

Factors Influencing Hunters' Attitudes on Restrictions on Buck Harvest to Protect Young Bucks

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We explored data from the Hunter Satisfaction Survey (Siemer et al. 2015) to study motivations influencing hunter willingness to accept some restrictions on their freedom to shoot a buck of any size or age to provide additional protection for yearling bucks using linear discriminant function analysis. The goal of the analysis was to separate groups of respondents representing various levels of acceptance of restrictions on young buck harvest on the basis of their responses to the various questions. The groups were defined from responses to question 16 which specifically asked respondents to indicate their willingness to accept restrictions on young buck harvest. We used the entire statewide data set and did not weight the data. Note that the number of respondents used in the discriminant analysis (n=1792) is less than the total number of respondents because the analysis only included those respondents who answered all of the questions used in it. There were also respondents who indicated that they were “unsure” on whether they thought yearling bucks should receive further protection (Question 14) and these were omitted from the analysis. All analyses were done with SAS (SAS rel. 9.3, Cary NC).

Respondents were assigned to groups as “Low” (0 or 1), “Medium” (2) or “High” support (3 or 4) for their willingness to accept restrictions. Responses to question 6e which asked how important it is to continue to be allowed to use a buck tag to take any legal antlered buck one chooses (hereafter referred to as the freedom of choice in shooting any buck) revealed that some of the respondents who had indicated a high level of support for acceptance of restrictions also indicated a high level of support (3 or 4) for freedom of choice to shoot any buck (Figure 1). Overall, 57.6% of respondents indicated high support (3 or 4) for the freedom of choice, 16.1% indicated they were moderately supportive (2) and 26.3% indicated low support. One could logically suggest that the distributions of responses to questions 6e and 16 should be mirror images of one another. Since the responses from the respondents who expressed support for freedom of choice and acceptance of restrictions seemed contradictory (3 or 4 for both), we assigned them to a separate group which we called “Both”. Finally, we placed the respondents that were “Unsure” (9) about their willingness to accept restrictions into another group.

Correlation analysis of the raw data (ungrouped) revealed that respondents’ desire to further reduce the young buck harvest, have a better chance to take a big antlered buck, see more bucks with big antlers, willingness to pass up shots on smaller antlered deer under a variety of circumstances and the desire to spend less effort to take a big buck were all positively correlated with their willingness to accept some restrictions on their freedom to shoot a buck of any age or size (Table 1). The strongest negative correlations (i.e., unwillingness to accept restrictions) came from respondents who valued the freedom to take any antlered buck that they choose, value the ability to take at least one deer of any sex or age, maintain the length of the season, not have to spend more effort to take one deer and be allowed to take antlerless deer during the season.

We used the candisc procedure in SAS to interpret group differences and proc discrim to determine how well respondents could be classified into their respective groups for levels of support for restrictions based upon their responses to other questions. Canonical discriminant analysis derives a linear combination of the variables that has the highest possible multiple correlation with the groups. The first canonical variable is the optimal combination providing maximum multiple correlation. The second canonical variable is the linear combination that is uncorrelated with the first that provides maximum

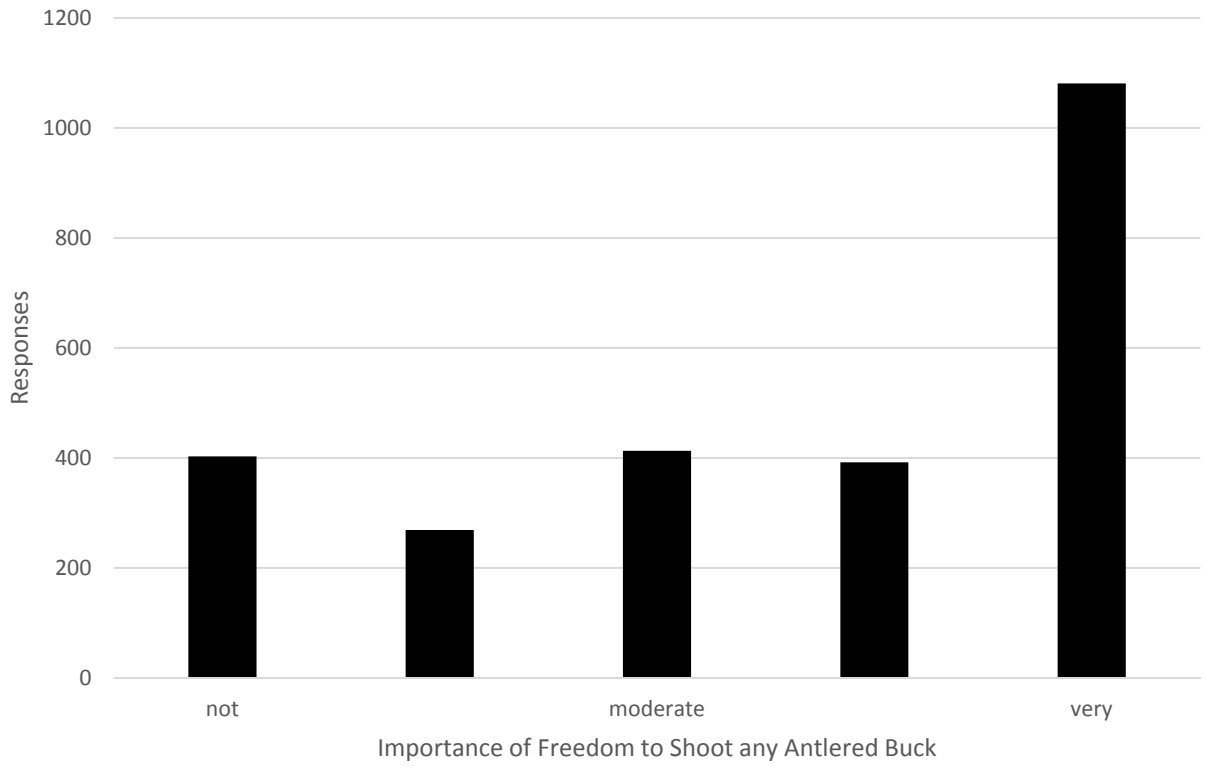
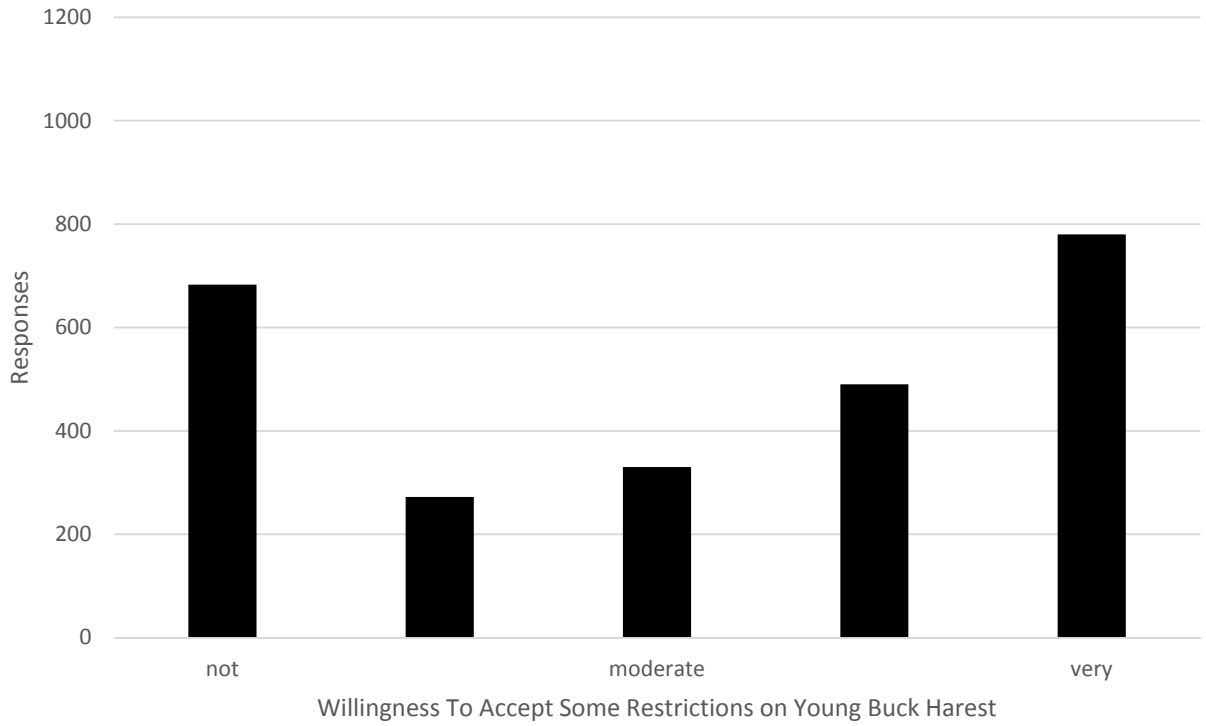


Figure 1. Responses to questions about hunter's willingness to accept restrictions on young buck harvest and the importance of being able to harvest any antlered buck.

Table 1. Correlations with the level of acceptance for some restrictions (Question 16) for various questions.

14.IMPORTANCE THAT YOUNG BUCK HARVEST BE REDUCED FURTHER	0.6244
6B.HAVE BETTER CHANCE OF TAKING A BIG ANTLERED BUCK	0.5807
6A.SEE MORE BUCKS W/BIG ANTLERS	0.5717
13D.PASS SHOTS IF DOING SO WAS PROMOTED BY DEC, OTHERS	0.5476
13A.PASS SHOTS IF OTHER HUNTERS ALSO WOULD DO SO	0.5272
13C.PASS SHOTS IF LAST DAY AND HAD NOT TAKEN A BUCK	0.4682
13B.PASS SHOTS ON LAST DAY AND STILL HAD NOT TAKEN A DEER	0.4455
13E.PASS SHOTS IF DEER DENSITY LOW AND BUCK ENCOUNTERS FEW	0.4414
13F.PASS SHOTS IF DEER DENSITY HIGH AND BUCK ENCOUNTERS FREQ	0.4200
6C.SPEND LESS EFFORT TO HARVEST A BIG BUCK	0.3323
11A.OPPORTUNITY TO TAKE A BIG ANTLERED DEER	0.2471
11B.OPPORTUNITY TO TAKE AT LEAST 1 BUCK ANY SIZE	0.2310
11F.BUCK HUNTING RULES/REGS	0.1495
6P.HAVE RULES THAT MAKE IT EASY IN FIELD TO DETERMINE A LEGAL BUCK	0.1300
6H.SEE MORE DEER (ANTLERED/ANTLERLESS)	0.1255
11D.OPPORTUNITY TO TAKE AT LEAST 1 DEER	0.0902
11C.OPPORTUNITY TO TAKE MORE THAN 1 BUCK	0.0855
6D.SEE MORE BUCKS, ANY SIZE/AGE	0.0720
11E.OVERALL OPPORTUNITY TO BE IN THE FIELD	0.0224
6N.HAVE SAME BUCK HARVEST RULES IN ALL AREAS OF THE STATE	0.0086
6O.HAVE SAME BUCK HARVEST RULES DURING ALL HUNTING SEASONS	0.0022
1.TOTAL YEARS OF DEER HUNTING	-0.0505
6K.NOT HAVE TO SPEND MORE EFFORT TO TAKE AT LEAST 1 DEER	-0.1588
6G.CONTINUE TO BE ALLOWED TO TAKE AT LEAST 2 ANTLERED DEER	-0.1642
6M.KEEP AS MANY WEEKENDS IN REG SEASON IN ZONE I HUNT	-0.1890
6J.BE ALLOWED TO TAKE ANTLERLESS DEER IN REG SEASON	-0.2079
6F.NOT HAVE TO SPEND ANY MORE EFFORT TO HARVEST 1 DEER	-0.2287
6L.KEEP REG SEASON AS LONG AS CURRENT SEASON IN ZONE I HUNT	-0.2332
6I.BE ALLOWED TO TAKE AT LEAST 1 DEER OF ANY AGE	-0.3685
6E.CONTINUE TO BE ALLOWED TO TAKE ANY BUCK I CHOOSE	-0.5295

multiple correlation and so on. The number of canonical variables equals the number of original variables or the number of groups minus one, whichever is smaller (SAS rel. 9.3, Cary NC).

The correlations in Table 1 provided us a starting point in selecting variables to separate the groups. We settled on 10 variables which included a further reduction in the proportion of yearling bucks in the harvest, the desire to see and take more big antlered bucks, attitudes on the passing of shots at small antlered deer, the desire to maintain the current season length, the opportunity to take at least one deer during the season and the freedom to choose any antlered buck.

The pooled within-class correlation of the opportunity to see and take large antlered deer ( $r=0.87$ ) and the level of support for passing shots at small bucks on the last day if hunters had not taken any deer or a buck ( $r=0.84$ ) were both high suggesting that they may share in contributing to the accounting of the variability. All other correlations were low to moderate (Table 2).

A multivariate comparison of means showed that the groups were significantly different (Wilks' Lambda, 40 and 6743.8 df,  $p<0.001$ ). Separate univariate ANOVAs (Fisher's protected LSD  $\alpha=0.05$ , SAS proc glm) of pairwise comparisons of means for each variable for each level of support for additional restrictions are provided in Table 3. As expected, hunters in the "High" support group (33.0% of sample) strongly favored further reducing the proportion of yearling bucks in the harvest, increased opportunity to see and take big bucks, passing shots at small bucks under a variety of circumstances and indicated the lowest support for freedom of choice and the ability to take at least one deer of any age during the season. Hunters in the "Low" support for restrictions group (34.7%) were supportive of freedom of choice, being allowed to take at least one deer of any age during the season and more strongly favored keeping the season as long as it currently is. The "Medium" group (12.6%) generally fell out in the middle for all of the variables. The "Unsure" group (2.2%) expressed a relative willingness to pass on shots and offered low support for freedom of choice. They, surprisingly, indicated relatively low support for increased opportunity to see or take big bucks, along with the "Medium" group. Most interesting were those in the "Both" group (17.4%) who supported both the acceptance of restrictions on themselves and the freedom of choice. Their level of support for willingness to accept restrictions based upon the frequency that they selected 3 or 4, was significantly lower than that for those in the "High" group (chi-square=42.2, 1 df,  $p<0.001$ ). The "Both" group's support for freedom of choice was, surprisingly, significantly higher than that from all other groups, including those opposing restrictions. The "Both" group was about equally supportive of acceptance of restrictions and freedom of choice (chi-square=2.1, 1 df,  $p=0.14$ ) and are also relatively willing to pass shots. The "Both" group can be categorized as hunters who do practice restraint in the field, value the opportunity to see and harvest big bucks and are willing to accept some restrictions, but also feel strongly that hunters should have the freedom of choice. Whether or not they would support mandatory restrictions is somewhat questionable.

Four canonical variables were constructed from the linear discriminant function analysis and we assumed equality of the variance-covariance matrices (pool=yes option in proc discrim). The first 2 canonical variables accounted for 98.6% of the total variation so we will concentrate on them. The first canonical variable (CAN 1) had a canonical correlation of 0.81 ( $p<0.001$ ) and accounted for 81.5% of the

Table 2. Pooled within-class correlation for the variables used to separate hunters by levels of acceptance for restrictions on bucks harvested.

Variable	6B	6A	13A	14	13D	13C	13B	6L	6I
6B.HAVE BETTER CHANCE OF TAKING A BIG ANTLERED BUCK									
6A.SEE MORE BUCKS W/BIG ANTLERS	0.87245 <.0001								
13A.PASS SHOTS IF OTHER HUNTERS ALSO WOULD DO SO	0.28913 <.0001	0.28534 <.0001							
14. IMPORTANCE THAT YOUNG BUCK HARVEST BE REDUCED FURTHER	0.26952 <.0001	0.27315 <.0001	0.21102 <.0001						
13D.PASS SHOTS IF DOING SO WAS PROMOTED BY DEC, OTHERS	0.25740 <.0001	0.27725 <.0001	0.58503 <.0001	0.19152 <.0001					
13C.PASS SHOTS IF LAST DAY AND HAD NOT TAKEN A BUCK	0.18842 <.0001	0.20360 <.0001	0.50914 <.0001	0.15835 <.0001	0.46392 <.0001				
13B.PASS SHOTS ON LAST DAY AND STILL HAD NOT TAKEN A DEER	0.15596 <.0001	0.17004 <.0001	0.47206 <.0001	0.14679 <.0001	0.40305 <.0001	0.84206 <.0001			
6L.KEEP REG SEASON AS LONG AS CURRENT SEASON IN ZONE I HUNT	0.04584 0.0526	0.04991 0.0348	-0.02864 0.2261	-0.01104 0.6409	-0.02433 0.3038	-0.07054 0.0028	-0.05797 0.0142		
6I.BE ALLOWED TO TAKE AT LEAST 1 DEER OF ANY AGE	-0.07399 0.0017	-0.07650 0.0012	-0.14142 <.0001	-0.08024 0.0007	-0.10767 <.0001	-0.16532 <.0001	-0.20642 <.0001	0.22214 <.0001	
6E.CONTINUE TO BE ALLOWED TO TAKE ANY BUCK I CHOOSE	-0.09281 <.0001	-0.10566 <.0001	-0.16594 <.0001	-0.10440 <.0001	-0.13746 <.0001	-0.16058 <.0001	-0.16736 <.0001	0.18553 <.0001	0.36266 <.0001

Table 3. Univariate ANOVA's for support levels of acceptance of restrictions on freedom to shoot a buck of any size or age.

Variable	$\sqrt{MSE}$	df <sup>1</sup>	class means <sup>2</sup>				
			High	Both	Medium	Unsure	Low
6B.HAVE BETTER CHANCE OF TAKING A BIG ANTLERED BUCK	1.17	4, 2010	3.35-A	2.99-B	2.45-C	2.36-C	1.52-D
6A.SEE MORE BUCKS W/BIG ANTLERS	1.17	4, 2014	3.38-A	3.00-B	2.48-C	2.41-C	1.59-D
13A.PASS SHOTS IF OTHER HUNTERS ALSO WOULD DO SO	1.46	4, 1938	5.07-A	4.50-B	3.95-C	4.27-BC	3.00-D
14.IMPORTANCE THAT YOUNG BUCK HARVEST BE REDUCED FURTHER	1.25	4, 2107	3.19-A	2.83-B	2.05-C	2.10-C	1.04-D
13D.PASS SHOTS IF DOING SO WAS PROMOTED BY DEC, OTHERS	1.53	4, 1917	4.92-A	4.42-B	3.82-C	4.53-B	2.73-D
13C.PASS SHOTS IF LAST DAY AND HAD NOT TAKEN A BUCK	1.66	4, 1939	4.23-A	3.62-B	2.72-C	4.02-A	2.28-D
13B.PASS SHOTS ON LAST DAY AND STILL HAD NOT TAKEN A DEER	1.68	4, 1941	3.96-A	3.44-B	2.35-C	3.76-AB	2.14-C
6L.KEEP REG SEASON AS LONG AS CURRENT SEASON IN ZONE I HUNT	1.18	4, 2004	2.83-C	3.43-AB	3.32-AB	3.30-B	3.57-A
6I.BE ALLOWED TO TAKE AT LEAST 1 DEER OF ANY AGE	1.37	4, 2003	1.72-D	2.67-B	2.70-B	2.13-C	3.04-A
6E.CONTINUE TO BE ALLOWED TO TAKE ANY BUCK I CHOOSE	0.95	4, 2012	0.88-E	3.64-A	2.87-C	2.55-D	3.41-B

1-For an overall F test for no difference among support categories, all were significant  $p < 0.001$

2-Means in each row with the same letter were not significantly different using Fisher's protected LSD ( $\alpha = 0.05$ )

Table 4. Within canonical structure (loadings) and classification functions.

Variable	Canonical Variable		Classification Functions				
	CAN1	CAN2	Low	Medium	High	Both	Unsure
6B.HAVE BETTER CHANCE OF TAKING A BIG ANTLERED BUCK	0.412	0.531	0.100	0.543	0.720	0.661	0.615
6A.SEE MORE BUCKS W/BIG ANTLERS	0.406	0.504	0.566	0.561	0.673	0.719	0.289
13A.PASS SHOTS IF OTHER HUNTERS ALSO WOULD DO SO	0.405	0.422	1.134	1.339	1.306	1.318	1.062
14.IMPORTANCE THAT YOUNG BUCK HARVEST BE REDUCED FURTHER	0.468	0.588	0.394	0.790	1.286	1.255	0.673
13D.PASS SHOTS IF DOING SO WAS PROMOTED BY DEC, OTHERS	0.401	0.458	0.536	0.806	0.889	0.892	1.043
13C.PASS SHOTS IF LAST DAY AND HAD NOT TAKEN A BUCK	0.343	0.320	0.137	0.204	0.200	0.096	0.418
13B.PASS SHOTS ON LAST DAY AND STILL HAD NOT TAKEN A DEER	0.321	0.316	0.426	0.151	0.455	0.611	0.454
6L.KEEP REG SEASON AS LONG AS CURRENT SEASON IN ZONE I HUNT	-0.206	0.007	1.955	1.778	1.724	1.777	2.028
6I.BE ALLOWED TO TAKE AT LEAST 1 DEER OF ANY AGE	-0.316	-0.053	0.854	0.810	0.946	0.671	0.564
6E.CONTINUE TO BE ALLOWED TO TAKE ANY BUCK I CHOOSE	-0.870	0.476	3.660	3.310	1.171	4.424	3.072
Constant			-14.839	-15.646	-15.051	-22.062	-16.006

variation. CAN 1 had a high negative loading on freedom of choice (-0.87), and loaded moderately on being allowed to take at least 1 deer of any age (negative) and maintaining season length (negative). The positive loadings were all moderate and based upon further reducing the proportion of yearling bucks in the harvest, the opportunity to see and take big antlered bucks and passing of shots under a variety of circumstances (Table 4). The relative size of the discriminate classification functions in Table 4 also provide insight into the relative importance of the individual variables in separating the groups. Note the high importance of freedom of choice for the "Both" group which contributed highly to the separation.

CAN 2 had a canonical correlation of 0.54 ( $p < 0.001$ ) and accounted for an additional 17.1% of the variation. CAN2 loaded most heavily (positive) on reducing the proportion of yearling bucks in the harvest, the chances to see and take big antlered bucks and the freedom of choice. Recall that freedom of choice had a very strong negative loading on CAN 1. CAN 2 also had more moderate positive loadings on passing shots.

Plotting the first two canonical variable centroids (Figure 2) showed that the groups did separate nicely and primarily so along the horizontal axis (CAN 1). Recall that the freedom of choice loaded negatively

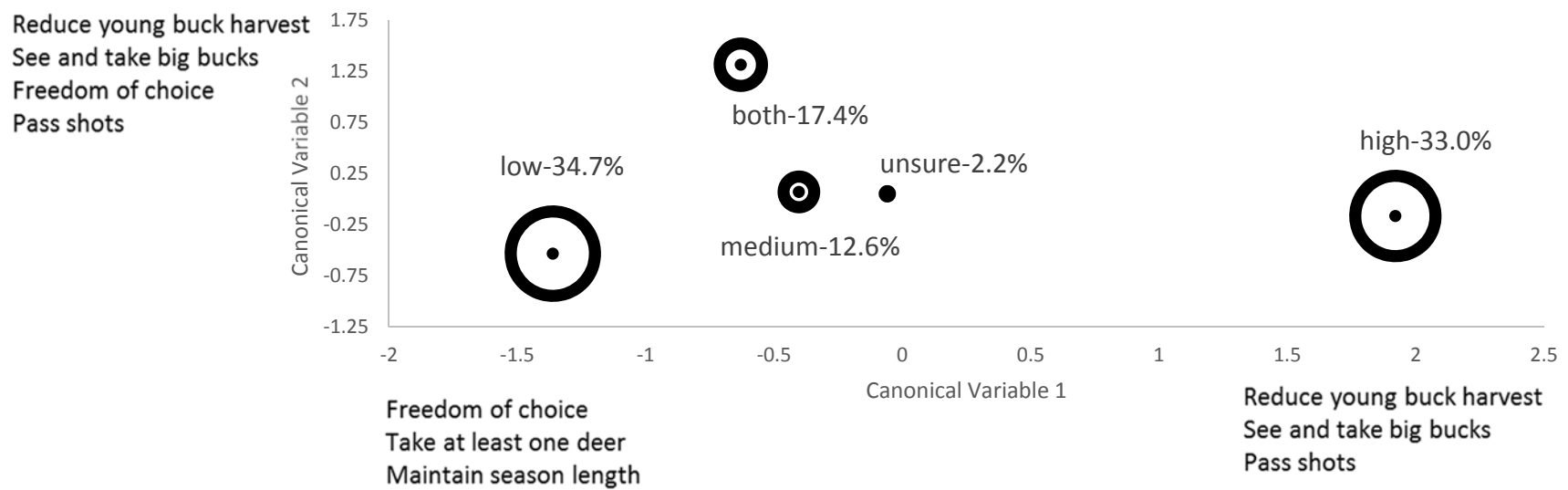


Figure 2. Plot of the first and second canonical discriminant function centroids to separate groups based upon their levels of acceptance of some restrictions on their freedom to shoot bucks of any size or age. The points represent the mean canonical scores and relative sizes of the group. Note that the "both" group was comprised of respondents who indicated that they strongly supported both freedom of choice and willingness to accept some restrictions.



Table 5. Classification summary error matrix from the linear discriminant function analysis. The groups are based upon levels of support for accepting some restrictions on the harvest of small bucks. The “both” group expressed support for some restrictions but also supported the freedom of choice to shoot any buck.

FROM	Classified INTO					Total
	low	medium	high	both	unsure	
low	400 64.31	73 11.74	38 6.11	68 10.93	43 6.91	622 100.00
medium	53 23.45	75 33.19	32 14.16	47 20.80	19 8.41	226 100.00
high	4 0.68	43 7.26	481 81.25	1 0.17	63 10.64	592 100.00
both	22 7.05	46 14.74	0 0.00	220 70.51	24 7.69	312 100.00
unsure	9 22.50	6 15.00	8 20.00	7 17.50	10 25.00	40 100.00
Total	488 27.23	243 13.56	559 31.19	343 19.14	159 8.87	1792 100.00

on the horizontal axis (CAN 1) and positively on the vertical axis (CAN 2). The classification obtained from the analysis was correct for 66% of the samples used to develop the classification functions (Table 5). The “High” support group for the acceptance of restrictions was the most correctly classified group (81.25% correct). The “Both” group also classified well at 70.51% correct. The most common classification errors were “Medium” into “Low” (23.5%), “Unsure” into “Low” (22.5%), “Medium” into “Both” (20.8%) and “Unsure” into “High” (20.0%). This points to the stand alone nature of the “High” and “Both” support groups and the scattered nature of the “Unsure” group. In general, the “Unsure” and “Medium” groups were more closely aligned with the “Low” group than with the “High” group based upon their responses to the questions used in the analysis. The proximity of the “Both” group with these groups is the result of their responses to the freedom of choice question.

## Conclusions

New York’s deer hunters are a diverse bunch with differing visions as to what deer hunting should be. About 1/3<sup>rd</sup> of them are primarily interested in the opportunity to see and take big bucks and seem to be focused on that. They are supportive of accepting restrictions on the harvest of young bucks. Another 1/3<sup>rd</sup> care much less about sacrificing the opportunity to harvest any buck that they wish and are more concerned with the opportunity to take any deer including young bucks and antlerless deer. The “Medium” and “Unsure” groups (14.8%) who were either unsure or right down the middle on their attitudes about accepting restrictions on their freedom to take any buck that they choose were generally more intermediate in their attitudes and seem to be on the fence on the issue of young buck harvest restrictions. The “Both” group (17.4%) is supportive of both accepting restrictions and freedom of choice and seems to be on both sides of the fence. This group indicated a strong willingness to accept

restrictions on young buck harvest and is relatively willing to pass opportunities on young bucks but at the same time places a high value on the freedom of choice. There is clearly no regulatory solution that is going to make them all happy.

We see public access to private land as a major factor in hunting opportunity in much of the state. In retrospect, it would have been very interesting to have asked a question about the types of land that hunters had access to and to see how the differing levels of opportunity influence attitudes on willingness to accept restrictions on young buck harvest.

## **References**

SAS Institute Inc., Copyright 2002-2010. 9.3 TS Level 1M2 W32\_7PRO platform. Cary, NC, USA.

Siemer, W.F., D. J. Decker, and R. C. Stedman. 2015. Hunter satisfactions with deer harvest opportunities in New York State. Human Dimensions Research Unit Publication Series 15-05. Department of Natural Resources, Cornell University, Ithaca New York. 38pp.