0	0
Round trip time (days)	7	7
Fixed Costs per Voyage		
Vessel hire	$27,933	$35,292
Fuel	$14,515	$14,515
Pilots	$6,385	$6,385
Ice Breaking*	$ -	$ -
Port Costs	$7,220	$7,220
Linesmen	$5,600	$5,600
Admin costs	$3,115	$3,115
Total Fixed Voyage Cost	$64,767	$72,127
	$ -	$ -
Variable Costs per Box	$ -	$ -
Handling charges / box (4 moves)	$940	$940

Breakeven Costs

The per-unit breakeven cost for 40' containers (converted to 53' equivalents) under different vessel and capacity utilization scenarios is provided in Figure 8.19.

Figure 8.19: Per Unit Breakeven Cost for Halifax–Boston Feeder Service

The breakeven level for our two chosen classes of vessel for the lower cost scenario is $1,846 and $1,409, respectively. Another port call in Portland or elsewhere in New England could be accommodated with extra time in the cycle. Portland has the advantage of offering lower stevedoring costs as well.

Comparative Truck Costs

In early 2008, we were advised by a major international shipping line that they were paying trucking US$600 per container per direction from NY / NJ to Boston or $1,200 per round trip. We also obtained a more recent "one-off" quotation of US$1,500 return. These rates do not

include lift costs at NY. When marketing such a service, the all-in costs via Halifax and NY should be considered.

Conclusion

From a traffic volume perspective, it is expected that there is sufficient container traffic moving between Halifax and Boston/Portland to justify a feeder service, provided that shipping lines calling at Halifax commit traffic to this service.

When one considers the addition of lift costs at both Halifax and Boston, it does not appear that this service can offer a competitive rate, and the business results of all of the previous operators of the service would tend to support this conclusion. With only six or seven major deep sea lines currently serving Halifax, there may not be a sufficient critical mass to support such a service, in any case, unless carriers committed significant volumes to it.

8.4.4 Halifax – Bermuda

Traffic Potential

It is not known what traffic levels currently move between Halifax and Bermuda or what potential exists for such a service. The data obtained by the team from various sources does not show the traffic information between these two markets.

There are two types of traffic that could potentially be moved between Halifax and Bermuda. These include deep sea feeder cargo that could be transhipped at Halifax instead of NY. The potential lines could include Hapag Lloyd, OOCL, NYK, Costa/Hamburg Sud and Zim. (ACL sometimes carries Bermuda cargo on its own vessels for transhipping at NY.)

There may also be some opportunity to carry Atlantic Region cargo to Bermuda. (The GI data was not revealing in this respect. It may be a case of there not being direct service, so little cargo is moving.)

We expect the range of potential feeder traffic along the Halifax-Bermuda feeder route to be in the order of 80,000 tons per year under the Base Case, which translates to approximately 4,000 FEUs per year, or 70 FEUs per trip (assuming 56 trips per year with 6.5 days of cycle time), using a Fighter class ship. This is not expected to represent sufficient traffic to justify a service along this route. However, service could potentially be justified using a small vessel, such as the Super Coaster.

Feeder Service Costs

The total fixed and variable costs for a round trip feeder service along the Halifax-Bermuda route are expected to be as follows:

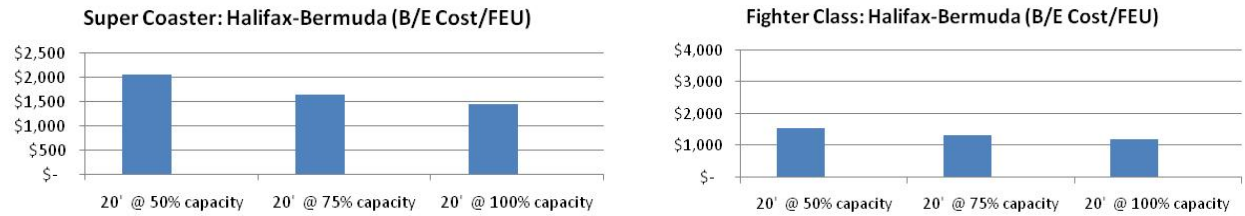
Figure 8.20: Fixed and Variable Costs for Feeder Service along Halifax–Bermuda Route

Time Calculation for Cycle	Super Coaster	Fighter
Season	*Year Round*	*Year Round*
Distance (miles)	1500	1500
Speed (knots)	12	12
Steaming time (days)	5.2	5.2
Port time (days)	1.25	1.25
Approaches (days)	0.3	0.3
Round trip time (days)	**6.5**	**6.5**
Fixed Costs per Voyage		
Vessel hire	$47,780	$60,368
Fuel	$28,467	$28,467
Pilots	$4,911	$4,911
Ice Breaking*	$ -	$-
Port Costs	$5,739	$5,739
Linesmen	$3,200	$3,200
Admin costs	$5,328	$5,328
Total Fixed Voyage Cost	$95,424	$108,013
Variable Costs per Box		
Handling charges / box (4 moves)	$850	$850

Breakeven Costs

The container trade to/from Bermuda is typically 20' boxes. The per-unit breakeven cost for 20' containers under different vessel and capacity utilization scenarios is provided in Figure 8.21.

Figure 8.21: Per Unit Breakeven Cost for Halifax-Bermuda Feeder Service



Using a Super Coaster vessel with a nominal capacity of 154 x 20' units and a box handling cost of $850 per round trip, the round trip cost per unit is $604 (assuming full capacity).

Using a Fighter Class vessel with a nominal capacity of 154 x 20' units and a box handling cost of $850 round trip, the unit cost is $1,454.

Comparative Costs

The competition for this service would be loading a container in Halifax and transhipping at NY, or trucking a container from Halifax to NY, to be loaded there. Another line, Bermuda International Shipping Line, has moved cargo from Halifax to Camden, NJ, by rail, for onward shipment to Bermuda.

With the approximate distance between Halifax and NY being 1,100 km, the trucking cost between these two nodes is estimated at $5,040 (round trip). The total cost of shipping between Halifax and Bermuda will likely add another $2,000 for the leg between NY to Bermuda, making it $7,040. (Current rate indications that we have received are in the vicinity of US$2,000 for cargo moving from NY to Bermuda, on a return-move basis.)

Conclusion

Though the cost of a feeder service from Halifax to Bermuda could be competitive, it would have to compete with similar services via NJ ports. If a component of regional cargo could be found, this would help the viability.

8.5 Regional Short Sea Shipping Routes

The Ro-Ro voyages that we have selected to evaluate are Belledune–Argentia and Yarmouth, to either Boston, MA or Portland, ME (110 nautical miles distant from Boston).

All of these services are aimed at truck or ferry traffic. As such, we have chosen a Ro-Ro vessel of1,800 lanemetre capacity (Finnmaster) for the purposes of our feasibility analysis.

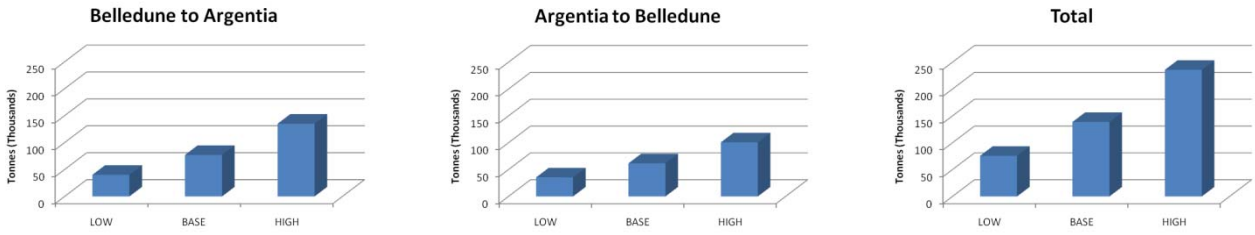
8.5.1 Belledune – Argentia (Ro-Ro)

Traffic Potential

The traffic potential for this service is the cargo that moves between the mainland of Atlantic Canada and the island of Newfoundland, on both Oceanex and MAI. MAI handled about 88,000 units per year, and Oceanex handled slightly more, as per the earlier discussion. A Belledune–Argentia service would likely target truck traffic moving from Toronto and Montreal to Newfoundland.

According to the noted traffic scenarios, expected traffic along this feeder route is expected is as follows:

Figure 8.22: Ro-Ro Traffic Potential along Belledune–Argentia Route



Based on the above, we expect the range of potential Ro-Ro traffic along the mainland-Newfoundland route to be in the order of 150,000 units per year under the Base Case, which translates to approximately 1,442 units per week in each direction. This would be sufficient traffic to justify a service along this route, however it would need to take significant market share from Oceanex and MAI.

It should be noted that such a service would be in direct competition with Oceanex and MAI.

Ro-Ro Service Costs

The total fixed and variable costs for a round trip Ro-Ro service between Belledune and Argentia are expected to be as follows:

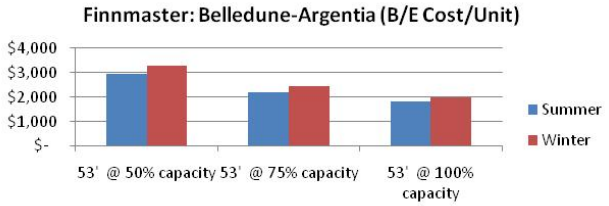
Figure 8.23: Fixed and Variable Costs for Feeder Service between Belledune–Argentia

Time Calculation for Cycle	Belledune - Argentia	
Season	*Summer*	*Winter*
Distance (miles)	990	990
Speed (knots)	16	14
Steaming time (days)	3	3
Port time (days)	1	1
Approaches (days)	0	0
Round trip time (days)	4	4
Fixed Costs per Voyage		
Vessel hire	$62,698	$70,736
Fuel	$44,544	$47,013
Pilots	$1,135	$1,135
Ice Breaking*	$ -	$6,200
Port Costs	$2,000	$2,000
Linesmen	$2,000	$2,000
Admin costs	$3,197	$3,607
Total Fixed Voyage Cost	$115,574	$132,691
Variable Costs per Box		
Handling charges / Trailer (4 moves)	$700	$700

Breakeven Costs

The per unit breakeven cost for 53' containers, using the Finnmaster vessel, and capacity utilization scenarios is provided in Figure 8.24.

Figure 8.24: Per Unit Breakeven Cost for Belledune–Argentia Ro-Ro Service



The initial breakeven level from Belledune is $1,836 per trailer, assuming full capacity, but not including trucking to and from inland destinations or origins.

Comparative Costs

The possibility of operating a truck Ro-Ro service from the Port of Belledune has generated significant interest over the past several years. The primary competitor for this service would be the Oceanex service to Newfoundland from Montreal, which was recently indicated at a level of more than $3,000 per 53' container from Montreal to St. John's. It should be noted that the Oceanex rates are quoted on an empty return to origin basis.

Comparative trucking rates obtained in 2007 were between $3,500 and $5,800 per 53' container or trailer. It is not certain whether these were via MAI or Oceanex.

The trucking cost is estimated at $5,280 (round trip), with an assumption of $1.8/km between Belledune and North Sydney plus a round trip ferry charge of about $2,700, which includes a 25 percent fuel surcharge.

Conclusion

It is unclear if traffic between Belledune and Argentia is sufficient to justify a new service, given that this market is already largely served by Oceanex and MAI.

The service could be competitive if the cargo was generated at either the Newfoundland end (Argentia) for transport to Gaspé or NB or the reverse. When trucking costs from Montreal to Belledune and Argentia to St. John's are added to shipping costs, the result is not as promising.

8.5.2 Yarmouth – Boston

Traffic Potential

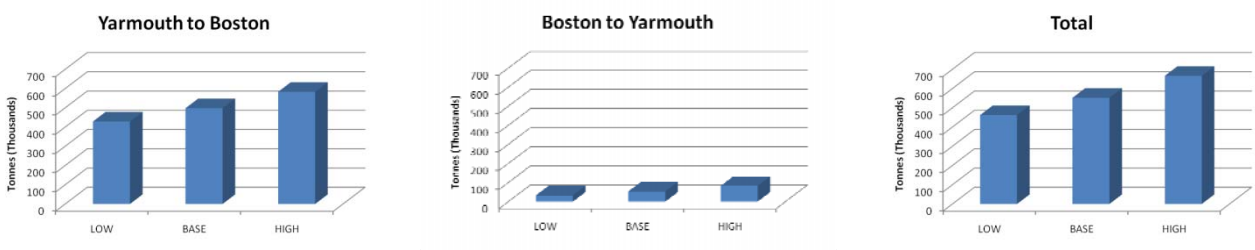
Cargo between southwestern NS and New England is generally trucked all the way around NS and through NB and ME, or moves via ferry between Digby and Saint John, before moving back on the highway. Not all traffic moving on the ferry is going to the US, however.

The estimated size of the market is 5,800 truckloads per annum of seafood going to the Boston market.[51] There is also other cargo such as tires and Christmas trees (seasonally) going in this direction. (Commercial traffic on the Digby – Saint John ferry service has declined from a peak of 28,000 units in 2000, to an estimated 15,000 in 2006, largely due to the closure of the local saw mills near Digby.)

According to the noted traffic scenarios, expected traffic along this feeder route is as follows:

[51] Opus International and MariNova Consulting, "Digby-Saint John Ferry Service Traffic and Socio-Economic Analysis", Transport Canada, 2007.

Figure 8.25: Ro-Ro Traffic Potential along Yarmouth–Boston Route



Ro-Ro Service Costs

The total fixed and variable costs for a round trip Ro-Ro service along the Yarmouth–Boston route are expected to be as follows:

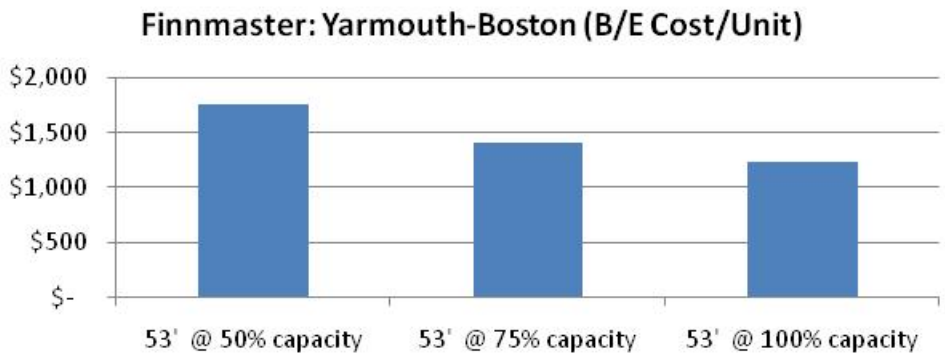
Figure 8.26: Fixed and Variable Costs for Feeder Service along Yarmouth–Boston Route

Time Calculation for Cycle	Yarmouth-Boston
Season	*Year Round*
Distance (miles)	472
Speed (knots)	16
Steaming time (days)	1
Port time (days)	1
Approaches (days)	0
Round trip time (days)	3
Fixed Costs per Voyage	
Vessel hire	$40,191
Fuel	$21,022
Pilots	$4,800
Ice Breaking*	$ -
Port Costs	$7,800
Linesmen	$2,500
Admin costs	$2,049
Total Fixed Voyage Cost	$78,362
Variable Costs per Box	
Handling charges / Trailer (4 moves)	$900

Breakeven Costs

The per-unit breakeven cost for 53' trailers under different vessel and capacity utilization scenarios is provided in Figure 8.27.

Figure 8.27: Per Unit Breakeven Cost for Yarmouth–Boston Ro-Ro Service



Comparative Truck Costs

About half the trucks use ferry service. With the use of a ferry service, the trucking costs between Yarmouth and Boston are estimated at $3,520 ($1.8/km for Yarmouth–Digby and Saint John–Boston plus the cost of ferry including fuel surcharge, $785) for a round trip. Without the use of a ferry, the distance between Yarmouth and Boston is approximately 1,400 km, and the estimated cost of trucking is $5,140 (round trip).

Conclusion

There have been a number of ferry services operating from Yarmouth to New England. All of these have been Ro-Pax vessels that carried both tractors and trailers along with drivers. The additional cost associated with Ro-Pax service as compared to straight Ro-Ro appears to be high enough to make such a service unviable. In order to operate on a Ro-Ro basis, trucking companies or shippers in NS would need to establish operations in the US to provide local deliveries, as most Ro-Ro's are only licensed to carry 12 passengers.

It must be stated, as well, that such a Ro-Ro service would have an impact on the already struggling ferry service.

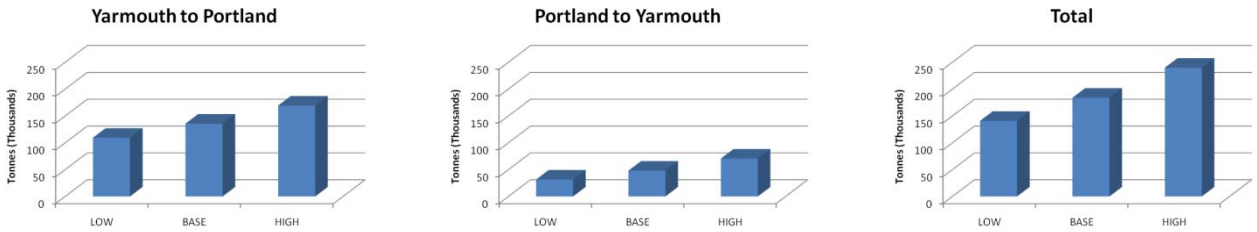
8.5.3 Yarmouth – Portland

Traffic Potential

The traffic potential for a Portland service is basically the same as Boston.

According to the noted traffic scenarios, expected traffic along this feeder route is as follows:

Figure 8.28: Ro-Ro Traffic Potential along Yarmouth–Portland Route



Based on the above, we expect the range of potential Ro-Ro traffic along the Yarmouth-Boston route to be in the order of 180,000 tons per year under the Base Case, which translates to approximately 7,000 '53 containers per year, or 40 '53 containers per trip (assuming 166 trips per year with 2.2 days of cycle time), using a Finnmaster. This is not expected to represent sufficient traffic to justify a service along this route. Given the close proximity of Portland to Boston, however, this route can potentially carry some of the traffic destined to Boston, which could make this route more attractive.

Ro-Ro Service Costs

The total fixed and variable costs for Ro-Ro feeder service along the Yarmouth–Portland route are expected to be as follows:

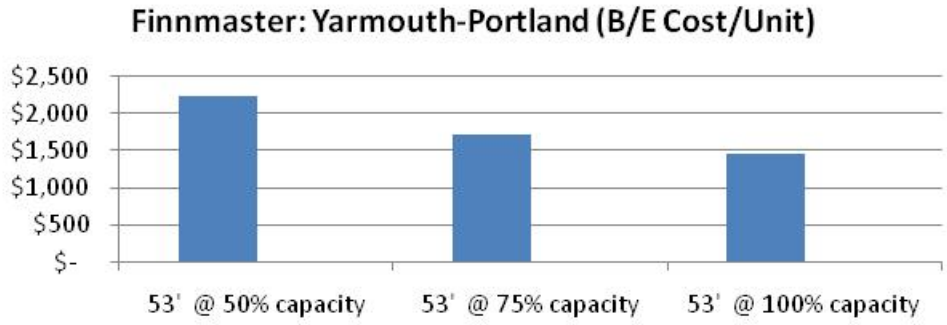
Figure 8.29: Fixed and Variable Costs for Feeder Service along Yarmouth–Portland Route

Time Calculation for Cycle	Yarmouth-Portland
Season	*Year Round*
Distance (miles)	362
Speed (knots)	16
Steaming time (days)	1
Port time (days)	1
Approaches (days)	0
Round trip time (days)	2
Fixed Costs per Voyage	
Vessel hire	$26,738
Fuel	$17,437
Pilots	$2,500
Ice Breaking*	$ -
Port Costs	$3,300
Linesmen	$2,000
Admin costs	$1,803
Total Fixed Voyage Cost	$53,778
Variable Costs per Box	
Handling charges / Trailer (4 moves)	$700

Breakeven Costs

The per-unit breakeven cost for 53' and 40' containers under different vessel and capacity utilization scenarios is provided in Figure 8.30.

Figure 8.30: Per Unit Breakeven Cost for Yarmouth–Portland Ro-Ro Service



Comparative Truck Costs

The cost to truck from Yarmouth to Portland is 1,250 km one way (not using the ferry). The cost at $1.80/km is $4,500 round trip. Using a ferry service, the estimated cost is $2,880 (about 580 km for Yarmouth-Digby and Saint John-Portland, plus a ferry charge of $785, including fuel surcharge).

Conclusion

As a sole destination, Portland is not expected to represent enough traffic to justify a new service.

The choice of Portland as an alternative port to Boston relates to the port costs associated with each destination. At a voyage cost of $53,778 from Yarmouth, the trailer cost on the basis of 100 trailers, handling costs and drayage should not exceed $1,300 which would be extremely competitive with trucking costs. Added to these costs would have to be delivery to Boston, which is only 160 km away, and at $1.80/km, would cost about $576 return, for a total of $1,876.

This would compare with a cost of $5,043 for trucking from Yarmouth to Boston, return.

9 Key Players and Strategic Partners

As discussed, in order for short sea shipping to take hold and be viable, a number of elements have to be in place. In particular, a proposed service has to be:

- Commercially viable, from a traffic and revenue/cost perspective,
- Competitive with other modes, from a cost, service and reliability perspective. Frequency can also be an issue, particularly for the grocery and perishable trade.

In this section, we discuss the potential players and strategic partners that can support the development of hub-and-spoke feeder and regional short sea shipping services in eastern Canada. It is stressed that key players and strategic partners are only expected to be interested in developing new services where a business case exists (i.e. where the service is expected to be commercially viable/competitive).

9.1 Hub-and-Spoke Feeder Services

In almost every respect, starting a feeder service is less complicated than a domestic or international short sea service because there are fewer stakeholders involved. Key players and strategic partners in the development of hub-and-spoke feeder services are likely to be those with an inherent interest in the operations of these services as an extension or complement to their existing businesses. Accordingly, key players and strategic partners may include the following:

- Ports
- Terminal operators
- Shipping lines
- Financiers / investors

The key to starting a feeder service is to identify a need / route and would-be customers. As we have discussed elsewhere, it can be a common-user service or dedicated service.

Ideally, the need for such a service has been identified by a mainline carrier because they will be motivated to use it if it materializes. In this case, a potential feeder operator could start up a service when it has a commitment for sufficient cargo to at least reach the breakeven point. After that, the feeder operator could sell slots to other shipping lines to the point where the vessel reaches capacity.

If it is known that shipping lines “A”, “B”, and “C” have cargo being trucked to port “Z” and that this could be served by a competitive feeder, this is another scenario that could be exploited.

If the motivation for the service is coming from an entrepreneur interested in the sector, and if the service is to operate on a common-user basis, there are bigger obstacles to overcome. A mainline carrier will need to be convinced that the service will save cost and be at least as reliable as their present means of serving the particular market. Before committing significant amounts of cargo, the shipping line will want to see the feeder operates on a consistent basis for some period of time. It will also be reluctant to enter any contract for service until the

feeder operation proves itself. The period between the start-up and when a vessel reaches breakeven can therefore be several months. The operator must have sufficient working capital in place or some support from a third party to get through this period.

Usually, feeder operators only sell their service to mainline carriers and never interfere with the relationship of the shipping line and its customer (the shippers). The mainline carrier sells the service on a door-door or port-port basis and depends on the feeder to be the extension of the mainline service. The only time a feeder operator would sell to a shipping line's customer *per se* is when they are using deep sea containers to reposition containers to a point where the mainline carrier needs them, or if they are also providing short sea (non-feeder) service.

As we have explained elsewhere, the barriers to entry for a non-cabotage feeder service are comparatively low. An operator needs a customer (or customers), a ship and some staff at either end of the service. The ship can either be chartered or purchased, and as long as it meets international safety and security standards, can be ready in as much time as it takes to reposition it. However, a would-be operator will likely be required to pay for the first and last months' charter upfront, as well as to put up a bank guarantee at the terminals it intends to call. Depending on its longevity in the shipping business, it may also need to pay cash for fuel, until the operator builds a credit rating.

Regarding port costs, if possible, the feeder operator should price the service on an FIO (Free In, Out) basis, avoid paying for stevedoring, and have the mainline carriers pay these costs. This will not always be possible, particularly if the feeder service is calling at a remote location where the mainline carriers have no relationship with the terminal operator. In other parts of the world, it is known that feeder lift costs are often considerably lower than mother ship lifts. The terminals in these cases take their profit from the mother ship lift or have different labour contracts that apply to the feeder sector, which allows them to price these lifts lower. It would help increasing the viability of the feeder sector in eastern Canada if ports and stevedoring companies (and labour) were to move towards this model.

9.2 Regional Short Sea Services

Developing a viable short sea shipping service is much more complicated than a pure feeder operation, unless the trucking industry is a partner in the service. If a trucking firm or a major shipper is not a participant or investor in the service, the operator of the service will need to spend considerable resources on marketing a sales infrastructure. Key players and strategic partners will include the following:

- Ports
- Terminal operators
- Shipping lines
- Shippers and consignees
- Trucking companies
- Financiers / investors

In the case of a short sea, rather than feeder service, two players are key: shippers and trucking companies. Shippers need to be convinced that a short sea service will save money and be as reliable and predictable as alternatives such as road or rail.

Truckers are also important, as they can potentially be partners *in* a service, or competitors *to* a service. Ideally, they would be partners or even investors in a service, similar to what took place between Turkey and Italy, where 12 trucking companies came together to form UN RoRo. Instead of being the customer of short sea, they can potentially profit from such a venture and have input into another element of the supply chain. This would also address issues such as driver shortages and still leave local delivery to local drivers. Many such firms have invested in 53' intermodal containers, which can also be carried onboard a vessel. Trucking firms that would be likely candidates to invest in short sea shipping in eastern Canada may include:

- Armour Transportation Group
- Day & Ross
- Midland / Irving
- Clarke Transport
- Maritime ON
- Reimer Express
- Transport Bessner
- Garfield
- Transport Robert

The ports being considered have been discussed elsewhere in the report. However, ports can help the viability of short sea services by keeping their berthage and wharfage rates low and by providing incentives to encourage the sector. In some European ports, short sea berths have been built, but there is not yet any need for this in any of the ports studied, with the exception of Belledune. St. John's needs additional capacity, which is also discussed elsewhere. Halifax has several berths that can be used for both Ro-Ro and Lo-Lo vessels.

Potential terminal operators will include most of the stevedoring firms already active in eastern Canada. They are:

- Halterm
- CeresGlobal
- Oceanex
- Quebec Stevedoring Ltd.
- Logistec
- Furncan
- Federal Marine Terminals
- Montreal Gateway Terminals

Canadian shipping companies are readily identifiable and would be the natural first choice to start domestic services. They include:

- Oceanex
- Fednav
- CSL

- Groupe Desgagnes
- Bay Ferries Ltd.
- CTMA
- Woodward's
- Irving / Atlantic Towing
- McKeil Marine
- MarineLink

Domestic companies could also partner with overseas companies, particularly those in countries that are part of the EFTA.

Shippers and consignees would generally fall within two or three categories. If truckers are to be partners in the service, then an operator would be wise not to come between the trucker and its customer, such as a major retailer. If the trucking industry was not a partner, then major retailers such as those listed below would need to be approached:

- Canadian Tire
- HBC
- Wal-Mart
- Loblaws
- Sobeys
- Home Hardware
- Rona
- Sears
- CRSA (Canadian Retail Shipper's Association)
- Staples

Another approach could apply to attracting large industrial shippers, such as in the pulp and paper or metals industries. The *Working Paper on Hub & Spoke Operations and Short Sea Shipping* discussed an extreme example of building a supply chain for one major shipper (StoraEnso). This region has a number of large forest product shippers, such as AbitibiBowater and Kruger. AbitibiBowater has begun shipping paper from Gatineau to Europe via rail and the Port of Trois Rivières. Kruger recently started shipping wood chips by short sea; the service was supported by the Government of Quebec. NewPage (formerly StoraEnso) ships most of its products by rail, however, there may be an opportunity to ship by water to certain destinations, as the plant is located at tidewater.

9.3 Financing

There are many recent examples of short sea shipping services being financed and/or changing ownership. These were discussed in the *Working Paper on Hub & Spoke Operations and Short Sea Shipping* and include one noteworthy Canadian company, Oceanex, which was sold in early 2008 for $165 million. There are also examples, such as Unifeeder (and even Oceanex predecessors), which have grown from one vessel companies to multi-million dollar companies.

When this study began, there was money available for credible buyers purchasing known entities with good balance sheets and prospects for growth.[52] This situation has changed making the Government of Canada's support more critical to stimulating adoption of short sea shipping services.

Start-ups are another question. Even seemingly well capitalized start-ups can run into cash flow issues and lose patience, as the Eimskip Halifax-New England experience demonstrated in late 2007 and early 2008.

In early 2008, a member of the consultant team approached a banker in London (UK) regarding financing such a service, and they responded:

> *"What are the barriers to entry and competitive environment? If you could build a case that the service is the only one of its kind and the majority of cash flows are contracted then it may pique an investor's interest".*

This last statement succinctly summarizes the issues. In the case of a Canadian cabotage service, there are high barriers to entry. This situation favours incumbents in the trade and is a deterrent to new investors, particularly those who need to import a foreign vessel. Once a new service is established, however, the cabotage regime tends to discourage new entrants, so barriers to entry can be viewed both positively and negatively depending whether an operator/investor has an established service, or is contemplating a new one.

With respect to the second question, in the common-user feeder business, a start-up will experience difficulty securing contracts until the operation has proven itself. Even substantial entities such as Eimskip (prior to Iceland's recent financial turmoil) experienced slow uptake of their Halifax-New England feeder service. In the case of a dedicated feeder operation, a deep sea shipping line would usually prefer to work with a known entity with a proven track record rather than a start-up. If a new market is being served at the request of the deep sea carrier, then the service will likely start up with breakeven volumes at least, or the contracted revenue will be sufficient to justify starting a service.

[52] It is possible and indeed likely that credit will be harder to obtain for financing new feeder or regional short sea ventures given the current economic climate.

10 Options to Support the Development of Feeder and Regional Short Sea in Eastern Canada

The feasibility analysis of the selected routes, discussed in Sections 8.4 and 8.5, suggests that there is potential for commercially viable feeder and regional short sea service on some routes in eastern Canada. However, the fact that no private sector groups have yet to invest in these services on any sustained basis suggests that risks are perhaps perceived as being too high relative to the expected commercial return from operations.

Accordingly, this section raises a number of possible catalyst action options for consideration to promote the development of feeder or regional short sea services.[53]

10.1 Options for Consideration

The options put forth in this section have been categorized under six headings:

- Market entry analysis
- Market promotion
- Start-up risk mitigation
- Infrastructure support
- Deployment of new technologies
- Others

10.1.1 Market Entry Analysis

Before developing a new feeder or regional short sea service, private sector proponents typically spend significant resources in assessing the business case for such services. However, market entry analysis and related business case development can be costly and in many cases can act as a barrier to entry. **Market analysis and business case support funding** could encourage entrepreneurs to assess the business case for the development of a new feeder or regional short sea study. Indeed, the Government of Quebec has already successfully used such a mechanism to support the analysis of new short sea routes (e.g. for the development of wood chips for Kruger, as earlier discussed).

Funding for market entry analysis could be contingent on specific eligibility criteria and subject to a call for proposals. Funding should be for a share of the total cost of the related studies (as opposed to full cost) to ensure that the private sector proponent has a vested interest in doing more than just studying the feeder or regional short sea development option. A similar Government of Canada mechanism would be the Canadian International Development Agency's Industrial Cooperation Programs, which can fund up to 75 percent of eligible costs for approved feasibility studies, led by the private sector.[54]

[53] We would be remiss if we did not stress that – in our opinion - the most significant impediments to the development of feeder and regional short sea shipping in eastern Canada remain the regulatory matters earlier discussed. However, options to address these impediments have not been discussed as part of this study.

[54] http://www.acdi-cida.gc.ca/inc.

10.1.2 Market Promotion

As discussed in Section 4.5, one of the key challenges in the development of feeder or regional short sea shipping services is the following "Catch 22":

Shippers and shipping lines are unwilling to commit traffic to feeder or regional short sea services until such services are proven. Conversely, potential short sea operators are unwilling to take the very significant risks inherent in developing feeder or short sea services, until traffic is proven.

A number of options can help address this challenge:

Marketing Development Support
Where a new feeder or regional short sea service is, or is about to be launched, funding could be provided to support part of the first-year marketing expenses so that the costs of educating the market about the service may be undertaken. A related example would be the financing of promotion costs of a new air service to a previously unserved area. Many airports currently make marketing promotion dollars available to operators offering a new service to a previously unserved market. Such funds would improve the possibility of up-take of the new service by users who might otherwise wait to see if the service develops as expected.

Market Development Support: Two Approaches
Provided there is sufficient traffic potential to justify a new feeder or regional short sea service, there are two different approaches to addressing the market challenge embodied in the above noted "Catch 22":

- Create an incentive for the market to use feeder or regional short sea shipping
- Support the start-up of feeder or regional short sea shipping so that it can attract the market

Each of these approaches is discussed below.

Incentivize the Market to use Feeder or Regional Short Sea Shipping
One way to promote a shift to short sea would be to provide financial incentives to the market to use feeder or regional short sea services for some limited period. The aim of such a program would be to incentivize the market to accept the necessary supply chain risks inherent in switching to a largely unproven transport mode.

Funding under such an arrangement could be time-bound (e.g. available only in the first year or two of the new service's operation) and would be intended to build comfort in the market for the virtues of short sea. The appropriate level of support required to motivate the shipping lines to provide or the shippers to use would likely be a function of perceived risk/return, and would differ for different types of commodities moved. Non time-sensitive/non-perishable, low-value commodities would likely be most responsive to such a program.

Service Start-Up Support
The Government of Canada could provide financial support to new feeder or regional short sea operators during some initial start-up period (e.g. six months to two years) to cover a portion of fixed costs. The aim of such a support initiative, inspired by the European Marco Polo program,

would be to help new operators cover fixed operating costs during the start-up period, before demand reaches a level that makes the service commercially viable.

In effect, this support program would allow an operator to provide regular service in order to prove itself to the market, even if running at a loss for the initial start-up period (i.e. limit start-up risk). The intent would be that, after the initial support period, the operator could continue to provide service on a commercial basis, with the market being satisfied that short sea is a legitimate option for the movement of freight.

10.1.3 Start-up Risk Mitigation

Though it is not within the scope of this study to recommend changes to existing regulations, actions can be taken by the Government of Canada to mitigate the costs and related risks of noted regulatory issues.

One such example might be a **remission of duty on vessels** (assuming that duty remission is somehow tied to a service offering on a particular route). Such remission could be tied to a willingness to remain on a route during off-peak periods so as to develop competitive alternatives to land-based transport modes. Such a remission or perhaps even refundable tax credit program could support right-sizing efforts by shipowners as they try to find the optimal size of asset to deploy on a particular route.

A similar program could be a **remission of the cost of reconfiguring ships** to meet the Canadian standards.

Loan guarantees, mortgage support and/or tax holidays might also have a place in this catalyst action toolbox, though this option should be reviewed in more detail.

10.1.4 Infrastructure Support

Unlike in BC, where significant transport capacity issues justify infrastructure spending to promote better utilization of transport assets using short sea shipping (as are the intended recent Government of Canada investments in short sea infrastructure, as earlier described), there are few such infrastructure capacity issues in eastern Canada.

There may nevertheless be opportunities to invest in landside infrastructure in eastern Canada to facilitate the development of feeder or regional short sea services. Such infrastructure needs, though, should be dictated by the needs of feeder or regional short sea proponent investors/operators.

Specific Infrastructure Funding Opportunities

Subject to the needs of a potential private sector feeder or regional short sea investors/operators and/or relate strategic partners, specific investment opportunities may include:

- Ro-Ro ramps at Belledune and Yarmouth to accommodate a potential Ro-Ro service. In Argentia, Marine Atlantic has indicated its willingness to share its ramp, which would limit need for a second Ro-Ro ramp.
- Container laydown areas (fenced, with reefer plugs), or parking area for trailers
- Container terminal capacity improvements at St. John's
- Gantry cranes ports already handling containers (e.g. Sept-Îles, Argentia)
- Others as determined through a call for proposal process

10.1.5 Deployment of New Technologies

Funding could be made available for pilot or demonstration projects on new technologies that could promote the development of feeder or regional short sea shipping in eastern Canada. On the vessel side, carriers are in the best position to see innovative technologies that might be deployed, and so support through a call for proposal process would be best. On the port side, technologies or process improvements that improve lift speeds or reduce lift costs might also be funded.

10.1.6 Other Considerations

Port Costs

A program that realigns port costs in support of feeder development could be an important factor in inducing modal switching. Port lift costs are substantially reduced for feeder operation in Hamburg, and this differential pricing has been instrumental in the growing of short sea services in the Baltic region. Where terminals are leased to a private operator, lift costs are not necessarily possible to reduce, but promotional port rates for harbour dues and berthage may go some way to support feeder operations.

Incorporation of Social Costs into Modal Pricing

While this is not a short sea promotion program *per se*, it does resonate from two perspectives. Trucking does not pay its full cost from a social cost perspective, and as fuel prices rise, short sea becomes even more competitive from a cost perspective against truck. The imposition of a carbon tax or cap and trade scheme on the transport industry is the way the Europeans are moving forward.

Education and Training

Shipper education can also help overcome inertia and image perception in modal switching. A shipper education program would be a useful addition to the toolbox of catalyst action initiatives.

10.2 Key Support Program Principles

In the consultant's opinion, catalyst actions to promote the development of feeder or regional short sea shipping should create the enabling conditions for the private sector to take the lead in developing new services, in a way that will also achieve the Government of Canada's social, environmental and economic objectives. Key principles that could guide the selection and further development of catalyst actions and protect the Government of Canada's interests include the following:

- Any private sector support program should be implemented via a call for proposals and should be a matching-dollar program. Competition for funding could help optimize results and shared risk would increase the operator's stake in the success of the venture. .
- The funding proposal should demonstrate that service offerings will meet the market requirements of cargo interests, as well as achieve social, environmental and economic ends (modal shift, reduction in green house gas emissions, etc.)
- Geographic scope limits (e.g. in line with broader strategic objectives – Atlantic Gateway) are also suggested as they de-politicize the decision process.

11 Conclusion

As the analysis in the report has shown, there is potential for hub-and-spoke feeder service and new regional short sea shipping services in eastern Canada, both in terms of traffic potential and competitive transport costs on certain routes.

Of the six potential feeder or short sea routes analysed, the two emanating from Sept-Îles would appear to have the most promise. These include a Montreal-Sept-Îles feeder and short sea service, as well as a feeder service linking Sept-Îles with Corner Brook, Souris and Halifax. A Halifax-Bermuda feeder could also compete cost-wise with competition operating out of New Jersey, but would need a substantial traffic commitment from a deepsea carrier to be viable. The Halifax-New England feeder is more problematic because of the high stevedoring costs in Boston make it difficult to compete with direct service and trucking from New York.

In terms of regional short sea service, a Ro-Ro service between Belledune and Argentia would likely find it difficult to compete with both Oceanex and Marine Atlantic. Such a service would also require major capital spending at Belledune and potentially Argentia, if the Marine Atlantic dock is not available. A Ro-Ro service between Yarmouth and New England could compete with over the road trucking, but would have an impact on the existing ferry service between Digby and Saint John.

Despite these opportunities, the private sector has been slow to develop new feeder and regional short sea services in eastern Canada. The main reason has been a lack of critical mass of traffic. The underlying reasons stem from both the buy-side and the supply-side of feeder services, creating a “Catch 22” situation summarized as follows:

Shippers and shipping lines are unwilling to commit traffic to feeder or regional short sea services until such services are proven. Conversely, potential short sea operators are unwilling to take the very significant risks inherent in developing new feeder or short sea services, until traffic is proven.

A number of catalyst action options have been suggested in the previous chapter to help address this Catch 22 situation and in turn promote the development of feeder and regional short sea services in eastern Canada.

Ultimately, the success of hub-and-spoke feeder and regional short sea services will depend on the perceived commercial viability of these services from the perspective of potential private sector investor/operators.

It should be noted that the economic slowdown that has beset the North American economy will make it more difficult to find financing for short sea operations. It will also tend to reduce cargo growth and lessen the critical mass of volume available for feeder services emanating from ports such as Halifax. If, on the other hand, a short sea or feeder service can demonstrate significant cost reductions over competing modes, then shippers (and shipping lines) may give alternative routings some consideration. Competition from other modes may nevertheless increase, given the drop in traffic demand.

With the right public support programs and investments, the development of the feeder and regional short sea sectors can play a more important role in the movement of freight in eastern Canada and in the optimization of the Atlantic and Continental Gateways.

Annex A: Literature Review

Over thirty studies were reviewed by the CPCS Team as part of this study. The list of studies reviewed is provided below. A summary of each study, and relevance to the present project, is included in the Working Paper, *Literature Review*.

Study Title	Author(s)	Date
Etude de préfaisabilité sur la création d'un service maritime roulier sur le Saint-Laurent – Rapport Synthèse	Jacques Paquin, et al. for MTQ	1995
Etude comparative des options de transport pour l'approvisionnement en hydrocarbures de la region du saguenay / Lac St. Jean	MTQ	1997
The Development of a Gateway Hub at the Port of Halifax	James Frost	2002
Short Sea Shipping in Atlantic Canada	MariNova and Dr. Mary R. Brooks	2003
Analysis of the Great Lakes / St. Lawrence River Navigation System's Role in US Ocean Container Trade	Pennsylvania Transportation Institute	2003
Short Sea Shipping: Market Assessment Tools Development	Geoplan Opus and MariNova	2004
Transport Multimodal alternative pour l'industrie forestière sur la Cote Nord au Québec	Institut canadien de recherches en genie forestier (FERIC)	2004
Cleveland Trans-Erie Ferry Service Feasibility Study	TranSystems	2004
Social and Economic Impact of Marine Atlantic	MariNova and Opus International	2005
Social and Economic Impact of Marine Atlantic Drop Trailer Service	MariNova and Opus	2005
PEI Short Sea Shipping Study	Enterprise Management Consultants & MariNova	2005
Short Sea Shipping Market Study (Halifax-Hamilton Short Sea Study)	MariNova & Partners	2005
Research Study on the Coasting Trade Act	Research and Traffic Group	2005
Marine Transportation Study For the Ontario Marine Transportation Forum and the Ontario Ministry of Transportation	Mariport Group Ltd.	2006
Short Sea Shipping on the East Coast of North America	Brooks, Hodgson and Frost	2006
Shipping Out: The Development of a Gateway Hub at the Port of Halifax	James Frost, AIMS Atlantica Papers #5	2006
Short Sea Shipping Opportunities in the Lower St. Lawrence Region	Maritime Innovation	2006

Study Title	Author(s)	Date
Four Corridor Case Studies of Short sea Shipping Services	GI	2006
Short Sea Shipping in Canada	Mariport Group Ltd.	2006
Saint John-Digby Ferry Study: Issues and Options	Belleclaire, MariNova and Opus	2006
Belledune-Corner Brook Short Sea Study	Bellefontaine Consulting & MariNova	2007
Saint John-Digby Ferry Study	Opus and MariNova	2007
Great Lakes/St. Lawrence Seaway (GLSLS) Study	Led by Transport Canada and US Department of Transportation	2007
Great Lakes St. Lawrence Seaway: New Cargoes/New Vessels Market Assessment Report	TEMS, Inc. and RAND Corporation for Transport Canada and US DoT	2007
Restructuring the Maritime Transportation Industry: Global Overview of Sustainable Development Practices	Claude Comtois and Brian Slack	2007
Towards a North American Cabotage Regime: A Canadian Perspective	Hodgson, J.R.F. and Mary R. Brooks	2007
Etude de faisabilité sur l'intégration du transport maritime à la chaine logistique du papier journal et du papier à recycler	Papier White Birch	2008
Short Sea Shipping in North America: Understanding the Requirements of Atlantic Canadian Shippers	Mary R. Brooks and Valerie Trifts	2008
North American Freight Transportation: The Road to Security and Prosperity.	Book chapter by Brooks, Mary R.	2008
Feasibility Study: Belledune-Argentia Freight Service	Bellefontaine Consulting Services	2008
North American Freight Transportation: The Road to Security and Prosperity.	Book chapter by Brooks, Mary R.	2008

Annex B: Major International Transhipment Hubs

A number of enormous container transhipment hubs have emerged worldwide in the past decade or so. The major transhipment hubs are noted in the table below.

Figure B-1: Estimated Transhipment Volumes at Main Hub Ports, 2006

Hub Ports	*Region*	Total Throughput *(million teu)*	Transhipment Estimate *(million teu)*	Estimated Transhipment Incidence
Singapore	*SE Asia*	24.793	20.206	81.5%
Hong Kong	*Far East*	23.540	7.062	30.0%
Busan	*Far East*	12.039	5.213	43.3%
Kaohsiung	*Far East*	9.775	5.132	52.5%
Dubai	*Mid East*	8.923	4.707	52.8%
Tanjung Pelepas	*SE Asia*	4.800	4.598	95.8%
Shanghai*	*Far East*	21.710	4.342	20.0%
Port Klang	*SE Asia*	6.327	3.252	51.4%
Hamburg	*N Europe*	8.862	2.898	32.7%
Algeciras	*S Europe*	3.245	2.758	85.0%
Gioia Tauro	*S Europe*	2.873	2.385	83.0%
Salalah	*Mid East*	2.390	2.366	99.0%
Colombo	*SE Asia*	3.079	2.328	75.6%
Rotterdam	*N Europe*	9.691	2.258	23.3%
Antwerp	*N Europe*	7.022	1.896	27.0%
Bremerhaven	*N Europe*	4.444	1.880	42.3%
Kingston	*Carib*	1.981	1.743	88.0%
Jeddah	*Mid East*	2.964	1.550	52.3%
Port Said East	*N Africa*	1.648	1.483	90.0%
Freeport	*Carib*	1.463	1.448	99.0%
Khor Fakkan	*Mid East*	1.731	1.402	81.0%
Marsaxlokk	*S Europe*	1.450	1.392	96.0%
Manzanillo (Panama)	*Cam E*	1.331	1.125	84.5%
Colon	*Cam E*	1.050	0.945	90.0%
Balboa	*Cam W*	0.988	0.939	95.0%
Barcelona	*S Europe*	2.318	0.867	37.4%
Port Said	*N Africa*	1.008	0.756	75.0%
Damietta	*N Africa*	0.830	0.722	87.0%
Piraeus	*S Europe*	1.390	0.713	51.3%
Taranto	*S Europe*	0.857	0.711	83.0%
Le Havre	*N Europe*	2.130	0.639	30.0%
Durban	*S Africa*	2.198	0.488	22.2%
Kwangyang	*Far East*	1.751	0.443	25.3%
Manzanillo (Mexico)	*Cam W*	1.251	0.399	31.9%
Valencia	*S Europe*	2.613	0.392	15.0%
Puerto Cabello	*NCSA*	0.846	0.347	41.0%
Aden	*Mid East*	0.398	0.328	82.5%
Tokyo	*Far East*	3.659	0.322	8.8%
Cartagena	*NCSA*	0.711	0.320	45.0%
Taichung	*Far East*	1.198	0.266	22.2%
Haifa	*Mid East*	1.178	0.265	22.5%
Yokohama	*Far East*	2.977	0.262	8.8%
Felixstowe	*N Europe*	3.000	0.258	8.6%
Total		**198.433**	**93.806**	**47.3%**

Source: Drewry Shipping Consultants, 2006

Annex C-1: Marco Polo Programmes

The following provides an overview of the five Marco Polo Programs (April 2008). The five program titles are those used in its Call for Proposals, and the points listed as key features and purposes are taken directly from the listed expectations and component parts[55].

Modal shift actions

This program provides aid to start up a service or develop an existing service. Projects funded should aim to shift freight off the road. Key features of the program are:

- Maximum subsidy of €1 per 500 tonne-km shifted off the road.
- Minimum subsidy threshold €500,000, thus at least 250 million tonne-km to be shifted over the total length of the contract.
- Subsidy rate can be up to 35 percent of eligible costs.
- Ancillary infrastructure is not supported (only services).
- Subsidy available for up to three years.
- Support must not unduly distort competition.
- Project must be viable after subsidy ends.

Catalyst actions

This program provides aid to overcome structural barriers in the market. Projects funded should be highly innovative, aiming to achieve a real breakthrough. Key features of the program are:

- Maximum subsidy is not linked to modal shift but the service has to achieve modal shift.
- Minimum subsidy threshold €2 million.
- Subsidy rate can be up to 35 percent of eligible costs.
- Infrastructure that is ancillary to the service can be supported.
- Subsidy available for up to five years.
- Project must disseminate its results.
- Political support may be given by the European Commission if required.
- Support must not unduly distort competition.
- Project must be innovative and viable after subsidy ends.

Common learning actions

This program provides aid to improve co-operation and sharing of knowhow. The objective is mutual training or exchange of information to help cope with an increasingly complex transport and logistics market. Key features of the program are:

- Minimum subsidy threshold €250,000.
- Subsidy rate can be up to 50 percent of eligible costs.
- Subsidy available for up to two years.
- Project must disseminate its results.
- Innovative on a European level.

[55] http://ec.europa.eu/transport/marcopolo/calls/docs/2008/call08_summary.pdf, last accessed 31 October 2008.

Motorways of the sea actions

This program provides aid to shift freight from road to short sea shipping or a combination of short sea shipping with other modes of transport. Key features of the program are:

- Maximum subsidy of €1 per 500 tonne-km shifted off the road.
- Minimum subsidy threshold €2.5 million, thus at least 1.25 billion tonne-km shifted over the total length of each contract.
- Subsidy rate can be up to 35 percent of eligible costs.
- Preparatory measures and infrastructure ancillary to the action can be supported.
- Subsidy available for up to five years.
- Innovative action.
- Project must disseminate its results and must be viable after the subsidy ends.

Traffic avoidance actions

This program provides aid to integrate transport into production logistics to avoid a large percentage of freight transport by road. Key features of the program are:

- Minimum subsidy threshold €1 million, thus at least 500 million tonne-km or 25 million vehicle-km of freight traffic avoided.
- Maximum subsidy of €1 for avoidance of every 500 tonne-km or 25 vehicle-km of road freight.
- Subsidy rate can be up to 35 percent of eligible costs.
- Preparatory measures and infrastructure ancillary to the action can be supported.
- Subsidy available for up to five years.
- Innovative action.
- Project must disseminate its results and must lead to a sustainable traffic avoidance of at least 10 percent of freight volume of existing services related to road transport flows in production logistics.

Annex C-2: Marco Polo – Key Principles

Recognizing that the focus of Marco Polo programs is removing trucks from the road within the context of a larger emphasis on GHG emission reduction and congestion reduction, the programs take a 'plane-level'—as opposed to bird's eye—view of the problem. Trade-offs between modes (and between prospective locations for industrial development) are all seen as part of the solution.

> *The qualitative environmental and social benefits from the proposed action could be for instance, that the new "modally-shifted" route avoids sensitive and metropolitan areas and/or natural resorts or that the "new" concept in a Traffic avoidance action leads to less road congestion in densely populated areas. Other benefits may result from the use of clean fuels or abatement techniques on ships. The quantitative environmental and social benefits calculation is based on a comparison of the relevant external costs for the old "road"-route with the new "modally shifted"-route respectively "old" transport service with the "new" concept of traffic avoidance.*[56]

[56] http://ec.europa.eu/transport/marcopolo/calls/docs/2008/call08_full.pdf, page 9.

The Marco Polo programs focus at an international level within the EU. They do not apply domestically, however they do offer insights if one thinks of the instruments in the context of what they are intended to achieve. Hence, it is worth reviewing them from a focus on key principles as the objectives for each program are tied specifically to the execution principles, that is, taking an approach of determining program characteristics after deciding the goals of the program. (The goals are in bold.)

1. If the target action is a **modal shift** (from road to a new or existing non-road service) is desired in a particular corridor, the aid is allocated based on a subsidy per tonne-km removed from road, that is it is cargo-related with a threshold minimum on the amount of modal shift and a cap on the percentage of the costs that may be subsidized and on the number of years of the subsidy. Ancillary infrastructure investment (like port infrastructure) is not supported.
2. If the target action is a **"Motorways of the Sea" modal shift** (from road to a service involving short sea shipping) is desired, the aid is allocated based on the same subsidy per tonne-km removed from road, but the threshold minimum on the amount of modal shift is half the previous program, but a cap on the percentage of the costs that may be subsidized remains the same, although the number of years of the subsidy is longer. In this program, ancillary infrastructure investment is supported.
3. If the target action is the **removal of a structural impediment**, the outcome has to be a resulting modal shift. The supported action must not distort competition. Again, there is a cap on the percentage of the costs that may be subsidized and on the number of years of the subsidy, although a longer period of time for the subsidy is given to achieve the goal. An interesting addition with this particular target action is that the recipient of the funding is required to disseminate its results.
4. If the target action is to **disseminate information** about the learning from the program, there is a minimum threshold but the amount of the subsidy is higher and the duration of the subsidy is shorter. Training is seen as a form of dissemination as is the development of capacity management models in rail or pricing improvements in terminals. The higher subsidy recognizes that education and training in Europe are perceived differently than they would be in the US (while in Canada, there is moderate support of public funds being used for education and training).
5. If the target action is the **restructuring of production logistics** so as to reduce road usage, there is again a subsidy to take tonne-kms out of the manufacturer's distribution network. These actions are different from the other actions in Marco Polo because avoidance of road transport is the focus instead of modal shift off the road. There are minimum thresholds for traffic removal, and the subsidy rates are similar to the modal shift funds. Both ancillary infrastructure and preparatory measures are eligible and the program is available for the maximum duration found in the other programs. Particularly interesting is that proposed project must reduce road traffic by 10 percent of existing traffic, a difficult threshold for large multi-country operating entities to meet.

To expand the discussion further, some of the programs are quite specific on what constitutes acceptable service provision. Using an example provided by the program documentation, the modal shift in activities from road to rail would require the service provider to meet the following test:

- *Road-competitive quality of service;*
- *Central integrated control of the services and offer of a "door-to-door" concept;*
- *Guaranteed departures and arrival times;*
- *Compensation system for quality deficiencies;*
- *Applied international interoperability of equipment, safety or information systems.* [57]

Similar requirements are seen as appropriate for short sea proposals that seek funding. In other words, the funding must bring about service offerings that meet the market requirements of cargo interests.

Because two of the program types are new in 2008, it is too soon to determine if they will succeed in gaining the modal shift desired as part of the EU's environmental policy of reducing GHG emissions.

Finally, several of the programs require dissemination so that there is shared learning. Such funds could include (according the documentation) the following as funded activities:

- *New co-operation and capacity management models in rail;*
- *Improving pricing, procedures and methods in the terminal;*
- *European training centres;*
- *Reduction of transport damages and prevention of theft and/or sabotage;*
- *Increasing the demand for non-road transport;*
- *Improving the shippers' understanding of intermodal freight transport;*
- *Any actions aiming to improve the integration of the new Member States in the logistics chain.* [58]

While the exact wording is not critical, the ability to bring universities, colleges, and community learning centres into the promotion strategy would bode well for improving the effectiveness of any program proposed.

57 http://ec.europa.eu/transport/marcopolo/calls/docs/2008/call08_full.pdf, page 2.
58 http://ec.europa.eu/transport/marcopolo/calls/docs/2008/call08_full.pdf, page 3.

Annex C-3: Selection of Marco Polo Project Grants

A variety of new services to be funded under the Marco Polo program, and related funding amounts, can be summarized in the tables below:

Feeders

Company	Route	Funding
MCL	Antwerp/Rotterdam/Bremerhaven-Riga	€1,241,961

Short Sea Container

Company	Route	Funding
IMCL	Rotterdam-Gydnia/Gdansk, Bremerhaven	€1,037,357
Logitec	Sassuolo (Italy)-Castellon de la Plana (Spain)	€4,000,000
Mac Andrews	Bilboa-Sheerness-Rotterdam	€1,714,711

Short Sea Ro-Ro

Company	Route	Funding
Brittany Ferries	Santander-Poole	€870,877
Grimaldi Logistics	Civitavecchia-Barcelona (upgrade)	€4,500,000
Transmediterranea	Livorno(Italy)-Barcelona (Spain	€4,847,392
DFDS	Lubeck(Germany)-Riga (Latvia) (upgrade)	€1,555,475

Sea & Rail

Company	Route	Funding
NIKO Transport	Slovenia-Zeebrugge-Killingholme	€1,062,790

Annex D: List of Stakeholders Consulted

Over thirty stakeholders were approached as part of this study. Stakeholders included a broad range of industry players, including shipping lines, shippers, railway and trucking companies, port and terminal operators. Of the stakeholders approached, the following provided responses to the study questionnaire.

Company Name
Shipping Lines
Fednav
Seaway Marine Transport
McKeil Marine
Ports
Saint John Port Authority
Montreal Port Authority
Sept-Iles Port Authority
Halifax Port Authority
Trois Rivieres Port Authority
St. John's Port Authority
Terminal Operators
Ceres Global (Cerescorp)
Shippers
HBC Logistics
Canadian Tire
Loblaws

A selection of other groups, including Oceanex, provided other input not directly in line with the survey questionnaire.

Annex E: Stakeholder Questionnaire[59]

Eastern Canada Hub-and Spoke Study

[Transport Canada Study on Potential Hub-and-Spoke Container Transhipment Operations in Eastern Canada for Marine Movement of Freight (Short Sea Shipping)]

Stakeholder Consultation Guide

Organization:	
Contact Name / Title:	
Contact Details:	
Industry:	
Date of Response:	

Key Questions

1. In your opinion, what traffic (both domestic and international) going through Eastern Canada/US could potentially use a competitive container or other short sea service, if one existed? (Specific to your region, or generally).

   Please provide input here

2. What is the origin and destination of this traffic currently? How is this traffic moving today? Do you see this traffic feeding into an existing or new marine hub-and-spoke network in Eastern Canada?

   Please provide input here

3. In your opinion, what volumes (annual) could potentially be diverted to short sea shipping, if this above noted service(s) were competitive?

   Please provide input here

4. Are you aware of any efforts underway to develop new, container or other, short sea shipping services in your market? What traffic would this service serve?

   Please provide input here

5. Are you aware of any past or existing short sea shipping services in your region ? If so, what market segment did/ do they serve? What are / were the key success factors/ deficiencies with these existing/ past short sea shipping services?

[59] This questionnaire was also translated into French.

Please provide input here

6. Can you describe any advantages, disadvantages, perceptions, mispercetions about short sea shipping in Eastern Canada, generally?

Please provide input here

7. In your opinion, which ports in Eastern Canada are currently, or are in the best position to be, international marine hubs in a hub-and –spoke network with a short sea shipping component?

Please provide input here

8. For transport organizations – in your opinion, what shippers would stand to benefit most from short sea shipping. Why?

Please provide input here

9. In your opinion, what are the key success factors in establishing viable short sea shipping operations?

Please provide input here

10. Similarly, what are the main obstacles in establishing short sea shipping?

Please provide input here

11. For international shipping lines - why have intercontinental services shown little interest in topping off with short sea cargo? Is this opportunity less lucrative? Why?

Please provide input here

Annex F-1: Atlantic Canadian Port Profiles

The Atlantic Canadian ports reviewed are as listed below:

- Halifax, NS
- Canso Superport, NS (including Port Hawkesbury and the proposed Melford Terminal)
- Sydney, NS
- Shelburne, NS
- Yarmouth, NS
- St. John's, NL
- Corner Brook, NL
- Goose Bay, NL
- Saint John, NB
- Belledune, NB
- Bayside, NB
- Sept-Îles, PQ

The characteristics, with respect to the depth of approach channels, berths, storage areas and buildings, and commodities handled are shown below.

Port and Approach Channel Depth	Terminal	Berths and Storage	Principal Commodities	Principal Industries and Markets	Intermodal Connections
Halifax, NS Approach channel depth 18 m	South End Container Terminal	Total berth length 960 m x 16 m to 13.7 m draft	Container, Ro-Ro, Breakbulk, Heavy-lift		Road and rail
	North End Container Terminal	Total berth length 670 m x 16.5 m draft	Containers, Ro-Ro		Road and rail
	Grain Elevator	No Liner Service, N/A for this study			
	Terminal A/A1	Total berth total 760 m x 11.2 m draft	Container, Ro-Ro, Breakbulk, Heavy-lift		Road and rail
	Terminal 23/24	Total berth length 355 m x 8.9 m draft	Container, Ro-Ro, Breakbulk, Heavy-lift, Cruise		Road and rail
	Richmond Terminals	Total berth length 454 m x 8.8 m draft	Bulk, Breakbulk, Containers, Project Cargoes, Cable facilities		Road and rail
	Cruise Ship Terminal	Total berth length 600 m x 11.0 m draft	Cruise		Road only
	Oil Refinery	Private Facility N/A for this study			
	Gypsum Loading Terminal	Private Facility N/A for this study			

Port and Approach Channel Depth	Terminal	Berths and Storage	Principal Commodities	Principal Industries and Markets	Intermodal Connections
Canso Superport and Melford Terminal, NS Approach channel depth 27 m	Canso/Port Hawkesbury	7 dedicated specialised terminals (N/A to this study) 1 small craft and cruise terminal 1 general cargo terminal	Containers, general cargo		Road access only, although the rail link to Melford may provide access here
	Melford Proposed container terminal	Proposed berth 950 m x 17 m draft total area 217 ha	Containers, general cargo		Road and rail
Sydney, NS Approach channel depth 11.7 m	Sydney Marine Terminal	1 wharf 275 m long x 12 m draft 1 wharf 65 m long x 8.5 m draft 4.4 ha storage Cruise Pavillion	Project cargo, break bulk, bulk, cruise		
	International Coal Pier	180 m long berth x 15 m draft	Coal	Coal imported for Nova Scotia Power	Road and rail
	Atlantic Canada Bulk Terminal	360 m berth (2 berths) x 13.5 m to 15 m draft 44 ha storage	Coal, Aggregate Project cargo	Coal imported for Nova Scotia Power. Aggregate exported to Bermuda.	Road and rail
	Marine Atlantic Ferry Terminal	Wharf 1 212m Wharf 2 240m Wharf 3 150m 12 ha storage 4.7 ha queuing area	Ferry Service between NS and Nfld. Ro-Ro service - 86,000 commercial units in 2005		Road only
Shelburne, NS Approach channel depth 9.0 m	Shelburne Marine Terminal	"Stem" berth 130 m x 13 m draft "Tee" berth 163 m x 13 m draft	Containers, seafood		Road only
Yarmouth, NS Approach channel depth 6.6 m	Berth 1	152 m x 6.7 m draft	Containers, seafood		Road only
	Berth 2	130m x 5.2m draft	Containers, seafood		Road only
St. John's NL Approach channel	Berth 1	Berth length 175 m x 1.5 m to 6.0 m draft			Road only

Port and Approach Channel Depth	Terminal	Berths and Storage	Principal Commodities	Principal Industries and Markets	Intermodal Connections
depth 11.8 m	Berth 2	Berth length 165 m x 6.0 m draft			Road only
	Berth 3	Berth length 180 m x 8.0 m to 9.0 m draft			
	Berth 4	Berth length 120 m x 7.3 m to 8.2 m draft			Road only
	Berth 5	Berth length 120 m x 7.3 m to 8.2 m draft			Road only
	Berth 6	Berth length 150 m x 3.7m to 7.0 m draft			Road only
	Berth 7	Berth length 120 m x 6.4 m to 7.0 m draft			Road only
	Berth 8	Berth length 150 m x 8.0 m draft			Road only
	Berth 9	Berth length 150 m x 7.4 m draft			Road only
	Berth 10	Berth length 150 m			Road only
	Berth 11	Berth length 150 m			Road only
	Berth 17	Berth length 180 m x 8.1 m to 10.3 m draft			Road only
	Berth 18	Berth length 76 m x 15.3 m to 16.9 m draft			Road only
	Berth 19	Berth length 115 m x 6.7 m to 8.9 m draft			Road only
	Berth 20	Berth length 162 m x 5.5 m to 10.4 m draft			Road only
	Berth 21	Berth length 58 m x 7.3 m to 9.3 m draft			Road only
Corner Brook, NL Approach channel depth 46 m	1 berth	Berth length 360 m x 10.1 m draft	Paper and containers		Road only

Port and Approach Channel Depth	Terminal	Berths and Storage	Principal Commodities	Principal Industries and Markets	Intermodal Connections
Goose Bay, NL	Berth 1	Berth length 244 m x 5.6 m to 9.0 m draft Total shed area 1,640 m^2			
	Berth 2	Berth length 51 m x 5.4 m to 7.0 m draft			
Saint John, NB Approach channel depth 9.1 m	Long Wharf Terminal	Berth A 182 m x 9.1 m draft Berth B/C 280 m x 10.7 m draft Shed B 5,520 m^2	General and Bulk Cargo		Road and rail
	Navy Island Terminal	Berth 1 378 m x 10.4 m draft Berth 2 200 m x 10.4 m draft Berth 3 313 m x 10.4 m draft 4 sheds totaling 48,300 m^2	Forest Products General Cargo Containers		Road and rail
	Rodney Container Terminal	Slip berths 295 m x 12.2 m draft Margin berths 608 m x 12.2 m draft 8 sheds of 3,160 m^2	Containers, Breakbulk		Road and rail
	Pugsley C Terminal	Berth 232 m x 10.4 m draft Shed of 6,100 m^2	General Cargo		Road and rail
	Lower Cove Terminal	Berth 245 m x 10.7 m draft	Bulk Containers General Cargo		Road and rail
	Barrack Point Terminal	Berth 290 m x 13 m draft 2 sheds totaling 22,300m^2	Potash Rock salt		Road and rail
	Nos. 10, 11, 12 Terminal	Berth 11 68 m x 9.7 m draft Berth 12 263 m x 9.1 m draft Shed 12 6,900 m^2	General and Bulk Cargo		Road and rail
	Cruise Terminal	North berth 89 m x 10.4 m draft Berth A/B 289 m x 10.4 m	Cruise		Road only

Port and Approach Channel Depth	Terminal	Berths and Storage	Principal Commodities	Principal Industries and Markets	Intermodal Connections
Belledune, NB	Terminal 1	Berth length 155 m x 10.4 m draft	Ore concentrates, sulphuric acid, liquid petroleum		Road and rail
	Terminal 2	Berth length 307 m x 14.4 m draft	Mainly coal		Road and rail
	Terminal 3	**West Berth:** Berth length 200 m x 9.9 m draft **East Berth:** Berth length 200 m x 11.5 m draft Total open area 13.5 ha Total shed area 6,500 m^2	Synthetic gypsum, armour stone, aggregates, metallurgical coke, perlite, wood pulp, forest products, containers		Road and rail
	Freight Station 101	No berth Total shed area 1,74 $0m^2$	Any dry cargoes passing through the port		Road and rail
Bayside, NB Approach channel depth 21.3 m	Berth	Total contiguous berth length 242 m x 8.0 m draft	Aggregate mined on site and exported to various markets. Frozen seafood imported from Alaska and exported to US and other points. Paper exported to various points.	On-site quarry Fishery Pulp and paper	No inter-modal facilities. Only truck traffic fpr imports. There is no longer a rail link.
	Woodstock Cold Storage building	Capacity: 7,000 tonnes			
	Adjacent warehouse	Total shed area 3,600 m^2			
Sept-Îles, PQ	Stations 1 to 20	Private Facilities N/A for this study			
	Pointe Noire Dock	466m Bulk loading dock 2 berths 16m and 12m draft Ships up to 150,000 t	Iron ore	Wabush Mines	Rail to Northern Quebec/Labrador
	La Relance Dock	260m bulk and general cargo dock, 14m draft	Alumina, coal, dolomite, aluminum, Coal	Alouette Wabush Mines	Road Rail to Northern Quebec/ Labrador

Port and Approach Channel Depth	Terminal	Berths and Storage	Principal Commodities	Principal Industries and Markets	Intermodal Connections
	Rail Car Ferry Terminal	141m general cargo dock with mobile ramp for the rail car ferry and shed 9 to 10m draft	General cargo, aluminum	Alouette	Road Rail ferry Rail to Northern Quebec/ Labrador
	Point-aux-Basques Dock	183m x 8.5m draft open and covered storage	Bulk and general cargo		Road Rail to Northern Quebec/ Labrador
	Tanker jetty	98m x 12m draft	Gasoline, fuel and bunker		Road Rail to Northern Quebec/ Labrador
	Mg-Blanche Dock	244m x 8m draft open storage	General cargo, planned for cruise ship calls		Road Rail to Northern Quebec/ Labrador

Annex F-2: Characteristics of Central Canadian Ports

The following central Canadian ports were also reviewed:

- Montreal, QC
- Quebec, QC
- Hamilton, ON
- Toronto, ON
- Oshawa, ON

The characteristics, with respect to the depth of approach channels, berths, storage areas and buildings, and commodities handled at these ports are shown below.

Port and Approach Channel Depth	Terminal	Berths and Storage	Principal Commodities	Principal Industries and Markets	Intermodal Connections
Montreal, PQ Approach channel depth 11.3m	Bickerdike Complex	Total berth length 1,670 m x 8.8 m draft Total open area 8.0 ha Total shed area 18,700m^2	Containers		Road and rail
	Logistec Terminals	**Area 1:** Berth length 152 m x 9.1 m draft Total shed area 3,735 m^2 **Area 2:** Total berth length 2,784 m x 10.5 m draft Total open area 20.5 ha Total shed area 56,000 m^2 **Area 3:** Berth length 198 m x 5.5 m draft Total open area 2.7 ha Total shed area 4,640 m^2 **Area 4:** Total berth length 440 m x 5.2 m draft Total open area 8.2 ha	General cargo		Road and Rail
	Grain Terminal	Total berth length 640 m x 8.2 to 10.7 m draft	Grain		Road and rail

Port and Approach Channel Depth	Terminal	Berths and Storage	Principal Commodities	Principal Industries and Markets	Intermodal Connections
	Racine Terminal	Total berth length 1,640 m x 8.2 m to 10.7 m draft Total open area 20.6 ha	Containers		Road and rail
	Maisonneuve Terminal	Total berth length 830 m x 1.7 m draft Total open area 17.9 ha	Containers		Road and rail
	Cast Terminal	Total berth length 740 m x 10.7 m draft Total open area 19.7 ha	Containers		Road and rail
	Petroleum Berths	N/A for this study			
	Contrecoeur Terminal	Total berth length 404 m x 6.1 m to 10.7 m draft	General cargo		Road and rail
Quebec Approach channel depth 15.5m	Beauport	Total berth length 1,120 m x 12.0 m to 15.0 m draft Total open area 13.6 ha Total shed area 4,180 m^2	Dry and liquid bulk		Road and rail
	Estuaire	Total berth length 3,760 m x 5.5 m to 12 m draft Total open area 5.5 ha Total shed area 26,400 m^2	Grains and general cargo		Road and rail
	Pointe a Carcy	Total berth length 725 m x 8.0 m to 10.7 m draft	Cruise ships		Road only
	Anse au Foulon	Total berth length 1,500 m x 1.3 m to 12 m draft Total open area 7 ha Total shed area 19,500 m^2	General cargo and solid bulk		Road and rail
Hamilton Approach channel depth 8.2m	Pier 10	Total berth length 1,080 m x seaway draft Total shed area 15,900 m^2	General cargo, steel coils, containers		

Port and Approach Channel Depth	Terminal	Berths and Storage	Principal Commodities	Principal Industries and Markets	Intermodal Connections
	Pier 11	Total berth length 1,250 m x seaway draft	Dry and liquid bulk		Road and rail
	Pier 12	Total berth length 1,000 m x seaway draft	General cargo, liquid and dry bulk cargoes, containers		Road and rail
	Pier 14	Total berth length 690 m x seaway draft	General and dry bulk cargo		Rod and rail
	Pier 15	Not a cargo facility			
	Pier 22	No berths at this location			
	Pier 23	Total berth length 840 m x seaway draft	General, liquid and dry bulk cargo		Road and rail
	Pier 24	Total berth length 470 m x seaway draft Total open area 2.8 ha Total shed area 10,450 m^2	General cargo		D and rail
	Pier 25	Total berth length 610 m x seaway draft	Liquid and dry bulk		Road only
	Pier 26	Total berth length 925 m x seaway draft	Liquid and dry bulk		Road and rail
Toronto Approach channel depth 8.2m	Terminal 51	Total berth length 600 m x 8.2 m draft Total open area 5ha Total shed area 11,650 m^2	Cement, Asphalt, Salt, Aggregate		Road and rail
	Terminal 52	Total berth length 213 m x 8.2 m draft Total open area 5.3 ha Total shed area 8,170 m^2	Cement, Asphalt, Salt, Aggregate		Road and rail
Oshawa Approach channel depth 8.2m	East Berth	Berth length 274 m x 8.2 m draft	Solid bulk		Road and rail
	West Berth	Berth length 211 m x 7.2 m draft Total open area (both berths) 3.3 ha Total shed area (both berths) 2,080 m^2	Solid bulk		Road and rail

Annex F-3: Characteristics of Eastern US Ports

US east coast ports reviewed include:

- Searsport, ME
- Portland, ME
- Gloucester, MA
- Boston, MA
- New London, Connecticut (CT)
- Camden, NJ
- Philadelphia, Pennsylvania (PA)
- Wilmington, North Carolina (NC)
- West Palm Beach, FL
- Canaveral, FL

The characteristics, with respect to the depth of approach channels, berths, storage areas and buildings, and commodities handled at these ports are shown below.

Port and Approach Channel Depth	Terminal	Berths and Storage	Principal Commodities	Principal Industries and Markets	Intermodal Connections
Searsport, ME Approach channel depth 10 m	Terminal 1	Private liquid bulk facility, N/A for this study			
	Terminal 2	**Berth 1:** Berth length 244 m x 12.2 m draft **Berth 2:** Berth length 244 m x 9.75 m draft Total shed area 8,360 m^2 (planned)			Road and rail
	Terminal 3	Private liquid bulk facility, N/A for this study			
Portland, ME Approach channel depth 12 m	International Marine Terminal	Berth length 220 m x 10.5 m draft	Containers, Ro-Ro, ferry to NS		Road and rail
	Maine State Pier	Berth length 84 m x 10.5 m draft	Ferry services		Road and rail
	Portland Ocean Terminal Pier 1	Berth length 300 m x 10.5 m draft	Cruise passengers		Road and rail

Port and Approach Channel Depth	Terminal	Berths and Storage	Principal Commodities	Principal Industries and Markets	Intermodal Connections
	Portland Ocean Terminal Pier 2	Berth length 180 m x 10.5 m draft	Cruise passengers		Road and rail
	Mobil Oil Terminal	Private liquid bulk facility, N/A for this study			
	Motiva Terminal	Private liquid bulk facility, N/A for this study			
	Pipe Line Pier 1	Private liquid bulk facility, N/A for this study			
	Pipe Line Pier 2	Private liquid bulk facility, N/A for this study			
	Sprague Energy Terminal	Private liquid bulk facility, N/A for this study			
Gloucester, MA Approach channel depth 7.5m	Cargo berth	Total berth length 150 m x 5.5 m draft 1 refrigerated warehouse	Frozen fish and other food		Road link - 1.6km to rail siding
Boston, MA	Conley Terminal	Total berth length 1,370 m x 10.6 m to 13.5 m draft Total open area 35 ha	Containers		Road and rail
	Boston Autoport	Total open area 26 ha	Automobiles, trucks		Road and rail
	Mystic Piers 48/49/50	Berth length 120 m x 10.5 m draft	Salt		Road and rail
	Medford Street Terminal	No berth lengths provided in the port's publicity documents. Draft 12 m Total open area 14 ha	General cargo		Road and rail
New London, CT Approach channel depth 12m	General Cargo Berth	Berth 300 m x 10.5 m draft Total open area 2.4 ha Total shed area 4,650 m^2	Coal, Sand, Forest Products, General Cargo		Road and rail
	Liquid Bulk Berth	Berth 270 m x 10.8 m draft	Petroleum products		

Port and Approach Channel Depth	Terminal	Berths and Storage	Principal Commodities	Principal Industries and Markets	Intermodal Connections
Camden, NJ Approach channel depth 12.2m (current plans to deepen to 13.7m)	Becket St Terminal	4 berths, total length 700 m x 9.0 m to 12.0 m draft 13 sheds totaling 65,000 m^2	Mainly dry bulk cargo		Road and rail
	Broadway Terminal	Pier 1 230 m x 10.7m draft Pier 5 346 m x 10.7 m draft 31 sheds totaling 128,000 m^2	Breakbulk and Bulk		Road and rail
	Broadway Produce Terminal	Berth length 340 m x 10.7 m draft	Fruits and other perishable goods		No information
	Port of Salem Terminal	berth 105 m - draft not provided Sheds totaling 24,000 m^2	General Cargo		Road only
Philadelphia, PA Approach channel depth 12.2m (current plans to deepen to 13.7m)	Packer Ave. Terminal	6 berths totaling 1,160 m x 12.2 m draft 2 sheds totaling 17,700 m^2 1 refrigerated shed of 62,300 m^3	Containers Breakbulk		Road and rail
	Pier 96/98 Annex	2 berths of 402 m x 9.75 m draft each Autowashing shed 1,400 m^2 Service Building 7,430 m^2	Automobiles, trucks, heavy equipment, project cargo		Road and rail
	Piers 78 and 80	Pier 78 North 274 m x 10.7 m draft Pier 78 South 260 m x 10.7 m draft Pier 80 North 303 m x 10.7 m draft Pier 80 South 349 m x 10.7 m draft	Paper and forest products		Road and rail

Port and Approach Channel Depth	Terminal	Berths and Storage	Principal Commodities	Principal Industries and Markets	Intermodal Connections
	Piers 38 and 40	North berth 168 m x 9.75 m draft South berth 168 m x 9.75 m draft East berth 189 m x 9.75 m draft 2 sheds of 16,720 m^2 each	Paper and forest products		Road and rail
	Pier 84	berth 261 m x 9.75 m draft Shed 1 46,450 m^2 Shed 2 3,720m^2	Cocoa beans and cocoa products		Road and rail
	Pier 82	Berth 1 347 m x 9.75 m draft Berth 2 261 m x 9.75 m draft 1 shed 12,080 m^2	Fruits and vegetables, breakbulk, paper and project cargo		Road and rail
	Tioga Marine Terminal	6 berths totaling 1,170 m x 10.97 m draft 2 sheds totaling 37,000 m^2	Containers, refrigerated fresh fruit, forest products, autos, project cargo and breakbulk		Road and rail
Wilmington, NC Approach channel depth 12.8m	2 terminals	6 berths totalling 2,003 m x 12.6 m draft import facilities for grain & other bulk cargoes 300,000 m^2 covered storage 40 ha paved open storage	Forest products, wood pulp, chemicals, grain, general cargo		Road and rail
West Palm Beach, FL Approach channel depth 9.75m	7 cargo terminals	Total berth length 1,580 m x 9.75 m depth			Road and rail

Port and Approach Channel Depth	Terminal	Berths and Storage	Principal Commodities	Principal Industries and Markets	Intermodal Connections
Canaveral, FL	9 dry cargo berths 2 tanker berths 1 Ro-Ro berth	**Berth North 1** length 192 m x 11.8 m draft **Berth North 2** length 192 m x 11.8 m draft **Berth North 3** length 122 m x 9.75 m draft **Berth North 4** length 68.6 m x 11.0 m draft **Tanker Berth 1** length 42.7 m x 12.0 m draft **Tanker Berth 2/South 4 & 5** length 720 m x 12.0 m draft **Berth South 1, 2, 3** length 493 m x 10.6 m draft Covered storage totaling 70,000 m^2 Open storage 16 ha	Main commodities are Oil, Construction aggregates and cent		Road only

Annex F-4: Characteristics of Non-US Ports

Finally, the following ports, not located on mainland North America, include:

- Hamilton, Bermuda
- Freeport, Bahamas

The characteristics, with respect to the depth of approach channels, berths, storage areas and buildings, and commodities handled at these ports are shown below.

Terminal	Berths and Storage	Principal Commodities	Principal Industries and Markets	Intermodal Connections
3 berths for cargo vessels	Berth lengths not provided draft alongside 7.9m	Containers and general cargo		Road only

The approach channel to the Port of Hamilton, Bermuda has a minimum depth of 8.5 m.

Terminal	Berths and Storage	Principal Commodities	Principal Industries and Markets	Intermodal Connections
Freeport Harbour Company Terminal	Total berth length (6 berths) 2,500 m x 9.15 m draft Open storage for 500 trailers Total shed area 3790 m^2	General cargo, Ro-Ro, cruise		Road only
Freeport Container Port	Total berth length 1,036 m x 16 m draft Total open area 49ha	Containers		Road only

The approach channel to the Port of Freeport has a minimum depth of 16.0 m.

Annex G: Evaluation of Hub & Spoke Combinations

No.	Criteria	Yes/No
1	Is there a critical mass of container or Ro-Ro traffic currently moving overland (rail/road) from the hub port to the destination(s)?	
2	Do the related commodities likely lend themselves to movement by short sea (non-perishable, non time sensitive, low-medium value by weight)?	
3	Is the shipping hub-spoke route open year round?	
4	Given the nature of the hub-spoke route, and the cost structure of competing transport modes along that same route, is short sea feeder service likely to have a competitive advantage (in terms of cost, or otherwise)?	
5	Are there any regulatory or structural reasons that would preclude the feasibility of the hub-spoke route?	

		Criteria (Y/N)					
Hub	Spoke/Feeder Destination Ports	1	2	3	4	5	Short-listed?
Halifax	Argentia-St. Pierre Miquelon	Y	Y	Y	Y	Y	N
	Corner Brook-Sept-Îles-Souris	Y	Y	Y	Y	Y	Y
	Quebec City-Trois-Rivieres-Montreal	Y	Y	Y	N	Y	N
	Oshawa-Toronto-Hamilton	Y	Y	N	N	Y	N
	New London-Bridgeport	Y	Y	Y	?	Y	N
	Philadelphia / Camden	Y	Y	Y	Y	Y	Y
	Portland-Boston	Y	Y	Y	Y	Y	Y
	Cleveland-Detroit-Chicago (via Great Lakes)	Y	Y	N	N	Y	N
	Freeport	N	Y	Y	N	N	N
	Hamilton Bermuda	?	Y	Y	Y	N	Y
Montreal	St. John's-Corner Brook	Y	Y	Y	Y	Y	N
	Quebec City- Port Cartier-Sept-Îles	Y	Y	Y	?	?	Y
	Oshawa-Toronto-Hamilton	Y	Y	N	N	?	N
	Cleveland-Detroit-Chicago (via Great Lakes)	Y	Y	N	N	Y	N
	Freeport	Y	Y	Y	Y	Y	N
St. John's	Corner Brook-Montreal	Y	Y	Y	Y	Y	N
	Halifax	Y	Y	Y	Y	Y	N
	Labrador-Canadian North	?	Y	N	?	Y	N
	Portland-Boston	?	Y	Y	Y	Y	N
Saint John	New York	?	Y	Y	Y	Y	N
	Puerto Rico	?	Y	Y	Y	N	N
	St. Thomas, USVI	?	Y	Y	Y	N	N
Quebec	St. John's-Corner Brook	?	Y	Y	?	Y	N
	Port Cartier-Sept-Îles	?	Y	Y	?	Y	N
	Oshawa-Toronto-Hamilton	?	Y	N	?	Y	N
	Cleveland-Detroit-Chicago (via Great Lakes)	?	Y	N	?	Y	N
	Freeport	?	Y	Y	Y	N	N
Sept-Îles	St. John's-Corner Brook	?	Y	Y	Y	Y	N
	PEI-Halifax	?	Y	Y	Y	Y	Y
	Port Cartier-Quebec City	?	Y	Y	?	Y	Y
	Oshawa-Toronto-Hamilton	?	Y	N	Y	Y	N
	Cleveland-Detroit-Chicago (via Great Lakes)	?	Y	N	Y	Y	N
	Freeport	?	Y	Y	Y	N	N

Melford	Argentia-St. Pierre Miquelon	N	Y	Y	Y	Y	N
	Corner Brook-Sept-Îles-Souris	Y	Y	Y	Y	?	N
	Quebec City-Trois-Rivieres-Montreal	N	N	Y	N	Y	N
	Oshawa-Toronto-Hamilton	Y	Y	N	N	Y	N
	Philadelphia	Y	Y	Y	Y	Y	N
	New London-Bridgeport	Y	Y	Y	?	Y	N
	Portland-Boston	Y	Y	Y	Y	Y	N
	Cleveland-Detroit-Chicago (via Great Lakes)	Y	Y	N	N	Y	N
	Freeport	N	Y	Y	N	N	N
	Hamilton Bermuda	?	Y	Y	Y	N	N

Annex H: Evaluation of Regional Short Sea Combinations

No.	Criteria	Yes/No
1	Is there a critical mass of traffic (container, Ro-Ro, break-bulk or bulk) currently moving overland (rail/road) along the regional short sea route?	
2	Do the related commodities likely lend themselves to movement by short sea?	
3	Is the regional short sea route open year round?	
4	Is the regional short sea service likely to offer a competitive advantage (in terms of cost, or otherwise)?	
5	Are there any regulatory or structural reasons that would preclude the feasibility of regional short sea service on the route?	

		Criteria (Y/N)					
Origin/Destination	Origin/Destination	1	2	3	4	5	Short-listed?
Montreal	Great Lakes	Y	Y	N	?	Y	N
Montreal	North Shore - Corner Brook	?	Y	Y	Y	Y	Y
Quebec City	Sept-Îles-Port Cartier	?	Y	Y	?	Y	Y
Quebec City	North Shore - Corner Brook	?	Y	Y	Y	Y	N
Sept-Îles	Corner Brook-Halifax	?	Y	Y	Y	Y	Y
Belledune	Argentia	?	Y	Y	?	Y	Y
Saint John	US East Coast	?	Y	Y	N	Y	N
Yarmouth	Portland-Boston (Ro-Ro)	?	Y	Y	Y	Y	Y
Sydney	Newfoundland (drop trailers)	Y	Y	Y	Y	Y	N
Saguenay	St. Lawrence ports	?	Y	?	?	Y	N
St. John's	Labrador & north	?	Y	N	?	Y	N

Annex I: Feasibility Study Assumptions

Terminal Handling Charges

The cost of terminal handling charges for containers is significant. As most container freight is charged 'Gate to Gate' the costs of handling on the terminal are normally born by the shipping line. As referenced above, in Canada these services are usually provided by unionised labour, and costs can increase dramatically if a small quantity of cargo is being handled.

For the purposes of discussion, we may assume that the cost to handle a single box on a terminal either loading to or discharging from a vessel will have a base rate of between $150 and $200 per unit. In non-unionised ports or ports without a major container terminal where ship's gear is used to discharge, the per unit handling charge is likely to be between $100 and $150 per container, so we may assume for purposes of calculation that the cost of loading a container onto a ship at one end of a voyage in Canada and discharging it at the other will be approximately $300.

This means that when attempting to establish a breakeven volume that the gross freight per unit must be reduced by the handling charge to arrive at a contribution margin. Alternatively the breakeven contribution requirement for each unit must be grossed up to include Terminal Charges when calculating a freight rate.

When evaluating the various routes, consideration must be given to what type of cargo might be available and in what configuration.

Discussions with local stevedores indicate that six to ten moves per hour are achievable in loading or discharging a vessel of this class and configuration. Given gang and machine time to undertake this process, we estimate that load discharge operations will cost between $150 and $200 per move.

Containers

Most domestic cargo in Canada is shipped either by truck or by intermodal container either by truck or train. A North American standard intermodal container is 53 feet long by 8 foot 6 inches wide by 9 foot six inches high. It has an internal capacity of approximately 57 percent larger than an international standard box and 41 percent larger than an international high cube box.

A vessel that was expected to trade 53' containers would likely have to be specially configured, most likely using cell guides, to accept them, but the advantage to using these containers for domestic trade would be significant:

1. Many trucking companies and the railway already own significant inventories of these units
2. Their increased width means that two North American standard pallets (48" x 48") can be loaded side by side giving better stowage capacity
3. They can be handled using conventional container handling equipment
4. They correspond to the North American maximum for truck dimensions so there is no disadvantage to changing from trucking to marine transport
5. The increased volume should lead to significant reductions in terminal handling charges.

These standard intermodal containers pose some unique challenges to the shipping industry. These units are designed to be carried either by rail or by truck and so are not designed to withstand the racking forces that would normally be encountered in the marine environment. Their physical configuration also presents a problem for marine use.

The twistlock sockets on 53' containers are on standard 40 foot spacing, but the 7.5 foot overhang at each end means that unless the ship is specially configured, each container takes up four TEU longitudinally. The extra width of these boxes also means that they extend over into what would normally be the next bay on both sides using conventional spacing impeding the locking of normal twist locks.

For international trade, standard units must be used, but for Vessels outfitted for the carriage of North American 53' units undertaking combined short sea and feeder services within Canada, carriage of standard units could be accomplished without significant difficulty as standard containers could be loaded into 53' bays even though this might result in sub-optimal use of space on the vessel.

Vessel Capacities
For the two sizes of vessel considered for our cost analysis, the nominal container capacities using 53 foot North American units would be reduced to 37 x 53 foot units for the Super Coaster class of vessel (assuming a single stack on deck) plus some extra space for standard 40' and 20' containers and on the Fighter class vessel a total of 44 x 53 units plus significant space for standard 40s and 20s.

In both classes of vessel the loss of usable space required for the carriage of 53' containers could make them impractical. In such a situation, the shipping company's marketing department would need to develop a strategy that would allow the development of the market for the smaller international containers.

The selected intermediate-sized Ro-Ro vessel, the Finnmaster class, at 1,800 lane metres and 8,400 tonnes deadweight, is assumed to carry approximately 100 North American road trailers.

Seasonal Assumptions
Canadian voyages have been costed for summer and winter as there are significant seasonal differences in pilotage costs transiting the Laurentian Pilotage Authority areas and ice delays in the Gulf of St Lawrence. It should also be noted that we have allowed for a reduction of transit speed of two knots between Winter and Summer to account for reduced average speed in ice.

Currency
All figures are offered in CAD as the extreme fluctuations in exchange over the past few months make this simpler for calculation purposes. Port fees have been calculated for each port. For all Canadian ports, a round figure of $500 per port per visit has been allowed to cover berthage and harbour dues

Vessel & Operating Cost Assumptions

We have selected three types of vessels for this study. Two geared container fitted multipurpose general cargo vessels and a medium sized RoRo. Our costs included capital cost

for the vessels proposed which were ascertained through discussion with a number of ship brokers

Operating Costs
Operating costs for the Vessels both for crew and for R&M were derived through a combination of consultants' experience and through discussion with an experienced ship manager. Crew were assumed to work on a two days on, one (paid) day off system which is common in the Canadian merchant fleet. R&M costs were estimated at the low end of a range of possible costs.

Amortisation Period.
The consultants selected a fairly short amortisation period (eight years) for the conventional vessels as these vessels tend to have a fairly short life expectancy in the open market. For the RoRo vessel selected a much longer period was used, as the history in the Canadian market indicates that for this type of vessel, once entered into Canada, that utilisation will extend for the life of the vessel.

Fuel consumption and rates
Fuel consumption was estimated using the rates published in the Vessels' specifications or by calculation on the basis of between 125 and 158 grams per horse power per hour
Fuel rates were in a period of significant transition during the period that the study was undertaken. Rates for calculation were the Halifax Harbour rates as of USD 380 mt for IFO (International Fuel Oil) 180 and MGO (Marine Gas Oil) USD 750mt as quoted by Imperial Oil at 13 Nov 08

Vessel & Operating Cost Estimates

Super Coaster Type (154 TEU14)
91m x 14.7m x 7m

Capital Costs
$8,500,000 amortised over 7 years @ 8%
Duty @25% amortised over 7 years @ 8%*
Modifications for entry $500,000 over 5 years @ 8%*

*Duty, modifications and Canadian Crew only required for Coasting Trade within Canada, note that crewing is assumed ten persons at one day onboard for half day off (with pay).

Operating Costs

Daily Debt Service	$4,314
Daily Debt Service Mods	$330*
Daily Debt Service Duty	$1,081*
Daily Operating Costs	$850
Daily Crewing Cost	$3,500*/2,040 (USD1,700)
Base operating cost	$9,725(before allowance for RoC (Return on Capital))
Base operating Cost Intl	$6,600 (before allowance for RoC)

Fuel / Consumption

12 knots on 7t IFO 180 + avg 1t MGO per day
IFO 180 @ CAD 467/tonne
MGO @ CAD 922/tonne

Fighter Type (321 TEU14)
101m x 18.8 x 9.3m

Capital Costs
$12,000,000 amortised over 7 years @ 8%
Duty @25% amoritised over 7 years @ 8%*
Modifications for entry $500,000 over 5 years @ 8%*

*Duty, modifications and Canadian Crew only required for Coasting Trade within Canada.

Operating Costs

Daily Debt Service	$6,091
Daily Debt Service Mods	$330*
Daily Debt Service Duty	$1,522*
Daily Operating Costs	$950
Daily Crewing Cost	$3,500*/2,040 (USD1,700)
Base operating cost	$11,443 (before allowance for RoC)
Base operating Cost Intl	$8,291 (before allowance for RoC)

Fuel / Consumption

14 knots on 16.5t IFO 180 + avg 1t MGO per day
IFO 180 @ USD 380/tonne
MGO @ CAD 750/tonne

Finnmaster
162.6m x 26.6m x 13.8m

The sisters Finnmaster ans Finnreel were sold to their current owners in March 2008 for a reported en bloc price of USD 45m. We have used this number to generate debt service costs at an exchange rate of $CAD1.2/USD. As these vessels are built in 2000 we have amortised the purchase price over 20 years to their expected end of service life.

Capital Costs

$CAD 27,000,000 amortised over 20 years at 8.0%.
Duty 25% per month (the lack of other available large RoRos in the Canadian market, suggests that payment of the duty on an annual basis would be a more reasonable and prudent approach that paying it outright at the time of import).
Modifications $CAD 1,000,000 over 60 months at 8%.

Operating Costs

Daily Debt Service	$7,405
Daily Debt Service Mods	$660*
Daily Duty (1/120 / 30.5)	$1,844
Daily Operating Costs	$2,000
Daily Crewing Cost	$4,000*/2,640 (USD2,200)
Base operating Cost Canada	$15,409 (before allowance for RoC)
Base operating Cost Intl	$11,545 (before allowance for RoC)