NEW JERSEY NORTHERN BOBWHITE ACTION PLAN

A Report to the New Jersey Fish and Game Council on the status of and management recommendations for northern bobwhite (*Colinus virginianus*) in New Jersey.

Revised August 5, 2011

New Jersey Division of Fish and Wildlife
David Chanda, Director
Larry Herrighty, Assistant Director

Bureau of Wildlife Management
Upland Game and Furbearer Project
Paul M. Castelli, Research Scientist II (ret.)
Andrew W. Burnett, Principal Biologist
Joseph R. Garris, Wildlife Technician

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Executive Summary

Northern bobwhite populations have declined throughout most of their range for over 100 years. New Jersey's declines are among the most precipitous recorded. Recent studies found high mortality rates are the primary cause of these declines. Annual adult mortality in New Jersey was 91.4%. Avian predation was the highest mortality factor (43.5%). Domestic Cats caused 10.1% of total bobwhite mortality while direct hunting mortality was 2.9% of non-breeding season mortality. Currently the mortality rate of this population is too high to sustainable a viable population and any reduction in mortality will benefit bobwhite.

Population models indicated that winter mortality, which includes hunting, is a critical factor in population growth. At low bobwhite population levels harvest may not be self-limited because the ratio of hunters to birds, efficiency of the hunters, and harvest rate can increase as bobwhite abundance declines. Stocking exacerbates this problem and may introduce disease, reduce genetic diversity, or compromise population surveys. At its current low level, the New Jersey wild bobwhite population should benefit from restricted harvest.

Low survival rates for bobwhite can be related to the quantity and quality of early successional habitats. Recent telemetry studies have found that covey home range sizes were large, presumably due to poor habitat quality. In these studies, normally favorable grassland habitats were too few and too small to improve habitat quality. A habitat model predicted that 800,000 acres of potential habitat exist in the wild bobwhite zone, but only 18% of this habitat is currently occupied by bobwhite. This suggests existing habitat is of poor quality.

Bobwhite populations naturally fluctuate and occasionally in some areas may experience extirpation. When local pockets of habitat shrink or become isolated from other existing habitats, it is less likely bobwhite will find and repopulate empty patches. A sufficient quantity of connected, good quality, early successional habitats allow bobwhites to meet all their life needs while avoiding predators, including hunters, and surviving periods of severe winter weather. In New Jersey human activity is increasing habitat loss and fragmentation.

To reverse the loss of bobwhite habitat, the Division has engaged government and private stakeholders in bobwhite conservation efforts. Concerned sportsmen and sportswomen have formed the New Jersey Quail Project in response to the decline of bobwhite. On average of 3,450 acres a year are improved for bobwhite in New Jersey. However, this level of restoration does not overcome the 14,000 acres lost annually to development.

This action plan outlines six goals and associated actions designed to return bobwhite to the population level of 1980 by increasing habitat quantity and quality. A prescriptive hunt plan that provides for harvest opportunity consistent with the action plan goals is included. Given the current status of bobwhite, a closed season and some restriction of stocking is recommended at this time.

Purpose

The purpose of the northern bobwhite action plan is to propose strategies and tactics designed to perpetuate Northern bobwhite (*Colinus virginianus*) (hereafter bobwhite) and their habitats in New Jersey while providing opportunity for people to enjoy and use bobwhite on a sustainable basis.

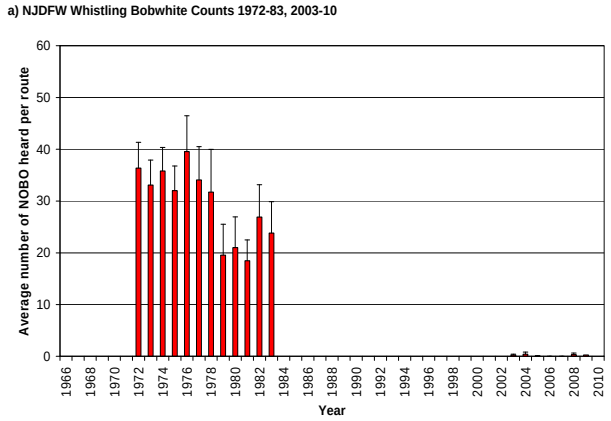
Background

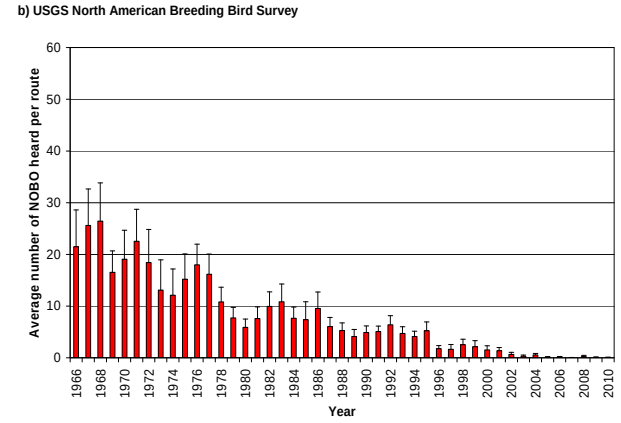
Bobwhites are a popular game bird native to the southern two thirds of the United States, which includes New Jersey. Prior to settlement of New Jersey by Europeans, bobwhites were probably only found in scattered forest openings and burned areas. Bobwhite populations likely expanded during the 1700's and 1800's as forests were cleared for farmland. Brushy, weedy farms, ploughed with horses and devoid of pesticide use provided ideal habitat for coveys. During the 1800's bobwhite were found in nearly all of New Jersey. Northern bobwhite populations appear to have declined during the 1860's in New Jersey and began declining in North America by 1880-90 (Errington and Hamerstrom 1936). By the early 1900's, bobwhites were scarce north of Trenton. They were most common in the central and southern portions of the state, and generally absent from areas devoid of cereal crops (Warren and Burlington 1937, Rue 1973). While no single factor can be associated with the decline, loss or conversion of suitable habitat led to decreased survival or recruitment and is considered the primary cause (Brennan 1994).

Since 1960, the New Jersey bobwhite-hunting season was open from early November into February, with a bag limit of 7 birds per day. Semi-wild preserves, commercial shooting preserves, and falconers had longer seasons with more liberal bags limits. In an effort to reverse the bobwhite population decline, the New Jersey Fish and Game Council (hereafter Council) established two bobwhite-hunting zones, beginning in the 2005-06 season. A wild bobwhite zone was established south of State Highway 33 with a season length shortened to January 31 and a daily bag limit reduced to 4 birds per day. North of State Highway 33 was considered an area unsuitable for wild bobwhite and bobwhite-hunting regulations remained as they were prior to 2005-06.

Monitoring

Bobwhite survey data for New Jersey are available from 1966 to the present time. Surveys include the New Jersey Division of Fish and Wildlife (hereafter Division) Whistling Bobwhite Call Count Survey, the United States Geological Survey's North American Breeding Bird Survey (BBS), and the National Audubon Society's Christmas Bird Count. All 3 surveys show similar, dramatic declines in bobwhite numbers in New Jersey (Figures 1, 2, and 3). Data from the BBS indicate that bobwhite populations are declining throughout most of their range. The observed declines in New Jersey between 1980 and 2007 of 13.0% per year are among the most precipitous recorded (Sauer et al. 2008).





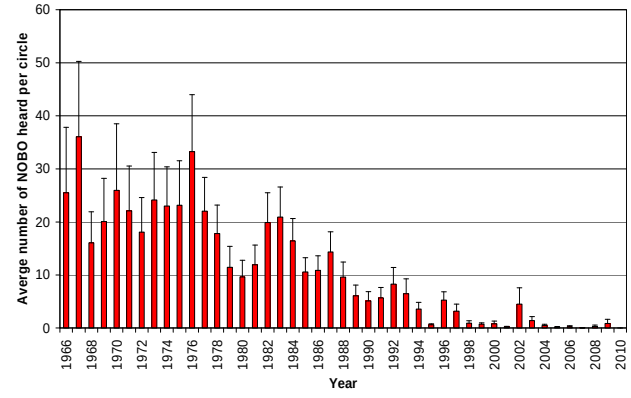
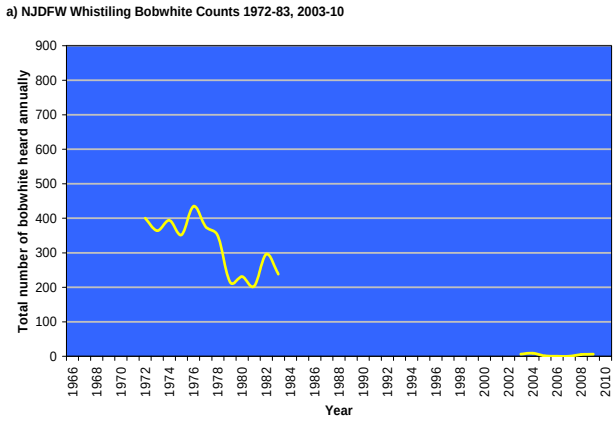
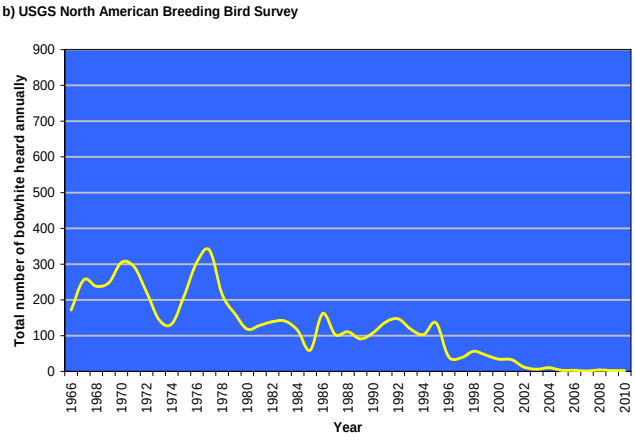


Figure 1. Average number of bobwhite (+SE) heard per survey route in New Jersey since 1966





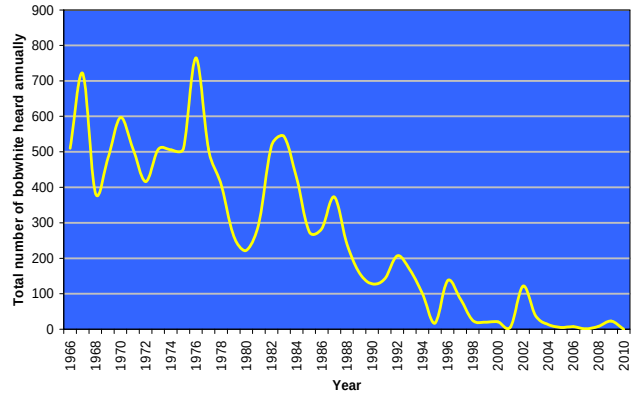


Figure 2. Total number of bobwhite heard annually in New Jersey since 1966

Demography

In response to the long-term decline of New Jersey's bobwhite population, the Council directed the Division to initiate research on the population and its habitat. From 2005 through 2008 the Division's Bureau of Wildlife Management partnered with Dr. Christopher Williams from the University of Delaware to conduct several year-round radio telemetry studies of bobwhite in Cumberland County, NJ. The purpose of the studies was to measure bobwhite nesting effort, nesting success, home range, annual survival, mortality factors, and population size.

Collins (2008) conducted breeding season (Apr 1-Sep 30) radio telemetry studies of bobwhite on a 48 mi^2 study area in Cumberland County from 2006-2008. Breeding season home ranges averaged 86.6 acres (± SE 15.1). The probability that an individual bird would initiate nest incubation was 68.7% for females (n = 15) and 20.2% for males (n = 4). The average clutch size was 14.2 eggs (± SE 0.58). Nest success was estimated to be 45.4% (± SE 1; n = 20 nests) and hatchability of successful nests was 96.1% (± SE 2.0). Adult survival during the breeding season was 34.3%. Survival of broods from hatch through fledging was not measured.

Results of this study indicate that breeding season ecological and demographic parameters for bobwhite in southern New Jersey appear to be similar to those reported elsewhere in the species range. These data indicate that bobwhite declines in New Jersey are not explained by reductions in nest initiation or nest success rates nor clutch size. This correspondence of bobwhite nest success in New Jersey to other populations should not be interpreted that bobwhite in New Jersey are doing well. Bobwhites are declining in most of their range despite generally good nest success. Brood survival or survival at other times of the year could still be limiting bobwhite populations. The similarity of nest success rates only implies that New Jersey does not represent a special case in bobwhite biology.

Lohr (2009) conducted non-breeding season (Oct 1-Mar 31) radio telemetry studies of the same bobwhite population from 2006-08. Nonbreeding season adult survival was 25.2%. Sandercock et al. (2008) predicted that a 47% winter survival rate was necessary for a stable population. Non-breeding season covey home range size averaged 72.2 acres in New Jersey. In Illinois, an area of similar latitude, home ranges were typically less than 25 acres (Roseberry and Klimstra 1984). Covey home range sizes in southern New Jersey were more similar to those reported by Madison et al. (2000) and Bell et al. (1985) who both concluded that poor habitat quality was the factor responsible for large covey home range sizes.

Predation was the leading mortality factor (85.5%) in both studies (Table 1). Avian predators (e.g., hawks and owls) were the primary predators, followed by mammals. Domestic cats (*Felis catus*) accounted for 10.1% of bobwhite mortality. Direct hunting mortality was low, 2.9% of non-breeding season mortality. However, the indirect effects of hunting, such as non-retrieved loss, increased predation or reduced covey survival when covey size falls below 11 birds (Williams 2001), was not estimated.

Table 1. Mortality factors of radio-telemetered northern bobwhite in southern New Jersey (from Collins (2008) and Lohr (2009)).

Season		Source of mortality						
		Predation, avian	Predation, domestic cat	Predation, mammal	Predation, unknown	Window collision	Hunter harvest	Unknown source
Breeding (Apr 1-Sep 30)	#	14	2	9	7	0	0	2
	%	41.2	5.9	26.5	20.6	0.0	0.0	5.9
Non-breeding (Oct 1-Mar 31)	#	16	5	6	0	1	1	6
	%	45.7	14.3	17.1	0.0	2.9	2.9	17.1
Annual (Apr 1-Mar 31)	#	30	7	15	7	1	1	8
	%	43.5	10.1	21.7	10.1	1.4	1.4	11.6

The annual adult survival rate was 8.6% based on Collins (2008) and Lohr (2009), which equates to 91.4% annual mortality. A survival rate this low is not sufficient to sustain a viable bobwhite population. Sandercock et al. (2008) estimated that an annual survival rate of 41% is required to ensure a viable bobwhite population. Population modeling incorporating the vital rates of New Jersey bobwhite predicts that the population is declining at 30% annually (C. K. Williams, University of Delaware, personal communication). Nationally, bobwhites are estimated to be declining at 44% annually (Sandercock et al. 2008). While the magnitude of the declines is likely overestimated, it seems clear that the population trajectory is negative. Both models indicate that winter mortality, which includes hunting, is a critical factor. Low adult survival is the primary explanation for the continued downward trend in New Jersey's bobwhite population.

Habitat Requirements and Limitations

Low survival rates of bobwhite are most likely related to the quantity and quality of early successional habitats. The loss and degradation of these habitats is considered the most likely cause of bobwhite population declines. Collins (2008) and Lohr (2009) found bobwhite use grassland and shrub land habitats preferentially (Figure 4). The risk of mortality during the nonbreeding season was increased by use of grassland habitat, low movement rates, and increased proximity to occupied buildings and barns Lohr (2009). Previous studies have speculated that lower rates of covey movement would result in lower mortality from decreased vulnerability to predation and hunting (Scott and Klimstra 1954, Roseberry 1964, Williams et al. 2000).

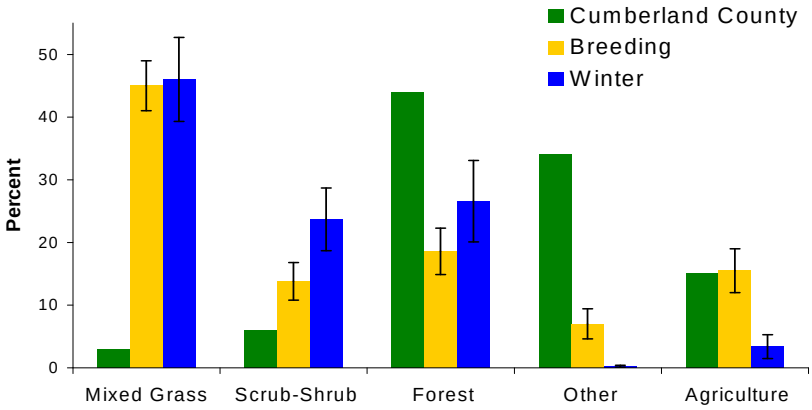
Lohr (2009:16) suggested the following explanation:

> "[T]his paradox may have been caused by intense fragmentation of usable space by vast areas of agriculture, salt marsh, urban development and other seldom-utilized habitat types, effectively confining movement within their home range to small patches of suitable habitat. For example, the three coveys with mean daily movement rates <70m/day were found in areas that fit this description. These coveys also exhibited the smallest home ranges in my study (all were ~10ha). Coveys in small isolated patches of habitat would be especially vulnerable to localized changes in the availability of food resources and escape cover if their ability to move to another

patch of suitable habitat was limited. Additionally, Roseberry (1979) noted that quail hunting is not a random searching process, as experienced hunters concentrate their efforts in habitat that quail use most often. This relationship is also likely for predators that form search images for available prey. Therefore, coveys relegated to isolated patches of habitat may face higher mortality from both hunting and predation."

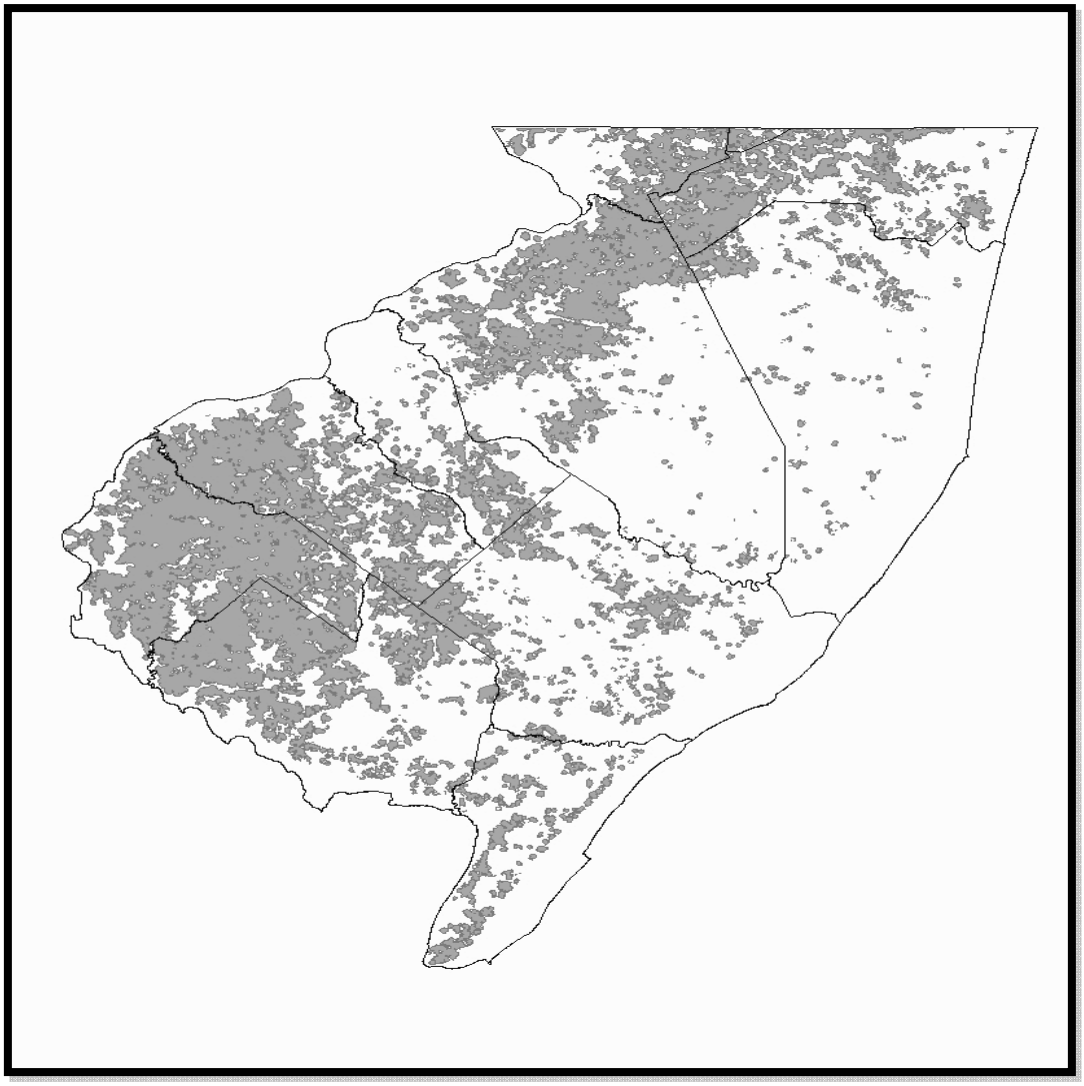
It appears that the normally favorable grassland habitats were too few and too small to function as high quality habitat and therefore functioned as ecological traps. Additionally, harvested agricultural lands or those planted with traditional winter cover crops provide little or no value to bobwhite during the non-breeding season (Lohr 2009).

Figure 3. Average percentage of radiolocations (+SE) recorded for bobwhite in Cumberland County, NJ during breeding and winter (2006-2008) seasons, in contrast to overall land use percentages in Cumberland County (Collins 2008, Lohr 2009).



Fowles et al. (2008) developed a spatial model of potential bobwhite habitat by examining the habitat patterns surrounding locations where bobwhites were present (Figure 5). The model found that bobwhite presence was positively related to areas with more than 10% grassland interspersed with forest edge, shrubby, and barren areas and negatively related to large blocks of forest or wetland habitat and urban land use. The model predicted approximately 800,000 acres of potential bobwhite habitat in southern New Jersey. Field surveys conducted during 2008 estimated that only 18% of the predicted potential habitat is occupied by bobwhite (B. M. Collins, NJDFW, unpublished data).

Figure 4. Predicted potential bobwhite habitat in southern New Jersey (Fowles et al 2008).



An average of 8,900 acres of New Jersey farmland has been lost annually from 1995-2002 (NJDEP 2008). The long-term trend from smaller to larger farms, a shift in crop interests from cereals to vegetables or horticultural products, more efficient machinery, increased pesticide use, and "clean" farming practices have all likely contributed to decreased habitat suitable for bobwhite. Additionally, mowing and hay cutting operations in the grassy habitat preferred by bobwhite for nesting, may result in the mortality of incubating hens and result in considerable nest destruction. Some insecticides, (such as heptachlor, DDT, dieldrin and aldrin previously used in crop fields), have been found to kill bobwhite (Lutz 1962, Rosene 1969). These insecticides may have been used in New Jersey, but have been effectively banned within the United States since the early 1970s. The insecticide Monitor® 4, which is currently used in New Jersey, is categorized as a "restricted use pesticide" due partly to its residue effects on avian species. Insecticides have an indirect negative effect on bobwhite by lowering insect abundance during the critical brood rearing period. Herbicides can also reduce carrying capacity by reducing bobwhite food seeds and cover (Rosene 1969).

Bobwhite populations naturally fluctuate and in some years may experience extirpation (i.e., a localized extinction). Winters with significant snowfall may exacerbate these extirpations especially in smaller habitat patches, which have a higher probability extirpation.

The winters of 2009-2010 and 2010-2011 both had above average snowfall and periods of several weeks where 18" or more of snow covered the ground. In Maryland, radio telemetered bobwhite suffered +90% mortality during these weather events (William Harvey, Maryland Department of Natural Resources, Personal Communication). Division biologists are concerned that these snowfalls caused widespread mortality among bobwhite in New Jersey. In large, healthy populations, extirpated areas are usually recolonized quickly via the immigration and recruitment of surviving bobwhite from adjoining areas. When local pockets of habitat become isolated from other existing habitats, it is much less likely that bobwhite will find and recolonize the unoccupied patches, because they do not move very far. Collins (2008) and Lohr (2009) determined that daily movements were 165.09 and 172.55 yards, respectively. Fragmentation of bobwhite habitat increases the risk of extirpations and decreases the probability of repopulation (Roseberry and Klimstra 1984, Guthery et al. 2000).

Human development is a major cause of habitat fragmentation in New Jersey. According to the U.S. Censuses of Population and Housing, New Jersey is the most densely populated state, a distinction it has held since 1970. The human density in 2000 was 1,134 people per square mile (USDOC 2000); more than twice the human density recorded in 1940 (Forstall 1990). Emigration to suburban and rural areas has been a growing since the 1940's. The resultant demand for housing, open recreation areas, roads, and other development activities has reduced the available habitat for most wildlife species, including bobwhite. The majority of development activities come at the expense of farmlands, forests, and other open space areas. From 1995 to 2002, 14,000 acres of New Jersey was converted to urban land use annually (NJDEP 2008).

Urban sprawl and suburban growth is often accompanied by an increase in domestic pets that may predate on bobwhite. The New Jersey Department of Health and Senior Services conducts annual voluntary surveys of animal impoundment facilities. Ninety facilities reported impounding 63,088 cats in 2008 of which only 22,883 were adopted or redeemed by their owners (NJDHSS 2009). There is a growing body of scientific literature that strongly suggests that cats are a significant mortality factor to small mammals, birds, reptiles and amphibians (The Wildlife Society 2001, Schmidt et al. 2007, Longcore et al. 2009).

Loss and fragmentation of usable space is usually considered the primary threat associated with increasing urban and suburban development. However, Lohr (2009) suggested that the mere presence of occupied buildings and barns had a negative effect on bobwhite winter survival. This is consistent with the results of Fowles et al. (2008) that any amount of urban land use was negatively correlated with bobwhite occurrence. Barratt (1997) found that predation by cats associated with homes in residential areas could significantly impact populations of small native fauna in relatively undisturbed adjacent natural land. These findings support the assertion of Seckinger et al. (2008) that "habitat quality for bobwhite may be influenced by factors at the spatial scale of the predator and not solely determined by vegetation structure and usable space."

Both feral and house cats prey on bobwhite. On several occasions Lohr (2009) observed bobwhite coveys being flushed by collared house cats. In one instance, a bobwhite radiocollar was found immediately adjacent to a mature cat and a litter of kittens in the crawlspace under a home. The remains of at least two bobwhites were present in the crawlspace. As early as 1931, Stoddard asserted that housecats posed a serious threat to bobwhite of all ages and proposed licensing requirements for owners and fines if cats caused the deaths of "valuable bird life."

Additionally, cats that are fed by humans may pose a disproportionately large threat to wildlife, including bobwhite, as they are less constrained by prey availability than other predators and can exist at artificially high densities (Lepczyk et al. 2003).

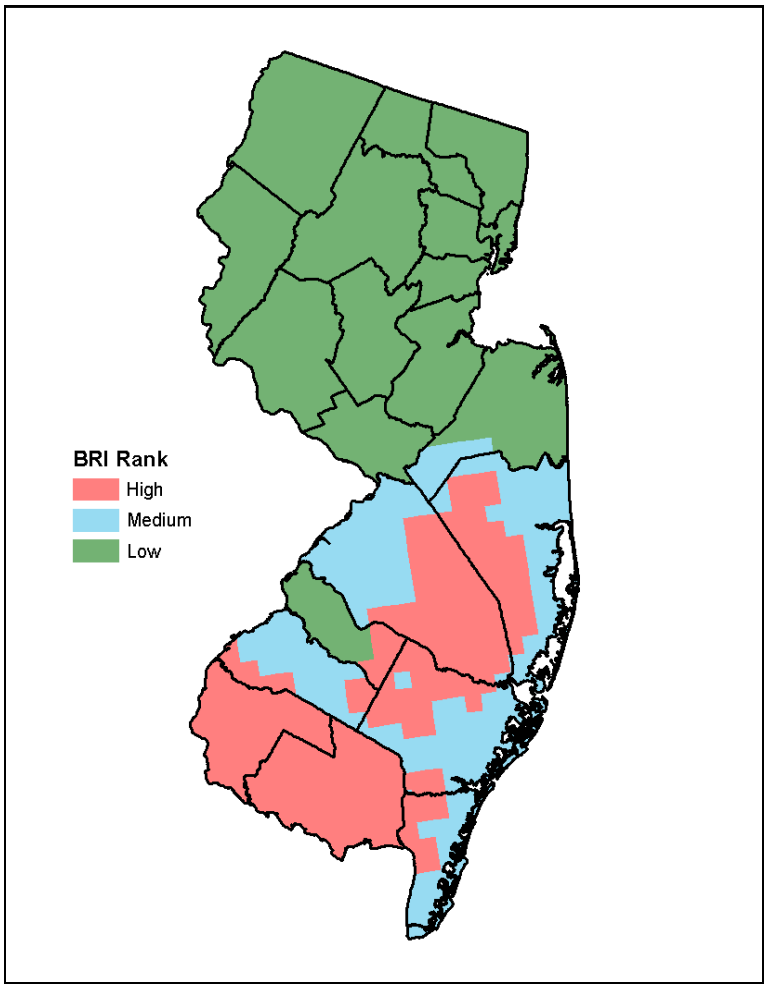
In summary, a sufficient quantity of connected, good quality early successional habitats allow bobwhite to meet all their life needs (food, water, shelter, living space) while avoiding predators, including hunters, and surviving periods of severe winter weather. Diminished habitat quality and quantity combined with the negative effects of fragmentation put bobwhite at greater risk of death. Habitat directly effects recruitment and survival, making it the key determinant of bobwhite population status.

Habitat Management

Just as habitat is the ultimate cause of the bobwhite decline, it is also the ultimate solution. Reversing the bobwhite decline requires increasing the quality and quantity of habitat. 3,450 acres annually have been improved annually in New Jersey since 2003. At the same time, nearly 14,000 acres of farmland and forest were lost to development annually (NJDEP 2008). Increased restoration efforts that focus on increasing quality, quantity, and connectedness of existing habitats are needed for bobwhite in New Jersey.

The Northern Bobwhite Conservation Initiative (NBCI) provides a national blueprint for bobwhite restoration and will be an important management tool for bobwhite recovery at both the national and local level (Dimmick et al, 2002). Division biologists and administrators, the Council Chair, and representatives from conservation and sportsmen groups interested in bobwhite, participated in a NBCI workshop at the University of Delaware on May 1, 2009 to identify focal areas for habitat improvements in New Jersey (Figure 6). Biologist Ranking Information classified bobwhite habitat suitability at the county and block (6,400 acre) level. Suitability was categorized in terms of the likelihood that bobwhite populations would respond to proposed management actions and, importantly, render enough habitat to maintain viable population levels given appropriate conservation policy.

Figure 5. Biologist Ranking Information for northern bobwhite in New Jersey as determined at the NBCI workshop, Newark DE, May 2009.



Subsequent to the NBCI meeting, Division staff from the bureaus of Wildlife Management, Land Management, and Endangered and Nongame Species met with local partners, (including NJ Audubon, NJ Quail Project, South Jersey Quail Unlimited, Ruffed Grouse Society, University of Delaware, US Fish and Wildlife Service, and USDA Natural Resource Conservation Service) to form an Early Successional Habitat Coalition. The Coalition's proposed mission is to increase and connect early successional habitat for northern bobwhite, American woodcock, and other species that depend on similar habitat by identifying focal areas for targeted outreach to local landowners and implementing appropriate habitat practices.

A variety of federally funded conservation programs are available for fish and wildlife conservation on private lands (Appendix A). In 2008, Congress eliminated Farm Bill funds for conservation on public lands and ceased funding the Landowner Incentive Program.

Habitat Management on Division Wildlife Management Areas

The Division manages approximately 200,000 acres of potential bobwhite habitat south of Route 33. The majority of this land, approximately 116,000 acres, consists of unmanaged, closed canopy, pine-dominated woodlands in the New Jersey Pinelands Area. The Pinelands Commission regulates all land use within this area. These unmanaged woodlands are generally

between 40 and 90 years of age and provide little or no useable space for bobwhite. Within this area, habitat management and restoration is classified by the Pinelands Commission as "development" and requires a permit. The current administrative procedures of the Pinelands Commission permit program greatly limit habitat restoration for all wildlife species. This administrative roadblock to wildlife habitat management is the subject of negotiations between the Pinelands Commission, the Division, Department of Environmental Protection, environmental organizations, and key members of the State Legislature. In the near future a significantly improved process for implementing habitat projects in the Pinelands Area is anticipated.

The Pinelands probably represents the greatest potential growth area for wild bobwhite within their range in New Jersey. This area once harbored substantial numbers of bobwhite when the woodlands had a more open canopy and well-developed understory of native herbaceous and woody plants. The more open woodland character, which supported native biodiversity in addition to bobwhite, was maintained by wildfire. Over the past 30 years, fire suppression efforts combined with the lack of management has resulted in the succession of much of the Pinelands habitats beyond the early successional stages useful to bobwhite. Forest stewardship plans are currently being developed for Wildlife Management Areas (hereafter WMA) within the Pinelands that would restore more natural fire regimes and plant assemblages in this region. These plans will produce early successional habitats that will greatly benefit bobwhite and other species that depend on these habitats. These significant habitat improvement actions cannot occur until the existing administrative hurdles are removed.

The remaining 84,000 acres of WMA are located within the more traditional farmland-associated bobwhite habitats found in Gloucester, Salem, Cumberland, and Cape May counties. Habitat management planning is also underway for WMA within these counties. Historically vegetable farming with a high percentage of fallow fields and brushy coverts was the predominant use in this area. Under those conditions, this area harbored New Jersey's highest densities of bobwhite. Modern agriculture in these areas is dominated by large grain fields and provides little useable space for bobwhite.

Management for early successional bird species like bobwhite is a high priority on WMA in the agricultural portions of southern New Jersey. Within this region, over 200 acres per year are restored to native grasses through planting or natural seeding or are planted to wildlife food plots. An additional 100 acres of woody/brushy cover are restored to early succession through forestry or hydro-axe contracts with private contractors. The biggest challenge, however, is the maintenance of early successional habitats once established. Controlled burning and mowing/disking by Division crews are used to maintain over 2,000 acres per year in a successional stage useable by bobwhite. Operational funding to maintain or increase this level of management becomes more challenging each year.

A new and innovative approach to maintaining and creating early successional habitats on WMA within the bobwhite's range has been developed through the use of in-kind services in lieu of payment from contract farmers. Beginning in 2010, farmers that lease State-owned farmland will be required to plant, mow, disc, and otherwise maintain early successional habitats in proximity to their leased farmland. The amount of habitat work to be done is based on the value of the lease established by a bidding process and the value of in-kind services as determined by the US Department of Agriculture and other knowledgeable sources. Under this program, thousands of additional acres of early successional habitat can be created and maintained on WMA without the need for increased operational funding.

Communication, Information and Education

Over the last several years, the Division has also identified and engaged stakeholders in bobwhite conservation efforts. Division staff attended 15 meetings of the NJ Habitat Incentive Team, which is a partnership comprised of the Division, USDA-NRCS, USDI-FWS, NJ Audubon, The Nature Conservancy, Conserve Wildlife Foundation, NJ State Federation of Sportsmen's Clubs, NJ Quail Project, Atlantic Coast Joint Venture, and state affiliate chapters of Ducks Unlimited, National Wild Turkey Federation, Quail Unlimited, Ruffed Grouse Society, and Trout Unlimited. Division staff helped form and have attended several meetings of the NJ Early Successional Habitat Coalition Group, which is a partnership comprised of the Division, USDA-NRCS, USDI-FWS, NJ Quail Project, South Jersey Quail Unlimited, and Ruffed Grouse Society. Division representatives have participated in three landowner workshops in conjunction with NJ Audubon and NJ Quail Project, granted three media interviews regarding bobwhite and collected 107 bobwhite occurrence reports from the public.

Division representatives have attended several meetings of the National Bobwhite Technical Committee (formerly called the Southeast Quail Study Group) and the Northeast Upland Game Bird Technical Committee. Our research findings were presented at GAMEBIRD 2006 in Athens, GA, the 2007 and 2008 annual meetings of The Wildlife Society in Tucson, AZ and Miami, FL, respectively, the annual meeting of the American Ornithologist Union in Philadelphia, PA, and at the 2008 Northeast Association of Fish and Wildlife Agencies meeting in Galloway, NJ. Scientific papers regarding bobwhite ecology in New Jersey were published in the Journal of Wildlife Management (Lohr et al. 2011) and Wilson Ornithological Journal (Collins et al. 2009) and a third is being prepared. A technique to distinguish pen-reared from wild bobwhite was developed and presented at an International conference on game birds (Castelli and Reed 2008). Four *New Jersey Hunting and Trapping Digest* articles (2004, 2005, 2009, 2010) and 4 website articles regarding habitat programs have been published, and 50 informational packets have been sent to farmers within the Columbus NRCS district (i.e., Burlington, Camden, and Ocean counties).

New Jersey Quail Project

The New Jersey Quail Project (NJQP) was formed in March 2007 by a group of concerned sportsmen and sportswomen in response to the decline of bobwhite populations in New Jersey and across the nation. The purpose of the NJQP is "to support and sustain suitable habitat for quail, educate the public and fellow sportsmen and sportswomen about quail habitat and its inhabitants, generate and sustain revenue through grants and donations to achieve goals and continue to work with biologists and land managers to provide manpower and funding to foster a return to a healthy native population of northern bobwhite quail in New Jersey". The NJQP is currently working to improve habitat at several southern New Jersey locations, one of which may serve as a source for wild bobwhite if restocking of other areas is deemed necessary. Division biologists Anthony Petrongolo, Lee Widjeskog, and Andrew Burnett serve on an ad hoc advisory board for the NJQP.

Stocking Program Review

As bobwhite populations declined in the latter 19th century, the NJ Board of Fish and Game Commissioners would periodically purchase wild birds from other states. Attempts at acclimating bobwhite obtained from southern states proved unsuccessful. Therefore the Board began to secure bobwhite from western states, as they were considered a larger and hardier bird.

Late in the spring of 1897, as an experiment, 1,032 western quail were purchased and distributed for propagation purposes (NJ Board of Fish and Game Commissioners 1898).

Stocking of wild quail in New Jersey from western sources began about 1899 with the introduction of 30,000 Oklahoma bobwhite (Warren and Burlington 1937). In 1913, the first bobwhites were reared at the state's Forked River game farm (NJ Board of Fish and Game Commissioners 1913). Early propagation efforts were started at Walpack Center, Sussex County in 1932. That operation was enlarged to the new artificial breeding facility established in 1934 at Holmansville (Jackson Township), Ocean County, where the total output exceeded 14,000 in 1937 (Warren and Burlington 1937). An unknown number of bobwhites were annually obtained in cooperation with county 4-H groups from 1950 to 1969 (Kingsbury 1969).

The Division raised quail at their Holmansville facility for put-and-take hunting from the mid-1930's until 1983. This property was traded to the Division of Parks and Forestry in exchange for property adjacent to the Clinton WMA. A portion of the quail stocking effort was transferred to the Forked River facility, which eventually was managed by the NJ Department of Corrections until it was closed during the mid-1990's.

Approximately 15,000 quail were stocked annually at Pequest, Greenwood Forest and Peaslee WMA until 1997. Stocking was reduced in 1998 due to budgetary reasons to approximately 10,000 quail annually at Greenwood Forest and Peaslee WMA. These birds are obtained from outside vendors at the lowest bid offered. In-season stocking by the Division's Bureau of Land Management continues until the first week of January.

Bobwhites are stocked on WMA's immediately preceding a hunting day to maximize hunter harvest. Carlson (1974) determined that 75.2% of 2,290 pen-raised bobwhite released on Colliers Mills WMA were harvested. The bag limit on WMAs is the same for wild and stocked birds.

Bobwhites are also stocked by private individuals, hunting clubs, and commercial hunting areas. The estimated statewide bobwhite stocking effort for the 2009-10 season was 29,857 birds released on 182,099 acres at 26 semi-wild preserves, 16 commercial preserves and 12 Division WMAs (10 pre-season for dog training and 2 in-season for hunting) (A.W. Burnett, NJDFW, unpublished data). The number of individual sportsmen that purchase and release is estimated at 913 (A.W. Burnett, NJDFW, unpublished data). No permit is required if the birds are released within 20 days of the purchase date. During calendar year 2009, the Division's Captive Game Permit Unit issued 1 Exhibitor, 1 Scientific, 14 Hobby, and 27 Propagation / Sales permits for 70,645 bobwhites. Licensed propagators may also sell bobwhite to out of state clients.

Effects of Stocking

Over a century of bobwhite stocking failed to increase wild bobwhite populations or re-establish wild populations. This is not unexpected as habitats have a certain carrying capacity and therefore can only sustain a finite number of birds. Pen-raised bobwhites are generally unsuited for survival in the wild (Roseberry et al. 1987, Perez et al. 2002). Additionally, Releasing pen-raised bobwhite for put-and-take hunting can have several potential negative consequences on existing populations.

Releasing pen-raised bobwhite into habitats of wild bobwhite can result in increased mortality of native bobwhite from both harvest and predation. Usually, hunter numbers, effort, and harvest decline as bobwhite abundance declines. Stocking eliminates this phenomenon as hunters can always expect to encounter bobwhite, leading to sustained hunting pressure on wild

bobwhite residing in stocked areas. DeVos and Speake (1995) found that wild bobwhites are attracted to the calling of pen-raised bobwhite released in their home range. Wild bobwhites usually were found within 50 yards of the released birds within one hour. Eggert et al. (2006) found that stocking pen-raised bobwhite affected behavior, lowered survival, and increased hunter susceptibility of wild birds. Hunters have no way to ensure that only stocked birds are harvested. Additionally, high densities of pen-raised bobwhite can attract natural predators, which will increase natural mortality of wild and pen-raised birds.

Other negative impacts of pen raised bobwhite on wild bobwhite are related to genetics and disease transmission. Pen-raised bobwhites that breed with wild birds may lower the genetic quality of the population (DeVos and Speake 1995). Evans et al. (2006) found that genetic diversity, number of alleles, and allelic richness were reduced in wild x pen-raised crosses. Released bobwhite that survive until (or are released during) the breeding season compromise efforts to measure population indices for wild populations. Landers et al. (1991) believed pen-raised bobwhites could function as a potential avenue for transmitting diseases such as quail bronchitis, avian pox, crytosporidiosis, crop capillariasis and histomoniasis ("blackhead disease") to wild birds.

Reintroduction

In a effort to restore bobwhite to northern New Jersey, 37 bobwhite (20M:17F) were captured in southern New Jersey and released in Delaware Township, Hunterdon County during 1982 and 1983 (Petrongolo 1982, Petrongolo 1983). Two hundred four wild bobwhites were live-trapped in Illinois and released in Delaware Township, Hunterdon County during March-April 1986 and in Andover Township, Sussex County in March 1987. One hundred Illinois birds were liberated at each release site (Eriksen 1988). Bobwhite persisted in the area of these sites for a few years following release, but a viable population was not established at either release site. Failure of these releases may have been caused by an insufficient number of birds initially released, the failure to subsequently release additional birds to offset natural mortality and adverse weather factors, or habitat conditions in these more northern areas were unsuitable for bobwhite (Eriksen 1988).

At this time, trapping and transfer operations will not work for bobwhite due to a lack of suitable habitat in most instances. The lack of early successional habitat is the reason for the bobwhite's decline. The primary solution is to create suitable habitat at a spatial scale to support viable bobwhite populations. If sufficient habitat is created and connected in areas that still contain wild bobwhite, they should be able to repopulate the area through natural reproduction. Where habitat is created on a sufficiently large scale, but no wild bobwhite exist, the Division will consider trap and transfer operations.

Harvest Management Review

Brewster (1911) noted the first New Jersey law applying to bobwhite was passed in 1820 when hunting was prohibited from February 1 to September 1 except for persons hunting their own land. The hunting season was shortened to November 1 to January 10 in 1838, further shortened to November 1 to January 1 in 1859, and closed for three years from1869 to 1872. The first daily bag limit for bobwhite was established in 1911 at ten birds per day (NJ Board of Fish and Game Commissioners 1911). By 1923, bobwhites were so scarce the season was closed in the 10 northern counties of Bergen, Essex, Hudson, Hunterdon, Morris, Passaic, Somerset, Sussex, Union and Warren (NJ Board of Fish and Game Commissioners 1923). In 1938, the bobwhite season reopened in Hunterdon, Morris, Somerset, Sussex, and Warren counties, and

remained closed in Bergen, Essex, Hudson, Passaic and Union counties until 1943. By 1940, few wild bobwhites existed north of Mercer and Middlesex counties while bobwhite remained plentiful in southern New Jersey during this period.

Prior to 1950, the bobwhite season was approximately one month long, from November 10 to December 10. After 1950 the season was extended until the end of December with a bag limit of 7 birds per day. In 1960 the bobwhite season spanned a period of approximately 3 months, from the first week in November to the middle of February, excluding days that conflicted with the deer season. This season format was essentially unchanged for nearly 45 years and was the longest since 1837. This format was also the most liberal season structure and bag limit for bobwhite within the northeastern U.S. A summary of New Jersey's bobwhite regulations may be found in Appendix B.

In 2005, the Council identified the area south of Route 33 as having the highest potential for restoring wild bobwhite habitat. The Council reduced the hunting season length by closing it on January 31 and lowered the bag limit to 4 in the southern or wild bobwhite zone. Bobwhite hunting is prohibited during December on those days authorized for shotgun deer hunting, except on semi-wild preserves where hunting is permitted from opening day until March 15, annually, including Sundays. Hunting is permitted on licensed commercial shooting preserves from September 1 to May 1, including Sundays. Daily bag limits are not applicable to commercial preserves per N.J.S.A. 23:3-32. Falconers may pursue bobwhite and other small game species beginning September 1 through March 31. Areas to the north retained the existing liberal season structure. Following a full review of the status of bobwhites in New Jersey, the Council recommended closing the bobwhite-hunting season statewide, beginning with the 2011-2012 season. Due to the different population size and recovery potential, Division staff were instructed to retain the north-south separation established in 2005 when developing a hunt plan that would establish population benchmarks for reopening the hunting season.

Effects of Harvest

Bobwhites have a long history of being hunted for sport and meat. Hunting regulations for upland species are generally not employed to meet population goals or limit populations of these species. Populations of bobwhite are a function of suitable habitat as their survival and recruitment are greatly influenced by habitat. Where high quality habitats exist in sufficient quantity, bobwhites are generally abundant. Early research found empirical support for the full compensation (doomed-surplus) harvest hypothesis (Baumgartner 1944, Parmalee 1953, Campbell et al. 1973). However, recent research finds harvest mortality is generally additive to natural mortality (Roseberry and Klimstra 1984, Pollock et al. 1989, Robinette and Doerr 1993, Williams et al. 2004). Harvest that is additive to natural mortality results in population levels that are below the biological carrying capacity. However, additive harvest is sustainable over the long-term if the population exhibits some density dependant response, either through survival or recruitment. Additive mortality has the greatest effect during longer hunting seasons, late winter harvest (Roseberry 1982), and when harvest and natural mortality may interact to produce "superadditive" mortality (Kokko 2001).

Hunting mortality among bobwhite populations can vary from 4.6% (Mangold 1951) to 63.5% (Vance and Ellis 1972), but normally ranges from 20-50% of the fall population throughout its range (Edminster 1954). Recent telemetry studies estimated direct hunting mortality of bobwhite in Cumberland County was 1.4% (Lohr 2009). The indirect effects of hunting, such as non-retrieved loss, increased predation or reduced covey survival when covey

size falls below 11 birds (Williams 2001), were not estimated. Currently, the total mortality from all causes is too high to maintain the New Jersey's low population. Population models point toward management of winter mortality as critical (Sandercock et al. 2008). Any positive effect on winter survival, such as reduced harvest mortality, will contribute to population growth more than any other factor (C. K. Williams, University of Delaware, personal communication).

Traditionally, bobwhite harvest is thought to be self-limited because hunter numbers and harvest declines as bobwhite abundance declines. This relationship appears to work at moderate population levels. However at a low population level, harvest does not appear to be self-limiting because the ratio of hunters to birds, efficiency of the average hunter, and harvest rate tend to increase as bobwhite abundance declines (Guthery 2004). Stocking can exacerbates this problem by increasing the number of hunters. Small and/or fragmented populations, such as those in New Jersey, are more susceptible to excessive harvest than large, connected populations (Guthery et al. 2000). Hunting pressure may also break up coveys and move birds to less suitable cover, both of which may expose them to higher natural predation. For these reasons fragmented bobwhite populations are at an increased risk of extirpation and without the connection to other suitable habitat, they have a decreased probability of recolonization (Roseberry and Klimstra 1984, Guthery et al. 2000). Therefore, while bobwhite harvest appears self-limiting at higher population levels, at the current low population level, the bobwhite populations in New Jersey should benefit from restricted harvest.

New Jersey Northern Bobwhite Action Plan

Goal, Actions and Strategies

GOAL: Restore the bobwhite population in New Jersey to the average density of 1980.

Rationale: The 1980 population level is the target of the Northern Bobwhite Conservation Initiative and has been consistently adopted across the range of the bobwhite as a benchmark for a healthy, sustainable population. The recreational, aesthetic, scientific, and ecological values associated with bobwhite are best realized from a healthy, sustainable population. Use the 1980 BBS average of 7.4 bobwhites heard per route as the metric for the goal, until such time as a suitable replacement survey is developed.

ACTION I: Identify and engage stakeholders in development and implementation of this action plan.

Rationale: The amount of habitat work required to meet this plan's goal is beyond the ability of any single agency. Numerous organizations and individuals value bobwhite and the habitats they require and are willing to contribute to creating the habitat needed to increase the population.

Strategy: Identify and engage all possible stakeholders including state and federal government agencies, non-government conservation organizations, sportsman's organizations, agricultural groups, businesses, farmers, and other landowners.

Strategy: Communicate the need, techniques, and opportunities for habitat improvement.

Strategy: Identify strengths and abilities of various partners and coordinate these to maximize habitat improvement efforts.

Strategy: Communicate the rationale for harvest and stocking regulations.

Strategy: Renew efforts to provide landowners with information on bobwhite habitat programs.

ACTION II: Identify, connect, improve, and increase habitat areas suitable for bobwhite.

Rationale: The bobwhite population goal and resultant societal benefits cannot be achieved or maintained without suitable grassland habitat interspersed with forest edge, shrubby, and barren areas. Habitat directly effects recruitment and survival, making it the ultimate determinant of bobwhite population status. Habitats can be managed to achieve the bobwhite action plan goals.

Strategy: In concert with all possible stakeholders, use the predictive bobwhite habitat model, other Geographic Information System tools, and information from partners to identify focal areas for habitat projects.

Strategy: Identify, improve, increase and connect habitat within focal areas.

Strategy: Review and prioritize habitat projects in focal areas.

Strategy: Coordinate habitat programs on public & private lands.

Strategy: Utilize Farm Bill and other new funding sources, combining and leveraging partners' resources.

Strategy: Continue and improve monitoring of habitat projects.

ACTION III: Maintain and improve population surveys and associated databases necessary to assess the population status of bobwhite.

Rationale: Annual assessment of the bobwhite population is needed to guide harvest and habitat management decisions.

Strategy: Continue to monitor the BBS.

Strategy: Continue to monitor the National Audubon Society Christmas Bird Count.

Strategy: Redesign the Division's Whistling Bobwhite Call Count Survey to monitor the trend and/or size of New Jersey's bobwhite population, inform the predictive bobwhite habitat model, and assess focal area habitat improvement projects.

Strategy: Coordinate efforts and share data with other early successional habitat bird surveys.

Strategy: Continue to monitor number of birds stocked and harvested on semi-wild preserves & commercial shooting preserves.

Strategy: When bobwhite-hunting resumes, improve design and statistical analyses of the Division's biennial Hunter Harvest Survey.

ACTION IV: Conduct research to improve our understanding of bobwhite, their population dynamics, and their relationships with habitat, the environment, and harvest.

Rationale: An improved understanding of bobwhite ecology will reduce the uncertainty associated with their management and lead to a greater predictive ability, allowing managers to maximize efficacy of habitat work and harvest regulations.

Action: Continue to explore opportunities for unbiased population estimation.

Action: Determine chick survival and chick/brood habitat use.

Action: Determine population response to habitat improvement.

ACTION V: Provide for human use consistent with the New Jersey Northern Bobwhite Action Plan.

Rationale: Bobwhites have esthetic, ecological, scientific and food values to humans. Bobwhite are valued by many people for viewing, photography, and hunting.

Strategy: Provide for viewing, photography, educational, and other aesthetic uses.

Strategy: Provide for hunting and harvest that is consistent with the action plan goals.

Strategy: Develop and implement a hunt plan that specifies regulations appropriate for varying population levels.

New Jersey Northern Bobwhite Hunt Plan

Harvest Goal

To provide sport-hunting opportunity for bobwhite consistent with action plan goals and appropriate for varying population levels. The goal of the New Jersey Northern Bobwhite Action Plan is to return statewide bobwhite numbers to 1979-81 BBS average of 7.1 bobwhites heard per route. The following harvest regulation packages give consideration for recovery from low population levels and for taking advantage of additional harvest opportunity at high populations. The actions below quantify a prescriptive approach to bobwhite harvest management. A new bobwhite survey may be designed to replace the BBS as the metric for the prescriptive harvest approach at some point in the future. Harvest restrictions alone cannot restore bobwhite populations. The decline in suitable habitat will need to be reversed if we are to grow the bobwhite population in New Jersey. Until then, the New Jersey Fish and Game Council has restricted the bobwhite hunting season to the following areas: Greenwood Forest WMA in Burlington and Ocean counties, Peaslee WMA in Atlantic and Cumberland counties and on those semi-wild and commercial shooting preserves licensed for bobwhite hunting during the 2009-2010 season. Hunting for bobwhites in all other portions of the State is prohibited until the bobwhite population rebounds as outlined below.

Harvest Guidelines:

1. *Maintain desired populations*, i.e., ensure that hunting mortality in New Jersey does not cause the bobwhite population to remain below the population goal.
2. *Maximize hunting opportunity*, i.e., when population status allows, maximize the number of days when bobwhite hunters can go afield.
3. *Keep regulations simple*, i.e., minimize the complexity of restrictions within the state.
4. *Learn from experience*, i.e., increase our understanding of how hunting regulations affect hunting activity, harvest rates, and bobwhite populations by standardizing regulation packages for varying population levels.

A. PRESCRIBED HUNTING SEASON

The average number of bobwhite heard on BBS routes during 1979-81 was 7.1 birds per route. Seasons will be set using the average number of bobwhite heard per route during the USGS North American Breeding Bird Survey over a three-year period. A closed or restrictive season will be prescribed when the three-year average is below the 1979-81 level. A moderate season will be prescribed when the three-year average is at or slightly above the 1979-81 level. A liberal season will be prescribed when the three-year average is well above the 1979-81 level. An average 0.2 bobwhites were heard on BBS routes during the three-year period 2008-2010.

Restricted Season:

A restricted bobwhite hunting season is recommended when the latest three-year average number of bobwhite counted on the BBS routes is less than 2.5 bobwhites per route. Hunting will be restricted to Greenwood Forest and Peaslee WMA and properly licensed semi-wild and commercial shooting preserves (See PEN RAISED BOBWHITE below).

Minimal Season:

A minimal bobwhite season is recommended when the latest three-year average number of bobwhite counted on the BBS routes equals or exceeds 2.5 per route for three consecutive years,

but is less than 7. The minimal hunting season will begin statewide on the Saturday following the first Monday in November and conclude on the second Saturday following Thanksgiving. The daily bag limit will be two birds of either sex. The minimal hunting season dates and bag limit will not apply to Greenwood Forest and Peaslee WMA and properly licensed semi-wild and commercial shooting preserves (See PEN RAISED BOBWHITE below).

Moderate Season:

A moderate bobwhite season is recommended when the latest three-year average number of bobwhite counted on the BBS routes equals or exceeds 7 per route for three consecutive years, but does not exceed 14.0. The moderate season for hunting bobwhite will begin statewide on the Saturday following the first Monday in November and conclude on December 31. The daily bag limit will be four birds of either sex. The moderate hunting season dates and bag limit will not apply to Greenwood Forest and Peaslee WMA and properly licensed semi-wild and commercial shooting preserves (See PEN RAISED BOBWHITE below).

Liberal Season:

A liberal bobwhite season is recommended when the latest three-year average number of bobwhite counted on the BBS routes equals or exceeds 14.0 per route for three consecutive years. The liberal season for hunting bobwhite will begin statewide on the Saturday following the first Monday in November and conclude on January 31. The daily bag limit will be seven birds of either sex.

Zoning:

The Council may elect to create separate bobwhite hunting zones due to differential bobwhite populations in the State using BBS data pertinent to specific regions.

B. PEN-RAISED BOBWHITE

Stocking of pen-raised bobwhites will be restricted in order to protect wild bobwhite populations. Stocking of pen-raised bobwhite on Division Wildlife Management Areas will be limited to Greenwood Forest and Peaslee WMA when the bobwhite season is restricted. Bobwhite stocking in accordance with state regulations may be allowed in limited circumstances, but strongly discouraged, from September 1 through May 1, inclusive, as provided below. Stocking of pen-raised bobwhite will not be permitted from May 2 through August 31. Sportsmen will be encouraged to stock ring-necked pheasants or chukar partridge in place of pen-raised bobwhite.

Greenwood Forest WMA and Peaslee WMA:

Pen-raised bobwhite may be released on these two State Wildlife Management Areas only. Birds stocked may be taken by shooting and falconry, without regard to sex, by properly licensed hunters between the first Saturday following the first Monday in November and the following January 31, inclusive. All hunters must possess a Pheasant and Quail Stamp when hunting quail at Greenwood Forest or Peaslee WMA. The daily bag limit under a Restricted, Minimal or Moderate hunting season is 4 birds. The daily bag limit under a Liberal hunting season is 7 birds.

Commercial Shooting Preserves:

Pen-raised bobwhite may be released on those commercial shooting preserves properly licensed for bobwhite during the 2009-2010 fiscal year. Birds stocked may be taken by shooting only on lands in the commercial application and license, without regard to sex and daily bag limit, by properly licensed hunters between September 1 and the following May 1, inclusive. Every harvested bird covered under the commercial license must be tagged regardless of sex, including birds from the freezer and/or meat sale being transported or sold.

Semi-wild Shooting Preserves:

Pen-raised bobwhite may be released on those semi-wild shooting preserves properly licensed for bobwhite during the 2009-2010 fiscal year. Birds stocked may be taken by shooting only on lands in the semi-wild application and license, without regard to sex and daily bag limit, by properly licensed hunters between the first Saturday following the first Monday in November and the following March 15, inclusive. Every harvested bird covered under the semi-wild license must be tagged regardless of sex, including birds from the freezer and/or meat sale being transported or sold.

Conclusion

Bobwhites have experienced a long-term, 100-year decline throughout most of their range. New Jersey's declines have been among the most precipitous. Studies indicate that this decline is driven by low annual survival rates. The quantity and quality of habitat directly affects annual survival rates, making habitat the key determinant of bobwhite population status. The Division has prepared a New Jersey Northern Bobwhite Action Plan that summarizes the ecology and status of bobwhite and proposes actions and strategies designed to increase their habitats and their population.

The Division recommends that the Council adopt the New Jersey Northern Bobwhite Action Plan. This plan outlines six actions and associated strategies needed to halt and reverse the decline of bobwhite in New Jersey. The Division is currently acting on most of these actions to the extent possible with currently available resources. The Division has prepared a hunt plan to provide sport-hunting opportunity for bobwhite consistent with the action plan goal and the habitat potential in 2 zones of the state. The hunt plan provides prescriptive harvest regulation packages give consideration for recovery from low population levels and for taking advantage of additional harvest opportunity at high populations.

The Division recommends that the Council act in accordance with the New Jersey Northern Bobwhite Hunt Plan. The current BBS three-year average (2008-2010) in New Jersey is 0.2 bobwhite per route. Under the plan, the hunting of bobwhite would be restricted to Greenwood Forest and Peaslee WMA and those commercial or semi-wild shooting preserves properly licensed for bobwhite during 2009-10 beginning with the 2011-2012 hunting season and continuing until the three year BBS average equals or exceeds established thresholds to permit an open season. Separate bobwhite zones may be created based on BBS data specific to pertinent portions of the State. The Division also recommends that the stocking of pen-raised bobwhite be curtailed in accordance with the plan during this time.

The Division recognizes that harvest restrictions alone cannot restore bobwhite populations. The decline in suitable habitat will need to be reversed if we are to grow the bobwhite population in New Jersey. This can only happen with a concerted effort of multiple partners coordinating their actions and leveraging their resources.

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Appendix A. Summary of Wildlife Conservation Programs for Private Lands

Wildlife Habitat Incentive Program (WHIP) – USDA NRCS	WHIP encourages participants to develop and improve high quality habitat that supports wildlife populations of national, state, tribal, and local significance through financial and technical assistance. The 2008 Farm Bill authorized $85 million per year funding.
Conservation Reserve Program (CRP) – USDA FSA	CRP is a voluntary program for agricultural landowners that was originally established by the 1985 Farm Bill primarily for retiring highly erodible lands from agricultural production and establishing permanent covers. There has been extensive research on the impacts of CRP, which has indicated dramatic positive effects on many species of wildlife, especially birds. The program is large and has a variety of CRP Conservation Practices (CP-33 Habitat Buffers for Upland Birds, CP-38 State Acres for Wildlife Enhancement) and initiatives. As of 2008, there were approximately 34.7 million acres enrolled in the program nationally.
Conservation Reserve Enhancement Program (CREP) – USDA FSA	This CRP program focuses on helping agricultural producers retire farmland to protect environmentally sensitive land, decrease erosion, restore wildlife habitat, and safeguard ground and surface water.
Agricultural Management Assistance Program (AMA) – USDA NRCS	Small farm owners (under 200 acres, depending on crop) can receive up to 75% funding for implementation of projects that improve water quality, decrease pollution or erosion, or create habitat for at-risk species. AMA will also pay for up to 75% of the cost for organic certification (capped at $500).
Environmental Quality Incentives Program (EQIP) – USDA NRCS	EQIP provides financial and technical assistance to farmers and ranchers who face threats to soil, water, air, and related natural resources such as pollinators, at-risk species and threats from invasive species. This is one of the largest funded programs with a Congressional authorization of $7.325 billion through 2012.

Appendix A. Summary of Wildlife Conservation Programs for Private Lands (cont.)

Grassland Reserve Program (GRP) – USDA NRCS & FSA	The GRP assists landowners and operators in protecting grazing uses and related conservation values by conserving and restoring grassland resources on eligible private lands through rental contracts and easements. As of 2008, there are 250 easements covering over 115,000 acres in 38 states. The 2008 Farm Bill authorized an additional 1.2 million acres by 2012.
Conservation Stewardship Program (CSP) – USDA NRCS	CSP encourages producers to address resource concerns in a comprehensive manner by improving, maintaining, and managing existing conservation activities and undertaking additional ones. Prior to 2008, this type of assistance was provided by the Conservation Security Program. The program is authorized to enroll nearly 13 million acres each fiscal year.
Rural Energy for America Program Grants (REAP Grants) – USDA Rural Development	Agricultural producers, small business owners and energy cooperatives are eligible for REAP grants. Grants are available for energy audits, feasibility studies and renewable energy development, including wind, solar, biomass, geothermal and hydro. REAP grants cover up to 25% of total project costs.
Partners for Fish and Wildlife – USDI FWS	Partners works in voluntary partnerships with private landowners to restore wetlands, streams and river corridors, prairie, grasslands and other important fish and wildlife habitats for federal trust species (migratory birds, threatened and endangered species, anadromous fish and some marine mammals). The program provides technical and financial assistance.
Renewable Energy Incentive Program (REIP) – NJ Clean Energy Program	This program offers financial incentives and technical assistance for installing equipment and systems that produce electricity. Solar, wind and biomass systems are eligible for REIP funds. Deadlines for applications are January 1, May 1 and September 1.

Appendix B. New Jersey Northern Bobwhite Status and Management Timeline

1820	Bobwhite hunting illegal from February 1 to September 1, except for persons hunting their own land.
1838	The open season for bobwhite was November 1 – January 10.
1859	The open season for bobwhite was November 1 – January 1.
1869	The season for bobwhite was closed for three years.
1899	Earliest bobwhite survey on record. Wild stock (30,000) from Oklahoma was introduced and distributed throughout the state.
1904-1940's	Supplemental feeding of bobwhite (as well as pheasants and Hungarian partridge) was conducted by state game wardens when the ground was snow covered. Farmers and sportsmen were encouraged to cooperate with the program and provided with feed.
1910	Wild bobwhite were uncommon in the northern New Jersey counties.
1911	The first daily, bobwhite bag limit was set at ten birds per day.
1913	The first bobwhite were raised at the state's Forked River Game Farm.
1923-1938	The season for bobwhite was closed in Bergen, Essex, Hudson, Hunterdon, Morris, Passaic, Somerset, Union and Warren Counties.
1930	New Jersey firearm license sales peaked at 199,234.
1934	State Quail Farm opened in Jackson Township, Ocean County. By 1937, the total output exceeded 14,000 birds.
By 1940	Few wild bobwhite exist in New Jersey north of Mercer and Middlesex County.
1948	The estimated bobwhite harvest was 14,883 (the lowest point 1924-2002).
1950-1969	Additional bobwhite were obtained in cooperation with county 4-H groups and stocked throughout the state.
1955	The open season for bobwhite was November 4 – January 14.
1959	The open season for bobwhite was November 7 – January 30.
1960	The open season for bobwhite was November 12 – February 15.
1971	The estimated bobwhite harvest was 301,735 (the highest point 1924-2007).
1975	A $5 Pheasant and Quail Stamp was required to hunt stocked game birds on wildlife management areas. Stamp sales were 28,513.
1978	Sales of Pheasant and Quail Stamps reached 29,434.
1980	The State Quail Farm (Jackson) was closed. Quail propagation efforts were transferred to the Forked River Game Farm.
mid-1990's	The Forked River Game Farm was closed.
1998-2004	The number of bobwhite stocked by the Division of Fish and Wildlife was reduced from 15,000 birds on three wildlife management areas to 10,000 birds on two wildlife management areas. Birds are obtained from outside vendors at the lowest bid offered.
2000-present	Disabled veterans and persons aged 16 and under are exempt from licensing fees. The cost of a Pheasant and Quail Stamp is $40.
2005-07	The number of bobwhite stocked in-season by the Division of Fish and Wildlife was reduced to 5,200 birds on two wildlife management areas. Season length and bag limits were reduced in southern portion of the State south of Route 33.
2007	The number of firearm licenses sold declined to 70,627 (the lowest figure since 1912) and the number of Pheasant/Quail stamps declined to 12,009 (the lowest figure since inception).
2007-present	The number of bobwhite stocked in-season by the Division of Fish and Wildlife was returned to 10,000 on two wildlife management areas.