Eastern Whip-poor-will Survey:

Benson, Fair Haven, Poultney, and West Haven

Helen W. Buckner Memorial Natural Area near Tim's Trail © Sarah Carline

Annual Report to

Vermont Fish & Wildlife Department

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VERMONT CENTER FOR ECOSTUDIES
Uniting People and Science for Conservation

Acknowledgements

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Introduction

The Eastern Whip-poor-will (*Antrostomus vociferus*) is a nocturnal aerial insectivore found in edge habitats across eastern North America. Seldom seen due to its cryptic plumage yet well known for its distinctive call, the male Eastern Whip-poor-will (WPW) will call continuously throughout clear, moonlit nights during breeding season (usually late May through early July) (Cink 2002). Habitat requirements for this species are complex and necessitate a mix of open-understory forest for breeding and rearing young, and large tracts of open land in order to forage successfully (Hunt 2006). Examples of breeding habitat include forests with dry, nutrient poor soils such as Pine Barrens and Pine-oak Woodlands. Suitable foraging habitats include fields, power line rights-of-way, agricultural settings, and recently logged or burned areas (Hunt 2013).

Eastern Whip-poor-will / © Laura Gooch / CC 2.0

Due in part to loss of this composite habitat, the geographic range of WPW has contracted and populations have declined (Sauer et al. 2011). Forest maturation, urbanization, and industrialization have been cited as causal factors in WPW decline (Environment Canada 2015). As agriculture decreases and parts of Vermont revert back to their initial, more forested state, early successional habitat necessary to host a robust WPW population is lost. In addition to habitat loss, WPW declines have also been attributed to population declines in large-bodied moths (possibly due to pesticide use), and collisions with cars (COSEWIC 2009).

WPW numbers declined by 77% between the first (1976-1981) and second (2002-2007) Vermont Breeding Bird Atlas (Renfrew 2013). Other breeding bird atlases (MD, NY, ON, PA) showed an average decline of 54% between their first and second atlases. However,

most bird surveys are carried out during the day and associated data may fail to accurately represent nocturnal bird populations. This lack of standardized and consistent nocturnal bird surveys prompted Pamela Hunt of New Hampshire Audubon to commence the Northeast Nightjar Survey in 2005 which consisted of nocturnal roadside surveys in four New England States, conducted by volunteers. The survey monitors all three species of nightjars found in New England – the Chuck-will's-widow, Common Nighthawk, and Eastern Whip-poor-will (primary focus). In 2011, in response to data collected from bird surveys, the Northeast Nightjar Survey, and years of anecdotal accounts of population decline in Vermont, the WPW was listed as Threatened in the state.

Project Background

Volunteer Surveys

In 2005, the Northeast Nightjar Survey expanded to Vermont as nocturnal roadside routes. Each route consisted of ten points spaced 0.5 miles apart at which volunteers completed a three-minute point count. In 2007, the protocol was updated to its current method, which consists of a series of ten six-minute point counts spaced one mile apart (Hunt 2007). Vermont Center for Ecostudies (VCE) has led this volunteer effort for the past 14 summers. Each year, volunteers survey routes within regions exhibiting habitat characteristics considered potentially suitable for WPWs (low elevation, matrix of field and forest). The generation of these routes were loosely based on habitat associations derived from work done in New Hampshire (Hunt 2006) or other data (e.g., Cink 2002, Hunt pers. obs.). In general, the routes met all or most of the following criteria:

1. Away from major roads and developed areas
2. Lower elevation river valleys
3. Habitat mosaic of forest and open areas (latter including old fields, utility rights-of-way, and barren lands)
4. Pine or pine/oak forest (though this was often not apparent from Google Earth images)
5. Presence of gravel pits as indicator of well-drained soils

These volunteer surveys not only detect population changes in Vermont, they also contribute to a broad regional effort to detect population changes in the northeastern United States.

VCE Surveys

In order to better understand habitat requirements of this species and obtain more precise counts, VCE has conducted intensive WPW surveys in different regions of Vermont since 2014, funded in part by the Vermont Fish & Wildlife Department. These surveys have served to provide more thorough population estimates in the entire state. In 2014, surveys were conducted in the West Haven and Fair Haven area, targeting an area where WPWs were believed to be relatively abundant. The subsequent two years were primarily focused around routes that had been previously surveyed by volunteers. Routes were augmented with cluster sampling when a WPW was heard at an original point and each ten-point route was surveyed twice. In addition, point count surveys were conducted at ad hoc points based on historical records or areas with ideal habitat. From 2016 to 2019, VCE created new routes in areas where few whip-poor-wills have been reported. These routes were created based on the criteria for generating volunteer surveys as in 2007, and were augmented with cluster sampling and ad hoc points as in the previous two years. Each ten-point route was surveyed twice. As often as possible, these newly created routes were surveyed by volunteers in subsequent years. In 2018 and 2019, Automated Recording Units (ARUs) were used in conjunction with roadside surveys, which allowed more data to be collected along the routes.

Community Involvement

VCE often receives incidental WPW reports across the state. If the observers are not eBird users, we encourage them to register and submit an eBird report with the location, date, and time of the observation, preferably with a recording of the calling WPW. Often times, these reports are during spring migration. Additionally, VCE posts volunteer opportunities to local listservs as roadside survey routes become available.

Methods

VCE Surveys

Our objective in the 2020 breeding season was to obtain an estimate of the number of WPW in the West Haven and Fair Haven area where the species is known to be relatively abundant based on intensive surveys completed by VCE in 2014. In 2014, potential survey areas were not randomly selected. Instead, roads were scouted during the day to locate potential habitat, then nocturnal surveys were conducted (under suitable weather conditions and moon illumination), with stops made as often as every 0.25 miles in appropriate habitat to listen for WPW. This method was completed for Benson, Fair Haven, and West Haven (Figure 1), and included one pre-established ten-point route in West Haven.

In 2020, we surveyed as many of the same roads from 2014 as time allowed (Figure 2). We excluded busy highways and gated or Class 4 roads. During the day, photos and brief habitat descriptions were noted at each point according to the Northeast Nightjar Habitat description. During the nocturnal surveys (under suitable weather conditions and moon illumination), we listened at each point for WPWs for six minutes. If no WPW were detected, we proceeded to the next point, spaced approximately one mile away. This one-mile spacing follows the standardized, replicable survey method that was set up by Pamela Hunt for the Northeast Nightjar Surveys in 2007. Two pre-established ten-point routes were also surveyed in this area: West Haven and Fair Haven.

Surveys were conducted from 30 May through 28 June, on nights with at least 50% moon illumination, during the full moon or waxing and waning gibbous moons, when WPWs are known to call more frequently. Surveys started 20–30 minutes after sunset and continued as long as the moon was visible and the weather suitable. During the waning moon, surveys began after sunset, continued until dark, then were delayed varying amounts of time until the moon rose above the horizon. Early morning surveys ended 15 minutes before sunrise.

Surveys were not conducted if conditions were windy (wind speed > 8 mph), cloudy (> 50% cloud cover), or rainy. Some points were repeated due to declining weather conditions in the first survey or if a survey ended at a point with a calling WPW. If a calling WPW was detected just before dawn, moon set, or declining weather, the original point would be re-surveyed and cluster sampling would begin.

Each point on a given route included a six-minute count, during which time two observers listened and recorded birds independently of one another. At each point, latitude, longitude, wind speed, cloud cover, temperature, and noise were noted. Passing cars were noted during the course of the survey. The survey consisted of listening for one-minute intervals for six minutes, with a compass bearing and qualitative proximity assessment (“very close,” “close,” “far,” or “very far”) if a WPW was heard. Because WPW are often found in clusters, we used cluster sampling to potentially detect more birds in the vicinity of a detection. If a WPW was detected at a point, a supplemental point survey would be completed approximately 0.5 miles away in as many directions as possible. Ideally, there would have been two to three supplemental points available for each original point where a WPW was heard; however, this was not always possible due to lack of roads, impending sunrise or moonset, inclement weather, or time constraints.

When a WPW was detected at a point, observers would take a bearing to better determine (and potentially triangulate) the location of the individual bird. At the end of each point count, observers would review the quantity and possible location of calling WPWs and make notes of directions based on the visible landscape at the point. Any WPW detections were mapped along the compass bearing noted to approximately 1 km for a "very far" distance code, 0.5 km - 0.75 km for a "far" distance code, and 0.25 km or less for "close" or "very close" distance codes. Repeat detection bearings and distance codes, along with location notes, were used to assist in mapping.

Volunteer Surveys:

Volunteers surveyed 16 pre-established roadside routes using the Northeast Nightjar Survey protocols during the 2020 breeding season under suitable weather and lunar conditions in the following Vermont towns: Berkshire, Brattleboro (partial survey), Brandon, Concord, Corinth, Coventry, Fair Haven, Georgia, Highgate (surveyed twice), Panton, Rutland, Salisbury, Snake Mountain, South Tunbridge, Springfield, and Wells. Routes were evaluated prior to the 2020 breeding season based on recommendations from the Northeast Nightjar Coordinator, Pamela Hunt. Any route with no WPW detections for three consecutive years would be surveyed only once in a five-year period (however, if a volunteer was interested in continuing to survey on an annual basis, their data would be included in the report). Routes without detections in the past three years that were not surveyed in 2020 included: Bennington, Ferrisburg, Hinesburg, Monkton, Pawlet, Peacham, Randolph, Shoreham, and Underhill. While the COVID-19 pandemic prevented some routes from being surveyed, overall volunteers were enthusiastic about surveying, as stay-at-home orders were eased to include local recreation just prior to the survey window.

Community Involvement

Due to COVID-19, we did not attempt to recruit new volunteers to conduct roadside surveys in 2020. Instead, we posted a request to eBird in late April asking Vermont birders to stay close to home and help document the return of WPW to their breeding grounds, as little is known about their migration patterns. We posted the same request to naturalists with the Vermont Atlas of Life, a project within iNaturalist. Soon after, a volunteer posted a similar public call-out to his local Front Porch Forum (a community based online forum) with the intent to reach out to people in his community. He enlisted the local Audubon chapter to help confirm each WPW report.

Results and Discussion

VCE Surveys

The 2020 WPW breeding season survey was completed using the systematic protocol with cluster sampling which was implemented in 2015 in order to produce standardized, replicable surveys. As in previous survey years, clusters of WPW were found throughout our survey areas in 2020. Our survey efforts were focused in primarily in Benson, Fair Haven and West Haven, which holds Vermont's largest WPW population. We surveyed 133 points and detected 97 individual WPWs (Table1).

Benson (Figure 3)

The Town of Benson is north of West Haven and consists of rural farmland along the shores of Lake Champlain. Many of the fields are hay fields or grazed fields, but there are also many cedar-filled shrubby fields. There are large forests, including many pine forests, bordering Lake Champlain and along the northern boundaries of Benson. Centrally located to the WPW activity in Benson is a protected 451-acre area, Shaw Mountain. It consists of an oak hickory forest, pine forests, and a shrub swamp. In 2020, the majority of WPWs in Benson were located along the large forests that border Lake Champlain–there were 13 individual WPWs in this cluster. One WPW was detected just north of Benson in Orwell. Seven WPWs were heard at points in Vermont, but they were mapped (based on distance codes and compass bearings) to locations in New York. There was a cluster of four WPW located east of Route 22A near Ponds Woods Wildlife Management Area. Finally, there was a lone WPW just south of the center of Benson. In total, 26 WPWs were heard at points in the Benson area in 2020. This is a significant increase to the 15 WPWs documented in 2014.

Fair Haven, Poultney and Castleton (Figure 4)

Most of the areas surveyed in Fair Haven and nearby Poultney and Castleton are predominately composed of slate quarries. The northern portion of the survey area (north of Route 4) consists of small quarries near open hay fields with large, adjacent forests to the west, east, and north. This area also encompasses a small air field and Old Marsh Pond Wildlife Management Area. The southern portion of the survey area (south of Route 4) includes quarries in thickly settled areas of Fair Haven, Poultney, and Castleton with few hay fields. There are pine forests to the east and southeast of the quarries. Also notable is a large power line cut that runs east to west through the forests. A ten-point route was established in this area in 2007, which begins in the slate quarries then continues south through hardwood forests and follows the Poultney River valley. The

WPWs were clustered in two distinct areas in both survey years. Nine WPWs were detected in the northern survey area, including a calling WPW mapped to a cluster of islands on Old Marsh Pond. This is a decrease from the 13 WPWs detected in 2014 in the same area. In the southern survey area, we detected nine calling WPW along the quarries on the pre-established route, plus an additional six WPWs were heard in close proximity to these quarries. This is a significant increase from the three WPWs heard in 2014. In total, there were 16 WPWs detected in 2014 on Fair Haven area surveys and 24 WPWs detected in 2020.

West Haven (Figure 5)

The West Haven route consists primarily of seasonally flooded forests, marshes, and hay fields along the Poultney River. Bald Mountain lies to the west of these open areas. Forests consist of oak, pine, or cedar forests. The Helen W. Buckner Memorial Natural Area at Bald Mountain is the center of WPW activity and is managed by The Nature Conservancy in Vermont. It is well known for its ecological diversity and holds the largest population of Golden-winged Warblers–a species, like the WPW, that relies on early successional habitat. The northern part of West Haven consists of a mix of farmland and large forest tracts, including The Narrows Wildlife Management Area along Lake Champlain. This WMA could provide suitable habitat for WPW foraging with its 81 acres of wetlands, old fields and orchards, and proximity to ~350 acres of conserved farmland. It also contains ledges and cliffs with softwoods, which could provide nesting habitat for breeding WPWs. In 2020, 29 calling WPWs were detected along the pre-established West Haven route, with 18 in Vermont, and 11 in New York. In 2014, there were a total of 32 calling WPWs detected along the West Haven route, with 28 in Vermont and four in New York. A short distance to the east of the route along the Poultney River, a cluster of four WPWs were detected in 2020, where only one was detected in 2014. Ten calling WPWs were heard along Pettis and Cold Springs Road, which was a slight decrease from the 13 birds detected in 2014. At the eastern end of Main Road, three WPWs were heard in New York across Lake Champlain, where there were three birds mapped to Vermont in 2014. Finally, a lone calling WPW was found in the southeast corner of West Haven near Route 22A that was not heard in 2014. In total, there were 51 WPWs detected in 2014 and only 47 WPWs detected on our West Haven surveys in 2020.

Volunteer Surveys:

The 2020 breeding season surveys completed by volunteers provided a significant amount of data for the project, with 155 individual points surveyed (Figure 6). Several of these routes have been consistently surveyed over the past 14 years. Of 155 points surveyed, 34

WPWs were detected within the survey protocol at 18 primary points (Table 3). Of these detections, there were 28 individual WPWs based on mapping. Two routes showed an increase in WPW detections compared to 2019: Snake Mountain and Wells. However, several volunteers noted a decrease in WPW detections on their survey completed within the survey protocols, compared to the previous year: Concord, Fair Haven, and South Tunbridge. Corinth, Rutland, and Salisbury have had no detection in two to three years.

Community Involvement:

Several incidental reports of WPW heard prior to the breeding season were submitted to eBird in 2020. From the community forum posting, there was a confirmed WPW report in Brattleboro (which many birders flocked to hear) and several unconfirmed reports in towns in towns with no previous WPW historical records. These WPW locations were in largely forested areas near the Green Mountain National Forest–in Dover, Topsham, Jamaica, Jacksonville, Shaftsbury, Townshend, and Wilmington.

Conclusion

VCE's 2020 intensive surveys in Rutland County yielded an increased number of WPW compared to 2014. This area continues to be Vermont's largest hotspot for WPWs and is a critical area to monitor for future population changes. This season's increased detection rate could be due to differences in protocol (adding set point counts every mile) rather than a true population increase. In 2020, we expanded our survey in the southern Fair Haven area to include the Fair Haven Route and surrounding quarries, which were not surveyed in 2014. At that time, the cluster of WPW in those quarries were not well documented. It wasn't until 2015 that the route was surveyed annually by volunteers. Anecdotal evidence from a few homeowners in the Benson area suggests that there are more WPWs this year than in many years past. Our surveys indicate that Benson has more WPWs than 2014 as well. There are likely WPWs located in areas we did not have access to (private property, gated roads) or access was difficult/time consuming. VCE's recent WPW surveys have been highly constrained due to the limited number of sites and routes that could be surveyed during the short breeding season and under conditions in which WPWs are known to call. To acquire more robust and comprehensive data, we continue to suggest use of automated recording units (e.g., Digby et al. 2013), which allows for more extensive surveys. WPWs have been successfully detected by ARUs even on nights outside of the Northeast Nightjar Protocol, when the moon is less than 50% illuminated (Clark and Fristrup 2009). Future surveys in this area could be made more thorough by incorporating additional surveys or ARU setups on privately held properties (with landowner permission), and hiring additional staff to set

up ARUs and analyze recordings.

Widespread decline of insect populations is on the forefront of leading explanations for aerial insectivore population declines, such as WPW. Habitat loss, predation, and collisions with vehicles may also be contributing factors. WPW populations in Vermont should continue to be monitored with surveys and automated recording devices over time to help determine if and when a conservation plan is needed. Since the areas we surveyed hold many conserved lands (Shaw Mountain, Ponds Woods Wildlife Management Area, Old Marsh Pond Wildlife Management Area, Helen W. Buckner Memorial Natural Area at Bald Mountain, and The Narrows Wildlife Management Area), if a conservation plan is deemed necessary, this would be an ideal location to carry one out.

Overall, this WPW survey protocol has proven to be sound, and surveying in other parts of Vermont is warranted, particularly in areas without established routes (i.e., areas with little historical data). In addition to continuing the survey protocol implemented in 2015 and establishing new routes around the state, we also suggest conducting an analysis of habitat use, which would better enable assessment of WPW habitat capacity in Vermont and permit fine-tuning of route designations for regular monitoring. This should include not only analyzing habitat relationships along existing survey routes, but also in other potentially suitable environments that are not well-covered by roadside surveys. For example, expanding surveys to include power lines, quarries, and recently logged areas would allow us to evaluate WPW use of these disturbed areas and to determine whether they constitute an important source of habitat that might play a critical role in recovery efforts. Modeling to identify potential WPW habitat could prove to be a valuable tool to increase detections across Vermont. Volunteers or VCE staff could follow up with point count surveys, thereby strengthening the model over time.

Volunteers detected 34 WPWs along routes in the breeding season, and several volunteers reported WPWs outside of their routes. Volunteers know their local WPW populations well, and having them submit reports on a regular basis is invaluable. Volunteers provide at least half of the annual points surveyed across the state. With a short breeding season, enlisting the help of volunteers is critical to providing long term data to determine population trends in the future.

Community involvement continues to be a valuable source of information for detecting this nocturnal species. There were several incidental reports prior to the breeding season, which helps bolster our long term migration data. Reaching out to the general public via public

online forums or listservs in specific areas each year could be a good way to determine new locations to survey in the future and to promote awareness about the species.

Figure 1. Points surveyed in 2014. Green lines represent roads surveyed.

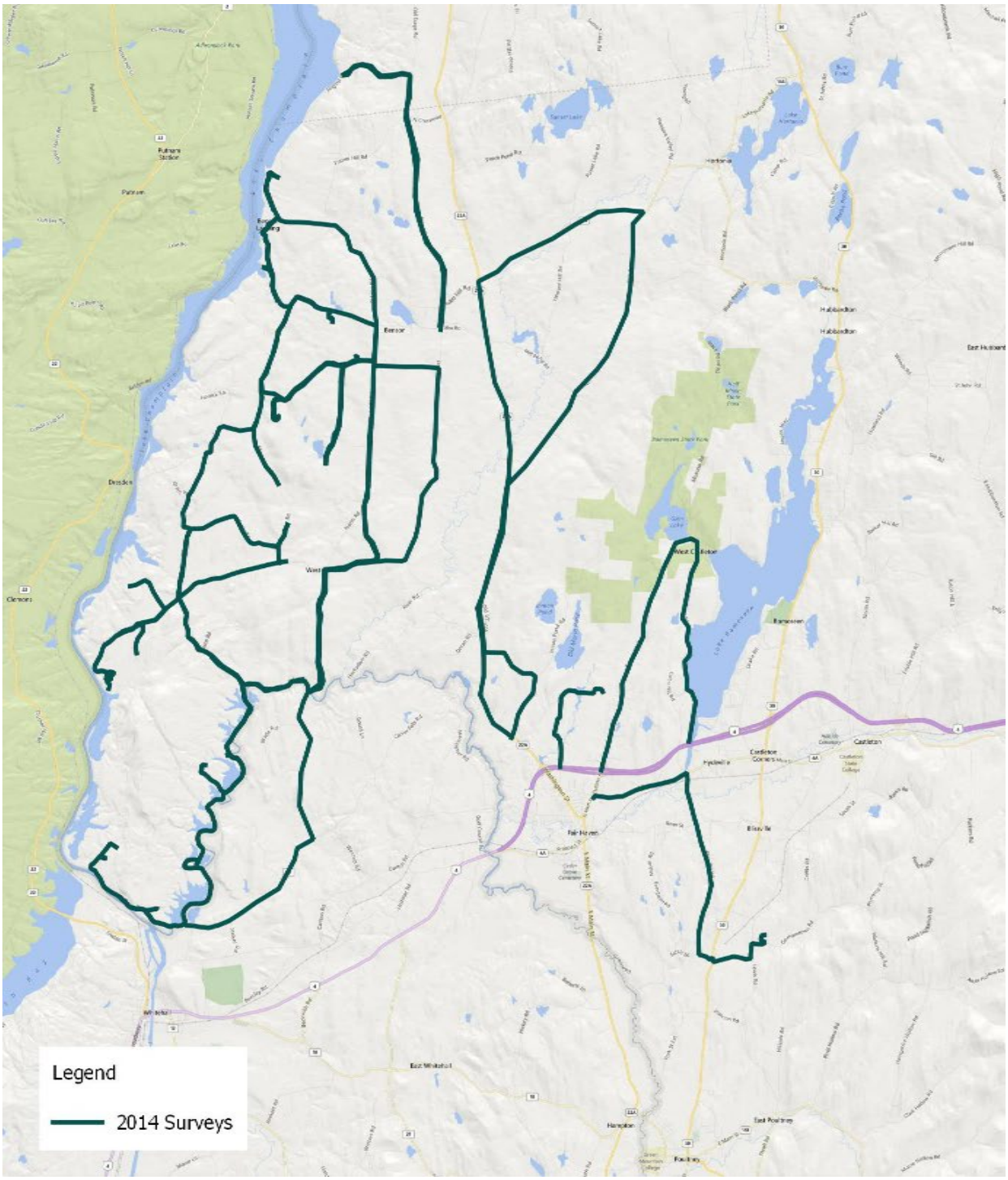

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Figure 2. Points surveyed in 2020. Orange lines represent roads traveled, navy dots represent points surveyed.

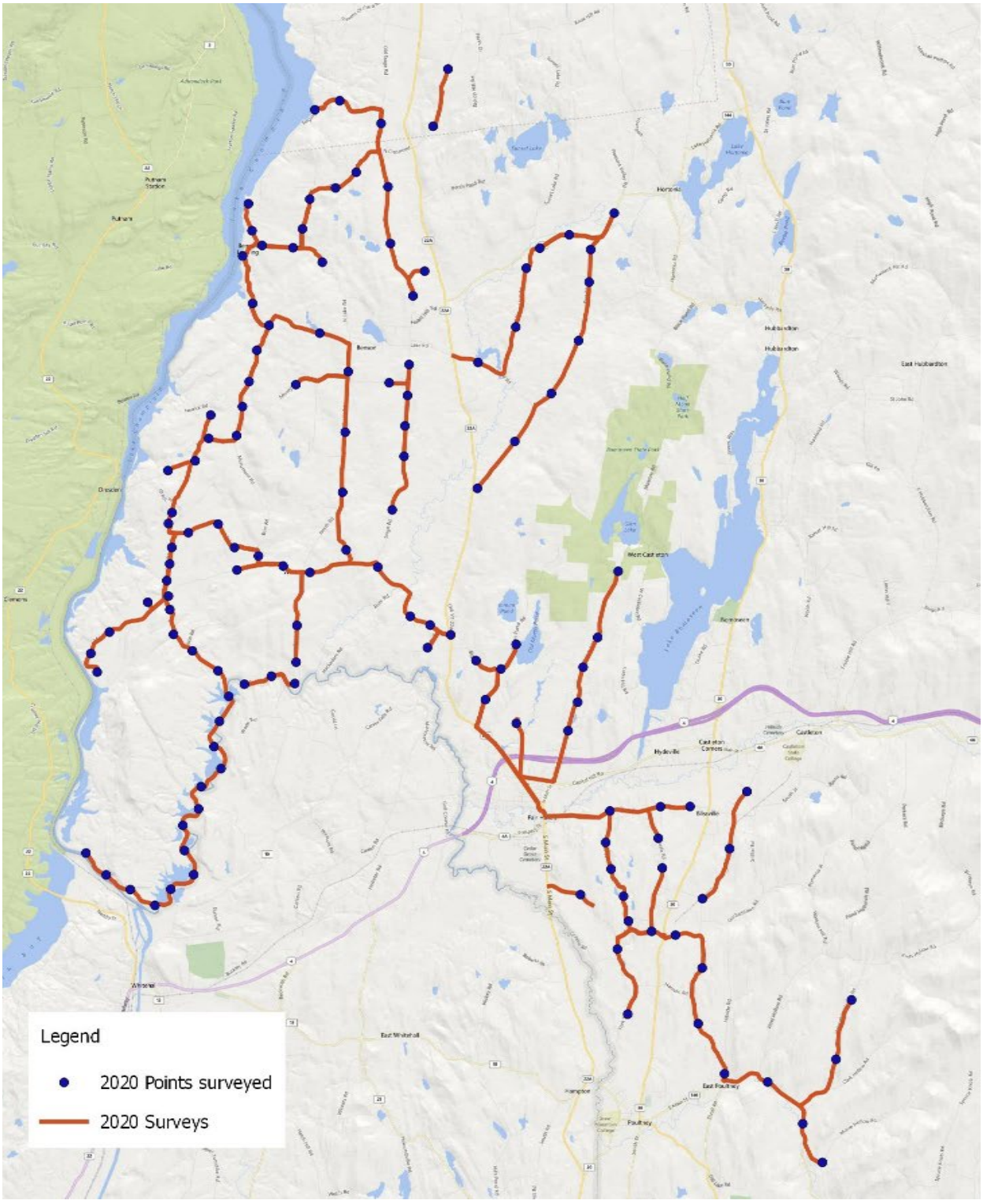

Figure 3. Approximate locations of calling WPWs in 2014 and 2020 in Benson, VT.

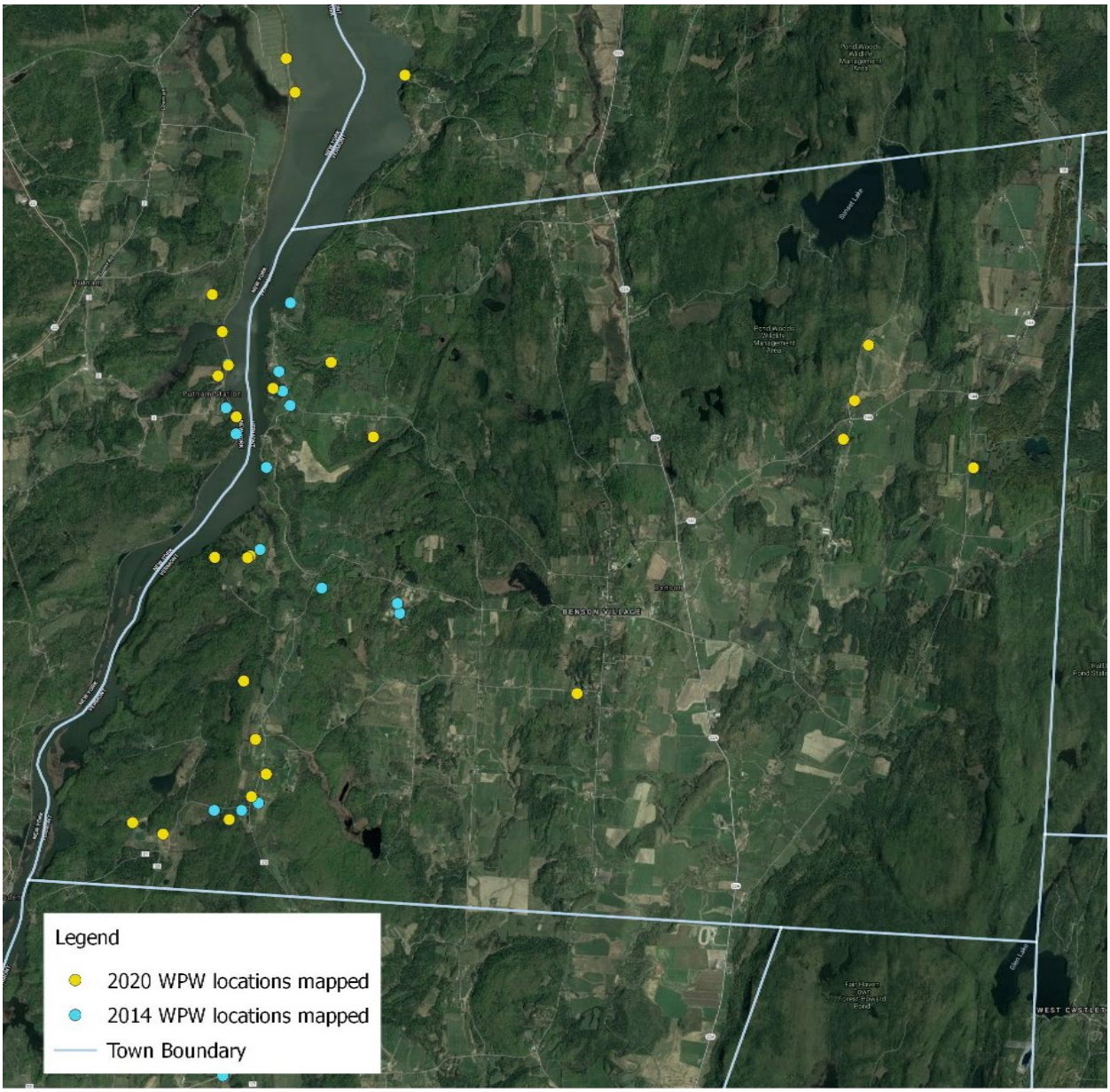

Figure 4. Approximate locations of calling WPWs in 2020 compared to 2014 in Fair Haven, Poultney, and Castleton, VT.

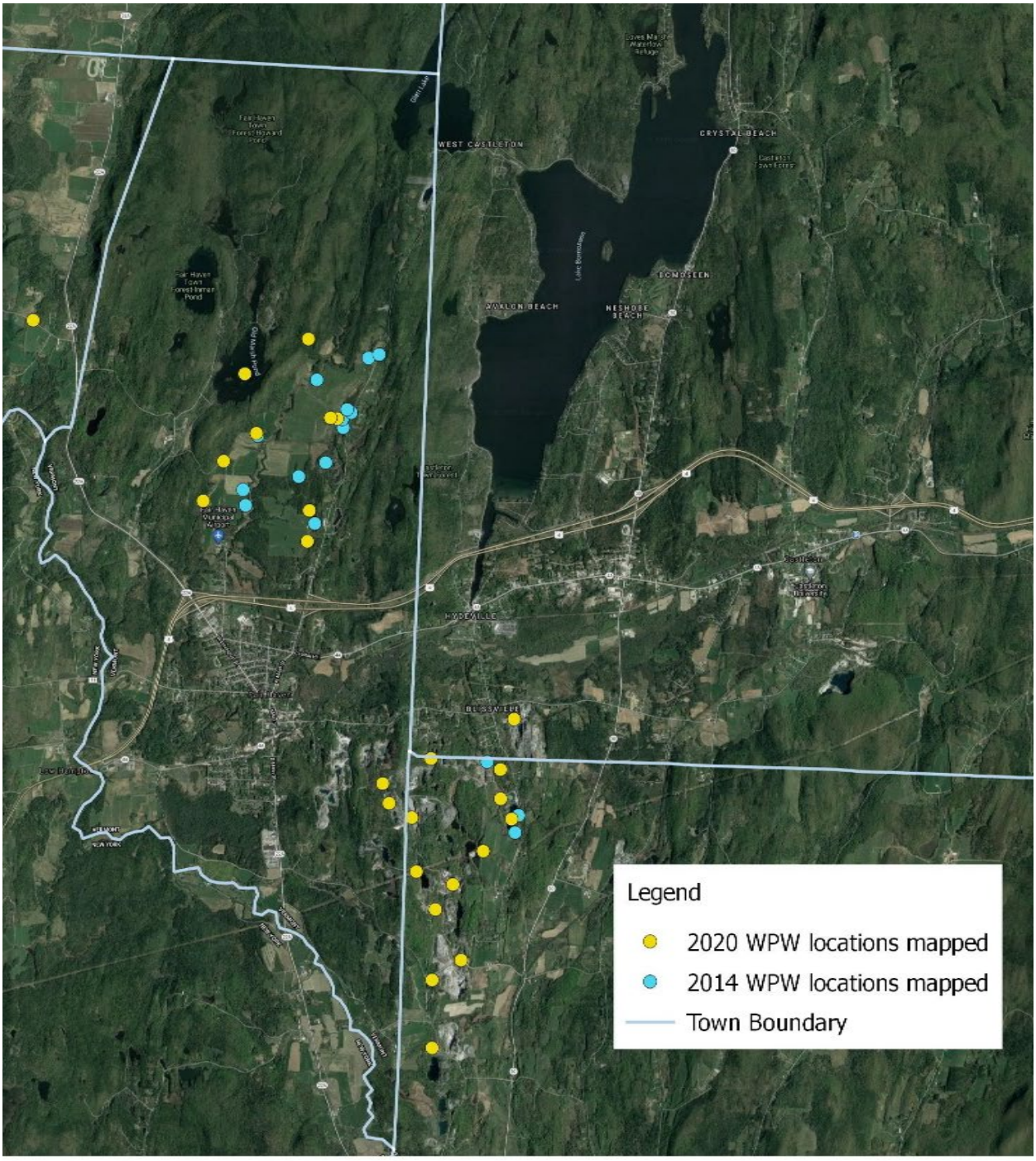

Figure 5. Approximate locations of calling WPWs in 2020 compared to 2014 in West Haven, VT.

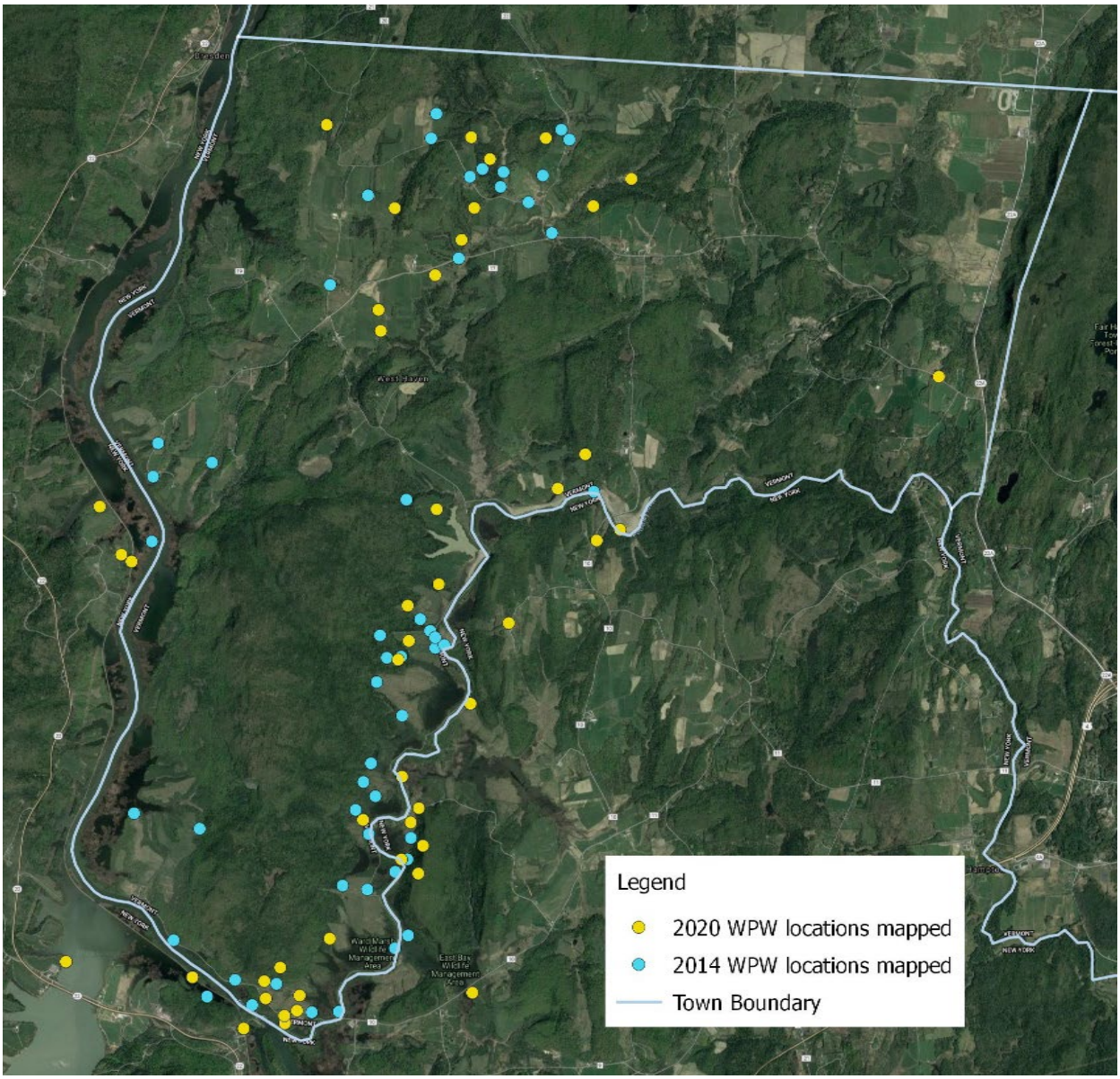

Figure 6. Points surveyed by volunteers. Green pins indicate points with WPW detection(s).

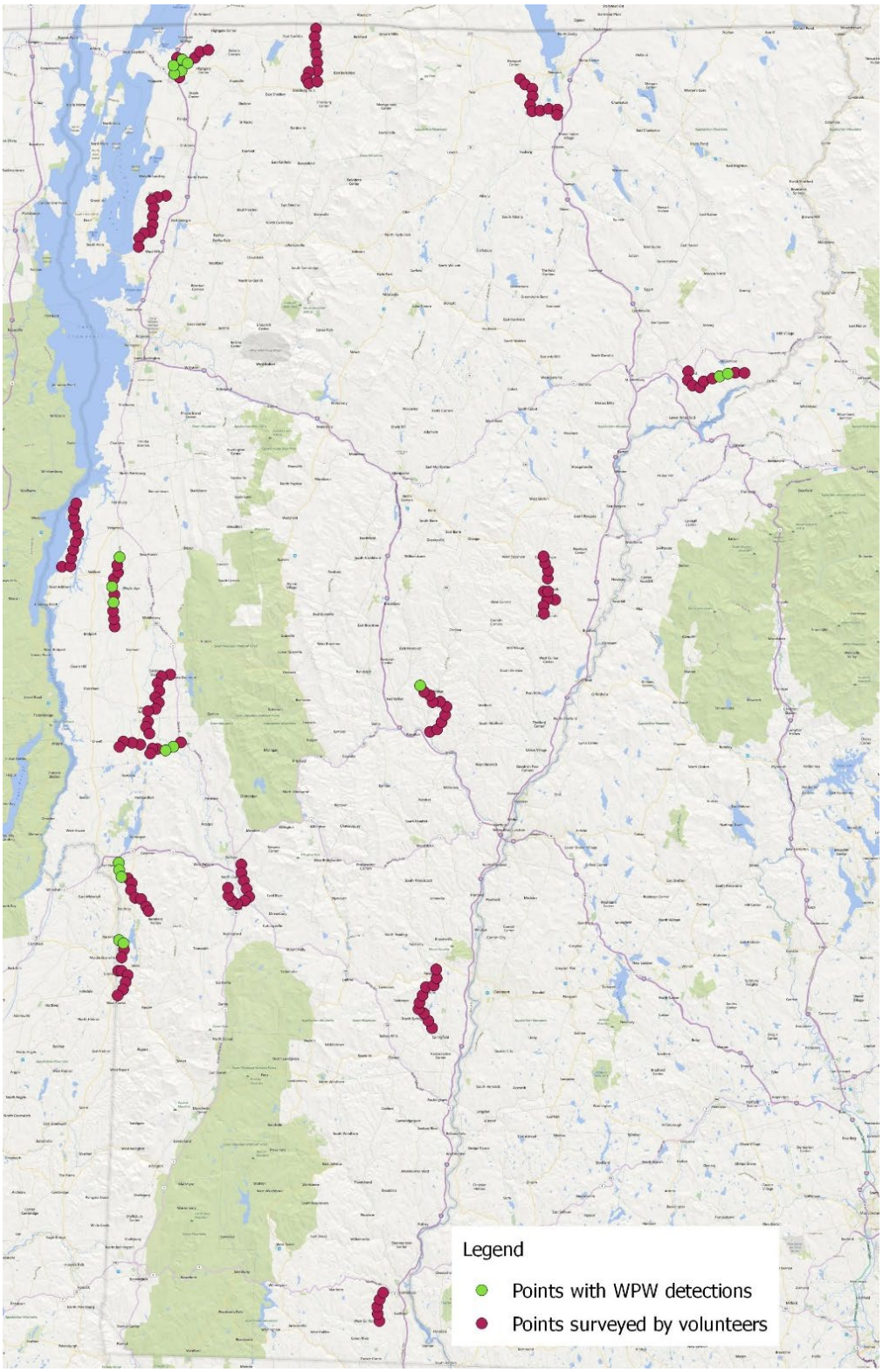

Table 1. Approximate locations of singing Whip-poor-wills in 2020 detected by VCE surveys with the date and time of first detection. Repeat detections are not listed. Approximate locations were mapped based on estimated distance codes and compass bearings.

Date	Time	WPW #	XCOORD	YCOORD	State
30-May-20	4:12	1	-73.424023	43.619471	NY
30-May-20	4:12	2	-73.422517	43.618736	NY
30-May-20	4:29	3	-73.4272	43.62459	NY
30-May-20	22:10	4	-73.3598	43.626498	VT
30-May-20	22:30	5	-73.354079	43.620974	NY
30-May-20	22:30	6	-73.350638	43.622131	NY
31-May-20	4:35	7	-73.384372	43.68018	VT
31-May-20	4:48	8	-73.389445	43.681563	VT
31-May-20	21:16	9	-73.373325	43.681943	VT
31-May-20	21:30	10	-73.369618	43.684708	VT
31-May-20	21:30	11	-73.367145	43.687419	VT
31-May-20	21:47	12	-73.368935	43.691607	VT
31-May-20	22:19	13	-73.370887	43.698664	VT
1-Jun-20	0:11	14	-73.369811	43.713757	VT
1-Jun-20	0:11	15	-73.370253	43.713529	VT
1-Jun-20	0:28	16	-73.375736	43.713582	VT
1-Jun-20	0:52	17	-73.372123	43.73052	NY
1-Jun-20	0:52	18	-73.375164	43.73546	NY
1-Jun-20	4:08	19	-73.354578	43.656573	VT
1-Jun-20	4:08	20	-73.348967	43.659474	VT
1-Jun-20	4:20	21	-73.37396	43.652979	VT
1-Jun-20	4:20	22	-73.361562	43.663823	VT
2-Jun-20	4:37	23	-73.349277	43.7281	VT
3-Jun-20	21:37	24	-73.249176	43.724387	VT
3-Jun-20	22:00	25	-73.266661	43.739176	VT
3-Jun-20	22:09	26	-73.269022	43.732484	VT
3-Jun-20	22:45	27	-73.270887	43.727824	VT
3-Jun-20	23:58	28	-73.303731	43.638422	VT
4-Jun-20	1:40	29	-73.355752	43.630153	VT
4-Jun-20	20:50	30	-73.432177	43.576107	NY
4-Jun-20	21:03	31	-73.413552	43.574441	NY
4-Jun-20	21:15	32	-73.402983	43.574019	VT
4-Jun-20	21:15	33	-73.402781	43.572184	VT
4-Jun-20	21:15	34	-73.406024	43.568985	NY
4-Jun-20	21:15	35	-73.398173	43.570878	VT
4-Jun-20	21:32	36	-73.399956	43.569536	VT
4-Jun-20	21:32	37	-73.40004	43.570347	VT

4-Jun-20	21:46	38	-73.397793	43.5725	VT
4-Jun-20	21:46	39	-73.400633	43.575475	VT
4-Jun-20	22:00	40	-73.393356	43.578555	VT
4-Jun-20	22:00	41	-73.372372	43.572797	NY
4-Jun-20	22:00	42	-73.380324	43.58549	NY
4-Jun-20	22:17	43	-73.38282	43.587	NY
4-Jun-20	22:35	44	-73.388456	43.591212	VT
4-Jun-20	22:35	45	-73.381442	43.590946	NY
4-Jun-20	22:53	46	-73.382717	43.595817	NY
4-Jun-20	22:35	47	-73.379646	43.588458	NY
4-Jun-20	22:53	48	-73.38025	43.592464	NY
4-Jun-20	23:27	49	-73.372649	43.603596	NY
4-Jun-20	23:43	50	-73.381887	43.614036	VT
4-Jun-20	23:43	51	-73.381718	43.610283	VT
4-Jun-20	23:43	52	-73.383291	43.608285	VT
5-Jun-20	0:15	53	-73.377617	43.6243	VT
5-Jun-20	0:15	54	-73.367018	43.612185	NY
5-Jun-20	0:15	55	-73.377318	43.616322	VT
5-Jun-20	1:08	56	-73.395894	43.642158	VT
5-Jun-20	1:21	57	-73.385855	43.643295	VT
5-Jun-20	1:21	58	-73.386184	43.645527	VT
5-Jun-20	21:00	59	-73.27638	43.617362	VT
5-Jun-20	21:32	60	-73.239711	43.587313	VT
5-Jun-20	21:53	61	-73.2475	43.584404	VT
5-Jun-20	21:53	62	-73.246465	43.582099	VT
5-Jun-20	22:05	63	-73.242815	43.58043	VT
5-Jun-20	22:05	64	-73.236203	43.572628	VT
5-Jun-20	22:05	65	-73.23901	43.56971	VT
5-Jun-20	22:20	66	-73.242077	43.574124	VT
5-Jun-20	22:35	67	-73.239551	43.561479	VT
5-Jun-20	22:35	68	-73.234876	43.563805	VT
5-Jun-20	23:09	69	-73.239553	43.553556	VT
6-Jun-20	21:02	70	-73.356333	43.737101	VT
6-Jun-20	21:14	71	-73.366004	43.733965	VT
7-Jun-20	3:41	72	-73.315291	43.697141	VT
7-Jun-20	21:02	73	-73.374481	43.740783	NY
7-Jun-20	21:02	74	-73.376141	43.745277	NY
7-Jun-20	21:17	75	-73.373479	43.736747	NY
8-Jun-20	2:26	76	-73.344021	43.771715	VT
8-Jun-20	2:41	77	-73.363798	43.773724	NY
8-Jun-20	2:41	78	-73.362326	43.76965	NY

9-Jun-20	21:21	79	-73.25944	43.636233	VT
9-Jun-20	21:33	80	-73.254815	43.626945	VT
9-Jun-20	21:33	81	-73.255872	43.627041	VT
10-Jun-20	1:56	82	-73.259276	43.616243	VT
10-Jun-20	2:09	83	-73.259625	43.612645	VT
10-Jun-20	2:51	84	-73.269661	43.632177	VT
10-Jun-20	2:51	85	-73.267808	43.625246	VT
10-Jun-20	3:34	86	-73.273078	43.621995	VT
10-Jun-20	4:03	87	-73.226356	43.591911	VT
10-Jun-20	4:32	88	-73.228545	43.586039	VT
11-Jun-20	21:19	89	-73.226755	43.580257	VT
11-Jun-20	21:19	90	-73.228512	43.582626	VT
11-Jun-20	21:19	91	-73.23131	43.576514	VT
12-Jun-20	2:19	92	-73.372101	43.65638	VT
12-Jun-20	2:19	93	-73.369785	43.661577	VT
12-Jun-20	2:31	94	-73.372531	43.663907	VT
12-Jun-20	3:02	95	-73.377852	43.649228	VT
12-Jun-20	3:31	96	-73.38379	43.656356	VT
12-Jun-20	3:31	97	-73.393804	43.665229	VT

Table 2. Approximate locations of singing Whip-poor-wills in 2014 detected by VCE surveys with the date and time of first detection. Repeat detections are not listed. Approximate locations were mapped based on estimated distance codes and compass bearings.

Date	Time	WPW #	XCOORD	YCOORD	State
11-May-14	20:42	1	-73.382851	43.608604	VT
11-May-14	20:42	2	-73.384956	43.608483	VT
11-May-14	20:42	3	-73.382702	43.602314	VT
11-May-14	20:51	4	-73.386449	43.605891	VT
11-May-14	21:28	5	-73.37858	43.611357	VT
11-May-14	21:38	6	-73.385952	43.610872	VT
11-May-14	22:21	7	-73.38207	43.625319	VT
12-May-14	3:46	8	-73.404776	43.571478	VT
12-May-14	4:32	9	-73.407275	43.574159	VT
12-May-14	4:49	10	-73.401201	43.573733	VT
12-May-14	21:19	11	-73.396	43.570708	VT
12-May-14	3:58	12	-73.411416	43.572382	NY
17-May-14	20:55	13	-73.419533	43.620868	NY
18-May-14	4:24	14	-73.410674	43.629272	VT
19-May-14	1:56	15	-73.367795	43.660205	VT
19-May-14	2:02	16	-73.361997	43.659839	VT
19-May-14	2:14	17	-73.364106	43.65698	VT
19-May-14	2:19	18	-73.36823	43.658625	VT
19-May-14	2:45	19	-73.358098	43.663656	VT
19-May-14	3:05	20	-73.359284	43.664709	VT
19-May-14	3:15	21	-73.370893	43.660525	VT
19-May-14	3:16	22	-73.372726	43.659703	VT
19-May-14	3:22	23	-73.378441	43.663793	VT
19-May-14	3:24	24	-73.377673	43.666406	VT
19-May-14	3:36	25	-73.387738	43.657715	VT
19-May-14	3:48	26	-73.3933	43.6482	VT
19-May-14	4:04	27	-73.374377	43.651021	VT
19-May-14	4:15	28	-73.360673	43.653711	VT
6-Jun-14	4:20	29	-73.41861	43.63133	VT
6-Jun-14	4:41	30	-73.419348	43.627785	VT
6-Jun-14	21:00	31	-73.422154	43.591906	VT
6-Jun-14	21:11	32	-73.412505	43.590267	VT
6-Jun-14	22:00	33	-73.416333	43.578389	VT
7-Jun-14	3:31	34	-73.3545	43.626167	VT
7-Jun-14	4:22	35	-73.375828	43.683051	VT
7-Jun-14	4:28	36	-73.371256	43.683048	VT
7-Jun-14	4:38	37	-73.368445	43.683928	VT

7-Jun-14	21:05	38	-73.387611	43.589694	VT
7-Jun-14	21:14	39	-73.389553	43.59227	VT
7-Jun-14	21:22	40	-73.386634	43.59373	VT
7-Jun-14	21:46	41	-73.388408	43.595251	VT
7-Jun-14	21:46	42	-73.387282	43.597235	VT
7-Jun-14	20:52	43	-73.381939	43.587013	NY
7-Jun-14	21:00	44	-73.381418	43.589297	NY
8-Jun-14	3:50	45	-73.37782	43.609531	VT
8-Jun-14	4:00	46	-73.376506	43.609843	VT
8-Jun-14	4:07	47	-73.377841	43.610644	VT
8-Jun-14	4:15	48	-73.380042	43.6126	VT
10-Jun-14	4:10	49	-73.344872	43.706834	VT
10-Jun-14	4:12	50	-73.345268	43.708015	VT
10-Jun-14	22:11	51	-73.226189	43.578679	VT
10-Jun-14	22:13	52	-73.225638	43.58069	VT
10-Jun-14	22:20	53	-73.230683	43.586928	VT
14-Jun-14	21:02	54	-73.368181	43.714519	VT
14-Jun-14	21:11	55	-73.367121	43.724424	VT
14-Jun-14	21:17	56	-73.372167	43.728474	NY
14-Jun-14	21:20	57	-73.373857	43.731613	NY
15-Jun-14	4:00	58	-73.364398	43.733623	VT
15-Jun-14	4:00	59	-73.363158	43.73188	VT
15-Jun-14	4:07	60	-73.365017	43.735988	VT
15-Jun-14	4:20	61	-73.363114	43.744263	VT
15-Jun-14	4:36	62	-73.357884	43.709878	VT
15-Jun-14	21:08	63	-73.383731	43.58568	VT
15-Jun-14	21:23	64	-73.38783	43.583792	VT
15-Jun-14	21:31	65	-73.391472	43.584215	VT
15-Jun-14	4:07	66	-73.37354	43.736896	NY
16-Jun-14	2:59	67	-73.39201	43.570783	VT
16-Jun-14	3:11	68	-73.383761	43.577535	VT
16-Jun-14	21:03	69	-73.256674	43.621824	VT
16-Jun-14	21:22	70	-73.267601	43.624963	VT
16-Jun-14	21:29	71	-73.260994	43.620197	VT
16-Jun-14	21:39	72	-73.269955	43.618657	VT
16-Jun-14	21:40	73	-73.269561	43.616844	VT
16-Jun-14	3:20	74	-73.381826	43.5789	NY
17-Jun-14	2:50	75	-73.258411	43.614723	VT
17-Jun-14	3:04	76	-73.253841	43.625891	VT
17-Jun-14	3:04	77	-73.254007	43.626872	VT
17-Jun-14	3:11	78	-73.25255	43.627653	VT

17-Jun-14	3:11	79	-73.253214	43.628014	VT
17-Jun-14	3:20	80	-73.258086	43.63147	VT
17-Jun-14	3:20	81	-73.249765	43.634021	VT
17-Jun-14	3:25	82	-73.248052	43.634423	VT

Table 3. Date, route, point number, approximate location of volunteer observer at time of WPW detection, and indication of a possible repeat detection based on mapping for volunteer surveys. Does not include surveys completed outside of the Northeast Nightjar Protocol or points other than primary points on a route.

Date	Route and Point	XCOORD	YCOORD	Repeat?
31-May-20	Concord 7	-71.8146	44.4199	N
31-May-20	Concord 7	-71.8146	44.4199	N
31-May-20	Concord 8	-71.7947	44.4245	N
31-May-20	Concord 8	-71.7947	44.4245	N
01-June-20	Brandon 2	-73.1133	43.7883	N
01-June-20	Brandon 3	-73.1316	43.7821	N
04-June-20	Snake Mountain 4	-73.255593	44.03522	N
04-June-20	Snake Mountain 4	-73.255593	44.03522	N
04-June-20	Snake Mountain 4	-73.255593	44.03522	N
04-June-20	Snake Mountain 6	-73.259116	44.0623	N
04-June-20	Snake Mountain 6	-73.259116	44.0623	N
04-June-20	Snake Mountain 10	-73.241297	44.112468	N
05-June-20	S. Tunbridge 10	-72.526304	43.893042	N
05-June-20	Wells 1	-73.24247	43.45582	N
05-June-20	Wells 2	-73.23183	43.45050	N
07-June-20	Highgate 1	-73.0940	44.9360	N
07-June-20	Highgate 1	-73.0940	44.9360	N
07-June-20	Highgate 1	-73.0940	44.9360	N
07-June-20	Highgate 3	-73.1110	44.9310	N
07-June-20	Highgate 4	-73.1130	44.9450	N
07-June-20	Highgate 4	-73.1130	44.9450	N
07-June-20	Highgate 4	-73.1130	44.9450	Y
07-June-20	Highgate 6	-73.0920	44.9550	N
07-June-20	Highgate 6	-73.0920	44.9550	N
07-June-20	Highgate 7	-73.0790	44.9490	Y
08-June-20	Fair Haven 1	-73.243179	43.589117	N
08-June-20	Fair Haven 1	-73.243179	43.589117	N
08-June-20	Fair Haven 1	-73.243179	43.589117	N
08-June-20	Fair Haven 2	-73.242096	43.576539	N

08-June-20	Fair Haven 3	-73.236643	43.564795	Y
08-June-20	Fair Haven 3	-73.236643	43.564795	N
01-July-20	Highgate 1	-73.0940	44.9360	Y
01-July-20	Highgate 1	-73.0940	44.9360	Y
01-July-20	Highgate 7	-73.0790	44.9490	Y

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