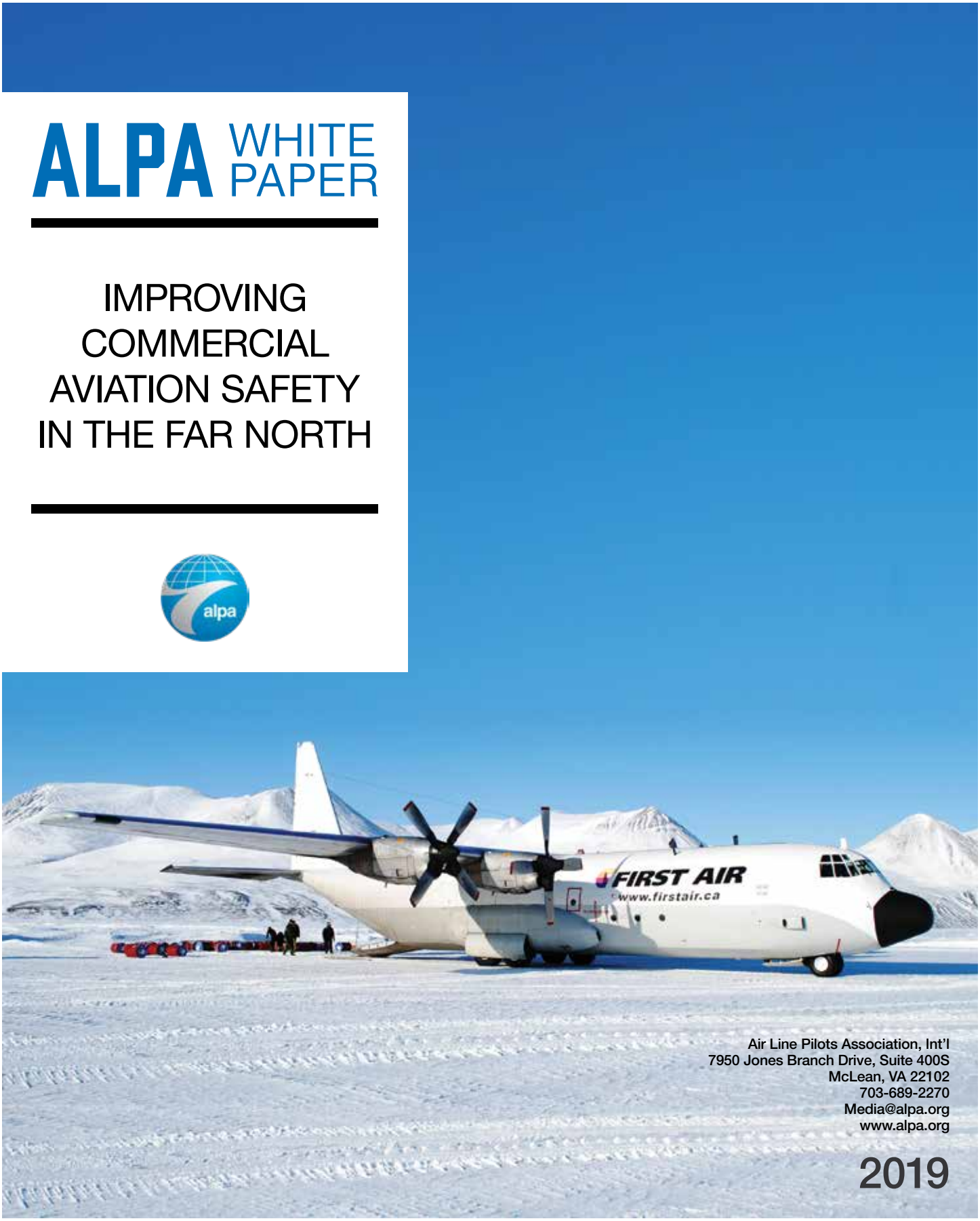
ALPA WHITE PAPER

IMPROVING COMMERCIAL AVIATION SAFETY IN THE FAR NORTH



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FOREWORD FROM ALPA PRESIDENT JOE DEPETE

Those who pilot the skies of the Far North—the region above the 60th latitude in the United States and Canada—know it is a magnificent realm of majestic sights and rarified experiences. To the people who call the region their home, aviation is not just a tool, it is a lifeline.

Maintaining those connections is not without challenge. The cold climate, long periods of darkness in winter, and rugged terrain present unique obstacles for all pilots who fly in, over, or through the region. In addition, inadequate air traffic services equipment and procedures, spartan airport infrastructure, understaffed aircraft rescue and firefighting, and the lack of other essentials most pilots take for granted all add to the risks.

Upgrades to air traffic control facilities, airport infrastructure, and long-term planning at airports would make great strides to mitigate risks for not just domestic operations, but also flights taking a transpolar routing.

The number of flights in Far North airspace—whether a small regional aircraft connecting a village to the world or a large widebody passing through on international travel—has been growing steadily with no signs of stopping. From 2007 to mid-2019, the number of flights per month over Canadian domestic airspace north of 60 degrees latitude has more than doubled.

Recognizing all of this, the Air Line Pilots Association (ALPA) has devoted particular attention to improving aviation safety for pilots, passengers, and cargo that fly in the Far North. This white paper provides information on airline operations in this part of the world, along with recommendations to address identified shortcomings in international standards, regulations, infrastructure, procedures, and resources, all of which are aimed at making significant aviation safety improvements in this largely neglected part of the world.

Of primary concern is the diversion of widebody commercial aircraft to remote locations. With more flights taking a transpolar routing, the occurrence of just such an event is more significant, and it would be devastating if a successful emergency landing were sullied by a tragic aftermath. Upgrades to air traffic control facilities, airport infrastructure, and long-term planning at airports in the Far North would make great strides in mitigating these risks.

A longstanding goal of ALPA is to create "One Level of Safety" for commercial airline passengers and shippers as well as the pilots—ALPA's members—who fly them, regardless of the type of equipment, payload, and routes operated. The Far North represents unique challenges, but we think that, by working with government and industry, we can prevent loss of life in the future.

Joseph D DePete

Capt. Joe DePete
ALPA President

EXECUTIVE SUMMARY

North of the 60th latitude in the United States and Canada, lies 2.1 million square miles of land that is home to a miniscule percentage of those countries' residents, living in small towns and villages. For these remote locations, an aircraft may be the only means of travel to the outside world for much of the year.

Numerous airlines serve as the lifeblood for many of these small communities by providing year-round transportation of passengers and cargo. But many more pilots overfly the area operating long-haul international flights. Cold temperatures, extended periods of darkness, and other unique attributes create challenging operating conditions for all pilots who fly throughout, or overfly, the region.

The services and infrastructure available in the Far North are less than ideal. In fact, the navigational infrastructure and airport services many pilots take for granted elsewhere simply do not exist in this remote environment.

The Air Line Pilots Association, International (ALPA) recognizes the unique challenges pilots face while flying in the airspace of far northern Canada, Alaska, and the Arctic. In 2012, the Association established the President's Committee for Remote Operations (PCRO) to address these flight operations and safety issues to promote one level of safety for all ALPA members.

This paper provides information on airline operations in this vast region of the world and provides recommendations to address identified shortcomings in international standards, regulations, infrastructure, procedures, and resources, all of which are aimed at making significant aviation safety improvements in this largely neglected part of the world.

BACKGROUND

Aviation is a vital element necessary for survival in small communities located in the Far North due to the lack of adequate roads, highways, rail, and bodies of water to connect them with larger towns and cities. Airplanes deliver virtually all of the physical resources needed by these outposts—everything from food and clothing to building materials, heating oil, large equipment and all sorts of other items.

This region poses numerous challenges to aviation, including inadequate air traffic services equipment and procedures, airport infrastructure, aircraft rescue and firefighting equipment, and other needs. A longstanding goal of ALPA is to create "One Level of Safety" for commercial airline passengers and shippers as well as the pilots, ALPA's members, who fly them, regardless of the type of equipment, the type of payload, and routes flown. The Far North represents unique challenges but none that cannot be addressed with proper planning and funding.

This paper's focus concerns all planned flight operations and unplanned flight operations in the Far North. However, another significant and frequently overlooked type of flight operation is that which results from accommodating a widebody aircraft on an international overflight that must divert in an emergency situation. This is a relatively infrequent operation, but it poses higher-than-normal risks and garners worldwide attention when it occurs, as this paper will further describe.

Recognizing the need to identify and address safety and operational shortcomings in the Far North, ALPA created the PCRO in 2012. The work of this committee benefits airlines and pilots globally, since most of the far northern airports, in addition to scheduled and charter service, serve as "long range" en route alternates for extended operations (ETOPS) and long-range operations (LROPs) transpolar flights.

INCREASE OF OVERFLIGHT AIR TRAFFIC

The increasing volume of international overflight air traffic over the Far North is one important factor in understanding the needs of commercial aviation in the region.

Prior to the 1990s, the airspace over Russia and China was not used by civil aviation flights for geopolitical reasons (i.e., rivalry between the North Atlantic Treaty Organization and Warsaw Pact

countries) and economic reasons, specifically, lack of demand for direct routes to the countries south of Russia.

Since then, several factors have led to greater demand for and feasibility of using this airspace, including:

- The fall of the Warsaw Pact and rise of a more open Russian state.
- Opening of the Chinese economy, which experienced GDP growth of 2,800% from 1991 to 2016.[1]
- Opening of the economy in India, which experienced GDP growth of 2,200% from 1991 to 2016.[2]
- Availability of longer-range air carrier aircraft (e.g., A340, B-777), making direct routes from North America to the Middle East and Asia more feasible.
- Rise of Dubai, Qatar, Abu Dhabi, and other Middle Eastern cities and emirates as major financial and trade centers, with associated development of international air carriers.

Figure 1 shows the notional differences in routing from 1990 to today.

Analysis of NAV CANADA data from 2007 to mid-2019 reveals that the number of overflights north of the 60th parallel in Canadian Domestic Airspace (CDA) more than doubled from approximately 4,500 flights per month to a peak of 12,000 monthly (Figure 2, page 5). The result of this increase in flight operations has caused the CDA to become the second-largest air navigation service by volume of air traffic in the world, after the United States.

Further analysis shows that flights operated by the top carriers tended to approximate the growth in overall crosspolar traffic from 2007 to 2019 and accounted for 52–68% of traffic (Figure 3, page 5).

Although operations are somewhat different, traffic using the North Atlantic Tracks (NAT) also flies at times through far northern airspace. Starting from a much higher baseline, NAT traffic through the Gander Oceanic Control Area has also increased 1.6% per year from 2006 to 2016 and is expected to rise at a greater rate of 3.0–4.8% annually through 2036 (Figure 4, page 6). NAV CANADA reports that there were 539,000 flights on NATs in 2016.

The improvements in flight efficiency over the CDA on transpolar routes are key enablers for profitable flight operations. However, increased traffic on these routes also increases the potential for unexpected diversions by widebody aircraft into very small

[1] https://www.theguardian.com/news/datablog/2012/mar/23/china-gdp-since-1980#data
[2] http://www.firstpost.com/business/25-years-of-liberalisation-a-glimpse-of-indias-growth-in-14-charts-2877654.html

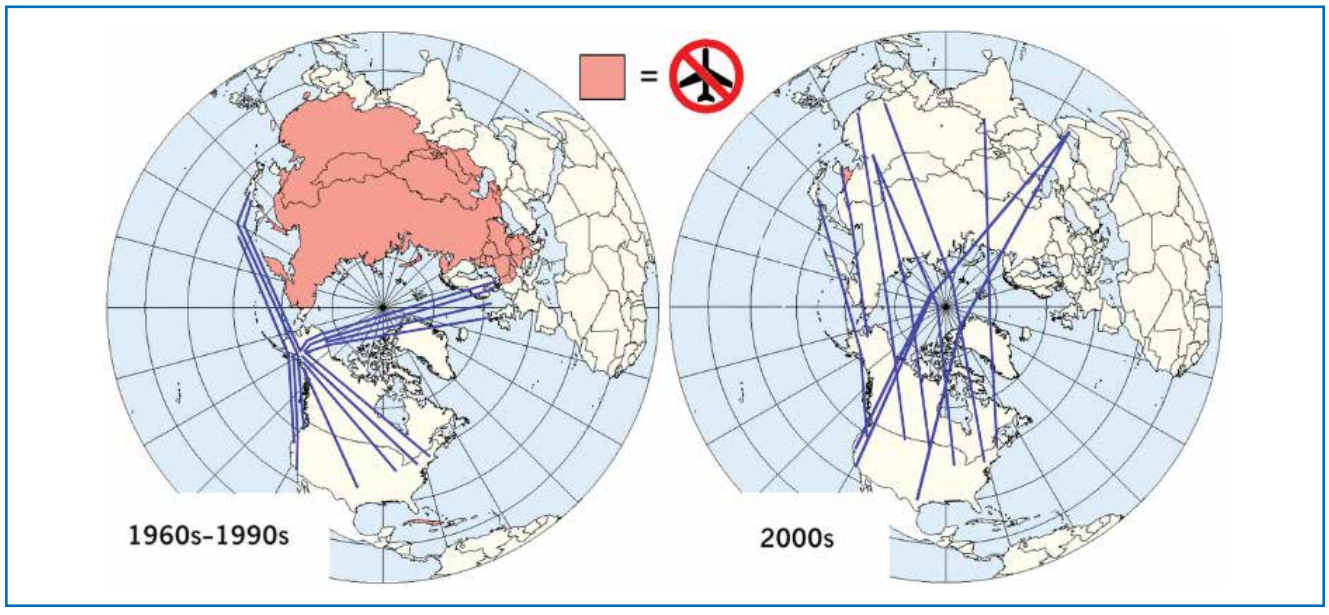

FIGURE 1: Notional routing differences from 1990 to today (Source: Wikipedia)

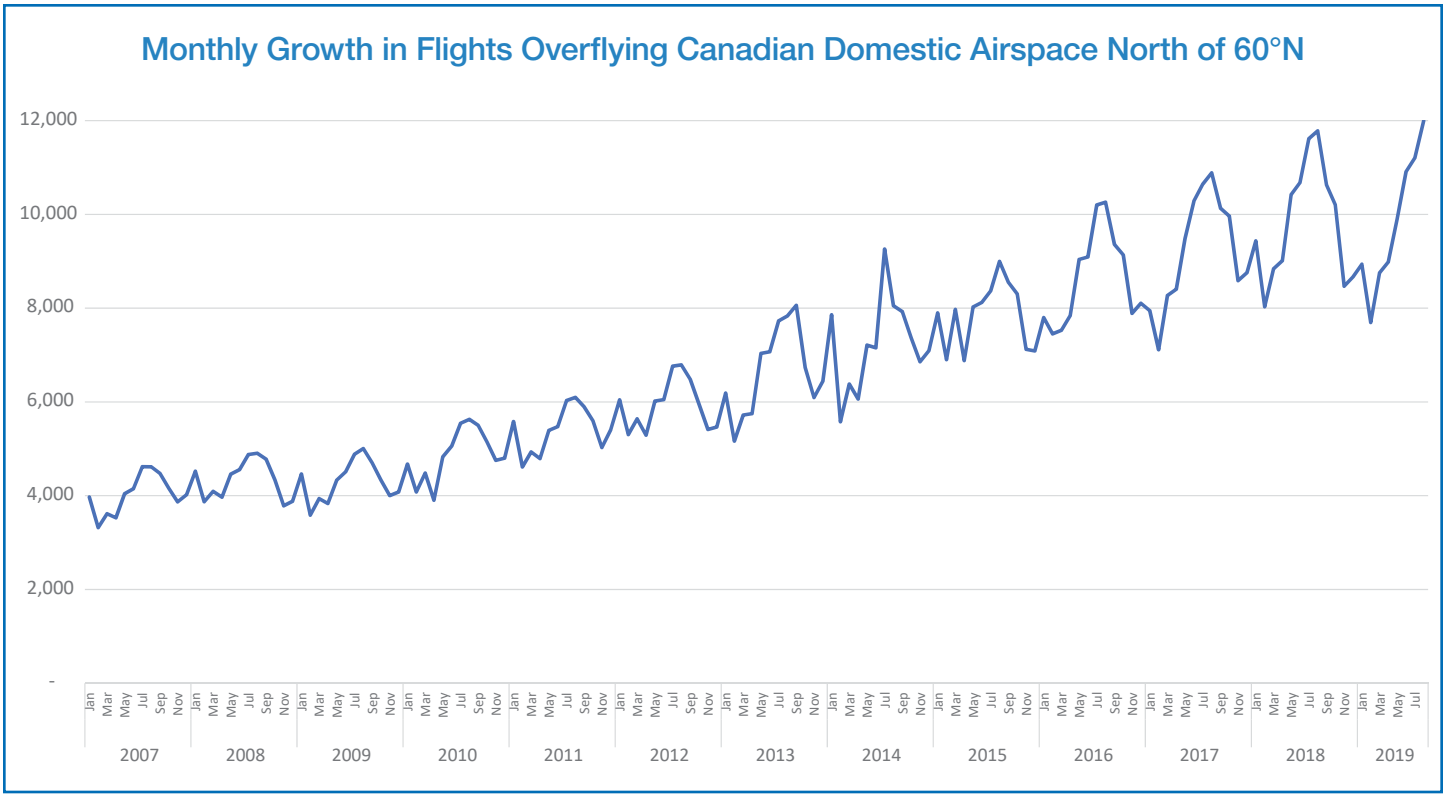

FIGURE 2: Growth in flights per month over Canadian domestic airspace north of 60° latitude (Source: NAV CANADA)

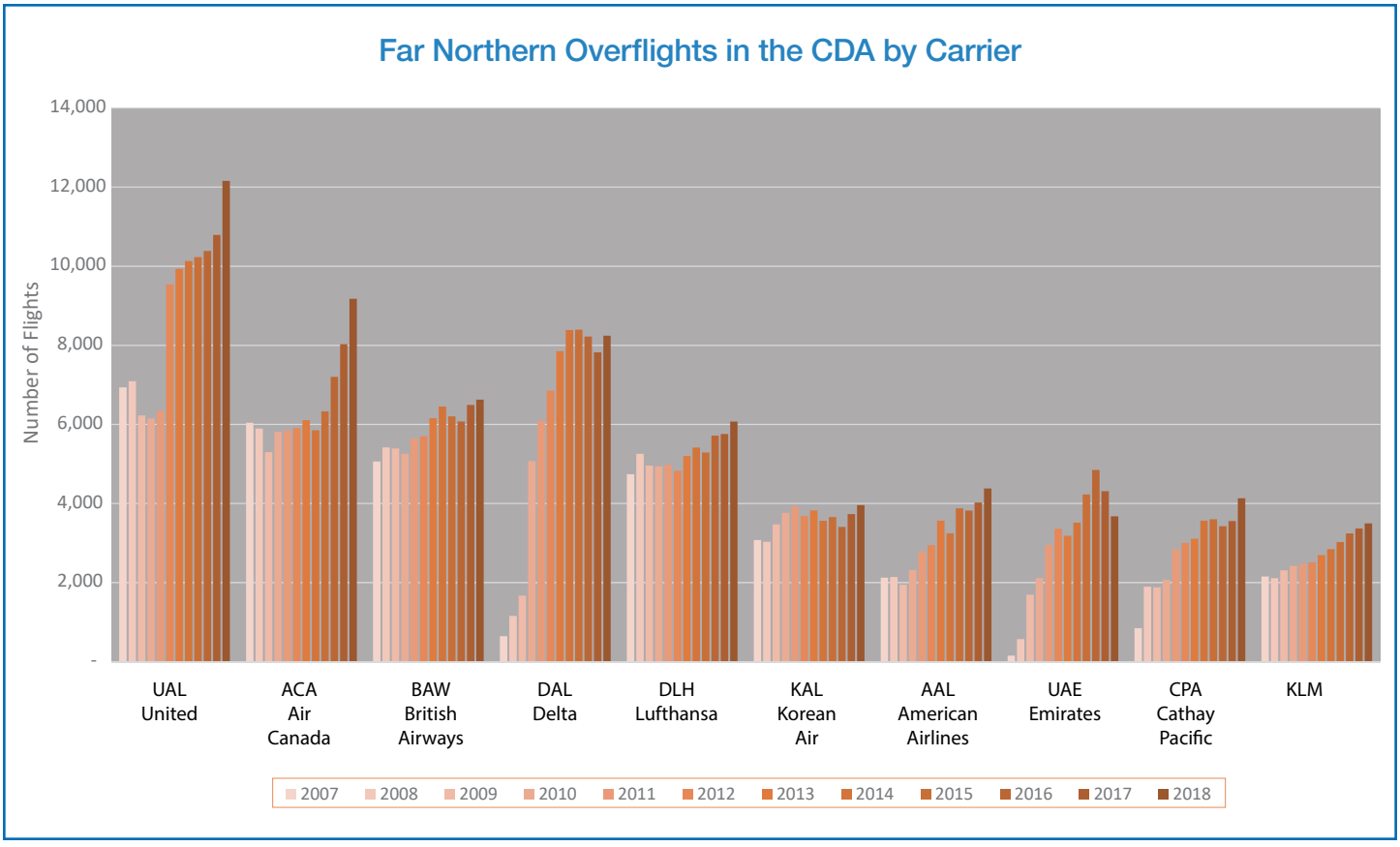

FIGURE 3: Change in CDA flights by airline (Source: NAV CANADA)

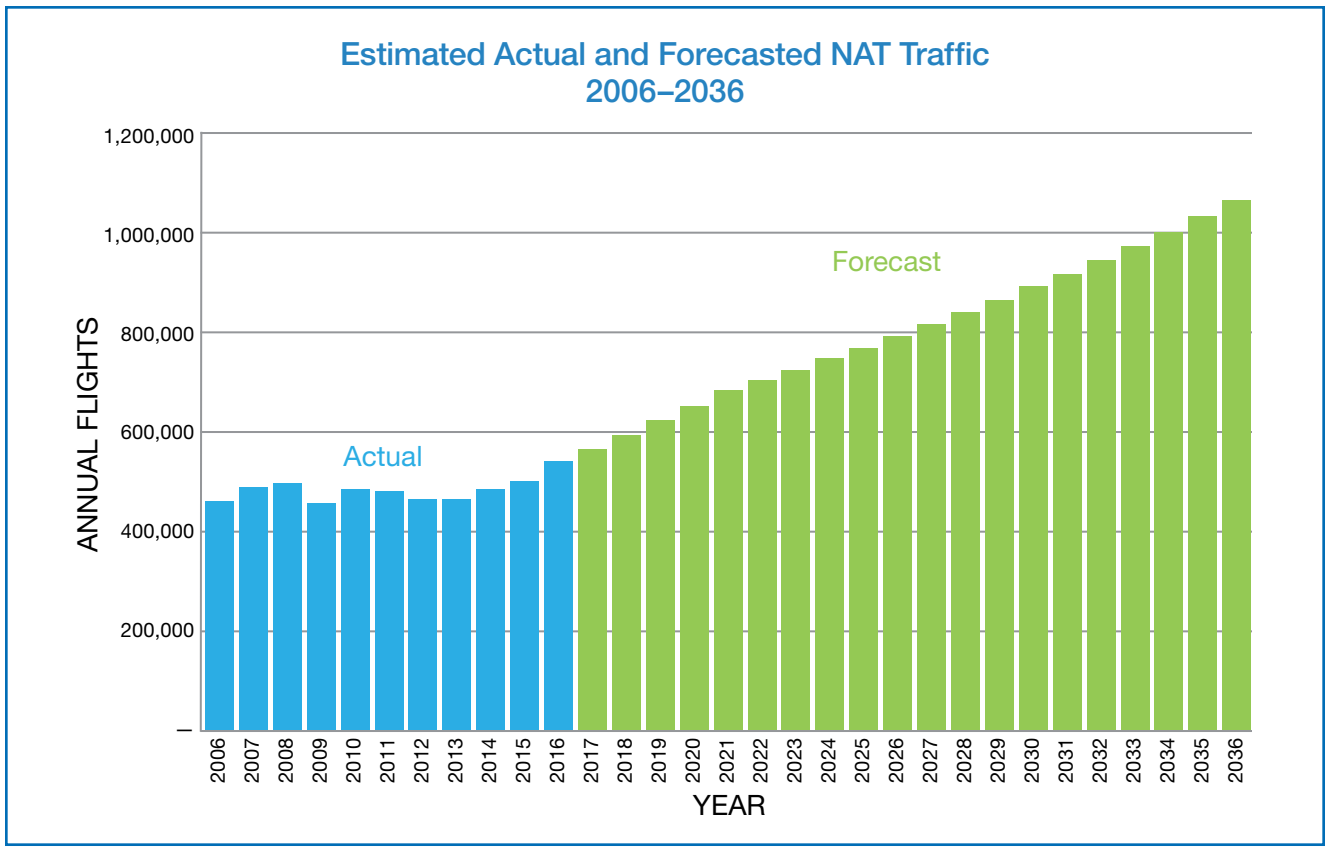

FIGURE 4: NAT traffic growth through 2036 (Source: NAV CANADA)

airports that lack adequate resources to safely and properly care for the passengers and crews onboard, especially in the event of an emergency.

AIR TRAFFIC CONTROL NEEDS

Prior to the increase in overflight traffic, air traffic control (ATC) infrastructure was sufficient to handle local traffic. However, because of the shift in traffic flow, the skies of the Far North are now considerably busier. As a result, the ATC infrastructure elements—communication, navigation, and surveillance (CNS) and ATC automation and procedures—which were sufficient for domestic air traffic, now need improvements to handle the increased widebody traffic overflying the region.

In an ideal scenario during an emergency, ATC plays an essential role in supporting the flight crew so that they can concentrate on managing the situation in the aircraft. ATC knows the precise, real-time location and altitude of the emergency aircraft and surrounding traffic and is able to communicate directly and instantaneously with everyone in the airspace. ATC automation and procedures support the controller in clearing airspace to accommodate the emergency aircraft.

However, air navigation services providers do not presently have the resources necessary in the Far North to make that ideal scenario a reality throughout the region. To better accommodate aircraft experiencing an emergency, the following CNS and ATC automation and procedures improvements are needed.

COMMUNICATIONS

In Alaska and Canada, very high frequency (VHF) radio coverage is currently available at higher altitudes with additional coverage available via high frequency (HF) radio. Controller-pilot data link communication (CPDLC) is also available in Alaskan and Canadian airspace via satellite communications (SATCOM) but may have coverage issues at northern latitudes for some satellite providers. Also, HF and SATCOM (i.e., voice and CPDLC) communications may be degraded or unavailable during periods of solar activity; communications on the ground

at some remote communities may be impacted by these outages as well.

To ensure direct and effective communications during potential emergency situations, future communication capabilities for Alaska and Northern Canada should include continuous ATC VHF voice coverage at cruise altitudes and extending from cruise altitude to the surface in the vicinity of designated diversion airports.

ATC also has the ability to coordinate with airport personnel in the event of a diversion—to alert emergency response and other officials via telephone while the aircraft is still too far away for communication over VHF radio. In some cases, an airport may have several hours of time to prepare to receive an emergency diversion aircraft if notified in a timely manner.

NAVIGATION

Global navigation satellite system (GNSS) services for en route navigation are widely available in this region, and most air carrier aircraft are equipped with both satellite navigation and inertial reference systems (IRS) to provide en route navigation capability in case of a GNSS outage. These resources are sufficient for navigation in cruise flight.

FIGURE 5: Current ADS-B coverage in northern Canada (Source: NAV CANADA)

In Alaska, instrument landing system (ILS) approaches are available at most potential diversion airports. However, ILS's are less common in northern Canada, with only 7 of the 38 airports in the Far North being equipped. Canadian airports generally do not have GNSS (i.e., RNAV) approaches that are appropriate for air carrier aircraft (i.e., RNAV/RNP or LNAV/VNAV). LPV and LNAV-only approaches are much more common as they cater to the smaller aircraft that regularly serve these communities.

Future navigation capabilities should include the development and installation of ILS, required navigation performance (RNP), and/or LNAV/VNAV approaches appropriate for air carrier aircraft, so that aircraft performing an emergency diversion will have the ability to perform a vertically guided approach in all weather conditions. GNSS approaches have the advantage of not being dependent on operational ground transmitter equipment, which require ongoing maintenance and upkeep. However, ILS systems offer the best all-weather access, and far more aircraft are equipped for ILS than any other type of precision approach.

SURVEILLANCE

Current and projected (i.e., to 2020) radar and automatic dependent surveillance-broadcast (ADS-B) coverage for Alaska is fairly comprehensive at en route altitudes, as well as at low altitudes in the vicinity of most candidate diversion airports.

Current ADS-B coverage for northern Canada surrounding the Hudson Bay is shown in Figure 5, and current radar coverage is shown in Figure 6 (page 8); many of the radars are owned by NAV CANADA and are in the process of being replaced, but significant gaps in surveillance exist, particularly at lower altitudes and in the central-western part of the region north of 60° latitude.

Canada is in the process of implementing space-based ADS-B surveillance services. Once in place, all of the Far North will have ADS-B-based surveillance capabilities for aircraft tracking and for providing radar-based services for

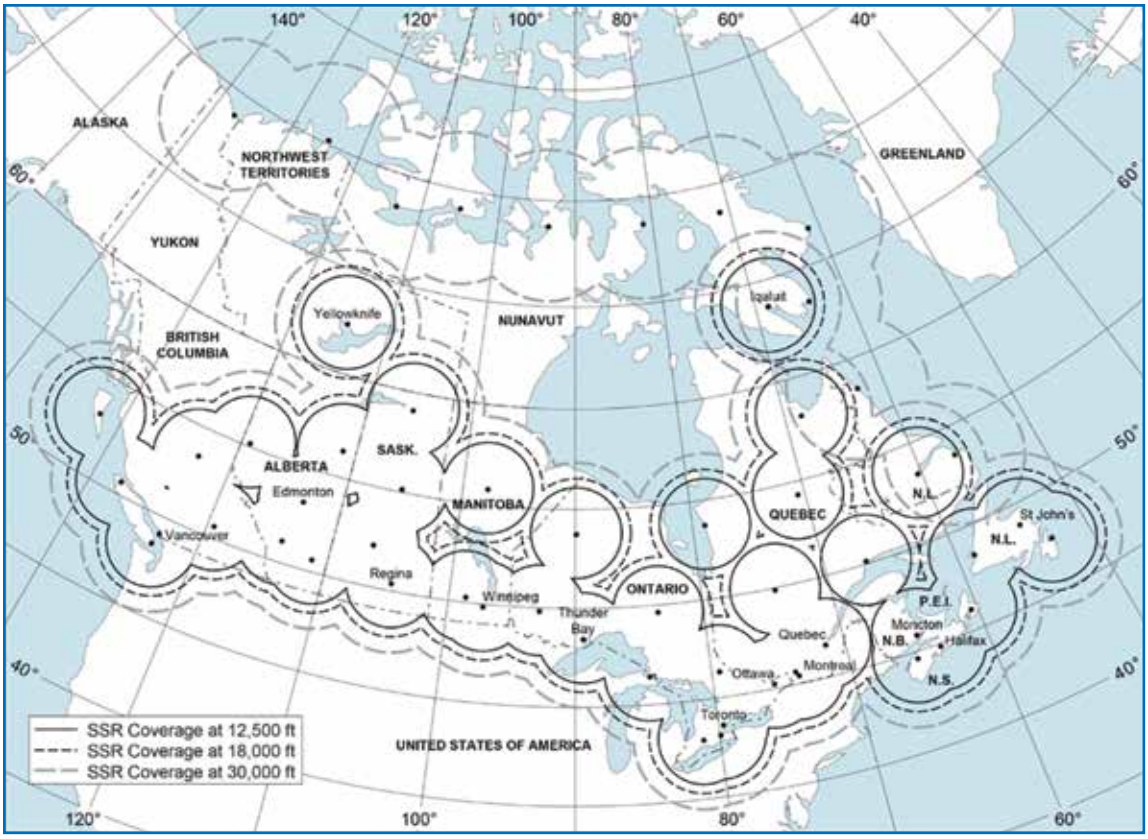

FIGURE 6: Current surveillance radar coverage in northern Canada (Source: NAV CANADA)

aircraft equipped with ADS-B. NAV CANADA is considering an ADS-B out mandate which, if implemented, would greatly improve the aircraft equipage with the necessary technology onboard that would enable surveillance coverage in this region from en route down to the surface. This capability would support the objectives for emergency diversions, as ADS-B surveillance would be able to provide ATC with coverage from cruise altitudes to landing at a diversion airport.

ATC AUTOMATION AND PROCEDURES

The CNS infrastructure of the Far North supports procedural separation, using HF, SATCOM, or CPDLC, with VHF radio in the vicinity of local airports. Once space-based ADS-B surveillance is available across the region, automation systems will likely be updated to provide this surveillance data to the controller's workstation, and radar-like ATC separation services will become feasible when aircraft are flown in VHF radio range. These improvements should greatly enhance ATC service during emergencies.

AIRPORT INFRASTRUCTURE AND OPERATIONS REQUIREMENTS

An important component of polar operations and ETOPS/LROPS is the designation of alternate airports to use for diversions while airline aircraft are operating en route and have an event that requires a landing before reaching the intended destination.

The International Civil Aviation Organization (ICAO) has published Standards and Recommended Practices (SARPS) regarding alternate and en route airports. Following is an excerpt from Annex 6, Chapter 1, Definitions (emphasis added):

> *"Alternate aerodrome.* An aerodrome to which an aircraft may proceed when it becomes either impossible or inadvisable to proceed to or to land at the aerodrome of intended landing where the necessary services and facilities are available, where aircraft performance requirements can be met and which is operational at the expected time of use. Alternate aerodromes include the following:

En route alternate. An alternate aerodrome at which an aircraft would be able to land in the event that a diversion becomes necessary while en route."

The Federal Aviation Administration has published regulations and advisory guidance governing the resources needed for airports used for a proposed operation, as excerpted (emphasis added):

CFR 14 FAR 121.97 Airports: Required data

"(a) Each certificate holder conducting domestic or flag operations must show that each route it submits for approval has enough airports that are properly equipped and adequate for the proposed operation, considering such items as size, surface, obstructions, facilities, public protection, lighting, navigational and communications aids, and ATC.

"(b) Each certificate holder conducting domestic or flag operations must show that it has an approved system for obtaining, maintaining, and distributing to appropriate personnel current

FIGURE 7: Potential diversion airports in Alaska (Source: ALPA)

FIGURE 8: Potential diversion airports in Canada (Source: ALPA)

TABLE 1: Potential Diversion Airports in Alaska

Anchorage (PANC)	12,400'
Barrow (PABR)	7,100'
Cold Bay (PACD)	10,180'
Fairbanks (PAFA)	11,800'
King Salmon (PAKN)	8,901'
Shemya Island (PASY)	10,004'
Adak (PADK)	7,790'
Deadhorse (PASC)	6,500'
Ketchican (PAKT)	7,500'
Kodiak (PADQ)	7,533'
Bethel (PABE)	6,400'
Cordova (PACV)	7,500'
Dillingham (PADL)	6,400'
Nome (PAOM)	6,175'
Kotzebue (PAOT)	6,300'

TABLE 2: Potential Diversion Airports in Canada

AIRPORT (ICAO ID)	LONGEST AVAILABLE RUNWAY
Whitehorse (CYXY)—current alternate airport	8,605' Paved
Yellowknife (CYZF)—current alternate airport	7,503' Paved
Iqaluit (CYFB)—current alternate airport	9,500' Paved
Inuvik (CYEV)	6,001' Paved
Norman Wells (CYVQ)	5,998' Paved
Fort Simpson (CYFS)	6,000' Paved
Rankin Inlet (CYRT)	6,000' Paved
Kugluktuk (CYCO)	5,502' Gravel
Cambridge Bay (CYCB)	5,076' Gravel
Resolute Bay (CYRB)	6,504' Gravel

(Source: FAA and Jeppesen)

aeronautical data for each airport it uses to ensure a safe operation at that airport. The aeronautical data must include the following:

(1) Airports.
  (i) Facilities.
  (ii) Public protection. After February 15, 2008, *for . . . operations in the North Polar area and South Polar area, this includes facilities at each airport or in the immediate area sufficient to protect the passengers from the elements and to see to their welfare."*

FAA Advisory Circular 120-42B, ETOPS and Polar Operations
"It is important that any airport designated as an ETOPS alternate have the capabilities, services, and facilities to safely support the operation."

Transport Canada has published guidance governing the resources needed for airports used for ETOPS, as excerpted:

TP 6327, Safety Criteria for Approval of ETOPS
"Operators are required to show that the facilities and services specified for air carriers are available for their use and adequate for the proposed operation. For the purpose of this document, in addition to meeting these criteria, those airports which meet Transport Canada standards and ICAO Annex 14 and are determined to be usable by that particular aeroplane, will be accepted as adequate airports."

Although TP6237 specifies requirements for safely getting an en route aircraft on the ground in the event of a diversion, it does not specify what ground facilities should be provided for the safe deplaning, protection, and accommodations of passengers and crew.

As is explained below, events involving widebody aircraft diverting into en route alternates call into serious question the adequacy of the SARPS and civil aviation authority requirements and how well they are being implemented by airlines and airport authorities.

Alaska presently has 15 airports with paved runways that serve as a suitable alternate (Table 1, Figure 7, page 9), but they do not all have the services and resources available to be truly effective alternate airports. Canada, with a much larger land mass than Alaska, has only three airports with paved runways that serve as designated alternates, but several more airports could serve as alternates if they were to be updated with much-needed improvements.

Currently, an adequate en route alternate can be several hours away while flying over Canada, which may create safety concerns depending on the situation.

One important consideration with respect to the en route alternates under considerations is that many of them that are not designated as international airports. As such, they are not properly equipped or

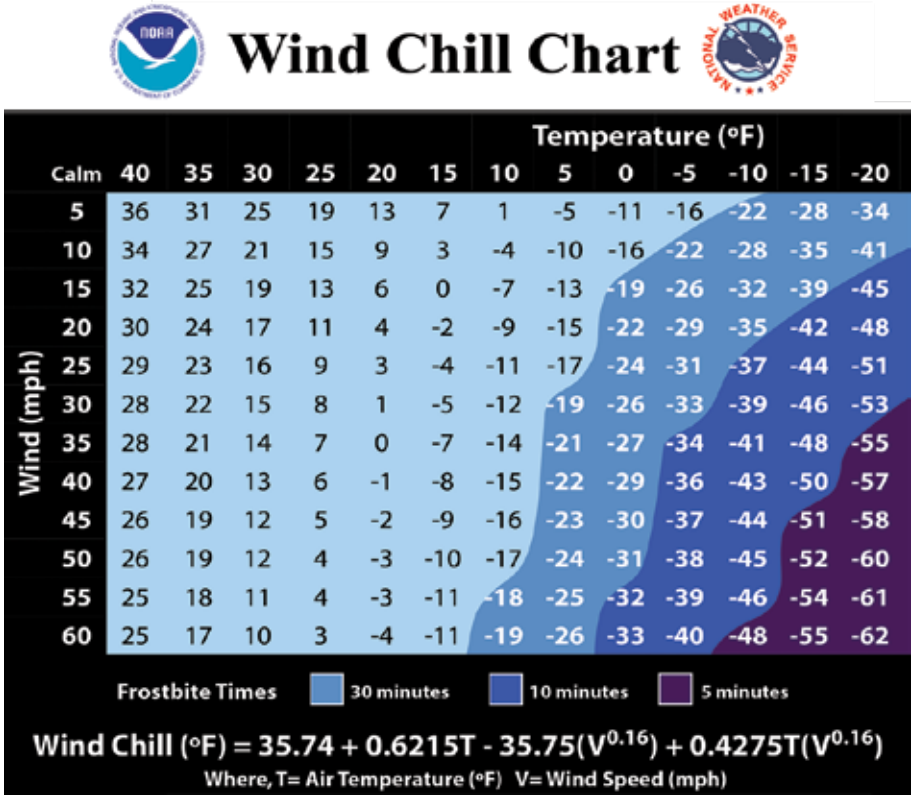

FIGURE 9: National Weather Service Wind Chill Chart (Source: NOAA)

staffed with customs personnel capable of processing passengers and crews into the United States or Canada, as the case may be. Where international airline flight diversions occur at such locations, the passengers and crew may be required to stay on board the aircraft, which based on experience can be many hours. In the event of an emergency evacuation, all such persons would be legally unable to take refuge in an airport terminal or other facility.

Shown in red (Figure 8, page 9) are the three existing diversion airports (Whitehorse [CYXY], Yellow-knife [CYZF], and Iqaluit [CYFB]) serving this enormous region. The green locations are candidate diversion airports with paved runways and the yellow locations are candidate diversion airports that presently have gravel runway (Table 2, page 9).

EMERGENCY DIVERSIONS IN THE FAR NORTH

Unlike aircraft diversions that occur in temperate climates, during winter in Alaska and Canada, the combination of potentially inadequate resources available to widebody aircraft passengers and crews and exposure to extremely low temperatures and resulting windchills can create an extremely dangerous situation in the event of an accident or incident.

Per Figure 9 (page 10), a temperature of -20°F/-29°C with a 30-knot wind would feel like -55°F/-48°C. Exposed skin can suffer frostbite in five minutes in such conditions.

The importance of adequate standards, regulations, and aviation authority oversight concerning designated alternate airports in the Far North—and addressing the potential for extreme winter temperatures—is borne out by examining three diversions that occurred in 2017.

Example 1: B-777-300ER from Europe to U.S. West Coast, February 2017
This flight departed Europe with 216 passengers and 17 crewmembers and experienced an automatic shutdown of the left (number 1) engine due to detection of an anomaly. The crew diverted to a polar en route alternate airport over concerns that the right engine would also shut down. The temperature that day at the alternate was -24°F/-31°C with variable winds. Passengers and crew were kept on the aircraft 14 hours due to inadequate accommodations at the airport and in town. Ultimately, a relief flight from New York City picked up the passengers to fly them back to New York, then on to their final destination.

What kept this event from becoming dangerous is that the aircraft's remaining systems were fully functional, and there was no accident, so there was no requirement to deplane or evacuate. The crew was able to keep everyone warm onboard until the passengers could be transferred to another aircraft. However, even the smallest mechanical issue with any number of aircraft environmental systems could have made this outcome significantly worse.

Example 2: A320 from Long Beach (LGB) to Ft. Lauderdale (FLL), August 2017
During cruise, strong fumes emanated from mid- and aft-cabin and galley areas. Numerous passengers complained of health effects from the fumes, and the flight crew went on oxygen. The flight was diverted to Oklahoma City (OKC). Weather at OKC was not a factor, and the landing was completed without incident. All passengers were deplaned into the terminal, treated as needed, and rebooked on later flights. The aircraft was later ferried to New York City for maintenance.

The situation was serious, but entirely manageable, in large measure because cold temperatures were not a factor, there was no accident, and there was a suitable terminal for use by the deplaning passengers and crew.

Example 3: A380 from Europe to U.S. West Coast, September 2017
This flight departed a European capital airport bound for a major hub in California. During flight over Greenland, the right outboard engine (number 4) failed and partially disintegrated. No one was injured in the incident, and the crew successfully diverted the flight to an alternate airport in eastern Canada just south of the 60th parallel. The flight's 496 passengers and 24 crewmembers had to remain on board approximately 14 hours after landing because there were no air stairs suitable for the A380 and because Customs processing/containment was not available for so many people at the alternate airport. The passengers were ultimately picked up

and carried on to their destination by relief flights, but they were not given the normal standard of accommodations and space available in an airline terminal, much less a hotel room.

Because there was no accident and the cabin was habitable, no one was required to deplane. However, the situation could have been dire if all onboard had needed to deplane in the middle of extremely cold winter temperatures and strong winds.

ADDRESSING THESE ISSUES

These incidents, and others like them, prompt numerous questions such as these:

- Can the industry provide better advance planning for these events so that resources and accommodations are available to passengers who deserve and expect to be able to deplane, rather than hold them in cramped conditions on a ramp for many hours?
- Are the airlines meeting the actual intent of the ICAO SARPS and civil aviation authority regulations when circumstances like these are not fully anticipated and met by those involved?
- If an aircraft accident occurs at a designated alternate airport, are the airline and airport fully prepared to meet the safety, health, and comfort needs of the passengers and crews who survive?

SAFETY RISK ASSESSMENT

ICAO's safety risk assessment matrix[3] (Figure 10) is a well-known tool in use around the world by aviation safety experts as part of the safety management system process. Enough issues have been identified by widebody aircraft diverting into small, Far North airports to warrant the use of this tool to examine the need for more safety measures.

Per this matrix and the history of diversions into the Far North, the probability of a widebody commercial aircraft diverting into a small, remote alternate airport would likely rate a "4, Occasional." With increased traffic operating over the Far North, the probability is also increasing that these types of events will happen on a more frequent basis.

The severity of such a diversion would depend on whether an accident resulted, of course, but it would also depend on whether passengers and crews would need to deplane into extreme temperatures without adequate protection. An accident would not be necessary for that to occur because, as described above, an incident involving smoke or fumes onboard would necessitate an evacuation. As such, the severity of a diversion event could easily rate as "catastrophic," depending on the variables involved.

ICAO's *Safety Management Manual* states that occasional, catastrophic events are "high risk" and "unacceptable under the existing circumstances." It recommends that authorities "cease or cut back operation promptly, if necessary. Perform priority risk mitigation to ensure that additional or enhanced preventive controls are put in place to bring down the risk index to the moderate or low range."

[3] ICAO "Safety Management Manual," Doc 9859, AN/474, Third Edition, 2013

Safety Risk Assessment Matrix

Risk probability		Risk severity				
		Catastrophic A	Hazardous B	Major C	Minor D	Negligible E
Frequent	5	5A	5B	5C	5D	5E
Occasional	4	4A	4B	4C	4D	4E
Remote	3	3A	3B	3C	3D	3E
Improbable	2	2A	2B	2C	2D	2E
Extremely improbable	1	1A	1B	1C	1D	1E

FIGURE 10: ICAO Safety Risk Assessment Matrix

AIRPORT RESOURCES

ALPA conducted a telephone poll in 2017 of airport managers in the Far North to determine what kinds of resources are available to passengers and crews of aircraft facing emergency situations at their airports, which serve as alternates. Following are a few findings from that poll.

- Most of the facilities do not have a tug on the property that is capable of moving the largest aircraft allowed to use the airport as an alternate.
- One of the airports surveyed does not have air stairs that are capable of reaching the largest aircraft that could use the field.
- Aircraft rescue and firefighting services are not uniformly available to airplanes that divert. They range from no capabilities at all to an expected delay of an hour or more. At one airport, a full 24 hours prior notice is required for services to be available.
- Medical facilities are not uniformly available, and the degree of medical services and facilities varies greatly.
- Some airports do not have terminals large enough to accommodate the number of stranded passengers and crew that could need to be sheltered in the event of a widebody in-flight diversion.
- Most poll respondents do not have the survival gear that would likely be needed for passengers and crews in the event of a widebody emergency.
- The basics of food and water could be provided to stranded passengers at most of the airports, but not without severely straining local supplies and distribution.
- The availability of jet fuel varies considerably, which is a vital consideration when an aircraft is on the ground for a prolonged period operating on an aircraft auxiliary power source.

It is evident that the requirements for en route alternate airports in the Far North have not kept pace with the increases in traffic and the size of aircraft that may need to use them. As such, there is potential for a major safety issue if a commercial aircraft were to have an accident or incident that necessitated removing everyone from the aircraft at a Far North alternate airport, particularly in very harsh winter conditions.

AIRLINE CONTINGENCY PLANS

U.S. air carriers are required to obtain approval from the Federal Aviation Administration per the requirements of FAA Order 8900.1, Operations Specification (OpSpec) B055[4] if they intend to operate in the Arctic Polar region. Some of the requirements in this OpSpec for additional required equipment, airline selection of diversion airports, and passenger recovery plans are as follows:

H. Additional Required Equipment for North Polar Operations

1) Except for all cargo operations, expanded medical kit to include Automated External Defibrillators (AED) (Refer to the current edition of AC 91.21-1, Use of Portable Electronic Devices Aboard Aircraft)

2) A minimum of two cold-weather, anti-exposure suits will be required to be on board the aircraft so that outside coordination at a diversion airport with extreme climatic conditions can be accomplished safely[5]

I. En Route Polar Diversion Alternate Airport Requirements
The flight must be able to make a safe landing, and the airplane maneuvered off the runway at the selected diversion airport. In the event of a disabled airplane following landing, the capability to move the disabled airplane must exist so as not to block the operation of any recovery airplane. In addition, those airports designated for use

[4] FAA Order 8900.1, Volume 3, Chapter 18, Section 4
[5] FAR §121.353 requires "Enough survival kits, appropriately equipped for the route to be flown for the number of occupants of the airplane."

must be capable of protecting the safety of all personnel by being able to:

1) Offload the passengers and flightcrew in a safe manner during possible adverse weather conditions,

2) Provide for the physiological needs of the passengers and flightcrew for the duration until safe evacuation, and

3) Be able to safely extract passengers and flightcrew as soon as possible (execution and completion of the recovery is expected within 12 to 48 hours following diversion)

J. Recovery Plan for Passengers at Polar Diversion Alternate Airports

All operators conducting polar operations must submit to the FAA a recovery plan that will be initiated in the event of an unplanned diversion. The recovery plan should address the care and safety of passengers and flightcrew at the approved emergency airport, and include the plan of operation to extract the passengers and flightcrew from that airport.

1) The operator should be able to demonstrate its ability to launch and conduct the recovery plan on its initial application for north polar route approval.

2) The operator must maintain the accuracy and completeness of its recovery plan and diversion airport database at least annually.

There are no similar requirements in Canada for passenger/crew offloading, physiological needs, or recovery plans. Based on what ALPA has learned about the resources available to the few airports in the Far North, it seems questionable at best that U.S. airlines could demonstrate compliance with all of the above provisions in a manner that would meet the expectations of passengers and crewmembers. One major airline's contingency plans includes a checklist to be used during a diversion scenario, procedures to activate an internal airline crisis center, and plans to request assistance from the U.S. military in case the diversion airport is not suitable for landing airline-owned recovery aircraft.

In addition, ALPA learned that the major airline had also retained a third-party contractor that specializes in handling local issues (e.g., obtaining landing permission and relief supplies, arranging passenger accommodations, etc.) for any diversions to Russian airports.

To help with passenger accommodations while recovery operations are underway, the airline has several unit load device (ULD) containers stored at a major hub airport within a few hours flying time of all potential diversion airports in the Far North (assuming the runway is available and usable), with equipment intended to help passengers and recovery personnel cope with arctic conditions beyond what the B055 OpSpec requires. The equipment includes boots, parkas, mittens, extreme weather coveralls, headlamps, and flashlights. The containers also include materials to help accommodate passengers who are sheltered (e.g., blankets, diapers, hand towels/tissues, etc.). This airline performs periodic inventories and checks of the equipment to ensure non-spoilage of equipment, including batteries.

Because these supplies are containerized, thus require widebody transportation, this limits the size of airports to which these supplies can be dispatched. Furthermore, stockpiling these resources hours away from the alternate airport where they are needed greatly increases the likelihood that passengers and crews will be subjected to life-threatening temperatures and winds without proper protection, as described above.

ALPA'S RECOMMENDATIONS

AIR TRAFFIC CONTROL

1. As additional diversion airports are identified, communications capabilities should be upgraded as necessary to ensure that sufficient voice coverage is available for these airports while transitioning from cruise to lower altitudes.

2. Airports in the Far North should have ILS and/or RNAV/RNP approaches that are appropriate for large air transport aircraft, in addition to approaches that cater to the smaller aircraft that regularly serve them.

3. ATC surveillance should be extended to lower altitudes to assist with vectoring aircraft to diversion airports. Fortunately, space-based ADS-B coverage is coming in the future and will provide coverage to the surface.

4. U.S. and Canadian regulators should perform an analysis of whether the northern high-altitude airspace should be redesigned to take advantage of advances in communications, navigation, and surveillance capabilities.

5. An evaluation should be made of whether the existing area of compass unreliability in the vicinity of the north magnetic pole (which is currently moving toward Russia at the rate of 40 nautical miles annually) could be made more accessible in case of emergency through use of instrument approach procedures that are referenced to true North. This would need to include identification of any relevant cockpit and ATC procedures that would be affected by use of true North.

AIRPORT

1. The available network of airports that can serve as alternates should be expanded in Alaska and Canada to increase the safety of overflight aircraft operations.

2. While we are spotlighting the issues of diversions to the Far North, a global evaluation of the number of suitable alternate airports in all remote areas needs to be conducted, and that number should be increased as needed to ensure safety.

3. U.S. and Canadian regulatory requirements for en route alternate airports have not kept pace with the increases in traffic and the size of aircraft that may need to use them and should be reexamined and updated. There is potential for a major safety issue if a commercial aircraft has an accident at an alternate en route airport or needs to evacuate an aircraft in the absence of terminal or other accommodations to provide the basic necessities.

4. ICAO should task a standing committee, or create an ad hoc study group, to assess the adequacy of the standards for alternate airports in the Polar North and all other remote locations around the globe. This group would determine whether the standards and recommended practices and guidance should be updated to meet today's needs. State's aviation authorities should adopt changes to their requirements based on any new ICAO SARPS.

5. Aviation authorities and state governments should devote additional resources to alternate airports as needed to provide for the safe deplaning and basic accommodation of passengers and crew until their recovery is completed.

6. If an adequate-sized terminal is not available, a low-cost, insulated, and heated and/or air conditioned structure could be constructed for dedicated use as a temporary terminal whenever needed. It should be equipped (e.g., chairs, cots, blankets, food, restroom facilities, etc.) to provide for the needs of stranded passengers on a temporary basis. To make this expenditure more palatable, the facility could be used as a community center, recreational facility, etc., when not in use as a temporary terminal. Heated buses are also needed in some locations to pick up passengers and crews and take them to the safety of such a structure.

7. A temporary morgue needs to be available either on property or in close proximity in the event of an accident.

8. Medical capabilities need to be improved at some locations to ensure that appropriate medical attention is available for the maximum number of passengers and crews who may need such services in the event of an accident at the airport. This can be accomplished through mutual aid agreements, local hospitals, emergency-care facilities, military facilities, etc.

9. The United States and Canada should create go-teams of customs personnel to respond to diversion situations within their respective countries to process passengers and crews at airports not having this capability. These resources are needed to temporarily accommodate passengers and crews off the aircraft until a recovery operation occurs.

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