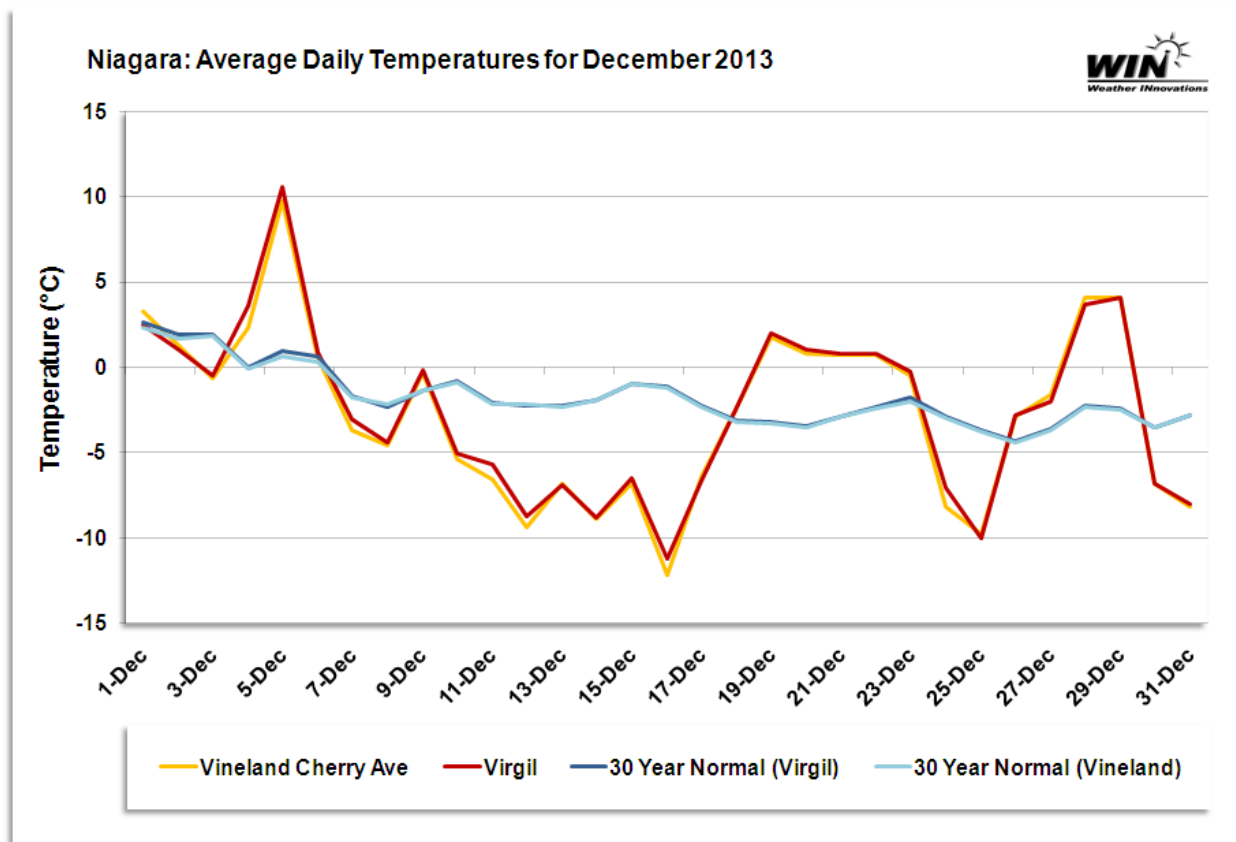


December 2013

Overview

A much colder-than-normal December in the Niagara appellation was a noticeable change, following two consecutive Decembers with above-normal temperatures. Monthly temperatures averaged -2.9°C in the west and -2.5°C in the east. Accordingly, the average monthly temperature in the west was 2.1°C below normal (compared to 2.6°C above normal in 2012) and 1.4°C below normal in the east (compared to 3.2°C above normal in 2012). These statistics are based on Environment Canada's 30-year normals. This summary illustrates December 2013 temperatures, as well as the icewine harvest opportunities that arose. For this report, icewine hours are defined as instances when the average hourly temperature was between -8.0°C and -12.0°C , inclusive.



Temperature Analysis

The colder-than-normal temperatures this winter actually began in November 2013, with the coldest temperature reaching -16.2°C in the west at the Rockway station and -16.4°C in the east at the Virgil East station. The monthly minimum temperatures for each site in December 2013 ranged from -15.7°C at the

NOTL Irvine Road station (compared to -7°C at the Vineland Escarpment station in 2012) to -25.8°C at Grimsby (compared to -12.9°C at Grimsby and Virgil East in 2012). The monthly minimum temperatures occurred on the 16th and 25th of December. There were 6 days in November and 15 days in December when temperatures at one or more stations dipped into icewine temperature ranges. This is shown in the following figures.

Niagara West: November 2013 Daily Minimums

Date	Winora	Grimsby	West Lincoln	Lincoln Fly Road	Beamsville	Lincoln Hwy 8	Lincoln Lakeshore	Vineland Cherry Ave.	Vineland Escarpment	Jordan Escarpment	Jordan Hwy 8	Jordan Harbour	Rockway
1-Nov	9.2	7.8	8.1	7.9	8.7	8.3	9.2	9	8.4	8.4	8.9	8.8	8.6
2-Nov	3.5	2.1	2.3	2.2	2.9	2.9	3.6	3.3	2.8	2.7	3.4	3	2.7
3-Nov	-5.3	-7.1	-5.2	-4.9	-4.3	-4.6	-5.2	-6.3	-4.5	-4.8	-4.5	-6.3	-5.5
4-Nov	-5.5	-7.6	-5.6	-5	-4.2	-4.9	-5.9	-6.9	-4.9	-5.4	-4.8	-6.5	-6.1
5-Nov	-1.9	-2.8	1.7	1.8	1.7	-1.4	-1.8	-1.7	2.7	1.4	0.1	-1.6	0.5
6-Nov	9.7	8.4	8.5	8.3	9.3	9.1	9.8	9.7	9.4	9.1	9.5	8.7	8.6
7-Nov	3.6	2.4	2.6	2.6	3.3	3.2	3.9	3.5	3.1	2.9	3.9	3.2	3.1
8-Nov	1	-0.5	-0.4	0	0.7	0.8	1.5	0.5	0.2	0	1.1	0.1	0.3
9-Nov	1.5	-1.3	-0.5	0	1.7	1.2	-1.2	-0.3	0.3	-0.4	-0.2	-2.2	-0.2
10-Nov	1.8	-0.3	0.4	1.3	2.2	1.5	2.6	2.6	1.9	1.4	3	2.8	2.1
11-Nov	-0.3	-1.4	-1.4	-1.2	-0.5	-0.5	0.4	-0.2	-0.7	-0.9	0	-0.1	-0.6
12-Nov	-3.8	-5.2	-4.8	-4.7	-4	-3.7	-2	-4.4	-3.9	-4.3	-3.3	-2.9	-4.2
13-Nov	-3.5	-5.1	-4.9	-4.9	-4.2	-4.2	-3.2	-4.8	-4.5	-4.5	-3.8	-4.4	-4.5
14-Nov	2.5	1.8	2.3	2.4	3.1	2.7	3.4	3.3	2.9	3.1	3.7	3.3	3.1
15-Nov	5.3	4.5	3.9	4.1	5	5.3	5.4	5.3	5.3	4.8	5.2	5.3	6.2
16-Nov	5.3	3.1	3.2	4.1	5.4	5.5	5.4	5.4	4.9	3.9	3.3	5.2	5.4
17-Nov	12.3	11.2	10.8	10.8	11.5	11.2	11.9	11.8	11.3	11.2	11.8	11.3	11.1
18-Nov	1.9	0.8	0.9	0.9	1.6	1.5	2.3	2	1.4	1.4	2.2	1.8	1.6
19-Nov	-3.9	-5.3	-3.7	-3.2	-4.3	-3.2	-2.5	-4.5	-3.7	-3.2	-3.2	-2.9	-5.2
20-Nov	-6.2	-7.6	-5.4	-4.6	-5.1	-5.3	-6.8	-8.1	-5.4	-5.8	-6.1	-6.9	-7.8
21-Nov	-4.8	-2.3	-2	-0.5	-2.6	-3.9	-2.2	-5.7	-1.6	-2.2	-3.9	-4.3	-4.7
22-Nov	0.3	-1	-1.1	-1	-0.5	-0.3	0.8	0.1	-0.6	-0.8	-0.1	0	-0.6
23-Nov	-7.4	-8.4	-8.7	-8.1	-7.3	-7.4	-6.4	-7	-7.5	-7.4	-6.7	-6.9	-7.4
24-Nov	-10.6	-11.6	-11.4	-11.3	-10.6	-10.5	-9.7	-10.4	-10.5	-10.6	-9.7	-10.3	-10.5
25-Nov	-7.7	-9	-8.8	-8.8	-8.2	-8.1	-7.6	-8	-8.2	-8.6	-7.9	-7.9	-8.8
26-Nov	-0.4	-1.5	-1.3	-1.3	-0.7	-0.7	-0.2	-0.4	-0.8	-0.9	-0.2	-0.7	-0.8
27-Nov	-5.8	-6.8	-7.4	-6.3	-5.4	-5.3	-4.1	-4.5	-5.2	-5.4	-4.6	-4.6	-4.9
28-Nov	-9	-11.1	-12.1	-10.4	-9.2	-9.4	-7.8	-8.2	-9.2	-9.7	-8	-8.2	-8.9
29-Nov	-10.2	-15.9	-10.5	-9.2	-10.4	-11	-12.1	-15.8	-9.2	-11.9	-12.2	-12.4	-16.2
30-Nov	-5.8	-9	-8.7	-9.4	-7.3	-9.9	-9.8	-9.7	-7.8	-10.7	-12.4	-9.5	-14.9

Legend:

	Days with Ice Wine Temperatures
	Monthly Minimum

Niagara East: November 2013 Daily Minimums

Date	St. Catharines Glass Ave	St. Catharines Third Ave	West St. Catharines Fifth St	Niagara College	St. David's Bench	Niagara Airport	Virgil	Virgil East	NOTL Irvine Road	Lakeshore	Parkway	Queenston
1-Nov	9.2	8.5	8.7	8.8	8.9	8.9	9	9.2	9.1	9	9.3	9.1
2-Nov	3.3	2.9	2.5	2.8	2.8	2.5	2.5	3	3.1	2.5	2.9	3.2
3-Nov	-4.8	-5.2	-4.7	-4.7	-4.4	-5.5	-5.5	-5.1	-5.3	-5	-5	-5.3
4-Nov	-5.6	-5.7	-5.3	-5	-5.1	-6	-6.1	-6	-6.1	-5.5	-5.8	-6
5-Nov	-0.6	0.3	1.7	1.8	3.6	0.9	1.4	1.5	0.3	1.3	-1	1.1
6-Nov	9.1	8.7	8.7	9.2	9.5	9.2	9.3	9.5	9.6	9.2	9.5	9.5
7-Nov	3.9	3.4	3.2	3.4	3.4	3.3	3.5	3.6	3.7	3.7	3.9	3.7
8-Nov	1.2	0.4	0.1	0.1	1	1	1.6	1.7	1.7	2.4	2.6	2.5
9-Nov	-1.5	-1.8	-0.1	-0.5	-0.5	-0.4	-1.3	-1.4	-1.6	0.4	0.1	-1.9
10-Nov	2.6	1.7	2.1	2.5	2.7	2.6	2.7	2.8	3	3.2	3.3	2.9
11-Nov	0.2	-0.4	-0.3	-0.2	-0.3	-0.4	-0.4	0	0	0	0.1	0.1
12-Nov	-2.5	-2.6	-4.4	-4.1	-2.8	-3.7	-3.2	-2.8	-2.8	-2.5	-2.5	-2.6
13-Nov	-3.6	-5	-4.4	-4.2	-4.8	-4.7	-3.8	-4.2	-4.7	-3.1	-3.1	-4.7
14-Nov	3.6	3.1	3.4	3.1	4	3.8	3.4	3.8	3.8	3.4	3.6	3.7
15-Nov	4.4	3.3	5.4	5.9	6.7	4.2	3.6	4.5	2.5	3.6	2.3	4
16-Nov	3.7	3.1	4.4	3.7	6.1	4.8	4.5	3.8	4.6	3.3	4.4	5.1
17-Nov	11.7	11.3	11.3	11.2	11.5	11.4	11.7	11.9	11.6	11.6	11.7	11.7
18-Nov	2.3	1.9	1.7	2	2.1	1.9	2.2	2.4	2.5	2.4	2.7	2.5
19-Nov	-3.4	-4.8	-5	-4.5	-4.9	-6.3	-5.3	-5.6	-4.8	-2.7	-1.7	-1.8
20-Nov	-6.8	-7.4	-7.2	-7.2	-6.6	-7.6	-7.5	-7.4	-7.9	-7.1	-6.8	-6.4
21-Nov	-3.9	-4.2	-2.2	-1.9	-0.4	-2.9	-3.9	-2.3	-4.4	-4.1	-4.2	-4.3
22-Nov	0.4	0.4	-0.8	-0.5	0.4	-0.1	0.2	0.6	0.3	0.5	0.6	0.4
23-Nov	-6.7	-7	-7.3	-6.8	-7.2	-7.4	-7.5	-7.1	-7.3	-7.3	-7	-7.4
24-Nov	-9.5	-9.5	-10.3	-10.1	-8.7	-9.1	-8.9	-8.6	-8.6	-8.7	-8.4	-8.5
25-Nov	-7.6	-8.6	-8.5	-9	-7.5	-7.8	-8	-7.8	-8.1	-7.4	-7.5	-7.6
26-Nov	-0.2	-0.5	-0.7	-0.5	-0.4	-0.6	-0.5	-0.3	-0.4	-0.5	-0.3	-0.3
27-Nov	-4.1	-4.3	-4.9	-4.7	-4.3	-4.6	-4.4	-4.3	-4.5	-4.2	-4.3	-4.4
28-Nov	-7.9	-8.3	-8.9	-8.9	-7.8	-9	-7.8	-7.8	-7.4	-7.2	-6.9	-7.4
29-Nov	-15.7	-13.7	-11.6	-12.2	-12.6	-15.7	-15	-15.3	-16.4	-12.3	-11.3	-12.2
30-Nov	-15.4	-12	-10.2	-9.6	-10.4	-8.7	-10.8	-8.9	-9	-10.6	-10.9	-8.8

Legend:

	Days with Ice Wine Temperatures
	Monthly Minimum

Niagara West: December 2013 Daily Minimums

Date	Winona	Grimsby	West Lincoln	Lincoln Fly Road	Beamsville	Lincoln Hwy 8	Lincoln Lakeshore	Vineland Cherry Ave.	Vineland Escarpment	Jordan Escarpment	Jordan Hwy 8	Jordan Harbour	Rockway
1-Dec	1.5	-0.2	0.9	1.5	1.3	1	1.1	1.3	1.6	1.7	1.1	1	1.1
2-Dec	-1.5	-2.1	-3.5	-2.1	-2	-1	0.6	-2.8	-1.4	-4.3	-2	-2.8	-3.6
3-Dec	-4.9	-8.8	-7.4	-5.9	-5.2	-5	-4.9	-6.8	-5.4	-7.2	-5.4	-6.3	-6.1
4-Dec	1.1	0	0	-0.2	0.1	0.2	1	0	-0.3	0.1	0	-0.1	-0.5
5-Dec	3.3	2.2	2.3	2.6	3	2.7	3.1	2.6	3.2	3.1	2.7	2.1	2.5
6-Dec	-1.8	-2.8	-2.6	-2.6	-1.9	-2.1	-1.3	-1.6	-2.1	-2.1	-1.4	-1.8	-1.9
7-Dec	-6.8	-8.8	-8.7	-8.1	-7.1	-7.2	-6.8	-7	-7.5	-7.5	-6.9	-6.9	-7.4
8-Dec	-8.5	-10.1	-9.7	-9.2	-7.8	-8.1	-8.4	-8.4	-8.2	-9.3	-8.8	-8.8	-8.8
9-Dec	-3.1	-4.1	-3.9	-3.8	-3.2	-3.4	-2.6	-2.8	-3.2	-3.2	-2.6	-3.1	-3.2
10-Dec	-8	-8.9	-8.4	-8.5	-7.7	-8	-7.2	-7.5	-7.8	-7.8	-7.2	-7.4	-7.8
11-Dec	-10.6	-12.5	-12.8	-11.8	-11.2	-11.4	-10	-10.5	-11	-10.8	-9.7	-10.5	-10.4
12-Dec	-13.1	-14.7	-14	-13.8	-13.2	-13.4	-12.3	-12.6	-13.1	-13.3	-12.5	-12.7	-13
13-Dec	-9	-10	-10	-10.1	-9.4	-9.3	-8.5	-8.8	-9.7	-9.9	-9.3	-9	-9.9
14-Dec	-9.8	-11	-11	-11.1	-10.4	-10.4	-9.5	-10	-10.6	-10.5	-10	-10.3	-10.5
15-Dec	-10.7	-11.6	-11.1	-10.9	-10.1	-10.2	-9.4	-9.6	-10.2	-10.2	-9.4	-9.8	-9.9
16-Dec	-17.7	-25.1	-19.5	-15.5	-17	-16.8	-16.5	-20.9	-16.3	-20.3	-17.9	-17.9	-20
17-Dec	-14.5	-19.3	-15.8	-11.9	-10.2	-11.9	-12.8	-14.9	-10.5	-15.9	-15.1	-14.2	-16.2
18-Dec	-5.1	-6.5	-6.4	-6.1	-5.3	-5.7	-4.5	-4.7	-5.4	-6	-4.7	-5	-5.4
19-Dec	-1.4	-2.5	-2.2	-2.2	-1.4	-1.6	-1	-1.1	-1.7	-1.8	-1	-1.5	-1.4
20-Dec	0	-0.1	0	0	0.3	0	0.2	0	0.1	0.2	0.2	-0.1	-0.2
21-Dec	-0.2	-1.2	-1.2	-1.3	-0.8	-0.6	-0.3	-0.5	-0.9	-1	-0.4	-0.8	-0.9
22-Dec	-0.9	-1.6	-1.4	-1.4	-0.9	-1.1	-0.7	-0.8	-1.1	-1.2	-0.6	-1.1	-1.1
23-Dec	-6.2	-8	-5.9	-6.2	-7.2	-6.1	-4.6	-5.3	-5.3	-5.5	-6.4	-6.6	-6.8
24-Dec	-18.1	-23.1	-19.6	-17.2	-14.8	-16.1	-15.4	-18	-16.2	-18.5	-16	-16.4	-16.9
25-Dec	-19.2	-25.8	-20	-18.1	-17.9	-17.9	-15.9	-20.1	-16.9	-19.3	-17.2	-16.9	-18.1
26-Dec	-7.3	-8.5	-9	-8.5	-7.6	-7.7	-6.8	-7.3	-8.2	-9.9	-7.2	-7	-8.1
27-Dec	-6.7	-7.6	-7.7	-7.3	-7	-6.8	-6.2	-6.4	-6.8	-7.2	-6.6	-6.6	-7.2
28-Dec	2.9	2	1.9	2.1	2.8	2.8	3.2	2.6	2.4	2.3	2.9	0.9	2.3
29-Dec	-4.2	-5.1	-4.9	-4.7	-4.1	-4.3	-3.5	-3.7	-4.2	-4.1	-3.5	-4.1	-4.1
30-Dec	-8.3	-9.5	-8.7	-8.7	-8.4	-8.6	-7.7	-8.3	-8.2	-8.1	-7.5	-8.3	-8.1
31-Dec	-10.5	-11.5	-11.3	-11.5	-11.1	-11.1	-10.3	-10.9	-11	-11.7	-10.3	-11.1	-11.3

Legend:

	Days with Ice Wine Temperatures
	Monthly Minimum

Niagara East: December 2013 Daily Minimums

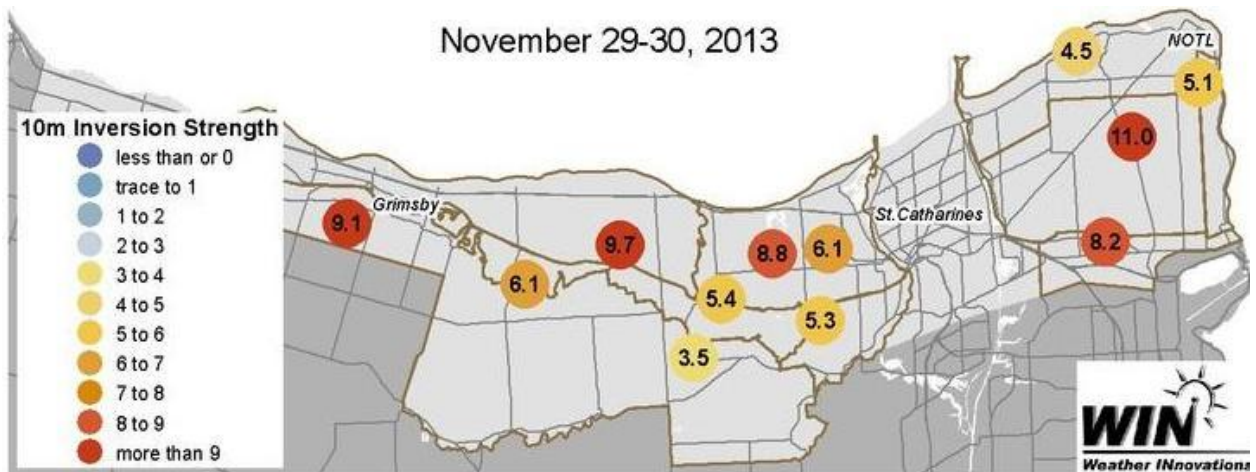
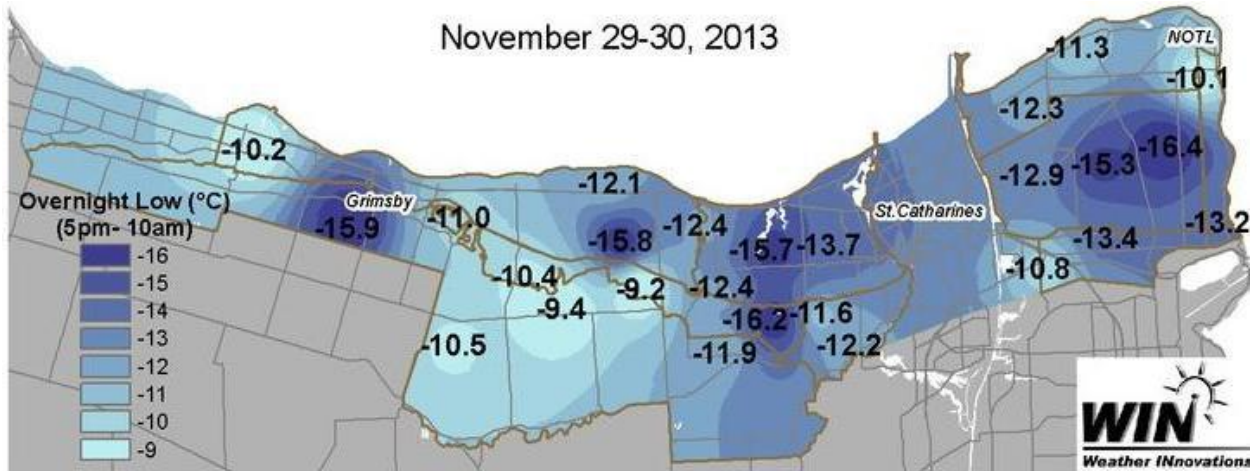
Date	St. Catharines Glass Ave	St. Catharines Third Ave	West St. Catharines Fifth St	Niagara College	St. David's Bench	Niagara Airport	Virgil	Virgil East	NOTL Irvine Road	Lakeshore	Parkway	Queenston	
1-Dec	1	0.8	1.2	2.1	1.9	1.8	1.5	1.7	1.4	1.4	0.9	1.1	1.8
2-Dec	-3.2	-3.6	-3.2	-2.9	-3.1	-3.6	-2.4	-3.5	-3.8	-0.2	0	-2.5	-2.3
3-Dec	-6.4	-6.5	-6.1	-5.8	-5.3	-6.9	-5.7	-6	-6.7	-6	-6.3	-6.3	-6.5
4-Dec	0.4	0.3	-0.1	0	0.4	0.2	0.4	0.6	0.6	0.4	0.7	0.8	0.5
5-Dec	2.6	2.6	2.9	3.2	3.7	3.5	3.6	3.7	3.7	3.2	3.3	3.7	3.4
6-Dec	-1.3	-1.6	-1.8	-1.5	-1.4	-1.5	-1.4	-1	-1.1	-1.2	-1	-1.1	-1.3
7-Dec	-6.5	-8.2	-7.1	-7.7	-7	-6.5	-6.7	-6.4	-6.3	-6.2	-5.8	-5.7	-6.1
8-Dec	-8.7	-9.6	-9.1	-9.4	-8.2	-8.2	-8.3	-8.3	-9.2	-8.2	-8	-7.4	-8.2
9-Dec	-2.5	-2.8	-3.1	-2.6	-2.7	-3	-2.8	-2.5	-2.7	-2.9	-2.8	-2.7	-2.6
10-Dec	-7.1	-7.4	-7.4	-7.2	-7.1	-7.2	-7	-6.7	-6.6	-6.6	-6.2	-6.2	-6.7
11-Dec	-9.7	-10	-10.7	-10.1	-9.8	-9.5	-9.2	-8.8	-8.6	-8.5	-7.6	-8	-9.2
12-Dec	-12.3	-12.8	-12.9	-12.6	-12	-12.1	-12.2	-12	-12	-12	-11.7	-11.7	-11.8
13-Dec	-9.3	-9.6	-10	-9.7	-10	-10.2	-10.2	-9.6	-9.5	-9.5	-9.3	-9.3	-9.9
14-Dec	-9.9	-10.2	-10.5	-10.2	-10.3	-10.6	-10.5	-10.3	-10.3	-10.4	-10.2	-10.4	-10.4
15-Dec	-9.3	-9.5	-9.9	-9.6	-9.4	-9.4	-9.3	-9.1	-8.9	-9.1	-8.8	-9	-8.8
16-Dec	-21.3	-19.6	-19.4	-16.9	-15.4	-17.2	-17.1	-18.5	-19.4	-15.7	-14.8	-17	-14.9
17-Dec	-17.8	-17.2	-15.2	-15.3	-10.7	-11.5	-13.7	-14.6	-14.6	-13.2	-12.9	-12.7	-11.5
18-Dec	-4.6	-5.9	-5.4	-5.7	-5	-5.1	-5.9	-5.4	-5.7	-5.1	-4.9	-5.3	-5.4
19-Dec	-1	-1.4	-1.4	-1.1	-1.2	-1.4	-1.4	-1.1	-1.1	-1.3	-1.2	-1.1	-1.2
20-Dec	0.3	0.1	-0.1	0.3	0.5	0.3	0.2	0.5	0.5	0.2	0.3	0.5	0.3
21-Dec	-0.5	-0.7	-0.8	-0.4	-0.8	-0.9	-0.8	-0.6	-0.6	-0.8	-0.7	-0.6	-0.6
22-Dec	-0.7	-0.8	-1	-0.8	-1	-1	-0.9	-0.8	-1	-1	-0.8	-0.7	-0.8
23-Dec	-5.3	-6.3	-6	-5.3	-5.4	-5.4	-4.5	-4.1	-4.5	-3.6	-3.3	-3.9	-5.3
24-Dec	-18.6	-17.4	-17.7	-15.8	-15	-14.1	-15	-14.3	-13.9	-13.1	-10.2	-12.5	-13
25-Dec	-18.6	-18.7	-18.6	-17.9	-17.3	-18.2	-16.9	-18.5	-19.8	-15.5	-16.2	-20.5	-18.1
26-Dec	-7.2	-9.2	-7.8	-8.5	-7.5	-7.4	-7.9	-7	-7.2	-7.3	-7.7	-7.1	-6.7
27-Dec	-6.4	-7.5	-6.7	-7.3	-6.9	-7	-7	-6.6	-7.2	-7	-7.9	-6.9	-6.8
28-Dec	2	1.7	2.5	2.3	2.2	1.8	1.6	1.3	0.7	0.6	0	1.1	1.8
29-Dec	-3.6	-3.7	-4.1	-3.6	-3.4	-3.7	-3.7	-3.3	-3.4	-3.7	-3.5	-3.4	-3.4
30-Dec	-7.7	-8.1	-8	-8	-8.6	-8.7	-8.2	-8.1	-8.1	-8.3	-8.2	-8.2	-9.1
31-Dec	-10.4	-11.1	-11.3	-11.9	-10.7	-10.9	-10.4	-10.4	-10.7	-10.3	-10	-10.1	-10.9

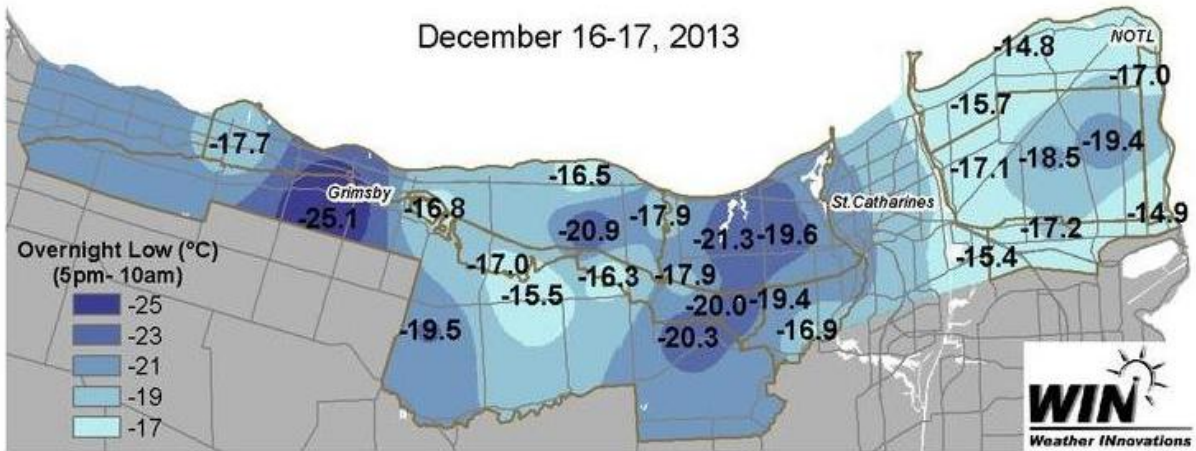
Legend:

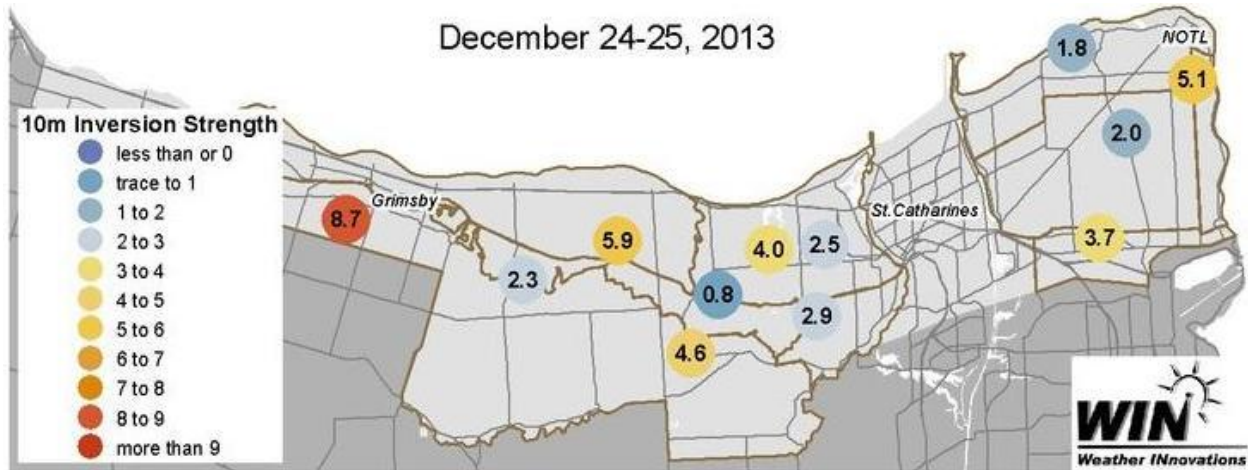
	Days with Ice Wine Temperatures
	Monthly Minimum

Inversion Strength

The following 6 figures show the coldest November and December nights: November 29-30, December 16-17 and 24-25. Note that the locations that experienced the lowest temperatures also had the strongest 10-metre temperature inversion at that time, and vice versa. All 3 of these nights had suitable inversion strengths for running wind machines.

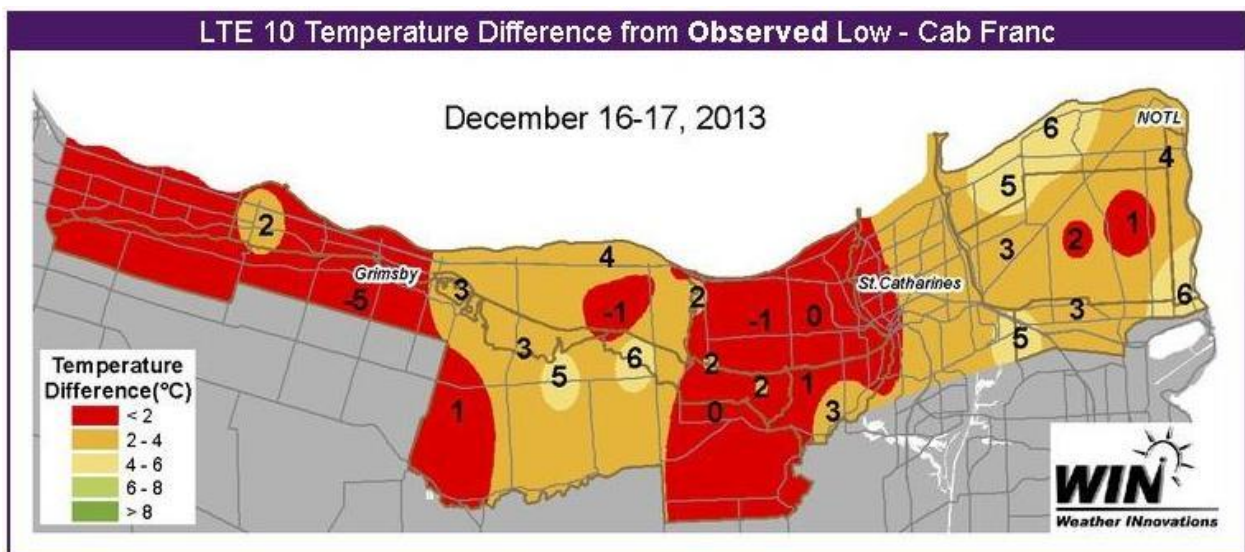




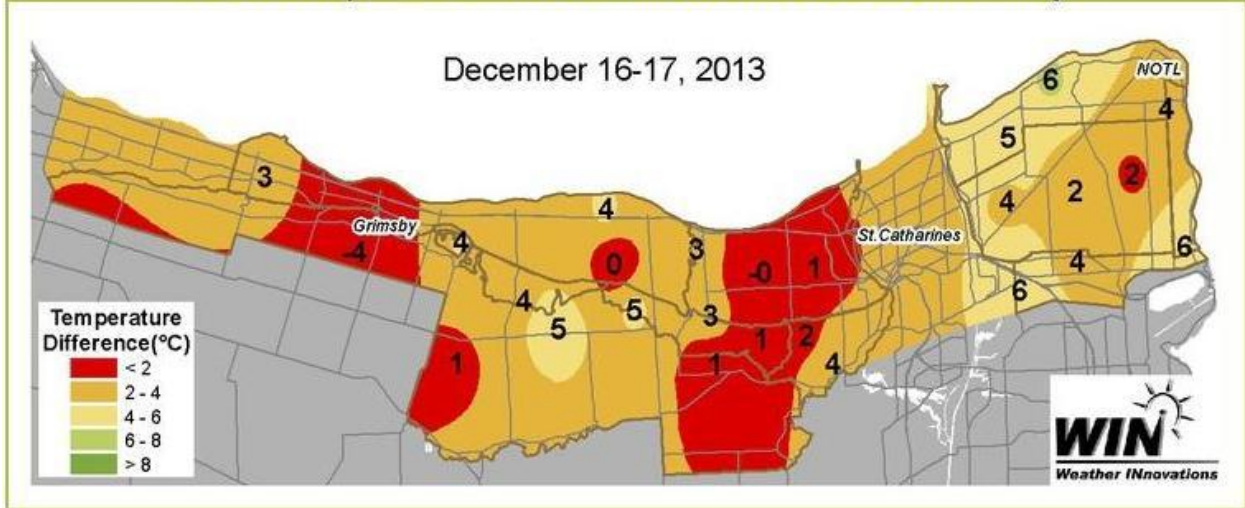


Bud Hardiness

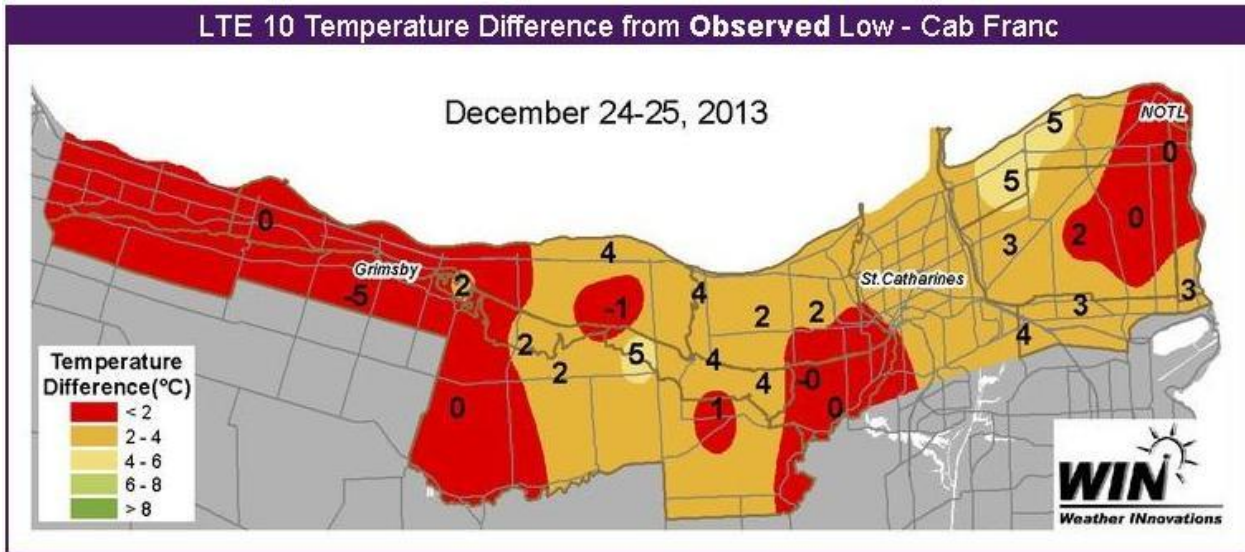
Temperatures dropped close to the estimated LTE10 values (the temperature at which 10% of primary buds would die) for Chardonnay and Cabernet Franc at a few locations during the 2 coldest December events. In particular, the Creek Shores appellation was very close to the estimated LTE10 value for Cab Franc on Dec 16-17. The Four Mile Creek, Twenty Mile Bench, Niagara River and Short Hills Bench appellations also came very close. The following figures show the temperature differences between the observed overnight low and the approximate estimated LTE10 values at that time. Note that a negative value does not necessarily mean that damage occurred, since LTE10 values are not updated daily and are not taken at all of the Niagara locations.



LTE 10 Temperature Difference from **Observed** Low - Chardonnay



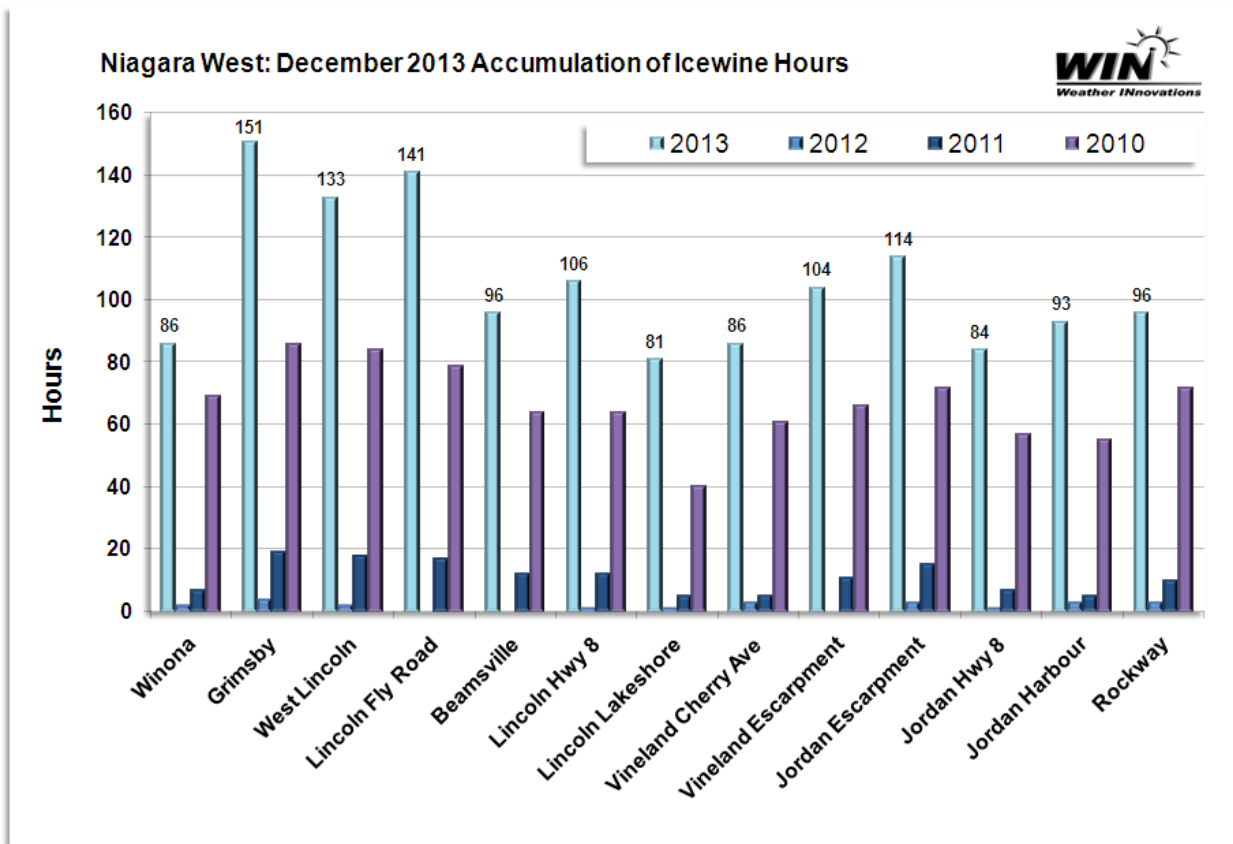
LTE 10 Temperature Difference from **Observed** Low - Cab Franc

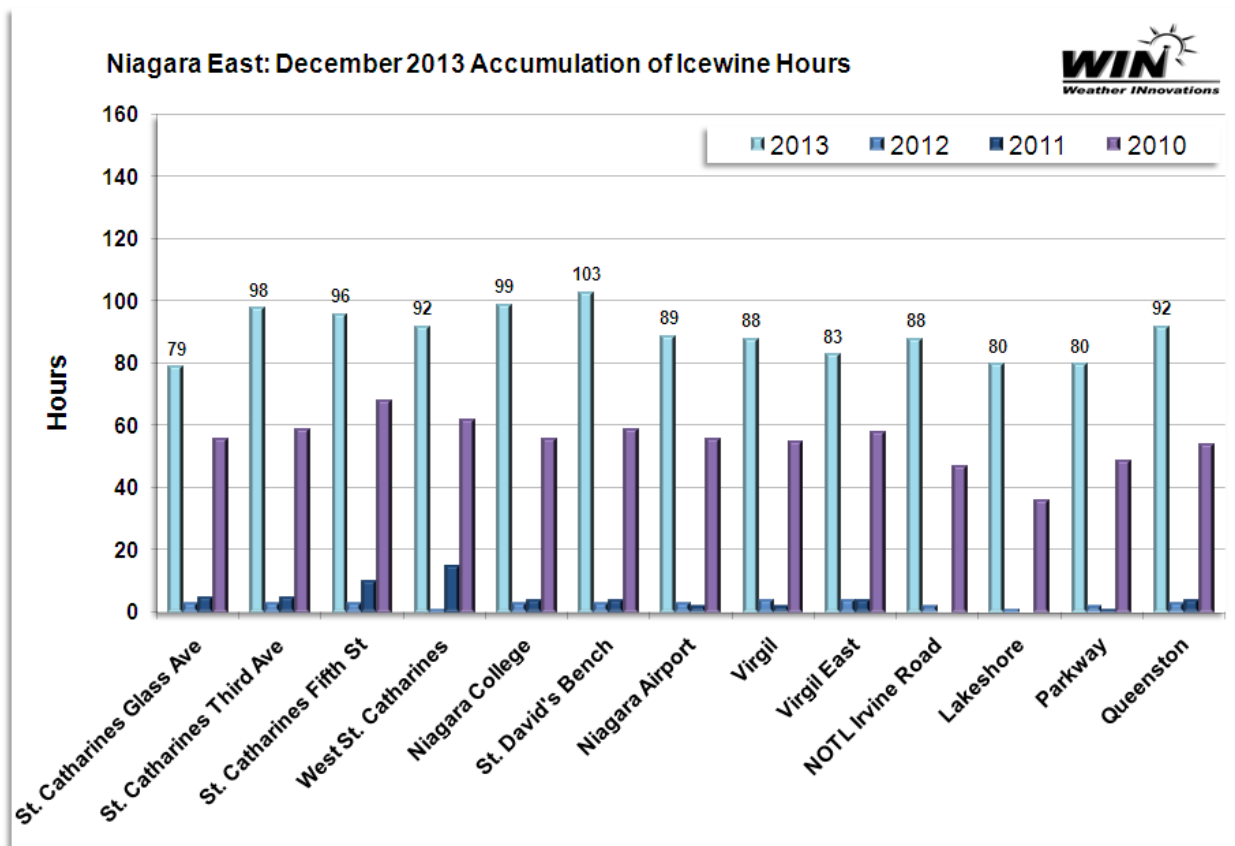




Icewine Hours Analysis

Icewine hours were abundant in both November and December, in contrast to previous years. The harvest began as early as November 24 for some locations. As seen in the following two figures, all of the stations accumulated a greater number of icewine hours than in 2010, 2011 and 2012. The Niagara stations recorded between 79 and 151 icewine hours in December 2013, compared to between only 0 and 4 icewine hours in 2012! Due to the frequent icewine harvest opportunities, many completed the icewine harvest by the end of December.





Summary

December 2013 temperatures were significantly below normal in the Niagara appellation; average temperatures for the month were 1.4°C to 2.1°C below the 30-year normals. The coldest temperature reached in Niagara was -25.8°C on December 25th at the Grimsby station. November and December 2013 provided ample opportunities for harvesting icewine grapes at most locations, unlike the previous two years. These conditions led to an early completion of the icewine harvest for many this year.