ICE WATCH PATROL by Eamon Power and Karl Hayes

Of all countries, Canada is, in many respects, unique. Its location at the northern end of the American Continent, stretching into the High Arctic, its extremes of climate, the immense size of its territory, its considerable natural resources, the great beauty of its isolated terrain. All of these features make it unique, but they also create many problems. This article examines one of these problems and the efforts made to deal with it.

A look at any world map shows two caps of ice at each end of the globe. The climate in these regions is such that there exists a permanent deep covering of ice over the sea. In the case of the Arctic, the permanent ice pack covers most of the Arctic Ocean, reaches across the northern coast of Greenland and Ellesmere Island, and runs into the Beaufort Sea towards the northwest coast of Canada and Alaska.

During the summer, the sea areas around the permanent ice are clear and open to shipping. Each year, as winter approaches and the temperatures descends, the ice cap extends, starting from the north and gradually working its way south, so that in mid-winter vast reaches of ocean are frozen solid. The freeze-up starts in the north in early September each year and finishes in the south the following March. It starts receding in late April/early May and moves northwards until early September, when it reaches the limits of the permanent ice, at which stage the cycle starts again.

This creates problems not only for

winter approaches and the ice begins to spread, they will need to be accurately informed of the ice's progress. The factors which affect the growth of ice are the salinity of the water, the temperature and the wind. Given certain conditions (a sustained burst of cold air and a light wind are ideal) the ice can grow with alarming rapidity, adding several inches in thickness and moving up to 30 miles per day. In those circumstances, the importance of accurately monitoring the spread of ice can clearly be appreciated.

Ice Patrol history

For this purpose, the Canadian Government established the Ice Patrol, which started in 1954 and was initially operated by ice observers aboard RCAF Lancasters. In 1957, the task was entrusted to the Ministry of Transport, where it remained until 1972 when it came under the jurisdiction of the Department of the Environment. Between 1958 and 1965, seasonal contracts were awarded to various civilian companies for reconnaissance aircraft, using a variety of types such as the Lancaster, Anson, C-46, DC-3 and DC-4. However, in 1967 the first long-term contract was awarded to Kenting Aviation, using DC-4s CF-KAD and CF-KAE, which were specially modified for the ice observation role by the addition of a canopy from an F-86 Sabre to the fuselage roof, to give the observer greater visibility. Kenting held this contract for five years, when Nordair successfully bid for the contract, using two Lockheed Electras.



Canadians but also for all other users of the sea in this region. In time, all the seas to the north of Canada and Alaska will freeze, in effect joining the land with the Arctic Continent. The ice will come south down through Baffin Bay and the Davis Strait, which separates Greenland from Canada, on into Hudson Bay and James Bay, down the Labrador Coast and into the Gulf of St. Lawrence.

Quite an amount of shipping uses these arctic waters, including fishing vessels, commercial shipping transiting the Northwest Passage and serving Canadian ports in the region, vessels carrying Canada's exports of grain from Churchill on Hudson Bay, Coast Guard cutters patrolling the seaways and drilling rigs exploring the seabed for minerals. All of these naturally wish to make the most possible use of the Arctic waters, but as Above: The Electra C-FNAY at Montreal-Dorval in September, 1982 before it received the SLAR radar (Karl Hayes) and, below, the same aircraft with its later colour scheme at Gander in February, 1989 (Falk Foto).



Nordair's Electra operations

Nordair's Electra operations, which were to last nearly 20 years, were particularly interesting. Two aircraft, registered CF-NAY and CF-NAZ, were acquired in the spring of 1972 for use on the contract and were extensively modified by Canadair for the task, entering service in late 1972. A third Electra was obtained in September 1972 and used for combination passenger/cargo operations on Nordair's Arctic scheduled services. This aircraft, CF-NAX, was designated an L188PF and had been created by splicing the fuselage forward of the wing leading edge from serial number 2001 on to the remaining fuselage section of serial number 2010. The former aircraft had been an L188CF Electra freighter with Saturn, which had crashed on takeoff from Hill Air Force Base, Utah, on 19th March, 1972. The forward fuselage, including the forward cargo door, was relatively undamaged and, by grafting it into the aft portion of L188C serial number 2010 (an ex Air New Zealand aircraft), an L188PF was created. This aircraft was used for just over three-and-ahalf years, at which stage it was replaced by Boeing 737-200Cs and stored at Cartierville, Montreal.

On 31st March, 1977 CF-NAZ departed Summerside, PEI, on a routine ice reconnaissance mission, but the weather was not favourable and the mission was aborted. The aircraft recovered to Summerside and was parked on the ramp. Not long after its return, a Canadian Armed Forces (CAF) Argus maritime patrol aircraft, returning from a rescue mission, attempted a three-engined landing in very adverse weather conditions. A wing of the Argus struck a snowbank in the course of an attempted goaround and the aircraft veered off the approach in a steepening bank. The port wing of the Argus neatly sliced through





the fuselage of CF-NAZ, severing it completely just aft of the wing trailing edge, and it also sliced through the Electra's port wing. The Argus crashed, sadly killing three of its crew.

The forward fuselage of the Electra contained all the special sensor equipment and was virtually undamaged. It was determined that a grafting programme similar to that used with CF-NAX would be feasible and would be a lower-cost programme than removing the specialist equipment from the remains of CF-NAZ and installing it in a new aircraft. Nordair negotiated a complex deal with American Jet Industries (AJI) of Van Nuys, California, which embraced the disposal of the L188PF CF-NAX. This aircraft was put into service by Nordair on an interim basis on ice reconnaissance work using only very basic sensors as a replacement for CF-NAZ. AJI would in the meantime acquire an ex-Air Florida aircraft, serial number 1111, and splice the nose section of CF-NAZ on at the wing root area, similar to the programme which had earlier been performed on CF-NAX. This activity took place at Van Nuys and the forward fuselage of CF-NAZ was flown from Summerside to Van Nuys in an AJI Mini-Guppy. The work was completed early in 1978 and the 'new' Electra (C-GNDZ) was also equipped with Side-Looking Airborne Radar (SLAR) during the conversion prowith gramme, which greatly enhanced its ice observation capability.

The SLAR was a Motorola unit removed from a Grumman OV-1 Mohawk, with the antenna installed on the Electra's lower forward fuselage. It became the primary ice observation sensor, mapping an area about 80km on either side of the Electra. C-GNDZ was re-delivered from Van Nuys to Montreal on 8th February, 1978 and made its first operational flight on 13th February. Electra CF-NAX was, in turn, passed on to AJI, who sold it to Reeve Aleutian Airwavs in Alaska as N178RV.

C-GNDZ settled into the routine of ice patrols working alongside 'NAY, a partnership that was to last until nearly the end of the Electra ice patrol operation. 'NDZ, being SLAR-equipped, was a much more productive observation platform than 'NAY, which at that stage only had a converted anti-submarine warfare radar, as well as its Bendix aircraft radar, and had to stay visual as much as possible. Accordingly, 'NDZ was usually used

Electra C-GNDZ at Gander in September, 1988 in the colours it wore during its final years of service (Falk Foto).

to cover the Eastern Arctic, which had much more shipping, while 'NAY was assigned to the Western Arctic.

The usual rotation of the two Electras was as follows. C-GNDZ started the year based at Gander, Newfoundland, from early February to mid-June. It then moved north to Frobisher Bay, then to the Northwest Territories (now in Nunavat and called Iqaluit) and flew from there until mid-August. It then continued north to Resolute Bay, NWT, where it remained until mid-October before returning south to Frobisher where it was based until mid-December. It then returned to Montreal for maintenance before commencing the cycle again in the following February.

The other Electra, CF-NAY, started off at CFB Summerside on Prince Edward Island in early January, where it remained until mid-April, which meant that both aircraft were covering the Atlantic seaboard in the early part of the year. It then acted as a back-up for NDZ, or had maintenance performed if required until early July, when it deployed to Inuvik on Canada's northwestern coast near the border with Alaska. It remained based at Inuvik until mid-October when it returned to Montreal as a back-up for 'NDZ. Both aircraft usually flew two days out of three, with an average mission length of eight hours. However, during 1984, 'NAY was also equipped with SLAR, making its first operational flight with its new equipment on 20th June, 1984 from Montreal to Frobisher, and from then on the two Electras were fully interchangeable.

By the mid 1980s, with the significant developments which had by then taken place in satellite technology, it was anticipated that the radar satellite (RADARSAT) would ultimately fulfil the requirements of sea-ice and iceberg observation. This would ultimately lead to the demise of the Electra operation, but they still had some years to go, and were to be joined by another aircraft. In 1983, the Expanded Ice Information Services Program (EIISP) was initiated to meet new demands. It involved two major initiatives - expansion of the existing sea-ice information programme to support year-round Arctic navigation, and the introduction of an iceberg information service for the east coast. As part of the EIISP, a De Havilland Canada DHC-7/Dash Seven with improved remote sensing capabilities was ordered in 1985.

The Electras depart

For nearly 20 years, the two Nordair Electras undertook the ice Patrol. After the two Electras had been placed in storage at Montreal's Dorval Airport, a broker was appointed to arrange for their sale. 'NDZ was the first to go, after a false, if interesting, start. A television reporter by the name of Chuck de Caro had set up his own company, called Aerobureau, to provide a service to the news media. An aircraft was to be acquired, outfitted as a flying television studio and equipped with an array of information-gathering and communications systems. It would then go on permanent standby for the major news networks, ready to depart at a moment's notice to cover and report realtime on those important but difficult-toget-to locations where a major news story was breaking.

The Electra was in all respects a most suitable aircraft for this purpose. A deposit was paid for the purchase of 'NDZ and, during the early part of 1991, work started at Dorval to prepare the aircraft for its new role. 'Aerobureau' titles were painted on the fuselage, and 'NDZ was named 'Amazin' Lady'. As a contemporary report on the project made clear, there were most ambitious plans: 'When the aircraft touches down, the news team of cameraman and reporters will be able to set off in search of the facts aboard a small fleet of vehicles. With a collapsible Schweizer 300 helicopter, a pair of lightweight all-terrain vehicles and three cross-country motorcycles at their disposal'!

Although there were big ideas for the project, there was, alas, little cash. As the report also noted, Mr. de Caro had sold most of his belongings to raise money, had persuaded manufacturers to donate high-tech equipment, and worked evenings and weekends to make ends meet. Sadly, the venture did not prove financially viable and had to be abandoned.

Another buyer was found for the Electra, who intended to use it as a cargo aircraft in Zaire. The aircraft was converted at Dorval to freighter configuration, with a bulk-loading interior, and with all the specialised reconnaissance equipment removed. 'New ACS' titles were painted on the fuselage side, and it was reregistered 9Q-CRY. An American ferry crew took the aircraft to its new home, where it was put to use flying produce and meat to small communities throughout Zaire, from its base at Kinshasa. Unfortunately, the operation was not to last very long. One day in August 1992, landing on a short mud strip normally used by Twin Otters, the nose gear sank into the mud and was ripped off, the Electra being wrecked in the ensuing crash. A sad end indeed to such a fine aircraft.

C-FNAY continued in storage at Dorval, but eventually, in February 1993, the Electra was registered N130US to its new owner, Renown Holding Company of Irving, Texas, and departed Dorval for Roswell, New Mexico. The Electra had been acquired by an individual who was concerned with the environment and intended to use the Electra for maritime patrols, to monitor the world's seaways to check whether ships were polluting the water. This project never achieved fruition either; the financial backer 'pulled the plug' and appointed World Wide Aircraft to repossess the aircraft. They flew it from Roswell to their base at Springfield, Missouri, where it sat for a

The prototype Dash 7, C-GNBX-X, had made its first flight at Downsview on 27th March, 1975, with the second aircraft joining the test programme on 26th June. At that stage, DHC claimed orders for 25 aircraft, but the status of these orders was somewhat questionable as the majority never crystallised into firm contracts. The test programme went well, however, and on 15th April. 1977 the Dash 7 was awarded its type certificate by the Canadian Department of Transport, with US FAA approval following on 25th April, 1977, By September 1977 the actual firm orders for the aircraft were a paltry three - one from Rocky Mountain Airways and two from Wardair.

With the sluggish Dash 7 sales, the Canadian government stepped in with an order for two specially-configured aircraft called Ranger Dash 7s for ice patrol duties with the Canadian Coast Guard, the order being announced in early June 1978. These were obviously unsold 'white tails' on the production line, as a contemporary report on a Family Day celebrating DHC's 50th anniversary at Downsview on 24th June 1978 stated that six Dash 7s were being prepared for equipment took over 12 months, and the aircraft was not delivered until 23rd May, 1986. Initially, C-GCFR operated alongside the Electras, with the Dash 7 generally allocated to the western Arctic in the summer, operating out of Inuvik, whilst the Electras operated from the Eastern Arctic. In the winter, the Dash 7 was usually based out of Summerside, whilst the Electras operated from Gander.

The Dash 7 continued to operate alongside the Electras for a few years, although the Electras were reaching the end of their useful lives on the Ice Patrol. The first to go was C-GNDZ, which made its last operational flight, NDZ-2070, on 30th July, 1989, out of Inuvik over the Beaufort Sea. The following day it was ferried from Inuvik to Dorval and was placed in storage. C-FNAY continued for a few months, but made its last flight, NAY-2248, from Gander to Dorval on 26th February, 1990, and joined 'NDZ in storage.

The RADARSAT, however, was not due to come on line for some years yet so, to bridge the gap, Environment Canada contracted with Intera Technologies of Calgary to provide a Canadair Challenger equipped with Synthetic



time. It was then flown to a location in Texas where it was converted to a freighter, in the course of which the observation radome was removed. It subsequently went to another location in southern California. The registration, N130US, was cancelled in October 1994 for a proposed sale to Mexico, which fell through, and the Electra remained in storage in southern California. It was eventually sold in April 1996 to Legion Express Inc., re-registered N188LE and flown to Opa Locka, Florida, where it had arrived by November 1996, and was parked awaiting a decision on its future. Legion Express attempted to sell the aircraft, but no buyer could be found, and it was broken up for spare parts at Opa Locka during 1999.

Dash-7 operations

The Dash 7's STOL attributes made it well suited for ice-patrol providing fourengine safety on the long missions over water and in remote Arctic areas, whilst its STOL capability opened up a large number of smaller airstrips. Its chief drawback was a more limited range than the Electra, which meant that a fuel stop was necessary on some of the more extended patrols. Electra C-FNAY ended its days at Opa Locka Airport in Florida as N188LE. It was put up for sale but eventually scrapped in 1999 (Karl Hayes).

delivery – two for Greenlandair, two for the Canadian Coast Guard, and repeat orders for Wardair and Rocky Mountain. However, enthusiast publications of the time never showed any airframes being allocated to the Coast Guard, and it is possible that instead these two aircraft were re-allocated to the Canadian Armed Forces, where they served as transports with 412 Squadron. Certainly the Coast Guard never took delivery of any Dash 7s. Production of the Dash 7 continued, however, and ultimately there was a total production run of 113 aircraft.

With the decision to acquire a single Dash 7 for the Ice Patrol in 1985, the aircraft allocated was c/n 102, a new production aircraft which was first noted at Downsview on 23rd April 1985 carrying registration C-GCFR. The aircraft was purchased by the Department of the Environment, and the initial contract for the management and operation of the aircraft was awarded to Bradley Air Services, a specialist Arctic operator. The installation and testing of the special Aperture Radar, the aircraft in question being C-FSIP, which became operational in January 1990. It cruised at high level, transmitting imagery while in flight to Coast Guard icebreakers and Ice Offices. The Challenger made its final flight on 31st March, 1995, all Arctic coverage during the summer of that year being provided by the Dash 7. The Canadian RADARSAT was launched in November 1995.

Thus, for the past six years, the Dash 7 has been the sole aircraft involved in Environment Canada ice patrol work, complementing RADARSAT. Its normal pattern of operation is to start each year based out of Prince Edward Island from early January to mid April, then moving to Gander, where it is based until May. It then returns to base at Carp, Ontario, for maintenance, spending the summer and autumn flying out of northern bases at Iqaluit, Resolute Bay and Inuvik, tracking the sea-ice. During November it is again based at Iqaluit, before returning to Carp during December for maintenance, before starting the cycle again. It occasionally visits airstrips in Greenland, and it regularly assists in providing sea-ice data for the surface re-supply of Thule, Greenland, during the short summer



season. About two years ago it participated in a special project studying global warming, called Surface Heat Budget of the Arctic, which involved surface heat measurement north of Thule, but such activities have been the exception rather than the rule, and the aircraft spends most of its time on the sea-ice and iceberg reconnaissance work.

C-GCFR differs quite considerably from the standard airline-type, and is designated a Dash 7-1501R. Externally, the most noticeable features are a visual observation station in the forward fuselage, looking somewhat like a fightertype cockpit (the modern version of the F-86 Sabre canopy on the Kenting DC-4!), plus the two SLAR (Side-Looking Airborne Radar) in long fairings on each side of the fuselage below the windows. The SLAR was developed by Canadian Astronautics Ltd. (CAL) of Ottawa, and it provides imagery out to around 52nm on each side of the aircraft from typical operating altitudes of 5,000-8,000ft. The aircraft has the facility to launch buoys from a chute in the aft fuselage, and two types are deployed. One is known as the AXBT, which provides water temperature information, and is used for the forecasting of freeze-up conditions in the Gulf of St. Lawrence. The other type of buoy is a simple position beacon, which is dropped onto icebergs to monitor their locations as they drift on the sea.

Fitted for the purpose

The Dash 7's cabin has a visual observation station with blister window in the forward left side immediately behind the flight deck bulkhead, and there is a similar blister window on the right side but without a seat. In the forward part of the cabin on the right side are two consoles, the front station being a communications post. Behind the communications post is the chart station and opposite is the SLAR console where operation of the SLAR radar picture is transferred

The Ice Patrol's Dash-7, C-GCFR, is seen here in the snow at Gander in January, 1988 (Falk Foto).

onto charts. In the centre fuselage under the left wing is the main bank of computers and aft of this is a four-seat rest station. There is a camera position under the floor housing a Zeiss camera for stereographic and regular photography and a workbench and various stowage facilities are located on the right side opposite the seating area.

The normal crew complement on typical ice patrol missions is seven, comprising two pilots, four Environment Canada ice observers and an electronics technician, who looks after the mission equipment and who can effect in-flight repairs if possible. This support service is provided by an outside contract agency, currently ADGA Services of Ottawa. The four ice observers rotate their positions through the aircraft as the flight progresses, with one in the visual position, one in the SLAR, one on the communications console and one on the chart position. In addition, two ground engineers accompany the Dash 7 to its operating location, but they do not travel on the flights. Like the pilots, the ground engineers are employed by First Air, the trading name of Bradley Air Services.

Apart from the specialised mission equipment, C-GCFR differs in a number of respects from the standard Dash 7. The maximum take-off weight is 47,000lb compared with 44,000lb on the standard machine, whilst maximum landing weight is 45,000lb up 3,000lb on the normal. Fuel capacity has been increased to 18,000lb, with additional fuel tanks in the wings, and a dump facility has been provided for the auxiliary fuel tanks only. In respect of the increased operating weights and fuel capacity, the only other

Another shot of the Dash-7, C-GDFR, in its current colour scheme at Gander in April, 2001 (Eamon Power).



Dash 7 with these features is the British Antarctic Survey aircraft VP-FBQ.

The Ice Patrol Dash 7 is mostly flown unpressurised, but it can be pressurised if necessary. This involves the insertion of internal pressure-bearing hatches over the two blister windows and in the cabin ceiling over the upper observation position. The aircraft's electrical system has an increased 300-amp capacity for all onboard mission equipment. It was originally delivered with Omega and LORAN long-range navigation systems, but these have been replaced by Dual INS, dual Litton IRUs and an integrated GPS system.

In mid April 2001, C-GCFR was positioned at Gander for ice reconnaissance work and we arrived there on the evening of Sunday, 22nd April. The aircraft was housed in the General Aviation Terminal hangar, where a consignment of spares, including a spare PT-6A-50 engine, were located to support the deployment. The Dash 7 had been on an extended mission that day and had arrived back in the late afternoon, with another flight planned for the following day. Monday morning dawned to reveal dense fog enveloping the Gander area, with visibility quoted as one-eighth of a mile, and conditions in the area where it was planned to operate were likewise poor. Consequently the crew took the decision to stand-down the operation for the day, and tentatively scheduled a sortie for the following day. The Monday flight had been intended to monitor icebergs as well as sea-ice, with the area of operation well to the north of Gander, but the profile for Tuesday was somewhat different, as it was necessary to track the movement of sea-ice which had been driven back towards the shore by easterly winds, particularly as the area of interest was not being covered by the RADARSAT that day.

The Environment Canada Ice Service manager in charge of the operation is responsible for drawing up the aircraft tasking and agreeing the flight profile with the aircraft commander who has the ultimate say in the aircraft operation. Whilst a mission can be flown entirely in IFR conditions using SLAR data only, it is preferable to be able to visually observe the sea-ice conditions on the surface. One of the key objectives of this mission was to evaluate and map the changing sea-ice conditions to the east of Newfoundland and in the Strait of Belle Isle. The remainder of the mission involved tactical support of Canadian Coast

Guard icebreakers working in the area (the Henry Larsen, Ann Hardy and Terry Fox) and assistance to two commercial vessels, a tanker inbound to Hollyrood in Conception Bay and a supply ship, the 'Cecile des Gagne', inbound to Blanc Sablon, being escorted by the Coast Guard icebreaker 'Pierre Radisson'.

Flight CFR-2019

While the early weather on the Tuesday was not much better, a forecast improvement resulted in clearance for the mission to go ahead. Before that, the Dash 7 departed to carry out a routine training check and arrived back in Gander shortly after 1300 local. The flight was designated CFR-2019, namely the 2019th operational mission by C-GCFR. Its total airframe time at that point stood at 11,122 hours. The aircraft uses the standard r/t callsign 'CANICE 03', which is part of a sequence used over the years by various aircraft involved in ice reconnaissance work. CANICE 01 was the Electra C-FNAY and 02 was sister ship C-GNDZ. CANICE 04 was C-FDTH, a Transport Canada DC-3 which was used for ice patrols in the Gulf of St. Lawrence (although it never actually used this callsign, preferring its own 'Transport 950'!). CANICE 05 was the Canadair Challenger C-FSIP.

With checks completed we were soon airborne, our initial track being southeast towards St. Johns. The weather was initially quite cloudy, but some ten minutes after departure some breaks in the cloud deck below allowed some of the rugged terrain along the coastal inlets to be seen. Our initial cruising altitude was 5,000ft with a speed of 190kt IAS and a 221kt groundspeed, with a fuel flow of just 400lb per hour for each PT-6A, which compares with nearly 1,600lb per hour for each engine on the Electra! The cloud rapidly broke up after passing St. Johns, allowing a good view of the surface of the sea with bands of drifting ice, which enabled photographs to be taken through the blister window with a handheld digital camera. The images would later be downloaded and e-mailed to the Coast Guard Ice Office at St. Johns to assist the tanker.

Our first waypoint was reached at 1702Z, where course was changed right around to the north-northwest, a heading of 337 degrees. The position reports



This shot of C-GCFR shows clearly the observation turret on top of the fuselage and the SLAR pod on the fuselage side (Eamon Power).

were made to Gander Centre, but each waypoint was identified by a numeric sequence, with the first point known as 'Position 1', the next as 'Position 2' and so forth, so that the position report read 'CANICE 03 by Position 1 at 1702, 5,000ft, estimating Position 2 at 1755, Position 3 Next', Gander Centre having previously been furnished with the waypoints as part of the flight plan. Our new track took us just off the east coast of Newfoundland, passing just to the west of checkpoint VYSTA.

At 1755Z we altered course westwards back towards a point north of Gander, and on this leg our groundspeed fell to just 180kt in the face of a stiff headwind. At 1805Z we passed over the Coast Guard icebreaker 'Henry Larsen' making its way through the ice below. After four more legs we descended down to 4,000ft and were then positioned to the east of the mouth of the Gulf of St. Lawrence. Another turn westwards took us just off the north shore of the Gulf of St. Lawrence. The four ice observers were kept busy throughout the flight, recording details of the sea-ice, drawing charts, preparing and sending data and liaising with the icebreakers.

At 1915Z we passed abeam the Heavy Gulf Icebreaker the 'Terry Fox', which was making its way through the ice, and the visual observer in the roof position established r/t contact with the vessel on the maritime channel and relayed directions which would take it through the narrowest part of the ice. At 1936 we saw the icebreaker 'Pierre Radisson' ploughing westwards through an extensive area of ice, leading the merchant vessel 'Cecile des Gagne' towards Blanc Sablon and an hour later we reached the



westernmost part of the mission east of Natashquan, Quebec, and soon made an eastbound turn, retracing our steps.

At this stage we climbed back up to 5,000ft and at 2110 crossed the coast of Newfoundland, routing across the northern part of the island near to St. Anthony. After several more course changes, we commenced a gradual descent to 3,000ft routing directly towards Gander. We coasted in north of Gander at 2235, with large numbers of seals visible on the sea-ice below, and not long afterwards had the Gander Airport in sight, the weather having improved dramatically from earlier in the day.

Although for cleared а visual approach, the download of the vast amount of data to the Ice Office at St. Johns was still underway, and so we had to request a hold whilst this was completed. The gear and flap were selected at 140kt, with speed progressively coming down to 120kt and touchdown took place just after 2250Z, giving a mission time of just under seven hours. A quick backtrack took us to the General Aviation Terminal hangar, where our ground crew quickly hooked up the towbar and C-GCFR vanished into the hangar for the night. While most of the crew were now finished, the chief ice observer had quite an amount of post-flight paperwork to complete even though his pre-flight preparations had started in his hotel room at an early hour that morning.

It had been a typical day's work for C-GCFR, providing vital information for the safe and expeditious flow of maritime traffic along the Gulf of St. Lawrence. It is a unique operation for the Dash 7, which has now diversified into a number of roles apart from its original STOL airliner concept, and a tribute to the versatility of this rugged design. Mention might also be made here of Dash 8 C-GCFJ, operated by Transport Canada and based at Ottawa, which flies anti-pollution patrols over the Great Lakes and Gulf of St. Lawrence, to show shipping that they are being monitored. It replaces a Department of Transport C-47, which carried out such patrols for many years.

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Transport Canada now has DHC-8 Dash-8, C-GCFJ, on its strength (Larry Deneault).