

Performance Report

State: New Hampshire

Grant W-89-R-5

Grant Type: Survey and Inventory

Period Covered July 1, 2004 – June 30, 2005

Project Title: SMALL GAME MANAGEMENT

Project VII

Job 1: NEW HAMPSHIRE SMALL GAME HUNTER SURVEYS

Job Objective: To quantify New Hampshire small game hunter interests, activities, preferences and attributes, and to use small game hunter observations and archery deer hunter observations as an index of New Hampshire small game species distribution and abundance.

Summary: Two small game surveys were created and implemented in 2004. Small game sighting data were solicited from small game hunters and successful deer bow hunters. All data were entered into an electronic data set and analyzed.

Target Date: June 30, annually

Status of Progress: On schedule

Deviations: None

Total Cost:

Procedures: A small game hunter survey (Appendix 1) and a bow hunter survey (Appendix 2) were designed, printed, and provided to participants. Small game hunter survey participants were solicited through speaking presentations, newspaper articles, news releases, and at public hearings and moose hunter seminars. Bow hunter survey participants were solicited from successful 2004 deer bow hunters (all successful bow hunters were sent a survey). Data from the small game hunter survey and the bow hunter survey were handled as independent data sets. All data were entered and summarized electronically with SAS or Access software.

Results: A total of 2,250 surveys were sent out to small game hunters. Four hundred and five survey cards were completed by small game survey volunteers. The response was a four-fold increase from 2003 and represents an 18% response rate. Increased participation in the survey appeared to result from our offering of a Ruger Red Label shotgun that was raffled off to a randomly selected participant in the survey. A total of 2,158 previously successful bow hunters were sent bow hunter surveys. Of these, 172 bow hunters (an 8% return rate) completed and returned a survey.

Small Game Hunter Survey: Figures 1 through 10 (attached) summarize small game survey results for the 2004/05 small game season (see Appendix 3 for raw data from Figures 1-10). Nearly 70 percent of small game hunting occurred during the month of October (Fig. 1). Ruffed grouse were the most sought after small game species accounting for 70% of hunting hours (Fig. 2). The North Region (see map, Appendix 4) was the most

popular hunting region in New Hampshire accounting for 38% of reported hunting hours, followed by the Central Region (28%) (Fig. 3). Ruffed grouse hunting in the North region accounted for the most small game hunter hours (Fig. 4). The majority of survey respondents hunted over dogs, although there was a large percentage of hunters that hunted grouse without a dog (Fig. 5). Our increased response rate to our survey could be a factor in this large increase. Woodcock were seen at a rate slightly higher than 1 bird per hunter hour (1.16) by all hunters (Fig. 6) and those that hunted with dogs (Fig. 7). Grouse observation rates were highest in the North region followed by the White Mountains and Central regions (Fig. 8) and woodcock observation rates were highest in the Northern region (Fig. 9).

Bow Hunter Survey: For a detailed summary of these data, see Figure 10 attached (see Appendix 3 for raw data from Figure 10). Bow hunter grouse observations are thought to reflect good production in the North and Central regions and stable to declining populations in southern regions during 2004. The greatest increase in the observation rates was seen in the White Mountains region.

For further details regarding small game hunter and bow hunter survey results, note the accompanying text with Figures 1-10 in Appendix 8.

Conclusions: Assorted small game surveys represent an efficient way to generate gross small game population data on a regional basis. The value of small game survey data is increasing annually as multiple years of data are accumulated and compared. With the generosity of the Sturm Ruger Company, we were able to increase our survey participation by 4-fold. If we are able to duplicate this response rate in future years it will strengthen our survey data.

Recommendations: Further efforts will be made to enhance survey participation rates and sample sizes through the use of sporting goods outlets, publications and our Department web page.

Submitted by

Julie Robinson
Small Game Project Leader
July 1, 2005

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Grant Project: SMALL GAME MANAGEMENT

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Job 2: NEW HAMPSHIRE SMALL GAME POPULATION MONITORING

Job Objective: To produce an annual density index of ruffed grouse and American woodcock, to be used in season setting, public education, and recreation promotion.

Summary: A total of 39 ruffed grouse drumming routes and 24 woodcock singing routes were run during the spring of 2005. Of the 24 woodcock routes run, 8 were run as a supplement to routes run annually on behalf of the U.S. Fish and Wildlife Service. Also in 2005, volunteers at Dartmouth College Grant ran 7 additional routes in their region. These numbers have been included as a separate section in this report.

Target Date: June 30, annually

Status of Progress: On schedule

Deviations: None

Total Cost:

Procedures: Existing ruffed grouse drumming routes were established during 1999. These routes were randomly placed in each of 18 wildlife management units (WMU's), at a rate of 2 routes per WMU. On average, each WMU consists of 500 square miles. WMU's were delineated on topographic maps printed in the "New Hampshire Atlas and Gazetteer". These maps were broken into a grid system consisting of 4-square mile blocks. X and Y coordinates were randomly selected in order to randomly select 2 four-square mile blocks in each WMU. Ten-mile grouse drumming routes were then subjectively mapped on roads that either began in, or passed through the randomly selected blocks. Roads with high volumes of traffic and/or high-speed traffic were avoided. Habitat quality was ignored as a consideration in route placement.

Ruffed grouse survey methodologies are described on the attached ruffed grouse survey form (Appendix 5). Woodcock surveys were conducted using existing U.S. Fish and Wildlife Service methodologies. Non-federal woodcock routes were run in those WMU's not covered by our existing U.S. Fish and Wildlife Service woodcock survey route program. Non-federal routes were run on segments of the randomly established ruffed grouse drumming routes.

Results: Thirty-nine grouse routes were run in 2005. Survey route data are summarized on the basis of 5 small game management zones (see Appendix 4). A raw data listing of survey route results is provided in Appendix 6.

Grouse were most abundant in the White Mountain Region of New Hampshire, where an average 0.85 drumming incidents per stop were heard (Fig. 11). This was an increase from the .56 heard in 2004. In contrast, for the second consecutive year since the survey began, 0.0 drumming incidents per stop were heard in southeast New Hampshire. In 2005, the survey results showed that an average of .7 drumming events per stop were heard in the North Country compared to .4 in 2004 (Figure 12). For the second year in a row the spring was very wet, windy and cool and could have delayed drumming. Biologist throughout the northern portion of the state heard drumming throughout the state after the survey period was finished.

Woodcock density patterns remained fairly constant throughout the state. Survey results for 2005 (Appendix 7) showed increases in woodcock heard per stop in the North and Central regions but dramatically fewer birds heard in the south regions. The Southeast and Southwest regions both showed marked decreases in singing males per stop (Figure 13). These decreases could be attributed to poor weather conditions during the survey period. The North, Central and White Mountains regions continue to have the highest number of males heard per stop. The best woodcock habitat in NH is in the northern portion of the state as reflected by the high regional counts there (Fig. 13). The average tally for woodcock in the North Country over the 7-year survey period is .7 woodcock heard per stop. In the White Mountains the 7-year average is .37 per stop. Survey trends suggest that the woodcock population is stable to increasing in our most popular woodcock-hunting destination (North and White Mountain regions). New Hampshire woodcock densities remain relatively strong and stable, as compared to data from the Eastern U.S. region at large (Figure 14).

For further details regarding grouse and woodcock survey results, note the accompanying text with Figures 11 through 14 in Appendix 8.

Conclusions: Grouse and woodcock surveys provide us with an efficient means to generate useful management data. With accumulating years of data, we are gaining substantial insight into the relative abundance of these important small game species. Over time, survey results will provide invaluable trend data for management decision-making.

Recommendations: Establishment of survey routes (using relatively unbiased sampling methods) represents a significant achievement for our department. Replication of these surveys on an annual basis provides us with valuable management data. No changes in this job are presently required.

Submitted by

Julie Robinson
Small Game Project Leader
July 1, 2005

Performance Report

State: New Hampshire

Grant W-89-R-5

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Grant Title: SMALL GAME MANAGEMENT

Project VII

Job 3: DISSEMINATION OF NEW HAMPSHIRE SMALL GAME SURVEY AND POPULATION MONITORING RESULTS.

Job Objective: To inform small game hunters, cooperators, survey respondents, volunteers, and other interested publics of the status of New Hampshire small game populations, and to provide other information of interest generated through hunter surveys and population monitoring efforts.

Summary: An annual small game summary report was written, printed and distributed. The report is being used to inform and educate the public, and to acknowledge past participation and encourage future participation in our assorted small game survey activities.

Target Date: June 30, annually

Status of Progress: On schedule

Deviations: None

Total Cost:

Procedures: Data from small game hunter surveys, bow hunter surveys, ruffed grouse drumming routes, and woodcock singing routes were analyzed and summarized in a 12 page Department publication entitled 2004/2005 New Hampshire Small Game Summary Report (Appendix 8).

Results: A total of 2,000 copies of the small game summary report will be printed in 2005. Copies of the report will be sent to previous survey participants in order to encourage their continued survey participation. In addition, copies of the report will be sent to prospective survey participants in an effort to encourage their future participation. Finally, reports will be distributed by Commissioners, staff, and regional offices to encourage interest in and knowledge of New Hampshire small game species.

Conclusions: Based on positive input received to date, focused distribution of small game summary reports leads to increased survey participation rates and heightened interest in our state small game resources.

Recommendations: No change in this job is recommended. The annual small game summary report will continue to be used to encourage survey participation, to educate the public and, to create interest in and appreciation for New Hampshire small game resources.

Submitted by

Julie Robinson
Small Game Project Leader
July 1, 2005

Fig. 1. New Hampshire small game hunter effort (2004-05)

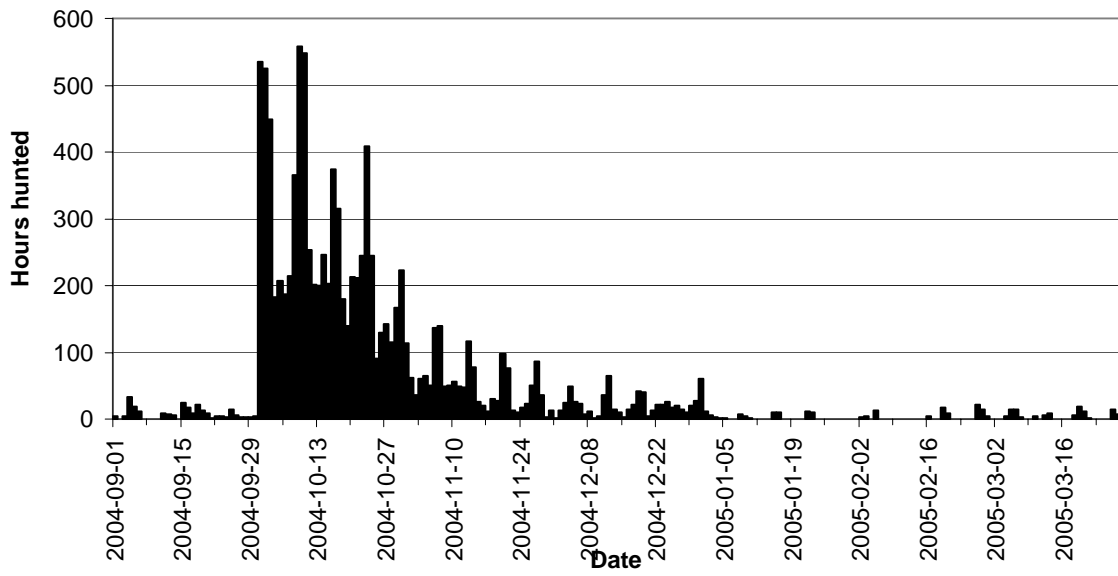


Fig. 2. New Hampshire small game hunter effort per species (1999-2004)

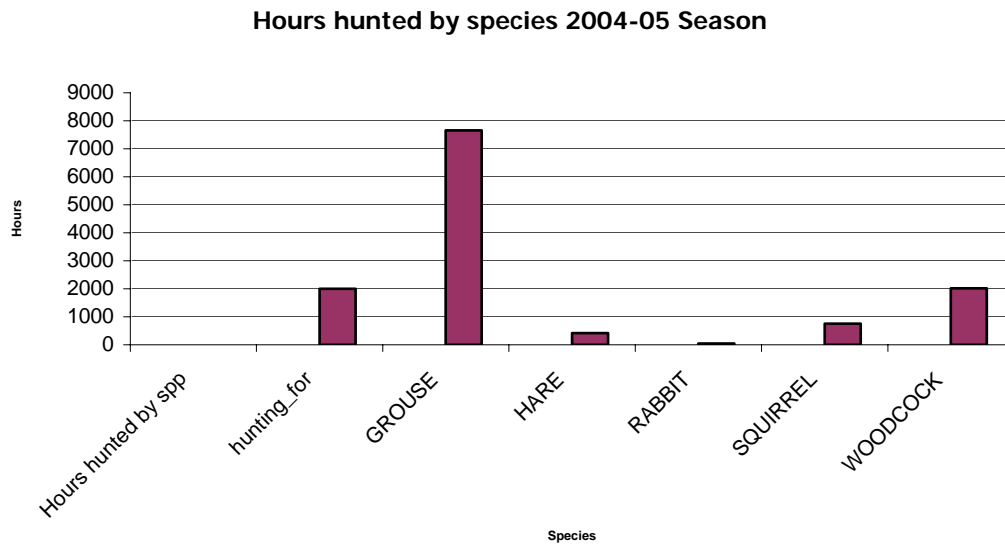


Fig. 3. New Hampshire small game hunter effort by region (1999-2004).

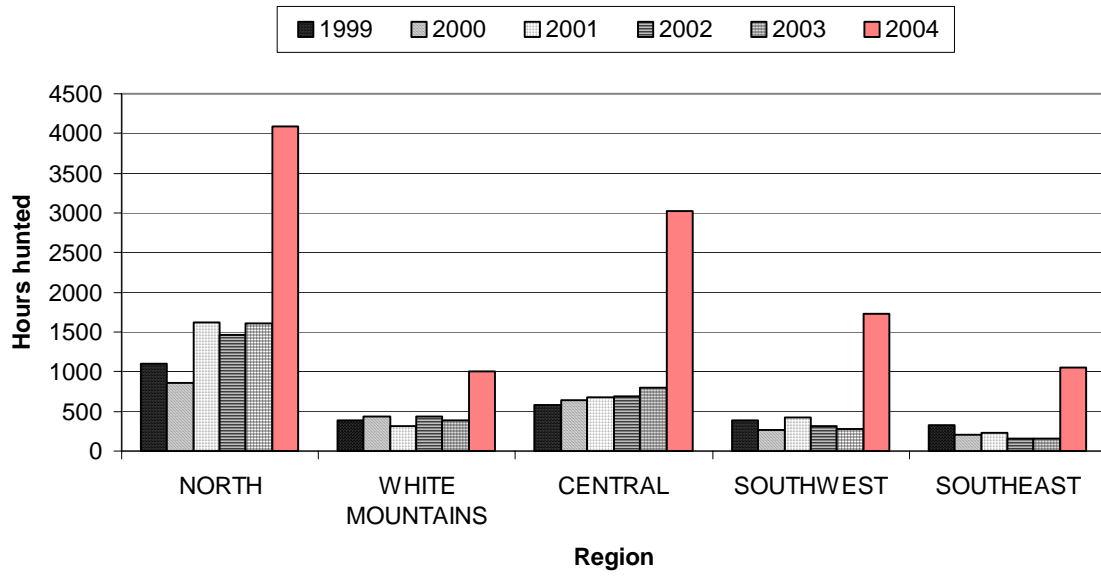


Fig. 4. New Hampshire small game hunter effort by species and region (2004).

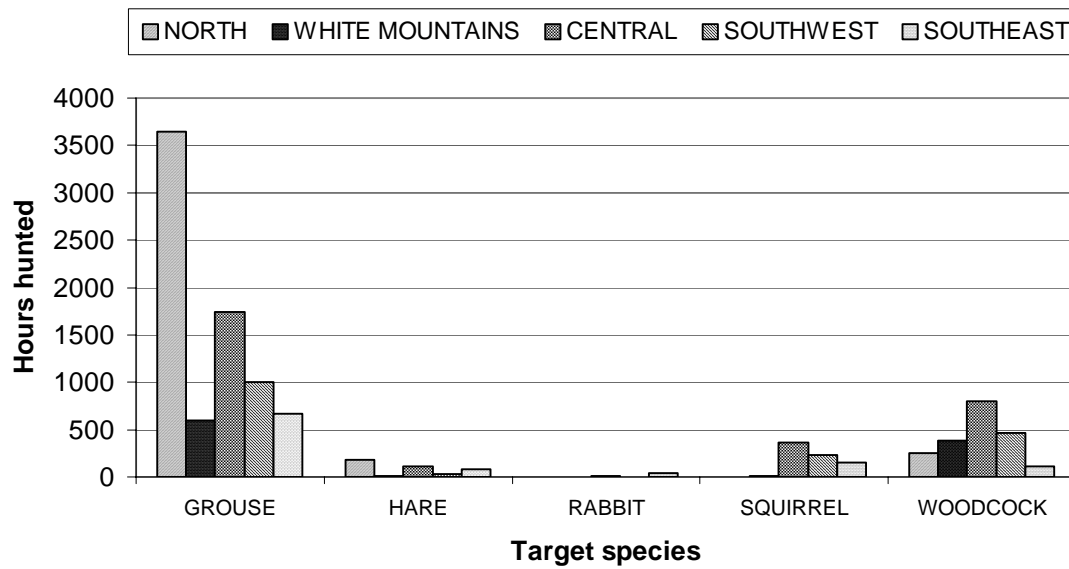


Fig. 5. New Hampshire small game hunter effort with and without the aid of a dog (2004).

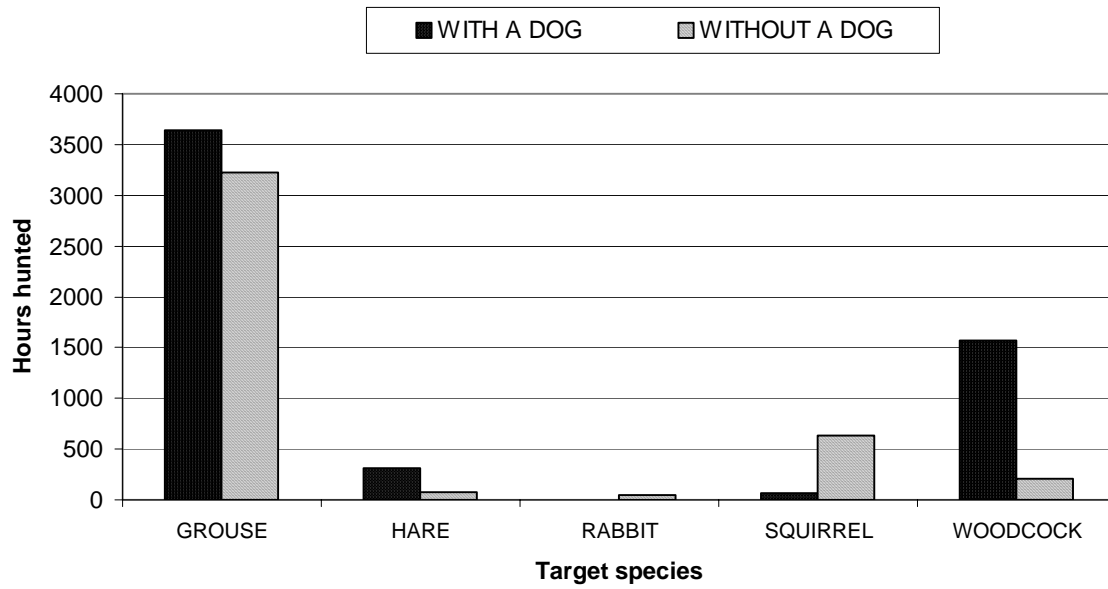


Fig. 6. New Hampshire small game hunter observation rates (1999-2004).

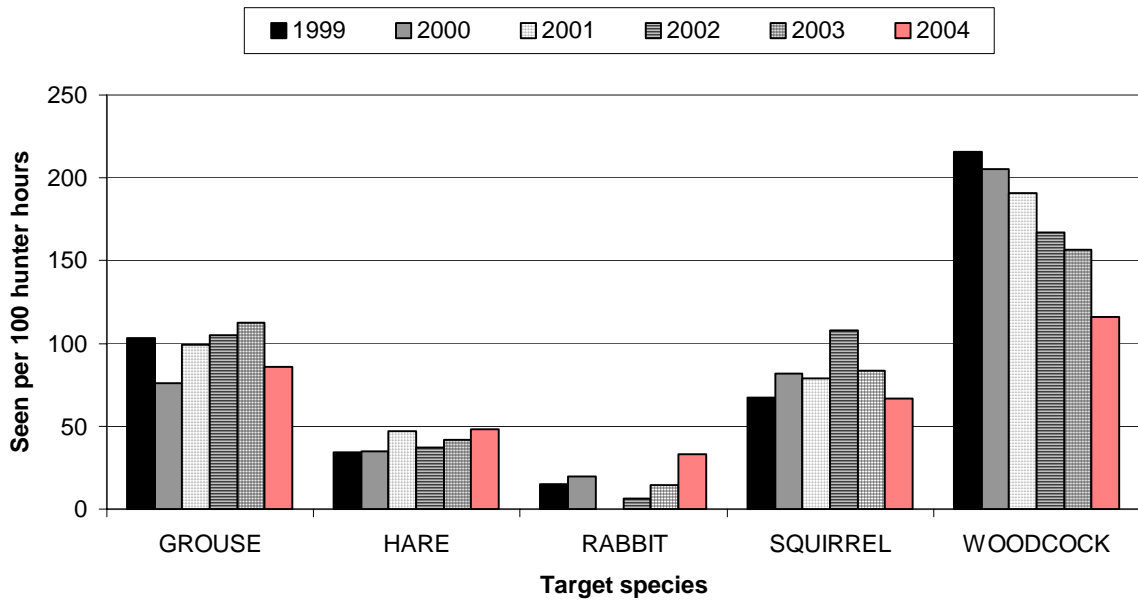


Fig. 7. New Hampshire small game hunter observation rates for dog hunters only (1999-2004).

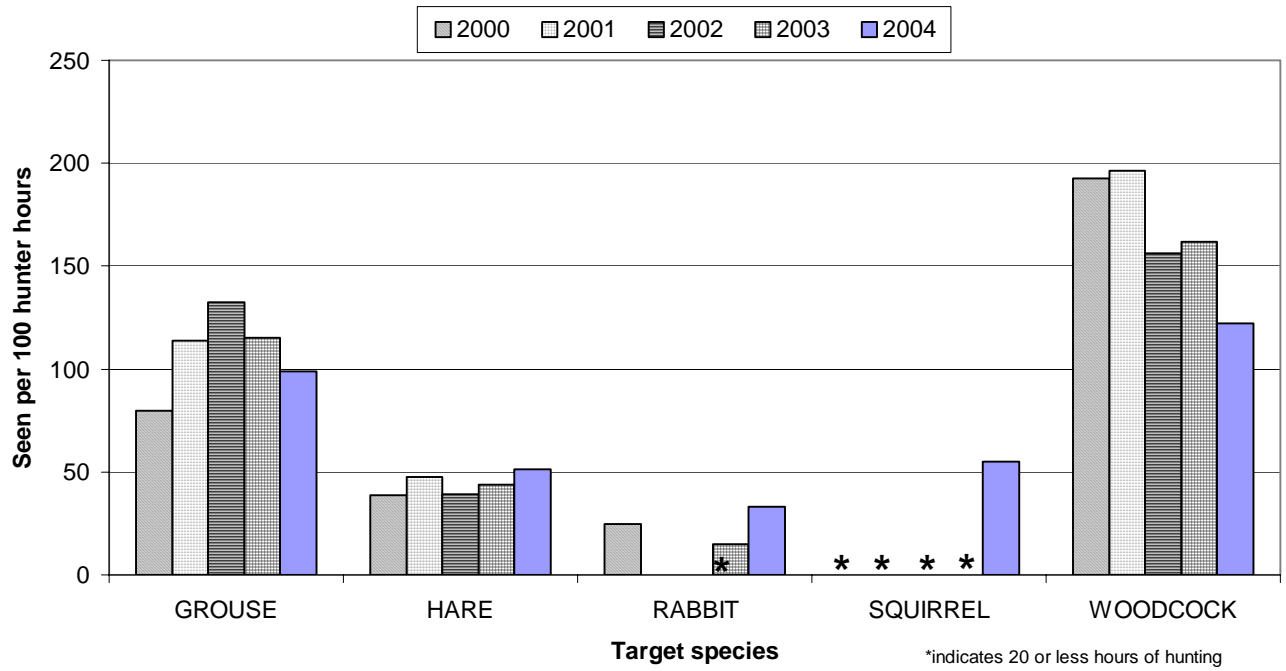


Fig. 8. New Hampshire grouse observation rates by region for dog hunters (2004).

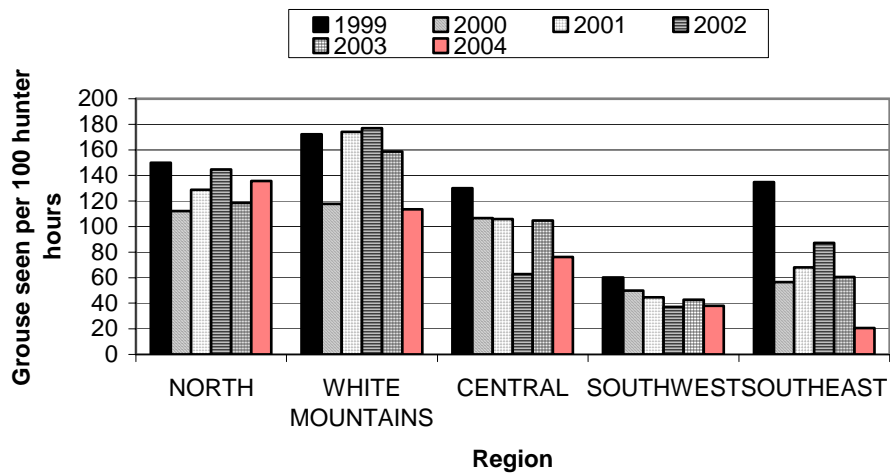


Fig. 9. New Hampshire woodcock observation rates by region for dog hunters (2004).

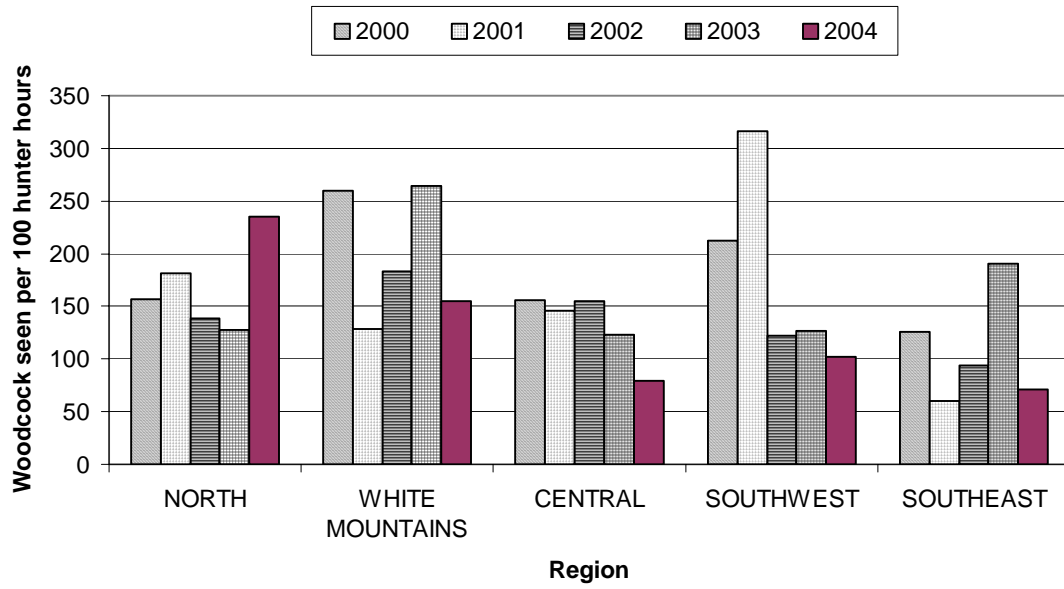


Figure 10. New Hampshire bow hunter observation rates of grouse by region (1997-2004).

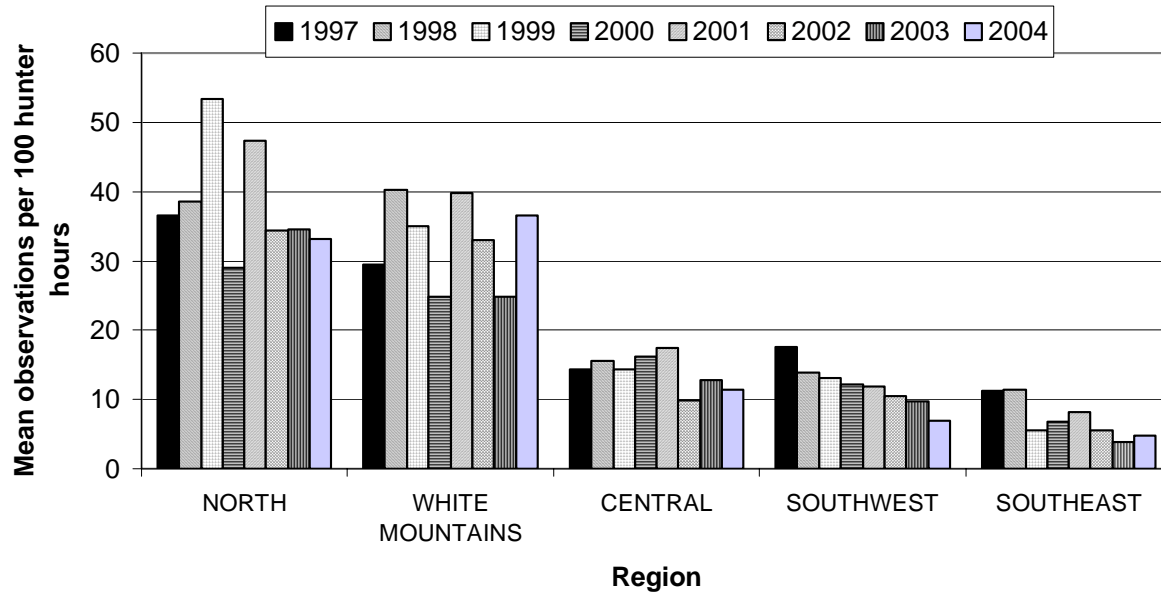


Fig. 11 Results from randomly stratified grouse drumming routes run in New Hampshire during 1999 (N=33), 2000 (N=31), 2001 (N=32), 2002 (N=32), 2003 (N=31), and 2004 (N=33), 2005 (N=39)

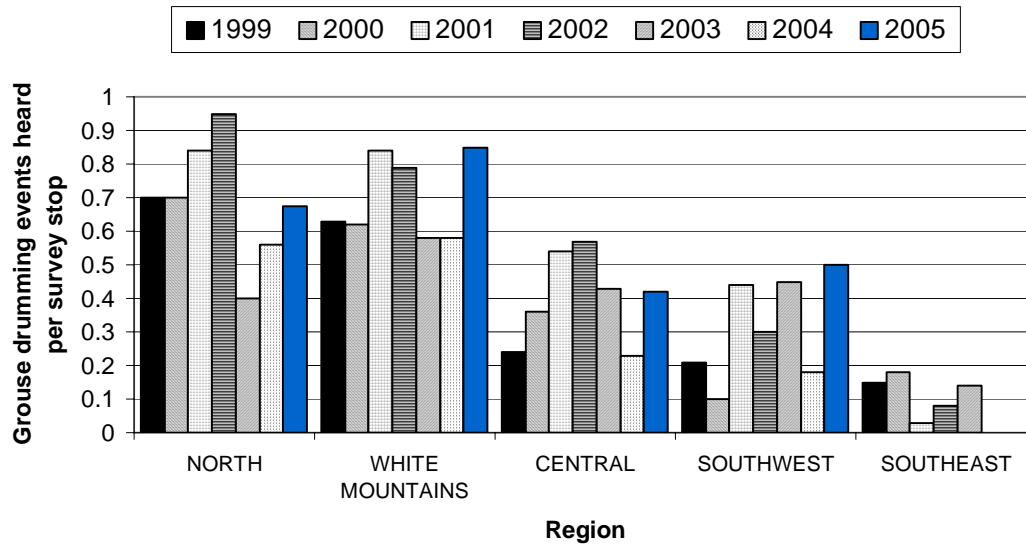


Fig.12 Results from selected ruffed grouse drumming routes run in New Hampshire's North Country (1996-2005).

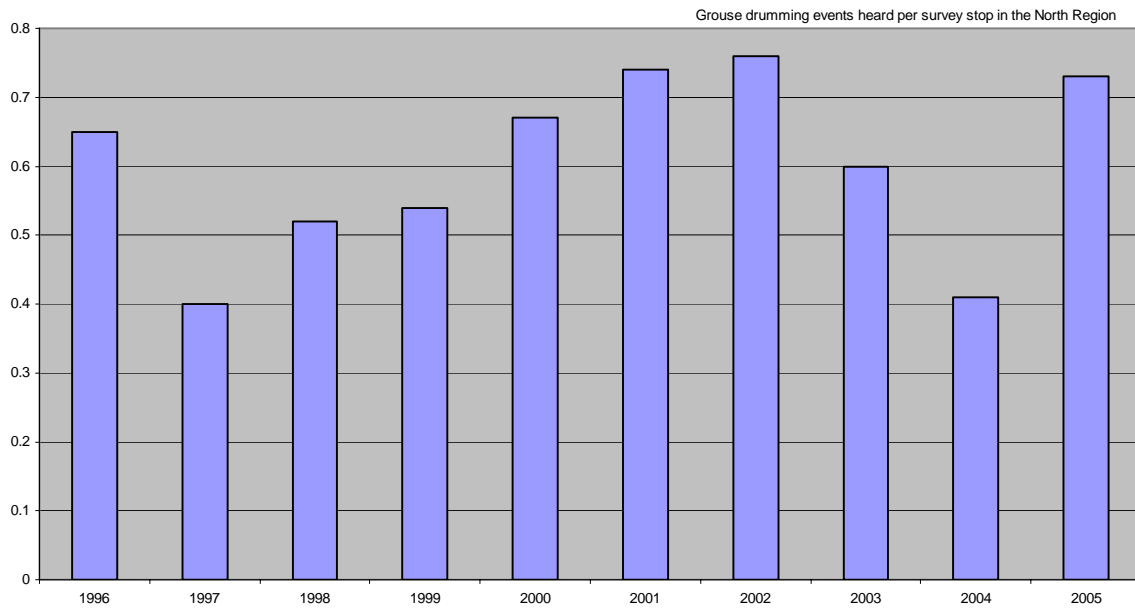


Fig. 13 Regional results from randomly stratified woodcock singing ground surveys run in New Hampshire during 1999 (N=19), 2000 (N=22), 2001 (N=21), 2002 (N=20), 2003 (N=20), and 2004 (N=21), 2005 (N=23).

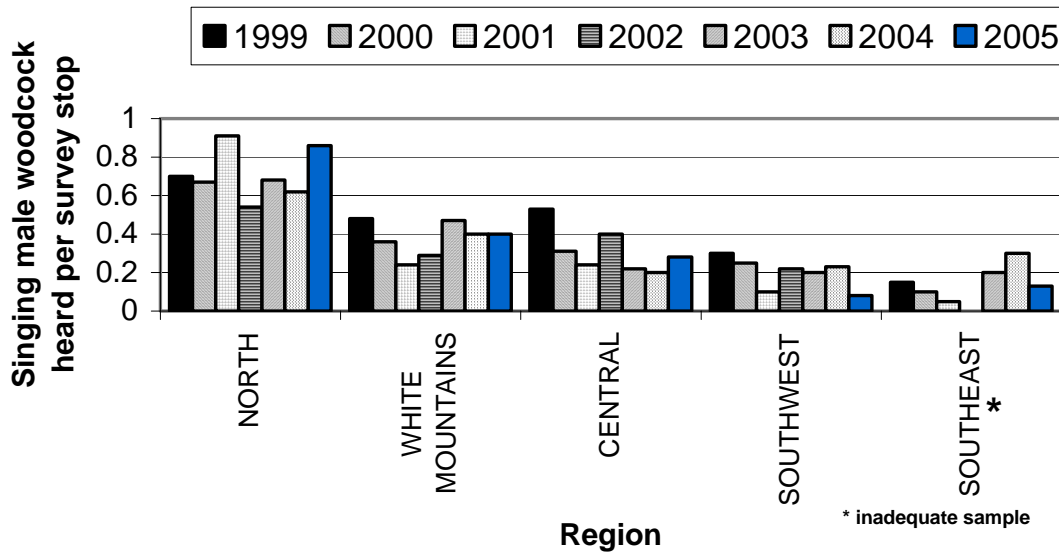
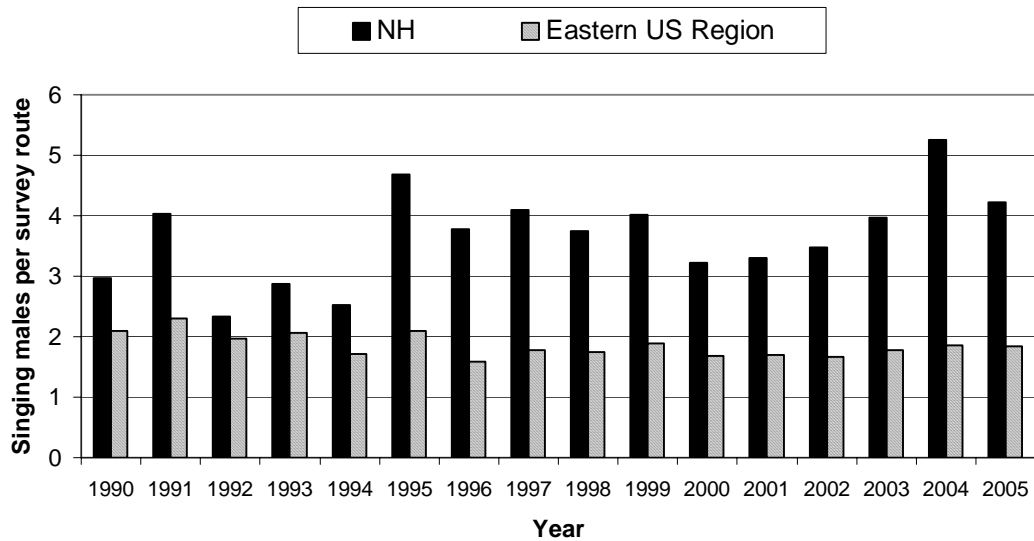


Fig. 14 Woodcock singing ground survey results contrasting New Hampshire with the Eastern U.S. Woodcock Management Region, for the period 1990 through 2005 (data taken from U.S. Fish and Wildlife Services American Woodcock Harvest and Breeding Population Status 2005 Summary Report).



Appendix 1. 2004/2005 Small Game Hunter Survey Card and Accompanying 2004 Letter.

2004/2005 SMALL GAME HUNTER SURVEY

Return by December 31, 2004 for Fall Hunting or March 31, 2005 for Winter Hunting



NAME: _____

MAILING ADDRESS: _____

TOWN OF RESIDENCE: STATE: ZIP:

DID YOU DO MOST OF YOUR SMALL GAME HUNTING WITH A DOG? (circle)		YES	NO							
MONTH	DAY	WMU	TOWN HUNTED	# HOURS HUNTED	# WOODCOCK SEEN	# GROUSE SEEN	# GRAY SQUIRREL SEEN	# RABBIT SEEN	# HARE SEEN	SPECIES PRINCIPALLY HUNTING FOR *
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Dear Small Game Hunting Enthusiast:

Thank you for participating in our small game hunter survey. Your field observations will provide our small game project with valuable management insight into American woodcock, ruffed grouse (partridge), gray squirrel, cottontail rabbit and snowshoe hare. The data you collect will help us to: 1) determine small game distribution in New Hampshire; 2) compare small game abundance by region; 3) assess annual changes in abundance stemming from changes in productivity and mortality; 4) generate small game hunting season forecasts; 5) determine management needs, and; 6) identify areas for possible habitat management.

When filling out this survey, PLEASE ADHERE TO THE FOLLOWING GUIDELINES:

- *Only record YOUR 2004/2005 small game hunting observations;*
- *The small game season can be divided into **2 reporting periods**: September 1 – December 31, and January 1 through March 31. If you hunt during both reporting periods, please advise us of such and we will send you a second survey;*
- *Enter your daily hunting observations sequentially. Your survey accommodates **14 days** of hunting information. Feel free to submit copies of the survey if you would like to do so;*
- *Please return your postage-paid survey upon filling in all available days, and/or by the last day of the appropriate reporting period (either December 31 or March 31).*
- *If you don't see any small game when hunting, zero fill the appropriate columns for that day;*
- *Include the Wildlife Management Unit (WMU) (see map on reverse side of this letter) and the town in which you hunted. Please don't list village names. We will not publish town results;*
- *Note that the last column on the survey is intended to identify the game species you were **"PRINCIPALLY" HUNTING FOR"**. If your principal pursuit was woodcock, place "WO" in the blocks, if it was gray squirrel place "SQ" in the blocks, etc. Note that the 2- letter abbreviation for each species of interest is highlighted on the survey form. Your data is only useful to us if you fill in the "PRINCIPALLY HUNTING FOR" column;*
- *Only fill out the survey if you are hunting the small game species we have listed;*
- *If you have a friend who would like to participate in this survey, have them call 271-2461;*
- *A brief summary report will be distributed to all survey respondents upon its completion.*

If you have questions about this survey, please feel free to call me at 868-1095. If you know someone who would like to participate in this survey, please send them our way; we need additional participants. Thanks in advance for your cooperation. **Our success depends on your response!**

Respectfully,

Julie Robinson
Wildlife Biologist

Dear Successful Bow Hunter:

The enclosed **BOW HUNTER SURVEY** provides our wildlife managers with valuable insight into the relative abundance and distribution of a number of important wildlife species. This year's survey is being sent to Granite State bow hunters who successfully harvested a deer during the 2005 archery season. We've chosen to work with successful bow hunters because: **1)** bow hunters are active during ideal wildlife viewing times, **2)** bow hunters employ hunting techniques that facilitate high wildlife observation rates, and; **3)** bow hunters have a good track record of responding to past surveys.

This survey provides you with an opportunity to contribute to our successful wildlife management programs. Your completed surveys provide valuable information to our small game, turkey, furbearer and black bear projects. Survey data enhances our knowledge and understanding of this spectacular array of wildlife species. Your observations are key to our success. **Please take the time to respond.** A brief summary report will be distributed to all survey respondents upon completion.

When filling out the survey card, **PLEASE ADHERE TO THE FOLLOWING GUIDELINES:**

- Only record **your 2004 September/October** bow hunting observations;
- Include all days that you actually bow hunt until the survey is filled;
- On those days when you don't see the listed species, fill in the appropriate columns with zeros;
- Include the Wildlife Management Unit (WMU) (**see the map on reverse side of this letter**) and the town in which you hunted. Please don't list village names;
- Your survey card accommodates up to 15 days of hunting information. Feel free to submit additional copies of the survey card if you are so inclined;
- Please send your **postage paid** survey card back to us by **November 5th**. Cards postmarked after December 1st will not be included in our data summary;

If you have any questions about this survey, please feel free to call me at 868-1095. Thanks in advance for your cooperation. **Our success depends on your response!**

Respectfully,

Julie Robinson
Wildlife Biologist

Appendix 3. 2004/1005 Hunter Survey Raw Data For Figures 1 through 14.

Fig. 1. New Hampshire small game hunter survey

01-Sep-04	4	23-Oct-04	409	09-Dec-04	2	07-Mar-05	3
03-Sep-04	4	24-Oct-04	244	10-Dec-04	4	10-Mar-05	4
04-Sep-04	33.5	25-Oct-04	90	11-Dec-04	36	12-Mar-05	6
05-Sep-04	18	26-Oct-04	129	12-Dec-04	65	13-Mar-05	8
06-Sep-04	11	27-Oct-04	142	13-Dec-04	15	18-Mar-05	6
11-Sep-04	9	28-Oct-04	115	14-Dec-04	10.5	19-Mar-05	18
12-Sep-04	7	29-Oct-04	166.5	15-Dec-04	3	20-Mar-05	12
13-Sep-04	6	30-Oct-04	223	16-Dec-04	15	21-Mar-05	2
15-Sep-04	24.25	31-Oct-04	113	17-Dec-04	21.5	26-Mar-05	14
16-Sep-04	17.75	01-Nov-04	61.5	18-Dec-04	41.5	27-Mar-05	7
17-Sep-04	8.5	02-Nov-04	35.5	19-Dec-04	40		
18-Sep-04	21.75	03-Nov-04	61	20-Dec-04	4.5		
19-Sep-04	13	04-Nov-04	64.75	21-Dec-04	13		
20-Sep-04	9	05-Nov-04	50	22-Dec-04	21.5		
21-Sep-04	2	06-Nov-04	136.5	23-Dec-04	21		
22-Sep-04	4	07-Nov-04	140	24-Dec-04	25.5		
23-Sep-04	4	08-Nov-04	48.5	25-Dec-04	17		
24-Sep-04	2.75	09-Nov-04	51	26-Dec-04	20.5		
25-Sep-04	14	10-Nov-04	56.5	27-Dec-04	14		
26-Sep-04	6	11-Nov-04	48.5	28-Dec-04	9.5		
27-Sep-04	3	12-Nov-04	47.5	29-Dec-04	20.5		
28-Sep-04	2.75	13-Nov-04	116.5	30-Dec-04	27		
29-Sep-04	3.5	14-Nov-04	77	31-Dec-04	60.5		
30-Sep-04	5	15-Nov-04	26	01-Jan-05	11		
01-Oct-04	535.3	16-Nov-04	20	02-Jan-05	6		
02-Oct-04	524.5	17-Nov-04	12	03-Jan-05	3		
03-Oct-04	448.8	18-Nov-04	30.5	04-Jan-05	2		
04-Oct-04	182.5	19-Nov-04	28	05-Jan-05	2		
05-Oct-04	207	20-Nov-04	98	08-Jan-05	7		
06-Oct-04	187.3	21-Nov-04	76	09-Jan-05	4		
07-Oct-04	214	22-Nov-04	13.5	10-Jan-05	2		
08-Oct-04	365.8	23-Nov-04	10	15-Jan-05	10		
09-Oct-04	558.8	24-Nov-04	17.5	16-Jan-05	10		
10-Oct-04	548.5	25-Nov-04	23	22-Jan-05	12		
11-Oct-04	252.8	26-Nov-04	50.5	23-Jan-05	10		
12-Oct-04	201.3	27-Nov-04	86	02-Feb-05	3		
13-Oct-04	199.5	28-Nov-04	36	03-Feb-05	4		
14-Oct-04	245.5	29-Nov-04	3	05-Feb-05	13		
15-Oct-04	203.5	30-Nov-04	13	16-Feb-05	4		
16-Oct-04	374	01-Dec-04	1	19-Feb-05	17		
17-Oct-04	314.5	02-Dec-04	13	20-Feb-05	8		
18-Oct-04	179.8	03-Dec-04	24.5	26-Feb-05	22		
19-Oct-04	140	04-Dec-04	48.5	27-Feb-05	15		
20-Oct-04	213	05-Dec-04	26	28-Feb-05	5		
21-Oct-04	212	06-Dec-04	22.5	04-Mar-05	4		
22-Oct-04	244.5	07-Dec-04	7	05-Mar-05	14		
		08-Dec-04	12	06-Mar-05	14		

Fig. 2. New Hampshire small game hunter effort per species (1999-2004).

Hours hunted by spp

hunting_for	1999	2000	2001	2002	2003	2004
GROUSE	1795.5	1573.8	2296.25	1905	1797.45	7661.25
HARE	521	254	512.5	499.5	754	417.5
RABBIT	101	55.5	48	16	83.5	51
SQUIRREL	78.5	11	40.5	90	49	751
WOODCOCK	288	506.5	368	555.8	544.2	2019.25

Fig. 3. New Hampshire small game hunter effort by region (1999-2004).

Hours hunted by region

MMR	1999	2000	2001	2002	2003	2004
NORTH	1100	862.3	1621.75	1465.5	1607.4	4091.5
WHITE MOUNTAINS	386	429.5	311.5	439.3	389	1003.25
CENTRAL	586	643.25	674	692.5	799.75	3026.25
SOUTHWEST	386	260.25	425.5	313.5	277.5	1725.75
SOUTHEAST	326	205.5	232.5	155.5	154.5	1053.25

Fig. 4. New Hampshire small game hunter effort by species and region (2004).

Hours hunted by spp and region

REGION	GROUSE	HARE	RABBIT	SQUIRREL	WOODCOCK
NORTH	3646.5	183	4	0	258
WHITE MOUNTAINS	598	10.5	0	9	385.75
CENTRAL	1740.5	114	6	363.5	802.25
SOUTHWEST	1004.75	30	0	230	461
SOUTHEAST	671.5	80	41	148.5	112.5

Fig. 5. New Hampshire small game hunter effort with and without the aid of a dog (2004).

dog_hunt	GROUSE	HARE	RABBIT	SQUIRREL	WOODCOCK
WITH A DOG	3643	309.5	3	69	1567.25
WITHOUT A DOG	3224.75	74	48	633.5	206

Fig. 6. New Hampshire small game hunter observation rates (1999-2004).

Year	hunting_for	SumOfhours_hunted	SumOfSeen	seen/100 hunter hours
1999	GROUSE	1861.5	1923	103.30
	HARE	521	178	34.17
	RABBIT	101	15	14.85
	SQUIRREL	78.5	53	67.52
	WOODCOCK	299	645	215.72
2000	GROUSE	1579.8	1201	76.02
	HARE	254	88	34.65
	RABBIT	55.5	11	19.82
	SQUIRREL	11	9	81.82
	WOODCOCK	506.5	1041	205.53
2001	GROUSE	2296.25	2278	99.21
	HARE	512.5	241	47.02
	RABBIT	48	0	0.00
	SQUIRREL	40.5	32	79.01
	WOODCOCK	368	703	191.03
2002	GROUSE	1905	1998	104.88
	HARE	499.5	185	37.04
	RABBIT	16	1	6.25
	SQUIRREL	90	97	107.78
	WOODCOCK	555.8	930	167.33
2003	GROUSE	1797.45	2019	112.33
	HARE	754	317	42.04
	RABBIT	83.5	12	14.37
	SQUIRREL	49	41	83.67
	WOODCOCK	544.2	852	156.56
2004	GROUSE	7661.25	6577	85.84
	HARE	417.5	200	47.9
	RABBIT	51	17	33.33
	SQUIRREL	751	501	66.71
	WOODCOCK	2019.25	2343	116.03

Fig. 7. New Hampshire small game hunter observation rates for dog hunter only (1999-2004).

	1999	2000	2001	2002	2003	2004
hunting_for	Seen/100 hunter hrs	Seen/100 hunter hrs	Seen/100 hunter hrs	Seen/100 hunter hrs	Seen/100 hunter hrs	Seen/100 hunter hrs
GROUSE	118.86	79.77	113.96	132.68	115.31	99.1
RE	33.78	38.55	47.77	39.14	43.88	51.37
BBIT	16.67	24.62	0.00	0.00	14.72	33.33
QUIRREL	0.00	0.00	0.00	0.00	175.00	55.07
WOODCOCK	227.44	192.63	196.17	156.20	161.82	122.31

Fig. 8. New Hampshire grouse observation rates by region for dog hunters (2004).

GROUSE	1999	2000	2001	2002	2003	2004
MMR	seen/100 hunter hrs	seen/100 hunter hrs	seen/100 hunter hrs	seen/100 hunter hrs	seen/100 hunter hrs	seen/100 hunter hrs
NORTH	149.90	112.00	128.79	144.77	118.64	135.71
WHITE MOUNTAINS	172.19	117.81	174.07	177.03	158.74	113.59
CENTRAL	130.08	106.58	105.90	62.93	104.90	76.26
SOUTHWEST	60.10	49.83	44.75	37.14	42.86	38.06
SOUTHEAST	134.88	56.60	68.07	87.18	60.53	20.57

Fig. 9. New Hampshire woodcock observation rates by region for dog hunters (2004).

WOODCOCK	1999	2000	2001	2002	2003	2004
MMR	seen/100 hunter hrs	seen/100 hunter hrs	seen/100 hunter hrs	seen/100 hunter hrs	seen/100 hunter hrs	seen/100 hunter hrs
NORTH	362.67	156.76	181.43	138.33	127.57	235.55
WHITE MOUNTAINS	253.13	259.76	128.36	183.01	263.93	155.4
CENTRAL	234.93	155.73	145.97	154.86	123.08	79.38
SOUTHWEST	100.00	212.59	316.06	122.11	127.14	102.53
SOUTHEAST	139.53	125.58	60.00	93.75	190.70	70.96

Fig. 10. Grouse observation rates calculated from data provided by bow hunter survey respondents.

mean observations per 100 hunter hours

	NORTH	WHITE MOUNTAINS	CENTRAL	SOUTHWEST	SOUTHEAST
1997	36.5	29.4	14.4	17.51	11.2
1998	38.6	40.2	15.6	13.81	11.4
1999	53.4	35	14.4	13.09	5.6
2000	29.05	24.86	16.21	12.19	6.78
2001	47.39	39.72	17.42	11.89	8.23
2002	34.41	32.99	9.92	10.45	5.52
2003	34.55	24.78	12.82	9.7	3.9
2004	33.11	36.61	11.35	6.95	4.79

Fig 11. Grouse drumming counts per region (2005).

Grouse drumming routes						
YEAR	NORTH	WHITE MOUNTAINS	CENTRAL	SOUTHWEST	SOUTHEAST	
1999	0.7		0.63	0.24	0.21	0.15
2000	0.7		0.62	0.36	0.1	0.18
2001	0.84		0.84	0.54	0.44	0.03
2002	0.95		0.79	0.57	0.3	0.08
2003	0.4		0.58	0.43	0.45	0.14
2004	0.56		0.58	0.23	0.18	0
2005	0.675		0.85	0.42	0.5	0

Fig 12. North Country Grouse (2005).

Grouse drumming in NORTH region

1996	0.65
1997	0.4
1998	0.52
1999	0.54
2000	0.67
2001	0.74
2002	0.76
2003	0.6
2004	0.41
2005	0.73

Fig. 13. Woodcock Singing ground survey results (2005).

Woodcock routes						
YEAR	NORTH	WHITE MOUNTAINS	CENTRAL	SOUTHWEST	SOUTHEAST	
1999	0.7	0.48	0.53	0.3	0.15	
2000	0.67	0.36	0.31	0.25	0.1	
2001	0.91	0.24	0.24	0.1	0.05	
2002	0.54	0.29	0.4	0.22		
2003	0.68	0.47	0.22	0.2	0.2	
2004	0.62	0.4	0.2	0.23	0.3	
2005	0.86	0.4	0.28	0.08	0.13	

Fig 14. NH data compared to Eastern US (2005).

Woodcock routes

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
NH	2.97	4.03	2.34	2.88	2.52	4.68	3.78	4.1	3.74	4.01	3.23	3.3	3.48	3.97	5.25	4.22
Eastern US Region	2.1	2.3	1.97	2.07	1.72	2.1	1.58	1.78	1.74	1.89	1.68	1.7	1.67	1.78	1.86	1.84

Appendix 4. Small Game Management Regions.

New Hampshire Small Game Management Regions



Appendix 5. Data Form For 2005 Grouse Routes.

**YEAR 2005 RUFFED GROUSE & TURKEY SURVEY DATA FORM
NH FISH AND GAME DEPARTMENT**

ROUTE NUMBER (USE ASSIGNED ROUTE NUMBERS ONLY): _____
 WMU: _____ Town: _____ Date of Survey: ____/____/____
 Observer's Name: _____ Was this route run by you last year? _____
 If Volunteer, please provide your phone number: _____

OFFICIAL SUNRISE _____:_____		SKY CONDITION		TEMP Fahrenheit		WIND (MPH)				PRECIP	
ROUTE START TIME _____:_____		___ Clear ___ ¼ Overcast ___ ½ Overcast ___ ¾ Overcast ___ ¾ Overcast		___ 35-39 ___ 40-49 ___ 50-59 ___ 60+		___ Calm ___ Gentle (1-3) ___ Light (4-7) ___ Moderate (8-12) ___ Strong (> 12)				___ None ___ Mist ___ Snow ___ Fog ___ Light Rain	
Stop #	Odometer Reading	Time	Total Drumming Events Heard	Total No. Gobblers Heard	Disturbance				Comments		
					Low	Mod	High	<i>Reject</i>			
1	.	:									
2	.	:									
3	.	:									
4	.	:									
5	.	:									
6	.	:									
7	.	:									
8	.	:									
9	.	:									
10	.	:									
TOTALS											

IMPORTANT: PLEASE READ THESE INSTRUCTIONS CAREFULLY AND COMPLETELY

1. Record the total number of grouse drumming events heard; **not** the number of individual grouse heard.
2. Record the total number of individual gobblers (male turkeys) heard; **not** the number of gobblers heard.
3. Conduct surveys between 15 April and 10 May
4. Begin routes 30 minutes BEFORE sunrise.
5. Stops should be at 1- mile intervals.
6. Listen for exactly 4 minutes.
7. Do not conduct surveys if temperatures are below normal, or in moderate wind or persistent rain.
8. Mail all completed forms by 5/20 to Julie Robinson, NH Fish & Game Dept, Region 3, 225Main Street, Durham, NH 03824.
9. Under "Disturbance" only check Reject if disturbance is dramatic enough to warrant rejection of the stop as a survey point.
10. Questions should be directed to Julie Robinson 868-1095, cell # 419-0198.

Appendix 6. Grouse and Turkey Survey Results for 2005.

STRATIFIED GROUSE ROUTES

RT NO.	WMU	TOWN	DATE	GROUSE	TURK	STOPS	OBSERVER
--------	-----	------	------	--------	------	-------	----------

NORTH

01	B	DUMMER	05/09/05	08	00	10	JKELLY
02	D1	WHITEFIEL	04/22/05	02	00	10	ATIMMINS
03	D1	LANCASTER	04/25/05	07	03	10	ATIMMINS
04	B	COLUMBIA	04/26/05	10	00	10	WSTAATS
05	C2	BERLIN	05/09/05	06	01	10	JKELLY
06	C2	MILAN	05/10/05	13	01	10	JKELLY
08	A	CLARKSVIL	05/03/05	07	00	10	WSTAATS
35*	D	BETHLEHE	05/02/05	01	01	10	NMANLEY

				54	06	80	
Birds Per Stop				.68	.07		

WHITE MOUNTAINS

09	E	JACKSON	--/--/--	00	00	00	BABRAMS
10	F	CAMPTON	05/05/05	03	00	9	JKNEELAND
11	E	CHATHAM	04/20/05	06	01	10	KBONTAITES
12	D2	BENTON	05/04/05	13	02	10	CJELLISON
13	D2	SUGAR HIL	04/27/05	07	01	10	ATIMMINS
14	F	RUMNEY	05/05/05	13	00	10	SWEBER

				42	04	49	
Birds Per Stop				.85	.08		

CENTRAL

15	I1	WEBSTER	05/11/05	04	02	10	EROBINSON
16	J2	PITTSFIELD	04/18/05	00	01	10	JROBINSON
17	G	CANAAN	05/02/05	06	03	10	TDAKAI
18	J1	TUFTONBO	04/29/05	03	03	10	KBONTAITES
19	J1	FREEDOM	05/18/05	01	01	10	KBONTAITES
20	I1	HILL	05/04/05	06	01	10	SBRESNAHAN
21	G	GRAFTON	05/10/05	09	00	10	TDAKAI
22	J2	GILMANTO	05/05/05	05	02	10	CBRIDGES

				34	13	80	
Birds Per Stop				.42	.16		

SOUTH WEST

23	H1	LANGDON	04/20/05	14	01	10	TWALSKI
24	H1	CROYDON	04/26/05	03	08	10	TWALSKI
25	I2	GOSHEN	04/22/05	07	08	10	TWALSKI
26	H2	NELSON	05/04/05	06	01	10	TWALSKI
27	I2	HILLSBORO	05/02/05	03	08	10	TWALSKI
28	H2	WINCHESTE	05/06/05	05	07	10	TWASKI
29	K	SHARON	04/26/05	00	01	10	JROBINSON
40	K	LYNDEBOR	04/27/05	02	01	10	JROBINSON

				40	35	80	
Birds Per Stop				.50	.43		

SOUTH EAST

30	L	DOVER	04/20/05	00	00	10	JROBINSON
32	M	CHESTER	04/26/05	00	00	10	EORFF
33	L	ALLENSTO	05/01/05	00	02	07	EORFF
34	M	DERRY	--/--/--	00	00		EORFF
36	M	SANDOWN	--/--/--	00	00		ESNYDER
				00	02	27	
Birds Per Stop				.00	.07		

2005 NORTH COUNTRY GROUSE INDEX

RT #	WMU	TOWN	DATE	GROUSE	STOPS	OBSERVER	LOCAL NAME
06	C2	MILAN	05/05/05	13	10	JKELLY	Mary Grande
07	B	STRATFORD	05/01/05	02	10	WSTAATS	Nash Stream
08	A	CLARKSVILLE	05/03/05	07	10	WSTAATS	Cedar Stream
50	A	PITTSBURG	05/10/05	08	10	WSTAATS	Smith Brook
51	A	PITTSBURG	05/06/05	10	10	WSTAATS	Indian tream
52	A	ERROL	05/04/05	03	10	WSTAATS	Greenough d.
53	B	MILLSFIELD	--/--/--	--	--	DROPPED IN 2004	
54	A2	DARTMOUTH	05/14/05	05	10	BOOMA	Loomis
55	A2	DARTMOUTH	05/14/05	14	10	KEVANS	Swift
56	A2	DARTMOUTH	05/13/05	04	10	BOOMA	Deadon
				66	90		
Birds Per Stop					.73		

*New route as of 2005.

These routes have been run in some combination since 1996. Three of these routes (6,7,8) are also part of our 2005 stratified sample.

Appendix 7. Woodcock survey results for 2005.

WOODCOCK ROUTE RESULTS

INCLUDES FEDERAL ROUTES ASSIGNED BY THE WATERFOWL PROJECT
AND 9 ROUTES (NO'S 100-108) RUN FOR THE SMALL GAME PROJECT

RT. NO.	WMU	TOWN	DATE	WOODC	STOPS	OBSERVER
---------	-----	------	------	-------	-------	----------

NORTH REGION

001	A	PITTSBURG	05/05/05	04	10	WSTAATS
002	B	STAR	05/05/05	09	10	TIMMINS
003	B/C2	ERRO	05/01/05	09	10	WSTAATS
100	D1	LANCAST	05/10/05	13	10	ATIMMINS
101	B	COLUMBIA	04/25/05	08	10	WSTAATS

				43	50	
<u>Woodcock Per Stop</u>				.86		

WHITE MOUNTAINS REGION

004	E	BETHLEHEM	05/03/05	06	10	ATIMMINS
005	E	PINKHAM NOT	05/09/05	04	10	ATIMMINS
006	D2	WARREN	05/06/05	01	10	KBORDEAU
106	E	CHATHAM	05/13/05	05	10	KBONTAITES
108	E	SACO (E.BR)	--/--/--	--	--	BABRAMS**

				16	40	
<u>Woodcock Per Stop</u>				.40		

CENTRAL REGION

010	G	ALEXANDRIA	04/29/05	01	10	KBORDEAU
007	J1	MOULTONBO	05/09/05	12	10	KBONTAITES
011	I1	CONCORD	05/05/05	01	10	SWHEELER
104	I1	FRANKLIN FA	05/10/05	05	10	KBORDEAU
008		EFFINGHAM	05/14/05	00	10	KBONTAITES
105	J2	LOUDON	05/14/05	08	10	JROBINSON

				17	60	
<u>Woodcock Per Stop</u>				.28		

SOUTH WEST REGION

009	H1	PLAINFIELD	05/01/05	01	10	EROBINSON
014	H2/I2	STODDAR	05/17/05	01	10	EROBINSON
013	H2	WALPOLE	--/--/--	--	--	TWALSKI
018		RICHMOND	05/05/05	00	00	TWALSKI
015		MT VERNON	05/05/05	00	00	LRyder
102	H1	LANGDON	04/19/05	02	10	TWALSKI
103	I2	HILLSBOR	--/--/--	--	--	

				04	30	
<u>Woodcock Per Stop</u>				.13		

SOUTH EAST REGION

107	L	EPSOM	05/06/05	00	10	EORFF
012		DERRY	05/03/05	00	10	EORFF
016	M	LONDERRY	05/05/05	00	10	EORFF
017	M	KENNSINGT	05/16/05	05	10	JROBINSON

				05	40	
<u>Woodcock Per Stop</u>				.13		

DARTMOUTH COLLEGE -2ND COLLEGE GRANT

110	LAMB VAL	05/13/05	01	10	GBOOMA
111	SOUTH SWIF	05/12/05	02	08	KEVANS
112	WINTER RD	05/12/05	08	05	KEVANS
113	LOOMIS	05/12/05	02	10	GBOOMA
114	DEAD DIA	05/06/05	05	10	KEVANS
115	4-MILE	05/11/05	06	10	KEVANS
116	SWIFT DIA	05/05/05	04	10	KEVANS
			28	63	
	<i>Woodcock per stop</i>		<u>.44</u>		

*also referred to as MARTIN MEADOWS

#107; was #31 grouse route converted to woodcock route by E. Orff in 1999.

**Removed from survey due to closed roads.

Appendix 8. Draft copy of the 2004/05 Small Game Summary Booklet.

June 30, 2005

Dear Small Game Hunting Enthusiast:

Thank you for your participation in our 2004/2005 Small Game Hunter Survey. Our objective was to receive 300 or more surveys this past year and as an incentive offered the chance to win a Ruger Red Label 20-gauge shotgun donated by the Sturm Ruger Company. The raffle was a huge success as we received over 400 surveys!!! **Thank you so much!** And although only one person won the gun, the Small Game Project was the big winner. We rely on data from those surveys to help guide us in our management decision-making and the data also serves as a basis for the content of this report.

Our survey plans were in jeopardy due to low participation in our surveys, but with the incredible response this past year we have a great sample which should provide good insight into the interests, activities and observations of our New Hampshire's small game hunters. Although you may not have won the gun, you can be satisfied that you are an important part of our initiative.

The Sturm Ruger Company was so impressed with the response generated by their donation that they are once again donating a firearm to our efforts. For the 2005/2006 hunting season, a small game rifle will be raffled off to a participant who completes and sends in a 2005/2006 Small Game Survey. This is a wonderful firearm and has the Sturm Ruger name behind it assuring you that is one of the finest guns manufactured. By participating in the survey you will be helping us to make your hunting experience in New Hampshire the best it can be. So I urge you to participate this year in our annual Small Game Survey and encourage your friends that enjoy small game hunting to do the same.

Signing up to become a small game survey volunteer is easy. Simply call the New Hampshire Fish and Game Department Wildlife Division at (603) 271-2461 or e-mail us your name and mailing address to wilddiv@wildlife.state.nh.us. Be sure to mention your interest in the small game survey. Then pass the word by letting your friends know about our efforts.

For those small game hunters who participated in our 2004/2005 survey efforts, and those bow hunters who returned their bow hunter survey, you have our sincere thanks and deepest appreciation. Without you and the dedicated Fish and Game staff who conduct grouse and woodcock surveys each spring, we would have little to report.

We would like your feedback. If you have comments to share or ideas to offer, please feel free to contact me directly at 868-1095. I look forward to hearing from you!

We wish you a safe and enjoyable hunting season in our beautiful state.

Sincerely,

Julie Robinson
Small Game Project Leader

HUNTING EFFORT OF SURVEY PARTICIPANTS IN NH DURING THE 2004 SMALL GAME SEASON

Fig. 1. New Hampshire small game hunter effort (2004-05)

Small game hunters who return their annual surveys provide information on small game hunting effort, hunter observation rates and species distribution. A total of 408 hunters responded to our 2004 survey, which spans the period 09/1/04-3/31/05. The high number of respondents is thought to be a response to the Department offering of a Ruger shotgun, to a randomly selected survey participant. Figures 1 through 9 of this report summarize the small game hunter survey results. A total of 10,000 hunter-hours were reported on the 2004 small game survey. The graph below depicts the distribution of hunter effort over New Hampshire's 2004-05 small game season. The majority of the hunting occurs during the early season, with grouse and woodcock being the preferred species. The squirrel season begins Sept 1st, thus the data for the month of September is squirrel hunters. As in previous years, hunting activities tend to decline in late October. During the remainder of the season, weekend hunting constitutes the majority of small game hunting in New Hampshire.

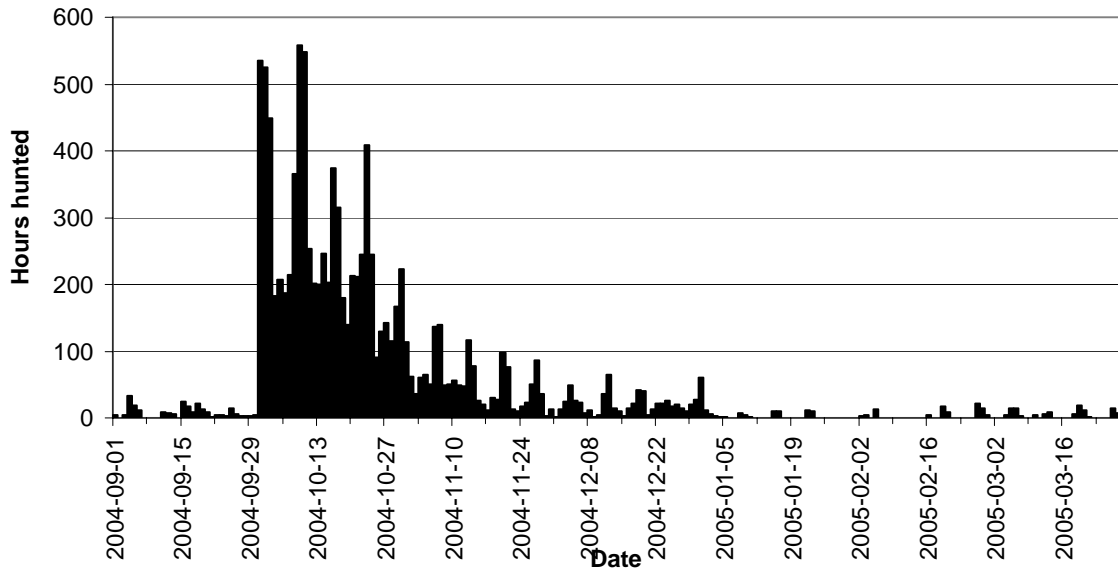


Fig. 2. New Hampshire small game hunter effort per species (2004/05)

Grouse hunting accounted for 70% of reported small game hunting hours during the 2004-05 season, an increase of 15% from 2003. Woodcock hunting remained nearly equal to the last year with an effort of 18%. Only 3% of the hours small game hunters spent hunting were targeted towards hare. The reason for this low effort is unclear. Rabbit hunting effort remained very low due to their dwindling numbers and habitat loss. Squirrel hunting reported 6% of the total hours. The early squirrel season allows hunters to teach youngsters to hunt during this quite time of year.

Hours hunted by species 2004-05 Season

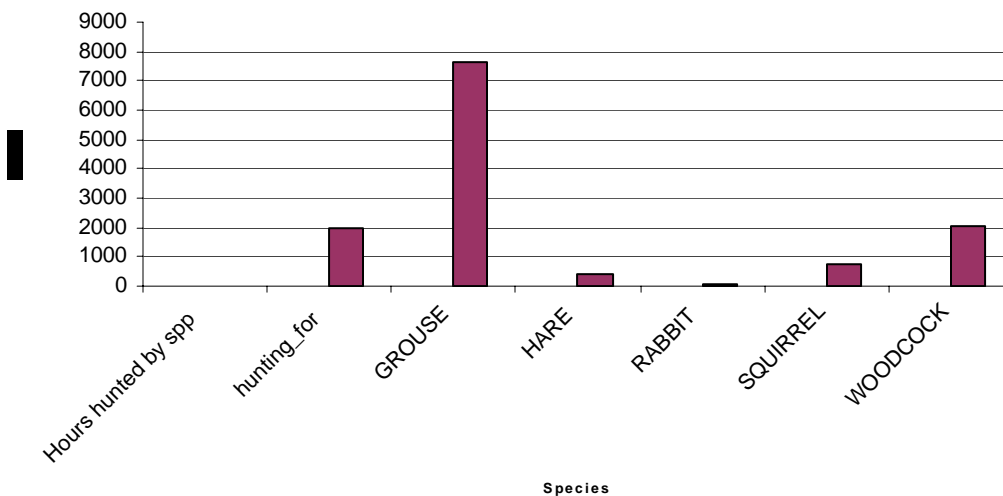


Fig. 3. New Hampshire small game hunter effort by region (1999-2004).

The data in the graph below reflects the dramatic increase in survey participation during 2004/2005. The take home message is that the North Country remains our premiere area for grouse and woodcock hunting, our two most sought after species.

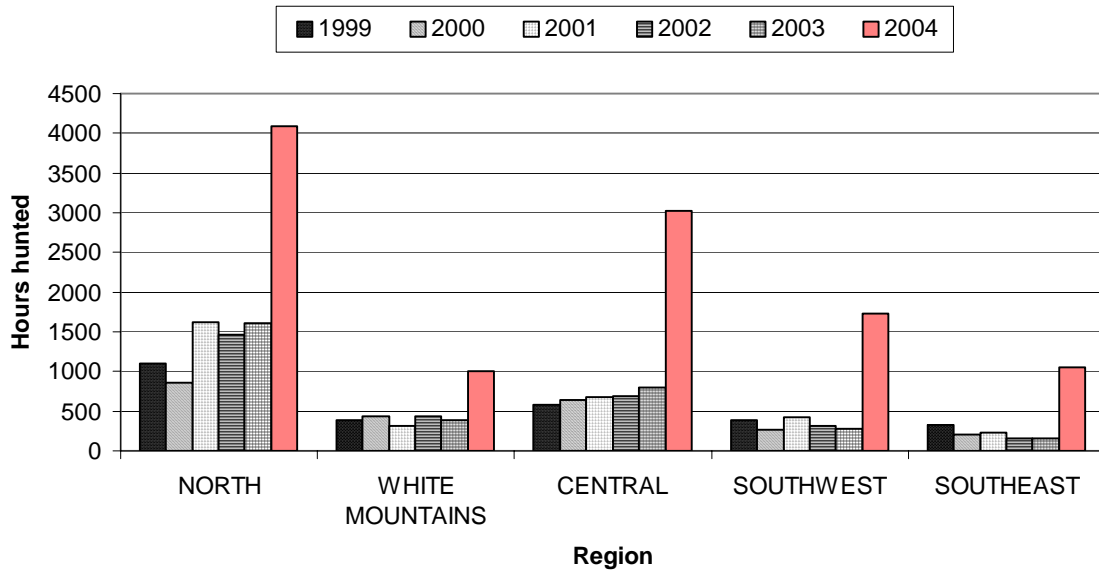


Fig. 4. New Hampshire small game hunter effort by species and region (2004/05).

As expected, the majority of the grouse hunting was in the northern portion of the state. For those that hunted woodcock, the Central region was preferred.

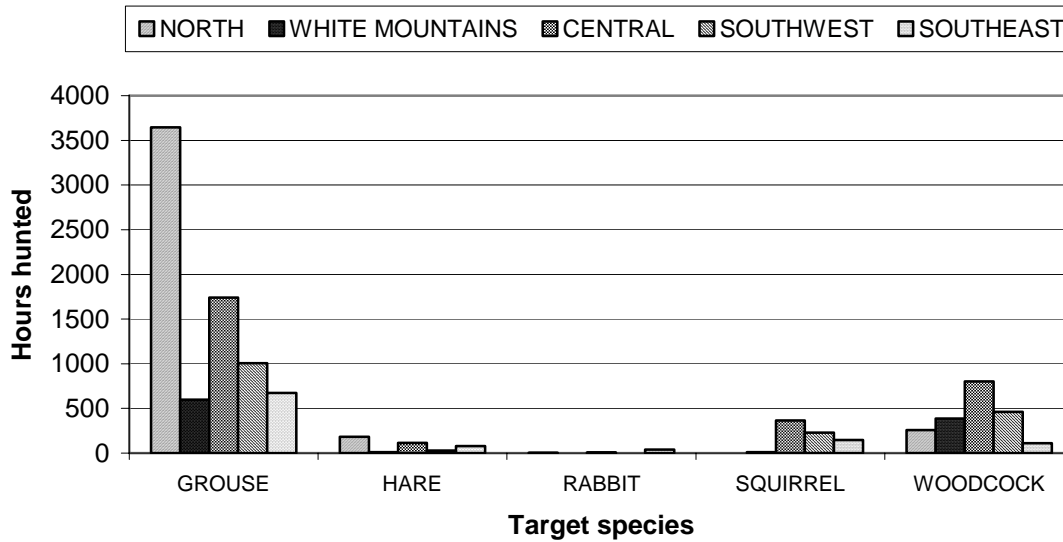


Fig. 5. New Hampshire small game hunter effort with and without the aid of a dog (2004/05).

Using a dog while small game hunting is the preferred method in New Hampshire. With a larger dataset it is interesting to see the difference between hunters with and without dogs. Although the data shows nearly identical hunting effort for grouse, the use of a dog is the preferred means of hunting. Nearly all hunters that pursued woodcock preferred to hunt with a dog.

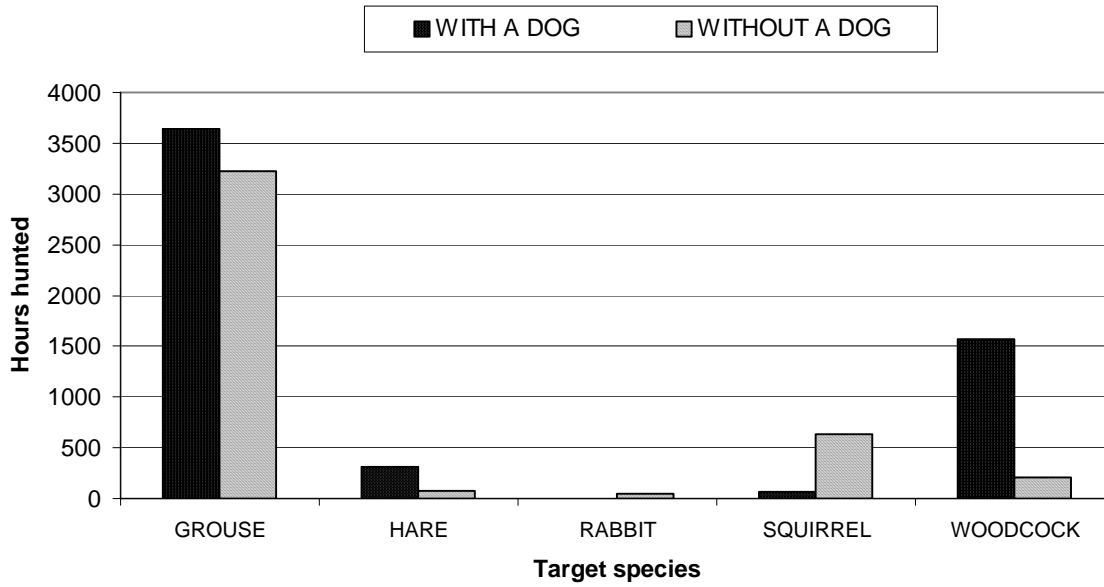


Fig. 6. New Hampshire small game hunter observation rates (1999-2004).

Observation rates are expressed in terms of animals seen per 100 hunter hours. This method is viewed as a reliable index to species abundance and allows us to compare species within and between years. No distinction is made in this graph between observation rates of hunters with or without dogs. It is interesting to note that while woodcock observation rates have steadily declined, spring woodcock survey results suggest that our breeding population is relatively stable.

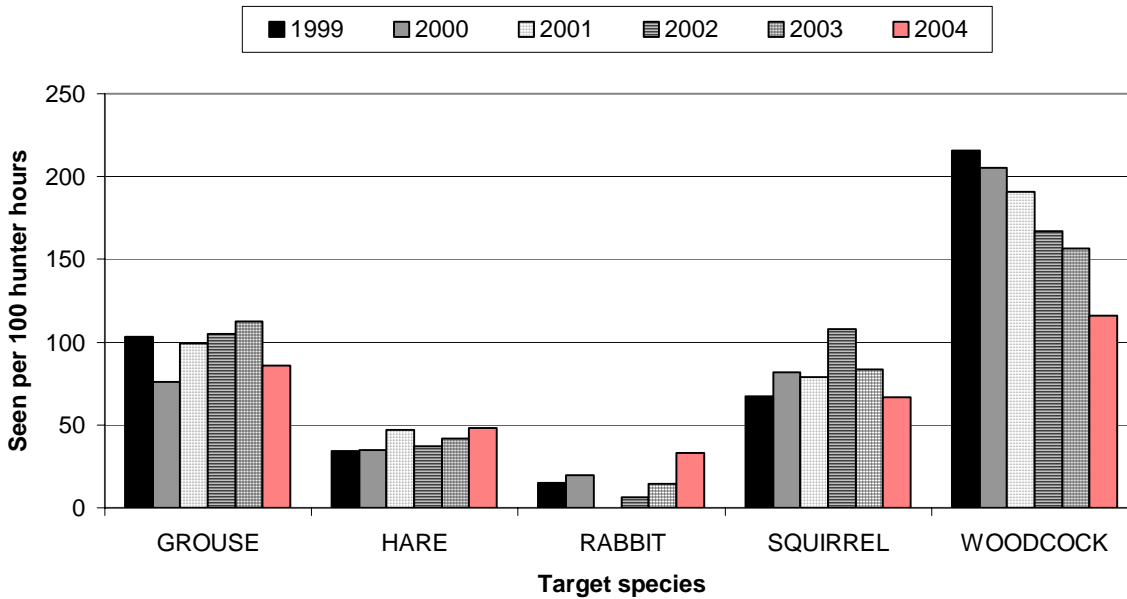


Fig. 7. New Hampshire small game hunter observation rates for dog hunters only (1999-2004).

The majority of survey respondents used a dog while hunting. By using their data alone we are able to eliminate variability that may result from combining dog and non-dog hunter results. Fewer grouse and woodcock were observed in 2004 than 2003. Squirrel and rabbit observations were up.

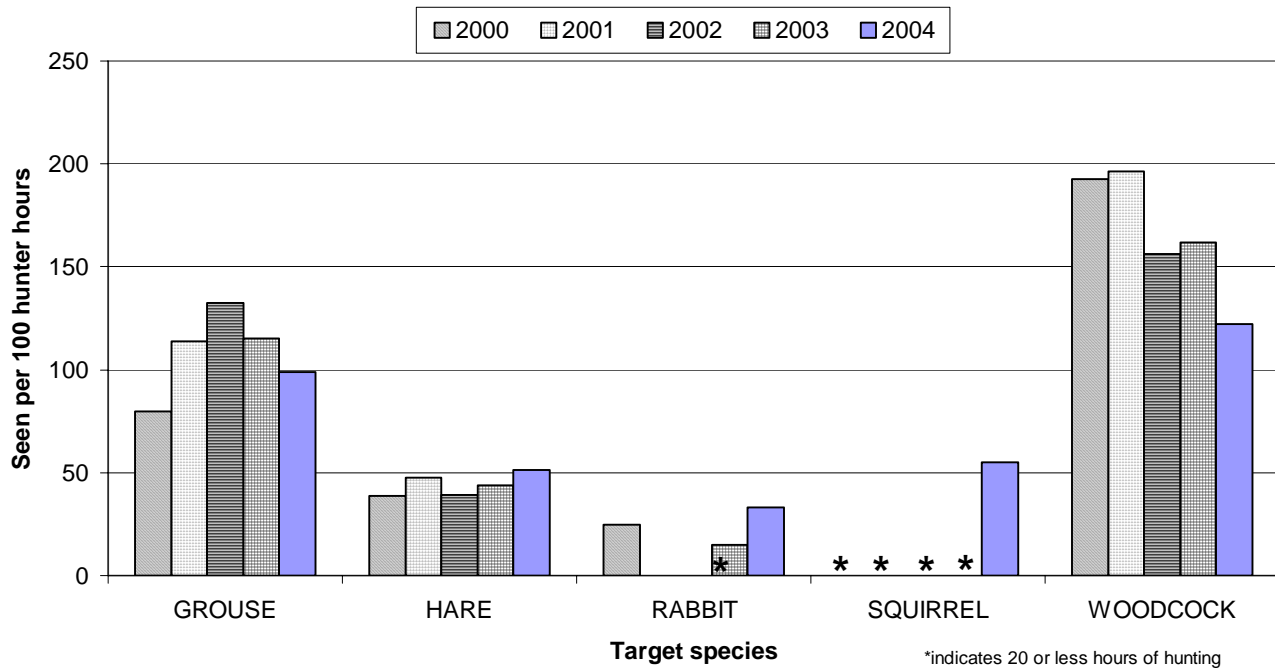


Fig. 8. New Hampshire grouse observation rates by region for dog hunters (2004).

The North region showed an increase in the frequency that grouse were observed. The White Mountain region along with the Southeast showed a much lower observation rate. There is considerable variability in grouse numbers from year to year and region to region. This is why it is important that Fish and Game manage wildlife species on a regional basis.

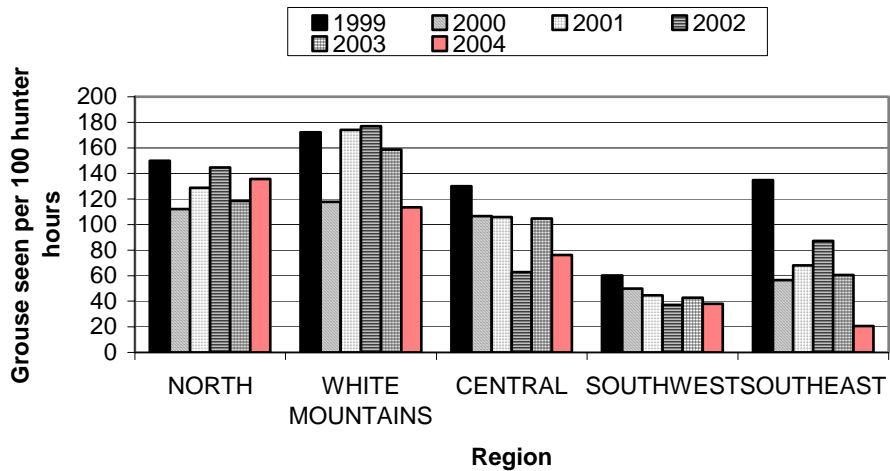
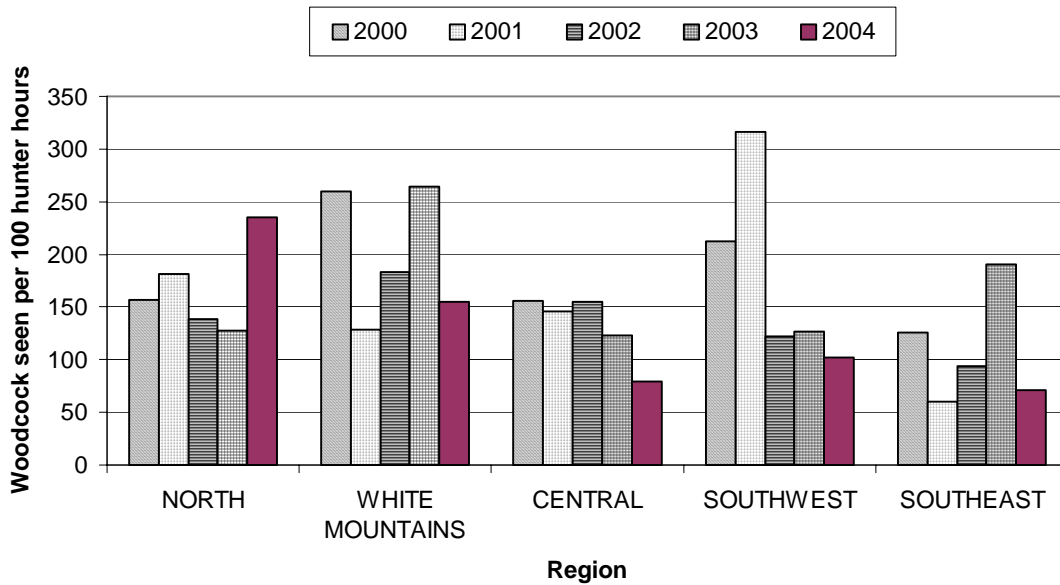


Fig. 9. New Hampshire woodcock observation rates by region for dog hunters (2004).

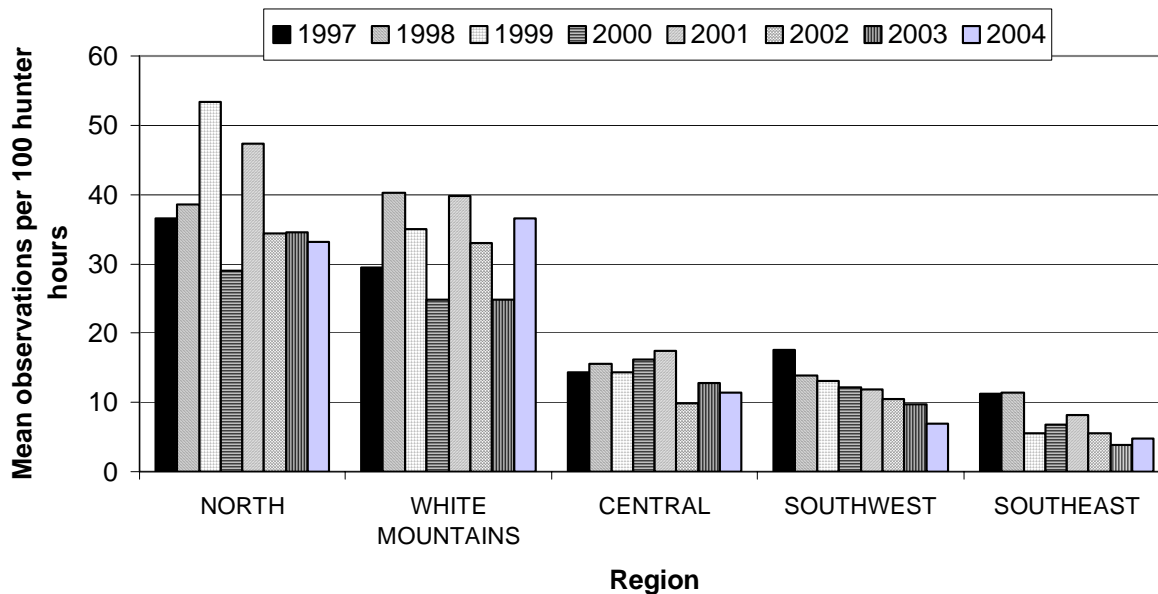
2004 woodcock sightings increased markedly in the North region. Sightings were nearly the same as 2003 in the Southwest while the Southeast and White Mountains regions showed dramatic decreases in observations. The wide swing in observation rates could be the result of variable sample sizes at the regional level. This can exaggerate the rate of change in a particular region.



BOW HUNTER OBSERVATION RATES IN NEW HAMPSHIRE DURING 2004

Figure 10. New Hampshire bow hunter observation rates of grouse by region (1997-2004).

Successful bow hunters are surveyed annually to assess their observation rates of various wildlife species. A total of 172 bow hunters out of 2158 responded to our 2004 survey. Bow hunter observations reflect nearly identical grouse observations in the North and Central regions as in 2003. The White Mountains showed a rebound in numbers observed. Note the difference between small game and bow hunter observation rates.



RESULTS FROM NH GROUSE SURVEY ROUTES CONDUCTED DURING SPRING 2005

Fig. 11 Results from randomly stratified grouse drumming routes run in New Hampshire during 1999 (N=33), 2000 (N=31), 2001 (N=32), 2002 (N=32), 2003 (N=31), and 2004 (N=33), 2005 (N=39).

Wildlife biologists and volunteers perform grouse drumming surveys from mid-April through mid-May to assess regional grouse breeding populations. Results show that numbers increased in all regions except for the Southeast where no drumming grouse were heard.

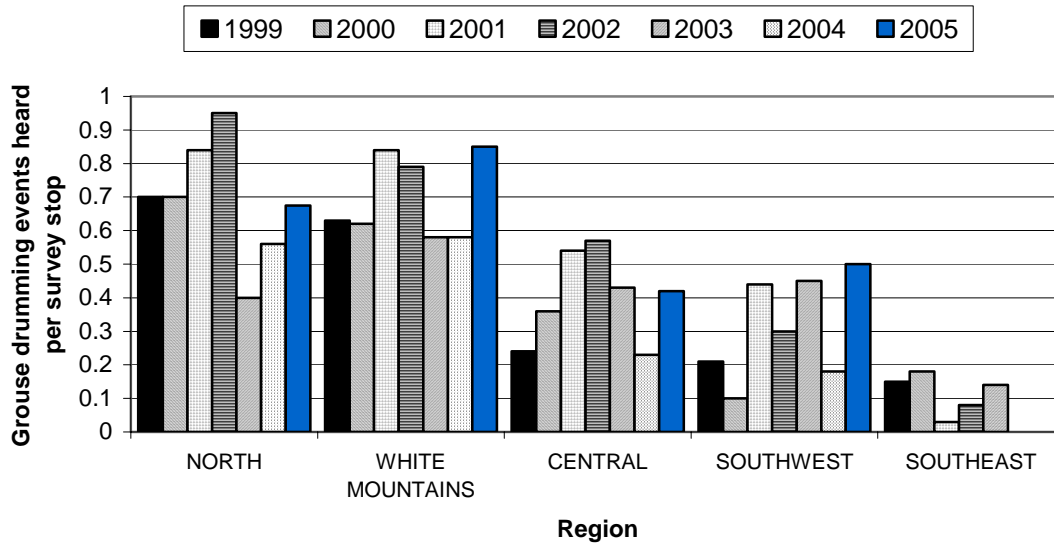
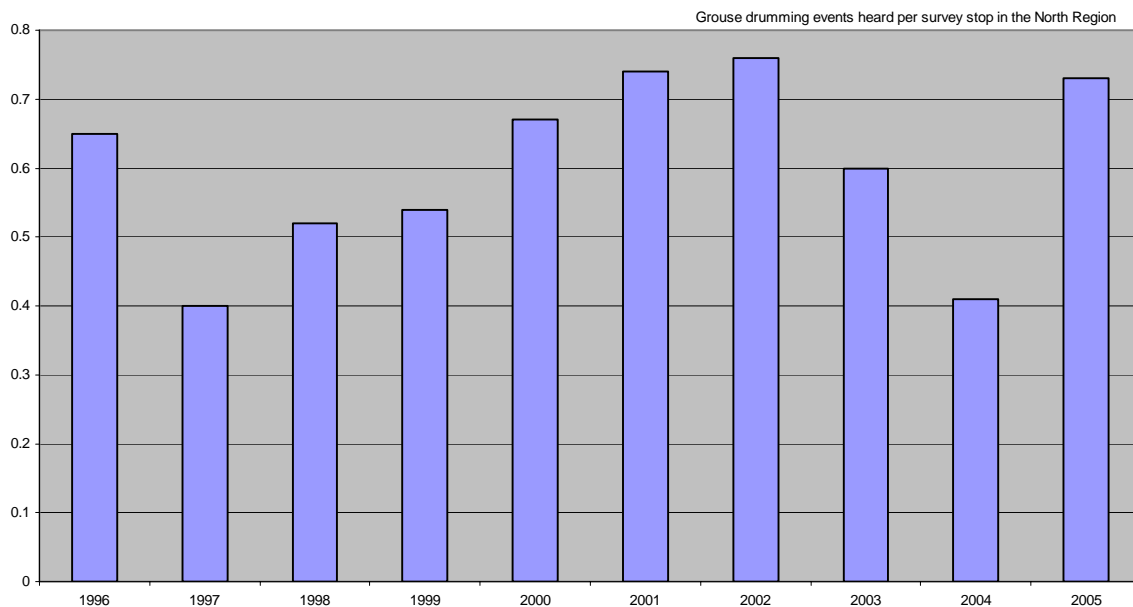


Fig.12 Results from selected ruffed grouse drumming routes run in New Hampshire's North Country (1996-2005) depicting the number of grouse drumming events heard per stop per year.

For the past decade, we have run 6-8 select drumming survey routes in the North Country. These routes track changes in grouse abundance on our premier grouse range. In 2005, the survey results show that an average of 0.7 drumming events per stop compared to 0.4 heard in 2004. This increase is great for those who love to hunt grouse in the North Country. Biologist and field dog clubs have reported flushing many grouse while a field. When grouse hunting in New Hampshire, the North Country is still our premiere range. Active forest management in the north is the key to keeping our grouse populations strong.



RESULTS FROM NH WOODCOCK SURVEY ROUTES CONDUCTED DURING SPRING 2005

Fig. 13 Regional results from randomly stratified woodcock singing ground surveys run in New Hampshire during 1999 (N=19), 2000 (N=22), 2001 (N=21), 2002 (N=20), 2003 (N=20), 2004 (N=21), 2005 (N=23).

Singing ground survey routes provide an index to the overall abundance of resident singing males, which is used to make references about the breeding population. The number of woodcock heard on Northern routes increased this year, this is good news for woodcock populations but also could be an attribute of more surveys being run this year compared to last. The Southeast and Southwest regions showed a decline. Habitat loss due to development is a concern in southern New Hampshire.

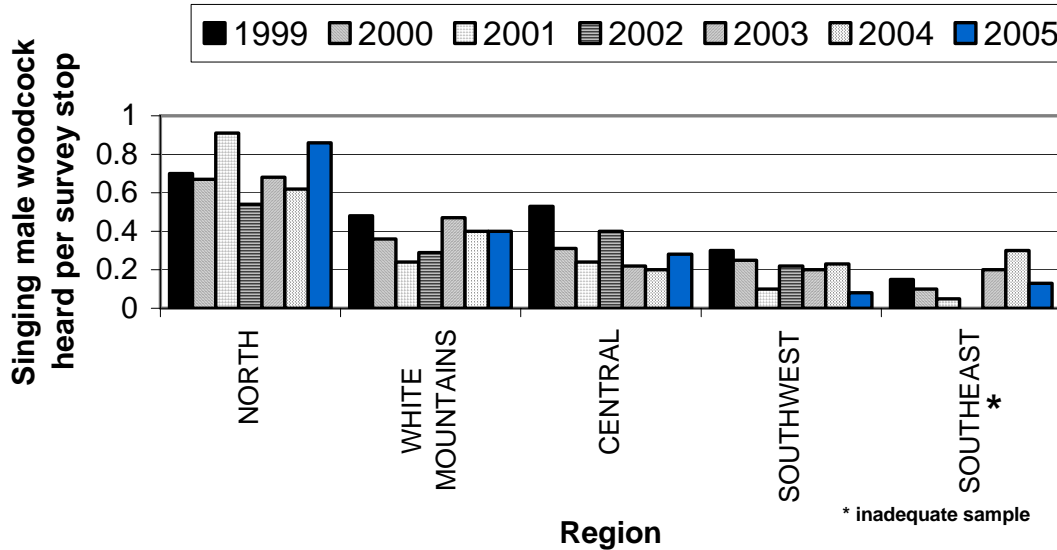
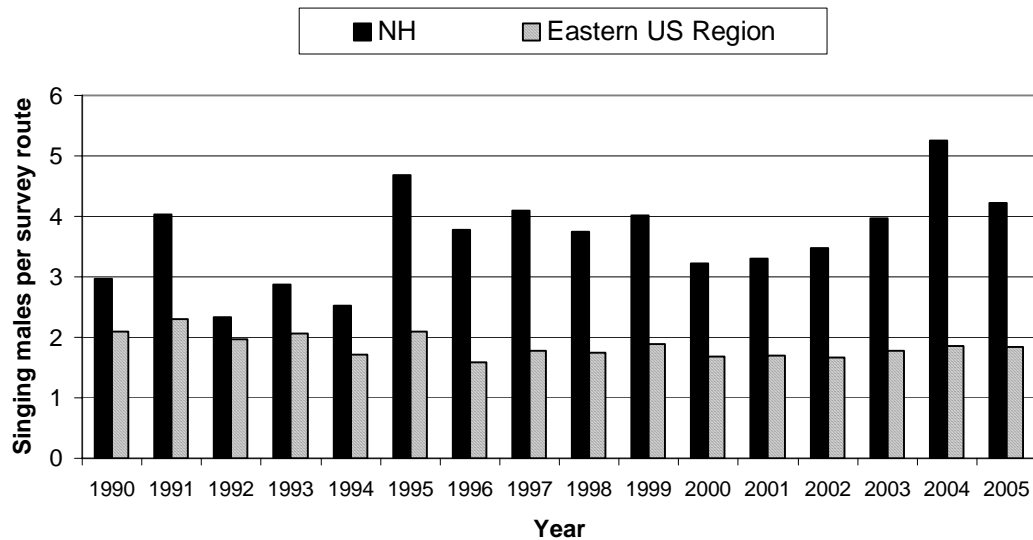


Fig. 14 Woodcock singing ground survey results contrasting New Hampshire with the Eastern U.S. Woodcock Management Region, for the period 1990 through 2005 (data taken from U.S. Fish and Wildlife Services American Woodcock Harvest and Breeding Population Status 2005 Summary Report).

The Eastern Woodcock Management Region consists of 13 states (including New Hampshire) and 4 Canadian provinces. Based on singing ground surveys conducted in the Eastern Region, woodcock populations have held steady the last few years, which is encouraging considering the entire population has been in a steady decline. New Hampshire's population continues to be stronger than that of many Eastern jurisdictions.



CONCLUSION

The key to managing any wildlife species begins with their habitat. This is especially true with small game species. Early successional habitats, which include overgrown fields, permanent grasslands, shrub-scrub communities and seedling/sapling forest patches, are all vital for small game species to thrive. Forest management is the way to create these early successional habitats, which are key to New Hampshire's abundant small game populations. In the northern portion of the state, small game populations, especially ruffed grouse and woodcock, remain relatively strong. This is due in part to aggressive forest management strategies. Unfortunately, the southern portion of the state continues to lose more and more habitat each year to development. It is important for southern towns (and those throughout the rest of the state) to work through their Conservation Commissions to protect vital habitats and to promote responsible forest management practices. If you enjoy small game species and other wildlife, get involved in your local community. You'd be amazed what a difference you can make!

New Hampshire's small game species are a valuable resource to the citizens of this state and to those that visit. This report compiled by the Fish and Game Department is the most efficient means of achieving a good understanding of the distribution, abundance and trends of our small game populations. With greater understanding of these populations, we hope to achieve improved management and to provide enhanced opportunities for public enjoyment of small game species.

What makes this survey credible is volunteer participation in our small game surveys. Without the participation from the hunters in the field, our project's success would not be possible. The more surveys we get back, the more valuable our data will be, **so please, take the time to participate in our small game survey.**

You can sign up to participate in the 2005/2006 survey by contacting us at NH Fish and Game Department, Wildlife Division Small Game Project, 11 Hazen Drive, Concord, NH 03301, or e-mail your name, address and small game interest to wilddiv@wildlife.state.nh.us, or call us at (603) 271-2462. We will send you a survey card in September. **And remember, we will be giving away a gun from Sturm Ruger to a randomly selected participant that returns a completed survey!**

Thank you for your interest in our small game project and in our state's invaluable wildlife resources.