(PHOTO CREDIT: MARSH SIKA BY EARL BLANSFIELD)

ASSESSING HUNTER OPINIONS AND ECONOMIC IMPACTS ASSOCIATED WITH SIKA DEER HUNTING AND MANAGEMENT ON MARYLAND'S EASTERN SHORE

Prepared for the
Maryland Department of Natural Resources
by the
Morgan State University
Patuxent Environmental and Aquatic Research Laboratory

ASSESSING HUNTER OPINIONS AND ECONOMIC IMPACTS ASSOCIATED WITH SIKA DEER HUNTING AND MANAGEMENT ON MARYLAND'S EASTERN SHORE

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Executive Summary

Sika deer are a non-native species in North America that have been introduced and have since become established on the Delmarva Peninsula (Delaware, Maryland, and Virginia). The sika deer creates a unique regional recreational hunting experience, with the majority of harvest occurring on Maryland's Lower Eastern Shore. In recent years, there is evidence of increased interest in sika deer hunting. The Maryland Department of Natural Resources (MDDNR) collects annual information on the number of hunters and hunter effort. General trends in the sika deer hunter effort estimates suggest an increase in sika deer hunting activity in recent years.

The purpose of this study was to conduct a survey to better understand hunter perspectives on a wide range of aspects of the sika deer hunting experience. Maryland hunters were contacted via email and requested to participate if they had previously hunted sika deer. A total of 3,655 viable responses were received, with this report providing a comprehensive review of survey results. This Executive Summary presents some of the key findings, focusing on hunter acceptance of regulations, hunter preferences and willingness to pay associated with sika deer hunting, and hunter trip expenditures.

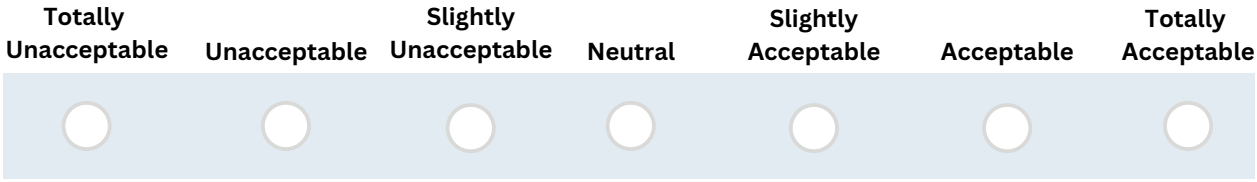
The purpose of this study was to conduct a survey of sika deer hunters to better understand hunter perspectives on the sika deer hunting experience.

Photos courtesy of the MD DNR Flickr, Top: Sika Quartet by Stephen Aprile
Left (Top to Bottom): Marsh Sika by Earl Blansfield, Winter Sunrise by Mary Lynn Price, and Sika by Tammy Jones

KEY FINDINGS:

Acceptance of Regulations: Case of Antler Point Restriction

Summary: Currently, there is no Antler Point Restriction (APR) for sika deer stags. The survey explored sika deer hunter acceptability of this current regulation status, as well as the acceptability of two changes - a change to an APR of 2 points or 3 points minimum on 1 antler. Acceptability was measured on a 7 point scale, ranging from totally unacceptable to totally acceptable, shown below.



- Finding --> A total of 43% of sika deer hunters indicated that a "no APR" restriction was acceptable (by checking one of the 3 circles in the image to the right), whereas 36% indicated that it was unacceptable (by checking one of the 3 circles to the left). Sika deer hunter acceptance of a 2 point APR was greater, with 52% of sika deer hunters indicating this regulation was acceptable as opposed to 30% indicating that it was unacceptable. *(See Maryland Sika Deer Hunter Survey, Q19a, Q19b).*

- Finding --> Contrary to the no APR and 2 point minimum APR described above, there is clear resistance to a 3 point APR. Only 28% of hunters assess the 3 point APR as acceptable, vs. 55% of hunters indicating that as unacceptable. *(See Maryland Sika Deer Hunter Survey, Q19c)*.

Acceptance of Regulations: Case of Stag Bag Limit

Summary: Currently, there is a 3 sika deer stag combined weapon season bag limit (limit 1 per weapon season). The survey explored the acceptability of this current regulation status, as well as the acceptability of a change - a bag limit of 2 sika deer stags for the hunting season. Acceptability was measured on a 7 point scale, ranging from totally unacceptable to totally acceptable.

- Finding --> A total of 49% of sika deer hunters indicated that the current regulation of a 3 stag combined weapon season bag limit was acceptable, whereas 32% indicated that it was not acceptable. Sika deer hunter acceptance of a 2 stag combined weapon season bag limit was greater, with 59% of sika deer hunters indicating this regulation was acceptable as opposed to 24% indicating that it was unacceptable (*See Maryland Sika Deer Hunter Survey, Q20a, Q20b*).

Sika Deer Hunter Preferences

KEY FINDINGS:

Hunter Preferences and Willingness to Pay for a Sika Deer Hunting Scenario

Summary: As a part of this survey effort, sika deer hunters were asked to choose between two sika deer hunting scenarios defined by the following attributes: the probability of harvesting any sika deer, the probability of harvesting a quality stag (3 or more points on 1 antler), the type of antler point restriction (if any), the annual combined weapon season stag bag limit, and annual fees (licenses, stamps, permits). This effort, called a choice experiment, presents hunters with a choice between two different sika deer hunting scenarios in order to identify hunter preferences (both average and variation across hunters) and willingness to pay (WTP) for a sika deer hunting scenario. Maryland residents and non-residents were explored independently through two different models. (*See Maryland Sika Deer Hunter Survey, Q11-18*)

AVERAGE HUNTER PREFERENCES FOR REGULATIONS

- Finding --> On average, resident hunters have a preference for moderate changes in two key regulations. Hunters prefer a minimum 2 point on one side Antler Point Restriction (APR) to no APR, and combined weapon season bag limit of 2 stags (relative to 3 stags).
- Finding --> Contrary to resident hunters, non-resident hunters on average prefer no APR relative to the 2 point minimum and 3 point minimum APR.

VARIATION IN HUNTER PREFERENCES FOR REGULATIONS

- Finding --> Results show that within each of the resident and non-resident hunter groups, hunters vary in their preferences related to significant regulation changes.
- Finding --> A majority of hunters are worse off moving from a 3 stag to a 1 stag combined weapon season stag bag limit, for residents (54% worse off vs. 46% better off) and non-residents (57% worse off and 43% better off). The majority of non-resident hunters are against moving from no APR to a 3 point APR by a 2-1 margin (68% worse off and 32% better off).
- Finding --> No variation in resident hunter preferences relating to moving from a 3 stag to a 2 stag combined weapons season stag bag limit was identified. This, combined with the fact that the average resident is in favor of the move to a 2 stag bag limit, suggests that this hypothetical regulation change would be positively received by a large percentage of resident hunters.

WILLINGNESS TO PAY (WTP) FOR SIKA DEER HUNTING

- Finding --> Average hunter maximum WTP for the current sika deer hunting scenario (in terms of regulations, sika deer and stag harvest, and base license fees) is $58.07 for residents and $157.67 for non-residents.
- Finding --> WTP is also assessed for three alternative scenarios in which two regulation changes (2 point APR and 2 stag bag limit) independently and jointly produce changes in annual harvest probability measures for any sika deer (50% to 55%) and 3 point or better quality stags (10% to 20%). For the joint regulation scenario, WTP is $30 and $31 higher than the current scenario for residents and non-residents respectively. As this increase in WTP reflects the maximum additional annual fees that an average hunter would be willing to pay for the new scenario, this change in WTP could be used to explore hunter acceptance of an additional hunting fee that was implemented concurrently with these harvest and regulation changes.

Sika Deer Hunter Expenditures

KEY FINDINGS:

2021-2022 Sika Deer Hunter Trip Spending Estimated at $8.7 Million

Summary: As a part of this survey effort, sika deer hunters were asked to indicate the amount they had spent in eight categories *(vehicle transportation, public transportation, restaurants/bars, groceries, lodging, guide fees, access fees and other)* on a recent sika deer hunting trip.

- Finding --> Per-trip spending across all (resident and non-resident) hunters ranged from an average of $351 per-trip ($150 per hunting day) for the firearm season, $426 per-trip ($186 per hunting day) for the muzzleloader season, and $568 per-trip ($220 per hunting day) for the archery season. *(See Maryland Sika Deer Hunter Survey, Q31, Q33).*

- Finding --> Trip-related spending is calculated by using the following weapon-season specific figures for the 2021-2022 hunting season obtained from this survey: average per-trip spending, average number of hunting days per hunter, average hunting days per hunting trip. These three figures are then applied to the estimate of 3,937 sika deer hunters from the MDDNR Hunter Mail Survey (2021-2022 hunting season). Trip-related annual spending for the 2021-2022 hunting season is estimated to be $8,730,000.

MD DNR Department Photo: Dorchester County December 2022

This Executive Summary highlights emerging key themes from the Maryland Sika Deer Hunter Survey. The rest of this document provides a comprehensive description of survey questions and responses from sika deer hunters. Much of this information, though not included in the Executive Summary, is also highly relevant to the management of sika deer in Maryland. Please explore this document and contact Scott Knoche at scott.knoche@morgan.edu if you have any questions.

This project was supported by the Maryland Department of Natural Resources Wildlife & Heritage Service.

MARYLAND DEPARTMENT OF NATURAL RESOURCES

PEARL MORGAN PATUXENT ENVIRONMENTAL AND AQUATIC RESEARCH LABORATORY

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BACKGROUND

Non-native sika deer (*Cervus nippon yakushimae*) - originally native to the Southern Island Yakushima of Japan - were introduced to the Eastern Shore of Maryland on James Island in 1916 (Flyger, 1961). Today, the sika deer provides a unique recreational hunting experience for Maryland resident and nonresident hunters, with the majority of hunting effort and harvest occurring in Dorchester County, Maryland. Harvest data from annual deer reports in Maryland accounts for most of the records on their population. Maryland's annual Big Game Harvest Report reported that 3,400 sika deer were harvested in the 2021-2022 hunting season.

The overarching objective of this study was to examine a wide range of aspects of the sika deer hunting experience, including preferences for management regulations, hunter participation/effort, satisfaction, and expenditure patterns and other details related to hunting trips. Study findings are intended to increase our understanding of the human dimensions of the sika deer hunting experience and to guide the development of management strategies that incorporate the preferences and behaviors of sika deer hunters. This project was supported by Maryland Department of Natural Resources (MDDNR). The statements, findings, conclusions, and recommendations are those of the authors(s) and do not necessarily reflect the views of MDDNR.

SURVEY DETAILS

To accomplish the objective of this study, the Morgan State University Patuxent Environmental and Aquatic Research Laboratory (MSU PEARL) project team developed and implemented a web-based survey of Maryland sika deer hunters. The survey was conducted through the Survey Monkey software platform and was designed to be both computer and mobile friendly. The survey instrument was developed by the MSU PEARL project team in conjunction with input received from the MDDNR. The MSU project team conducted survey pre-testing with Maryland sika deer hunters to ensure readability and comprehension. The pre-testing involved 12 Maryland hunters who completed the survey while on a video call with a MSU PEARL researcher. Survey pre-

testing was conducted using both the mobile and desktop versions of the internet survey. Minor adjustments were made to the survey to improve comprehension and flow, including edits to question language and changes to font sizing/bolding. The final survey instrument is provided in *Appendix A*.

The web-based survey of Maryland resident and non-resident sika deer hunters was implemented through up to two email contacts by the MDDNR. While an email and web-based survey excludes hunters who do not have an email address on-file with the MDDNR, this sample frame accounts for approximately 80% of all licensed hunters in Maryland. The initial email was sent on February 25, 2022 to all hunters who had purchased a Maryland hunting license (Resident Regular Hunting License, Resident Senior Hunting License, Nonresident Hunting License, or Nonresident Senior Hunting License) in the previous three hunting seasons (i.e., 2019-2020, 2020-2021, 2021-2022) and who had an email address on-file with the MDDNR (n=96,157). A second email invitation was sent on March 4, 2022, to individuals who had not completed the survey through the first email contact. The survey link remained active through the end of April. In each email contact, hunters were asked to click on the weblink provided and participate in the survey if they had ever hunted sika deer in Maryland.

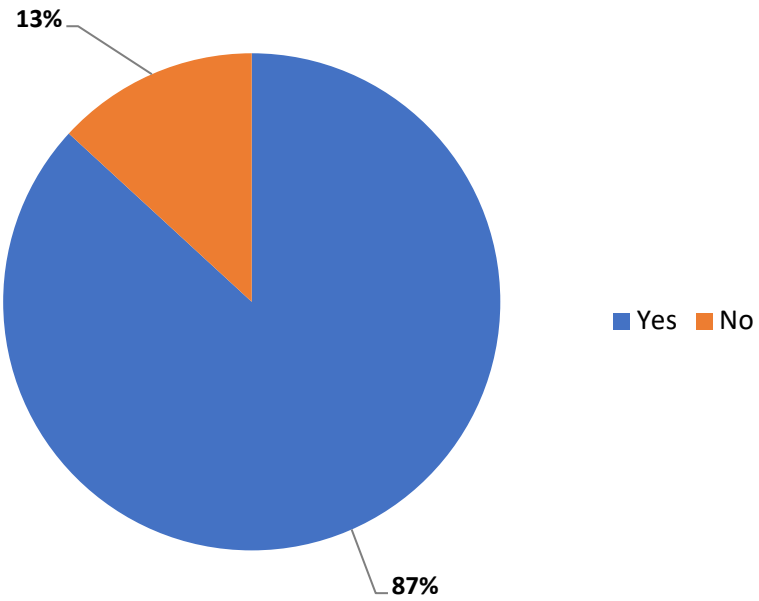
In total 4,209 unique survey responses were received, with 554 of these individuals responding that they had never hunted sika deer. As survey participation was requested by people who had previously hunted sika deer, these 554 individuals were excluded from the analysis provided in the survey. Survey results presented in this report consist of the responses from 3,655 sika deer hunters, with these results presented in charts and tables for ease of interpretation.

HUNTER SURVEY RESULTS

SECTION 1: HUNTING BACKGROUND

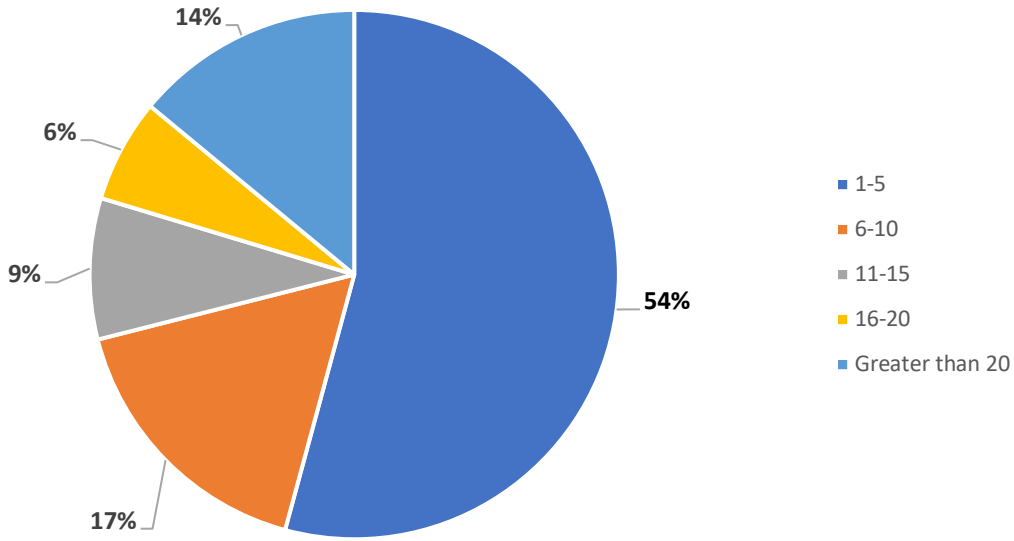
NOTE: This is a qualification question. Respondents who answer "No" were disqualified from the survey. The invitation email sent to hunters indicated that the survey was only intended to be completed by individuals who had previously hunted sika deer in Maryland.

Q1. HAVE YOU EVER HUNTED FOR SIKA DEER IN THE STATE OF MARYLAND?



ANSWER CHOICES	RESPONSES	
Yes	3,655	86.8%
No	554	13.2%
Total Responses: 4,209		

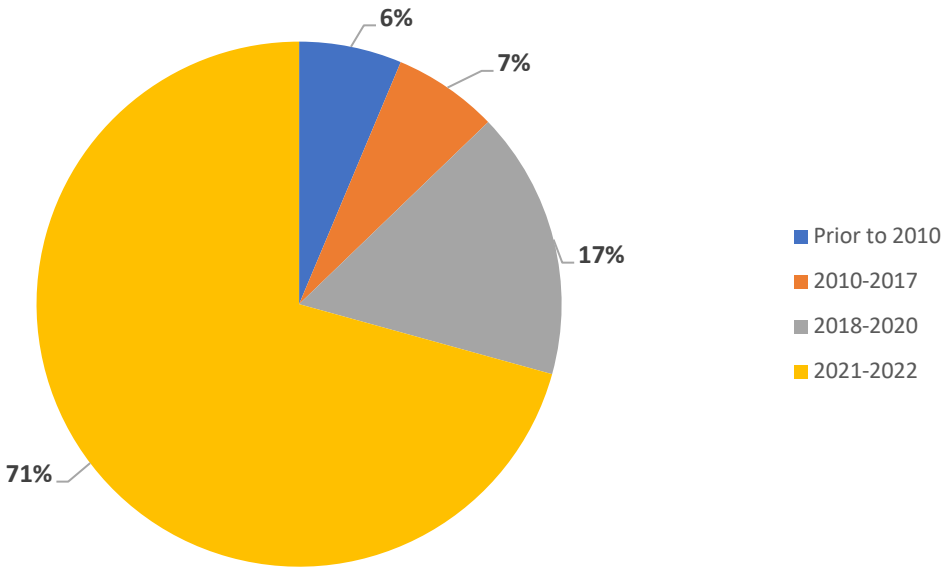
Q2. DURING HOW MANY YEARS HAVE YOU HUNTED SIKA DEER?



ANSWER CHOICES	RESPONSES	
1-5[1]	1880	54.2%
6-10	584	16.8%
11-15	299	8.6%
16-20	219	6.3%
Greater than 20	486	14.0%
Total Responses: 3,468		

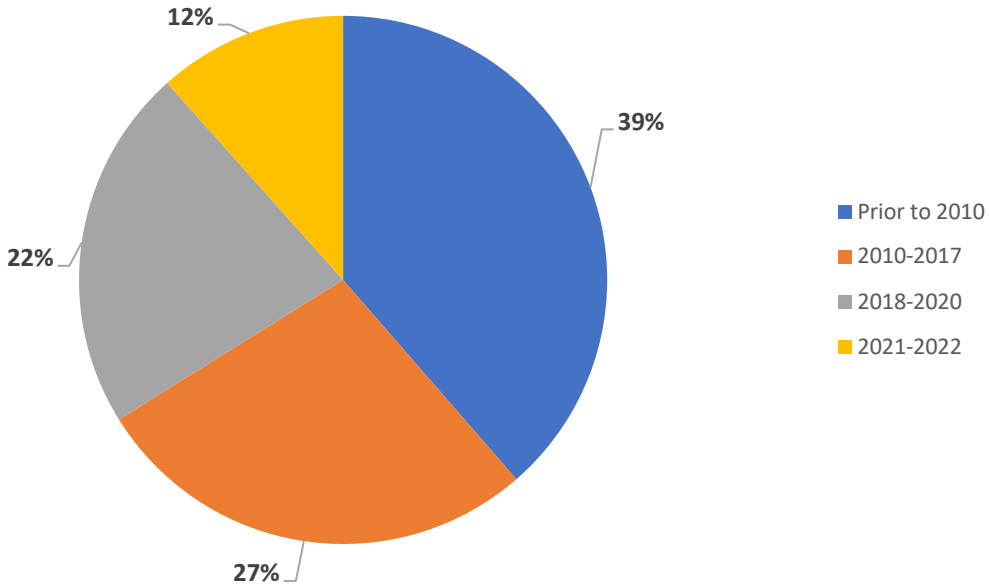
[1] Respondents who indicated that they have hunted sika deer for less than one year were included in this group.

Q3. WHAT WAS THE MOST RECENT YEAR THAT YOU HUNTED SIKA DEER?



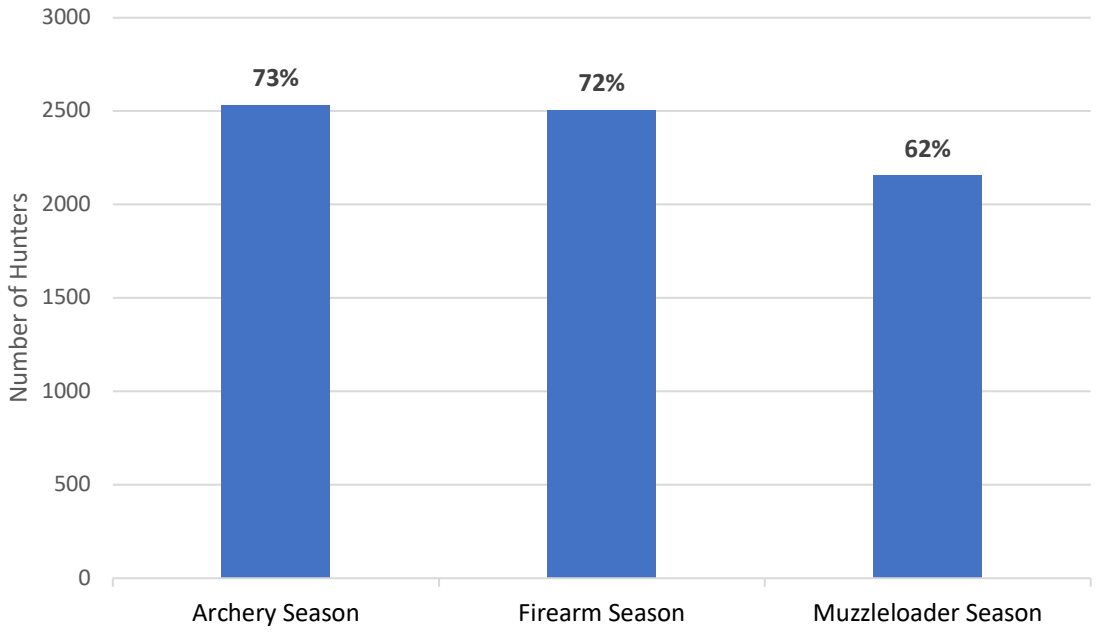
ANSWER CHOICES	RESPONSES	
Prior to 2010	219	6.3%
2010-2017	224	6.5%
2018-2020	571	16.5%
2021-2022	2447	70.7%
Total Responses: 3,461		

Q4. WHAT WAS THE FIRST YEAR THAT YOU HUNTED SIKA DEER?



ANSWER CHOICES	RESPONSES	
Prior to 2010	1317	38.6%
2010-2017	939	27.5%
2018-2020	759	22.3%
2021-2022	396	11.6%
Total Responses: 3,411		

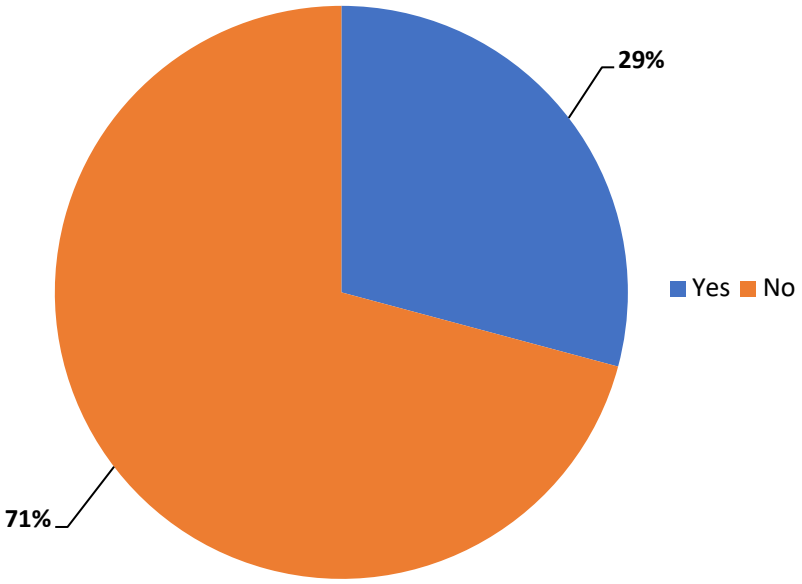
Q5. IN WHICH WEAPON SEASONS HAVE YOU HUNTED SIKA DEER? (CHECK ALL THAT APPLY)



ANSWER CHOICES	RESPONSES	
Archery Season	2,532	73.1%
Firearm Season	2,505	72.2%
Muzzleloader Season	2,155	62.2%
Total Responses: 3,466		

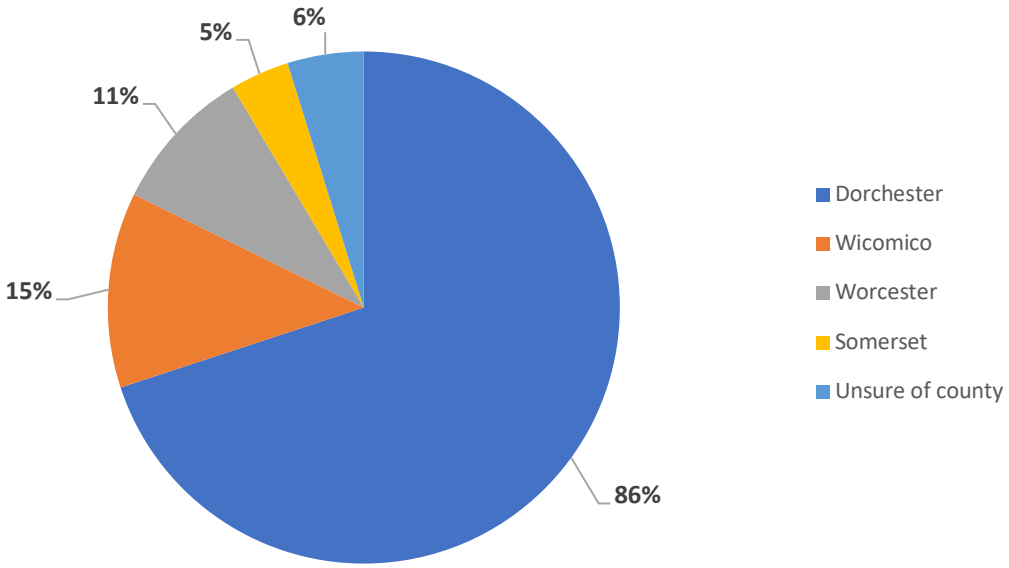
ANSWER CHOICES	NON-RESIDENT RESPONSES		RESIDENT RESPONSES	
Archery Season	726	71.9%	1,806	73.5%
Firearm Season	542	53.7%	1,963	79.9%
Muzzleloader Season	532	52.7%	1,623	66.1%
Total Non-Resident Responses: 1,010			Total Resident Responses: 2,456	

Q6. HAVE YOU HUNTED SIKA DEER DURING ANTLERLESS-ONLY MUZZLELOADER SEASON?



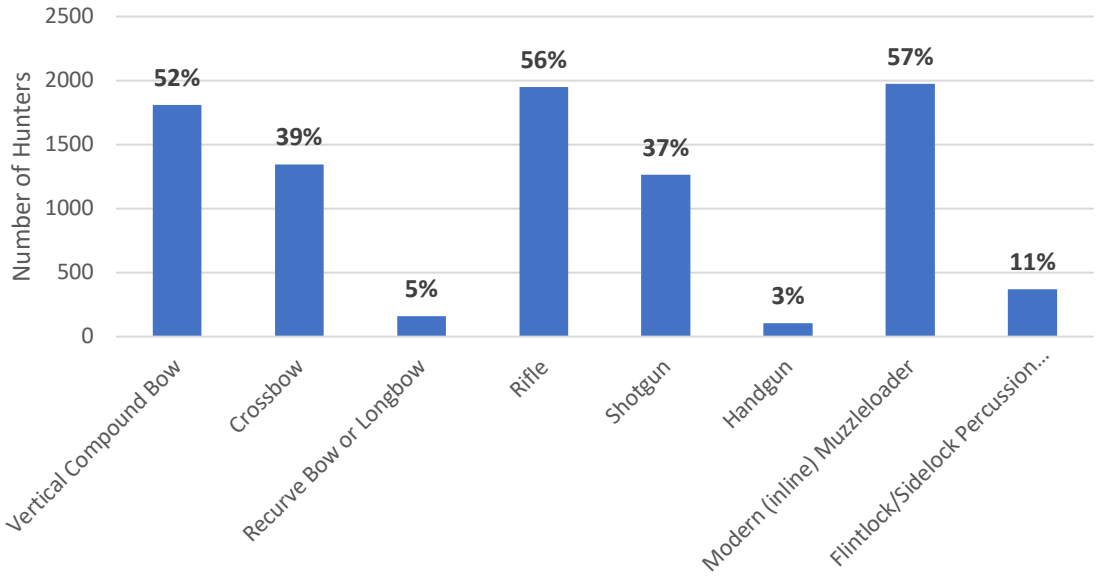
ANSWER CHOICES	RESPONSES	
Yes	1,005	29.2%
No	2,440	70.8%
Total Responses: 3,445		

Q7. IN WHICH COUNTIES HAVE YOU HUNTED SIKA DEER? (CHECK ALL THAT APPLY)



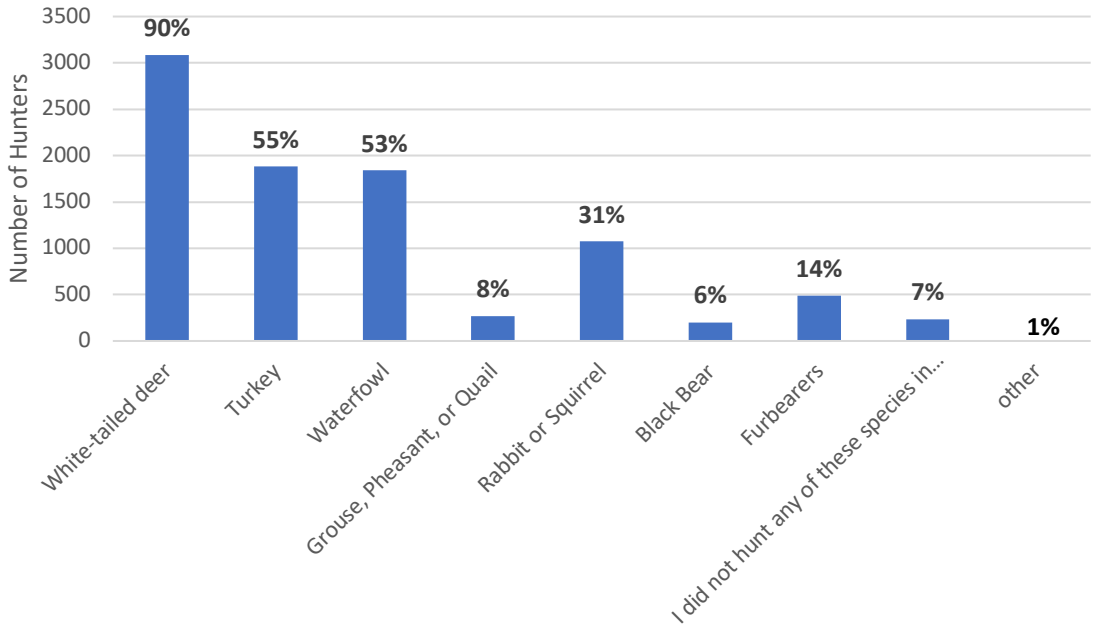
ANSWER CHOICES	RESPONSES	
Dorchester	2,948	85.7%
Wicomico	520	15.1%
Worcester	387	11.2%
Somerset	157	4.6%
Unsure of county	203	5.9%
Total Responses: 3,439		

Q8. WHAT TYPE OF WEAPONS HAVE YOU USED TO HUNT SIKA DEER? (CHECK ALL THAT APPLY)



ANSWER CHOICES	RESPONSES	
Vertical Compound Bow	1,808	52.1%
Crossbow	1,346	38.8%
Recurve Bow or Longbow	160	4.6%
Rifle	1,948	56.2%
Shotgun	1,265	36.5%
Handgun	107	3.08%
Modern (Inline) Muzzleloader	1,975	56.9%
Flintlock/Sidelock Percussion Muzzleloader	370	10.7%
Other	8	<1%
Total Responses: 3,469		

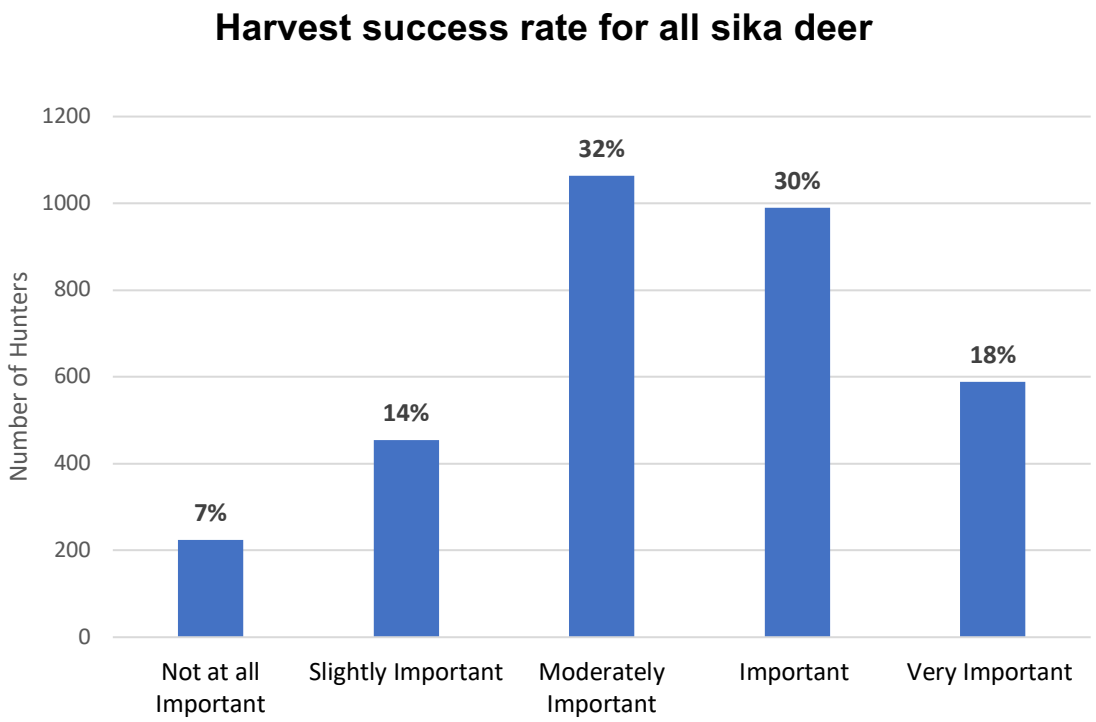
Q9. OTHER THAN SIKA DEER, WHAT GAME ANIMALS HAVE YOU HUNTED IN MARYLAND IN THE PAST THREE YEARS? (CHECK ALL THAT APPLY)



ANSWER CHOICES	RESPONSES	
White-tailed deer	3,085	89.5%
Turkey	1,881	54.6%
Waterfowl	1,839	53.4%
Grouse, Pheasant, or Quail	271	7.9%
Rabbit or Squirrel	1,073	31.1%
Black Bear	197	5.7%
Furbearers	491	14.2%
I did not hunt any of these species in Maryland in the past 3 years	235	6.8%
Other	43	1.25%
Total Responses: 3,447		

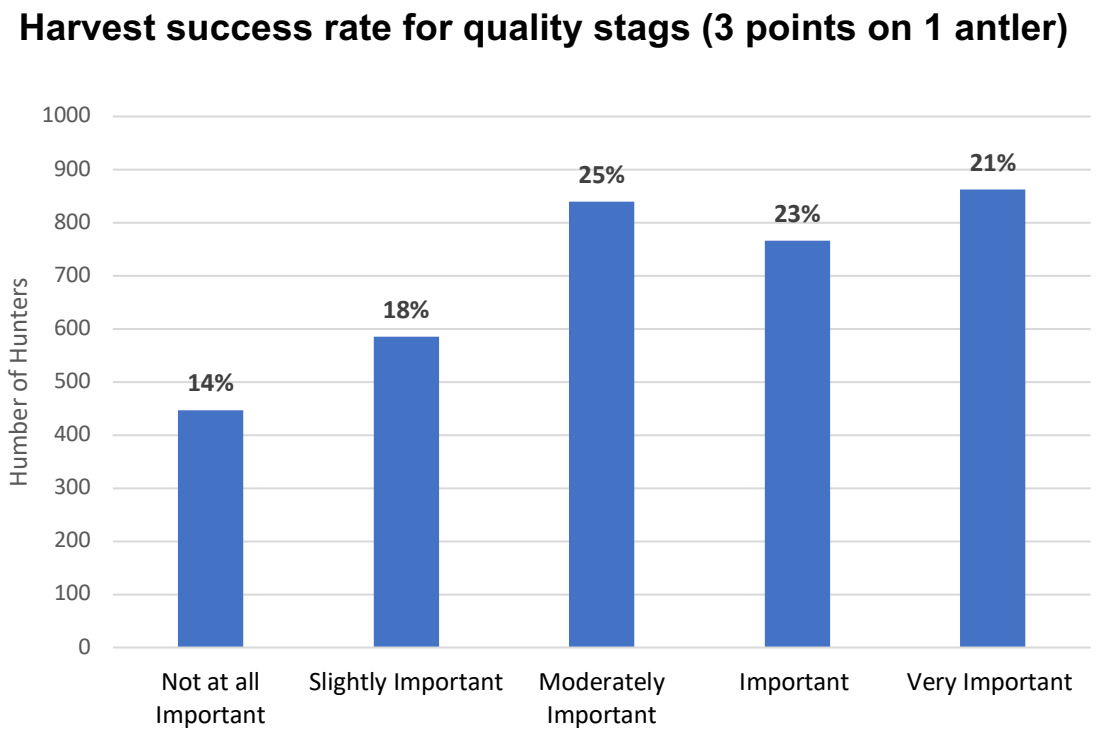
SECTION 2: SIKA DEER HUNTING SCENARIOS

Q10a. HOW IMPORTANT ARE THE FOLLOWING ASPECTS OF YOUR SIKA DEER HUNTING EXPERIENCE?



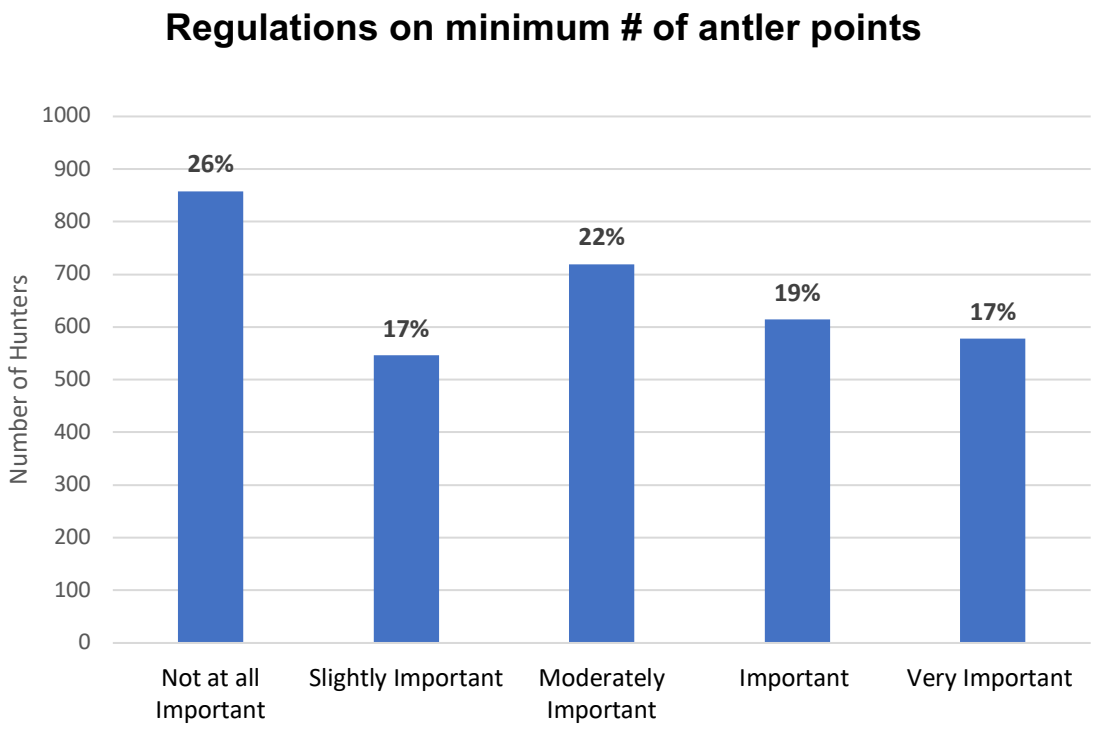
ANSWER CHOICES	RESPONSES	
Not at all Important	224	6.7%
Slightly Important	454	13.7%
Moderately Important	1,064	32.0%
Important	990	29.8%
Very Important	589	17.7%
Total Responses: 3,321		

Q10b. HOW IMPORTANT ARE THE FOLLOWING ASPECTS OF YOUR SIKA DEER HUNTING EXPERIENCE?



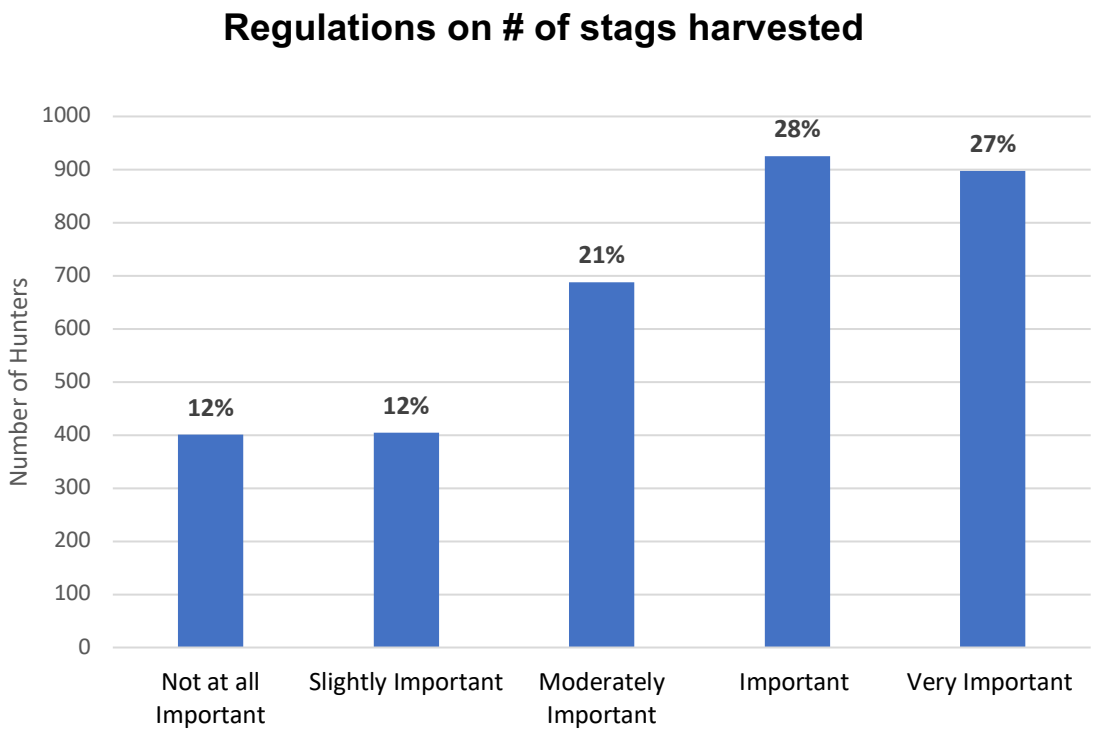
ANSWER CHOICES	RESPONSES	
Not at all Important	447	13.5%
Slightly Important	585	17.6%
Moderately Important	839	25.3%
Important	766	23.1%
Very Important	682	20.5%
Total Responses: 3,319		

Q10c. HOW IMPORTANT ARE THE FOLLOWING ASPECTS OF YOUR SIKA DEER HUNTING EXPERIENCE?



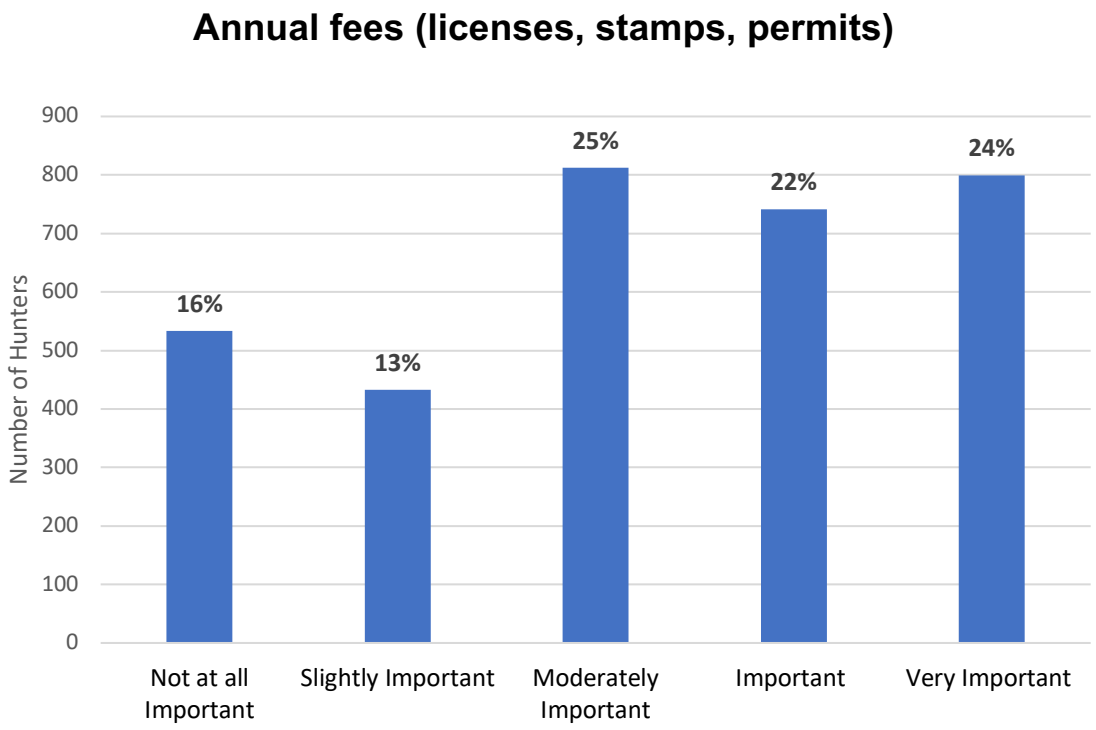
ANSWER CHOICES	RESPONSES	
Not at all Important	858	25.9%
Slightly Important	546	16.5%
Moderately Important	719	21.7%
Important	614	18.5%
Very Important	578	17.4%
Total Responses: 3,315		

Q10d. HOW IMPORTANT ARE THE FOLLOWING ASPECTS OF YOUR SIKA DEER HUNTING EXPERIENCE?



ANSWER CHOICES	RESPONSES	
Not at all Important	401	12.1%
Slightly Important	405	12.2%
Moderately Important	688	20.7%
Important	925	27.9%
Very Important	898	27.1%
Total Responses: 3,317		

Q10e. HOW IMPORTANT ARE THE FOLLOWING ASPECTS OF YOUR SIKA DEER HUNTING EXPERIENCE?



ANSWER CHOICES	RESPONSES	
Not at all Important	533	16.1%
Slightly Important	433	13.1%
Moderately Important	812	24.5%
Important	741	22.3%
Very Important	799	24.1%
Total Responses: 3,318		

Q11-18. Sika Deer Hunting Scenarios

Introduction and Methods

The sika deer hunting experience has a variety of attributes that could positively or negatively affect the perceived quality of the hunting experience. Such attributes might include license fees, bag limits, antler point restrictions and expectations of annual harvest success. The attribute-based approach we use to explore sika deer hunter preferences for hunting scenario attributes is called a stated preference choice experiment (SPCE), and the behavioral theory and model underpinning this attribute-based analysis of sika deer hunting is called a Random Utility Model (RUM). In this context a sika deer hunter receives utility (or disutility) from the levels of attributes of a sika deer hunting scenario. Utility is a technical economics term that broadly refers to the benefits an individual receives through consuming a good or service. Presumably (all else equal) benefits to the hunter would increase as harvest rate increases, and decrease as license fees increase.

In the SPCE implemented through this survey, sika deer hunters are asked to compare two different sika deer hunting scenarios and identify a preferred hunting scenario. Each sika deer hunting scenario presented to hunters contains the same types of attributes and different attribute levels. For example, each scenario would have an attribute “annual hunter success” probability, with levels for this attribute differing across scenarios from as low as 30% to as high as 80%. These attributes and attribute levels are described in the below table.

Table 1. Sika Deer Hunting Scenario Attributes and Attribute Levels

Attribute Category	Attribute	Number of Attributes	Attribute Level
Annual Hunter Success			
	% harvesting at least 1 sika deer (antlered or antlerless)	6	30%; 40%; 50%; 60%; 70%; 80%
	% harvesting at least 1 quality stag (3 points or more on 1 antler)[2]	6	10%; 20%; 30%; 40%; 50%; 60%
Antlered Regulations			
	Antler Point Restriction (min. points on 1 antler, all stags)	3	No restriction; 2 points; 3 points
	Combined Weapon Season Antlered Bag Limit	3	3 stags; 2 stags; 1 stag
Annual Fees			
	Licenses, Stamps and Permits[3]	6	$10; $25; $40; $55; $75; $100

In order to identify the utility weight associated with each sika deer hunting scenario attribute, it is necessary to elicit preference information by presenting hunters with a wide array of choice sets with two hunting scenarios, each of which is composed of different attribute levels. There are a very large number of possible choice sets composed of the attribute levels in table 1. Experimental design procedures were used to construct 72 unique sika deer hunting choice sets optimally designed to elicit the maximum amount of tradeoff information from a hunter. These 72 choice sets were blocked into groups of four, and each hunter was randomly assigned one of these 18 sets. See figure 1 for one of the 72 unique sika deer hunting choice scenarios.

[2] As the probability of harvesting a quality stag is a subset of the probability of harvesting any sika deer, the "quality stag" attribute was required to be less than the "sika deer" attribute in all choice scenarios faced by the survey respondent.

[3] A different set of fees was used for non-residents to conform with the higher level of annual fee levels these hunters currently face. Non-resident hunters could see 6 annual fees: $90, $130, $175, $215, $265, $310.

Figure 1: Example of Sika Deer Hunting Scenario Choice Set

Choice 1: Which Sika Deer Hunting Scenario do you most prefer?

SIKA DEER HUNTING CHARACTERISTICS	Scenario A	Scenario B
Annual Hunter Success		
% harvesting at least 1 sika deer (antlered or antlerless)	40%	80%
% harvesting at least 1 quality stag (3 points or more on 1 antler)	10%	60%
Antlered Regulations		
Antler Point Restriction (min. points on 1 antler, all stags)	None	2 points
Combined Weapon Season Antlered Bag Limit	2 stags	1 stag
Annual Fees		
Licenses, Stamps, & Permits	$40	$55

This choice of a preferred hunting scenario by the hunter enables the estimation of a statistical model called a random parameters logit that is used to estimate the mean and standard deviation of hunter preferences for specific attributes. A benefit of this method is that it enables the estimation of the average effect of an attribute on hunter scenario choice as well as whether the attribute affects different hunters in different ways. Two statistical models were estimated - a model for Maryland resident sika deer hunters and a model for non-resident sika deer hunters. See Appendix B for the model output produced using the Stata statistical software package. Each model consists of hunters who have reported previously hunting sika deer in Maryland.

For each Maryland resident and non-resident model, we perform three types of analyses. **First**, table 1 provides the direction (positive or negative) of the mean utility weight for each attribute, along with the corresponding statistical significance. For regulation attributes such as combined weapon season stag bag limit and antler point restriction that might have different effects depending on the hunter, both mean and standard deviation were estimated. **Second**, by estimating mean and standard deviation associated with hunter preferences for regulations, this enables the identification of the proportion of hunters who are "*better-off*" or "*worse-off*" with a regulation change. Four potential regulation changes will be examined - two regulation changes each for antler point restrictions and combined weapon season stag bag limits.

Third, model results will be used to calculate the average sika deer hunter willingness to pay in terms of annual fees (licenses, permits, and stamps) for a sika deer hunting scenario. Willingness to Pay (WTP) is a technical economics term that refers to the maximum amount of money an individual would be willing to pay for a good or service. In this case, WTP indicates the maximum a sika deer hunter would be willing to pay for a sika deer hunting scenario characterized by the following attributes: annual sika deer harvest probability for any sika deer, annual sika deer harvest probability for a quality stag (3 or more points on 1 antler), combined weapon season stag bag limit, and antler point restrictions.

Model Results

Table 2. Sika Deer Hunting Statistical Model Results

	RESIDENT		NON-RESIDENT	
Attribute	**Mean (Direction & Stat. Sig.[4])**	**Standard Deviation (Stat. Sig.)**	**Mean (Direction & Stat. Sig.)**	**Standard Deviation (Stat. Sig.)**
Annual Hunter Success				
% harvesting at least 1 sika deer (antlered or antlerless)	+***	N/A	+***	N/A
% harvesting at least 1 quality stag (3 points or more on 1 antler)	+***	N/A	+***	N/A
Antler Point Restriction (min. points on 1 antler, all stags)				
2 points	+**		-**	
3 points	+	***	-***	***
Combined Weapon Season Antlered Bag Limit				
2 stags	+**		+	
1 stag	-**	***	-**	***
Annual Fees				
Licenses, Stamps, & Permits	-***	N/A	-***	N/A

[4] *** = statistically significant at 1% level, ** = 5% level, * = 10% level

DISCUSSION

Mean (Average) Preferences for Resident and Non-Resident Hunters

The directional influence of attributes on sika deer hunting scenario choice is as expected for the annual fees and the sika deer harvest probability categories, across both resident and non-resident models. Annual fees are negative and statistically significant at the 1% level, meaning that we can say with a very high level of confidence that as annual fees increase in a sika deer hunting scenario, the probability of a hunter selecting that scenario decreases. This conforms with standard economic logic for the price of any good or service. Similarly, harvest probability is positive and statistically significant for the sika deer and quality stag attributes, meaning that as the annual harvest probability in a scenario increases the probability of a hunter selecting that scenario increases. While it is well understood that individuals hunt for a variety of reasons, harvesting an animal is clearly an objective of hunters.

Unlike with annual fees and harvest probability, the expected influence of combined weapon season stag bag limit and antler point restriction regulations is not necessarily obvious. Initially, it might seem sensible that changing to more strict regulations would reduce the likelihood a hunter would prefer that scenario. However, hunters may view more strict regulations positively as helping to ensure the long-term sustainability of the wildlife resource, reduce hunter crowding, or for another reason. The model examined resident and non-resident mean preferences for antler point restrictions (APRs), relative to the current regulation of no APR. Model results show that Maryland resident sika deer hunters on average prefer a 2 point APR over no APR. For resident hunters, while changing from no APR to a 3 point APR is positive it is not statistically significant at conventional levels. Hence we cannot conclude that a 3 point APR is on average preferred by resident hunters. Contrary to Maryland residents, non-resident hunters on average are negatively impacted by changing from a no APR regulation to both a 2 point and 3 point APR regulation, and this is statistically significant for both APRs. This may be due to non-residents desiring to preserve the opportunity of harvesting an antlered sika deer on more limited trip opportunities. The model also assessed average preferences for going from a 3 stag yearly bag limit to a 2 stag combined weapon season bag limit and a 1 stag bag limit, respectively. Maryland residents on average prefer a change to a 2 stag bag limit from the 3 stag bag limit, and this was statistically significant at the 5% level meaning that we have a high degree of confidence in this finding. On average resident and non-resident hunters prefer a 3 stag bag limit to a 1 stag limit and this is statistically significant at the 5% level.

Difference in Preferences (Standard Deviation) for Resident and Non-Resident Hunters

We examine whether there are differences within each of the two groups of hunters - Maryland residents and non-residents - as it relates to their preferences for regulation changes. We define a population difference in preferences as when there is a standard deviation in table 2 that is statistically significant (different from zero) at the 10% level or lower. For the two most strict regulations changes - no APR to a 3 point minimum on 1 side APR and a reduction in the combined weapon season stag bag limit from 3 stags to 1 stag - we identify a difference in hunter preferences for both the resident and non-resident hunter populations. This means that for each of these groups there will be a segment of hunters that are “better off” with changing to more strict regulations, and a segment of hunters that are “worse off” with changing to more strict regulations.

Estimating both the mean and standard deviation for a regulation change enables the calculation of the proportion of the hunter population who are “better off” and “worse off” from a regulation change. See table 3 below for the breakdown of the proportion of hunters who are better off and worse off from the regulation changes. Where there was no evidence of differences in the preferences for a regulation change in the population, table 3 notes that there was “No Difference Across Hunters”. Notably, for three out of four of the more strict regulation changes, we see relatively similar proportions of hunters who are made better off and worse off from the change. Indeed, for resident hunters moving from no APR to a 3 point APR it’s split right down the middle, with 50% of these hunters made better off and worse off, respectively.

Table 3. Proportion of Hunters Better-Off and Worse-Off with Regulation Changes

	Resident		***Non-Resident***	
	% of Hunters Better Off	*% of Hunters Worse Off*	*% of Hunters Better Off*	*% of Hunters Worse Off*
Antler Point Restriction Change				
Regulation change from no APR to at least 2 points on one side APR	*No Difference Across Hunters*		*No Difference Across Hunters*	
Regulation change from no APR to at least 3 point on one side APR	*50%*	*50%*	*32%*	*68%*
Combined Weapon Season Stag Bag Limit				
Regulation change from yearly 3 stag bag limit to 2 yearly stag bag limit	*No Difference Across Hunters*		*No Difference Across Hunters*	
Regulation change from yearly 3 stag bag limit to 1 yearly stag bag limit	*46%*	*54%*	*43%*	*57%*

Hunter Willingness to Pay (WTP) for Different Sika Deer Hunting Scenarios

Results from the Maryland resident and non-resident statistical models enable the calculation of sika deer hunter willingness-to-pay (WTP) for different sika deer hunting scenarios. The WTP figures in Table 4 reflect the maximum amount the average sika deer hunter would be willing to pay in annual fees (licenses, stamps, and permits) for a sika hunting experience that is characterized by specific regulations and harvest probabilities. Recent harvest and hunter effort data from the MDDNR indicate that approximately 50% of sika deer hunters harvest at least one sika deer annually and about 10% of sika deer hunters harvest a quality stag (three points or more on one antler) annually. Currently, there is no APR and the combined weapon season stag bag limit is three. We calculate WTP for the current sika deer hunting experience that is defined by the current regulations and estimates of harvest success probability derived from MDDNR data. We then estimate hunter WTP for different three scenarios that involve the implementation of new regulations and the concurrent increase in sika deer harvest probabilities.

Table 4: Maryland resident and non-resident willingness to pay (WTP) for the current sika deer hunting scenario and three scenarios in which regulation changes increase the probability of quality stag harvest from 10% to 20% and increase the probability of harvesting any sika deer from 50% to 55%.

	WTP for Maryland Resident	WTP for Non-Resident
Current Scenario *Annual Sika Deer Harvest Probability = 50%* *Annual Quality Stag Harvest Probability = 10%* *APR = None* *Combined Weapon Season Stag Limit = 3*	$58.07	$157.67
Alternative Scenario 1 *Annual Sika Deer Harvest Probability = 55%* *Annual Quality Stag Harvest Probability = 20%* *APR = 2 points min on 1 side* *Combined Weapon Season Stag Limit = 3*	$79.83	$178.51
Alternative Scenario 2 *Annual Sika Deer Harvest Probability = 55%* *Annual Quality Stag Harvest Probability = 20%* *APR = None* *Combined Weapon Season Stag Limit = 2*	$81.07	$207.14
Alternative Scenario 3 *Annual Sika Deer Harvest Probability = 55%* *Annual Quality Stag Harvest Probability = 20%* *APR = 2 points min on 1 side* *Combined Weapon Season Stag Limit = 2*	$88.23	$188.61

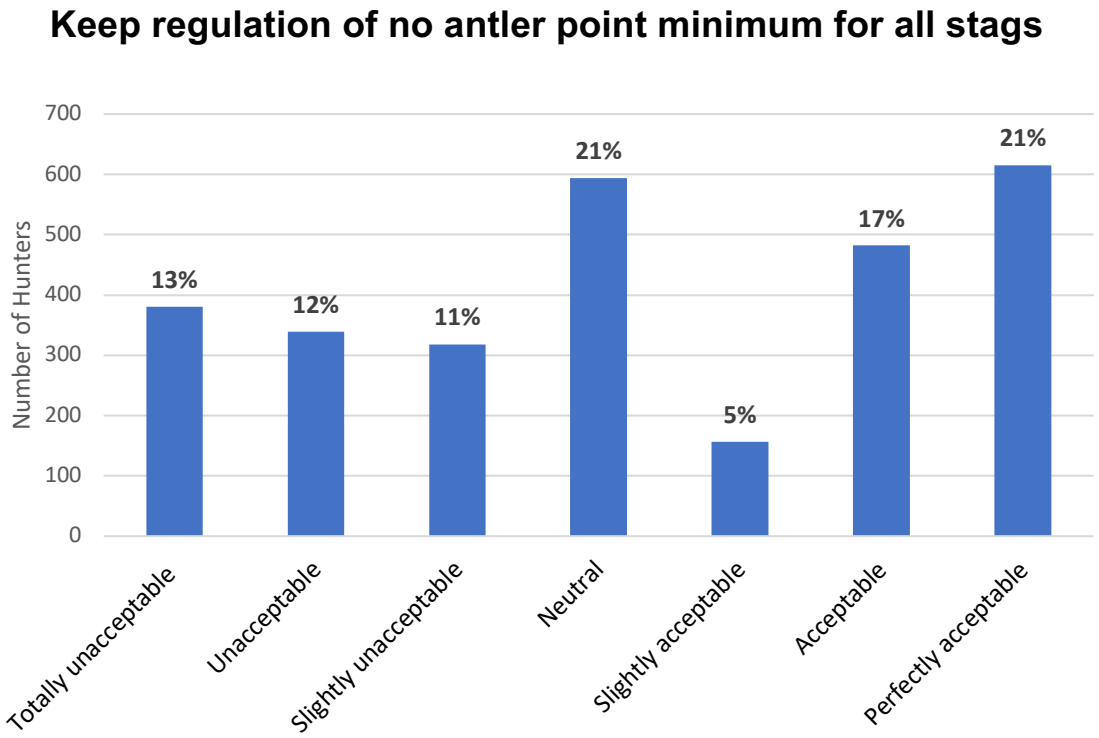
For the current sika deer hunting scenario, an average Maryland resident hunter has a WTP of about $58 in annual fees, while non-residents on average have a WTP of about $158 in annual fees. Alternative Scenario 1 examines hunter WTP for a sika deer hunting scenario in which the implementation of a 2 point minimum on 1 side APR generates an increase in the annual probability of harvesting any sika deer (50% to 55%) and an increase in annual probability of harvesting a quality stag (10% to 20%). Alternative Scenario 2 examines hunter WTP for the same harvest increases as in Alternative Scenario 1 with the implementation of a 2 stag combined weapon season bag limit. In these two alternative scenarios, Maryland resident hunter WTP is about $22 to $23 greater than the current scenario, and non-resident hunter WTP is about $21 to $49 greater than the current scenario. Alternative Scenario 3 assumes that the implementation of both a 2 point minimum on 1 side APR and a 2 stag combined

weapon season bag limit generates the same increases in harvest probabilities as in the other scenarios. Maryland hunter WTP for Alternative Scenario 3 is about $30 greater than in the Current Scenario; for non-residents in Alternative Scenario 3 WTP is about $31 greater than the Current Scenario.

It's important to exercise caution if using WTP figures in table 4 to inform license pricing decisions. A complicating issue is that to hunt sika deer in Maryland a regular hunting license is needed as well as (possibly) archery and muzzleloader stamps, and these licenses/stamps confer hunting privileges for game species other than sika deer. To the extent that hunters interpret annual fees to be purchasing other hunting privileges as well, this could affect hunter WTP for a specific sika deer hunting scenario. A way around this issue is to focus the analysis on the change in WTP between scenarios rather than the WTP associated with a specific scenario. By focusing on the change in WTP between two scenarios, we are controlling for an individual's interpretation of annual fees across these scenarios and hence we can specifically link the change in WTP to the change in sika deer scenario attribute levels. For example, Maryland Resident WTP for Alternative Scenario 3 is about $30 greater than the Current Scenario. This means that in addition to the changes in harvest probabilities and regulations, the average resident hunter could be charged a $20 annual fee specific to sika deer hunting and still be better off (by about $10) in Alternative Scenario 3 than the hunter was under the Current Scenario. More broadly, as long as a sika deer - specific fee costs less than the WTP change between scenarios, the average sika deer hunter will be "better off" by paying for the stamp and having new regulations and new sika deer harvest probabilities.

SECTION 3: SIKA DEER HUNTING REGULATIONS AND POPULATION

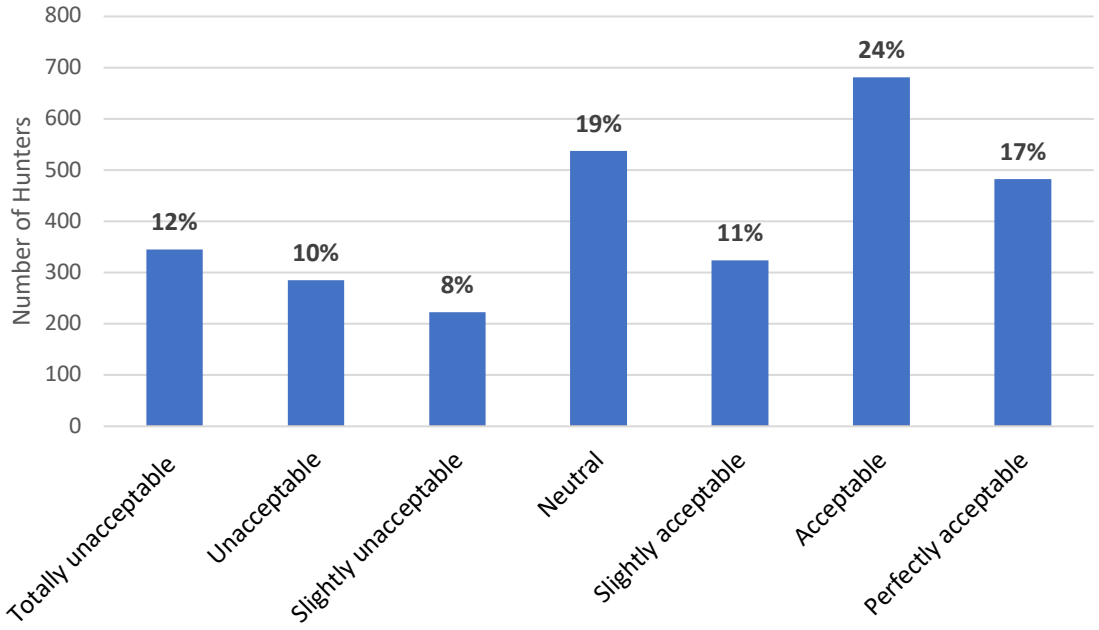
Q19a. PLEASE INDICATE THE LEVEL OF ACCEPTABILITY TO YOU FOR EACH STATEMENT BELOW.



ANSWER CHOICES	RESPONSES	
Totally unacceptable	380	13.2%
Unacceptable	339	11.8%
Slightly unacceptable	318	11.0%
Neutral	594	20.6%
Slightly acceptable	157	5.4%
Acceptable	482	16.7%
Perfectly acceptable	615	21.3%
Total Responses: 2,885		

Q19b. PLEASE INDICATE THE LEVEL OF ACCEPTABILITY TO YOU FOR EACH STATEMENT BELOW.

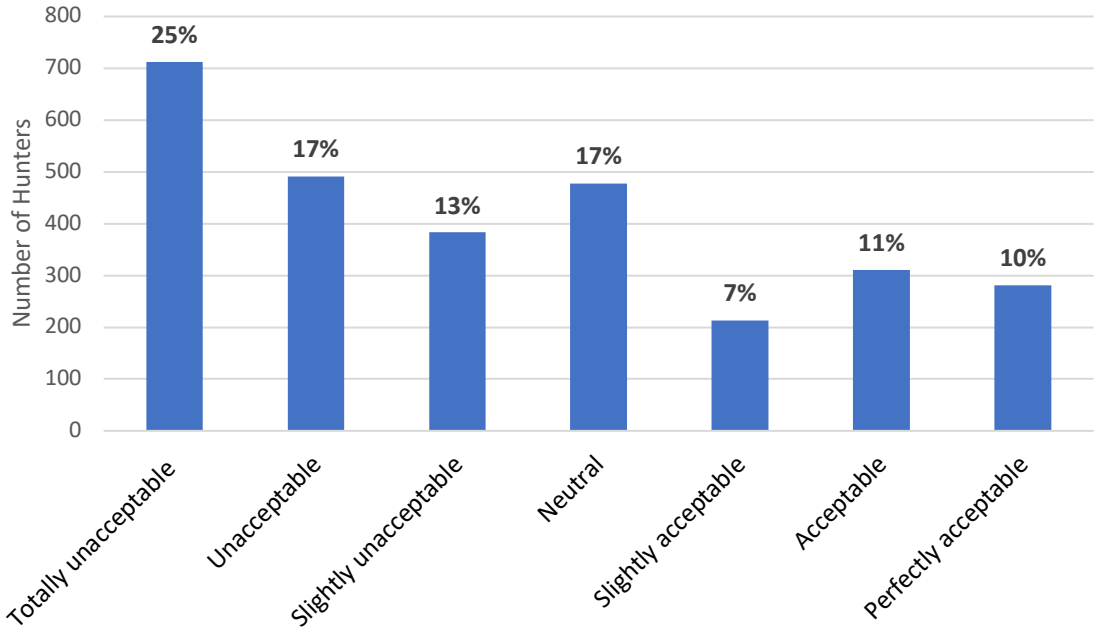
Change regulation to a minimum of 2 points on 1 antler for all stags



ANSWER CHOICES	RESPONSES	
Totally unacceptable	345	11.9%
Unacceptable	285	9.9%
Slightly unacceptable	223	7.8%
Neutral	537	18.7%
Slightly acceptable	324	11.3%
Acceptable	681	23.7%
Perfectly acceptable	483	16.8%
Total Responses: 2,878		

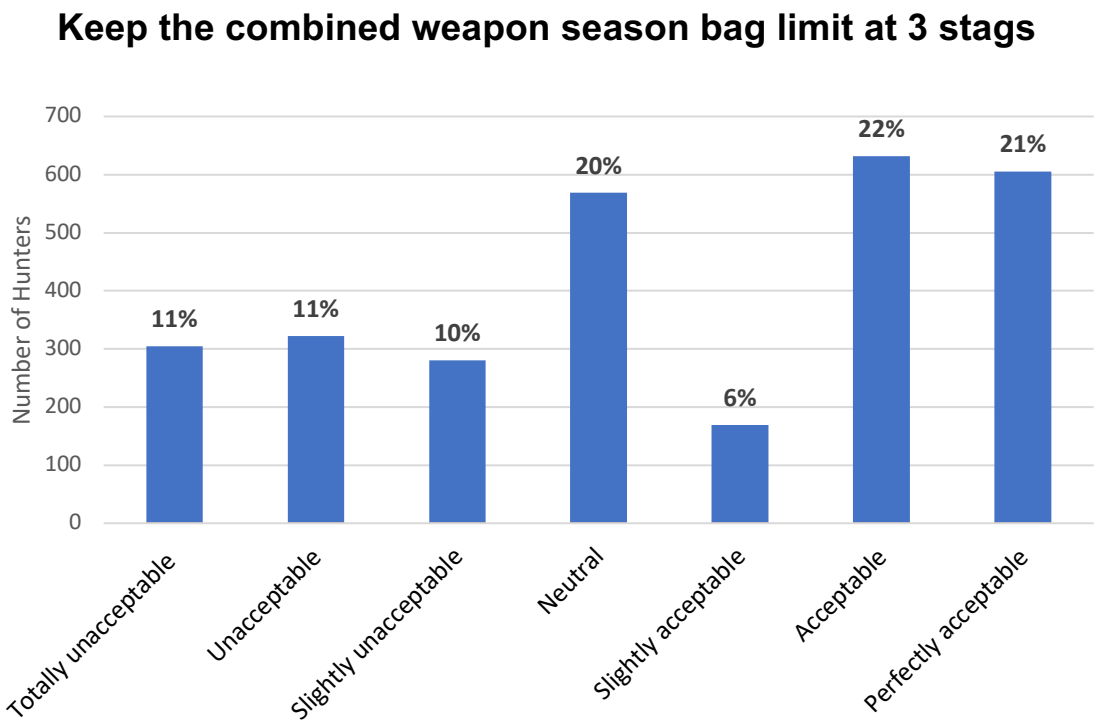
Q19c. PLEASE INDICATE THE LEVEL OF ACCEPTABILITY TO YOU FOR EACH STATEMENT BELOW.

Change regulation to a minimum of 3 points on 1 antler for all stags



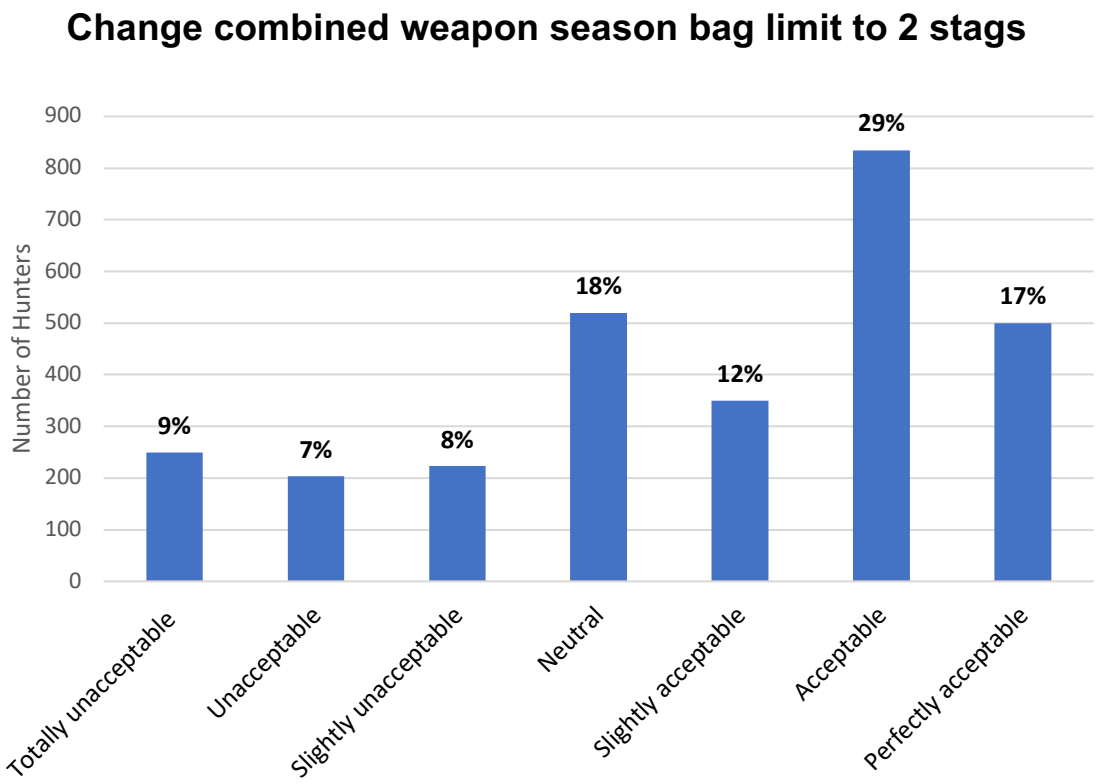
ANSWER CHOICES	RESPONSES	
Totally unacceptable	712	24.8%
Unacceptable	491	17.1%
Slightly unacceptable	383	13.4%
Neutral	478	16.7%
Slightly acceptable	213	7.4%
Acceptable	311	10.8%
Perfectly acceptable	281	9.8%
Total Responses: 2,869		

Q20a. PLEASE INDICATE THE LEVEL OF ACCEPTABILITY TO YOU FOR EACH STATEMENT BELOW.



ANSWER CHOICES	RESPONSES	
Totally unacceptable	305	10.6%
Unacceptable	322	11.2%
Slightly unacceptable	280	9.7%
Neutral	569	19.8%
Slightly acceptable	169	5.9%
Acceptable	632	21.9%
Perfectly acceptable	604	20.9%
Total Responses: 2,881		

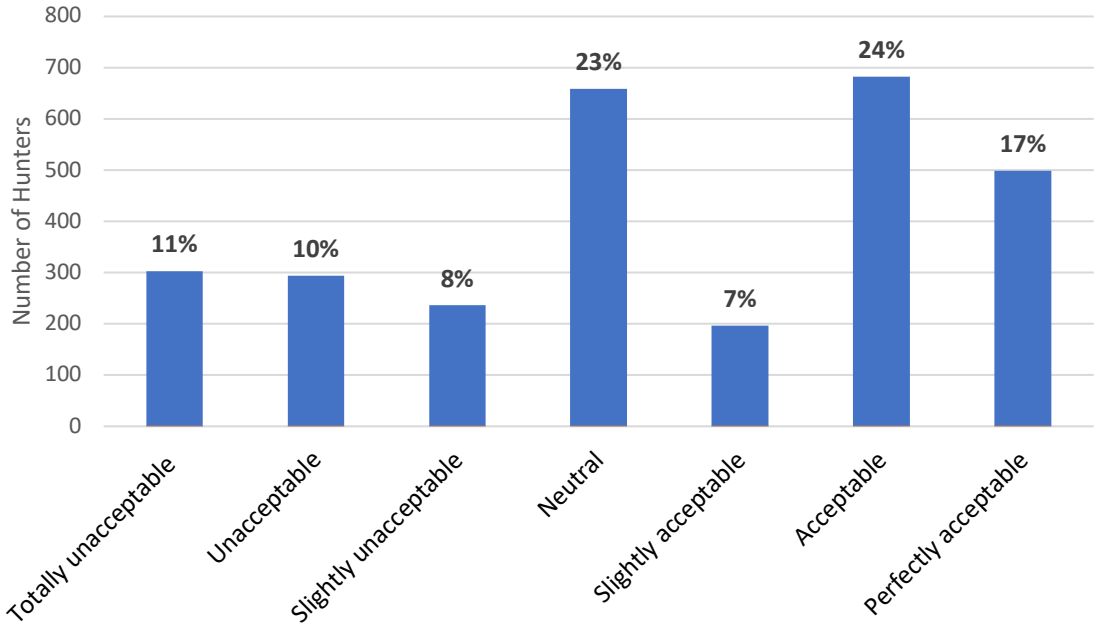
Q20b. PLEASE INDICATE THE LEVEL OF ACCEPTABILITY TO YOU FOR EACH STATEMENT BELOW.



ANSWER CHOICES	RESPONSES	
Totally unacceptable	249	8.7%
Unacceptable	203	7.1%
Slightly unacceptable	223	7.8%
Neutral	520	18.1%
Slightly acceptable	350	12.2%
Acceptable	834	29.0%
Perfectly acceptable	500	17.4%
Total Responses: 2,879		

Q20c. PLEASE INDICATE THE LEVEL OF ACCEPTABILITY TO YOU FOR EACH STATEMENT BELOW.

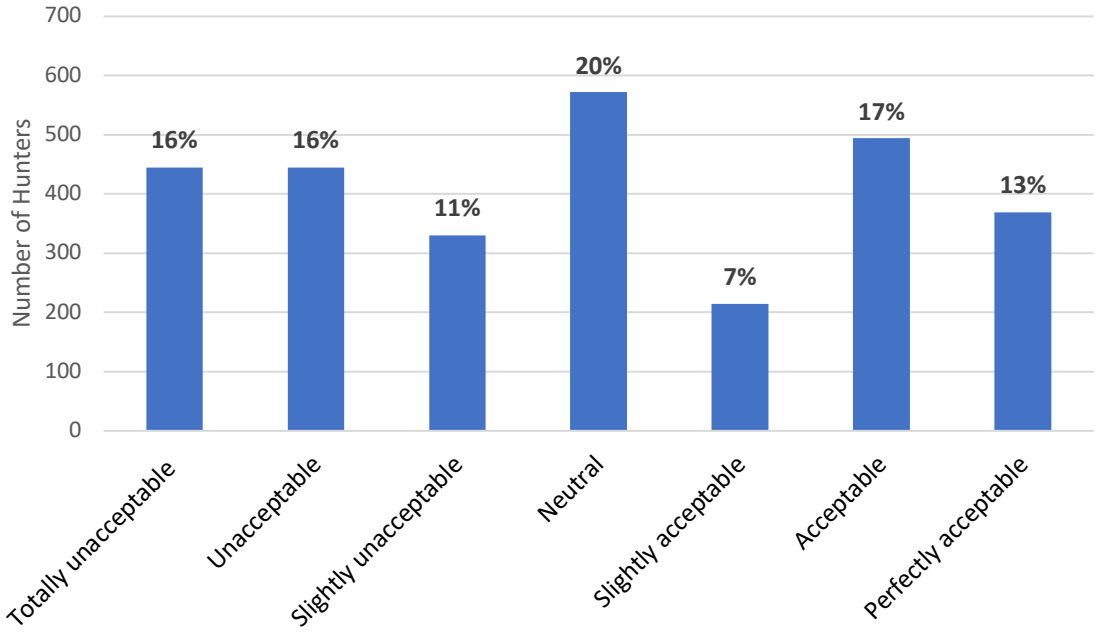
Keep single weapon season bag limit at 3 antlerless sika deer



ANSWER CHOICES	RESPONSES	
Totally unacceptable	303	10.6%
Unacceptable	294	10.2%
Slightly unacceptable	236	8.2%
Neutral	659	23.0%
Slightly acceptable	197	6.9%
Acceptable	682	23.8%
Perfectly acceptable	499	17.4%
Total Responses: 2,870		

Q20d. PLEASE INDICATE THE LEVEL OF ACCEPTABILITY TO YOU FOR EACH STATEMENT BELOW.

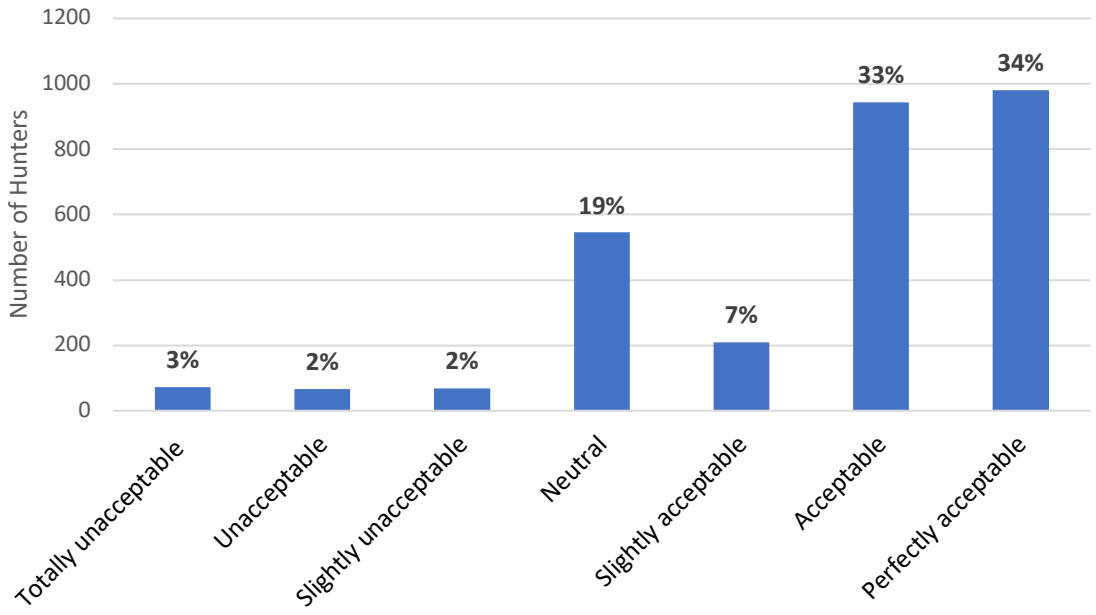
Change single weapon season bag limit to 1 antlerless sika deer



ANSWER CHOICES	RESPONSES	
Totally unacceptable	445	15.5%
Unacceptable	445	15.5%
Slightly unacceptable	330	11.5%
Neutral	572	19.9%
Slightly acceptable	215	7.5%
Acceptable	494	17.2%
Perfectly acceptable	369	12.9%
Total Responses: 2,870		

Q21a. PLEASE INDICATE THE LEVEL OF ACCEPTABILITY TO YOU FOR EACH STATEMENT BELOW.

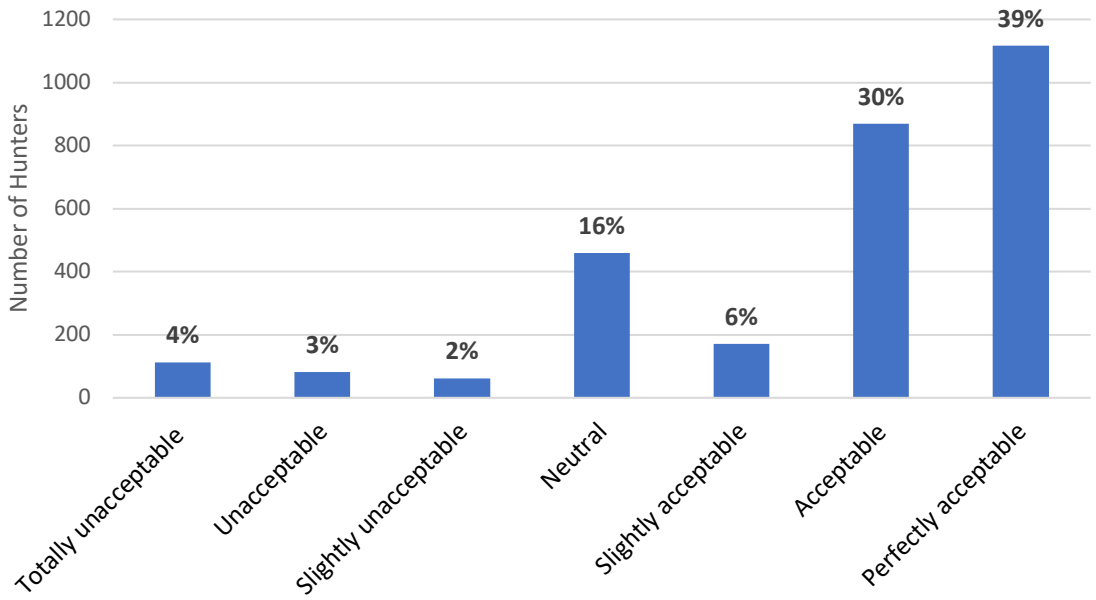
50% increase in sika deer population in current geographic range



ANSWER CHOICES	RESPONSES	
Totally unacceptable	73	2.5%
Unacceptable	67	2.3%
Slightly unacceptable	69	2.4%
Neutral	545	18.9%
Slightly acceptable	209	7.2%
Acceptable	943	32.7%
Perfectly acceptable	981	34.0%
Total Responses: 2,887		

Q21b. PLEASE INDICATE THE LEVEL OF ACCEPTABILITY TO YOU FOR EACH STATEMENT BELOW.

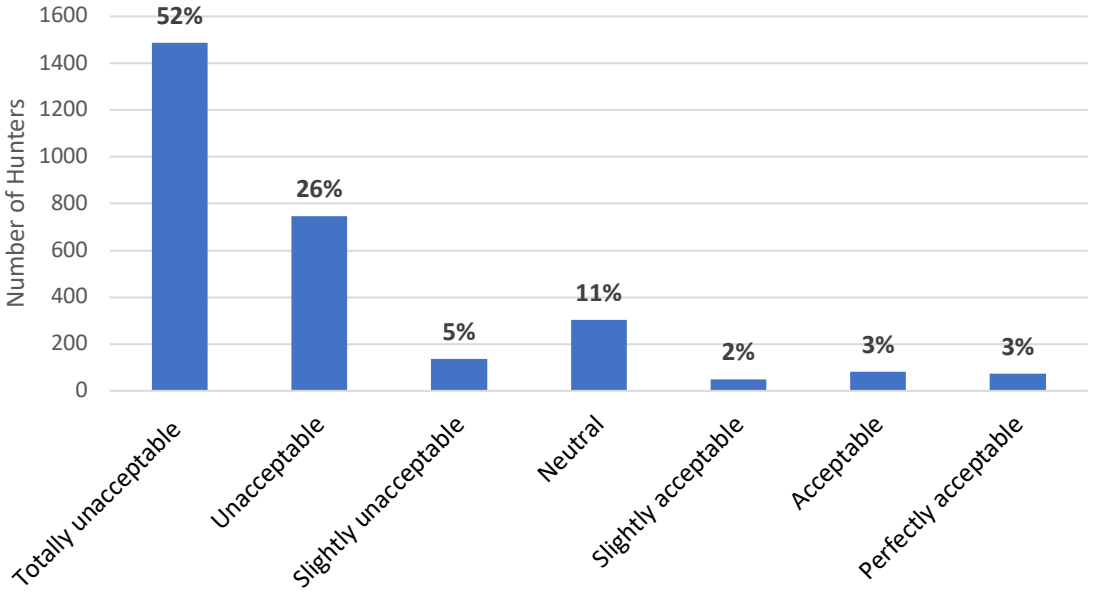
Expansion of sika deer population to areas of Maryland's Eastern Shore outside of current geographic range



ANSWER CHOICES	RESPONSES	
Totally unacceptable	113	3.9%
Unacceptable	82	2.9%
Slightly unacceptable	62	2.2%
Neutral	460	16.0%
Slightly acceptable	170	5.9%
Acceptable	869	30.2%
Perfectly acceptable	1,116	39.1%
Total Responses: 2,882		

Q21c. PLEASE INDICATE THE LEVEL OF ACCEPTABILITY TO YOU FOR EACH STATEMENT BELOW.

50% decrease in sika deer population in current geographic range

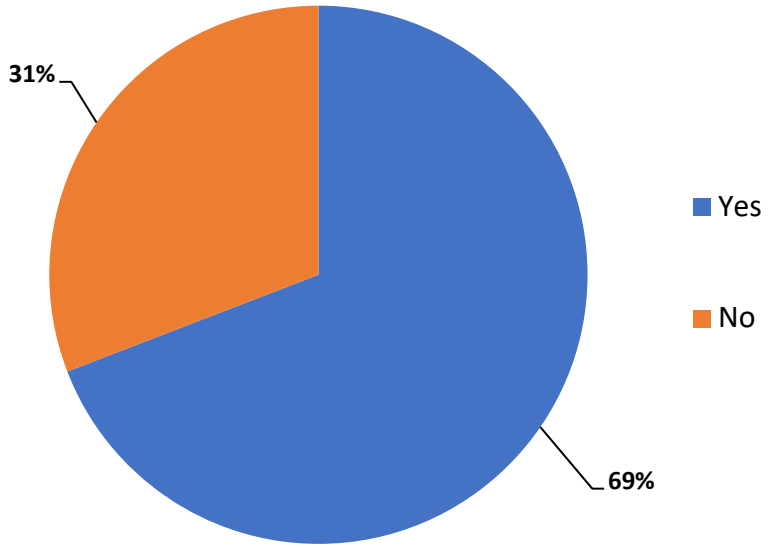


ANSWER CHOICES	RESPONSES	
Totally unacceptable	1,487	51.7%
Unacceptable	747	26.0%
Slightly unacceptable	137	4.8%
Neutral	304	10.6%
Slightly acceptable	49	1.7%
Acceptable	81	2.8%
Perfectly acceptable	73	2.5%
Total Responses: 2,878		

SECTION 4: SIKA DEER HUNTING TRIP (2021-2022)

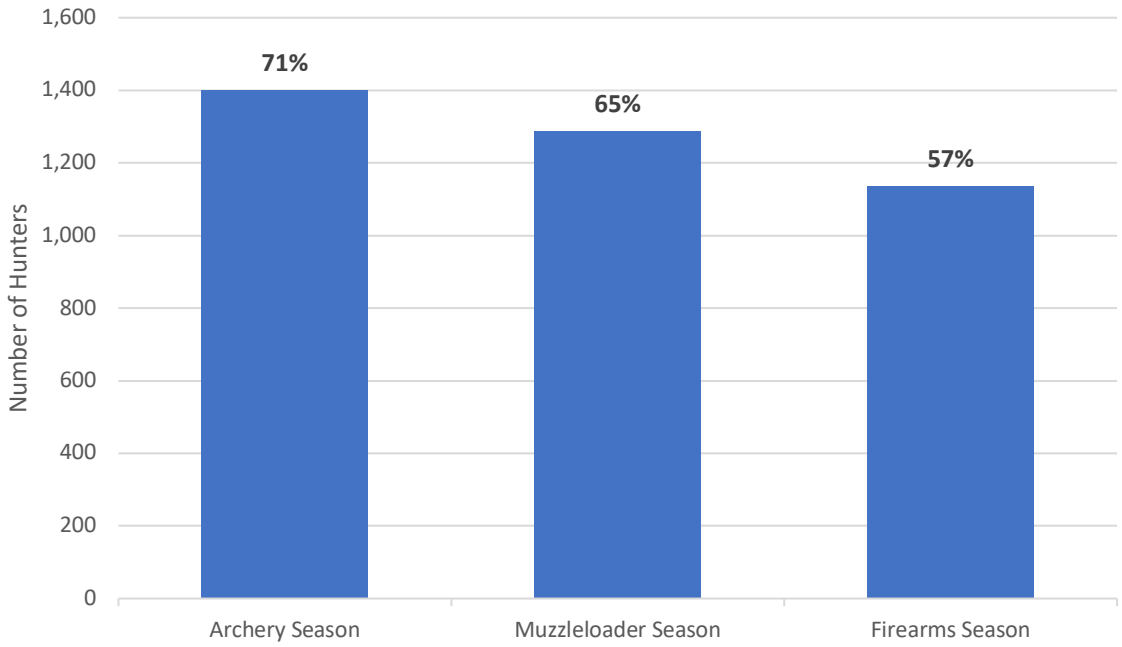
NOTE: This is a skip question. Respondents who answer "Yes" proceed to Questions 23 – 34, to answer questions about a specific trip taken

Q22. DID YOU HUNT FOR SIKA DEER IN THE 2021-2022 HUNTING SEASON?



ANSWER CHOICES	RESPONSES	
Yes	1,985	68.4%
No	919	31.7%
Total Responses: 2,904		

Q23. IN WHICH WEAPON SEASONS DID YOU HUNT SIKA DEER IN THE 2021-2022 HUNTING SEASON? (CHECK ALL THAT APPLY)



ANSWER CHOICES	RESPONSES	
Archery Season	1,400	70.6%
Firearm Season	1,288	65.0%
Muzzleloader Season	1,136	57.3%
Total Responses: 1,982		

Q24. DURING WHICH MONTH WAS THIS SIKA DEER HUNTING TRIP?

NOTE: In this question we asked people to report on a trip nearest a specific date. Participants were randomly sorted to report on different trips and different seasons based on their responses to Q23, see Appendix A for an example. Responses are not reflective of the actual distribution of trips throughout the year, to prevent misinterpretation these responses have been omitted from this report.

NOTE: The following questions are asked in reference to a specific sika deer hunting trip, taken during the 2020-2021 hunting season. Hunters were asked to tell us about a trip taken during a specified weapon season, see Appendix A for an example.

QUESTION	ARCHERY SEASON	FIREARM SEASON	MUZZLELOADER SEASON
Q25. What type of weapon did you use on this trip?	54.2% Compound bow 45.7% Crossbow 1.2% Long bow 2.6% Recurve bow 1.2% Other	74.3% Rifle 29.5% Shotgun 0.6% Handgun 8.2% Other	4.1% Flintlock/Sidelock Percussion muzzleloader 96.8% Modern muzzleloader 6.9% Other
Q26. What type of land did you hunt on this trip?	42.0% Public land 51.2% Private land 6.8% Both	37.9% Public land 57.0% Private land 5.1% Both	38.1% Public land 55.4% private land 6.5% Both
Q27. Please provide the name of the county where you hunted on this trip.	83.3% Dorchester 8.0% Wicomico 4.1% Worcester 2.8% Unsure 1.8% Somerset 0% Other	82.3% Dorchester 9.0% Wicomico 3.5% Worcester 1.9% Unsure 2.4% Somerset 1.0% Other	82.5% Dorchester 8.2% Wicomico 2.2% Worcester 2.6% Unsure 3.1% Somerset 0.5% Other
Q28. Miles traveled one-way on this trip	Mean= 144.3 miles Median = 96 miles	Mean= 120.4 miles Median = 90 miles	Mean= 116 miles Median = 90 miles
Q29. People that went on this trip	Mean= 2.3 people Median = 2 people	Mean= 2.7 people Median = 2 people	Mean= 2.4 people Median = 2 people
Q30. Nights away on this trip	Mean= 2.1 nights Median = 2	Mean= 1.8 nights Median = 2	Mean= 2.1 nights Median = 2
Q31. Days spent hunting on this trip	Mean= 2.6 days Median = 2	Mean= 2.3 days Median = 2	Mean= 2.5 days Median = 2
Q32. Total hours spent hunting on this trip	Mean= 19.9 hours Median = 16	Mean= 16.4 hours Median = 12	Mean= 19.2 hours Median = 16

QUESTION	ARCHERY SEASON	FIREARM SEASON	MUZZLELOADER SEASON
Q33. Total trip expenditure [5]	*All Hunters:* Mean= $568.31 25th percentile= $87 50th percentile= $225 75th percentile= $695 *Resident:* Mean= $303.89 25th percentile= $60 50th percentile= $149 75th percentile= $300 *Non-Resident:* Mean= $1006.47 25th percentile= $230 50th percentile= $700 75th percentile= $1,405	*All Hunters:* Mean= $ 351.45 25th percentile= $70 50th percentile= $180 75th percentile= $400 *Resident:* Mean= $275.03 25th percentile= $55 50th percentile= $150 75th percentile= $320 *Non-Resident:* Mean= $599.00 25th percentile= $150 50th percentile= $345 75th percentile= $650	*All Hunters:* Mean= $461.81 25th percentile= $90 50th percentile= $225 75th percentile= $477.50 *Resident:* Mean= $342.18 25th percentile= $55 50th percentile= $160 75th percentile= $337.50 *Non-Resident:* Mean= $722.17 25th percentile= $226.50 50th percentile= $432.50 75th percentile= $891
Q34. Percent of expenditures in county hunted	0%-25% = 13.3% 26%-50%= 12.2% 51%-75%= 23.4% 76%-100%= 51.1%	0%-25% = 14.8% 26%-50%= 15.4% 51%-75%= 19.9% 76%-100%= 49.9%	0%-25% = 12.9% 26%-50%= 13.1% 51%-75%= 22.1% 76%-100%= 52.0%

[5] Total trip expenditures were calculated from hunter expenditures, reported across the following eight categories: round-trip vehicle transportation costs (ex: fuel, tolls), public transportation (ex: airplane, car/RV rental), food and drink from restaurants/bars, food and drink from grocery or convenience stores, lodging (ex: motels, cabins, lodges, camping) guide fees or package fees, public land use or access fees (excluding leases), and other. Finer resolution expenditure data is available upon request.

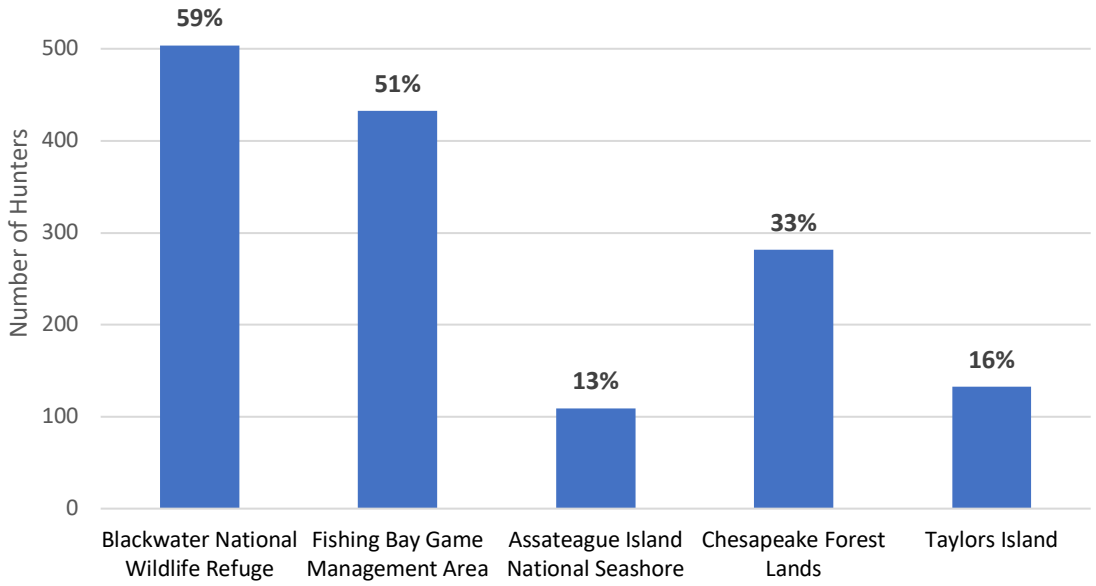
SECTION 5: PUBLIC AND PRIVATE LAND HUNTING

Q35. IN WHICH OF THE FOLLOWING SEASONS (IF ANY) DID YOU HUNT PUBLIC LAND FOR SIKA DEER IN MARYLAND? (CHECK ALL THAT APPLY)

ANSWER CHOICES	RESPONSES	
2019 – 2020	865	31.3%
2020 – 2021	889	32.2%
2021 – 2022	910	33.0%
I did not hunt sika deer on public land	1,454	52.7%
Total Responses: 2,760		

Q36. ON WHICH OF THE FOLLOWING TYPES OF PUBLIC LAND DID YOU HUNT SIKA DEER DURING THE 2021-2022 HUNTING SEASON? (CHECK ALL THAT APPLY)

NOTE: Respondents were asked to report which recent seasons they hunted for sika deer on public land. Q36 – Q38 describe their public land hunting activity during the 2021-2022 hunting season.



ANSWER CHOICES	RESPONSES	
Blackwater National Wildlife Refuge	504	58.9%
Fishing Bay Game Management Area	433	47.1%
Assateague Island National Seashore	109	12.7%
Chesapeake Forest Lands	282	33.0%
Taylors Island	133	15.6%
Total Responses: 855		

Q37. ON PUBLIC LAND DURING THE 2021-2022 HUNTING SEASON, HOW MANY DAYS DID YOU HUNT SIKA DEER IN EACH WEAPON SEASON?

ANSWER CHOICES	MEAN
Archery season	4.58 days
Early (October) Muzzleloader Season	1.21 days
Late (December) Muzzleloader Season	0.75 days
Regular Firearms Season	1.62 days
Late (January) Firearms Season	0.57 days
Total Responses: 910	

Q38. ON PUBLIC LAND DURING THE 2021-2022 HUNTING SEASON, HOW MANY OF EACH TYPE OF SIKA DEER DID YOU HARVEST?

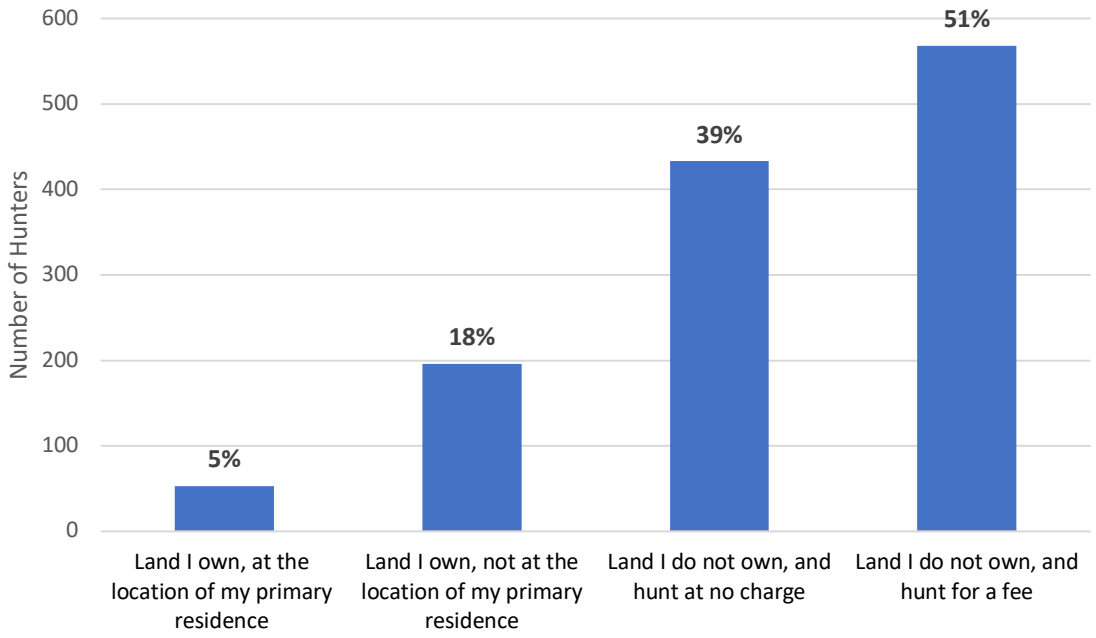
ANSWER CHOICES	MEAN
Antlerless Sika Deer	0.30
Antlered Sika Deer with less than 6 total points	0.18
Antlered Sika Deer with at least 6 total points	0.09
Total Responses: 2,540	

Q39. IN WHICH OF THE FOLLOWING SEASONS (IF ANY) DID YOU HUNT PRIVATE LAND FOR SIKA DEER IN MARYLAND? (CHECK ALL THAT APPLY)

ANSWER CHOICES	RESPONSES	
2019 – 2020	1,018	38.1%
2020 – 2021	1,006	37.7%
2021 – 2022	1,101	41.3%
I did not hunt sika deer on private land	1,255	47.0%
Total Responses: 2,669		

Q40. ON WHICH OF THE FOLLOWING TYPES OF PRIVATE LAND DID YOU HUNT SIKA DEER DURING THE 2021-2022 HUNTING SEASON? (CHECK ALL THAT APPLY)

NOTE: Respondents were asked to report which recent seasons they hunted for sika deer on private land. Q40 – Q43 describe their private land hunting activity during the 2021-2022 hunting season.



ANSWER CHOICES	RESPONSES	
Land I own, at the location of my primary residence	53	4.8%
Land I own, not at the location of my primary residence	196	17.6%
Land I do not own, and hunt at no charge	433	38.9%
Land I do not own, and hunt for a fee (ex: hunting lease, outfitter	568	51.1%
Total Responses: 1,112		

Q41. ON PRIVATE LAND DURING THE 2021-2022 HUNTING SEASON, HOW MANY OF DAYS DID YOU HUNT SIKA DEER IN EACH WEAPON SEASON?

ANSWER CHOICES	MEAN
Archery season	4.98 days
Early (October) Muzzleloader Season	1.45 days
Late (December) Muzzleloader Season	1.30 days
Regular Firearms Season	3.09 days
Late (January) Firearms Season	0.80 days
Total Responses: 1,096	

Q42. ON PRIVATE LAND DURING THE 2021-2022 HUNTING SEASON, HOW MANY OF EACH TYPE OF SIKA DEER DID YOU HARVEST?

ANSWER CHOICES	MEAN
Antlerless Sika Deer	0.46
Antlered Sika Deer with less than 6 total points	0.21
Antlered Sika Deer with at least 6 total points	0.19
Total Responses: 3,035	

SECTION 6: MULTIPLE-DAY SIKA DEER HUNTING TRIPS

Q43. IN WHICH OF THE FOLLOWING SEASONS (IF ANY) DID YOU TAKE A MULTIPLE-DAY SIKA DEER HUNTING TRIP IN MARYLAND? (CHECK ALL THAT APPLY)

DEFINITION: A MULTIPLE-DAY TRIP IS A TRIP THAT INVOLVES STAYING AT LEAST ONE NIGHT AT A LOCATION OTHER THAN YOUR PRIMARY RESIDENCE.

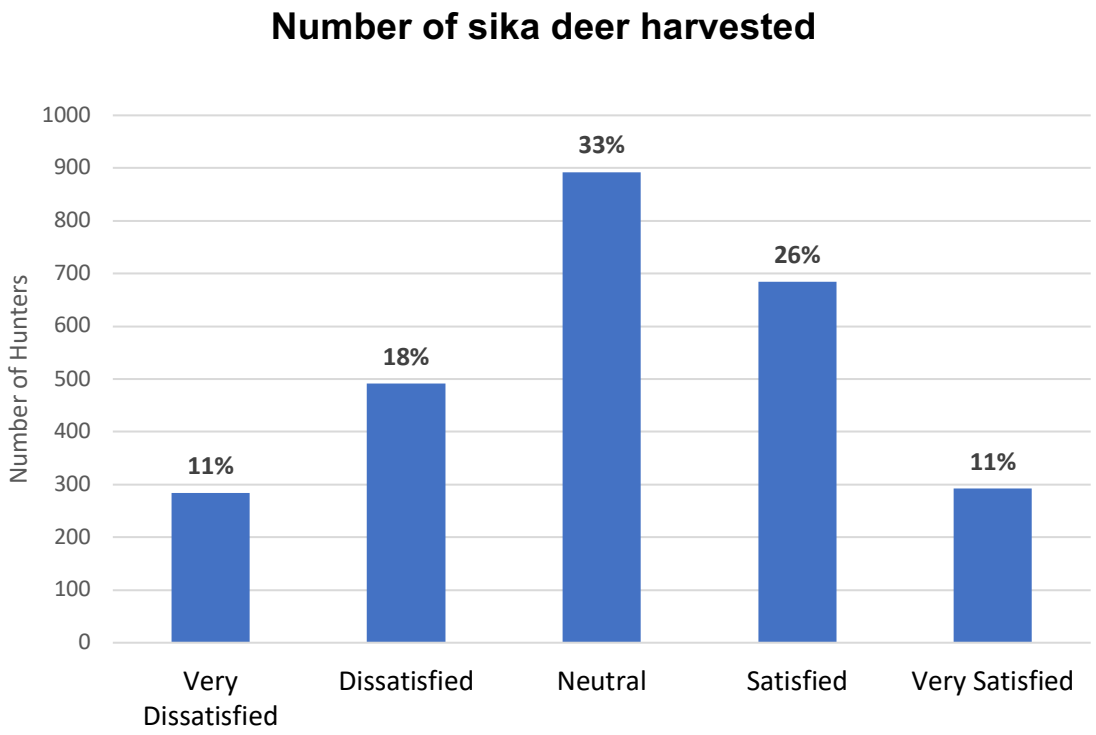
ANSWER CHOICES	RESPONSES	
2019 – 2020	789	44.5%
2020 – 2021	901	50.8%
2021 – 2022	1,145	64.5%
I did not take a multiple day sika deer hunting trip	544	30.7%
Total Responses: 1,775		

Q44. PLEASE PROVIDE THE REQUESTED DETAILS ABOUT YOUR MULTIPLE-DAY SIKA DEER HUNTING TRIP(S) DURING THE 2021-2022 HUNTING SEASON.

NOTE: Hunters were asked to describe the length and number of their multiple day hunting trips. Due to a reporting error in the survey mechanism, responses have been omitted from this report.

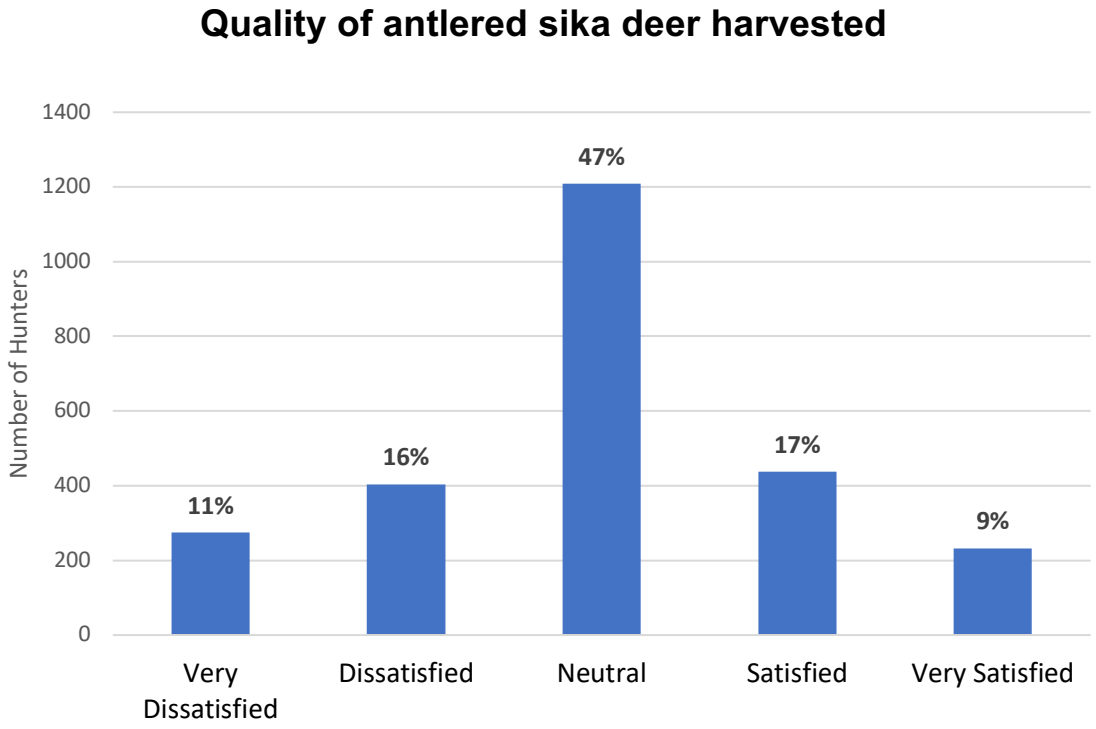
SECTION 7: SIKA DEER HUNTING SATISFACTION

Q45a. PLEASE INDICATE YOUR SATISFACTION WITH THE FOLLOWING ASPECTS OF THE MOST RECENT SEASON YOU HUNTED SIKA DEER IN MARYLAND



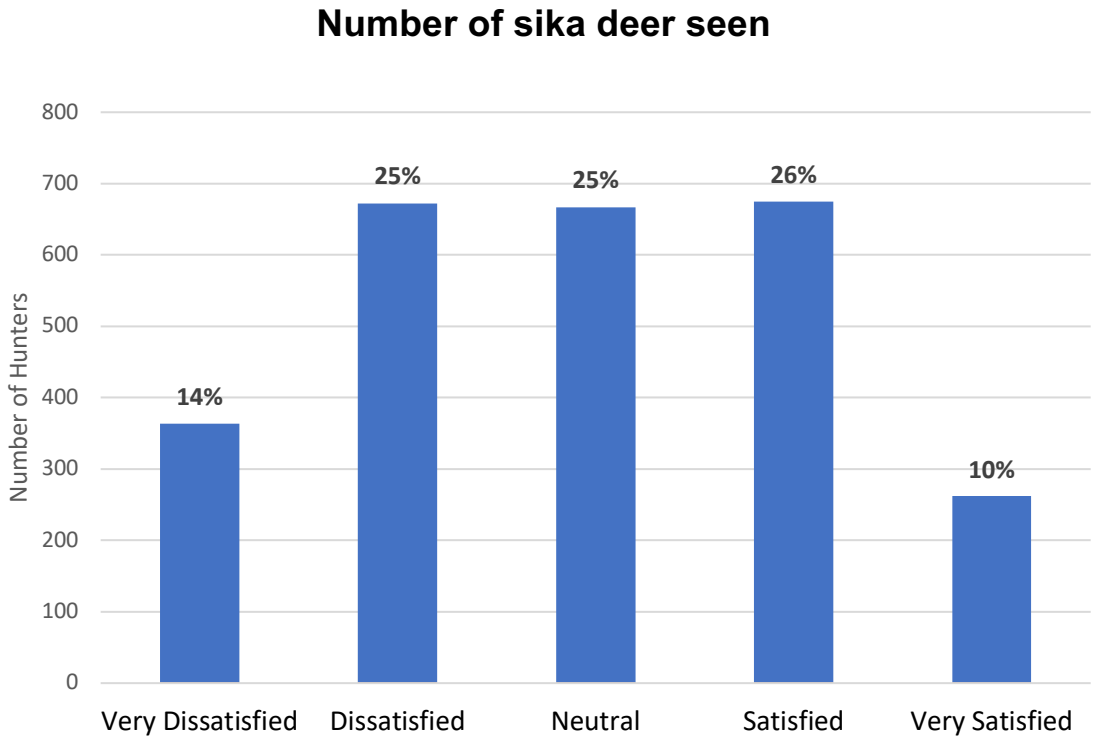
ANSWER CHOICES	RESPONSES	
Very Dissatisfied	284	10.7%
Dissatisfied	491	18.6%
Neutral	892	33.7%
Satisfied	685	25.9%
Very Satisfied	292	11.0%
Total Responses: 2,644		

Q45b. PLEASE INDICATE YOUR SATISFACTION WITH THE FOLLOWING ASPECTS OF THE MOST RECENT SEASON YOU HUNTED SIKA DEER IN MARYLAND?



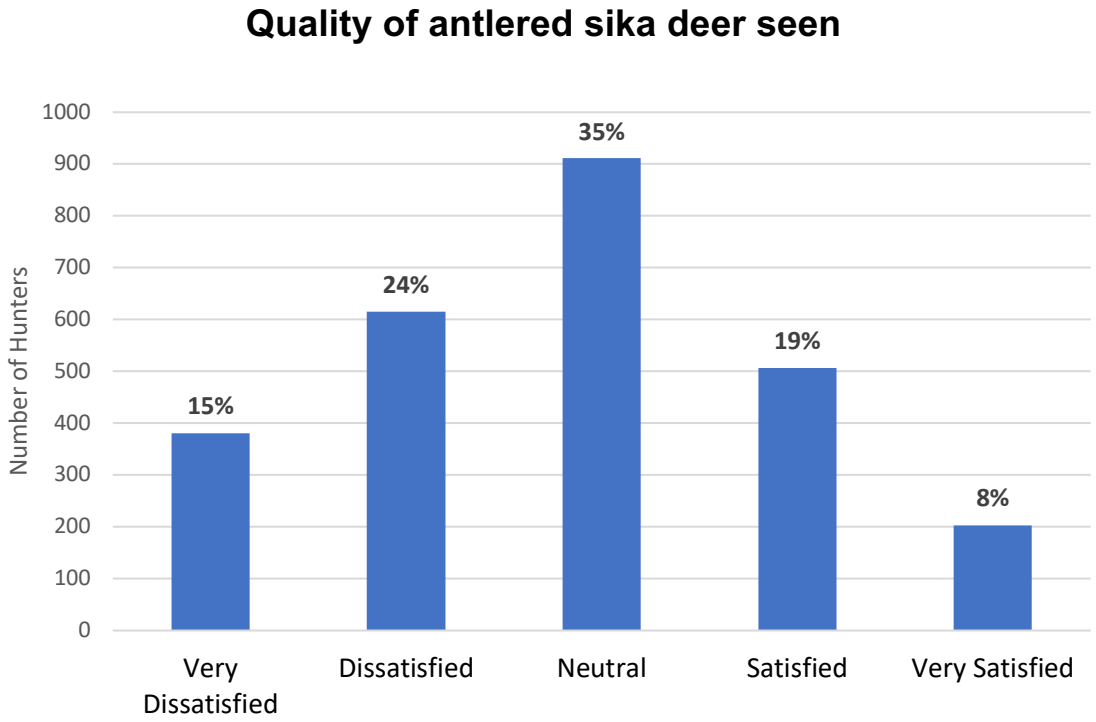
ANSWER CHOICES	RESPONSES	
Very Dissatisfied	274	10.7%
Dissatisfied	404	15.8%
Neutral	1,208	47.3%
Satisfied	437	17.1%
Very Satisfied	232	9.1%
Total Responses: 2,555		

Q45c. PLEASE INDICATE YOUR SATISFACTION WITH THE FOLLOWING ASPECTS OF THE MOST RECENT SEASON YOU HUNTED SIKA DEER IN MARYLAND?



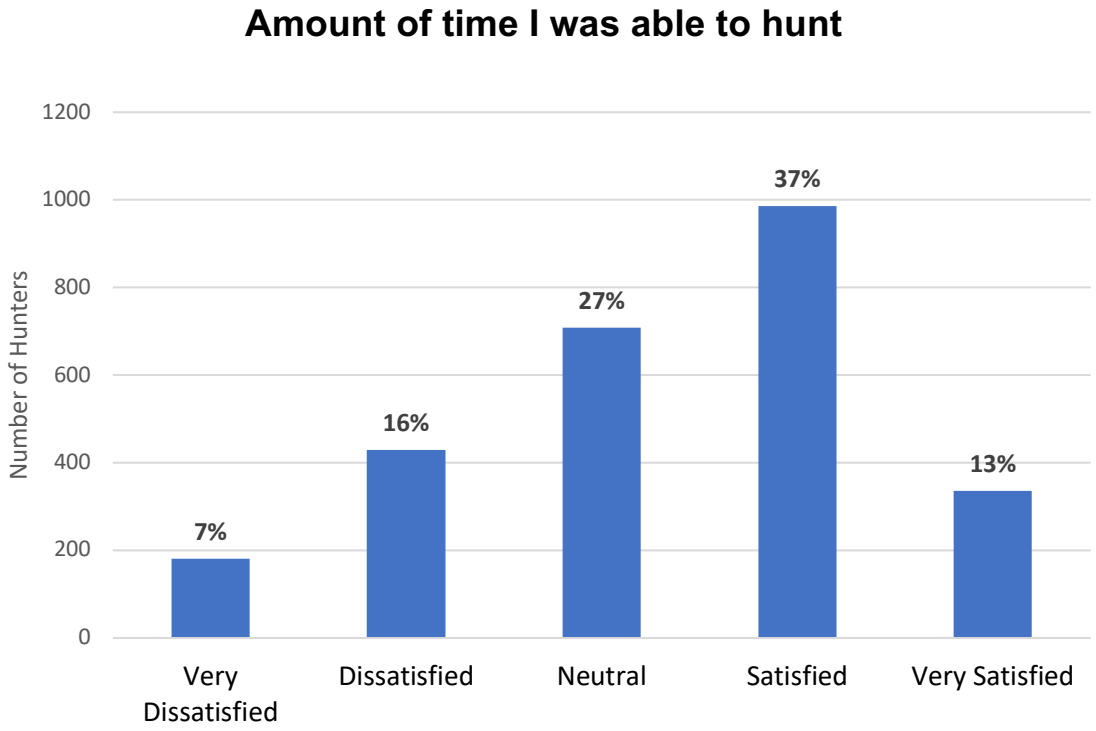
ANSWER CHOICES	RESPONSES	
Very Dissatisfied	364	13.8%
Dissatisfied	672	25.5%
Neutral	667	25.3%
Satisfied	675	25.6%
Very Satisfied	262	9.9%
Total Responses: 2,640		

Q45d. PLEASE INDICATE YOUR SATISFACTION WITH THE FOLLOWING ASPECTS OF THE MOST RECENT SEASON YOU HUNTED SIKA DEER IN MARYLAND?



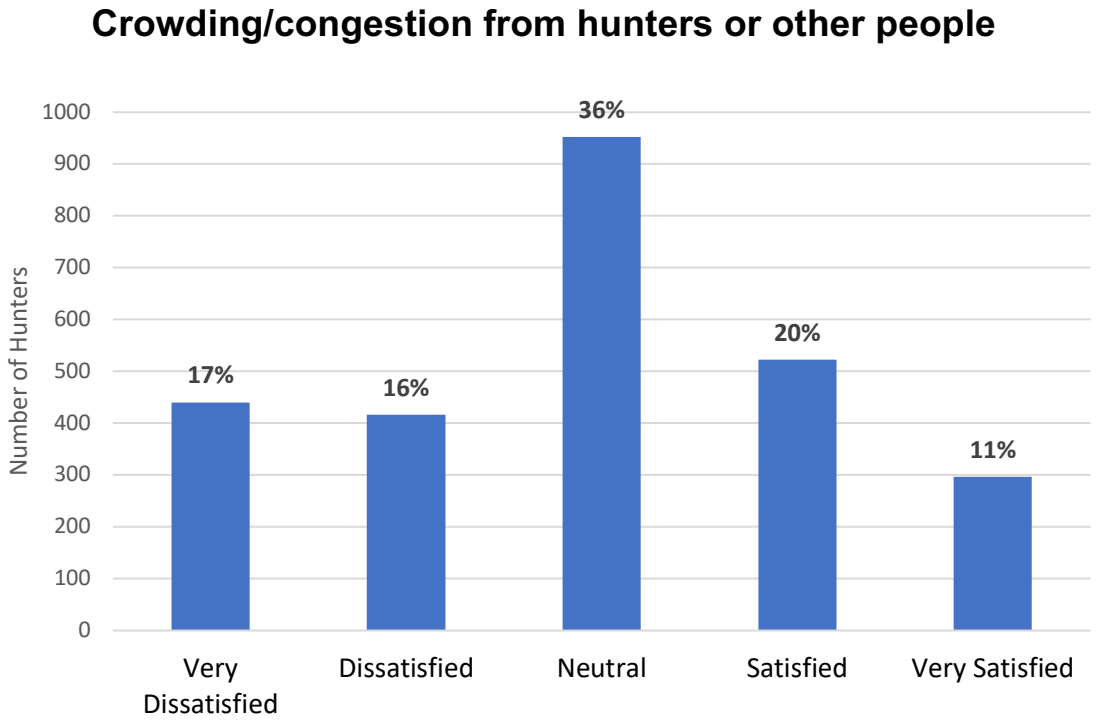
ANSWER CHOICES	RESPONSES	
Very Dissatisfied	381	14.6%
Dissatisfied	615	23.5%
Neutral	911	34.8%
Satisfied	507	19.4%
Very Satisfied	203	7.8%
Total Responses: 2,617		

Q45e. PLEASE INDICATE YOUR SATISFACTION WITH THE FOLLOWING ASPECTS OF THE MOST RECENT SEASON YOU HUNTED SIKA DEER IN MARYLAND?



ANSWER CHOICES	RESPONSES	
Very Dissatisfied	181	6.9%
Dissatisfied	429	16.3%
Neutral	708	26.8%
Satisfied	986	37.4%
Very Satisfied	336	12.7%
Total Responses: 2,640		

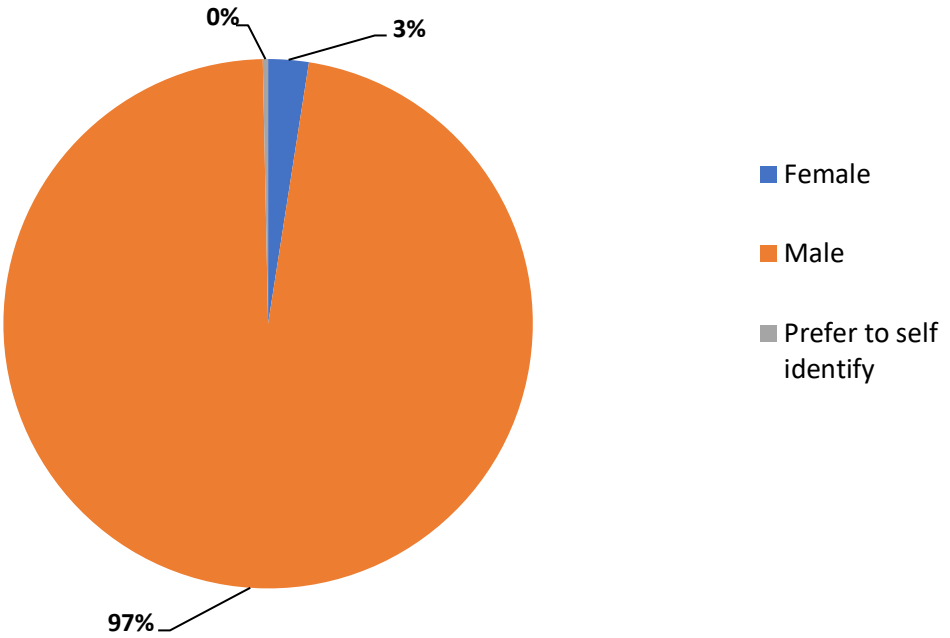
Q45f. PLEASE INDICATE YOUR SATISFACTION WITH THE FOLLOWING ASPECTS OF THE MOST RECENT SEASON YOU HUNTED SIKA DEER IN MARYLAND?



ANSWER CHOICES	RESPONSES	
Very Dissatisfied	440	16.8%
Dissatisfied	417	15.9%
Neutral	952	36.2%
Satisfied	522	19.9%
Very Satisfied	296	11.3%
Total Responses: 2,627		

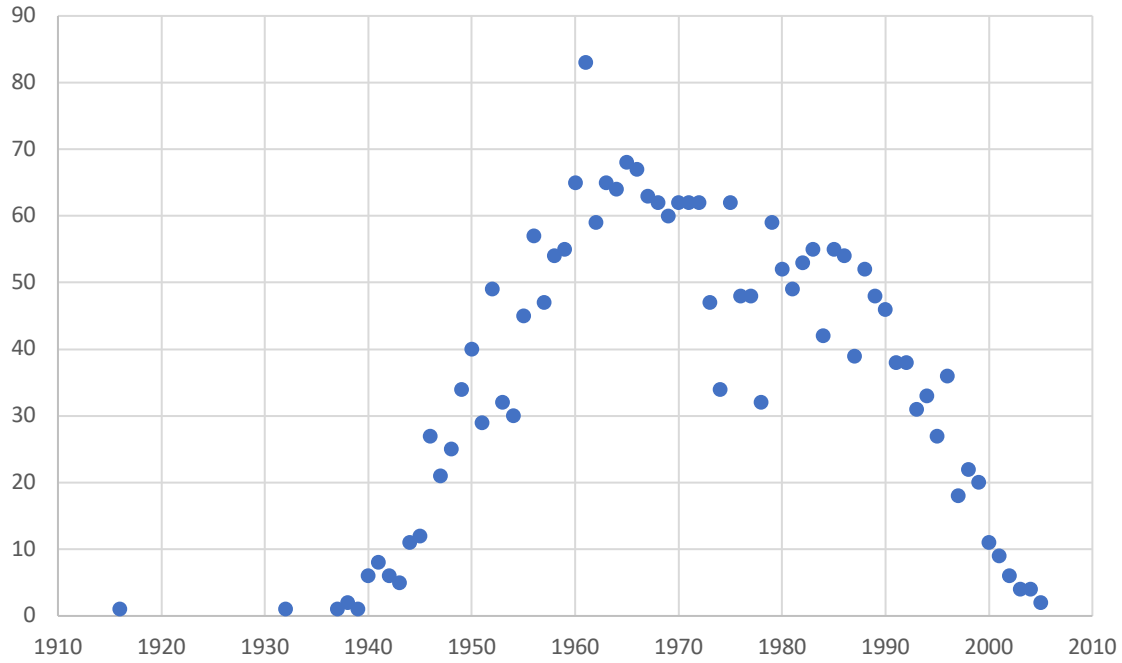
SECTION 8: DEMOGRAPHICS

Q46. WHAT IS YOUR GENDER?



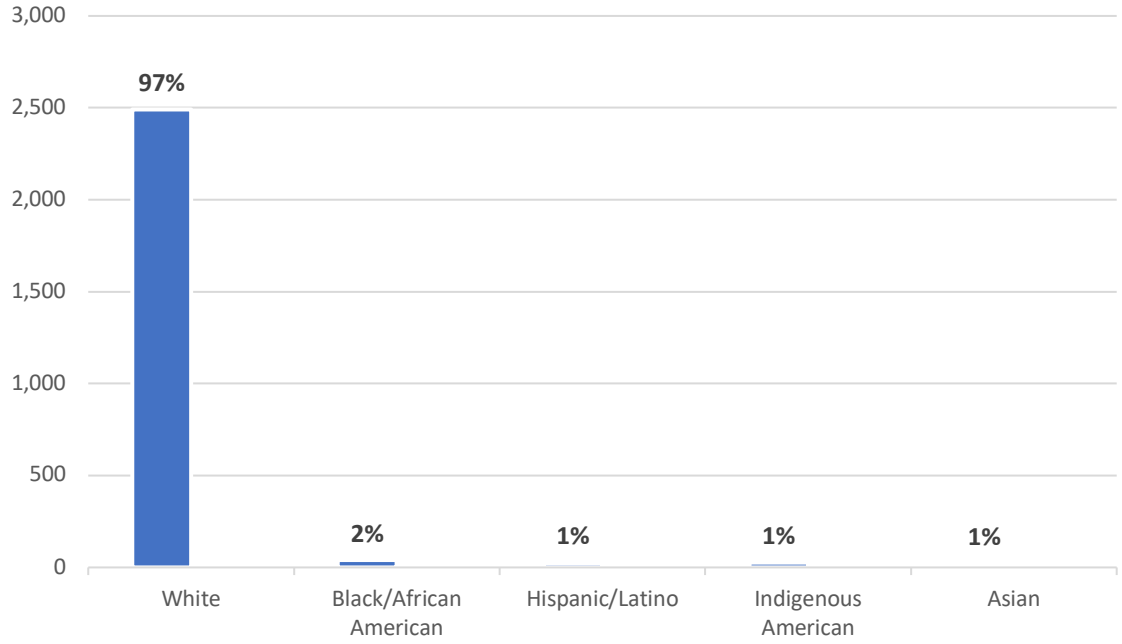
ANSWER CHOICES	RESPONSES	
Female	63	2.4%
Male	2,574	97.3%
Prefer to self identify	9	0.3%
Total Responses: 2,646		

Q47. IN WHAT YEAR WERE YOU BORN?



SUMMARY	RESPONSES
Minimum	1916
Median	1970
Maximum	2005
Total Responses: 2,615	

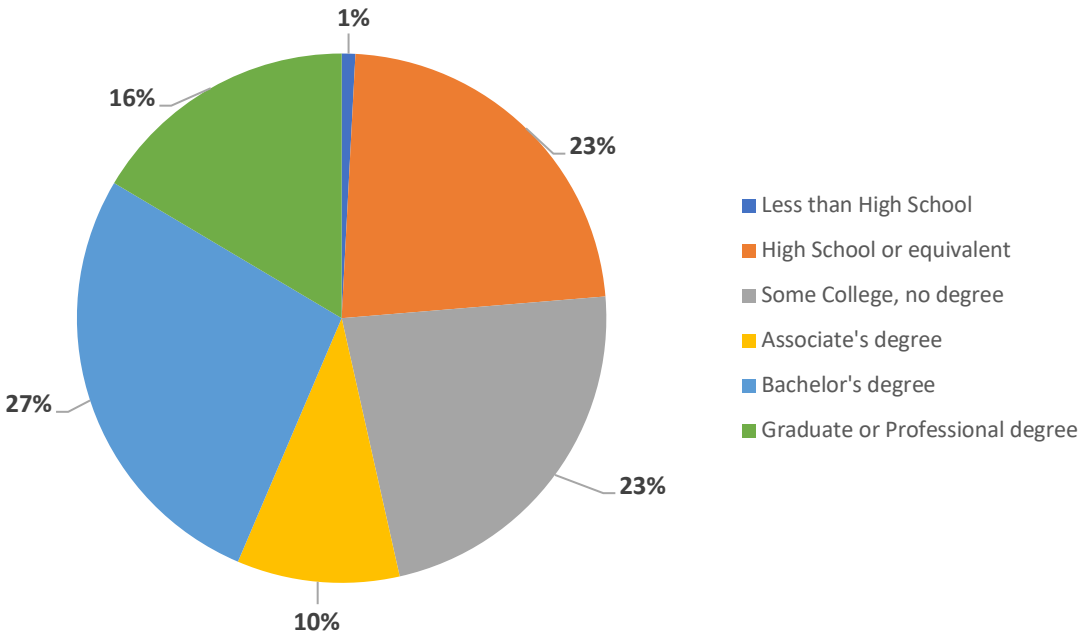
Q48. WHAT IS YOUR RACE/ETHNICITY?



ANSWER CHOICES	RESPONSES	
White	2,490	97.3%
Black/African American	39	1.5%
Hispanic/Latino	23	0.9%
Indigenous American	26	1.0%
Asian	16	0.6%
Total Responses: 2,558		

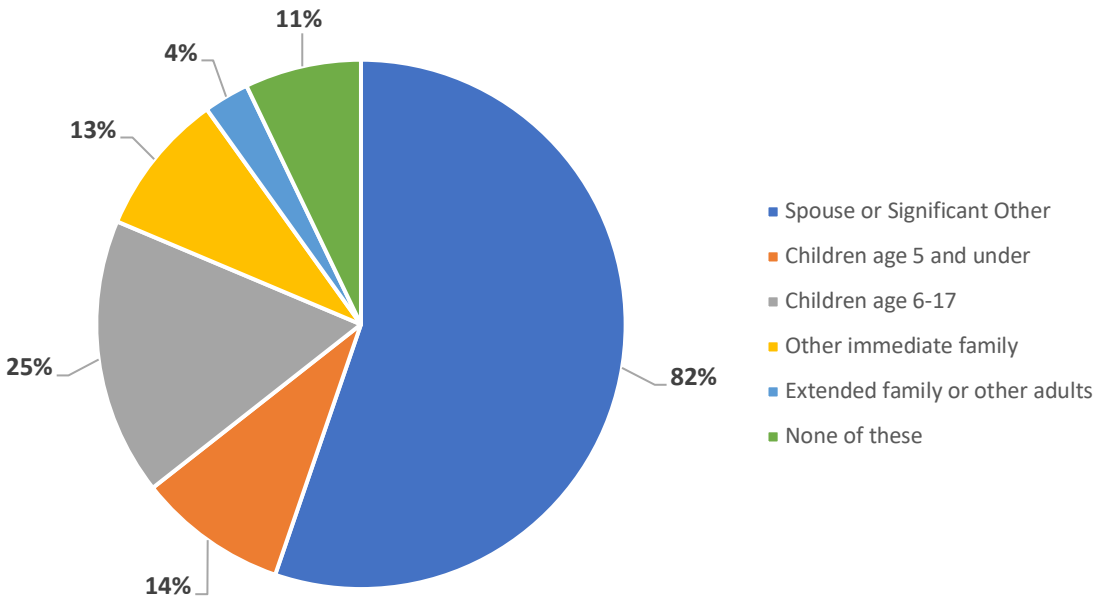
* 48 respondents responded “Other”, either in place of or in addition to the above choices

Q49. WHAT IS THE HIGHEST DEGREE OR LEVEL OF SCHOOLING YOU HAVE COMPLETED?



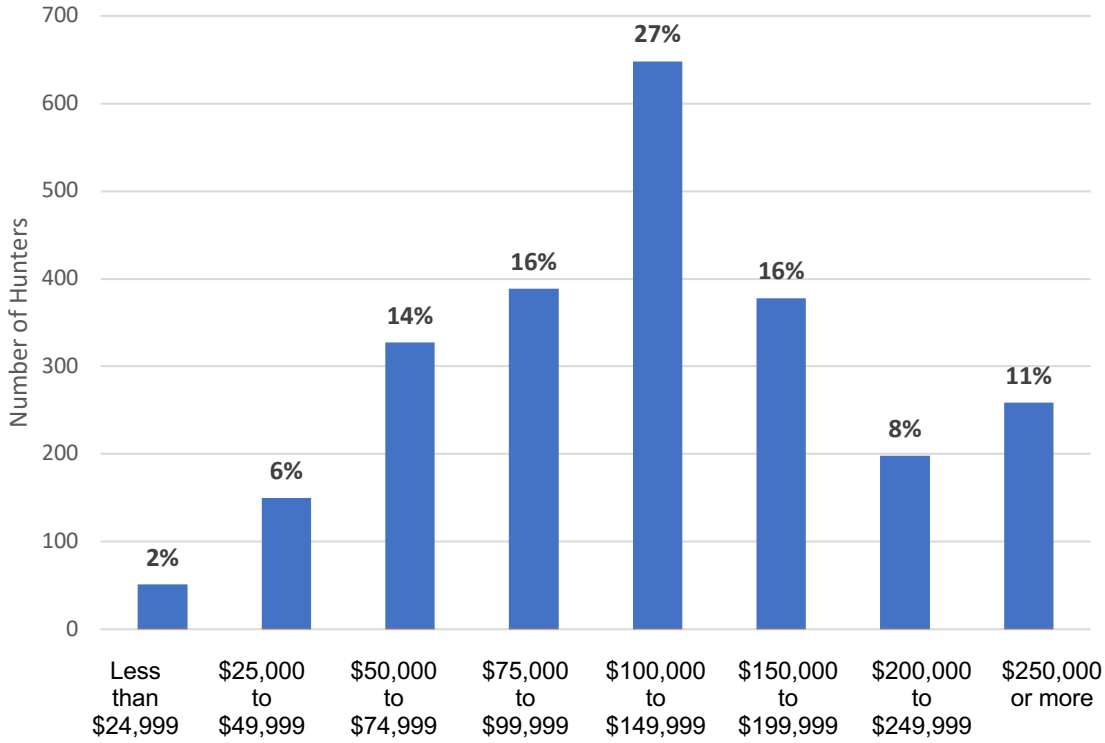
ANSWER CHOICES	RESPONSES	
Less than High School	21	0.8%
High School or equivalent	601	22.9%
Some College, no degree	598	22.8%
Associate's degree	254	9.7%
Bachelor's degree	714	27.2%
Graduate or Professional degree	433	16.5%
Total Responses: 2,621		

Q50. DO ANY OF THE FOLLOWING LIVE IN YOUR HOUSEHOLD? (CHECK ALL THAT APPLY)



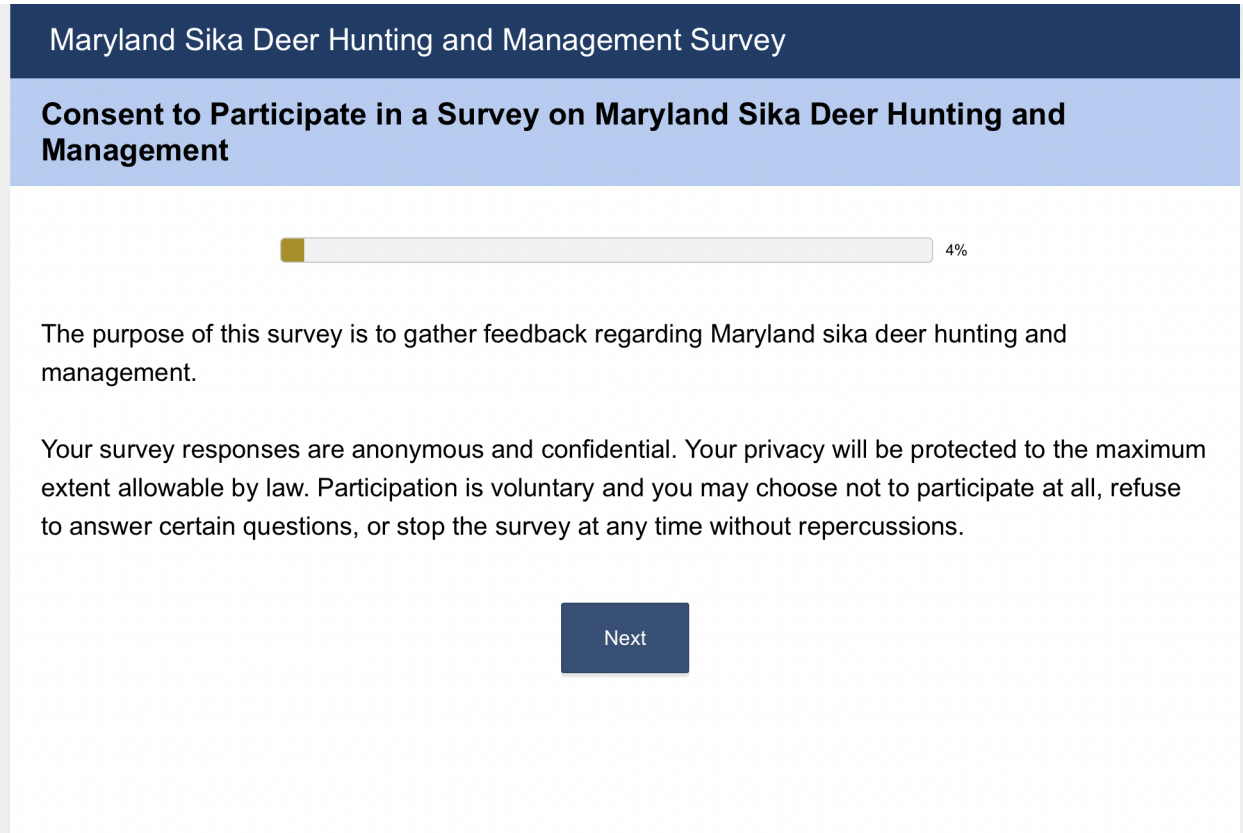
ANSWER CHOICES	RESPONSES	
Spouse or Significant Other	2100	81.5%
Children age 5 and under	349	13.5%
Children age 6-17	645	25.0%
Other immediate family	333	12.9%
Extended family or other adults	106	4.1%
None of these	271	10.5%
Total Responses: 2,576		

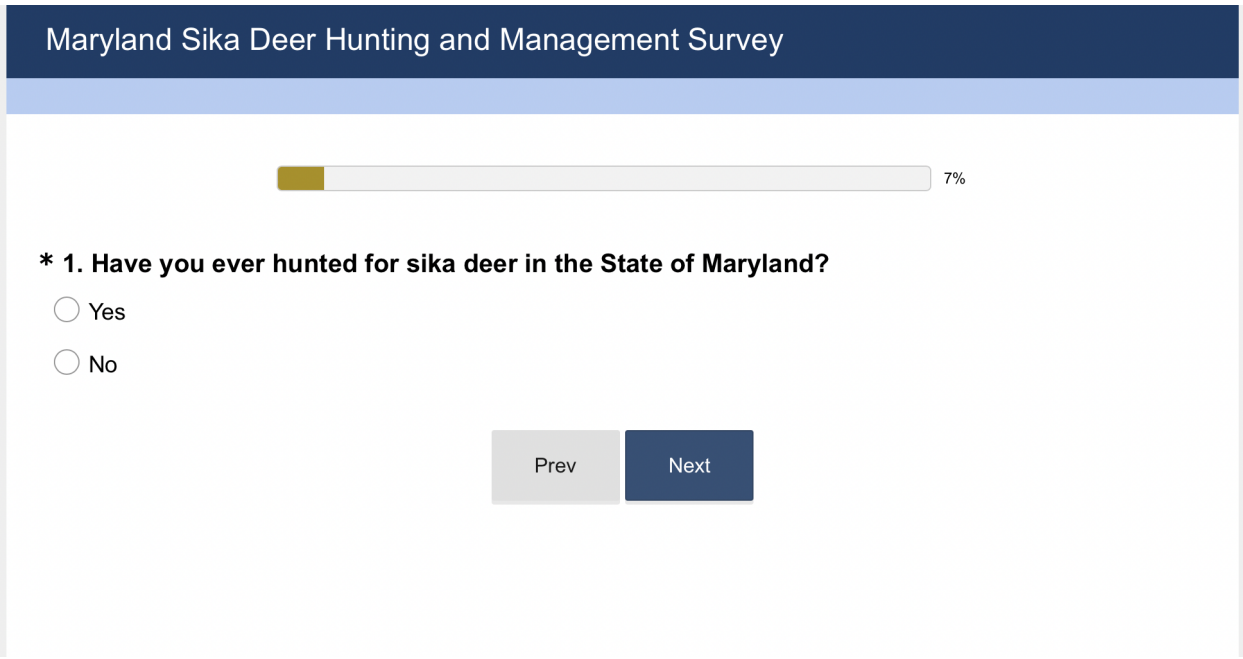
Q51. WHAT IS YOUR APPROXIMATE ANNUAL HOUSEHOLD INCOME?



ANSWER CHOICES	RESPONSES	
Less than $24,999	51	2.1%
$25,000 to $49,999	150	6.3%
$50,000 to $74,999	327	13.6%
$75,000 to $99,999	389	16.2%
$100,000 to $149,999	648	27.0%
$150,000 to $199,999	378	15.8%
$200,000 to $249,999	198	8.3%
$250,000 or more	259	10.8%
Total Responses: 2,400		

APPENDIX A: SURVEY INSTRUMENT





Maryland Sika Deer Hunting and Management Survey

Your Sika Deer Hunting Background

11%

2. During how many years have you hunted sika deer?

3. What was the most recent year that you hunted sika deer?

4. What was the first year that you hunted sika deer?

5. In which weapon seasons have you hunted sika deer? (check all that apply)

- [ ] Archery Season
- [ ] Firearm Season
- [ ] Muzzleloader Season

6. Have you hunted sika deer during the antlerless-only muzzleloader season?

- ( ) Yes
- ( ) No

7. In which counties have you hunted sika deer? (check all that apply)

- [ ] Dorchester
- [ ] Wicomico
- [ ] Worcester
- [ ] Somerset
- [ ] Unsure of county
- [ ] Other county (please specify)

8. What type of weapons have you used to hunt sika deer? (check all that apply)

- [ ] Vertical Compound Bow
- [ ] Crossbow
- [ ] Recurve Bow or Longbow
- [ ] Rifle
- [ ] Shotgun
- [ ] Handgun
- [ ] Modern (Inline) Muzzleloader
- [ ] Flintlock/Sidelock Percussion Muzzleloader
- [ ] Other (please specify)

9. Other than sika deer, what game animals have you hunted in Maryland in the past three years? (check all that apply)

- [ ] White-tailed deer
- [ ] Turkey
- [ ] Waterfowl
- [ ] Grouse, Pheasant, or Quail
- [ ] Rabbit or Squirrel
- [ ] Black Bear
- [ ] Furbearers
- [ ] I did not hunt any of these species in Maryland in the past 3 years
- [ ] Other (please specify)

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Maryland Sika Deer Hunting and Management Survey

DESCRIPTION: Sika Deer Hunting Scenarios

14%

In the upcoming section, you will be presented with four choices. Each choice will be between two Sika Deer Hunting Scenarios – Scenario A and Scenario B. Each scenario will have the same types of characteristics. However, each scenario will have different levels of these characteristics.

For example, Scenario A might have high harvest success rate with strict regulations, while Scenario B has low harvest success rate with less strict regulations.

Your task is to compare the levels of all characteristics across Scenario A and Scenario B and decide which scenario you most prefer.

To prepare for making these choices, it will be helpful to think about the aspects of the sika deer hunting experience that are important to you. Please answer the questions in the following table.

10. How important are the following aspects of your sika deer hunting experience?

	Not at all Important	Slightly Important	Moderately Important	Important	Very important
Harvest success rate for all sika deer	○	○	○	○	○
Harvest success rate for quality stags (3 points on 1 antler)	○	○	○	○	○
Regulations on minimum # of antler points	○	○	○	○	○
Regulations on # of stags harvested	○	○	○	○	○
Annual fees (licenses, stamps, permits)	○	○	○	○	○

Prev Next

Maryland Sika Deer Hunting and Management Survey

Sika Deer Hunting Scenarios

18%

Choice 1: Which Sika Deer Hunting Scenario do you most prefer?

SIKA DEER HUNTING CHARACTERISTICS	Scenario A	Scenario B
Annual Hunter Success		
% harvesting at least 1 sika deer (antlered or antlerless)	40%	80%
% harvesting at least 1 quality stag (3 points or more on 1 antler)	10%	60%
Antlered Regulations		
Antler Point Restriction (min. points on 1 antler, all stags)	None	2 points
Combined Weapon Season Antlered Bag Limit	2 stags	1 stag
Annual Fees		
Licenses, Stamps, & Permits	$40	$55

11. Choice 1: Which Sika Deer Hunting Scenario do you most prefer?

12. Given the option of hunting sika deer in the scenario you selected above, would you...

- ○ Hunt for sika deer
- ○ Not hunt for sika deer

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Maryland Sika Deer Hunting and Management Survey

Sika Deer Hunting Scenarios

21%

Choice 2 : Which Sika Deer Hunting Scenario do you most prefer?

SIKA DEER HUNTING CHARACTERISTICS	Scenario A	Scenario B
Annual Hunter Success		
% harvesting at least 1 sika deer (antlered or antlerless)	80%	30%
% harvesting at least 1 quality stag (3 points or more on 1 antler)	50%	10%
Antlered Regulations		
Antler Point Restriction (min. points on 1 antler, all stags)	3 points	None
Combined Weapon Season Antlered Bag Limit	3 stags	2 stags
Annual Fees		
Licenses, Stamps, & Permits	$75	$25

13. Choice 2: Which Sika Deer Hunting Scenario do you most prefer?

14. Given the option of hunting sika deer in the scenario you selected above, would you...

- ○ Hunt for sika deer
- ○ Not hunt for sika deer

Prev Next

Maryland Sika Deer Hunting and Management Survey

Sika Deer Hunting Scenarios

25%

Choice 3 : Which Sika Deer Hunting Scenario do you most prefer?

SIKA DEER HUNTING CHARACTERISTICS	Scenario A	Scenario B
Annual Hunter Success		
% harvesting at least 1 sika deer (antlered or antlerless)	30%	80%
% harvesting at least 1 quality stag (3 points or more on 1 antler)	20%	20%
Antlered Regulations		
Antler Point Restriction (min. points on 1 antler, all stags)	2 points	3 points
Combined Weapon Season Antlered Bag Limit	1 stag	3 stags
Annual Fees		
Licenses, Stamps, & Permits	$10	$100

15. Choice 3: Which Sika Deer Hunting Scenario do you most prefer?

16. Given the option of hunting sika deer in the scenario you selected above, would you...

- ○ Hunt for sika deer
- ○ Not hunt for sika deer

Prev Next

Maryland Sika Deer Hunting and Management Survey

Sika Deer Hunting Scenarios

29%

Choice 4 : Which Sika Deer Hunting Scenario do you most prefer?

SIKA DEER HUNTING CHARACTERISTICS	Scenario A	Scenario B
Annual Hunter Success		
% harvesting at least 1 sika deer (antlered or antlerless)	80%	60%
% harvesting at least 1 quality stag (3 points or more on 1 antler)	60%	10%
Antlered Regulations		
Antler Point Restriction (min. points on 1 antler, all stags)	2 points	None
Combined Weapon Season Antlered Bag Limit	3 stags	2 stags
Annual Fees		
Licenses, Stamps, & Permits	$100	$10

17. Choice 4: Which Sika Deer Hunting Scenario do you most prefer?

18. Given the option of hunting sika deer in the scenario you selected above, would you...

- ○ Hunt for sika deer
- ○ Not hunt for sika deer

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Maryland Sika Deer Hunting and Management Survey

Sika Deer Hunting Regulations and Population

32%

Please indicate the level of acceptability to you for each statement below.

19. Sika Deer Antler Point Restrictions

	Totally unacceptable	Unacceptable	Slightly unacceptable	Neutral	Slightly acceptable	Acceptable	Perfectly acceptable
Keep regulation of no antler point minimum for all stags	○	○	○	○	○	○	○
Change regulation to a minimum of 2 points on 1 antler for all stags	○	○	○	○	○	○	○
Change regulation to a minimum of 3 points on 1 antler for all stags	○	○	○	○	○	○	○

20. Sika Deer Bag Limits

	Totally unacceptable	Unacceptable	Slightly unacceptable	Neutral	Slightly acceptable	Acceptable	Perfectly acceptable
Keep the combined weapon season bag limit at 3 stags	○	○	○	○	○	○	○
Change combined weapon season bag limit to 2 stags	○	○	○	○	○	○	○
Keep single weapon season bag limit at 3 antlerless sika deer	○	○	○	○	○	○	○
Change single weapon season bag limit to 1 antlerless sika deer	○	○	○	○	○	○	○

21. Maryland Sika Deer Population

	Totally unacceptable	Unacceptable	Slightly unacceptable	Neutral	Slightly acceptable	Acceptable	Perfectly acceptable
50% increase in sika deer population in current geographic range	○	○	○	○	○	○	○
Expansion of sika deer population to areas of Maryland's Eastern Shore outside of current geographic range	○	○	○	○	○	○	○
50% decrease in population of sika deer in current geographic range	○	○	○	○	○	○	○

Prev Next

Maryland Sika Deer Hunting and Management Survey

Your Maryland Sika Deer Hunting Activity in the 2021-2022 Hunting Season

36%

*** 22. Did you hunt for sika deer in the 2021-2022 Hunting Season?**

○ Yes ○ No

Prev Next

Maryland Sika Deer Hunting and Management Survey

Weapon Seasons Hunted in 2021-2022 Hunting Season

39%

*** 23. In which weapon seasons did you hunt sika deer in the 2021-2022 Hunting Season? (check all that apply)**

- [ ] **Muzzleloader Season**
- [ ] **Archery Season**
- [ ] **Firearms Season**

Prev Next

Maryland Sika Deer Hunting and Management Survey

Firearms Season: Maryland Sika Deer Hunting Trip

50%

HUNTING TRIP DEFINITION: For the purpose of this page, a hunting trip begins when you leave your primary residence, and ends when you return to your primary residence. Thus, a single hunting trip could be as short as a 30 minute hunt or as long as several weeks.

For this page only, please recall the Sika Deer Firearms season hunting trip you took that was closest to the following date:

January 8, 2022

Please think back to this specific hunting trip
-closest to this date- when answering all questions on this page.

24. During which month was this sika deer firearm hunting trip?

25. What type of weapon did you use on this trip? (check all that apply)

- [ ] Rifle
- [ ] Shotgun
- [ ] Handgun
- [ ] Other (please specify)

26. What type of land did you hunt on this trip? (check all that apply)

- [ ] Public land
- [ ] Private land

27. Please provide the name of the county where you hunted on this trip.

28. How many miles did you travel (one-way) to reach your destination on this trip?

29. Including yourself, how many people went on this trip?

30. How many nights were you away from your primary residence on this trip?

31. How many days did you spend hunting sika deer on this trip?

32. How many total hours did you spend hunting sika deer on this trip?

33. For this trip, please enter the dollar amount of your share of expenditures for each category below. Please provide your best estimate. If you made no expenditures for a category, please enter a "0".

Round-trip vehicle transportation costs (ex: fuel, tolls)	
Public transportation (ex: airplane, car/RV rental)	
Food & drink from restaurants/bars	
Food & drink from grocery or convenience stores	
Lodging (ex: motels, cabins, lodges, camping)	
Guide fees or package fees	
Public land use or access fees (excluding leases)	
Other	

34. For this trip, what percent of the total dollar amount you provided above occurred in the county you hunted?

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Maryland Sika Deer Hunting and Management Survey

Public Land Hunting for Sika Deer - Previous Three Seasons

54%

35. In which of the following seasons (if any) did you hunt <u>PUBLIC LAND</u> for sika deer in Maryland? (check all that apply)

- [ ] 2021-2022 Hunting Season
- [ ] 2020-2021 Hunting Season
- [ ] 2019-2020 Hunting Season
- [ ] I did not hunt sika deer on public land during any of these seasons

Prev Next

Maryland Sika Deer Hunting and Management Survey

Public Land Sika Deer Hunting in the 2021-2022 Season

57%

36. On which of the following types of public land did you hunt sika deer during the 2021-2022 hunting season? (check all that apply)

- [ ] Blackwater National Wildlife Refuge
- [ ] Fishing Bay Game Management Area
- [ ] Assateague Island National Seashore
- [ ] Chesapeake Forest Lands
- [ ] Taylors Island
- [ ] Other type of public land (please specify)

37. On public land during the 2021-2022 hunting season, how many days did you hunt sika deer in each weapon season?

	# of days
Archery Season	
Early (October) Muzzleloader Season	
Late (December) Muzzleloader Season	
Regular Firearms Season	
Late (January) Firearms Season	

38. On public land during the 2021-2022 hunting season, how many of each type of sika deer did you harvest?

	# harvested
Antlerless Sika Deer	
Antlered Sika Deer with less than 6 total points	
Antlered Sika Deer with at least 6 total points	

Prev Next

Maryland Sika Deer Hunting and Management Survey

Private Land Sika Deer Hunting - Previous Three Seasons

68%

39. In which of the following seasons (if any) did you hunt PRIVATE LAND for sika deer in Maryland? (check all that apply)

- [ ] 2021-2022 Hunting Season
- [ ] 2020-2021 Hunting Season
- [ ] 2019-2020 Hunting Season
- [ ] I did not hunt sika deer on private land during any of these three hunting seasons

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Maryland Sika Deer Hunting and Management Survey

Private Land Sika Deer Hunting in the 2021-2022 Season

71%

40. On which of the following types of private land did you hunt sika deer during the 2021-2022 hunting season? (check all that apply)

- [ ] Land I own, at the location of my primary residence
- [ ] Land I own, not at the location of my primary residence
- [ ] Land I do not own, and hunt at no charge
- [ ] Land I do not own, and hunt for a fee (ex: hunting lease, outfitter)

41. On private land during the 2021-2022 hunting season, how many days did you hunt sika deer in each weapon season?

	# of days
Archery Season	
Early (October) Muzzleloader Season	
Late (December) Muzzleloader Season	
Regular Firearms Season	
Late (January) Firearms Season	

42. On private land during the 2021-2022 hunting season, how many of each type of sika deer did you harvest?

	# harvested
Antlerless Sika Deer	
Antlered Sika Deer with less than 6 total points	
Antlered Sika Deer with at least 6 total points	

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Maryland Sika Deer Hunting and Management Survey

Multiple-Day Sika Deer Hunting Trips

82%

43. In which of the following seasons (if any) did you take a multiple-day sika deer hunting trip in Maryland? (check all that apply)
Definition: A multiple-day trip is a trip that involves staying at least one night at a location other than your primary residence.

- [ ] 2021-2022 Hunting Season
- [ ] 2020-2021 Hunting Season
- [ ] 2019-2020 Hunting Season
- [ ] I did not take a multiple-day sika deer hunting trip in Maryland during any of these three hunting seasons

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Maryland Sika Deer Hunting and Management Survey

2021-2022 Hunting Season: Multiple-Day Trips

86%

44. Please provide the requested details about your multiple-day sika deer hunting trip(s) during the 2021-2022 Hunting Season.

	total # of multiple-day trips	total # of nights away from primary residence	total # of days spent hunting
Sika Deer Multiple-Day Hunting Trips			

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Maryland Sika Deer Hunting and Management Survey

Satisfaction with Your Most Recent Sika Deer Hunting Season

96%

45. Please indicate your satisfaction with the following aspects of the most recent season you hunted sika deer in Maryland

	Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied
Number of sika deer harvested	○	○	○	○	○
Quality of antlered sika deer harvested	○	○	○	○	○
Number of sika deer seen	○	○	○	○	○
Quality of antlered sika deer seen	○	○	○	○	○
Amount of time I was able to hunt	○	○	○	○	○
Crowding/congestion from hunters or other people	○	○	○	○	○

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Maryland Sika Deer Hunting and Management Survey

About You

100%

Summaries of the following questions help us represent the hunting activities of all types of hunters. Individual answers are CONFIDENTIAL.

46. What is your gender?

- ○ Male
- ○ Female
- ○ Prefer to self identify

47. In what year were you born?

48. What is your race/ethnicity?

- ☐ White
- ☐ Indigenous American
- ☐ Black/African American
- ☐ Asian
- ☐ Hispanic/Latino
- ☐ Other (please specify)

49. What is the highest degree or level of schooling you have completed?

- ○ Less than High School
- ○ High School or equivalent
- ○ Some College, no degree
- ○ Associate's degree
- ○ Bachelor's degree
- ○ Graduate or Professional degree

50. Do any of the following live in your household? (check all that apply)

- ☐ Spouse or significant other
- ☐ Children age 5 and under
- ☐ Children age 6-17
- ☐ Other immediate family
- ☐ Extended family or other adults
- ☐ None of these

51. What is your approximate annual household income?

- ◯ Less than $24,999
- ◯ $25,000 to $49,999
- ◯ $50,000 to $74,999
- ◯ $75,000 to $99,999
- ◯ $100,000 to $149,999
- ◯ $150,000 to $199,999
- ◯ $200,000 to $249,999
- ◯ $250,000 or more

52. Please provide any comments about the survey in the box below.

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APPENDIX B: RANDOM PARAMETERS LOGIT RESULTS

Maryland Resident Model

```
. mixlogit binarychoice1 success_all success_stag fees if (binarychoice1 !=. & Version <= 18), rand(APR_2pts APR_3pts l
> imit_2 limit_1) group(id_choice) id(RespondentID) nrep(200) robust cluster (RespondentID)

Iteration 0:   log likelihood = -5558.9136  (not concave)
Iteration 1:   log likelihood = -5461.4198
Iteration 2:   log likelihood = -5447.3014
Iteration 3:   log likelihood = -5447.2604
Iteration 4:   log likelihood = -5447.2604

Mixed logit model                               Number of obs     =     16,940
                                                Wald chi2(7)      =     376.89
Log likelihood = -5447.2604                     Prob > chi2       =     0.0000

                      (Std. Err. adjusted for 2,256 clusters in RespondentID)
```

binarychoi~1	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
Mean						
success_all	1.168587	.1170201	9.99	0.000	.9392323	1.397943
success_stag	1.181829	.1235496	9.57	0.000	.9396759	1.423981
fees	-.0120971	.0007493	-16.14	0.000	-.0135657	-.0106285
APR_2pts	.0866433	.0408704	2.12	0.034	.0065387	.1667478
APR_3pts	.013234	.05197	0.25	0.799	-.0886254	.1150933
limit_2	.1016006	.0398207	2.55	0.011	.0235534	.1796478
limit_1	-.1228769	.0511042	-2.40	0.016	-.2230393	-.0227144
SD						
APR_2pts	-.0028831	.0119342	-0.24	0.809	-.0262737	.0205076
APR_3pts	1.035529	.0771298	13.43	0.000	.8843575	1.186701
limit_2	.0136067	.043916	0.31	0.757	-.0724672	.0996806
limit_1	1.150238	.0737174	15.60	0.000	1.005755	1.294722

Appendix B: Random Parameters Logit Results (Continued)

Non-Resident Model

```
. mixlogit binarychoice1 success_all success_stag fees if (binarychoice1 !=. & Version > 18), rand
> (APR_2pts APR_3pts limit_2 limit_1) group(id_choice) id(RespondentID) nrep(200) robust cluster (
> RespondentID)

Iteration 0:   log likelihood = -2186.6697  (not concave)
Iteration 1:   log likelihood = -2164.3424
Iteration 2:   log likelihood = -2150.0069  (not concave)
Iteration 3:   log likelihood = -2149.8665
Iteration 4:   log likelihood = -2149.4515
Iteration 5:   log likelihood = -2149.4506
Iteration 6:   log likelihood = -2149.4506

Mixed logit model                               Number of obs     =      7,258
                                                Wald chi2(7)      =     258.08
Log likelihood = -2149.4506                     Prob > chi2       =     0.0000

                          (Std. Err. adjusted for 954 clusters in RespondentID)
```

binarychoi~1	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
Mean						
success_all	2.165903	.2060056	10.51	0.000	1.762139	2.569666
success_stag	2.161049	.204538	10.57	0.000	1.760162	2.561936
fees	-.008239	.0005614	-14.68	0.000	-.0093393	-.0071388
APR_2pts	-.1526981	.0647995	-2.36	0.018	-.2797029	-.0256934
APR_3pts	-.5289931	.0866207	-6.11	0.000	-.6987665	-.3592196
limit_2	.0831876	.0656521	1.27	0.205	-.0454882	.2118634
limit_1	-.1671212	.0772058	-2.16	0.030	-.3184417	-.0158006
SD						
APR_2pts	-.0034943	.0131009	-0.27	0.790	-.0291716	.0221831
APR_3pts	1.09279	.1345523	8.12	0.000	.8290719	1.356507
limit_2	.3175794	.2283608	1.39	0.164	-.1299995	.7651583
limit_1	1.026394	.1224065	8.39	0.000	.7864819	1.266307