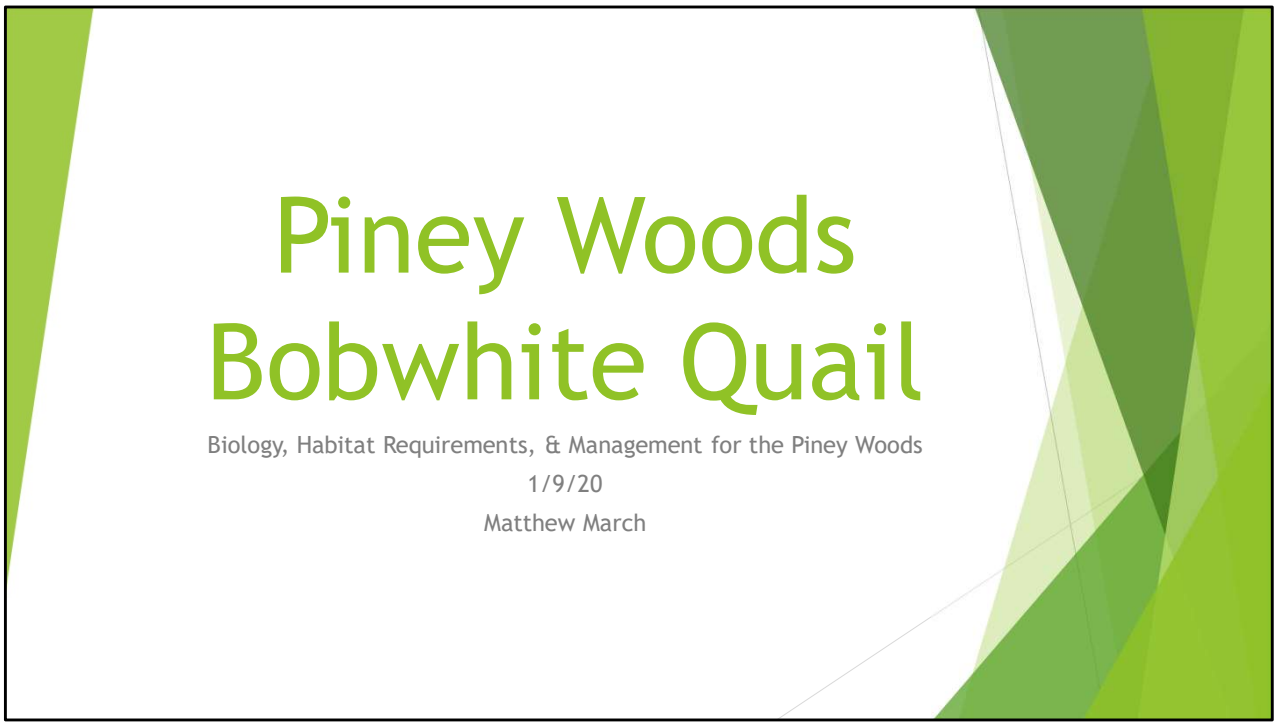
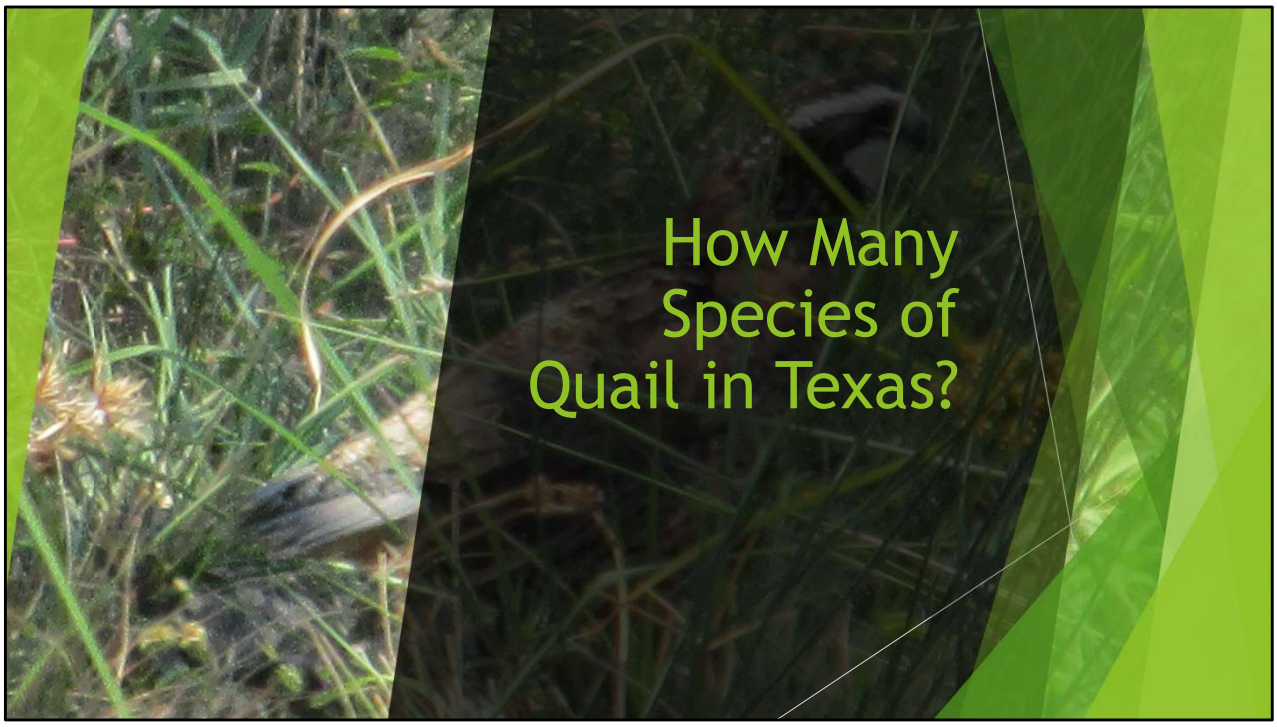


After introductions I ask the participants if any of them have ever seen a bobwhite quail in the piney woods region of east Texas. Many of the participants will likely say no or a long time ago. At this time I point out how quail have been on a decline and have disappeared not only from many areas of east Texas, but also across the state. However, bobwhite quail are still present in the piney woods but typically at a very low density, so they go unnoticed. I personally have seen bobwhite quail in east Texas in locations where quail habitat management is occurring such as in the national forests. During this presentation you will gain an understanding of why bobwhite quail are very scarce in the piney woods and have a very interesting history of population changes in our region of the state. Before we dive directly into east Texas, I will begin by reviewing taxonomy and history of population changes of quail in Texas with a specific focus on changes in the piney woods. Next, we will cover life history, habitat requirements, and specific management for the piney woods ecoregion. Lastly, you as a participant will get the opportunity to be a bobwhite quail biologist!

Northern Bobwhite Taxonomy

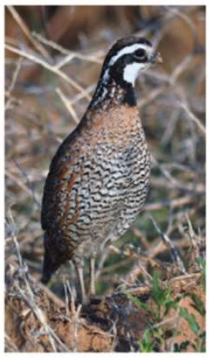
- Order: Galliformes
- Family: Odontophoridae
- Genus: Colinus
- Species: C. *virginiaus*

I will not spend very much time on this slide, but I do want to briefly touch on taxonomy. Quail belong to the order Galliformes which are heavy bodied, chunky ground feeding birds. This includes birds such as pheasants, grouse, prairie chickens, turkey, etc. Odontophoridae includes all the quail species found in the U.S. which includes 6 species.



At this time I ask the participants of the six species of quail found in the U.S. how many can be found in Texas? After giving them time to guess, I state there are 4 species of quail found in Texas, but only bobwhites occurs in east Texas. I now want to go through each of the four species so you can gain a better understanding of the different species and where to find them in the state.

Bobwhite Quail (*Colinus virginianus*)



Male northern bobwhite.
Source: Becky Ruzicka

Female northern bobwhite.
Source: Becky Ruzicka

I ask participants to raise their hand if they think bobwhite quail are a grassland bird? Even though most people have this visual of bobwhite quail as a grassland bird they can be found in a variety of habitat when the correct habitat structure is met. Bobwhite quail will actually struggle in a pure grassland setting because they need brush or "edge" for cover and protection. I will discuss edge in more detail later in the presentation as it is essential in habitat management. Bobwhite quail adaptability to a variety of habitats can be seen in its Texas range map. The species occurs across the state except for the far western Trans Pecos desert. This includes a variety of habitats and ecoregions such as brush country, cedar breaks, short grass prairie, tall grass prairie, south Texas shrub land, and pine forest. Bobwhite quail are most abundant in the state in the north central rolling plains, south Texas brush country, escarpments in the Panhandle, and to a lesser extent the coastal tallgrass prairie. Bobwhite quail are the most abundant species of quail in Texas.

Scaled Quail (*Callipepla squamata*)

Male and female scaled quail are difficult to distinguish in the field. *Sources: Left, Becky Ruzicka; right, Greg Schechter–Flickr CC by 2.0*

The next most widespread and common species of quail in Texas is the scaled quail. Scaled quail, or by its nickname cottontop, is found in the western parts of the state and are right at home in arid locations. Unlike bobwhite quail, which typically flush, scaled quail tend to run from predators or hunters. Scaled quail are a taller and lanker bird when compared to bobwhites. Additionally, scaled quail can be found in large coveys upwards of 50-75 individuals, while a large bobwhite quail covey may be 20-30 individuals at most.

Gambel's Quail (*Callipepla gambelii*)

Male Gambel's quail.
Source: JeffB–Flickr CC by 2.0

Female Gambel's quail.
Source: Matt Tillett–Flickr CC by 2.0

The third most common species in Texas is the gambel's quail. Gambel's are restricted to the desert of far western Texas. They can be found in riparian areas and arroyos along the Rio Grande River and other watersheds. Arroyos are basically dried creek beds. Gambel's range map can be misleading because they are mostly restricted to the riparian areas of the Rio Grande River and some of the large arroyos heading north into the desert. Gambel's are know to roost in the thick brush found in arroyos and are the only species of quail in Texas to roost off the ground.

Montezuma Quail (*Cyrtonyx montezumae*)

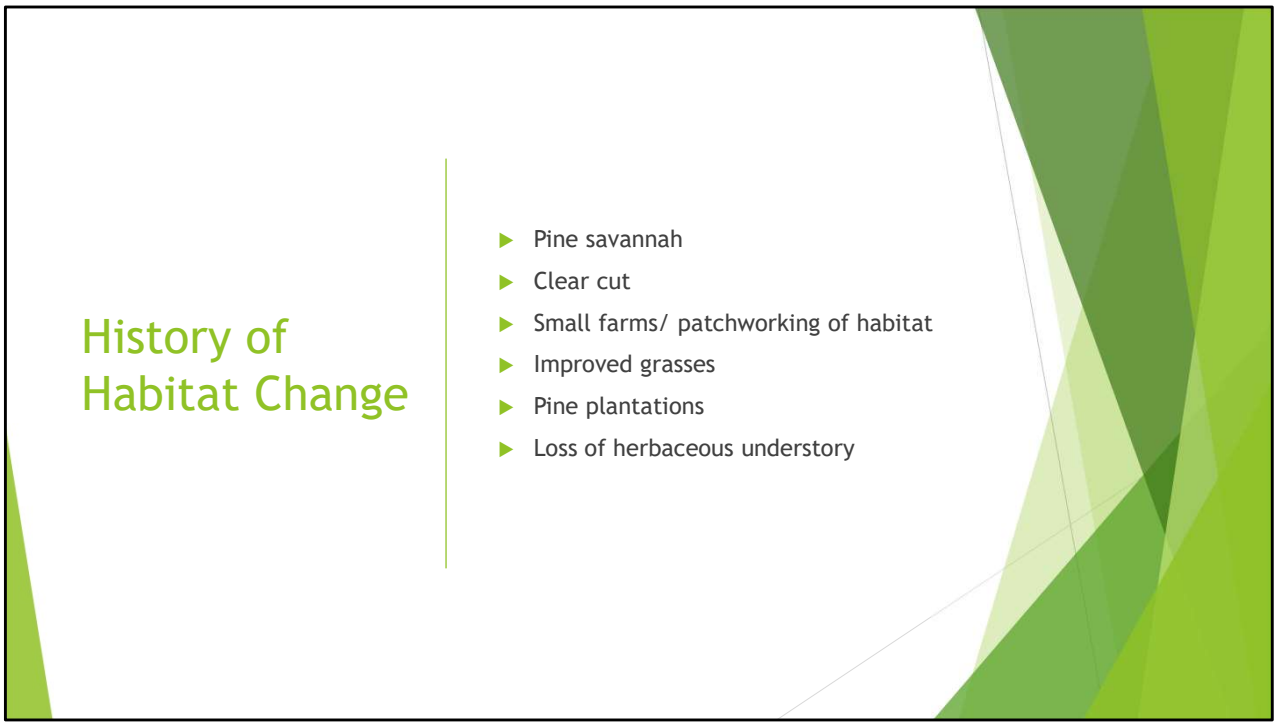
Male Montezuma quail.
Source: Bettina Arigoni–Flickr CC by 2.0

Female Montezuma quail.
Source: Bettina Arigoni–Flickr CC by 2.0

Up to this point all three species can be hunted in Texas. But, the fourth and least common species of quail, the Montezuma quail is protected. However, you can hunt Montezuma quail in other southwestern states where populations are more robust. Montezuma are high desert birds that can be found in higher elevation pinyon and alpine pine forest found in the mountains of west Texas. They are most common in the Chisos, Davis, and Guadalupe Mts. There is also a disjunct population found in the limestone hills of southwest Texas around the Rocksprings area. Historically, Montezuma quail were more common and mostly likely widespread in the hills of central Texas and the mountain ranges in the west.

Bobwhite Historically Abundant in East Texas?

Currently east Texas is not a stronghold for bobwhite quail and many people have the perception that it was never an historically important area. However, if you look at their range map in North America you can see the piney woods of east Texas sits right in the middle of their range. In fact the pine belt and deciduous forest found in east Texas extends across the south and up the eastern seaboard. The southeast part of the country including eastern Texas was historically important to quail and is an area know for quail hunting heritage. In fact, bobwhites where so common in east Texas, that in the early parts of the 20th century the national bird dog trials were held at the Gus Engeling WMA in Palestine, TX. By the end of the century, bobwhites were absent from the WMA which is a trend that occurred across many locations in east Texas.

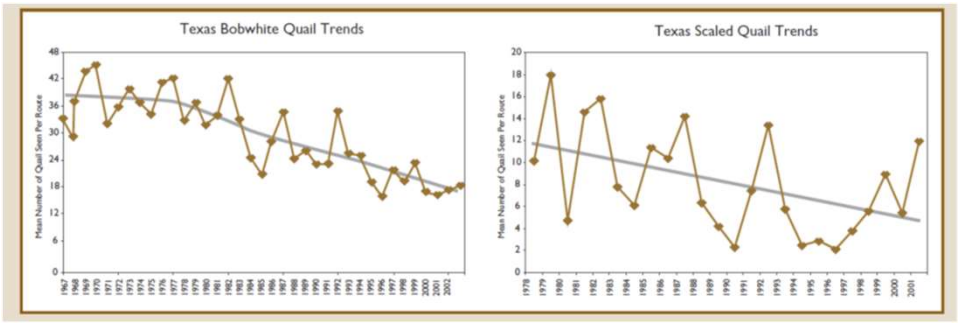


Finding population data prior to the 1950's is difficult, but when examining historical records and the quail hunting heritage of the south we can assume the piney woods historically had a healthy quail population. East Texas and specifically the piney woods ecoregion has a long history of habitat change. Habitat change and fragmentation of habitat is believed to be the number one reason for population declines not only in east Texas, but across North America. Other factors are contributing such as predation and diseases. When looking at the piney woods a series of significant habitat changes has occurred in the last 150 years. These changes were brought on by changing utilization of natural resources and land practices. These changes have been both good and bad for quail populations. Historically, the uplands were dominated by an open pine savannah. This ecosystem is maintained by fire which decreases woody understory and increases herbaceous cover (grasses, wildflowers, non woody plants, etc.). This historical ecosystem provided ideal habitat for bobwhites. As we begun to harvest timber in the 19th century clear cutting of the forest occurred which likely led to population declines. Ironically, many of these clear-cut sites were replaced with small farms that created a patchwork of habitats. Imagine hundreds of small farms in a small area that have a patchwork of open pastures, clear cut sites, overgrown fields, harvestable timber, regeneration pine, brushy fence lines, and fallow crop land. This quilt work of habitat met bobwhites' habitat requirements and "edge" requirement thus leading to large populations seen in the first half of the 20th century. As agriculture practices changed and improved fields became

cleaner, crops were not left standing after harvest, and more importantly native grasses were replaced with improved grasses quail habitat diminished. Additionally, may of these small farms and previously harvested timberlands were converted to pine plantations which are basically habitat deserts for bobwhites. The last nail in the coffin that caused the steep declines seen in the second half of the 20th century was the removal of fire form the landscape which caused the loss of herbaceous understory.

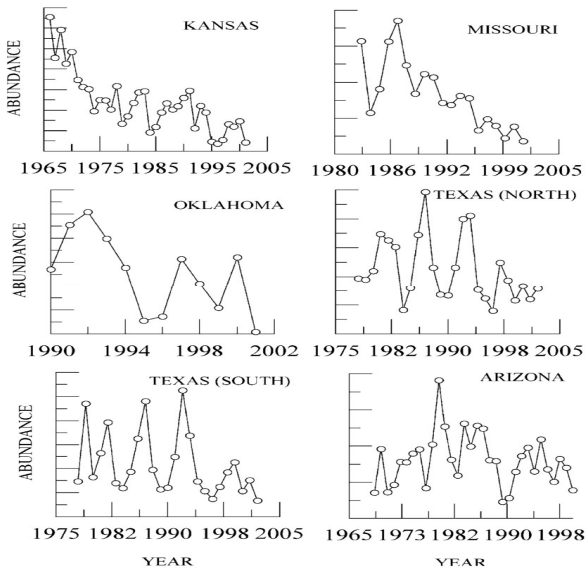
Like we already discussed the historical fire regime was and still is an essential requirement to maintaining a pine savannah and thus quail habitat that was historically found in east Texas. This historical fire regime was created by two sources: 1) lightning which naturally started fires and 2) fires intentionally set by Native Americans. Native Americans recognized game species and thus food sources increased in areas where fires occurred. Thus, they set fires to increase game species by improving wildlife habitat through fires. Rather started by lighting or Native Americans historical pine savannahs were likely maintained by fires as often as every 3-5 years.

Current Populations Trends



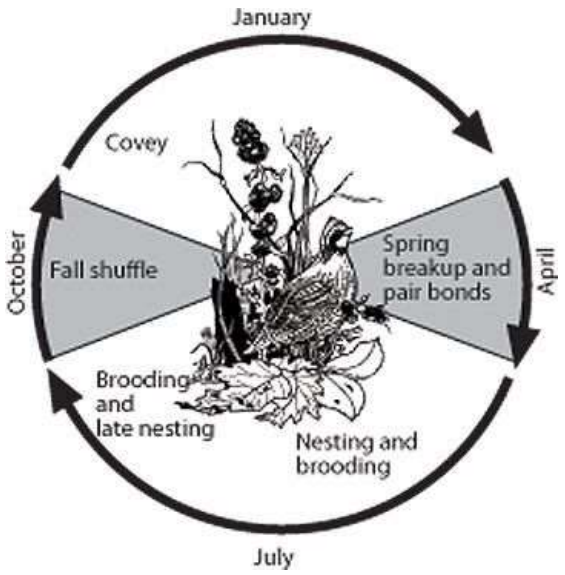
Texas Parks and Wildlfie Department (TPWD) has been conducting roadside surveys since 1976 to track long term tends in quail populations across the state. Random 20-mile routes are randomly assigned and during the first two weeks of every August TPWD staff conducts a survey to record the number of singles, pairs, conveys, and the number of quail within conveys for each quail species by 1-mile increments. The data from these survey routes are then compiled by ecoregions in the state. Survey routes are not conducted in the piney woods, post oak savannah, and blackland prairies ecoregions. So unfortunately, we do not have specific population trends for the region of Texas we are talking about today. TPWD roadside surveys provide the best data available on statewide population trends since it is conducted annually during the same time, using the same routes, over large spatial regions of the state. Sadly, but to not much surprise, TPWD surveys have shown since 1980 there has been on average a 5.6% decline in number of bobwhite quail recorded statewide annually to result in up to 75% loss of total population prior to 1980. Even though we do not have specific data from TPWD for the piney woods we can assume similar dramatic declines have occurred in the piney woods ecoregion. Habitat change, mostly from habitat fragmentation and loss of native grass diversity has led to these sharp declines. I do want to point out the individual points form year to year which represents drastic changes in population size form year to year. This is correlated to quail being a boom or bust species, which will talk about in more detail in a later slide.

Current Populations Trends



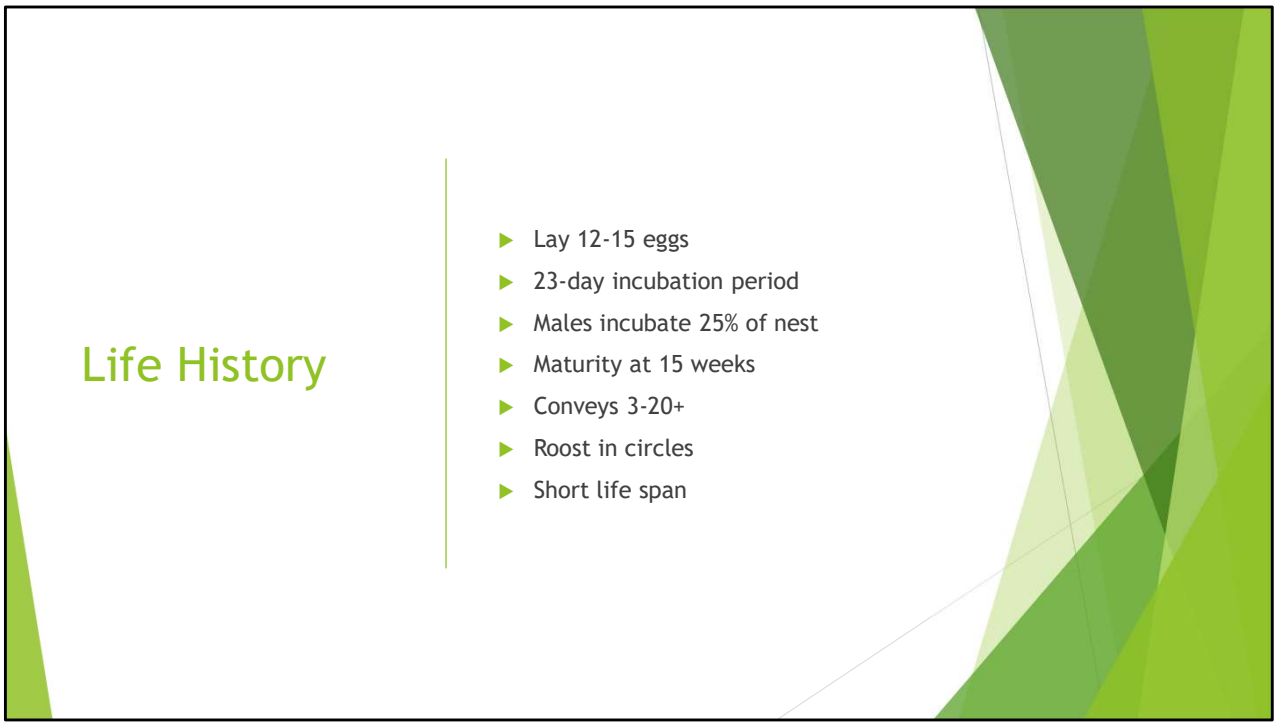
The main takeaway from this slide is quail populations are declining across the country just not in Texas. Again, don't pay attention to individual points (years) as they reflect the boom and bust life strategy of quail but the long-term trends overtime.

Life History



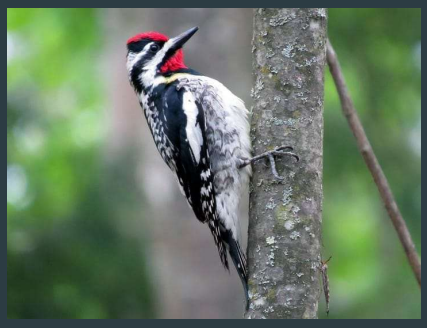
Now that we have covered taxonomy and population history of bobwhites, I know want to move into the life history and ecology section of the presentation. I will begin by taking you through a brief overview of the yearly life cycle of a quail. We will start during the winter. During this time of year populations are typically at their lowest point during the year and bobwhites are in large conveys. Winter sees the largest coveys during the year with coveys being as large as 30 individuals. March into April brings the spring breakup where large conveys split into smaller coveys. It also brings the beginning of mating season and bonds between pairs are formed. During mating season cocks use the well known "ah, bob-white" call to attract females. During this time period quail count calls can be used to estimate the population. Nesting can begin as early as mid April and hens can produce more then one clutch per season and with more then one mate. Nesting can last from late summer into early fall if conditions are ideal. However, majority of nesting occurs form May into June. This is very important when considering pasture shredding or hay mowing during this time of year. Because these activities can destroy nests and harm the population, it is recommended to avoid these practices as far into summer as possible. As late as July or August would be ideal, but a good rule of thumb is to wait until June 15th at a minimum. October is marked by a period called the fall shuffle and which smaller coveys come together and individuals "shuffle" or break up into conveys for the winter with different individuals. It is believed this a life history strategy to ensure gene flow between coveys within a population. Without this "shuffle" mating would continually occur within

the same convey year after year.



This slide provides some quick facts about bobwhites' life history. Incubation period is 23 days long and each nest will be 12-15 eggs. Males will incubate 25% of nest. Bobwhites need to mature fast and reach maturity quick to deal with constantly changing habitat conditions and predation and for this reason maturity is reached at 15 weeks. Conveys can be as small as 3 individuals during the summer and as large as 20, but 30+ is not unheard-of during winter. To provide protection from predators at night, bobwhites in a convey will roost in a circle on the ground with tails facing into the circle and eyes facing out. This way the convey can see predators coming from 360 degrees. Because bobwhites are basically on the menu for every predator, they have a short life span with the average being 6 months and anything over 3 years being considered old with a maximum lifespan of 5 years.

Indicator Species



Short-eared Owl	Eastern Meadowlark
Common Nighthawk	Painted Bunting
Eastern Kingbird	Chuck-wills Widow
Loggerhead Shrike	Red-cockaded Woodpecker*
Brown Thrasher	Brown-headed Nuthatch
Blue-winged Warbler	Bachman's Sparrow
Prairie Warbler	Lesser Prairie Chicken
Eastern Towhee	Attwater's Prairie Chicken*
American Tree Sparrow	Northern Harrier
Field Sparrow	Texas Horned Lizard
Savannah Sparrow	Texas Tortoise
Grasshopper Sparrow	Prairie Dog
Henslow's Sparrow	Black-footed Ferret*
Dickcissel	

Endangered

You could make the argument that bobwhite quail could be an indicator species. An indicator species is a species that can be used as an indicator to infer the health of the habitat. In other words, it is kind of like a canary in a coal mine for the quality of habitat. If you have quail, your habitat is good, and you are supporting a wide range of wildlife. If quail are missing this could be a sign that your habitat quality is degraded and thus your animal and plant diversity will decrease. The chart in this slides shows all the species that benefit from managing habitat for bobwhite quail. Some of these species are endangered such as prairie chickens and black footed ferret. Specifically for the piney woods the endangered red cockaded woodpecker is found in the same pine savannah habitats quail utilize. Other bird species in our region that benefit form quail management includes, but not limited to common nighthawk, eastern kingbird, logger head shrike, savannah sparrow, grasshopper sparrow, Henslow's sparrow, eastern meadowlark, painted bunting, and brown-headed nuthatch. Many of these bird species are also dependent on a pine savannah ecosystem or grasslands and for the same reason as bobwhites their population are also in decline.

Boom and Bust Species

Year	Mean # Quail Observed Per Route	15-year Mean
2018	3.66	17.74
2017	23.16	17.74
2016	52.52	17.74
2015	38.84	17.74
2014	7.52	17.74
2013	2.80	17.74
2012	3.48	17.74
2011	5.32	17.74
2010	8.02	17.74
2009	6.64	17.74
2008	18.53	17.74
2007	21.05	17.74
2006	13.98	17.74
2005	37.37	17.74
2004	23.20	17.74

If you examine the graph in this slide which is statewide averages from TPWD surveys from 2018 to 2004, you will see how there has been a steady decline in bobwhite quail statewide. However, one thing I want you to pay attention to is the drastic up and downs from year to year. This graph demonstrates how quail are a boom and bust species which is an important part of the species life history strategy. In years when food is limited, and nesting quality is degraded populations will decrease to the point where they seem absent form the landscape. Then out of nowhere if conditions change the population will explode and quail will be around every clump of grass or bush. This trend is mostly related to rainfall and which years with higher rainfall sees increased insects (food) and plant growth (nesting) which causes a boom in the population. Timing of rainfall also plays a role in this correlation. The correlation between precipitation and population size is more prevalent in arid areas of the state where rainfall is more sporadic. Interestingly, in eastern parts of the state especially in the coastal tall grass prairies increased rainfall can cause populations declines. Abundant rainfall can cause nest to flood and make herbaceous cover so thick chicks and even adults cannot move though it. As we begin to talk about habitat requirements this concept of to thick of cover becomes very important when managing habitat for quail in areas with high rainfall regions such as in the piney woods.

There are several years I want to draw to your attention in this slide. First look how 2016 has the highest average of 52.52 for the entire time period. Since quail are on the decline,

we should have expected the highest average closer to 2004, but conditions must have been perfect for a population explosion in 2016. Then conditions turned bad and two years later we saw an average of 3.66 which is one of the lowest for this time period. Another set of years represents the correlation between rainfall and population size. Does anyone remember what occurred during 2011? 2011 marked the driest one-year period on record for the state of Texas, thus population averages were extremely low leading up to this drought and afterwards. Habitat degradation was so extreme it took several years to recover and thus the lowest average was in 2013 at 2.8.

Bobwhites water requirements are met with preformed and metabolic water. This mean bobwhites obtain all the water they need through the food they eat (preformed water) and as a by product of aerobic respiration (metabolic water). With that being said, bobwhites will drink water if it is available and can benefit from watering stations such as the one pictured in this slide. However, for our region water availability is usually not an issue and watering stations benefits are likely minimal when compared to arid locations.

I begin by asking participants which food group they believe is most important to quail? I will define mast as the fruit of trees and shrubs such as acorns, nuts, berries, etc. Many participants will likely say grass seeds even though insects are the most important group. This is because most grasses don't produce a large enough seed for quail. However, two groups of grasses, paspalum and panicum, do produce large enough seeds to be an important food source for quail. Chicks mostly eat insects until 6-8 weeks old. This is because insects provide the required protein needed to grow. Grass seeds are typically low in protein and mast is not present during the spring and summer. Additionally, a boom of insects, typically associated with rainfall, can cause a population boom in bobwhites.

During spring bobwhites forage on green growth, including cool season plants and warm season plants breaking dormancy, and insects. During summer, most plant growth decreases, and majority of seeds and mast are unavailable, thus insects are the major food source during this time. Fall forage includes mast, but mast can be unpredictable from year to year and may not remain available into winter. Forage during winter can be limited due to insects and mast not being present. Seeds from grasses may be the only food source during winter until winter annuals begin growth.

This is only a partial list of predators and diseases for bobwhites, but these are the ones commonly associated with population declines. Predation from coyotes, feral hogs, and imported red fire ants occurs on adults, chicks, and nests. It has been suggested that predator control could be a useful management tool in increasing bobwhite populations, however preliminary research suggest habitat quality plays in important role in reducing impacts form predation. For example, it is impossible to find a location in the piney woods that doesn't have coyotes, feral hogs, and fire ants. So why do some locations have bobwhites, and some don't? It would make since that habitat quality is the deciding factor. Researchers are still trying to understand the impact imported red fire ants have on natural insects which are the major food source for chicks. Helminths in bobwhites is an emerging issue that researchers are still trying to understand. The jury is still out if this parasite is causing the population decline or if impacts are increased in poor quality habitat.

If you are wanting to manage for bobwhites, predation and diseases are something you should keep in the back of your mind as issues that need to be managed for, but I believe it is more important to focus on providing good quality habitat.

This is likely the most important slide in the presentation when managing for bobwhites. To successfully manage for bobwhites you must understand they are an edge species and manage your landscape to create edge. Edge is the point at which two different types of cover or landscape types meet. For example, it could be as noticeable as the line between mature forest and a grassland or a fence line that separates a mowed pasture from a brushy field. It can also be as subtle as a clump of grass that has not been grazed next to a graze patch or clumps of brush surrounded by grasses. Bobwhites thrive in a landscape that has a plethora of edge and will struggle and a mowed manicured pasture or forest. Bobwhites need edge as cover and to test if you have enough edge you can implement the 50:50 rule and which a bobwhite should never be more than 50 yards from brush or cover 50 feet in diameter. Another rule of thumb is you should be able to throw a softball from one patch of cover to the next which equals about 5-20% of habitat should be brush/cover.

Bobwhites need a large amount of quality habitat to sustain a population. Under ideal conditions population density can be as high as 1 quail per acre and you would theoretically need at least 15 acres of quality habitat to support a convey. You need 700 bobwhites to maintain a viable population and thus you will need 3,500-7,000 acres to sustain a bobwhite population.

Habitat types for quail species is divided into 5 types. The requirements of each type will

differ between quail species. For bobwhites loafing, escape, and roosting cover can be the same. Nesting cover consist of bunchgrasses 12-18 inches tall at a minimum of 8 inches tall. You can visualize a basketball as the size bunchgrasses needed to provide nesting cover. You should aim for 200-500 clumps per acre with 300 being the goal. At 200 or lesser clumps the chance of predation of nest increases and at greater than 500 clumps grass becomes to thick for chicks to move through. Brooding provides overhead cover with low litter, abundance of insects, and is typically disturbed areas that allow chicks to move easily. Imagine yourself as a baby chick trying to move through two foot tall grass or thick brush, this is why management of the amount of herbaceous cover is so important in our high rainfall region. Loafing cover is dense brush 3-10-foot tall and at least 5 feet in dimeter with a closed canopy and an open base. Mature pine trees provide little benefit in loafing cover.

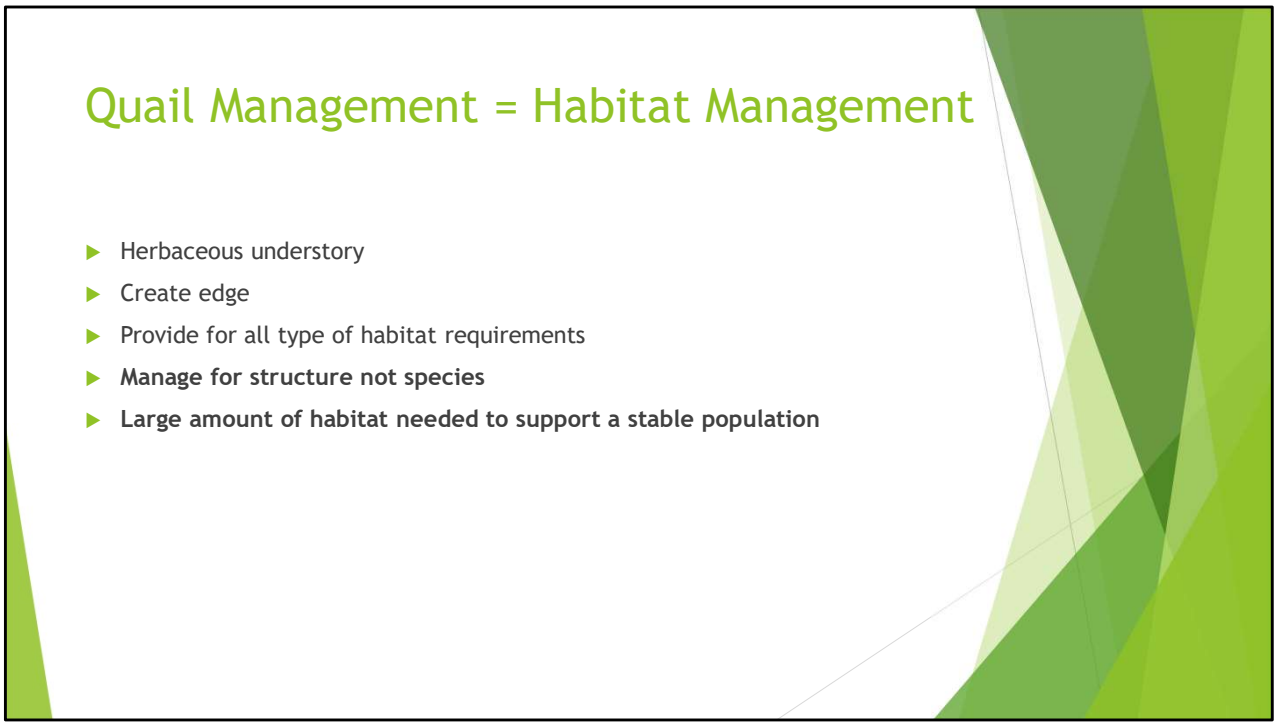
Structure vs Native Species

Now that you understand the habitat cover type requirements for bobwhites, I want to discuss this concept of structure over specific species. I ask the participants of the two pictures above which pasture do you believe provides better habitat structure for bobwhites? The picture on the left is poor quality habitat because the structure is to thick, while the picture on the right provides basketball size clumps perfect for nesting with low grazed areas in between for chicks to move around. The picture on the left is of a native tall grass prairie with bluestem, indian grass, and switchgrass, while the picture on the right is nonnative smut grass. When managing for bobwhite habitat we should strive for native plants, but I would recommend when beginning management you should pay more attention on providing proper structure and habitat types over specific plants. You should work with what plants are present on the site and manage for structure over species.

Savannah Type Ecosystem

- Creates Edge
- Naturally provides for all 5 habitat types
- Easy movement
- Protection from predators
- Foraging sources
- Importance of longleaf?

Pine savannah type ecosystems maintained by fire provide ideal habitat for bobwhite. Fires create edge by burning some areas hotter than others. Additionally, savannah type ecosystems provide all 5 cover types required by bobwhites and provide abundant food sources of insects and seeds. Grassland areas between brushy areas provide easy movement for chicks, while scattered low growing woody vegetation provides protection from predators. Many conservation groups and naturalists push the importance of longleaf pine savannahs, and I would have to agree. But, when managing for bobwhites does it really matter if is a loblolly, shortleaf, slash, or longleaf pine? I would make the argument that it is more important to manage for the savannah type ecosystem structure over specific pine tree species.



If you have not noticed a trend yet quail management equals habitat management. To sustain a bobwhite population you will need an herbaceous understory with edge scattered throughout and ensure quality nesting, brooding, and loafing cover is provided. And always remember to manage for structure not specific species. And because of the large amount of habitat required to support a population the vast majority of landowners feel they do not have enough land to make a difference. However, if many small landowners perform sound habitat management a stable population can be established. It will take the work of a community of landowners to reverse the bobwhite decline just not a handful of individuals. Lastly, habitat management is a continual project that will require follow up treatments year after year and you should not expect instant results.

Is to much grass a bad thing?

We have now discussed habitat requirements for bobwhites, and we are now going to move into specific activities you can perform. I will begin by asking do you think there is to much grass in this picture and if so, what can we do to improve bobwhite habitat on this site? Management activities could include prescribed fire, shredding, plowing strips, and grazing. These activities are the backbone of habitat management. (fire, axe, plow, and cow)

Many sites require brush management to start the process of improving bobwhite habitat. A variety of methods exist form hand tools to heavy equipment. Common mechanical methods in our region include using hydro axes, mulchers, and bull dozers to clear sites with heavy understory growth. You can also use chemical applications as an alternative. Chemical applications can be as complex as ariel applications or as simple as using a wick sprayer in the top right picture. Wick sprayers work well in a field where small brush has begun to take hold. Plants must come in contact directly with the wick sprayer; thus you can set it high enough that herbicide only contacts the woody vegetation and not the herbaceous vegetation you want to keep. Individual plant treatment methods (IPT) are effective on a small scale and an important tool for small landowners who do not have the capital to invest in equipment. Effective techniques can include a backpack sprayer, chainsaw, and loppers. Most woody species can be controlled by cutting to ground level and then spraying the stem or trunk with an application of triclopyr and diesel.

Brush sculpting is an important concept when conducting brush management. By manipulating what areas receive brush management we can sculpt the landscape and create edge that can benefit bobwhites. Instead of clearing a 50-acre tract you can increase edge by clearing five separate 10-acre tracts. Another habitat concept when performing brush management is the slash technique. The slash technique involves individually cutting limbs of brush to provide loafing cover.

Plowing can be an important tool in providing food sources for bobwhites. Plowing encourages growth of early successional plants (plants that are first to become establish after a disturbance) such as croton, ragweed, goat weed, sunflowers, and a whole assortment of forbs. These early successional plants provide seeds and mast along with being sites that increase insect populations. Plowing is best achieved by plowing narrow strips across your property. In year one plow a strip (10-20' wide) across your property, the second year plow another strip next to the first strip, the third year plow a strip next to the second-year strip. Then in the fourth year re plow the strip in year one and repeat the cycle. This method of plowing will allow you to have 3 strips in different successional stages of plant regrowth. Plowing also allows for bare ground which can be important for bobwhites movement though the landscape.

Food plots can be an important supplemental management tool but will not drastically effect your population. I would recommend using both winter and summer food plots. During the summer, especially drought years food sources can be as scare as during winter and a summer food plot can provide supplemental forage. It is also a good idea to utilize several small food plots throughout your property instead of one large open food plot. Remember, bobwhites don't like to be more then 50 yards from cover so increasing food plot size will not increase utilization.

We have already spent time talking about the historical fire regime in the piney woods and how it is used to maintain a pine savannah ecosystem. You should realize not every site is suitable for a prescribed fire. To have a safe and effective prescribed fire there must be enough herbaceous cover to carry a fire. On many locations the understory has become so thick it may not carry a fire effectively to achieve the desired results. When this is the case a mechanical or chemical brush management activities must occur prior to a prescribed fire. This will open the canopy and understory allowing more sunlight and thus herbaceous growth so a prescribed fire can occur in later years. It is recommended that most savannah type systems be burned on a 3-5 year rotation.

I think it is obvious from the bottom picture on this slide that grazing is needed to allow quail to move through the grassland and create the basketball size clumps needed for nesting. Cattle are an essential management tool and helps to replace the natural cycle of large herbivorous (bison) grazing on grasslands. Cattle are sometimes viewed as detrimental to grasslands and natural ecosystems, but when managed properly by not overstocking and implementing a sound grazing plan cattle are an essential wildlife habitat management tool.

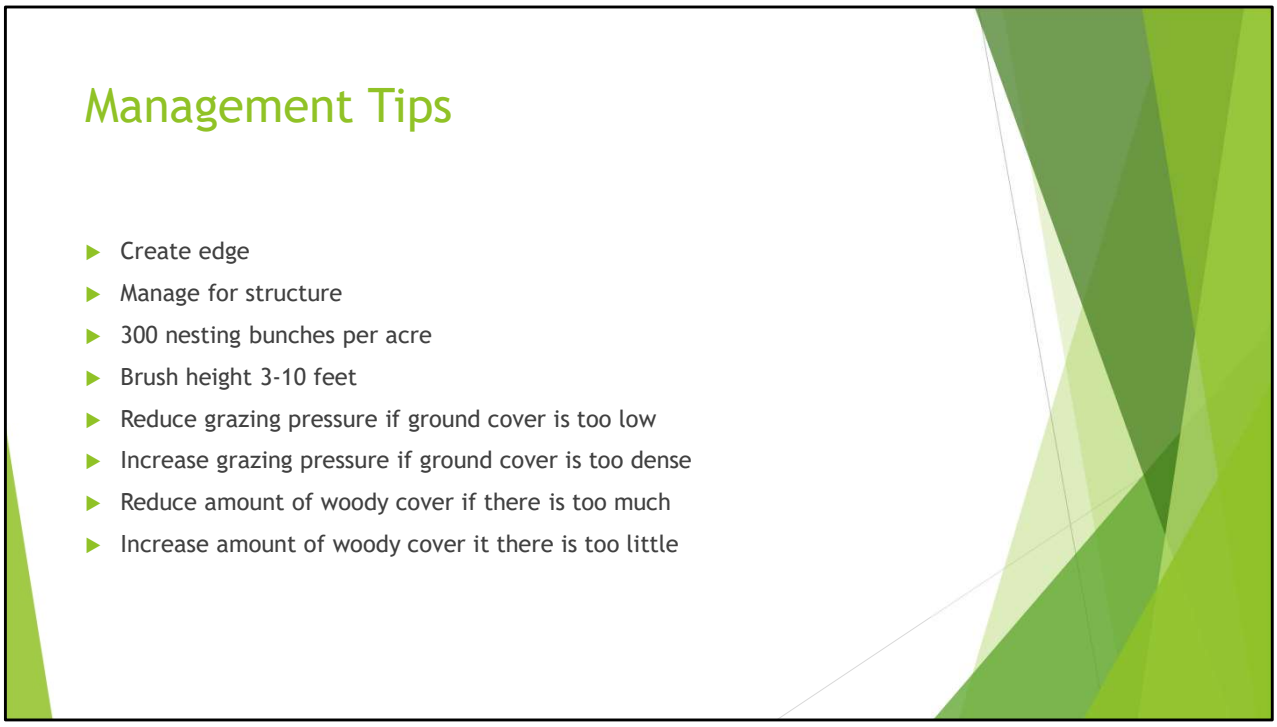
I am not going to spend much time about talking about native plant restoration since we have already reviewed how you should mange for structure not species. But obviously, if you can start with a clean slate like in this picture after a clear cutting, I would recommend planting longleaf pines if in the correct soil type. You do need to be aware that you should always utilize local seed sources to the best of your ability. Local seed sources will have ecotypes or varieties adapted for your location. A great example of this is little bluestem. Little bluestem is a tall grass that can be found form the sandy hills of east Texas to the deep black soils of the mid west. If you are attempting a restoration with little bluestem seeds from Iowa it will fail because these seeds are the wrong ecotype. Sandy hills little bluestem is the correct ecotype for east Texas and will be the only ecotype that can survive in the sandy hills of east Texas.

Fence Lines and Field Edges

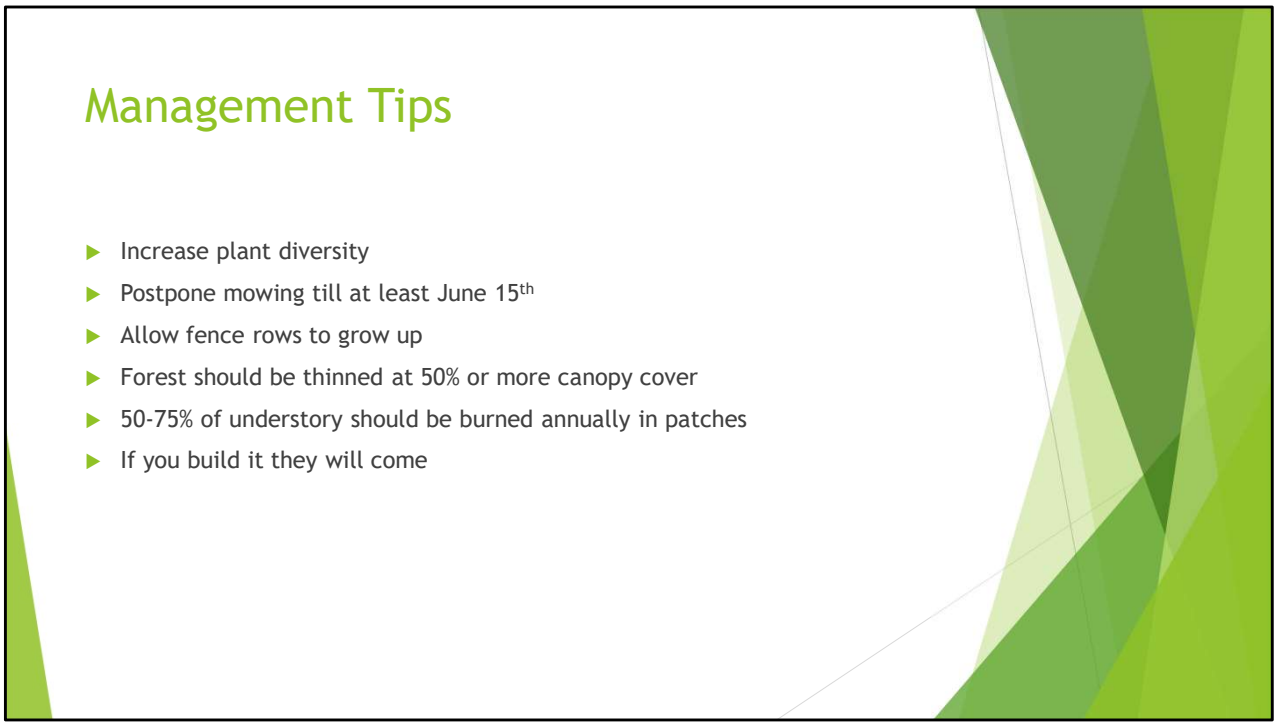
Most landowners prefer to keep fence lines clean and edges of fields mowed and weed free. However, these locations when allowed to “grow up” increase edge on your property and provide escape cover. Allowing a brushy fence line can increased the amount of habitat available for bobwhites to utilize on your property.

Predator control can be an important tool in managing for quail, but like we discussed earlier it is more important to mange for habitat. If you did want to start a predator control plan, I would recommend spreading ant poison to kill imported red fire ants especially during nesting season.

We are not going to get into the specifics of pen raised birds, but they are not a sustainable option in supplementing wild populations. If you want a “true” wild population you should focus on habitat management, if your goal is to maximize hunting opportunities for quail then releasing pen raised birds can fulfill this goal. Many quail hunting operations or ranches release pen raised birds to increase hunter opportunities, due to the reality of the size of ranch that would be needed to support a profitable quail hunting operation on just a “true” wild population.



As we wrap up the management section of the presentation, I want to provide you a couple of slides of helpful tips. Your quail management plan should focus on creating edge, managing for structure not specific species, aim for 300 basketball size nesting bunch grasses per acre and provide brush at a height of 3-10 feet for loafing and escape cover. The last four points would seem like basic management, but many times landowners don't take these simple steps to improve quail habitat. Grazing pressure should be increased or decreased depending on ground cover density. Constantly be inventorying the amount of woody cover available and perform management activities if needed.



Higher plant diversity will increase the amount of forage available for bobwhites and increase food availability during stress periods like droughts and hard freezes. Also, postpone mowing till after the height of nesting season (at least June 15th). Allow fence lines and field edges to remain brushy to increase edge. Forest canopy should be thinned at 50% or more canopy cover and 50-75% of understory should be burned annually in patches. Lastly as the old saying goes if you build it, they will come!

The next group of slides will be pictures of common habitats seen in the piney woods. During this part of the presentation participants are asked to be quail biologist and judge the habitat based on what they have learned as habitat requirements for bobwhites. Habitats will be judge as either being excellent, fair, marginal, or poor. After evaluating the habitat they are asked to give reasons for the evaluation and what management activities could occur to improve the habitat. After participants have conducted their evaluation, I will then review my evaluation and discuss the results.

Habitat: Pine savannah that has a history of fire, but it has been several years (left picture)

1) Marginal
2) Herbaceous growth is adequate in the foreground providing nesting and brooding habitat. There appears to be plenty of woody vegetation 3-10 feet tall to provided escape cover. However, the woody vegetation has reached a point to where herbaceous growth is decreasing. A prevalent edge line is present between the grass along the road and the woody vegetation.
3) A prescribed fire and/or brush management is needed to decrease woody growth and increase herbaceous growth.

Habitat: Improved nonnative grasses, Bermuda hay field (right picture)

1) Poor

2) Lack of nesting cover, brooding cover, escape cover, and food sources. Improved hay fields and pastures are basically deserts for bobwhites. Other then the lack of habitat, a monoculture does not provide an adequate foraging source.
3) This site would be ideal to start from scratch and perform a native plant restoration project.

Habitat: Longleaf pine restoration site after a clear cut

1) Fair
2) Early successional plants are abundant on the site allowing for adequate forage sources. Insects are also likely abundant in this habitat. Nesting cover is present but limited due to the site being in an early successional state. Appears to be only 1-3 clumps of basketball size grass nesting cover in the picture, thus nesting cover is lacking but present. The main reason for the evaluation of fair is the lack of escape or loafing cover. Woody vegetation 3-10 feet tall and 50 feet in diameter is not present on this site. In this picture, the closest escape cover may be underneath the pine trees that were left standing in background. This site is likely a couple years form being excellent bobwhite habitat.
3) This site has potential to be great quail habitat as it matures into a longleaf pine savannah. As the site matures the pine trees will grow and other woody vegetation will evade allowing for increased cover. Additionally, bunch grasses will increase allowing for more nesting cover. A prescribed fire will be needed to allow for an open understory, adequate amount of herbaceous cover, and bare ground as this site matures. Cattle grazing may also be an option on this site.

Habitat: Thick yaupon understory (left picture)

1) Poor
2) No herbaceous or nesting cover present. Understory is to thick to be utilized by bobwhites.
3) Site may struggle to carry a prescribed fire due to the lack of herbaceous growth. Brush management needs to occur first followed by a prescribed fire a couple years later.

Habitat: Pine plantation (right picture)

1) Poor
2) Zero nesting, brooding, and loafing cover.
3) Thinning of forest canopy to increase herbaceous and understory growth.

Habitat: Longleaf pine savannah, Sabine National Forest

1) Excellent
2) This habitat has everything a bobwhite could ask for. Herbaceous cover is excellent along with plenty of nesting cover. Grass is not to thick to hamper movement through the habitat. There are small clumps of woody vegetation throughout the herbaceous vegetation that makes for loafing cover. The forest canopy is adequately open to allow enough sunlight to encourage herbaceous growth. Lastly, a predominate edge line can be seen in the left of the picture going down the hill. This edge line appears to mark a line between woody understory and an herbaceous understory. This edge line moves through the landscape and makes quick access to escape cover.
3) Prescribed fire to keep in current state

At this point I describe and pass around specimens of grasses to participants. I include approximately 20 common species to our region. I discuss if the species is native or nonnative and if it is an important species for bobwhites and why.

Species includes: little bluestem, big bluestem, broomsedge bluestem, bushy bluestem, silver bluestem, king ranch bluestem, brown seeded paspalum, Florida paspalum, bahia grass, vasey grass, beaked panicum, purple top, eastern gamma grass, switch grass, Johnson grass, Bermuda, rye grass, and yellow indian grass