



Vermont State Climate Office
Initial Climate Impacts Summary
October 2010

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Introduction

In October, all areas of Vermont received plentiful rainfall as a series of coastal or ocean storms moved through on the 1st (a continuation of Tropical Storm Nicole's remnants at end of September), 6th -7th and 14th -16th. In addition, precipitation from the intense storm that moved from the western Great Lakes into southern Canada struck Vermont on October 25-30. The total monthly liquid precipitation was 7.5-12 inches, 7.5-11 inches and 9.5-10.5 inches in the northeast, western and southeastern climate divisions respectively. Monthly averages for the northeast and southeastern divisions is 3.5-4 inches with 3-3.5 inches in western Vermont. A new monthly record of 14.71 inches was set at the Mt. Mansfield summit, while in Brattleboro, 12.5 inches fell by month's end.

River levels (along both main stems and tributaries) rose dramatically across Vermont on October 1st, with the resulting flooding of fields and roads, especially in western and northeast Vermont. Major storm impacts ranged from several house evacuations (Lyndonville and Bristol) to many road closures. The Vermont Emergency Management reported up to 3000 power outages statewide. Saturated soils combined with gusty winds resulted in trees and power lines blown down from late night on September 30th continuing into October 1st.

Heavy rainfall and gusty winds returned to the state on October 15-16th. The heaviest rainfall was observed in the Springfield Vermont area (southeast Vermont) where 3.96 inches fell with local road closures around North Springfield and Weathersfield locales. At the Burlington International Airport (NWS Office) a new daily record of 2.14 inches was set.

Significant snowfall was also observed across Vermont in October. An average of 4-10 inches fell in the hilly terrain along the spine and the western upsloping regions of the Green Mountains. At the summit, Mt Mansfield received 34.1 inches of snow setting a new monthly record. In addition, this summit station reported daily record snowfalls of 7 inches on the 15th and 18 inches on the 16th.

Detailed precipitation summary

Figure 1 highlights the wide range of total liquid precipitation across Vermont (and northern New York state), as a function of orographic effects (upsloping enhancement and rain shadowing). The orographic enhancement was clearly observed by comparing Mt. Mansfield along the spine of the Green Mountains, with Burlington in the Champlain Valley (Figure 2).

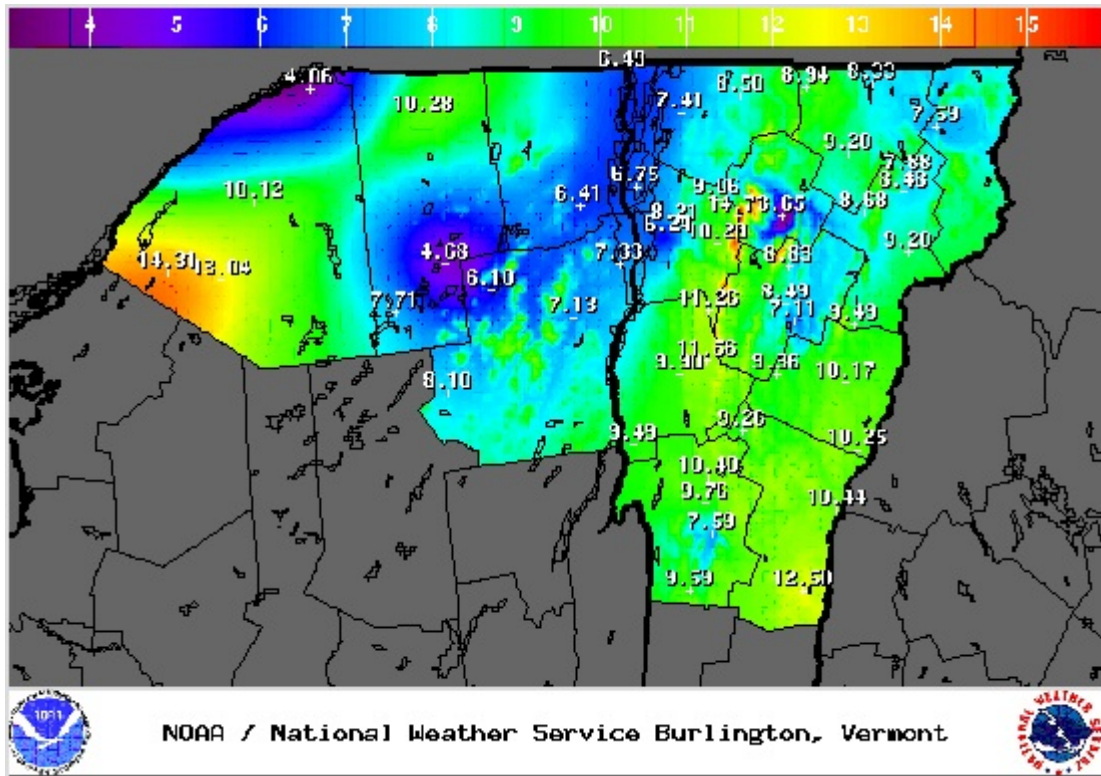


Figure 1: October 2010 precipitation totals across the National Weather Service Forecast Office - Burlington International Airport area of coverage.

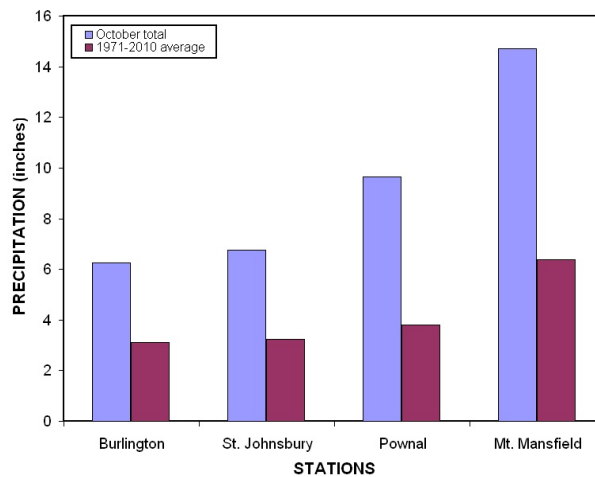


Figure 2: Comparison between October 2010 total precipitation with the 1971-2000 averages for four selected stations. Differing times of observations are of note. Precipitation at Burlington (western VT) and St. Johnsbury (northeast VT) are measured at midnight, those at Mt. Mansfield at 1600 (4:00 PM) and 0700 (7:00 AM) at Pownal.

Not only were the monthly rainfall totals at least twice their 1971-2000 average amounts (Table 1), but numerous daily records were set throughout the month as well. These are summarized in Table 2.

Table 1: Comparison between October 2010 total liquid precipitation and 1971-2000 averages by climate division (1= Northeast, 2 = Western, 3=Southeast).

CLIMATE DIVISION	1971-2000 MEAN PRECIPITATION	OCTOBER 2010 PRECIPITATION	HIGHEST 2010 TOTAL (inches)
1	3.5 - 4 inches	7.5 - 12 inches	
2	3 - 3.5 inches	6.5 - 10.5 inches	14.71 at Mt. Mansfield (record)
3	3.5 - 4 inches	9.5 - 10.5 inches	12.5 near Brattleboro

Table 2: Daily precipitation records set in October 2010

STATION	1 Oct. (inches)	2 Oct. (inches)	15 Oct. (inches)	16 Oct. (inches)
Bethel 4N	3.32			
Canaan	3.10			
Cavendish	3.42			
Chelsea 2NW	3.71			1.47 (tie)
Cornwall	3.58			
East Haven	3.00	1.96		
Eden 2S	3.53			
Essex Junction	2.34			2.35
Hanksville	3.91			
Island Pond	3.52			
Jay Peak	2.83			2.34
Montpelier 2	3.15	1.06		1.20
Mt. Mansfield	5.05			3.47
Newport	3.20			
Northfield	2.35			

North Hartland Lake	3.11	1.73		2.16
North Springfield Lake	2.95	2.20	1.75	1.87
Plainfield	3.46	1.36		1.20
Rochester	2.86			
Rutland	3.96			
Salisbury 2N	4.47			
South Lincoln	4.30			
Sutton	3.52			
Sutton 2NE	3.03			
Union Village Dam	3.52			
Woodstock	3.88			
Worcester 2W	3.25			1.29
Ball Mountain Lake	3.07			
Pownal 1NE	3.52			
Sunderland	2.99	1.57		
ASOS (K1V4) St. Johnsbury	2.93			
ASOS (KMPV) Barre- Montpelier airport	2.94			
ASOS (KBTU) Burlington Intl airport	1.49 (tie		2.14	

[Note: All station measurements end at 0700 EDT except for the midnight observations at the ASOS locations.]

The remnants of Tropical Storm Nicole brought steady rain from September 30th into the afternoon of October 1st, with heavy at times. Low pressure moved north along a frontal boundary that extended along the east coast. The remnants of TS Nicole also provided additional moisture and wind energy. Storm impacts from this event ranged from several house evacuations (Lyndonville and Bristol) to many road closures. The Vermont Emergency Management reported up to 3000 power outages statewide. Saturated soils combined with gusty winds resulted in trees and power lines being blown down during the night of September 30th into October 1st. In response to these heavy rainfalls, rivers across western and northeast Vermont (main stem and tributaries) rose dramatically on October 1st, with flooding of fields and roads. In general flood damage was minor, and a few reports are included below to provide a flavor of the impacts (Table 3).

Table 3: Flooding and river impacts in Western and Northeast Vermont on 1 October

- ▶ In the Lyndonville area (northeast VT), high water from the Passumpsic River and Miller's Run led to closures or restricted travel along with portions of Routes 5, 122 and 114. Portions of Route 5 were also closed in the town of Orleans due to high water from the Barton River.
- ▶ The Lamoille River flooded portions of Rte 15, especially around the town of Cambridge where sandbags were used to protect 3 houses.
- ▶ In the state capital of Montpelier, some state employees were sent home early due to the flood threat of the Winooski River.
- ▶ The New Haven, Middlebury and Otter Creek Rivers flooded portions of roads in Addison County. Most seriously impacted was River Road around Bristol, where one house was evacuated.
- ▶ The Mad River flooded fields and portions of roads in Waitsfield and Moretown. Additionally, water was reported on portions of Route 14 in the South Randolph area and Route 100 near Rochester both most likely associated with rapid rises on the White River.
- ▶ The Browns River flooded portions of Route 128 in the towns of Essex and Westford. Water was reported on roads in the town of Richmond from the Winooski River.

Some of the specific statewide emergency actions directly related to the 1 October storm event included:

- Colchester Swift Water Rescue Team was activated and deployed to Lyndonville to rescue a trapped motorist who ultimately escaped under his/her own power.
- Swift Water Rescue Team initiated search for a lost kayaker who was eventually found unharmed in East Burke by Vermont State Police.
- Emergency shelters were opened by Red Cross in Lyndonville (Fire Department) and in Rutland (Red Cross Building) to assist any evacuees during October 1st.

A few days later on 4 October, an ocean storm off New Jersey moved north along the New England coast during the 5th and 6th and into northern Maine on the 7th. Across Vermont, periods of rain fell from the late morning of the 6th ending on the 8th. Precipitation totals ranged between 0.50 - 1.50 inches across the three climate divisions, with the greatest station total of 2.18 inches being observed at the summit of Mt. Mansfield. Although this sequence of rain resulted in minimal impacts, small hail was observed across the northwest third of the state. Specifically, pea size hail (0.25 inch diameter or smaller) was accompanied by wind gusts to 35 mph occurred during the mid and late afternoon across portions of northeast Vermont (Franklin and Lamoille counties) and western Vermont (Chittenden County).

On the evening of 14 October, steady rain and gusty winds returned to the state continuing into the morning of the 16th. Low pressure moved across New England, and deepened along the coast of Maine with strong inflow of Atlantic moisture. Although the heaviest rain fell on the 15th, this event did not produce the statewide impacts observed on 1 October. A localized downburst produced the heaviest precipitation in Springfield, VT (3.96 inches) on the 15th, with a three-day total of 4.12

inches from the 14th - 16th. This in turn led to local road closures around North Springfield and Weathersfield. Regionally, climate division totals for this event were 1.50-2.60 inches in Division 1 (Northeast), 2.00-2.80 inches in Division 2 (Western) and 2.50-4.12 inches in Division 3 (Southeast).

Elsewhere, heavy snow was observed on 15 and 16 October as cold air aloft combined with a deepening surface low to produce 4 -10 inches of snow in the hilly terrain along the spine of and the western upslope of the Green Mountains. The summit of Mt Mansfield reported daily record snowfalls of 7 inches on the 15th and 18 inches on the 16th, which contributed to the new monthly record of 34.1 inches of snow received there.

The final week of October (25-30) experienced periods of rain with amounts averaging generally between 1 and 2 inches over an extended time period. The intense storm system with some record breaking low pressure readings in the western Great Lakes region moved into Canada. Surges of precipitation with colder air moved across Vermont. The month ended with colder air ushered in on the 31st, which resulted in measurable snow in Burlington (0.1 inch).