

# 2018 SURVEYS & RESEARCH PROGRAM SUMMARY REPORT



N.C. Wildlife Resources Commission  
Division of Wildlife Management  
919-707-0050  
[ncwildlife.org](http://ncwildlife.org)

The North Carolina Wildlife Resources Commission's Surveys & Research (S&R) Program is housed within the agency's Wildlife Management Division. Program responsibilities principally include surveys, research and regulations for game species. This report represents an overview of many of the recurring survey activities and current research within the S&R Program for fiscal year 2017-18. Information included herein does not represent the full report on these individual activities. For most activities, more thorough and detailed reports are available and can be found on the Wildlife Commission's website ([ncwildlife.org](http://ncwildlife.org)) or by request.

Many of the activities highlighted in this report could not be accomplished without the commitment and effort of numerous employees throughout all divisions of the agency. We especially want to acknowledge staff of the Private Lands Program in the Wildlife Management Division and staff of the Land & Water Access Division for their year-round commitment to many of these projects.

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## Upland Game Birds & Small Game Mammals

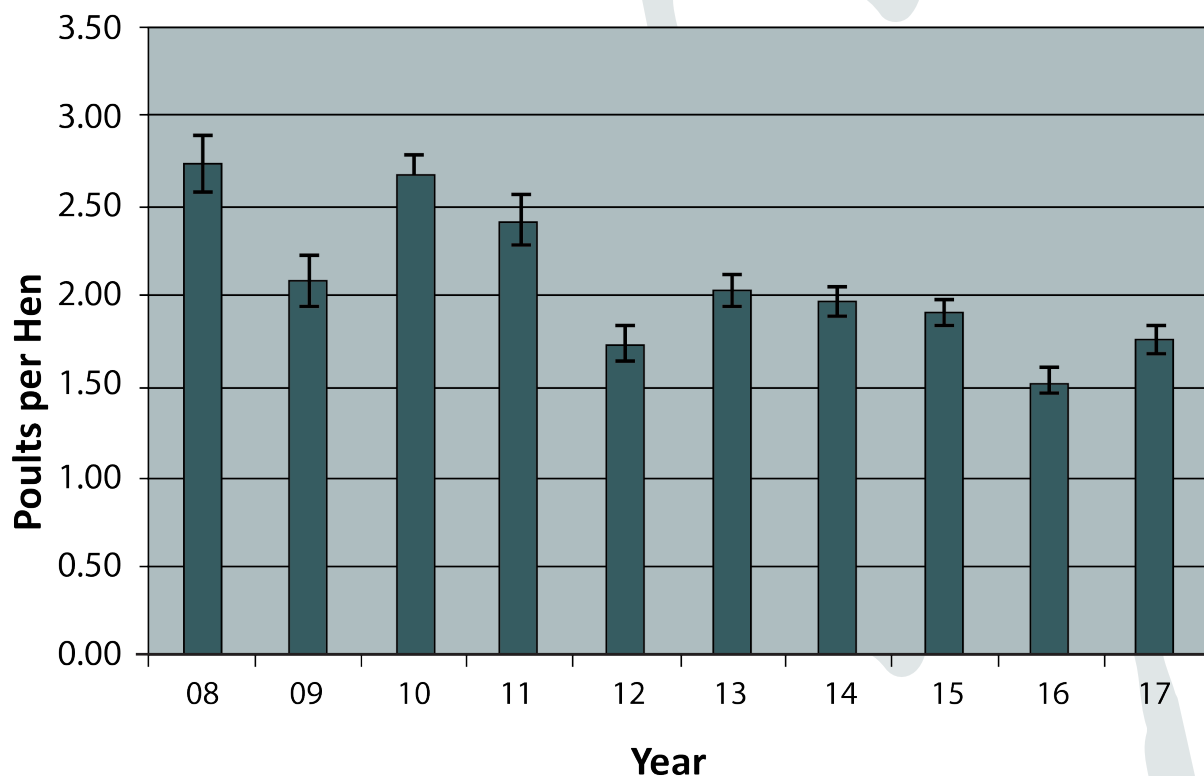
### Wild Turkey Summer Observation Survey

Each summer (July–August) the N.C. Wildlife Resources Commission (NCWRC) coordinates an observation survey to gain insight into wild turkey productivity and carryover of gobblers from the previous spring turkey season.

In 2017, 1,202 individuals participated in the survey and included a mix of NCWRC employees, National Wild Turkey Federation members, and other individuals who had participated in the survey previously. Produc-

tivity statewide was estimated to be 1.8 poult per hen, but was significantly higher in the coastal region than in the piedmont or mountains. Productivity was estimated to be 2.1 poult/hen in the Coastal region and 1.6 poult per hen in both the Piedmont and Mountain regions. Poul survival statewide (estimated number of poults for hens with at least one poul) was 3.7, but also varied significantly among the regions. Estimates of turkey reproduction this year are relatively low in comparison to what biologists have

observed over the course of the last decade. During the last 10 years, productivity estimates have been as high as 2.7 poult per hen and estimates of poul survival have been as high as 4.0 poult per hen with poults. It was somewhat encouraging to see the 2017 estimates higher than those seen in 2016, since the 2016 survey recorded the lowest estimates during this time period. However, 2017 estimates are still relatively low in comparison to most of the previous 10 years.



Statewide productivity estimates from Wild Turkey Summer Observation Surveys, 2008-2017. Error bars represent 95% confidence intervals.

## Grouse Drumming Survey

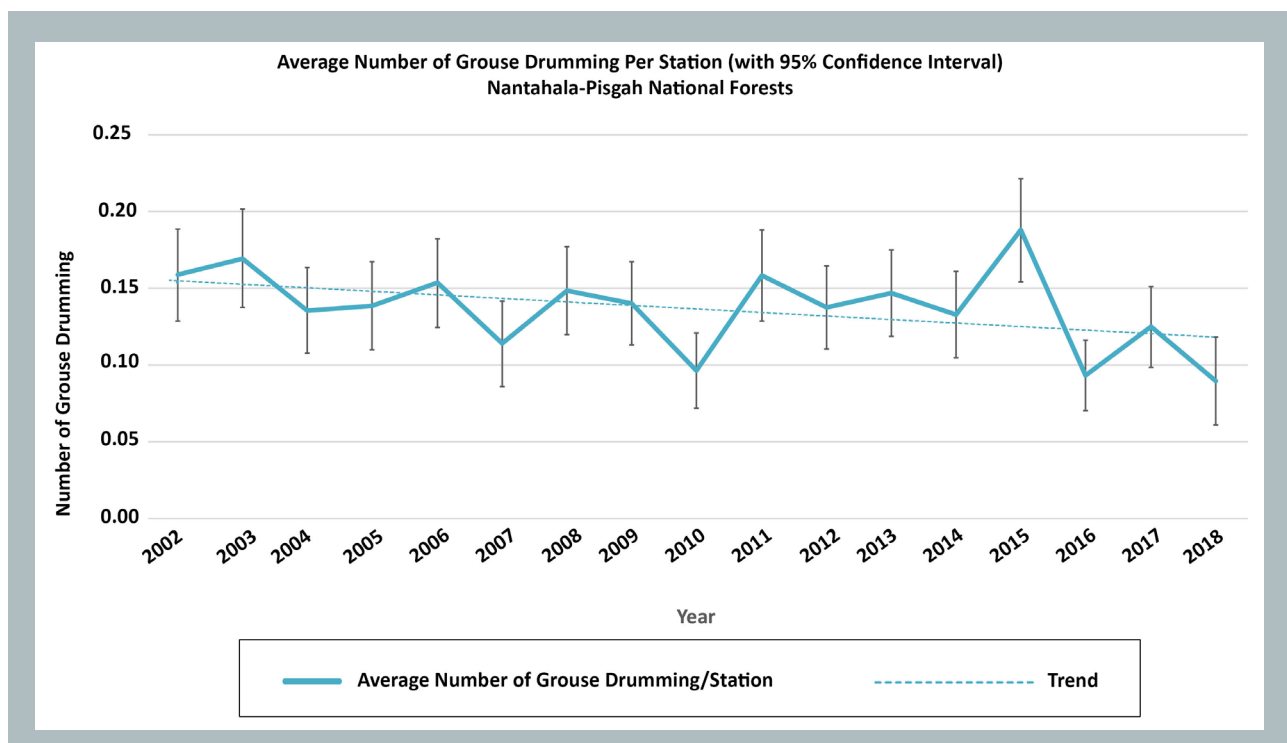
Since 2002, staff have conducted an annual ruffed grouse drumming survey in order to determine a long-term index to ruffed grouse populations. The survey occurs two weeks prior to the start of the spring turkey season and consists of roadside survey with listening points every ½ mile. The survey begins at ½ hour before sunrise and can continue for up to three hours. Observers listen for drumming grouse at each station for four minutes. The survey in 2018 occurred between March 26-April 11. During the 2018 survey, staff made a number of changes to survey design to both improve survey efficiency and to incorporate a wider variety of survey routes

occurring off U.S. Forest Service lands. The 2018 survey consisted of 22 survey routes (391 listening stations) on National Forests and four new routes (61 listening stations) on state-owned game lands. One additional walking route was established on Pond Mountain Game Land. On the National Forest survey routes, 35 drumming males were heard at the 391 stations, yielding an average of 0.09 grouse drumming/station. This is the lowest annual estimate since the survey began in 2002 and continues to suggest an overall declining trend in the grouse population. Two grouse were heard at stations on Needmore Game Land and one grouse was heard on Sandy Mush Game Land. No grouse were heard at stations on Cold Mountain or Silver



Ruffed Grouse (Photo: Wikipedia)

Game Lands. The overall average number of grouse drumming per station on these state-owned game lands was 0.05 grouse/station. Five drumming grouse were heard on the Pond Mountain walking route.



Average number of grouse heard drumming per station on Nantahala – Pisgah National Forests, North Carolina Grouse Drumming Survey, 2002-2018.

## Avid Quail and Grouse Hunter Surveys

Staff continue to monitor bobwhite quail and ruffed grouse hunting activity through avid hunter surveys. Forty-six volunteer avid quail hunters provided hunting statistics during the 2017-18 hunting season on 557 quail hunting trips. On an average hunt day, 2.1 coveys were flushed and 2.1 quail bagged per hunt party.

Quail hunting success varied within the state depending on the region and landowner type. By region, flush rates were as follows: Coastal Plain (0.65 coveys/hour), Piedmont (0.38 coveys/hour), and Mountain (0.04 coveys/hour). By landowner type, statewide flush rates were 0.76 coveys/hour on private land versus 0.24 coveys/hour on game lands.

On 41% of the reported hunting trips, no coveys were found by the hunters. Hunting success has been fairly stable since the mid-1990s (i.e., coveys flushed, harvest), although the data indicate a slight increase in the percentage of hunting trips in which no birds are flushed. However, hunting success is

not a direct indicator of quail abundance because hunters selectively change their hunting locations to areas with higher quail abundances. Declines were noted in survey respondents, both in terms of number of participants and reported hunts. The average hunter age has been steadily increasing; from the mid-40s when the survey began to 60 this past year.

Fifty-six volunteer avid grouse hunters participated during the 2017-18 hunting season, providing grouse hunting statistics for 640 hunting trips. Hunters went afield an average of 11.4 days during the season. They flushed on average 1.7 grouse/hunting trip and 0.5 grouse flushed/hour hunted. On 48% of the hunting trips, no grouse were found by the hunters. Since 1984, flush rates have generally declined from 1.4 to 0.5 grouse/hour. However, flush rates are not a direct indicator of grouse abundance because hunters will change their hunting locations over time to focus on areas with more grouse.



## Wild Turkey Gobbling Chronology

Expanding efforts that started in 2016, staff continued to investigate the use of automated acoustic recorders during the spring 2018 to determine the chronology of wild turkey gobbling across the state. This effort is expected to continue for several years and will allow staff to ensure that wild turkey hunting seasons are timed appropriately to maximize both turkey reproduction and hunter satisfaction. Fifty-one acoustic recorders were deployed statewide during spring 2018. Each NCWRC district had five or six recorders.

Recorders were deployed on large properties with little to no turkey hunting pressure. Each unit was programmed to record 2.5 hours/day, beginning 30 minutes before sunrise, from Feb. 24 through June 3, 2018. Approximately 11,600 hours of total time were recorded.

Data processing, using RavenPro software, will take place in the fall of 2018. Plans are to deploy the acoustic recorders again at these sites in 2019, after which staff will thoroughly analyze all data collected from 2016 through 2019.



Chris Kreh, Upland Game Bird Biologist (l) and Danny Ray, District 8 Wildlife Biologist, set up an automated acoustic recorder. (Photo: NCWRC)

## Avid Rabbit Hunter Survey

Thirty-four respondents reported harvesting 2,157 rabbits during 471 hunting trips throughout 59 counties in North Carolina. Marsh rabbits were harvested in 30 of the 59 counties and accounted for almost 16% of the reported harvest. There were 41 reported hunts in November, 78 in December, 165 in January, and 187 in February. Seventy-nine percent of the rabbit harvest occurred in December and January. Hunters jumped approximately 1.5 rabbits per hour and harvested approximately 61% of those rabbits, which is a very slightly lower success rate than the 2016-2017 season where hunters harvested 62% of rabbits that were jumped. On an average hunt,

7.6 rabbits were jumped, and 4.6 rabbits were harvested. Hunters jumped at least one rabbit on 99% of the reported hunts and successfully harvested one or more rabbits on 84% of the hunts.



Eastern cottontail (Photo: Melissa McGaw)

## Migratory Game Birds

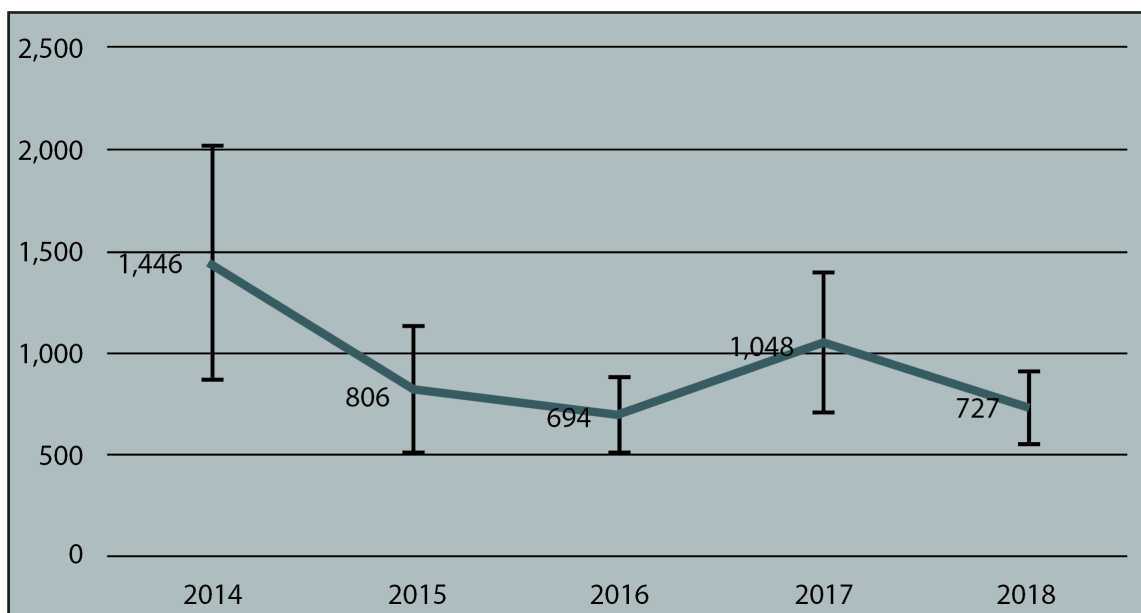
### Aerial Waterfowl Surveys

In early October 2017, an aerial survey of resident Canada geese was conducted in the Northeast Canada Goose Hunt Zone. Staff observed 3,817 geese, representing a 38% increase from the survey in 2016, and similar to the 1995-2016 average. In 2016, the NCWRC annual mid-winter waterfowl survey transitioned from an all waterfowl survey to a survey that focuses solely on tundra swans, brant and Canada geese in the Northeast Hunt Zone. Changes made at that time were in part due to budget cuts within the U.S. Fish and Wildlife Service and a thorough evalua-

tion of waterfowl management data needs. Tundra swans and brant are two species that require a flyway winter survey estimate to inform an annual harvest decision. Staff continue to count Canada geese during the survey to help track migrant numbers of this species in northeast North Carolina.

During the January 2018 survey, they counted 78,865 tundra swans and 2,559 brant. The tundra swan count was 15% lower than the previous year, but 8% higher than the previous 9-year average. They observed 18,030 Canada geese within the Northeast Hunt Zone; 10% higher than the 2017 count and 14% higher than the previous 9-year average.

2018 marked the 5<sup>th</sup> year of a helicopter-based survey for breeding black ducks in our coastal marshes. The survey, occurring in mid-April each year, includes all significant coastal marsh habitat from Cedar Island north the Virginia state line. In the first three years, staff made a number of changes to survey procedures, but have maintained a consistent sampling design since 2016. In spring 2018, they estimated 727 pairs of breeding black ducks and 1,659 total black ducks. Both estimates have remained fairly consistent since the inception of the survey.



*Numbers of breeding pairs of black ducks from a helicopter survey in coastal marsh habitat. Estimates prior to 2016 not directly comparable due to changes in survey procedures. Error bars represent 95% confidence intervals.*



## Dove Banding

As part of a nationwide program since 2003, agency staff each summer (July-August) trap and band mourning doves in order to understand harvest and survival rates better. Data obtained from these efforts directly inform a harvest strategy used to guide hunting seasons in the Eastern Management Unit. In summer 2017, staff banded 1,007 mourning doves. This represents a 13% decline from the previous year and is 25% below their annual banding goal of 1,345.



Dove banding (Photo: NCWRC)

## Migratory Game Bird Harvest and Hunter Activity

Harvest estimates for most migratory game birds in North Carolina are generated by the U.S. Fish and Wildlife Service through the Harvest Information Program (HIP) and by the NCWRC's annual hunter harvest estimates. The following are the harvest estimates for tundra swans, Canada geese in the Northeast Hunt Unit and light geese during the Conservation Order Season as determined by NCWRC surveys.

In accordance with the approved Tundra Swan Management Plan, permits allocated to North Carolina increased from 5,000 the

previous year to 6,250 in 2017-18. This change explains harvest and hunter participation estimates compared to the previous year. During the 2017-18 hunting season, an estimated 5,309 swan hunters hunted 11,588 hunter days. Estimated

numbers of swan hunters and swan hunter days increased by 42% and 37%, respectively, from the 2016-17 tundra swan season. An estimated 3,289 tundra swans were killed during the 2017-18 season. The estimated retrieved harvest and estimated total kill increased by 57% from the 2016-17 tundra swan season. Staff estimated that 1,693 hunters harvested 664 Canada geese during the 14-day Canada goose season in the Northeast Hunt Zone. Additionally, they estimated that 63 hunters harvested 265 light geese (snow geese & Ross's geese) during the spring 2018 Light Goose Conservation Order Season.



Swan hunting (Photo: NCWRC)

## Wood Duck Banding & Wood Duck Nest Box Checks

As part of their long-term and ongoing monitoring efforts, agency staff continue to trap and band wood ducks each summer (July–September). When combined with efforts from other state wildlife agencies and the U.S. Fish and Wildlife Service, results obtained are a very important piece of information that is needed to appropriately manage and monitor wood duck populations. During the 2017 banding period, staff captured and banded 805 wood ducks statewide, representing a 36% decrease from the previous year and a 30% decrease from the previous 10-year average. Despite the recent decline in banding totals, the NCWRC is routinely among the leaders in numbers of wood duck banded in the Atlantic Flyway each year.

Staff continue to maintain and monitor over 500 wood duck nest boxes located in public waters in District 1. These

wood duck boxes originated from an agency program called “Operation Wood Duck” that began in the late 1980s. For the 2017 nesting season, staff estimate that 76% of the boxes were used by wood ducks with 419 nesting attempts. Nearly 3,000 ducklings were produced. Since the inception of the program, staff estimate over 65,000 ducklings produced.



Kimberly McCargo (Wildlife Conservation Biologist I) cleans out a wood duck nest box. (Photo: NCWRC)

*In 2017, 805 wood ducks were banded statewide, representing a 36% decrease from the previous year and a 30% decrease from the previous 10-year average.*



Land & Water Access Wilkes Crew members, Wes Duncan (left) and Mike Greene capture wood ducks as part of the annual wood duck banding program. (Photo: NCWRC)

## Avian Influenza Sampling

Agency staff continued to collect samples from hunter-harvested waterfowl as part of a nationwide program designed to detect avian influenza. North Carolina was one of many state agencies asked to participate in the program administered by the United States Department of Agriculture’s Wildlife Services Program.

During fall/winter 2017-18, staff collected 517 samples primarily in the Coastal Plain on both public and private hunting areas. While avian influenza viruses routinely circulate in many waterfowl species, no highly pathogenic subtypes of concern (H5, H7) were detected.

## American Black Duck Research Project

Spring 2018 marked the second and final year of a black duck nesting ecology project being headed by the University of Delaware. In 2018, 93 black duck nests were located and monitored. Seventy-three percent of monitored nests were located in brackish marsh habitat of the Pamlico/Albemarle Peninsula within Hyde County, while the remaining nests were located in island/dredge spoil habitats along the Dare County Outer Banks.

During the 2018 field season, the earliest date staff found black ducks initiating was

Feb. 25; the latest date was May 25. Compared to 2017, staff had a slightly more normal bell-shaped distribution with peak nest initiation centering around the first two weeks of April.

Apparent nest success in 2018 was 63%. The composition of nest fates for the 2018 season included 41 hatched, 34 abandoned, 19 depredated, and 2 nonviable. Of the 34 abandoned nests, 28 (82%) were due to investigator activity in initial nest visits. Of the 19 depredated nests, several primary nest predators were identified including American and fish crow, raccoon and American mink.



*Daniel Lawson (Univ. of Delaware) determines the incubation stage of a black duck nest in a Hyde County marsh. (Photo: NCWRC)*

*Brackish marsh habitat important to breeding black ducks. Photo taken in Carteret County during the spring, aerial breeding black duck survey. (Photo: NCWRC)*



## Black Bears

For more information on black bears, including the Black Bear Annual Report in North Carolina, visit: [www.ncwildlife.org/bears](http://www.ncwildlife.org/bears). The report is under the “Surveys and Reports” tab.

### *Black Bear Cooperator Program*

Mortality information from harvested bears, including the collection of premolar teeth and weights, began in 1969 under the voluntary Black Bear Cooperator Program. Age and sex information gathered from biological samples are used for analyzing the age structure of the harvested population and for population reconstruction modeling. During the 2017-18 bear hunting season, staff collected 1,827 upper pre-molars of bears from cooperating hunters (1,185 Coastal Bear Management Unit (CBMU), 617 Mountain Bear Management Unit (MBMU), 25 Piedmont Bear Management Unit (PBMU)). The number of bear teeth submitted

by hunters statewide has declined since the 1990s from 57-64% to 53% in 2017, despite intensive efforts expended by NCWRC staff during the bear hunting seasons.

In order to increase submission rates, the NCWRC, in 2014, started mailing bear cooperator envelopes to all holders of the Bear E-stamp prior to and during the regulated bear hunting season. Tooth submission rates in the CBMU (56%)

increased slightly from the prior hunting season (2016=52%), while submission rates in the MBMU (49%) and PBMU (48%) declined. Bear houndsmen participation in the Bear Cooperator Program has been substantially higher than participation by still hunters; in 2017, 59% of houndsmen and 42% of still hunters who harvested a bear also submitted biological information.



*Colleen Olfenbuttel (Black Bear/Furbearer Biologist) removes an upper premolar from a harvested bear. (Photo: NCWRC)*

### Hard Mast Survey

Mountain hard mast surveys were conducted along 11 routes in fall 2017. The overall hard mast index was fair and increased slightly from 2016. Since 1983, North Carolina has experienced 22 years in which the hard mast index was rated as fair. White oak rated as fair and above long-term averages. Red oak rated as good and above long-term averages for the species. Hickory production was fair and beech production was good.

Although the impetus for the hard mast survey was related to a desire to better understand annual hard mast production and its impacts on black bear populations, hard mast is an important food source for many species of wildlife and is important to monitor for its multi-species impacts.

Hard Mast Survey Results for Western North Carolina, 2008-2017

Year	White Oak	Red Oak	All Oaks	Hickory	Beech	Total
2008	1.01	2.40	1.76	3.82	4.34	2.06
2009	0.48	2.47	1.55	1.72	5.58	1.67
2010	3.46	3.97	3.75	3.50	0.87	3.66
2011	1.17	2.22	1.74	1.30	4.96	1.76
2012	1.87	2.68	2.31	2.01	3.14	2.29
2013	1.00	1.43	1.23	2.43	4.45	1.44
2014	4.43	4.36	4.42	2.33	1.23	4.10
2015	1.07	2.65	1.92	2.64	5.77	2.09
2016	2.71	2.60	2.66	2.45	4.08	2.67
2017	2.13	4.42	3.40	3.20	5.69	3.44
<b>Long-term average (1983-2017)</b>	<b>1.88</b>	<b>2.85</b>	<b>2.36</b>	<b>2.36</b>	<b>4.14</b>	<b>2.50</b>
Numerical Rating = Crop Quality 0.0 to 2.0 = Poor    2.1 to 4.0 = Fair 4.1 to 6.0 = Good    6.1 to 8.0 = Excellent						

## Bear E-Stamp Survey

Using the bear e-stamp holder database for the 2017 bear hunting season, 83,151 bear hunter surveys were mailed in late January 2018. Staff received 29,550 responses (36% response rate) and 61% of respondents (n=17,880) had not hunted black bears prior to the 2017 bear hunting season.

Similar to the results from the last two years, 30% of respondents reported that they either had no intentions to hunt bear (got the bear e-stamp because it was free) or didn't know they

had a bear e-stamp. Thirty-three percent responded that they usually hunt bears and planned on doing so during the 2017 bear hunting season while 27% of respondents consider themselves a bear hunter. When asked to describe their bear hunting efforts during the 2017 bear hunting season, 15% of respondents specifically hunted for bear, 50% hunted for other game species but may have taken a bear, and 35% did not hunt for bears. Of the hunters who described that they hunted specifically for bear during the 2017 season, 58% reported hound

hunting and 42% reported still/stand hunting. Five percent of respondents who hunted during the 2017 season were successful at harvesting a bear, a slight increase from the previous survey year (4% in 2016). Fifty-five percent of successful respondents used dogs to harvest their bear, while 45% reported harvesting their bear by still hunting. Fifty-five percent of successful respondents reported using the aid of unprocessed food to harvest their bear.

## BearWise Program

In 2018, the Southeastern Association of Fish & Wildlife Agency's (SEAFWA) Large Carnivore Working Group, composed of the state bear biologist from each SEAFWA member state, developed BearWise ([www.bearwise.org](http://www.bearwise.org)), a regional program to help people live responsibly with black bears. To achieve this, BearWise shares ways to prevent conflicts, provides credible resources to resolve problems, and encourages community initiatives to keep bears wild. In order to promote BearWise initiatives in North Carolina, a BearWise Commit-



tee comprising 12 staff members from the Wildlife Management and Education divisions was formed. The committee has met on several occasions and has coordinated on different projects focused on outreach materials, bear-resistant trash can testing, identifying community partners, and a BearWise community certification program. Initial efforts of promoting BearWise were launched in the Asheville area, due



(Photo: NCWRC)

to the high number of human-bear interactions and the community support for the NCSU/NCWRC Urban/Suburban Bear Project.

## Furbearers

For more information, including reports, on furbearers and trapping in North Carolina, see also: [www.ncwildlife.org/trapping](http://www.ncwildlife.org/trapping)

### *Raccoon Field Trial Survey*

Data were collected on raccoon field trials conducted from May 1987 through February 2018. Data collected included total time hunted by each cast (individual timed event), the number of dogs in each cast, and the number of raccoons observed. Data indicate that

the Piedmont (1.19 coons/hour) and Coastal Plain (0.95 coons/hour) regions saw an increase in the number of raccoons seen per hour, while the Mountain (0.91 coons/hour) region saw a slight decline. Participation (25%) in the survey was similar to last year's response rate.



(Photo: Wikipedia)

### *Eastern Spotted Skunk Hair Snare Study*

In winter 2017, NCWRC staff cooperated with Warren Wilson College to develop and test a non-invasive, hair snare method for collecting genetic material from Eastern Spotted Skunks. Staff tested various hair snare designs that were paired with trail cameras in areas with and without records of spotted skunks in western North Carolina.

The relatively low cost of this device gives it the potential for widespread use across the species' range to estimate population sizes, identify genetic bottlenecks, and compare the genetics of subspecies, which will help close knowledge gaps and inform wildlife management decisions.

Detections of Eastern Spotted Skunks were similar between cam-

eras and hair snares using glue tape. Hair snares using gun brushes had slightly lower detections. Comparing gun brushes versus glue tape, the latter had a higher number of hair follicles collected and was cheaper (~\$14) to build. These hair snares may provide a low-cost option to survey and detect for Eastern Spotted Skunks with the added benefit of collecting genetic material.

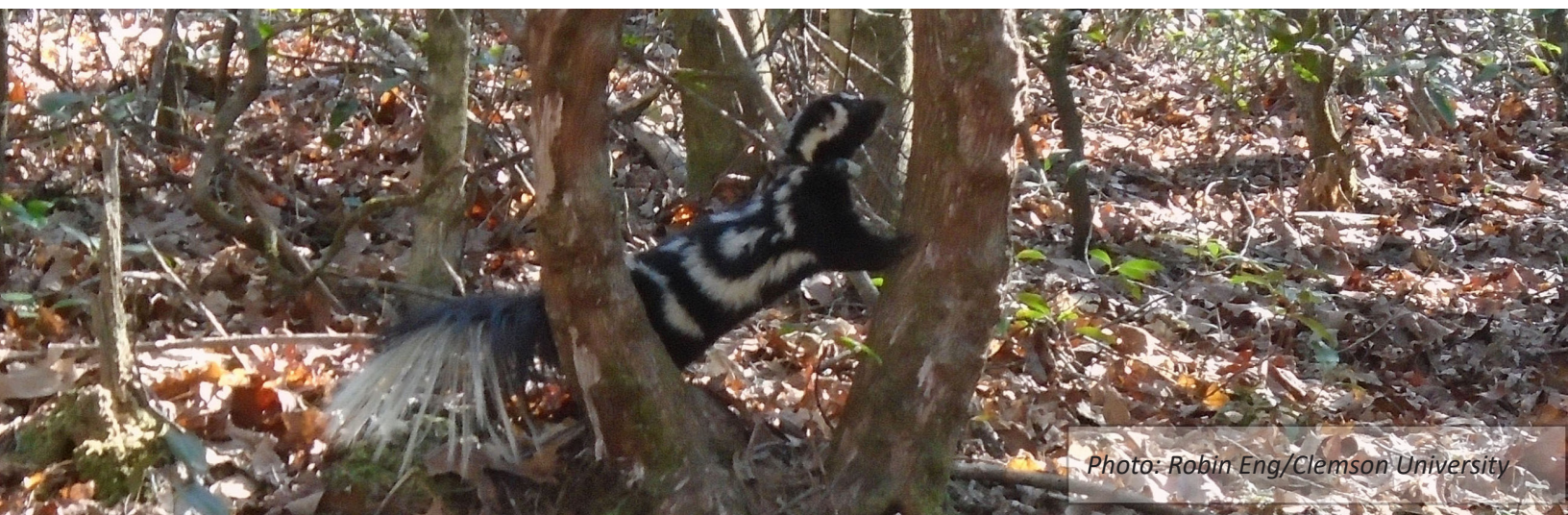


Photo: Robin Eng/Clemson University

## Eastern Spotted Skunk Population Camera Survey

Since January 2015, North Carolina has conducted a winter camera survey to document presence of Eastern Spotted Skunks. If there are enough detections, biologists hope to use the data to identify individuals, determine habitat preference, and track trends in the population.

Until winter 2017, detections were low due to the camera brand being used. In winter 2017, staff established 51 camera sites using Bushnell HD Aggressor cameras and detected eight Eastern Spotted skunks, a 300% increase in detection compared to 2016 and using Reconyx cameras.



Trail camera photo of a spotted skunk taken in western North Carolina.

In winter 2018, staff established 51 camera sites using the same Bushnell cameras and detected 45 skunks. For the winter 2018 survey, staff set up cameras at the same sites they had in 2016. They are currently reviewing the data to determine how many of their 45 detections were individual skunks and separate detections.

## Bobcat & River Otter Sex and Age Ratio

Starting with the 2014-15 season, North Carolina started collecting bobcat skulls primarily from licensed trappers. The information will be used to determine the sex and age ratio of the harvest. The sampling objective is 10-15% of the trapper harvest for five consecutive years.

Due to low pelt prices and the voluntary nature of the program, agency staff have not yet

achieved collecting 10% of the harvest. Since the 2013-14 season, they have collected 170 skulls; during the 2017-18 season, they collected 32 skulls. Biologists have sent the upper canine from all skulls to a lab for aging, with results expected in September 2018.

River otter skulls are collected to gather data on the age structure and sex ratio of harvested otters. The annual sampling period is from

November through February, which is concurrent with the regulated furbearer trapping season. During the 2017-18 trapping season, staff collected 100 otter skulls. Once they removed teeth from the skulls for aging, they gave the skulls to the N.C. Museum of Natural Sciences, who requested the skulls and genetic material for archival purposes and for future research.



### Muskrat Sex and Age Ratio

Due to concerns about regional muskrat populations, several southeastern, north-eastern and Canadian furbearer biologists have started monitoring muskrat populations in cooperation with licensed trappers. Efforts involve monitoring the age and sex ratio of harvested muskrats, as this may indicate population declines.

Starting in 2011, North Carolina joined regional efforts by attending fur sales and working with North Carolina fur dealers. During the 2017-18 season, staff sampled 1,407 muskrats, a decline from the 2016-17 season, likely due to a decline in the harvest of muskrats due to low pelt prices.



Casey Dukes (Wildlife Conservation Biologist I) examines a North Carolina muskrat pelt at a regional fur buyers shed in Chincoteague, VA. (Photo: NCWRC)

#### Sex and Age Ratio Data from North Carolina Muskrats

Category	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Adult male/female	1.5	3.64	1.11	1.91	1.34	1.11	1.22	0.80
Juvenile male/female	0.96	1.3	1.38	1.93	1.14	1.58	1.11	2.27
Juvenile/adult	2.12	2.4	1.48	2.66	1.04	2.10	1.80	1.15
Juvenile/Adult Female	5.3	11.36	3.16	7.73	2.43	4.61	4.01	2.08
Sample Size (n)	82	199	928	133	2,627	319	2,505	1,407

## Trapper Harvest Survey

Since the 2002-2003 trapping season, an annual voluntary trapper mail harvest survey was sent to all licensed trappers to track reported statewide furbearer harvest by species. Results for the 2017-2018 survey are not complete, as surveys were still being received in July and August 2018. For the 2016-17 trapping season, there was a 5% increase (49,154 estimated harvest) in the overall furbearer harvest compared to 2015-16 (46,901 estimated harvest). Of the 2,983 trappers who had a trapping license during the 2016-17 trapping season, staff estimated 1,439 actively trapped-an increase of 10% from the previous year.

	2016-17 Trapper Harvest	% Change from the Previous Year
Beaver	9,727	+ 4%
Bobcat	1,390	+ 37%
Coyote	6,344	- 17%
Gray Fox	3,806	- 9%
Mink	165	+ 2%
Muskrat	3,122	+ 10%
Nutria	718	- 51%
Raccoon	11,263	+ 20%
Red Fox	1,925	- 6%
River Otter	1,449	+ 16%
Skunk	503	+ 3%
Virginia Opossum	8,740	+ 22%
Weasels	0	- 100%

## Pelt Prices

Licensed fur dealers and the North American Fur Auction were contacted to solicit average pelt prices paid to North Carolina fur harvesters during the 2017-18 trapping season. Fur prices declined by 17%, with red fox (-47%), mink (-34%), gray fox (-30%), otter (-29%), raccoon (-14%), muskrat (-22%) and bobcat (-7%) experiencing declines in pelt prices.

Striped skunk (80%), coyote (22%), beaver (8%) and opossum (1%) experienced increases in pelt prices compared to the 2016-17 trapping season.

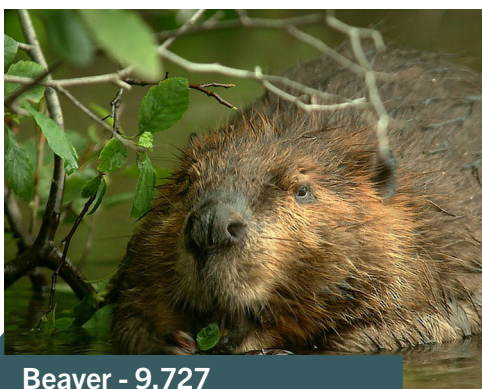
There were nine licensed fur dealers during the 2017-2018 furbearer harvest season, an increase from five the prior season.

## Top Three Trapper-Harvested Furbearers in 2016-17



Raccoon - 11,263

(Photo: USFWS)



Beaver - 9,727

(Photo: USFWS)



Virginia Opossum - 8,740

(Photo: USFWS)

## Coastal Plain Fox Population Trend Camera Surveys

Currently, there is no widely accepted technique to estimate or track trends in fox populations over wide geographic scales. In recent years, the NCWRC, in coordination with partners, has attempted to develop such a survey. Following up on efforts in 2015 and 2016, the NCWRC, along with UNC-Wilmington, conducted another camera survey from February-March 2018 on Holly Shelter Game Land using Bushnell Cameras on motion-triggers and 4 different baits/lures (e.g., fatty acid scent, synthetic fermented egg, castor oil, sardines) and no scent. They recorded 43,414 photos over 616 trap nights; 21 of the 88 cameras recorded canids. Canids were captured at similar rates between cameras where human scent was not masked (27%) and where scent was restricted (21%).

Across species, cameras baited with sardines (44%) had greater capture success compared to controls (6%). Cameras baited with sardines and oil (40% each) improved capture success of coyotes compared to controls (7%). Fatty acid scent (63%) was the only attractant to improve fox (red and gray) capture success over controls (13%).

Concurrent with the 2018 camera survey, the NCWRC conducted spotlight surveys from February through early March on Holly Shelter Game Land. These surveys were conducted to determine if there was an alternative method to survey for foxes. However, due to lack of canid detections, poor weather and poor road conditions, staff stopped these surveys.



*Kimberly McCargo (Wildlife Conservation Biologist I) conducts a fox spotlight survey at Holly Shelter Game Land. (Photo: NCWRC)*

In addition, during summer 2018, the NCWRC cooperated with Western Carolina University (WCU) and NCSU to conduct a fox camera survey on Bull Neck Swamp in Tyrrell County. A camera survey was conducted in 2009 that focused on bobcats, but researchers detected a high number of gray foxes. This follow-up survey followed the same protocols as 2009 and may help biologists determine if there has been a change in gray fox abundance in that area. The camera survey is complete, and results are being analyzed by WCU.

## White-tailed Deer

### *Biological Data Collection*

The NCWRC annually collects and monitors deer data from four primary sources: 1. mandatory big-game reported harvest system, 2. hunter harvest survey, 3. deer hunter wildlife observation survey, and 4. biological harvest data collected by staff and cooperators. The NCWRC relies on these databases to provide technical guidance to landowners, assess the current condition of the herd, and evaluate proposed deer regulations relative to statewide biological objectives.

Agency personnel obtained biological data (e.g., age, sex, weight, antler measurements, fetal/reproductive information) from 4,291 deer from a variety of sources, including the Deer Management Assistance Program (DMAP), voluntary hunt clubs, agency-staffed check stations, meat processors, taxidermists, herd health evaluations, depredation permit kills, vehicle kills, disease evaluations, and a hunter jawbone return program. This information is used to evaluate the status of herds in relation to habitat, population parameters, and current harvest season frameworks.

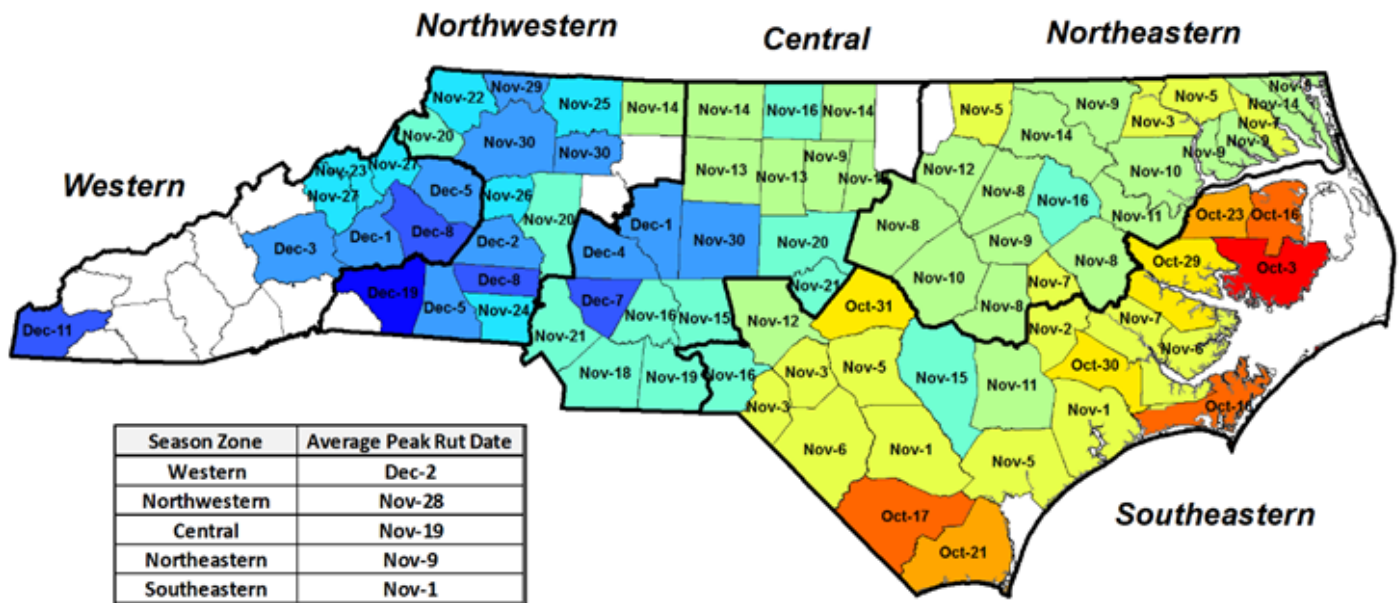
Additionally, these data are used to increase understand-

ing of breeding chronology across the state. Program staff concluded a multi-year deer season frameworks evaluation and disseminated biological and sociological results to constituents. The evalu-

ation resulted in management changes to improve the sex ratio and age structure of the herd across the state as well as timing of doe harvest in western North Carolina.



*Left to right, James Tomberlin (District 7 Biologist), Danny Ray (District 8 Biologist) and Jason Smith (Technical Assistance Biologist) collect biological and disease surveillance samples from a white-tailed deer. (Photo: NCWRC)*



Estimated peak rut dates based on reproductive data collected through the agency’s annual deer biological data collection program. Counties shaded in white cannot be estimated due to low sample sizes.

### Chronic Wasting Disease Surveillance

Staff continue to collect and test both routine and clinical samples from deer for Chronic Wasting Disease (CWD). For the fiscal year 2017-2018, staff collected 452 samples, which are being tested by the Wisconsin Veterinarian Diagnostic Lab. Currently, all returned results for those samples have been “not detected.”

As part of Cervid Health Cooperator Program, 159 of the 452 samples were collected

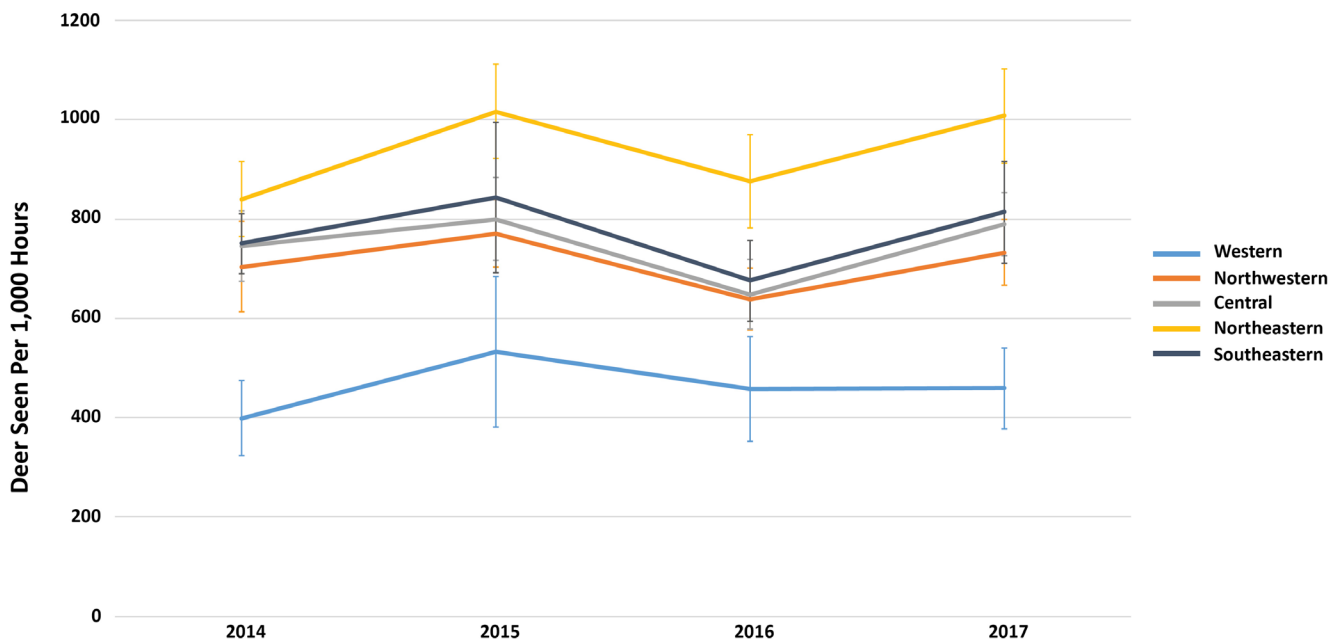
by 10 participating taxidermists. Biologists are continuing to recruit and train taxidermists for CWD surveillance. As of June 30, 2018, they had certified 45 Cervid Health Cooperators. Staff completed a revised CWD sampling protocol that will be implemented starting with the 2018-19 hunting season. Previously, the agency had operated under a scheme of intensive statewide sampling every five years. Now, statewide sampling will occur annually utilizing five-year goals. This, along

with relaxing some of the prior requirements (retropharyngeal lymph nodes only, no GPS or QBS location required, no spacing requirements within counties), involving partners (taxidermists, processors, NCDOT), and using a weighted system to target sources where CWD is more likely to be found, should result in double the number of samples they have collected in the past over a five-year period.

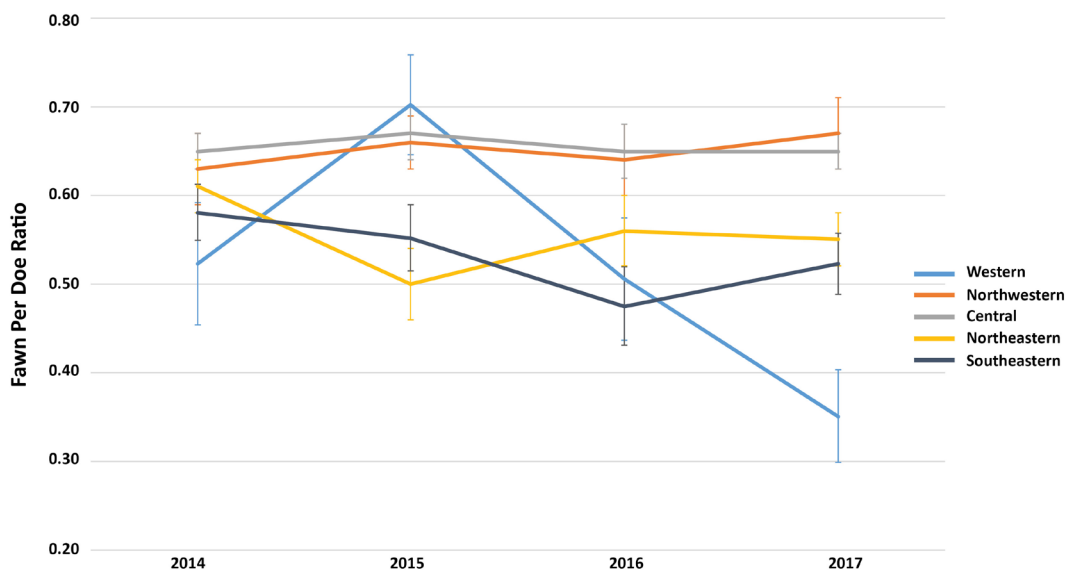
### Deer Hunter Observation Survey

In order to provide an economical and statistically robust means of monitoring the relative observation rates of several game species (including white-tailed deer), an annual North Carolina Deer Hunter Observation Survey (DHOS) has been conducted since 2014. These observation data provide valuable insight into geographical and temporal variation in herd parameters. During the 2017-18 hunting sea-

son, 1,701 deer hunters participated in the survey and reported over 84,000 deer observed. In 2017, hunters observed on average 0.77 deer/hr., 2.47 does/buck, and 0.55 fawns/doe. The overall observation rate generally increased in all management zones compared to 2016 while the observed fawn/doe ratio remained fairly consistent with the exception of a notable decrease in the western zone.



Regional observation rates of white-tailed deer as determined from the annual deer hunter observation survey.



Regional fawn/doe ratios as determined from the annual deer hunter observation survey.

## Multi-Species Surveys & Research

### Big Game Harvest Reporting

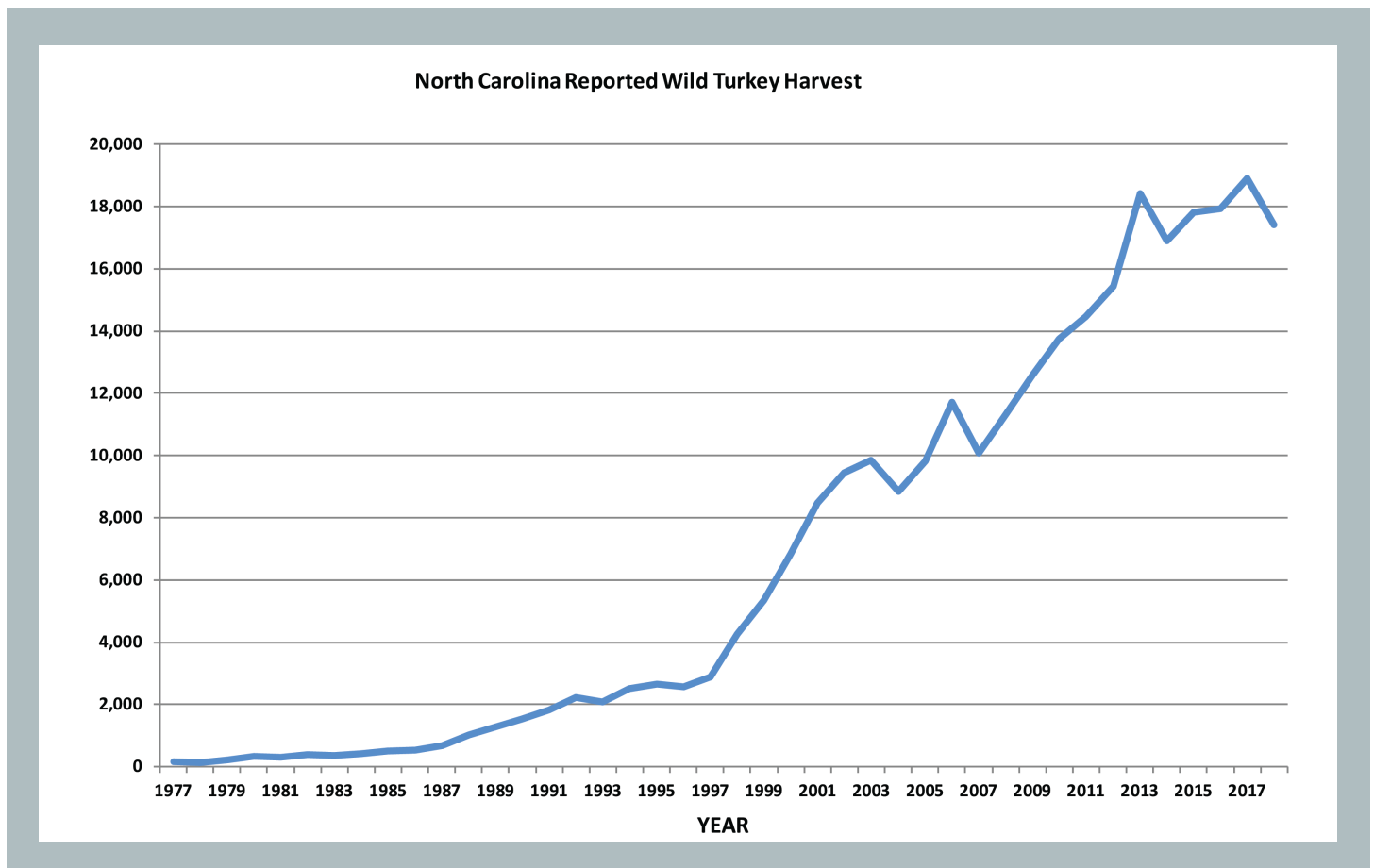
Mandatory reporting of big-game (deer, bear, turkey) harvest is required by General Statute and provides a long-term dataset of reported harvests for these species. Currently, reporting is allowed by either automated telephone or Internet. In coordination with the IT Department, S&R Program personnel provide oversight of some technical aspects of both reporting systems.

#### Wild Turkey Harvest

The 2018 spring wild turkey season in North Carolina ran from April 14-May 12 statewide. The dates for the Youth Season were April 7-13, 2018. Male or bearded turkeys were legal with a daily limit of one bird and a season limit of two birds. Youth

could only harvest one bird during the Youth Season. Reporting of wild turkey harvests was mandatory via the agency's telephone or online reporting systems. Including 1,293 birds harvested during the Youth Season, the 2018 reported spring turkey harvest was 17,408 birds.

*This year's total state-wide turkey harvest of 17,408 birds decreased from last year's harvest of 18,919 birds.*

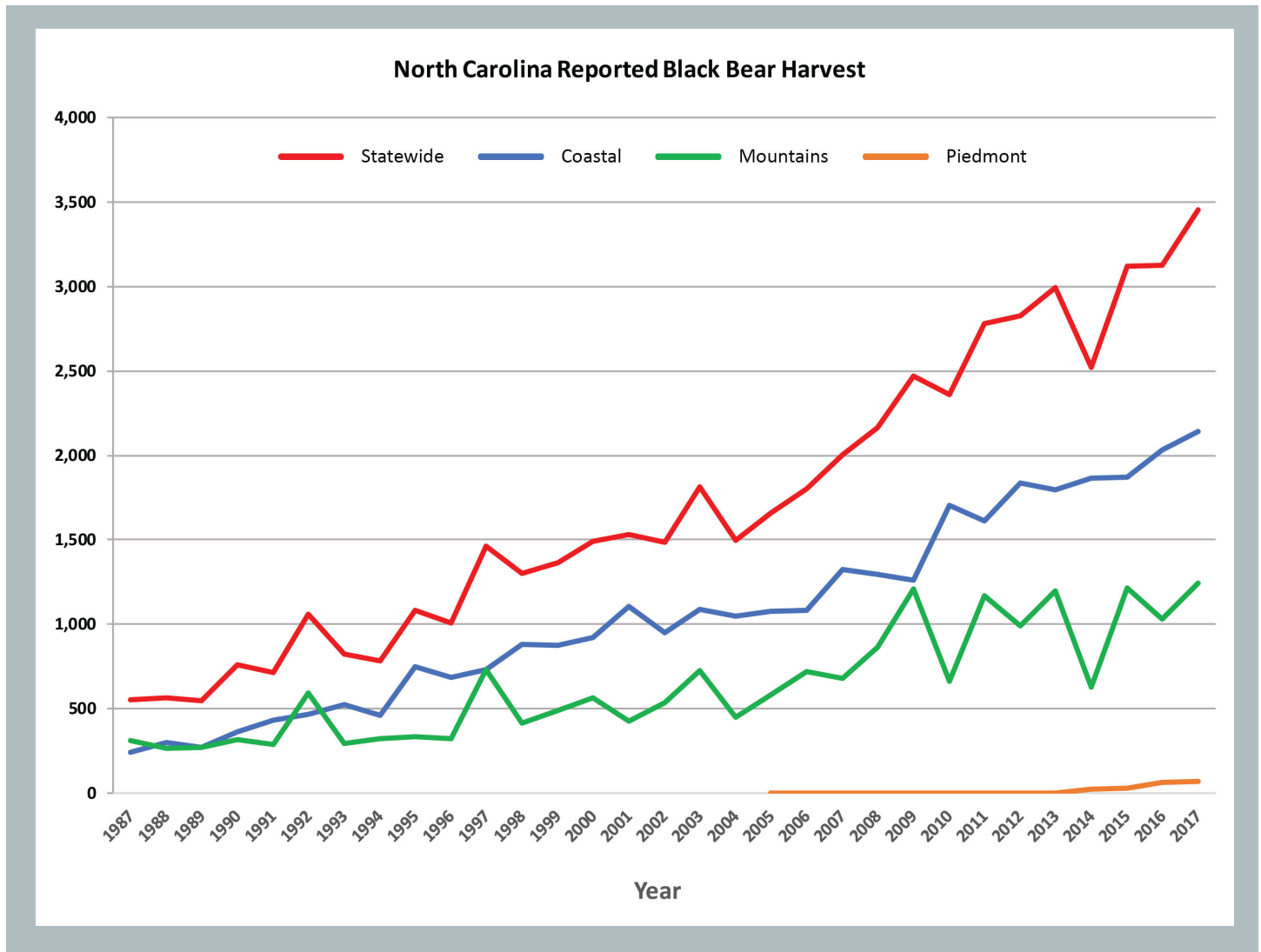


Bear Harvest & Mortality

Statewide in 2017, reported black bear harvest was 3,454 (2,138 Coastal Plain BMU, 1,264 Mountain BMU, 52 Piedmont BMU). This was a record harvest and a 11% increase from the 2016 season. The statewide bear harvest has increased for 8 of the ten past consecutive years from 2008

through 2017; the largest increase in harvest in those 10 years occurred in 2015. Total known 2017 black bear mortality was 3,681 bears, including the statewide harvest plus additional non-harvest mortality as follows: Auto=212 bears, Depredation=6 bears, Illegal=1 bear, Other=1 bear, and Unknown=7 bears.

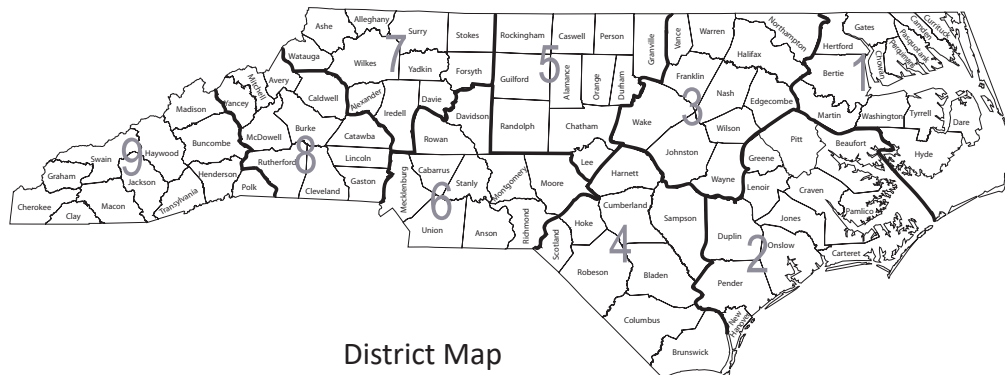
*The 2017 season saw a record bear harvest, with an increase of 11% from the 2016 season.*





White-tailed Deer Harvest

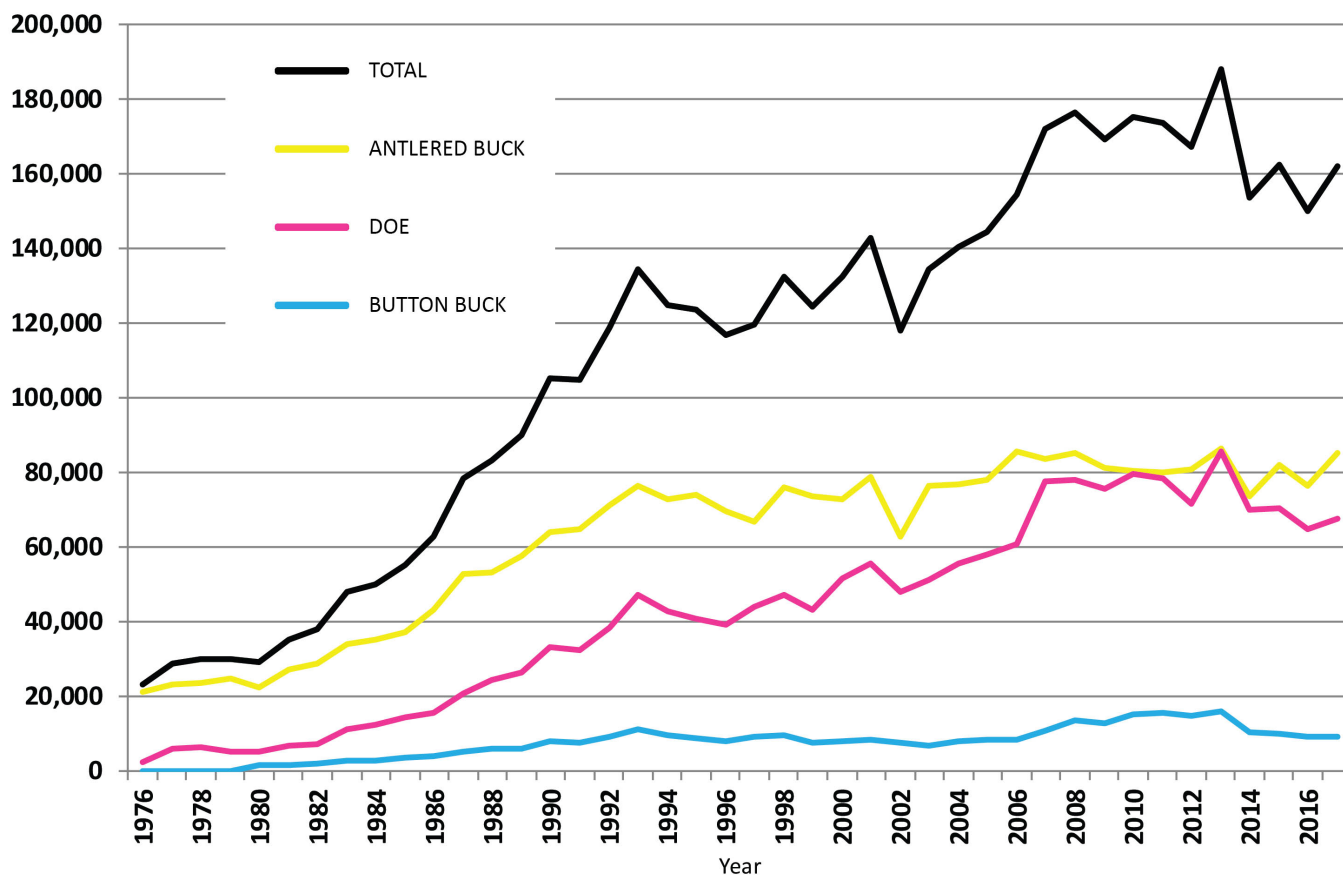
North Carolina hunters reported harvesting 161,854 deer during the 2017-2018 hunting season, consisting of 52.6% antlered bucks, 5.6% button bucks and 41.8% does. Total statewide harvest was up 8.0% from the 2016-2017 season, with increases in Districts 2-9 ranging from 3.4% in District 3 to 13.3% in District 4. Harvest declined 3.9% in District 1.



District Map

*This year's total statewide deer harvest was up 8% from the 2016-17 season.*

North Carolina Reported Deer Harvest



### Deer Hunter Observation Survey

As mentioned on page 21, a deer hunter observation survey has been conducted each year since 2014. During the four deer hunting seasons from 2014-2017, volunteer deer hunters recorded wildlife observations on 105,683 hunting trips encom-

passing 364,238 observation hours. While the survey provides insight into deer herd parameters, it may also have long-term utility in monitoring many additional game species that are normally difficult to monitor. Not only are participants asked to record observations of deer but they

also are also requested to record observations of all other game species observed. Biologists believe that over time this survey will provide insight into changes in species abundance that may occur from both a spatial and temporal perspective.

Statewide Total Annual Counts of Selected Game Species Observed in the North Carolina Deer Hunter Observation Survey, 2014-2017.

Year	Gray Squirrel	Fox Squirrel	Total Squirrels	Raccoon
2014	62,713	1,994	64,707	2,546
2015	69,225	1,549	70,774	1,888
2016	51,747	1,159	52,907	1,589
2017	89,997	2,071	92,068	2,666

Year	Coyote	Bobcat	Gray Fox	Red Fox
2014	1,533	346	988	289
2015	1,190	237	645	310
2016	982	168	532	151
2017	1,470	298	712	279

Statewide Species Observation Rates in the North Carolina Deer Hunter Observation Survey, 2014-2017. Statewide Mean Estimates Derived from Annual State Averages.

Species	Animals Seen Per 1,000 Hours
Gray Squirrel	765.6
Raccoon	27.2
Fox Squirrel	17.7
Coyote	14.1
Gray Fox	8.3
Red Fox	3.4
Bobcat	3.4

### Annual Hunter Harvest Survey

Each year, the NCWRC conducts a survey of randomly selected hunting license holders to estimate hunter participation and harvest of multiple species where mandatory reporting is not required. While harvests of big game species can be tallied

through the agency’s mandatory reporting systems, this separate survey can also provide an alternative method to compare harvest estimates for those species. Below is a table that highlights hunter participation and harvest estimates for many of North Carolina’s small

game species for the 2017-18 hunting seasons.

*Note that bobcat, coyote, fox and raccoon may also be harvested by trappers. Trapper harvest estimates for these species are separate and included on page 17.*

Species	Total Hunters	Total Days Hunted	Total Harvest
Bobwhite Quail	5,563	30,104	24,692
Gray Squirrel	43,710	267,954	330,257
Fox Squirrel	3,974	19,564	6,905
Ruffed Grouse	4,157	32,452	3,790
Rabbit	35,765	239,619	200,197
Crow	9,782	42,573	98,566
Mourning Dove	68,656	182,554	812,701
Woodcock	2,568	10,210	6,612
Bobcat	3,301	25,645	1,993
Coyote	33,498	270,488	47,072
Fox (Gray & Red)	2,873	42,851	2,937
Raccoon	8,986	181,098	59,946

### General Disease Surveillance

Agency staff investigated 200 disease reports and carried out several disease surveillance efforts leading to numerous laboratory submissions. Disease reports included 26 different species with 101 Deer, 27 foxes and 21 raccoons. Staff continued to test for Lymphoproliferative Disease Virus (LPDV) in wild tur-

keys that died of unknown causes of mortality; 5 of 6 animals submitted for testing were positive for LPDV.

One deer herd health check was performed during the 2017-18 period and four animals were euthanized and necropsied. Samples from all relevant tissues were sent to the Southeastern Cooperative Wildlife Disease Study for diagnostics. The

results indicated that three of the four Mountain Island State Forest deer had antibodies against Epizootic Hemorrhagic Disease (EHD) and Bluetongue viruses, and abomasal parasite data from deer collected in summer would be required to give a more thorough analysis of the population health.

## North Carolina Wildlife Resources Commission Mission Statement

To conserve North Carolina's wildlife resources and their habitats and provide programs and opportunities that allow hunters, anglers, boaters and other outdoor enthusiasts to enjoy wildlife-associated recreation.

## Surveys & Research Program Mission Statement

The mission of the Surveys and Research Program is to 1) ensure the long term viability and sustained harvest of game and furbearer populations by providing the best possible scientific information on the status and management of each species and its habitats so that regulations and management are based on objective data; and 2) participate in planning and coordination of management directives based on sound science.



[ncwildlife.org](http://ncwildlife.org)