Feasibility Study for the Restoration of Wild Northern Bobwhite in Minnesota

Minnesota Department of Natural Resources

Section of Wildlife Management

January 15, 2015

The purpose of this report is to comply

with MN statutes Sec. 67, Chapter 312 and

Section 67, Chapter 290 H.F. No. 2852

$9,000 in 2015 is from the game and fish fund for the commissioner, in consultation with interested parties, agencies, and other states, to develop a detailed restoration plan to recover the historical native population of bobwhite quail in Minnesota for its ecological and recreational benefits to the citizens of the state. The commissioner shall conduct public meetings in developing the plan. No later than January 15, 2015, the commissioner must report on the plan's progress to the legislative committees with jurisdiction over environment and natural resources policy and finance. This is a onetime appropriation.

QUAIL RECOVERY PLAN; REPORT.

The commissioner of natural resources, in consultation with interested parties, must develop a detailed feasibility study for the restoration of a wild population of quail in Minnesota. No later than January 15, 2015, the commissioner must report on the study's progress to the legislative committees with jurisdiction over environment and natural resources policy and finance.

History and Status

The northern bobwhite *(Colinus virginianus)* was likely not present in Minnesota before European settlement. Early explorers to Minnesota such as Pike, Long, Schoolcraft and others never mentioned the bobwhite in their extensive journals, despite their interest in gamebirds (Hertzel 2007). Even in Iowa, prior to settlement bobwhite were restricted to southeast and south central Iowa (Iowa report to the legislature 2008) along the prairie-forest border. However with settlement bobwhites expanded northward well into Minnesota. In 1932 Aldo Leopold wrote regarding Iowa:

"The early settler brought the axe, plow, cow, split rail fence, hedges, weeds and grain to Iowa. The axe converted shady woods into brushy stumplots and the plow flanked them with weedy crop fields full of strange nourishing seeds (corn, wheat, oats). Plows on the prairie checked the sweep of prairie fires and shrubs promptly romped up every draw and coulee with quail at their heels. On the flat prairie each settler needed 3-6 miles of fence for each quarter section of land…lacking money for wire and timber for rails, settlers planted Osage orange hedgerows…tens of thousands of miles of as fine a quail cover as ever grew, planted on the hitherto quail-less prairie, and all within in ten steps (quail steps) of weedy laden crop fields. Quail responded to this disturbance in the forest and prairies by the millions…it was the golden age of quail (1860-90)."

In Minnesota the situation was likely similar (Chesness 1964) with quail reaching the state around 1850 and expanding northward as far as Ottertail County (Roberts 1932). This expansion was likely rapid, as the first regulated hunting season for bobwhites occurred in 1858. The first recorded harvest estimate came in 1919 with a harvest estimate of just 6,100 birds (Minnesota Department of Natural Resources, 2000). This data suggests that quail populations had already decline significantly from the 19th century. Estimated harvest peaked in 1927 when a statewide, 37 day season produced a harvest of 13,000 birds.

By 1932 the season was restricted to only SE Minnesota. The last bobwhite season in Minnesota was 1958 when 3,200 birds were harvested during the 16 day season.

By the early 1960's the average number of quail seen during the August Roadside Survey had dwindled to four (Chesness 1964). Between 1990 and 2014 only 3 single bobwhites have been recorded on this survey, one each in Fairbault, Freeborn and Rice counties. (Nicole Davros, MNDNR Research Biologist, pers.comm. 2014).

Breeding bird surveys in SE Minnesota by The Natural Resources Research Institute (NRRI) and the Minnesota County Biological Survey in the 1990s found no bobwhites (Steve Stucker, Minnesota Biological Survey, MNDNR pers. Comm. 2014). The northern bobwhite does not appear on any Minnesota Breeding Bird Survey (BBS) compilation and has not been included on the North American BBS list of nesting MN birds since the inception of the survey in 1966. Hertzel also reported that bobwhites had been recorded on the Minnesota Christmas Bird Count within their historical range only six times since 1901, the last being in 1984.

The Minnesota Breeding Bird Atlas Project preliminarily reports 3 confirmed bobwhite sightings in Houston and extreme SE Winona counties. (Minnesota Breeding Bird Atlas website, 2014). The northern bobwhite was not considered for inclusion as a Species of Greatest Conservation Need because the prevailing expert opinion was that wild bobwhites were extirpated from the state.

On the other hand, Quail Forever in Minnesota reports a Minnesota population of "less than 1000 birds" primarily in Houston County (Minnesota Quail Forever Website, 2014). Quail Forever actively solicits bobwhite sightings in SE Minnesota, and this data is summarized in Appendix 2.

Habitat Needs

The bobwhite is associated with early-successional vegetation, making use of agricultural fields, grasslands, grass-shrub rangelands, park-like pine forests and mixed pine-hardwood forests. Bobwhites thrive in, shrubby/brushy habitats adjacent to small grains (oats/wheat, sorghum) interspersed with grasslands, abundant weeds and some open woodland. Abandoned cropland is also a preferred habitat. Interspersion of these habitats is very important. These habitats all have the characteristics of overhead concealment cover, yet have abundant bare soil underneath them. Bare, open ground is an important habitat component. Thick stands of grasses, even native grasses, like those preferred by pheasants, are not good quail habitat.

Quail form coveys of 10-12 individuals in the fall and roost in loose circles to share body heat through the winter months. Winter covey home ranges in good habitat are approximately 50 acres. Given this small home range and need for brushy habitats, farm fields must be relatively small or very irregularly shaped to provide the habitat needs of quail and promote abundant numbers.

Restoration Challenges

Habitat-land use

Minnesota's current land use patterns do not provide good quail habitat. As farming has become more efficient, fields become larger to accommodate larger more efficient equipment. Hedge rows and other odd brushy/weedy areas are removed to accommodate larger more efficient equipment. US pesticide use shows a dramatic increasing trend (Upland Gamebird Study Advisory Committee. 2010). Fewer weeds in association with cropland are detrimental to the quail population.

Changes in the types of crops farmers grow have impacted quail numbers through time. Corn and soybeans are currently the dominant crops (13 million acres), with less than 2 million acres in hay and small grains. This represents a dramatic reversal from 1950, when less than 6 million acres were planted to row crops and nearly 10 million acres were planted to small grains and hay (Midwest Pheasant Study Group. 2012).

All these changes in land use practices, larger fields with fewer hedges and fence lines, weed free crops, and loss of small grain crops have reduced Minnesota's bobwhite to extirpation or near extirpation.

Lack of a source population

Minnesota's wild bobwhite population is likely extirpated, or nearly extirpated. Game farm raised domestic quail may persist in the wild for brief periods of time, and 2014 MNDNR records show that 34 shooting preserves in the state offer quail hunting, and 25 licensed game farms raise over 13,000 quail annually.

There is a history of releasing game farm raised bobwhites in Minnesota that dates back to the mid 1800's. The Minnesota Department of Fish and Game began captive rearing programs at the Carlos Avery Game Farm near Forest Lake in 1933, and continued such programs into the 1950s. Existing Minnesota quail have likely been genetically affected by these introductions. It is uncertain if targeted deliberate bobwhite habitat restoration in SE Minnesota would result in a recovered population.

Wild quail populations in neighboring Wisconsin and Iowa have not fared much better than Minnesota's wild quail population, but both states still retain hunting seasons. Iowa's long term average wild bobwhite harvest is 404,000 birds, and

harvests over 1 million birds were common in the 1960s and 70s. The average harvest from 2008-2012 was only 12,400 birds. Bobwhites are now nearly absent in northern Iowa, and restoration plans through the Northern Bobwhite Conservation Initiative (NBCI) focus exclusively on the southern half of the state (Dimmick et al., 2002).

For the 2012 hunting season Wisconsin reported through their small game survey a total bobwhite harvest of just 257 birds. Wisconsin, like Minnesota, did not participate in NBCI.

Minnesota Climate

Minnesota is at the extreme northern edge of what is considered historic bobwhite range. Because of their small size and energy needs, bobwhites are extremely sensitive to snow cover and any short-term population gains could be wiped out by a single storm event. Severe winter storms have been implicated in significant bobwhite declines throughout much of the Midwest (NBCI, IOWA gov. report, others).

Despite a changing climate that is predicted to be warmer, climate change models also predict an increase in severe storms. These severe storms, even if they are infrequent, will result in significant quail mortality if they occur in the winter months.

Unproven restoration techniques

Some have suggested that quail be reintroduced to Minnesota by translocating wild birds from well-established source populations, much like the very successful reintroduction of the wild turkey (*Meleagris gallopavo*). Even if a source population of wild bobwhites could be found and donor states would agree to allow birds to be moved, this technique is unproven for bobwhites. Quail are small birds and need large amounts of energy to survive for even short periods of time. Their extremely high natural annual mortality rates (approaching 85%) would require large numbers of quail to be translocated. Few long-term successes can be found anywhere in North America.

Restoration Opportunities
Despite these challenges, some opportunities appear to exist at this time.

Minnesota Quail Forever Advocacy
There is interest in restoring a wild bobwhite population in Minnesota. Quail Forever is a non-profit organization dedicated to education, habitat projects and conservation initiatives designed to increase populations of bobwhite quail within their traditional ranges. Two chapters exist in Minnesota . The organization's conservation model is that money raised locally is kept and used locally to fund projects where that money was raised. Quail Forever, a sister organization to Pheasants Forever, was founded in Minnesota in 2005.

Quail Forever has been successful in receiving Minnesota Conservation Partnership Legacy funding and have recently acquired land in SE Minnesota that will be restored to quail habitat and managed by the MNDNR.

National Interest
There is national interest in restoring bobwhite quail populations throughout its historic range. In 2002 the Northern Bobwhite Conservation Initiative (NBCI) was published. The NBCI resulted in regional and national attention, causing bobwhite restoration to become a national priority and a common topic of the national conservation dialogue (Dimmick et al. 2002).

Legacy Funding
Approximately $80 million are available annually to "restore, protect, and enhance wetlands, prairies, forest and habitat for fish, game, and wildlife." These monies could be a funding source to restore quail habitat in southeastern Minnesota.

Partnering with other interests
An entire suite of species that live in the same habitats as bobwhites in native grasslands, savannahs, and shrublands are in long-term decline (NBCI 2002). In Minnesota these species include the henslows and grasshopper sparrows, red headed woodpecker, loggerhead shrike, eastern meadowlark, dickcissel, eastern hognose snake, and others. Habitat work for bobwhites will likely benefit these species as well. Partnering with stakeholders interested in these species could broaden support for bobwhite conservation.

Oak savanna is one of Minnesota's rarest native plant communities. Numerous partners have, and continue to, restore oak savannas, and this work should benefit bobwhites.

Restoring permanent vegetation along watercourses is a strategy to improve Minnesota's water quality. Projects to accomplish this where currently lacking could be designed to benefit quail in SE Minnesota, and Clean Water Legacy Funds may be an appropriate funding mechanism.

Important Questions That Need to be Answered Prior to Embarking on a Bobwhite Restoration Effort in Minnesota

Due to the very significant challenges that will make the outcome of any restoration effort uncertain, the MNDNR suggests that several key questions need to be answered prior to any significant investment in a restoration effort specifically for bobwhites.

Are there a sufficient number of landowners in SE Minnesota that are willing to implement habitat practices on their working lands that can support a sustainable wild bobwhite population? History and economics suggest that it will be difficult to find willing landowners in sufficient numbers, but this question could be answered through a well-designed landowner survey.

Is there a source population of wild bobwhites in Minnesota? This could be determined by genetically testing or possibly radio isotope testing some of the quail that are free ranging in SE Minnesota. If the answer is yes, habitat restoration if done at a large enough scale could restore bobwhite populations, or at least increase them from their current status. If the answer is no, then habitat restoration alone will likely not work.

Is there a source population in neighboring Wisconsin or Iowa close enough to naturally immigrate into SE Minnesota if habitat is improved? Based upon the current status of bobwhites in Wisconsin and Iowa, and the decision Iowa has made to not attempt habitat restoration specifically for bobwhites in the northern portion of the state, the answer appears to be no. However the MNDNR believes other quail experts should be consulted.

Is there support to restrict the release of game farm bobwhites in portions of SE Minnesota? Landowners and hunting dog enthusiasts in project areas could be questioned through appropriate surveys.

Habitat Restoration Plan

If it is determined that a source population of bobwhites does exist in Minnesota, a focused habitat restoration plan could be implemented. MNDNR thinks the initial focus area should be primarily Houston County. Interested stakeholders also are interested in Winona and Fillmore Counties. As previously mentioned the NBCI has published a national bobwhite restoration plan. NBCI has identified the types and amounts of habitats and habitat management efforts needed to achieve the restoration of quail populations to 1980 levels. Their 3 main habitat objectives are to:

1. Increase the amount and enhance the quality of the agricultural lands for nesting, brood-rearing, and roosting by bobwhites and other grassland species of wildlife by adding native warm season grasses and other conservation plantings such as shrubs and forbs.

2. Enhance the management practices on pinelands and mixed pine-hardwoods by thinning, controlled burning, and site preparation in a fashion that benefits bobwhites and other wildlife, and increase acreage devoted to longleaf pine where it is ecologically feasible.

3. Preserve and enhance the quality of rangelands by utilizing vegetation management practices and grazing regimes that favor the retention and improvement of native plant communities beneficial to bobwhites and other wildlife.

If one substituted oak and mixed oak forest in objective number 2, the MNDNR believes these objectives summarize what is needed to restore wild quail in Minnesota. While Minnesota did not participate in this national bobwhite planning effort, the NBCI plan gives us excellent guidance on restoring quail.

NBCI planning was structured around Bird Conservation Regions (BCRs) which are the planning units for the North American Bird Conservation Initiative. The historic bobwhite range in Minnesota was primarily found in the Eastern Tallgrass Prairie BCR (22) and the Prairie Hardwood Transition BCR (23). NBCI does contain a restoration plan for BCR 22, while BCR 23 was not covered, as Minnesota, Wisconsin and Michigan, states at the extreme northern edge of the historic bobwhite range, did not participate in the planning effort. While Houston, Fillmore, and Winona counties fall primarily within BCR 23 habitat restoration guidance from NBCI's BCR 22 is directly applicable to MN, and the Central Hardwoods (BCR 24) chapter is also helpful.

Specific Habitat Management Practices

The most highly valued and most productive agricultural lands offer little hope for improving bobwhite abundance, and should not be considered for bobwhite habitat restoration (Dimmick et al. 2002). Concentrating efforts to less valued and less productive agricultural lands, pastures, hayland, forests, and existing conservation lands should be the primary focus of this effort. Using a variety of management and maintenance activities that focus on development of high quality nesting, brood raising, roosting and woody cover will benefit quail the most.

NBCI determined that optimum quail abundance in BCR 22 occurs where cropland occupies from 30 to 65% of the landscape, grassland occurs on 15 to 30% of the area and more than 8,500 yards/square mile of woody edge is present.

Within BCR 22 NBCI recommends that for every square mile of existing non-prime agricultural land, an average of 32 acres of high quality nesting, roosting and woody cover be developed or maintained. This could include the establishment of linear cover including field borders, filter strips, riparian buffers (shrubs, trees, grass, legumes) and hedgerows. Thirty foot wide field borders and filter strips established and maintained in warm season grasses and forbs is an excellent place to develop this cover. These habitat practices can also greatly reduce soil, water, and nutrient runoff (Iowa State University STRIPS 2014).

NBCI acknowledges that the lack of good to excellent nesting and brood-rearing cover is the most critical habitat factor limiting bobwhite production on a majority of its range. Forest cover is more abundant in SE MN than in BCR 22 overall, thus the grassland component of this habitat complex is the most limiting factor in most SE MN areas. In order to support a quail population, some land currently in row-crop production will need to be converted to non-agricultural use, primarily grassland. Iowa State University has recently found that by converting just 10% of a crop-field to diverse, native perennials farmers and landowners can reduce the amount of soil leaving their fields by 90% and the amount of nitrogen leaving their fields by up to 85%. Prairie strips also provide habitat for biodiversity, including pollinators and other beneficial insects (Iowa State University STRIPS 2014).

Five percent of non-native pasture and hayland should be converted to native grasses and forbs suitable for quail. Tall monotypic stands of planted native grass such as switchgrass or even big bluestem do not provide quality quail habitat.

Small woodlots and perimeters of larger hardwood forests, where adjacent to agricultural row crop, and grasslands can provide an important source of protective cover and food for bobwhites, but generally speaking, practices common to hardwood forest management have provided benefits to quail that are hard to quantify within the contexts of management of the forested acres themselves (Dimmick et al. 2002, BCR 24 Chapter). However "soft" forest edges do benefit quail. Forest edges should be maintained in an early successional state. The practice of hinge cutting is a well-accepted quail management practice. Existing forest openings should be maintained. Forest thinning to reduce basal areas, and oak savanna restorations in particular will benefit quail.

10 percent of existing conservation lands, such as CRP should be maintained annually by burning or disking. Converting and maintaining existing grass waterways and non-native CRP fields to suitable native warm season grasses and forbs should be implemented.

Developing and maintaining small foodplots in close proximity to quality nesting, brood rearing, and winter cover is a good quail management practice. Small grains including sorghum are preferable to corn or soybeans. Leaving these food plots stand for more than one year will benefit quail if annual weed seeds are allowed to develop.

Conservation Delivery

Many quail specific habitat management practices also protect soil and water. Local Soil and Water Conservation District (SWCD) Plans could integrate quail conservation into their soil and water conservation objectives. Landowner surveys could identify clusters of landowners interested in quail management and these farms could be targeted by the SWCD to help achieve soil and water conservation objectives as well as quail habitat management.

Landowners can work with the Natural Resources Conservation Service and their partners to restore quail habitat on their lands as part of the Mississippi River Basin Healthy Watersheds Initiative. Much of the historical bobwhite quail range lies within the Initiative's focus areas.

Pheasants/Quail Forever Farm Bill Biologists could help targeted landowners find federal funding to implement quail habitat management on their properties.

The Minnesota Department of Natural Resources can ensure that their local land managers better understand the needs of bobwhite quail and look for opportunities to implement on-the-ground management practices that benefit quail. They too can provide technical guidance to private landowners on how to improve their lands for quail.

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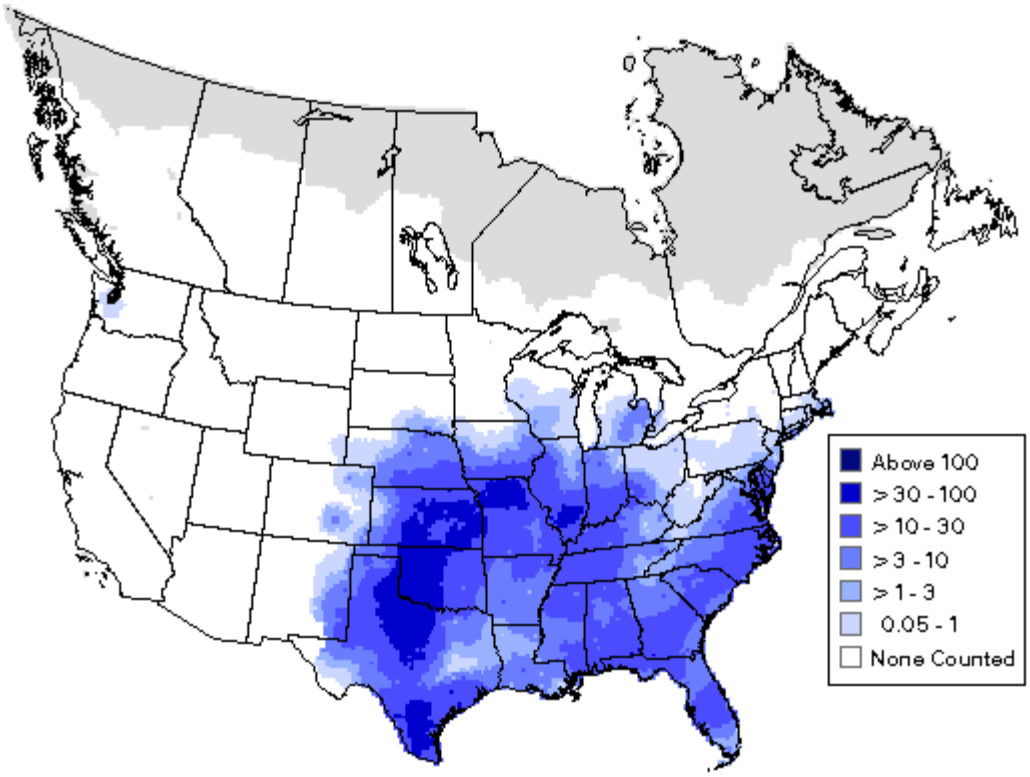
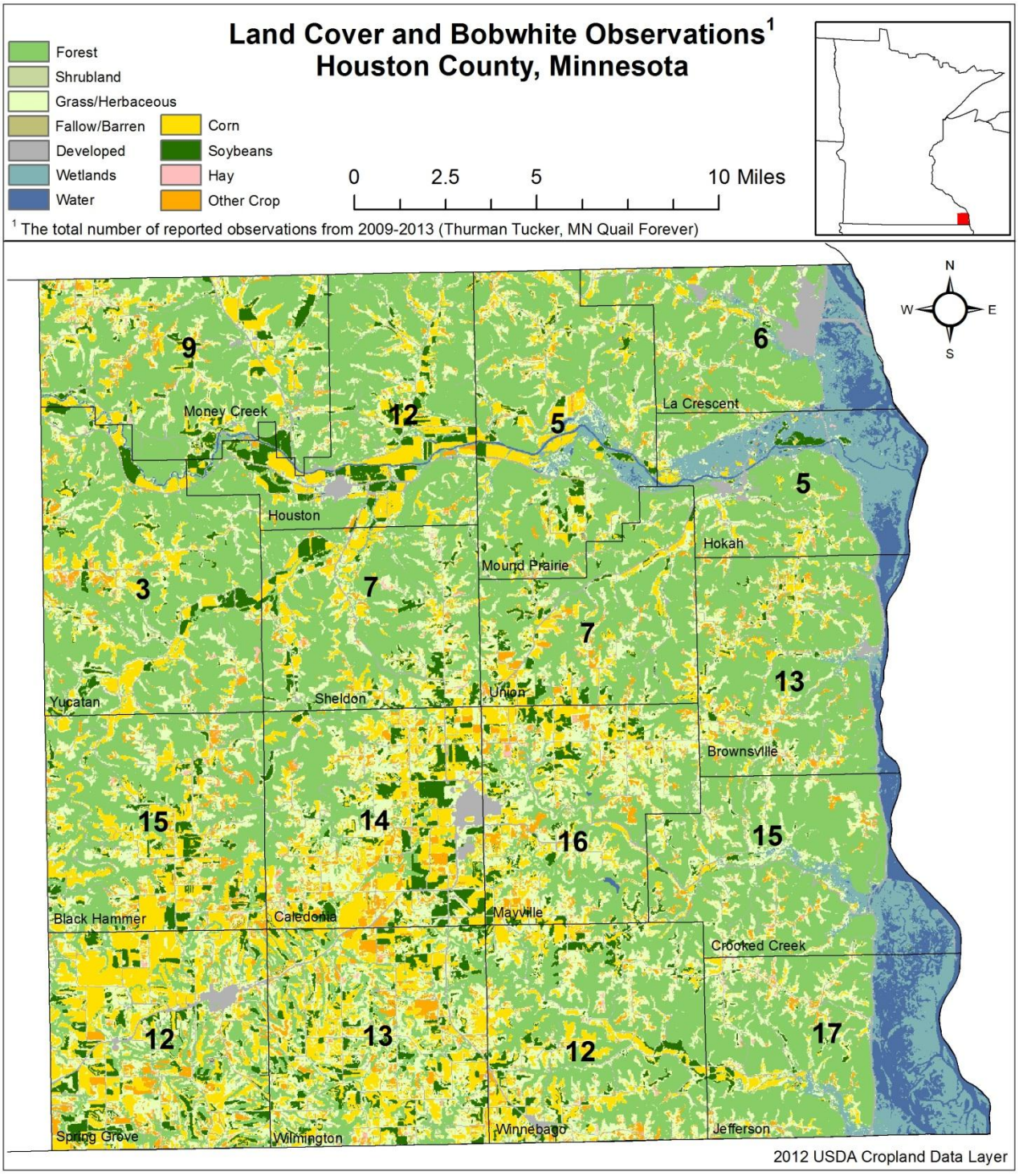
Appendicies

Appendix 1. United States Geological Survey Habitat Suitability Index for the Northern Bobwhite. http://www.lmvjv.org/hsi_model/species/nobo/s_nobo.aspx



Appendix 2. Land Cover and Bobwhite Observations in Houston County MN.



Appendix 3. Average Annual Snowfall.