sustainability

MDPI

Article

Using Different Migratory Game Bird Hunter Types to Explore Drivers of Support for Hunter Recruitment, Retention, and Reactivation Policies in North Carolina, USA

Elena C. Rubino [1,2,*] and Christopher Serenari [3]

[1] Arkansas Forest Resources Center, Division of Agriculture, University of Arkansas System, Monticello, AR 71655, USA
[2] College of Forestry, Agriculture, and Natural Resources, University of Arkansas at Monticello, Monticello, AR 71655, USA
[3] Department of Biology, Texas State University, San Marcos, TX 78666, USA; c_s754@txstate.edu
* Correspondence: rubino@uamont.edu

Abstract: Policies designed to retain, recruit, and reactivate hunters have been developed to stimulate a range of motivations, although knowledge of which hunter types are more driven by various motivations remains deficient. To help fill this gap, we use survey responses from two types of migratory bird hunters in North Carolina as a case study to better understand hunter attitudes towards and motivational drivers of support for/opposition against the Sunday hunting of migratory birds. The results indicate that support for the legalization of Sunday migratory waterfowl hunting was driven by the importance of including as many weekends as possible each season, beliefs about increasing youth participation, and the potential for economic benefits, whereas opposition was driven by the importance of providing time for waterfowl to rest from hunting pressure. Opposition to the legalization of Sunday webless migratory bird hunting was driven by the belief that legalization may harm webless migratory bird populations. These findings provide agencies with an understanding of the differences in migratory waterfowl and webless migratory bird hunters' motivations and encourage the inclusion of both social and ecological motivations when designing recruitment, retention, and reactivation policies.

Keywords: game birds; hunting policy; HRR; R3; Sunday hunting legalization

Citation: Rubino, E.C.; Serenari, C. Using Different Migratory Game Bird Hunter Types to Explore Drivers of Support for Hunter Recruitment, Retention, and Reactivation Policies in North Carolina, USA. *Sustainability* **2022**, *14*, 3820. https://doi.org/10.3390/su14073820

Academic Editor: Cheryl Lohr

Received: 22 January 2022
Accepted: 22 March 2022
Published: 24 March 2022

1. Introduction

As one of the earliest interactions between early *Homo* species and the environment [1], hunting can be described as a social–ecological system (SES) [2]. Social–ecological systems reflect the intertwining of institutions, knowledge, and ethics that mediate the human use of natural resources (i.e., social systems) and natural biological and biophysical processes (i.e., ecological systems) [3]. In the case of modern recreational hunting, the social system includes the hunters, their behaviors and decisions, the formal and informal institutions that regulate hunting activities, and the interactions between such stakeholders [2,4]. The ecological system is composed of the hunted species, the components of the ecosystems where they live, and the ecological processes and interactions that occur between the hunted species and their ecosystems' components [2]. Social and ecological systems overlap, such that forces influencing one system will inherently affect the other.

Within this SES framework, hunting policies are an external force intentionally designed to influence both social and ecological systems and their interactions. For example, across the globe, hunting policies such as hunting seasons and bag limits are designed to limit hunting activity and reduce pressures on the hunted species when policies are tightened (e.g., shifting greater sage-grouse (*Centrocercus urophasianus*) hunting seasons to later in the year in Nevada [5]). Conversely, hunting policies can be employed to increase

hunting activities and better control species populations when relaxed (e.g., promoting zone-based management based on motivational factors for red deer (*Cervus elaphus*) harvesting in Norway [6], permitting the taking of lesser snow geese (*Chen caerulescens*) outside of the regular hunting season in parts of Canada and the U.S. [7]). Similarly, policies to recruit, retain, and reactivate hunters have been implemented by wildlife agencies in North America and Europe in an effort to slow or reverse decades-long declines in hunting participation [6,8–10]. Declining numbers of active hunters may cause significant ecological and socioeconomic ramifications, including reduced funding for conservation, damage to crops, potential disease outbreaks, and disrupted wildlife management implementation [8,11,12]. As such, the development of recruitment, retention, and reactivation policies has been a top priority for wildlife agencies. These policies have been designed to stimulate a range of hunter motivations rooted in both the ecological and social systems. For example, many recruitment, retention, and reactivation initiatives target motivations within the ecological system by focusing on the experience of hunting the desired species, both in terms of increasing hunting opportunities [13–15] and hunt quality [13,16,17]. Other policies attend to how hunters value aspects of their broader hunting experience, which includes social components [4,18–21]. For instance, many recruitment initiatives aim to diversify hunting in terms of race, age, and gender in an attempt to reduce cultural barriers for hunters [22,23].

Sunday hunting bans are an example of policies with substantial recruitment, retention, and reactivation implications in that they restrict hunting availability, which has made them a focus of recent debate [24]. Eleven east coast U.S. states currently have either Sunday hunting bans or restrictions (e.g., only permitted on private lands or in select counties) [25]. North Carolina is one such state, although it has been slowly transitioning to less restrictive policies. In 2015, the Outdoor Heritage Act removed the prohibition of firearms hunting on Sundays. Then, the 2017 Outdoor Heritage Enhanced Act provided more opportunities for Sunday hunting, including allowing hunting within 500 yards of a residence on private land and granting public landowners the authority to implement new Sunday hunting options on the public lands they manage [26].

However, in addition to other restrictions (e.g., prohibiting deer hunting with the use of dogs or hunting within 500 yards of a place of worship), the prohibition of hunting migratory birds on Sunday remains in North Carolina per the North Carolina Wildlife Resources Commission (NCWRC). The NCWRC has mandated third-party research to document general support for/opposition against the Sunday hunting of migratory game birds in North Carolina [27]. Sunday hunting legalization has been lauded for its influences on both social and ecological systems. Proponents of Sunday hunting legalization in areas where it is prohibited often cite the ability to increase hunting opportunities, expand hunting traditions, and generate millions of dollars in economic activity [25,27–29], all of which influence local hunting participation to some degree.

Currently, waterfowl season dates in North Carolina typically run intermittently from October through January, although Canada goose (*Branta canadensis*) season opens in September [30]. Duck seasons are now recently established within two duck hunting zones (coastal and inland) with slightly different dates but identical bag limits [30]. Webless migratory game bird seasons generally run intermittently from September through December with bag limits of 15 (with American woodcock (*Scolopax minor*) and common snipe (*Gallinago gallinago*) exceptions) [30]. Yet, migratory bird hunting remains prohibited on Sundays. However, there is still debate among hunters and the NCWRC continues to explore public opinion via public surveys and forums [24], making the NCWRC's investigation into Sunday hunting legalization a helpful case study in the use of hunters' social–ecological motivations to develop recruitment, retention, and reactivation policies.

Previous studies have stressed the importance of understanding the heterogeneity of hunters' preferences and how such preferences dictate the success of recruitment, retention, and reactivation policies [6,18–20,31]. Additionally, research has demonstrated that understanding the full spectrum of hunting motivations across types of hunters can

help managers improve recruitment, retention, and reactivation success [23,32]. Although there is recognition that heterogeneity among hunters means that a variety of such policies are likely required to maximize hunting engagement [31,33], there is little research on the specifics of which hunter types are more driven by various motivations. Expanding research that elucidates motivations by hunter type will aid managers in improving their recruitment, retention, and reactivation policies and increasing hunter satisfaction [16,32].

This research seeks to contribute to the exploration of hunter motivations by using survey responses from migratory bird hunters in North Carolina as a case study to better understand disparate attitudes towards and motivational drivers of support for/opposition against the Sunday hunting of migratory birds. Our objective was to determine if migratory waterfowl (e.g., duck, coot, goose, brant, and swan) hunters and webless migratory bird (e.g., dove, rail, gallinule, moorhen, woodcock, and snipe) hunters [34] exhibit differing motivations in support of/opposition to Sunday hunting legalization. We use our results to compare and contrast motivations across different types of hunters, and we offer how our findings can be considered when developing more tailored and effective recruitment, retention, and reactivation policies in the future.

2. Methods

2.1. Survey Design and Implementation

The NCWRC and Responsive Management, Inc. jointly designed and tested [35] the survey questions. These questions highlighted respondents' hunting behaviors and preferences, their attitudes towards motivations and justifications for and against Sunday hunting, and their support/opposition towards Sunday hunting. The NCWRC was responsible for the generation of a random sample of resident North Carolina Federal Harvest Information Program (HIP)-certified migratory bird hunters. Responsive Management, Inc. staff then contacted potential respondents via phone between December 2017 and January 2018. Staff utilized a five-callback design [36], which maintains representativeness by avoiding bias towards respondents who are easier to contact. The NCWRC followed North Carolina State University human subjects research standards to protect the subjects involved in this study.

2.2. Data Analysis

Because of our interest in the factors driving support and opposition towards Sunday hunting among migratory waterfowl hunters and webless migratory bird hunters, we employed logistic regression analysis [37]. The dependent variables of our two models were support/opposition towards the Sunday hunting of (1) migratory waterfowl and (2) webless migratory birds, respectively (assuming the same total number of hunting days, in both cases). These binary variables (1 for "support", 0 for "oppose") were created by consolidating responses from a five-point Likert scale (1—strongly oppose to 5—strongly support) [17], where respondents either strongly or somewhat supported/opposed Sunday hunting of migratory waterfowl and webless migratory birds. Respondents who indicated "Neither support nor oppose" or "I don't know" were not included in the logistic regression analysis. These logit models were estimated using the 'logit' command in the Stata 17/BE statistical software package (https://www.stata.com/manuals/u5.pdf (accessed on 17 March 2022)), and the significance of results was reported at the 5% level [17]. Because we included up to 24 covariates in our initial models to explain variation in support (Appendix A Table A1), we used the corrected Akaike Information Criterion (AICc) to find the most parsimonious models [37].

3. Results

We obtained 428 valid responses for the migratory waterfowl hunter model and 475 valid responses for the webless migratory bird hunter model. Most respondents were male (>96% in both models), the average age of migratory waterfowl hunters was approximately 41 years old, and the average age of webless migratory bird hunters was

approximately 45 years old (Appendix A Table A2). Respondents' annual, pre-tax income was similar in both models, where we found a relatively even distribution of respondents earning from USD 20,000 per year to USD 99,999 per year. Approximately 25% of respondents earned USD 120,000 or more (S2). Approximately 25% of respondents had a high school diploma or equivalent in both models. However, approximately 41% of migratory waterfowl hunters had a bachelor's degree or higher, whereas approximately 34% of webless migratory bird hunters had a bachelor's degree or higher (Appendix A Table A2).

Between 2016 and 2017, migratory waterfowl hunters and webless migratory bird hunters hunted an average of 7.75 (SD = 9.27) and 5.45 (SD = 8.41) days, respectively (as compared to an average of 14.59 days for North Carolina deer hunters from 2016 to 2017 [38]). In total, approximately 38% of respondents supported the legalization of Sunday hunting of migratory waterfowl, while 16% opposed and 47% answered "neither" or "I don't know". Similarly, approximately 42% of respondents supported the legalization of Sunday hunting of webless migratory birds, with 19% opposing and 40% answering "neither" or "I don't know".

Among migratory waterfowl hunters, it was most important that the season ends as late as possible (M = 3.96, SD = 1.19) and that the season includes as many weekends as possible (M = 3.80, SD = 1.30). On average, the only attribute respondents considered unimportant was having multiple splits in the season (M = 2.60, SD = 1.31) (Appendix A Table A3). On average, webless migratory bird hunters felt that having access to hunting areas was most important (M = 4.09, SD = 1.10), followed by ensuring the season includes as many weekends as possible (M = 3.80, SD = 1.31). The only attribute deemed unimportant was having the seasons start as early as possible (M = 2.69, SD = 1.41) (Appendix A Table A3). Comparisons between respondents in the two models were limited to questions that were asked identically to both groups. We did not detect any significant differences in how migratory waterfowl or webless migratory bird hunters viewed the importance of such attributes (Appendix A Table A3).

Respondents in both models tended to have similar attitudes towards Sunday hunting. On average, respondents most strongly disagreed that Sunday hunting should be banned because it may harm bird populations (migratory waterfowl hunters: M = 1.92, SD = 1.38; webless migratory bird hunters: M = 1.91, SD = 1.27), as well as because it provides a day for non-hunter recreationists to enjoy the outdoors without hunters (migratory waterfowl hunters: M = 2.31, SD = 1.65; webless migratory bird hunters: M = 2.56, SD = 1.68) and that migratory birds need a day of rest (migratory waterfowl hunters: M = 2.44, SD = 1.57; webless migratory bird hunters: M = 2.45, SD = 1.56) (Appendix A Table A3). Conversely, respondents generally agreed that allowing Sunday hunting would increase youth hunting participation (migratory waterfowl hunters: M = 4.02, SD = 1.39; webless migratory bird hunters: M = 3.82, SD = 1.46), provide economic benefits (migratory waterfowl hunters: M = 3.71, SD = 1.50; webless migratory bird hunters: M = 3.65, SD = 1.45), and increase opportunities for hunters who work (migratory waterfowl hunters: M = 3.95, SD = 1.57; webless migratory bird hunters: M = 3.85, SD = 1.58). Most strongly, respondents agreed that choosing to hunt on Sunday should be a personal rather than governmental decision (migratory waterfowl hunters: M = 4.01, SD = 1.50; webless migratory bird hunters: M = 4.05, SD = 1.47) (Appendix A Table A3). Comparisons between respondents in the two models indicate that migratory waterfowl hunters were significantly more likely than webless migratory bird hunters to disagree that Sunday hunting should be banned because it provides a day that non-hunting recreationists can enjoy the outdoors without hunters ($t(452) = 2.25$, $p = 0.05$). There were no other significant differences between hunter groups with regard to attitudes towards Sunday hunting.

For exploring drivers of support for/opposition against Sunday hunting, the reported migratory waterfowl hunter logit model and webless migratory bird hunter logit model (S4) were the most parsimonious models according to the corrected Akaike Information Criterion. We tested for correlations across all potential variables for the two models, and

all correlation coefficients were less than 0.70, confirming that there was not a strong linear relationship between potential covariates.

The importance of a waterfowl season with as many weekends as possible, the belief that Sunday hunting would increase youth hunting participation, and the belief that Sunday hunting would provide economic benefits were all positive and significant motivational drivers of support at the 5% level for migratory waterfowl hunters. Conversely, the importance of allowing waterfowl time to rest from hunting pressure was negatively significant at the 5% level. The milage traveled by respondents to hunt and their level of education were not significant predictors of support for Sunday hunting (Appendix A Table A4).

Within the webless migratory bird hunter model, the belief that Sunday hunting should be banned because of possible harm to bird populations was a negative and significant motivational driver of support at the 5% level, indicating that the more respondents agreed that Sunday hunting could be harmful to bird populations, the less they supported Sunday hunting. The importance of including as many as days as possible in the season, the importance of having a full, uninterrupted day of hunting, the belief that Sunday hunting would increase youth hunting participation, and respondents' level of income were not significant motivational drivers of support at the 5% level (Appendix A Table A4).

4. Discussion

Our results provide evidence that motivations are unique among different hunter types and that management and policy decisions favored by some types may discount the interests of others [6,18–20,31]. Specifically, our results illustrate that migratory waterfowl hunters and webless migratory bird hunters seek different experiences and are motivated by different drivers. Similar findings have been reported within disparate typologies of American deer (*Odocoileus* spp.) hunters [21] and Norwegian red deer hunters [6]. As such, our findings can be used to contribute to current conversations regarding the roles of recruitment, retention, and reactivation initiatives aimed at increasing hunting opportunities, versus those seeking to improve the quality of the hunt [13,16,17]. Both of these types of recruitment, retention, and reactivation strategies operate under the assumption that hunters are strongly driven by different, and often competing [13,39], hunting-related motivations.

For instance, similar to Schummer et al. [13], we observed that migratory waterfowl hunters assigned a high degree of importance to the influence of hunt quality factors (e.g., late seasons and resting periods for waterfowl) on their hunting experience, and the importance of time for waterfowl to rest from hunting pressures was a negative and significant driver of support for Sunday hunting. The quantity of hunting opportunities was also consistently valued by waterfowl hunters [13], namely the importance of including as many weekends as possible in the season. Webless migratory bird hunters were inconsistent regarding hunting-related motivations. Aligning with previous research that some typologies of grouse hunters [19] and turkey hunters [20] are highly motivated by more hunting days and greater bag limits, we found webless migratory bird hunters valued quantity-based factors (e.g., access to hunting areas, as many weekends as possible, uninterrupted days of hunting). However, these latter two factors were not significant drivers of support for Sunday hunting. Instead, opposition to Sunday hunting was driven by the belief that legalization may harm bird populations, a quality-based motivation. Understanding these differences in hunting-related motivations will be helpful to wildlife managers interested in designing specific policies that manage different guild populations in ways that will encourage recruitment, retention, and reactivation ideals of the respective types of hunters.

It is also of note that our results illuminate the need for agencies to consider the role of non-hunting-related motivations in their recruitment, retention, and reactivation policies. For instance, support for Sunday hunting among migratory waterfowl hunters was driven by beliefs about increased youth participation and the potential for economic benefits. Our findings confirm the importance of social aspects within hunting culture (e.g., spending time with family and friends, teaching others how to hunt) [19–21,31],

yet also elucidates that economic motivations can be compelling motivators for some types of hunters, as well. This finding suggests that agencies should not reduce potential recruitment, retention, and reactivation policies down to simply appealing to permitted hunters' motivations [18–20,31]. Rather, agencies should also examine the broader, societal-level implications of their policies [4], as hunters already consider these in their decision making, and these policies may provide opportunities to better engage the local community (including non-hunters) in the future.

Whereas other studies have affirmed that hunters are not a homogenous group due to variations at the personal level [6,18–20,23,31], this study extends this principle to add that hunters who target different species, even among migratory bird hunters, display an array of behaviors and motivations that should be considered when developing guild-specific management policies. In accordance with past research on the range of hunter typologies [19,20], our findings highlight that migratory waterfowl hunters' and webless migratory bird hunters' support for/opposition against the legalization of Sunday hunting are driven by different factors. This indicates that policies tailored to specific hunter types may assist with reaching recruitment, retention, and reactivation objectives. This case study sets the stage for future research in that it documents the importance of understanding the complete spectrum of psychological (e.g., satisfaction associated with uninterrupted hunting days), sociocultural (e.g., recruitment of youth hunters), economic (e.g., potential local and regional economic benefits), and ecological (e.g., concern of harm to migratory game bird populations) motivations that drive recruitment, retention, and reactivation policy support. Such research will be helpful to agency decision-makers, not only in terms of implementing relevant guild-specific management policies, but also in creating greater opportunities to engage with migratory game bird hunters in North Carolina.

Author Contributions: E.C.R. contributed to the conceptualization, data analysis, and drafting of the manuscript. C.S. contributed to the conceptualization, data collection, and revision of the manuscript. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: The study was conducted following the highest ethical standards in accordance with the Declaration of Helsinki.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data presented in this study are available on request from the corresponding author. The data are not publicly available due to participant confidentiality.

Acknowledgments: We thank all respondents for their time and effort in completing the survey.

Conflicts of Interest: The authors have no conflicts of interest to disclose.

Appendix A

Table A1. Coding of attitudinal and demographic covariates included in most parsimonious models explaining hunter support/opposition towards Sunday hunting of migratory waterfowl and webless migratory birds, North Carolina, USA, 2017–2018.

Covariate	Coding for Models
Importance of waterfowl season including as many weekends as possible	Scale: 1 (not at all important)–5 (extremely important)
Importance of webless migratory bird season including as many days as possible	Scale: 1 (not at all important)–5 (extremely important)
Importance of having a full uninterrupted day to hunt webless migratory birds	Scale: 1 (not at all important)–5 (extremely important)
Importance of having time for waterfowl to rest from hunting pressures	Scale: 1 (not at all important)–5 (extremely important)

Table A1. *Cont.*

Covariate	Coding for Models
Belief that Sunday hunting should be banned because of possible harm to migratory game bird populations	Scale: 1 (strongly disagree)–5 (strongly agree)
Belief that Sunday hunting would increase youth hunting participation	Scale: 1 (strongly disagree)–5 (strongly agree)
Belief that Sunday hunting would provide local and regional economic benefits	Scale: 1 (strongly disagree)–5 (strongly agree)
One-way miles traveled (number of miles typically traveled by respondent to hunt migratory game birds in North Carolina)	Continuous value
Education	Coded to be continuous: 1 (not a high school graduate)–7 (professional or doctorate degree)
Income	20: <USD 20,000 30: USD 20,000–USD 39,999 50: USD 40,000–USD 59,999 70: USD 60,000–USD 79,999 90: USD 80,000–USD 99,999 110: USD 100,000–USD 119,999 120: ≥USD 120,000 or more

Table A2. Sociodemographic characteristics of migratory waterfowl and webless migratory bird hunters, North Carolina, USA, 2017–2018.

	Migratory Waterfowl Hunters (n = 428)		**Webless Migratory Birds Hunters (n = 475)**	
Characteristic	**% of Sample**		**% of Sample**	
Gender				
Male	97.90		96.63	
Female	2.10		3.37	
Income				
Under USD 20,000	3.66		3.37	
USD 20,000–USD 39,999	13.24		11.40	
USD 40,000–USD 59,999	14.93		17.62	
USD 60,000–USD 79,999	16.34		18.13	
USD 80,000–USD 99,999	15.49		17.36	
USD 100,000–USD 119,999	9.01		8.03	
USD 120,000 or more	27.32		24.09	
Highest level of education				
Not a high school graduate	0.96		2.84	
High school graduate or equivalent	24.40		26.04	
Some college or trade school, no degree	16.51		19.47	
Associate's or trade school degree	16.99		17.51	
Bachelor's degree	30.86		26.48	
Master's degree	6.70		5.47	
Professional or doctorate degree	3.59		2.19	
	Mean	**S.D.**	**Mean**	**S.D.**
Age	40.82	15.71	44.51	15.86

Table A3. Attitudinal characteristics of migratory waterfowl and webless migratory bird hunters, North Carolina, USA, 2017–2018.

	Migratory Waterfowl Hunters (n = 428)		Webless Migratory Birds Hunters (n = 475)	
Importance of attributes regarding Sunday hunting seasons (migratory waterfowl and webless migratory bird specific) [a]				
Importance of season ending as late as possible	3.96	1.19	—	—
Importance of having multiple splits in the season	2.60	1.31	—	—
Importance of season spreading out over the longest period possible	3.70	1.19	—	—
Importance of season including as many weekends as possible	3.80	1.30	3.80	1.31
Importance of having time for migratory waterfowl/webless migratory birds to rest from hunting pressures	3.73	1.24	3.56	1.25
Importance of having access to impoundments/hunting areas	3.50	1.27	4.09	1.10
Importance of having a full uninterrupted day to hunt	—	—	3.78	1.29
Importance of season including as many days as possible	—	—	3.58	1.30
Importance of having the season start as early as possible	—	—	2.69	1.41
Attitudes towards Sunday hunting [b]				
Sunday hunting should be banned because it provides a day that non-hunting recreationists can enjoy the outdoors without hunters	2.31	1.65	2.56	1.68
Sunday hunting should be allowed because it would help manage migratory game bird populations in North Carolina	3.06	1.66	3.04	1.64
Sunday hunting would increase youth hunting participation	4.02	1.39	3.82	1.46
Sunday hunting would provide local and regional economic benefits	3.71	1.50	3.65	1.45
Sunday hunting should be allowed because choosing to hunt on Sunday should be a personal rather than governmental decision	4.01	1.50	4.05	1.47
Sunday hunting should be banned because of possible harm to migratory game bird populations	1.92	1.38	1.91	1.27
Sunday hunting should be banned because migratory game birds need a day of rest	2.44	1.57	2.45	1.56
Sunday hunting should be allowed because the ban limits opportunities for hunters who work the other six days a week	3.95	1.57	3.85	1.58

[a] Coded on a scale of 1 (not at all important)–5 (extremely important). [b] Coded on a scale of 1 (strongly disagree)–5 (strongly agree) (directly compared across hunting groups).

Table A4. Most parsimonious logit model results explaining hunter support/opposition towards Sunday hunting of migratory waterfowl and webless migratory birds, North Carolina, USA, 2017–2018.

Migratory Waterfowl Hunters (n = 227)	Coefficient (Standard Error)	Webless Migratory Bird Hunters (n = 285)	Coefficient (Standard Error)
Importance of waterfowl season including as many weekends as possible	1.03 * (0.30)	Importance of webless migratory bird season including as many days as possible	−0.68 (0.85)
Importance of having time for waterfowl to rest from hunting pressures	−0.86 * (0.34)	Importance of having a full uninterrupted day to hunt webless migratory birds	0.36 (0.64)
Belief that Sunday hunting would increase youth hunting participation	0.69 * (0.30)	Belief that Sunday hunting should be banned because of possible harm to migratory game bird populations	−3.64 * (1.66)
Belief that Sunday hunting would provide local and regional economic benefits	0.62 * (0.28)	Belief that Sunday hunting would increase youth hunting participation	1.32 (0.80)
One-way miles	0.01 (0.00)	Income	−0.02 (0.03)
Education	0.01 (0.23)	Constant	6.32 (4.90)
Constant	−4.64 * (2.17)		
Log likelihood	−25.80	Log likelihood	−8.96

* denotes significance at the 5% level.

References

1. Moleon, M.; Sanchez-Zapata, J.A.; Margalida, A.; Carrete, M.; Owen-Smith, N.; Donazar, J.A. Humans and scavengers: The evolution of interactions and ecosystem services. *BioScience* **2014**, *64*, 394–403. [CrossRef]
2. van Vliet, N.; Fa, J.; Nasi, R. Managing hunting under uncertainty: From one-off ecological indicators to resilience approaches in assessing the sustainability of bushmeat hunting. *Ecology* **2015**, *20*, 3. [CrossRef]
3. Berkes, F.; Folke, C. *Linking Social and Ecological Systems: Management Practices and Social Mechanisms for Building Resilience*; Cambridge University Press: Cambridge, UK, 1998.
4. Larson, L.R.; Stedman, R.C.; Decker, D.J.; Siemer, W.F.; Baumer, M.S. Exploring the social habitat for hunting: Toward a comprehensive framework for understanding hunter recruitment and retention. *Hum. Dimens. Wildl.* **2014**, *19*, 105–122. [CrossRef]
5. Blomberg, E.J. The influence of harvest timing on greater sage-grouse survival: A cautionary perspective. *J. Wildl. Manag.* **2015**, *79*, 695–703. [CrossRef]
6. Andersen, O.; Wam, H.K.; Mysteryd, A.; Kaltenborn, B.P. Applying typology analyses to management issues: Deer harvest and declining hunter numbers. *J. Wildl. Manag.* **2014**, *78*, 1282–1292. [CrossRef]
7. Alisauskas, R.T.; Rockwell, R.F.; Dufour, K.W.; Cooch, E.G.; Zimmerman, G.; Drake, K.L.; Leafloor, J.O.; Moser, T.J.; Reed, E.T. Harvest, survival and abundance of midcontinent lesser snow geese relative to population reduction efforts. *Wildl. Monogr.* **2011**, *179*, 1–42. [CrossRef]
8. Zhang, X.; Miller, C.A. Associations between socioeconomic status and hunting license sales among census tracts in Cook County, Illinois. *Hum. Dimens. Wildl.* **2019**, *24*, 148–158. [CrossRef]
9. Hansson-Forman, K.; Sandström, C.; Ericsson, G. What influences hunting participation of potential new hunters? Qualitative insights from Sweden. *Wildl. Biol.* **2020**, *2020*, 4. [CrossRef]
10. Vayer, V.R.; Larson, L.R.; Peterson, M.N.; Lee, K.J.; Von Furstenberg, R.; Choi, D.Y.; Stevenson, K.; Ahler, A.A.; Anhalt-Depies, C.; Woosnam, K.M.; et al. Diverse university students across the United States reveal promising pathways to hunter recruitment and retention. *J. Wildl. Manag.* **2021**, *85*, 1017–1030. [CrossRef]
11. Grado, S.C.; Hunt, K.M.; Hutt, C.P.; Santos, X.T.; Kaminski, R.M. Economic impacts of waterfowl hunting in Mississippi derived from a state-based mail survey. *Hum. Dimens. Wildl.* **2011**, *16*, 100–113. [CrossRef]
12. Poudel, J.; Henderson, J.E.; Munn, I.A. Economic contribution of hunting expenditure to the southern United States of America. *Int. J. Environ. Sci.* **2016**, *73*, 236–254. [CrossRef]
13. Schummer, M.L.; Simpson, J.; Davis, J.B.; Shirkey, B.; Wallen, K.E. Balancing waterfowl hunting opportunity and quality to recruit, retain, and reactivate. *Wildl. Soc. Bull.* **2020**, *44*, 391–395. [CrossRef]

14. U.S. Department of the Interior [USDOI]. Hunting, Fishing, Recreational Shooting, and Wildlife Conservation Opportunities and Coordination with States, Tribes, and Territories. Available online: https://www.doi.gov/sites/doi.gov/files/uploads/signed_so_3356.pdf (accessed on 12 January 2022).
15. Kerr, G.N. Efficiency of a recreational deer hunting bag limit. *Eur. J. Wildl. Res.* **2019**, *65*, 15. [CrossRef]
16. Schroeder, S.A.; Cornicelli, L.; Fulton, D.C.; Merchant, S.S. The influence of motivation versus experience on recreation satisfaction: How appreciative-versus achievement-oriented recreation experience preferences relate to hunter satisfaction. *J. Leis. Res.* **2019**, *50*, 107–131. [CrossRef]
17. Schroeder, S.A.; Fulton, D.C.; Cornicelli, L.; Cordts, S.D.; Lawrence, J.S. Clarifying how hunt-specific experiences affect satisfaction among more avid and less avid waterfowl hunters. *Wildl. Soc. Bull.* **2019**, *43*, 455–467. [CrossRef]
18. Schroeder, S.A.; Fulton, D.C.; Lawrence, J.S. Managing for preferred hunting experiences: A typology of Minnesota waterfowl hunters. *Wildl. Soc. Bull.* **2006**, *34*, 380–387. [CrossRef]
19. Wam, H.K.; Andersen, O.; Pedersen, H.C. Grouse hunting regulations and hunter typologies in Norway. *Hum. Dimens. Wildl.* **2013**, *18*, 45–57. [CrossRef]
20. Watkins, C.; Poudyal, N.C.; Caplenor, C.; Buehler, D.; Applegate, R. Motivations and support for regulations: A typology of eastern wild turkey hunters. *Hum. Dimens. Wildl.* **2018**, *23*, 433–445. [CrossRef]
21. Black, K.E.; Jensen, W.F.; Newman, R.; Boulanger, J. Motivations and satisfaction of North Dakota deer hunters during a temporal decline in deer populations. *Hum.-Wildl. Interact.* **2018**, *12*, 427–443.
22. Serenari, C.; Peterson, M.N. Evaluating the cultural fit of hunting and angling among minority sportspersons in North Carolina. *Leis. Sci.* **2018**, *44*, 22–35. [CrossRef]
23. Metcalf, E.C.; Graefe, A.R.; Trauntvein, N.E.; Burns, R.C. Understanding hunting constraints and negotiation strategies: A typology of female hunters. *Hum. Dimens. Wildl.* **2015**, *20*, 30–46. [CrossRef]
24. Chavez, K. NC Wildlife Commission Gauges Public Sentiments on Sunday Hunting on Game Lands. *Asheville Citizen Times*. 23 January 2020. Available online: https://www.citizen-times.com/story/news/2020/01/23/nc-wildlife-resources-commission-seeks-public-input-sunday-hunting/4540742002/ (accessed on 16 January 2022).
25. John Durham and Associates. The Economic Impact of Sunday Hunting. National Shooting Sports Foundation. Available online: http://sundayhunting.org/PDF/SundayHunting_EconomicImpact.pdf (accessed on 10 January 2022).
26. North Carolina Wildlife Resources Commission (NCWRC). New Law Enhances Opportunities to Hunt on Sundays. *North Carolina Wildlife Resources Commission News*. 28 July 2017. Available online: https://www.ncwildlife.org/News/new-law-enhances-opportunities-to-hunt-on-sundays (accessed on 10 January 2022).
27. Responsive Management. North Carolina Migratory Bird Hunters' and the General Public's Opinions on and Attitudes toward the Hunting of Migratory Birds on Sunday in North Carolina. Available online: https://www.ncwildlife.org/Portals/0/Hunting/Documents/NC%20Sunday%20Waterfowl%20Hunting%20Report%202018%2002%2022.pdf (accessed on 3 January 2022).
28. Jagnow, C.P.; Ellis, R.W. Results from the 2006 Virginia Sunday Hunting Survey. Virginia Department of Game and Inland Fisheries. Available online: https://www.dgif.virginia.gov/wp-content/uploads/2006-Sunday-Hunting-Survey-Report.pdf (accessed on 10 January 2022).
29. Legislative Budget and Finance Committee. A Study of the Potential Economic, Social, and Other Impacts of Expanding Sunday Hunting in Pennsylvania. Available online: http://lbfc.legis.state.pa.us/Resources/Documents/Reports/129.pdf (accessed on 10 January 2022).
30. North Carolina Wildlife Resources Commission (NCWRC). Season and Limits for Migratory Game Birds. Available online: https://www.ncwildlife.org/hunting/seasons-limits/waterfowl-seasons-limits/season-and-limits-for-migratory-game-birds#6720624-ducks-mergansers--coots (accessed on 17 March 2022).
31. Bradshaw, L.; Holsman, R.H.; Petchenik, J.; Finger, T. Meeting harvest expectations is key for duck hunter satisfaction. *Wildl. Soc. Bull.* **2019**, *43*, 102–111. [CrossRef]
32. Hayslette, S.E.; Armstrong, J.B.; Mirarchi, R.E. Mourning dove hunting in Alabama: Motivations, satisfactions, and sociocultural influences. *Hum. Dimens. Wildl.* **2001**, *6*, 81–95. [CrossRef]
33. Heyser, H.A. *Want Great Hunting? What You Need, in a Word, Is Restraint*; California Waterfowl Association: Roseville, CA, USA, 2017; pp. 20–26.
34. Robinson, K.W.; Howell, D.L. 2020 Survey of Duck Hunters in North Carolina: Perspectives towards Duck Hunting Zones and Season Dates. Available online: https://www.ncwildlife.org/Portals/0/ProposedRegulations/Migratory-Birds/2020_Duck_Season_Structure_Survey_Feb2021.pdf (accessed on 1 March 2022).
35. Alaimo, K.; Olson, C.M.; Frongillo, E.A. Importance of cognitive testing for survey items: An example from food security questionnaires. *J. Nutr. Educ.* **1999**, *31*, 269–275. [CrossRef]
36. Duda, M.D.; Nobile, J.L. The fallacy of online surveys: No data are better than bad data. *Hum. Dimens. Wildl.* **2010**, *15*, 55–64. [CrossRef]
37. Pienaar, E.F.; Jarvis, L.S.; Larson, D.M. Using a choice experiment framework to value conservation—Contingent development programs: An application to Botswana. *Ecol. Econ.* **2014**, *98*, 39–48. [CrossRef]

38. North Carolina Wildlife Resources Commission (NCWRC). Surveys & Reports. Hunter Harvest Survey Estimates: 2016–2017. Available online: https://www.ncwildlife.org/Hunting/Learn-Resources/Reports#2625243-harvest-reports (accessed on 17 March 2022).
39. Bregnballe, T.; Madsen, J. Tools in waterfowl reserve management: Effects of intermittent hunting adjacent to a shooting-free core area. *Wildl. Biol.* **2004**, *10*, 261–268. [CrossRef]