Cooperator Ruffed Grouse & American Woodcock Hunting Log

During the 2013-14 ruffed grouse and American woodcock hunting seasons, 260 hunters recorded their daily hunting activities, including information such as the number of birds flushed, the number of hours hunted, the number of birds killed, and if a dog was used to hunt grouse and woodcock. The primary purpose of the log is to monitor the number of birds flushed per hour. Changes in the flush rate illustrate trends in the grouse and woodcock populations when viewed over a long period of time and will provide insight into statewide distributions for these popular game species as habitats change both locally and on a landscape scale.

We thank all the hunters that participated in this survey during the 2013-14 seasons.

Results from the 2013-14 Season

During the 2013-14 season, participants reported data from almost 2,400 hunting trips across the state, from the lower Hudson Valley in the south, to the Adirondacks and St. Lawrence Valley in the north, and the Lake Plains and Allegheny Plateau in far western New York. They spent almost 6,400 hours afield and flushed almost 5,000 grouse (about 0.8 flushes/hour) and close to 3,100 woodcock (about 0.7 flushes/hour). Findings from the 2013-14 season include:

Grouse Hunting

- Hunters participating in the survey averaged about 25 hours afield during the 2013-14 season. They took about 9 trips afield for the season and spent about 3 hours afield per trip (Table 1).
- Grouse log participants averaged about 19 grouse flushed per hunter for the 2013-14 season and had to spend about one hour and 20 minutes hunting in order to flush one grouse. In addition, hunters averaged about 1.5 birds harvested for the season and had to invest over 16 hours of hunting effort to harvest one grouse. On average, one out of every 13 grouse flushes resulted in a kill (a 7.7% success rate; Table 1).
- About 75% of the effort expended by hunters occurred during the first half of the season (September - November; Table 2). In addition, about 80% of the grouse flushed and 78% of the grouse harvested occurred during this early part of the season, but the flush rate was similar between the early and late portions of the season.
- Slightly more effort was expended by hunters on public lands, and the number of grouse flushed was slightly higher there (Table 3); however, the flush rates on public and private lands were similar (0.76 flushes/hour).
- Overall, there was far more effort expended in the southern grouse season zone than the northern season zone (over 70% of the total), but the flush rate was lower in the southern zone (about 0.75 flushes/hour vs. 0.85 flushes/hour; Table 4).
- Hunting effort was well distributed across major geographic regions of New York State. About 43% of the hunting effort took place in western New York (37% Appalachian Hills & Plateau Ecozone, 6% Lake Plains Ecozone), about 26% in northern New York (17% Adirondacks-Tug Hill Ecozone, 7% St. Lawrence Valley Ecozone, 2% Champlain Valley Ecozone), and about 32% in the

southeastern part of the state (18% Catskills-Delaware Hills, 14% Mohawk Valley-Hudson-Valley-Taconic Highlands). The highest number of grouse were flushed and harvested in the Appalachian Hills & Plateau Ecozone, followed by the Catskill-Delaware Hills and Adirondacks-Tug Hill ecozones (Table 5; see Figures 1 and 2 for regions referred to here).

- The flush rate was highest in the Adirondacks-Tug Hill and Catskills-Delaware Hills ecozones (about 0.96 grouse flushed/hour), followed by the Appalachian Hills and Plateau Ecozone (0.82 birds flushed/hour). The rest of the ecozones were at or below the annual statewide average of 0.77 grouse flushed/hour (Table 5, Figures 1 and 2).
- Most hunters that participated in the survey used a dog to hunt grouse (Table 6). In general, hunters that used a dog flushed and harvested more grouse and had a higher flush rate (0.85 grouse flushed/hour) than hunters that did not use a dog (0.62 grouse flushed/hour).

Woodcock Hunting

- Analyses for woodcock data were restricted to 20 September through 30 November. This represents the period in which resident and migrating woodcock were in New York and accounted for 99% of all the woodcock observations during the survey. The results presented in this report are based on 1,781 trips and 4,935 hours afield by 235 hunters.
- Hunters participating in the survey averaged almost 21 hours afield during the 2013 woodcock season. They took about 8 trips afield for the season and spent about 3 hours afield per trip (Table 1).
- Survey participants averaged about 13 woodcock flushed per hunter for the 2013 season and had to spend just over 1 ½ hours hunting in order to flush one woodcock. In addition, hunters averaged almost 3 birds harvested for the season and had to invest about 8 hours of hunting effort to harvest one woodcock. On average, one out of every 5 woodcock flushes resulted in a kill (a 20% success rate; Table 1).
- Hunting effort was evenly distributed over the 45-day season (Table 7), with a peak in effort in mid-October. More birds were flushed during the last week of October than during any other week of the season, and this week coincided with the highest observed flush rate (1.04 birds flushed/hour; Table 7). The overall flush rate from 20 September through 30 November was 0.70 birds/hour.
- There was more hunting effort and woodcock flushed and killed on public land than on private land, but the flush rate was higher on private land (0.79 vs. 0.63 woodcock flushed/hour; Table 3).
- There was more hunting effort and woodcock flushed and killed in the southern zone than in the northern zone, but the flush rate was similar between the northern and southern zones (about 0.70 woodcock flushed/hour; Table 4).
- The flush rate was highest in the Lake Plains Ecozone (1.40 woodcock flushed/hour), followed by the St. Lawrence Valley Ecozone (1.03 woodcock flushed/hour). Several other ecozones were close to the statewide average flush rate (0.70 birds flushed/hour), with the exception of the Champlain Valley and Mohawk Valley-Hudson Valley-Taconic Highlands ecozones, which were below the statewide average (Table 8, Figure 4).
- Most hunters that participated in the survey used a dog to hunt woodcock (Table 6). Hunters that used a dog flushed and harvested more woodcock and had a higher flush rate (0.96 birds flushed/hour) than hunters that did not use a dog (0.18 birds flushed/hour).

Comparing 2013-14 to Previous Seasons

Ruffed Grouse

- Over the past ten seasons, 1,188 hunters have participated in this survey. They took almost 29,000 trips afield, spent about 80,000 hours pursuing grouse, flushed around 79,000 birds, and harvested roughly 6,800 grouse. During this time period, the average flush rate was 1.02 grouse flushed/hour.
- Summary statistics for hunter effort (trips/hunter, hours/hunter) during the 2013-14 season were similar to the previous season and were below the long-term average. Indices for grouse abundance (flushes/hunter, flushes/hour) were higher than 2012-13, but below the long-term average. The amount of time spent afield to harvest a grouse has increased the past five seasons from 9 hours in 2009-10 to over 16 hours in 2013-14 (Table 1).
- Flush rates were similar from 2012-13 to 2013-14 in most ecozones, with the exception of modest increases in the St. Lawrence Valley and Catskills-Delaware Hills (Figure 1).
- Over the past ten seasons, trends in grouse populations statewide and in major ecozones have resembled a “bell-shaped curve” that peaked from 2006-09 (Figure 1). It is unclear whether this is illustrative of the grouse population “cycles” that have been observed in other states. If we use statewide grouse harvest estimates as an index to grouse populations, over the past two decades there does not seem to be a 10-year cycle in New York. Whether this is because declining habitat quantity and quality have disrupted the cycle, or whether these habitat factors are "masking" a cycle that would normally occur during optimal habitat conditions is not known. Alternately, there may be population cycles operating at a geographic scale larger (e.g., the northeastern U.S.) or smaller (e.g., the St. Lawrence Valley) than currently being measured. In the coming years, data from the Grouse Hunter's Log will help identify patterns in grouse populations and help us determine whether such cycles occur in New York.
- After ten seasons, we can begin to assemble a picture of grouse distribution and abundance in New York State, and use this information to help target habitat management efforts to improve conditions for early successional species (Figure 3). Improving or restoring habitat in or close to regions with high quality habitat has a better chance at being successful than habitat management in regions devoid of high quality grouse habitat. In fact, conducting habitat improvement in regions with a lack of good habitat can have detrimental impacts on grouse populations by creating habitat "sinks" (islands of good habitat in a sea of poor habitat) that are insufficient for reproduction and survival.
- Annual variation in grouse abundance is likely a result of variation in weather, including spring temperature and rainfall and winter snow conditions, and food availability during the summer and fall (e.g., soft and hard mast). Ecozones with flush rates that are consistently below the statewide average likely suffer from poor habitat quantity and quality. In areas with a lack of the early successional habitats on which this species depends, grouse, their nests, and young are more vulnerable to predation and other limiting factors.

American Woodcock

- With the expansion of the woodcock season from 30 days in 2010 to 45 days in 2011, we observed a concomitant increase in hunter effort. Hunter effort has increased gradually from 2010 through 2013, but the flush rate has varied by year. The flush rate in 2013 was the highest

observed in the four years woodcock have been included in this survey (0.70 birds flushed/hour; Table 1, Figure 5).

- In the spring "Singing-ground Survey" (SGS) coordinated by the U.S. Fish and Wildlife Service the number of singing males per route in New York from 2010 to 2012 was 2.78, 2.61, and 2.68 males, respectively, so over this short time span the SGS conducted in the spring and the hunter's log were correlated. This relationship did not continue in 2013 as the singing males index was similar to the previous season (2.66), but the flush rate in the fall increased from 0.58 to 0.70 birds flushed/hour possibly indicating good recruitment during summer 2013.
- Three of the last four years the peak of woodcock migration occurred during the last week of October, with the exception being 2011 when it occurred the week of October 18th (Figure 5).

Table 1. Summary statistics for the grouse and woodcock hunting seasons from the Cooperator Ruffed Grouse & American Woodcock Hunting Log, 2013-14.

Summary Statistics	Grouse Hunting					Woodcock Hunting				
	2010-11	2011-12	2012-13	2013-14	3-Yr Avg (10-11 - 12-13)	Fall 2010	Fall 2011	Fall 2012	Fall 2013	3-Year Avg (10-12)
Number of Hunters	272	294	280	260	282	259	266	237	235	254
Trips/Hunter	8.9	10.8	9.4	9.1	9.7	4.8	6.2	6.4	7.6	5.8
Hours/Trip	2.8	2.7	2.6	2.7	2.7	2.9	2.9	2.7	2.8	2.8
Hours/Hunter	24.9	29.4	24.9	24.5	26.4	13.9	17.6	17.1	21.0	16.2
Birds Flushed/Hunter	21.3	26.4	17.8	19.0	21.8	9.3	8.5	10.7	13.1	9.5
Birds Harvested/Hunter	1.9	2.0	1.5	1.5	1.8	1.8	1.9	2.3	2.6	2.0
Hours/Bird Flushed*	1.2	1.1	1.4	1.3	1.2	1.5	2.1	1.6	1.6	1.7
Hours/Bird Harvested*	13.2	14.4	16.5	16.8	14.7	7.9	9.3	7.5	8.1	8.2
% of Birds Flushed that were Harvested	8.9	8.9	8.5	7.7	8.8	18.9	22.2	21.5	19.7	20.9
Flush Rate (birds flushed/hour)**	0.90	0.96	0.73	0.77	0.86	0.59	0.49	0.58	0.70	0.55

* Number of hours afield to flush or harvest one bird.

** Overall flush rates are calculated as an average flush rate for all days hunted, not a simple division of the total number of birds flushed by the total number of hours hunted.

NOTE: Analyses for woodcock data were restricted to 20 September through 30 November. This represents the period in which resident and migrating woodcock were in New York and accounted for 99% of all the woodcock observations during the survey. Results for 2013 are based on 1,781 trips and 4,935 hours afield by 235 hunters.

Table 2. Hunting effort, grouse flushed and killed, and flush rates (grouse flushed/hour) by month from the Cooperator Ruffed Grouse & American Woodcock Hunting Log, 2013-14.

Month	# of Trips	% of Total	# of Hours	% of Total	# Grouse Flushed	% of Total	# Grouse Harvested	% of Total	Flush Rate ± SE* (flushes/hour)
September	74	3%	215	3%	190	4%	11	3%	0.89 ± 0.12
October	1,146	49%	3,088	48%	2,344	48%	177	47%	0.72 ± 0.03
November	561	24%	1,632	26%	1,390	28%	109	29%	0.86 ± 0.05
December	198	8%	493	8%	417	8%	42	11%	0.88 ± 0.09
January	203	9%	496	8%	345	7%	24	6%	0.82 ± 0.08
February	177	8%	446	7%	246	5%	16	4%	0.57 ± 0.07

* SE = standard error; Data analysis included logs with some missing data. Overall flush rates are calculated as an average flush rate for all days hunted, not a simple division of the total number of birds flushed by the total number of hours hunted.

Table 3. Hunting effort, grouse and woodcock flushed and killed, and flush rates (birds flushed/hour) by land type (public vs. private) from the Cooperator Ruffed Grouse & American Woodcock Hunting Log, 2013-14.

	Public Land				Private Land			
	Grouse Hunting		Woodcock Hunting		Grouse Hunting		Woodcock Hunting	
	#	%	#	%	#	%	#	%
Number of Trips	1,238	54%	977	57%	1,052	46%	743	43%
Number of Hours	3,490	57%	2,824	59%	2,673	43%	1,932	41%
# Birds Flushed	2,738	59%	1,668	57%	1,934	41%	1,283	43%
# Birds Harvested	189	52%	333	58%	172	48%	242	42%
Flush Rate ± SE* (flushes/hour)	0.76 ± 0.03		0.63 ± 0.03		0.76 ± 0.03		0.79 ± 0.05	

Table 4. Hunting effort, grouse and woodcock flushed and killed, and flush rates (birds flushed/hour) by season zone from the Cooperator Ruffed Grouse & American Woodcock Hunting Log, 2013-14.

	Northern Zone				Southern Zone			
	Grouse Hunting		Woodcock Hunting		Grouse Hunting		Woodcock Hunting	
	#	%	#	%	#	%	#	%
Number of Trips	564	24%	487	27%	1,790	76%	1,289	73%
Number of Hours	1,632	26%	1,440	29%	4,725	74%	3,482	71%
# Birds Flushed	1,353	28%	942	31%	3,566	72%	2,140	69%
# Birds Harvested	101	27%	162	27%	277	73%	445	73%
Flush Rate ± SE* (flushes/hour)	0.85 ± 0.04		0.73 ± 0.06		0.75 ± 0.03		0.69 ± 0.03	

* SE = standard error; Data analysis included logs with some missing data. Overall flush rates are calculated as an average flush rate for all days hunted, not a simple division of the total number of birds flushed by the total number of hours hunted.

NOTE: Analyses for woodcock data were restricted to 20 September through 30 November. This represents the period in which resident and migrating woodcock were in New York and accounted for 99% of all the woodcock observations during the survey. Results for 2013 are based on 1,781 trips and 4,935 hours afield by 235 hunters.

Table 5. Number of hours hunted, number of grouse flushed and killed, and flush rates (grouse flushed/hour) from the Cooperator Ruffed Grouse & American Woodcock Hunting Log, 2013-14.

Ecozone / WMU Aggregate*	**Trips**		**Hours**		**Grouse Flushed**		**Grouse Killed**		**Flush Rate**** (grouse flushed/hour)	
	#	**%**	**#**	**%**	**#**	**%**	**#**	**%**	**Mean**	**SE****
St. Lawrence Valley	**158**	**6.8%**	**403**	**6.5%**	**304**	**6.4%**	**24**	**6.6%**	**0.77**	**0.08**
East Ontario Plain	57	2.5%	141	2.3%	113	2.4%	7	1.9%	0.85	0.17
St. Lawrence Valley	101	4.4%	262	4.2%	191	4.0%	17	4.6%	0.73	0.09
Champlain Valley	**63**	**2.7%**	**144**	**2.3%**	**64**	**1.3%**	**3**	**0.8%**	**0.51**	**0.09**
Champlain Valley & Transition	63	2.7%	144	2.3%	64	1.3%	3	0.8%	0.51	0.09
Adirondacks-Tug Hill	**329**	**14.2%**	**1,054**	**17.0%**	**957**	**20.2%**	**74**	**20.2%**	**0.96**	**0.06**
Tug Hill	96	4.2%	333	5.4%	387	8.2%	31	8.5%	1.28	0.14
Tug Hill Transition	86	3.7%	245	4.0%	147	3.1%	8	2.2%	0.74	0.11
Northern Adirondacks	97	4.2%	318	5.1%	306	6.5%	24	6.6%	0.95	0.09
Central Adirondacks	50	2.2%	158	2.5%	117	2.5%	11	3.0%	0.74	0.11
Lake Plains	**177**	**7.7%**	**354**	**5.7%**	**175**	**3.7%**	**23**	**6.3%**	**0.46**	**0.06**
Oneida Lake Plains	91	3.9%	189	3.0%	143	3.0%	21	5.7%	0.77	0.10
Great Lakes Plain	80	3.5%	156	2.5%	27	0.6%	2	0.5%	0.12	0.03
Oswego Lowlands	6	0.3%	9	0.1%	5	0.1%	0	0.0%	n/a***	
Appalachian Hills & Plateau	**878**	**38.0%**	**2,285**	**36.9%**	**1,882**	**39.7%**	**148**	**40.4%**	**0.82**	**0.04**
East Appalachian Plateau	405	17.5%	1,141	18.4%	1,110	23.4%	86	23.5%	0.93	0.06
Central Appalachian Plateau	43	1.9%	133	2.1%	133	2.8%	9	2.5%	1.10	0.16
North Appalachian Hills	150	6.5%	321	5.2%	180	3.8%	10	2.7%	0.59	0.07
West Appalachian Hills	280	12.1%	690	11.1%	459	9.7%	43	11.7%	0.74	0.07
Catskills-Delaware Hills	**411**	**17.8%**	**1,110**	**17.9%**	**1,112**	**23.4%**	**72**	**19.7%**	**0.97**	**0.06**
Catskills	237	10.3%	690	11.1%	636	13.4%	38	10.4%	0.87	0.07
Otsego-Delaware Hills	155	6.7%	390	6.3%	471	9.9%	34	9.3%	1.22	0.10
Neversink-Mongaup Hills	19	0.8%	30	0.5%	5	0.1%	0	0.0%	n/a***	
Mohawk Valley-Hudson Valley-Taconic Highlands	**293**	**12.7%**	**850**	**13.7%**	**249**	**5.2%**	**22**	**6.0%**	**0.31**	**0.04**
Mohawk Valley	86	3.7%	253	4.1%	174	3.7%	13	3.6%	0.70	0.10
Hudson Valley	119	5.2%	360	5.8%	30	0.6%	4	1.1%	0.07	0.02
North Taconic Highlands	78	3.4%	208	3.4%	45	0.9%	5	1.4%	0.29	0.06
South Taconic Highlands	8	0.3%	25	0.4%	0	0.0%	0	0.0%	n/a***	
New York City Transition	2	0.1%	4	0.1%	0	0.0%	0	0.0%	n/a***	
Statewide Totals	**2,309**		**6,200**		**4,743**		**366**		**0.77**	**0.02**

*WMU Aggregates are groupings of Wildlife Management Units. Ecozones are groupings of WMU Aggregates. The Coastal Lowlands Aggregate (New York City and Long Island) does not have a ruffed grouse season, thus is not listed.

** Overall flush rates are calculated as an average flush rate for all days hunted, not a simple division of the total number of grouse flushed by the total number of hours hunted; Data analysis included logs with some missing data. SE = Standard Error

***There was an insufficient sample size in these WMU aggregates. A minimum of 20 trips or 35 hours is needed for analysis. Data from these aggregates contributed to the ecozone and statewide totals.

Table 6. Hunting effort, grouse and woodcock flushed and killed, and flush rates (birds flushed/hour) by hunting method (with dog vs. without) from the Cooperator Ruffed Grouse & American Woodcock Hunting Log, 2013-14.

	Hunted *WITH* a Dog				**Hunted *WITHOUT* a Dog**			
	Grouse Hunting		**Woodcock Hunting**		**Grouse Hunting**		**Woodcock Hunting**	
	#	**%**	**#**	**%**	**#**	**%**	**#**	**%**
Number of Trips	1,429	62%	1,151	67%	865	38%	574	33%
Number of Hours	3,660	60%	3,032	64%	2,490	40%	1,711	36%
# Birds Flushed	3,222	69%	2,684	90%	1,451	31%	294	10%
# Birds Harvested	276	76%	533	92%	89	24%	48	8%
Flush Rate ± SE (flushes/hour)	0.85 ± 0.03		0.96 ± 0.04		0.62 ± 0.04		0.18 ± 0.02	

* SE = standard error; Data analysis included logs with some missing data. Overall flush rates are calculated as an average flush rate for all days hunted, not a simple division of the total number of birds flushed by the total number of hours hunted.

NOTE: Analyses for woodcock data were restricted to 20 September through 30 November. This represents the period in which resident and migrating woodcock were in New York and accounted for 99% of all the woodcock observations during the survey. Results for 2013 are based on 1,781 trips and 4,935 hours afield by 235 hunters.

Table 7. Hunting effort, woodcock flushed and killed, and flush rates (woodcock flushed/hour) by week from the Cooperator Ruffed Grouse & American Woodcock Hunting Log, 2013-14.

Week of	# of Trips	% of Total	# of Hours	% of Total	# Woodcock Flushed	% of Total	# Woodcock Harvested	% of Total	Flush Rate ± SE* (flushes/hour)
20 Sept	48	3%	139	3%	72	2%	0	0%	0.60 ± 0.14
27 Sept	169	9%	471	10%	212	7%	25	4%	0.53 ± 0.08
4 Oct	246	14%	631	13%	384	13%	84	14%	0.64 ± 0.07
11 Oct	279	16%	716	15%	510	17%	103	17%	0.74 ± 0.07
18 Oct	265	15%	722	15%	560	18%	128	21%	0.82 ± 0.08
25 Oct	212	12%	623	13%	571	19%	106	18%	1.04 ± 0.10
1 Nov	232	13%	655	13%	489	16%	105	17%	0.86 ± 0.10
8 Nov	200	11%	589	12%	265	9%	50	8%	0.55 ± 0.07
15 Nov	75	4%	235	5%	12	0%	0	0%	0.07 ± 0.03
22 Nov	39	2%	112	2%	7	0%	2	0%	0.06 ± 0.04
30 Nov	15	1%	41	1%	0	0%	0	0%	0.00 ± 0.00

* Overall flush rates are calculated as an average flush rate for all days hunted, not a simple division of the total number of woodcock flushed by the total number of hours hunted; Data analysis included logs with some missing data; SE = Standard Error

NOTE: Analyses for woodcock data were restricted to 20 September through 30 November. This represents the period in which resident and migrating woodcock were in New York and accounted for 99% of all the woodcock observations during the survey. Results for 2013 are based on 1,781 trips and 4,935 hours afield by 235 hunters.

Table 8. Number of hours hunted, number of woodcock flushed and killed, and flush rates (woodcock flushed/hour) from the Cooperator Ruffed Grouse & American Woodcock Hunting Log, 2013-14.

Ecozone / WMU Aggregate*	**Trips**		**Hours**		**Woodcock Flushed**		**Woodcock Killed**		**Flush Rate**** (woodcock flushed/hour)	
	#	**%**	**#**	**%**	**#**	**%**	**#**	**%**	**Mean**	**SE****
St. Lawrence Valley	**137**	**7.9%**	**353**	**7.4%**	**364**	**12.3%**	**65**	**11.2%**	**1.03**	**0.12**
East Ontario Plain	52	3.0%	132	2.8%	132	4.4%	21	3.6%	0.84	0.18
St. Lawrence Valley	85	4.9%	221	4.6%	232	7.8%	44	7.6%	1.15	0.17
Champlain Valley	**51**	**2.9%**	**126**	**2.6%**	**48**	**1.6%**	**6**	**1.0%**	**0.37**	**0.14**
Champlain Valley & Transition	51	2.9%	126	2.6%	48	1.6%	6	1.0%	0.37	0.14
Adirondacks-Tug Hill	**288**	**16.6%**	**937**	**19.6%**	**507**	**17.1%**	**89**	**15.4%**	**0.65**	**0.07**
Tug Hill	90	5.2%	317	6.6%	106	3.6%	21	3.6%	0.40	0.08
Tug Hill Transition	77	4.4%	218	4.6%	85	2.9%	14	2.4%	0.47	0.11
Northern Adirondacks	86	5.0%	292	6.1%	272	9.2%	45	7.8%	1.16	0.19
Central Adirondacks	35	2.0%	110	2.3%	44	1.5%	9	1.6%	0.40	0.13
Lake Plains	**127**	**7.3%**	**250**	**5.2%**	**305**	**10.3%**	**65**	**11.2%**	**1.40**	**0.17**
Oneida Lake Plains	63	3.6%	140	2.9%	77	2.6%	10	1.7%	0.60	0.11
Great Lakes Plain	60	3.5%	105	2.2%	226	7.6%	54	9.3%	2.31	0.30
Oswego Lowlands	4	0.2%	5	0.1%	2	0.1%	1	0.2%	n/a***	
Appalachian Hills & Plateau	**638**	**36.8%**	**1,728**	**36.2%**	**1,021**	**34.4%**	**199**	**34.4%**	**0.61**	**0.04**
East Appalachian Plateau	328	18.9%	963	20.1%	624	21.0%	133	23.0%	0.73	0.06
Central Appalachian Plateau	21	1.2%	67	1.4%	10	0.3%	2	0.3%	0.17	0.08
North Appalachian Hills	94	5.4%	205	4.3%	178	6.0%	36	6.2%	0.72	0.11
West Appalachian Hills	195	11.2%	493	10.3%	209	7.0%	28	4.8%	0.40	0.06
Catskills-Delaware Hills	**331**	**19.1%**	**901**	**18.8%**	**566**	**19.1%**	**115**	**19.9%**	**0.71**	**0.06**
Catskills	186	10.7%	540	11.3%	263	8.9%	54	9.3%	0.63	0.08
Otsego-Delaware Hills	127	7.3%	334	7.0%	296	10.0%	60	10.4%	0.89	0.11
Neversink-Mongaup Hills	18	1.0%	27	0.6%	7	0.2%	1	0.2%	n/a***	
Mohawk Valley-Hudson Valley-Taconic Highlands	**163**	**9.4%**	**485**	**10.1%**	**159**	**5.4%**	**39**	**6.7%**	**0.36**	**0.05**
Mohawk Valley	34	2.0%	97	2.0%	32	1.1%	4	0.7%	0.35	0.08
Hudson Valley	75	4.3%	225	4.7%	50	1.7%	13	2.2%	0.20	0.04
North Taconic Highlands	48	2.8%	144	3.0%	76	2.6%	22	3.8%	0.66	0.15
South Taconic Highlands	6	0.3%	19	0.4%	1	0.0%	0	0.0%	n/a***	
New York City Transition	0	0.0%	0	0.0%	0	0.0%	0	0.0%	n/a***	
Statewide Totals	**1,735**		**4,780**		**2,970**		**578**		**0.70**	**0.03**

*WMU Aggregates are groupings of Wildlife Management Units. Ecozones are groupings of WMU Aggregates. The Coastal Lowlands Aggregate (New York City and Long Island) does not have a ruffed grouse season, thus is not listed.

** Overall flush rates are calculated as an average flush rate for all days hunted, not a simple division of the total number of woodcock flushed by the total number of hours hunted; Data analysis included logs with some missing data. SE = Standard Error

***There was an insufficient sample size in these WMU Aggregates. A minimum of 20 trips or 35 hours is needed for analysis. Data from this aggregate contributed to the ecozone and statewide totals.

NOTE: Analyses for woodcock data were restricted to 20 September through 30 November. This represents the period in which resident and migrating woodcock were in New York and accounted for 99% of all the woodcock observations during the survey. Results for 2013 are based on 1,781 trips and 4,935 hours afield by 235 hunters.

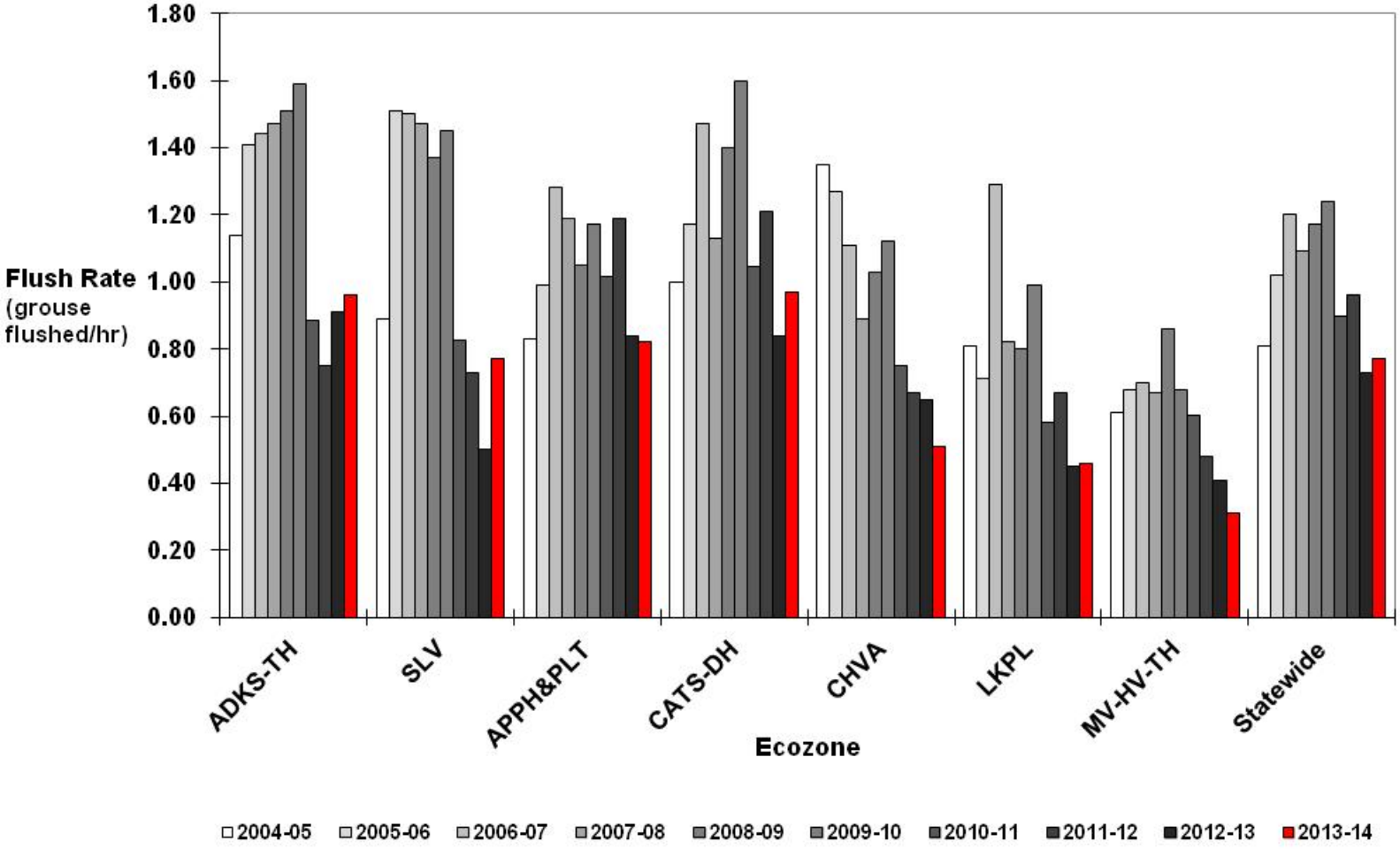

Figure 1. Flush rate (grouse flushed/hour) by ecozone based on Cooperator Ruffed Grouse Hunting Log data for the 2004-05 through 2013-14 seasons. Ecozones are an aggregation of Wildlife Management Units. Abbreviations: Champlain Valley (CHVA), Adirondacks-Tug Hill (ADKS-TH), Catskills-Delaware Hills (CATS-DH), St. Lawrence Valley (SLV), Appalachian Hills & Plateau (APPH&PLT), Lake Plains (LKPL), Mohawk Valley-Hudson Valley-Taconic Highlands (MV-HV-TH). The Costal Lowlands Ecozone (New York City and Long Island) does not have a ruffed grouse hunting season.

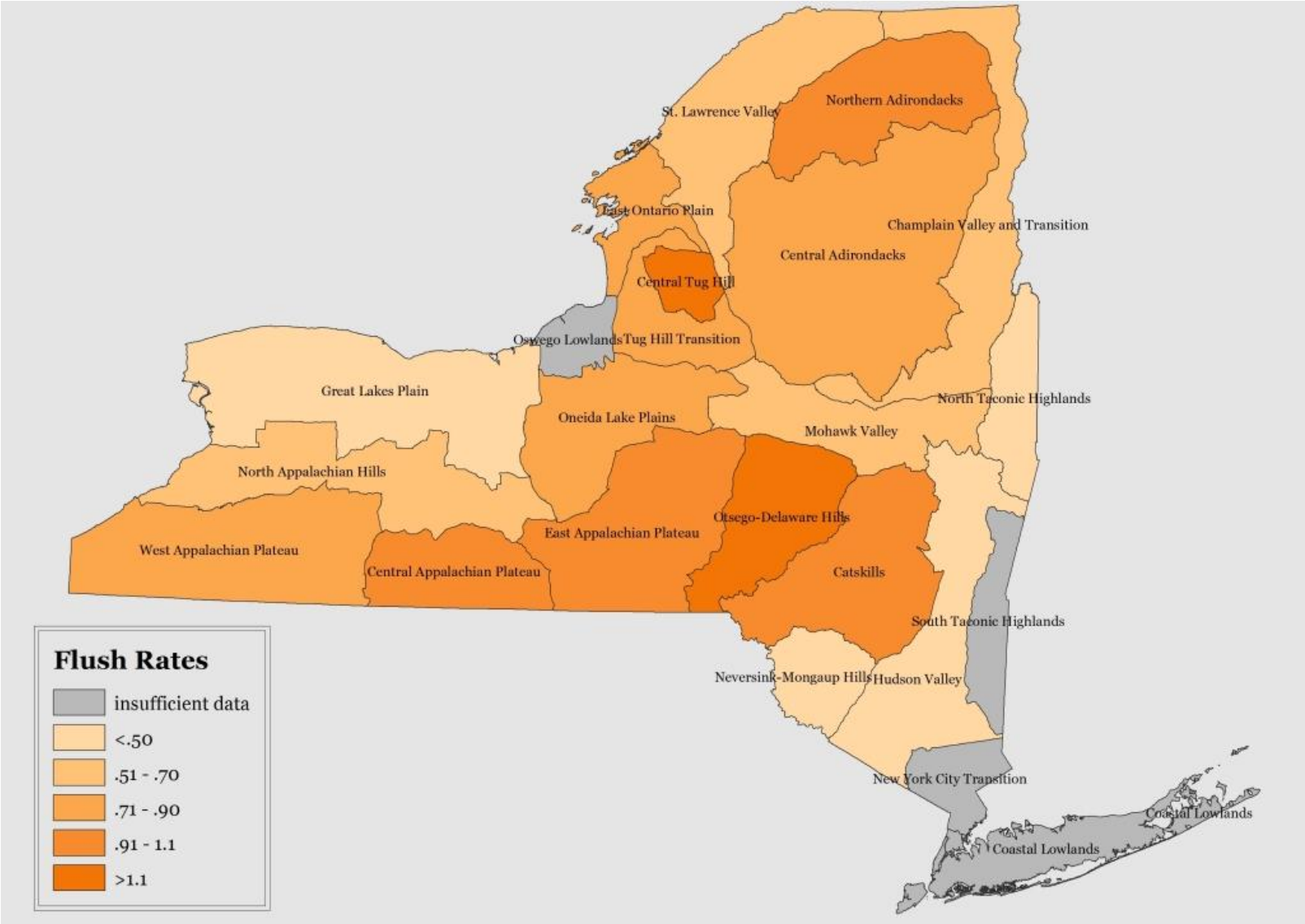

Figure 2. Ruffed Grouse flush rate (grouse flushed/hour) by Wildlife Management Unit (WMU) aggregate from the Cooperator Ruffed Grouse & American Woodcock Hunting Log, 2013-14. Only aggregates with ≥20 observations/records or ≥35 hours were included in the analysis. The statewide flush rate for 2013-14 was 0.77 grouse flushed/hour. WMU aggregate in white north of New York City had too few observations for analysis. The Coastal Lowlands aggregate does not have a grouse hunting season, so the survey was not conducted there.

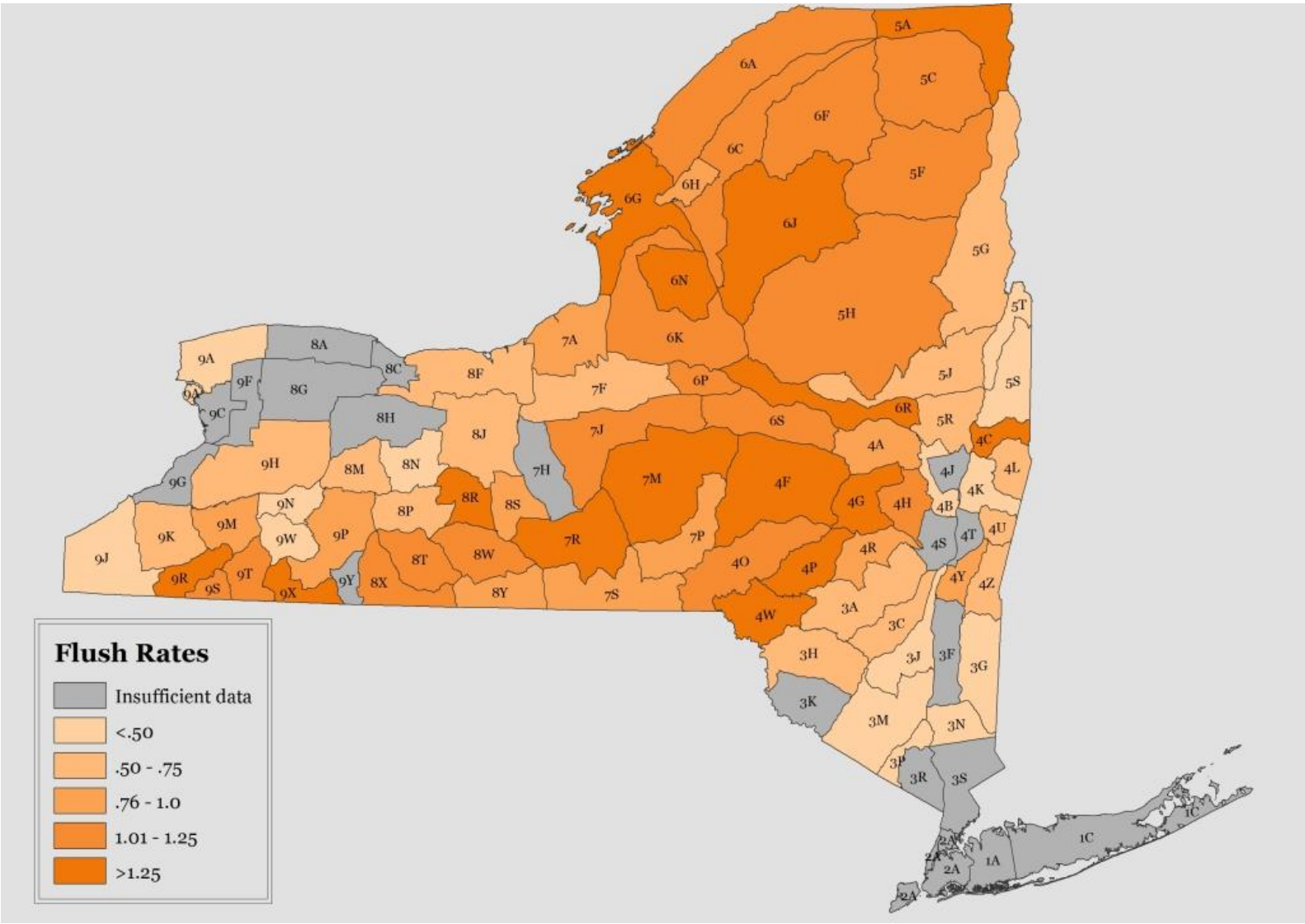

Figure 3. Ruffed Grouse flush rate (grouse flushed/hour) by Wildlife Management Unit (WMU) from the Cooperator Ruffed Grouse & American Woodcock Hunting Log, 2004-05 – 2013-14. Only ecozones with ≥50 observations/records or ≥150 hours were included in the analysis. The statewide flush rate for the ten-year period was 1.0 grouse flushed/hour. WMUs in white north of New York City (WMU 2A) had too few observations for analysis. WMUs comprising the Coastal Lowlands Ecozone (WMUs 2A, 1A, and 1C) do not have a grouse hunting season.

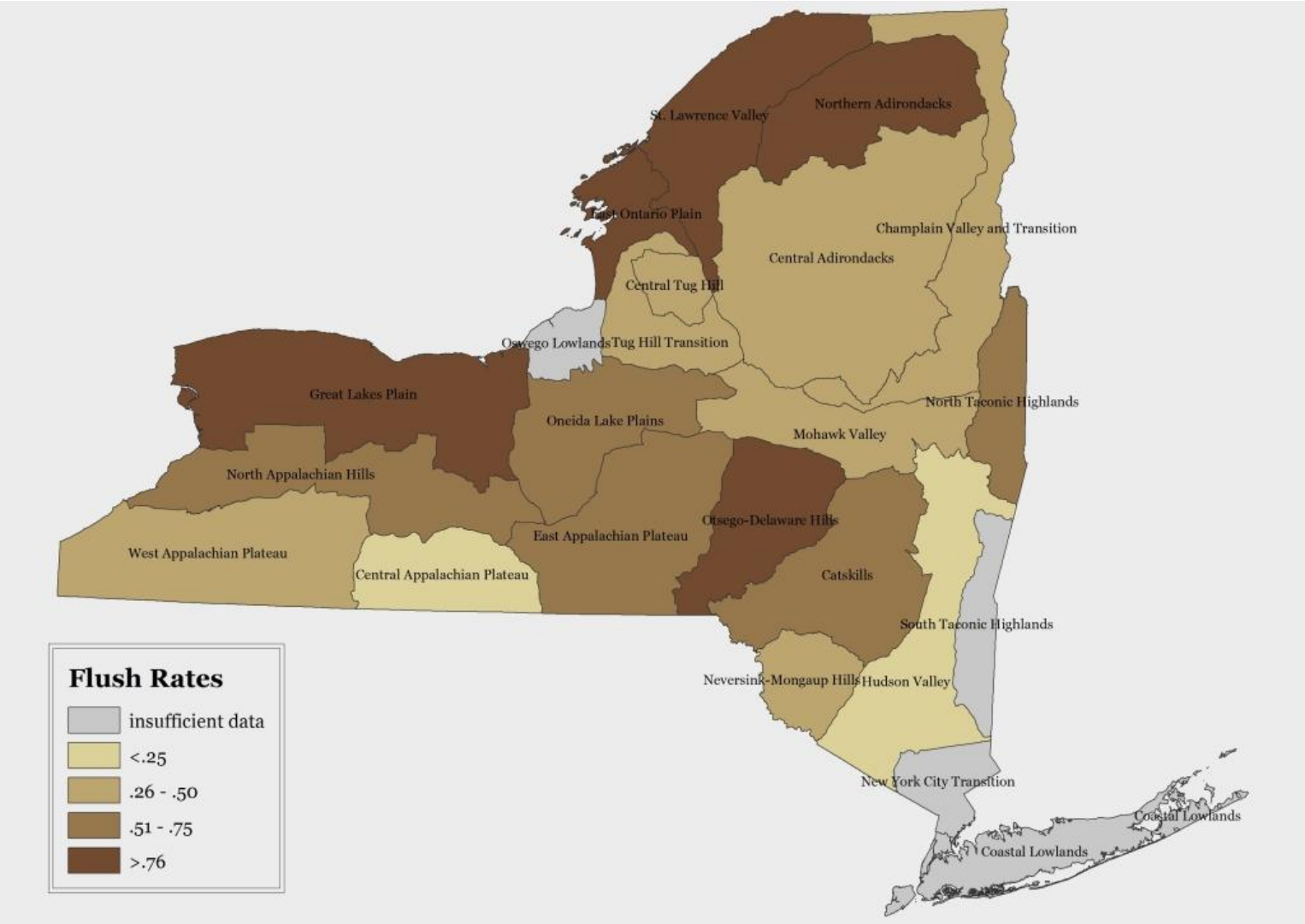

Figure 4. American woodcock flush rate (grouse flushed/hour) by Wildlife Management Unit (WMU) aggregate from the Cooperator Ruffed Grouse & American Woodcock Hunting Log, 2013-14. Only aggregates with ≥20 observations/records or ≥35 hours were included in the analysis. The statewide flush rate for 2013-14 was 0.70 woodcock flushed/hour. WMU aggregate in white north of New York City had too few observations for analysis. The Coastal Lowlands aggregate does not have a grouse hunting season, so the survey was not conducted there.

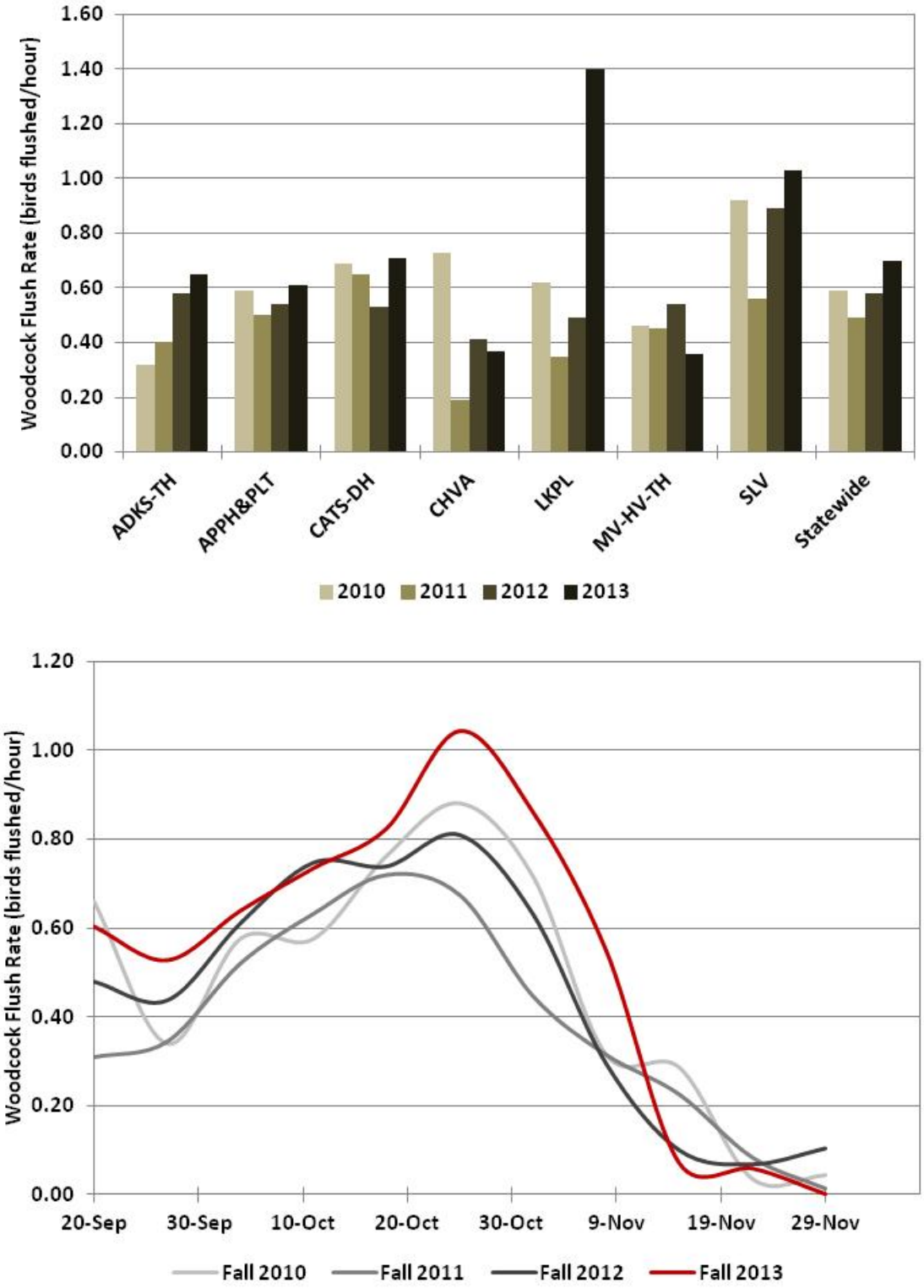

Figure 5. American woodcock flush rate (woodcock flushed/hour) by ecozone (top) and the flush rate by week (bottom) from the Cooperator Ruffed Grouse & Woodcock Hunting Log. The statewide flush rate for 2013 was 0.70 woodcock flushed/hour. Abbreviations: Champlain Valley (CHVA), Adirondacks-Tug Hill (ADKS-TH), Catskills-Delaware Hills (CATS-DH), St. Lawrence Valley (SLV), Appalachian Hills & Plateau (APPH&PLT), Lake Plains (LKPL), Mohawk Valley-Hudson Valley-Taconic Highlands (MV-HV-TH). The Costal Lowlands Ecozone (New York City and Long Island) does not have a ruffed grouse hunting season.