Collision Course

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More than 80,000 passengers have been put at risk over the last five years when airplanes they were travelling in came dangerously close together in Canadian skies, according to never-before-released federal aviation data.

Between 2001 and mid-2005, there were more than 800 incidents in which planes got too close to each other, according to Transport Canada data — about one incident every two days. Sometimes, they come within seconds of crashing.

This is one of the major findings in a joint investigation of the Canadian commercial airline industry by the Toronto Star, the Hamilton Spectator and The Record of Waterloo Region.

The investigation found a safety system straining at the seams. Experts — pilots, mechanics, airline workers and people who study aviation data — warn significant changes must be made to prevent a major catastrophe.
Among other findings:

• About twice a day in Canada, pilots or air traffic controllers make mistakes that could cause accidents, including putting two planes on the same runway at the same time, navigational errors, changing altitudes without permission or making unsafe takeoffs and landings.

• Mechanical malfunctions, from engine fires to parts falling off in mid-flight, have risen steadily from 2000 to 2004.

• Smaller aircraft, including planes, gliders and helicopters, are also involved in "near misses," both with other small planes and commercial airplanes heading in and out of increasingly crowded airspace above major airports.

"There will be a serious accident. It's just a matter of time," warns veteran aviator Ken Green, who retired in March after a 33-year career as a commercial airline pilot with Air Canada. His concerns are echoed by other aviation experts.

Transport Canada data show a steady increase in the number of alleged violations of Canadian aviation regulations such as improper maintenance checks and pilots taking off or landing without air traffic control authorization. The regulator, which has the power to discipline pilots, airlines and air traffic controllers under the Canadian Aviation Regulations, recorded 1,251 alleged breaches in 2004 alone, up 79 per cent from 2001.

It all comes against a backdrop of worsening safety statistics.

According to the Transportation Safety Board of Canada, the number of fatal aircraft accidents was up 48 per cent between 2004 and 2005, from 27 to 40. It was the largest number of fatal crashes since 2001 and resulted in 61 deaths.

Eight of those deaths were the result of six accidents in the air taxi industry, which uses small planes. That's double the number of fatal accidents in 2004 and the most since 1998. In all, the accident rate for Canadian aircraft — planes, helicopters and gliders — increased 3 per cent between 2004 and 2005.

Cost cutting, human fatigue and poor morale are key factors that threaten safety in the skies, according to dozens of pilots, air traffic controllers and mechanics interviewed.

With air traffic predicted to double over the next decade, it amounts to a perfect storm.

Merlin Preuss, head of civil aviation with Transport Canada, says Canadians have one of the safest aviation systems in the world. But increasingly crowded skies do pose a safety challenge, he says.

"The amount of (air) traffic is increasing which can lead to more incidents being reported," he says.

"One of our fears is if we continue to be successful just at this level and our (traffic) goes up, there will be more front-page stories about where the system has failed."

Transport Canada's strategy for addressing a potential spike in accidents is a controversial new approach that will hand over many safety-monitoring duties to airlines. Critics call it a mistake that will allow for-profit companies to self-regulate.

The airspace over Canada is massive, but so is the complexity in managing it. There are about 6,000 airports or landing facilities across Canada, including 1,300 operating under licences from Transport Canada. Of these, 42 operate with air traffic control towers — including all major Canadian cities — and 64 others, like those in Timmins and North Bay, have flight service stations that provide weather and advisory services.

Towered airports take most of the 60-million-plus passengers and last year handled a total of 4.3 million takeoffs and landings — down about 1 million from the industry's peak in 1999, but on the way up as the airlines recovered from 9/11 and later, SARS.

In congested skies, there's little room for error. For example, two commercial jets separated by four nautical miles and on a collision course would strike each other in less than 20 seconds.

In one recent incident, two planes heading for Toronto in January — an Air Canada Jazz passenger jet and a Thunder Airlines turboprop — came close to colliding because the Jazz crew had improperly set the plane's altimeter and the pilots thought they were higher than they actually were. The larger Jazz jet was descending and came close to crashing down on the smaller Thunder Airlines plane. A proximity warning alarm sounded and the Jazz jet pulled up just in time.

Like most of these incidents, the 100 passengers on the two planes were unaware of the close call, called a "loss of separation." The incident report shows the planes came within 200 feet (60 metres) of each other — a thin whisker in aviation terms.

Planes are required to maintain "separation" from other aircraft in busy airspace, either vertically or horizontally. Vertical separation is typically 1,000 feet (305 metres). How far apart planes must be horizontally depends on where the airplane is in its trip. Near busy airports, planes may be allowed as close as three nautical miles (5.5 kilometres) apart. Farther along the flight path, five miles is typical, but in remote rural or ocean areas where there is no radar coverage, the bubble of protected airspace around a plane may be measured in dozens of miles.

Canadian aviation rules — set by Transport Canada — allow thousands of planes to fly without a proximity-warning device like the kind that saved the day in the Jazz-Thunder Airlines incident.

For 10 years, Transport Canada has studied making the Traffic Collision Avoidance System (TCAS) mandatory. In the U.S., TCAS systems are required for planes with more than 10 passengers, while in the European Union the minimum is 20 passengers. It's only those foreign regulations that force Canadian planes flying into those countries to have the technology installed.

`LOSS OF SEPARATION'

When close calls between planes do happen, they are rarely investigated. The Transportation Safety Board, Canada's federal agency responsible for studying air safety mishaps, is a lean operation, able to investigate about 50 aviation incidents and accidents a year from the thousands that take place.

Since 1996, for example, there have been 1,619 incidents classified by the TSB as "risk of collision" or "loss of separation" involving commercial aircraft. Of

those, 95 per cent received only cursory review. Only 79 triggered more thorough investigations — fewer than one in 20.

The TSB has been aware of this problem for years. A "safety advisory" written by the board in 2000 warned that "losses of separation do occur, many of which involve risks of collision."

"Current and proposed defences against this threat are not adequate," it stated. "Although the probability of a mid-air collision is very low, the associated consequences are high."

Nav Canada, the private company that manages the country's air traffic control towers, exists to accomplish one primary task: Keep planes from coming anywhere near each other.

When planes do breach the protective distances set by Canadian aviation safety rules, officials log the incident as a "loss of separation."

Nav Canada figures show 78 losses of separation and another 279 potential losses of separation involving air traffic controllers last year, the highest total in the last five years. The company says the growth is partly explained by more reporting of minor incidents.

Many losses of separation involve small aircraft — including thousands of small planes, gliders and helicopters flying out of rural airports, flight schools or airstrips — that come into conflict with commercial airplanes. Such incidents happen with surprising frequency in Canadian skies and historically more often in the busy summer months.

The pilot of a WestJet 737 flight heading into Hamilton from Winnipeg experienced four "near misses with light aircraft" that required "aggressive manoeuvring to avoid a collision," reads a July 2003 incident report.

Those light aircraft are believed to be gliders from the Southern Ontario Soaring Association, a gliding club with 150 members based in Rockton, between Hamilton and Kitchener.

The near miss occurred in lightly controlled airspace where gliders and small private planes are allowed to fly without transponders — which send out a signal that alerts larger planes of other aircraft — and all pilots are responsible for keeping an eye out for other planes.

But the airspace, up to 12,500 feet, is also on the landing and takeoff path for Pearson and Hamilton international airports, which means jets regularly fly low near the glider club.

Club president Dave Springford said commercial airline pilots, trained to fly using sophisticated navigational instruments, don't always respect the rights of smaller planes when flying at low altitudes.

Last year, pilots of an Air Canada Jazz flight from Toronto to London, Ont., faced a similar moment of terror when the flight crew reported passing "within 500 feet of a glider."

"Nothing had been seen on radar," the incident report says.

Last July, a CanJet Boeing 737 from Montreal was 12 nautical miles from the runway in Ottawa when the flight crew "looked out and saw a Cessna 172 off the aircraft's left wing, about 100 feet above them," an incident report says.

Nav Canada says the Cessna pilot was allowed in that airspace, but was breaking the rules because he was not in radio contact with the Ottawa tower and had no transponder.

Without a transponder, the Cessna was invisible to the CanJet plane's collision avoidance system, and nearly invisible to controllers. Only a last-minute warning from controllers, and luck, saved the day.

Breaches of separation between large planes are particularly dangerous in the airspace around airports.

In the Jazz-Thunder Air near miss, even after the planes' emergency alarm systems prompted the pilots to change course, the danger wasn't over, according to the incident report. The Jazz plane resumed its descent into Toronto only 1.5 nautical miles ahead of the Thunder Airlines plane — far less than the four nautical miles required by aviation safety regulations.

Ken Bittle, president and chief safety officer with Thunder Airlines, says his pilot was never aware of how close he was to another plane.

"(It was) very close. That's not comfortable at all and in that particular phase of flight, with this aircraft coming from behind and above and descending is the worst possible case. You would never, ever see them."

That's because gazing out of a cockpit window, a pilot can't see below or directly above.

"With a car you have, more or less, a level playing field. There is a car, sometimes it's coming at you or beside you or behind you, you're not looking up or down for it. With an airplane you have all these directions, plus you have the vertical separation."

Neither Air Canada Jazz nor Air Canada would answer questions on incidents involving their planes. WestJet, also approached for this series, would not comment on specifics.

Controller errors can involve even higher stakes because they often involve large commercial airliners filled with people.
Last August, controllers inadvertently put an Air Canada 767 arriving from Rome on a conflicting course with an Air Canada Jazz regional jet departing Toronto. The planes came within three-quarters of a nautical mile of each other at the same altitude.

Both crews received alerts from their onboard collision avoidance systems. The 767 pilot descended at the last moment to avoid the Jazz plane.

Last April, a Canadair Regional Jet operated by U.S.-based Pinnacle Airlines was on approach into Toronto from Memphis at the same time as an Air Canada Airbus flight 449 was landing in Toronto from Ottawa.

As the two planes descended onto runway 24R at Pearson International Airport at the same time, they came within 500 feet vertically and 1.5 miles laterally of one another before landing safely, an incident report states. That's well below the required distance to ensure safety.

Pearson's runway 24R was the site of another close call in 2003 when an Air Canada Boeing 767 was taking off just as another Air Canada Boeing 767 was departing from runway 23.

"The Toronto departure controller momentarily confused the two aircraft call-signs," reads the incident report. "The two aircraft were placed on converging flight paths."

The controller quickly ordered the two planes on diverging paths.

But not before the plane on 24R came within 1.5 nautical miles to the south and 600 feet below the other Boeing plane.

THE TECHNOLOGY GAP

Loss of separation incidents demonstrate one of the ways the air safety system is most vulnerable: It relies on everyone — from commercial and weekend pilots to air traffic controllers — following a complex set of rules, which vary by airport and are laid out in a 400-page manual and a thick book of charts. And pilots of smaller planes often don't have the same skills or experience as big jet pilots.

Capt. Michael Zorychta, CanJet's director of flight operations, said he'd like to see tougher regulation of amateur pilots to ensure their knowledge and skills are current.

"They shouldn't be there in the first place," he says. "You get a lot of professional people ... (that have) the wherewithal to afford to either own or rent (a plane) and they don't do it for a living and they are less vigilant, let's say, than the professional pilots."

One solution would be to ban smaller planes from larger airport airspace altogether, as is the case at Heathrow airport in London. Zorychta suggests that solution could be implemented around Pearson.

Either way, he would like to see every plane, no matter how small, equipped with a Traffic Collision Avoidance System — technology that trips a cockpit alarm when planes come too close together.

"It seems like a no-brainer," he says. Still, Canada doesn't require TCAS at all, despite calls from pilots, air traffic controllers and the TSB dating back at least a decade.

Most large commercial aircraft in Canada are equipped with the life-saving systems because they need it to fly over the U.S., where TCAS has been mandatory for 13 years. But many smaller planes in Canada running on domestic-only routes remain unequipped.

Jennifer Taylor, Transport Canada's director of aerodromes and air navigation, says the agency is working toward TCAS regulations in the near future. She says the long delay in getting there is the result of differing air traffic levels than the U.S. and a lengthy approval process in Canada.

"We don't have that same kind of accident risk as they do in the States (because) we don't have the same volume (of traffic)," she says. "And there are protocols and rules imposed on us ... and the first principle is that you should not be able to make rules that are going to impose a restriction on people's activities easily. You should not be able to do that quickly. It should require lots of research, lots of assessment, lots of consultation."

It's an argument that falls flat with most pilots.

"Why would you not put this on an airplane?" asks Capt. Bob Perkins, a 33-year veteran commercial pilot and national safety committee chair with the Airline Pilots Association, which represents 63,000 pilots at 40 airlines in Canada and the U.S.

"It does cost a little bit of money, but it can potentially save the airplane and whoever is on it. It's a no-brainer."

The TCAS system required for large commercial planes (more than 30 seats) in U.S. and European airspace costs about $250,000 (U.S.), while TCAS for smaller planes cost between $29,000 and $79,500 depending on the size of the aircraft. Most small aircraft that don't require TCAS need at least a transponder, which costs about $1,800.

Money is an increasingly big factor in aviation safety, say many long-time aviation professionals. Grant Corriveau, who retired as an Air Canada pilot two years ago, has seen budgetary belt-tightening change the way pilots fly during his 30-year career.

"Something goes from an amber condition to a red condition a lot faster than it used to because the buffers are smaller," he says.

For example, commercial planes carry much less fuel today than ever before to reduce costs. But it means that when a flight doesn't go as planned and landing is delayed, pilots have much less time to react before the fuel runs out.

In one 2003 incident, a Convair 580 aircraft heading to New Zealand became lost as a result of a navigational error. By the time it eventually landed, the plane was down to its last 359 pounds of fuel — enough for only a few minutes of flight time, according to a TSB document.

"All the new bells and whistles are continually pushed to the limit in order to become more profitable and to squeeze more airplanes into more airspace and then when something goes wrong, you have less outs and less room to manoeuvre," says Corriveau.

Perhaps the greatest safety measure working in favour of travellers is the fact that the sky is a big place. Even when navigational mistakes happen, the likelihood of an accident remains small.

But experts say the odds grow along with air traffic. Brian Alexander, a pilot and lawyer with New York-based Kreindler & Kreindler, among the largest international aviation law firms which has handled air disaster cases including Lockerbie, SwissAir and 9/11, says there are mounting concerns about safety in the air.

"There are parts of the system that are working well and are improving as technology improves. Having said that, it is absolutely true to be sure that there are serious problems which will eventually rear their ugly head and result in tragedies and we'll have all the Monday morning quarterbacks talking about, `Well, we knew that but we didn't fix it.'"

The single biggest concern, which Alexander calls a "crisis," is an expected dramatic growth in air travellers over the next decade that promises to surpass the system's ability to ensure safety.

"The overall airspace system is not presently prepared for what is an inevitable increase in air traffic and travellers over the next five to 10 years," he says.

One estimate, cited by Transport Canada officials, is a doubling of accidents by 2015 as air traffic experiences dramatic growth with Asian routes and a general increase in flying.

"We have a lot of occurrences like you see in the reporting incident data," says Capt. Brian Boucher, an Air Canada pilot and technical safety chair of the Air Canada Pilots Association. "What we have now isn't working safely. We might get by and not have anything for two or three years. But are we doing the right thing? We want to do what's in the best interests of the travelling public."

THE HUMAN FACTOR

With Canada's privatized air traffic control structure and airlines struggling for economic viability, concerns about safety are increasingly subjected to cost pressures, say unions for pilots and air traffic controllers.

Those pressures, they say, result in overwork, fatigue and, ultimately, mistakes.

Robert Thurgur, president of the Canadian Air Traffic Control Association, says chronic short staffing in the nation's control towers has compromised the delicate work of managing planes in the sky.

"I think there's a very strong influence on costs. It's not as safe a system as if safety came first and costs came a distant second," he says. "Anytime you've got people that are working excessive amounts of overtime in a complex environment with distractions, you are increasing the likelihood of incidents."

Many control towers across the country are not happy workplaces, says Thurgur.

"There's a lot of frustration with Nav Canada and the way the system is being run. ... Our employee surveys show controllers are disengaged and unhappy. There's a feeling that senior management isn't living up to the commitment and philosophies of the company."

Officials with Nav Canada admit there is understaffing in some of its facilities while others are overstaffed thanks to union rules that limit the ability to move controllers from one facility to another.

Nav Canada investigates about 200 incidents a year involving controllers, says Kathy Fox, the company's vice-president of operations. In many cases, those investigations lead to "retraining" courses, generally lasting about a day.

In very rare cases, controllers will be ordered to take lengthier retraining or be removed from their positions and reassigned, she says.

A controller in Moncton was ordered to take a one-day retraining course following an August 2004 incident in which an Air Georgian pilot was forced to take "evasive action" after coming within 700 feet and a half mile from a WestJet B737 on an approach into Halifax.

A controller responsible for monitoring the Air Georgian plane failed to make sure the pilot had sight of the WestJet flight, says Fox.

"That allowed the spacing to erode to less than (mandatory) separation. ... (But) they were not on a collision course."

She says the controller was given a one-day retraining course to ensure "his work habits were correct" and a clarification was issued to all staff in the centre on proper procedures.

Many pilots seem as frazzled as controllers — with a workload they say contributes to human error.

Retired Air Canada pilot Ken Green filed several complaints with the airline over the past couple of years warning that fatigue is leaving pilots more prone to making mistakes.

Says Green: "I'm a passenger sitting behind these (pilots) now and I don't even want to use my (flight) passes because I'm almost scared to fly."

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