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Hunting Success on Albany, Georgia Plantations: The Albany Quail Project's Modern Quail Management Strategy

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The Albany Quail Project began in March 1992 as a cooperative between Auburn University's School of Forestry and Wildlife Sciences and the private quail plantation community surrounding Albany, Georgia. The goal of this collaboration was to increase population densities and hunting success of northern bobwhites (*Colinus virginianus*) on these properties. Issues important to the plantations were investigated via field research techniques (e.g. radio-telemetry) and then modifications in management regimes were put into practice. From 1992-2006 over 8,000 wild bobwhites were radio-tagged to study various demographic and population mechanism of bobwhites. The result has been a change in management style based on science creating the concept of Modern Quail Management (MQM) techniques. Bobwhite population densities and hunting success during the last decade on these properties have been higher and more stable than witnessed during any previous period in their history. On our primary study site during 1980-1996 the average number of coveys seen per hour was 3.9 (SE = 0.265) with a range of 2.7 - 6.5 (CV = 0.28). Following the implementation of MQM techniques this average during 1997-2005 increased to 7.7 (SE = 0.317) with a range of 6.9-9.7 (CV = 0.12) and population density has been maintained at or near 5 birds per ha. This manuscript provides a brief history of the Albany Quail Project, describes how results from these studies have contributed to the evolution of new management philosophies over the last decade, outlines what these changes have been, and describes how they have been successfully applied on numerous properties in the Albany area to improve bobwhite populations and hunting success.

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Key words: *Colinus virginianus*, Georgia, hunting, modern quail management, northern bobwhite, plantation, radio-telemetry

Introduction

The decline of northern bobwhite (*Colinus virginianus*) populations across most of the southeastern United States has been well documented (Sauer et al. 2004). The decreasing number of bobwhites caused concern among quail biologists and quail enthusiasts for many years with various reasons for the decline discussed and remedies debated (Brennan 1991). No firm answers to the problem existed because the reasons for quail declines were numerous and interconnected. Socio-economic change had occurred across the southeastern landscape since the initial research related to quail management conducted by Stoddard (1931) and Rosene (1969). Modern agricultural and forestry practices have become

much more efficient during the latter half of the 20th century and are generally detrimental to quail populations.

Despite considerable changes in the landscape and the factors affecting quail populations, approaches to quail management remained relatively unchanged as little new research into quail ecology was being conducted. No comprehensive, long-term studies were underway to assess quail management techniques in relation to changes in the southeastern landscape and the associated declines in quail numbers during the 1970s and 1980s.

Quail hunting has a strong tradition in South Georgia, and since the early 20th century large land holdings have been managed to maximize quail pro-

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duction for this purpose. Because of this objective, intensive modern agricultural and forest management was not as readily adopted on these properties compared to the rest of the Southeast. Consequently, populations on these privately owned lands remained relatively stable compared to the rest of the southeastern U.S. (Brennan et al. 2000, Palmer et al. 2002). However, from the late 1970s through the early 1990s even these South Georgia quail plantations, the last stronghold of wild quail in the state, were beginning to experience declines and concern mounted.

Along with the strong quail hunting traditions of this area there has been a long history of landowners supporting quail research and allowing properties to be used as outdoor laboratories for research on quail ecology and management. The work of Stoddard (1931), Rosene (1969), Simpson (1976), and Tall Timbers Research Station (Landers and Mueller 1986) are some examples of research efforts made possible by the area's private landowners in the past. When covey finds began to significantly decrease even in the face of intensive management activities, these owners and managers decided that new research based techniques were needed to determine weak points in traditional habitat management. One of the first current programs to address the quail decline with a comprehensive approach of research, land management, and outreach began in 1992 by Auburn University on an intensely managed quail property near Albany, Georgia. While quail hunting success among these sites was still relatively good, records showed it was not equal to some of their better years in earlier decades. The feelings of the landowner and manager were that the traditional management program utilized was ineffective, but it was unclear why. The landowner agreed to fund a 3-year research project to determine what was lacking in their management scheme and how to remedy any shortcomings most efficiently. After only one year the benefits of conducting this program became evident to the surrounding plantation owners and managers at which time the size, scope, study area, and funding of the work was expanded. The project

which began as a single 3-year study in 1992 continues to the present and is called the Albany Quail Project (AQP).

The AQP is a very unique program in several ways. It is a privately funded, university based research/outreach program where continued funding is closely tied to the quail hunting success experienced by the contributors. This type of accountability makes the AQP unique and accounts for the sharp focus of the work. Quail hunting success in this area is traditionally measured in covey finds/hour. This was the yardstick used to determine success of the Albany Quail Project from the beginning and continues today.

Another difference between the AQP and other university wildlife research projects is in the applied nature of the work and the speed at which it is transferred to the end users. Because of the close relationship between private landowners and researchers at the AQP, results from research are rapidly applied to management. This rapid integration of research and management was most productive when individuals involved with the hunting and land management activities of a given property were actively included in and consulted on all study directions, designs, and interpretations. This partnership gave ownership of the AQP to the non-university participants and served as a vital feed-back mechanism for university researchers. The other benefit of this cooperative effort was a significant decrease in the time from study completion to dissemination to the public. In many cases a manager or landowner would adopt management practices before completion of research without complete assurance of its efficacy. In comparison, university researchers usually require several years and levels of confidence before publishing results and making management recommendations.

A final diversion from typical university research projects is in how information from the project is distributed. The emphasis of the AQP is on the development of effective quail management techniques and disseminating these techniques to the public through newsletters, the popular press, and

personal interactions rather than publishing in the scientific literature. While this did not necessarily gain favor with the university, it relates back to accountability and the source of continuing funding for the Project.

A principle component of the AQP was simply to monitor large numbers of radio-tagged bobwhite quail for long periods and then use those data to design field experiments to test dogmas and develop new management techniques to produce more quail and better hunting. The long-term nature and large sample sizes of the AQP have allowed management recommendations to be based on reliable evidence and continues to be successful as evidenced by the near 15-year existence of the AQP.

Herein, we highlight the results from the first 14 years of AQP. We present the 5 management items we deem critical for a successful quail management program in the 21st century in southern Georgia. Taken together these items provide the foundation for what we have termed Modern Quail Management (MQM), a formulae for producing quality bobwhite habitat and establishing a basis for future management decisions to increase bobwhite hunting success.

Study Area

Our study area is part of an 80,000 ha aggregate of large, privately owned properties in Baker and Dougherty Counties located in southwest Georgia surrounding the city of Albany. This land was purchased and developed as shooting properties mostly by wealthy northern industrialists beginning in the 1940s. The AQP began on one plantation of about 6,000 ha in size and has over time included 10 different properties that collectively represent over 42,000 ha (Sisson et al. 2009b). Approximately 80% of the study area consists of mature old-field pine woodlands interspersed with small (1-4 ha) and scattered fallow fields (20%). Land management activity through the 1970s and 1980s was typical of quail management in the region since the 1930s: a combination of timber thinning, prescribed burning, and agricultural plantings. Historically, quail pop-

ulations over the study area fluctuated around 2.5 birds/ha (Simpson 1976). More detailed descriptions of our study area can be found in other AQP publications (Yates et al. 1995, Burger et al. 1998, Sisson et al. 2000b,a, Terhune et al. 2006, 2007).

Methods

The majority of our work focused on the use of radio-telemetry to monitor a wide array of bobwhite demographics, population ecology, behavior, habitat use, and hunting issues. The radio transmitter specifications and attachment procedures have been previously described and shown to produce accurate and reliable information for our study sites Sisson et al. (2009a,b), Terhune et al. (2007).

During the 15-year study many of the experiments and tests were evaluated by using hunting success (measured in coveys observed per hour) to measure the effect of a treatment. Since the objective of the quail plantations is to provide high quality quail hunting, the most direct method to evaluate any practice is to determine its effect on hunting success. This has been the traditional method used by owners and managers to evaluate population response to management programs in some cases for over 100 years, and has, more recently, been shown to correlate well with population density for these types of properties (Palmer et al. 2002). In addition to hunting success indices, we used surveys, censuses, radio-telemetry, and other data to determine a treatment's effect and explain why it occurred.

Many topics were addressed by the AQP from 1992 through 2005. Some of the most significant include the following:

Annual Survival and Causes of Mortality

To understand quail population dynamics it was important to document patterns in long-term survival and causes of mortality. Year-round monitoring of a large sample of radio-tagged birds on 2 study areas provided these data. Birds were trapped and radio-tagged at these study sites twice a year (Oct/Nov & March) and then monitored at least twice weekly throughout the year. Cause of mortality was recorded wherever possible by evidence

at the kill site or condition of the radio as described by Curtis et al. (1988). Seasonal and annual survival estimates were obtained through the Kaplan-Meier method (Kaplan and Meier 1958, Pollock et al. 1989).

Brood Habitat Use

Very little was known about habitat requirements for quail broods in these environments when the study began, therefore this became one of our primary objectives early on. This information was produced by identifying habitat used by radio-tagged hens after their nests hatched until the young birds fledged.

Supplemental Feeding

Providing supplemental feed for birds has always been a traditional activity on quail plantations. This multiple-year study on intensively managed properties using wild, radio-tagged quail was designed to detect differences in bird survival, predation rates, reproductive output, and hunting efficiency on areas where supplemental feed was provided versus areas that were not. After this initial study was completed these same parameters were compared in two follow-up studies: 1) the effects of hunting season feeding versus year-round feeding and 2) the effects of spreading feed versus using stationary feeders.

Hardwood Clean-up

When the AQP work began in the early 1990s hardwood encroachment appeared to be a universal problem on all study areas. Using the same techniques and examining the same parameters as all the other studies from the AQP we compared responses of quail to “clean-up” operations (i.e. treatment) in pre versus post and treatment versus control (i.e. no hardwood removal) designs. The effect of “clean-up” on nest predator populations was documented as well.

Nest Predation

Numerous studies were conducted to better understand the relationship between quail and their predators. Radio-tagged quail were used to collect information about adult bird’s predators, nest

predators, and predator removal programs. We provided data from our study sites for additional research which involved developing and testing a “predator index” to determine the level at which predator populations should be managed and for a large-scale predator removal experiment. Most of our work involving predators was conducted in collaboration with other institutions and agencies such as Tall Timbers Research Station, University of Georgia, and USDA-APHIS Wildlife Services.

Results and Discussion

From 1992-2006 over 8,000 wild bobwhites were radio-tagged and monitored on 10 different properties in Georgia and Alabama by the field staff of the Albany Quail Project. One of the factors that became apparent early on in the investigations was that bobwhite survival was higher and distributed differently on these managed properties compared to other properties in the Southeast (Sisson et al. 2009b, Burger et al. 1998). In addition to higher annual survival (approx. 20%), mortality on our study areas was more evenly distributed throughout year giving relatively more breeding birds a chance to reproduce in spring and summer. The average overwinter survival for all our study sites combined was 54% and was shown to be the underlying theme for success on all the populations we have studied that are doing well, as well as the first sign of trouble for those that are not (Sisson et al. 2009b). We attribute this high survival to populations existing in large blocks of good habitat, a region of mild climate, conservative harvest pressure, management of mammalian predators, and supplemental feeding. In many other studies (Sisson et al. 2009b) the majority of annual mortality occurred during fall and over the winter leaving proportionally fewer breeders to produce young during the spring and summer.

Brood habitat was poorly understood at the beginning of the project with only a few small sample size studies having been conducted which produced apparently conflicting information. It became one of our initial objectives and a high priority to determine optimal brood raising conditions for our study sites.

Albany Quail Hunting Success

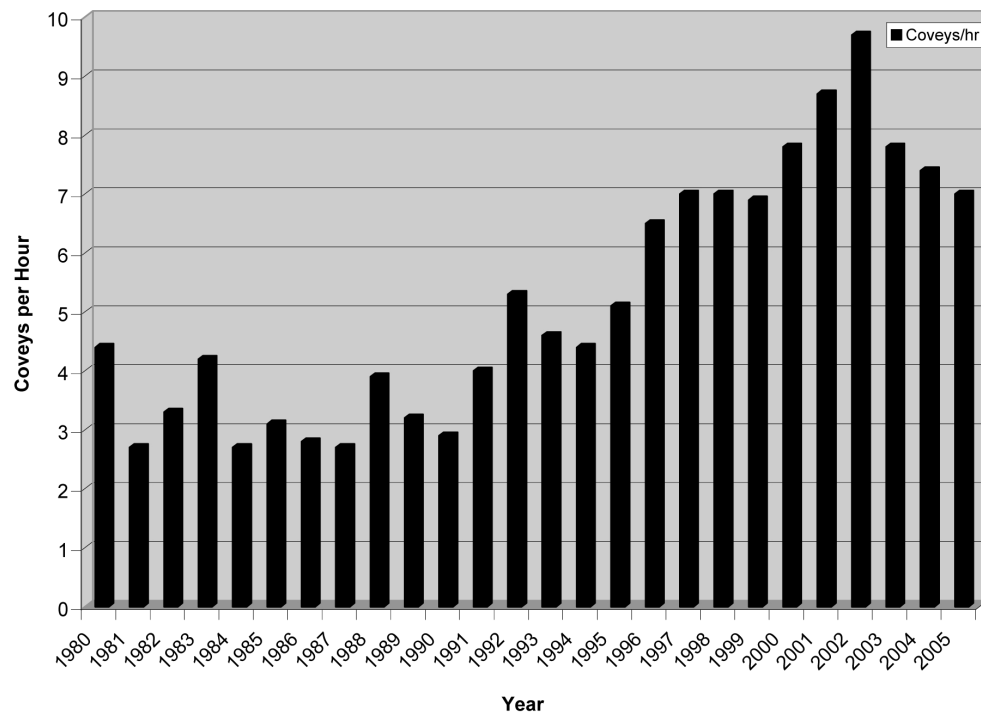


Figure 1: Hunting success (coveys/hour) on the primary study site of the Albany Quail Project in Baker County, GA prior to (1980 - 1996) and after (1997 - 2005) the implementation of Modern Quail Management techniques.

Monitoring radio-tagged hens with young broods revealed the importance of weedy fallow fields due to their cover conditions and high insect availability compared to other habitats (burned woods, agricultural fields, and “feed patches”)(Yates et al. 1995). It was also determined that woodlands with a higher percentage of these types of fields produced consistently higher quality hunting with 30-35% of an area in fields being optimal (Michener et al. 2000). This resulted in a flurry of activity on local properties reclaiming old fields and creating new ones scattered across the landscape. Radio-telemetry monitoring of hundreds of broods since these early findings have re-enforced them and helped fine tune the management of thousands of acres of fallow “weed fields” now being maintained specifically for brood habitat. This was also our first indication that the traditional “bird patch” may have been ineffective in maintaining quail populations.

At the beginning of AQP in 1992 there was a long standing negative bias by wildlife professionals towards supplemental feeding of any kind (Frye 1954). However, this did not preclude it being a common practice for bobwhites on intensively managed properties throughout their range (Frye 1954, Guthery 1986, Simpson 1976, Brennan et al. 1994). It was under the influence of this negative bias that we began studying this topic in 1993 with this initial investigation providing some of the first evidence of the beneficial impacts of supplemental feeding for bobwhites (Sisson et al. 2000a). This study documented the potential of supplemental feeding to increase over winter survival, body condition, and reproductive output in the spring (Sisson et al. 2000a). Current large and longer-term studies at Tall Timbers Research Station are verifying these early results (W. H. Palmer, personal communication).

Moreover, follow-up investigations have re-

vealed additional benefits to year-round feeding versus the traditional fall-spring feeding programs (AQP & TTRS, unpublished data). The next phase of this work was an examination of how supplemental feeding affected hunting success and hunting quality. A series of field experiments over a 4-year period revealed that coveys not being fed had a greater chance of being found by hunters (65%) than did fed coveys (50%) (Sisson 2005). This occurred for the same reasons that made unfed coveys in our earlier study more vulnerable to predators - increased daily movement and larger home range size (Sisson et al. 2000a). These findings contributed to the Georgia Department of Natural Resources policy that does not consider the hunting of quail that are being supplementally fed as "baiting". Broadcast spreading of supplemental feed year-round is now an integral part of most plantations management program.

These feeding studies also led to more questions concerning the long standing practice of planting quail "feed patches". During this same time period we conducted an experiment systematically eliminating feed patches on one of our study areas without negatively impacting the quail population (AQP, unpublished data), as was similarly reported on by Brennan et al. (2000). This in conjunction with the lack of use by broods, as mentioned above, contributed to the widespread demise of this long standing quail management tradition on many sites.

Hardwood encroachment into old-field pine uplands over time became one of the biggest management challenges of properties in the area. Even with frequent burning regimes, abundant mid- and over-story hardwoods had over time encroached to the point where ground cover growth was being negatively impacted. As this problem began to be dealt with in the Albany area, we initiated a long term telemetry project to monitor bobwhite demographics, population density, and predator abundance before and after this intensive mechanical hardwood removal and compared to other untreated (i.e. hardwoods not removed) sites. The results of this study illustrated dramatic improvements in bobwhite survival and reproductive success following a mechan-

ical hardwood "clean-up" operation, as well as dramatic reduction in predation stemming from the removal of predator habitat (Sisson et al. 2002). Quail populations on these sites soon reached an all time high and remain high and stable today. Hardwood removal is not a novel idea, previously being described by Rosene (1969) but had not received much attention recently. However, in response to illustrating the benefits anew, this type of work has been conducted over tens of thousands of hectares in the region during the last decade.

The management of nest predators has long been a controversial subject with little research specific to bobwhites available to make management decisions. Our telemetry studies along with those of our colleagues were raising concerns about the level of nest predation occurring on sites in the southeast. In addition, new technology was documenting precisely what the main nest predators were (Staller et al. 2005). The lack of comprehensive knowledge on management of quail nest predators led to a series of research experiments addressing the subject. The initial work was a Quail Unlimited funded collaborative project (AQP, TTRS, MSU) looking at nest predator abundance region wide that documented a strong correlation between predator abundance and reproductive success (Palmer et al. 2001). This was followed up by an on-going collaborative project (AQP, TTRS, UGA, USDA-WS) looking at experimental nest predator removal in a cross-over design and replicated across study sites. These studies are demonstrating the positive impacts of nest predator management under some circumstances (Carroll et al. 2005). In response to the results of these studies and interest from landowners, the Georgia Department of Natural Resources now has a permitting system that allows landowners with a management program in place for bobwhites to trap nest predators year-round under special permit. This program has been a huge success and is now standard procedure on most of the intensively managed properties in the region.

The result of the above described public/private collaboration has been a change in management

Albany Quail Hunting Success

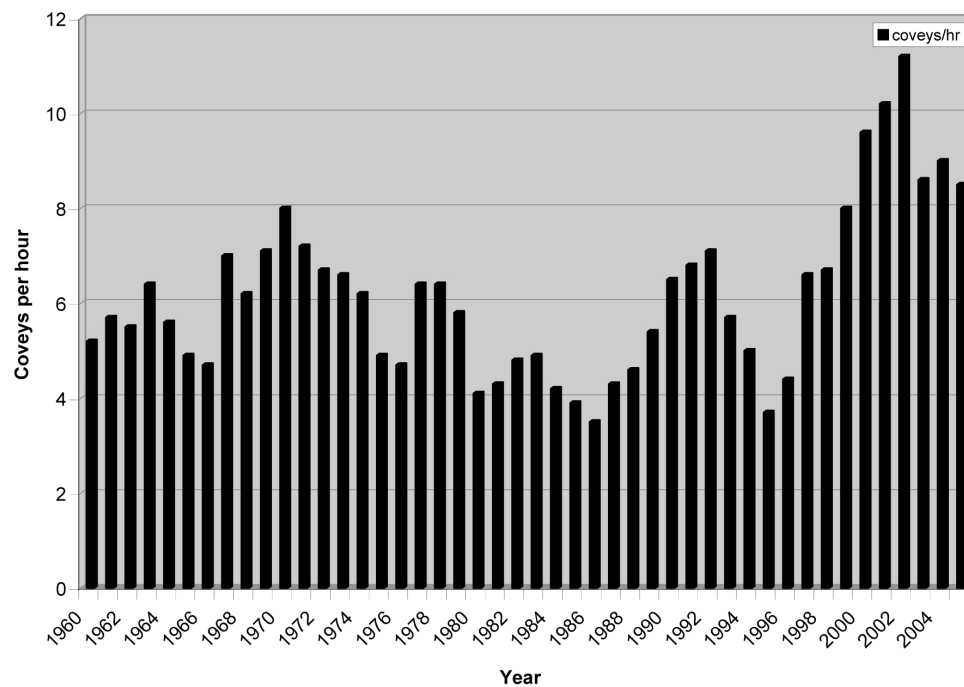


Figure 2: Hunting success (coveys/hour) on the secondary study site of the Albany Quail Project in Dougherty and Baker Counties, GA prior to (1960 - 1996) and after (1997-2005) the implementation of Modern Quail Management techniques.

style across a large acreage to one based on science creating the concept of modern quail management (MQM) techniques. This has taken plantation style quail management above and beyond the standard techniques of thinning timber and burning the woods by adding more aggressive techniques. The cornerstones of this new management philosophy have been hardwood clean-up, brood habitat management, management of nest predators, and year-round supplemental feeding.

Bobwhite population densities and hunting success during the last decade on these properties implementing MQM are now higher and more stable than any previous period in their history. On our primary study site from 1980 to 1996, prior to their initiation of MQM, the average number of coveys seen per hour was 3.9 (SE = 0.265) with a range of 2.7-6.5 (CV = 0.28). Following the implementation of MQM, from 1997 to 2005, average number of coveys seen per hour almost doubled to 7.7 (SE = 0.317)

with a range of 6.9-9.7 (CV = 0.12, Figure 1). Population density estimates on the same property during the same time frames showed similar increases from about 2.5 birds/ha to at or near 5.0 birds/ha. Our secondary study area had a covey per hour average of 5.5 (SE = 0.188) during the period from 1960-1996 with a range of 3.7-8 (CV = 0.21). Since implementation of MQM this property has averaged 8.7 coveys per hour (SE = 0.503) with a range of 6.6-11.2 (CV = 0.17, Figure 2), a testament to the efficacy of tried and applied research and management.

Management Implications

Modern quail management is a much more intensive form of quail management than was practiced prior to the time the Albany Quail Project began. Traditional quail management techniques were developed in conjunction with land use practices that existed from the 1930s through the late 1960s. Under traditional management programs, bobwhite

densities fluctuated around 2.5 birds/ha and were largely a byproduct of other land practices (Stoddard 1931, Rosene 1969, Simpson 1976, Palmer et al. 2002). Today's properties practicing MQM now have populations fluctuating around 5.0 birds/ha and higher.

Successes from the research and outreach efforts of the AQP helped created optimism in the quail community which has led to increased management intensity on many properties. Modern quail management has spread and succeeded on traditional quail management areas first developed in the early 1900s in Alabama, throughout Georgia, the Carolinas, into Virginia and elsewhere. In addition, the AQP and its approach have been involved in developing successful new quail properties on southeastern land holdings which were never previously dedicated to quail production. Even with the high cost of renovations, annual input, and foregone alternative revenue, properties with large populations of wild birds and quality quail hunting are in high demand but extremely limited in supply. Surveys of firms involved in brokerage of such properties indicate that value added to a hunting property managed using MQM techniques approaches \$1,000 per acre more than a similar property managed in the traditional manner.

Since its conception, the AQP has helped increase knowledge of management for quail, do away with some dogmas, and break new ground on issues such as feeding, brood habitat management, and the benefits of predator management. Its research and successes helped influence revisions in state wildlife management policy and regulations to now allow supplemental feeding during hunting season and permitted year round trapping of mammal nest predators. The one fact that those involved with the project always keep in the forefront of their thinking is that the AQP began because people involved with quail management realized that the world in which their quail populations existed had changed but management had not. Modern quail management techniques are extremely successful today however, "Modern" is a relative con-

cept, which eventually becomes "Traditional". Continued research and application of those results are needed to ensure high density bobwhite populations and quality hunting over the long term.

Acknowledgments

We have had the distinct pleasure over the years of working on some of the finest properties in the country as well as benefiting from the knowledge of some of the most skilled quail managers in existence. It has been a rare treat as researchers to see results of our work immediately put into action and produce results. As always, we thank the landowners and others who have supported this effort and all the dedicated field staff that gathered all the data and made us look good.

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