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Some Canadian Disasters: Their Measurement and Their Impact on Measurement

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ABSTRACT

Disasters are of interest to governments, firms and people as they can have significant impact of commercial activity, firms and people's lives. For this reason, there is a need to measure their impact to help assess the options to prevent or to mitigate the consequences of future reoccurrences. Unfortunately, some disasters can complicate or make much more difficult the measurement or data collection exercise making even standard collection for analysis difficult. This paper uses some actual examples from past disasters (the terrorist attacks of September 11, 2001, the ice storm of January 1998 and the power outage of August 2003). All had impact on transportation and the Canadian economy. The paper will show how the impacts of the disasters were measured and their impact on the measurement process itself.

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INTRODUCTION

Disasters are of interest to governments, firms and people as they can have significant impact of commercial activity, firms and people's lives. For this reason, there is a need to measure their impact to help assess the options to prevent future reoccurrences. Unfortunately, some disasters can complicate or make much more difficult the measurement or data collection exercise making even standard collection for analysis difficult. This paper uses some actual examples from past disasters in Canada to show how they were measured and their impact on the measurement process.

The Canadian federal agency Public Safety Canada has a Canadian Disaster Database which "contains historical information on disasters which have directly affected Canadians, at home and abroad, over the past century. References to all types of Canadian disasters, including those triggered by natural hazards, technological hazards or conflict (not including war) can be found here." The database covers the period 1900-2010 and contains 817 disasters.¹ This paper will examine some disasters with a transportation component, which illustrate both the impact and the complications of disaster measurement with the focus being on measurement performed by Statistics Canada. Statistics Canada is the federal statistical agency created with the mandate "to collect, compile, analyse, abstract and publish statistical information relating to the commercial, industrial, financial, social, economic and general activities and condition of the people".²

TERRORISM—SEPTEMBER 11, 2001

The terrorist attacks of September 11, 2001 were a transportation disaster that received much attention in 2011 as the 10th anniversary occurred. While the disaster took place in the United States, "Twenty-four Canadians were killed when terrorists crashed two commercial airliners into the towers of the World Trade Center. One Canadian was aboard each of the two hijacked aircraft. The other 22 Canadians were among the 2 823 people killed in the subsequent collapse of both towers."³

After American airspace was closed to all incoming international flights, the decision was made to ground all civil aviation in Canada as well. International flights that did not have sufficient fuel to turnaround and return to their origins were diverted to Canadian airports to land. In all 238 flights with over 33,000 passengers were diverted to airports such as Goose Bay, Gander, Stephenville, Moncton, St. John's, Halifax, Montreal, Toronto, Winnipeg, Calgary, Whitehorse and Vancouver.⁴ Transport Canada had instructed NAV CANADA (the aeronautical authority) to try to “avoid, if possible, redirecting planes to large urban areas such as Toronto, Montreal or Ottawa, because of security concerns”.⁵

**TABLE 1: DIVERTED AIRCRAFT BY AIRPORT OF LANDING
SEPTEMBER 11, 2001**

Airport	Number of aircraft
Gander NF	38
Deer Lake NF	1
St. John's NF	21
Stephenville NF	8
Goose Bay NF	7
Halifax NS	47
Moncton NB	10
Montreal (Mirabel) QC	10
Montreal (Dorval) QC	7
Toronto ON	14
Hamilton ON	4
Winnipeg MB	15
Edmonton AB	6
Calgary AB	13
Yellowknife NT	1
Whitehorse YK	2
Vancouver BC	34
Total	238

Source: NAV CANADA, [NAV CANADA and the 9/11 Crisis,
http://www.navcanada.ca/NavCanada.asp?Language=EN&Content=contentdefinitionfiles%5Cnewsroom%5Cbackgrounders%5C911crisis.xml](http://www.navcanada.ca/NavCanada.asp?Language=EN&Content=contentdefinitionfiles%5Cnewsroom%5Cbackgrounders%5C911crisis.xml)

To give some perspective to the numbers in Table 1, Gander had a population around 10,000 people and the 38 aircraft diverted to Gander airport deplaned 6,656 people who had to be processed, housed and fed.⁶

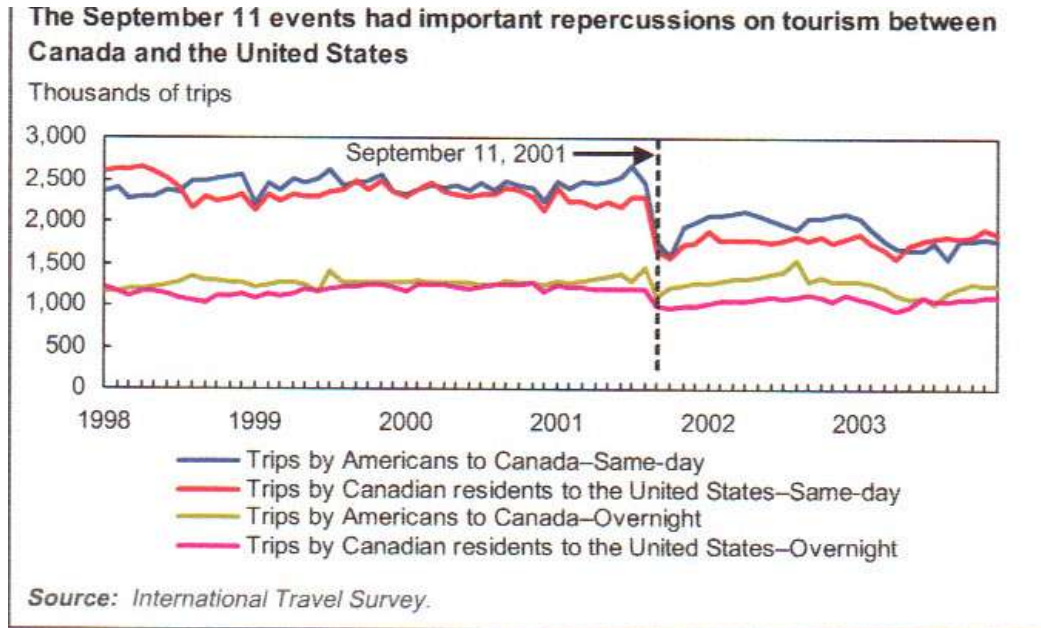
FIGURE 1: GANDER AIRPORT, SEPTEMBER 11, 2001



Source: AP Photo/NAV CANADA

Figure 2 is reprinted from the Statistics Canada study ‘The tourism trade balance between Canada and the United States, 1991-2003’.⁷ It shows the impact on travel between Canada-United States that occurred subsequent to the events of 9/11. Between August and October 2001, the number of same-day trips by Americans to Canada dropped by 35% and the number of same-day trips by Canadians to the United States declined by 32%. While the numbers did rebound some in November 2001, levels continued depressed with respect to those seen before the terrorist attacks. There was also a decline in overnight trips in each direction but these rebounded much more quickly.⁸

FIGURE 2: TOURISM EFFECTS OF SEPTEMBER 11, 2001



Source: Statistics Canada catalogue 87-003, Travel-log, Vol. 23, No. 1, Figure 6, page 6

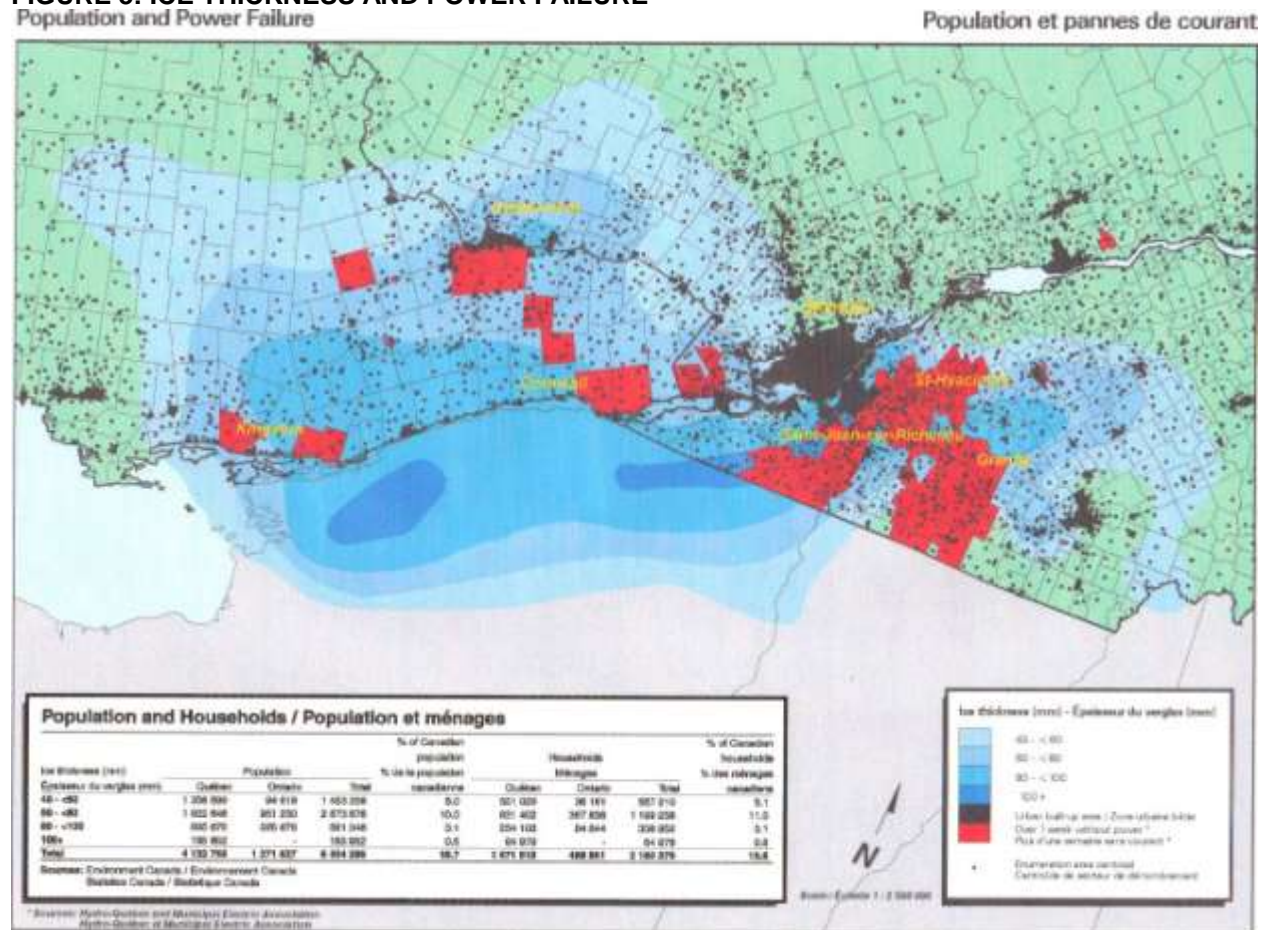
How did the terrorist activity of September 11 impact on measurement? The International Travel Survey cited in Figure 2 uses data from a Frontier Counts Survey, a mail-back International Travel Survey as well as the Air Exit Survey of Overseas Travellers. With the Air Exit Survey of Overseas Travellers “interviews are conducted each month in designated Canadian airports and the collection period lasts 3 to 7 days....The Statistics Canada interviewers personally interview overseas travellers who are returning home by direct flight. Before the first call for boarding, interviewers question travellers who are waiting for the chosen flights in order to identify travellers from overseas countries. All overseas visitors are interviewed, even if they do not come from the target country. To help achieve a good response rate, the questionnaire is available in 10 languages. Also, the interview team is composed of interviewers with various linguistic abilities.”⁹ Immediately following the terrorists attacks, airport authorities in Canada started to greatly restrict access to airport lounge areas. This prevented Statistics Canada interviewers from gaining access until representations were made at a senior level from Statistics Canada to Transport Canada. Interviewer access was again granted in a period of days.

ICE STORM JANUARY 1998

In early January 1998 (from the Sunday the 4th through Saturday the 10th) portions of Ontario and Quebec, were hit by a mix of primarily freezing rain but also ice pellets and snow. The total water equivalent of the precipitation “exceeded 73 mm [2.9 inches] in Kingston, 85 mm [3.3 inches] in Ottawa and 100 mm [3.9 inches] in areas south of Montréal”.¹⁰

The storm drove 100,000 people to take refuge in shelters, several thousand kilometres of power lines and telephone cables were brought down, over 1,000 transmission towers were toppled; more than 30,000 wooden utility poles were brought down. At the height of the storm, close to 1.4 million customers in Quebec and over 230,000 in Ontario were without electricity.¹¹

FIGURE 3: ICE THICKNESS AND POWER FAILURE



Statistics Canada - Catalogue no. 16F0021XIB

Statistique Canada - n° 16F0021XIB au catalogue

Source: Statistics Canada catalogue 16F0021XIB, The St. Lawrence River Valley 1998 Ice Storm: Maps and Facts, page 7

Figure 3 shows the ice thickness and areas of the longest power outages. Effects on the economy were noticeable:

- Over 2.6 million people were either prevented from getting to work or impeded in getting there;
- 135,000 people lived in areas that had power outages that lasted 10 days;
- Retail sales in the province of Quebec declined 10% in January 1998;
- 274 thousand dairy cows were in the area of the power outages. The closure of processing plants resulted in the dumping of over 10 million litres (2.6 million gallons) of milk.¹²

Table 2 shows that the transportation disruptions caused by the ice storm were sufficient to have a visible negative effect on the intermodal (piggyback) tonnage carried on Canada's major railways. Much larger declines in tonnage, with respect to the previous year, were experienced in the weeks that included the January 4-10th ice storm.

TABLE 2: RAILWAY CARLOADINGS, INTERMODAL (PIGGYBACK) TONNAGE

Period	Metric Tonnage	Change from the same period previous year
7 day period ending December 21 1997	319 000	-2.5%
10 day period ending December 31 1997	339 000	-8.1%
7 day period ending January 7 1998	189 000	-21.7%
7 day period ending January 14 1998	226 000	-25.7%
7 day period ending January 21 1998	284 000	-7.3%

Source: Statistics Canada, Weekly Railway Carloadings Survey, The Daily, January 22/1998, January 27/1998, January 30/1998, February 3/1998 and February 9/1998

How did the ice storm of January 4-10, 1998 impact on measurement? While the Statistics Canada headquarters in Ottawa was only closed for two days (Friday January 9th and Monday January 12th), many staff were missing for longer periods as they were unable to get out of their homes to make it to work.¹³ The Montreal regional office did not reopen until Friday January 16th.¹⁴ Data collection was complicated by the power outages. "Collecting data from households in some storm-ravaged areas presented two sides of the same problem: many householders were without power and had far more pressing concerns than responding to one of our surveys. On the other hand, many interviewers were themselves severely affected".¹⁵ All data releases were released on

time although this, in some cases, required various solutions such as extending the time frames for data collection activities, accepting lower response rates or reducing sample sizes.¹⁶

POWER OUTAGE AUGUST 2003

An electricity blackout occurred on August 14, 2003 that affected parts of Ohio, Michigan, Pennsylvania, New York, Vermont, Massachusetts, Connecticut, New Jersey and the province of Ontario and affected approximately 50 million people. Power restoration varied between four days and a week later.¹⁷

TABLE 3: TOTAL NUMBER OF PEOPLE WHO LOST WORK AS A RESULT OF THE ONTARIO-US POWER OUTAGE, RATE OF ABSENTEEISM, AND ASSOCIATED HOURS LOST, ONTARIO AND GATINEAU QC, LAST HALF OF AUGUST 2003

Number of people absent because of power outage	Rate of absenteeism (absent workers as a share of total employed)	Total hours lost
'000	%	'000
2,381.4	36.8	26,377.3

Source: Statistics Canada, Labour Force Survey, The Daily, October 30, 2003

Table 3 shows that 2.4 million workers in Ontario and Quebec “lost 26.4 million hours of work time in the second half of August because of the Ontario-US power outage and subsequent conservation period”.¹⁸

If one looks at the data for Canadian wholesale trade for August 2003, there was a decline of 4.6%. This was the largest monthly decline in wholesale trade since the aforementioned ice storm of January 1998.¹⁹

In aviation, aircraft landings and takeoffs are measured at 42 Canadian airports with NAV CANADA air traffic control towers. When one compares August 2003 with August 2002, these aircraft movements showed a decline of 10.2%. Several airports closed totally on August 14th and flight activity was reduced for several days. Some of the airports in the power outage area with the largest declines were:

- Toronto City Centre -39%;
- Waterloo Regional -26%;
- London -21.7%;
- Toronto/Buttonville -19.8%;

- Windsor -16.7%.²⁰

How did the power outage of August 2003 impact on measurement? The Ontario offices of Statistics Canada (including the headquarters and primary processing areas) were closed for a period of 6 days due to the lack of power or fluctuating power. The federal and provincial governments had requested that large employers reduce power consumption during this period. Where possible, work was transferred to regional offices outside of Ontario. The data shown in Table 3 were derived from questions that were added to the regular Labour Force Survey for September 2003. These questions were asked of a sample of respondents in Ontario and Gatineau Quebec (this latter due to the large numbers who commute from Gatineau to work in Ontario).²¹

CONCLUSION

Disasters impact the lives of people and businesses. They can result in increased demand for government action and can hamper the delivery of the same. For these reasons, there is a need to measure their impact to help assess the options to prevent future reoccurrences or to help respond to future reoccurrences of the disasters.

Unfortunately, some disasters can complicate or make much more difficult the measurement or data collection exercise making even standard collection for analysis difficult. Solutions to these problems in Canada were the existence of regional offices which enabled work to be transferred to non-affected areas, flexibility in survey processes (extending collection periods, changes to sample sizes, changes to acceptable response rates) and the ability to add quickly disaster specific questions to ongoing survey vehicles.

NOTE

The views and opinions expressed in this paper are those of the author and do not necessarily reflect those of Statistics Canada.

Endnotes

¹ To be recorded in the database, the following criteria must be met: “The database includes events that meet one or more of the following criteria:

- 10 or more people killed
- 100 or more people affected/injured/evacuated or homeless
- an appeal for national/international assistance
- historical significance
- significant damage/interruption of normal processes such that the community affected cannot recover on its own”

<http://www.publicsafety.gc.ca/prg/em/cdd/disscl-eng.aspx>

² <http://www.statcan.gc.ca/about-aperçu/act-loi-eng.htm>, Section 3(a) Statistics Act. 1970-71-72, c. 15, s. 1.

³ <http://www.publicsafety.gc.ca/prg/em/cdd/dtls-eng.aspx?disno=2001.005>

⁴ Transport Canada website, “Four days in September” downloaded September 22, 2011,

<http://www.tc.gc.ca/eng/mediaroom/infosheets-fourdays-fourdays-6433.htm>

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<http://www.navcanada.ca/NavCanada.asp?Language=EN&Content=contentdefinitionfiles%5Cnewsroom%5Cbackground%5C911crisis.xml>, “NAV CANADA and the 9/11 Crisis”

⁶ <http://www.tc.gc.ca/eng/mediaroom/infosheets-fourdays-fourdays-6433.htm#yellow> Transport Canada website, “Four days in September” downloaded October 24, 2011,

⁷ <http://www.statcan.gc.ca/pub/87-003-x/87-003-x2005001-eng.pdf>, Statistics Canada, Travel-Log, Catalogue no. 87-003, Volume 23 No. 1, page 6

⁸ <http://www.statcan.gc.ca/pub/87-003-x/87-003-x2005001-eng.pdf>, Statistics Canada, Travel-Log, Catalogue no. 87-003, Volume 23 No. 1, page 6

⁹ <http://www.statcan.gc.ca/cgi-bin/imdb/p2SV.pl?Function=getSurvey&SDDS=3152&lang=en&db=imdb&adm=8&dis=2> Statistics Canada website, downloaded October 26, 2011

¹⁰ Statistics Canada catalogue no. 16F0021XIB, “The St. Lawrence Valley 1998 Ice Storm: Maps and Facts”, page 1

¹¹ Statistics Canada catalogue no. 16F0021XIB, “The St. Lawrence Valley 1998 Ice Storm: Maps and Facts”, page 1

¹² Statistics Canada catalogue no. 16F0021XIB, “The St. Lawrence Valley 1998 Ice Storm: Maps and Facts”

¹³ Statistics Canada, @StatCan, January 14, 1998 edition, article “Ice storm takes its toll”

¹⁴ Statistics Canada, @StatCan, January 28, 1998 edition, article “The ice storm: The story is far from over in Quebec”

¹⁵ Statistics Canada, @StatCan, February 11, 1998 edition, article “We buckled down to keep rates up: Data collection after the ice storm”

¹⁶ Statistics Canada, @StatCan, January 28, 1998 edition, article “The ice storm: The story is far from over in Quebec”

¹⁷ U.S.-Canada Power System Outage Task Force, “Final Report on the August 14, 2003 Blackout in the United States and Canada: Causes and Recommendations”, April 2004, page 1

¹⁸ Statistics Canada, The Daily, “Impact of the Ontario-US power outage on hours worked”, October 30, 2003

¹⁹ Statistics Canada, The Daily, “Wholesale trade August 2003”, October 21, 2003

²⁰ Statistics Canada, “Aircraft movements statistics, August 2003 (Preliminary)”, catalogue no. 51F0001PIE, October 2003

²¹ Statistics Canada, The Daily, “Impact of the Ontario-US power outage on hours worked”, October 30, 2003

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