

The Northern Bobwhite in Georgia:

Making Decisions on Restoration



Photo credit: Susan Ellis-Felege

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The long-term decline of the bobwhite in Georgia and throughout the Southeast is well known and well documented. Our understanding of the fundamental causes of the bobwhite decline is generally based on anecdotal and indirect evidence. It is human nature to attribute the decline to simple reasons, such as the introduction of Mexican quail, or increases in coyote, fire ant, armadillo or cattle egret populations, or numerous other possible problems. However, much of the scientific evidence points to the drastic and often complex changes in the Southeastern landscape habitat as the root cause.

As a result of increasing interest and investment in quail management among landowners, land managers, and federal- and state-agencies in Georgia, initiation of management programs to help restore bobwhites in the Southeast are being undertaken. Much of this work is directed at managing habitats to benefit bobwhites at both the local and regional levels. However, experiences by managers in many localities across the South have shown that land management is highly site specific – what works on one site does not always work on others. For example, when managers invest in bobwhite restoration they sometimes have a great response and are satisfied with the results. Unfortunately, other managers have worked equally hard following similar management prescriptions yet they see little return. Thus, the need to study bobwhites in many parts of Georgia and the Southeast has become evident. Much of the current literature available to landowners focuses on habitat management rather than providing a general guide to making decisions regarding the landscape feasibility to manage for bobwhites in the first place. This creates the misconception that all properties are created equal with regard to wild bobwhite management. Further, knowledge of various factors of bobwhite ecology combined with the how, why, and what to look for to identify optimal properties to purchase and manage for bobwhites, will render more efficient bobwhite management and wise use of of manpower and monetary resources.

The goal of this booklet is to address those issues: by helping managers make better decisions before they invest heavily in quail management. The main point here is to help identify specific goals relative to bobwhite restoration, such as level of hunting pressure, and what are the challenges in meeting those goals? If the answers to the questions outlined in this bulletin still point toward managing for wild bobwhites then managers should take advantage of the many excellent materials available. Here in Georgia, an excellent guide has been produced by the Georgia Department of Natural Resources, entitled, “Bobwhite Quail in Georgia” and is available from the Georgia DNR. If the answer is “no,” then alternatives to wild bobwhite management might be more appropriate.

History

Many issues in bobwhite management are linked to their history—especially land use. Presently, there are remnant populations of bobwhites in many parts of Georgia; however, other areas presently include some of highest bobwhite population densities ever reported in the Southeast. This is not simply a function of what is going on right now in these particular locations, but also a result of the overall landscape context and how land has been managed over the last couple of hundred years – particularly during the past 4-5 decades.

As many of us already know the bobwhite is associated with a couple of different types of landscapes. Before Europeans dramatically changed the Georgia landscape it was already shaped by Native Americans and natural processes. In pre-European Georgia, bobwhite habitat was likely a consequence of one key factor—FIRE. Whether manmade or caused by natural forces, fire changes vegetation. It creates several types of habitats that we now mimic on places that are intensively managed for quail. The most obvious of these habitats is the fire-climax pine savanna most of us recognize on the plantations around Albany, Georgia, and the Red Hills surrounding Thomasville, Georgia. As Europeans settled the Southeast and changed the landscape we created another habitat that was good for bobwhites—low intensity AGRICULTURE. Therefore, during the period from about the early 1700s to the mid-20th century, we created landscapes in Georgia that helped support abundant bobwhite populations. However, it is important to remember that this was basically done as an accident which means that even with no specific management we still produced lots of quail. Starting in the early 20th century and in a more dramatic way in the 1950s that all changed. Farming, in general peaked in Georgia about 1950, has declined throughout much of Georgia, and that which is left has become significantly more intense. For example, the advent of center-pivot irrigation systems and the introduction and increasing size of tractors and implements has reduced the amount of early succession habitats (e.g., field borders, hedgerows) that was once common among less intensively managed agricultural sites. Comparing two maps of Georgia, these dramatic changes in agriculture over the last half century are evident. This has been bad news for bobwhites and many other grassland dependent wildlife species in many regions of Georgia (Figure 1).

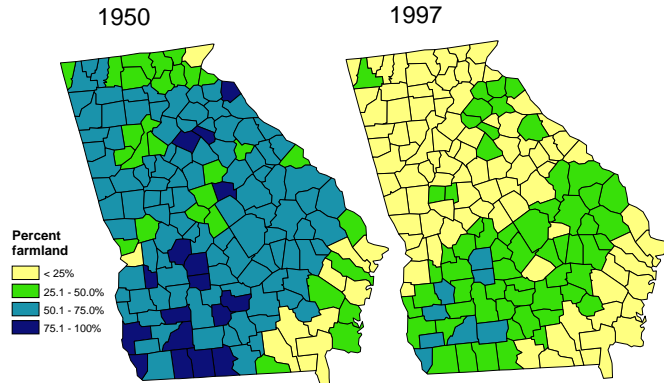
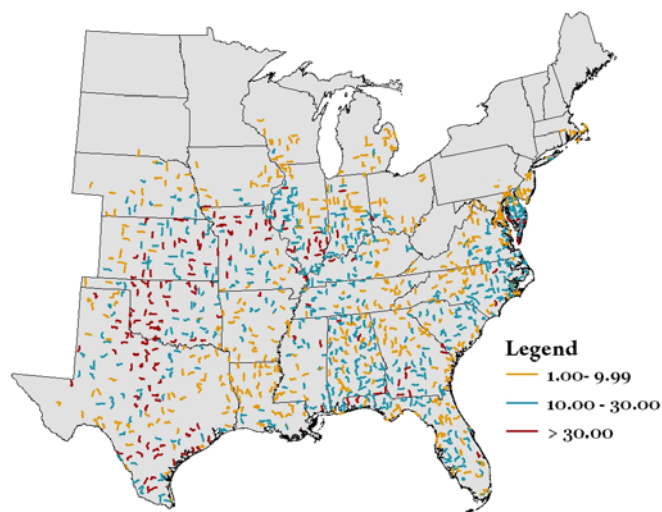


Figure 1. In 1950 we see many counties in Georgia dominated by agriculture. The dark blue areas indicate > 75% of the land area devoted to farming. By 1997 we see much of this farmland is lost. We completely lost the highest category of farmland and most counties outside the Upper Coastal Plain now have <25% land area devoted to farming. Southwest Georgia has retained more farmland than other parts of the state.

Unfortunately for bobwhites, the changes have not been to other “suitable” habitat, but to poorer quality habitat. Some of those same factors, for example, have created more suitable forest habitat for deer and turkeys. For example, bobwhite can use upland pine forests, like pine savanna (i.e. open pine canopy that lets ample sunlight to the ground which promotes a groundcover comprised of grasses, forbs, legumes, briars, scattered shrubs and vines), but the problem now is that we have the wrong kind of forests—mainly hardwood forests and high density pine forests. Among these types of forests, canopy closure is prevalent and quantity and quality of early succession or groundcover vegetation diminishes with time. This means that the deck is stacked against those of us wanting to manage for quail in many regions of Georgia. The bobwhite decline parallels the decline in Southeastern agriculture (Figure 2).

Figure 2. a) Breeding Bird Survey results during 1994-2003 showing concentration of bobwhites mainly in the southwestern Georgia. Blue and red surveys show moderate to high abundance. Yellow suggests very low to spotty distribution. b) A steady decline in bobwhite abundance estimates for Georgia. All of the counts are much lower now than in 1966 when the survey began. (from Sauer, J. R., J. E. Hines, and J. Fallon. 2005. *The North American Breeding Bird Survey, Results and Analysis 1966 - 2005*. Version 6.2.2006. [USGS Patuxent Wildlife Research Center](http://www.mrl.govt.nz/patuxent), Laurel, MD.



The Playing Field—Where in Georgia do we have the best opportunities?

This history and present land use trends interact to give us a starting point in making decisions about quail management. There are parts of Georgia where making large investments in management for wild quail is not a profitable use of time and money.

Rather ironically, even the worst base landscapes in Georgia can support some quail, but the financial and land investment needed is enormous. Based on the attached maps Georgia is classified into those areas where management for wild quail will be easier versus those where management is much more challenging—and likely expensive. A rather simple way to start is doing a simple survey of the area to see if there are any quail present. There are now available some good and reasonably easy to implement techniques for estimating abundance of quail (see the Tall Timbers Research Station, Inc website for information of bobwhite abundance estimation <http://talltimbers.org/gb-autumnest.html>). This provides your starting point (Figure 3).

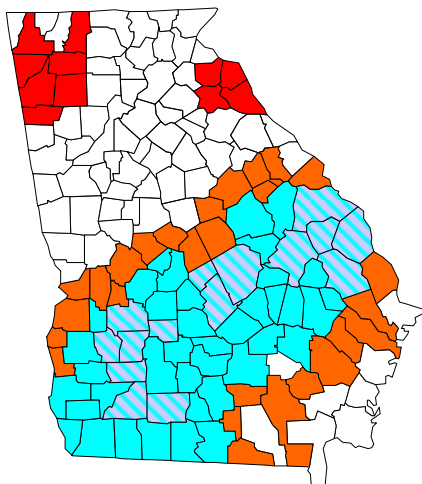
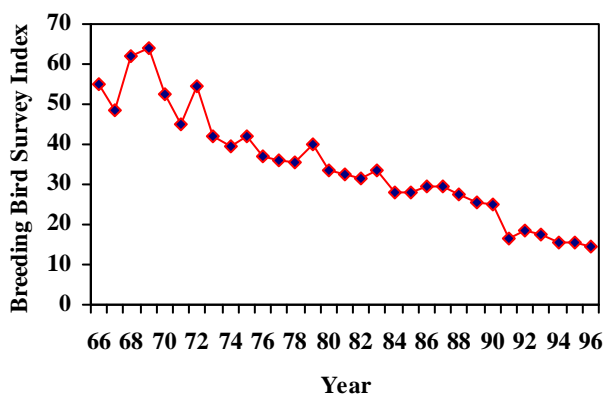


Figure 3. There are times when we might be flogging the proverbial dead horse. This map highlights those areas where quail management is more likely to succeed and those areas which are more challenging. The blue highlighted counties are those with the best management potential, including the counties with diagonal lines which are in the Georgia DNR Bobwhite Quail Initiative. Orange counties include the second tier where there are portions of those regions which hold some opportunity. The red counties have scattered areas with potential, but with many more management challenges. Those areas away from these colored areas, mainly the mountainous north and urban areas hold little hope for bobwhite restoration. Some of these areas can still support token populations, but generally not at densities that allow regular hunting. Map originally produced by the Georgia working group of the Northern Bobwhite Conservation Initiative.

Scale—How big is big enough?

Managers often want a magic figure for the size area needed for bobwhite management to assure success in restoring bobwhite populations. Again, this is difficult because we have to remember that wildlife do not respect property boundaries. In the past, when the general landscape provided at least some decent bobwhite habitat, someone who wanted to manage for quail could manage a small property and depend on good results. Analogous to this is the present deer situation here in Georgia. We can manage quite small properties for deer because they can also use neighboring properties. For bobwhite management in the past we were also depending on our neighbors to subsidize our populations. Now in even the best regions in Georgia quality habitat is often fragmented and land ownership is on small parcels. Someone who owns a few hundred acres next to a well-managed quail plantation in south Georgia is in a much different situation than someone in the Piedmont with a few hundred acres surrounded by hardwood forest, dense pines, and fescue pastures.

Because of the fragmented nature of good quail habitat in Georgia managers must think in terms of areas >2,000 acres – a general rule in this case is the more the better. Remember that a property containing intensive management does not have to be at that scale to be successful, but the quail friendly landscape-level matrix probably should be. To illustrate, let's look at 2 common scenarios:

Scenario A. You have 200 acres that you want put into well-managed quail habitat. This might ideally be a stand of pines with low basal area of 40 ft²/acre (see Appendix II). It is burned regularly and providing excellent ground cover. Unfortunately, you are surrounded by hardwood bottoms, cotton fields, and dense CRP pines. This is illustrated below (Figure 4a). In this situation you might produce some quail because they are pretty adaptable. However, your large investment in managing this 200 acres will, likely, result in only a modest response by bobwhites. This is not acceptable for many who want to hunt wild bobwhites, but if you want to hear just a few males calling in the spring or to hunt just a few times, then it might be ok.



Scenario B. You have 1,000 acres, but cannot manage all of it, or you have several neighbors who are also willing to do some management for bobwhites. In this case you see below (Figure 4b) that it is not just the managed stand that is important, but the entire landscape matrix. Also, in this case you will likely get a better response from bobwhites to your management, and you are more likely to obtain a huntable population. This is no guarantee and in many parts of Georgia the “island” effect seems to negatively affect managed properties even much larger than 1,000 acres.

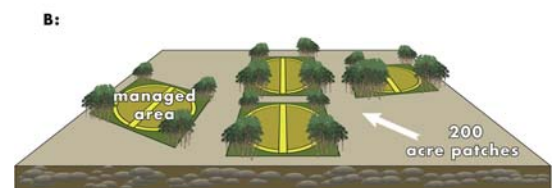


Figure 4. a) A small well-managed area surrounded by poor habitat will be difficult and is likely to have minimal results. b) Small areas of well-managed habitat have a better chance in succeeding when there are a large number of sites in the same vicinity.

Present Land Use

Types of habitats

Much of Georgia's bobwhite country is a mix of several types of habitats. If a manager is lucky then much of the landscape is comprised of low basal area pines, but most properties will be a mix of farmland, hay and pastureland, and upland and bottomland forest. These provide quite a range of potential for management, but also many challenges. For example, pine forests can range from being some of the best quail habitat in the South to some of the worst, depending on the type of management that has been done as it determines the quality of the ground cover. Many other habitats are simply unsuitable for quail. These are summarized in the following table to present a realistic picture of what might be done (Table 1).

Habitat composition and distribution

Not only does the amount of these habitats influence management decisions, but how they are situated on the landscape. Often we have a mixture of all of the above habitats with various field types, stand sizes and distribution. Interestingly, both smaller and larger stands can be good or bad, as can the way habitats are distributed on the landscape. For example, a 1,000 acre soybean field surrounded by well managed pines is going to provide habitat around the edges. In the summer when the soybean canopies it could become useable habitat for bobwhites (although the way we manage crop fields means it can still be pretty poor habitat), but in the fall after the soybeans are harvested and the stalks are mowed it is unusable space. If bobwhite habitat is not available adjacent to the soybean field in the pines or in field borders, corners, hedgerows etc. then the cotton field is never usable for quail. In essence the habitat impact of the adjacent cover is much greater than the cover acreage itself because it provides nesting cover, brood range, escape cover and food and thus allows the soybean field to be usable habitat for a portion of the year. If that field is split up then a much larger percentage of the landscape will become suitable habitat. In order to illustrate some examples of how this might work a couple of examples are included below (Figure 5a and b). Also important to consider relative to landscape context is the habitat for the animals that prey on quail. For example, bobwhite population response to management may be greater on lands that are bordered by a sod farm than on lands bordered by a closed canopy hardwood forest. Why? The sod farm, while not providing habitat for quail, is not providing habitat for quail predators; whereas the hardwood forest is not providing habitat for quail but is providing habitat for raccoons, opossums, rat snakes, Cooper's hawks and a variety of other quail predators.

Table 1. Common habitats found in Georgia and their value to bobwhite management. Some of these habitats can be quite variable depending on management being undertaken at a particular site.

| Land use | Value when not modified to benefit bobwhites | Potential for providing quail habitat | Challenges to conversion | Costs for undertaking quail management |
|-------------------------------|--|---|---|---|
| Hardwood forest | Low value except when providing some mast crop. Provides habitat for many quail predators | Bottomland hardwoods generally have low potential. Some potential to manage upland white oaks. | Wet or moist soils are difficult to manage for quail. Bottoms are usually considered important for other conservation values. Upland hardwoods are difficult because there is little experience in creating “oak savanna” landscapes. Removal is expensive. | High |
| Plantation pine forest | Generally low because most pine forests have high basal areas with canopy closure providing poor habitat. Young stands can provide excellent habitat for a short time (5-7 years). | Most of these stands have excellent potential over time. Especially those planted as a result of the 1985 and subsequent Farm Bills; and especially longleaf as they allow more sunlight to the ground and can be burned while in the seedling/sapling stage. | Most of these stands are expected by landowners to produce revenue. Conversion to quail management will generally reduce the revenue stream, and lengthen rotation income generation periods. | Low to high depending on the need for pine income generation. If basal areas can be reduced, then these habitats can be very good. |
| Annual crop field | Low to medium value. Cotton is the prime crop and is generally quail unfriendly. However, field margins offer good opportunities. Doesn't serve as source of predators. | Good potential when taking advantage of field margins, center pivot corners and cover cropping systems and even excellent potential if combined with management of adjacent pine woodlands | Field margins are often plagued by poor native seed banks and invasion by sod grasses. Landowners are often hesitant to change management practices. | Low to high depending on how much of field is put into field margins. Some practices are very income neutral and may actually enhance productivity. |
| Hay/pasture | Low value because of species composition and management. Doesn't serve as source of predators. | Can be good if converted to other land use or to more quail friendly species. A mix of native bunch grasses, legumes and forbs can be very good. | Sod grasses, especially bermudagrass, are difficult and expensive to control. Even conversion to low density pines is challenging. Exotic grasses should be controlled prior to pine regeneration. | High cost because of need to control typical species found in these fields. |

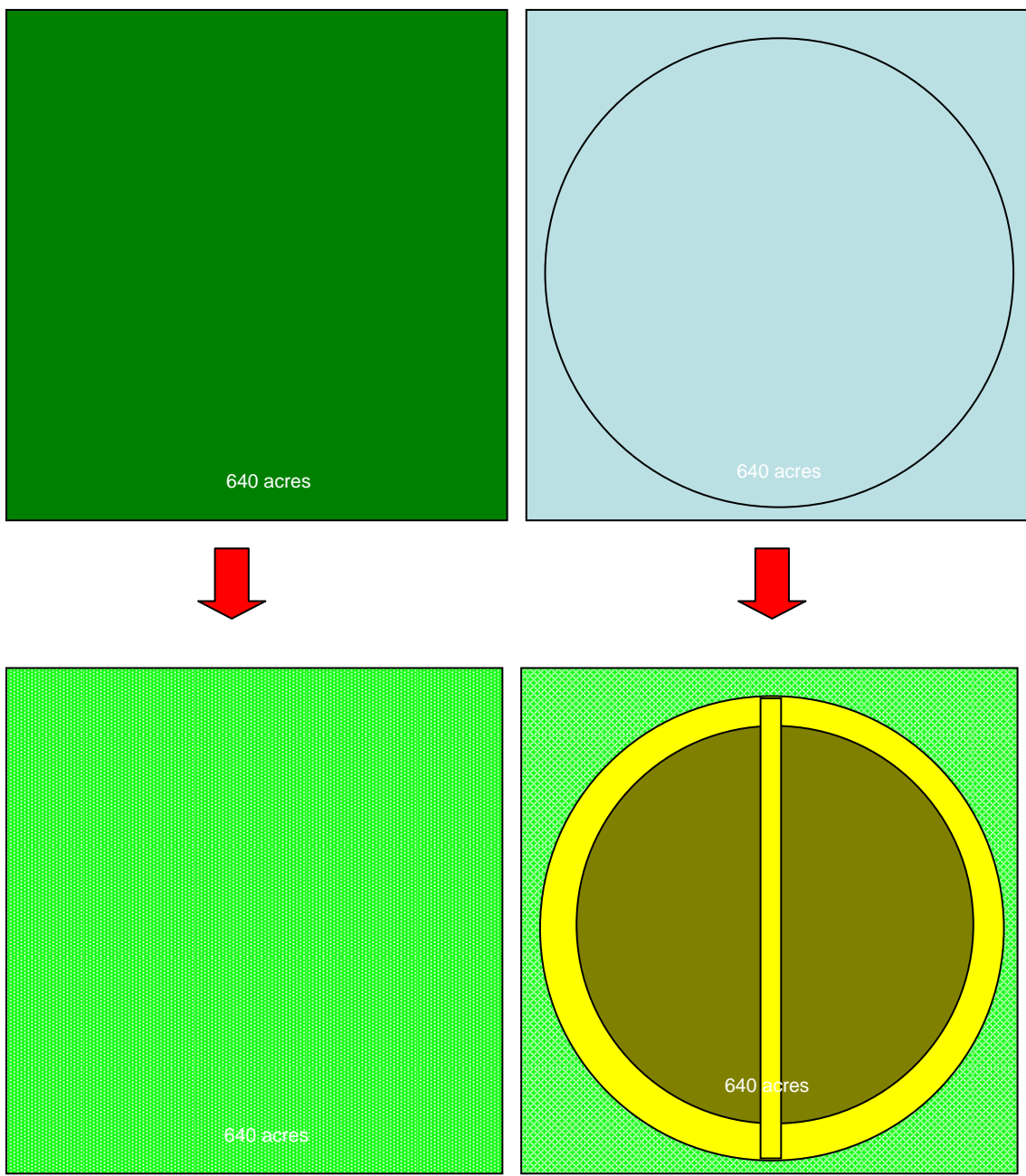


Figure 5a. Left side shows a management transition from a 640 acre stand of unthinned 20-year-old loblolly pine with no understory resulting in poor bobwhite habitat to a thinned stand with a low basal area of 40 ft²/acre. The right side is a single conventional center-pivot irrigation field of cotton with no edge habitat development transitioning to one with minimal loss of cotton crop, but also containing early successional margins and a strip across the field. The cotton has been changed to conservation tillage with winter cover and the pivot corners converted to low basal area pines.

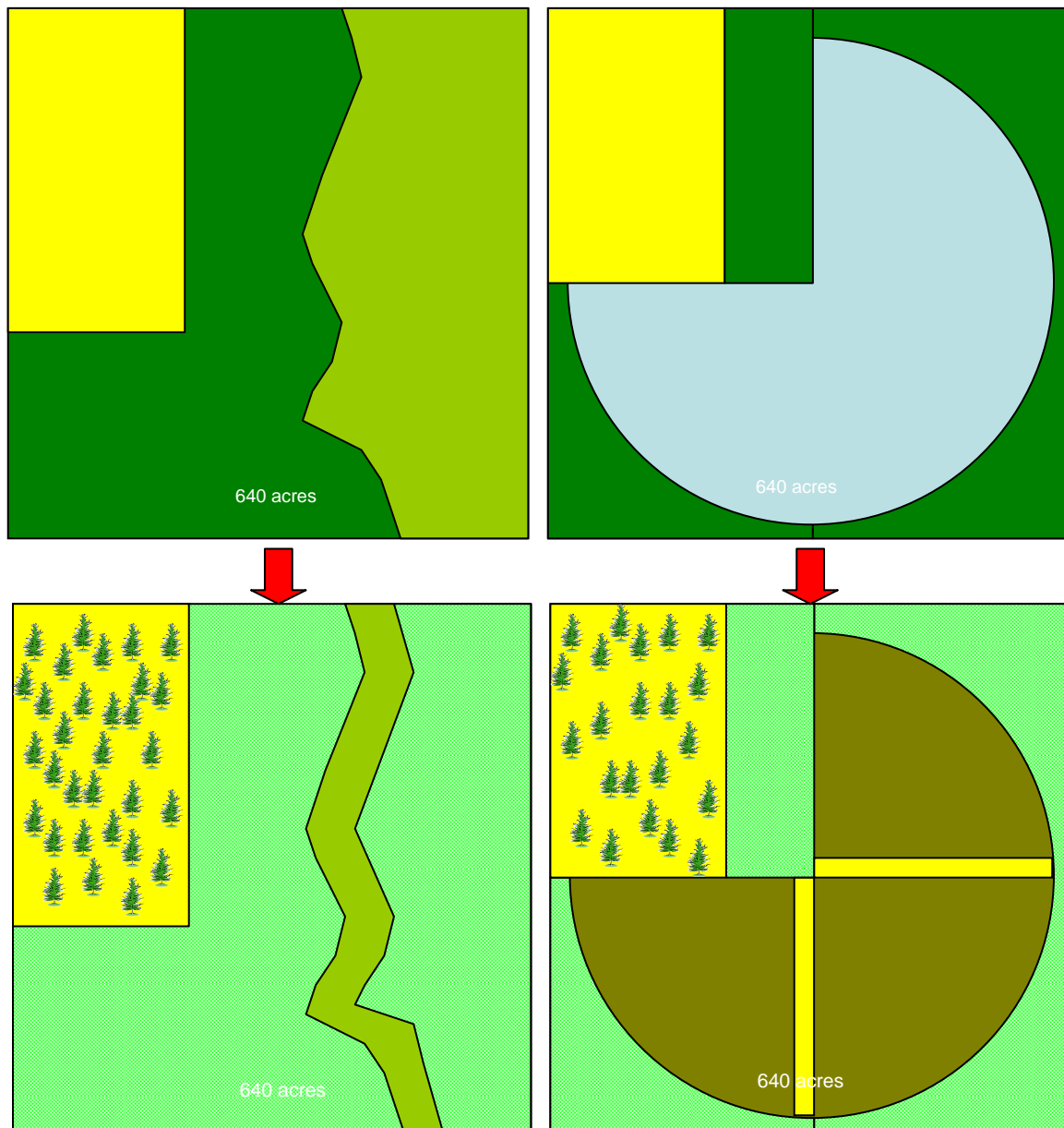


Figure 5b. On the left side we see a solid stand of 20 year-old loblolly pine with a $90 \text{ ft}^2/\text{acre}$ basal area in center. A large stand of bottomland hardwood and pine on right, and a fescue/bermudagrass pasture on top left. Presently this is very poor habitat. This area is very challenging. The pine stand can be made into good habitat, but that positive management is not going to be as effective because of adjacent habitat. On the bottom left we see the same stands after extensive and intensive management. Field on upper left has been herbicided for grass control and entered in Longleaf Pine CPA—low density longleaf pines. The large pine stand has been thinned to $40 \text{ ft}^2/\text{acre}$ ba. The hardwood/pine stand on right has been thinned to $50 \text{ ft}^2/\text{acre}$ ba using hardwood removal. On the right side we see a conventional irrigated cotton field with corners planted into 15 year old loblolly pines. Presently this is poor habitat. However, with management of field edges and pivot corners can be made to be fair habitat and good around edges. Conversion of the hay field to quail friendly vegetation can make this better than the previous cotton field example. Same stands after extensive and intensive management. Field on upper left has been herbicided and converted to low density longleaf pine. The pivot corners and small stand at top have been thinned to $40\text{-}50 \text{ ft}^2/\text{acre}$ ba. The cotton field now uses conservation tillage and winter cover crops. The two light colored strips are 30 to 60 foot wide herbaceous field margins following BQI recommendations.

Summary

A Georgia landowner or wildlife manager interested in managing for bobwhite quail needs to keep in mind a couple of key factors that should influence their decision. The first is what goals they want to accomplish? And, are these goals obtainable given the current property? If it is to go back to the early 1960s as they remember then it is likely a waste of time. That was then and this is now. Yes, the landscape we are dealt provides many more challenges, but those challenges can make a successful management program that much more satisfying. That said, the goal(s) established must be a realistic potential outcome. In some parts of Georgia the answer will be to manage for something else or simply try to provide some recreation by releasing quail. Perhaps an obvious, but necessary comment, at this point is a step in the right direction would be to contact an experienced gamebird biologist to aid in decisions making and developing a game management plan.

The simple outline above together with that goal hopefully provides some guidance so landowners and managers can be more realistic about what they can accomplish. On the following page (Appendix I) is a simple scoring system to aid the decision of whether a property is worthy of investing the time and resources to manage for bobwhites. Wildlife management is part science and part art. We should use the science to help us make logical decisions about what we can accomplish and we should use the art to help shape our creativity for restoring this outstanding gamebird.

Acknowledgments

Helpful review and many useful comments on the bulletin were provided by M. Mengak, T. Terhune, S. Wellendorf, and R. Thackston. J. Thompson J.P. Bond, and T. Terhune assisted with figures.

Helpful Places for Information

Georgia Department of Natural Resources - <http://georgiawildlife.dnr.state.ga.us/>

Georgia Forestry Commission - <http://www.gfc.state.ga.us/>

Natural Resources Conservation Service, Wildlife Habitat Management Institute - <http://www.whmi.nrcs.usda.gov/>

Northern Bobwhite Conservation Initiative - <http://www.bobwhiteconservation.org/>

Tall Timbers Research Station – <http://www.talltimbers.org/gb-research.html>

Quail Unlimited - <http://www.qu.org/>

Southeast Quail Study Group - <http://seqsg.qu.org/seqsg/index.cfm>

University of Georgia Gamebird Research Lab - <http://gamebird.forestry.uga.edu/research>

Appendix I - Making decisions about wild bobwhite management

The above information is designed to provide a backdrop on decision making about quail management. There are effectively a small number of options for quail management in Georgia. They are: 1) manage for hunting of wild bobwhites, 2) manage for hunting of pen-reared bobwhites, and 3) give up and manage for other purposes. Within each of these options there is a range of management options which provide various levels of hunting opportunities, depending on investment in the resource. The following decision tree is designed to help a landowner choose from the options. Although we provide a simple scoring system one must remember that some of us will be very happy being able to move toward modest hunting opportunities on our property and that management for bobwhites also benefits a host of other wildlife species, some of which are also in serious decline.

Key to quail management

1. Are wild bobwhites present on or adjacent to the property? Based on number of wild Bobs heard whistling during summer.
 - a. 0 Bobs = 0.
 - b. 1-2 Bobs = 1
 - c. 3-4 Bobs = 2
 - d. >4 Bobs = 3

2. Desired level of hunting?
 - a. You wish to hunt regularly throughout season with high probability of finding multiple coveys and harvesting multiple quail each time. Yes = 1
 - b. You wish to hunt a few times during a season, can accept a low covey find rate and desire to occasionally harvest a quail. Yes = 2.
 - c. All other answers. Yes = 0.

3. Where is your property in Georgia—see Figure 3?
 - a. Counties colored blue. Yes =2.
 - b. Counties in orange or red. Yes = 1.
 - c. Counties in white. Yes = 0.

4. How large is the property, or acreage of the property, plus well managed property adjacent?
 - a. >2,000 acres. Yes = 3.
 - b. >1,000 and <2,000 acres. Yes = 1.
 - c. <1,000 acres. Yes = 0.

5. What is the base land? This includes the 500 acres surrounding the center of the property. Add the scores of a-d, so you could get a score of 0-8 for this question.
- Predominantly low basal (40 to 60 ft²/acre) area pines. Yes = 3.
 - <30% hardwood forest. Yes = 2.
 - Predominantly row crop agriculture. Yes = 2
 - Predominantly hay and pasture. Yes = 1
6. How much alternative land use are you willing to devote to quail management?
- All. Yes = 3.
 - >50% land area. Yes = 2.
 - Field margins and other management. <5% Yes = 1.
 - None. Yes = 0.

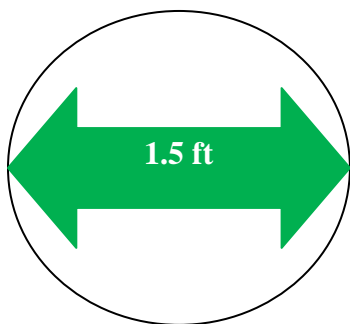
| | | |
|-------|------|---|
| Score | >15 | Likely you have what it takes to manage for wild bobwhites. |
| | 7-14 | Managing for wild bobwhites is a marginal proposition for you. |
| | 0-7 | Managing for wild quail will be very difficult. You might want to consider other goals. |

Appendix II - Basal Area of Pine Forests

Basal area seems to be a measure that confounds landowners and the public alike. It is actually not a difficult topic, but explanation of it likely needs a bit of math review and graphical support. When we speak of a basal area of 40 ft²/acre, we are talking about taking the cross-sectional area of the trunks of all of the trees in an acre and adding them together. It is as if we took a chainsaw and cut all the trees at the same height and looked down at the stumps. This particular measure means that if we have on an acre 40 trees and each one has a trunk that has a cross-sectional area of 1 ft², we have our 40 ft²/acre. This could also mean we could have 80 trees each with an area of 0.5 ft²/acre. This could also be done with trees of all different diameters.

So how is this done? First we need to find the diameter of each tree at breast height—this was of the breast height of German foresters who developed the concept. This is 4.5 ft above the ground. Using simple geometry diameter can be converted to a cross-sectional area. If we know the diameter we simply divide by 2 to get the radius, we then square that number and multiply by π (this is the constant 3.14). If we measure the diameter in feet then we have the cross-sectional area in ft². We then add all of these together for the number of trees in an acre and we are done.

Of course foresters have all types of shortcuts for this and the most common is the use of prisms. No matter how we do it we are developing a measure of the number and size of tree trunks per acre. Now you might ask what his has to do with quail? As it turns out we use this as an index for how much canopy cover we have per acre which in effect determines how much sunlight reaches the forest floor. Measures of 20-40 ft²/acre give us lots of sunlight on the ground and potentially lots of good ground cover. A measure of 70 ft²/acre generally gives us little light on the ground and we end up with lots of pine needles and not much else.



$$Area = \left(\frac{1.5}{2}\right)^2 * 3.14 = 1.77 \text{ ft}^2$$

If we have 30 of these trees on an acre we have a basal area of $1.77 * 30 = 53.1 \text{ ft}^2/\text{acre}$

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