

ICEBREAKING PROGRAM REPORT ON PERFORMANCE

ARCTIC OPERATIONS - SUMMER 2003



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NHQ, Ottawa

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Nansivik, 2003

“Working together to maintain safe and accessible Canadian waters.”

Foreword

Until the mid-1990's, the Canadian Coast Guard Icebreaking Program traditionally focused on escorting ships through ice, breaking out wharves and ice-covered harbours, clearing ice jams on the St. Lawrence River to prevent flooding and transporting fuel and cargo to remote Arctic sites. The launch of Radarsat, a Canadian remote sensing satellite, in 1995 and the use of new technology have resulted in more timely and accurate ice information that has helped to optimize the efficiency of icebreakers and marine traffic. Improved ice routing advice permits vessels to navigate safely around difficult areas of ice, therefore, reducing transit times, delays in ice, fuel consumption and the reliance on icebreaker support. The outcome has been reduced requirements for icebreaker escorts, improved effectiveness of commercial ship movements, increased client satisfaction and public confidence in the CCG.

The Icebreaking Program is committed to working with Transport Canada, Environment Canada and mariners to ensure that the capacities and standards are in place to prepare for, prevent, and respond to marine emergencies in ice; to facilitate local, national, and international initiatives to promote safe ice navigation and to support marine security; to support access to Canadian waters and coastal communities; and, to provide relevant, reliable, up-to-date, and timely information to people and organizations interested in ice-covered Canadian waters.

From mid-June to November each year since 1930, Canadian Coast Guard icebreakers have conducted annual operations in the high Arctic and Hudson Bay. Icebreakers are pre-positioned throughout the Arctic to provide the full gambit of Coast Guard services, such as route assistance to commercial vessels, the transportation and landing of fuel and general cargo at northern settlements, marine navigation aids maintenance, search and rescue (including medical evacuations if necessary), hydrographic, oceanographic placement and other science work, Canadian federal presence in the Arctic (sovereignty) and maritime environmental emergency response.

This report provides an overview of the icebreaking services provided in the Arctic between June and November 2003. Statistics presented in this report were compiled from the Icebreaking Operations Data Information System (IODIS) and the Fleet Activity Information System (FAIS) with the cooperation of the Ships' Officers aboard CCG icebreakers and Ice Officers in the Sarnia Ice Operations Centre. The report demonstrates the workload in the Arctic by icebreakers and the services provided to clients.

Original signed by

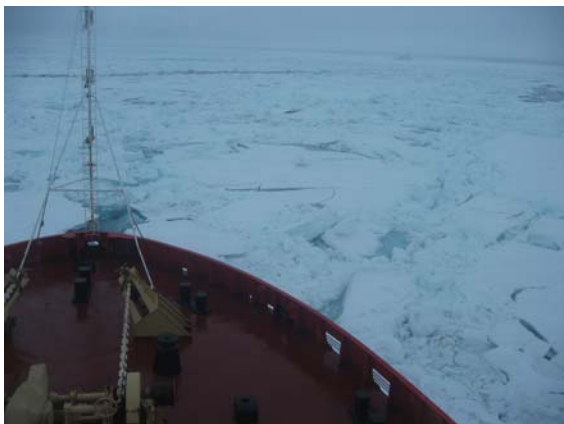
David A. Jackson
Manager, Icebreaking Program

Overview

The Canadian Coast Guard (CCG) is mandated by the “Oceans Act” with the responsibility for the “safe, economical and efficient movement of ships in Canada in Canadian waters”. This mandate is accomplished in the Icebreaking Program by the provision of icebreaking and ice management services.

The mission of the Icebreaking Program is to provide icebreaking services of benefit to Canadian commerce, sovereignty and riparian interests with regard to the marine environment, consistent with client needs and government expectations.

The presence of a viable, guaranteed icebreaking service is one of, if not the most, important factors in sustaining the eastern Canadian and Arctic economies and communities. Not only because maritime shipping is the most economical method of transporting large amounts of goods, but also from the perspective of linking these communities to the rest of Canada.



Icebreaking activities also contribute directly to the DFO objectives of Marine Safety, Environmental Protection and the Facilitation of Marine Trade and Commerce.



The CCG provide a range of icebreaking services during winter operations in southern Canada and during summer ice operations in the Arctic. These services focus on safety to shipping, environmental protection while minimizing vessel delays caused by ice conditions. Some vessels require minimal assistance while others are heavily dependent on CCG icebreakers to escort them to their destination. Other services provided in conjunction with ice escort assistance are: re-supply, channel and track maintenance, ice charts and ice routing advice, harbour breakouts and flood control.

Description of Partners, Clients, and Services

Icebreaking Program and the Canadian Ice Service

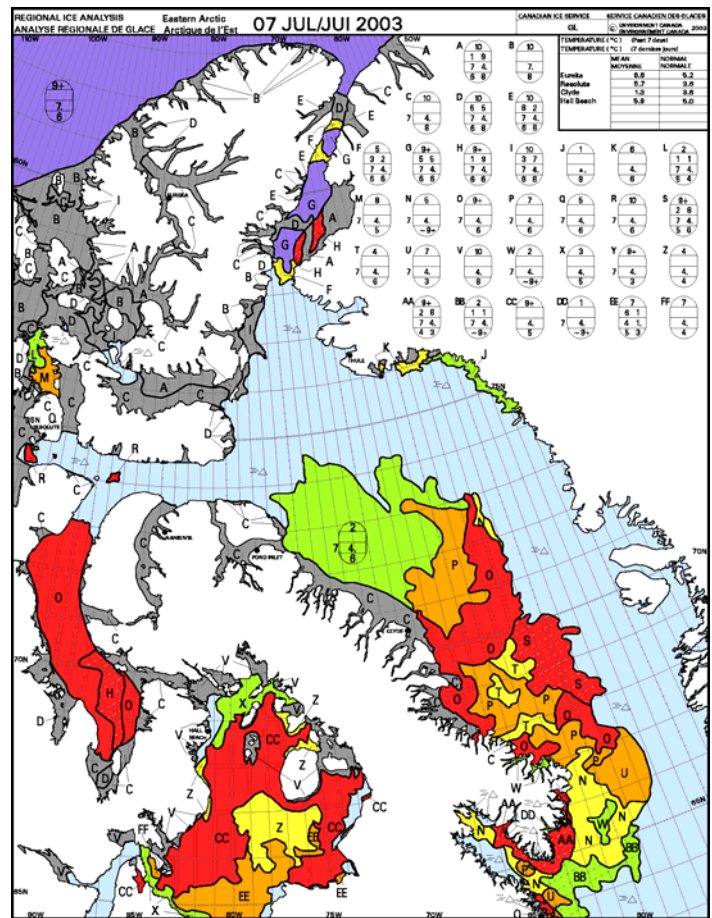
Since 1971, the Canadian Ice Service of Environment Canada and the Icebreaking Program have operated an integrated ice information program. The main activity of the partnership arrangement is to finance and provide ice information services that support the ice related activities of both departments.



CCGS *Terry Fox* steaming through ice with cargo

The CCG contributes \$10.3 million each year for a “suite of services” from the Canadian

Ice Service (CIS), which are required for effectively delivering the Icebreaking Program Levels of Service (LOS). The specific services required are defined annually through joint operational planning between CCG Icebreaking program, CCG Regions and the CIS. The “suite of services” provided from the CIS include data acquisition, data analysis and interpretation, information dissemination, and ice forecasting services. Detailed information regarding these services is highlighted in Annex A of this report.



The Canadian Coast Guard receives a high quality ice information service with regional, tactical and specialized products in support of icebreaker operations in southern and Arctic waters. The Canadian Ice Service benefits from the financial and logistical resources provide by the Coast Guard which enables the delivery of a comprehensive, efficient ice service for the well being of Canadians and their environment. This integration has resulted in demonstrated efficiencies with benefits to the Government of Canada and to Canadians at large.

Clients

Icebreaking services benefit a number of clients including commercial vessels, fishing vessels, Arctic residents, port operators and the general public. The following table depicts the clients that were provided Icebreaking Services during Summer Arctic Operations.

- Table 1: Comparison over the past four years of vessels by flag in Canadian Arctic waters, requiring the assistance of icebreakers.

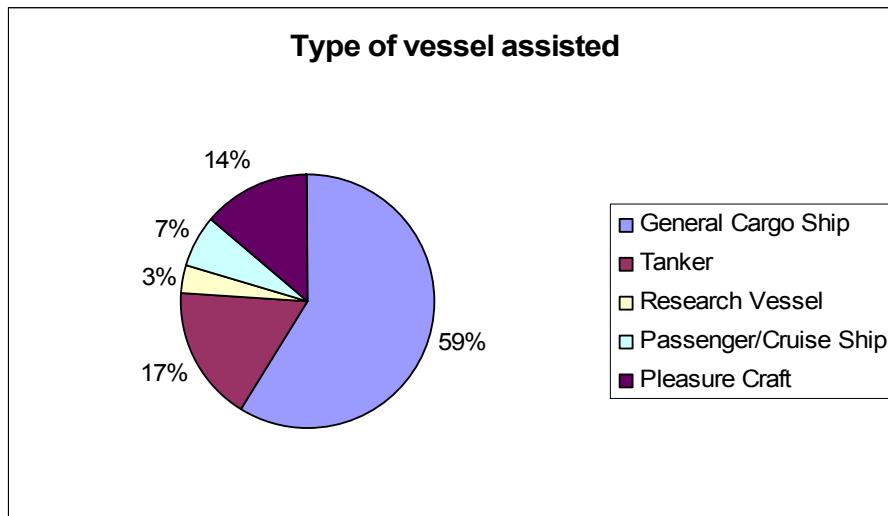
YEAR	2003	2002	2001	2000
FLAG				
Canada	12	27	21	11
Cyprus	5	0	0	0
USA	4	1	2	2
Malta	1	0	0	0
Russia	1	3	0	0
Bahamas	2	3	0	1
Liberia	0	10	12	4
Barbados	0	0	4	0
Denmark	0	0	2	0
Germany	0	0	0	4
Norway	0	4	0	0
Panama	0	1	0	0

Icebreaking Operations Data Information System (IODIS)



M/V Passenger Ship Akademik Ioffe off Resolute

- Table 2: Graph showing the different type of vessels that have been assisted in the summer 2003.



IODIS

Icebreaking Services

The following table details the Icebreaking services provided in Southern and Northern (Arctic) waters.

▪ **Table 3: Icebreaking services provided by the Canadian Coast Guard**

Ice Routing and Information Services	Managing Ice Operations Centres during periods where ice constitutes a marine hazard; Undertaking helicopter ice reconnaissance services to survey ice conditions; Monitoring ice regimes, ship movements through ice and activating ice control zones as required; and Providing ice information broadcasts and ice routing advice to marine shipping via Marine Communication and Traffic Services (MCTS) centres.
Route Assistance	Organizing convoys and escorting ships through ice-covered waters, freeing vessels trapped in ice and keeping shipping channels open
Harbour Breakouts	Breaking out approaches and clearing ice from wharf faces of port terminals and facilities in commercial and fishing harbours Assisting shipping within ports and at marine facilities by keeping ice clear of barge operations and the ship at anchor, and by streaming petroleum off-loading hoses Breaking out harbours to facilitate ice clearance at the end of the ice season
Flood Control	Monitoring ice conditions and water levels in anticipation of flood risks Preventing formation of ice jams and excessive build-up of ice in areas threatened by flooding Providing icebreaker services to facilitate ice flow during spring break-up.
Northern Re-supply	Transporting dry cargo and fuel during the annual re-supply of Northern settlements and National Defense sites when commercial carriers are not available. CCG icebreakers deliver cargo and fuel to the Eureka weather station and Kugaaruk settlement each summer.
Arctic Sovereignty	Maintaining sovereignty in the Canadian Arctic with such activities as guiding foreign vessels through arctic waters. It should be noted that a CCG icebreaker is frequently the only federal resource positioned in a particular area of the Arctic.



CCGS Terry Fox loading cargo in Nanisivik for Kugaaruk



CCGS Terry Fox

Performance Measurement

In 1990, the “*Icebreaking Operations Data Information System*” (IODIS) was developed in order to effectively monitor the management and the effectiveness of the icebreaking fleet in support of Icebreaking Levels of Service (LOS). Since that time, it has undergone many changes to its present state which is a National Oracle/web-based application. In addition, it will soon roll-out as a mobile version for use on board the Coast Guard icebreakers.

While it’s current state is much more useful for recording and reporting of data on icebreaking operations, its development is ongoing to include further performance measurement and risk management capabilities.

The Icebreaking Program has worked closely with the Marine Programs Performance Measurement Group in order to identify appropriate indicators and logic model frameworks as a tool to better monitor and report on the icebreaking activities.

As in most government organizations, the reporting of performance is a fiscal-year approach. However, within the Icebreaking Program it is preferable to report on a semi-annual basis, as our Icebreaking Operational seasons are predicated on two seasons:

- (1) Winter Season (southern waters): From mid-December until mid-April/early May.
- (2) Summer Season (Arctic waters): From late June until October.



CCGS Pierre Radisson at Kugaaruk in Pelly Bay, 2003

The 6 CCG Icebreakers assigned to Arctic Icebreaking Operations in 2003 were CCGS *Louis S. St-Laurent*, CCGS *Terry Fox*, CCGS *Henry Larsen*, CCGS *Des Groseilliers*, CCGS *Pierre Radisson* and CCGS *Sir Wilfrid Laurier*.

Statistical Data for 2003 Arctic Season

Arctic Icebreaking Services:

The number of activities and occurrences that take place in the southern waters is much higher than those in the north. While the number of vessels transiting Arctic waters is much lower than in southern waters, the escorts tend to be much longer, lasting several days, as opposed to a few hours in the south. Harbour breakouts and flood control are icebreaking services that primarily occur in southern waters; whereas northern resupply support and Arctic sovereignty occur only in the north.

- Table 4: Comparison for the past four years of Icebreaking Services provided in the Canadian Arctic waters

YEAR	2003	2002	2001	2000
Vessels Escorted	27 (4 convoys)	51 (2 convoys)	47 (1 convoy)	28 (1 convoy)
Channel and Track Maintenance	1	0	1	0
Freeing Beset Vessels	4	0	0	0
Helicopter Ice Reconnaissance	13	14	15	12
Commercial Harbour Breakouts	0	4	0	0
Assisting Shipping in Harbour	0	0	2	0



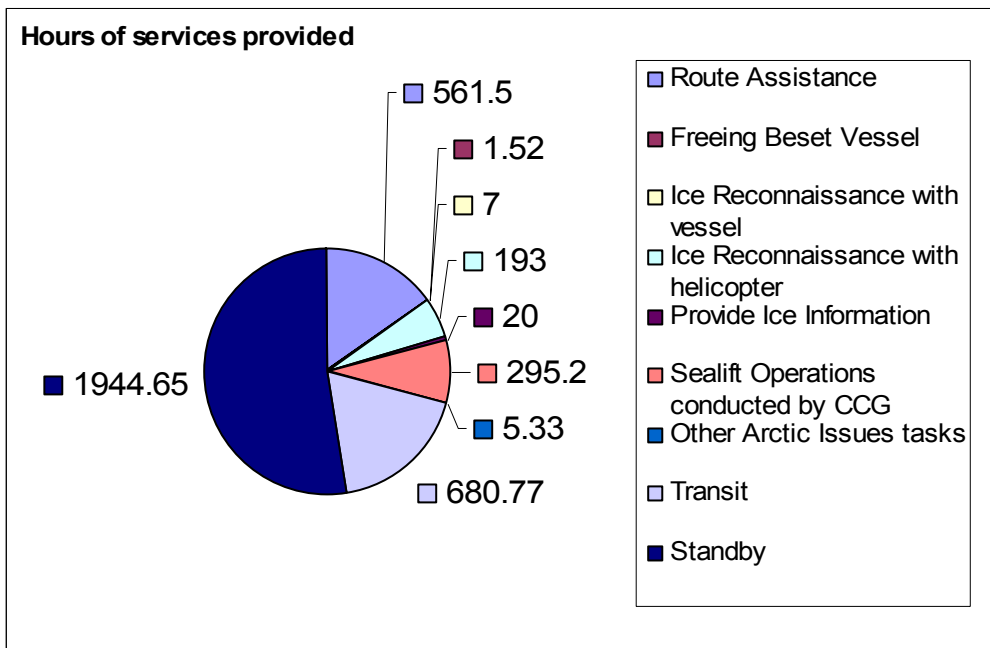
CCGS Terry Fox resupply of Eureka Weather Station, 2003



CCGS Sir Wilfrid Laurier standing by for shipping

In addition to the services that the Icebreaking Program provided during the summer, several icebreakers were involved in dedicated Arctic Science Projects: CCGS *Louis S. St-Laurent* in the Chukchi and Beaufort Seas from August 6 to September 7 and the CCGS *Sir Wilfrid Laurier*, from September 6 to 23. The CCGS *Des Groseilliers* also participated in some opportunity science for two weeks in August and constructed three helicopter landing pads at various locations in addition to the usual aids to navigation support. CCGS *Henry Larsen* carried out Hydrographic support in August, following the PACER GOOSE resupply of the US Air Force Base at Thule Greenland. The remainder of the icebreakers' time was spent on "Standby" and "Transit" time, both of which can be linked to Arctic Sovereignty. The following graph shows the hours of time spent on all the services, including the above mentioned items.

- Table 5: Comparison of hours spent on Icebreaking services during the Arctic Operations 2003.

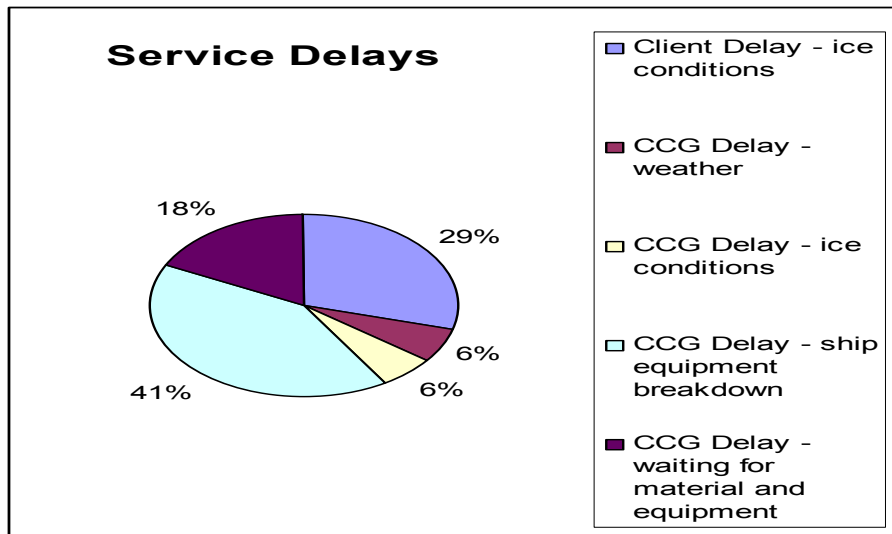


Fleet Activity Information System

Service Delays

During icebreaking activities delays may be encountered, whether at the client’s request or the Canadian Coast Guard. During the icebreaking activities, the icebreaker’s encountered seven delays as a result of the ship equipment breakdown.

- Table 6: Percentage of service delays in the Canadian Arctic, 2003.

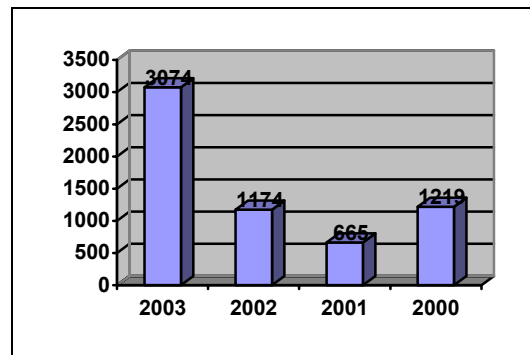


Fleet Activity Information System

Northern Re-supply Support

The CCG’s icebreaker fleet continues to carry fuel and cargo to ports in the Canadian Arctic when commercial ice capable vessels are not available, on a cost-recovered basis. The above graph represents the amount of fuel and cargo delivered to the Environment Canada weather station in Eureka on Ellesmere Island and to Kugaaruk in Pelly Bay at the southern end of the Gulf of Boothia. Since the community of Kugaaruk is growing, there was a substantial increase in cargo delivered to in 2003.

- Table 7: Comparison over the past four years of cargo (tonnes) delivered by CCG from Nanisivik to Eureka and Kugaaruk.



Canadian Coast Guard – Central and Arctic

Block Commitments:

The Coast Guard and private industry jointly developed “Icebreaking Block Commitments” within a Levels of Service Framework as an approach to understand the nature of demand and the interaction between capacity and demand. A block commitment is a requirement for a Canadian Coast Guard icebreaking service by an identified client or client group in a specific geographic area in a defined time period, namely what, where and when.



CCGS Louis St. Laurent standing by in Arctic Bay, 2003

- Table 8: Chart outlining the Block Commitments in the Canadian Arctic



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- Table 9: Block Commitments for the Canadian Arctic identifying the period for which icebreaking services are required as well as the type of vessel required to perform the services.

#	Area Name	Description of Area	Period dd/mm	Icebreaker Type
A01	Hudson Bay	Hudson Bay and CASPR Zones 16 & 14	03/07 - 24/10	1200
A02	Foxe Basin	CASPR Zone 8 exc. Fury & Hecla Strait	20/08 - 15/09	1200
A03	Hudson Strait	CASPR Zone 15 inc Ungava Bay	03/07 - 24/10	1200
A04	East Baffin	CASPR Zones 10 & 9	14/08 - 18/09	1200
A05	Parry Channel East	CASPR Zone 13 & Wellington Channel to Penny Strait	10/08 - 15/10	1200
A06	Parry Channel West	CASPR Zone 2, Peel Sound, Franklin Strait, Byam Martin Channel north to Cameron Is. and all of M'Clure Strait	10/08 - 15/10	1300
A07	Pelly	CASPR Zone 5, Gulf of Boothia, Prince Regent Inlet, inc. Fury & Hecla Strait & Bellot Strait	12/08 - 13/10	1300
A08	Ellesmere	CASPR Zone 3, Jones Sound, the Lincoln Sea & approaches to Alert	24/08 - 05/09	1300
A09	Victoria	CASPR Zones 7 & 11	12/08 - 13/10	1200, 1100
A10	Beaufort	CASPR Zones 12 & 4 west to Canada/U.S. border	10/07 - 06/10	1200, 1100
A11	Barrow	Canada/U.S. border west to Icy Cape, Alaska	10/07 - 06/10	1300
A12	West Greenland	East Baffin Bay, Disko Is. to Arctic Circle at CASPR Zone 10 limits	05/07 - 15/08	1200

Response Time Targets

Under average ice conditions, a Canadian Coast Guard icebreaker will be on scene in the Canadian Arctic to provide route assistance within 10 hours. There are several variables which will affect the response time for route assistance such as: location of the vessel requiring assistance, conditions of ice and weather, availability of an icebreaking resource, proximity of an icebreaker to the vessel (transit time), and capability of the assigned icebreaker. In addition, certain priorities must be considered in the operational context when delivering the service. For example, all distress and emergency situations take precedence.

During the 2003 summer operations, two services exceeded the 10 hour response time due to lengthy transit times. All other route assistance services provided in the Canadian Arctic during the summer of 2003 were within the 10 hour response time. Response time numbers are low due to coordinated commercial ship movements by the Ice Operations Centre and icebreakers.

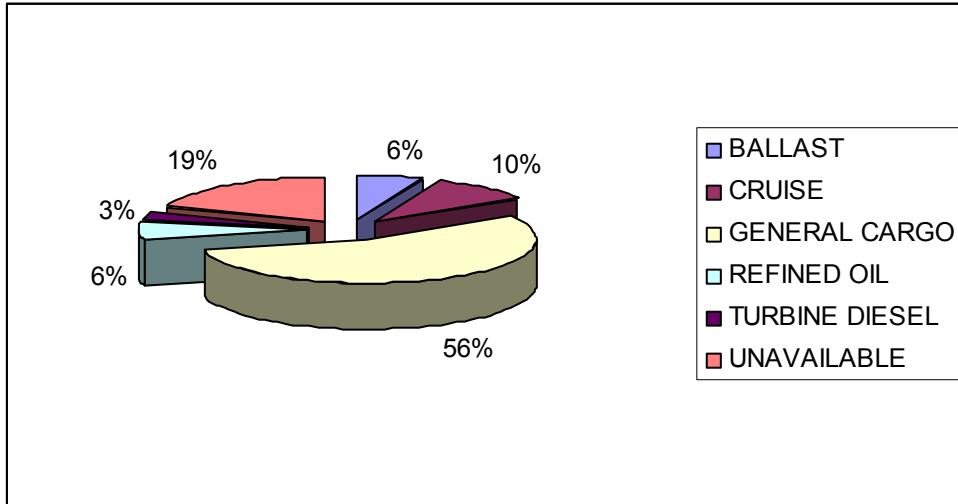
Service Delivery Dates

- Table 10: Comparison over the past four years of the first icebreaking service provided and the last service provided in the Canadian Arctic, excluding stand-by times.

YEAR	First Service Request Delivered	Last Service Request Delivered
2003	June 24, 2003	September 21, 2003
2002	July 6, 2002	October 20, 2002
2001	June 30, 2001	October 8, 2001
2000	July 4, 2000	October 29, 2000

It is a valuable exercise to monitor the types of cargo carried by ships entering/departing the Arctic as this is a reflection of the growing economy and needs of the inhabitants.

- Table 11: Percentage of cargo carried by ships assisted in ice.



IODIS



M/V Lady Franklin unloading cargo at Iqaluit at low tide

Accidents

Shipping accidents are an inevitable part of operations in a hostile environment. The Coast Guard attempts to mitigate their occurrence by a combination of effective ice information and escort operations.

As detailed in the Transportation Safety Board of Canada, Marine Statistics Report, 2003 there were seven reported incidents in the Arctic in 2003.

- Table 12: Accident details for the Canadian Arctic in the summer of 2003.

	2003	2002	2001	2000	1999
Shipping Accidents	7	2	4	8	17
Accidents Aboard Ship	4	0	0	0	3
Vessels Involved in Shipping Accidents by Type of Vessel	17	8	4	2	7
Cargo/OBO/Tanker	3	5	3	0	4
Ferry/Passenger	3	1	0	0	0
Tug/Barge	2	0	1	2	0
Fishing	0	1	0	0	0
Other	9	1	0	0	3
Vessels Lost	0	2	0	1	0
Fatalities	3	0	0	4	0
Incidents	1	1	1	2	1



Sailing vessel beset in ice in Franklin Strait, September 18, 2003

Ice information Services provided by the Canadian Ice Services

- Table 13: The following table outlines the numbers of hours of service provided by the Canadian Ice Service, and the number of reports or charts issued (developed) for the summer Arctic Operations 2003.

Service	Hours
Aircraft surveillance	342
Ice Service Specialist (ISS) (total)	1415
Shipboard	743
Ice Office	158
Aircraft	514
	Number
Satellite Images	2228
Ice Charts (total)	1195
Daily Ice Analysis Charts	1089
Weekly Regional Ice Charts	106

**numbers provided by Canadian Ice Services, March 2004*

Icebreaking Program

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CCGS Terry Fox and Fast Rescue Craft at Pelly Bay, 2003

Summary

“Working together to maintain safe and accessible Canadian waters.”



As can be seen from the results of the 2003 Arctic season, the icebreaking program concluded a successful season with all of its icebreakers fully employed in providing valuable services to Northerners.

The Coast Guard had a long history of operations in the Canadian Arctic Archipelago, that have ensures its continued viability and sense of inclusion in Confederation. This role will become increasingly important as Northern people not only expand their desire for self-determination and government but also grow their economies in order to pursue these goals.



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On a final coda, as the Coast Guard icebreakers headed south after a busy summer in the Arctic, one icebreaker remained. The CCGS *Amundsen* (formerly named the *Sir John Franklin*) was frozen into three-metre thick ice, floating above 230 metres of ocean water in Franklin Bay. The CASES project (Canadian Arctic Shelf Exchange Study) is one of several Scientific projects funded by the Federal Government that the *Amundsen* is being utilized in. The research focuses on climate change and global warming, with sub-themes of carbon budgets and greenhouse gases interacting with global ocean currents. More detailed conclusions will be drawn when data from this project is studied.

Homeward Bound



ANNEX A – CANADIAN ICE SERVICES:Data Acquisition

CIS provides data acquisition services, including quality control and archiving, for the following:

- visual ice reconnaissance from CCG helicopters
- complete fixed-wing aircraft reconnaissance program on a turn-key basis including:
 - contracting for aircraft and maintenance
 - outfitting with remote sensing and specialized communications equipment
 - staffing with ice reconnaissance specialists
 - flight scheduling coordinated with other data sources to meet CCG needs at minimum-cost
 - quality control
 - archiving
- complete multiple satellite data acquisition program including:
 - data ordering
 - agreements for ground station reception, processing and delivery
 - quality control
 - archiving
- surface ice observations from ships and shore stations
- meteorological data to support ice forecasting
- ice information from foreign countries to support international missions

Data Interpretation

CIS provides interpretation services for all acquired data:

- integrating knowledge obtained from multiple data sources
- incorporating their expertise and knowledge of the local weather and climatology, water currents and tidal effects and the history of the ice on-site at CCG locations as well as from the Ice Centre
- producing ice analysis products at a variety of scales to meet CCG requirements

Information Dissemination

CIS provides services for the dissemination of ice information in a variety of ways:

- information from helicopter reconnaissance is delivered to CCG Ice Offices and ships
- data and information from fixed wing aircraft reconnaissance is downlinked in real-time to CCG ships properly equipped and within a few hours to CCG Ice Offices
- data and information from satellites is available for telephone transmission (including Inmarsat and cellular) within a few hours to CCG Ice Offices and ships
- all ice information products for CCG are available via fax or computer either on

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- request or on a scheduled, standing order basis
- selected ice information products provided for the marine public are delivered to CCG Marine Radio Stations and to the DND CFH radio-fax broadcast station

Ice Forecast Services

CIS provides forecasts of future ice conditions to satisfy many needs:

- very short term "nowcasts" provided by Ice Service Specialists on icebreakers to aid navigation decision-making
- 1 to 5 day forecasts for strategic planning of icebreaker operations and route planning
 - objective guidance provided by computer models of ice dynamics that consider winds, currents and internal ice stresses
 - uses numerical weather prediction output from the Canadian Meteorological Centre
- 30 day forecasts as medium range guidance for planning purposes
 - long range meteorological forecasts from several national weather centres
- seasonal outlooks to aid the planning of seasonal activities in ice covered waters
 - primarily analog forecasting techniques based on climatological patterns and a long archive of historical ice information



ANNEX B – SOURCES

Icebreaking Levels of Service (LOS)

Icebreaking Operations Data Information System (IODIS)

Fleet Activity Information System (FAIS)

Icebreaking Program Internet Site

http://www.ccg-gcc.gc.ca/ice-gla/main_e.htm

Ice Information Services Partnership Agreement between the Canadian Coast Guard Icebreaking Program of the Department of Fisheries and Oceans and the Canadian Ice Service of Environment Canada, September 2003 (DRAFT) (IISPA)

Transportation Safety Board of Canada, Statistics, Marine 2003

Photographs were provided by CCG icebreakers.

Map of Nunavut from www.alternative-learning.org/maps/nunavut-map.html