
**Confirmed Tornado
Wagner Lake, Ontario
May 31, 1985**

Date- Local: Friday, May 31st, 1985.

UTC: Friday, May 31st, 1985.

Time-Local: 17:40

UTC: 21:40

Location: Wagner Lake, N. of Uxbridge

Region: York – Durham

Classification: Confirmed Tornado

Category: A

Casualties: None

Track Length: 33425m

Width: None Available

Motion: 252°

Damage Estimate: None Available

F-Scale Rating: F2

Code: BS/TS

Damage Survey: yes

Spotter Reports: None

Other Documents:

Logged event citing tornado.

The May Thirty-First Tornado Outbreak in Southern Ontario report.

More information can be found in the brown 'Ontario May 1985' folder at the front of the year.

Map of detailed spots along tornado path.

Tornado F-Scale Assessment

Marci Vanhoucke

Tornado Data Production Assistant, Environment Canada

July 21, 2005.

Classification: Confirmed Tornado

Date: Friday, May 31st, 1985.

Location: Wagner Lake (N. of Uxbridge); York – Durham

Assessment: F2

F-Code: BS/TS

Explanation of Assessment: There is a Tornado Outbreak report stating that along the damage track, there was a barn demolished and some tree damage. Due to the damage cited, this tornado is rated an F2.

CLASSIFICATION: Severe Thunderstorm

SOURCE/WATCHER ID:

EVENT TIME (UTC): 20-15 **EVENT DAY:** 31.0 **MONTH:** 5.0 **YEAR:** 1985.0 **EVENT DURATION (HR):** 1.0 **(MIN):** 50.0

DAY OF THE WEEK:

EVENT LOCALE: Grand Valley-Holland Landing-Wagner Lake-Reaboro-Emily Park

ASOCTD PUBLIC RGN: Waterloo-Wellington-Dufferin

DETAILED DESCRIPTION: tornado and 25 MM hail
4 killed,
tens of millions in damage, barn roof collapsed, thick trees downed, crop

INITIAL ASSESSMENT: YES

SPL WX STATEMENT IN EFFECT ?: UKN **STATEMENT LEAD TIME (HR):** (MIN):

WATCH IN EFFECT ?: UKN **WATCH LEAD TIME (HR):** (MIN):

WARNING IN EFFECT ?: UKN **WARNING LEAD TIME (HR):** (MIN):

TORNADO:

WINDSPEED: ?

RAINFALL: ? MM **RAIN DURATION:**

HAIL DIAMETER: 25 MM **HAIL DESCRIPTION:** 26

EVENT DESCRIPTION: Tornado

Mesoscale ?: **Synoptic ?:** **Big Event ?:**

Statement Est Hit/Miss:

Watch Est Hit/Miss:

Warning Est Hit/Miss:

Separate Event (30km/30min): YES

Vetted by:

Vetted date:

THE MAY THIRTY-FIRST TORNADO OUTBREAK IN SOUTHERN ONTARIO

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TABLE I Time of Occurrence of Tornadoes by County

Figure 1 Hail, Damaging Wind Areas and Tornado Tracks for May 31, 1985 Tornado Outbreak

Figure 2 Tornado Paths for Barrie, Grand Valley-Tottenham, and Alma Tornadoes.

Figure 3 Tornado Paths for Wagner Lake, Reaboro, Ida, Rice Lake and Minto Tornadoes

Figure 4 Tornado Path for Rush Cove Tornado

Figure 5 City of Barrie Tornado Path

Acknowledgements:

We wish to acknowledge the contribution of all staff from the Ontario Weather Centre, Scientific Services Division, Peterborough Weather Office and the Kingston Weather Office who conducted on site investigations or aerial surveys of the tornado paths during the week following the tornado outbreak.

THE MAY THIRTY-FIRST TORNADO OUTBREAK IN SOUTHERN ONTARIO

by

W. Lawrynuik - Chief, Forecast Operations
B. Greer - Chief Meteorologist
M. Leduc - Severe Weather Meteorologist
O. Jacobsen - Meteorologist

1. Introduction

During the afternoon of May 31, 1985 a powerful cold front moved through Southern Ontario triggering a series of very damaging tornadoes. Twelve people were killed and scores of others injured as the storms moved across the Province. Property damage is estimated well over \$100 million.

This report will outline the weather pattern of May 31 which led to the storms as well as the Ontario Weather Centre's response to the real time events of the day. The report will document through detailed maps the tracks of all the tornadoes confirmed to this date (June 10). A general description of the damage and a best estimate of the time of the tornadoes will be included. Some preliminary recommendations are put forward as a consequence of the May 31st tornado outbreak.

2. Meteorological Conditions and Severe Weather Watches

On May 30th hot, humid tropical air became established across the Central United States. The air was also very unstable meaning that with any sort of lifting mechanism very intense thunderstorms could develop. During the early afternoon of May 30th a weak disturbance moved across Lake Erie and allowed some of this tropical air to move into extreme southwestern Ontario.

Another weak disturbance during the morning hours of May 31st pushed the warm humid air northeastward producing thunderstorms across all of Southern Ontario. No damage was reported from these thunderstorms in Ontario but the arrival of the warm very unstable airmass set the stage for the very dramatic events of later that day.

While the warm humid air was becoming established across the south half of Ontario an intense spring storm was developing just west of the Great Lakes. A low pressure centre with strength more typical of a mid winter storm tracked across upper Michigan during the morning of May 31st to north of Sudbury by evening. A very sharp cold front trailed southward from this low pressure system.

The morning analysis at Environment Canada's Ontario Weather Centre indicated that the thermodynamic and dynamic features necessary for the possible development of severe thunderstorms were present. The thermodynamic instability of the airmass was confirmed from the radiosonde reports east of the cold front crossing Michigan. The air above one km was

3. The Severe Weather Event and the Severe Weather Warnings - Cont'd...

Durham and Victoria Counties. Following a confirmed report of a tornado at Shelburn, a tornado warning was issued at 5:00 p.m. for Southern Simcoe, Northern Peel and York Counties.

Reports of the tornadoes at Grand Valley and Barrie were received by the Ontario Weather Centre at 5:00 and 5:20 p.m. respectively. Tornado warnings were issued at 5:40 p.m. for the downstream areas of Northern Durham, Victoria and Haliburton counties. Radar reports between 5:20 and 5:40 p.m. also indicated the very rapid development of storms moving across Eastern Lake Erie to the Niagara Peninsula. As a result at 5:50 p.m. severe storm warnings were issued for the Haldimand-Norfolk and Niagara Regional municipalities.

Further details on tornadoes in Orangeville and in the Tottenham area came in to the Ontario Weather Centre between 5:30 and 6:00 p.m. Based on the continuing strength of the radar echoes, tornado warnings were extended to Southern Durham and Peterborough Counties at 6:05 p.m. and to Haliburton, Northumberland, Prince Edward and Hastings counties at 6:25 p.m. At 7:00 p.m. all watches and warning messages were cancelled for all regions except for Haliburton and Lake Ontario east of Oshawa. Between 6:40 and 7:20 p.m. reports were received of tornadoes just southwest of Peterborough and in Rawden Township of Southern Hastings county.

At 7:10 p.m. the tornado warning was extended east again to include Lennox and Addington, Renfrew and Frontenac counties which mark the eastern most areas served by the Ontario Weather Centre. At about the same time the Quebec Weather Centre in Montreal, which handles forecasts for the Ottawa - Cornwall and vicinity, was notified of the continuing presence of tornadoes in the storms headed their way.

Finally at 9:20 p.m. the remaining watches were cancelled for Eastern Ontario.

4. Tornado Paths and Estimated Time of Occurrence

The tornado paths and time estimates contained in this report were determined from aerial surveys and on-site investigations of the tornado paths by Ontario Weather Centre staff, from provincial police reports, photographs, newspaper clippings, weather watcher reports, eye witness accounts, etc. Only information assembled before June 10th was available to prepare this report.

General information concerning all tornadoes and other related reports of severe weather are given in this section mostly in map form. Detailed accounts for individual tornadoes are provided in the next section.

5.2 Barrie Tornado - Figure 2

About 4:10 p.m. a funnel cloud dipped down from a severe thunderstorm in Egremont Township about 4 km southwest of Hopeville. For the next 50 minutes the severe thunderstorm travelled east-northeastward at 75 km/h over a distance of 85 km. It appears to have generated a series of 5 tornadoes which culminated in the devastating storm which struck southern portions of the city of Barrie. It is also conceivable that the damage paths could have resulted from one or two tornadoes touching down more than once.

a) Damage Area 1 (Hopeville)

Three concessions southwest of Hopeville to near Grey County Road 8.

Path Length: 17 km (the storm may have skipped occasionally)

Time: about 4:10 p.m.

Description of Damage: numerous barns and outbuildings were destroyed or severely damaged. Only minor damage to houses was indicated. No injuries were reported.

b) Damage Area 2 (Corbetton)

From 1 km southwest of Corbetton, a village southeast of Dundalk on Highway 10, to near Randwick at the intersection of Airport Road and the 25th Sideroad of Mulmur.

Time: struck Corbetton area at 4:17 p.m.

Path Length: 35 km

Description of Damage: the width of the damage path averaged 200 to 300 metres to just south of Honeywood where it narrowed to 50-100 metres. Through this area about 15 barns or outbuildings were destroyed and about 10 houses were heavily damaged. Cars and trucks were tossed around with some moved 60 metres. The storm continued to just south of Ruskview where it appears that a split occurred. A weakening portion appears to have lifted off the ground and moved northeast. Debris was found several km north of Ruskview. One sign which originated near Highway 24 was discovered near the hamlet of Glencairn. It had travelled about 20 km. The southern part of the storm moved from south of Ruskview to south of Randwick where it also appears to have lifted off the ground.

c) Damage Area 3 (Lisle)

Two concessions east of Randwick the tornado appears to have touched down again. Tree damage is reported as far east as Camp Borden. Two barns were destroyed near Lisle. Investigators were not allowed onto Camp Borden but reports from the Base Police and aerial surveys indicate little damage on the Base and no damage further east.

5.3 The Grand Valley-Tottenham Tornado - Figure 2

At 4:15 p.m., only a few minutes after the start of the storm which would hit Barrie, another tornado touched down just north of Arthur. This same tornado remained on the ground for an incredible 90 km as it tracked east-northeast at 85 km/h to the east end of the Holland Marsh. It then skipped along a further 17 km before lifting off for good near Mount Albert.

The damage path width varied from about 150 metres to 400 metres occasionally up to 600 metres wide. Nearly all structures within this track were damaged. Well over 100 homes were seriously damaged or destroyed with at least that many barns and outbuildings destroyed.

From Arthur to Grand Valley the damage path ranged from 150 to 400 metres wide. Estimates are that 40 buildings were seriously damaged or destroyed. In the town of Grand Valley an estimated 40 to 50 homes near the centre of the tornado track were destroyed. Winds with the tornado are estimated to have exceeded 400 km/h. Dozens of other buildings on the edge of the track suffered varying degrees of damage. One indication of the intensity of the storm was the roof of the Library being lifted and thrown 200 metres before crashing down on a house. Two people were killed in the town.

From east of Grand Valley to Orangeville the swath of damage continued 150 to 300 metres wide. The most noteworthy damage was at Mono Plaza north of Orangeville. The plaza was levelled. East of Orangeville all the way to Holland Marsh the damage swath continued with a similar degree of damage occurring. Particularly hard hit was the area just south of Tottenham where about 15 homes were extensively damaged or levelled and two deaths were reported. There was some evidence all along the track of a second weak swath of tree damage a few hundred metres south of the main track but little property damage has been noted.

The tornado moved down into the Holland Marsh just southeast of Dunkerron and followed the canal road eastward and then northeastward about 5 or 6 km. It destroyed hundreds of trees along the canal and did considerable damage to buildings along the north canal road. The tornado then headed directly eastward across the marsh hitting the village of Ansnorveldt after destroying three hydro transmission towers. East of the Holland Marsh the storm began skipping with less serious intermittent damage reported. The storm appears to have lifted off for the last time near Mount Albert.

6. Recommendations

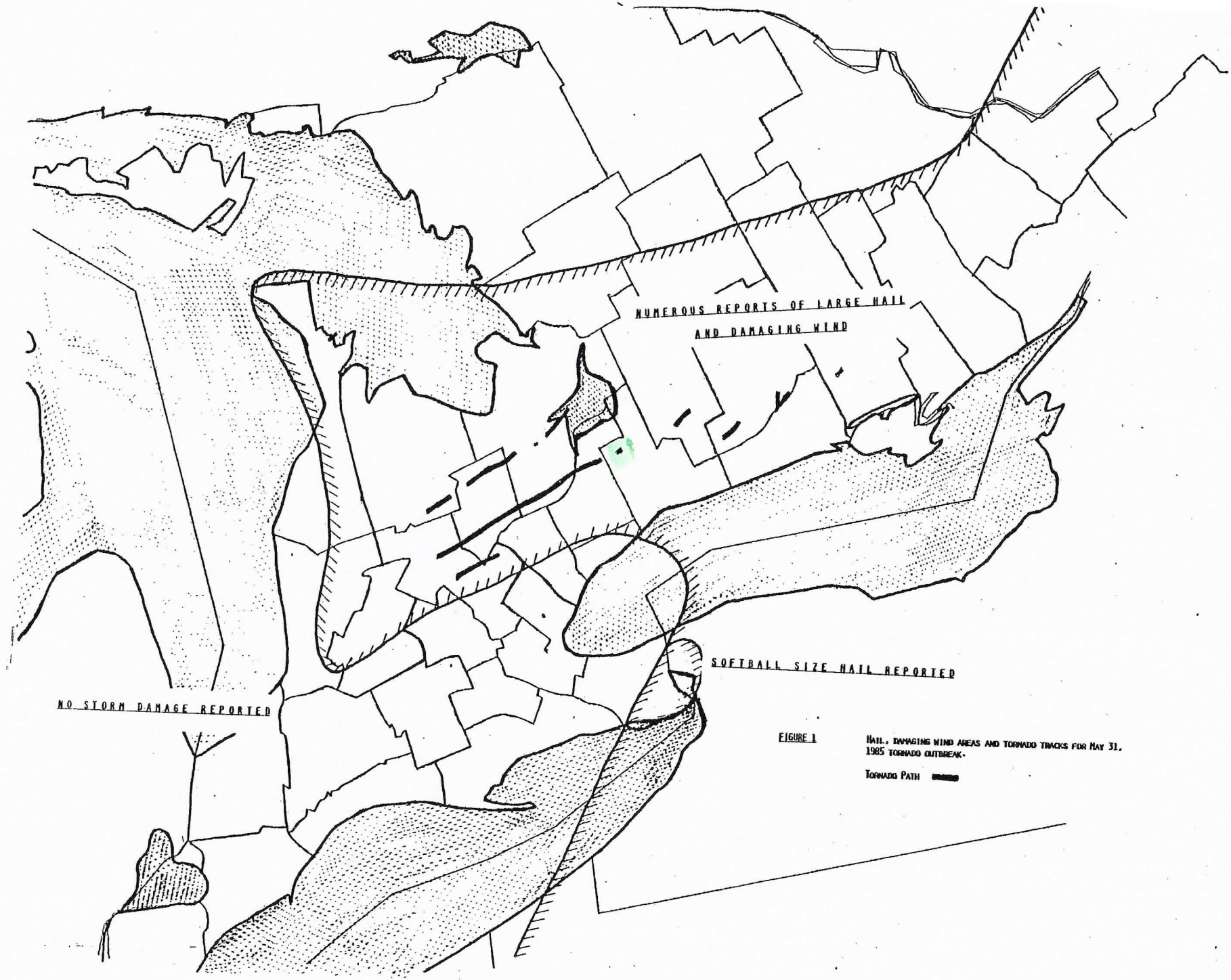
The following recommendations are made as a result of the preliminary investigation conducted by the Ontario Weather Centre.

- 6.1 A public education program needs to be undertaken to make people more aware of the nature of severe storms. For example there seems to be a widespread misconception that severe thunderstorms and tornadoes are independent events. Also, the public in general, and emergency officials in particular, need to understand the steps they should take when a watch is in effect; when a warning is in effect; or, when a severe storm appears imminent.
- 6.2 The methods in use for distributing warnings to the public and to emergency officials needs to be reviewed in detail.
 - a) Consultation with the media and emergency officials should be an integral part of this review.
 - b) Evaluation of the public awareness of and reaction to Environment Canada's weather watches and warnings should be undertaken.
- 6.3 The Weather Centre needs to improve its ability to detect severe thunderstorms and tornadoes:
 - a) Doppler Radar has been shown to be a fairly effective, though far from a foolproof method of detecting severe thunderstorms which may produce tornadoes. Research should be accelerated to assess the abilities of the newly acquired Doppler Radar at King City.
 - b) Additional severe weather watchers in rural areas of Ontario especially upstream of population centres need to be recruited.
 - c) The Ontario Weather Centre should undertake a development project with a view to identifying any new knowledge resulting from this survey and report the data collected on this storm that would improve future forecasts.
 - d) The Ontario Weather Centre will review its severe weather procedures in consultation with other regional units in view of the May 31st experience.

TABLE ITime of Occurrence of Tornadoes by County

<u>Counties</u>	<u>Issue Time of * Severe Thunderstorm Warning</u>	<u>Issue Time of Tornado Warning</u>	<u>Time of Actual Storm</u>
Northern Bruce	2:25 p.m.	-	3:00 p.m. Rush Cove Tornado
Northern Wellington	3:15 p.m.	-	4:15 p.m. Tornado Touchdown near Arthur
Dufferin	3:54 p.m.	-	4:28 p.m. Grand Valley 4:45 p.m. Orange- ville
Southern Grey	3:15 p.m.	-	4:17 p.m. Tornado Touchdown near Corbetton
Southern Simcoe	3:54 p.m.	5:00 p.m.	5:18 p.m. Holland Landing.
Northern Simcoe	3:54 p.m.	-	5:00 p.m. Barrie
Northern York	4:53 p.m.	5:00 p.m.	5:25 p.m. Holt
Northern Durham	4:53 p.m.	5:20 p.m.	5:40 p.m. Wagner Lake
Southern Victoria	N/A	5:20 p.m.	6:05 p.m. Reaboro
Southern Peterborough	N/A	6:05 p.m.	6:20 p.m. Cavan 6:25 p.m. Birdsall
Southern Hastings	N/A	6:25 p.m.	6:35 p.m. <u>Minto</u>

* These severe thunderstorm warnings issued by the Ontario Weather Centre contained the statement: "Remember some severe thunderstorms produce tornadoes."



NUMEROUS REPORTS OF LARGE HAIL
AND DAMAGING WIND

NO STORM DAMAGE REPORTED

SOFTBALL SIZE HAIL REPORTED

FIGURE 1 HAIL, DAMAGING WIND AREAS AND TORNADO TRACKS FOR MAY 31, 1985 TORNADO OUTBREAK.
TORNADO PATH

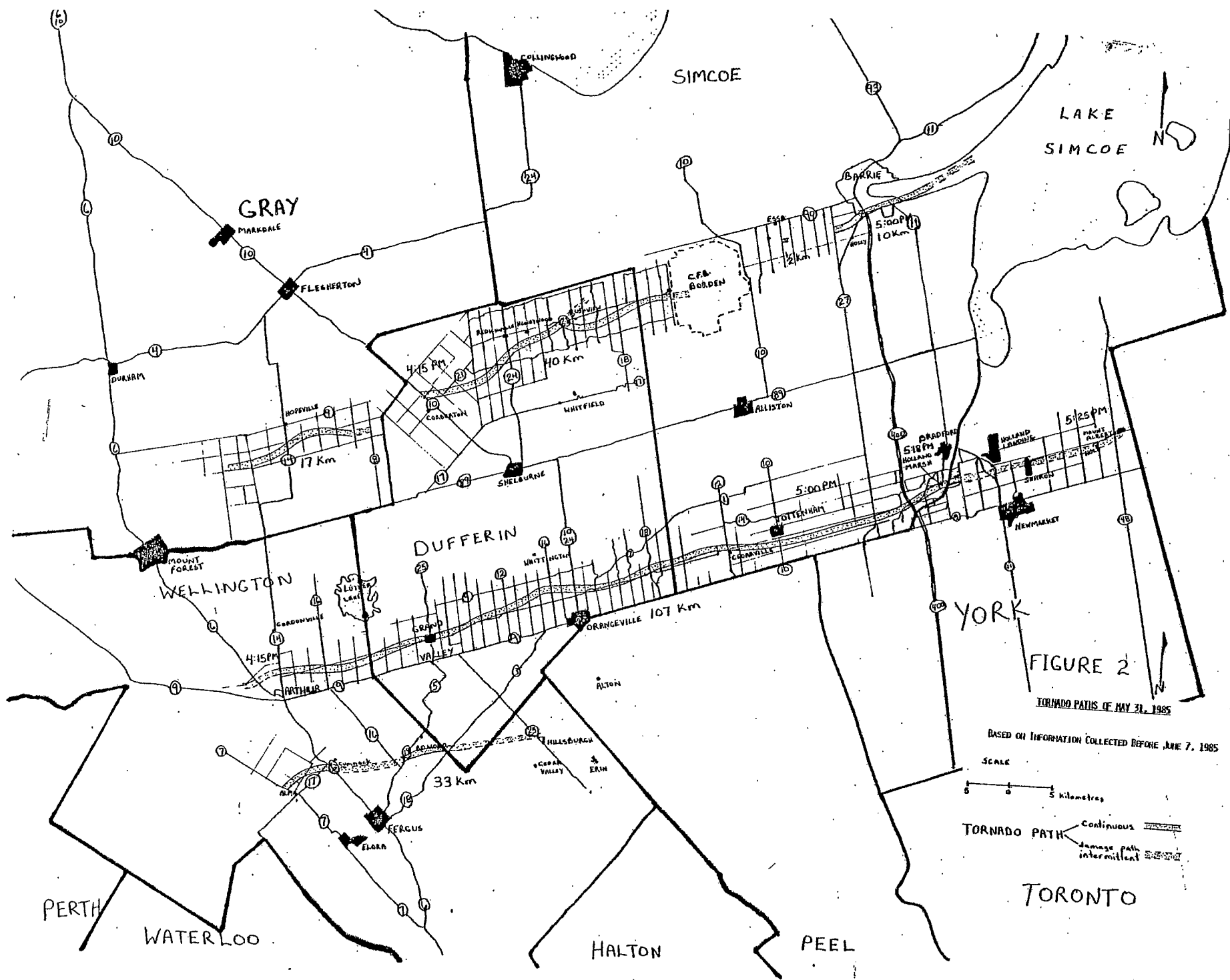




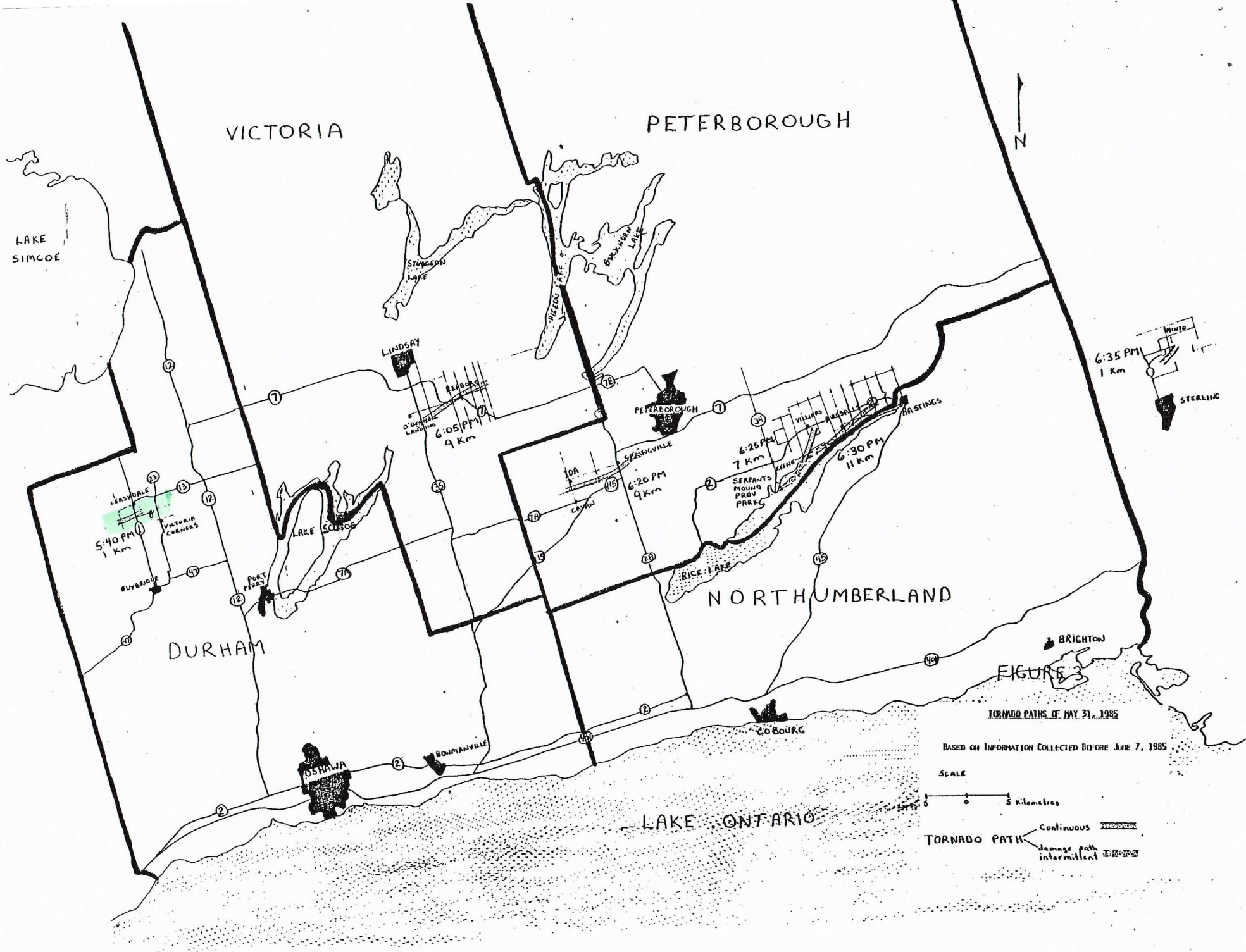
FIGURE 2
TORNADO PATHS OF MAY 31, 1985

BASED ON INFORMATION COLLECTED BEFORE JUNE 7, 1985

SCALE
0 5 kilometres

TORNADO PATH
 Continuous 
 Damage path intermittent 

TORONTO



TORNADO PATH OF MAY 31, 1985

BASED ON INFORMATION COLLECTED BEFORE JUNE 7, 1985

SCALE



TORNADO PATH

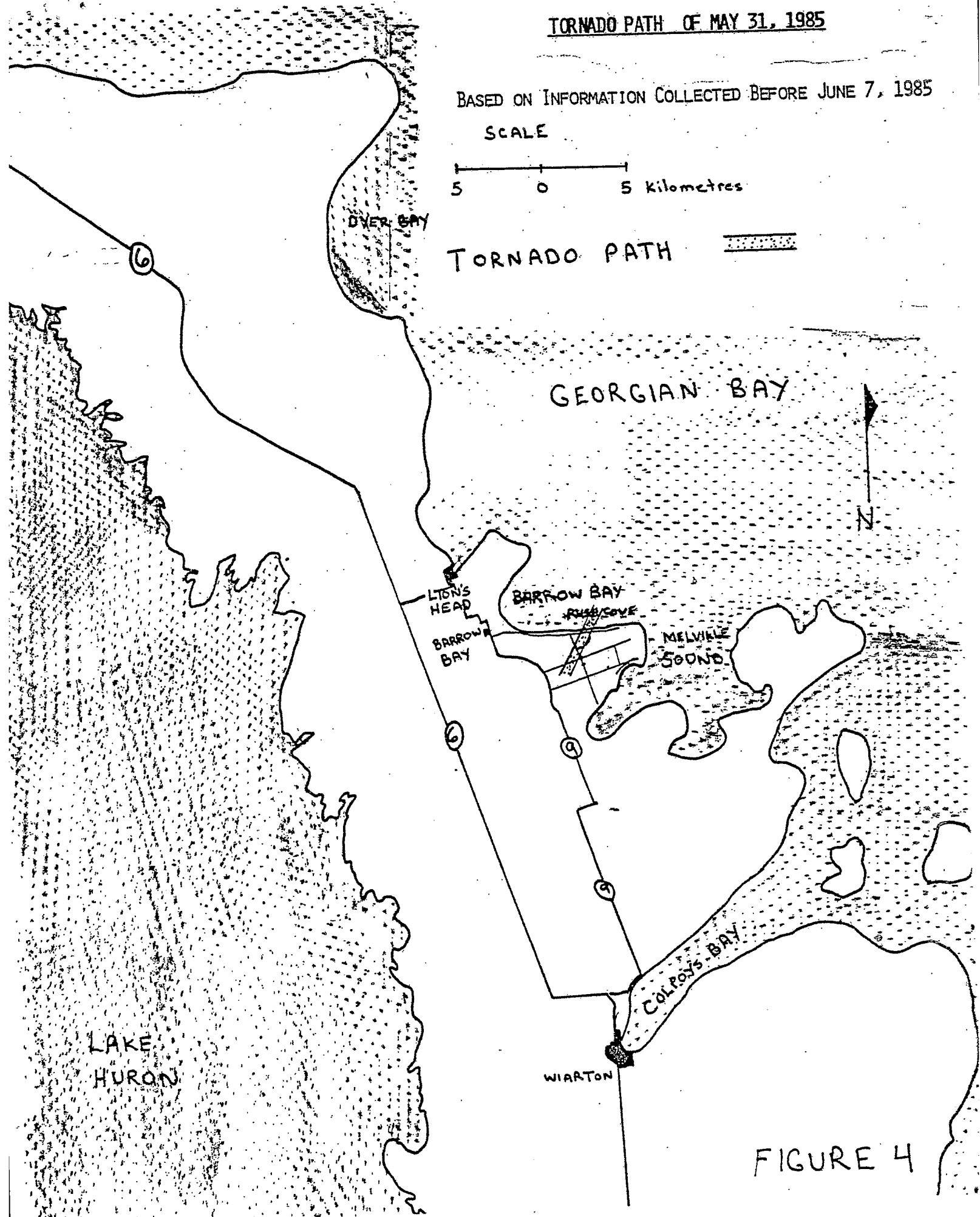


FIGURE 4

TORNADO PATHS OF MAY 31, 1985

BASED ON INFORMATION COLLECTED BEFORE JUNE 7, 1985



FIGURE 5

Numbers are keyed to houses.
Tour distance approximately 5 km/3 mi.



CITY OF BARRIE
ENGINEERING DEPARTMENT

TORNADO PATH
Continuous
intermittent

5

T

6

T

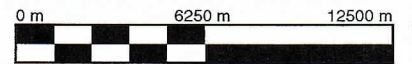
PRELIMINARY
ESTIMATE
FOR
TORNADO
DAMAGE
PATH

MINOR
DAMAGE

WARD 4

WARD 5





Slides - Ole Jacobsen, Dejan Ristic

- ① Buzzman aviation - south of Holland Landing.
 - facing West from Hwy ⑪
 - damage to hangar and flattened building south of house, occurred at 5:05 PM
 - marked ① on map
- ② Tree damage - south of Holland Landing but north of picture ①
 - facing southeast
 - possible cyclonic rotation
 - possible second funnel from picture ①
 - marked ② on map
- ③ Tree damage in valley - Between Holland Landing - Sharon
 - Facing south from subdivision
 - marked ③ on map
- ④ Barn damaged - Between Holland Landing - Sharon
 - Facing west-southwest
 - marked ④ on map
- ⑤ Barn damage - East of Sharon
 - Facing east
 - debris thrown cyclonically
 - marked ⑤ on map.
- ⑥ Barn destroyed - East of Victoria Corners
 - Facing northeast
 - marked ⑥ on map
- ⑦ Large hole in barn roof on east side
 - Facing west
 - occurred at 5:40 PM
 - marked ⑦ on map

⑧ Barn damage - south of Lindsey
- Facing east
- marked ⑩ on map.

⑨ Barn damage - just north of ⑧
- Facing east
- marked ⑪ on map.

⑩ Tree delinked - just east of ⑨
- Facing south
- marked ⑫ on map.

⑪ Barn damage - east of ⑩
- Facing east
- marked 19 on map.

⑫ Tree damage - west of Reaborn
- Facing west
- trees snapped at 2 to 5 metres above ground
- marked ⑬ on map.

⑬ Tree and House damage - just west of Reaborn
- Facing south
- occurred at 6:00 PM
- marked ⑭ on map.

⑭ Barn damage - east of Reaborn
- Facing west
- marked ⑮ on map.

⑮ Tree damage - east of Reaborn
- Facing east
- lots of debris in area
- marked ⑳ on map.

⑯ House destroyed - south of Ida
- Facing south-southeast
- stone structure
- marked ㉑ on map.

⑰ Church damaged - across road from ⑯
- Facing south-southwest
- marked ㉒ on map.

⑱ Barn destroyed - east of Ida
- Facing north
- marked ㉓ on map.

⑲ Barn destroyed - south of Springville
- Facing west off Hwy ㉔
- occurred at 6:20 PM
- marked ㉕ on map.

698523
698525

A ✓ F=2

TORNADO PROJECT SUMMARY SHEET

1. DATE AND TIME May 31, 1985 1740 EDT

2. LOCATION OR PATH (attach map) Wagner Lake, Ont.

3. PATH LENGTH NOT KNOWN <1mi; 1-4mi; 5-10mi; 11-50mi; LENGTH IF >50mi

4. PATH WIDTH 5. TORNADO PART OF SQUALL LINE? YES; NO; UNKNOWN:

6. ANY UNUSUAL COLORATION? YES; NO; UNKNOWN

7. ANY UNUSUAL SOUND? YES; NO; UNKNOWN

8. IF ANSWER TO 6 OR 7 YES, ELABORATE;

9. LIST ANY ASSOCIATED PHENOMENA (Such as hail, vivid lightning heavy rain, no rain, etc.)

10. TOTAL DAMAGE ESTIMATE \$ 11. TOTAL DEATHS

12. TOTAL INJURED 13. TOTAL HOMELESS

14. LIST ALL REFERENCES

15. SUMMARIZE REMARKS PERTAINING TO (a) FUNNEL; (b) INTERESTING OR CAPRICIOUS EVENTS.

b) Barn demolished, trees damaged

T.O. 176 44950 200 C
4893 525

L.O. 176 76675 500 C
4904 050