Vermont 2013 Safety Belt Use Study

Prepared by:
William Clements, Ph.D.
Michael Oman, P.E.
Norwich Studies and Analysis Institute
Northfield, Vermont 05663

For the Governor's Highway Safety Program
Vermont Department of Public Safety
103 S. Main Street
Waterbury, Vermont 05671
August 2013

Vermont 2013 Safety Belt Usage Survey

2013 represents the twenty-sixth annual safety belt observational survey conducted under the auspices of the Vermont Governor's Highway Safety Program. The survey protocol has been completely redesigned this year to reflect the requirements of 23CFR1340.

Based on the Federal Register, the purpose of the revised requirements is to "... select observation sites that are more representative of the road segments in the State in a more cost effective manner. For these reasons, NHTSA proposed to revise the Uniform Criteria so that future surveys would give States more accurate data to guide their occupant protection programs" (Federal Register/Vol. 76, No. 63/April 1, 2011/p.18043).

To this end, the survey protocol has been completely redesigned to reflect formal randomization of the data collected to be more representative of actual conditions in the field. Key features of this redesign have included:

- The total survey sample of 82 sites has been retained based on good statistical performance in previous years.
- The geographic stratification into seven county based geographic areas has been retained.
- The previous stratification of roads into three volume based groups has been replaced by a stratification into two groups based on functional classification. This has been deemed to better reflect actual roadway functionality than the volume based approach.
- Survey sites have been based on a formal random selection procedure from a statewide roadway data base with the probability of selection proportional to size (known as a PPS selection). The size criterion has been vehicle miles traveled on the roadway segments.
- These sites have been selected from a population of all roadways other than local roadways in the geographic areas of the state other than those designated as part of the Metropolitan Statistical Area (MSA) (i.e. Chittenden, Franklin, and Grand Isle Counties). In the MSA area, the population from which selections were made included most local roadways as well.
- The number selected in each geographic and functional classification stratum has been proportional to the total vehicle miles traveled in each of these strata compared to the statewide VMT.
- Further random selections were made for other survey characteristics such as time of observation.

Additional requirements relative to the permissible statistical "error" of the survey and its estimation, and the permissible levels of missed observations placed further constraints on the survey criteria.

In previous years, this survey would occur in two phases bracketing a "Click It Or Ticket" (CIOT) awareness and enforcement program. These would include both a pre- and post-enforcement survey of the same sites intended to assess the effectiveness of the usage enhancement program. However, this year, because of scheduling limitations and more rigorous statistical requirements for accuracy necessitating two observers, rather than one, per site, only the post-enforcement survey was conducted.

This year's field survey was conducted during late June and July, 2013. Data were collected on laptop computers for front seat occupants of all passenger vehicles under 10,000 pounds gross vehicle weight (gvw) wearing safety belts at the 82 sample sites selected for the revised survey design.

Survey Results

Data were collected for all days of the week and both peak hours ("rush hours") and off-peak hours. The statewide results, weighted in accordance with NHTSA specified inverse PPS weighting, including standard error estimates and confidence interval limits, are displayed in Table 1.

Table 1. Statewide Weighted Survey Results

			95% Confidence Interval	
Rate for	Rate	SE	LB	UB
Driver	84.2%	0.0067	82.9%	85.5%
All Occupants	84.9%	0.0057	83.7%	86.0%
Males	77.3%	0.0094	75.5%	79.1%
Females	93.0%	0.0055	92.0%	94.1%
Cars	88.0%	0.0071	86.6%	89.4%
Trucks	69.9%	0.0170	66.6%	73.3%

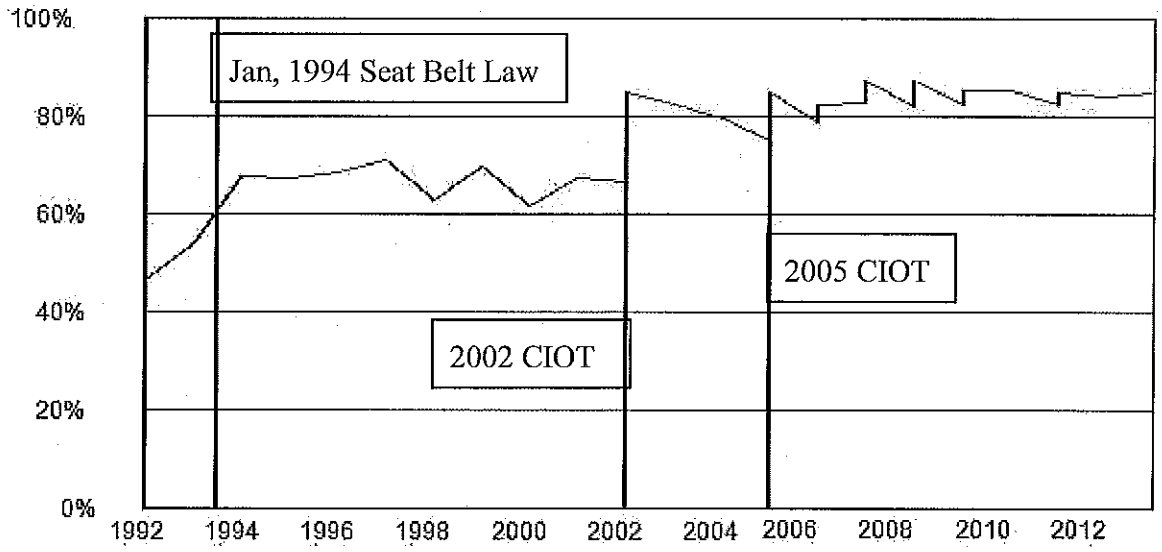
The post-enforcement rate for all front seat occupants of 84.9% safety belt usage continues for the second year in a row at just below the nationally recognized criterion of 85% after remaining just above 85% for four consecutive years (since 2007). Unlike in many previous years, there was no decline from the previous year's level, however, no pre-enforcement survey was conducted, so it is impossible to draw any firm conclusion about this.

The statistical methods used to evaluate the observational data are in conformance with those developed by NHTSA and specified in 23CFR1340. In conformance with those criteria, the standard error is less than 2.5% (0.57% for all sites/occupants statewide). Also, not reported in this table, the total incidence of unknown observations was less than 10% (1.6% for all observations statewide).

Historical Trends

Historical usage rates are displayed in the following graph.

Figure 1 Historical Safety Belt Usage Rate



Historically, it may be seen that usage rates increased significantly between the enactment of Vermont's safety belt law in January of 1994 and the 1994 observational study by over 10 percentage points from 54% to 68%. This increase is preceded by a more gradual rise prior to 1994, although this may be the result of increased public awareness due to the publicity surrounding the discussion of the law in addition to the effect of the law itself.

After the enactment of the law, safety belt usage remained fairly constant, varying slightly around about 65% until the public education and awareness campaign associated with the "Click-It-Or-Ticket" program in 2002. Directly associated with this program there was an increase of nearly 20 percentage points (from 66% to 85%). It may reasonably be inferred that these two events are causally related.

Prior to the 2005 enforcement effort, the rate drifted down gradually despite some effort at increased awareness and enforcement. The reasons for this are unclear. It is possible that the public was getting used to the low level awareness campaigns as they became more part of the normal background to living and generating little new awareness. For years, the rate had hovered between roughly 65 - 70%, suggesting a kind of "natural level" in the neighborhood of 2/3. Prior to 2005, each enforcement effort showed apparently diminishing returns with a subsequent drift toward lower rates immediately prior to the enforcement campaign. It is unclear whether this represented lower effectiveness of the campaigns when conducted from a higher base level, a gradual inuring of the public to the campaigns' methods or message, some quality of the campaign itself, or some other factor or combination of factors.

For the past several years the usage rate has held remarkably steady. For some years it seemed to vary in response to the CIOT campaigns, but for the past few years, even that variability has diminished, varying little at just below 85%. The overall rate has, for the past several years, also been unresponsive to the enforcement campaign, although without a pre-enforcement survey, it is impossible to know this for sure. It is entirely possible that the rate has settled into a new "natural rate" in the absence of a primary law of about 85%

Although the evidence of a single year is limited, it also appears that the new survey design has uncovered nothing very different from the old design.

Usage Rate: Additional Factors

In addition to the statewide weighted results, unweighted results have been analyzed in greater detail. These are displayed across the geographic and functional classification stratifications in Table 2, and for day of week and time variation in Tables 3a and 3b.

Table 2. Safety Belt Usage Rate for Total Occupants

Region \ Func Class	Arterial	Collector	Total
Chittenden	87.2%	89.4%	87.7%
Bennington/Addison	85.8%	82.6%	84.9%
Franklin/Grand Isle	81.3%	72.7%	78.1%
Northeast Kingdom	81.9%	74.0%	79.5%
Rutland	86.3%	84.3%	86.2%
Washington/Lamoille	83.6%	80.7%	83.0%
Windham/Orange/Windsor	88.0%	84.3%	87.1%

Table 3a. Safety Belt Usage Rate by Day of Week

Day-of-Week \ Func Class	Arterial	Collector	Total
Weekday	85.8%	80.7%	84.3%
Weekend	86.4%	88.7%	86.7%

Table 3b. Safety Belt Usage Rate by Hour of Day

Hour \ Func Class	Arterial	Collector	Total
Peak	89.1%	89.7%	89.2%
Off-Peak	85.3%	82.3%	84.6%

Observations

Detailed usage rates continue to show notable variations. Highest rates continue to be found among females, while the lowest rates continue to be found among males and pickup truck occupants. Regionally, there is noticeably lower usage along the entire northern tier of the State (<80%), while other counties all exhibit higher usage rates, often exceeding 85%. In general, except for Chittenden County, arterial roadways exhibited better compliance than collectors or local roadways, sometimes, as is especially notable in the northern tier counties, significantly higher.

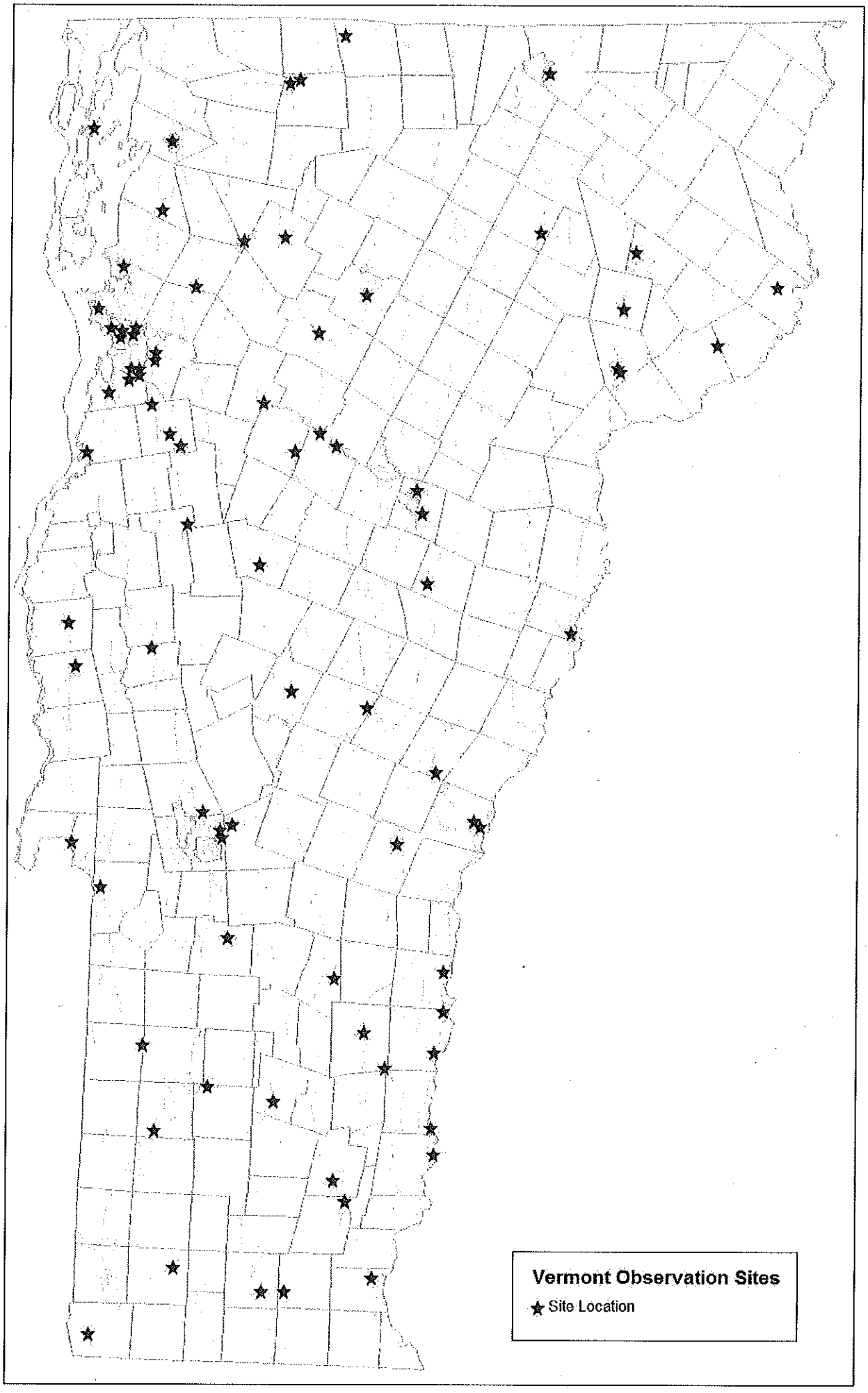
Off-peak hours exhibit lower compliance than peak hours on both functional classes of roadway. Somewhat unexpectedly,August 29, 2013 based on the hourly variations, weekend days exhibit slightly higher compliance than weekdays (because the peak hour commute difference is also correlated with weekdays rather than weekends), especially given the peak hour. However, this difference is quite small. It may be an artifact of the data collection schedule (i.e., sites were grouped by geographic area, and, on examination, all of the norther tier sites were surveyed on weekdays, likely artificially lowering the apparent compliance for those days.)

Although enforcement appears to have reached a stable level (i.e., it appears that it is no longer engendering any broad, state-wide increase in the post enforcement rate), it has obviously been an effective tool in the past. It is at least possible that a more targeted approach may be effective in situations where usage is unusually lax. Based on the data, such an opportunity may exist geographically in the northern tier counties, and temporally during off-peak hours. Similarly, the uniquely low compliance rates among males and pickup truck occupants suggests a potential opportunity for more carefully targeted education/awareness/"consciousness raising" efforts.

Appendix A: Individual Sites: Counting Record and Raw Belt Usage Rates

Site Counting Record												Count					
SID	CG	Cls	Route	FC	CntSta	AADT	DATE	TIME	DIR	LNS	INIT	NVeh	NOcc	OccBlt	NUnk	Occ%	Unk%
1101	CC	Art	US-7	14	D243	18400	06/29/13	1323	N	1	zht	335	505	450	4	89.11%	0.79%
1102	CC	Art	I-89	1	W089	25500	06/30/13	735	N	2	zht	204	275	264	5	96.00%	1.79%
1103	CC	Art	TH-3	16	D331	6400	07/27/13	1345	S	1	zht	102	131	111	4	84.73%	2.96%
1104	CC	Art	US-2	14	WILL12	11590	06/29/13	739	W	1	zht	110	134	120	6	89.55%	4.29%
1105	CC	Art	TH-1	16	COLC19	14000	07/27/13	909	N	1	zht	227	296	229	0	77.36%	0.00%
1106	CC	Art	TH-4	14	D156	15300	07/27/13	1155	N	1	zht	197	273	214	1	78.39%	0.36%
1107	CC	Art	US-2	16	D019	10100	07/27/13	804	E	1	zht	134	173	156	4	90.17%	2.26%
1108	CC	Art	I-89	11	D423	8500	06/29/13	827	N	3	zht	180	210	195	3	92.86%	1.41%
1109	CC	Art	VT-116	6	D127	3700	07/05/13	954	N	1	zht	87	111	99	1	89.19%	0.89%
1110	CC	Art	VT-116	14	D525	5500	06/29/13	935	N	1	zht	96	129	109	0	84.50%	0.00%
1111	CC	Art	TH-9	12	D001	14600	07/27/13	1004	N	1	zht	196	263	226	2	85.93%	0.75%
1112	CC	Art	VT-15	14	COLC13	20900	07/27/13	1252	E	1	zht	131	177	156	1	88.14%	0.56%
1113	CC	Art	VT-116	6	D296	10400	07/05/13	858	N	1	zht	134	169	153	1	90.53%	0.59%
1201	CC	Col	TH-10	17	SOBR40	4000	06/29/13	1046	E	1	zht	80	108	100	2	92.59%	1.82%
1202	CC	Col	VT-128	7	D309	2100	06/27/13	731	N	1	zht	142	146	134	4	91.78%	2.67%
1203	CC	Col	TH-5	19	SHEL01	3400	06/29/13	1135	S	1	zht	101	137	128	1	93.43%	0.72%
1204	CC	Col	TH-4	9	D370	770	07/05/13	1333	E	1	zht	27	34	32	0	94.12%	0.00%
1205	CC	Col	TH-5	7	D360	1600	07/05/13	1042	E	1	zht	32	40	29	0	72.50%	0.00%
1206	CC	Col	TH-6	17	D524	5000	06/29/13	1230	S	1	zht	77	100	93	2	93.00%	1.96%
1207	CC	Col	TH-13	17	D447	11800	07/27/13	1100	S	1	zht	112	144	118	2	81.94%	1.37%
2101	BAd	Art	V022A	6	A113	4500	07/07/13	921	S	1	zht	56	81	71	1	87.65%	1.22%
2102	BAd	Art	V011-	6	B114	6900	07/11/13	1252	W	2	zht	149	189	172	3	91.01%	1.56%
2103	BAd	Art	U007-	2	B112	6100	07/12/13	1312	N	1	zht	97	136	103	3	75.74%	2.16%
2104	BAd	Art	V009-	2	B130	3500	07/12/13	1155	W	1	zht	105	156	134	2	85.90%	1.27%
2105	BAd	Art	V030-	6	B121	2500	07/11/13	1040	S	1	zht	61	63	52	3	82.54%	4.55%
2106	BAd	Art	U007-	2	A107	7900	07/07/13	1135	S	1	zht	98	145	129	2	88.97%	1.36%
2201	BAd	Col	V017-	7	A015	1600	07/05/13	1148	W	1	zht	148	193	154	2	79.79%	1.03%
2202	BAd	Col	V007A	7	B103	4900	07/11/13	1145	S	1	zht	87	93	80	2	86.02%	2.11%
2203	BAd	Col	V074-	7	A154	1900	07/07/13	1026	E	1	zht	36	54	47	0	87.04%	0.00%
3101	FGI	Art	VT-104A	6	F047	4700	06/27/13	848	E	1	zht	101	105	91	3	86.67%	2.78%
3102	FGI	Art	VT-105	6	NA	6400	06/25/13	1213	E	1	zht	81	109	87	2	79.82%	1.80%
3103	FGI	Art	US-2	6	G102	2900	06/25/13	709	W	1	zht	62	69	52	2	75.36%	2.82%
3201	FGI	Col	TH12	9	F165	1500	06/25/13	903	N	1	zht	19	21	13	0	61.90%	0.00%
3202	FGI	Col	VT-207	7	F155	3100	06/25/13	1103	S	1	zht	20	23	19	0	82.61%	0.00%
3203	FGI	Col	US-7	7	F149	4500	06/25/13	955	N	1	zht	98	121	88	0	72.73%	0.00%
4101	NEK	Art	U005-	16	C165	5600	07/26/13	821	S	1	zht	186	225	179	5	79.56%	2.17%
4102	NEK	Art	V016-	6	P022	1600	07/26/13	1532	S	1	zht	34	46	36	0	78.26%	0.00%
4103	NEK	Art	U002-	14	C160	8600	07/26/13	918	E	1	zht	109	134	109	0	81.34%	0.00%
4104	NEK	Art	V191-	6	NA	3300	06/25/13	1421	N	1	zht	22	33	26	0	78.79%	0.00%
4105	NEK	Art	U002-	2	E007	2600	07/26/13	1024	W	1	lad	93	120	107	7	89.17%	5.51%
4201	NEK	Col	U005-	7	C146	14300	07/26/13	1312	S	1	zht	125	152	110	0	72.37%	0.00%
4202	NEK	Col	U005-	7	C101	2700	07/26/13	1404	N	1	lad	69	84	67	3	79.76%	3.45%
4203	NEK	Col	S0277	7	E144/	160	07/26/13	1140	W	1	zht	8	10	5	0	50.00%	0.00%

SID	CG	Cls	Route	FC	CntSta	AADT	DATE	TIME	DIR	LNS	INIT	NVeh	NOcc	OccBlt	NUnk	Occ%	Unk%
5101	Rut	Art	U004-	2	R112	11200	07/28/13	1029	W	1	zht	172	265	244	6	92.08%	2.21%
5102	Rut	Art	V030-	6	R126	2800	07/28/13	1356	S	1	zht	83	108	93	3	86.11%	2.70%
5103	Rut	Art	U004-	14	R081	12900	07/28/13	1123	W	1	zht	159	236	201	1	85.17%	0.42%
5104	Rut	Art	V022A	6	NA	4900	07/28/13	1242	N	1	lad	110	157	122	2	77.71%	1.26%
5105	Rut	Art	U007-	2	R102	9000	07/28/13	844	S	1	lad	112	134	117	4	87.31%	2.90%
5201	Rut	Col	V140-	7	R316	910	07/23/13	948	E	1	zht	24	23	17	2	73.91%	8.00%
5202	Rut	Col	S3216	17	R472	1200	07/28/13	940	W	1	zht	32	47	42	1	89.36%	2.08%
6101	WL	Art	V100-	6	W364	3800	06/30/13	1031	N	1	zht	57	82	70	2	85.37%	2.38%
6102	WL	Art	U302-	14	NA	6800	07/06/13	942	W	1	zht	237	305	231	7	75.74%	2.24%
6103	WL	Art	V100-	6	L179	8700	06/27/13	1217	S	1	zht	197	243	200	4	82.30%	1.62%
6104	WL	Art	V015-	6	NA	5700	06/27/13	1057	E	1	zht	82	116	100	0	86.21%	0.00%
6105	WL	Art	I089-	1	W034	23100	06/30/13	829	S	2	zht	177	201	182	5	90.55%	2.43%
6106	WL	Art	V100-	6	W008	1300	06/30/13	1137	N	1	zht	67	102	96	2	94.12%	1.92%
6107	WL	Art	V104-	6	NA	3500	06/27/13	956	N	1	zht	64	77	62	2	80.52%	2.53%
6201	WL	Col	S6104	17	W239	2000	07/06/13	851	W	1	zht	21	26	23	0	88.46%	0.00%
6202	WL	Col	V108-	7	L130	8400	06/27/13	1310	N	1	zht	145	182	143	6	78.57%	3.19%
6203	WL	Col	U002-	7	W145	3800	06/30/13	922	W	1	lad	58	77	64	0	83.12%	0.00%
7101	WOW	Art	V103-	2	Y062	9000	07/23/13	1101	N	1	zht	130	147	122	3	82.99%	2.00%
7102	WOW	Art	U005-	6	NA	4300	07/24/13	1241	S	1	lad	44	62	53	1	85.48%	1.59%
7103	WOW	Art	V030-	6	X124	3800	07/11/13	1451	S	1	zht	83	114	94	1	82.46%	0.87%
7104	WOW	Art	I089-	1	Y085	23300	07/09/13	1125	S	1	zht	211	283	250	2	88.34%	0.70%
7105	WOW	Art	V030-	6	NA	5200	07/11/13	1554	S	1	zht	101	118	102	3	86.44%	2.48%
7106	WOW	Art	V030-	16	X130	6300	07/12/13	850	S	1	zht	63	72	66	2	91.67%	2.70%
7107	WOW	Art	V103-	2	Y427	5200	07/23/13	1359	N	1	lad	94	99	83	5	83.84%	4.81%
7108	WOW	Art	V100-	6	NA	2500	07/11/13	1351	S	1	zht	53	62	58	1	93.55%	1.59%
7109	WOW	Art	I091-	1	N002	7700	07/12/13	1058	E	2	lad	58	56	50	4	89.29%	6.67%
7110	WOW	Art	V009-	2	X133	5700	07/23/13	1258	S	1	zht	88	105	96	3	91.43%	2.78%
7111	WOW	Art	V103-	2	Y161	4600	07/24/13	940	S	2	zht	76	83	72	2	86.75%	2.35%
7112	WOW	Art	I091-	1	Y075	11900	07/24/13	1045	W	2	zht	47	61	58	2	95.08%	3.17%
7113	WOW	Art	V011-	6	Y133	9000	07/09/13	901	N	1	zht	148	195	172	0	88.21%	0.00%
7114	WOW	Art	I089-	1	Y001	14200	07/12/13	952	W	1	lad	58	67	62	2	92.54%	2.90%
7115	WOW	Art	V009-	2	X134	4800	07/09/13	1325	E	1	zht	100	145	133	2	91.72%	1.36%
7116	WOW	Art	U004-	2	Y116	8600	07/23/13	1159	S	1	zht	145	178	154	1	86.52%	0.56%
7201	WOW	Col	V014-	7	Y003	1600	07/09/13	1007	S	1	zht	82	104	81	1	77.88%	0.95%
7202	WOW	Col	V131-	7	Y177	5400	07/24/13	836	W	2	zht	112	139	122	3	87.77%	2.11%
7203	WOW	Col	S0117	7	X153	6700	07/24/13	1142	N	1	zht	104	123	96	4	78.05%	3.15%
7204	WOW	Col	S0176	7	Y300	1300	07/07/13	1257	W	1	zht	32	48	41	2	85.42%	4.00%
7205	WOW	Col	V110-	7	N127	860	07/06/13	1131	N	1	zht	19	26	24	0	92.31%	0.00%
7206	WOW	Col	U005-	7	Y223	10400	07/09/13	1215	S	2	zht	88	107	97	1	90.65%	0.93%


Vermont Observation Sites
Site Location