

2012-13 SURVEY OF SNIPE AND RAIL HUNTERS IN NORTH CAROLINA



Photo courtesy of Mike Marsh



Prepared by:

Joe Fuller

Migratory Game Bird Coordinator

Chris Baranski

Northern Piedmont Management Biologist

Merril Cook

Human Dimensions Biologist

Mark Jones

Supervising Wildlife Biologist

Ryan Myers

Surveys and Research Analyst

Dain Palmer

Human Dimensions Biologist

EXECUTIVE SUMMARY

Introduction

We conducted this statewide survey to examine the views and opinions of North Carolina snipe and rail hunters regarding a variety of topics related to snipe and rail hunting and management. We believe this to be the first ever opinion survey of snipe or rail hunters conducted by the North Carolina Wildlife Resources Commission (NCWRC).

Methods

In late winter and spring of 2013, we surveyed 3,000 hunters that were registered in the Harvest Information Program (HIP). The sampling frame included only registrants who indicated that they hunted snipe and/or rails the previous hunting season. The survey response rate was 60%.

Results

General Participation

- Only 10% of respondents indicated that they hunted **either** snipe or rails in North Carolina anytime during the last 5 years.
- Of those individuals that indicated they hunted snipe, only 29% of respondents indicated that during most of their snipe hunting, they are specifically pursuing snipe.
- Of those individuals that indicated they hunted rails, 71% of respondents indicated that during most of their rail hunting, they are specifically pursuing rails.
- 60% of snipe and rail hunters were 45 years of age or older. The age of snipe and rail hunters is similar to woodcock hunters in North Carolina, but older than surveyed hunters that pursue other species (doves, waterfowl, and deer).
- As expected, the majority of rail hunting occurs in the coastal plain with 57% of all rail hunting occurring in the southern coastal plain.
- The majority of snipe hunting occurs in the coastal plain; however, of the 6 sub-regional choices provided, the highest level of snipe hunting occurred in the northern Piedmont (25%).

Barriers to Participation and Satisfaction

- 43% of snipe hunters indicated that a major barrier affecting their snipe hunting was finding public lands that hold huntable numbers of snipe.
- 33% of rail hunters indicated that a major barrier affecting their rail hunting was lack of access to areas to hunt rails due to waterfront development.
- 32% of rail hunters indicated that a major barrier affecting their rail hunting was a limited number of hunting days due to tide cycles and wind conditions.
- 39% of snipe hunters and 38% of rail hunters were neither satisfied nor dissatisfied with NCWRC snipe or rail management.

Seasonal Hunting Patterns, Harvest and Rail Season Preferences

- Snipe hunters hunted an average of 6 days during the 2012-13 snipe hunting season with an average harvest of 6 snipe/hunter.
- We estimated a total of 718 snipe hunters statewide during the 2012-13 season with a statewide harvest of 3,949 snipe.
- Rail hunters hunted an average of 6 days during the 2012 rail hunting season with an average harvest of 22 rails/hunter.
- We estimated a total of 332 rail hunters statewide during the 2012 season with a statewide harvest of 7,626 rails.
- Regarding the timing of the rail season, of the options provided, the highest level of support was to have a continuous 70-day season starting in early September.
- In regards to the rail season opening date, the highest level of support was to open the season to coincide with a lunar high tide cycle as opposed to a fixed opening date each year.

Management Considerations

- It appears that rail hunters are open to minor modifications to the rail season to better target hunting days around lunar tide cycles. Based on preliminary results from this survey, the NCWRC did select a split season for the 2013 rail season. The season opened slightly later than normal (September 7th) and closed for nearly 1 week one in late September. We presume that this structure allowed for potentially more days afield as the 1st week of September and the last several days of September and early October experienced low lunar tides during a time period when we expected few coastal rail hunters would have hunted anyway. The relatively short closed period also avoided the season extending much further into November or December, which would not have been supported by the majority of rail hunters.
- This survey sampled only those individuals that hunted either coots/**snipe** or **rails**/gallinules the previous year as indicated by Harvest Information Program (HIP) screening questions. However, only 10% of respondents indicated that they actually hunted either snipe or rails anytime during the previous 5 years. HIP screening questions are used to identify various migratory game bird hunting groups and set the foundation for follow-up surveys conducted by the U.S. Fish & Wildlife Service (USFWS). These additional surveys conducted by the USFWS are those used to estimate harvest and hunter trends.
- Results of this survey suggest that both snipe and rail harvests are much higher than those estimated from the USFWS HIP program. North Carolina harvest estimates provided by HIP are likely inaccurate and will remain so until the HIP registration process in North Carolina undergoes major changes.

Contents

EXECUTIVE SUMMARY.....	i
INTRODUCTION.....	1
METHODS.....	1
Survey Instrument Design	1
Survey Implementation	1
Data Weighting	2
Data Analysis.....	2
RESULTS	3
Response Rate.....	3
Rail/Snipe Hunter Characteristics and Participation	4
<i>General Demographics</i>	4
<i>General Participation</i>	4
Snipe Hunting.....	4
<i>Participation, Effort and Harvest</i>	4
<i>Areas Hunted and Hunting Styles - Snipe</i>	5
<i>Barriers to Participation and Satisfaction - Snipe</i>	5
Rail Hunting.....	6
<i>Participation, Effort and Harvest</i>	6
<i>Areas Hunted and Hunting Styles - Rails</i>	6
<i>Opinions on Rail Season Alternatives</i>	7
<i>Barriers to Participation and Satisfaction - Rails</i>	7
DISCUSSION.....	8
Snipe Hunting.....	9
Rail Hunting.....	10
LITERATURE CITED.....	12
Appendix A: Survey Instrument/Frequencies	14
Appendix B: Survey Design and Analysis	27
Appendix C: Cross-tabulations	30
Appendix D: Frequency distributions of County most often snipe and rail hunted and Game Land most often snipe and rail hunted	34

INTRODUCTION

Compared to other species, e.g., deer, turkeys and waterfowl, snipe and rails are pursued by relatively few hunters in North Carolina. Long-term trends of numbers of hunters pursuing snipe and rails are lacking. Prior to the early 1990's, there were essentially no estimates of harvest or numbers of hunters pursuing these species. The U.S. Fish and Wildlife Service's (USFWS) Harvest Information Program (HIP) was established, in part, to generate regional and nationwide harvest and hunter activity estimates for these species. However, state level estimates for North Carolina and many other states have extremely poor precision. Due to survey procedures geared to provide nationwide estimates, harvest and hunter estimates for rails in North Carolina cannot be estimated in some years.

Possibly due to generally low numbers of hunters, North Carolina Wildlife Resources Commission (NCWRC) staff rarely receives direct, formal communication from snipe and rail hunters. Although lack of hunter comments (and complaints) may indicate general hunter satisfaction, it is actually unknown if the majority of snipe and rail hunters are satisfied with the NCWRC's management direction and hunting season structure. Prior to 2013, neither snipe nor rail were included in any formal NCWRC hunting surveys to estimate hunting effort or harvest. In addition, there have been no statewide snipe or rail hunter opinion surveys in the history of the NCWRC. With this survey, our goals were to provide baseline information on snipe and rail hunter demographics and statewide and regional snipe and rail hunting participation. Wilson's snipe (also referred to as Common snipe and hereafter referred to as snipe), King, Clapper

and Virginia rails along with Sora are classified as migratory game birds, therefore hunting seasons are regulated by the USFWS.

In the past, the NCWRC has set snipe and rail seasons (within federal guidelines) with very little input from these hunter groups. Snipe currently enjoy a maximum 107-day season, and there is limited opportunity for changes in season structure for this species. However, this survey did request input regarding the current season structure and several alternatives for rail hunting seasons.

METHODS

Survey Instrument Design

The survey was conducted in the late winter and spring of 2013. We used the USFWS Harvest Information Program (HIP) to identify possible snipe and rail hunters, as all snipe and rail hunters 16 years of age and older are required to be HIP certified. For this study, the sampling frame was all hunters ≥ 16 who had HIP certification with an effective date of March 1, 2012 through February 28, 2013, and according to HIP screening questions, hunted coots/snipe or rail/gallinule during the previous 12 months.

In order to test the survey instrument, we conducted structured cognitive interviews with a convenience sample of snipe and rail hunters (persons known by NCWRC staff prior to the interviews). During cognitive interviews, we examined how well questions and directions were interpreted in order to improve the survey instrument wording and design. The final survey instrument contained questions on snipe and rail hunting behaviors, views on rail hunting regulations and season structure, barriers to

snipe and rail hunting and demographics (Appendix A).

Survey Implementation

We contacted 3,000 hunting license holders greater than 16 who reported hunting coot/snipe and/or rail/gallinule in the previous 12 months. HIP screening questions allowed for stratified sampling based on question response. We surveyed 740 of 740 (100%) individuals that indicated that they hunted rails/gallinules the previous year, but did not hunt coots/snipe. We surveyed 1,260 of 2,597 (49%) individuals that indicated they hunted coots/snipe the previous year, but did not hunt rails/gallinules. Lastly, we surveyed 1,000 of 29,079 (3%) individuals that indicated that they hunted both coots/snipe and rails/gallinules the previous year. We did not survey any HIP registrants that did **not** indicate hunting either coot/snipe or rail/gallinule the previous season. We realize that some proportion of this group may have actually hunted either snipe or rails during the 2012-13 season. However, we assumed that this was a minimal number of hunters and have no reason to believe that opinions of this small group of hunters would differ from those individuals surveyed. Not surveying this group was seen primarily as a cost savings measure. The results of the HIP screening questions alone suggested that as many as 32,000 individuals hunted the four species identified in the screening questions. We suspected that this number was grossly inflated and was related in large part to documented instances of vendors improperly administering screening questions. Therefore, we were concerned that the sample frame consisted of a large number of individuals that did not hunt any of the species. To address this problem, we sampled those individuals that indicated they hunted either of these species groups rather than both at a much higher rate.

We felt that responses to screening questions that indicated that the individual hunted one species group, but not the other more likely represented an intentional question response as opposed to a license vendor simply marking “yes” to all screening questions and increased our likelihood of contacting actual snipe or rail hunters.

A modified version of the Tailored Design Method (Dillman et al. 2009) was used to administer the survey. Hunters were sent up to three full survey packet mailings and one follow-up postcard after the first mailing. The first full survey packet mailing (cover letter, survey instrument, and business reply return envelope) was mailed on March 25, 2013. One week after the first mailing, reminder postcards were sent to all survey recipients. Non-respondents were sent follow-up mailings four weeks and eight weeks after the first mailing. The survey closed July 1, 2013.

Data Weighting

To investigate possible nonresponse bias we compared survey respondents with the entire sampling frame for the following variables: state of residence, age, sex, HIP response to hunting coot/snipe or rail/gallinule, and type of hunting license. For all variables except sex and hunting license type (lifetime vs. short-term/annual) there were minor differences. There was evidence of an association between age and type of hunting license and response to the survey. Therefore, we weighted all statewide frequency data based on age and hunting license type (Appendix B, Table 1). Following the recommendation of Winship and Radbill (1994), we did not use weighted data for statistical tests which depend on standard errors.

Data Analysis

We analyzed data using IBM SPSS Statistics 21.0 (SPSS Inc. 2012). We calculated frequency distributions and percentages of respondents in each category for every survey question. For bivariate comparisons, we used cross-tabulations, chi-square tests (χ^2) to test null hypotheses that there were not differences between variables. We used a probability value (P) ≤ 0.05 to indicate statistically significant relationships. We omitted or combined categories in cross-tabulations when $>20\%$ of cells had expected values <5 or when any cells had expected values <1 (Delucchi 1983). We removed data for the mountain region where there were low response rates. We calculated adjusted residuals to determine which cells in cross-tabulations were significantly different from expected values. An adjusted residual with an absolute value ≥ 2.0 was evidence against independence in the cell (Agresti and Finlay 1999). Whenever chi-square tests had $P \leq 0.05$ we calculated effect sizes (Cramer's V for cross-tabulations) (Vaske 2008). We used Vaske's (2008) guidelines for interpreting effect sizes (Appendix B, Table 2). We calculated means for items which used a 5 point disagreement/agreement scale (Strongly Disagree=1, Strongly Agree=5) or a 5 point conflicts scale (Conflicts Very Unlikely=1, Conflicts Very Likely=5). We did not include responses of "unsure" in mean calculations. Due to rounding, percentages may not total 100% or may appear off when individual categories were combined. In general, we considered Cramer's V statistic ≥ 0.10 worthy of reporting in that it suggested at least a "minimal" relationship.

We calculated total statewide hunting effort (days), harvest, and number of hunters by extrapolating from the 1,753 survey

responses. A total of 52 rail hunters and 100 snipe hunters claimed effort and/or harvest for the 2012-2013 season(s). There was no significant evidence of nonresponse bias within any of the snipe or rail hunting responses ($P > 0.05$). Total snipe and rail hunters were extrapolated proportionally based on the stratified sample. Total harvest and days were extrapolated from sample means and total hunter estimates. The total estimated rail harvest by species was assumed to be proportional to the overall species count identified by hunters. Because we did not sample any hunters that did not indicate hunting snipe or rails the previous year, our extrapolations would be considered minimal estimates.

RESULTS

Response Rate

The survey response rate, calculated by omitting incorrect addresses, deceased persons, and persons ineligible to respond, was 60%. Results indicate that our disproportionate stratified sampling of HIP questionnaire respondents was successful at targeting snipe and rail hunters (Appendix B, Table 3). Snipe hunters were most frequent within the group indicating they hunted snipe the previous year, but did not hunt rails (13%). Rail hunters were most frequent within the group indicating they hunted rails the previous year, but did not hunt snipe (10%). Snipe hunters (3%) or rail hunters (1%) were the least frequent within the group indicating they hunted both snipe and rails the previous year.

Rail/Snipe Hunter Characteristics and Participation

This survey was designed to gather information for both rail and snipe hunters. Respondents were asked to answer questions pertaining only to the species they hunted. The questionnaire was not designed to include separate demographic questions for each hunter group, rather they were asked at the end of the survey for both groups. **See Appendix A for response frequencies for all questions.**

General Demographics

Most (98%) rail and snipe hunters lived in North Carolina (Question 44), 99% were male (Question 46), and 60% were 45 years of age or older (Question 47). Forty-eight percent of respondents had at least a Bachelor's degree (Question 45). Sixty percent of rail and snipe hunters indicated having a gross household income of \$60,000 or more (Question 48).

General Participation

Survey respondents were asked about their general participation in either rail or snipe hunting seasons in North Carolina. Only 10% of respondents hunted either rails or snipe in North Carolina sometime during the last 5 years (Question 1). Only respondents who had hunted either rails or snipe during the last 5 years could respond to the remaining questions in the survey.

Snipe Hunting

Participation, Effort and Harvest

Of those respondents that indicated that they hunted either rails or snipe, 83% indicated that they hunted snipe in North Carolina anytime during the last 5 years (Question 2). Only 29% of respondents indicated that during most of their snipe hunting, they are specifically pursuing snipe (Question 3). Alternately, 71%

indicated most of their snipe hunting occurs while hunting other species, e.g., upland game or waterfowl. Forty-eight percent of snipe hunters started snipe hunting before 1990 and 20% started snipe hunting after 2005 (Question 5). Only 7% of snipe hunters considered snipe hunting to be one of their most important or their most important hunting activity (Question 4). However, for those respondents that indicated that they specifically hunt snipe, 19% indicated that snipe hunting was one of their most important hunting activities (Appendix C, Table 1). Snipe hunters were asked about their participation in North Carolina's snipe season over the last five years. Thirty-three percent of snipe hunters indicated hunting snipe each of the last five years.

During the 2012-13 season, snipe hunters hunted an average of 6 days with a median of 4 days (Question 7). We detected no difference in number of days hunted for those that indicated that the specifically hunting snipe compared to those that primarily harvest snipe while hunting other species ($\chi^2=2.55$, $df=3$, $P=.466$). During the 2012-13 season, respondents harvested an average of 6 snipe (median=3), while 28% indicated that they did not harvest any snipe (Question 8). Extrapolated survey results indicate that statewide, 718 hunters hunted 4,222 (± 881) days and harvested 3,949 (± 923) snipe. Seventy-six percent of snipe hunters reported spending \$100 or less on things related to snipe hunting in the past 12 months (Question 11).

Of the six regional choices, 25% of snipe hunters indicated hunting the most days in the northern Piedmont followed by the central Coastal Plain (22%), northern Coastal Plain (21%), southern Coastal Plain (20%), southern Piedmont (8%) and mountains (4%) (Question

9). Additionally, we asked snipe hunters which three counties they snipe hunted the most days during the last 5 years (Question 10, Appendix D, Table 1). The top 3 counties included New Hanover, Brunswick and Currituck.

Areas Hunted and Hunting Styles - Snipe

Snipe hunters were asked to identify **all** the areas they hunted snipe in North Carolina in the last 5 years (Question 12). Snipe hunters more often hunted on private lands (owned-48%, leased-45%, neither owned nor leased-41%) compared to game lands (36%).

When asked to identify the areas where they **most often** hunted snipe in North Carolina in the last 5 years, 32% of snipe hunters indicated they most often hunted on leased property, while 21% most often hunted on NCWRC game lands (Question 13). Differences in property type hunted based on region most often hunted were not statistically significant ($\chi^2=13.98$, $df=9$, $P=.123$).

When provided choices reflecting the type of habitat where most snipe hunting occurs, 45% of respondents indicated that most snipe hunting occurs on wet pastures and fields flooded by rainfall (Question 14). The majority (55%) of snipe hunters typically do not use a dog when hunting snipe (Question 15), while 11% typically keep records (birds flushed, number bagged, etc.) of their snipe hunting trips (Question 16).

Thirty percent of snipe hunters indicated that they have occasionally or frequently hunted snipe on NCWRC game lands during the last 5 years (Question 17). We asked hunters to list the three game lands that they snipe hunted on the most days during the last five years (Question 18, Appendix D, Table 2). The top three game lands included: Butner-Falls of

Neuse, Croatan and Holly Shelter. We also asked hunters their likelihood of snipe hunting on game lands if more snipe hunting areas were made available near their home (Question 19). A majority (59%) indicated that they were likely to hunt snipe on game lands if more areas were made available near their homes, whereas 26% indicated that they were unlikely to hunt on game lands even if additional areas were made available near their home. We did not detect a significant relationship between region most often hunted and hunting on game lands if additional areas were made available ($\chi^2=2.50$; $df=3$; $P=.476$).

Barriers to Participation and Satisfaction - Snipe

We asked several questions about general satisfaction with snipe management, quality of hunting in North Carolina, and barriers to snipe hunting participation. Thirty-seven percent of snipe hunters indicated the overall quality of their snipe hunting had gotten worse compared to when they first started snipe hunting, while only 12% indicated it had gotten better (Question 21). Compared to other regions, snipe hunters in the Piedmont indicated that the overall quality of snipe hunting had gotten much worse over time (Appendix C, Table 2).

Of the 5 choices given, the highest percentage of respondents (39%) indicated that they were neither dissatisfied nor satisfied with how the NCWRC manages snipe (Question 22). Twelve percent indicated they were very satisfied, while 3% indicated they were very dissatisfied.

Snipe hunters were asked to identify things that may affect their snipe hunting experiences and participation in snipe hunting in North Carolina (Question 20). The percentage of snipe hunters

who indicated the following were **major** barriers affecting their snipe hunting experiences and participation were: finding public lands that hold huntable numbers of snipe – 43%, snipe populations are too low – 33%, difficult to find areas to hunt snipe on private property – 21%, work or family obligations or health problems – 19%, hunters hunting other species interferes with snipe hunting – 14%, snipe hunting regulations are too confusing – 2%, and snipe hunting is too expensive – 0%.

We examined barriers to satisfaction in relation to region most often hunted (Appendix C, Table 3). In general, Piedmont hunters indicate that finding areas to hunt snipe on private property as a major barrier when compared to Coastal Plain hunters. Piedmont snipe hunters indicate that interference from hunters hunting other species as a major barrier when compared to Coastal hunters. Piedmont hunters also indicated that low snipe populations as a major barrier to their hunting when compared to Coastal Plain hunters.

Rail Hunting

Participation, Effort and Harvest

Of those respondents that indicated that they hunted either rails or snipe (Question 1), 39% indicated that they hunted rails in North Carolina anytime during the last 5 years (Question 23). Seventy-one percent of respondents indicated that during most of their rail hunting, they are specifically pursuing rails (Question 24). Forty-six percent of rail hunters started rail hunting before 1990 and 29% started rail hunting after 2005 (Question 26). Nineteen percent of rail hunters considered rail hunting to be one of their most important or their most important hunting activity (Question

25). However, for those respondents that indicated that they specifically hunt rails, 26% indicated that rail hunting was one of their most important hunting activities (Appendix C, Table 4). Rail hunters were asked about their participation in North Carolina's rail season over the last five years. Twenty-six percent of rail hunters indicated hunting rails each of the last five years. During the 2012 season, rail hunters hunted an average of 6 days with a median of 4 days (Question 28). During the 2012 season, respondents harvested an average of 22 rails (median=17), while 12% indicated that they did not harvest any rails (Question 29).

Extrapolated survey results indicate that statewide, 332 hunters hunted 2,030 (± 508) days and harvested 7,626 ($\pm 2,694$) rails. Species proportions included Clapper Rail (79%), King Rail (6%), Virginia Rail (11%) and Sora (4%). Fifty-five percent of rail hunters reported spending \$100 or less on things related to rail hunting in the past 12 months (Question 32).

Areas Hunted and Hunting Styles - Rails

Of the six regional choices, 57% of rail hunters indicated hunting the most days in the southern Coastal Plain followed by the central Coastal Plain (29%), southern Piedmont (7%), northern Coastal Plain (5%) and northern Piedmont (3%). No respondents indicated hunting rails in the mountains during the last 5 years (Question 30). Additionally, we asked rail hunters which three counties they rail hunted the most days during the last 5 years (Question 10, Appendix D, Table 3). The top 3 counties included New Hanover, Brunswick and Carteret.

Rail hunters were asked to identify **all** the areas they hunted rails in North Carolina in the last 5 years (Question 33). Response frequencies included: state public waters (74%), private property - neither owned nor leased (24%),

private property either owned by the respondent or a hunting partner (21%) and leased property (17%). Nineteen percent of rail hunters indicated hunting on game lands during the last 5 years. When asked to identify the areas where they **most often** hunted rails in North Carolina in the last 5 years, 78% of rail hunters indicated they most often hunted on state public waters, while 2% most often hunted on NCWRC game lands (Question 34).

The majority (68%) of rail hunters typically do not use a dog when hunting rails (Question 35), while 15% typically keep records (birds flushed, number bagged, etc.) of their rail hunting trips (Question 36).

Twenty-seven percent of rail hunters indicated that they have occasionally or frequently hunted rails on NCWRC game lands during the last 5 years (Question 37). We asked hunters to list the three game lands that they rail hunted on the most days during the last five years (Question 38, Appendix D, Table 4). The top three game lands included: Croatan, Sutton Lake and Cape Fear River Wetlands.

Opinions on Rail Season Alternatives

Currently, federal frameworks allow the NCWRC to open the rail season on September 1 and close the season no later than the last Sunday in January. The season may be split into two segments. Prior to the 2013 season, the NCWRC consistently chose a continuous season beginning in early September. For the 2013 season, the NCWRC chose to split the season into two segments. Rail hunters were asked to indicate how much they disagreed or agreed with a series of statements about the general timing of the rail season and whether the season should be split into two segments (Question 39). Respondents were asked to rate

their level of disagreement/agreement on a five point scale (1=Strongly Disagree; 5=Strongly Agree).

Of the three options provided, the highest level of support was to have a continuous rail season starting in early September. Forty-eight percent of rail hunters agreed with this option while 13% disagreed (mean=3.7). A split season option was supported by 34% of respondents (mean = 3.1) while only 21% of respondents supported shifting the entire season later in the fall/winter (mean=2.5). A minimum of 36% of respondents were either neutral or unsure of their opinion for any of the 3 options (Question 39).

We also asked rail hunters a question regarding preferences for the day the season should open in September (Question 40). Of the options provided, the highest level of support was to open the season to coincide with a lunar high tide cycle. Forty-three percent of respondents agreed with this option while 17% disagreed (mean=3.5). Little support was shown to not opening the season in September, but rather moving it later in the fall (18% agreed, 48% disagreed, mean=2.3). For the remaining two options, levels of agreement and disagreement were nearly equivalent. Thirty-two percent agreed that the season should always open on September 1st (regardless of the day of week) while 30% disagreed (mean=3.0). Twenty-two percent agreed that the season should always open on the 1st Saturday in September while 25% disagreed (mean=3.0).

Barriers to Participation and Satisfaction - Rails

We asked several questions about general satisfaction with rail management, quality of hunting in North Carolina, and barriers to rail hunting participation. Twenty-one percent of rail hunters indicated the overall quality of their

rail hunting had gotten worse compared to when they first started rail hunting, while 53% indicated it had stayed about the same (Question 42). Only 9% of respondents indicated that they were dissatisfied with how the NCWRC manages rails, while 38% indicated that they were satisfied with NCWRC rail management (Question 43).

Rail hunters were asked to identify things that may affect their rail hunting experiences and participation in rail hunting in North Carolina (Question 41). Of the choices provided, the two responses with the highest percentage of hunters indicating a major barrier affecting their rail hunting experience and participation included: lack of access to areas to hunt rails due to waterfront development (33%) and limited hunting days due to tide cycles and wind conditions (32%).

DISCUSSION

Based on this survey, snipe and rail hunters in North Carolina are almost exclusively male and 60% are at least 45 years old. In North Carolina, snipe and rail hunters are older than hunters who pursue other species – dove hunters (51%≥45 years), deer hunters (48%≥45 years) and duck hunters (40%≥45 years) (Palmer 2009, Fuller et al. 2011, Fuller et al. 2012a). Snipe and rail hunters are similar to woodcock hunters where 59% were greater than 45 years old (Fuller et al. 2012b). We caution that hunters less than 16 years of age are underrepresented in the sample frames for each of these surveys because many are not required to be HIP certified and/or licensed. Compared to surveys of other hunter groups in North Carolina (Palmer 2009, Fuller et al. 2011, Fuller et al. 2012a, b), snipe and rail hunters in North Carolina had similar education levels to woodcock and waterfowl hunters (48% of snipe

and rail hunters, 45% of woodcock hunters and 42% of waterfowl hunters had at least a Bachelor's degree), and higher levels of formal education than dove hunters (35% had at least a Bachelor's degree), and deer hunters (20% had at least a Bachelor's degree). Levels of gross household income for North Carolina snipe and rail hunters (60%>\$60,000) were similar to other migratory bird hunters in North Carolina (Woodcock: 57%>\$60,000, dove hunters: 57%>\$60,000, waterfowl: 64%>\$60,000), but much greater than North Carolina deer hunters (43%>\$60,000).

We note that only 10% of respondents indicated that they hunted either snipe or rails in North Carolina during the last 5 years. This was unexpectedly low as the HIP screening question(s) specifically asks if the individual hunted either snipe/coots or rails/gallinules the previous year. Although our stratified sampling did target snipe and rail hunters more effectively than would have been accomplished by simple random sampling, the overall use of HIP screening questions to target the two hunter groups is a very inefficient survey method. We believe this inefficiency is very likely related to vendor compliance issues. Administration of the HIP screening questions by vendors is suspect with numerous anecdotal examples of vendors answering questions without customer input. The error rate associated with incorrect coding of the screening question by vendors can be magnified by only a few vendors in instances where the hunter group, e.g., rail hunters, is few in numbers. Inefficiencies with data collection will likely continue until significant changes are made to how migratory game bird hunters are licensed or permitted in North Carolina.

Snipe Hunting

Prior to this survey, we suspected that some portion of snipe hunting and harvest occurs while pursuing other species, unlike the hunting of many other species, e.g., deer, bear, turkey. Accordingly, only 29% indicated that most of their snipe hunting and harvest occurred while specifically pursuing snipe. We assume that the majority of this “incidental” hunting is occurring by hunters pursuing either waterfowl or woodcock. In a 2013 statewide survey of all licensed hunters, 17% of snipe hunters were considered as “incidental” hunters as defined by indicating 0 days hunted, but ≥ 1 snipe harvested. Other than several predator species (bobcat, coyote, fox), the percent of incidental snipe hunters was higher than all other species hunter groups (NCWRC-unpublished data).

Only 11% of snipe hunters were dissatisfied with how the NCWRC manages snipe in North Carolina. We note that 63% were either neutral or unsure of their opinion. This is most likely because habitat management conducted by the NCWRC is normally not directed specifically towards snipe and management plans and documents prepared by the NCWRC usually do not emphasize snipe habitat or harvest management. Further, because of the relatively few individuals that specifically pursue snipe, there has been minimal direct communication with snipe hunters in the past.

Not unexpectedly, most snipe hunting occurs on private lands. We note however that 36% of snipe hunters indicated hunting on NCWRC game lands during the last 5 years and 21% indicating that they hunted most often on NCWRC game lands. In comparison, snipe hunters utilize game lands much more so than waterfowl hunters (7% most often hunt on game lands) and dove hunters (6% most often

hunt on game lands), but similar to woodcock hunters (22% most often hunt on game lands). With increasing urbanization, changing land use patterns and ownership, we are interested in seeing if game bird hunting and land ownership patterns change over time. Increasingly, it is difficult to simply obtain permission to hunt private property and any future surveys should track this issue as it relates to game bird hunting in general.

Breeding Bird Survey (BBS) Routes suggest a long-term (1966-2011) stable population of snipe in eastern North America (<http://www.mbr-pwrc.usgs.gov/bbs/>). In spite of the indications from the BBS, nearly 33% of respondents in this survey indicated that snipe populations being too low as a major barrier to their snipe hunting participation and 12% indicated that the overall quality of their snipe hunting had gotten much worse over time. If snipe populations have remained relatively stable over time, decline in quality hunting may be more related to reduction in habitat necessary to concentrate large numbers of snipe in association with a reduction in the ability to gain access to preferred snipe hunting areas.

Estimates of the number of snipe hunters and harvest statewide determined from this survey provide interesting comparisons to other surveys. Our estimate of 787 snipe hunters from this survey is very similar to the 2012 North Carolina Hunter Harvest Survey (633 hunters) and the 2012 USFWS estimate generated from the HIP program (800 hunters) (Raftovich and Wilkins 2013). However, the total statewide harvest determined from this survey (3,949 snipe harvested) is much higher than the NC Hunter Harvest Survey (921 snipe harvested) or the USFWS HIP estimate (800

snipe harvested). The wide discrepancy is due to differences between the mean number of snipe harvested per hunter as determined by each of the surveys [1.0/hunter (HIP), 1.5/hunter (NC Hunter Harvest Survey), 5.9/hunter (this survey)]. We believe that this survey likely provides a more accurate measure of harvest because the harvest/hunter estimate is based on 100 responses as opposed to 12 responses from the NC Hunter Harvest Survey and 2 responses from the USFWS HIP.

We did not ask snipe hunters questions regarding the timing of the snipe season in North Carolina. Currently, federal guidelines allow a maximum 107-day season that can occur anytime between September 1 and February 28. The season can be split into 2 segments. For a number of years, the Commission has taken the maximum season days allowed backed up consecutively from the February 28 ending date. Based on our knowledge of snipe migrations, concentrations and anecdotal information from snipe hunters, we are not aware of any desire to set the season to start any earlier than mid-November; the only viable option for a season date change.

Rail Hunting

Unlike snipe (this survey) and woodcock hunting (Fuller et al. 2012b), most rail hunting and harvest occurs while specifically pursuing rails. This isn't surprising given the unique habitat and hunting methods required for rails. Nearly 40% of rail hunters were satisfied with how the NCWRC manages rail in North Carolina. However, over 50% of respondents were either neutral or unsure of their opinion. The satisfaction with NCWRC management likely is related to the relatively high bag limits and season length enjoyed for a number of years rather than any direct habitat management or

agency programs that are geared towards rail management. In fact, abundance of rails is most likely related to maintenance of the structure and function of tidal marshes that directly results from coastal wetland protection laws (Eddleman et al. 1988).

Not unexpectedly, most rail hunting occurs on state public waters. Although 20% of rail hunting occurs on private property, we suspect that some of these areas are in fact privately owned marsh adjacent to public waters. Due to the relatively restricted habitat type and hunting style for most rail species, continued access and hunting of coastal marsh is critical to the continuation of rail hunting traditions. Although the NCWRC can only control access and hunting of state owned game lands, the agency should be concerned about continued coastal waterfront development. The concern relates in part to potential degradation of marsh habitat, but also hunting restrictions that commonly occur with developed waterfront.

Population status of rails from both a regional and state perspective is poorly understood and there is general consensus that standardized surveys are needed to track populations trends (D.J. Case & Associates 2009). Although harvest estimates for rails are monitored with reasonable precision at regional and nationwide scales, harvest estimates for North Carolina from the HIP program are either not estimated in some years, or when available, precision is poor. In addition, accuracy of HIP estimates for North Carolina is likely poor due to extremely limited hunter responses. Compared to the most recent HIP generated estimate (500 hunters) from 2010 (Raftovich et al. 2012), this survey estimated slightly fewer hunters (332). In contrast, harvest estimates from this survey (7,626 rails harvested) was much greater than

that derived from HIP (900 rails harvested). Similar to the snipe harvest estimates, the discrepancy is exacerbated by the reported mean harvest per hunter within each survey. Because hunter response and sample size are low most years, HIP harvest and hunter estimates are normally averaged over a period of years. Most recently, HIP estimates report on average 3.1 rails harvested/hunter whereas results from this survey indicated 20.6 rails harvested/hunter. Our estimates were based on responses from 52 rail hunters whereas HIP estimates are generally based on fewer than 5 hunter contacts in any given year.

For the 2012 season, Atlantic Flyway harvest estimates derived from HIP apportion the rail harvest as follows: 85% Clapper Rail, 14% Sora, 1% Virginia Rail and 0% King Rail. We estimated the harvest in North Carolina as 79% Clapper Rail, 4% Sora, 11% Virginia Rail and 6% King Rail. As expected, Clapper Rails comprise the majority of the rail harvest, and this was confirmed by both surveys. Harvest apportionment by the HIP is determined from hunter submitted wings, so identification to species should be accurate. Our survey simply asked hunters to list the number of each species harvested. We recognize that the Virginia Rail and Sora may be confused by some hunters and incorrectly reported on our survey. Further, distinguishing between Clapper and King Rail can be much more difficult and may be one reason why King Rails accounted for a relatively large proportion of our harvest when compared the Atlantic Flyway HIP estimate.

In the recent past, the setting of the rail season has occurred with limited public input from rail hunters. The relatively few rail hunters in North Carolina typically have limited contact with the agency in regards to season preferences or

questions regarding population status or management concerns. This might suggest that many rail hunters are satisfied with current hunting opportunities and season structure. For a number of years, the NCWRC has set the season to occur from early September through mid-November with all 70 days running consecutively. In the last 20 years, the rail opener has coincided with the dove season opening in some years and not in other years. In addition, it has occasionally opened on September 1 with and without a concurrent dove opening. We are unaware of the decision process used to determine the optimal opening hunting day, but we surmise that it was based partly on limited, anecdotal communications with rail hunters and agency inertia with changing seasons with limited public input.

Based on our knowledge of the majority of coastal rail hunting being dictated by lunar and wind tide conditions, our season preference questions attempted to understand whether rail hunters desired any changes to season timing compared to the status quo. The responses to our season preference questions, taken individually, present somewhat conflicting results. Many more hunters agree, than disagree, that the season timing should remain as is, i.e., a consecutive 70-day season occurring from early September to early November. However, a separate question indicated that a majority of rail hunters are either neutral or support the opening of the season to take advantage of a lunar high tide cycle which could delay the season opening to as late as September 15. This option garnered more support than options to either always open the season on September 1 or always open on the first Saturday in September. These results must be considered along with the fact that a limited number of hunting days due to

tide and wind conditions ranked high as a major barrier to rail hunting participation. This suggests that rail hunters are open to minor modifications to the rail season to better target hunting days around lunar tide cycles. Based on preliminary results from this survey, the NCWRC did select a split season for the 2013 rail season. The season opened slightly later than normal (September 7th) and closed for nearly one week in late September. We presume that this structure allowed for potentially more days afield as the 1st week of September and the last several days of September and early October experienced low lunar tides during a time period when we expected few coastal rail hunters would have hunted anyway. The relatively short closed period also avoided the season extending much further into November or December, which would not have been supported by the majority of rail hunters.

LITERATURE CITED

- Agresti, A. and B. Finlay. 1999. Statistical methods for the social sciences, Third edition. Prentice Hall, Upper Saddle River, New Jersey, USA.
- Delucchi, K.L. 1983. The use and misuse of chi-square: Lewis and Burke revisited. *Psychological Bulletin* 94(1):166-176.
- Dillman, D.A., J. D. Smyth, and L. M. Christian. 2009. Internet, mail, and mixed-mode surveys: the tailored design method. John Wiley & Sons, Inc., Hoboken, New Jersey.
- D.J. Case and Associates. 2009. Priority Information Needs for Rails and Snipe. Association of Fish & Wildlife Agencies' Migratory and Upland Game Bird Support Task Force.
- Eddleman, W.R., F.L. Knopf, B. Meanley, F.A. Reid, and R. Zembal. 1988. Conservation of North American rallids. *Wilson Bulletin*. 100:458-475.
- Fuller, J., D. Howell and D. Palmer. 2011. 2010-2011 Waterfowl Hunter Survey Report. North Carolina Wildlife Resources Commission – unpublished report.
- Fuller, J. D. Palmer, C. Baranski, R. Jacobs, M. Jones, and K Knight. 2012*a*. 2011-2012 North Carolina Dove Hunter Survey Report. North Carolina Wildlife Resources Commission – unpublished report.
- Fuller, J. D. Palmer, C. Baranski, R. Jacobs, M. Jones, and K. Knight. 2012*b*. 2011-2012 North Carolina Woodcock Hunter Survey Report. North Carolina Wildlife Resources Commission – unpublished report.
- Palmer, D. 2009. 2006 Survey of Deer Hunters in North Carolina. North Carolina Wildlife Resources Commission – unpublished report.
- Raftovich, R.V., K.A. Wilkins, S.S. Williams, and H.L. Spriggs. 2012. Migratory Bird Hunting Activity and Harvest during the 2010 and 2011 Hunting Seasons. U.S. Fish and Wildlife Service, Laurel, Maryland, USA.
- Raftovich, R.V. and K.A. Wilkins. 2013. Migratory bird hunting activity and harvest during the 2011-12 and 2012-13 hunting seasons. U.S. Fish and Wildlife Service, Laurel, Maryland, USA.
- SPSS. 2012. IBM SPSS Statistics, Version 21.0. SPSS Inc., Chicago, Illinois.
- Vaske, J. J. 2008. Survey research and analysis: applications in parks, recreation, and human dimensions. Venture Publishing, Inc., State College, Pennsylvania.

Winship, C. and L. Radbill. 1994. Sampling weights and regression analysis. *Sociological Methods and Research* 23(2):230-257.

Appendix A: Survey Instrument/Frequencies



2012-13 North Carolina Rail & Snipe Hunter Survey

This survey is an opportunity for you to let us know about your experiences and opinions about rail (marsh hens) and snipe hunting and management in North Carolina. We need to hear from you even if you rarely or never have hunted rails or snipe. **If you have never hunted rails or snipe, please answer the first question and return the survey.**

1. Have you hunted either rails (also known as marsh hens) or snipe in North Carolina anytime during the last 5 years? Note: You should answer "Yes" to this question if you sometimes harvest or attempt to harvest snipe or rails (marsh hens) even though you may be primarily hunting other species.

9.6% Yes (**continue to question 2**)

90.4% No (**please stop here and return the survey**)

General Snipe Hunting

2. Have you hunted snipe in North Carolina anytime during the last 5 years?

83.3% Yes (**continue to question 3**)

16.7% No (**please skip to question 23 on page 7**)

3. Which of the following best describes your snipe hunting in North Carolina? (**check only one**)

29.4% During most of my snipe hunting I am specifically hunting snipe

70.6% Most of my snipe harvest occurs while I'm hunting other species (for example – upland game or waterfowl)

4. How important is snipe hunting to you? (**check only one**)

25.4% It's one of my least important hunting activities

36.1% It's less important than my other hunting activities

31.5% It's no more important than my other hunting activities

6.6% It's one of my most important hunting activities

0.5% It's my most important hunting activity

5. When did you start hunting snipe? (**check only one**)

19.6% Before 1970

13.1% 1970 to 1979

15.4% 1980 to 1989

10.7% 1990 to 1999

21.6% 2000 to 2005

19.6% 2006 or later

6. During which of the last 5 hunting seasons did you hunt snipe in North Carolina? (**check all that apply**)

- 64.3% 2012-13
- 71.5% 2011-12
- 69.9% 2010-11
- 60.4% 2009-10
- 56.7% 2008-09

7. About how many days did you hunt snipe during the 2012-13 season in North Carolina (November 14, 2012 through February 28, 2013)?

5.88 (Mean); 4 (Median) Days

29.2% Check here if you did not hunt during the 2012-13 season (**please skip to question 9**)

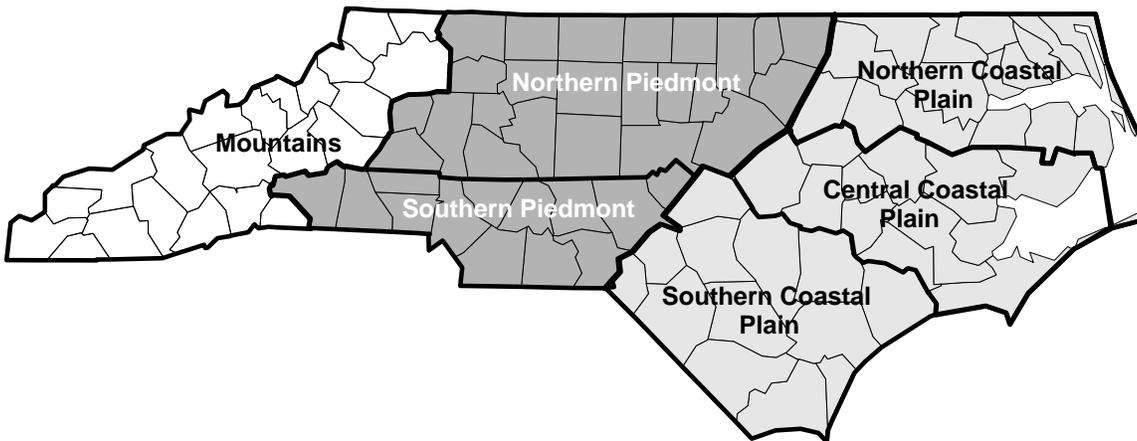
8. About how many snipe did you **personally** harvest during the 2012-13 season in North Carolina? Do not record harvests of others with whom you hunted.

5.50 (Mean); 3 (Median) Snipe

28.4% Check here if you did not harvest any snipe during the 2012-13 season

9. Using the map below, please indicate the region in North Carolina in which you snipe hunted the **most** days during the last 5 years. (**check only one**)

- 4.4% Mountains
- 25.4% Northern Piedmont
- 8.4% Southern Piedmont
- 20.5% Northern Coastal Plain
- 21.8% Central Coastal Plain
- 19.6% Southern Coastal Plain



10. In which 3 counties in North Carolina did you snipe hunt the most days during the last 5 years?

County Name	
1.	New Hanover (4.7%)
2.	Brunswick (4.6%)
3.	Currituck (4.2%)

11. About how much money did you spend in North Carolina and outside North Carolina on things related to snipe hunting in the past 12 months (for example: ammunition, gear, lodging, food and transportation costs, dog expenses, hunting leases, habitat management)? (**check only one**)

- 76.1% \$100 or less
- 7.2% \$101 to \$200
- 8.3% \$201 to \$500
- 8.4% Over \$500

Areas Snipe Hunted and Snipe Hunting Styles

12. Please indicate **all** the areas where you hunted snipe in North Carolina in the last 5 years. Note: All national forests in North Carolina are part of the Wildlife Commission game lands program. (**check all that apply**)

- 45.0% Private property (leased or rented by me or a hunting partner)
- 48.3% Private property (owned by me or a hunting partner)
- 40.9% Private property (not owned or leased by me or a hunting partner)
- 36.3% Wildlife Commission game lands, including national forests
- 3.5% Other (please specify): _____

13. In the last 5 years, where did you **most often** hunt snipe in North Carolina? Note: All national forests in North Carolina are part of the Wildlife Commission game lands program. (**check only one**)

- 31.1% Private property (leased or rented by me or a hunting partner)
- 28.2% Private property (owned by me or a hunting partner)
- 17.1% Private property (not owned or leased by me or a hunting partner)
- 21.0% Wildlife Commission game lands, including national forests
- 2.6% Other (please specify): _____

14. Which of the following best reflects the type of habitat where **most** of your snipe hunting occurs? (**check only one**)

- 44.5% Most of my snipe hunting occurs on wet pastures and fields flooded by rainfall.
- 16.4% Most of my snipe hunting occurs on managed waterfowl impoundments during winter/spring draw-down.
- 15.2% Most of my snipe hunting occurs on wet areas in lakes and reservoirs.
- 23.8% Other (please specify): _____

15. Do you typically use a dog when snipe hunting?

- 44.7% Yes
- 55.3% No

16. Do you typically keep records of your snipe hunting trips (numbers of birds flushed, number bagged, etc.)?

- 11.3% Yes
- 88.7% No

17. Which of the following best describes your use of N.C. Wildlife Commission game lands for snipe hunting during the last 5 years? (**check only one**)
- 69.8% I do not or very rarely hunt snipe on Commission game lands (**please skip to question 19**)
 - 19.8% I have occasionally hunted snipe on Commission game lands
 - 10.4% I have frequently hunted snipe on Commission game lands

18. Please list the 3 game lands that you snipe hunted most often on during the last 5 years.

Game Land Name	
1.	Butner-Falls of Neuse (16.3%)
2.	Croatan National Forest (9.5%)
3.	Holly Shelter (8.7%)

19. If more snipe hunting areas on game lands were made available in areas near your home, how unlikely or likely would you be to snipe hunt on these areas? (**check only one**)
- 17.9% Very unlikely
 - 8.4% Somewhat unlikely
 - 8.4% Neither unlikely nor likely
 - 29.1% Somewhat likely
 - 30.2% Very likely
 - 4.9% Unsure

Snipe Hunting Satisfaction

20. Some things may affect your snipe hunting experiences and participation. Please indicate which of the following are not barriers, minor barriers, or major barriers to your snipe hunting in North Carolina. (**check one for each possible barrier**)

	Not a Barrier	Minor Barrier	Major Barrier
Finding areas to hunt snipe on private property	46.0%	32.9%	21.1%
Finding public lands that hold huntable numbers of snipe	27.9%	28.8%	43.3%
Interference from hunters hunting other species	54.5%	31.7%	13.8%
Snipe populations are too low	27.2%	40.1%	32.7%
Work or family obligations or health problems	45.6%	35.3%	19.1%
Snipe hunting is too expensive	91.0%	9.0%	0.0%
Snipe hunting regulations are too confusing	73.2%	25.0%	1.8%
Other barrier (please specify):			

21. Since you began snipe hunting what changes have you observed in the overall quality of your snipe hunting in North Carolina? (**check only one**)
- 12.0% It has gotten much worse
 - 25.2% It has gotten a little worse
 - 36.4% It has stayed about the same
 - 11.3% It has gotten a little better
 - 0.6% It has gotten much better
 - 14.7% Unsure
22. In general, how dissatisfied or satisfied are you with how the N.C. Wildlife Resources Commission manages snipe in North Carolina? (**check only one**)
- 3.1% Very dissatisfied
 - 8.2% Somewhat dissatisfied
 - 38.7% Neither dissatisfied nor satisfied
 - 14.2% Somewhat satisfied
 - 11.7% Very satisfied
 - 24.1% Unsure

General Rail (Marsh Hen) Hunting

23. Have you hunted rails (also known as marsh hens) in North Carolina anytime during the last 5 years?
- 39.2% Yes (**continue to question 24**)
 - 60.8% No (**please skip to question 44 on page 15**)
24. Which of the following best describes your rail hunting in North Carolina? (**check only one**)
- 71.1% During most of my rail hunting and harvest I am specifically hunting rails
 - 28.9% Most of my rail hunting and harvest occurs while I'm hunting other species (for example – waterfowl)
25. How important is rail hunting to you? (**check only one**)
- 15.2% It's one of my least important hunting activities
 - 31.3% It's less important than my other hunting activities
 - 33.9% It's no more important than my other hunting activities
 - 18.3% It's one of my most important hunting activities
 - 1.1% It's my most important hunting activity
26. When did you start hunting rails? (**check only one**)
- 16.8% Before 1970
 - 12.0% 1970 to 1979
 - 17.0% 1980 to 1989
 - 11.5% 1990 to 1999
 - 14.5% 2000 to 2005
 - 28.7% 2006 or later

27. During which of the last 5 hunting seasons did you hunt rails in North Carolina? (**check all that apply**)

- 64.8% 2012
- 69.8% 2011
- 60.6% 2010
- 52.0% 2009
- 46.9% 2008

28. About how many days did you hunt rails during the 2012 season in North Carolina (September 1 through November 9)?

6.11 (Mean); 4 (Median) Days

27.8% Check here if you did not hunt during the 2012 season (**please skip to question 30**)

29. About how many rails of the following different species did you ***personally*** harvest during the 2012 season in North Carolina? Record the number you harvested or check "Did not harvest" for each species. Do not record harvests of others with whom you hunted. **If you are not comfortable with providing estimates for each species, leave this section blank and simply provide us with the total number of rails harvested.**

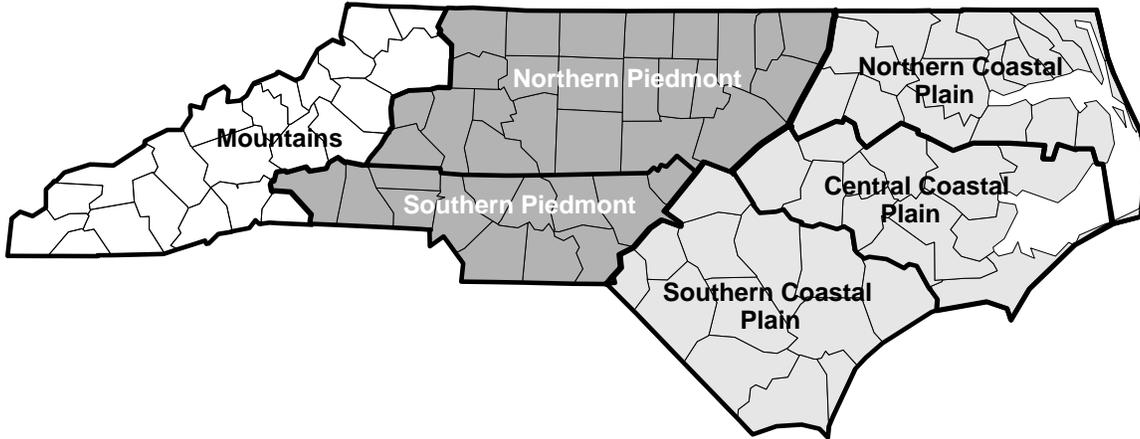
Species	Number Harvested	Did not harvest
Clapper Rail	<u>22.16 (Mean); 11.75 (Median)</u>	10.5%
King Rail	<u>4.26 (Mean); 2 (Median)</u>	31.2%
Sora Rail	<u>3.88 (Mean); 4 (Median)</u>	34.9%
Virginia Rail	<u>9.57 (Mean); 8 (Median)</u>	32.4%

Total number of rails harvested: 22.95 (Mean); 17 (Median)

12.0% Check here if you did not harvest any rails during the 2012 season

30. Using the map below, please indicate the region in North Carolina in which you rail hunted the **most** days during the last 5 years. (**check only one**)

- 0% Mountains
- 2.6% Northern Piedmont
- 6.9% Southern Piedmont
- 4.8% Northern Coastal Plain
- 28.5% Central Coastal Plain
- 57.2% Southern Coastal Plain



31. In which 3 counties in North Carolina did you rail hunt the most days during the last 5 years?

	County Name
1.	New Hanover (25.9%)
2.	Brunswick (22.4%)
3.	Carteret (9.9%)

32. About how much money did you spend in North Carolina and outside North Carolina on things related to rail hunting in the past 12 months (for example: ammunition, gear, lodging, food and transportation costs, dog expenses, hunting leases, habitat management)? (**check only one**)

- 54.7% \$100 or less
- 20.9% \$101 to \$200
- 8.5% \$201 to \$500
- 15.8% Over \$500

Areas Rail Hunted and Rail Hunting Styles

33. Please indicate **all** the areas where you hunted rails in North Carolina in the last 5 years. Note: All national forests in North Carolina are part of the Wildlife Commission game lands program.

(**check all that apply**)

- 17.0% Private property (leased or rented by me or a hunting partner)
- 21.1% Private property (owned by me or a hunting partner)
- 23.9% Private property (not owned or leased by me or a hunting partner)
- 74.3% State public waters (navigable streams, rivers, coastal sounds and public reservoirs)
- 18.6% Wildlife Commission game lands, including national forests
- 2.5% Other (please specify): _____

34. In the last 5 years, where did you **most often** hunt rails in North Carolina? Note: All national forests in North Carolina are part of the Wildlife Commission game lands program. (**check only one**)
- 2.9% Private property (leased or rented by me or a hunting partner)
 - 10.9% Private property (owned by me or a hunting partner)
 - 5.7% Private property (not owned or leased by me or a hunting partner)
 - 77.5% State public waters (navigable streams, rivers, coastal sounds and public reservoirs)
 - 1.5% Wildlife Commission game lands, including national forests
 - 1.4% Other (please specify): _____

35. Do you typically use a dog when rail hunting?
- 32.1% Yes
 - 67.9% No

36. Do you typically keep records of your rail hunting trips (numbers of birds flushed, number bagged, etc.)?
- 14.9% Yes
 - 85.1% No

37. Which of the following best describes your use of N.C. Wildlife Commission game lands for rail hunting during the last 5 years? (**check only one**)
- 73.3% I do not or very rarely hunt rails on Commission game lands (**please skip to question 39 on page 12**)
 - 24.1% I have occasionally hunted rails on Commission game lands
 - 2.7% I have frequently hunted rails on Commission game lands

38. Please list the 3 game lands that you rail hunted most often on during the last 5 years.

	Game Land Name
1.	Croatan National Forest (12.5%)
2.	Sutton Lake (9.9%)
3.	Cape Fear River Wetlands (9.4%)

Rail Season Preferences and Satisfaction

Currently, federal guidelines allow for a 70 day rail season that may begin as early as September 1st and must end no later than the last Sunday in January. The season may be split into 2 segments. For many years, the rail season in North Carolina has started in early September with all 70 days running consecutively and ending in early November.

39. Considering the current rail season structure as described above, please indicate how much you disagree or agree with the following statements. (**check one for each statement**) Note: Please review all options before responding.

	Strongly Disagree		Neutral		Strongly Agree	Unsure
	1	2	3	4	5	Unsure
The Commission should keep the current rail season structure (early September to early November)	4.8%	8.6%	25.3%	19.0%	29.3%	13.0%
The Commission should shift the entire season later (mid-November to late January with no splits)	28.7%	14.6%	24.6%	12.3%	8.9%	11.0%
The Commission should split the season with some days occurring early in the framework and the rest later in the framework	17.3%	9.0%	23.5%	18.6%	15.8%	15.8%

40. We know that many coastal rail hunters target their hunting days with lunar high tides during a full or new moon. As it relates to opening day and tide cycles, please indicate how much you disagree or agree with the following statements. (**check one for each statement**) Note: Please review all options before responding.

	Strongly Disagree	Neutral			Strongly Agree	Unsure
	1	2	3	4	5	
The Commission should always open the season on September 1 st (no matter what the day of the week)	17.8%	12.2%	28.1%	14.2%	18.1%	9.6%
The Commission should always open the season on the 1 st Saturday in September	14.4%	11.0%	43.5%	4.4%	18.0%	8.6%
The Commission should strive to open the season with the lunar high tide cycle (around a full or new moon). This could mean opening the season anytime from around September 1 st to September 15th	5.7%	11.0%	28.7%	17.0%	26.1%	11.5%
The Commission should not open the season in September; it should be opened later in the fall	33.8%	14.1%	20.7%	11.1%	6.8%	13.6%

41. Some things may affect your rail hunting experiences and participation. Please indicate which of the following are not barriers, minor barriers, or major barriers to your rail hunting in North Carolina. (**check one for each possible barrier**)

	Not a Barrier	Minor Barrier	Major Barrier
Lack of access to areas to hunt rails due to waterfront development	33.9%	33.4%	32.7%
Finding huntable numbers of rails	35.4%	41.1%	23.5%
Limited number of hunting days due to tide cycles and/or wind conditions	20.3%	47.5%	32.2%
Interference from hunters hunting other species	71.3%	24.5%	4.2%
Work or family obligations or health problems	43.0%	27.0%	30.0%
Rail hunting is too expensive	92.4%	7.6%	0%
Rail hunting regulations are too confusing	67.8%	29.4%	2.8%
Other barrier (please specify):			

42. Since you began rail hunting what changes have you observed in the overall quality of your rail hunting in North Carolina? (**check only one**)

- 5.2% It has gotten much worse
- 15.3% It has gotten a little worse
- 53.3% It has stayed about the same
- 11.2% It has gotten a little better
- 0.0% It has gotten much better
- 15.1% Unsure

43. In general, how dissatisfied or satisfied are you with how the N.C. Wildlife Resources Commission manages rails in North Carolina? (**check only one**)

- 0.0% Very dissatisfied
- 8.5% Somewhat dissatisfied
- 28.9% Neither dissatisfied nor satisfied
- 17.4% Somewhat satisfied
- 20.3% Very satisfied
- 24.8% Unsure

Background Information

For us to understand people’s responses to the previous questions more fully, we need to know a few things about your background. Remember you are volunteering to participate in this study and you can skip any questions you don’t want to answer.

44. In what state do you live? (**check only one**)

- 97.9% North Carolina
- 2.1% Other _____

45. What is the highest level of formal education you have completed? (**check only one**)

- 4.8% Less than a high school graduate
- 11.9% High school graduate or GED
- 22.6% Some college or trade school
- 12.4% Associate or trade school degree
- 33.8% Bachelor's or four-year degree
- 14.5% Graduate or professional degree

46. Are you male or female?

- 98.8% Male
- 1.2% Female

47. Please indicate your age. (**check only one**)

- 0.0% Under 16
- 10.8% 16 to 24
- 11.9% 25 to 34
- 17.3% 35 to 44
- 21.4% 45 to 54
- 38.6% 55 and over

48. Which of the following best represents your gross household income (before taxes) last year?
(**check only one**)

- 5.4% Less than \$20,000
- 15.6% \$20,000 to \$39,999
- 19.1% \$40,000 to \$59,999
- 17.8% \$60,000 to \$79,999
- 14.9% \$80,000 to \$99,999
- 9.2% \$100,000 to \$119,999
- 17.9% \$120,000 or more

Thank you for your participation! If you would like us to notify you when the results of the survey are posted online, please give us your email address: _____

If you have any other comments you would like to share with us, please use the space below or attach additional sheets.

Please use the enclosed postage-paid envelope, or mail this survey to:

**Rail and Snipe Hunter Survey
N.C. Wildlife Resources Commission
1722 Mail Service Center
Raleigh, NC 27699-1722**

Appendix B: Survey Design and Analysis

Table 1. Data Weighting.

License Type	Age	Sample Frame		Respondents		Weight ^a
		Count	%	Count	%	
Short-term and Annual	Under 16	0	0.0%	0	0.0%	0.000
	16 to 24	285	9.9%	87	5.0%	3.276
	25 to 34	317	11.0%	117	6.8%	2.709
	35 to 44	342	11.9%	154	8.9%	2.221
	45 to 54	381	13.2%	211	12.2%	1.806
	55 and over	382	13.3%	282	16.3%	1.355
Lifetime	Under 16	0	0.0%	0	0.0%	0.000
	16 to 24	168	5.8%	91	5.3%	1.846
	25 to 34	128	4.5%	86	5.0%	1.488
	35 to 44	116	4.0%	85	4.9%	1.365
	45 to 54	157	5.5%	126	7.3%	1.246
	55 and over	600	20.9%	494	28.5%	1.215

^a Weight calculation = (Sampling Frame Count/Respondents Count)*1

Table 2. Interpretation of effect sizes (adapted from Vaske 2008, p. 108).

Test	Minimal Relationship	Typical Relationship	Substantial Relationship
Cramer's <i>V</i>	.10	.30	.50
<i>eta</i>	.10	.243	.371
Cohen's <i>d</i>	.20	.50	.80

Table 3. Response rate of snipe and rail hunters based on HIP screening questions and sampling allocations.

	HIP Screening questions			Survey Total
	Did not hunt snipe, but hunted rails ¹	Did not hunt rails, but hunted snipe ²	Hunted both rails and snipe ³	
Percentage of respondents indicating they hunted snipe anytime the last 5 years	7% (29)	13% (110)	3% (13)	9% (152)
Percentage of respondents indicating they hunted rails anytime the last 5 years	10% (42)	3% (25)	1% (7)	4% (74)
Percentage of survey respondents	58% (407)	67% (826)	53% (501)	60% (1,734)

¹ 707 of 740 (100%) individuals surveyed

² 1,231 of 2,597 (49%) individuals surveyed

³ 939 of 29,079 (3%) individuals surveyed

Appendix C: Cross-tabulations

Table 1. Opinions on importance of snipe hunting (Question 4) by description of snipe hunting in North Carolina (Question 3).

How important is snipe hunting to you?	Which of the following best describes your snipe hunting in North Carolina? ^a	
	During most of my snipe hunting I am specifically hunting snipe.	Most of my snipe harvest occurs while I'm hunting other species.
It's one of my least important hunting activities.	23.1%	26.1%
It's less important than my other hunting activities.	29.2%	38.9%
It's no more important than my other hunting activities.	27.7%	33.1%
It's one of my most important hunting activities.	20.0% ^b	1.9% ^c

^a $\chi^2 = 22.65$; $df = 3$; $P = <.001$; Cramer's $V = .319$

^b Adjusted residual ≥ 2

^c Adjusted residual ≤ -2

Table 2. Opinions on changes in snipe hunting quality (Question 21) by region most often snipe hunted (Question 9).

Since you began snipe hunting what changes have you observed in the overall quality of your snipe hunting in North Carolina?	Indicate the region in North Carolina in which you snipe hunted the most days during the last 5 years. ^a		
	Mountains ^b	Piedmont	Coastal Plain
It has gotten much worse.	--	23.0% ^c	3.9% ^d
It has gotten a little worse.	--	31.1%	30.4%
It has stayed about the same.	--	36.1%	49.0%
It has gotten better.	--	9.8%	16.7%

^a $\chi^2 = 18.64$; $df = 6$; $P = .005$; Cramer's $V = .233$

^b Category not included due to low numbers of respondents.

^c Adjusted residual ≥ 2

^d Adjusted residual ≤ -2

Table 3. Region in which hunters hunted the most days (Question 9) by perceived barriers to hunters snipe hunting (Question 20) as reported during a 2013 survey of North Carolina snipe hunters.

Please indicate which of the following are not barriers, minor barriers, or major barriers to your snipe hunting in North Carolina.		Indicate the region in North Carolina in which you snipe hunted the most days during the last 5 years.		
		Mountains ^h	Piedmont	Coastal Plain
Finding areas to hunt snipe on private property. ^a	Not a Barrier	--	36.2% ^j	52.5% ⁱ
	Minor Barrier	--	36.2%	33.9%
	Major Barrier	--	27.5%	13.6%
Finding public lands that hold huntable numbers of snipe. ^b	Not a Barrier	--	20.3%	31.9%
	Minor Barrier	--	34.4%	25.7%
	Major Barrier	--	45.3%	42.5%
Interference from hunters hunting other species. ^c	Not a Barrier	--	46.9%	57.4%
	Minor Barrier	--	25.0%	37.4%
	Major Barrier	--	28.1% ⁱ	5.2% ^j
Snipe populations are too low. ^d	Not a Barrier	--	25.4%	28.1%
	Minor Barrier	--	26.8% ^j	50.9% ⁱ
	Major Barrier	--	47.9% ⁱ	21.1% ^j
Work or family obligations or health problems. ^e	Not a Barrier	--	50.7%	41.7%
	Minor Barrier	--	40.3%	33.0%
	Major Barrier	--	9.0% ^j	25.2% ⁱ
Snipe hunting is too expensive. ^f	Not a Barrier	--	94.0%	89.6%
	Minor Barrier	--	6.0%	10.4%
Snipe hunting regulations are too confusing. ^g	Not a Barrier	--	84.8% ⁱ	69.1% ^j
	Minor Barrier	--	15.2% ^j	30.9% ⁱ
	Major Barrier ^h	--	--	--

^a $\chi^2 = 7.10$; $df = 2$; $P = .029$; Cramer's $V = .195$

^b $\chi^2 = 3.12$; $df = 2$; $P = .210$; Cramer's $V = .133$

^c $\chi^2 = 18.86$; $df = 2$; $P < .001$; Cramer's $V = .325$

^d $\chi^2 = 16.28$; $df = 2$; $P < .001$; Cramer's $V = .297$

^e $\chi^2 = 7.21$; $df = 2$; $P = .027$; Cramer's $V = .199$

^f $\chi^2 = 1.05$; $df = 1$; $P = .305$; Cramer's $V = .076$

^g $\chi^2 = 5.46$; $df = 1$; $P = .019$; Cramer's $V = .176$

^h Category not included due to low numbers of respondents.

ⁱ Adjusted residual ≥ 2

^j Adjusted residual ≤ -2

Table 4. Opinions on importance of rail hunting (Question 25) by description of rail hunting in North Carolina (Question 24).

How important is rail hunting to you?	Which of the following best describes your rail hunting in North Carolina? ^a	
	During most of my rail hunting and harvest I am specifically hunting rails.	Most of my rail hunting and harvest occurs while I'm hunting other species.
It's one of my least important hunting activities.	10.4% ^c	29.0% ^b
It's less important than my other hunting activities.	33.8%	25.8%
It's no more important than my other hunting activities.	29.9%	41.9%
It's one of my most important hunting activities.	26.0% ^b	3.2% ^c

^a $\chi^2 = 12.17$; $df = 3$; $P = .007$; Cramer's $V = .336$

^b Adjusted residual ≥ 2

^c Adjusted residual ≤ -2

Appendix D: Frequency distributions of County most often snipe and rail hunted and Game Land most often snipe and rail hunted

Table 1. Percent frequency of county listed as top 3 counties snipe hunted the most days during the last 5 years.

County	% of total responses	County	% of total responses	County	% of total responses
New Hanover	4.7%	Harnett	1.0%	Rowan	0.3%
Brunswick	4.6%	Cleveland	1.0%	Polk	0.3%
Currituck	4.2%	Randolph	1.0%	Onslow	0.3%
Hyde	4.2%	Stanly	1.0%	Nash	0.3%
Pender	3.5%	Halifax	1.0%	Madison	0.3%
Caswell	3.2%	Richmond	1.0%	Haywood	0.3%
Carteret	3.0%	Robeson	0.9%	Edgecombe	0.3%
Durham	2.9%	Transylvania	0.9%	Cabarrus	0.3%
Craven	2.5%	Franklin	0.9%		
Beaufort	2.5%	Cumberland	0.9%		
Chatham	2.3%	Mitchell	0.8%		
Granville	1.9%	Bertie	0.8%		
Person	1.8%	Iredell	0.8%		
Perquimans	1.8%	Washington	0.8%		
Dare	1.8%	Rutherford	0.8%		
Rockingham	1.7%	Stokes	0.8%		
Camden	1.7%	Martin	0.8%		
Davidson	1.6%	Columbus	0.7%		
Duplin	1.6%	Bladen	0.7%		
Chowan	1.6%	Alamance	0.7%		
Hertford	1.6%	Orange	0.6%		
Lee	1.6%	Yadkin	0.6%		
Gates	1.6%	Wilkes	0.6%		
Montgomery	1.6%	Surry	0.6%		
Pamlico	1.5%	Henderson	0.6%		
Johnston	1.4%	Hoke	0.6%		
Jones	1.4%	Lincoln	0.6%		
Scotland	1.4%	Gaston	0.6%		
Pasquotank	1.4%	Wilson	0.5%		
Pitt	1.4%	Burke	0.5%		
Moore	1.3%	Northampton	0.3%		
Warren	1.3%	Vance	0.3%		
Lenoir	1.1%	Alleghany	0.3%		
Anson	1.1%	Union	0.3%		

Table 2. Percent frequency of game lands listed as the top 3 game lands snipe hunted the most often in the last 5 years.

Game Land	% of total responses		Game Land	% of total responses
Butner-Falls of Neuse	16.3%		Vance	1.5%
Croatan (National Forest)	9.5%		Dover Bay	1.5%
Holly Shelter	8.7%		Dupont State Forest	1.5%
Jordon	7.0%		Green River	1.5%
R. Wayne Bailey - Caswell	4.2%		Lee	1.5%
Green Swamp	3.8%		Linwood	1.5%
Juniper Creek	3.8%		Nantahala (National Forest)	1.5%
Sutton Lake	3.3%		Pisgah (National Forest)	1.5%
Cape Fear River Wetlands	3.2%		White Oak	1.5%
Uwharrie (National Forest)	3.1%			
Carteret County	2.7%			
North River	2.7%			
Brunswick County	2.3%			
Chatham	2.3%			
Johns River	2.2%			
Gull Rock	1.7%			
Harris	1.7%			
Chowan	1.7%			
Hyco	1.7%			
Mayo	1.7%			
Sandhills	1.7%			
Pisgah WRC	1.5%			

Table 3. Percent frequency of county listed as top 3 counties rail hunted the most days during the last 5 years.

County	% of total responses	County	% of total responses	County	% of total responses
New Hanover	25.9%	Camden	1.5%	Davidson	0.8%
Brunswick	22.4%	Currituck	1.5%	Granville	0.8%
Carteret	9.9%	Pasquotank	1.5%	Jones	0.8%
Hyde	7.6%	Pitt	1.5%	Wake	0.8%
Pender	5.3%	Onslow	1.3%		
Pamlico	3.3%	Johnston	0.9%		
Craven	2.4%	Perquimans	0.9%		
Dare	2.2%	Person	0.9%		
Bertie	1.7%	Scotland	0.8%		
Chowan	1.7%	Washington	0.8%		
Beaufort	1.7%	Chatham	0.8%		

Table 4. Percent frequency of game lands listed as the top 3 game lands rail hunted the most often in the last 5 years.

Game Land	% of total responses	Game Land	% of total responses
Croatan (National Forest)	12.5%	North River	8.1%
Sutton Lake	9.9%	Harris	5.0%
Cape Fear River Wetlands	9.4%	Chowan	4.9%
Goose Creek	9.4%	Holly Shelter	4.9%
Gull Rock	9.4%	Mayo	4.9%
White Oak	8.9%	Butner-Falls of Neuse	4.4%
Carteret County	8.1%		